2022 *RZR* PRO R / PRO R 4
Service Manual

FOREWORD

The information printed within this publication includes the latest product information at time of print. The most recent version of this Service Manual is available in electronic format at www.polarisdealers.com.

This Service Manual is designed primarily for use by certified Polaris Master Service Dealer® technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with the service procedures before starting any repair. Certain procedures require the use of special tools. Use only the proper tools as specified. If you have any doubt as to your ability to perform any of the procedures outlined in this Service Manual, contact an authorized dealer for service.

We value your input and appreciate any assistance you can provide in helping make these publications more useful. Please provide any feedback you may have regarding this manual. Authorized dealers can submit feedback using 'Ask Polaris'. Click on 'Ask Polaris', and then click on 'Service Manual / Service Literature Question'.

Publication Printed November 2021 (PN 9940259 R01)

SAFETY WARNINGS

The following signal words and symbols appear throughout this manual and on the vehicle. Your safety is involved when these words and symbols are used. Become familiar with their meanings before reading the manual.

⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING
SAFETY ALERT WARNING indicates a hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠ CAUTION
SAFETY ALERT CAUTION indicates a hazardous situation which, if not avoided, COULD result in minor to moderate injury.

NOTICE
NOTICE provides key information by clarifying instructions.

IMPORTANT
IMPORTANT provides key reminders during disassembly, assembly and inspection of components.

TRADEMARKS

POLARIS ACKNOWLEDGES THE FOLLOWING PRODUCTS MENTIONED IN THIS MANUAL:

Loctite, Registered Trademark of the Loctite Corporation

Nyogel, Trademark of Wm. F. Nye Co.

Fluke, Registered Trademark of John Fluke Mfg. Co.

Mity-Vac, Registered Trademark of Neward Enterprises, Inc.

Torx, Registered Trademark of Textron

Hilliard, Trademark of the Hilliard Corporation

Warn, Trademark of Warn Industries

FOX, Registered Trademark of FOX RACING SHOX

RydeFX, Registered Trademark of ArvinMeritor

Some Polaris factory publications can be downloaded from www.polarisindustries.com, purchased from www.purepolaris.com or by contacting the nearest Polaris dealer.

REVISION INDEX

REV	DATE	CHANGES
R01	2/11/2022	Initial Release

FEEDBACK FORM

A feedback form has been created for the technician or consumer to provide Polaris with an overall satisfaction rating for this service manual, provide comments on your experience or upload pictures/video. This feedback form is viewable on a mobile device by scanning the QR code or by clicking **HERE** if viewing this document electronically.

2022 *RZR* PRO R / PRO R 4

Service Manual

Chapter Summary

CHAPTER 1
GENERAL INFORMATION

VEHICLE IDENTIFICATION

MODEL NUMBER DESIGNATION (2015 +)

Example: R15RUE57AC

GROUP	MODEL YEAR		MAKE / CHASSIS CODE			ENGINE CODE		REGION	OPTION
1st	2nd	3rd	4th*	5th*	6th*	7th*	8th*	9th	10th**
R	1	5	R	U	E	5	7	A	C

* = digits that would transfer to 17 digit VIN and are used in digits 4-8 respectively
** = 10th digit will be used on color/featured versions of models (not including the base)
First 3 digits and 10th digit are used in model number only. They are not used with the 17 digit VIN.
Digits 1 through 8 determine Digital Wrench calibration.

VEHICLE IDENTIFICATION NUMBER (VIN) DESIGNATION (2015+)

Example: 4XARUE573FG000000

WORLD MFG. ID			VEHICLE DESCRIPTORS						VEHICLE IDENTIFIERS							
			CHASSIS	DRIVELINE	CHASSIS MODIFIER	ENGINE SIZE	ENGINE MODIFIER	CHECK DIGIT	MODEL YEAR *	MFG. LOCATION	INDIVIDUAL SERIAL NO.					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
4	X	A	R	U	E	5	7	3	F	G	0	0	0	0	0	0

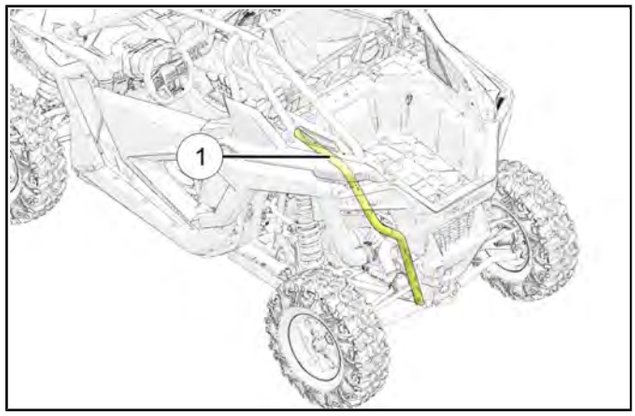
* Model Year: A = 2010; B = 2011; C = 2012; D = 2013; E = 2014; F = 2015; G = 2016; H = 2017; J = 2018; K = 2019; L = 2020; M = 2021; N= 2022

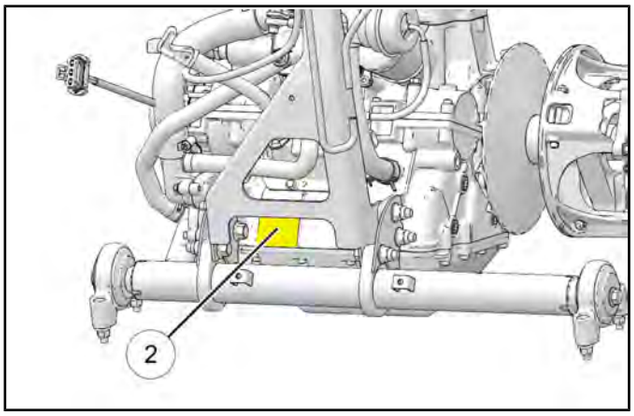
VIN AND ENGINE SERIAL NUMBER LOCATIONS

Whenever corresponding about a Polaris ORV, refer to the vehicle identification number (VIN) and the engine serial number.

The VIN can be found stamped on the rear left vertical shock support tube ①.

The engine serial number can be found on a decal applied to the front of the engine crankcase ② or stamped into the crankcase on the PTO side of the engine.





REFERENCE INFORMATION

REPLACEMENT KEYS

Replacement keys can be made from the original key. To identify which series the key is, take the first two digits on the original key and refer to the chart to the right for the proper part number.
(i.e. In this example, the first two digits are 31 which would use key blank PN 4110141.)

SERIES#	PART NUMBER
20	4010278
21	4010278
22	4010321
23	4010321
27	4010321
28	4010321
31	4110141
32	4110148
67	4010278
68	4010278

PUBLICATION NUMBERS

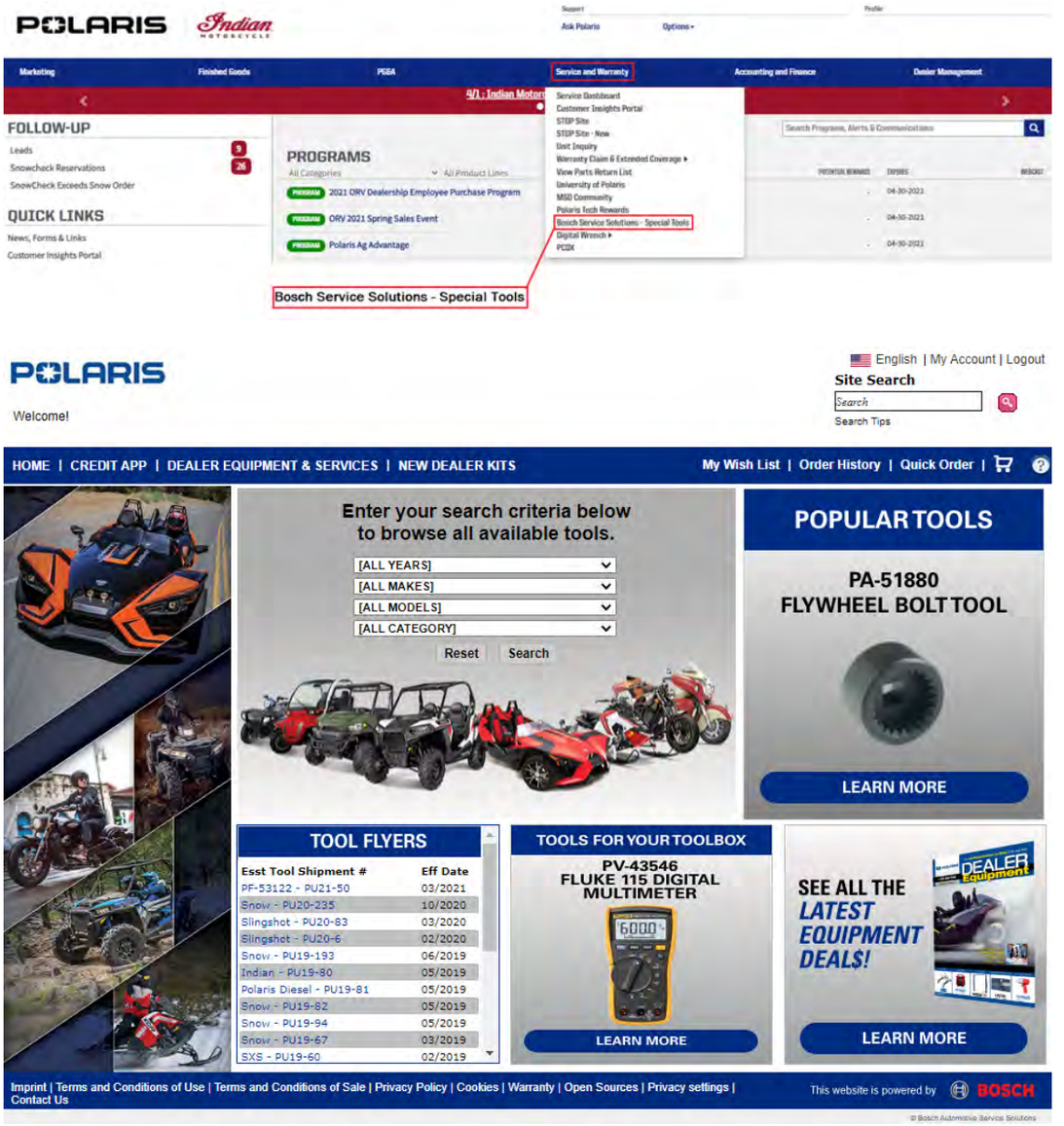
YEAR	MODEL	OWNER'S MANUAL
2021	*RZR* PRO R	—
	RZR PRO R 4	—

NOTICE
When ordering service parts be sure to use the correct parts manual. Polaris factory publications can be found at www.polaris.com or purchased from www.purepolaris.com.

SPECIAL TOOLS

Special tools may be required while servicing this vehicle. Some of the tools listed or depicted are mandatory, while other tools may be substituted with a similar tool, if available. Polaris recommends the use of Polaris Special Tools when servicing any Polaris product. Dealers may order special tools through the Polaris official tool supplier.

Bosch Automotive Service Solutions 1-800-345-2233 or https://polaris.service-solutions.com



MASTER TORQUE TABLE

MAINTENANCE

PART DESCRIPTION	TORQUE SPECIFICATION
Engine Oil Drain Plug	**13 ft-lbs (18 Nm)**
Engine Oil Filter	**18 in-lbs (2 Nm)**
Front Gearcase Drain/Fill Plug	**10 ft-lbs (14 Nm)**
Ignition Coil Fastener	**7 ft-lbs (10 Nm)**
Spark Arrestor Fastener	**8 ft-lbs (11 Nm)**
Spark Plug	**9 ft-lbs (12 Nm)**

ENGINE / COOLING / EXHAUST

PART DESCRIPTION	TORQUE SPECIFICATION
Battery Cable Fasteners	**60 in-lbs (9 Nm)**
Cargo Box Support Fasteners	**22 ft-lbs (30 Nm)**
Crankshaft Harmonic Damper Fastener	1. Torque fastener to 74 ft-lbs (100 N·m) 2. Loosen fastener 180° 3. Torque fastener to 22 ft-lbs (30 N·m) + 70°
Engine Mount Lower Fasteners (LH Mount)	**52 ft-lbs (70 Nm)**
Engine / Transmission Mount	**Step 1: 26 in-lbs (3 Nm)** **Step 2: 33 ft-lbs (45 Nm)**
Engine / Transmission Mount Isolator Fastener	**33 ft-lbs (45 Nm)**
Exhaust Manifold Fasteners	**Step 1: 60 in-lbs (7 Nm)** **Step 2: 22 ft-lbs (30 Nm)**
Heat Shield Fasteners	**71 in-lbs (8 Nm)**
Head pipe to Muffler Studs	**18 ft-lbs (25 Nm)**
Intake Hose Clamps	**35 in-lbs (4 Nm)**
Intake Mounting Fasteners	**9 ft-lbs (12 Nm)**
Isolator Mounting Bracket Fastener	**18 ft-lbs (25 Nm)**
Oxygen Sensor	**30 ft-lbs (40 Nm)**
Prop Shaft Coupling Fasteners	**11 ft-lbs (15 Nm)**
Radiator Mounting Fasteners	**9 ft-lbs (12 Nm)**
Thermostat Cover Fasteners	**9 ft-lbs (12 Nm)**
Transmission-to-Engine Mounting Fasteners	**Step 1: 11 ft-lbs (15 Nm)** **Step 2: 44 ft-lbs (60 Nm)**

FUEL SYSTEM

PART DESCRIPTION	TORQUE SPECIFICATION
Carbon Canister Filter Fasteners	**9 ft-lbs (12 Nm)**
Fuel Tank Mounting Fasteners	**15 ft-lbs (20 Nm)**
PFA Nut	**70 ft-lbs (95 Nm)**

PVT SYSTEM

PART DESCRIPTION	TORQUE SPECIFICATION
Drive Clutch Retaining Bolt	**Step 1: 140 ft-lbs (190 Nm)** **Step 2: Loosen two full turns (720°)** **Step 3: 118 ft-lbs (160 Nm)**
Driven Clutch Retaining Bolt	**55 ft-lbs (75 Nm)**
Inner PVT Cover Fasteners	**①: 11 ft-lbs (15 Nm)** **②: 35 in-lbs (4 Nm)**
Outer PVT Cover Fasteners	**60 in-lbs (7 Nm)**

TRANSMISSION

PART DESCRIPTION	TORQUE SPECIFICATION
Gear Position Sensor Shield Fasteners	**①: 15 ft-lbs (20 Nm)** **②: 22 ft-lbs (30 Nm)** **③: 72 in-lbs (8 Nm)**
Shift Cable Bracket Fasteners	**22 ft-lbs (30 Nm)**

PART DESCRIPTION	TORQUE SPECIFICATION
Shift Cable Jam Nut	**7 ft-lbs (10 Nm)**
Transmission Drain/Fill Plug	**14 ft-lbs (19 Nm)**

FINAL DRIVE

PART DESCRIPTION	TORQUE SPECIFICATION
Front Gearcase Bracket Vertical Bolts	1. **Install vertical bolts on drivers side and torque nuts until 1-2mm gap** 2. **Torque Gearcase Isolator bolts: 55 ft-lbs (75 Nm) + 180°** 3. **Torque vertical bolts: 81 ft-lbs (110 Nm)**
Front Gearcase Pinion Housing Fasteners	**7 ft-lbs (10 Nm) – Apply Loctite 2760**
Front Gearcase Ring Gear Assembly Fasteners	**14 ft-lbs (19 Nm) + 40°**
Front Gearcase Shift Arm Fasteners	**50 in-lbs (6 Nm)**
Gearcase Cover Plate Fasteners	**23 ft-lbs (31 Nm)**
Gearcase Isolator Fasteners (Front and Rear)	**55 ft-lbs (75 Nm) + 180°**
Prop Shaft Support Bearing Fasteners (4-seat)	**33 ft-lbs (45 Nm)**
Wheel Hub Axle Nut	**89 ft-lbs (120 Nm)**
Wheel Nuts	**148 ft-lbs (200 Nm)**

STEERING / SUSPENSION

PART DESCRIPTION	TORQUE SPECIFICATION
Control Arm Mounting Fasteners	**133 ft-lbs (180 Nm) - Torque bolt side**
Hub Mounting Fasteners	**81 ft-lbs (110 Nm)**
Knuckle Mounting Fasteners	**133 ft-lbs (180 Nm) - Torque bolt side**
Lower Ball Joint Nut	**44 ft-lbs (60 Nm) + 90° (Single Use)**
Upper Ball Joint Pinch Bolt	**52 ft-lbs (70 Nm) - Torque bolt side**
Radius Rod Fasteners	**Inner Radius Rod Fasteners (Single Use): 52 ft-lbs (70 Nm) + 90° Outer Radius Rod Fasteners: 133 ft-lbs (180 Nm) - Torque bolt side**
Shock Mounting Fasteners	**133 ft-lbs (180 Nm) - Torque bolt side**
Stabilizer Bar Link Fasteners	**81 ft-lbs (110 Nm)**
Stabilizer Bar Mounting Fasteners	**52 ft-lbs (70 Nm)**
Steering Coil Assembly Fasteners	**27 in-lbs (3 Nm**
Steering Column Cover Fasteners	**27 in-lbs (3 Nm**
Steering Rack Mounting Plate Fasteners	**44 ft-lbs (60 Nm)**
Steering Shaft Bearing Fasteners	**22 ft-lbs (30 Nm)**
Steering Shaft Pinch Bolt (Lower)	**26 ft-lbs (35 Nm) + 90°**
Steering Shaft Pinch Bolt (Upper)	**22 ft-lbs (30 Nm)**
Steering Tilt Bracket Fasteners	**33 ft-lbs (45 Nm)**
Steering Wheel Nut	**66 ft-lbs (90 Nm)**
Tie Rod End Ball Joint Nuts:	**52 ft-lbs (70 Nm) + 90°**
Tie Rod Jam Nut	**89 ft-lbs (120 Nm)**
Toe Link Fasteners	**133 ft-lbs (180 Nm) - Torque bolt side**
Trailing Arm Mounting Fasteners	**133 ft-lbs (180 Nm) - Torque bolt side**

BRAKE SYSTEM

PART DESCRIPTION	TORQUE SPECIFICATION
Brake Caliper Fasteners (Front)	**73 ft-lbs (100 Nm)**
Brake Caliper Fasteners (Rear)	**52 ft-lbs (70 Nm)**
Junction Block Fasteners	**35 in-lbs (4 Nm)**
Brake Banjo Bolt	**51 ft-lbs (70 Nm)**
Master Cylinder Fasteners	
Bracket Fasteners	**7 ft-lbs (10 Nm)**
Master Cylinder Bolt	
Nut - Master Cylinder Fastener	**21-23 ft-lbs (28-31 Nm)**
Nut - Master Cylinder Bolt	**4ft-lbs (6 Nm)**

BODY / FRAME

PART DESCRIPTION	TORQUE SPECIFICATION
Body Fasteners	**7 ft-lbs (10 Nm)**
Body Panel Fasteners	**7 ft-lbs (10 Nm)**
Box Support Fasteners	**22 ft-lbs (30 Nm)**
Door Hinge Fasteners	**18 ft-lbs (24 Nm)**
Door Latch Actuator Assembly Fasteners	**9 ft-lbs (12 Nm)**
Door Latch Fasteners	**9 ft-lbs (12 Nm)**
Door Panel Fasteners	**35 in-lbs (4 Nm)**
Door Striker Fasteners	**9 ft-lbs (12 Nm)**
Door Trim Bracket Fasteners	**18 in-lbs (2 Nm)**
Driveline Support Fasteners	**44 ft-lbs (60 Nm)**
Engine Mount Fasteners	**44 ft-lbs (60 Nm)**
Frame Cross Bar Fastener (4 Seat) (M8x1.25x20)	**18 ft-lbs (25Nm)**
Frame Cross Bar Fastener (4 Seat) (M8x1.25x16))	**15 ft-lbs (20Nm)**
Front Bumper Fasteners	**37 ft-lbs (50 Nm)**
Handle Latch Fastener	**22 in-lb (3 Nm)**
Hinge Bracket Fasteners	**18 ft-lbs (24 Nm)**
Latch Hook Fastener	**9 ft-lbs (12 Nm)**
Oil Filter Guard Fastener	**44 in-lbs (5 Nm)**
Propshaft Mount Fastener	**15 ft-lbs (20 Nm)**
Rear Seat Base Fastener	**22 ft-lbs (30 Nm)**
Rear Seat Striker Fastener	**35 in-lbs (4 Nm)**
Roof Fasteners	**11 ft-lbs (15 Nm)**
ROPS Fasteners (2-Seat)	1. **B-Pillar Fasteners ① - ②: 148 ft-lbs (200 Nm)** 2. **C-Pillar Fasteners ③ - ④: 89 ft-lbs (120 Nm)** 3. **A-Pillar Fasteners ⑤ - ⑧: 89 ft-lbs (120 Nm)** 4. **Confirm B-Pillar Fastener Torque: 148 ft-lbs (200 Nm)**
ROPS Fasteners (4-Seat)	1. **C-Pillar Fasteners ① - ②: 148 ft-lbs (200 Nm)** 2. **D-Pillar Fasteners ③ - ④: 89 ft-lbs (120 Nm)** 3. **A-Pillar Fasteners ⑤ - ⑧: 89 ft-lbs (120 Nm)** 4. **B-Pillar Fasteners ⑨ - ⑫: 44 ft-lbs (60 Nm)** 5. **Confirm C-Pillar Fastener Torque: 148 ft-lbs (200 Nm)**
Seat Base Fasteners	**15 ft-lbs (20 Nm)**
Seat Frame Hinge Fastener	**15 ft-lbs (20 Nm)**Starting
Seat Hinge Nut	**7 ft-lbs (10 Nm)**

PART DESCRIPTION	TORQUE SPECIFICATION
Seat Latch Fastener	**6 ft–lb (9 Nm)**
Seat Release Assembly Fastener	**10 in-lbs (1 Nm)**
Seat Shell Tube Fastener	**10 in-lbs (1 Nm)**
Skid Plate Fasteners	**9 ft-lbs (12 Nm)**
Skid Plate Plug Fasteners (Hex)	**9 ft-lbs (12 Nm)**
Skid Plate Plug Fasteners (Torx)	**44 in-lbs (5 Nm)**
Tilt Assembly Bracket Fastener	**15 ft-lbs (20 Nm)**
Underseat Flip Panel Fastener	**6 ft-lb (8 Nm)**
Upper Control Arm Bracket Fasteners	**52 ft-lbs (70 Nm)**

ELECTRICAL

PART DESCRIPTION	TORQUE SPECIFICATION
Alternator Cover Fasteners	**6 ft-lbs (9 Nm)**
Alternator Mounting Fasteners	**15 ft-lbs (20 Nm)**
Crankshaft Position Sensor (CPS) Fastener	**9 ft-lbs (12 Nm)**
ECU Fasteners	**27 in-lbs (3 Nm)**
Electronic Throttle Control (ETC) Fasteners	**7 ft-lbs (10 Nm)**
Ignition Coil Fasteners	**7 ft-lbs (10 Nm)**
Knock Sensor Fastener	**15 ft-lbs (20 Nm)**
Pedal Position Sensor (PPS) Fasteners	**18 ft-lbs (24 Nm)**
Starter Mounting Fasteners	**26 ft-lbs (35 Nm)**
Starter Positive Terminal Fastener	**11 ft-lbs (15 Nm)**

VEHICLE SPECIFICATIONS

2022 *RZR* PRO R

CATEGORY	DIMENSION / CAPACITY
Length	136.5″ / 346.7 cm
Width	74″ / 188.0 cm
Height	73.4″ / 186.5 cm
Wheel Base	104.5″ / 265.4 cm
Ground Clearance	16″ / 40.6 cm
Dry Weight	Sport: 2085 lbs. / 946 kg Premium: 2144 lbs. / 973 kg Ultimate: 2187 lbs. / 992 kg
Gross Vehicle Weight	Sport: 2940 lbs. / 1334 kg Premium: 3010 lbs. / 1365 kg Ultimate: 3040 lbs. / 1379 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	4-Stroke Gas, DOHC
Engine Displacement	1997 cc
Number of Cylinders	4
Bore & Stroke	93 x 73.5 mm
Compression Ratio	12.5:1
Engine Idle Speed	1250 +/- 100 RPM
Engine Max Speed	8500 RPM
Valve Clearance (Intake)	**.003 - .008" (0.076 - 0.20 mm)**
Valve Clearance (Exhaust)	**.008 - .014" (0.20 - 0.35 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 0W-50**
Oil Capacity	**5.5 qt (5.2 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.5 qt (9.94 L)**

FUEL SYSTEM	
Type	Bosch MG1
Fuel Delivery	Electronic Fuel Pump (in-tank)
Fuel Pressure (key-on engine-off)	**75 ± 2 PSI (520 ± 14 kPa)** **58 ± 2 PSI (399 ± 13.7 kPa)**
Fuel Capacity / Requirement	12.1 gal. (45.8 L) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	1700 Watts @ 3250 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	MG1 ECU
Spark Plug / Gap	ZMR7A-10 / 0.9-1.0 mm
Battery / Amp Hr	Sport: 12v Flooded, 400 CCA / 31 A/hr Premium/Ultimate: 2 x 12v Flooded, 400 CCA / 31 A/hr
DC Outlet	Standard 12 Volt

ELECTRICAL	
Relays	Start, Fan, EFI, Pump, Chassis, EPS, Accy, Shocks, SCM
Fuses	7.5A Chassis 7.5A Fuel 7.5A Instr Accy 7.5A Instr Unsw 7.5A Key 7.5A Lights 7.5A SCM 7.5A Shocks 7.5A Water 10A EFI 10A Socket 10A Term Accy 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	Dual Range - P/ R / N / L / H
Front/Rear Gearcase Lubricant	**80W-140 Angle Drive Fluid**
Front Gearcase Capacity	**12.2 oz (360 mL) - Fill to Spill**
Rear Gearcase Capacity	**16.1 oz (475 mL) - Fill to Spill**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**31.3 oz (925 mL)**

STEERING / SUSPENSION	
Front Toe	**1/4" toe-in – 1/4" toe-out (6.4 mm toe-in – 6.4 mm toe-out)**
Rear Toe	**1/4" toe-in (6.4 mm toe-in)**
Front Suspension	Independent Dual A-arm with stabilizer bar Walker Evans 2.5" Velocity Needle Shock w/16-position adjustable clickers **OR** FOX 3.0 Live Valve X2 Internal Bypass w/Dynamix DV
Front Travel	22.2″ (56.4 cm)
Rear Suspension	Independent Trailing Arm with stabilizer bar Walker Evans 3.0" Velocity Needle Shock w/16-position adjustable clickers **OR** FOX 3.0 Live Valve X2 Internal Bypass w/Dynamix DV
Usable Rear Travel	29.2″ (74.2 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES	
Front Rim / Size	Aluminum 15 x 7
Rear Rim / Size	Aluminum 15 x 7

WHEELS / BRAKES		
Front Tire Make / Model / Size		Maxxis Rampage Fury 32 x 10 R15
Rear Tire Make / Model / Size		Maxxis Rampage Fury 32 x 10 R15
Tire Air Pressure	Front	**15 psi (103 kPa)**
	Rear	**15 psi (103 kPa)**
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Dual Bore Caliper
Brake Fluid		**DOT 4**

2022 RZR PRO R CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2022 *RZR* PRO R	0-1800 Meters (0-6000 Feet)	W-34-112 (1323597)	Black (7045112)	Black (7045138)
	1800-3700 Meters (6000-12000 Feet)	W-34-104 (1323586)		

2022 *RZR* PRO R 4

CATEGORY	DIMENSION / CAPACITY
Length	165.5″ / 420.4 cm
Width	64″ / 162.6 cm
Height	74″ / 187.9 cm
Wheel Base	133.5″ / 339 cm
Ground Clearance	16″ / 40.6 cm
Dry Weight	Sport: 2365 lbs. / 1072 kg Premium: 2437 lbs. / 1105 kg Ultimate: 2480 lbs. / 1125 kg
Gross Vehicle Weight	Sport: 3471 lbs. / 1574 kg Premium: 3545 lbs. / 1608 kg Ultimate: 3555 lbs. / 1612 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	900 lbs. / 408 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	4-Stroke Gas, DOHC
Engine Displacement	1997 cc
Number of Cylinders	4
Bore & Stroke	93 x 73.5 mm
Compression Ratio	12.5:1
Engine Idle Speed	1250 +/- 100 RPM
Engine Max Speed	8500 RPM
Valve Clearance (Intake)	**.003 - .008" (0.076 - 0.20 mm)**
Valve Clearance (Exhaust)	**.008 - .014" (0.20 - 0.35 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 0W-50**
Oil Capacity	**5.5 qt (5.2 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.5 qt (9.94 L)**

FUEL SYSTEM	
Type	Bosch MG1
Fuel Delivery	Electronic Fuel Pump (in-tank)
Fuel Pressure (key-on engine-off)	**75 ± 2 PSI (520 ± 14 kPa)** **58 ± 2 PSI (399 ± 13.7 kPa)**
Fuel Capacity / Requirement	12.3 gal. (46.5 L) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	1700 Watts @ 3250 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	MG1 ECU
Spark Plug / Gap	ZMR7A-10 / 0.9-1.0 mm
Battery / Amp Hr	Sport: 12v Flooded, 400 CCA / 31 A/hr Premium/Ultimate: 2 x 12v Flooded, 400 CCA / 31 A/hr
DC Outlet	Standard 12 Volt

ELECTRICAL	
Relays	Start, Fan, EFI, Pump, Chassis, EPS, Accy, Shocks, SCM
Fuses	7.5A Chassis 7.5A Fuel 7.5A Instr Accy 7.5A Instr Unsw 7.5A Key 7.5A Lights 7.5A SCM 7.5A Shocks 7.5A Water 10A EFI 10A Socket 10A Term Accy 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	Dual Range - P/ R / N / L / H
Front/Rear Gearcase Lubricant	**80W-140 Angle Drive Fluid**
Front Gearcase Capacity	**12.2 oz (360 mL) - Fill to Spill**
Rear Gearcase Capacity	**16.1 oz (475 mL) - Fill to Spill**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**31.3 oz (925 mL)**

STEERING / SUSPENSION	
Front Toe	1/4" toe-in – 1/4" toe-out (6.4 mm toe-in – 6.4 mm toe-out)
Rear Toe	1/4" toe-in (6.4 mm toe-in)
Front Suspension	Independent Dual A-arm with stabilizer bar Walker Evans 2.5" Velocity Needle Shock w/16-position adjustable clickers **OR** FOX 3.0 Live Valve X2 Internal Bypass w/Dynamix DV
Front Travel	22.2″ (56.4 cm)
Rear Suspension	Independent Trailing Arm with stabilizer bar Walker Evans 3.0" Velocity Needle Shock w/16-position adjustable clickers **OR** FOX 3.0 Live Valve X2 Internal Bypass w/Dynamix DV
Usable Rear Travel	29.2″ (74.2 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES	
Front Rim / Size	Aluminum 15 x 7
Rear Rim / Size	Aluminum 15 x 7

WHEELS / BRAKES		
Front Tire Make / Model / Size		Maxxis Rampage Fury 32 x 10 R15
Rear Tire Make / Model / Size		Maxxis Rampage Fury 32 x 10 R15
Tire Air Pressure	Front	**18 psi (124 kPa)**
	Rear	**18 psi (124 kPa)**
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Dual Bore Caliper
Brake Fluid		**DOT 4**

2022 RZR PRO R 4 CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2022 *RZR* PRO R 4	0-1800 Meters (0-6000 Feet)	W-34-112 (1323746)	Black (7045112)	Black (7045138)
	1800-3700 Meters (6000-12000 Feet)	W-34-104 (1323586)		

MISC. SPECIFICATIONS AND CHARTS

CONVERSION TABLE

UNIT OF MEASURE	MULTIPLIED BY	CONVERTS TO
ft-lbs	x 12	= in-lbs
in-lbs	x 0.0833	= ft-lbs
ft-lbs	x 1.356	= Nm
in-lbs	x 0.0115	= kg-m
Nm	x 0.7376	= ft-lbs
kg-m	x 7.233	= ft-lbs
kg-m	x 86.796	= in-lbs
kg-m	x 10	= Nm
inch	x 25.4	= mm
mm	x 0.03937	= inch
inch	x 2.54	= cm
mile (mi)	x 1.6	= km
km	x 0.6214	= mile
ounces (oz)	x 28.35	= grams (g)
fluid ounces (fl oz)	x 29.57	= cubic centimeters (cc)
cubic centimeters (cc)	x .03381	= fluid ounces
grams (g)	x 0.035	= ounces
pounds (lb)	x 0.454	= kg
kilogram (kg)	x 2.2046	= lbs
cubic inches (cu in)	x 16.387	= cc
cubic centimeters (cc)	x 0.061	= cubic inches
US quarts	x 0.946	= liters (L)
liters (L)	x 1.057	= US quarts
US gallons	x 3.785	= liters (L)
liters (L)	x 0.264	= US gallons
PSI	x 6.895	= kilopascals (kPa)
kilopascals (kPa)	x 0.145	PSI
π (3.14) x Radius² x Height =		= cylinder volume
°C to °F:	9/5 (°C + 32)	= °F
°F to °C:	5/9 (°F − 32)	= °C

SAE TAP / DRILL SIZES

THREAD SIZE	DRILL SIZE	THREAD SIZE	DRILL SIZE
#0–80	3/64	1/2–13	27/64
#1–64	53	1/2–20	29/64
#1–72	53	9/16–12	31/64
#2–56	51	9/16–18	33/64
#2–64	50	5/8–11	17/32
#3–48	5/64	5/8–18	37/64
#3–56	45	3/4–10	21/32
#4–40	43	3/4–16	11/16
#4–48	42	7/8–9	49/64
#5–40	38	7/8–14	13/16
#5–44	37	1–8	7/8
#6–32	36	1–12	59/64
#6–40	33	1 1/8–7	63/64
#8–32	29	1 1/8–12	1 3/64
#8–36	29	1 1/4–7	1 7/64
#10–24	24	1 1/4–12	1 11/64
#10–32	21	1 1/2–6	1 11/32
#12–24	17	1 1/2–12	1 27/64
#12–28	4.6 mm	1 3/4–5	1 9/16
1/4–20	7	1 3/4–12	1 43/64
1/4–28	3	2–4 1/2	1 25/32
5/16–18	F	2–12	1 59/64
5/16–24	I	2 1/4–4 1/2	2 1/32
3/8–16	O	2 1/2–4	2 1/4
3/8–24	Q	2 3/4–4	2 1/2
7/16–14	U	3–4	2 3/4
7/16–20	25/64		

METRIC TAP / DRILL SIZES

TAP SIZE	DRILL SIZE	DECIMAL	NEAREST FRACTION
3 x .50	#39	0.0995	3/32
3 x .60	3/32	0.0937	3/32
4 x .70	#30	0.1285	1/8
4 x .75	1/8	0.125	1/8
5 x .80	#19	0.166	11/64
5 x .90	#20	0.161	5/32
6 x 1.00	#9	0.196	13/64
7 x 1.00	16/64	0.234	15/64
8 x 1.00	J	0.277	9/32
8 x 1.25	17/64	0.265	17/64
9 x 1.00	5/16	0.3125	5/16
9 x 1.25	5/16	0.3125	5/16
10 x 1.25	11/32	0.3437	11/32
10 x 1.50	R	0.339	11/32
11 x 1.50	3/8	0.375	3/8
12 x 1.50	13/32	0.406	13/32
12 x 1.75	13/32	0.406	13/32

DECIMAL EQUIVALENTS

FRACTION	DECIMAL	MM TO INCHES
1/64	0.0156″	
1/32	0.0312″	1 mm = 0.0394″
3/64	0.0469″	
1/16	0.0625″	
5/64	0.0781″	2 mm = 0.0787″
3/32	0.0938″	
7/64	0.1094″	3 mm = 0.1181″
1/8	0.1250″	
9/64	0.1406″	
5/32	0.1563″	4 mm = 0.1575″
11/64	0.1719″	
3/16	0.1875″	5 mm = 0.1969″
13/64	0.2031″	
7/32	0.2188″	
15/64	0.2344″	6 mm = 0.2362″
1/4	0.25″	
17/64	0.2656″	7 mm = 0.2756″
9/32	0.2813″	
19/64	0.2969″	
5/16	0.3125″	8 mm = 0.3150″
21/64	0.3281″	
11/32	0.3438″	9 mm = 0.3543″
23/64	0.3594″	
3/8	0.375″	
25/64	0.3906″	10 mm = 0.3937″
13/32	0.4063″	
27/64	0.4219″	11 mm = 0.4331″
7/16	0.4375″	
29/64	0.4531″	
15/32	0.4688″	12 mm = 0.4724″
31/64	0.4844″	
1/2	0.500″	13 mm = 0.5118″

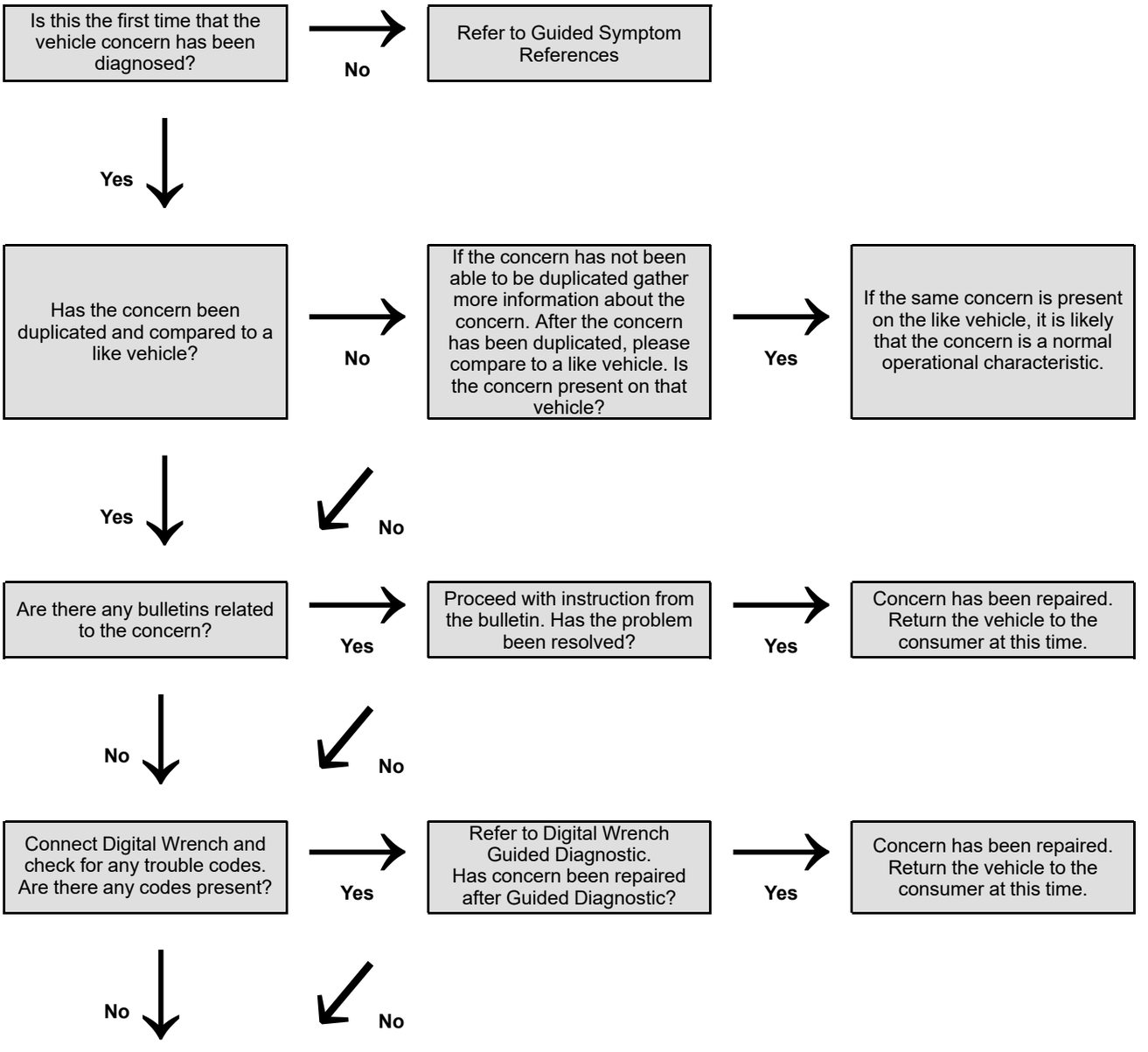
FRACTION	DECIMAL	MM TO INCHES
33/64	0.5156″	
17/32	0.5313″	
35/64	0.5469″	14 mm = 0.5512″
9/16	0.5625″	
37/64	0.5781″	15 mm = 0.5906″
19/32	0.5938″	
39/64	0.6094″	
5/8	0.625″	16 mm = 0.6299″
41/64	0.6406″	
21/32	0.6563″	17 mm = 0.6693″
43/64	0.6719″	
11/16	0.6875″	
45/64	0.7031″	18 mm = 0.7087″
23/32	0.7188″	
47/64	0.7344″	19 mm = 0.7480″
3/4	0.750″	
49/64	0.7656″	
25/32	0.7813″	20 mm = 0.7874″
51/64	0.7969″	
13/16	0.8125″	21 mm = 0.8268″
53/64	0.8281″	
27/32	0.8438″	
55/64	0.8594″	22 mm = 0.8661″
7/8	0.875″	
57/64	0.8906″	23 mm = 0.9055″
29/32	0.9063″	
59/64	0.9219″	
15/16	0.9375″	24 mm = 0.9449″
61/64	0.9531″	
31/32	0.9688″	25 mm = 0.9843″
63/64	0.9844″	
1	1.000″	

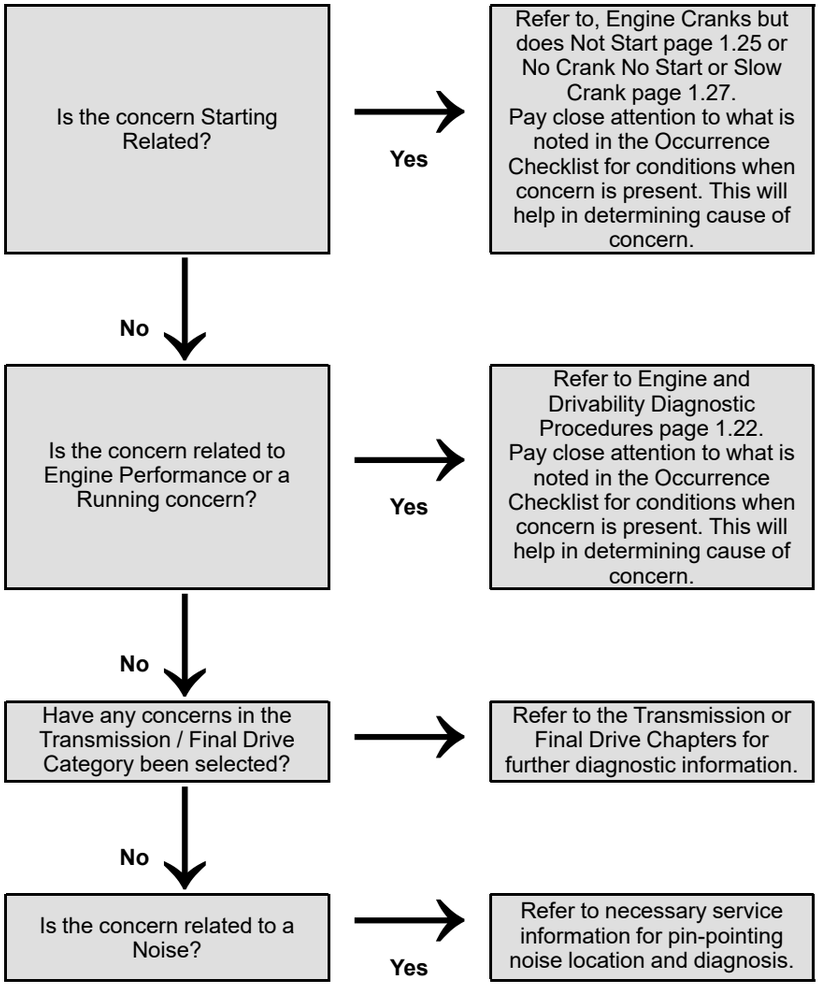
GENERAL DIAGNOSTICS

GENERAL DIAGNOSTICS INFORMATION OVERVIEW

NOTICE
General Diagnostics is a section within the Service Manual that contains information relating to various vehicle diagnostics. These procedures are not vehicle specific and can be used for troubleshooting many different vehicles. For vehicle specific troubleshooting and diagnostic information please refer to the specific system chapters for more information.

GUIDED SYMPTOM DIAGNOSTIC





GUIDED SYMPTOM REFERENCES

- For concerns that have not been able to be duplicated or are repeat concerns :

– Refer to the Customer Questionnaire and gather more information from the Consumer.
– Gather the information from previous repairs including Ask Polaris Cases.
– Verify that the concern can be consistently duplicated. When the concern is duplicated, please note the conditions under which the concern is happening. Refer to the Symptom Checklist for various conditions.
– If the concern has been verified and all of the information has already been collected, please start an Ask Polaris case at this time. If this information has not yet been gathered, gather this information first.

ENGINE AND DRIVABILITY DIAGNOSTIC PROCEDURES

NOTICE
The following chart is to prevent overlooking a simple problem. These basic systematic procedures should be checked before further testing is performed.

① What is the customers concern and can the concern be duplicated at this time?	Yes	• Proceed to step ②
	No	• If the concern can not be duplicated, check for any bulletins related to the concern. Gather more information from the consumer. Proceed to step ③. If the concern still can not be duplicated proceed to step ⑦.
② Are there any Team-Tips, Recalls, or Other Bulletins for this concern?	Yes	• Proceed to bulletin for repair procedure. If problem is still present, return to chart.
	No	• Proceed to step ③
③ Are there any warning lights or messages on vehicle? (Reference necessary manual for light identification)	Yes	• For CHECK ENGINE LIGHT or PERFORMANCE LIMITED LIGHT – Connect to Digital Wrench®. Check codes and continue with Digital Wrench® Guided diagnosis. – Certain failures may not display a CEL / MIL on the instrument cluster. In this instance record CEL's from the instrument cluster and refer to the necessary section in the Service Manual. – Refer to Warning Lights page 1.29. • For ENGINE HOT WARNING – Check Coolant level. If not full, fill to correct level. – Check Oil level. If not full, fill to correct level. – Visually inspect for Oil or Coolant leaks. If any leaks are present repair before continued diagnosis. – Refer to Warning Lights page 1.29. – Refer to Over Heating page 1.28. • For EPS WARNING (if applicable) Refer to STEERING - EPS TROUBLESHOOTING. – Check battery voltage and connections. – Check connections at EPS unit. If any connection or wiring damage is found, repair before proceeding. – Refer to EPS Troubleshooting (Using Digital Wrench®) page 1.67. Check codes and continue with diagnosis. – If no codes are present, refer to EPS Troubleshooting (Power Steering Non-Functional with MIL OFF) page 1.66 – If codes are present, refer to EPS Troubleshooting (Power Steering Non-Functional with MIL ON) page 1.65
	No	• Connect to Digital Wrench®. Check codes and continue with Digital Wrench® Guided diagnosis. • If no codes are present, proceed to step ④

④ Does the engine crank?	Yes	• Check Oil level. If not full, fill to correct level. • Check Fuel Level. (Check tank using flash light - gauge may not be accurate - add fuel if needed) • Check Coolant level. If not full, fill to correct level. Continue to step ⑤
	No	• Check Oil level. If oil is low concern may be caused by lack of oil or oil pressure. Suspect internal engine issue. Refer to Chapter 3 Engine / Cooling System. • Check for battery power. Voltage should be ~ 12.6 V. • Load test battery. If battery fails the load test, charge / replace battery as needed. Retest for concern before proceeding. • Check Ignition Switch and connections. Concern may be caused by faulty Ignition Switch. • Refer to No Crank No Start or Slow Crank page 1.27 for further diagnostic procedures
⑤ Does the engine stay running?	Yes	• Continue to step ⑥
	No	• Check air filter for blockage. • Check for spark. Refer toEngine Cranks but does Not Start page 1.25 for quick check. • Check fuel supply using fuel pressure gauge. Is fuel pressure within specification? • Check exhaust for blockage. • After checking for air supply and fuel pressure, perform leakdown test. • Refer to Engine Cranks but does Not Start page 1.25 for more information.

⑥ Will the vehicle move under its own power?	Yes	• Continue to step ⑦
	No	• Remove PVT cover if necessary and check belt for damage or unusual wear. Refer to Belt Inspection for more information. • If no damage is found, using the aid of an assistant slowly rev engine observing clutch engagement. If no engagement is seen refer to PVT System Troubleshooting. • Using the aid of an assistant verify the propshaft is turning, while the clutch is engaged. If the driveshaft is turning refer to Differential Diagnosis / Disassembly in the applicable service manual. • If the driveshaft is not moving, concern may be within transmission. Refer to the necessary section in the applicable service manual.
⑦ Test drive vehicle for concern.		• If the concern is related to the PVT system, Transmission, or Final Drive, refer to the applicable section in the service manual. • If the concern is electrical systems related, refer to Electrical Troubleshooting. • If the concern is overheating or related to the cooling system, first refer to Over Heating page 1.28 , then Cooling Troubleshooting page 1.32. • If the concern is driveability related (lack of power, misfire, etc.), refer to Fuel System Troubleshooting page 1.56, or Cylinder Misfire Detection page 1.54. These concerns may also be caused by a mechanical failure. • If the concern can not be diagnosed or repaired using normal diagnostic means, please contact Polaris Technical Service Team.

ENGINE CRANKS BUT DOES NOT START

1. Check battery voltage while cranking. If voltage is below 10.8V, vehicle may not start.
   - Perform Voltage Drop Test on Starter Circuit. Refer to Testing Voltage Drop page 1.74 for more information. Acceptable drop is 0.1V per connection, if too much drop is detected concern may be caused by faulty starter, or solenoid.
   - Charge battery.
   - If equipped with a serviceable battery, check battery electrolyte level. Fill following procedure if low.
   - If battery voltage is not ~12.6 V charge battery at recommended rate. Attempt starting after charging.
   - If battery still does not reach ~12.6 V, battery may require replacement.
2. Visually inspect vehicle for any electrical connectors or wiring that may be loose or damaged. Check connectors for water intrusion or corrosion.
   - If connections are found to be loose, repair connector as necessary.
   - If connector is found to have corrosion or water within connectors, clean, dry, and reconnect.
   - Repair any damage to wiring.
3. Check vehicle for trouble codes. Refer to Digital Wrench® Diagnostic.
   - If codes are present proceed with testing per Digital Wrench®.
4. Check air box and filter for debris or moisture.
   - If debris is found clear debris and recheck for concern.
   - If water is found within air box, dry box and filter. It is possible that engine may have ingested water. This could cause engine failure, refer to Engine Troubleshooting page 1.30
5. Check fuel level and condition in vehicle.
   - Possible to have incorrect reading from fuel gauge. Using a flashlight, check for fuel in tank. If no fuel is visible, fill with fuel before further diagnostic.
   - Check fuel quality, pull fuel sample or drain tank and refill with fresh fuel from a reliable source.

IMPORTANT
When filling with fuel, ensure that the fuel being used meets the correct octane rating specific to the vehicle.

   - If filled with fuel, vehicle starts, and gauge still is not reading test the fuel sending unit.
6. Check fuses or fuel system relays (where applicable).
   - If any fuel related system fuses are blown, replace fuses and recheck. Wiring concern or faulty parts may cause fuse to blow.
   - It is advisable to try swapping a relay with a known good relay to check operation. Swap relay with like relay and see if vehicle starts.
7. Check fuel lines and fittings for leaks or damage.
   - If leak or damage is found repair, replace as necessary and recheck concern.
   - If no concerns are found proceed with fuel pressure testing.
8. Perform a fuel pressure test during engine cranking.
   - Verify that battery voltage is present at the fuel pump. A low voltage concern may cause the pump to be inoperable.
   - Check using fuel pressure gauge to see that fuel pressure is within specification.
   - If not within specification, if equipped check fuel filter / screen for restriction.
   - If no concern is found with filter or pressure is still low after filter replacement, suspect weak or faulty fuel pump.
9. Inspect spark plug wiring, spark plug, and check for spark.
   - Check to make sure that spark plug is tight.
   - Inspect spark plug for fouling. Inspect plug gap using feeler gauge or similar tool. Adjust to specification if needed.
   - Disconnect plug wire and install an inline spark tester between the spark plug wire and spark plug. Check for spark. If a spark tester is not available, remove the spark plug and reinstall wire to plug connection. Using caution crank engine while watching spark plug for spark.

⚠ CAUTION
DO NOT TOUCH SPARK PLUG DURING TEST. TOUCHING SPARK PLUG COULD RESULT IN ELECTRIC SHOCK.

   - If plug does not spark in previous test, check connections at ignition coil. Ensure that the ignition coil has power and is receiving signal from the ECU. Concern may be caused by faulty ignition coil or electrical concern.
10. Listen for unusual noises while cranking.

- Broken or damaged flywheel, starter motor gear, or starter motor drive could sound like engine cranking but crankshaft may not be turning.
- Unusual noise could suggest that there may be a mechanical engine concern. Proceed to step ⑬

11. Check ECU and connections.

- ECU could be faulty causing concern.
- Check ECU for power and grounds to make sure that computer is turning on.

12. If all previous checks pass, concern may be caused by internal engine issue.
    - Refer to Cylinder Leakdown Test.
    - Previous testing may be caused by or lead to replacement of one or more of the following:

– Cylinder head gasket leak
– No valve clearance (cam wear)
– Cylinder or piston worn
– Piston rings worn, leaking, broken, or sticking
– Bent valve or stuck valve
– Valve spring broken or weak
– Valve not seating properly (bent or carbon accumulated on sealing surface)
– Rocker arm sticking (if applicable)

NO CRANK NO START OR SLOW CRANK

1. Verify that battery is charged and has ~12.6 V using DMM or battery tester.
   - Check battery electrolyte level. If low top off battery. See Maintenance — Electrical and Ignition Systems.
   - Charge battery at recommended rate. See. Attempt starting after charging.
   - If battery will not reach ~12.6 V could be caused by battery draw. Refer to Diagnostic — Electrical Diagnostics.
   - If battery will not reach ~12.6 V, load test battery. Replace if necessary. Refer to Electrical — Battery Removal / Installation.
2. Verify connections at battery are installed correctly and are tight.
   - If battery terminals are not installed correctly, install terminals correctly
   - Make sure terminals are clean of dirt and corrosion. If not refer to Maintenance — Battery Maintenance.
3. Visually inspect vehicle for any electrical connectors or wiring that may be loose or damaged.
   - If wiring issues are found, repair as necessary. Refer to wiring diagrams if needed.
   - Check battery ground. Follow Negative (-) Cable from battery to chassis and make sure connection is clean and tight.
4. Check connections at starter and starter solenoid. Refer to Electrical Chapter.
   - Make sure connections are clean and tight. If not repair before further diagnosis.
   - Check Positive (+) terminals at starter and solenoid for available voltage using DMM. Readings should be ~12.6 V
   - With battery disconnected check cables for high resistance. Reading should be less than 1 Ohm. If resistance is higher than specification replace wiring.
   - Reconnect battery and perform voltage drop test on wiring to starter and to starter solenoid. Concern may still be caused by high resistance in wires even if resistance is within specification when disconnected.
   - If voltage drop test fails, continue testing to isolate component that will require replacement (starter / starter solenoid / wiring). Acceptable voltage drop during cranking is 0.1 V per connection.
5. Check Brake Switch operation.
   - Using Digital Wrench® verify that the Brake Switch is changing state from “Active” when the brake is depressed to “Inactive” when the brake is released.
   - Most vehicles need to see brake being depressed before vehicle will start. If brake lights do not light when brake is depressed, concern may be caused by brake switch operation.
6. Possible faulty key switch.
   - Attempt turning key switch on and off multiple times.
   - Wiggle key switch while turning.
   - If vehicle starts, concern may be caused by key switch or connection to switch. Refer to Electrical Chapter.
7. Check for communication with ECU using Digital Wrench®
   - If there is no communications with ECU there may be a concern with the CAN system or ECU causing the no start.
8. Concern may be caused by mechanical engine concern.
   - Refer to Engine Troubleshooting.

OVER HEATING

1. Verify coolant is filled to correct level.
   - If coolant is low, fill to correct level.
2. Test and check for correct coolant mixture.
   - If coolant mix is incorrect, correct mixture as necessary.
   - If incorrect coolant was used in vehicle, flush cooling system and bleed, fill to correct level, and recheck.
3. Check for coolant leaks / air pockets.
   - Visually check all hoses and radiator for leaks. If leaks are found repair as necessary.
   - Check cooling system using coolant pressure tester. If leaks can not be seen on visual inspection, refer to Engine / Cooling system for more information.
   - Check for air in cooling system. Bleed the cooling system if needed.
4. Check Oil level.
   - Low oil level or oil in need of changing may cause increase in engine temperature.
   - Too high of oil level may cause engine temperatures to increase.
   - Check level and correct as necessary. Check maintenance history to determine if oil needs to be changed.
5. Check Cooling Fan operation.
   - Make sure the cooling fan is engaging. Command cooling fans on and off using Digital Wrench to check operation.
   - Monitor engine temperature using Digital Wrench® viewing the Engine Temperature PID. Once engine has reached running temperature cooling fan should engage.
6. Water Pump / Thermostat / Radiator may be suspect of concern.
   - Thermostat could be opening too slowly or stuck closed. Check temperature using Digital Wrench® viewing the Engine Temperature to check for correct operation.
   - Water pump may be faulty or not circulating enough coolant to keep temperature within specification.
   - Radiator core may not be functioning correctly or failed causing concern.
7. Faulty Temp Sensor / Circuit / ECU.
   - Confirm engine is overheating. It could be possible that the coolant sensor is sending an incorrect signal causing the ECU to think the vehicle is overheating when it is running at the proper temperature.
   - Check connections at temp sensor and wiring. If damage is found repair, as needed.
   - Resistance test sensor, refer to ECT Sensor test. If test fails, replace sensor.
   - If concern is still present after sensor replacement suspect the ECU is not receiving correct signal input. Inspect circuit wiring.
8. Check cooling system using combustion leak tester for any combustion gasses entering the cooling system. This may suggest a head gasket, cylinder head failure, or other engine damage. Adding coolant before test may dilute the system and cause inaccurate test results.
9. Engine Damage
   - The overheating concern may be caused by an engine concern.
   - Refer to the necessary section in the Service Manual for further engine testing.
   - Check Radiator and cooling fans for restrictions or damage.
   - Check for debris, dirt, or mud between fan and radiator restricting air flow. If present, clean and recheck.
   - Check for damage to radiator or cooling fans. If damage is found to components repair or replace as necessary.
   - Inspect for any aftermarket modifications that may be restricting air flow. *(Radiator Modifications, Grille Modifications, Aftermarket Bumpers, Lightbars, etc.)* Pay close attention to the Radiator Shroud presence and placement.
10. Inspect ECU calibration level.
    - If any ECU calibrations are available, update at this time.

WARNING LIGHTS

1. **CHECK ENGINE**
   - Engine fault has been detected. Refer to Digital Wrench for codes.
   - Proceed with diagnosis after checking codes.
2. **EPS WARNING (If applicable)**
   - Power steering fault has been detected.
   - Check for codes using Digital Wrench. If no codes present refer to **EPS System – Troubleshooting**
   - Check connections at battery, could be caused by voltage concern.
   - Visually inspect connections at EPS Unit.
   - For further diagnosis refer to **Steering System – Steering Assembly EPS**
3. **ENGINE HOT**
   - Over temperature condition detected.
   - Check coolant level. If not full fill to correct level. Bleed the cooling system to ensure there are no air pockets present.
   - Visually inspect hoses and radiator for coolant leaks. Repair as necessary.
   - Pressurize cooling system and look for pressure losses. This indicates a leak in the cooling system. Inspect for external leaks, if none are found it is possible there is an internal leak.
   - Check cooling system using combustion leak tester for any combustion gasses entering the cooling system. This could indicate possible Head / Headgasket failure.
   - Check oil level. Verify that oil is filled to the correct level. Engine oil that is low, or overfull can cause overheating concerns. Check maintenance history to see if oil needs to be changed.
   - Visually inspect for oil leaks.
   - Refer to Over Heating page 1.28 for more info.
4. **PERFORMANCE LIMITED**
   - Check for codes using Digital Wrench. Refer to Guided Diagnostic for further diagnosis.
5. **BRAKE WARNING**
   - Detects brake system failure.
   - Inspect brake system for leaks, damage, etc. Refer to **Brake System** chapter for more information.

ENGINE TROUBLESHOOTING

SPARK PLUG FOULING		
• Spark plug cap loose or faulty • Incorrect spark plug heat range or gap • PVT system calibrated incorrectly/ components worn or mis-adjusted • Fuel quality poor (old) or octane too high • Improperly assembled air intake system	• Injector Spray Pattern • High Leakdown • Valvetrain / Valve Clearances • Restricted exhaust • Vehicle not reaching operating temperature (Short tripping)	• Oil contaminated with fuel • Weak ignition (loose coil ground, faulty coil, or stator) • Restricted engine breather system • Restricted air filter (main or pre-cleaner) or breather system

ENGINE TURNS OVER BUT FAILS TO START		
• No fuel • Dirt in fuel line or filter • Fuel will not pass through fuel valve • Clogged / Failed Fuel Injector	• Fuel pump inoperative/restricted • Tank vent plugged or pinched • Engine flooded • Injector control circuit failure	• Low compression (high cylinder leakage) • No spark (Spark plug fouled) ignition component failure • Intake leak / vacuum leak

ENGINE DOES NOT TURN OVER		
• Battery, Starter, and Ground Cable Connections • Engine seized, rusted, or mechanical failure	• Starter motor does not turn • Starting system circuit concern (blown fuse / failed relay / damaged wiring)	• Dead battery

ENGINE RUNS BUT WILL NOT IDLE		
• Restricted fuel supply • Intake leak / vacuum leak	• Low compression • TPS (installed incorrect / electrical concern / failed sensor)	• Throttle Body (installed incorrect / electrical concern / failed) • Crankcase breather restricted

ENGINE IDLES BUT WILL NOT ACCELERATE		
• Spark plug fouled/weak spark • Broken throttle cable • Obstruction in air intake	• Air box removed (reinstall all intake components) • Incorrect ignition timing • Throttle Body	• Cam worn excessively • Restricted exhaust system • Low fuel pressure

ENGINE HAS LOW POWER		
• Spark plug fouled	• PVT not operating properly	• Restricted exhaust muffler
• Cylinder, piston, ring, or valve wear or damage (check compression)	• Cam worn excessively	• Low fuel pressure
• Poor fuel quality		

PISTON FAILURE - SCORING		
• Lack of lubrication	• Dirt entering engine through cracks in air filter or ducts	• Engine oil dirty or contaminated
• Improper air filter maintenance		

EXCESSIVE SMOKE (BLUE / BLACK) AND CARBON BUILDUP		
• Excessive piston-to-cylinder clearance	• Worn rings, piston, or cylinder	• Restricted breather
• Wet sumping	• Worn valve guides or seals	• Air filter dirty or contaminated

LOW COMPRESSION		
• Cylinder head gasket leak	• Cylinder or piston worn	• Piston rings worn, leaking, broken, or sticking
• No valve clearance (cam wear)	• Bent valve or stuck valve	• Valve spring broken or weak
• Valve not seating properly (bent or carbon accumulated on sealing surface)		

BACKFIRING		
• Ignition system faulty: – Spark plug cap cracked / broken – Ignition coil faulty – Ignition or kill switch circuit faulty – Poor connections in ignition system – Ignition timing incorrect – Sheared flywheel key	• Intake system air leaks • Fouled spark plug or incorrect plug or plug gap • Low fuel pressure • Poor fuel quality	• Exhaust system air leaks • Valve sticking • Throttle Body (installed incorrect / electrical concern / failed)

COOLING TROUBLESHOOTING

OVERHEATING		
• Low coolant level	• Restricted system (mud or debris in radiator fins causing restriction to air flow, passages blocked in radiator, lines, pump, or water jacket, accident damage)	• Electrical malfunction
• Air in cooling system	• Lean mixture (vents, fuel pump)	• Water pump failure/ Loose impeller
• Wrong type/mix of coolant	• Fuel pump output weak	• Thermistor failure
• Faulty pressure cap or system leaks	• Cooling fan inoperative or turning too slowly (perform current draw test)	• Low oil level
• High oil level	• Faulty hot light circuit	• Thermostat stuck closed or not opening completely
• Spark plug incorrect heat range		
• Radiator		

LEAK AT WATER PUMP WEEP HOLE	
• Faulty water pump mechanical seal (coolant leak)	• Faulty pump shaft oil seal (oil leak)

TEMPERATURE TOO LOW	
• Thermostat stuck open	• Contaminated coolant
• Thermostat opening too soon	

DIGITAL WRENCH

DIGITAL WRENCH® SOFTWARE OVERVIEW

The Polaris Digital Wrench® software allows a technician to perform the following tasks:

- Analyze real-time engine data
- Create customer service account records
- Generate / upload service reports
- Perform guided diagnostic procedures
- Perform output state control tests (most models)
- Reflash ECU calibration files
- View or clear trouble codes and freeze time data

See “Digital Wrench® Software Installation and Updates” for information on the latest software and updates.

For information on how to use the Digital Wrench® software, refer to the Digital Wrench® System Help. To access the Digital Wrench® System Help, do one of the following:

- Expand the Digital Wrench® Help drop-down on the left side of the main screen and click System Help.
- Select the ‘Display Diagnostic System Help’ menu icon (question mark) on the main screen.

SPECIAL TOOLS

SPECIAL TOOL	PART NUMBER
Digital Wrench® Diagnostic Kit	PU-47063-C, which includes the following: • Digital Wrench® Software: PU-48731-A • Standard Interface Cable: PU-47151 • SmartLink Module Kit: PU-47471 / MultiLink XP Module Kit: PU-52792 • USB-Serial Adapter Cable: PU-50621
Wireless Vehicle Link (WVL)	PU-51435

GUIDED DIAGNOSTICS

Guided diagnostics are available within Digital Wrench® for all supported Trouble Codes (that is, any fault that will turn on the ‘Check Engine’ indicator).

In addition, guided diagnostics are also available for many other electrical sub systems.

DIGITAL WRENCH® SOFTWARE INSTALLATION AND UPDATES

Polaris recommends that you check your Digital Wrench® software version often and upgrade when available to make sure you are using the most current software. New programming files and diagnostic procedures are added to subsequent versions of the software as they become available.

To identify which Digital Wrench® software version is installed on your PC, do the following:

1. Launch the Digital Wrench® software.
2. On the Digital Wrench® main screen, locate the following information in the lower, right-hand corner:
   - Base Version ① (for example, *Version: 4.1*).
   - Update ② (release date), if available.

NOTICE

If no updates for the Base Version are available, the information in the lower, right-hand corner displays only the Base Version (for example, *Version: 4.1 Base*). You will not see an update (release date).

CHECKING FOR DIGITAL WRENCH® SOFTWARE UPDATES

To check if a Digital Wrench® software update is available, do the following:

1. Open a web browser and log on to the Polaris dealer website (www.polarisdealers.com).
2. From the Service and Warranty drop-down, select Digital Wrench, and then click Digital Wrench Updates.
3. Select the Digital Wrench X.X Updates link.

4. Select the update you want to install on your PC.

IMPORTANT

You must have the latest Base Version installed on your PC before you can install the update. Updates will not install on older Base Versions of Digital Wrench®. If you do not have the latest Base Version installed on your PC, skip this section and proceed to “Installing a New Digital Wrench® Base Version”.

NOTICE

If you are using Internet Explorer, do NOT select “Run”. Instead, select “Save” and save the file to your PC before you run the install.

5. Follow the on-screen prompts to install the update.
6. Once the update is complete, launch the Digital Wrench® software and verify the information in the lower, right-hand corner matches the update you just installed.

INSTALLING A NEW DIGITAL WRENCH® BASE VERSION

To install a new Digital Wrench® Base Version, do the following:

1. Open a web browser and log on to your Polaris dealer website (www.polarisdealers.com).
2. From the Service and Warranty drop-down, select Digital Wrench, and then click Digital Wrench Base Version Installer.

NOTICE

If you are using Internet Explorer, do NOT select “Run”. Instead, select “Save” and save the file to your PC before you run the install.

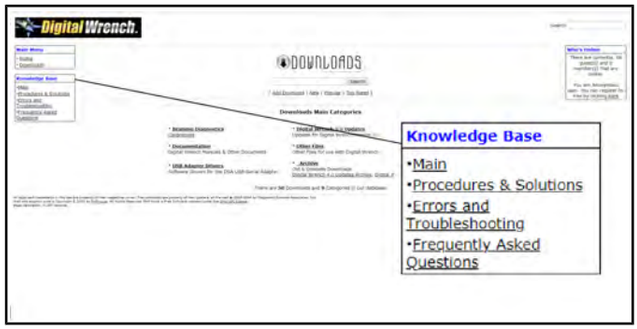
3. Follow the on-screen prompts to install the new Base Version.

4. Once the installation is complete, launch the Digital Wrench® software and verify the information in the lower, right-hand corner matches the new Base Version you just installed.

DIGITAL WRENCH® COMMUNICATION ERRORS

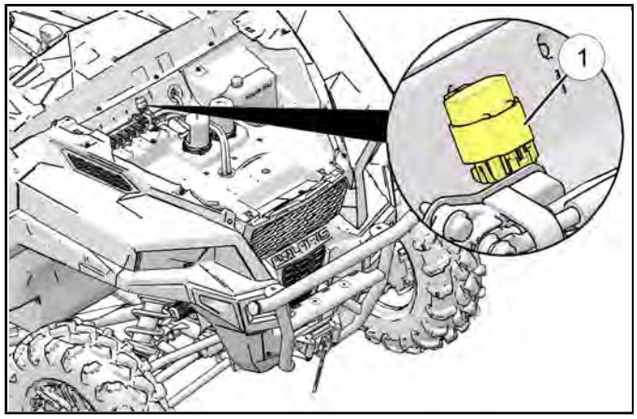
If you experience problems connecting to a vehicle, or any other Digital Wrench® software-related problem, visit the Digital Wrench® home page (www.polaris.diagsys.com) and locate the following information under Knowledge Base:

- Errors and Troubleshooting
- Frequently Asked Questions (FAQs)
- Procedures and Solutions



DIGITAL WRENCH® - DIAGNOSTIC CONNECTOR

Located under the hood connected to a sealed plug ①.



Follow these steps to connect the diagnostic interface cable to the vehicle to allow Digital Wrench® use:

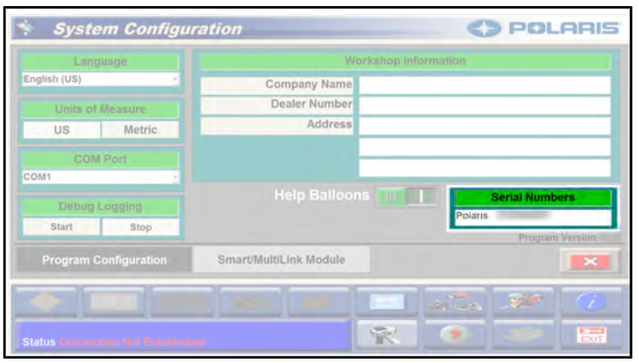
1. Assemble the SmartLink Module and attach the PC Interface Cable to your laptop.
2. Remove the protective cap from the Digital Wrench® connector.
3. Connect the Vehicle Interface Cable to the Digital Wrench® diagnostic connector.
4. Turn the ignition key to the ‘ON’ position, select the appropriate vehicle and wait for the status to display ‘Connected’ in the lower left corner of the screen.
5. Once connected, proceed with using Digital Wrench®.

DIGITAL WRENCH® SERIAL NUMBER LOCATION

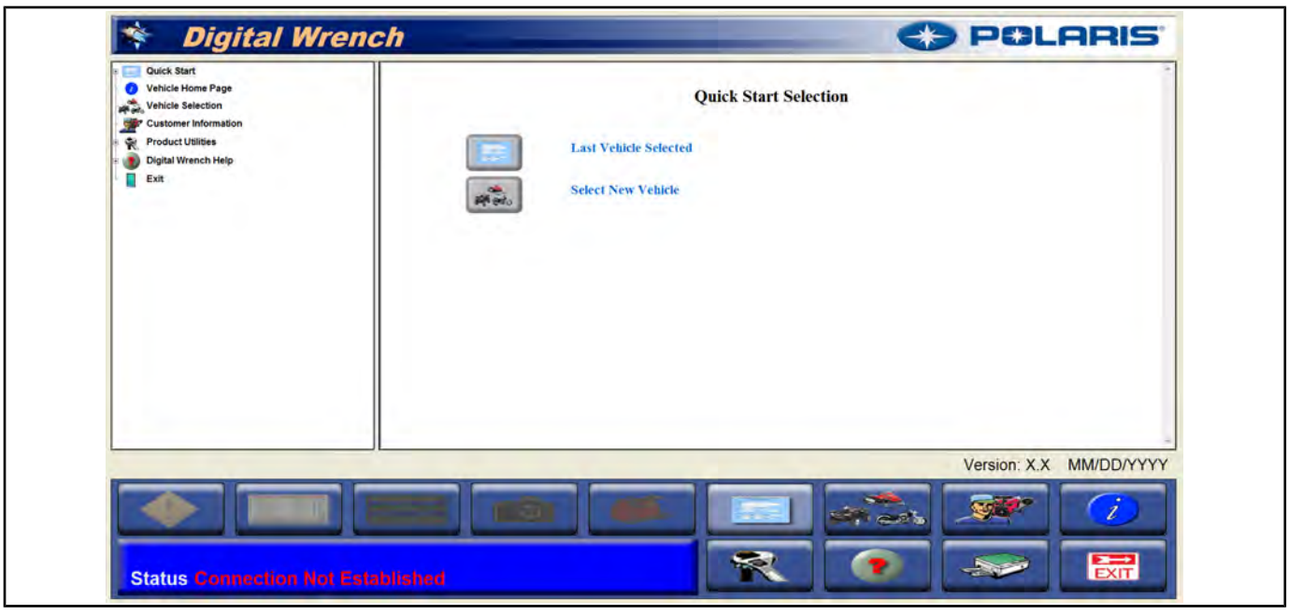
To locate the Digital Wrench® serial number, do the following:

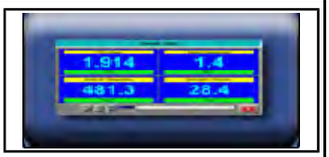
1. Launch the Digital Wrench® software.
2. On the Digital Wrench® main screen, select the 'Configure the Diagnostic System Software' menu icon.

3. Locate the serial number on the right side of the System Configuration screen.



DIGITAL WRENCH® FEATURE MAP



	View and / or clear trouble codes in the Engine Controller Memory.		Add and / or update vehicle and customer information.
	View sensor and ECU information in a grid, meter, or chart format. This is the most viewed screen.		Add and / or update vehicle and customer information. Also view ECU Identification.
	View information from the main ECU sensors.		Access the Vehicle Home Page.
	Set up data capture and record functions.		Access the System Configuration screen.
	Perform specialized testing and adjustment functions service reports.		Access the Digital Wrench® System Help.
	Open the ASSERT ASK form.		Print the current screen as a formatted printout.

ENGINE CONTROLLER REPROGRAMMING (REFLASH)

OVERVIEW

The Digital Wrench® Engine Controller Reprogramming (or “Reflash”) feature allows reprogramming of the ECU fuel and ignition map. To successfully reprogram the ECU, an Authorization Key must be obtained by entering a Request Code in the field provided on the Reflash Authorization site. The Request Code is automatically generated by Digital Wrench® during the reprogramming process.

REPROGRAMMING (REFLASH) TIPS

- Check the Vehicle’s Battery Voltage

  Make sure the vehicle’s battery voltage (no load) is at minimum 12.8 volts (12.5 volts with the key ON). If necessary, connect a battery charger to bring voltage level above minimum.

- Use a Dedicated PC for Diagnostics Only
  - Best results are obtained using a PC that is dedicated to Digital Wrench® diagnostics only. Running Digital Wrench® software on a PC that includes other non-essential programs might affect the software performance.
  - Make sure the PC is plugged in and charging before you attempt to reprogram.
  - Avoid using the PC while reprogramming is in progress.

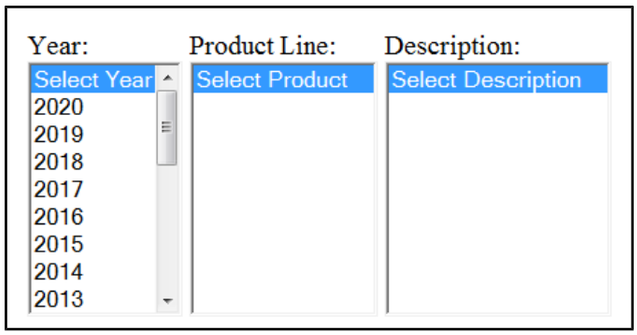
- Understand the Process

  Review the Digital Wrench® System Help before you attempt to reprogram. See “Digital Wrench® Software Overview” for information on how to access the System Help.

REPROGRAMMING (REFLASH) PROCEDURE

1. Verify the most current version of the Digital Wrench® software is installed on your PC.
2. Connect the SmartLink Module cables to your PC and the vehicle.
3. Launch the Digital Wrench® software.
4. Select the ‘Change Vehicle’ menu icon.

5. Select the Year, Product Line, and Description.



6. Select the ‘Special Tests’ menu icon.

7. Select Engine Controller Reprogramming from the Special Tests menu.
8. Follow the on-screen prompts to perform the reflash.
9. Copy the Request Code in Digital Wrench®.
10. Open a web browser and log on to your Polaris dealer website (www.polarisdealers.com).
11. From the Service and Warranty drop-down, select Digital Wrench, and then click Reflash Authorization.
12. Paste the Request Code from Digital Wrench® into the field provided on the Reflash Authorization site and click Continue.
13. Continue to follow the on-screen prompts.
14. Copy and paste the Authorization Key into the field provided in Digital Wrench® and click Continue.
15. Once the reflash is complete, click Finish. Then verify the reflash worked by starting the vehicle.

POLARIS MOBILE DIGITAL WRENCH® (PMDW)

Polaris Mobile Digital Wrench® (PMDW) is a diagnostic software application (app) designed specifically for Android™ devices. When paired with the Wireless Vehicle Link (WVL) (PU-51435), the PMDW app provides many of the same features and functions as the Digital Wrench® software.

You can download the PMDW app on your Android device from the Polaris dealer website. From the Service and Warranty drop-down, select Digital Wrench, and then click Mobile Digital Wrench App Download.

MINIMUM SPECIFICATIONS FOR ANDROID DEVICES

- Minimum operating system: Android 3.1 “Honeycomb” or higher (Android 4.0 or higher preferred)

NOTICE
The PMDW app will not work on Microsoft Windows 8™ or Apple IOS™ products.

- Dual core processor / 2 GB internal memory / external micro SD (32 or 64 GB) slot / 500 MB RAM
- Rear facing camera with minimum 3.0 mega pixel resolution with auto / continuous focus
- Video, microphone, and voice-to-text capable
- Internet and Bluetooth wireless technology capable
- Device must be set to allow the installation of non-market applications

ADDITIONAL INFORMATION

- An electronic user’s guide is provided within the PMDW app. To access the user’s guide, launch the app, and then click “Help” under the Settings / Preferences menu.
- Only CAN-based vehicles are compatible with the PMDW app and the WVL. See the user’s guide for a complete list of compatible vehicles.

ENGINE ELECTRICAL DIAGNOSTICS

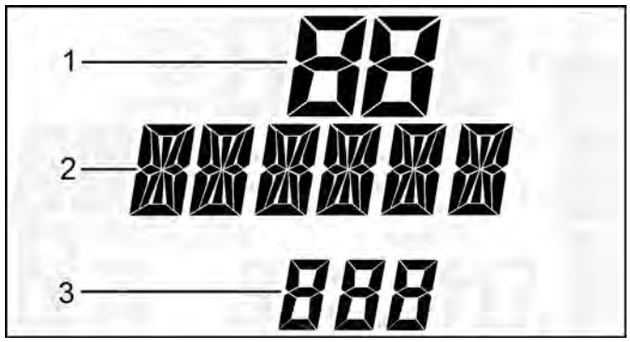
DIAGNOSTIC TROUBLE CODES OVERVIEW

NOTICE
The diagnostic mode is accessible only when the check engine MIL has been activated. If there is a diagnostic problem with the power steering system, the power steering MIL will illuminate and blink in place of the check engine MIL.

Use the following procedure to display diagnostic trouble codes that were activated during current ignition cycle causing the MIL to illuminate. Error codes are not stored. When the key is turned OFF, the code and message is lost, but will reappear if the fault reoccurs after restarting the engine.

If the CHECK ENGINE lamp or the EPAS lamp illuminates, retrieve the active error codes from the display.

1. Press and hold the MODE button to enter the settings menu.
2. Press either toggle button to cycle to the “DIAGCODE” option. Press MODE to select.
3. More than one diagnostic code may be present. Press the toggle UP button to see if more codes are present. Press MODE to select a code.
4. Record the three numbers displayed.



   - The first number (located top) can be 1 to 2 digits in length. This number equates to the fault mode (FMI).
   - The second number (located middle) can be 2 to 6 digits in length. This number equates to the suspected area of fault (SPN).
   - The third number (located bottom) can range from 0 to 9. This number represents the total number of trouble code present (example: 2 means there are 3 codes present).

5. Press MODE to exit to the settings menu.

MASTER TROUBLE CODE LIST

IMPORTANT

Not all codes that are listed in this chart will be applicable to all vehicles. For vehicle specific codes, and pin-point testing. Please refer to Digital Wrench for more information.

SPN	COMPONENT	FMI	CONDITION	CODE
29	Accelerator Position 2	0	Data Valid But Above Normal Operational Range	P350A
		2	Not Plausible	P1225
		3	Voltage Too High	P1228
		4	Voltage Too Low	P1227
51	Throttle Position Sensor 1	0	Data Valid But Above Normal Operational Range	P1123
		1	Data Valid But Below Normal Operational Range	P1122
		2	Signal Out of Range	P0121
		3	Voltage Too High	P0123
		4	Voltage Too Low	P0122
		10	Abnormal Rate Of Change	P0120
		13	Out Of Calibration	P1120
70	Parking Brake Switch	19	Received Network Data In Error	U25CD
84	Vehicle Speed Sensor	0	Data Valid But Above Normal Operational Range	P0500 / C1704 / C1057
		1	Data Valid But Below Normal Operational Range	P0502
		2	Data Erratic or Intermittent (or missing)	P0503 / C1058
		3	Voltage Too High	P1507
		4	Voltage Below Normal, Or Shorted To Low Source	P1506
		8	Abnormal Frequency Or Pulse Width Or Period	P0501
		9	Abnormal Update Rate	P160A
		10	Abnormal Rate Of Change	C1068 / C1705
		12	Bad Intelligent Device Or Component	P3503
		19	Received Vehicle Speed Has Error	P106B / C1069 / P306B
91	Accelerator Position 1	3	Voltage Too High	P0228
		4	Voltage Too Low	P0227
96	Fuel Level Signal	2	Data Erratic, Intermittent Or Incorrect	P0461
		3	Voltage Above Normal, Or Shorted To High Source	P0463
		4	Voltage Too Low	P0462
		16	Data Valid But Above Normal Operating Range	P1462
		18	Data Valid But Below Normal Operating Range	P1463
98	Engine Oil Level Sensor/Switch	3	Voltage Above Normal, Or Shorted To High Source	P1527
		4	Voltage Too Low	P1526
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P250F
100	Engine Oil Pressure	1	Data Valid But Below Normal Operational Range - Most Severe Level	P1524
		2	Data Erratic, Intermittent Or Incorrect	P3021
		5	Current Below Normal Or Open Circuit	P1521
		12	Bad Intelligent Device Or Component	P3020

SPN	COMPONENT	FMI	CONDITION	CODE
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P0524
		18	Data Valid But Below Normal Operating Range - Moderately Severe Level	P1523
102	Manifold Absolute Pressure Sensor	2	Data Erratic, Intermittent Or Incorrect	P0106
		3	Voltage Above Normal, Or Shorted To High Source	P0108
		4	Voltage Too Low	P0107
		7	Mechanical System Not Responding Or Out Of Adjustment	P1106
		10	Abnormal Rate Of Change	P0109
105	Intake Air Temperature Sensor (T-MAP)	0	Data Valid But Above Normal Operational Range - Most Severe Level	P1111
		2	Data Erratic, Intermittent Or Incorrect	P0111
		3	Voltage Too High	P0113
		4	Voltage Too Low	P0112
		10	Abnormal Rate Of Change	P0114
		15	Data Valid But Above Normal Operating Range	P0127
106	Intake Air Pressure Sensor	0	Data Valid But Above Normal Operational Range	P110B
		1	Data Valid But Below Normal Operational Range	P110A
		2	Data Erratic, Intermittent Or Incorrect	P1109
		3	Voltage Too High	P1108
		4	Voltage Too Low	P1107
107	Engine Air Filter 1 Differential Pressure Sensor	0	Data Valid But Above Normal Operational Range - Most Severe Level	P1280
		2	Data Erratic, Intermittent Or Incorrect	P1284
		3	Voltage Above Normal, Or Shorted To High Source	P1282
		4	Voltage Too Low	P1283
		7	Mechanical System Not Responding Or Out Of Adjustment	P1286
		10	Abnormal Rate Of Change	P1285
		16	Data Valid But Above Normal Operating Range - Moderately Severe Level	P1281
108	Barometric Pressure Sensor	2	Data Erratic, Intermittent Or Incorrect	P2227
		3	Voltage Above Normal, Or Shorted To High Source	P2229
		4	Voltage Below Normal, Or Shorted To Low Source	P2228
		10	Abnormal Rate Of Change	P2230
110	Engine Temperature Sensor	0	Engine Overheat Shutdown	P1217
		2	Data Erratic, Intermittent Or Incorrect	P0116
		3	Voltage Too High	P0118
		4	Voltage Too Low	P0117
		10	Abnormal Rate Of Change	P0119
		15	Data Valid But Above Normal Operating Range	P1116
		16	Temperature Too High	P0217
		17	Data Valid But Below Normal Operating Range	P0128
		19	Received Network Data In Error	U25C6
157	Fuel Rail Pressure Sensor	2	Data Erratic, Intermittent Or Incorrect	P0194
		3	Voltage Above Normal, Or Shorted To High Source	P0193

SPN	COMPONENT	FMI	CONDITION	CODE
		4	Voltage Below Normal, Or Shorted To Low Source	P0192
		5	Current Below Normal Or Open Circuit	P0197
		15	Data Valid But Above Normal Operating Range - Least Severe Level	P0199
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P0195
158	Battery Potential	3	Voltage Above Normal, Or Shorted To High Source	P1567
		4	Voltage Below Normal, Or Shorted To Low Source	P1566
162	Transmission Range	2	Invalid	U108D
167	Alternator Power Supply Potential	0	Data Valid But Above Normal Operational Range - Most Severe Level	P1570
		1	Data Valid But Below Normal Operational Range - Most Severe Level	P1572
		3	Voltage Above Normal, Or Shorted To High Source	P1569
		4	Voltage Below Normal, Or Shorted To Low Source	P1568
		16	Data Valid But Above Normal Operating Range - Moderately Severe Level	P1571
		18	Data Valid But Below Normal Operating Range - Moderately Severe Level	P1573
168	System Power	1	Data Valid But Below Normal Operational Range - Most Severe Level	P1563
		2	Data Erratic, Intermittent Or Incorrect	P0561
		3	Voltage Too High	C1063 / P0563 / C1820
		4	Voltage Too Low	P0562
		16	Data Valid But Above Normal Operating Range - Moderately Severe Level	P1564
		18	Data Valid But Below Normal Operating Range - Moderately Severe Level	P1565
171	Ambient Air Temperature	19	Received Network Data In Error	U25C7
173	Exhaust Temperature Sensor	0	Data Valid But Above Normal Operational Range - Most Severe Level	P1517
		3	Voltage Above Normal, Or Shorted To High Source	P0546
		4	Voltage Below Normal, Or Shorted To Low Source	P0545
		10	Abnormal Rate Of Change	P1546
175	Oil Temperature Sensor	2	Data Erratic, Intermittent Or Incorrect	P3096
		12	Bad Intelligent Device Or Component	P3097
190	Engine Speed	0	Data Valid But Above Normal Operational Range - Most Severe Level	P0219 / C1059
		1	Data Valid But Below Normal Operational Range - Most Severe Level	C1060
		2	Data Erratic, Intermittent Or Incorrect	C1061
		7	Mechanical System Not Responding Or Out Of Adjustment	P1219
		19	Received Engine Speed Has Error	P3219 / C1066
		31	Error in Engine Speed Computation	P121C
400	Engine Speed	31	Error in Engine Speed Computation	P121D
523	Gear Sensor Signal	2	Data Erratic, Intermittent Or Incorrect	P0914
		3	Voltage Above Normal, Or Shorted To High Source	P0917
		4	Voltage Too Low	P0916
		9	Abnormal Update Rate	P1914
		11	Root Cause Not Known	P0915
525	Transmission Requested Gear	19	Received Network Data In Error	U255C
527	Cruise Control Panel Switches	31	Condition Exists	P153D

SPN	COMPONENT	FMI	CONDITION	CODE
563	ABS active	19	Received Network Data In Error	U25C9
597	Brake Switch	2	Data Erratic, Intermittent Or Incorrect	C0040
		9	Abnormal Update Rate	C1240
		10	Abnormal Rate Of Change	C2453
		19	Received Network Data In Error	C1340
627	System Voltage	15	Data Valid But Above Normal Operating Range - Least Severe Level	P2504
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P2503
628	ECU Memory	12	Bad Intelligent Device Or Component	P1602 / C1073
		13	Out Of Calibration	P0601 / C1601
630	Calibration	19	Checksum/CRC Error	C1074
634	Idle Air Control	3	Voltage Above Normal, Or Shorted To High Source	P0509
		4	Voltage Below Normal, Or Shorted To Low Source	P0508
		5	Current Below Normal Or Open Circuit	P0505
		7	Mechanical System Not Responding Or Out Of Adjustment	P0519
		13	Out Of Calibration	P1300
636	Crankshaft Position Sensor	2	Plausibility Fault	P0335
		8	Abnormal Frequency Or Pulse Width Or Period	P0336
637	Camshaft Position Sensor	7	Mechanical System Not Responding Or Out Of Adjustment	P0016
		8	Abnormal Frequency Or Pulse Width Or Period	P0340
645	Tachometer Driver Circuit	3	Voltage Above Normal, Or Shorted To High Source	P1739
		4	Voltage Below Normal, Or Shorted To Low Source	P1738
		5	Current Below Normal Or Open Circuit	P1737
651	Injector 1 (MAG)	4	Voltage Below Normal / Shorted To Low Source / Driver Circuit Grounded.	P1262
		5	Current Below Normal / Open Circuit / Driver Circuit Open / Grounded	P0261
652	Injector 2 (PTO)	3	Voltage Above Normal, Or Shorted To High Source / Driver Circuit Short to B+	P0265
		4	Voltage Below Normal, Or Shorted To Low Source / Driver Circuit Grounded	P1265
		5	Current Below Normal Or Open Circuit / Driver Circuit Open / Grounded	P0264
677	Starter Solenoid Driver Circuit	3	Voltage Above Normal, Or Shorted To High Source	P0617
		4	Voltage Below Normal, Or Shorted To Low Source	P0616
		5	Current Below Normal Or Open Circuit	P0615
731	Knock Sensor 1	1	Data Valid But Below Normal Operational Range - Most Severe Level	P0326
		2	Data Erratic, Intermittent Or Incorrect	P0325
		3	Voltage Above Normal, Or Shorted To High Source	P0328
		4	Voltage Below Normal, Or Shorted To Low Source	P0327
746	Rear Differential Output (Turf)	3	Driver Circuit Short to B+	P1692
		4	Driver Circuit Grounded	P1693
		5	Driver Circuit Open / Grounded	P1691
876	AC Compressor Clutch Relay	3	Voltage Above Normal, Or Shorted To High Source	P0647
		4	Voltage Below Normal, Or Shorted To Low Source	P0646
		5	Current Below Normal Or Open Circuit	P0645

SPN	COMPONENT	FMI	CONDITION	CODE
905	Wheel Speed Sensor (Front Left)	2	Data Erratic, Intermittent Or Incorrect	C1131
		3	Voltage Above Normal, Or Shorted To High Source	C1231
		4	Voltage Below Normal, Or Shorted To Low Source	C1331
		5	Current Below Normal Or Open Circuit	C1631
		6	Current Above Normal Or Grounded Circuit	C1B31
		7	Mechanical System Not Responding Or Out Of Adjustment	C1731
		8	Abnormal Frequency Or Pulse Width Or Period	C1431
		10	Abnormal Rate Of Change	C1831
		14	Special Instructions	C1531
		20	Data Drifted High	C1931
		21	Data Drifted Low	C1A31
		31	Condition Exists	C0032
906	Wheel Speed Sensor (Front Right)	2	Data Erratic, Intermittent Or Incorrect	C1034
		3	Voltage Above Normal, Or Shorted To High Source	C1134
		4	Voltage Below Normal, Or Shorted To Low Source	C1234
		5	Current Below Normal Or Open Circuit	C1634
		6	Current Above Normal Or Grounded Circuit	C1B34
		7	Mechanical System Not Responding Or Out Of Adjustment	C1734
		8	Abnormal Frequency Or Pulse Width Or Period	C1334
		10	Abnormal Rate Of Change	C1834
		14	Special Instructions	C1434
		20	Data Drifted High	C1934
		21	Data Drifted Low	C1A34
		31	Condition Exists	C1C34
907	Wheel Speed Sensor (Rear or Rear Left)	2	Data Erratic, Intermittent Or Incorrect	C103D
		3	Voltage Above Normal, Or Shorted To High Source	C113D
		4	Voltage Below Normal, Or Shorted To Low Source	C123D
		5	Current Below Normal Or Open Circuit	C163D
		6	Current Above Normal Or Grounded Circuit	C1B3D
		7	Mechanical System Not Responding Or Out Of Adjustment	C173D
		8	Abnormal Frequency Or Pulse Width Or Period	C133D
		10	Abnormal Rate Of Change	C183D
		11	Root Cause Not Known	C2429
		14	Special Instructions	C143D
		20	Data Drifted High	C193D
		21	Data Drifted Low	C1A3D
		31	Condition Exists	C1C3D
908	Wheel Speed Sensor (Rear Right)	2	Data Erratic, Intermittent Or Incorrect	C1047
		5	Current Below Normal Or Open Circuit	C1647
		6	Current Above Normal Or Grounded Circuit	C1B47
		7	Mechanical System Not Responding Or Out Of Adjustment	C1747

SPN	COMPONENT	FMI	CONDITION	CODE
		10	Abnormal Rate Of Change	C1847
		20	Data Drifted High	C1947
		21	Data Drifted Low	C1A47
		31	Condition Exists	C1C47
1071	Fan Relay Driver Circuit	3	Voltage Above Normal	P1482
		4	Voltage Below Normal	P1483
		5	Current Below Normal Or Open Circuit	P1481
1127	Boost Pressure Sensor	0	Data Valid But Above Normal Operational Range	P0234
		2	Data Erratic, Intermittent Or Incorrect	P0236
		3	Voltage Above Normal	P0238
		4	Voltage Below Normal	P0237
		31	Condition Exists	P1234
1268	Ignition Coil Primary Driver 1 (MAG)	3	Voltage Above Normal	P1353
		4	Voltage Below Normal	P1361
		5	Current Below Normal Or Open Circuit	P1351
1269	Ignition Coil Primary Driver 2 (PTO)	3	Voltage Above Normal	P1354
		4	Voltage Below Normal	P1362
		5	Current Below Normal Or Open Circuit	P1352
1321	Starter Enable Circuit	3	Voltage Above Normal	P1617
		4	Voltage Below Normal	P1616
		5	Current Below Normal Or Open Circuit	P1615
1347	Fuel Pump Driver Circuit	3	Voltage Above Normal	P0232
		4	Voltage Below Normal	P0231
		5	Current Below Normal Or Open Circuit	P0230
		8	Abnormal Frequency Or Pulse Width Or Period	P0233
1352	Knock Level Cylinder 1 (MAG)	0	Data Valid But Above Normal Operational Range	P1336
		16	Data Valid But Above Normal Operating Range	P2336
1353	Knock Level Cylinder 2 (PTO)	0	Data Valid But Above Normal Operational Range	P1337
		16	Data Valid But Above Normal Operating Range	P2337
1485	EFI Relay Control Circuit	3	Voltage Above Normal	P0687
		4	Voltage Below Normal	P0686
		5	Current Below Normal Or Open Circuit	P0685
1557	Fan Driver 2	3	Voltage Above Normal	P0694
		4	Voltage Below Normal, Or Shorted To Low Source	P0693
		5	Current Below Normal Or Open Circuit	P0481
1809	Lateral Acceleration Sensor	13	Out Of Calibration	C1261
		19	Received Network Data In Error	U25CA
		20	Data Drifted High	C1161
1810	Longitudinal Acceleration Sensor	7	Mechanical System Not Responding Or Out Of Adjustment	C1362
		13	Out Of Calibration	C1262
		19	Received Network Data In Error	U25CB

SPN	COMPONENT	FMI	CONDITION	CODE
		20	Data Drifted High	C1162
1888	PTO Solenoid Driver Circuit	3	Voltage Above Normal, Or Shorted To High Source	P1311
		4	Voltage Below Normal, Or Shorted To Low Source	P1312
		5	Current Below Normal Or Open Circuit	P1310
2584	Brake Pressure Switches	3	Voltage Above Normal, Or Shorted To High Source	C2244
		4	Voltage Below Normal, Or Shorted To Low Source	C2044
		13	Out Of Calibration	C1263
		17	Data Valid But Below Normal Operating Range - Least Severe Level	C2144
		20	Data Drifted High	C1164
2590	Vehicle Speed	16	Data Valid But Above Normal Operating Range - Moderately Severe Level	P1500
2596	Speed Key Selected Maximum Vehicle Speed Limit Message	19	Received Network Data In Error	U255A
		31	Condition Exists	U2259
2629	Engine Turbocharger 1 Compressor Outlet Temperature	3	Voltage Above Normal, Or Shorted To High Source	P1235
		4	Voltage Below Normal, Or Shorted To Low Source	P1236
3056	Oxygen Sensor Bank 1 Sensor 1	2	Data Erratic, Intermittent Or Incorrect	P0130
		3	Voltage Above Normal, Or Shorted To High Source	P0132
		4	Voltage Below Normal, Or Shorted To Low Source	P0131 / C1049
		12	Bad Intelligent Device Or Component	P113A
		17	Data Valid But Below Normal Operating Range - Least Severe Level	C2049
3057	Oxygen Sensor Bank 1 Sensor 2	2	Data Erratic, Intermittent Or Incorrect	P0136
		3	Voltage Above Normal, Or Shorted To High Source	P0138
		4	Voltage Below Normal, Or Shorted To Low Source	P0137
3597	ECU Output Supply Voltage 1	0	Data Valid But Above Normal Operational Range - Most Severe Level	P16A3
		1	Data Valid But Below Normal Operational Range - Most Severe Level	P16A6
		3	Voltage Above Normal, Or Shorted To High Source	P16A2
		4	Voltage Below Normal, Or Shorted To Low Source	P16A1
		16	Data Valid But Above Normal Operating Range - Moderately Severe Level	P16A5
		18	Data Valid But Below Normal Operating Range - Moderately Severe Level	P16A7
3598	ECU Output Supply Voltage 2	0	Data Valid But Above Normal Operational Range - Most Severe Level	P16AA
		1	Data Valid But Below Normal Operational Range - Most Severe Level	P16AC
		3	Voltage Above Normal, Or Shorted To High Source	P16A9
		4	Voltage Below Normal, Or Shorted To Low Source	P16A8
		16	Data Valid But Above Normal Operating Range - Moderately Severe Level	P16AB
		18	Data Valid But Below Normal Operating Range - Moderately Severe Level	P16AD
3599	ECU Output Supply Voltage 3	0	Data Valid But Above Normal Operational Range - Most Severe Level	P17AC
		1	Data Valid But Below Normal Operational Range - Most Severe Level	P17AE
		3	Voltage Above Normal, Or Shorted To High Source	P17AA
		4	Voltage Below Normal, Or Shorted To Low Source	P17AB
		16	Data Valid But Above Normal Operating Range - Moderately Severe Level	P17AD

SPN	COMPONENT	FMI	CONDITION	CODE
		18	Data Valid But Below Normal Operating Range - Moderately Severe Level	P17AF
8014	Battery Charger	18	Data Valid But Below Normal Operating Range - Moderately Severe Level	P0761
		31	Condition Exists	P0762
65559	CAN1 Bus Hardware	11	Root Cause Not Known	P1130 / U2101
		31	Condition Exists	C1130
65613	ETC Accelerator Position Sensor Correlation	2	Data Erratic, Intermittent Or Incorrect	P1135
516125	CAN 1	9	Abnormal Update Rate	U25E9
516178	Idle Engine speed	19	Received Network Data In Error	U25C0
520129	ABS Low Pressure Feed Circuit 1	31	Condition Exists	C1012
520130	ABS Low Pressure Feed Circuit 2	31	Condition Exists	C1013
520131	ABS Valve Relay	12	Bad Intelligent Device Or Component	C2420
520132	ABS Pressure Sensor Supply Out of Range	31	Condition Exists	C2423
520133	ABS Internal Pressure Sensor	2	Data Erratic, Intermittent Or Incorrect	C2439
		12	Bad Intelligent Device Or Component	C2424
520134	ABS Motor Supply Failure	31	Condition Exists	C2425
520137	ABS Manually Disabled	31	Condition Exists	C2433
520140	ABS Internal ECU Failure	12	Bad Intelligent Device Or Component	C2437
520141	CAN1 Bus Wiring	31	Condition Exists	C2438
520152	ABS Solenoid (Rear Left In)	31	Condition Exists	C1324
520153	ABS Solenoid (Rear Left Out)	31	Condition Exists	C1325
520194	Throttle Release Signal	2	Data Erratic, Intermittent Or Incorrect	P1553
		3	Voltage Above Normal, Or Shorted To High Source	P1555
		4	Voltage Below Normal, Or Shorted To Low Source	P1554
		7	Mechanical System Not Responding Or Out Of Adjustment	P1552
520198	Throttle Position Sensor 2	0	Data Valid But Above Normal Operational Range - Most Severe Level	P1223
		1	Data Valid But Below Normal Operational Range - Most Severe Level	P1222
		3	Voltage Above Normal, Or Shorted To High Source	P0223
		4	Voltage Below Normal, Or Shorted To Low Source	P0222
		10	Abnormal Rate Of Change	P0220
		13	Out Of Calibration	P1220
520201	Overheat Indicator Lamp	3	Voltage Above Normal, Or Shorted To High Source	P1656
		4	Voltage Below Normal, Or Shorted To Low Source	P1657
		5	Current Below Normal Or Open Circuit	P1655
520202	Canister Purge Valve	3	Voltage Above Normal, Or Shorted To High Source	P0443
		4	Voltage Below Normal, Or Shorted To Low Source	P0445
		5	Current Below Normal Or Open Circuit	P0444
520203	Front Wheel Back Drive (Active Descent System)	3	Voltage Above Normal, Or Shorted To High Source	P1686
		4	Voltage Below Normal, Or Shorted To Low Source	P1687
		5	Current Below Normal Or Open Circuit	P1685
520204	Fuel Correction Front	15	Data Valid But Above Normal Operating Range - Least Severe Level	P0172

SPN	COMPONENT	FMI	CONDITION	CODE
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P0171
520205	Fuel Correction Rear	15	Data Valid But Above Normal Operating Range - Least Severe Level	P0175
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P0174
520206	Reverse Alarm	2	Data Erratic, Intermittent Or Incorrect	P1684
		3	Voltage Above Normal, Or Shorted To High Source	P1682
		4	Voltage Below Normal, Or Shorted To Low Source	P1683
		5	Current Below Normal Or Open Circuit	P1681
520207	All Wheel Drive Control Circuit	3	Voltage Above Normal, Or Shorted To High Source	P1835
		4	Voltage Below Normal, Or Shorted To Low Source	P1834
		5	Current Below Normal Or Open Circuit	P1836
520208	Chassis Relay	3	Voltage Above Normal, Or Shorted To High Source	P1614
		4	Voltage Below Normal, Or Shorted To Low Source	P1613
		5	Current Below Normal Or Open Circuit	P1611
520211	Idle Speed	3	Voltage Above Normal, Or Shorted To High Source	P0507
		4	Voltage Below Normal, Or Shorted To Low Source	P0506
520219	Accessory Relay	3	Voltage Above Normal, Or Shorted To High Source	P1647
		4	Voltage Below Normal, Or Shorted To Low Source	P1645
		5	Current Below Normal Or Open Circuit	P1646
520220	Battery Charge Relay	3	Voltage Above Normal, Or Shorted To High Source	P163D
		4	Voltage Below Normal, Or Shorted To Low Source	P163A
		5	Current Below Normal Or Open Circuit	P163C
520221	Steering Over Current Shut Down	6	Current Above Normal Or Grounded Circuit	C1050
		12	Bad Intelligent Device Or Component	C102E
520222	Steering Excessive Current Error	6	Current Above Normal Or Grounded Circuit	C1051
520223	Steering Torque Partial Failure	31	Condition Exists	C1052
520224	Steering Torque Full Failure	31	Condition Exists	C1053
520225	EPS Inverter Temperature	0	Data Valid But Above Normal Operational Range - Most Severe Level	C1055
		12	Bad Intelligent Device Or Component	C102F
		16	Data Valid But Above Normal Operating Range - Moderately Severe Level	C1054
520226	EPS Communications Receive Data Error	2	Data Erratic, Intermittent Or Incorrect	U0100
		31	Condition Exists	C1067
520227	EPS CAN Communications Transmit Error	2	Data Erratic, Intermittent Or Incorrect	U1100
520228	Position Encoder Error	11	Root Cause Not Known	C1065
		12	Bad Intelligent Device Or Component	C106A
		31	Condition Exists	C106B
520229	Software Error	12	Bad Intelligent Device Or Component	C1070
		31	Condition Exists	C106F
520230	IC CAN Communication with EPS	31	Condition Exists	U0131
520231	EPS Power Save Condition	31	Condition Exists	C1071
520252	ABS Solenoid (Rear or Right Rear In)	5	Current Below Normal Or Open Circuit	C1024

SPN	COMPONENT	FMI	CONDITION	CODE
		31	Condition Exists	C1330
520253	ABS Solenoid (Rear or Right Rear Out)	5	Current Below Normal Or Open Circuit	C1025
		31	Condition Exists	C1332
520254	ABS Solenoid (Front or Front Left In)	5	Current Below Normal Or Open Circuit	C1026
		31	Condition Exists	C1326
520255	ABS Solenoid (Front or Front Left Out)	5	Current Below Normal Or Open Circuit	C1027
		31	Condition Exists	C1327
520256	ABS Solenoid (Front Right In)	5	Current Below Normal Or Open Circuit	C1028
		31	Condition Exists	C1328
520257	ABS Solenoid (Front Right Out)	5	Current Below Normal Or Open Circuit	C1029
		31	Condition Exists	C1329
520260	ABS Motor	3	Voltage Above Normal, Or Shorted To High Source	C1020
		4	Voltage Below Normal, Or Shorted To Low Source	C1021
		6	Current Above Normal Or Grounded Circuit	C101E
		7	Mechanical System Not Responding Or Out Of Adjustment	C0020
		8	Abnormal Frequency Or Pulse Width Or Period	C101F
		12	Bad Intelligent Device Or Component	C101C
520262	ABS/Brake Controller Source Voltage	0	Data Valid But Above Normal Operational Range - Most Severe Level	C2422
		1	Data Valid But Below Normal Operational Range - Most Severe Level	C2421
		3	Voltage Above Normal, Or Shorted To High Source	C1039 / C1241
		4	Voltage Below Normal, Or Shorted To Low Source	C1038
520264	ABS/Brake Controller ECU	12	Bad Intelligent Device Or Component	C1041
		12	Bad Intelligent Device Or Component	C1243
		13	Out Of Calibration	C1141
520265	ABS Module	7	Mechanical System Not Responding Or Out Of Adjustment	C1042
520266	ABS Brake Switch (Front/Rear)	3	Voltage Above Normal, Or Shorted To High Source	C1044
		5	Current Below Normal Or Open Circuit	C1043
520272	Glow Plug Relay Driver Circuit	3	Voltage Above Normal, Or Shorted To High Source	P1384
		4	Voltage Below Normal, Or Shorted To Low Source	P1383
		5	Current Below Normal Or Open Circuit	P1385
520273	Fuel Pull Solenoid Relay Driver Circuit (Low Side)	3	Voltage Above Normal, Or Shorted To High Source	P125D
		4	Voltage Below Normal, Or Shorted To Low Source	P125C
		5	Current Below Normal Or Open Circuit	P125A
520275	Accelerator Position/Brake Position Interaction	31	Condition Exists	P150A / U1007
520276	Throttle Position Sensor (1 or 2 Indeterminable)	2	Data Erratic, Intermittent Or Incorrect	P150C
		12	Bad Intelligent Device Or Component	P150B
520277	Throttle Body Control - Power Stage	2	Data Erratic, Intermittent Or Incorrect	P151A
		3	Voltage Above Normal, Or Shorted To High Source	P150D
		4	Voltage Below Normal, Or Shorted To Low Source	P150E
		8	Abnormal Frequency Or Pulse Width Or Period	P151B

SPN	COMPONENT	FMI	CONDITION	CODE
		31	Condition Exists	P153F
520278	Throttle Body Control - Return Spring Check Failed	31	Condition Exists	P151C
520279	Throttle Body Control - Adaption Aborted	31	Condition Exists	P151D
520280	Throttle Body Control - Limp Home Position Check Failed	31	Condition Exists	P151E
520281	Throttle Body Control - Mechanical Stop Adaptation Failure	31	Condition Exists	P152A
520282	Throttle Body Control - Repeated Adaptation Failed	31	Condition Exists	P152B
520283	Throttle Body Control	2	Data Erratic, Intermittent Or Incorrect	P152F
		3	Voltage Above Normal, Or Shorted To High Source	P152C
		4	Voltage Below Normal, Or Shorted To Low Source	P152D
520284	Throttle Body Control - Position Deviation Fault	31	Condition Exists	P152E
520285	Brake Switch (1 or 2 Indeterminable)	2	Data Erratic, Intermittent Or Incorrect	P153E
520286	ECU Monitoring Error	31	Condition Exists	P1540
520287	ECU Monitoring Error (Level 3)	31	Condition Exists	P1541
520288	ECU Monitoring of Injection Cut Off (Level 1)	31	Condition Exists	P1542
520289	ECU Monitoring of Injection Cut Off (Level 2)	31	Condition Exists	P1543
520305	Throttle Body Control - Requested Throttle Angle Not Plausible	31	Condition Exists	P1530
520306	ECU ADC Fault - No Load	31	Condition Exists	P1531
520307	ECU ADC Fault - Voltage	31	Condition Exists	P1532
520308	Accelerator Sensor Sync Fault - Sensor Diff Exceeds Limit	31	Condition Exists	P1533
520309	ECU Fault - ICO	31	Condition Exists	P1534
520311	ECU Fault - Hardware Disruption	31	Condition Exists	P1537
520331	Knock Sensor Positive Line	3	Voltage Above Normal, Or Shorted To High Source	P1327
		4	Voltage Below Normal, Or Shorted To Low Source	P1328
520332	Knock Sensor Negative Line	3	Voltage Above Normal, Or Shorted To High Source	P132A
		4	Voltage Below Normal, Or Shorted To Low Source	P132B
520341	Wastegate Solenoid Driver	3	Voltage Above Normal, Or Shorted To High Source	P0243
		4	Voltage Below Normal, Or Shorted To Low Source	P0246
		5	Current Below Normal Or Open Circuit	P0245
520342	Idle Fuel Correction Bank 1	15	Data Valid But Above Normal Operating Range - Least Severe Level	P116C
520343	Idle Fuel Correction Bank 2	15	Data Valid But Above Normal Operating Range - Least Severe Level	P116E
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P116F
520344	Adaptive Fuel Correction Bank 1	15	Data Valid But Above Normal Operating Range - Least Severe Level	P0170
		17	Data Valid But Below Normal Operating Range - Least Severe Level	P1170
520376	Internal fault - Chassis Output Disabled	31	Condition Exists	P1618
520381	Non Functional Application SW Installed	31	Condition Exists	C1681
520496	Intercooler Pump Driver Circuit	3	Voltage Above Normal, Or Shorted To High Source	P107D
		4	Voltage Below Normal, Or Shorted To Low Source	P107C

SPN	COMPONENT	FMI	CONDITION	CODE
		5	Current Below Normal Or Open Circuit	P107E
520498	Stator	4	Voltage Below Normal, Or Shorted To Low Source	P1510
		5	Current Below Normal Or Open Circuit	P1511
520513	Motor Controller Encoder	2	Data Erratic, Intermittent Or Incorrect	P1140 / P1368
		31	Condition Exists	P1141 / P1369
520514	Motor Controller Temperature Sensor	3	Voltage Above Normal, Or Shorted To High Source	P1142 / P1165
		4	Voltage Below Normal, Or Shorted To Low Source	P1143 / P1166
		31	Condition Exists	P1144 / P1167
520515	Electric Motor Temperature	0	Data Valid But Above Normal Operational Range - Most Severe Level	P1145 / P1168
		4	Voltage Below Normal, Or Shorted To Low Source	P1B0D / P1169
520516	Motor Controller Temperature	0	Data Valid But Above Normal Operational Range - Most Severe Level	P1146 / P116A
520517	Motor Controller	3	Voltage Above Normal, Or Shorted To High Source	P1147 / P1184
		6	Current Above Normal Or Grounded Circuit	P1148 / P1185
		12	Bad Intelligent Device Or Component	P1149 / P1186
		19	Received Network Data In Error	P1150 / P1187
520518	Motor Controller Contactor	5	Current Below Normal Or Open Circuit	P1151 / P1177
		6	Current Above Normal Or Grounded Circuit	P1152 / P1178
520519	Motor Controller Speed Sensor	31	Condition Exists	P1153 / P116B
520520	BMC CAN Communication	31	Condition Exists	P0754
520522	Display Relay	5	Current Below Normal Or Open Circuit	P3038
524067	Drive Mode Select Switch	2	Data Erratic, Intermittent Or Incorrect	P153C
		3	Voltage Above Normal, Or Shorted To High Source	P153A
		4	Voltage Below Normal, Or Shorted To Low Source	P153B
524070	Operator Presence Switch	3	Voltage Above Normal, Or Shorted To High Source	P251C
524075	Hydraulic Oil Pressure Sensor/ Switch	17	Data Valid But Below Normal Operating Range - Least Severe Level	P150F
524076	Engine Oil Pressure Sensor/Switch	17	Data Valid But Below Normal Operating Range - Least Severe Level	P151F
524085	EPS Fault Lamp Driver Circuit	12	Bad Intelligent Device Or Component	C106C
524086	EPS SEPIC Voltage Error	3	Voltage Above Normal, Or Shorted To High Source	C106D
		4	Voltage Below Normal, Or Shorted To Low Source	C106E

CYLINDER MISFIRE DETECTION

NOTICE
This process only applies to some MY15 and later models. Refer to this procedure only if one of the codes shown below is displayed in Digital Wrench.

The ECU monitors crankshaft speed via the crankshaft position sensor. A misfire will cause a fluctuation in crankshaft speed. A code will set and turn on the check engine light after an engine misfire threshold/rate is detected that is above a pre-determined limit. This threshold varies based on engine speed.

One or more of the following codes will be set if a misfire occurs:

- P0301 (SPN 65591/FMI 7) Misfire Detected, Cylinder 1 (MAG)
- P0302 (SPN 65592/FMI 7) Misfire Detected, Cylinder 2 (PTO)
- P0314 (SPN 65590/FMI 7) Misfire Detected, Cylinder Not Identified

Once a cylinder misfire code is set, the following events will occur:

- Check Engine Light illuminates
- If the cylinder can be detected by the ECU (code P0301 or P0302), the ECU will deactivate the fuel injector for that cylinder. This will remain in effect until the key is cycled off and back on.
- If the cylinder with the misfire cannot be detected (code P0314), the ECU will limit available power by limiting how far the throttle plate opens.

One the key is cycled, the trouble code(s) will show current but there will be no fuel injector deactivation or throttle limitation unless the misfiring continues to occur. The check engine light will remain illuminated until there are 4000 engine revolutions (i.e. 4000 RPM for one minute) without a significant misfire being detected. Once this condition is met, the check engine light will turn off and the code(s) will show as historic.

If a misfire code has been set and there is no observed misfire, cycle the key and allow 4000 engine revolutions to see if the check engine light turns off. If it does not turn off, diagnose by verifying the following items:

- Low battery voltage (loose connection, low charge, bad battery)
- Faulty voltage regulator
- Ignition Coil and connections are good
- Spark plugs wires are secure
- The correct spark plugs are installed and the plugs are not fouled
- Crankshaft Position Sensor tests good
- Wiring to the Crankshaft Position Sensor, ECU and Ignition Coil are not damaged. Chassis ground is clean and tight
- Fuel pressure is within specification
- Fresh/good quality fuel is in the fuel tank
- Engine mechanical is good (leak down, timing)
- Confirm the belt is in good condition, specifically looking for signs of hour-glassing
- Confirm primary clutch operation (worn/incorrect weights, loose spider/jam nut)
- Confirm secondary clutch operation (sliders, rollers, helix)

FLUID LEAKS

Fluid leaks can apply to multiple different systems used in the vehicle. Leaks can be a common cause of concerns within these systems. Procedures that are used for checking leaks can apply to multiple systems.

When diagnosing fluid leaks, refer to the appropriate **"Level Inspection"** procedure, Fluid Inspection page 1.55, or the appropriate chapter in the Service Manual before proceeding with any repairs or parts replacement.

FLUID INSPECTION

OVERVIEW

Multiple vehicle systems will contain different fluids or lubricants within the system.

These fluids should be inspected for condition and level. Refer to **Fluid Condition** and the appropriate level check within the Service Manual for more information.

Most of these systems should be inspected for leaks using the same methods. Refer to **Fluid Leak** for more information.

FLUID LEAK

Perform the following inspection prior to replacement of any seals or gaskets.

1. Inspect the fluid level prior to any checks to verify that the system is currently leaking.

NOTICE
If the system is not low at this time, clean and continue to monitor. It is possible that the fluid is residual from manufacturing or previous repairs.

2. Thoroughly clean the area using an appropriate cleaner (Brake cleaner, Throttle Body cleaner, Soap, etc.) prior to diagnosing the leak.
3. Operate the vehicle under the condition that the leak presented and re-inspect for leak.
4. Pinpoint location of leak. Check for any damage to parts and repair the leak as necessary.

NOTICE
If the leak can not be pin-pointed using this method, the leak may require dye to be added to the system, operated and inspected for leaks using a UV light.

FLUID CONDITION

Refer to the appropriate **"Level Check"** procedure for the fluid being inspected. When the fluid is inspected it should be compared to **NEW** recommended replacement fluid.

INSPECTION ITEMS	CAUSE
Inspect for the following: • Unusual Color • Unusual Odor • Fluid Contamination	• The fluid has been contaminated with another fluid (cross-contamination, ex. Oil mixing with Coolant). • Fluid overheated • Natural fluid breakdown (replace fluid per recommended maintenance interval / fluid replacement procedure). • If a fluid is contaminated with metal or debris, suspect that there is a mechanical failure causing the fluid contamination. Refer to the Service Manual information related to the system in question.

FUEL SYSTEM DIAGNOSTICS

FUEL SYSTEM TROUBLESHOOTING

FUEL STARVATION / LEAN MIXTURE

SYMPTOMS	CAUSES
• Hard start or no start • Bog • Backfire • Popping through intake / exhaust • Hesitation • Detonation • Low Power • Spark plug erosion / fouling • Engine runs hot • Surging • High / Erratic idle	• No fuel in tank • Restricted tank vent, or routed improperly • Fuel lines or fuel injectors restricted • Fuel pump inoperative • Air leak in system • Intake air leak (throttle shaft, intake ducts, air box cover) • Faulty oxygen sensor

RICH MIXTURE

SYMPTOMS	CAUSES
• Hard start or no start • Bog • Backfire • Popping through intake / exhaust • Hesitation • Detonation • Low Power • Spark plug erosion / fouling • Engine runs hot • Surging • High / erratic idle	• No fuel in tank • Restricted tank vent, or routed improperly • Fuel lines or fuel injectors restricted • Fuel pump inoperative • Air leak in system • Intake air leak (throttle shaft, intake ducts, air box cover) • Faulty oxygen sensor

POOR IDLE

SYMPTOMS	CAUSES
• Idle Too High (if > 1400 RPM when warm).	• Throttle stop screw tampering • Throttle cable sticking, improperly adjusted, routed incorrectly • Faulty electrical connection
• Idle Too Low (if < 1100 RPM when warm).	• Plugged air filter • Leaking injector (rich condition) • Belt dragging • Throttle stop screw tampering
• Erratic Idle	• Throttle cable incorrectly adjusted • Air leaks, dirty injector • T-MAP damaged (check with Digital Wrench®) • Tight valves (low compression or high leakdown) • Ignition timing incorrect • Belt dragging • Dirty air filter • High percentage of cylinder leakdown (worn engine) • Low compression (worn engine) • Spark plug(s) fouled • Spark plug wires loose or worn • Faulty electrical connection

PVT SYSTEM DIAGNOSTICS

PVT SYSTEM TROUBLESHOOTING

SITUATION	PROBABLE CAUSE	REMEDY
Engine RPM below specified operating range, although engine is properly tuned.	Wrong or broken drive clutch spring.	Replace with recommended spring.
	Drive clutch shift weight too heavy.	Install correct shift weight kit to match engine application.
	Driven clutch spring broken or installed in wrong helix location.	Replace spring; refer to proper installation location.
Erratic engine operating RPM during acceleration or load variations.	Drive clutch binding.	Disassemble drive clutch; inspect shift weights for wear and free operation.
		Clean and polish stationary shaft hub; reassemble clutch without spring to determine problem area.
	Belt worn unevenly - thin / burnt spots.	Replace belt.
	Driven clutch malfunction.	Replace ramp buttons.
		Inspect movable sheave for excessive bushing clearance.
	Sheave face grooved.	Replace the clutch.
Engine RPM above specified operating range.	Incorrect drive clutch spring (too high of rate).	Install correct recommended spring.
	Drive clutch shift weights incorrect for application (too light).	Install correct recommended shift weights.
	Drive clutch binding.	Disassemble and clean clutch, inspecting shift weights and rollers. Reassemble without the spring and move sheaves through entire range to further determine probable cause.
	Driven clutch binding.	Disassemble, clean, and inspect driven clutch, noting worn sheave bushing and ramp buttons and helix spring location.
	Clutch sheaves greasy; belt slippage.	Clean sheaves with denatured alcohol or brake cleaner, install new belt.
Harsh drive clutch engagement.	Drive belt worn too narrow.	Replace belt.
	Excessive belt / sheave clearance with new belt.	Perform belt / sheave clearance adjustment with shim washers beneath spider.
Drive belt turns over	Wrong belt for application.	Replace with correct belt.
Belt burnt, thin spots	Abuse (continued throttle application when vehicle is stationary, excess load)	Caution operator to operate machine within guidelines.
	Dragging brake	Inspect brake system.
	Slow, easy clutch engagement	Fast, effective use of throttle for efficient engagement.

SITUATION	PROBABLE CAUSE	REMEDY
PVT cover overheating (melting)	Plugged air intake or outlet.	Clear obstruction
	Belt slippage due to water, oil, grease, etc., rubbing on cover.	Inspect system. Clean , repair or replace as necessary. Seal PVT system ducts.
	Clutches or weight being applied to cover while in operation.	Remove weight. Inform operator.
	High vs. low range.	Instruct operator on guidelines for operation in proper driving range for different terrain as outlined in Owner's Safety and Maintenance Manual.
Water ingestion	Cover seals or ducts leaking	Find leak and repair as necessary.
	Operator error	Instruct operator on guidelines for operation in wet terrain as outlined in Owner's Safety and Maintenance Manual.
Belt slippage	Belt worn out	Replace belt.
	Water ingestion	Inspect and seal PVT system.
	Belt contaminated with oil or grease	Inspect and clean.
PVT noise	Belt worn or separated, thin spots, loose belt	Replace belt.
	Broken or worn clutch components, cover hitting clutches	Inspect and repair as necessary.
Engagement erratic or stabby	Thin spots on belt, worn belt	Replace belt. Refer to belt burnt troubleshooting and instruct operator.
	Drive clutch bushings stick	Inspect and repair clutches.

PVT SYSTEM OVERHEATING / DIAGNOSIS

During routine maintenance, or whenever PVT system overheating is evident, it's important to check the inlet *and* outlet duct for obstructions. Obstructions to air flow through the ducts will significantly increase PVT system operating temperatures. The vehicle should be operated in Low when extended low vehicle speed operation is anticipated.

CLUTCH DRIVE BELT & COVER RELATED ISSUES: DIAGNOSIS	
POSSIBLE CAUSES	**SOLUTIONS / WHAT TO DO**
Loading the vehicle into a tall trailer when in high range.	Shift transmission to Low during loading of the vehicle to prevent belt burning.
Starting out going up a steep incline from a stopped position.	When starting out on an incline, use Low gear. Shift transmission to Low during loading of the vehicle to prevent belt burning.
Driving at low RPM or low ground speed (at approximately 3-7 MPH).	Drive at higher speed or use Low. The use of Low is highly recommended for cooler PVT operating temperatures and longer component life.
Insufficient engine warm-up when exposed to low ambient temperatures.	Warm engine at least 5 min., then with transmission in neutral, advance throttle to approx. 1/8 throttle in short bursts, 5 to 7 times. The belt will become more flexible and prevent belt burning.
Slow and easy clutch engagement.	Fast, effective use of the throttle for efficient engagement.
Stuck in mud or snow.	Shift the transmission to Low, carefully use fast, aggressive throttle application to engage clutch. **WARNING:** Excessive throttle may cause loss of control and vehicle overturn.
Climbing over large objects from a stopped position.	Shift the transmission to Low, carefully use fast, aggressive, brief throttle application to engage clutch. **WARNING:** Excessive throttle may cause loss of control and vehicle overturn.
Belt slippage from water or snow ingestion into the PVT system.	Remove the PVT drain plug. Shift the transmission to neutral. Using the throttle, vary the engine rpm from idle to full throttle. Repeat several times as required. During this procedure, the throttle should not be held at the full position for more than 10 seconds. Clutch seals should be inspected for damage if repeated leaking occurs.
Clutch malfunction.	Clutch component inspection should be performed by a Polaris MSD certified technician.
Poor engine performance.	Fouled spark plugs, foreign material in fuel tank, restricted fuel lines, or faulty fuel pump may cause symptoms similar to clutching malfunction.
GENERAL RANGE OPERATION GUIDELINES:	**Low:** Basic operational speeds less than 7 MPH, riding through rough terrain (swamps, mountains, ect.), or low ground speeds and when continuously operating at speeds less than 30 mph in sand/dune environments.
	High: High ground speeds, or speeds above 7 MPH.

Operating in Low Gear

Low gear should be used when riding through rough terrain or when basic operational ground speeds are less than 7 MPH. Use High gear when basic operational ground speeds are more than 7 MPH.

General Sand / Dune Driving

The use of Low gear when continuously operating at speeds less than 30 mph will greatly increase belt life in sand/dune environments.

IMPORTANT
Do not shift from Low to High without coming to a complete stop. Using High gear for heavy loads, hilly terrain, sand/dune environments, or in wet, muddy conditions will increase the chance of drive belt damage.

TRANSMISSION DIAGNOSTICS

HARD SHIFTING

SYSTEM DIAGNOSIS

Difficulty shifting, or harsh shifting are generally caused by the Transmission or PVT Systems. The system causing the difficult shifting concern can generally be diagnosed using the following information.

SYMPTOM	CAUSE
Vehicle is difficult to shift **ONLY** with the engine running	Refer to **PVT System** Chapter for more information
Vehicle is difficult to shift all the time	Refer to **Transmission Isolation** this will help determine if the concern is internal or external to the transmission. After isolation proceed with diagnosis.

ADDITIONAL HARD SHIFTING CAUSES

SHIFTING CAUSES	
• Shift cable adjustment/condition • PVT alignment (clutch center distance) • Transmission lubricant type/quality • Transmission leaks / fluid level	• Loose fasteners on sector gear cover • Worn rod ends, clevis pins, or pivot arm bushings • Shift selector rail travel • Worn, broken or damaged internal transmission components

TRANSMISSION ISOLATION

To determine if shifting difficulty or problem is caused by an internal transmission problem or external concern the transmission should be isolated using the following information.

After the transmission is isolated refer to **Additional Shifting Causes** or the proper chapter in the service manual for additional information.

1. Disconnect the shift cable from the bellcrank.
2. With the shift cable disconnected from the transmission shift the vehicle using the shift lever.
   - If the shift lever continues to bind the concern is likely caused by the shift cable. Refer to the proper service information for replacement.
   - If the shift lever moves freely proceed to step 3.
3. With the shift lever disconnected manually select each gear range at the transmission bellcrank.
   - If the bellcrank requires more than approximately 15 ft-lbs (20 N·m) to rotate, the shifting concern is most likely caused by an internal transmission concern.
   - If the bellcrank moves freely, manually select each gear range at the transmission bellcrank and test ride vehicle. If it functions properly then there is likely still an outside concern causing the issue.

FINAL DRIVE DIAGNOSTICS

ALL WHEEL DRIVE (AWD) CONCERNS

All Wheel Drive (AWD) concerns are generally caused by a mechanical concern within the front gearcase, or electrical concern. The following chart will help finding the root cause and assist with basic checks of the front gearcase and AWD system. Refer to the proper chapter in the service manual for additional vehicle specific information.

SYMPTOM	CAUSE
AWD stays engaged even when switch is OFF	• Rollers flat-spotted. Remove all and roll across a table to check for flat spots • Inside of ring gear is dimpled from harsh engagement. Check the ramps and low spots inside ring gear. Should be smooth. • Output Hub races are flat spotted/dimpled. Run your finger along the outer surface that goes inside of the cage. Should be uniform with no high points. • Armature plate or coil magnetized. Rule out armature plate by putting it close to something metal to see if it tries to stick. • Drivetrain wedged. Often caused by torsion spring coming out of place.
AWD Does not engage	• Roller cage is broken. Can typically find debris in the oil if drained • No power to AWD coil. Jump power and ground directly to the coil and verify AWD function. If AWD functions this confirms an electrical issue is causing the concern. Verify fuses are in good condition and inspect the wiring harness for damage or broken wires. Check all connections for damaged pins or bad connection. • Weak magnetism. With power and ground to the coil, armature plate should not be able to be pried off with fingers. • Armature plate bent/damaged. Check flatness and look for uneven wear marks • Prop shaft not turning at transmission snorkel shaft. Internal transmission damage

DRIVESHAFT (HALF SHAFT) DIAGNOSTICS

Driveshaft (Half Shaft) operation can cause various customer concerns. For more information related to Driveshaft concerns or failures **CLICK HERE** to view the **“Half Shaft Analysis”** poster.

BRAKE SYSTEM DIAGNOSTICS

BRAKE NOISE TROUBLESHOOTING

Dirt or dust buildup on the brake pads and disc is the most common cause of brake noise (squeal caused by vibration). If cleaning does not reduce the occurrence of brake noise, Permatex™ *Disc Brake Quiet* can be applied to the back of the pads. Follow directions on the package. This will keep pads in contact with caliper piston(s) to reduce the chance of squeaks caused by dirt or dust.

POSSIBLE CAUSE	REMEDY
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with CRC Brakleen™ or an equivalent non-flammable aerosol brake cleaner. Remove pads and/or disc hub to clean imbedded material from disc or pads.
Pad(s) dragging on disc due to: Improper adjustment Master cylinder reservoir overfilled Master cylinder compensating port restricted Master cylinder piston not returning completely Caliper piston(s) not returning Operator error (riding the brake)	 Adjust pad stop Set to proper level Clean compensating port Inspect. Repair as necessary Clean piston(s) seal Educate operator
Loose wheel hub or bearings	Check wheel and hub for abnormal movement. Check axle nut torque. Inspect/replace bearing if needed.
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary
Noise is from other source (axle, hub, disc or wheel)	If noise does not change when brake is applied check other sources. Inspect and repair as necessary

BRAKE VIBRATION

PEDAL / LEVER VIBRATION *(VIBRATION IS ONLY FELT IN PEDAL OR LEVER WHILE BRAKING)*	
• Brake Disc worn (runout or thickness variance exceeds service limit) • Brake Disc damaged	• Brake Pad wear (uneven / unusual wear)

VEHICLE VIBRATION *(VIBRATION FELT THROUGH ENTIRE VEHICLE / CHASSIS WHILE BRAKING)*	
• Worn Suspension components	• Alignment issues

CALIPER OVERHEATS (BRAKES DRAG)

CALIPER OVERHEATS (BRAKES DRAG)	
• Pad clearance set incorrectly • Parking brake lever incorrectly adjusted (if equipped) • Brake pedal or brake lever binding or unable to return fully • Incorrect brake fluid level (overfilled fluid reservoir)	• Parking brake left on (if equipped) • Residue build up under caliper seals • Incorrect operation of brakes – Operator using the throttle and brakes at the same time. – Excessive use of the brakes.

POOR BRAKE PERFORMANCE

POOR BRAKE PERFORMANCE	
• Air in system	• Incorrectly adjusted stationary pad
• Water in system (brake fluid contaminated)	• Worn or damaged master cylinder or components
• Caliper or disc misaligned	• Damaged brake pad noise insulator
• Caliper dirty or damaged	• Brake pads drag
• Brake line damaged or lining ruptured	• Brake caliper drags
• Worn disc and/or friction pads	• Brake fluid leaks

BRAKES LOCK

BRAKES LOCK	
• Alignment of caliper to disc	• Failed brake hose / line
• Caliper pistons sticking	• Improper assembly of brake system components
• Failed master cylinder	• Faulty distribution block (INTL models only)

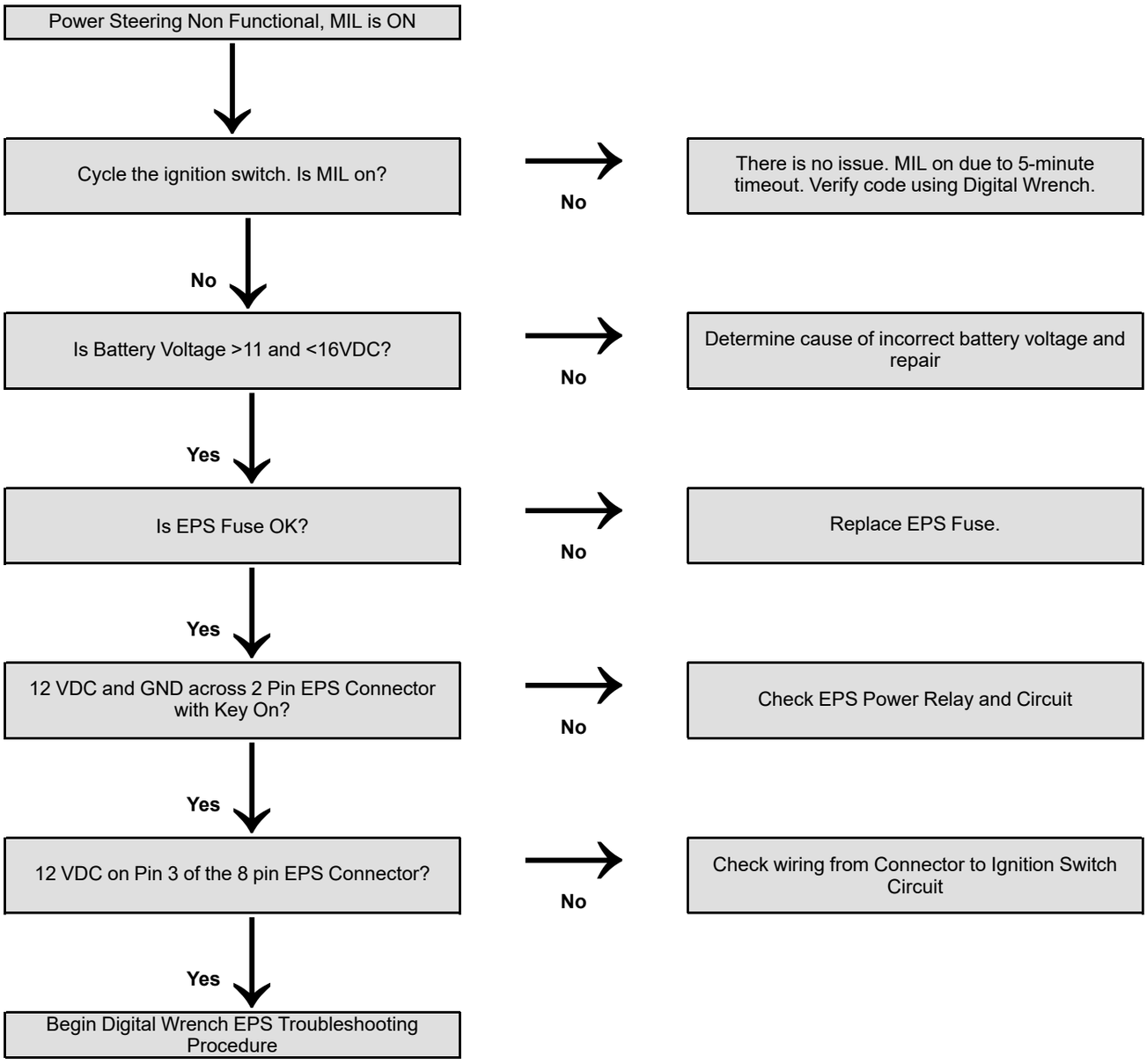
STEERING / SUSPENSION DIAGNOSTICS

EPS TROUBLESHOOTING (POWER STEERING NON-FUNCTIONAL WITH MIL ON)

IMPORTANT

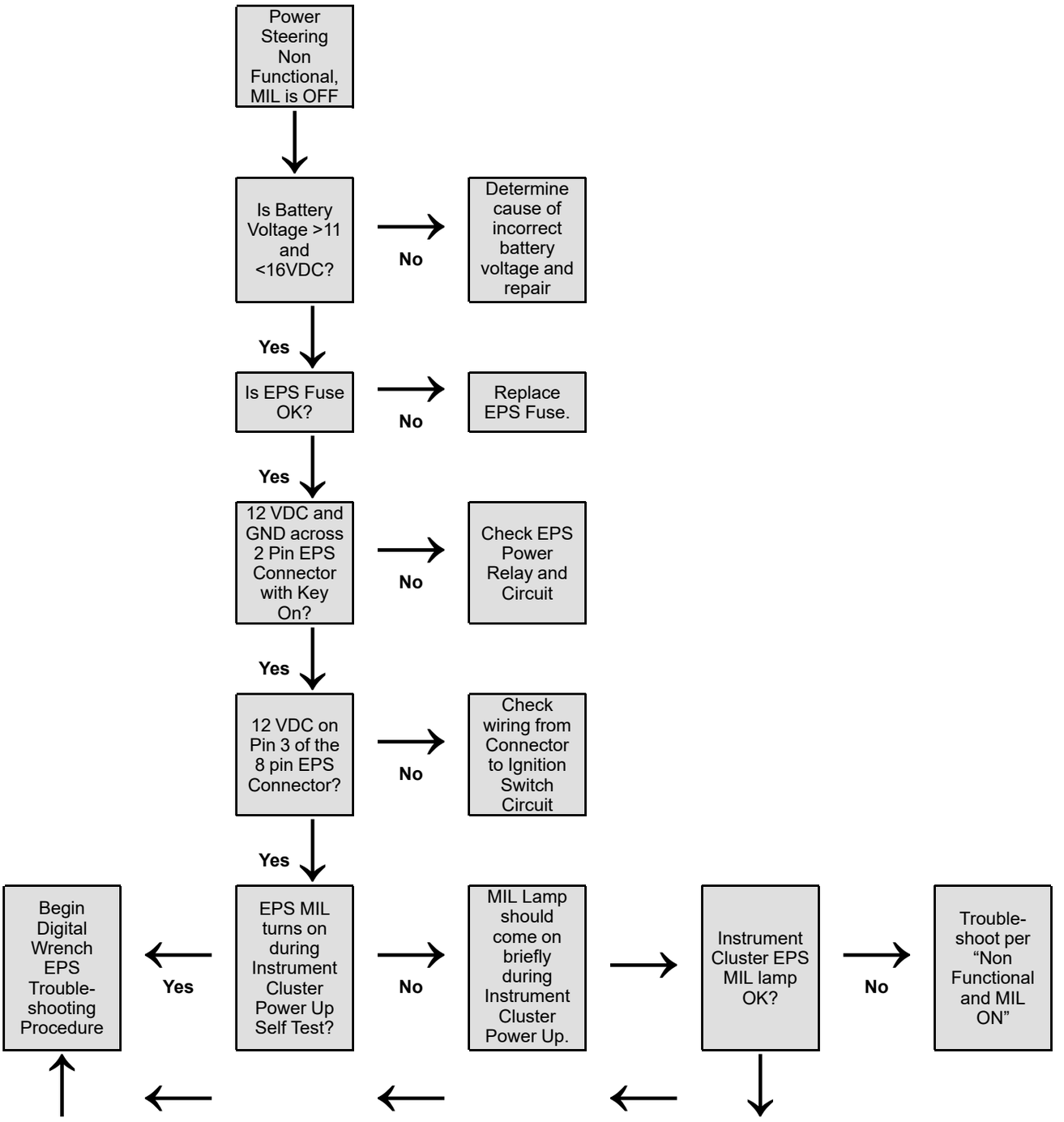
READ BEFORE YOU REPLACE THE EPS UNIT!

Verify the EPS unit has the latest software version and calibration loaded before replacing the EPS unit. If not, update to the latest version for each and follow the guided diagnostic procedure(s) available in Digital Wrench®.



EPS TROUBLESHOOTING (POWER STEERING NON-FUNCTIONAL WITH MIL OFF)

IMPORTANT
READ BEFORE YOU REPLACE THE EPS UNIT! Verify the EPS unit has the latest software version and calibration loaded before replacing the EPS unit. If not, update to the latest version for each and follow the guided diagnostic procedure(s) available in Digital Wrench®.



EPS TROUBLESHOOTING (USING DIGITAL WRENCH®)

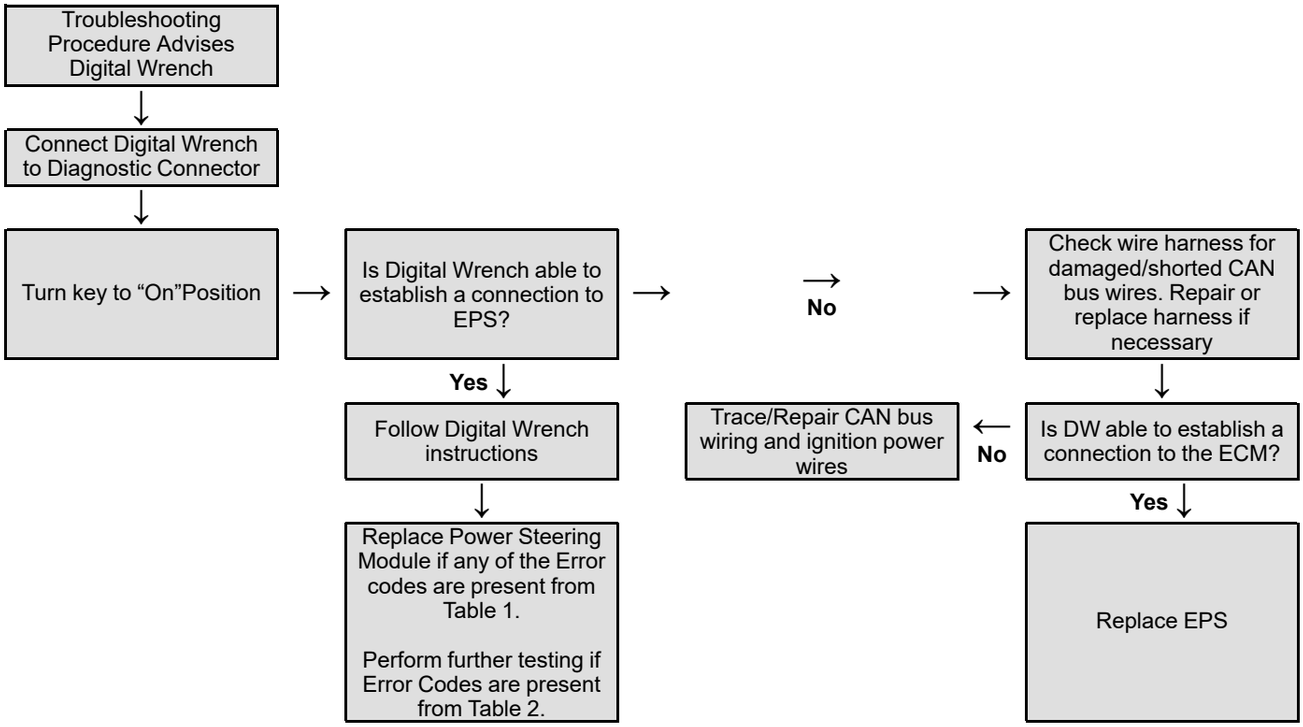


TABLE 1

- Position Encoder Error
- EPS Software Error
- Steering Torque Sensor Full Failure
- Steering Excessive Current Error*
- Steering Over Current Shutdown*
- Phase Sensing Over Current
- Phase Sensing Excessive Current
- Torque Sensor Range
- Rotor Encoder Communication
- Rotor Encoder Variance
- SEPIC Voltage Low/High
- EEPROM Failure

**These Error Codes must have multiple occurrences or you must be able to duplicate the condition before replacing the EPS unit.*

TABLE 2

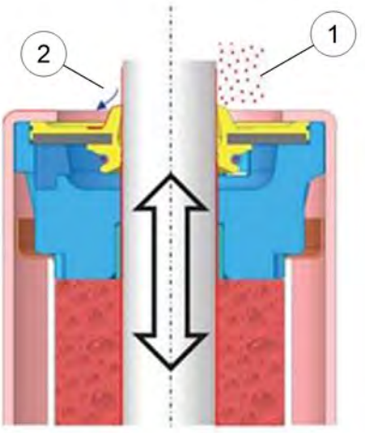
- **EPS Inverter Temperature Test**
  1. Verify that the Power Steering module heat sink surface (top surface) is clean and free of mud and dirt. Make a note of how much debris was on heat sink before cleaning. Record all power steering error codes. EPS inverter temperature can be monitored through Digital Wrench.
  2. Allow vehicle to set and cool for at least 2 hours.
  3. Drive vehicle for 30 minutes of left and right turning and then connect to Digital Wrench and read Power Steering Error Codes. If inverter temperature error code is present, replace Power Steering Module. If error is not present, Module is OK. EPS inverter temperature can be checked using Digital Wrench.

- **Battery Voltage Over / Under Test**
  1. Disconnect 2 pin power connector to EPS and verify battery voltage (12-14 VDC) is present on pins with key on. If voltage is low, investigate and correct cause. If voltage at pins is correct, cheak all connections for corrosion, damage, and tightness. Check pin 3 on 8 pin connector for 12V signal with key on.

- **Calibration Error - Reflash EPS Unit**

SHOCK ANALYSIS

Shock “misting” ① or “weepage” ② is common and should be present during normal vehicle operation. All Shock Absorber Seals are designed to allow a thin film of oil to pass into and out of the shock. This thin film of oil lubricates the Seal to ensure low friction and reduces the corrosion rate of the Piston Rod.



Vehicle operating conditions have a high impact on how much shock oil might be present on the seal and shock body (i.e. road conditions and operating temperature). It is important to properly identify the difference between normal operation (weepage or misting) and a shock that has a leak. Below are some images to help determine what is normal and what could be identified as a bad shock.

MISTING OR WEEPAGE	LEAKAGE
	

ELECTRICAL DIAGNOSTICS

ELECTRICAL SERVICE NOTES

Keep the following notes in mind when diagnosing an electrical problem.

- Refer to wiring diagram for stator and electrical component resistance specifications.
- When measuring resistance of a component that has a low resistance value (under 10 Ohms), remember to subtract meter lead resistance from the reading. Connect leads together and record the resistance. The resistance of the component is equal to tested value minus the lead resistance.
- Become familiar with the operation of your meter. Be sure leads are in the proper jack for the test being performed (i.e. 10A jack for current readings). Refer to the Owner's Manual included with your meter.
- Voltage, amperage, and resistance values included in this manual are obtained with a Fluke™ 77 Digital Multimeter **(PV-43568)**. This meter is acceptable for use when diagnosing electrical problems. Readings obtained with other meters may differ.
- Pay attention to the prefix on the meter reading (K, M, etc.) and the position of the decimal point.
- For resistance readings, isolate component to be tested. Disconnect wire harness or power supply.

DIGITAL MULTI-METER (DMM) NOTES

Polaris advises to only use a high quality DMM that meets the same standards as the Fluke™ 77 (PV-43568) for electrical testing.

Unless you are very familiar with Ohm's Law, and have complete information about the circuit you are trying to diagnose, test lights are likely to provide results that would be misleading. This is especially true if any solid state component is involved, where you will almost certainly not have complete circuit information.

Polaris also specifically advises against the use of other circuit testing devices, including but not limited to:

- Short finders
- Simplified circuit testers
- Fuse piggy-back devices

Testers beside a DMM will only work in one scenario, and slight variables can provide you with misleading results. The testing practices described in this chapter are more certain and rely only on the DMM and your knowledge.

STATIC AND DYNAMIC TESTING

There are many methods for testing a DC circuit. These methods fall into one of two categories, either static or dynamic.

STATIC TESTING

The two most common forms of static testing are:

- Resistance testing (the Ohms setting on your DMM)
- Measuring voltage with the circuit open, such as when the harness connector is off a sensor you are testing. This is commonly referred to as measuring "Available Voltage".

These two tests will help you find the majority of electrical issues. If they do not, we must remember that static circuit testing does not take into account how current actually flows in that circuit. That is only accomplished with dynamic testing.

Before attempting dynamic testing (as it is intrusive on sealed connectors and damage could be done if not careful), verify the following:

- Static voltage testing advised for that circuit has been completed, and is in spec.
- All associated circuits have under 1 ohm of resistance from end to end. Testing Continuity / Resistance page 1.71
- All associated circuits have no shorts to ground. Testing For A Short To Ground page 1.71
- All associated circuits have no shorts to voltage. Testing For A Short To Voltage page 1.72

DYNAMIC TESTING

There are two types of dynamic testing we will advise to use when diagnosing electrical concerns:

- Current flow testing (Amperage) Testing Current Flow (Amperage) page 1.73. Measuring Amperage is not a common practice, as you will not typically have a spec to compare your reading to. Also, many components on this machine flow over 10 Amps, which will blow the majority of DMM fuses. The exception to this is a parasitic draw test refer to Current Draw - Key Off page 1.74.
- Measuring voltage drop. Performing this test correctly will give you understanding of how electrical pressure (voltage) varies in a circuit as current is flowing. Testing Voltage Drop page 1.74

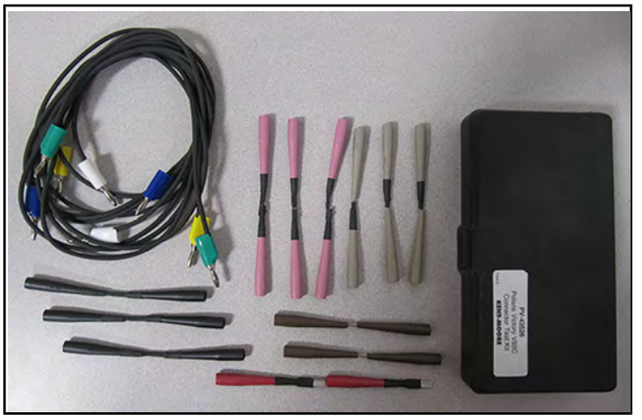
CONNECTOR PROBING GUIDELINES

FRONT PROBING

Front probing is accomplished by pulling the harness connector from the component, and then taking a measurement from the terminal face. This is the measurement taken in most situations.

The terminals in electrical connectors are small and fragile. Do not probe directly with your meter leads, as the meter leads are larger than almost all terminals. Probing with a meter lead will likely damage the terminal by spreading it beyond it's design limits, causing no tension. If there is no tension, you will have either no connection or a poor connection.

To avoid causing damage, use of the appropriate adapters is required. Most terminals used on Polaris machines can be tested using terminal test kit PV–43526. It includes male and female adapters that can be plugged into banana connectors to adapt to your meter.



PV–43526 adapters are also used as known good terminal drag testers. Insert the male tester terminal into the female connector on the harness. There should be a noticeable amount of force to install and remove the tester, and you should be able to tip the harness connector with the tester hanging from the connector, and not have the tester fall out.

If very little or no resistance is felt, or if the tester falls out when the connector is held upside down, this is an indication that the female connector in the harness has insufficient tension and will cause connection issues. You can either replace that harness, or service it by replacing the terminal or attempting to adjust/tighten the tang in the female terminal.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

BACK PROBING

Back probing is typically not advisable on sealed connectors, as it can easily cause damage to the wire, terminal, connector body, or body to wire seal.

NOTICE
There are commercially available back probe kits. Fine, narrow needles with no coating to block current flow also work well for back probing.

If back probing must be done to see voltage drop while current is flowing in the circuit (dynamic testing), ensure it is done only on connectors that are large enough to accommodate the probe. Ensure back probing is done gently and carefully. Ensure no damage has been done after probing.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

BREAK OUT

This is a method of front probing to achieve the goal of back probing, which is to measure the circuit while it is functioning.

You can use test probe kit PV–43526, test leads, and electrical tape to create a bridge with exposed testing areas to have everything exposed but still working.

IMPORTANT
Use electrical tape to cover the exposed conductive parts of the circuit, mainly the clamps of your test leads. If they contact each other, circuit or component damage could occur from a short.

TESTING CONTINUITY / RESISTANCE

Testing using the Ohmmeter function of your DMM is one of the first things you will do when troubleshooting an electrical issue. It is especially convenient when the wiring diagram provides a resistance spec for the component in the circuit you are diagnosing. It can quickly give you a good idea if you simply need to replace a part, or if there might be another circuit issue.

Using the following points in conjunction with your DMM owner's manual will ensure your resistance testing is always accurate:

- Only measure resistance on an isolated part of the circuit. This means if you are testing internal resistance of a component, it cannot be connected to the harness. If you are measuring a wire (typically from the ECU to a sensor) both the sensor and ECU would need to be unplugged. Most Ohmmeters provides a precise amount of current to determine resistance. Any other sources will make your reading inaccurate.
- Ensure you are making good contact by using the proper terminal adapters. Connector Probing Guidelines page 1.70
- If you are not using a self ranging meter, double check your range setting.
- If your continuity is under 1 ohm, leave the harness disconnected and move on to Testing For A Short To Ground page 1.71 and Testing For A Short To Voltage page 1.72.

For a video demonstration, scan the QR code below, or right click it and select "open in new tab."

TESTING FOR A SHORT TO GROUND

Shorts to ground happen when the current flowing in a given circuit bypasses the load. The current flowing from B+ finds an easier way to return to ground (B-), so much more of it can flow than the circuit is designed for. This causes the circuit's protection device (either a fuse or circuit breaker) to open, protecting the circuit from damage.

There are many possible causes of a short to ground, here are some:

- The harness rubbing against a component that is grounded, such as the frame, chassis component, or engine.
- A component's internal circuitry contacting its case.
- Wire-to-wire chaffing causing contact with the conductor of a ground side circuit.
- Corrosion/moisture in a component providing a ground path.
- Moisture in a connector body providing a ground path.

NOTICE
This test is typically done right after checking continuity from sensor to ECU when diagnosing an EFI DTC. It can also be used to help diagnose concerns about blowing fuses. Ensure you are able to duplicate the concern before testing so that your results point you in the right direction.Testing for Intermittent Conditions page 1.73

TESTING PROCEDURE

1. Consult the wiring diagram. Determine which circuit you will be testing.
2. Ensure that any static voltage checks advised in relation to the DTC or concern you are diagnosing have been performed and are in spec.
3. Ensure you have checked continuity of the circuit. Testing Continuity / Resistance page 1.71
4. Ensure that neither end of the circuit is connected.
5. Set your DMM to Ohms.
6. Connect one meter lead securely to the battery negative post.
7. Connect the other lead to either end of the disconnected circuit. Ensure you are using the correct adapter.Connector Probing Guidelines page 1.70
8. If there is continuity, the harness is damaged and should be repaired or replaced.
9. If the DMM reads OL, there is no short to ground. Leave the harness disconnected on both sides, and proceed to check for a short to voltage. Testing For A Short To Voltage page 1.72

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

TESTING FOR A SHORT TO VOLTAGE

There are three possible short to voltage causes:

1. Internal electronic component short.
2. Harness chaffing leading to contact of the circuit being diagnosed to one with B+ or a different reference voltage.
3. Moisture in a connector or component.

TESTING PROCEDURE

1. Consult the wiring diagram. Determine which circuit you will be testing.
2. Ensure that any static voltage checks advised in relation to the DTC or concern you are diagnosing have been performed and are in spec.
3. Ensure you have checked continuity of the circuit. Testing Continuity / Resistance page 1.71
4. Ensure you have checked for a short to ground. Testing For A Short To Ground page 1.71
5. Ensure that neither end of the circuit is connected.
6. Set your DMM to DC volts.
7. Connect one meter lead securely to the battery negative post.
8. Connect the other lead to either end of the disconnected circuit. Ensure you are using the correct adapter.Connector Probing Guidelines page 1.70
9. If there is voltage present, the harness is damaged and should be repaired or replaced. You may need to remove the protective tape and tubing to inspect.
10. If the DMM reads 0 volts, the concern may be in a component related to the circuit. If so, checking internal continuity of non-electronic components may reveal the concern, but diagnosis at this point may require using known good parts.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

TESTING FOR INTERMITTENT CONDITIONS

Intermittent conditions are very difficult to diagnose, as when you are testing the circuit, you may not have the circuit failing to indicate where the issue is. Intermittent electrical failures are almost always related to a poor connection that only goes open in specific situations, such as going over a certain kind of bump, at a certain temperature, or when the machine is torque loaded in one way.

Here is a list of possible failures that can be associated with an intermittent electrical failure:

- Loose female terminal in an electrical connector.

NOTICE

If the terminals in question are the correct size/series, always use PV–43526 to test the drag when inserting and removing the test terminal adapters. Compare the effort to the drag against the known good tester terminal for reference.

- Poor terminal to wire crimp.
- Terminal crimp that occurred at least partially on insulation instead of the conductor wire strands.
- Terminal fretting corrosion
- Contamination/moisture corrosion
- A full or partial break of the conductor wires in the insulation, with or without visible insulation damage.
- Improper routing, especially when it leads to chaffing or heat damage, especially near exhaust.

You may need to use different techniques to duplicate these concerns. These include but are not limited to:

- Moving the harness by wiggling it or flexing certain areas.
- Pulling at or near the suspected connector.
- Pushing in different directions to flex the connector body and try to isolate poor connections.
- Changing the temperature. This can be accomplished with either heat guns or cold air guns.

⚠ WARNING

Always exercise caution when using these tools, and use them for short periods of time when changing the temperature of an area. Failure to do so can lead to serious injury and/or damage to the machine.

TESTING CURRENT FLOW (AMPERAGE)

Performing a current flow test requires the meter leads be inserted into the correct cavities in the meter, and be placed in series in the circuit to be tested. Refer to your Digital Multi Meter's owner's manual for potential model specific instructions. Ensure you are using acceptable adapters to avoid damaging the connector terminals. See Connector Probing Guidelines page 1.70.

NOTICE

Amperage specs are generally not provided for circuits/components. Please only perform this test when advised in the manual.

IMPORTANT

Many circuits on this machine will exceed the 10 Amp fuse in most Digital Multi Meters in normal operation.

CURRENT DRAW - KEY OFF

Parasitic draw is when there is excessive current flow with the key off.

While the most common causes of draws are improperly installed accessories (tapping into un-switched B+ instead of switched) there can be electronic component failures that can cause this as well.

IMPORTANT

Do not connect or disconnect the battery cable, or ammeter with the engine running. Damage will occur to electrical components.

IMPORTANT

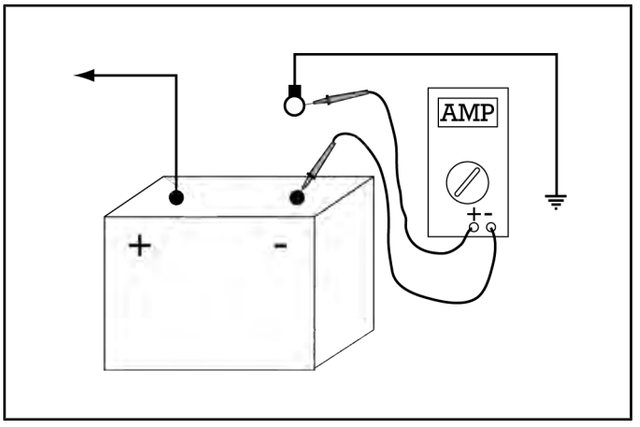
Charging system damage will occur if incompatible components are installed. Always reference the Polaris Electronic Parts Catalog for the proper part numbers.

NOTICE

Wait ten minutes with the key off for the ECU to power down. This will avoid a faulty readout while testing amperage draw.

TESTING PROCEDURE

1. Remove the negative cable from the battery.
2. Connect a jumper from the negative battery cable terminal to the negative battery post.
3. Ensure your meter leads and selector dial are set to measure amperage.
4. Connect your red lead to the battery negative cable terminal.



5. Connect your black lead to the battery negative post.
6. Momentarily key the ignition switch on, then off.

IMPORTANT

Ensure all electrical components are switched off, or damage to your jumper and/or meter will occur.

7. Wait 10 minutes before checking the value. Vehicles will vary, but electronic components will take time to fully go to sleep after switched power is removed.
8. Maximum allowable is 10 milliamps. If your meter is ranged to the 10 Amp scale, this will appear as 0.010 Amps.

Current Draw - Key Off:
Maximum of .01 DCA (10 mA)

9. If over 10 milliamps, go to the fuse block and start systematically removing one fuse at a time until the value drops, indicating the circuit that requires attention.

TESTING VOLTAGE DROP

NOTICE

If you disconnect the connector at the load, and measure voltage with one lead on the power supply wire, and one to ground, you will be measuring available voltage. This is a static test and not dynamic voltage drop testing. Refer to Static and Dynamic Testing page 1.69.

The measurement of voltage is the **DIFFERENCE** in electrical pressure between the two points your DMM leads are touching.

Most circuits will have one load. The load is the component in the circuit that uses the current flow to do work, such as move a solenoid or light a bulb.

Voltage coming into the load should be near battery voltage with current flowing. There will be some loss from moving through electrical contacts in connectors and relays, but it will be minimal.

NOTICE

You will need to backprobe to perform this test. For information about doing this safely, refer to Connector Probing Guidelines page 1.70.

Voltage should be near fully depleted by the load. This means that when measuring on the ground side of the circuit, immediately after the load, back to battery negative, you should have near zero pressure difference (voltage).

If you do have a difference in pressure, this means there is something adding resistance to the circuit such as corrosion.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

NOTES

CHAPTER 2
MAINTENANCE

2

PERIODIC MAINTENANCE - GENERAL

LUBRICANTS / SERVICE PRODUCTS

PRODUCT	SIZE (QUANTITY)	PART NUMBER
PS-4	1 qt (12)	2876244
	1 gal (4)	2876245
	16 gal keg	2876247
	55 gal drum	2876246
PS-4 Extreme Duty	1 qt (12)	2878920
	2 qt (8)	2878922
	1 gal (4)	2878919
	16 gal keg	2879003
	55 gal drum	2879002
	330 gal tote	2879001
AGL	1 qt (12)	2878068
	1 gal (4)	2878069
	2.5 gal (2)	2878070
Demand Drive	1 qt (12)	2877922
	2.5 gal (2)	2877923
Gas Shock Oil	1 qt (6)	2870995
	2.5 gal (2)	2872279
Antifreeze / Coolant 50/50 Extended Life	1 qt (12)	2880514
	1 gal (6)	2880513
	55 gal drum	2880512
Chain Lube	16 oz aerosol (12)	2872348
Fogging Oil	12 oz aerosol (12)	2870791
	1 qt (12)	2871517
All Season Grease	Four 3 oz packs (6)	2871322
	14 oz cartridge	2871423
U-Joint Grease	3 oz tube (24)	2871515
	14 oz cartridge	2871551
Carbon Clean	12 oz bottle (12)	2871326
Fuel Stabilizer	16 oz (12)	2870652
	2.5 gal (2)	2872280

PRE-RIDE INSPECTION

ITEM	INSPECTION / CHECK
Air Filter	• Air filter / air box is clean • Filter is properly installed • Air box cover is secured and fastened
Brake System	• Check brake fluid level is between MIN and MAX • Check brake pedal is not soft when pushed • Verify both brake lever and pedal stop and hold the vehicle • Inspect for leaks
Cooling System	• Verify coolant level is filled to the FULL COLD mark on coolant reservoir (if engine is cold) • Inspect hoses and radiator for leaks • Extract debris from radiator
Engine Oil	• Verify oil level is in the SAFE range on the dipstick • Inspect oil for color and contaminants
Engine Stop Switch	• Ensure operation
Exhaust	• Check fasteners • Check spark arrester condition / attachment • Inspect heat shields
Frame / Body Fasteners	• Inspect, ensure tightness, check none are missing
Front / Rear Suspension	• Inspect bushings • Check for damage to the control arms / trailing arms • Check for leaking shocks • Check shock mounting fasteners
Fuel	• Inspect fuel lines for leaks and damage • Start your ride on a full tank
Gauge Cluster	• Ensure operation of indicator lamps
Headlights / Taillights	• Ensure all lights are operational • Adjust headlight aim as required
Shift Lever	• Ensure operation in all ranges (P, R, N, L, H)
Steering System	• Check for proper EPS operation (if equipped) • Check for tightness/play in the steering wheel when turned lock to lock
Throttle	• Ensure smooth operation • Snaps closed with handlebars in any position
Tires	• Check for proper air pressure in all tires • Inspect for tire damage / objects in tire • Ensure adequate tread depth

ITEM	INSPECTION / CHECK
Wheels / Lug Nuts	• Ensure rim is not cracked / bent • Verify proper lug nut torque
Winch (if equipped)	• Inspect cable / line and switch • Ensure operation

POLARIS MAINTENANCE SCHEDULE

The intervals shown are based on vehicles operated under normal conditions.

Each interval is given in hours and miles (kilometers). Items should be serviced at whichever interval comes first following the **Initial Break-In Service**.

Continue to reference the following maintenance schedules at the given intervals as hours and miles (kilometers) increase on the vehicle.

Vehicles subjected to severe use must be serviced at 50% of the stated interval. Examples of Severe Use: Frequent immersion in mud, water, or sand, constant high RPM use, prolonged low-speed heavy load operation, extended idle, and short trip cold weather operation.

INITIAL BREAK-IN SERVICE
FIRST 25 HOURS / 1 MONTH

Engine Air Filter	Inspect air filter; replace as necessary. Ensure proper installation of filter and airbox cover. Inspect ducts and screens; clean as necessary.
Cooling System	Fluid level inspection; inspect for fluid leaks; add coolant if needed. Inspect coolant strength seasonally; pressure test system yearly.
General Lubrication	Locate all applicable fittings and grease.
Shift Cable / Linkage	Inspect; adjust as needed.
Parking Brake (if applicable)*	Inspect; adjust as needed.
Battery	Check terminals; terminals should be tight and free of corrosion. Clean, test, and replace as necessary.
Engine Oil and Filter	Change the engine oil and filter.
Front Gearcase Fluid	Initial fluid level inspection; add lubricant if needed.
Rear Gearcase Fluid	Initial fluid level inspection; add lubricant if needed.
Transmission Fluid	Initial fluid level inspection; inspect for fluid leaks; add lubricant if needed.
Spark Arrestor	Inspect; clean as needed.
The break-in period consists of the first 25 hours of operation. Careful treatment of a new engine and drive components will result in more efficient performance and longer life for these components. The items outlined in this service interval only need to be performed at the first 25 hours of operation. They do not need to be performed every 25 hours.	
* It is recommended to have an authorized Polaris dealer perform these services.	

Vehicles subjected to severe use must be serviced at 50% of the stated interval. Examples of Severe Use: Frequent immersion in mud, water, or sand, constant high RPM use, prolonged low-speed heavy load operation, extended idle, and short trip cold weather operation.

EVERY 25 HOURS / 500 MILES (800 KM) OR YEARLY FOLLOWING INITIAL BREAK-IN SERVICE

Engine Air Filter	Inspect air filter; replace as necessary. Ensure proper installation of filter and airbox cover. Inspect ducts and screens; clean as necessary.
Battery	Check terminals; terminals should be tight and free of corrosion. Clean, test, and replace as necessary.
Brake System	Fluid level inspection; inspect for fluid leaks; add lubricant if needed. Inspect brake pad wear. Inspect hoses for damage.
General Lubrication	Locate all applicable fittings and grease.
Radiator	Inspect; Clean external surfaces.
Tires	Inspect; Adjust pressure level as needed; Inspect wear and replace as needed.
Shift Cable/ Linkage	Inspect; adjust as needed.
* Have an authorized Polaris dealer or other qualified person perform these services.	

Vehicles subjected to severe use must be serviced at 50% of the stated interval. Examples of Severe Use: Frequent immersion in mud, water, or sand, constant high RPM use, prolonged low-speed heavy load operation, extended idle, and short trip cold weather operation.

EVERY 50 HOURS / 1000 MILES (1600 KM) OR YEARLY FOLLOWING INITIAL BREAK-IN SERVICE

Engine Air Filter	Inspect air filter; replace as necessary. Ensure proper installation of filter and airbox cover. Inspect ducts and screens; clean as necessary.
Battery	Check terminals; terminals should be tight and free of corrosion. Clean, test, and replace as necessary.
Brake System	Fluid level inspection; inspect for fluid leaks; add lubricant if needed. Inspect brake pad wear. Inspect hoses for damage.
General Lubrication	Locate all applicable fittings and grease.
Radiator	Inspect; Clean external surfaces.
Tires	Inspect; Adjust pressure level as needed; Inspect wear and replace as needed.
Engine Oil and Filter	Change the engine oil and filter.
Spark Plug	Inspect; replace as needed.
Wiring	Inspect for wear, routing, and retention.
Front Gearcase Fluid	Change fluid.
Rear Gearcase Fluid	Change fluid.
Transmission Fluid	Initial fluid level inspection; inspect for fluid leaks; add lubricant if needed.
Drive Belt	Inspect; replace as needed.
Clutches	Inspect weights, bushings, rollers, wearable parts; clean; replace worn parts as needed.
Spark Arrestor	Inspect; clean as needed.
Suspension Components / Alignment*	Inspect front and rear suspension bushings, and ball joints for loose or worn components; replace as needed. Inspect shock absorbers for leaks or damage.
Cooling System	Fluid level inspection; inspect for fluid leaks; add coolant if needed. Inspect coolant strength seasonally; pressure test system yearly.
Wheel Bearings	Inspect; replace as needed.
Parking Brake (if applicable)*	Inspect; adjust as needed.
Fuel System*	Cycle key to pressurize fuel pump; check for leaks at fuel system connections, check for leaks at fill cap.
Intake Ducts	Inspect ducts for proper sealing / air leaks.
Shift Cable/ Linkage	Inspect; adjust as needed.
Suspension and Steering Components/ Alignment	Inspect; replace as needed.
* Have an authorized Polaris dealer or other qualified person perform these services.	

Vehicles subjected to severe use must be serviced at 50% of the stated interval. Examples of Severe Use: Frequent immersion in mud, water, or sand, constant high RPM use, prolonged low-speed heavy load operation, extended idle, and short trip cold weather operation.

ADDITIONAL MAINTENANCE INTERVALS

Every 2000 miles (3200KM) / 24 months / 2 years / 100 hours	Brake Fluid	Change fluid.
Every 2500 miles (4000KM)	Shock Absorbers*	Replace or rebuild (if applicable).

ADDITIONAL MAINTENANCE INTERVALS

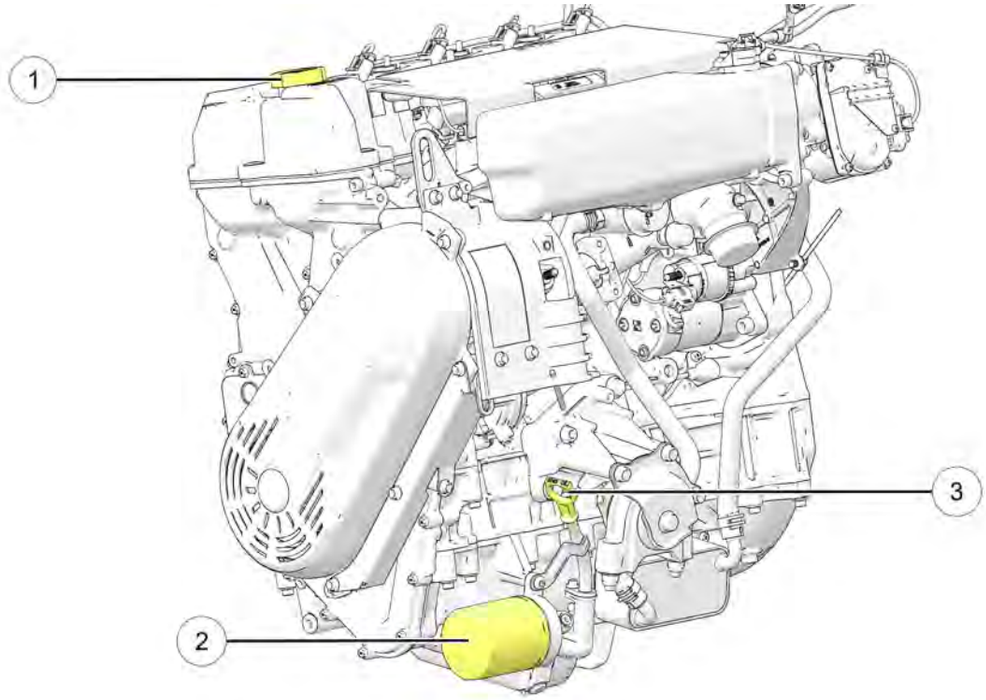
Every 5000 miles (8000KM) / 60 months / 5 years	Coolant	Change fluid.
	Alternator Belt	Replace.
	Spark Plugs	Replace.
Every 10,000 miles (16,000KM) / 500 hours	Valve Clearance*	Inspect; adjust as needed.
* Have an authorized Polaris dealer or other qualified person perform these services.		

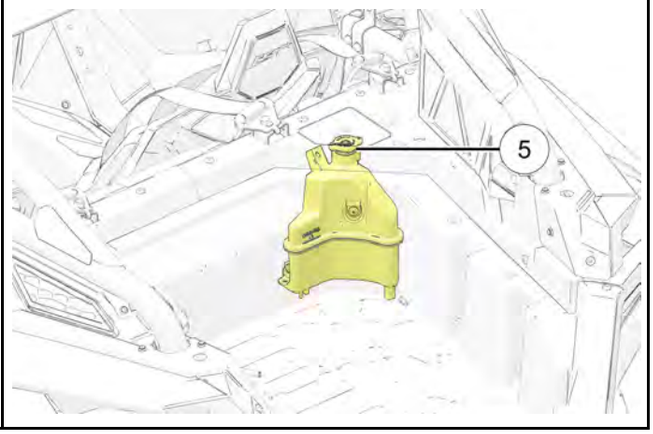
MAINTENANCE QUICK REFERENCE

ITEM	LUBE REC.	METHOD	FREQUENCY*
Oil Fill Cap ①: - Under Cargo Box **Oil Filter ②:** - Passenger side rear wheel well **Dipstick ③:** - Passenger's side rear wheel well	Polaris PS-4 or Polaris PS-4 Extreme Duty	Add oil to proper level ④ on dipstick	Perform a break-in oil and filter change at 25 hrs or one month; perform every 50 hrs thereafter
Engine Coolant - Front-Right Side of Cargo Box	Polaris 50/50 Coolant	Maintain coolant level in coolant reservoir bottle ⑤.	Check level daily; change coolant every two years

** More often under severe use, such as operation in water or under severe loads.*

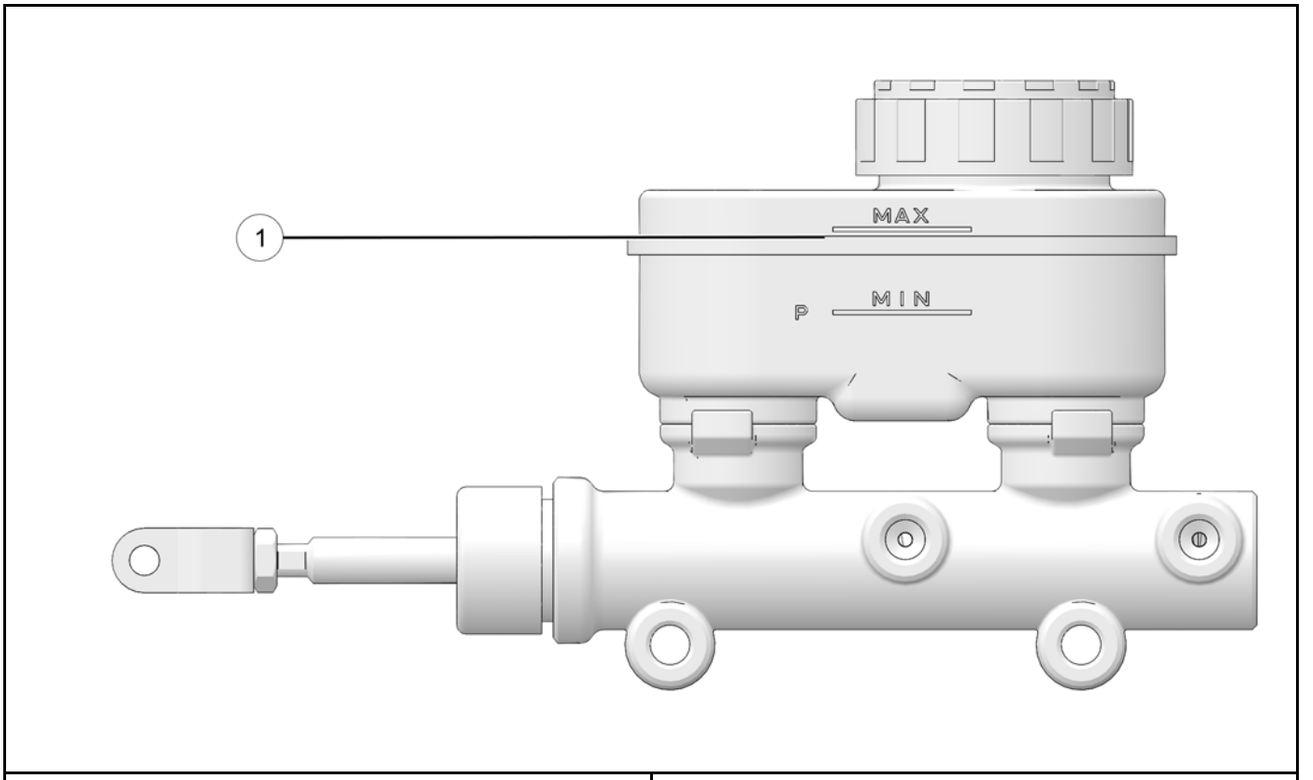
ITEM	LUBE REC.	METHOD	FREQUENCY*

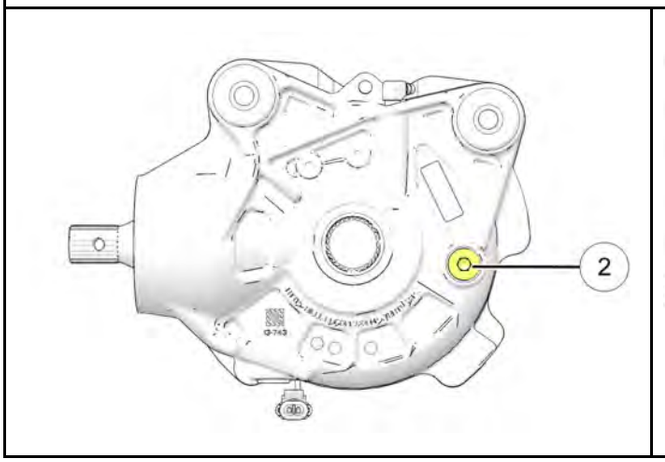


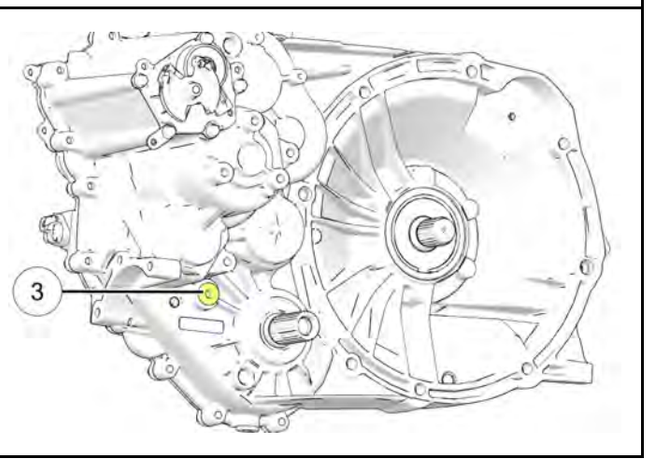


ITEM	LUBE REC.	METHOD	FREQUENCY*
Brake Fluid	Polaris DOT 4 Brake Fluid	Maintain fluid level between “MAX and “MIN” lines on the master cylinder reservoir ①	Check level during pre-ride inspection; change fluid every two years
Front Gearcase	Polaris Demand Drive	Add lubricant through fill hole ② **12.2 oz (360 mL) - Fill to Spill**	Initial level check at 25 hours or 1 month; Change lubricant at 100 hours or every 12 months, whichever comes first
Transmission	Polaris AGL	Add lubricant until it is visible at the fill hole threads ③	

***** More often under severe use, such as operation in water or under severe loads.





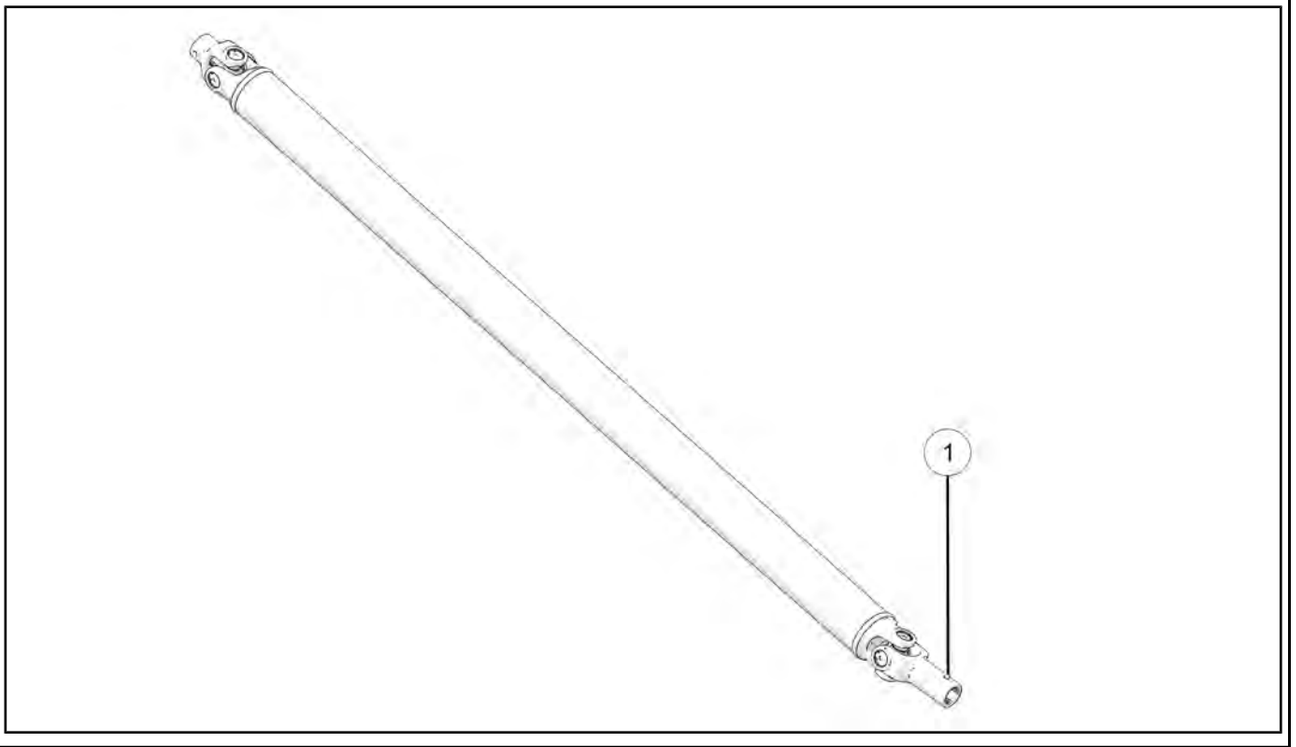


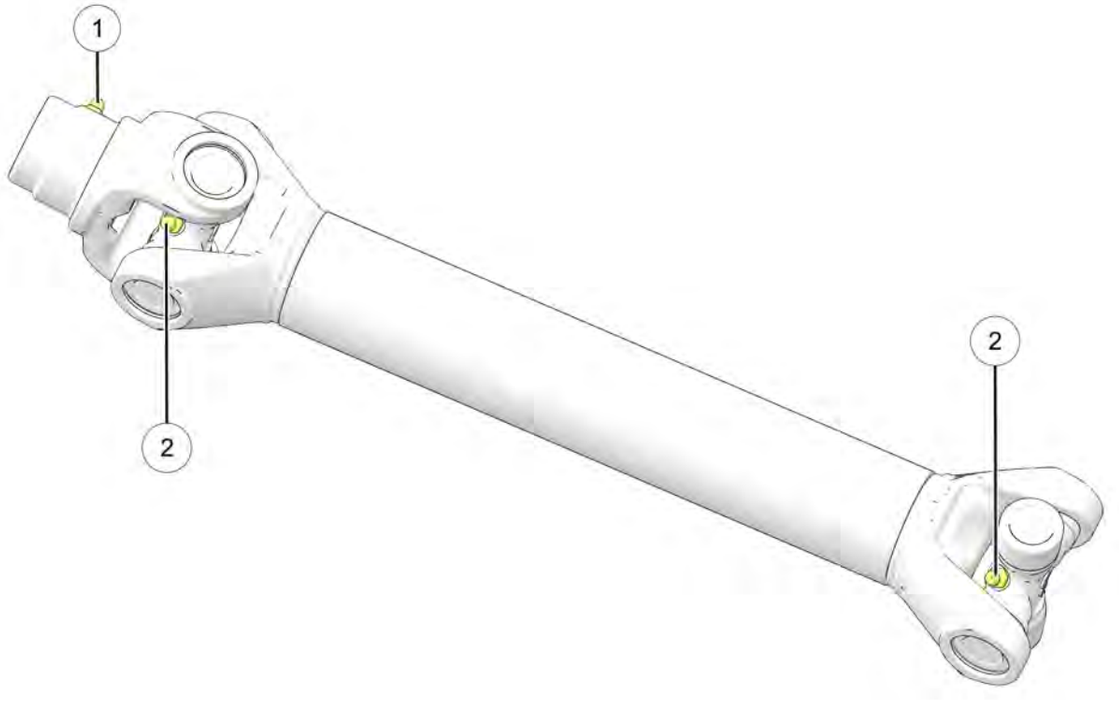
GREASE LUBRICATION POINTS

There are grease fittings on the front stabilizer bar mounts, rear stabilizer bar mounts, and on the prop shaft slip yoke. Apply grease until all traces of water have been purged out at each of these areas.

ITEM	METHOD	RECOMMENDED LUBE	FREQUENCY
Propshaft Yokes	Grease fittings ① on the slip yokes	Polaris Premium U-Joint Grease	Grease fittings every 500 miles (800 km); Grease before long periods of storage, and after thoroughly washing or submerging the vehicle
U-Joints	Grease Fittings ② on the U-joints		

ITEM	METHOD	RECOMMENDED LUBE	FREQUENCY





ENGINE / EXHAUST

ENGINE OIL LEVEL

This engine is a wet-sump engine, meaning the oil is contained in the bottom of the crankcase. To check the oil level, follow the procedure listed below.

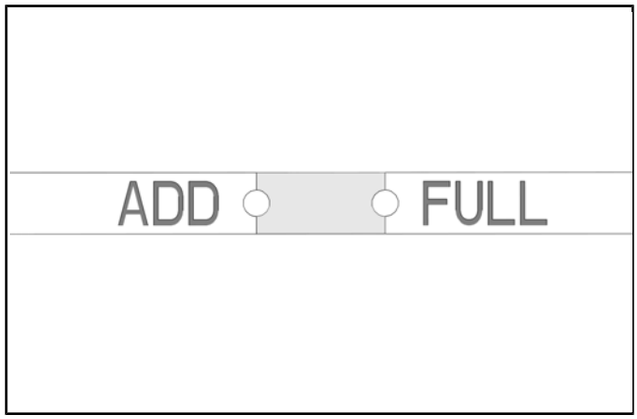
1. Park the vehicle on a level surface and place the vehicle in park.
2. Stop the engine. Allow the oil level to settle for 3 minutes before removing the dipstick

IMPORTANT
Do not check oil immediately after engine operation.

3. Remove the dipstick and wipe dry with a clean cloth.
4. Reinstall dipstick and ensure it seats completely.

NOTICE
Make certain the dipstick is inserted all the way into the dipstick tube to produce consistent oil level readings.

5. Remove dipstick and check that the oil level is between the ADD and FULL line. Add oil as necessary to bring the level to the safe zone on the dipstick. Do not overfill.



FLUID CAPACITY
Use only **Full Synthetic SAE 5W-50** oil as specified.

NOTICE
A rising oil level between checks in cool weather driving can indicate contaminants such as fuel or moisture collecting in the crankcase. If the oil level is over the full mark, change the oil immediately.

ENGINE OIL AND FILTER CHANGE

1. Place the vehicle on a level surface and allow the engine to run, if necessary, two to three minutes until warm. Stop engine and set parking brake.
2. Clean the area around the drain plug at the bottom of the oil pan.

⚠ WARNING
Personal injury can occur when handling used oil. Hot oil can cause burns or skin damage.

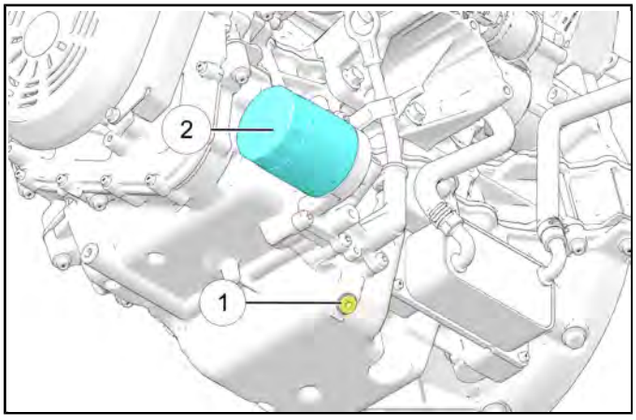
3. Place a drain pan beneath the oil pan and remove drain plug ①.
4. Remove the crush washer and DISCARD.
5. Allow oil to drain completely.
6. Using a clean, dry cloth, clean filter sealing surface on crankcase.

NOTICE
The sealing surface on the drain plug should be clean and free of burrs, nicks or scratches.

7. Install NEW crush washer onto the drain plug ① and install. Torque to specification.

TORQUE
Oil Drain Plug: **13 ft-lbs (18 Nm)**

8. Using oil filter socket **PU-52890**, turn the oil filter ② counter-clockwise to remove and discard.



9. Lubricate gasket area on new oil filter with a film of fresh engine oil. Check to make sure the sealing areas are in good condition.

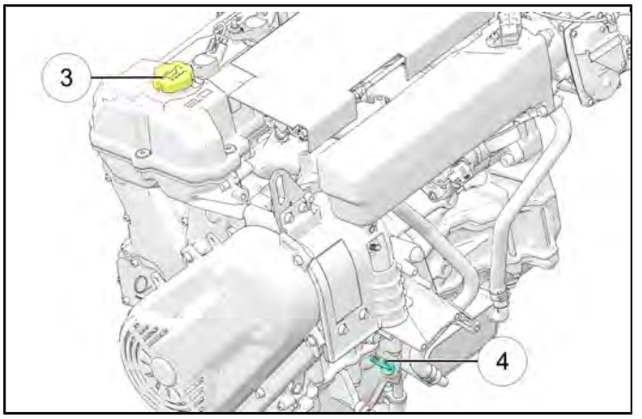
10. Install a new oil filter and torque to specification.

TORQUE
Oil Filter: **18 in-lbs (2 Nm)**

11. Fill the sump with oil to the recommended level through the oil filler access cap ③ on top of the valve cover.

FLUID CAPACITY
Recommended Engine Oil: PS-4 Full Synthetic 5W-50 or **PS-4 Extreme Duty Full Synthetic 0W-50** **Engine Oil Capacity:5.5 qt (5.2 L)**

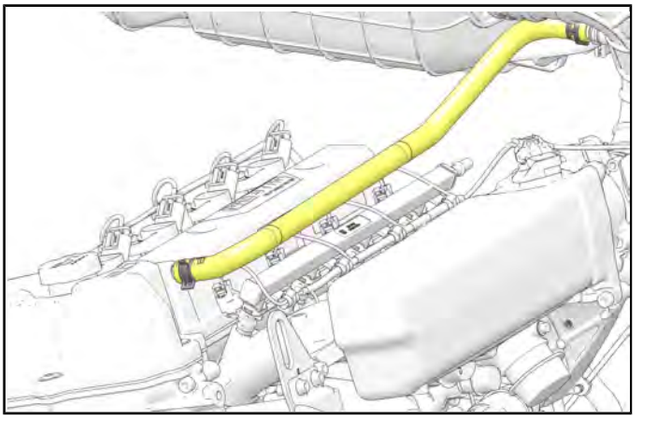
12. Place gear selector in neutral.
13. Start the engine and let it idle for a minimum of two minutes. Stop the engine and inspect for leaks.
14. Re-check the oil level on the dipstick ④ after three minutes and add oil as necessary to bring the level to the safe zone on the dipstick.



15. Dispose of used oil and oil filter properly.

ENGINE BREATHER HOSE

The engine valve cover is equipped with a breather hose that vents to the engine air intake. Inspect the breather hose for possible kinks or wear. The hose is form fitted for proper fit.



IMPORTANT
Make sure the vent hose is not kinked, restricted or cut.

ENGINE CYLINDER LEAKDOWN TEST

A cylinder leak-down test is the best indication of engine condition. Follow tester manufacturer's instructions to perform a cylinder leak-down test. Never use high pressure leakage testers as crankshaft seals may dislodge and leak.

Cylinder Leakage Service Limit: 15% *If leakage exceeds service limit, inspect the engine for the cause.*

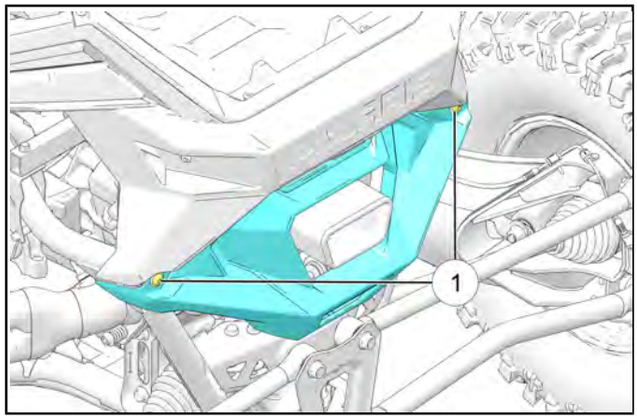
NOTICE
A brand new or rebuilt engine will have higher leakdown than an engine with 5 hours of runtime. Leakdown should decrease once the rings are broken in.

SPARK ARRESTOR

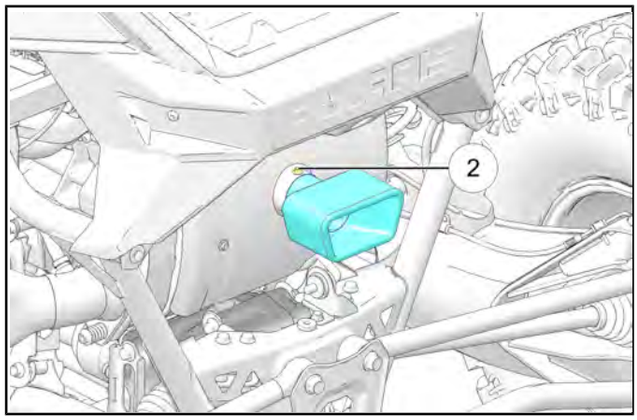
The spark arrestor should be cleaned after every oil change to remove accumulated carbon. A plugged spark arrestor will affect engine performance. Replace a cracked or damaged spark arrestor before running the vehicle.

NOTICE
The spark arrestor should be cleaned each time the machine is submerged in water/mud, and after every oil change.

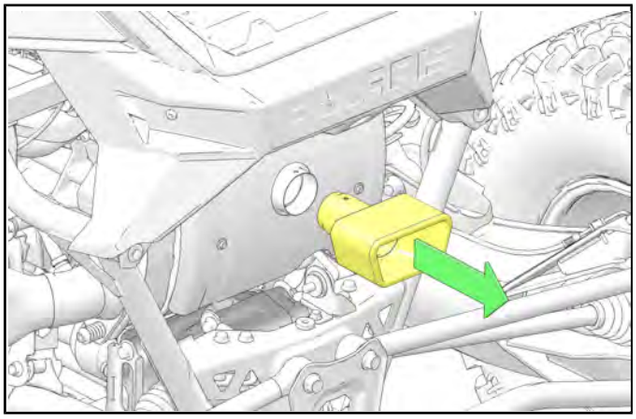
1. Remove two fasteners ① and remove the rear bumper.



2. Remove the spark arrestor retaining fastener ②.



3. Remove the arrestor from the end of the muffler.



4. Use a non-synthetic brush to clean the screen on the arrestor. If necessary, blow debris from the screen with compressed air.
5. Inspect the screen for wear and damage. Replace if damaged.
6. Reinstall the spark arrestor. Torque fasteners to specification.

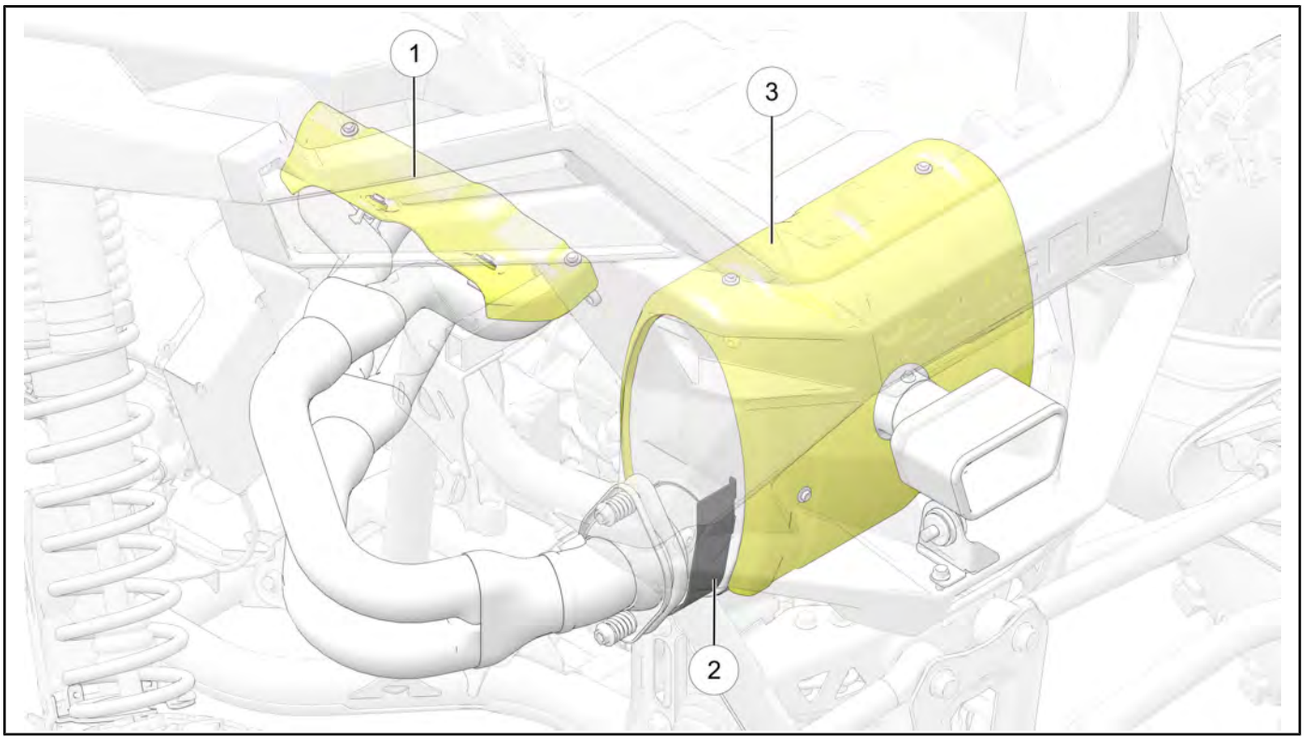
TORQUE
Spark Arrestor Fastener: **8 ft-lbs (11 Nm)**

7. Reinstall the rear bumper. Torque fasteners to specification.

TORQUE
Rear Bumper Fasteners: **7 ft-lbs (10 Nm)**

HEAT SHIELD INSPECTION

Verify all shields are properly installed and not damaged. If a shield is damaged or missing, it **MUST** be replaced.

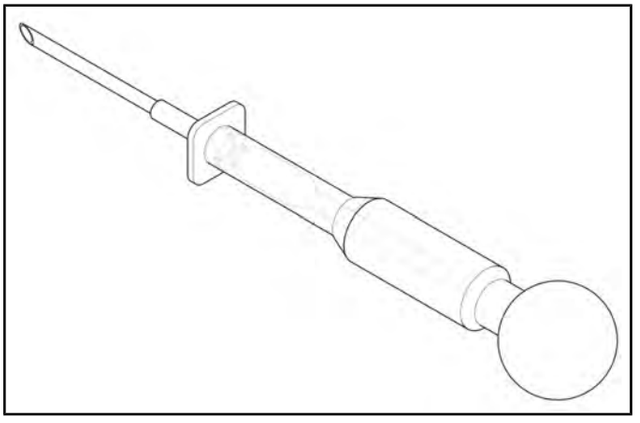


① Front Upper Headpipe Shield	③ Silencer Shield
② Silencer Inlet Shield	

COOLING SYSTEM

COOLANT STRENGTH

Test the strength of the coolant using an antifreeze hydrometer.

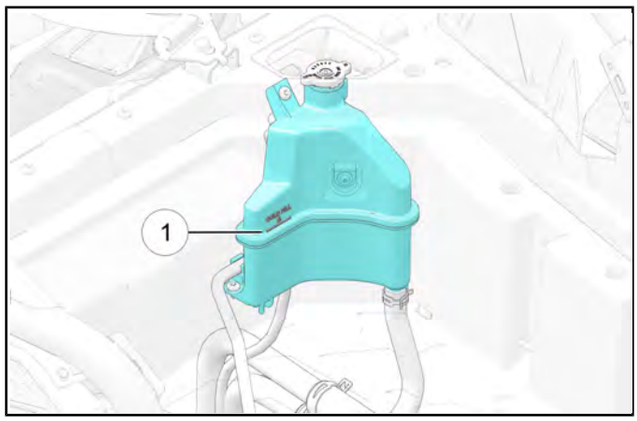


- A 50/50 mixture of antifreeze and distilled water will provide the optimum cooling, corrosion protection, and antifreeze protection.
- Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system.
- Straight water or antifreeze may cause the system to freeze, corrode, or overheat.

Recommended Coolant:
Polaris 50/50 Extended Life Anti-freeze
2880514 (quart)
2880513 (gallon)

COOLANT LEVEL INSPECTION

The coolant tank is located on the front-right side of the cargo box, under the coolant bottle access panel. The coolant level should be filled to the FULL COLD level ① indicated on the recovery bottle.



With the engine at operating temperature, the coolant level should be between the upper and lower marks on the coolant tank. If not, perform the following procedure:

1. Ensure the vehicle is positioned on a level surface.
2. View the coolant level tank.

⚠ WARNING

Never remove the pressure cap when the engine is warm or hot. Escaping steam can cause severe burns. The engine must be cool before removing the pressure cap.

3. If the coolant level is below the FULL COLD line, inspect the vehicle for signs of leaking on the radiator, engine, and coolant hoses.
4. Remove the pressure cap. Using a funnel, add the recommended 50/50 coolant mixture to the FULL COLD level on the tank.

Recommended Coolant:
Polaris 50/50 Extended Life Anti-freeze
2880514 (quart)
2880513 (gallon)

5. Reinstall the pressure cap.

NOTICE

Use of a non-standard pressure cap will not allow the recovery system to function properly.

6. If coolant was required, start engine and check for leaks. Make sure radiator fins are clean to prevent overheating.

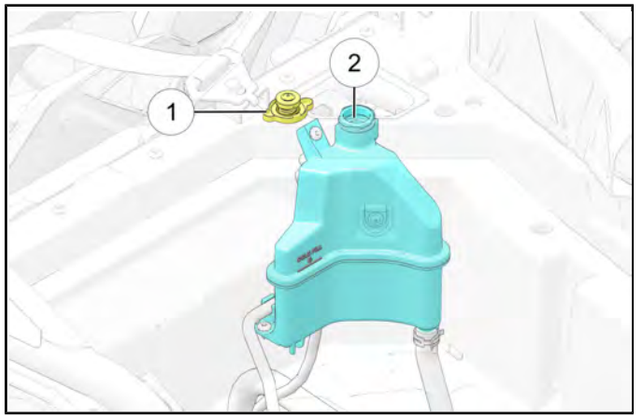
COOLING SYSTEM PRESSURE TEST

1. Remove coolant bottle access panel.
2. Remove pressure cap ① and pressure test the cap using a commercially available pressure tester. The pressure cap relief pressure is 13 psi. Replace the cap if it does not meet this specification.

⚠ WARNING

Never remove pressure cap when engine is warm or hot. The cooling system is under pressure and serious burns may result. Allow the engine to cool before servicing.

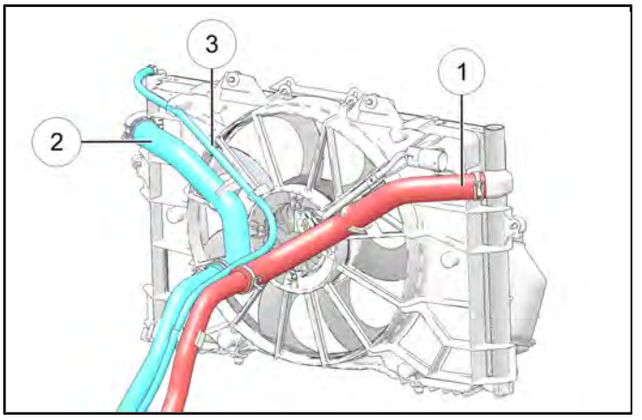
3. To test the cooling system, connect the pressure tester to the cooling neck ② with the correct adapter.



4. The system must maintain 10 psi for five minutes or longer. If pressure loss is evident within five minutes, check the filler neck, radiator, hoses, clamps and water pump weep hole for leakage.

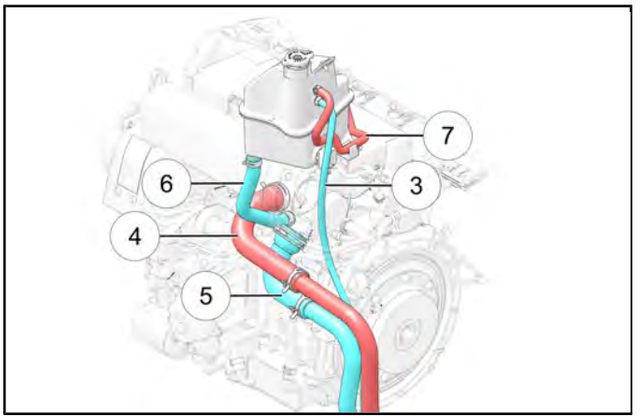
COOLANT HOSE INSPECTION

1. Inspect all radiator coolant hoses for cracks, deterioration, abrasion or leaks. Replace if necessary.



① Radiator Inlet Hose
② Radiator Outlet Hose
③ Vent Hose

2. Inspect all engine hoses for cracks, deterioration, abrasion, or leaks. Replace if necessary.

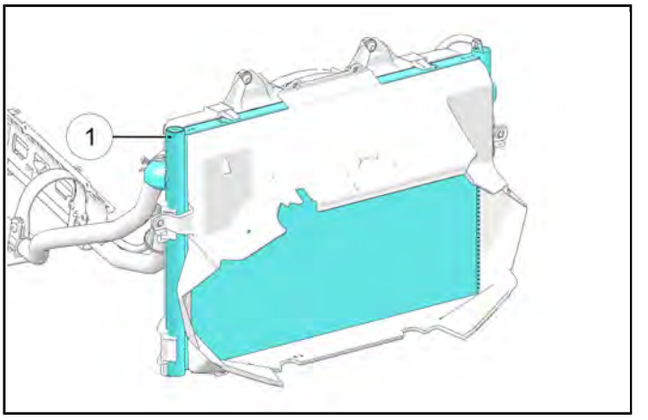


④ Engine Outlet Hose
⑤ Engine Inlet Hose
⑥ Coolant Bottle Hose
⑦ Engine Vent Hose

3. Check tightness and condition of all hose spring clamps. Replace if necessary.

RADIATOR INSPECTION / CLEANING

1. Check engine radiator ① air passages for restrictions or damage.



2. Carefully straighten any bent radiator fins.
3. Remove any obstructions with low pressure compressed air or low pressure water.

⚠ CAUTION

Washing the vehicle with a high-pressure washer could damage the radiator fins and impair the radiators effectiveness. Use of a high-pressure washer is not recommended.

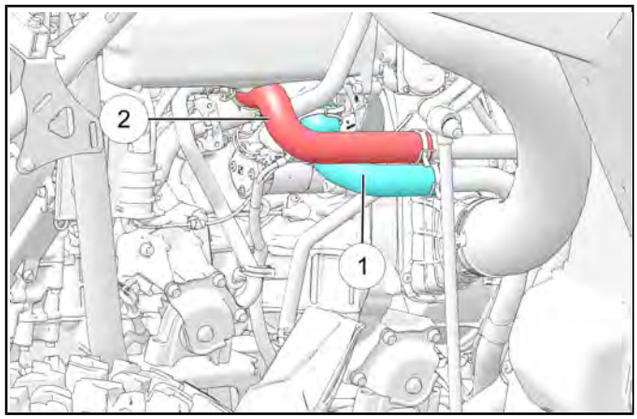
COOLANT FLUSH

1. Allow the vehicle to cool down before working with the cooling system.

⚠ CAUTION

Escaping steam/coolant can cause burns. Never remove the pressure cap or coolant hose while the engine is warm/hot.

2. Place a drain pan below the engine coolant inlet ① and outlet ② hoses.



NOTICE

Rear shock is hidden for clarity.

3. Remove the pressure cap from the coolant reservoir.
4. Remove a coolant hoses and allow the vehicle to completely drain.

NOTICE

You may need to elevate the front of the vehicle to allow all coolant to drain from the radiators and then elevate the rear of the vehicle to allow coolant to drain from the engine and charge air cooler.

5. A wet vac may also be used to evacuate coolant from the system.
6. Connect the coolant hoses and properly position the clamps.
7. Ensure the transmission is in park.
8. Slowly fill the cooling system at the coolant reservoir with 50/50 extended life coolant. Refer to Chapter 1 – General Specifications for approximate coolant system capacity.
9. Fill the reservoir to the FULL COLD line.
10. Proceed to bleed the cooling system.

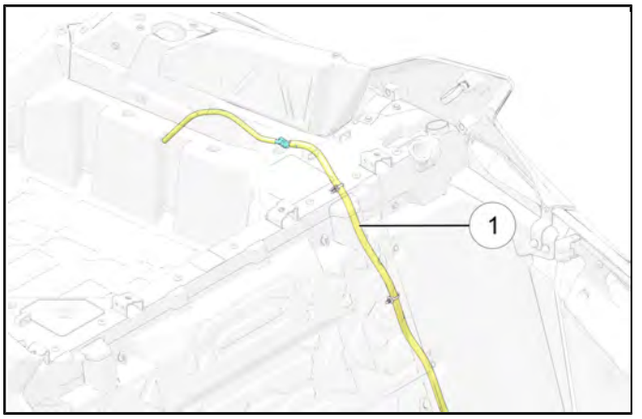
FUEL SYSTEM AND AIR INTAKE

FUEL TANK VENT INSPECTION

Symptoms of a restricted fuel tank vent include the following:

- collapsing or expanding fuel tank
- hiss / rush of air when fuel tank cap is removed
- engine miss or hesitation
- loss of engine performance
- high exhaust temperatures

1. Remove the seats, upper and lower rear close off panels.
2. Check the fuel tank vent line ① for signs of wear, deterioration or damage. Replace vent line if necessary.

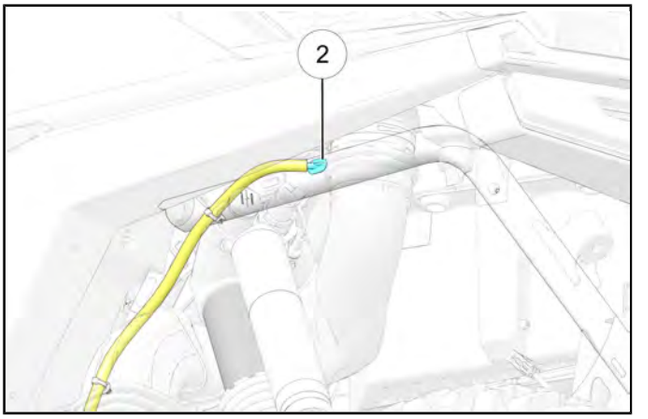


NOTICE
Most of the exposed fuel tank vent line can be seen through the left rear wheel well.

3. Be sure the vent line is routed properly as shown and secured with cable tie(s).

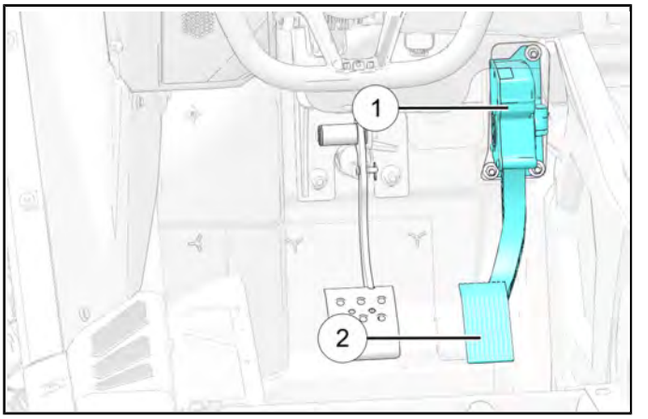
NOTICE
Make sure vent line is not kinked or pinched.

4. The vent hose should route towards the driver's side rear of the vehicle and terminate ② into the frame tube.



THROTTLE PEDAL INSPECTION

This vehicle is equipped with Pedal Position Sensor ① used to detect when the throttle pedal ② is pushed or released.



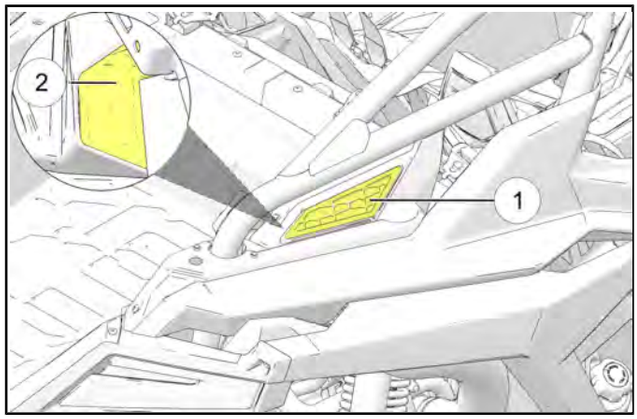
The throttle pedal should move freely and always return back to its idle position when released.

Check throttle pedal periodically.

ENGINE INTAKE PRE-FILTER SERVICE

It is recommended that the engine intake pre-filter be inspected daily. The filter should be inspected using the following procedure:

1. The engine intake pre-filter is located just above the right rear wheel fender.
2. Inspect the pre-filter on the outboard ① and inboard ② sides. If necessary, clean with soapy water and air dry.



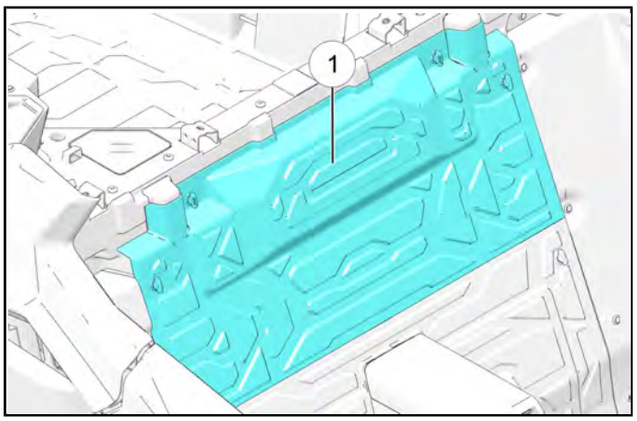
⚠ CAUTION

Compressed air or high pressure hose may damage the frog skin pre-filter on the intake.

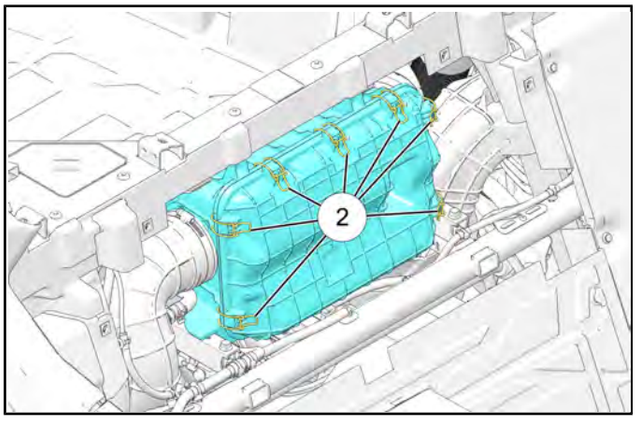
AIR FILTER SERVICE

Inspect the air filter at the intervals outlined in the Periodic Maintenance Chart. In extremely dusty conditions, air filter replacement will be required more often.

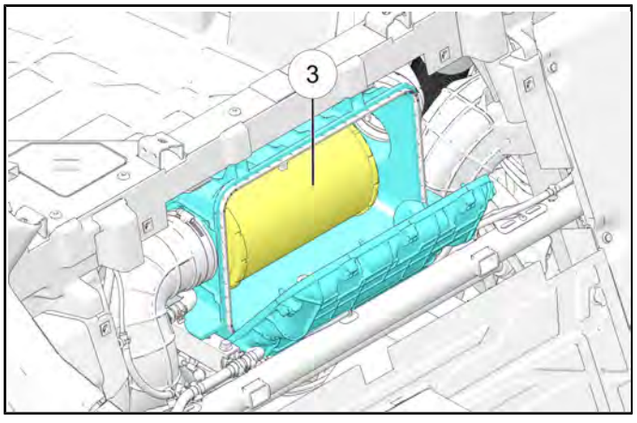
1. Remove seats.
2. Remove upper rear close off panel ①.



3. Disengage seven cover latches ②.



4. Pull cover outward far enough to remove air filter ③.



5. Inspect the air box for oil or water deposits. Wipe away any deposits with a clean shop towel.

NOTICE
If the filter has been soaked with fuel or oil it must be replaced.

6. Inspect the air filter and replace if necessary.

NOTICE
DO NOT attempt to clean the air filter.

7. Place air filter into the air box and reinstall air box cover.

NOTICE
Be sure the lower tabs on the air box cover are properly engaged into the air box.

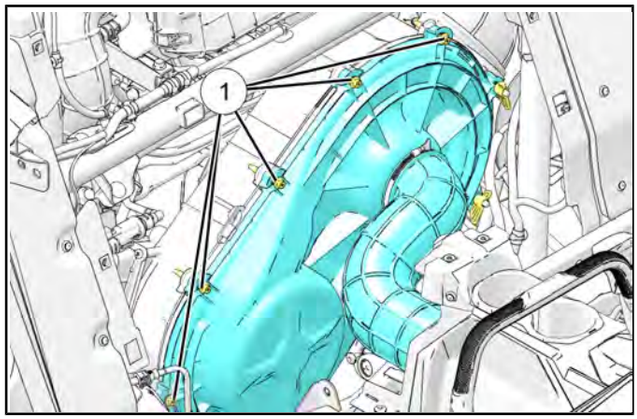
8. Engage the cover latches.
9. Reinstall rear close off panel and seats.

PVT / FINAL DRIVE / WHEEL AND TIRE

PVT DRAIN

If water is ingested into the PVT system:

1. Remove seats. Remove rear seats on 4-seat vehicles.
2. Remove upper and lower rear close-off panels.
3. Remove five fasteners ① and disengage quarter-turn latches. Remove outer PVT cover.



4. Allow the water to drain out. Reinstall PVT cover, close-off panels, and seats.
5. Place the transmission in Park. Apply the brakes.
6. Start the engine and apply varying throttle for 10-15 seconds to expel any moisture from the PVT and air dry the belt and clutches.

⚠ CAUTION

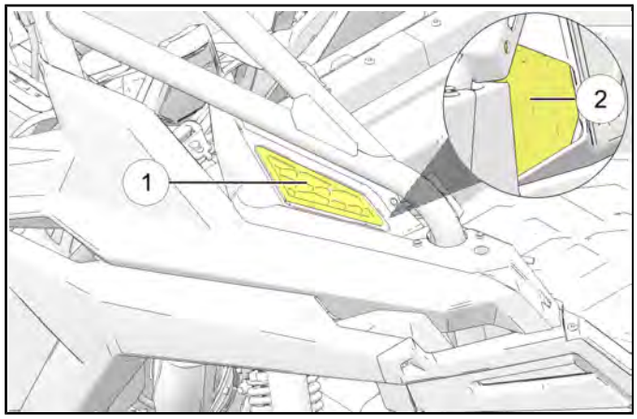
Do not hold the throttle wide open for more than 10 seconds.

7. Allow the engine RPM to settle to idle speed. Apply the brakes. Shift the transmission into Low.
8. Test run the vehicle for slippage. If the belt slips, repeat steps 1-5.

PVT INTAKE PRE-FILTER SERVICE

It is recommended that the PVT intake pre-filter be inspected daily. The filter should be inspected using the following procedure:

1. The PVT intake pre-filter is located just above the left rear wheel fender.
2. Inspect the pre-filter on the outboard ① and inboard ② sides. If necessary, clean with soapy water and air dry.



⚠ CAUTION

Compressed air or high pressure hose may damage the pre-filter material on the intake.

FRONT GEARCASE LUBRICATION

NOTICE
It is important to follow the front gearcase maintenance intervals described in the Periodic Maintenance Chart. Regular fluid level inspections should be performed as well.

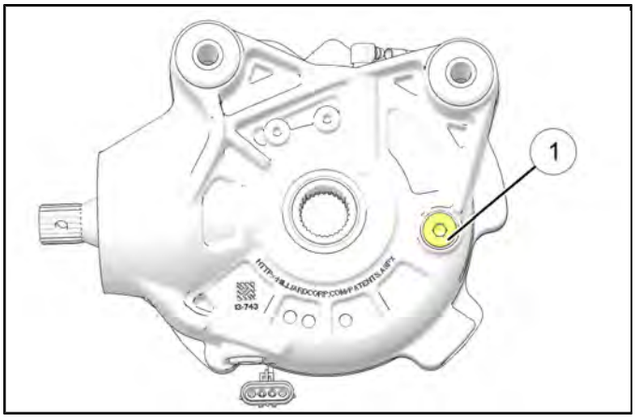
The front gearcase fluid level should be checked and changed in accordance with the maintenance schedule.

- Be sure vehicle is positioned on a level surface when checking or changing the fluid.
- Check vent hose to be sure it is routed properly and unobstructed.

FRONT GEARCASE FLUID LEVEL CHECK

The fill plug is located on the bottom right side of the front gearcase. Access the fill plug through the right front wheel well.

1. Position vehicle on a level surface.
2. Remove the fill plug ① and check the fluid level.



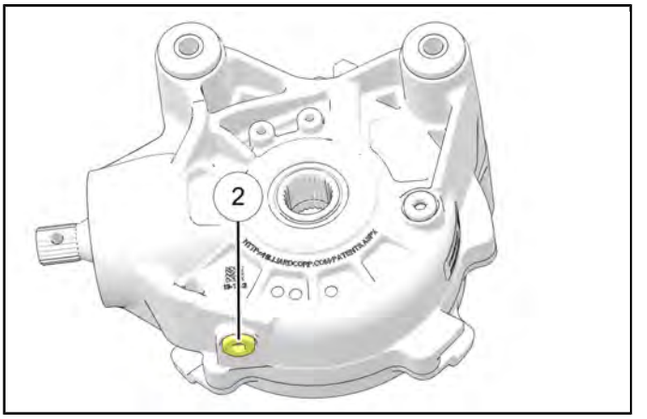
3. If fluid level is not within specification. add the recommended fluid as needed.
4. Reinstall the fill plug and torque to specification.

TORQUE
Front Gearcase Fill / Drain Plug Torque: **10 ft-lbs (14 N·m)**

FRONT GEARCASE FLUID CHANGE

The drain plug is located on the bottom of the front gearcase. Access the drain plug through the access hole in the frame underneath the front gearcase.

1. Remove the fill plug.
2. Place a drain pan under the front gearcase drain plug.
3. Remove the drain plug ② and allow fluid to drain completely.



4. Clean the drain plug magnetic surface.
5. Reinstall the drain plug and torque to specification.
6. Add the recommended amount of fluid through the fill hole.

FLUID CAPACITY
Recommended Front Gearcase Fluid: **80W-140 Angle Drive Fluid 2877922 (quart)** **Capacity: 12.2 oz (360 mL) - Fill to Spill**

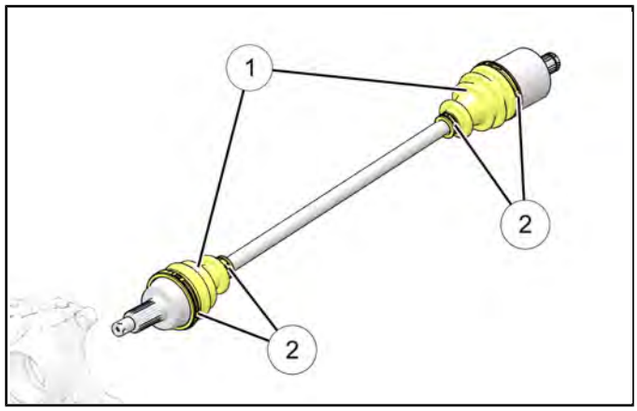
7. Reinstall the fill plug and torque to specification.

TORQUE
Front Gearcase Fill / Drain Plug Torque: **10 ft-lbs (14 Nm)**

8. Check for leaks. Dispose of used fluid properly.

DRIVE SHAFT BOOT INSPECTION

Inspect the front and rear drive shaft boots ① for damage, tears, wear or leaking grease. If the boots exhibit any of these symptoms, they should be replaced. Check to see the boot clamps ② are properly positioned. Refer to Drive Shaft CV Joint / Boot Replacement for drive shaft boot replacement.

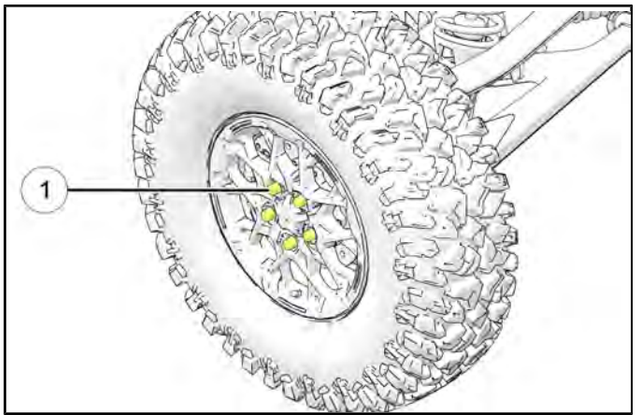


WHEEL REMOVAL

1. Position the vehicle on a level surface.
2. Place the transmission in PARK and stop the engine.
3. Loosen the wheel nuts slightly. If wheel hub removal is required, remove the wheel cap, cotter pin and loosen the hub nut slightly.
4. Elevate the appropriate side of the vehicle by placing a suitable stand under the frame.
5. Remove the wheel nuts and remove the wheel.

WHEEL INSTALLATION

1. Verify the transmission is still in PARK.
2. Place the wheel in the correct position on the wheel hub. Be sure the valve stem is toward the outside and rotation arrows on the tire point toward forward rotation.
3. Attach the wheel nuts ① and finger tighten them.



4. Carefully lower the vehicle to the ground.
5. Torque the wheel nuts to the proper torque specification.

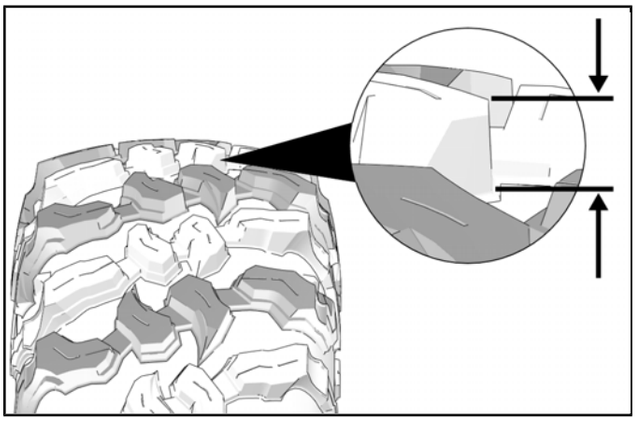
TORQUE
Wheel Lug Nuts: **148 ft-lbs (200 Nm)**

⚠ CAUTION

If wheels are improperly installed it could affect vehicle handling and tire wear.

TIRE INSPECTION

- Improper tire inflation may affect vehicle maneuverability.
- When replacing a tire always use original equipment size and type.
- The use of non-standard size or type tires may affect vehicle handling.



MEASUREMENT
Tire Lug Service Limit: **Replace if 1/8″ (3 mm) or less.**

⚠ WARNING

Operating with worn tires will increase the possibility of the vehicle skidding easily with possible loss of control. Worn tires can cause an accident. Always replace tires when the usable tread depth has worn out.

TIRE PRESSURE

Remove the valve stem cap and check tire pressure using the tire pressure gauge included in the vehicle's tool kit.

TIRE PRESSURE SPECIFICATION (COLD)

MODEL	FRONT	REAR
RZR PRO R	**15 psi (103 kPa)**	**15 psi (103 kPa)**
RZR PRO R 4	**18 psi (124 kPa)**	**18 psi (124 kPa)**

TRANSMISSION

TRANSMISSION LUBRICATION

NOTICE
It is important to follow the transmission maintenance intervals described in the Periodic Maintenance Chart. Regular lubricant level inspections should be performed as well.

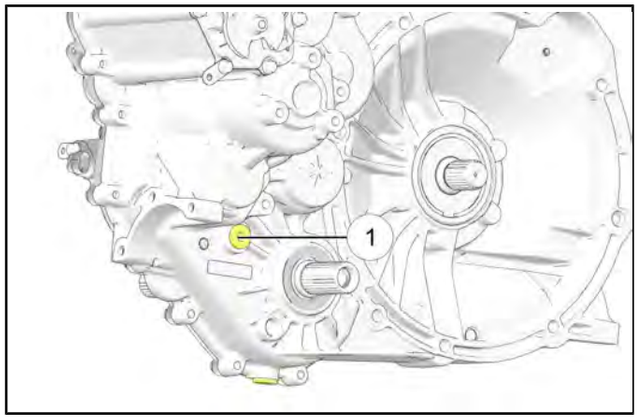
The transmission lubricant level should be checked and changed in accordance with the maintenance schedule.

- Be sure vehicle is positioned on a level surface when checking or changing the lubricant.
- Check vent hose to be sure it is routed properly and unobstructed.

TRANSMISSION OIL LEVEL CHECK

The fill plug is located on the rear portion of the transmission gearcase. Access the fill plug at the rear of the vehicle. Maintain lubricant level even with the bottom of the fill plug hole.

1. Position vehicle on a level surface.
2. Remove the fill plug ① and check the lubricant level.



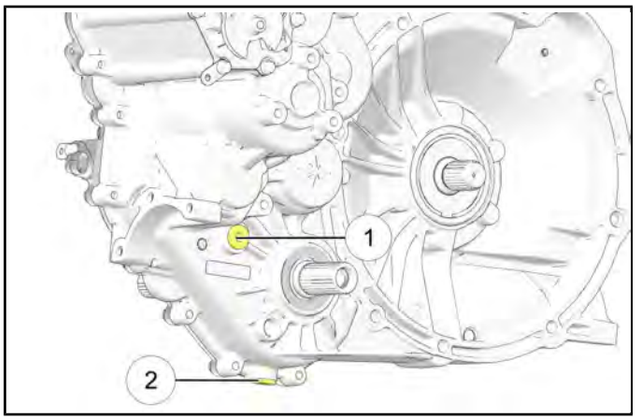
3. If lubricant level is not even with bottom threads, add recommended lubricant as needed. Do not overfill.
4. Reinstall the fill plug and torque to specification.

TORQUE
Transmission Fill / Drain Plug: **14 ft-lbs (19 Nm)**

TRANSMISSION OIL CHANGE

The drain plug is located on the bottom of the transmission gearcase. Access the drain plug through the drain hole in the skid plate.

1. Remove the fill plug.
2. Place a drain pan under the transmission drain plug.
3. Remove drain plug ② and allow lubricant to drain completely.



4. Clean the drain plug magnetic surface.
5. Reinstall the drain plug and torque to specification.
6. Add the recommended amount of lubricant through the fill plug hole. Maintain the lubricant level at the bottom of the fill plug hole when filling the transmission. Do not overfill.

FLUID CAPACITY
Recommended Transmission Lubricant: **AGL Synthetic Gearcase Lubricant** **Capacity: 31.3 oz (925 mL)**

7. Reinstall the fill plug ① and torque to specification.

TORQUE
Transmission Fill / Drain Plug: **14 ft-lbs (19 Nm)**

8. Check for leaks. Dispose of used lubricant properly.

STEERING

STEERING INSPECTION

The steering components should be checked periodically for loose fasteners, worn tie rod ends, ball joints and damage.

Replace any worn or damaged steering components. Steering should move freely through the entire range of travel without binding. Check routing of all cables, hoses, and wiring to be sure the steering mechanism is not restricted or limited.

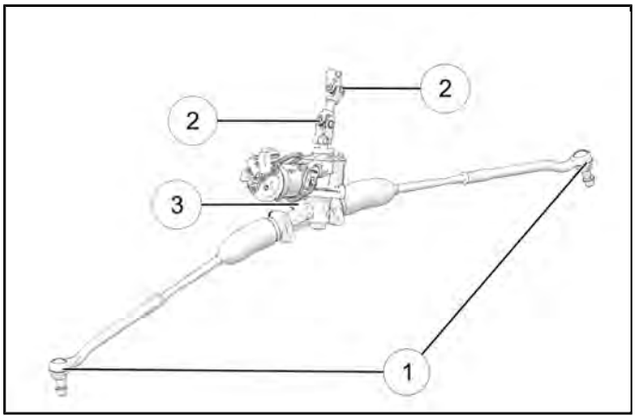
NOTICE
Check front end alignment whenever steering components are replaced.

⚠ WARNING
Due to the critical nature of the procedures outlined in this chapter, Polaris recommends steering component repair and adjustment be performed by an authorized Polaris MSD certified technician.

STEERING WHEEL FREE-PLAY

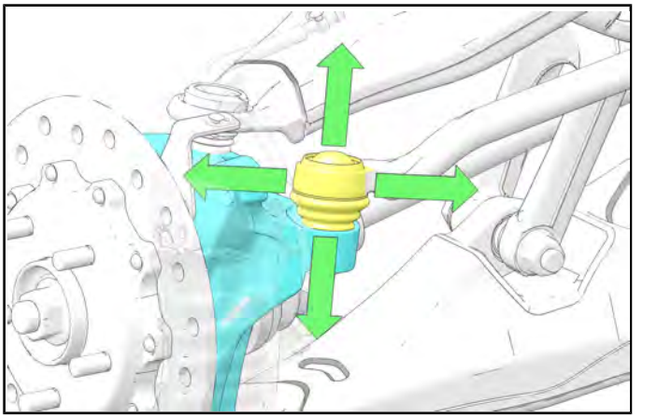
Check steering wheel for specified free-play and operation

1. Position the vehicle on level ground.
2. Turn ignition ON to activate EPS system.
3. Lightly turn the steering wheel left and right.
4. There should be about 0.8-1.0″ (20-25 mm) of free-play.
5. If there is excessive free-play or the steering feels rough, inspect the following components.
6. Tie Rod Ends ①.
7. Steering Shaft U-Joints ②.
8. Steering Gearbox ③.

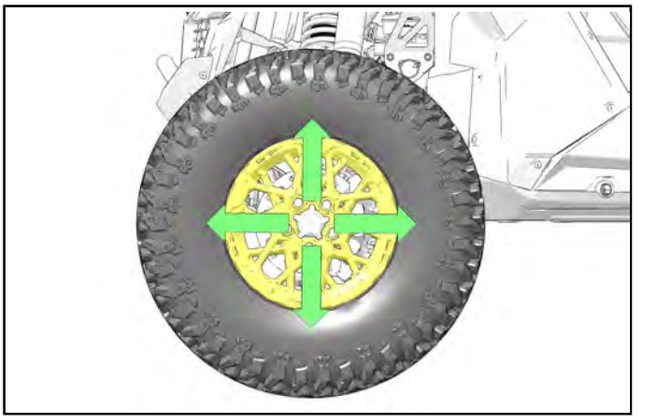


TIE ROD END / WHEEL HUB INSPECTION

- To check for play in the tie rod end, grasp the steering tie rod, pull in all directions feeling for movement.



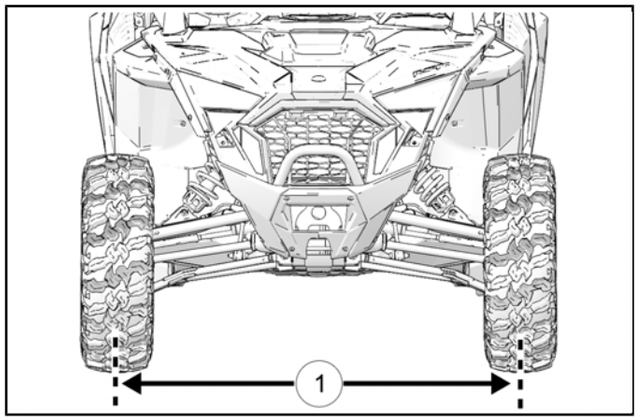
- Replace any worn steering components. Steering should move freely through entire range of travel without binding.
- Elevate front end of machine so front wheels are off the ground. Check for any looseness in front wheel/hub assembly by grasping the tire firmly at top and bottom first, and then at front and rear. Try to move the wheel and hub by pushing inward and pulling outward.



- If abnormal movement is detected, inspect the hub and wheel assembly to determine the cause (loose wheel nuts or loose front hub nut).
- Refer to Front Bearing Carrier Inspection / Removal and Rear Bearing Carrier Inspection / Removal for wheel bearing service procedures.

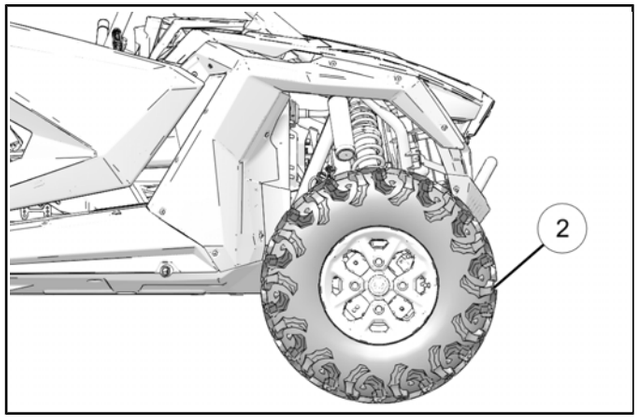
FRONT WHEEL ALIGNMENT INSPECTION

1. Place machine on a smooth level surface and set steering wheel in a straight ahead position. Secure the steering wheel in this position.
2. Place a chalk mark on the center line of the front tires approximately 16″ (40.6 cm) from the floor or as close to the hub/axle center line as possible ①.

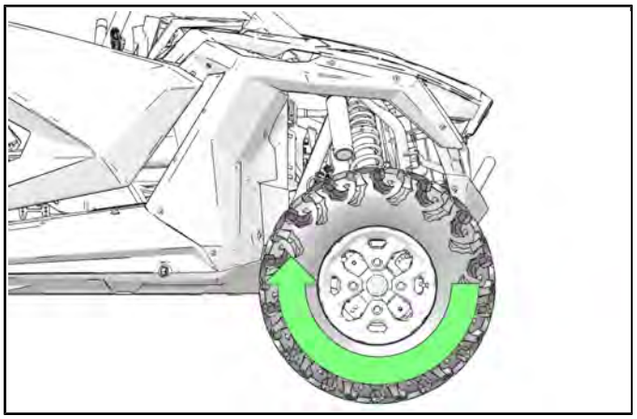


NOTICE
It is important the height of both marks be equally positioned to get an accurate measurement.

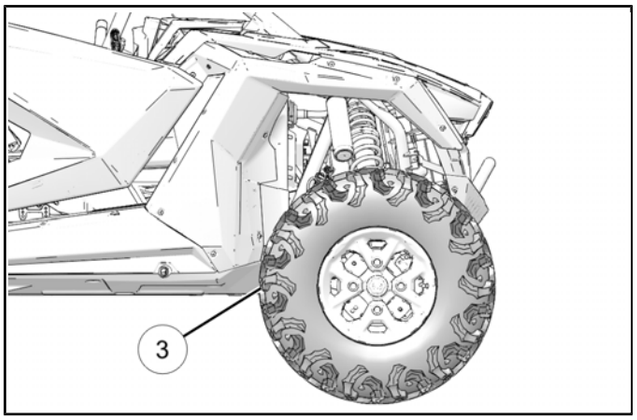
3. Measure the distance between the marks and record the measurement. Call this measurement ②.



4. Rotate the tires 180° by moving the vehicle forward. Position chalk marks facing rearward, even with the hub/axle center line.



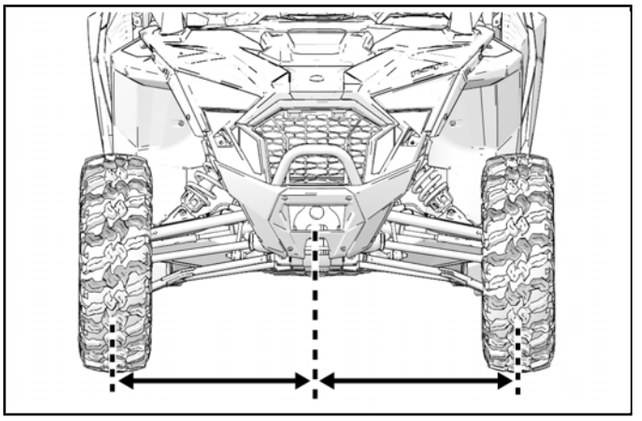
5. Measure the distance between the marks and record. Call this measurement ③. Subtract measurement ② from measurement ③, this is the vehicle toe. Toe-out means the measurement at the front of the tire ② is wider than the measurement at the rear ③. Toe-in is just the opposite.



MEASUREMENT
Wheel Toe (Front): **1/4” toe-in – 1/4” toe-out(6.4 mm toe-in – 6.4 mm toe-out)**

WHEEL TOE ADJUSTMENT

If toe alignment is incorrect, repeat steps 3-5 of “Wheel Toe Alignment Inspection”, but instead measure the distance between each wheel and the vehicle center. This will tell you which tie rod needs adjusting.



NOTICE
Be sure steering wheel is straight ahead before determining which tie rod needs adjustment.

⚠ CAUTION
During tie rod adjustment, it is very important that the following precautions be taken when tightening tie rod end jam nuts. If the rod end is positioned incorrectly it will not pivot, and may break.

To adjust toe alignment:

- Hold tie rod end to keep it from rotating.
- Loosen jam nuts at both end of the tie rod.
- Shorten or lengthen the tie rod until alignment is as required to achieve the proper toe setting as specified.

MEASUREMENT
Wheel Toe: **1/4” (6.35 mm) toe-in – 1/4” (6.35 mm) toe-out**

- After alignment is complete, torque jam nuts to specification.

TORQUE
Tie Rod Jam Nut: **40 ft-lbs (54 Nm)**

⚠ CAUTION
When tightening the tie rod end jam nuts, the rod ends must be held parallel to prevent rod end damage and premature wear. Damage may not be immediately apparent if done incorrectly.

- Vehicles equipped with Dynamix suspension having a steering shaft, EPS unit, steering rack, or tie rod removed/adjusted/disconnected MUST have Steering Angle Sensor Centering procedure performed once everything is reinstalled. Refer to Steering Angle Sensor Centering (Dynamix) page .

SUSPENSION

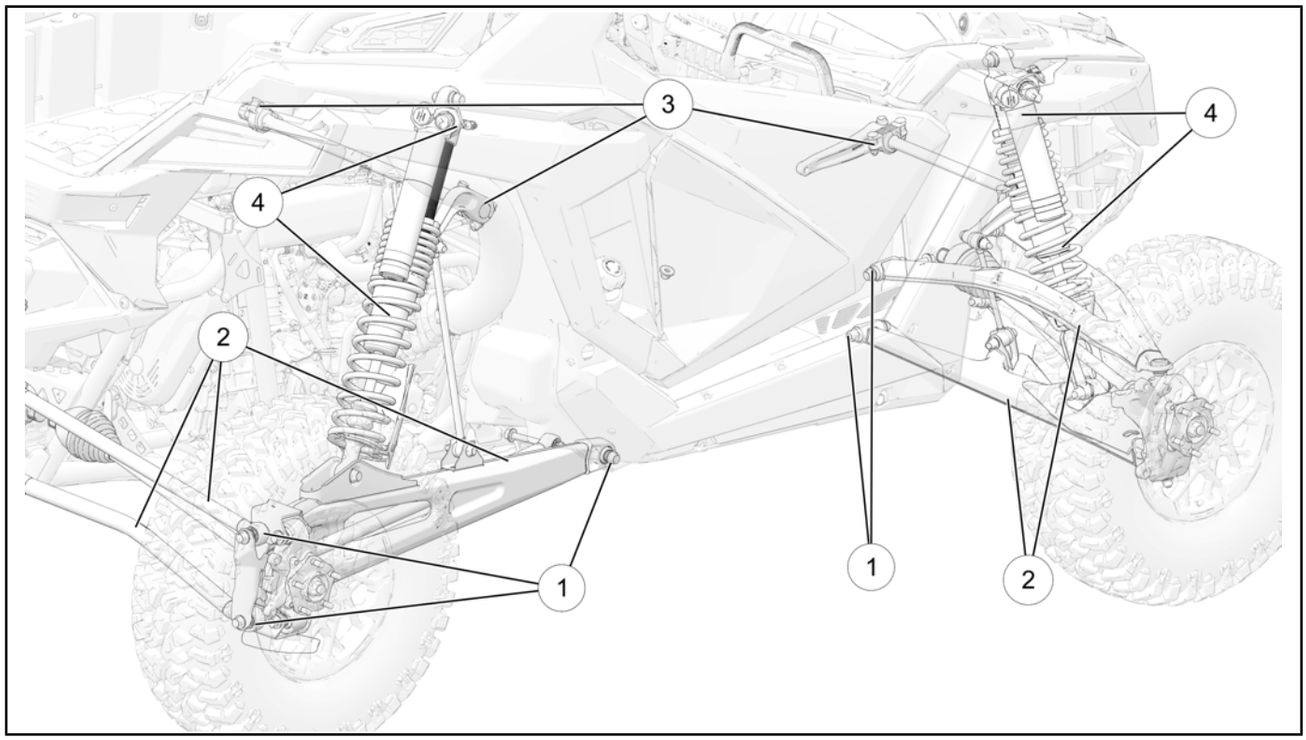
SUSPENSION INSPECTION

① Inspect all control arm bushings/bearings to make sure they are not broken, missing or extremely loose .

② Check for damage/impact to all control arms and/or trailing arms and radius rods.

③ Inspect stabilizer bar and stabilizer bar bushings for damage/wear.

④ Ensure the shocks are not leaking oil. especially around the shock caps and shaft seals.



SUSPENSION LUBRICATION

Refer to Grease Lubrication Points for suspension lubrication.

NOTICE
There are no grease fittings on the front control arm pivot points or the rear trailing arms.

PRELOAD SETTINGS

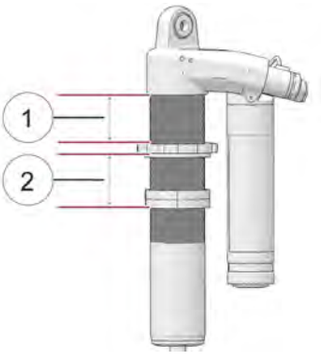
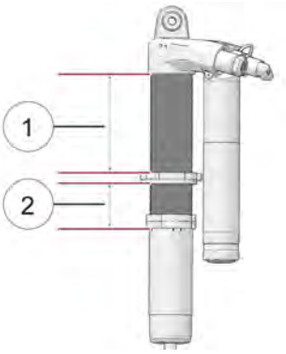
Adjusting preload settings can alter vehicle handling.

IMPORTANT
Never exceed the MAX allowable preload when adjusting the suspension. Damage to the suspension system may occur if the MAX allowable preload is exceeded.

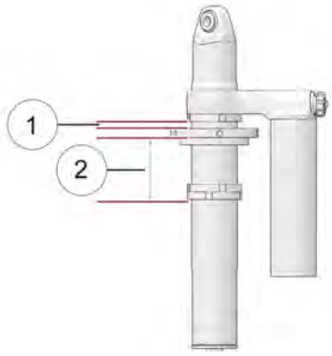
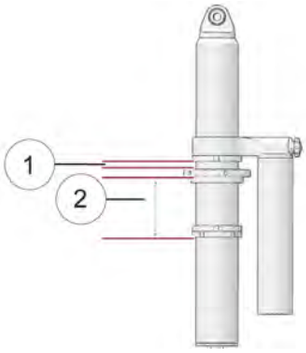
RZR PRO R		FACTORY DEFAULT PRELOAD SETTINGS		GVW SETTING (MAX ALLOWABLE PRELOAD)	
	Measurement*	Fox®	Walker Evans	Fox®	Walker Evans
Front Shocks	①	3.06 in. (7.8 cm)	0.88 in. (2.2 cm)	4.06 in. (10.3 cm)	1.88 in. (4.8 cm)
	②	2.75 in. (7.0 cm)	2.75 in. (7.0 cm)	2.75 in. (7.0 cm)	2.75 in. (7.0 cm)
Rear Shocks	①	6.88 in. (17.5 cm)	0.06 in. (0.2 cm)	7.88 in. (20.0 cm)	1.06 in. (2.7 cm)
	②	4.50 in. (11.4 cm)	4.50 in. (11.4 cm)	4.50 in. (11.4 cm)	4.50 in. (11.4 cm)

*See the images in the Front / Rear Spring Preload Adjustment section to view corresponding preload measurement locations

FOX® SHOCKS (IF EQUIPPED)

SHOCK LOCATION	MEASUREMENT*
Front Shock	
Rear Shock	

WALKER EVANS® SHOCKS (IF EQUIPPED)

SHOCK LOCATION	MEASUREMENT*
Front Shock	
Rear Shock	

FRONT / REAR SPRING PRELOAD ADJUSTMENT

The factory setting is appropriate for nearly all riding conditions. If desired, the suspension may be adjusted to maintain vehicle clearance height when carrying loads. Adjusting the suspension may change vehicle handling.

IMPORTANT
The distance between the main preload ring (top ring) and the cross-over rings (middle rings) should be constant. If you move the main preload ring, you will need to move the cross-over rings an equal amount. The cross-over rings need to be locked tight after any adjustment is made. To lock the cross-over rings, take a punch and hammer to hit each side so the rings jam together. If the cross-over rings are not locked down tight, damage to the shock may occur.

To adjust the preload, do the following:

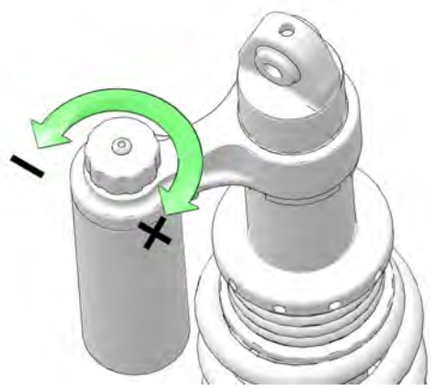
1. Elevate the vehicle to allow the suspension to fully extend.
2. Turn the adjusting ring to the left to add preload. Turn the adjusting ring to the right to remove preload.

Uneven adjustment may cause poor handling of the vehicle. Always adjust both the left and right spring preloads equally or have your POLARIS dealer or qualified person perform the adjustments.

FRONT / REAR SHOCK COMPRESSION ADJUSTMENT (NON-DYNAMIX)

The compression damping clicker knob is located at the top of the shock reservoir.

1. Turn the clicker **clockwise** to **increase** compression damping.
2. Turn the clicker **counter-clockwise** to **decrease** compression damping.



LOCATION	DEFAULT CLICKER POSITION
Front	8/16 clicks
Rear	8/16 clicks

BRAKE SYSTEM

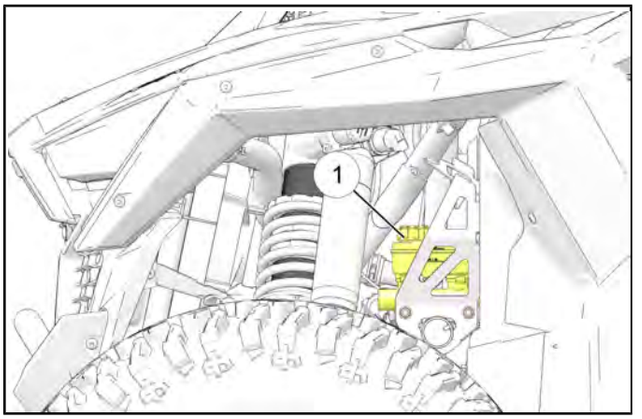
BRAKE FLUID INSPECTION

Always check the brake pedal travel and inspect the brake fluid reservoir level before each operation. If the fluid level is low, add DOT 4 brake fluid only.

Brake fluid should be changed every two years. The fluid should also be changed anytime the fluid becomes contaminated, the fluid level is below the minimum level, or if the type and brand of the fluid in the reservoir is unknown.

The brake fluid master cylinder reservoir can be accessed through the left front wheel well.

1. Position vehicle on a level surface.
2. Place the transmission in PARK.
3. Inspect brake fluid level in the reservoir ①. The level should be between the MAX and MIN level lines.



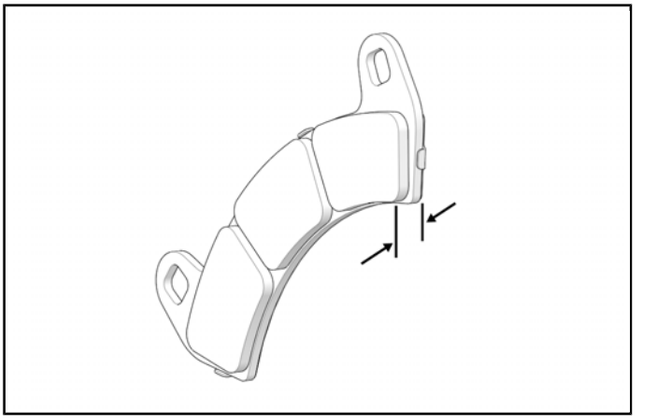
4. If fluid level is lower than the MIN level line, add brake fluid until it reaches the MAX level line.
5. Install the reservoir cap, and forcefully apply the brake pedal for a few seconds. Check for fluid leakage around the master cylinder and brake caliper fittings.

BRAKE HOSE AND FITTING INSPECTION

Check brake system hoses and fittings for cracks, deterioration, abrasion, and leaks. Tighten any loose fittings and replace any worn or damaged parts.

BRAKE PAD INSPECTION

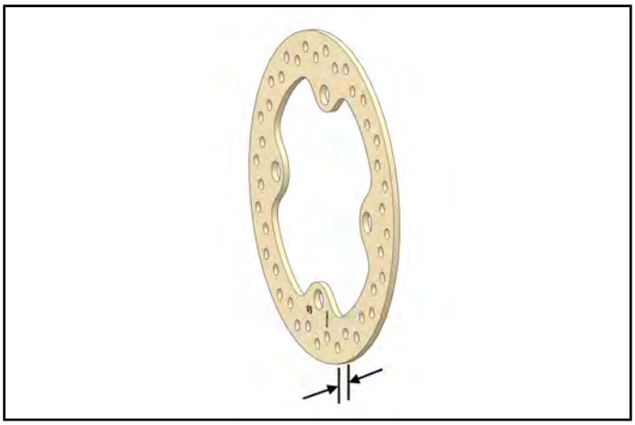
Measure the thickness of the pad material and backing plate with a caliper. Replace pads if worn beyond the service limit.



MEASUREMENT
Brake Pad Thickness: **.296 ± .007″(7.53 ± .19 mm)** **.180″ (4.6 mm)**

BRAKE DISC INSPECTION

1. Visually inspect disc for scoring, scratches and gouges. Replace disc if deep scratches are evident.
2. Using a micrometer, measure disc thickness at eight different points around the pad contact surface.



MEASUREMENT
Brake Disc Thickness **.295 ± .008″(7.5 ± .2 mm)** Service Limit: **.268″ (6.8 mm)** Brake Disc Thickness Variance: **Service Limit: 0.002″ (0.051 mm)**

3. Mount a dial indicator. Slowly rotate the disc and read runout on the dial indicator Replace disc if runout exceeds specifications.

MEASUREMENT
Brake Disc Runout: **.010″ (0.25 mm)**

ELECTRICAL AND IGNITION SYSTEM

BATTERY MAINTENANCE

Keep battery terminals and connections free of corrosion. If cleaning is necessary, remove the corrosion with a stiff wire brush. Wash with a solution of one tablespoon baking soda and one cup water. Rinse well with tap water and dry off with clean shop towels. Coat the terminals with dielectric grease or petroleum jelly.

⚠ WARNING

CALIFORNIA PROPOSITION 65 WARNING:
Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
WASH HANDS AFTER HANDLING.

⚠ WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:

- **External:** Flush with water.
- **Internal:** Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.
- **Eyes:** Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases.
Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space. Always shield eyes when working near batteries.
KEEP OUT OF REACH OF CHILDREN.

NOTICE

Batteries must be fully charged before use or battery life will be reduced by 10-30% of full potential. Charge battery according to “Charging Procedure” page 12.26. Do not use the vehicle’s stator/alternator to charge a new battery.

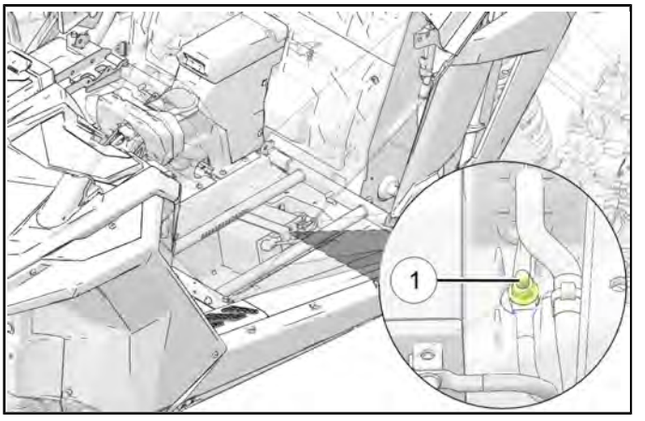
BATTERY CHARGING / OFF SEASON STORAGE

Refer to Charging Procedure page 12.26 and Battery Off Season Storage page 12.25 in the electrical chapter.

ENGINE / CHASSIS ELECTRICAL GROUND

Inspect the ground cable connections. Remove ground terminals and clean, if necessary.

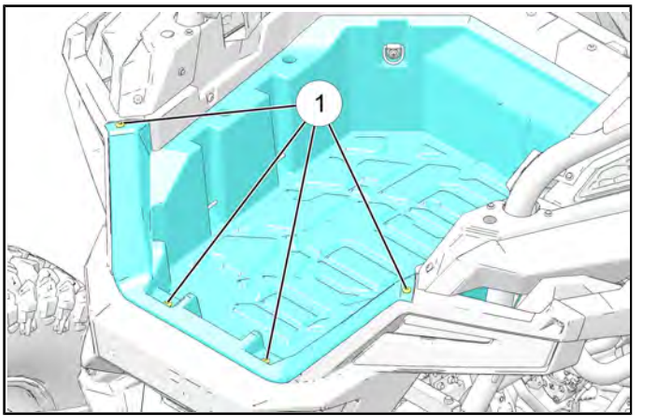
The engine / chassis ground ① is located under the driver’s seat, behind the battery.



SPARK PLUG SERVICE

Inspect and replace the spark plugs at the intervals outlined in the Periodic Maintenance Chart.

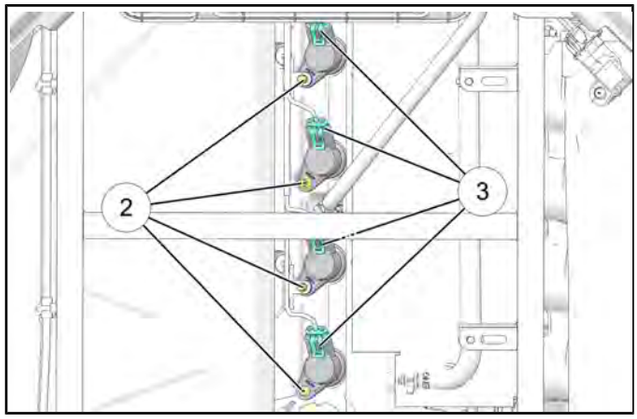
1. Remove four fasteners ① and remove the cargo box.



⚠ WARNING

A hot engine can cause serious burns. Allow engine to cool or wear protective gloves when removing the spark plugs.

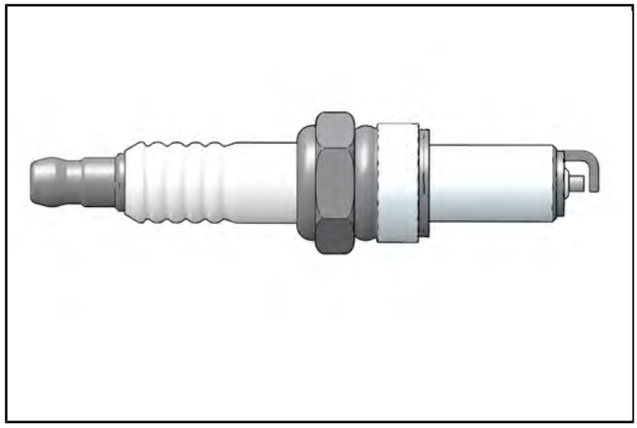
2. Remove four fasteners ②, four electrical harness connections ③ and remove ignition coils.



3. Clean out plug wells with compressed air to remove any loose dirt or debris.
4. Rinse plug wells with water and dry with compressed air.

NOTICE
Spark plug wells have drain holes built into the cylinder head to allow water to drain out.

5. Remove spark plugs using a 5/8” spark plug socket with an extension.
6. Inspect electrodes for wear and carbon buildup. Look for a sharp outer edge with no rounding or erosion of the electrodes.



7. Clean with electrical contact cleaner or a glass bead spark plug cleaner only.

⚠ CAUTION
A wire brush or coated abrasive should not be used.

8. Measure gap with a wire gauge. Adjust gap if necessary by carefully bending the side electrode.

MEASUREMENT
Spark Plug Gap: **0.039” (1 mm)**

9. If necessary, replace spark plug with proper type.

⚠ CAUTION
Severe engine damage may occur if the incorrect spark plug is used.

Recommended Spark Plug: **ZMR7A-10**

10. Install spark plugs and torque to specification.

TORQUE
Spark Plug Torque: **9 ft-lbs (12 Nm)**

11. Install ignition coils. Ensure coils are pushed all the way down so they engage onto the spark plugs. Torque fasteners to specification.

TORQUE
Ignition Coil Fasteners: **7 ft-lbs (10 Nm)**

12. Reconnect ignition coil harness connectors.
13. Reinstall the cargo box. Torque fasteners to specification.

TORQUE
Cargo Box Fasteners: **7 ft-lbs (10 Nm)**

NOTES

CHAPTER 3
ENGINE / COOLING SYSTEM

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
PU-52890	Oil Filter Socket
PU-52876	Piston Ring Compressor
PU-52884	Rear Main Crankshaft Seal Installer
PU-52885	Front Main Crankshaft Seal Installer
PU-52919	Drive Clutch Puller
PU-52920	Drive Clutch Holder
PV-43531	Oil Pressure Gauge
PV-1253	Valve Spring Compressor
PU-50563	Camshaft Timing Holding Plate
PU-52810	Harmonic Damper Holder
OTC 6667 or Equivalent	Harmonic Damper Puller
OTC 7425 or Equivalent	Belt Stretch Tool
OTC 4554 or Equivalent	Torque Angle Gauge
PU-43506-A	Fuel Pressure Gauge Kit
PA-48838	Fuel Pressure Gauge Adapter
PU-51129	Timing Chain Tensioner Retractor (Optional)

ENGINE LUBRICATION SPECIFICATIONS

NOTICE
Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear.

AMBIENT TEMPERATURE RANGE	RECOMMENDED OIL
-35 °F to +100 °F (-37 °C) to (+38 °C)	PS-4 5W-50 4-Cycle Oil
-45 °F to +130 °F (-43 °C) to (+54 °C)	PS-4 Extreme 0W-50 4-Cycle Oil

Oil may need to be changed more frequently if POLARIS oil is not used. Do not use automotive oil. Follow the manufacturer's recommendations for ambient temperature operation. Part numbers can be found in the POLARIS Products chapter.

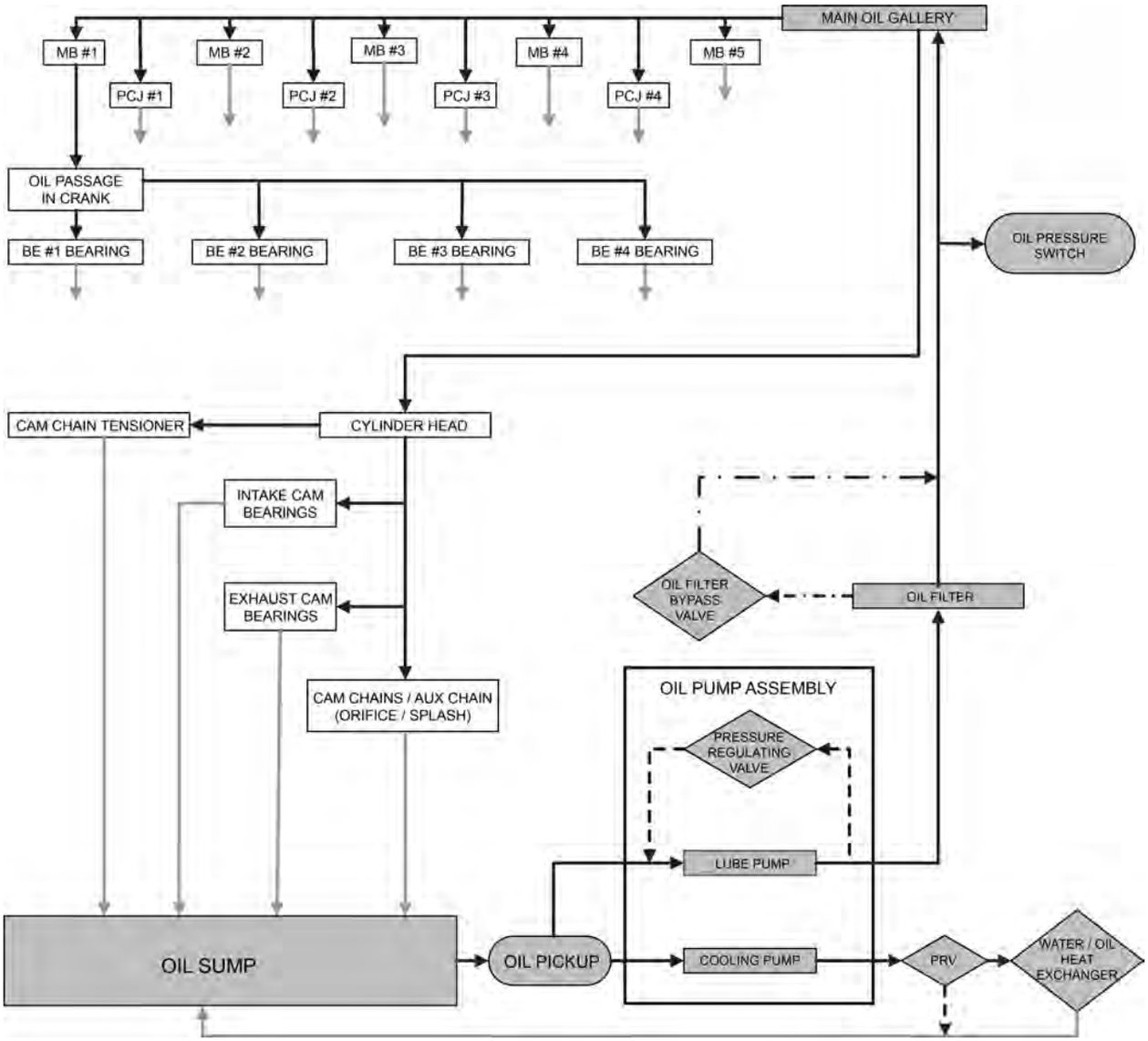
NOTICE
Mixing brands or using a non-recommended oil may cause serious engine damage. Always use the recommended oil. Never substitute or mix oil brands.

Always check and change the oil at the intervals outlined in the Periodic Maintenance Chart. Always use the recommended engine oil.

FLUID CAPACITY
Capacity: 5.5 qt (5.2 L)

* Additional oil may be required after complete engine disassembly. Check level after filling and add oil as needed.

OIL FLOW DIAGRAM



ENGINE SERVICE SPECIFICATIONS

SERVICE SPECIFICATIONS - ENGINE

ITEM	SPECIFICATIONS
Compression	**200 PSI (1379 kPa) ± 20%** no more than 5% variation between cylinders
Max Cylinder Leakage (warm)	**25%**
Oil Pressure (Minimum @ 1100 RPM)	**20–50 PSI (138–345 kPa)** Engine at operating temperature
Piston Pin to Connecting Rod Clearance (NEW condition)	**0.0006 in (0.015 mm)**

ITEM	SPECIFICATIONS
Piston to Cylinder Clearance (NEW condition)	**0.0017–0.0029 in (0.045–0.075 mm)**
Surface Head Flatness (100x100 in any direction)	Longitudinal or Transverse: **0.0012 in (0.03 mm)** Overall: **0.0035 in (0.09 mm)**
Exhaust Manifold Warpage (Maximum)	**0.0200 in (0.50 mm)**
Rear Bearing Journal Diameters	**2.0464–2.0472 in (51.98– 52.00mm)**
Rod Journal Diameters	**1.7714–1.7724 in (44.995–45.019 mm)**

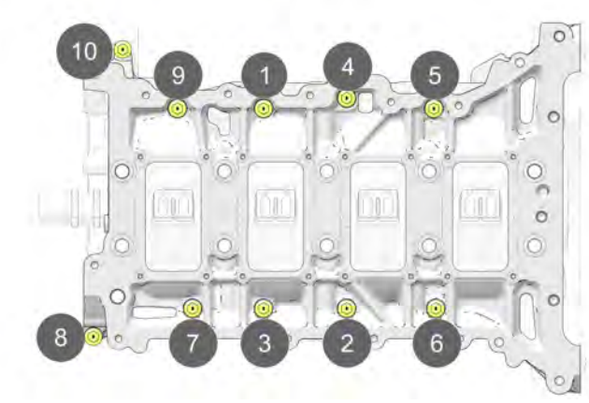
CAMSHAFT / CYLINDER HEAD / CYLINDER			
ITEM		**STANDARD**	**SERVICE LIMIT**
Valve Train		Over Head Valve / 4 valves per cyl 2 Intake Valve / 2 Exhaust Valve	—
Camshaft	Cam Lobe Height - Intake	**1.6385 - 1.6448" (41.62 - 41.78 mm)**	**1.6366" (41.57 mm)**
	Cam Lobe Height - Exhaust	**1.6307 - 1.6370" (41.42 - 41.58 mm)**	**1.6287" (41.37 mm)**
	Camshaft Journal O.D. - All (with phosphate coating)	**1.0211 - 1.0224" (25.936 - 25.971 mm)**	**1.0207" (25.926 mm)**
	Camshaft Carrier Bore I.D. - All	**1.0238 -1.0246" (26.006 - 26.027 mm)**	**1.0255” (26.047 mm)**
	Camshaft Oil Clearance	**0.0013 - 0.0035" (0.035 - 0.091 mm)**	**0.0048” - (0.122 mm)**
	Camshaft End Play	**0.0039 - 0.0104" (0.101 - 0.265 mm)**	**.0162" (0.411 mm)**
Cylinder	Cylinder - Surface Warp Limit (cylinder head surface)	-	**.004” (0.1 mm)**
	Cylinder Bore - Standard	**3.6614 ± .0003" (93 mm ± 0.008 mm)**	-
	Cylinder Out of Round Limit	-	**.001” (0.025 mm)**
	Cylinder Taper Limit	-	**.001” (0.025 mm)**
	Cylinder to Piston Clearance	**0.0017 - 0.0029 (0.045 - 0.075 mm)**	-
Cylinder Head	Cylinder Head - Surface Warp Limit	-	**.0039” (0.1 mm)**
	Cylinder Head - Standard Height	**4.767 ± .0019" (121.10 ± 0.10 mm)**	-
Valve	Valve Lash (Cold) - Intake	**0.003 - 0.008” (0.0762 - 0.2032 mm)**	-
	Valve Lash (Cold) - Exhaust	**0.008 - 0.014” (0.2032 - 0.3556 mm)**	-
	Valve Stem Diameter - Intake	**0.2155 - 0.2161" (5.475 - 5.490 mm)**	-
	Valve Stem Diameter - Exhaust	**0.2147 - 0.2153" (5.455 - 5.47 mm)**	-
	Valve Stem Oil Clearance - Intake	**.0003 - .0015" (0.010 - 0.040 mm)**	-
	Valve Stem Oil Clearance - Exhaust	**.0011 - .0023" (0.030 - 0.060 mm)**	-
	Valve Stem Overall Length - Intake	**3.7704" (95.77 mm)**	-
	Valve Stem Overall Length - Exhaust	**3.8023" (96.58 mm)**	-
Valve Guide	Valve Guide Inner Diameter	**.1956 - .2019" (4.970 - 5.130 mm)**	-
Valve Seat	Valve Seat - Contacting Width - Intake	**.0393 ± .0039" (1.0 ± 0.10 mm)**	**.0551" (1.4 mm)**

CAMSHAFT / CYLINDER HEAD / CYLINDER			
ITEM		**STANDARD**	**SERVICE LIMIT**
	Valve Seat - Contacting Width - Exhaust	**.0590 ± .0039" (1.5 ± 0.10 mm)**	**.0748" (1.9 mm)**
	Valve Seat Angles - Intake	**14.0° ± 1.5°** **30.0° ± 1.5°** **45.75° ± 0.25°** **51.0° ± 1.5°**	-
	Valve Seat Angles - Exhaust	**15.0° ± 1.5°** **30.0° ± 1.5°** **44.75° ± 0.25°** **60.0° ± 1.5°**	-

PISTON / RINGS / CONNECTING ROD / CRANKSHAFT / BALANCE SHAFT				
ITEM			**STANDARD**	**SERVICE LIMIT**
Piston	Standard O.D. - Measured 90° to pin, 0.51 in. (13 mm) up from piston skirt		**3.66 ± 0.0005” (92.970 ± 0.015 mm)**	-
	Piston Pin Bore I.D. (Standard)		**0.8663 - 0.8665” (22.004 - 22.010 mm)**	**0.8677 in (22.042 mm)**
	Piston Pin O.D.		**0.8659 - 0.8661” (21.995 - 22.000 mm)**	**0.8651 in (21.975 mm)**
Piston Ring	Installed Gap	Top Ring	**0.0177 - 0.0236” (0.45 - 0.60 mm)**	**0.0275 in (0.7 mm)**
		Second Ring	**0.0275 0.0374” (0.70 - 0.95 mm)**	**0.0401 in (1.02 mm)**
		Oil Control Rails	**0.0009 - 0.0401” (0.025 - 1.02 mm)**	**0.0452 in (1.15 mm)**
	Ring to Groove Clearance	Top Ring	**0.0012 - 0.0037” (0.030 - 0.095 mm)**	**0.0059 in (0.15 mm)**
		Second Ring	**0.0012 - 0.0034” (0.030 - 0.086 mm)**	
Connecting Rod	Connecting Rod Small End I.D.		**0.8668 - 0.8673” (22.017 - 22.030 mm)**	**0.8677 in (22.04 mm)**
	Connecting Rod Axial Clearance		**0.0039 - 0.0118” (0.100 - 0.300 mm)**	-
	1 - Marking	Conn. Rod Big End Bore I.D.	**1.8892 - 1.8895” - (47.987 - 47.994 mm)**	-
	2 - Marking	Conn. Rod Big End Bore I.D.	**1.8895 - 1.8898” (47.995 - 48.001 mm)**	-
	3 - Marking	Conn. Rod Big End Bore I.D.	**1.8898 - 1.8900” (48.002 - 48.008 mm)**	-
Crankshaft	A - Marking	Main Journal O.D.	**2.0464 - 2.0466” (51.98 - 51.986 mm)**	**2.0454" (51.954 mm)**
	B - Marking	Main Journal O.D.	**2.0467 - 20469” (51.987 - 51.993 mm)**	**2.0460" (51.969 mm)**
	C - Marking	Main Journal O.D.	**2.0470 - 2.0472 (51.994 - 52.000 mm)**	**2.0465” (51.9811)**
	A - Marking	Rod Journal O.D.	**1.7714 - 1.7717” (44.995 - 45.002 mm)**	**1.7700" (44.959 mm)**
	B - Marking	Rod Journal O.D.	**1.7717 - 1.7720” (45.003 - 45.010 mm)**	**1.7706” (44.975 mm)**
	C - Marking	Rod Journal O.D.	**1.7720 - 1.7724” (45.011 - 45.019 mm)**	**1.7712” (44.991 mm)**
	Crankshaft Runout Limit (PTO to MAG)		-	**Less than 0.001” (0.03 mm)**
	Crankshaft Runout Limit (PTO MAG to Center)		-	**Less than 0.001” (0.04 mm)**

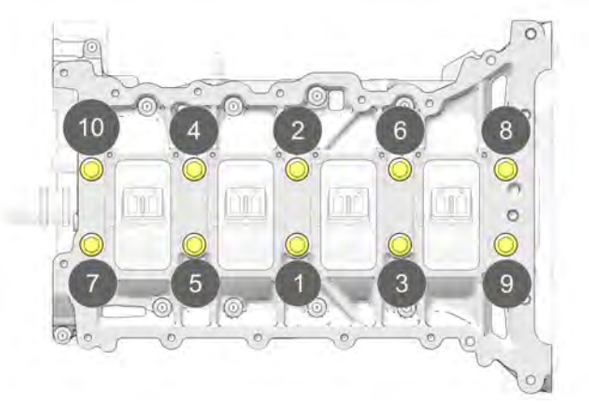
TORQUE SEQUENCE - ENGINE

CRANKCASE - OUTER



Crankcase Fasteners, Outer: **16 ft-lbs (22 N·m)**

CRANKCASE - INNER



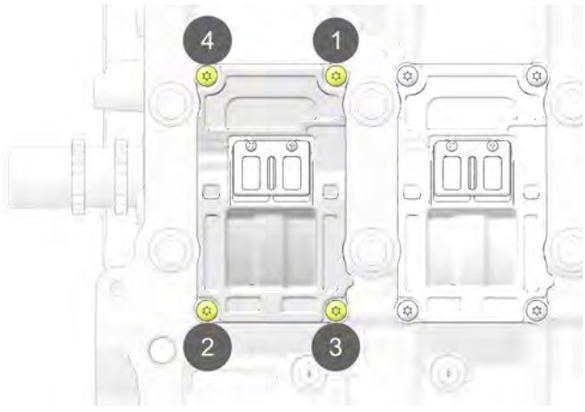
Crankcase Fasteners, Inner (re-usable):

NOTICE

Oil fasteners before installation.

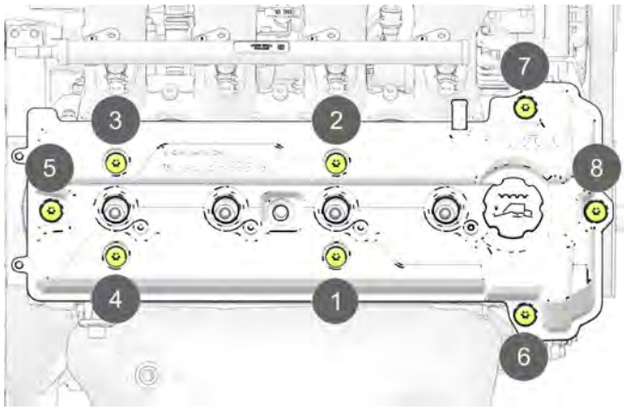
1. Torque all fasteners to 14 ft-lbs (20 N·m) in sequence specified.
2. Torque all fasteners to 26 ft-lbs (35 N·m) in sequence specified.
3. Angle torque all fasteners in sequence an additional 45°
4. Angle torque all fasteners in sequence an additional 45°
5. Angle torque all fasteners in sequence an additional 90°

REED VALVE



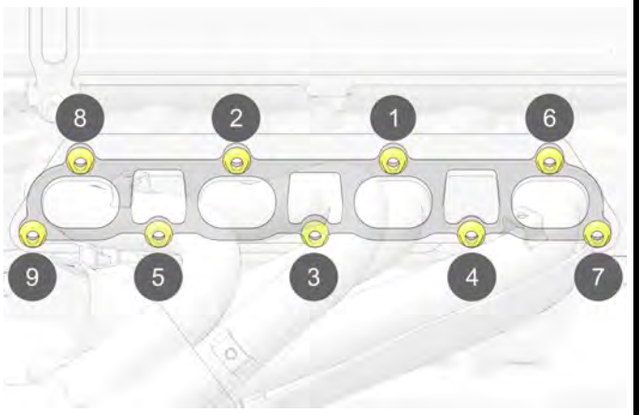
Reed Valve Fasteners: **80 in-lbs (9 N·m)**

VALVE COVER



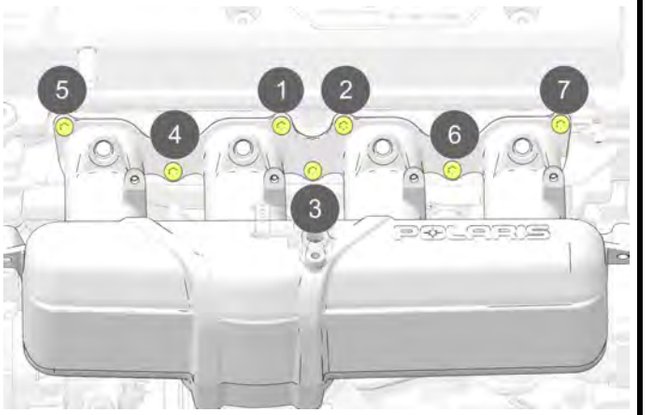
Valve Cover Fasteners: **89 in-lbs (10 N·m)**

EXHAUST MANIFOLD



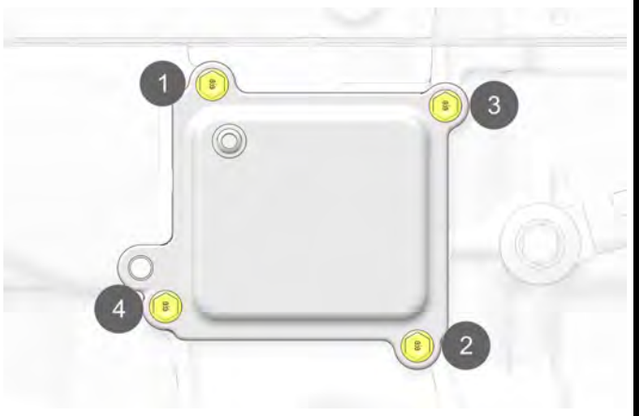
Exhaust Manifold Nuts: **30 ft-lbs (41 N·m)**

INTAKE MANIFOLD



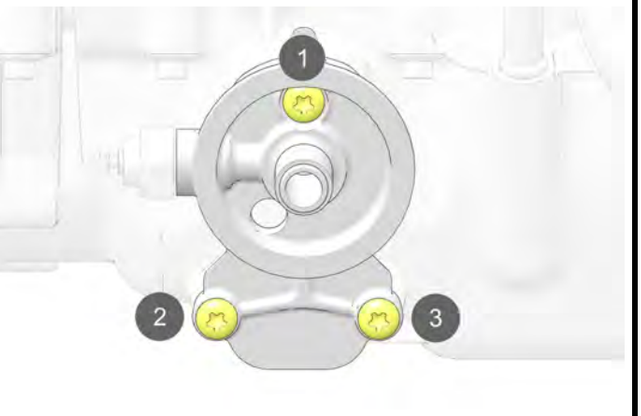
Intake Manifold Fasteners: **16 ft-lbs (22 N·m)**

ENGINE BREATHER



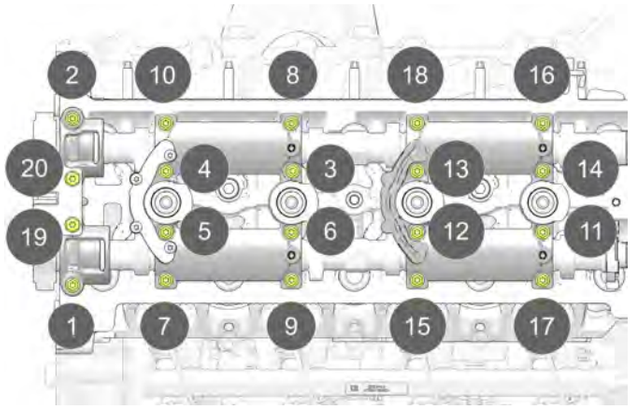
Engine Breather Fasteners: **80 in-lbs (9 N·m)**

OIL FILTER ADAPTER



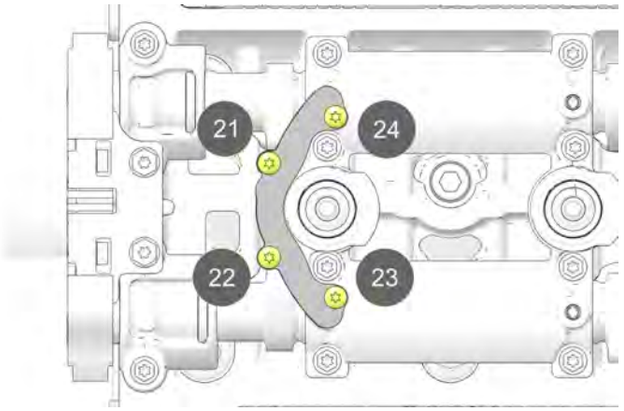
Oil Filter Adapter Fasteners: **13 ft-lbs (18 N·m)**

CAM CARRIER



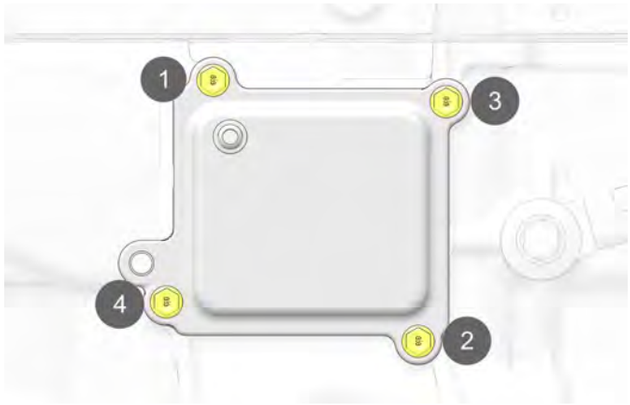
Camshaft Carrier Fasteners:	1. Tighten fasteners in sequence shown using 3-turn (1080°) intervals until fully seated. 2. Torque to specification in sequence shown. **13 ft-lbs (17 N·m)**

OIL TRANSFER PLATE



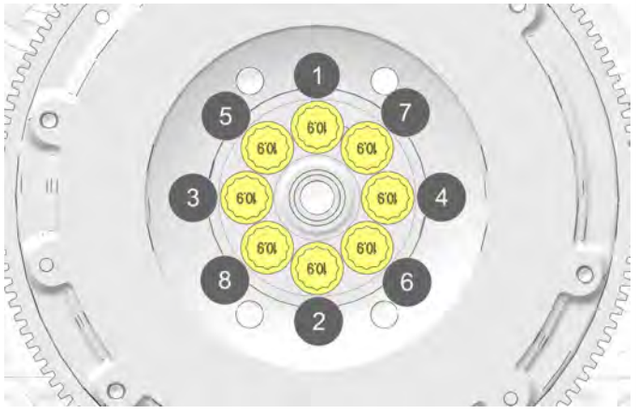
Oil Transfer Plate Fasteners:	**53 in-lbs (6 N·m)**

ENGINE BREATHER



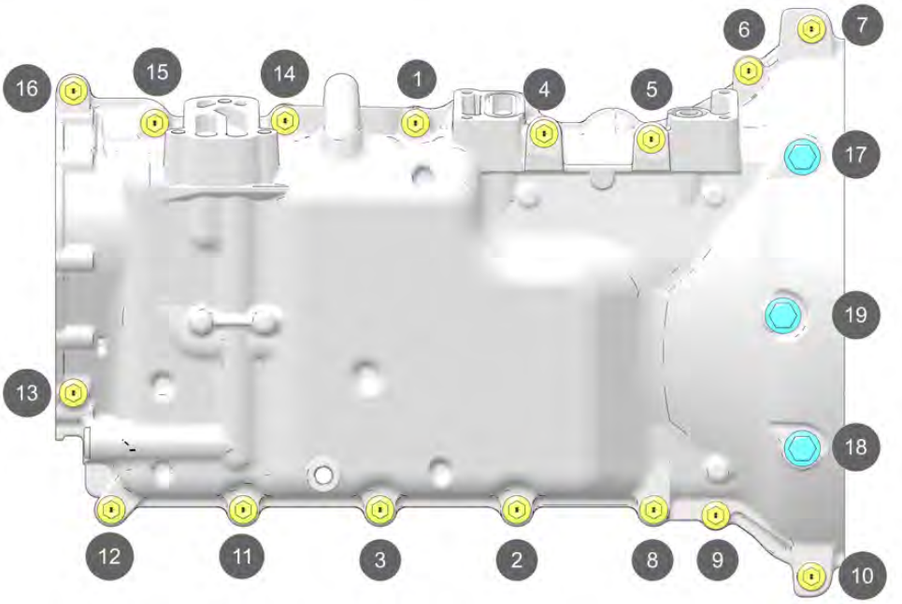
Engine Breather Fasteners:	**80 in-lbs (9 N·m)**

FLYWHEEL



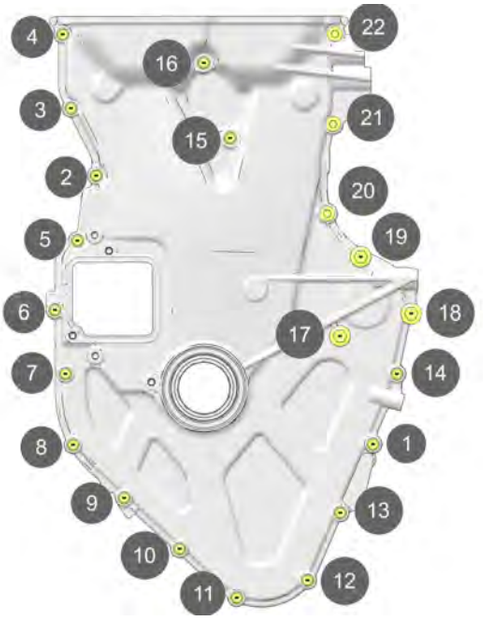
Flywheel Fasteners (single-use):	**24 ft-lbs (33 N·m) + 120°**

OIL PAN



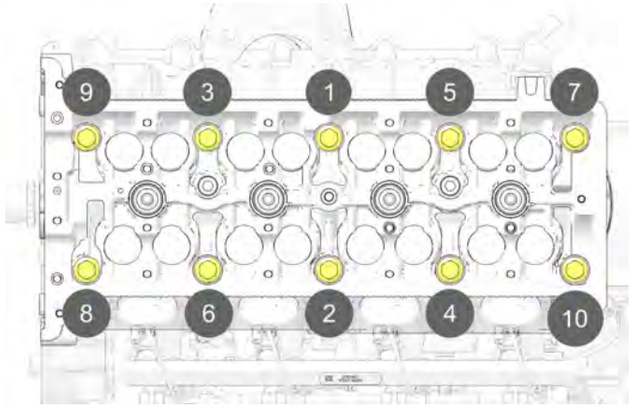
M8 Fasteners: Items 1–16	**16 ft-lbs (22 N·m)**
M10 Fasteners: Items 17–19	**35 ft-lbs (48 N·m)**

FRONT COVER



M6 Fasteners: Items 1–16	**80 in-lbs (9 N·m)**
M8 Fasteners: Items 17–22	**16 ft-lbs (22 N·m)**

CYLINDER HEAD



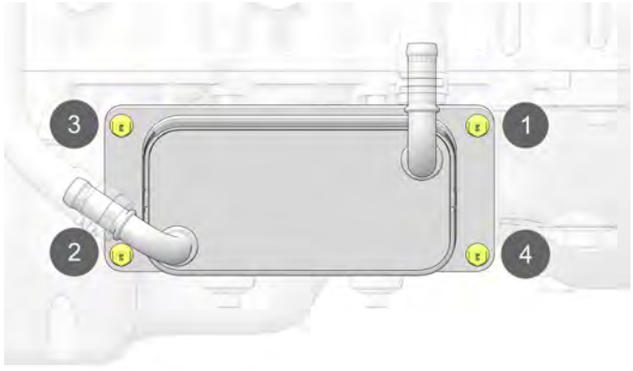
Cylinder Head Fasteners (re-usable):

NOTICE

Oil fasteners before installation.

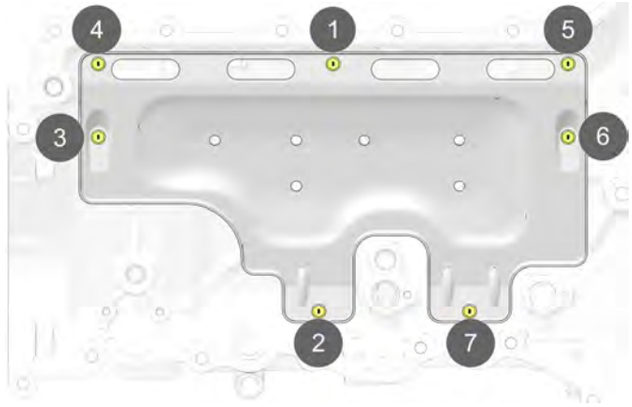
1. Torque all fasteners to 14 ft-lbs (20 N·m) in sequence specified.
2. Torque all fasteners to 26 ft-lbs (35 N·m) in sequence specified.
3. Angle torque all fasteners in sequence an additional 90°
4. Angle torque all fasteners in sequence an additional 90°
5. Angle torque all fasteners in sequence an additional 180°

OIL COOLER



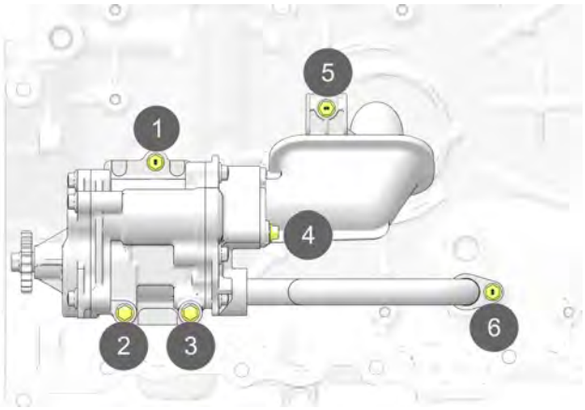
Oil Cooler Fasteners: **80 in-lbs (9 N·m)**

WINDAGE PLATE



Windage Plate Fasteners: **80 in-lbs (9 N·m)**

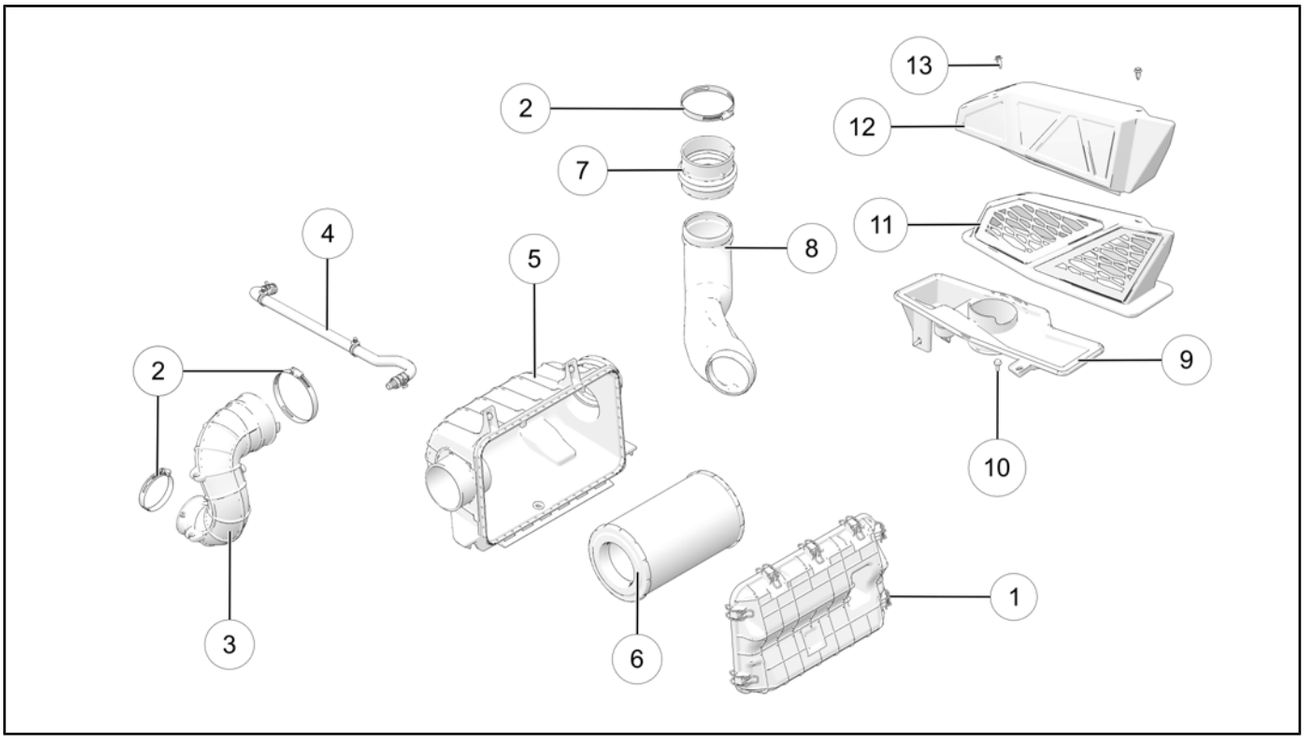
OIL PUMP



Oil Pump Fasteners: **80 in-lbs (9 N·m)**

INTAKE / EXHAUST SYSTEM

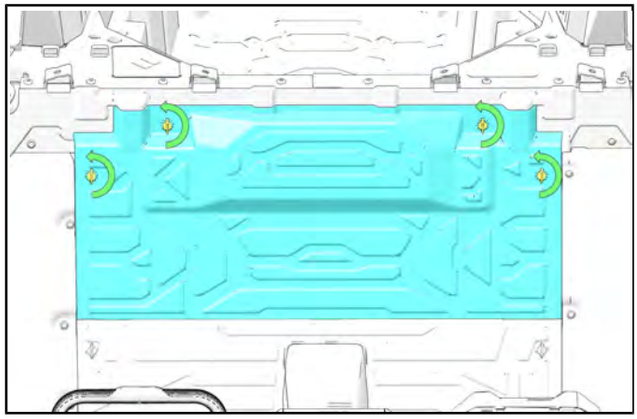
ENGINE INTAKE ASSEMBLY VIEW



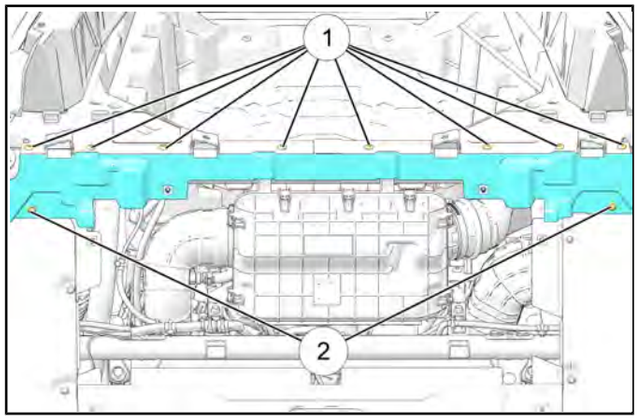
① Air Box Latch	⑧ Inlet Air Box Duct
② Intake Clamp **35 in-lbs (4 Nm)**	⑨ Lower Intake Bezel
③ Engine Intake Hose	⑩ Lower Intake Bezel Mounting Fastener **9 ft-lbs (12 Nm)**
④ Engine Vent Hose	⑪ Upper Intake Bezel
⑤ Air Box	⑫ Intake Bezel Deflector
⑥ Air Filter	⑬ Push-Rivet
⑦ Duct Coupler	

AIR BOX REMOVAL

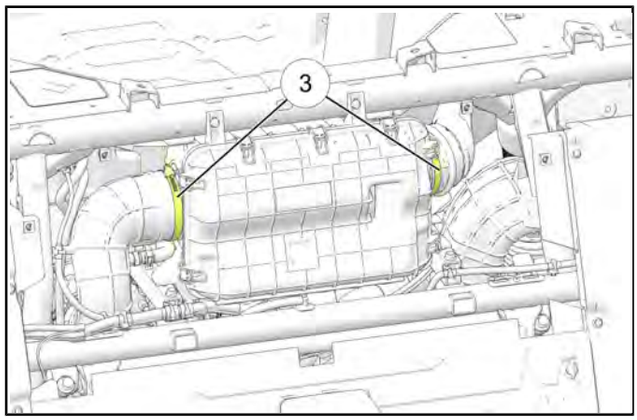
1. Remove seats.
2. Remove upper rear close off panel.



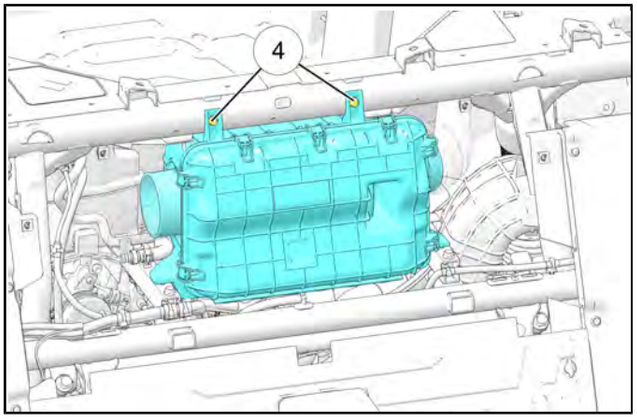
3. Remove eight fasteners ① and two push rivets ②. Remove close-off panel cover.



4. Loosen the band clamps ③ retaining the intake hoses to the air box.



5. Remove two fasteners ② retaining the air box.



6. Lift air box upward to disengage lower mounting tabs and remove air box from vehicle.

AIR BOX INSTALLATION

1. Install the air box and re-engage lower mounting tabs.
2. Install the intake hoses onto the air box. Tighten hose clamps to specification.

TORQUE
Intake Hose Clamps: **35 in-lbs (4 Nm)**

3. Install two air box mounting fasteners. Torque fasteners to specification.

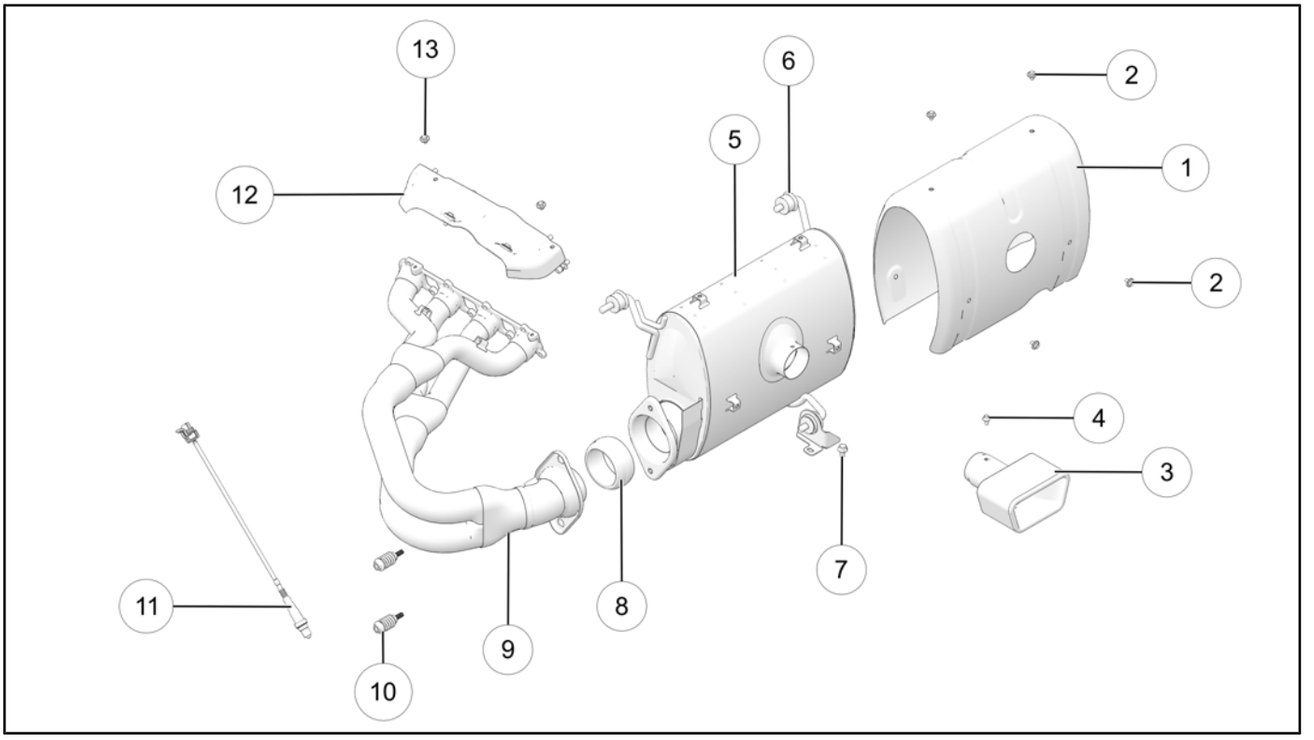
TORQUE
Air Box Mounting Fasteners: **9 ft-lbs (12 Nm)**

4. Install rear close off panel cover. Torque fasteners to specification.

TORQUE
Rear Close Off Panel Cover Fasteners: **7 ft-lbs (10 Nm)**

5. Install upper rear close off panel.
6. Install both seats.

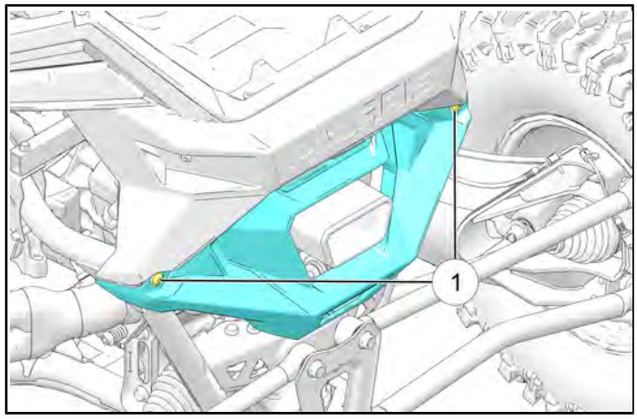
EXHAUST ASSEMBLY VIEW



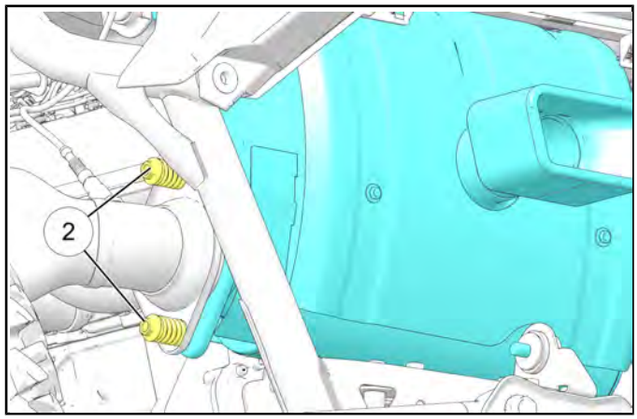
① Muffler Heat Shield	⑧ Exhaust Pipe Gasket
② Muffler Heat Shield Fastener **71 in-lbs (8 Nm)**	⑨ Headpipe
③ Spark Arrestor	⑩ Headpipe-to-Muffler Fastener **18 ft-lbs (25 Nm)**
④ Spark Arrestor Fastener **8 ft-lbs (11 Nm)**	⑪ Oxygen Sensor **30 ft-lbs (40 Nm)**
⑤ Muffler	⑫ Headpipe Heat Shield
⑥ Muffler Isolator	⑬ Headpipe Heat Shield Fastener **71 in-lbs (8 Nm)**
⑦ Lower Isolator Mounting Fastener **18 ft-lbs (25 Nm)**	

MUFFLER REMOVAL

1. Remove two fasteners ① and remove the rear bumper.



2. Remove two muffler studs ② and disconnect muffler from the headpipe.



3. Disengage muffler from isolator mounts and remove the muffler.

MUFFLER INSTALLATION

1. Engage muffler into isolator mounts.
2. Install a new muffler gasket and install the two fasteners retaining the muffler to the exhaust pipe. Torque fasteners to specification.

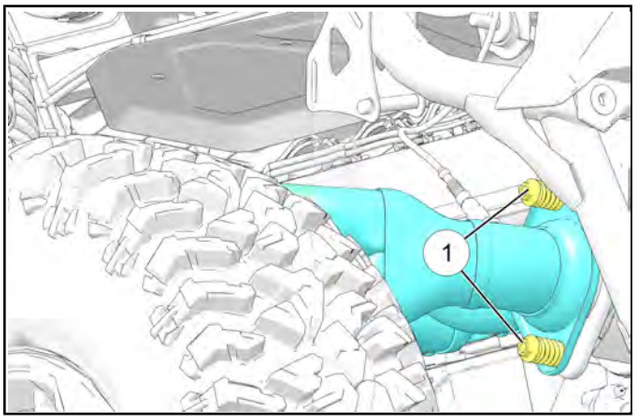
TORQUE
Exhaust Pipe Fasteners: **18 ft-lbs (25 Nm)**

3. Install the rear fasciar. Torque fasteners to specification

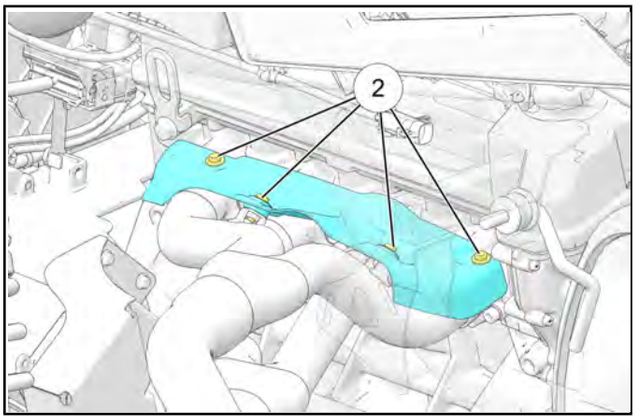
TORQUE
Rear Fascia Fasteners: **7 ft-lbs (10 Nm)**

EXHAUST PIPE REMOVAL

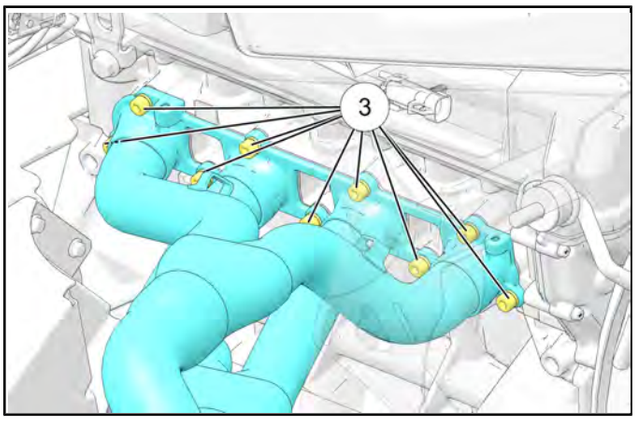
1. Remove two headpipe to muffler studs ①.



2. Disconnect Oxygen Sensor wiring.
3. Remove four headpipe heat shield fasteners ② and remove heat shield.



4. Remove nine manifold fasteners ③. Remove headpipe from the vehicle.

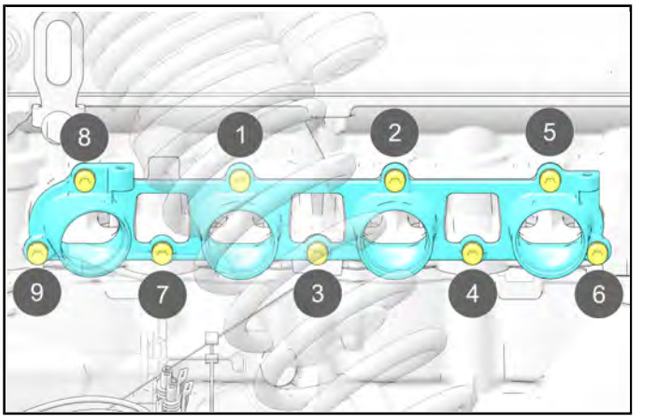


EXHAUST PIPE INSTALLATION

1. Install heat shield and four fasteners onto the exhaust pipe. Torque heat shield fasteners to specification.

TORQUE
Manifold Heat Shield Fasteners: **71 in-lbs (8 Nm)**

2. Install exhaust pipe and install nine exhaust manifold fasteners. Torque fasteners to specification in the sequence shown.



TORQUE
Exhaust Manifold Fasteners: **Step 1: 60 in-lbs (7 Nm)Step 2: 22 ft-lbs (30 Nm)**

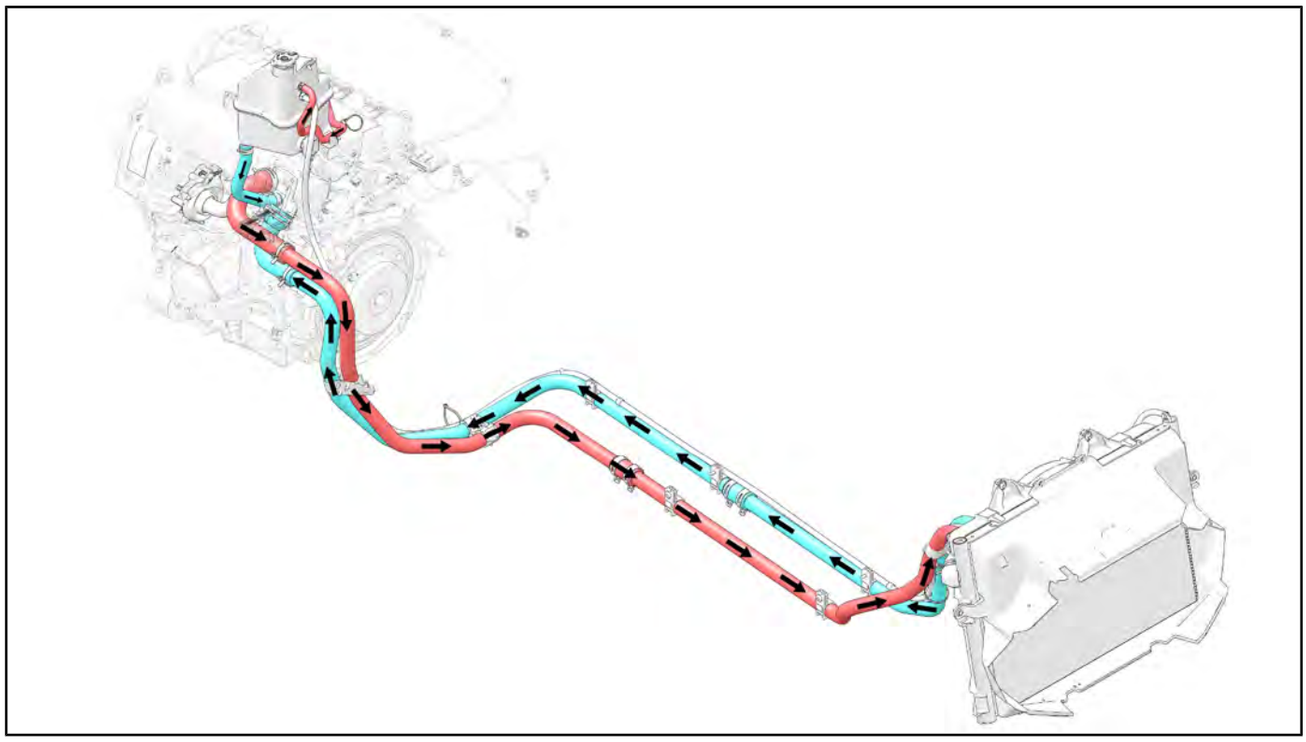
3. Install new gasket in between headpipe and the muffler.
4. Install two headpipe to muffler studs. Torque fasteners to specification.

TORQUE
Headpipe to Muffler Fasteners: **18 ft-lbs (25 Nm)**

5. Connect oxygen sensor wiring.

COOLING SYSTEM

COOLING SYSTEM FLOW



COOLING SYSTEM SPECIFICATIONS

COOLING SYSTEM CAPACITY

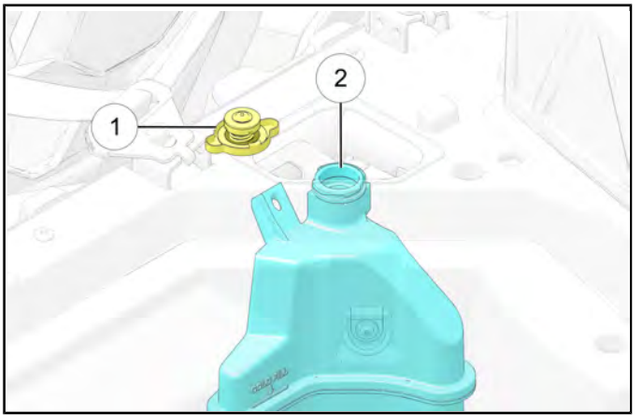
RZR PRO R	10.5 qts (9.94 L)

TEMPERATURE SPECIFICATIONS

CONDITION	COOLANT TEMP ° F (° C)
Room Temperature	68° F (20° C)
Thermostat Begins Opening	180° F (82° C)
Fan Off *(when temp decreases to)*	190° F (88° C)
Fan On (fan speed 50%) *(engine running) (when temp increases to)*	190° F (88° C)
Fan On (fan speed 100%) *(engine running) (when temp increases to)*	207° F (97° C)
Thermostat Full Open	203° F (95° C)
Fan On *(engine OFF)* ** fan will run up to 30 seconds without engine running*	230° F (110° C)
Engine Temperature **Overheat Indicator ON**	241° F (116° C)
Engine Protection **Torque Limit**	244° F (118° C)
Engine Protection **Cylinder Deactivation**	250° F (121° C)
Engine Protection **Shutdown & Overheat Indicator Flashes**	255° F (124° C)

COOLING SYSTEM PRESSURE TEST

1. Remove the coolant bottle cover.
2. Remove pressure cap ① and pressure test the cap using a commercially available pressure tester. The pressure cap relief pressure is 18 psi. Replace the cap if it does not meet this specification.



⚠ WARNING

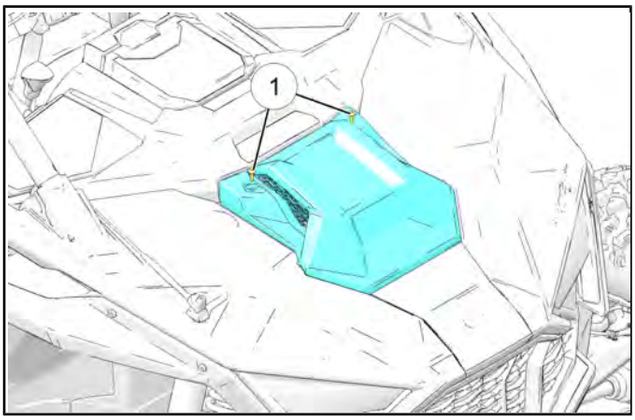
Never remove pressure cap when engine is warm or hot. The cooling system is under pressure and serious burns may result. Allow the engine to cool before servicing.

3. To test the cooling system, connect the pressure tester to the cooling neck ② with the correct adapter.
4. The system must maintain 10 psi for five minutes or longer. If pressure loss is evident within five minutes, check the filler neck, radiator, hoses, clamps and water pump weep hole for leakage.

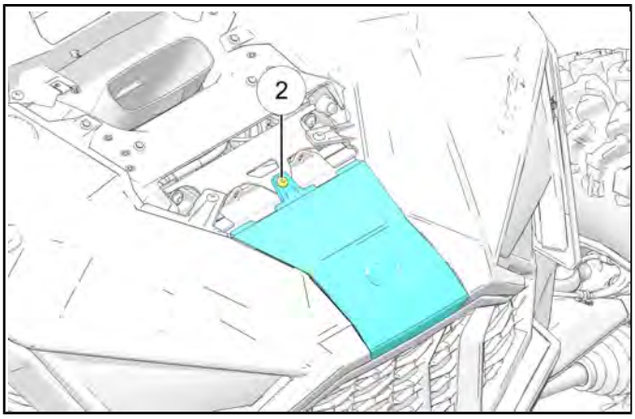
RADIATOR REPLACEMENT

REMOVAL

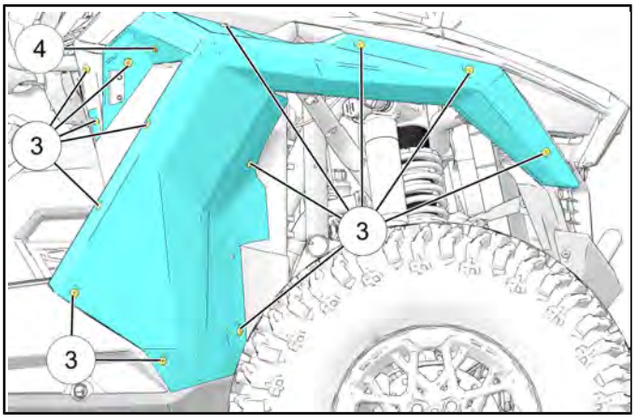
1. Drain cooling system.
2. Remove two fasteners ① and remove the hood.



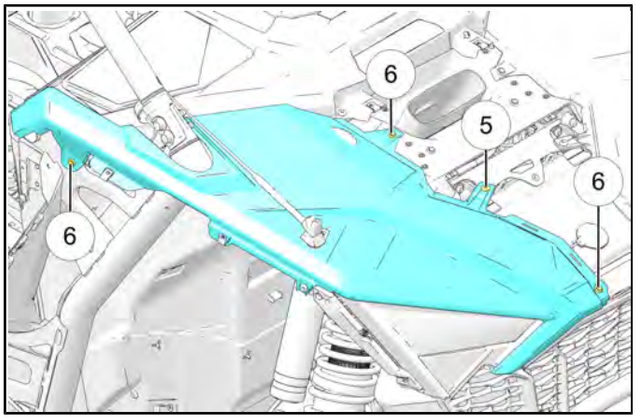
3. Remove one fastener ② and remove the nose cone.



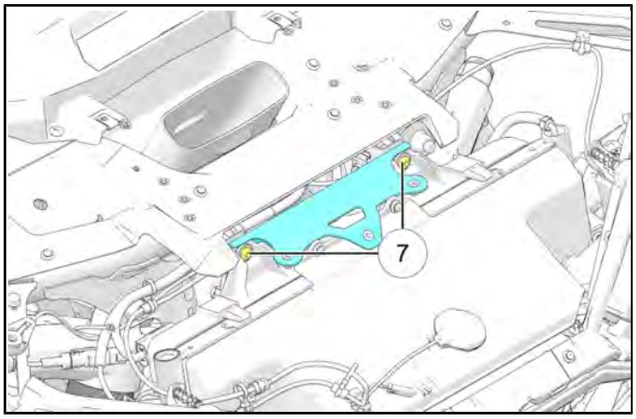
4. Remove thirteen fasteners ③, one push-pin ④, and remove the front fender flare. Repeat for opposite side of the vehicle.



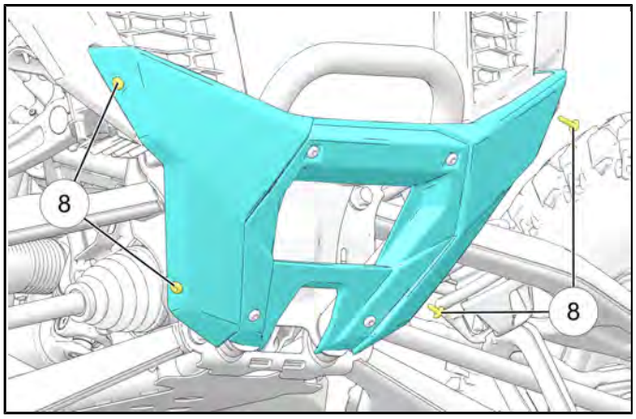
5. Remove one fastener ⑤, three push-pins ⑥, and remove the front fender. Repeat for opposite side of the vehicle. If equipped, disconnect antenna.



6. Remove two fasteners ⑦ and remove the fender mounting bracket.

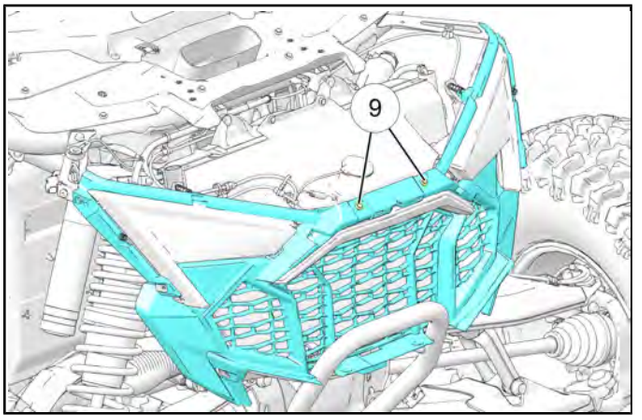


7. Remove four fasteners ⑧ and remove the front bumper assembly.

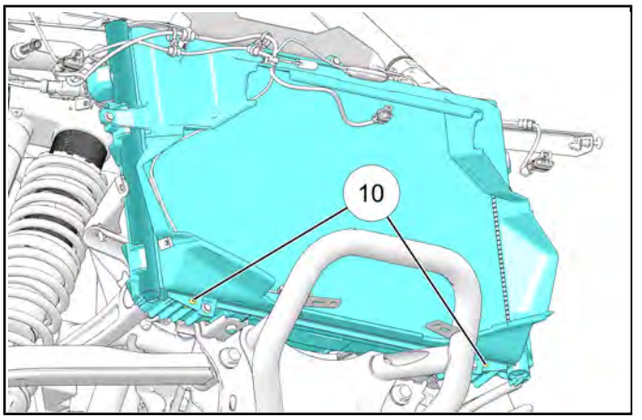


8. Disconnect electrical connectors from the headlights and accent lights, if equipped..

9. Remove two push-pins ⑨ and remove the front fascia.



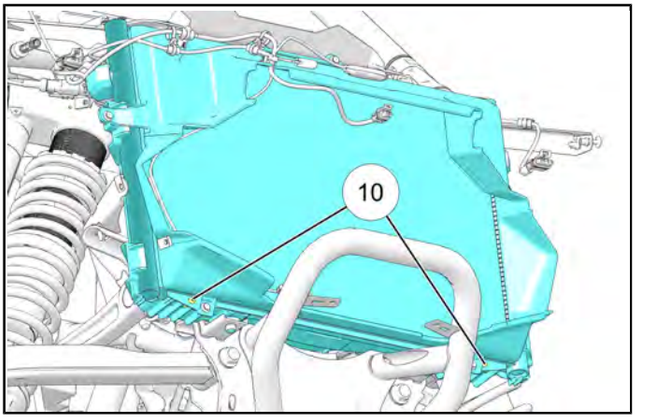
10. Disconnect coolant hoses from the radiator.
11. Disconnect electrical connector from cooling fan assembly.
12. Remove two fasteners ⑩ retaining the radiator assembly.



13. Disconnect any wiring from the radiator assembly.
14. Remove radiator, cooling fan and radiator shroud as an assembly.
15. Remove push-pins to separate radiator from fan and shroud assemblies.

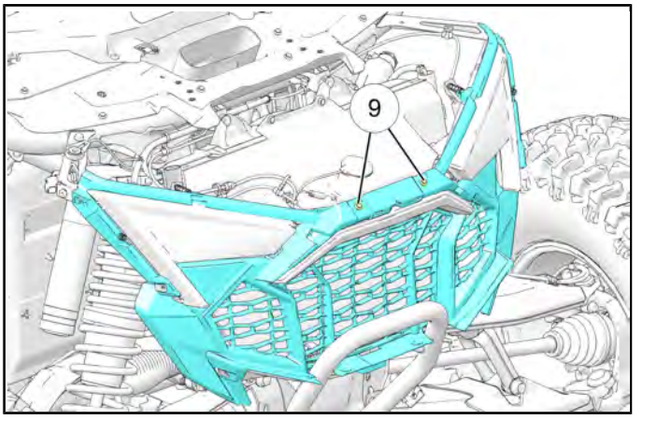
INSTALLATION

1. Install new radiator onto cooling fan and shroud, and install assembly mounting push-pins.
2. Mount radiator assembly onto vehicle chassis and install radiator hoses.
3. Route and install wiring harness onto radiator assembly.
4. Install two fasteners to mount assembly. Torque fasteners to specification.



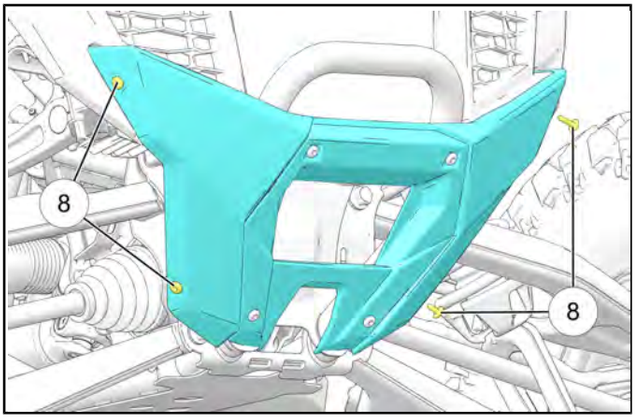
TORQUE
Radiator Mounting Fasteners: **9 ft-lbs (12 Nm)**

5. Connect cooling fan electrical connector.
6. Install front fascia and install two mounting push-pins.



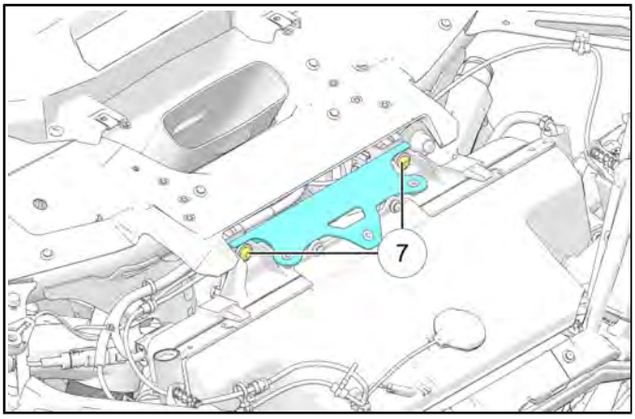
7. Install headlight and accent light electrical connectors.

8. install front bumper assembly. Torque fasteners to specification.



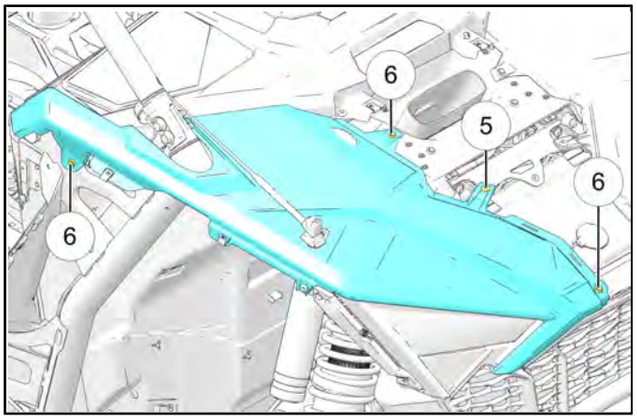
TORQUE
Front Bumper Fasteners: **7 ft-lbs (10 Nm)**

9. Install front fender mounting bracket. Torque fasteners to specification.



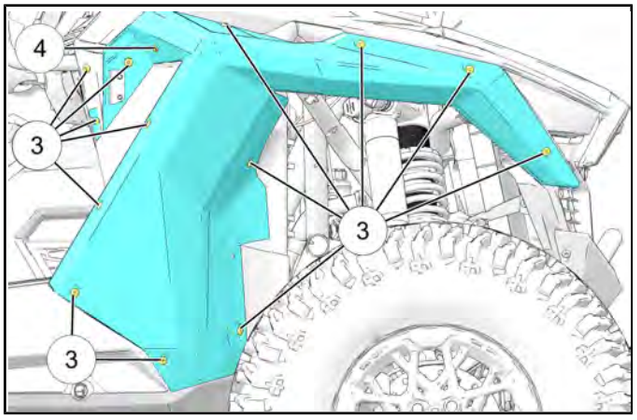
TORQUE
Front Fender Mounting Bracket Fasteners: **7 ft-lbs (10 Nm)**

10. Install front fenders. Torque fasteners to specification



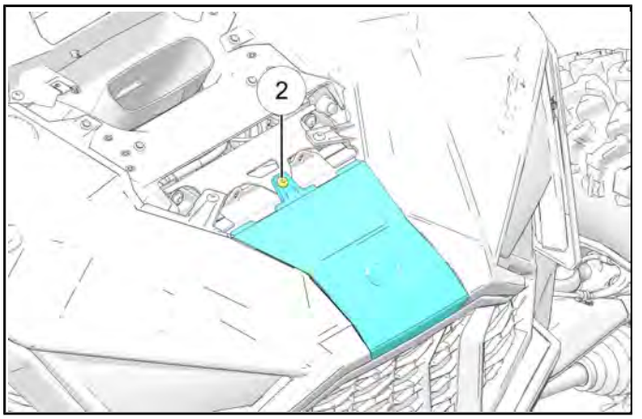
TORQUE
Front Fender Fasteners: **7 ft-lbs (10 Nm)**

11. Install fender flares. Torque fasteners to specification.



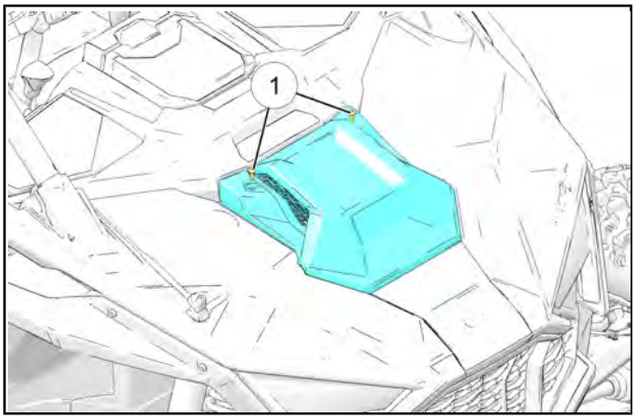
TORQUE
Front Fender Flare Fasteners: **7 ft-lbs (10 Nm)**

12. Install nose cone. Torque fastener to specification.



TORQUE
Nose Cone Fastener: **7 ft-lbs (10 Nm)**

13. Install front hood. Torque fasteners to specification.



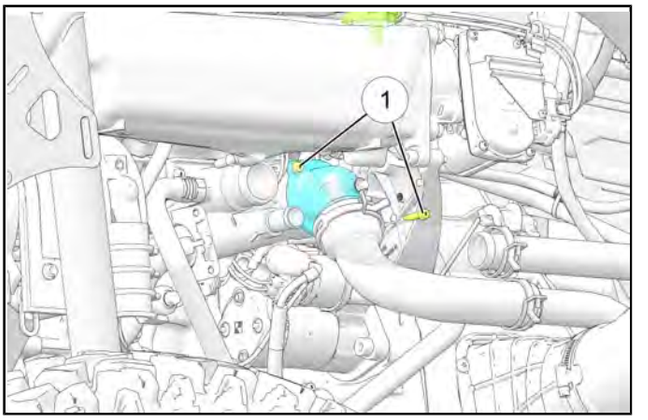
TORQUE
Hood Fasteners: **7 ft-lbs (10 Nm)**

14. Fill and bleed the cooling system. Refer to Cooling System Specifications.

THERMOSTAT REPLACEMENT

REMOVAL

1. Place a drain pan under the engine below the thermostat housing.
2. Remove two fasteners ① and remove the thermostat cover.



3. Pull the thermostat up to remove it from the housing.

INSTALLATION

1. Install new thermostat into the housing.

⚠ CAUTION
Installing the thermostat upside down will damage the thermostat and lead to engine overheating.

2. Install thermostat cover. Torque fasteners to specification.

TORQUE
Thermostat Cover Fasteners: **9 ft-lbs (12 Nm)**

3. Fill and bleed the cooling system. See Cooling System Bleeding.

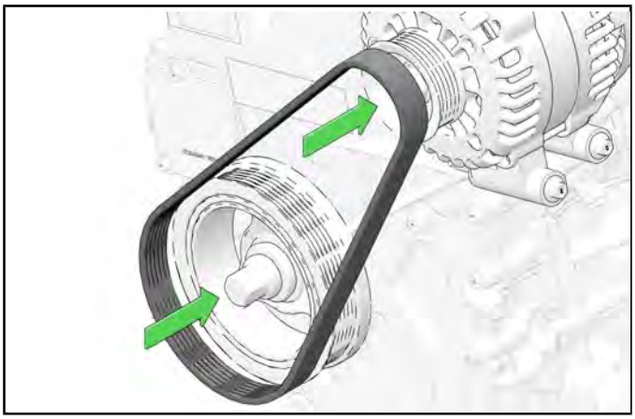
ENGINE SERVICE

STRETCH BELT REPLACMENT

IMPORTANT

NEVER re-use a stretch belt. A new belt must be installed any time a belt is removed.

1. Cut the stretch belt and discard.
2. Clean and inspect the belt groves of the alternator and harmonic damper. See Harmonic Damper Cleaning and Inspection outlined in this chapter.
3. Using a commercially-available stretch belt installation tool, install a NEW stretch belt over the alternator and balance pulleys.

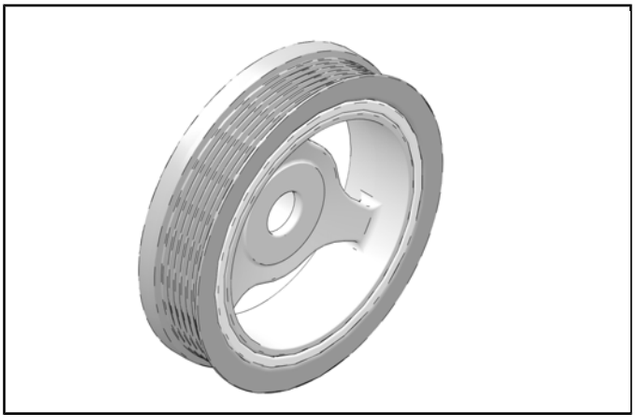


NOTICE

Turn the balance pulley clockwise to make sure the belt is properly seated in the grooves of the alternator and balance pulley.

HARMONIC DAMPER CLEANING AND INSPECTION

1. Clean the harmonic damper.



2. Clean the belt grooves of all dirt or debris with a wire brush.

⚠ CAUTION

Wear safety glasses in order to avoid eye damage.

3. Dry the harmonic damper with compressed air.
4. Inspect the harmonic damper for the following:
   - Worn, grooved, or damaged hub seal surface. A harmonic damper hub seal surface with excessive scoring, grooves, rust or other damage must be replaced.

IMPORTANT

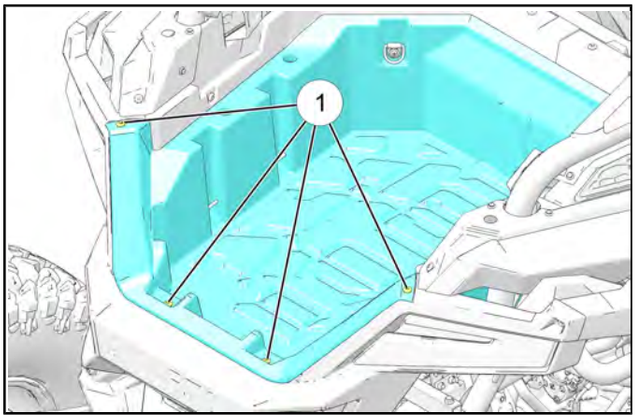
In order for the belt to track properly, the belt grooves should be free of all dirt or debris.

   - Dirty or damaged belt grooves. The damper belt grooves should be free of any nicks, gouges, or other damage that may not allow the belt to track properly. Minor imperfections may be removed with a fine file.
   - Worn, chunking or deteriorated rubber between the hub and pulley

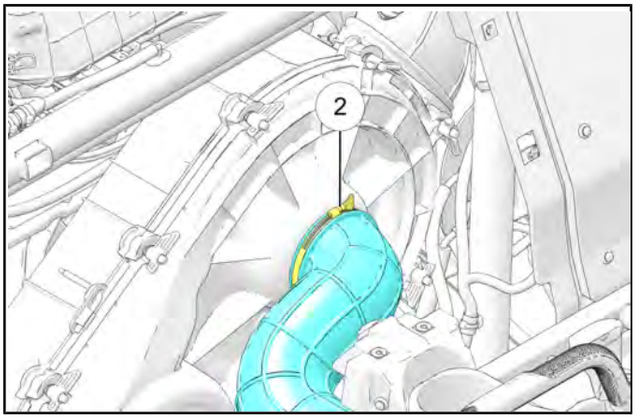
3

ENGINE REMOVAL

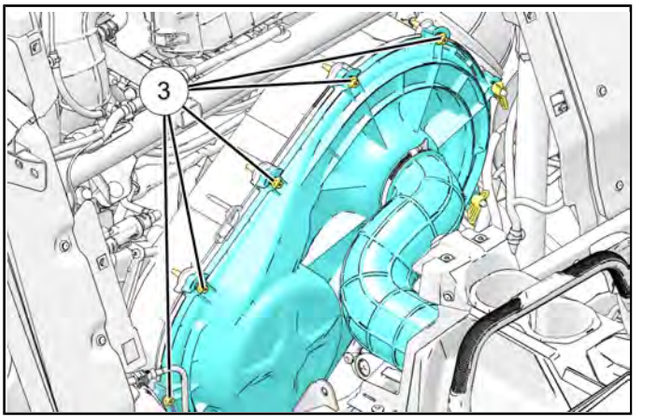
1. Park vehicle on a level surface.
2. Remove seats. On 4-seat models, remove the rear seats.
3. Disconnect the battery.
4. Remove upper and lower rear close-off panels.
5. Remove four fasteners ① and remove the cargo box.



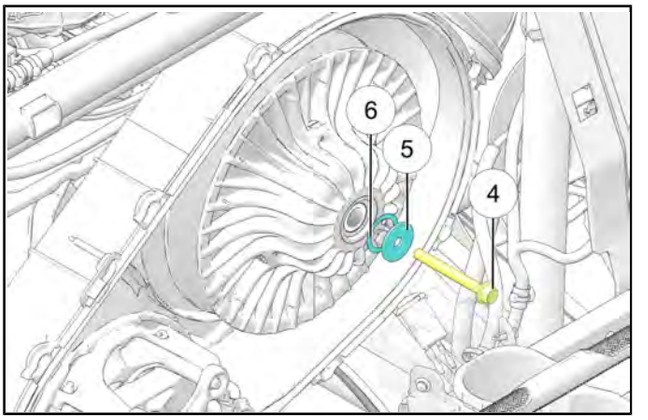
6. Drain coolant. Disconnect engine coolant inlet and outlet hoses.
7. Disconnect fuel line from the fuel rail.
8. Loosen hose clamp ② and remove the PVT intake hose.



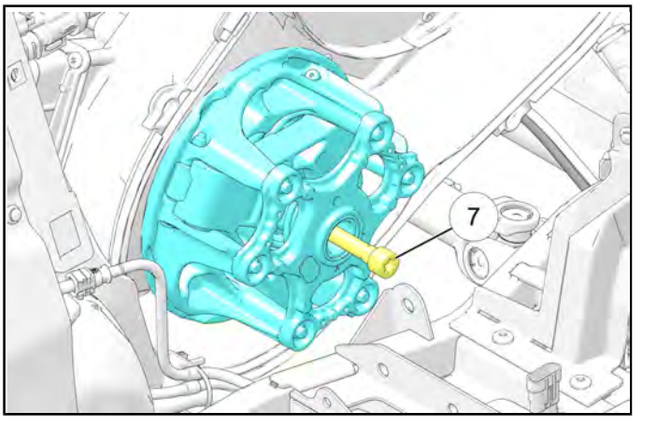
9. Remove five fasteners ③, disengage remaining 1/4 turn latches, and remove the outer PVT cover.



10. Remove the drive belt.
11. Remove bolt ④, spacer ⑤, and washer ⑥. Remove the driven clutch.



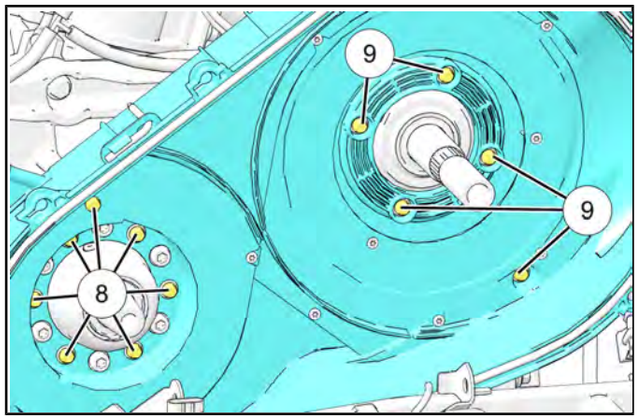
12. Remove drive clutch retaining bolt ⑦ and remove the drive clutch moveable-sheave assembly.



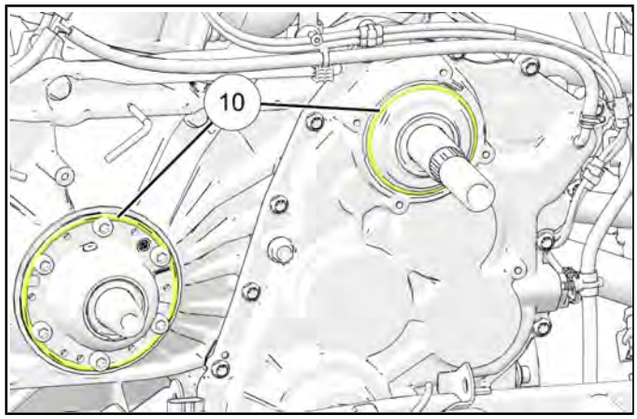
13. Remove the outer slip-fit post and install the Drive Clutch Puller (PN **PU-52422**) to remove the stationary sheave.

Drive Clutch Puller: **PU-52422**

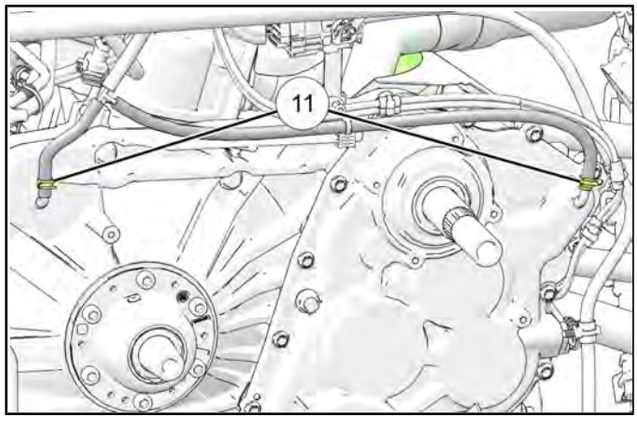
14. Remove inner clutch cover fasteners ⑧ and ⑨, and remove the inner clutch cover.



15. Remove two O-rings ⑩ from the transmission.

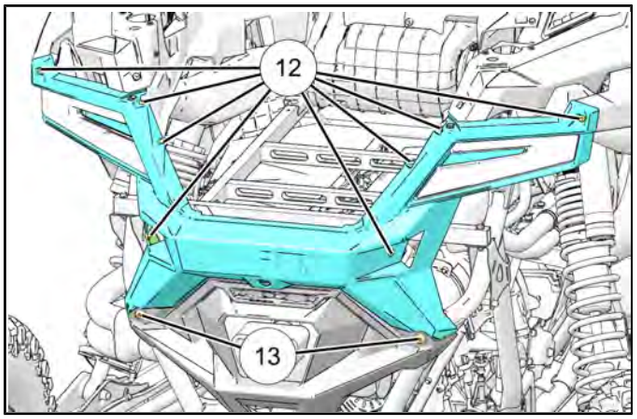


16. Disengage hose clamps ⑪ and remove vent hoses from the transmission.

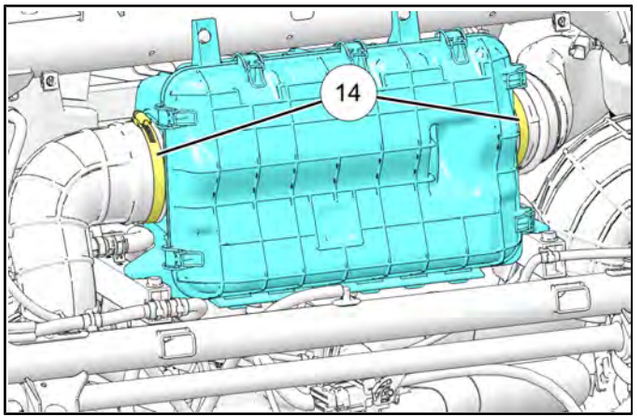


17. Disconnect rear tail light harness.

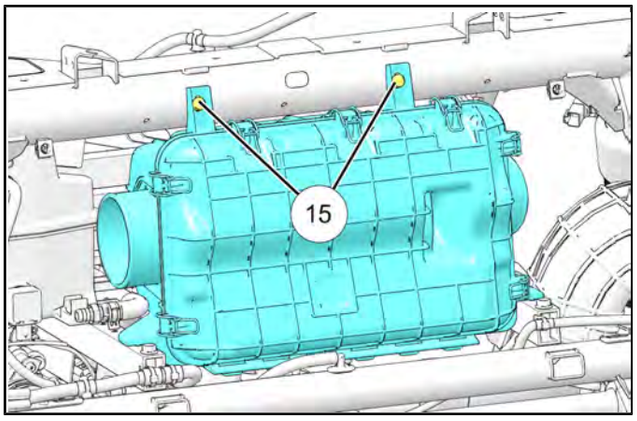
18. Remove eight fasteners ⑫ from the rear fascia, and two fasteners ⑬ from the rear bumper. Remove rear fascia and bumper.



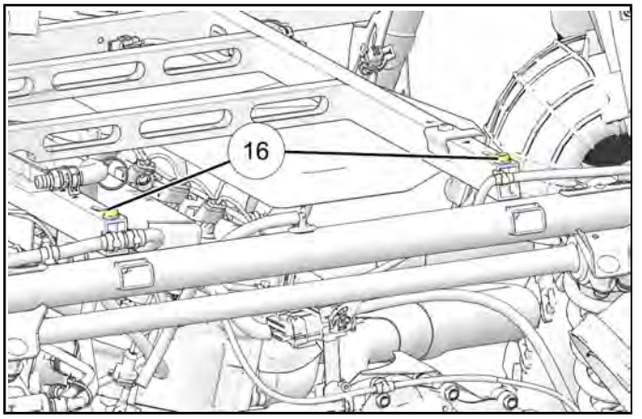
19. Loosen two air box hose clamps ⑭ and disconnect air ducts from the air box.



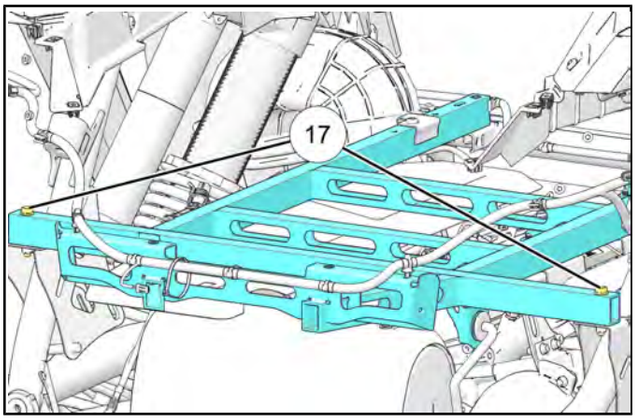
20. Remove two air box mounting fasteners ⑮ and remove the air box.



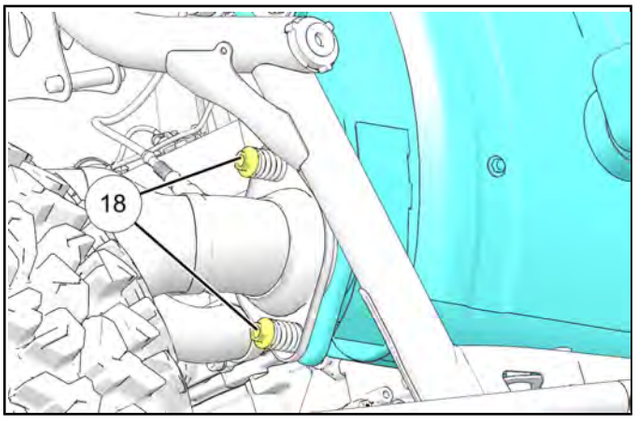
21. Remove two fasteners ⑯ from the front of the box support.



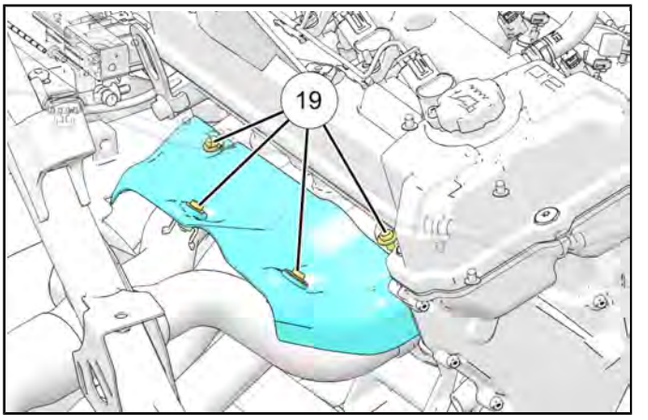
22. Remove two rear fasteners ⑰ and remove cargo box support.



23. Remove two exhaust pipe-to-muffler fasteners ⑱ and remove the muffler.

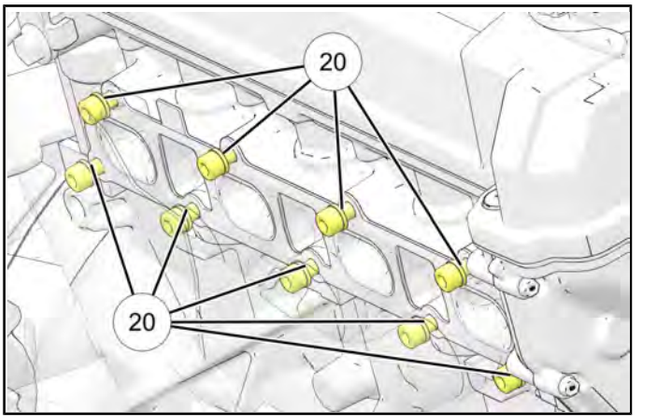


24. Remove four fasteners ⑲ from the exhaust manifold heat shield and remove heat shield.

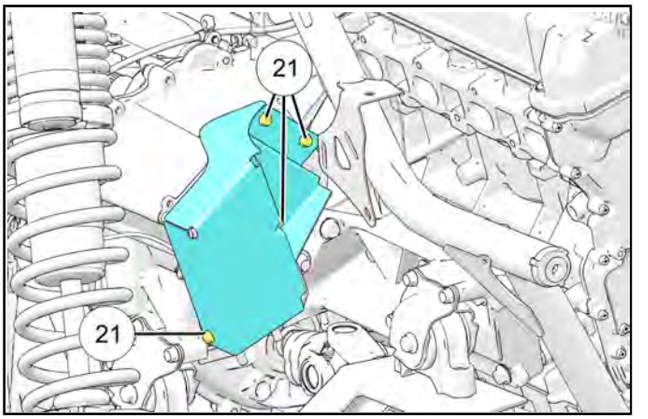


25. Disconnect oxygen sensor electrical harness.

26. Remove nine fasteners ⑳ from the exhaust manifold and remove the exhaust assembly.

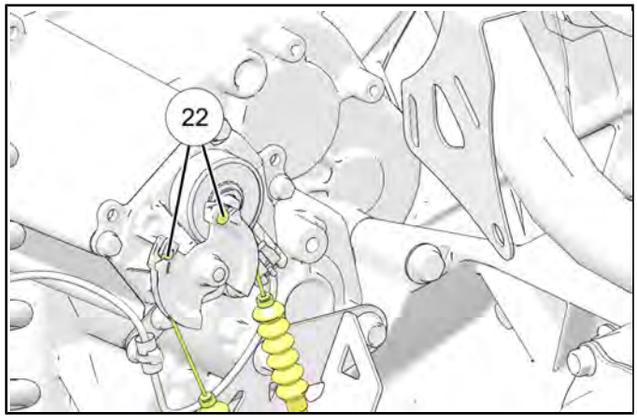


27. Remove four fasteners ㉑ from gear position sensor shield and remove shield.

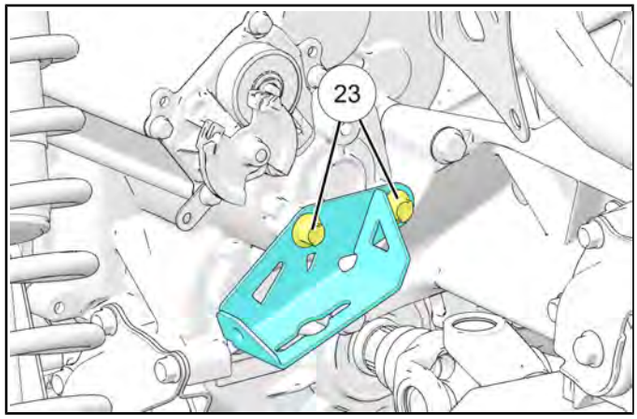


28. Disconnect gear position sensor electrical harness.

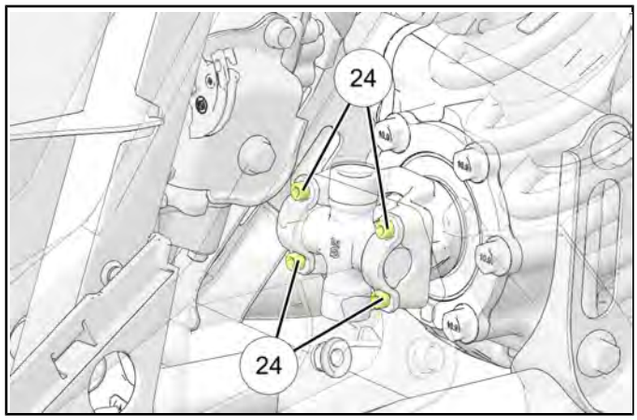
29. Disconnect shift cables ㉒.



30. Remove two fasteners ㉓ and remove shift cable bracket.

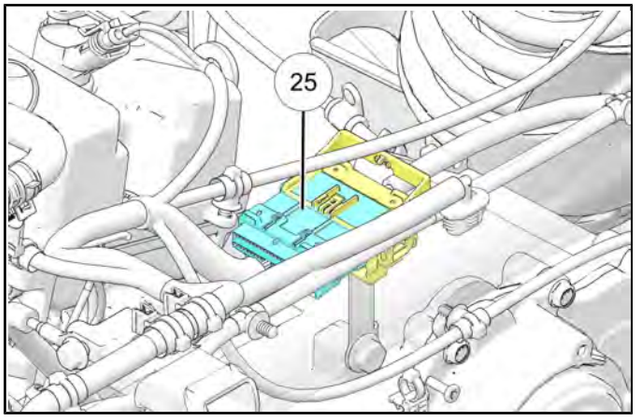


31. Remove four fasteners ㉔ retaining the rear prop shaft and remove rear prop shaft.

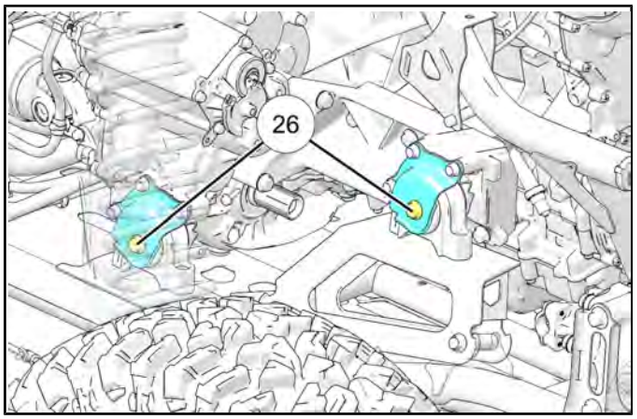


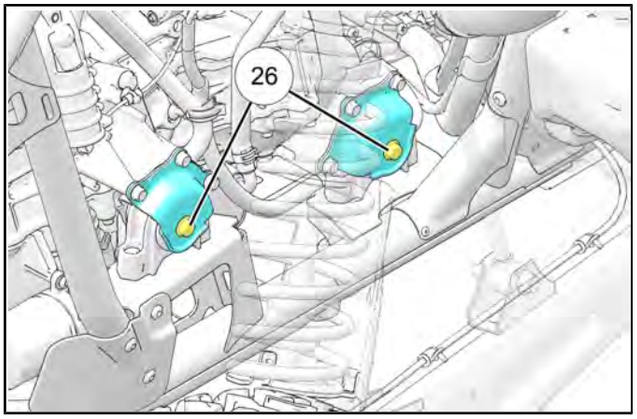
NOTICE
Prop shaft hidden for image clarity.

32. Disconnect main engine electrical harness ㉕.

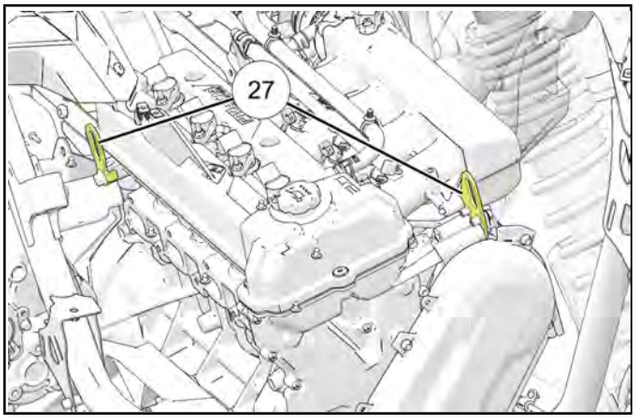


33. Remove four engine/transmission mounting fasteners ㉖.

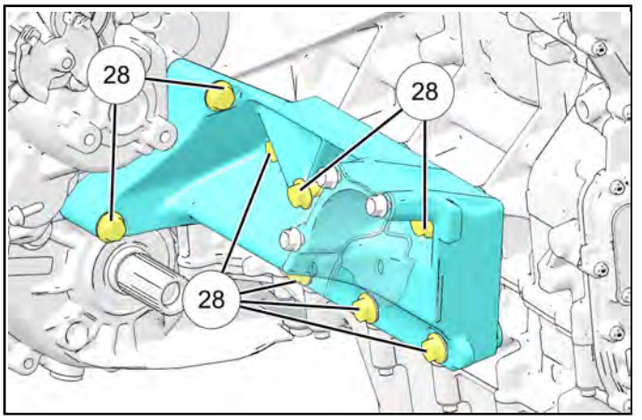




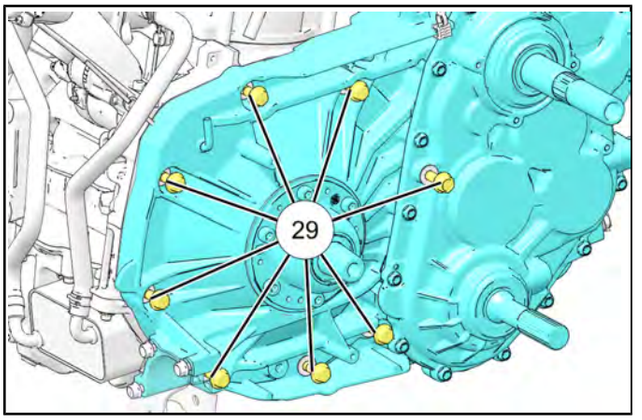
34. Attach engine hoist to lift brackets ㉗ . Remove engine and transmission as an assembly through the top of the vehicle.



35. With the engine and transmission removed from the vehicle, remove eight fasteners ㉘ and remove the engine mount.



36. Remove eight fasteners ㉙ from the transmission. Separate the engine and transmission.

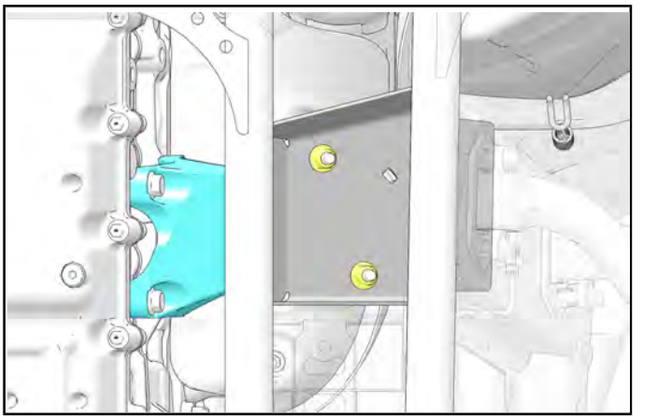


ENGINE INSTALLATION PREPARATION

IMPORTANT

Remove oil filter from engine and place a rag over the oil filter housing before installation.

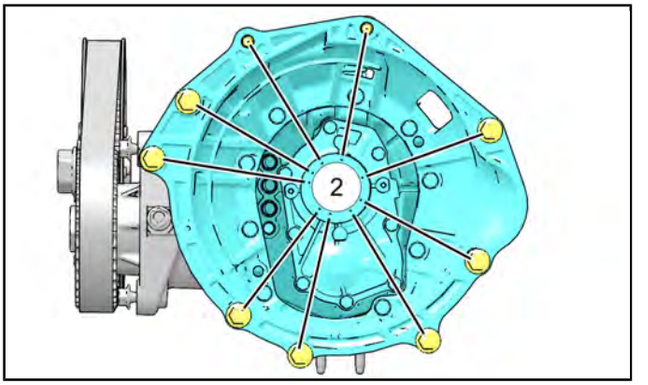
1. Remove the engine from the stand using an engine hoist.
2. Carefully place the engine mounting brackets from the engine on the mounts from the frame.
3. Install the engine mount isolator nuts and torque to specification.



TORQUE

Engine Mount Isolator Nuts (Lower):
50 ft-lbs (68 N·m)

4. If the transmission was removed from engine prior to removal, attach the transmission to engine mounting fasteners ② and torque to specification.

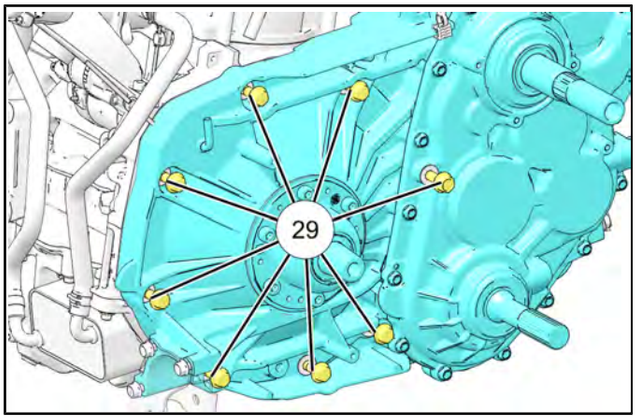


TORQUE

Transmission to Engine Fasteners:
40 ft-lbs (54 N·m)

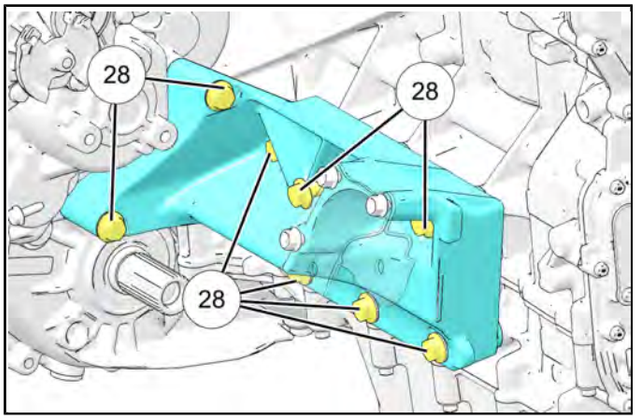
ENGINE INSTALLATION

1. Align transmission with the engine. Install eight fasteners ㉙ into the transmission. Torque fasteners to specification.



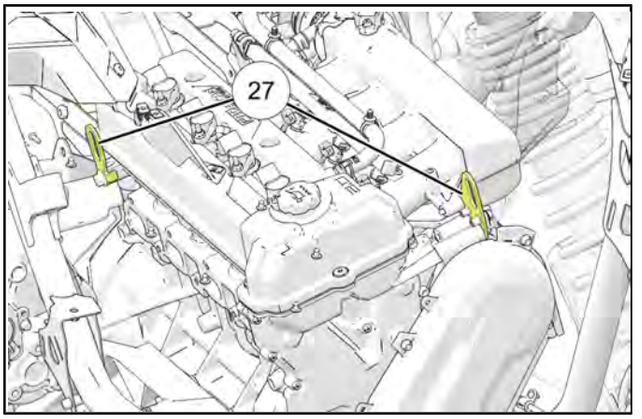
TORQUE
Transmission-to-Engine Mounting Fasteners: **Step 1: 11 ft-lbs (15 Nm)Step 2: 44 ft-lbs (60 Nm)**

2. Install the engine mount. Install eight fasteners ㉘ into the engine mount. Torque fasteners to specification.

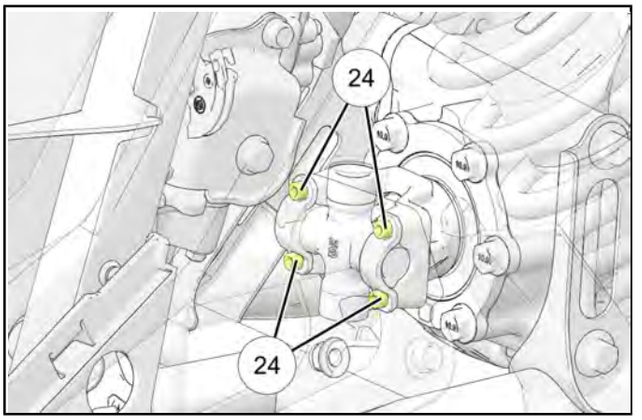


TORQUE
Engine Mount Fasteners: **Step 1: 26 in-lbs (3 Nm)Step 2: 33 ft-lbs (45 Nm)**

3. Attach engine hoist to lift brackets ㉗ . Lower engine and transmission as an assembly into the vehicle.



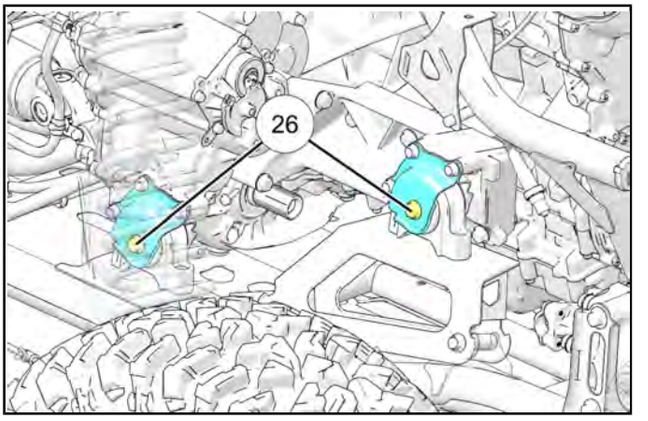
4. With the engine/transmission assembly hanging in place, install front and rear prop shafts onto the transmission output shafts.
5. Install rear prop shaft onto rear gearcase. Install four fasteners ㉔ and torque fasteners to specification.



NOTICE
Prop shaft hidden for image clarity.

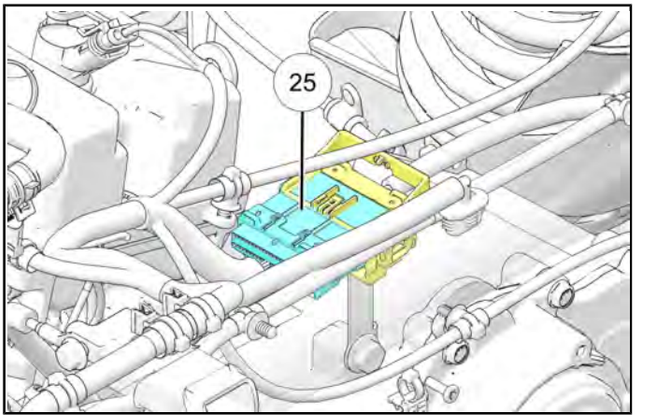
TORQUE
Rear Prop Shaft Coupling Fasteners: **11 ft-lbs (15 Nm)**

6. Install four engine/transmission mounting fasteners ㉖. Torque fasteners to specification.

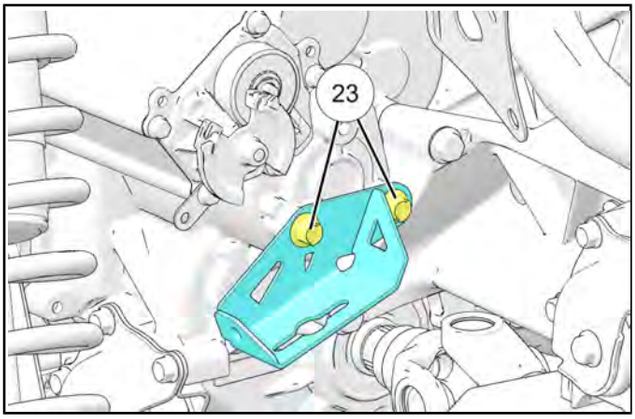


TORQUE
Engine/Transmission Mounting Fasteners: **33 ft-lbs (45 Nm)**

7. Connect main engine electrical harness ㉕.

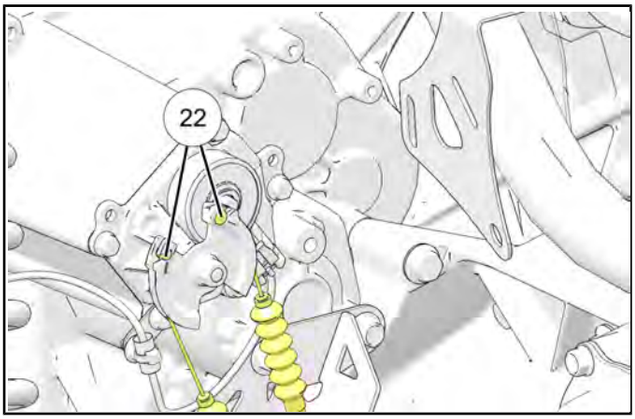


8. Install shift cable bracket and two fasteners ㉓ . Torque fasteners to specification.



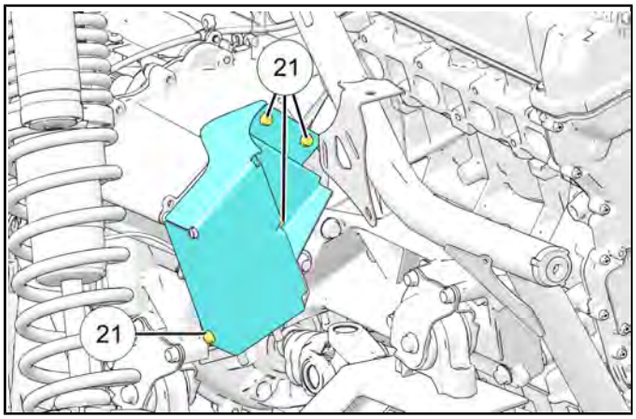
TORQUE
Shift Cable Bracket Fasteners: **22 ft-lbs (30 Nm)**

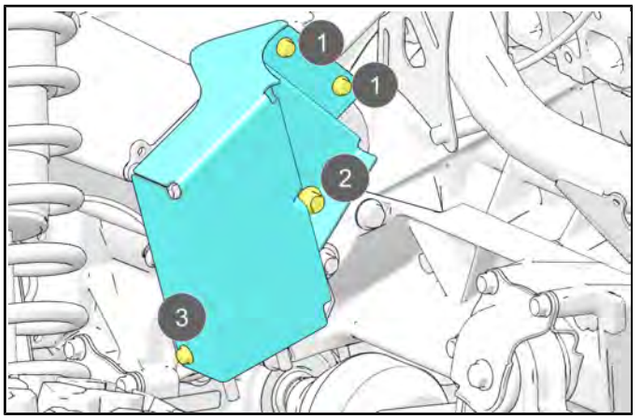
9. Connect shift cables ㉒.



Connect gear position sensor electrical harness.

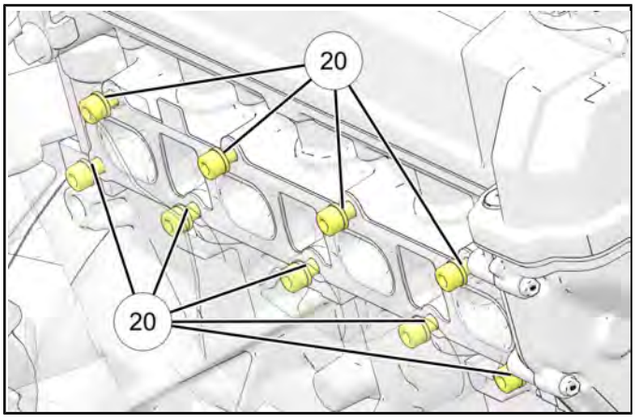
10. Install gear position sensor shield and four fasteners ㉑. Torque fasteners to specification as shown.

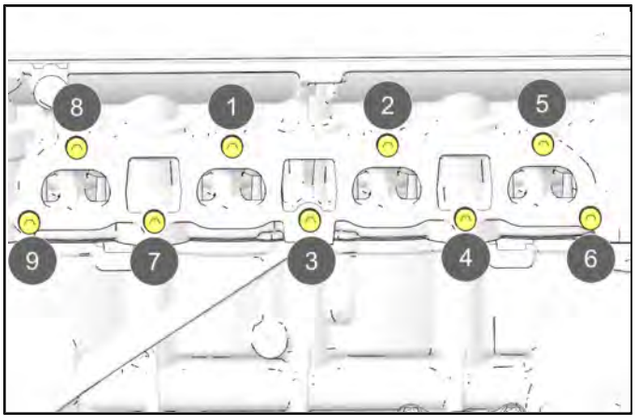




TORQUE
Gear Position Sensor Shield Fasteners: **①: 15 ft-lbs (20 Nm)②: 22 ft-lbs (30 Nm)③: 72 in-lbs (8 Nm)**

11. Install exhaust pipe onto engine. Install nine fasteners ⑳. Torque fasteners to specification in the sequence shown.



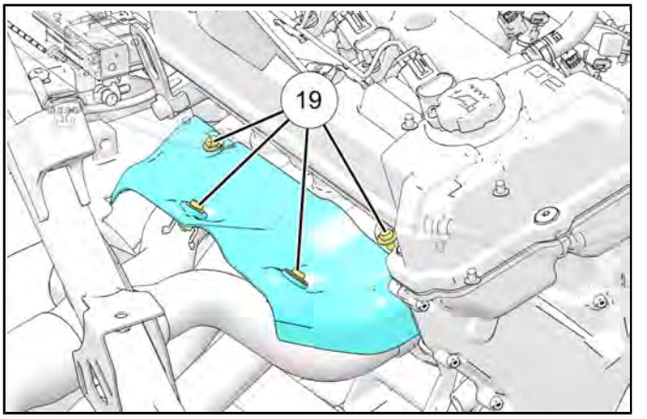


NOTICE
Exhaust manifold hidden for image clarity

TORQUE
Exhaust Manifold Fasteners: **Step 1: 60 in-lbs (7 Nm)Step 2: 22 ft-lbs (30 Nm)**

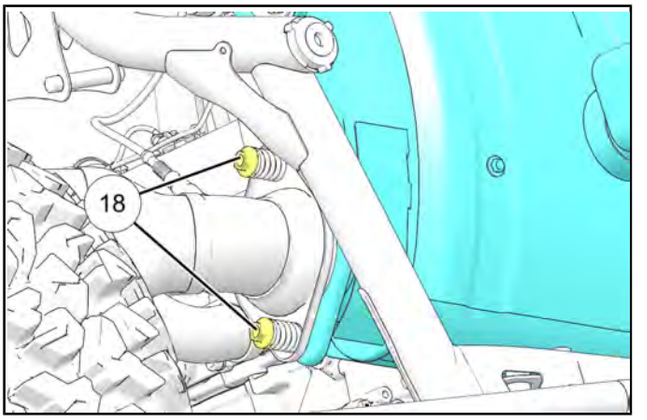
12. Connect oxygen sensor electrical harness.

13. Install exhaust manifold shield and four fasteners ⑲. Torque fasteners to specification.



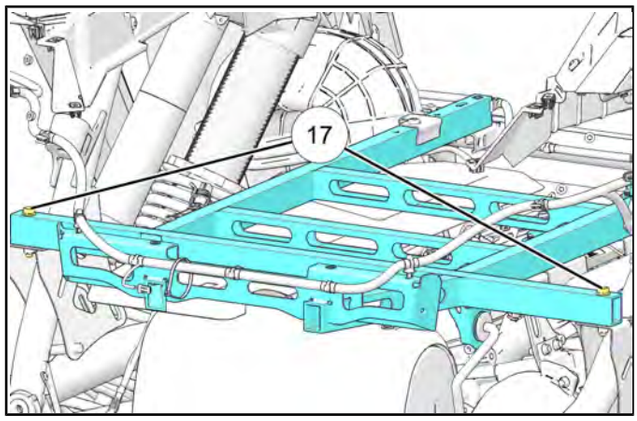
TORQUE
Exhaust Manifold Heat Shield Fasteners: **71 in-lbs (8 Nm)**

14. Install muffler into rubber grommets. Install two exhaust pipe-to-muffler fasteners ⑱. Torque fasteners to specification.

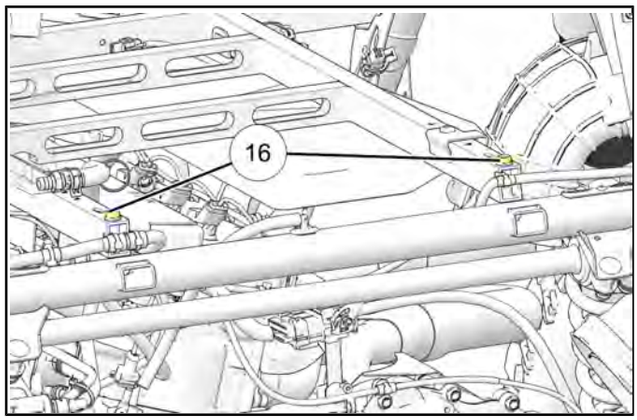


TORQUE
Head Pipe to Muffler Fasteners: **18 ft-lbs (25 Nm)**

15. Install rear cargo box support. Loosely install two rear fasteners ⑰.

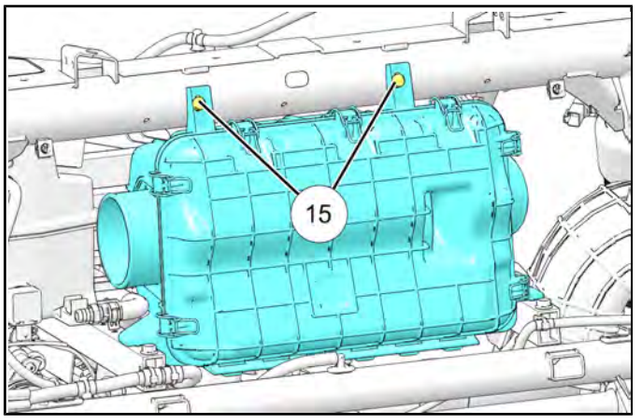


16. Install two fasteners ⑯ into the front of the box support. Torque front and rear fasteners to specification.



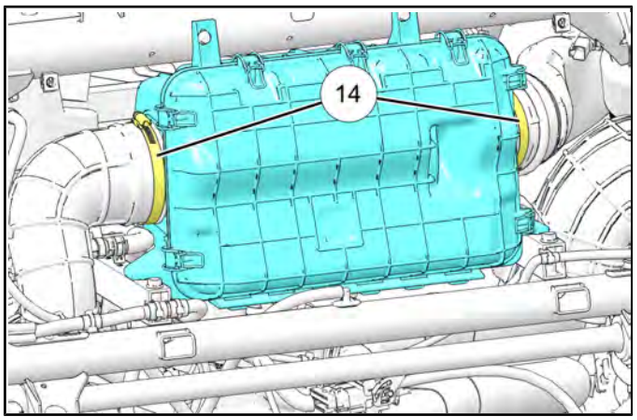
TORQUE
Cargo Box Support Fasteners: **22 ft-lbs (30 Nm)**

17. Install air box and two air box mounting fasteners ⑮. Torque fasteners to specification.



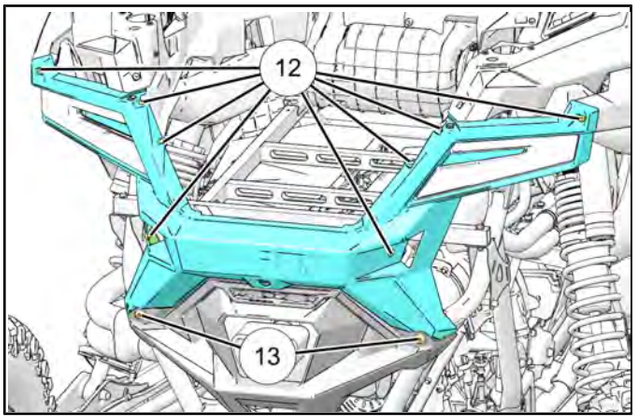
TORQUE
Air Box Mounting Fasteners: **9 ft-lbs (12 Nm)**

18. Install air box ducts. tighten two air box hose clamps ⑭. Torque hose clamps to specification.



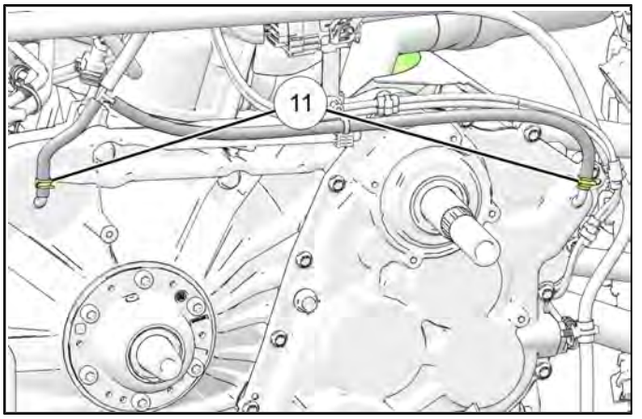
TORQUE
Intake Duct Hose Clamps: **35 in-lbs (4 Nm)**

19. Install rear fascia and rear bumper. Install eight fasteners ⑫ into the rear fascia, and two fasteners ⑬ into the rear bumper. Torque fasteners to specification.

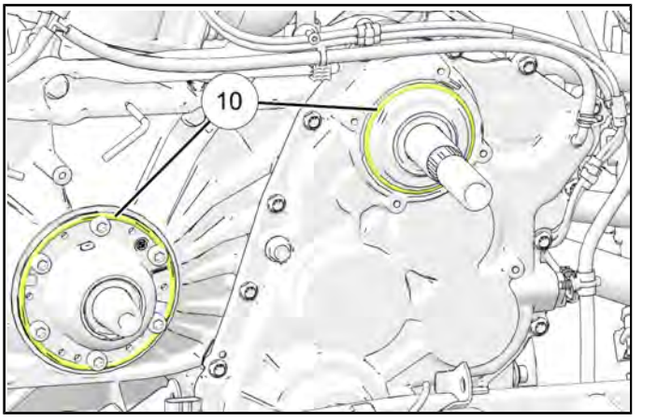


TORQUE
Rear Fascia/Bumper Fasteners: **7 ft-lbs (10 Nm)**

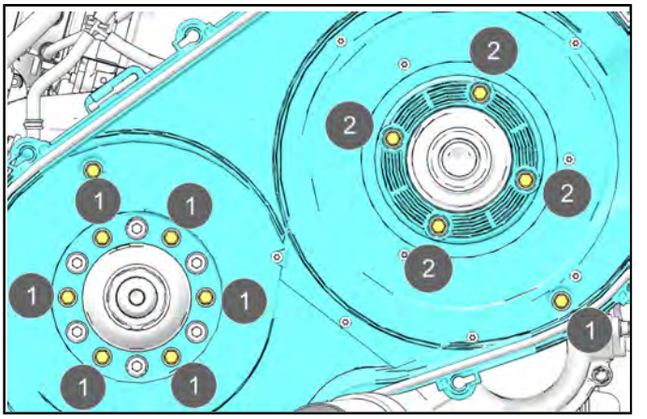
20. Connect rear tail light harness.
21. Install two transmission vent lines and engage hose clamps ⑪.



22. Install two O-rings ⑩ onto the transmission.



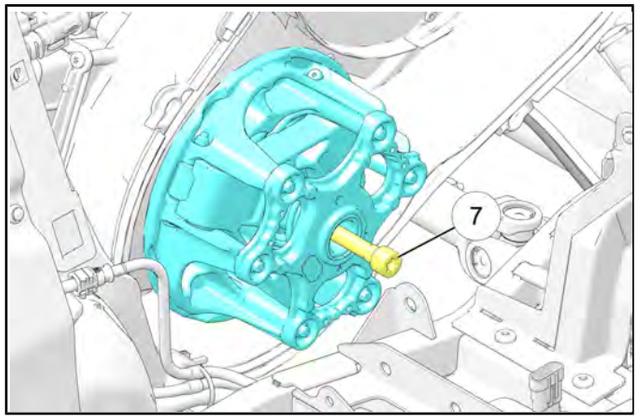
23. Install inner clutch cover and inner clutch cover fasteners ⑧ and ⑨. Torque fasteners to specification.



TORQUE
Inner PVT Cover Fasteners: **①: 11 ft-lbs (15 Nm)②: 35 in-lbs (4 Nm)**

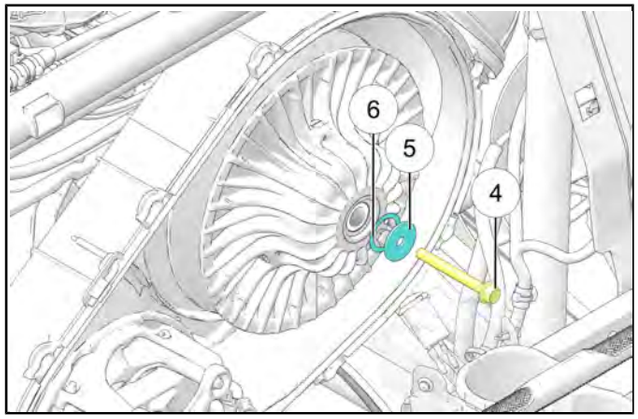
24. Install drive clutch stationary sheave.

25. Install drive clutch moveable sheave and drive clutch retaining bolt ⑦. Torque fastener to specification.



TORQUE
Drive Clutch Retaining Bolt: **Step 1: 140 ft-lbs (190 Nm)Step 2: Loosen two full turns (720°)Step 3: 118 ft-lbs (160 Nm)**

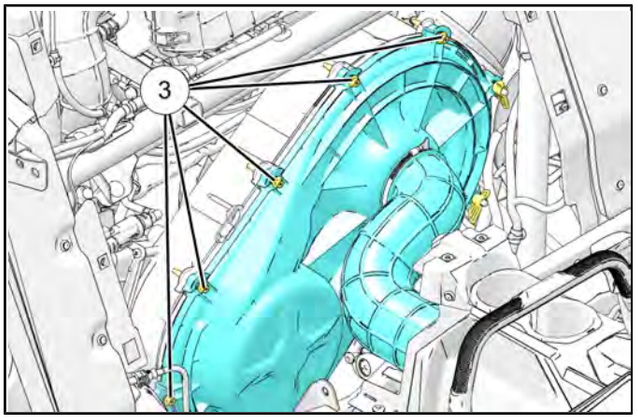
26. Install driven clutch, bolt ④, spacer ⑤, and washer ⑥. Torque fastener to specification.



TORQUE
Driven Clutch Retaining Bolt: **55 ft-lbs (75 Nm)**

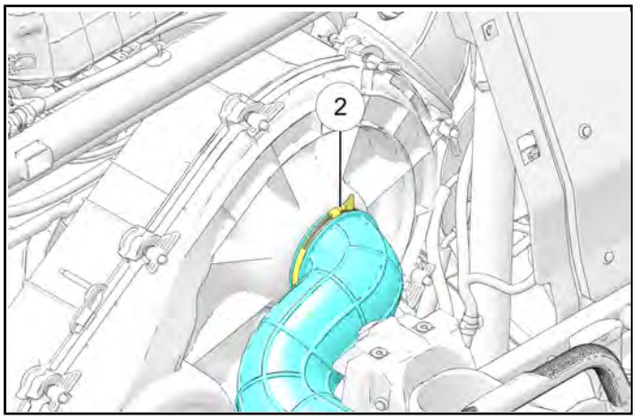
27. Install the drive belt.

28. Install outer clutch cover. Install five fasteners③ and engage 1/4 turn latches to secure the cover. Torque fasteners to specification.



TORQUE
Outer PVT Cover Fasteners: **60 in-lbs (7 Nm)**

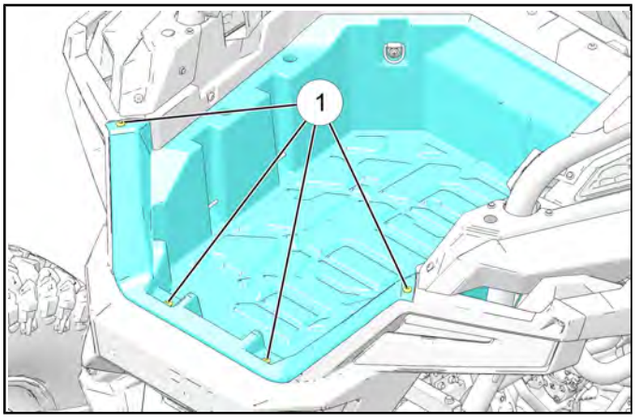
29. Install clutch intake hose. Tighten hose clamp ②. Torque hose clamp to specification.



TORQUE
PVT Intake Hose Clamp: **35 in-lbs (4 Nm)**

30. Connect fuel line onto the fuel rail.
31. Connect coolant inlet and outlet hoses to the engine.
32. Fill coolant. Refer to coolant fill/bleed procedure outlined in this chapter.

33. Install cargo box and four fasteners ①. Torque fasteners to specification.



TORQUE
Cargo Box Fasteners: **7 ft-lbs (10 Nm)**

34. Install upper and lower rear close-off panels.

35. Connect the battery. Torque cables to specification.

TORQUE
Battery Cable Fasteners: **60 in-lbs (9 Nm)**

36. Install seats. On 4-seat models, install the rear seats.

ENGINE MOUNT INSPECTION

IMPORTANT
Before replacing any engine mount due to suspected fluid loss, verify that the source of the fluid is the engine mount, not the engine or accessories.

1. Install a commercially available engine hoist and raise the engine slightly.
2. Observe the engine mount while raising the engine. Raising the engine removes the weight from the engine mount and creates slight tension on the rubber.
3. Replace the engine mount if the engine mount exhibits any of the following conditions:
   - The hard rubber is covered with heat check cracks.
   - The rubber is separated from the metal plate of the engine mount.
   - The rubber is split through the center of the engine mount.
   - The engine mount is leaking fluid.
4. For engine mount replacement, refer to **ENGINE MOUNT REPLACEMENT** procedure.

ENGINE DISASSEMBLY / INSPECTION - TOP END

VALVE COVER REMOVAL

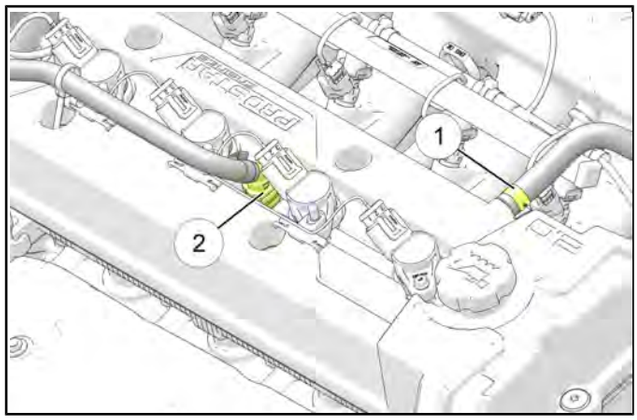
NOTICE

The valve cover can be removed with the engine installed in the chassis.

⚠ WARNING

A hot engine can cause serious burns. Allow engine to cool or wear protective gloves when removing the spark plugs.

1. Disconnect the breather hose by removing clip ① from the valve cover fitting. Using a remote-style hose clamp pliers, press in on both of the coolant line fitting ② tabs to remove.



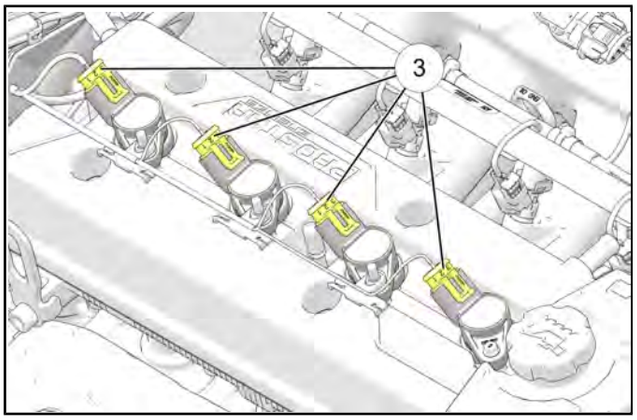
IMPORTANT

Place a shop rag over the end of the coolant line to catch any fluid that may be in the line.
For proper coolant line fitting removal, Refer to Fuel Line Quick Connection page .

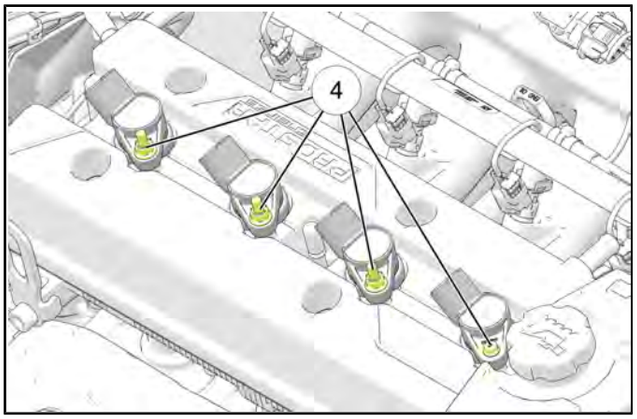
NOTICE

It is not necessary to remove the coolant vent line fitting from the cylinder head, the valve cover will come off over it. The vent line can be removed with the coil harness to avoid cutting the double zip tie.

2. Unplug the spark plug wire connectors ③ from the ignition coils.



3. Remove the ignition coil fasteners ④.

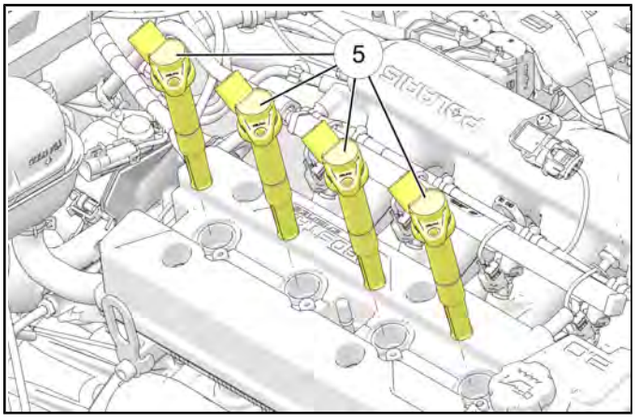


IMPORTANT

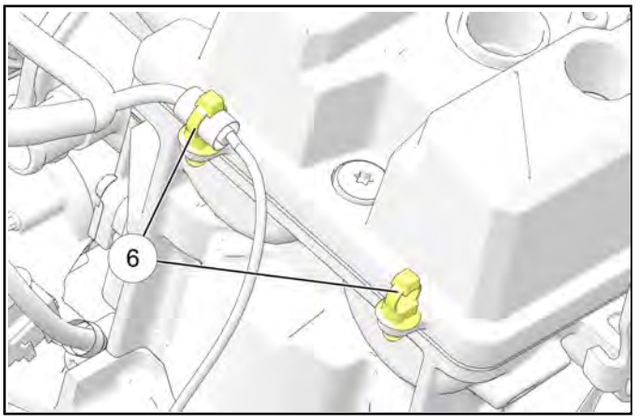
Before removing the ignition coils, clean out plug wells with compressed air to remove any loose dirt or debris.

4. Rinse plug wells and coolant vent line with water and dry with compressed air.

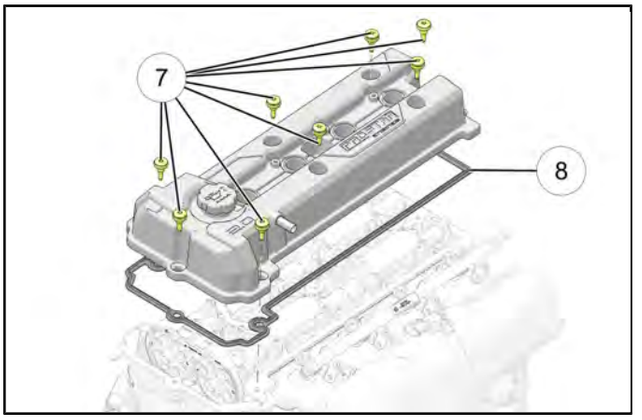
5. Remove ignition coils ⑤.



6. Snip the electrical tie downs ⑥ and leave the fir trees in the valve cover.

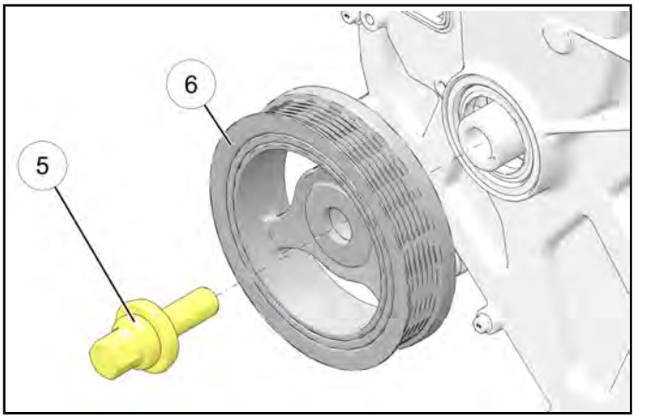


7. Using compressed air, blow out the vent fitting cavity to remove any dust or debris prior to removing the valve cover.
8. Remove valve cover fasteners ⑦. Remove valve cover and gasket ⑧.



CRANKSHAFT HARMONIC DAMPER REMOVAL

1. Park vehicle on a flat surface.
2. Remove the cargo box.
3. Remove alternator belt cover.
4. Using special tool PU-52810 to hold the harmonic damper, remove the harmonic damper fastener ⑤ and washer.
5. Using the recommended 3–jaw puller, remove the harmonic damper ⑥. Clean and inspect the harmonic damper prior to installation. Refer to Harmonic Damper Cleaning and Inspection page 3.67

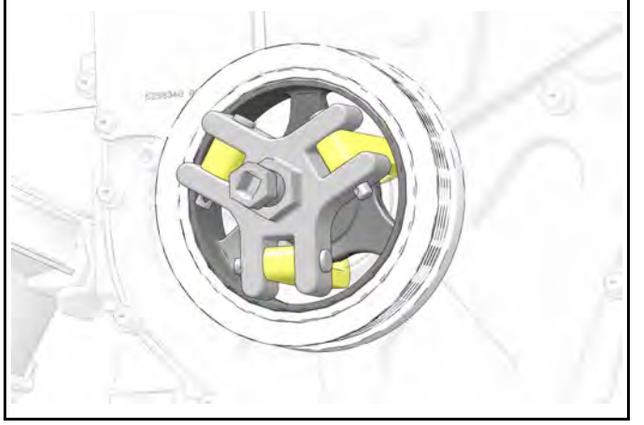


NOTICE

Recommended 3-Jaw puller:
OTC 6667

IMPORTANT

Place the 3–jaw puller on the inside arms of the damper during removal as shown. NEVER place force on the outside of the harmonic damper as damage will occur.

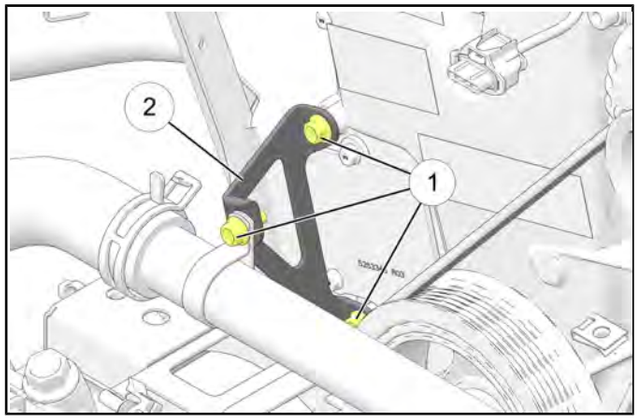


ENGINE FRONT COVER REMOVAL

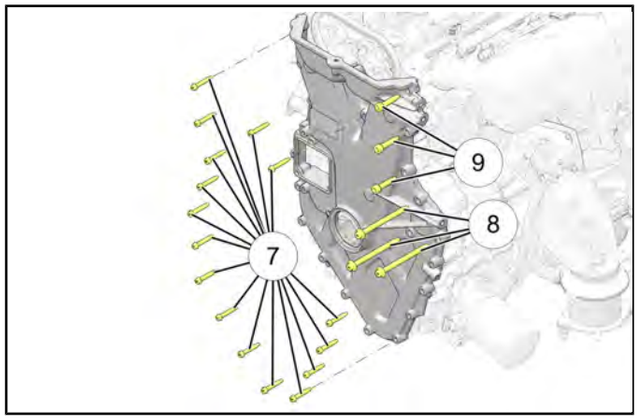
IMPORTANT

Make sure the oil is properly drained from the engine before removing the front cover.

1. Remove the Alternator. See Alternator Removal page
2. Remove the Valve Cover. See Valve Cover Removal page 3.39
3. Remove the Harmonic Balancer Pulley. See Crankshaft Harmonic Damper Removal page
4. Remove three fasteners ① and coolant bracket ②.



5. Remove fasteners ⑦, ⑧ and ⑨ and remove the front cover.



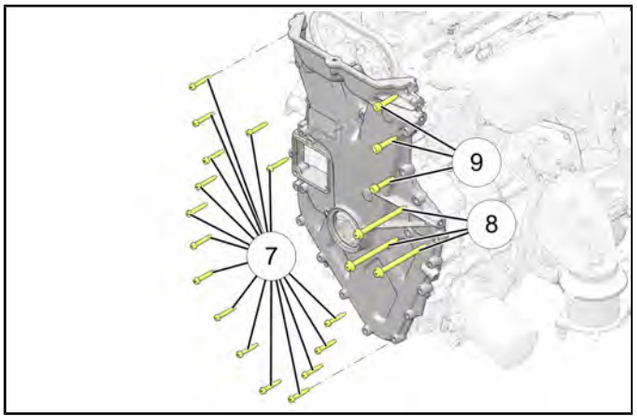
TIMING CHAIN SERVICE

REMOVAL

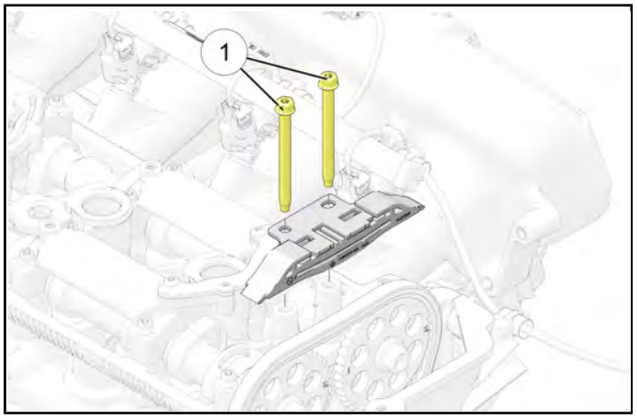
NOTICE

The Engine must be removed from the chassis to perform this procedure. See Engine Removal Preparation page

1. Remove the Alternator. See Alternator Removal page
2. Remove the Valve Cover. See Valve Cover Removal page 3.39
3. Remove harmonic pulley. See Crankshaft Harmonic Damper Removal page .
4. Remove fasteners ⑦, ⑧ and ⑨ and remove the front cover.



5. Remove the chain tensioner. See Tensioner Service page 3.42
6. Remove two upper timing chain guide fasteners ①. Remove the upper timing chain guide.



7. Remove the timing chain.

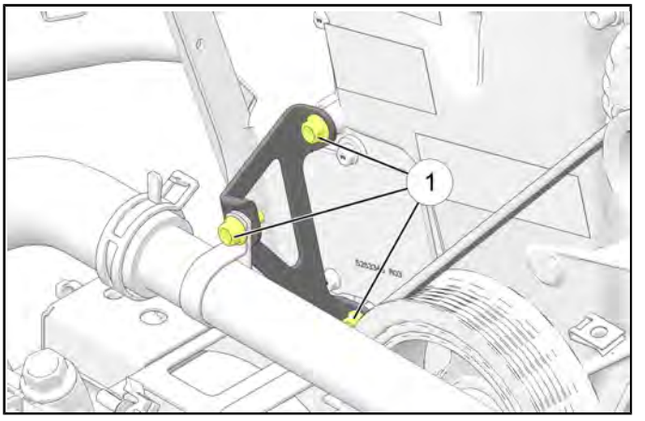
INSTALLATION

For timing chain installation see Camshaft Timing Chain and Sprocket Installation page 3.91

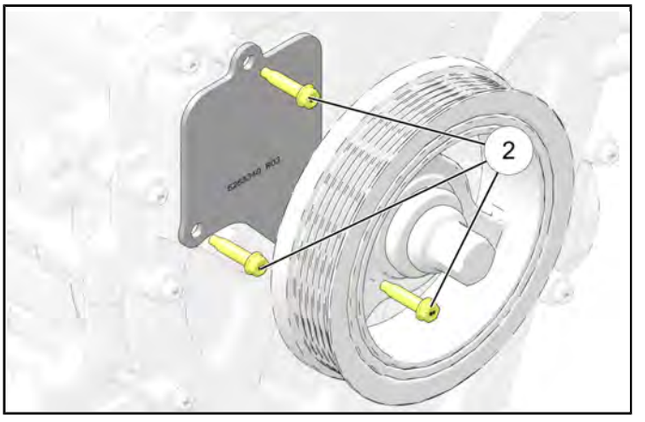
TENSIONER SERVICE

REMOVAL

1. Remove three fasteners ① and coolant bracket.



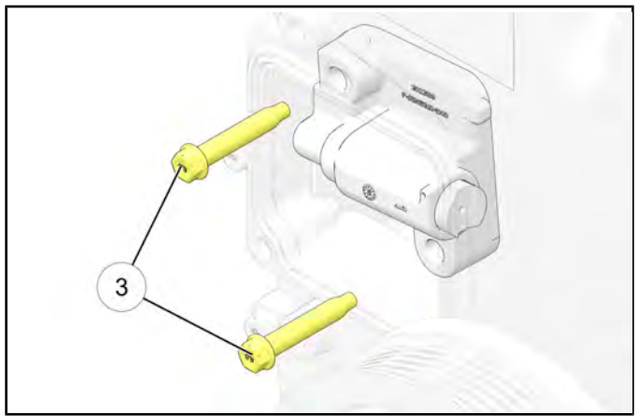
2. Remove three tensioner cover fasteners ② and tensioner cover.



IMPORTANT
The timing chain tensioner must be removed to unload chain tension before the timing chain is removed.

NOTICE
The bottom fastener feature is slotted.

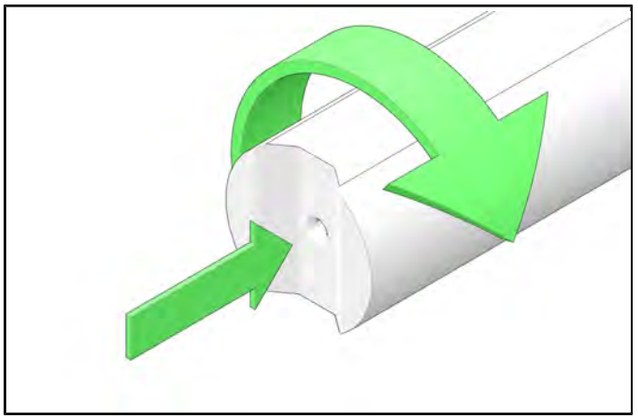
3. Remove chain tensioner fastener ③ and chain tensioner.



INSTALLATION

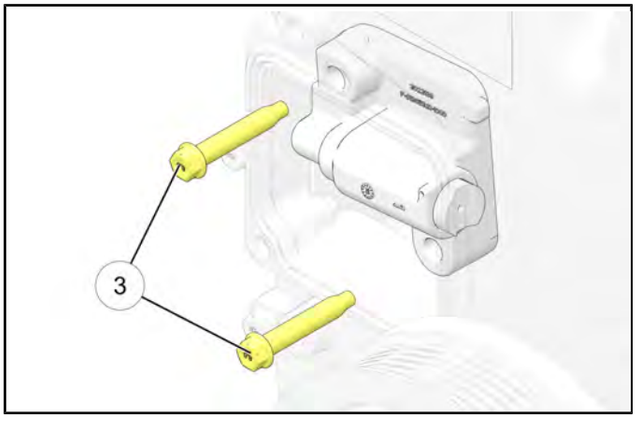
Reset the timing chain tensioner by performing the following steps:

1. Remove the piston assembly from the body of the timing chain tensioner.
2. Press in and twist clock-wise the end of the tensioner piston until it engages with itself and stays collapsed.



NOTICE
This procedure works best when the tensioner piston is dry.

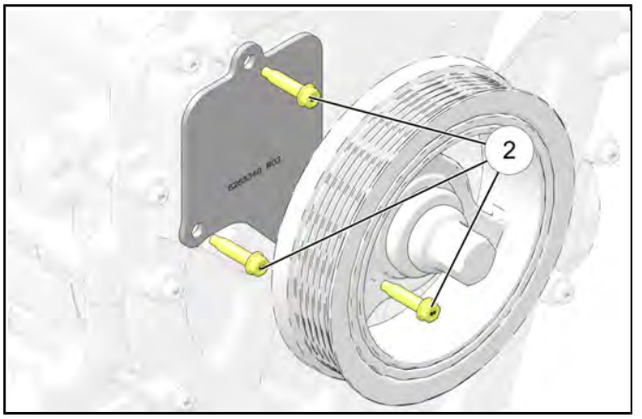
3. Reinstall the piston assembly into the body of the tensioner.
4. Install the tensioner assembly into the crankcase.
5. Install chain tensioner assembly. Install chain tensioner fasteners ③ and torque to specification.



TORQUE
Tensioner Fasteners: **80 in-lbs (9 N·m)**

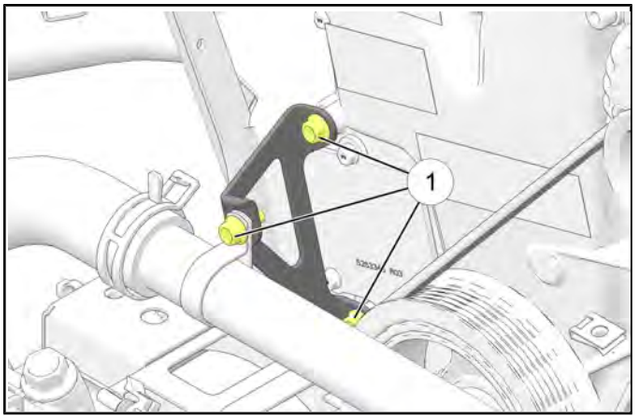
6. Press in and release the tensioner piston to allow it to engage with the chain guide.

7. Install the gasket and tensioner cover. Install three tensioner cover fasteners ② and torque to specification.



TORQUE
Tensioner Cover Fasteners: **80 in-lbs (9 N·m)**

8. Install coolant bracket and three fasteners ①. Torque to specification



TORQUE
Cooling Line Retention Fasteners: **97 in-lbs (11 N·m)**

CAMSHAFT REMOVAL

⚠ CAUTION

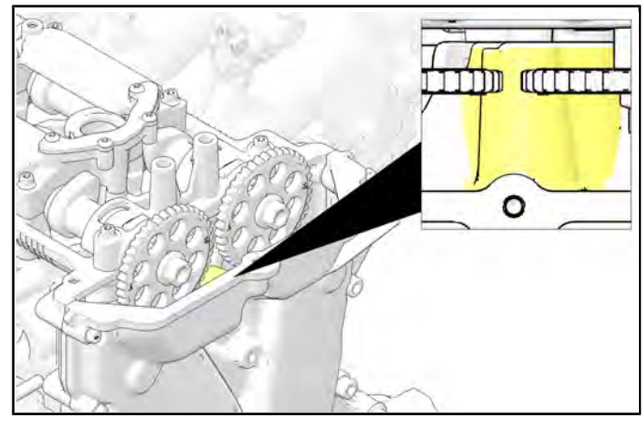
Removal and Installation of the camshafts requires care not to damage the camshafts, caps, and thrust surfaces.

1. Remove the Valve Cover. Refer to Valve Cover Removal page 3.39
2. Mark the chain and cam sprockets as a temporary reference for installation.
3. Rotate engine to Cylinder 1 TDC (on compression stroke) and mark the harmonic balancer and front cover with a paint pen for temporary TDC reference.

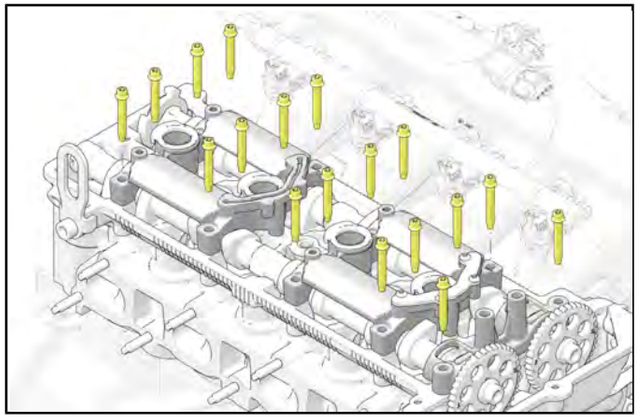
NOTICE

Slots on the rear of the camshafts should line up horizontally.

4. Remove the timing chain tensioner. See TENSIONER REMOVAL page 3.42
5. Allow the chain to rest upon the front cover boss.

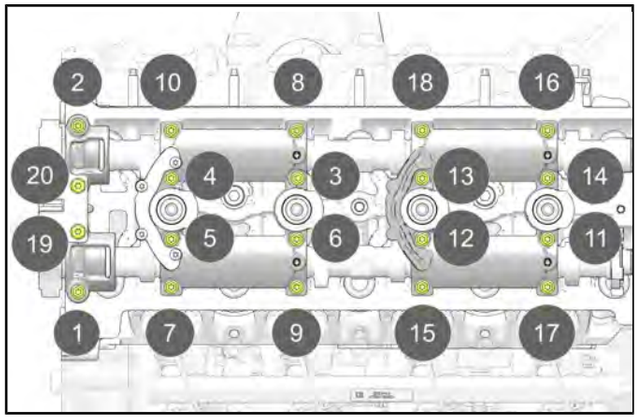


6. Remove the camshaft carrier fasteners in the sequence shown.



IMPORTANT

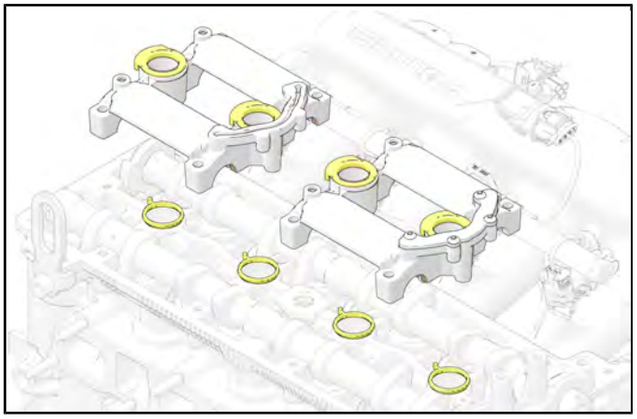
Remove each bolt on each cap one turn at a time until there is no spring tension pushing on the camshaft.



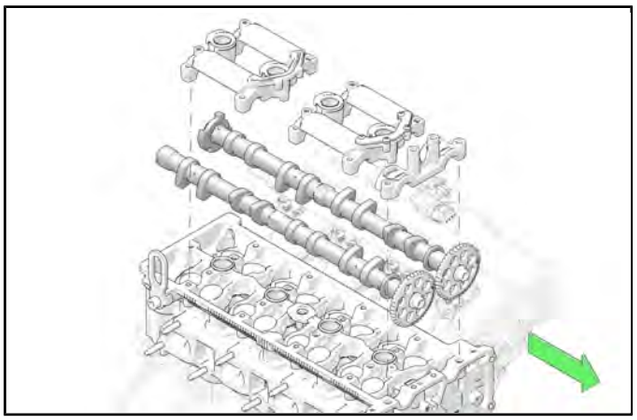
IMPORTANT

Note the orientation of the camshaft carriers for re-assembly.

7. Remove and retain camshaft gaskets.

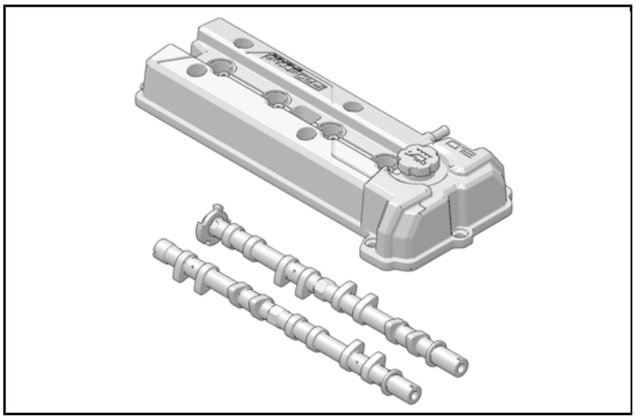


8. Remove the camshaft carriers.



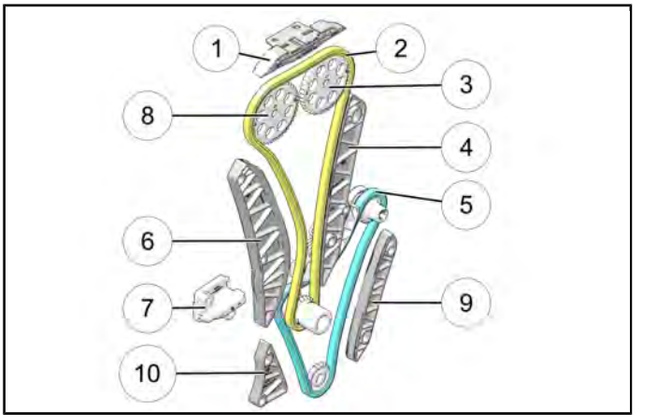
9. Remove the intake and exhaust camshaft.

CAMSHAFT CLEANING AND INSPECTION



- Inspect the camshaft journals and lobes for wear or scoring.
- Inspect the camshaft sprocket alignment notch for damage.
- Inspect the camshaft cover for damage or loose oil control baffles.
- Clean the camshaft cover.
- Wash the camshaft in solvent.
- Oil the camshaft.
- Inspect the camshaft cover for cracks or other signs of damage.

CAMSHAFT TIMING CHAIN AND SPROCKET CLEANING AND INSPECTION



1. Inspect the timing chain guides ①, ④, ⑥, ⑨, and ⑩ for cracking or wear.

NOTICE
Items ④ and ⑩ may be able to be installed upside-down. Make sure all guides are in the proper orientation before final assembly.

2. Replace the timing chain guides if excessive wear is present on the chain guide surface.

NOTICE
For new guide installation, put assembly grease on the guides to aid in installation. DO NOT use molylube!

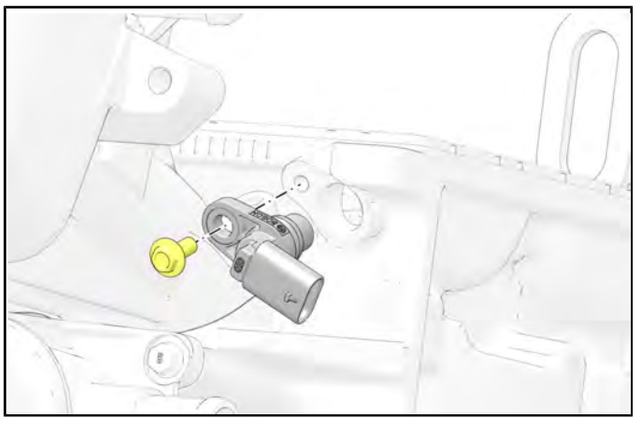
3. Release the tension on the water pump guide ⑨ before proceeding with timing chain install.
4. Replace the timing chain tensioner shoe if wear exceeds 0.045 in (1.12 mm) depth on the chain guide surface.
5. Inspect the timing chain ② and actuators ③, ⑧ for wear.
6. Inspect the oil / water pump chain ⑤ for wear.
7. Check to ensure pump drive shaft & bearing are installed straight, make sure they spin freely.
8. Inspect the camshaft sprocket faces for signs of movement.
9. Inspect the camshaft sprocket teeth and chain for signs of excessive wear, chipping, or seizure of the timing chain links.
10. Verify oil nozzle oil flow with compressed air.
11. Inspect the timing chain tensioner ⑦ for scoring or free movement. If damaged, replace the timing chain tensioner.

12. Turn the engine over after the chains have been installed to verify smooth operation.

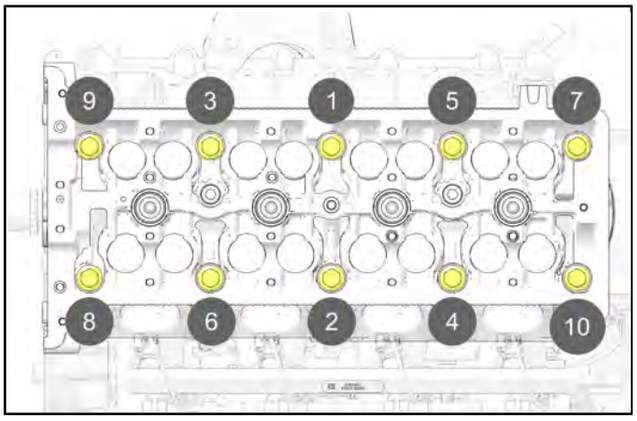
CYLINDER HEAD REMOVAL

NOTICE
The Engine must be removed from the chassis to perform this procedure. See **Engine Removal Preparation page**

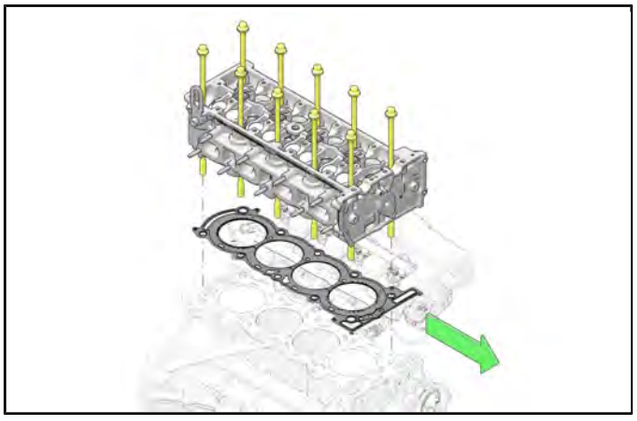
1. Remove the Cam Phaser.



2. Remove the cylinder head to the block bolts in sequence.



3. Remove the cylinder head.



4. Remove the cylinder head gasket.
5. Use the following procedures to properly clean the cylinder head and cylinder block surfaces:
   - Use a kitchen soft scrub pad and ID Red to clean the cylinder head and cylinder block gasket surfaces. Do not scratch or gouge any surface.

IMPORTANT

Do not use any other method or technique to clean these gasket surfaces. Do not use a tap to clean the cylinder head bolt holes.

IMPORTANT

Be careful not to gouge or scratch the gasket surfaces. Do not gouge or scrape the combustion chamber surfaces. The feel of the gasket surface is important, not the appearance. There will be indentations from the gasket left in the cylinder head after all of the gasket material is removed. These small indentations will be filled in by the new gasket.

6. Clean the old sealer/lube and dirt from the bolt holes with a stiff steel brush.
7. When cleaning the cylinder head bolts holes use a suitable commercial spray liquid solvent and compressed air from an extended-tip blow gun to reach the bottom of the holes.

⚠ CAUTION

Wear safety glasses to avoid injury when using compressed air or any cleaning solvent.

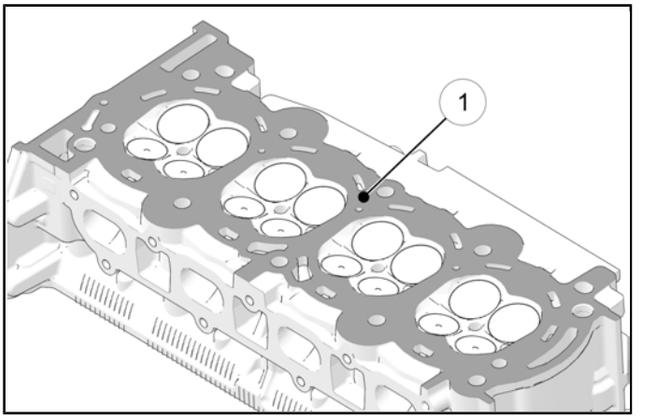
CYLINDER HEAD WARP INSPECTION

Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon.

⚠ CAUTION

Use care not to damage gasket sealing surface. All gasket surfaces must be clean, dry and free of any oil or grease upon assembly. Clean sealing surfaces with rubbing alcohol or electrical contact cleaner. Do not touch sealing surfaces of the new head gasket.

Lay a straight edge across the surface of the cylinder head ① at several different points and measure warp by inserting a feeler gauge between the straight edge and the cylinder head surface. If warp exceeds the service limit, replace the cylinder head.



MEASUREMENT
Cylinder Head Warp Limit: **.0039″ (0.1 mm)**

1. Clean the cylinder head bolts.

IMPORTANT

Do not use a wire brush on any gasket sealing surface.

2. Clean the cylinder head. Remove all varnish, soot and carbon to the bare metal.
3. Clean the valve guides.
4. Clean the threaded holes. Use a nylon bristle brush.
5. Clean the remains of the sealer from the plug holes.
6. Inspect the cylinder head bolts for damaged threads or stretching and damaged heads caused by improper use of tools.
7. Replace all suspect bolts.

8. Inspect the cylinder head for cracks. Check between the valve seats and in the exhaust ports.

IMPORTANT
Do not attempt to weld the cylinder head, replace it.

9. Inspect the cylinder head deck for corrosion, sand inclusions and blow holes.
10. Inspect the cylinder head deck surface for flatness.

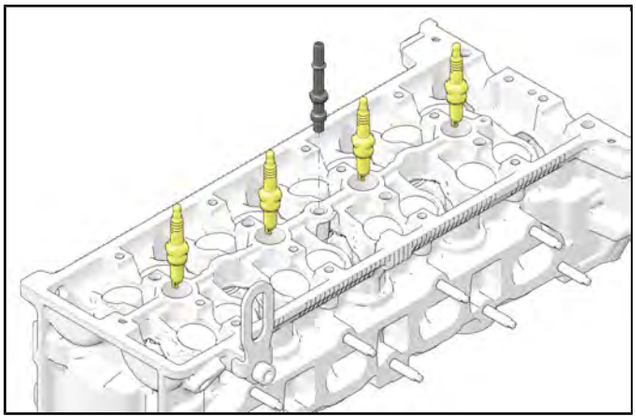
Surface Head Flatness
Longitudinal or Transverse: **0.0012 in (0.03 mm)**
Overall: **0.0035 in (0.09 mm)**

IMPORTANT
If the cylinder head is out of specification, replace the cylinder head. Do not machine the cylinder head.

11. Inspect the sealing surfaces.

CYLINDER HEAD AND GASKET SURFACE CLEANING AND INSPECTION

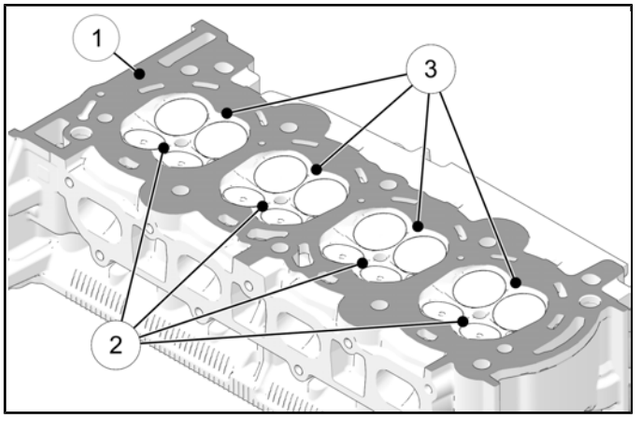
1. Remove the spark plugs and coolant vent line fitting.



2. Inspect the cylinder head gasket and mating surfaces for leaks, corrosion and blow-by. If the gasket has failed, use the following faults to determine the cause:
   a. Improper installation
   b. Loose or warped cylinder head
   c. Missing, off location or not fully seated dowel pins
   d. Corrosion in the seal area around the coolant passages
   e. Chips or debris in the cylinder head bolt holes
   f. Bolt holes in the cylinder block not drilled or tapped deep enough

IMPORTANT
Do not use a wire brush on any part of the valve stem. Do not grind or condition the intake valve.

3. Inspect the cylinder head gasket surface.



- Cylinder head may be reused if corrosion is found only outside a 4 mm (0.375 in) band around each combustion chamber ①.
- Replace the cylinder head if the area between the valve seats is cracked ②.
- Replace the cylinder head if corrosion has been found inside a 4 mm (0.375 in) band around each combustion chamber ③.

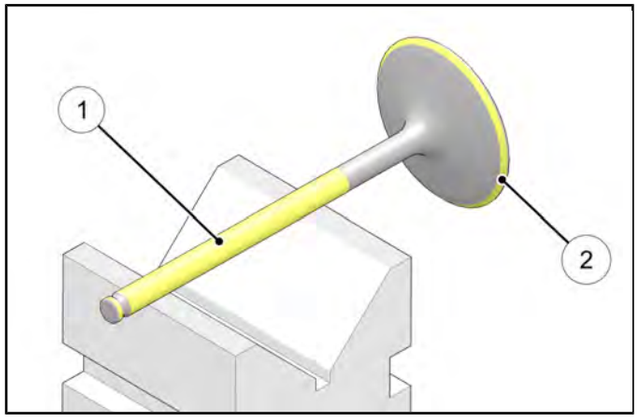
VALVE INSPECTION

NOTICE
Valve service specifications can be found at the beginning of this chapter. See **Service Specifications - Engine page 3.5**.

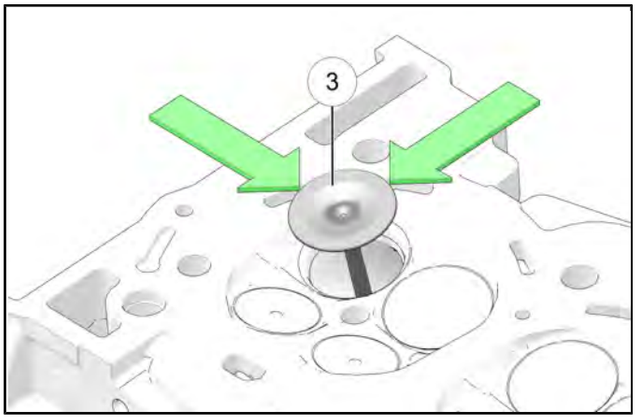
1. Remove valves from the cylinder head.
2. Place valves on V-blocks as shown and measure valve stem runout ① using a runout gauge or similar tool.
3. Inspect the valve face for damage from burning, pitting or uneven contact.

NOTICE
Pitting is common on exhaust valve seats with these materials and is not a cause for rejection.

4. Place valves on V-block as shown and inspect valve head radial runout ②.



5. Insert valves into their original locations in cylinder head.
6. Inspect that each valve moves up and down smoothly without binding in guide.
7. Measure valve stem deflection ③ for all valves to determine if valve or valve guide requires replacement.



- Raise valve 10mm (0.400") off of seat.
- Position dial indicator as shown. Measure deflection in two directions perpendicular to each other (X & Y axis).

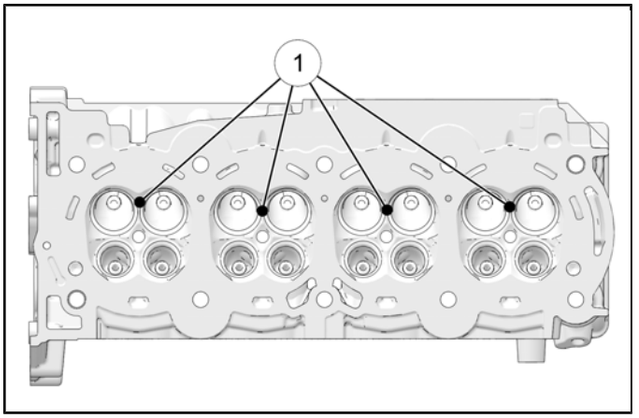
8. Replace valve and repeat step 6 if valve stem O.D. measures outside standard range. If valve stem deflection exceeds service limits with a new valve installed, valve guide must be replaced.
9. Installation of new valve guides and/or new valves requires valve seat reconditioning. This work should be performed by an experienced technician properly equipped to perform cylinder head reconditioning.

COMBUSTION CHAMBER CLEANING

WARNING

Wear eye protection during combustion chamber cleaning.

1. Clean all accumulated carbon deposits from combustion chambers and valve seat area ①.



NOTICE

Carbon Clean Fuel Treatment (2871326) can be used to help remove carbon deposits.

Do not use a metal scraper, a coarse wire brush or abrasive cleaners to clean the cylinder head. Damage may result.

2. Visually inspect cylinder head gasket surface and combustion chamber for cracks or damage. Pay close attention to areas around spark plug and valve seats.

VALVE SEAT RECONDITIONING

Valve seat reconditioning should be performed by a technician proficient in cylinder head reconditioning techniques. Reconditioning techniques vary, so follow the instructions provided by the valve reconditioning equipment manufacturer. Do not grind seats more than necessary to provide proper seat surface, width, and contact point on valve face.

WARNING

Wear eye protection or a face shield during cylinder head disassembly and reassembly.

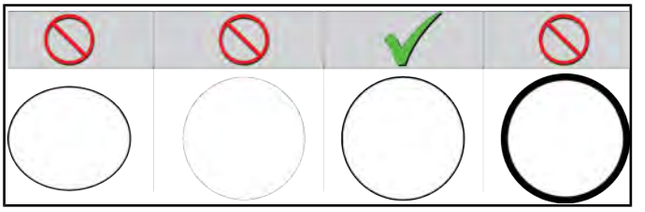
VALVE SEAT INSPECTION

Inspect valve seat in cylinder head for pitting, burnt spots, roughness, and uneven surface. If any of the above conditions exist, the valve seat must be reconditioned. *If the valve seat is cracked the cylinder head must be replaced.*

NOTICE

Pitting is common on exhaust valve seats and head seats with these materials and is not a cause for rejection.

Valve seat width and point of contact on the valve face is very important for proper sealing. The valve must contact the valve seat over the entire circumference of the seat, and the seat must be the proper width all the way around. If seat is uneven, compression leakage will result. If seat is too wide, seat pressure is reduced, causing carbon accumulation and possible compression loss. If seat is too narrow, heat transfer from valve to seat is reduced. The valve may overheat and warp, resulting in burnt valves.



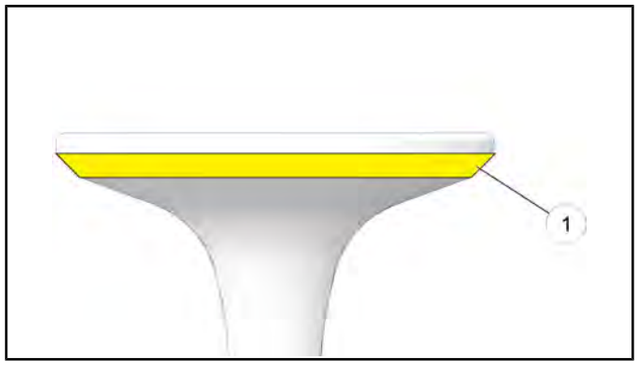
RENEWING VALVE SEATS

1. Install pilot into valve guide.
2. Apply cutting oil to valve seat and cutter.
3. Place 46° cutter on the pilot and make a light cut.
4. Inspect the cut area of the seat:

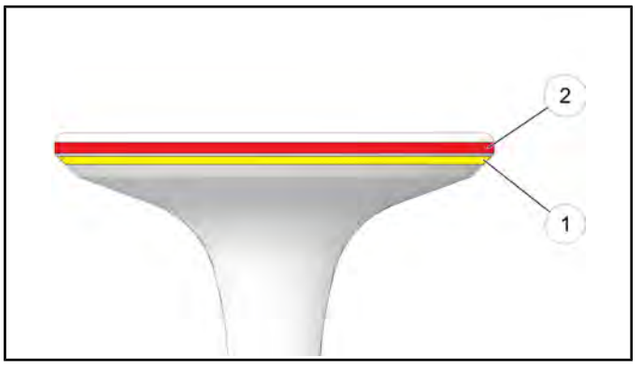
- If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.
- If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or runout. If the pilot is bent it must be replaced.
- If the contact area of the cutter is in the same place, the valve guide is distorted from improper installation and must be replaced. Be sure the cylinder head is at the proper temperature and replace the guide.
- If the contact area of the initial cut is greater than 75%, continue to cut the seat until all pits are removed and a new seat surface is evident. NOTE: Remove only the amount of material necessary to repair the seat surface.

NOTICE
Remove only the amount of material necessary to repair the seat surface.

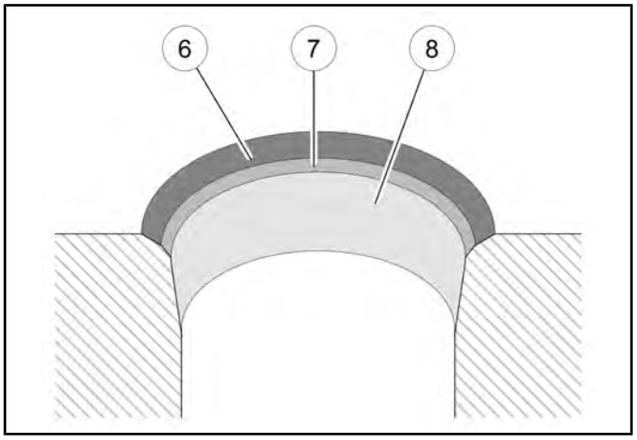
5. To check the contact area of the seat on the valve face, apply a thin coating of Prussian Blue™ paste to the valve seat. If using an interference angle (46°) apply black marker to the entire valve face ①.



6. Insert valve into guide and tap valve lightly into place a few times.
7. Remove valve and check where the Prussian Blue™ or black marker indicates seat contact on the valve face. The valve seat should contact the middle of the valve face or slightly above, and must be the proper width ①.



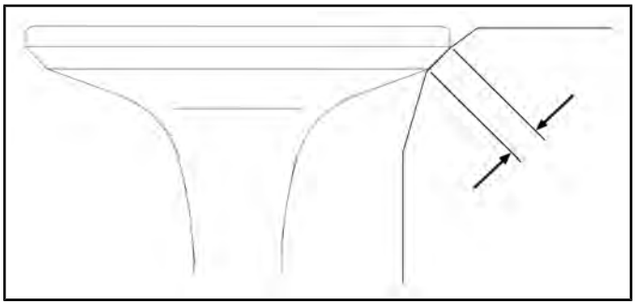
- If the indicated seat contact is at the top edge of the valve face and contacts the margin area ② it is too high on the valve face. Use the 30° cutter to lower the valve seat.
- If too low use the 60° or 75° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.
- If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.
- If the seat is too narrow, widen using the 45° cutter and re-check contact point on the valve face and seat width after each cut.



ITEM	ANGLE
⑥	30º
⑦	45º or 46º
⑧	60º or 75º

NOTICE

When using an interference angle, the seat contact point on the valve will be very narrow, and is a normal condition. Look for an even and continuous contact point on the black marker, all the way around the valve face.



8. Clean all filings from the area with hot soapy water. Rinse and dry with compressed air.
9. Lubricate valve guides with clean engine oil and apply oil or water based lapping compound to the face of the valve.

NOTICE

Lapping is not required if an interference angle reconditioning method is used.

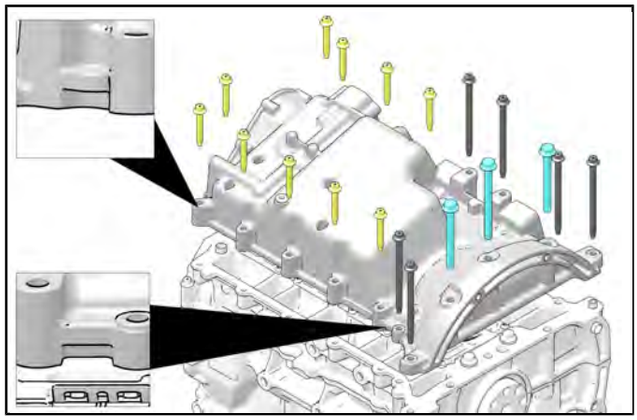
10. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.
11. Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this four to five times until the valve is fully seated, and repeat process for the other valve(s).
12. Thoroughly clean cylinder head and valves.

ENGINE DISASSEMBLY / INSPECTION - BOTTOM END

OIL PAN REMOVAL

NOTICE
The oil pump drive chain must be removed before the oil pan can be removed.

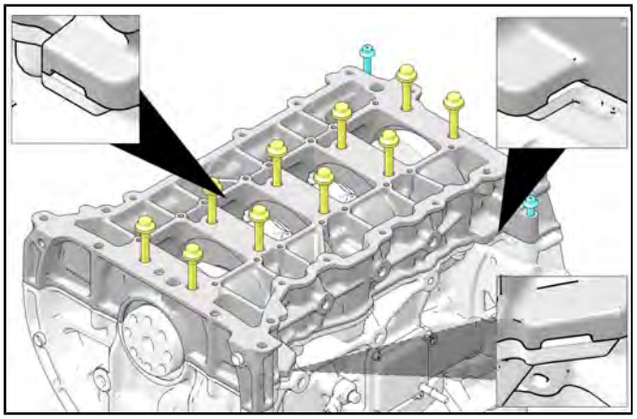
Remove the oil pan bolts.



IMPORTANT
Use the pry points on the oil pan to release the seal between the crankcase and the oil pan.

LOWER CRANKCASE REMOVAL

1. Remove the bedplate perimeter fasteners and the main fasteners.

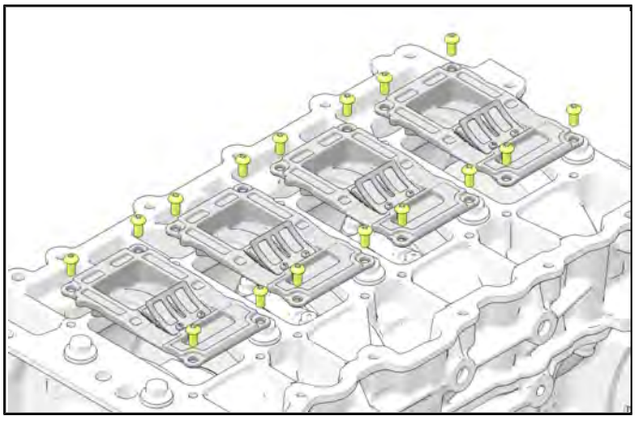


IMPORTANT
Do not forget the 2 outside rear fasteners.

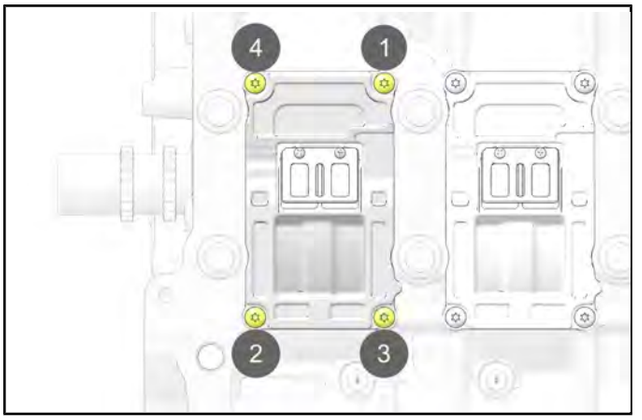
2. Using the pry-points and an appropriate prying tool, gently separate the upper and lower crankcase.

REED VALVE REPLACEMENT

1. Remove the four fasteners retaining each of the reed valves to the crankcase.



2. Installation is performed by reversing removal. Torque fasteners to specification in sequence.



IMPORTANT

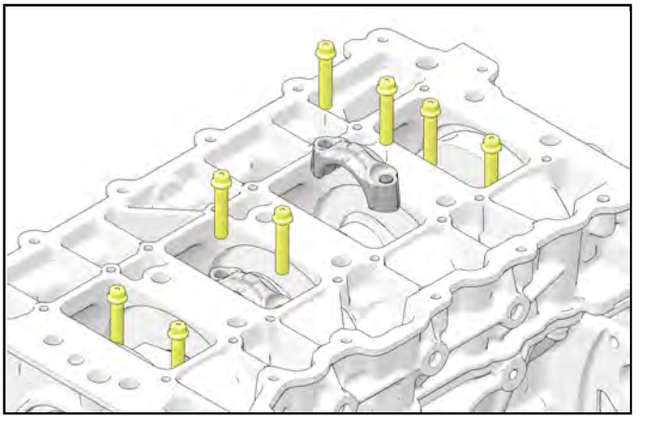
The reed valves must be installed in the correct direction. They have features on them that correspond with the crankcase fasteners. Make sure they are in the proper orientation as shown..

TORQUE

Reed Valve Fasteners:
80 in-lbs (9 N·m)

PISTON, CONNECTING ROD, AND BEARING REMOVAL

1. Rotate the crankshaft to a position where the connecting rod bolts are the most accessible.



2. Mark the connecting rod and cap with the cylinder position. Also mark their orientation. This will ensure the caps and connecting rods are re-assembled properly.
3. Remove any ridge at the top of the cylinder bore to avoid damage to the piston ring lands.
4. Remove the connecting rod bolts.
5. Remove the connecting rod cap.
6. Remove the piston and connecting rod assembly.

⚠ CAUTION

Use care not to damage the cooling jet during piston/rod removal.

PISTON DISASSEMBLY / INSPECTION

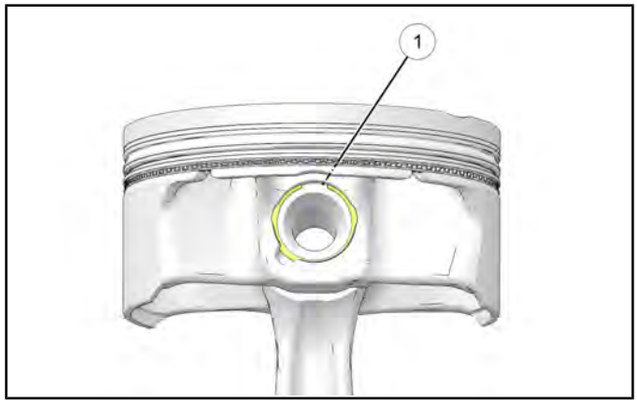
NOTICE

New pistons are directional (intake vs. exhaust), but can be placed in either cylinder.

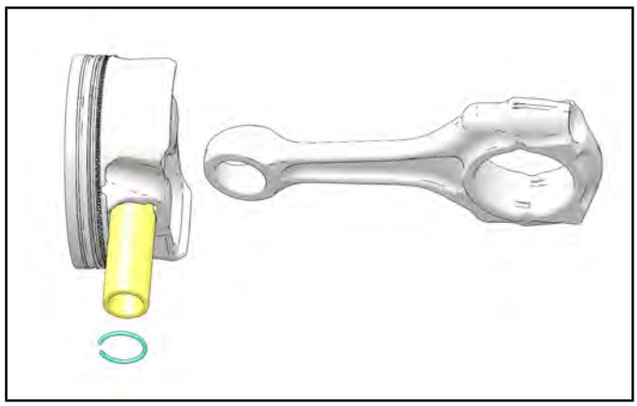
IMPORTANT

Mark the exhaust piston with a paint pen prior to removal.

1. Note location of the piston circlip gap ① at the top (12:00 position) or bottom (6:00 position).



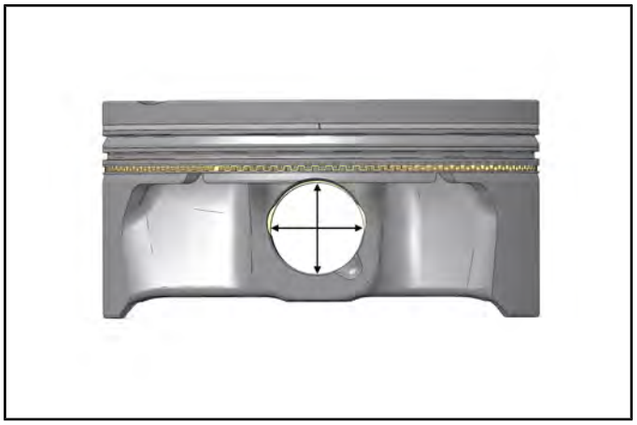
2. Remove piston circlip and push piston pin out of piston. If necessary, heat the crown of the piston slightly with a heat gun if pin cannot be removed by hand. Discard circlips.



⚠ CAUTION

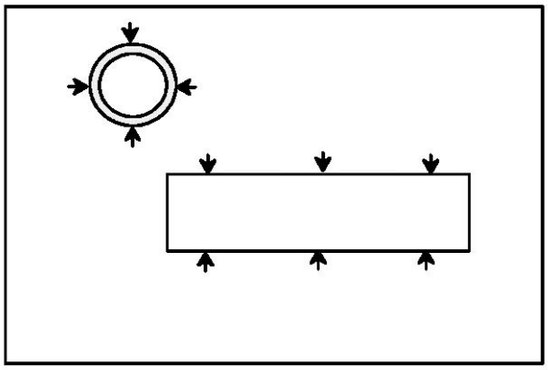
DO NOT apply heat to piston rings or a loss of radial tension could result.

3. Measure piston pin bore I.D. in two directions (90° apart). Replace piston and piston pin if out of specification.



MEASUREMENT
Piston Pin Bore I.D.: **0.8663 - 0.8665” (22.004 - 22.010 mm)** Service Limit: **0.8677 in (22.042 mm)**

4. Measure piston pin O.D. in two directions (90° apart) at three locations on the length. Replace piston and piston pin if out of specification.



MEASUREMENT
Piston Pin O.D.: **0.8659 - 0.8661” (21.995 - 22.000 mm)** Service Limit: **0.8651 in (21.975 mm)**

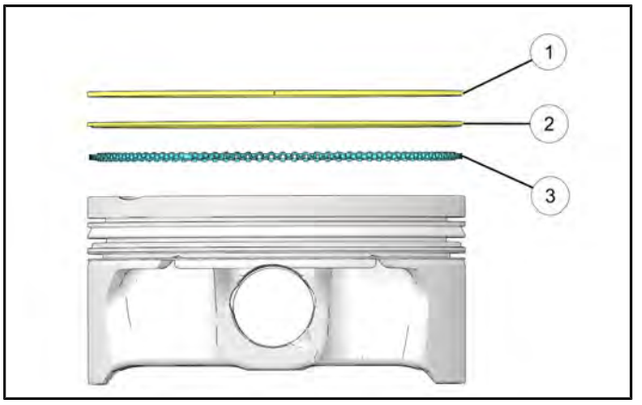
PISTON RING REMOVAL

1. Carefully remove top compression ring ① by hand or using a ring removal pliers (**PV-43570-1**).

⚠ CAUTION

DO NOT expand the ring more than necessary to remove it from the piston or the ring may break or lose radial tension.

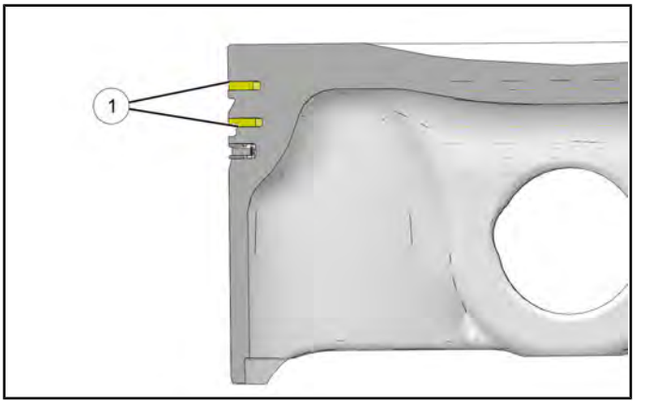
- **Piston ring pliers:** Carefully expand ring and lift it off the piston.
- **By hand:** Placing both thumbs on the ring ends, spread the ring open and push up on opposite side. Do not scratch ring lands.



2. Repeat procedure for second compression ring ②.
3. The oil control ring ③ is a three piece design consisting of a top and bottom steel rail and a center expander section. Remove top rail first, then bottom rail, then the expander.

PISTON RING TO GROOVE CLEARANCE INSPECTION

Measure piston ring to groove clearance ① by placing the ring in the ring land and measuring with a thickness (feeler) gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.

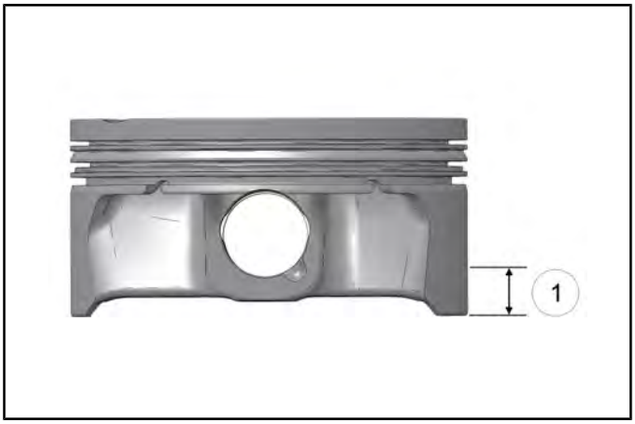


MEASUREMENT
Piston Ring to Groove Clearance: Top Ring: **0.0012 - 0.0037” (0.030 - 0.095 mm)** Second Ring: **0.0012 - 0.0034” (0.030 - 0.086 mm)** Service Limit: **0.0059 in (0.15 mm)**

PISTON-TO-CYLINDER CLEARANCE

Measure piston outside diameter at a point 13 mm ① up from the bottom of the piston, at a right angle to piston pin bore.

Subtract measurement from maximum measurement obtained in Step 4 of **"Cylinder Inspection"** procedure.

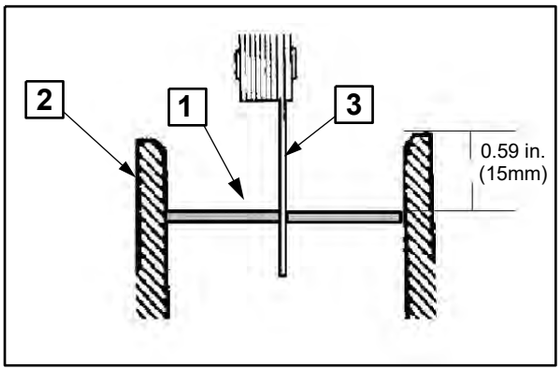


MEASUREMENT
Piston O.D. (Standard): **3.66 ± 0.0005" (92.970 ± 0.015 mm)** Cylinder to Piston Clearance: **0.0017 - 0.0029 (0.045 - 0.075 mm)**

PISTON RING INSTALLED GAP

1. Place each piston ring ① inside the cylinder ②. Use the piston to push the ring squarely into cylinder, as shown below.
2. Measure installed gap with a feeler gauge ③ at both the top and bottom of the cylinder.

NOTICE
A difference between top and bottom end gap measurements is a general indication of cylinder taper (wear). The cylinder should be measured for taper and out of round.



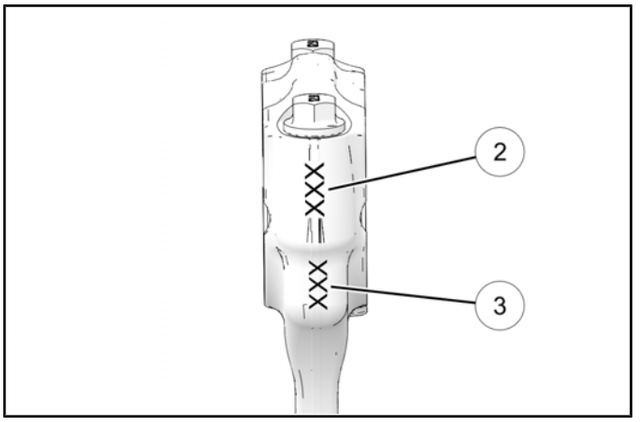
3. If the installed gap measurement exceeds the service limit, replace the rings.

MEASUREMENT
Piston Ring Installed Gap: Top Ring: **0.0177 - 0.0236" (0.45 - 0.60 mm)** Service Limit: **0.0275 in (0.7 mm)** Second Ring: **0.0275 0.0374" (0.70 - 0.95 mm)** Service Limit: **0.0401 in (1.02 mm)** Oil Control Rails: **0.0009 - 0.0401" (0.025 - 1.02 mm)** Service Limit: **0.0452 in (1.15 mm)**

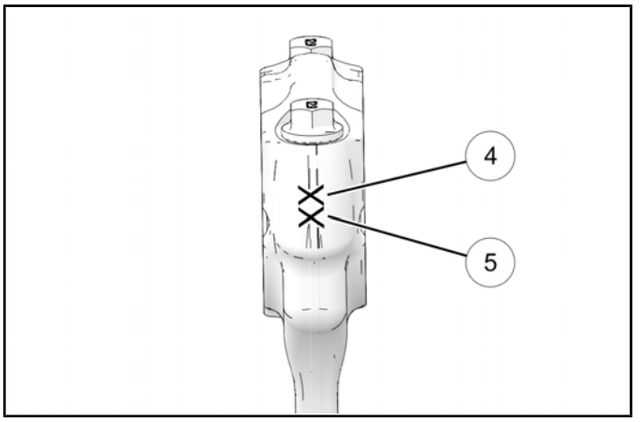
NOTICE
Always check piston ring installed gap when installing new rings and/or a new cylinder.

CONNECTING ROD INSPECTION

1. The 3 digit numbers stamped onto the intake side of the connecting rod are serial numbers used to match the rod cap ② with the rod stem ③.

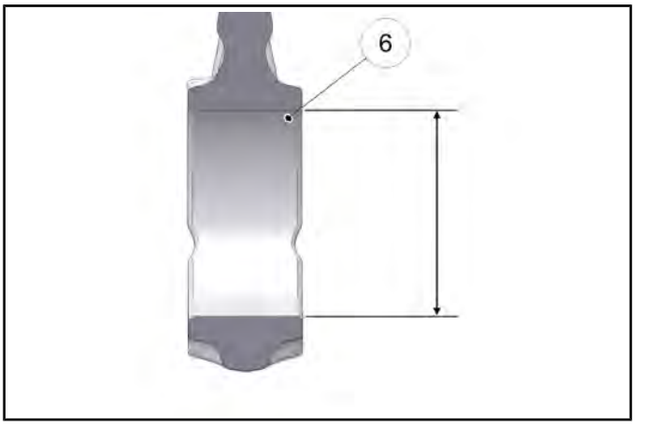


2. The number ④ and letter ⑤ stamped onto the exhaust side of the connecting rod represent the bore diameter of the connecting rod.



3. Inspect the small end and big end of connecting rod (and matching rod cap) for damage, galling of surface or pitting.

4. Measure small end I.D. ⑥ in two directions as shown. Record measurements and compare to specifications. Replace connecting rod if worn past the service limit specification.



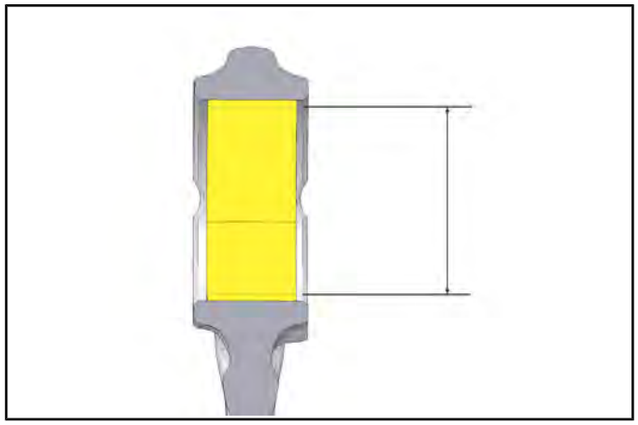
MEASUREMENT
Connecting Rod Small End I.D.: **0.8668 - 0.8673” (22.017 - 22.030 mm)** Service Limit: **0.8677 in (22.04 mm)**

5. Install matching rod cap on connecting rod **(without bearings)** and install the bolts.

6. Tighten bolts snug, then torque to specification.

TORQUE
Connecting Rod Fasteners: a. Torque both fasteners to 106 in-lbs (12 N·m) b. Torque both fasteners to 22 ft-lbs (30 N·m) c. Angle torque an additional + 90° for both fasteners

7. Using a dial bore gauge, measure big end I.D. in two directions shown. Record measurements and compare to specifications.



8. Refer to the number stamped onto the exhaust side of the connecting rod. This number represents the bore diameter.
9. The table below lists the big end bore diameter specifications.

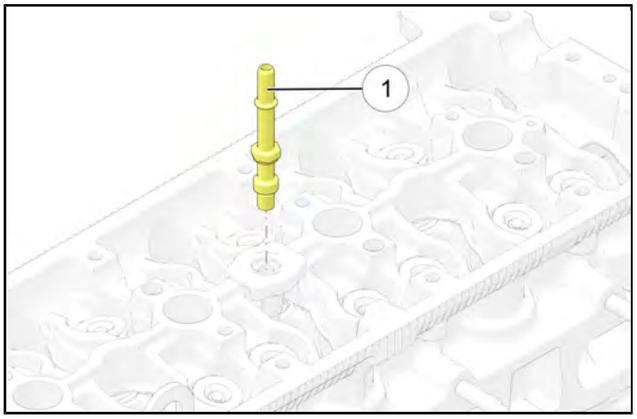
BEARING SELECTION CHART — ROD BEARINGS

CONNECTING ROD BIG END BORE DIAMETERS		
1	2	3
1.8892 - 1.8895” - (47.987 - 47.994 mm)	**1.8895 - 1.8898” (47.995 - 48.001 mm)**	**1.8898 - 1.8900” (48.002 - 48.008 mm)**

10. Whether using new connecting rods or re-installing the original ones, refer to the bearing selection chart provided in the **Connecting Rod Bearing Selection page 3.74** procedure in this chapter.

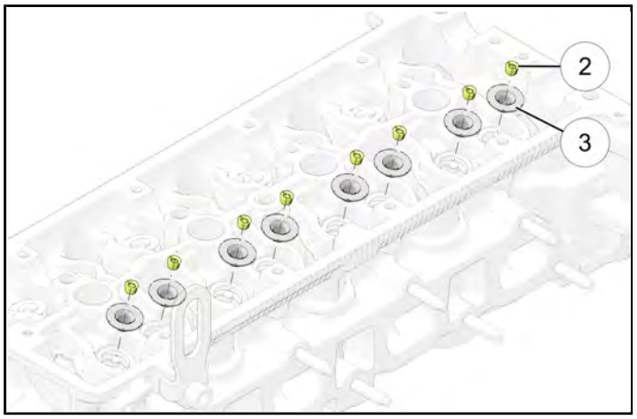
CYLINDER HEAD DISASSEMBLY

1. Remove the coolant vent fitting ①.



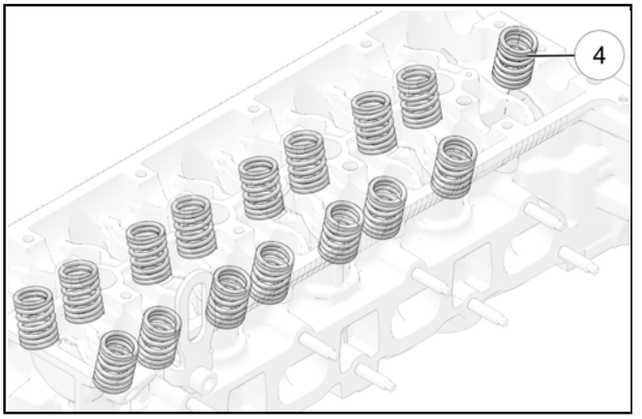
IMPORTANT
Ensure that the valve train components are kept together and identified in order for proper re-installation in their original position.

2. Using the **PV-1253** compressor, compress the valve spring.



3. Remove the valve keys ②.
4. Slowly release the **PV-1253** compressor from the valve spring assembly.
5. Remove the retainers ③.

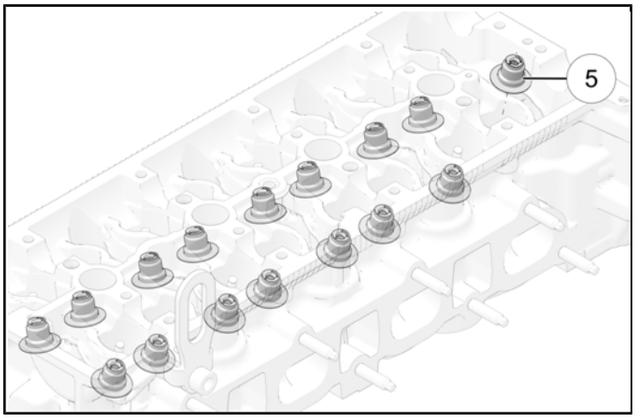
6. Remove the springs ④.



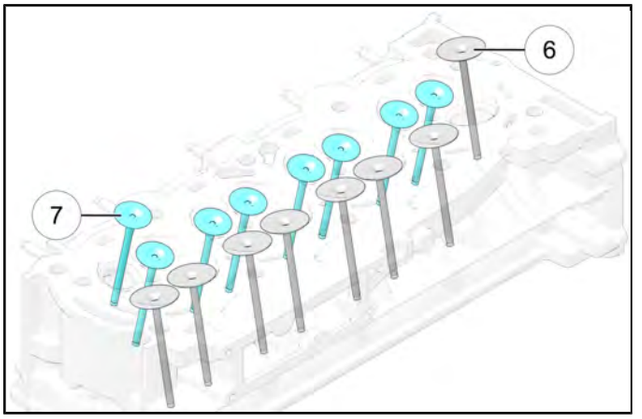
⚠ CAUTION

Do not damage the valve guide. Remove any burrs that have formed at the key groove by chamfering the valve stem with an oil stone or a file.

7. Using the a commercially available valve seal remover , remove the valve seals ⑤. Do not reuse the valve seals.



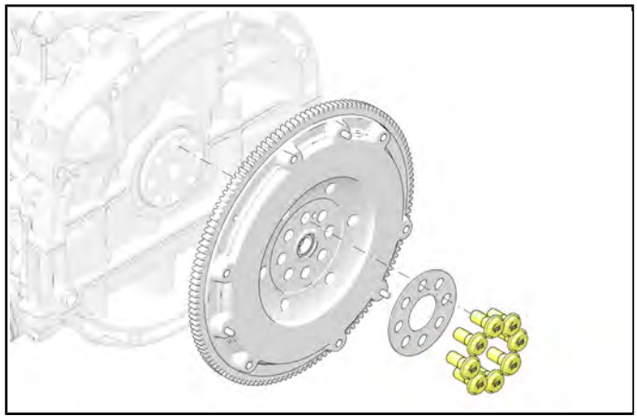
8. Remove the intake ⑥ and exhaust ⑦ valves.



FLYWHEEL REMOVAL

NOTICE
The fasteners and washer plate are one-time use and MUST be replaced with a new washer plate and fasteners anytime they are removed.

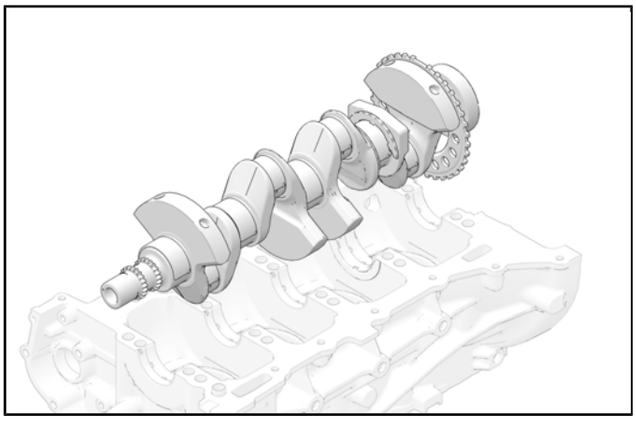
1. Remove the flywheel attaching fasteners and washer plate. Discard BOTH the fasteners and washer plate.
2. Remove the flywheel.



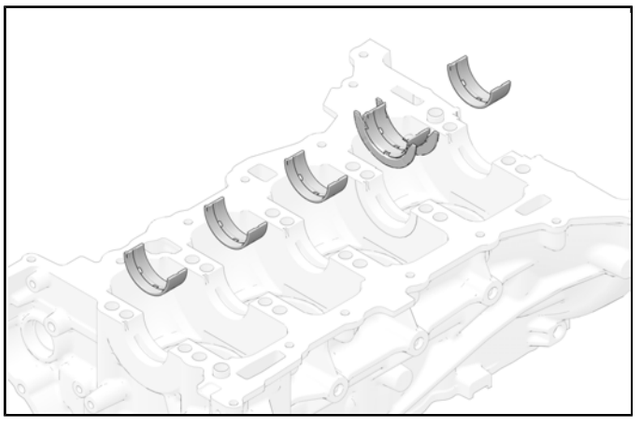
3. Clean the thread adhesive from the flywheel fastener holes. Use a nylon bristle brush to clean the holes in the crankshaft.

CRANKSHAFT AND BEARING REMOVAL

1. Remove the crankshaft from the block.



2. Remove and discard the crankshaft rear oil seal from the block.
3. Remove the bearing inserts from the block.



4. Remove the bearing inserts from the bed plate.
5. Clean the oil, sludge, and carbon.
6. Inspect the oil passages for obstructions.
7. Inspect the threads.
8. Inspect the bearing journals and the thrust surfaces for the following conditions:
   - Cracks
   - Chips
   - Gouges
   - Roughness
   - Grooves
   - Overheating (discoloration)

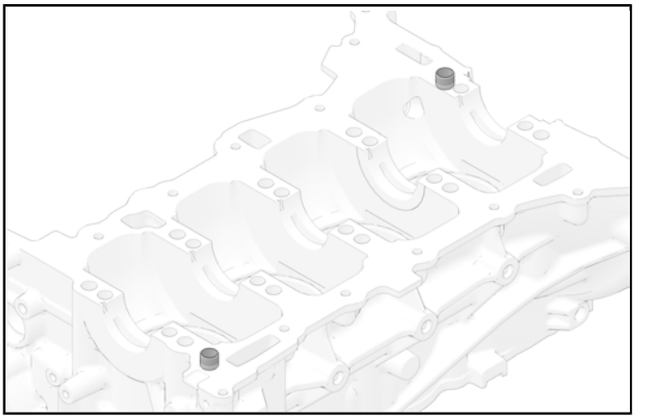
9. Inspect the corresponding bearing inserts for imbedded foreign material. If foreign material exists find the cause and repair it.

IMPORTANT
Replace the crankshaft if cracks, severe gouges or burned spots are found. Slight roughness may be removed with a fine polishing cloth soaked in clean engine oil. Burrs may be removed with a fine oil stone.

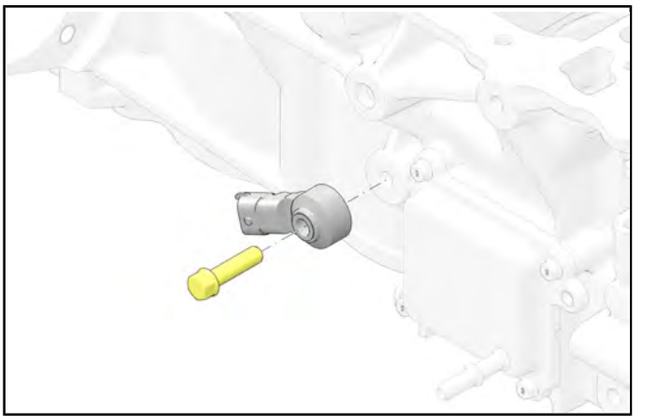
10. Measure the crankshaft journals. Use a micrometer or dial indicator to measure the taper and runout. Note the result for the later selection of bearing inserts. If not within limits the crankshaft must be replaced. Note the location of the main bearing high spots. If they are not in line, the crankshaft is bent and must be replaced.

ENGINE BLOCK DISASSEMBLY

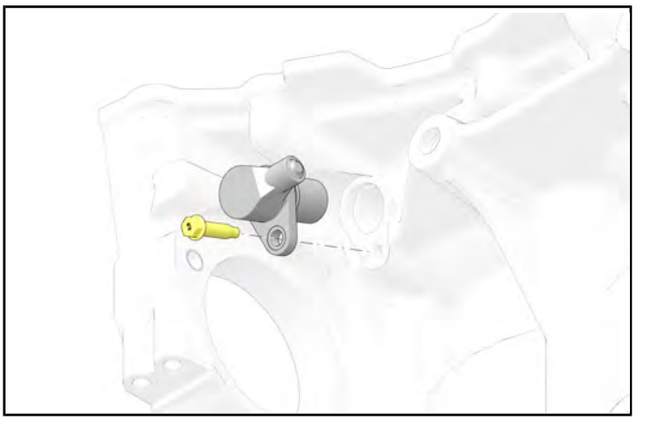
1. Remove the engine block alignment dowels.



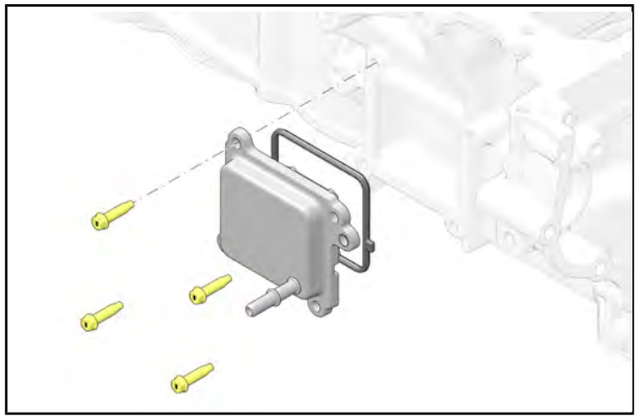
2. Remove the knock sensor and bolt.



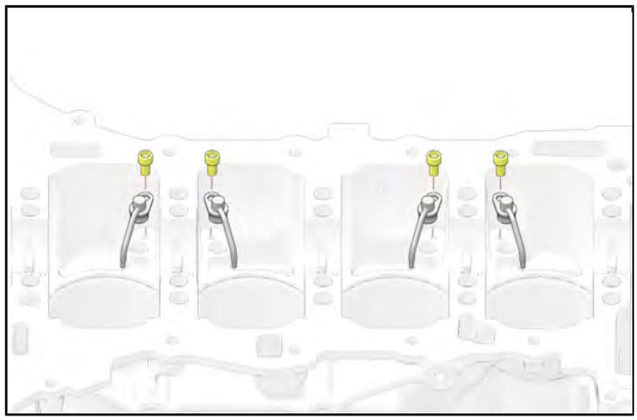
3. Remove the crankshaft position (CKP) sensor and bolt.



4. Remove four fasteners, breather assembly, and gasket from the engine block.



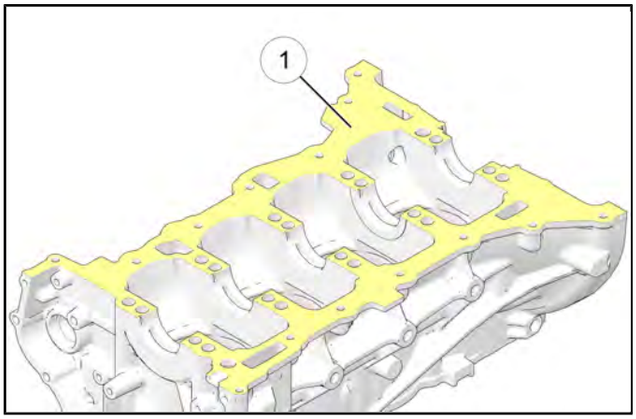
5. Remove and discard the piston jet fasteners.



6. Remove the piston jet.

ENGINE BLOCK CLEANING AND INSPECTION

1. Clean the sealing material from the gasket mating surfaces ① with a suitable tool.

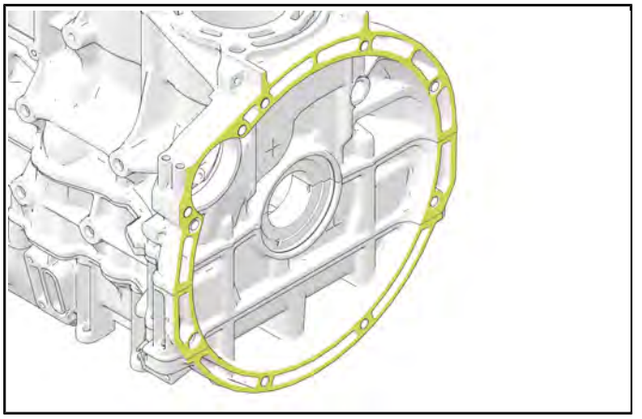


2. Clean the engine block and lower crankcase in a cleaning tank with solvent appropriate for aluminum.
3. Flush the engine block with clean water or steam.
4. Clean the oil passages.
5. Clean the blind holes.
6. Spray the cylinder bores and the machined surfaces with engine oil.
7. Inspect the threaded holes. Clean the threaded holes with a rifle brush. If necessary, drill out the holes and install thread inserts.

NOTICE
Do not attempt to machine the lower crankcase to engine block surfaces.

8. Use a straight edge and a feeler gauge to check the deck surface for flatness. Carefully machine minor irregularities. Replace the block if more than 0.010 in (0.254 mm) must be removed.
9. Inspect the oil pan rail for nicks. Inspect the front cover attaching area for nicks. Use a flat mill file to remove any nicks.
10. Clean the sealing material from the gasket mating surfaces on the lower crankcase engine block side with a suitable tool.
11. Clean the sealing material from the gasket mating surfaces on the lower crankcase oil pan side with a suitable tool.

12. Inspect the mating surfaces of the transmission face.

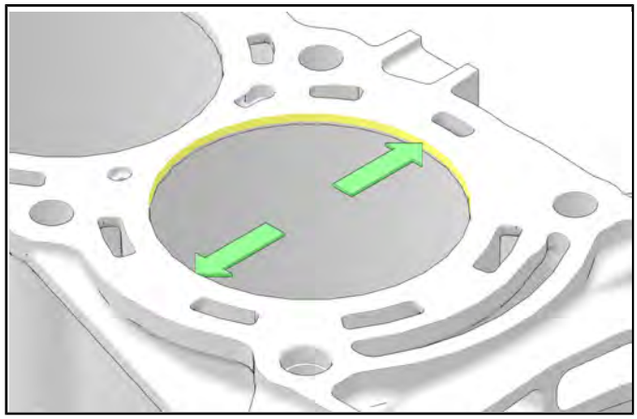


NOTICE
A broken flywheel may result if the transmission case mating surface is not flat.

13. Use the following procedure in order to measure the engine block flange runout at the mounting bolt hole bosses:
    a. Temporarily install the crankshaft and upper bearings. Measure the crankshaft flange runout using a commercially available dial indicator ①.
    b. Hold the gauge plate flat against the crankshaft flange.
    c. Place the dial indicator stem on the transmission mounting bolt hole boss. Set the indicator to 0.
    d. Record the readings obtained from all of the bolt hole bosses. The measurements should not vary more than 0.008 in (0.203 mm).
    e. Recheck the crankshaft flange runout if the readings vary more than 0.008 in (0.203 mm).
    f. Remove the crankshaft and bearings.
14. Inspect the crankshaft main bearing bores. Use a commercially available gauge ① to measure the bearing bore concentricity and alignment. Refer to **Service Specifications - Engine page 3.5**.

IMPORTANT
Bores must be inspected with a torque plate installed.

15. Replace the engine block and bed plate if the crankshaft bearing bores are out of specification.
16. Remove the bed plate.
17. Inspect the cylinder bores using the gauge ①. Inspect for the following items:

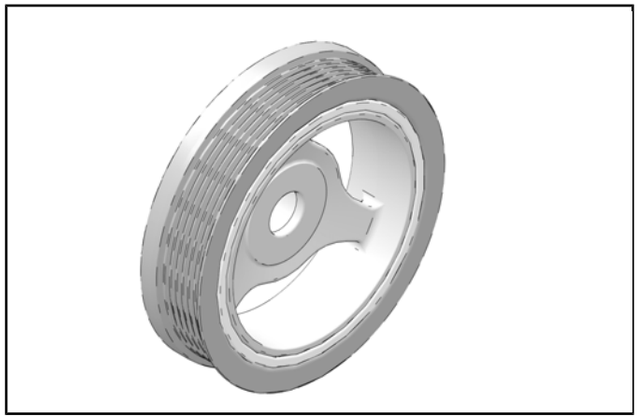


- Wear
- Taper
- Runout
- Ridging

18. If the cylinder bores are out of specification, replace engine block.

HARMONIC DAMPER CLEANING AND INSPECTION

1. Clean the harmonic damper.



2. Clean the belt grooves of all dirt or debris with a wire brush.

⚠ CAUTION

Wear safety glasses in order to avoid eye damage.

3. Dry the harmonic damper with compressed air.
4. Inspect the harmonic damper for the following:
   - Worn, grooved, or damaged hub seal surface. A harmonic damper hub seal surface with excessive scoring, grooves, rust or other damage must be replaced.

IMPORTANT

In order for the belt to track properly, the belt grooves should be free of all dirt or debris.

   - Dirty or damaged belt grooves. The damper belt grooves should be free of any nicks, gouges, or other damage that may not allow the belt to track properly. Minor imperfections may be removed with a fine file.
   - Worn, chunking or deteriorated rubber between the hub and pulley

ENGINE FLYWHEEL CLEANING AND INSPECTION

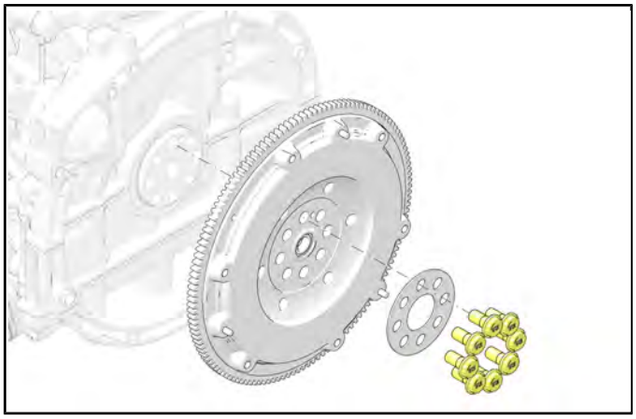
IMPORTANT

In order to maintain the proper component balance, contact surface taper, and heat transfer, manual transmission flywheels are NOT to be machined.

NOTICE

The fasteners and washer plate are one-time use and MUST be replaced with a new washer plate and fasteners anytime they are removed.

1. Clean the flywheel in solvent.



⚠ CAUTION

Wear safety glasses in order to avoid eye damage.

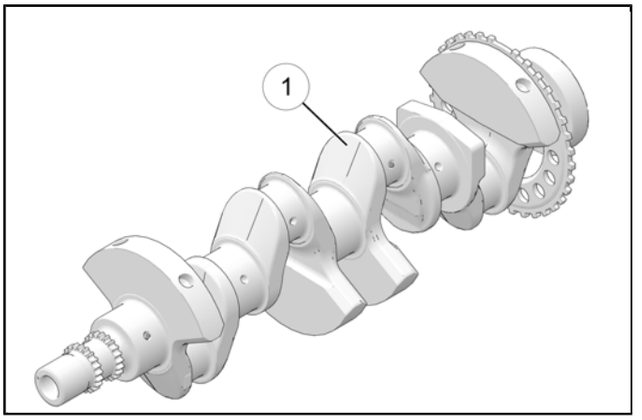
2. Dry the flywheel with compressed air.
3. Inspect the transmission flywheel for the following:
   - Damaged ring gear teeth
   - Loose or improperly positioned ring gear. The ring gear has an interference fit onto the flywheel and should be positioned completely against the flange of the flywheel.
   - A scored, grooved or damaged friction surface.

CRANKSHAFT AND BEARING CLEANING AND INSPECTION

IMPORTANT

Use care when handling the crankshaft. Avoid damage to the bearing surfaces or the lobes of the crankshaft position reluctor. Damage to the teeth of the crankshaft position reluctor ring may affect performance.

1. Clean the crankshaft ① with solvent.



2. Thoroughly clean all oil passages and inspect for restrictions or burrs.

⚠ CAUTION

Wear safety glasses in order to avoid eye damage.

3. Dry the crankshaft with compressed air.
4. Perform a visual inspection of the crankshaft for damage.

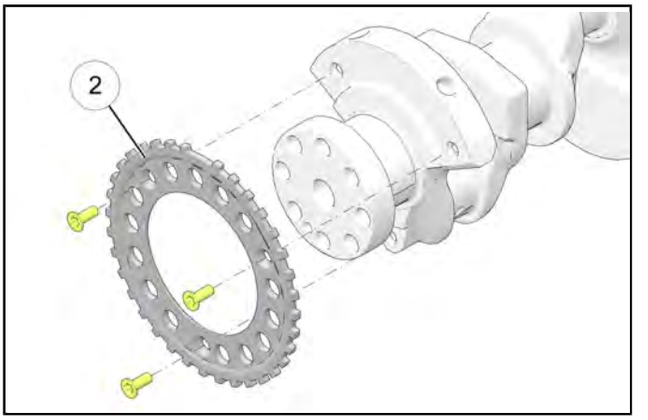
IMPORTANT

Reluctor ring teeth should not have imperfections on the rising or falling edges. Imperfections of the reluctor ring teeth may effect performance.

IMPORTANT

Clean all patchlock from the crankshaft threads.

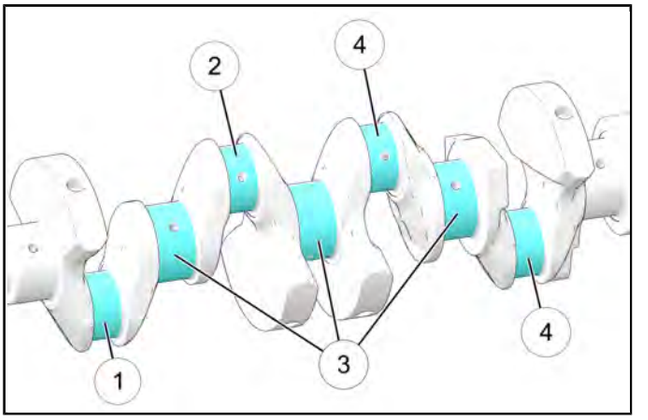
5. The crankshaft position ring ② may be replaced if damaged. Use NEW fasteners any time they are removed. Torque the crankshaft position ring fasteners to specification.



TORQUE

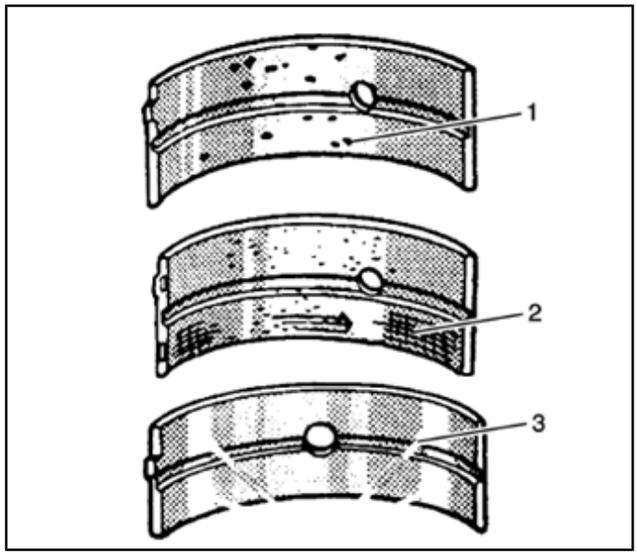
Crankshaft Position Ring Fasteners:
89 in-lbs (10 N·m)

6. Inspect the crankshaft journals for wear ①. The journals should be smooth, with no signs of scoring, wear, or damage.



7. Inspect the crankshaft journals for grooves or scoring ②.
8. Inspect the crankshaft journals for scratches or wear ③.
9. Inspect the crankshaft journals for pitting or imbedded bearing material ④.
10. Measure the crankshaft journals for out-of-round.
11. Measure the crankshaft journals for taper.
12. Measure the crankshaft runout.. Using wooden V-blocks, support the crankshaft on the front and rear journals.

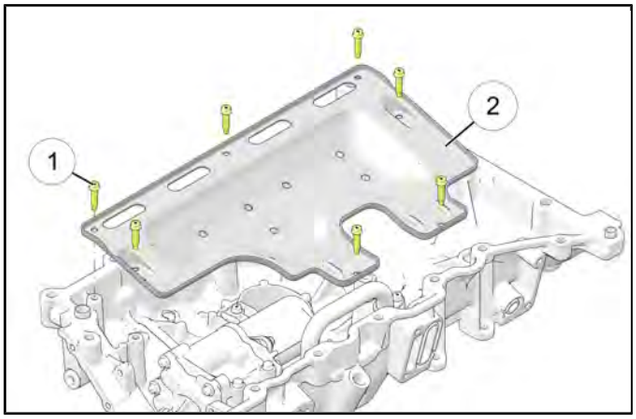
13. Use a commercially available dial indicator in order to measure the crankshaft runout at the front and rear intermediate journals.
14. Use the indicator in order to measure the runout of the crankshaft rear flange.
15. Replace the crankshaft if the measurements are not within specifications.
16. Inspect crankshaft bearings for craters or pockets ①. Flattened sections on the bearing halves also indicate fatigue.



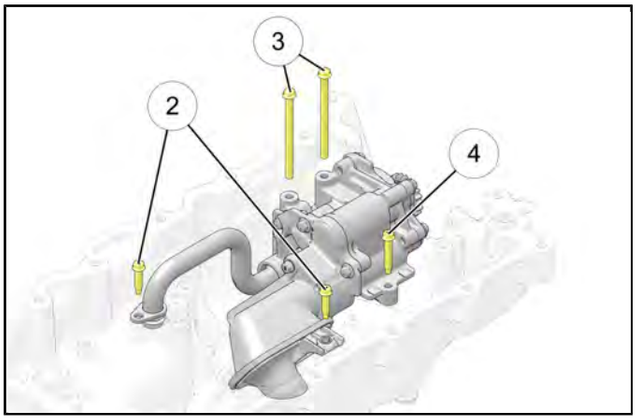
17. Inspect the crankshaft bearings for excessive scoring or discoloration ②.
18. Inspect the crankshaft bearings for dirt or debris imbedded into the bearing material.
19. Inspect the crankshaft bearings for improper seating indicated by bright, polished sections of the bearing ③. If the lower half of the bearing is worn or damaged, both upper and lower halves should be replaced. Generally, if the lower half is suitable for use, the upper half should also be suitable for use.

OIL PUMP DISASSEMBLY

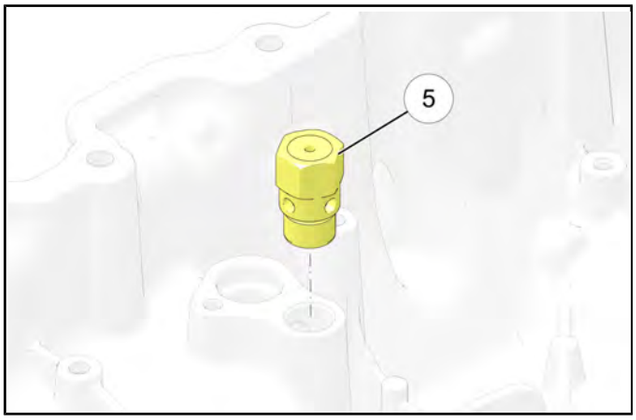
1. Remove the windage fasteners ① and windage plate ②.



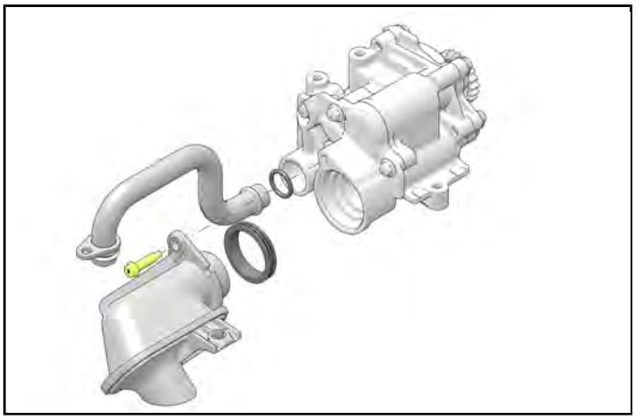
2. Remove the oil pickup ② and oil pump assembly fasteners ③ & ④.



3. Remove the regulator valve ⑤.



4. Remove the pickup tube, oil tube, and seals from the oil pump. Clean all of the parts in cleaning solvent. Remove varnish, sludge and dirt.

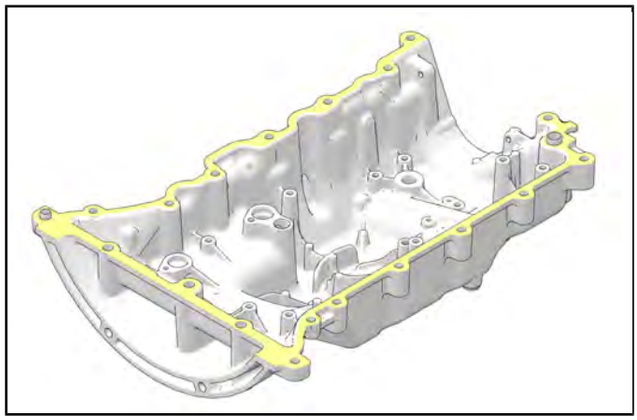


5. Inspect the oil pump components for wear. Replace components as necessary.

ENGINE ASSEMBLY - BOTTOM END

OIL PAN CLEANING AND INSPECTION

1. Clean the oil pan mating surface.

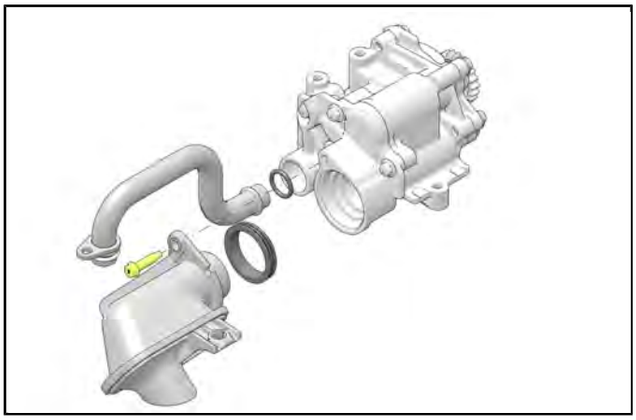


2. Clean the oil pan. Remove all the sludge and the oil deposits.
3. Inspect the threads for the engine oil drain plug.
4. Inspect the oil pan for cracking near the pan rail and the transmission mounting points.
5. Repair or replace the oil pan as necessary.

OIL PUMP ASSEMBLY

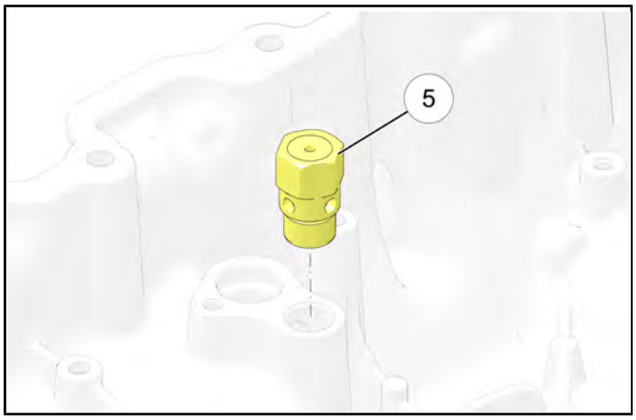
IMPORTANT
Lubricate seals with oil before installation or seal damage may occur.

1. Install the pickup tube, oil tube, and seals to the oil pump. Torque fastener to specification.



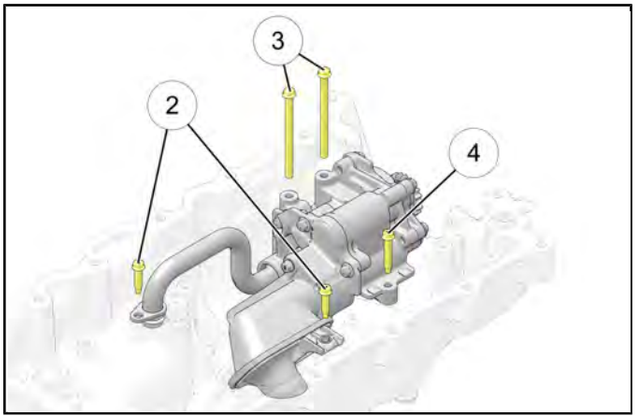
TORQUE
Oil Pump Pickup Fasteners: **80 in-lbs (9 N·m)**

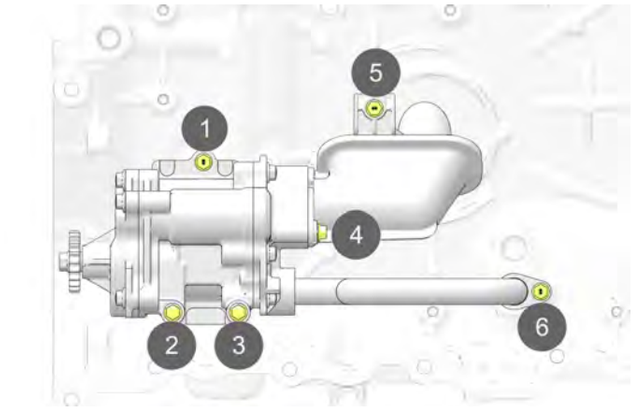
2. Install the regulator valve ⑤ into the oil pan. Torque to specification



TORQUE
Regulator Valve Assembly: **21 ft-lbs (28 N·m)**

3. Install the oil pump assembly into the oil pan. Install the oil pickup ② and oil pump assembly fasteners ③ & ④. Torque fasteners to specification in sequence shown.

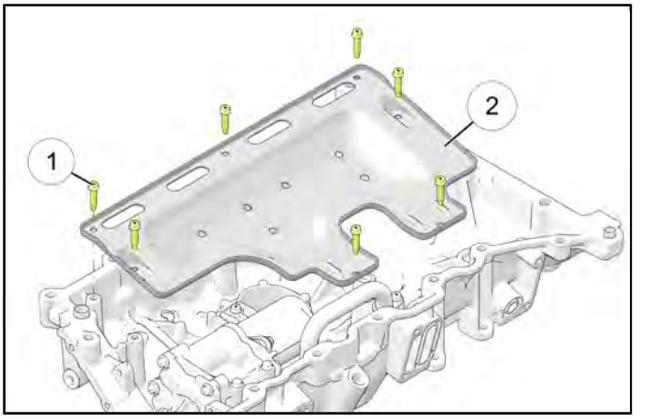


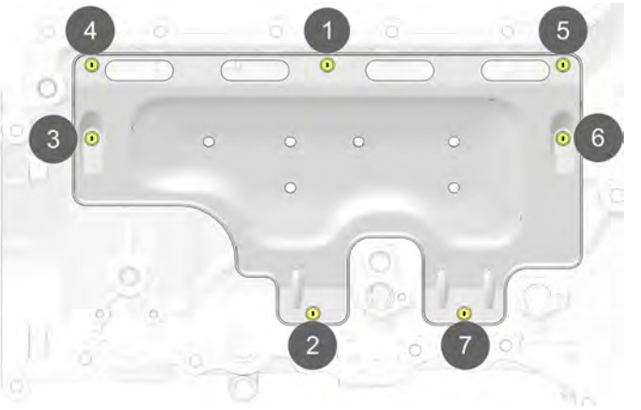


TORQUE
Oil Pump Pickup Fasteners: **80 in-lbs (9 N·m)**

TORQUE
Oil Pump Fasteners: **80 in-lbs (9 N·m)**

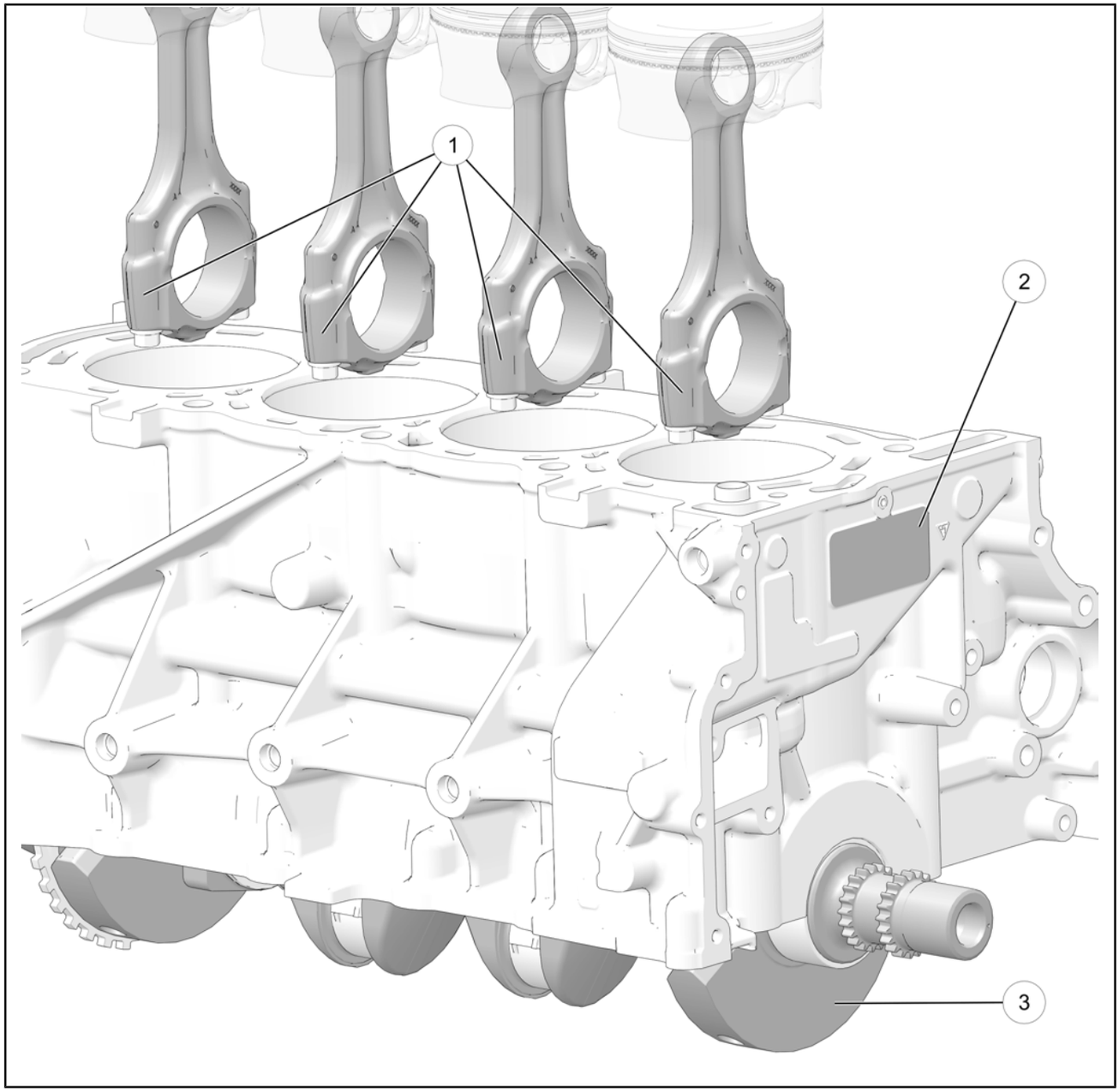
4. Install the windage plate ② and fasteners ①. Torque fasteners to specification in sequence shown.





TORQUE
Windage Plate Fasteners: **80 in-lbs (9 N·m)**

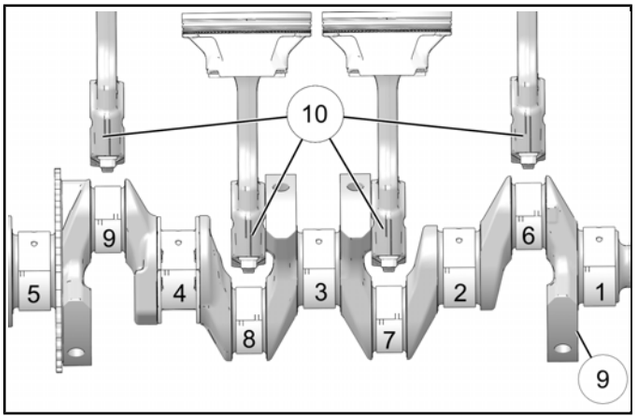
BEARING SELECTION IDENTIFICATION LETTERS AND NUMBERS



① Connecting Rod Bearing Identification Number (one number)	② Crankcase Bearing Identification Number	③ Crankshaft Bearing Identification Letters **nine letters:** the first five are the main bearings, starting at the timing chain end. The last four are the rod bearing numbers, starting at the timing chain end.

CONNECTING ROD BEARING SELECTION

In order to select the proper bearing for the connecting rods, you must reference the number on each connecting rod ⑩ and match that up with the rod journal letters on the crankshaft ⑨.



In this example, you would use the number *2* as the connecting rod code. You would use letters *B* and *B* as the crankshaft codes (crank journals 2 and 4). Based off the bearing selection chart, you would use a *Blue* bearing for each connecting rod

Red bearing for Rod #1

White bearing for Rod #2

Blue bearing for Rod #3

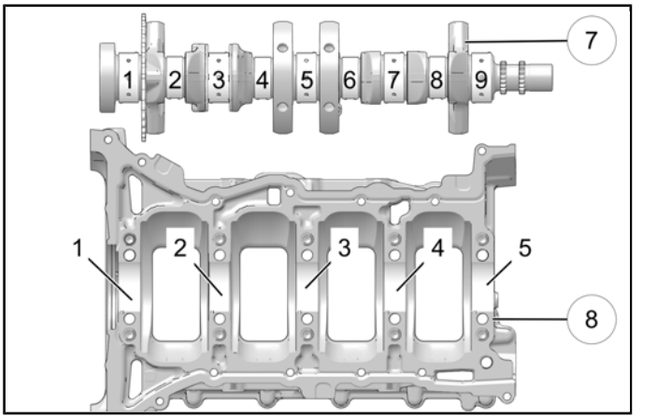
Yellow bearing for Rod #4

BEARING SELECTION CHART — ROD

	Crankshaft			
Rod	Code	A	B	C
	1	White	Red	Red
	2	Blue	White	Red
	3	Yellow	Blue	White

CRANKSHAFT MAIN BEARING SELECTION

In order to select the proper main bearings for the crankshaft, you must reference the nine numbers on the crankcase ⑧ and match that up with the main journal letters on the crankshaft ⑦.



Black bearing for Main #1

Blue bearing for Main #2

Green bearing for Main #3

Yellow bearing for Main #4

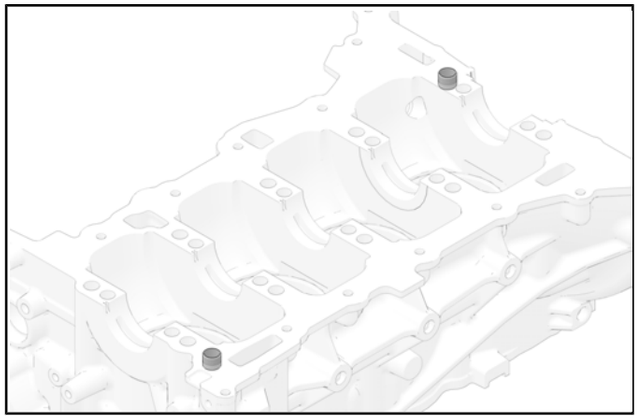
Red bearing for Main #5

BEARING SELECTION CHART — MAIN BEARINGS

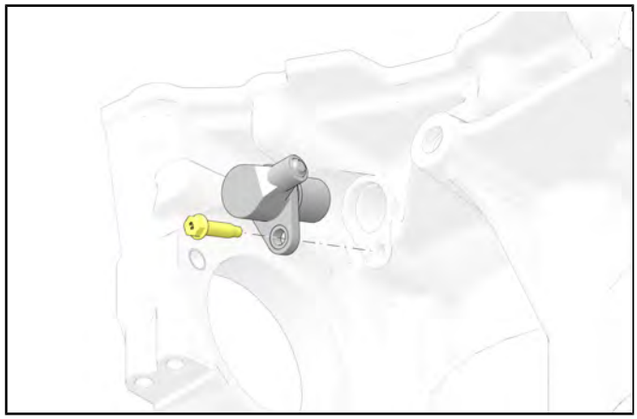
	Crankshaft			
Case	Code	A	B	C
	1	Green	Blue	Black
	2	Yellow	Green	Blue
	3	Red	Yellow	Green

ENGINE BLOCK ASSEMBLY

1. If removed, install the engine block alignment dowels.



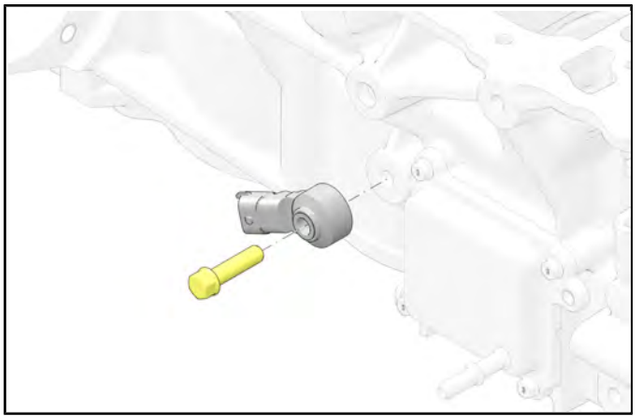
2. Lubricate the crankshaft position sensor O-ring with engine oil.

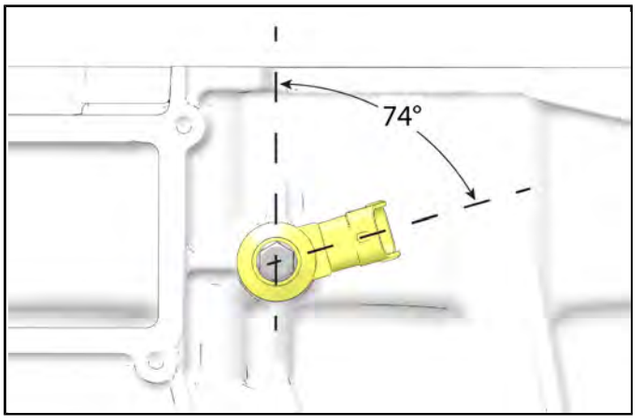


3. Install the crankshaft position sensor. Torque fastener to specification.

TORQUE
Crankshaft Position Sensor Fastener: **80 in-lbs (9 N·m)**

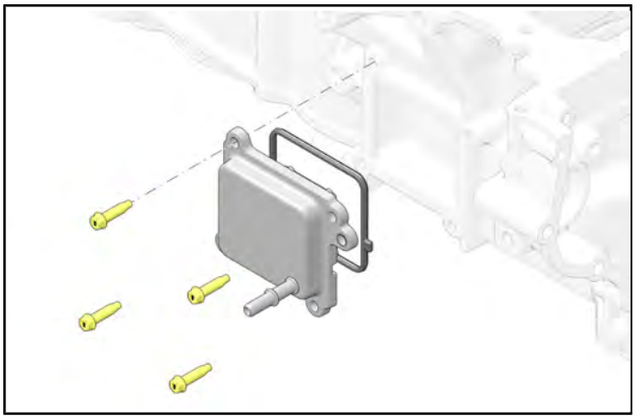
4. Install the knock sensor and fastener. Clock the knock sensor to the correct orientation. Torque fastener to specification.

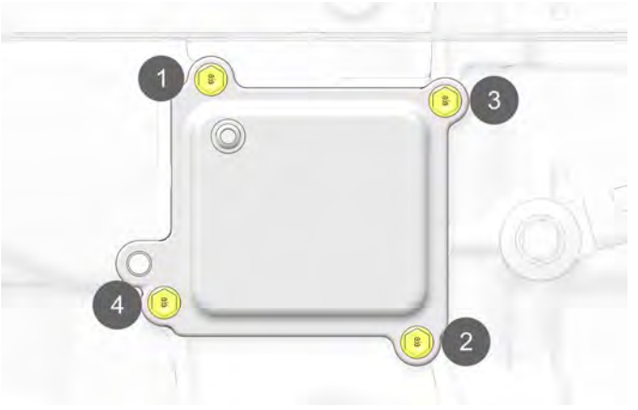




TORQUE
Knock Sensor Fastener: **16 ft-lbs (22 N·m)**

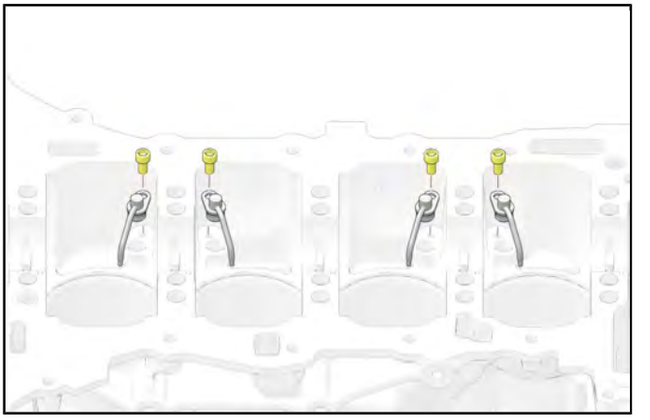
5. Install breather assembly, and gasket to the engine block. Torque four fasteners in sequence to specification.





TORQUE
Engine Breather Fasteners: **80 in-lbs (9 N·m)**

6. Install the piston jets.



IMPORTANT
Lubricate the o-rings with engine oil. Ensure the piston jets are seated prior to torquing fasteners

7. Install the piston jet fasteners and torque to specification.

TORQUE
Piston Jet Fasteners: **89 in-lbs (10 N·m)**

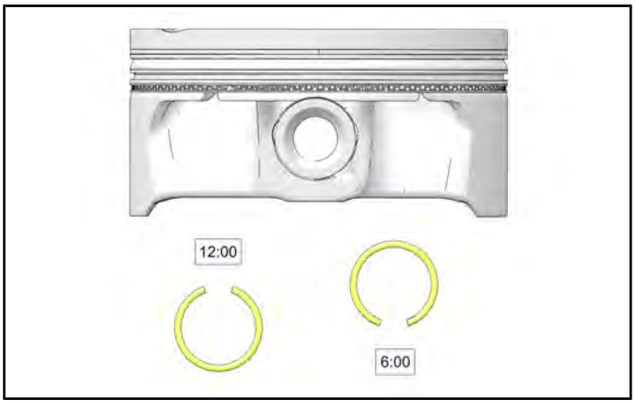
PISTON / CONNECTING ROD ASSEMBLY

1. Lubricate connecting rod small end, piston pin bore and piston pin with engine oil.

⚠ CAUTION

Do not re-use circlips. Circlips become deformed during the removal process.
Do not compress the new clip more than necessary to prevent loss of radial tension. Severe engine damage may result if circlips are re-used or deformed during installation.

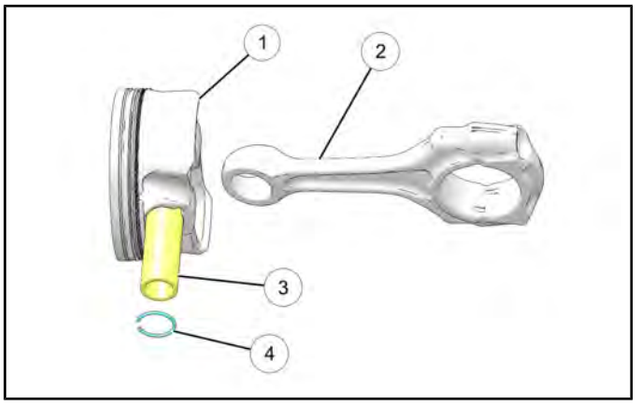
2. Install a new circlip on one side of piston with gap at the top (12:00 position) or bottom (6:00 position).



IMPORTANT

Never re-use a piston pin circlip.
If reinstalling the original connecting rods, orientate the rods the same as when removed. If new connecting rods are being installed, they can be installed either way (there is no piston pin offset in the rod), however it is recommended they be installed with rods facing the same direction.

3. Place piston ① on connecting rod ②. Push piston pin ③ through rod and piston until it seats against the installed circlip.



⚠ CAUTION

Do not tap on pin or cause any sideways force to connecting rod. Warm piston crown with a heat gun if pin cannot be installed by hand, or use a piston pin installation tool.

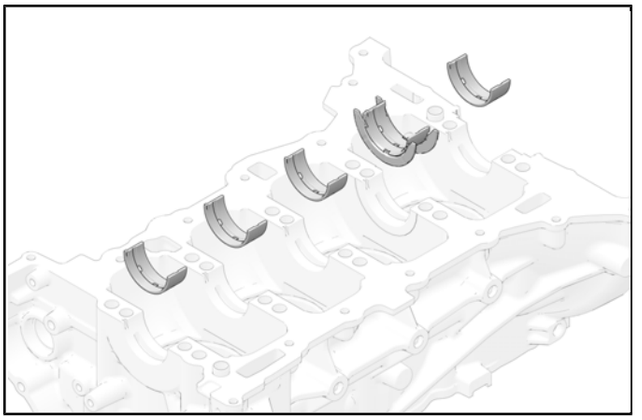
⚠ CAUTION

DO NOT apply heat to piston rings or a loss of radial tension could result.

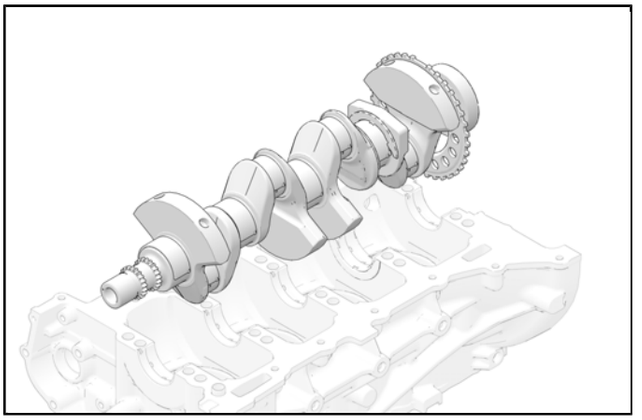
4. Install the remaining circlip ④ with gap at the top (12:00 position) or bottom (6:00 position). Push the piston pin in both directions to make sure the clips are properly seated in the groove.

LOWER CRANKCASE INSTALLATION

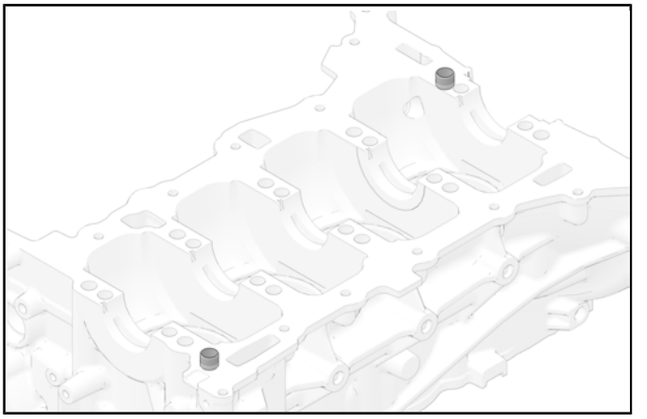
1. For crankcase bearing selection, see **Crankshaft Main Bearing Selection page 3.74** and **Bearing Selection Identification Letters and Numbers page 3.73**.
2. Install the upper crankshaft bearings and lubricate bearing surfaces with engine oil.



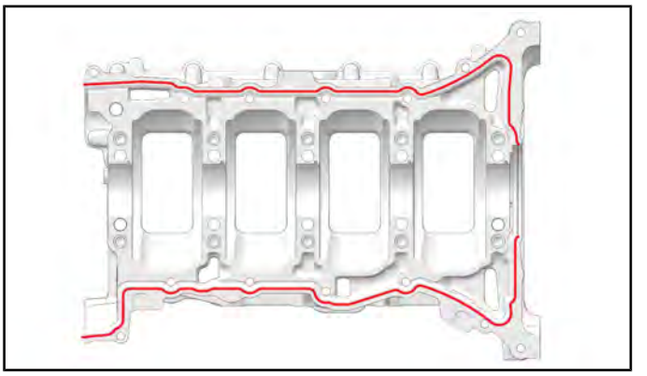
3. Install the crankshaft on the journals.



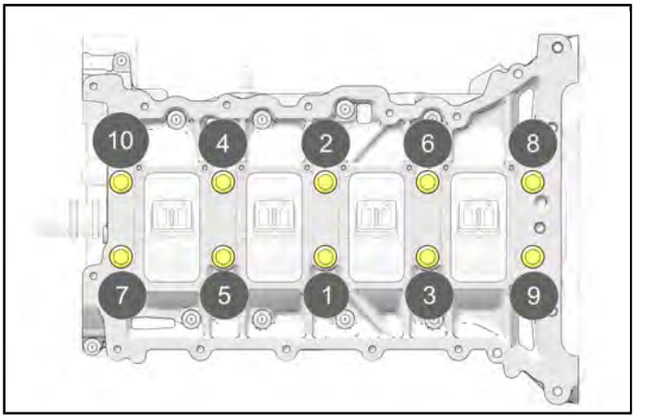
4. Install the lower bearing halves, without grooves, into the lower crankcase. Apply oil to bearing surfaces.
5. If removed, install the engine block alignment dowels.



6. Install the lower block bearings.
7. Clean both halves of the block sealing surfaces with isopropyl alcohol. Apply Three Bond 1217H sealant in a bead approximately 3mm wide by 2mm high, as shown.

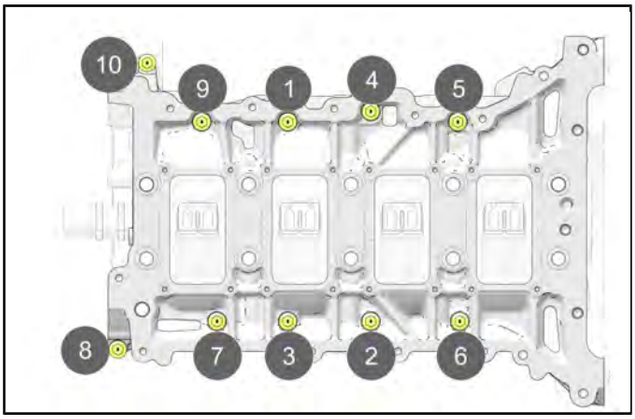


8. Install the lower crankcase. Tap gently into place with a suitable tool if necessary. Ensure it is aligned properly on the alignment dowels.
9. Install the NEW crankshaft bearing bolts in sequence finger tight. Torque the crankshaft bearing bolts in sequence to specification.



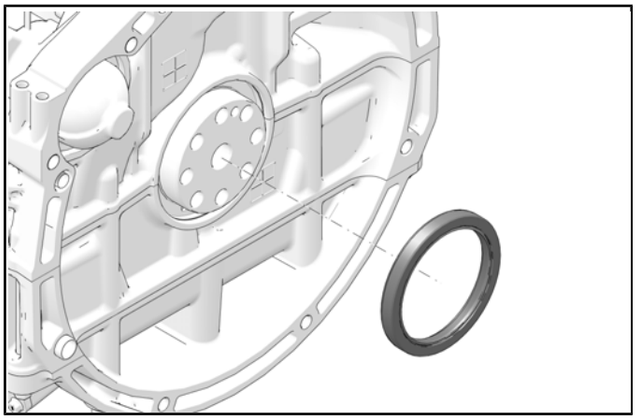
TORQUE
Crankcase Fasteners, Inner: a. Torque all fasteners to 14 ft-lbs (20 N·m) in sequence specified. b. Torque all fasteners to 26 ft-lbs (35 N·m) in sequence specified. c. Angle torque all fasteners in sequence an additional 45° d. Angle torque all fasteners in sequence an additional 45° e. Angle torque all fasteners in sequence an additional 90°

10. Torque the lower crankcase perimeter bolts in sequence to specification.



TORQUE
Crankcase Fasteners, Outer: **16 ft-lbs (22 N·m)**

CRANKSHAFT REAR OIL SEAL INSTALLATION



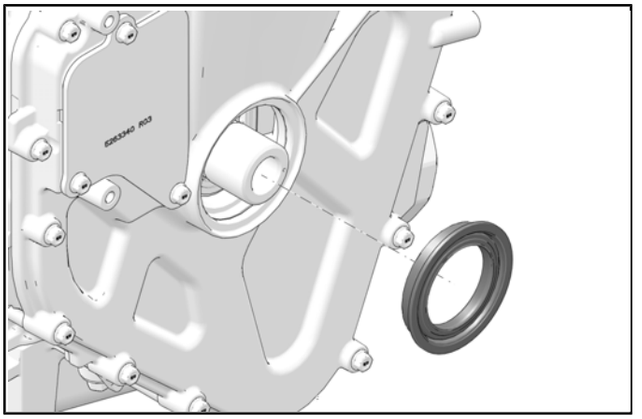
1. Remove excess sealer from seal recess.

IMPORTANT
Ensure the crankshaft is clean and free of any sealant.

2. Lubricate the outside diameter of the new crankshaft seal with clean engine oil.
3. Using the **PU-52884** rear seal installer, press the new crankshaft seal into the housing. The **PU-52884** also establishes the depth of the seal in the crankshaft seal bore.

CRANKSHAFT FRONT OIL SEAL INSTALLATION

1. Install the seal into the front cover using the **PU-52885** installer .



2. Ensure that the engine front cover is properly supported when installing the seal.

FRONT COVER INSTALLATION

IMPORTANT

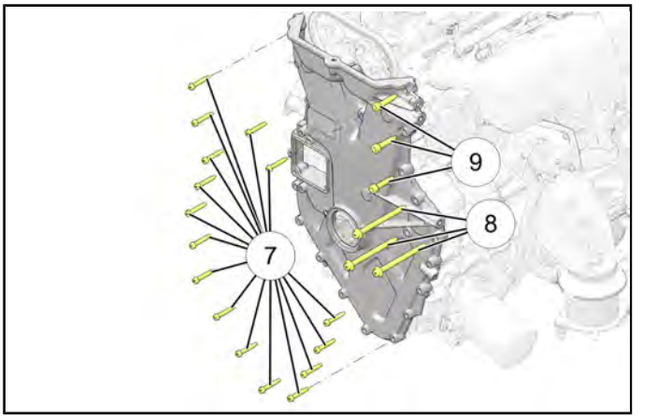
Make sure the engine is in proper timing before installing the front cover. See Camshaft Timing Chain and Sprocket Installation page 3.91.

1. Clean the front cover and apply liquid engine sealant to the front cover prior to installation. Ensure the engine block and oil pan sealing faces are cleaned with isopropyl alcohol and free of oil.

NOTICE

Apply assembly grease on the OD of the crankshaft and water pump before installing the front cover. This helps accommodate the bearing in front cover.

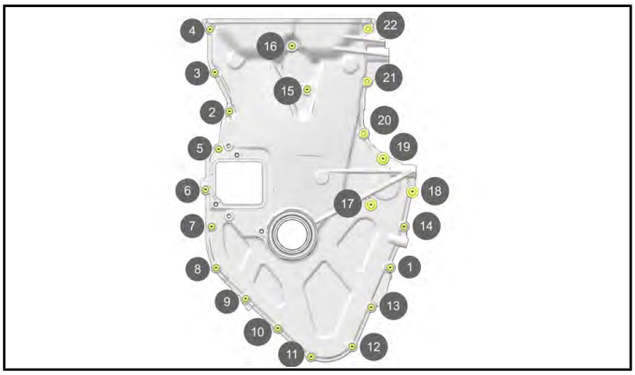
2. If required, Install Timing Chain Tensioner. See Timing Chain Tensioner Installation page
3. Install front cover. Loosely install fasteners ⑦, ⑧ and ⑨.



NOTICE

The longer fasteners ⑧ support the water pump. Make sure the pump is seated properly before installing the fasteners.

4. Torque fasteners to specification in sequence shown.



TORQUE
M6 Fasteners (Items 1–16): **80 in-lbs (9 N·m)**

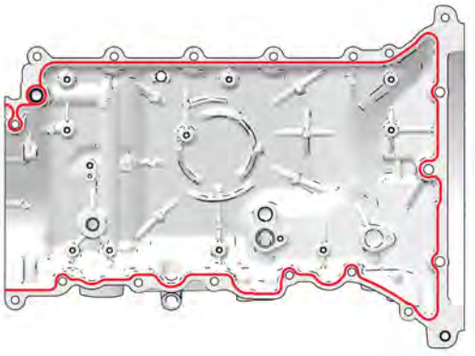
TORQUE
M8 Fasteners (Items 17–22): **16 ft-lbs (22 N·m)**

5. Install the Harmonic Balance Pulley. See Crankshaft Harmonic Pulley Installation page
6. Install the Alternator. See Alternator Installation page

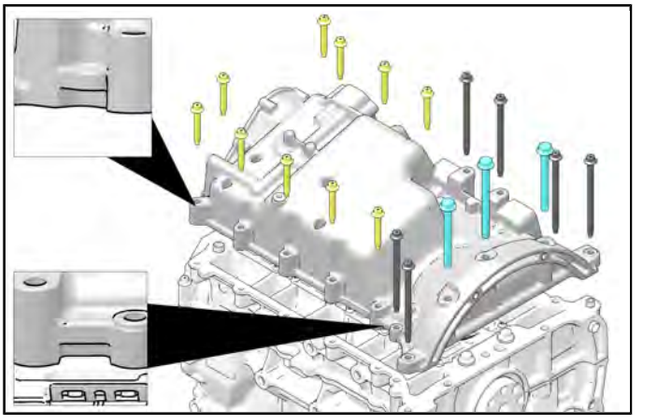
OIL PAN INSTALLATION

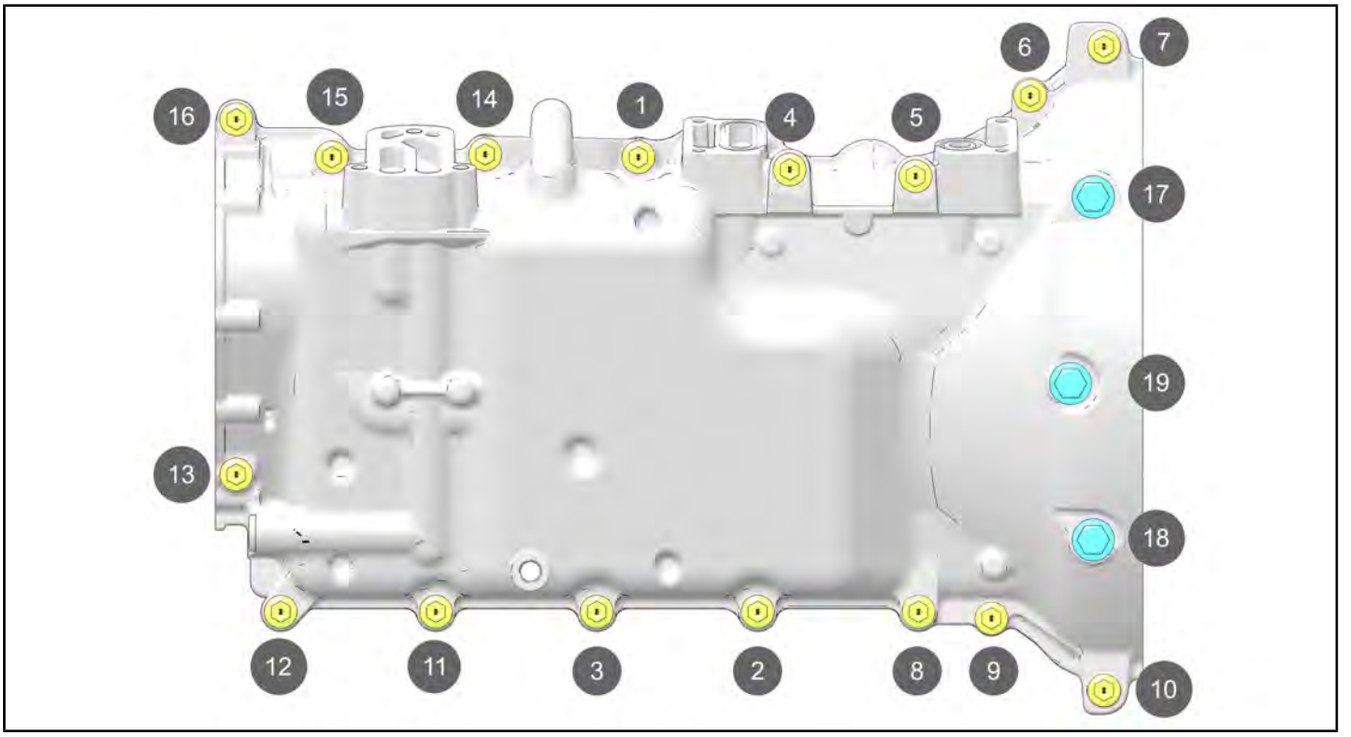
NOTICE
The oil pan has to be install first before the front cover.

1. Make sure that the oil pan and mounting surface on the lower crankcase are free of all oil and debris.
2. Clean with isopropyl alcohol prior to applying sealant. Apply sealant in approximately 3mm wide by 2mm high bead around the perimeter of the oil pan as shown.



3. Install the oil pan.
4. Install the oil pan fasteners and torque to specification in sequence.



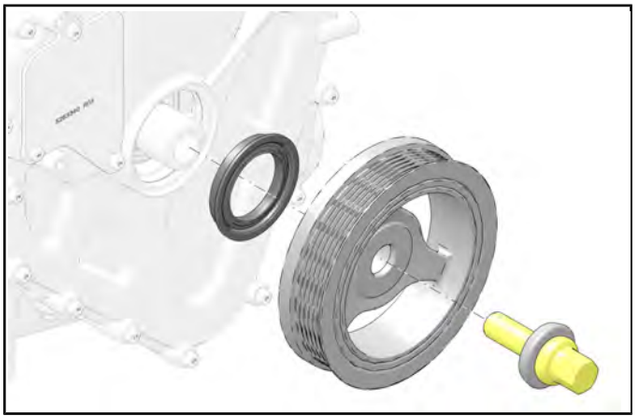


TORQUE
M8 Fasteners (items 1-16): **16 ft-lbs (22 N·m)** M10 Fasteners (items 17-19): **35 ft-lbs (48 N·m)**

CRANKSHAFT HARMONIC DAMPER INSTALLATION

NOTICE
Ensure both components are aligned correctly or serious engine damage will occur.

1. Install the Harmonic Pulley onto the crankshaft.



2. Oil the threads and install the retaining fastener. Use the **PU-51123** guide and a breaker bar to prevent the crankshaft from rotating when tightening the fastener. Torque to specification.

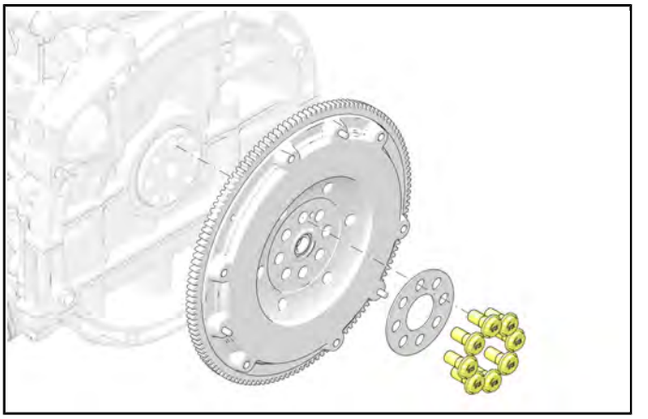
TORQUE
Front Harmonic Pulley Fastener: a. Torque fastener to 74 ft-lbs (100 N·m) b. Loosen fastener 180° c. Torque fastener to 22 ft-lbs (30 N·m) + 70°

3. Install cargo box. Torque fasteners to specification.

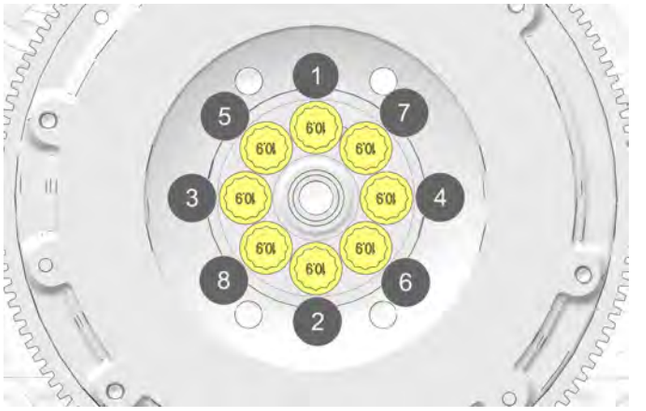
TORQUE
Cargo Box Fasteners: **7 ft-lbs (10 Nm)**

FLYWHEEL INSTALLATION

1. Install the flywheel.



2. Install the adapter plate and NEW fasteners. Tighten the fasteners using the torque sequence shown. Torque fasteners to specification.



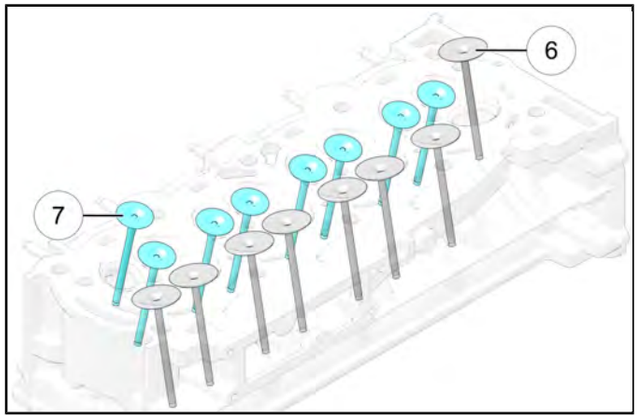
TORQUE
Flywheel Fasteners: **24 ft-lbs (33 N·m) + 120°**

ENGINE ASSEMBLY - TOP END

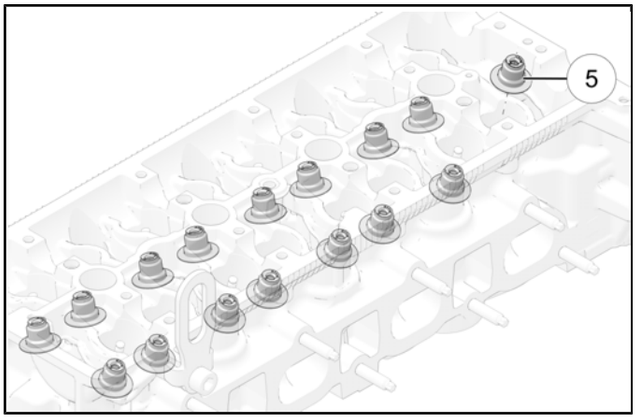
CYLINDER HEAD ASSEMBLY

NOTICE
In order to avoid damage, install the spark plugs after the cylinder head has been installed on the engine.

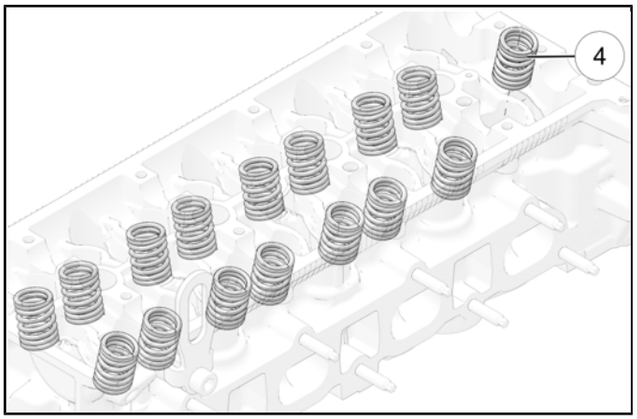
1. Inspect the valve springs for the following conditions:
   - Expanded height
   - Unparallel spring ends
   - Spring tension using tester
   - Any distorted springs should be replaced
2. Install the intake ⑥ and exhaust ⑦ valves .



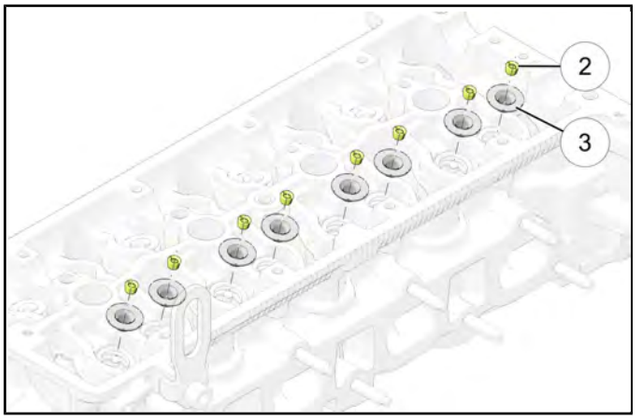
3. use the following steps to measure valve runout:
   a. Apply a dab of Prussian blue on the entire valve face. Seat the valve but do not rotate it. The Prussian blue traces transferred to the valve seat are an indication of concentricity of the valve seat.
   b. Clean all traces of Prussian blue.
   c. Apply a dab of Prussian blue on the valve seat and repeat the check. The traces of Prussian blue transferred to the valve face indicates valve face concentricity.
4. Replace any valves, if required.
5. Install the new valve seals ⑤. Fully seat the seals on the valve guides.



6. Install the springs ④.

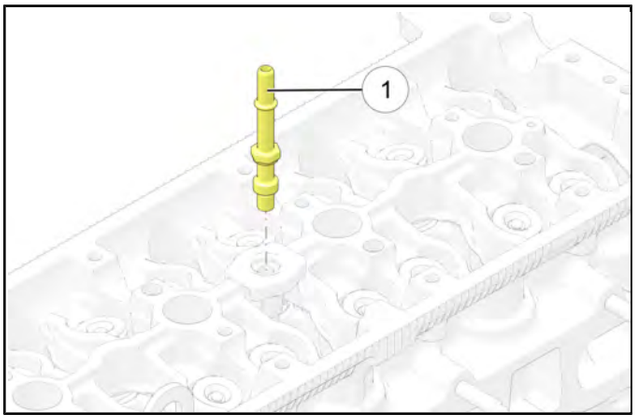


7. Install the retainers ③.



8. Using the **PU-51126** compressor, compress the valve spring.
9. Install the valve keys ②.
10. Slowly release the **PU-51126** compressor from the valve/spring assembly

11. Inspect for proper valve key seating.
12. Install the remaining valves, springs, and other components.
13. Install the cylinder head air vent fitting ① and torque to specification.

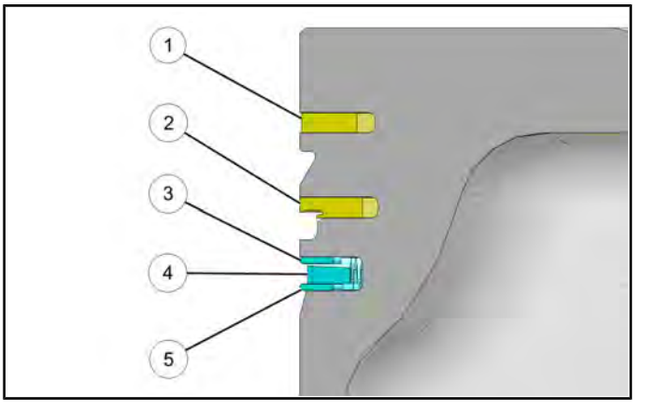


If re-using fitting, apply a dab of Loctite 565 or equivalent thread sealant to fitting threads.

TORQUE
Coolant Vent Fitting: **106 in-lbs (12 N·m)**

PISTON RING INSTALLATION

IMPORTANT
Apply clean engine oil to all ring surfaces and ring lands upon installation. Always check piston ring installed gap before rings are installed on piston. Refer to **PISTON RING INSTALLATION GAP** procedure. Clean accumulated carbon from piston ring grooves and oil ring lube holes if piston has been in service.



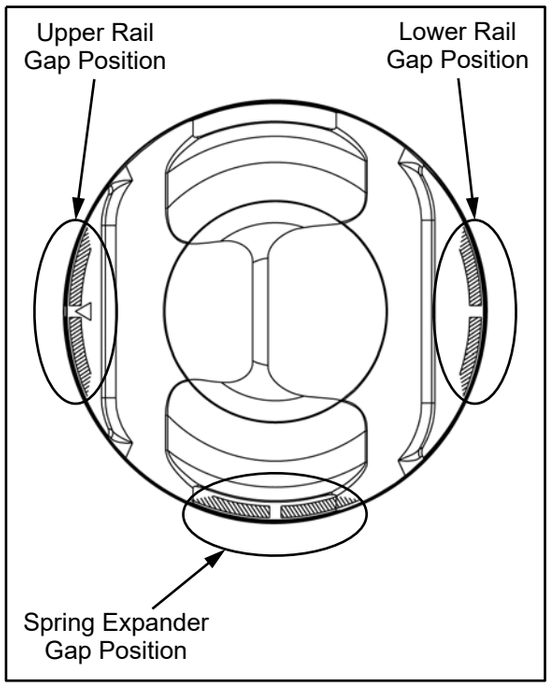
① Top Ring	④ Spring Expander
② Second Ring	⑤ Lower Rail
③ Upper Rail	

1. Place oil control ring expander in oil ring groove. Rotate expander in groove until butt ends are on PTO side of piston (see illustration below).

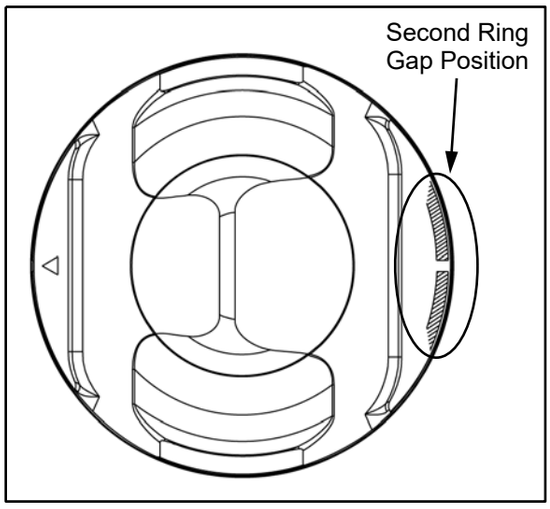
NOTICE
Ends must butt squarely together and must not overlap.

2. Install lower rail with end gap positioned on the intake side of piston.

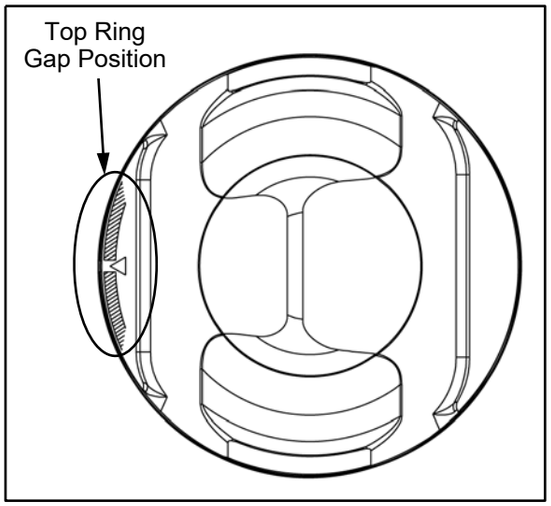
3. Install upper rail with end gap positioned on the exhaust side of piston.



4. Install second ring with marking facing top of piston. Rotate ring to position the end gap toward intake side of piston as shown below.



5. Install top ring with mark facing top of piston. Rotate ring to position the end gap toward exhaust side of piston as shown below.



6. Be sure top and second rings rotate freely in their grooves and do not bind when compressed by hand.

PISTON, CONNECTING ROD, AND BEARING INSTALLATION

1. Install the connecting rod bearings. Use NEW bearings.
   a. Install the bearing inserts into the connecting rod and the connecting rod cap.
   b. Lubricate the connecting rod bearings with engine oil.
2. Install the piston and the connecting rod to the correct bore.
   a. Stagger each piston ring end gap equally around the piston.
   b. Lubricate the piston and the piston rings with engine oil.
   c. Lubricate the piston ring compressor internal surface with engine oil. Install piston ring compressor **PU-52876** over the piston. Do not disturb the piston ring end gap location.
   d. The piston must be installed so that the arrow on the top of the piston faces the exhaust side of the engine.
   e. Place the piston in its matching bore.
   f. Gently tap the piston into its bore with a hammer handle. Guide the connecting rod to the connecting rod journal while tapping the piston into place.
   g. Hold the piston ring compressor **PU-52876** against the engine block until all the rings have entered the cylinder bore.

IMPORTANT

Ensure that the connecting rod cap is properly oriented on the connecting rod.

⚠ CAUTION

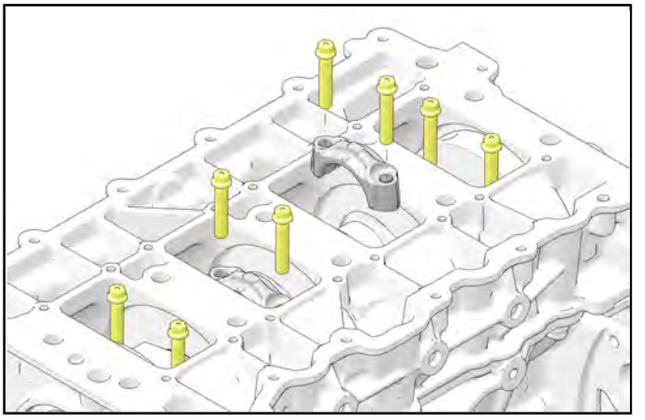
Use care not to damage the cooling jet during piston/rod installation.

3. Blow the fractured surfaces of the connecting rod with compressed air to ensure the fracture face is free of debris.

IMPORTANT

Do not brush the fracture face to clean it.

4. Install the connecting rod cap.



IMPORTANT

Verify that the marking on the connecting rod and cap are correct.
Make sure the connecting rod and rod cap fractures mate properly.

5. Install the connecting rod bolts. Always use new bolts. Torque the connecting rod bolt nuts to specification.

TORQUE

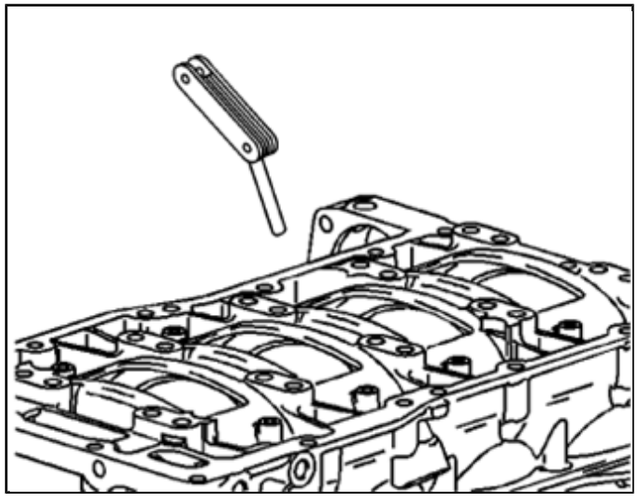
Connecting Rod Fasteners:

a. Torque both fasteners to 106 in-lbs (12 N·m)
b. Torque both fasteners to 22 ft-lbs (30 N·m)
c. Angle torque an additional + 90° for both fasteners

6. Install the remaining connecting rods and piston assemblies.

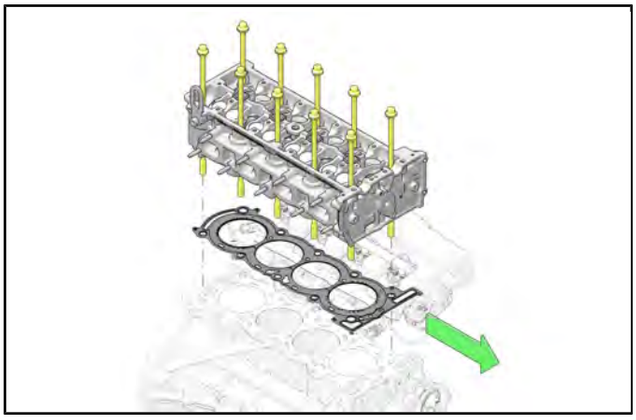
7. Measure the connecting rod side clearance with a feeler gauge.

Connecting Rod Axial Clearance:
0.0039 - 0.0118” (0.100 - 0.300 mm)



CYLINDER HEAD INSTALLATION

1. Install the cylinder head gasket to the block. Do not use any sealing material.

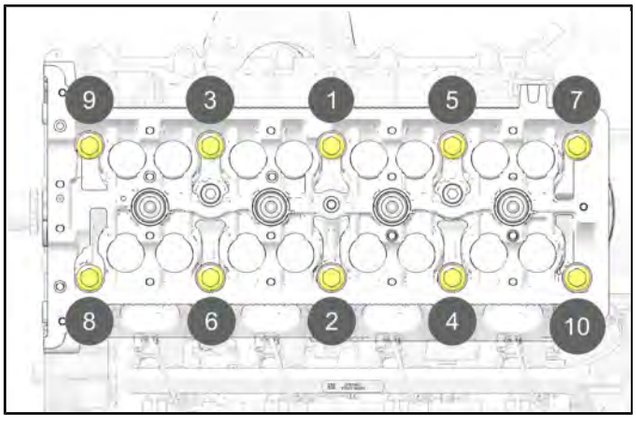


2. Before installation, perform Valve Sealing Test. See Valve Sealing Test page
3. Install the cylinder head.

IMPORTANT
Cylinder head fasteners can be re-used up to 4 times. Tightening of the fasteners beyond 4 uses will result in the threads stretching & should then be replaced.

⚠ CAUTION
Do not drop fasteners into cylinder head. Damage to the fastener threads may occur.

4. Install and torque the cylinder head bolts in sequence.



TORQUE
Cylinder Head Fasteners: a. Torque all fasteners to 14 ft-lbs (20 N·m) in sequence specified. b. Torque all fasteners to 26 ft-lbs (35 N·m) in sequence specified. c. Angle torque all fasteners in sequence an additional 90° d. Angle torque all fasteners in sequence an additional 90° e. Angle torque all fasteners in sequence an additional 180°

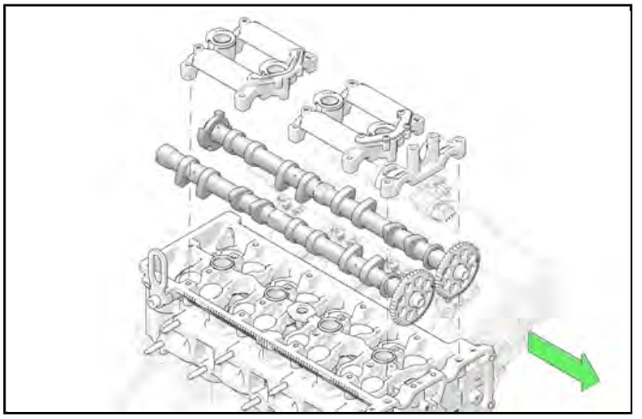
CAMSHAFT INSTALLATION

⚠ CAUTION
Failure to install the camshafts as directed in the instructions below may result in engine damage.

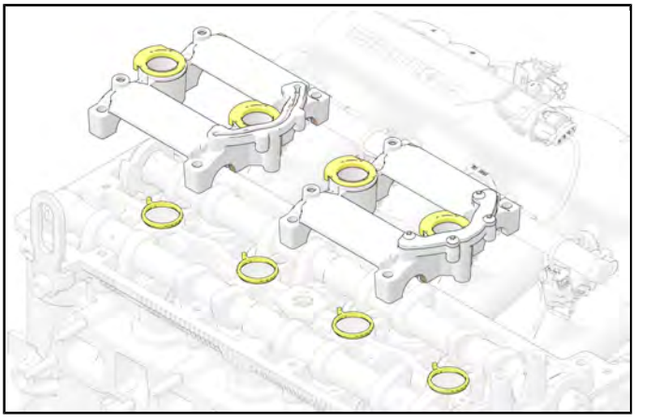
IMPORTANT
Lubricate the bucket diameters with engine oil and the cam journals and lobes with assembly lube prior to installing the camshafts.

NOTICE
Recheck valve lash when buckets are removed. Valve Lash - Tappet Selection page 3.96

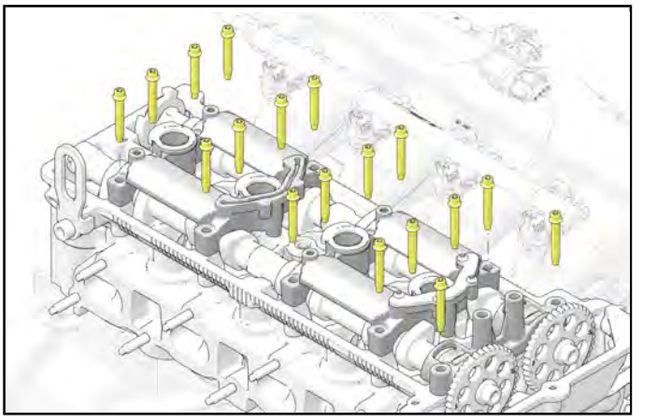
1. Set the intake and exhaust camshafts.

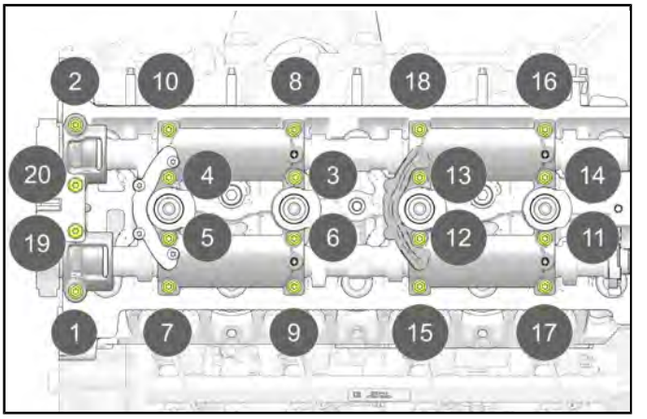


2. Install camshaft gaskets.



3. Tighten the camshaft fasteners in increments of three turns until they are seated. Torque to specification in the sequence shown.





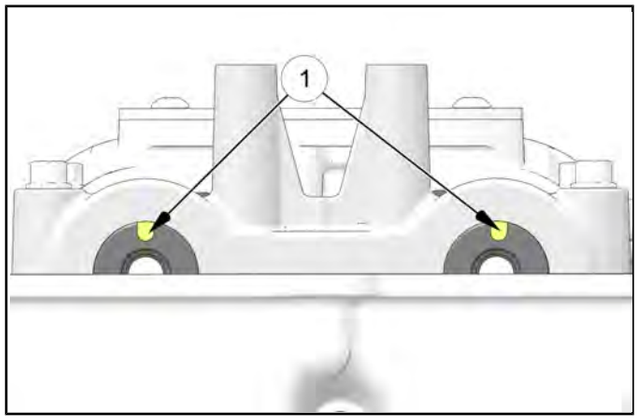
TORQUE
Camshaft Carrier Fasteners: **13 ft-lbs (17 N·m)**

4. Install the Valve Cover. See Valve Cover Installation page 3.97.

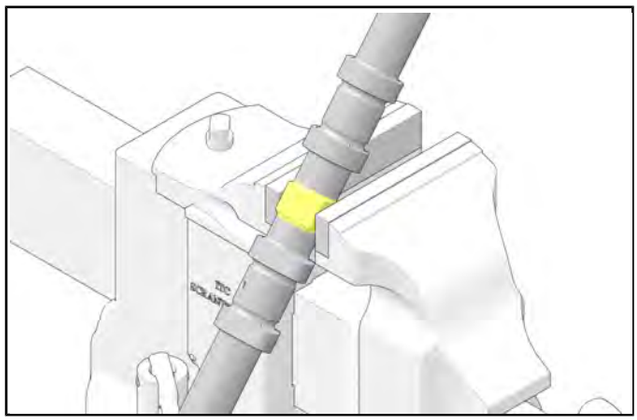
CAMSHAFT TIMING CHAIN AND SPROCKET INSTALLATION

NOTICE
When performing timing chain service, it may be helpful to use the timing chain retainer **PU-51116**.

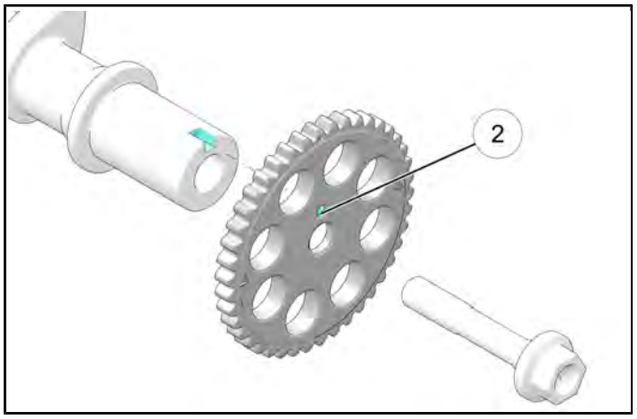
1. Ensure the intake and exhaust camshaft notches are in the 12 o'clock position ①. The number 1 piston should be at top dead center (TDC), crankshaft key at 12 o'clock. The engine is timed top-dead center exhaust stroke.



2. If removed, install the intake and exhaust camshaft sprockets. Place the cam hex in a soft jaw vice.



3. Align the camshaft sprockets with the timing mark ② in the 12 o'clock position. Torque fasteners to specification.

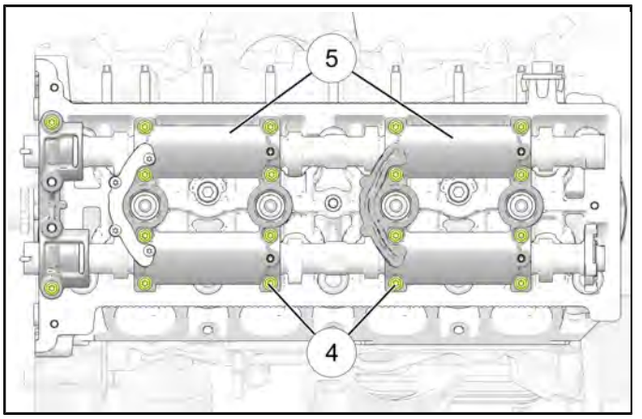


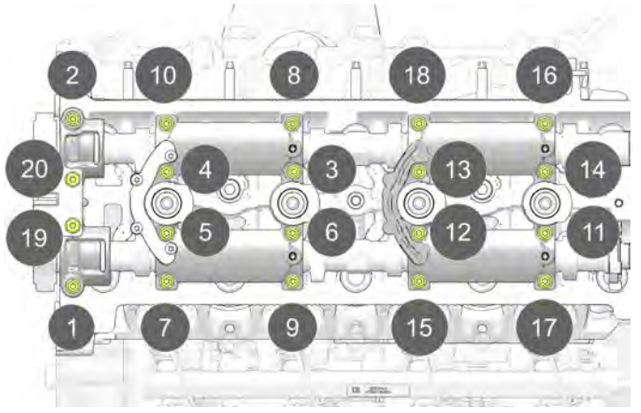
Oil the threads and apply grease to the head of the fastener

IMPORTANT
Always install NEW actuator bolts.

TORQUE
Camshaft Sprocket Fastener: **22 ft-lbs (30 N·m) + 90°**

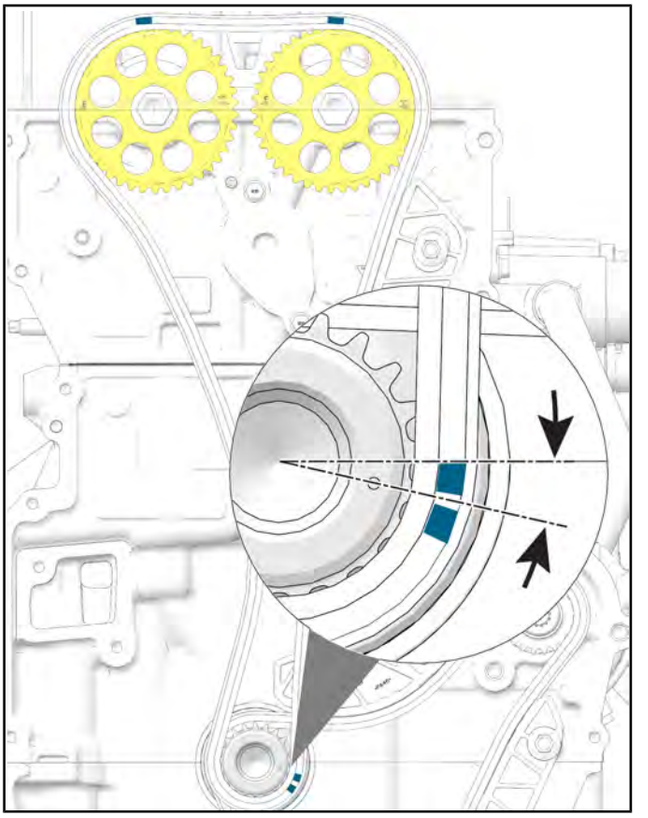
4. Install camshaft carriers and fasteners. Tighten the camshaft fasteners in increments of three turns until they are seated. Torque to specification in the sequence shown.





TORQUE
Camshaft Carrier Fasteners: **13 ft-lbs (17 N·m)**

5. Assemble the timing chain with indicator marks as shown.

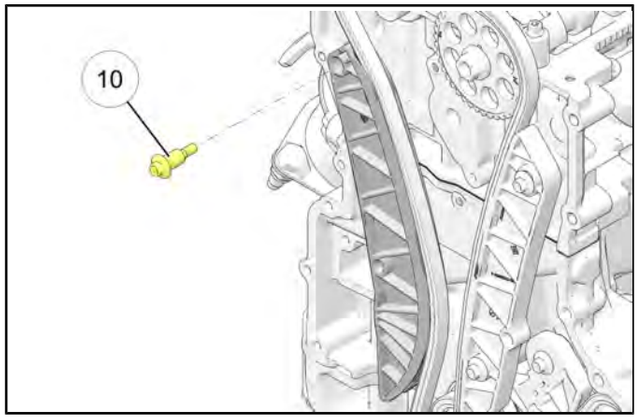


MEASUREMENT
12.7° or approximately the 4 o'clock position

IMPORTANT
There are 4 colored links on the timing chain. Use the following procedure to line up the links with the actuators. Orient the chain so that the colors are visible. Always use new actuator bolts.

6. Hand tighten the new intake camshaft actuator bolt.
7. Line up the indicator marks on the chain to the 12 o'clock position of the intake and exhaust sprockets as shown.
8. Line up the indicator dot on the crankshaft in the 4 o'clock position as shown. Route the timing chain around the crankshaft sprocket and align crankshaft indicator dot between the colored links in approximately the 4 o'clock position.

9. Install the adjustable timing chain guide and install the adjustable timing chain guide fastener ⑩ and torque to specification.



TORQUE
Timing Chain Guide Fastener (Adjustable): **89 in-lbs (10 N·m)**

10. Rotate the crankshaft clockwise to remove all chain slack.

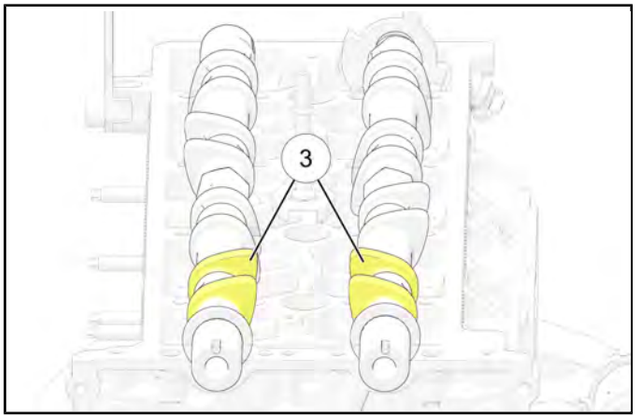
IMPORTANT
Do not rotate the intake camshaft.

11. Install the tensioner. See **TENSIONER INSTALLATION page 3.43**
12. Verify that all of the colored links and the appropriate timing marks are still aligned. If they are not, repeat the portion of the procedure necessary to align the timing marks.
13. Install the Front Cover. See Front Cover Installation page 3.80
14. Install the Valve Cover. See Valve Cover Installation page 3.97
15. Install the Alternator. See Alternator Installation page

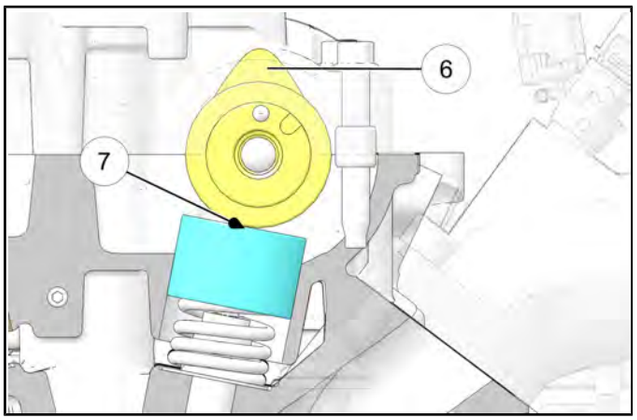
VALVE CLEARANCE ADJUSTMENT

IMPORTANT
Always inspect valve clearance prior to camshaft installation or final engine assembly.

1. Lubricate the camshaft bearing journal surfaces with Polaris PS-4 engine oil prior to installation.
2. Carefully install the camshafts into the cylinder head. The PTO camshaft lobes ③ should face in as shown.



3. Install the cam carriers. See **Camshaft Installation page 3.90**
4. Rotate the camshaft until the cam lobes above the valves you are inspecting are facing up ⑥.



5. Measure the valve clearance ⑦ using a feeler gauge. Record the measurement if clearance is out of specification.

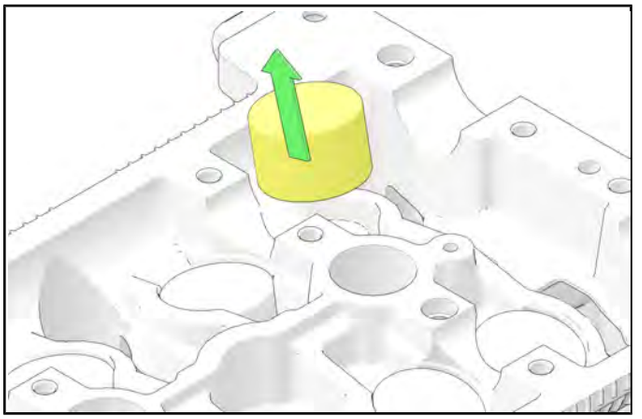
6. Repeat steps 6 and 7 until all eight valves have been inspected.

MEASUREMENT
Intake Valve Clearance (cold): **0.003 - 0.008” (0.0762 - 0.2032 mm)** Exhaust Valve Clearance (cold): **0.008 - 0.014” (0.2032 - 0.3556 mm)**

7. If any of the valve clearance measurements are out of specification, remove the camshaft carriers and camshafts and proceed with this procedure.

NOTICE
If all valve clearance measurements are within specification, remove the camshaft carriers and proceed to “**Camshaft Installation / Timing**”.

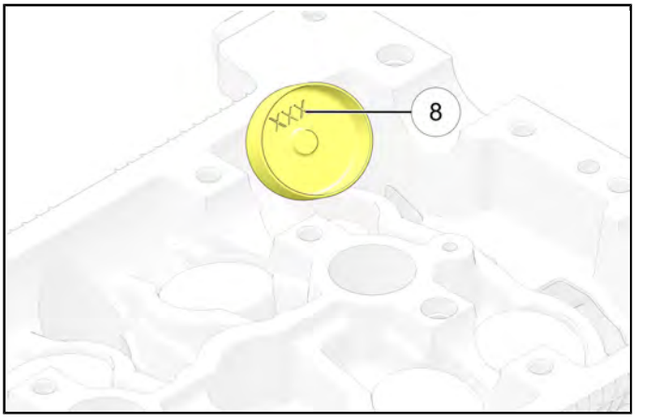
8. Remove the valve tappet from a valve that was out of specification.



NOTICE
Keep mated parts together and in order with respect to their location in the cylinder head for assembly purposes. Mark each component or place them in an organized rack as you remove them.

IMPORTANT
If performing this procedure with the cylinder head installed on the engine, make sure the crankshaft is rotated 90 degrees from TDC so the valves don't run into the pistons. The clearance will change (get tighter) if the lash is set with the head disassembled compared to after it is installed on the engine.

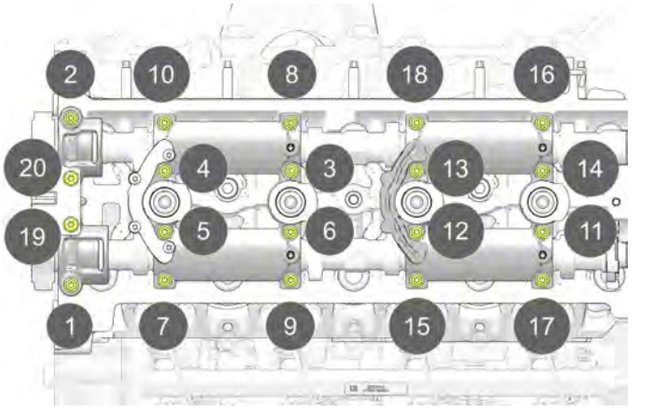
9. Record the 3 digit number on the bottom of the tappet ⑧.



10. Reference the valve clearance measurement recorded for that valve, along with the 3-digit tappet number.
11. Refer to the appropriate tappet selection matrix (Intake or Exhaust) on the following pages and select the proper tappet.
12. Install the appropriate tappet.

NOTICE
Lubricate the outer portion of the valve tappet upon installation.

13. Repeat steps 10-14 until all necessary valves have been adjusted.
14. Reinstall the camshafts and camshaft carriers and tighten the fasteners, in sequence shown, to specification.



TORQUE
Camshaft Carrier Fasteners: **13 ft-lbs (17 N·m)**

15. Measure and confirm that valve clearance is now within specification for each valve.
16. If valve clearance is not within specification, repeat this procedure.
17. If all valve clearance measurements are now within specification, remove the camshaft carriers and proceed to "**Camshaft Timing**".

VALVE LASH - TAPPET SELECTION

A 440 tappet means the thickness of the tappet is 4.40 mm. Part Number: 5138477-XXX (X's represent 3 digit tappet size)

An Engine Valve Lash Adjustment calculator has been created and is located under Service and Warranty – News, Forms and Links.
Click or go to https://www.polarisdealers.com/files/ServWarr/English/Engine%20Valve%20Adjustment%20Calculator.pdf

The proper valve tappet may also be obtained by completing these steps:

IMPORTANT
The Valve Lash Specification and Measured Valve lash must be calculated in millimeters (mm)

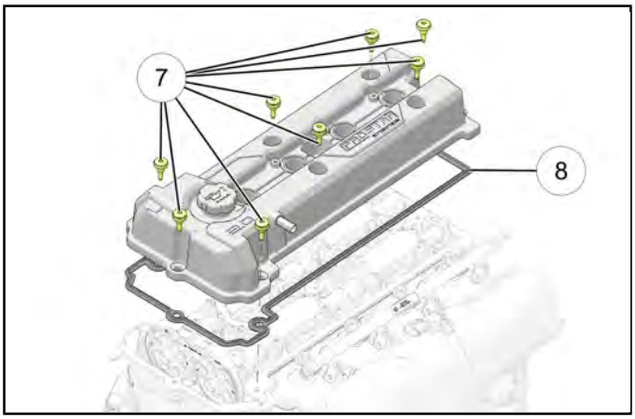
1. Subtract the actual valve lash on the engine from the valve lash specification (i.e. 0.29 mm – 0.20 mm) = 0.09 mm.
2. Divide the 3 digit tappet number by 100 (i.e. 450 / 100) = 4.5 mm.
3. Add the results of step 1 and step 2 (i.e. 0.09 mm + 4.5 mm) = 4.59 mm.
4. Multiply that answer by 100 to obtain the correct new tappet (i.e. 4.59 mm x 100 = 459).
5. Refer to the table below to find the closest available tappet size to the result from step 4 (i.e. 459 should be rounded to 460 since there is a 460 tappet).

AVAILABLE TAPPETS

440	450	460	470	480	490	500	510	520	530	540
442	452	462	472	482	492	502	512	522	532	542
445	455	465	475	485	495	505	515	525	535	545
448	458	468	478	488	498	508	518	528	538	

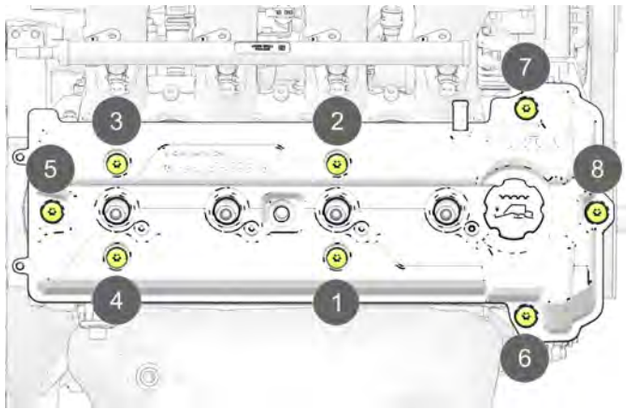
VALVE COVER INSTALLATION

1. Assemble the valve cover and a NEW gasket ⑧. Ensure that the gasket is located in the retaining groove in the valve cover.



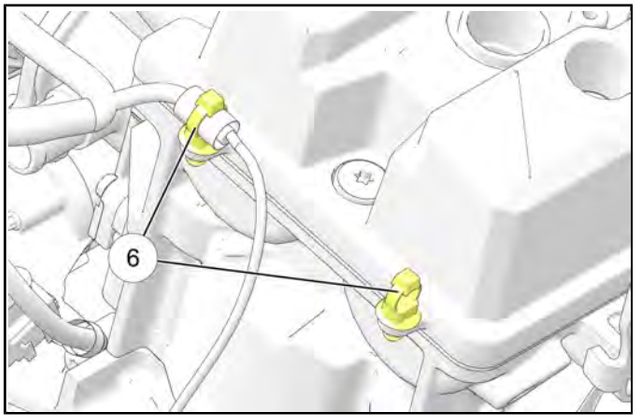
IMPORTANT
Apply liquid engine sealant at the T-Joint

2. Install the cover on the cylinder head and hand start the fasteners ⑦. Using sequence shown, torque fasteners to specification.

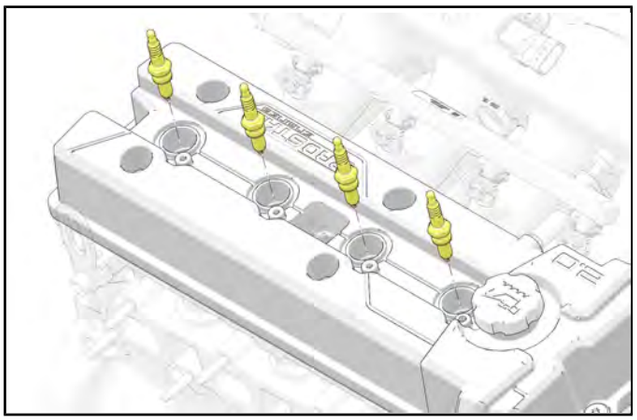


TORQUE
Valve Cover Fasteners: **89 in-lbs (10 N·m)**

3. Install new cable ties ⑥ to the valve cover.

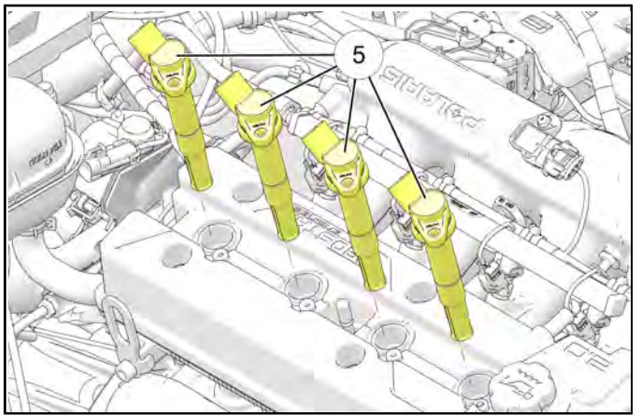


4. Install the spark plugs ① and torque to specification.

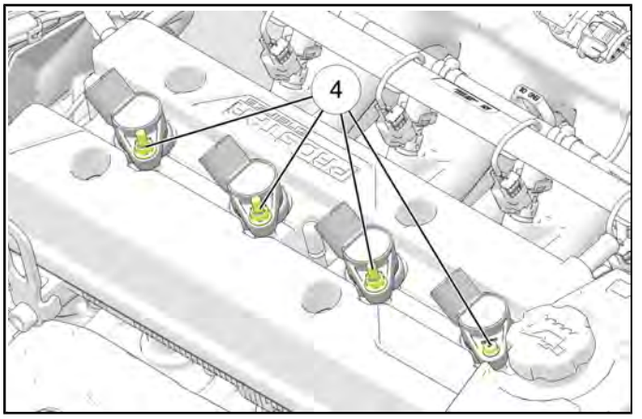


TORQUE
Spark Plugs: **106 in-lbs (12 N·m)**

5. Install the ignition coils ⑤.

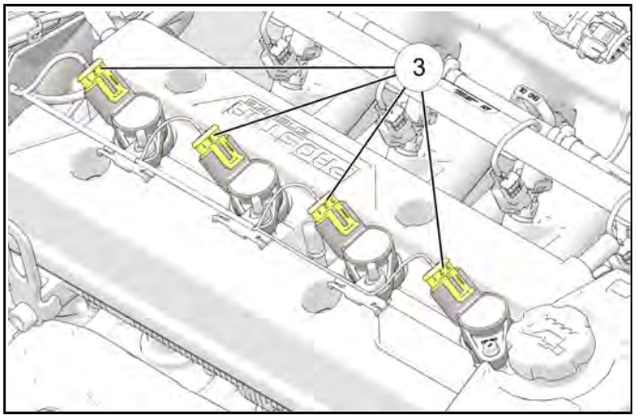


6. Install the ignition coil fasteners ④. Torque to specification

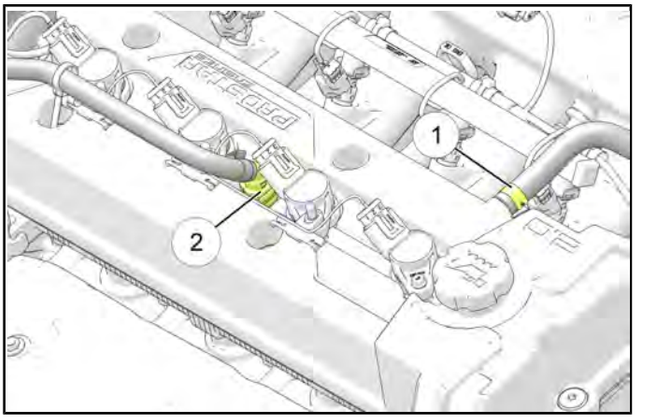


TORQUE
Ignition Coil Retaining Fasteners: **80 in-lbs (9 N·m)**

7. Connect the spark plug wire connectors ③ to the ignition coils.



8. Connect the breather hose by securing clip ① to the valve cover fitting. Connect the coolant vent line fitting ②.



NOTICE
Listen for an audible click when connecting the coolant line fitting and gently pull on the connector to make sure the line is fully connected.

CHAPTER 4
ENGINE ELECTRICAL

ELECTRONIC CONTROL UNIT (ECU)

ECU OPERATION OVERVIEW

The ECU is the brain or central processing computer of the entire EFI fuel/ignition management system. During operation, sensors continuously gather data which is relayed through the wiring harness to input circuits within the ECU. Signals to the ECU include: ignition power (on/off), barometric pressure, intake air temperature, boost pressure, manifold absolute pressure (load), engine coolant temperature, crankshaft position and engine speed (RPM), throttle position and battery voltage. The ECU compares the input signals to the programmed maps in its memory and determines the appropriate fuel and ignition requirements for the immediate operating conditions. The ECU then sends output signals to set injector duration and ignition timing.

During operation, the ECU continually performs a diagnostic check of itself, each of the sensors, and system performance. If a fault is detected, the ECU turns on the “Check Engine” light on the instrument cluster and stores the fault code in its fault memory. Depending on the significance or severity of the fault, normal operation may continue, or "Fail-Safe" operation (slowed speed, richer running) may be initiated. A technician can determine the cause of the “Check Engine” light by referencing the “Instrument Cluster Trouble Code Display” and “Diagnostic Trouble Code Table” or by using Digital Wrench®. The ECU requires a minimum of 7.0 volts to operate. The memory in the ECU is operational the moment the battery cables are connected.

To prevent engine over-speed and possible failure, an RPM limiting feature is programmed into the ECU. If the maximum RPM limit is exceeded, the ECU suppresses the injection signals, cutting off the fuel flow and retards the ignition timing. This process repeats it self in rapid succession, limiting operation to the preset maximum.

RPM Limit:
8800

ECU SERVICE

Never attempt to disassemble the ECU. It is sealed to prevent damage to internal components. Warranty is void if the case is opened or tampered with in any way.

All operating and control functions within the ECU are pre-set. No internal servicing or readjustment may be performed. If a problem is encountered, and you determine the ECU to be faulty, contact the Polaris Service Department for specific handling instructions. Do not replace the ECU without factory authorization.

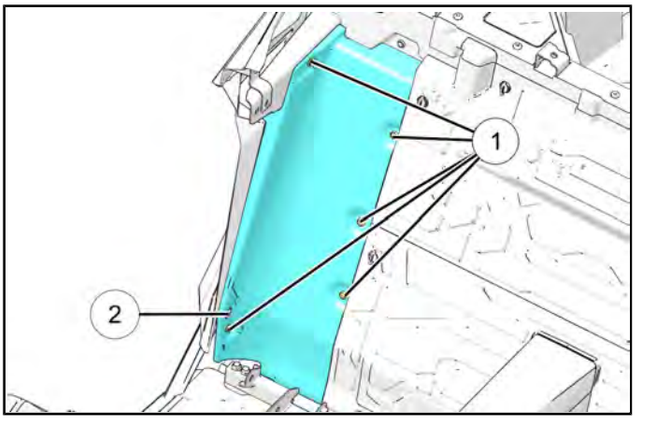
For the purpose of troubleshooting, a known-good ECU from another Polaris ***RZR*** of the same model may be used without system or engine component damage.

ECU REPLACEMENT

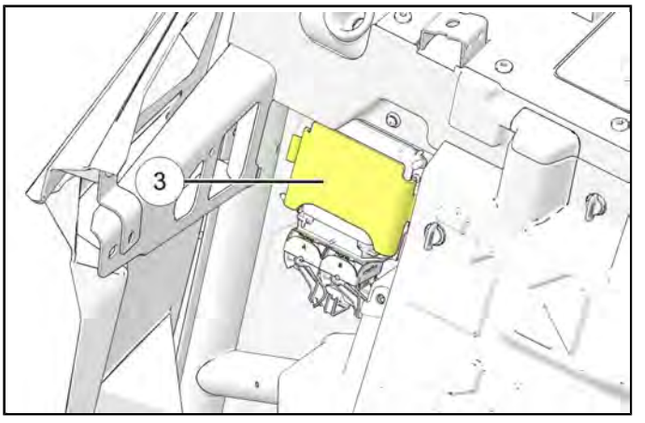
Although the need for ECU replacement is unlikely, a specific replacement procedure is required to ensure that all essential data contained within the original ECU is transferred to the replacement ECU.

NOTICE
Refer to this procedure and carefully follow all instructions provided in Digital Wrench®.

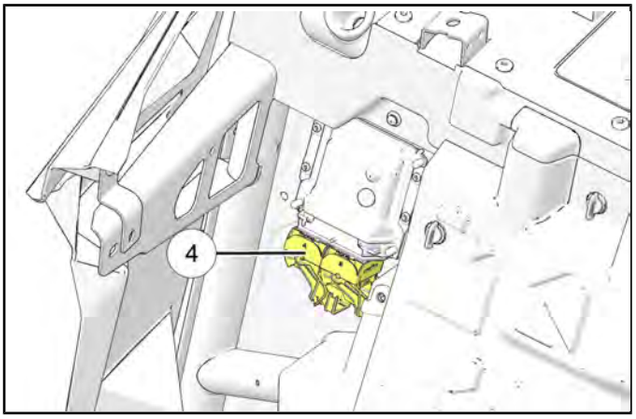
1. Carefully follow the ECU replacement instructions provided in Digital Wrench® to ensure that all essential data contained within the original ECU is transferred to the replacement ECU.
2. Remove seats. On 4-seat models, remove rear seats.
3. Remove five push-pins ① and one fastener ② and remove close-off panel.



4. Remove the plastic cover ③ by pulling on the outer tab.

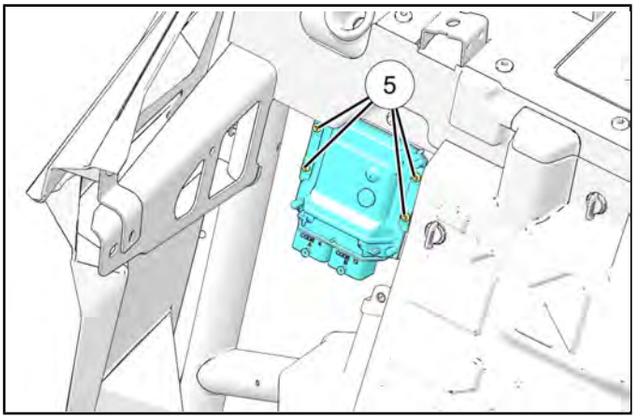


5. With the ignition turned off, disconnect the wire harness from the ECU. Lift the connector locking levers ④ and rotate up until the connectors are free from the ECU.



NOTICE
Upon removing the ECU connector, you should hear a “click” when the connector is fully open.

6. Remove four fasteners ⑤ and remove ECU.
7.



8. To install, reverse the procedure and tighten the mounting fasteners to specification.

NOTICE
Upon installing the ECU connector, you should hear a “click” when the connector is fully closed.

TORQUE
ECU Retaining Fasteners: **27 in-lbs (3 Nm)**

ETC LEARN PROCEDURE

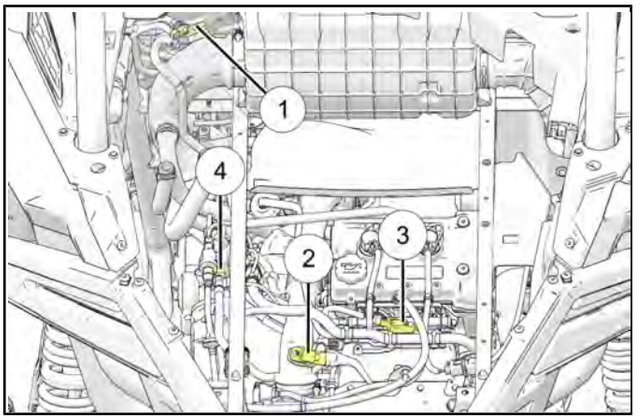
IMPORTANT
This procedure MUST be performed on the vehicle whenever the ECU is replaced or reflashed or the throttle body is replaced.

1. After the reflash / ECU replacement / throttle body change, leave the key on (engine not running) for 60 seconds. Do NOT crank the engine during this time.
2. Turn the key off and wait 3 minutes. During this time, the ECU will write values into memory and then completely shut down.
3. Turn key back on and start the vehicle. The vehicle should operate normally.
4. If the procedure was interrupted at any time, start back at step 1.

PRESSURE SENSORS

BAP SENSOR

The Barometric Air Pressure sensor ①, located on the intake duct after the air filter, measures ambient air pressure. The sensor reading is used to detect changes in elevation and for turbo speed limiting for altitude.



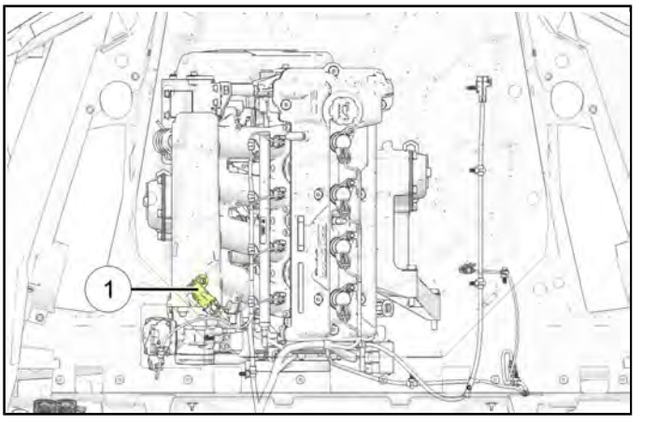
FUEL PRESSURE SENSOR (EVAP MODELS)

On EVAP models, the fuel pressure sensor monitors fuel pressure in the fuel supply line and sends pressure data to the ECU. The ECU interprets the fuel pressure data and raises or lowers fuel pressure based manifold pressure.

The ECU also uses the fuel pressure sensor to prevent a rich condition during a purge event.

TMAP SENSOR

The Temperature and Manifold Absolute Pressure sensor (T-MAP) ① is located on the intake manifold after the throttle body. The sensor is the primary control sensor for the EFI system and it measures the pressure of the air going into each cylinder.



AIR TEMPERATURE SENSOR DATA

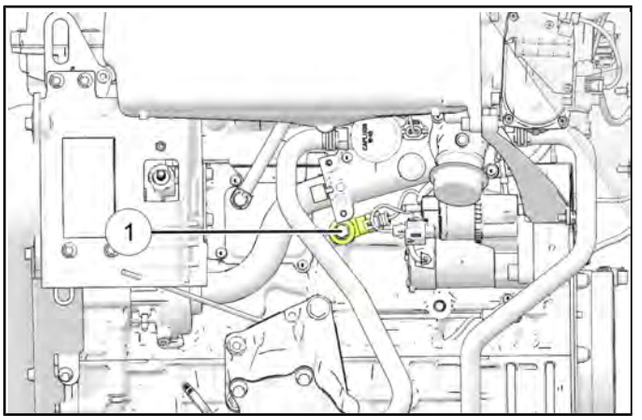
The following table gives an approximate resistance reading of the temperature sensor at the given temperature.

TEMPERATURE	≈ RESISTANCE (Ω)
-40° F (-40° C)	45303
-31° F (-35° C)	34273
-22° F (-30° C)	26108
-13° F (-25° C)	19999
-4° F (-20° C)	15458
5° F (–15° C)	12000
14° F (-10° C)	9395
23° F (-5° C)	7413
32° F (0° C)	5895
41° F (5° C)	4711
50° F (10° C)	3791
59° F (15° C)	3068
68° F (20° C)	2499
77° F (25° C)	2056
86° F (30° C)	1706
95° F (35° C)	1411
104° F (40° C)	1174
113° F (45° C)	987
122° F (50° C)	833
131° F (55° C)	703
140° F (60° C)	595
149° F (65° C)	508
158° F (70° C)	436
167° F (75° C)	374
176° F (80° C)	323
185° F (85° C)	280
194° F (90° C)	243
203° F (95° C)	213
212° F (100° C)	187
221° F (105° C)	164
230° F (110° C)	144
239° F (115° C)	127
248° F (120° C)	113

KNOCK SENSOR

KNOCK SENSOR OVERVIEW

The knock sensor ① is located on the right side of the block, next to the starter.



The knock sensor “listens” for knock by converting internal engine noise in to an electrical signal. The ECU uses the signal to determine the level of knock within the combustion chambers after each combustion event.

When the ECU determines detonation has occurred, the CHECK ENGINE lamp will turn on.

The ECU will retard timing first and then reduce the boost target if knock continues.

If knock occurs:

- Drain the fuel and fill with fresh fuel. Always use premium fuel (91+ octane)
- Check for non-approved Polaris modifications to the engine or exhaust system
- Verify there is no water or foreign material in the fuel
- Verify there is no internal engine damage
- Verify the cooling system is working properly

KNOCK SENSOR TESTING

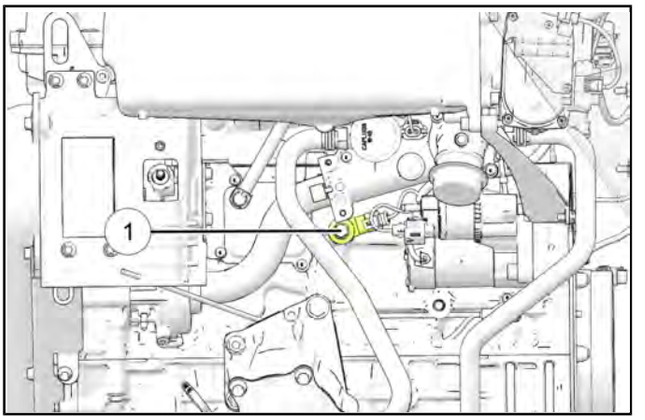
1. Disconnect the harness going to the knock sensor.
2. Use a multimeter to ohm between the two pins on the sensor harness.

Knock Sensor:
4,870 kΩ

3. If the sensor measures OL between the pins or there is continuity to chassis ground, replace the knock sensor.

KNOCK SENSOR REPLACEMENT

1. Disconnect the harness going to the knock sensor.
2. Remove the knock sensor mounting bolt ① and remove the sensor from the cylinder.



NOTICE
The knock sensor does not run through a coolant jacket in the cylinder. No fluid should come out of the hole when the sensor is removed.

3. Install the new knock sensor. The knock sensor should be orientated so the sensor lead does not rub on any component. The sensor lead should point straight forward. Torque mounting bolt to specification.

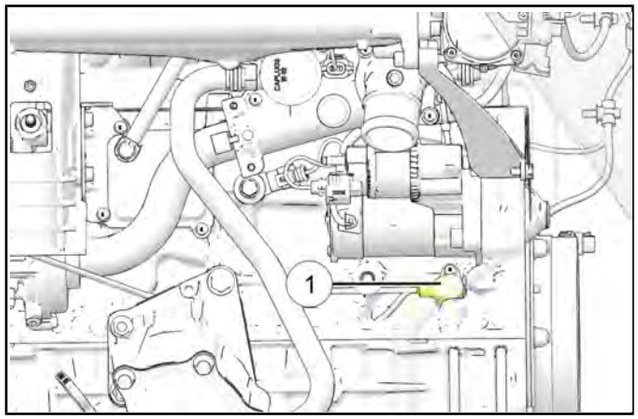
TORQUE
Knock Sensor Fastener: **15 ft-lbs (20 Nm)**

4. Connect knock sensor harness.

CRANKSHAFT POSITION SENSOR (CPS)

CPS OPERATION OVERVIEW

Mounted below the starter, the crankshaft position sensor ① is essential to engine operation, constantly monitoring the rotational speed (RPM) and position of the crankshaft.



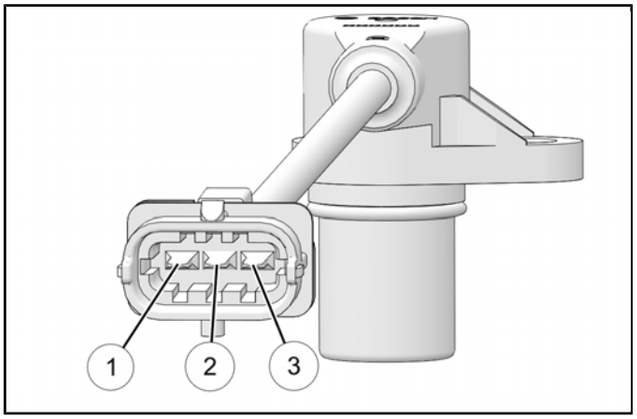
A ferromagnetic 35-tooth encoder ring with a missing tooth is built onto the flywheel. The inductive speed sensor is mounted 1.0 ± 0.26 mm (0.059 ± 0.010 in.) away from the encoder ring. During rotation, an AC pulse is created within the sensor for each passing tooth. The ECU calculates engine speed from the time interval between the consecutive pulses.

The encoder ring missing tooth creates an “interrupt” input signal, corresponding to specific crankshaft position. This signal serves as a reference for the control of ignition timing by the ECU. Synchronization of the CPS and crankshaft position takes place during the first two revolutions each time the engine is started. This sensor must be properly connected at all times. If the sensor fails or becomes disconnected for any reason, the engine will stop running.

CPS TEST

The CPS is a sealed, non-serviceable assembly. If fault code diagnosis indicates a problem with this sensor, test as follows:

1. Locate the CPS harness connector above the transmission on the RH side of the vehicle and disconnect the harness.
2. Pin ① is for the shield circuit and it should be OL to pins ② & ③. A resistance reading would indicate a shorted sensor.



3. Connect an ohmmeter between CPS pin terminals ② & ③. A resistance value of **1000Ω ± 10%** at room temperature should be obtained.

CPS Resistance Specification:
1000Ω ± 10%

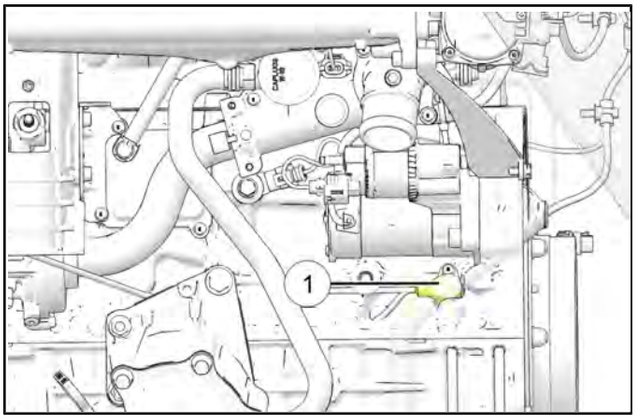
4. If the resistance is correct:

- Test the main harness circuit between the sensor connector terminals and the corresponding pin terminals at the ECU (see wiring diagram).
- Check the sensor mounting, air gap, flywheel encoder ring for damage or runout, and flywheel key. Follow the CPS Replacement procedure to inspect CPS and flywheel encoder ring for damage.

5. If the resistance is incorrect, follow the CPS Replacement page procedure.

CPS REPLACEMENT

1. Disconnect CPS electrical harness.
2. Remove fastener ① retaining sensor to the engine.



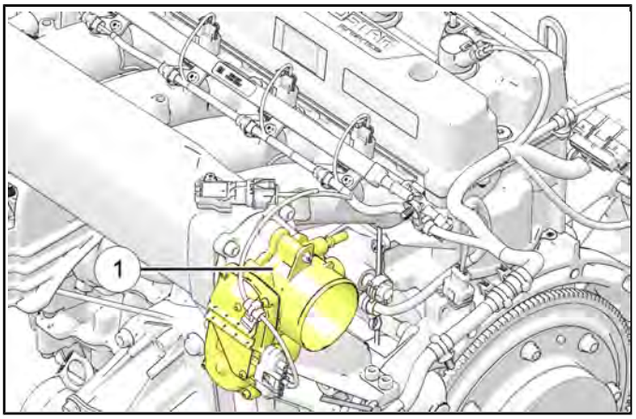
3. Install new sensor using a light coating of oil on the O-ring to aid installation.
4. Install fastener and torque to specification.

TORQUE
CPS Fastener: **9 ft-lbs (12 Nm)**

ELECTRONIC THROTTLE CONTROL (ETC) / THROTTLE BODY

ETC OPERATION OVERVIEW

Mounted to the intake manifold, the throttle body ① assembly provides the proper air/fuel ratio needed for engine operation.



The throttle body assembly includes the Electronic Throttle Control and Idle Air Control systems.

NOTICE
The ETC is a non-serviceable component and can only be tested using Digital Wrench®. If the ETC is faulty, the entire assembly must be replaced.

Mounted on the throttle body, the ETC electronically controls the throttle body. The ETC controls engine throttle operation to provide the proper air/fuel ratio needed for engine operation at all RPM ranges based off input provided by the Pedal Position Sensor (PPS) and Electronic Control Unit (ECU).

ETC TEST

Never attempt to disassemble the ETC assembly. Warranty is void if the end cover is opened or tampered with in any way.

All operating and control functions within the ETC are pre-set. No internal servicing or adjustments may be performed. If a problem is encountered, and you determine the ETC to be faulty, contact the Polaris Service Department for specific handling instructions. Do not replace the ETC without factory authorization.

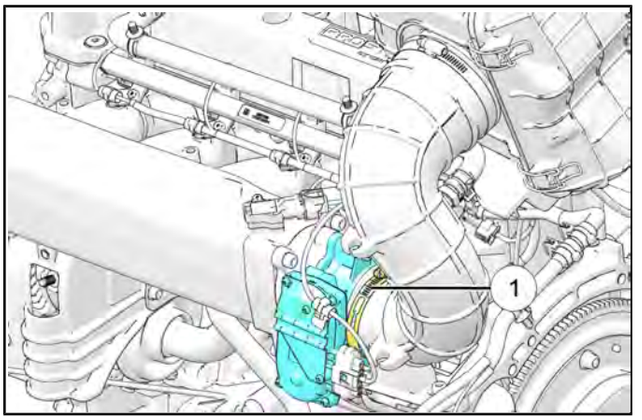
Use Digital Wrench® to perform all troubleshooting of this component. Use a Volt Ohm meter to test the vehicle harness continuity between the ETC connector and ECU connector. Refer to the wire diagram for pin-out details. If the ETC is faulty, the entire ETC assembly must be replaced (see ETC / Throttle Body Replacement page).

If code P1227 is being set, verify the following:

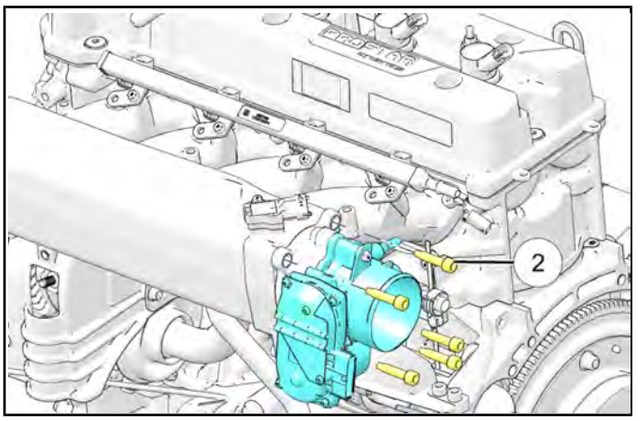
1. Check power supply voltage on pin for Pedal
2. Verify voltage at pedal for supply line. Troubleshoot wiring
3. Check the pedal for sensor/physical damage (circuit fault). Troubleshoot pedal 1 and 2 vs each other (depending on faults)

ETC / THROTTLE BODY REPLACEMENT

1. Remove the cargo box.
2. Disconnect ETC electrical harness.
3. Loosen the clamp ① retaining the intake duct to the ETC. Remove the duct from the ETC.



4. Remove the four bolts ② retaining the ETC housing to intake plenum.



5. Remove the ETC housing and gasket from intake plenum.
6. Reverse these steps for installation. Torque the ETC housing retaining bolts, intake duct clamps and body fasteners to specification.

TORQUE
ETC Housing Fasteners: **7 ft-lbs (10 Nm)** Intake Duct Clamp: **35 in-lbs (4 Nm)** Body Fasteners: **7 ft-lbs (10 Nm)**

ETC LEARN PROCEDURE

IMPORTANT
This procedure MUST be performed on the vehicle whenever the ECU is replaced or reflashed or the throttle body is replaced.

1. After the reflash / ECU replacement / throttle body change, leave the key on (engine not running) for 60 seconds. Do NOT crank the engine during this time.
2. Turn the key off and wait 3 minutes. During this time, the ECU will write values into memory and then completely shut down.
3. Turn key back on and start the vehicle. The vehicle should operate normally.
4. If the procedure was interrupted at any time, start back at step 1.

PEDAL POSITION SENSOR (PPS)

OPERATION OVERVIEW

NOTICE
DO NOT attempt to service the PPS. The PPS is a non-serviceable component and can only be tested using Digital Wrench®. If the PPS is faulty, the entire throttle pedal assembly must be replaced.

Mounted to the throttle pedal assembly, the PPS acts as a pedal position sensor. The PPS provides accelerator pedal position to the Electronic Control Unit (ECU) to increase or decrease engine RPM using the Electronic Throttle Control (ETC). The PPS is the primary input used to control engine speed during vehicle operation.

PPS TEST

The PPS can be tested utilizing Digital Wrench® by verifying that throttle position readout varies as the pedal is pressed. There should not be any dead spots in the reading if using the graph mode in Digital Wrench. Reference the Data Display section and be sure Throttle Position is displayed. With the ignition key on for at least 15 seconds and engine not running, the Throttle Position will read approximately 13% when the pedal is released. With the pedal fully depressed, the Throttle Position will vary depending on what gear you have selected.

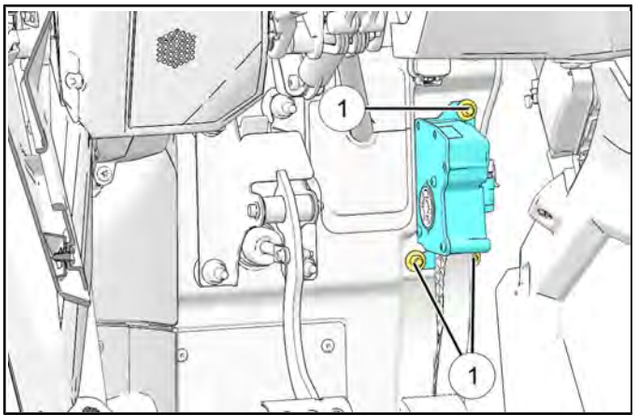
- High ≈ 60%.
- Low ≈ 39%.
- Neutral / Reverse / Park ≈ 19%

The Pedal Position Sensor is calibrated to the throttle pedal. If the PPS is faulty, the throttle pedal assembly must be replaced.

PPS REPLACEMENT

NOTICE
The PPS is calibrated to the throttle pedal. If the PPS is faulty, the throttle pedal assembly must be replaced.

1. Remove the drivers seat and disconnect the negative (-) battery cable.
2. Disconnect the PPS harness connection located on the throttle pedal.
3. Remove the three fasteners ① retaining the throttle pedal assembly to the frame.



4. Remove pedal assembly.
5. Reverse procedure for installation. Torque fasteners to specification.

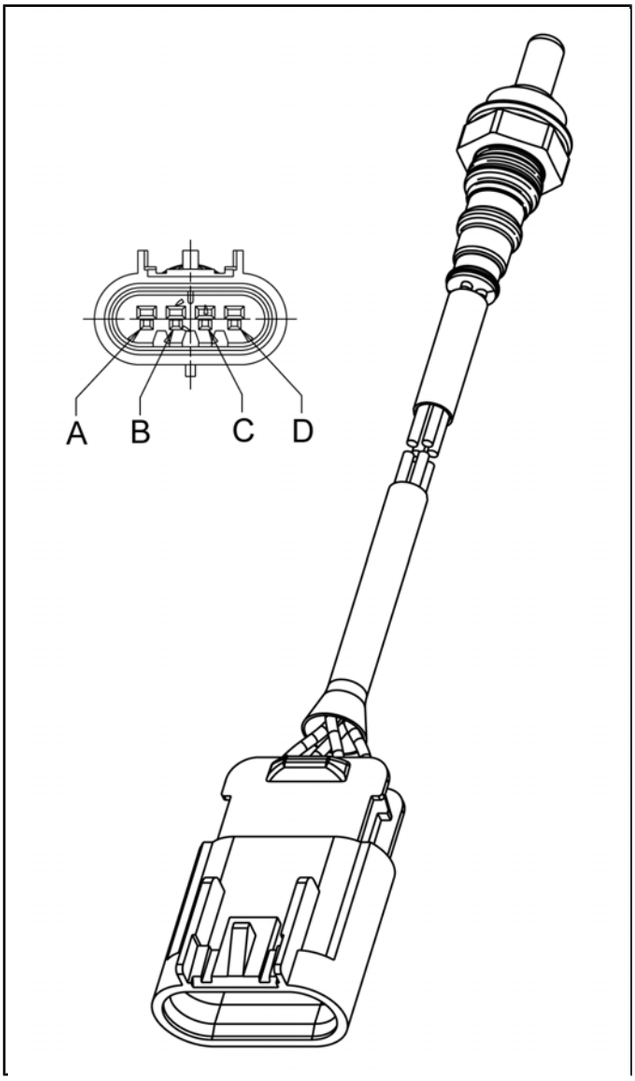
TORQUE
PPS Mounting Fasteners: **18 ft-lbs (24 Nm)** Battery Cable Fasteners: **60 in-lbs (9 Nm)**

OXYGEN SENSOR

OXYGEN SENSOR INFORMATION

The oxygen sensor, located on the exhaust pipe before the muffler, uses a 4 wire heated element.

2018		
CONNECTOR PIN	**WIRE COLOR**	**PIN AND WIRE CONNECTION**
A	Purple	Heater Power
B	White	Heater Ground
C	Gray	Sensor Output
D	Black	Sensor Ground



The sensor element in the oxygen sensor cannot be tested effectively with static tests. The heater circuit element in the sensor however, can be tested with an ohmmeter.

MEASUREMENT
Oxygen Sensor Heater Element Resistance 15.8–18.6 Ohms

NOTICE
This test MUST be performed with the sensor at room temperature.

First, verify if there are any stored codes for the oxygen sensor.

NOTICE
The ECU must first run though the O2 sensor time delay before a trouble code will be set. This may take several minutes at idle to occur.

Short drive cycles and cold temperatures will both affect the delay time of the O2 sensor (increases the delay). The delay time ensures the oxygen sensor heater has run long enough to provide accurate data.

OXYGEN SENSOR REPLACEMENT

1. Disconnect the harness going to the oxygen sensor.
2. Remove the oxygen sensor from the exhaust pipe.
3. Install new oxygen sensor. Torque sensor to specification.

TORQUE
Oxygen Sensor: **13 ft-lb (18 Nm)**

4. Connect the harness going to the oxygen sensor.

CHAPTER 5
EFI / FUEL SYSTEM

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
PU-43506-A	Fuel Pressure Gauge Kit
PU-50326	Fuel Pump Service Tool
PA-48838	Fuel Pressure Gauge Adapter

EFI OVERVIEW

EFI OPERATION OVERVIEW

The EFI system is designed to provide peak engine performance with optimum fuel efficiency and lowest possible emissions. The ignition and injection functions are electronically controlled, monitored and continually corrected during operation to maintain peak performance.

The central component of the system is the Bosch MG1 Electronic Control Unit (ECU) which manages system operation, determining the best combination of fuel mixture and ignition timing for the current operating conditions.

An electric fuel pump is used to move fuel from the tank, through the fuel supply line, to the fuel rail. At the engine, fuel fed through the fuel rail supplies fuel to the injectors, which inject into the intake ports. The ECU controls the amount of fuel by varying the length of time that the injectors are "on." This range can vary depending on fuel requirements. The controlled injection of the fuel occurs every other crankshaft revolution, or once for each 4-stroke cycle. When the intake valve opens, the fuel/air mixture is drawn into the combustion chamber, ignited and burned.

The ECU controls the amount of fuel being injected and the ignition timing by monitoring the primary sensor signals for intake air temperature, manifold absolute pressure (load), engine temperature, engine speed (RPM) and throttle position. These primary signals are compared to the programming in the ECU computer chip, and the ECU adjusts the fuel delivery and ignition timing based on these values.

During operation, the ECU has the ability to re-adjust temporarily; providing compensation for changes in overall engine condition and operating environment, so it will be able to maintain the ideal air/fuel ratio. During certain operating periods such as cold starts, warm up, acceleration, etc., a richer air / fuel ratio is automatically calculated by the ECU.

EFI SERVICE NOTES

- For more convenient and accurate testing of EFI components, it is recommended dealers utilize the Digital Wrench® Diagnostic Software (dealer only). Some testing may be done manually using the procedures provided in this chapter.
- **80% of all EFI problems are caused by wiring harness connections.**
- For the purpose of troubleshooting difficult running issues, a known-good ECU from another RZR of the same model and year may be used without damaging system or engine components.
- Never attempt to service any fuel system component while engine is running or ignition switch is "on."
- Cleanliness is essential and must be maintained at all times when servicing or working on the EFI system. Dirt, even in small quantities, can cause significant problems.
- Do not use compressed air if the system is open. Cover any parts removed and wrap any open joints with plastic if they will remain open for any length of time. New parts should be removed from their protective packaging just prior to installation.
- Clean any connector before opening to prevent dirt from entering the system.
- Although every precaution has been taken to prevent water intrusion failure, avoid direct water or spray contact with system components.
- Do not disconnect or reconnect the wiring harness connector to the control unit or any individual components with the ignition "on." This can send a damaging voltage spike through the ECU.
- Do not allow the battery cables to touch opposing terminals. When connecting battery cables attach the positive (red) cable to positive (+) battery terminal first, followed by negative (black) cable to negative (-) battery terminal.
- Never start the engine when the cables are loose or poorly connected to the battery terminals.
- Never disconnect battery while engine is running.
- Never use a battery boost-pack to start the engine.
- Do not charge battery with key switch "on."
- Always disconnect negative (-) battery cable lead before charging battery.
- Always unplug ECU from the wire harness before performing any welding on the unit.

INITIAL PRIMING / STARTING PROCEDURE

NOTICE
The injection system should be purged of all air prior to initial start up any time the fuel system has been disassembled.

If the fuel system has been completely drained of fuel, cycle the key switch from OFF to ON two times, waiting approximately 5 seconds at each ON cycle to allow the fuel pump to cycle and shut down.

Attempt to start the vehicle normally. If the vehicle does not start after 5 seconds of cranking, a problem may exist and should be diagnosed. Verify no trouble codes are set and that the unit has good fuel pressure at key on.

NOTICE
Accurate testing of EFI components is recommended utilizing the Digital Wrench® II Diagnostic Software (dealer only).

FUEL INJECTORS

FUEL INJECTOR OPERATION OVERVIEW

The fuel rail, located on the intake manifold, retains the fuel injectors to the intake assembly. O-rings on both ends of the injectors prevent external fuel leaks and also insulate the injectors from heat and vibration.

When the key switch is on, the fuel rail is pressurized, and the EFI relay provides voltage to the injectors. During engine operation, the ECU completes the ground circuit, energizing the injectors. The valve needle in each injector is opened electromagnetically, and the pressure in the fuel rail forces fuel down through the inside. The “director plate” at the tip of the injector contains a series of calibrated openings which directs the fuel into the intake port in a cone-shaped spray pattern.

The amount of fuel injected is controlled by the ECU and determined by the length of time the valve needle is held open, also referred to as the “injection duration” or “pulse width”. It may vary in length depending on the speed and load requirements of the engine.

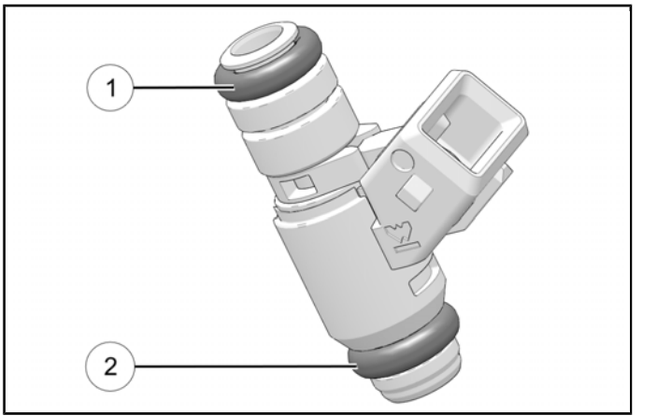
The ECU gathers fuel injection timing information from the Crankshaft Position Sensor (CPS) and the Pedal Position Sensor (PPS) to allow for sequential fuel injection.

FUEL INJECTOR O-RINGS

1. Any time an injector is removed, you must replace the upper and lower O-rings.
2. Always lubricate NEW injector o-rings with clean, silicone-free motor oil.

NOTICE
Apply oil sparingly and avoid contaminating the pintle valve / jet surface and upper inlet port.

3. Install NEW o-rings onto top and bottom of injector



ITEM	PART NUMBER	COLOR	POSITION
①	1500198	Blue	TOP OF INJECTOR
②	5415066	Green	BOTTOM OF INJECTOR

IMPORTANT
Always install NEW o-rings when removing the fuel rail or injectors.

IMPORTANT
Verify that the new top and bottom o-rings are installed in the correct position and are lubricated with clean, silicone-free oil.

FUEL INJECTOR TROUBLESHOOTING

Injector problems typically fall into three general categories- electrical, dirty / clogged, or leakage. An electrical problem usually causes one or both of the injectors to stop functioning. Several methods may be used to check if the injectors are operating.

- With the engine running at idle, feel for operational vibration, indicating that they are opening and closing.
- When temperatures prohibit touching, listen for a buzzing or clicking sound with a screwdriver or mechanic's stethoscope.
- Disconnect the electrical connector from an injector and listen for a change in idle performance (only running on one cylinder) or a change in injector noise or vibration.

NOTICE
Do not apply voltage directly to the fuel injector(s). Excessive voltage will burn out the injector(s). Do not ground the injector(s) with the ignition on. Injector(s) will open/turn on if relay is energized.

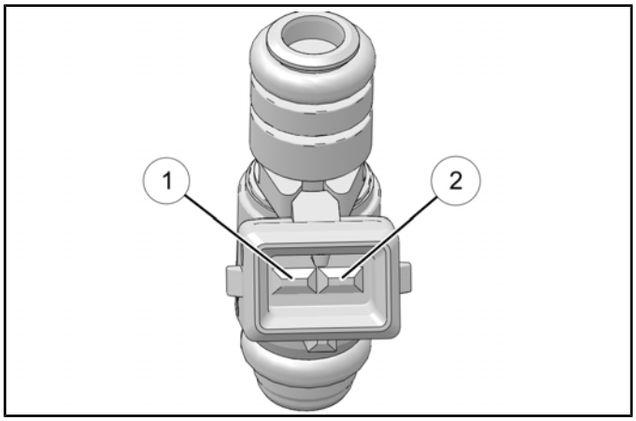
If an injector is not operating, it can indicate either a bad injector, or a wiring/electrical connection problem. Check as follows:

Injector leakage is very unlikely, but in rare instances it can be internal (past the tip of the valve needle), or external (weeping around the injector body). The loss of system pressure from the leakage can cause hot restart problems and longer cranking times.

Injector problems due to dirt or clogging are unlikely due to the design of the injectors, the high fuel pressure, the use of filters and the detergent additives in the gasoline. Symptoms that could be caused by dirty/clogged injectors include rough idle, hesitation/stumble during acceleration, or triggering of fault codes related to fuel delivery. Injector clogging is usually caused by a buildup of deposits on the director plate, restricting the flow of fuel, resulting in a poor spray pattern. Some contributing factors to injector clogging include; dirty air filters, higher than normal operating temperatures, short operating intervals and dirty, incorrect, or poor quality fuel. Cleaning of clogged injectors is not recommended; they should be replaced. Additives and higher grades of fuel can be used as a preventative measure if clogging has been a problem.

FUEL INJECTOR TEST

The fuel injectors are non-serviceable. If diagnosis indicates a problem with either injector, test the resistance of the fuel injector(s) by measuring between the two pin terminals ① & ②.



Fuel Injector Resistance Specification: **11.4 - 12.6 Ω**

5

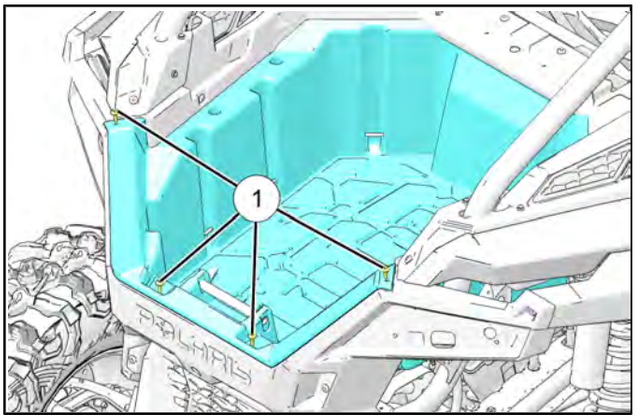
FUEL INJECTOR REPLACEMENT

1. Be sure the engine has cooled enough to work on.

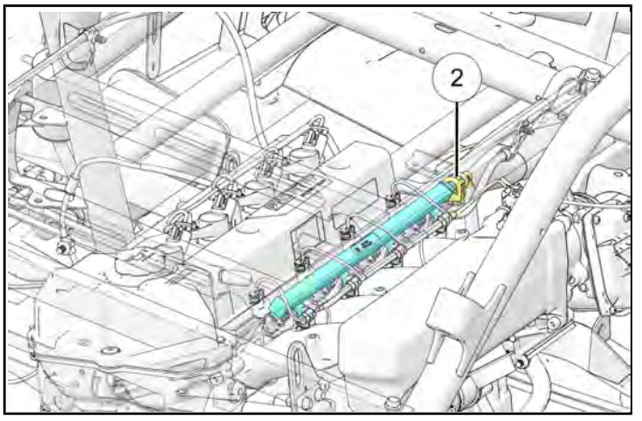
⚠ CAUTION

The engine and exhaust system become very hot during operation and remains hot for a period of time after the engine is shut off. Wear insulated protection of wait until the exhaust system has cooled before performing service work to prevent burns.

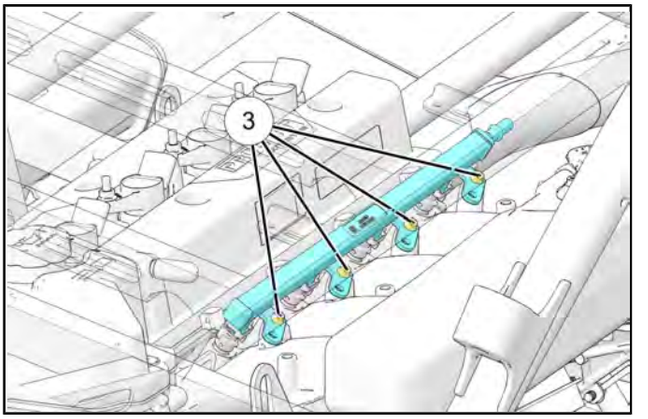
2. Disconnect the battery negative cable.
3. Remove four fasteners ① and remove the cargo box.



4. Thoroughly clean the area around the fuel injectors.
5. Disconnect the fuel supply line ② from the fuel rail.



6. Disconnect the wiring going to the fuel injectors.
7. Remove the two fasteners ③ retaining the fuel rail to the engine intake.



8. Remove the fuel rail and fuel injectors from the engine intake.

NOTICE

Both ends of the injector are sealed with o-rings. If the injectors are going to be reused, ensure the o-rings are not damaged.

9. Pull out the injector retaining clip and pull the injector from the fuel rail. Repeat on the other injector if necessary.
10. Upon installation of the new fuel injectors, lightly lubricate the injector O-rings to aid installation.
11. Install the new injector(s) into the fuel rail and reinstall the retaining clip.

IMPORTANT

The retaining clip(s) should click when properly engaged.

12. Lightly lubricate the injector O-rings and reinstall the fuel rail / injector assembly into the engine intake.
13. Install the fuel rail mounting screws and torque to specification.

TORQUE

Fuel Rail Mounting Screws:
7 ft-lb (10 Nm)

14. Connect the wiring harness to the correct fuel injector.
15. Connect the fuel supply line to the fuel rail.

16. Perform a push/pull test on the fuel supply line connection with at least 5 lbs of force. Use a rag around the connector in case of fuel leakage.

IMPORTANT
Connection should NOT come apart during push/pull test.

17. Reconnect the negative battery cable.

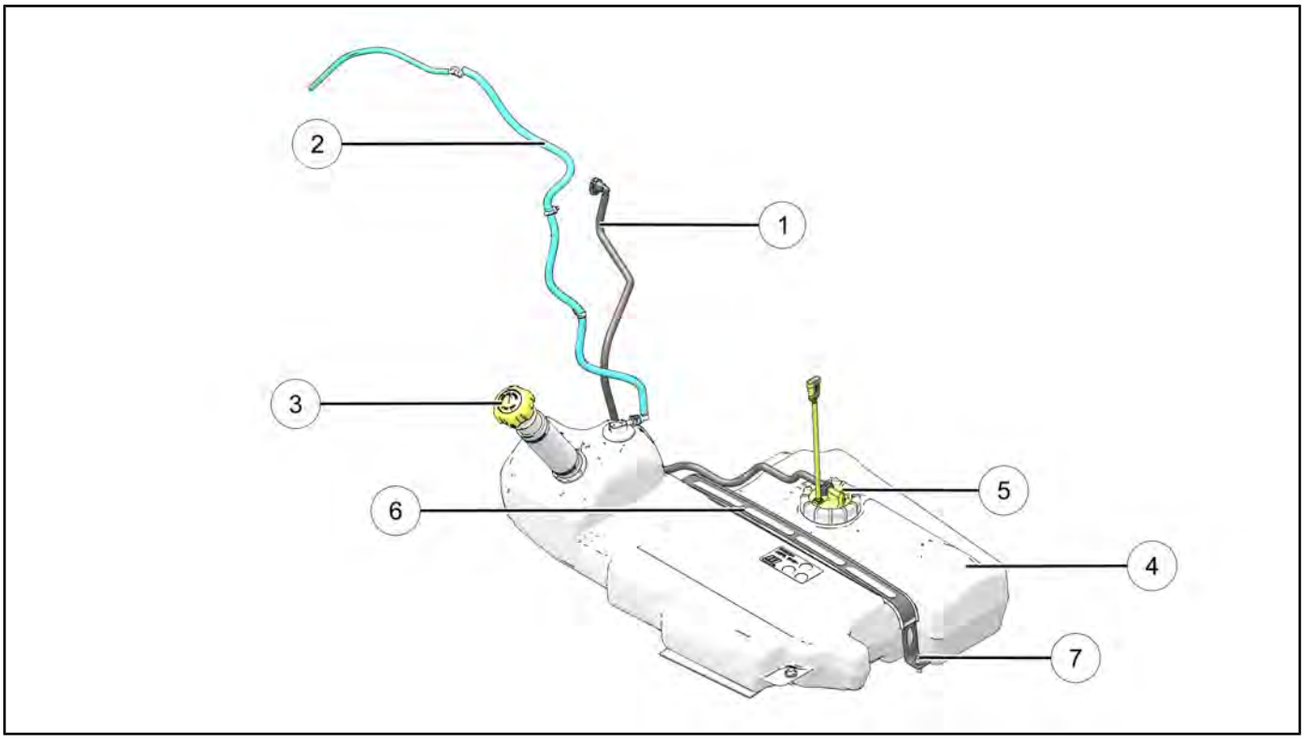
TORQUE
Battery Terminal Fasteners: **60 in-lbs (7 Nm)**

18. Turn key on to allow the fuel system to prime and inspect the fuel rail and injectors for fuel leaks.
19. Reinstall the cargo box.

TORQUE
Cargo Box Fasteners: **7 ft-lbs (10 Nm)**

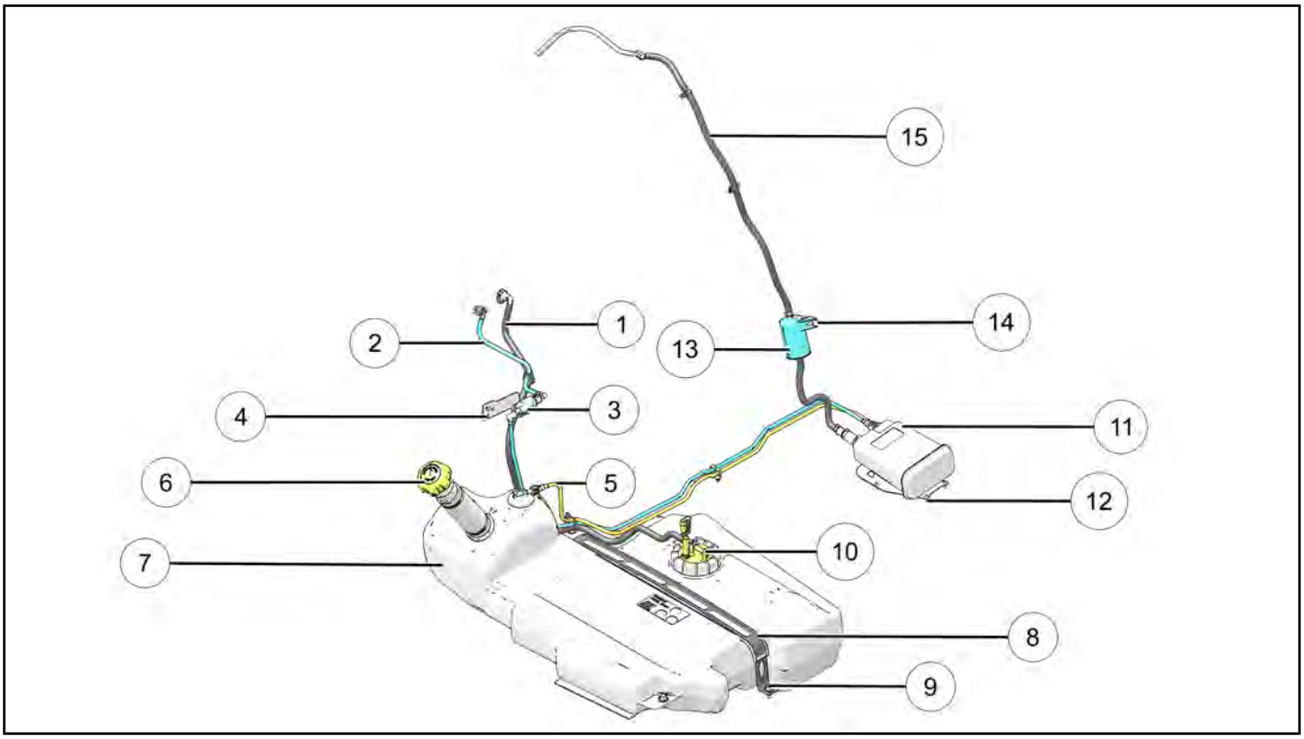
FUEL LINES

FUEL SYSTEM ASSEMBLY VIEW



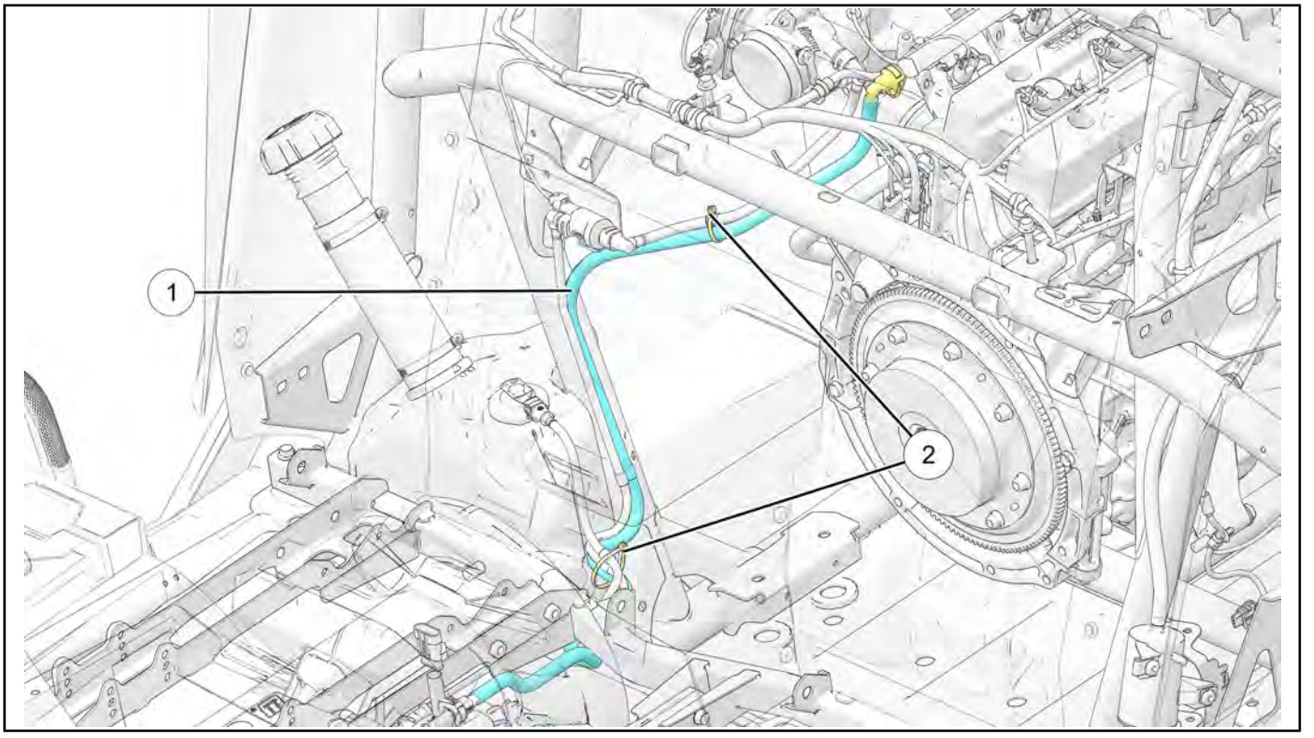
① Fuel Supply Line	⑤ Fuel Pump Assembly
② Fuel Vent Line	⑥ Fuel Tank Strap
③ Fuel Cap	⑦ Fuel Tank Strap Fasteners **15 ft-lbs (20 Nm)**
④ Fuel Tank	

FUEL SYSTEM ASSEMBLY VIEW (EVAP)



① Fuel Supply Line	⑨ Fuel Tank Strap Fasteners **15 ft-lbs (20 Nm)**
② Fuel Purge Line	⑩ Fuel Pump
③ Purge Solenoid	⑪ Carbon Canister
④ Purge Solenoid Mounting Rivet	⑫ Carbon Canister Rivet
⑤ Fuel Tank-to-Canister Line	⑬ Carbon Canister Filter
⑥ Fuel Cap	⑭ Carbon Canister Filter Fasteners **9 ft-lbs (12 Nm)**
⑦ Fuel Tank	⑮ Fuel Vent Line
⑧ Fuel Tank Strap	

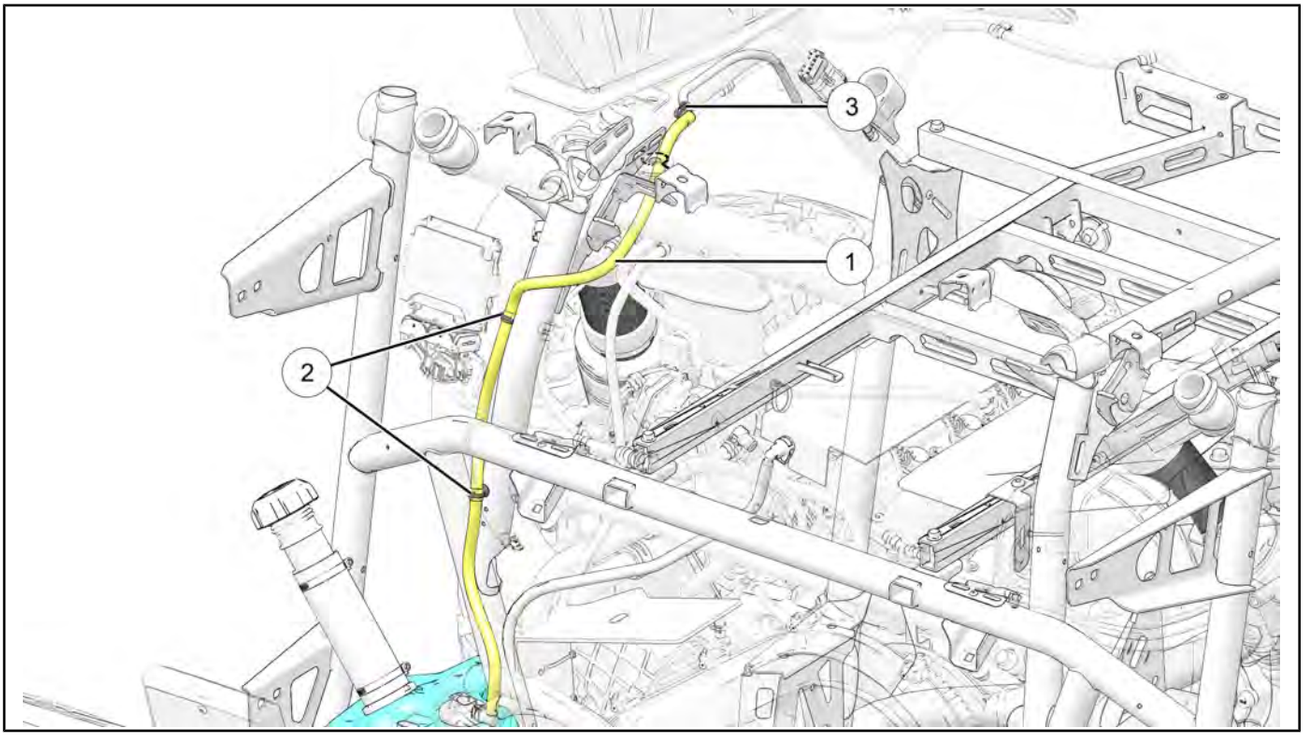
FUEL LINE REMOVAL / INSTALLATION



① Fuel Supply Line	② Zip Tie *(attached to vent line)*

1. Place a shop towel around the fuel line to catch any dripping fuel.
2. If removing either end of supply line, pull clip up (do not remove), and press bottom tab in to release the line.
3. Release the fuel line from the applicable retaining clips. See image/table above.
4. Remove the fuel line from the vehicle.
5. To install the line, verify the connections are clean and free of debris.
6. Place the fuel line back over the fitting and slide the connector locking mechanism back into place. Verify the connector tabs snap back into place.
7. Be sure fuel line is routed and retained properly. See image/table above from applicable retention points.
8. Turn the key on to prime the system. Check for leaking at both ends of the fuel lines.

FUEL VENT LINE ROUTING

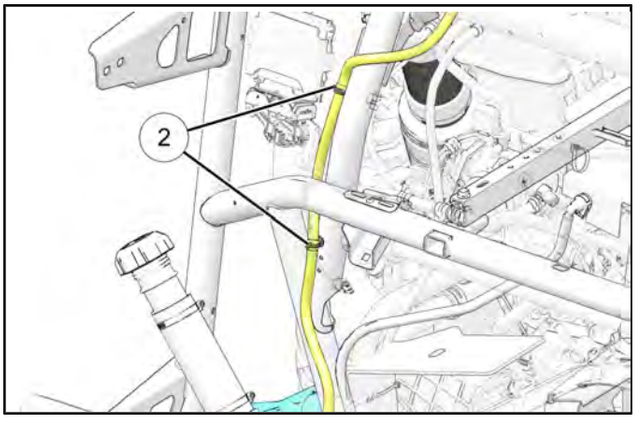


① Fuel Vent Line	③ Zip Tie

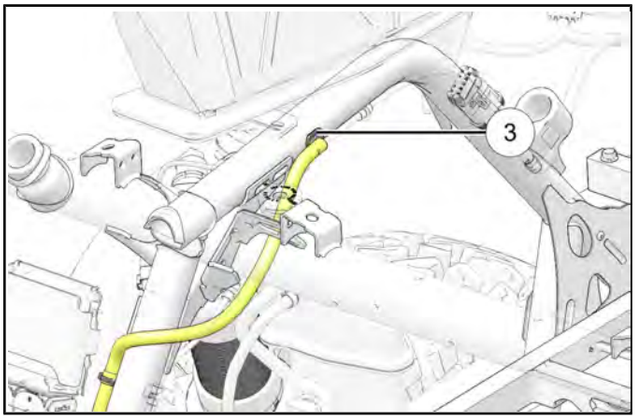
NOTICE
Be sure the vent line is routed properly and secured with cable tie(s). Check the fuel tank vent line for signs of wear, deterioration or damage. Replace vent line if necessary.

Symptoms of a restricted fuel tank vent include the following:	Collapsing fuel tank
	Engine miss or hesitation
	Loss of engine performance
	High exhaust temperatures.

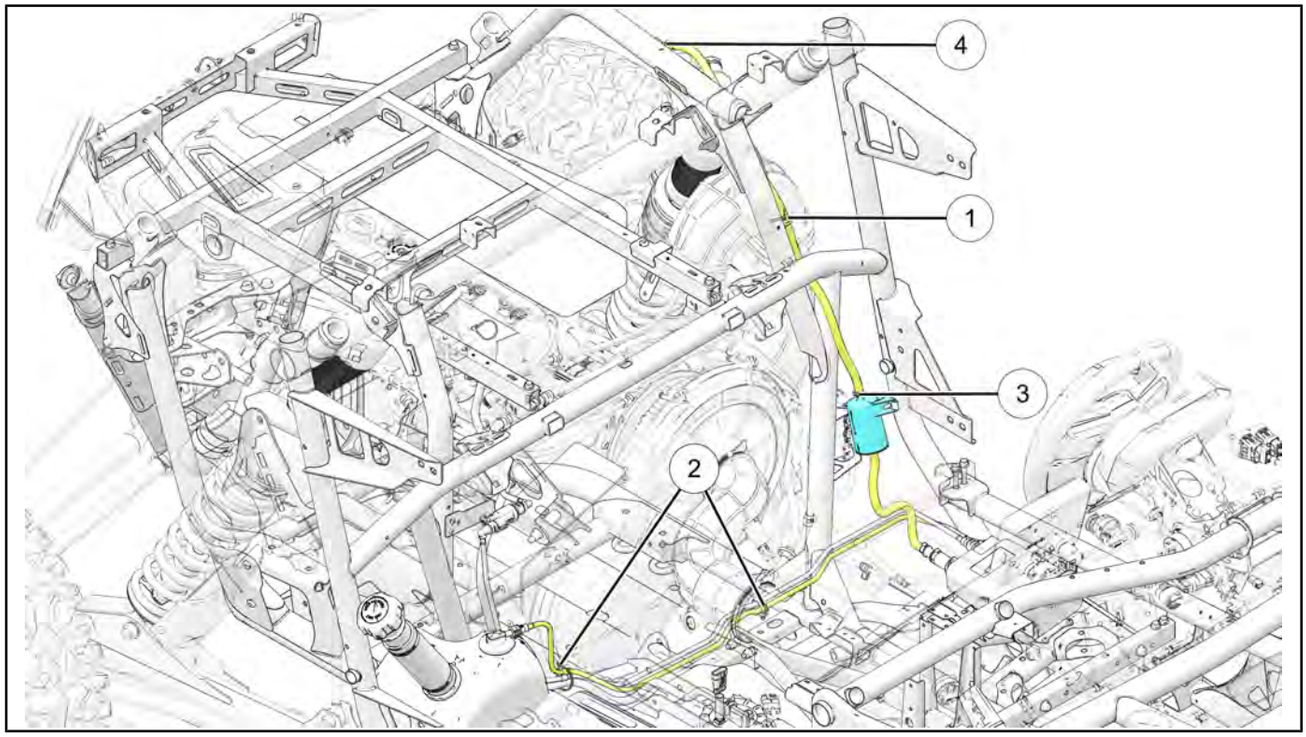
1. Route fuel vent line up the passenger-side rear shock mounting tube and secure with two zip ties ②.



2. Secure vent line into the shock support tube with a termination fitting ③.



FUEL VENT LINE ROUTING (EVAP)

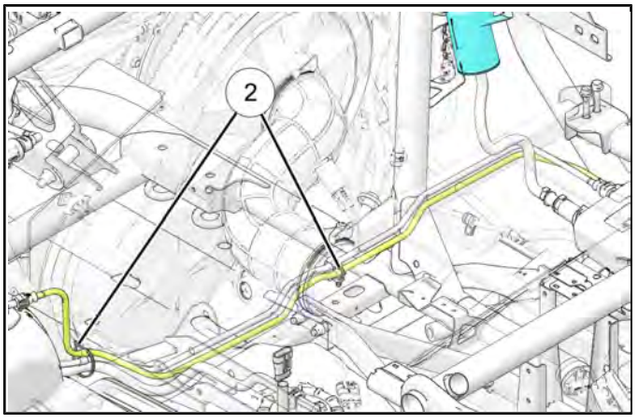


① Fuel Line	③ Hose Clamp
② Zip Tie	④ Termination Fitting

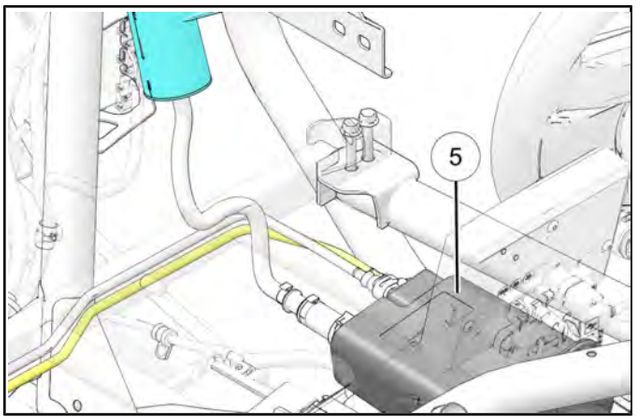
NOTICE
Be sure the vent line is routed properly and secured with cable tie(s). Check the fuel tank vent line for signs of wear, deterioration or damage. Replace vent line if necessary.

Symptoms of a restricted fuel tank vent include the following:	Collapsing fuel tank
	Engine miss or hesitation
	Loss of engine performance
	High exhaust temperatures.

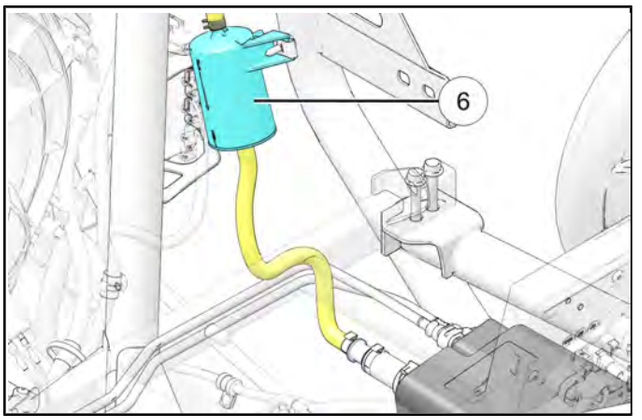
1. Route fuel vent line under the seats and secure vent line using two zip ties ②.



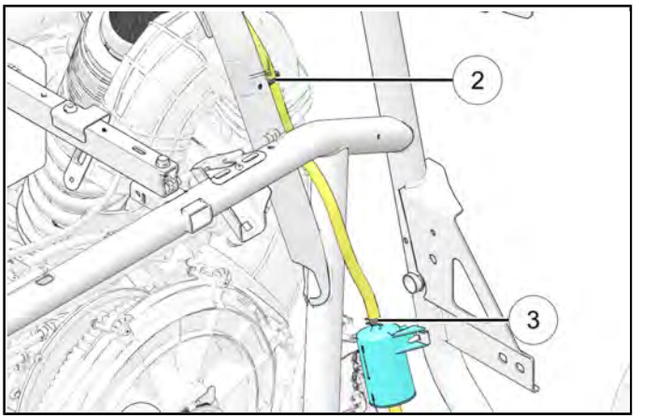
2. Route vent line into the carbon canister ⑤.



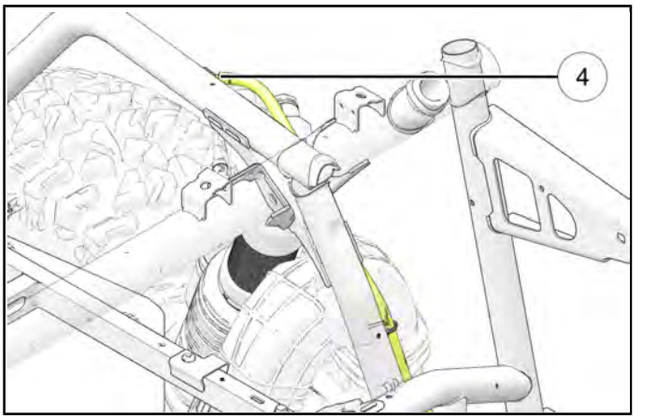
3. Route vent line from the carbon canister to the canister filter ⑥.



4. Attach vent line to the canister filter with a hose clamp ③, and attach to the frame using a zip tie.

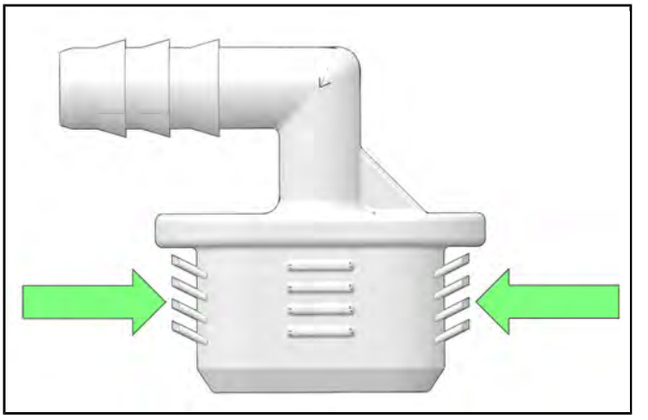


5. Route vent line back along the left shock support tube and attach to the fitting in the frame ④.



VENT LINE TERMINATION FITTING

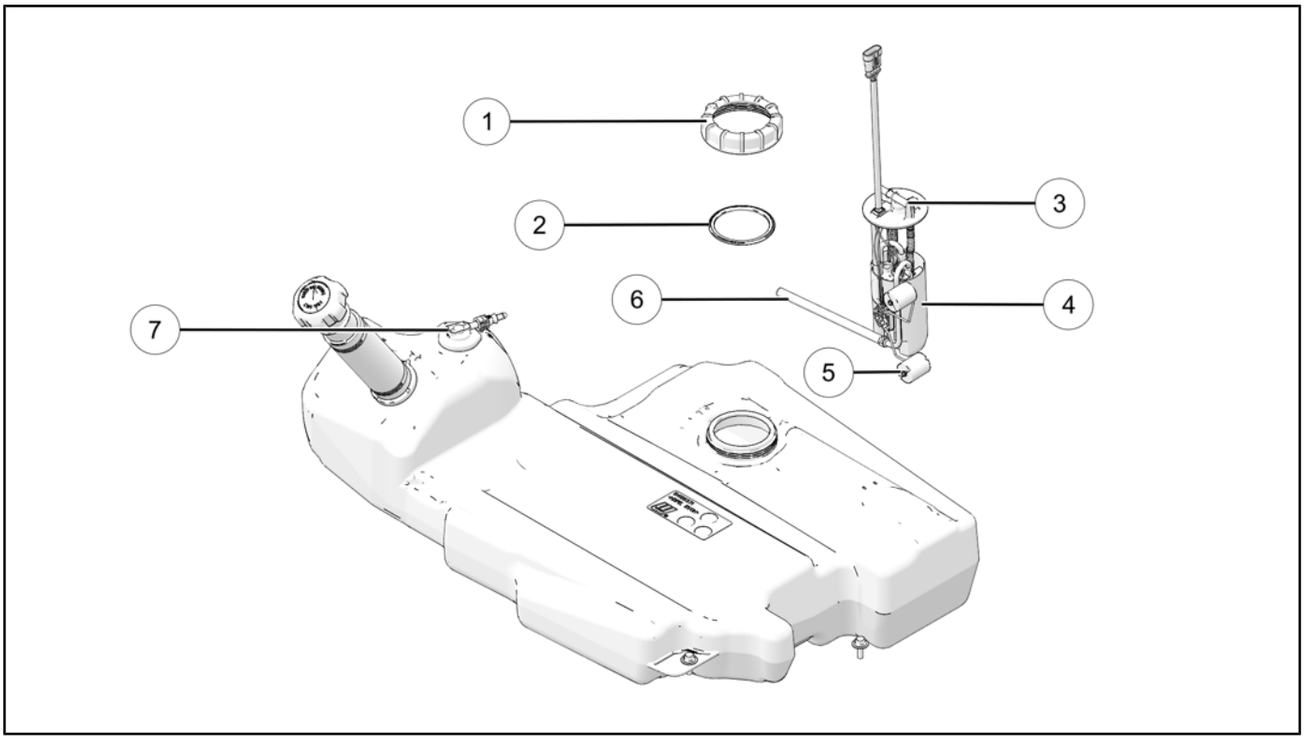
This fitting should be inspected and tested using a Mity Vac™ to ensure proper venting. Connect the Mity Vac to the fitting and give it 5 pumps. The gauge should return to 0 immediately or there is an obstruction.



NOTICE
If the vent line fitting is removed from the frame, it must be replaced. The ears on the clip (*arrows*) will not hold properly once it is removed.

FUEL TANK / PUMP

FUEL TANK ASSEMBLY VIEW



① PFA Nut **70 ft-lbs (95 Nm)**	⑤ Fuel Level Float
② PFA Gasket	⑥ Fuel Pickup
③ Supply Line	⑦ Fuel Tank Vent
④ Fuel Pump	

FUEL TANK REPLACEMENT

REMOVAL

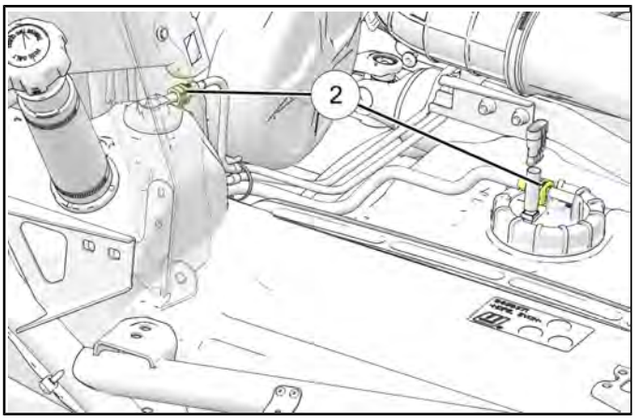
NOTICE

Syphon as much fuel from the tank as possible before attempting to remove it from the vehicle.

⚠ WARNING

Always wear safety goggles when working with high pressure or flammable fluids. Failure to do so could result in serious injury or complications.

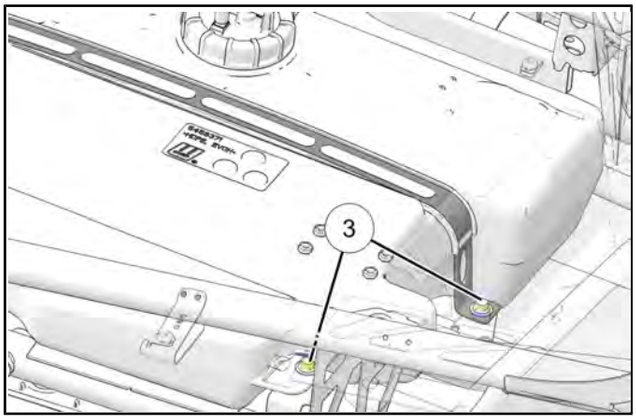
1. Remove the driver and passenger seats. on 4-seat vehicles, remove rear seats.
2. Remove upper and lower rear close off panels.
3. Disconnect the battery cables from the battery, located under the driver's seat.
4. Remove the lower floor panels. See Console and Lower Floor Removal page 11.25.
5. Disconnect the fuel pump electrical harness.
6. While holding a shop towel over the fuel line connectors, disconnect fuel supply and vent line ② from the fuel tank.



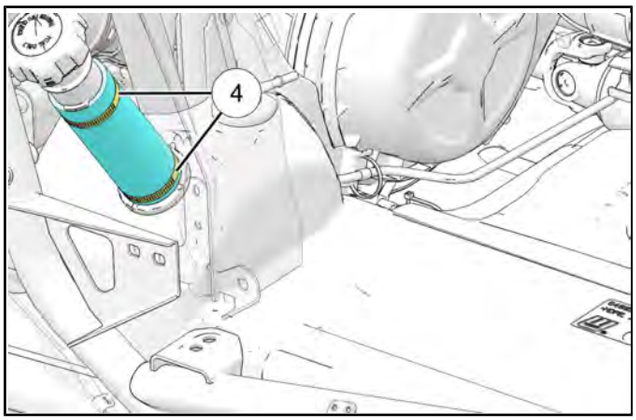
NOTICE

A small amount of fuel may come out of the fuel lines or pump fitting. Properly drain fuel into a suitable container.

7. Remove two fasteners ③ from the front of the tank, and one fastener from the rear tank strap (not shown). Remove fuel tank strap.



8. Loosen two hose clamps ④ and remove rubber hose from the fuel tank.



9. Lift the rear of the fuel tank up first. Carefully pull the fuel tank out of the vehicle.

5

INSTALLATION

1. Reverse the removal procedure for fuel tank installation.

TORQUE
Fuel Tank Fasteners: **15 ft-lbs (20 Nm)**

TORQUE
Body Panel Fasteners: **7 ft-lbs (10 Nm)**

TORQUE
Seat Base Frame Fasteners: **15 ft-lbs (20 Nm)**

TORQUE
Shift Knob Fastener: **35 in-lbs (4 Nm)**

TORQUE
Battery Cable Fasteners: **60 in-lbs (7 Nm)**

FUEL PUMP OPERATION OVERVIEW

When the key switch is turned to "ON", the ECU activates the fuel pump, which pressurizes the system for start-up.

The ECU switches off the pump preventing the continued delivery of fuel in these instances:

- If the key switch is not promptly turned to the "start" position.
- If the engine fails to start.
- If the engine is stopped with the key switch "on" (as in the case of an accident).

In these situations, the “check engine” light will go on, but will turn off after 4 cranking revolutions if system function is OK. Once the engine is running, the fuel pump remains on.

As boost pressure increases, fuel pressure increases due to the manifold pressure controlled fuel regulator. It is NORMAL to see fuel pressure fluctuations as the throttle varies.

FUEL PRESSURE TEST

NOTICE

This test applies to non-EVAP models only.

IMPORTANT

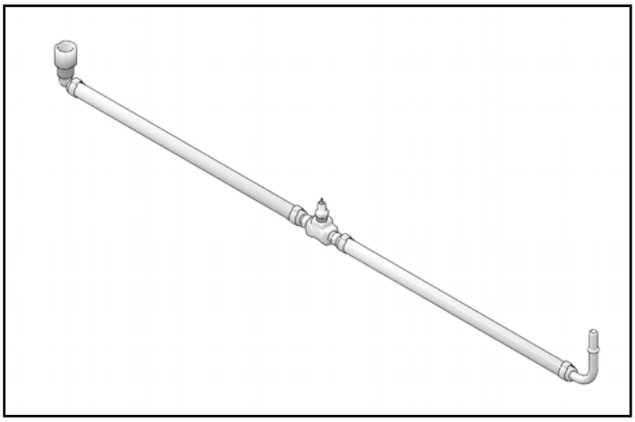
As boost pressure increases, fuel pressure increases due to the manifold pressure controlled fuel regulator. It is NORMAL to see fuel pressure fluctuations as the throttle varies.

If a fuel delivery problem is suspected, make certain the fuel pump pickup filter in the tank is not plugged, that the fuel pump relay is being activated by the ECU, all electrical connections are properly secured, the fuses are good, and a minimum of 7.0 volts is being supplied. If during starting the battery voltage drops below 7.0 volts, the ECU will fail to operate the system.

⚠ WARNING

Fuel is extremely flammable and may cause severe burns, injury, or death.
Do not use any device that produces a flame or electrical devices that may spark around fuel or fuel vapors.

1. Install the Fuel Pressure Gauge Adapter in-line between the fuel pump outlet and fuel supply line.



Fuel Pressure Gauge Adapter:
PA-48838

2. Connect the hose from the Fuel Pressure Gauge Kit to the test valve on the Fuel Pressure Gauge Adapter. Route clear hose into a portable gasoline container or the vehicle's fuel tank.

Fuel Pressure Gauge Kit:
PU-43506-A

3. Turn on key switch to activate the pump and check the system pressure on the gauge. If proper system pressure is observed, the ignition switch, ECU, fuel pump, and pressure regulator are working properly. Turn the key switch off and depress the valve button on the tester to relieve the system pressure.

Fuel Pressure (key on, engine off):
58 ± 2 psi (400 ± 14 kPa)

4. If the pump did not activate , disconnect the harness connector from the fuel pump. Connect a DC voltmeter across terminals "3" and "4" in the plug on the vehicle fuel pump harness. Turn on the key switch and observe voltage to ensure a minimum of 7 volts is present.

NOTICE

If the voltage was below 7 VDC, test the battery, ignition switch, relay(s), wiring harness and ECU.

5. If the reading is between 7 and 14 volts, turn key switch off and connect an ohmmeter between terminals "3" and "4"' at the white fuel pump connector to check for continuity within the fuel pump.

NOTICE

If there was no continuity between the pump terminals, replace the fuel pump assembly.

6. If voltage at the plug was within the specified range, and there was continuity across the pump terminals, reconnect the plug to the fuel pump, making sure you have a clean connection. Turn on the key switch and listen for the pump to activate.

NOTICE

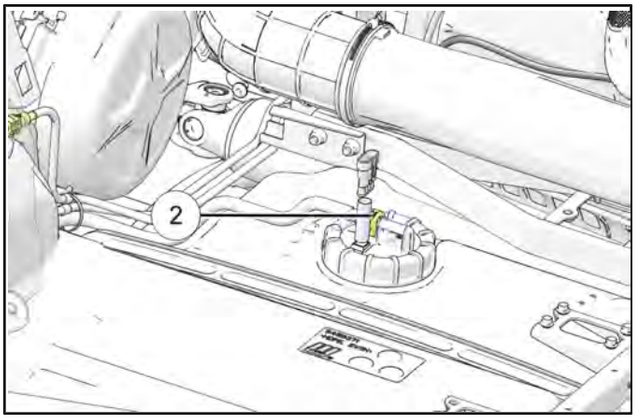
If the pump starts, repeat steps 3, 4 and 5 to verify correct pressure.

7. If the pump still does not operate, check for correct ECU operation by plugging in a known-good ECU of the same model.
8. If the pump still does not operate, replace the fuel pump.

FUEL PUMP REPLACEMENT

REMOVAL

1. Remove the driver and passenger seats. on 4-seat vehicles, remove rear seats.
2. Remove upper and lower rear close off panels.
3. Disconnect the battery cables from the battery, located under the driver's seat.
4. Remove the lower floor panels. See Console and Lower Floor Removal page 11.25.
5. Disconnect the fuel pump electrical harness.
6. While holding a shop towel over the fuel line connector, disconnect the fuel supply line ②.



NOTICE
A small amount of fuel may come out of the fuel lines or pump fitting. Properly drain fuel into a suitable container.

7. Place the Fuel Pump Service Tool over the fuel pump PFA nut. Using a 1/2″ drive ratchet or breaker bar, loosen and remove the PFA nut. Discard the PFA nut.

NOTICE
Apply downward force on the fuel pump flange while removing the fuel pump PFA nut.

Fuel Pump Service Tool: **PU-50326**

8. Carefully lift the fuel pump out of the fuel tank. As the fuel pump assembly is being removed, be aware of float arm and pump pre-filter. Hold the float arm to the pump body as you lift and tilt the pump to ensure that the float arm is not bent when removed from the tank.
9. Transfer old fuel pump to a suitable container capable of safely holding fuel. The fuel pump will retain some fuel.
10. Inspect the inside of the fuel tank for debris (may require flashlight and mirror). If debris like mud or sand is present, fuel tank should be flushed and cleaned out prior to installation of new fuel pump assembly.

NOTICE
It is recommended to remove the fuel tank from the vehicle and rinse it with a small amount of clean fuel. Do not use water or any other chemicals to remove debris.

INSTALLATION

1. Use cleaning wipes provided to clean fuel tank surface and threads. Remove all debris, grease and oil. Allow surfaces to dry completely.
2. Install new PFA gasket onto fuel pump assembly using care not to damage gasket or bend float arm.
3. Install fuel pump into fuel tank, hold float arm to the pump body and tilt assembly to ensure float arm does not get caught or bent during installation.

IMPORTANT
Fuel pump pickup tube should face FORWARD when installing on 2-seat vehicles. Fuel pump pickup tube should face REARWARD when installing on 4-seat vehicles. Incorrect fuel pump orientation will result in an inaccurate fuel level reading.

4. Gently push down on fuel pump flange ensuring flange is centered.
5. Roughly align orientation mark on fuel pump between the orientation marks on fuel tank to ensure float arm does not get bent or snagged.

⚠ WARNING
Failure to align the orientation marks may lead to interferences with the fuel level float arm and cause incorrect function.

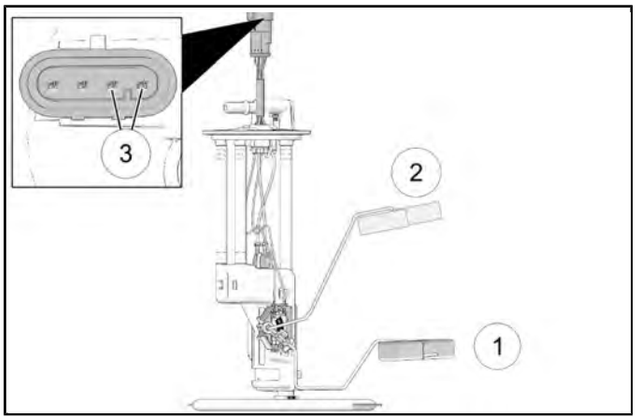
6. While maintaining downward pressure, thread new PFA nut onto fuel tank and hand tighten. Use care when starting PFA nut, ensuring threads are properly aligned. Verify orientation marks are still aligned between fuel pump and fuel tank.
7. Torque PFA nut to specification using the Fuel Pump Service Tool (PU-50326) and a calibrated torque wrench.

TORQUE
Fuel Pump PFA Nut: **70 ft-lbs (95 Nm)**

8. Verify alignment of fuel pump and tank orientation marks.
9. Connect the fuel supply line to the pump.

FUEL SENDER TEST

1. Remove the fuel pump assembly from the fuel tank. Refer to Fuel Pump Replacement.
2. Using an Ohm meter, measure the resistance of the fuel sender as shown below.



ITEM	POSITION	READING
①	EMPTY position	**450 Ω ± 5%**
②	FULL position	**100 Ω ± 3%**
③	Measure between the two pins	—

3. Allow the sender float to sit in the **EMPTY position** and compare to specification.
4. Slowly move the sender float to the **FULL position** and compare to specification.
5. If the readings are out of specification, or if the reading is erratic or LCD display “sticks”, check the following before replacing the fuel pump assembly:
   - Loose float
   - Float contact with tank
   - Bent float rod
6. If none of the conditions exist, the fuel sender assembly is faulty. Replace the fuel pump assembly. Refer to Fuel Pump Replacement.

5

NOTES

CHAPTER 6
PVT SYSTEM

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
PU-50518-A	Drive Clutch Compressor
PU-52422	Drive Clutch Puller
PU-50578	Spider Jam Nut Socket
PU-52944	Drive Clutch Holding Tool

Bosch Automotive Service Solutions: 1-800-345-2233 or http://polaris.service-solutions.com

2022 *RZR* PRO R CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2022 *RZR* PRO R	0-1800 Meters (0-6000 Feet)	W-34-112 (1323597)	Black (7045112)	Black (7045138)
	1800-3700 Meters (6000-12000 Feet)	W-34-104 (1323586)		

2022 *RZR* PRO R 4 CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2022 *RZR* PRO R 4	0-1800 Meters (0-6000 Feet)	W-34-112 (1323746)	Black (7045112)	Black (7045138)
	1800-3700 Meters (6000-12000 Feet)	W-34-104 (1323586)		

PVT SYSTEM OVERVIEW

GENERAL OPERATION

⚠ WARNING

All PVT maintenance or repairs should be performed by a certified Polaris Master Service Dealer (MSD) technician who has received the proper training and understands the procedures outlined in this manual. **Because of the critical nature and precision balance incorporated into the PVT components, it is absolutely essential that no disassembly or repair be made without factory authorized special tools and service procedures.**

The Polaris Variable Transmission (PVT) consists of three major assemblies:

1) The Drive Clutch

2) The Driven Clutch

3) The Drive Belt

The internal components of the drive clutch and driven clutch control engagement (initial vehicle movement), clutch upshift and backshift. During the development of the Polaris vehicle, the PVT system is matched first to the engine power curve; then to average riding conditions and the vehicle's intended usage. Therefore, modifications or variations of components at random are never recommended. Proper clutch setup and careful inspection of existing components must be the primary objective when troubleshooting and tuning.

DRIVE CLUTCH OPERATION

Drive clutches primarily sense engine RPM. The two major components which control its shifting function are the shift weights and the coil spring. Whenever engine RPM is increased, centrifugal force is created, causing the shift weights to push against rollers on the moveable sheave, which is held open by coil spring preload. When this force becomes higher than the preload in the spring, the outer sheave moves inward and contacts the drive belt. This motion pinches the drive belt between the spinning sheaves and causes it to rotate, which in turn rotates the driven clutch.

At lower RPM, the drive belt rotates low in the drive clutch sheaves. As engine RPM increases, centrifugal force causes the drive belt to be forced upward on drive clutch sheaves.

DRIVEN CLUTCH OPERATION

Driven clutches primarily sense torque, opening and closing according to the forces applied to it from the drive belt and the transmission input shaft. If the torque resistance at the transmission input shaft is greater than the load from the drive belt, the drive belt is kept at the outer diameter of the driven clutch sheaves.

As engine RPM and horsepower increase, the load from the drive belt increases, resulting in the belt rotating up toward the outer diameter of the drive clutch sheaves and downward into the sheaves of the driven clutch. This action, which increases the driven clutch speed, is called upshifting.

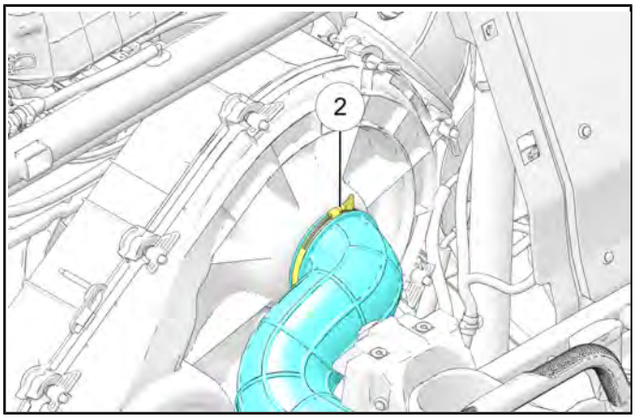
Should the throttle setting remain the same and the vehicle is subjected to a heavier load, the drive belt rotates back up toward the outer diameter of the driven clutch and downward into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called backshifting.

In situations where loads vary (such as uphill and downhill) and throttle settings are constant, the drive and driven clutches are continually shifting to maintain optimum engine RPM. At full throttle a perfectly matched PVT system should hold engine RPM at the peak of the power curve. This RPM should be maintained during clutch upshift and backshift. In this respect, the PVT system is similar to a power governor. Rather than vary throttle position, as a conventional governor does, the PVT system changes engine load requirements by either upshifting or backshifting.

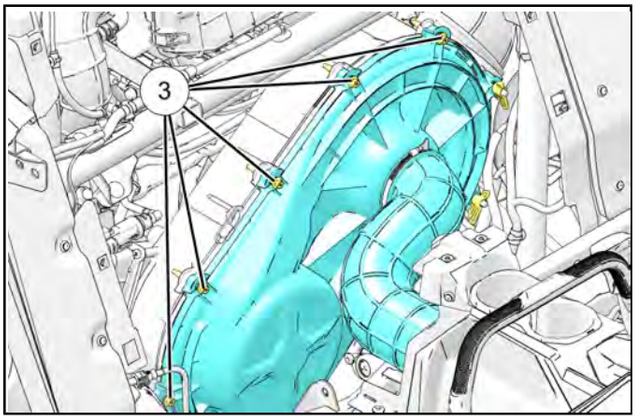
DRIVE BELT

BELT REMOVAL

1. Park vehicle on a level surface.
2. Remove seats. On 4-seat models, remove the rear seats.
3. Remove upper and lower rear close-off panels.
4. Loosen hose clamp ② and remove the PVT intake hose.



5. Remove five fasteners ③, disengage remaining 1/4 turn latches, and remove the outer PVT cover.



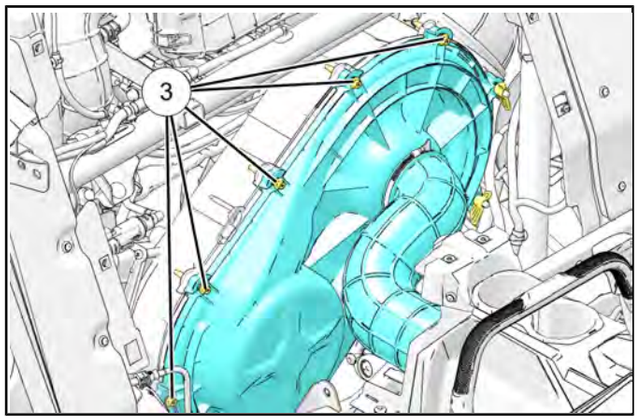
6. Remove the drive belt.

BELT INSPECTION

1. Inspect belt for hour glassing (extreme circular wear in at least one spot and on both sides of the belt). Hour glassing occurs when the drive train does not move and the drive clutch engages the belt.
2. Inspect belt for loose cords, missing cogs, cracks, abrasions, thin spots, or excessive wear. Compare belt measurements with a new drive belt. Replace if necessary.
3. Belts with thin spots, burn marks, etc., should be replaced to eliminate noise, vibration, or erratic PVT operation. See the Troubleshooting Chart at the end of this chapter for possible causes.

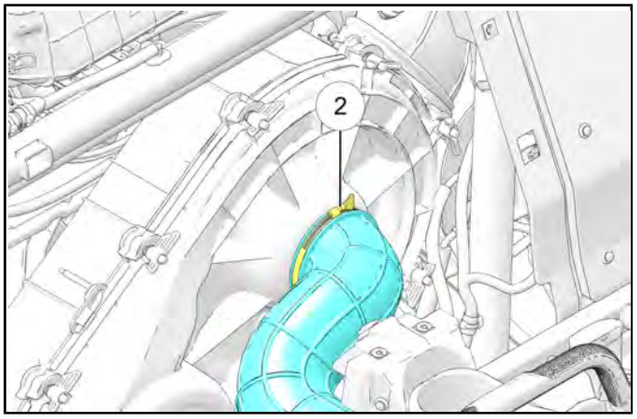
BELT INSTALLATION

1. With the clutch spreader tool installed, loop the belt over the drive clutch and over part of the driven clutch. Be sure to install belt in the direction previously marked.
2. Rotate the driven clutch and walk the belt into the clutch.
3. Remove the clutch spreader tool from the driven clutch.
4. Rotate / spin the driven clutch and belt approximately 5-7 times to properly seat the belt in the driven clutch.
5. Install outer clutch cover. Install five fasteners③ and engage 1/4 turn latches to secure the cover. Torque fasteners to specification.



TORQUE
Outer PVT Cover Fasteners: **60 in-lbs (7 Nm)**

6. Install clutch intake hose. Tighten hose clamp ②. Torque hose clamp to specification.



TORQUE
PVT Intake Hose Clamp: **35 in-lbs (4 Nm)**

7. Install upper and lower rear close-off panels.
8. Install seats. On 4-seat models, install the rear seats.

BELT BREAK-IN

A proper break-in of the clutches and drive belt will ensure a longer life and better performance. If a belt fails, always clean any debris from the duct and from the engine compartment.

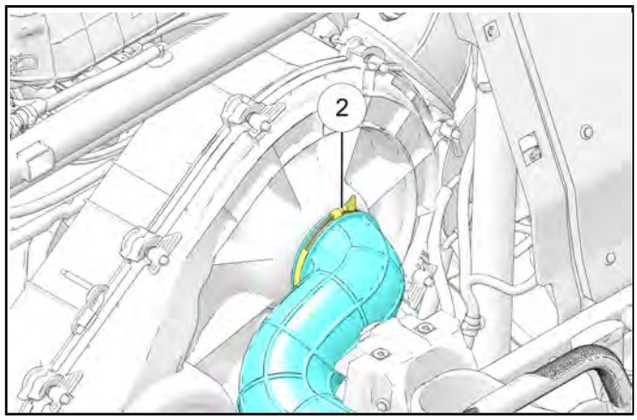
Standard Break-In
Drive at slower speeds for the first 50 miles (80 km) of operation. Carry only light loads. Avoid aggressive acceleration, high-speed operation and prolonged operation at a specific RPM during this period.

Sand/Dune Break-In
Drive in low gear for the first 5 miles (8 km) of operation. Avoid prolonged low speed operation at high throttle. Avoid aggressive acceleration, high-speed operation and prolonged operation at a specific RPM during this period.

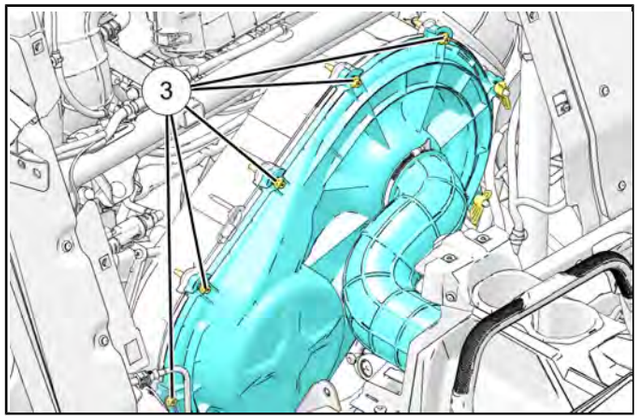
DRIVE CLUTCH SERVICE

DRIVE CLUTCH REMOVAL

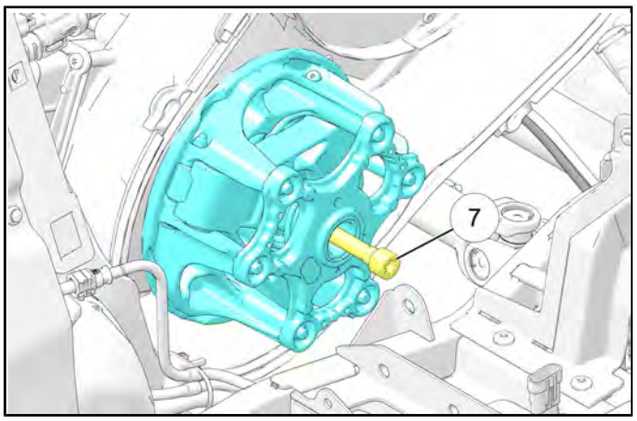
1. Park vehicle on a level surface.
2. Remove seats. On 4-seat models, remove the rear seats.
3. Remove upper and lower rear close-off panels.
4. Loosen hose clamp ② and remove the PVT intake hose.



5. Remove five fasteners ③, disengage remaining 1/4 turn latches, and remove the outer PVT cover.



6. Remove the drive belt.
7. Remove drive clutch retaining bolt ⑦ and remove the drive clutch moveable-sheave assembly.

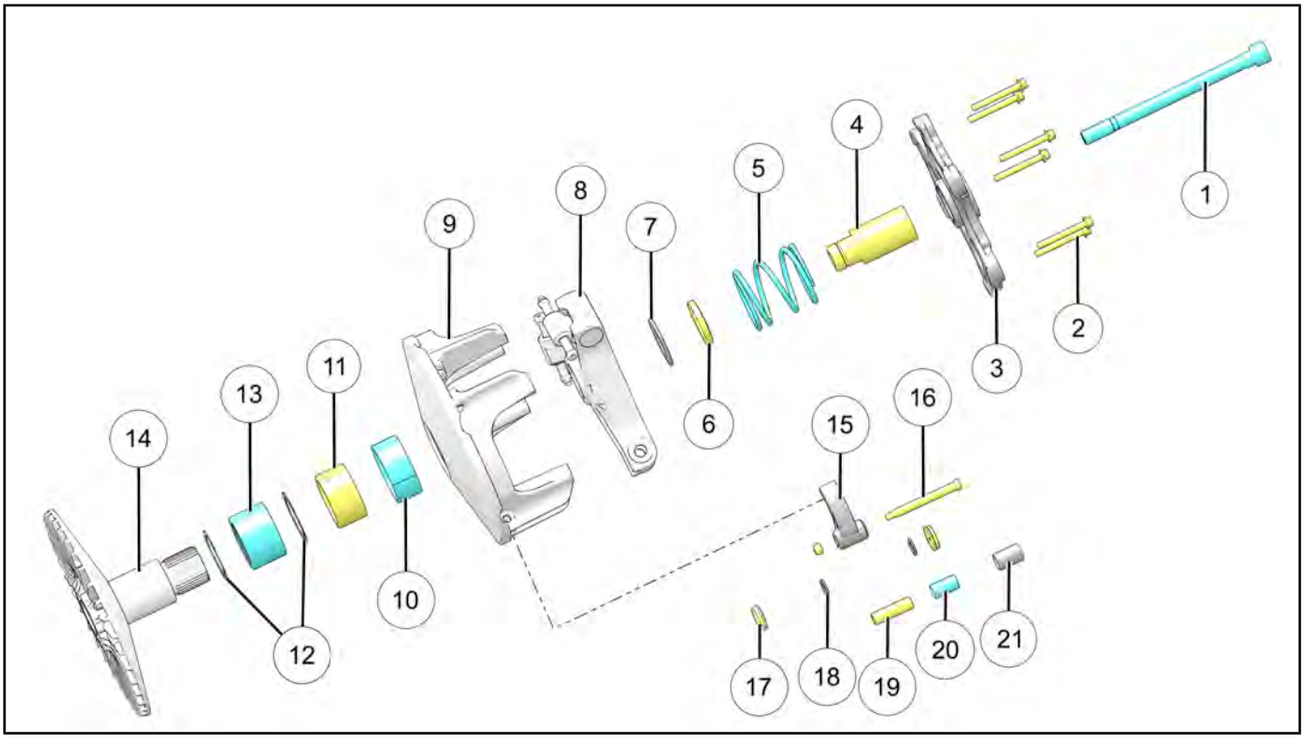


8. Remove the outer slip-fit post and install the Drive Clutch Puller (PN **PU-52422**) to remove the stationary sheave.

Drive Clutch Puller:
PU-52422

6

DRIVE CLUTCH ASSEMBLY VIEW



REF	DESCRIPTION	TORQUE
①	Clutch Bolt	**140 ft-lbs (190 Nm)**
②	Drive Clutch Cover Bolts	**15 ft-lbs (21 Nm)**
③	Drive Clutch Cover	-
④	Outer Clutch Post	-
⑤	Spring	-
⑥	Belleville Washer	Dome side facing outer post
⑦	Washer	-
⑧	Spider	-
⑨	Sheave Assembly	-
⑩	Bushing	-
⑪	Clutch Spacer	-
⑫	Washer	-
⑬	Needle Bearing	-
⑭	Stationary Sheave	-
⑮	Shift Weight	-
⑯	Shift Weight Fastener	**20 in-lb (2 Nm)**
⑰	Clutch Button	-

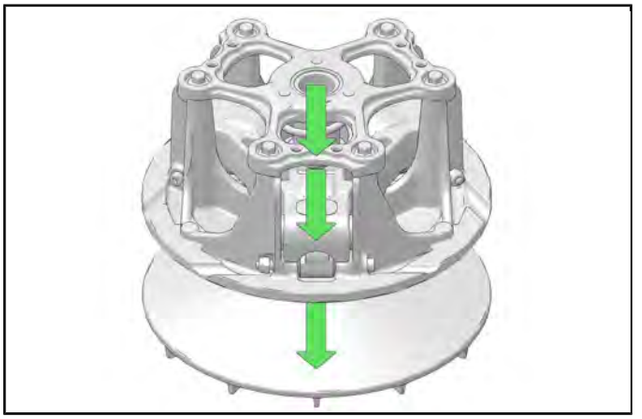
REF	DESCRIPTION	TORQUE
⑱	Washer	-
⑲	Spider Pin	-
⑳	Bushing	-
㉑	Roller	-

CLUTCH DISASSEMBLY

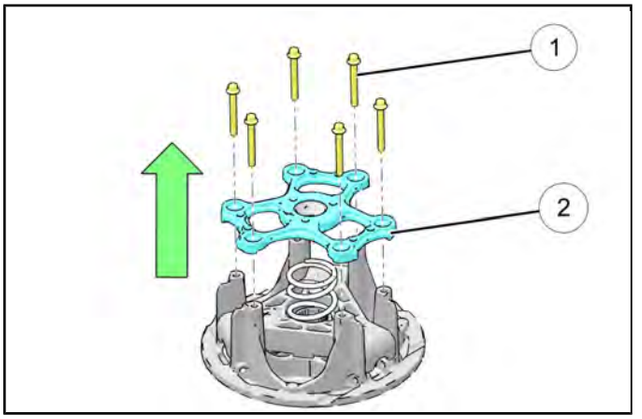
⚠ CAUTION

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!

1. Using a permanent marker, mark the cover, spider, and moveable sheave for reference, as the cast in X's may not have been in alignment before disassembly.

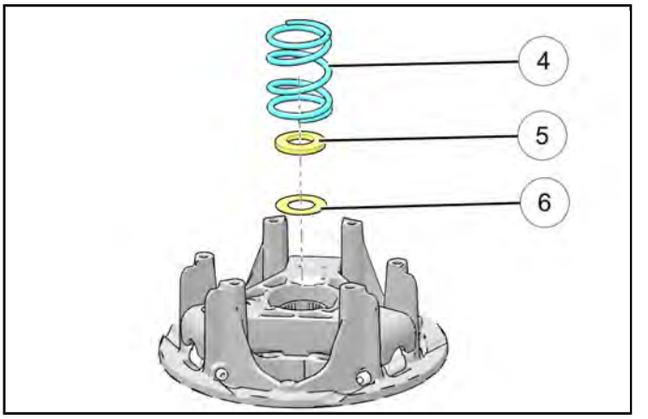


2. Remove cover bolts ① evenly in a cross pattern and remove cover plate ②.



3. Inspect area on shaft where bushing rides for wear, galling, nicks, or scratches. Replace clutch assembly if worn or damaged.

4. Remove and inspect the clutch spring ④. Refer to **Drive Clutch Spring Inspection page 6.14** procedure.



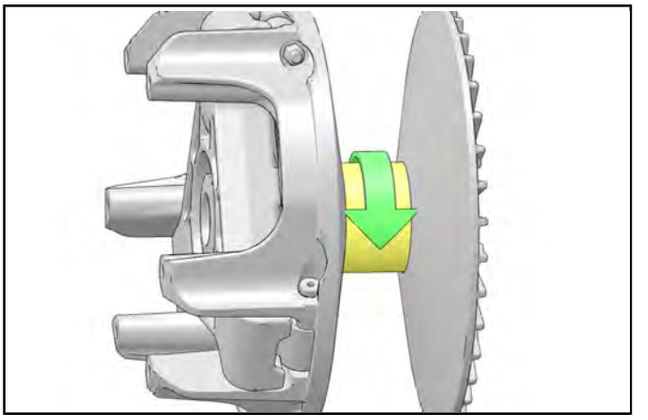
5. Remove and inspect belleville washer ⑤ and washer ⑥. Replace if necessary.

IMPORTANT

Belleville washer must be installed with dome facing the outer post.

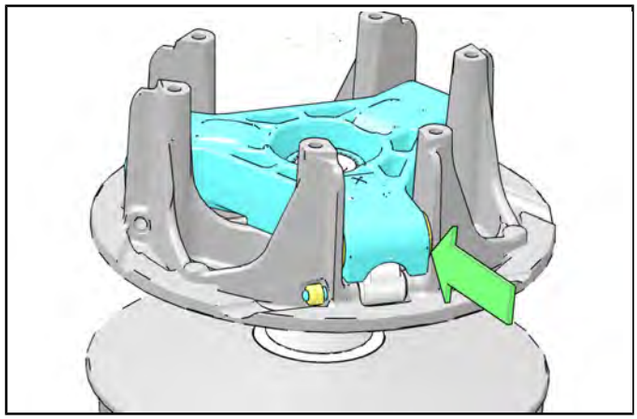
BEARING INSPECTION

- Verify there is no binding or rough spots. If problems are noted continue with disassembly.



BUTTON TO TOWER CLEARANCE INSPECTION

1. Inspect for any clearance between spider button to tower. If clearance exceeds specification, replace all buttons and inspect surface of towers. Refer to **Spider Removal page 6.11** procedure.



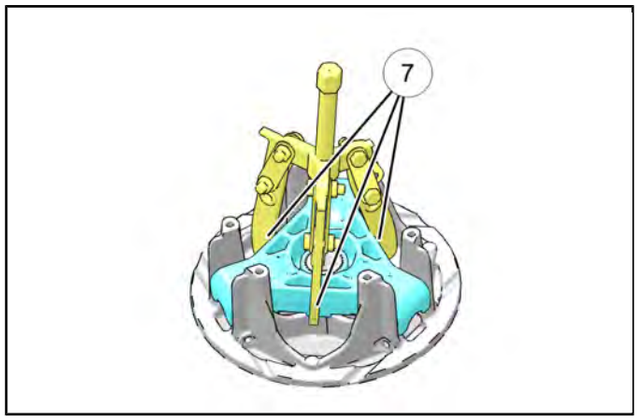
Button to Tower Clearance: 0.000 - 0.020”

2. Inspect sheave surfaces. Replace the entire clutch if worn, damaged or cracked.

SPIDER REMOVAL

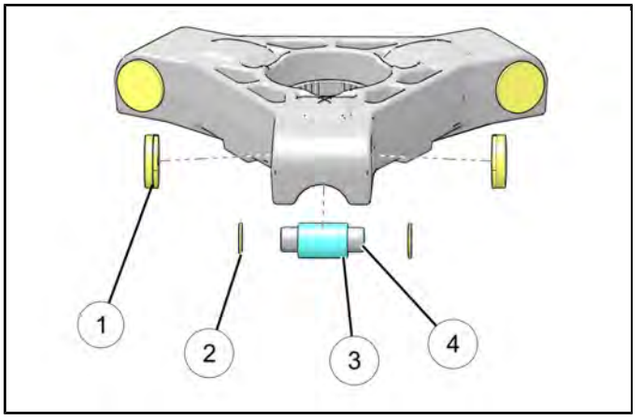
1. Remove the spider assembly. If the spider cannot be removed by hand, use a conventional 3-jaw puller as shown to remove the spider from the clutch assembly.

IMPORTANT
Do not pull on the outer fingers of the spider or damage may occur. Position 3 jaw puller in the positions shown ⑦.



ROLLER, PIN, AND THRUST WASHER INSPECTION

1. Inspect all rollers ③, roller pins ④, roller washers ②, and roller caps ① by pulling a flat metal rod across the roller.
2. Turn roller with your finger. If you notice resistance, galling, or flat spots, replace all the rollers.

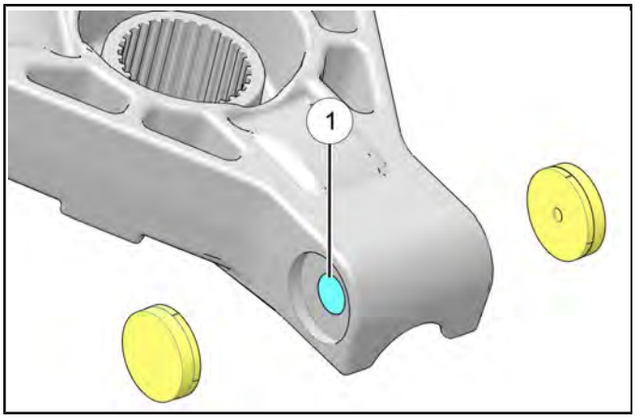


ROLLER REPLACEMENT

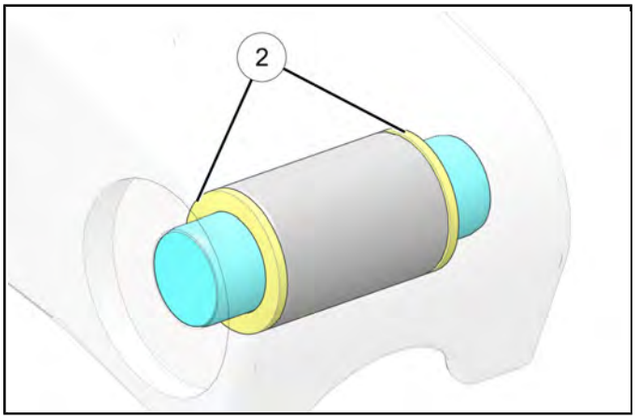
IMPORTANT

When replacing rollers, install new roller pins and thrust washers.

1. Remove the roller buttons. Inspect and replace if excessively worn.
2. Press the roller pin out using a correctly sized punch and commercial press to remove the roller.



3. Install the new roller and thrust washers ② and press in a new roller pin using a commercial press and correctly sized punch.



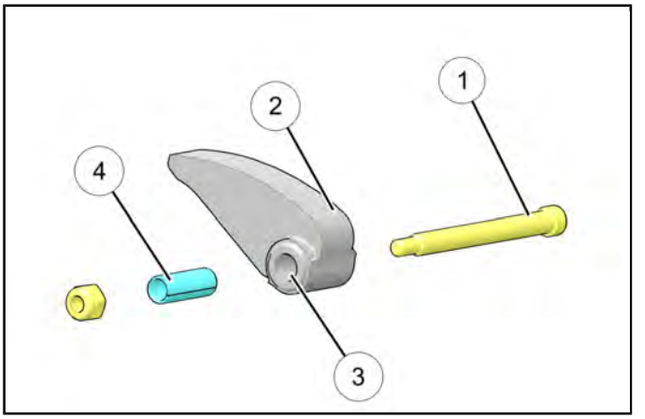
4. Install the roller buttons and verify smooth operation of the roller.

SHIFT WEIGHT INSPECTION

- Remove shift weight fasteners ① and weights ②. Inspect the contact surface of the weight ②. The surface should be smooth and free of dents or gall marks. Inspect the weight pivot bore ③ and bolts for wear or galling. Also inspect the shift weight bushing for wear. Replace if necessary. If weights or bolts are worn or broken, replace in sets of three with new bolts and nuts.

⚠ CAUTION

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.



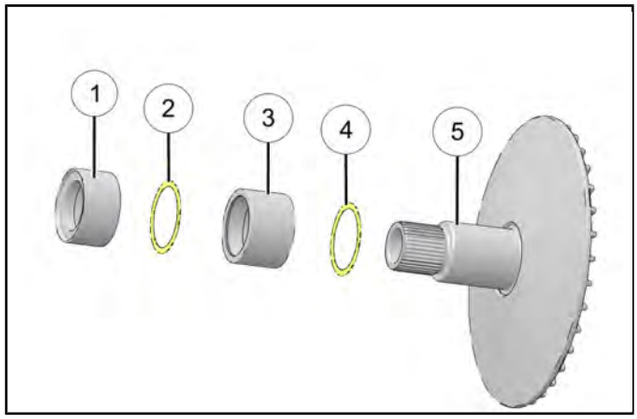
NOTICE

A damaged shift weight is usually caused by a damaged or stuck roller in the spider assembly. Refer to **Roller, Pin, and Thrust Washer Inspection page 6.11** procedure.

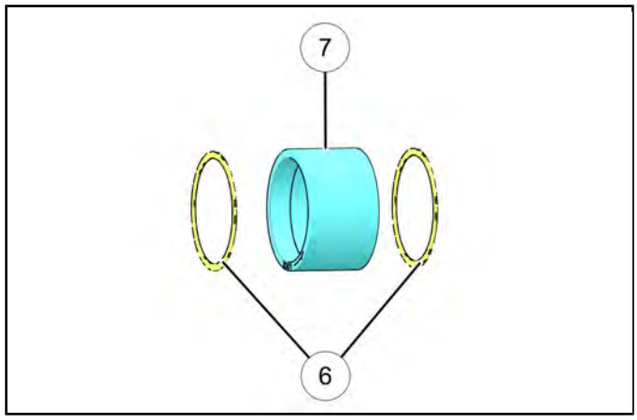
CLUTCH INSPECTION

NOTICE
Remove cover, spring and spider following instructions for drive clutch disassembly, then proceed as follows:

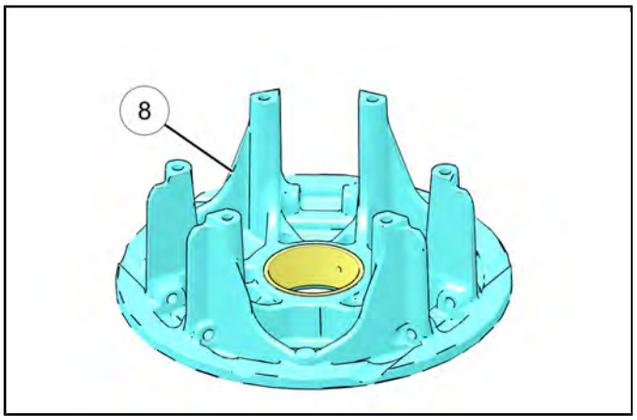
1. Remove the clutch spacer ①, washers ② and ④, and needle bearing ③ from the Sheave assembly ⑤.



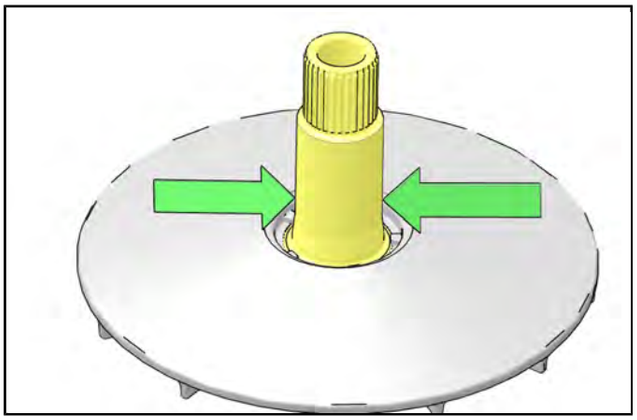
2. Verify there are no binding or rough spots on the bearing. If problems are noted, replace bearing ⑦ and washers ⑥. Refer to Bushing Service page 6.15.



3. Inspect the moveable clutch sheave ⑧ for damage or wear.



4. Inspect surface of shaft for pitting, grooves or damage. Measure the outside diameter and compare to specifications. Replace the drive clutch assembly if shaft is worn or damaged.



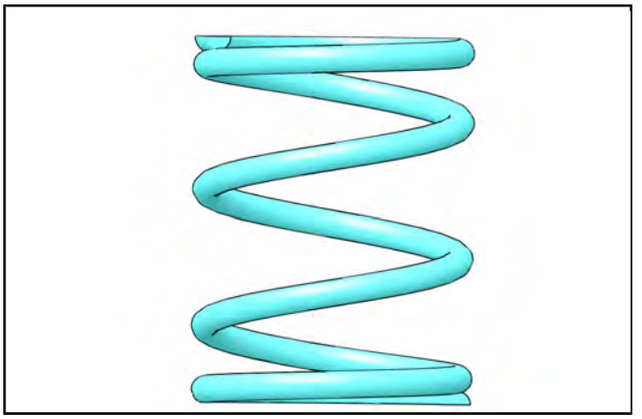
MEASUREMENT
Shaft Diameter:**1.416” (35.975 mm)** Service Limit:**1.413” (35.913 mm)**

5. Visually inspect Vespel® thrust washers for damage. Measure the thickness and compare to specification. Replace if worn or damaged.

MEASUREMENT
Thrust Washer Thickness: Standard: **0.030 – 0.040” (0.76 - 0.96 mm)** Service Limit: **0.020” (0.50 mm)**

DRIVE CLUTCH SPRING INSPECTION

- Measure the Drive Clutch Spring height. Compare to specification and replace if necessary.

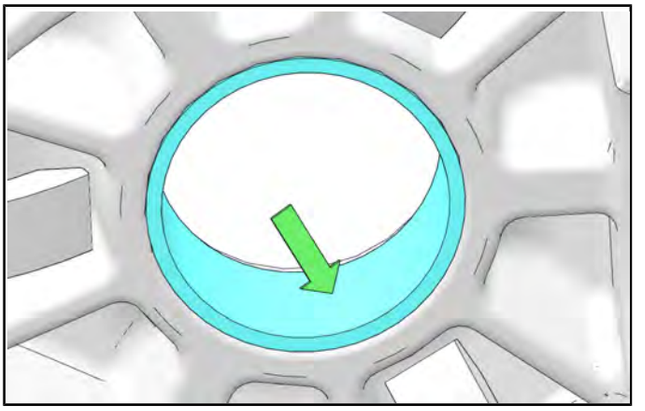


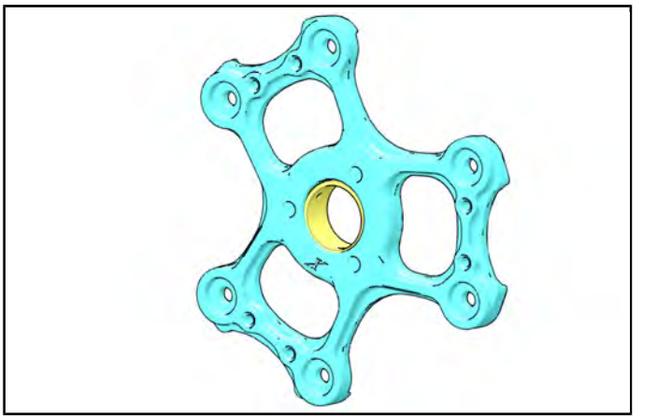
MEASUREMENT
Drive Clutch Spring Height: **7044938: 3.76 in (95.43 mm)7045110: 4.60” (116.74mm)7045326: 3.83” (97.26mm)**

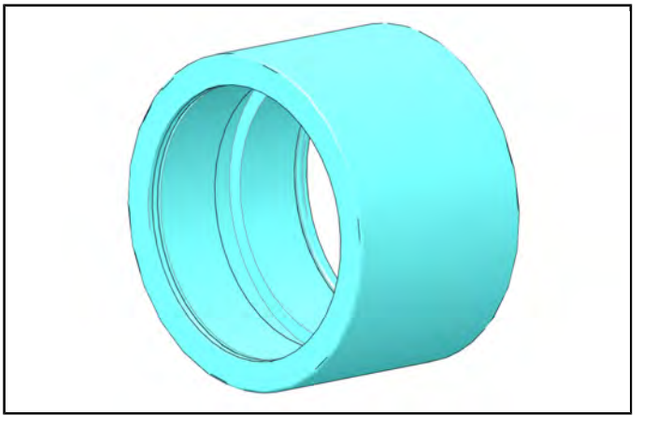
DRIVE CLUTCH BUSHINGS INSPECTION

1. Inspect the Teflon® coating on the Moveable Sheave bushing, Drive Clutch Cover Bushing, and the One-way Bearing Bushing. Inspect for signs of wear, grooving or cracking. De-glaze sheave surfaces with a 3M Scotch-Brite™ Pad if needed.

NOTICE
Replace the bushing(s) if more brass than Teflon® is visible on the bushing(s). Refer to **Bushing Service page 6.15** procedure.



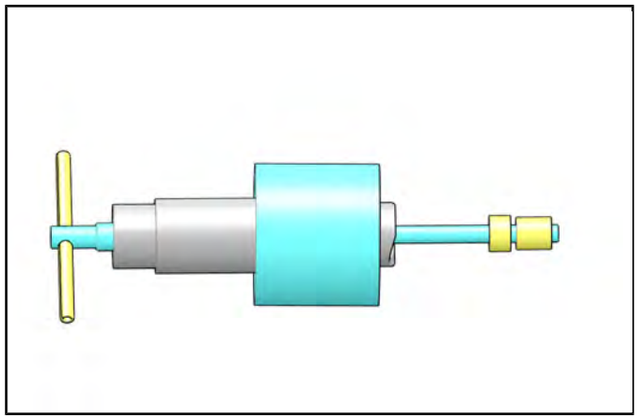




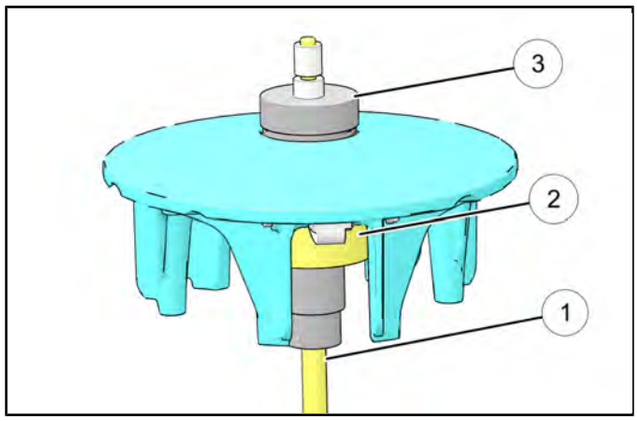
BUSHING SERVICE

MOVEABLE SHEAVE - BUSHING REMOVAL

1. Remove clutch as outlined previously in this chapter.
2. Install handle end of the Piston Pin Puller (PN**2870386**) ① securely into bench vise and lightly grease puller threads.



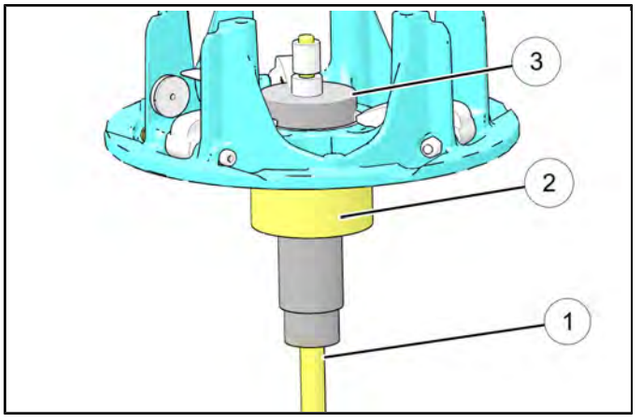
3. Remove nut from puller rod and set aside.
4. Install adapter cup (PN **5020632**) ② onto puller.



5. With towers pointing toward the vise, slide sheave onto puller rod.
6. Install puller tool (PN **5020629**) ③ into center of sheave with “A side" toward sheave.
7. Install nut onto end of puller rod and hand tighten. Turn puller barrel to increase tension on sheave if needed. Using a hand held propane torch, apply heat around outside of bushing until tiny smoke tailings appear.
8. Turn sheave counterclockwise on puller rod until it comes free. Lift sheave off puller.
9. Remove nut from puller rod and set aside.
10. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

DRIVE CLUTCH BUSHING INSTALLATION

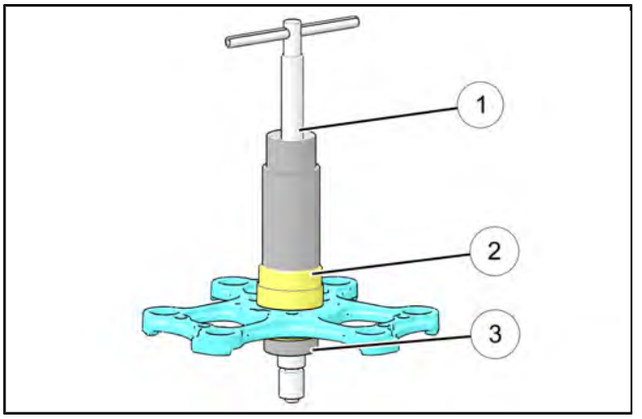
1. Place adapter cup (PN **5020632**) ② on puller.



2. Apply Loctite® 620 evenly to bushing bore inside moveable sheave.
3. Set bushing in place on sheave.
4. Insert installation puller tool (PN **5020634**) ③ with “A” side down, into center of bushing.
5. With towers pointing upward, slide sheave, bushing and tool onto puller rod.
6. Install nut on puller rod and hand tighten. Turn barrel to apply additional tension if needed.
7. Turn sheave counterclockwise, making sure bushing is drawn straight into bore. Continue until bushing is seated.
8. Remove nut from puller rod and set aside.
9. Remove sheave from puller.
10. Remove installation tool.

COVER BUSHING REMOVAL

1. Install adapter cup (PN **5020632**) ② on puller.



IMPORTANT

When removing the bushing, the outside of the cover should be facing the barrel of the Piston Pin Puller as shown or damage to the cover may result.

2. From inside of clutch cover, insert adapter tool (PN **5020629**) ③ into cover bushing.
3. With outside of cover toward the puller barrel, slide cover onto puller.
4. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.
5. Turn clutch cover counterclockwise on puller rod until bushing is removed and cover comes free.
6. Remove nut from puller rod and set aside.
7. Remove bushing and bushing removal tool from puller. Discard bushing.

COVER BUSHING INSTALLATION

1. Apply Loctite® 620 evenly to bushing bore in cover.
2. Install adapter cup (PN **5020632**) on puller, insert cover onto puller rod, placing inside of cover toward vise.

IMPORTANT

When installing the bushing, the inside of the cover should be facing the barrel of the Piston Pin Puller or damage to the cover may result.

3. Working from outside of cover, insert new bushing and adapter tool (PN **5020634**) into center of clutch cover.
4. Install nut on rod and hand tighten. Turn puller barrel to apply more tension if needed.
5. Turn clutch cover counterclockwise on puller rod until bushing is seated.
6. Remove nut from puller rod. Take installation tool and clutch cover off rod.

CLUTCH ASSEMBLY

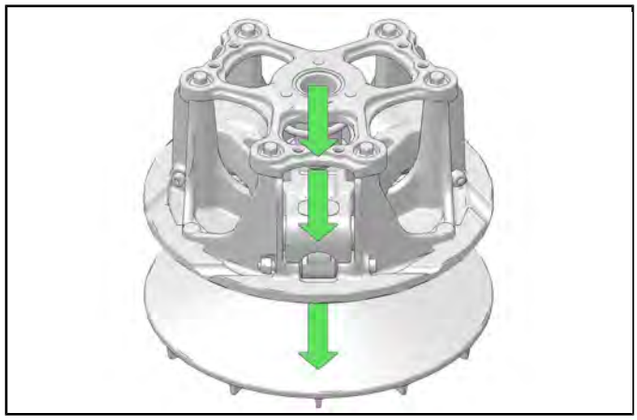
NOTICE

The Teflon® bushings are self-lubricating.

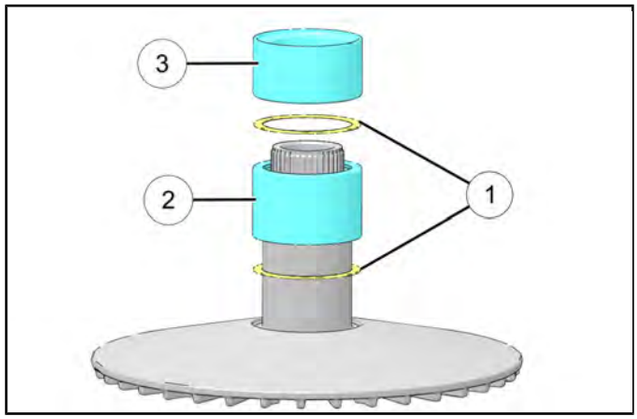
⚠ CAUTION

Do not apply oil or grease to the bushings.

Reassemble the drive clutch in the following sequence. Be sure the “X”, or the marks that were made earlier are aligned during each phase of assembly.



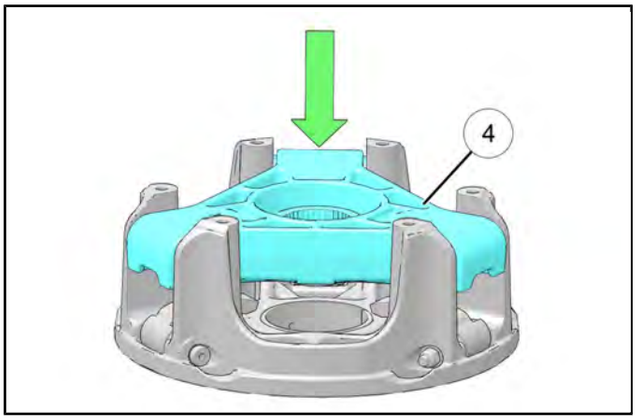
1. Install two washers ①, needle bearing ②, and clutch spacer ③ onto the stationary sheave in the order shown.



2. Install clutch spider as shown ④.

NOTICE

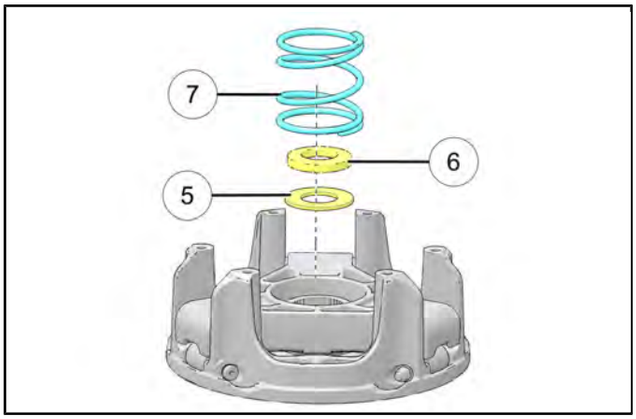
If necessary, once the splines are aligned properly, an arbor press may be used to properly seat the clutch spider.



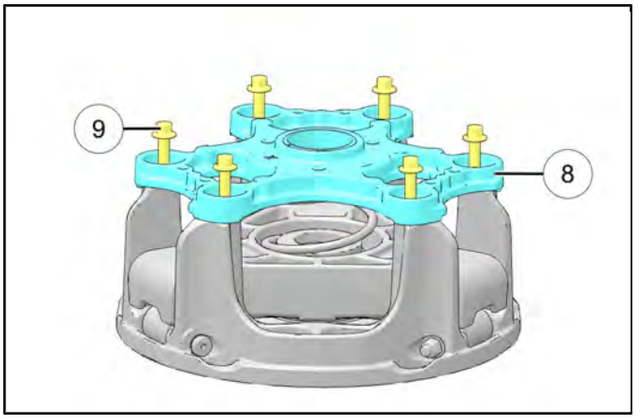
3. Install washer ⑤, belleville washer ⑥, and clutch spring ⑦.

IMPORTANT

Belleville washer must be installed with dome facing the outer post.



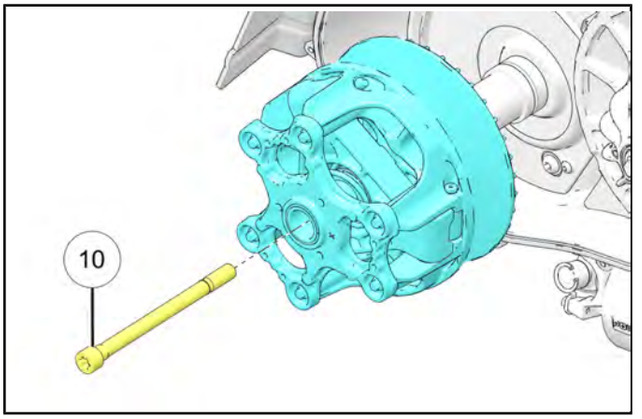
4. Install the clutch cover ⑧ and clutch cover bolts ⑨. Hand tighten bolts.



5. Torque cover bolts in a cross pattern evenly to specification.

TORQUE
Drive Clutch Cover Bolts: **15 ft-lbs (21 Nm)**

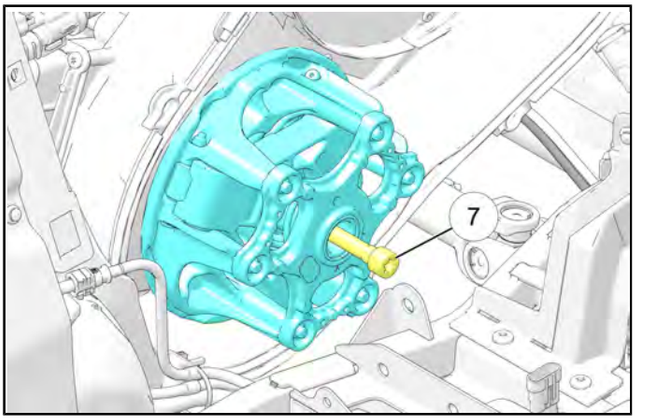
6. Install drive clutch assembly and drive clutch bolt ⑩. Torque bolt to specification.



TORQUE
Drive Clutch Bolt: **140 ft-lbs (190 Nm)**

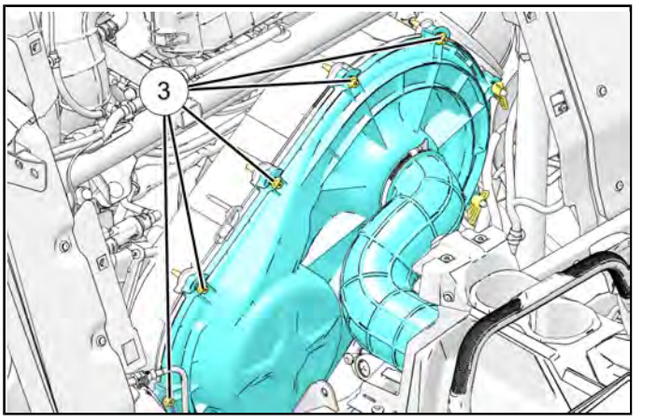
DRIVE CLUTCH INSTALLATION

1. Install drive clutch stationary sheave.
2. Install drive clutch moveable sheave and drive clutch retaining bolt ⑦. Torque fastener to specification.



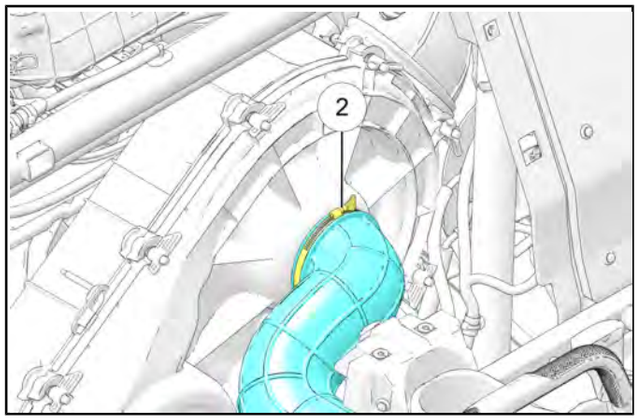
TORQUE
Drive Clutch Retaining Bolt: **Step 1: 140 ft-lbs (190 Nm)Step 2: Loosen two full turns (720°)Step 3: 118 ft-lbs (160 Nm)**

3. Install the drive belt.
4. Install outer clutch cover. Install five fasteners③ and engage 1/4 turn latches to secure the cover. Torque fasteners to specification.



TORQUE
Outer PVT Cover Fasteners: **60 in-lbs (7 Nm)**

5. Install clutch intake hose. Tighten hose clamp ②. Torque hose clamp to specification.



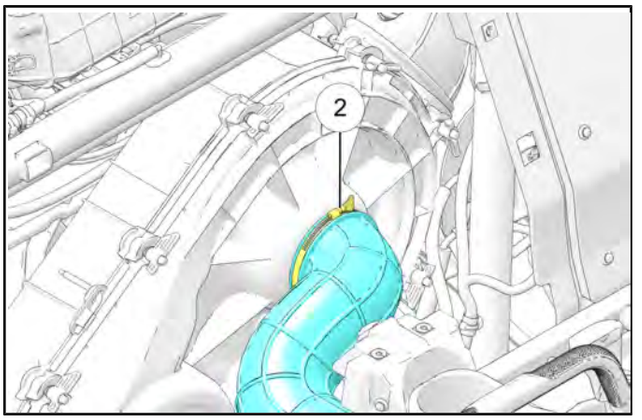
TORQUE
PVT Intake Hose Clamp: **35 in-lbs (4 Nm)**

6. Install upper and lower rear close-off panels.
7. Install seats. On 4-seat models, install the rear seats.

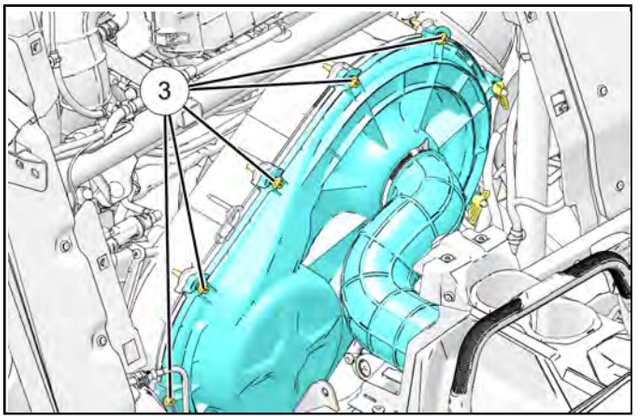
DRIVEN CLUTCH SERVICE

DRIVEN CLUTCH REMOVAL

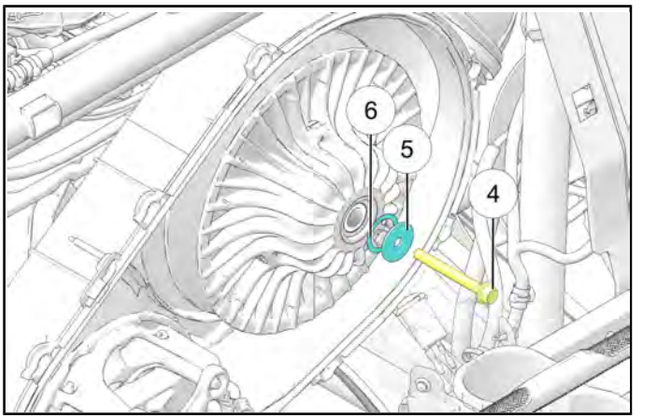
1. Park vehicle on a level surface.
2. Remove seats. On 4-seat models, remove the rear seats.
3. Remove upper and lower rear close-off panels.
4. Loosen hose clamp ② and remove the PVT intake hose.



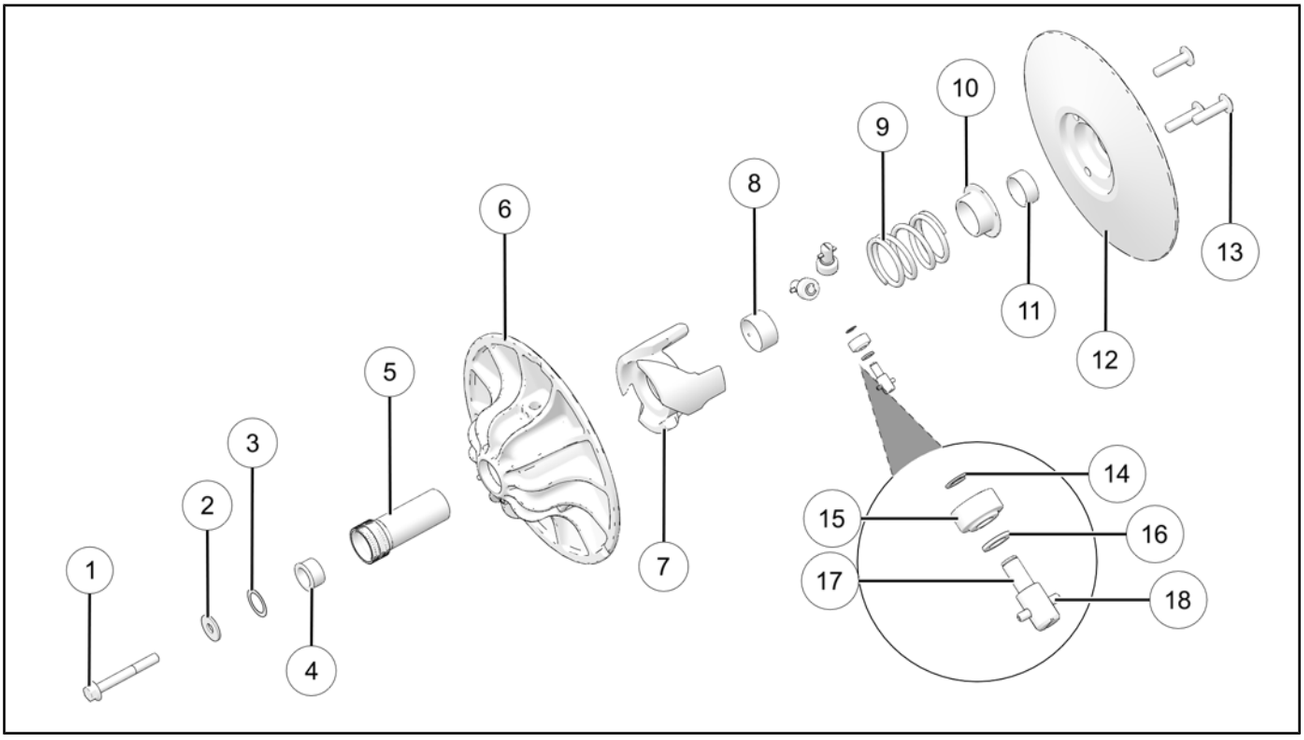
5. Remove five fasteners ③, disengage remaining 1/4 turn latches, and remove the outer PVT cover.



6. Remove the drive belt.
7. Remove bolt ④, spacer ⑤, and washer ⑥. Remove the driven clutch.



DRIVEN CLUTCH ASSEMBLY VIEW



① Driven Clutch Bolt **2020 Models: 43 ft-lbs (58 Nm)**	⑩ Spring Cup
② Washer	⑪ Bushing
③ Shim	⑫ Moveable Sheave
④ Bushing	⑬ Helix Fasteners **32 ft-lbs (44 Nm)**
⑤ Driven Post	⑭ E-Clip
⑥ Stationary Sheave	⑮ Roller
⑦ Helix	⑯ Washer
⑧ Bushing	⑰ Roller Pin
⑨ Spring	⑱ Spring Pin

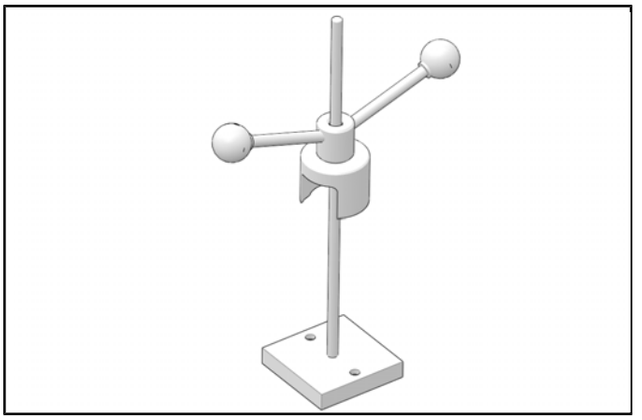
DRIVEN CLUTCH DISASSEMBLY

1. Remove driven clutch from the transmission input shaft.

IMPORTANT

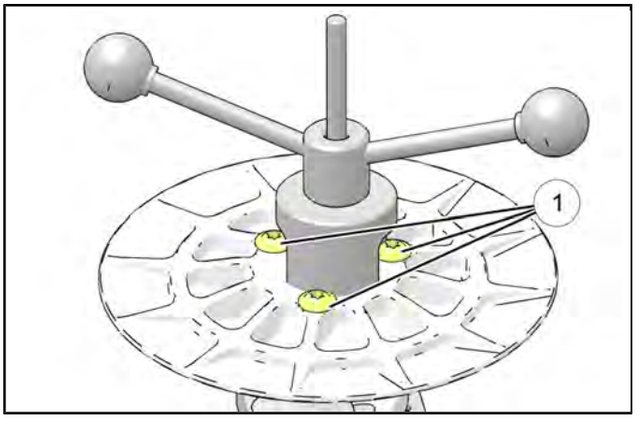
It is important to mark the position of the helix cover, sheaves and spider with a tape or grease marker before disassembly. Some components will have X's on the components for alignment reference. This helps with clutch assembly and maintains clutch balance.

2. Separate the sheaves and place the driven clutch (helix side up) into the Universal Clutch Compressor.



Universal Clutch Compressor: **PU-50518-A**

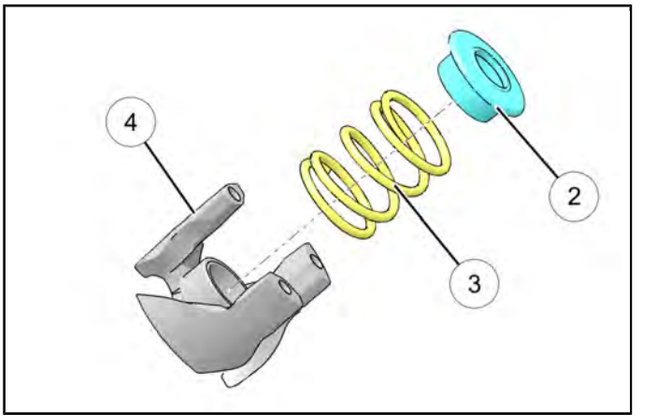
3. Spin the compressor down until it just starts to contact the helix cover. Remove the three fasteners ① that secure the cam (helix) assembly using a T50 Torx driver. Remove the universal clutch compressor and stationary sheave.



⚠ CAUTION

The helix cover is loaded by the spring. Not using a proper compressor may result in personal injury or damage to the clutch.

4. Remove spring cap ② and clutch spring ③ from the helix ④.



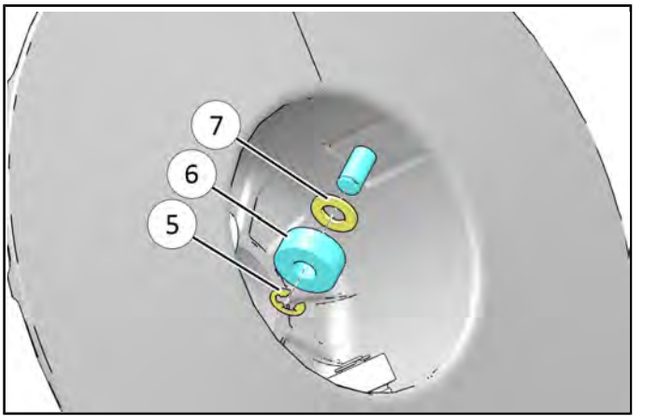
IMPORTANT

Mark Helix to Sheave hole orientation before removing helix.

5. Inspect roller for play and wear or rough spots by rotating it. If excessive wear, rough spots, or play exists, remove the E-clip ⑤, Roller ⑥, and Washer ⑦ from sheave. Replace as necessary.

NOTICE

Roller pin is not serviceable.

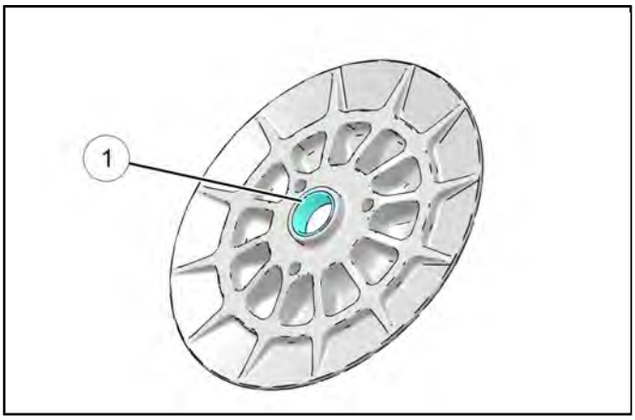


6. Inspect the sheaves for excessive wear or damage. Replace if necessary.

HELIX AND MOVABLE SHEAVE BUSHING INSPECTION

1. Inspect the Teflon® coating ① on the moveable sheave bushing. Inspect Sheave for signs of wear, grooving or cracking. De-glaze sheave surfaces with a 3M Scotch-Brite™ Pad if needed. Replace if needed.

Moveable Sheave Bushing Inspection: Replace the movable sheave if more brass than Teflon® is visible on the bushing.



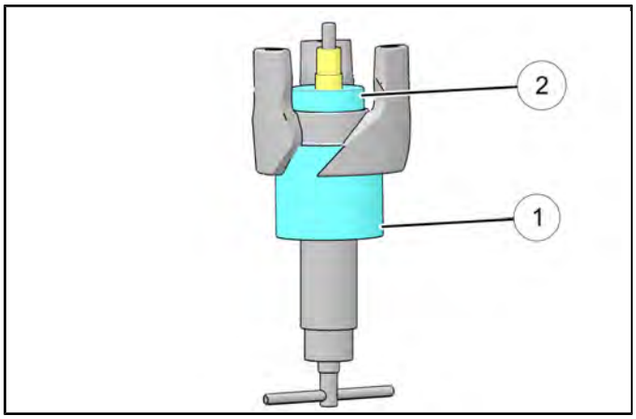
2. Inspect the Teflon® coating ② on the Helix bushing. Inspect Helix for signs of wear, grooving or notching on ramps. De-glaze surfaces with a 3M Scotch-Brite™ Pad if needed. Replace if needed.

Helix Bushing Inspection: Replace the Helix bushing if more brass than Teflon® is visible on the bushing. Refer to Bushing Service page 6.23procedure.

BUSHING SERVICE

HELIX BUSHING REMOVAL

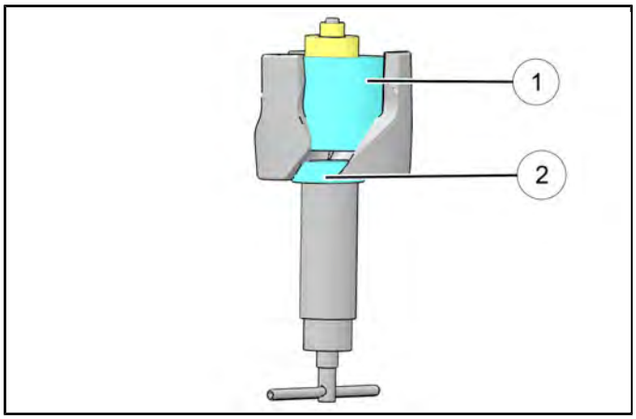
1. Install the main adapter ① on puller.



2. From the inside of the Helix, insert bushing adapter ② (PN **5020636**) into the bushing. Install spacer and top nut to secure adapter on Helix.
3. Insert the piston pin puller in a vise.
4. Using a pry bar located between the fingers of the helix, turn the helix counter clockwise to remove the bushing.
5. Remove the nut from the puller rod and set aside.
6. Remove the bushing and bushing removal tool from the puller. Discard the bushing.

HELIX BUSHING INSTALLATION

1. Apply Loctite 620® evenly to bushing bore in cover.



2. From the bottom of the Helix, insert the new bushing and bushing adapter ② (PN **5020636**)
3. Install the main adapter ①, spacer adapter, and securing nut on top of the Helix.

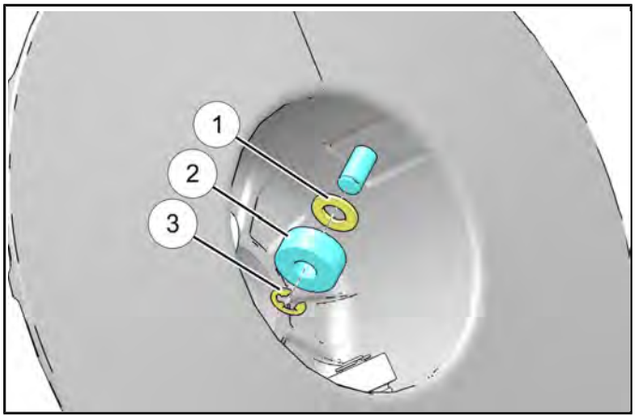
4. Use a pry bar located between the fingers of the Helix to turn the Helix counterclockwise. Turn until bushing bottoms out.

IMPORTANT
Only light force is needed to install the bushing. Do not increase pressure after bushing bottoms out, or damage may result to bushing.

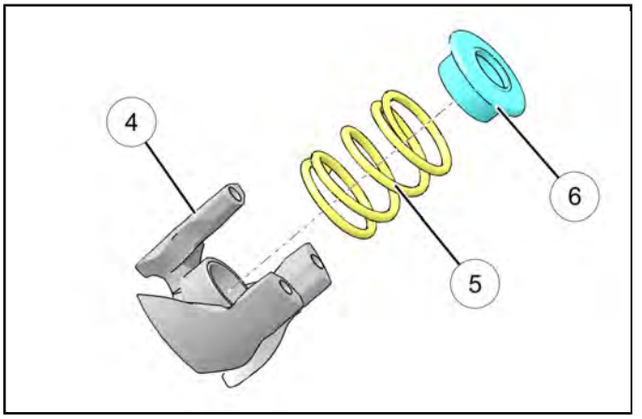
5. Remove nut and spacer adapter from puller rod. Remove Helix and bushing adapter from puller rod.

DRIVEN CLUTCH ASSEMBLY

1. Re-install washer ①, roller ②, and e-clip ③ Ensure e-clip is fully seated and roller rotates freely.

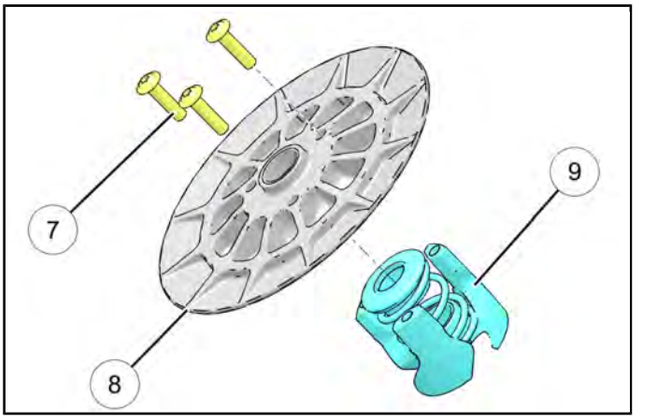


2. Install clutch spring ⑤ and clutch spring cap ⑥ on the helix ④. Ensure the clutch spring is fully seated.

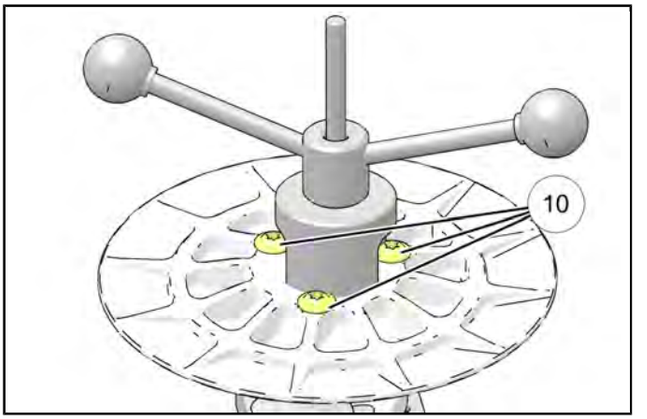


3. Re-install the retaining fasteners ⑦ and movable sheave ⑧ onto the helix ⑨ using previous hole orientation.

IMPORTANT
Using previous hole orientation will ensure the driven clutch maintains balance.



4. Using clutch compressor PU-50518 compress the driven clutch assembly.



⚠ CAUTION
The helix cover is loaded by the spring. Not using a proper compressor may result in personal injury or damage to the clutch.

5. Torque the three T50 torx fasteners ⑩ to specification.

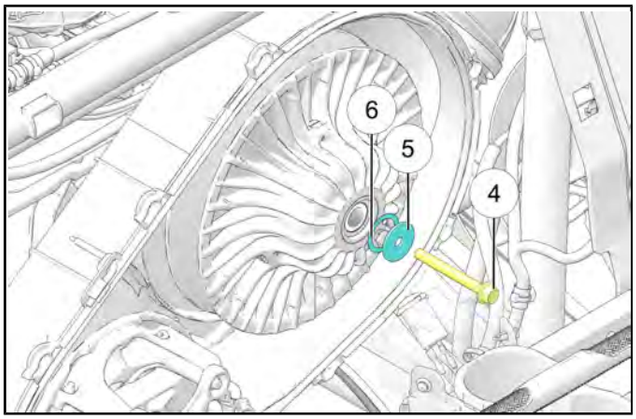
TORQUE
Helix Fasteners: **32 ft-lbs (44 Nm)**

6. Once back together, verify the alignment marks made during disassembly are properly aligned.

7. Install the stationary and movable sheave on the vehicle. See Driven Clutch Installation.

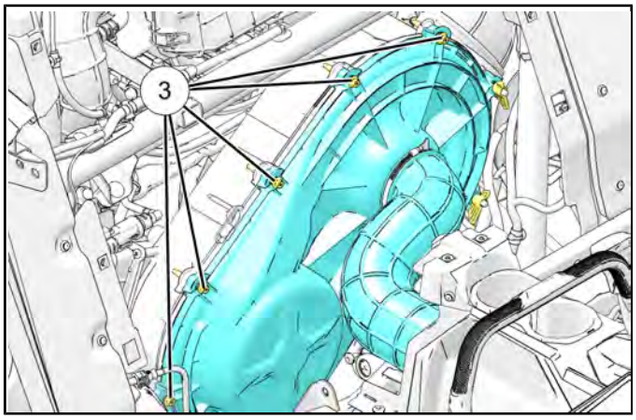
DRIVEN CLUTCH INSTALLATION

1. Install driven clutch, bolt ④, spacer ⑤, and washer ⑥. Torque fastener to specification.



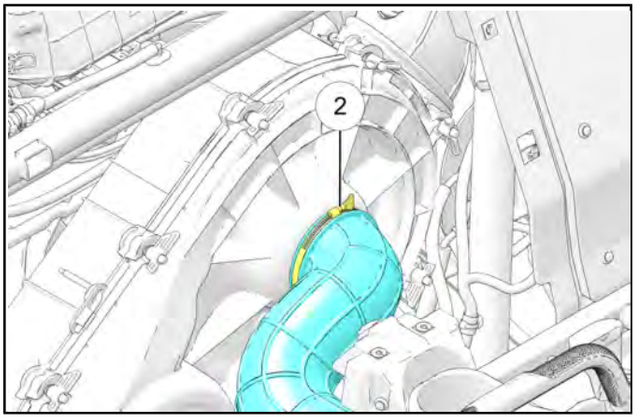
TORQUE
Driven Clutch Retaining Bolt: **55 ft-lbs (75 Nm)**

2. Install the drive belt.
3. Install outer clutch cover. Install five fasteners③ and engage 1/4 turn latches to secure the cover. Torque fasteners to specification.



TORQUE
Outer PVT Cover Fasteners: **60 in-lbs (7 Nm)**

4. Install clutch intake hose. Tighten hose clamp ②. Torque hose clamp to specification.



TORQUE
PVT Intake Hose Clamp: **35 in-lbs (4 Nm)**

5. Install upper and lower rear close-off panels.
6. Install seats. On 4-seat models, install the rear seats.

DRIVEN CLUTCH ALIGNMENT

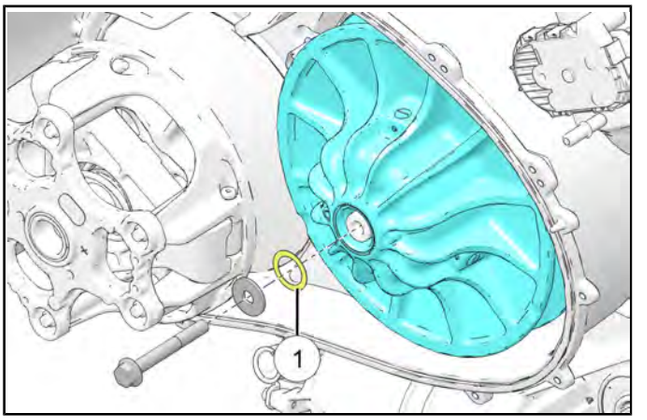
Most vehicles require four to six alignment washers (PN **7557060**) for proper alignment. As many as eight alignment washers or as few as zero may be used.

IMPORTANT
The main washer directly under the head of the bolt must always be used.

1. Remove the outer clutch cover from the vehicle.
2. Rotate the driven clutch clockwise several times before inspection.
3. Inspect where the belt is riding on the drive clutch.

NOTICE
A mobile device can be used to capture a picture of the belt tracking to determine if adjustment is needed.

4. Remove the drive belt.
5. Remove the Driven Clutch Bolt and washer.



6. Add shims ① to move the belt closer to the inner sheave of the drive clutch, or remove shims to move the belt closer to the outer sheave of the drive clutch.

IMPORTANT
Ensure the driven clutch splines and transmission splines and shaft are clean and free of debris.

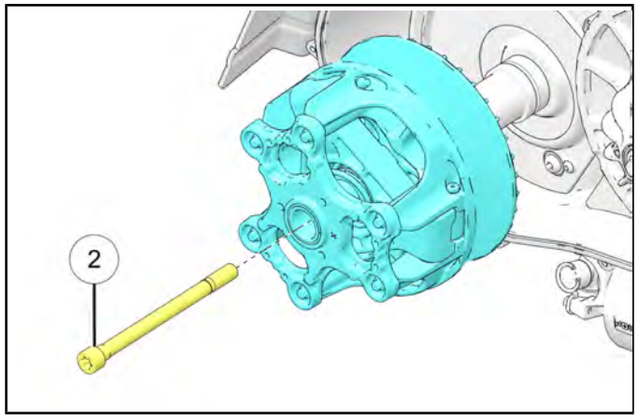
7. Reinstall the washers and Driven Clutch Bolt. Torque to specification.

TORQUE
Driven Clutch Bolt: **2020 Models: 43 ft-lbs (58 Nm)**

NOTICE
When finished, the driven clutch should not rotate on its own, or should stop with minimal drag when using a new bearing.

8. Remove the drive clutch bolt ② and drive clutch.

IMPORTANT
Ensure the drive clutch taper and engine taper are clean and free of debris.



9. Reinstall the drive clutch and bolt. Torque the drive clutch bolt to specification.

TORQUE
Drive Clutch Retaining Bolt: **140 ft-lbs (190 Nm)**

10. Reinstall the drive belt and outer cover assembly. Refer to Belt Installation page .

NOTES

CHAPTER 7
TRANSMISSION

GENERAL INFORMATION

SPECIAL TOOLS

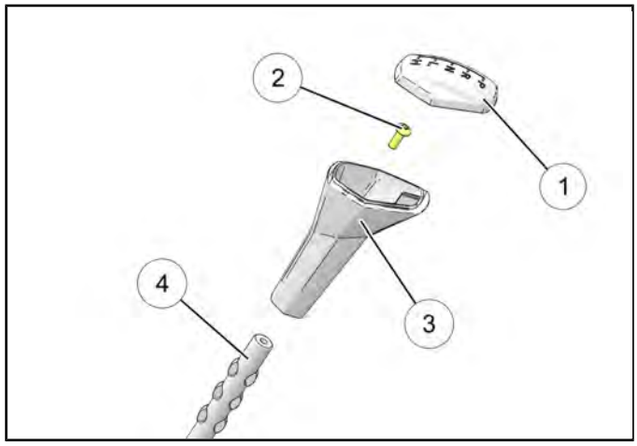
PART NUMBER	TOOL DESCRIPTION
PU-51862	Snorkel Tube Tool
PU-52422	Drive Clutch Puller

Bosch Automotive Service Solutions: 1-800-345-2233
or http://polaris.service-solutions.com

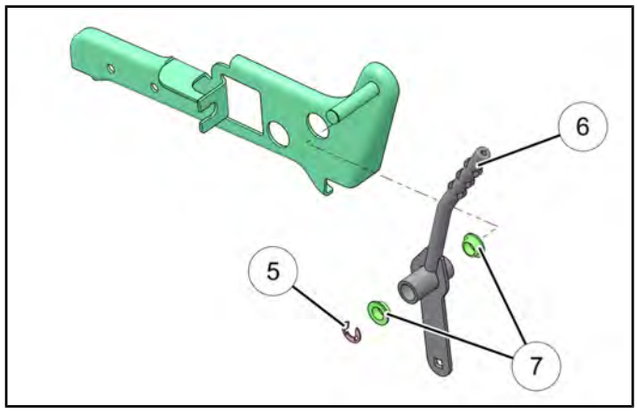
SHIFT LEVER / CABLE

SHIFT LEVER REMOVAL

1. Remove the shift knob cover ①, retaining screw ② and shift knob ③ from the shift lever ④.



2. Remove the fasteners retaining the center console (see Body / Frame chapter). Remove the console from the vehicle.
3. Remove the clip and washer retaining the shift cable to the shift lever and disconnect the cable end from the lever.
4. Remove the retaining ring ⑤ and slide the shift lever ⑥ off the mounting bracket and out from the frame.



5. Remove both bushings ⑦ from the shift lever and service as needed.

SHIFT LEVER INSTALLATION

Perform the removal steps in reverse order to install the gear shift lever (lever, cable, console, shift knob).

SHIFT CABLE INSPECTION

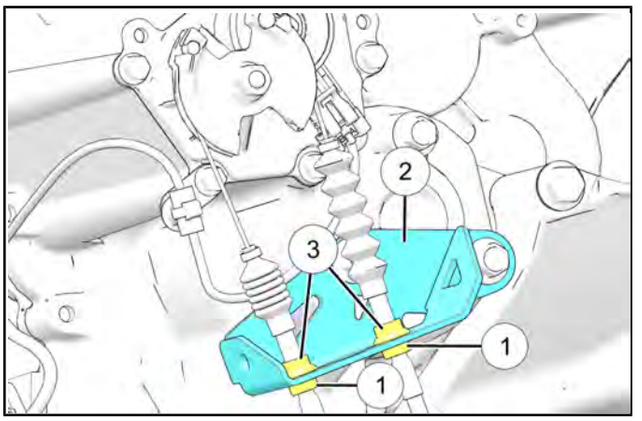
Shift cable adjustment may be necessary if symptoms include:

- No gear position or AWD display on instrument cluster
- Ratcheting noise on deceleration
- Inability to engage into a gear
- Excessive gear lash (noise)
- Gear selector moving out of desired range

Inspect shift cable, clevis pins, and pivot bushings and replace if worn or damaged.

SHIFT CABLE ADJUSTMENT

1. Locate the shift cable attached to the transmission case in the right rear wheel well area.
2. Inspect shift cables, clevis pin, pivot bushings, and dust boots. Replace if worn or damaged.
3. If adjustment is required, loosen the lower jam nuts ① and pull the cable out of the mount ② to move the upper jam nut ③.



4. Adjust the shift cable so there is the about the same amount of cable travel when shifting slightly past HIGH gear than when shifting to PARK.
5. Thread the upper or lower jam nut as required to obtain proper cable adjustment.

NOTICE
This procedure may require a few attempts to obtain the proper adjustment.

6. Once the proper adjustment is obtained, place the shift cables and upper jam nuts into the mount. Tighten the lower jam nuts against the mount.

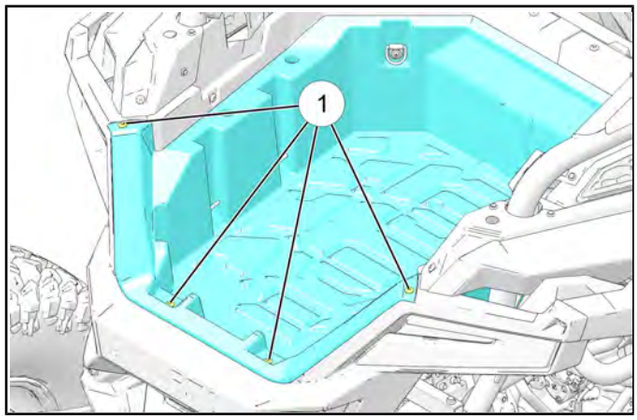
TORQUE
Shift Cable Jam Nuts: **7 ft-lbs (10 Nm)**

7. Start engine and shift through all gears to ensure the shift cable is properly adjusted. If transmission still ratchets after cable adjustment, the transmission will require service.

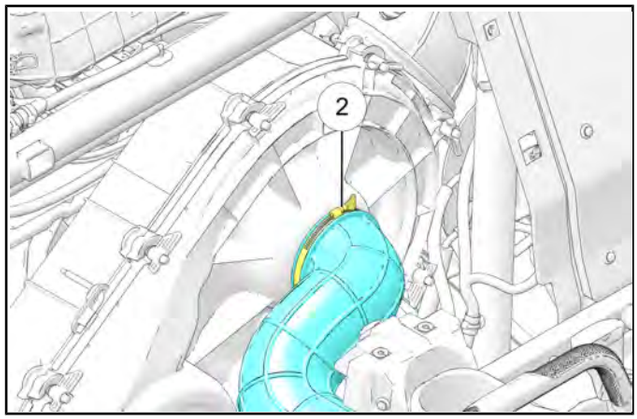
TRANSMISSION SERVICE

TRANSMISSION REMOVAL

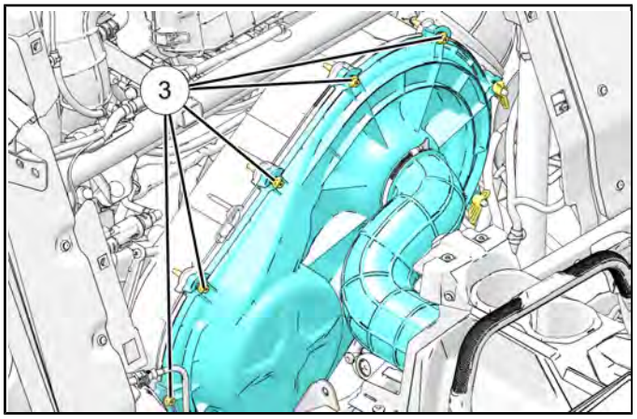
1. Park vehicle on a level surface.
2. Remove seats. On 4-seat models, remove the rear seats.
3. Disconnect the battery.
4. Remove upper and lower rear close-off panels.
5. Remove four fasteners ① and remove the cargo box.



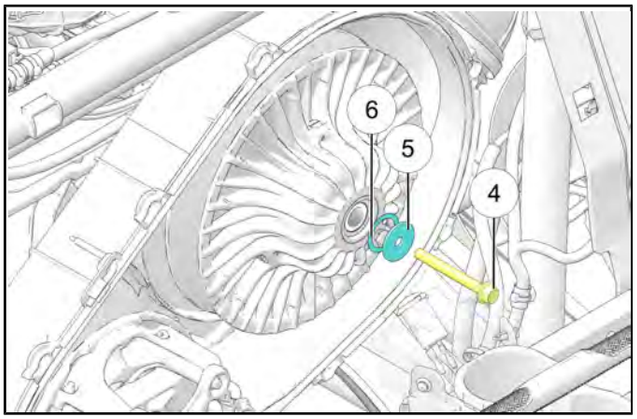
6. Drain coolant. Disconnect engine coolant inlet and outlet hoses.
7. Disconnect fuel line from the fuel rail.
8. Loosen hose clamp ② and remove the PVT intake hose.



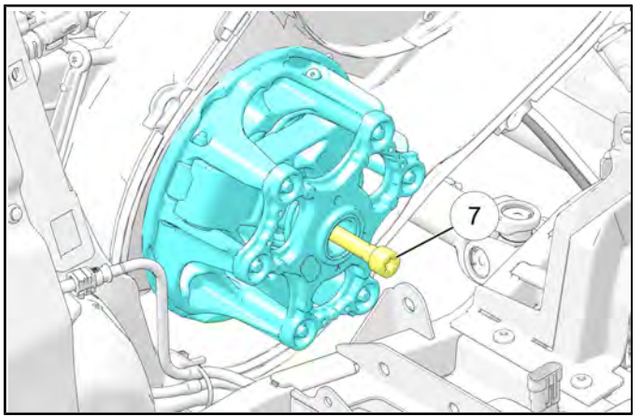
9. Remove five fasteners ③, disengage remaining 1/4 turn latches, and remove the outer PVT cover.



10. Remove the drive belt.
11. Remove bolt ④, spacer ⑤, and washer ⑥. Remove the driven clutch.



12. Remove drive clutch retaining bolt ⑦ and remove the drive clutch moveable-sheave assembly.

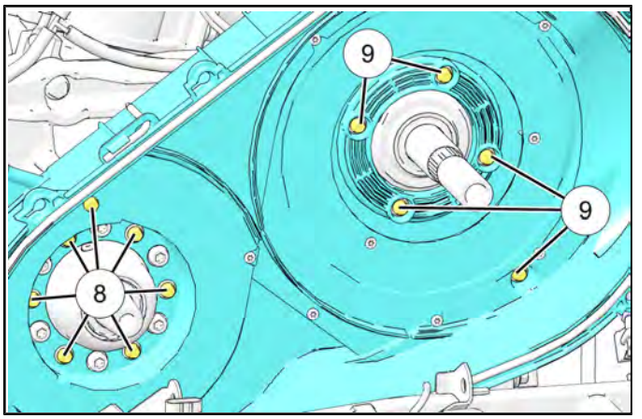


7

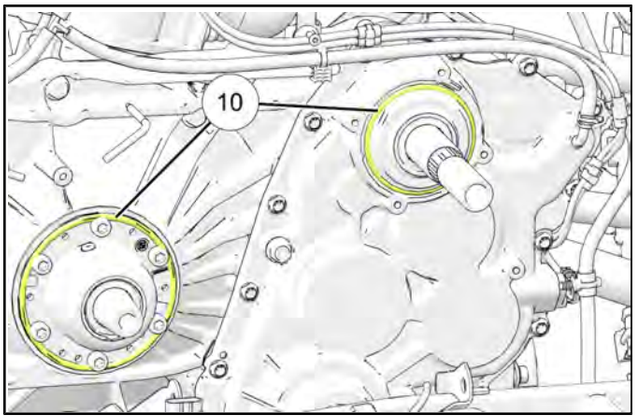
13. Remove the outer slip-fit post and install the Drive Clutch Puller (PN **PU-52422**) to remove the stationary sheave.

Drive Clutch Puller: **PU-52422**

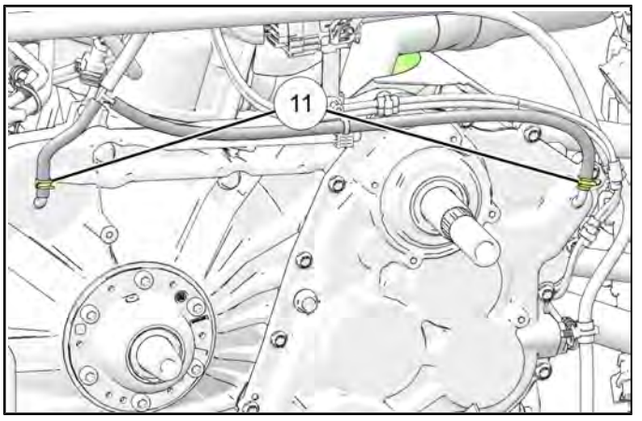
14. Remove inner clutch cover fasteners ⑧ and ⑨, and remove the inner clutch cover.



15. Remove two O-rings ⑩ from the transmission.

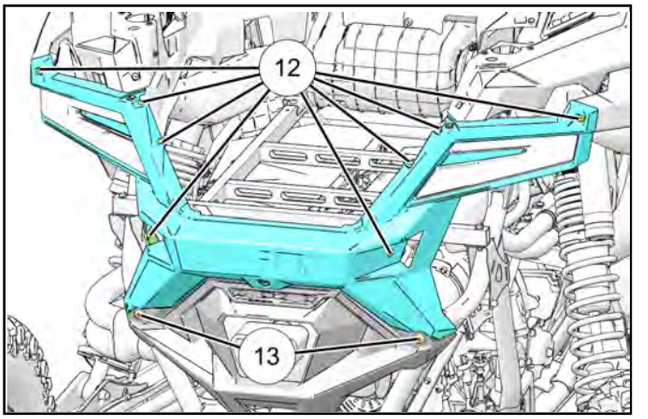


16. Disengage hose clamps ⑪ and remove vent hoses from the transmission.

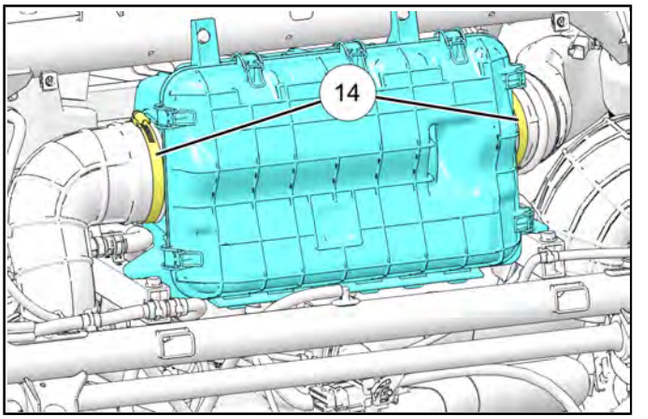


17. Disconnect rear tail light harness.

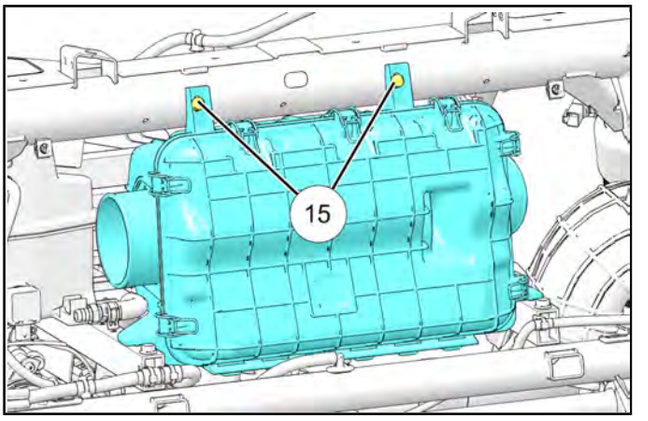
18. Remove eight fasteners ⑫ from the rear fascia, and two fasteners ⑬ from the rear bumper. Remove rear fascia and bumper.



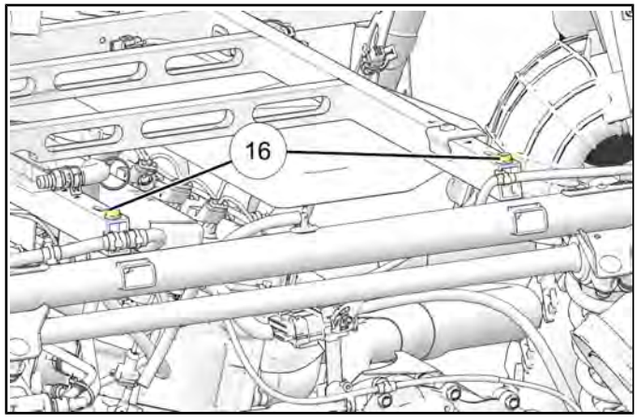
19. Loosen two air box hose clamps ⑭ and disconnect air ducts from the air box.



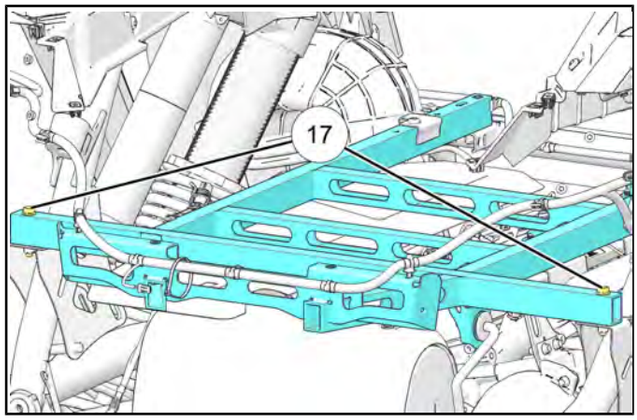
20. Remove two air box mounting fasteners ⑮ and remove the air box.



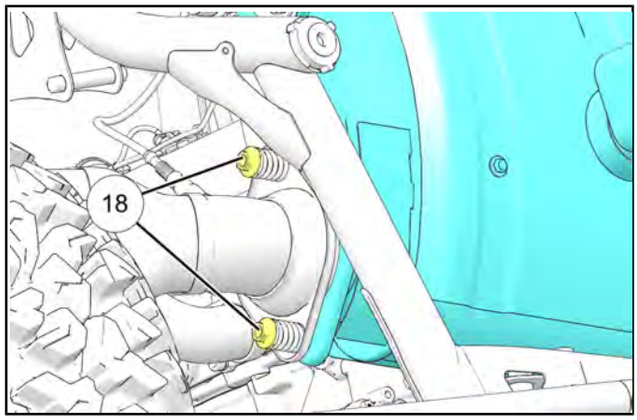
21. Remove two fasteners ⑯ from the front of the box support.



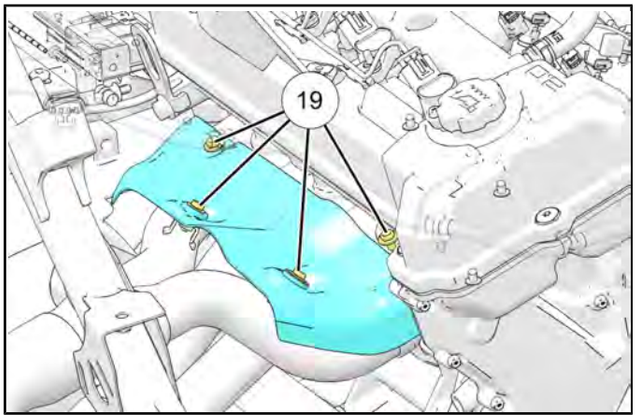
22. Remove two rear fasteners ⑰ and remove cargo box support.



23. Remove two exhaust pipe-to-muffler fasteners ⑱ and remove the muffler.

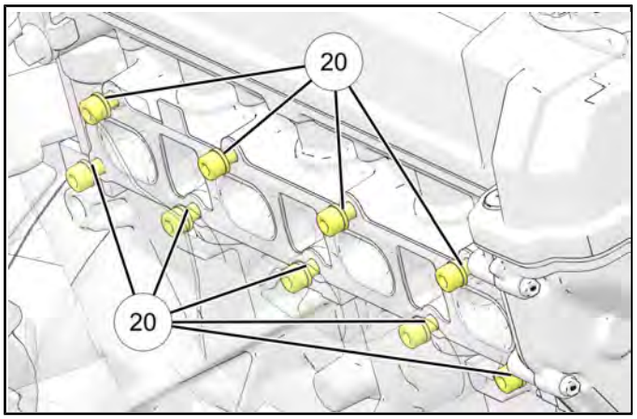


24. Remove four fasteners ⑲ from the exhaust manifold heat shield and remove heat shield.

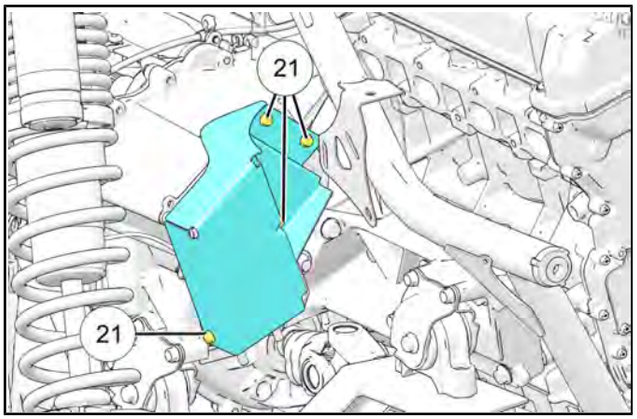


25. Disconnect oxygen sensor electrical harness.

26. Remove nine fasteners ⑳ from the exhaust manifold and remove the exhaust assembly.

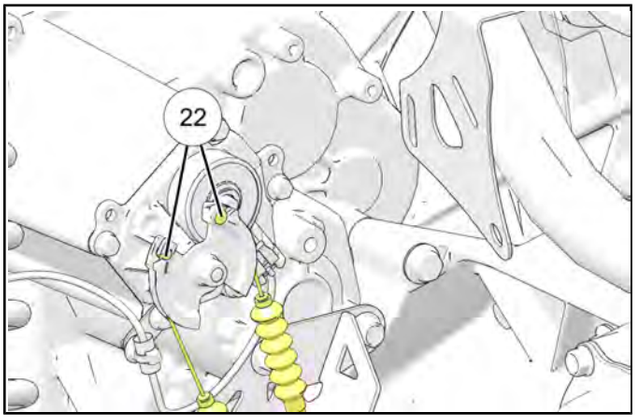


27. Remove four fasteners ㉑ from gear position sensor shield and remove shield.

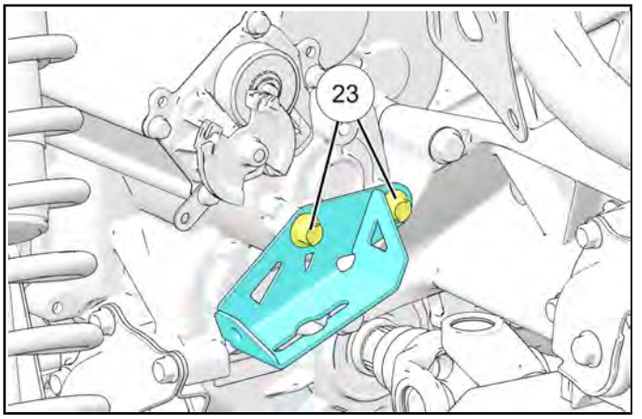


28. Disconnect gear position sensor electrical harness.

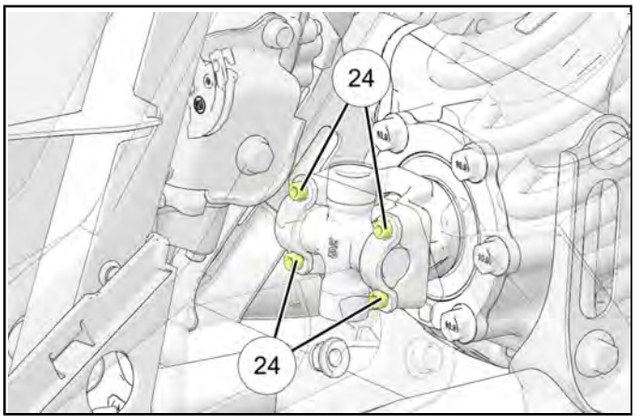
29. Disconnect shift cables ㉒.



30. Remove two fasteners ㉓ and remove shift cable bracket.

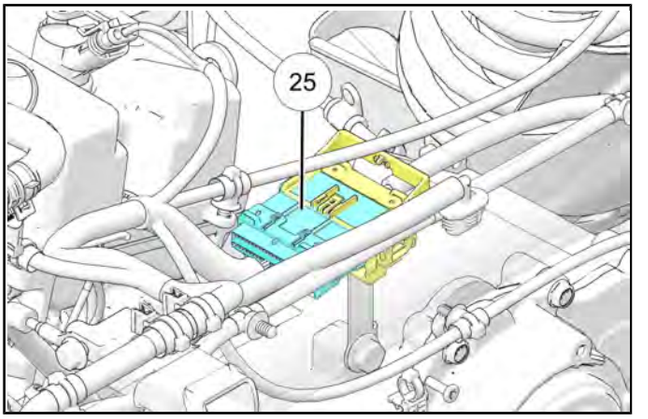


31. Remove four fasteners ㉔ retaining the rear prop shaft and remove rear prop shaft.

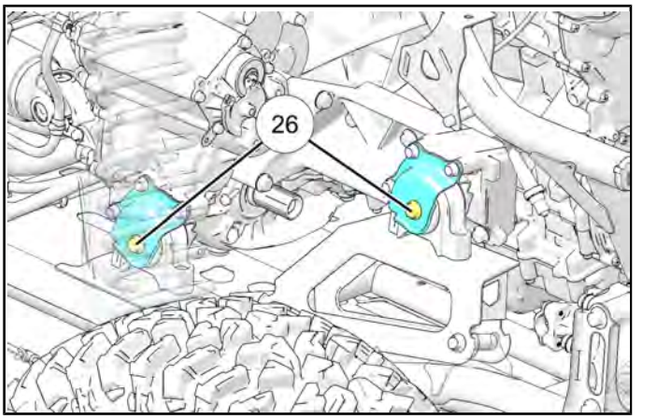


NOTICE
Prop shaft hidden for image clarity.

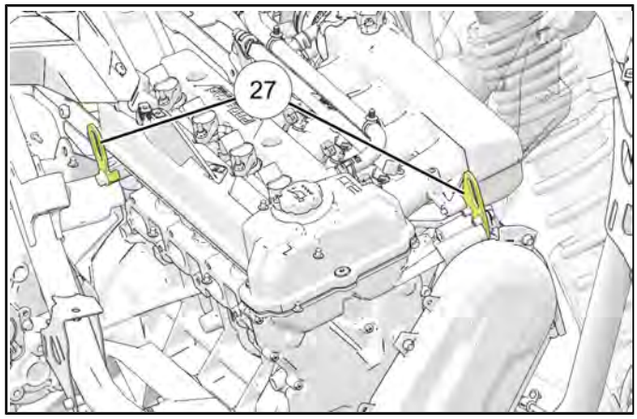
32. Disconnect main engine electrical harness ㉕.



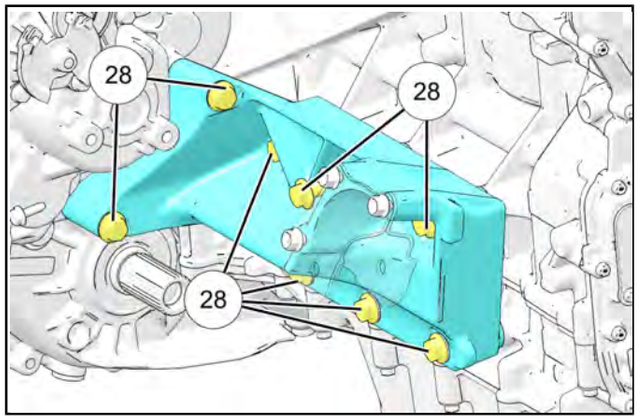
33. Remove four engine/transmission mounting fasteners ㉖.



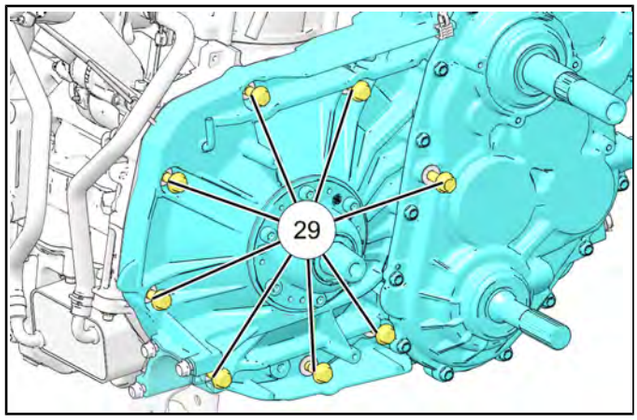
34. Attach engine hoist to lift brackets ㉗ . Remove engine and transmission as an assembly through the top of the vehicle.



35. With the engine and transmission removed from the vehicle, remove eight fasteners ㉘ and remove the engine mount.

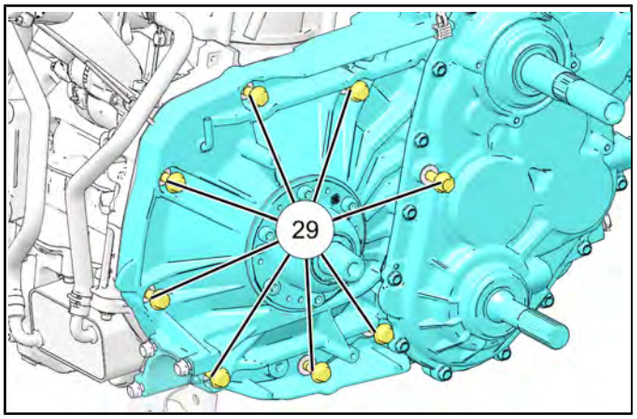


36. Remove eight fasteners ㉙ from the transmission. Separate the engine and transmission.



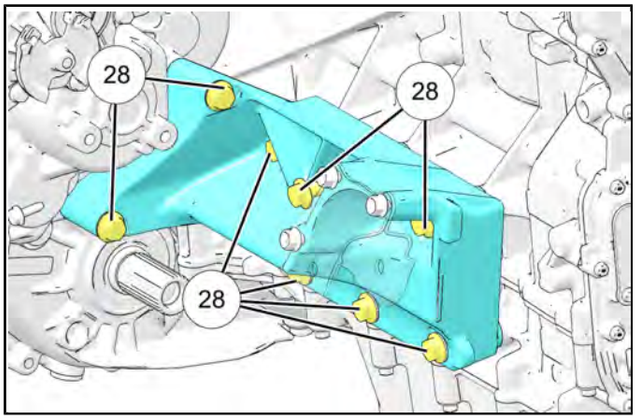
TRANSMISSION INSTALLATION

1. Align transmission with the engine. Install eight fasteners ㉙ into the transmission. Torque fasteners to specification.



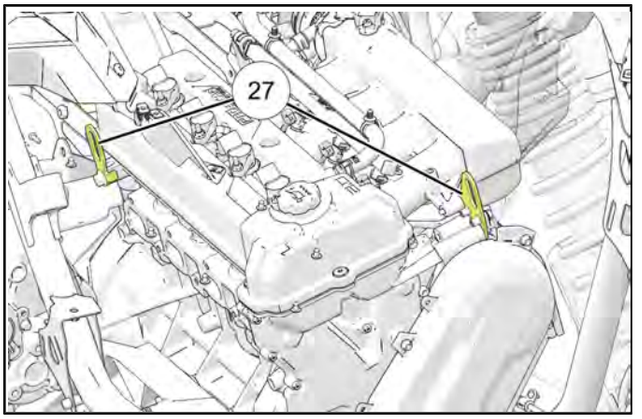
TORQUE
Transmission-to-Engine Mounting Fasteners: **Step 1: 11 ft-lbs (15 Nm)Step 2: 44 ft-lbs (60 Nm)**

2. Install the engine mount. Install eight fasteners ㉘ into the engine mount. Torque fasteners to specification.

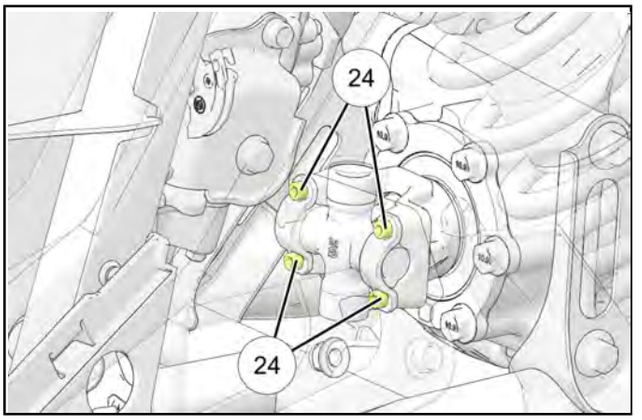


TORQUE
Engine Mount Fasteners: **Step 1: 26 in-lbs (3 Nm)Step 2: 33 ft-lbs (45 Nm)**

3. Attach engine hoist to lift brackets ㉗ . Lower engine and transmission as an assembly into the vehicle.



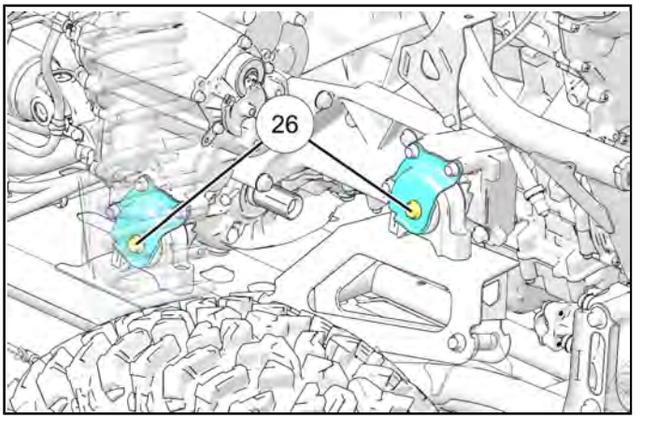
4. With the engine/transmission assembly hanging in place, install front and rear prop shafts onto the transmission output shafts.
5. Install rear prop shaft onto rear gearcase. Install four fasteners ㉔ and torque fasteners to specification.



NOTICE
Prop shaft hidden for image clarity.

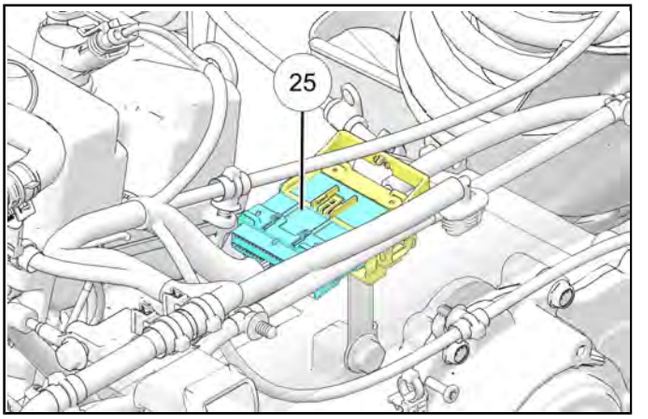
TORQUE
Rear Prop Shaft Coupling Fasteners: **11 ft-lbs (15 Nm)**

6. Install four engine/transmission mounting fasteners ㉖. Torque fasteners to specification.

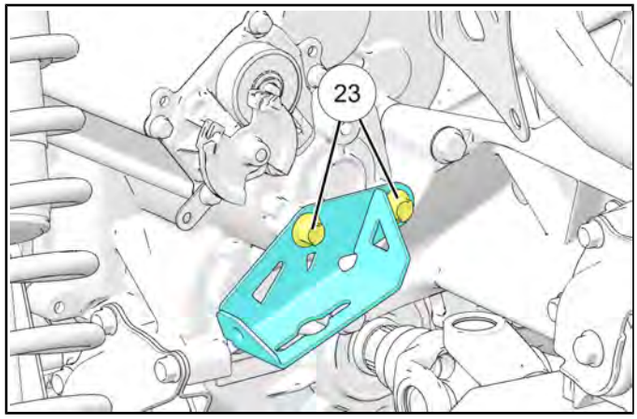


TORQUE
Engine/Transmission Mounting Fasteners: **33 ft-lbs (45 Nm)**

7. Connect main engine electrical harness ㉕.

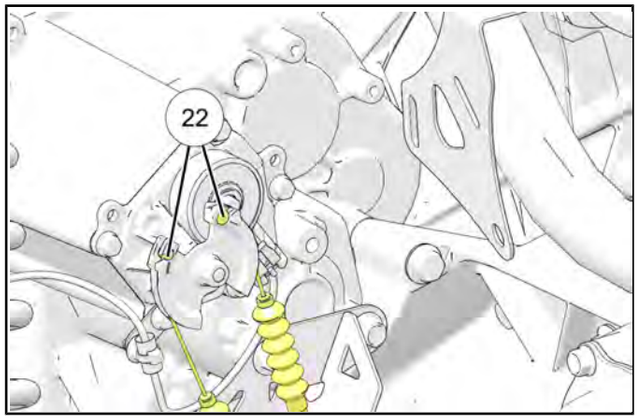


8. Install shift cable bracket and two fasteners ㉓ . Torque fasteners to specification.



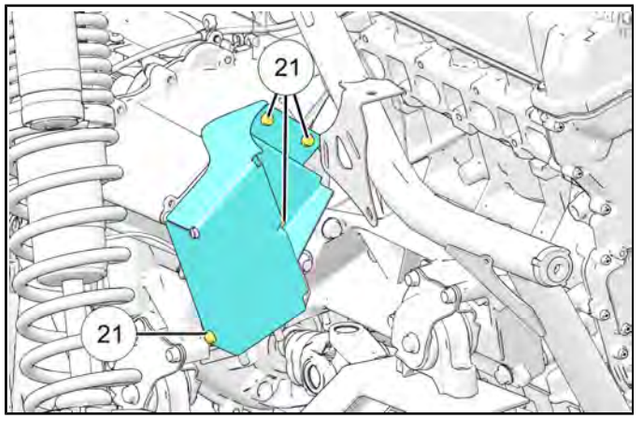
TORQUE
Shift Cable Bracket Fasteners: **22 ft-lbs (30 Nm)**

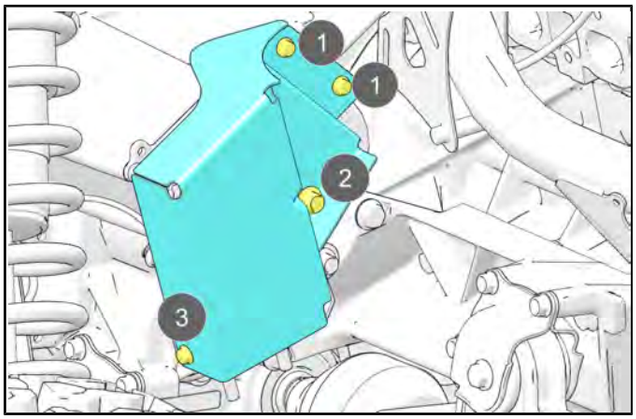
9. Connect shift cables ㉒.



Connect gear position sensor electrical harness.

10. Install gear position sensor shield and four fasteners ㉑. Torque fasteners to specification as shown.

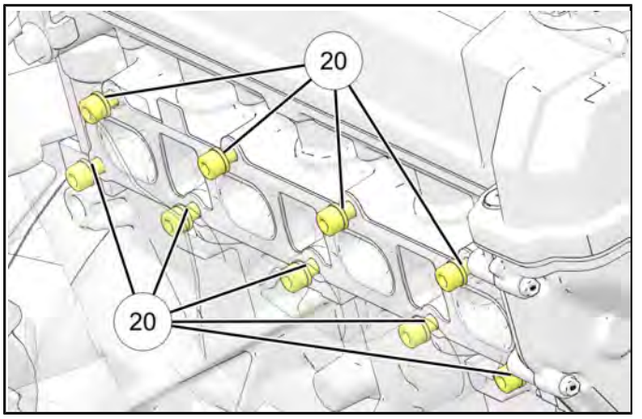


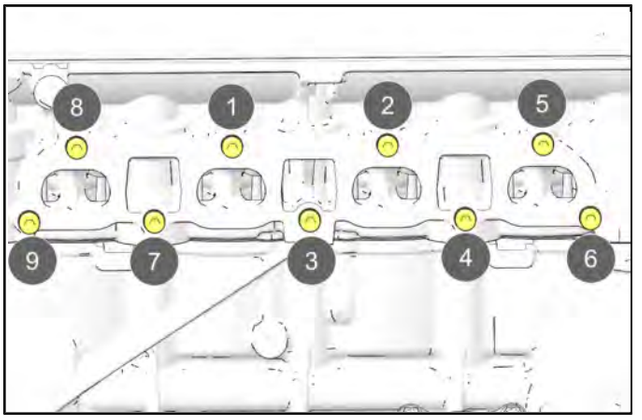


TORQUE
Gear Position Sensor Shield Fasteners: **①: 15 ft-lbs (20 Nm)②: 22 ft-lbs (30 Nm)③: 72 in-lbs (8 Nm)**

7

11. Install exhaust pipe onto engine. Install nine fasteners ⑳. Torque fasteners to specification in the sequence shown.



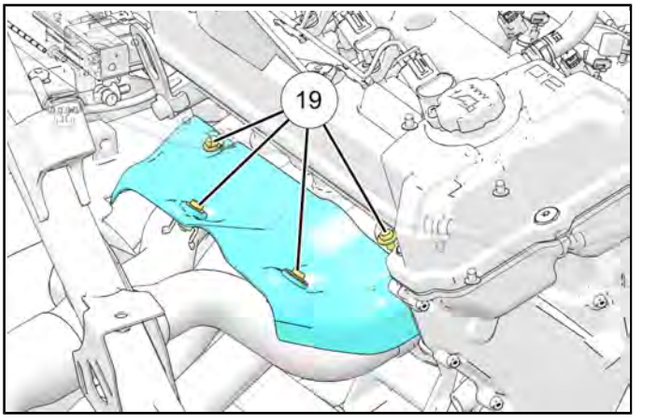


NOTICE
Exhaust manifold hidden for image clarity

TORQUE
Exhaust Manifold Fasteners: **Step 1: 60 in-lbs (7 Nm)Step 2: 22 ft-lbs (30 Nm)**

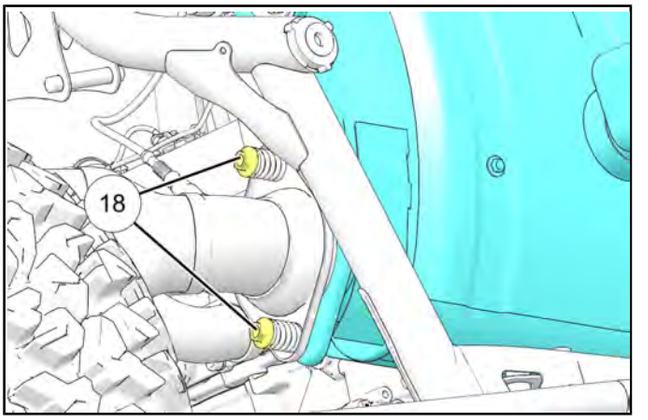
12. Connect oxygen sensor electrical harness.

13. Install exhaust manifold shield and four fasteners ⑲. Torque fasteners to specification.



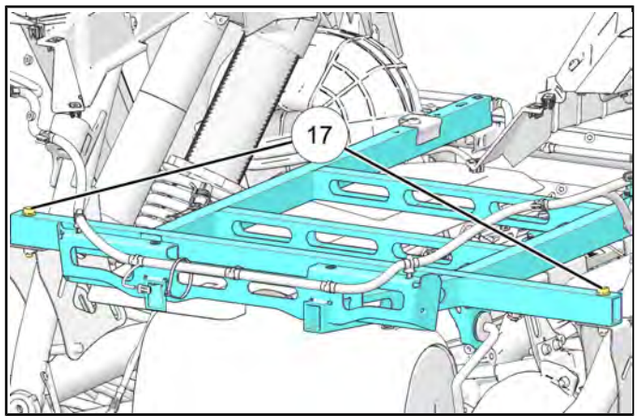
TORQUE
Exhaust Manifold Heat Shield Fasteners: **71 in-lbs (8 Nm)**

14. Install muffler into rubber grommets. Install two exhaust pipe-to-muffler fasteners ⑱. Torque fasteners to specification.

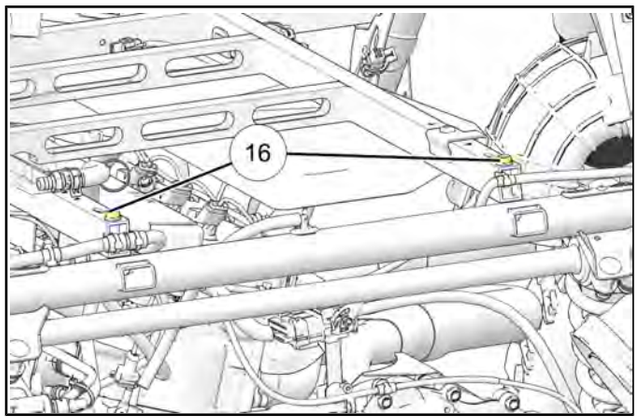


TORQUE
Head Pipe to Muffler Fasteners: **18 ft-lbs (25 Nm)**

15. Install rear cargo box support. Loosely install two rear fasteners ⑰.

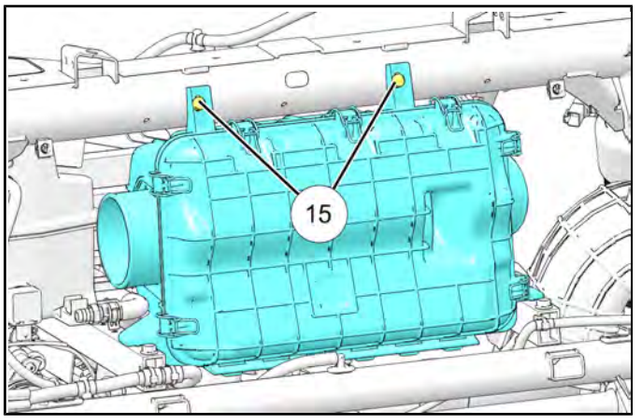


16. Install two fasteners ⑯ into the front of the box support. Torque front and rear fasteners to specification.



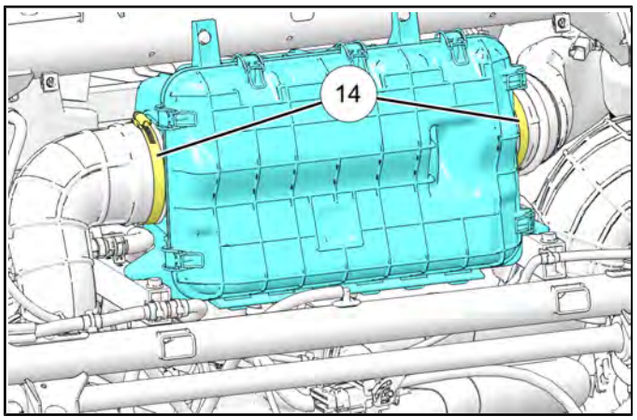
TORQUE
Cargo Box Support Fasteners: **22 ft-lbs (30 Nm)**

17. Install air box and two air box mounting fasteners ⑮. Torque fasteners to specification.



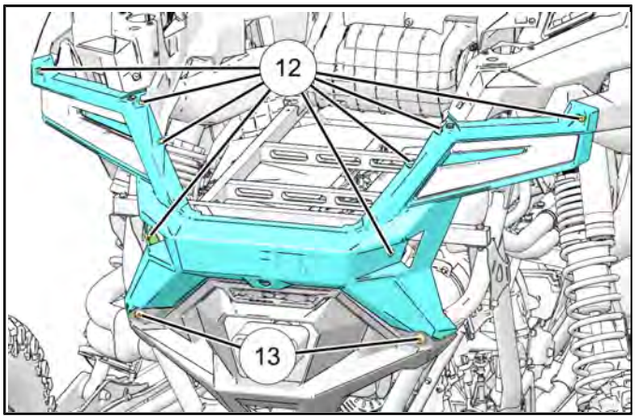
TORQUE
Air Box Mounting Fasteners: **9 ft-lbs (12 Nm)**

18. Install air box ducts. tighten two air box hose clamps ⑭. Torque hose clamps to specification.



TORQUE
Intake Duct Hose Clamps: **35 in-lbs (4 Nm)**

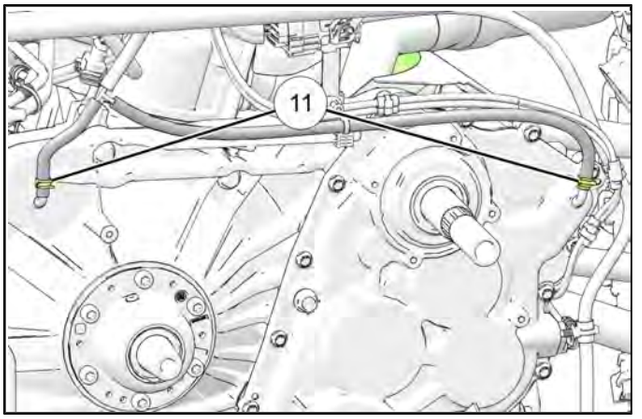
19. Install rear fascia and rear bumper. Install eight fasteners ⑫ into the rear fascia, and two fasteners ⑬ into the rear bumper. Torque fasteners to specification.



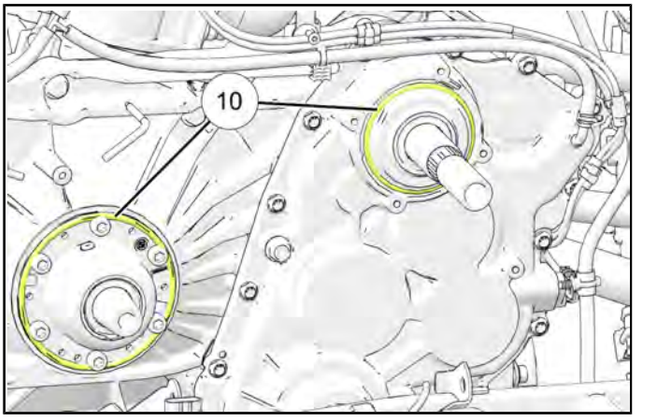
TORQUE
Rear Fascia/Bumper Fasteners: **7 ft-lbs (10 Nm)**

20. Connect rear tail light harness.

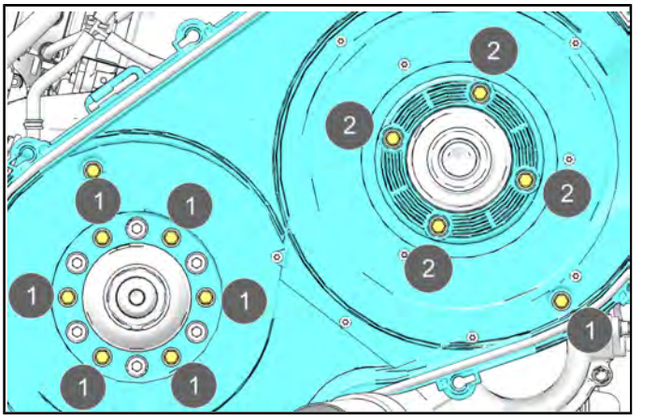
21. Install two transmission vent lines and engage hose clamps ⑪.



22. Install two O-rings ⑩ onto the transmission.



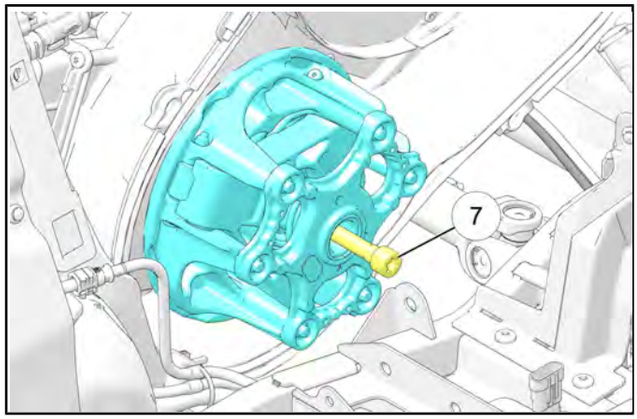
23. Install inner clutch cover and inner clutch cover fasteners ⑧ and ⑨. Torque fasteners to specification.



TORQUE
Inner PVT Cover Fasteners: **①: 11 ft-lbs (15 Nm)②: 35 in-lbs (4 Nm)**

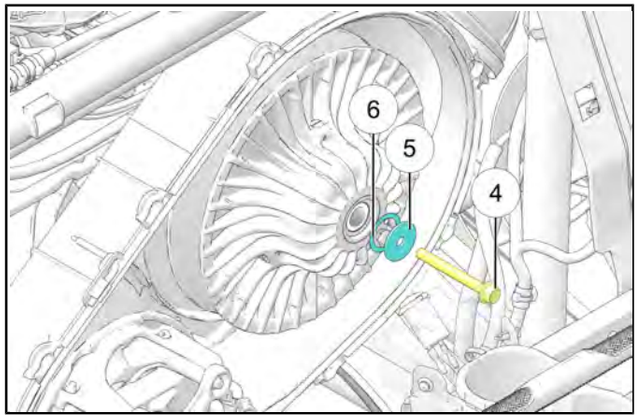
24. Install drive clutch stationary sheave.

25. Install drive clutch moveable sheave and drive clutch retaining bolt ⑦. Torque fastener to specification.



TORQUE
Drive Clutch Retaining Bolt: **Step 1: 140 ft-lbs (190 Nm)Step 2: Loosen two full turns (720°)Step 3: 118 ft-lbs (160 Nm)**

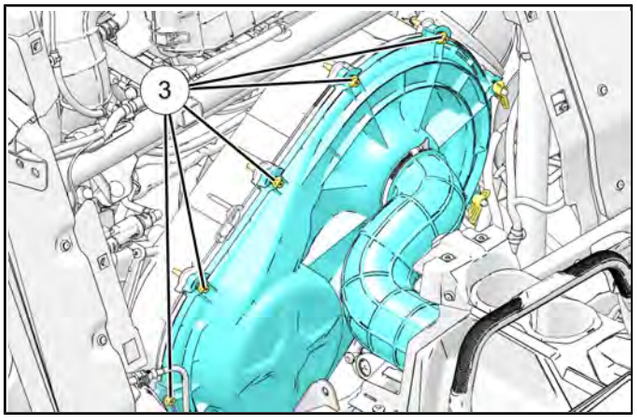
26. Install driven clutch, bolt ④, spacer ⑤, and washer ⑥. Torque fastener to specification.



TORQUE
Driven Clutch Retaining Bolt: **55 ft-lbs (75 Nm)**

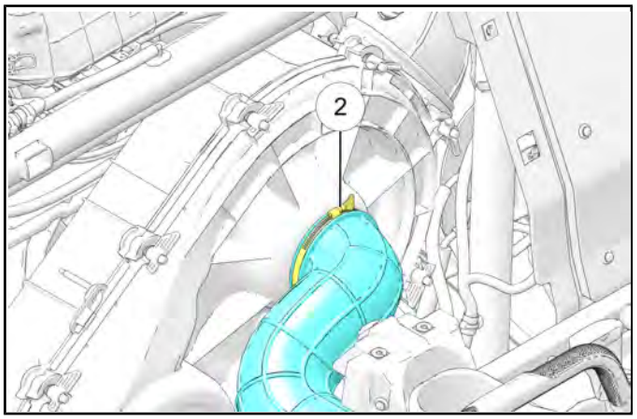
27. Install the drive belt.

28. Install outer clutch cover. Install five fasteners③ and engage 1/4 turn latches to secure the cover. Torque fasteners to specification.



TORQUE
Outer PVT Cover Fasteners: **60 in-lbs (7 Nm)**

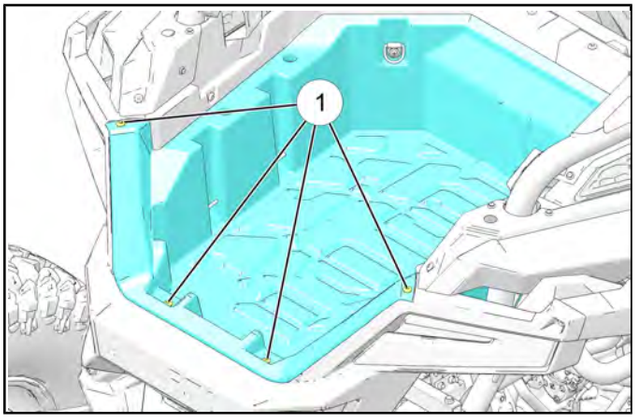
29. Install clutch intake hose. Tighten hose clamp ②. Torque hose clamp to specification.



TORQUE
PVT Intake Hose Clamp: **35 in-lbs (4 Nm)**

30. Connect fuel line onto the fuel rail.
31. Connect coolant inlet and outlet hoses to the engine.
32. Fill coolant. Refer to coolant fill/bleed procedure outlined in this chapter.

33. Install cargo box and four fasteners ①. Torque fasteners to specification.



TORQUE
Cargo Box Fasteners: **7 ft-lbs (10 Nm)**

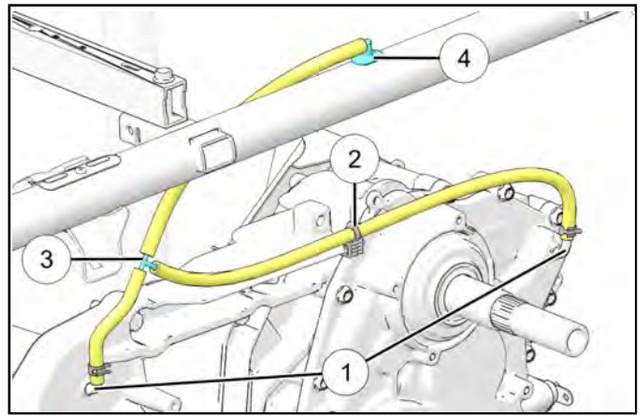
34. Install upper and lower rear close-off panels.
35. Connect the battery. Torque cables to specification.

TORQUE
Battery Cable Fasteners: **60 in-lbs (9 Nm)**

36. Install seats. On 4-seat models, install the rear seats.

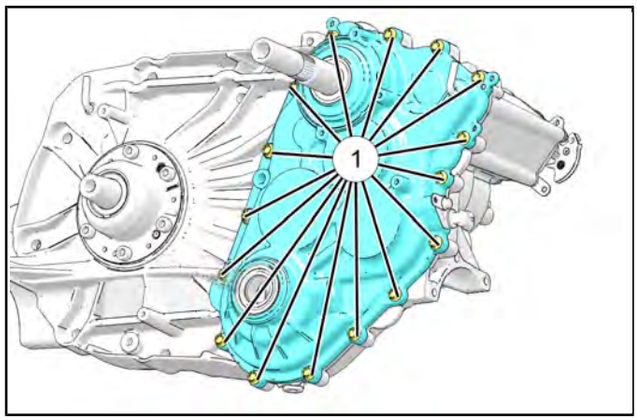
TRANSMISSION VENT LINE ROUTING

1. The transmission vent lines connect to two barb fittings ① on the front of the transmission.
2. One line routes across the transmission and is secured with a hinge clip ②.
3. Both lines join at a tee-fitting ③ above the transmission.
4. The vent line terminates into a fitting ④ on the rear sway bar mounting tube below the air box.

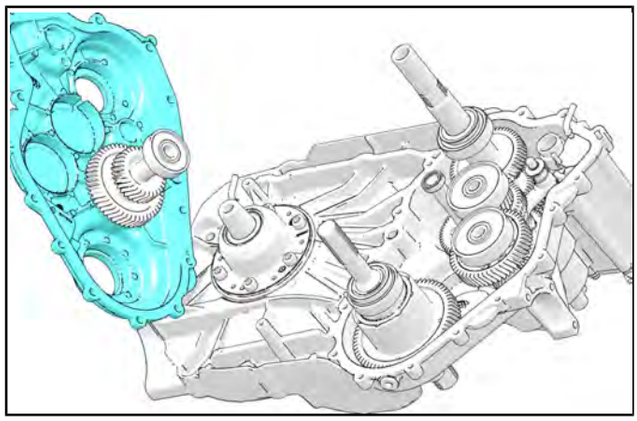


TRANSMISSION DISASSEMBLY

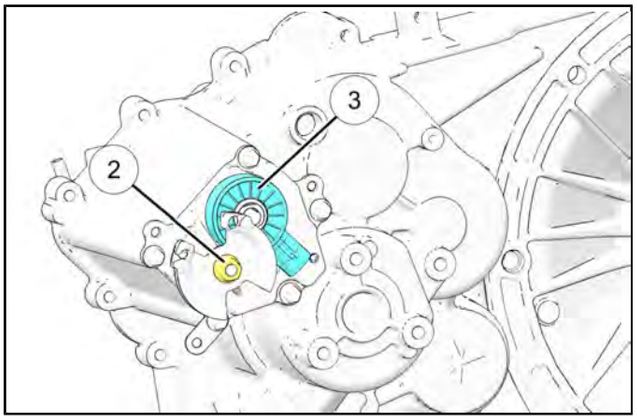
1. Drain transmission fluid.
2. Remove sixteen fasteners ① and separate transmission cover from the transmission.



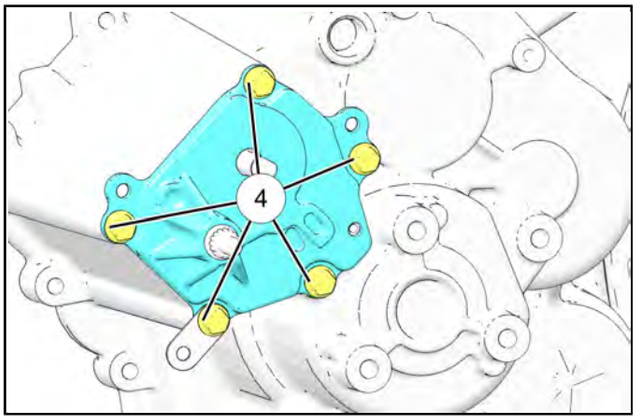
NOTICE
Idler gear may come off with front transmission cover as shown.



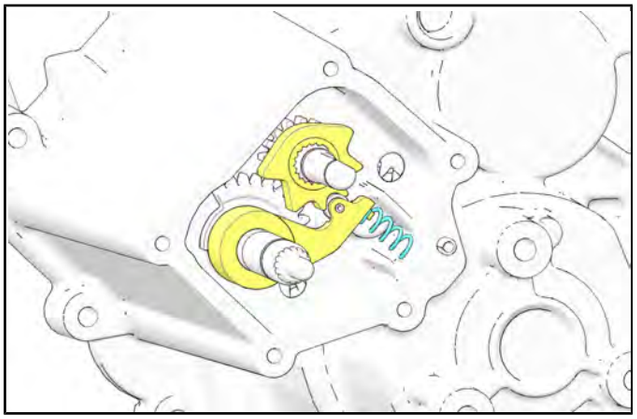
3. Remove idler gear from transmission cover.
4. Remove one fastener ② and remove shift linkage plate.
5. Remove transmission position sensor ③.



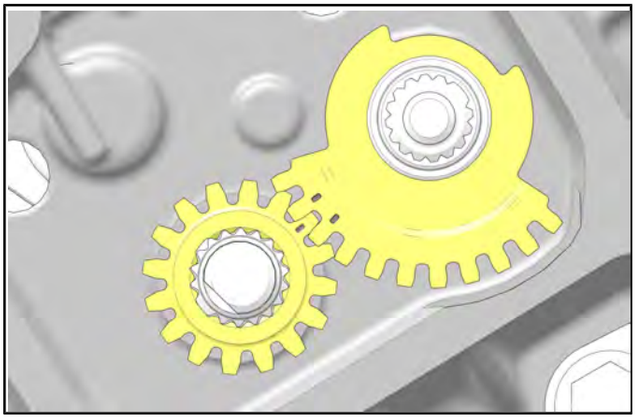
6. Remove five fasteners ④ and remove rear transmission cover.



7. Remove detent spring, detent pawl and detent star. Note the master spline on the detent star and the shift shaft.

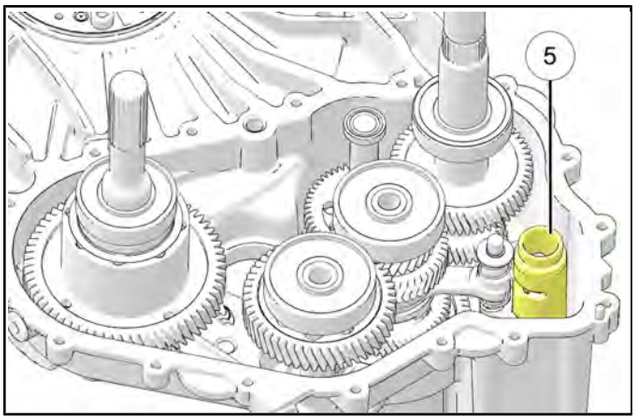


8. Remove the two sector gears.



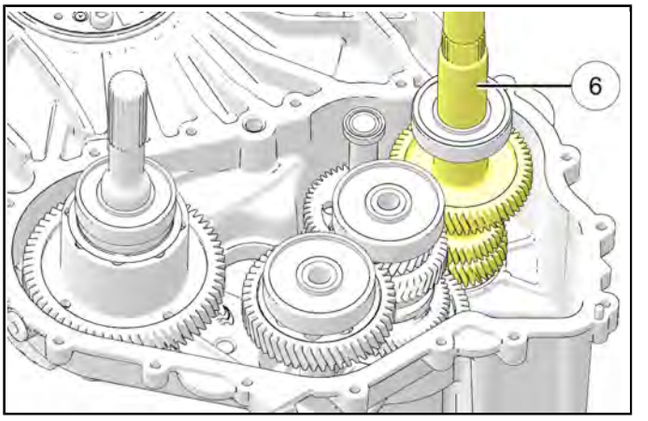
NOTICE
Note the timing marks on the shift gears for reassembly purposes.

9. Lift up on the shift shaft rail and move the rail assembly rearward to allow the shift fork pins to be removed from the shift drum ⑤. Remove the shift drum from the transmission housing.

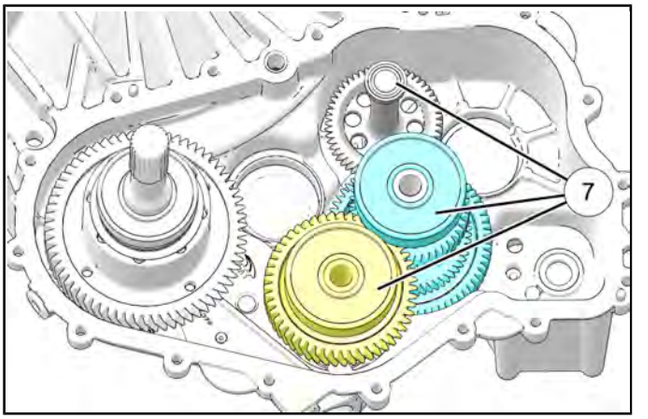


10. Remove the shift shaft and forks as an assembly.

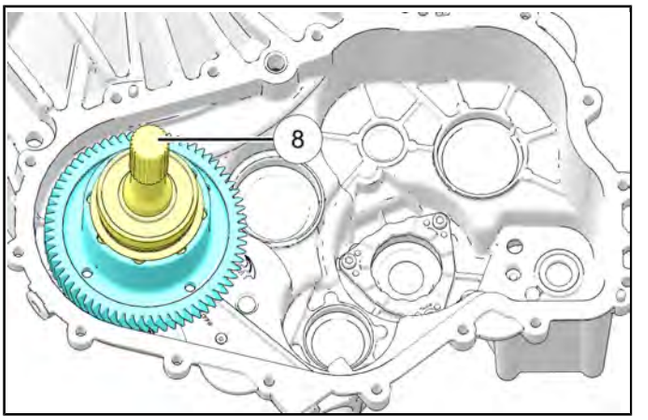
11. Remove transmission input shaft ⑥.



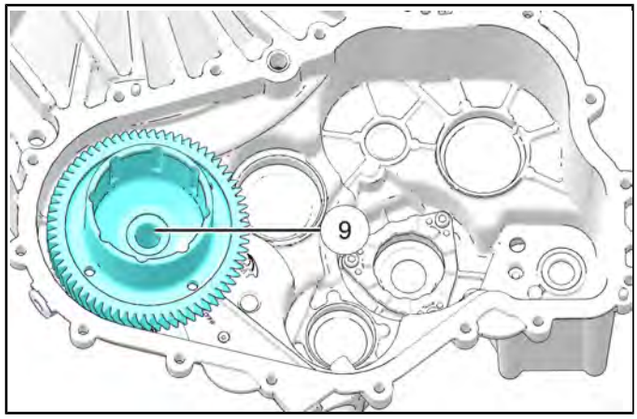
12. Remove three idler gears ⑦ as an assembly.



13. Remove front output shaft ⑧ from gear housing.



14. Remove output shaft gear ⑨.

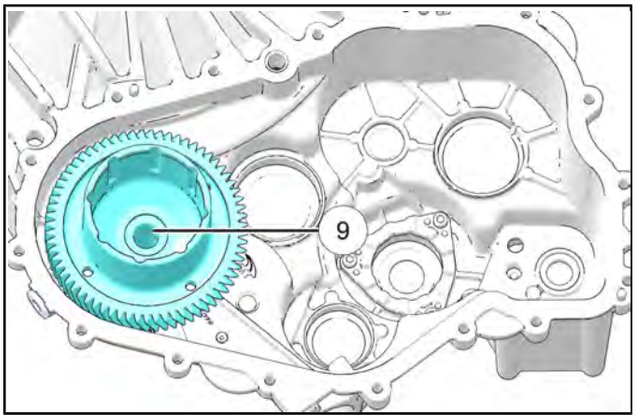


15. Inspect all of the gears, shafts, and bearings for excessive wear or damage.

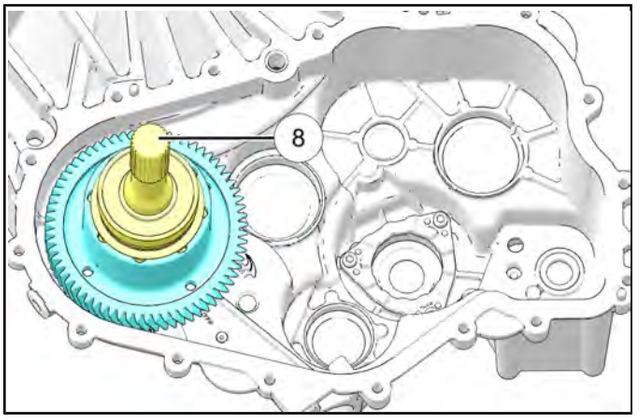
IMPORTANT
If gear replacement is required, also replace the corresponding gear and/or gear shaft.

TRANSMISSION ASSEMBLY

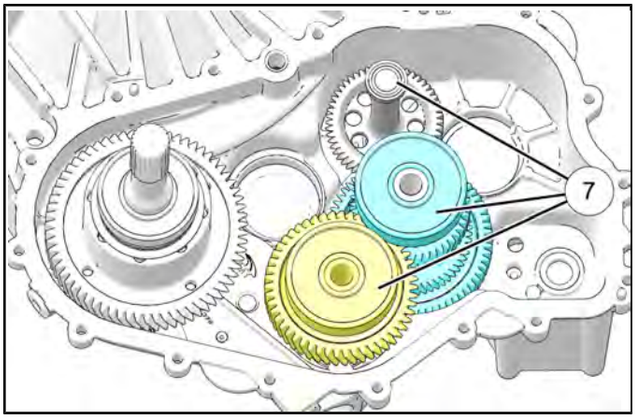
1. Thoroughly clean the mating surfaces of the transmission case halves so they are free of 3 Bond sealant. Failure to properly clean the surfaces may lead to transmission case leaks.
2. Install output shaft gear ⑨.



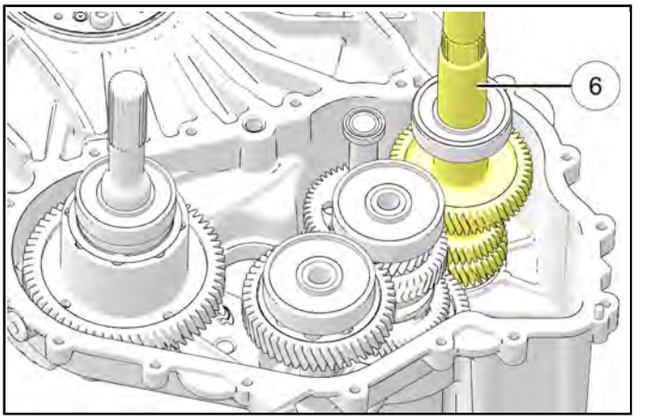
3. Install front output shaft ⑧ into gear housing.



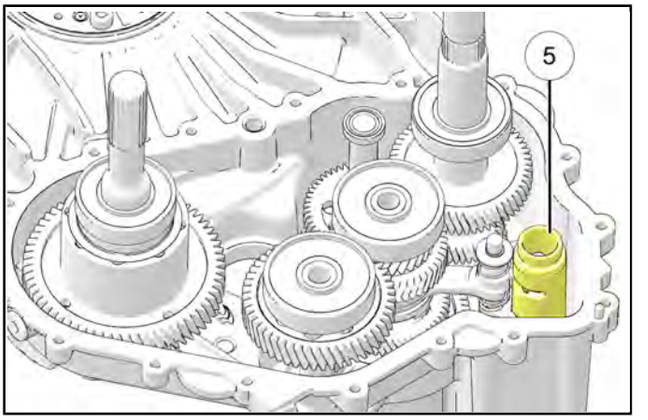
4. Install three idler gears ⑦ as an assembly.



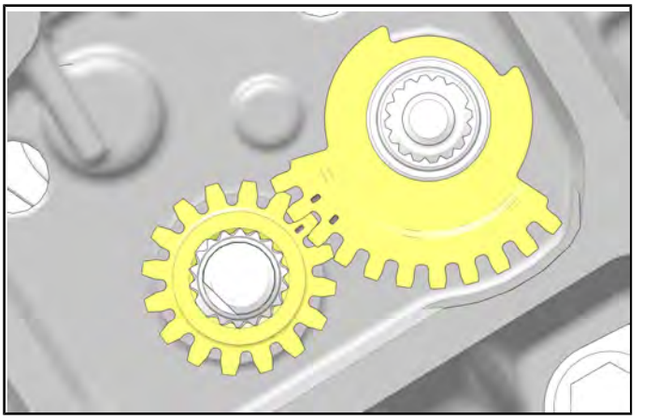
5. Install transmission input shaft ⑥.



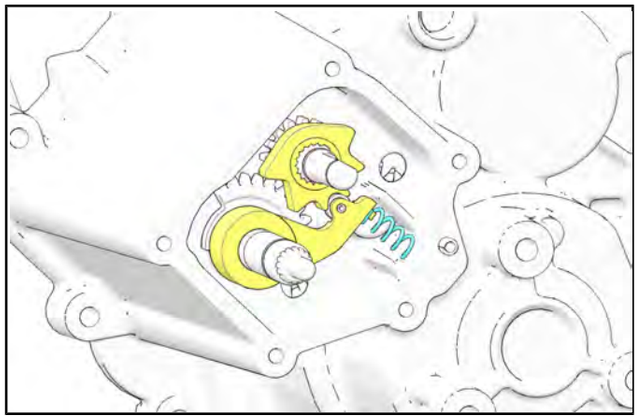
6. Install the shift shaft and forks as an assembly.
7. Lift up on the shift shaft rail and move the rail assembly rearward to allow the shift fork pins to be installed onto the shift drum ⑤. Install the shift drum into the transmission housing.



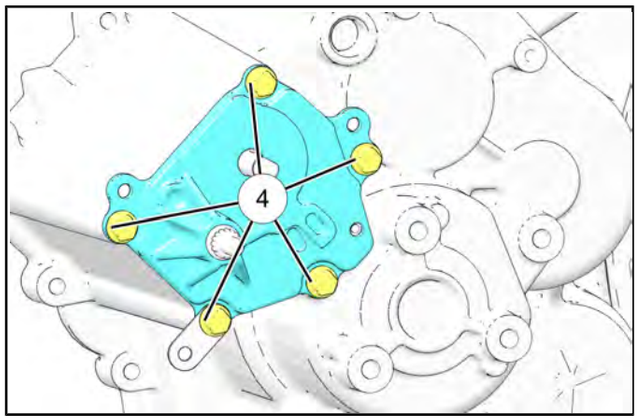
8. Install the two sector gears.



9. Install detent spring, detent pawl and detent star. Note the master spline on the detent star and the shift shaft.



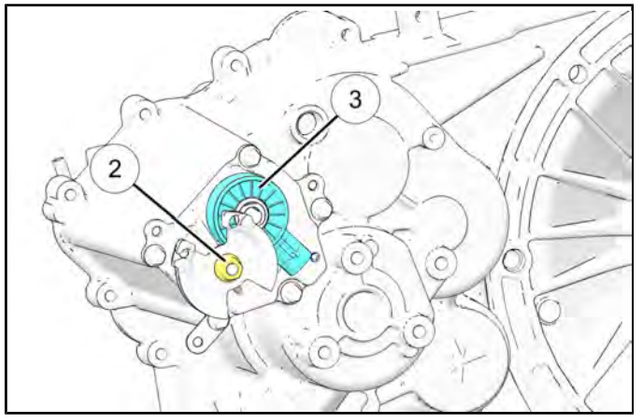
10. Install five fasteners ④ into rear transmission cover. Torque fasteners to specification.



TORQUE
Sector Gear Cover Fasteners:

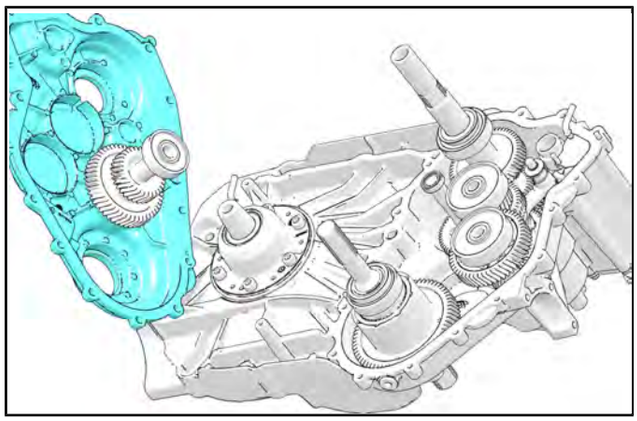
11. Install transmission position sensor ③.

12. Install shift linkage plate and one fastener ②. Torque fastener to specification.



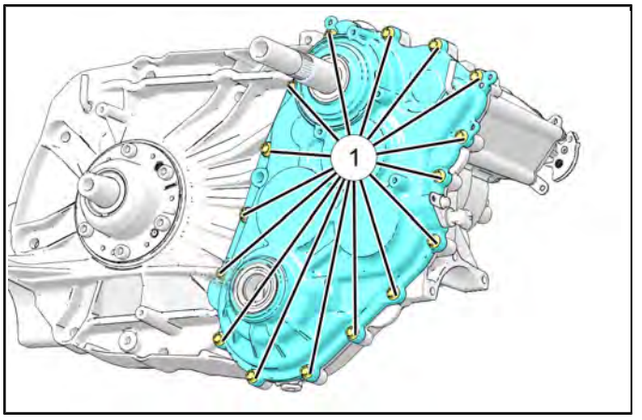
TORQUE
Shift Linkage Plate Fastener:

13. Install idler gear into transmission cover.



14. Apply a continuous bead of Crankcase 3 Bond Sealant (PN **2871557**) to left-hand transmission mating surface.

15. Install transmission cover onto the transmission and install sixteen fasteners ①. Torque fasteners to specification.



TORQUE
Transmission Cover Fasteners::

CHAPTER 8
FINAL DRIVE

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2872608	Roll Pin Removal Tool
8700226	CV Boot Clamp Pliers
PU-48951	Axle Boot Clamp Tool

BEARING CARRIER

FRONT BEARING CARRIER INSPECTION / REMOVAL

NOTICE

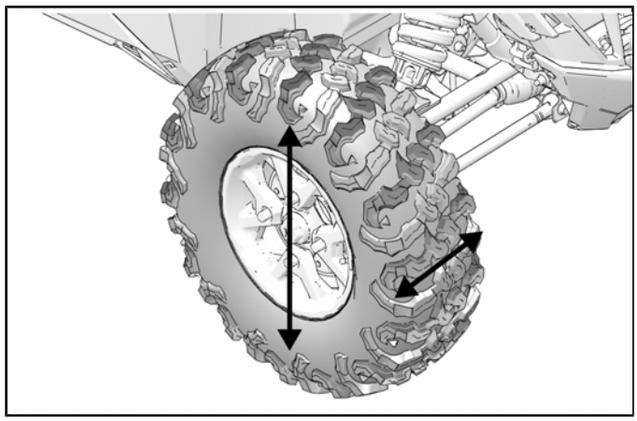
Bearing carriers are serviced as an assembly and the bearings are not individually serviceable. No additional greasing of the wheel bearings is required.

1. Elevate front of vehicle and safely support machine under the frame area.

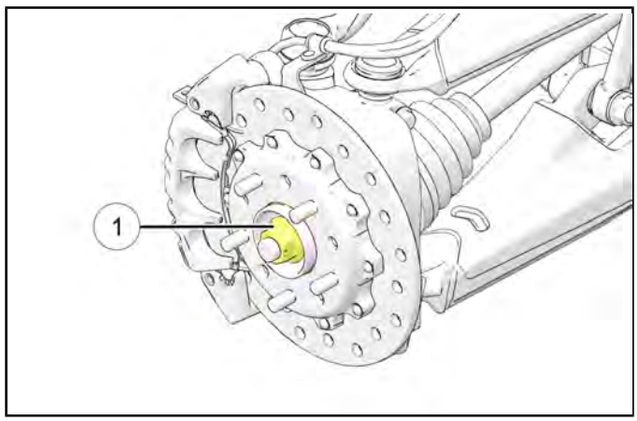
⚠ WARNING

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Check bearings for side play by grasping the top and bottom of the tire firmly and checking for movement. The tire should rotate smoothly without binding or rough spots.



3. Remove wheel nuts and remove the front wheel.
4. Remove the front wheel hub axle nut ① and discard.

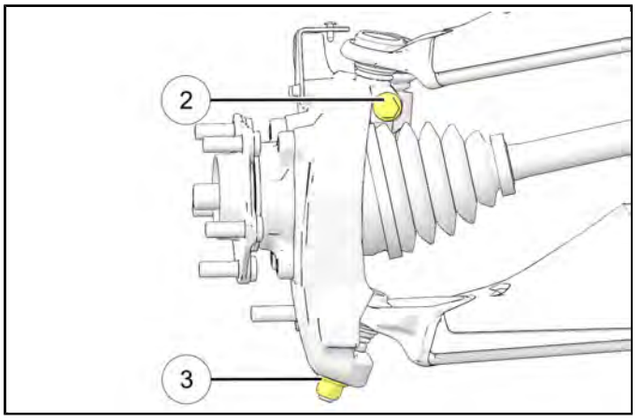


5. Remove the fastener retaining the steering tie rod end to the front bearing carrier.
6. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc.

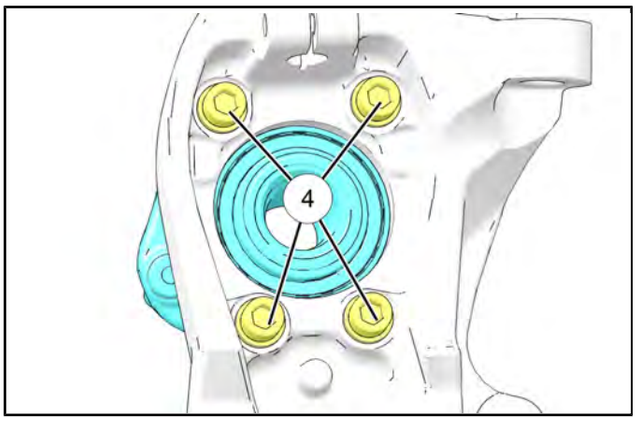
⚠ CAUTION

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

7. Remove the front wheel hub assembly.
8. Remove the upper ball joint pinch bolt ② and lower ball joint retaining nut ③.



9. Using a soft faced hammer, lightly tap on the knuckle assembly while removing the upper and lower ball joint ends.
10. Remove knuckle assembly from the front drive shaft.
11. Remove four fasteners ④ and separate hub from knuckle.



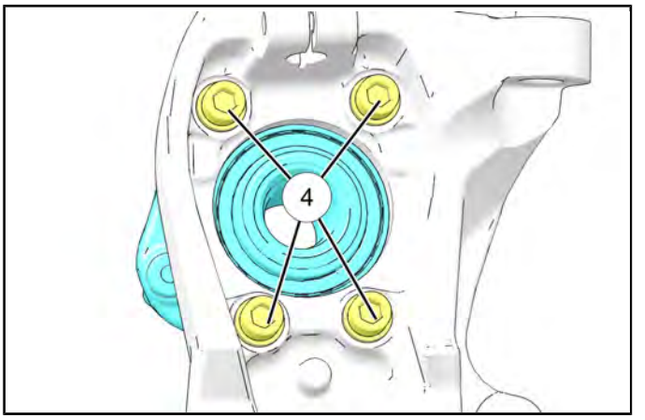
12. Rotate bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion.

IMPORTANT
Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

13. Replace hub assembly if moisture, dirt, corrosion, or roughness is evident. The bearing should also be inspected for any scratches, wear, or damage. Replace hub assembly if it is damaged.

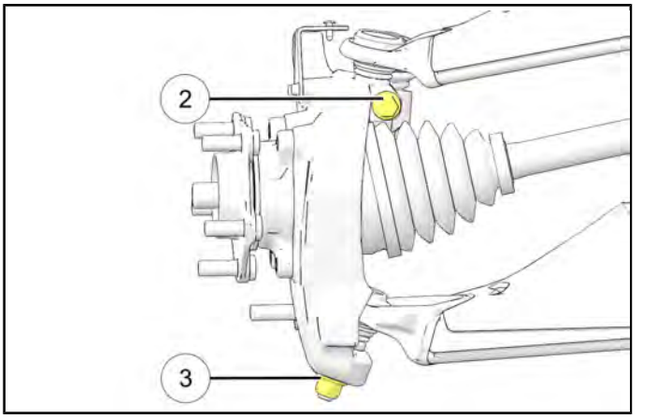
FRONT BEARING CARRIER INSTALLATION

1. Install bearing carrier into steering knuckle. Torque fasteners to specification.



TORQUE
Hub Assembly Mounting Fasteners: **81 ft-lbs (110 Nm)**

2. Install half shaft axle through the backside of the bearing carrier.
3. Install the upper and lower ball joint ends into the front bearing carrier.
4. Install upper ball joint pinch bolt and lower ball joint nut. Torque to specification.



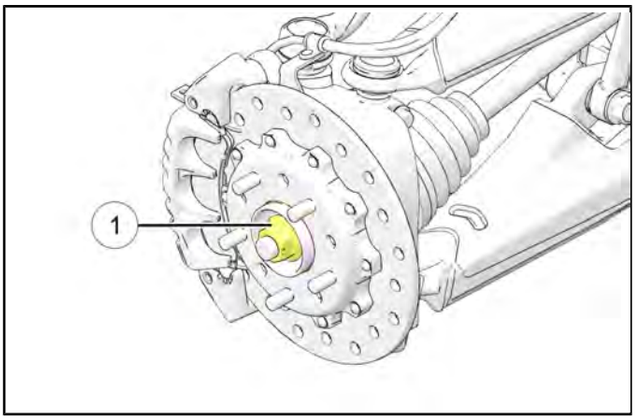
TORQUE
Upper Ball Joint Pinch Bolt: **52 ft-lbs (70 Nm) - Torque bolt side**

TORQUE
Lower Ball Joint Nut: **44 ft-lbs (60 Nm) + 90° (Single Use)**

5. Install brake disc and caliper assembly. Torque brake caliper fasteners to specification.

TORQUE
Front Caliper Mounting Bolts: **73 ft-lbs (100 Nm)**

6. Install front knuckle assembly and axle nut. Torque NEW axle nut to specification.



TORQUE
Wheel Axle Nut: **89 ft-lbs (120 Nm)**

7. Install the steering tie rod end onto the front steering knuckle.
8. Torque the tie rod end fastener to specification.

TORQUE
Tie Rod End Fastener: **52 ft-lbs (70 Nm) + 90°**

9. Install wheel and five wheel nuts. Torque wheel nuts to specification.

TORQUE
Wheel Nuts: **148 ft-lbs (200 Nm)**

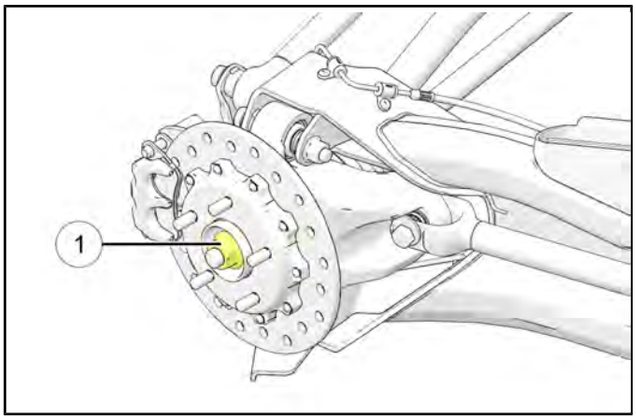
10. Rotate wheel and check for smooth operation.

REAR BEARING CARRIER INSPECTION / REMOVAL

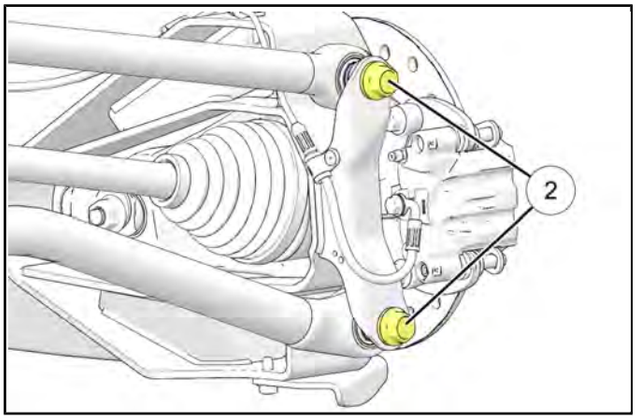
1. Elevate rear of vehicle and safely support machine under the frame area.

⚠ WARNING
Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Check bearings for side play by grasping the top and bottom of the tire firmly and checking for movement. The tire should rotate smoothly without binding or rough spots.
3. Remove the wheel nuts and rear wheel.
4. Remove rear axle nut ① from the rear wheel hub assembly.

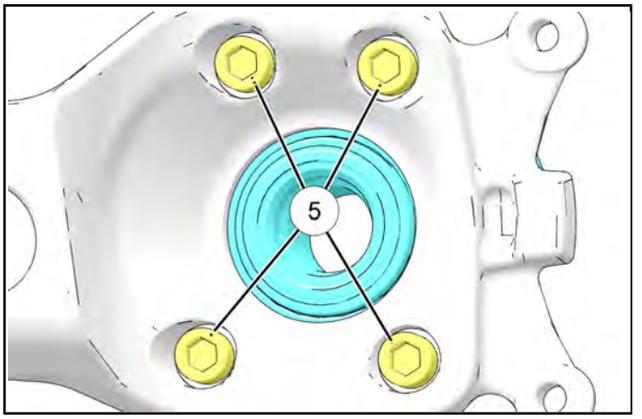


5. Remove the radius rod outer mounting bolts ②, nuts and washers from the bearing carrier. Swing radius rods down.



6. Remove half shaft from knuckle assembly.

7. Remove four fasteners ⑤ and remove hub assembly from the bearing carrier.



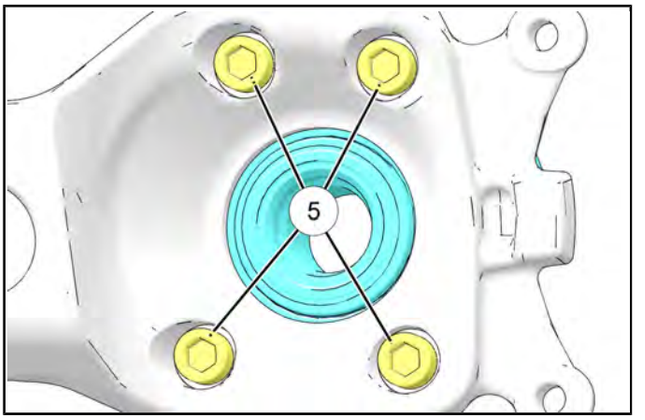
8. Rotate bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion.

IMPORTANT
Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

9. Replace hub assembly if moisture, dirt, corrosion, or roughness is evident.

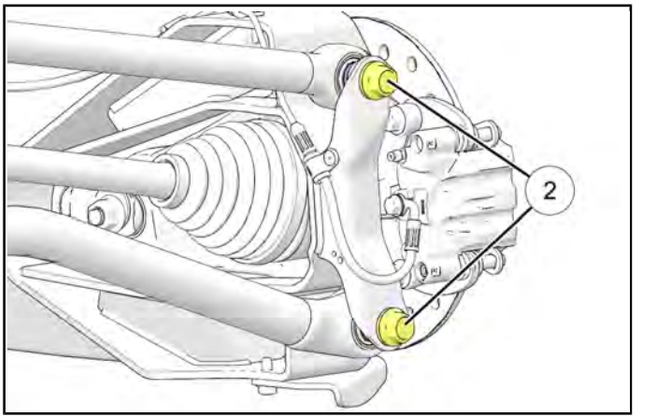
REAR BEARING CARRIER INSTALLATION

1. Install hub assembly into rear bearing carrier. Torque fasteners to specification.



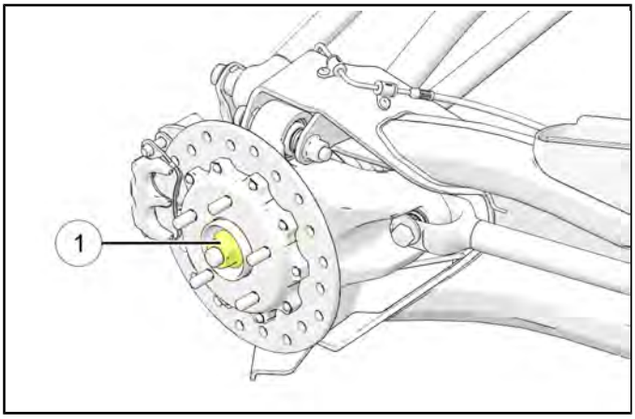
TORQUE
Rear Hub Mounting Fasteners: **81 ft-lbs (110 Nm)**

2. Install drive shaft through the backside of the bearing carrier.
3. Install upper and lower radius rods. Torque fasteners to specification.



TORQUE
Rear Radius Rod Fasteners: **Inner Radius Rod Fasteners (Single Use): 52 ft-lbs (70 Nm) + 90°Outer Radius Rod Fasteners: 133 ft-lbs (180 Nm) - Torque bolt side**

4. Install NEW wheel axle nut. Torque nut to specification.



TORQUE
Wheel Axle Nut: **89 ft-lbs (120 Nm)**

5. Install wheel and five wheel nuts. Torque nuts to specification.

TORQUE
Wheel Nuts: **148 ft-lbs (200 Nm)**

HALF SHAFT

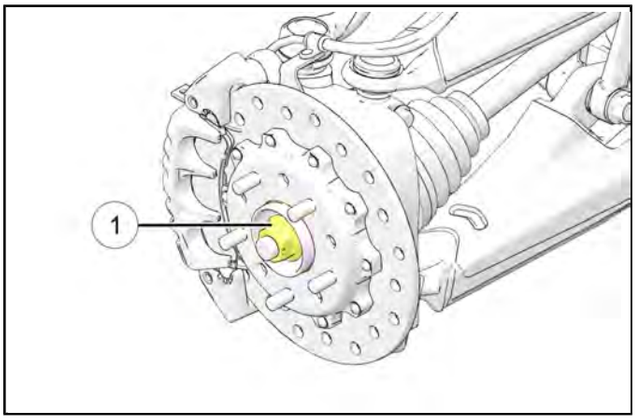
FRONT HALF SHAFT REMOVAL

1. Elevate front of vehicle and safely support machine under the frame area.

⚠ WARNING

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Remove wheel nuts and remove the front wheel.
3. Remove the front wheel hub axle nut ① and discard.

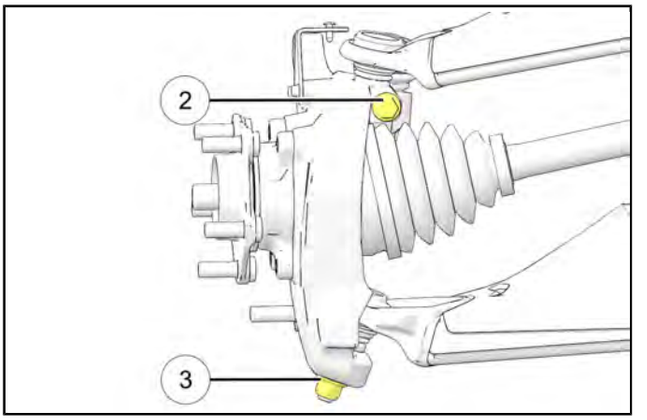


4. Remove the fastener retaining the steering tie rod end to the front bearing carrier.
5. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc.

⚠ CAUTION

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

6. Remove the front wheel hub assembly.
7. Remove the upper ball joint pinch bolt ② and lower ball joint retaining nut ③.

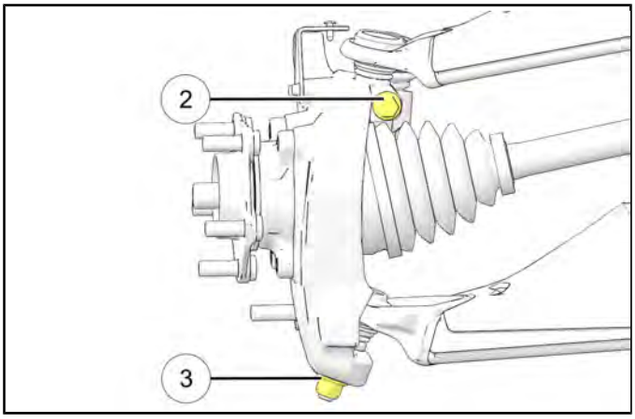


8. Using a soft faced hammer, lightly tap on the knuckle assembly while removing the upper and lower ball joint ends.
9. Remove knuckle assembly from the front drive shaft.
10. With a short, sharp jerk, remove half shaft from the front gearcase.

FRONT HALF SHAFT INSTALLATION

1. Apply anti-seize to the inboard splines and Install half shaft into front gearcase.
2. Install half shaft axle through the backside of the bearing carrier.
3. Install the upper and lower ball joint ends into the front bearing carrier.

4. Install upper ball joint pinch bolt and lower ball joint nut. Torque to specification.



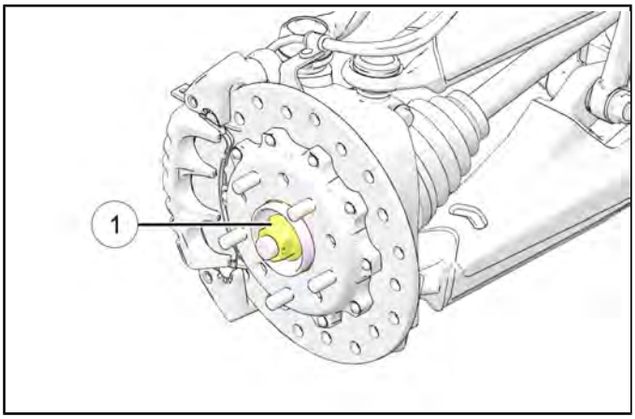
TORQUE
Upper Ball Joint Pinch Bolt: **52 ft-lbs (70 Nm) - Torque bolt side**

TORQUE
Lower Ball Joint Nut: **44 ft-lbs (60 Nm) + 90° (Single Use)**

5. Install brake disc and caliper assembly. Torque brake caliper fasteners to specification.

TORQUE
Front Caliper Mounting Bolts: **73 ft-lbs (100 Nm)**

6. Install front knuckle assembly and axle nut. Torque NEW axle nut to specification.



TORQUE
Wheel Axle Nut: **89 ft-lbs (120 Nm)**

7. Install the steering tie rod end onto the front steering knuckle.
8. Torque the tie rod end fastener to specification.

TORQUE
Tie Rod End Fastener: **52 ft-lbs (70 Nm) + 90°**

9. Install wheel and five wheel nuts. Torque wheel nuts to specification.

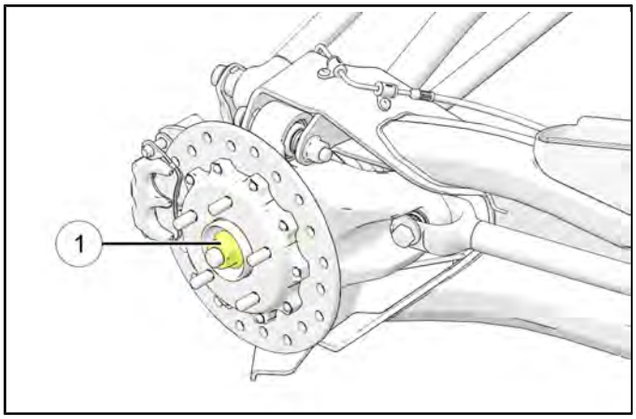
TORQUE
Wheel Nuts: **148 ft-lbs (200 Nm)**

REAR HALF SHAFT REMOVAL

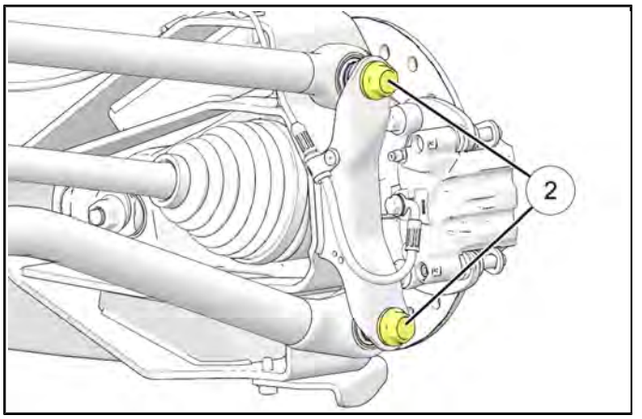
1. Elevate rear of vehicle and safely support machine under the frame area.

⚠ WARNING
Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Remove the wheel nuts and rear wheel.
3. Remove rear axle nut ① from the rear wheel hub assembly.



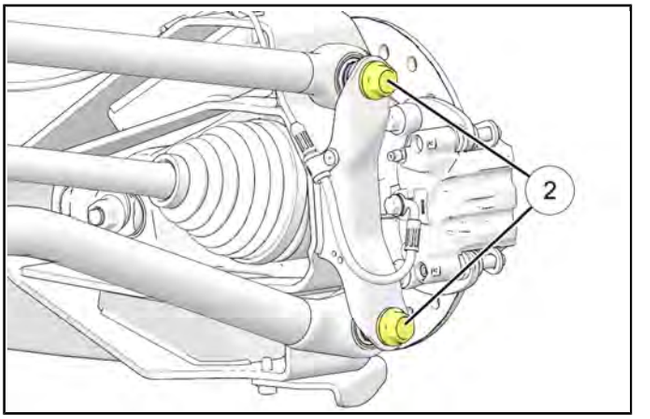
4. Remove the radius rod outer mounting bolts ②, nuts and washers from the bearing carrier. Swing radius rods down.



5. With a sharp, short jerk, remove drive shaft from the rear gearcase.

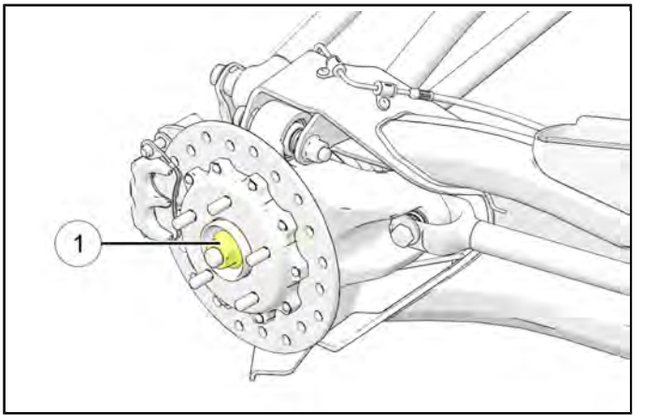
REAR HALF SHAFT INSTALLATION

1. Apply anti-seize to inboard splines and install half shaft into rear gearcase.
2. Install drive shaft through the backside of the bearing carrier.
3. Install upper and lower radius rods. Torque fasteners to specification.



TORQUE
Rear Radius Rod Fasteners: **Inner Radius Rod Fasteners (Single Use): 52 ft-lbs (70 Nm) + 90°Outer Radius Rod Fasteners: 133 ft-lbs (180 Nm) - Torque bolt side**

4. Install NEW wheel axle nut. Torque nut to specification.



TORQUE
Wheel Axle Nut: **89 ft-lbs (120 Nm)**

5. Install wheel and five wheel nuts. Torque nuts to specification.

TORQUE
Wheel Nuts: **148 ft-lbs (200 Nm)**

HALF SHAFT / CV JOINT HANDLING TIPS

Care should be exercised during half shaft removal or when servicing CV joints. Half shaft components are precision parts.

Cleanliness and following these instructions is very important to ensure proper shaft function and a normal service life.

- The complete half shaft and joint should be handled by getting hold of the interconnecting shaft to avoid disassembly or potential damage to the half shaft joints.
- Over-angling of joints beyond their capacity could result in boot or joint damage.
- Make sure surface-ground areas and splines of shaft are protected during handling to avoid damage.
- Do not allow boots to come into contact with sharp edges or hot engine and exhaust components.
- The half shaft is not to be used as a lever arm to position other suspension components.
- Never use a hammer or sharp tools to remove or to install boot clamps.
- Be sure joints are thoroughly clean and that the proper amount and type of grease is used to refill when joint boots are replaced and when joints are cleaned. Refer to text for grease capacity of CV joints and CV joint boots.

CV JOINT / BOOT REPLACEMENT

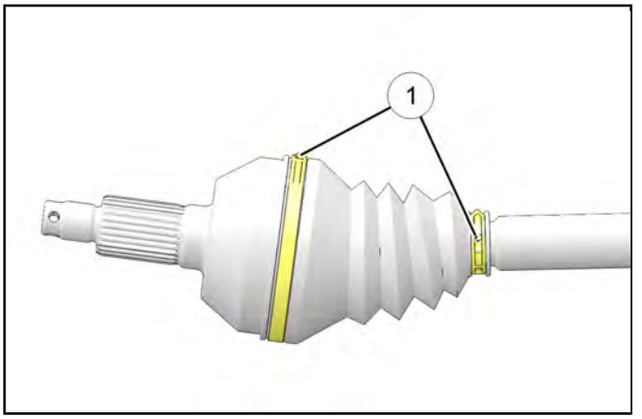
NOTICE

Outer CV Joint replacement is not recommended. If the outer joint is damaged, a new half shaft assembly should be installed.

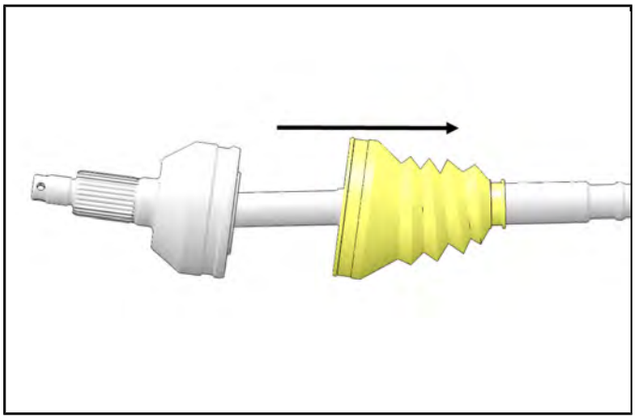
NOTICE

This procedure applies to inner and outer boot replacement for the rear drive axles.

1. Use a side cutters to cut and discard the boot clamps ①.



2. Remove the large end of the boot from the CV joint and slide the boot down the shaft.



3. Clean the grease from the face of the joint.

⚠ CAUTION

Complete disassembly of the CV joint is NOT recommended. The internal components are precision fit and develop their own characteristic wear patterns. Intermixing the internal components could result in looseness, binding, and/or premature failure of the joint.

IMPORTANT

If the grease in the joint is obviously contaminated with water and/or dirt, the joint should be replaced.

4. The CV joint is fitted with a circlip at the end of the shaft inside the housing. The shaft is likely to be damaged from striking the cage / race to separate the CV joint from the shaft. It is recommended to replace the entire half shaft assembly if there is damage to the outer joint.
5. Remove the inner joint from the shaft to remove the CV boot.
6. Slide the boot clamp and boot (large end first) onto the plunging joint end of the drive shaft and position the boot in it's groove machined in the shaft.
7. Grease the joint with the special CV joint grease provided in the boot replacement kit. Fill the cavity behind the balls and the splined hole in the joint's inner race. Pack the ball tracks and outer face flush with grease. Place any remaining grease into the boot.

⚠ CAUTION

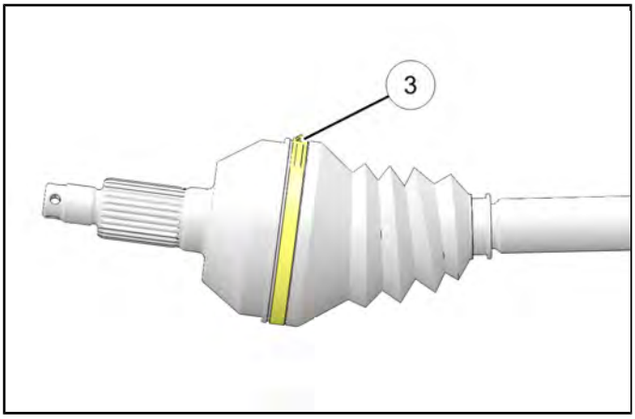
The grease provided in the replacement kit is specially formulated for wear resistance and durability. DO NOT use substitutes or mix with other lubricants.

NOTICE

The amount of grease provided in the boot kit is pre-measured. Use entire contents of package.

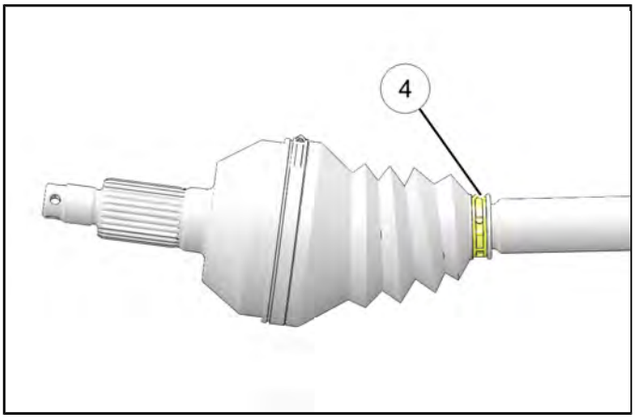
8. Remove excess grease from the CV joint's external surfaces and place the excess grease in the boot.
9. Pull the boot over the joint and position the boot lips into the grooves on the joint housing and shaft. Make sure the boot is not dimpled or collapsed.

10. Install and tighten the large clamp ③ using the appropriate clamp tool.



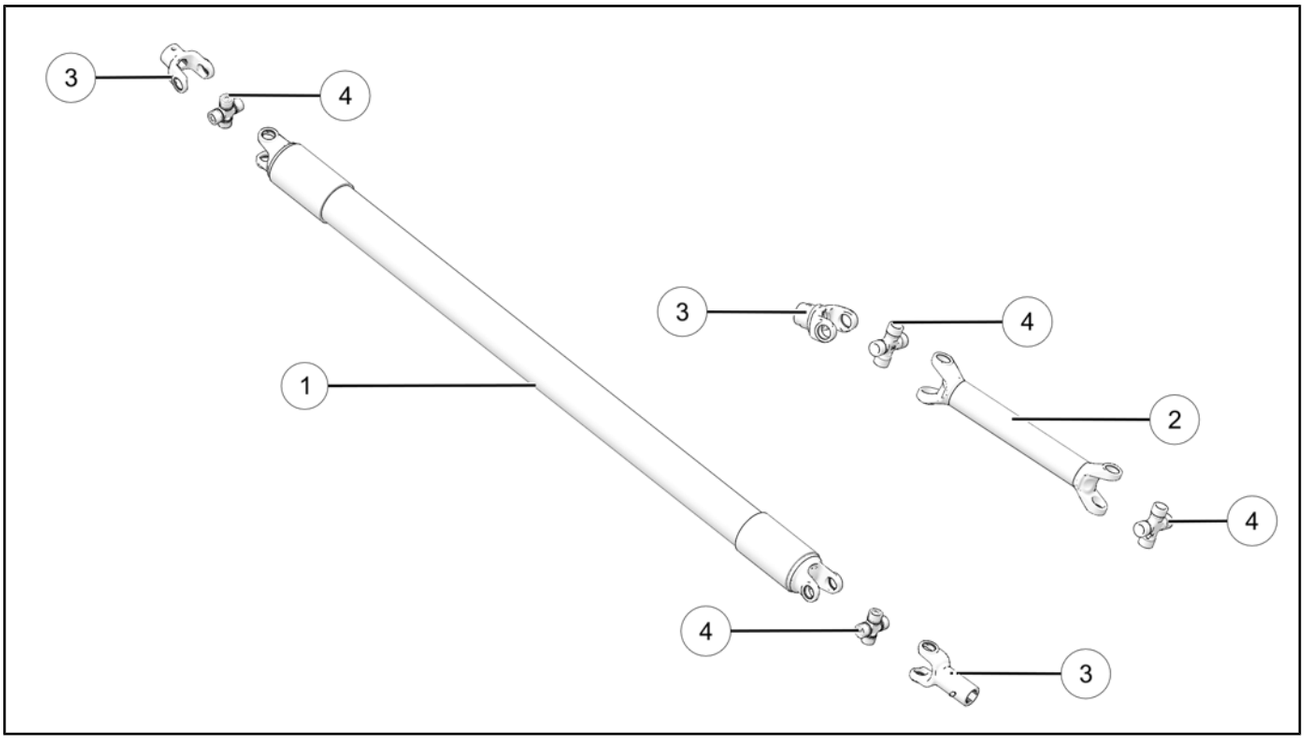
Axle Boot Clamp Tool: PU-48951 or CV Boot Clamp Pliers: 8700226

11. While pulling out on the CV shaft, fully extend the CV joint and slide a straight O-ring pick or a small slotted screw driver between the small end of the boot and the shaft. This will allow the air pressure to equalize in the CV boot in the position that the joint will spend most of its life. Before you remove your instrument, be sure the small end of the boot is in its correct location on the shaft.
12. Install and tighten the small clamp ④ on the boot using the appropriate clamp tool.



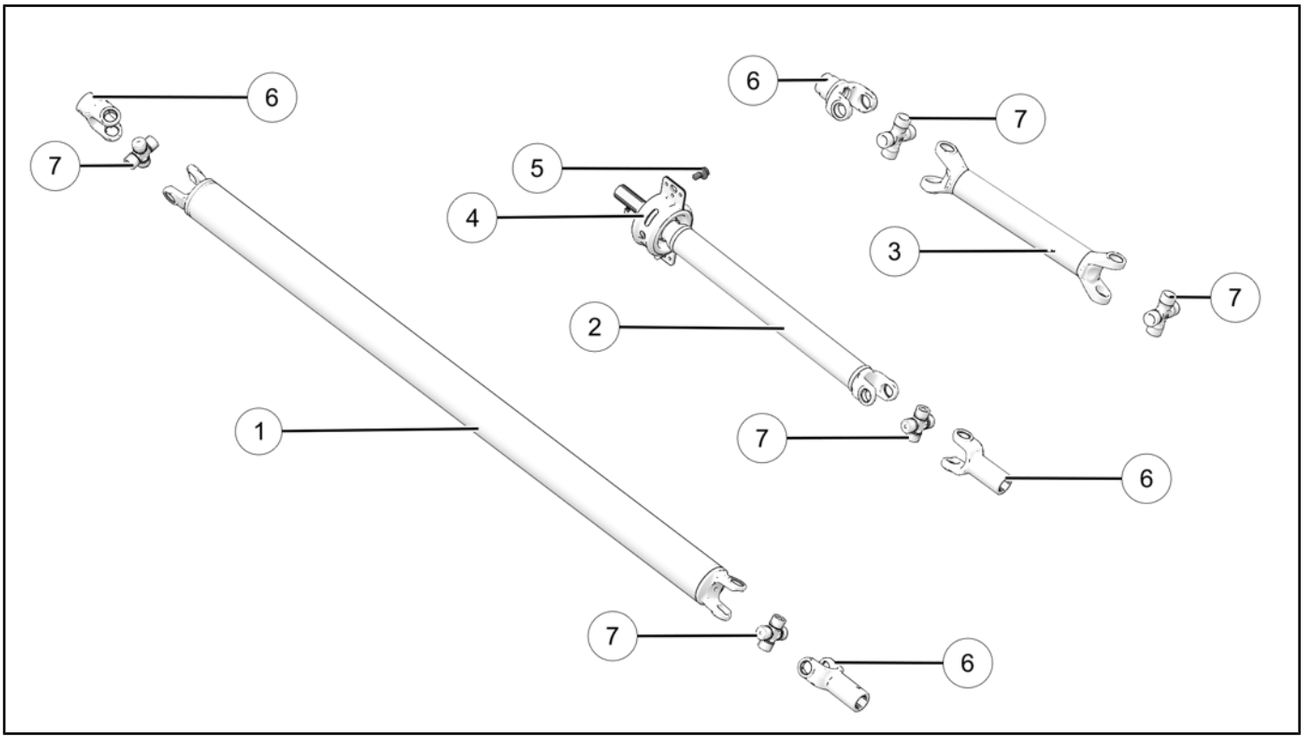
PROP SHAFT

PROP SHAFT ASSEMBLY VIEW



① Front Prop Shaft	③ Slip Yoke
② Rear Prop Shaft	④ Cross and Bearing

PROP SHAFT ASSEMBLY VIEW (4-SEAT)

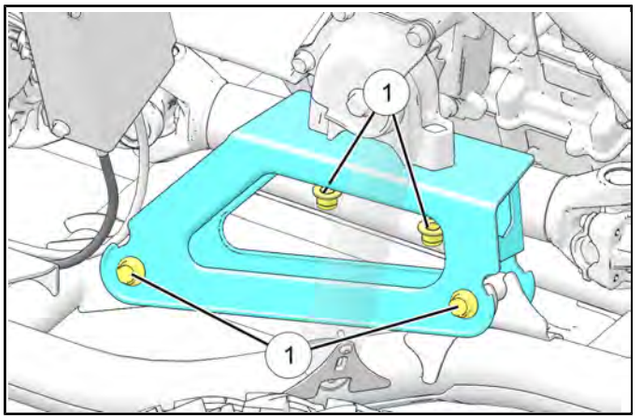


① Front Prop Shaft	⑤ Support Bearing Fasteners **33 ft-lbs (45 Nm)**
② Intermediate Prop Shaft	⑥ Slip Yoke
③ Rear Prop Shaft	⑦ Cross and Bearing
④ Support Bearing	

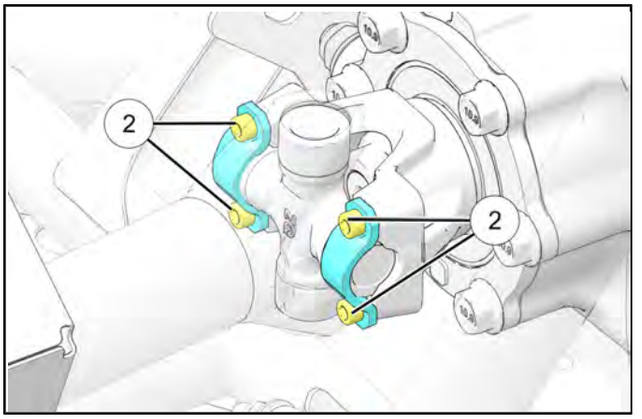
REAR PROP SHAFT REPLACEMENT

REMOVAL

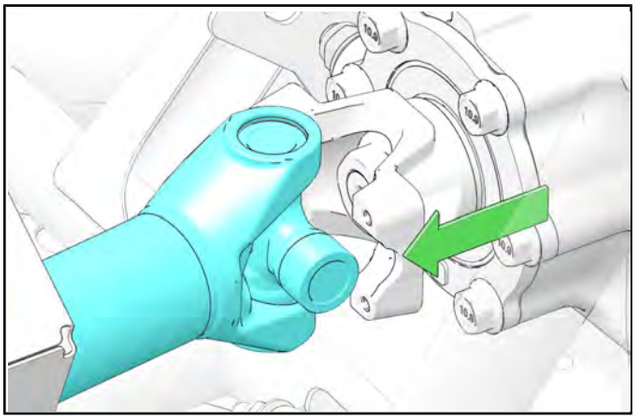
1. Park vehicle on a flat, level surface.
2. Remove four fasteners ① and remove engine mounting bracket.



3. Remove four fasteners ② retaining rear prop shaft U-joint.



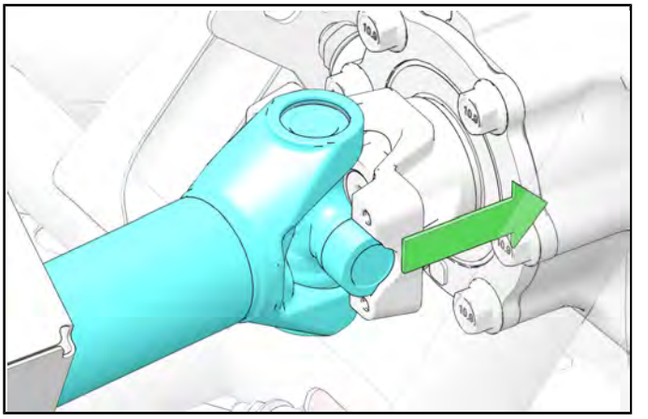
4. Pull prop shaft forward to disengage coupler from the U-joint.



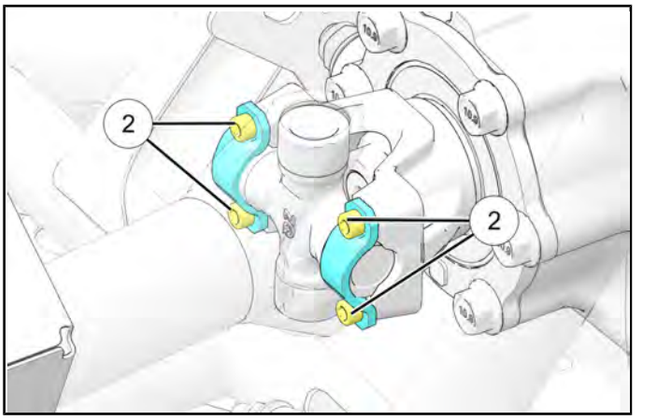
5. Pull prop shaft rearward to disengage slip-yoke from transmission output shaft.

INSTALLATION

1. Install prop shaft onto transmission output shaft. Grease front yoke/transmission output shaft upon installation.
2. Install prop shaft U-joint into rear gearcase coupler.

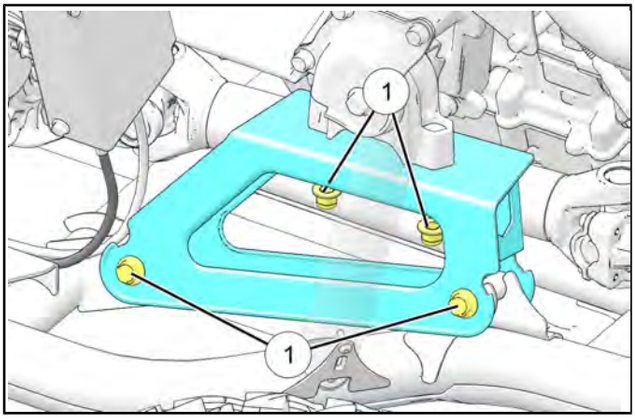


3. Install brackets onto U-joint and torque fasteners to specification.



TORQUE
U-joint Coupler Fasteners: **11 ft-lbs (15 Nm)**

4. Install engine mounting bracket and torque fasteners to specification.

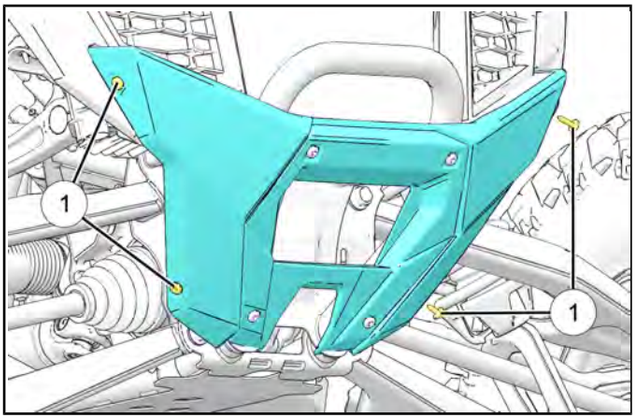


TORQUE
Engine Isolator Mounting Fasteners: **33 ft-lbs (45 Nm)** Lower Engine Mount Fasteners: **52 ft-lbs (70 Nm)**

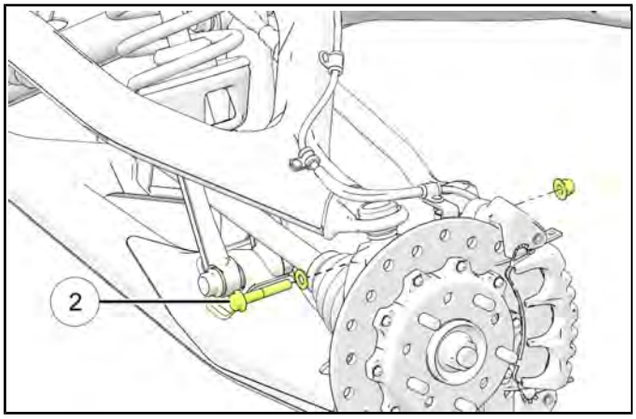
FRONT PROP SHAFT REPLACEMENT

REMOVAL

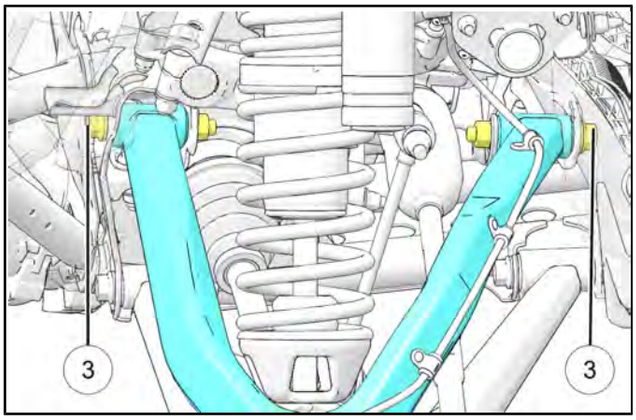
1. Place vehicle on a suitable lift or jack and remove front wheel.
2. Remove four front fascia fasteners ① and remove front fascia.



3. Remove ball joint pinch bolt ②, washer, and nut from the upper control arm.

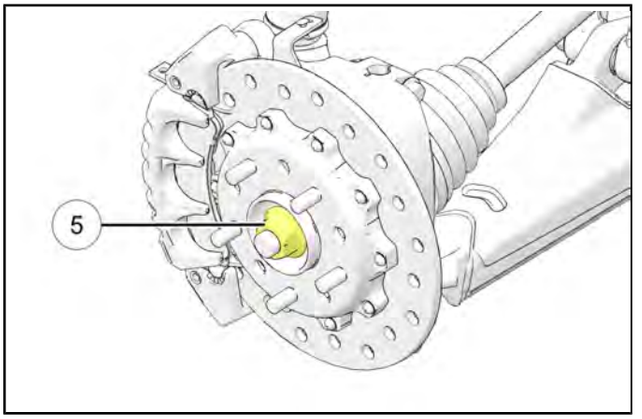


4. Remove two control arm mounting fasteners ③.



IMPORTANT
The access panel must be removed from the driver's side footwell to remove rear upper control arm fastener. To remove the rear upper control arm fastener from the passenger side, turn the steering wheel counter-clockwise to lock. Cover the tie rod boot with a rag or lubricate the socket extension shaft to prevent damage to the boot.

5. Remove wheel axle nut ⑤.

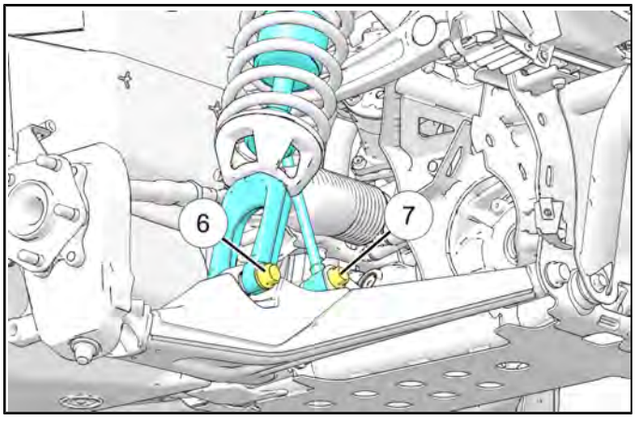


6. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc.

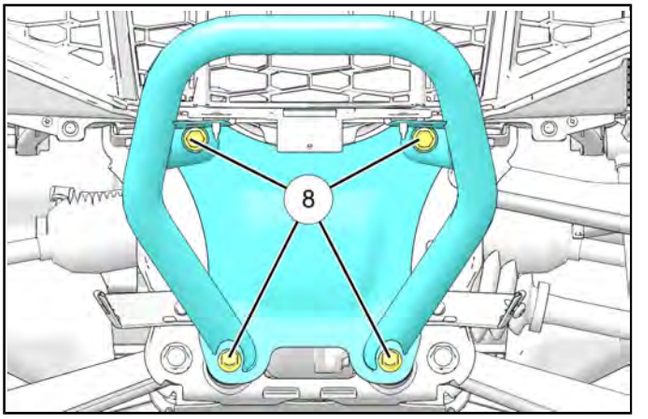
⚠ CAUTION

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

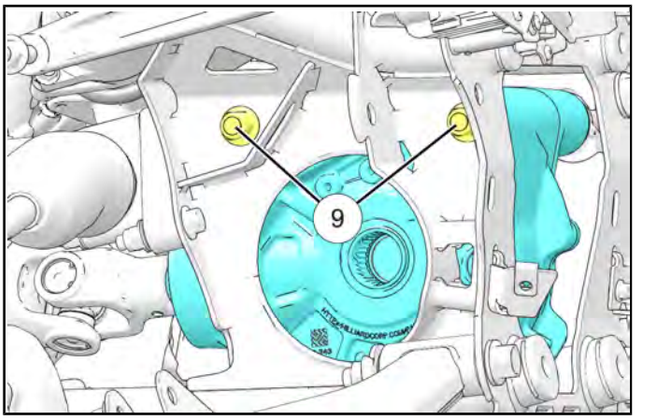
7. Remove lower shock fastener ⑥ and sway bar link fastener ⑦. Move shock and sway bar link out of the way.
8. With a short, sharp jerk, remove half shaft from the front gearcase.



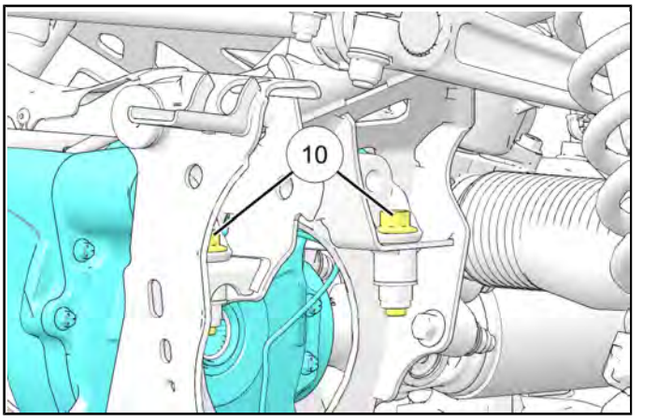
9. Repeat previous steps on opposite side of vehicle.
10. Remove four fasteners ⑧ and remove the front bumper.



11. Remove two front gearcase isolator fasteners ⑨.

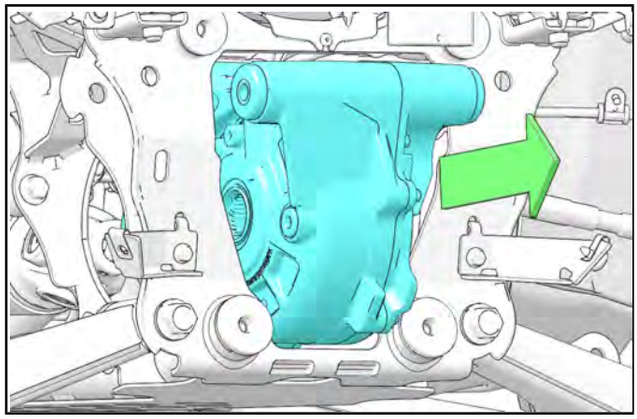


12. Remove two vertical bolts ⑩.

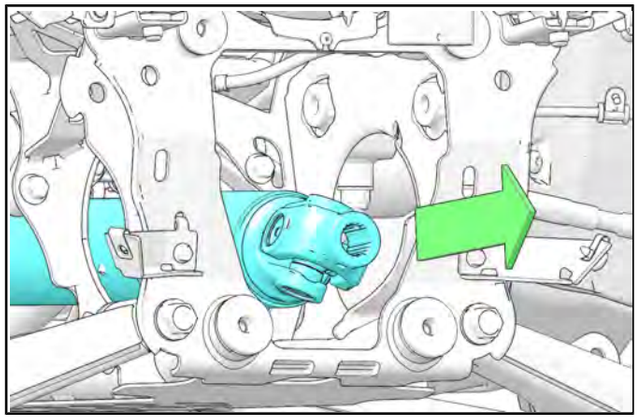


13. Remove and discard roll pin from front prop shaft.
14. Disconnect two front gearcase electrical harnesses.

15. Disconnect vent line and remove gearcase through the opening in front of the frame.



16. Remove prop shaft through the opening in front of the frame.

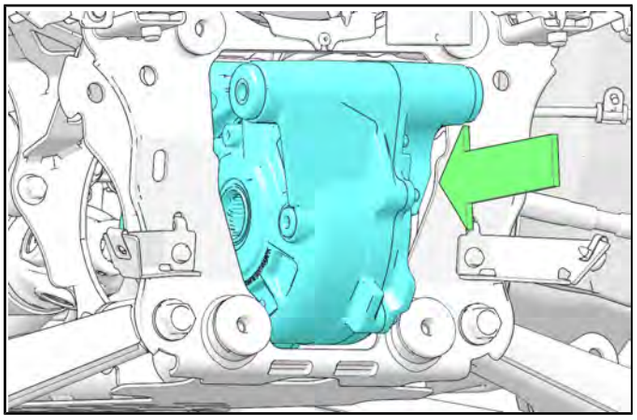


INSTALLATION

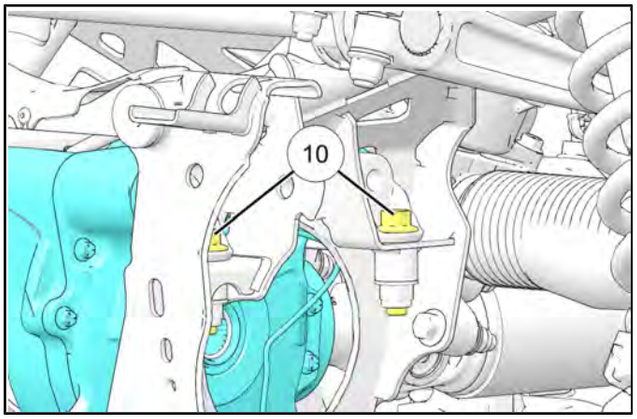
1. Install prop shaft through the front of vehicle.
2. Connect prop shaft slip yoke to the transmission output shaft. On 4-seat vehicles, connect slip yoke to intermediate output shaft.

NOTICE
The slip yoke on 4-seat vehicles has a skip-tooth. Align skip tooth with the intermediate shaft to install.

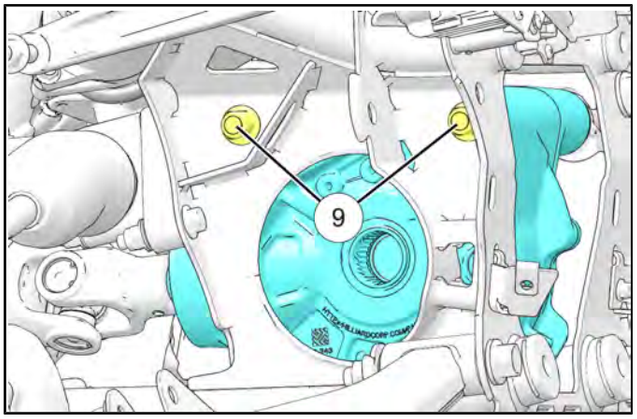
3. Install front gearcase through the opening in front of the frame. Connect vent line.



4. Install half shaft onto front gearcase input shaft.
5. Loosely install two vertical bolts.

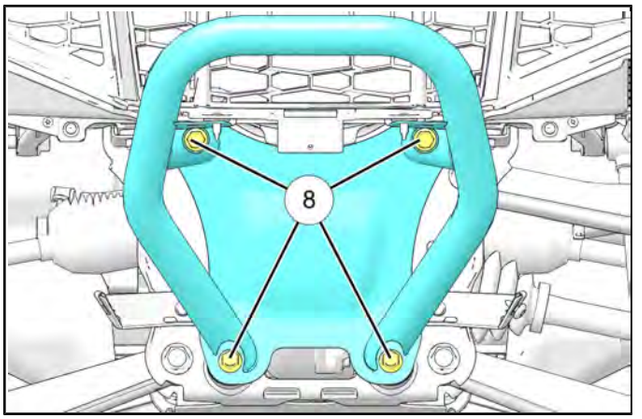


6. Install two front gearcase isolator fasteners. Torque fasteners to specification.



TORQUE
Front Gearcase Torque Sequence: a. **Install vertical bolts on drivers side and torque nuts until 1-2mm gap** b. **Torque Gearcase Isolator bolts: 55 ft-lbs (75 Nm) + 180°** c. **Torque vertical bolts: 81 ft-lbs (110 Nm)**

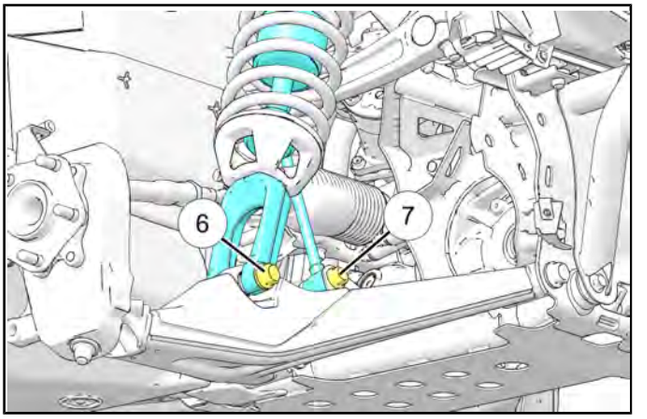
7. Install NEW front prop shaft roll pin.
8. Install two front gearcase electrical harnesses.
9. Install front bumper. Torque fasteners to specification.



TORQUE
Front Bumper Fasteners: **37 ft-lbs (50 Nm)**

10. Install half shafts into front gearcase.

11. Install lower shock and sway bar link onto lower contol arms. Torque fasteners to specification.



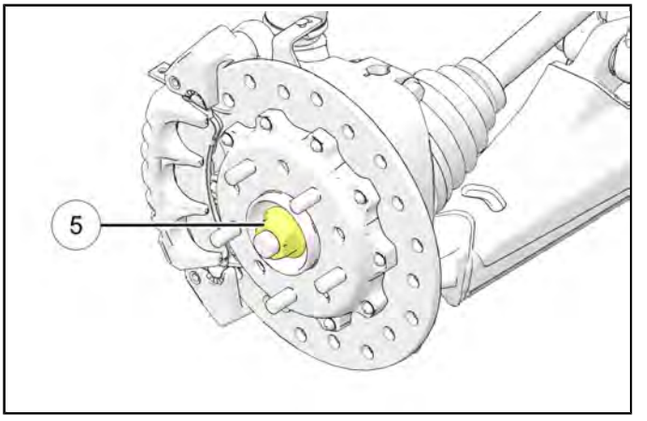
TORQUE
Lower Shock Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

TORQUE
Sway Bar Link Fasteners: **81 ft-lbs (110 Nm)**

12. Install brake disc and caliper assembly. Torque brake caliper fasteners to specification.

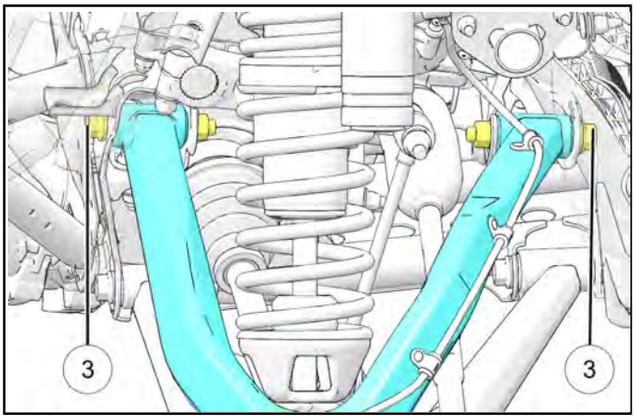
TORQUE
Front Caliper Mounting Bolts: **73 ft-lbs (100 Nm)**

13. Install front knuckle assembly and axle nut. Torque axle nut to specification.



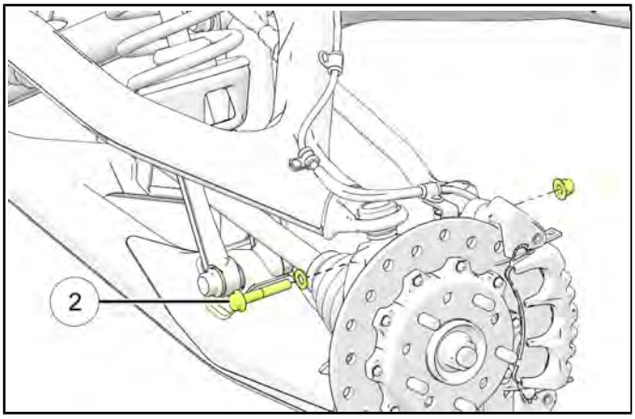
TORQUE
Wheel Axle Nut: **89 ft-lbs (120 Nm)**

14. Install control arm into its inner mounts, and ball joint into the bearing carrier.
15. Install two control arm mounting fasteners. Torque fasteners to specification.



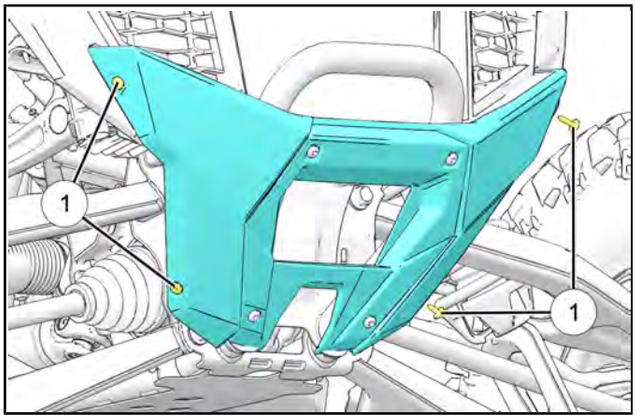
TORQUE
Control Arm Mounting Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

16. Install ball joint pinch bolt, washer, nut. Torque fastener to specification.



TORQUE
Upper Ball Joint Pinch Bolt: **52 ft-lbs (70 Nm) - Torque bolt side**

17. Install front fascia and four front fascia mounting fasteners.



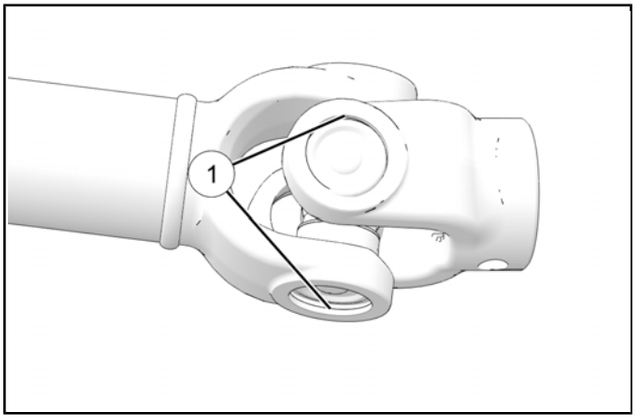
TORQUE
Front Fascia Fasteners: **7 ft-lbs (10 Nm)**

U-JOINT DISASSEMBLY

⚠ CAUTION

Always wear eye protection.

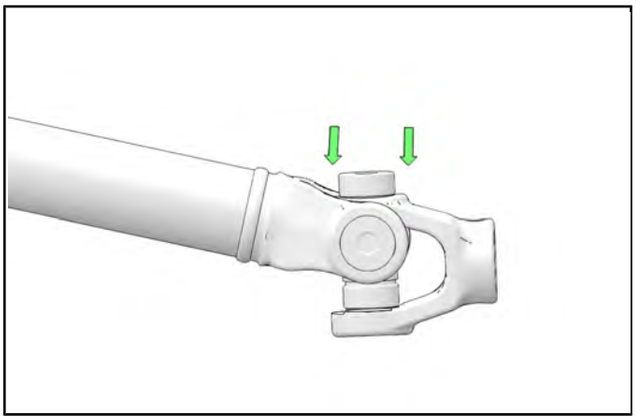
1. Remove external snap ring ① from all four bearing caps.



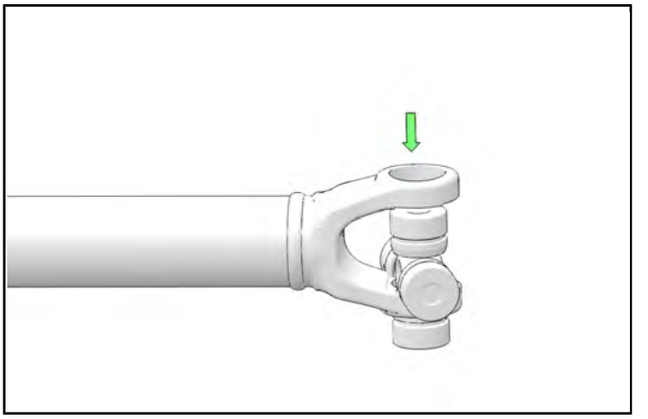
NOTICE

If yoke or bearing is removed, cross bearing must be replaced. Note orientation of grease fitting (if equipped) and mark inner and outer yoke for correct re-positioning during installation.

2. Support inner yoke as shown and drive outer yoke down (bearing cap out) with a suitable press.



3. Support U-joint and press inner yoke down to remove remaining bearing caps.



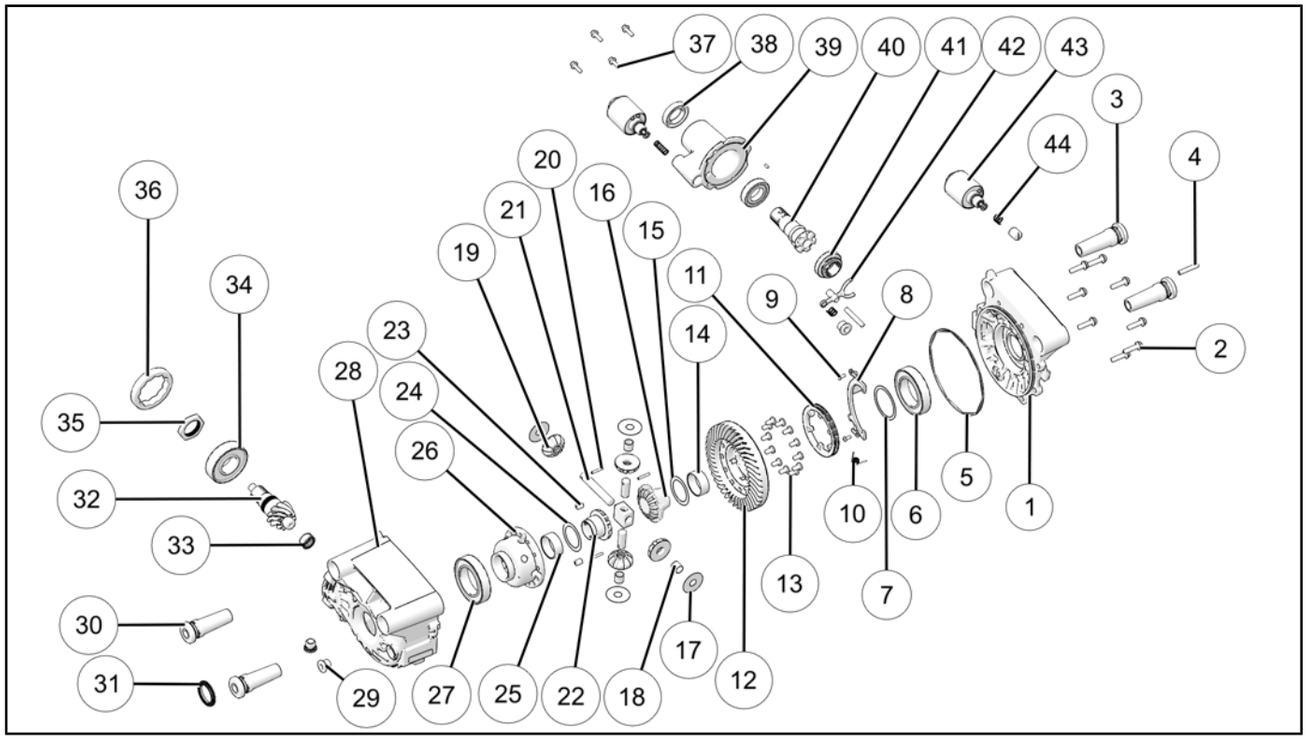
4. Force U-joint cross to one side and lift out of inner yoke.

U-JOINT ASSEMBLY

1. Install new bearing caps in yoke by hand. Carefully install U-joint cross. Tighten vise or use a press to force bearing caps in.
2. Using a suitable arbor, fully seat bearing cap in one side. Continually check for free movement of bearing cross as bearing caps are assembled.
3. Install snap ring to contain bearing cap just installed. Repeat procedure for other side.
4. Install outer yoke, aligning marks made before disassembly.
5. Repeat Steps 1-3 to install bearing caps on outer yoke.
6. Seat all bearing caps against snap rings.
7. When installation is complete, yokes must pivot freely in all directions without binding. If the joint is stiff or binding, tap the yoke lightly to center the joint until it pivots freely in all directions.

FRONT GEARCASE

FRONT GEARCASE ASSEMBLY VIEW

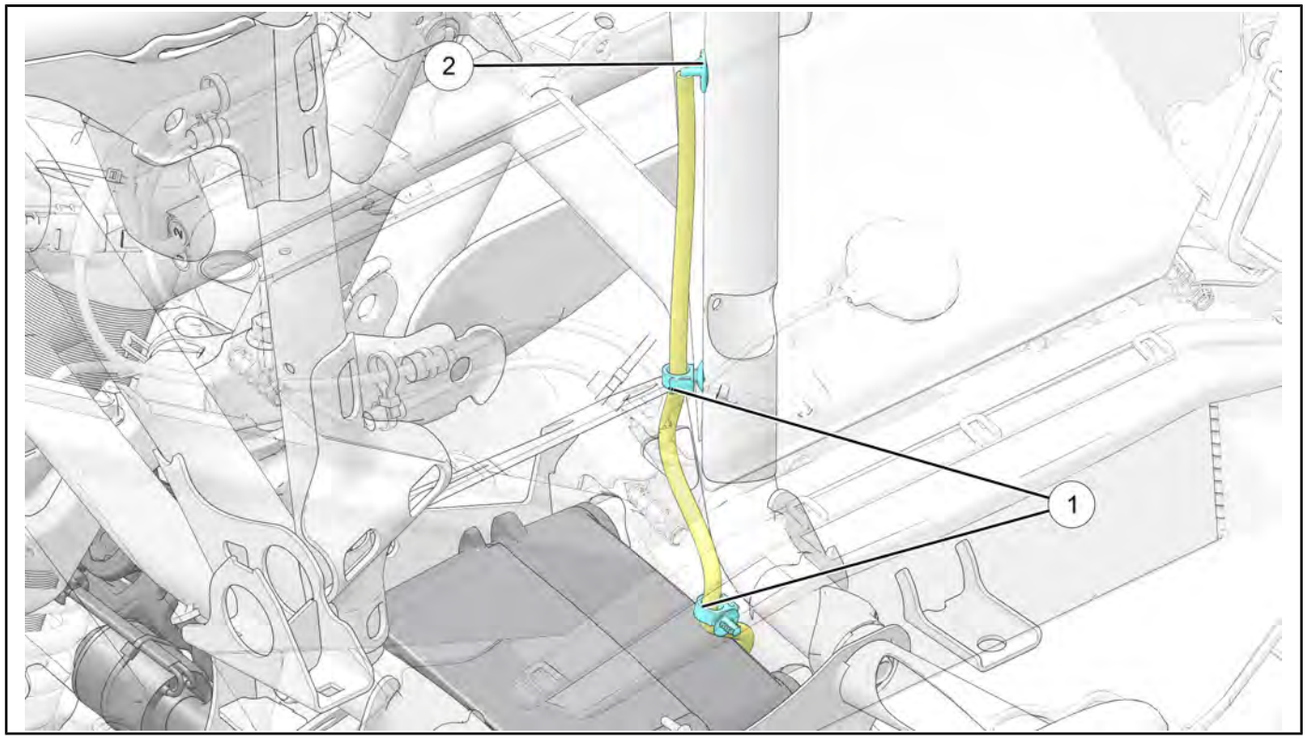


① Cover Plate	㉓ Dowel Pin
② Cover Plate Fasteners	㉔ Shim
③ Isolator Mount	㉕ Bearing
④ Vent Tube	㉖ Differential Carrier

⑤ O-Ring	㉗ Bearing
⑥ Bearing	㉘ Case
⑦ Shim	㉙ Fill/Drain Plugs
⑧ Shift Arm	㉚ Isolator Mount
⑨ Shift Arm Fasteners	㉛ Oil Seal
⑩ Spring	㉜ Pinion Gear
⑪ Engagement Dog	㉝ Bearing
⑫ Ring Gear	㉞ Bearing
⑬ Ring Gear Fasteners	㉟ Pinion Bearing Nut
⑭ Bearing	㊱ Lock Nut
⑮ Shim	㊲ Pinion Housing Fasteners
⑯ Output Gear	㊳ Triple Lip Seal
⑰ Thrust Washer	㊴ Pinion Disconnect Housing
⑱ Bearing	㊵ Disconnect Shaft
⑲ Spider Gear	㊶ Shift Collar
⑳ Dowel Pin	㊷ Shift Disconnect Fork
㉑ Differential Pin	㊸ Solenoid
㉒ Output Gear	㊹ Spring

FRONT GEARCASE VENT LINE ROUTING

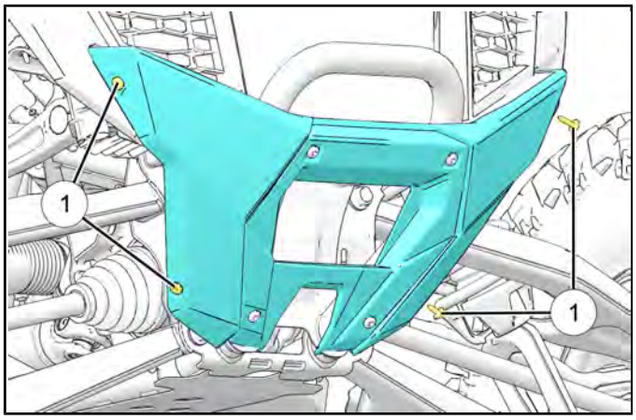
The front gearcase vent line routes up the LH shock support tube. It is then retained with two hinge clips ①. The vent line continues upward and terminates into and open section of the frame using a termination fitting ②.



FRONT GEARCASE REPLACEMENT

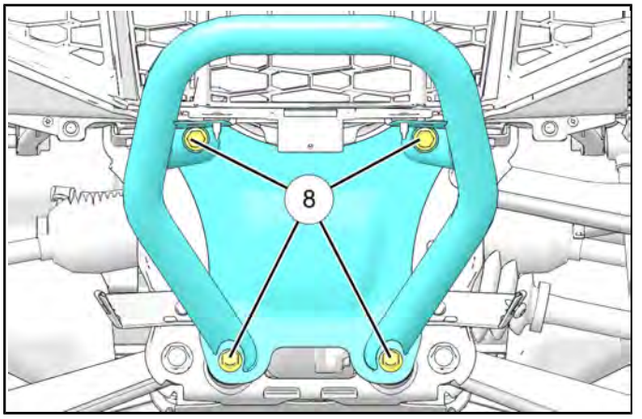
REMOVAL

1. Place vehicle on a suitable lift or jack and remove front wheel.
2. Remove four front fascia fasteners ① and remove front fascia.

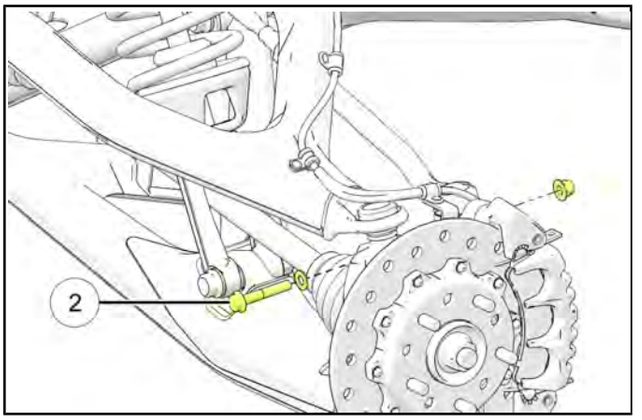


8

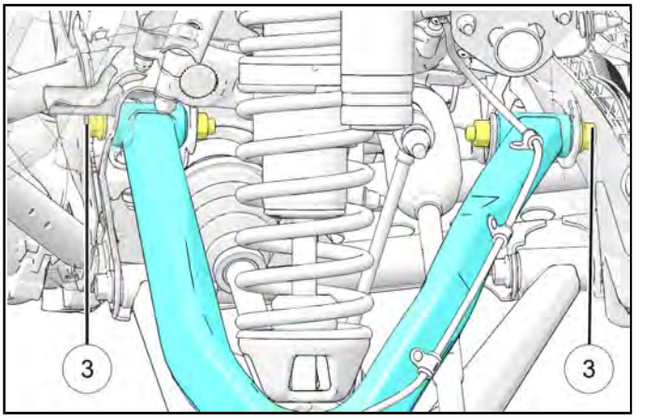
3. Remove four fasteners ⑧ and remove the front bumper.



4. Remove ball joint pinch bolt ②, washer, and nut from the upper control arm.



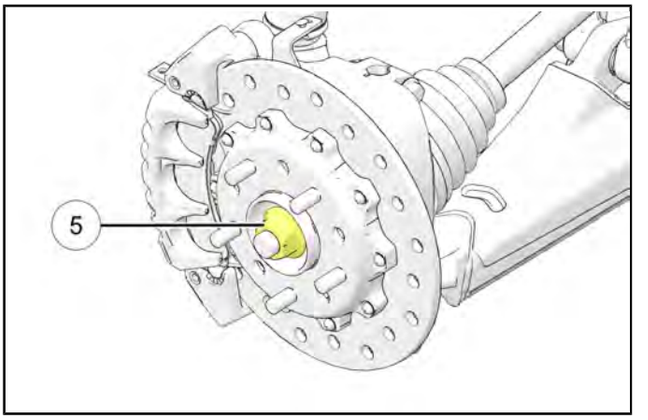
5. Remove two control arm mounting fasteners ③.



IMPORTANT

The access panel must be removed from the driver's side footwell to remove rear upper control arm fastener. To remove the rear upper control arm fastener from the passenger side, turn the steering wheel counter-clockwise to lock. Cover the tie rod boot with a rag or lubricate the socket extension shaft to prevent damage to the boot.

6. Remove wheel axle nut ⑤.



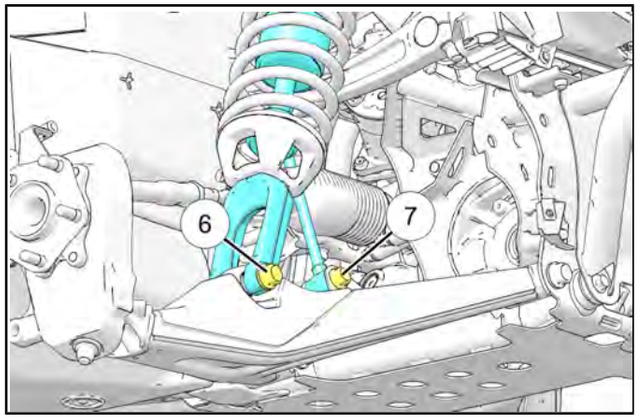
7. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc.

⚠ CAUTION

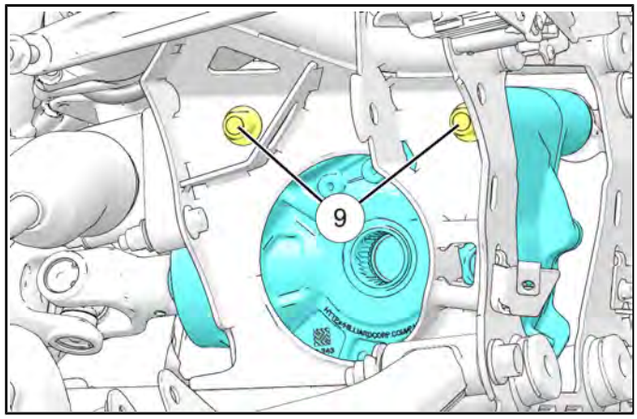
Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

8. Remove lower shock fastener ⑥ and sway bar link fastener ⑦. Move shock and sway bar link out of the way.

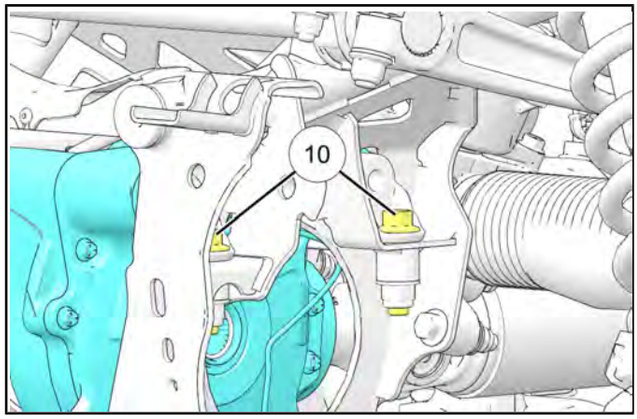
9. With a short, sharp jerk, remove half shaft from the front gearcase.



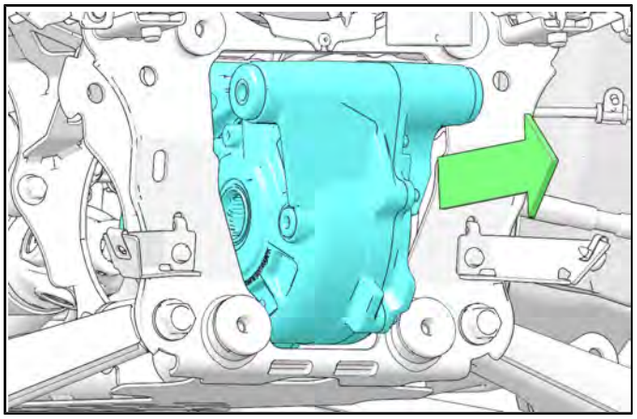
10. Repeat previous steps on opposite side of vehicle.
11. Remove two front gearcase isolator fasteners ⑨.



12. Remove two vertical bolts ⑩.

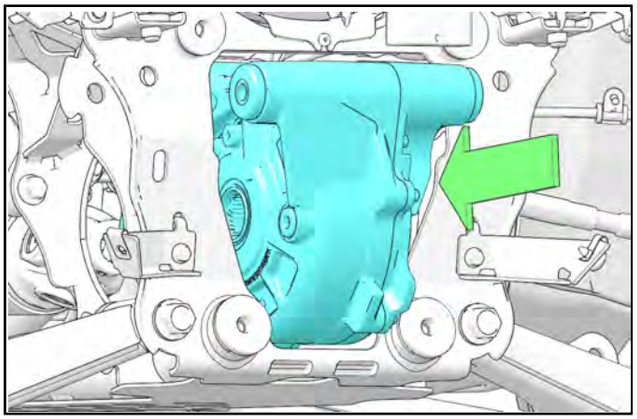


13. Remove and discard roll pin from front prop shaft.
14. Disconnect two front gearcase electrical harnesses.
15. Disconnect vent line and remove gearcase through the opening in front of the frame.

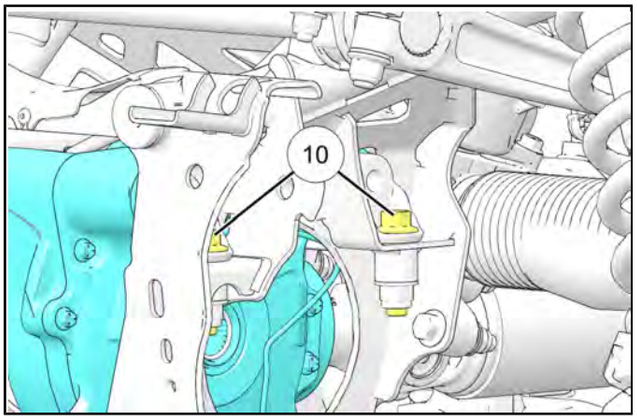


INSTALLATION

1. Install front gearcase through the opening in front of the frame. Connect vent line.

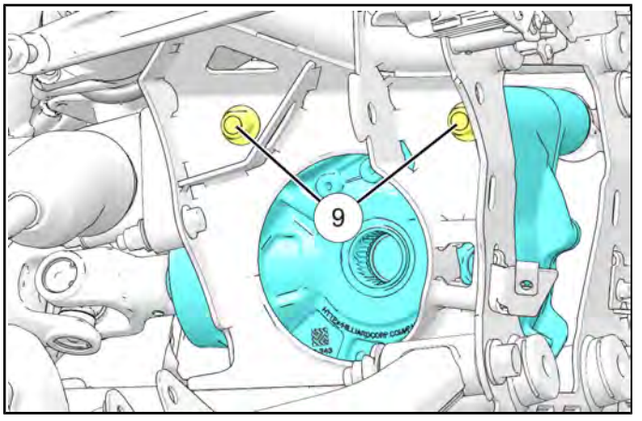


2. Install half shaft onto front gearcase input shaft.
3. Loosely install two vertical bolts.



8

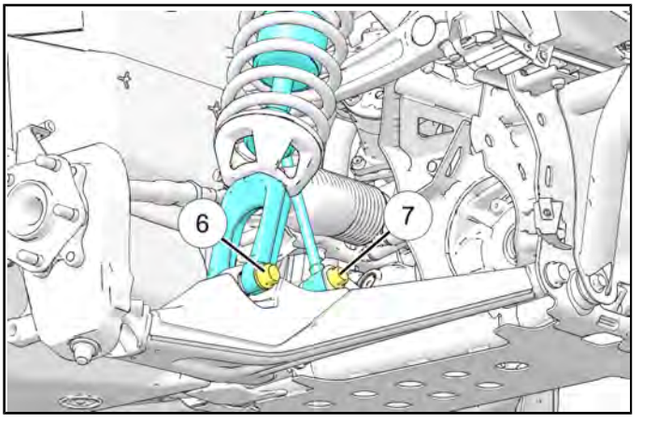
4. Install two front gearcase isolator fasteners. Torque fasteners to specification.



TORQUE
Front Gearcase Torque Sequence: a. **Install vertical bolts on drivers side and torque nuts until 1-2mm gap** b. **Torque Gearcase Isolator bolts: 55 ft-lbs (75 Nm) + 180°** c. **Torque vertical bolts: 81 ft-lbs (110 Nm)**

5. Install NEW front prop shaft roll pin.
6. Install two front gearcase electrical harnesses.
7. Install half shafts into front gearcase.

8. Install lower shock and sway bar link onto lower contol arms. Torque fasteners to specification.



TORQUE
Lower Shock Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

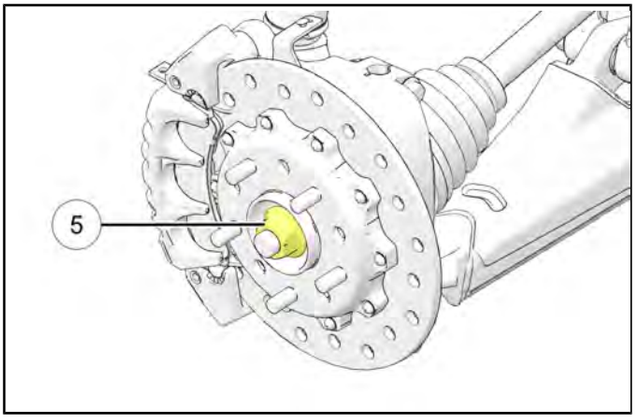
TORQUE
Sway Bar Link Fasteners: **81 ft-lbs (110 Nm)**

9. Install brake disc and caliper assembly. Torque brake caliper fasteners to specification.

TORQUE
Front Caliper Mounting Bolts: **73 ft-lbs (100 Nm)**

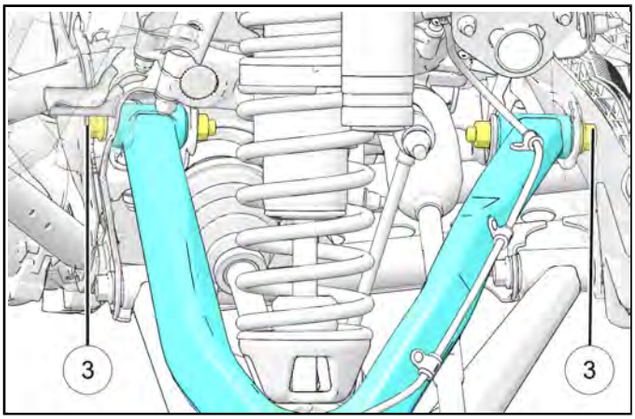
10. Apply Anti-Seize to half shaft axle splines.

11. Install front knuckle assembly and axle nut. Torque axle nut to specification.



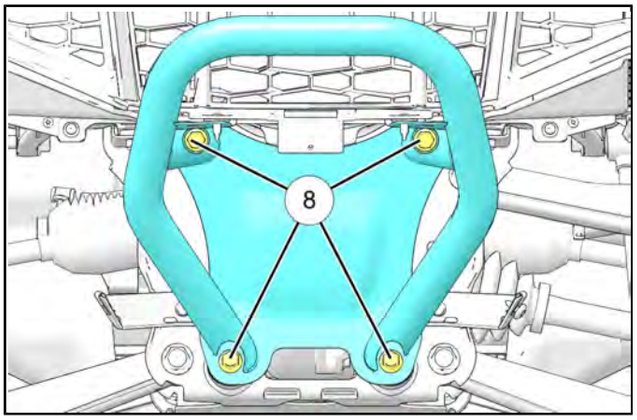
TORQUE
Wheel Axle Nut: **89 ft-lbs (120 Nm)**

12. Install control arm into its inner mounts, and ball joint into the bearing carrier.
13. Install two control arm mounting fasteners. Torque fasteners to specification.



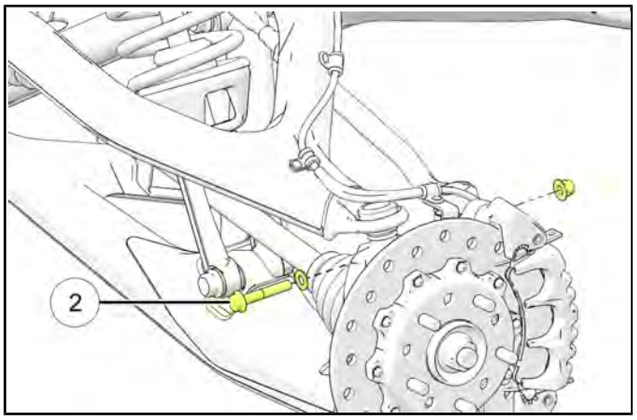
TORQUE
Control Arm Mounting Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

14. Install front bumper. Torque fasteners to specification.



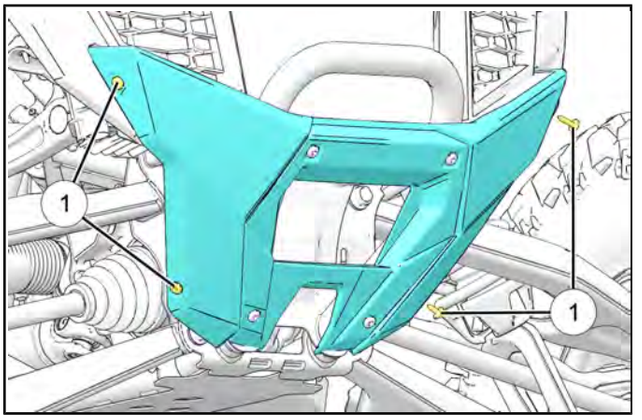
TORQUE
Front Bumper Fasteners: **37 ft-lbs (50 Nm)**

15. Install ball joint pinch bolt, washer, nut. Torque fastener to specification.



TORQUE
Upper Ball Joint Pinch Bolt: **52 ft-lbs (70 Nm) - Torque bolt side**

16. Install front fascia and four front fascia mounting fasteners.

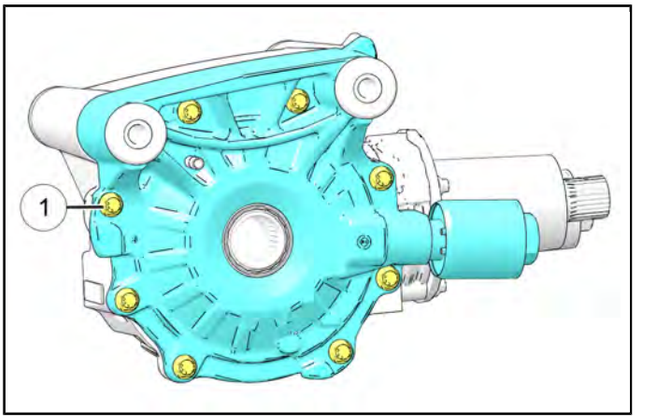


TORQUE
Front Fascia Fasteners: **7 ft-lbs (10 Nm)**

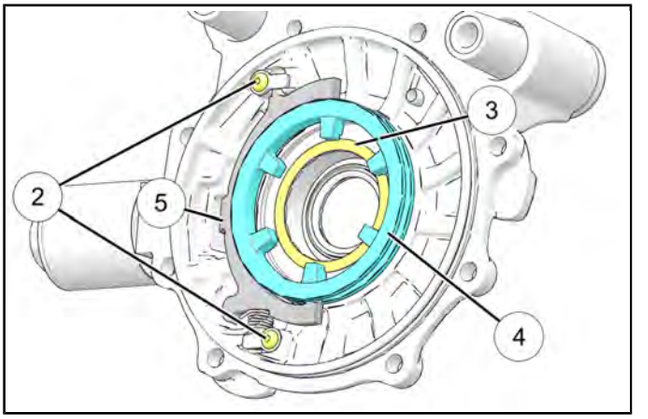
FRONT GEARCASE DISASSEMBLY / INSPECTION

COVER PLATE

1. Drain and properly dispose of gearcase fluid. Remove any metal particles from the drain plug magnet.
2. Remove eight cover plate fasteners ①. Remove cover and solenoid as an assembly.



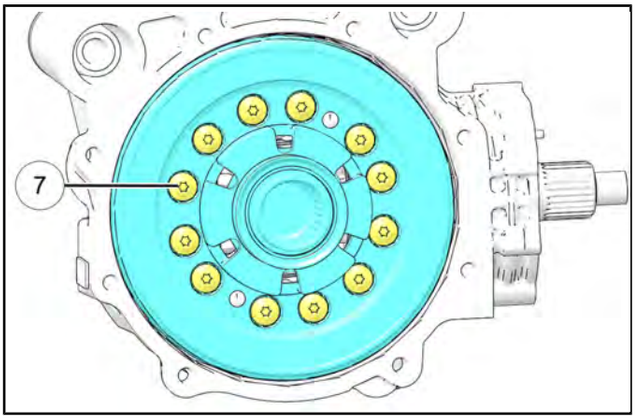
3. **If replacing one of these components:** Remove two fasteners ② and remove the shift arm ⑤, engagement dog ④, and shim ③ from the cover plate.



NOTICE
If replacement of the shift arm, engagement dog, and shim is not required, do not remove. Inspect sealing o-ring on the cover and inspect the axle seal. Replace if damaged or worn.

RING AND SPIDER GEARS

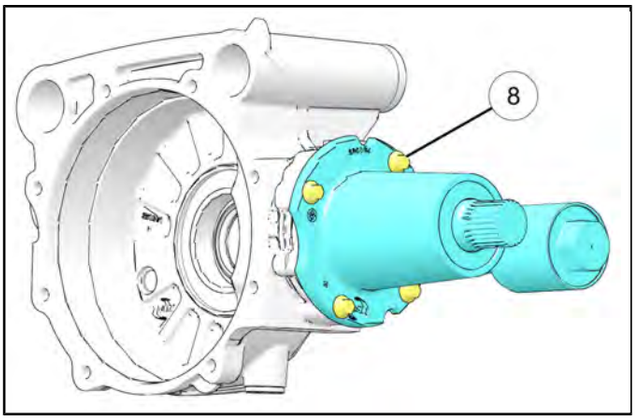
1. Remove twelve fasteners ⑥ and remove ring gear, spider gear, and carrier as an assembly.



NOTICE
Use a hammer and punch on the passenger-side hub to tap the ring gear assembly out of the case.

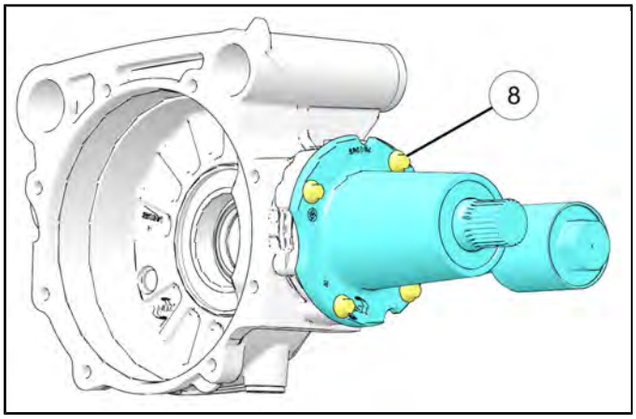
PINION GEAR AND HOUSING

1. Remove four fasteners ⑧ and remove pinion gear, housing, and solenoid as an assembly.



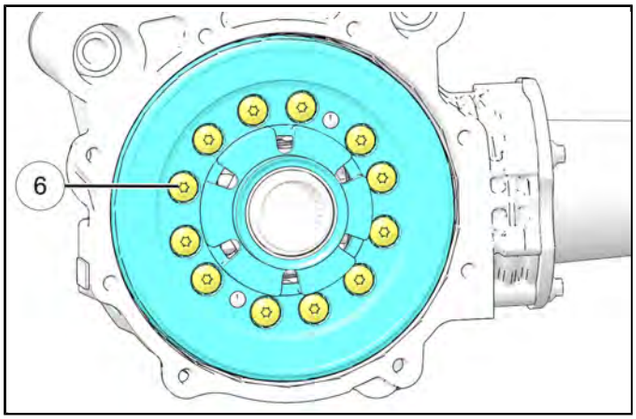
FRONT GEARCASE ASSEMBLY

1. Clean surface between housing and pinion assembly.
2. Apply a thin bead of gasket sealant **(3233885)** around the pinion-to-case sealing surface
3. Install pinion gear, housing, and solenoid as an assembly. Torque fasteners to specification.



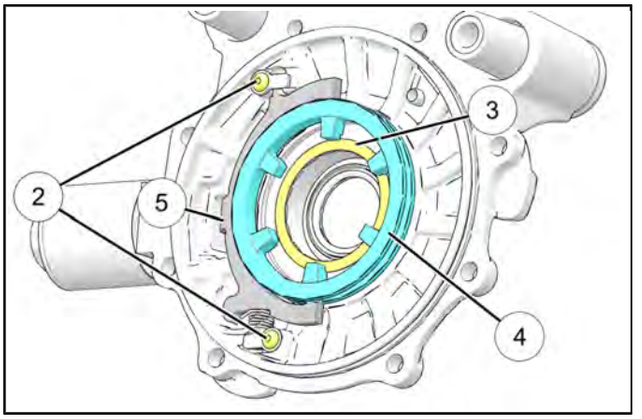
TORQUE
Pinion Gear Housing Fasteners: **7 ft-lbs (10 Nm) – Apply Loctite 2760**

4. Install ring gear assembly. Torque fasteners to specification.



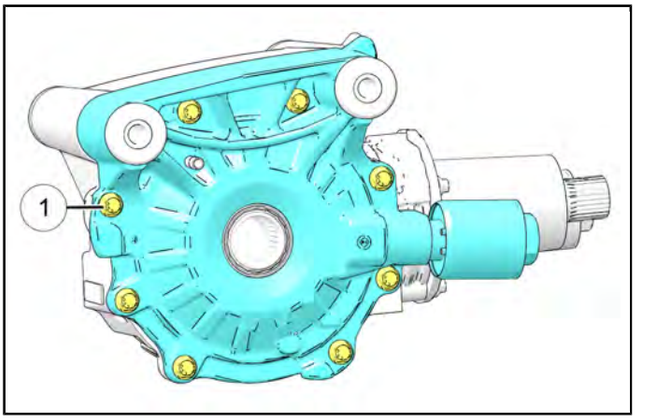
TORQUE
Ring Gear Assembly Fasteners: **14 ft-lbs (19 Nm) + 40°**

5. **If replaced** Install shim, engagement dog, and shift arm onto cover plate. Torque fasteners to specification.



TORQUE
Shift Arm Fasteners: **50 in-lbs (6 Nm)**

6. Install cover plate. Torque fasteners to specification.

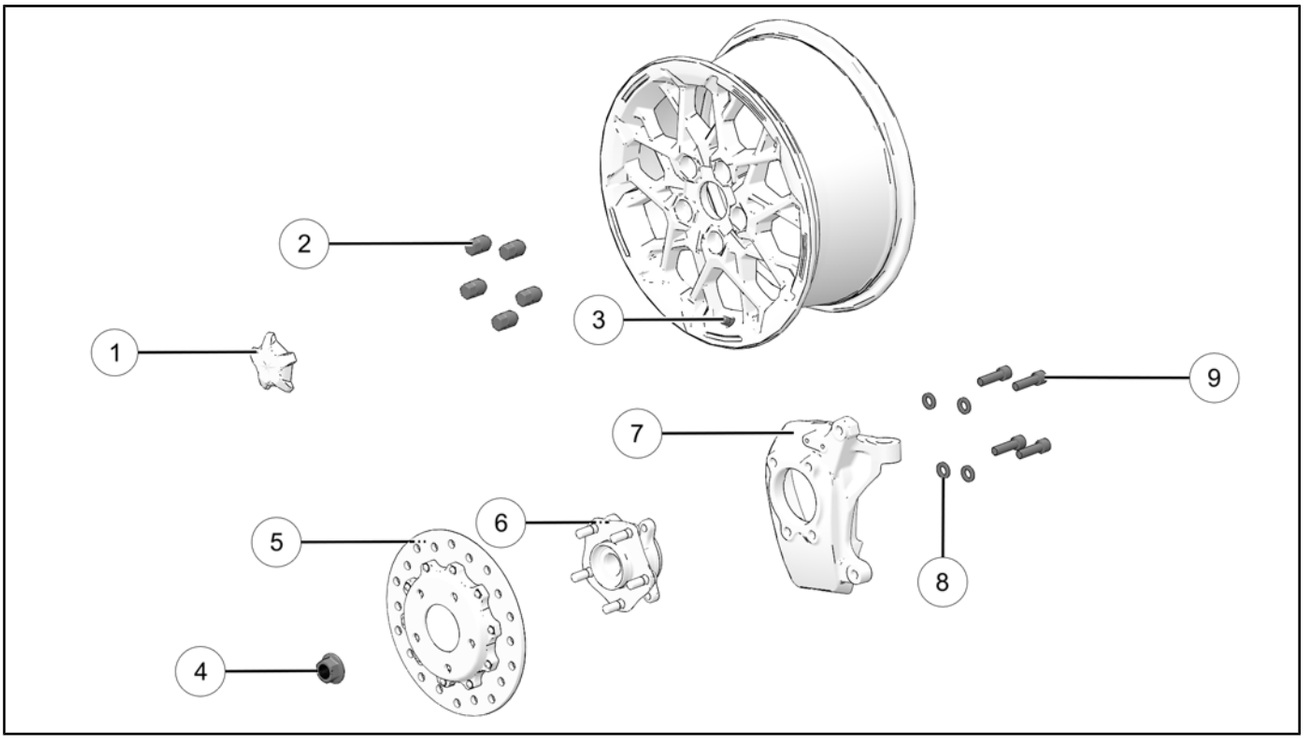


IMPORTANT
Apply silicone assembly grease to the cover o-ring and the axle seal ID. Line up the differential engagement dogs with the ring gear slots to install the cover plate. Once aligned, rock the cover plate down into place. Do NOT use a hammer on the cover plate.

TORQUE
Cover Plate Fasteners: **23 ft-lbs (31 Nm)**

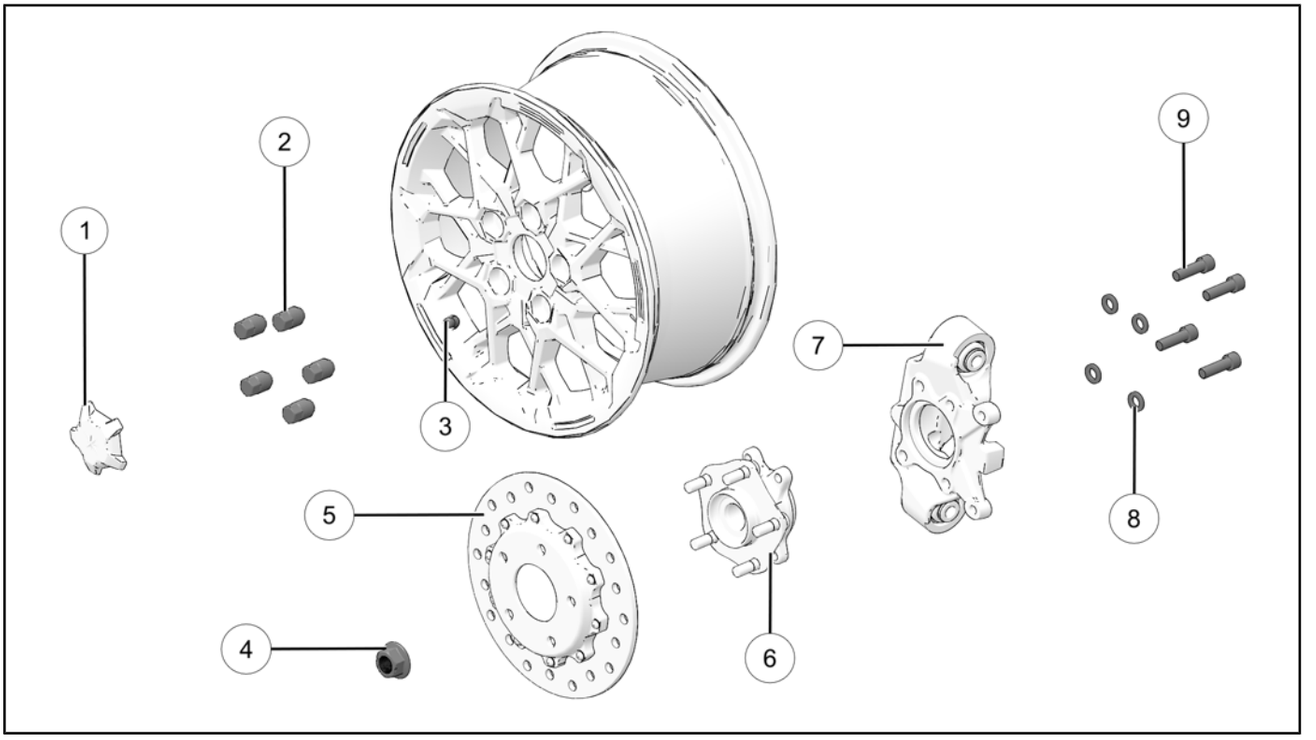
WHEEL HUBS

FRONT HUB ASSEMBLY VIEW



① Wheel Cap	⑥ Hub Assembly
② Wheel Lug Nuts **148 ft-lbs (200 Nm)**	⑦ Steering Knuckle
③ Valve Stem	⑧ Washers
④ Axle Nut **89 ft-lbs (120 Nm)**	⑨ Hub Mounting Bolt **81 ft-lbs (110 Nm)**
⑤ Brake Rotor	

REAR HUB ASSEMBLY VIEW



① Wheel Cap	⑥ Hub Assembly
② Wheel Lug Nuts **148 ft-lbs (200 Nm)**	⑦ Knuckle
③ Valve Stem	⑧ Washers
④ Axle Nut **89 ft-lbs (120 Nm)**	⑨ Hub Mounting Bolts **81 ft-lbs (110 Nm)**
⑤ Brake Rotor	

TIRE BALANCING

Any time a tire is replaced, the tire and wheel assembly must be balanced to evenly distribute the weight of the tire and wheel assembly.

Balancing tires eliminates/minimizes steering vibrations, prevents excessive wear on suspension components, and increases a tire's lifespan and performance.

Symptoms of an imbalanced, or improperly balanced tire include:

- Steering wheel vibration
- Seat or floorboard vibration
- Excessive or uneven tread wear

NOTES

CHAPTER 9
STEERING / SUSPENSION

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
PU-53908	FOX Air Valve Assembly Service Set
2876389	Multi-Function Pliers
2878925-329	Shock Spring Preload Spanner Wrench
39800780	IFP tool (FOX Commercially Available)
PU-50939	Seal Protector Sleeve (2.0” shocks only)
PU-51039	Gas Shock Fill Tool
PU-51829	FOX Spanner Wrench - 2.5″ / 3.0″ Inner Internal Bypass
PU-51830	FOX Spanner Wrench - 2.5″ Outer Internal Bypass
PU-51832	FOX Spanner Wrench - 3.0″ Outer Internal Bypass
PU-51838	FOX Shock Body Bolding Tool (3.0″)
N/A	42 mm Inner Tie Rod End Socket (Commercially Available)

Bosch Automotive Service Solutions: 1-800-345-2233 or http://polaris.service-solutions.com

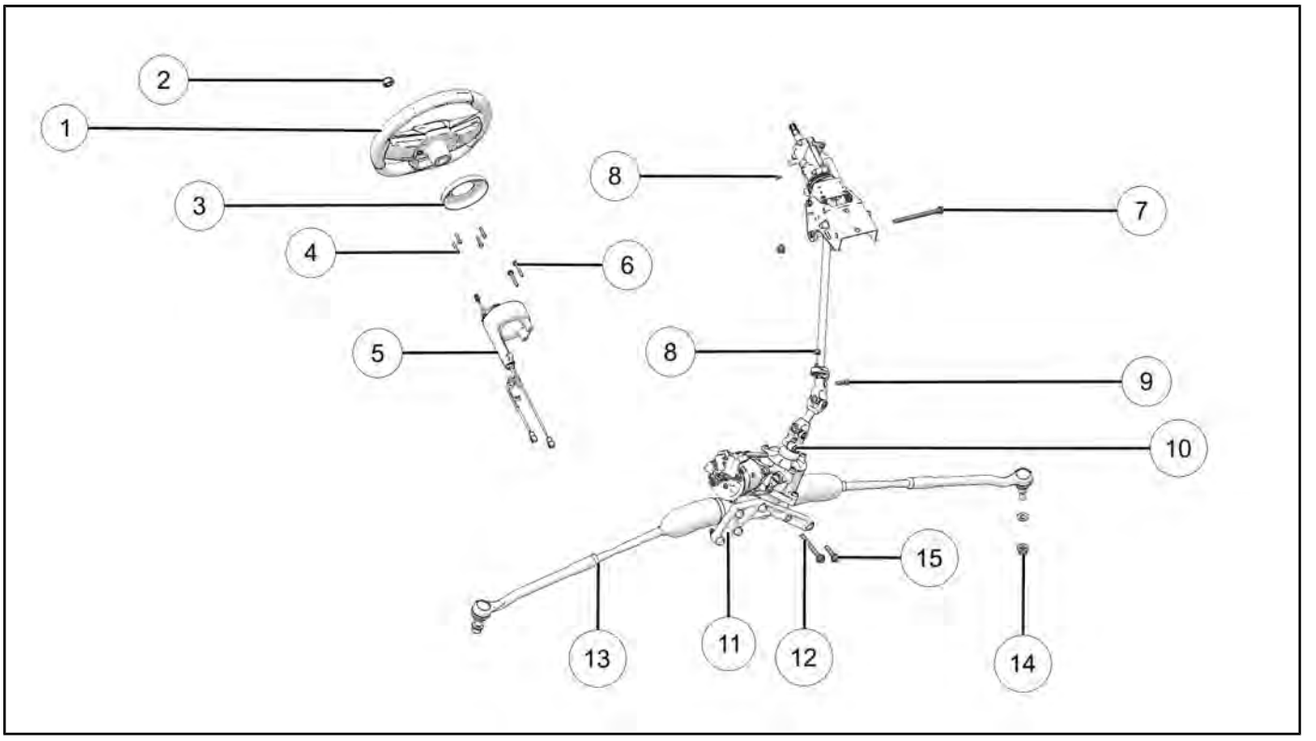
STEERING ALIGNMENT SPECIFICATIONS

FRONT WHEEL ALIGNMENT SPECIFICATIONS	
Camber (Non-Adjustable)	**-0.52° ± 0.46°**
Caster (Non-Adjustable)	**4.49° ± 0.82°**
Toe	**0.00° ± 0.45°**

REAR WHEEL ALIGNMENT SPECIFICATIONS	
Camber (Non-Adjustable)	**-0.49° ± 0.75°**
Toe	**0.25° ± 0.45°**

STEERING SYSTEM

STEERING SYSTEM ASSEMBLY VIEW



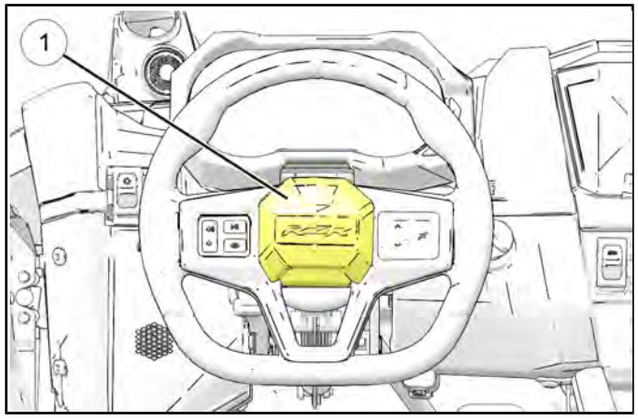
① Steering Wheel	⑥ Coil Assembly Fasteners **27 in-lbs (3 Nm**	⑪ Steering Rack Mounting Plate
② Steering Wheel Nut **66 ft-lbs (90 Nm)**	⑦ Tilt Bracket Fasteners **33 ft-lbs (45 Nm)**	⑫ Mounting Plate Inner Fasteners **44 ft-lbs (60 Nm)**
③ Steering Column Cover	⑧ Steering Shaft Bearing Fasteners **22 ft-lbs (30 Nm)**	⑬ Tie Rod Jam Nut **89 ft-lbs (120 Nm)**
④ Steering Column Cover Fasteners **27 in-lbs (3 Nm**	⑨ Upper Steering Shaft Pinch Bolt **22 ft-lbs (30 Nm)**	⑭ Ball Joint Retaining Nut **52 ft-lbs (70 Nm) + 90°**
⑤ Coil Assembly	⑩ Lower Steering Shaft Pinch Bolt **26 ft-lbs (35 Nm) + 90°**	⑮ Mounting Plate Outer Fasteners **44 ft-lbs (60 Nm)**

UPPER STEERING SHAFT REPLACEMENT

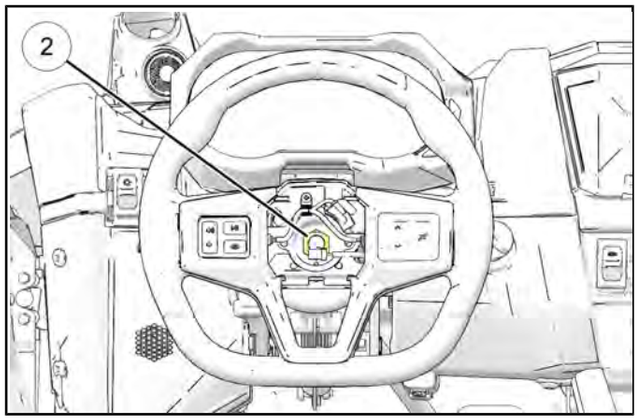
REMOVAL

1. Park vehicle on a flat, level surface.

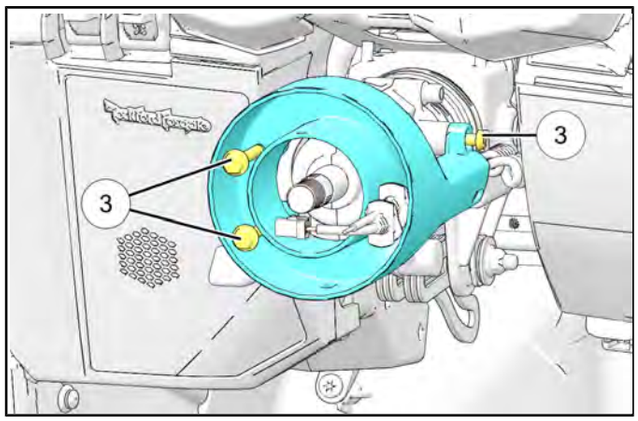
2. Remove steering wheel cover ①.



3. Remove steering wheel nut ② and remove steering wheel.

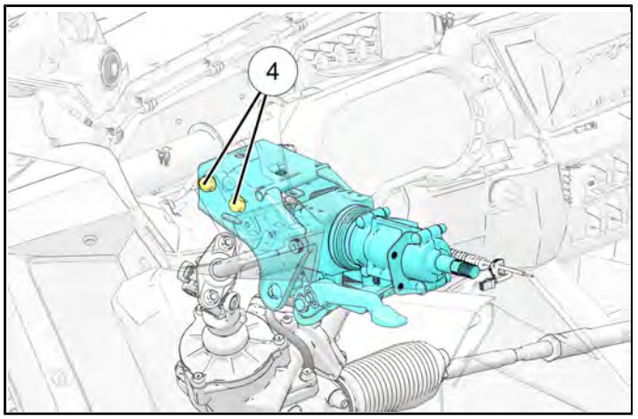


4. Remove three fasteners ③ and remove the steering coil assembly. Disconnect electrical harness.



5. Remove dash. See Dash Removal in the Body/Frame chapter.

6. Remove two fasteners ④ from the tilt bracket assembly, and remove tilt bracket and pivot tube as an assembly.



INSTALLATION

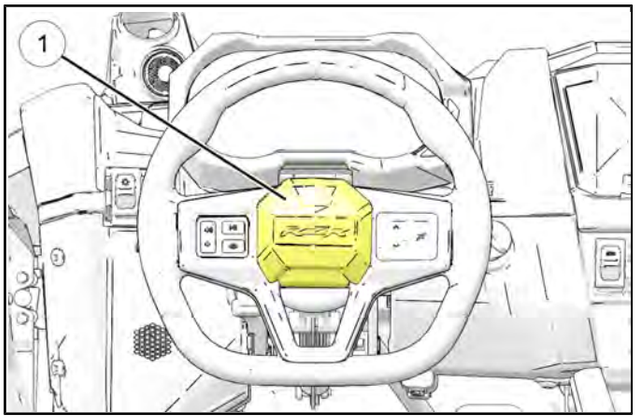
1. Reverse removal procedure for installation.

TORQUE
Tilt Bracket Mounting Fasteners: **33 ft-lbs (45 Nm)** Front Coil Assembly Fasteners: **27 in-lbs (3 Nm** Coil Assembly Side Fastener: **27 in-lbs (3 Nm** Steering Wheel Nut: **66 ft-lbs (90 Nm)**

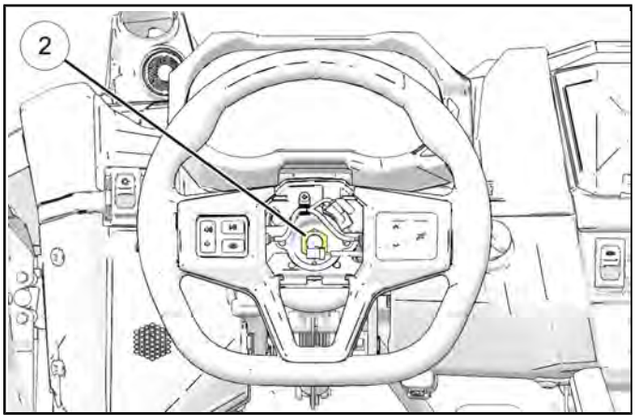
LOWER STEERING SHAFT REPLACEMENT

REMOVAL

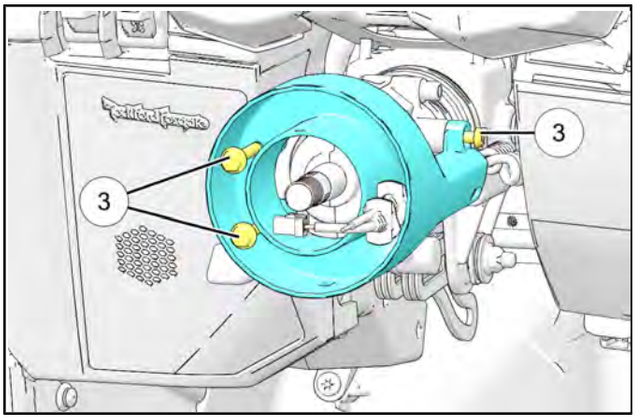
1. Park vehicle on a flat, level surface.
2. Remove steering wheel cover ①.



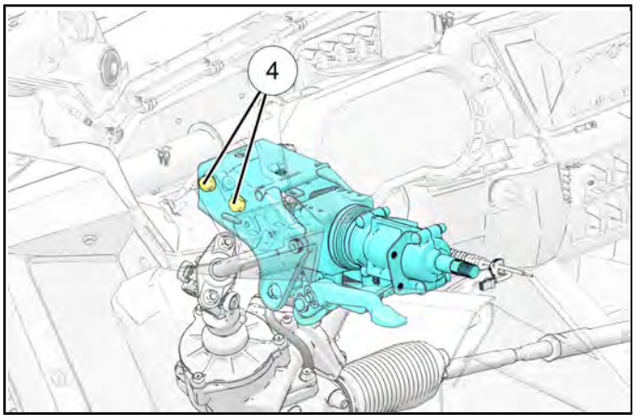
3. Remove steering wheel nut ② and remove steering wheel.



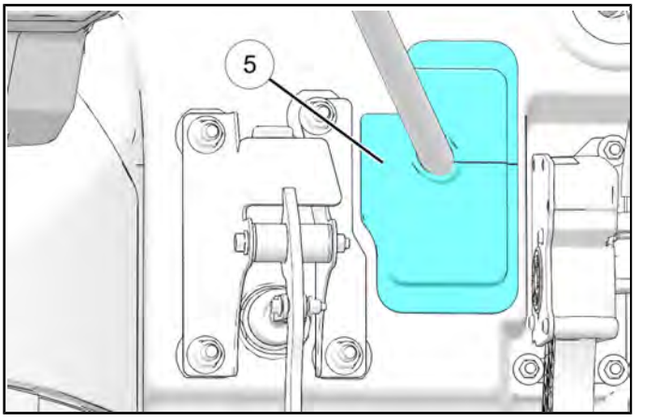
4. Remove three fasteners ③ and remove the steering coil assembly. Disconnect electrical harness.



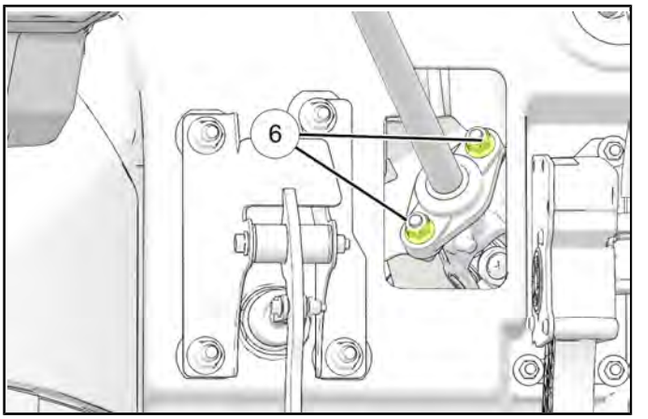
5. Remove dash. See Dash Removal in the Body/Frame chapter.
6. Remove two fasteners ④ from the tilt bracket assembly, and remove tilt bracket and pivot tube as an assembly.



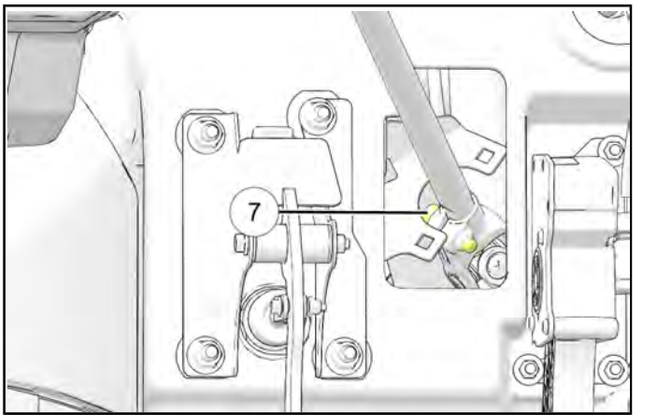
7. Remove steering boot ⑤.



8. Remove two steering shaft bearing fasteners ⑥.



9. Remove one pinch bolt ⑦ and remove steering shaft.



INSTALLATION

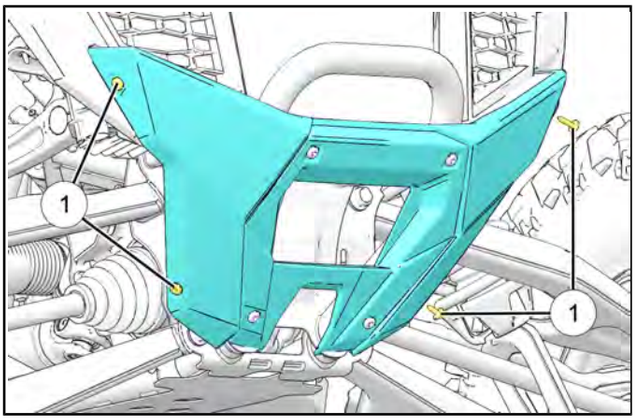
1. Reverse removal procedure for installation.

TORQUE
Tilt Bracket Mounting Fasteners: **33 ft-lbs (45 Nm)** Front Coil Assembly Fasteners: **27 in-lbs (3 Nm** Coil Assembly Side Fastener: **27 in-lbs (3 Nm** Steering Wheel Nut: **66 ft-lbs (90 Nm)** Steering Shaft Bearing Fasteners: **22 ft-lbs (30 Nm)** Steering Shaft Pinch Bolt: **22 ft-lbs (30 Nm)**

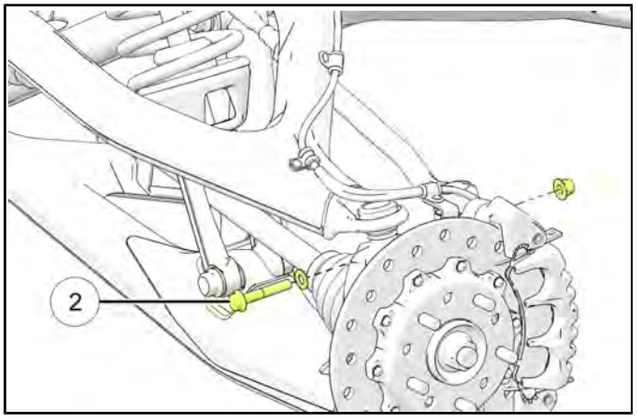
EPS UNIT / STEERING RACK REPLACEMENT

REMOVAL

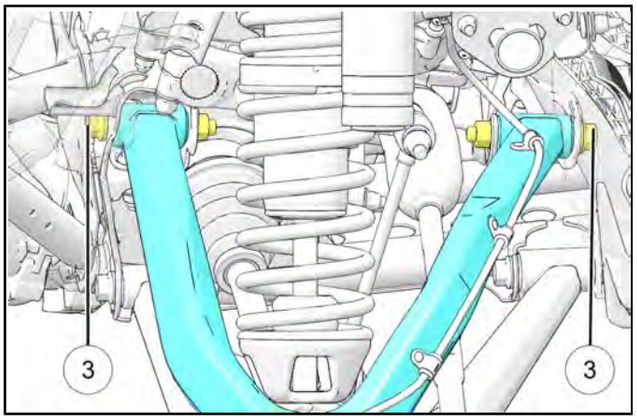
1. Remove upper and lower steering shaft. Refer to lower steering shaft removal outlined in this chapter.
2. Remove four front fascia fasteners ① and remove front fascia.



3. Remove ball joint pinch bolt ②, washer, and nut from the upper control arm.

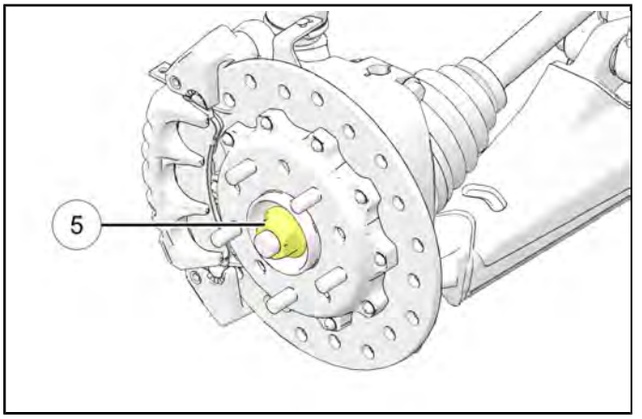


4. Remove two control arm mounting fasteners ③.



IMPORTANT
The access panel must be removed from the driver's side footwell to remove rear upper control arm fastener. To remove the rear upper control arm fastener from the passenger side, turn the steering wheel counter-clockwise to lock. Cover the tie rod boot with a rag or lubricate the socket extension shaft to prevent damage to the boot.

5. Remove wheel axle nut ⑤.

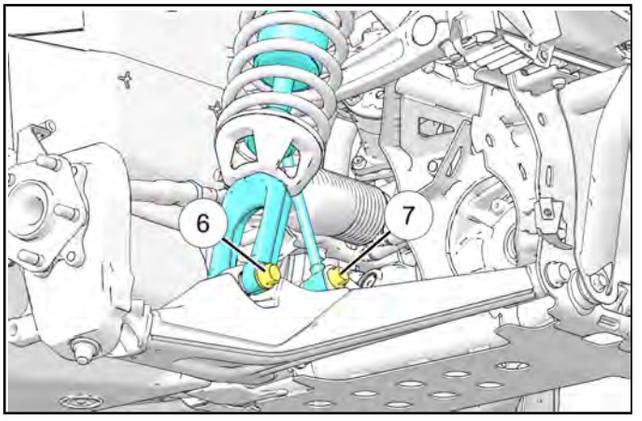


6. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc.

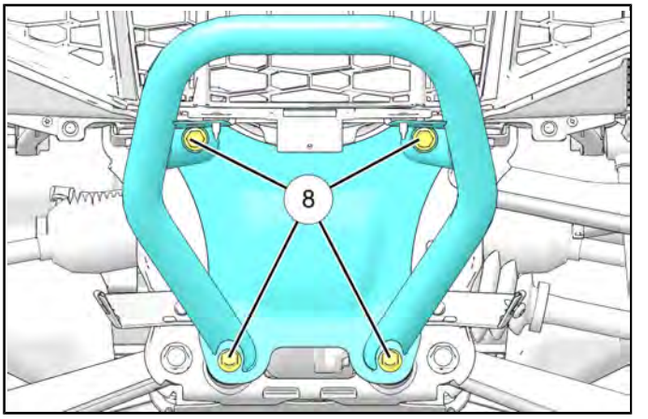
⚠ CAUTION

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

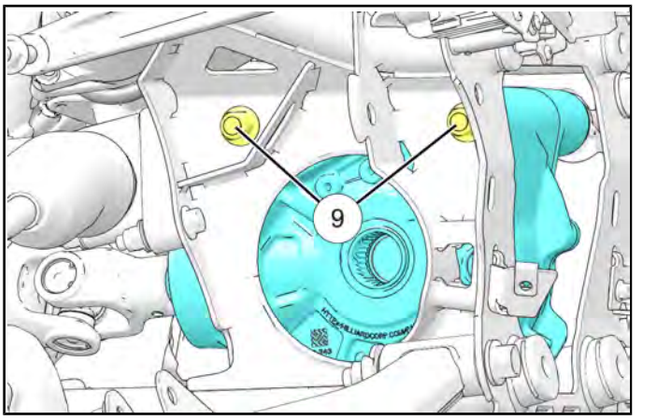
7. Remove lower shock fastener ⑥ and sway bar link fastener ⑦. Move shock and sway bar link out of the way.
8. With a short, sharp jerk, remove half shaft from the front gearcase.



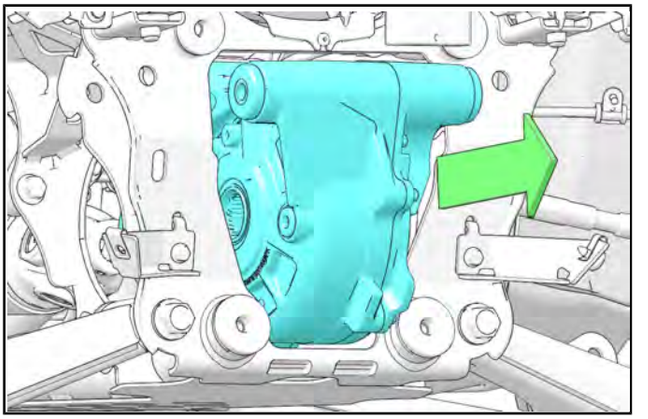
9. Repeat previous steps on opposite side of vehicle.
10. Remove four fasteners ⑧ and remove the front bumper.



11. Remove two front gearcase isolator fasteners ⑨.

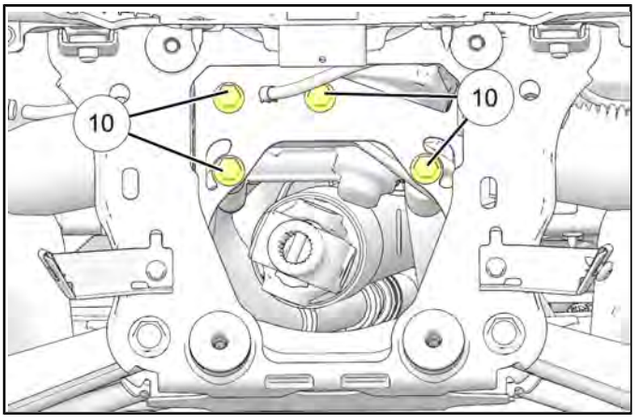


12. Remove and discard roll pin from front prop shaft.
13. Disconnect two front gearcase electrical harnesses.
14. Disconnect vent line and remove gearcase through the opening in front of the frame.



15. Remove tie rod ball joints from steering knuckles.

16. Remove four fasteners ⑩ and remove steering rack/EPS assembly from the vehicle.

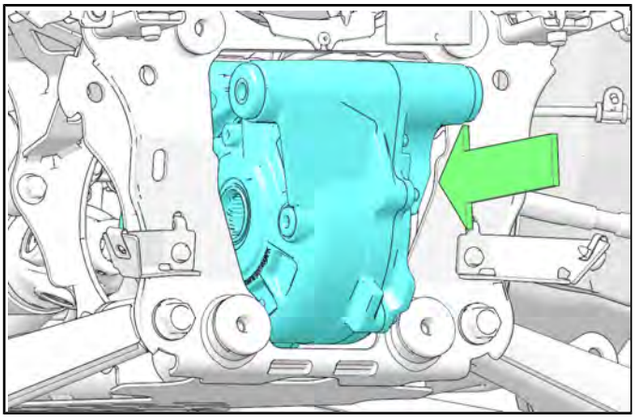


INSTALLATION

1. Install steering rack/EPS assembly into place. Install four mounting bracket fasteners and torque to specification.

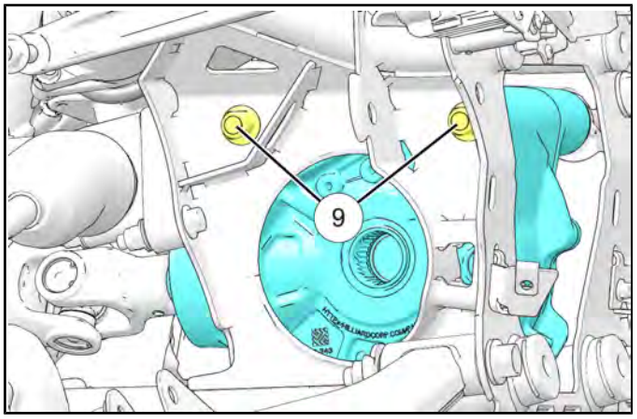
TORQUE
Steering Rack Mounting Fasteners: **44 ft-lbs (60 Nm)**

2. Install front gearcase through the opening in front of the frame. Connect vent line.



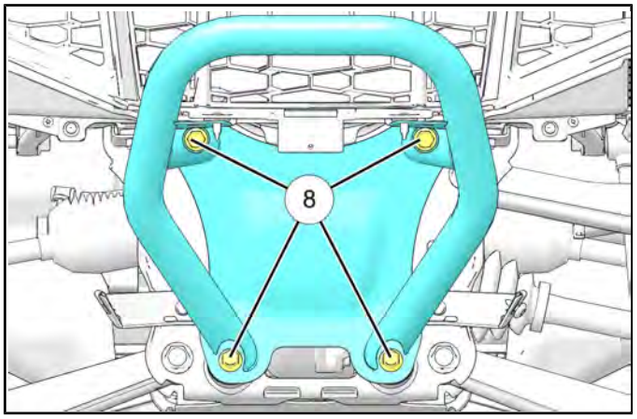
3. Install half shaft onto front gearcase input shaft.

4. Install two front gearcase isolator fasteners. Torque fasteners to specification.



TORQUE
Front Gearcase Torque Sequence: a. **Install vertical bolts on drivers side and torque nuts until 1-2mm gap** b. **Torque Gearcase Isolator bolts: 55 ft-lbs (75 Nm) + 180°** c. **Torque vertical bolts: 81 ft-lbs (110 Nm)**

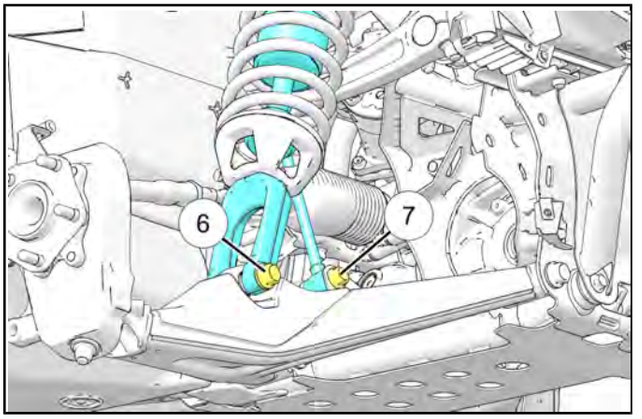
5. Install NEW front prop shaft roll pin.
6. Install two front gearcase electrical harnesses.
7. Install front bumper. Torque fasteners to specification.



TORQUE
Front Bumper Fasteners: **37 ft-lbs (50 Nm)**

8. Install half shafts into front gearcase.

9. Install lower shock and sway bar link onto lower contol arms. Torque fasteners to specification.



TORQUE
Lower Shock Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

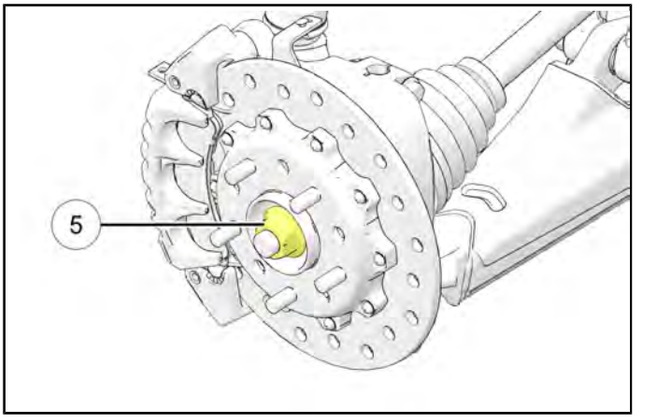
TORQUE
Sway Bar Link Fasteners: **81 ft-lbs (110 Nm)**

10. Install brake disc and caliper assembly. Torque brake caliper fasteners to specification.

TORQUE
Front Caliper Mounting Bolts: **73 ft-lbs (100 Nm)**

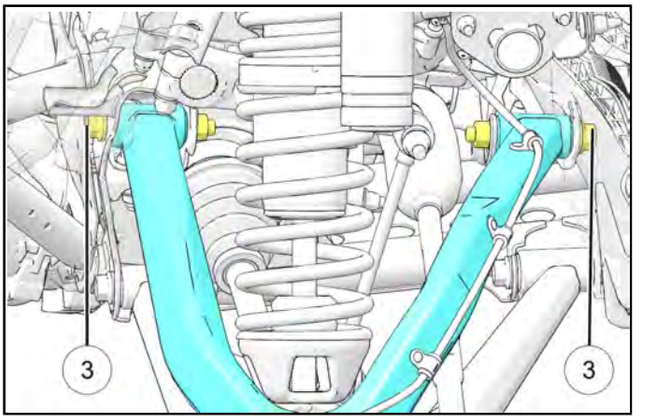
11. Apply Anti-Seize to half shaft axle splines.

12. Install front knuckle assembly and axle nut. Torque axle nut to specification.



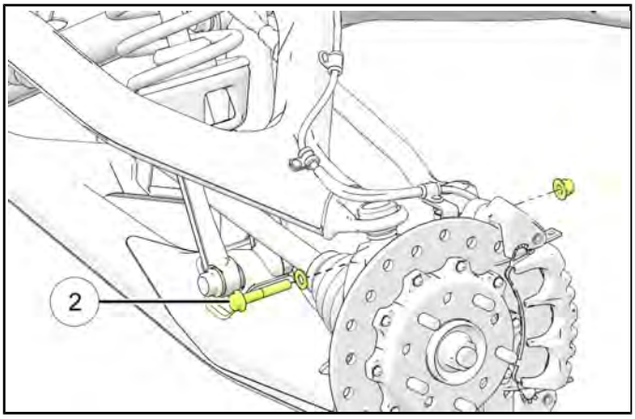
TORQUE
Wheel Axle Nut: **89 ft-lbs (120 Nm)**

13. Install control arm into its inner mounts, and ball joint into the bearing carrier.
14. Install two control arm mounting fasteners. Torque fasteners to specification.



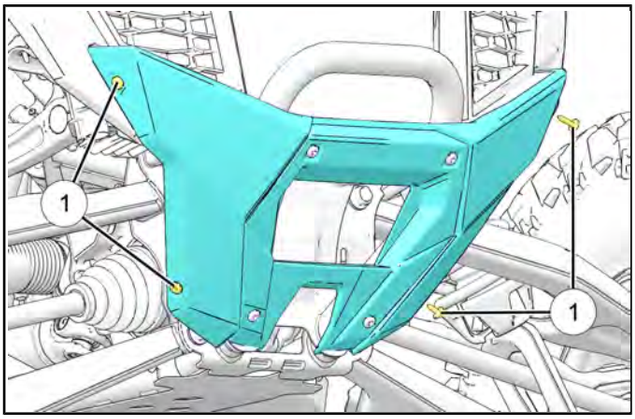
TORQUE
Control Arm Mounting Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

15. Install ball joint pinch bolt, washer, nut. Torque fastener to specification.



TORQUE
Upper Ball Joint Pinch Bolt: **52 ft-lbs (70 Nm) - Torque bolt side**

16. Install front fascia and four front fascia mounting fasteners.



TORQUE
Front Fascia Fasteners: **7 ft-lbs (10 Nm)**

17. Install upper and lower steering shafts. Refer to lower steering shaft replacement outlined in this chapter.

TORQUE
Tilt Bracket Mounting Fasteners: **33 ft-lbs (45 Nm)** Front Coil Assembly Fasteners: **27 in-lbs (3 Nm** Coil Assembly Side Fastener: **27 in-lbs (3 Nm** Steering Wheel Nut: **66 ft-lbs (90 Nm)** Steering Shaft Bearing Fasteners: **22 ft-lbs (30 Nm)** Steering Shaft Pinch Bolt: **22 ft-lbs (30 Nm)**

EPS PRE-POSITIONING / STEERING ANGLE CENTERING

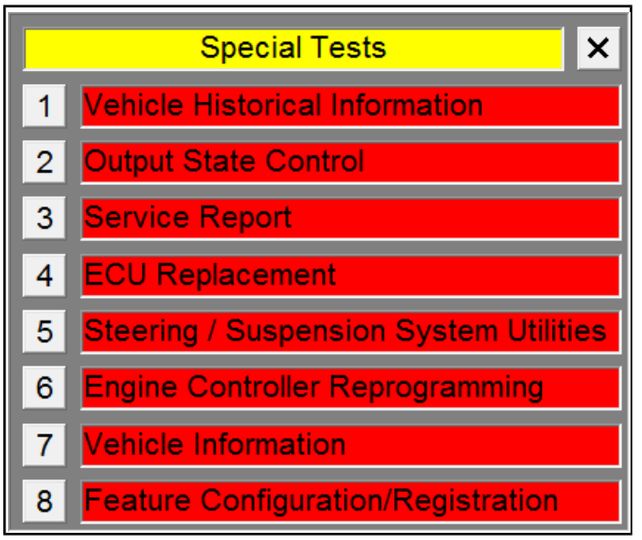
EPS PRE-POSITION PROCEDURE

The EPS pre-position procedure should be performed if:

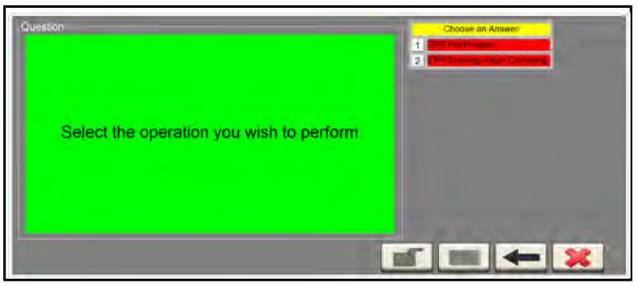
- The EPS has been removed/replaced
- The steering shafts have been disconnected
- New steering components have been installed
- The SCM is indicating out-of-alignment faults

IMPORTANT
Before continuing, the steering rack and input shafts must be disconnected from the EPS module. If necessary, remove the EPS module. If EPS module has skip-tooth splines, mark locations of the skip-tooth splines on the module shafts. EPS module electrical connectors MUST be connected, and the ignition key “ON”

1. Connect vehicle to Digital Wrench, and select “Special Tests” menu.
2. Select option 5 from Special Tests menu.



3. Select option 1 at the next menu.



4. Follow instructions in Digital Wrench to properly pre-position the EPS unit.

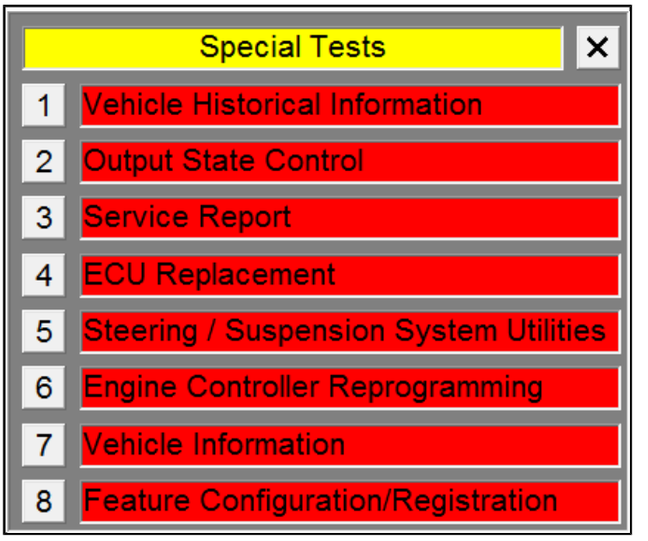
EPS STEERING ANGLE CENTERING

The EPS Steering Angle Sensor Centering procedure should be performed if:

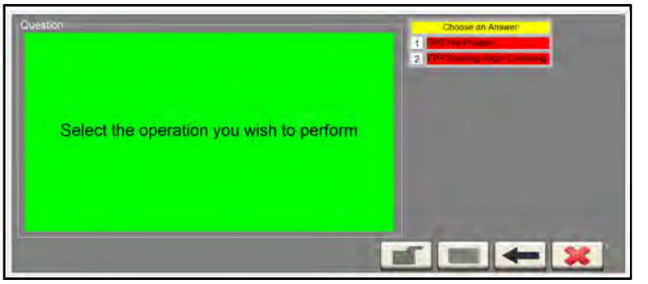
- The EPS has been removed/replaced
- The EPS is indicating out-of-alignment faults
- New steering components have been installed
- The SCM is indicating out-of-alignment faults

IMPORTANT
The steering system must be properly aligned, and steering wheel must be straight before performing this procedure.

1. Connect vehicle to Digital Wrench, and select “Special Tests” menu.
2. Select option 5 from Special Tests menu.



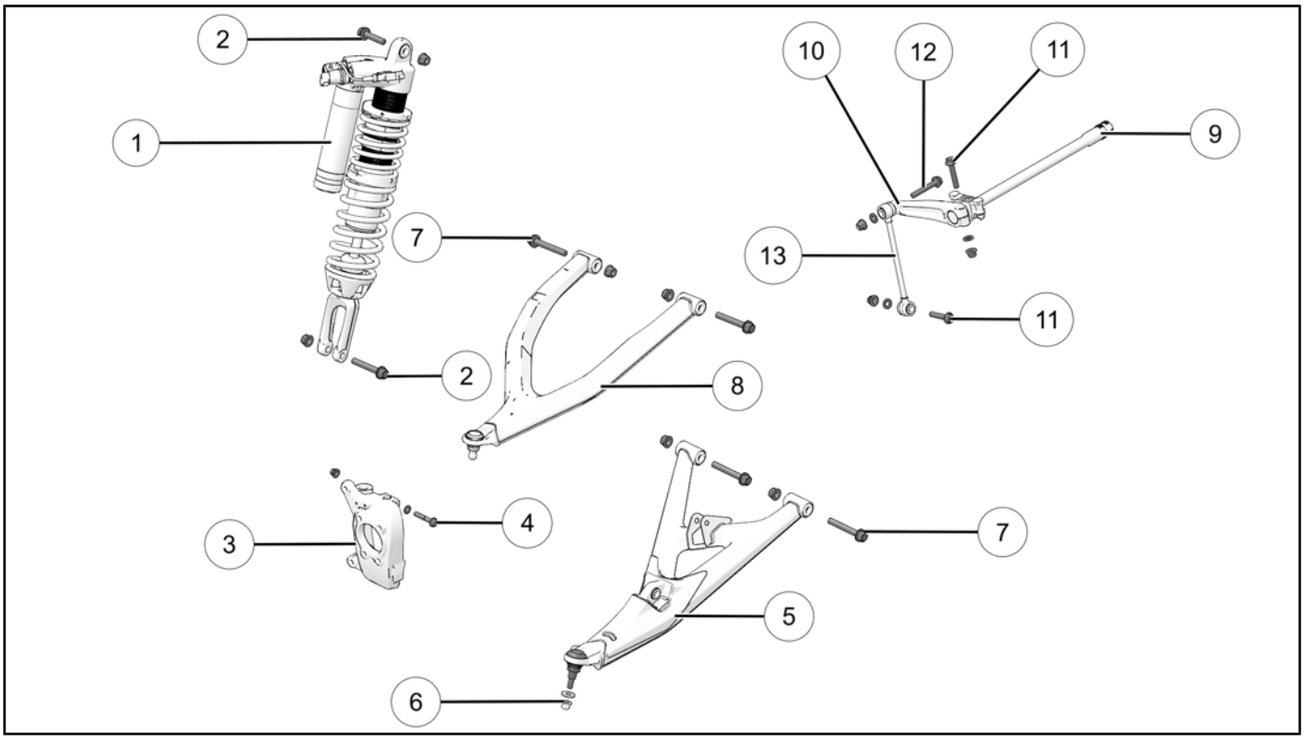
3. Select option 2 at the next menu.



4. Follow instructions in Digital Wrench to properly center the EPS steering angle sensor.

FRONT SUSPENSION

FRONT SUSPENSION ASSEMBLY VIEW

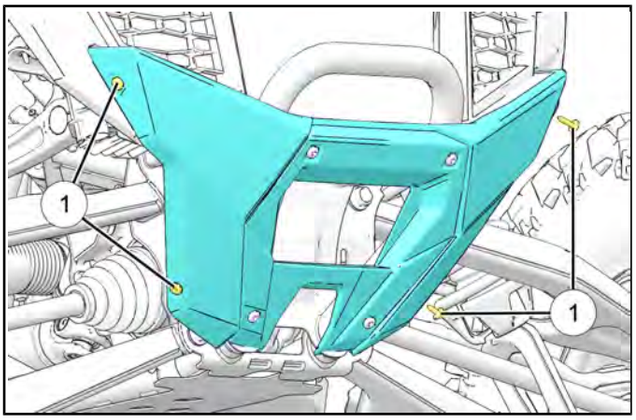


① Shock Assembly	⑧ Upper Control Arm
② Shock Mounting Fasteners **133 ft-lbs (180 Nm) - Torque bolt side**	⑨ Sway Bar
③ Knuckle	⑩ Sway Bar Arm
④ Upper Ball Joint Pinch Bolt **52 ft-lbs (70 Nm) - Torque bolt side**	⑪ Sway Bar Fasteners **81 ft-lbs (110 Nm)**
⑤ Lower Control Arm	⑫ Sway Bar Link-to-Arm Fasteners **81 ft-lbs (110 Nm)**
⑥ Lower Ball Joint Fastener **44 ft-lbs (60 Nm) + 90° (Single Use)**	⑬ Sway Bar Link
⑦ Control Arm Fasteners **133 ft-lbs (180 Nm) - Torque bolt side**	

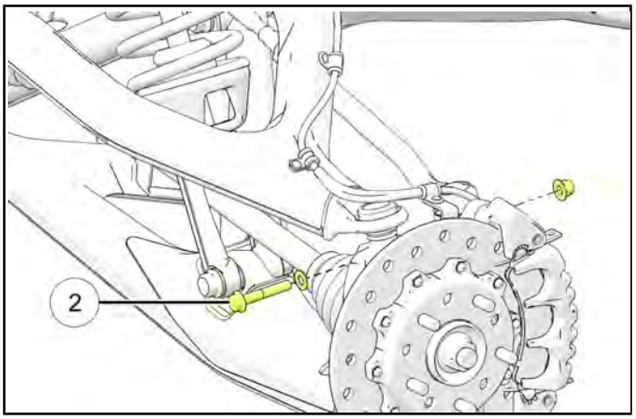
UPPER CONTROL ARM REPLACEMENT

REMOVAL

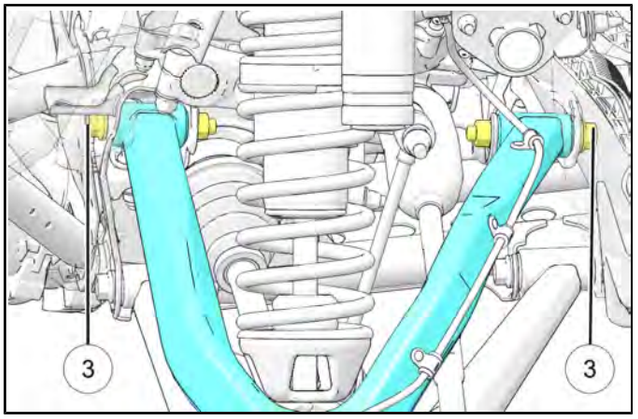
1. Place vehicle on a suitable lift or jack and remove front wheel.
2. Remove four front fascia fasteners ① and remove front fascia.



3. Remove ball joint pinch bolt ②, washer, and nut from the upper control arm.



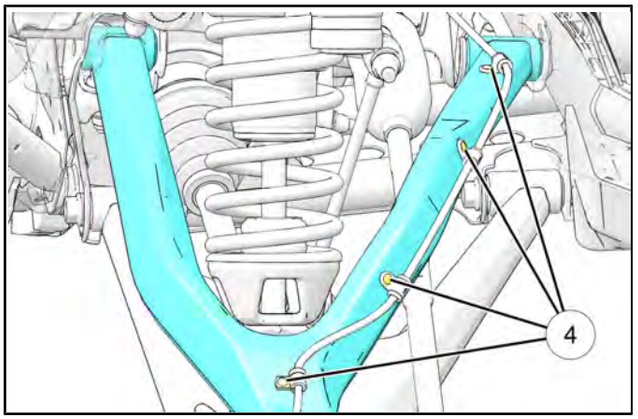
4. Remove two control arm mounting fasteners ③.



IMPORTANT

The access panel must be removed from the driver's side footwell to remove rear upper control arm fastener. To remove the rear upper control arm fastener from the passenger side, turn the steering wheel counter-clockwise to lock. Cover the tie rod boot with a rag or lubricate the socket extension shaft to prevent damage to the boot.

5. Drill out four rivets ④ retaining front brake line to the control arm using a 3/16" drill bit.

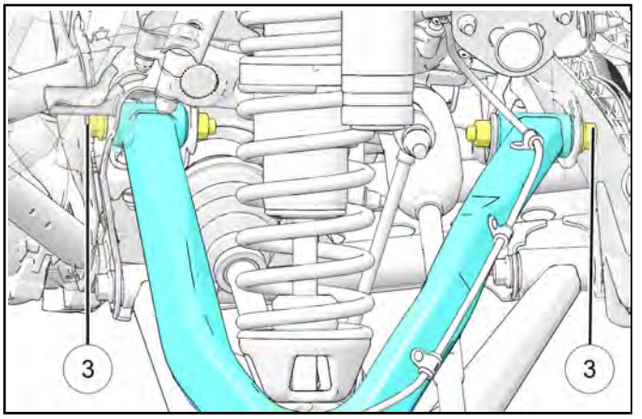


6. Remove control arm from the vehicle.

INSTALLATION

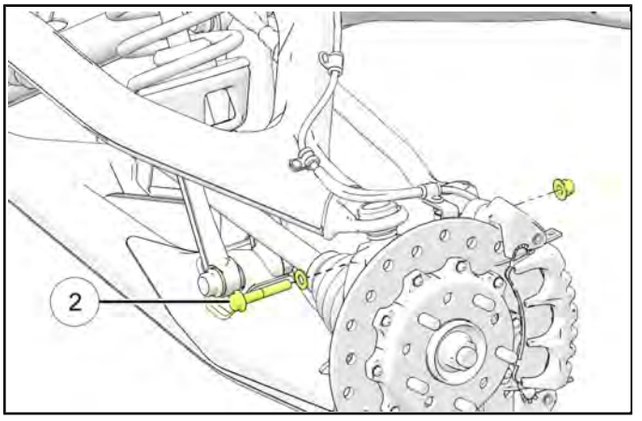
1. Install control arm into its inner mounts, and ball joint into the bearing carrier.

2. Install two control arm mounting fasteners. Torque fasteners to specification.



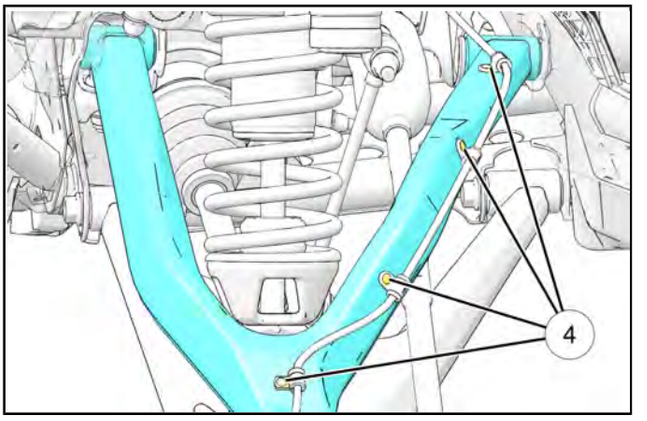
TORQUE
Control Arm Mounting Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

3. Install ball joint pinch bolt, washer, nut. Torque fastener to specification.

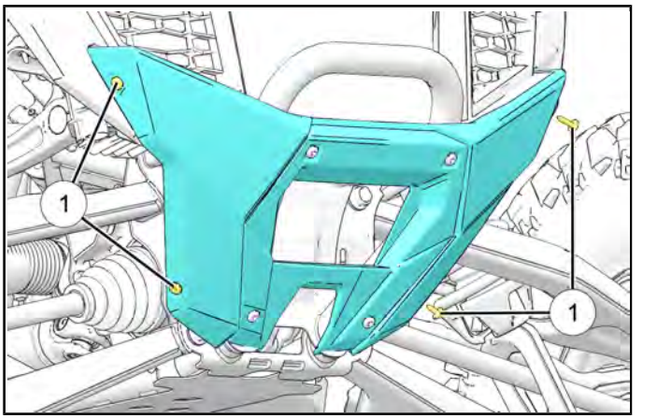


TORQUE
Upper Ball Joint Pinch Bolt: **52 ft-lbs (70 Nm) - Torque bolt side**

4. Align brake line mounts onto holes in the control arm. Install four new rivets retaining brake line to control arm.



5. Install front fascia and four front fascia mounting fasteners.



TORQUE
Front Fascia Fasteners: **7 ft-lbs (10 Nm)**

LOWER CONTROL ARM REPLACEMENT

REMOVAL

1. Park vehicle on a flat, level surface.
2. Safely raise front of the vehicle.
3. Remove wheel.

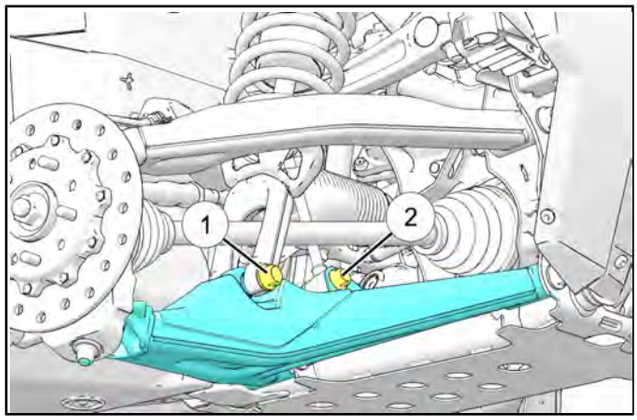
4. Properly support the suspension using a floor jack or tie down strap to prevent suspension from fully drooping.

⚠ CAUTION

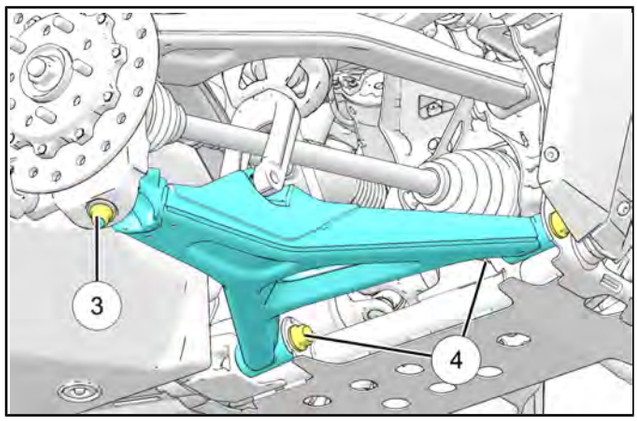
Suspension must be supported when the shock absorber is removed. If suspension is not properly supported, suspension weight will rest on the inner tie rod, which may result in damage to the tie rod and/or tie rod boot.

Suspension/knuckle should be supported using a floor jack, or securely strapped to a vehicle tie-down point on the chassis.

5. Remove lower shock fastener ① and lower stabilizer bar link fastener ②.



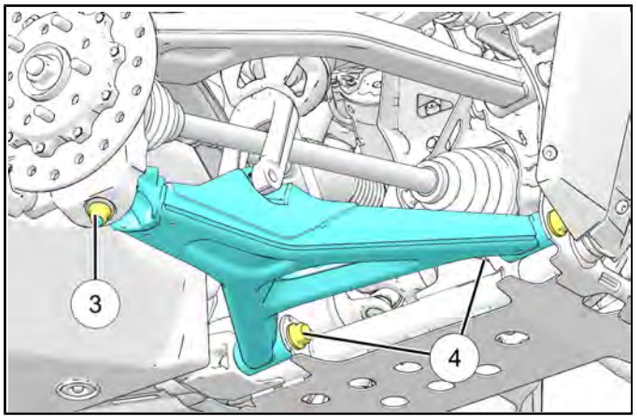
6. Remove and discard ball joint nut ③. Remove two control arm mounting fasteners ④.



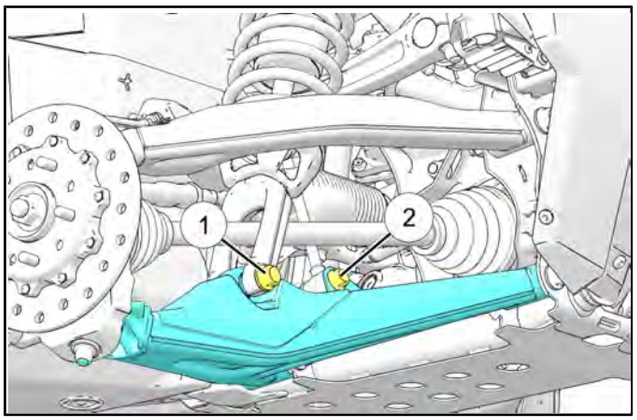
7. Remove lower control arm.

INSTALLATION

1. Loosely install lower control arm, mounting fasteners, and NEW ball joint nut into place.



2. Install lower shock and stabilizer bar link fasteners into the control arm.



3. Torque Fasteners to specification.

TORQUE
Control Arm Mounting Fasteners: **133 ft-lbs (180 Nm) - Torque bolt side**

TORQUE
Lower Ball Joint Fastener: **44 ft-lbs (60 Nm) + 90° (Single Use)**

TORQUE
Shock Mounting Fastener: **133 ft-lbs (180 Nm) - Torque bolt side**

TORQUE
Stabilizer Bar Link Fastener: **81 ft-lbs (110 Nm)**

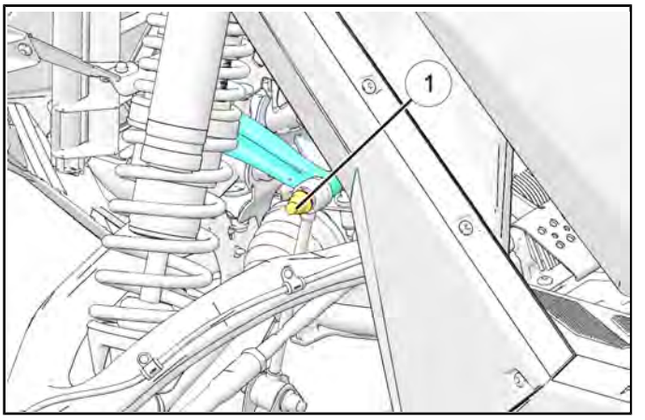
4. Install wheel. Torque wheel nuts to specification in a star pattern.

TORQUE
Wheel Nuts: **148 ft-lbs (200 Nm)**

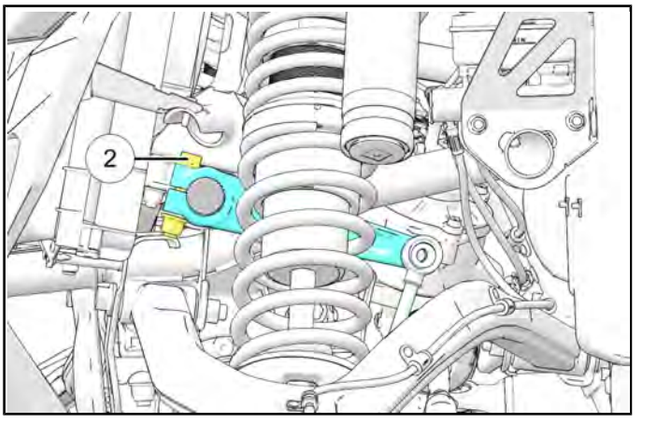
FRONT STABILIZER BAR REPLACEMENT

REMOVAL

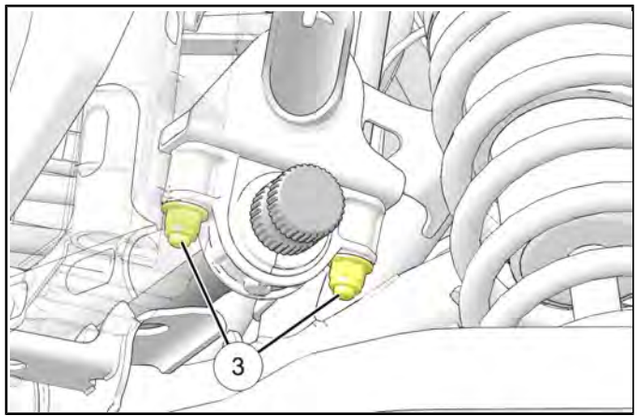
1. Remove one fastener ① retaining stabilizer bar link to the arm. Repeat on opposite side of vehicle.



2. Mark orientation of stabilizer bar arm onto the stabilizer bar for correct orientation upon installation.
3. Remove stabilizer arm-to-bar fastener ② and remove stabilizer bar arm. Repeat on opposite side of vehicle

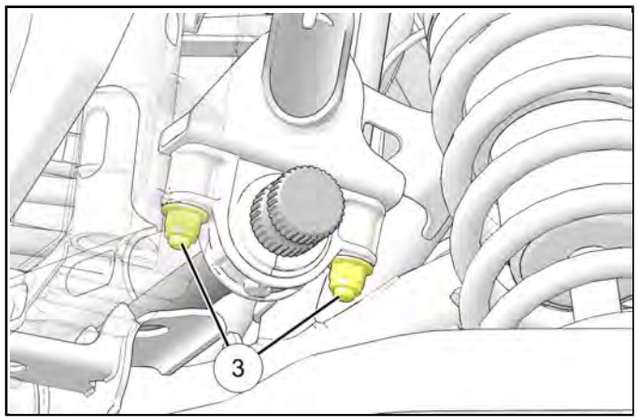


4. Remove two fasteners ③ retaining stabilizer bar to the frame. Repeat on opposite side of vehicle and remove the stabilizer bar.



INSTALLATION

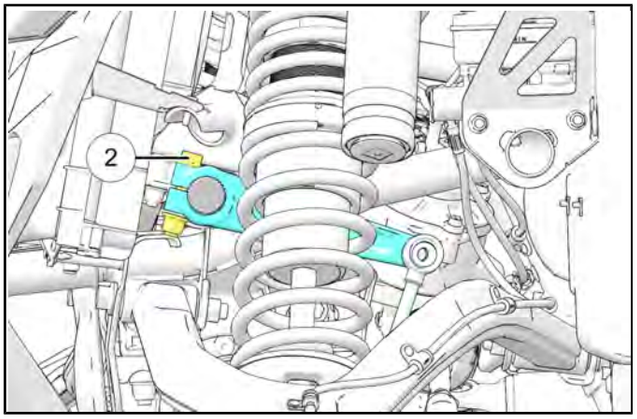
1. Install stabilizer bar into mounts. install four mounting fasteners. Torque fasteners to specification.



TORQUE
Stabilizer Bar Mounting Fasteners: **52 ft-lbs (70 Nm)**

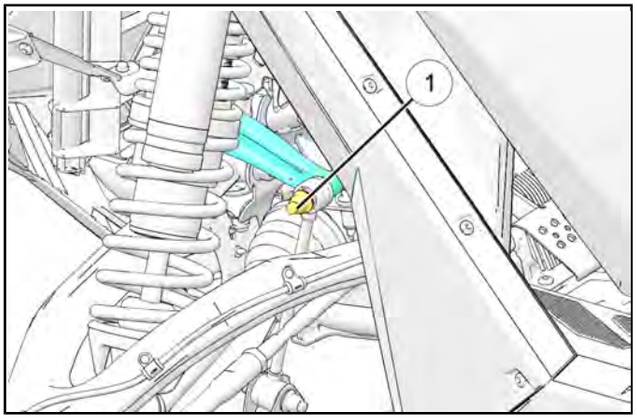
2. Install arm onto stabilizer bar in the same orientation as removed.

3. Install arm-to-bar fastener. Torque fastener to specification. Repeat on opposite side of vehicle.



TORQUE
Stabilizer Arm-to-Bar Fasteners: **81 ft-lbs (110 Nm)**

4. Install one fastener retaining arm to stabilizer bar link. Torque fastener to specification. Repeat on opposite side of vehicle.

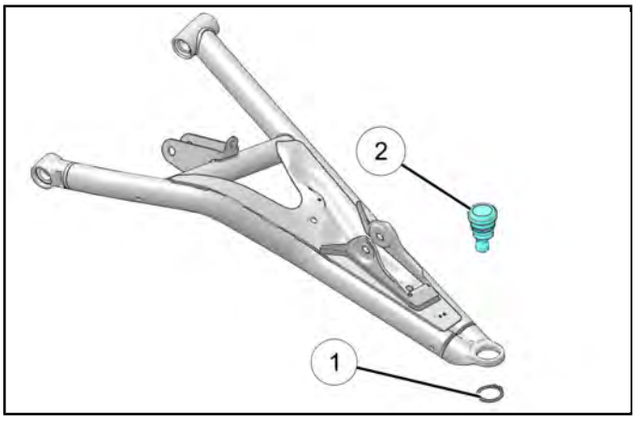


TORQUE
Stabilizer Bar Link Fasteners: **81 ft-lbs (110 Nm)**

BALL JOINT REPLACEMENT

REMOVAL

1. Remove the retaining ring ① from the ball joint ②.

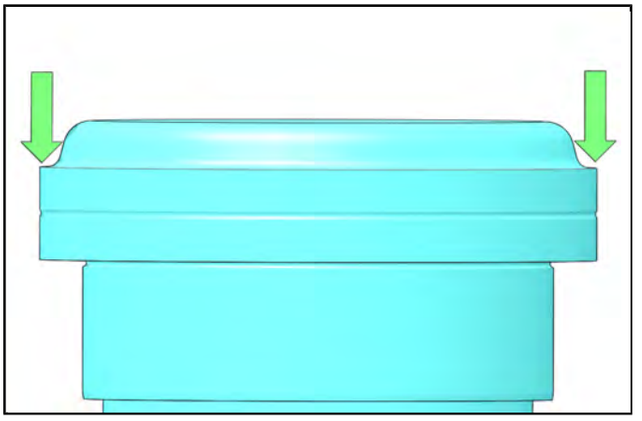


2. Place a proper sized driver on the ball joint and place the control arm in a press.
3. Carefully press the ball joint out of the control arm and discard the ball joint.

INSTALLATION

1. By hand, install the NEW ball joint into the control arm.
2. Using a press, carefully drive in the new ball joint into the control arm.

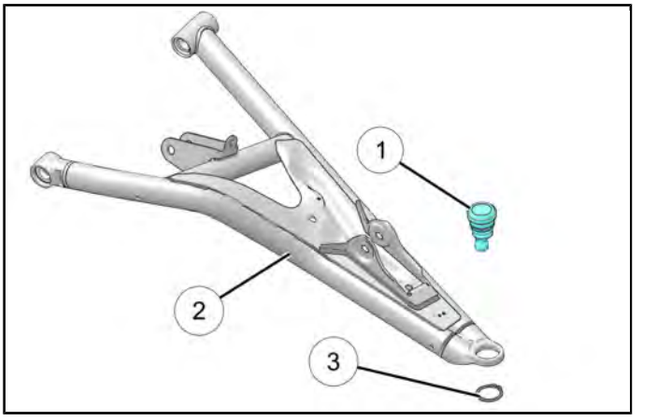
IMPORTANT
Press adapter MUST engage the outer flange of the ball joint as shown. NOT on the rolled lip of the ball joint.



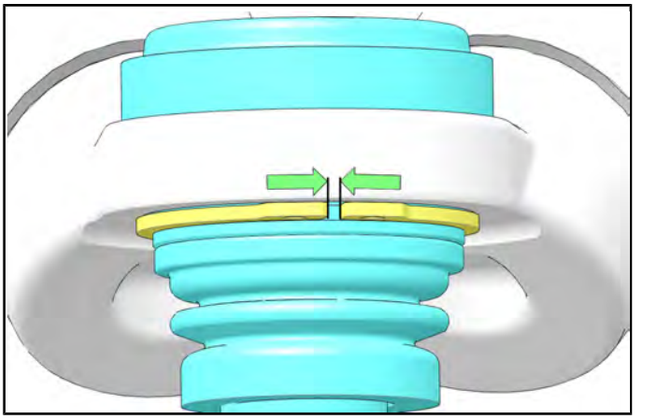
3. After the new ball joint ① is fully installed into the control arm ②, inspect the snap ring groove for any damage, dirt, or debris. Clean groove, if necessary.

NOTICE
A pick, stiff bristled brush, or other suitable tool may be used to clean the snap ring groove.

4. install a new retaining ring ③.



5. Measure the installed end gap of the retaining ring to ensure it is fully seated and within specification.

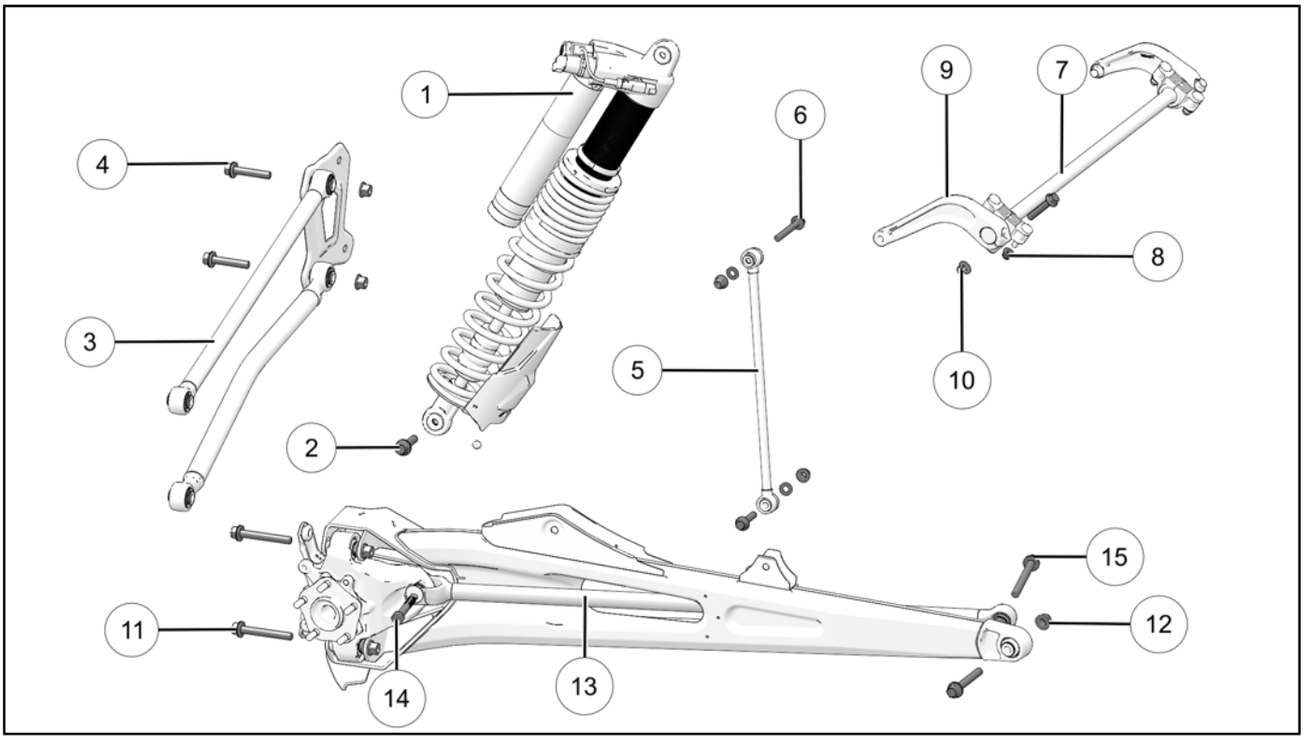


MEASUREMENT
Retaining Ring Installed End Gap: **No greater than 5 mm**

6. If the installed end gap of the retaining ring exceeds **5 mm**, remove retaining ring, inspect and clean groove as necessary. Install a **NEW** retaining ring and repeat measurement.
7. Repeat the ball joint service procedure for any additional control arm ball joint replacements.
8. Refer to upper/lower control arm replacement for installation procedure and applicable torque specifications.

REAR SUSPENSION

REAR SUSPENSION ASSEMBLY VIEW



① Shock Assembly	⑥ Stabilizer Bar Link Fastener **81 ft-lbs (110 Nm)**	⑪ Knuckle Mounting Fastener **133 ft-lbs (180 Nm) - Torque bolt side**
② Shock Mounting Fastener **133 ft-lbs (180 Nm) - Torque bolt side**	⑦ Stabilizer Bar	⑫ Trailing Arm Fastener **133 ft-lbs (180 Nm) - Torque bolt side**
③ Radius Rod	⑧ Stabilizer Bar Mounting Fastener **52 ft-lbs (70 Nm)**	⑬ Toe Link
④ Radius Rod Fastener **Inner Radius Rod Fasteners (Single Use): 52 ft-lbs (70 Nm) + 90°** **Outer Radius Rod Fasteners: 133 ft-lbs (180 Nm) - Torque bolt side**	⑨ Stabilizer Bar Arm	⑭ Rear Toe Link Fastener **133 ft-lbs (180 Nm) - Torque bolt side**
⑤ Stabilizer Bar Link	⑩ Stabilizer Bar Arm Fastener **81 ft-lbs (110 Nm)**	⑮ Front Toe Link Fastener **133 ft-lbs (180 Nm) - Torque bolt side**

TRAILING ARM REPLACEMENT

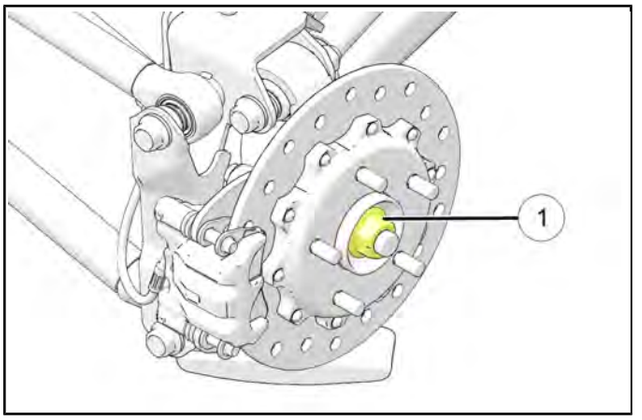
REMOVAL

NOTICE
Use new attaching nuts upon installation of the rear trailing arm and bearing carrier.

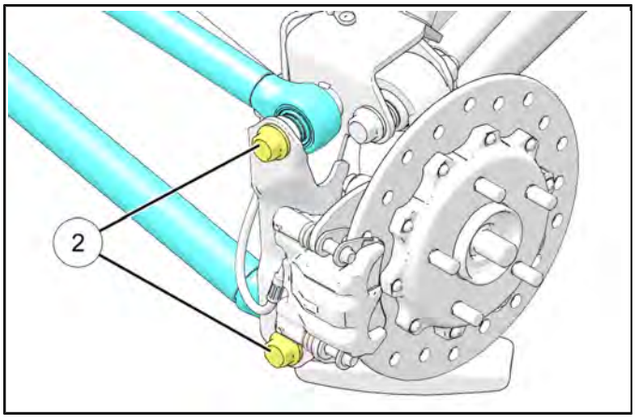
1. Raise and support vehicle by main frame.

⚠ WARNING
Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.

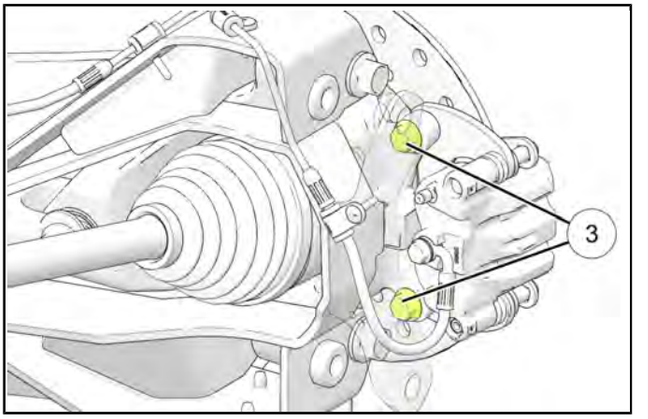
2. Remove the wheel nuts and remove the rear wheel.
3. Remove the wheel hub nut ①.



4. Remove the radius rod mounting bolts ②, nuts and washers from the bearing carrier. Swing radius rods down.

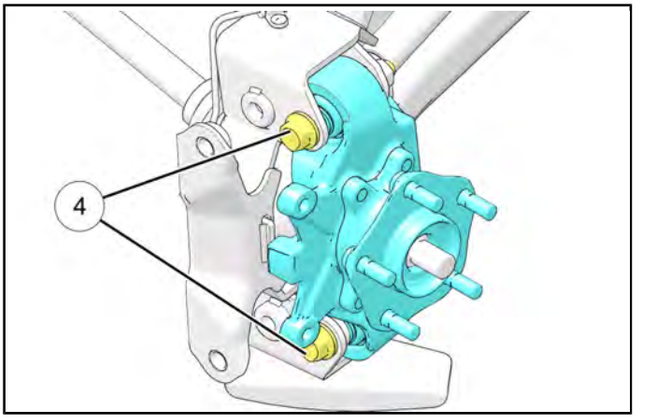


5. Remove the two brake caliper mounting bolts ⑦.



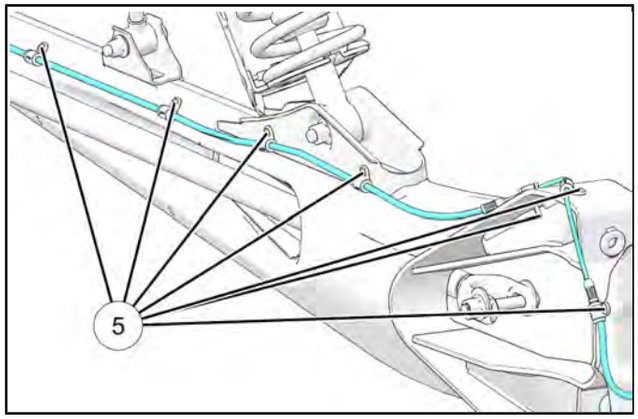
⚠ CAUTION
Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

6. Remove brake disc assembly.
7. Remove two bolts ④, nuts, and washers that attach the rear knuckle to trailing arm.

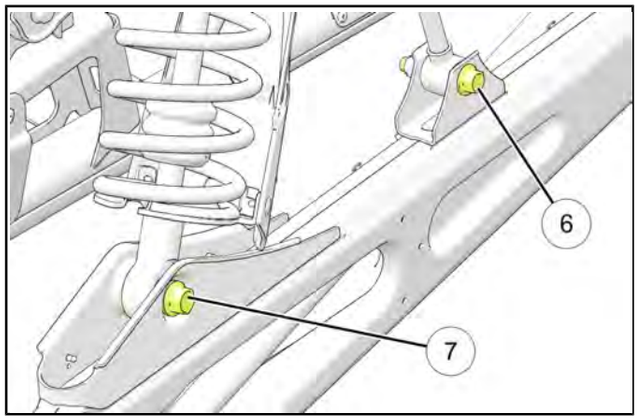


8. Remove the knuckle and bearing carrier from the rear drive shaft and trailing arm.
9. Rotate bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion. Replace bearing if moisture, dirt, corrosion, or roughness is evident.

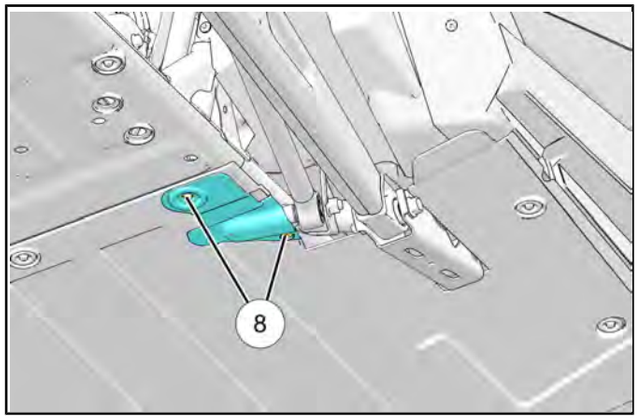
10. Drill out clips ⑤ that secure the brake line retainers to the trailing arm using a 3/16” drill bit.



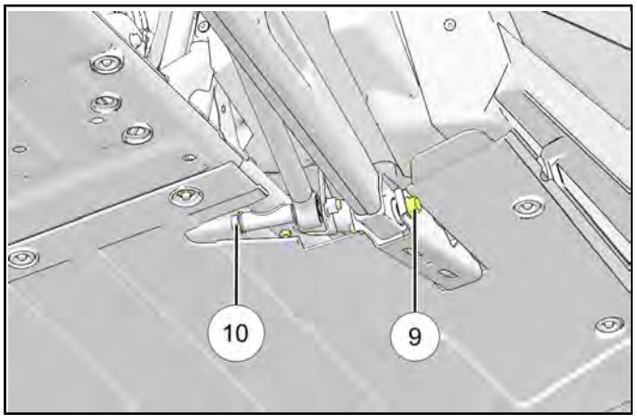
11. Remove the lower stabilizer bar linkage fastener ⑥.
12. Support trailing arm with suitable jack stand or support.
13. Remove the lower shock bolt ⑦.



14. Remove two fasteners ⑧ from toe link access panel.



15. Remove the front trailing arm fastener ⑨ and toe link fastener ⑩.



16. Remove rear toe link fastener.
17. Remove trailing arm from vehicle. Visually inspect trailing arm, bushings, and spherical bearing for wear.
18. Replace trailing arm if physically damaged.

INSTALLATION

1. Reverse removal procedure to reinstall rear trailing arm.

NOTICE
Use new fastener nuts upon installation of the rear trailing arm and bearing carrier.

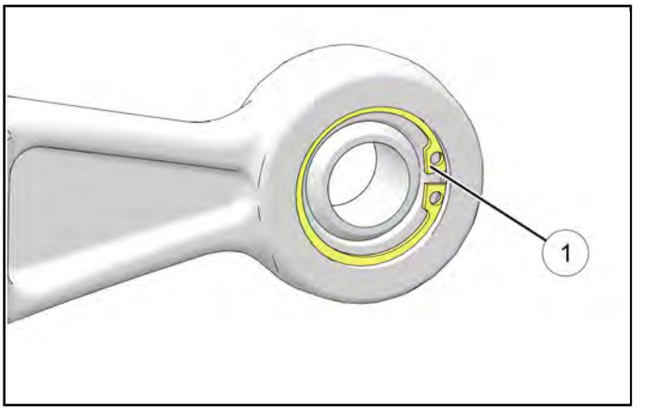
2. Torque all fasteners to specification.

TORQUE
Trailing Arm to Main Frame: **133 ft-lbs (180 Nm) - Torque bolt side** Rear Shock Mounting Bolts: **133 ft-lbs (180 Nm) - Torque bolt side** Rear Stabilizer Bar Linkage: **81 ft-lbs (110 Nm)** Radius Rod Mounting Bolts: **Inner Radius Rod Fasteners (Single Use): 52 ft-lbs (70 Nm) + 90°Outer Radius Rod Fasteners: 133 ft-lbs (180 Nm) - Torque bolt side** Bearing Carrier to Trailing Arm Bolts: **133 ft-lbs (180 Nm) - Torque bolt side** Rear Brake Caliper Mounting Bolts: **52 ft-lbs (70 Nm)** Rear Wheel Axle Nut: **89 ft-lbs (120 Nm)** Wheel Nuts: **148 ft-lbs (200 Nm)**

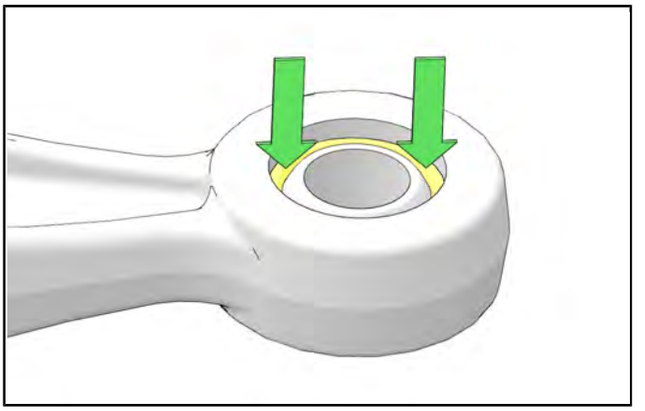
3. Refer to Steering Alignment procedure outlined in this chapter to properly set rear wheel toe and thrust angle.
4. After rear trailing arm installation, test vehicle at low speeds before putting into service.

TRAILING ARM SPHERICAL BEARING REPLACEMENT

1. Remove trailing arm. See Trailing Arm Removal outlined in this chapter.
2. Remove bushings and O-rings.
3. Remove snap ring ① that retains the spherical bearing.



4. Properly support the trailing arm and press the spherical bearing out of trailing arm casting.
5. Be sure to only press on outer most surface of bearing race, do not press on the center spherical bearing.



6. Inspect trailing arm bearing housing for wear or damage. Replace trailing arm if damaged.
7. Press in new bearing until fully seated into trailing arm casting.
8. Install **new** snap ring, O-rings (not required) and bushings.

RADIUS ROD REPLACEMENT

REMOVAL

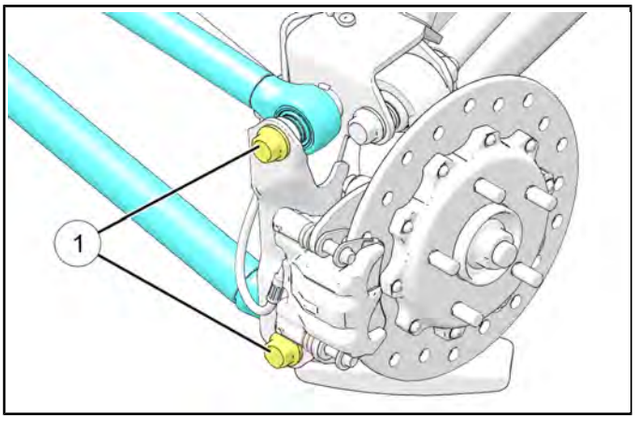
The following procedure details upper and lower radius rod removal and replacement on one side of the vehicle. Repeat the following steps to remove the radius rods from the opposite side.

1. Safely raise and support vehicle by main frame.

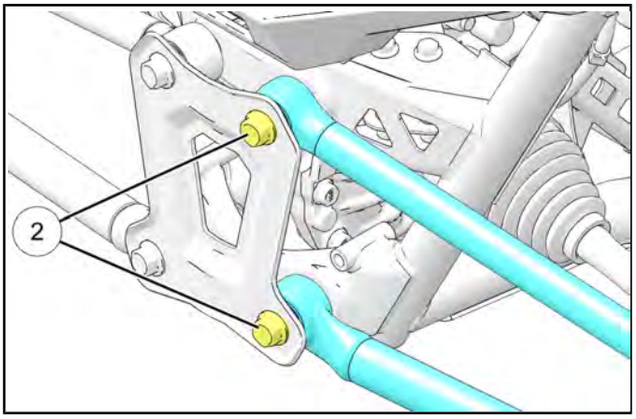
⚠ WARNING

Serious injury or death may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.

2. Remove the rear wheel nuts and rear wheel.
3. Identify / mark radius rods “upper” and “lower”.
4. Remove the bolt ①, nut, and washer attaching the upper and lower radius rod to the bearing carrier. Discard the nuts.



5. Remove bolts ② attaching radius rods to the vehicle frame. Discard the nuts.



6. Remove radius rods from vehicle.
7. Examine radius rod shafts, boots and spherical bearings. Replace entire radius rod if any excessive wear is evident.

INSTALLATION

1. Reverse removal procedure to reinstall the radius rods.
2. Torque all fasteners to specification.

NOTE

Use new attaching nuts upon installation of the rear radius rods.

TORQUE

Radius Rod Mounting Fasteners:
Inner Radius Rod Fasteners (Single Use): 52 ft-lbs (70 Nm) + 90°Outer Radius Rod Fasteners: 133 ft-lbs (180 Nm) - Torque bolt side
Wheel Nuts:
148 ft-lbs (200 Nm)

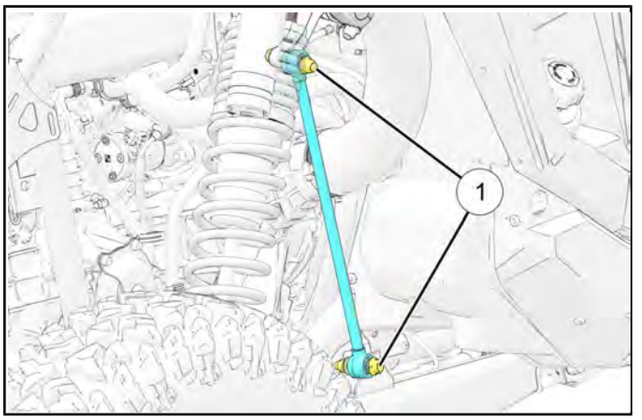
⚠ WARNING

Upon radius rod installation, test vehicle at low speeds before putting into service.

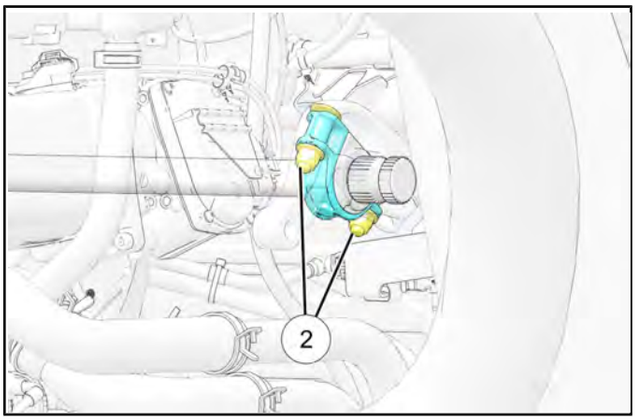
REAR STABILIZER BAR REPLACEMENT

REMOVAL

1. Lift and support vehicle by main frame.
2. Remove rear wheel nuts and wheels.
3. Identify / mark top side of the stabilizer bar to reference during installation.
4. Remove the fasteners retaining the stabilizer bar to the linkage ① on each side of the vehicle.



5. Remove the four fasteners ② retaining the stabilizer bar to the vehicle frame.



6. Remove the bushing brackets and bushings for ease of removal.
7. Carefully remove the stabilizer from the LH wheel well area of the vehicle.
8. Inspect the stabilizer bar for straightness. Inspect the pivot bushings and replace if needed.

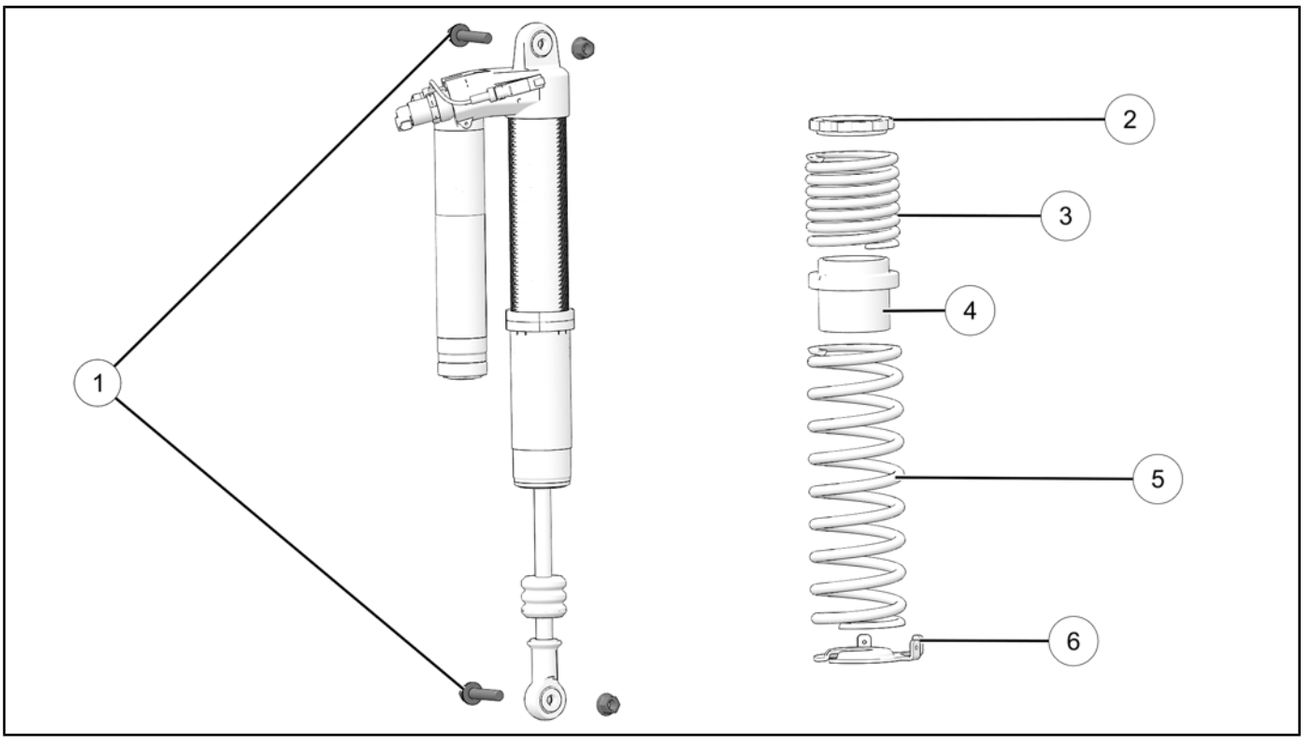
INSTALLATION

1. Carefully install stabilizer bar through the LH wheel well area.
2. Fully install stabilizer bar, bushings, bracket and bracket fasteners and stabilizer links. Center stabilizer bar in the frame. Torque fasteners to specification (see below).
3. Torque all fasteners to specification (see below).
4. Lubricate stabilizer bar pivot bushings via grease fitting.
5. Install rear wheels and wheel nuts. Torque wheel nuts to specification.

TORQUE
Rear Stabilizer Bar Linkage: **81 ft-lbs (110 Nm)** Stabilizer Bar Mounting Bracket Bolts: **52 ft-lbs (70 Nm)** Wheel Lug Nuts: **148 ft-lbs (200 Nm)**

SHOCKS / SPRINGS

SHOCK ASSEMBLY VIEW



① Shock Mounting Fasteners **133 ft-lbs (180 Nm) - Torque bolt side**	④ Spacer
② Spring Adjuster	⑤ Main Spring
③ Tender Spring	⑥ Spring Retainer
Retainer gap should be 180 degrees from spring end.	

SHOCK REPLACEMENT

1. Elevate the vehicle off the ground to relieve the suspension load.
2. Support under A-arm or trailing arm.
3. If equipped, disconnect Dynamix electrical connection and cut cable tie retaining harness to the shock body.
4. Remove the upper and lower fasteners retaining the shock and remove the shock from the vehicle.

5. Reverse the procedure to reinstall the shock. Torque fasteners to specification.

IMPORTANT
Ensure Dynamix equipped models have the harness properly secured to the shock body.

TORQUE
Front Shock Mounting Bolts (Top and Bottom): **133 ft-lbs (180 Nm) - Torque bolt side** Rear Shock Mounting Bolts (Top and Bottom): **133 ft-lbs (180 Nm) - Torque bolt side**

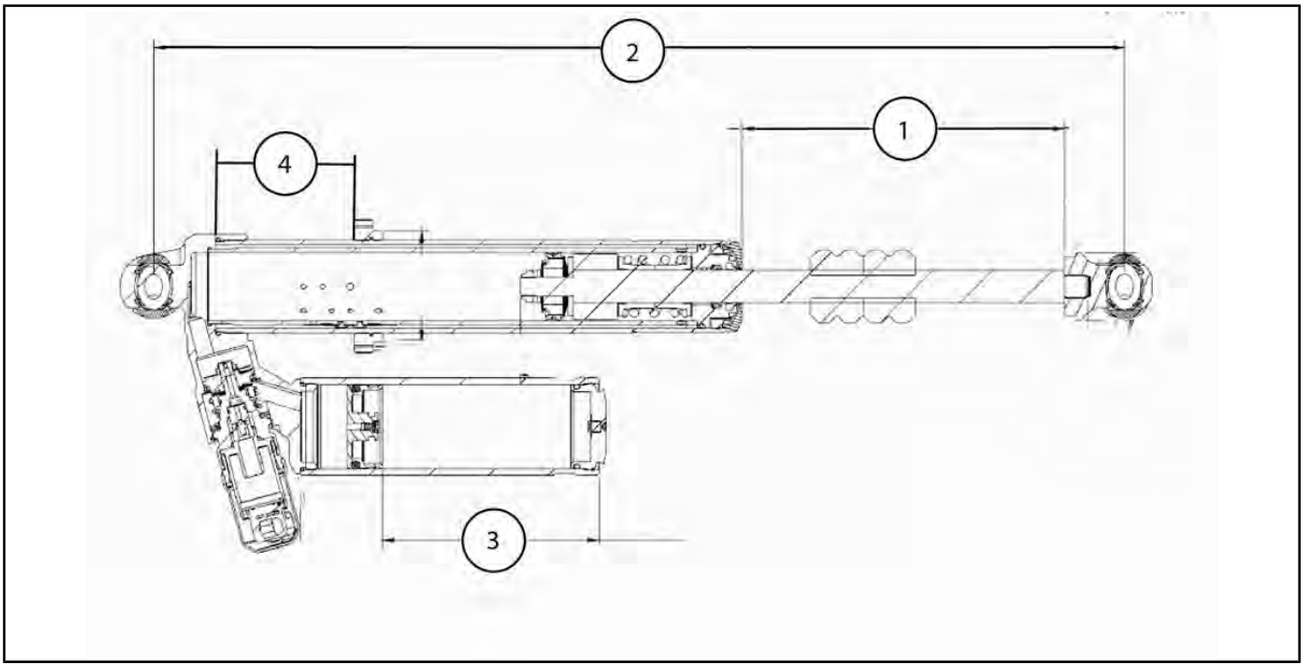
SHOCK / SPRING REPLACEMENT

1. Remove the shock and note the spring preload distance (see Spring Adjustment page .)
2. Loosen the jam nut (if applicable) and adjustment ring until the spring is loose. If needed, use a spring compressor to compress the spring far enough to remove the spring retainer.
3. Remove the spring and spring retainer from the existing shock and install components onto the new shock.
4. Install the spring(s) and spring retainer.

NOTICE
The spring retainer gap should be 180° from the end of the spring upon installation.

5. Tighten the spring adjustment ring to set the preload distance noted in Step 1.
6. Reinstall the shock onto the vehicle and torque new fasteners to specification.

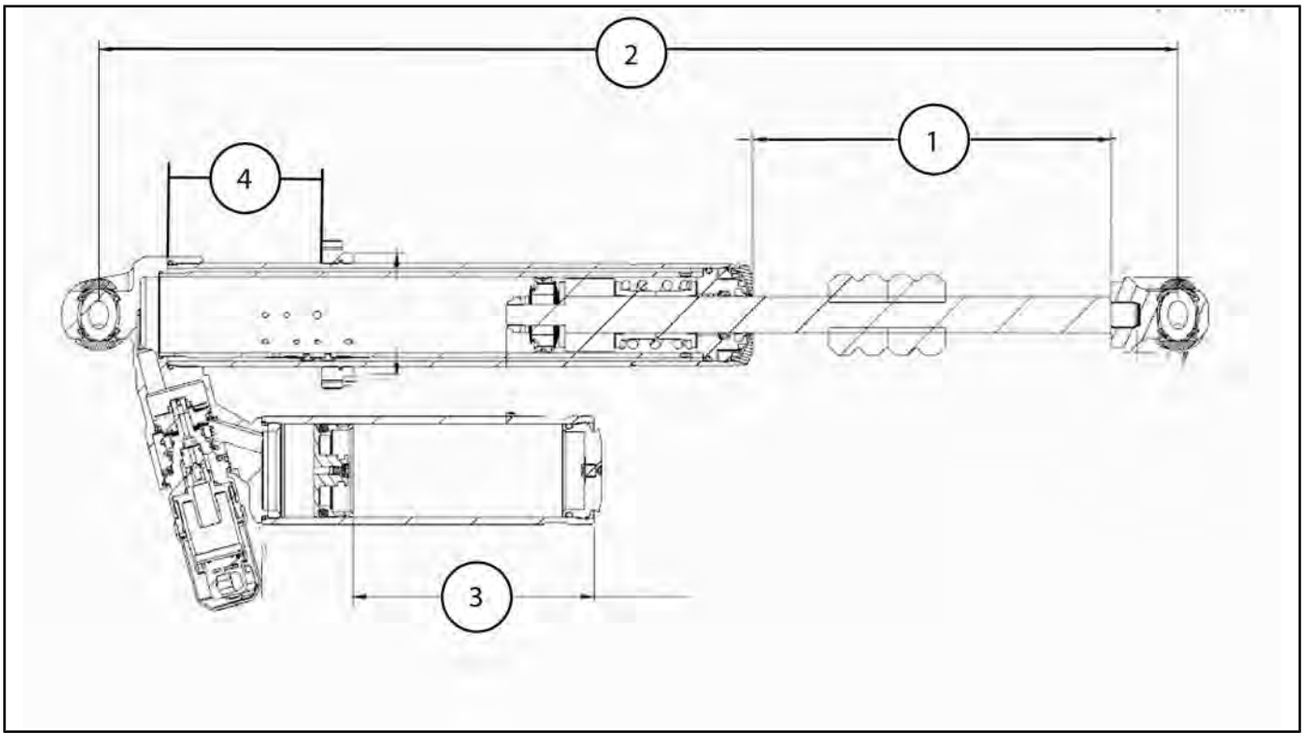
FOX 3.0” DV SHOCK INFORMATION (FRONT)



SHOCK SPECIFICATIONS

***RZR* XP TURBO S**	
Shock Travel ①	11.80″ (29.97 cm)
Extended Length ②	35.47″ (90.09 cm)
IFP Depth ③	7.30″ (18.54 cm)
Spring Adjustment Setting ④	2.20″ (5.58 cm)
Nitrogen Pressure	100 psi (690 kPa) +/- 5%
Gas Shock Oil	2874124 (qt.)

FOX 3.0” DV SHOCK INFORMATION (REAR)



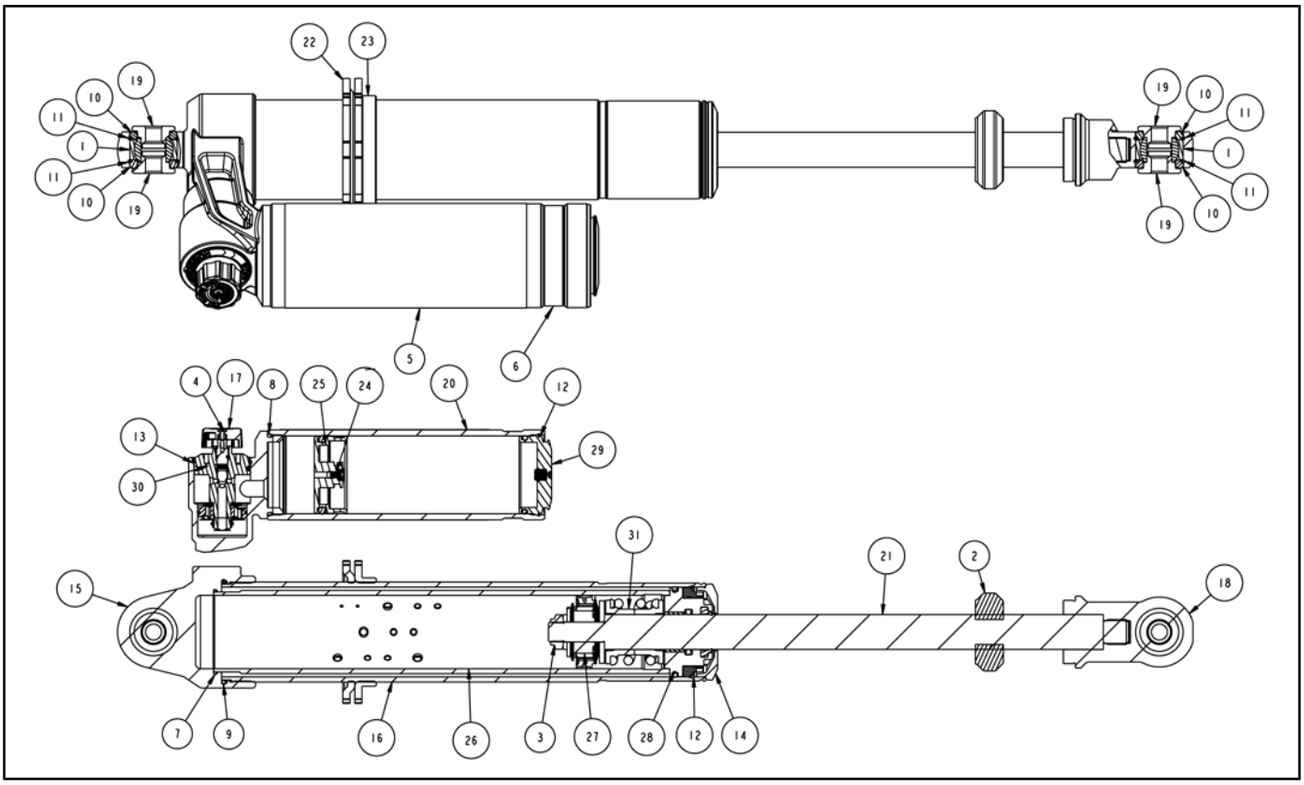
SHOCK SPECIFICATIONS

***RZR* PRO R**	
Shock Travel ①	15.59″ (39.59 cm)
Extended Length ②	42.24″ (107.28 cm)
IFP Depth ③	9.70″ (24.64 cm)
Spring Adjustment Setting ④	6.63″ (16.84 cm)
Nitrogen Pressure	100 psi (690 kPa) +/- 5%
Gas Shock Oil	2874124 (qt.)

SHOCK SERVICE

FOX SHOCK SERVICE

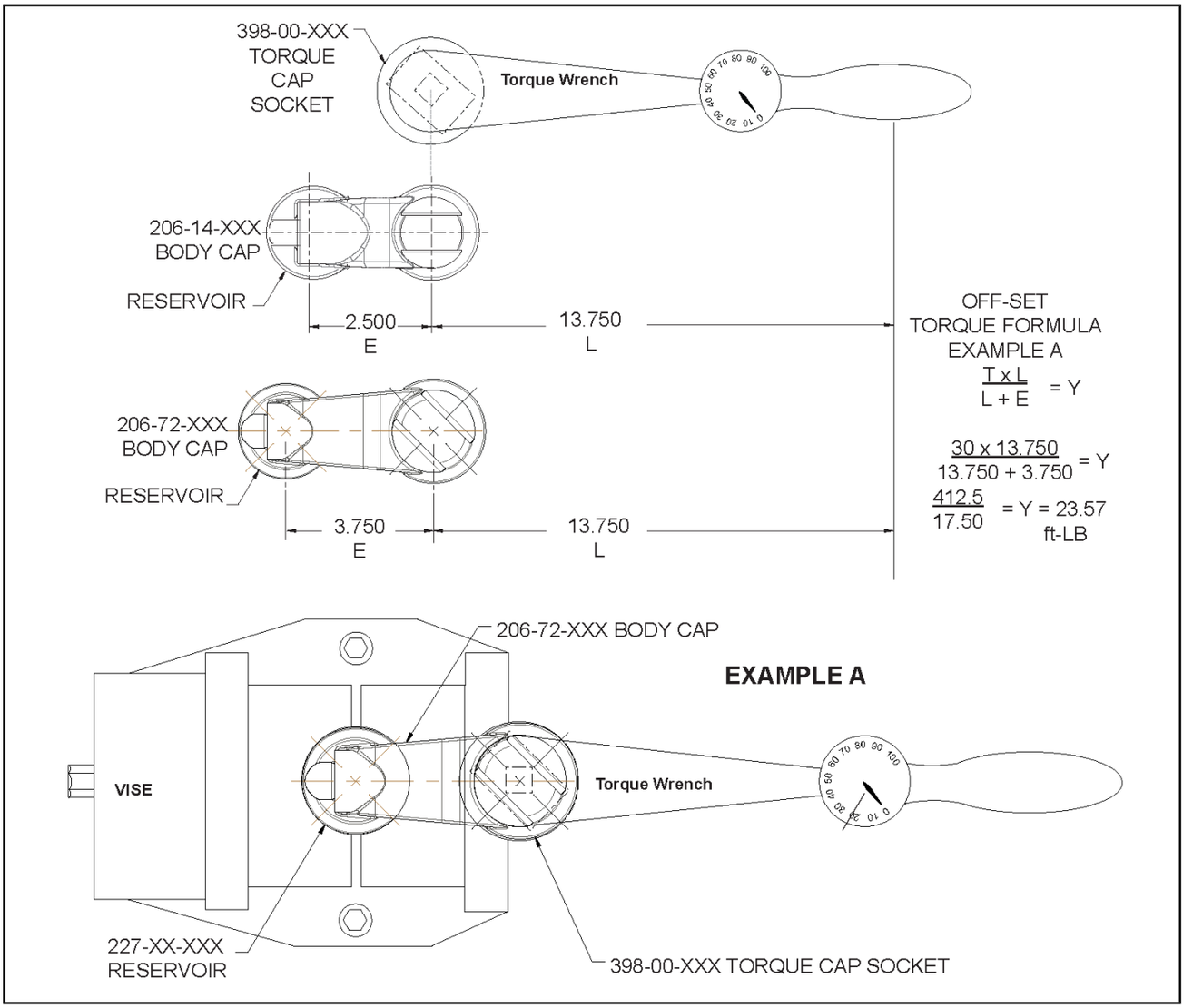
FOX 2.5” / 3.0” O.E. PODIUM BYPASS



① Spherical Bearing	⑰ Low Speed Adjuster Knob
② Bumper	⑱ Eyelet
③ Lock Nut	⑲ Reducer
④ Screw	⑳ Reservoir
⑤ Reservoir Decal	㉑ Shaft
⑥ Band Decal	㉒ Spring Adjuster Ring
⑦ O-ring	㉓ Spring Adjuster Ring Backup
⑧ O-ring	㉔ Screw Assembly
⑨ O-ring	㉕ Piston Assembly
⑩ O-ring	㉖ Internal Bypass Body Assembly
⑪ Retaining Ring	㉗ Valving Assembly
⑫ Retaining Ring	㉘ Bearing Assembly
⑬ Retaining Ring	㉙ Reservoir End Cap Assembly
⑭ Bearing Cap	㉚ Damping Adjust Assembly
⑮ Body Cap	㉛ Sparing Hardware Assembly
⑯ Body	

OFFSET TORQUE FORMULA

For example, if you had to torque a reservoir body on a Body Cap 206-72-XXX to 30 ft-lb
Run down Body Cap on Reservoir.
Place reservoir in Body Clamps 803–00–XXXX in a Vise.
Use Body Cap Socket 398–00–XXX to torque the body cap with a torque wrench to 24 ft-lb of torque.



Torque (T) = 30 ft-lb of desired torque	Example A
Y = Unknown Torque Value	Set Torque Wrench to 24 ft-lb
L = 13.750″	Will equal 30 ft-lb of torque applied to the reservoir.
E = 3.750″ or 2.500″ **depending on body cap*	

FOX SHOCK DISASSEMBLY

A training video is available on University of Polaris (https://lms.latitudelearning.com/home/main.aspx) for disassembly of Podium Internal Bypass shocks. Search for “Podium Internal Bypass Shock”.

⚠ CAUTION

Always wear safety glasses and read directions completely before disassembling the shock

IMPORTANT

Inspect the shock for signs of oil leakage prior to any disassembly or cleaning.

Cleanliness is critical; make sure your work area is clean and organized prior to starting work.

Contamination of the shock will lead to premature wear and poor function of your shocks.

When replacing a seal during a service, make sure the new seal is the same size, shape, and material as the one you are replacing. In some cases, there may be two or more seals in the rebuild kit that look similar.

In this manual we will completely disassemble the entire shock. Many shock services may not require complete disassembly of some components. Example if the eyelet is tight to the shaft it may not require removal or if the shock body and body cap do not show any signs of oil leakage and they are tight, they may not require removal.

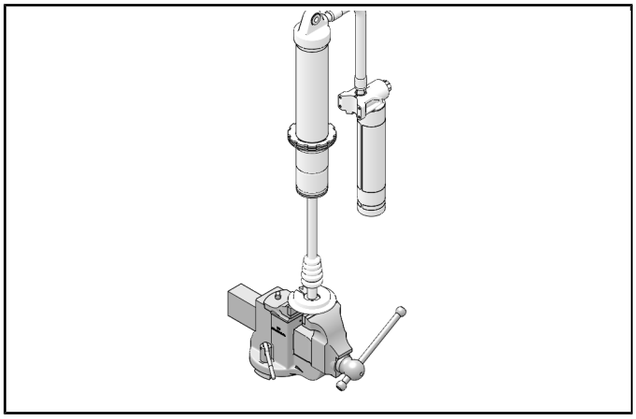
Record compression adjuster settings by counting the number of clicks in (clockwise) until the adjuster stops. Once you have recorded the numbers, back all adjusters out counter clockwise to the (full soft) position.

Record spring length preload distance prior to spring removal. To remove spring back preload collars off enough to remove spring retainer.

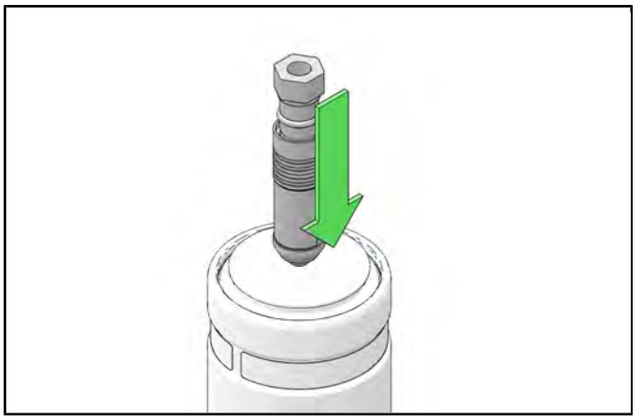
Clean the entire shock assembly with soapy water or mild solvent. Rinse and dry shock.

Ensure you have obtained the correct rebuild kit and oil prior to disassembly.

1. Clamp the shock body securely in a vice.

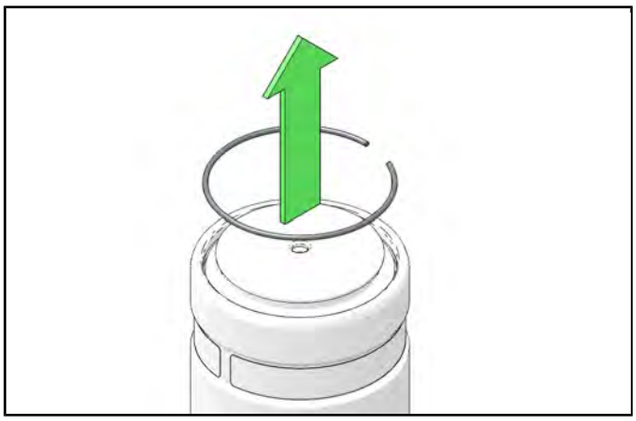


2. Discharge nitrogen pressure from reservoir using the gas fill tool needle.

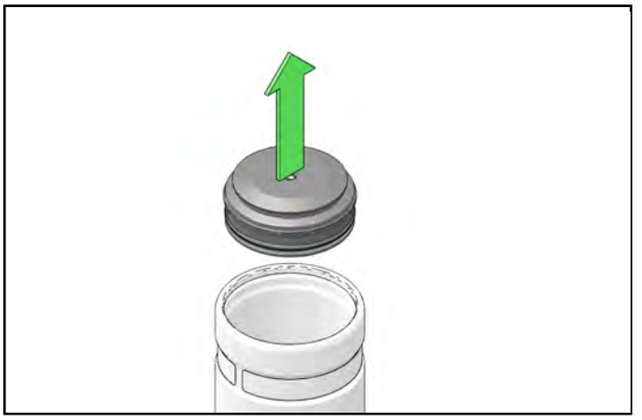


Gas Fill Tool:
PS-45259

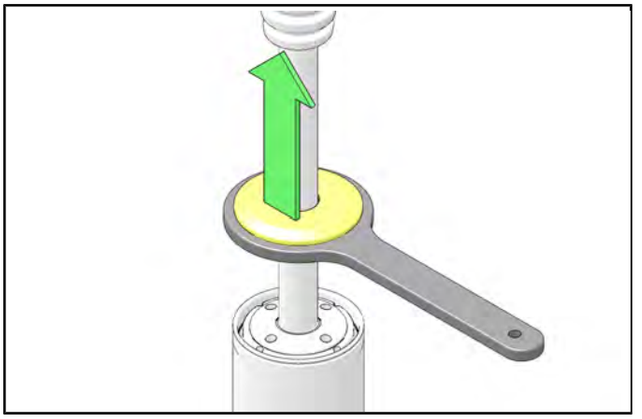
3. Once the nitrogen has been released, depress reservoir cap and remove retaining ring. Typically, a valve shim can be used.



4. Remove reservoir end cap from reservoir.



5. Slide body cap removal tool over body and place the retaining ring from the reservoir end cap around the body cap. Slide the tool up to the retaining ring and tap with hammer to remove.

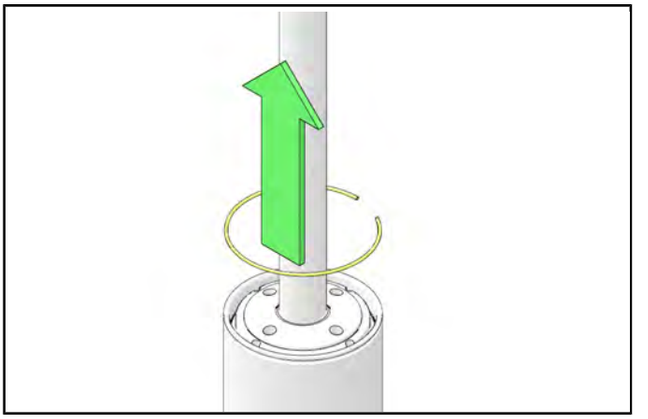


6. Once the cap is removed it will expose the bearing assembly. On 2.5 diameter shocks, you will need to apply a sufficient amount of heat to the bearing assembly to break the Loctite bond between the cinch ring and the bearing assembly.

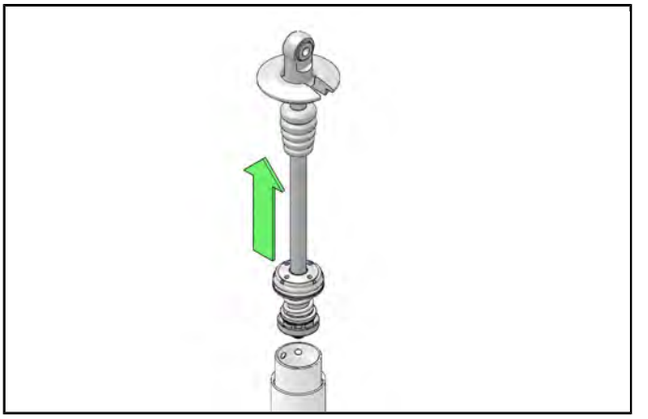
NOTICE
The seal will be destroyed from the heat and must be replaced.

7. Hold cinch ring with spanner and rotate bearing assembly counter-clockwise to release pressure on retaining ring.

8. Press down on bearing assembly and remove retaining ring.



9. Remove the shaft assembly and body assembly.



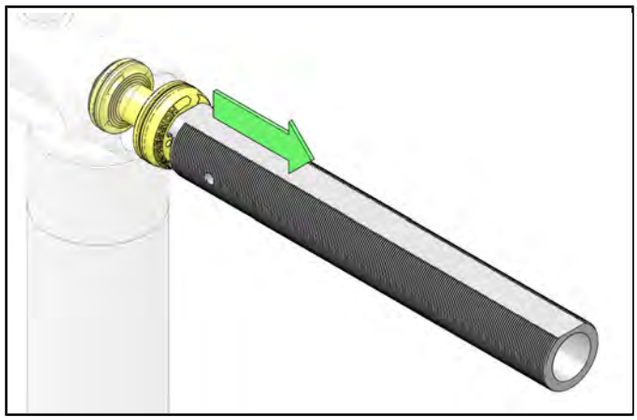
10. Use the IFP tool to hold the IFP.

IFP Tool: **commercially available** *also available from FOX 398-00-780*

11. Remove bleed screw and o-ring with extra long 1/8" hex wrench.

12. Remove IFP.
13. Dump out used shock oil.
14. Using a #10 Torx screwdriver remove screw from LSC.

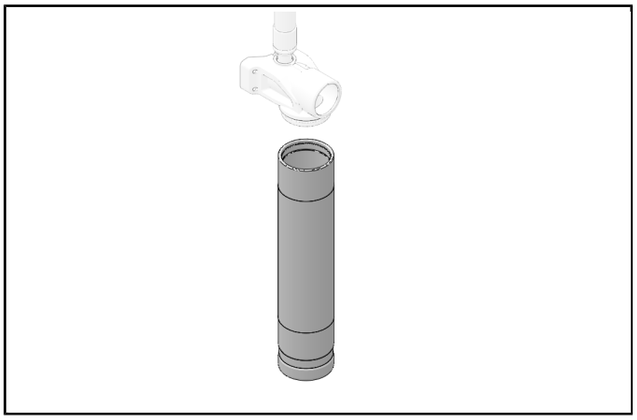
15. Push in on LSC and remove retaining ring.



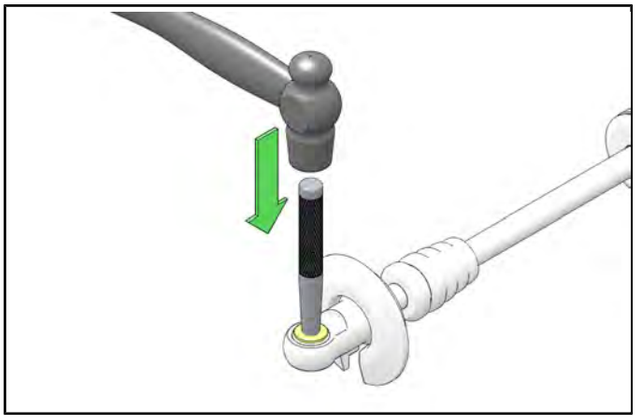
16. Use the IFP tool to remove LSC.

IFP Tool:
commercially available
also available from FOX 398-00-780

17. Use a strap wrench to remove the reservoir.

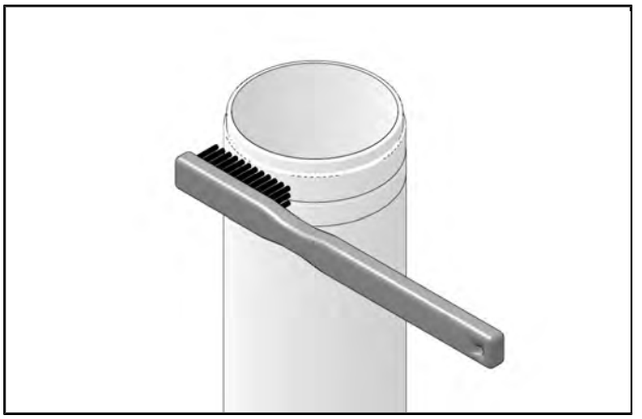


18. To remove pressed in reducers, use a tapered pin punch and hammer. Drive pin punch into reducer with a couple of medium taps with the hammer. Tap the pin punch out and remove the reducer from the tapered pin punch.

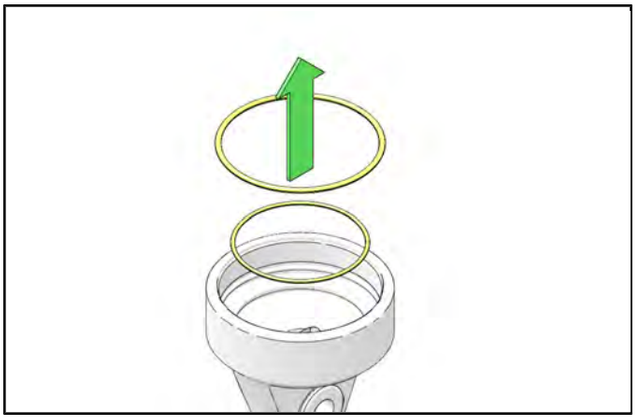


19. Remove both internal retaining rings.
20. Press out the spherical bearing with mandrel or socket, press only on the bearing race.
21. Ensure reservoir o-ring has been removed.
22. With the body of the shock placed in clamp block and secured in vise, apply a sufficient amount of heat to the body cap with a propane torch to remove the body cap with the correct body cap socket.

23. Use a wire brush, heat and a pick to remove any Loctite residue left on body threads. Clean thoroughly with contact cleaner and lint-free towel inside and out.

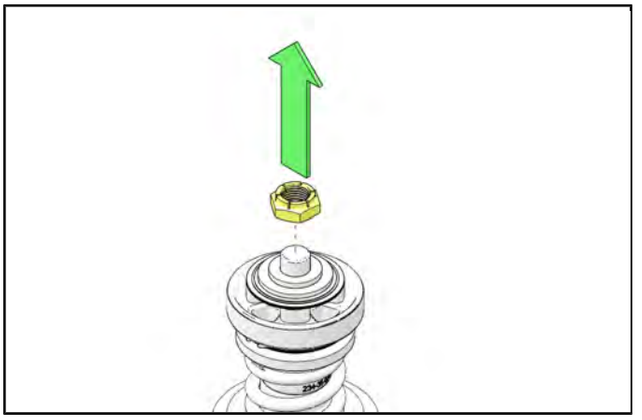


24. Remove both internal o-rings.

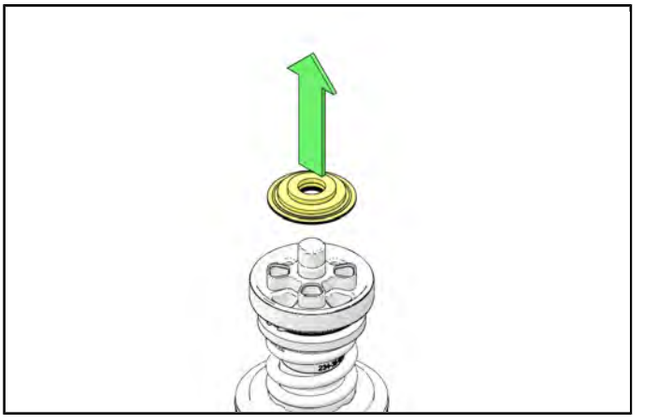


25. Use a wire brush, heat and a pick to remove any Loctite residue left on body cap threads. Clean thoroughly with contact cleaner and lint-free towel inside and out.

26. Remove lock nut from the shaft assembly.

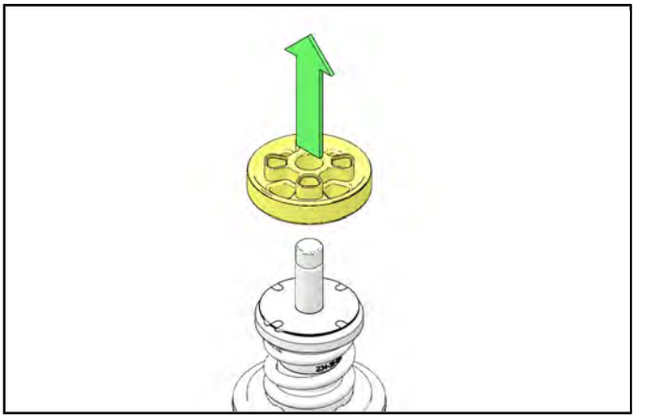


27. Remove rebound valve stack from the assembly and cable tie together. Clean with contact cleaner.



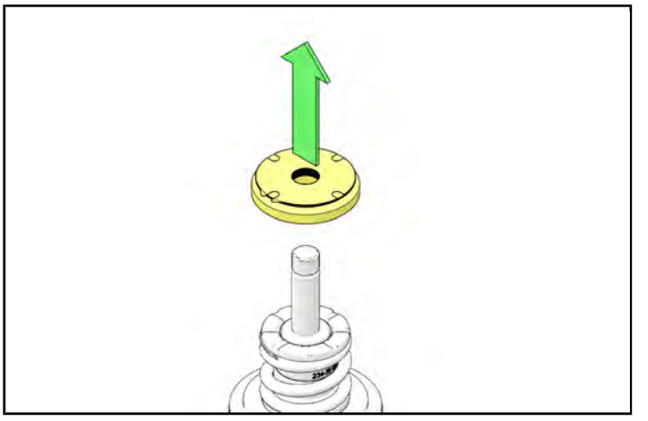
NOTICE
Damping pistons are directional. Rebound side shown.

28. Remove damping piston.

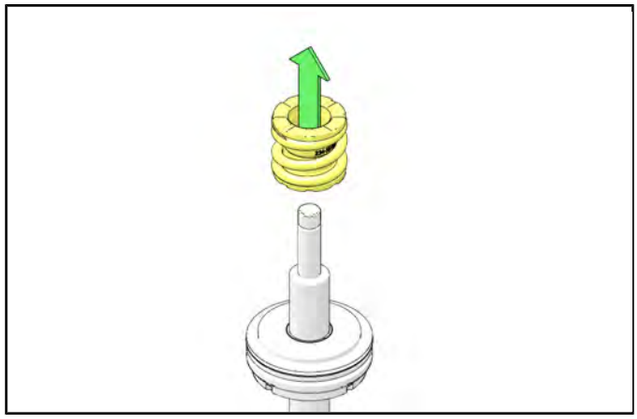


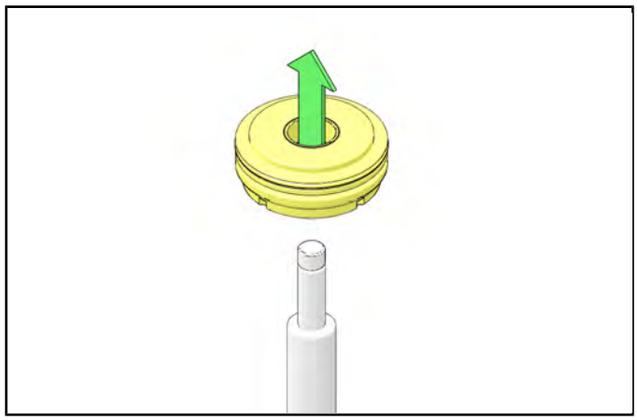
29. Note the bleed shim orientation on compression valve stack.

30. Remove compression valve stack and cable tie together. Clean with contact cleaner.



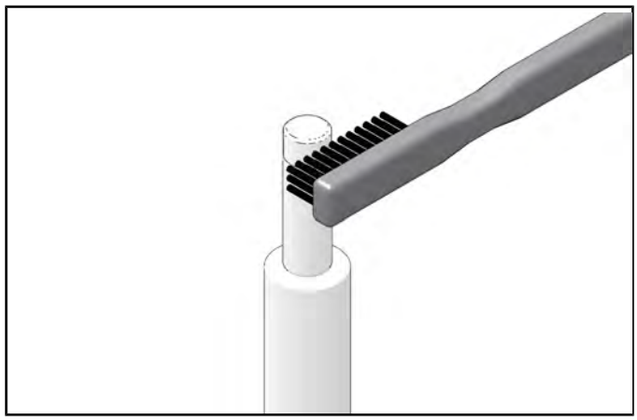
31. Remove negative spring assembly, bearing assembly, and bumper.



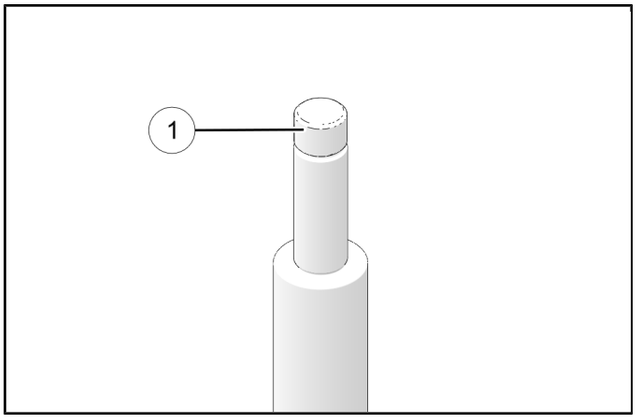


32. With the shaft assembly placed in clamp block and secured in vise, apply a sufficient amount of heat to the eyelet with a propane torch to remove the eyelet with the correct body cap socket.

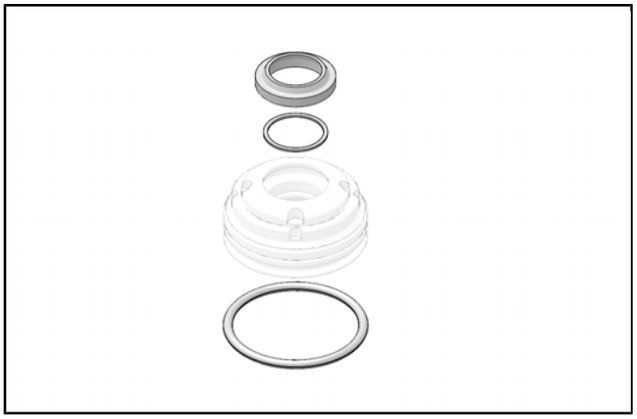
33. Use a wire brush, heat, and a pick to remove any Loctite residue left in the eyelet and shaft threads. Clean thoroughly with contact cleaner and lint-free towel.



34. Apply Loctite primer 7649 to eyelet threads ①. Wipe over-spray off any external surface.



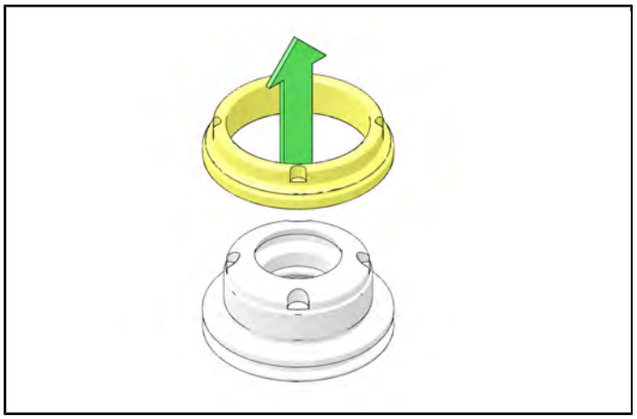
35. Remove all seals and o-rings from bearing assembly.



NOTICE

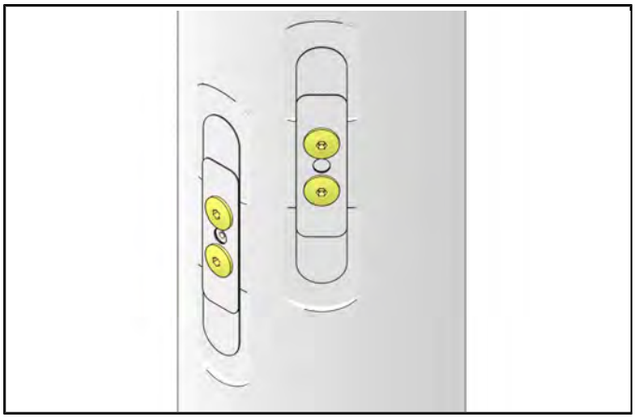
If the DU bearing needs replacement, replace the complete bearing assembly.

36. Clean all surfaces of the bearing housing and cinch ring.



Bypass internal body assembly

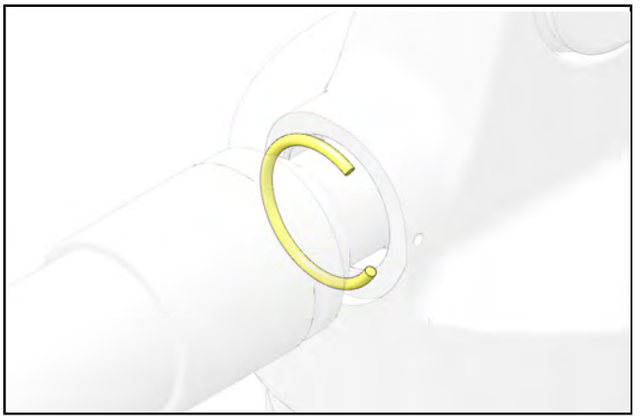
37. Remove screws using a 5/64" hex wrench.



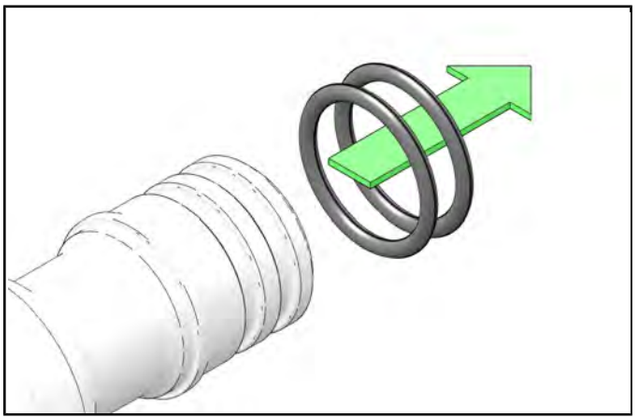
NOTICE

Observe location, size and thickness of bypass valves.

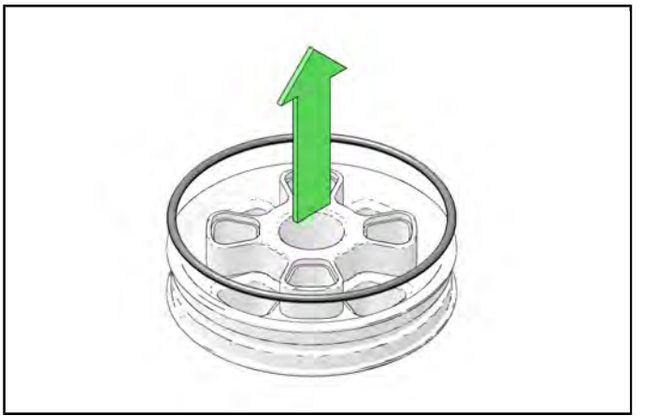
38. To remove the remote hose assembly, de-pressurize reservoir, push hose in and remove retaining ring with a small pick.



39. Remove hose o-rings.

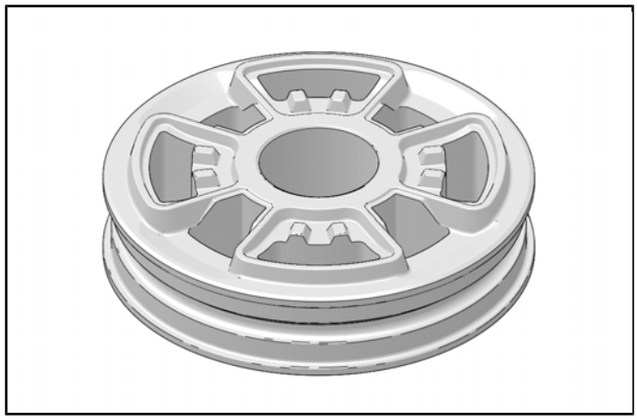


40. Pistons are equipped with an energizing o-ring under piston bearing. Clean the surface with contact cleaner.

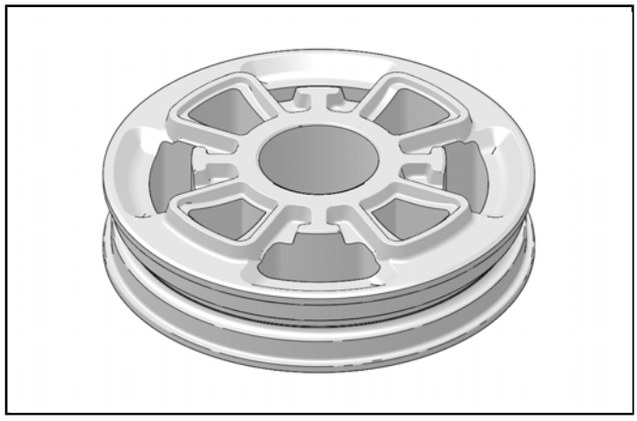


2.5 Bypass Piston

Compression Side

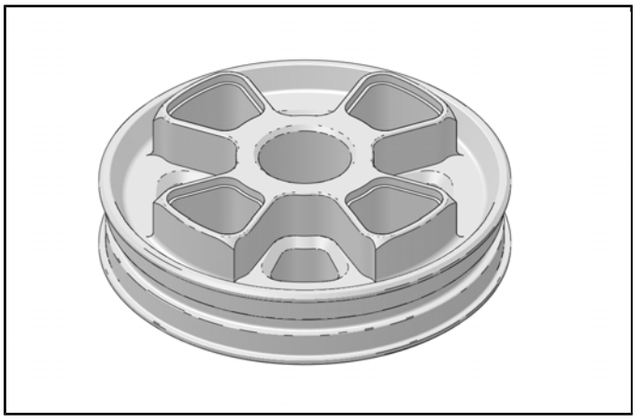


Rebound Side

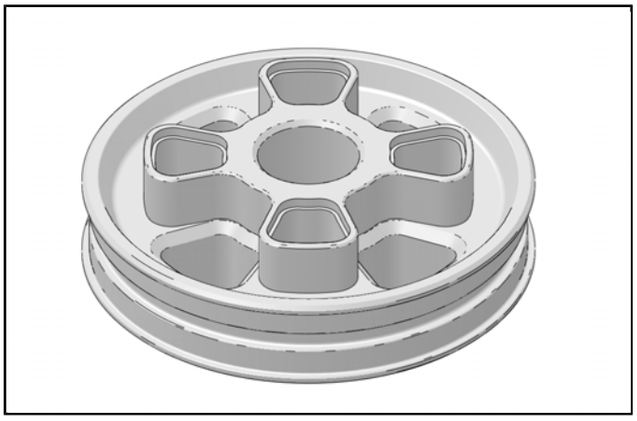


3.0 Bypass Piston

Compression Side



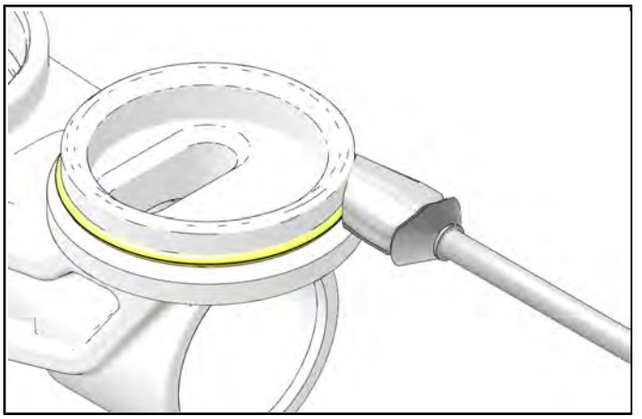
Rebound Side



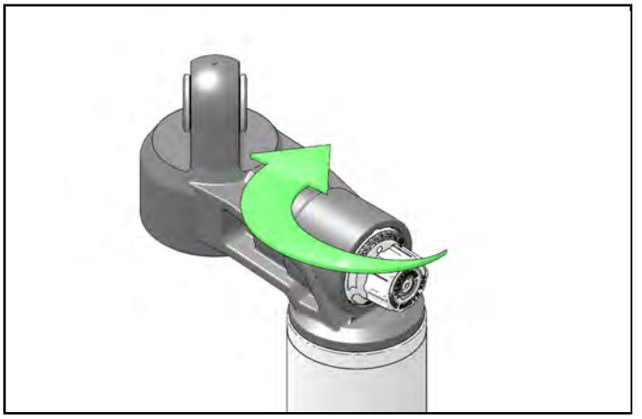
FOX SHOCK ASSEMBLY

A training video is available on University of Polaris (https://lms.latitudelearning.com/home/main.aspx) for assembly of Podium Internal Bypass shocks. Search for “Podium Internal Bypass Shock”.

1. Install reservoir o-ring and apply a thin layer of slick honey on o-ring.



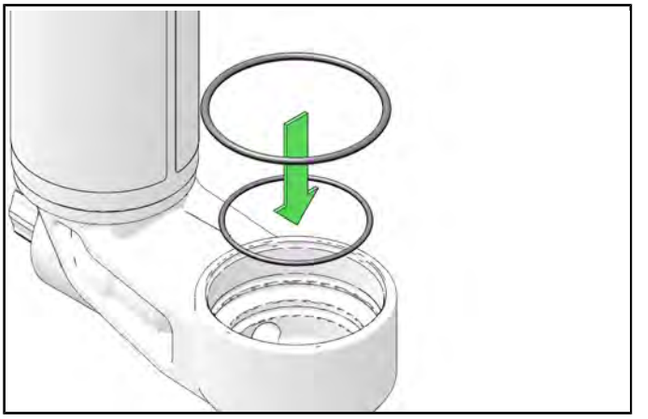
2. Using clamp blocks to secure reservoir in vise, torque body cap to specification using the offset formula. See Offset Torque Formula page 9.32.



TORQUE
Body Cap (step 1): **30 ft-lb (42 Nm)**

3. With body prepared with Loctite primer add a layer of Loctite 638 2 threads up, 2 threads wide 360°.

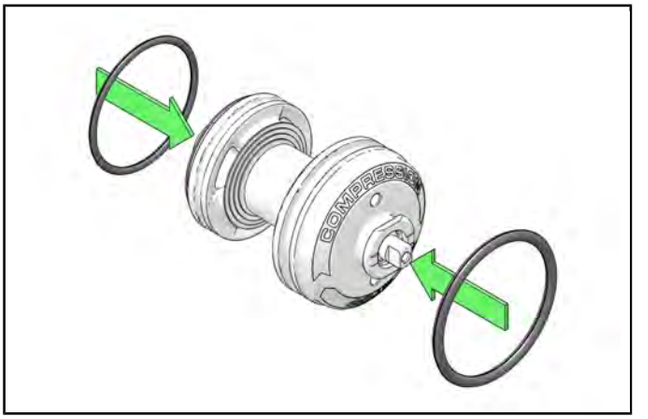
4. Apply a thin layer of Slick Honey to body cap o-rings.



5. Install both o-rings in body cap. Ensuring no Slick Honey is on threads.
6. Torque body cap to final specified torque with body cap socket.

TORQUE
Body Cap (step 2): **100 ft-lb (135 Nm)**

7. Apply Slick honey to LSC o-ring and install.



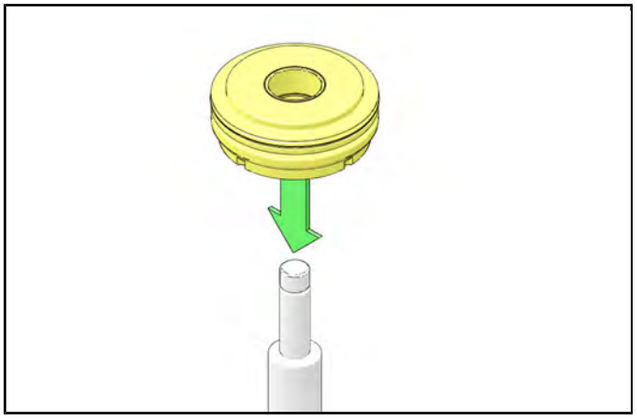
8. Install LSC and retaining ring.

9. With the retaining ring fully installed, position LSC with IFP tool.
10. Install retaining ring.
11. Press spherical bearing into position.
12. Install retaining ring.
13. Apply Loctite 638 to shaft, 2 threads up, 2 threads wide 360°.
14. Torque eyelet to specification with shaft secured in clamp blocks.

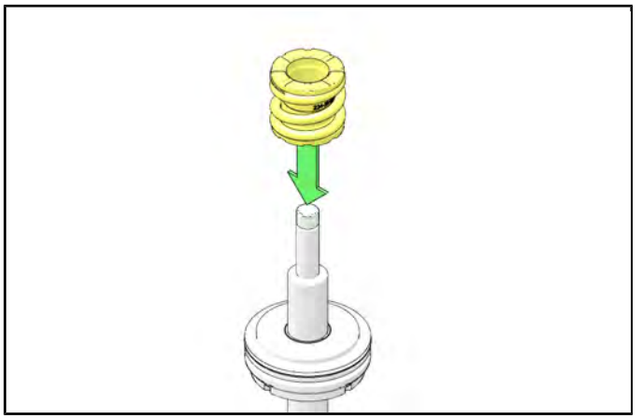
TORQUE
Shock Eyelet: **50 ft-lb (68 Nm)**

15. Install 398-00-095-B Bullet tool on shaft to install bumper.
16. Install body cap.
17. Install T-seal.
18. Install 1st T-seal back-up ring.
19. Install 2nd T-seal back-up ring
20. Install wiper seal.
21. Lubricate all seals with Slick Honey.
22. Install external o-ring.

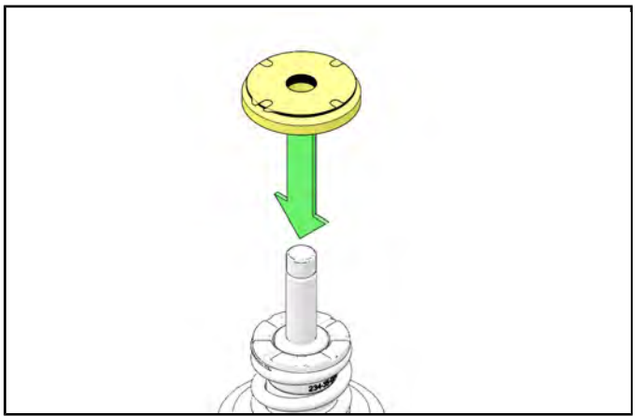
23. Install bearing assembly with cinch ring.



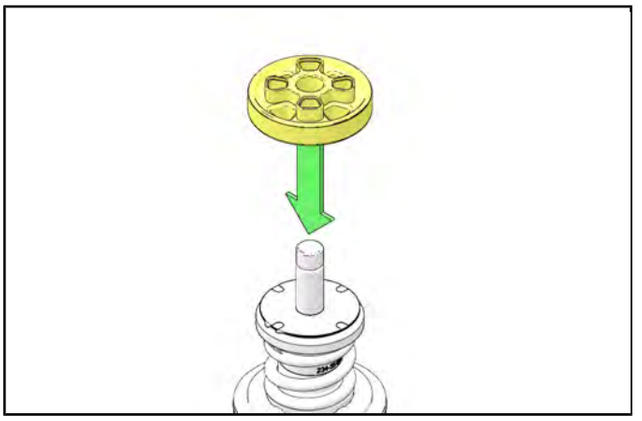
24. Install negative spring assembly.



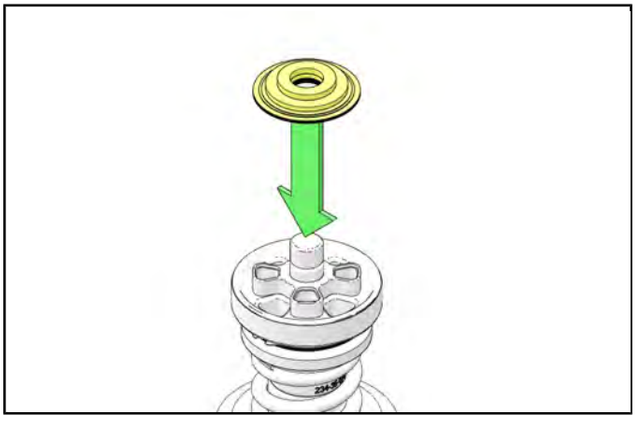
25. Install compression valve stack.



26. Install piston with compression port in-line with bleed shim.

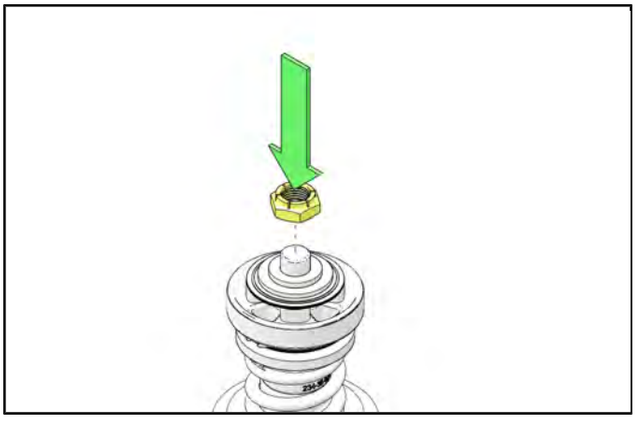


27. Install rebound valve stack.



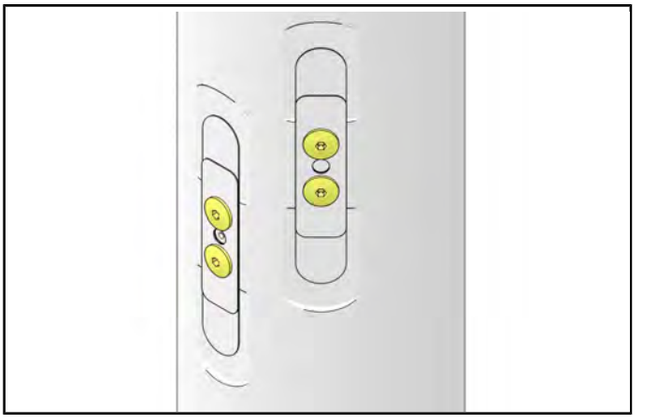
28. Install shaft nut and torque to specification.

TORQUE
Shaft Nut: **22 ft-lb (30 Nm)**



29. Install all Bypass check valves.

30. Use Loctite 242 (Blue) on bypass screws. Torque bypass screws to specification.

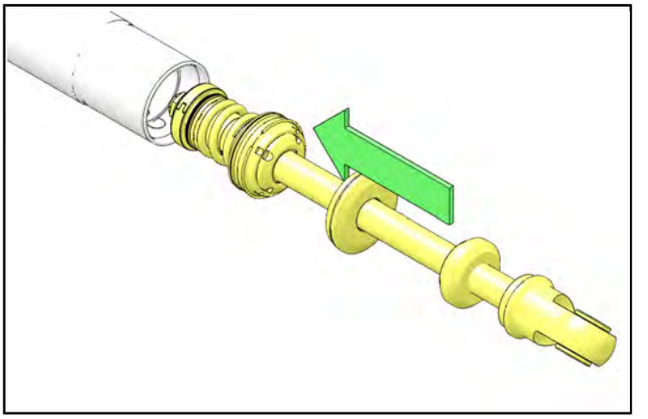


TORQUE
Bypass Screw: **14 in-lb (2 Nm)**

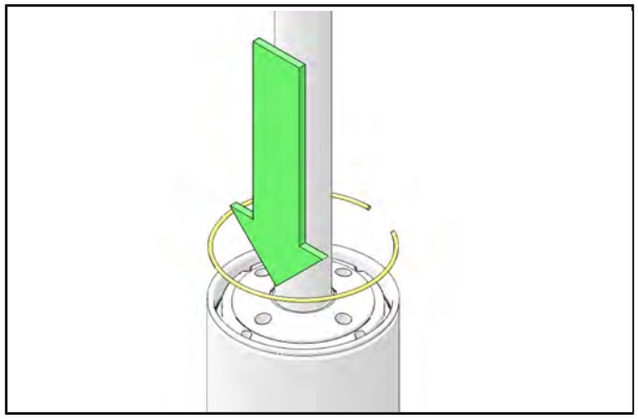
31. Install assembled internal body. Ensure that body is seated properly in body cap.
32. Fill reservoir assembly with oil and install lubricated IFP.
33. Ensuring oil level is above IFP, install bleed screw with o-ring. Torque bleed screw to specification.

TORQUE
Bleed Screw: **14 in-lb (2 Nm)**

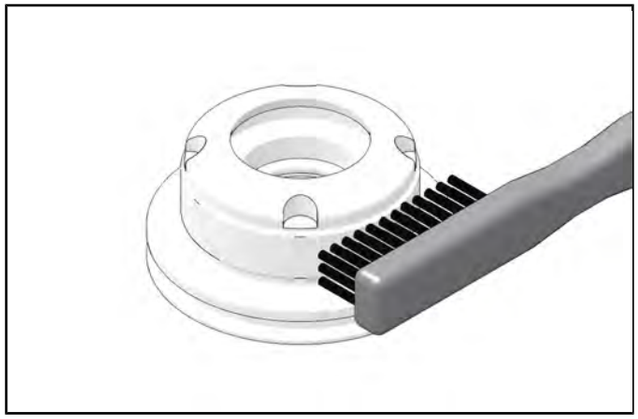
34. Install shaft assembly into inner body.



35. Depress shaft assembly deep enough so that negative spring assembly is just below inner body top.

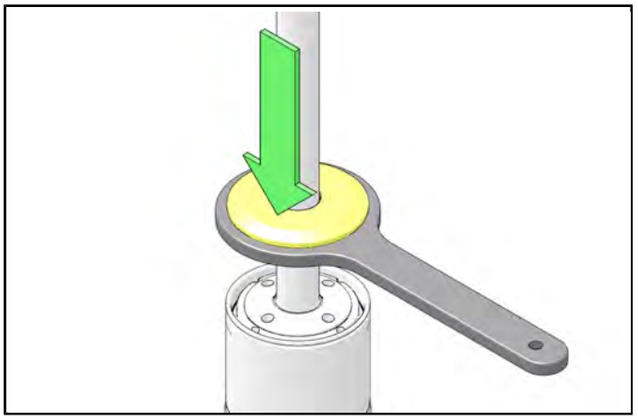


36. Slide bearing assembly into position seated on inner body.
37. Remove cinch ring from assembly and wipe out all oil residue.
38. Clean cinch ring thoroughly.



39. Run cinch ring down to the bottom thread on bearing assembly.
40. Install retaining ring, ensuring that it is fully seated in ring gland.
41. Holding cinch ring spanner, torque bearing assembly to specification.

TORQUE
Shock Bearing Assembly: **35 ft-lb (47 Nm)**

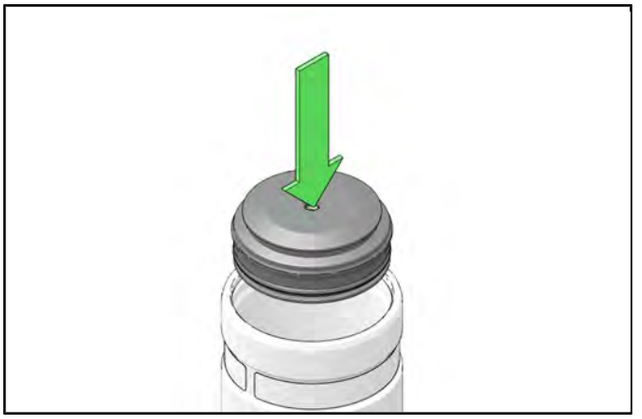


42. On 2.5 Bypass shocks with Aluminum body, apply 290 wicking Loctite to bearing assembly threads. 3.0 Bypass shocks with steel outer bodies do not require 290 Loctite on the bearing assembly threads.

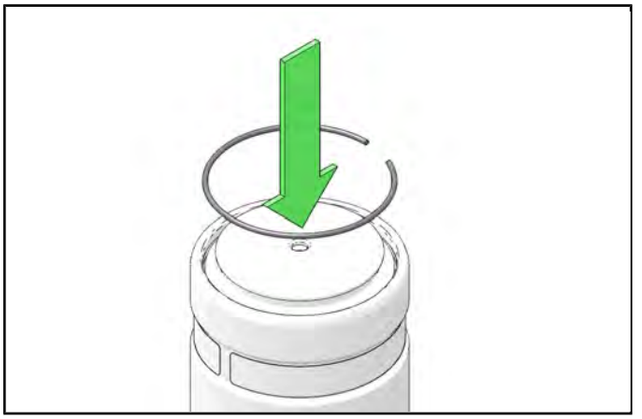
NOTICE
On remote reservoir assemblies, lubricate o-rings with Slick Honey prior to installing hose assembly. With hose fully seated install retaining ring, Ensure retaining ring is fully seated by pulling back on hose.

43. With shaft full extended, remove bleed screw and o-ring.
44. Always set IFP with a down motion of IFP tool. (oil should be above IFP when completed). Refer to the Shock Specifications tables at the beginning of this section for proper IFP depth.
45. After setting IFP depth, install Bleed screw with o-ring.

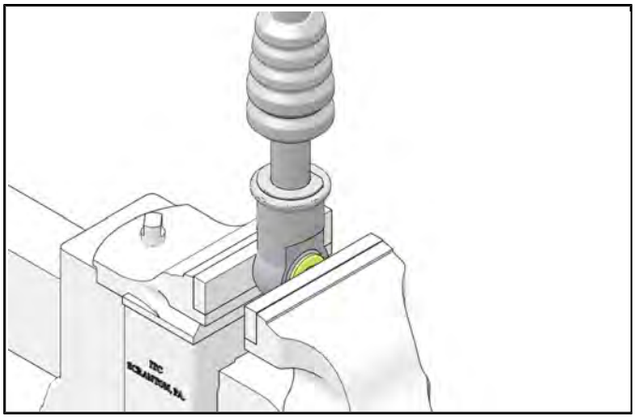
46. Install reservoir end cap o-ring and lubricate with Slick Honey.



47. Install retaining ring, ensure that it is fully seated in ring gland.



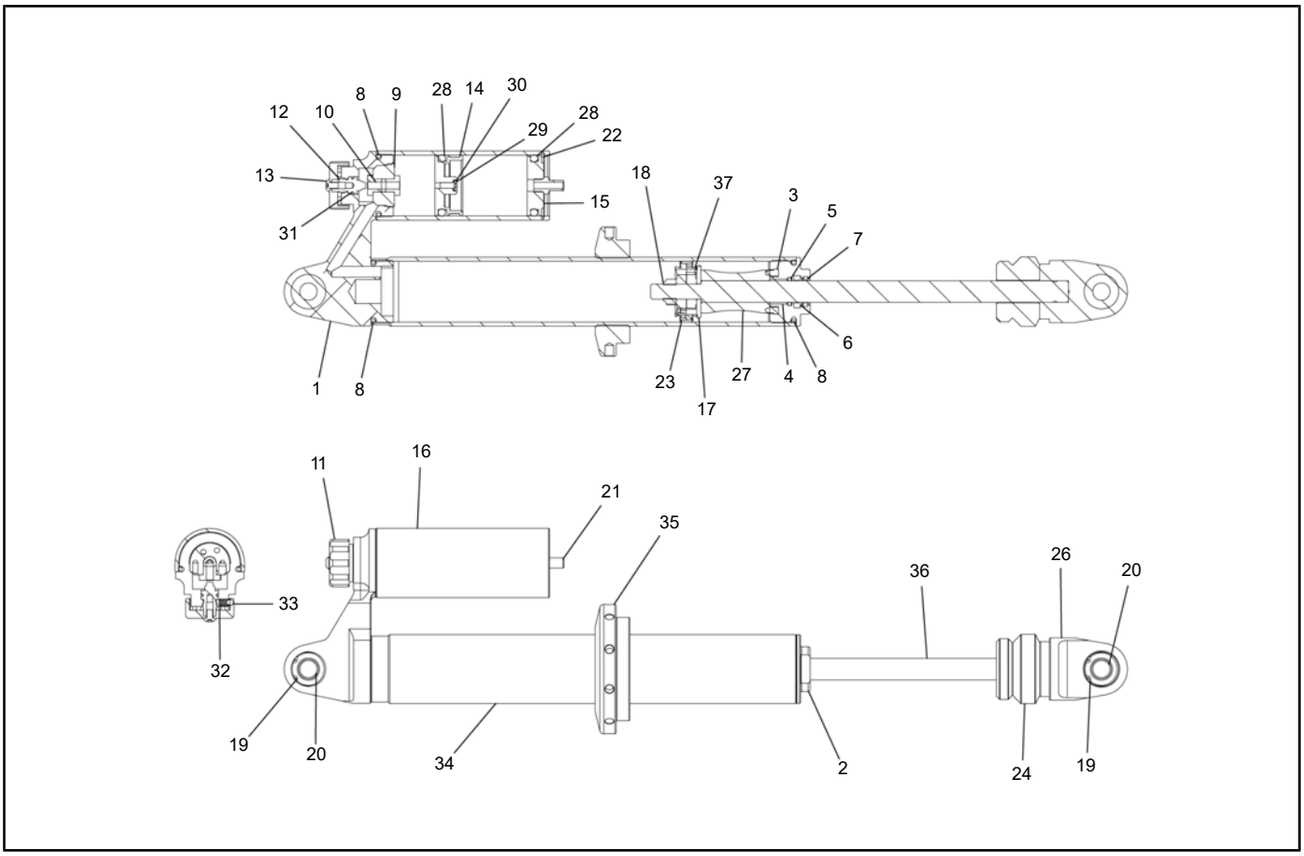
48. Fill reservoir with specified nitrogen pressure.
49. Stroke shock absorber and inspect shock for leaks.
50. Install body cap.
51. Clean oil residue from shock.
52. Install o-ring and reducers in eyelet and body.



SHOCK SERVICE

WALKER EVANS SHOCK SERVICE

WALKER EVANS™ 2.5" FRONT SHOCK / 3.0" REAR SHOCK



REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION
1.	Body Cap Asm.	14.	Piston Asm, Floating (IFP)	27.	Shaft Spacer (1.235" x 1.985")
2.	Seal Head Asm.	15.	Reservoir End Cap	28.	O-Ring
3.	Internal Bump Stop	16.	Reservoir Body	29.	Screw (8/32")
4.	Shaft Bushing (0.625")	17.	Washer (1.50" x 0.125" x 0.348")	30.	O-Ring
5.	O-Ring	18.	Crimp Nut (7/16")	31.	O-Ring
6.	Seal	19.	Snap Ring	32.	Detent Spring
7.	Wiper	20.	Spherical Bearing	33.	Detent Ball
8.	O-Ring	21.	Schraeder Valve	34.	Shock Body
9.	Piston, Clicker	22.	Snap Ring	35.	Spring Adjustment Nut
10.	Clicker Bolt	23.	Piston Wear Band (1.750" OD)	36.	Shaft, Chrome
11.	Clicker Knob	24.	Bump Stop	37.	2-Piece Piston Asm.
12.	Clicker Stud	25.	N/A		
13.	Screw (10/32")	26.	Shaft Loop		

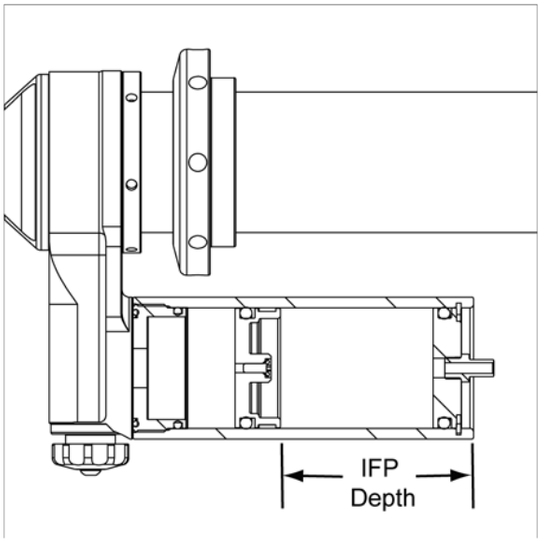
GENERAL SERVICE INFORMATION

Recommended Service Intervals

Walker Evans™ Racing Shocks will perform the best if serviced at regular intervals:

- Every ride - Wash and dry the vehicle and suspension
- Every 100 hours - Visually inspect shock seals
- Every 1500 miles or Annually - Change shock oil and replace seals

FRONT SHOCK SERVICE INFORMATION



FRONT SHOCK DESIGN DETAILS		
Travel		8.64″ (21.95 cm)
Extended Length		26.00″ (66.04 cm)
IFP Depth	All models	6.25″ (15.88 cm)
Nitrogen Pressure		150 psi (1034.21 kPa) +/- 5%
Gas Shock Oil		2874124 (qt.)

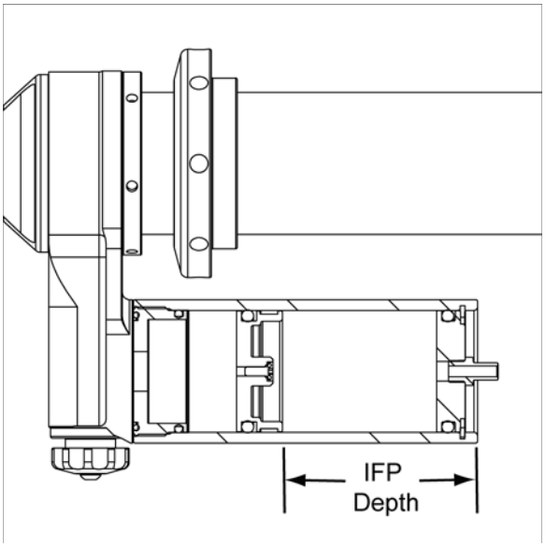
***RZR* PRO R FRONT SHOCK VALVING**

COMPRESSION	REBOUND	CLICKER ASSEMBLY
1.75 x 0.125	1.50 x 0.010	0.700 x 0.010
1.00 x 0.015	1.00 x 0.008	**CLICKER PISTON**
1.20 x 0.008	1.45 x 0.008	1.000 x 0.012
1.30 x 0.008	1.30 x 0.008	1.000 x 0.012
1.45 x 0.008	1.20 x 0.010	0.700 x 0.012
1.55 x 0.010	1.10 x 0.010	0.600 x 0.015
1.10 x 0.010	1.00 x 0.015	0.600 x 0.015
1.55 x 0.010	0.900 x 0.015	
	0.750 x 0.065 (AN)	
	0.750 x 0.065 (AN)	
	0.750 x 0.065 (AN)	
Piston Bleed Orifice: none		

***RZR* PRO R 4 FRONT SHOCK VALVING**

COMPRESSION	REBOUND	CLICKER ASSEMBLY
1.75 x 0.125	1.50 x 0.012	0.700 x 0.010
0.900 x 0.012	1.45 x 0.010	**CLICKER PISTON**
1.00 x 0.015	1.30 x 0.010	1.000 x 0.015
1.20 x 0.012	1.20 x 0.010	1.000 x 0.015
1.30 x 0.012	1.10 x 0.012	0.900 x 0.015
1.45 x 0.012	1.00 x 0.015	0.600 x 0.015
1.55 x 0.010	0.900 x 0.015	0.600 x 0.015
1.10 x 0.010	0.750 x 0.065 (AN)	
1.55 x 0.010	0.750 x 0.065 (AN)	
	0.750 x 0.065 (AN)	
Piston Bleed Orifice: none		

REAR SHOCK SERVICE INFORMATION



REAR SHOCK DESIGN DETAILS		
Travel		12.00″ (30.48 cm)
Extended Length		33.50″ (85.09 cm)
IFP Depth	All Models	8.00″ (20.32 cm)
Nitrogen Pressure		150 psi (1034.21 kPa) +/- 5%
Gas Shock Oil P/N		2874124 (qt.)

RZR PRO R REAR SHOCK VALVING

CHECK VALVE	COMPRESSION	REBOUND	CLICKER ASSEMBLY
1.55 x 0.008	1.750 x 0.140	1.85 x 0.008	0.700 x 0.010
1.00 x 0.008	1.10 x 0.015	1.85 x 0.008	**CLICKER PISTON**
0.900 x 0.060 (round side to shim)	1.20 x 0.015	1.00 x 0.012	1.000 x 0.012
	1.30 x 0.010	1.65 x 0.008	1.000 x 0.012
	1.45 x 0.010	1.55 x 0.012	0.700 x 0.012
	1.55 x 0.010	1.45 x 0.012	0.600 x 0.015
	1.65 x 0.010	1.30 x 0.010	0.600 x 0.015
	1.75 x 0.010	1.30 x 0.010	
	1.90 x 0.010	1.10 x 0.015	
	2.05 x 0.012	0.900 x 0.008	
		1.20 x 0.015	
		0.900 x 0.060	
	No Piston Bleed Orifice		

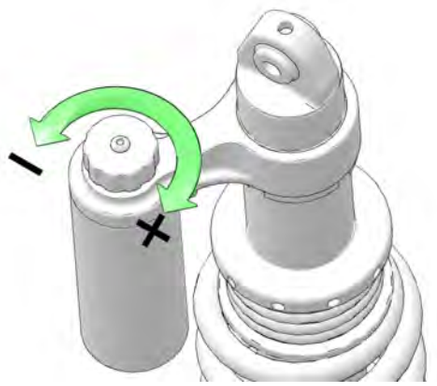
RZR PRO R 4 REAR SHOCK VALVING

CHECK VALVE	COMPRESSION	REBOUND	CLICKER ASSEMBLY
1.55 x 0.008	1.750 x 0.140	1.85 x 0.008	0.700 x 0.010
1.10 x 0.008	1.00 x 0.010	1.85 x 0.008	**CLICKER PISTON**
0.900 x 0.060	1.10 x 0.010	1.10 x 0.012	1.000 x 0.015
	1.20 x 0.010	1.65 x 0.012	1.000 x 0.015
	130 x 0.010	1.55 x 0.012	0.900 x 0.015
	1.45 x 0.012	1.45 x 0.012	0.600 x 0.015
	1.55 x 0.012	1.30 x 0.012	0.600 x 0.015
	1.65 x 0.012	1.20 x 0.012	
	1.75 x 0.012	1.10 x 0.015	
	1.85 x 0.012	1.00 x 0.015	
	1.90 x 0.010	1.30 x 0.015	
	2.05 x 0.008	0.900 x 0.060	
	2.05 x 0.008		
	2.05 x 0.008		
	No Piston Bleed Orifice		

FRONT / REAR SHOCK COMPRESSION ADJUSTMENT (NON-DYNAMIX)

The compression damping clicker knob is located at the top of the shock reservoir.

1. Turn the clicker **clockwise** to **increase** compression damping.
2. Turn the clicker **counter-clockwise** to **decrease** compression damping.



LOCATION	DEFAULT CLICKER POSITION
Front	8/16 clicks
Rear	8/16 clicks

WALKER EVANS™ SHOCK REBUILD INFORMATION

When performing maintenance on Walker Evans™ shocks, use the Gas Shock Recharging Kit (PN 2200421), as it contains the necessary valves, pressure gauge, and fittings to deflate and pressurize shocks.

⚠ WARNING

Walker Evans™ shocks contain high pressure nitrogen gas. Extreme caution must be used while handling and working with Walker Evans™ shocks and related high pressure service equipment. The pressure must be released from the shock before disassembly. It is strongly recommended you wear safety glasses and ear protection during these procedures.

SPECIAL TOOLS

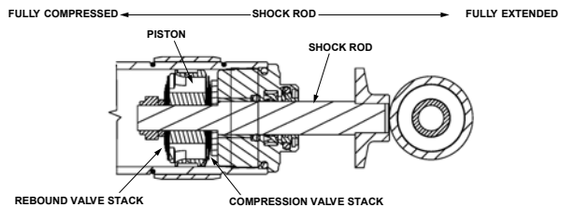
PART NUMBER	DESCRIPTION
2200421	Gas Shock Recharging Kit
PS-45908	IFP Tool
PU-50979	Shock Body Holding Tool - Front
PU-50938	Shock Body Holding Tool - Rear
2872429	Shock Rod Holding Tool - Front
PS-50931	Shock Rod Holding Tool - Rear
PU-50939	Shock Seal Protector Sleeve - Front
PU-50952	Shock Seal Protector Sleeve - Rear

VALVE SHIM ARRANGEMENT

Shown below is an example of how valving stacks are arranged.

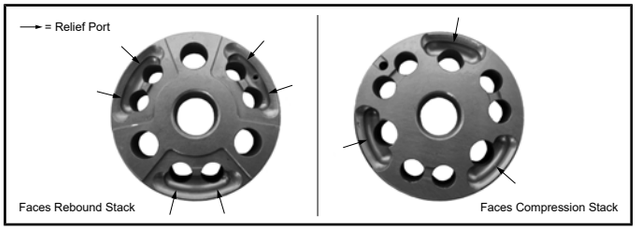
NOTICE

The rebound and compression valve stacks will always be positioned as shown in the illustration, regardless of how the shock assembly is installed.



SHOCK PISTON ORIENTATION

The face of the piston with the greater number of relief ports will always face the rebound valve stack.



9

WALKER EVANS™ SHOCK DISASSEMBLY

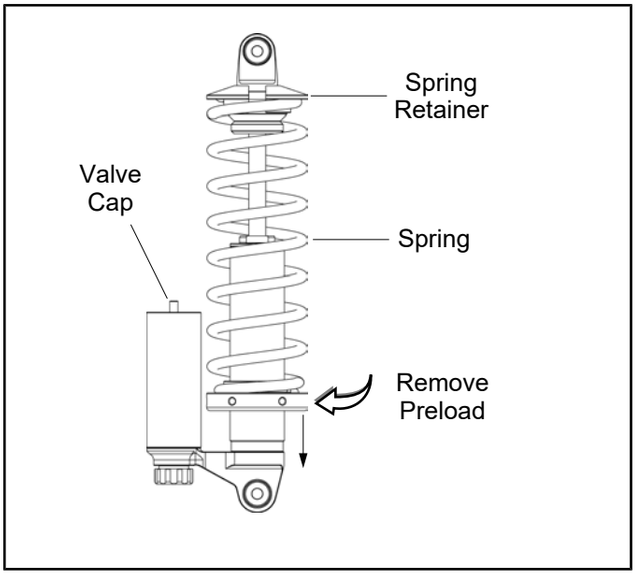
NOTICE

To prevent damage or marks to the shock, the use of special tools and a soft jaw vise is recommended.

⚠ WARNING

Walker Evans™ shocks contain high pressure nitrogen gas. Extreme caution must be used while handling and working with Walker Evans™ shocks and related high pressure service equipment. The pressure must be released from the shock before disassembly. It is strongly recommended you wear safety glasses and ear protection during these procedures.

1. Clean and carefully remove shock from the vehicle.
2. Back preload adjuster all the way down and carefully remove spring retainer and spring(s).



3. Use the appropriate shock body holding tool to properly secure the shock assembly into a vice for service.

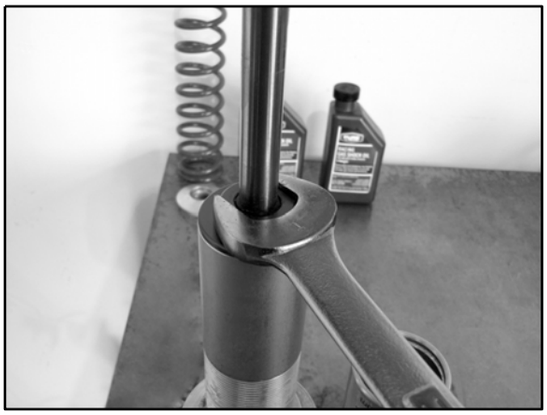
Front Shock Body Holding Tool: PU-50979
Rear Shock Body Holding Tool: PU-50938

4. Remove the valve cap from the valve fitting on the top of the reservoir.
5. Carefully depressurize the shock.

6. Using a snap ring pliers, remove the retaining ring from the reservoir.

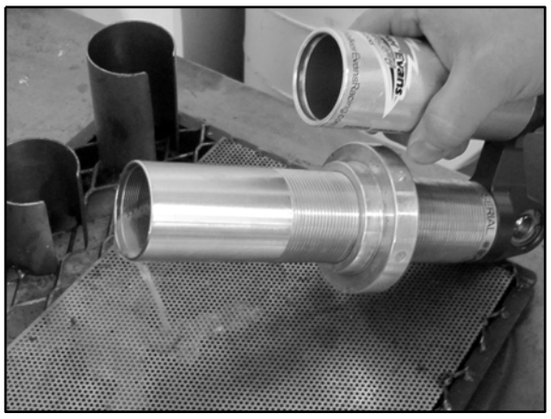
7. Carefully remove the cap from the reservoir body.

8. Using a 1" open-end wrench or adjustable wrench, loosen and remove the bearing cap from the shock body.



9. Slowly lift up and remove the shock rod assembly from the shock body.

10. Remove and properly dispose of the oil from the shock body.



NOTICE
Insert the IFP Tool (PS-45908) and cycle the Internal Floating Piston (IFP) a few times to purge the shock oil from the reservoir.

11. Remove the floating piston from the shock reservoir using the IFP Tool (PS-45908).

12. Clean and inspect ALL parts and replace as needed.

NOTICE
Seal kits are available and should be installed at this time if seals or O-rings are damaged or worn.

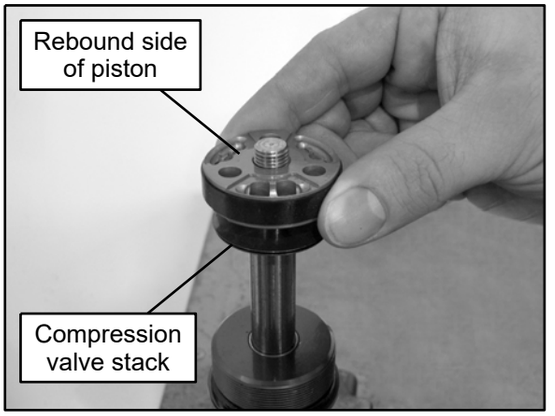
13. Use the appropriate shock rod holding tool and a vise to mount the shock rod vertically with the threaded end upward.

Front Shock Rod Holding Tool: 2872429 Rear Shock Rod Holding Tool: PU-50931

14. Using an 11/16" socket, remove the nut retaining the valve stack and piston.

NOTICE

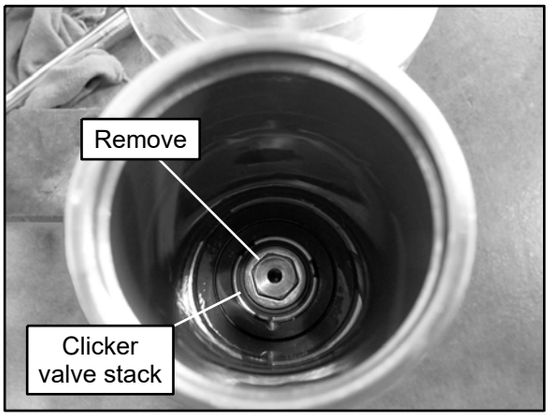
Keep the rebound and compression valve stacks in the order they were removed. If unsure of order, refer to “Shock Valving” under the “Shock Service Information” provided earlier in this section.



15. Place the valve stack on a clean shop towel in order of removal.
16. Inspect the valves for kinks, waves, pits or foreign material.
17. Inspect the piston wear band and replace if damaged or worn.
18. Use the appropriate shock body holding tool to properly secure the shock assembly into a vice for service.

Front Shock Body Holding Tool: PU-50979
Rear Shock Body Holding Tool: PU-50938

19. **Front Shocks Only**: Using a 9/16" socket w/ extension, remove the fastener retaining the clicker valve stack. Place the valve stack on a clean shop towel in order of removal.



NOTICE

Keep the valve stack in the order it was removed. If unsure of order, refer to “Shock Valving” under the “Shock Service Information” provided earlier in this section.

20. Inspect the valves for kinks, waves, pits or foreign material
21. Thoroughly clean all shock components and shock body prior to assembly.

WALKER EVANS™ SHOCK ASSEMBLY

1. Install new seals and O-rings on the seal head assembly.
2. Use the appropriate shock rod holding tool and a vise to mount the shock rod vertically with the threaded end upward.

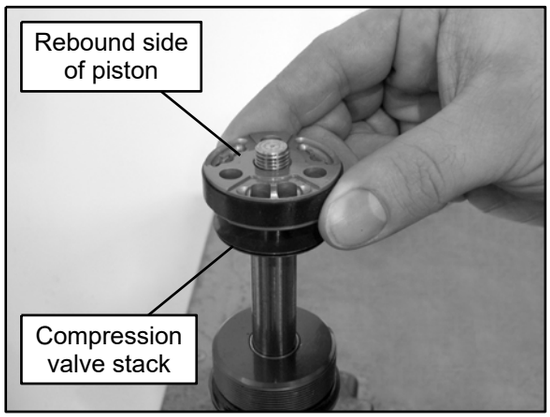
Front Shock Rod Holding Tool: 2872429 Rear Shock Rod Holding Tool: PU-50931

NOTICE
If the shock rod or the mounting eyelet end is being replaced, apply red Loctite to the threads of the shock shaft prior to installation. Not using Loctite may allow the shaft to loosen from the eyelet.

3. Install the appropriate Shock Seal Protector Sleeve over the shaft threads.

Front Shock Seal Protector Sleeve: PU-50939 Rear Shock Seal Protector Sleeve: PU-50952

4. Install seal head assembly onto the shock shaft.
5. Remove the Shock Seal Protector Sleeve.
6. Place the compression valve stack on the rod in the reverse order of disassembly.
7. Place valve piston on top of the compression stack.



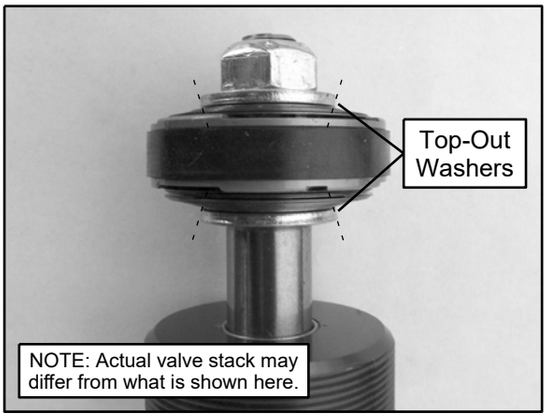
NOTICE
If unsure of the valve stack order, refer to “Shock Valving” under the “Shock Service Information” provided earlier in this section.

8. Place a new lock nut onto the shock rod. Torque the new lock nut to specification.

NOTICE
Do not over torque the nut or damage to the valve stack can occur.

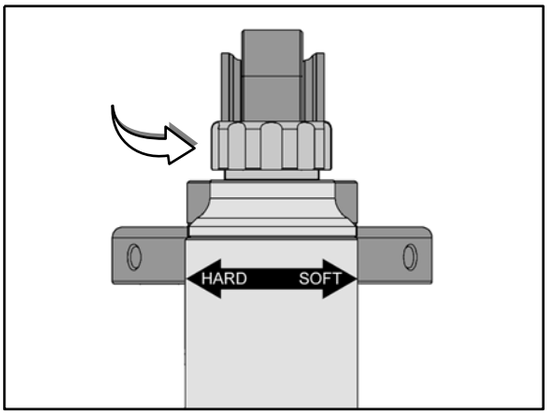
TORQUE
Shock Rod Lock Nut: **14 ft-lbs (19 N·m)**

NOTICE
Make sure “Top-Out” washers are orientated as shown.



9. **Front Shocks Only:** Assemble the clicker valve stack on top of the fastener and install the assembly into the reservoir body. Tighten the valve stack fastener securely.

10. Turn the compression adjuster knob counter-clockwise (soft) until it stops, so damping is in the full open position.



11. Use the appropriate shock body holding tool to properly secure the shock assembly into a vice for service.

Front Shock Body Holding Tool: PU-50979 Rear Shock Body Holding Tool: PU-50938

12. Fill the shock body and remote reservoir 1/2 full of the recommended gas shock oil.

FLUID CAPACITY
Recommended Shock Oil: Racing Gas Shock Oil (PN 2874124) (Quart) 10 Weight for Walker Evans Shocks

13. Using a 3/32" Allen wrench, remove IFP bleed screw.

14. Apply a thin film of oil to IFP O-ring and wear band. Insert IFP into reservoir until completely submerged. Allow air to escape as you install the piston.

15. Screw IFP Tool (PS-45908) onto the floating piston.

16. Slowly cycle the IFP up and down.

- Be sure to bottom out piston in the reservoir body.
- Allow time for the bubbles to dissipate.
- Repeat the process until all air has been removed.

17. Pull IFP up until its top is approximately 1" (2.54 cm) from top of reservoir and remove the IFP Tool. Using a 3/32" Allen wrench, install the IFP bleed screw.

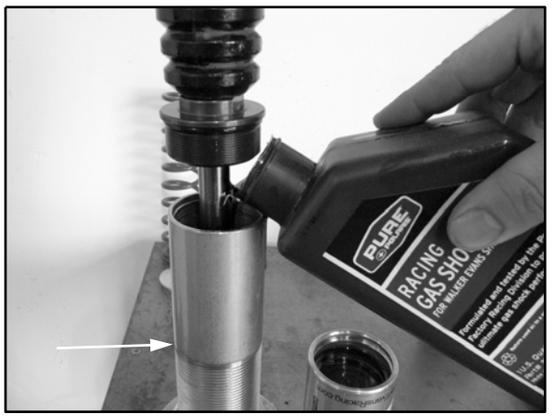
NOTICE

When the IFP Tool is removed, the IFP must remain submerged in shock oil to prevent air from getting under the floating piston.

18. Fill the shock body with oil approximately 1/4" below the threads.
19. Apply a thin film of oil to the wear band on the damping piston. Slowly insert the shock rod assembly into the body until the damping piston assembly is approximately 1" below the oil surface.

- Move rod up and down slowly over a range of about 1" until no air bubbles rise from damping piston. Be careful to keep damping piston at least 1/4" below the surface of the oil during this process.
- While holding the shock rod, apply 2 - 3 sharp blows to the rod eyelet with a rubber mallet driving the piston down into the shock body. This opens the valves on the damping piston. You will see the released air bubbles come to the surface of the oil.

20. Add oil to the body tube until the surface of the oil is at the top of the shock body threads.

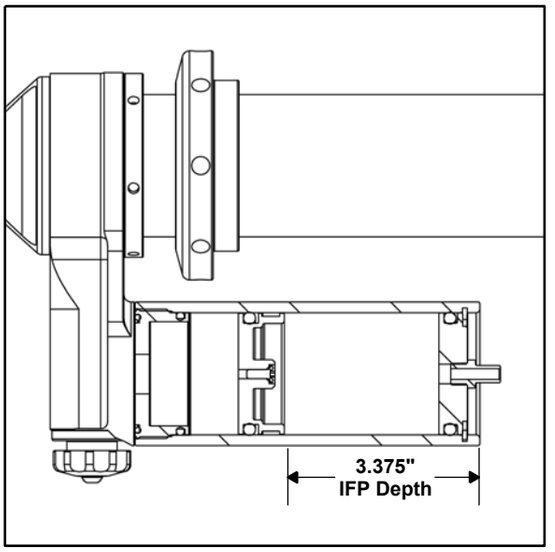


NOTICE

During installation, some shock oil will over flow. Wrap a shop cloth around the shock body to catch any oil overflow.

21. Pull the damping piston up until it is just below the surface of the oil.
22. Hold the rod eyelet with one hand. With other hand, slide the bearing cap down the shaft until contact with the body is made. Oil will overflow from around the bearing cap.
23. Screw the bearing cap assembly into the shock body by hand, holding the rod up so that the bearing cap is in contact with the bottom of the damping piston assembly. Be careful not to cross-thread the bearing assembly.
24. Using a 1" open-end wrench, tighten the bearing cap.
25. Using a 3/32" Allen wrench, remove the IFP bleed screw.

26. Set the IFP depth to the specified length from the top of the reservoir.

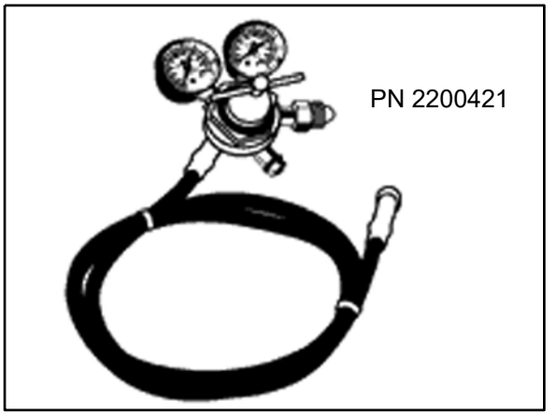


MEASUREMENT
IFP Depth: **FRONT**: 2.875″ (73.02 cm) **REAR *RZR* XP 1000**: 6.25″ (158.8 mm) **REAR *RZR* XP 4 1000**: 7.25″ (184.2 mm)

27. Using a long 3/32” Allen wrench, install the IFP bleed screw.

NOTICE
Apply grease to the end of the Allen wrench so the bleed screw sticks to it during installation.

28. Pour the residual shock oil out of the reservoir into a proper disposal container.
29. Install the reservoir cap. Push down on the reservoir cap using even pressure until the retaining ring groove is exposed.
30. Install the retaining ring and check to make sure retaining ring is seated properly.
31. Push the shock rod assembly completely into the shock body. It should go all the way down smoothly without interference. If it does not, disassemble and reassemble per this procedure.
32. Secure the shock body in a vise by its lower mount.
33. Pressurize the shock reservoir through the Schrader® valve using the Gas Shock Recharging Kit (PN 2200421).



34. Continue filling until the shaft has fully extended and the reservoir pressure is at 125 psi.

Nitrogen Pressure (Front and Rear):
125 psi (862 kPa) +/- 5%

⚠ WARNING
CHARGE THE SHOCK USING NITROGEN GAS ONLY. DO NOT FILL WITH ANY OTHER GASES. Doing so compromises the performance of the shock and may be EXTREMELY DANGEROUS!

35. Reinstall the valve cap.
36. Clean all oil residue from the shock and reservoir with solvent, and dry with low pressure compressed air in a well ventilated area.

37. Check shock for any leaks.

NOTICE
If leakage from a remote shock reservoir hose fitting is evident, check for a loose fitting and seal threads with Three Bond 1215 (PN 2871557)

38. Reinstall the compression spring and the spring retainer.
39. Thread the spring preload adjuster down against the spring and set the preload to the specified measurement (see Chapter 2 – Spring Adjustment).
40. Set the compression adjuster knob to the recommended setting or the original setting upon removal (see Chapter 2 – Shock Compression Adjustment).
41. Remove the shock from the vise.
42. Reinstall spherical bearing O-rings and polyurethane bushings.

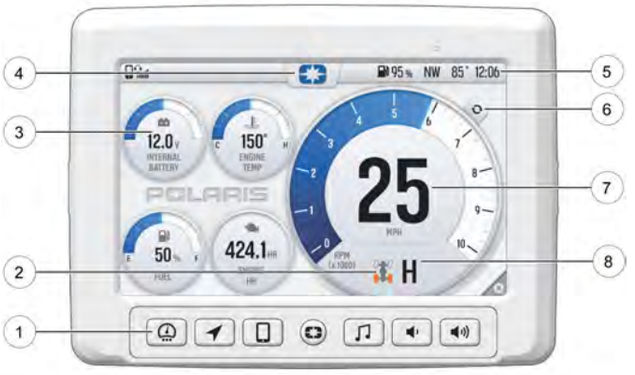
NOTICE
After installation, be sure to RIDE SLOWLY initially to ensure the shock and the vehicle's suspension is performing correctly.

DYNAMIX ACTIVE SUSPENSION

DYNAMIX SHOCKS DISASSEMBLY / ASSEMBLY

While the Dynamix Shocks come apart similar to a FOX Podium Bypass shock, there are several differences. Refer to the training on University of Polaris (https://lms.latitudelearning.com/home/main.aspx) and do a search for “Live Valve Shock” for complete disassembly and assembly of a Dynamix shock.

OVERVIEW



① Ride Command Buttons

② Driveline Mode

③ Widgets

④ Settings

⑤ Icon Bar

⑥ Gauge View Mode

⑦ Speedometer/ Tachometer

⑧ Gear Status

DEMONSTRATION MODE

"Demo" Mode allows the operator to experience the feel associated with each Ride Mode before actual use. Activate "Demo" Mode by placing the vehicle in Park (P) and turning off the engine, then turn the ignition key switch to ON position. The operator can cycle through the different Ride Modes using the UP or DOWN arrow buttons, then use the throttle, brakes, and steering wheel to assess the feel of each Ride Mode.

SUSPENSION CONTROL MODULE (SCM)

The Suspension Control Module (SCM) contains the logic for suspension control, including communications, operator inputs, and shock drivers, to execute the suspension control algorithms. The SCM also has an internal 6-axis inertial measurement unit which is used to monitor the performance of the vehicle by the suspension control algorithms.

⚠ CAUTION

Moving or altering the orientation of the SCM may have an adverse effect on vehicle handling. Never move the SCM from it’s factory mounting location.

DYNAMIX™ DV SYSTEM FEATURES

The Pro R's DYNAMIX DV (dual valve) shock (if equipped), features both rebound and compression control valves located on the shock. The rebound and compression is controlled and monitored by the inertial measurement unit (IMU) inside the suspension control module (SCM). The 90-pin suspension control module (SCM) is the heart of the Dynamix Active Suspension. The IMU monitors the vehicle's yaw, pitch, and roll positions and rates, the SCM responds by making fine adjustments to these valves based on the suspension mode and vehicle speed.

Both valves are amperage controlled by the SCM. Varying the amperage to these valves changes the size of the orifice.

A lower amperage provides a smaller orifice (more damping) to flow shock oil through; a greater amperage provides a larger orifice (less damping).

If the valves become damaged, they are replaced as an assembly. The amperages can be monitored in Digital Wrench. The system is capable of self-diagnosing issues and codes will appear in Digital Wrench. For disassembly and assembly please visit the MSD Garage to watch FOX shock videos. SCM position is critical to Dynamix DV calibration, so it must not be relocated or reoriented.

EPS RESPONSE

When Dynamix DV Ride Modes are selected, EPS unit response & feedback is specifically tuned for each Ride Mode, resulting in different steering feel in each ride mode.

X BUTTON

Located on the steering wheel. When pressed, SCM responds by putting all 4 shocks to maximum compression. Will remain for as long as the button is held, or will revert after 1 second if the button is just tapped.

VEHICLE SPEED SENSITIVITY

The system continuously monitors the speed of the vehicle and adjusts to a base level of compression and damping for a given vehicle speed depending on the mode selected by the user.

CORNERING CONTROL

The system continuously monitors steering angle, lateral acceleration, and vehicle yaw rate to provide enhanced cornering control, reducing body motion for maximum performance. Compression is increased in the outside shocks and decreased in the inside shocks, reducing body roll and keeping the vehicle stable.

BRAKING

The system continuously monitors the brake switch status and vehicle deceleration rate, reducing body motion, and increasing available compression travel for braking into harsh terrains. The compression on the front shocks increase as the rear shocks soften to keep the vehicle flat

ACCELERATION

The system continuously monitors vehicle speed, accelerator pedal position, and vehicle speed. Under heavy acceleration, the compression increases in the rear shocks to keep the vehicle flatter, and put power down to the dirt faster.

AIRBORNE DETECTION

The system continuously monitors the state of the vehicle using its 6-axis inertial measurement unit. When low-g situations are encountered, the system provides maximum damping until the low-g situation is no longer present, after which it reverts back to the user-selected drive mode.

ADVANCED DIAGNOSTICS

The system continuously monitors the health and state of all input and output signals. If a fault is detected, the system reverts to a safe operating state and alerts the operator of a component or system problem via the SCM diagnostic indicator on the RideCommand™ display.

RIDE MODE CONTROLS (IF EQUIPPED)

If equipped, Ride Mode controls can be found on the right-hand side of the steering wheel. There are 4 available modes to select from: Baja, Rock, Track, and Comfort. The UP and DOWN arrow buttons are used to cycle through the different modes.

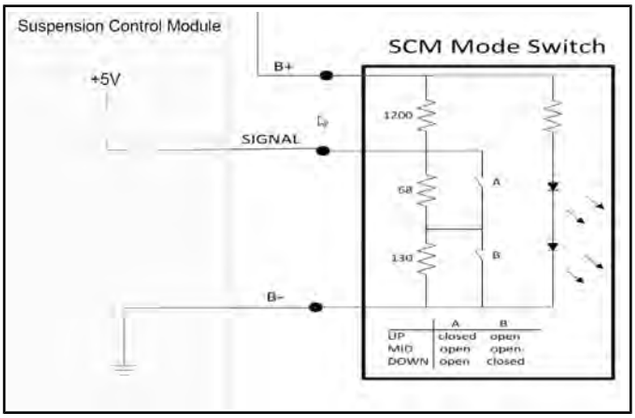
The momentary MAX FIRM button is on the right. When this button is pressed, the suspension will immediately switch to maximum compression damping. The vehicle will maintain this setting if the button is continuously pressed. Once the button is released, maximum compression damping will persist temporarily, and then revert back to the previous setting.

NOTICE
The system will prevent mode transitions when a current vehicle state is present (cornering, braking, or accelerating).

MODE	SUSPENSION DESCRIPTION	POWER STEERING DESCRIPTION
Baja Mode	High compression and low rebound damping for large and aggressive suspension events.	Good feeling of the front wheels with excellent bump rejection.
Rock Mode	High compression and low rebound with angle based damping adjustments for maneuvering through rockier terrain. At higher vehicle speeds, damping becomes similar to Comfort Mode.	High assist level and bump rejection for low steering effort when maneuvering in rocks.
Track Mode	Medium compression and high rebound damping for frequent cornering events.	Best feeling of the front wheels for frequent cornering events.
Comfort Mode	Low compression and rebound damping to allow the shock to move and absorb smaller suspension events.	High assist level and bump rejection for low steering effort and maximum comfort.
“Demo” Mode	“Demo” Mode allows the operator to experience the feel associated with each Ride Mode before actual use. Activate “Demo” Mode by placing the vehicle in Park (P) and turning off the engine, then turn the ignition key switch to ON position. The operator can cycle through the different Ride Modes using the UP or DOWN arrow buttons, then use the throttle, brakes, and steering wheel to assess the feel of each Ride Mode.	

SUSPENSION MODE SWITCH (DYNAMIX MODELS)

For more information on the Dynamix suspension system, refer to the Steering / Suspension chapter - Dynamix Overview page



SWITCH POSITION	CONTACT A	CONTACT B	PINS 1 TO 7
Comfort	Closed	Open	1270 Ω
Sport	Open	Open	1400 Ω
Firm	Open	Closed	1330 Ω

NOTES

CHAPTER 10
BRAKE SYSTEM

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2870975	Mity Vac™

Bosch Automotive Service Solutions:
1-800-345-2233 or http://polaris.service-solutions.com/

BRAKE SYSTEM SPECIFICATIONS

FRONT BRAKE SYSTEM

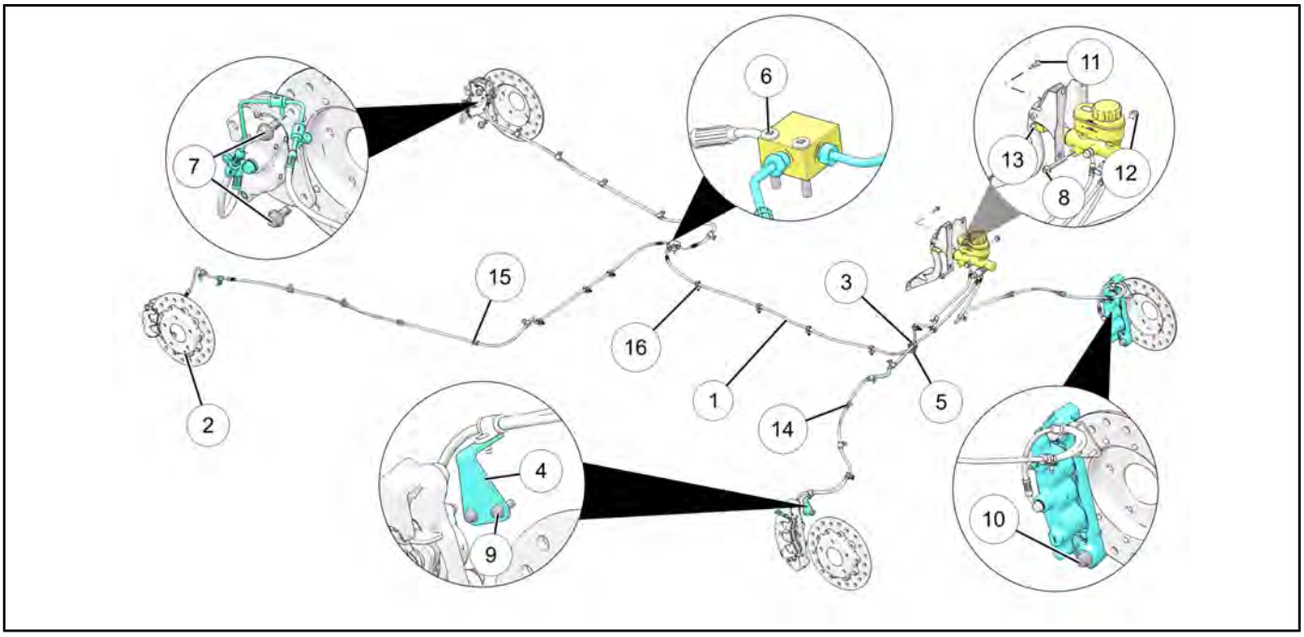
ITEM	STANDARD	SERVICE LIMIT
Front Pad Thickness	**.2+/- .01" (5.08 +/- 0.254 mm)**	**.003" (0.76mm)**
Front Disc Thickness	**.295 ± .008″ (7.5 ± .2 mm)**	**.268″ (6.8 mm)**
Front Disc Runout	–	**.010″ (0.25 mm)**

REAR BRAKE SYSTEM

ITEM	STANDARD	SERVICE LIMIT
Rear Pad Thickness	**.15 +/- .005" (3.81+/- 0.13 mm)**	**.003" (0.76mm)**
Rear Disc Thickness	**.295 ± .008″ (7.5 ± .2 mm)**	**.268″ (6.8 mm)**
Rear Disc Runout	–	**.010″ (0.25 mm)**

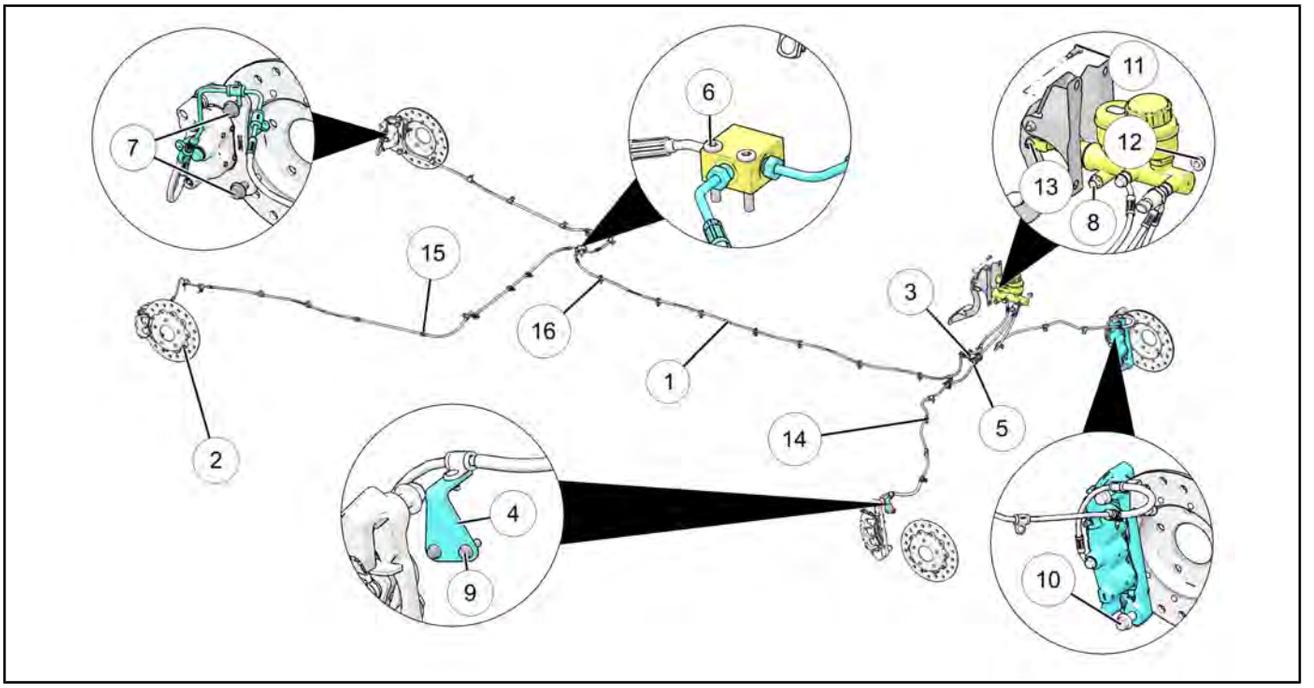
BRAKE SYSTEM OVERVIEW

BRAKE SYSTEM VIEW (2-SEAT)



① Brake System	⑨ Bracket Fasteners **7 ft-lbs (10 Nm)**
② Brake Disk	⑩ Front Brake Caliper Fasteners **73 ft-lbs (100 Nm)**
③ Button Clip	⑪ Master Cylinder Bolt
④ Bracket - Hose, Brake, Knuckle	⑫ Nut - Master Cylinder Fastener **21-23 ft-lbs (28-31 Nm)**
⑤ Edge Clip	⑬ Nut - Master Cylinder Bolt **4ft-lbs (6 Nm)**
⑥ Junction Block Fasteners **35 in-lbs (4 Nm)**	⑭ Pop Rivet
⑦ Rear Brake Caliper Fasteners **51 ft-lbs (70 Nm)**	⑮ Pop Rivet
⑧ Master Cylinder Fasteners	⑯ Clip - Fir Tree

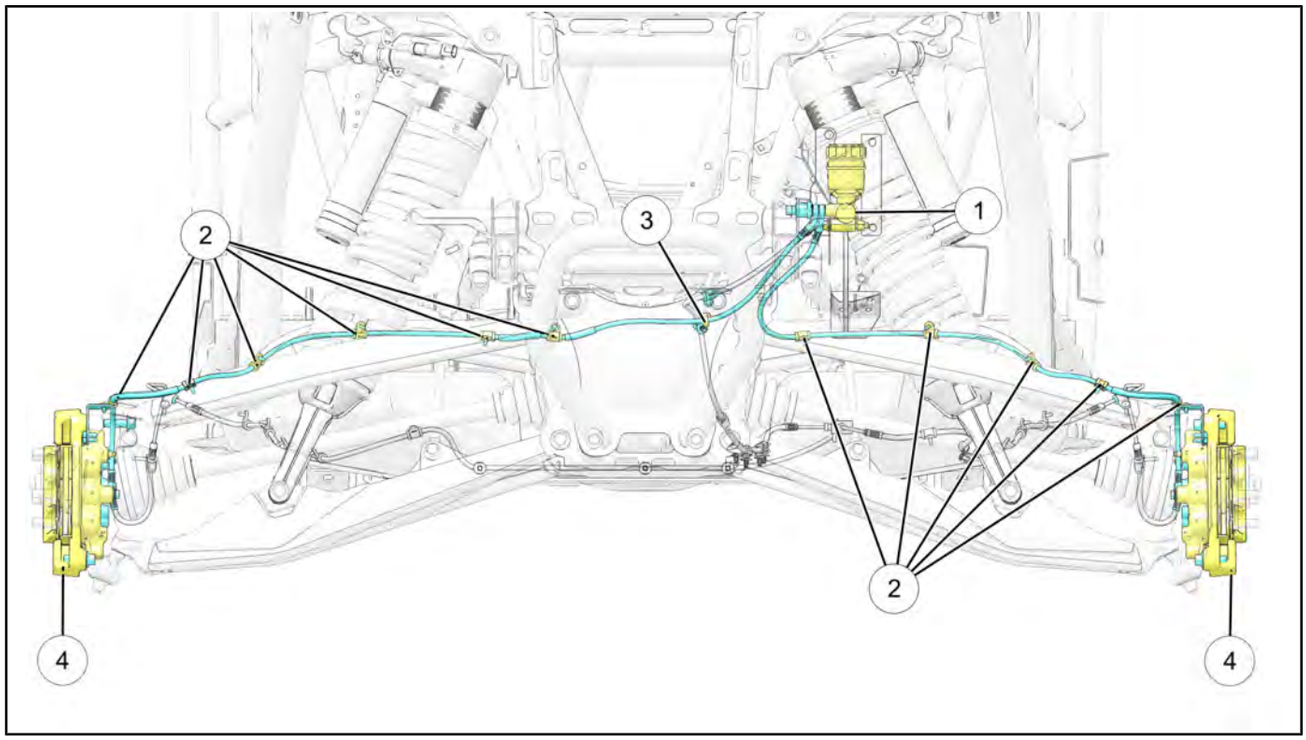
BRAKE SYSTEM VIEW (4-SEAT)



① Brake System	⑨ Bracket Fasteners **7 ft-lbs (10 Nm)**
② Brake Disk	⑩ Front Brake Caliper Fasteners **73 ft-lbs (100 Nm)**
③ Button Clip	⑪ Master Cylinder Bolt
④ Bracket - Hose, Brake, Knuckle	⑫ Nut - Master Cylinder Fastener **21-23 ft-lbs (28-31 Nm)**
⑤ Edge Clip	⑬ Nut - Master Cylinder Bolt **4ft-lbs (6 Nm)**
⑥ Junction Block Fasteners **35 in-lbs (4 Nm)**	⑭ Pop Rivet
⑦ Rear Brake Caliper Fasteners **51 ft-lbs (70 Nm)**	⑮ Pop Rivet
⑧ Master Cylinder Fasteners	⑯ Clip - Fir Tree

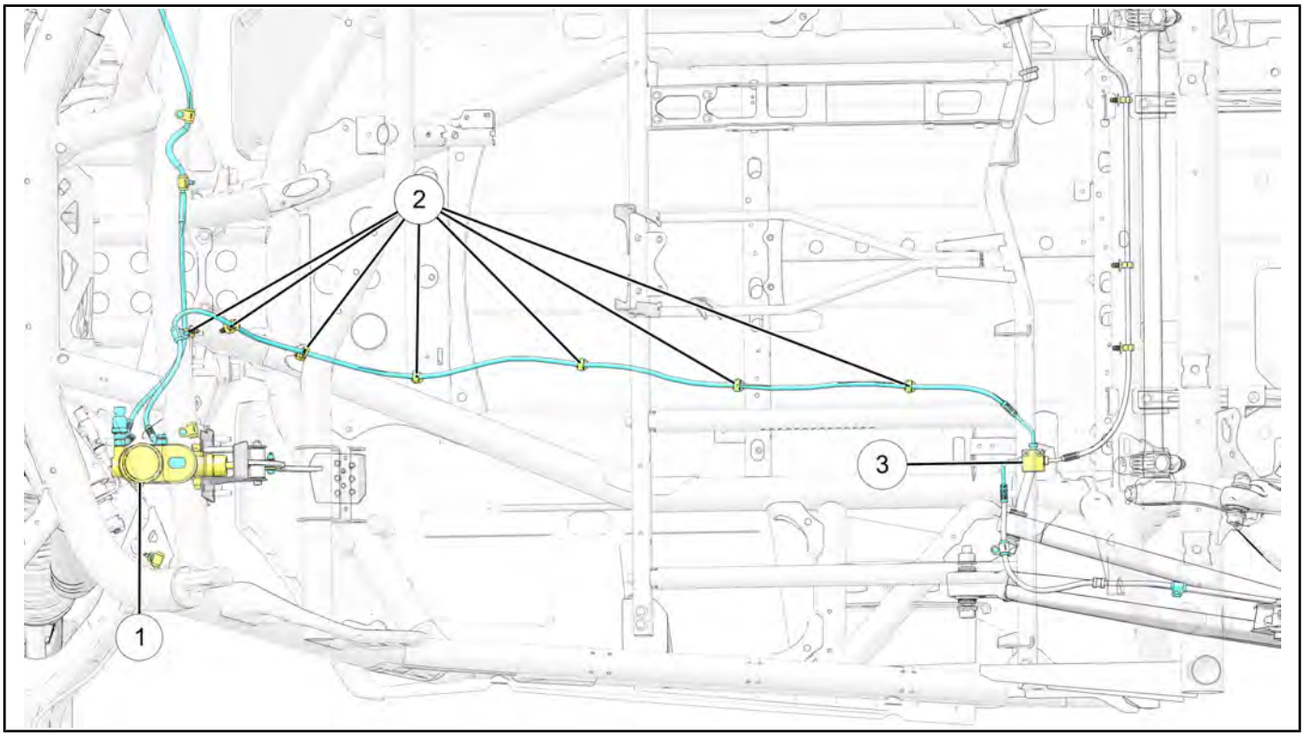
BRAKE LINE ROUTING / RETENTION (2-SEAT)

Master Cylinder To Front Brake Calipers



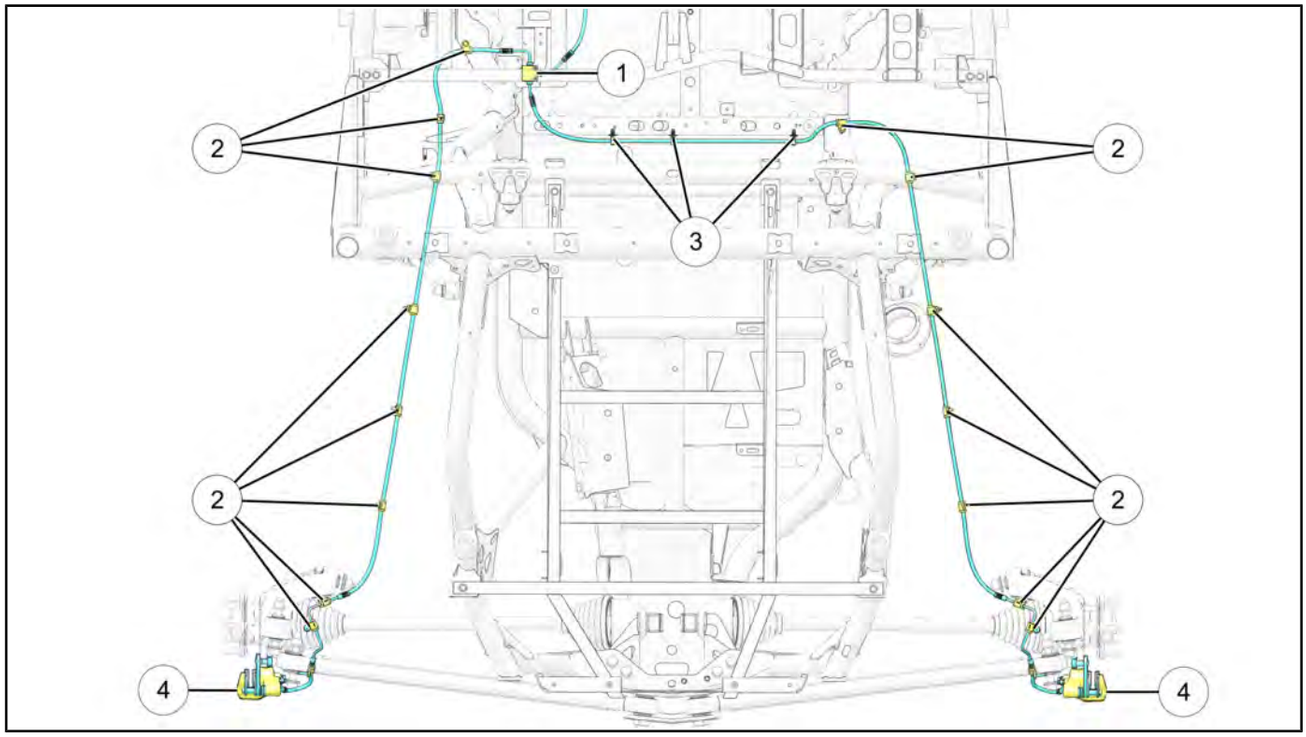
① Master Cylinder
② Rivet Clip
③ Routing Clip
④ Front Brake Calipers

Master Cylinder To Junction Block



① Master Cylinder
② Routing Clip
③ Junction Block

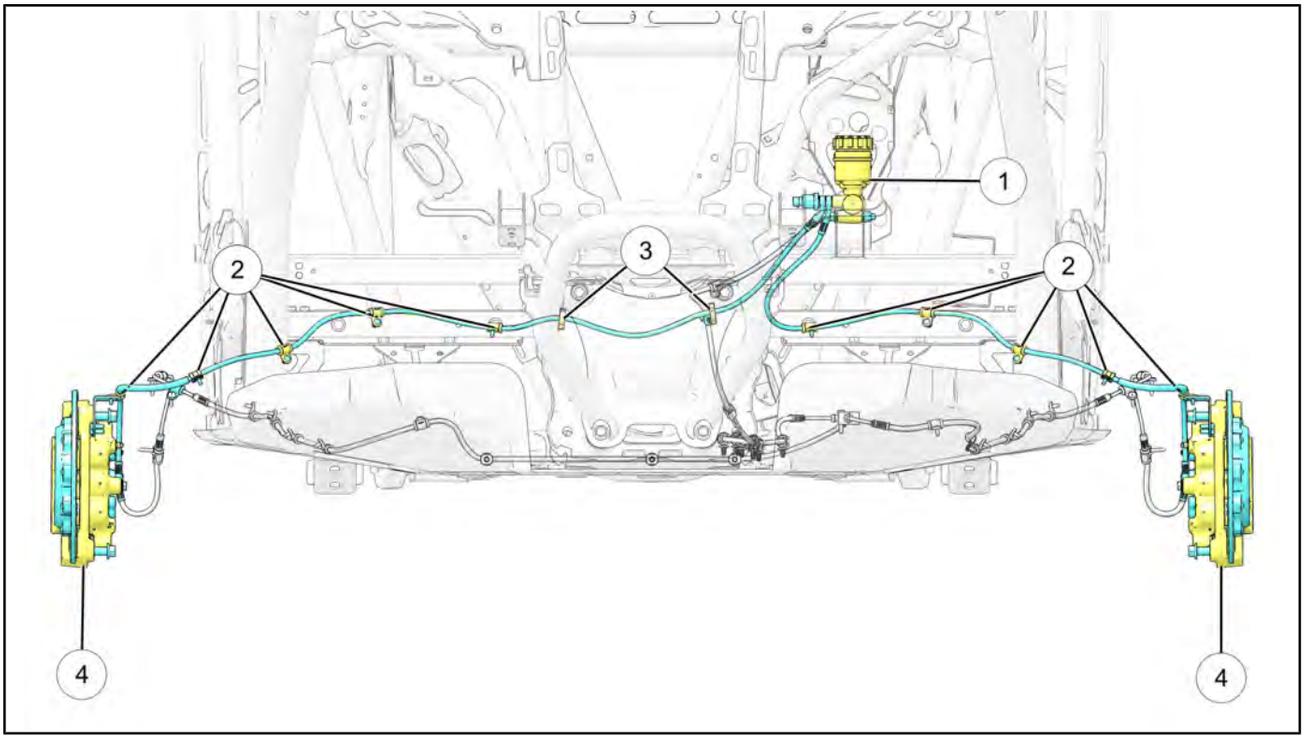
Junction Block to Rear Brake Calipers



① Junction Block
② Rivet Clip
③ Routing Clip
④ Rear Brake Caliper

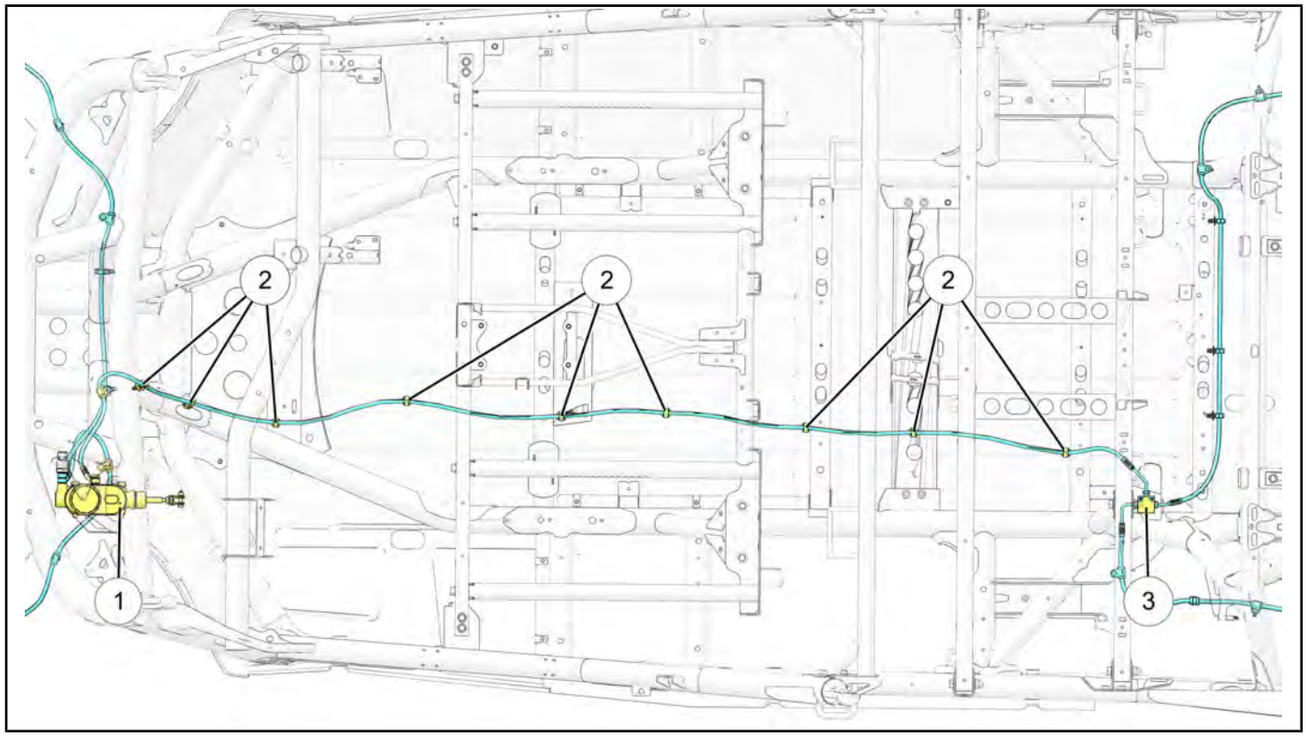
BRAKE LINE ROUTING / RETENTION (4-SEAT)

Master Cylinder To Front Brake Calipers



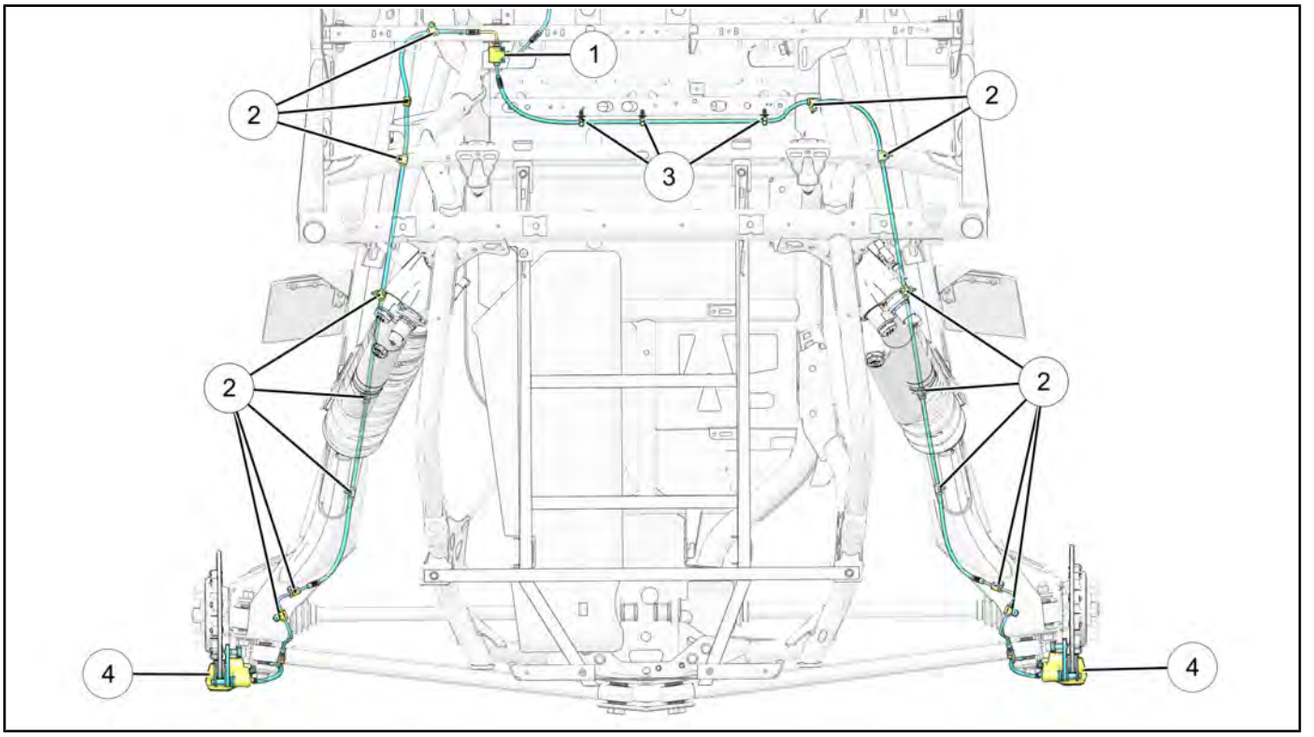
① Master Cylinder
② Rivet Clip
③ Routing Clip
④ Front Brake Calipers

Master Cylinder To Junction Block



① Master Cylinder
② Routing Clip
③ Junction Block

Junction Block to Rear Brake Calipers



① Junction Block
② Rivet Clip
③ Routing Clip
④ Rear Brake Caliper

BRAKE SYSTEM SERVICE NOTES

Disc brake systems are light weight, low maintenance, and perform well in the conditions this vehicle will routinely encounter. There are a few things to remember when replacing disc brake pads or performing brake system service to ensure proper system function and maximum pad service life.

- DO NOT over-fill the master cylinder fluid reservoir.
- Make sure the brake pedal returns freely and completely.
- Adjust stop pin on brake caliper(s) after pad service.
- Check that the rubber baffle is retracted inside master cylinder reservoir cap.
- Check and adjust master cylinder reservoir fluid level after pad service.
- Make sure atmospheric vent on reservoir is unobstructed.
- Test for brake drag after any brake system service and investigate cause if brake drag is evident.
- Make sure caliper moves freely on guide pins (where applicable).
- Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.
- Perform a brake burnishing procedure after installing new pads to maximize service life.
- DO NOT lubricate or clean the brake components with aerosol or petroleum products. Use only approved brake cleaning products.

HYDRAULIC BRAKE SYSTEM OPERATION

The Polaris brake system consists of the following components or assemblies: brake pedal, master cylinder, hydraulic brake lines, brake calipers, brake pads, and brake discs, which are secured to the drive line.

When the foot activated brake lever is applied it applies pressure on the piston within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the pistons located in the brake calipers move outward and apply pressure to the moveable brake pads. These pads contact the brake discs and move the calipers in their floating bracket, pulling the stationary side pads into the brake discs. The resulting friction reduces brake disc and vehicle speed.

The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper moves further outward and becomes self adjusting. Fluid from the reservoir fills the additional area created when the caliper piston moves outward.

Brake fluid level is critical to proper system operation. Too little fluid will allow air to enter the system and cause the brakes to feel spongy. Too much fluid could cause brakes to drag due to fluid expansion.

Located within the master cylinder is the compensating port which is opened and closed by the master cylinder piston assembly. As the temperature within the hydraulic system changes, this port compensates for fluid expansion or contraction. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for fluid expansion. **Never overfill the reservoir! Do not fill the reservoir beyond the MAX LEVEL line!**

When servicing Polaris brake systems use only **Polaris DOT 4 Brake Fluid (PN 2872189)**.

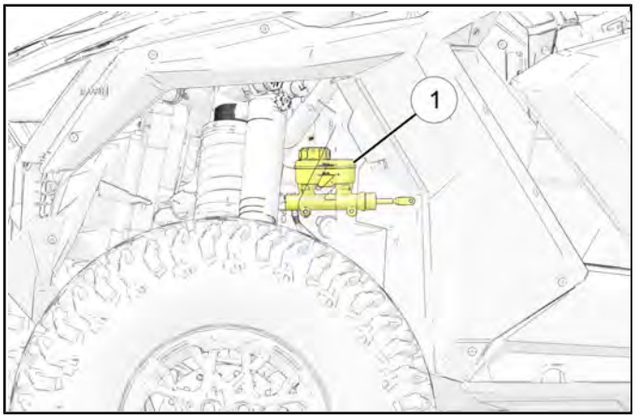
⚠ WARNING

Once a bottle is opened, use what is necessary and discard the rest in accordance with local laws. Do not store or use a partial bottle of brake fluid. Brake fluid is hygroscopic, meaning it rapidly absorbs moisture. This causes the boiling temperature of the brake fluid to drop, which can lead to early brake fade and the possibility of serious injury.

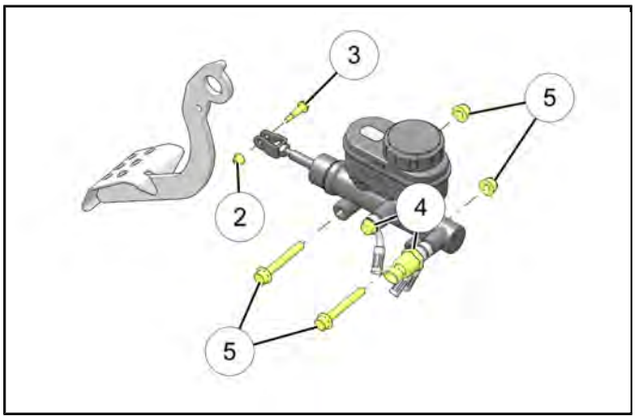
MASTER CYLINDER

MASTER CYLINDER REMOVAL

1. Locate the master cylinder ① above the left front tire in the wheel well area.



2. Remove the nut ② from the fastener ③ that attaches the master cylinder to the brake pedal lever.



3. Place a container to catch brake fluid under the master cylinder brake line banjo bolts ④.

⚠ CAUTION

Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

NOTICE

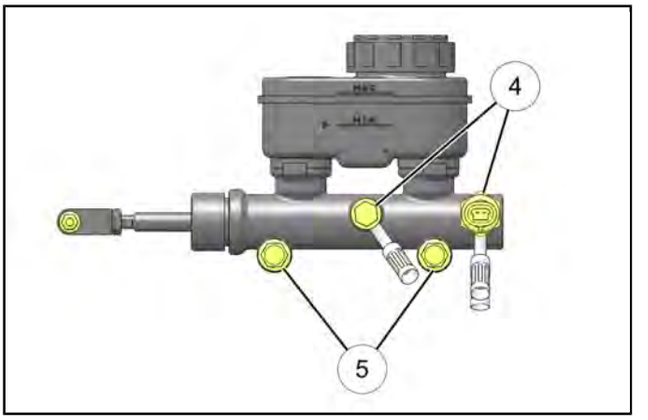
Make note of front and rear brake line locations to master cylinder.

4. Loosen the brake line banjo bolts and allow fluid to drain.

NOTICE

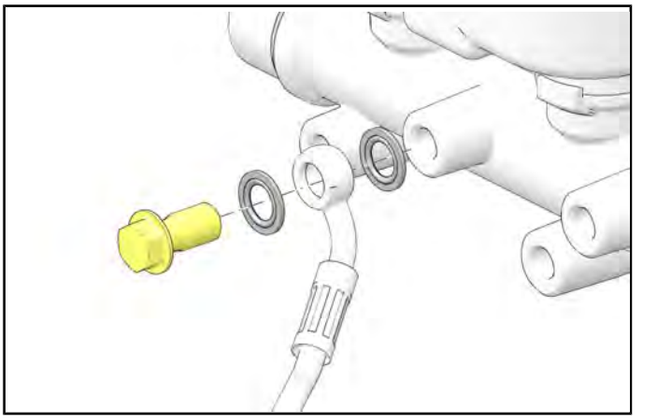
Dispose of fluid properly. Do not re-use.

5. Remove the two mounting fasteners ⑤ that secure the master cylinder to the frame.



MASTER CYLINDER INSTALLATION

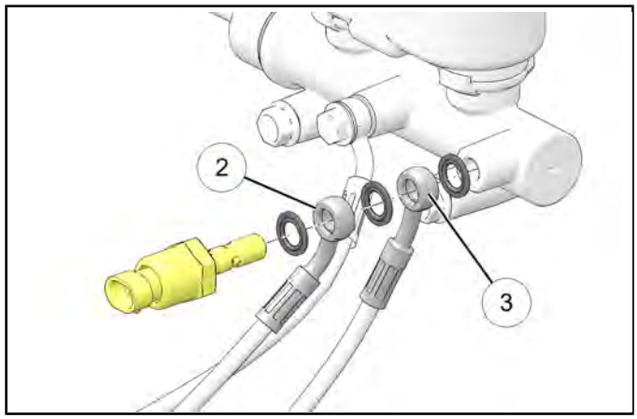
1. Install new stat-o-seal, rear brake line banjo fitting, new stat-o-seal and banjo bolt to the rear port on the master cylinder.



IMPORTANT

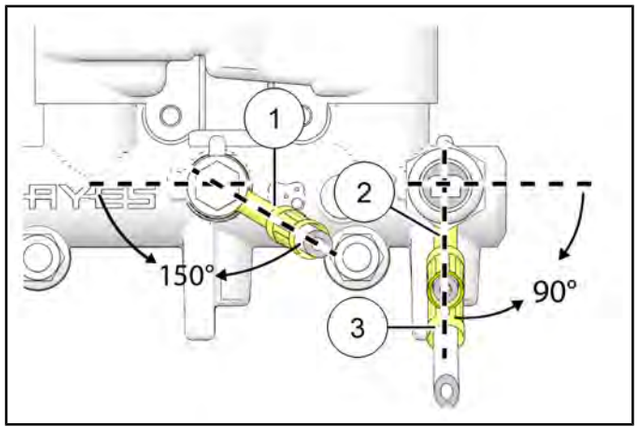
Lubricate seals with a thin film of DOT 4 brake fluid prior to installation.

2. Install new stat-o-seal, front brake line banjo fitting ③, new stat-o-seal, front brake line banjo fitting ②, new stat-o-seal, and brake pressure switch to the front port on the master cylinder.



IMPORTANT
Lubricate seals with a thin film of DOT 4 brake fluid prior to installation.

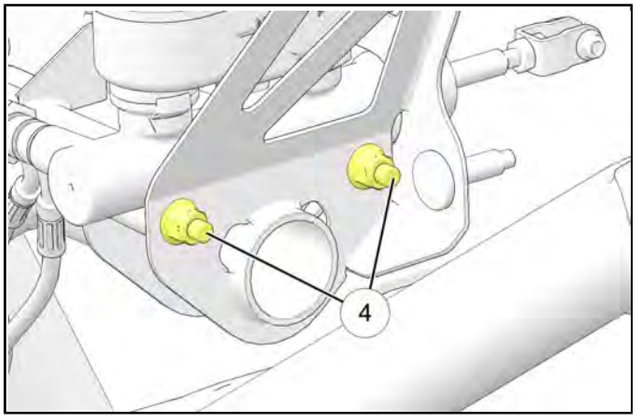
3. Rotate the brake lines until they are orientated as shown. Torque banjo bolt and brake pressure switch to specification.



ITEM	DESCRIPTION	ANGLE
①	Rear Brake Line	125°
②	Front Right Brake Line	105°
③	Front Left Brake Line	105°

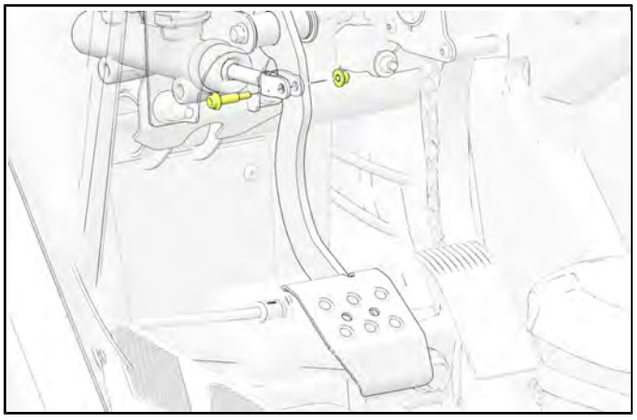
TORQUE
Banjo Bolt / Brake Pressure Switch: **15 ft-lbs (20 Nm)**

4. Install the master cylinder retaining bolts ④ and nuts. Torque bolts to specification.



TORQUE
Master Cylinder Mounting Bolts: **23 ft-lbs (31 Nm)**

5. Reconnect the main harness to the brake pressure switch.
6. Align the operating rod clevis to the brake pedal. Install the operating rod fastener and nut to retain the operating rod to the pedal.



7. Perform the BRAKE BLEEDING / FLUID CHANGE page procedure.

BRAKE BLEEDING / FLUID CHANGE

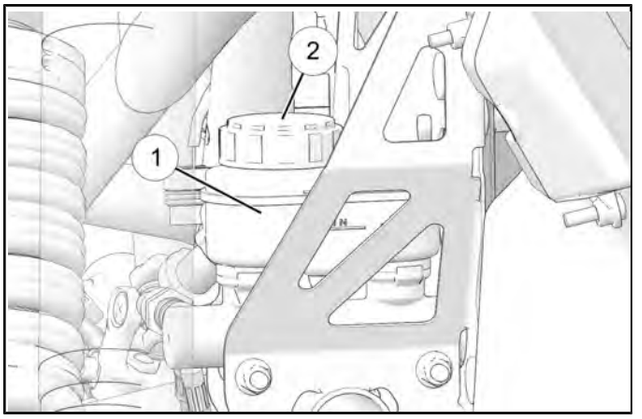
IMPORTANT
Bleed the right rear caliper first, followed by the left rear, front right, and finally the front left caliper.

⚠ CAUTION
Always wear safety glasses when handling chemicals and fluids.

⚠ CAUTION

Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

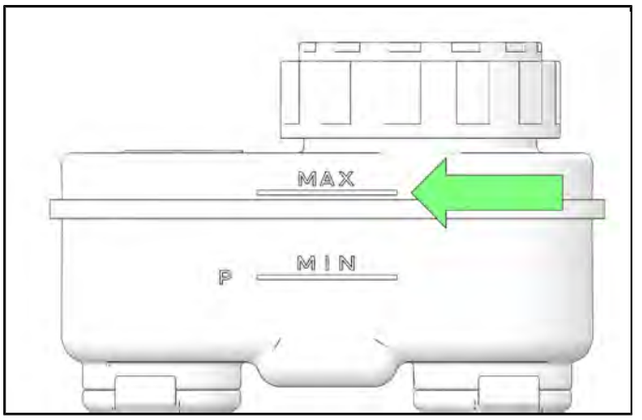
1. Clean master cylinder reservoir cover thoroughly and remove the cover ②.



2. If changing fluid, remove old fluid from reservoir ① with a Mity Vac™ pump or similar tool.

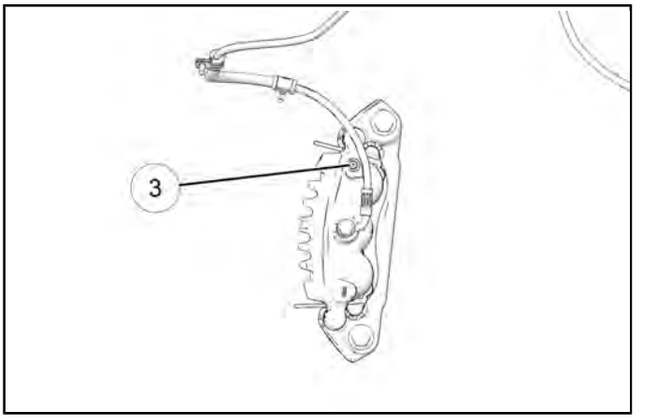
Mity Vac™:
2870975

3. Add brake fluid to the indicated MAX level of reservoir.



Polaris DOT 4 Brake Fluid
2872189

4. Bleed the brakes in the following order: right rear, left rear, right front and finally the left front. Install a box end wrench on caliper bleeder screw. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.
5. Have an assistant slowly pump foot pedal until pressure builds and holds.
6. Hold brake pedal down to maintain pedal pressure, and open bleeder screw ③ one full turn. Close bleeder screw and release pedal.



NOTICE

Do not release foot pedal before bleeder screw is tight or air may be drawn into the brake system.

7. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

IMPORTANT

Do not allow the brake fluid level in the reservoir to drop below the MIN line to prevent air from entering the master cylinder.

NOTICE

There is a rib within the reservoir that separates fluid between front and rear brake systems. It may appear that there is fluid in the reservoir even if the rear half of the reservoir is empty.

8. Tighten bleeder screw securely and remove bleeder hose. Torque bleeder screw to specification.

TORQUE

Bleeder Screw:
47 in-lbs (5 N·m)

9. Repeat steps 5 - 8 for the remaining calipers.
10. Add brake fluid to MAX level on reservoir.

Master Cylinder Fluid Level
Between MIN and MAX lines on reservoir.

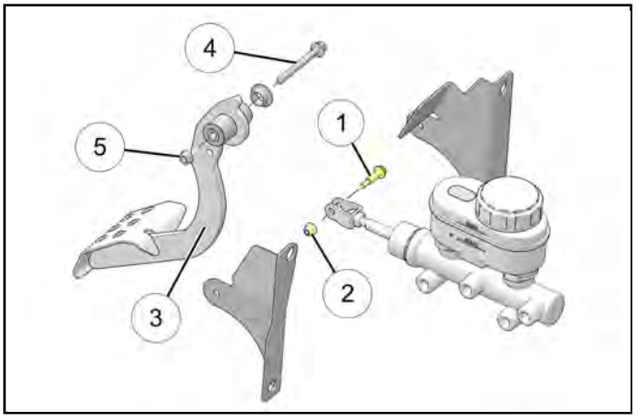
11. Install master cylinder reservoir cover.
12. Field test machine at low speed before putting into service. Check for proper braking action and pedal reserve. With pedal firmly applied, pedal reserve should be no less than 1/2"(1.3 cm).

13. Check brake system for fluid leaks.

BRAKE PEDAL

BRAKE PEDAL REMOVAL

1. Locate the brake pedal lever ③ and remove the nut ② and master cylinder clevis fastener ①.
2. Remove the nut ⑤ and ④ from the pedal mount and remove the brake pedal lever ③ from the vehicle.



BRAKE PEDAL INSTALLATION

1. Reverse the “Removal” steps to install brake pedal lever. Compare brake pedal free-play to specification.

Brake Pedal Free-play:
0.090” (2.28 mm)

FRONT BRAKE SERVICE

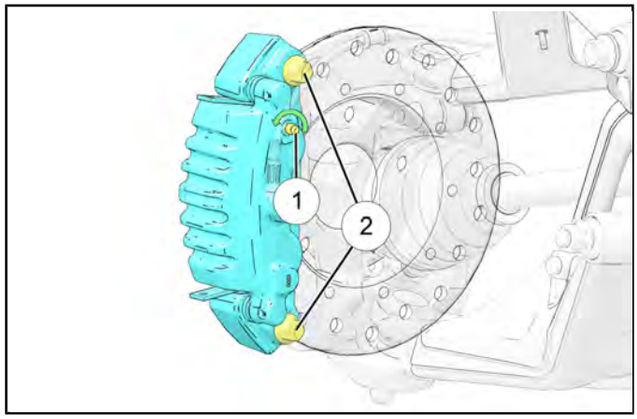
BRAKE CALIPER / PAD REMOVAL

NOTICE
Tie rod end needs to be removed to gain access to the top bolt on the brake caliper.

1. Elevate and support the front of the vehicle.

⚠ WARNING
Always properly support a vehicle that is raised so it does not tip or fall. Severe injury or damage may occur if the machine tips or falls.

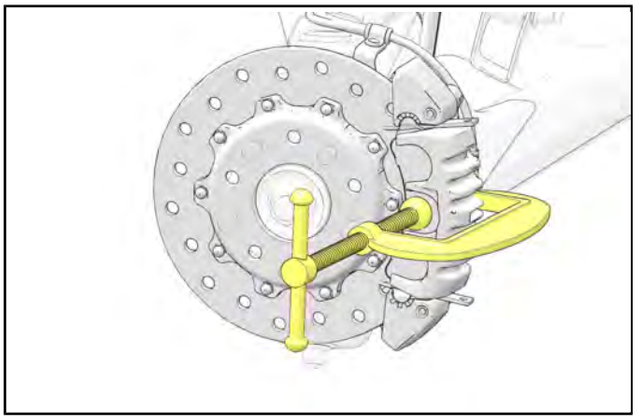
2. Remove the wheel nuts and front wheel.
3. Loosen the brake pad adjuster screw ① 2-3 turns [counter-clockwise].



4. Remove the upper and lower caliper mounting bolts ② and remove the caliper from the front hub.

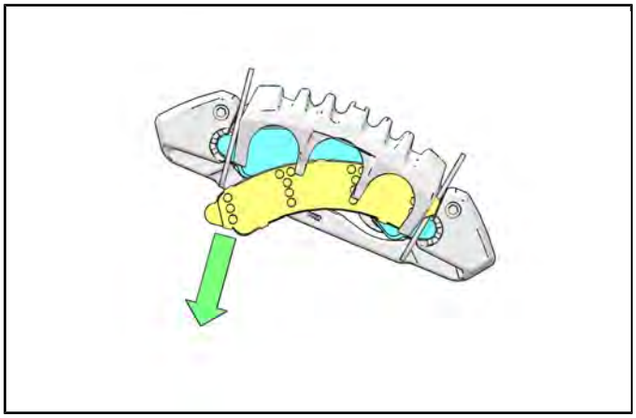
NOTE
When removing the caliper, be careful to not damage the brake line. Support the caliper with a wire hangar or rope to avoid kinking or bending the brake line.

5. Push caliper piston into the caliper bore slowly using a C-clamp or locking pliers with the pads installed.



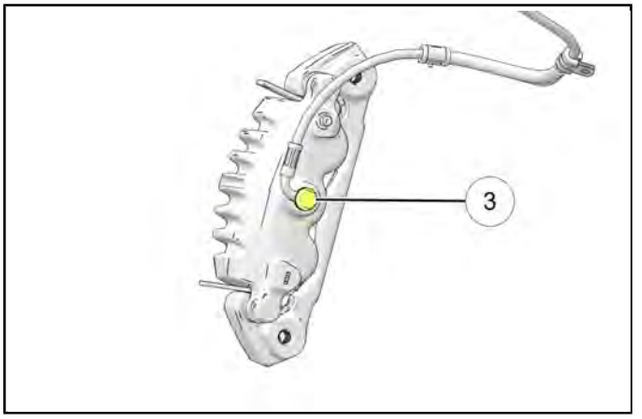
NOTE
Brake fluid will be forced back into the master cylinder fluid reservoir when the piston is pushed back into the caliper. Remove excess fluid from reservoir as required so it does not overflow.

6. Push the mounting bracket inward and slip the outer brake pad out between the bracket and caliper body.

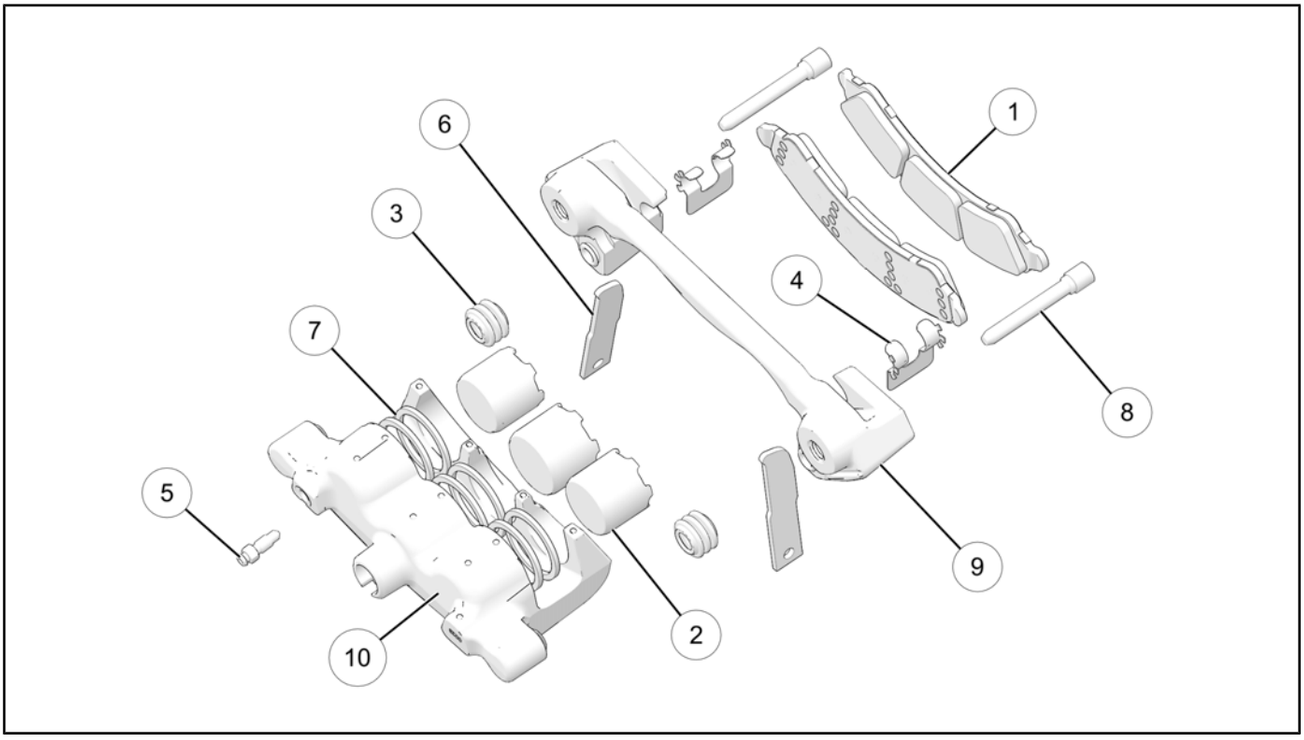


7. Remove the inner pad from the bracket and caliper.
8. **TO REMOVE CALIPER:**
   Place a catch pan under the brake caliper.

9. Remove the bolt ③ retaining the brake line to the caliper.



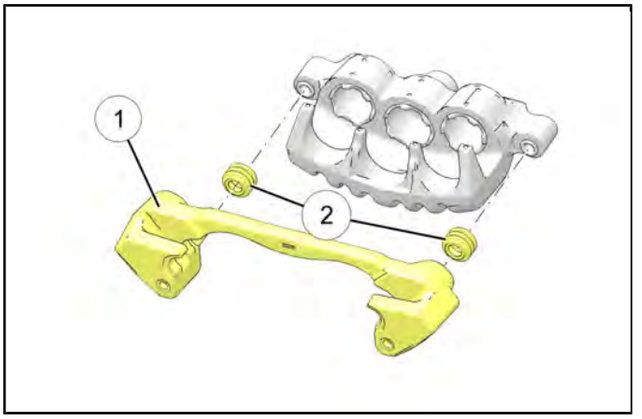
FRONT CALIPER ASSEMBLY VIEW



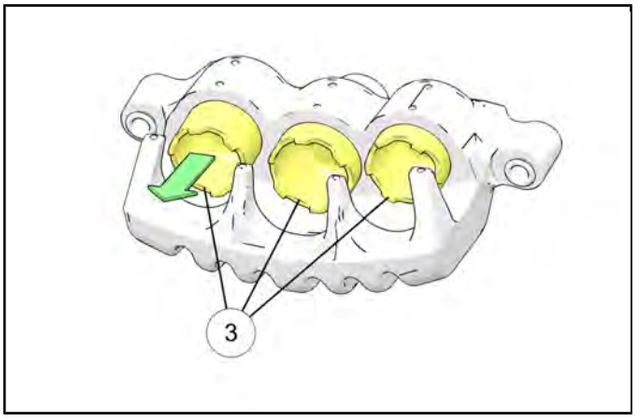
① Brake Pads	⑥ Pad Spacer
② Pistons *lubricate with DOT 4 Brake Fluid*	⑦ Piston O-Rings *lubricate with DOT 4 Brake Fluid*
③ Boots	⑧ Mount Pins *apply Silicone Grease on install*
④ Brake Pad Wear Clip	⑨ Brake Scraper
⑤ Bleeder Screw **48 in-lb (5 Nm)**	⑩ Caliper Assembly

FRONT CALIPER DISASSEMBLY / INSPECTION

1. Remove the mount bracket assembly ① and dust boots ②.

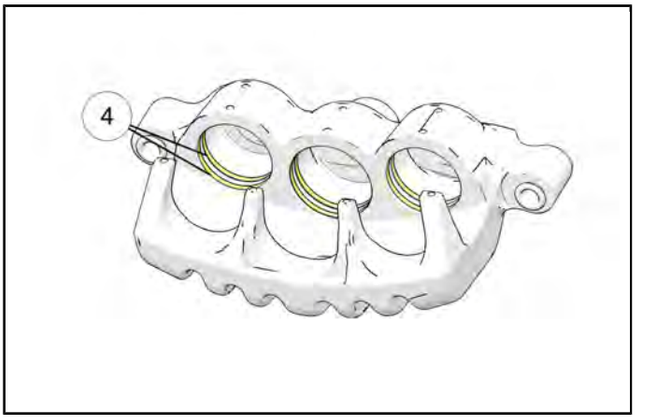


2. Thoroughly clean the caliper before disassembly and prepare a clean work area for disassembly.
3. Use a commercially available caliper piston pliers to extract the pistons ③ from the caliper



IMPORTANT
Do not remove the caliper pistons with a standard pliers. The piston sealing surface will become damaged if a standard pliers is used.

4. Once the pistons are removed, use a pick to carefully remove the o-rings ④ from the caliper. O-rings should be replaced during caliper service.



5. Clean the caliper body, pistons, and retaining bracket with brake cleaner or alcohol.

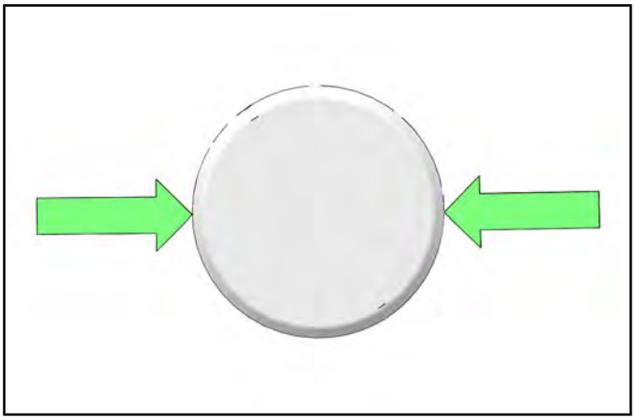
NOTICE
Be sure to clean all the seal grooves in the caliper body.

6. Inspect caliper body for nicks, scratches, pitting or wear.
7. Measure bore size and compare to specifications. Replace if damaged or worn beyond service limit.

MEASUREMENT
Front Caliper Piston Bore I.D.: **Small Bores: 1.375″ (34.93 mm)** **Service Limit: 1.377” (34.98 mm)** **Large Bore: 1.500″ (38.10 mm)** **Service Limit: 1.502” (38.15 mm)**

8. Inspect piston for nicks, scratches, pitting or wear.

9. Measure piston diameter and replace if damaged or worn beyond service limit.

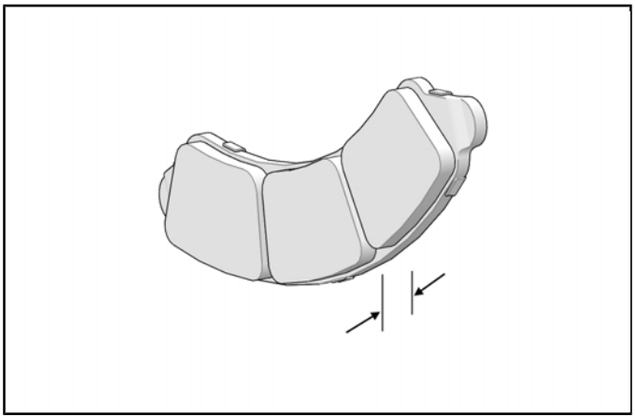


MEASUREMENT
Front Caliper Piston O.D.: **Small Bores: 1.368 - 1.369″ (34.76 - 34.80 mm)** **Large Bore: 1.498 - 1.499″ (38.06 - 38.10 mm)**

10. Inspect the brake disc and pads as outlined in this chapter.

BRAKE PAD INSPECTION

Measure the thickness of the pad material and backing plate with a caliper. Replace pads if worn beyond the service limit.



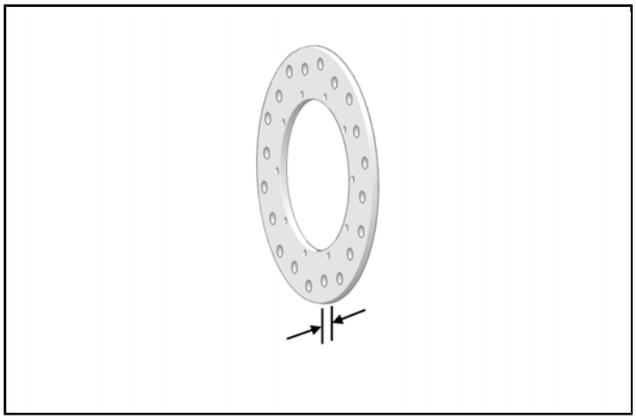
MEASUREMENT
Brake Pad Thickness: **.296 ± .007″(7.53 ± .19 mm)** Service Limit: **.180″ (4.6 mm)**

FRONT CALIPER ASSEMBLY

1. Coat piston with clean Polaris DOT 4 Brake Fluid **(PN 2872189)**. Install piston with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly with light resistance.
2. Install new sealing o-rings inside the caliper.
3. Carefully press the pistons into the caliper.
4. Install the mount bracket assembly and dust boots.
5. Compress the mounting bracket and make sure the dust seals are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.

BRAKE DISC INSPECTION

1. Visually inspect disc for scoring, scratches and gouges. Replace disc if deep scratches are evident.
2. Using a micrometer, measure disc thickness at eight different points around the pad contact surface.



MEASUREMENT
Brake Disc Thickness **.295 ± .008″(7.5 ± .2 mm)** Service Limit: **.268″ (6.8 mm)** Brake Disc Thickness Variance: **Service Limit: 0.002″ (0.051 mm)**

3. Mount a dial indicator. Slowly rotate the disc and read runout on the dial indicator Replace disc if runout exceeds specifications.

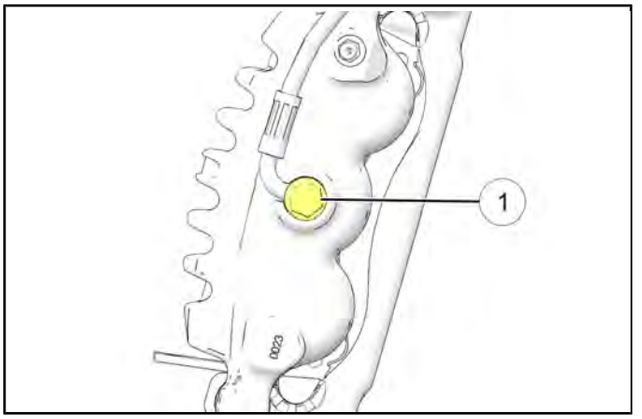
MEASUREMENT
Brake Disc Runout: **.010″ (0.25 mm)**

FRONT BRAKE DISC REPLACEMENT

1. Dismount the wheel hub assembly from the vehicle by pulling straight out.
2. Remove the tie-rod to gain access to the front caliper.
3. Remove the front caliper and brake disc.
4. Replace brake disc with a new one.

BRAKE CALIPER / PAD INSTALLATION

1. Install the bolt ① retaining the brake line fitting to the caliper. Torque banjo bolt to specification.



NOTICE
The calipers have self-orienting features, brake lines do not need to be oriented if installed correctly.

TORQUE
Brake Line Banjo Bolt: **15 ft-lbs (20 Nm)**

2. Install the inner pad on the bracket and caliper.
3. Install the outer brake pad between the bracket and caliper body.
4. Install the caliper on the knuckle. Torque mounting fasteners to specification.

TORQUE
Brake Caliper Mounting Bolts: **73 ft-lbs (100 Nm)**

5. Slowly pump the brake pedal until pressure has been built up. Maintain at least 1/2" (12.7 mm) of brake fluid in the reservoir to prevent air from entering the brake system.
6. Install the adjustment set screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn (counterclockwise).
7. Install the front wheel and the wheel nuts.

TORQUE
Wheel Lug Nuts: **148 ft-lbs (200 Nm)**

BRAKE BURNISHING PROCEDURE

It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times. **Do not make more than 3 stops per 1 mile (1.6 km)**.

TROUBLESHOOTING

BRAKE PEDAL SWITCH INSPECTION

The Brake Pedal Switch is mounted near the Brake Pedal Assembly. When the brake pedal is depressed this switch will turn from active to inactive. This can be monitored using Digital Wrench ®. If the status does not switch when depressed, proceed with further testing.

1. Disconnect electrical connector from sensor.
2. Inspect sensor and connector for moisture or corrosion. If moisture or corrosion is found, clean first and re check.
3. With connector disconnected, check resistance across pins on the sensor. When switch is closed (brake pedal not depressed) resistance should be less than 0.5 ohms. With switch open (brake pedal depressed) resistance should show an open (OL).
4. If the sensor test fails, resistance is not within specification; the sensor should be replaced.
5. If the sensor test passes, resistance is within specification, inspect the circuit for correct operation. If there is a concern found with the circuit repair and recheck operation.
6. If the concern is still present, it is possible that there may be a concern with the ECU.

REAR BRAKE SERVICE

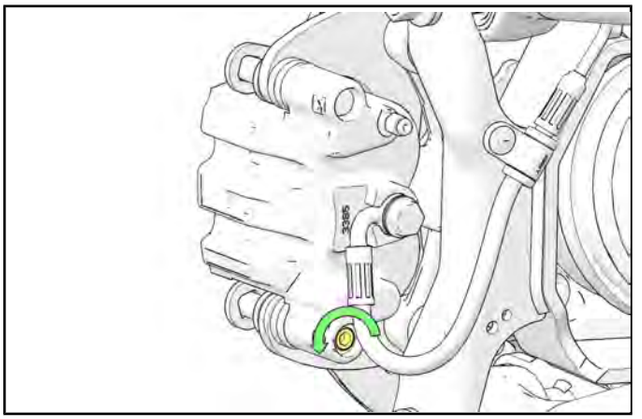
BRAKE CALIPER / PAD REMOVAL

1. Elevate and support rear of vehicle.

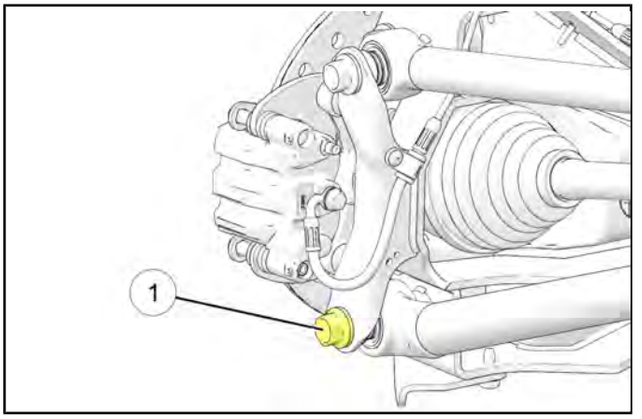
⚠ CAUTION

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

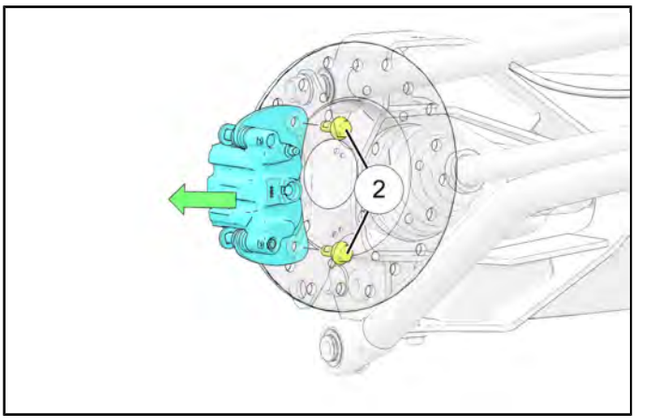
2. Remove the rear wheel.
3. Loosen pad adjuster screw 2-3 turns.



4. Remove the lower radius rod outer mounting bolt ①, nut and washer from the bearing carrier. Swing radius rod down. Discard the nut.



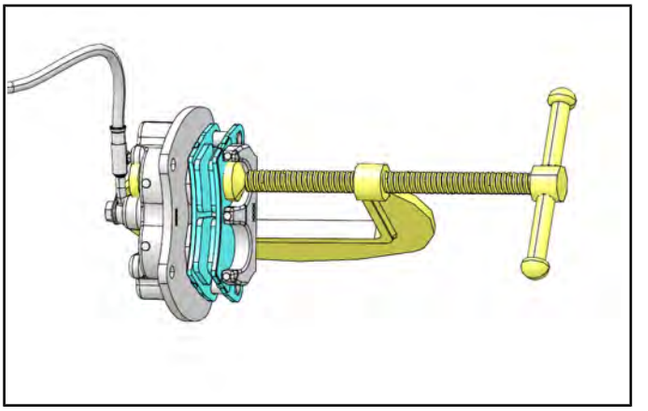
5. Remove the two caliper mounting bolts ② and lift caliper off the brake disc.



NOTICE

When removing caliper, be careful not to damage brake line. Support caliper to avoid kinking or bending brake line.

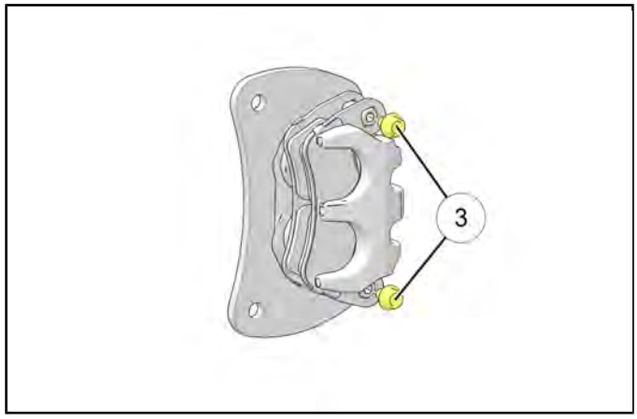
6. Push caliper piston into the caliper bore slowly using a C-clamp or locking pliers with pads installed.



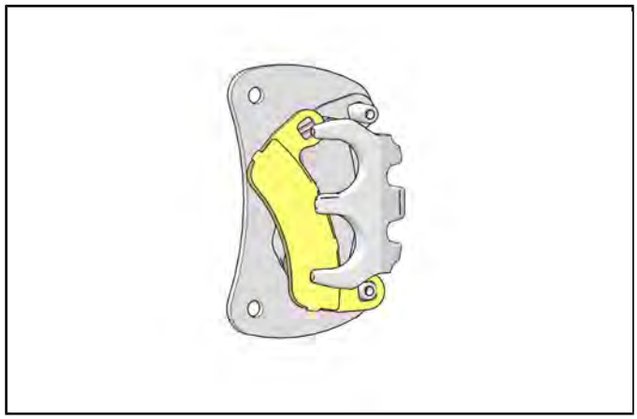
NOTICE

Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

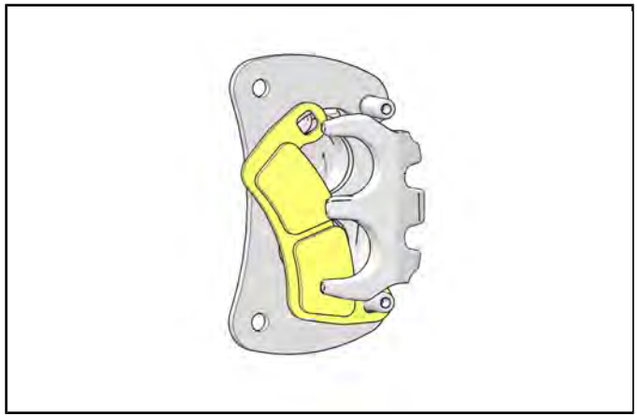
7. Remove two bolts ③ to gain access to brake pads.



8. Push caliper mounting bracket inward and slip outer brake pad past the edge to remove.



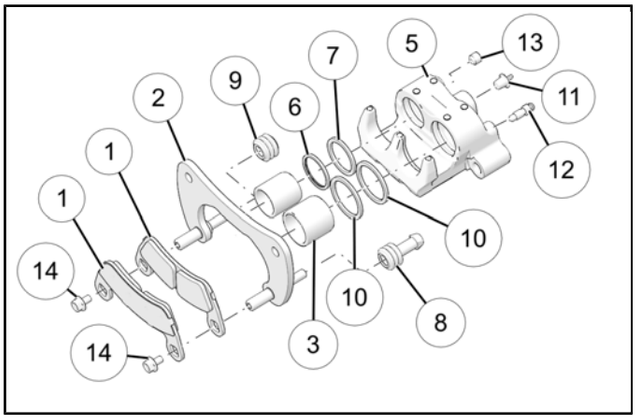
9. Remove the inner brake pad.



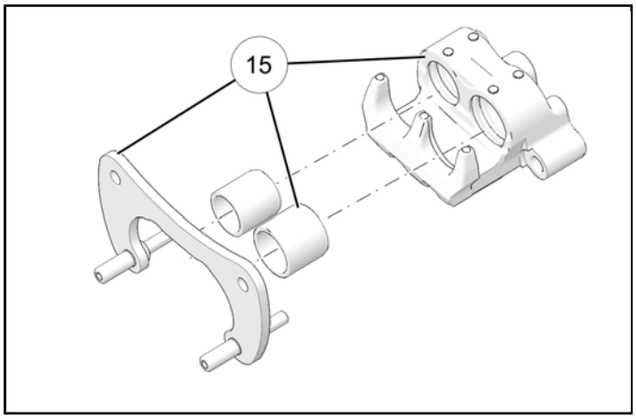
10. **To remove the brake caliper:** place a catch pan under the brake caliper and remove the banjo bolt retaining the brake line to the caliper.

REAR CALIPER DISASSEMBLY / INSPECTION

1. Remove brake pad adjustment set screw ⑬.
2. Push upper pad retainer pin inward and slip brake pads ① past the edge and remove from the caliper.
3. Remove mount bracket ② and dust boots ⑧ & ⑨.



4. Using piston pliers, remove the piston ③ from the caliper body ⑤. Remove the square O-rings ⑥, ⑦ & ⑩ from the caliper body ⑤.
5. Clean the caliper body, piston, and retaining bracket ⑮ with brake cleaner or alcohol.



NOTICE
Be sure to clean caliper body seal grooves.

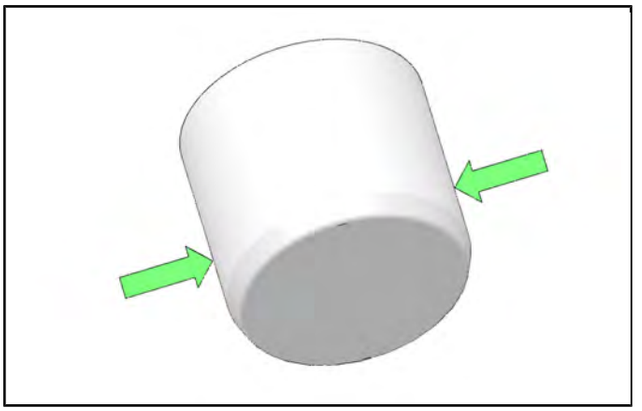
10

CALIPER INSPECTION

1. Inspect caliper body for nicks, scratches or wear. Measure bore size and compare to specifications. Replace if damage is evident or if worn beyond service limit.

MEASUREMENT
Rear Caliper Piston Bore I.D.: **Large: 1.375″ (34.93 mm)** **Service Limit: 1.377″ (34.98 mm)** **Small (2-Seat Only): 1.188″ (30.18 mm)** **Service Limit: 1.19″ (30.23 mm)**

2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.

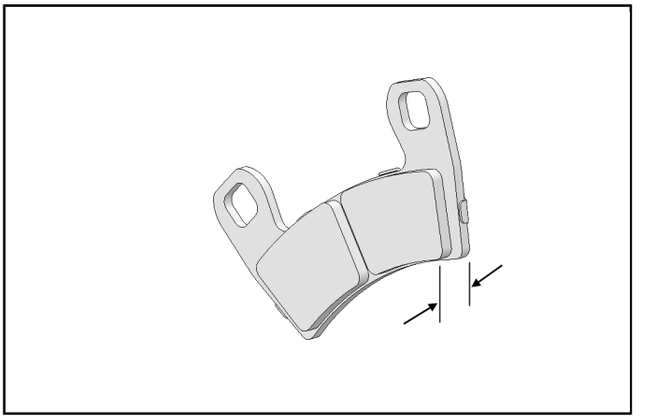


MEASUREMENT
Rear Caliper Piston Bore I.D.: **Large: 1.368-1.370 (34.75-34.80 mm)** **Small (2-Seat Only): 1.1860-1.1875″ (30.12-30.16 mm)**

3. Inspect the brake disc and pads as outlined in this chapter.

BRAKE PAD INSPECTION

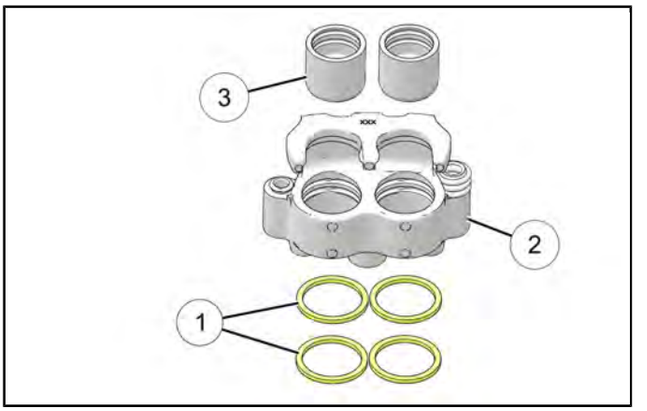
Measure the thickness of the pad material and backing plate with a caliper. Replace pads if worn beyond the service limit.



MEASUREMENT
Brake Pad Thickness: **.296 ± .007″(7.53 ± .19 mm)** **.180″ (4.6 mm)**

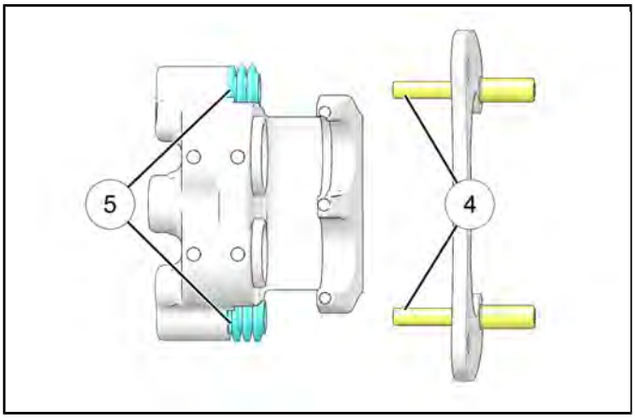
REAR CALIPER ASSEMBLY

1. Install new caliper seals ① in the caliper body ②. Be sure groove is clean and free of residue or brakes may drag upon assembly.



2. Coat piston with clean Polaris DOT 4 Brake Fluid **(PN 2872189)**. Install piston ③ with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly with light resistance.

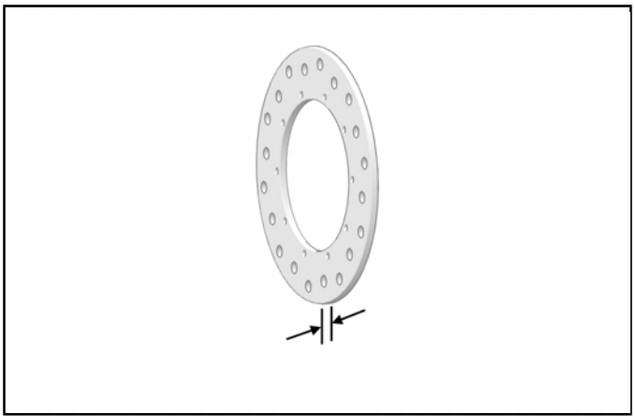
3. Lubricate the mounting bracket pins ④ with silicone grease and install the rubber dust seal boots ⑤.



4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.

REAR BRAKE DISC INSPECTION

1. Visually inspect disc for scoring, scratches, or gouges. Replace disc if deep scratches are evident.
2. Use a 0-1″ micrometer and measure disc thickness at eight different points around the pad contact surface. Replace disc if worn beyond service limit.



Brake Disc Thickness
.295 ± .008″(7.5 ± .2 mm)
.268″ (6.8 mm)

Brake Disc Thickness Variance:
Service Limit: 0.002″ (0.051 mm)

3. Mount a dial indicator and measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specifications.

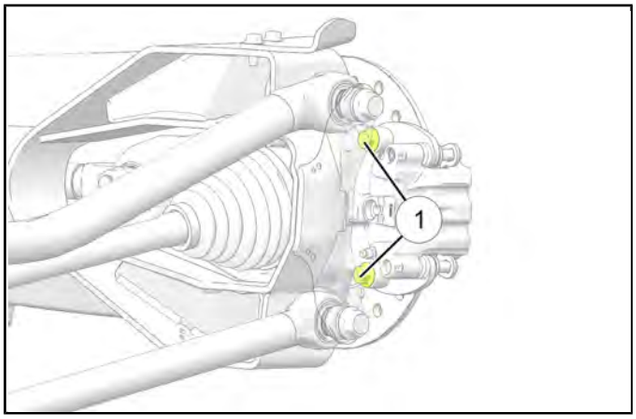
Brake Disc Runout:
.010″ (0.25 mm)

REAR BRAKE DISC REPLACEMENT

1. Dismount the wheel hub assembly from the vehicle by pulling straight out.
2. Remove the rear caliper and brake disc.
3. Replace brake disc with a new one.

REAR BRAKE CALIPER / PAD INSTALLATION

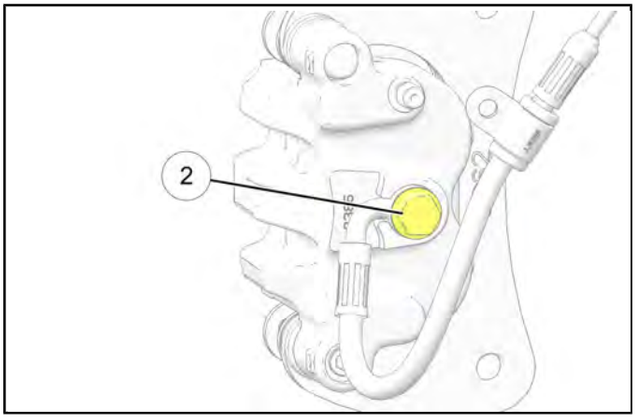
1. Install the rear caliper with new mounting bolts. Torque mounting bolts ① to specification.



TORQUE
Rear Caliper Mounting Bolts: **51 ft-lbs (70 Nm)**

10

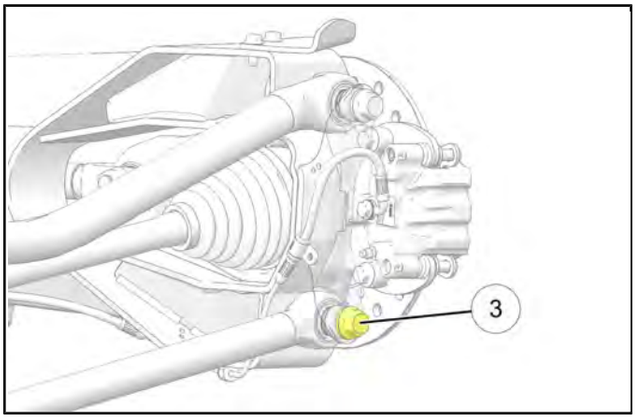
2. Install brake line banjo bolt ②. Torque banjo bolt to specification.



NOTICE
The calipers have self-orienting features, brake lines do not need to be oriented if installed correctly.

TORQUE
Banjo Bolts: **15 ft-lb (20 Nm)**

3. Install lower radius rod bolt, washer and new nut. Torque to specification.



TORQUE
Radius Rod to Bearing Carrier Bolt: **Inner Radius Rod Fasteners (Single Use): 52 ft-lbs (70 Nm) + 90°Outer Radius Rod Fasteners: 133 ft-lbs (180 Nm) - Torque bolt side**

4. Install the pad adjustment screw and turn until stationary pad contacts disc, then back off 1/2 turn.
5. Follow bleeding procedure outlined earlier in this chapter.
6. Install wheel and torque wheel nuts to specification.

TORQUE
Wheel Nuts: **148 ft-lbs (200 Nm)**

NOTICE
If new pads are installed, refer to this procedure.Brake Burnishing Procedure page 10.22.

BRAKE BURNISHING PROCEDURE

It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times. **Do not make more than 3 stops per 1 mile (1.6 km)**.

CHAPTER 11
BODY / FRAME

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2876389	Multi-Function Pliers

Bosch Automotive Service Solutions:
1-800-345-2233 or http://polaris.service-solutions.com/

DECAL REPLACEMENT

⚠ WARNING

The following procedure involves the use of an open flame. Perform this procedure in a well ventilated area, away from gasoline or other flammable materials. Be sure the area to be flame treated is clean and free of gasoline or flammable residue.

⚠ CAUTION

Do not flame treat components that are installed on the vehicle. Remove the component from the vehicle before flame treating.

The body cab components are plastic polyethylene material. Therefore, they must be “flame treated” prior to installing a decal to ensure good adhesion. The flame treating procedure can also be used to reduce or eliminate the whitish stress marks that are sometimes left after a fender or cab is bent, flexed, or damaged.

⚠ CAUTION

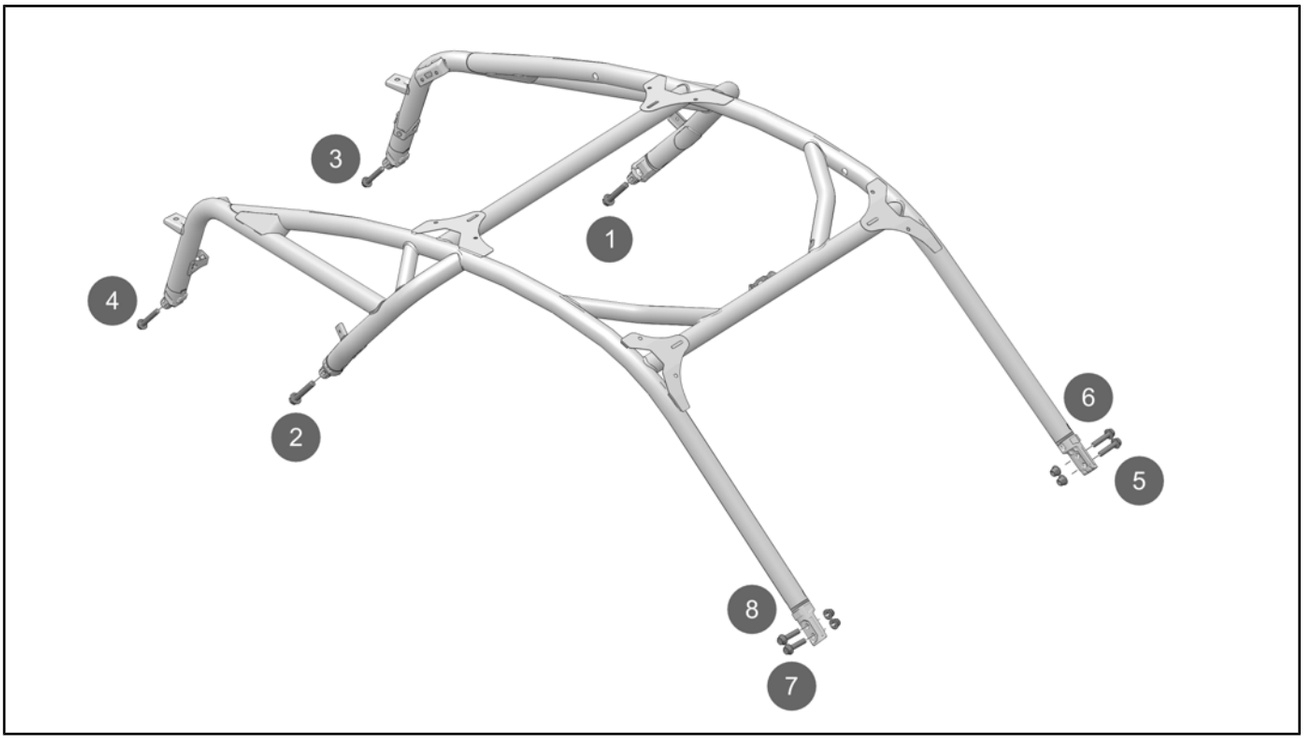
Do not flame treat painted plastic components. Painted plastic surfaces should only be wiped clean prior to decal adhesion.

To flame treat the decal area:

1. Pass the flame of a propane torch back and forth quickly over the area where the decal is to be applied until the surface appears slightly glossy. This should occur after just a few seconds of flame treating. Do not hold the torch too close to the surface (2-3 inches from the flame tip is recommended). Keep the torch moving to prevent damage.
2. Apply the decal on one edge first. Slowly lay down remainder of the decal while rubbing lightly over the decal surface to eliminate any air bubbles during the application.

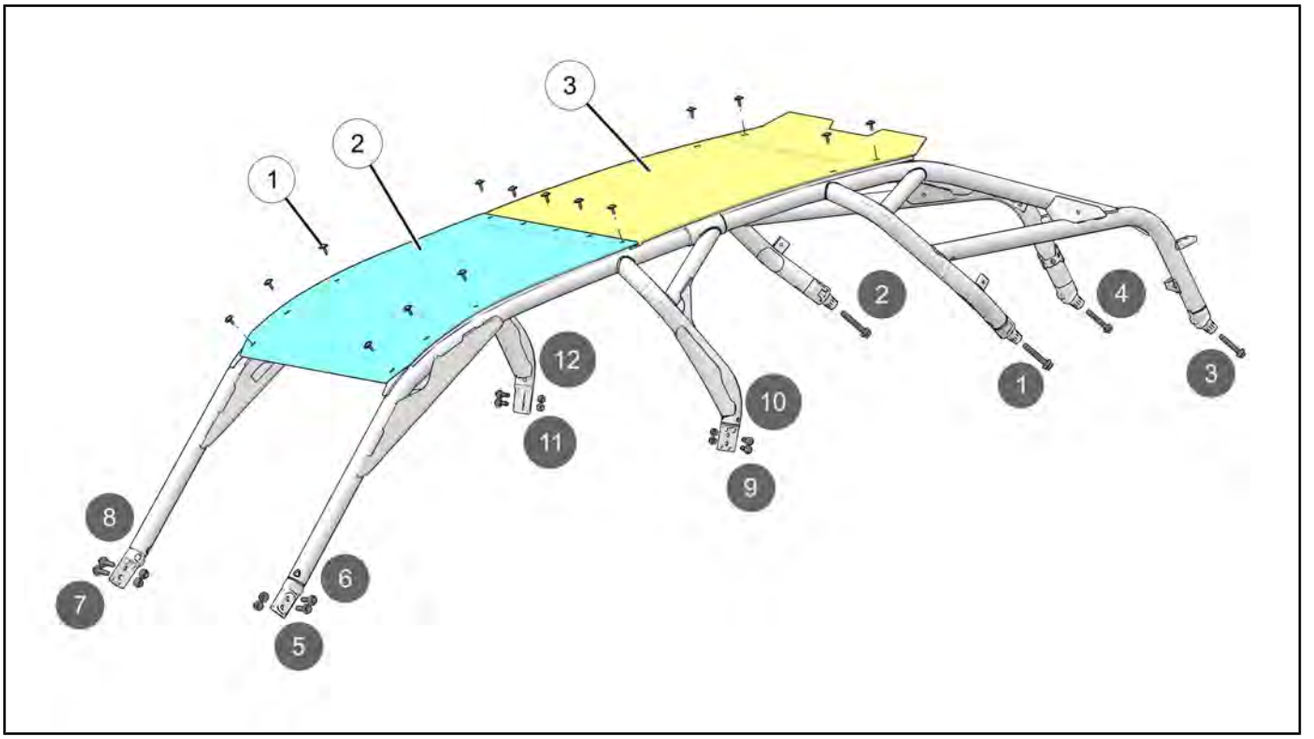
BODY ASSEMBLY VIEWS

CAB FRAME ASSEMBLY



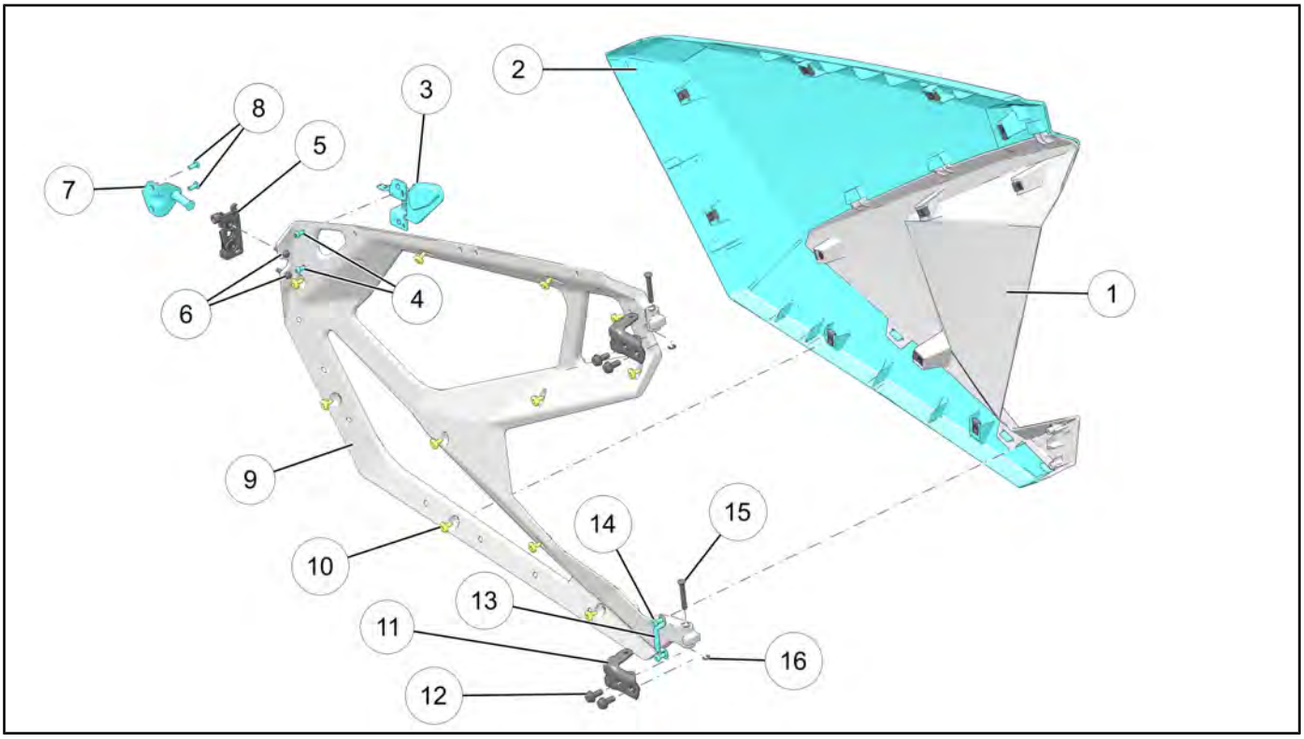
ROPS Assembly	Follow the ROPS Torque sequence: 1. **B-Pillar Fasteners ① - ②: 148 ft-lbs (200 Nm)** 2. **C-Pillar Fasteners ③ - ④: 89 ft-lbs (120 Nm)** 3. **A-Pillar Fasteners ⑤ - ⑧: 89 ft-lbs (120 Nm)** 4. **Confirm B-Pillar Fastener Torque: 148 ft-lbs (200 Nm)**

CAB FRAME ASSEMBLY (4-SEAT)



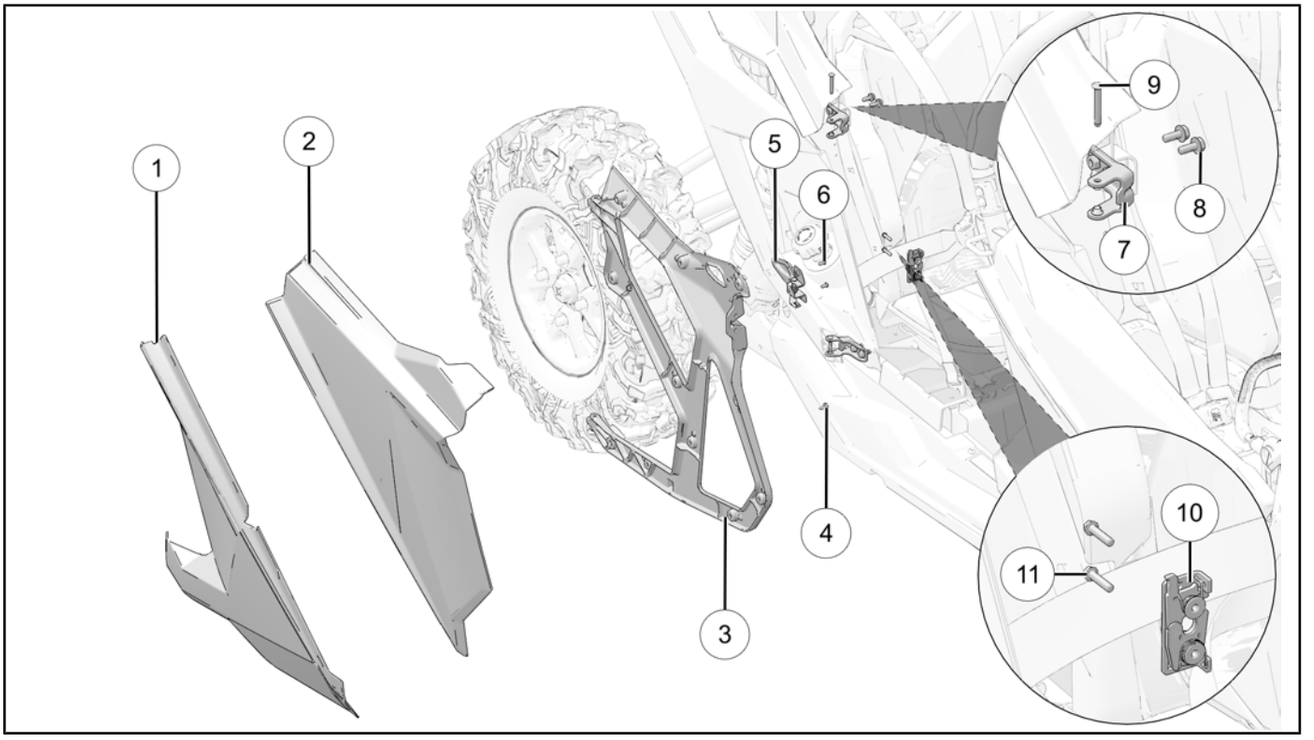
① Roof Fastener	**11 ft-lbs (15 Nm)**
② Front Roof	—
③ Rear Roof	—
ROPS Assembly	Follow the ROPS Torque sequence: 1. **C-Pillar Fasteners ① - ②: 148 ft-lbs (200 Nm)** 2. **D-Pillar Fasteners ③ - ④: 89 ft-lbs (120 Nm)** 3. **A-Pillar Fasteners ⑤ - ⑧: 89 ft-lbs (120 Nm)** 4. **B-Pillar Fasteners ⑨ - ⑫: 44 ft-lbs (60 Nm)** 5. **Confirm C-Pillar Fastener Torque: 148 ft-lbs (200 Nm)**

DOORS



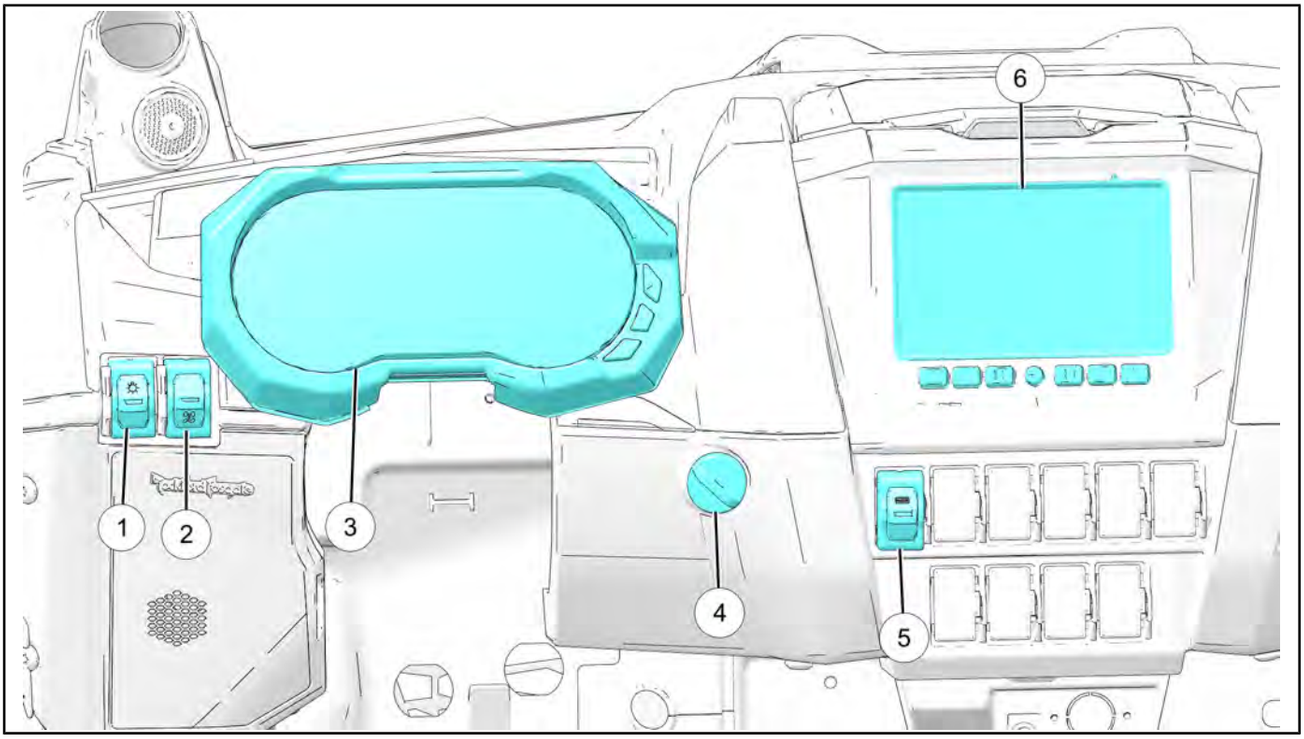
① Rear Door panel	⑨ Door Frame
② Front Door Panel	⑩ Door Panel Fastener **35 in-lbs (4 Nm)**
③ Latch Actuator Assembly	⑪ Door Hinge
④ Latch Actuator Assembly Fastener **9 ft-lbs (12 Nm)**	⑫ Door Hinge Fastener **18 ft-lbs (24 Nm)**
⑤ Door Latch	⑬ Door Trim Bracket
⑥ Door Latch Fasteners **9 ft-lbs (12 Nm)**	⑭ Door Trim Bracket Fastener **18 in-lbs (2 Nm)**
⑦ Door Striker	⑮ Door Hinge Pin
⑧ Door Striker Fastener **9 ft-lbs (12 Nm)**	⑯ Door Hinge E-Clip

REAR DOORS



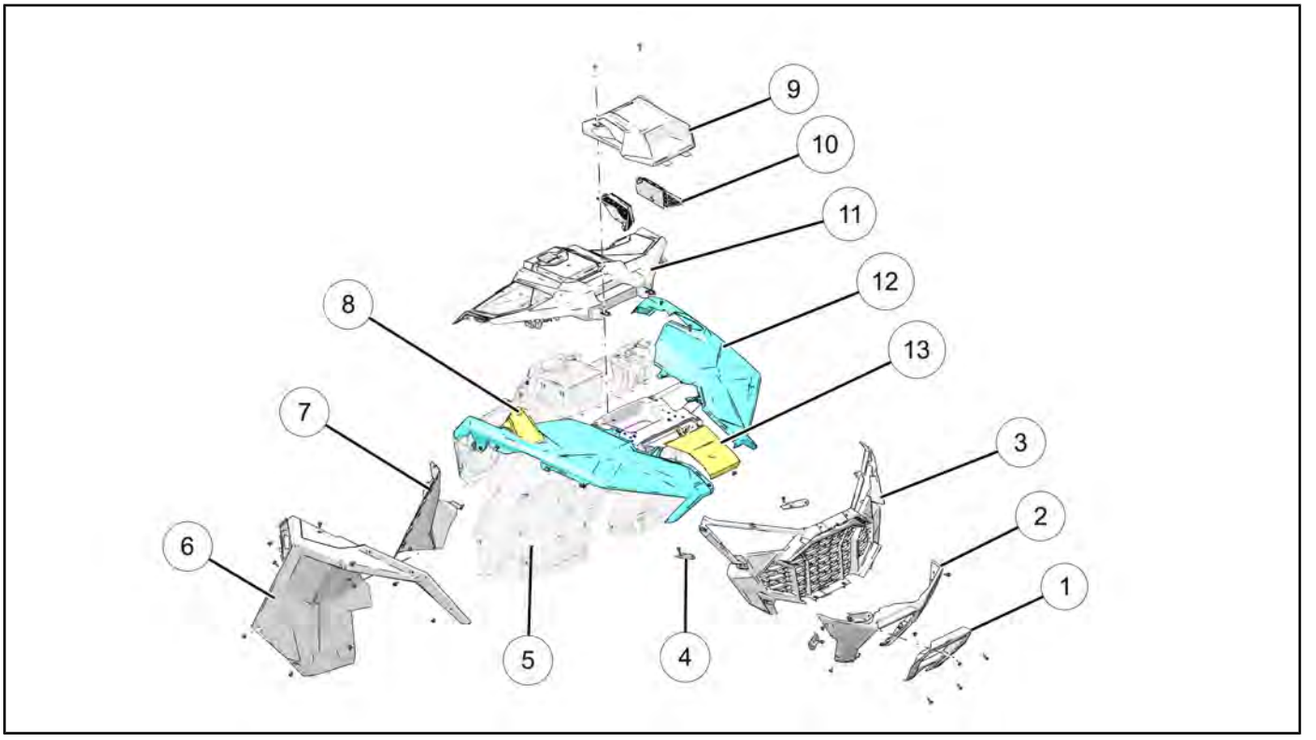
① Rear Lower Door Panel	⑦ Door Hinge
② Rear Upper Door Panel	⑧ Door Hinge Fastener **18 ft-lbs (24 Nm)**
③ Rear Door Frame	⑨ Door Hinge Pin
④ Door Frame Fastener **7 ft-lbs (10 Nm)**	⑩ Door Latch
⑤ Door Latch Actuator	⑪ Door Latch Fastener **9 ft-lbs (12 Nm)**
⑥ Door Latch Actuator Fastener **9 ft-lbs (12 Nm)**	

DASH / CONTROLS



① Headlight Switch	④ Key Switch
② AWD Switch	⑤ Drive Mode Switch
③ Instrument Cluster	⑥ 7” Display

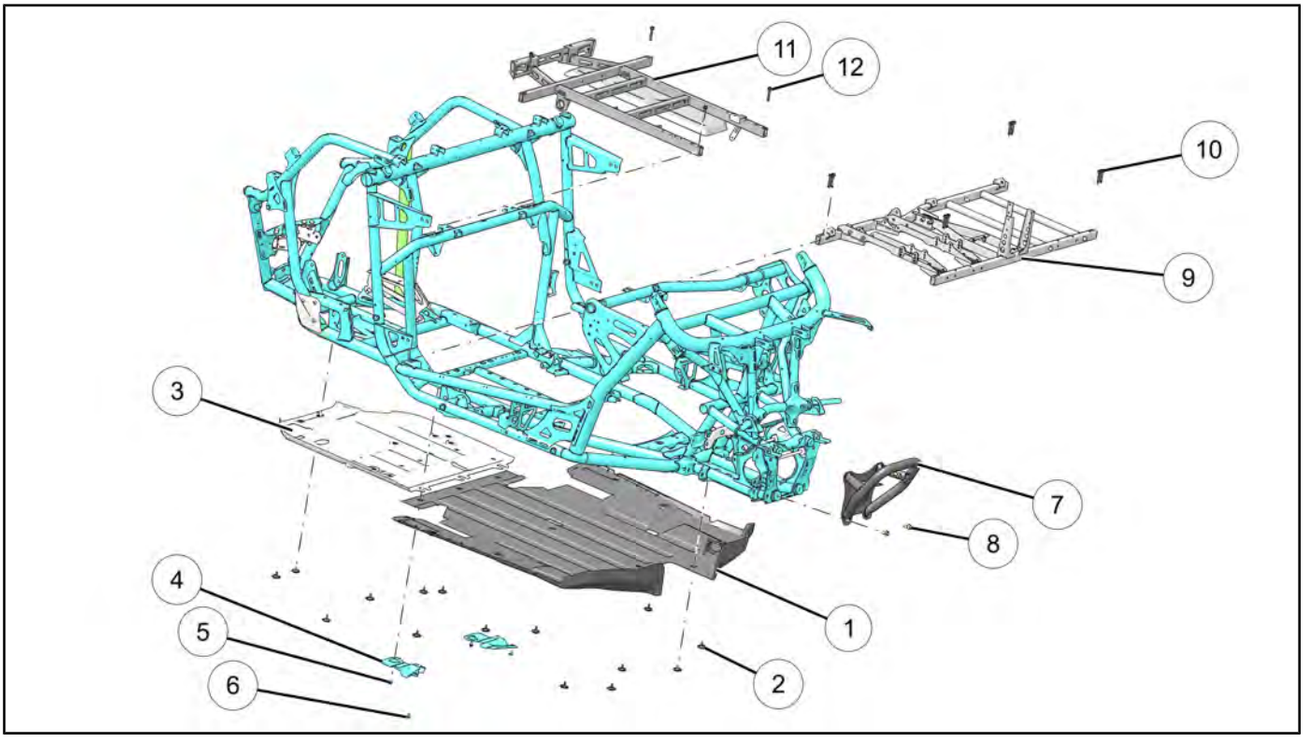
HOOD / FRONT BODY



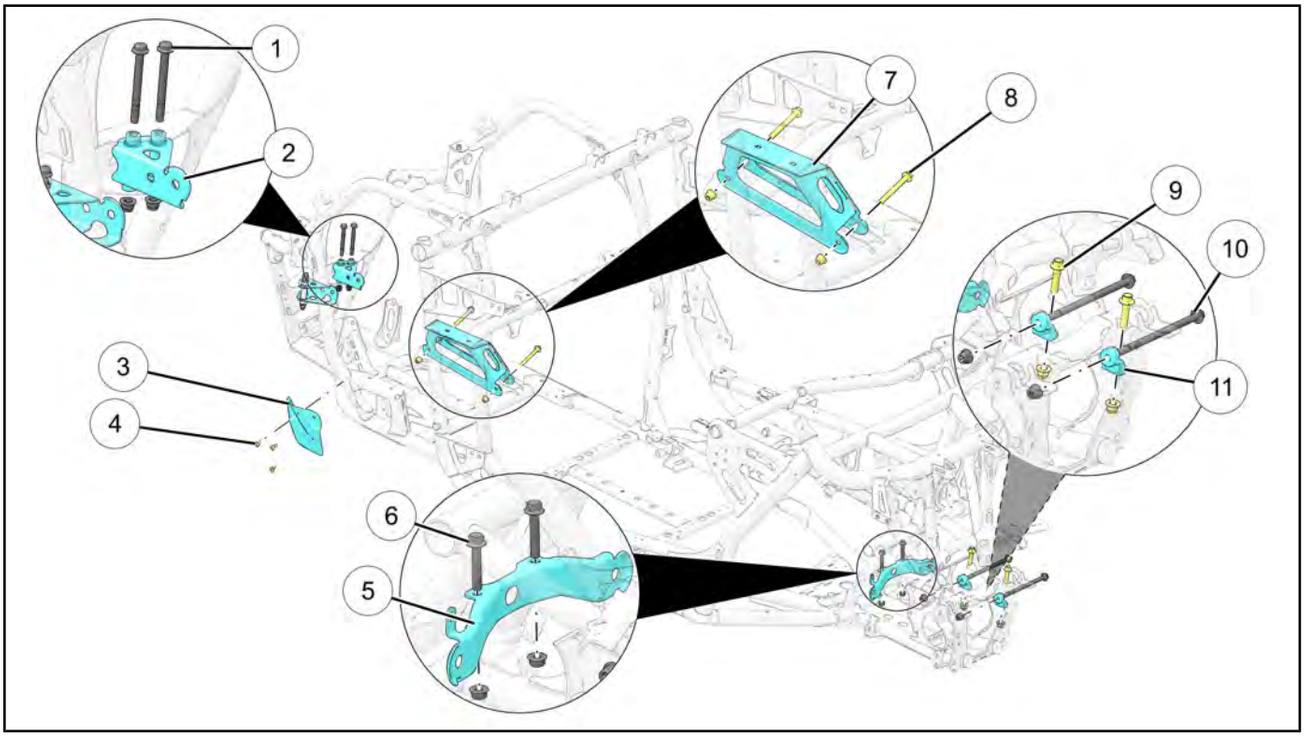
① Front Bumper Cover	⑧ A-Pillar Cover
② Front Bumper	⑨ Center Hood
③ Front Fascia	⑩ Hood Grill (LH)
④ Bumper Mount Bracket	⑪ Dash Lid
⑤ Firewall	⑫ Fender (LH)
⑥ Fender Flare (RH)	⑬ Nose Cone
⑦ Inner Fender Flare (RH)	

TORQUE
Body Fasteners: **7 ft-lbs (10 Nm)**

CHASSIS / MAIN FRAME

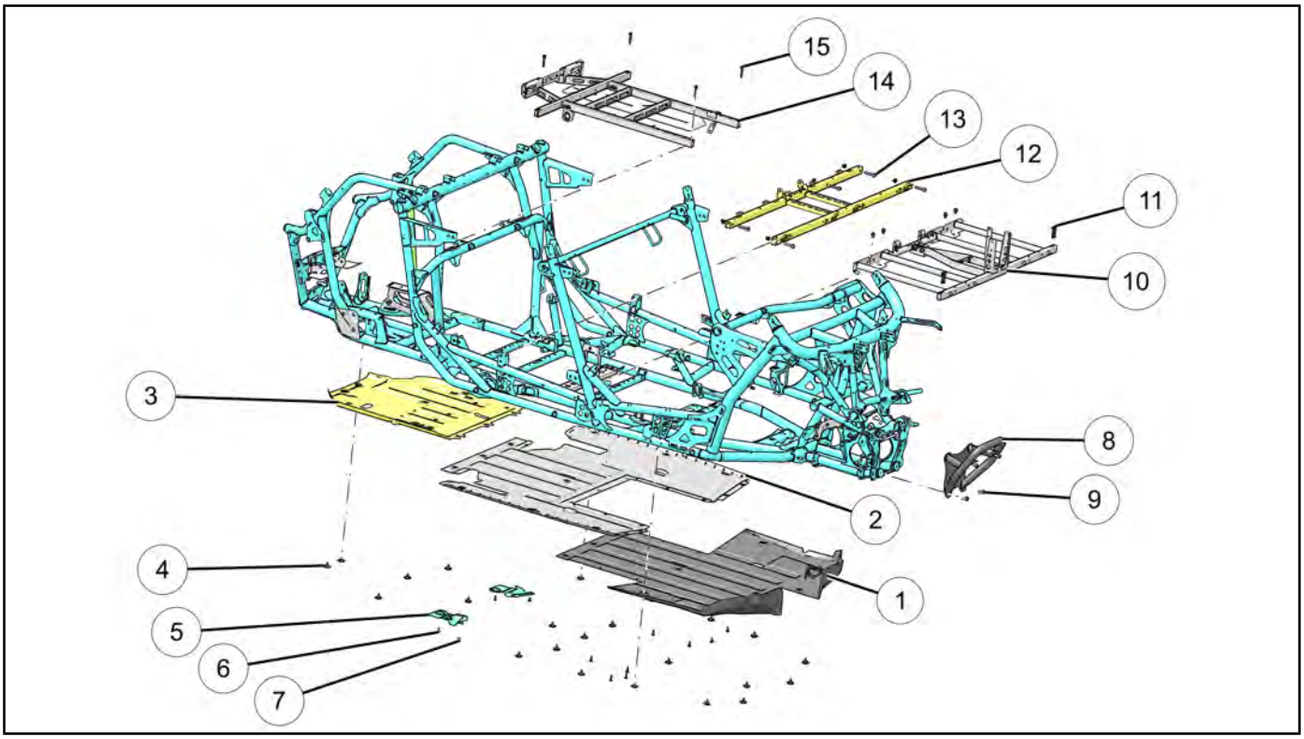


① Front Skid Plate	⑦ Front Bumper
② Skid Plate Fastener **9 ft-lbs (12 Nm)**	⑧ Front Bumper Fastener **37 ft-lbs (50 Nm)**
③ Rear Skid Plate	⑨ Seat Base
④ Skid Plate Plug	⑩ Seat Base Fastener **15 ft-lbs (20 Nm)**
⑤ Skid Plate Plug Fastener (Torx) **44 in-lbs (5 Nm)**	⑪ Box Support
⑥ Skid Plate Plug Fastener (Hex) **9 ft-lbs (12 Nm)**	⑫ Box Support Fastener **22 ft-lbs (30 Nm)**

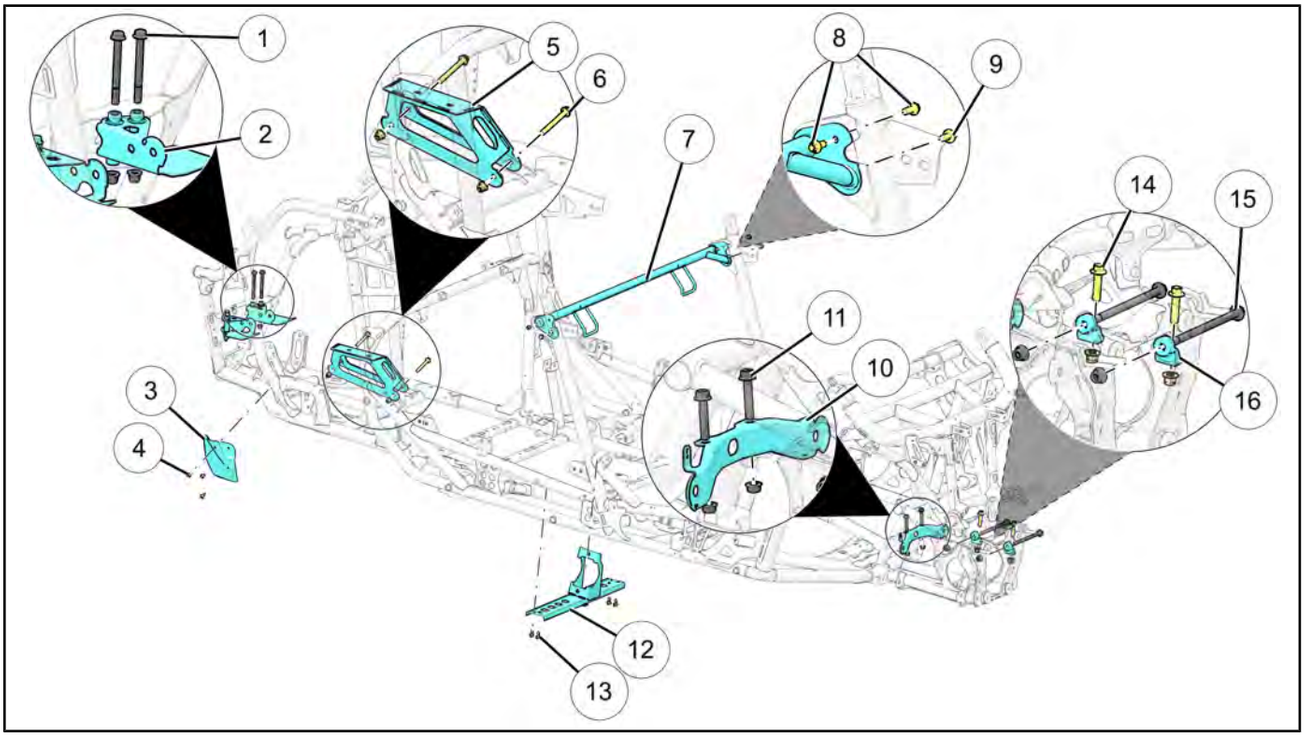


① Driveline Support Fastener **44 ft-lbs (60 Nm)**	⑦ Engine Mount
② Driveline Support	⑧ Engine Mount Fastener **44 ft-lbs (60 Nm)**
③ Oil Filter Guard	⑨ Front Drive Mount Fastener (M12 x 1.25 x 230) (See Front Drive Removal / Installation for torque procedure)
④ Oil Filter Guard Fastener **44 in-lbs (5 Nm)**	⑩ Front Drive Mount Fastener (M12 x 1.25 x 50) (See Front Drive Removal / Installation for torque procedure)
⑤ Upper Control Arm Bracket	⑪ Front Drive Mount Casting
⑥ Upper Control Arm Bracket Fastener **52 ft-lbs (70 Nm)**	

CHASSIS / MAIN FRAME (4-SEAT)



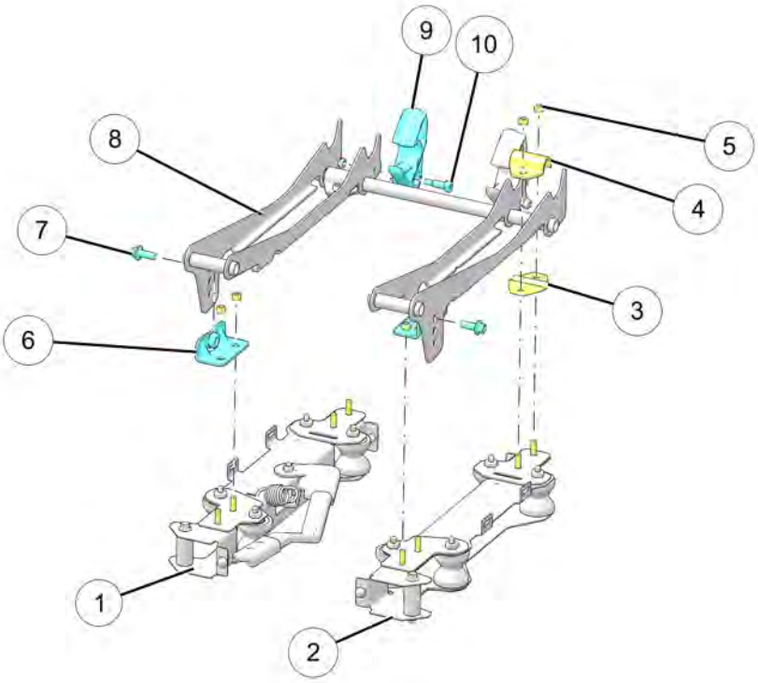
① Front Skid Plate	⑨ Front Bumper Fastener **37 ft-lbs (50 Nm)**
② Middle Skid Plate	⑩ Seat Base
③ Rear Skid Plate	⑪ Seat Base Fastener **15 ft-lbs (20 Nm)**
④ Skid Plate Fastener **9 ft-lbs (12 Nm)**	⑫ Rear Seat Base
⑤ Skid Plate Plug	⑬ Rear Seat Base Fastener **22 ft-lbs (30 Nm)**
⑥ Skid Plate Plug Fastener (Torx) **44 in-lbs (5 Nm)**	⑭ Box Support
⑦ Skid Plate Plug Fastener (Hex) **9 ft-lbs (12 Nm)**	⑮ Box Support Fastener **22 ft-lbs (30 Nm)**
⑧ Front Bumper	



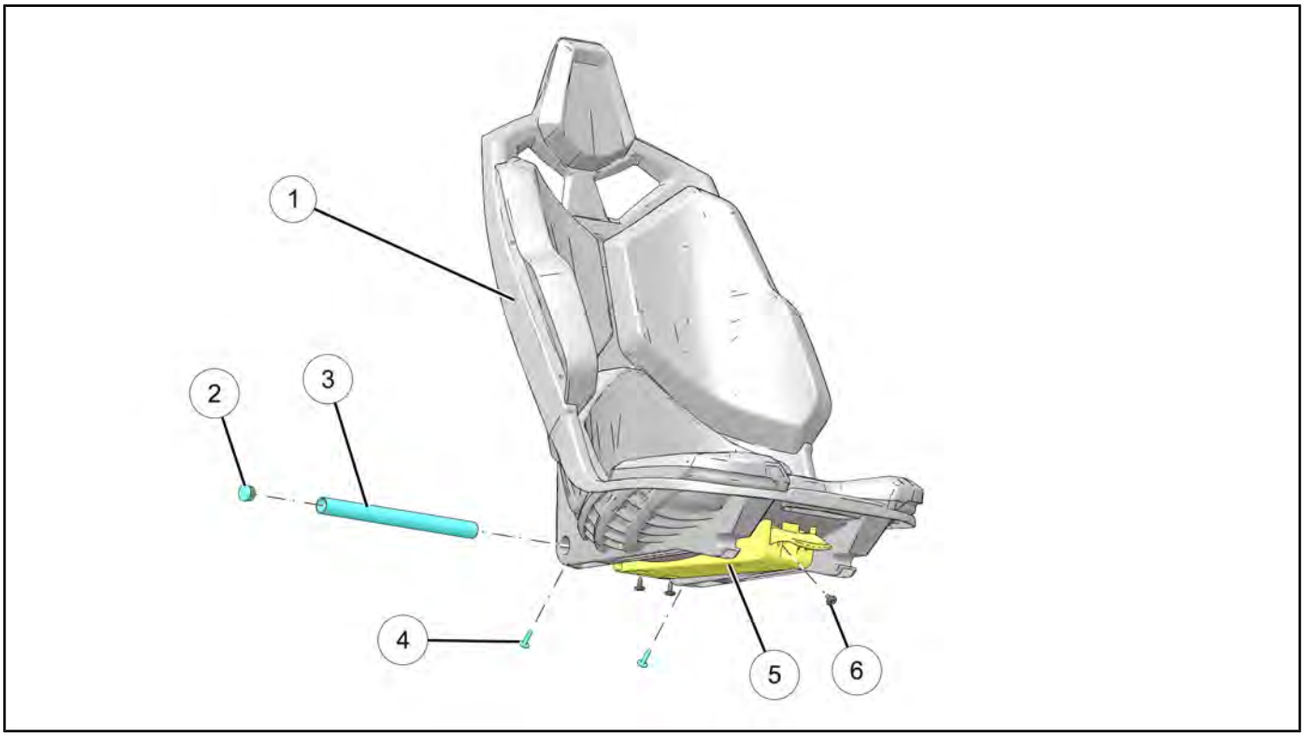
① Driveline Support Fastener **44 ft-lbs (60 Nm)**	⑨ Frame Cross Bar Fastener (4 Seat) (M8x1.25x16) **15 ft-lbs (20Nm)**
② Driveline Support	⑩ Upper Control Arm Bracket
③ Oil Filter Guard	⑪ Upper Control Arm Bracket Fastener **52 ft-lbs (70 Nm)**
④ Oil Filter Guard Fastener **44 in-lbs (5 Nm)**	⑫ Propshaft Mount
⑤ Engine Mount	⑬ Propshaft Mount Fastener **15 ft-lbs (20 Nm)**
⑥ Engine Mount Fastener **44 ft-lbs (60 Nm)**	⑭ Front Drive Mount Fastener (M12 x 1.25 x 230) (See Front Drive Removal / Installation for torque procedure)
⑦ Frame Cross Bar	⑮ Front Drive Mount Fastener (M12 x 1.25 x 50) (See Front Drive Removal / Installation for torque procedure)
⑧ Frame Cross Bar Fastener (4 Seat) (M8x1.25x20) **18 ft-lbs (25Nm)**	⑯ Front Drive Mount Casting

SEAT ASSEMBLY

TORQUE REFERENCE

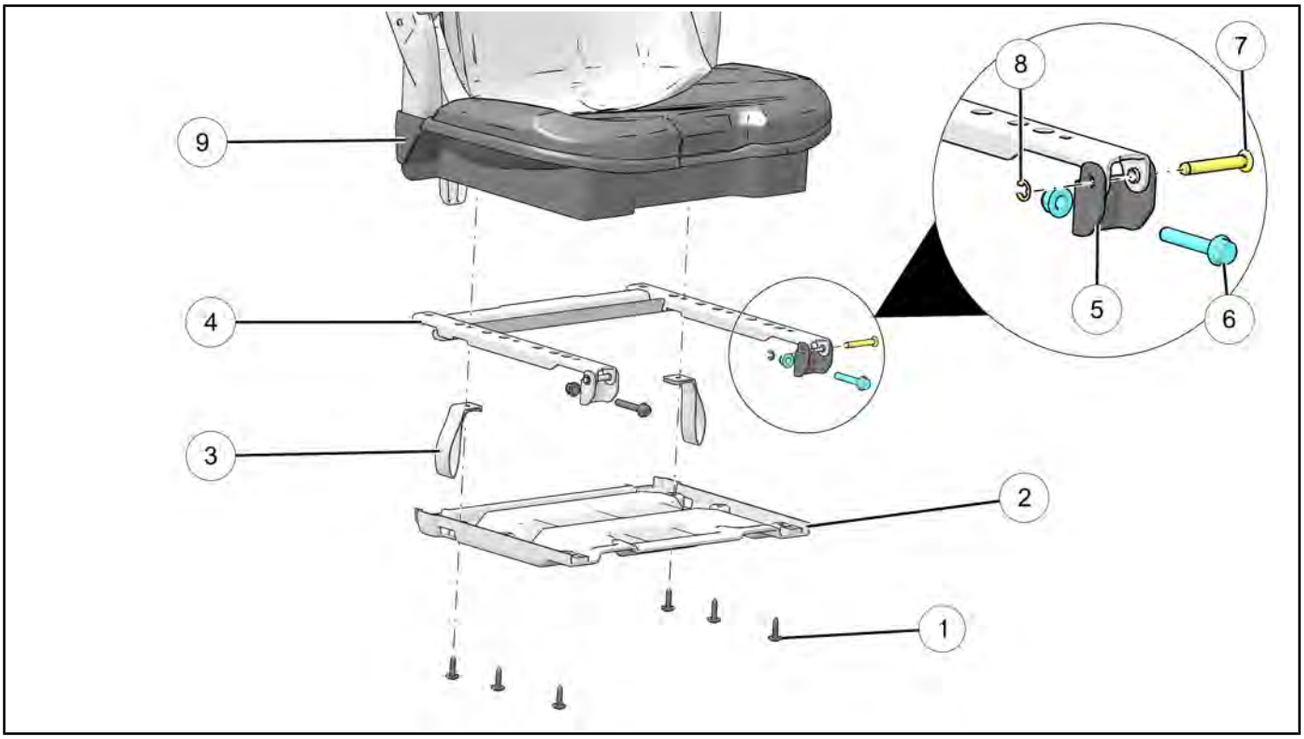


① Seat Slider RH	⑥ Tilt Assembly Bracket
② Seat Slider LH	⑦ Tilt Assembly Bracket Fastener **15 ft-lbs (20 Nm)**
③ Seat Hinge Bushing (lower)	⑧ Seat Tilt Receiver
④ Seat Hinge Bushing (upper)	⑨ Latch Hook
⑤ Seat Hinge Nut **7 ft-lbs (10 Nm)**	⑩ Latch Hook Fastener **9 ft-lbs (12 Nm)**

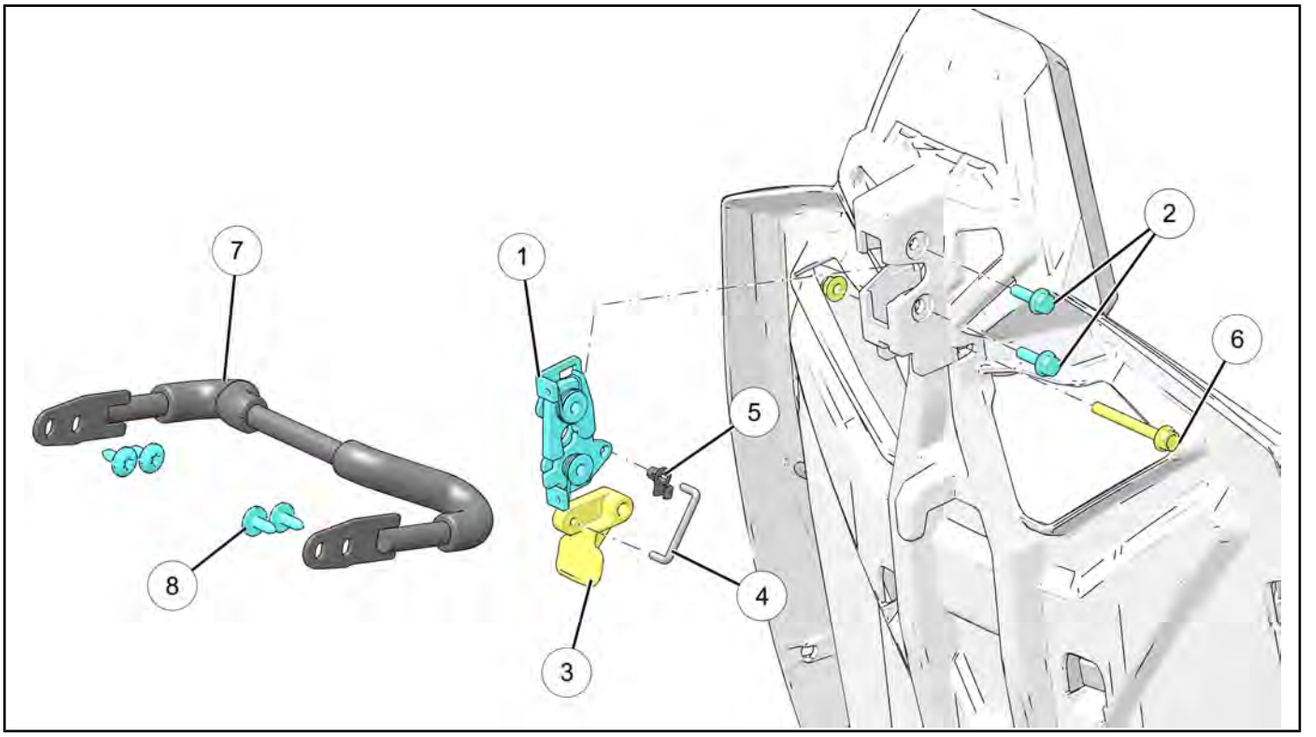


① Seat Assembly	④ Seat Shell Tube Fastener **10 in-lbs (1 Nm)**
② End Cap	⑤ Seat Release Assembly
③ Seat Shell Tube	⑥ Seat Release Assembly Fastener **10 in-lbs (1 Nm)**

REAR SEAT ASSEMBLY (4-SEAT)

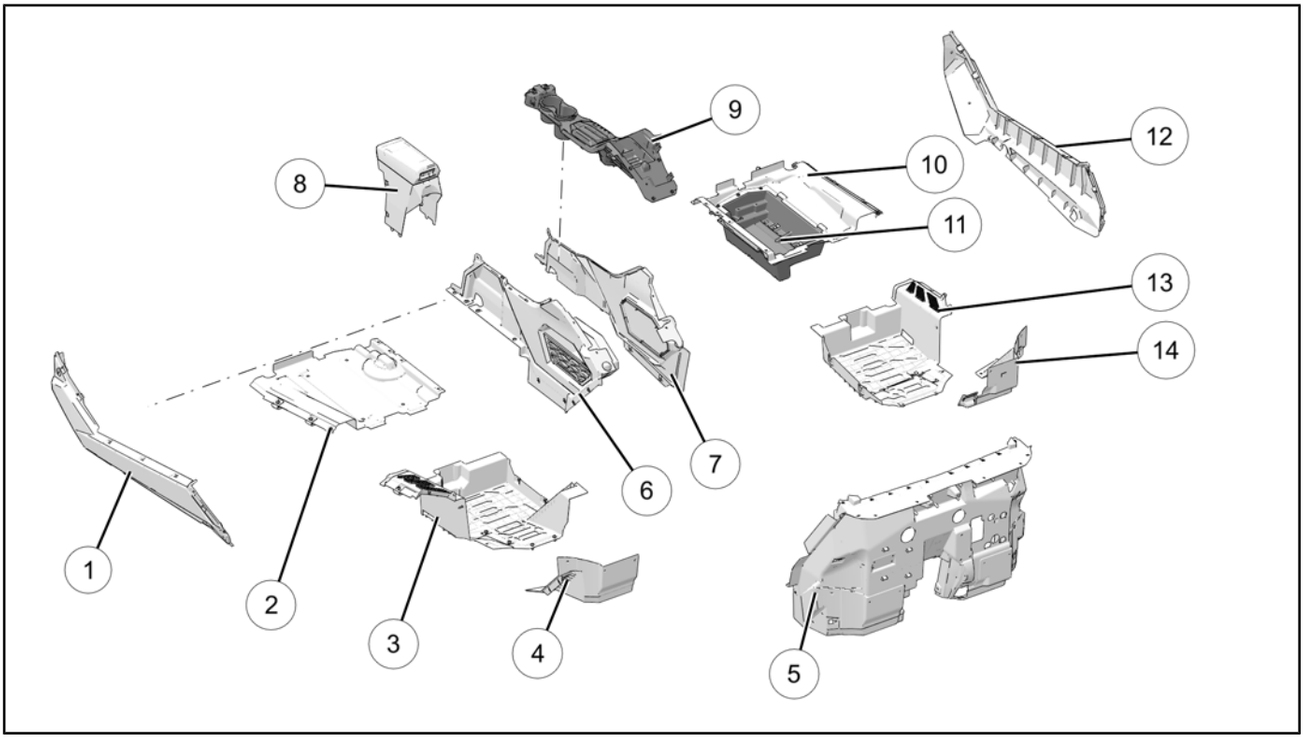


① Underseat Flip Panel Fastener **6 ft-lb (8 Nm)**	⑥ Seat Frame Hinge Fastener **15 ft-lbs (20 Nm)**
② Underseat Flip Panel	⑦ Door Hinge Pin
③ Seat Strap	⑧ E-Clip
④ Seat Frame (Rear)	⑨ Seat Bottom Assembly
⑤ Seat Frame Hinge	



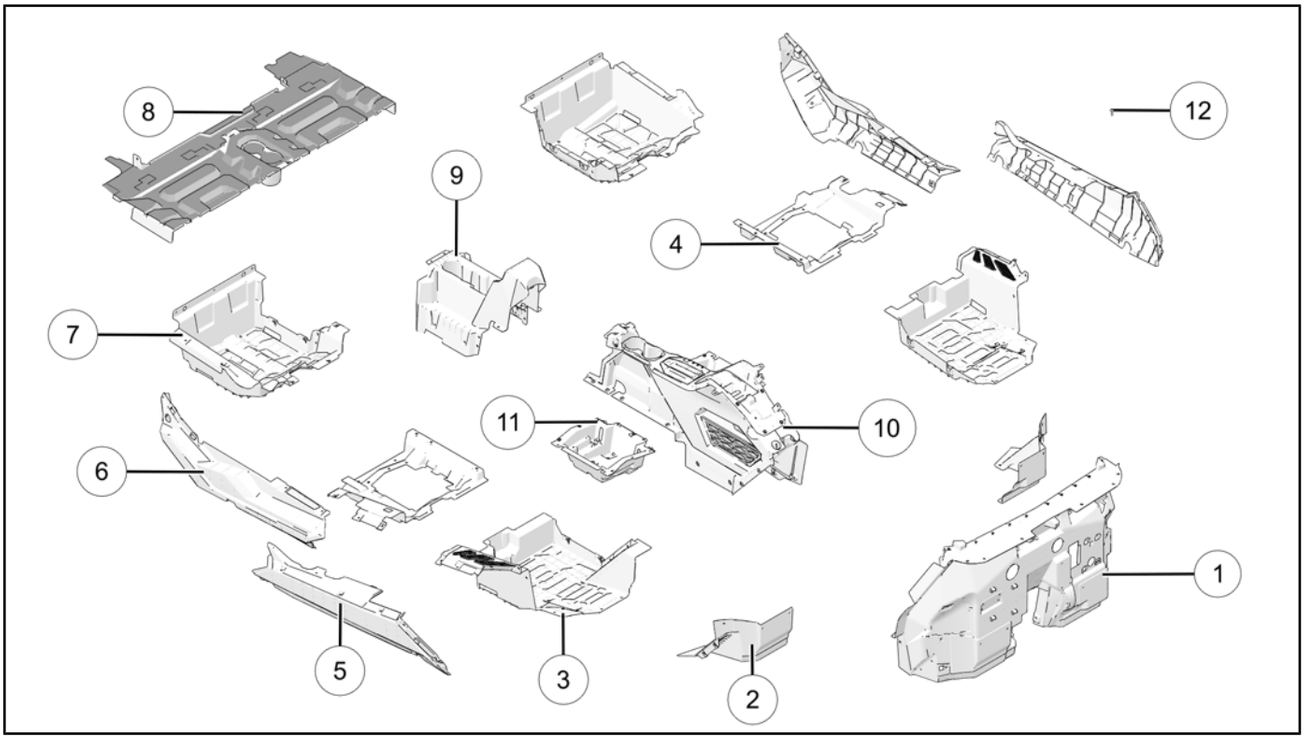
① Seat Latch	⑤ Door Latch Clip
② Seat Latch Fastener **6 ft–lb (9 Nm)**	⑥ Handle Latch Fastener **22 in-lb (3 Nm)**
③ Handle Latch	⑦ Rear Seat Striker
④ Seat Latch Rod	⑧ Rear Seat Striker Fastener **35 in-lbs (4 Nm)**

FLOOR / ROCKER PANELS



① Rocker (RH)	⑧ Rear Center Console
② Underseat panel (RH)	⑨ Center Console Top
③ Front Floor (RH)	⑩ Underseat Panel LH
④ Passenger Footrest Panel	⑪ Battery Tray
⑤ Front Main Floor	⑫ Rocker (LH)
⑥ Center Console (RH)	⑬ Front Floor (LH)
⑦ Center Console (LH)	⑭ Driver Footrest Panel

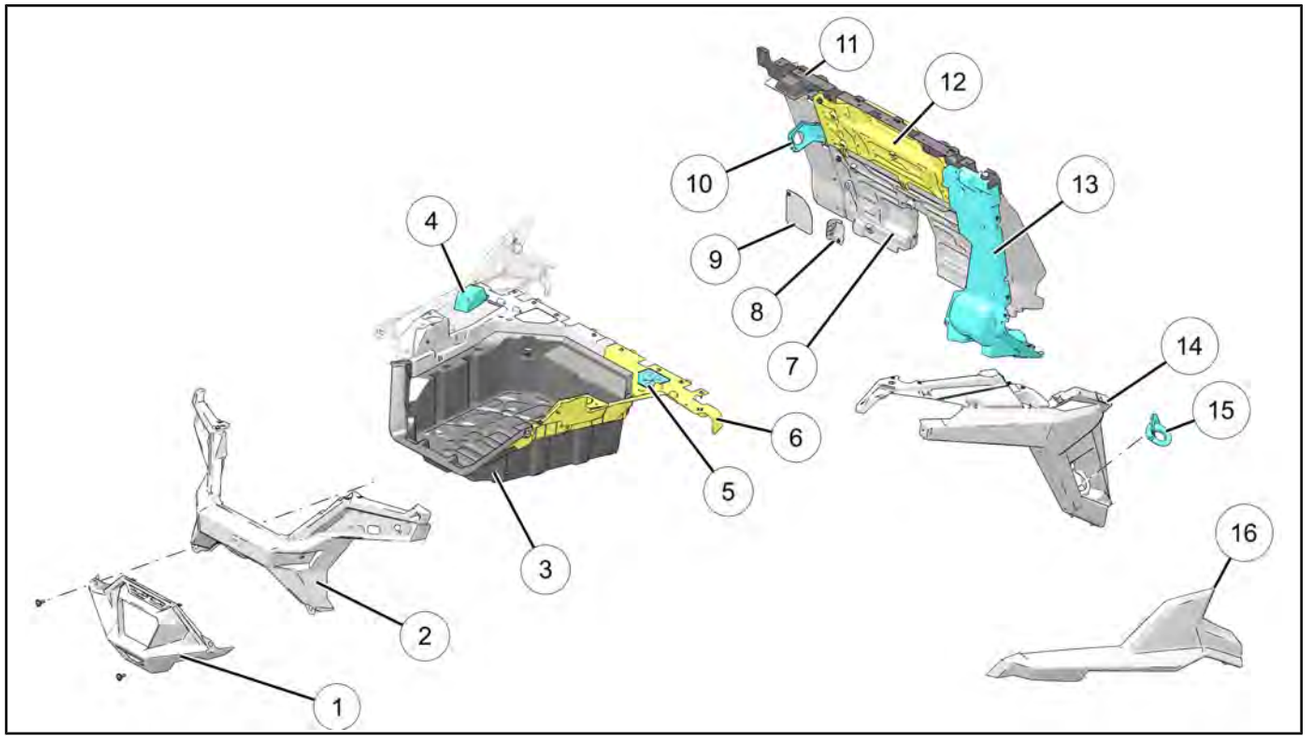
FLOOR / ROCKER PANELS (4-SEAT)



① Front Main Floor	⑦ Rear Floor
② Foot Rest Panel	⑧ Rear Under-Seat Panel
③ Front Floor Panel	⑨ Rear Center Console
④ Under-Seat Panel	⑩ Front Center Console
⑤ Front Rocker Panel	⑪ Battery Tray
⑥ Rear Rocker Panel	⑫ Body Panel Fasteners **7 ft-lbs (10 Nm)**

REAR CARGO BOX / FENDERS

IMPORTANT
All Body Fasteners are 88 in-lbs (10 Nm).

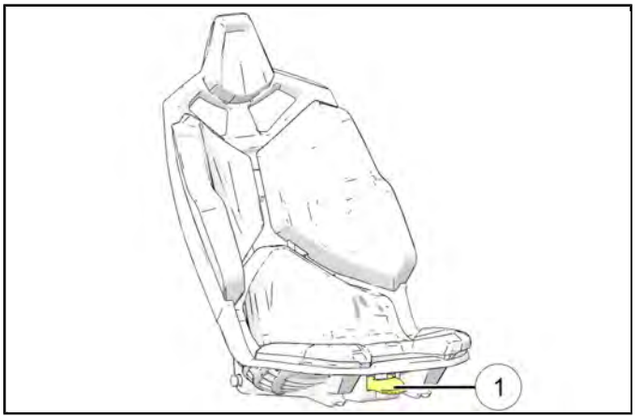


① Rear Bumper	⑨ PDM Guard
② Rear Facia	⑩ Rear Close Off Plug (LH)
③ Rear Box Tub	⑪ Close-Off Panel Plug (LH)
④ B-Pillar Close-off panel	⑫ Rear Top Close-Off Panel
⑤ Coolant Access Panel	⑬ Rear Close-Off Panel (RH)
⑥ Inner Fender (RH)	⑭ Rear Fender Flare (RH)
⑦ Rear Bottom Close-Off Panel	⑮ Fill Neck Grommet
⑧ EVAP Grommet	⑯ Rear Outer Fender

BODY COMPONENT REMOVAL

SEATS

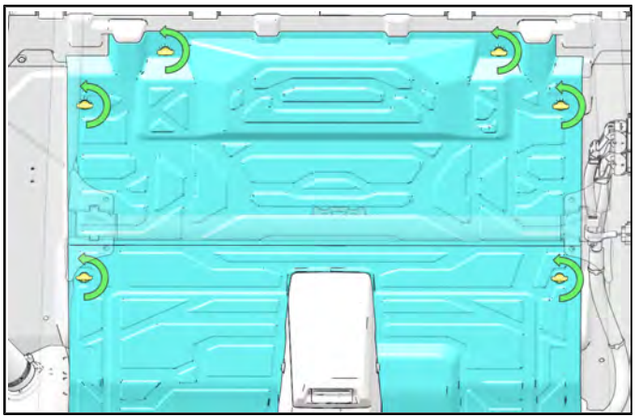
1. To remove a seat, lift upward on the release lever ① located under the front of the seat.



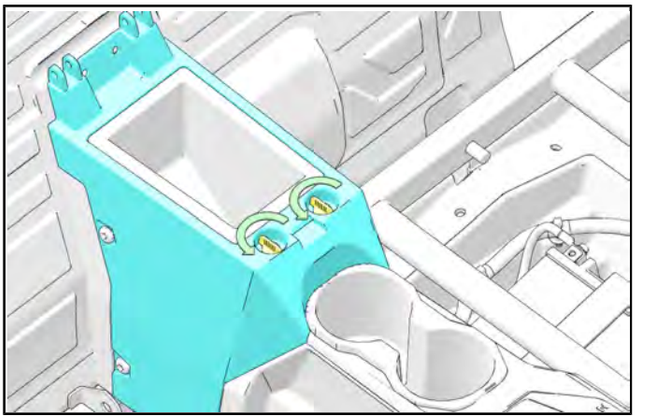
2. Lift upward and forward on the seat while lifting up on the release lever and remove seat from the vehicle.

REAR CLOSE-OFF PANEL

1. Remove seats.
2. Unlock six 1/4 turn latches (four on top panel, two on bottom panel).



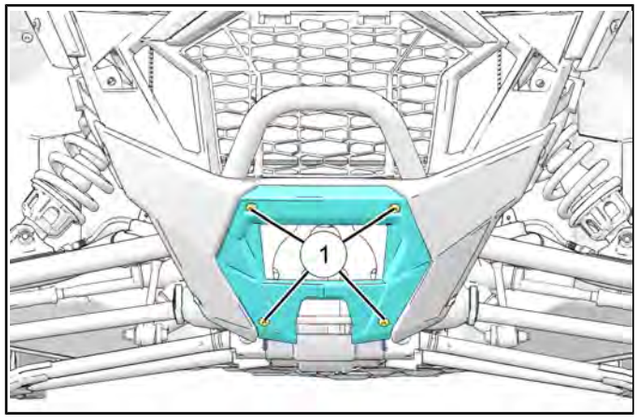
3. Unlock two 1/4 turn latches from the center console.



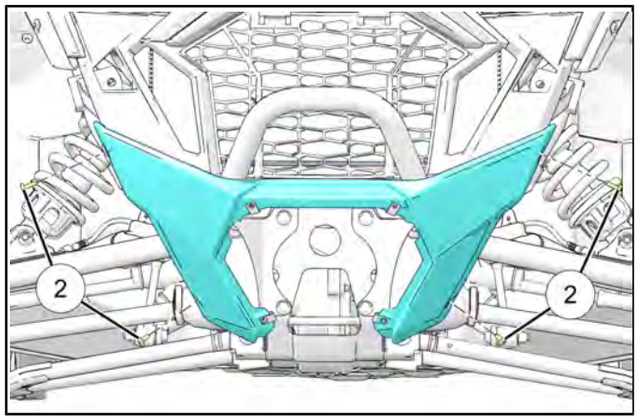
4. Lift upward and remove the top close-off panel, and the bottom close-off panel.

FRONT FASCIA

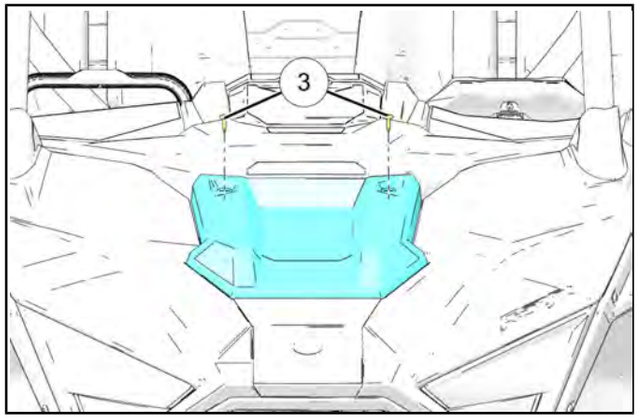
1. Remove four fasteners ① and remove the front bumper cover.



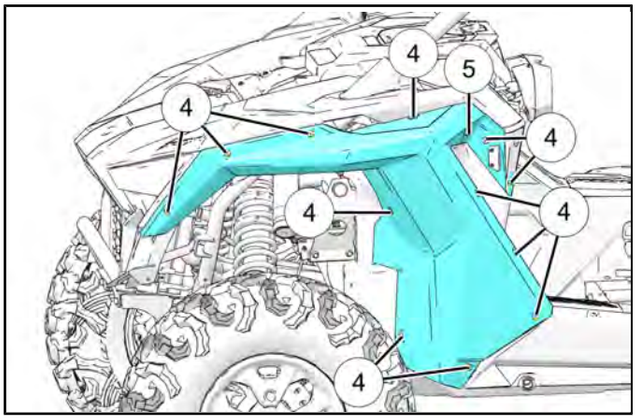
2. Remove four fasteners ② and remove the front bumper.



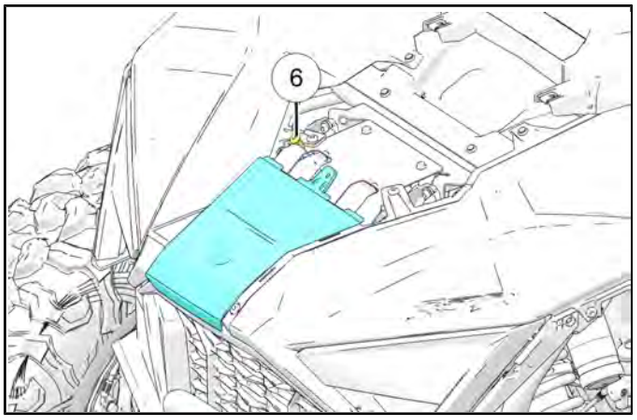
3. Remove two fasteners ③ and remove the front hood.



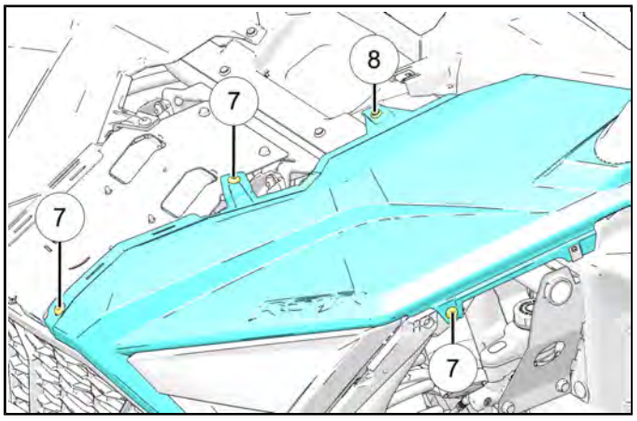
4. Remove twelve fasteners ④ and one push pin ⑤ from each fender flare, and remove fender flares.



5. Remove one fastener ⑥ and remove the nose cone.

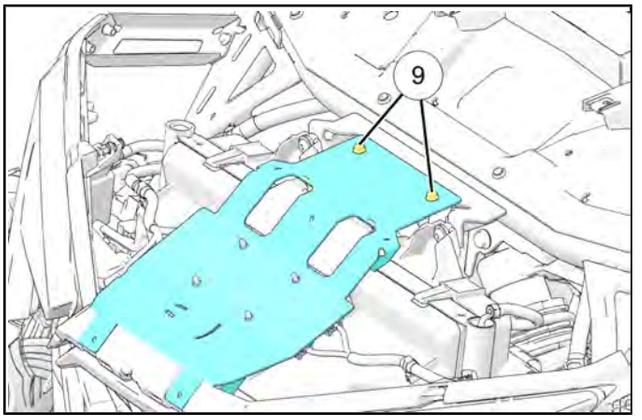


6. Remove three fasteners ⑦ and one push pin ⑧ from each fender, and remove front fenders.

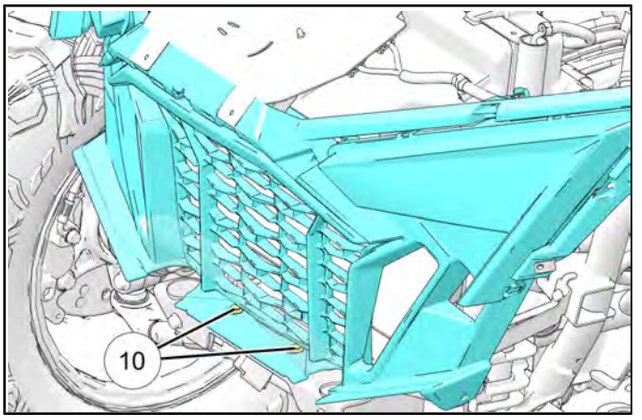


11

7. Loosen two voltage regulator mounting bracket fasteners ⑨. Do not remove fasteners.

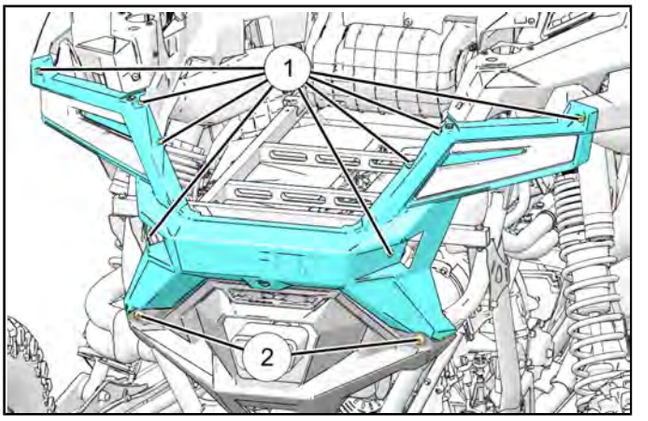


8. Disconnect all headlight and accent light electrical connections.
9. Remove two push pins ⑩ and remove front fascia.



REAR FASCIA

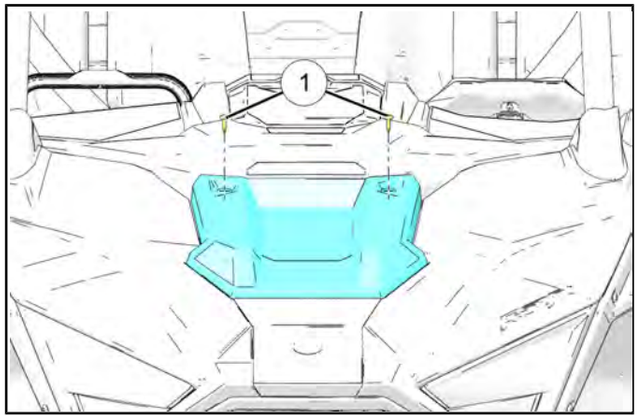
1. Remove cargo box.
2. Disconnect rear tail light harness.
3. Remove eight fasteners ① from the rear fascia, and two fasteners ⑫ from the rear bumper. Remove rear fascia and bumper.



HOOD / FRONT BODY

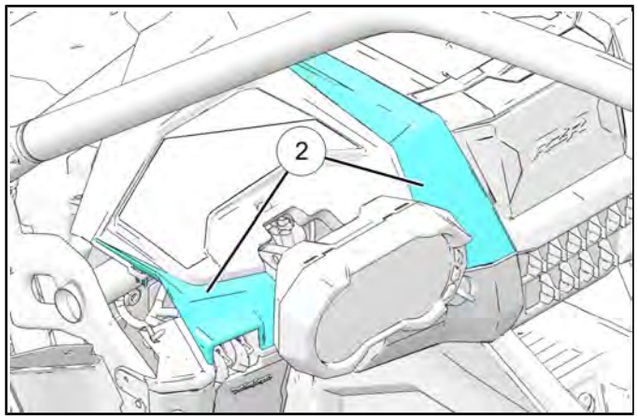
HOOD REMOVAL

1. Remove two fasteners ① and remove hood.

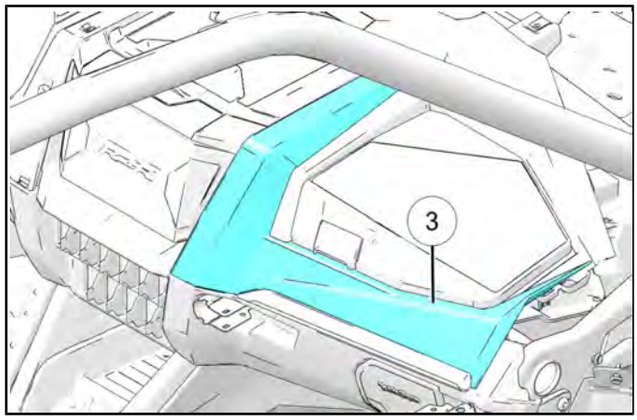


DASH REMOVAL

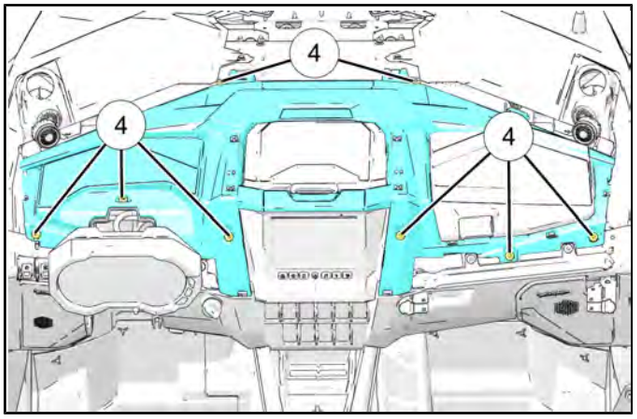
1. Remove front fascia. See Front Fascia Removal page 11.21.
2. Remove LH and center dash trim ②.



3. Remove RH dash trim ③.

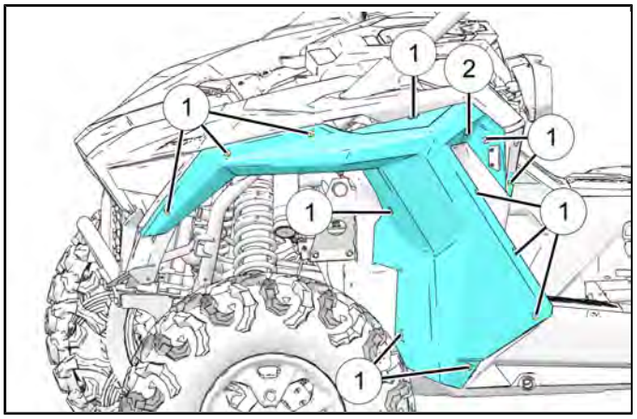


4. Remove eight fasteners ④ and remove dash.



FRONT FENDER FLARE REMOVAL

1. Remove twelve fasteners ① and one push pin ② and remove fender flare.

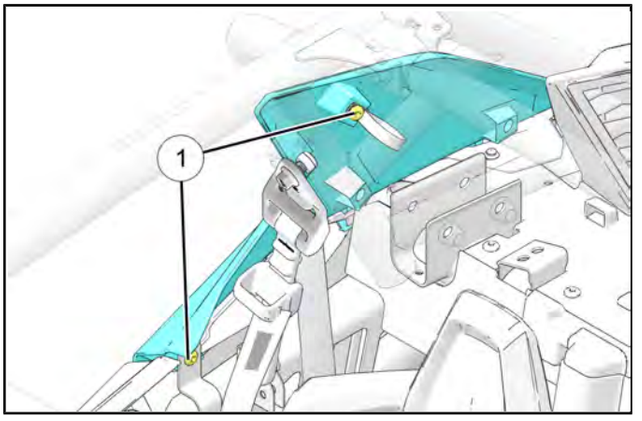


11

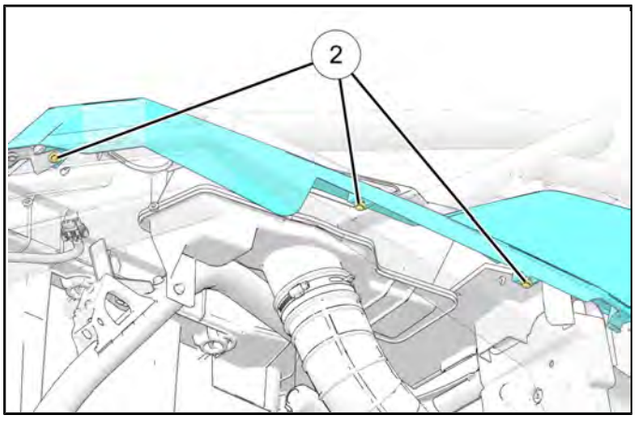
REAR FENDER / FENDER FLARE

FENDER REMOVAL

1. Remove two fasteners ① from fender.

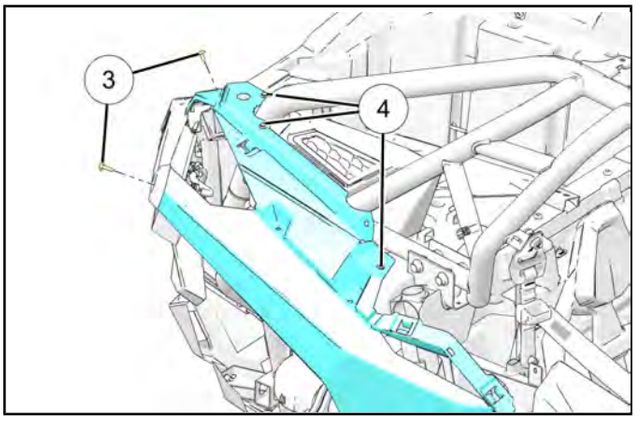


2. Remove three push pins ② and remove rear fender.

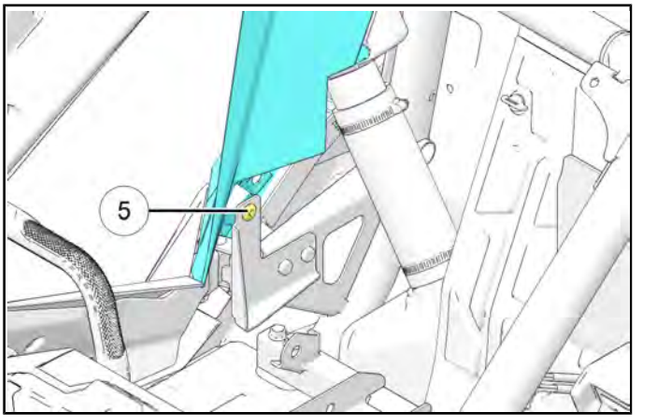


FENDER FLARE REMOVAL

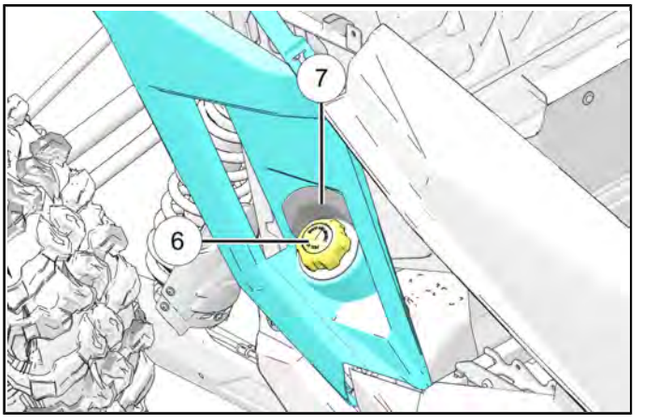
1. Remove two fasteners ③ and three push pins ④ from the fender flare.



2. Remove one fastener ⑤ near the fuel tank.

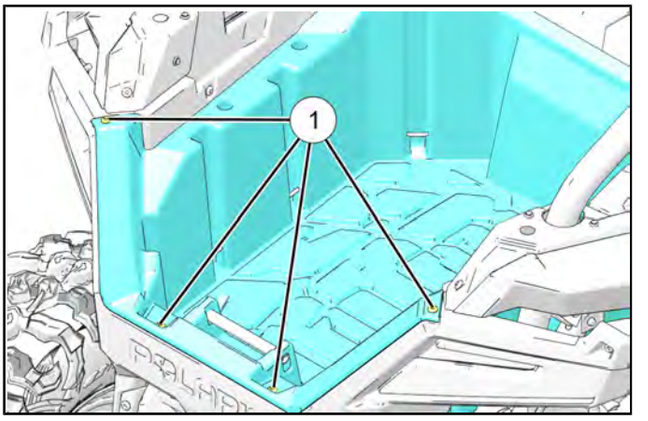


3. Remove gas cap ⑥ and support grommet ⑦ (passenger side only) and remove rear fender flare.



CARGO BOX

1. Remove four fasteners ① from the cargo box.

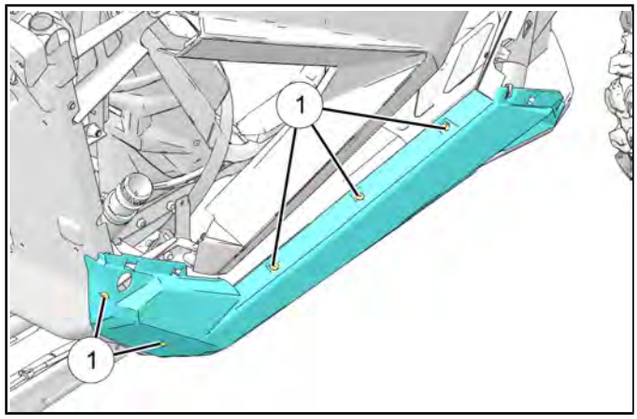


2. Pull the rear of the cargo box up and rearward to disengage front tabs and remove cargo box.

ROCKER PANELS, CONSOLE, AND FLOOR

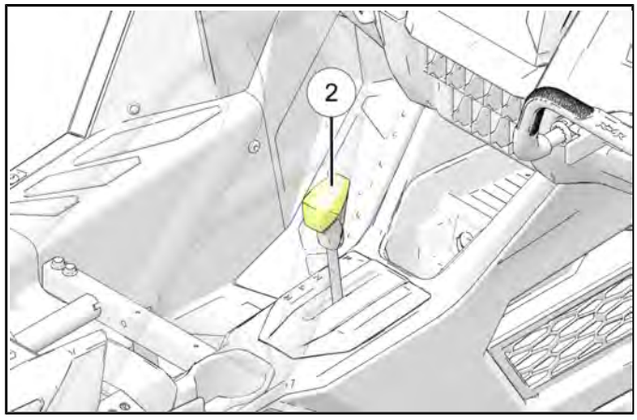
ROCKER PANEL REMOVAL

1. Remove front fender flare. See Fender Flare Removal page 11.23.
2. Remove rear fender and fender flare. See Rear Fender / Fender Flare Removal page 11.24.
3. Remove five fasteners ① and remove rocker panel.

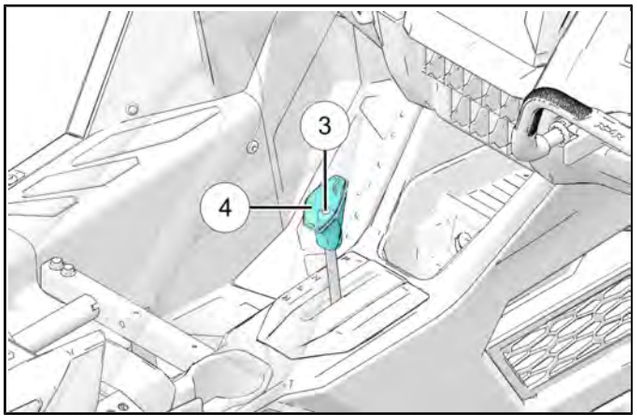


CONSOLE AND LOWER FLOOR REMOVAL

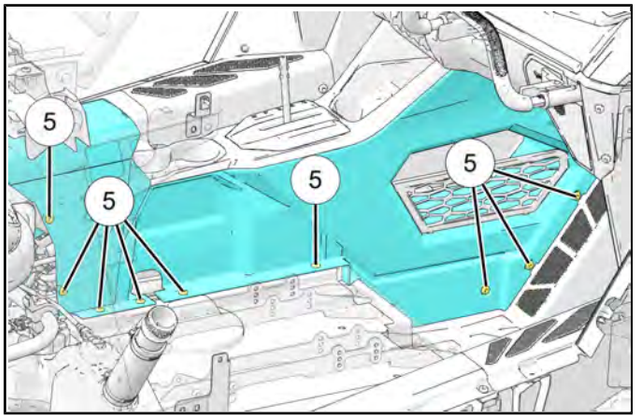
1. Remove seats and rocker panels.
2. Remove top half of shift knob ②.



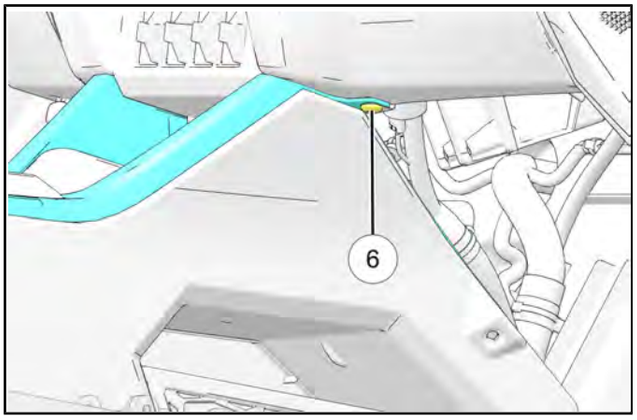
3. Remove one fastener ③ and remove lower shift knob half ④.



4. Disconnect 12V outlet connections from under the center storage console.
5. Remove nine fasteners ⑤ from either side of the console.

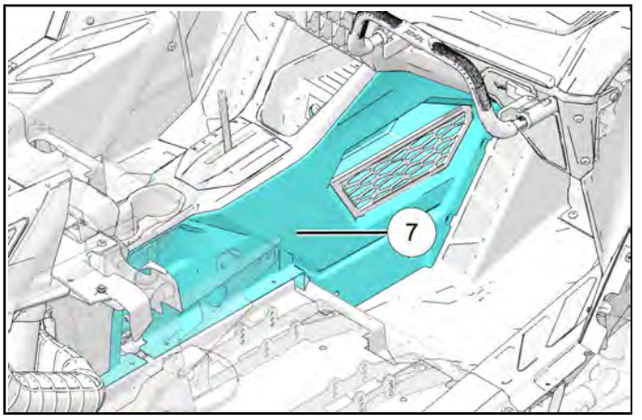


6. Remove one fastener ⑥ from either side of the console under the dash.

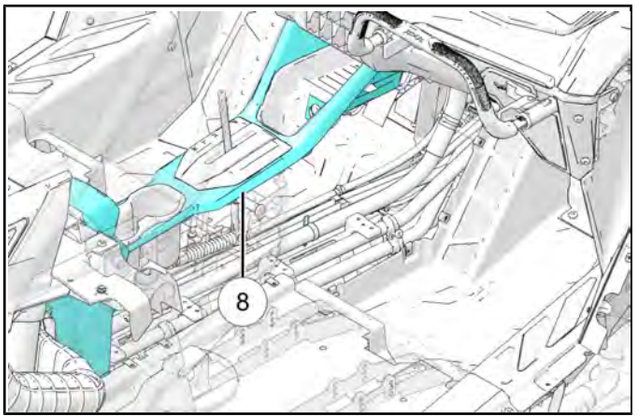


11

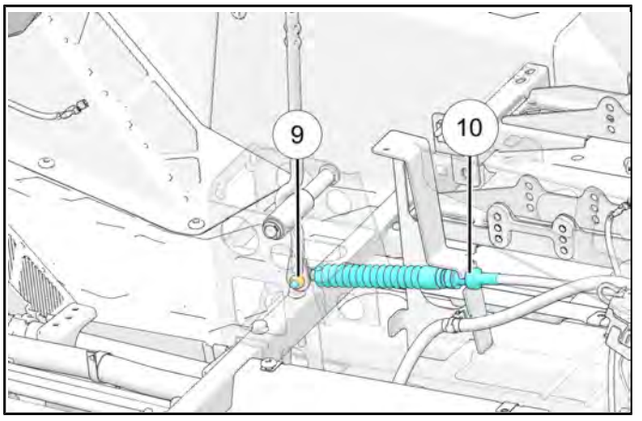
7. Remove right and left console halves ⑦ from the vehicle.



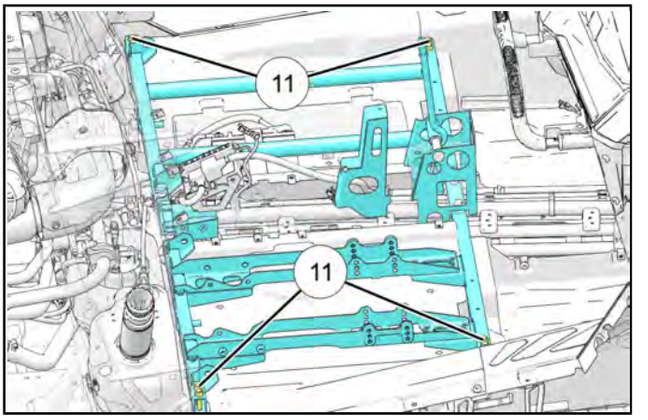
8. Remove any remaining electrical connections and remove console ⑧.



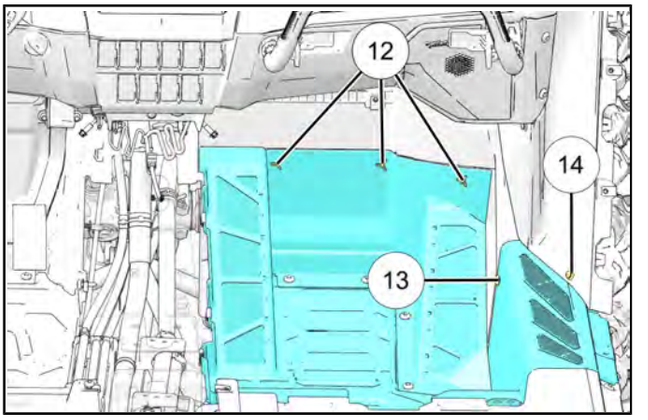
9. Remove one fastener ⑨ from the shift linkage and remove shift cable ⑩ from its mounting bracket.



10. Remove seat base frame fasteners ⑪ and remove the seat frame.



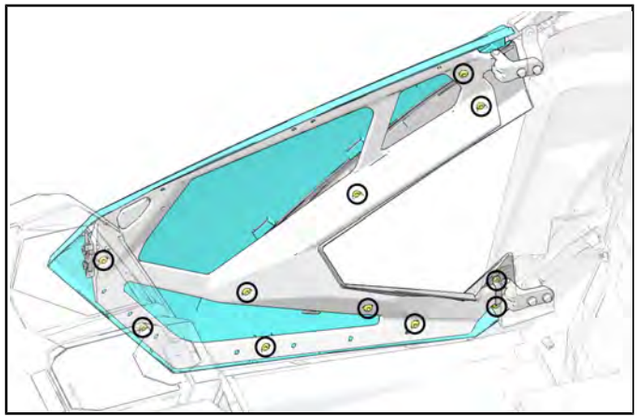
11. Remove three rivets ⑫ one fastener ⑬ and one push pin ⑭ from either floor panel, and remove floor panels.



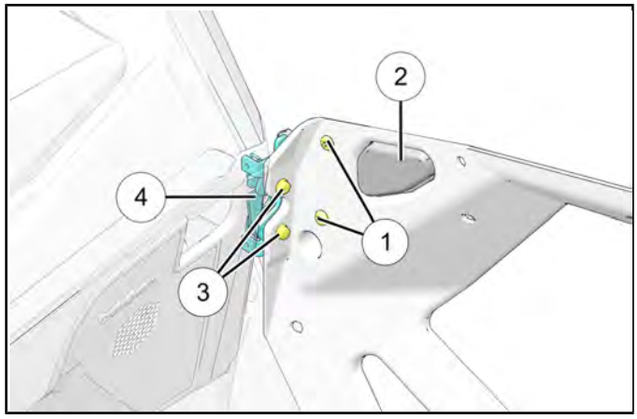
DOORS

DOOR PANEL / LATCH REPLACEMENT

1. Remove eleven fasteners and remove door panels as an assembly.



2. Remove latch actuator fasteners ① and remove latch actuator ②.
3. Remove latch fasteners ③ and remove latch ④.



4. Install new latch. Torque fasteners to specification.

TORQUE
Door Latch Fasteners: **9 ft-lbs (12 Nm)**

5. Install new latch actuator. Torque fasteners to specification.

TORQUE
Door Latch Actuator Fasteners: **9 ft-lbs (12 Nm)**

6. Install door panel. Torque fasteners to specification.

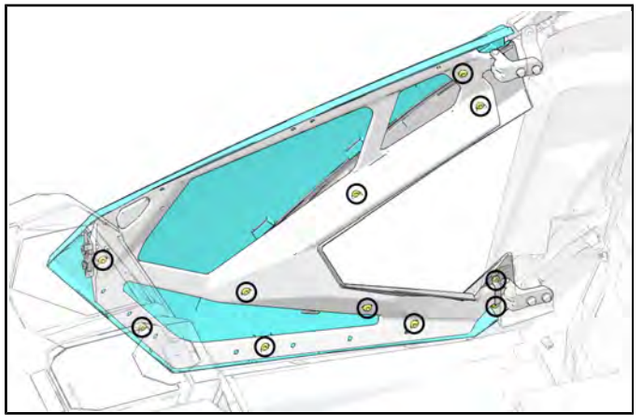
TORQUE
Door Panel Fasteners: **35 in-lbs (4 Nm)**

7. Install door trim bracket. Torque fasteners to specification.

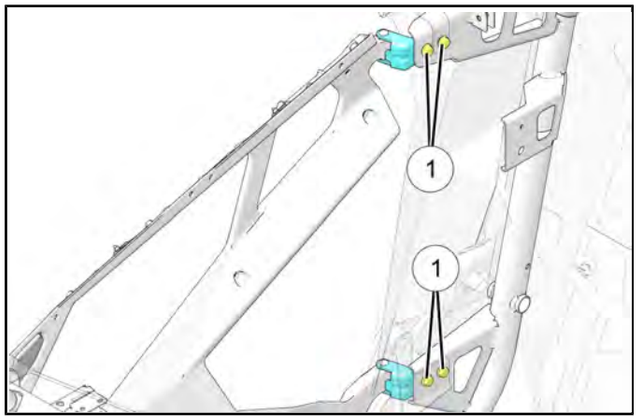
TORQUE
Door Trim Bracket Fasteners: **18 in-lbs (2 Nm)**

DOOR ADJUSTMENT

1. Remove eleven fasteners and remove door panels as an assembly.

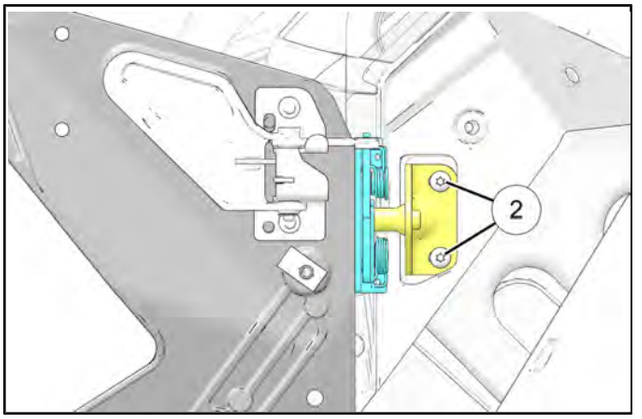


2. Close the door and keep it closed during entire adjustment for proper functional fit.
3. Loosen four fasteners ① holding the door assembly hinge brackets to the frame.



11

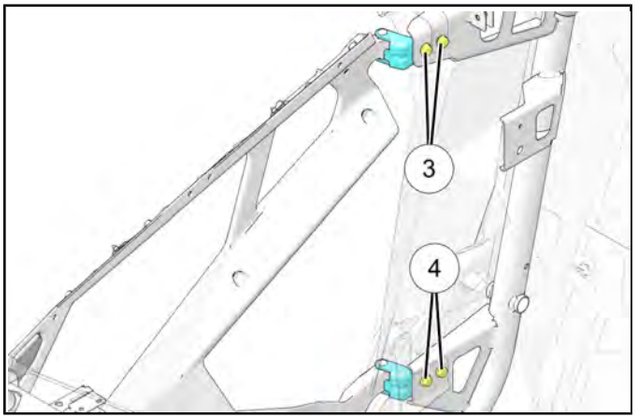
4. Adjust the door until the front latch is centered both vertically and horizontally on the striker rod as shown.



NOTICE
If it is difficult to center vertically and horizontally, loosen striker assembly fasteners ② for extra adjustment. Once aligned, torque striker fasteners.

TORQUE
Door Striker Fasteners: **7 ft-lbs (10 Nm)**

5. Holding the door in position, tighten the top hinge bracket fasteners ③, and then the bottom fasteners ④. Torque to specification.



TORQUE
Hinge Bracket Fasteners: **18 ft-lbs (24 Nm)**

6. Install door panel onto the door frame. Torque fasteners to specification.

TORQUE
Door Panel Fasteners: **35 in-lbs (4 Nm)**

TORQUE
Door Trim Bracket Fasteners: **18 in-lbs (2 Nm)**

CHAPTER 12
ELECTRICAL

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2460761	Hall Effect Sensor Probe Harness
2870630	Timing Light
2871745	Static Timing Light Harness
PU-49466	Relay Bypass
PU-50296	Polaris MDX-610P Battery Tester
PU-50338	Battery Hydrometer
PV-43526	Connector Test Kit
PV-43568	Fluke™ 77 Digital Multimeter
-	Digital Wrench® (see Chapter 4 – DIGITAL WRENCH® OPERATION page)

Bosch Automotive Service Solutions:
1-800-345-2233 or http://polaris.service-solutions.com/

ELECTRICAL SERVICE NOTES

Keep the following notes in mind when diagnosing an electrical problem:

- All EFI component information and diagnostic testing procedures are located in the Fuel System chapter.
- Always refer to Digital Wrench when diagnosing and diagnostic trouble code.
- Refer to wiring diagram for stator and electrical component resistance specifications.
- When measuring resistance of a component that has a resistance value under 10 Ohms, remember to subtract meter lead resistance from the reading. Connect the leads together and record the resistance. The resistance of the component is equal to tested value minus the lead resistance.
- Become familiar with the operation of your meter. Be sure leads are in the proper jack for the test being performed (i. e. 10A jack for current readings). Refer to the Owner's Manual included with your meter for more information.
- Voltage, amperage, and resistance values included in this manual are obtained with a Fluke™ 77 Digital Multimeter (PV-43568). This meter is used when diagnosing electrical problems. Readings obtained with other meters may differ.
- Pay attention to the prefix on the multimeter reading (K, M, etc.) and the position of the decimal point.
- For resistance readings, isolate the component to be tested. Disconnect it from the wiring harness or power supply.
- Most electrical issues are related to damaged wiring. Fully test wiring before replacing any components.

ENGINE/CHASSIS HARNESS COMPONENTS

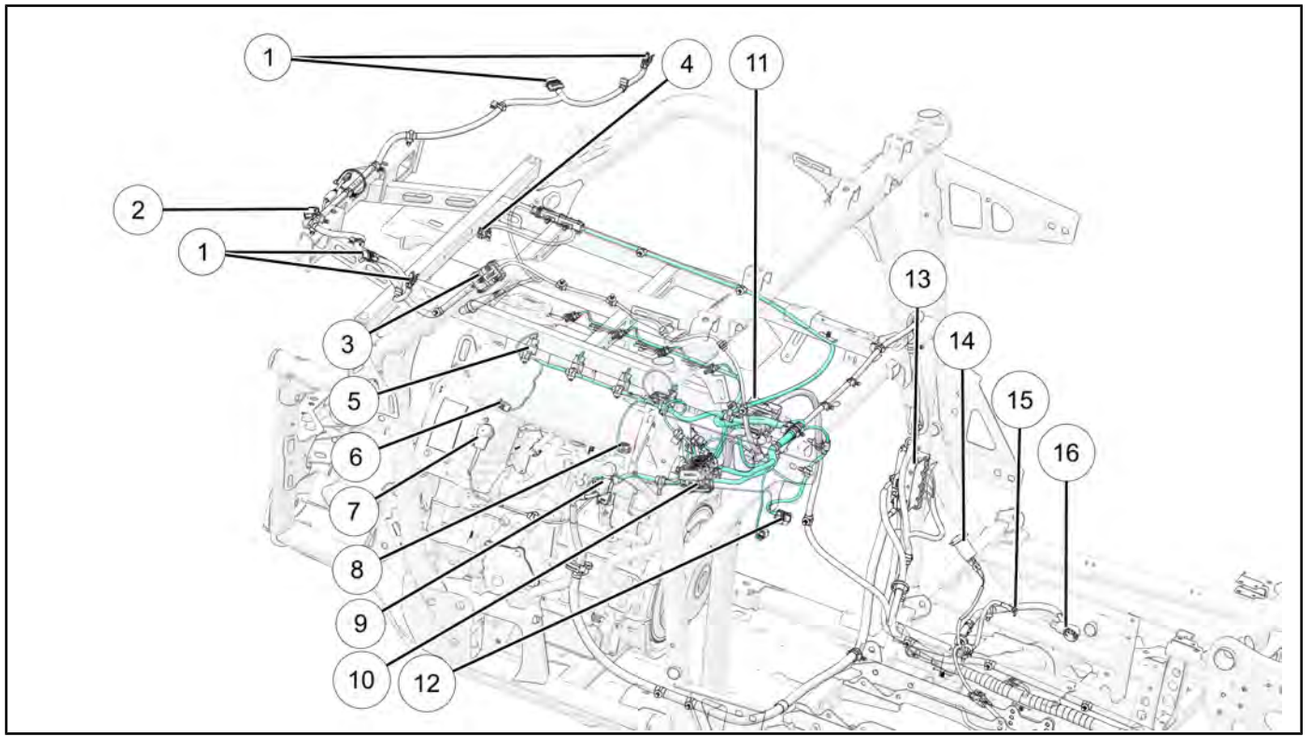
ENGINE HARNESS

- Ignition Coils
- Oxygen Sensor
- Throttle Body
- Fuel Injectors
- TMAP Sensor
- Alternator
- Coolant Temperature Sensor
- ECM (x2)
- Purge Solenoid (EVAP Models)
- Camshaft Sensor
- Crankshaft Sensor
- Starter Solenoid
- Knock Sensor
- Gear Position
- Speed Sensor

CHASSIS HARNESS

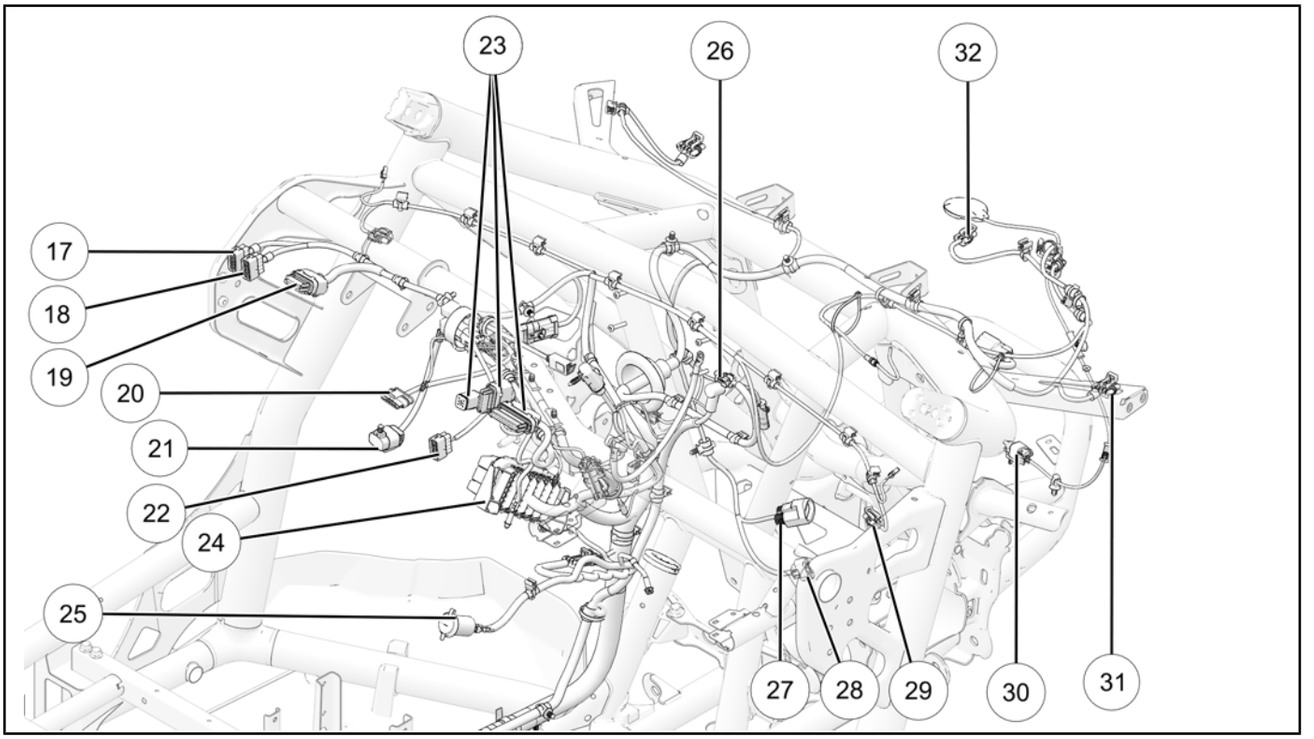
- Ambient Air Temperature Sensor
- Front Lighting
- Radiator Fan
- Audio
- PULSE Bar
- Front Drive Solenoid Relays
- EPS
- Dash Switches
- Instrument Cluster
- Fuel Pump/Sender
- PDM1 and PDM2 (Fuse Blocks)
- SCM
- Shock Compression
- Shock Rebound

ELECTRICAL COMPONENT LOCATIONS (REAR)



① Tail Light Harness	⑨ Starter (+)
② Back Up Camera	⑩ ECU Harness
③ Rear Box Harness	⑪ Engine Harness
④ Oxygen Sensor	⑫ Transmission Harness
⑤ Fuel Injector	⑬ Fuel Box
⑥ Alternator Harness	⑭ 12V receptacle
⑦ Alternator (+)	⑮ Battery Negative (-)
⑧ Coolant Temperature Sensor	⑯ Battery Positive (+)

ELECTRICAL COMPONENT LOCATIONS (FRONT)

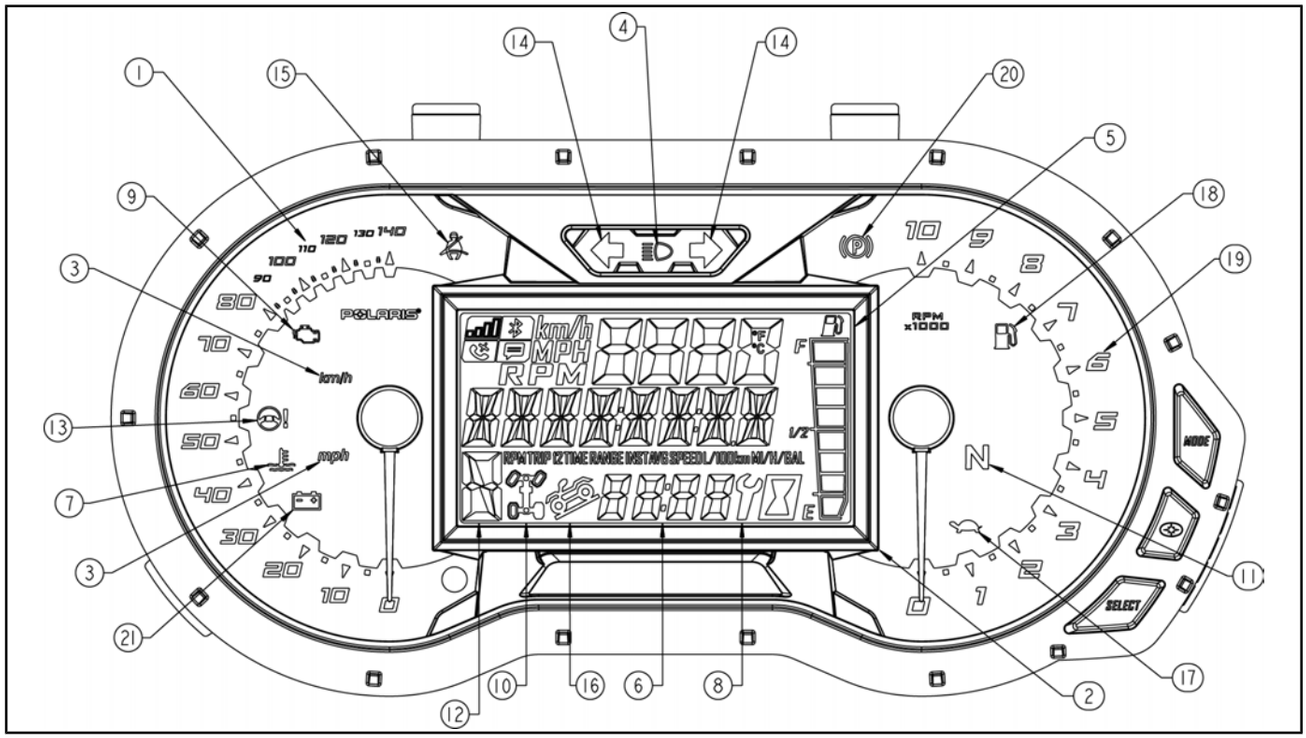


⑰ Headlight Switch	㉕ 12V Receptacle
⑱ AWD Switch	㉖ PULSE Bar
⑲ C4 Gauge	㉗ EPS Power
⑳ Key Switch	㉘ EPS Signal
㉑ Diagnostic Plug	㉙ Speaker
㉒ Drive Mode Switch	㉚ Ambient Air Temperature Sensor
㉓ Ride Command Display	㉛ Headlight
㉔ Fuse Block	㉜ Accent Light

INSTRUMENT CLUSTER

RIDER DISPLAY OVERVIEW

The instrument cluster displays critical vehicle information to the user. Reference the following page for display functions and descriptions.



NOTICE
The use of a high pressure washer may damage the instrument cluster. Wash the vehicle by hand or with a garden hose using mild soap. Certain products, including insect repellents and chemicals, will damage the instrument cluster lens. Do not use alcohol to clean the instrument cluster. Do not allow insect sprays to contact the lens. Immediately clean off any gasoline that splashes on the instrument cluster.

The rider information display is located in the instrument cluster. All segments will light up for 1 second at start-up.

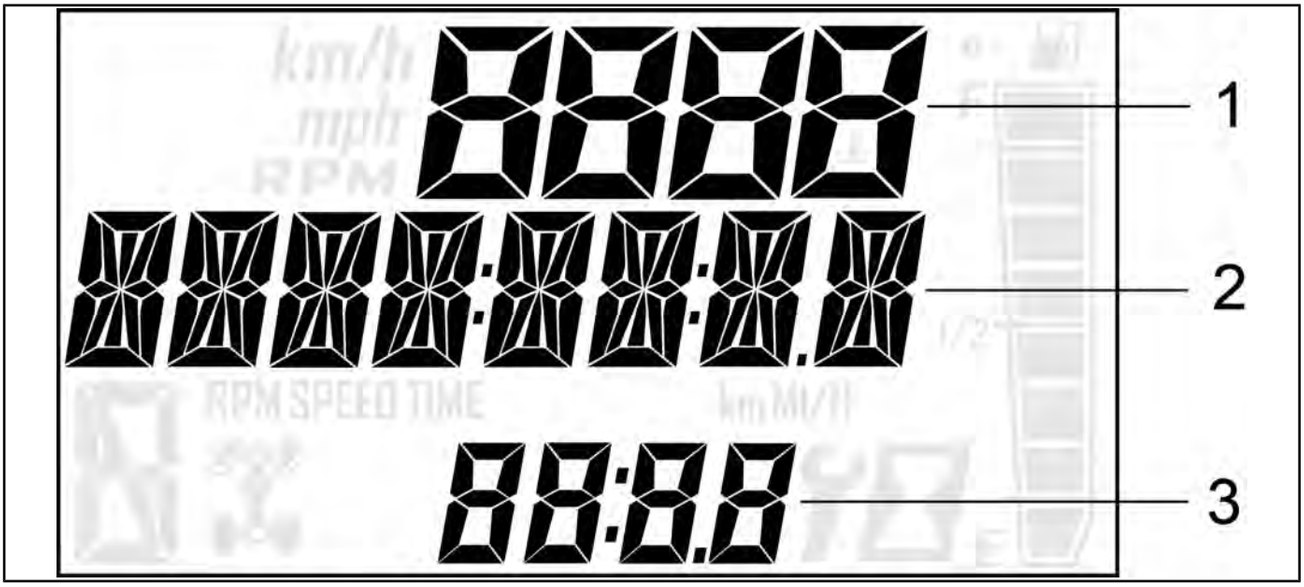
NOTICE
If the instrument cluster fails to illuminate, a battery over-voltage may have occurred and the instrument cluster may have shut off to protect the electronic speedometer.

① **Vehicle Speed Display** - Analog display of vehicle speed in MPH or km/h.
② **Information Display Area - Odometer / Trip Meter / Tachometer / Engine Temperature / Engine Hours / Service Info / Clock** - LCD display of the service hour interval, total vehicle miles or km., total engine hours, a trip meter, engine RPM and engine temperature.
③ **MPH / KM/H Display** - MPH is displayed when the instrument cluster is in the *Standard* mode. KM/H is displayed when the instrument cluster is in the *Metric* mode.
④ **High Beam Indicator** - LED icon illuminates whenever the headlight switch is in the high beam position.
⑤ **Fuel Level Indicator** - LCD bar graph indicating current fuel level.
⑥ **Clock** - Displays current time in either 12-hour or 24-hour formats.
⑦ **Engine Temperature Indicator** - Illuminates when the ECU determines the engine is overheating. The indicators will initially flash to indicate the engine is overheating. The indicators will stay lit and not flash if a severe overheating condition exists.
⑧ **Service Interval Indicator** - Preset at the factory and adjustable by the user, a flashing wrench symbol alerts the operator that the preset service interval has been reached and maintenance should be performed. The wrench icon will flash for 10 seconds upon start-up once it reaches 0.
⑨ **Check Engine MIL** - Illuminates when the ECU has detected a Diagnostic Trouble Code in the engine management system.
⑩ **AWD Indicator** - Illuminates 2WD, 4WD, and 4WD Lock modes when a forward/reverse gear is selected.
⑪ **Neutral Gear Indicator** - Illuminates when gear selector is in the neutral (N) position.
⑫ **Gear Position Indicator** - Displays gear selector position. H = High L = Low N = Neutral R = Reverse P = Park – = Gear Signal Error (shifter stuck between gears)
⑬ **Power Steering System MIL** - Illuminates when a fault has occurred with the power steering system. This indicator illuminates when the key is turned to the ON position and goes off when the engine is started.
⑭ **Turn Signal / Hazard Lamp Indicator** - Illuminates whenever the LH, RH or hazard lamps are activated (INT'L Models Only).
⑮ **Helmet / Seat Belt Indicator** - Illuminates for several seconds when the key is turned to the ON position. The lamp is a reminder to the operator to ensure all riders are wearing helmets and seat belts before operating the vehicle.
⑰ **Performance Limited Indicator** - Illuminates when engine performance is electronically limited.
⑱ **Low Fuel Indicator** - Illuminates when fuel level reaches lowest bar on fuel level indicator.
⑲ **Engine Speed Display** - Analog display of engine speed in thousands of revolutions per minute.
⑳ **Parking Brake Indicator** - Illuminates when parking brake is engaged (INT'L Models Only).
㉑ **Low Battery Indicator** - Illuminates when battery voltage is low, charging system may be overloaded.

INFORMATION DISPLAY AREA

The LCD portion of the instrument cluster is the information display area. Information displayed in this area includes: odometer, trip meter, engine RPM, engine hours, service interval, clock, engine Diagnostic Trouble Codes (DTCs) and power steering DTCs.

DISPLAY AREA MODES



AREA 1 MODES	MODE DESCRIPTION
Engine Temperature	Temperature of engine coolant
Vehicle Speed	Speed of vehicle
Tachometer	Engine speed (RPM)
AREA 2 MODES	**MODE DESCRIPTION**
Odometer	The odometer records and displays the total distance traveled by the vehicle. The odometer can not be reset.
Trip Meters (T1 / T2)	The trip meter records the miles traveled by the vehicle on each trip, if reset before each trip.
Trip Time	Time length of vehicle operation since mode was last reset.
Engine Hours	Total hours of engine operation since manufactured.
Service Hours	A flashing wrench symbol indicates that the preset service interval has been reached.
AREA 3 MODES	**MODE DESCRIPTION**
Clock	The clock displays time in a 12-hour or 24-hour format.

GAUGE SETTINGS MENU

Press and release the MODE button to cycle through the Area 1 modes until the desired default mode displays.

1. Press and hold the MODE button to enter the settings menu.
2. Press and release either toggle button to cycle to the desired option.
3. Press MODE to select the option.
4. Press either toggle button to cycle to the desired setting.
5. Press MODE to save and exit to the settings menu.
6. Press and hold the MODE button to exit the settings menu.

BACKLIGHT COLOR

The information center backlight can be set to either blue or red.

1. Press and hold the MODE button to enter the settings menu.
2. Press either toggle button to cycle to the “BL COLOR” option. Press MODE to select.
3. Press either toggle button to cycle to the desired setting.
4. Press MODE to save and exit to the settings menu.

CLOCK

The clock must be reset any time the battery has been disconnected or discharged.

1. Press and hold the MODE button to enter the settings menu.
2. Press either toggle button to cycle to the “CLOCK” option. Press MODE to select.
3. Press either toggle button to cycle to the desired setting (12H or 24H). Press MODE to select.
4. Press either toggle button to change each segment of the clock. Press MODE to accept a change and advance to the next segment.

DISPLAY UNITS

1. Press and hold the MODE button to enter the settings menu.

2. Press either toggle button to cycle to the desired “UNITS” option (distance, temperature or volume). Press MODE to select.
3. Press either toggle button to cycle to the desired setting.
4. Press MODE to save and exit to the settings menu.

TRIP METER

Use a trip meter to track the distance traveled during a specific trip or period of time. Reset the meter to zero before traveling.

1. Press either toggle button to cycle to the desired trip meter option (T1 or T2).
2. Press and hold either toggle button until the meter resets to zero.

TRIP TIME

Use a trip time meter to track the travel time during a specific trip. Reset the meter to zero before traveling.

1. Press either toggle button to cycle to the trip time option (TT).
2. Press and hold either toggle button until the meter resets to zero.

PROGRAMMED SERVICE INTERVAL

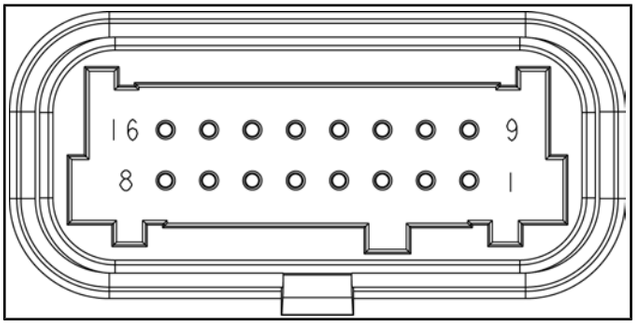
The service interval counter is programmed to 25 hours at the factory. As hours of engine operation increase, the counter decreases. The wrench icon will flash for about 10 seconds when the counter reaches zero (0), and each time the key is turned on thereafter, until the counter is reset.

When this feature is enabled, it provides a convenient reminder to perform routine maintenance. Refer to “**Periodic Maintenance Chart page** ” for recommended service intervals

Use the following procedure to reset or change the service interval:

1. Press and hold the MODE button to enter the settings menu.
2. Press either toggle button to cycle to the “Service Hours” option. Press MODE to select.
3. Press MODE to reset the existing value and exit, or press either toggle button to change the value. Press MODE to save and exit to the settings menu.

INSTRUMENT CLUSTER PINOUTS



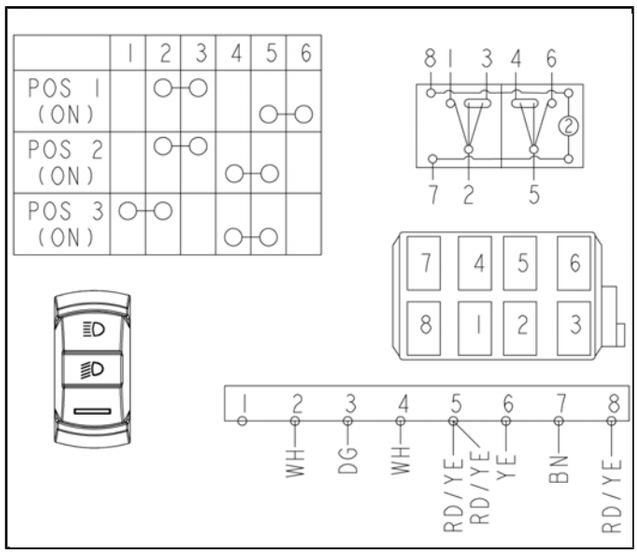
FUNCTION	PIN
CAN High	1
CAN Low	2
Switched Power (Vdc)	3
Constant Power (Vdc)	4
Ground	5
Left Turn Signal Input	6
Right Turn Signal Input	7
High Beam Input	8
Trailer Turn Sign Input	10
Fuel Level Sensor	11
Blackout Mode Input	12
Accy Air Temp Input	15

SWITCHES / CONTROLS

HEADLAMP SWITCH

1. Disconnect the headlamp switch harness by depressing the connector locks and pulling on the connector. Do not pull on the wiring.
2. Test between the 3 sets of outputs (OFF / LOW / HIGH). If any of the tests fail, replace headlamp switch assembly.

- Move the switch to HIGH. There should be continuity between switch pins 2 and 3; 5 and 6; 7 and 8.
- Move the switch to LOW. There should be continuity between switch pins 2 and 3; 4 and 5; 7 and 8..
- Move the switch to OFF. There should be continuity between switch pins 1 and 2; 4 and 5; 7 and 8.



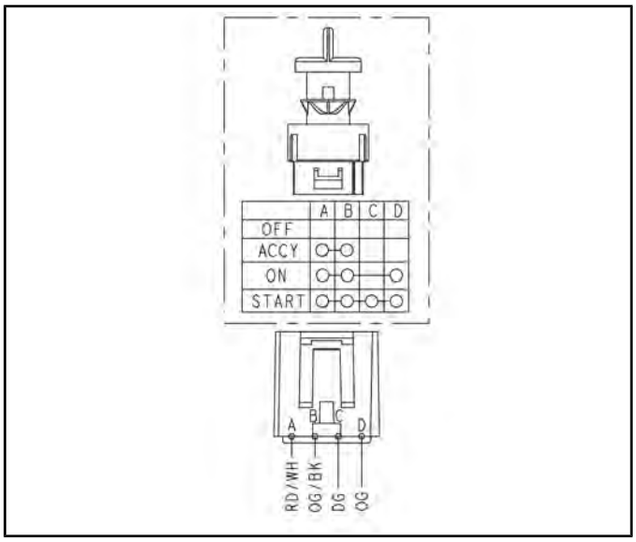
NOTICE

Pins 7 and 8 provide power and ground to light the switch lamp.

IGNITION / KEY SWITCH

1. Disconnect the key switch harness by depressing the connector lock and pulling on the connector. Do not pull on the wiring.
2. Test between the 4 sets of outputs (OFF / ACCY / ON / START). If any of the tests fail, replace ignition switch assembly.

- In the OFF position, there should be no continuity between any of the pins.
- Turn the key to ACCY position. There should be contunity between switch pins A and B.
- Turn the key to ON position. There should be continuity between switch pins A, B and D.
- Turn the key to START position. There should be continuity between all the pins on the switch.



12

AWD / 2WD / TURF SWITCH

PIN CONTINUITY

SWITCH POSITION	CONTINUITY BETWEEN
POS 1 ON	Pins 2 and 3
POS 2 OFF	—
POS 3 ON	Pins 1 and 2

SWITCH FUNCTION

PIN	FUNCTION
1	Turf Request Input
2	Ground, AWD Switch
3	AWD Request Input
4	—
5	—
6	—
7	Key Switch B+, AWD Switch Light
8	—

1. Disconnect the AWD / 2WD / TURF switch harness by depressing the connector locks and pulling on the connector. Do not pull on the wiring.
2. Test between the 3 sets of outputs (AWD / 2WD / TURF). If any of the tests fail, replace the switch assembly.
3. Move the switch to AWD. There should be continuity between switch pins 2 and 3.
4. Move the switch to 2WD. There should be no continuity between any pins.
5. Move the switch to TURF. There should be continuity between switch pins 1 and 2.

NOTICE
Pins 7 and 2 provide power and ground to light the switch lamp.

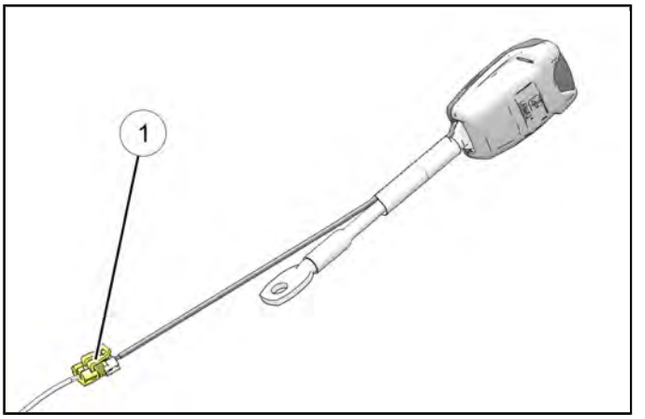
SEAT BELT SWITCH

Location
Found on the driver's seat belt latch

Functionality
If the circuit is open (buckle undone) vehicle speed will be limited to 15mph. If the circuit is closed (buckle inserted), the vehicle will function normally.

Testing:

1. Disconnect the harness ① running to the seat belt.

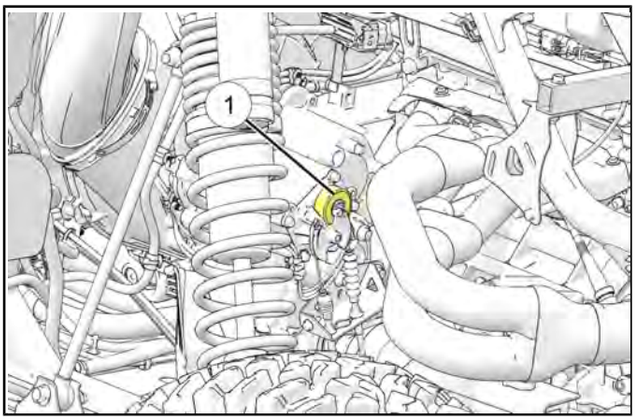


2. Using a multi-meter, measure between both pins on switch.

	SEAT BELT DISENGAGED	SEAT BELT ENGAGED
Between both pins on switch	∞ (OL)	< 1 Ω

TRANSMISSION / GEAR POSITION SWITCH

The transmission (gear position) switch ① is located on the rear of the transmission and can be accessed through the rear LH wheel well area.



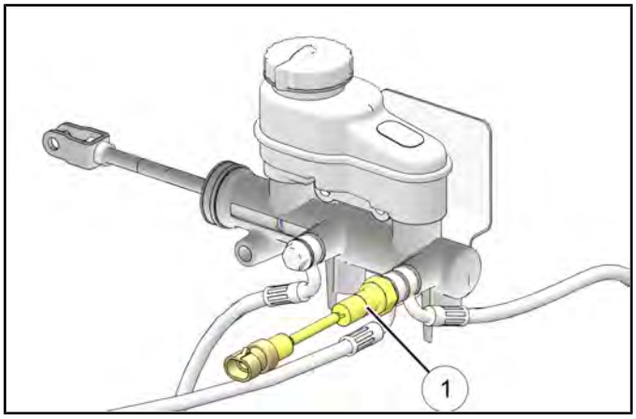
TESTING

1. Disconnect the transmission switch harness by lifting the connector lock and pulling on the connector. Do not pull on the wiring.
2. Test the transmission switch continuity readings for each gear position and compare to the specification table below.

GEAR POSITION	RESISTANCE VALUE WHEN MEASURED AT SWITCH TERMINALS A AND B
HIGH	620 Ω
LOW	300 Ω
NEU	160 Ω
REV	75 Ω
PARK	24 Ω

BRAKE PRESSURE SWITCH

The brake pressure switch ① is located on the rear brake line outlet on the master cylinder.



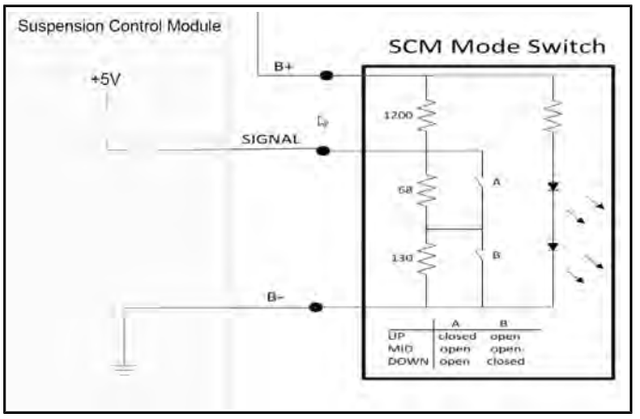
TORQUE
Brake Pressure Switch: **15 ft-lbs (20 Nm)**

NOTICE
Always replace brake system seals if fastener is loosened or removed.

1. Disconnect the wire harness from the brake switch.
2. Connect an ohmmeter across switch contacts. Reading should be infinite (OL).
3. Apply foot brake and check for continuity between switch contacts. If there is no continuity or greater than 0.5 Ω resistance when the brake is applied with slight pressure, first clean the switch contacts and re-test. Replace switch if necessary.

SUSPENSION MODE SWITCH (DYNAMIX MODELS)

For more information on the Dynamix suspension system, refer to the Steering / Suspension chapter - Dynamix Overview page



SWITCH POSITION	CONTACT A	CONTACT B	PINS 1 TO 7
Comfort	Closed	Open	1270 Ω
Sport	Open	Open	1400 Ω
Firm	Open	Closed	1330 Ω

STEERING ANGLE SENSOR CENTERING (DYNAMIX)

The steering angle sensor centering procedure should be performed ANY TIME one of the following situations occurs:

- EPS has been removed, disconnected, or replaced
- EPS codes SPN 1807 FMI 13 or 31 is present
- Steering System or Front Suspension has been serviced (such as toe alignment)
- New steering components have been installed
- SCM is indicating an alignment code **SPN 516122 FMI 15 or 17** or **SPN 524114 FMI 2**

1. Connect to Digital Wrench.
2. Perform EPS Steering Angle Centering procedure, found in Steering / Suspension System Utilities on the Special Tests menu in Digital Wrench.
3. Drive vehicle straight at 10 mph (16 km/h) for at least 10 seconds.
4. Come to a complete stop without turning the steering wheel. Turn key off.
5. Turn key to ON position.
6. Cycle key off and back on.
7. If any codes are set after performing the EPS Absolute Position Sensor Calibration procedure, repeat steps 2-6
8. If no EPS or SCM DTCs are present, drive straight and verify that the reported steering angle from the EPS is centered (+/– 5°).
9. If the steering is properly centered, perform SCM Steering Angle Adaptation Value Reset procedure, found in Steering / Suspension System Utilities on the Special Tests menu in Digital Wrench.

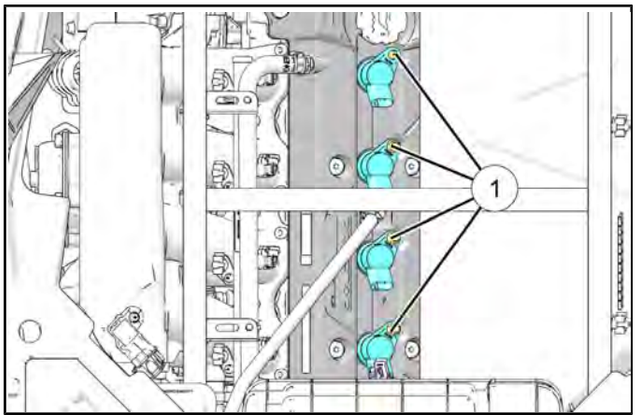
IGNITION COIL

OPERATION OVERVIEW

The ignition coil is used to provide high voltage to fire the spark plugs. When the ignition key is on, DC voltage is present in the primary side of the ignition coil windings. During engine rotation, an AC pulse is created within the crankshaft position sensor for each passing tooth on the flywheel's encoder ring. The encoder ring missing tooth creates an "interrupt" input signal, corresponding to specific crankshaft position. This signal serves as a reference for the control of ignition timing. The ECU then calculates the time interval between the consecutive pulses, and determines when to trigger the voltage spike that induces the voltage from the primary to the secondary coil windings to fire the spark plugs.

IGNITION COIL REPLACEMENT

1. Remove the cargo box.
2. Disconnect ignition coil electrical harness.
3. Remove ignition coil mounting fasteners ① and remove ignition coils.



NOTICE
Note for installation that cylinder 1 ignition coil fastener is a different fastener than the other ignition coil fasteners (no post).

4. Replace ignition coil and torque fastener to specification.

TORQUE
Ignition Coil Fastener: **7 ft-lbs (10 Nm)**

5. Install ignition coil harness retainers to the ignition coil fastener posts.
6. Install Cargo Box and torque fasteners to specification.

TORQUE
Cargo Box Fasteners: **7 ft-lbs (10 Nm)**

CHARGING SYSTEM

CURRENT DRAW - KEY OFF

Parasitic draw is when there is excessive current flow with the key off.

While the most common causes of draws are improperly installed accessories (tapping into un-switched B+ instead of switched) there can be electronic component failures that can cause this as well.

IMPORTANT

Do not connect or disconnect the battery cable, or ammeter with the engine running. Damage will occur to electrical components.

IMPORTANT

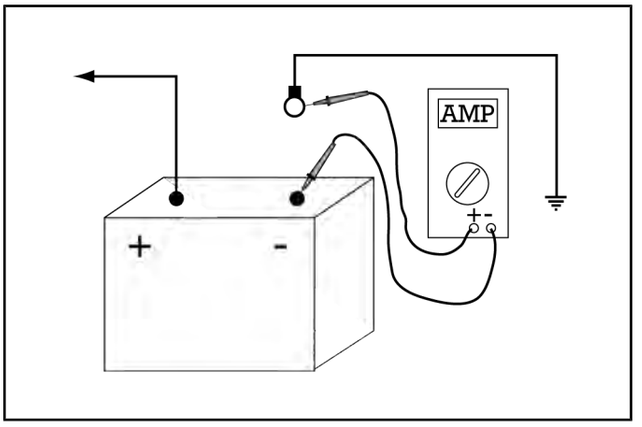
Charging system damage will occur if incompatible components are installed. Always reference the Polaris Electronic Parts Catalog for the proper part numbers.

NOTICE

Wait ten minutes with the key off for the ECU to power down. This will avoid a faulty readout while testing amperage draw.

TESTING PROCEDURE

1. Remove the negative cable from the battery.
2. Connect a jumper from the negative battery cable terminal to the negative battery post.
3. Ensure your meter leads and selector dial are set to measure amperage.
4. Connect your red lead to the battery negative cable terminal.



5. Connect your black lead to the battery negative post.
6. Momentarily key the ignition switch on, then off.

IMPORTANT

Ensure all electrical components are switched off, or damage to your jumper and/or meter will occur.

7. Wait 10 minutes before checking the value. Vehicles will vary, but electronic components will take time to fully go to sleep after switched power is removed.
8. Maximum allowable is 10 milliamps. If your meter is ranged to the 10 Amp scale, this will appear as 0.010 Amps.

Current Draw - Key Off:
Maximum of .01 DCA (10 mA)

9. If over 10 milliamps, go to the fuse block and start systematically removing one fuse at a time until the value drops, indicating the circuit that requires attention.

CHARGING SYSTEM “BREAK EVEN” TEST

IMPORTANT

Do not allow the battery cables to become disconnected with the engine running. Follow the steps below as outlined to reduce the chance of damage to electrical components.

The “break even” point of the charging system is the point at which the alternator overcomes all system loads (lights, etc.) and begins to charge the battery. Depending on battery condition and system load, the break even point may vary slightly. The battery should be fully charged before performing this test.

⚠ WARNING

Never start the engine with an ammeter connected in series. Damage to the meter or meter fuse will result.
Do not run test for extended period of time.
Do not run test with high amperage accessories.

1. Using an inductive amperage metering device, (set to DC amps) connect to the negative battery cable.
2. With engine off, key switch and lights in the on position, the ammeter should read negative amps (battery discharge).
3. Shift transmission into park and start the engine. With the engine running at idle, observe meter readings.

4. Increase engine RPM while observing ammeter and tachometer. Note the RPM at which the battery starts to charge (ammeter indication is positive).
5. With lights and other electrical loads off, the “break even” point should occur at approximately 1500 RPM or lower.

CHARGING SYSTEM TESTING FLOW CHART

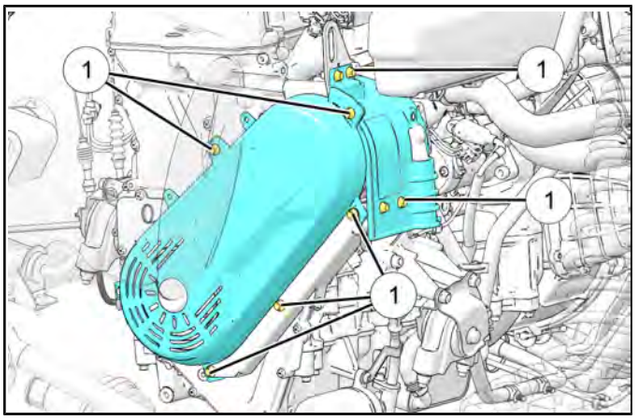
STEP	ACTION	VALUE	YES	NO
1	*NOTICE* The following test is performed with the alternator at approximately 77°F (25°C). 1. Turn OFF all accessories. 2. Turn OFF ignition. 3. Connect a carbon pile load tester to the vehicle. *NOTICE* **When using a carbon pile load tester, make sure the load is turned completely off prior to connecting a battery to prevent sparking.** 4. Connect an inductive ammeter to the output circuit of the alternator. 5. Start the engine. 6. Increase the engine speed to 2,500 RPM. 7. Adjust the carbon pile so the maximum current is observed. 8. Is the current output ≥ the value specified?	Load Test Output: **≥87A**	System OK	Go to STEP 3
2	1. Maintain the load test current flow value. 2. Maintain engine speed at 2,500 RPM. 3. Measure the voltage between the alternator output terminal and the alternator metal housing. 4. Is the voltage observed equal to the specified value?	Battery Voltage	Go to STEP 7	Go to STEP 3
3	1. Maintain the load test current flow value. 2. Maintain engine speed at 2,500 RPM. 3. Measure the voltage drop from the battery negative terminal to the metal housing of the alternator. 4. Is the voltage measured less than the specified value?	0.5 V	Go to STEP 4	Go to STEP 8
4	1. Maintain the engine speed at 2,500 RPM and the load test value on the carbon pile. 2. Measure the voltage drop from the output terminal of the alternator to the positive terminal on the battery. 3. Is the voltage measured less than the specified value?	0.5 V	Go to STEP 7	Go to STEP 9
5	1. Test the alternator single pink wire on the harness for voltage. 2. Is the voltage measured within the specified range?	Battery Voltage	Go to STEP 12	Go to STEP 6
6	1. Inspect for poor connections at the harness connector of the ECU. 2. Was the problem located and corrected?	–	Go to STEP 12	Go to STEP 10
7	1. Inspect for poor connections at the alternator. 2. Was the problem located and corrected?	–	Go to STEP 12	Go to STEP 11

STEP	ACTION	VALUE	YES	NO
8	1. Repair the high resistance or open in the alternator grounding circuit. 2. Was the problem located and corrected?	–	Go to STEP 12	–
9	1. Repair the high resistance or open in the alternator output circuit. 2. Was the problem located and corrected?	–	Go to STEP 12	–
10	1. Replace the ECU. 2. Was the ECU replaced?	–	Go to STEP 12	–
11	1. Replace the alternator assembly. 2. Was the alternator assembly replaced?	–	Go to STEP 12	–
12	1. Run the vehicle to verify the repair. 2. Was the problem corrected?	–	Charging System OK	Go to STEP 1

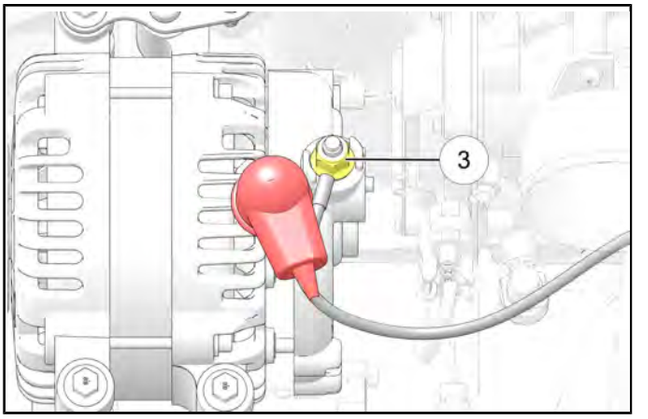
ALTERNATOR REPLACEMENT

REMOVAL

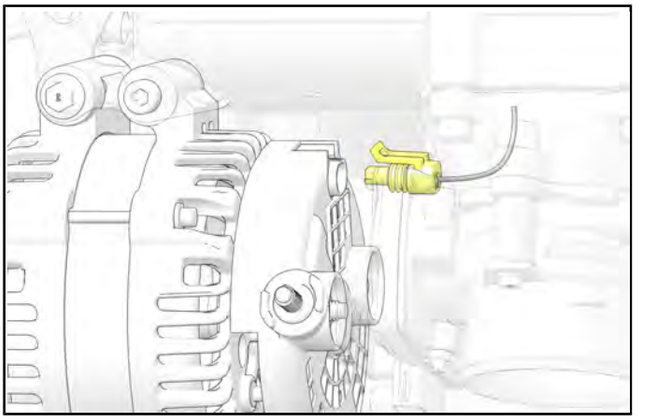
1. Park vehicle on flat and level surface.
2. Loosen negative (-) battery terminal bolt and disconnect.
3. Remove four fasteners ① and remove alternator cover.



4. Remove positive terminal nut ③ and disconnect the main charging lead from the alternator.

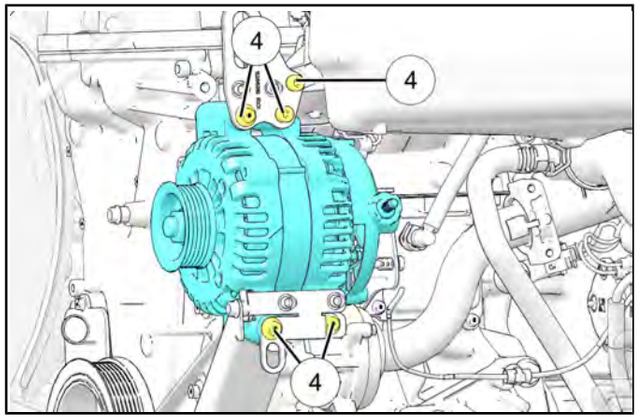


5. Disconnect the alternator electrical connector.



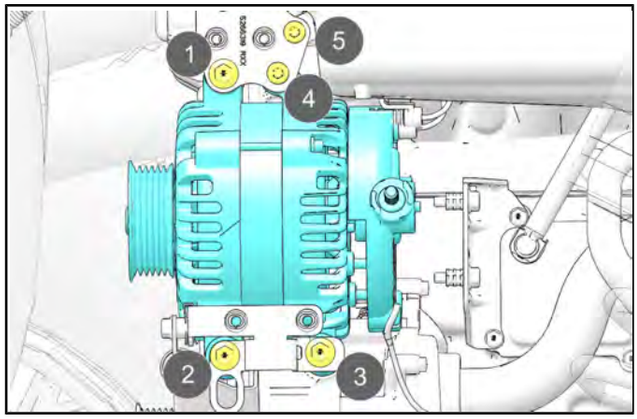
6. Cut the stretch belt and remove.

7. Remove five fasteners ④ and remove the alternator.



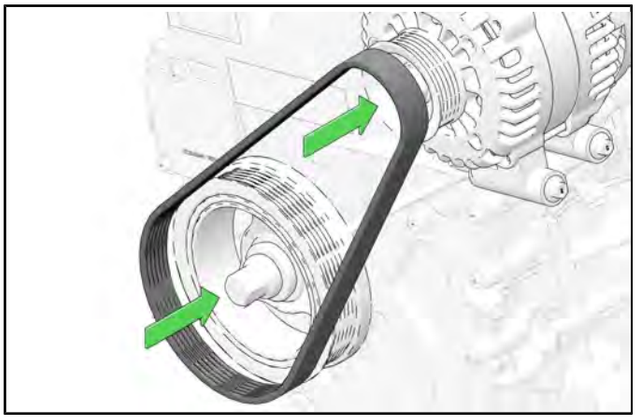
INSTALLATION

1. Install new alternator. Loosely install fasteners. Torque fasteners to specification in sequence shown.

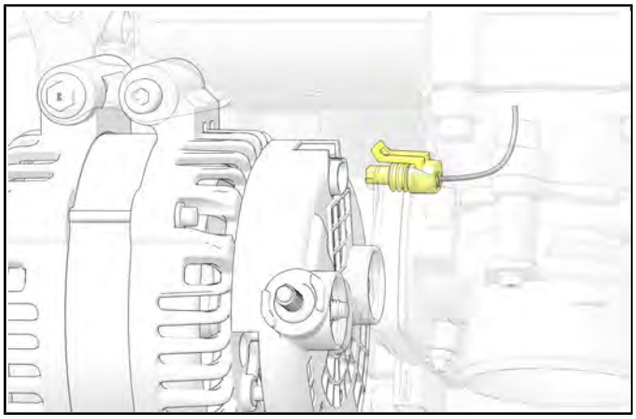


TORQUE
Alternator Mounting Fasteners: **15 ft-lbs (20 Nm)**

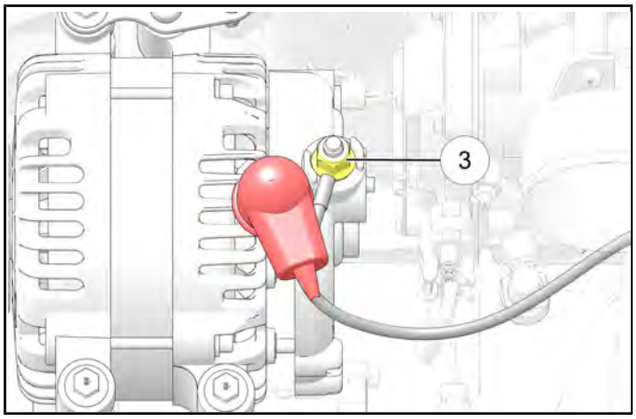
2. Using a commercially-available stretch belt installation tool, install a NEW stretch belt over the alternator and balance pulleys.



3. Connect the alternator electrical connector.

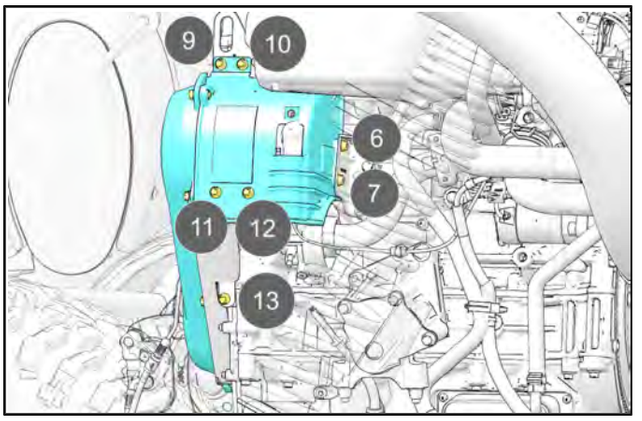


4. Install the main charging lead to the alternator. Install positive terminal nut ③ and torque to specification. Cover the terminal nut with the red protective cap.



TORQUE
Alternator Terminal Nut: **84 in-lbs (9 N·m)**

5. Install alternator covers and torque fasteners in the sequence shown.



TORQUE
Alternator Cover Fasteners: **6 ft-lbs (9 Nm)**

6. Install negative (-) cable to the battery and torque terminal bolt to specification.

TORQUE
Negative Battery Terminal: **60 in-lbs (9 Nm)**

BATTERY

BATTERY SPECIFICATIONS

Type	Polaris / Johnson Controls 575 Sealed - Maintenance Free
Voltage	12 Vdc
Nominal Capacity @ 10 HR Rate	30 AH
CCA	575
Nominal Open Circuit Voltage	12.8 Vdc or more.
Recommended Charging Rate	1.8A @ 5-10 HR or 6.0A @ 1 HR

NOTICE

Never attempt to open the battery. If the seal is broken, the battery will be ruined and will fail within a few weeks.

GENERAL BATTERY INFORMATION

⚠ WARNING

CALIFORNIA PROPOSITION 65 WARNING:Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. WASH HANDS AFTER HANDLING.

⚠ WARNING

Battery electrolyte is poisonous. It contains acid! Serious burns can result from contact with the skin, eyes, or clothing.

ANTIDOTE:
External: Flush with water.
Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call a physician immediately.
Eyes: Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in closed space. Always shield eyes when working near batteries.

Keep out of reach of children.

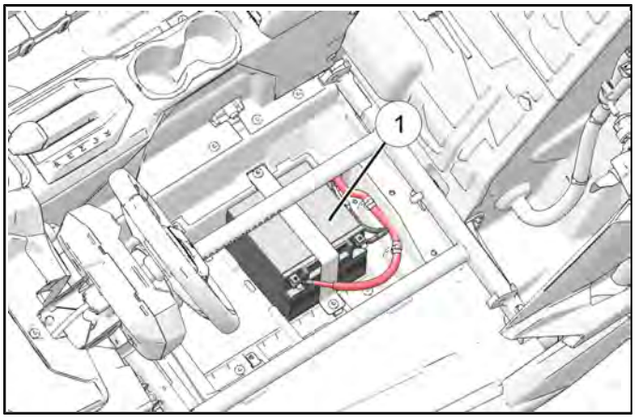
1. Check battery voltage with a volt/ohm meter. A fully charged battery should be 12.8 V or higher.
2. If the voltage is below 12.6 V, the battery will need to be recharged (see Chapter 11 – Charging Procedure page 12.26).

To service a Maintenance Free battery:

3. Remove battery from the vehicle (see Battery Removal page).
4. Test battery with a voltage meter or load tester to determine battery condition. This will determine the length of time required to charge the battery to full capacity. Refer to OCV table (see OCV - Open Circuit Voltage Test page 12.25).
5. Charge the battery as recommended (see – Charging Procedure page 12.26).

BATTERY REMOVAL

1. Remove the driver's seat to access the battery ①.

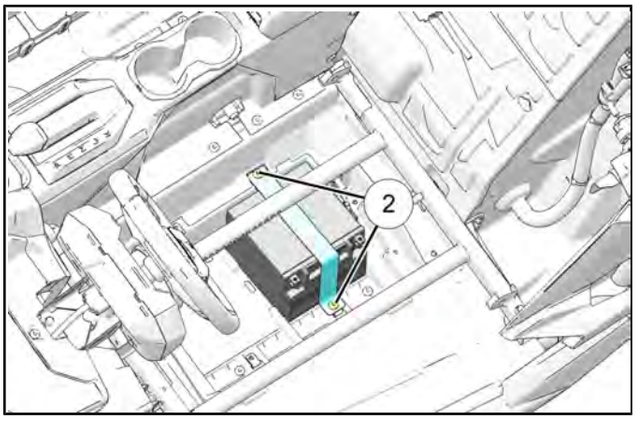


2. Disconnect the black (negative) battery cable(s).
3. Disconnect the red (positive) battery cable(s).

⚠ CAUTION

To reduce the chance of sparks: Whenever removing the battery, disconnect the black (negative) cable first. When reinstalling the battery, install the black (negative) cable last.

4. Remove the battery hold-down bracket fasteners ②, and remove the bracket.



5. Lift the battery out of the vehicle.

BATTERY INSTALLATION

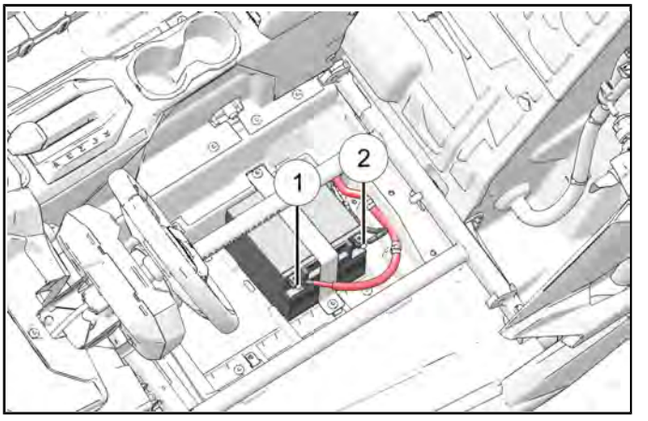
⚠ CAUTION

Using a new battery that has not been fully charged can damage the battery, result in a shorter life and hinder vehicle performance.

1. Ensure the battery is fully charged.
2. Place the battery in the battery holder and secure with hold-down strap. Torque fasteners to specification.

TORQUE
Battery Mount Bracket Fasteners: **53 in-lbs (6 Nm)**

3. Coat the terminals with dielectric grease or petroleum jelly.
4. Connect and tighten the red (positive) ① cable(s) first.
5. Connect and tighten the black (negative) ② cable(s) last. Torque terminal fasteners to specification.



TORQUE
Battery Terminal Fasteners: **60 in-lbs (7 Nm)**

6. Verify that cables are properly routed and reinstall the driver's seat.

BATTERY OFF SEASON STORAGE

Whenever vehicle is not used for a period of three months or more, remove the battery from the vehicle, ensure that it's fully charged, and store it out of the sun in a cool, dry place. Check battery voltage each month during storage and recharge as needed to maintain a full charge.

NOTICE
Battery charge can be maintained by using a Polaris battery tender or by charging once a month to make up for self-discharge. Battery tenders can be left connected to automatically charge the battery if voltage drops below a pre-determined level.

BATTERY TESTING

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first.

The following are two tests which can easily be made on a sealed Maintenance Free battery to determine its condition: OCV Test and a Load Test.

OCV - OPEN CIRCUIT VOLTAGE TEST

Battery voltage should be checked with a digital multitester. Readings of 12.6 volts or less require further battery testing and charging. See the following chart and “Load Test”.

NOTICE
Maintenance Free batteries should be kept at a high state of charge during storage. If the battery is stored or used at a low state of charge, hard crystal sulfation will form on the plates, reducing the efficiency and service life of the battery. Use a volt/ohm meter to test battery voltage.

OPEN CIRCUIT VOLTAGE

STATE OF CHARGE	VOLTAGE
100%	12.8 V and up
75% Charged	12.6 V
50% Charged	12.3 V
25% Charged	12.0 V
0% Charged	11.8 V or less

LOAD TEST

⚠ CAUTION
To prevent shock or component damage, remove spark plug high tension leads and connect securely to engine ground before proceeding.

A battery may indicate a full charge condition in the OCV test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered.

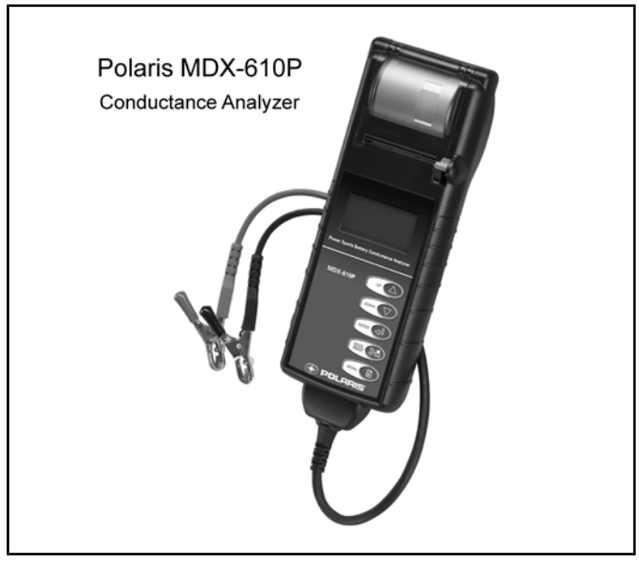
To perform this test, use a load testing device that has an adjustable load. Apply a load of three times the ampere-hour rating. At 14 seconds into the test, check battery voltage. A good 12V battery will have at least 10.5 volts. If the reading is low, charge the battery and retest.

BATTERY CONDUCTANCE ANALYZER

Conductance describes the ability of a battery to conduct current. A conductance tester functions by sending a low frequency AC signal through the battery and a portion of the current response is captured, from this output a conductance measurement is calculated. Conductance testing is more accurate than voltage, specific gravity, or load testing.

When equipped with dual batteries, each battery must be disconnected and isolated before it can be tested using a battery tester.

Authorized Polaris dealers/distributors are required to use the conductance analyzer when testing 12V Polaris batteries.



Polaris MDX-610P **PU-50296**

CHARGING PROCEDURE

If battery voltage is 12.6 Vdc or less, the battery may need recharging. When using an automatic charger, refer to the charger manufacturer's instructions for recharging.

Do not exceed 6 amps when charging the battery.

NOTICE
Charge the battery using an automatic charger that will not exceed 14.6 Vdc. An automatic charger will signal when charging is complete. Allow the battery to stand disconnected for at least 1-2 hours after being properly charged. If the voltage drops below 12.6 volts, charging was ineffective or the battery needs to be replaced.

⚠ WARNING
An overheated battery could explode, causing severe injury or death. Always watch charging times carefully. Stop charging if the battery becomes very warm to the touch. Allow it to cool before resuming charging.

STATE OF CHARGE	VOLTAGE (DC)	ACTION	CHARG-E TIME
100%	12.8 or more	None, check again in 3 months	None Required
75% - 100%	12.6 - 12.8	May need slight charge	3 - 6 hrs
50% - 75%	12.3 - 12.6	Needs Charge	5 - 11 hrs
25% - 50%	12.0 - 12.3	Needs Charge	At least 13 hrs
0% - 25%	12.0 or less	Needs Charge	At least 20 hrs

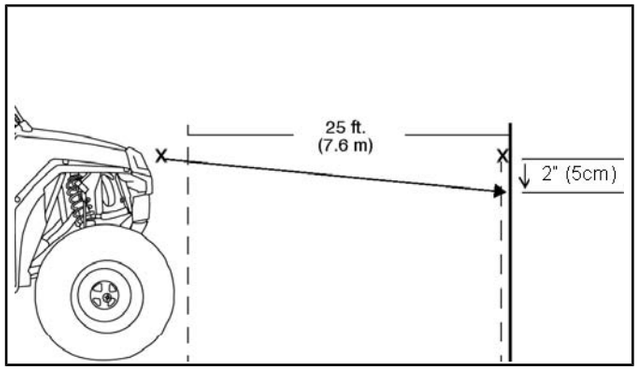
NOTICE
Follow the charger instructions supplied by the manufacture regarding the order or connections, switch positions and when to connect the charger to an outlet.

LIGHTING SYSTEM

HEADLIGHT ADJUSTMENT

The headlight beams are adjustable.

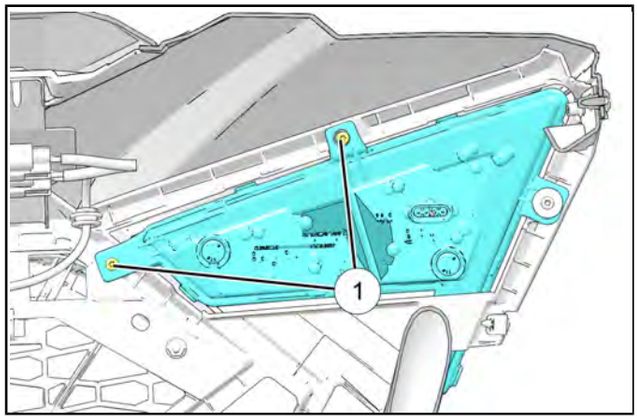
1. Place the vehicle on a level surface with the headlight approximately 25 ft. (7.6 m) from a wall.



2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height.
3. With the machine in Park, start the engine and turn the headlight switch to the LOW position.
4. The most intense part of the LOW beam headlight beam should be aimed 2 in. (5 cm) below the mark placed on the wall in Step 2.

NOTICE
Rider weight must be included in the seat while performing this procedure.

5. Adjust the beam to the desired position by loosening or tightening the two T-25 adjustment screws ① and moving the lamp to the appropriate height.



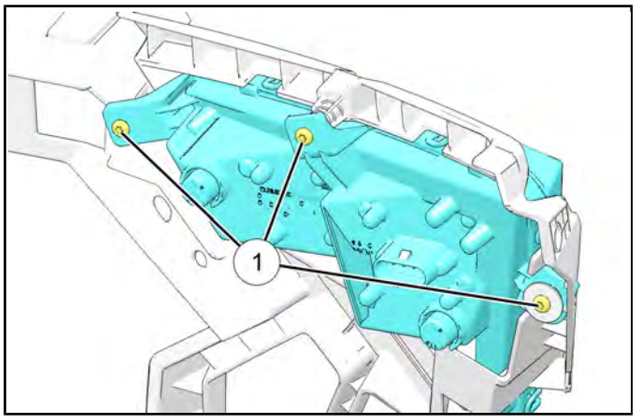
6. Adjust the beam to desired position. Repeat the procedure to adjust the other headlight.

⚠ WARNING
Due to the nature of light utility vehicles and where they are operated, headlight lenses become dirty. Frequent washing is necessary to maintain lighting quality. Riding with poor lighting can result in severe injury or death.

HEADLAMP REPLACEMENT

REMOVAL

1. Remove the front fascia. See Front Fascia Removal page 11.21.
2. Disconnect wire harness from headlamp assembly. Be sure to pull on the connector, not on the wiring.
3. Remove three fasteners ① from the headlamp assembly and remove the headlamp.



INSTALLATION

1. Install the headlamp adjustment springs onto the front bumper mounting bosses.
2. Insert the three T-25 headlamp mounting screws into the headlamp assembly mounting holes.
3. Fully tighten all three headlamp screws until the headlamp assembly is fully seated. Back two headlamp adjustment screws off 1/8” to 1/4” (2-3 turns).
4. Install front fascia. Torque fasteners to specification.

TORQUE
Body fasteners: **7 ft-lbs (10 Nm)**

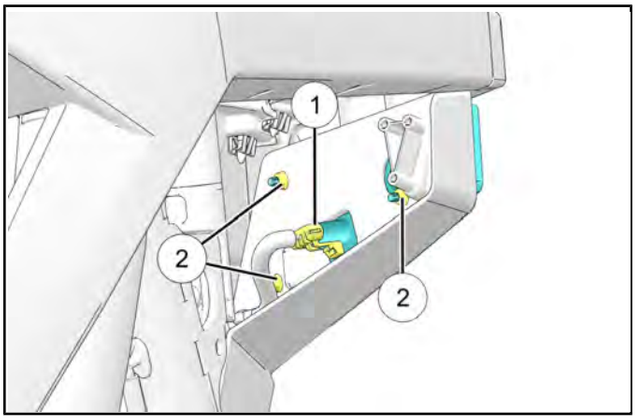
5. Perform the Headlight Adjustment procedure outlined in this chapter.

TAIL LIGHT REPLACEMENT

Before replacing the taillight(s), use a digital multi-meter to test the harness to ensure the lamp is receiving 12 volts and that a ground path is present.

REMOVAL

1. Disconnect the wire harness ①.
2. While holding the taillight assembly, remove the three nuts ② retaining the taillight assembly and remove it from the rear fascia.



INSTALLATION

1. Reverse the removal procedure for tail light installation.

TORQUE
Tail Light Mounting Fasteners: **24 in-lb (3 Nm)**

DASH LIGHT

The LED light will remain ON for approximately 30 seconds after key has been switched to the OFF position.

COOLING SYSTEM

COOLING FAN DESCRIPTION AND OPERATION

The RZR Turbo fan is controlled by the ECU and a solid state driver in the fan motor assembly.

Power is supplied through a 30 amp fuse to terminal 1 of the fan connector.

The ground path for the motor assembly is provided through terminal 2 of the fan assembly connector.

Terminal 4 of the fan assembly connector runs back to 141, or terminal 41 of ECU connector 1. This provides a pulse-width modulated ground path that acts as the control signal for the controller in the fan assembly. This controls fan speed. The longer the ground path through the ECU is left on, the faster the fan motor will spin.

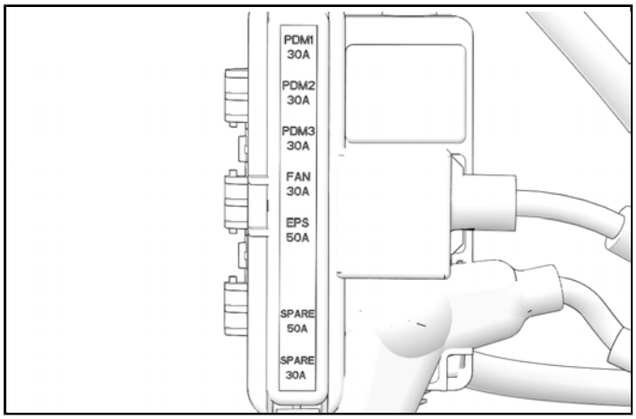
COOLING FAN TESTING

The cooling fan circuit can be tested for proper function by using Digital Wrench – Output State Control. From this menu, you can turn the cooling fan off and on. If the cooling fan does not come on when requested:

1. Disconnect the harness going to the fan and check for power and ground on the main harness side using a multimeter.

NOTICE
When performing this test, Fan Control must be set to ON or no voltage will be seen.

2. If power is present, reconnect the fan harness and remove the fuse box cover. Cycle the Fan control ON using Digital Wrench and check voltage on the fan 30A fuse. Fuse is located in fuse block by the driver's side rear wheel well.



- If voltage is being lost, jump power directly to the fan and use an inductive amp clamp around the fan power wire.
- Normal running amperage for the fan is 15–20 amps but will be momentarily higher when the fan first kicks on.

3. If no power is present, isolate it to a power or ground issue.

- Ground wire back to battery negative should have less than 1 Ω.
- Power side should show battery voltage. If battery voltage is not seen, check voltage at the fan fuse.

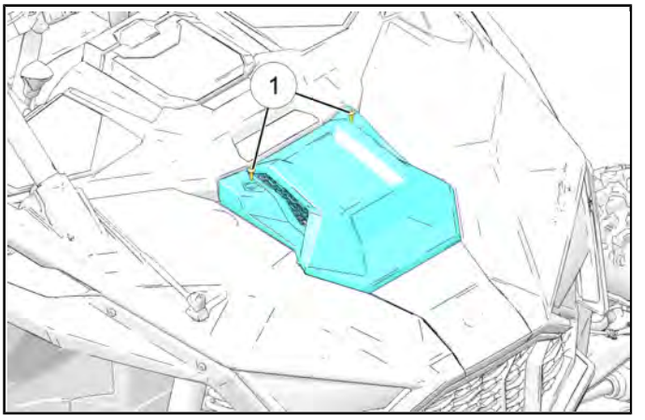
FAN CONTROL CIRCUIT BYPASS TEST

1. Disconnect harness from coolant temperature sensor on the engine cylinder head (see Engine Coolant Temperature Sensor (ECT) Overview outlined in this chapter).
2. With the transmission in Park, start the engine. After a few seconds, the fan should start running and the “Check Engine” indicator should display on the instrument cluster. This indicates all other components are working properly.
3. If the fan does not run or runs slowly, check the fan motor wiring, ground, motor condition, circuit breaker and mechanical relay for proper operation. Repair or replace as necessary. If the fan runs with the sensor harness disconnected, but will not turn on when the engine is hot, check the coolant temperature sensor and connector terminals.

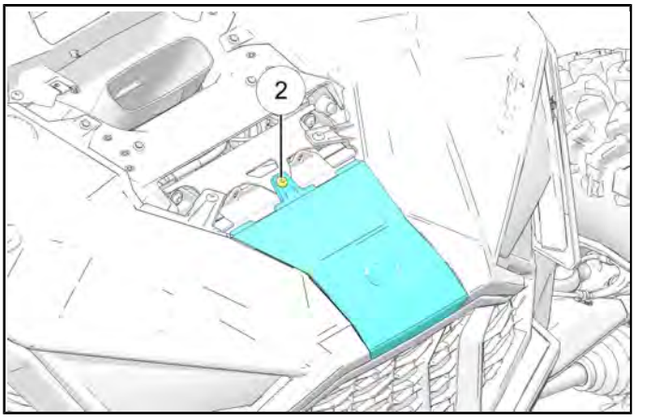
COOLING FAN REPLACEMENT

REMOVAL

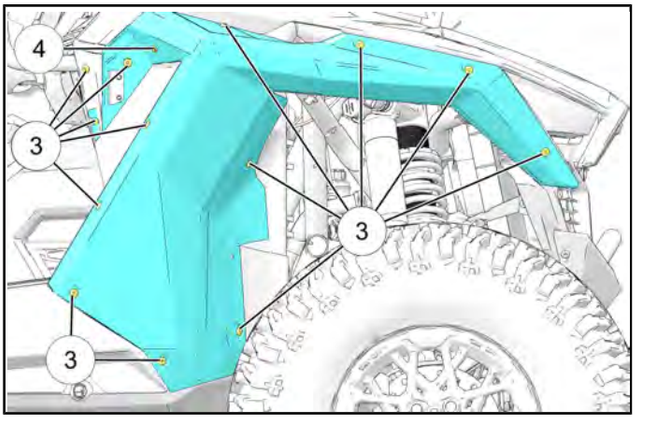
1. Drain cooling system.
2. Remove two fasteners ① and remove the hood.



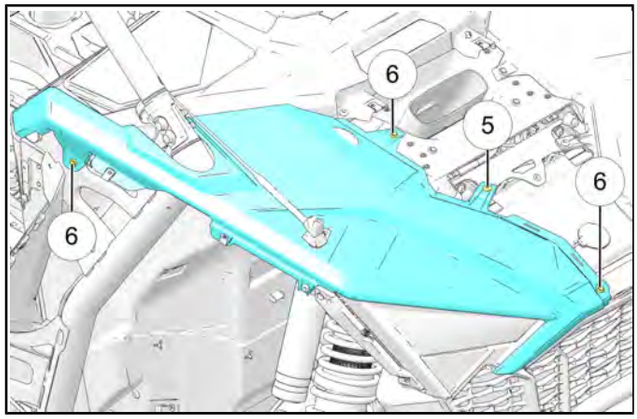
3. Remove one fastener ② and remove the nose cone.



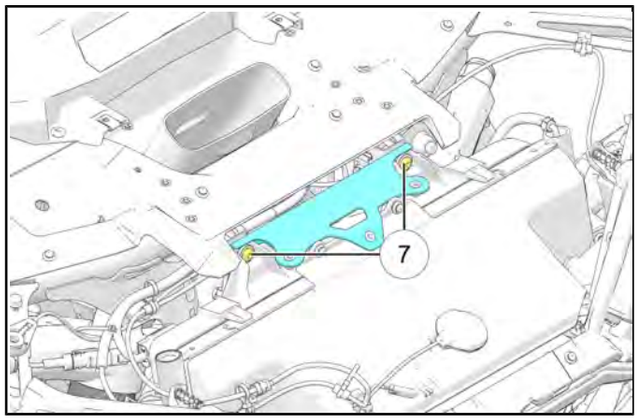
4. Remove thirteen fasteners ③, one push-pin ④, and remove the front fender flare. Repeat for opposite side of the vehicle.



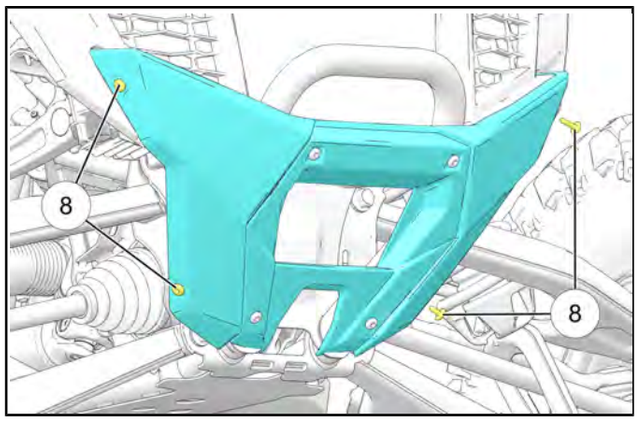
5. Remove one fastener ⑤, three push-pins ⑥, and remove the front fender. Repeat for opposite side of the vehicle. If equipped, disconnect antenna.



6. Remove two fasteners ⑦ and remove the fender mounting bracket.

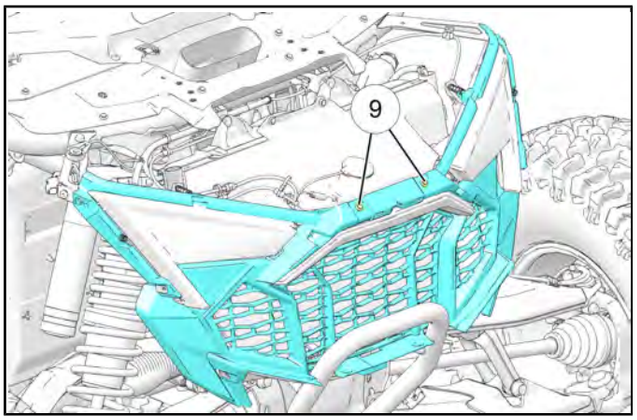


7. Remove four fasteners ⑧ and remove the front bumper assembly.

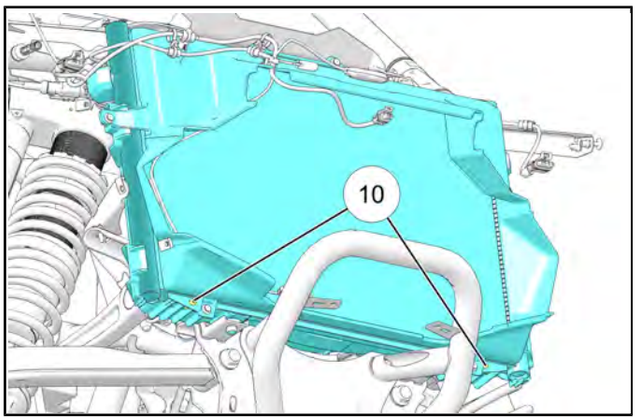


8. Disconnect electrical connectors from the headlights and accent lights, if equipped..

9. Remove two push-pins ⑨ and remove the front fascia.



10. Disconnect coolant hoses from the radiator.
11. Disconnect electrical connector from cooling fan assembly.
12. Remove two fasteners ⑩ retaining the radiator assembly.

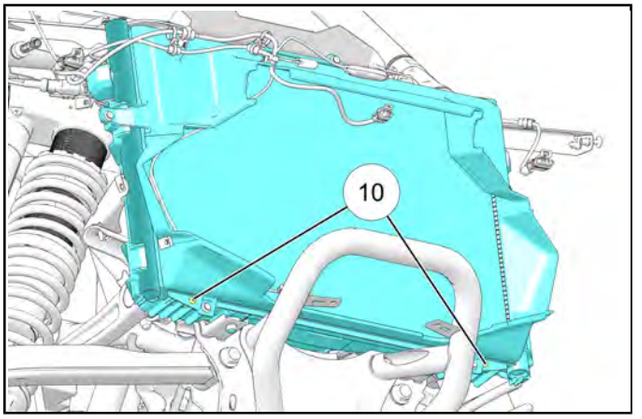


13. Disconnect any wiring from the radiator assembly.
14. Remove radiator, cooling fan and radiator shroud as an assembly.
15. Remove push-pins to separate radiator from fan and shroud assemblies.

INSTALLATION

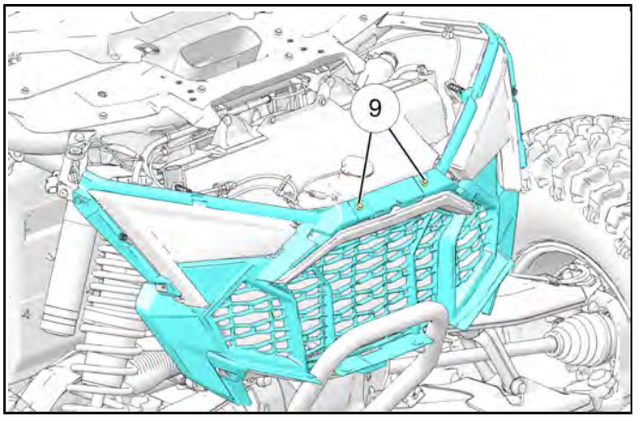
1. Install new radiator onto cooling fan and shroud, and install assembly mounting push-pins.
2. Mount radiator assembly onto vehicle chassis and install radiator hoses.
3. Route and install wiring harness onto radiator assembly.

4. Install two fasteners to mount assembly. Torque fasteners to specification.



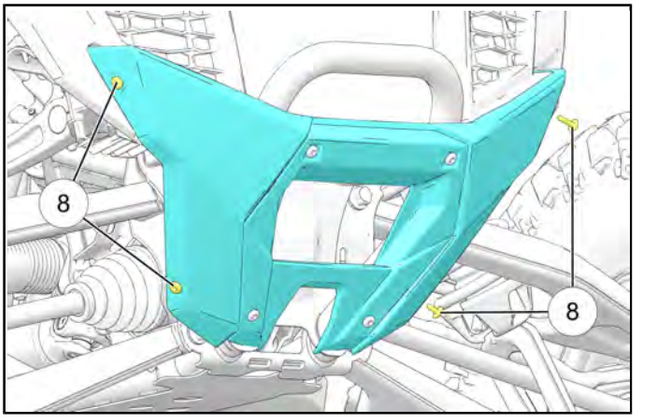
TORQUE
Radiator Mounting Fasteners: **9 ft-lbs (12 Nm)**

5. Connect cooling fan electrical connector.
6. Install front fascia and install two mounting push-pins.



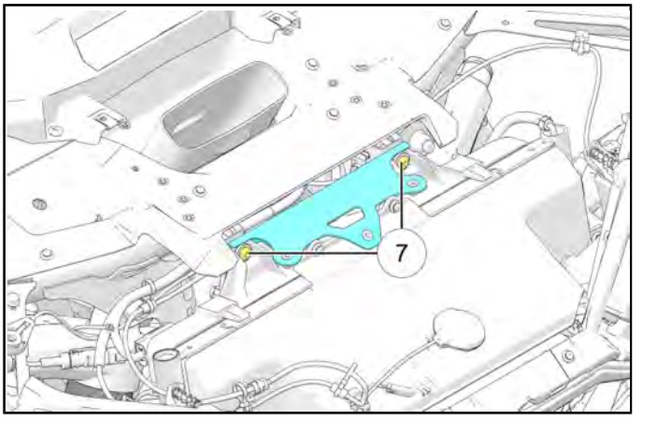
7. Install headlight and accent light electrical connectors.

8. install front bumper assembly. Torque fasteners to specification.



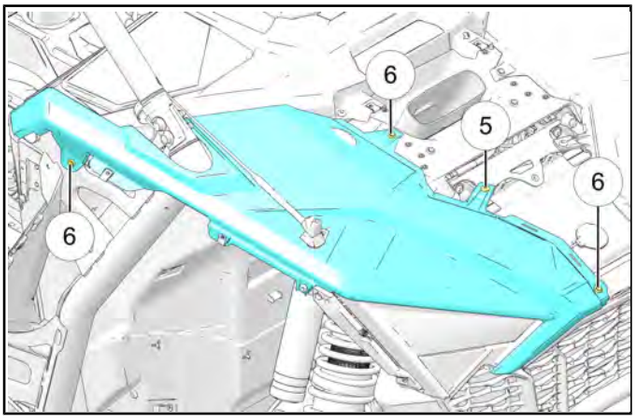
TORQUE
Front Bumper Fasteners: **7 ft-lbs (10 Nm)**

9. Install front fender mounting bracket. Torque fasteners to specification.



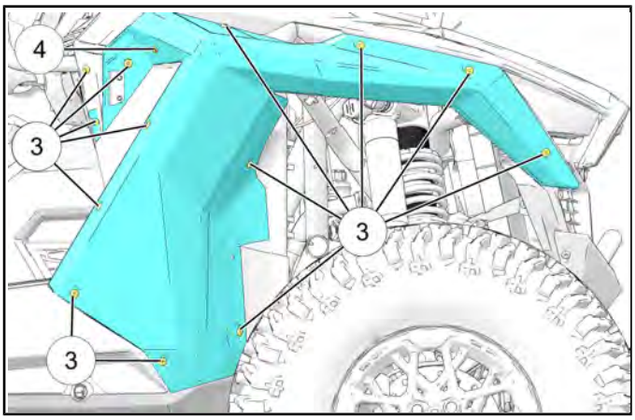
TORQUE
Front Fender Mounting Bracket Fasteners: **7 ft-lbs (10 Nm)**

10. Install front fenders. Torque fasteners to specification



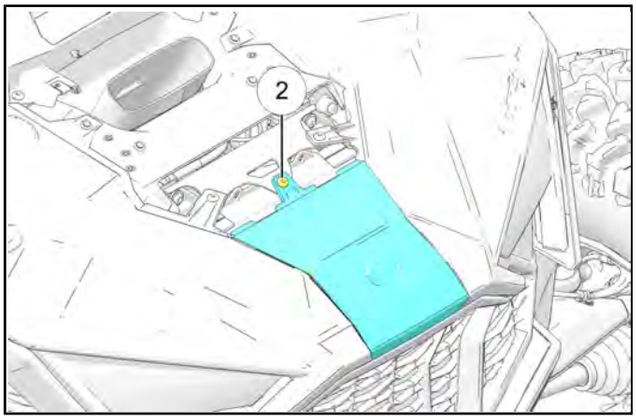
TORQUE
Front Fender Fasteners: **7 ft-lbs (10 Nm)**

11. Install fender flares. Torque fasteners to specification.



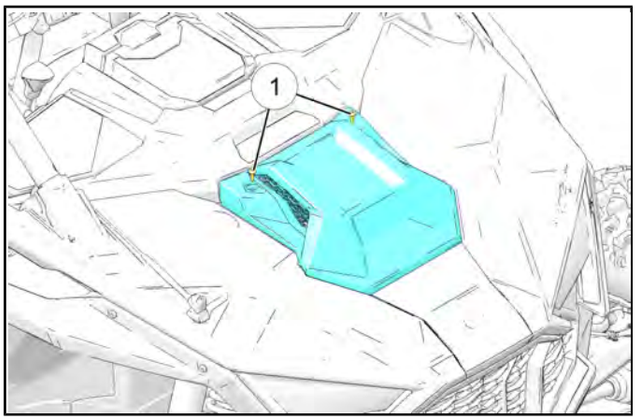
TORQUE
Front Fender Flare Fasteners: **7 ft-lbs (10 Nm)**

12. Install nose cone. Torque fastener to specification.



TORQUE
Nose Cone Fastener: **7 ft-lbs (10 Nm)**

13. Install front hood. Torque fasteners to specification.

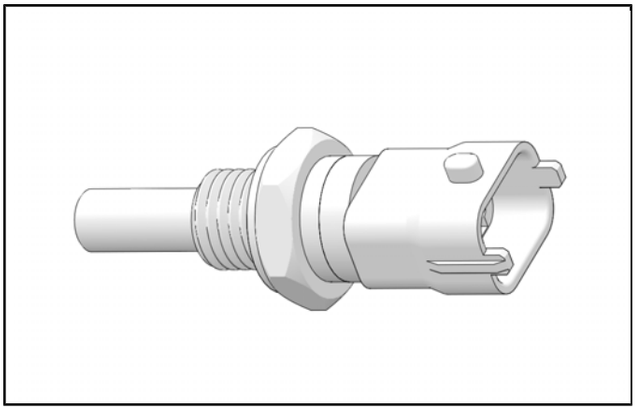


TORQUE
Hood Fasteners: **7 ft-lbs (10 Nm)**

14. Fill and bleed the cooling system. Refer to Cooling System Specifications.

ECT SENSOR TEST

To quickly rule out other components and wiring related to the ECT, disconnect the harness from the ECT sensor and start the engine. After a few seconds, the fan should turn on and the “Check Engine” indicator should display on the instrument cluster. This indicates all other components are working properly.



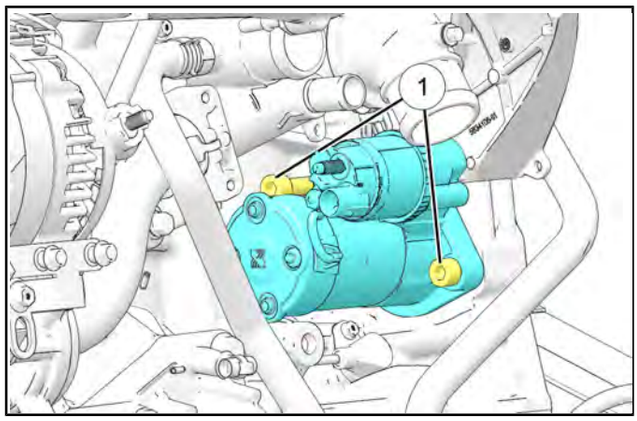
Polaris dealers can test the sensor by using Digital Wrench® Diagnostic Software (dealer only).

TEMPERATURE °F (°C)	RESISTANCE
68 °F (20 °C)	2.5 k Ω ± 6%
86 °F (30 °C)	1.7 k Ω ± 6%
104 °F (40 °C)	1.2 k Ω ± 6%
122 °F (50 °C)	834 Ω ± 6%
140 °F (60 °C)	596 Ω ± 6%
158 °F (70 °C)	435 Ω ± 6%
176 °F (80 °C)	323 Ω ± 6%
194 °F (90 °C)	243 Ω ± 6%
212 °F (100 °C)	186 Ω ± 6%

STARTING SYSTEM

STARTER / SOLENOID REPLACEMENT

1. Remove electrical connections from the starter assembly.
2. Remove two fasteners ① retaining the starter assembly and remove the starter.

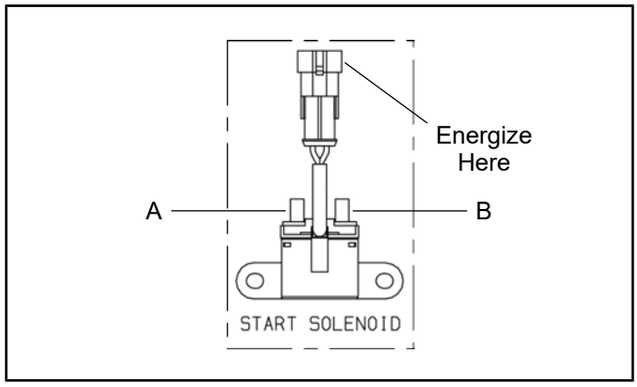


3. Reverse procedure for starter assembly installation. Torque fasteners to specification.

TORQUE
Starter Positive Cable Fastener: **11 ft-lbs (15 Nm)** Starter Mounting Fasteners: **26 ft-lbs (35 Nm)**

STARTER SOLENOID BENCH TEST

Test the start solenoid by powering the solenoid using battery voltage for a *maximum of 5 seconds*. With the solenoid energized, resistance should read about 0 - 0.5 Ω between terminals (A) and (B). If resistance measurement is out of specification, replace the starter solenoid.



STARTER SOLENOID OPERATION

To energize the Starter Solenoid the following must occur:

- The brake must be applied to provide a ground path via the Orange wire.
- The key switch must be turned to the “start” position to provide 12V power via the Green / White wire.
- Once the pull-in coil is energized, the solenoid provides a current path for 12V power to reach the starter motor.

ELECTRONIC POWER STEERING (EPS)

EPS OPERATION

The EPS module is an intelligent electronic power steering system that operates off of the vehicle's 12V electrical system. It calculates steering assist by sensing the difference between the input torque of the steering post and the output torque required to turn the wheels, and then provides assist by energizing an electric motor. The process provides a smooth, seamless assist.

The system is continuously running diagnostic checks and monitoring factors such as battery voltage, ground speed and engine speed. In the event an internal or external issue that affects the EPS system is detected, the system will illuminate a fault indicator and transition to a normal mechanically coupled steering system. The system is Polaris Digital Wrench® compatible for simplified diagnostics and system troubleshooting through the vehicle's diagnostic port.

With the engine off and the key on, the power steering unit will operate for up to five minutes. After the five minutes, you will need to cycle the key switch and restart the engine to regain power steering operation.

NOTICE

To conserve battery power, the EPS unit will shut down 5 minutes after the engine has stopped if the key remains in the ON position. At this point, the EPS Malfunction Indicator Light will illuminate to indicate the EPS has shut down and will set a fault code in Digital Wrench®.

The Power Steering 30A Fuse.

- If the fuse fails, the Power Steering Malfunction Indicator Light (MIL) on the instrument cluster will illuminate. During this time, the vehicle will have no power steering operation. You will be able to connect and communicate with the vehicle's Engine Controller, but not the Power Steering Controller, while using Digital Wrench®.

NOTICE

DO NOT SPLICE OR CUT INTO THE CAN CIRCUITS.

⚠ WARNING

Electronic Power Steering (EPS) units are not interchangeable between ATV and *RANGER* product lines.

NOTICE

See Steering System Assembly page in the Steering / Suspension chapter for power steering unit removal and installation procedures.

CONNECTOR	TERMINAL	SIGNAL	FUNCTION
A	1	B+	Battery Positive
	2	GND	Battery Negative
B	1	GND	
	2	GND	
	3	VCC2	
	4	VCC1	
	5	PWM-P	
	6	PWM-T1 / TSM	Main Torque Sensor Signal
	7	PWM-S	
	8	PWM-T2 / TSS	Sub Torque Sensor Signal
C	1	-	
	2	CAN High	CAN Signal High
	3	CAN Low	CAN Signal Low
	4	GND	

CONNECTOR	TERMINAL	SIGNAL	FUNCTION
	5	VIGN	Ignition Signal
	6	GND	

PROPER EPS SYSTEM DIAGNOSING

READ BEFORE YOU REPLACE THE EPS UNIT!

NOTICE
Verify the EPS unit has the latest software version and calibration loaded before replacing the EPS unit. If not, update to the latest version for each and follow the guided diagnostic procedure(s) available in Digital Wrench®.

FUSES / RELAYS

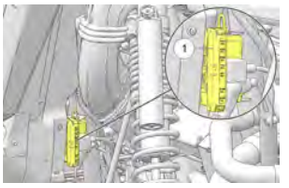
FUSE / RELAY CENTERS

⚠ WARNING

Do not arrange fuses improperly or use replacement fuses with improper amperage values. This could lead to electrical overload, which can result in severe injury or death.

PRIMARY FUSE CENTER

If the engine stops or will not start, if the power steering stops working (if equipped), or if you experience other electrical failures, a fuse may need replacement. Locate and correct any short circuits that may have caused the blown fuse, then replace the fuse.

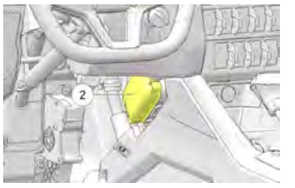


There are two fuse/relay centers accessible on the vehicle. The primary fuse center ① is in the driver-side rear wheel well. Remove the protective shield before accessing the primary fuse center.

LABEL	VALUE	FUNCTION
FAN	30A MCASE Fuse	Engine Cooling Fan
PDM 1	30A MCASE Fuse	Power to Secondary Fuse Center for Lights, Instrumentation, Audio Amp Fuse, and Accessory Relay
PDM 2	30A MCASE Fuse	Power to Secondary Fuse Center for Auxiliary Outlets, Chassis, SCM, and Shock Fuse
PDM 3	30A MCASE Fuse	Power to Secondary Fuse Center for Fuel and EFI Fuse
EPS	50A MCASE Fuse	Electronic Power Steering
PULSE PWR	200A ZCASE Fuse	Battery Power to Polaris Pulse and 6AWG Cable
AUD AMP	30A Fuse	Audio Amplifier

SECONDARY FUSE CENTER

The secondary fuse center ② is under the dash, near the operator's right knee area.



LABEL	VALUE	FUNCTION
FUEL	10A Fuse	Fuel Pump
TERM BLK	10A Fuse	Terminal Block Accessory
INST ACCY	10A Fuse	Diagnostic Accessory, Interior LED Light, Display Accessory (optional)
PWR PT 1	10A Fuse	12V Socket (in front of gear selector)
INST UNSW	7.5A Fuse	Display (optional), Gauge, Diagnostic
LIGHTS	7.5A Fuse	Headlights, Taillights, Accent Lights (optional), Brake Lights
CHASSIS	15A Fuse	AWD Switch Light, Oxygen Sensor Heater, EPS Wake-Up, Vehicle Speed Sensor, Seat Belt Switch, SCM Wake-Up (optional), SCM Mode Switch (optional), AWD Coil, Gauge, Waste Gate

LABEL	VALUE	FUNCTION
EFI	10A Fuse	Accessory Relay Coil, ECM Wake-Up, Pump Relay Coil, Chassis Relay Coil, Start Relay Coil, EFI Relay Coil, Injectors, SCM Relay Coil (optional), Lights Relay Coil, Ignition Coil, Starter Solenoid Coil, Brake Relay Coil
COIL	7.5A Fuse	Ignition coils
FRONT DIFF	10A Fuse	Front Differential
CHARGE	15A Fuse	Battery Charge Port
Additional Fuses (if equipped)		
SCM	10A Fuse	Shock Control Module
SHOCK	15A Fuse	Shock Power

PDM FUSE TROUBLESHOOTING

IMPORTANT

In the event of faults or intermittent power to functions connected to more than just one fuse, a solution may be to replace one of the PDM fuses. This is because power routes from the PDM fuses to different "downstream" fuses. See the table below for details.

PDM FUSE	"DOWNSTREAM" FUSES
PDM 1 (30A)	INST UNSW (7.5A)
	LIGHTS (7.5A)
	INTR ACCY (10A)
	TREM BLK (10A)
PDM 2 (30A)	PWR PT1 (10A)
	CHASSIS (7.5A)
	SCM (10A)
	SHOCK (15A)
PDM 3 (30A)	EFI (10A)
	START (15A)
	FUEL (10A)

If you believe a PDM fuse may be causing intermittent power to its "downstream" fuses, follow the procedure for replacing and testing below.

1. Place the vehicle in PARK, turn off the engine, and then turn the ignition switch to the ON position.
2. Access the Primary Fuse Center in the driver-side rear wheel well.
3. Gently nudge the suspected PDM fuse by hand and check to see if intermittent power occurs to vehicle functions. This will simulate vehicle operation and help confirm which PDM is at issue. If intermittent power does not occur, perform the same nudge test on the remaining PDM fuses.
4. Once the correct PDM fuse is confirmed, turn the ignition switch to the OFF position.
5. Replace the PDM fuse using one of the SPARE fuses.

IMPORTANT

After removing a fuse, always check to ensure the two wire terminals that the fuse connects to are properly seated. Dislodged or misaligned wiring may also cause intermittent power to vehicle functions. If this is the case, adjust the wires by pushing up from the backside of the fuse block. If the problem persists, consult your dealer.

6. Turn the ignition switch to the ON position.
7. Gently nudge the SPARE fuse and check to see if intermittent power occurs to vehicle functions.

CAN SYSTEM

CAN SYSTEM OVERVIEW

The CAN system allows a large amount of information to flow between components. The CAN system on this vehicle will link the ECU, Diagnostic Connector, Instrument Cluster/PIDD and EPS unit through a green and a yellow wire.

CAN SYSTEM TESTING

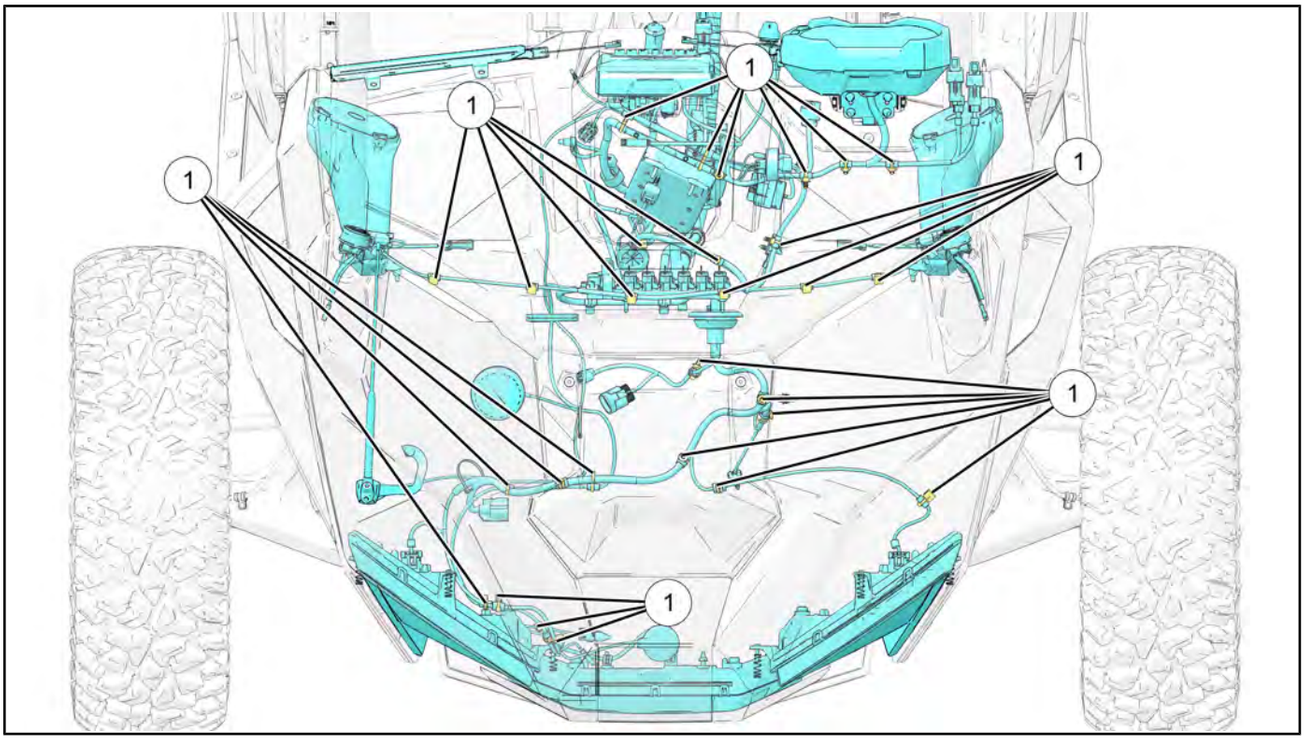
A component not displaying information correctly could be the cause of damaged CAN wiring or a faulty component.

The easiest location to test the CAN system is at the Diagnostic Connector.
Turn the key to the OFF position. Using a multimeter, ohm across the Green and Yellow wires at the diagnostic connector.

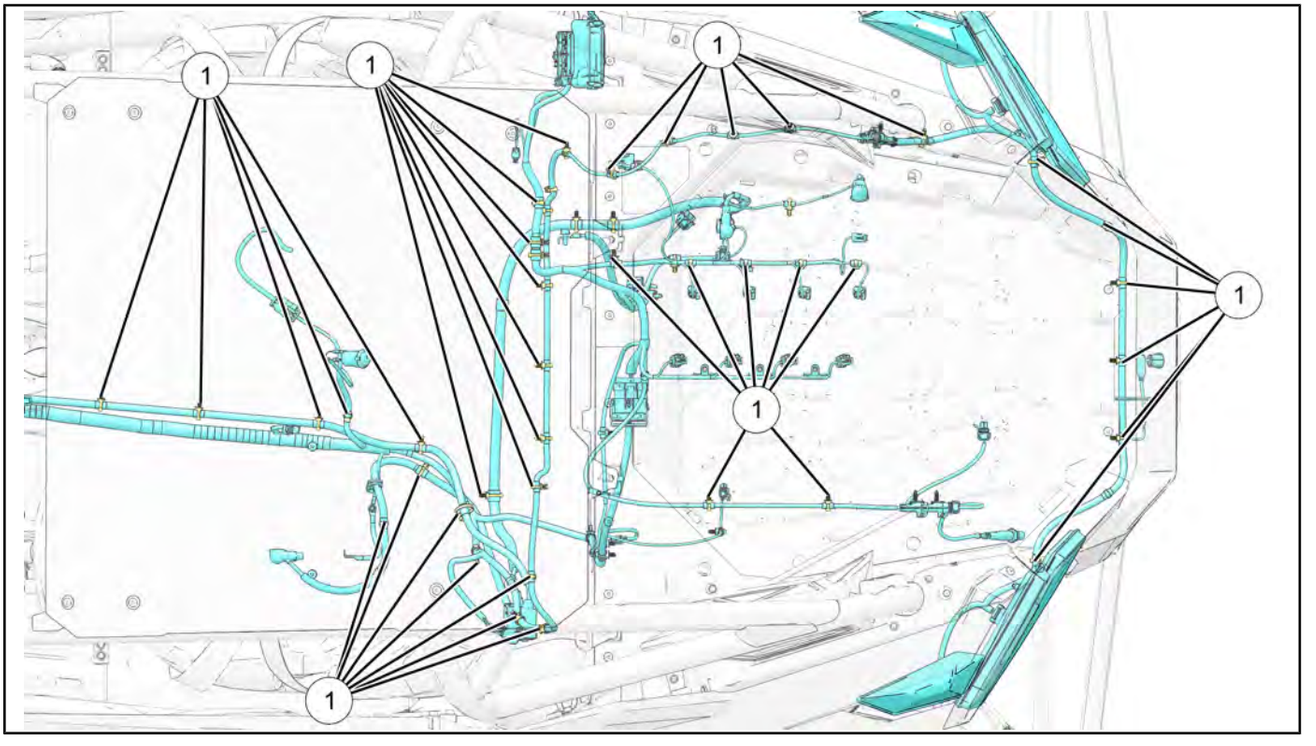
- A *RZR* equipped with a PIDD should have a reading of 120 Ω. Anything other than 120 Ω is bad.
- A *RZR* not equipped with a PIDD should see a reading of 60 Ω. A reading of 120 Ω is bad.

WIRING HARNESS

ELECTRICAL HARNESS RETENTION



①	Zip Tie Retention Point	The white tape on the harness signifies a retention point



APPENDIX A WIRING DIAGRAMS

NOTES

A

B

C

D

E

F

G

H

I

K

L

M

O

P

Q

R

S

T

U

V

W