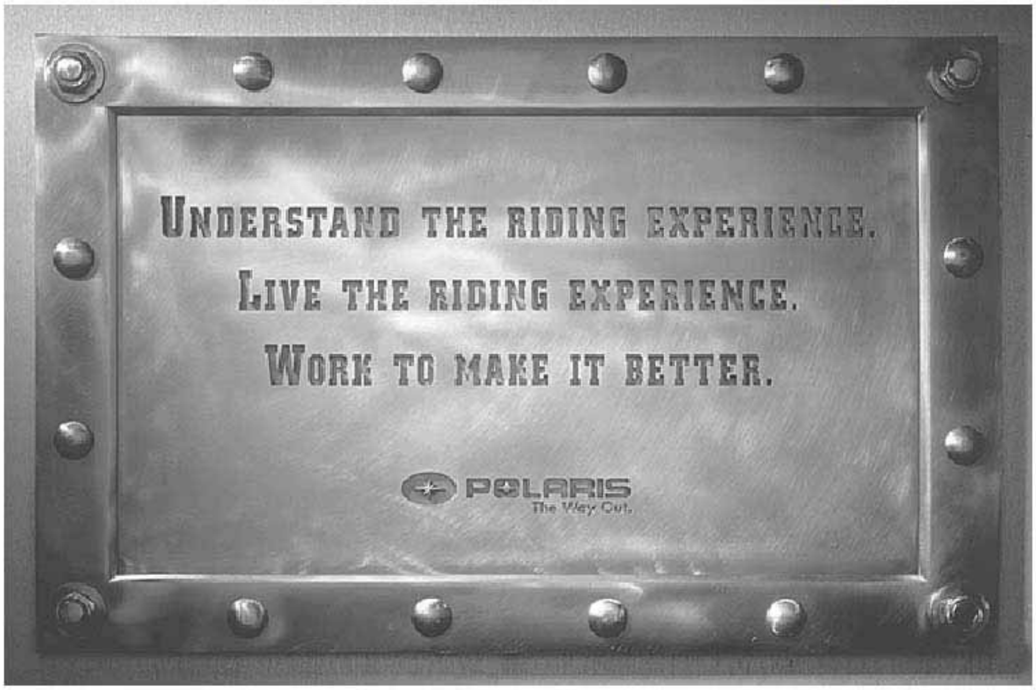


2007 SPORTSMAN 450 / 500 EFI / 500 X2 EFI SERVICE MANUAL

FOREWORD

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 service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

Comments or suggestions about this manual may be directed to: Service Publications Dept. @ Polaris Sales Inc. 2100 Hwy 55 Medina Minnesota 55340.

2007 Sportsman 450 / 500 EFI / 500 X2 EFI Service Manual PN 9920560

UNDERSTANDING MANUAL SAFETY LABELS AND DIRECTIONS

Throughout this manual, important information is brought to your attention by the following symbols:

WARNING

SAFETY ALERT WARNING indicates a potential hazard that may result in severe injury or death to the operator, bystander or person(s) inspecting or servicing the vehicle.

CAUTION

SAFETY ALERT CAUTION indicates a potential hazard that may result in minor personal injury or damage to the vehicle.

CAUTION

CAUTION indicates special precautions that must be taken to avoid vehicle damage or property damage.

NOTE:

NOTE 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

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

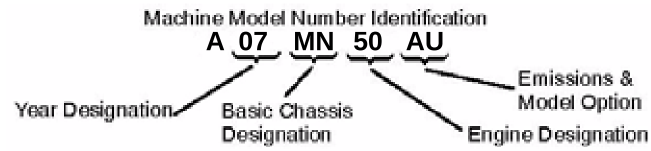
NOTES

CHAPTER 1
GENERAL INFORMATION

MODEL NUMBER INFORMATION

Model Number

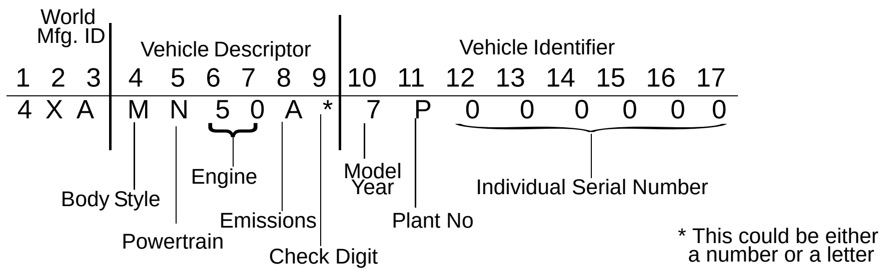
The machine model number must be used with any correspondence regarding warranty or service.



Engine Designation Numbers

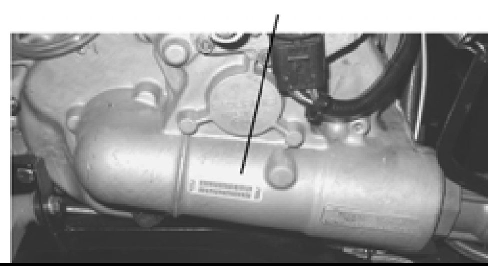
EH50PLE - Single Cylinder, Liquid Cooled,4 Stroke, Electric Start

Vehicle Identification Number (VIN)



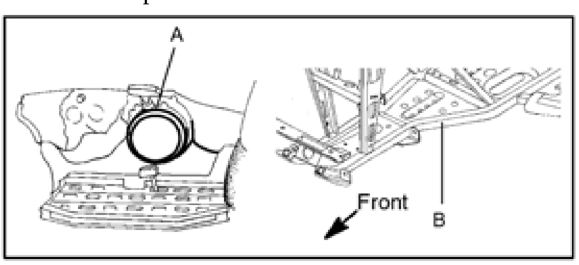
Transmission I.d. Location

The transmission I.D.number is located on top of the transmission snorkel, right side of machine.



Engine And Machine Serial Numbers

The machine model number and serial number are important for vehicle identification. Be sure to refer to the engine model number and serial number whenever corresponding about an engine. This information can be found on the sticker applied to the top side of the crankcase (A). An additional number is stamped on the side of the crankcase beneath the cylinder coolant elbow.



The machine serial number is stamped on the lower left side of the frame tube (B).

Publications

Table 1-1: Publications

Year	Model	Model No.	Owner's Manual PN	Parts Manual PN	Parts Micro Fiche PN
2007	Sportsman 500 EFI	A07MN50A (Deluxe) A07MH50A (Standard) A07MH50F (Standard Intl')	9920364	9920365	N/A
2007	Sportsman X2 500 EFI	A07TN50A (Deluxe) A07TH50A (Standard)	9920632	9920902	N/A
2007	Sportsman 450 EFI	A07MH46A	9920629	9920557	N/A
2007	Sportsman X2 500 EFI Quadricycle	A07MH46E	9920650	9920899	N/A

Paint Codes

Table 1-2: Paint Codes

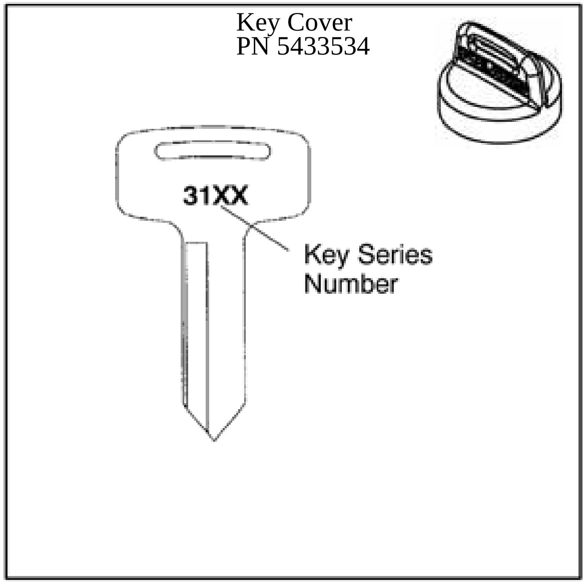
PAINTED PART	COLOR DESCRIPTION	DITZLER NUMBER	POLARIS NUMBER
Sportsman Frame	Black	9440	P-067

Replacement Keys

Replacement keys can be made from the original key (Phoenix excluded). 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. Should both keys become lost, ignition switch replacement is required.

Table 1-3: Key Numbers

Series #	Part Number
20	4010278
21	4010278
22	4010321
23	4010321
27	4010321
28	4010321
31	4110141
32	4110148
67	4010278
68	4010278



Sportsman 'Deluxe' and 'Standard' Model Component Comparison

For Model Year 2007, a Sportsman 'Deluxe' and 'Standard' model were offered. Use the following table as a guide:

SPORTSMAN 'DELUXE' MODEL	Item Location	SPORTSMAN 'STANDARD' MODEL
Winch	1	No Winch
PXT Tires	2	Titan Tires
PVT w/EBS	3	Non-EBS (X2 excluded)
Rear Work Lights	4	No Work Lights
Front Drive w/ Active Descent Control (ADC)	5	No Active Descent Control (ADC)
Speed Sensor Wiring for ADC	6	No Sensor Wiring Change
Rear Rack Extension	7	No Rack Extension
Cast Aluminum Wheels	8	Steel Wheels
Single Exhaust	9	Single Exhaust
Wire Harness w/ Active Descent Control (ADC)	10	Standard Wire Harness
PDM w/ Active Descent Control (ADC)	10	Standard PDM

Deluxe Model Pictured

Sportsman X2 ‘Deluxe’ and ‘Standard’ Model Component Comparison

For Model Year 2007, an X2 ‘Deluxe’ and ‘Standard’ model were offered. Use the following table as a guide:

X2 ‘DELUXE’ MODEL	Item Location	X2 ‘STANDARD’ MODEL
Winch	1	No Winch
Rear Work Lights	2	No Work Lights
Front Drive w/ Active Descent Control (ADC)	3	No Active Descent Control (ADC)
Cast Aluminum Wheels	4	Steel Wheels

2007 SPORTSMAN 450

Model Number: A07MH46AA, AZ

Engine Model: EH46PLE

Table 1-4: Sportsman 450 General Specifications

Category	Dimension / Capacity
Length	83 in./211 cm
Width	48 in./122 cm
Height	48 in./122 cm
Wheel Base	50.5 in./128.3 cm
Ground Clearance	11 in./27.94 cm
Dry Weight	715 lbs./324 kg
Gross Vehicle Weight	1210 lbs./549 kg
Front Rack Capacity	90 lbs./40.8 kg
Rear Rack Capacity	180 lbs./81.6 kg
Towing Capacity	1225 lbs./555.6 kg
Body Style	Spirit
Hitch Tongue Capacity	120 lbs./54.4 kg

Table 1-5: Sportsman 450

ENGINE	
Platform	Fuji Single Cylinder
Engine Model Number	EH46PLE010
Engine Displacement	455cc
Number of Cylinders	1
Bore & Stroke (mm)	87.9 x 75 mm
Compression Ratio	9.8:1
Compression Pressure	50-90 psi W/Compression Release
Engine Idle Speed	1100 ± 50 RPM
Engine Max Operating Rpm	6000 Rpm ± 200 Rpm
Cooling System / Capacity	Liquid - 2.25 qt / 2.1 ltr
Overheat Warning	HOT on Instrument Cluster
Lubrication	Pressurized Dry Sump
Oil Requirements / Capacity	Polaris 0W-40 2 qt. / 1.9 ltr
Exhaust System	Single Pipe USFS Approved
Fuel System	
Carburetor	Mikuni BST 34mm
Main Jet	167.5
Pilot Jet	42.5
Jet Needle / Clip Position	4IB33 - 3
Needle Jet	P-6M (829)
Pilot Screw	2 3/4 Turns Out (initial)
Pilot Air Jet	1.3
Float Height	13mm ± 1 (.51 ± 0.40")
Fuel Delivery	Fuel Pump
Fuel Capacity / Requirement	4.25 gal US / 19.9 liters 87 Octane (minimum) or 89 Oxygenated
Electrical	
Alternator Output	260 w @ 3000 RPM
Voltage Regulator	3-phase - PDM
Lights : Pod	50 watts
Grill	2 x 37 watts
Brake	26.9 watts
Tail	8.26 watts
Worklight	13 watts
Indicator	1 watt
Operating RPM	6000 RPM
Ignition System	DC/CDI Ignition
Ignition Timing	30°± 2° BTDC @ 5000 RPM
Spark plug / Gap	BKR6E / .035 in. / 0.9 mm
Battery / Amp Hr	Maintenance-Free / 12 Amp Hr.
Circuit Protection	Solid State - PDM
Starting	Electric / Recoil
Instrument Cluster	Analog Speedo w/ LCD

Table 1-6: Sportsman 450

Drivetrain	
Transmission Type	Drumshift - H/L/N/R/P
Transmission Capacity	32 oz. / 948 ml
Front Gearcase Capacity	8.97 oz. / 265 ml
Gear Ratio : Low Rev High Front Drive	23.91:1 16.30:1 10.49:1 3.82:1
Clutch Type	PVT Non-EBS
Belt	3211077
Steering / Suspension	
Front Suspension / Shock	A-arm / MacPherson Strut
Front Travel	8.2 in. / 20.8 cm
Rear Suspension / Shock	Progressive Rate Independent - w/ 2" Coil-over shock
Rear Travel	9.5 in. / 24.13 cm
Ground Clearance	11 in. / 27.94 cm
Shock Preload Adjustment Front / Rear	Front -Non Adjustable. Rear - Ratchet Style- Std.
Turning Radius	65 in./165.10 cm unloaded
Toe Out	0-1/16 in / .0 - .159 mm
Wheels / Brakes	
Wheel / Tire Size / Pattern - Front	Steel 25x8 - 12 / 4-156
Wheel / Tire Size / Pattern - Rear	Steel 25x11 - 12 / 4-156
Recommended Air Pressure	Front & Rear - 5 psi
Brake - Front	Dual Hydraulic Disc
Brake - Rear	Single Hydraulic Disc
Brake Fluid	DOT - approved only

Table 1-7: Sportsman 450 Jetting

Altitude		AMBIENT TEMPERATURE	
		Below 40 ° F Below 5 ° C	+40 to +80 ° F +5 to +28 ° C
Meters (Feet)	0-1800 (0-6000)	**175**	**167.5**
	1800-3700 (6000-12000)	**162.5**	**157.5**

Table 1-8: Sportsman 450 Clutching

Altitude		Shift Weight	Drive Clutch Spring	Driven Clutch Spring	Driven-Helix
Meters (Feet)	0-1800 (0-6000)	10 WH (5630710)	Blu/Grey (7042202)	Black (7041782)	40° 2+2 (5131446)
	1800-3700 (6000-12000)	20-40 (5631356)	Blu/Grey (7042202)	Black (7041782)	40° 2+2 (5131446)

2007 SPORTSMAN 500 EFI

Model Number: A07MH50AX, AY, AZ, AQ / A07MN50AL, AF / A07MH50FC

(Standard Models) (Deluxe Models) (International)

Engine Model: EH50PLE

Table 1-9: Sportsman 500 EFI General Specifications

Category	Dimension / Capacity
Length	83 in./211 cm
Width	48 in./122 cm
Height	48 in./122 cm
Wheel Base	50.5 in./128.3 cm
Ground Clearance	11.25 in./28.6 cm
Dry Weight	715 lbs./324 kg
Gross Vehicle Weight	1200 lbs./544 kg
Front Rack Capacity	90 lbs./40.8 kg
Rear Box Capacity	180 lbs./81.6 kg
Towing Capacity	1225 lbs./555.6 kg
Body Style	Spirit
Hitch Tongue Capacity	120 lbs./54.4 kg

Table 1-10: Sportsman 500 EFI

ENGINE	
Platform	Fuji Single Cylinder
Engine Model Number	EH50PLE210
Engine Displacement	499cc
Number of Cylinders	1
Bore & Stroke (mm)	92 x 75 mm
Compression Ratio	10.2:1
Compression Pressure	50-90 psi W/Compression Release
Engine Idle Speed	1100 ± 200 RPM
Engine Max Operating Rpm	6000 Rpm ± 200 Rpm
Cooling System / Capacity	Liquid - 2.5 qt / 2.4 ltr
Overheat Warning	HOT on Instrument Cluster
Lubrication	Pressurized Dry Sump
Oil Requirements / Capacity	Polaris 0W-40 2 qt. / 1.9 ltr
Exhaust System	Single Pipe USFS Approved
Fuel System	
Fuel System	Electronic Fuel Injection (EFI)
Fuel Pump (in tank assembly)	25L per hr. at 39 psi
Fuel Filter(s)	10 micron in-line 30 micron in tank - (not replaceable)
Fuel Injector(s)	Visteon
EFI Controller	Visteon VP5U1U-12A650-AA
Fuel Capacity / Requirement	6 gal US / 22.7 liters 87 Octane (minimum) or 89 Oxygenated
Electrical	
Alternator Output	350 w @ 6000 RPM
Lights : Pod	50 watts
Grill	2 x 37 watts
Brake	2 x 8.26 watts
Tail	2 x 26.9 watts
Worklight	2 x 13 watts
Indicator	1 watt
Operating RPM	6000 RPM
Ignition System	DC/CDI Ignition
Ignition Timing	13°± 3 BTDC @ 1150 RPM
Spark plug / Gap	BKR6E / .035 in. / 0.9 mm
Battery / Amp Hr	Lead Acid / 30 Amp Hr.
Circuit Breakers	Fan 12 amp / Switched Power 10 amp / Fuel Pump 10 amp / ECU 15 amp / Ignition Coil 10 amp / Accessory Power 10 amp / Lights 20 Amp
Starting	Electric / Recoil
Instrument Cluster	Analog Speedo w/ LCD

Table 1-11: Sportsman 500 EFI

Drivetrain	
Transmission Type	Drumshift - H/L/N/R/P
Transmission Capacity	32 oz. / 948 ml
Front Gearcase Capacity- CH	8.97 / 265 ml
Front Gearcase Capacity- ADC	9.3 / 275 ml
Gear Ratio : Low Rev High Front Drive	23.91:1 21.74:1 10.57:1 3.82:1
Clutch Type	PVT (Standard Models) PVT w/EBS (Deluxe Models)
Belt	3211113 EBS 3211077 Non-EBS
Steering / Suspension	
Front Suspension / Shock	A-arm / MacPherson Strut
Front Travel	8.2 in. / 20.8 cm
Rear Suspension / Shock	Progressive Rate Independent - Coil - over shock
Rear Travel	9.5 in. / 24.13 cm
Ground Clearance	11 in. / 27.94 cm
Shock Preload Adjustment Front / Rear	Front -Non Adjustable. Rear - Ratchet Style- Std.
Turning Radius	65 in./165.10 cm unloaded
Toe Out	0-1/16 in / .0 - .159 mm
Wheels / Brakes	
Wheel/Tire Size / Pattern - Front	26 x 8 - 12 / 4-156
Wheel/Tire Size / Pattern - Rear	26 x 11 - 12 / 4-156
Recommended Air Pressure	Front & Rear - 5 psi
Brake - Front	Dual Hydraulic Disc
Brake - Rear	Single Hydraulic Disc
Brake Fluid	DOT - approved only

Table 1-12: Sportsman 500 EFI Clutching

Altitude		Shift Weight	Drive Clutch Spring	Driven Clutch Spring	Helix* *No Adjustment
Meters (Feet)	0-1800 (0-6000)	10 WH (5630710)	Blu/Green (7041157)	White/Yel (7041635)	EBS (5131674)
	1800-3700 (6000-12000)	10 RH (5630709)	Blu/Green (7041157)	White/Yel (7041635)	EBS (5131674)

2007 SPORTSMAN X-2 500 EFI

Model Number: A07TH50AU, AZ, AQ / A07TN50AF / A07TH50EA
(Standard Models) (Deluxe Model) (Intl' Quadricycle)

Engine Model: EH50PLE

Table 1-13: Sportsman X-2 500 EFI General Specifications

Category	Dimension / Capacity
Length	93 in./236 cm
Width	48 in./122 cm
Height	48 in./122 cm
Wheel Base	57 in./145 cm
Ground Clearance	11 in./28 cm
Dry Weight	798 lbs./362 kg
Gross Vehicle Weight	1500 lbs./680 kg
Front Rack Capacity	90 lbs./40.8 kg
Rear Box Capacity	400 lbs./81.6 kg
Towing Capacity	1225 lbs./555.6 kg
Body Style	Spirit
Hitch Tongue Capacity	120 lbs./54.4 kg Rear box capacity and tongue weight not to exceed 400 lbs./181kg

Table 1-14: Sportsman X2 500 EFI

ENGINE	
Platform	Fuji Single Cylinder
Engine Model Number	EH50PLE210
Engine Displacement	499cc
Number of Cylinders	1
Bore & Stroke (mm)	92 x 75 mm
Compression Ratio	10.2:1
Compression Pressure	60-90 psi W/Compression Release
Engine Idle Speed	1150 ± 50 RPM
Engine Max Operating Rpm	6000 Rpm ± 200 Rpm
Cooling System / Capacity	Liquid - 2.5 qt / 2.4 ltr
Overheat Warning	HOT on Instrument Cluster
Lubrication	Pressurized Dry Sump
Oil Requirements / Capacity	Polaris 0W-40 2 qt. / 1.9 ltr
Exhaust System	Single Pipe USFS Approved
Fuel System	
Fuel System	Electronic Fuel Injection (EFI)
Fuel Pump (in tank assembly)	25L per hr. at 39 psi
Fuel Filter(s)	10 micron in-line 30 micron in tank - (not replaceable)
Fuel Injector(s)	Visteon
EFI Controller	Visteon VP5U1U-12A650-AA
Fuel Capacity / Requirement	6 gal US / 22.7 liters 87 Octane (minimum) or 89 Oxygenated
Electrical	
Alternator Output	350 w @ 6000 RPM
Lights : Pod	50 watts
Grill	2 x 37 watts
Brake	2 x 8.26 watts
Tail	2 x 26.9 watts
Worklight	2 x 13 watts
Indicator	1 watt
Operating RPM	6000 RPM
Ignition System	DC/CDI Ignition
Ignition Timing	10°± 1 BTDC @ 1150 RPM
Spark plug / Gap	BKR6E / .035 in. / 0.9 mm
Battery / Amp Hr	Lead Acid / 30 Amp Hr.
Circuit Breakers	Fan 12 amp / Switched Power 10 amp / Fuel Pump 10 amp / ECU 15 amp / Ignition Coil 10 amp / Accessory Power 10 amp / Lights 20 Amp
Starting	Electric / Recoil
Instrument Cluster	Analog Speedo w/ LCD

Table 1-15: Sportsman X2 500 EFI

Drivetrain	
Transmission Type	Drumshift - H/L/N/Rev/Park
Transmission Capacity	32 oz. / 948 ml
Front Gearcase Capacity- CH	8.97 / 265 ml
Front Gearcase Capacity- ADC	9.3 / 275 ml
Gear Ratio : Low Rev High Front Drive	23.91:1 21.74:1 10.57:1 3.82:1
Clutch Type	PVT w/EBS
Belt	3211113
Steering / Suspension	
Front Suspension / Shock	A-arm / MacPherson Strut
Front Travel	8.2 in. / 20.8 cm
Rear Suspension / Shock	Progressive Rate Independent - Coil - over shock
Rear Travel	8.75 in. / 22.2 cm
Ground Clearance	11 in. / 28 cm
Shock Preload Adjustment Front / Rear	Front -Non Adjustable. Rear - Ratchet Style- Std.
Turning Radius	82 in./208 cm unlocked
Toe Out	0-1/16 in / .0 - .159 mm
Wheels / Brakes	
Wheel Size / Pattern - Front	Steel 12x6 / 4-156
Wheel Size / Pattern - Rear	Steel 12x8 / 4-156
Front Tire Size	25x8-12
Rear Tire Size	25x11-12
Recommended Air Pressure	Front & Rear - 5 psi
Brake - Front	Dual Hydraulic Disc
Brake - Rear	Dual Hydraulic Disc

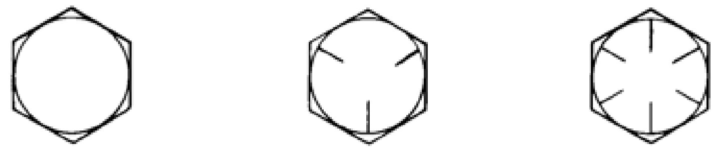
Table 1-16: Sportsman X2 500 EFI

Altitude		Shift Weight	Drive Clutch Spring	Driven Clutch Spring	Helix* *No Adjustment
Meters (Feet)	0-1800 (0-6000)	10 WH (5630710)	Blu/Green (7041157)	White/Yel (7041635)	EBS (5131674)
	1800-3700 (6000-12000)	10 RH (5630709)	Blu/Green (7041157)	White/Yel (7041635)	EBS (5131674)

MISC. NUMBERS/CHARTS

Standard Torque Specifications

The following torque specifications are to be used as a general guideline. There are exceptions in the steering, suspension, and engine areas. Always consult the exploded views in each manual section for torque values of fasteners before using standard torque.



Bolt Size		Threads/In	Grade 2	Grade 5	Grade 8
			Torque in. lbs. (Nm)		
#10	-	24	27 (3.1)	43 (5.0)	60 (6.9)
#10	-	32	31 (3.6)	49 (5.6)	68 (7.8)
			Torque ft. lbs. (Nm)*		
1/4	-	20	5 (7)	8 (11)	12 (16)
1/4	-	28	6 (8)	10 (14)	14 (19)
5/16	-	18	11 (15)	17 (23)	25 (35)
5/16	-	24	12 (16)	19 (26)	29 (40)
3/8	-	16	20 (27)	30 (40)	45 (62)
3/8	-	24	23 (32)	35 (48)	50 (69)
7/16	-	14	30 (40)	50 (69)	70 (97)
7/16	-	20	35 (48)	55 (76)	80 (110)
1/2	-	13	50 (69)	75 (104)	110 (152)
1/2	-	20	55 (76)	90 (124)	120 (166)

Metric

6 x 1.0	72-78 In. lbs.
8 x 1.25	14-18 ft. lbs.
10 x 1.25	26-30 ft. lbs.

*To convert ft. lbs. to Nm multiply foot pounds by .1.382
*To convert Nm to ft. lbs. multiply Nm by .7376.

SPECIFIC TORQUE VALUES OF FASTENERS
Refer to exploded views in the appropriate section.

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	4.6mm	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 Equivalent	Nearest Fraction
3x.50	#39	0.0995	3/32
3x.60	3/32	0.0937	3/32
4x.70	#30	0.1285	1/8
4x.75	1/8	0.125	1/8
5x.80	#19	0.166	11/64
5x.90	#20	0.161	5/32
6x1.00	#9	0.196	13/64
7x1.00	16/64	0.234	15/64
8x1.00	J	0.277	9/32
8x1.25	17/64	0.265	17/64
9x1.00	5/16	0.3125	5/16
9x1.25	5/16	0.3125	5/16
10x1.25	11/32	0.3437	11/32
10x1.50	R	0.339	11/32
11x1.50	3/8	0.375	3/8
12x1.50	13/32	0.406	13/32
12x1.75	13/32	0.406	13/32

Decimal Equivalents

1/64	.0156	
1/32	.0312	1 mm= .0394"
3/64	.0469	
1/16	.0625	
5/64	.0781	2 mm = .0787"
3/32	.0938	
7/64	.1094	3 mm =.1181"
1/8	.1250	
9/64	.1406	
5/32	.1563	4 mm = .1575"
11/64	.1719	
3/16	.1875	5mm= .1969"
13/64	.2031	
7/32	.2188	
15/64	.2344	6 mm = .2362"
1/4	.25	
17/64	.2656	7 mm = .2756"
9/32	.2813	
19/64	.2969	
5/16	.3125	8mm= .3150"
21/64	.3281	
11/32	.3438	9 mm = .3543"
23/64	.3594	
3/8	.375	
25/64	.3906	10 mm = .3937"
13/32	.4063	
27/64	.4219	11 mm =.4331"
7/16	.4375	
29/64	.4531	
15/32	.4688	12 mm = .4724"
31/64	.4844	
1/2	.5	13mm = .5118"
33/64	.5156	
17/32	.5313	
35/64	.5469	14 mm = .5512"
9/16	.5625	
37/64	.5781	15 mm = .5906"
19/32	.5938	
39/64	.6094	
5/8	.625	16mm=. 6299"
41/64	.6406	
21/32	.6563	17 mm =.6693"
43/64	.6719	
11/16	.6875	
45/64	.7031	18 mm = .7087"
23/32	.7188	
47/64	.7344	19 mm = .7480"
3/4	.75	
49/64	.7656	
25/32	.7813	20 mm = .7874"
51/64	.7969	
13/16	.8125	21 mm =.8268"
53/64	.8281	
27/32	.8438	
55/64	.8594	22 mm = .8661"
7/8	.875	
57/64	.8906	23 mm = .9055"
29/32	.9063	
59/64	.9219	
15/16	.9375	24 mm = .9449"
61/64	.9531	
31/32	.9688	25 mm = .9843"
63/64	.9844	
1	1.0	

Conversion Table

Unit of Measure	Multiplied by	Converts to
ft. lbs.	x 12	= in. lbs.
in. lbs.	x .0833	= ft. lbs.
ft. lbs.	x 1.356	= Nm
in. lbs.	x .0115	= kg-m
Nm	x .7376	= ft. lbs.
kg-m	x 7.233	= ft. lbs.
kg-m	x 86.796	= in. lbs.
kg-m	x 10	= Nm
in.	x 25.4	=mm
mm	x .03937	= in.
in.	x 2.54	= cm
mile (mi.)	x 1.6	= km
km	x .6214	= mile (mi.)
Ounces (oz.)	x 28.35	= Grams (g)
Fluid Ounces (fl. oz.)	x 29.57	= Cubic Centimeters (cc)
Cubic Centimeters (cc)	x .03381	= Fluid Ounces (fl. oz.)
Grams (g)	x 0.035	= Ounces (oz.)
lb.	x .454	= kg
kg	x 2.2046	= lb.
Cubic inches (cu. in)	x 16.387	= Cubic centimeters (cc)
Cubic centimeters (cc)	x 0.061	= Cubic inches (cu. in)
Imperial pints (Imp pt.)	x 0.568	= Liters (l)
Liters (l)	x 1.76	= Imperial pints (Imp pt.)
Imperial quarts (Imp qt.)	x 1.137	= Liters (l)
Liters (l)	x 0.88	= Imperial quarts (Imp qt.)
Imperial quarts (Imp qt.)	x 1.201	= US quarts (US qt.)
US quarts (US qt.)	x 0.833	= Imperial quarts (Imp qt.)
US quarts (US qt.)	x 0.946	= Liters (l)
Liters (l)	x 1.057	= US quarts (US qt.)
US gallons (US gal)	x 3.785	=Liters (l)
Liters (l)	x 0.264	= US gallons (US gal)
Pounds - force per square inch (psi)	x 6.895	= Kilopascals (kPa)
Kilopascals (kPa)	x 0.145	= Pounds - force per square inch (psi)
Kilopascals (kPa)	x 0.01	= Kilograms - force per square cm
Kilograms - force per square cm	x 98.1	= Kilopascals (kPa)
π(3.14)xR^2x H (height)		= Cylinder Volume

°C to °F: 9 (°C + 40) ÷ 5 - 40 = °F
°F to °C: 5 (°F + 40) ÷ 9 - 40 = °C

Glossary Of Terms

ABDC: After bottom dead center.
ACV: Alternating current voltage.
ADC: Active Descent Control.
Alternator: Electrical generator producing voltage alternating current.
ATDC: After top dead center.
BBDC: Before bottom dead center.
BDC: Bottom dead center.
BTDC: Before top dead center.
CC: Cubic centimeters.
Center Distance: Distance between center of crankshaft and center of driven clutch shaft.
Chain Pitch: Distance between chain link pins (No. 35 = 3/8, or 1 cm). Polaris measures chain length in number of pitches.
Crankshaft Run-Out: Run-out or "bend" of crankshaft measured with a dial indicator while crankshaft is supported between centers on V blocks or resting in crankcase. Measure at various points especially at PTO.
DCV: Direct current voltage.
Electrical Open: Open circuit. An electrical circuit which isn't complete.
Electrical Short: Short circuit. An electrical circuit which is completed before the current reaches the intended load. (i.e. a bare wire touching the chassis).
Engagement RPM: Engine RPM at which the drive clutch engages to make contact with the drive belt.
ft.: Foot/feet.
Ft. lb. / Foot Pound: A force of one pound at the end of a lever one foot in length, applied in a rotational direction.
g: Gram. Unit of weight in the metric system.
gal.: Gallon.
ID: Inside diameter.
in.: Inch/inches.
Inch Pound: In. lb. 12 in. lbs. = 1 ft. lb.
kg/cm: Kilograms per square centimeter.
kg-m: Kilogram meters.
Kilogram/meter: A force of one kilogram at the end of a lever one meter in length, applied in a rotational direction.
l or ltr: Liter.
Left Side: Always referred to based on normal operating position of the driver.
m: Meter/meters.
Mag: Magneto.
Magnetic Induction: As a conductor (coil) is moved through a magnetic field, a voltage will be generated in the windings. Mechanical energy is converted to electrical energy in the stator.
mi.: Mile/miles.
mm: Millimeter. Unit of length in the metric system. 1mm = approximately .040,.
Nm: Newton meters.
OD: Outside diameter.
Ohm: The unit of electrical resistance opposing current flow.
oz.: Ounce/ounces.
PDM: Power Distribution Module.
Piston Clearance: Total distance between piston and cylinder wall.
psi.: Pounds per square inch.
PTO: Power take off.
qt.: Quart/quarts.
RPM: Revolutions per minute.
Regulator: Voltage regulator. Regulates battery charging system output at approx. 14.5 DCV as engine RPM increases.
Resistance: In the mechanical sense, friction or load. In the electrical sense, ohms. Both result in energy conversion to heat.
Right Side: Always referred to based on normal operating position of the driver.
RPM: Revolutions per minute.
Seized Piston: Galling of the sides of a piston. Usually there is a transfer of aluminum from the piston onto the cylinder wall. Possible causes: 1) improper lubrication; 2) excessive temperatures; 3) insufficient piston clearance; 4) stuck piston rings.
Stator Plate: The plate mounted under the flywheel supporting the battery charging coils.
TDC: Top dead center. Piston's most outward travel from crankshaft.
Volt: The unit of measure for electrical pressure of electromotive force. Measured by a voltmeter in parallel with the circuit.
Watt: Unit of electrical power. Watts = amperes x volts.
WOT: Wide open throttle.

NOTES

CHAPTER 2
MAINTENANCE

MAINTENANCE

Periodic Maintenance Chart

Careful periodic maintenance will help keep your vehicle in the safest, most reliable condition. Inspection, adjustment and lubrication of important components are explained in the periodic maintenance chart.

Inspect, clean, lubricate, adjust and replace parts as necessary. When inspection reveals the need for replacement parts, use genuine Polaris parts available from your Polaris dealer.

NOTE: Service and adjustments are critical. If you're not familiar with safe service and adjustment procedures, have a qualified dealer perform these operations.

Maintenance intervals in the following chart are based upon average riding conditions and an average vehicle speed of approximately 10 miles per hour. Vehicles subjected to severe use must be inspected and serviced more frequently.

Severe Use Definition

- Frequent immersion in mud, water or sand
- Racing or race-style high RPM use
- Prolonged low speed, heavy load operation
- Extended idle
- Short trip cold weather operation

Pay special attention to the oil level. A rise in oil level during cold weather can indicate contaminants collecting in the oil sump or crankcase. Change oil immediately if the oil level begins to rise. Monitor the oil level, and if it continues to rise, discontinue use and determine the cause or see your dealer.

Maintenance Chart Key

The following symbols denote potential items to be aware of during maintenance:

■= CAUTION: Due to the nature of these adjustments, it is recommended this service be performed by an authorized Polaris dealer.
▸= SEVERE USE ITEM --If vehicle is subjected to severe use, decrease interval by 50%
(Severe Use is defined as frequent vehicle immersion in mud, water or sand, racing or race-style high rpm use, prolonged low speed - heavy load operation or extended idle. More preventative maintenance is required under these conditions. Fluid changes, cable and chassis lubrication are required more frequently. For engine oil, short trip cold weather riding also constitutes severe use. Pay special attention to oil level. A rising oil level in cold weather can indicate contaminants collecting in the oil sump or crankcase. Change oil immediately and monitor level. If oil level begins to rise, discontinue use and determine cause.)

E= Emission Control System Service (California).

NOTE: Inspection may reveal the need for replacement parts. Always use genuine Polaris parts.

⚠ WARNING
Improperly performing the procedures marked with a ■ could result in component failure and lead to serious injury or death. Have an authorized Polaris dealer perform these services.

Periodic Maintenance Chart

	Item	Maintenance Interval (whichever comes first) Hours	Calendar	Miles (KM)	Remarks
■	Steering	-	Pre-Ride	-	Make adjustments as needed.
▶	Front-suspension	-	Pre-Ride	-	
▶	Rear-suspension	-	Pre-Ride	-	
	Tires	-	Pre-Ride	-	
▶	Brake fluid level	-	Pre-Ride	-	
▶	Brake lever travel	-	Pre-Ride	-	
	Brake systems	-	Pre-Ride	-	
	Wheels /fasteners	-	Pre-Ride	-	
	Frame fasteners	-	Pre-Ride	-	
▶ E	Engine oil level	-	Pre-Ride	-	
	Passenger Seat Lock Out	-	Pre-Ride	-	Verify Seat is secured
	Dump Box Operation	-	Pre-Ride	-	Verify Box is latched
▶ E	Air filter, pre-filter	-	Daily	-	Inspect; clean often
▶ E	Air box sediment tube	-	Daily	-	Drain deposits when visible
	Coolant	-	Daily	-	Check level daily, change coolant every 2 years
	Headlamp/tail lamp	-	Daily	-	Check operation; apply dielectric grease if replacing
▶ E	Air filter, main element	-	Weekly	-	Inspect; replace as needed
	Recoil housing	-	Weekly	-	Drain water as needed, check often if operating in wet conditions
▶ ■	Brake pad wear	10 H	Monthly	60 (100)	Inspect periodically
	Battery	20 H	Monthly	125 (200)	Check terminals; clean; test
▶	Front gearcase oil (if equipped)	25 H	Monthly	155 (250)	Inspect level; change yearly
▶	Middle gearcase oil (if equipped)	25 H	Monthly	155 (250)	Inspect level; change yearly
▶	Rear gearcase oil (if equipped)	25 H	Monthly	155 (250)	Inspect level; change yearly
▶	Transmission oil	25 H	Monthly	155 (250)	Inspect level; change yearly

▶ Perform these procedures more often for vehicles subjected to severe use.
E Emission Control System Service (California)
■ Have an authorized Polaris dealer perform these services.

Periodic Maintenance Chart

Item		Maintenance Interval (whichever comes first)			Remarks
		Hours	Calendar	Miles (KM)	
⏵ E	Engine breather filter (if equipped)	25 H	Monthly	155 (250)	Inspect; replace if necessary
⏵ E	Engine oil change (break-in)	25 H	1 M	155 (250)	Perform a break-in oil change at one month
⏵	General lubrication	50 H	3 M	310 (500)	Lubricate all grease fittings, pivots, cables, etc.
	Shift Linkage	50 H	6 M	310 (500)	Inspect, lubricate, adjust
■	Steering	50 H	6 M	310 (500)	Lubricate
⏵	Front suspension	50 H	6 M	310 (500)	Lubricate
⏵	Rear suspension	50 H	6 M	310 (500)	Lubricate
■ E	Throttle Cable/ETC Switch	50 H	6 M	310 (500)	Inspect; adjust; lubricate; replace if necessary
E	Air intake ducts/ flange	50 H	6 M	310 (500)	Inspect ducts for proper sealing/air leaks
	Drive belt	50 H	6 M	310 (500)	Inspect; adjust; replace as needed
	Cooling system (if applicable)	50 H	6 M	310 (500)	Inspect coolant strength seasonally; pressure test system yearly
⏵ E	Engine oil change	100 H	6 M	620 (1000)	Perform a break-in oil change at 25 hours/one month
⏵ E	Oil filter change	100 H	6 M	620 (1000)	Replace with oil change
⏵ E	Oil tank vent hose	100 H	12 M	620 (1000)	Inspect routing, condition
⏵ E	Valve clearance	100 H	12 M	620 (1000)	Inspect; adjust

⏵ Perform these procedures more often for vehicles subjected to severe use.
E Emission Control System Service (California)
■ Have an authorized Polaris dealer perform these services.

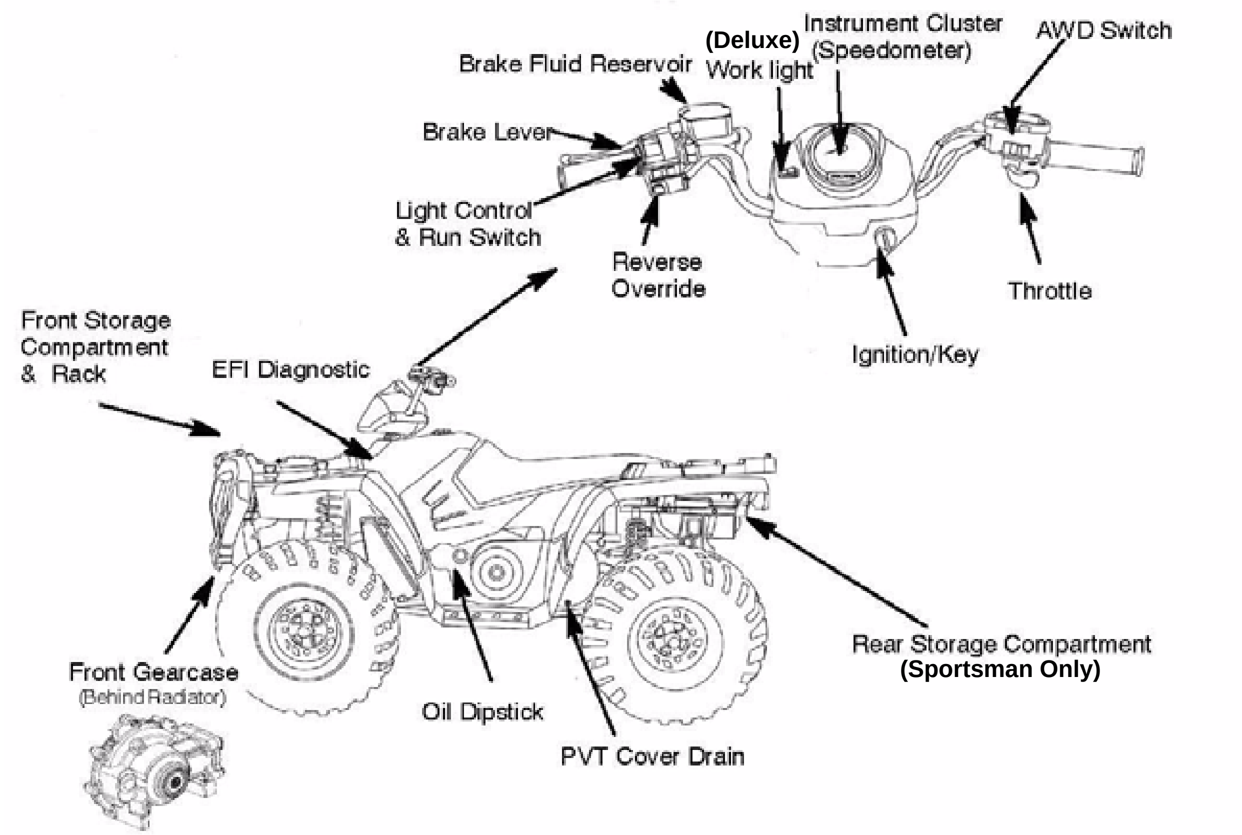
Periodic Maintenance Chart

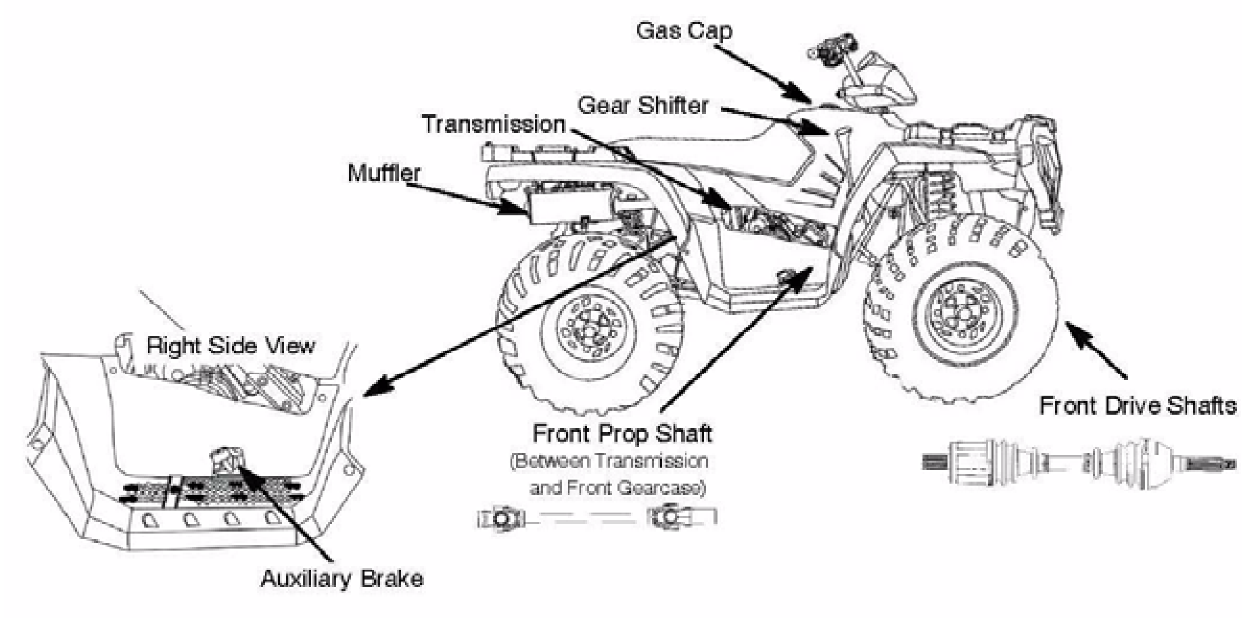
	Item	Maintenance Interval (whichever comes first)			Remarks
		Hours	Calendar	Miles (Km)	
■ E	Fuel system	100 H	12M	620 (1000)	Check for leaks at tank cap, lines, fuel valve, filter, pump, carburetor; replace lines every two years
■ E	Fuel Filter	100 H	12M	620 (1000)	Replace yearly
►	Radiator (if applicable)	100 H	12M	620 (1000)	Inspect; clean external surfaces
►	Cooling hoses (if applicable)	100 H	12M	620 (1000)	Inspect for leaks
►	Engine mounts	100 H	12M	620 (1000)	Inspect
	Exhaust muffler / pipe	100 H	12M	620 (1000)	Inspect
■ E	Spark plug	100 H	12M	620 (1000)	Inspect; replace as needed
■ E	Ignition Timing	100 H	12M	620 (1000)	Inspect
►	Wiring	100 H	12M	620 (1000)	Inspect for wear, routing, security; apply dielectric grease to connectors subjected to water, mud, etc.
■	Clutches (drive and driven)	100 H	12M	620 (1000)	Inspect; clean; replace worn parts
■	Front wheel bearings	100 H	12M	1000 (1600)	Inspect; replace as needed
■	Brake fluid	200 H	24M	1240 (2000)	Change every two years
	Spark arrestor	300 H	36M	1860 (3000)	Clean out
■	Toe adjustment	-			Inspect periodically; adjust when parts are replaced
► ■	Auxiliary brake	-			Inspect daily; adjust as needed
	Headlight aim	-			Adjust as needed

► Perform these procedures more often for vehicles subjected to severe use.
E Emission Control System Service (California)
■ Have an authorized Polaris dealer perform these services.

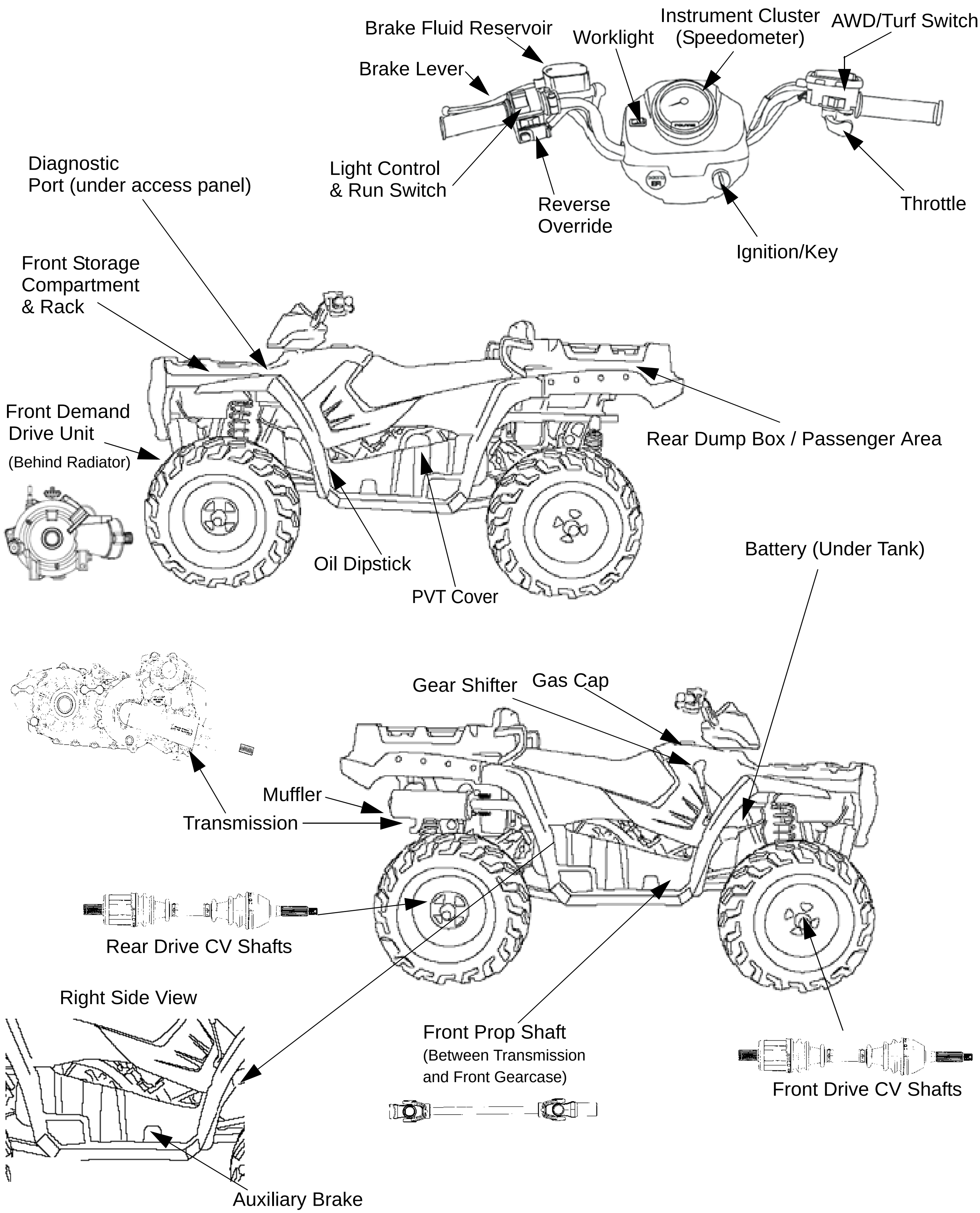
LUBRICATION / FLUIDS

SPORTSMAN Component Locations





SPORTSMAN X2 Component locations



Polaris Lubricants, Maintenance and Service Products

Table 2-1:

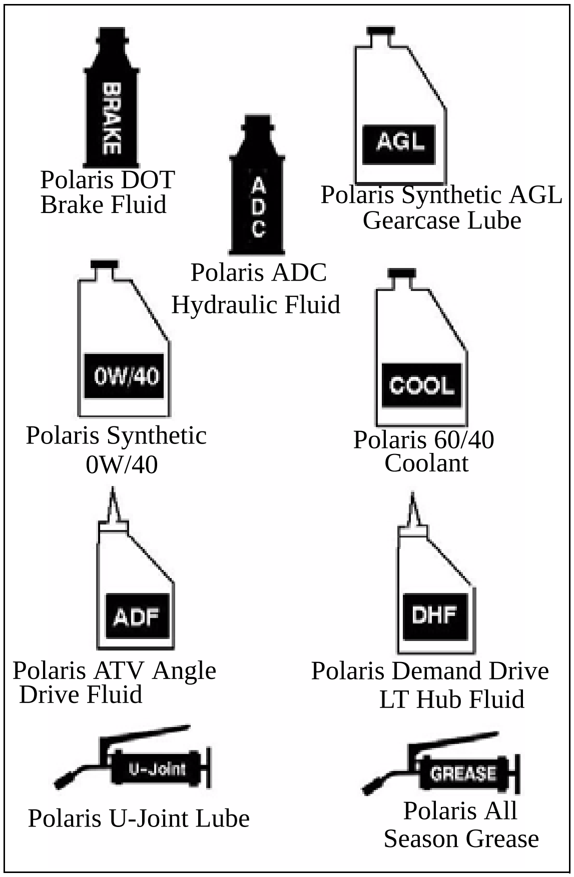
PART NUMBER	DESCRIPTION
Engine Lubricant	
2870791	Fogging Oil (12 oz. Aerosol)
2871281	Engine Oil (Quart) Premium Synthetic 0W-40 (4-cycle) (12 count)
2871844	Engine Oil (Gallon) Premium Synthetic 0W-40 (4-cycle) (4 count)
2871567	Engine Oil (16 Gallon) Premium 4 Synthetic 0W-40 (4-cycle)
Gearcase / Transmission Lubricants	
2876251	**Demand Drive LT Premium Hub Fluid**
3234438	**Polaris ADC Hydraulic Fluid**
2873602	Premium Synthetic AGL Gearcase Lube (12 oz. bottle) (12 count)
2873603	Premium Synthetic AGL Gearcase Lube (1 Gal. bottle) (4 count)
2876160	Premium ATV Angle Drive Fluid (32 oz.) (12 count)
2872276	Premium ATV Angle Drive Fluid (2.5 Gal.) (2 count)
2870465	Oil Pump for 1 Gallon Jug
Grease / Specialized Lubricants	
2871322	Premium All Season Grease (3 oz. cartridge) (24 count)
2871423	Premium All Season Grease (14 oz. cartridge) (10 count)
2871460	Starter Drive Grease (12 count)
2871515	Premium U-Joint Lube (3 oz.) (24 Count)
2871551	Premium U-Joint Lube (14 oz.) (10 count)
2871312	Grease Gun Kit
2871329	Dielectric Grease (Nyogel™)

Table 2-1:

PART NUMBER	DESCRIPTION
Coolant	
2871323	60/40 Coolant (Gallon) (6 count)
2871534	60/40 Coolant (Quart) (12 count)
Additives / Sealants / Thread Locking Agents / Misc.	
2874275	Loctite™ Primer N, Aerosol
2871956	Loctite™ Thread Sealant 565 (50 ml.) (6 count)
2871950	Loctite™ Threadlock 242 (6 ml.) (12 count)
2871951	Loctite™ Threadlock 262 (50 ml.) (10 count)
2871953	Loctite™ Threadlock 271 (6 ml.) (12 count)
2871557	3-Bond 1215 Sealant (5 oz.)
2871326	Premium Carbon Clean (12 oz.) (12 count)
2870652	Fuel Stabilizer (16 oz.) (12 count)
2871957	Black RTV Silicone Sealer (3 oz. tube) (12 count)
2871958	Black RTV Silicone Sealer (11 oz. cartridge) (12 count)
2870990	DOT 3 Brake Fluid (12 count)
2871557	Crankcase Sealant, 3 Bond 1215 (5 oz.)

Polaris Lubricant Symbol Identification

NOTE: The symbols used are for quick reference in identifying which lubricant/grease to use on each component.

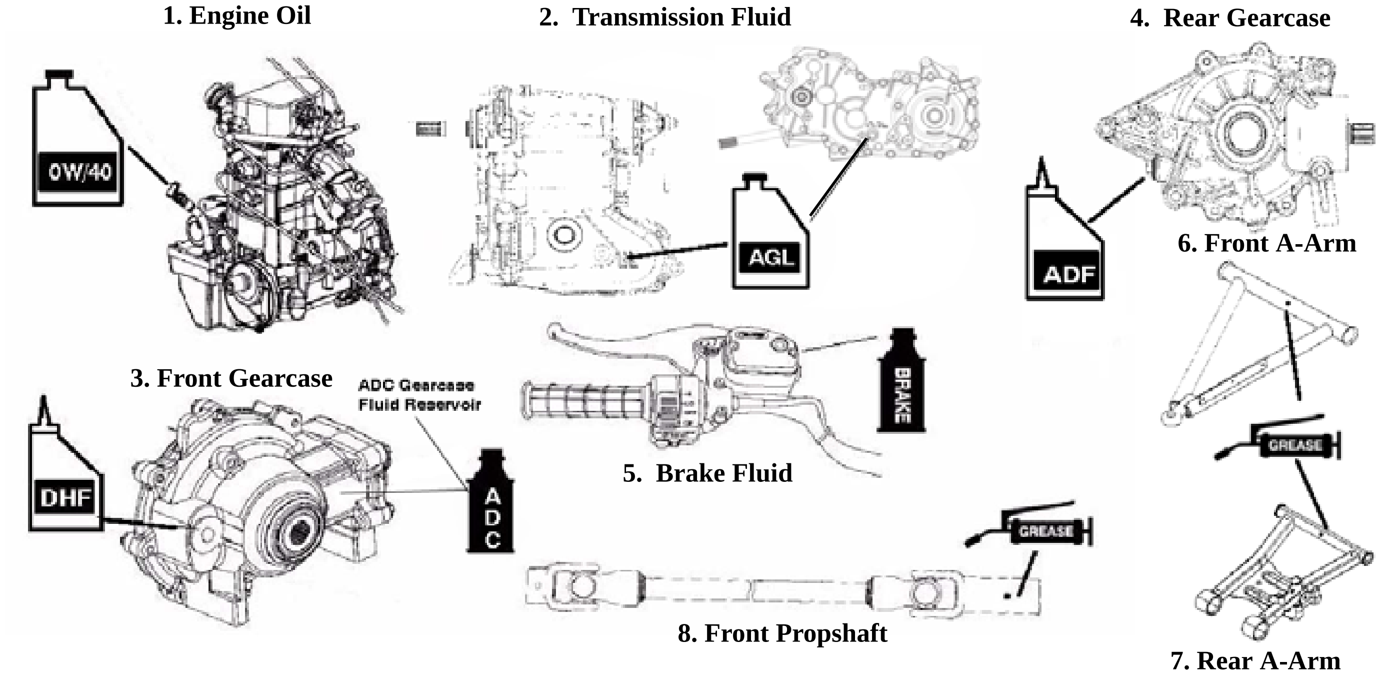


Pre-ride / Daily Inspection

Perform the following pre-ride inspection daily, and when servicing the vehicle at each scheduled maintenance.

- Verify seat lock-out operation
- Verify box lock-out operation
- Tires - check condition and pressures
- Fuel and oil tanks - fill both tanks to their proper level; Do not overfill oil tank
- All brakes - check operation and adjustment (includes auxiliary brake)
- Throttle -check for free operation
- Headlight/Taillight/Brakelight - check operation of all indicator lights and switches
- Engine stop switch - check for proper function
- Wheels - check for loose wheel nuts and axle nuts; check to be sure axle nuts are secured by cotter pins
- Air cleaner element - check for dirt or water; clean or replace
- Steering - check for free operation, noting any unusual looseness in any area
- Loose parts - visually inspect vehicle for any damaged or loose nuts, bolts or fasteners
- Engine coolant - check for proper level at the recovery bottle
- ADC Fluid Level - check for proper level

Lubrication Components



#	ITEM	LUBE	METHOD	FREQUENCY*
1.	Engine Oil	Polaris 0W/40	Check dipstick and add to proper level.	Change after 1st month, 6 months, or 100 hours thereafter; Change more often (25-50 hours) in extremely dirty conditions, or short trip cold weather operation.
2.	Transmission	Polaris AGL Synthetic Gearcase Lube	Add lube to bottom fill hole.	Change annually ❷
3A. 3B.	Front Gearcase ADC Fluid	Demand Drive LT Premium Polaris ADC Hydraulic	Drain completely. Add lube to specified quantity.	Gearcase - Change annually ❷ ADC - Change fluid every 2 years
4.	Rear Gearcase	ATV Angle Drive Fluid	Drain completely. Add lube to specified quantity.	Change annually ❷
5.	Brake Fluid	Polaris Dot 3 Brake Fluid	Fill master cylinder reservoir to indicated level	As required, change fluid every 2 years
6.	Front A-Arm	Polaris All Season Grease	Locate fitting and grease.	Semi-annually ❶
7.	Rear A-Arm	Polaris All Season Grease	Locate fitting and grease	Semi-annually ❶
5.	Front Propshaft	Polaris U-Joint Grease❸	Locate fitting and grease.	Semi-annually ❶

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

1 Semi-annually or 50 hours of operation (refer to Maintenance Schedule for additional information) More often under severe conditions (operating in water or hauling heavy loads)

2 Annually or 100 hours of operation (refer to Maintenance Schedule for additional information) More often under severe conditions (operating in water or hauling heavy loads)

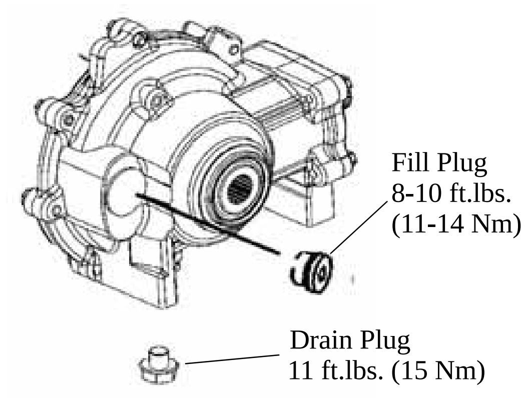
3 Grease conforming to NLGI No. 2, such as Polaris Premium All Season Grease, Conoco Superlube M or Mobilegrease Special

Front Gearcase Lubrication

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

- Be sure vehicle is level before proceeding and in PARK
- Check vent hose to be sure it is routed properly and unobstructed
- The correct front gearcase lubricant to use is Polaris Premium Demand Hub Fluid.

FRONT GEARCASE



Specified Lubricant:
Demand Drive LT Premium Hub Fluid
(PN 2876251)

CH Gearcase Capacity: 8.97 oz. (265 ml.)

ADC Gearcase Capacity: 9.3 oz. (275 ml.)

= T

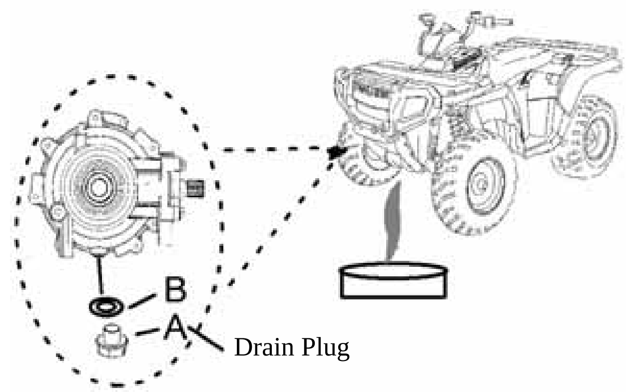
Fill Plug Torque: 8-10 ft.lbs. (11-14 Nm)

Drain Plug Torque: 11 ft.lbs. (15 Nm)

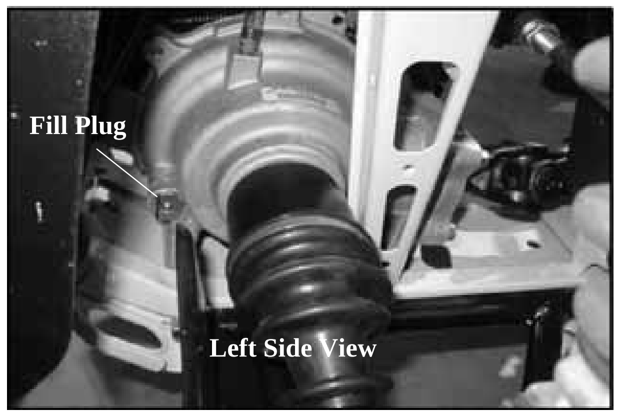
To Check the Lubricant Level:

The front and rear gearcase lubricant level cannot be checked with a dipstick. The gearcase must be drained and re-filled with the proper amount of lubricant or be filled to the bottom of the fill plug hole threads. Refer to procedures.

To Change Gearcase Lubricant:

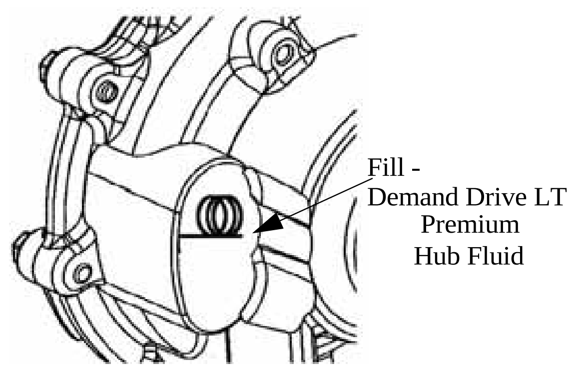


1. Remove gearcase drain plug (A) located on the bottom of the gearcase and drain oil. (The drain plug is accessible through the skid plate.) Catch and discard used oil properly.
2. Clean and reinstall drain plug (A) using a new sealing washer (B). Torque to specification.



3. Remove fill plug. Inspect the O-ring.
4. Fill with the recommended fluid amount or to the bottom of the fill plug hole threads. (See Illustration below).

Front Gearcase



5. Install / torque fill plug and check for leaks.

Transmission Lubrication

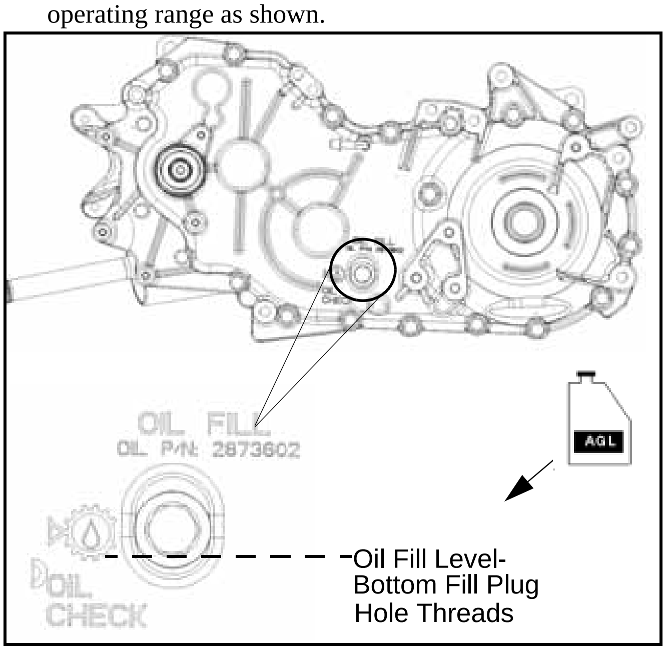
Transmission - Specified Lubricant: Polaris AGL Gearcase Lubricant (Gallon - PN 2873603) (12 oz. - PN 2873602) **Transmission - Capacity:** 32 oz. (948 ml)

= T
Transmission Drain / Fill Plug Torque: 20-25 ft.lbs. (27-34 Nm)

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

To check the level:

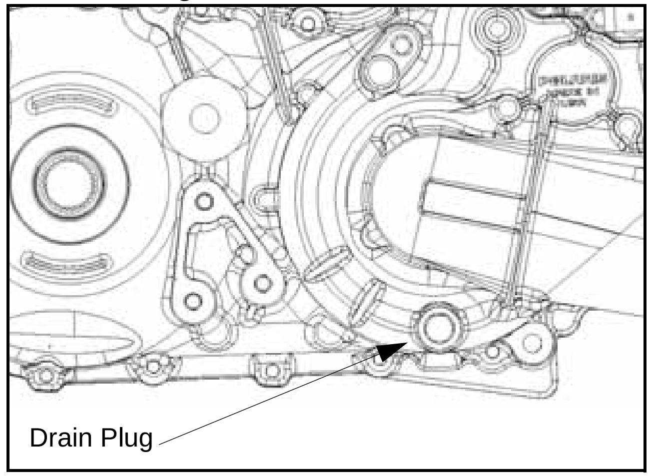
1. Be sure vehicle is level before proceeding
2. Clean around fill plug area.
3. Remove fill plug located on the left side of the ATV.
4. Fluid should be filled to bottom of fill plug hole threads. Add the proper lubricant as required to bring level into operating range as shown.



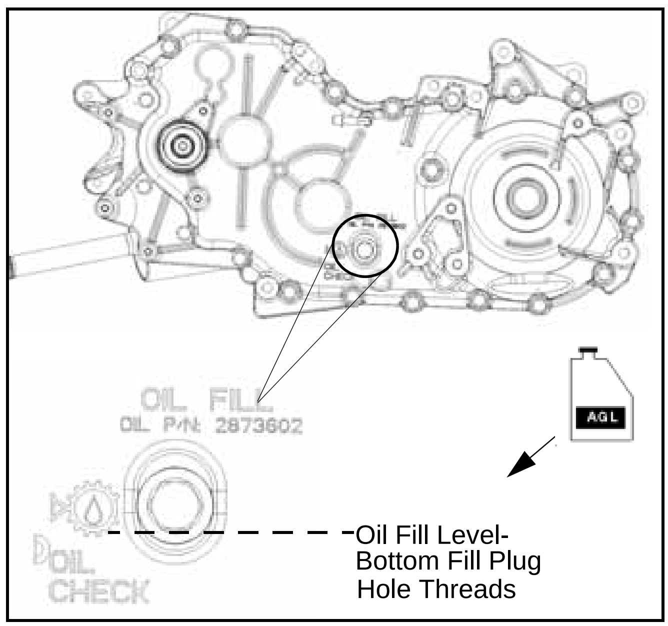
5. Install the check plug and torque it to specification

To change lubricant:

1. Place a drain pan beneath the transmission oil drain plug area.
2. Clean around the drain plug and remove the drain plug and wipe the magnetic end clean to remove all accumulated metallic filings.



3. After the oil has drained completely, install a new sealing washer (if installed) and install the drain plug. Torque to specification.
4. Add the proper lubricant through the fill plug hole until the oil level is to the bottom of the fill plug hole threads. Do not overfill.



5. Check for leaks.

ADC Differential Hydraulic Circuit Fluid Change

1. Make sure vehicle is parked on flat ground and allowed to sit at least 30 minutes prior to bleeding hydraulic circuit.
2. Thoroughly clean area around and on remote reservoir and bleeder valves.
3. Remove reservoir cap and diaphragm assembly.
4. Make sure hydraulic oil inside reservoir is free of debris. If any debris is found, use clean rag or suction device to remove from the reservoir.

NOTE: Debris in reservoir may block porting and produce inadequate bleeding of the system. Decreased performance may be encountered with inadequate bleed of the hydraulic circuit.

5. Begin the bleeding process by filling reservoir to ‘MAX’ line with clean Polaris ADC hyrdraulic fluid. (AW ISO 10 hydraulic fluid equivalent).
6. Locate bleeder valves found on either side of differential and remove the protective caps.
7. Turn bleeder valves counter-clockwise to loosen. Loosen bleeder screw slowly, allowing oil and any trapped air to flow out of fitting.

IMPORTANT: Do not allow hydraulic fluid in reservoir to drain below minimum fill line. Close bleeder valve before oil level falls below minimum fill line. Refilling empty reservoir will result in air pockets becoming trapped.

NOTE: If empty reservoir is encountered, filling of fluid is still possible. Verify air is not trapped before proceeding with step 7.

8. Continue steps 6-8 on both sides in sequence until clean fluid is seen when bleeding occurs.
9. Re-torque both bleeder valves to specification and reinstall cover caps.

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Bleeder Valve Torque: **80 in. lbs. (9 Nm)**

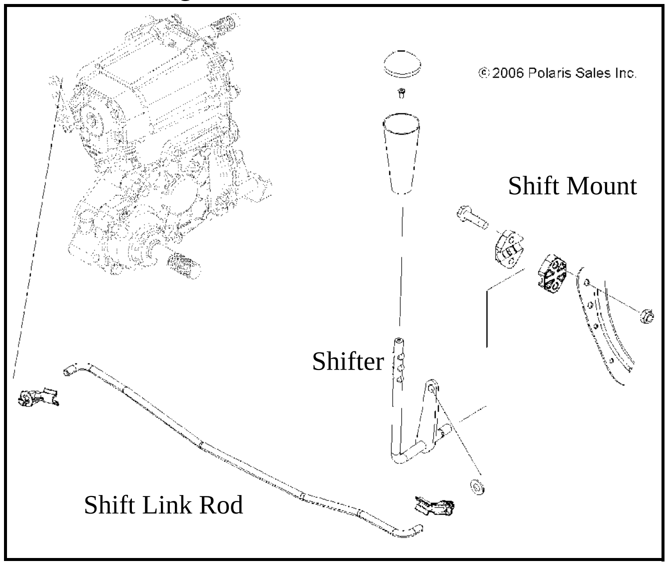
10. Fill reservoir with to a level midway between ‘MAX’ and ‘MIN’ fill lines. Verify no debris is found in reservoir oil.
11. Replace reservoir cap securely and wipe clean any residue.

VEHICLE INSPECTION

Shift Link Rod Inspection

NOTE: Shift rod is preset at time of manufacturer.

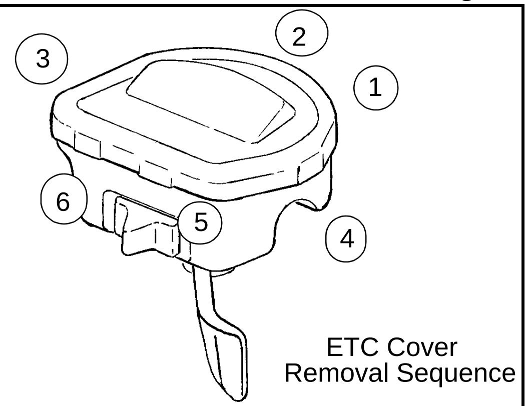
1. Inspect shift link tie rod ends and replace if worn or damaged. Lubricate pivot points with a light aerosol lubricant or grease if desired.



Throttle Inspection

Check for smooth throttle opening and closing in all handlebar positions. Throttle lever operation should be smooth and lever must return freely without binding.

1. Place the gear selector in Park.
2. Set parking brake.
3. Start the engine and let it idle.
4. Turn handlebars from full right to full left. If idle speed increases at any point in the turning range, inspect throttle cable routing and condition. Adjust cable tension as needed until lock-to-lock turning can be accomplished with no rise in engine rpm.
5. Replace the throttle cable if worn, kinked, or damaged.



Ill. 1

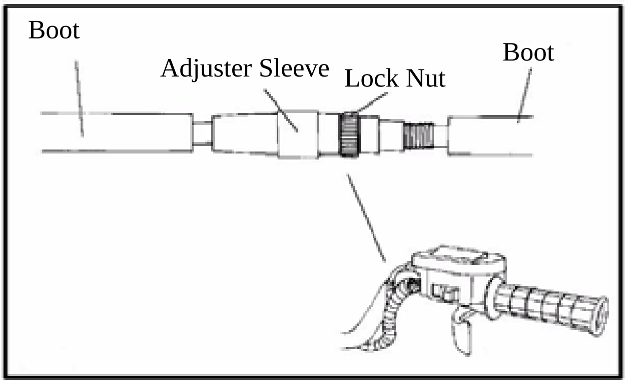
To remove the ETC cover:

1. Use a medium flat blade screwdriver and insert blade into the pocket of the cover starting on the #1 position.
2. Twist screwdriver slightly while lifting on the cover to release snap.
3. Repeat procedure at the other five locations as shown.

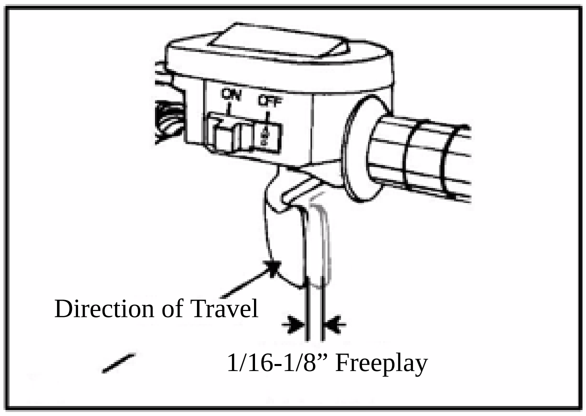
NOTE: Do not attempt to remove cover until all latch points are released.

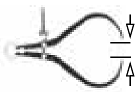
Throttle Cable / Electronic Throttle Control (ETC Switch) Adjustment

1. Slide boot off throttle cable adjuster and jam nut.
2. Place shift selector in neutral and set parking brake.
3. Loosen lock nut on in-line cable adjuster (Ill. 1).



4. Turn adjuster until specified freeplay is achieved at thumb lever. (see illustration). After making adjustments, quickly actuate the thumb lever several times and reverify freeplay.





Throttle Freeplay:
.0625 - .1250" (1.58 - 3.17mm)

5. Tighten lock nut securely and slide boot completely in place to ensure a water-resistant seal.
6. Turn handlebars from left to right through the entire turning range. If idle speed increases, check for proper cable routing. If cable is routed properly and in good condition, repeat adjustment procedure

Fuel System

⚠ WARNING

* Gasoline is extremely flammable and explosive under certain conditions.
* EFI components are under high pressure. Verify system pressure has been relieved before disassembly.
* Never drain the fuel system when the engine is hot. Severe burns may result
* Do not overfill the tank. The tank is at full capacity when the fuel reaches the bottom of the filler neck. Leave room for expansion of fuel.
* Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.
* Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.
* If you get gasoline in your eyes or if you should swallow gasoline, seek medical attention immediately.
* If you spill gasoline on your skin or clothing, immediately wash with soap and water and change clothing.
* Always stop the engine and refuel outdoors or in a well ventilated area.Keep away from open flames and electrical components when removing fuel filter.

- Always stop the engine and refuel outdoors or in a well ventilated area.
- Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.
- Do not overfill the tank. Do not fill the tank neck.
- If you get gasoline in your eyes or if you swallow gasoline, seek medical attention immediately.
- If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.
- Never start the engine or let it run in an enclosed area. Engine exhaust fumes are poisonous and can result loss of consciousness or death in a short time.
- **Never drain the system when the engine is hot. Severe burns may result.**

Fuel Lines

1. Check fuel lines for signs of wear, deterioration, damage, or leakage. Replace if necessary.
2. Be sure fuel lines are routed properly, the connectors latched and the lines secured with cable ties.

⚠ CAUTION

Make sure lines are not kinked or pinched

3. Replace all fuel lines every two years.

NOTE: See Chapter 4 for fuel line routing diagram.

Vent Lines

Check fuel tank, oil tank, crankcase, carburetor, battery and transmission vent lines for signs of wear, deterioration, damage or leakage. Replace every two years.

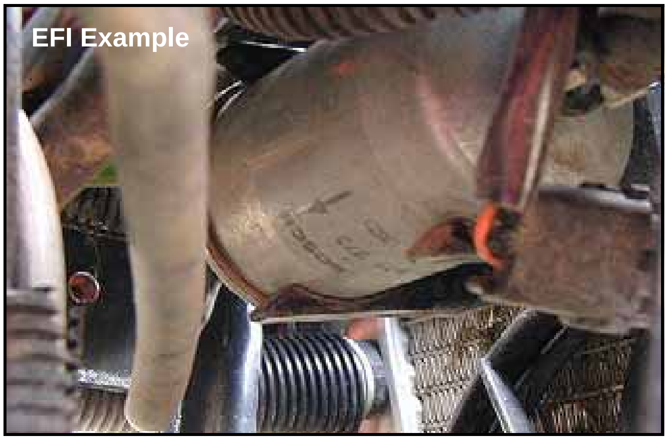
Be sure vent lines are routed properly and secured with cable ties.

⚠ CAUTION

Make sure lines are not kinked or pinched

Fuel Filter

The fuel filter should be replaced in accordance with the Periodic Maintenance Chart.



1. Locate filter at the front of the ATV. **NOTE:** Remove access panels if necessary.
2. Remove fuel lines from filter.
3. Install new filter onto fuel lines with arrow pointed in direction of fuel flow.
4. Install clamps on fuel line (if required).
5. Turn ignition to "ON".
6. Start engine and inspect for leaks.

Compression Test

NOTE: 450/500 4-Stroke engines are equipped with an automatic decompressor. Compression readings will vary in proportion to cranking speed during the test. Average compression (measured) is about **60-90 psi** during a compression test.

Smooth idle generally indicates good compression. Low engine compression is rarely a factor in running condition problems above idle speed. Abnormally high compression can be caused by a decompressor malfunction, or worn or damaged exhaust cam lobes. Inspect camshaft and automatic decompression mechanism if compression is abnormally high.

A cylinder leakage test is the best indication of engine condition on models with automatic decompression. Follow manufacturer's instructions to perform a cylinder leakage test. (Never use high pressure leakage testers as crankshaft seals may dislodge and leak).

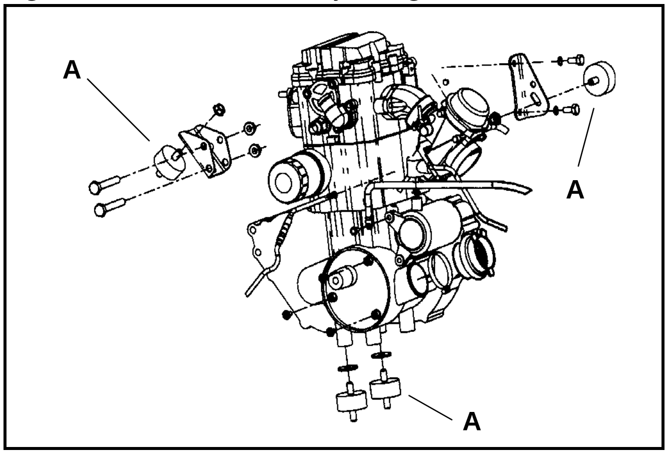
Cylinder Compression
Standard 60-90 PSI

Cylinder Leakage

Service Limit: 10%
(Inspect for cause if leakage exceeds 10%)

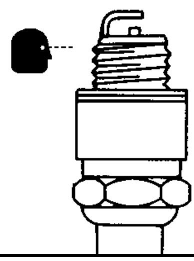
Engine Mounts

Inspect rubber engine mounts (A) for cracks or damage. Check engine fasteners and ensure they are tight.



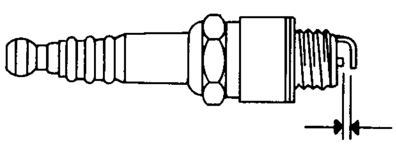
Spark Plug

1. Remove spark plug high tension lead. Clean plug area so no dirt and debris can fall into engine when plug is removed.
2. Remove spark plug.
3. Inspect electrodes for wear and carbon buildup. Look for a sharp outer edge with no rounding or erosion of the electrodes.



4. Clean with electrical contact cleaner or a glass bead spark plug cleaner only. **CAUTION:** A wire brush or coated abrasive should not be used.
5. Measure gap with a wire gauge. Refer to specifications for proper spark plug type and gap. Adjust gap if necessary by bending the side electrode carefully.

Spark Plug Gap



.036" (0.9 mm)

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

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

7. Apply a small amount of anti-seize compound to the spark plug threads.
8. Install spark plug and torque to specification.

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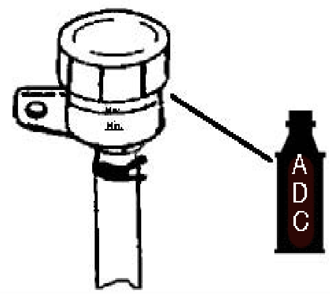
Recommended Spark Plug
Refer to the Specifications page in Chapter 1 for spark plug type.
Spark Plug Torque: 14 Ft. Lbs. (19 Nm)

Active Descent Control (ADC) Reservoir Level

The Active Descent Control reservoir (DELUXE Models Only) is located by the radiator fill cap. Check the level and verify it is between the 'MAX' and 'MIN' lines. Add only Polaris ADC fluid when required.



Battery Maintenance

Complete battery servicing information for both conventinoal and sealed batteries can be found in Chapter 10 of this manual.

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.

NOTE: Expected battery shelf life is 6-8 months depending on storage conditions. As a general rule before placing the battery into service, check the battery condition and charge accordingly.

New Batteries: Batteries must be fully charged before use or battery life can be reduced by 10-30% of full potential. Charge battery for 3-5 hours at a current equivalent of 1/10 of the battery's rated amp/ hour capacity (i.e. 12amp hr x .10 = 1.2 amp charging). Do not use the alternator to charge a new battery.

Liquid Cooling System Overview

The engine coolant level is controlled or maintained by the recovery system. The recovery system components are the recovery bottle, radiator filler neck, radiator pressure cap and connecting hose.

As coolant operating temperature increases, the expanding (heated) excess coolant is forced out of the radiator past the pressure cap and into the recovery bottle. As engine coolant temperature decreases the contracting (cooled) coolant is drawn back up from the tank past the pressure cap and into the radiator.

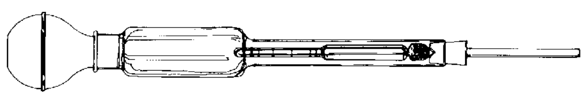
Some coolant level drop on new machines is normal as the system is purging itself of trapped air. Observe coolant levels often during the break-in period.

Overheating of engine could occur if air is not fully purged from system.

Polaris Premium 60/40 is already premixed and ready to use. Do not dilute with water.

Coolant Strength / Type

Test the strength of the coolant using an antifreeze hydrometer.

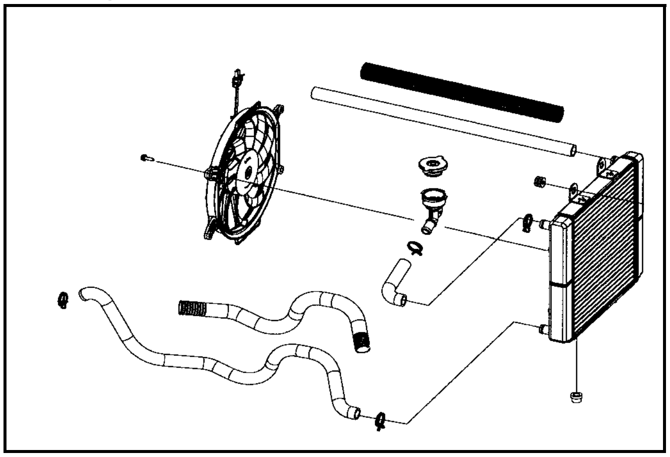


Antifreeze Hydrometer

- A 50/50 or 60/40 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.

Polaris 60/40 Anti-Freeze/ Coolant
(PN 2871323)

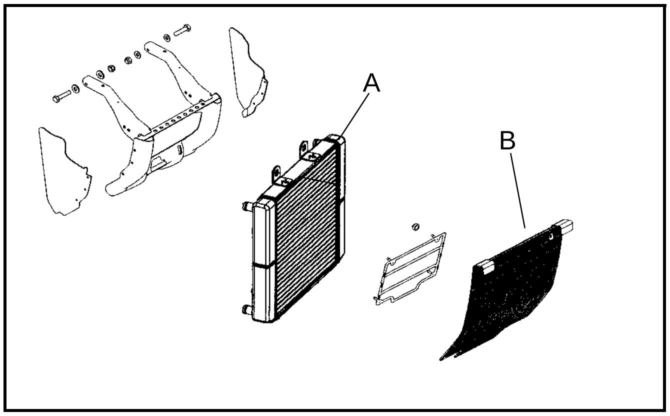
Cooling System Hoses



1. Inspect all hoses for cracks, deterioration, abrasion or leaks. Replace if necessary.
2. Check tightness of all hose clamps.

CAUTION
Do not over-tighten hose clamps at radiator, or radiator fitting may distort, causing a restriction to coolant flow. Radiator hose clamp torque is 36 in. lbs. (4 Nm).

Radiator/Grill Screen



1. Check radiator (A) air passages for restrictions or damage. Check and clean the radiator screen (B).
2. Carefully straighten any bent radiator fins.
3. Remove any obstructions with compressed air or low pressure water.

Cooling System Pressure Test

Refer to Chapter 3 for pressure test procedure.

Coolant Level Inspection

The recovery bottle, located on the left side of the machine, must be maintained between the minimum and maximum levels 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 reservoir. If not:

1. Remove reservoir cap. Inner splash cap vent hole must be clear and open.
2. Fill reservoir to upper mark with Polaris Premium 60/40 Anti Freeze / Coolant or 50/50 or 60/40 mixture of antifreeze and distilled water as required for freeze protection in your area.
3. Reinstall cap.

NOTE: If overheating is evident, allow system to cool completely and check coolant level in the radiator and inspect for signs of trapped air in system.

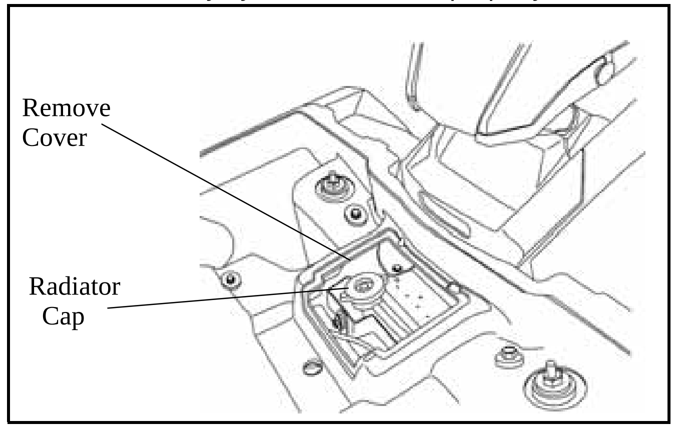
Radiator Coolant Level Inspection

NOTE: This procedure is only required if the cooling system has been drained for maintenance and/or repair. However, if the recovery bottle has run dry, or if overheating is evident, the level in the radiator should be inspected and coolant added if necessary.

⚠ 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.

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



To access the radiator pressure cap:

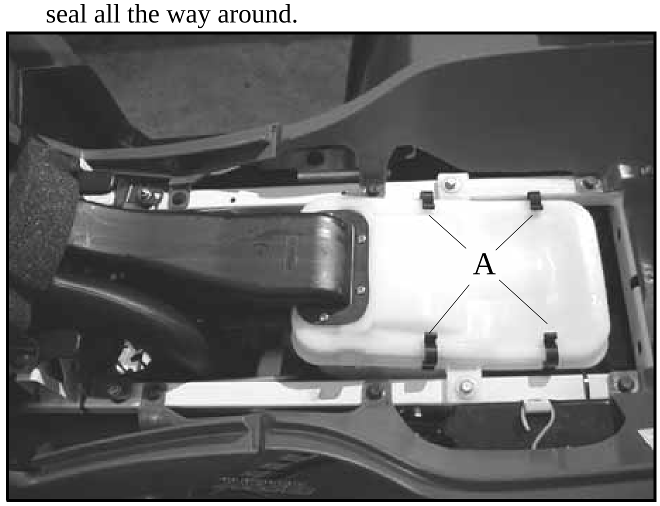
1. Open the front cargo storage.
2. Remove the inside cover over the radiator cap.

Air Filter/Pre-Filter Service

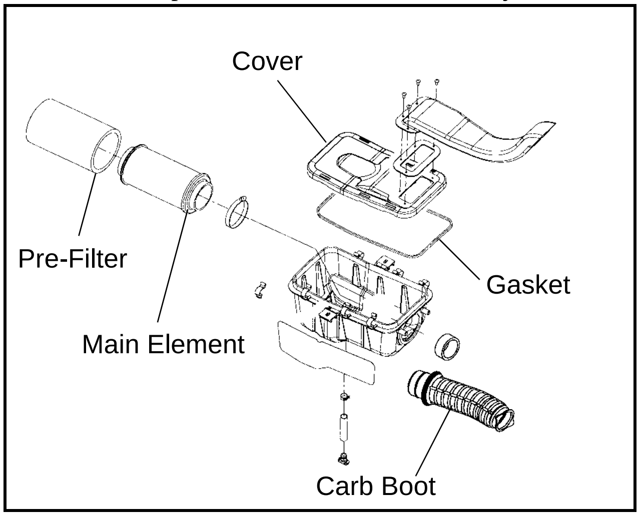
It is recommended that the air filter and pre filter be replaced annually. When riding in extremely dusty conditions, replacement is required more often.

The pre filter should be cleaned before each ride using the following procedure:

1. Lift up on the rear of the seat.
2. Pull the seat back and free of the tabs. **NOTE:** When reinstalling seat, make sure the slots in the seat engage the tabs in the fuel tank.
3. Remove clips (A) from air box cover and remove cover. Inspect the gasket. It should adhere tightly to the cover and seal all the way around.



4. Loosen clamp and remove air filter assembly.



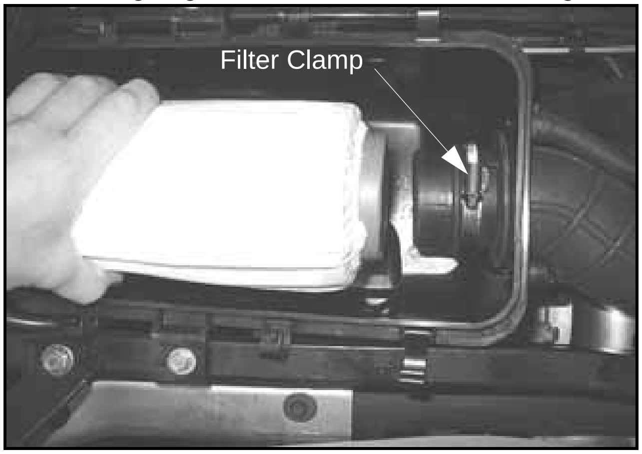
Cleaning:

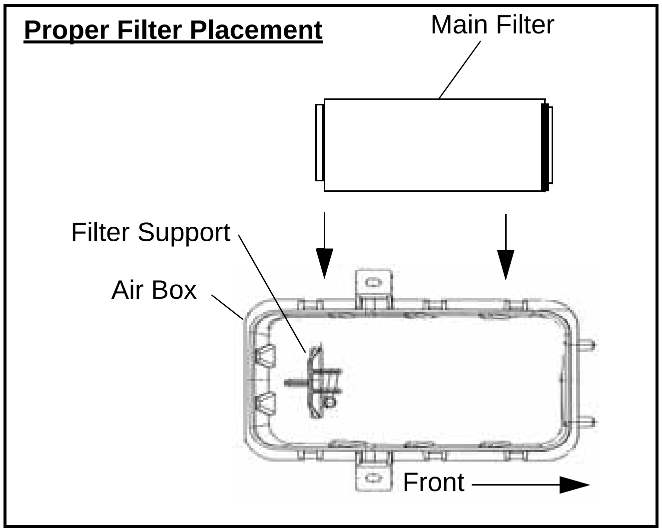
5. Slip the pre-filter element off of main element. Clean the pre filter with high flash point solvent, followed by hot soapy water.
6. Rinse and dry thoroughly.
7. Inspect element for tears or damage.
8. Apply foam filter oil or clean engine oil and squeeze until excess oil is removed.
9. Inspect main filter and replace if necessary. If the filter has been soaked with fuel or oil it must be replaced.

Installation:

10. Reinstall pre-filter element over main filter. Be sure the element covers entire surface of main filter without folds, creases, or gaps.
11. Reinstall filter on main filter mount. Place filter clamp over the assembly and tighten.

NOTE: Apply a small amount of general purpose grease to the sealing edges of the filter before reinstalling.





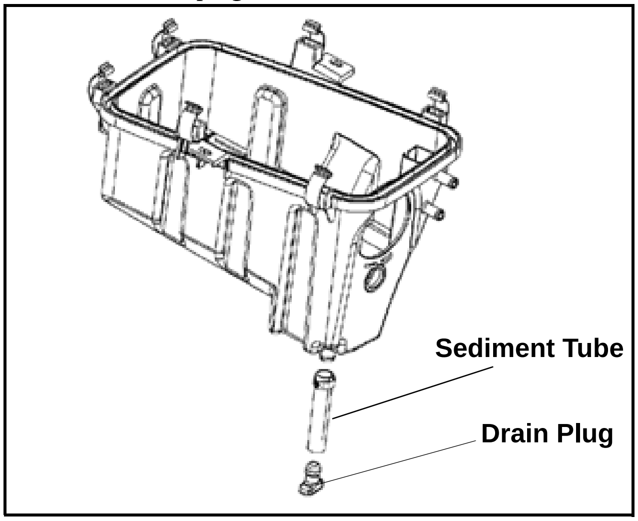
NOTE: The air filter should rest on the filter support. Proper placement of the air filter is important to prevent rattles and air leaks. See Illustration above.

12. Install air box cover and secure with clips.

Air Box Sediment Tube

Periodically check the air box drain tube located toward the rear of the machine. Drain whenever deposits are visible in the clear tube.

1. Remove drain plug from end of sediment tube.
2. Drain tube.
3. Reinstall drain plug.



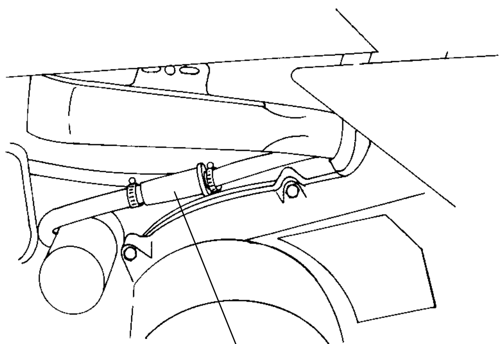
NOTE: The sediment tube will require more frequent service if the vehicle is operated in wet conditions or at high throttle openings for extended periods.

Breather Filter Inspection

Four-cycle ATV engines are equipped with a breather filter. The in-line filter is similar in appearance to a fuel filter, and is visible on the left side (Location A).

In-line breather filters can be installed in either direction.

Typical Breather Filter Location

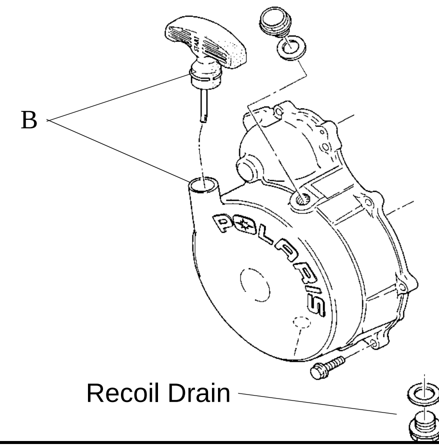


Breather Hose

1. Be sure breather line is routed properly and secured in place. **CAUTION:** Make sure lines are not kinked or pinched.

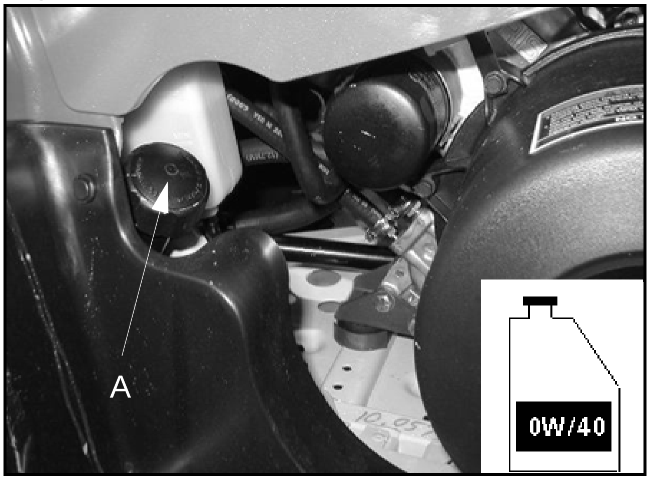
NOTE: In-line breather filter service life is extended when the foam air box pre-filter is in place and maintained properly. Never operate the engine without the pre-filter.

Recoil Housing



- Drain the housing periodically to remove moisture.
- Drain the recoil housing after operating the ATV in very wet conditions. This should also be done before storing the ATV. The drain screw is located at the bottom of the recoil housing. Remove the screw with a 10 mm wrench. Reinstall screw once housing has been drained.
- **CAUTION:** Make sure the manual start handle (B) is fully seated on the recoil housing, especially when travelling in wet areas. If it is not sealed properly, water may enter the recoil housing and damage components.
- Water will enter the recoil housing if the starter handle (B) is disengaged from the rope guide when under water.
- After travelling in wet areas the recoil housing and starter should always be drained completely by removing the recoil.
- Do not open the crankcase drain unless the engine has ingested water. Some engine oil will be lost if crankcase drain is opened.
- If recoil handle (B) seal has been damaged, the handle should be replaced.

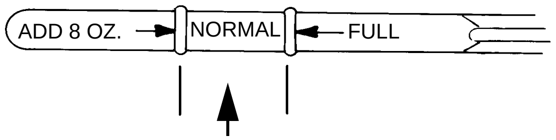
Engine Oil Level



The oil tank is located on the left side of the vehicle. To check the oil level:

1. Set machine on a level surface.
2. Clean the area around the dip stick.
3. Start and run engine for 20-30 seconds. This will return oil to its true level in the oil tank.
4. Stop engine, remove dipstick (A) and wipe dry with a clean cloth.
5. Reinstall dipstick, screw the dipstick into place.

NOTE: The dipstick must be screwed completely in to ensure accurate measurement.



6. Remove dipstick and check to see that the oil level is in the normal range. The oil should be between the top line and the bottom line on the dipstick. Add oil as indicated by the level on the dipstick. Do not overfill.

NOTE: Rising oil level between checks in cool weather driving, can indicate moisture collecting in the oil reservoir. If the oil level is over the full mark, change the oil.

Oil and Filter Change

Oil Filter Torque:
Turn by hand until filter gasket contacts sealing surface, then turn an additional 1/2 turn

Oil Filter Wrench:
(PV-43527)

Oil Tank Screen Fitting Torque:
25 ft-lb (34Nm)

Recommended Engine Oil:

Polaris Premium 4 All Season Synthetic, 0W-40

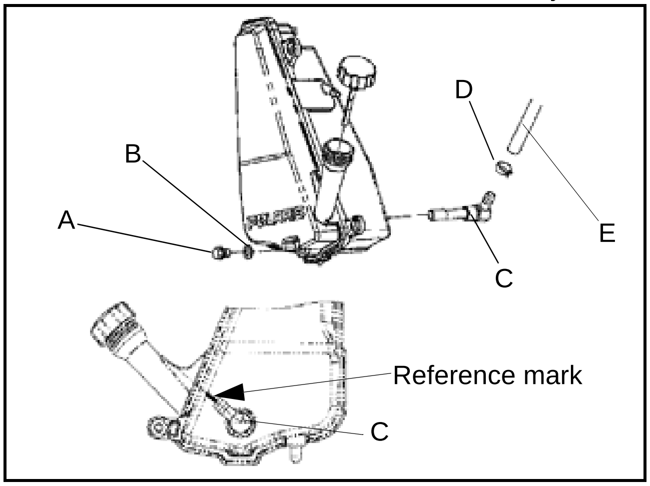
WARNING

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

NOTICE: Care must be taken to ensure that the fluids are contained. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembly of any component containing fluids.

1. Place vehicle on a level surface.
2. Clean area around drain plug (A) at bottom of oil tank.
3. Run engine two to three minutes until the engine is warm.
4. After two or three minutes stop the engine.

5. Place a drain pan beneath oil tank and remove the drain plug (A). **CAUTION:** Oil may be hot. Do not allow hot oil to come into contact with skin as serious burns may result.



6. Allow oil to drain completely.
7. Replace sealing washer (B) on drain plug (A).

NOTE: The sealing surfaces on the drain plug and the oil tank should be clean and free of burrs, nicks or scratches.

8. Reinstall the drain plug (A) and torque it to specification.

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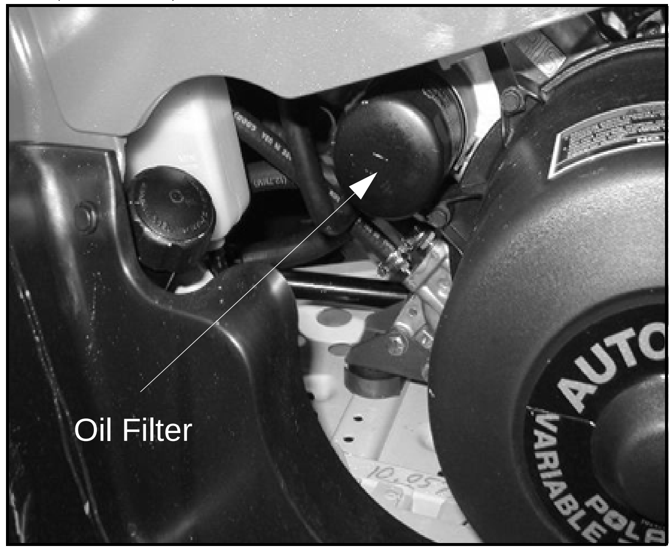
Oil Tank Drain Plug Torque: **14 ft. lbs. (19 Nm)** Crankcase Drain Plug Torque: **14 ft. lbs. (19 Nm)**

9. Loosen clamp (D).
10. Remove oil hose (E) from screen fitting (C) on bottom of oil tank.
11. Remove screen fitting (C) and clean the screen.
12. Apply Loctite™ thread sealant 505 or an equivalent pipe thread sealant or PTFE sealant tape to clean, oil free threads of fitting (C).
13. Install screen fitting (C) and rotate a minimum of 2 1/2 turns (clockwise) into the tank threads. Then rotate the screen fitting clockwise until the nipple of the screen fitting aligns with the reference marking on the tank.

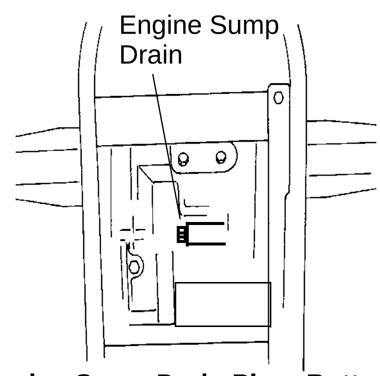
CAUTION
Maximum torque for the screen fitting is 25 ft-lb (34Nm), do not over tighten.

NOTE: Maximum torque for the screen fitting is 25 ft-lb (34Nm), do not over tighten.

14. Install oil hose (E) on fitting (C) and re-install clamp (D).
15. Place shop towels beneath oil filter. Use Oil Filter Wrench (**PV-43527**), turn filter counterclockwise to remove.



16. Using a clean dry cloth, clean filter sealing surface on the crankcase.
17. Lubricate the o-ring on new filter with a thin film of engine oil. Check to make sure the O-ring is in good condition.
18. Install the new filter and turn it by hand until the filter gasket contacts the sealing surface, then turn an additional 1/2 of a turn.
19. Approximately 1 cup of engine oil will remain in the crankcase. To drain, remove drain plug found on lower right side of crankcase.



Engine Sump Drain Plug- Bottom View

NOTE: The sealing surfaces on the drain plug and crankcase should be clean and free of burrs, nicks or scratches.

20. Reinstall drain plug and torque to specification.
21. Remove dipstick and fill tank with 2 quarts (1.9 L) of Polaris Premium 4 Synthetic Oil.
22. Place gear selector in Park and set parking brake.

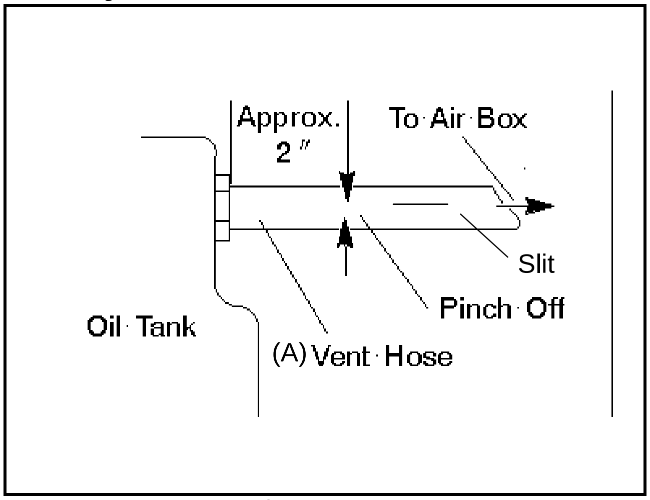
NOTE: Clamp or pinch off the vent line 2” from the oil tank as shown in the Oil Pump Priming Procedure for the 450/500 engine.

23. Re-check the oil level on the dipstick and add oil as necessary to bring the level to the upper mark on the dipstick.
24. Dispose of used filter and oil properly.

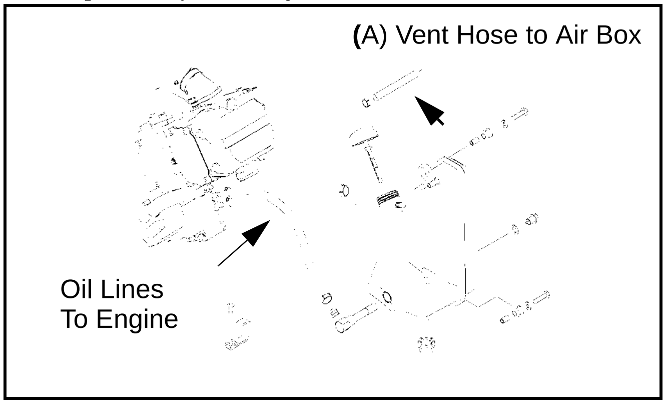
Oil Pump Priming Procedure

NOTE: This priming procedure must be performed whenever the oil hose connection between the oil tank and pump inlet has been disconnected.

1. Clamp or pinch off vent line (A) approximately 2” from oil tank to avoid the end of oil tank vent fitting, and the vent line’s pressure relief slit



2. Run engine at IDLE for 10-20 seconds.
3. Remove the vent line clamp. The oil pump will now be properly primed and ready for field operation. **Note:** *If the system is primed properly you should hear some air release. If you do not, the system has not primed. Repeat the process if necessary.*



Valve Clearance

Inspect and adjust valve clearance while the engine is cold and the piston positioned at Top Dead Center (TDC) on compression stroke.

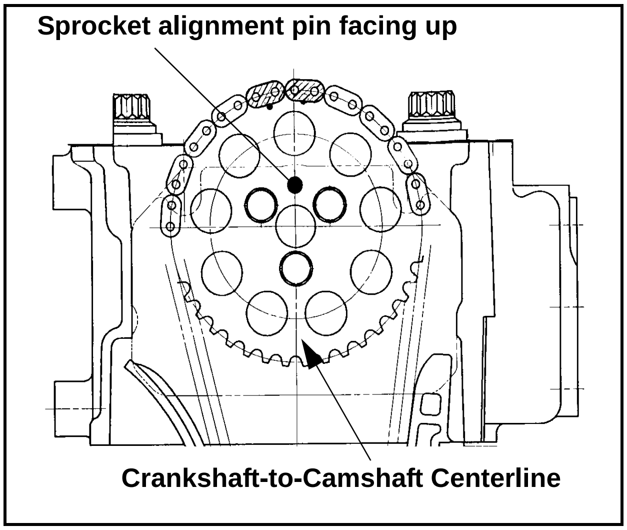
1. Remove the seat.
2. Remove body panels and fuel tank as necessary to gain access to valve cover.
3. Remove the spark plug high tension lead and remove the spark plug. **CAUTION:** Place a clean shop towel into the spark plug cavity to prevent dirt from entering.
4. Remove rocker cover bolts, cover and gasket.

NOTE: It may be necessary to tap cover lightly with a soft-faced hammer to loosen it from the cylinder head.

5. Remove timing inspection plug from recoil housing.

CAUTION

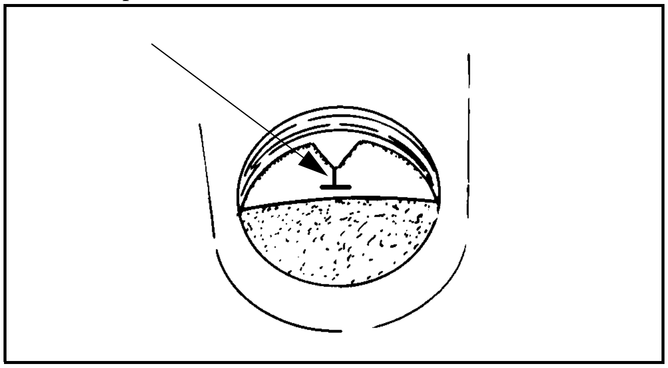
Failure to position the crankshaft at TDC on compression stroke will result in improper valve adjustment.



6. Rotate engine slowly with recoil rope, watching the intake valve(s) open and close.

NOTE: At this point watch the camshaft sprocket locating pin and slowly rotate engine until locating pin is facing upward, directly in line with the crankshaft to camshaft center line as shown. The camshaft lobes should be pointing downward.

7. Verify accurate TDC positioning by observing the “T” mark aligned with the pointer in the timing inspection hole. In this position there should be clearance on all valves.

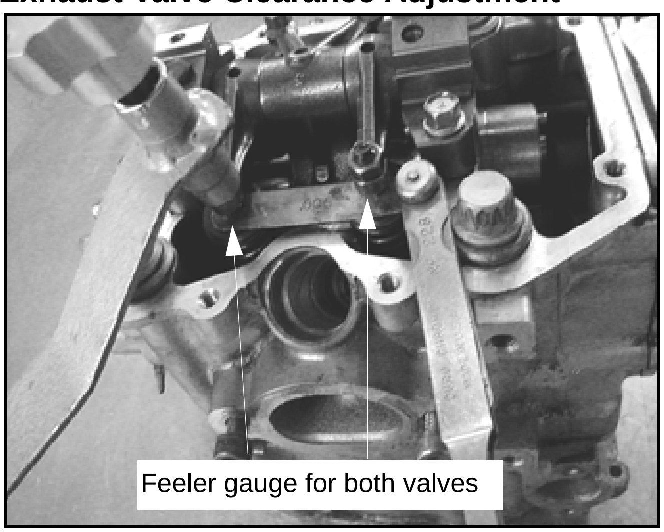


Intake Valve Clearance Adjustment

1. Insert a .006" (.15mm) feeler gauge between end of intake valve stem and clearance adjuster screw.
2. Using a 10 mm wrench and a screwdriver, loosen adjuster lock nut and turn adjusting screw until there is a slight drag on the feeler gauge.
3. Hold adjuster screw and tighten adjuster lock nut securely.
4. Re-check the valve clearance.
5. Repeat adjustment procedure if necessary until clearance is correct with locknut secured.
6. Repeat this step for the other intake valve.

INTAKE VALVE CLEARANCE
.006” (.15 mm)

Exhaust Valve Clearance Adjustment



NOTE: The exhaust valves share a common rocker arm, and must be adjusted using two feeler gauges.

1. Insert a .006" (.15mm) feeler gauge between end of exhaust valve stem and adjuster screw(s).
2. Loosen locknut(s) and turn adjuster screw(s) until there is a slight drag on feeler gauge(s). The Valve/Clutch Adjuster Tool **(PA-44689)** can be used to adjust the engines valves.

NOTE: Both feeler gauges should remain inserted during adjustment of each valve.

EXHAUST VALVE CLEARANCE
.006” (.15 mm)

3. When clearance is correct, hold adjuster screw and tighten locknut securely.
4. Re-check the valve clearance.
5. Repeat adjustment procedure if necessary until clearance is correct with locknut secured.

Steering

The steering components should be checked periodically for loose fasteners, worn tie rod ends, and damage. Also check to make sure all cotter pins are in place. If cotter pins are removed, they must not be re-used. Always use new cotter pins.

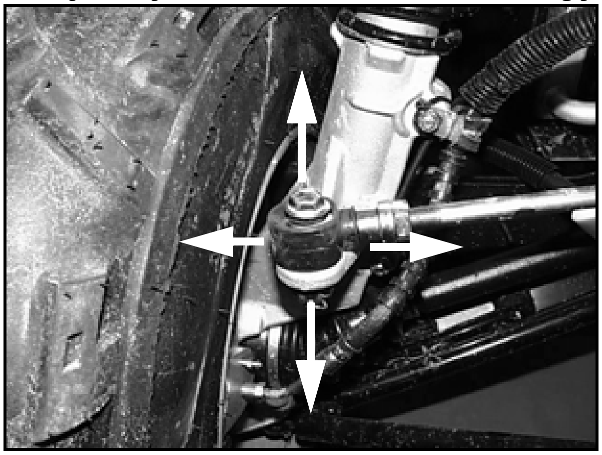
Replace any worn or damaged steering components. Steering should move freely through entire range of travel without binding. Check routing of all cables, hoses, and wiring to be sure the steering mechanism is not restricted or limited. **NOTE:** Whenever steering components are replaced, check front end alignment. Use only genuine Polaris parts.

WARNING

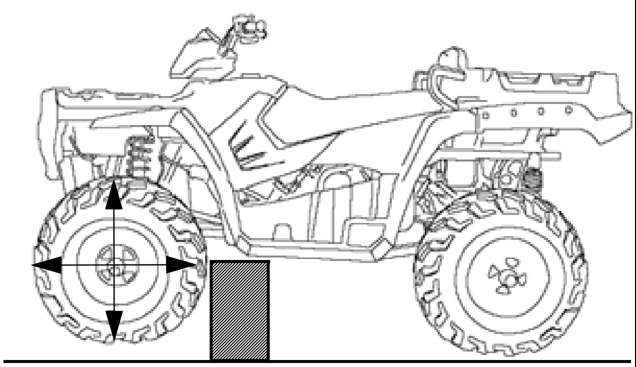
Due to the critical nature of the procedures outlined in this chapter, Polaris recommends steering component repair and adjustment be performed by an authorized MSD-certified technician when replacing worn or damaged steering parts.
Use only genuine Polaris replacement parts.

Tie Rod End/Steering Inspection

- To check for play in the tie rod end, grasp the steering tie rod, pull in all directions feeling for movement.
- Repeat inspection for inner tie rod end on steering post.



- 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 hub / wheel 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 (possible loose wheel nuts or loose front hub components).



Check for Loose Wheel or Hub

- Refer to the Body/Steering Chapter 5 or Final Drive Chapter 7 for service procedures.

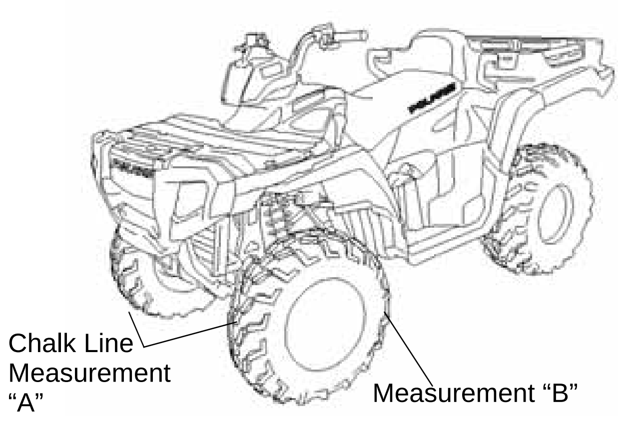
Camber and Caster

The camber and caster are non-adjustable.

Wheel Alignment

1. Place machine on a smooth level surface.
2. Set handlebars in a straight ahead position and secure handlebars in this position. **NOTE:** The steering arm center section can be used as an indicator of whether the handlebars are straight. The center section should always point straight back from the steering post.
3. Place a chalk mark on the center line of the front tires approximately 10" (25.4 cm) from the floor or as close to the hub/axle center line as possible. **NOTE:** It is important that the height of both marks be equally positioned in order to get an accurate measurement.
4. Measure the distance between the marks and record the measurement. Call this measurement “A”.
5. Rotate the tires 180^{o} by moving vehicle forward or backward. Position chalk marks facing rearward, even with the hub/axle centerline.
6. Again measure the distance between the marks and record. Call this measurement “B”. Subtract measurement “B” from measurement “A”. The difference between measurements “A” and “B” is the vehicle toe alignment. The recommended vehicle toe tolerance is 1/8" to 1/4" (.3 to.6 cm) toe out. This means the measurement at the front of the tire (A) is 1/8" to 1/4" (.3 to .6 cm) wider than the measurement at the rear (B)

Ill. 1



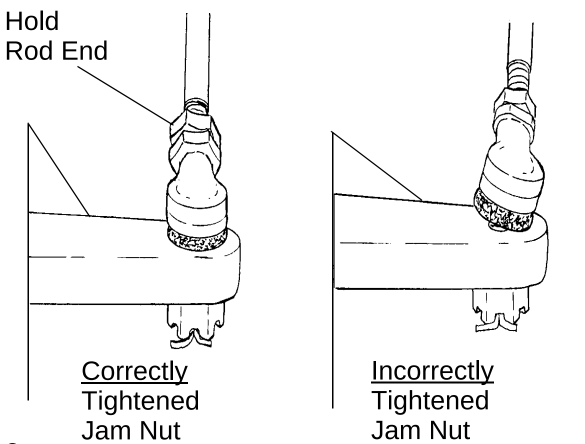
Wheel Toe-Out:
(A) - (B) = 1/8 - 1/4" (.3 to .6 cm)

Toe Alignment Adjustment

If toe alignment is incorrect, measure the distance between vehicle center and each wheel. This will tell you which tie rod needs adjusting. **NOTE:** Be sure handlebars are straight ahead before determining which tie rod(s) need 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



Ill. 2

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 in Method 1 or Method 2.
- **IMPORTANT:** 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. See illustration 2.
- After alignment is complete, torque jam nuts to specification.

= T

Tie Rod Jam Nut Torque:
12-14 ft. lbs. (16-19 Nm)

Exhaust Pipe

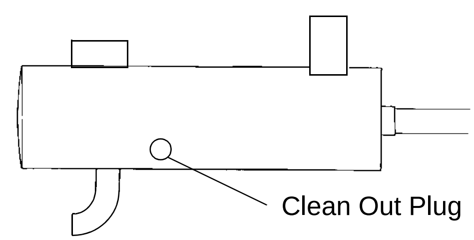
WARNING

- Do not perform clean out immediately after the engine has been run, as the exhaust system becomes very hot. Serious burns could result from contact with exhaust components.
- To reduce fire hazard, make sure that there are no combustible materials in the area when purging the spark arrestor.
- Wear eye protection.
- Do not stand behind or in front of the vehicle while purging the carbon from the spark arrestor.
- Never run the engine in an enclosed area.Exhaust contains poisonous carbon monoxide gas.
- Do not go under the machine while it is inclined.Set the hand brake and block the wheels to prevent roll back.

Failure to heed these warnings could result in serious personal injury or death.

The exhaust pipe must be periodically purged of accumulated carbon as follows:

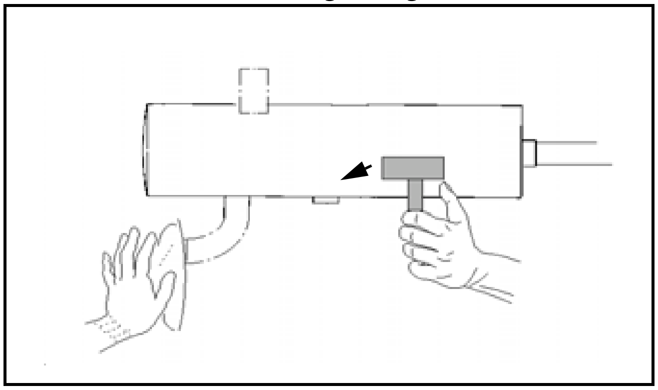
1. Remove the clean out plugs located on the bottom of the muffler.



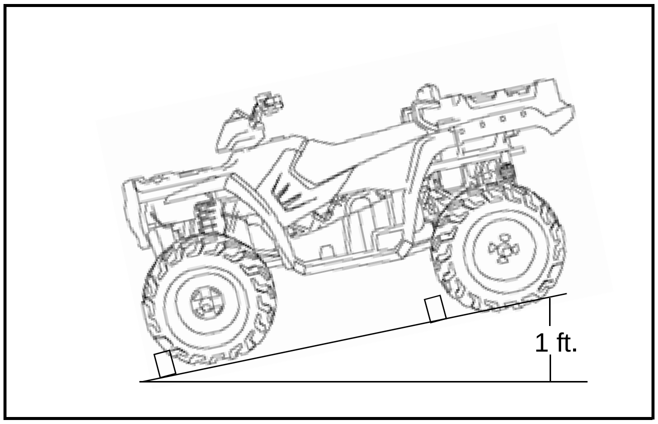
Ill. 1

2. Place the transmission in Park and start the engine. Purge accumulated carbon from the system by momentarily revving the engine several times.

3. If some carbon is expelled, cover the exhaust outlet and lightly tap on the pipe around the clean out plugs with a rubber mallet while revving the engine several more times.



4. If particles are still suspected to be in the muffler, back the machine onto an incline so the rear of the machine is one foot higher than the front. Set the hand brake and block the wheels. Make sure the machine is in Park and repeat Steps 2 and 3. **SEE WARNING**
5. If particles are still suspected to be in the muffler, drive the machine onto the incline so the front of the machine is one foot higher than the rear. Set the hand brake and block the wheels. Make sure the machine is in Park and repeat Steps 2 and 3. **SEE WARNING**

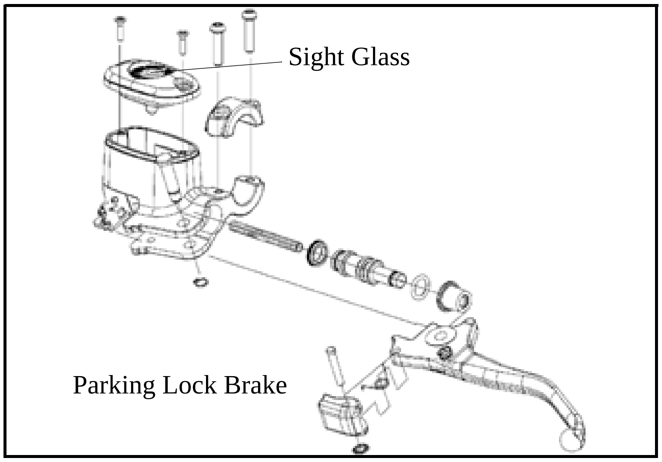


6. Repeat steps 2 through 5 until no more particles are expelled when the engine is revved.
7. Stop the engine and allow the arrestor to cool.
8. Reinstall the clean out plugs.

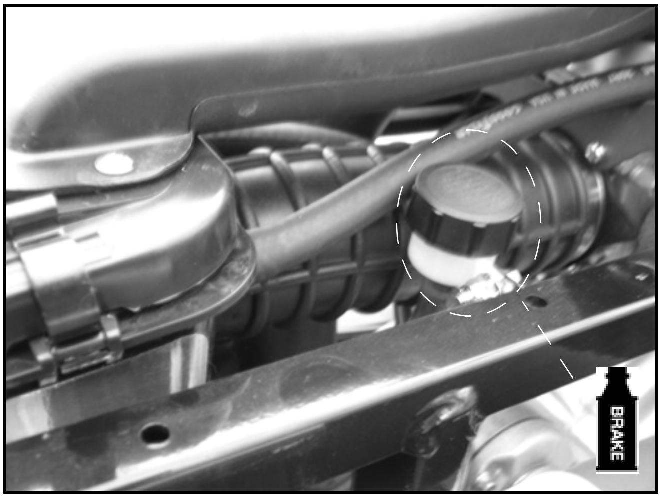
Brake System Inspection

The following checks are recommended to keep the brake system in good operating condition. Service life of brake system components depends on operating conditions. Inspect brakes in accordance with the maintenance schedule and before each ride.

- Keep fluid level in the master cylinder reservoir to the indicated level inside reservoir.
- Use Polaris DOT 3 Brake Fluid



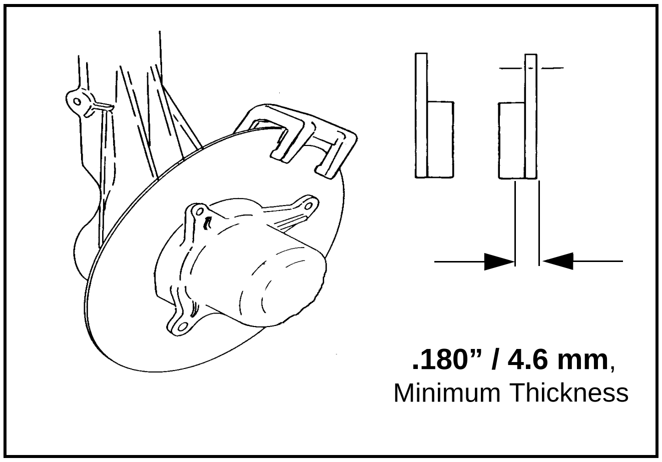
- Use Polaris DOT 3 Brake Fluid

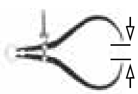


- Check brake for excessive travel or spongy feel.
- Check brake system for fluid leaks.
- Check friction pads for wear, damage or looseness.
- Check surface condition of the disc.

Brake Pad Inspection

Pads should be changed when the friction material is worn to **.180” / 4.6 mm**, or about the thickness of a dime.



 = **In. / mm.**

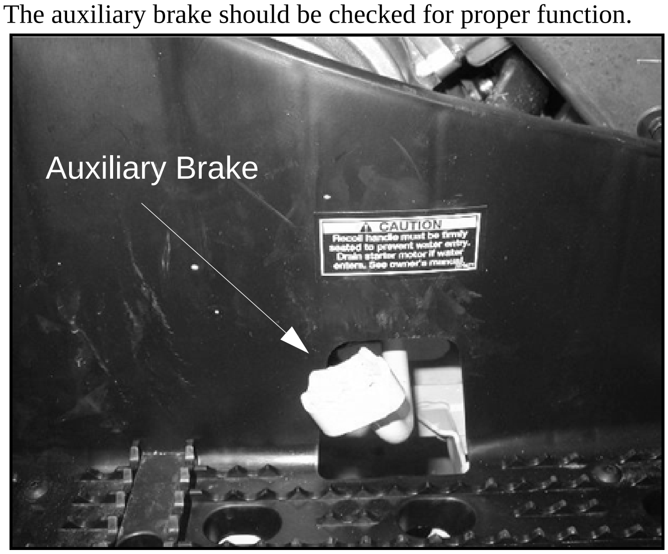
Brake Pad Service Limit:
.180" (4.6 mm)

Hose/Fitting Inspection

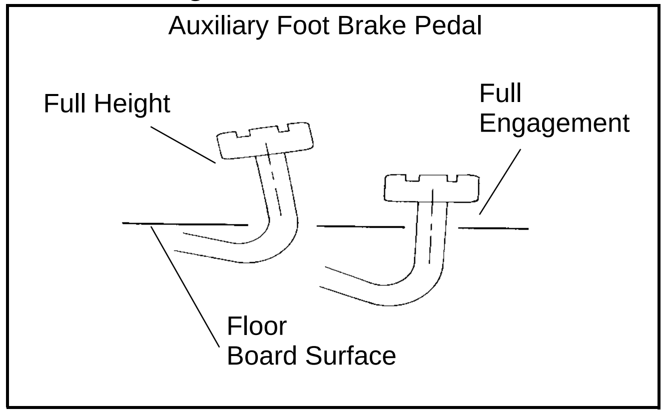
Check brake system hoses and fittings for cracks, deterioration, abrasion, and leaks.Tighten any loose fittings and replace any worn or damaged parts.

Auxiliary Brake Testing

The auxiliary brake should be checked for proper function.



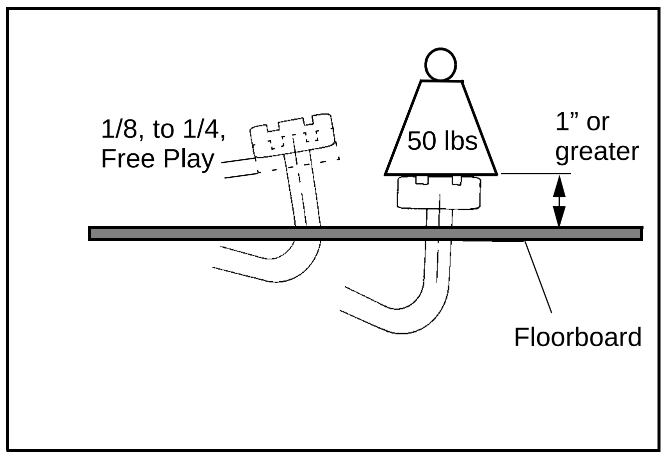
1. Support the rear wheels off the ground.
2. While turning the rear wheels by hand, apply the auxiliary foot brake. This brake should not stop the wheels from turning until the lever is half way between its rest position and bottoming on the footrest.



Auxiliary Brake Adjustment (Hydraulic)

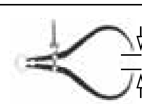
Use the following procedure to inspect the hydraulic auxiliary (foot) brake system and adjust or bleed if necessary:

First, check foot brake effectiveness by applying 50 lb. (approx.) downward force on the pedal. The top of the pedal should be at least 1 inch, (25.4mm) above the surface of the footrest.



If less than one inch, two things must be examined:

Free Play:

 = **In. / mm.**

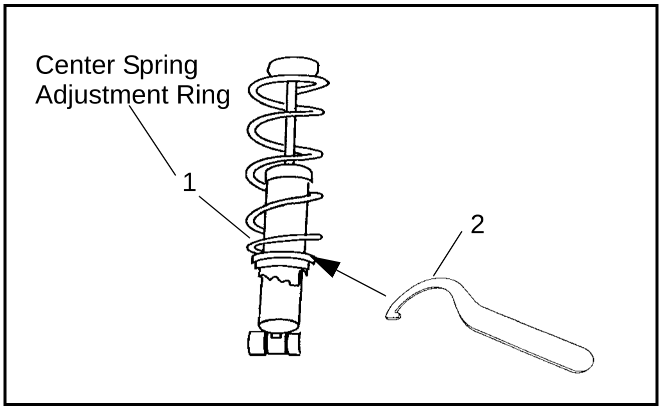
Foot Brake Freeplay:
1/8 - 1/4 inch (3.2 - 6.35 mm)

If free play is excessive, inspect pedal, linkage, and master cylinder for wear or damage and replace any parts as needed.

Bleeding:

If free play is correct and brake pedal travel is still excessive, air may be trapped somewhere in the system. Bleed the hydraulic auxiliary brake system in a conventional manner, following the procedure outlined in Brake Chapter 9.

Suspension Spring Preload Adjustment



Shock Spanner Wrench (PN 2871095)

Operator weight and vehicle loading affect suspension spring preload requirements. Adjust as necessary, using the spanner wrench (2) to turn the adjustment cam (1).

Front Suspension

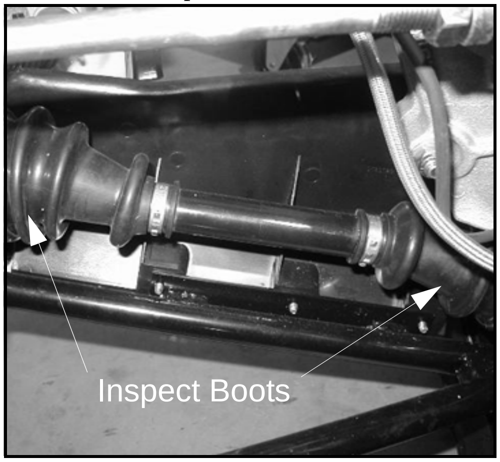
Compress and release front suspension. Damping should be smooth throughout the range of travel.

Check all front suspension components for wear or damage.

Inspect front strut cartridges for leakage.

CV Shaft Boot Inspection

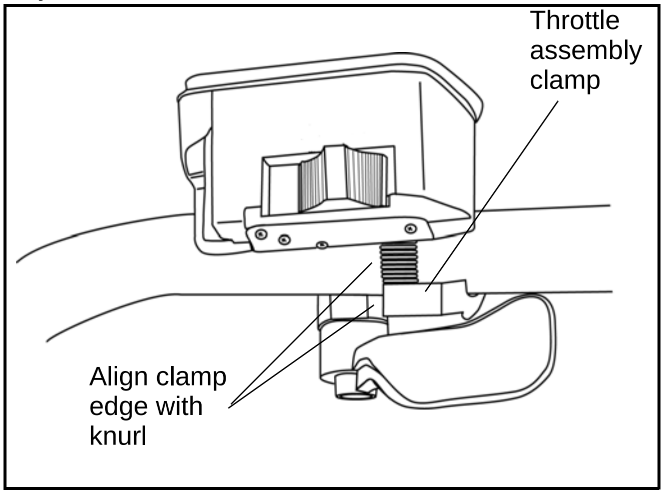
Inspect the CV shaft boots in the front and rear of the ATV for damage, tears, wear, or leaking grease. If the rubber boot exhibits any of these symptoms, replace the boot. Refer to Chapter 7 for CV boot replacement.



Controls

Check controls for proper operation, positioning and adjustment.

Brake control and switch must be positioned to allow brake lever to travel throughout entire range without contacting switch body.



Align throttle control assembly clamp with knurl on handlebar.

Wheels

Inspect all wheels for runout or damage. Check wheel nuts and ensure they are tight. Do not over tighten the wheel nuts.

⚠ WARNING

Operating an ATV with worn tires will increase the possibility of the vehicle skidding and possible loss of control.

Worn tires can cause an accident.

Always replace tires when the tread depth measures 1/8” (.3 cm) or less.

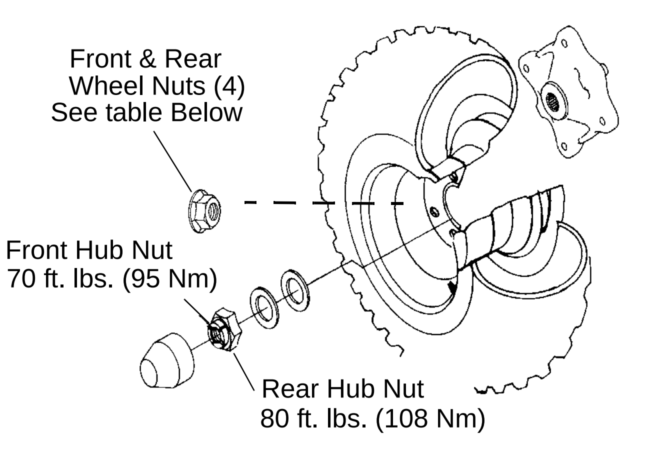
Inspect all wheels for runout or damage. Check wheel nuts and ensure they are tight. Do not over tighten the wheel nuts.

Wheel, Hub, And Spindle Torque Table

Item	Specification
Steel - Front Wheel Nuts	**27 Ft. Lbs. (37 Nm)**
Steel - Rear Wheel Nuts	**27 Ft. Lbs. (37Nm)**
Aluminum Front Wheel Nuts	**90 Ft. Lbs. (122 Nm)**
Aluminum Rear Wheel Nuts	**90 Ft. Lbs. (122 Nm)**
Front Hub Retaining Nut	**70 ft.lbs. (90 Nm)**
Rear Hub Retaining Nut	**80 Ft. Lbs. (108 Nm)**

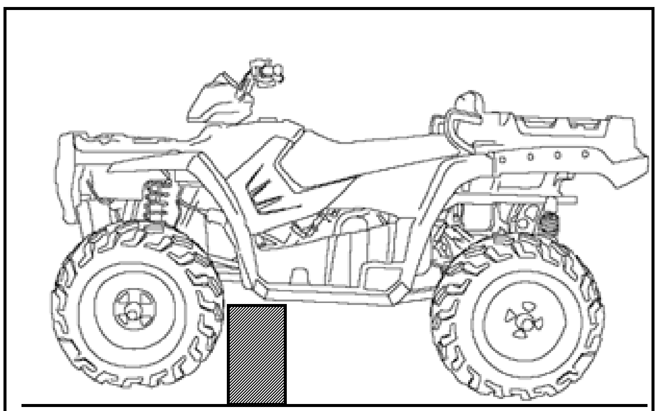
Wheel Removal Front or Rear

Front & Rear Wheels



1. Stop the engine, place the transmission in Park and lock the parking brake.
2. Loosen the wheel nuts slightly.

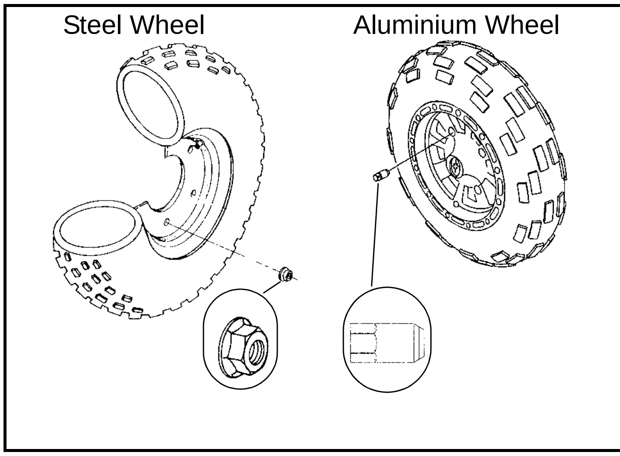
   • Elevate the side of the vehicle by placing a suitable stand under the footrest frame.



3. Remove the wheel nuts and remove the wheel.

Wheel Installation

1. With the transmission in Park and the parking brake locked, 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.
2. Attach the wheel nuts and finger tighten them.
3. Lower the vehicle to the ground.
4. Securely tighten the wheel nuts to the proper torque listed in the table.



CAUTION

If wheels are improperly installed it could affect vehicle handling and tire wear. On vehicles with tapered rear wheel nuts, make sure tapered end of nut goes into taper on wheel.

Tire Pressure

CAUTION

Maintain proper tire pressure. Refer to the warning tire pressure decal applied to the vehicle.

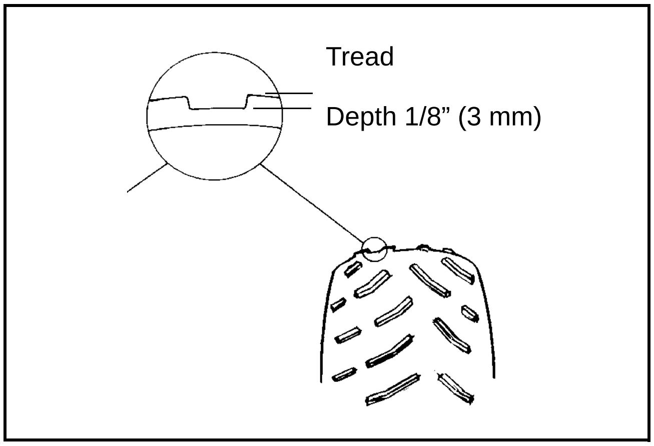
Tire Pressure Inspection (PSI - Cold)	
Front	**Rear**
5	5

Tire Inspection

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

Tire Tread Depth

Always replace tires when tread depth is worn to 1/8" (3 mm) or less.



⚠ WARNING

Operating an ATV with worn tires will increase the possibility of the vehicle skidding easily with possible loss of control.

Worn tires can cause an accident.

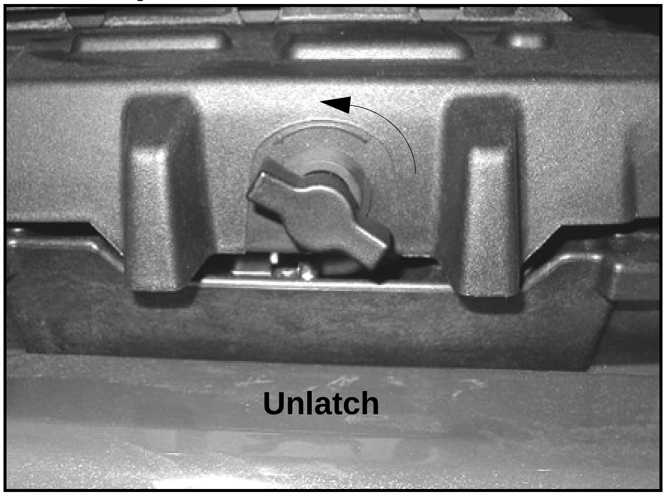
Always replace tires when the tread depth measures 1/8” (.3 cm) or less.

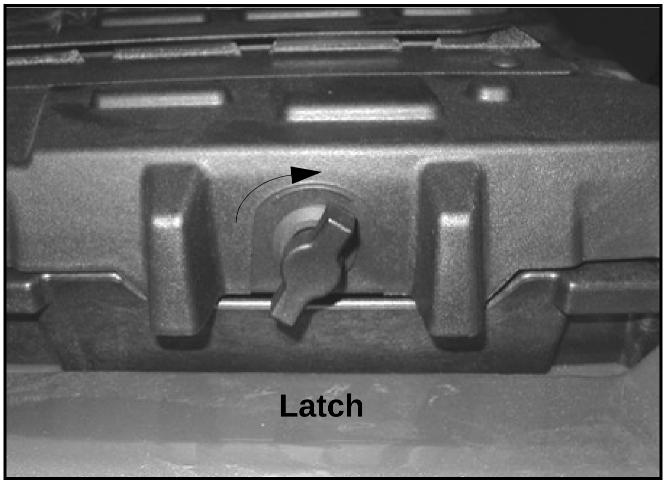
Frame, Nuts, Bolts, Fasteners

Periodically inspect the torque of all fasteners in accordance with the maintenance schedule. Check that all cotter pins are in place. Refer to specific fastener torques listed in each chapter.

Storage Compartments

The storage compartments are easily accessible. To open the front compartment turn the latch handle to the horizontal position on both sides. To close the storage compartment turn the latch handles just past the vertical position. Use the arrow located on top of the latch as a reference.





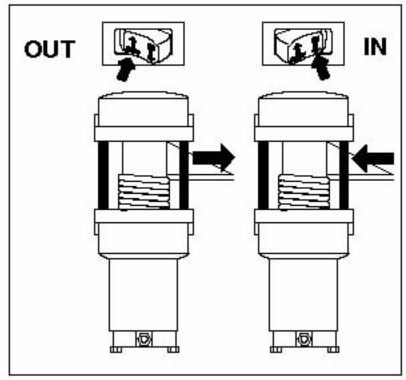
Winch Operation (If Equipped)

This information is for Sportsman models equipped with a winch in the front.

Winch Handlebar Controls

The winch is located in the front bumper area.

The mini-rocker (IN/OUT) control controls the direction of the cable for the winch. IN pulls the cable into the winch and OUT feeds the cable out of the winch.



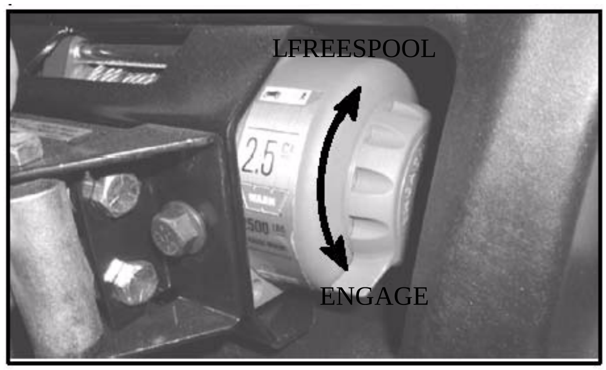
Winch Control

The winch control located on the side of the winch gives the operator easy access to switch between ENGAGED and FREESPOOL.

When the winch is ENGAGED, the winch only allows the cable to be pulled IN or released OUT via the mini-rocker switch on the handlebar.

When the winch is FREESPOOL, the winch allows the cable to be pulled out freely.

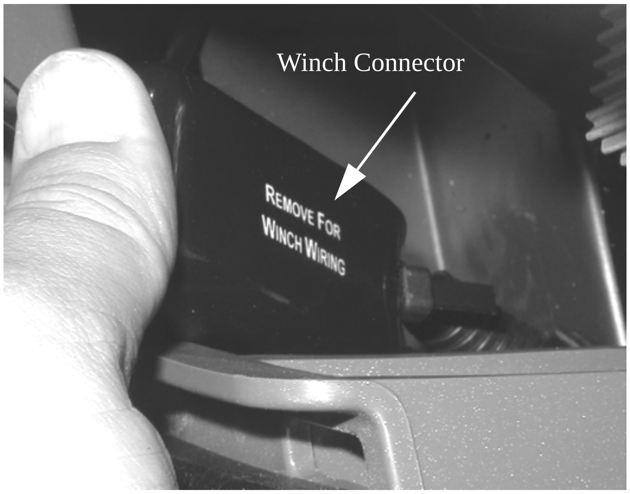
NOTE: The switch on the handlebar does not have to be in the OUT position.

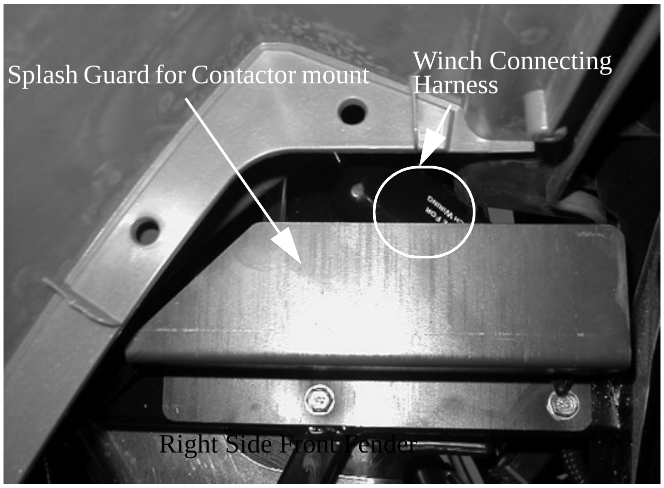


Winch Wire Locations

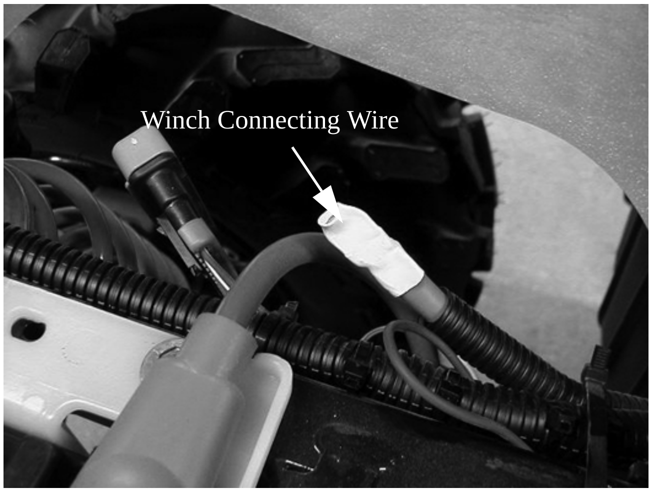
The winch wires can be located under the front cab area. Locate the wires, remove the cap and hook up to winch the Blue and

Yellow (6 Ga.) wires to the winch. Refer to the installation instructions for more details.

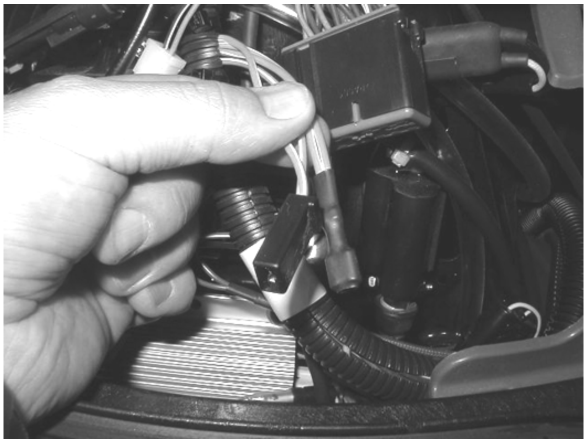




Locate the Red wire (6 Ga.) with the yellow crimp cover is located in the rear fender area. The red wire connects to the battery.



The Orange/White wires are located under the front cover (under headlight pod). The Orange/White wires supply the control power to the winch.



ATV Cleaning & Storage

Cleaning the ATV

Keeping your ATV clean will not only improve its appearance but it can also extend the life of various components. With a few precautions, your ATV can be cleaned much like an automobile.

Washing the ATV

The best and safest way to clean your ATV is with a garden hose and a pail of mild soap and water. Use a professional type washing mitten, cleaning the upper body first and the lower parts last. tRinse with water frequently and dry with a chamois to prevent water spots. **NOTE:** If warning and safety labels are damaged, contact your a Polaris dealer for free replacement.

Polaris does not recommend the use of a high pressure type car wash system for washing the ATV. If a high pressure system is used, exercise extreme care to avoid water damage to the wheel bearings, transmission seals, body panels, brakes and warning labels. NOTE: Grease all zerk fittings immediately after washing, and allow the vehicle to run for a while to evaporate any water that may have entered the engine or exhaust system.

Waxing the ATV

Your ATV can be waxed with any non-abrasive automotive paste wax. Avoid the use of harsh cleaners since they can scratch the body finish. Polaris offers a detailing kit for ATVs.

CAUTION

Certain products, including insect repellents and chemicals, will damage plastic surfaces. Use caution when using these products near plastic surfaces.

Storage Tips

See Page 2.9 for the part numbers of Polaris products.

CAUTION

Starting the engine during the storage period will disturb the protective film created by fogging and damage could occur. Never start the engine during the storage period.

Clean the Exterior

Make necessary repairs and then clean the ATV thoroughly with mild soap and warm water to remove all dirt and grime. Don’t use harsh detergents or high pressure washers. Some detergents deteriorate rubber parts. Use dish soap type cleaners only. High pressure washers may force water past seals.

Stabilize the Fuel

Fill the fuel tank. Add Polaris Carbon Clean Fuel Treatment or Polaris Fuel Stabilizer. Follow the instructions on the container for the recommended amount. (Carbon clean will also reduce the possibility of bacterial growth in the fuel system). Allow 15-20 minutes of operation for the stabilizer to disperse through the fuel in the tank and EFI sytem / carburetor. Turn the fuel valve off and drain the carburetor bowl (450 only).

Oil and Filter

Warm the engine and change the oil and filter. Follow the procedure in this chapter for proper oil change.

Air Filter / Air Box

Inspect and clean or replace the pre-cleaner and air filter. Clean the air box and drain the sediment tube.

Breather Filter

Inspect and clean or replace the breather filter.

Fluid Levels

Inspect the following fluid levels and change if necessary: front gearcase; transmission; brake fluid (change every two years or as required if fluid looks dark or contaminated).

Drain the Recoil Housing

Remove the recoil housing drain plug and drain any moisture.

Storage Kits

Polaris offers storage kits for ATVs. See a Polaris dealer or visit www.purepolaris.com.

Fog the Engine

To properly store the engine, use Polaris Fogging Oil according to the directions.

If you choose not to use Polaris Fogging Oil, perform the following procedure:

1. Support the front end of the machine so the engine is level or tilted slightly rearward.
2. Treat the fuel system with Polaris Carbon Clean according to the directions.
3. Remove the spark plug and add 2-3 tablespoons of Premium 4 Synthetic 0W-40 engine oil. To access the plug hole, use a section of clear 1/4” hose and a small plastic squeeze bottle filled with the pre-measured amount of oil. **Note:** *Do this carefully! If you miss the plug hole, oil will drain from the spark plug cavity into the hole at the front of the cylinder head, and appear to be an oil leak.* Install the spark plug and pull the engine over slowly with the recoil starter. Oil will be forced in and around the piston rings and ring lands, coating the cylinder with a protective film of fresh oil.
4. Apply dielectric grease to the inside of the spark plug cap and install the cap onto the plug.

5. Turn the engine over several times ***with the recoil only*** to ensure coverage of piston rings, cylinder walls and crankshaft bearings.
6. If Polaris fuel system additive is not used, fuel tank, and fuel lines should be completely drained of gasoline.

Lubricate

Inspect all cables and lubricate with Polaris Cable Lubricant. Follow lubrication guidelines in the maintenance section of the service or owner's manual to completely grease and lubricate the entire vehicle with Polaris Premium All Season Grease.

Storage Tips

Battery Storage

Remove the battery from the vehicle and ensure that it's fully charged before placing it in storage. See Chapter 10 for instructions.

Engine Anti-Freeze

Test engine coolant strength and change if necessary. Coolant should be replaced every two years.

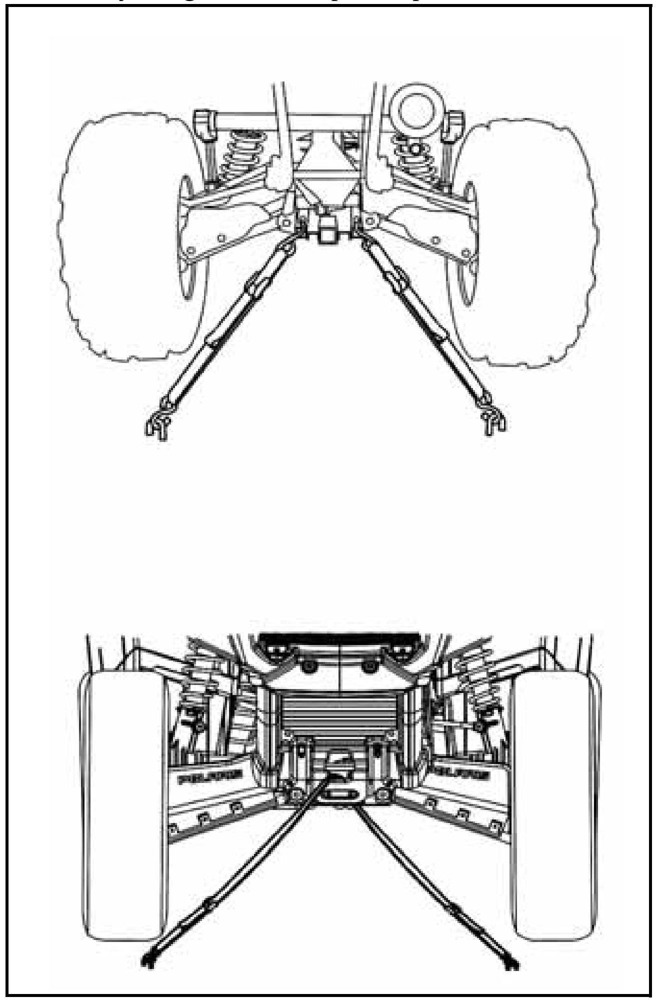
Storage Area/Covers

Set the tire pressure and safely support the ATV with the tires 1-2" off the ground. Be sure the storage area is well ventilated, and cover the machine with a genuine Polaris ATV cover. **NOTE:** Do not use plastic or coated materials. They do not allow enough ventilation to prevent condensation, and may promote corrosion and oxidation.

Transporting the ATV

Follow these procedures when transporting the vehicle.

1. Turn off the engine and remove the key to prevent loss during transporting.
2. Always place the transmission in park and lock the parking brake.
3. Turn the fuel valve off.
4. Be sure the fuel cap, oil cap and seat are installed correctly.
5. Always tie the frame of the ATV to the transporting unit securely using suitable straps or rope.



Maintenance Schedule

Service Date	Hours / Miles	Service Performed	Serviced By:

CHAPTER 3
ENGINE

SPECIFICATIONS

Torque Specifications

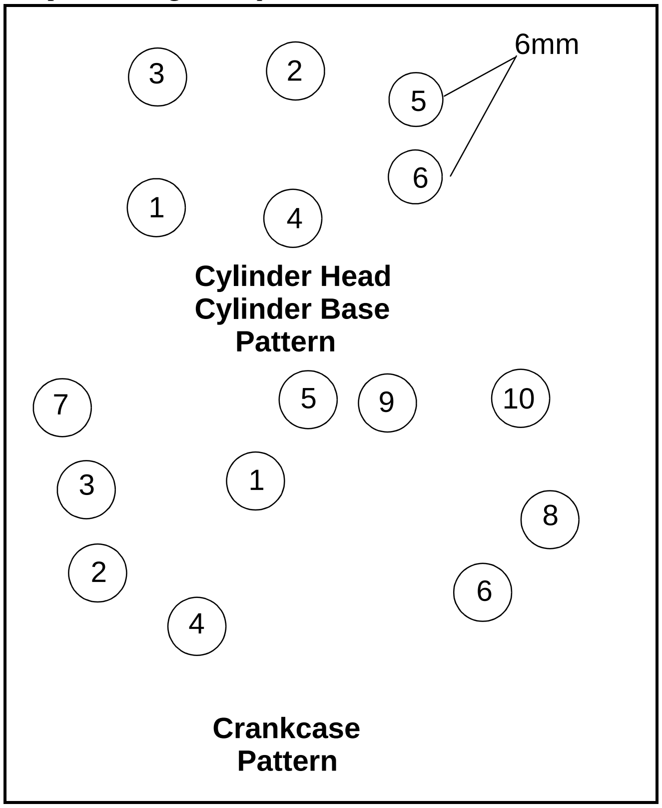
TORQUE SPECIFICATIONS		
Fastener	**Size**	**EH50PLE Ft. Lbs. (Nm)**
Blind Plug (Oil Pressure)	1/8 PT (28tpi)	6.5-11 (9-15 Nm)
Camshaft Sprocket	6mm	5-6.5 (7-9 Nm)
Camshaft Chain Tensioner Lever	6mm	5-6.5 (7-9 Nm)
Camshaft Chain Tensioner	6mm	5-6.5 (7-9 Nm)
Camshaft Chain Tensioner Cap	11mm	14-19 (20-25 Nm)
Carburetor Adaptor	8mm	12-14 (16-20 Nm)
Crankcase	8mm	14-15 (19-21 Nm)
Crankshaft Slotted Nut (Cam Chain Drive Sprocket)	28mm	35-51 (47-69 Nm)
Cylinder Base Bolts	10mm 6mm	45-49 (61-67 Nm) 6-8 (9-11 Nm)
Cylinder Head Bolts	11mm 6mm	Refer to Engine Assembly for torque procedure
Drive Clutch Bolt	7/16 - 20	40 (55 Nm)
Flywheel	16mm	58-72 (78-98 Nm)
Oil Delivery Pipe	12mm	11-15 (15-21 Nm)
Oil Drain Bolt (Crankcase)	14mm	14-17 (19-23 Nm)
Oil Filter Pipe Fitting	20mm	36-43 (49-59 Nm)
Oil Hose Fitting	1/8 Pipe Thread	6.5-11 (9-15 Nm)
Hard Metal Oil Line Banjo Fitting	N/A	11-16 ft.lbs. (15-21 Nm)
Oil Pump	6mm	5-6.5 (7-9 Nm)
Oil Pump Case Screw	5mm	1.5-2 (2-3 Nm)
One Way Valve	11mm	14-19 (20-25 Nm)
Recoil Housing	6mm	5-6.5 (7-9 Nm)
Rocker Cover	6mm	7-8 (9-11 Nm)
Rocker Support	8mm	8-10 (11-13 Nm)
Rocker Adjuster Screw	6mm	6-7 (8-10 Nm)
Water Pump Impeller Nut	6mm	5-6.5 (7-9 Nm)
Water Pump Housing Cover	6mm	5-6.5 (7-9 Nm)
Stator Plate	6mm	5-6.5 (7-9 Nm)
Starter Motor	6mm	5-6.5 (7-9 Nm)
Spark Plug	14mm	9-11 (12-15 Nm)
Thermistor	--	26 ± 2.1 (35 ± 3 Nm)

Special Tools

PART NUMBER	TOOL DESCRIPTION
2200634	Valve Seat Reconditioning Kit
2870390	Piston Support Block
2871043	Flywheel Puller
2871283	Crankshaft/Water Pump Seal Install Kit
5131135	Water Pump Install Kit
2870569	Crankshaft Truing Stand
2870975	Mity Vac™ Pressure Test Tool
PV-43527	OIl Filter Wrench

Engine Fastener Torque Patterns

Tighten cylinder head, cylinder base, and crankcase fasteners in 3 steps following the sequence outlined.



Engine Service Data

Cylinder Head / Valve				EH50PLE
Rocker Arm	Rocker arm ID			.8669-.8678" (22.020-22.041 mm)
	Rocker shaft OD			.8656-.8661" (21.987-22.0 mm)
	Rocker shaft Oil Clearance		Std	.0008-.0021" (.020-.054 mm)
			Limit	.0039" (.10 mm)
Camshaft	Cam lobe height	In	Std	1.2884-1.2924” (32.726-32.826 mm)
			Limit	1.2766" (32.426 mm)
		Ex	Std	1.2884-1.2924” (32.726-32.826 mm)
			Limit	1.2766" (32.426 mm)
	Camshaft journal OD		Mag	1.4935-1.4941” (37.935-37.950 mm)
			PTO	1.4935-1.4941” (37.935-37.950 mm)
	Camshaft journal bore ID		Mag	1.4963-1.4970” (38.005-38.025 mm)
			PTO	1.4963-1.4970” (38.005-38.025 mm)
	Camshaft Oil clearance		Std	.022-.0035”(.055-.090 mm)
			Limit	.0039" (.10 mm)
Cylinder Head	Surface warpage limit			.0020" (.05 mm)
	Standard Height			3.870" (98.3 mm)
Valve Seat	Contacting width	In	Std	.028" (.7 mm)
			Limit	.055" (1.4 mm)
		Ex	Std	.039" (1.0 mm)
			Limit	.071" (1.8 mm)
Valve Guide	Inner diameter			.2362-.2367" (6.0-6.012 mm)
	Protrusion above head			.689-.709" (17.5-18.0 mm)
Valve	Margin Thickness	In	Std	.039" (1.0 mm)
			Limit	.031" (.8 mm)
		Ex	Std	.047" (1.2 mm)
			Limit	.031" (.8 mm)
Valve	Stem diameter		In	.2343-.2348" (5.950-5.965 mm)
			Ex	.2341-.2346" (5.945-5.960 mm)
	Stem Oil Clearance	Std	In	.0014-.0024" (.035-.062 mm)
			Ex	.0016-.0026" (.040-.067 mm)
		Limit		.0059" (.15 mm)
	Overall length		In	3.976" (101.0 mm)
			Ex	3.984" (101.2 mm)
Valve Spring	Overall Length		Std	1.654" (42.0 mm)
			Limit	1.575" (40.0 mm)
	Squareness			.075” (1.9 mm)

Engine Service Data

Cylinder / Piston / Connecting Rod				EH50PLE
Cylinder	Surface warpage limit (mating with cylinder head)			.0020” (0.05 mm)
	Cylinder bore		Std	3.6221-3.6228” (92.00-92.02 mm)
	Taper limit			.0020” (0.05 mm)
	Out of round limit			.0020” (0.05 mm)
	Piston clearance		Std	.0006-.0018" (0.015-0.045 mm)
			Limit	.0024” (0.060 mm)
	Boring Limit			.020” (.5 mm)
Piston	Outer diameter	Std		3.6204-3.6215” (91.970-91.985mm)
		.0098" (.25 mm) OS		3.6304-3.6310” (92.21-92.23 mm)
		.0197" (.50 mm) OS		3.6403-3.6407” (92.46-92.47 mm)
	Standard inner diameter of piston pin bore			.9055-.9057” (23.0-23.006 mm)
Piston Pin	Outer diameter			.9053-.9055” (22.994-23.0 mm)
	Standard clearance-piston pin to pin bore			.0002-.0003” (.004-.008 mm)
	Degree of fit			Piston Pin must be a push (by hand) fit at 68^{o} F (20^{o}
Piston Ring	Piston Ring Installed gap	Top ring	Std	.0079-.0138" (.20-.36 mm)
			Limit	.039” (1.0 mm)
		Second ring	Std	.0079-.0138" (.20-.36 mm)
			Limit	.039” (1.0 mm)
		Oil ring	Std	.0079-.0276" (0.20-0.70 mm)
			Limit	.059" (1.5 mm)
Piston Ring	Standard clearance - piston ring to ring groove	Top ring	Std	.0016-.0031" (0.040.-080 mm)
			Limit	.0059" (.15 mm)
		Second ring	Std	.0012-.0028" (0.030-0.070 mm)
			Limit	.0059" (.15 mm)
Connecting Rod	Connecting rod small end ID			.9058- .9063” (23.007 - 23.020 mm)
	Connecting rod small end radial clearance		Std	.0003-.0010” (.007-.026 mm)
			Limit	.0020 (.05 mm)
	Connecting rod big end side clearance		Std	.0039-.0256” (.1-.65 mm)
			Limit	.0315” (.80 mm)
	Connecting rod big end radial clearance		Std	.0004-.0015” (.011-.038 mm)
			Limit	.0020” (.05 mm)
Crankshaft	Crankshaft runout limit			.0024” (.06 mm)

KEY - Std: Standard; OS: Oversize; ID: Inner Diameter; OD: Outer Diameter; Mag: Magneto Side;
PTO: Power Take Off.

GENERAL ENGINE SERVICE

Piston Identification

The piston may have an identification mark or the piston may not have an identification mark for piston placement. If the piston has an identification mark, follow the directions for piston placement below. If the piston does not have an identification mark, the direction for placement of the piston does not matter.

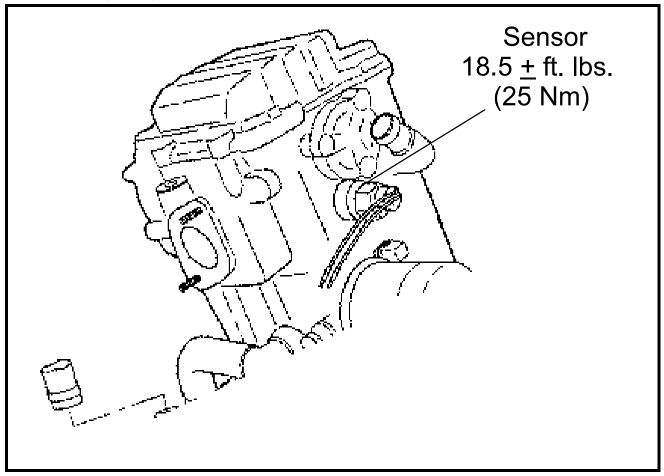
Note the directional and identification marks when viewing the pistons from the top. The letter "F", "→ ", "▶" or **:** must always be toward the flywheel side of the engine. The other numbers are used for identification as to diameter, length and design. Four stroke engine rings are rectangular profile. See text for oil control ring upper rail installation. Use the information below to identify pistons and rings.

Engine Model No.	Oversize Available* (mm)	Piston Length	Standard Piston Identification
EH50PLE	.25 .50	72 mm	C
EH42PLE	.25 .50	66 mm	B

*Pistons and rings marked 25 equal .25mm (.010") oversized

*Pistons and rings marked 50 equal .50mm (.020") oversized

Cooling System Specifications



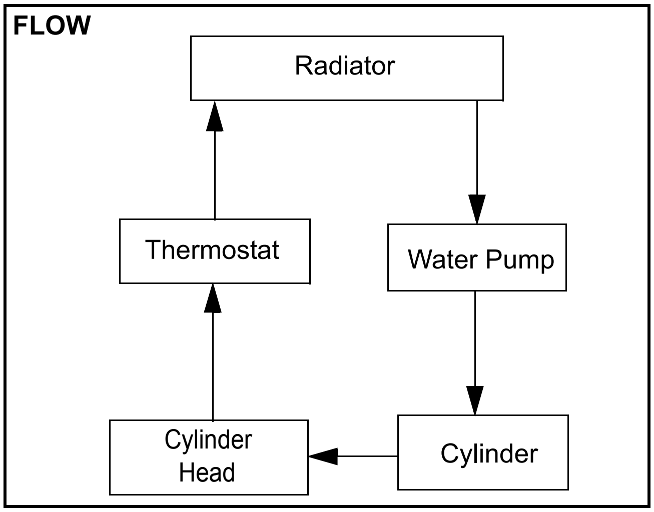
THERMISTOR READING DURING OPERATION

Condition	Approx. Reading (Min-Max)	Temperature
Temperature	37.3 - 39.2 k Ω	68° F (20° C)
System Capacity	2.25 Quarts (2.13L)	
Radiator Cap Relief Pressure	13 PSI (89.6 kpa)	

Cooling System

⚠ WARNING

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



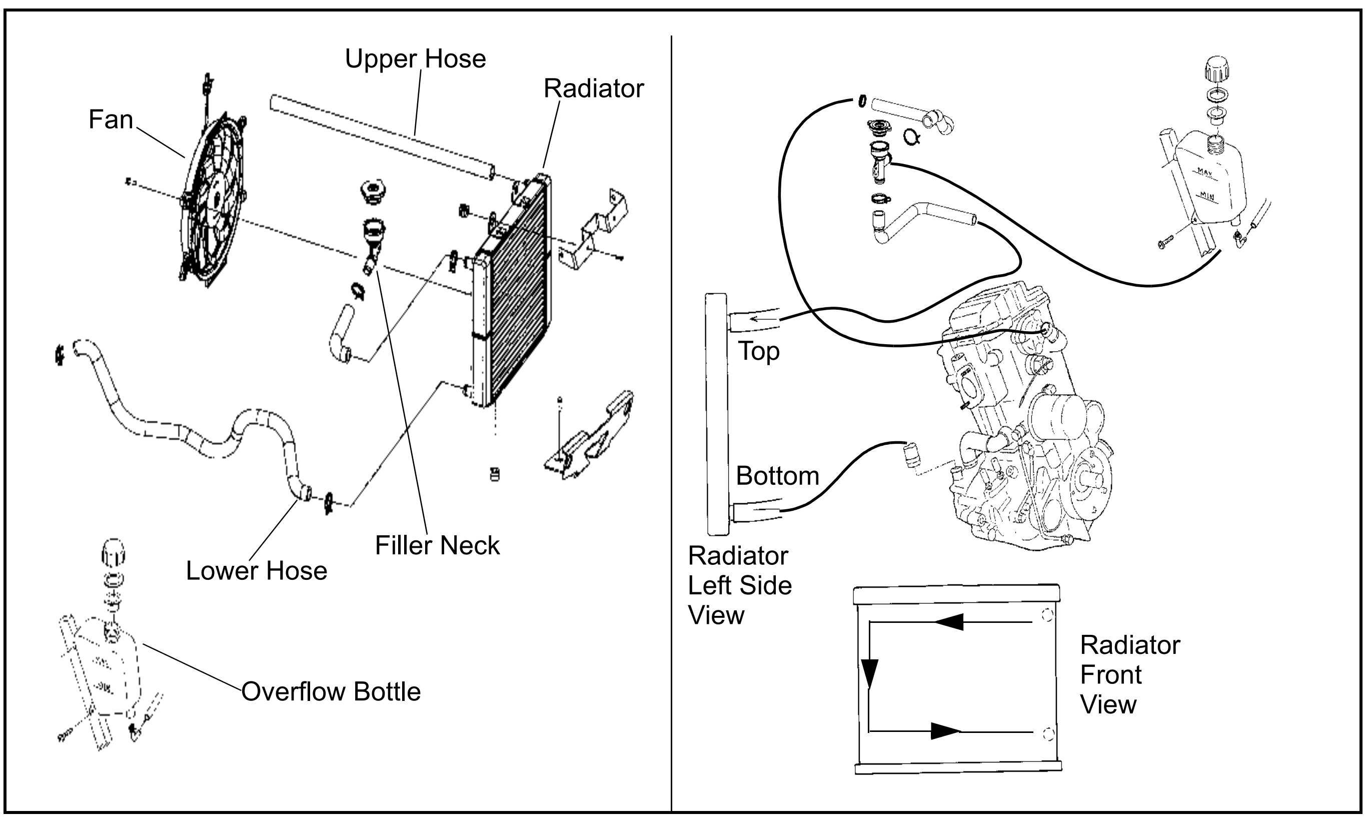
System Pressure Test

1. Remove radiator cap cover located in storage box.
2. Remove recovery bottle hose from coolant filler.
3. Connect a Mity Vac™ (**PN 2870975**) to radiator and pressurize system to 10 PSI (68.9 kpa). The system must retain 10 lbs of pressure for five minutes or longer. If pressure loss is evident within five minutes, check radiator, all cooling system hoses and clamps, or water pump seal.

Radiator Cap Pressure Test

1. Remove radiator cap and test using a cap tester (commercially available).
2. The radiator cap relief pressure is 13 lbs (89.6 kpa).

3



RECOMMENDED COOLANT

Use only high quality antifreeze/coolant mixed with distilled water in a 50/50 or 60/40 ratio, depending on freeze protection required in your area..

CAUTION

Using tap water in the cooling system will lead to a buildup of deposits which may restrict coolant flow and reduce heat dissipation, resulting in possible engine damage. Polaris Premium 60/40 Antifreeze/ Coolant is recommended for use in all cooling systems, and comes pre-mixed, ready to use.

Accessible Components

The following components can be serviced or removed with the engine installed in the frame:

- Flywheel
- Alternator/Stator
- Starter Motor/Starter Drive
- Cylinder Head
- Cylinder
- Piston/RIngs
- Camshaft
- Rocker Arms
- Cam Chain and Sprockets
- Water Pump / Water Pump Mechanical Seal*

The following components require engine removal for service:

- Oil pump / Oil Pump Drive Gear
- Counterbalance Shaft or Bearing(s)
- Connecting Rod
- Crankshaft
- Crankshaft Main Bearings
- Crankcase

*****It may be necessary to loosen engine mounts and move engine slightly to access water pump. Use the Water Pump Mechanical Seal Puller (**PN 2872105**) to replace mechanical seal with engine in frame.

Engine Removal (TYPICAL)

1. Clean work area.
2. Thoroughly clean the ATV engine and chassis.
3. Disconnect battery negative(-) cable.
4. Remove the following parts as required.
   - Seat
   - Left and Right Side Covers (Refer to Chapter 5)
   - Fuel Tank Cover / Front Cab (Refer to Chapter 5)
   - Fuel Tank (Refer to Chapter 4)
5. Disconnect spark plug high tension lead.
6. Remove springs from exhaust pipe and remove pipe.
7. Drain coolant and engine oil.
8. Remove air pre-cleaner and duct.
9. Remove airbox.
10. Remove carburetor. Insert a shop towel into the carburetor flange to prevent dirt from entering the intake port.
11. Remove center chain guard on chain drive AWD models.
12. Remove center drive and driven sprocket bolts and remove chain and sprockets as an assembly.
13. Refer to PVT System to remove outer clutch cover, drive belt, drive clutch, driven clutch, and inner cover.
14. Starter motor. Note ground cable location. Mark positive (+) cable mounting angle and remove cable.
15. Remove transmission linkage rod(s) from gear selector and secure out of the way.
16. Disconnect coolant temperature sensor wire.
17. Remove engine to chassis ground cable.
18. Remove all engine mount nuts and / or engine mount plates.
19. Remove engine through right side of frame.

Engine Installation Notes

After the engine is installed in the frame, review this checklist and perform all steps that apply.

General Items

1. Install previously removed components using new gaskets, seals, and fasteners where applicable.
2. Perform regular checks on fluid levels, controls, and all important areas on the vehicle as outlined in the daily pre-ride inspection checklist (refer to Chapter 2 or the Owner's Safety and Maintenance Manual).

PVT System

1. Adjust center distance of drive and driven clutch. (Chapter 6)
2. Adjust clutch offset, alignment, and belt deflection. (Chapter 6)
3. Clean clutch sheaves thoroughly and inspect inlet and outlet ducts for proper routing and sealing. (Chapter 6)

Transmission

1. Inspect transmission operation and adjust linkage if necessary. Refer to Chapter 2 and Chapter 8.

Exhaust

1. Replace exhaust gaskets. Seal connections with high temp silicone sealant if required.
2. Check to be sure all springs are in good condition.

Bleed Cooling System

1. Remove radiator cap and slowly add coolant to top of filler neck.
2. Fill coolant reservoir tank to full mark.
3. Install radiator cap and squeeze coolant lines to force air out of system.
4. Again remove radiator cap and slowly add coolant to top of fill neck.
5. Start engine and observe coolant level in the radiator. Allow air to purge and top off as necessary. Reinstall radiator cap and bring engine to operating temp. Check level in reservoir tank after engine is cool and add coolant if necessary.

Engine Break In Period

4 Cycle Engine Break-In Period is defined as the first 10 hours of engine operation or 2 full tanks of fuel.

1. Use only Polaris Premium 4 All Season synthetic oil, or API certified "SH" oil.Never substitute or mix oil brands. Serious engine damage can result.
2. Use fuel with a minimum octane of 87 (R+M)/2 method.
3. Change break-in oil and filter at 20 hours or 500 miles, whichever comes first.

Cylinder Hone Selection/ Honing Procedure

CAUTION

Selecting a hone which will straighten as well as remove material from the cylinder is very important. Using a common spring loaded finger type glaze breaker for honing is never advised. Polaris recommends using a rigid hone or arbor honing machine which also has the capability of oversizing.

Cylinders may be wet or dry honed depending upon the hone manufacturer's recommendations. Wet honing removes more material faster and leaves a more distinct pattern in the bore.

NOTE: See next page for more information on honing.

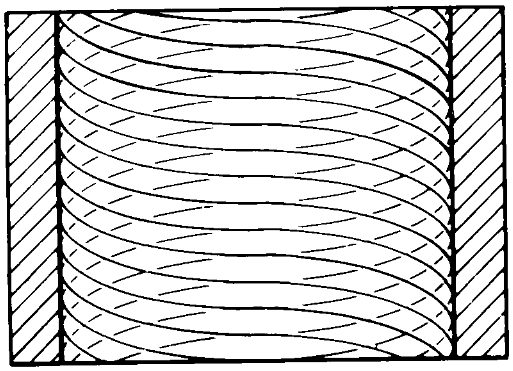
Honing To Oversize

CAUTION

If cylinder wear or damage is excessive, it will be necessary to oversize the cylinder using a new oversize piston and rings. This may be accomplished by either boring the cylinder and then finish honing to the final bore size, or by rough honing followed by finish honing.

CAUTION

For oversize honing, always wet hone using honing oil and a coarse roughing stone. Measure the piston (see piston measurement) and rough hone to the size of the piston. Always leave .002 - .003" (.05 - .07 mm) for finish honing. Refer to piston-to-cylinder clearance specifications before honing. Complete the sizing with fine grit stones to provide the proper cross-hatch finish and required piston clearance.



EXAMPLE OF CROSS HATCH PATTERN

3

A finished cylinder should have a cross-hatch pattern to ensure piston ring seating and to aid in the retention of the fuel/oil mixture during initial break in. Hone cylinder according to hone manufacturer's instructions, or these guidelines:

- Use a motor speed of approximately 300-500 RPM, run the hone in and out of the cylinder rapidly until cutting tension decreases. Remember to keep the hone drive shaft centered (or cylinder centered on arbor) and to bring the stones approximately 1/2" (1.3 cm) above and below the bore at the end of each stroke.
- Release the hone at regular intervals and inspect the bore to determine if it has been cleared, and to check piston fit. **NOTE:** Do not allow cylinder to heat up during honing. The thinner areas of the liner around the ports will expand causing uneven bore.
- After honing has been completed inspect all port opening areas for rough or sharp edges. Apply a slight chamfer to all ports to remove sharp edges or burrs, paying particular attention to the corners of the intake and exhaust ports.

Cleaning the Cylinder After Honing

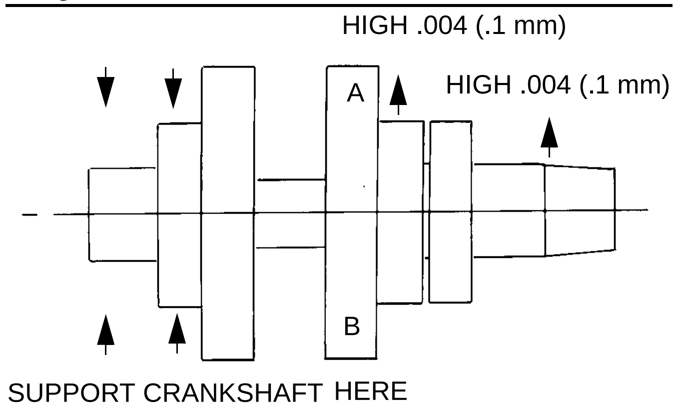
It is very important that the cylinder be thoroughly cleaned after honing to remove all grit material. Wash the cylinder in a solvent, then in hot, soapy water. Pay close attention to areas where the cylinder sleeve meets the aluminum casting (transfer port area). Use electrical contact cleaner if necessary to clean these areas. Rinse thoroughly, dry with compressed air, and oil the bore immediately with Polaris 2 Cycle Lubricant.

Crankshaft Straightening

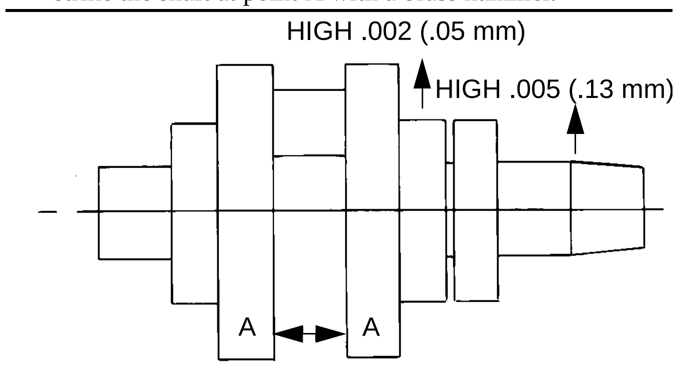
Lubricate the bearings and clamp the crankshaft securely in the Crankshaft Truing Stand (PN 2870569). Refer to the illustrations below.

Crankshaft Truing Stand (PN 2870569)

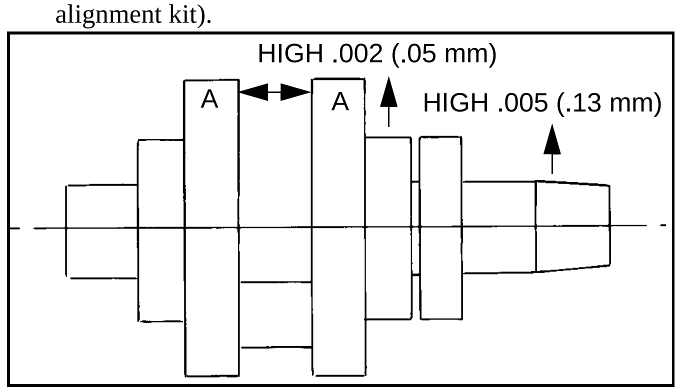
NOTE: The rod pin position in relation to the dial indicator position tells you what action is required to straighten the shaft.



1. To correct a situation like the one shown in the illustration, strike the shaft at point A with a brass hammer.



2. To correct a situation like the one shown in the illustration, squeeze the crankshaft at points A. (Use tool from alignment kit).



3. If the crank rod pin location is 180° from the dial indicator (opposite that shown above), it will be necessary to spread the crankshaft at position A as shown in the illustration at right. When rebuilding and straightening a crankshaft, runout must be as close to zero as possible.

NOTE: Maximum allowable runout is .0024".

Engine Lubrication- EH 50PL

Oil Type:Polaris Premium 4 Synthetic
(PN 2871281); or API certified "SH" 0-40W oil

Capacity:. . . . . Approximately 2 U.S. Quarts (1.9 l)

Filter Wrench . . . . **(PV-43527**)

*Drain Plug / Screen Fitting...14 ft. lbs. (19 Nm) (If fitting is removed, follow oil pump priming procedure).

*Oil Pressure Specification...20 PSI @ 5500 RPM, Polaris 0W-40 Synthetic (Engine Hot)

Oil Pressure Test - EH 50PL

1. Remove blind plug on front left cylinder head.
2. Insert a 1/8 NPT oil pressure gauge adaptor into the cylinder head and attach the gauge.
3. Start engine and allow it to reach operating temperature, monitoring gauge indicator.

NOTE: Use only Polaris Premium 4 Synthetic Engine Lubricant (**PN 2871281)**.

Oil Pressure at 5500 RPM (Engine Hot):
Standard: 20 PSI
Minimum: 12 PSI

Oil Pump Priming Procedure

See "Oil Pump Priming Procedure" on page 2.25.

Oil Flow - EH50PL

The following chart describes the flow of oil through the EH50PL engine. Beginning at the oil tank, the oil flows through a screen fitting in the bottom of the tank and into the oil supply hose. The feed side of the oil pump draws oil through the hose and into the crankcase oil gallery, and then pumps the oil through another passage to the one way valve. (When the engine is off, the one way valve closes to prevent oil in the tank from draining into the crankcase.) The oil is pumped through a delivery pipe to the oil filter. If the oil filter is obstructed, a bypass valve contained in the filter allows oil to bypass the filter element.

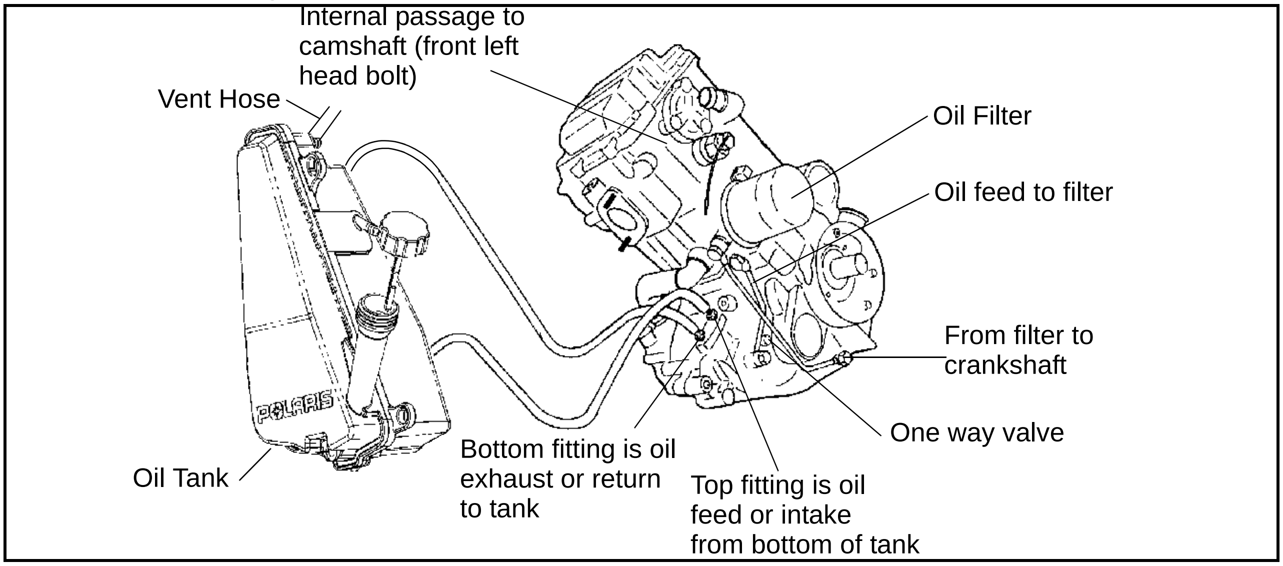
At this point, the oil is diverted in two directions. Oil is supplied to the camshaft through the left front cylinder stud, and an oil passage in the head. Oil enters the camshaft through the PTO (L) journal. The camshaft journals, cam lobes, and rocker arms are lubricated through holes in the camshaft. The oil lubricates the cam chain and sprocket and drains to the sump.

The other oil path from the filter leads through a delivery pipe to the crankcase main oil gallery, which leads to the stator plate oil passage. Here it passes through the slotted friction bearing (located in the stator plate) into the crankshaft. An oil seal on the stator plate prevents oil from entering the stator/flywheel area. Oil travels through the crankshaft to the crank pin, lubricating the connecting rod large end bearing directly. Oil also passes through an oil jet (drilled orifice) in the end of the crank pin to the PTO end main bearings and counterbalancer gears.

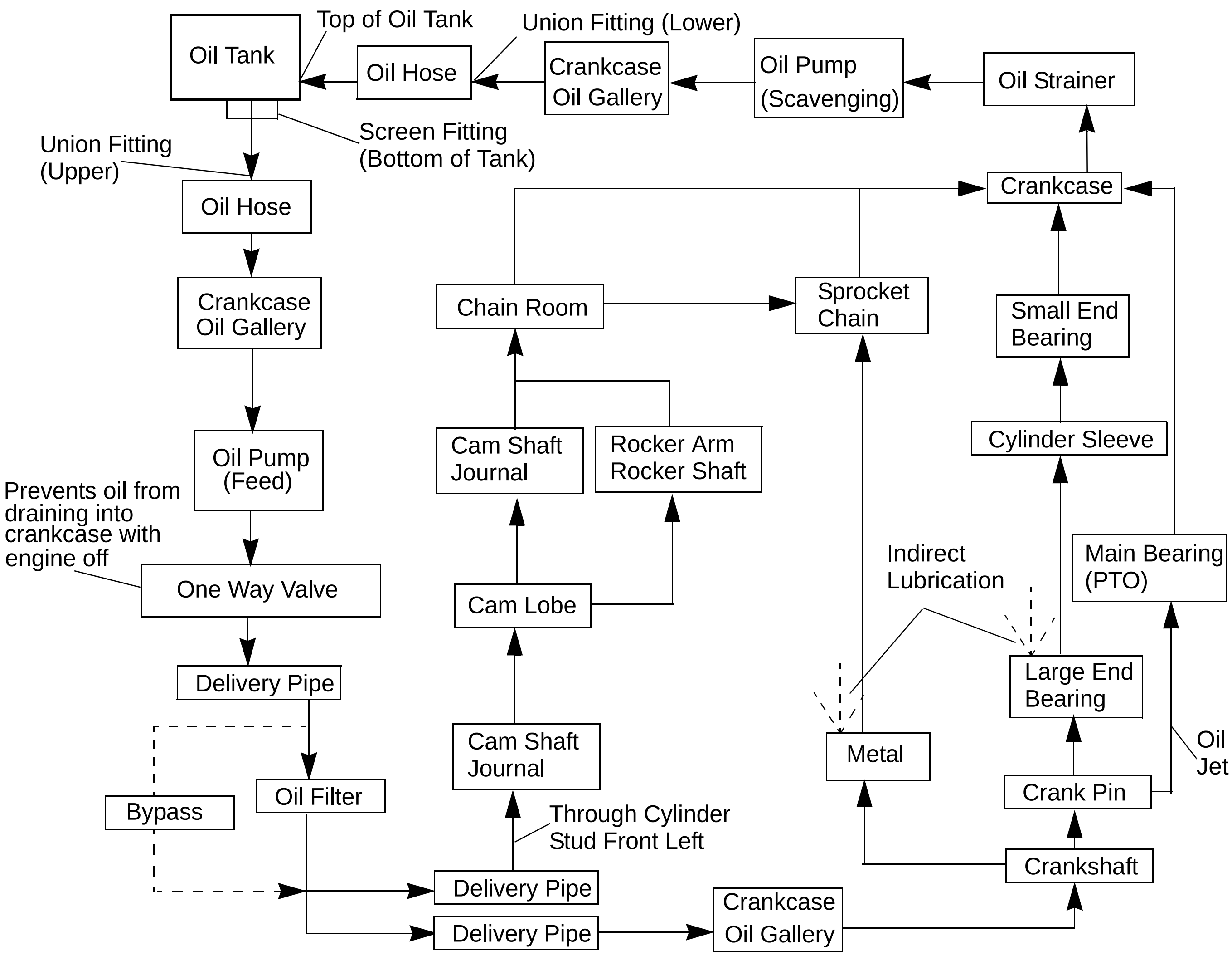
Residual oil from the lubrication of the crankshaft and connecting rod indirectly lubricates the cylinder wall, piston, rings, connecting rod small end bearing, piston pin, oil/water pump drive gears, cam chain and drive sprocket, and Magneto end crankshaft main bearing.

The one-way valve is located on the front left (PTO) side of the crankcase. The valve prevents oil in the tank from draining into the engine sump when the engine is off. The valve mechanism consists of a plunger, return spring, guide plug, and sealing washer. When the engine is running, oil pressure lifts the plunger off the seat, allowing oil flow. When the engine is off, spring pressure forces the plunger against the oil passage seat, preventing oil flow from the tank to the sump. The one-way valve requires very little maintenance. If engine oil drains into the sump when the engine is off, inspect the valve sealing surface for debris or damage. Inspect the return spring for distortion or damage.

EH50PL Oil Flow Diagram

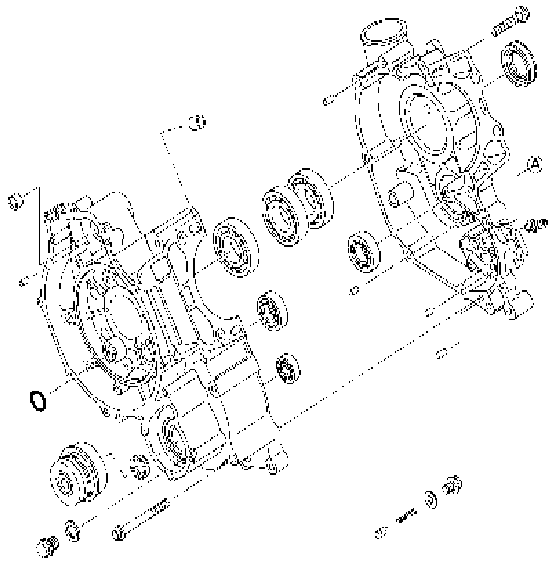


EH50PL Oil Flow Chart

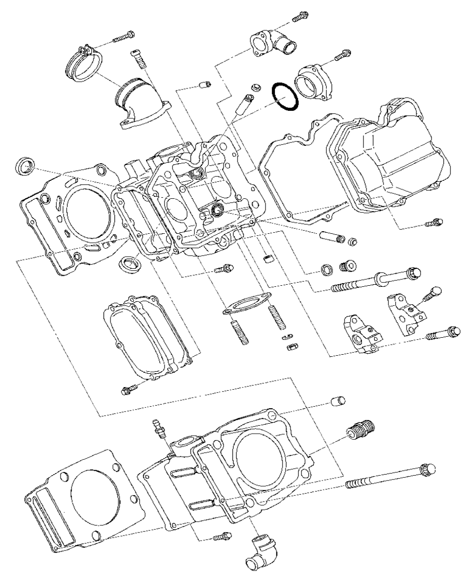


EH50PL Engine Exploded Views

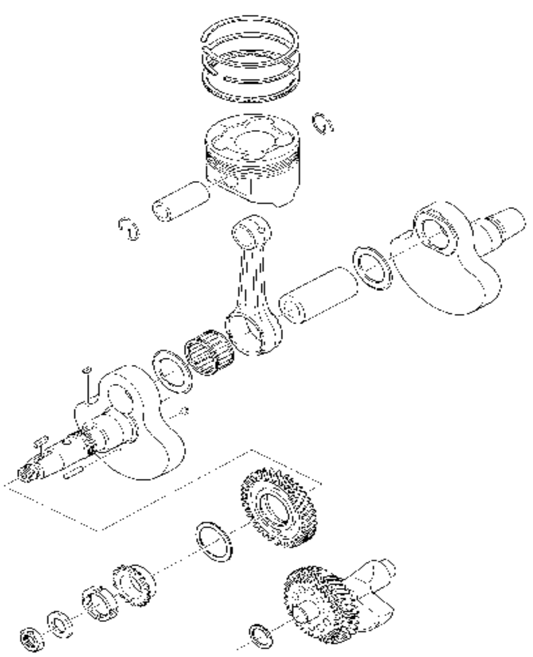
Crankcase



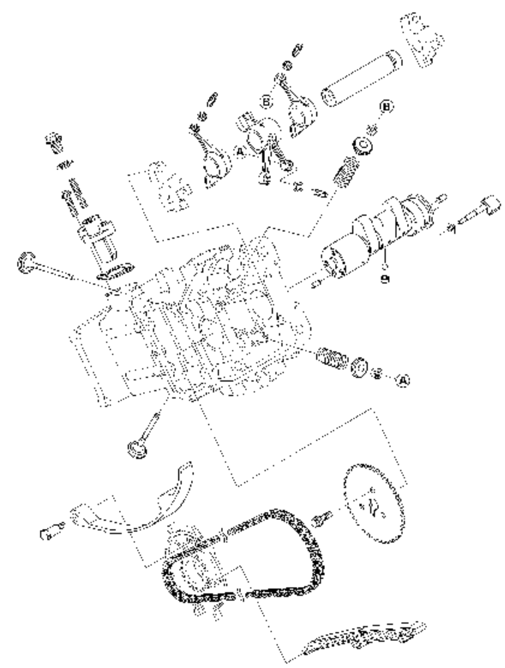
Cylinder/ Cylinder Head



Crankshaft and Piston



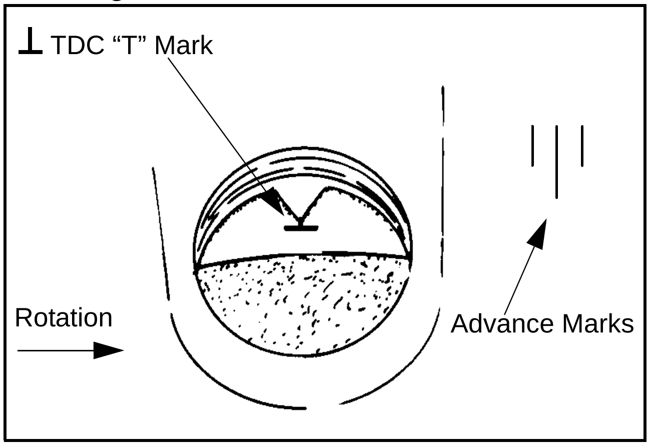
Valvetrain



ENGINE DISASSEMBLY

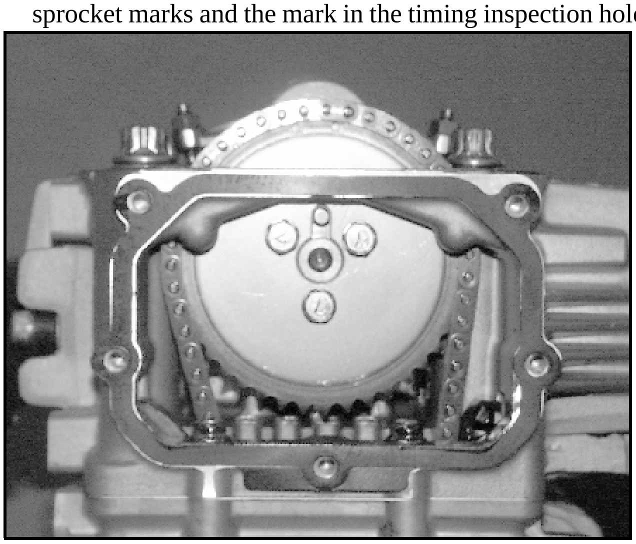
Cam Chain Tensioner/ROCKER ARM/ CAMSHAFT Removal

1. Remove ignition timing inspection plug from recoil housing.



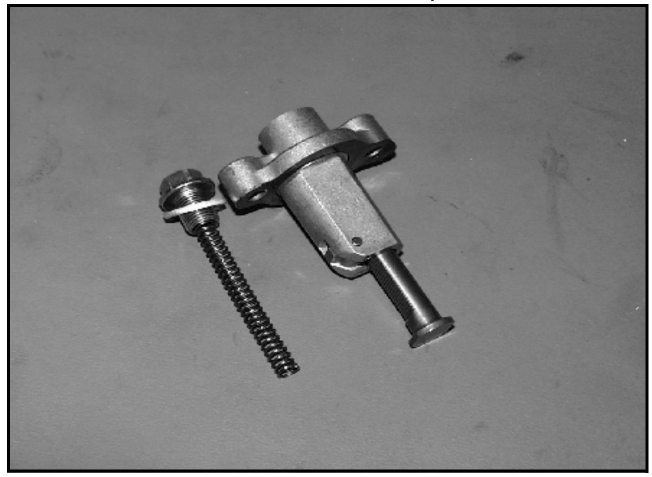
To position crankshaft at Top Dead Center (TDC) on compression stroke:

2. Rotate engine slowly in the direction of rotation watching intake valves open and start to close.
3. Continue to rotate engine slowly, watching camshaft sprocket marks and the mark in the timing inspection hole.



4. Align single (TDC) mark on flywheel with projection in inspection hole, and the cam sprocket pin (facing upward) aligned with the camshaft to crankshaft center line.

NOTE: The cam lobe should be pointing down and valves should have clearance at this point.



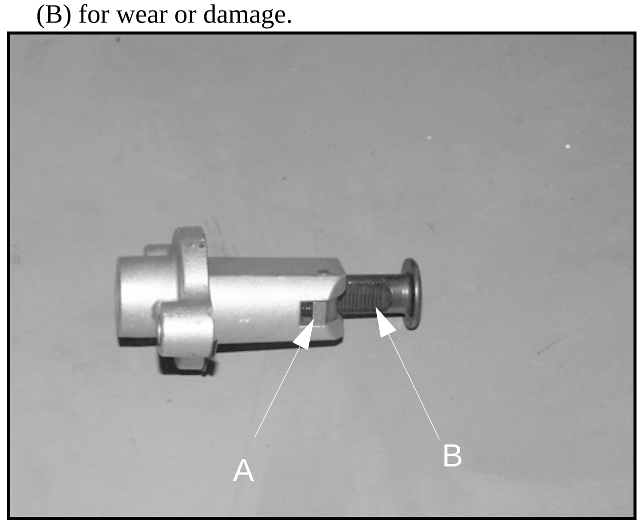
5. Remove cam chain tensioner plug, sealing washer, and spring.

> **CAUTION**
>
> The plug is under spring tension. Maintain inward pressure while removing.

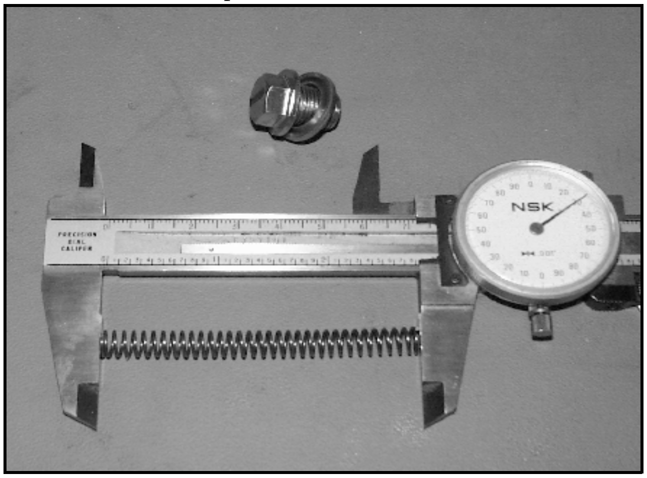
6. Remove the two 6x25 mm cam chain tensioner flange bolts.
7. Tap lightly on tensioner body with a soft face hammer to loosen and remove tensioner.

Cam Chain Tensioner Inspection

1. Pull cam chain tensioner plunger outward to the end of its travel. Inspect teeth on ratchet pawl (A) and plunger teeth (B) for wear or damage.



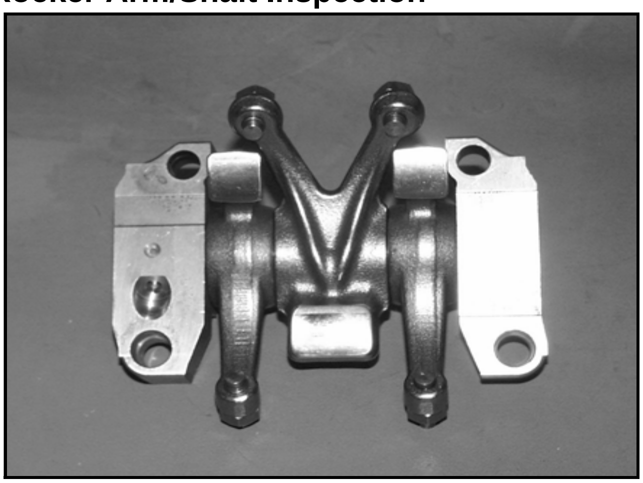
2. Push ratchet pawl and hold it. The plunger should move smoothly in and out of the tensioner body.
3. Release ratchet pawl and push inward on plunger. It should remain locked in position and not move inward.



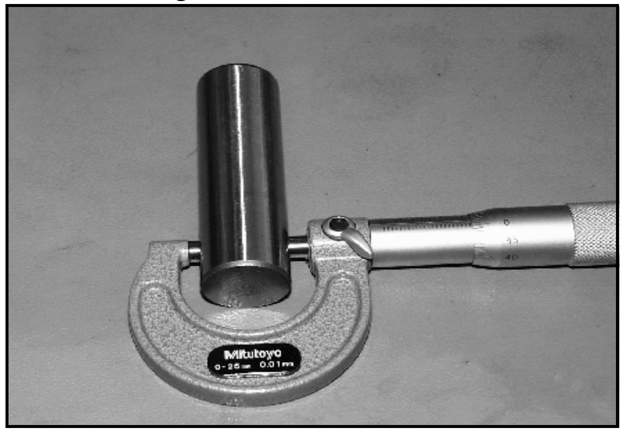
Tensioner Spring Free Length: 2.02” (5.13 cm) Limit 1.92 (4.88cm)

4. Measure free length of tensioner spring. Replace spring if excessively worn. Compare to specifications.
5. Replace entire tensioner assembly if any part is worn or damaged.

Rocker Arm/Shaft Inspection

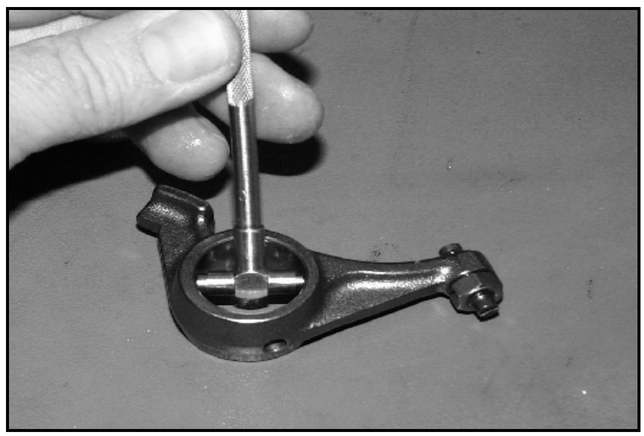


1. Mark or tag rocker arms to keep them in order for assembly.
2. Inspect each rocker arm cam follower surface. If there is any damage or uneven wear, replace the rocker arm. **NOTE:** Always inspect camshaft lobe if rocker arms are worn or damaged.



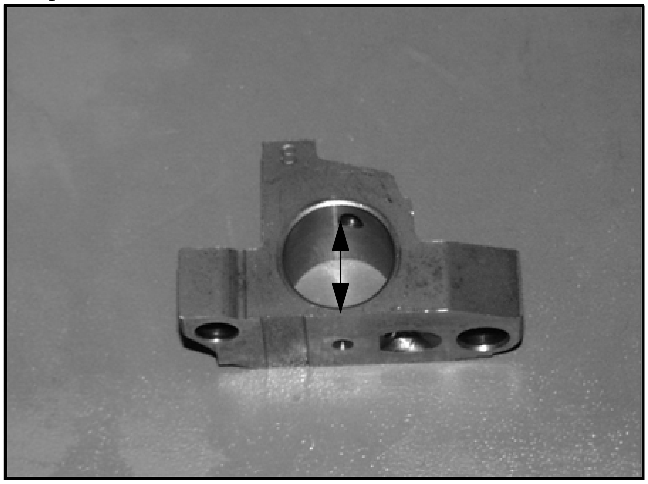
3. Measure O.D. of rocker shaft. Inspect it for wear or damage. Compare to specifications.

Rocker Shaft O.D.: .8656 - .8661 (21.987-22.0 mm)



Rocker Arm & Support I.D.: .8669 - .8678 (22.020-22.041 mm)

4. Measure I.D. of each rocker arm and compare to specifications.



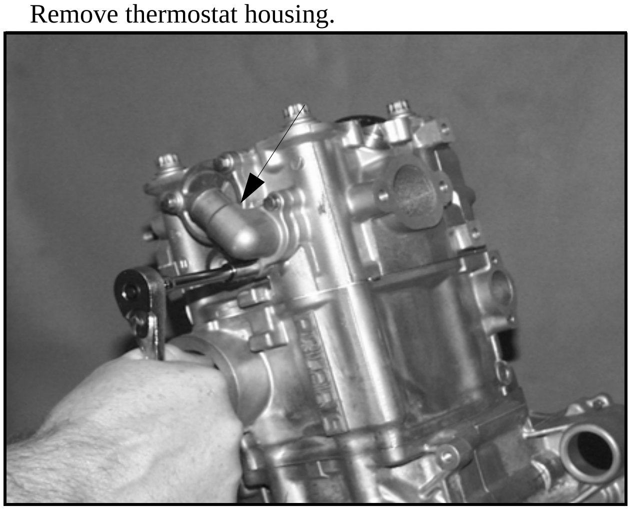
Rocker Shaft Oil Clearance:

Std: .0008 - .0021 (.020-.054 mm)
Limit: .0039” (.10 mm)

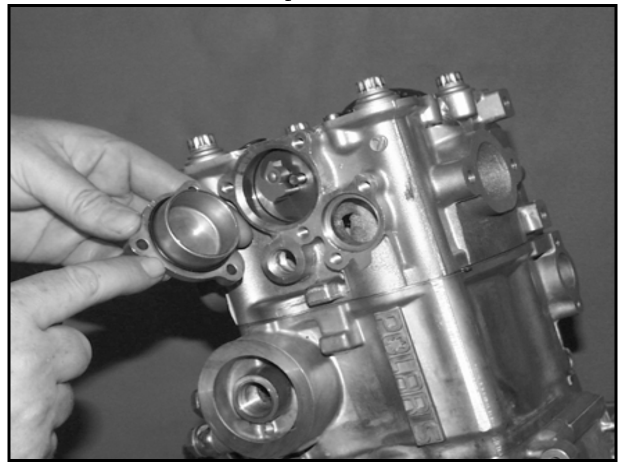
5. Measure I.D. of both rocker arm shaft supports and visually inspect surface. Compare to specifications.
6. Subtract rocker shaft O.D. from rocker arm & shaft support I.D. This is the oil clearance. Compare to specifications.
7. Inspect rocker adjuster screws for wear, pitting, or damage to threads of the adjuster or locknut. Replace all worn or damaged parts. **NOTE:** The end of the adjuster screw is hardened and cannot be ground or re-faced.

Camshaft Removal

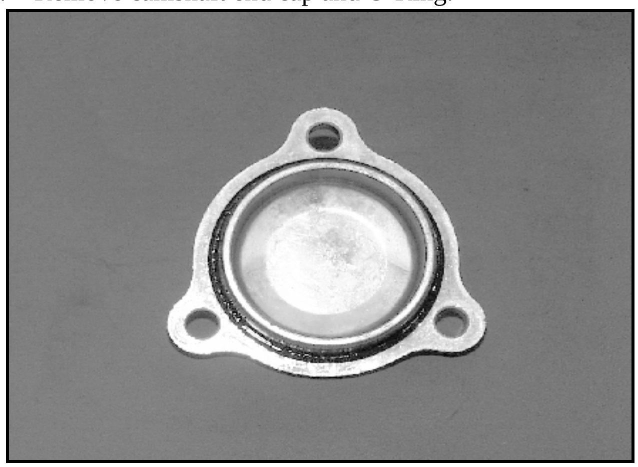
1. Remove thermostat housing.



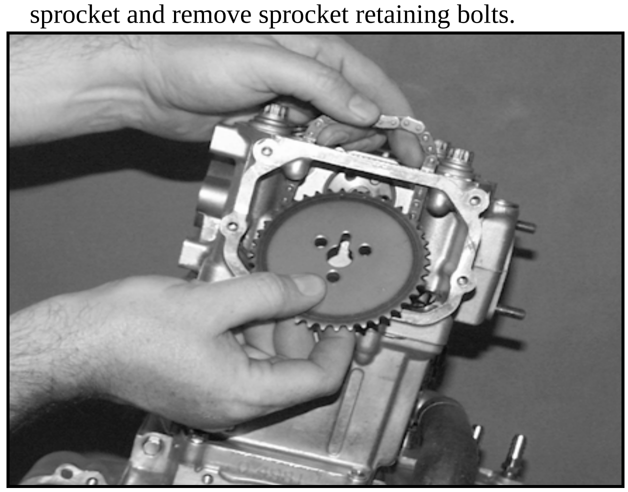
2. Remove camshaft sprocket inspection cover.
3. Loosen three camshaft sprocket bolts.



4. Remove camshaft end cap and O-Ring.

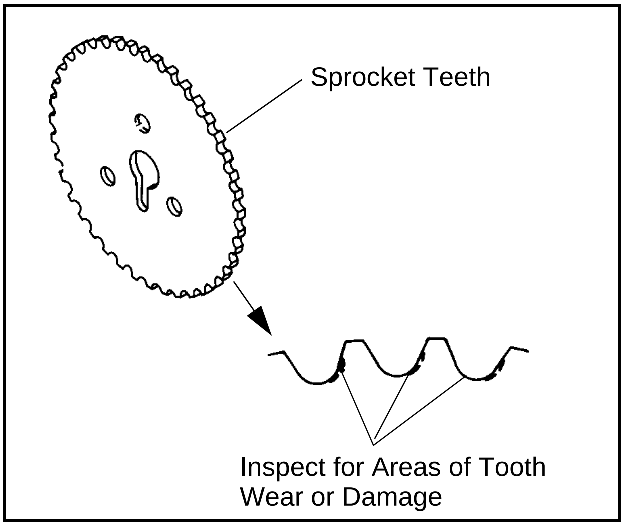


5. Inspect camshaft end cap (thrust face) for wear. Replace if worn or damaged.
6. Place a clean shop towel in the area below cam chain sprocket and remove sprocket retaining bolts.

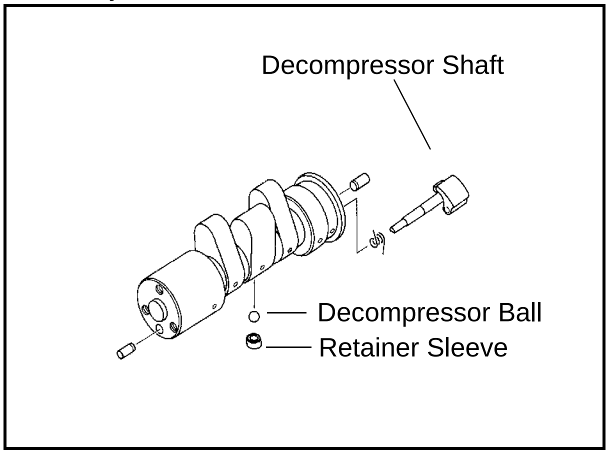


7. Slide camshaft inward to allow removal of cam sprocket and remove sprocket from camshaft and chain.

8. Secure cam chain with a wire to prevent it from falling into the crankcase.



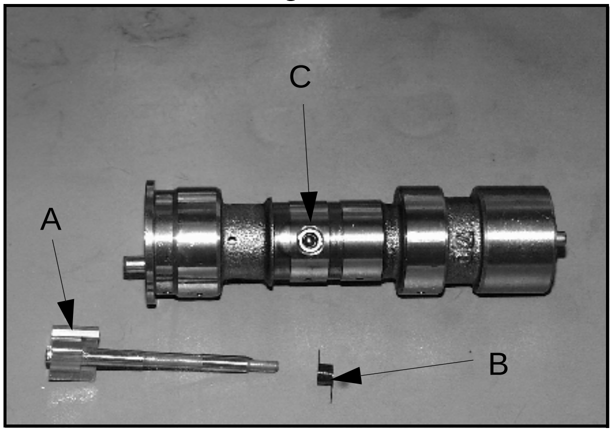
9. Inspect cam sprocket teeth for wear or damage. Replace if necessary.



10. Slide camshaft out the PTO side of the cylinder head.

Automatic Compression Release Removal/ Inspection

NOTE: The automatic compression release mechanism can be inspected and serviced without removing the camshaft from the cylinder head. The actuator ball (C) in the camshaft is not replaceable. Replace the camshaft as an assembly if the actuator ball is worn or damaged.

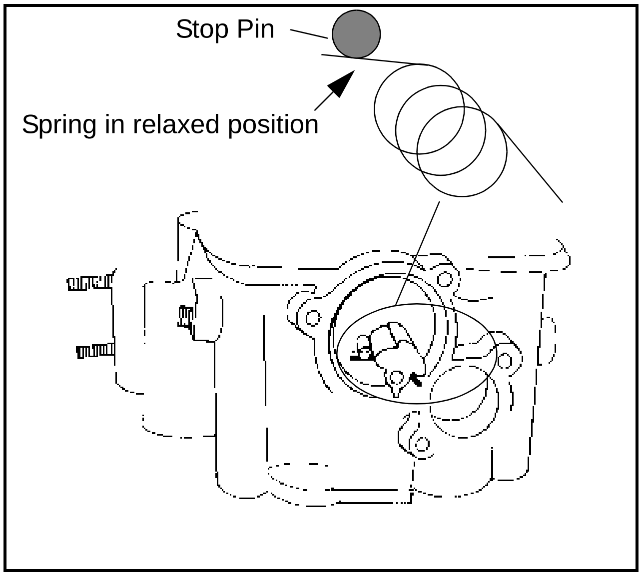


1. Check release lever shaft (A) for smooth operation throughout the entire range of rotation. The spring (B) should hold the shaft weight against the stop pin. In this position, the actuator ball (C) will be held outward in the compression release mode.
2. Remove release lever shaft and return spring.
3. Inspect shaft for wear or galling.
4. Inspect lobe on end of release lever shaft and actuator ball for wear and replace if necessary.

Automatic Compression Release Installation

1. Slide spring onto shaft.
2. Apply engine oil to release lever shaft.

The actuator ball must be held outward to allow installation of the release lever shaft.



If Camshaft Is Removed From Engine:

3. Turn the camshaft until the actuator ball is in the lowest position and install the release lever shaft.

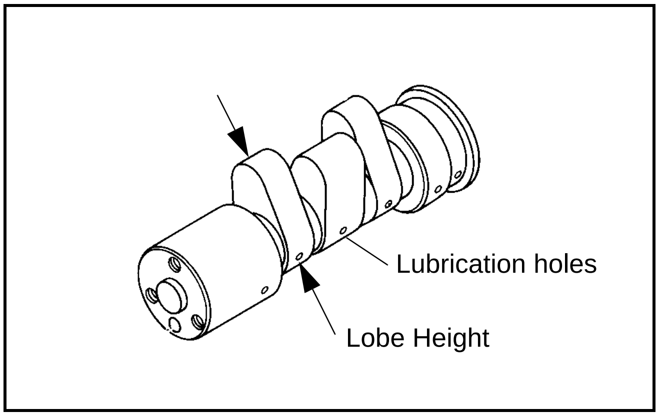
If Camshaft Is Installed In The Engine:

4. Use a small magnet to draw the actuator ball outward, or rotate the engine until the cam lobes face upward and install release lever shaft.
5. Position camshaft as shown at bottom of illustration at right.
6. Place arm of spring under stop pin as shown and push release lever inward until fully seated. Do not pre-wind the spring one full turn or the compression release will not disengage when the engine starts. Check operation of mechanism as outlined in Step 1 of Removal (above).

NOTE: When shaft is properly installed, actuator ball will be held in the “out” position. It is important to note that spring pressure is very light.

Camshaft Inspection

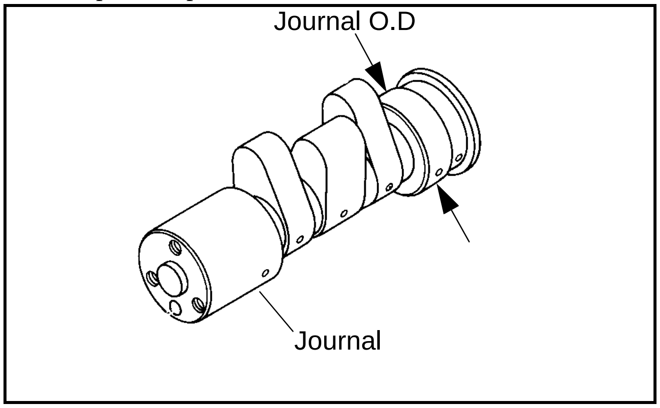
1. Visually inspect each cam lobe for wear, chafing or damage.
2. Thoroughly clean the cam shaft, making sure the oil feed holes are not obstructed.



Cam Lobe Height (Intake & Exhaust)

Std: 1.2884-102924” (32.726-32.826 mm)
Limit: 1.2766” (32.426 mm)

3. Measure height of each cam lobe using a micrometer. Compare to specifications.



Camshaft Journal O.D.:
Mag & PTO End: 1.4935-1.4941” (37.935- 37.950 mm)

4. Measure camshaft journal outside diameter (O.D.)
5. Measure ID of camshaft journal bore.

Camshaft Journal I.D.:
Mag & PTO End: 1.4963-1.4970” (38.005- 38.025 mm)

Calculate oil clearance by subtracting journal OD from journal bore ID. Compare to specifications.

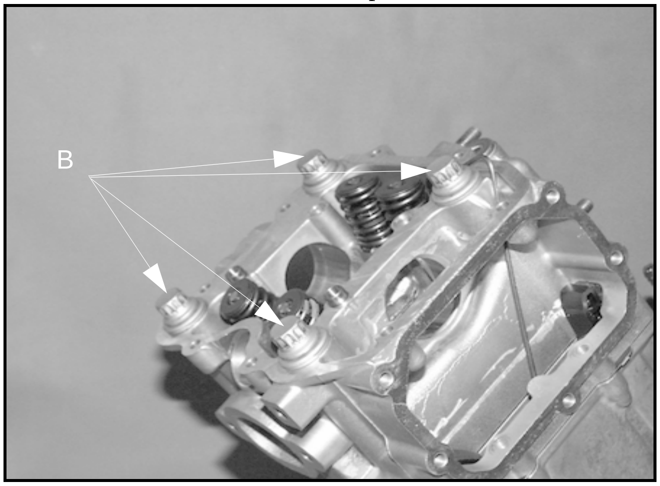
Camshaft Oil Clearance:
Std: .0022-.0035” (.055-.090 mm) Limit: .0039” (.10 mm)

NOTE: Replace camshaft if damaged or if any part is worn past the service limit.

NOTE: Replace cylinder head if camshaft journal bore is damaged or worn excessively.

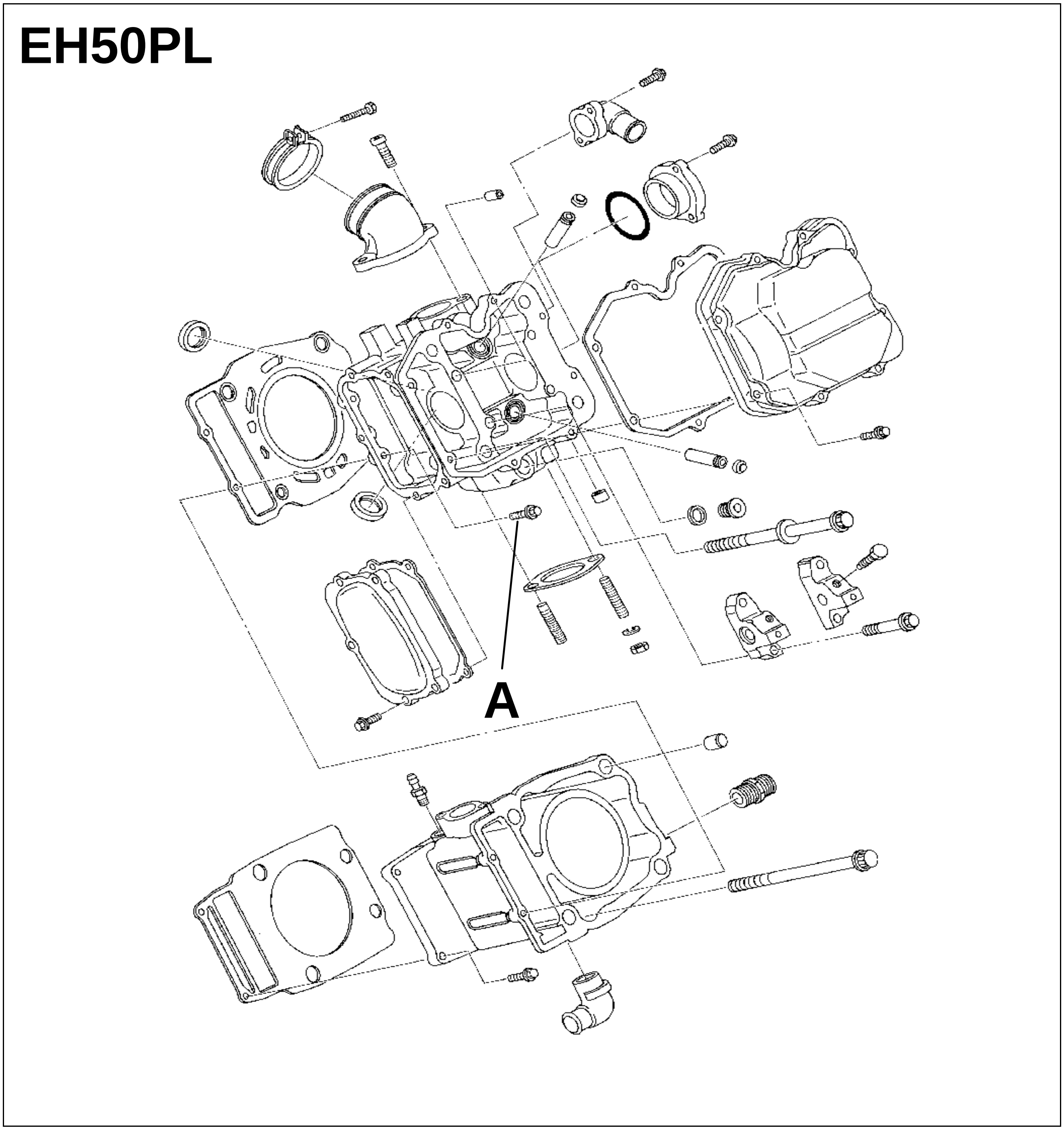
Cylinder Head Removal

1. Remove the two 6mm flange bolts (A) from cylinder head. See next exploded view on next page.
2. Loosen each of the four cylinder head bolts (B) evenly 1/8 turn each time in a criss-cross pattern until loose.

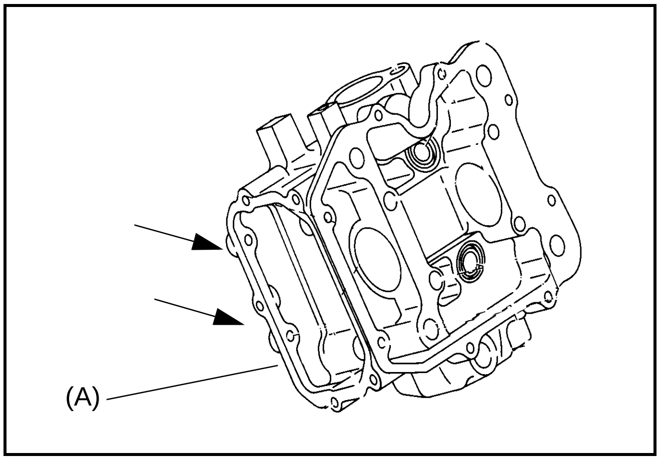


3. Remove bolts (B) and tap cylinder head lightly with a plastic hammer until loose. **CAUTION:** Tap only in reinforced areas or on thick parts of cylinder head casting to avoid damaging the thread.
4. Remove cylinder head and head gasket.

Cylinder Head Exploded View, EH50PL



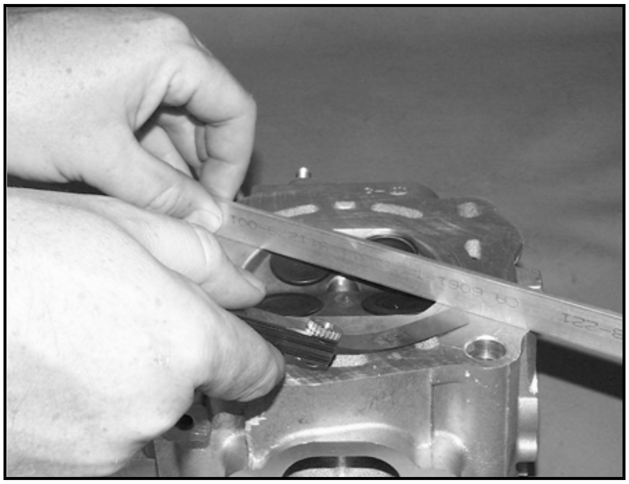
Cylinder Head Inspection



1. Thoroughly clean cylinder head (A) surface to remove all traces of gasket material and carbon.

⚠ CAUTION
Use care not to damage sealing surface.

Cylinder Head Warp



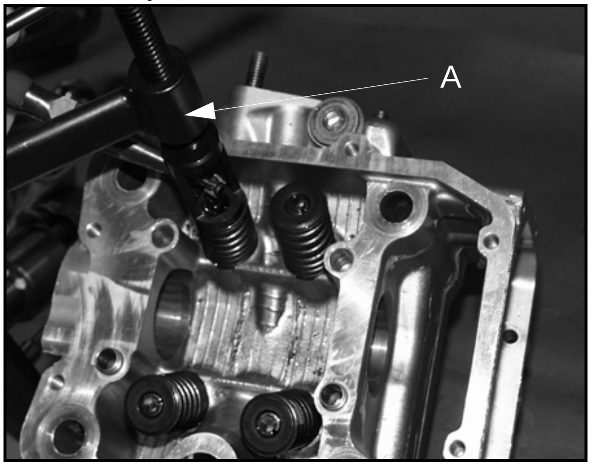
Cylinder Head Warp Limit:
.002" (.05 mm)

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

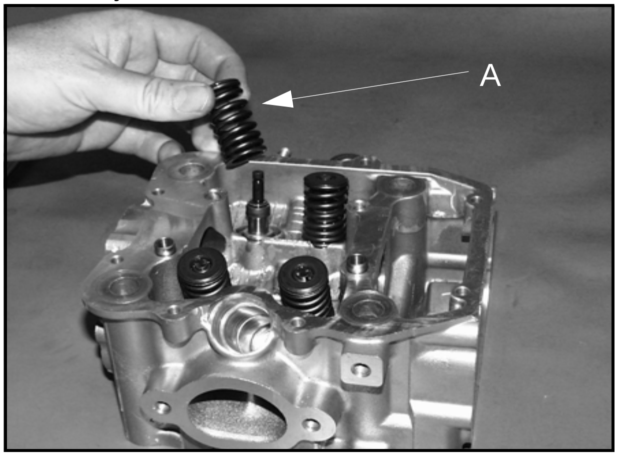
Cylinder Head Disassembly

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

NOTE: Keep all parts in order with respect to their location in the cylinder head.



1. Using a valve spring compressor (A), compress the valve springs and remove the split keeper. **NOTE:** To prevent loss of tension, do not compress the valve spring more than necessary.



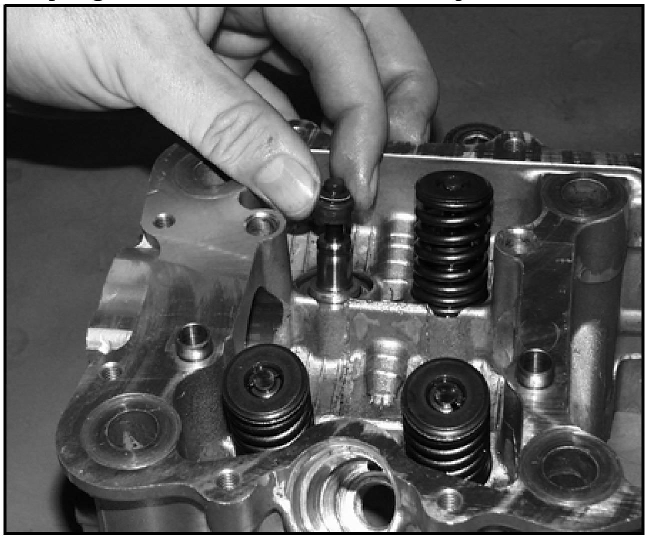
2. Remove spring retainer and spring.

NOTE: The valve springs should be positioned with the tightly wound coils against the cylinder head on progressively wound springs (A).

3. Push valve out, keeping it in order for reassembly in the same guide.

3

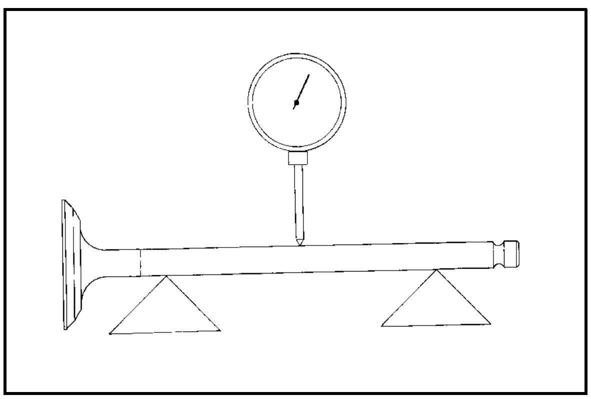
4. Measure free length of spring with a Vernier caliper. Check spring for squareness. Compare to specifications. Replace spring if either measurement is out of specification



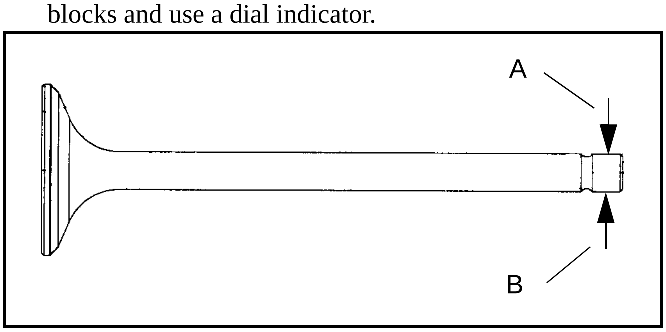
5. Remove valve seals. **CAUTION:** Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.

Valve Inspection

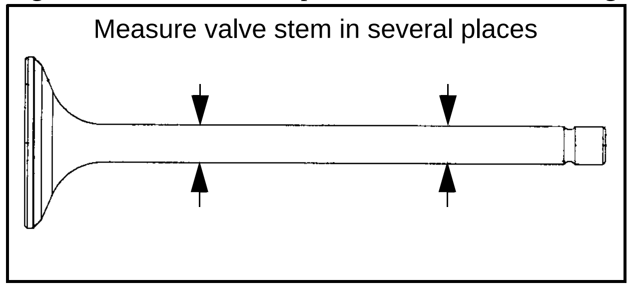
1. Remove all carbon from valve with a soft wire wheel.



2. Check valve face for runout, pitting, and burnt spots. To check for bent valve stems, mount valve in a drill or use "V" blocks and use a dial indicator.

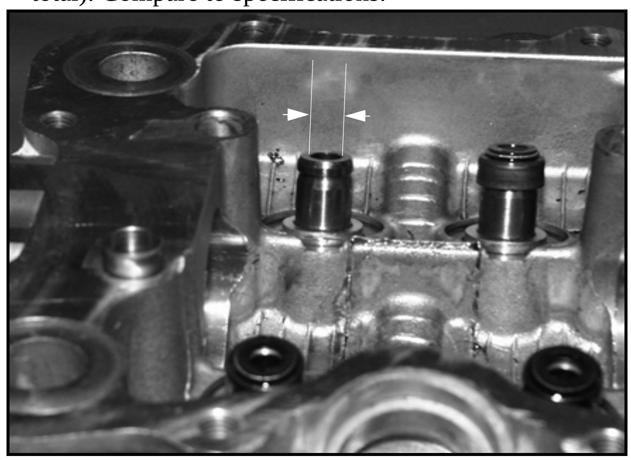


3. Check end of valve stem for flaring, pitting, wear or damage (A).
4. Inspect split keeper groove for wear or flaring of the keeper seat area (B). **NOTE:** The valves cannot be re-faced or end ground. Valves must be replaced if worn, bent, or damaged.



Valve Stem Diameter:
Intake: .2343-.2348" (5.950-5.965 mm)
Exhaust: .2341-.2346" (5.945-5.960 mm)

5. Measure diameter of valve stem with a micrometer in three places and in two different directions (six measurements total). Compare to specifications.



Valve Guide I.D.:
.2362-.2367" (6.0-6.012 mm)

6. Measure valve guide inside diameter at the top middle and end of the guide using a small hole gauge and a micrometer. Measure in two directions, front to back and side to side.
7. Subtract valve stem measurement to obtain stem to guide clearance.

NOTE: Be sure to measure each guide and valve combination individually

8. Replace valve and/or guide if clearance is excessive.Compare to specifications.

NOTE: If valve guides are replaced, valve seats must be reconditioned. Refer to Valve Seat Reconditioning for procedure.

Combustion Chamber

Clean all accumulated carbon deposits from combustion chamber and valve seat area with a soft wire brush.

Valve Seat ReconditionING

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.*

Cylinder Head Reconditioning

NOTE: Servicing the valve guides and valve seats requires special tools and a thorough knowledge of reconditioning techniques. Follow the instructions provided in the cylinder head service tool kit.

CAUTION

Wear eye protection when performing cylinder head service. Valve guide replacement will require heating of the cylinder head. Wear gloves to prevent burns.

Valve Guide Removal/Installation

1. Remove all carbon deposits from the combustion chamber, valve seat and valve guide area before attempting to remove valve guides.

CAUTION

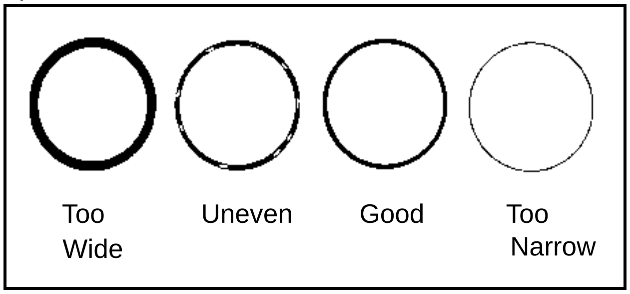
Carbon deposits are extremely abrasive and may damage the valve guide bore when guides are removed.

2. Place new valve guides in a freezer for at least 15 minutes while heating cylinder head.
3. Heat cylinder head in an oven or use a hot plate to bring cylinder head temperature to 212° F (100° C).

CAUTION

Do not use a torch to heat cylinder head or warpage may result from uneven heating. Head temperature can be checked with a pyrometer or a welding temperature stick. Wear the appropriate safety equipment for working with heated metal.

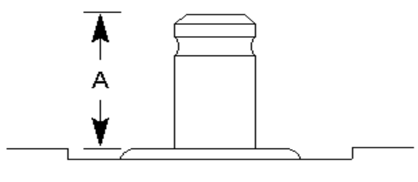
Follow the manufacturers instructions provided with the valve seat cutters in the Valve Seat Reconditioning Kit (**PN 2200634**). Abrasive stone seat reconditioning equipment can also be used. Keep all valves in order with their respective seat.



NOTE: 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 the seat is uneven, compression leakage will result. If the seat is too wide, seat pressure is reduced, causing carbon accumulation and possible compression loss. If the seat is too narrow, heat transfer from valve to seat is reduced and the valve may overheat and warp, resulting in burnt valves.

1. When thoroughly heated, place cylinder head on blocks of wood which will allow the old guides to be removed.
2. Using valve guide driver, drive guides out of the cylinder head from the combustion chamber side. Be careful not to damage guide bore or valve seat when removing guides.

3. Place cylinder head on cylinder head table. **NOTE:** Be sure cylinder head is still at 212^{o} F (100^{o} C) before installing new guides.



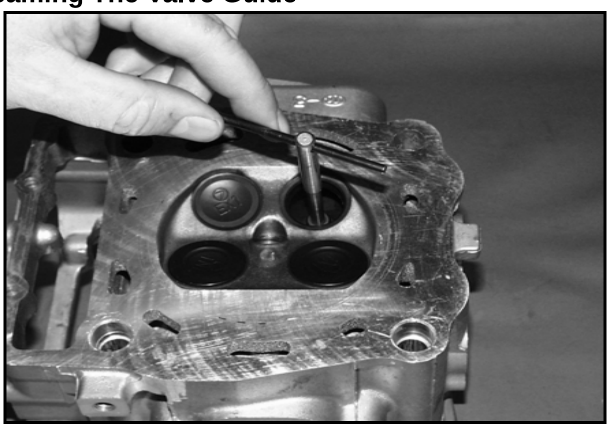
Valve Guide Installed Height

Valve Guide Height:

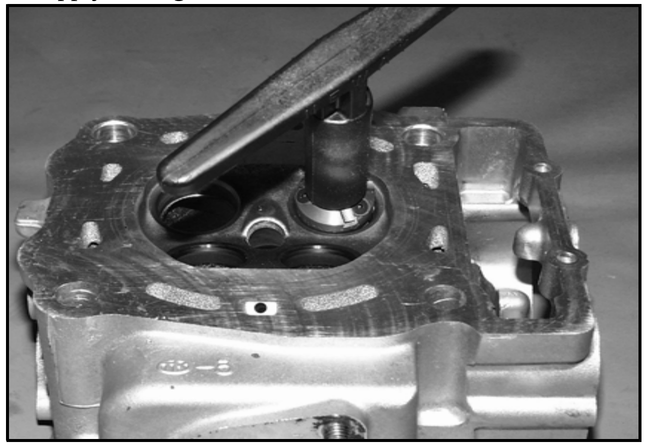
.689-.709” (17.5-18.0 mm)

4. Place a new guide in the valve guide installation tool and press guide in to proper depth. Check height of each guide above the cylinder head (A). **NOTE:** The guide can also be driven in to the proper depth. Inspect the guide closely for cracks or damage if a driver is used.

Reaming The Valve Guide

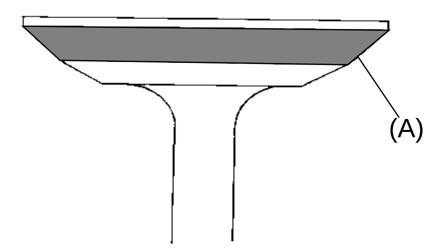


5. Allow cylinder head to cool to room temperature. Apply cutting oil to the reamer. Guides should be reamed from the valve spring side of the cylinder head. Ream each guide to size by turning the reamer clockwise continually. Continue to rotate reamer clockwise during removal of the tool.
6. Clean guides thoroughly with hot soapy water and a nylon brush. Rinse and dry with compressed air. Apply clean engine oil to guides.
7. Install pilot into valve guide.
8. Apply cutting oil to valve seat and cutter.



9. Place 46^{o} cutter on the pilot and make a light cut.
10. 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^{o} 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.



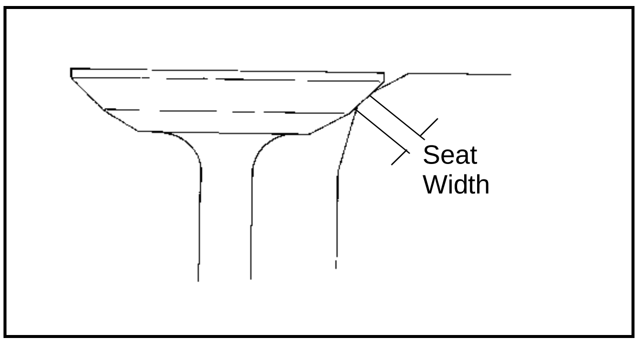
11. To check the contact area of the seat on the valve face, apply a thin coating of Prussian Blue™ paste to the valve seat. If using an interference angle (46^{o}) apply black permanent marker to the entire valve face (A).
12. Insert valve into guide and tap valve lightly into place a few times.

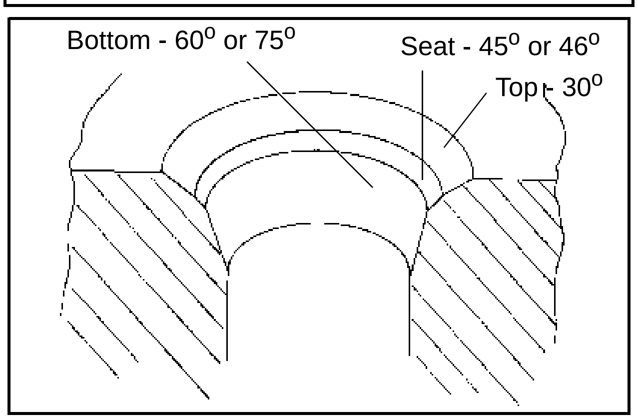
13. Remove valve and check where the Prussian Blue™ indicates seat contact on the valve face. The valve seat should contact the middle of the valve face or slightly above, and must be the proper width.

    - If the indicated seat contact is at the top edge of the valve face and contacts the margin area(B) 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.

Valve Seat Width:

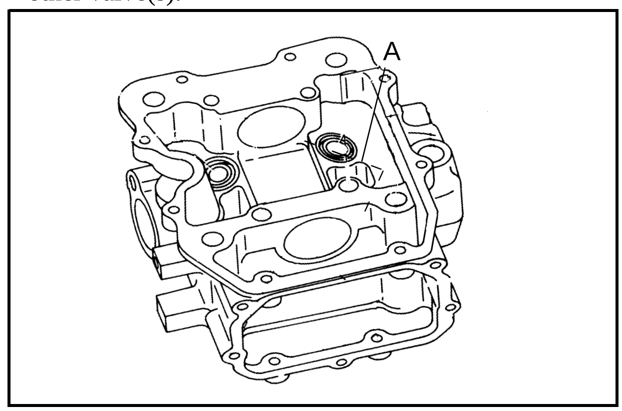
Intake Std: .028” (.7 mm)
Limit: .055” (1.4 mm)
Exhaust Std: .039” (1.0 mm)
Limit: .071” (1.8 mm)





NOTE: 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.

14. Clean all filings from the area with hot soapy water, rinse, and dry with compressed air.
15. Lubricate the valve guides with clean engine oil, and apply oil or water based lapping compound to the face of the valve. Lapping is not required with an interference angle.
16. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.
17. 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).



18. Clean cylinder head, valves, and camshaft oil supply passage (A) thoroughly.
19. If oil passage blind plug was removed, apply Crankcase Sealant **(PN 2871557)** or equivalent sealer to the threads and install, torquing to 8 ft. lbs. (11 Nm).

CAUTION

Do not allow sealant to enter oil passage.

20. Spray electrical contact cleaner into oil passage and dry using compressed air.

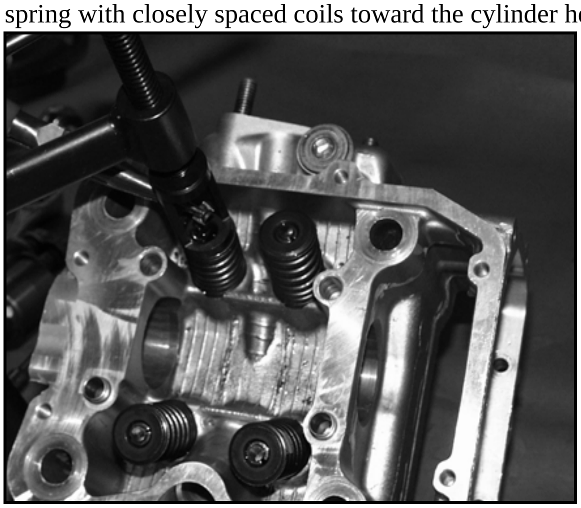
Cylinder Head Assembly

⚠ CAUTION

Wear eye protection during assembly.

NOTE: Assemble the valves one at a time to maintain proper order.

1. Install new valve seals on valve guides.
2. Apply engine oil to valve guides and seats.
3. Coat valve stem with molybdenum disulfide grease.
4. Install valve carefully with a rotating motion to avoid damaging valve seal.
5. Dip valve spring and retainer in clean engine oil and install spring with closely spaced coils toward the cylinder head.

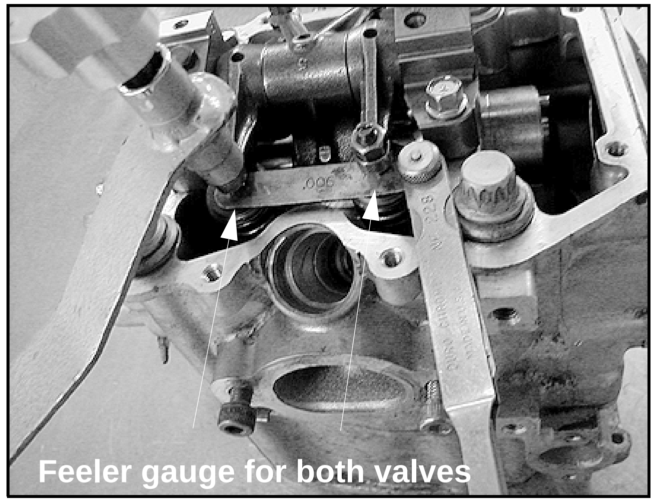


6. Place retainer on springs and install valve spring compressor. Compress spring only enough to allow split keeper installation and prevent loss of spring tension. Install split keepers with the gap even on both sides.
7. Repeat procedure for remaining valve.
8. When all valves are installed, tap lightly with soft faced hammer on the end of the valves to seat the split keepers.

Valve Sealing Test

1. Clean and dry the combustion chamber area.
2. Pour a small amount of clean, high flash point solvent into the intake port and check for leakage around each intake valve. The valve seats should hold fluid with no seepage.
3. Repeat for exhaust valves by pouring fluid into exhaust port.

Valve Clearance Adjustment



NOTE: The valves share a common rocker arm, and must be adjusted using two feeler gauges.

1. Insert .006 feeler gauge(s) between end of exhaust valve stem and adjuster screw(s).
2. Loosen locknut(s) and turn adjuster screw(s) until there is a slight drag on feeler gauge(s). The Valve/Clutch Adjuster Tool **(PA-44689)** can be used to adjust the 500 engines valves.

NOTE: Both feeler gauges should remain inserted during adjustment of each valve

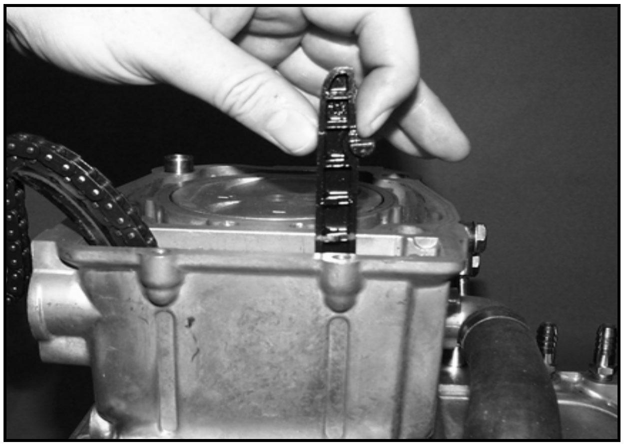
VALVE CLEARANCE

.006” (.15 mm)

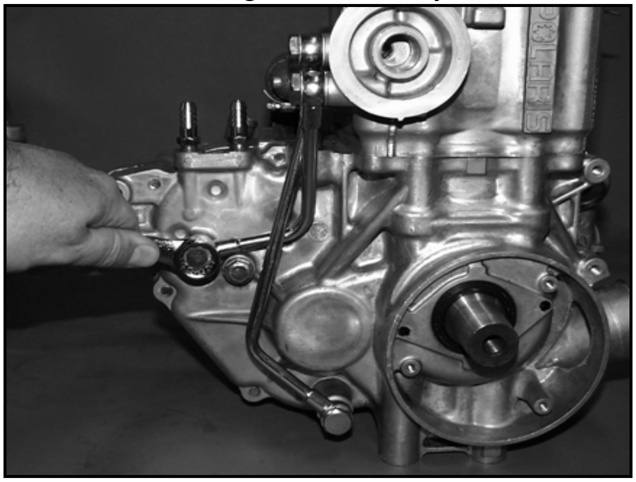
3. When clearance is correct, hold adjuster screw and tighten locknut securely
4. Re-check the valve clearance.
5. Repeat adjustment procedure if necessary until clearance is correct with locknut secured.

Cylinder/Piston Removal and Inspection

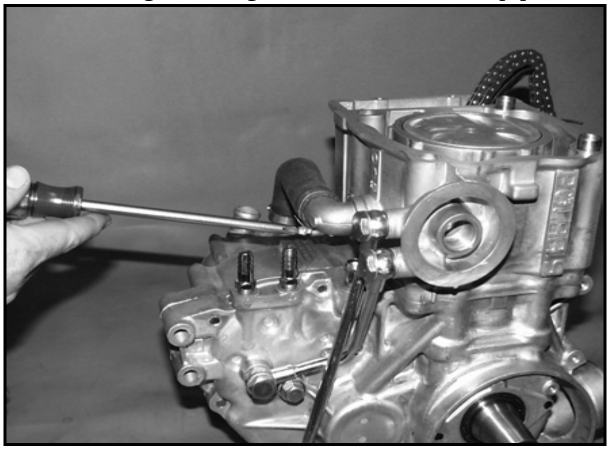
NOTE: Follow engine disassembly procedures to remove valve cover, camshaft and rocker arms, and cylinder head.



1. Remove cam chain guide at front of cylinder.



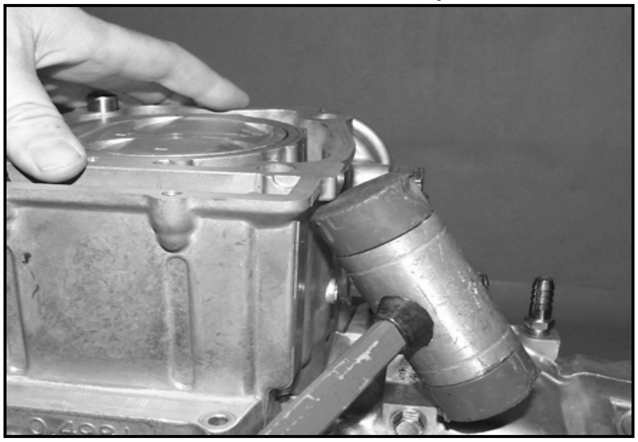
2. Loosen all four oil pipe banjo bolts and then remove the bolts and eight sealing washers. Remove the pipes.



3. Loosen hose clamps and remove coolant inlet hose.
4. Remove the two 6 mm cylinder base bolts.

5. Loosen each of the four large cylinder base bolts 1/4 turn at a time in a criss-cross pattern until loose and remove bolts.

NOTE: The bolts are inside the water jacket.



6. Tap cylinder lightly with a plastic hammer in the reinforced areas only until loose.
7. Rock cylinder forward and backward and lift it from the crankcase, supporting piston and connecting rod. Support piston with Piston Support Block **(PN 2870390)**.
8. Remove dowel pins from crankcase.

Piston Removal

1. Remove circlip. Note piston directional arrow pointing toward the right (Mag) side of engine.
1. Remove piston circlip and push piston pin out of piston. If necessary, heat the crown of the piston slightly with a propane torch.
2. Remove top compression ring.

CAUTION

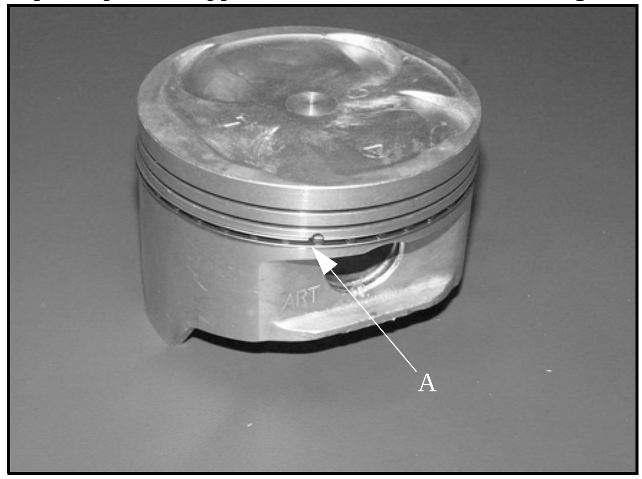
Do not apply heat to the piston rings. The ring may lose radial tension

***Using a piston ring pliers:** Carefully expand ring and lift it off the piston.

CAUTION

Do not expand the ring more than necessary to remove it from the piston or the ring may break

***By hand:** Placing both thumbs as shown, spread the ring open and push up on the opposite side. Do not scratch the ring lands.



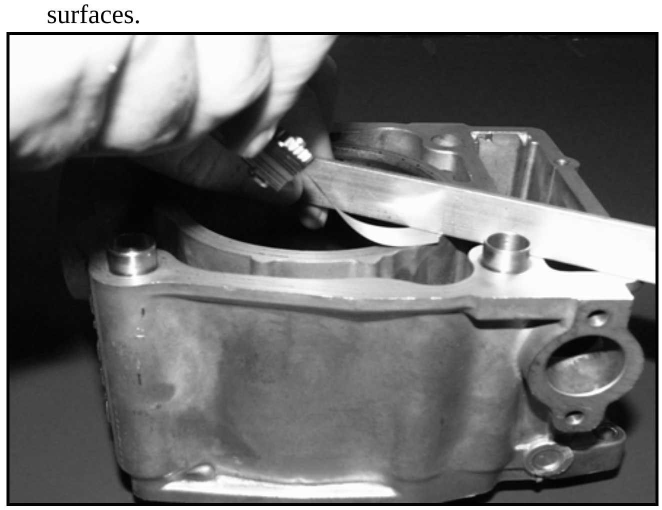
3. Repeat procedure for second ring.

The oil control ring is a three piece design consisting of a top and bottom steel rail and a center expander section. The top rail has a locating tab on the end which fits into a notch (A) in the upper oil ring land of the piston.

4. Remove the top rail first followed by the bottom rail.
5. Remove the expander.

Cylinder Inspection

1. Remove all gasket material from the cylinder sealing surfaces.

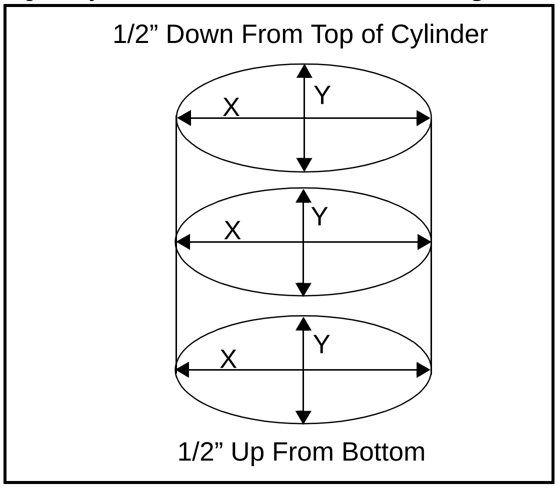


2. Inspect the top of the cylinder for warpage using a straight edge and feeler gauge.

Cylinder Warp Limit:

.002” (.05 mm)

3. Inspect cylinder for wear, scratches, or damage.

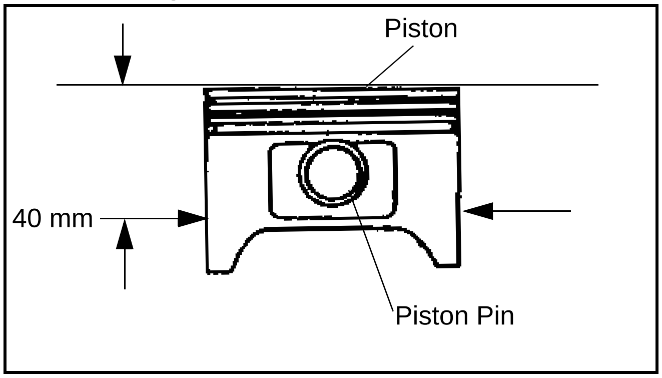


4. Inspect cylinder for taper and out of round with a telescoping gauge or a dial bore gauge. Measure in two different directions, front to back and side to side, on three different levels (1/2" down from top, in the middle, and 1/2" up from bottom).
5. Record measurements. If cylinder is tapered or out of round beyond .002, the cylinder must be re-bored oversize or replaced.

Cylinder Taper
Limit: .002 Max.
Cylinder Out of Round
Limit: .002 Max.

Standard Bore Size:
3.6221-3.6228" (92.00 - 92.012 mm)

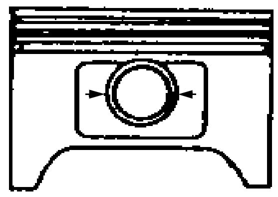
Piston-to-Cylinder Clearance



1. Measure piston outside diameter at a point 40 mm down from the top of the piston at a right angle to the direction of the piston pin.
2. Subtract this measurement from the maximum cylinder measurement obtained in Step 5 above.

Piston to Cylinder Clearance
Std: .0006- .0018" (.015- .045 mm)
Piston O.D.:
Std: 3.6204- 3.6215" (91.970-91.985 mm)

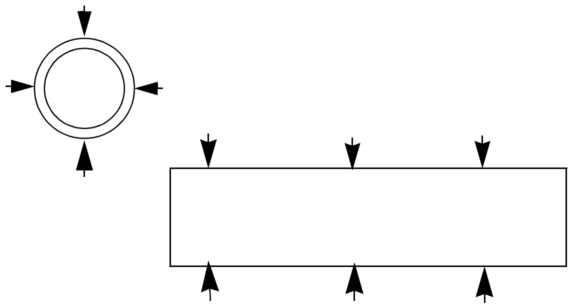
Piston/Rod Inspection



Piston Pin Bore

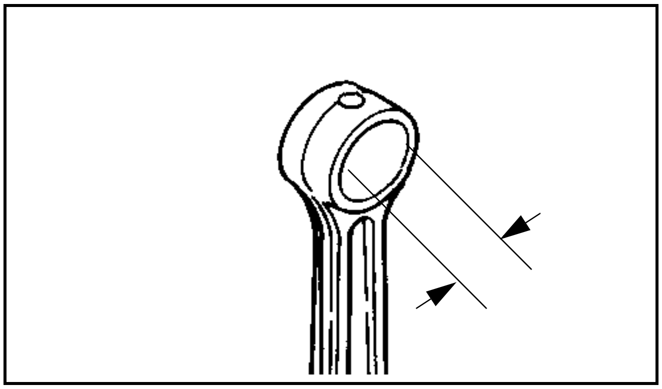
Piston Pin Bore:
.9055-.9057" (23.0-23.006 mm)

1. Measure piston pin bore.

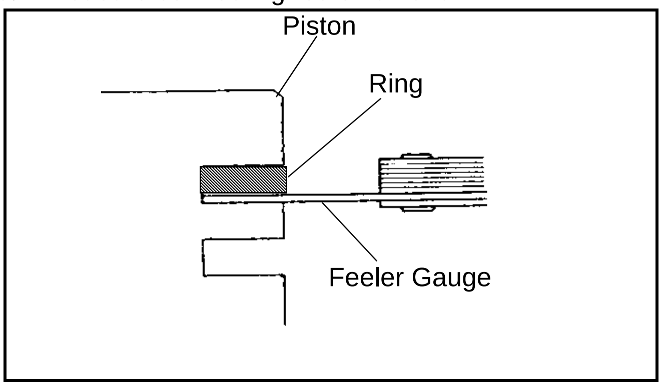


Piston Pin Measurement Locations

Piston Pin O.D.
.9053-.9055" (22.994-23.0 mm)



2. Measure piston pin O.D. Replace piston and/or piston pin if out of tolerance.
3. Measure connecting rod small end ID.



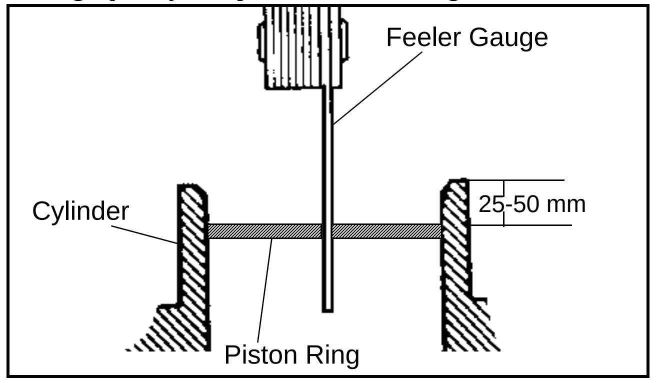
Piston Ring-to-Groove Clearance

Top Ring Std: .0016-.0031" (.040-.080 mm)
Limit: .0059" (15 mm)
Second Ring Std: .0012-.0028" (.030-.070 mm)
Limit: .0059" (15 mm)

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

Piston Ring Installed Gap

1. Place each piston ring inside cylinder using piston to push ring squarely into place as shown at right.



Piston Ring Installed Gap

Top Ring
Std: .0079- .0138" (.20- .36 mm)
Limit: .039" (1.0 mm)
Second Ring
Std: .0079- .0138" (.20- .36 mm)
Limit: .039" (1.0 mm)
Oil Ring
Std: .0079- .0276" (.20- .70 mm)
Limit: .059" (1.5 mm)

2. Measure installed gap with a feeler gauge at both the top and bottom of the cylinder.

NOTE: A difference in end gap indicates cylinder taper. The cylinder should be measured for excessive taper and out of round

3. If the *bottom* installed gap measurement exceeds the service limit, replace the rings. If ring gap is below specified limit, file ring ends until gap is within specified range.

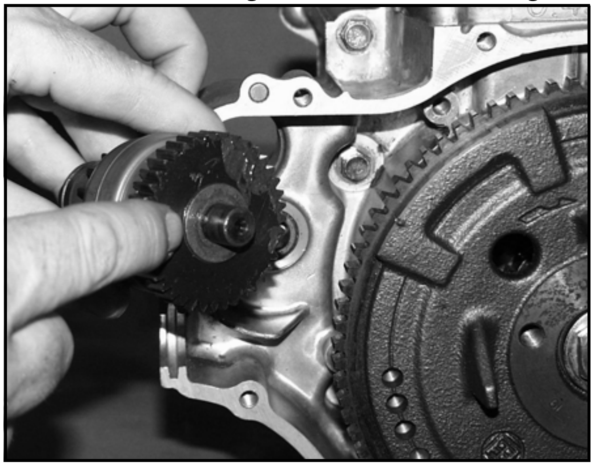
NOTE: Always check piston ring installed gap after re-boring a cylinder or when installing new rings. A re-bored cylinder should always be scrubbed thoroughly with hot soapy water, rinsed, and dried completely. Wipe cylinder bore with an oil rag immediately to remove residue and prevent rust.

Crankcase Disassembly

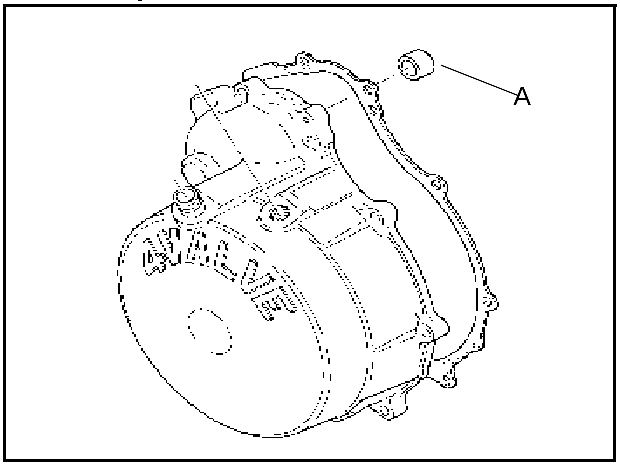
NOTE: The recoil starter, starter motor, starter drive, flywheel, stator, cam chain and sprockets can be serviced with the engine in the frame.

Starter Drive Removal/Inspection

1. Remove recoil housing bolts and remove housing.



2. Remove starter drive assembly. Note the thrust washer located at the rear of the drive mechanism.
3. Inspect the thrust washer for wear or damage and replace if necessary.



Std. Bushing ID:
.4735"-.4740" (11.11-12.04 mm)

Std. Shaft OD:
.470"-.472" (11.93-11.99 mm)

Starter Drive Bushing Clearance:
Std: .0015-.004" (.038-.102 mm)

Service Limit:
.008" (.203 mm)

4. Measure the OD of the starter drive shaft on both ends and record.
5. Measure the ID of the bushing in the recoil housing (A) and in the crankcase and record. Measure in two directions 90^{o} apart to determine if bushing is out of round. Calculate bushing clearance. Replace bushing if clearance exceeds the service limit.
6. Inspect gear teeth on starter drive. Replace starter drive if gear teeth are cracked, worn, or broken.

Flywheel/Stator Removal/Inspection

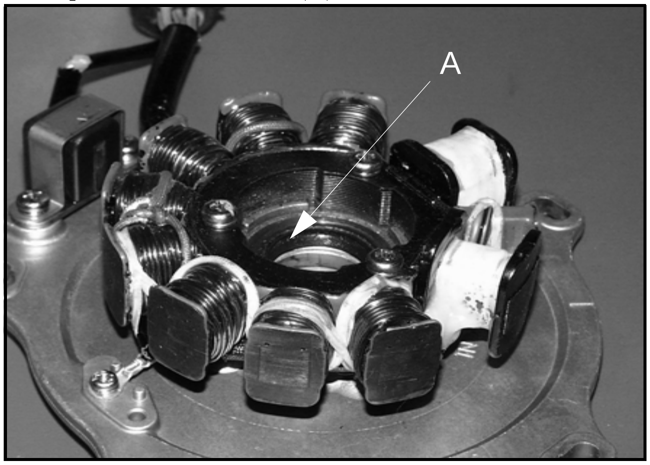
3

1. Remove flywheel nut and washer.
2. Install Flywheel Puller **(PN 2871043)** and remove flywheel.

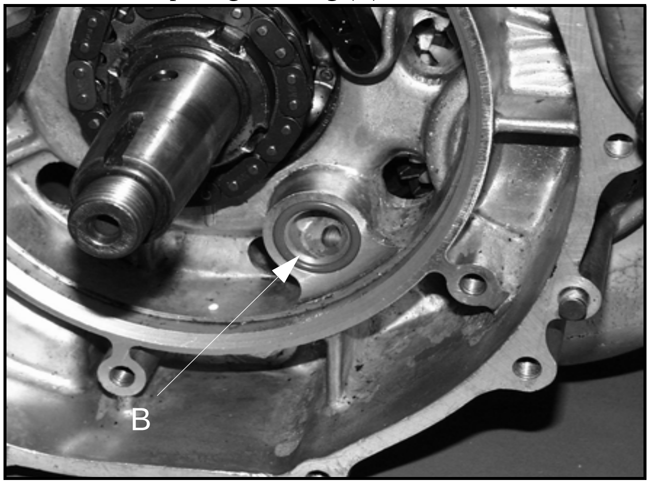
CAUTION

Do not thread the puller bolts into the flywheel more than 1/4" or stator coils may be damaged

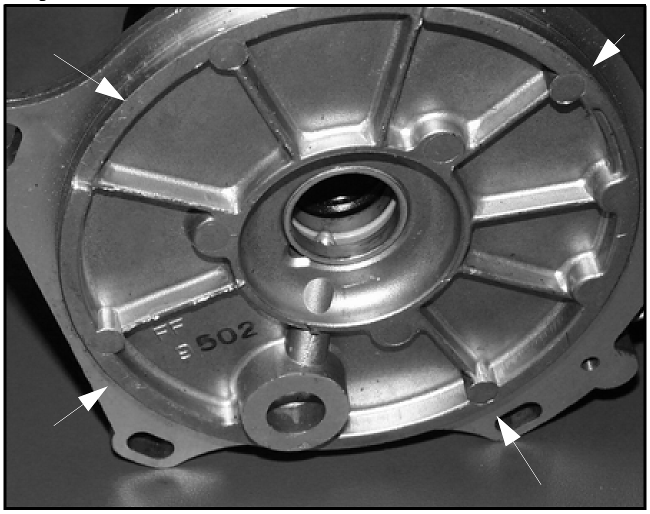
3. Mark or note position of stator plate on crankcase.
4. Remove bolts and carefully remove stator assembly, being careful not to damage crankshaft bushing on stator plate.
5. Replace crankshaft seal (A).



6. Remove oil passage O-Ring (B).

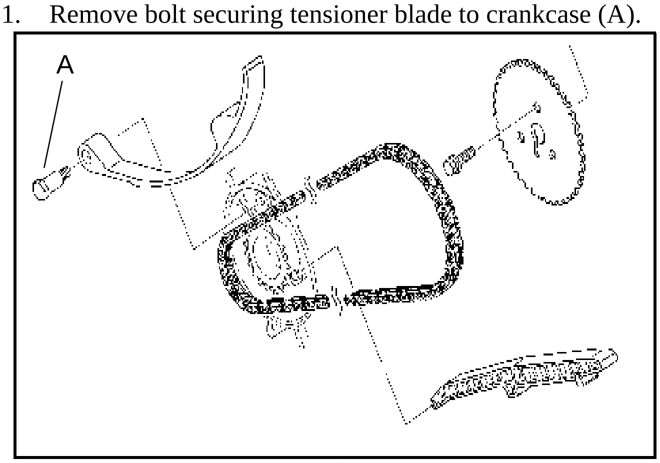


7. Remove large sealing O-Ring from outer edge of stator plate.

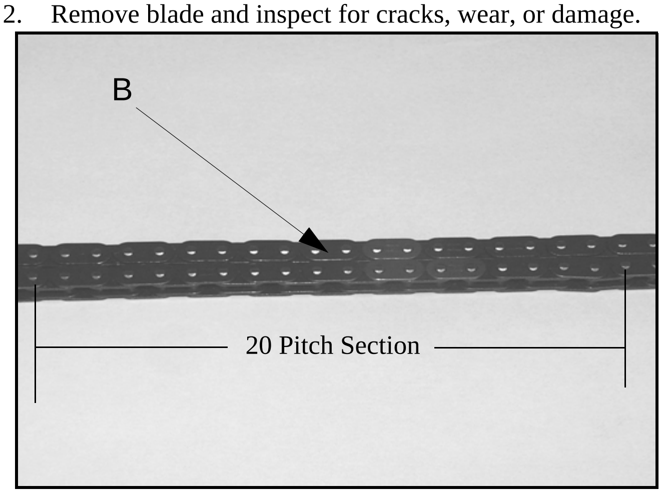


Cam Chain/Tensioner Blade

1. Remove bolt securing tensioner blade to crankcase (A).



2. Remove blade and inspect for cracks, wear, or damage.



3. Remove cam chain (B). Inspect chain for worn or missing rollers or damage. Stretch chain tight on a flat surface and apply a 10 lb. (4.53 kg) load. Measure length of a 20 pitch section of chain. Replace if worn past service limit.

Chain Service Limit: 5.407" (13.7 cm)

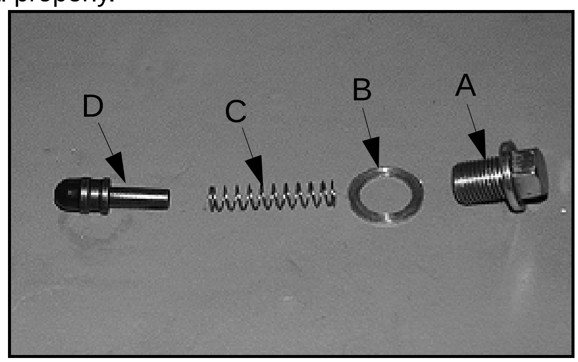
4. Using the special socket, remove the crankshaft slotted nut.

NOTE: The crankshaft slotted nut is a left-hand thread.

5. Remove cam chain drive sprocket and woodruff key from crankshaft.
6. Inspect sprocket teeth for wear or damage.
7. Inspect woodruff key for wear.
8. Replace any worn or damaged parts.

One Way Valve Removal

The one way valve prevents oil from draining out of the oil tank and into the crankcase when the engine is off. It must be clean and have adequate spring pressure in order to seal properly.

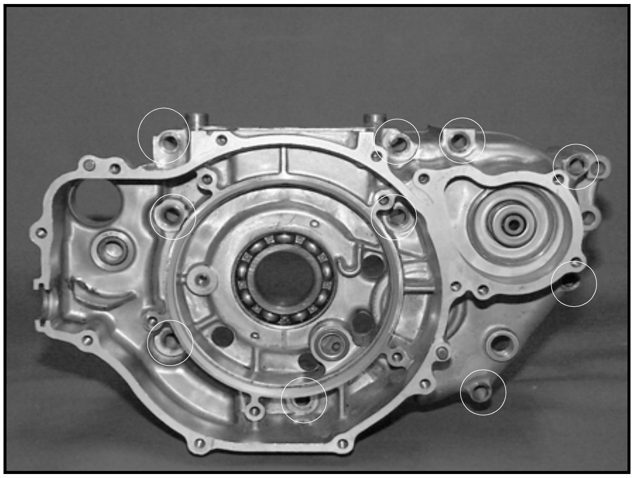


1. Remove cap bolt (A), sealing washer (B), spring (C), and one way valve (D) from PTO side crankcase.
2. Inspect free length of spring and check coils for distortion.

One Way Valve Spring Free Length:
Std: 1.450" (3.68 cm)

3. Inspect valve for wear.
4. Check seat area for nicks or foreign material that may prevent proper sealing of valve.

Crankcase Separation

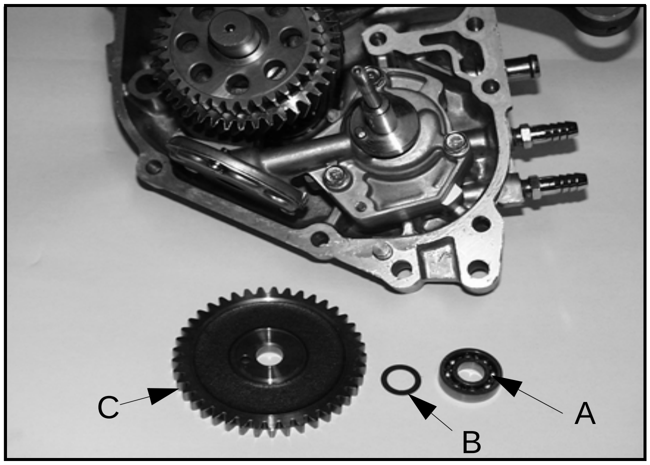


1. Remove flange bolts (10) from magneto side crankcase evenly in a criss-cross pattern.
2. Separate crankcase by tapping with a soft faced hammer in reinforced areas.
3. Tap lightly on balancer gear with a brass drift through the hole in the crankcase if necessary, to ensure the balancer shaft stays in the PTO side crankcase. Watch the gap along the crankcase mating surface and separate the crankcase evenly. It may also be necessary to tap the oil pump shaft lightly to separate the crankcase.

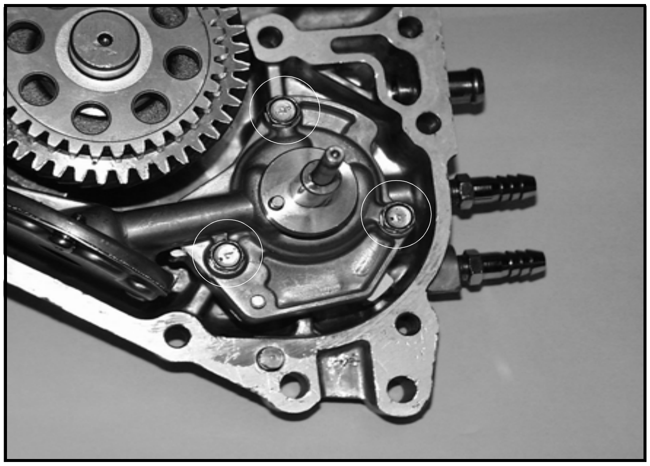
CAUTION
Do not strike the oil pump shaft at an angle or the shaft may bend, causing irreparable damage. Tap only *lightly* on the pump shaft if necessary.

4. Remove the Mag (RH) crankcase from the PTO case.

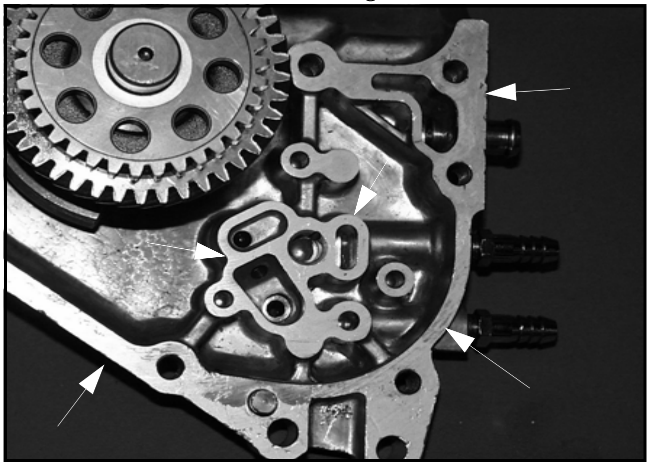
Oil Pump Removal/Inspection



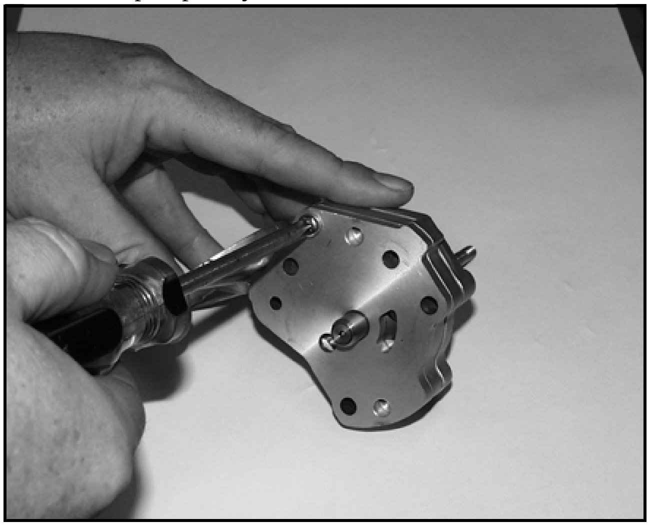
1. Remove pump shaft bearing (A) and thrust washer (B) from pump shaft.
2. Remove (2) bolts holding pump drive gear (C).
3. Inspect drive gear teeth for cracks, damage or excessive wear.



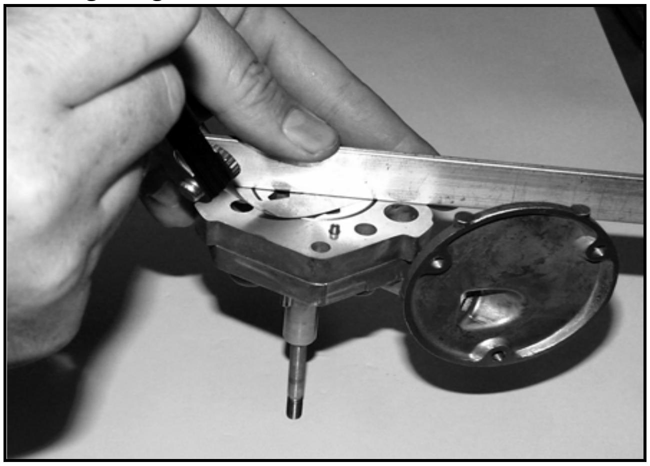
4. Remove three oil pump retaining bolts and pump.
5. Inspect mating surface of crankcase and oil pump. Check for nicks, burrs, or surface irregularities.



6. Remove the three screws and strainer screen from pump.
7. Clean screen thoroughly.
8. Remove pump body screw and feed chamber cover.



9. Measure pump end clearance using a feeler gauge and straight edge.

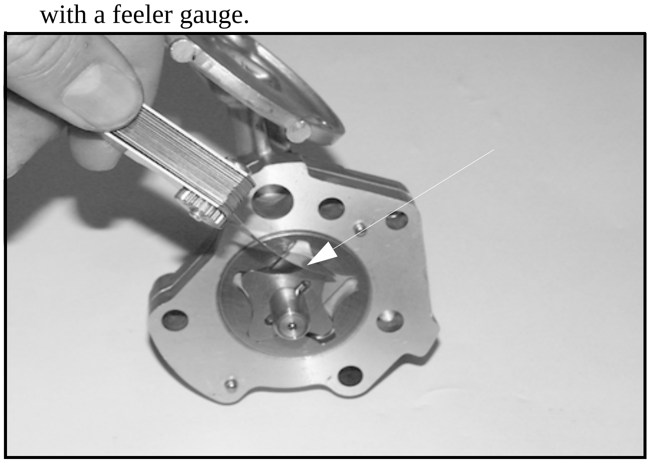


Pump End Clearance:

Std: .001 -.003 (.0254-.0762 mm)

Wear Limit: .004 (.1016 mm)

10. Measure clearance between outer feed rotor and pump body with a feeler gauge.



Rotor Tip Clearance:

Std: .005 (.127 mm)

Wear Limit: .008 (.2032 mm)

11. Measure rotor tip clearance with a feeler gauge.
12. Remove inner and outer feed rotor and pump chamber body.
13. Repeat measurements for scavenge rotor.
14. Remove inner and outer scavenge rotor and inspect pump shaft for wear.

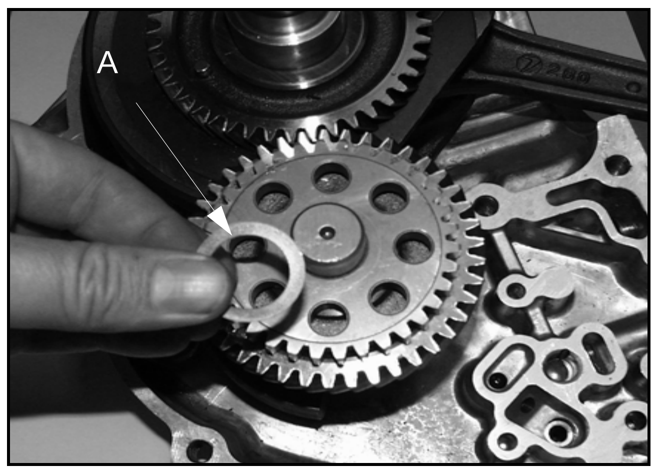
Oil Pump Assembly

1. Clean and dry all parts thoroughly. Apply clean engine oil to all parts. *Do not* use gasket sealer on the pump body mating surfaces or oil passages will become plugged.
2. Install pump shaft and scavenge rotor drive pin.
3. Install outer scavenge rotor, inner scavenge rotor, and scavenge casing.
4. Install outer feed rotor and inner feed rotor drive pin.
5. Install inner feed rotor and feed chamber cover with screw.
6. Tighten screw securely.
7. Install screen on pump body.
8. Install oil pump on crankcase and torque bolts to 6 ft. lbs. (8 Nm).

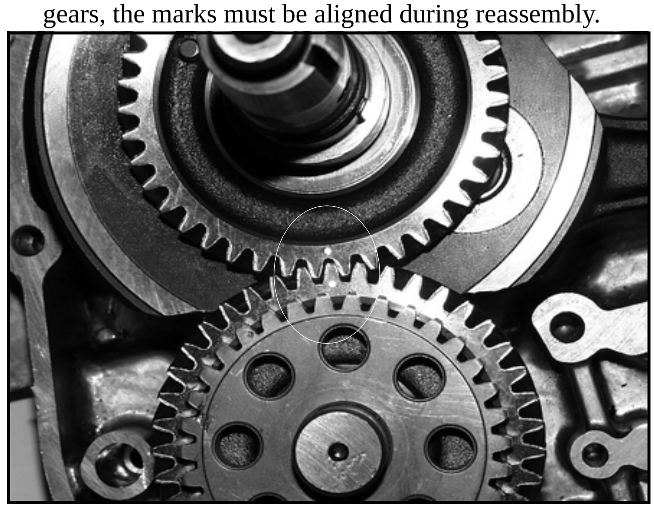
Oil Pump Attaching Bolt Torque:
6 ft. lbs. (8 Nm)

Counter Balancer Shaft Removal/Inspection

1. Remove the shim washer (A) from the counter balancer shaft.



2. Note the alignment dots on the balancer and crankshaft gears, the marks must be aligned during reassembly.

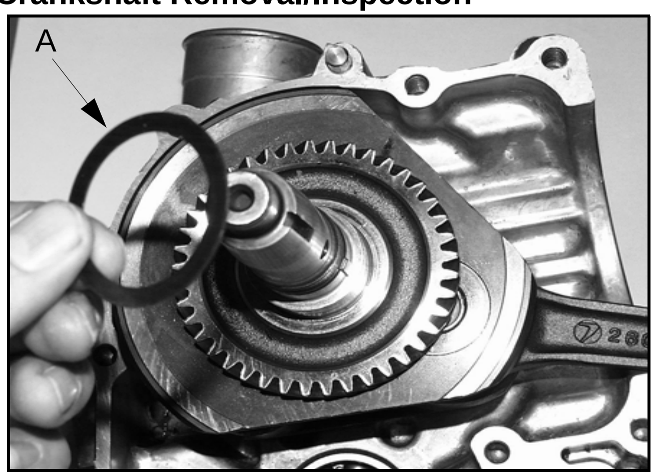


3. Turn the shaft until balancer counter weights clear the crankshaft and remove the balancer shaft from the crankcase.

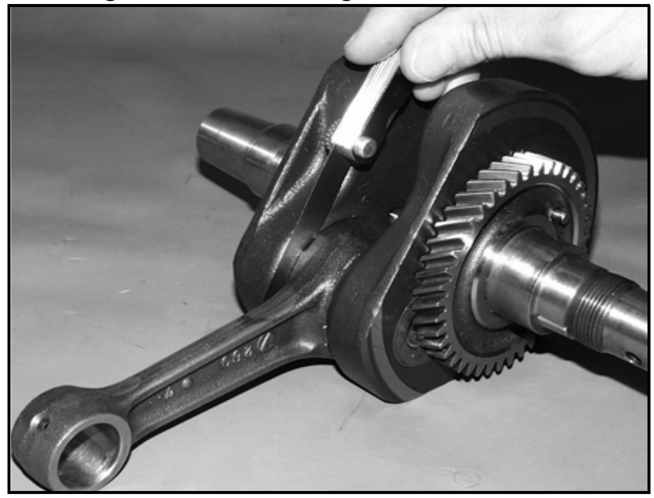
4. Inspect the balancer drive gear and pump shaft drive gear.
5. Replace the shaft if gear teeth are abnormally worn or damaged.
6. Inspect the balancer shaft bearings.

NOTE: Due to extremely close tolerances and minimal wear, the balancer shaft ball bearings must be inspected visually and by feel. Look for signs of discoloration, scoring or galling. Turn the inner race of each bearing. The bearings should turn smoothly and quietly. The outer race of each bearing should fit tightly in the crankcase. The inner race should be firm with minimal side to side movement and no detectable up and down movement.

Crankshaft Removal/Inspection



7. Remove the shim washer (A) from the crankshaft.
8. Support the PTO side crankcase and crankshaft; press the crankshaft out. Be careful not to damage the crankcase mating surface or connecting rod.



9. Use a feeler gauge to measure the connecting rod big end side clearance.

Connecting Rod Big End Side Clearance:

Std: .0039-.0256” (.1-.65 mm)
Limit: .0315” (.80 mm)

10. Place the crankshaft in a truing stand or V-blocks and measure the runout on both ends with a dial indicator.

Max Runout: .0024” (.06 mm)

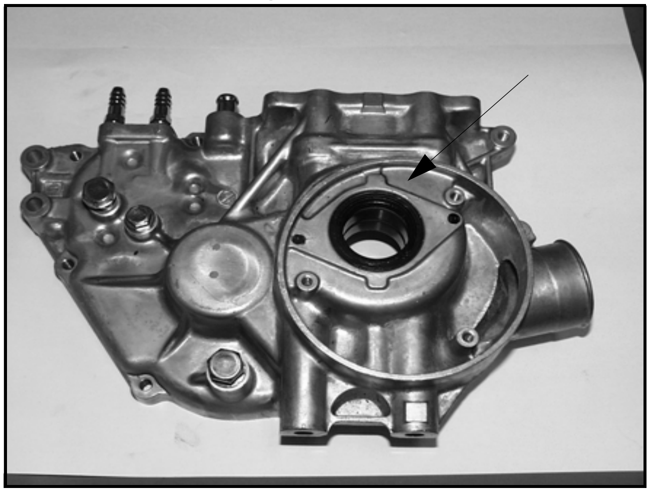
11. Measure the connecting rod big end radial clearance.

Big End Radial Clearance:

Std: .0004-.0015” (.011-.038 mm)
Limit: .0020” (.05 mm)

12. Inspect the crankshaft main bearing journals for scoring and abnormal wear.

Crankcase Bearing Inspection



1. Remove the seal from the PTO side crankcase.
2. Inspect the crankshaft main bearings, balancer shaft bearings, and pump shaft bearing.

NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. Look for signs of discoloration, scoring or galling. Turn the inner race of each bearing. The bearings should turn smoothly and quietly. The outer race of each bearing should fit tightly in the crankcase. The inner race should be firm with minimal side to side movement and no detectable up and down movement.

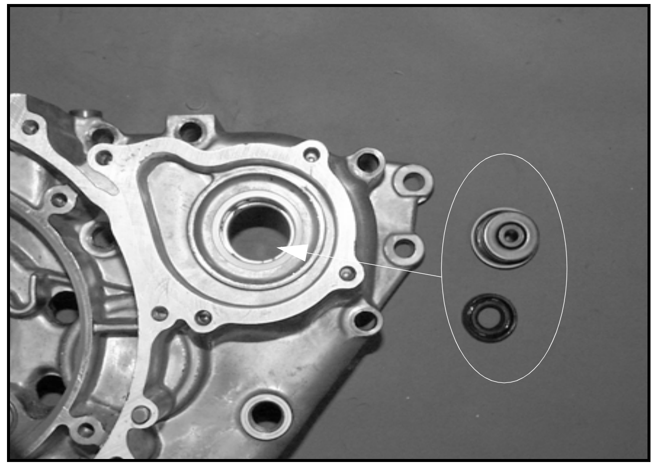
3. Support the crankcase and drive or press the main bearings out of each crankcase.
4. To remove balancer shaft bearings and pump shaft bearing use a blind hole bearing puller.

NOTE: Bearings are stressed during the removal process and *should not* be re-used!

Pump Shaft Oil Seal/Water Pump Mechanical Seal Removal (Engine Disassembled)

NOTE: The water pump mechanical seal can be removed without removing the engine. Refer to Water Pump Mechanical Seal Installation.

Replace the pump shaft seal and water pump mechanical seal whenever the crankcase is disassembled.



1. Remove the pump shaft bearing from the Magneto (right hand) side crankcase.
2. Pry out the oil seal, noting the direction of installation with the spring side facing IN (toward inside of case).
3. Drive the water pump mechanical seal out of the crankcase from inside to outside. Note: The new mechanical seal must be installed after the crankcases are assembled, using a special tool. See Mechanical Seal Installation.

Crankcase Inspection

1. Remove all traces of gasket sealer from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.
2. Check the oil pump and oil passage mating surfaces to be sure they are clean and not damaged.

Bearing Installation

NOTE: To ease bearing installation, warm the crankcase until hot to the touch. Place the bearings in a freezer.

1. Install the bearings so the numbers are visible.
2. Drive or press new bearings into the crankcases, using the proper driver.

CAUTION
Press only on outer race of bearing to prevent bearing damage

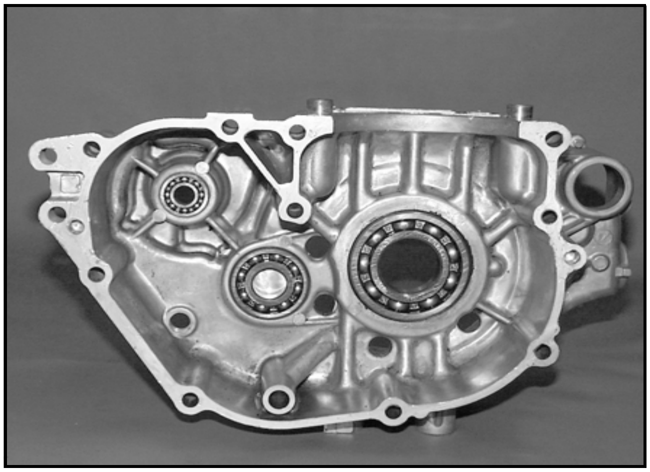
- 70 mm (2.755") driver- For crankshaft main bearings.
- 46 mm (1.810") For counter balancer bearings.
- 28 mm (1.100") For pump shaft bearing.

End Play Inspection/Adjustment

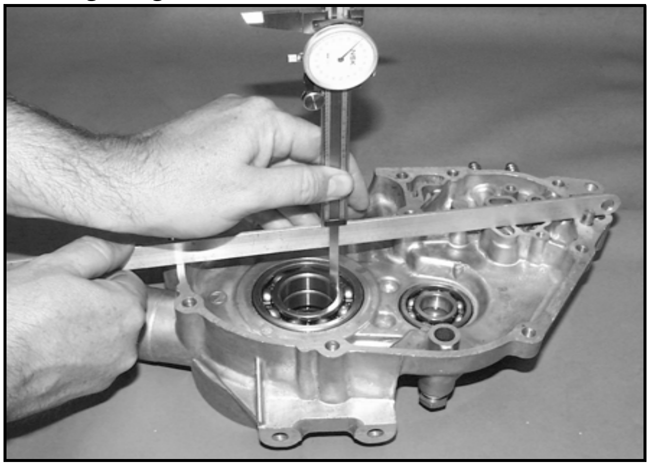
Before reassembling the crankcase,the following steps should be performed to determine the amount of crankshaft, counter balancer shaft, and pump shaft end play. Excessive end play may cause engine noise at idle and slow speeds. Too little play will side load the bearings which may lead to premature bearing failure.

Crankshaft End Play Adjustment

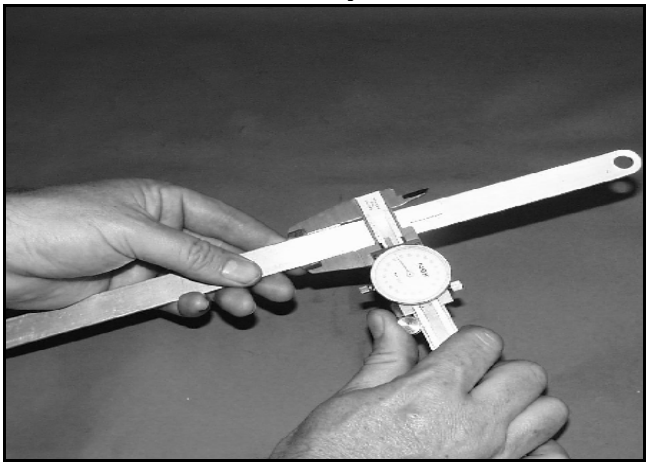
3. Make sure all bearings are firmly seated in the both Mag and PTO crankcase.



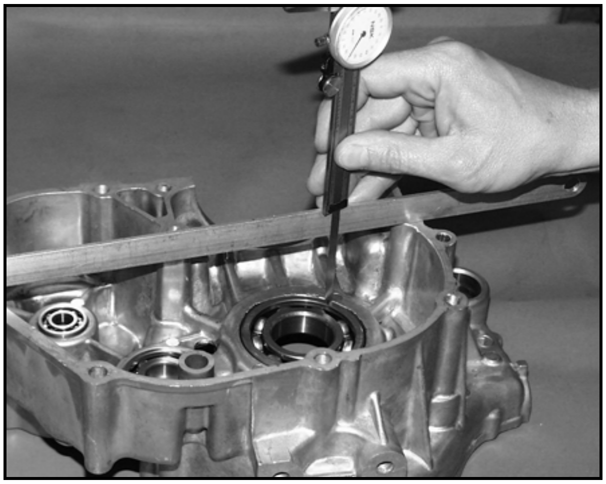
4. Measure the distance from the PTO crankcase mating surface to the main bearing using a dial caliper and a straight edge.



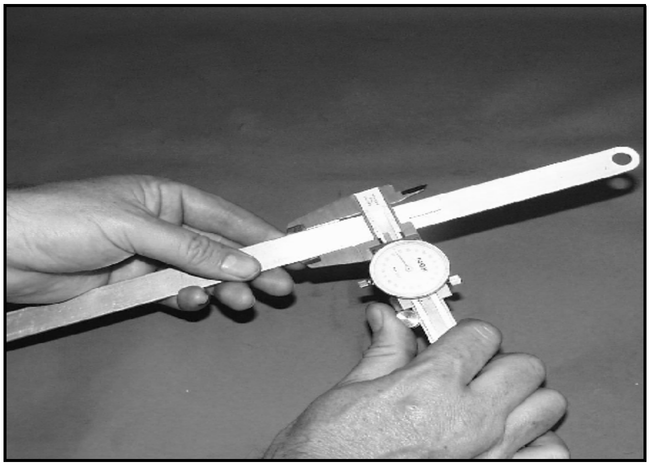
5. Subtract the thickness of the straightedge from the measurement obtained in Step 2 and record.



PTO Case Depth________________________



6. Measure the distance from the Magneto crankcase mating surface to the main bearing using the same method and record.

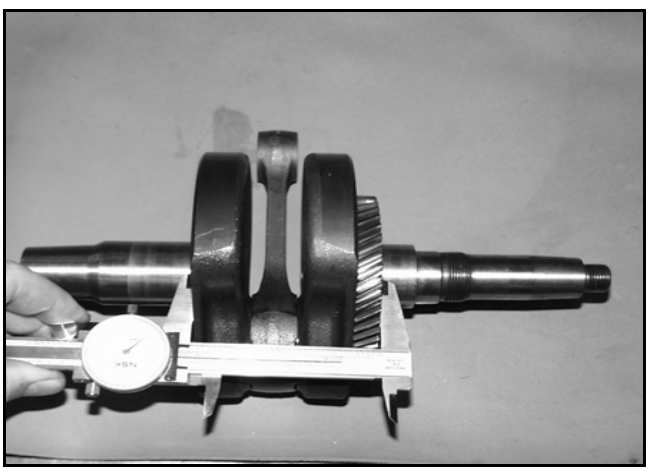


7. Subtract the thickness of the straightedge from the measurement obtained in Step 4 and record.

Mag Case Depth_______________

8. Add the readings recorded in Step 3 and Step 5 and record below.

Total Case Width_________________



9. Measure the width of the crankshaft at the bearing seats with a micrometer or dial caliper and record.

Crankshaft Width____________

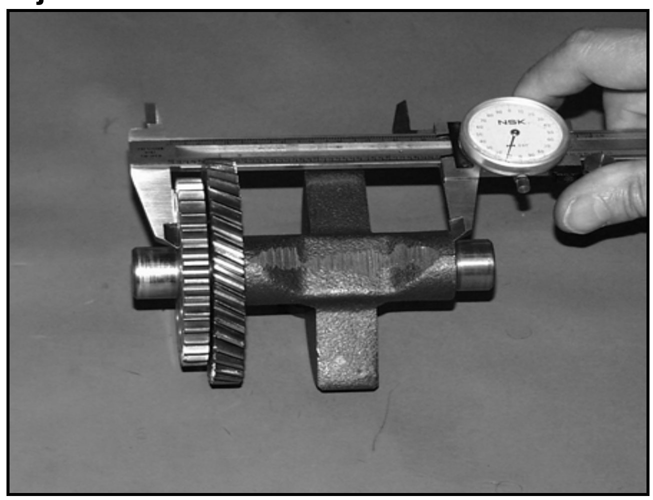
10. Subtract the Crankshaft Width measured in Step 7 from the Total Case Width recorded in Step 6, and record below.

Total End Play_____________

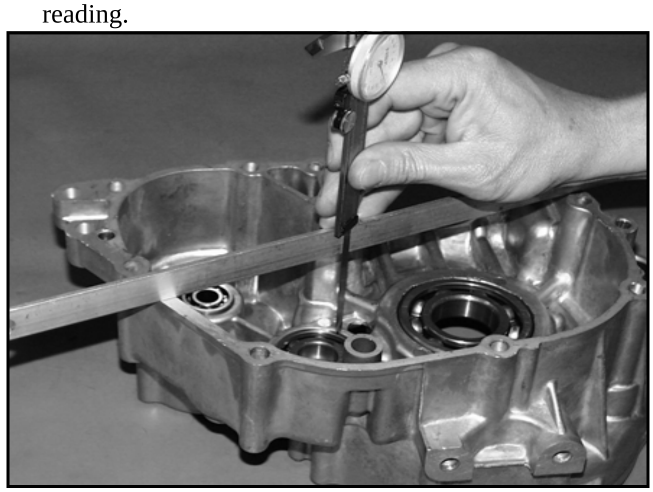
11. Subtract the thickness of the existing shim from the result of Step 8 to determine if a different shim is required. The result must be within the specified range listed.

Crankshaft End Play: .008-.016” (.02-.04 cm)

Counter Balancer Shaft End Play Adjustment.



12. Make sure all bearings are firmly seated in the crankcase.
13. Measure the width of the counter balancer shaft at the bearing seats with a dial caliper or micrometer, and record reading.



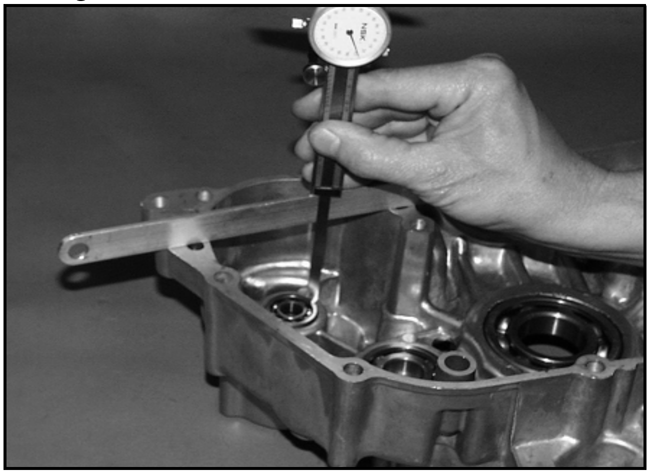
14. Measure the distance from the Mag crankcase mating surface to the balance shaft bearing using a dial caliper and a straight edge. Subtract the thickness of the straightedge and record.
15. Measure the distance from the PTO crankcase mating surface to the bearing using the same method outlined in Step 1, 2, and-3.
16. Add the readings obtained in Step 3 and Step 4.
17. Subtract the counter balancer shaft width measured in Step 2 from the figure obtained in Step 5.
18. Subtract the thickness of the existing shim from the result of Step 6 to determine if a different shim is needed. The result must be within the specified range listed at below.

Counter Balance Shaft End Play:

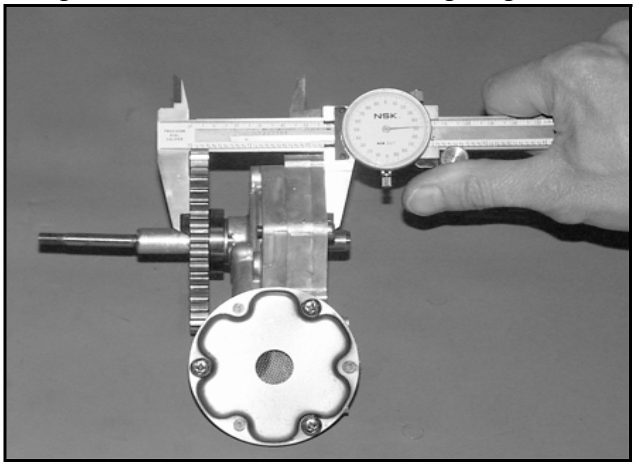
.008”-.016” (.02-.04 cm)

Oil Pump Shaft End Play Adjustment

1. Make sure the pump shaft bearing is firmly seated in the Magneto side crankcase.



2. Measure the distance from the magneto crankcase mating surface to the bearing using a dial caliper and a straight edge. Subtract the thickness of the straightedge and record.



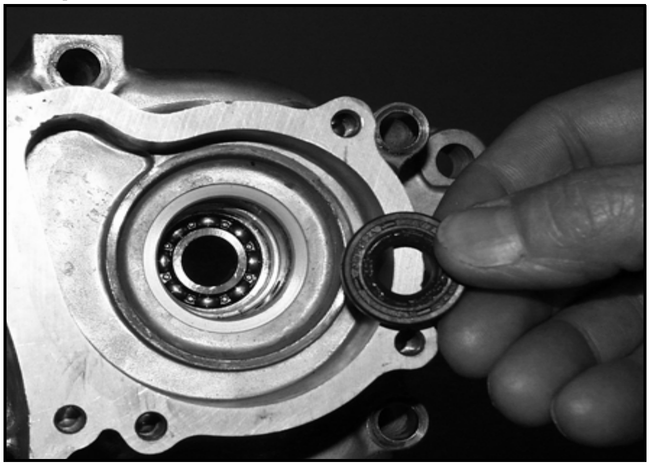
3. Install the gear on the oil pump and measure the width of the pump and gear. Subtract this measurement from the measurement recorded in Step 2.
4. Subtract the thickness of the existing shim from the result of Step 3 to determine if a different shim is needed. See Shaft End Play Spec.

Oil Pump Shaft End Play:

.008”-.016” (.02-.04 cm)

ENGINE REASSEMBLY

Pump Shaft Oil Seal Installation



1. Install the seal from the outside of the crankcase (water pump side) with the spring facing inward, toward the pump shaft bearing.
2. Drive or press the seal into place using a 25 mm (.985") seal driver, until flush with the outer edge of the seal bore.
3. Lubricate the seal lip with grease.

Crankshaft/Counter Balance/Oil Pump Installation

Lubricate all bearings with clean engine oil before assembly.

Use the Crankshaft/Water Pump Installation Kit **(PN 2871283)** to prevent damage to the crankshaft and main bearings during installation.

1. Install the crankshaft into the PTO side crankcase. Screw the threaded rod into the crankshaft until the threads are engaged a minimum of one inch (25.4mm).
2. Install the collar, washer, and nut onto the threaded rod. Hold the crankshaft and tighten the nut to draw the crankshaft into the main bearings until fully seated. Loosen the nut and remove the threaded rod from the crankshaft. If removal is difficult, install two nuts on the end of the threaded rod and tighten against each other.
3. Install the proper shim on the magneto end of the crankshaft.
4. Place the balancer shaft in the PTO crankcase aligning the timing marks on the crankshaft and balancer gears. Install the proper shim washer on the shaft.
5. Inspect the oil pump sealing surface on the crankcase. Apply a light film of engine oil to the surface and install the oil pump.

NOTE: Do not use gasket sealer on the pump mating surfaces.

NOTE: After engine is assembled and machine is readied for field operation, oil pump MUST be primed. Follow oil pump priming procedure**.**

Oil Pump Bolt Torque:
6 ft. lbs. (8 Nm)

6. Align the drive gear with the drive pin on the pump shaft and install the gear. Be sure the gear is fully seated and properly engaged.
7. Install the proper shim washer on the pump shaft.

Crankcase Assembly

1. Apply Crankcase Sealant (**PN 2871557**) to the crankcase mating surfaces. Be sure the alignment pins are in place.
2. Set the crankcase in position carefully to avoid damaging the pump shaft seal, and install the magneto end crankshaft installation tool (follow instructions provided with the Crankshaft/Water Pump Installation Kit **(PN 2871283).** Draw the crankcase halves together by tightening the nut on the tool and tapping lightly in the pump shaft area with a soft faced hammer to maintain alignment. Continually check alignment of the cases during installation, closing the gap equally until the surfaces are tightly seated.
3. Remove the tool.
4. Install the crankcase flange bolts and tighten in 3 steps following the pattern to specified torque.

Crankcase Bolt Torque:

14 ft. lbs. (19 Nm)

Crankcase Sealant:

(PN 2871557)

Water Pump Mechanical Seal Installation

5. Clean the seal cavity to remove all traces of old sealer.
6. Place a new mechanical seal in the seal drive collar, and install on the pump shaft.
7. Screw the guide onto the end of the pump shaft.
8. Install the washer and nut and tighten to draw seal into place until fully seated.
9. Remove the guide adaptor using the additional nut as a jam nut if necessary.

Water Pump Mechanical Seal Removal - Engine Installed

Water Pump Mechanical Seal Puller: (PN 2872105)

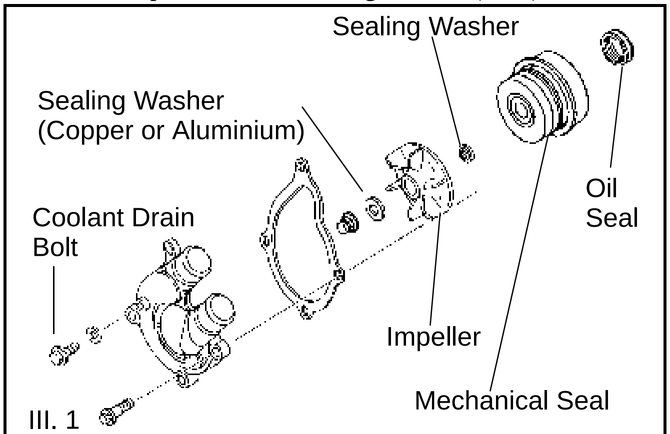
Replacement T-Handle: (PN 2872106)

This tool allows a technician to replace the mechanical water pump seal on EH50PL engines without removing the engine and splitting the cases.

CAUTION

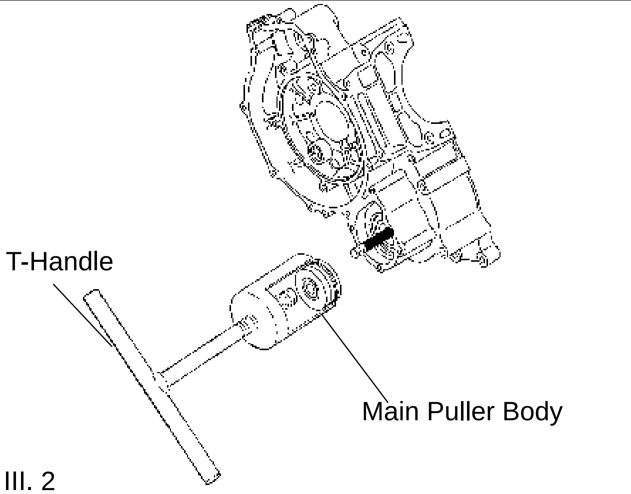
Improper or careless use of this tool or procedure can result in a bent water pump shaft.Pump shaft replacement requires engine removal and crankcase separation. Use caution while performing this procedure. Make sure that the puller is parallel to the shaft at all times. Do not place side loads on the water pump shaft or strike the puller or shaft in any way.

1. After the coolant has been drained, remove the water pump cover, impeller and the sealing washer. (Ill. 1).



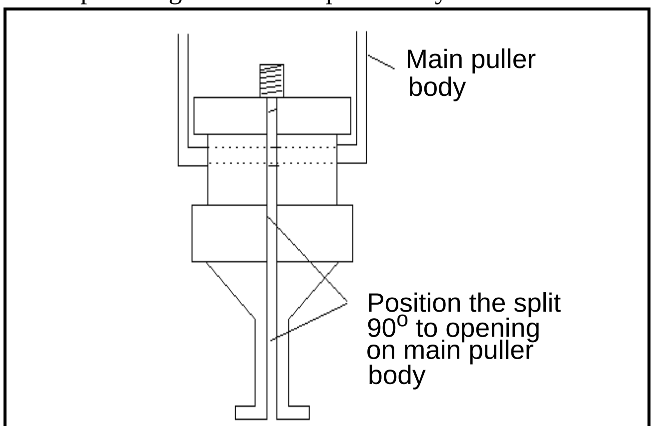
Ill. 1

2. Slide the main puller body over the outer portion of the mechanical seal as shown in Ill. 2 and turn T-Handle clockwise until it contacts water pump shaft. Continue rotating until outer portion of mechanical seal is separated from the metal seal body.



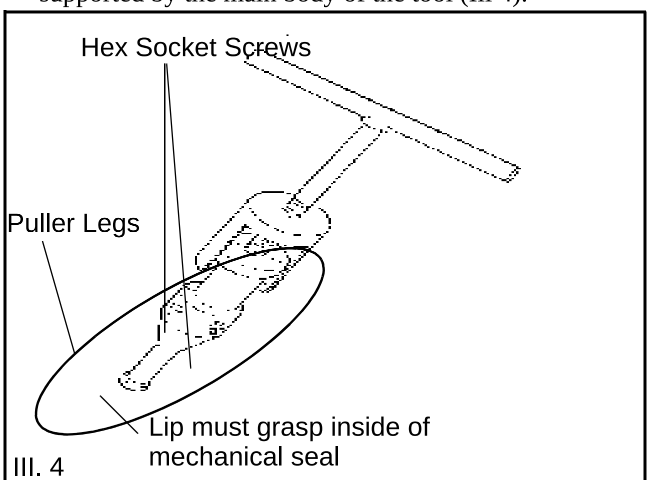
Ill. 2

3. Insert the puller legs between the water pump drive shaft and the remaining portion of the mechanical seal. Attach the puller legs to the main puller body. Ill. 3



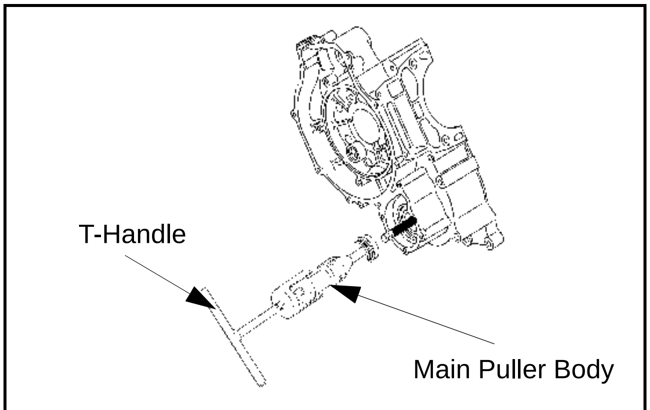
Ill.3

4. Ensure that the split between the puller legs are fully supported by the main body of the tool (Ill 4).



Ill. 4

5. Tighten the hex socket screws on the puller legs sufficiently so the lip of the puller legs will grasp the mechanical seal. Ill. 5.



Ill. 5

6. Turn the puller T-Handle clockwise until it contacts the water pump shaft. Continue rotating until the remaining portion of mechanical seal has been removed from the cases. Ill. 6 Pump shaft oil seal can also be replaced at this time if necessary.
7. The Water Pump Install Kit **(PN 5131135)** is required to install the new mechanical seal. This tool is available separately and it is also included in the Crankshaft/Water Pump Seal Installation Kit **(PN 2871283)**.

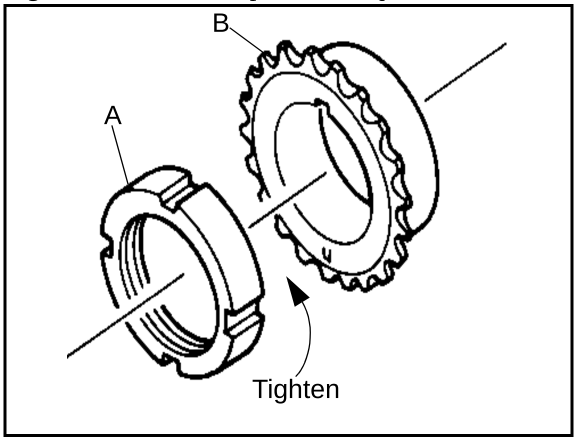
One Way Valve Installation

Install the one way valve plunger, spring, and plug using a new sealing washer.

One Way Valve Plug Torque:
16 ft. lbs. (22 Nm)

Cam Chain Drive Sprocket Installation

1. Install the Woodruff key, drive sprocket, and slotted nut. Tighten the nut to the specified torque.



Slotted Nut Torque:
35-51 ft. lbs. (47-69 Nm)

Tensioner Blade Installation

1. Install the tensioner blade and tighten the mounting bolt to specified torque.

Tensioner Blade Mounting Bolt Torque:
6 ft. lbs. (8 Nm)

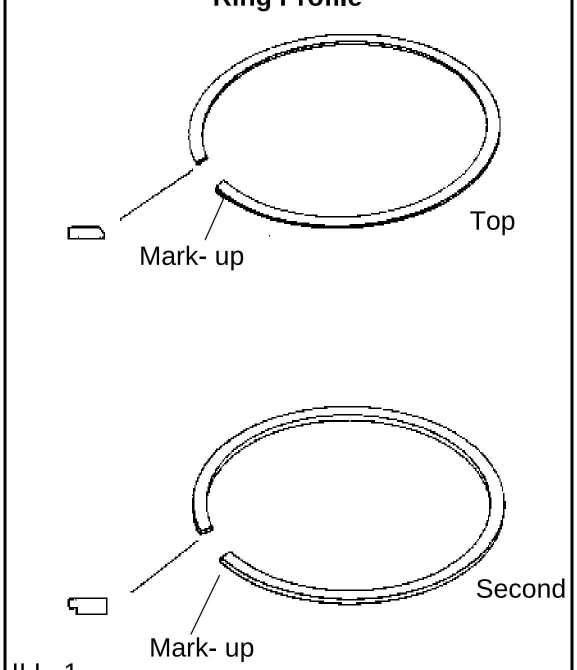
Piston Ring Installation

NOTE: Apply clean engine oil to all ring surfaces and ring lands. Always check piston ring installed gap before rings are installed on piston. If the piston has been in service clean any accumulated carbon from the ring grooves and oil control ring holes.

1. Place the oil control ring expander in oil ring groove with the end gap facing forward. The expander has no up or down marking and can be installed either way. The ends should butt squarely together and must not overlap.
2. Install the oil ring top rail.

NOTE: The top rail has a locating tab to prevent rotation. The tab must be positioned in the notch on the side of the piston as shown (A).

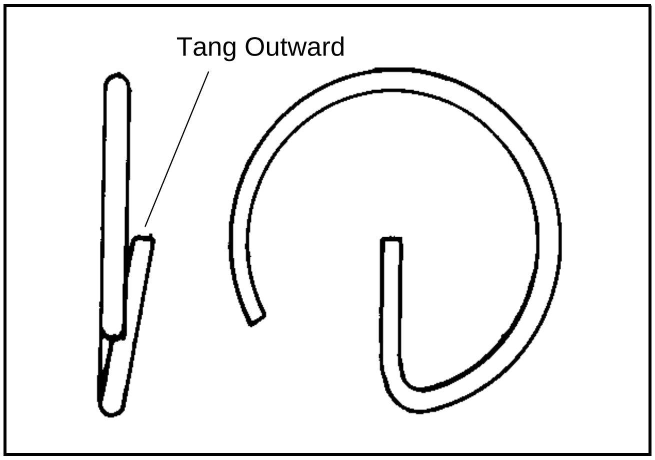
3. Install the bottom rail with the gap at least 30^{o} from the end of the expander on the side opposite the top rail gap.(See ILL. 1).
4. Install the second ring with the "R" mark facing up. Position the end gap toward the rear (intake) side of the piston.
5. Install the top ring (chrome faced) with the "R" mark facing up and the end gap facing forward (toward the exhaust). (See ILL. 1).
6. Check to make sure the rings rotate freely in the groove when compressed.



ILL. 1

Piston Installation

1. Clean the gasket surfaces on the cylinder and crankcase. Remove all traces of old gasket material.
2. Make sure the cylinder mounting bolt holes are clean and free of debris.

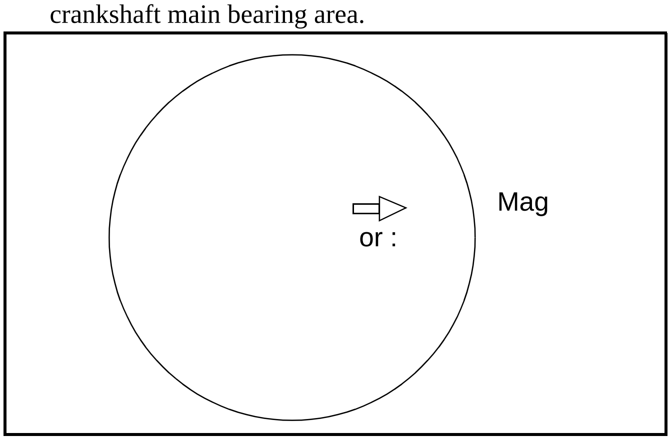


3. Install a new circlip on one side of the piston with the end gap facing *up* or *down*, and tang outward.

CAUTION

Circlips become deformed during the removal process. Do not re-use old circlips. Do not compress the new clip more than necessary upon installation to prevent loss of radial tension. Severe engine damage may result if circlips are re-used or deformed during installation.

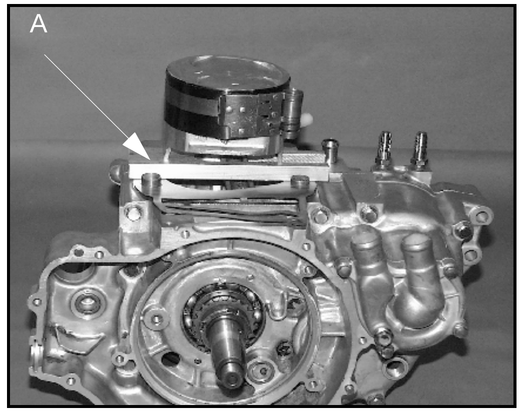
4. Apply clean engine oil to the piston rings, ring lands, piston pin bore, piston pin, and piston skirt. Lubricate the connecting rod (both ends), balancer drive gear, and crankshaft main bearing area.



5. Install the piston on the connecting rod with the arrow or : mark facing the magneto (RH) end of the crankshaft. The piston pin should be a push fit in the piston.
6. Install the other circlip with the gap facing up or down and tang outward. (See Caution with Step 3 above). Push the piston pin in both directions to make sure the clips are properly seated in the groove.

Cylinder Installation

7. Place the dowel pins in the crankcase and install a new cylinder base gasket.
8. Position the Piston Support Block (**PN 2870390**) (A) beneath the piston skirt to support the piston during cylinder installation.

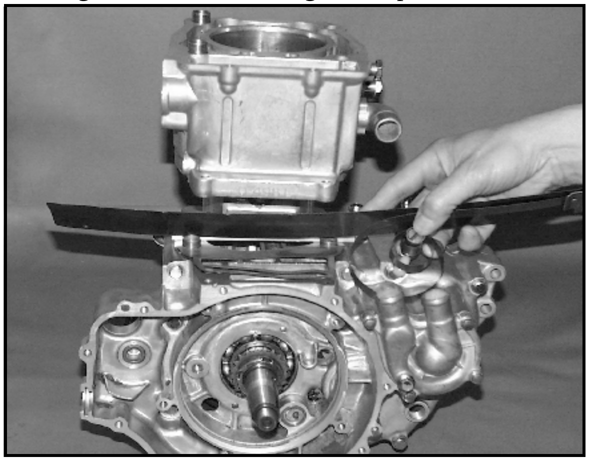


9. Apply clean engine oil to a ring compressor and install the compressor following manufacturers instructions.

CAUTION

Make sure the oil control ring upper rail tab is positioned properly in the notch of the piston. Verify all ring end gaps are correctly located.

10. Apply clean engine oil liberally to the cylinder bore and tapered area of the sleeve. Install the cylinder with a slight rocking motion until the rings are captive in the sleeve.



11. Remove the ring compressor and support block.
12. Push the cylinder downward until fully seated on the base gasket.
13. Apply a light film of oil to the threads and flange surface of the cylinder mounting bolts.
14. Install all four bolts finger tight. Rotate the engine and position the piston at BDC.

NOTE: If cam chain is installed, hold it up while rotating the engine to avoid damage to the chain, drive sprocket teeth, or tensioner blade.

15. Tighten the cylinder bolts in three steps in a criss cross pattern and torque to specifications.
16. Install the two 6 mm bolts and torque to specifications.

Cylinder Bolt Torque:

10 mm - 46 ft. lbs. (62 Nm)
6 mm - 6 ft. lbs. (8 Nm)

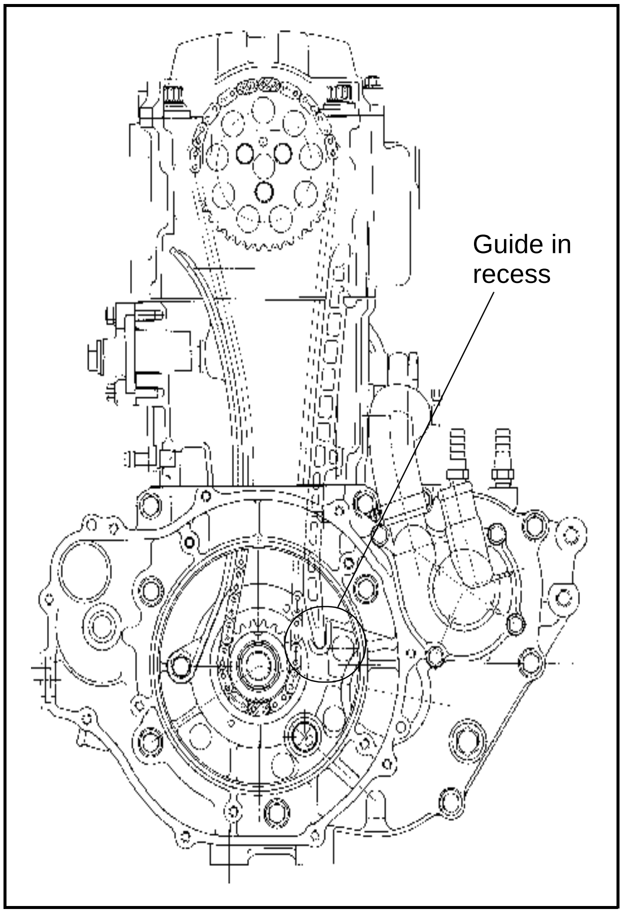
Cylinder Head Installation

Clean the gasket surfaces on the cylinder head and cylinder. Remove all traces of old gasket material. Refer to disassembly photos.

1. Install the cam chain tensioner guide. Be sure bottom end of guide is located properly in crankcase.
2. Install the two dowel pins and a new cylinder head gasket.
3. Place the cylinder head on the cylinder. Apply a film of engine oil to the cylinder head bolt threads and washers, and hand tighten the bolts.

The following procedure must be used to torque the cylinder head properly:

Torque all bolts evenly in a criss- cross pattern
***Torque bolts to 22 ft. lbs. (30 Nm)**
***Torque bolts to 51 ft. lbs. (70 Nm)**
***Loosen bolts evenly 180° (1/2 turn)**
***Loosen bolts again another 180° (1/2 turn)**
***Torque bolts to 11 ft. lbs. (15 Nm)**
***From this point, tighten bolts evenly 90° (1/4 turn)**
***Finally, tighten another 90° (1/4 turn)**
***Install two 6 mm bolts and torque to 6 ft. lbs. (8 Nm)**



Cam Chain/Camshaft Installation

Install the cam chain over the crankshaft.

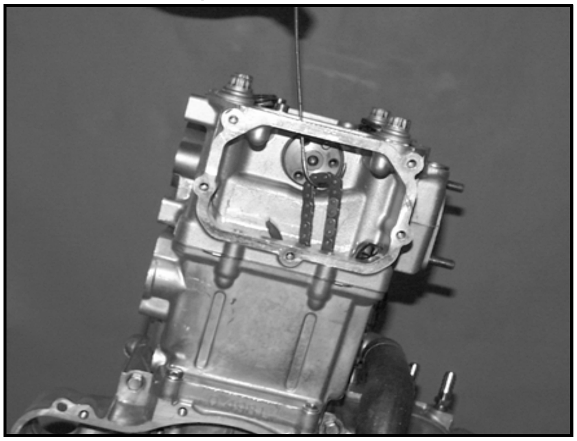
CAUTION

Serious engine damage may result if the camshaft is not properly timed to the crankshaft.

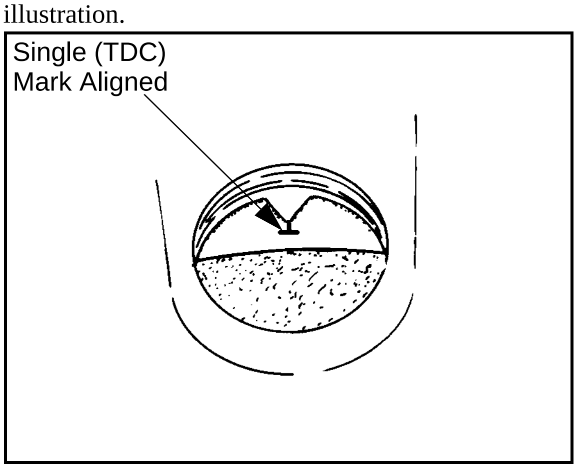
3

IMPORTANT CAMSHAFT TIMING NOTE: In order to time the camshaft to the crankshaft, the piston must be precisely located at Top Dead Center (TDC).

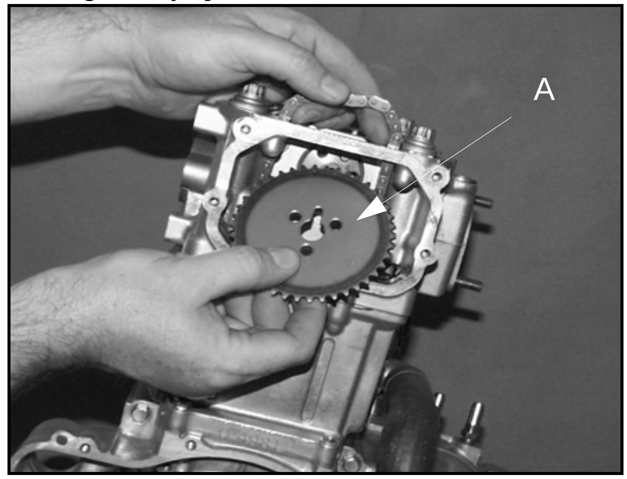
Camshaft Timing



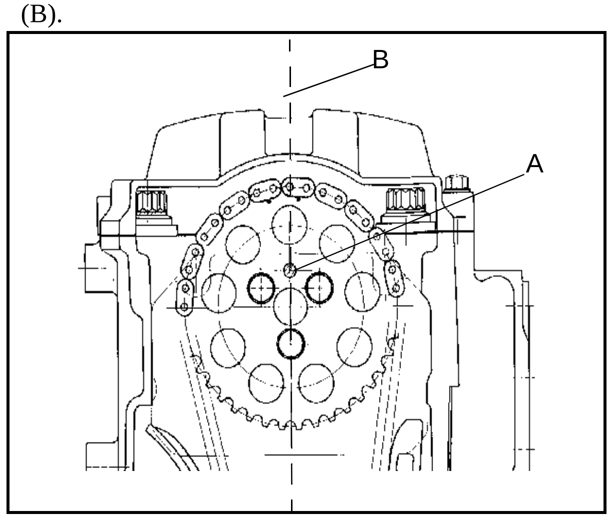
1. Apply Polaris Premium Starter Drive Grease (**PN 2871460**) to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil.
2. Install the camshaft with the lobes facing downward and the sprocket alignment pin facing upward.
3. Disconnect the wire from the cam chain and rotate the engine to align the single (TDC) timing mark (Top Dead Center) on the flywheel with the notch in the timing inspection window. Be sure to use the *single* TDC mark when installing the cam. Do not use the advance marks. See illustration.



4. Loop the cam chain on the cam sprocket with the dots on the sprocket facing outward and the alignment pin notch facing directly upward.

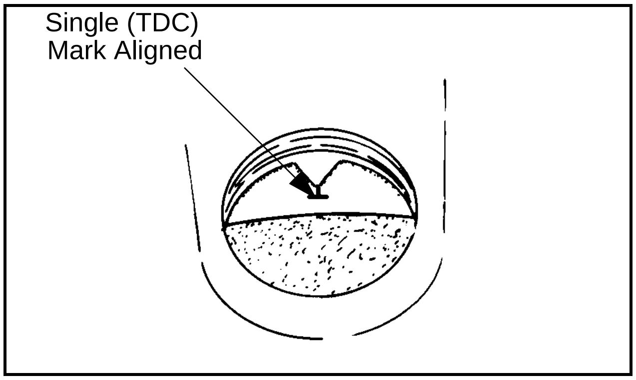


5. Before positioning the sprocket on the camshaft, check the position of the cam sprocket alignment pin. When the cam is positioned properly, the cam sprocket alignment pin (A) is directly in line with the crankshaft/camshaft centerline (B).



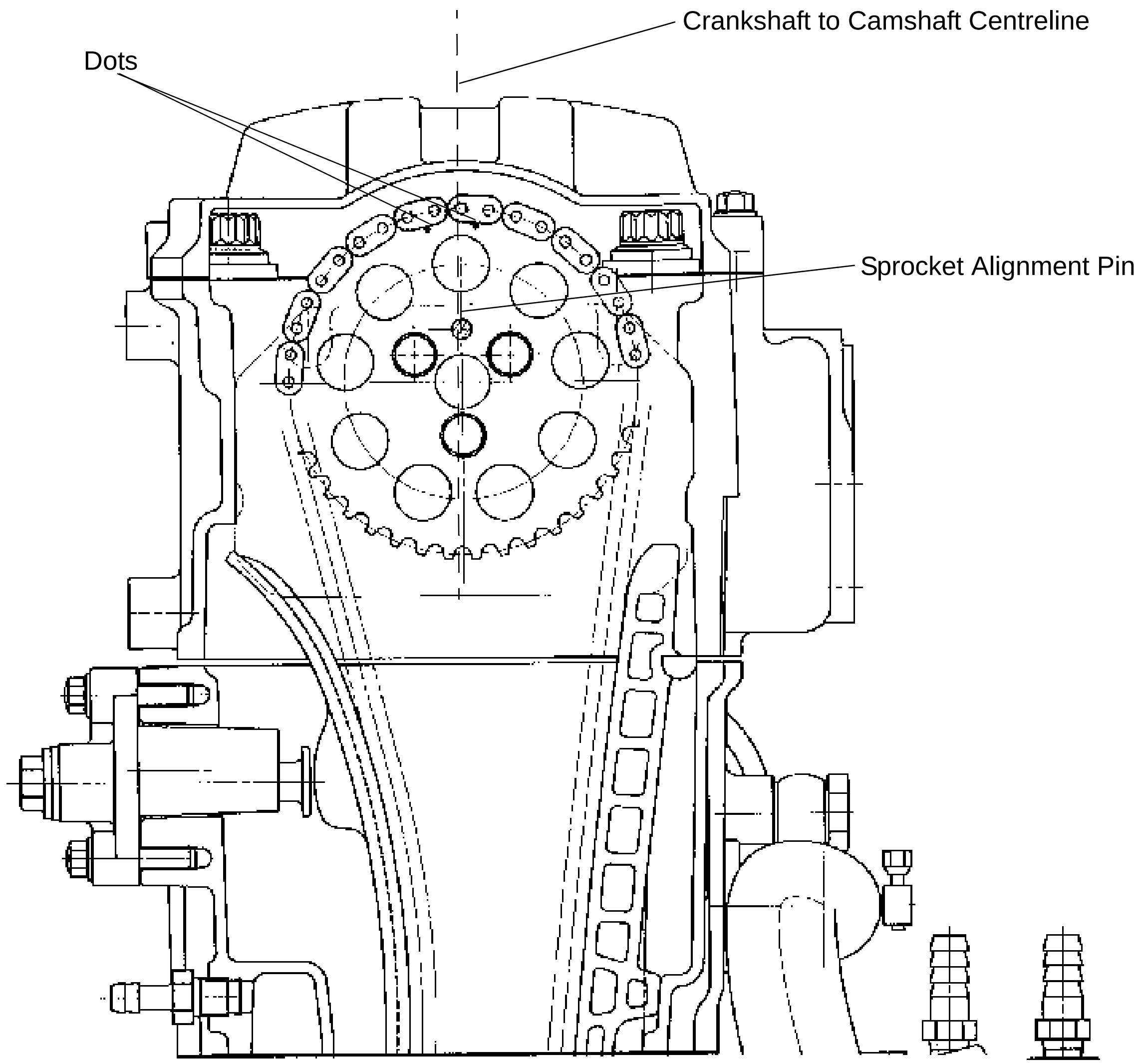
6. Install the sprocket on the camshaft. Apply Loctite™ 242 **(PN 2871949)** to the cam sprocket bolts and torque to specification.

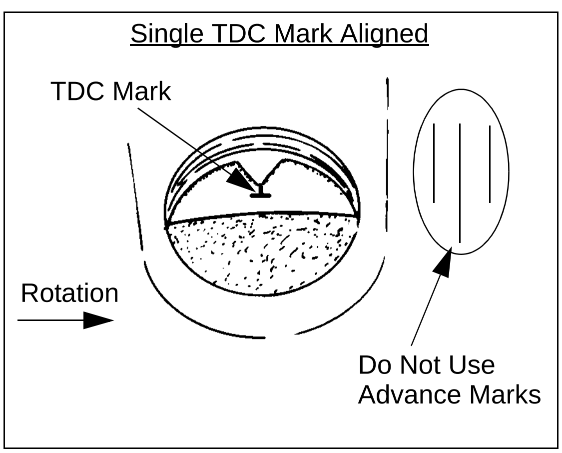
Cam Sprocket Bolt Torque:
6 ft. lbs. (8 Nm)



7. Verify TDC mark in timing inspection hole and alignment pin is directly in line with crankshaft to camshaft centerline. Refer to illustration.
8. Apply Crankcase Sealant **(PN 2871557)** to the camshaft end cap and install using a new O-Ring.
9. Check all cam timing marks to verify proper cam timing, and install the cam chain tensioner body with a new gasket.
10. After tensioner installation, rotate engine at least two revolutions and re-check marks/timing.

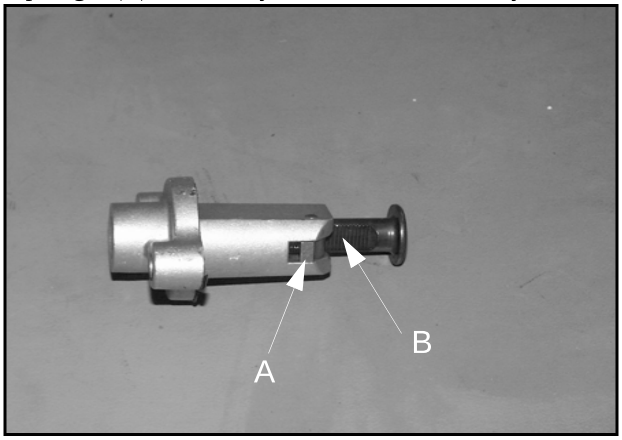
CAMSHAFT TIMING





Cam Chain Tensioner Installation

1. Release the ratchet pawl (A) and push the tensioner plunger (B) all the way into the tensioner body.



2. Install the tensioner body with a new gasket and tighten the bolts.

Tensioner Bolt Torque:
6 ft. lbs. (8 Nm)

3. Install the spring, new sealing washer, and tensioner plug.

Tensioner Plug Torque:
17 ft. lbs. (23 Nm)

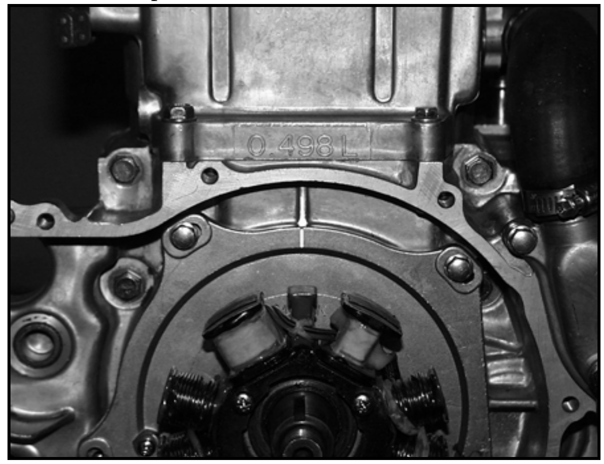
4. Slowly rotate engine two to three revolutions and re-check cam timing.

Stator, Flywheel and Starter Drive Installation

NOTE: The stator, flywheel, starter drive, and recoil can be assembled with the engine in the frame.

Stator

1. Apply a light film of grease to the crankshaft seal. Apply molybdenum disulfide grease or assembly lubricant to the crankshaft bushing.
2. Install a new O-Ring in the oil passage recess in the crankcase.
3. Apply 3 Bond 1215 **(PN 2871557)** or an equivalent sealer to the stator plate outer surface and install a new O-Ring.



4. Install the stator plate being careful not to damage the seal. Align timing reference marks on the plate and crankcase. Be sure the plate is fully seated.
   NOTE: This is a static timing mark. Strobe timing should be performed after start up.
5. Torque bolts evenly to specification.

Stator Plate Bolt Torque:
5-6.5 ft. lbs. (7-9 Nm)

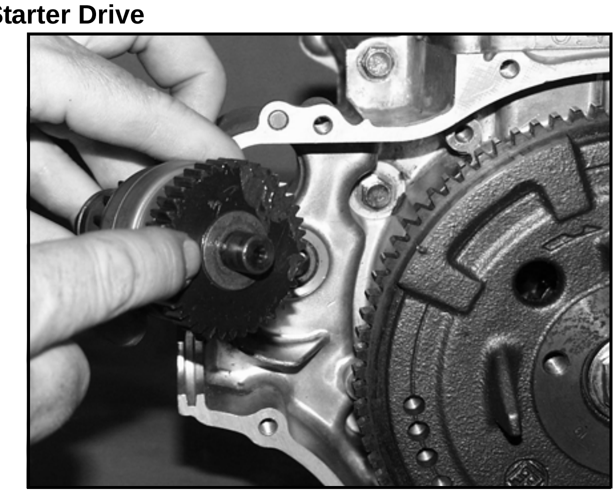
6. Seal stator wire grommet with Crankcase Sealant (**PN 2871557**) or equivalent sealer.

Flywheel

1. Install flywheel, washer, and nut. Torque flywheel to specification.

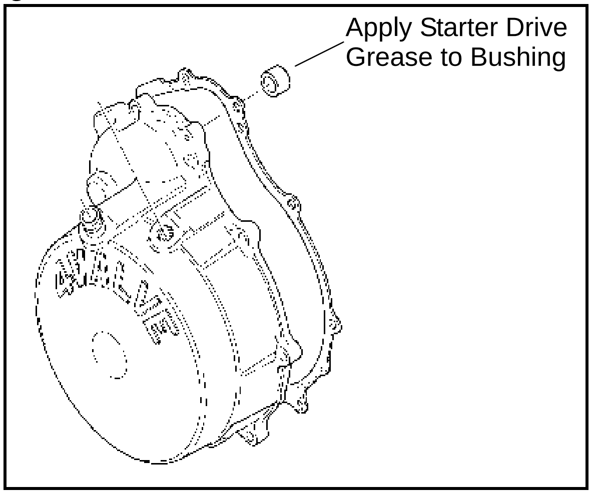
Flywheel Nut Torque:
58-72 ft. lbs. (78-98 Nm)

Starter Drive



1. Be sure the washer is positioned on the back of the drive

gear.



2. Apply starter drive grease to the drive bushing in the crankcase and all moving surfaces of the starter drive mechanism. Install the starter drive.
3. Install recoil housing gasket and recoil housing.

Starter Drive Grease:

(PN 2871460)

Rocker Shaft/Rocker Arm Assembly Installation

1. Assemble rocker arms, rocker shaft, and shaft supports.
2. Install and tighten rocker arm shaft locating bolt.
3. Apply starter drive grease to the cam lobes and cam follower surfaces.
4. Rotate the engine until the cam lobes are pointing downward.
5. Be sure the dowel pins are in place and install the rocker shaft assembly.
6. Apply a light film of engine oil to the threads of the bolts and tighten evenly.

Rocker Shaft Support Tower Bolt Torque:

9 ft. lbs. (12 Nm)

Rocker Shaft Locating Bolt Torque:

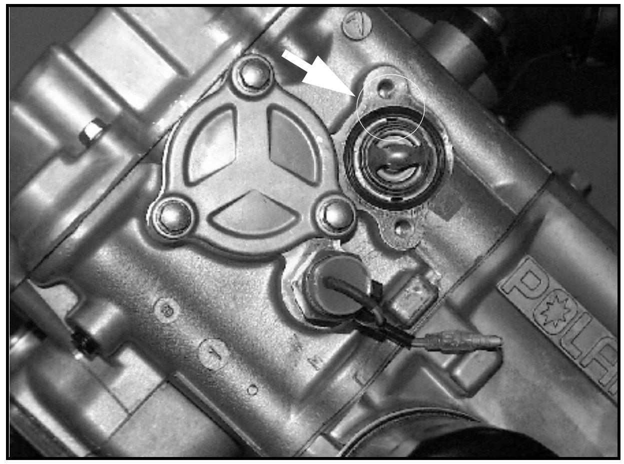
6 ft. lbs. (8 Nm)

7. Adjust valves according to the valve adjustment procedure found in Chapter 2, Maintenance.
8. Apply clean engine oil liberally to the valve springs, cam chain, rocker arms, and camshaft.
9. Place a new rocker cover gasket on the cylinder head and install the cover and bolts.

Rocker Cover Bolt Torque:

6 ft. lbs. (8 Nm)

Thermostat Installation



Install the thermostat with one of the air bleed holes positioned next to the upper thermostat cover bolt hole as shown.

Oil Pipes

Install the oil pipes with new sealing washers. Tighten all bolts evenly to specified torque.

Oil Pipe Bolt Torque:

20 ft. lbs. (27 Nm)

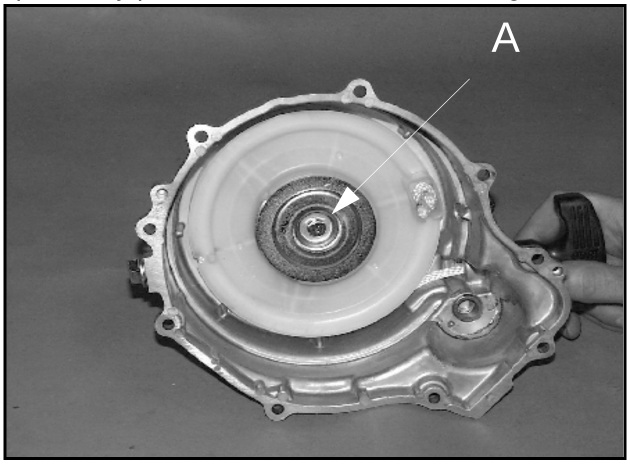
RECOIL

Recoil Disassembly/Inspection

CAUTION

The recoil is under spring tension. A face shield and eye protection is required during this procedure.

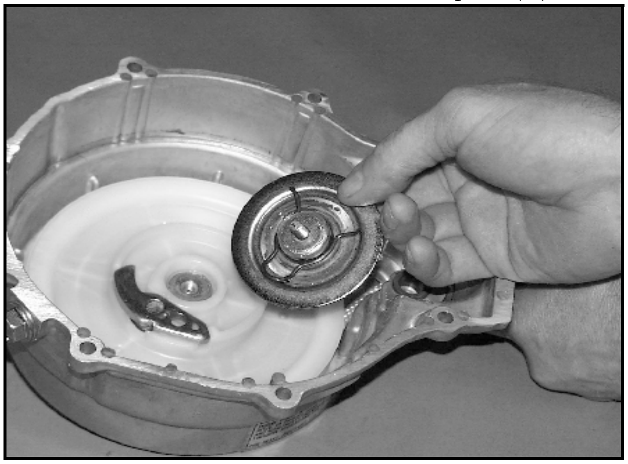
Replace any parts found to be worn or damaged.



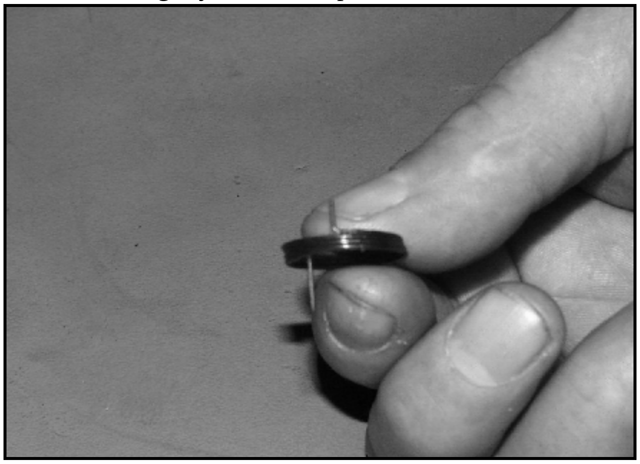
1. Remove bolts and recoil from the engine.
2. Pull recoil rope (if applicable) so it is extended approximately 12-18" (30-46cm). Check handle c-ring for proper tension, and the handle for cracks or damage which may allow water or dirt to enter the recoil housing through the rope.
3. Remove handle from the rope and allow spring tension on recoil to relax.

NOTE: The handle must seal tightly on the recoil housing to prevent water from entering.

4. Remove center bolt from recoil friction plate (A).



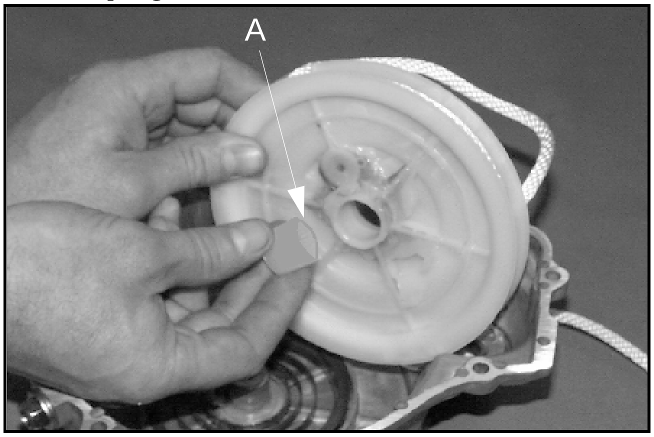
5. Inspect plate for wear or damage. Inspect plate friction spring for wear, damage, and proper tension. The spring should fit tightly on friction plate.



6. Remove ratchet pawl with spring and inspect. Replace spring or ratchet pawl if worn, broken, or damaged.

NOTE: Long arm of spring engages reel. Short end against pawl.

7. Hold reel firmly in housing. Pull rope handle until 12-18" (30-46cm) of rope is exposed, and hold reel in place.
8. Place rope in notch on outer edge of reel. Release tension on hub and allow reel to unwind approximately 6-7 turns until spring tension is released.

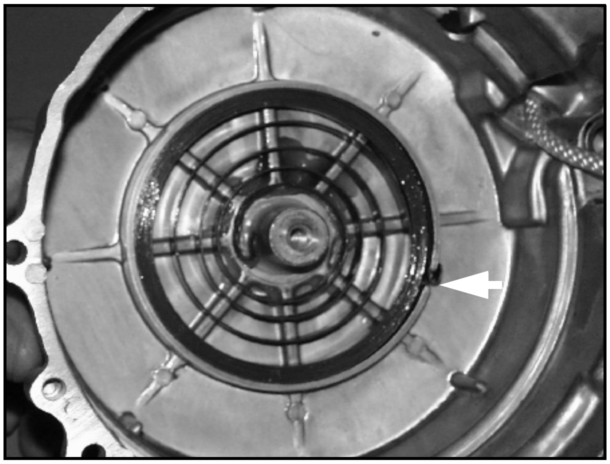


9. Slowly and carefully remove reel from recoil housing making sure the spring remains in the housing. Inspect the reel hub and bushing (A) for wear.
10. Unwind rope and inspect for cuts or abrasions.
11. Inspect drive tab on hub return spring for damage. To remove hub return spring, hold outer coils in place with one hand and slowly remove spring one coil at a time from the inside out.
12. Pull knot out of recoil reel. Untie knot. Remove rope from reel.

Recoil Assembly

CAUTION

Be sure to wear a face shield and eye protection when performing this procedure.



To install a new spring:

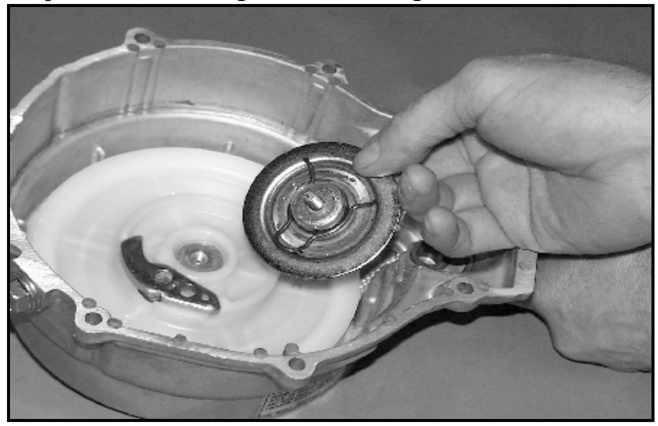
1. Place spring in housing with the end positioned so the spring spirals inward in a counterclockwise direction. See photo at right.
2. Hold spring in place and cut retaining wire.

To reinstall an old spring:

1. Hook outer tab in place in recoil housing and wind spring in a counterclockwise direction one coil at a time while holding the installed coils in place.
2. Lubricate the spring with light lubricant such as Premium All Season Grease **(PN 2871423)**.

To complete recoil assembly:

1. Route rope through guide bushing in recoil housing and into reel. Tie a secure knot in end of the rope.
2. Wind rope counterclockwise onto the reel, as viewed from ratchet side of reel.
3. Lock rope into notch on outer edge of reel.
4. Apply a small amount of grease or equivalent to the center post of the housing and the bushing.



5. Install reel into housing making sure the spring drive tab on the reel engages the spring and the reel is fully seated in the housing.
6. Apply downward pressure on the reel and rotate counterclockwise approximately 6-7 turns to pre-wind the spring. Continue rotating counterclockwise until rope on outer edge aligns with rope guide bushing.
7. Release rope from notch and allow reel to rewind completely. If more pre-wind is required, place rope in notch and add additional turns of pre-wind.
8. Install ratchet pawl and return spring, with long leg of spring engaged in reel.
9. Reinstall friction plate.

NOTE: The friction plate must be positioned with both end tabs of the friction spring opposite the ratchet pawl.

10. Torque friction plate retaining bolt to 5-6 ft. lbs. (7-9 Nm).
11. Reinstall recoil housing using a new gasket. Seal stator wire harness grommet with RTV silicone.

TROUBLESHOOTING

Spark Plug Fouling

- Spark plug cap loose or faulty
- Choke cable adjustment or plunger/cable sticking
- Foreign material on choke plunger seat or plunger
- Incorrect spark plug heat range or gap
- Carburetor inlet needle and seat worn
- Jet needle and/or needle jet worn or improperly adjusted
- Excessive carburetor vibration (loose or missing needle jet locating pins)
- Loose jets in carburetor or calibration incorrect for altitude/temperature
- Incorrect float level setting
- PVT system calibrated incorrectly or components worn or mis-adjusted
- Fuel quality poor (old) or octane too high
- Low compression
- Restricted exhaust
- Weak ignition (loose coil ground, faulty coil, stator, or ETC switch)
- ETC switch mis-adjusted
- Restricted air filter (main or pre-cleaner) or breather system
- Improperly assembled air intake system
- Restricted engine breather system
- Oil contaminated with fuel
- Restricted oil tank vent

Engine

Engine Turns Over But Fails to Start

- No fuel
- Dirt in fuel line or filter
- Fuel will not pass through fuel valve
- Fuel pump inoperative/restricted
- Tank vent plugged
- Carb starter circuit
- Engine flooded
- Low compression (high cylinder leakage)
- No spark (Spark plug fouled)

Engine Does Not Turn Over

- Dead battery
- Starter motor does not turn
- Engine seized, rusted, or mechanical failure

Engine Runs But Will Not Idle

- Restricted carburetor pilot system
- Carburetor misadjusted
- Choke not adjusted properly
- Low compression
- Crankcase breather restricted

Engine Idles But Will Not Rev Up

- Spark plug fouled/weak spark
- Broken throttle cable
- Obstruction in air intake
- Air box removed (reinstall all intake components)
- Incorrect or restricted carburetor jetting
- ETC switch limiting speed
- Reverse speed limiter limiting speed
- Carburetor vacuum slide sticking/diaphragm damaged
- Incorrect ignition timing
- Restricted exhaust system

Engine Has Low Power

- Spark plug fouled
- Cylinder, piston, ring, or valve wear or damage (check compression)
- PVT not operating properly
- Restricted exhaust muffler
- Carburetor vacuum slide sticking/diaphragm damaged
- Dirty carburetor

Piston Failure - Scoring

- Lack of lubrication
- Dirt entering engine through cracks in air filter or ducts
- Engine oil dirty or contaminated

Excessive Smoke and Carbon Buildup

- Excessive piston-to-cylinder clearance
- Wet sumping
- Worn rings, piston, or cylinder
- Worn valve guides or seals
- Restricted breather
- Air filter dirty or contaminated

Low Compression

- Decompressor stuck
- Cylinder head gasket leak
- No valve clearance or incorrectly adjusted
- 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

Backfiring

- ETC or speed limiter system malfunction
- Fouled spark plug or incorrect plug or plug gap
- Carburetion faulty - lean condition
- Exhaust system air leaks
- Ignition system faulty:
  Spark plug cap cracked/broken
  Ignition coil faulty
  Ignition or kill switch circuit faulty
  Ignition timing incorrect
  Sheared flywheel key
- Poor connections in ignition system
- System wiring wet
- Valve sticking
- Air leaks in intake
- Lean condition

Cooling System

Overheating

- Low coolant level
- Air in cooling system
- Wrong type of coolant
- Faulty pressure cap or system leaks
- Restricted system (mud or debris in radiator fins or restriction to air flow, passages blocked in radiator, lines, pump, or water jacket)
- Lean mixture (restricted jets, vents, fuel pump or fuel valve)
- Fuel pump output weak
- Restricted radiator (internally or cooling fins)
- Water pump failure
- Cooling system restriction
- Cooling fan inoperative or turning too slowly (perform current draw test)
- Ignition timing misadjusted
- Low oil level
- Spark plug incorrect heat range
- Faulty hot light circuit
- Thermostat stuck closed or not opening completely

Temperature Too Low

- Thermostat stuck open

Leak at Water Pump Weep Hole

- Faulty water pump mechanical seal (coolant leak)
- Faulty pump shaft oil seal (oil leak)

CHAPTER 4

FUEL SYSTEM

CHAPTER 4

FUEL INJECTION

SPECIAL TOOLS

Part Numbers / Descriptions

Table 4-1:

PART NUMBER	TOOL DESCRIPTION
PU-47063	Polaris EFI Diagnostic Software (Digital Wrench™)
PU-43506	Fuel Pressure Test Kit
PU-47476	Fuel Pressure Test Valve Kit
2201519	Throttle Position Sensor Tester
PU-47471	Digital Wrench™ SmartLink Kit

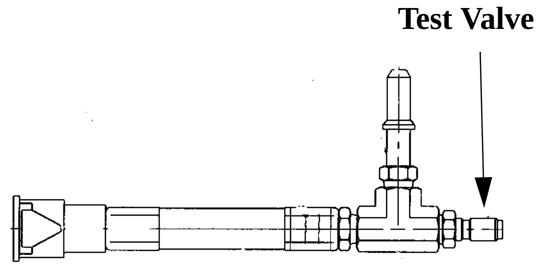
WARNING

- Gasoline is extremely flammable and explosive under certain conditions.
- EFI components are under high pressure. Verify system pressure has been relieved before disassembly.
- Never drain the fuel system when the engine is hot. Severe burns may result.
- Do not overfill the tank. The tank is at full capacity when the fuel reaches the bottom of the filler neck. Leave room for expansion of fuel.
- Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.
- Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.
- If you get gasoline in your eyes or if you should swallow gasoline, seek medical attention immediately.
- If you spill gasoline on your skin or clothing, immediately wash with soap and water and change clothing.
- Always stop the engine and refuel outdoors or in a well ventilated area.

Fuel Pressure Tester - PU-43506

IMPORTANT: The EFI fuel system remains under high pressure, even when the engine is not running. Before attempting to service any part of the fuel system, the pressure must be relieved. The pressure adapter has an integrated relief valve. Connect to the test valve and release the pressure.

Fuel Pressure Test Valve - PU-47476

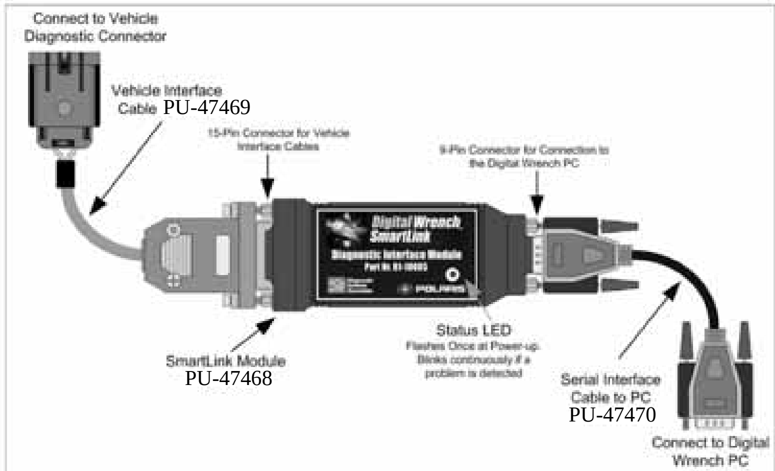


Polaris EFI Diagnostic Software Digital Wrench™ - PU-47063

This dealer-only software installs on laptop computers equipped with a CD drive and serial port connection, and is designed to replace multiple shop tools often used to test EFI components. It also includes step-by-step diagnostic procedures to aid technician repair and troubleshooting.

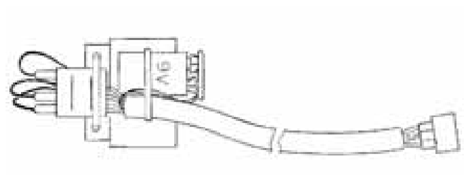
Digital Wrench™ SmartLink Module Kit - PU-47471

Available to Polaris dealers through our tool supplier, SPX (1-800-328-6657) This module kit contains the necessary cables and hardware to communicate between the vehicle ECM and the Digital Wrench diagnostic software. Polaris dealers can also order separately: SmartLink Module PU-47468, Vehicle Interface Cable PU-47469 and PC Interface Cable PU-47470. For use on all 15-pin connector-based Polaris EFI systems.



Throttle Position Sensor Tester - 2201519

This tester allows the use of a digital multi-meter to test TPS function as well perform initialization procedures. Polaris Dealers can order special tools from SPX.



EFI SERVICE NOTES

General Service Information

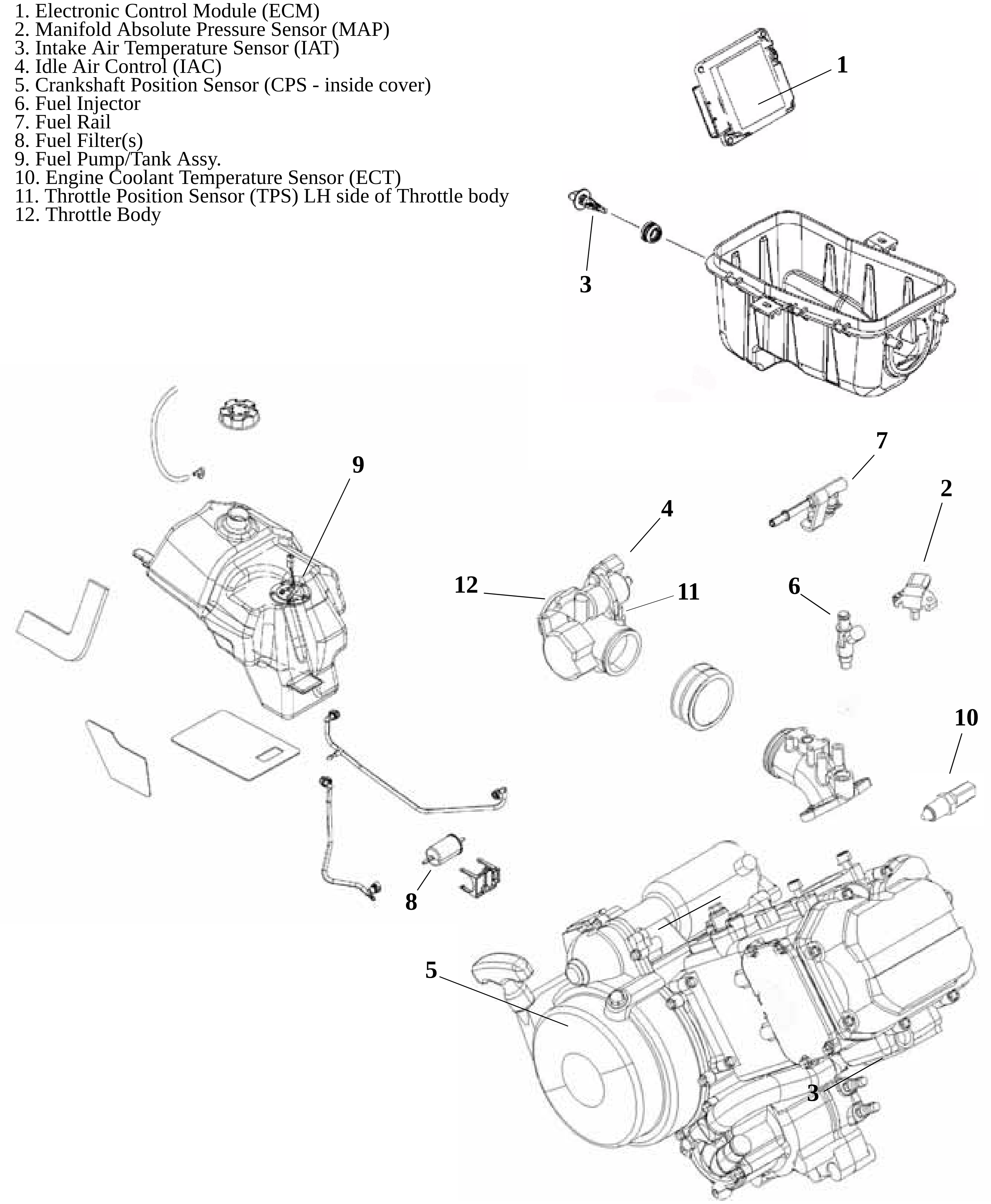
- For more convenient and accurate testing of EFI components, it is recommended dealers utilize the Polaris Diagnostic Software (dealer only), or limited testing may be done manually using the procedures provided.
- **80% of all EFI problems are caused by wiring harness connections. Follow a common sense approach when diagnosing a potential EFI issue:**

1. Disconnect the harness at the suspected sensor connector.
2. Inspect the connector ends for damage or contamination. If damaged, repair; if contaminated, clean. Reconnect and check function.
3. If the problem persists, perform a sensor bench test according to the specific sensor requirements.
4. If the sensor bench tests pass, disconnect the connector at the ECM and perform a continuity check between the sensor connector and the appropriate pin at the ECM connector (all connections for that sensor). Wiring resistance should be less than five (5) ohms.
5. If the resistance is high (or open), a wiring harness inspection is dictated (including a thorough inspection of the ECM connector for contamination or damage).
6. If the sensor passes and the wiring passes inspection, and reconnecting the ECM does not resolve the issue, then at that point a known-good ECM (from another 500 EFI ATV) could be connected and tested for problem resolution.

- For the purpose of troubleshooting difficult running issues, a known-good ECM from a same-model Polaris 500 ATV EFI system may be used without damaging system or engine components.
- Do not use dielectric grease on sealed connectors (connectors with a rubber grommet), as it may displace the rubber seal and allow contaminants to enter the connector.
- Never attempt to service any fuel system component while engine is running or ignition switch is turned to "on".
- **USE CARE when removing or installing the ECM connector, as well as all other harness connections on the ATV.** Dirt, even in small quantities, can cause significant problems. Clean connectors thoroughly before opening to prevent dirt from entering. Properly connect and disconnect the ECM harness to minimize damage to the connector pins and locking mechanism.
- Do not use compressed air if the EFI 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.
- 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 ECM.
- Do not allow the battery cables to touch opposing terminals. When connecting battery cables attach the positive (+) cable to positive (+) battery terminal first, followed by negative (-) 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 quick-start battery charger to start the engine.
- Always unplug ECM from the wire harness before performing any welding on the ATV.

EFI SYSTEM EXPLODED VIEW

1. Electronic Control Module (ECM)
2. Manifold Absolute Pressure Sensor (MAP)
3. Intake Air Temperature Sensor (IAT)
4. Idle Air Control (IAC)
5. Crankshaft Position Sensor (CPS - inside cover)
6. Fuel Injector
7. Fuel Rail
8. Fuel Filter(s)
9. Fuel Pump/Tank Assy.
10. Engine Coolant Temperature Sensor (ECT)
11. Throttle Position Sensor (TPS) LH side of Throttle body
12. Throttle Body



EFI SYSTEM

Component Locations/Identification

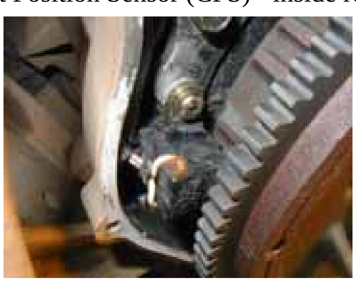
1. Electronic Control Module (ECM)

2. Manifold Absolute Pressure Sensor (MAP)

3. Intake Air Temperature Sensor (IAT)

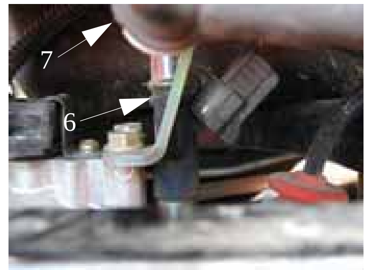
4. Idle Air Control (IAC)

5. Crankshaft Position Sensor (CPS) - inside recoil cover



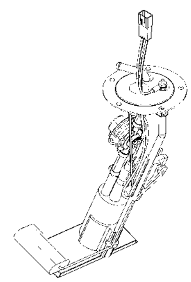
6. Fuel Injector

7. Fuel Rail

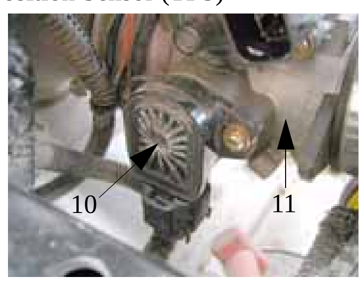


8. Fuel Filters (1 located in tank, 1 under front cab)

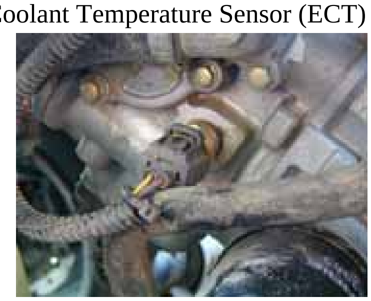
9. Fuel Pump / Regulator / Gauge Sender Assembly (located In tank as an assembly)



10. Throttle Position Sensor (TPS)

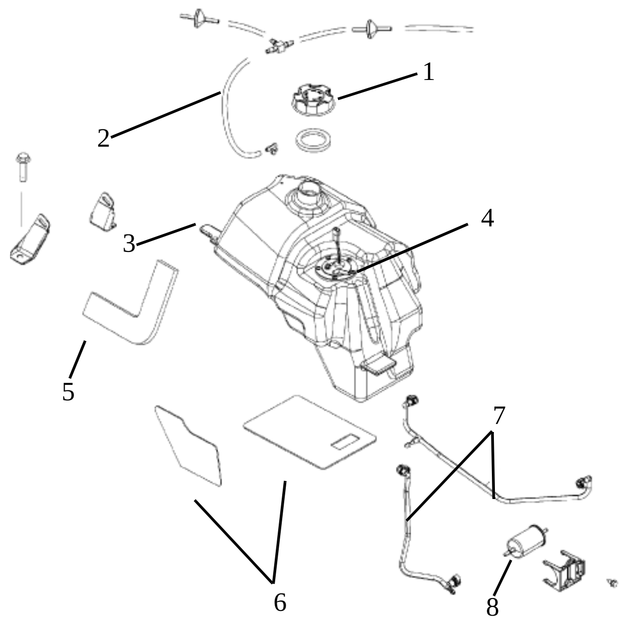


11. Throttle Body
12. Wire Harness Assembly
13. Engine Coolant Temperature Sensor (ECT)



FUEL TANK

Exploded View



1. Cap 2. Tank Vent In/Out 3. Tank Mount 4. Fuel Pump/ Tank Assembly 5. Seat Foam 6. Protective Foil 7. Fuel Lines 8. Fuel Filter

Fuel Flow

Fuel Tank → * Fuel Filter (30 micron) → * Fuel Pump / Pressure Regulator Unit → Fuel Tank

* Fuel Pump / Pressure Regulator Unit → External Fuel Filter - 10 micron → Fuel Supply Rail → Injectors

* component located in fuel tank

ELECTRONIC FUEL INJECTION

General Information

The Electronic Fuel Injection (EFI) system is a complete engine fuel and ignition management design. This system contains the following principal components:

- Fuel Pump
- Fuel Rail
- Fuel Line(s)
- Fuel Filter(s)
- Fuel Injector
- Pressure Regulator
- Throttle Body / Intake Manifold
- Engine Control Module (ECM)
- Ignition Coils
- Engine Coolant Temperature Sensor (ECT)
- Throttle Position Sensor (TPS)
- Crankshaft Position Sensor (CPS)
- Manifold Absolute Pressure Sensor (MAP)
- Idle Air Control (IAC)
- Intake Air Temperature Sensor (IAT)
- Wire Harness Assembly
- Check Engine Light (MIL)

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 Visteon Engine Control Module (ECM) which manages system operation, determining the best combination of fuel mixture and ignition timing for the current operating conditions.

An in-tank electric fuel pump is used to move fuel from the tank through the fuel line and in-line fuel filter. The in-tank fuel pressure regulator maintains a system operating pressure of 39 psi and returns any excess fuel to the tank. At the engine, fuel is fed through the fuel rail and into the injector, which injects into the intake port. The ECM controls the amount of fuel by varying the length of time that the injectors are "on." This can range from 1.5-8.0 milliseconds depending on fuel requirements. The controlled injection of the fuel occurs every other crankshaft revolution, or once for each 4-stroke cycle. The total amount of fuel needed for one firing of a cylinder is injected during each cycle. When the intake valve opens, the fuel/air mixture is drawn into the combustion chamber, ignited and burned.

The ECM controls the amount of fuel being injected and the ignition timing by monitoring the primary sensor signals for air temperature, manifold absolute pressure, engine temperature, engine speed (RPM), and throttle position (load). These primary signals are compared to the programming in the ECM computer chip, and the ECM adjusts the fuel delivery and ignition timing to match the values.

During operation the ECM 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 ECM.

Initial Priming / Starting Procedure

NOTE: The Injection system must be purged of all air prior to the initial start up, and/or any time the system has been disassembled.

If the EFI system is completely empty of fuel or has been disassembled and repaired:

1. Cycle the key switch from “OFF” to “ON” 6 times, waiting for approximately 3 seconds at “ON” and 5 seconds at “OFF” in sequence to allow the fuel pump to cycle and shut down.
2. Once step 1 is completed, turn the key switch to “START” until the engine starts or 5 seconds has passed.
3. If the engine failed to start, repeat step 1 for 2 more cycles and attempt to start the engine.

If the engine fails to start, a problem may still exist, and should be diagnosed.

NOTE: Accurate testing of EFI components is recommended utilizing the Polaris Diagnostic Software (dealer only).

FUEL LINES

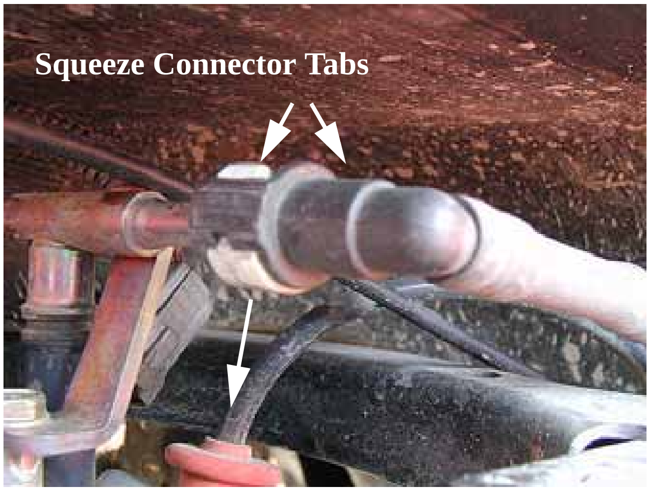
Quick Connect Removal/Installation

CAUTION

Verify fuel system has been depressurized before performing this procedure.

Sportsman 500 EFI models use quick connect fuel lines. Refer to the steps for fuel line removal / installation:

1. Thoroughly clean the connector. Place a shop towel around the fuel line to catch any dripping fuel. Squeeze the connector tabs together and push the locking tab out.
2. Pull out on the fuel line for removal.
3. To install the line, verify the connector and nipple are clean and free of debris.
4. Snap the fuel line back over the nipple, verify the connector tabs snap back into place.



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ELECTRONIC CONTROL MODULE (ECM)

Operation Overview

The ECM 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 ECM. Signals to the ECM include: ignition (on/off), crankshaft position and speed (RPM), throttle position, engine coolant temperature, air temperature, intake manifold air pressure and battery voltage.

The ECM compares the input signals to the programmed maps in its memory and determines the appropriate fuel and spark requirements for the immediate operating conditions. The ECM then sends output signals to set the injector duration and ignition timing.

During operation, the ECM continually performs a diagnostic check of itself, each of the sensors, and system performance. If a fault is detected, the ECM turns on the Malfunction Indicator Light (MIL) (Check Engine Light) on the speedometer and stores the fault code in its fault memory. A technician can access the stored fault codes manually using a “blink code” diagnosis flashed out through the instrument cluster or using the Digital Wrench Diagnostic Software. The ECM requires a minimum of 7.0 volts to operate. The memory in the ECM is operational the moment the battery cables are connected. Depending on the significance or severity of the fault, normal operation may continue, or a "Fail-Safe" operation may be initiated. In the event a “Fail-Safe” mode occurs, a base fueling table is used to determine the injector pulse width. This strategy will not compensate for engine temperature, intake air temperature, or altitude change, but instead operates based on the latest valid information taken from those sensors.

To prevent engine over-speed and possible failure, an RPM-limiting feature is programmed into the ECM. If the maximum RPM limit (7000) is exceeded, the ECM will suppress the ignition signal or injection signal. This process repeats itself in rapid succession, limiting operation to the preset maximum.

Sportsman 500 EFI RPM Limit:

This EFI system utilizes 2 methods -

“Hard” Limit - Ignition suppression occurs when RPM peaks rapidly:

- High: 7000 RPM
- Returns: 6900 RPM

“Soft” Limit - Injector suppression occurs when RPM reaches peak gradually:

- High: 7000 RPM
- Returns: 6900 RPM

RPM limits may vary slightly under operating conditions.

ECM Replacement

1. Remove the 2 retaining screws holding the ECM. *NOTE: Retain upper-left spacer located behind the ECM for re-installation.*
2. With the ignition turned off, disconnect the wire harness by pulling the black slider away from the ECM. Once the slider is fully extended, pull the connector from the ECM, using great care not to damage the harness connector or locking mechanism. NOTE: Should the black slider become broken, replacement parts are available.
3. To install, reverse the procedures, DO NOT apply dielectric grease to the connector, as it is a sealed connector. Install the upper-left retaining screw spacer and screws. Tighten screws to **10 in. lbs. (1.1 Nm)**.

ECM Service

Never attempt to disassemble the ECM. 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 ECM are pre-set. No internal servicing or readjustment may be performed. If a problem is encountered, and you determine the ECM to be faulty, contact the Polaris Service Department for specific handling instructions. Do not replace the ECM without factory authorization.

The relationship between the ECM and the throttle position sensor (TPS) is very critical to proper system operation. If the TPS is faulty, or the mounting position of the TPS is altered, the TPS must be re-initialized.

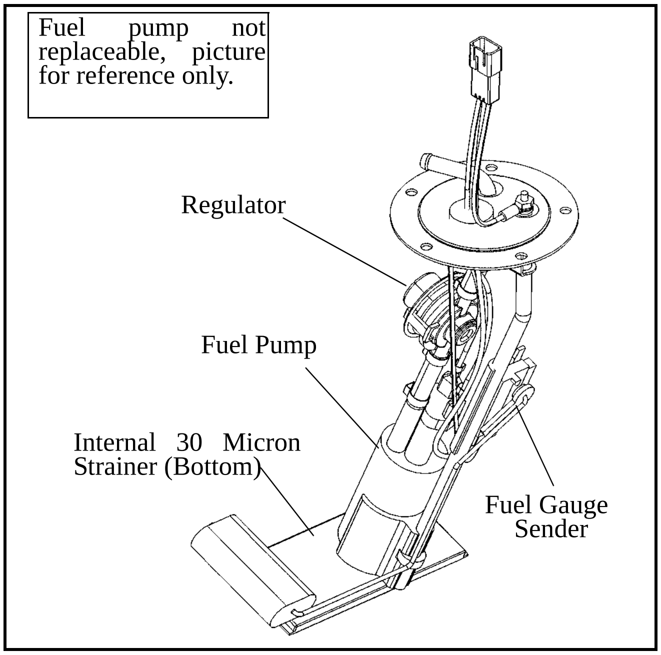
For the purpose of troubleshooting, a known-good ECM from a same-model Polaris 500 ATV EFI may be used without system or engine component damage.

FUEL PUMP ASSEMBLY

Operation / Testing

NOTE: All EFI units utilize quick connect fuel lines.

An electric fuel pump assembly is used to transfer fuel to the EFI system from inside the fuel tank. This assembly includes the fuel pump, regulator and fuel gauge sender. The pump is rated for a minimum output of 25 liters per hour at 39 psi and has a non-serviceable internal 30-micron filter. In addition, the pump has a replaceable 10-micron filter attached to the pump outlet, which is located under the strut mount.



When the key switch is turned to "ON", the ECM activates the fuel pump, which pressurizes the system for start-up.

The ECM 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, or
- 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.

NOTE: FUEL GAUGE SENDER TEST - To test fuel gauge sender function, refer to Chapter 10 in this service manual.

FUEL PUMP TEST

NOTE: The fuel pump/tank assembly is a non-serviceable assembly and must be replaced if determined to be faulty. If a fuel delivery problem is suspected, make certain the filters are not plugged, that the pump is being activated through the ECM, 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, a reduction of fuel pressure may occur resulting in a lean starting condition. If required, testing of the fuel pump and circuitry may be conducted.

CAUTION

Check the fuel test valve for any possible fuel seepage after performing any tests or procedures. 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. Insert the fuel test valve adapter **PU-47476.** Connect the pressure hose of the Polaris pressure tester (**PN PU-43506**) to the test valve. Route the clear hose into a portable gasoline container or the equipment fuel tank.

2. Turn on the key switch to activate the pump and check the system pressure on the gauge. If system pressure of 39 psi ± 3 is observed, the ignition switch, ECM, 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 Pump Pressure - 39 psi ± 3

NOTE: If the pressure is too high or too low, replace the fuel pump assembly.

3. If the pump did not activate (Step 2), disconnect the plug from the fuel pump. Connect a DC voltmeter across terminals "A" and "C" in the plug, turn on the key switch and observe if a minimum of 7 volts is present. If voltage is between 7 and 14, turn key switch off and connect an ohmmeter between the terminals "A" and "C"' on the pump to check for continuity.

NOTE: If there was no continuity between the pump terminals, replace the fuel pump/tank assembly.

NOTE: If the voltage is below 7Vdc, test the battery, ignition switch, wiring harness and ECM.

4. If voltage at the plug was good, and there was continuity across the pump terminals, reconnect the plug to the pump, making sure you have good, clean connections. Turn on the key switch and listen for the pump to activate.

NOTE: If the pump starts, repeat steps 1 and 2 to verify correct pressure.

NOTE: If the pump still does not operate, check for correct ECM operation by plugging in a known-good ECM.

NOTE: If the pump still does not operate, replace the pump/tank assembly.

Fuel Pump / Tank Assembly Replacement

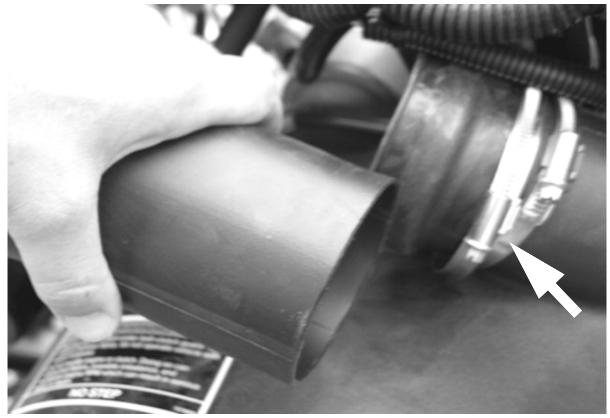
NOTE: All EFI units utilize quick connect fuel lines.

WARNING

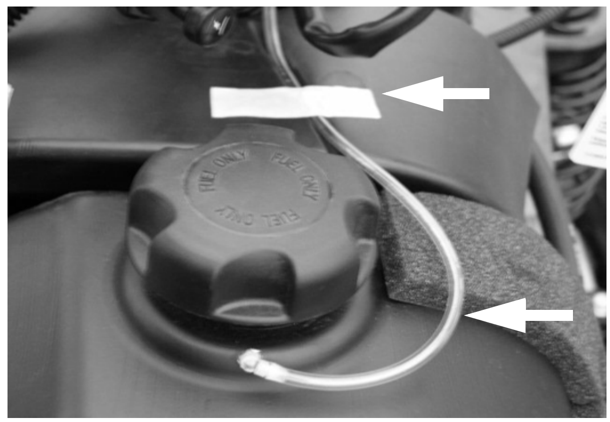
Always wear safety goggles when working with high pressure or flammable fluids. Failure to do so could result in serious injury or complications.

NOTE: The fuel pump cannot be replaced as an individual part, the entire fuel pump and fuel tank is replaced as an assembly. Refer to your parts book for the proper part number.

1. Disconnect the negative battery cable.
2. Remove the side panels and front cab assembly. Refer to "COVER PANEL REMOVAL" in Chapter 5 for details.
3. Remove the clamps on the PVT intake duct and remove the PVT duct.



4. Remove the gas tank cover vent hoses. Be sure to properly route the vent hoses upon reassembly.



5. With all the body panels removed from the front of the ATV and the gas tank exposed, disconnect the pump wiring harness.

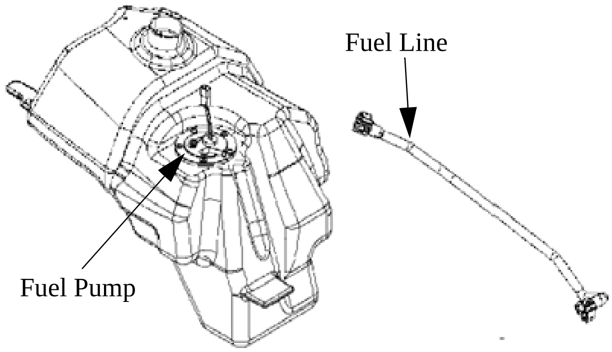
WARNING

Wear safety goggles while performing this procedure, failure to do so could result in serious injuries.

6. Relieve the fuel pressure at the fuel test valve.

7. Loosen the fuel tank hose and pull the fuel line from the tank.

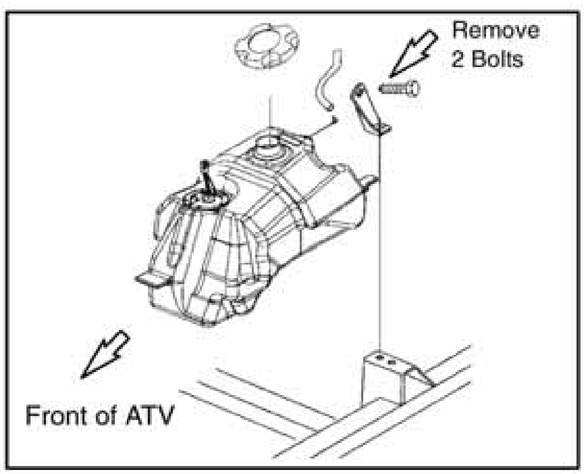
NOTE: A small amount of fuel may come out of the fuel line or tank. Plug the fuel line and tank inlet or use a shop towel during removal.



⚠ CAUTION

Check the fuel test valve for any possible fuel seepage after performing any tests or procedures. 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.

8. Remove the air box cover and remove the two gas tank mounting bolts at the rear of the gas tank.



9. Carefully pull the fuel tank out of the frame. Keep the fuel tank horizontal during removal, this will keep the fuel in the tank from spilling out the top inlet.

Fuel Tank Installation

1. Reinstall the tank assembly.
2. Reconnect the sender wiring harness and route the harness properly. Install the fuel line(s) and verify they are secure.
3. Reinstall the two fuel tank mounting bolts at back of tank.
4. Reinstall the PVT intake duct, gas tank vent line, front cab assembly, and side panels.

NOTE: Properly route the gas tank vent lines, use tape to secure the vent line in place. (See Pic 1).

5. Reconnect the negative battery cable. Test the sender for proper operation.

FUEL PRESSURE REGULATOR

General Information

The fuel pressure regulator maintains the required operating system pressure of 39 psi + 3psi. A rubber-fiber diaphragm divides the regulator into two separate sections, the fuel chamber and the pressure regulating chamber. The pressure regulating spring presses against the valve holder (part of the diaphragm), pressing the valve against the valve seat. The combination of atmospheric pressure and regulating spring tension equals the desired operating pressure. Any time the fuel pressure against the bottom of the diaphragm exceeds the desired (top) pressure, the valve opens, relieving the excess pressure, returning the excess fuel back to the tank.

Fuel Pressure Regulator Test

Refer to the “FUEL PUMP TEST” procedure.

Fuel Pressure Regulator Replacement

The regulator is a sealed, non-serviceable assembly. If it is faulty, the pump assembly must be replaced. Refer to the Fuel Pump/Tank Assembly Replacement procedure.

FUEL FILTERS

General Information

NOTE: All EFI units utilize quick connect fuel lines.

EFI Engines use a non-serviceable, high-volume, high-pressure, 30-micron internal fuel pump filter and a replaceable 10-micron, in-line fuel filter. Only the 10-micron filter is replaceable.

Fuel Filter Service

In line filter replacement is recommended every 2 years of operation or more frequently under extremely dusty, dirty conditions. Use only the specified filter, and install it according to the directional arrows. DO NOT use an aftermarket filter, as operating performance and safety can be affected.

Fuel Filter Replacement

1. Relieve system pressure through the test valve in the fuel rail before servicing.
2. Loosen clamps and slide hose off the filter ends.
3. Install new filter with arrow pointing to the fuel line connected to the injector rail and reinstall the clamps.

NOTE: When replacing the fuel filter, wet the interior of the new filter with gasoline before installation to ensure high pump pressure doesn't tear the filtering material.

FUEL INJECTOR

General Information

The fuel injector mounts into the intake manifold, and the fuel rail attaches at the top end. Replaceable O-Rings on both ends of the injector prevent external fuel leakage and also insulate it from heat and vibration.

When the key switch is on, the fuel rail is pressurized, and voltage is present at the injector. At the proper instant, the ECM completes the ground circuit, energizing the injector. The valve needle in the 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 injector is opened and closed once every other crankshaft revolution. The total amount of fuel needed for one firing is injected during each opening. The amount of fuel injected is controlled by the ECM 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 from 1.5-8 milliseconds depending on the speed and load requirements of the engine.

Fuel Injector Service

Injector problems typically fall into three general categories- electrical, dirty/clogged, or leakage. An electrical problem usually causes the injector to stop functioning.

NOTE: Do not apply voltage directly to the fuel injector(s). Excessive voltage will burn out the injector(s). Do not ground the injector with the ignition "on". Injector 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 Resistance Test

If an injector is not operating, it can indicate either a bad injector, or a wiring/electrical connection problem. Check as follows:

- Using an ohmmeter, test for continuity by placing the test leads on each pin of the injector.
- Resistance specification is **12.0Ω ±0.4Ω (20°C, 68°F)**

Injector Resistance Specification:
12.0Ω ±0.4Ω (20°C, 68°F)

Fuel Injector Replacement

1. Engine must be cool. Depressurize fuel system through test valve in fuel rail.
2. Remove the front fender assembly and fuel tank.
3. Thoroughly clean the area around and including the throttle body/manifold and the injectors.
4. Disconnect the fuel injector harness.
5. Remove the fuel rail mounting screws, doubler plate and carefully loosen / pull the rail away from the injector.
6. Reverse the procedures to install the new injector and reassemble. *Use new O-rings any time an injector is removed* (new replacement injectors include new O-rings). Lubricate the upper O-ring lightly with soapy water to aid installation. The lower O-ring should remain dry. Torque the fuel rail mounting screws to **5~7 ft. lbs. (6-9 Nm)**. Then install the doubler plate and torque to **8~9.5 ft. lbs. (11-13 Nm)**.

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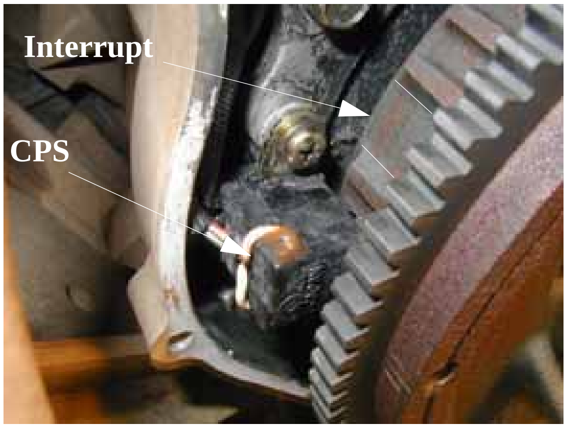
Fuel Rail Mounting Screws:
5~7 ft. lbs. (6-9 Nm)

Doubler Plate Screws
8~9.5 ft. lbs. (11-13 Nm)

CRANKSHAFT POSITION SENSOR (CPS)

General Information

The engine speed sensor is essential to engine operation, constantly monitoring the rotational speed (RPM) of the crankshaft.



A ferromagnetic 36-1 ring gear is cast onto the flywheel. The inductive crankshaft sensor is mounted **0.4 - 1.2 mm (0.015 - .047 in.)** away from this ring gear. During rotation, an AC pulse is created within the sensor for each passing tooth. The tooth gap creates an "interrupt" input signal, corresponding to specific crankshaft position for PTO cylinder. This signal serves as a reference for the control of ignition timing by the ECM.

Crankshaft Position Sensor Air Gap:
0.4 - 1.2 mm (0.015 - .047 in.)

Within one (1) revolution at start-up, the ECM calculates crankshaft position from the time interval between the consecutive pulses. Synchronization of the CPS, ECM and MAP sensor takes place during the first two (2) revolutions each time the engine is started. Once the engine is started, the ECM monitors the MAP sensor for the engine intake stroke. The CPS must be properly connected at all times. If the sensor fails or becomes disconnected for any reason, the engine will quit operating.

Crankshaft Position Sensor Test

The crankshaft position sensor is a sealed, non-serviceable assembly. If fault code diagnosis indicates a problem within this area, test and correct as follows:

1. Disconnect main harness connector from ECM.
2. Connect an ohmmeter between the pin terminals. A resistance value of **185Ω ± 20% at room temperature (20° C, 68° F)** should be obtained. If resistance is correct, check the mounting, air gap, toothed ring gear (damage, runout, etc.), and flywheel key.

Crankshaft Position Sensor Resistance:
185Ω ± 20% @ (20° C , 68° F)

3. Disconnect crankshaft sensor connector from wiring harness. Test resistance between the terminals. A reading of **185Ω ± 20% at room temperature (20°C, 68° F)** should again be obtained.

NOTE: If the resistance reading is incorrect, remove the screws securing the sensor to the mounting bracket and replace the sensor. If the resistance in step 2 was incorrect, but the resistance of the sensor alone was correct, test the main harness circuit between the sensor connector terminals and the corresponding pin terminals in the main connector. Correct any observed problem, reconnect the sensor, and perform step 2 again.

Crankshaft Position Sensor Replacement

1. Remove the RH footwell and rear body panel to gain access to the recoil cover.
2. Disconnect sensor harness connector.
3. Using an 8 mm socket, remove the recoil cover retaining bolts. A mallet or soft hammer may be required to loosen the cover for removal.
4. Remove the retainer screws securing the sensor.
5. Install the new sensor, routing the harness wire through the top of the case housing as was previously installed.
6. Set the air gap of the new sensor to the specified distance away from the ring gear. Torque the retaining screws to specification and reverify air gap.

= In. / mm.

CPS Air Gap:
0.4 - 1.2 mm (0.015 - .047 in.)

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CPS Retaining Screws:
26-34 in. lbs. (2.9-3.92 Nm)

MANIFOLD AIR PRESSURE SENSOR (MAP)

Operation Overview

Mounted on the throttle body intake, the manifold air pressure sensor (MAP) measures air passing and provides the ECM with the manifold pressure during engine operation. This allows the ECM to adjust the fueling according to actual engine load as well as identify which stroke is the intake stroke. The MAP sensor also provides the ECM with the ability to compensate for high altitude operation without any recalibration.

During initial start-up, the ECM is in a “waste spark - waste fuel” mode until the MAP sensor sends a negative pressure reading, indicating that the engine is on the intake stroke. Once this has been ‘learned’, the ECM will then monitor the MAP sensor and cease the initial start-up program.

Map Sensor Test

MAP sensors are a non-serviceable item. If it is faulty, it must be replaced. This sensor requires a 5 Vdc input to operate, therefore the MAP sensor should only be tested using Polaris Diagnostic Software (dealer only). Refer to the EFI Diagnostic Software Manual for more information.

Map Sensor Replacement

1. Disconnect sensor from engine harness.
2. Using a suitable tool, remove the retaining screw and replace the sensor, using a light coating of soapy water on the grommet to aid installation.

NOTE: Replacement MAP sensors may have an o-ring installed that must be removed prior to installing the grommet.

3. Install the sensor as shown in Figure 1, inserting it with a twisting motion to properly seat the grommet. Verify that the connector centerline is aligned with the throttle body centerline.
4. Install the retaining bracket. ***NOTE: Do not allow the retaining bracket to contact the MAP body.*** Torque the retaining screw to specification.

= T

MAP Retaining Screw:
29 in. lbs. (3.3 Nm)

INTAKE AIR TEMPERATURE SENSOR (IAT)

Operation Overview

The intake air temperature sensor (IAT) is used to indicate charge air temperatures to the ECM.

Mounted on the rear of the air box, the IAT sends a varying voltage signal to the ECM in direct correlation to the ambient air temperature. This signal is processed by the ECM and compared to the internal pre-programmed maps to determine the required fuel and ignition settings for the amount of engine load.

Intake Air Temperature Sensor Test

The IAT sensor is a non-serviceable item. If it is faulty, it must be replaced. It can be tested using the following method:

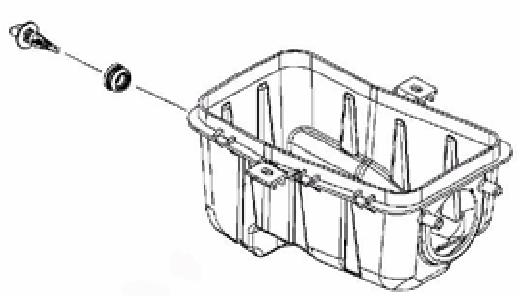
- With the test leads connected and the meter set to the ohms scale, observe the reading at room temperature **(20°C, 68°F)**.
- The reading should be:

IAT Resistance:
2.45±0.24Ω (New)
2.45±0.36Ω (Used)

- If the sensor does not read correctly, replace it.

Intake Air Temperature Sensor Replacement

1. Disconnect engine harness from sensor.
2. Using a suitable tool, remove the sensor from the grommet.
3. Lightly coat the grommet with soapy water and install a new sensor, using a twisting motion to properly seat the sensor in the grommet.
4. Re-connect the harness.



IDLE AIR CONTROL (IAC)

General Information

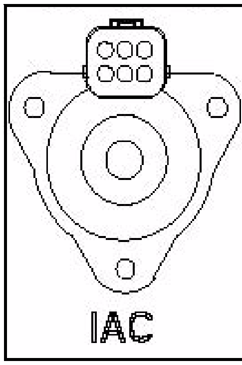
The Idle Air Control (IAC) is used to stabilize the idle quality of the engine at cold start-up and after warm-up operations.

Mounted on the throttle body, the IAC contains 1 stepper motor which receives varying voltage signal pulses from the ECM. These pulses determine the IAC plunger setting, thereby controlling the amount of air bypassing the closed throttle body for idle control. If the IAC is disconnected or inoperative, it will remain at it's last operated position.

Idle Air Control Test

The IAC is a non-serviceable item. If it is faulty, it must be replaced. It can be 'bench tested' using the following method:

1. With the test leads connected and the meter set to the ohms scale, observe the reading at the following pin locations of the IAC:



RESISTANCE BETWEEN PINS	
PINS	RESISTANCE
1-2	30Ω±1.2Ω
2-3	30Ω±1.2Ω
1-3	60Ω±2.4Ω
4-5	30Ω±1.2Ω
5-6	30Ω±1.2Ω
4-6	60Ω±2.4Ω
ALL OTHER COMBINATIONS: OPEN	

1. If any of the readings are out of specification, replace the IAC.

Idle Air Control Replacement

1. Disconnect the IAC from the engine harness.
2. Using a suitable tool, remove the retaining screws and replace the sensor.
3. Torque the retaining screws to

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IAC Retaining Screws:
17.7 in. lbs. (2 ± 0.5 Nm)

4

THROTTLE POSITION SENSOR (TPS)

Operation Overview

The throttle position sensor (TPS), mounted to the throttle body, is used to indicate throttle plate angle to the ECM.

> **The correct position of the throttle body idle stop is established and set at the factory. Do not loosen the throttle body idle stop or alter the stop position in any fashion. If the stop is repositioned, the entire throttle body assembly must be replaced.**

Mounted on the throttle body and operated directly off the end of the throttle shaft, the TPS works like a rheostat, varying the voltage signal to the ECM in direct correlation to the angle of the throttle plate. This signal is processed by the ECM and compared to the internal pre-programmed maps to determine the required fuel and ignition settings for the amount of engine load.

Throttle Position Sensor Test

The throttle position sensor (TPS) is a non-serviceable item. If it is faulty, it must be replaced. It can be tested using the following method:

Using an ohmmeter-

1. With the test leads connected and the meter set to the ohms scale, observe the reading at the following pin locations of the TPS:

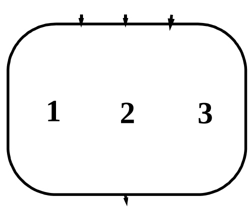
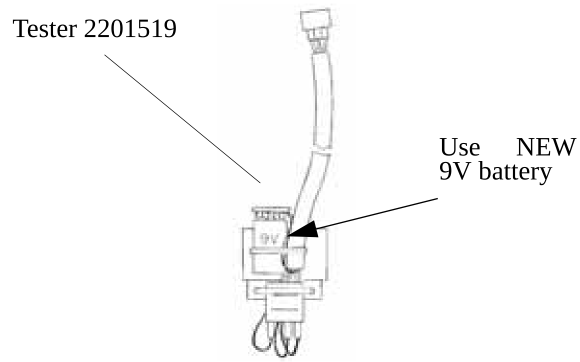


Table 4-1: TPS Resistance Readings

Pin	Throttle Position	Resistance
②-GND	-----	∞
①-②	**Closed**	**4KΩ (reference)**
①-②	**Open**	**820Ω (reference)**
①-③	-----	**4kΩ – 6kΩ**

Using TPS Test Adapter Harness 2201519-

- Set up the TPS Test Harness **2201519** according to the instructions. Verify that the 9 volt battery is new. Figure 2



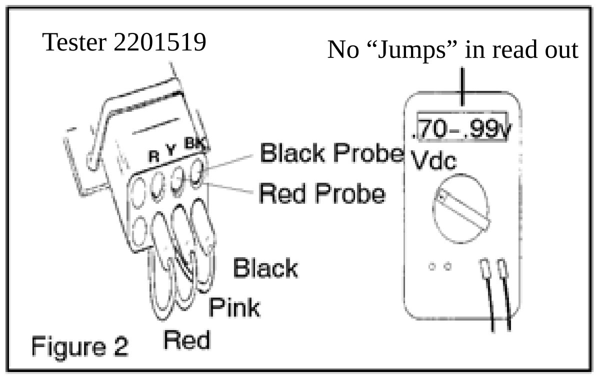


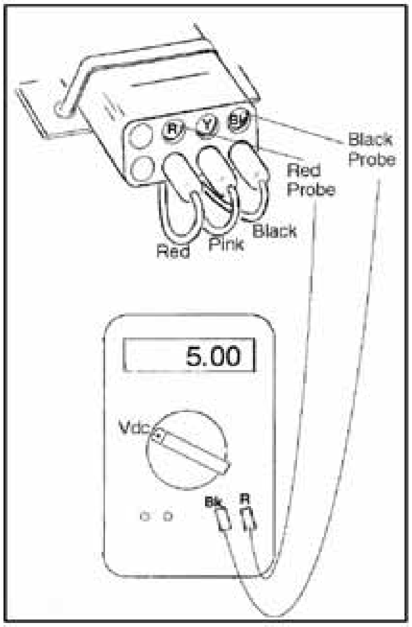
Figure 2

- Connect the test leads connected as shown in Figure 2 and the meter set to the “vdc” scale, move the throttle open and closed slowly while reading the display. The voltage should increase smoothly with no “jumps” or decreases when the throttle is applied.
- If the TPS does not function correctly, replace it.

Tps Tester - Correct Reference Voltage

A 5 volt reference voltage signal from the test harness is required for the TPS test to be accurate. Refer to the instructions provided with the TPS Test Adapter Harness (**2201519**) or follow these steps to check reference voltage.

- Harness Test: Insert black voltmeter probe into the “Bk” test port.
- Connect the red meter probe into the “R” port and verify the voltage is 4.99-5.01 vdc. If this reading is low, verify the 9 volt battery is good or try a new 9 volt battery.



Throttle Position Sensor Replacement

NOTE: The correct position of the TPS is established and set at the factory. If the TPS is repositioned, replaced or loosened it must be recalibrated.

1. Remove the LH side panel assembly.
2. Disconnect sensor from the engine harness.
3. Loosen and rotate the throttle body (B) to gain access to the retaining screws (if required).
4. Remove the retaining screws and replace the sensor, but do not tighten the screws at this point.
5. Refer to “TPS Initialization” for setting the TPS voltage.

Throttle Position Sensor (Tps) Initialization

The correct position of the throttle body idle stop is established and set at the factory. Do not loosen the throttle body idle stop or alter the stop position in any fashion. If the stop is repositioned, the entire throttle body assembly must be replaced.

Establishing a TPS setting : This step is crucial as it sets the TPS position using the fixed physical stop.

- Open and close throttle plate a couple of times to ensure full throttle closing. Do not snap closed, as this could cause unnecessary throttle plate to throttle body interference and/or damage.
- Set up the TPS Test Adapter Harness **2201519**. Verify that the 9 volt battery is new. Figure 2.

TPS Tester Adapter Harness- **2201519**

Should Read: **1.10 - 1.14 vdc**

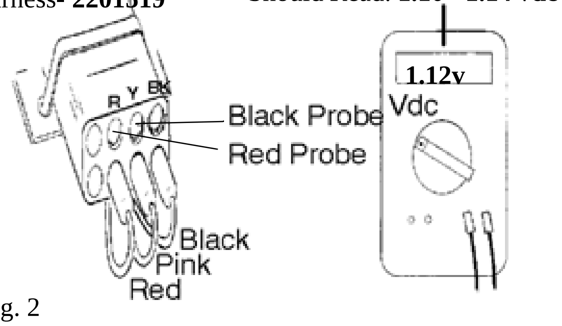


Fig. 2

500 EFI engines - Apply RED meter lead to the “R” port and BLACK meter lead to the “Y” port of TPS Tester Harness to obtain correct reading.

- *(NOTE: Applies to 500 EFI ONLY)* Attach the RED meter lead to the “R” port and BLACK meter lead to the “Y” port of the TPS Tester Harness **2201519**, verify the voltage output of the TPS reads **1.10 - 1.14 vdc**.
- If it does not read **1.10 - 1.14 vdc**, loosen the screws holding the TPS to the throttle body. Rotate TPS until voltmeter reads **1.10 - 1.14 vdc**.
- Retighten TPS mounting screws to specification and verify the voltage did not change.

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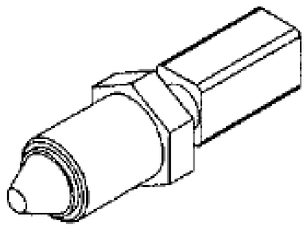
TPS Retaining Screws: **17.7 in. lbs. (2 ± 0.5 Nm)**

ENGINE TEMPERATURE SENSOR

General Information

Mounted on the cylinder, the engine temperature sensor measures coolant temperature. The engine temperature sensor is a Negative Temperature Coefficient (NTC) type sensor, as the temperature increases the resistance decreases.



Engine Coolant Temperature Sensor (ECT)

Coolant passes through the cylinder and by the sensor probe, varying a resistance reading which is relayed to the ECM. This signal is processed by the ECM and compared to it's programming for determining the fuel and ignition requirements during operation. The ECM also uses this signal to determine when to activate the fan during operation. If for any reason the engine temperature sensor circuit is interrupted, the fan will default to “ON”.

Engine Temperature Sensor Test

Polaris dealers can test the sensor by using the Polaris Digital Wrench™ Software (dealer only). Refer to the Digital Wrench™ Software Manual for more information.

To measure the sensor using an ohmmeter, place the tester leads on each terminal an read the resistance with the sensor at an ambient temperature of 68°F (20°C).

Table 4-1: Resistance Readings

TEMPERATURE °F (°C)	RESISTANCE
68 °F (20 °C)	37.3 - 39.2 k Ω

Engine Temperature Sensor Replacement

1. Disconnect sensor from engine harness.
2. Using a wrench, remove and replace the sensor, applying a light coating of thread sealant to aid installation.
3. Torque the sensor to specification.

= T
ETS Installation Torque: **18.5 ft. lbs. (25 Nm)**

FUEL SYSTEM TROUBLESHOOTING

FUEL STARVATION / LEAN MIXTURE

The correct position of the throttle body idle stop is established and set at the factory. Do not loosen the throttle body idle stop or alter the stop position in any fashion. If the stop is repositioned, the entire throttle body assembly must be replaced.

Symptoms: Hard start or no start, bog, backfire, popping through intake / exhaust, hesitation, detonation, low power, spark plug erosion, engine runs hot, surging, high idle, idle speed erratic.

- No fuel in tank
- Restricted tank vent, or routed improperly
- Fuel lines or fuel injectors restricted
- Fuel filter plugged
- Fuel pump inoperative
- Air leak in system
- Intake air leak (throttle shaft, intake boot, gasket or grommet)
- Throttle stop screw tampering - replace throttle body
- Failed Sensor or disconnected wiring

RICH MIXTURE

Symptoms: Fouls spark plugs, black, sooty exhaust smoke, rough idle, poor fuel economy, engine runs rough/ misses, poor performance, bog, engine loads up, backfire.

- Air intake restricted (inspect intake duct)
- Air filter dirty/plugged
- Poor fuel quality (old fuel)
- Fouled spark plug
- TPS setting incorrect
- Injector failure
- Failed Sensor or disconnected wiring
- Throttle stop screw tampering - replace throttle body

POOR IDLE

Symptom: Idle Too High (If greater than 1300 RPM when engine is warm)

- Throttle stop screw tampering - replace throttle body
- Throttle cable sticking, improperly adjusted, routed incorrectly
- Failed Sensor or disconnected wiring
- IAC stuck or inoperative
- Intake air leak

Symptom: Idle Too Low (if less than 900 RPM when engine is warm)

- Plugged air filter
- Leaking injector (rich condition)
- Belt dragging
- Throttle stop screw tampering - replace throttle body
- Failed Sensor or disconnected wiring

Symptom: Erratic Idle

- Throttle cable incorrectly adjusted
- Air Leaks, dirty injector
- TPS damaged or adjusted
- Tight valves
- Belt dragging
- Dirty air cleaner
- Engine worn
- Spark Plug fouled
- Throttle stop screw tampering - replace throttle body
- Failed Sensor or disconnected wiring

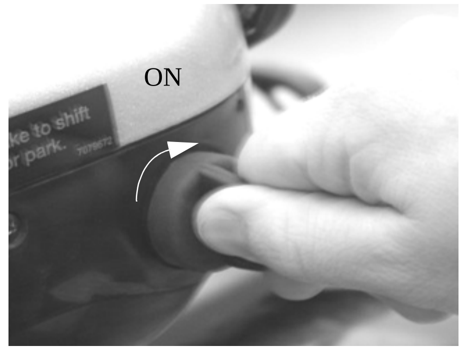
EFI DIAGNOSTICS USING 'BLINK CODES'

Blink Codes - Operation

To enable the blink codes, **turn the ignition from "OFF" to "ON" 3 times, leaving it 'on' the 3rd time, within 5 seconds.**

Any "blink codes" that are stored in the ECM will display, one at a time, in numerical order. The word 'WAIT' will appear on the LCD display and the Malfunction Indicator Light (MIL) or Check Engine light will begin to flash. *Read and record the number of flashes of the MIL light.* A code '12' indicates the beginning of the diagnostic sequence. A code '61' will flash after all codes have been transmitted.

NOTE: To clear codes manually, disconnect the positive battery lead for 20 seconds.



Malfunction Indicator Light (MIL) Diagnostic Example

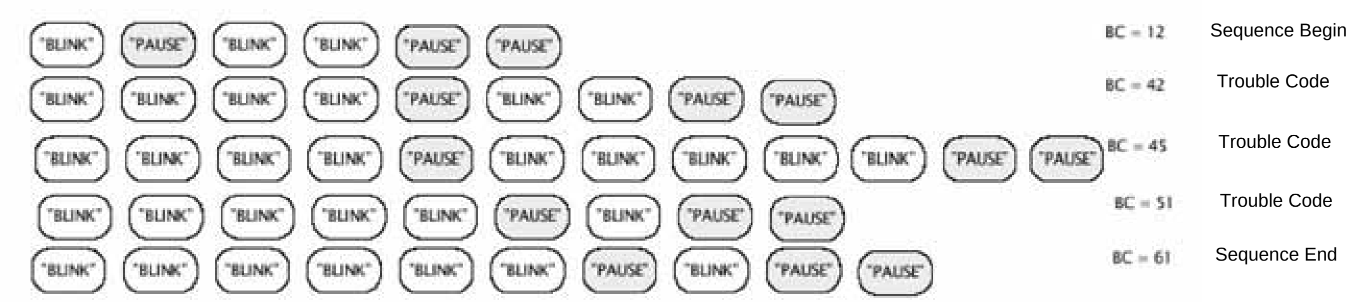


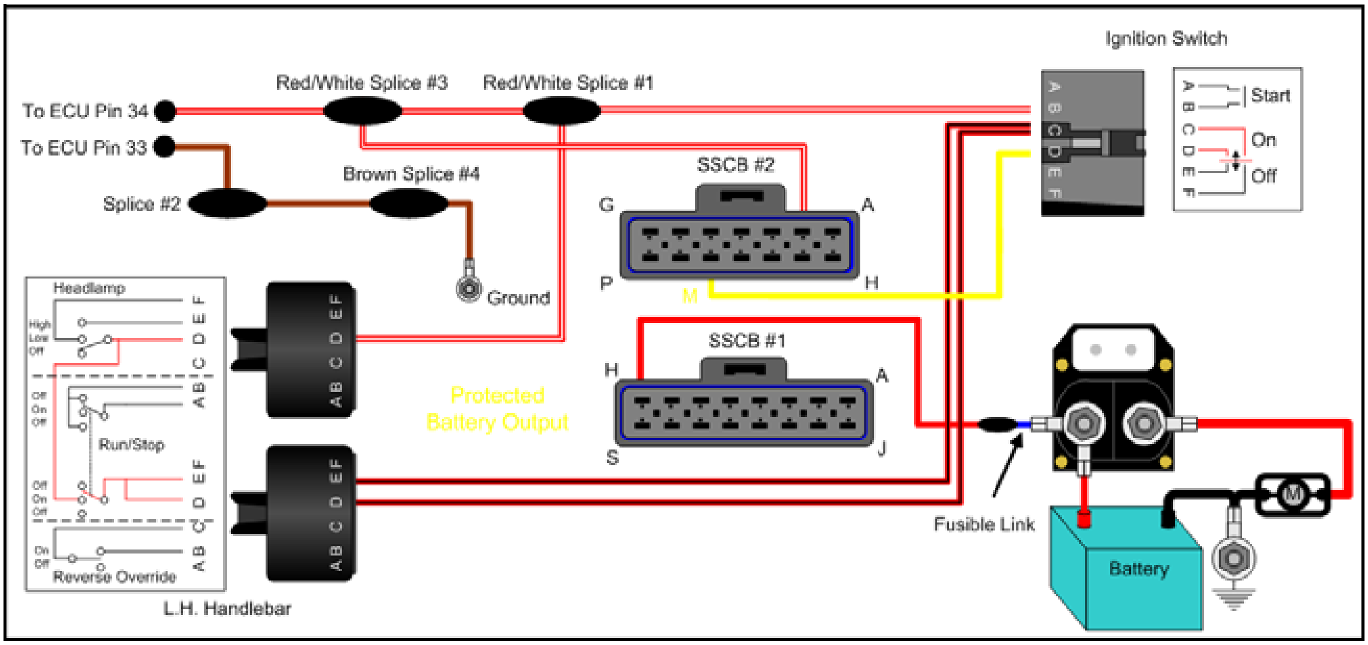
Table 4-1: DIAGNOSTIC "BLINK CODES" CHART

BLINK CODE	NAME	MIL LIGHT ON?
12	BEGIN SEQUENCE	--
21	Loss of Synchronization	Yes
22	TPS Circuit: Sensor Low	Yes
22	TPS Circuit: Sensor High	Yes
31	System Voltage Low	Yes
31	System Voltage High	Yes
41	Air Temp Sensor (IAT): Low Voltage	Yes
41	Air Temp Sensor (IAT): High Voltage	Yes
42	Engine Temperature Sensor Circuit (ECT): Low Voltage	Yes
42	Engine Temperature Sensor Circuit (ECT): High Voltage	Yes
44	CPS Circuit Fault	Yes
45	Barometric Pressure Sensor: MAP Circuit Low Input	Yes
46	Barometric Pressure Sensor: MAP Circuit High Input	Yes
47	IAC: Open Load	Yes
47	IAC: Short to Ground	Yes
51	Injector 1: Open Load / Short Circuit to Ground	Yes
51	Injector 1: Short Circuit to Battery	Yes
55	Diagnostic Lamp: Open Load	Yes
55	Diagnostic Lamp: Short Circuit to Ground	Yes
55	Diagnostic Lamp: Short Circuit To Battery	Yes
56	Fuel Pump: Open Load / Short Circuit to Ground	Yes
56	Fuel Pump: Short Circuit to Battery	Yes
58	Cooling Fan: Open Load / Short Circuit to Ground	Yes
58	Cooling Fan: Short Circuit to Battery	Yes
61	END SEQUENCE	--

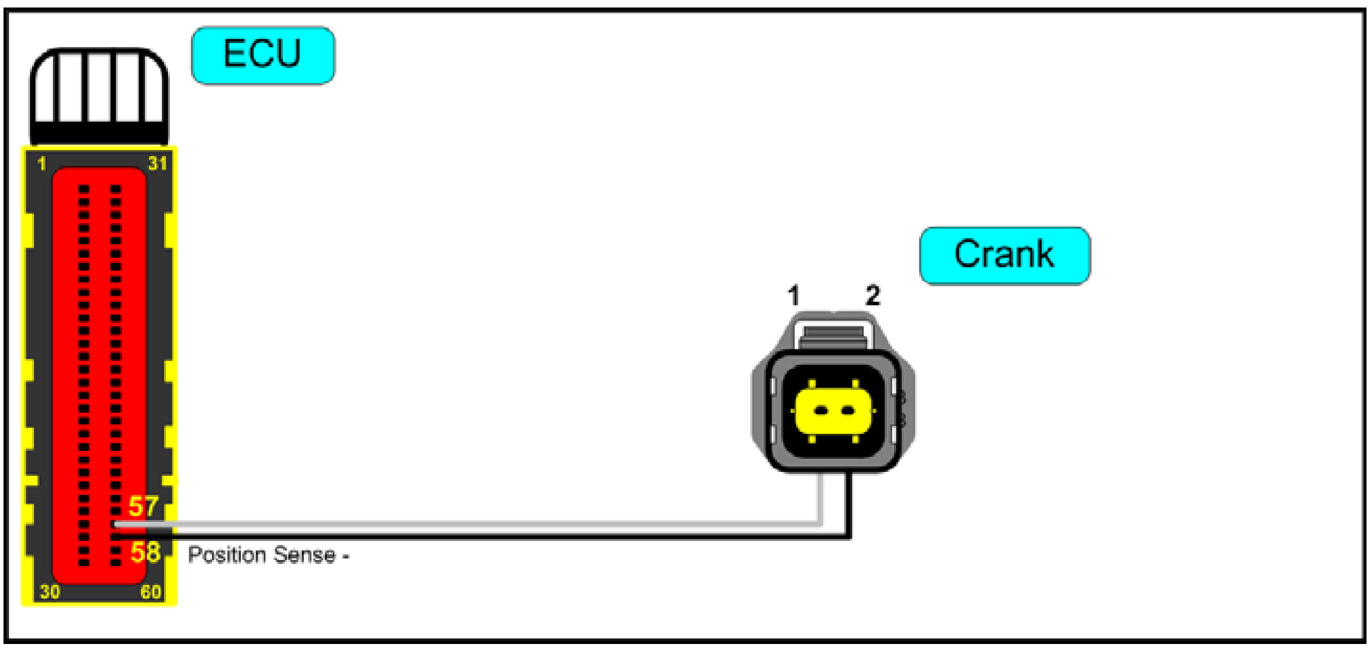
4

TROUBLESHOOTING DIAGRAMS

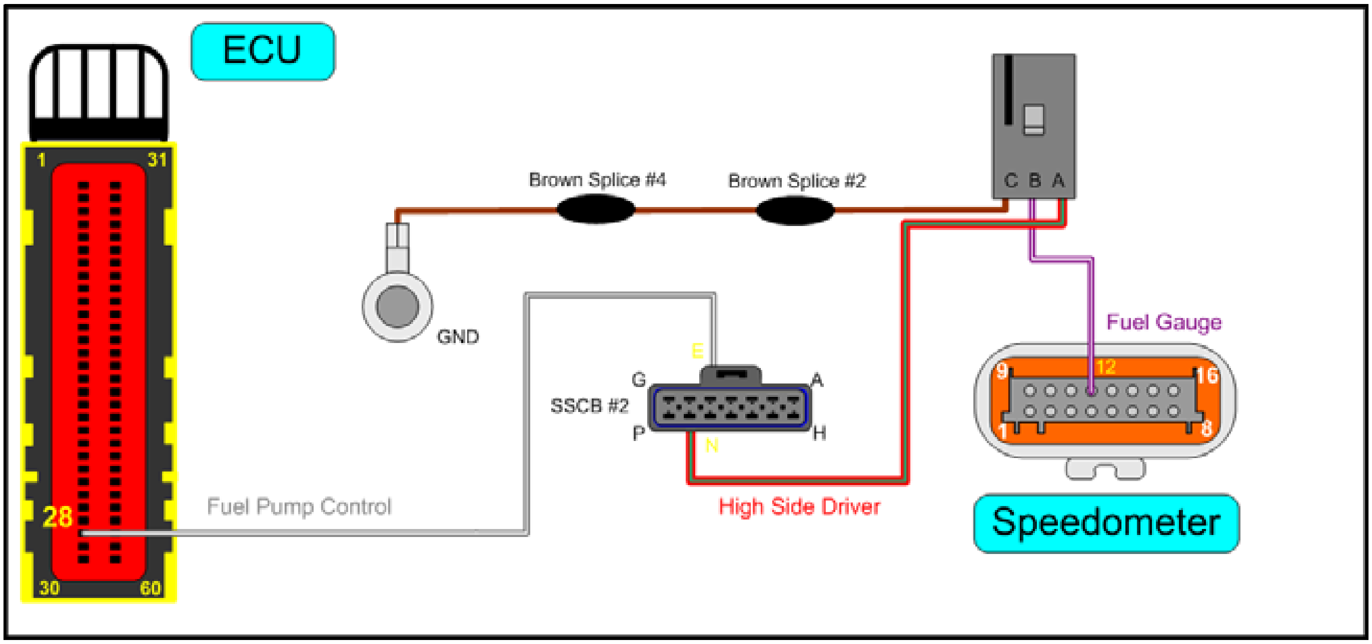
EFI CIRCUIT - Power On



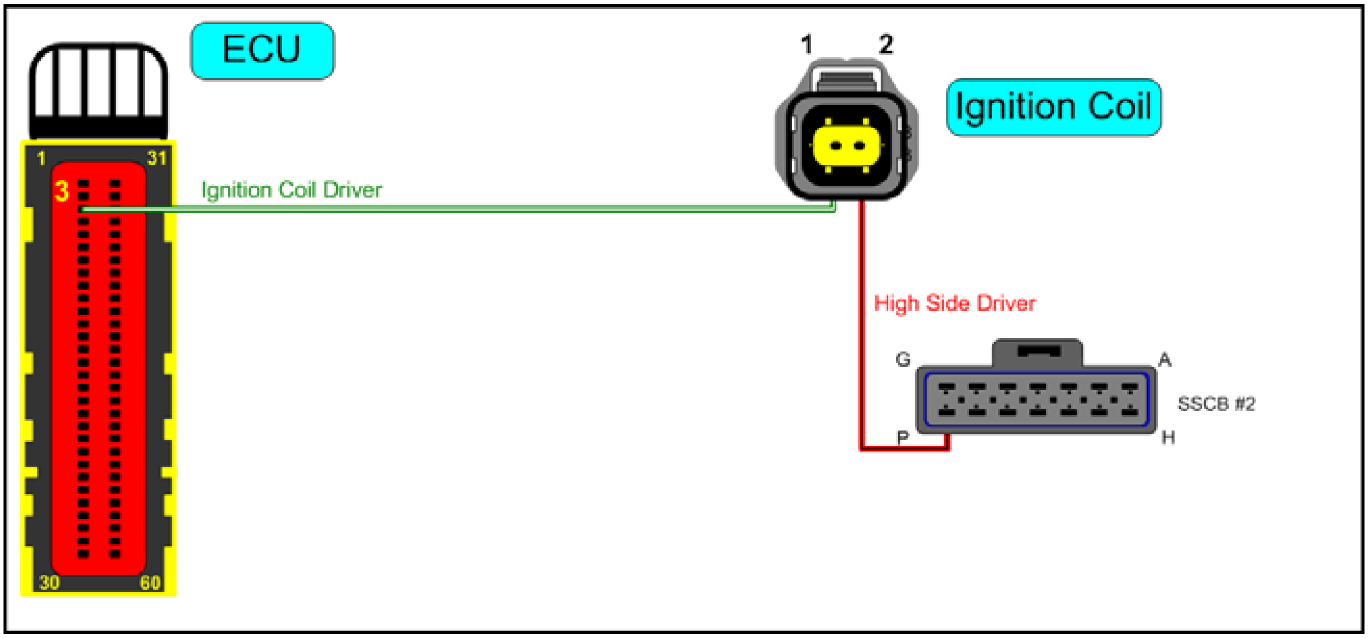
EFI CIRCUIT - Crank Position Sensor



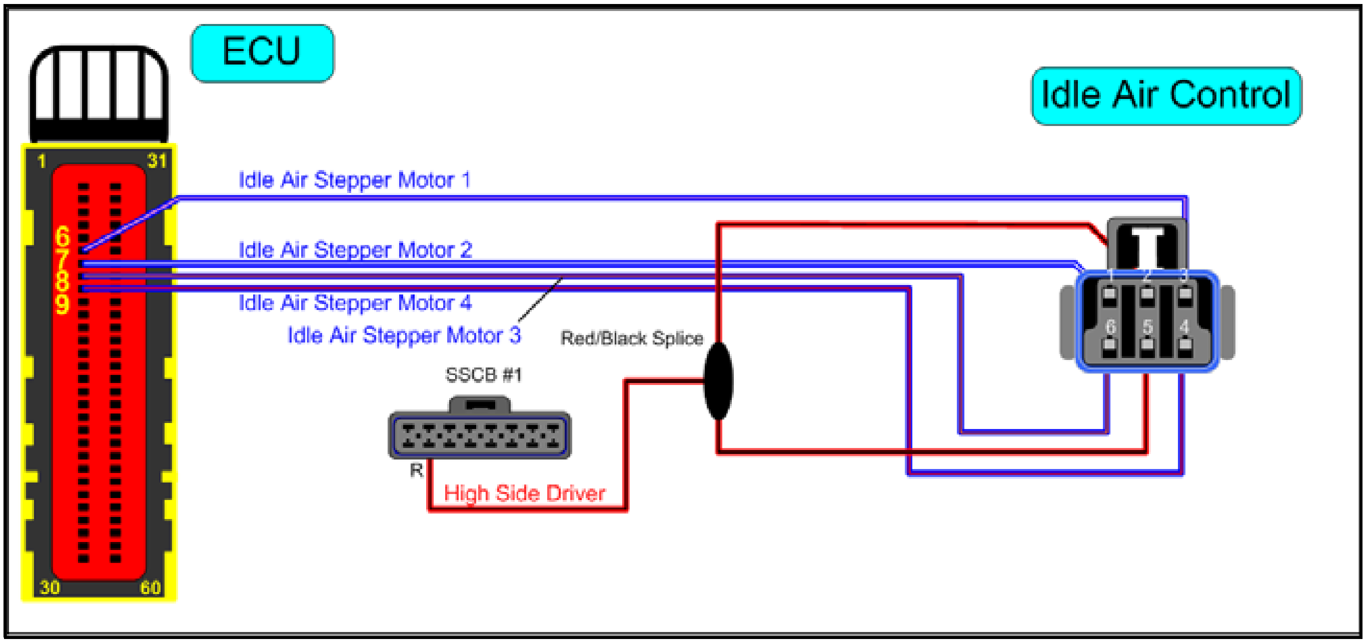
EFI CIRCUIT - Fuel Pump



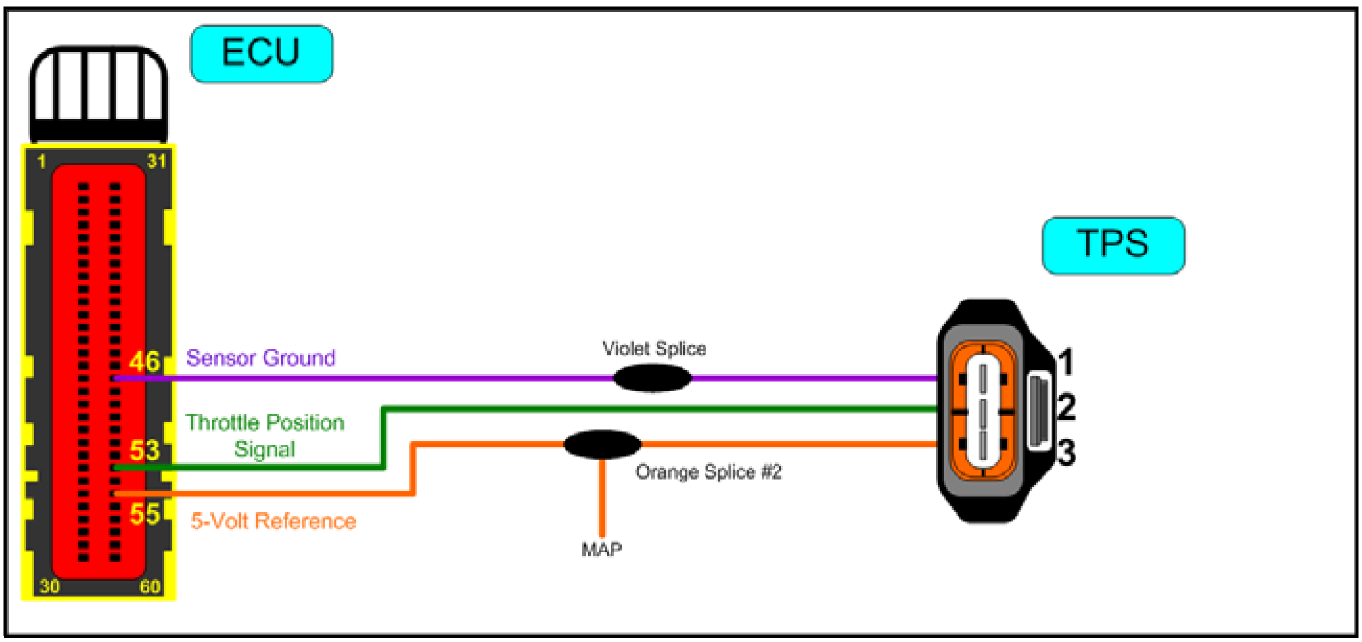
EFI CIRCUIT - Ignition Coil



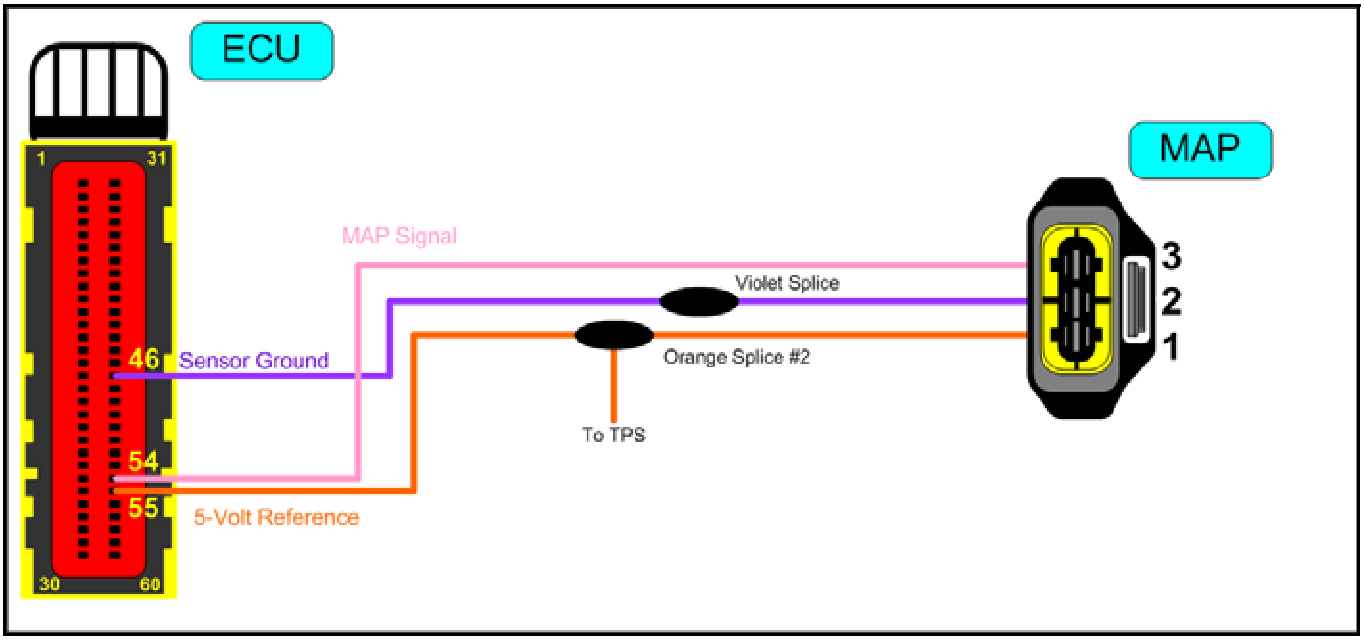
EFI CIRCUIT - Idle Air Control



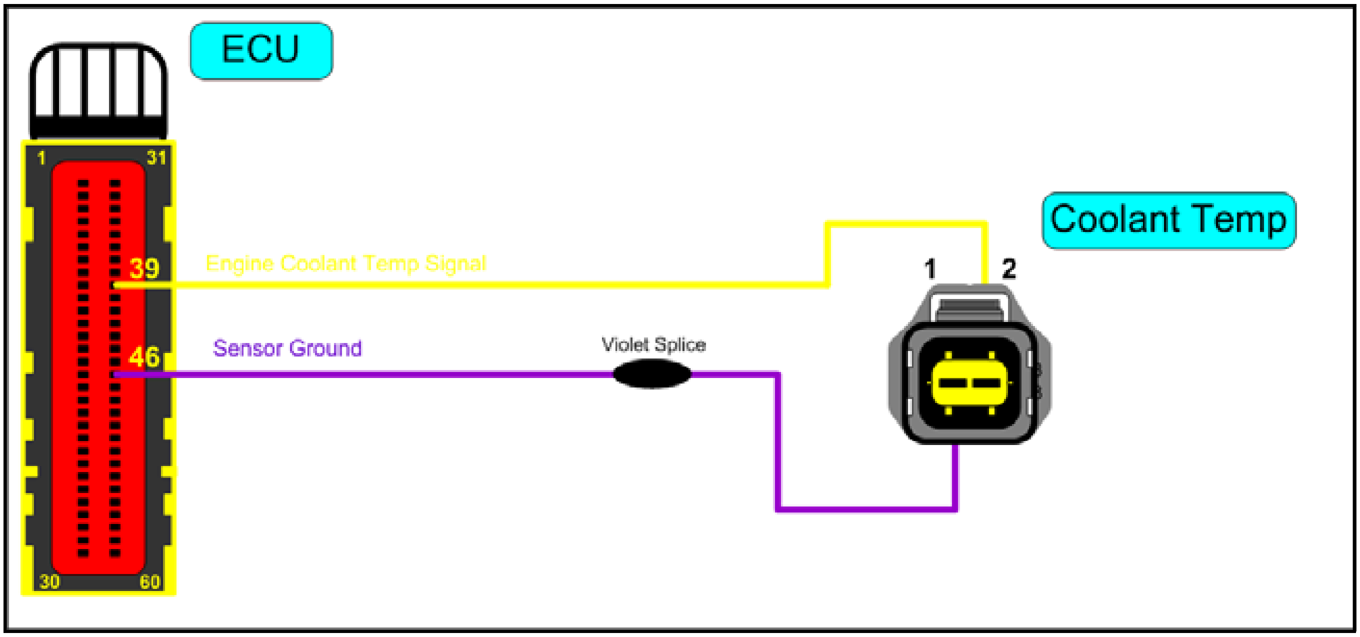
EFI CIRCUIT - Throttle Position Sensor



EFI CIRCUIT - Manifold Absolute Pressure Sensor



EFI CIRCUIT - Engine Coolant Temperature



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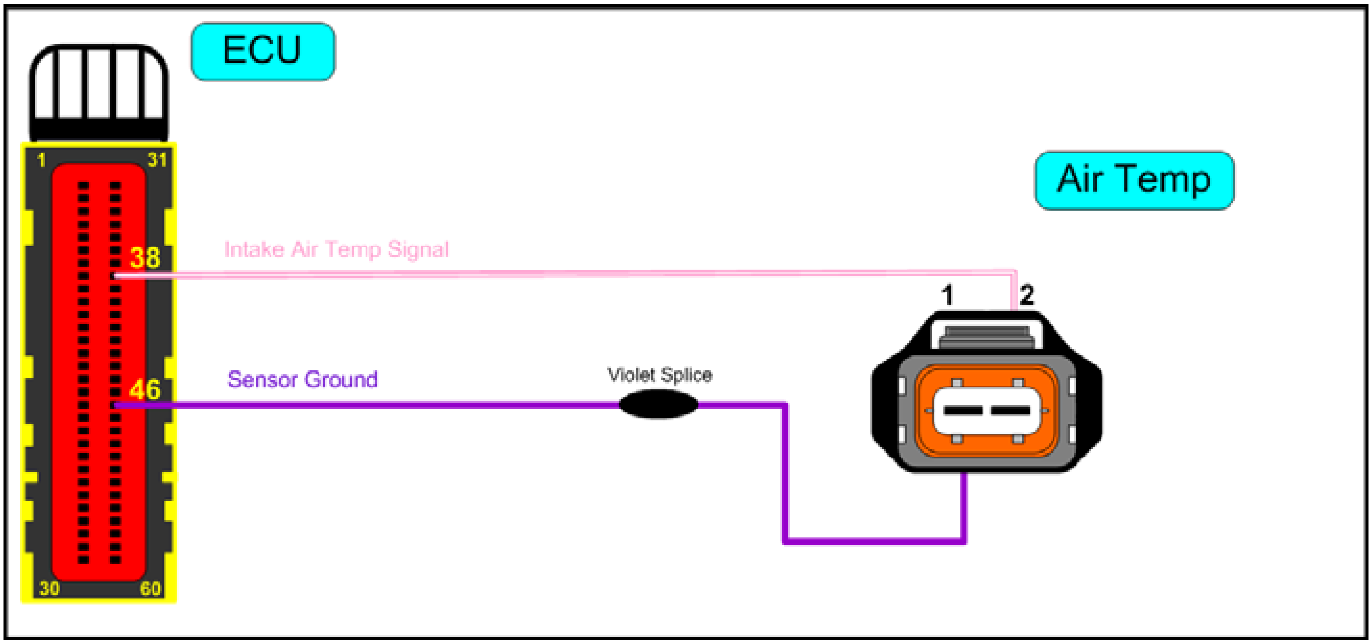
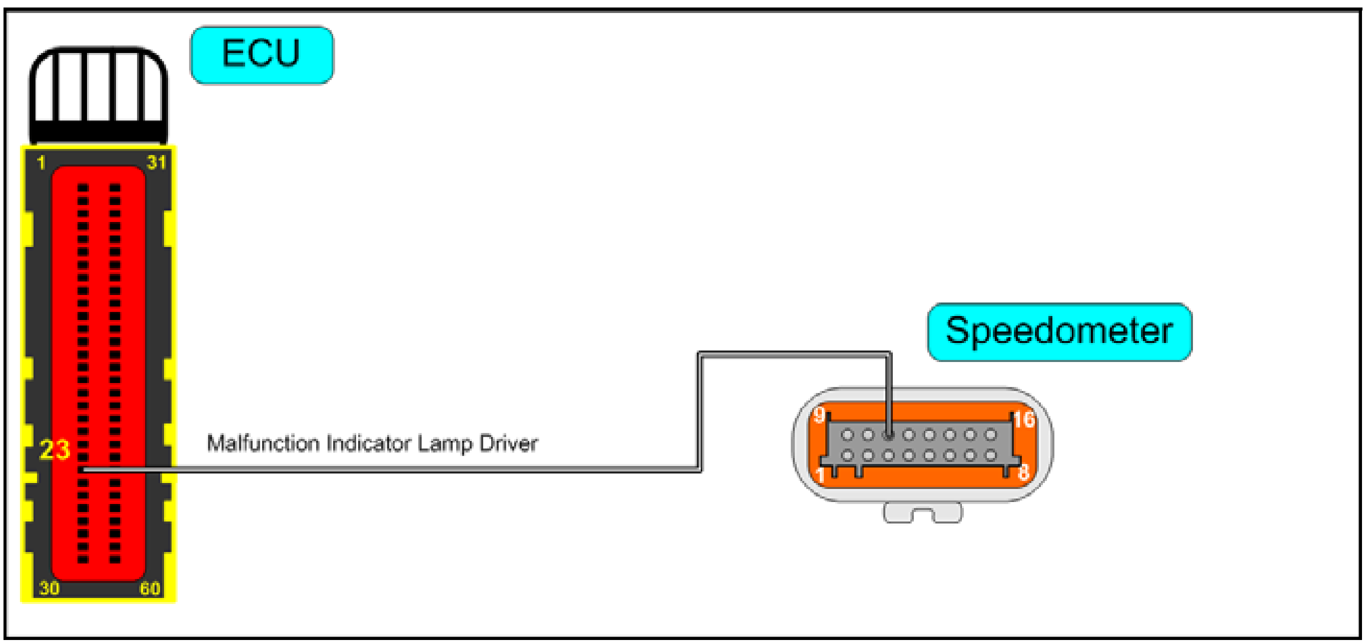
EFI CIRCUIT - Air Temperature Sensor



EFI CIRCUIT - Malfunction Indicator Light



CHAPTER 4

CARBURETOR - SPORTSMAN 450

GENERAL INFORMATION AND SPECIFICATIONS

Special Tools

PART NUMBER	TOOL DESCRIPTION
2870975	Mity Vac™ Pressure Test Tool
2872314	Carburetor Float Adjustment Tool

WARNING

Gasoline is extremely flammable and explosive under certain conditions.

Always stop the engine and refuel outdoors or in a well ventilated area.

Do not overfill the tank. The tank is at full capacity when the fuel reaches the bottom of the filler neck. Leave room for expansion of fuel.

Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

Never drain the float bowl when the engine is hot. Severe burns may result.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

If you get gasoline in your eyes or if you should swallow gasoline, seek medical attention immediately.

If you spill gasoline on your skin or clothing, immediately wash with soap and water and change clothing.

NOTE: It is strongly recommended that Polaris Carbon Clean be added regularly as directed to the fuel systems of all Polaris ATVs. Carbon Clean stabilizes the fuel, preventing clogging of the small passages and orifices common to ATV carburetors, and ensures constant performance, reliability and easier starting.

Carburetor Jetting

IMPORTANT: The following guidelines must be followed when establishing a main jet setting:

1. Select the lowest anticipated temperature and altitude at which the machine will be operated.
2. Select the correct main jet according to the engines fuel/ performance requirements.

CAUTION

A main jet that is too small will cause a lean operating condition resulting in serious engine damage. Select the correct main jet carefully for elevation and temperature according to the charts in the Specifications section or in the Owner's Safety and Maintenance Manual for each particular model.

Mikuni Jet Part Numbers

Main Jets		Pilot Jets	
Jet Number	Part Number	Jet Number	Part Number
130	**3131537**	25	**3131538**
132.5	**3131536**	27.5	**3131539**
135	**3131535**	30	**3131540**
137.5	**3131534**	32.5	**3131541**
140	**3131522**	35	**3131542**
142.5	**3131523**	37.5	**3131543**
145	**3131524**	40	**3131544**
147.5	**3131525**	42.5	**3131545**
152.5	**3131526**	47.5	**3131546**
155	**3131527**	50	**3131547**
157.5	**3131528**	52.5	**3131548**
160	**3131529**	55	**3131549**
162.5	**3131530**	57.5	**3131550**
165	**3131531**	60	**3131551**
167.5	**3131532**	65	**3131552**
170	**3131533**	70	**3131553**

Carburetor Specifications

Fuel System	
Carburetor	Mikuni BST 34mm
Main Jet	167.5
Pilot Jet	42.5
Jet Needle / Clip Position	4IB33 - 3
Needle Jet	P-6M (829)
Pilot Screw	2 3/4 Turns Out (initial)
Pilot Air Jet	1.3
Float Height	13mm ± 1 (.51 ± 0.40")
Fuel Delivery	Fuel Pump
Fuel Capacity / Requirement	4.25 gal US / 19.9 liters 87 Octane (minimum) or 89 Oxygenated

CARBURETION

BST 34 Carburetor Exploded View 1 of 2

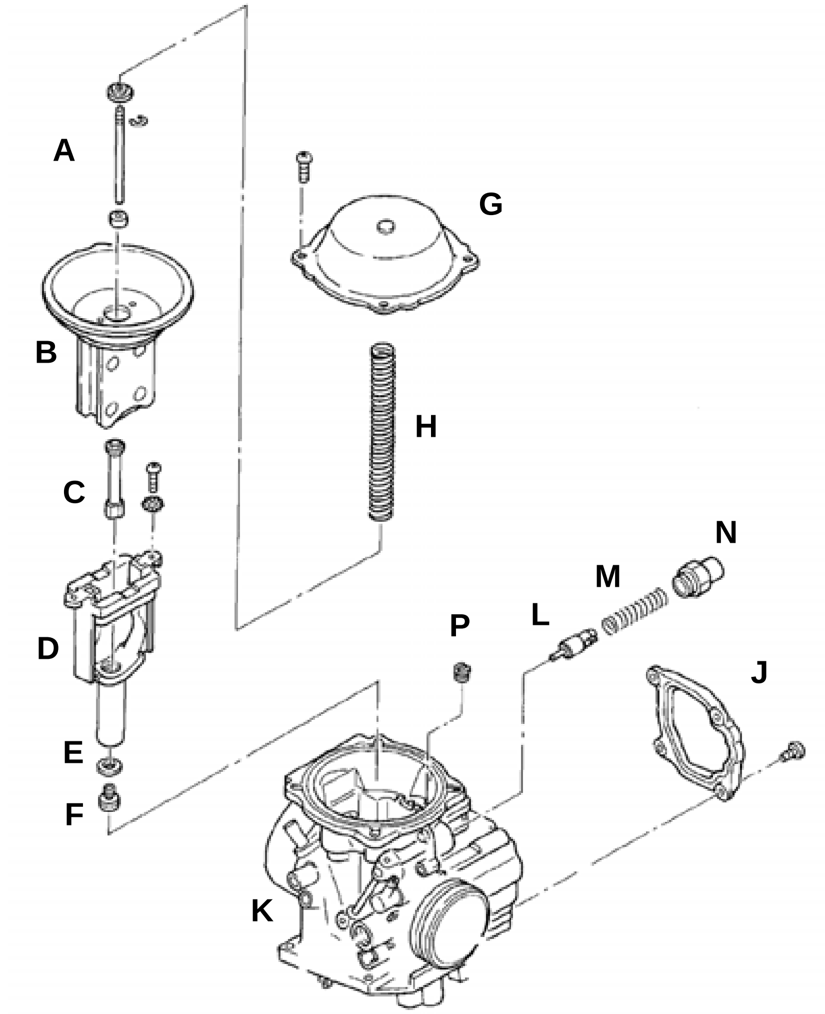


Table 4-1: Carburetor Components

REFERENCE	DESCRIPTION	REFERENCE	DESCRIPTION
A	Jet Needle	J	Throttle Control Cover Plate
B	Diaphragm Assembly	K	Carburetor Body
C	Needle Jet	L	Enrichment Plunger
D	Jet Block Assembly	M	Enrichment Spring
E	Washer	N	Cable guide
F	Main jet	P	Pilot Air Jet
G	Cover		
H	Spring		

BST 34 Carburetor Exploded View 2 of 2

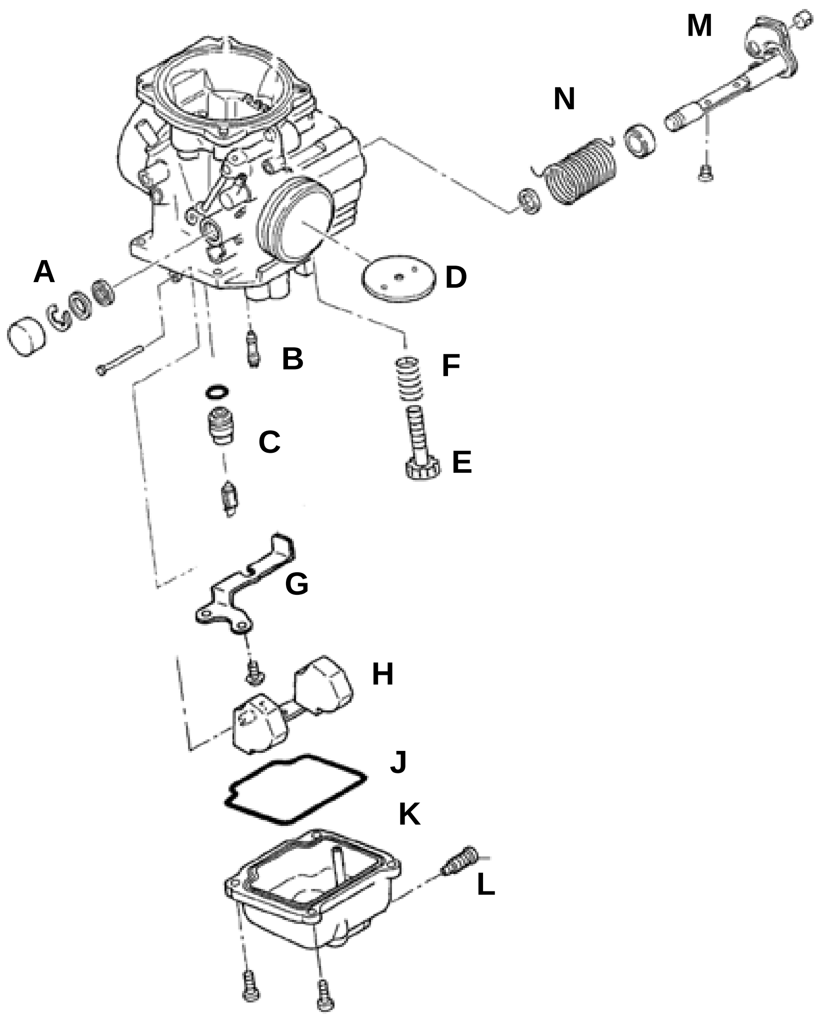


Table 4-2: Carburetor Components

REFERENCE	DESCRIPTION	REFERENCE	DESCRIPTION
A	Throttle Plate Shaft Retaining Components	J	Float Bowl O Ring
B	Pilot Jet	K	Float Bowl
C	Needle Valve Assembly	L	Float Bowl Drain Screw
D	Throttle Plate	M	Throttle Shaft
E	Idle RPM Speed Adjustment Screw	N	Throttle Shaft Return Spring
F	Spring		
G	Needle Valve Retaining Plate		
H	Floats		

CV Carburetor System Function

Carburetor Component Function			
System	**Main Components**	**Main Function**	**Main Affect**
Float System (Level Control)	Inlet Pipe, Needle and Seat, Float, Float Pin	Maintains specified fuel level in float chamber (carburetor float bowl)	All systems All throttle ranges
Venting	Passages in Carburetor, Vent lines to frame	Supplies atmospheric pressure to float chamber	All systems All throttle ranges
Starter (Choke/ Enrichment)	Choke Lever, Cable, Plunger, Return Spring, Carb Passages (Starter Jet, Starter Bleed Pipe)	Supplies additional fuel air mixture necessary for cold starting	All throttle ranges Greatest effect at low throttle settings and idle
Pilot (Idle System)	Pilot Jet/ Passage-ways, Pilot–Mixture Screw with Spring Washer and Sealing O–Ring, By-pass Ports (Behind Throttle Plate), Pilot Air Jet, Pilot Outlet, Throttle Plate	Primarily supplies fuel at idle and low throttle positions	Mainly idle to 1/4 throttle Minimal effect after 1/2 throttle
Main System	Main Jet, Main Air Jet, Main Air Passage, Needle Jet, Jet Needle, Vacuum Slide, Throttle Plate	Supplies fuel at mid–range and high throttle settings.	1/4 to full throttle

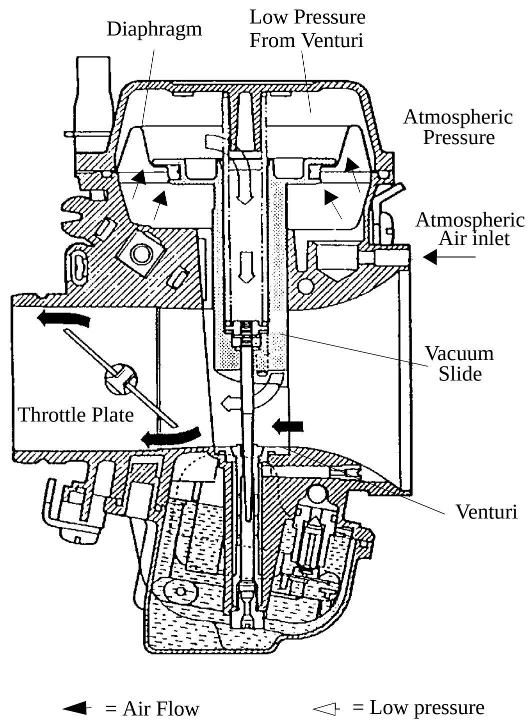
Carburetor Venting

The carburetor float bowl vent lines supply atmospheric pressure to the float bowl. The lines must be free of kinks, restrictions and be properly routed. This allows fuel to flow in the proper amount and prevents contaminants from entering the carburetor.

Mikuni CV Carb Operation

The constant velocity carburetor incorporates a mechanically operated throttle plate and a vacuum controlled slide valve (vacuum slide). The venturi cross–sectional area in the carburetor bore is increased or decreased automatically by the vacuum slide, which moves according to the amount of negative pressure (less than atmospheric) present in the venturi.

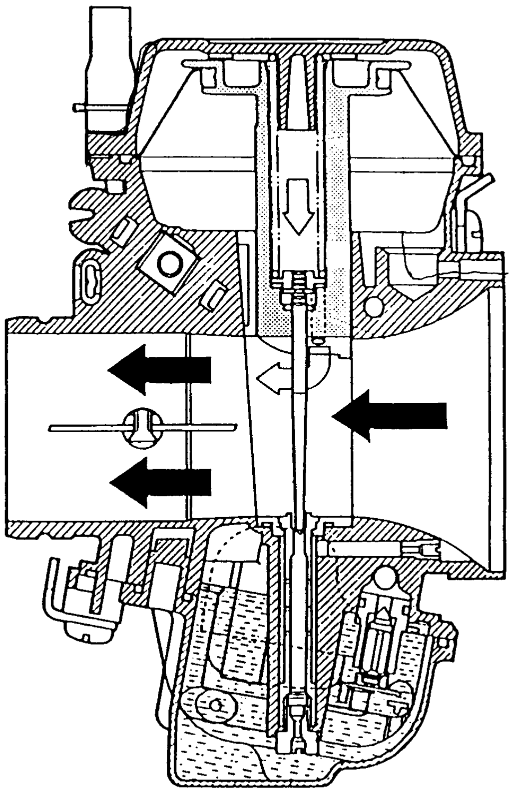
A diaphragm attached to the top of the vacuum slide is sealed to the slide and to the carburetor body forming two chambers. The chamber above the diaphragm is connected to the venturi area by a drilled orifice in the center of the vacuum slide. The chamber below the diaphragm is vented to atmospheric pressure by a passage on the air box side of the carburetor. A spring, installed in the center of the vacuum slide, dampens the slide movement and assists the return of the slide.



When the throttle plate is opened and engine speed begins to increase, the pressure in the venturi (and therefore in the chamber above the diaphragm) becomes significantly lower than atmospheric. Atmospheric pressure in the chamber below the diaphragm forces the diaphragm upward, raising the slide against spring pressure.

4

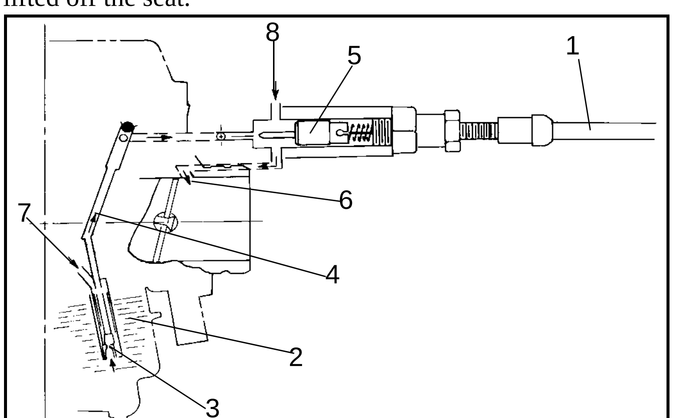
When the pressure above and below the diaphragm are nearly equal, the slide moves downward under spring pressure. Raising or lowering the slide increases or decreases the cross sectional area in the venturi, and therefore the air velocity in the venturi is kept relatively constant. This provides improved fuel atomization and optimum fuel/air ratio.



Note: Diagrams are for explanation of theory only, and are not true representations of Mikini BST carburetor.

Starter System (Choke or Enrichment)

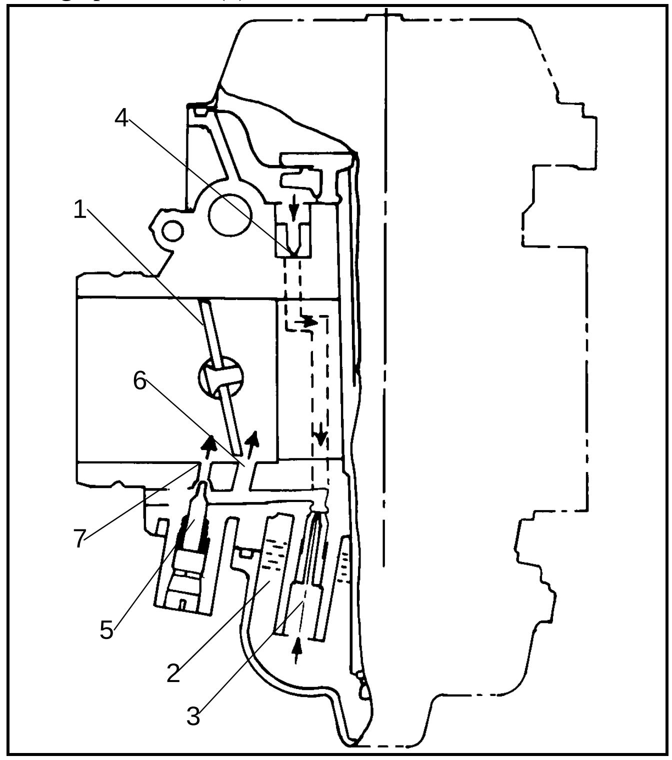
When the choke cable (1) is activated, the starter plunger (5) is lifted off the seat.



Fuel is drawn into the starter circuit from the float chamber (2) through the starter jet (3). Starter jet meters this fuel, which then flows into starter pipe (4) and mixes with the air (7) coming from the float chamber. The mixture, rich in fuel content, reaches starter plunger and mixes again with the air coming through a passage (8) extending from underneath the diaphragm. The rich fuel/air mixture for starting is discharged through starter outlet (6) in the main bore.

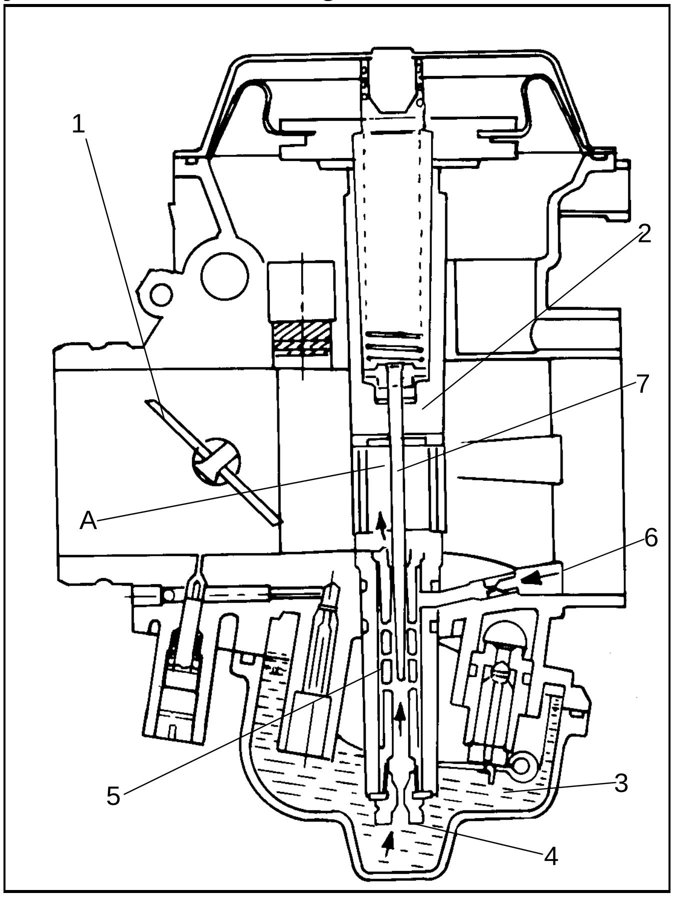
Pilot (Idle and Slow) System

This system supplies fuel during engine operation with throttle valve closed (1) or slightly opened. The fuel from float chamber (2) is metered by pilot jet (3) where it mixes with air coming in through pilot air jet (4). The mixture then goes up through pilot passage to pilot screw (5). A part of the mixture is discharged into the main bore out of bypass ports (6). The remainder is then metered by pilot screw and discharged into the main bore through pilot outlet (7).



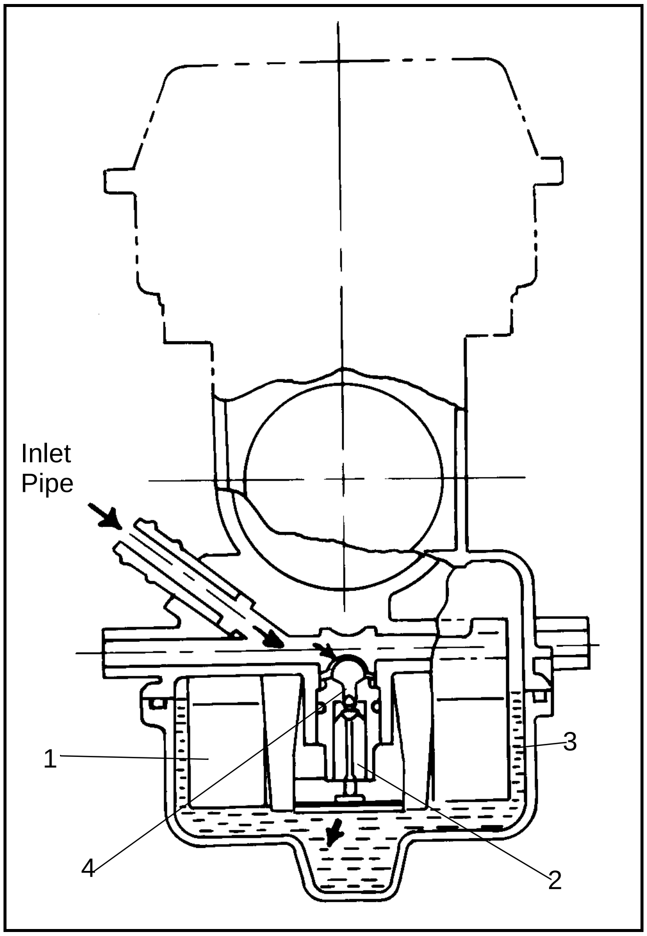
Main System

As throttle valve (1) is opened, engine speed rises, and this increases negative pressure in the venturi. Consequently the vacuum slide (2) moves upward. The fuel in float chamber (3) is metered by main jet (4), and the metered fuel enters needle jet (5), in which it mixes with the air admitted through main air jet (6) to form an emulsion. The emulsified fuel then passes through the clearance between needle jet (5) and jet needle (7), and is discharged into the venturi (A). Mixture proportioning is accomplished in needle jet (5); the clearance through which the emulsified fuel must flow is determined ultimately by throttle position and vacuum slide height.



Float System

Fuel enters the float chamber (3) by means of the inlet pipe and passage, through a screen on the back of the inlet needle seat (4), and around the inlet needle (2). As the fuel fills the float chamber, the float (1) rises and forces the inlet needle against the seat, shutting off the orifice in the seat. When fuel level is up in float chamber, floats are up and needle valve remains pushed up against valve seat. Under this condition, no fuel enters the float chamber. As the fuel level falls, floats go down and needle valve unseats itself to allow fuel into the chamber. In this manner, the needle valve releases and shuts off fuel alternately to maintain a constant fuel level inside the float chamber.



Pilot Screw

The pilot system supplies fuel during engine operation with the throttle valve closed or slightly opened. The fuel/air mixture is metered by pilot screw and discharged into the main bore through the pilot outlet.

CAUTION

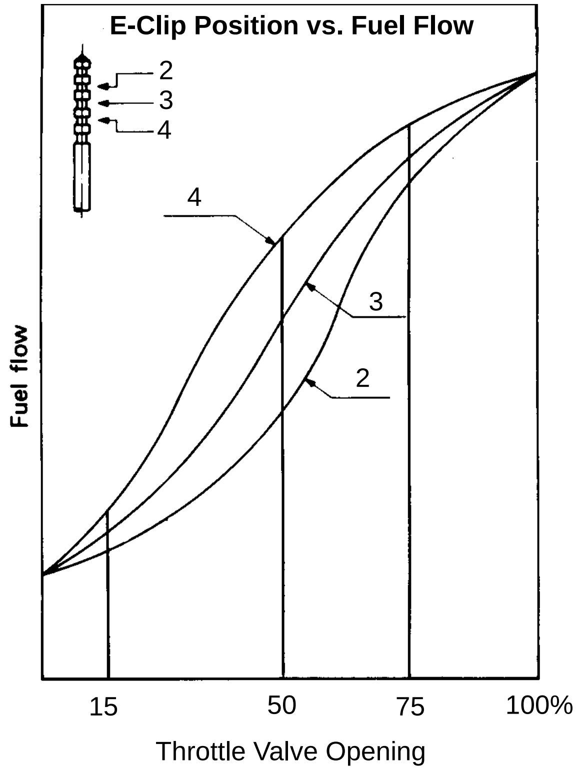
The pilot screw is calibrated at the factory to meet EPA / CARB regulations for air quality standards and is sealed with a brass plug to prevent tampering. Removal of the tamper proof plug is not permitted. For service purposes, cleaning of the pilot circuit can be done only by a certified repair shop to ensure air quality standards are not exceeded.

Pilot Screw Location

Brass Plug Installed

Brass Plug Removed

Air/Fuel Mixture Ratio



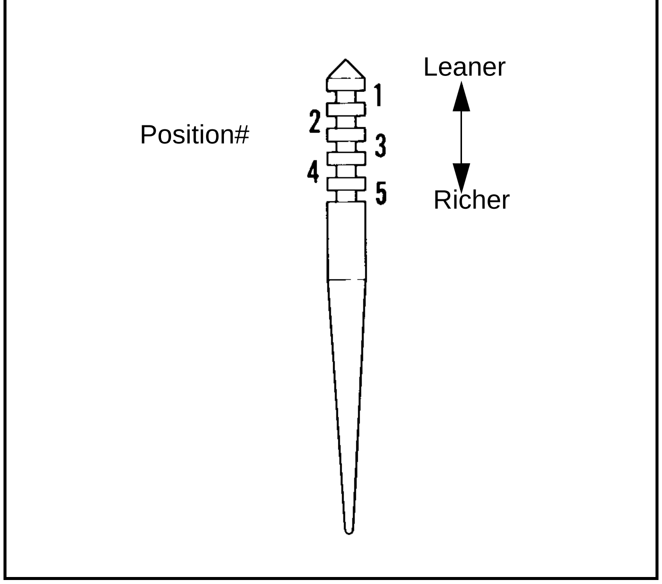
A carburetor with a slide type throttle valve is also called a variable venturi type carburetor. In this type of carburetor, the needle jet and jet needle serve to control proper air/fuel mixture ratio at the medium throttle valve opening (between 1/4 and 3/4 opening).

Having the proper needle jet and jet needle has a major impact on engine performance at partial load. The jet needle tapers off at one end and the clearance between the jet needle and the needle jet increases as the throttle valve opening gets wider. The air/fuel mixture ratio is controlled by the height of the "E" clip inserted into one of the five slots provided in the head of the jet needle. The previous chart shows the variation of fuel flow based on the height of the "E" clip.

Jet Needle

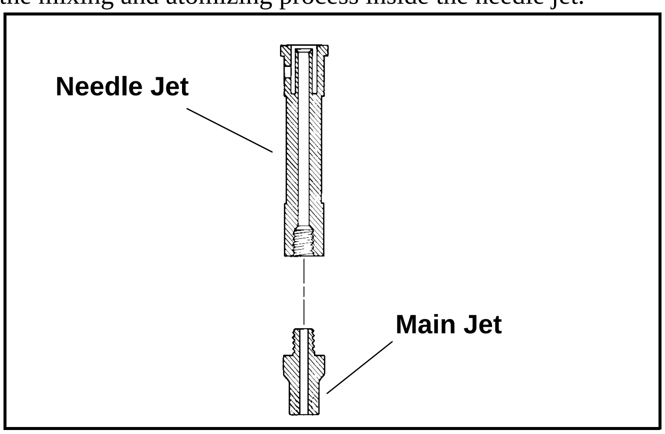
The jet needle has five adjustment grooves cut into the upper portion, and is tapered from approximately the middle of the needle to the lower end. The top is fixed to the center of the throttle valve by the needle clip, and the tapered end extends into the needle jet. Fuel flows through the space between the needle jet and jet needle. This space does not vary until the throttle reaches the 1/4 open point. At that time the tapered portion of the needle begins to move out of the jet, affecting fuel flow as the opening enlarges. If the needle clip is changed from the standard position to a lower groove, the needle taper starts coming out of the jet sooner, resulting in a richer mixture. Moving the clip higher produces a leaner mixture. If the taper is worn due to vibration, fuel flow may be significantly affected.

Jet Needle



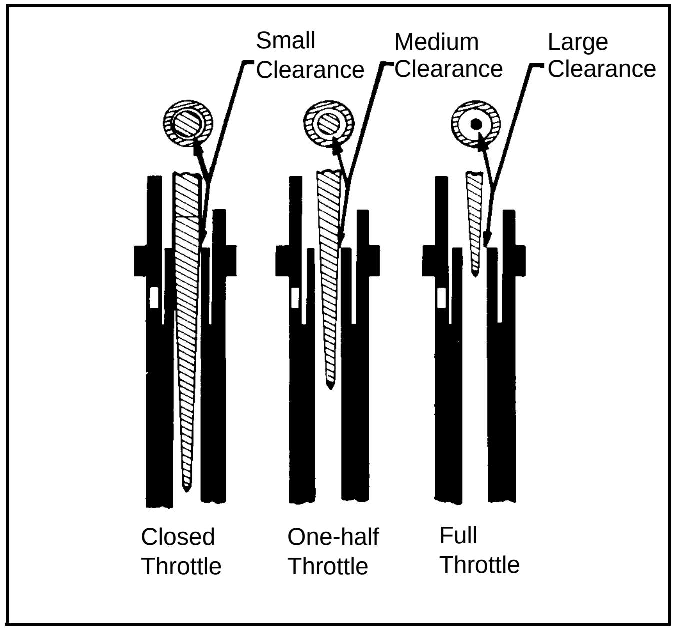
Needle Jet

The needle jet works in conjunction with the jet needle to regulate fuel flow rate. An air bleed opening in the side of the needle jet brings in air measured by the air jet. This air initiates the mixing and atomizing process inside the needle jet.



Throttle Opening vs. Fuel Flow

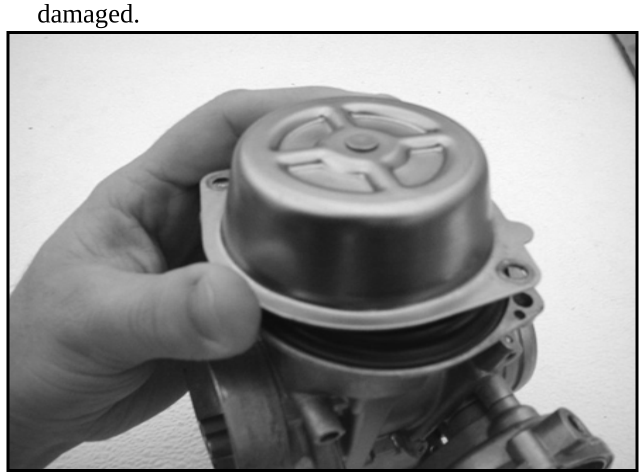
In a full throttle condition the cross sectioned area between the jet needle and the needle jet is larger than the cross sectioned area of the main jet. The main jet therefore has greater control over fuel flow.



Carburetor Disassembly – Mikuni CV

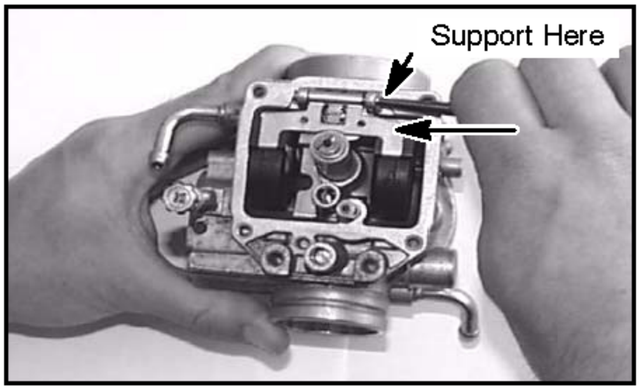
Use the following disassembly, assembly, and inspection techniques to service a CV carburetor.

1. Remove carburetor diaphragm chamber cover with a ratchet style screwdriver. DO NOT use an impact driver to remove the screws or carburetor may be permanently damaged.

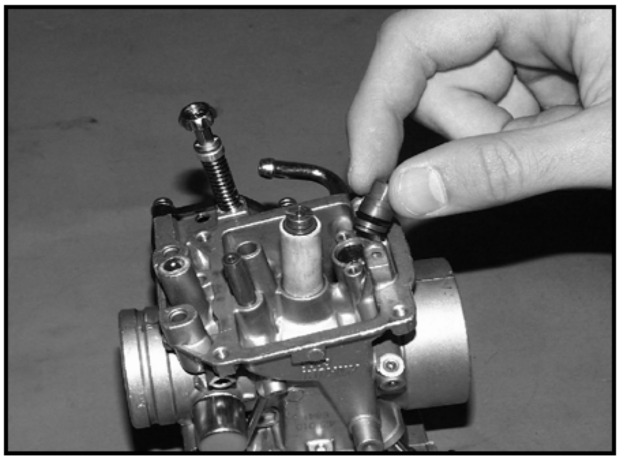


2. Remove float bowl. Remove the float pin screw. The float

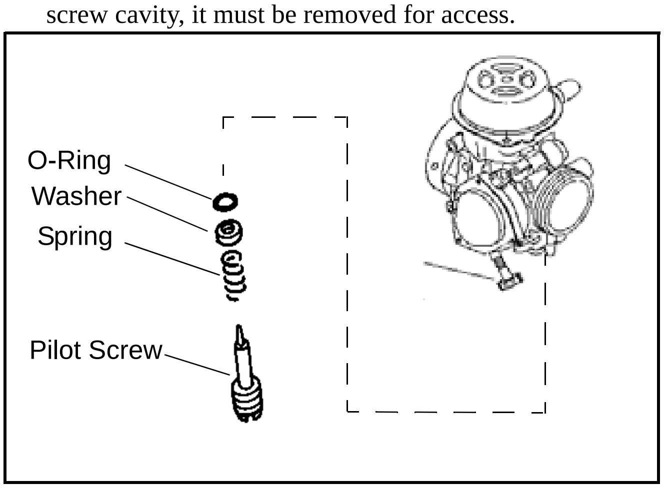
and float pin can be removed.



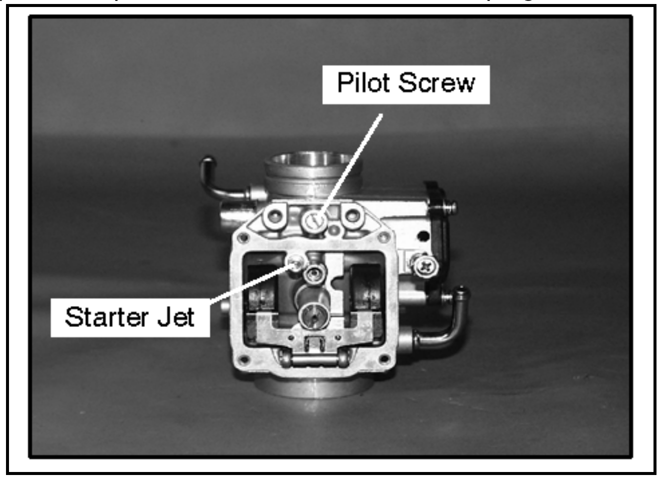
3. Remove inlet needle seat retaining screw along with plate, and carefully remove needle seat. **NOTE:** Do not use a pliers to remove the seat or permanent damage may occur.



4. Remove the pilot mixture screw, spring, flat washer, and O–Ring. If an anti–tamper plug is installed over the pilot screw cavity, it must be removed for access.



NOTE: The starter jet is removable. Upon disassembly, place the parts in a container for safe keeping.



Carburetor Cleaning

WARNING

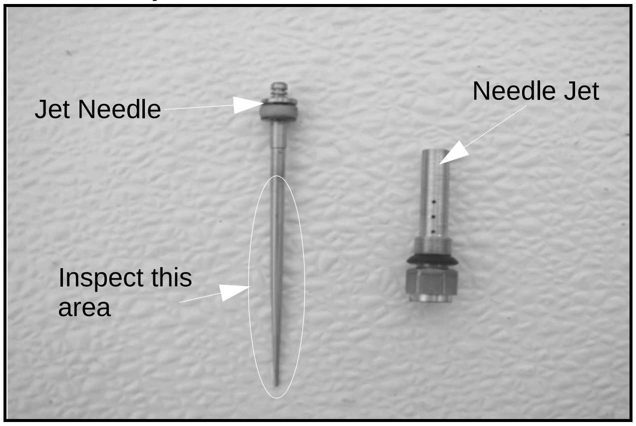
Protect eyes from contact with cleaner. Take appropriate safety measures during these procedures. Safety glasses and chemical resistant gloves are required. Should you get cleaner in your eyes or if you swallow cleaner, seek medical attention immediately.

Carburetor cleaners can be extremely caustic. Extended periods of soaking can loosen the adhesive sealer on the passage drill-way plugs. *Do not* soak rubber or plastic components (such as the vacuum slide diaphragm, needle seat screen, or O-Rings in caustic cleaning solutions. Damage may occur. Do not use agitator-type carburetor cleaning equipment. Rubber parts must be cleaned with mild detergent and hot water only.

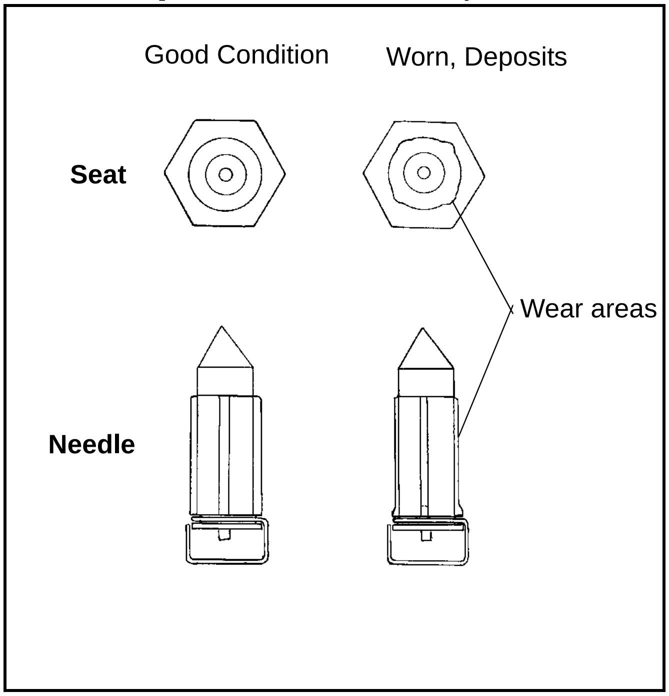
1. Thoroughly clean the carburetor body, jets, and all passages with carburetor cleaner or electrical contact cleaner.
2. If the carburetor is extremely dirty or contaminated with fuel residue and varnish, soak for short periods only in carburetor cleaner, and rinse in hot water.
3. Replace the jets if they have a buildup of fuel residue or bacterial growth that cannot be removed. Even a small amount of residue will reduce the flow characteristics of the jet.
4. Verify all passages and jets are unobstructed by spraying electrical contact cleaner through the passages. **CAUTION:** Do not use wire or welding tip cleaners as the orifice size may be altered.
5. Use low pressure air to dry carburetor body and all components.

Carburetor Inspection

1. Inspect jet needle and needle jet for wear. Look for discoloration, shiny spots, or an area that looks different than the rest of the needle. The middle to upper portion of the needle contacts the needle jet and is the most likely wear point. If jet needle shows signs of wear replace *both the needle and needle jet* to prevent a rich condition. TIP: A worn *needle jet* is difficult to spot. To check, slide a slightly larger *new jet needle* into the needle jet and hold it to a light source. Light will be visible between the needle and needle jet if it is worn.

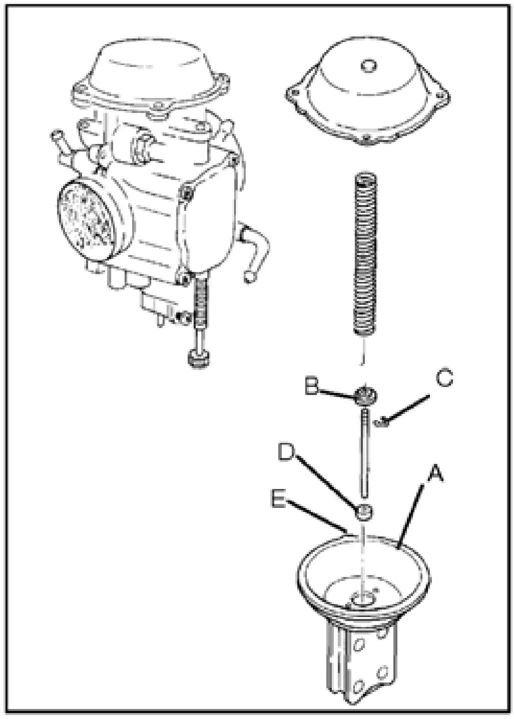


2. Inspect the inlet needle tapered surface for any sign of wear or damage. Be sure the spring loaded pin is free moving and returns freely when pushed. The inlet needle and seat should be pressure tested after assembly.

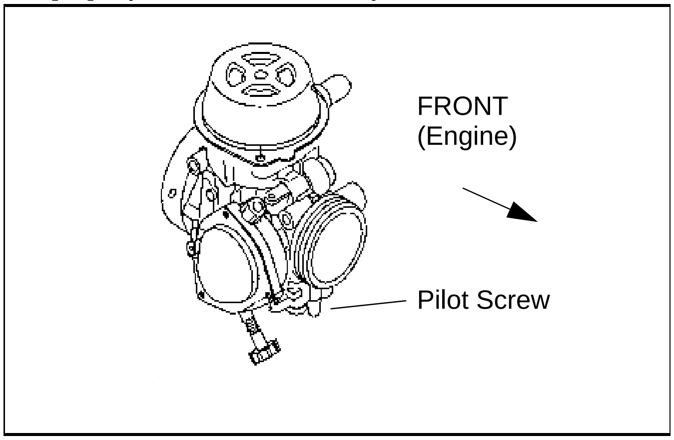


Carburetor Assembly

Inspect the diaphragm (A) for holes, deterioration, or damage. Make sure the diaphragm is pliable but not swollen. The diaphragm should fit properly in the carburetor body. Replace diaphragm assembly if diaphragm is damaged.



1. Replace parts in proper order. The spring seat (B) is stepped and must be placed on TOP of “E” Clip (C). Spacer washer (D) must be installed below the E–Clip. Refer to parts manual for more information.
2. Be sure the tab (E) on outer edge of diaphragm is positioned properly in the carburetor body.



3. Install the pilot mixture screw, spring, washer, and O–ring as an assembly. Lubricate the O–Ring with oil or light grease before installation. **CAUTION:** Do not damage the O–ring during installation. Turn the screw in until it *lightly* contacts the seat. Back out the specified number of turns. NOTE: The final pilot (idle) mixture must be adjusted with

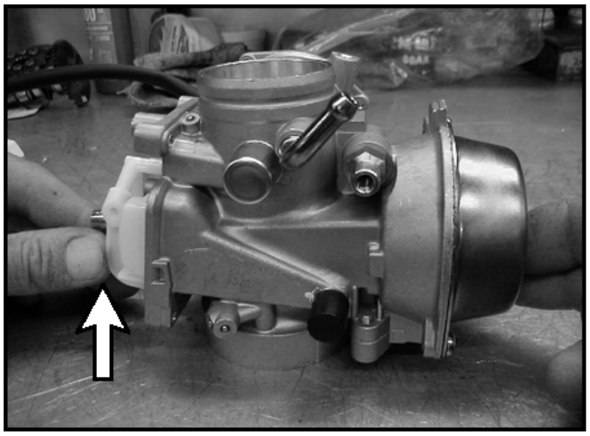
the engine running. Refer to Page 2.10.

**Pilot Screw Base Setting
(Set at Factory)**

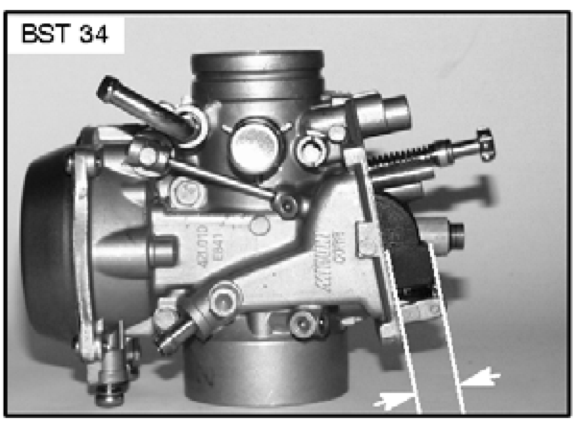
Factory Specification: 2.5 Turns Out

Float Height Adjustment

1. **Illustration 1**: Place the throttle side of the carburetor on a level surface to remove weight from float arm. In this position, the float tongue will rest slightly outward.



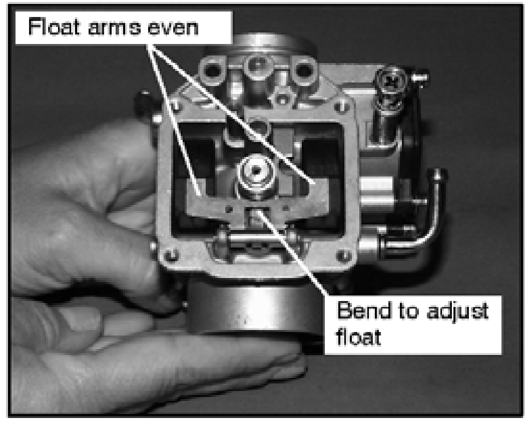
2. **Illustration 2**: With the carburetor still resting on the level surface, use one hand to slightly tilt the carburetor back. The float will then fall into the correct position, with the float tongue resting lightly on the inlet needle valve pin without compressing the spring. The bottom of the float should be parallel with the float bowl mating surface. **Illustration 3**: **NOTE:** If the float is past parallel with the mating surface, the carburetor has been tilted back too far and the float tongue is likely compressing the needle valve pin.



3. Measure the height from the float bowl mating surface to the top of step of the float as shown in Illustration 2. Both sides of float should be parallel to each other. The measurement should be made at the mid–point on top of the float using Float Adjustment Tool (**PN 2872314**) or a vernier caliper. When measuring the height, be sure the inlet needle valve spring is not compressed.

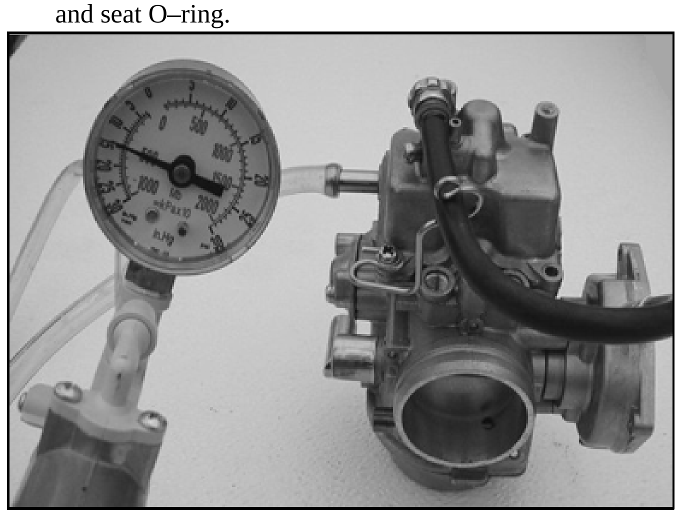
Float Bowl Height: 13-14 mm

4. If adjustment is necessary, bend the tongue slightly. Be sure float measurement is even on left and right side.



Needle and Seat Leakage Test

1. Install the float bowl. Invert the carburetor and install a Mity–Vac™ (**PN 2870975**) to the fuel inlet fitting. Apply 5 PSI pressure to inlet fitting. The needle and seat should hold pressure indefinitely. If not, inspect needle and seat and seat O–ring.

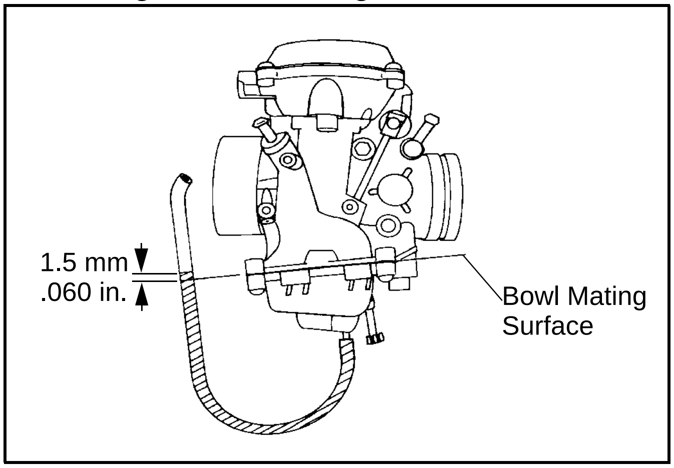


Mity Vac™ (PN 2870975)

Fuel Level Test

A fuel level test can be performed on some models if the drain hose fitting is accessible. Be sure to re–attach the bowl drain hose after performing the test. A fuel level test allows you to observe the height of the fuel in the float bowl without removing the carburetor. The fuel level can be observed with the engine either running or shut off, however, engine must run briefly to allow fuel level to stabilize.

1. Attach a clear line to drain fitting. Be sure line fits tightly on fitting. Position hose along side of carburetor as shown.

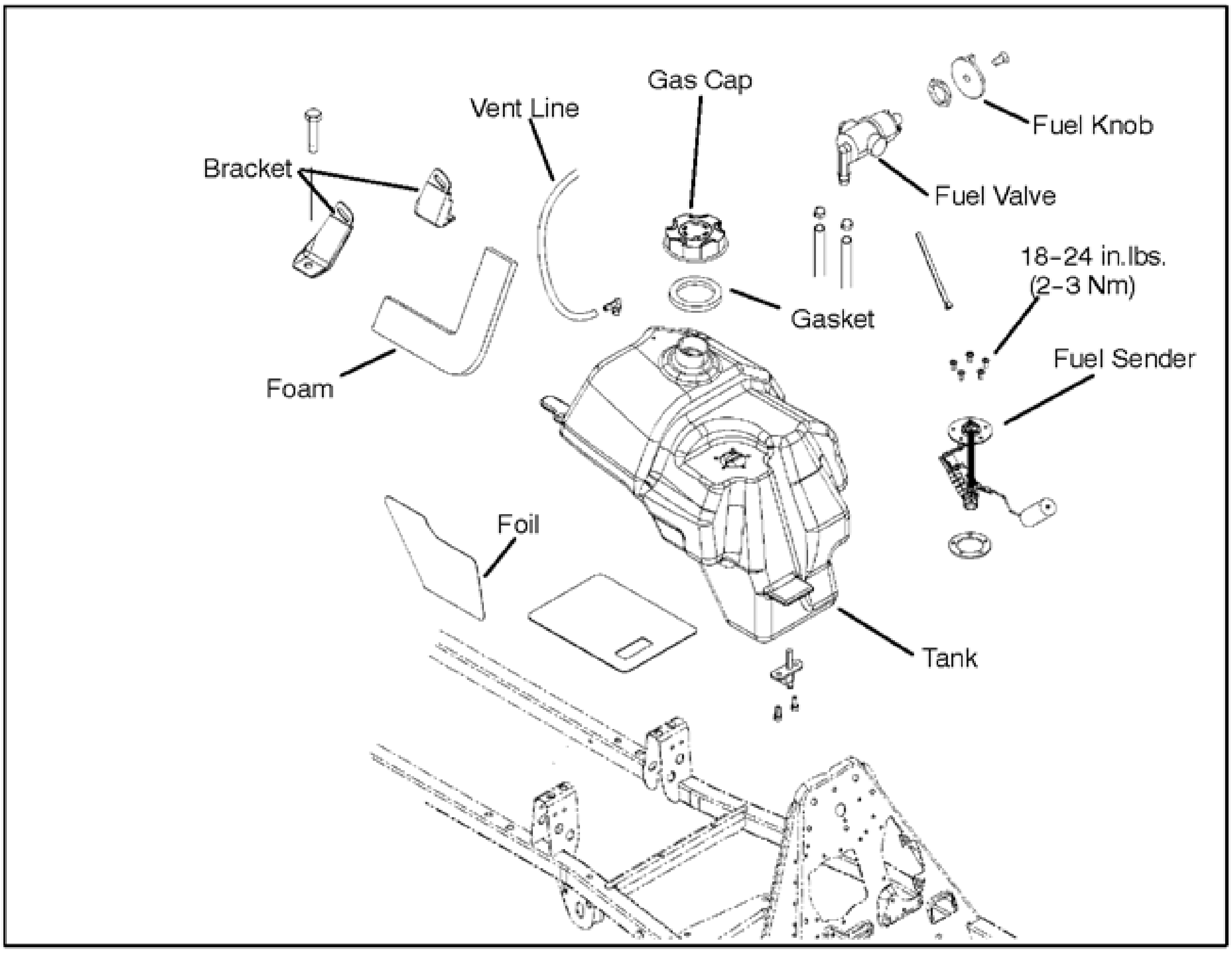


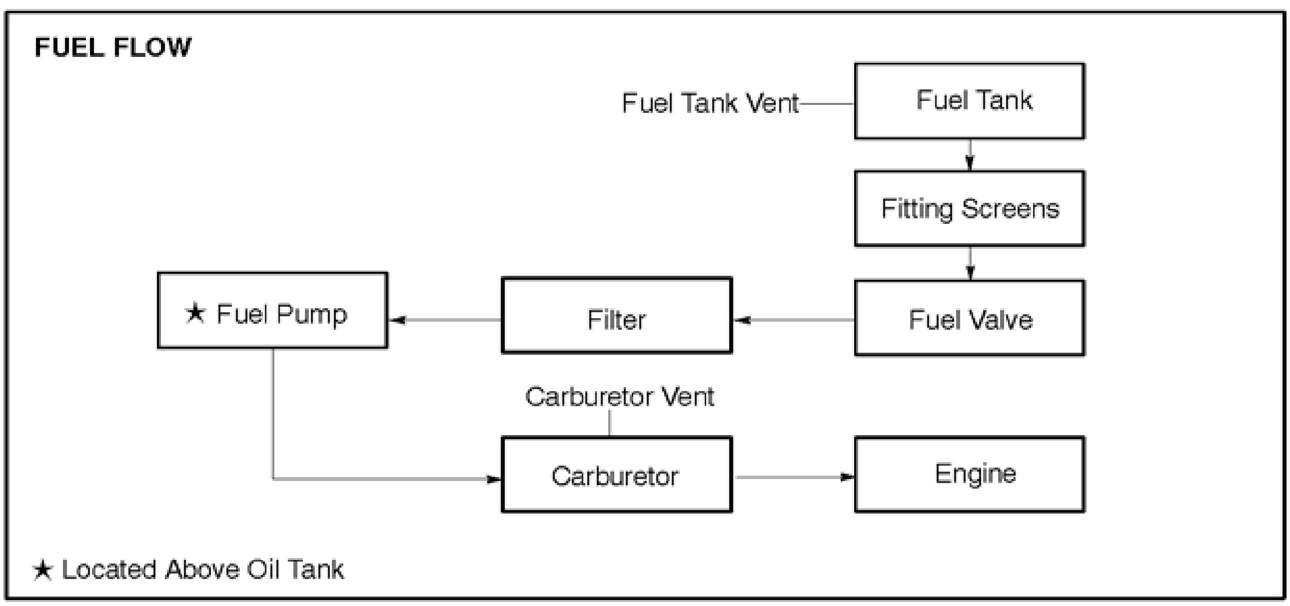
2. Open bowl drain screw by turning counterclockwise approximately two turns. Start and run engine for 3 to 5 seconds to allow fuel level to stabilize in the line. If level is out of specification, remove carburetor and inspect inlet needle and seat, float height, passages, etc.

NOTE: If a line was removed to perform this procedure, it must be replaced.

FUEL TANK/FUEL DELIVERY SYSTEM

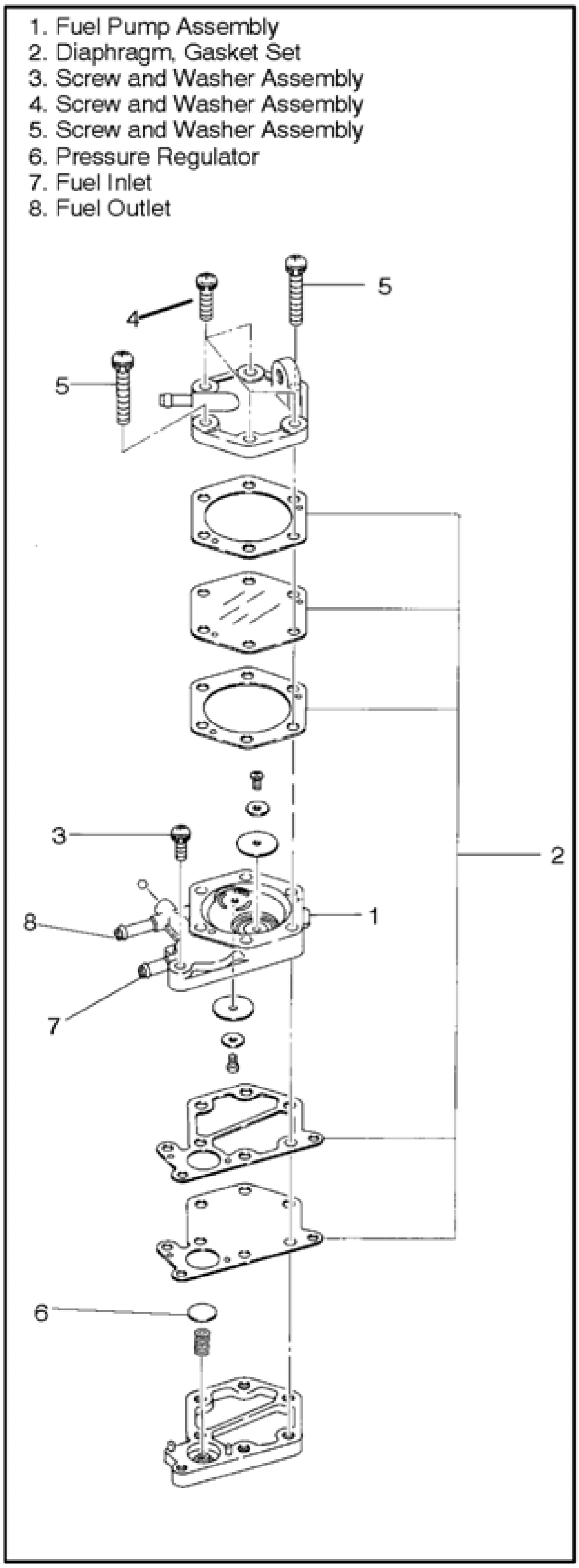
Fuel System Exploded View





FUEL PUMP

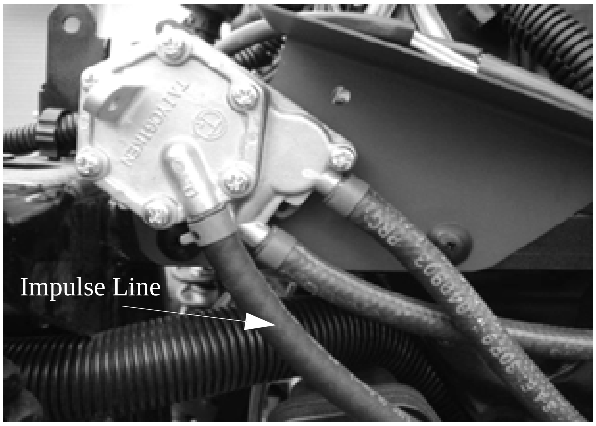
Fuel Pump Testing



This ATV is equipped with a pressure regulated fuel pump (1-3 PSI). The pump is located under the left front fender of the machine.

To test the fuel pump:

1. Turn fuel off.
2. Disconnect impulse line from pump.
3. Connect Mity-Vac™(PN 2870975) to the impulse line fitting on the pump.



4. Apply 5 inches (Hg) vacuum to the pump fitting. The diaphragm should hold vacuum indefinitely.

If fuel is present in the impulse line or vacuum chamber of the pump, the diaphragm is ruptured. The pump diaphragms must be replaced.

Fuel Pump Disassembly

1. Remove the screws from the pump assembly.

NOTE: Mark the location of the 2 longer screws for reassembly.

2. Remove the diaphragm cover, gasket, diaphragm, and valve body gasket.
3. Remove the outlet check-valve cover, diaphragm and gasket.

Fuel Pump Inspection and Reassembly

1. Inspect inlet and outlet check valves for cracks, warping or damage.
2. Inspect the diaphragms for cracks, holes or swelling.
3. To clean the valves or pump body, remove the set screw and washer. Remove the valve assembly and wash with soap and water.

NOTE: Carburetor cleaner may used to clean the pump body when the check valves are removed.

CAUTION

Carburetor cleaners are caustic and should not be used to clean non-metal parts of the fuel pump. Avoid breathing of vapors.

4. Carefully remove all traces of old gaskets and check the surfaces for damage. Replace diaphragms and gaskets as a set.
5. Reassemble the pump in reverse order of disassembly. Tighten all screws evenly.

Fuel Filter Replacement

1. Loosen the filter clamps and remove filter.

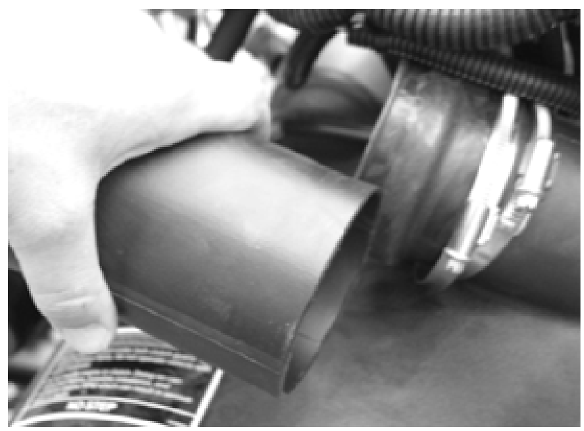
2. Install new filter onto fuel lines and install clamps.

FUEL GAUGE SENDING UNIT

Sending Unit Removal

1. Disconnect the negative battery cable.
2. Remove the side panels and front cab assembly. Refer to Chapter 5 for details.
3. Remove the gas tank cover vent hose. Be sure to properly route the vent hose upon reassembly.

4. Remove the clamps on the PVT intake duct and remove the PVT duct.



5. With all the body panels removed from the front of the ATV and the gas tank exposed, disconnect the fuel sender wiring harness.

6. Remove the 5 screws that secure the fuel sender to the tank.

7. Slowly lift the sender out of the tank. Lift the sender out at an angle, so the float will more easily come out of the fuel tank.

Testing

Refer to Chapter 10 for fuel gauge sending unit troubleshooting.

Sending Unit Installation

1. Reinstall the fuel sender with a new gasket, using care not to bend or damage the float arm.
2. Install the 5 screws and torque the screws to specification. Reconnect the sender and route the harness properly.

= T
Sending Unit Screw Torque: **18--24 in.lbs. (2--3 Nm) in criss-cross pattern**

3. Reinstall the PVT intake duct, gas tank vent line, front cab assembly, and side panels.

NOTE: Properly route the gas tank vent line, use tape to secure the vent line in place. (See Pic 1).

4. Reconnect the negative battery cable. Test the sender for proper operation.

TROUBLESHOOTING

FUEL STARVATION/LEAN MIXTURE

Symptoms: Hard start or no start, bog, backfire, popping through intake / exhaust, hesitation, detonation, low power, spark plug erosion, engine runs hot, surging, high idle, idle speed erratic.

- No fuel in tank
- Restricted tank vent, or routed improperly
- Fuel lines or fuel valve restricted
- Fuel filter plugged
- Carburetor vent line(s) restricted
- Plugged or restricted inlet needle and seat screen or inlet passage
- Clogged jets or passages
- Float stuck, holding inlet needle closed or inlet needle stuck
- Float level too low
- Intake air leak (throttle shaft, intake ducts, airbox or air cleaner cover)
- Jet needle position incorrect
- Incorrect pilot screw adjustment

RICH MIXTURE

Symptoms: Fouls spark plugs, black, sooty exhaust smoke, rough idle, poor fuel economy, engine runs rough/ misses, poor performance, bog, engine loads up, backfire.

- Air intake restricted (inspect intake duct)
- Air filter dirty/plugged
- Electric choke inoperative
- Incorrect pilot air/fuel screw adjustment
- Faulty inlet needle and seat
- Faulty inlet needle seat O-Ring
- Float level too high
- Poor fuel quality (old fuel)
- Loose jets
- Worn jet needle/needle jet or other carburetor parts
- Dirty carburetor (air bleed passages or jets)

POOR IDLE

Idle Too High

- Idle adjusted improperly/idle mixture screw damaged
- Sticky vacuum slide
- Throttle cable sticking, improperly adjusted, routed incorrectly
- Choke cable sticking, improperly adjusted, routed incorrectly
- Plugged or restricted idle jet

Idle Too Low

- Choke cable bending or incorrectly adjusted
- Idle speed set incorrectly
- Idle mixture screw misadjusted or damaged
- Belt dragging
- Ignition timing incorrect
- Worn jet needle/needle jet
- Plugged or restricted idle jet

Erratic Idle

- Choke cable bending or incorrectly adjusted
- Throttle cable incorrectly adjusted
- Air leaks, dirty carburetor passages (pilot circuit)
- Pilot mixture screw damaged or adjusted incorrectly
- Tight valves
- Ignition timing incorrect
- Belt dragging
- Dirty air cleaner
- Engine worn
- Spark plug fouled
- Idle speed set incorrectly (speed limiter)
- Worn jet needle/needle jet
- Plugged or restricted idle jet

CHAPTER 5

BODY / STEERING / SUSPENSION

5

GENERAL INFORMATION

Torque Specifications

Table 5-1:

COMPONENT	FT.LBS. (IN.LBS.)	NM
Front Hug Nut	70	95
Front A-Arm Attaching Bolt	30	41
Front A-Arm Ball Joint Stud Nut	25	35
Handlebar Adjuster Block	11-13	15-18
Master Cylinder Clamp Bolt	(45-55)	5.2-6.3
Rear Shock Bolt (Upper)	30	41
Rear Shock Bolt (Lower)	30	41
Rear Wheel Hub Nut	80	108
Upper Stabilizer Support Nuts	17	27
Upper Control Arm Mounting Bolt	35	48
Lower Wheel Bearing Carrier Bolt	50	68
Strut Rod Retaining Nut (Top)	15	21
Strut Casting Pinch Bolt	15	21
Tie Rod End Jam Nut	12-14	17-19
Tie Rod End Castle Nut	40-45	54-61
Tie Rod End Attaching Bolt	25-30	35-41

NOTE: Refer to exploded views throughout this chapter for identification and location of components.

Special Tools

Table 5-2:

PART NUMBER	DESCRIPTION
2870871	Ball Joint Replacement Tool
2870872	Shock Spanner Wrench
2870623	Shock Absorber Spring Compression Tool
2871572	Strut Rod Wrench
2871573	LH Strut Spring Compressor
2871574	RH Strut Spring Compressor
7052069	Charging Needle
2200421	Gas Shock Recharging Kit
2871352	Shock Rod Holding Tool
2871199	Seal Sleeve Installation Tool Kit
2870872	Shock Spanner Wrench
2871351	Fox™ Shock IFP Depth Tool

Decal Replacement

Flame Treating Decal Area

Plastic polyethylene material must be “flame treated" prior to installing a decal to ensure good adhesion. The flame treating procedure can often be used to reduce or eliminate the whitish stress marks that are sometimes left after a fender or cab is bent, flexed, or damaged.

WARNING

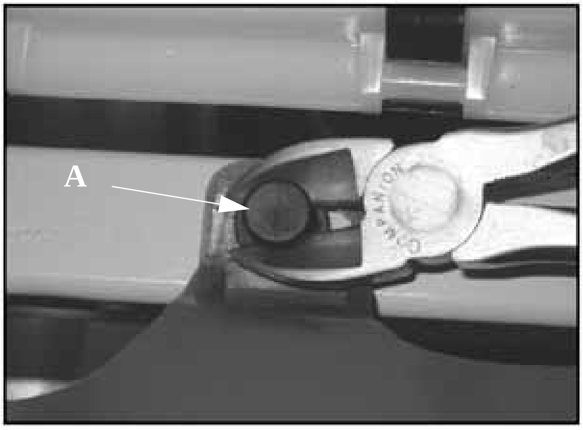
The following procedure involves the use of an open flame. Wear the appropriate safety equipment at all times. Perform this procedure in a well ventilated area, away from gasoline or other flammable materials. Verify the area to be flame treated is clean and free of gasoline or flammable residue.

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. Keep the torch moving to prevent damage.
2. Apply the decal.

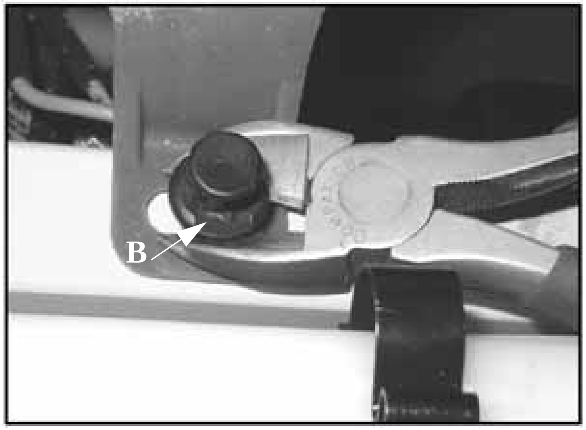
Plastic Insert Removal / Installation

Some Polaris ATVs use a two piece plastic insert in place of a metal screw. The plastic inserts are simple to remove and install.

1. Use a a pair of diagonal side cutters to lift the plastic insert (A) until you feel some slight pressure or lift the insert approximately 1/4" (6.35 mm). Apply just enough pressure on the side cutters to lift up on the insert. DO NOT apply too much pressure on the side cutters, or damage to the insert will occur.



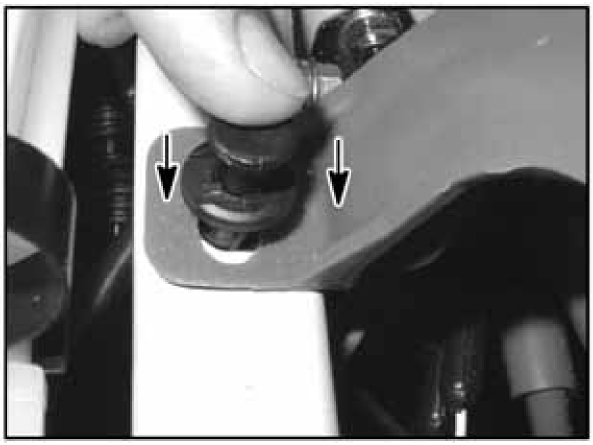
2. Next, use the diagonal side cutters under outside insert (B) to completely remove the assembly. NOTE: The inside insert (A) will still be installed in the outside insert (B).



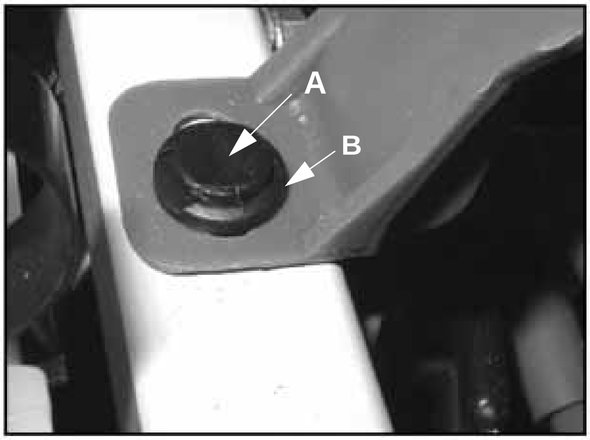
NOTE: The inside insert (A) will still be installed in the outside insert (B).

3. To install the inserts, press outside insert (B) into the hole. Press inside insert (A) until it snaps into place.

NOTE: The outside insert (B) should be flush surface after installation.



The inside insert (A) should be flush with the top of the outside insert (B).



5

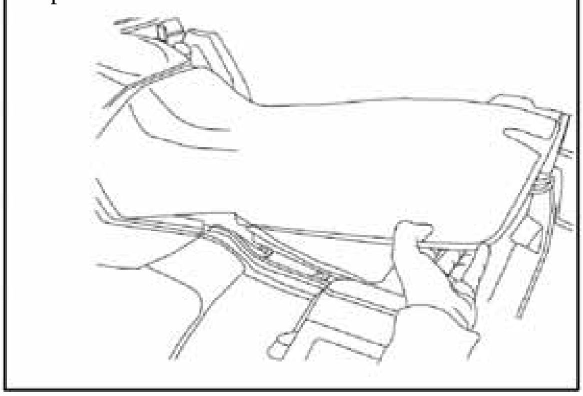
BODY

Side Panel Removal

Side panel removal is quick and easy, use the following instructions for removal and installation.

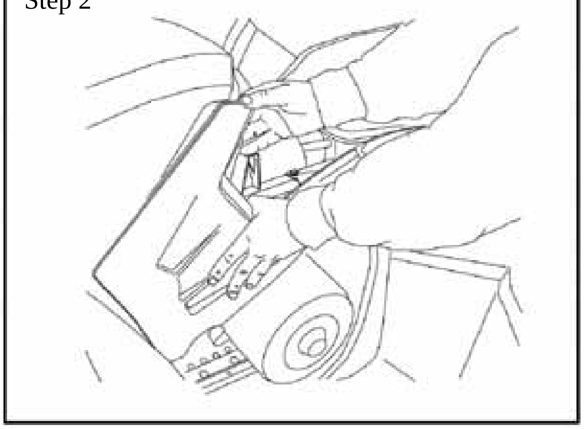
1. Remove seat by releasing the latch and lifting up on the seat.

Step 1



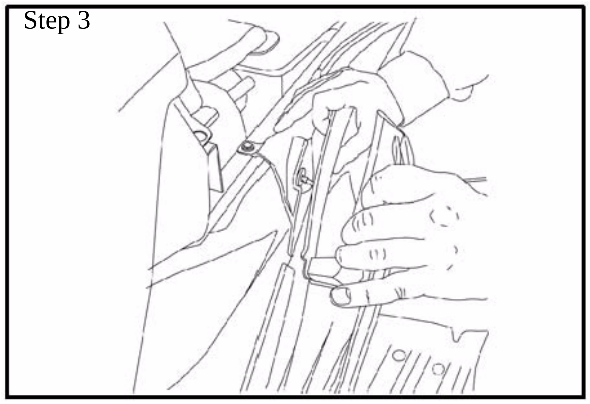
2. Grasp the rear of the side panel near the rear cab. With a firm motion, pull the panel outward to disengage the side panel from the grommet. Pull the panel downward and rearward to remove it from the ATV.

Step 2



3. Reinstall the side panel by reversing the removal procedure.

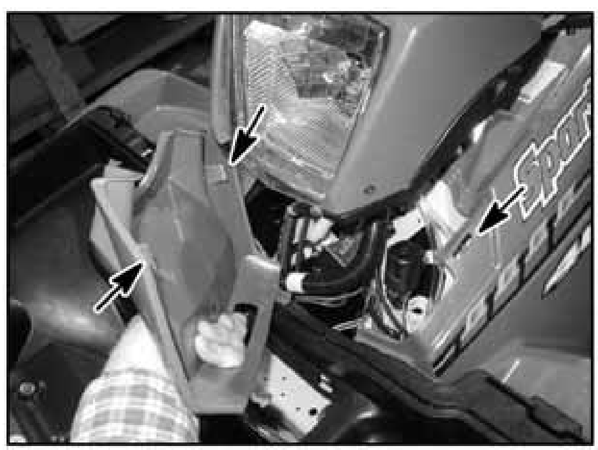
Step 3



Front Cover Removal / Installation

1. Open the front storage compartment
2. Pull up and outward on the front cover to remove the cover.

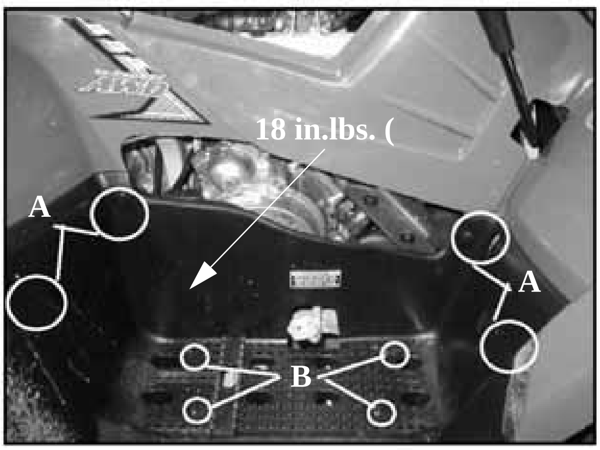
3. To install the front cover, insert the tabs of the front cover into the inserts of the cab. Make sure the tabs are aligned with the slots. Then press the rear tabs into the slots.



Foot Well Removal / Installation

1. Remove the four plastic inserts (A) that secure the wheel well to the front and rear cabs. (See “PLASTIC INSERT REMOVAL / INSTALLATION” for help).

2. Remove the four screws (B) from the bottom of the foot well. Remove the footwell.

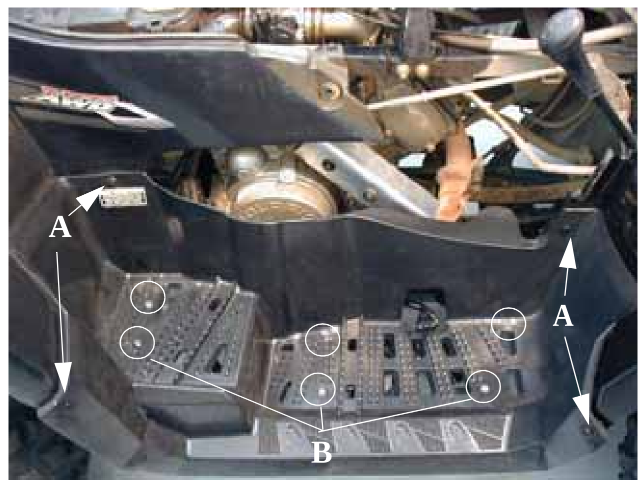


3. Reverse the removal procedures to install the foot well. Be sure to properly align the cab ends into the foot wells upon reassembly.

X2 Foot Well Removal / Installation

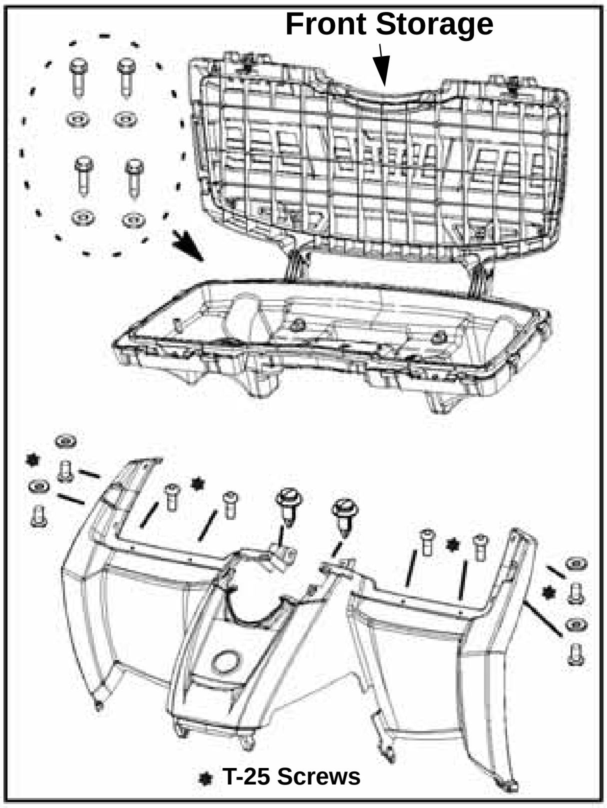
1. Remove the four plastic inserts (A) that secure the wheel well to the front and rear cabs. (See “PLASTIC INSERT REMOVAL / INSTALLATION” for help).

2. Remove the six screws (B) from the bottom of the foot well. Remove the footwell.

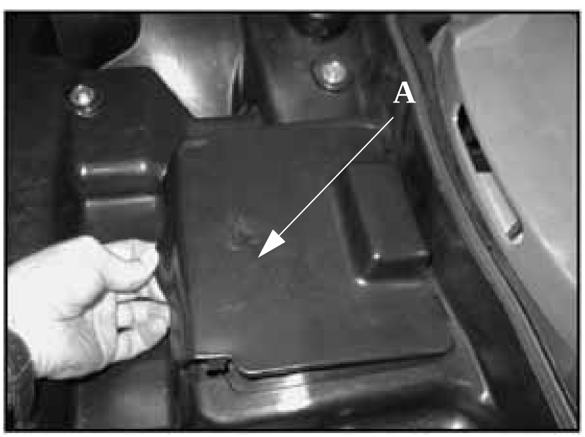


3. Reverse the removal procedures to install the foot well. Be sure to properly align the cab ends into the foot wells upon reassembly.

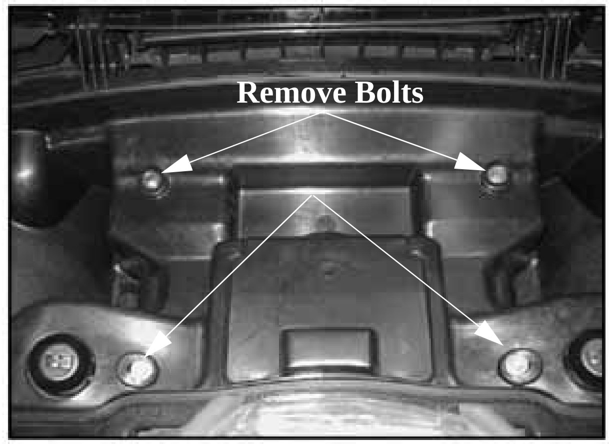
Front Storage Removal



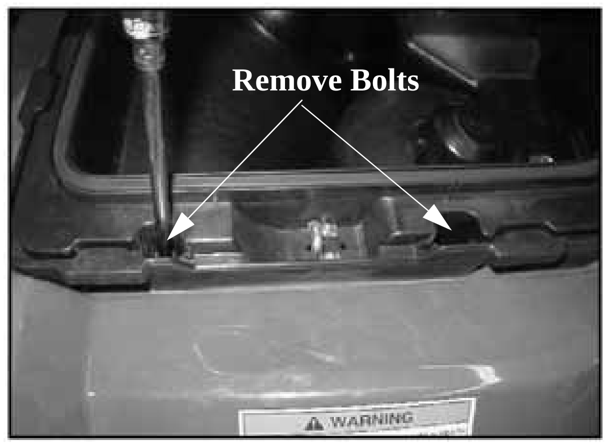
1. Remove the front radiator cap cover (A) by lifting upward on the cover.



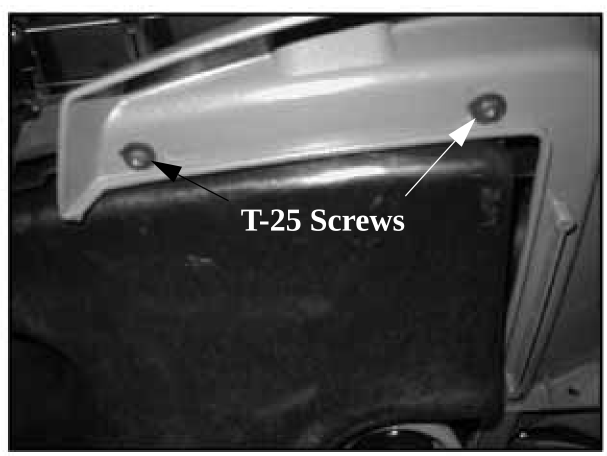
2. Remove the four bolts that secure the storage rack to the frame.



3. Remove the two (T25) screws that secure the storage box to the front fender well areas (each side).



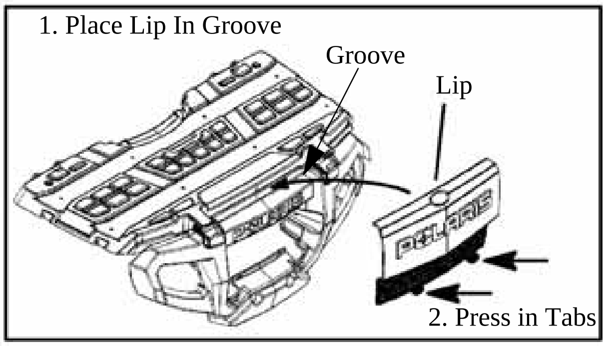
4. Remove the two (T25) screws that secure the outside of the storage box to the front fenders (each side).



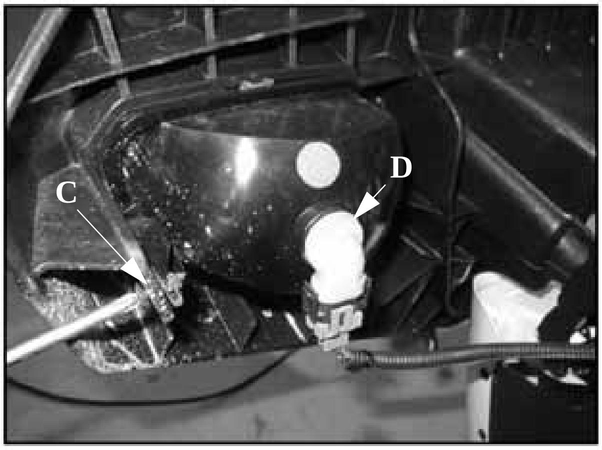
Winch Installation Area

5. Remove the front cover piece by lifting up on sides of the two locking tabs as shown. Pull the tabs out of the notches and lift up on the cover piece.

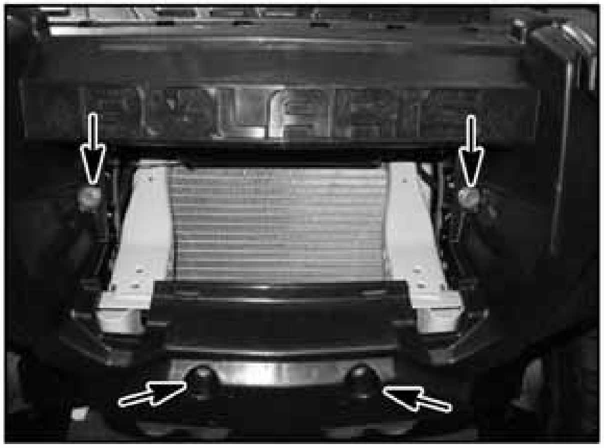
To install the front cover place top lip of the cover into and lift up to remove.



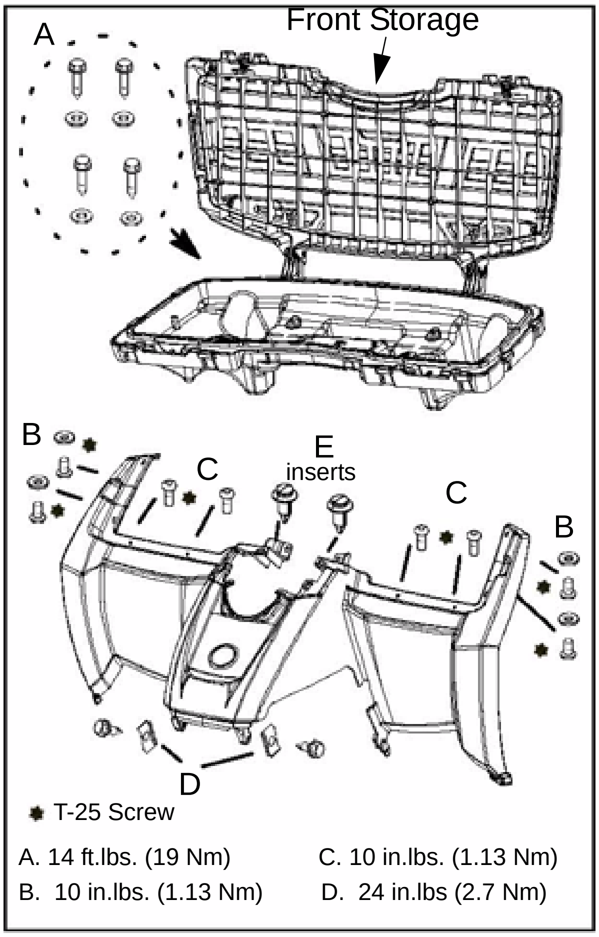
6. Remove the front headlights (C) or simply disconnect the electric connector (D) before removing the front plastic bumper.



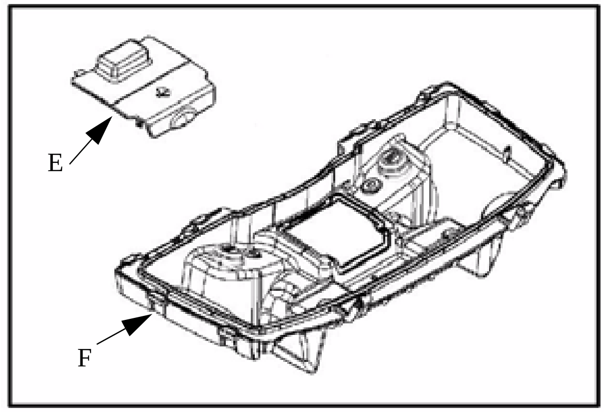
7. Remove the remaining bolts and screws that secure the front bumper section to the frame.



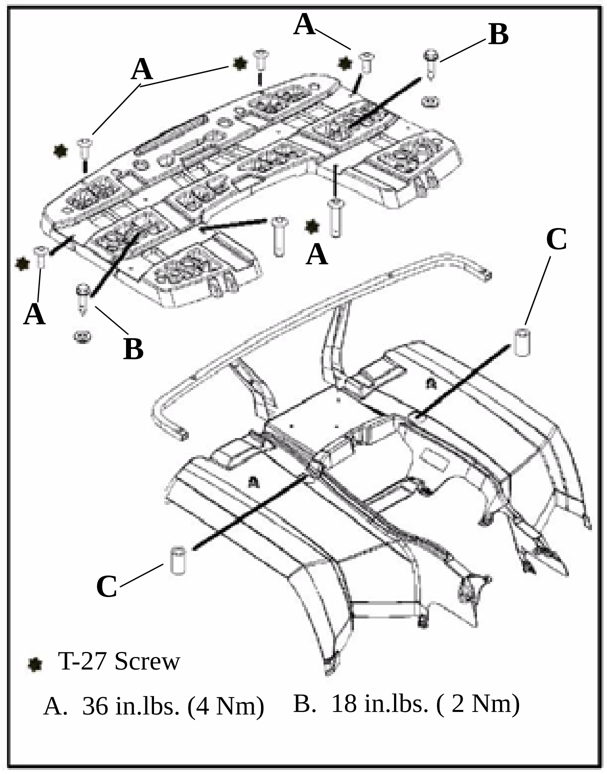
Front Storage Installation



1. Place the front storage rack onto the frame.
2. Install the four bolts (A) into the inside of the compartment hand tight.
3. Install the four screws and washers (B) (T-25) under the fender area (2 each side).
4. Install the four screws (C) (T-25) into the front fender area of the storage box (2 each side).
5. Install the two screws (D) into the rear area of the cab (if removed).
6. Install the two plastic inserts (E) into the front cab (if removed).
7. Torque all bolts and screws according to the illustration.
8. Install the front radiator cap cover (E) .



Sportsman Rear Rack Removal / Installation



1. Remove the six (A) T27 screws and two bolts (B) that secure the rear rack to the rear cab and frame.
2. Lift the rear rack from the ATV. Remove the two rack spacers (C).

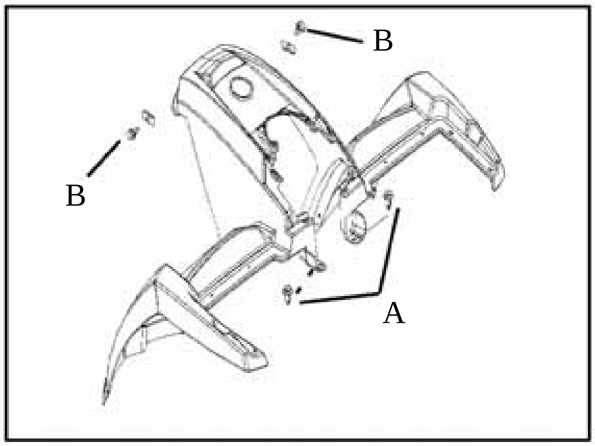
3. Place spacers on frame.

4. Install rear rack onto rear frame and cab.
5. Install the two bolts (B) and six (A) T-27 screws. Torque the bolts (A) to 18 in.lbs. (2 Nm) and six T-27 screws to 36 in.lbs. (4 Nm). Refer to the illustration for torque values.

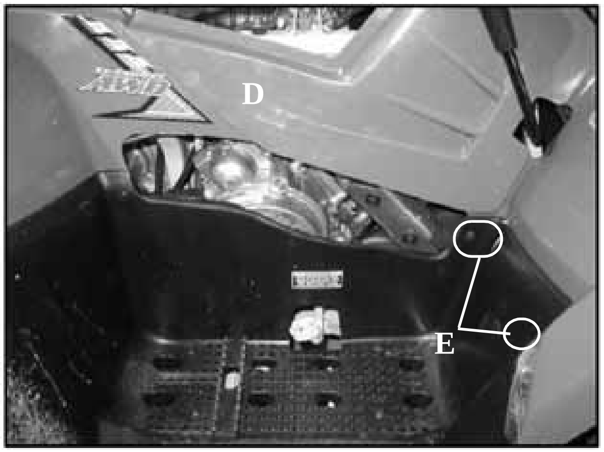
Front Cab/Fender Removal/Installation

1. Follow the “FRONT RACK / BUMPER REMOVAL” section to begin removal of the front cab, rack, and bumper.
2. Remove the plastic inserts (A) that secure the front cab to the upper strut support.

3. Remove the two screws (B) that secure the front cab to the frame in the fuel tank mount area.



4. Remove the side panels (D), refer to the “SIDE PANEL REMOVAL” section.
5. Remove the plastic inserts (E) that secure the front of the foot wells to the front cab.



6. Remove the fuel cap and place a clean lint free shop towel into the tank neck to keep any debris from falling into the tank.
7. The front cab should now slide back over the fuel tank and fuel tank neck.

NOTE: When removing the front cab use caution so the plastic cab does not scratch or get caught on other components.

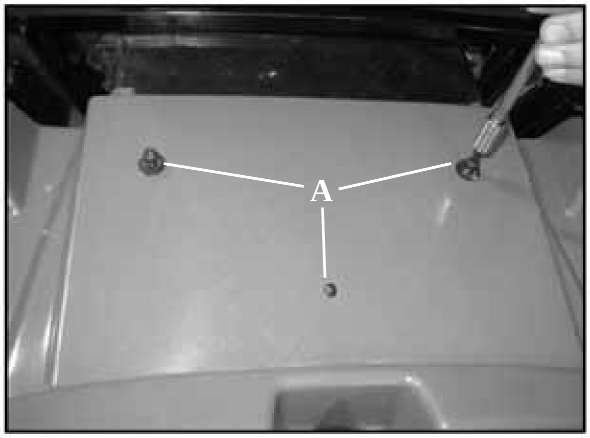
8. Reverse the removal steps for installation. Torque two front cab to frame screws to specification.

= T
Cab to Frame Screws **24 in.lbs. (2.7 Nm)**

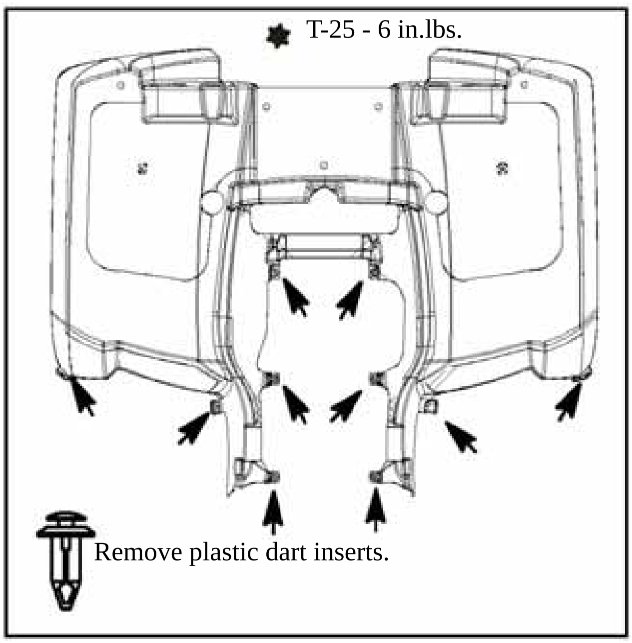
5

Sportsman Rear Cab / Fender Removal / Installation

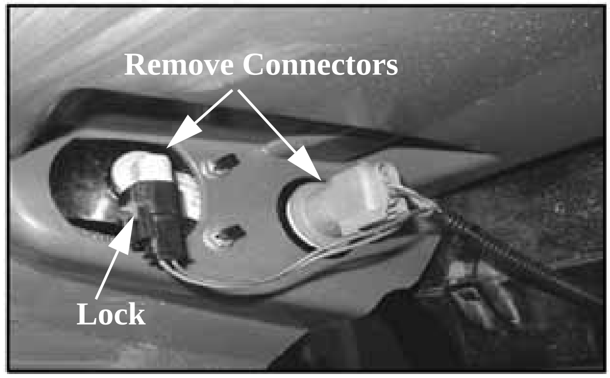
1. Follow the “REAR RACK REMOVAL” procedure to remove the rear rack.
2. Remove the three screws (A) (T-25) that secure the rear cab to the storage container.



3. Remove the ten plastic inserts that secure the rear cab to the frame and plastic.



4. Disconnect the rear lights by pulling the locks on each side and removing the connectors. Lift the rear cab from the frame.

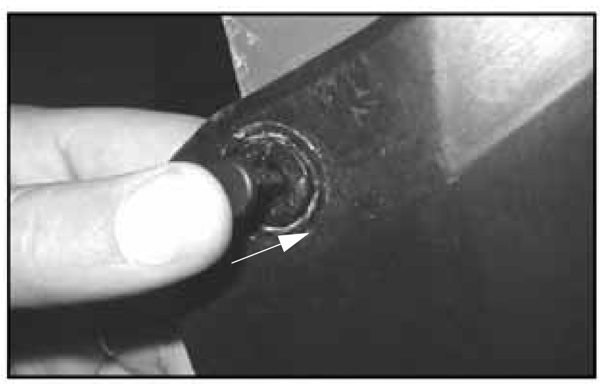


5. Reverse the removal steps for installation.

X2 Rear Quarter Panel Removal / Installation

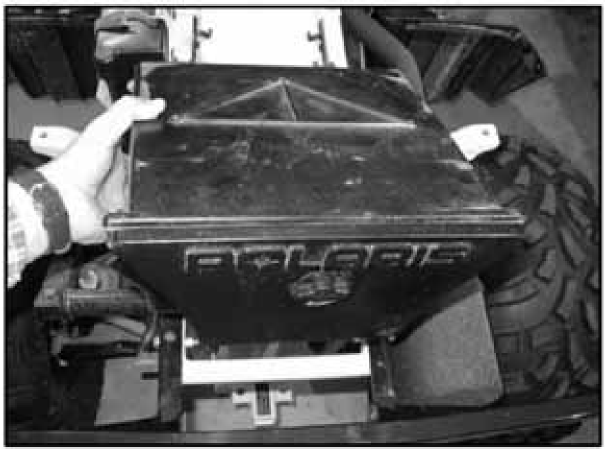
1. Remove the seat.
2. Remove the plastic inserts (circled) that secure the quarter panel to the rear footwell. (See “PLASTIC INSERT REMOVAL / INSTALLATION” for information).

3. Reverse the removal procedures to install the quarter panels. Verify panels are properly aligned to the footwell end upon reassembly.



Sportsman Rear Storage Removal / Installation

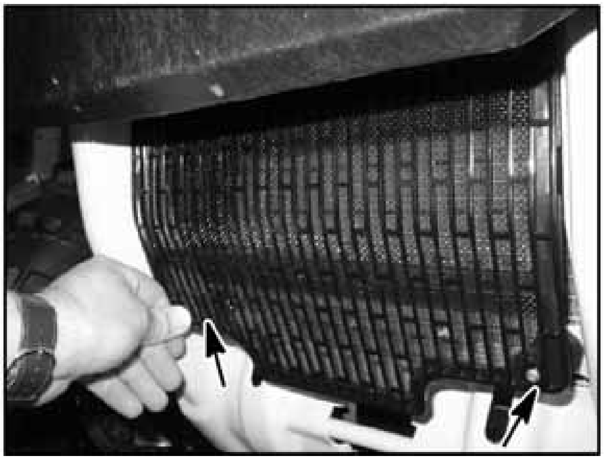
1. Follow the "REAR RACK REMOVAL" and "REAR CAB REMOVAL" procedure to remove the rear storage compartment. After the rear cab is removed the storage compartment comes out.
2. Remove the two plastic inserts that hold the rear storage compartment in place.
3. For installation, reverse the removal steps.
4. Torque the three T-25 screws that hold the rear storage to the rear cab to specification.



= T
T-25 Screw Torque **6 in. lbs. (0.70 Nm)**

Radiator Screen Removal

1. Pull out slightly on the top of the radiator screen.
2. With the top free, pull out on the bottom of the screen to remove the screen.
3. To install the screen, simply press the tabs on the screen back into the mounting grommets. Be sure the screen is securely in place.



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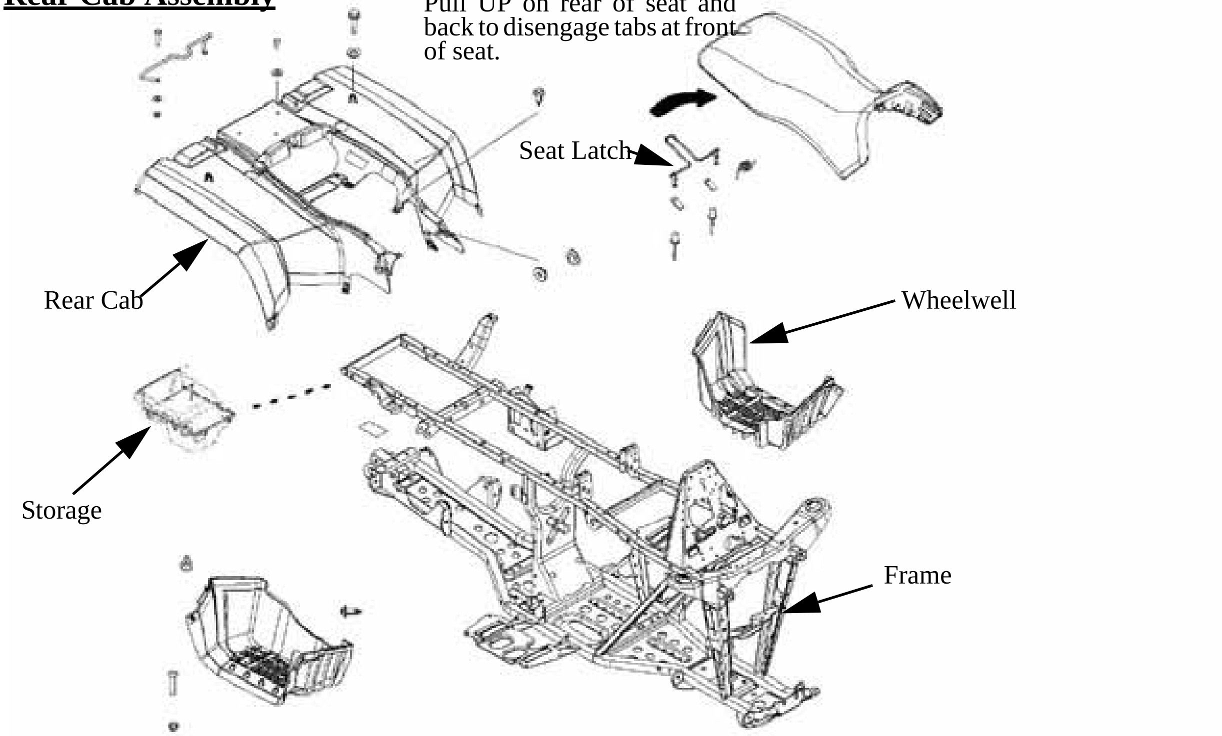
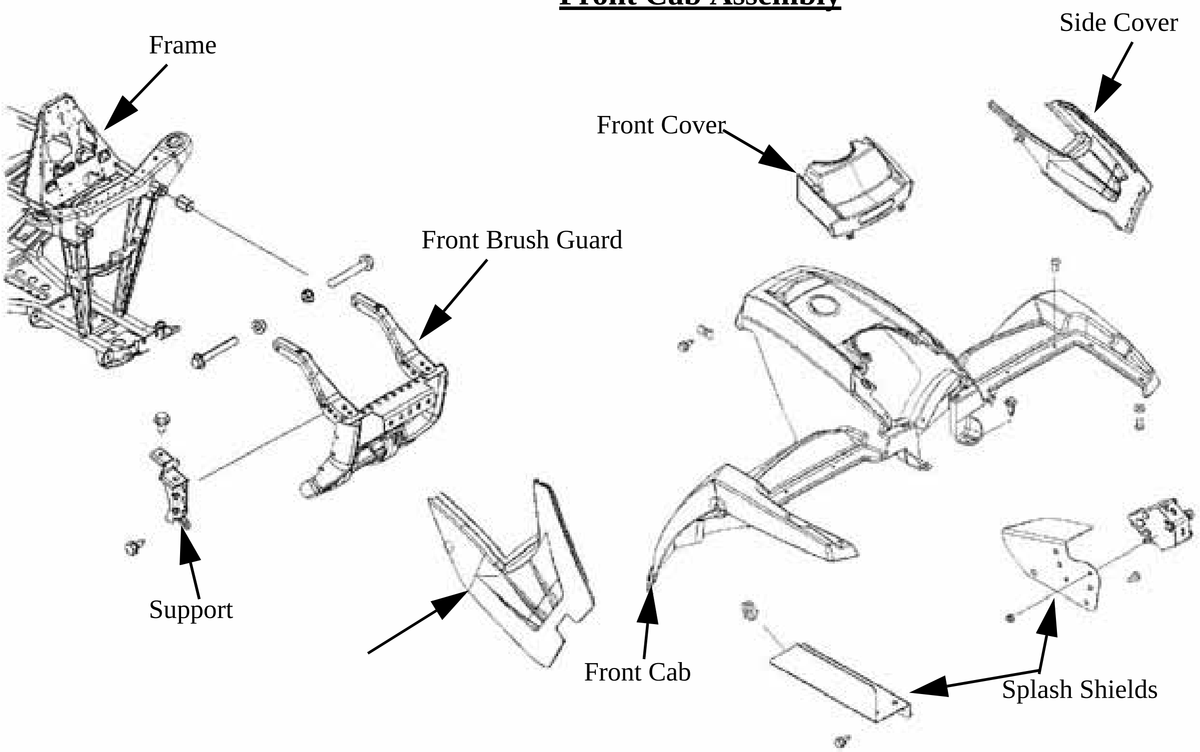
Sportsman Body Assembly Exploded View

Rear Cab Assembly

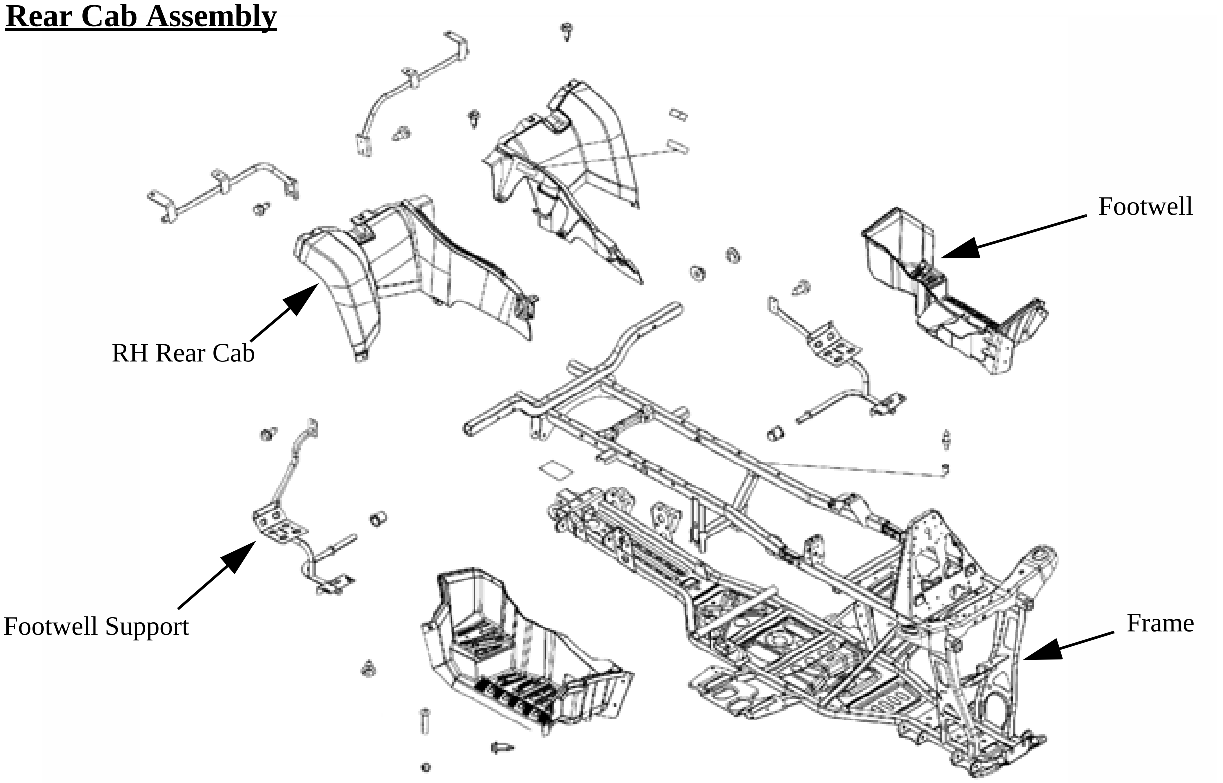


Front Cab Assembly

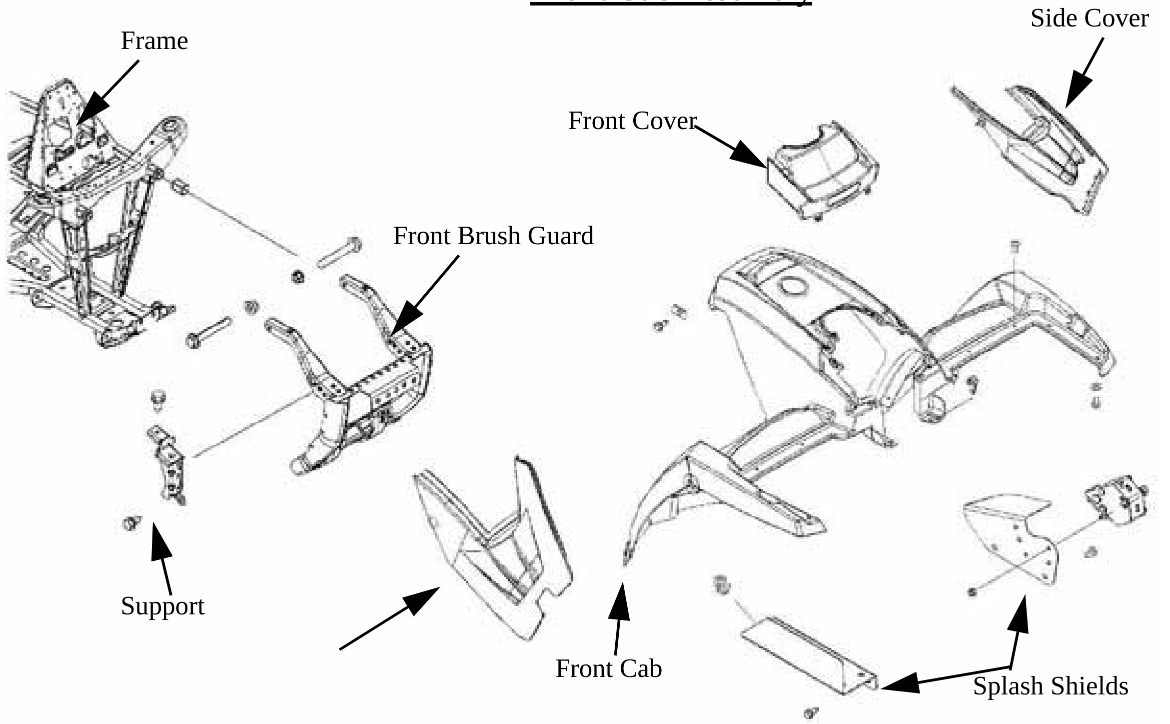


X2 Body Assembly Exploded View

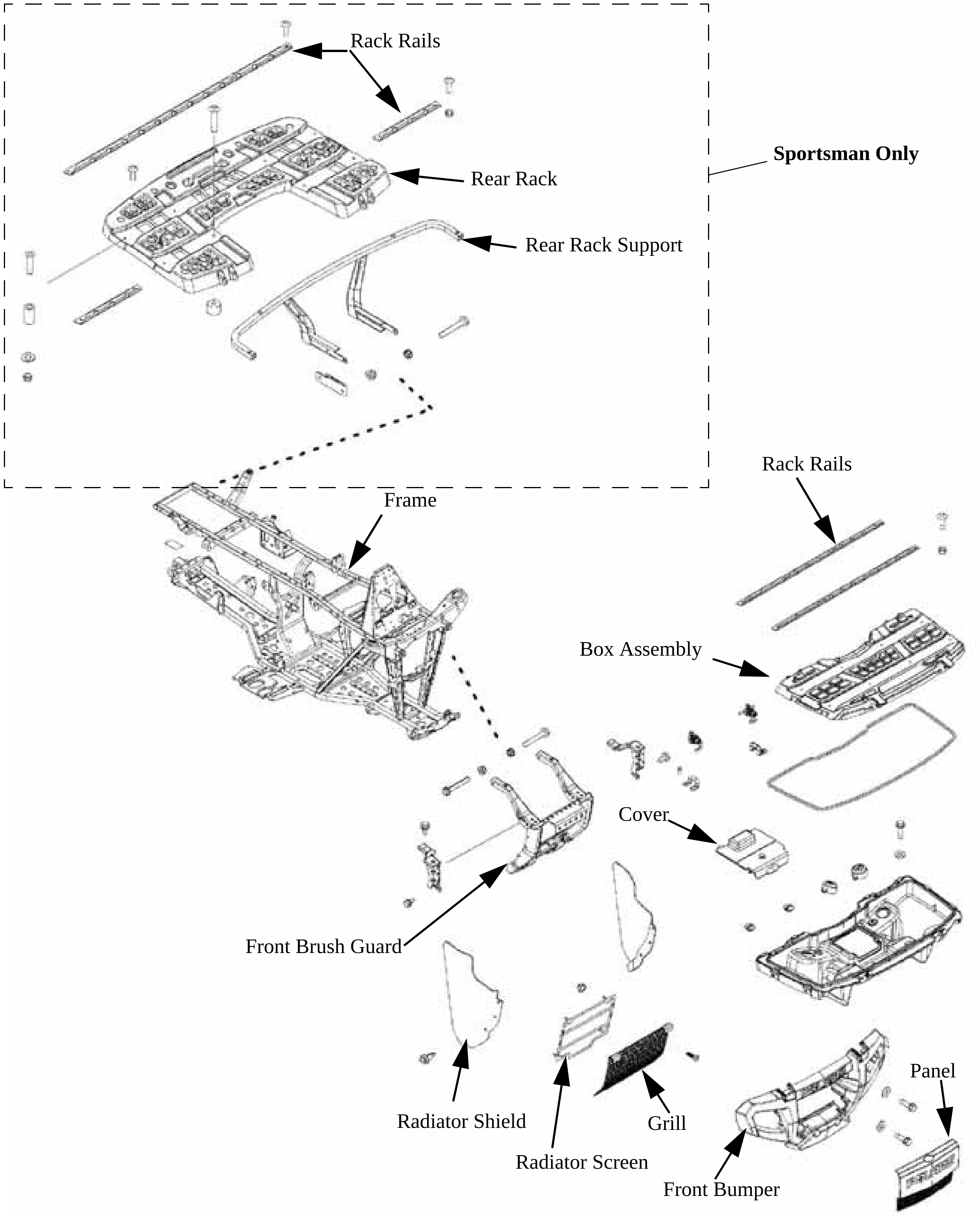
Rear Cab Assembly



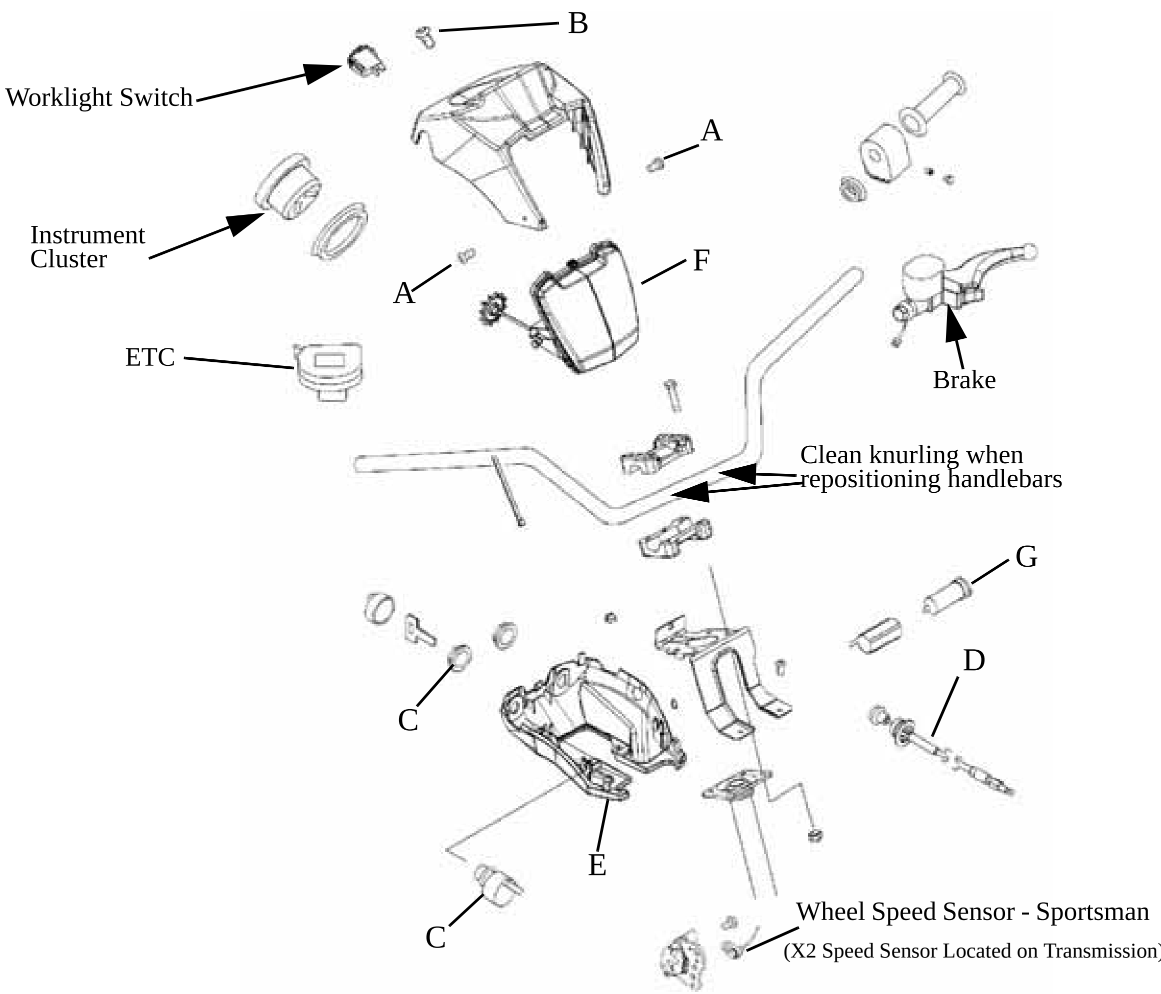
Front Cab Assembly



Body / Rack Exploded Views



Headlight Pod Exploded View



Disassembly

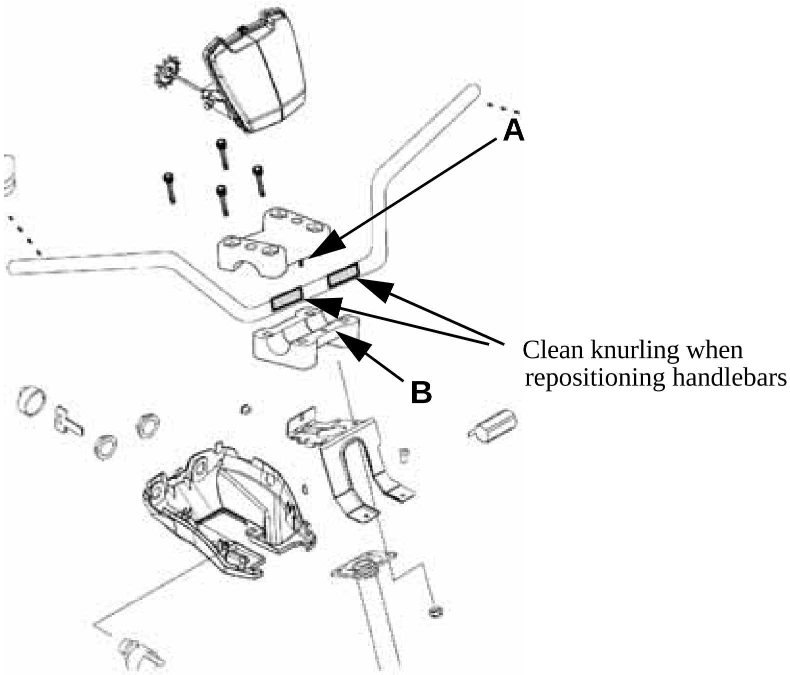
- Remove two side Phillips screws (A)
- Remove one rear Phillips screw (B)
- Lift top half of pod
- Disconnect instrument cluster wire connectors
- Disconnect work light switch connector
- Disconnect 12Vdc power plug (G)
- Disconnect headlight harness
- Remove ignition switch (C) and choke cable (D)
- Remove headlight (F) with adjuster
- Remove two screws securing bottom half of pod (E)

Assembly

- Install bottom of pod onto handlebar and secure to brackets
- Install key switch, choke cable, and headlight
- Connect 12Vdc power outlet (where applicable)
- Connect headlight
- Connect instrument cluster connectors to instrument cluster
- Install top of pod onto bottom half, making sure interlocking tabs mate properly
- Install two side Phillips screws
- Install one rear Phillips screw
- To adjust headlight, refer to procedure outlined in Chapter 2

STEERING

Handlebar Block Installation Procedure



1. The pin (A) on the bottom side of the top handlebar block faces down and to the front of the ATV.

2. The bottom handle bar block has a side with 3 holes, the side with 3 holes faces up and to the front of the ATV.

3. Align the pin (A) in the top block with the middle hole (B) in the bottom block for proper installation. The pin (A) and middle hole (B) should face the front of the ATV.

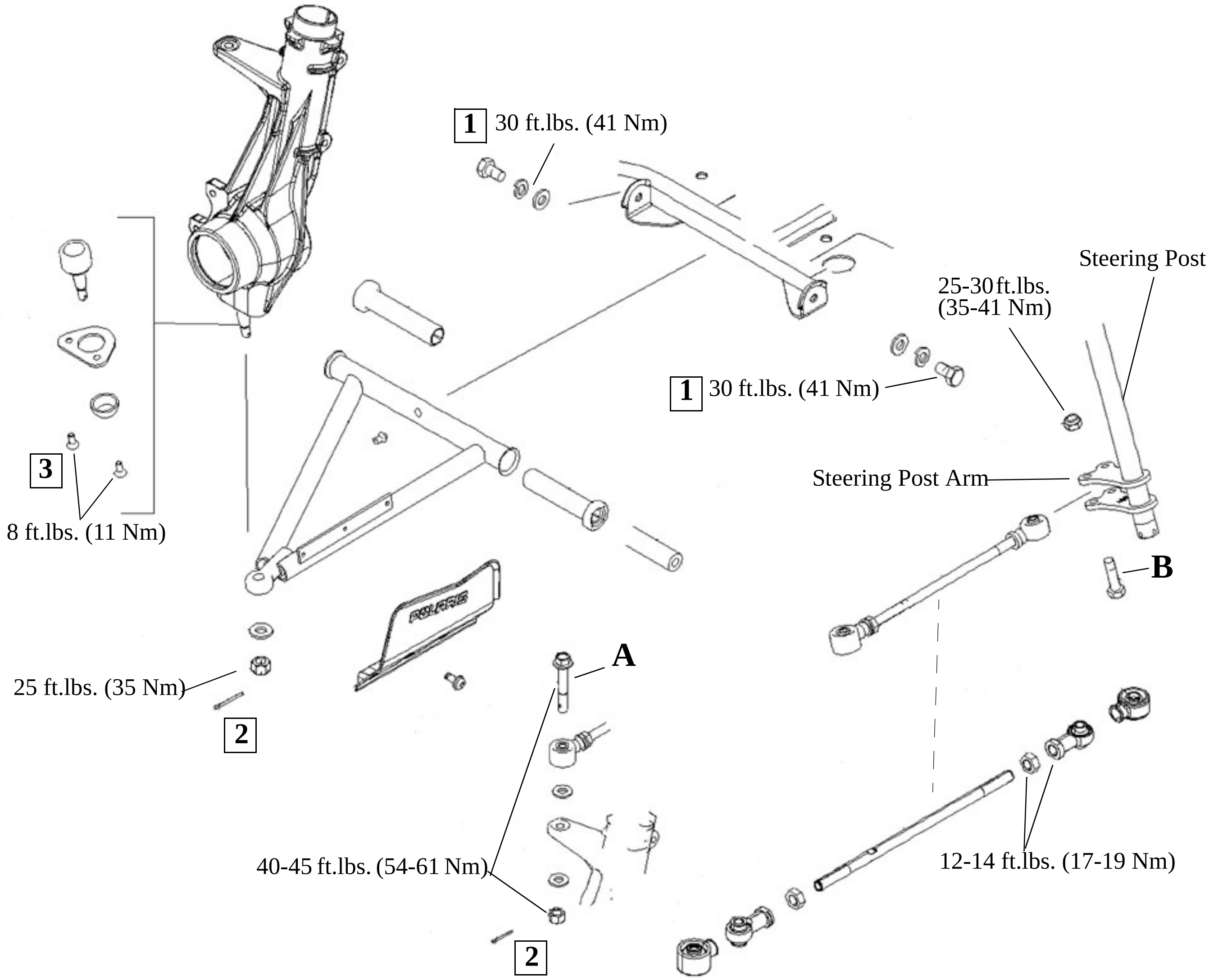
4. Install the pin side bolts first and evenly tighten the bolts down. Evenly torque the 2 front bolts to specification.

= T
Handle Bar Bolt Torque **11-13 ft.lbs.(15-18 Nm)**

5. Install the rear bolts and tighten evenly. Evenly torque the 2 rear bolts to specification.

NOTE: There will be a slight gap on the backside of the blocks after the procedure is performed.

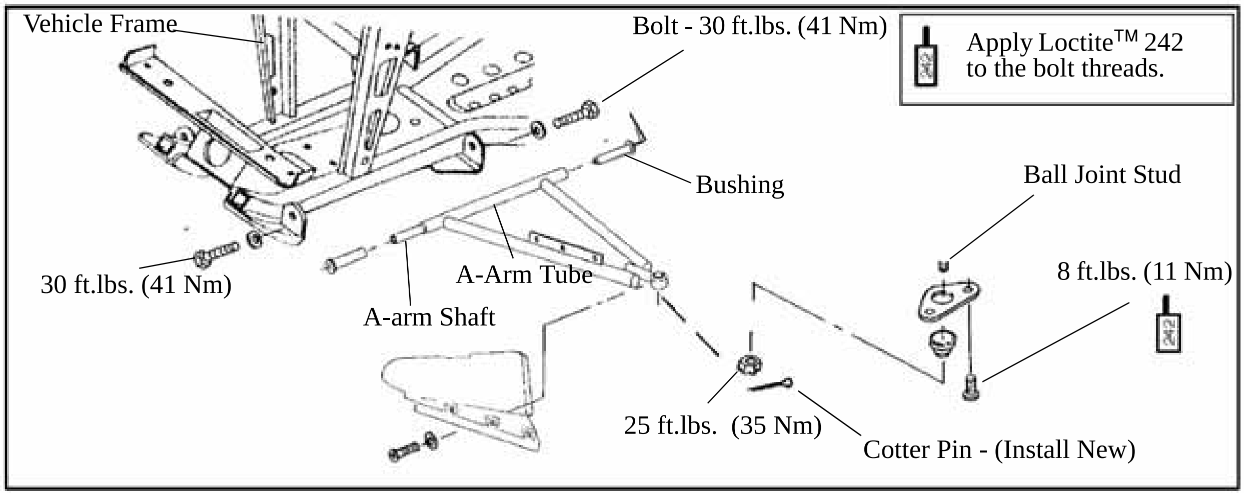
Steering / A-arm Exploded View



1 Always use new bolts upon reassembly.	**2** Always use new cotter pins upon reassembly. Install with open end toward rear of machine.	**3** Apply Loctite™ 242 to bolt threads.

NOTE: To avoid damage to tie rods and other steering components, be sure to install tie rod end bolts in the proper direction. The steering post arm bolt (B) points up; the rod end bolts (A) point down. Verify inner rod ends are placed between the steering post arms.

A-Arm Replacement



1. Elevate and safely support vehicle with weight removed from front wheel(s).
2. Remove cotter pin from ball joint stud at wheel end of A-arm and loosen nut until it is flush with end of stud.
3. Using a soft face hammer, tap nut to loosen A-arm from bolt. Remove nut and A-arm from hub strut assembly.
4. Loosen two bolts on A-arm tube by alternating each about 1/3 of the way until A-arm can be removed.
5. Examine A-arm shaft. Replace if worn. Discard hardware.
6. Insert A-arm shaft into new A-arm.
7. Install CV joint shields.
8. Install new A-arm assembly onto vehicle frame. Torque new bolts to specification.

= T

A-Arm Bolt Torque: **30 ft. lbs. (41.4 Nm)**

WARNING

The locking features on the existing bolts were destroyed during removal. DO NOT reuse old bolts. Serious injury or death could result if fasteners come loose during operation.

9. Attach A-arm to hub strut assembly. Tighten ball joint nut to specification. If cotter pin holes are not aligned, tighten nut slightly to align. Install a new cotter pin with open ends toward rear of machine. Bend both ends in opposite directions around nut

= T

Ball Joint Nut Torque: **25 ft. lbs. (35 Nm)**

WARNING

Upon A-arm installation completion, test vehicle at low speeds before putting into regular service.

Ball Joint Replacement

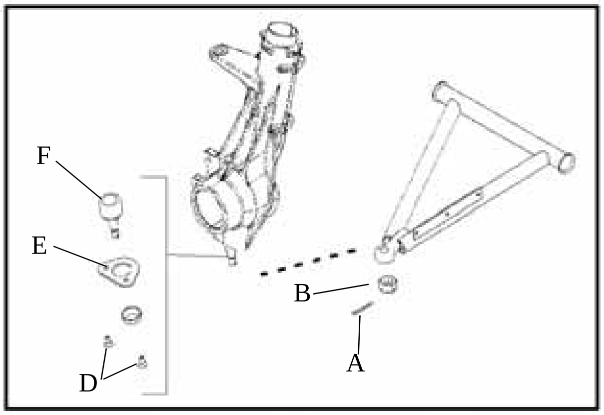
NOTE: Refer to the illustration on the previous page for this procedure.

1. Loosen front wheel nuts slightly.
2. Elevate and safely support machine under footrest/frame area.

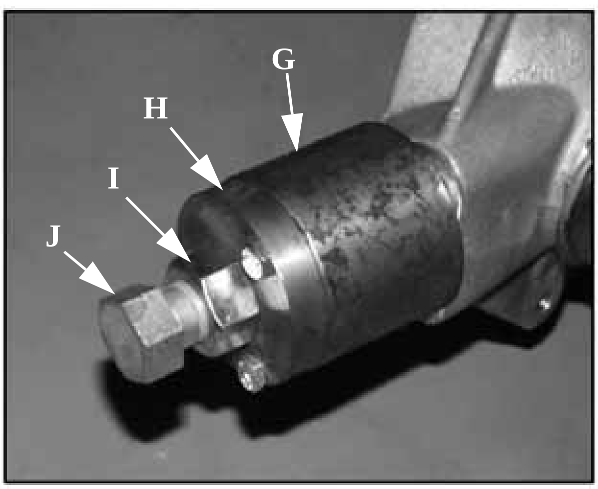
⚠ CAUTION

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.

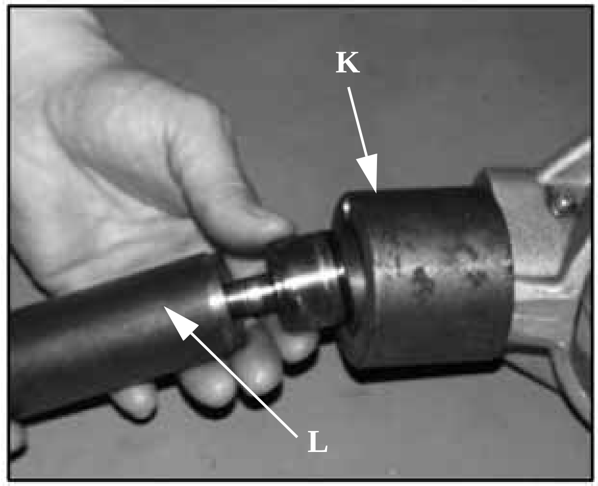
3. Remove wheel nuts and wheels.



4. Remove cotter pin (A) from ball joint castle nut (B).
5. Remove castle nut (B) and separate A-arm (C) from ball joint stud.
6. Remove screws (D) and ball joint retaining plate (E).
7. Use the Ball Joint Replacement Tool (PN 2870871), **remove** ball joint (F) from strut housing. Refer to photos.



8. Install puller guide (G) with extension cap (H).
9. Apply grease to extension cap and threads of puller bolt to ease removal.
10. Thread bolt (J) with nut (I) onto ball joint stud as shown.
11. Apply heat to ease removal.
12. Hold bolt (J) and turn nut (I) clockwise until ball joint is removed from strut housing.



13. To **install** a new ball joint, Remove extension cap and attach puller guide using short bolts provided in the kit.
14. Remove extension cap and attach puller guide using short bolts provided in the kit.
15. Insert new ball joint (K) into driver (L).
16. Slide ball joint/driver assembly into guide.
17. Apply heat to ease installation.
18. Drive new joint into strut housing until fully seated.
19. Apply Loctite™ 242 **(PN 2871949)** to threads of retaining plate screws or install new screws with pre-applied locking agent. Torque screws to specification.

= T

Retaining Screw Torque: **8 ft. lbs. (11 Nm)**

20. Install A-arm on ball joint and torque castle nut to specification.

= T

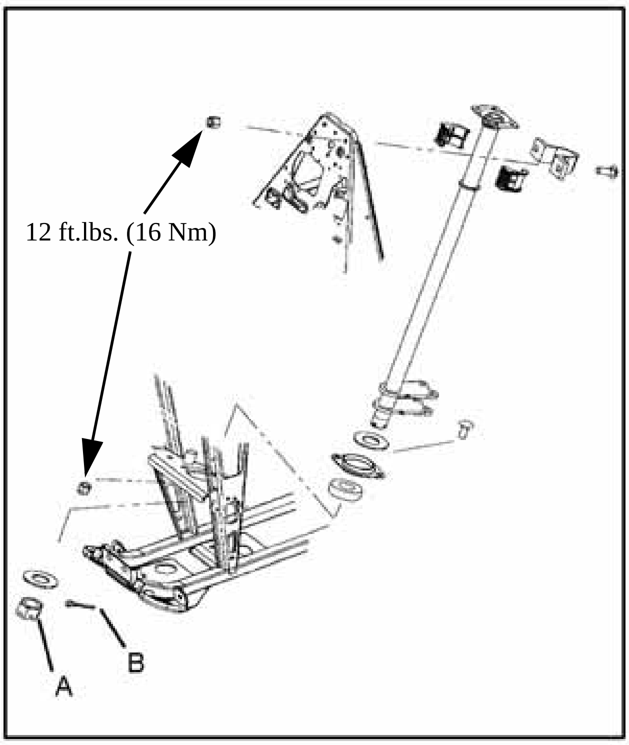
Castle Nut Torque: **25 ft. lbs. (35 Nm)**

21. Reinstall cotter pin with open ends toward rear of machine.

Steering Post Removal

1. Remove the front cab.
2. Remove the handle bar pod.
3. Remove the handle bar.
4. Remove the fuel tank bracket assembly.
5. Remove the steering tie rod ends from the steering bracket. Note the orientation of the fasteners and bracket on the steering assembly.
6. Remove the steering post nut (A) at the mount plate.
7. Remove the top steering bracket .
8. Remove the steering post.

Steering Post Assembly



1. Hand tighten steering post slotted nut (A).
2. Align the cotter pin hole on the steering post slotted nut (A).
3. Install the cotter pin (B). Bend both ends of the cotter pin around the slotted nut (A) in opposite directions.
4. Check the steering, the handle bars must move freely and easily from full left to full right without binding.

SUSPENSION

Front Strut Cartridge Replacement

NOTE: Refer to illustration on following page.

1. Hold strut rod and remove top nut.
2. Remove upper strut pivot assembly.

Strut Rod Wrench:
(PN 2871572)
Strut Spring Compressor Tools:
(PN 2871573) and (PN 2871574)

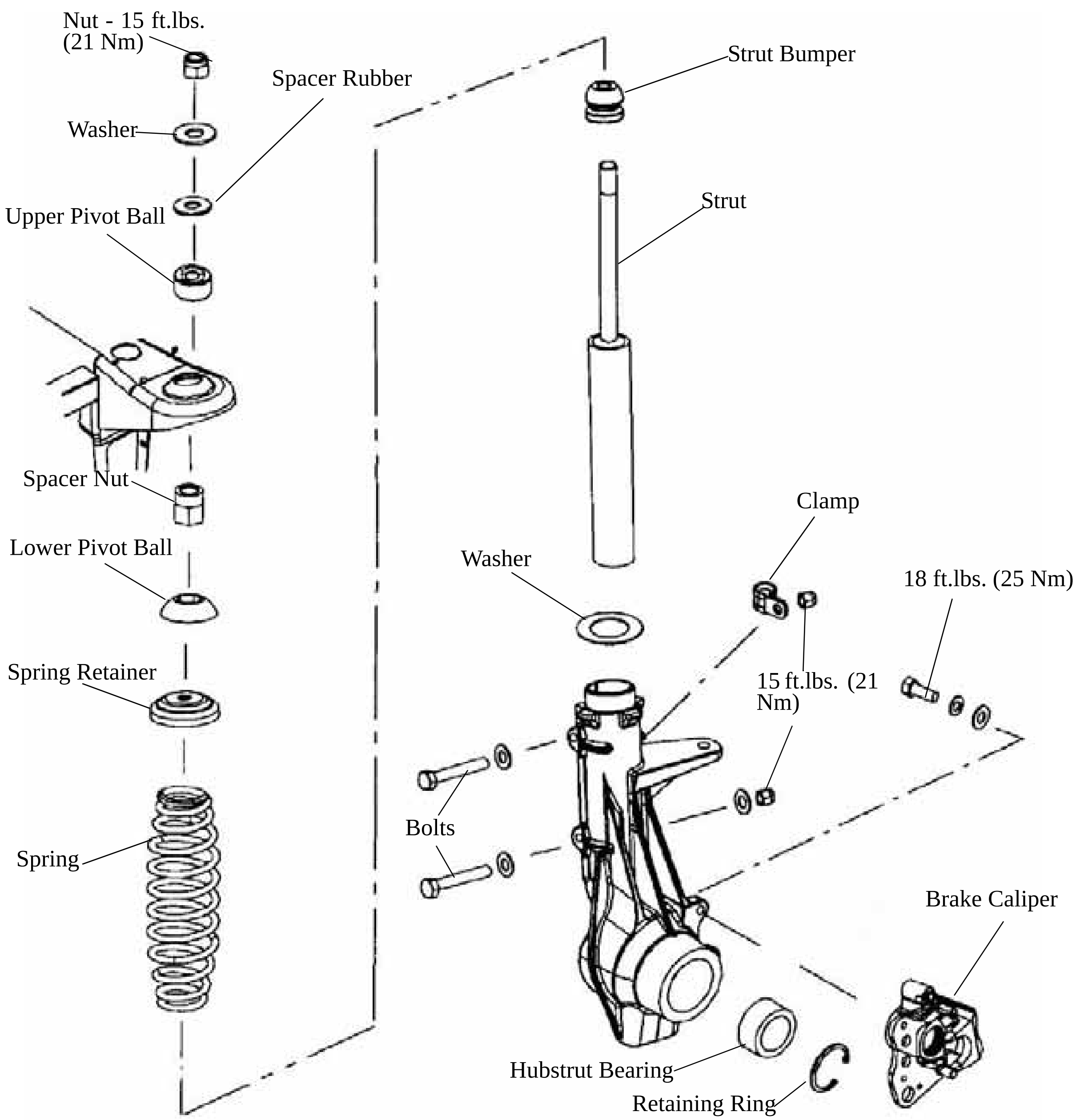
3. Compress spring using any commercially available spring compressor tool and remove the spacer nut.
4. Remove coil spring and collapse strut cartridge.
5. Remove two pinch bolts from strut casting.
6. Remove strut cartridge.
7. Install cartridge until bottomed in strut casting.
8. Install pinch bolts with wire clamp(s). Torque pinch bolts to specification.

= T
Pinch Bolt Torque: **15 ft. lbs. (21 Nm)**

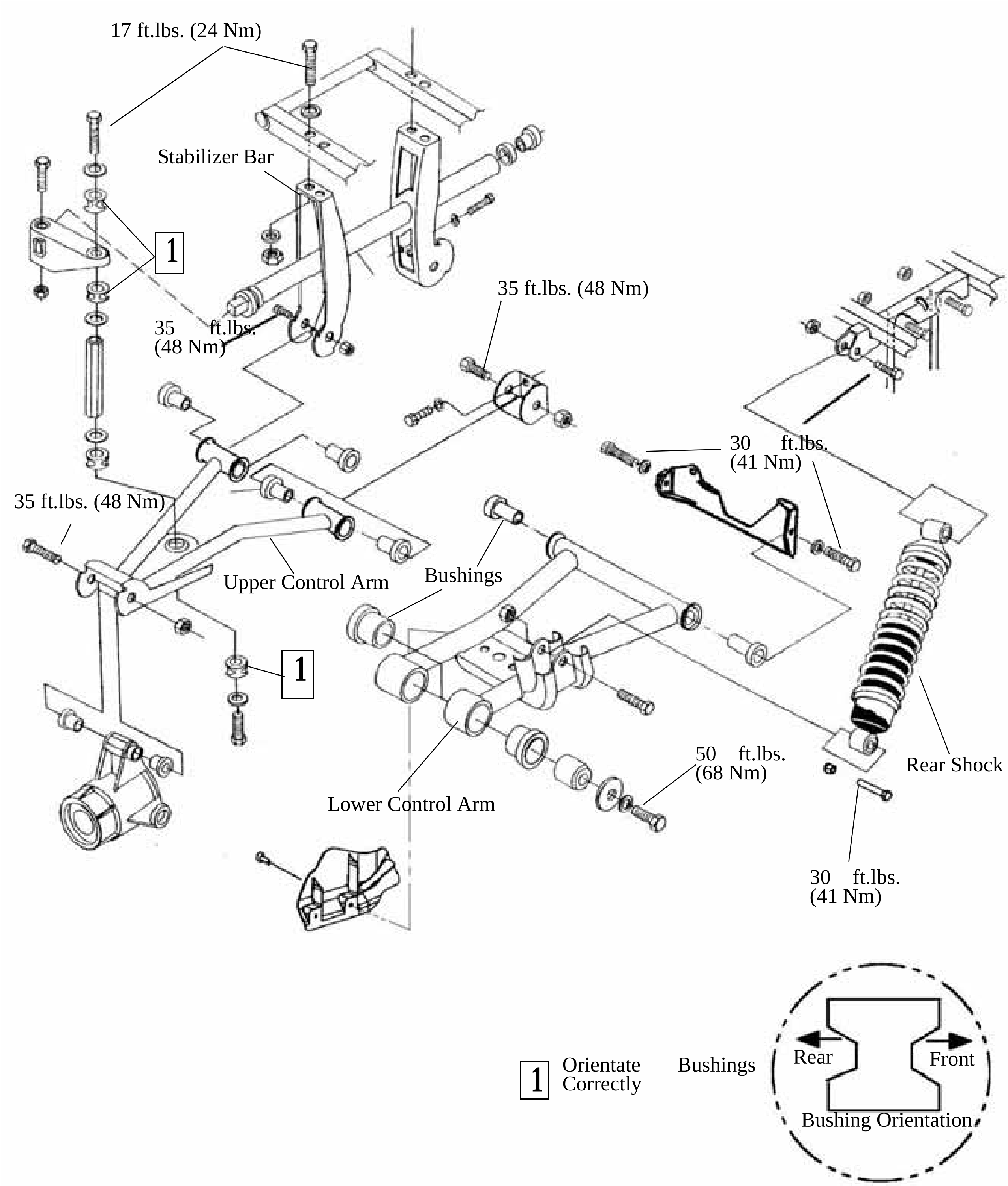
9. Reassemble spring and top pivot assembly. Be sure all parts are installed properly and seated fully.
10. Torque strut rod nut to specification. Do not over torque the nut.

= T
Strut Rod Nut Torque: **15 ft. lbs. (21 Nm)**

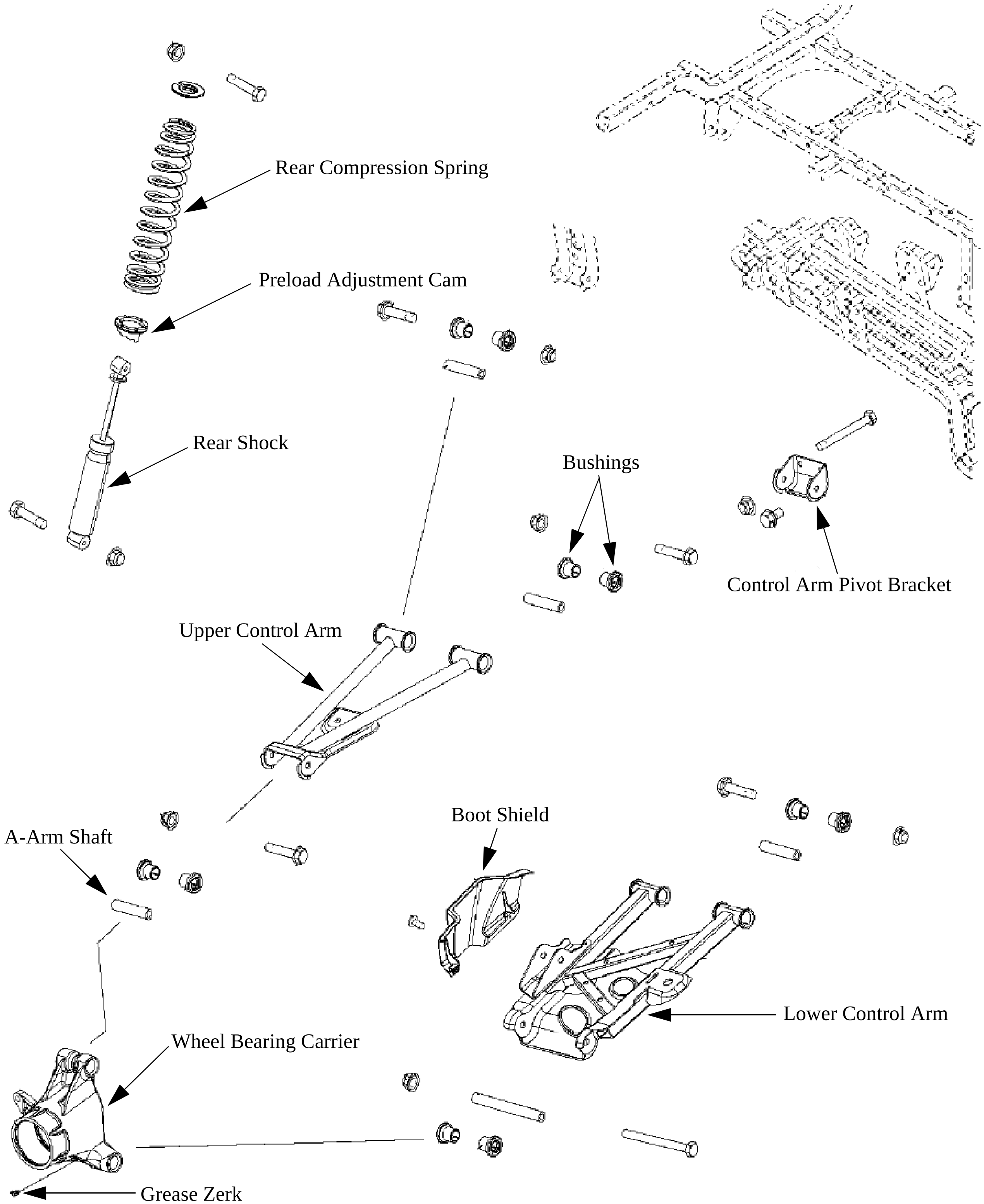
Strut Assembly



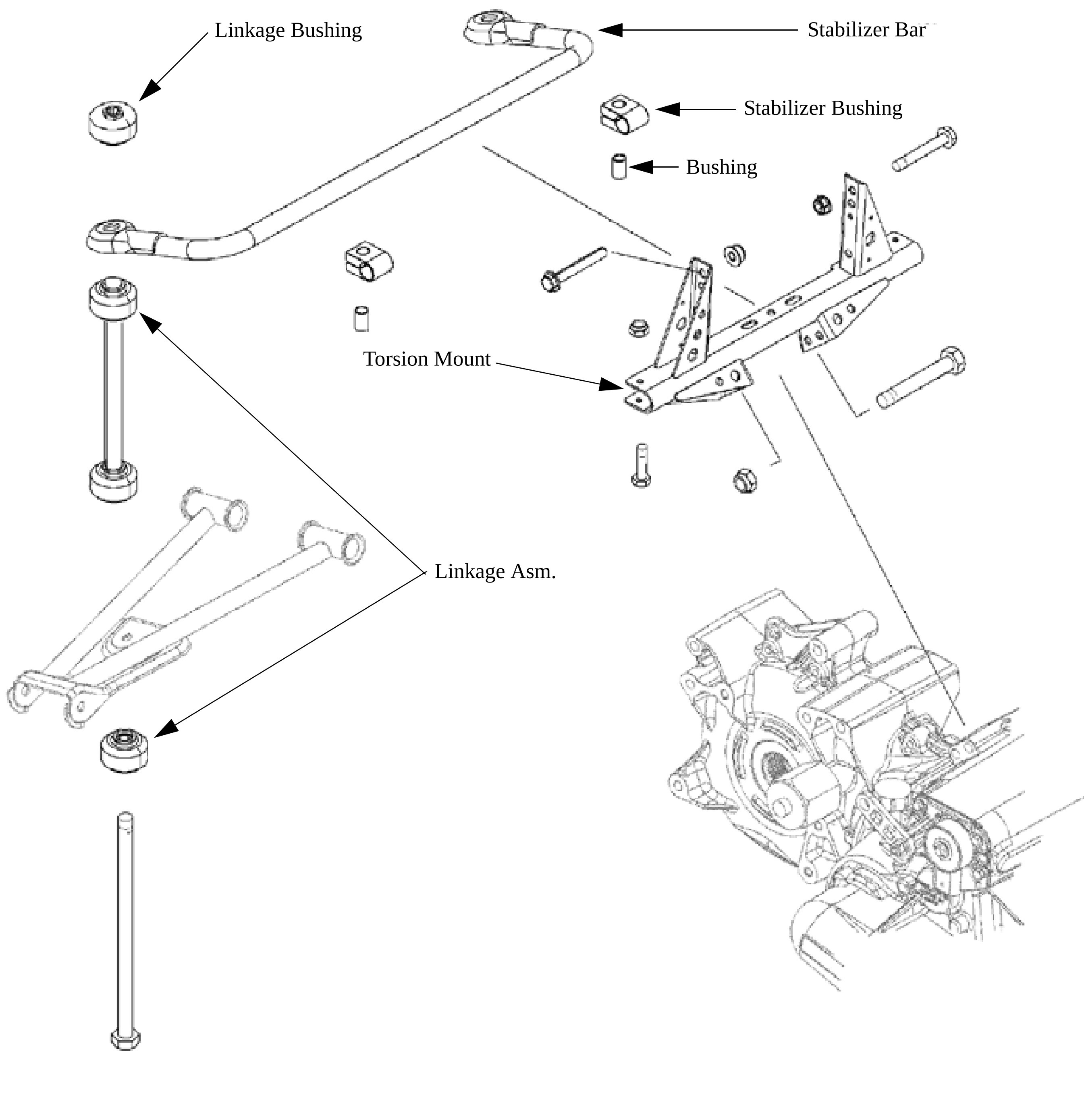
Sportsman Rear Suspension Assembly



X2 Rear Suspension Exploded View

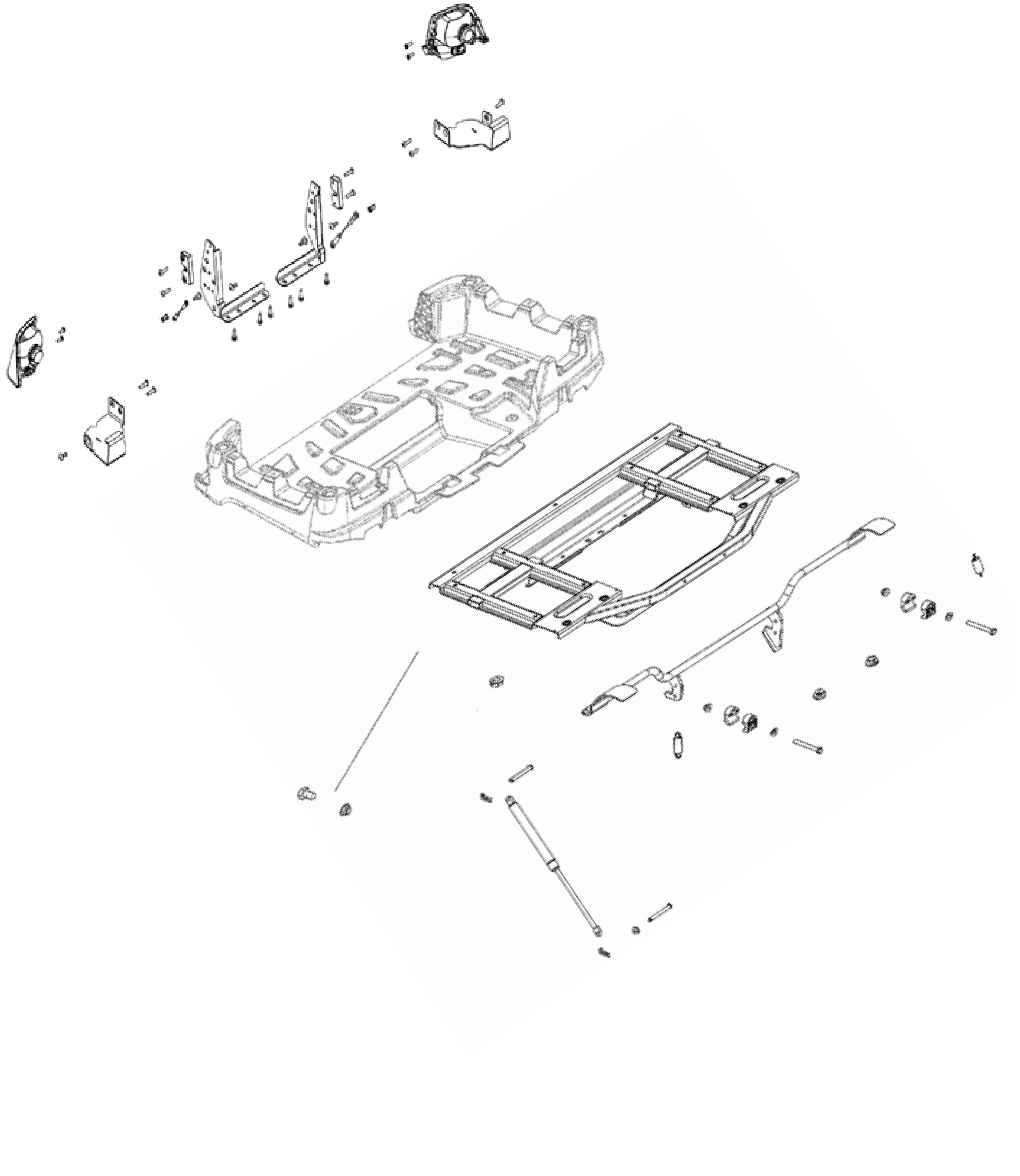


X2 Torsion Bar Exploded View



X2 CARGO BOX

Exploded View

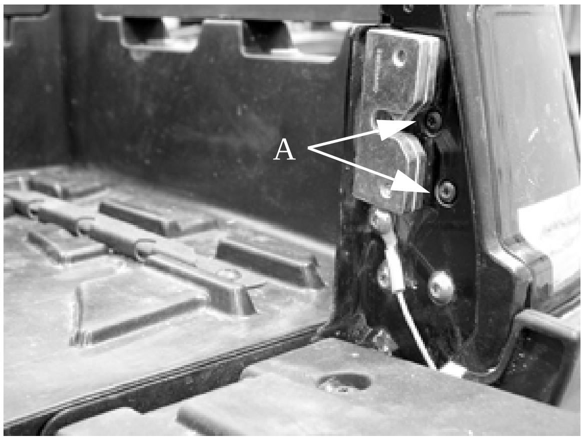


5

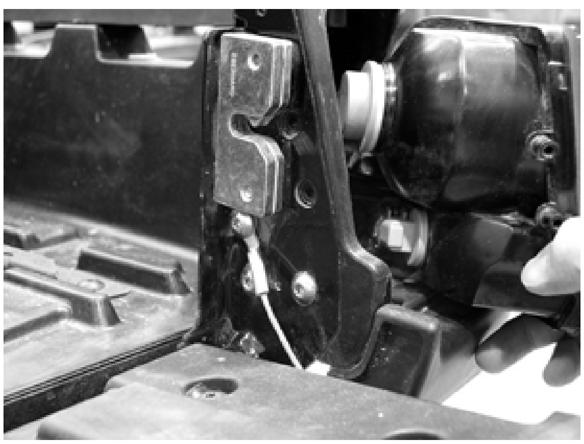
Removal / Installation

IMPORTANT: Before attempting to remove the cargo box, be sure that the cargo box is not set up for 2-UP riding. The passenger backrest should be face down in the cargo box and the driver seat backrest should be locked into position.

1. Open the tailgate and remove the 2 torx head screws (A) securing the rear taillights on each side of the cargo box as illustrated below.



2. Remove the taillight assembly from the cargo box.

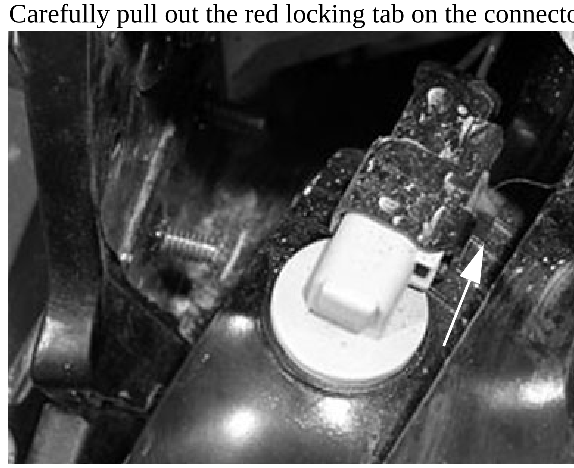


3. Disconnect the two wire harnesses connected to each of the taillights.

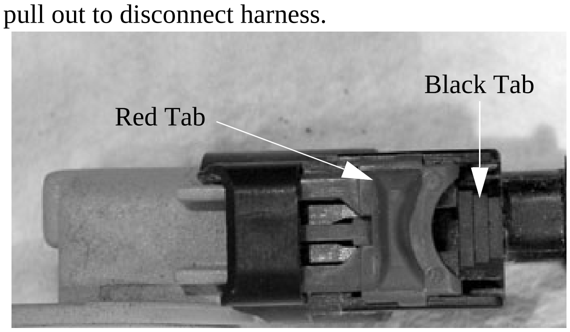
CAUTION

Use caution when disconnecting the smaller light bulb. Follow the procedure below to keep from damaging the connector. Damaging a connector may require wire harness replacement.

4. Carefully pull out the red locking tab on the connector.

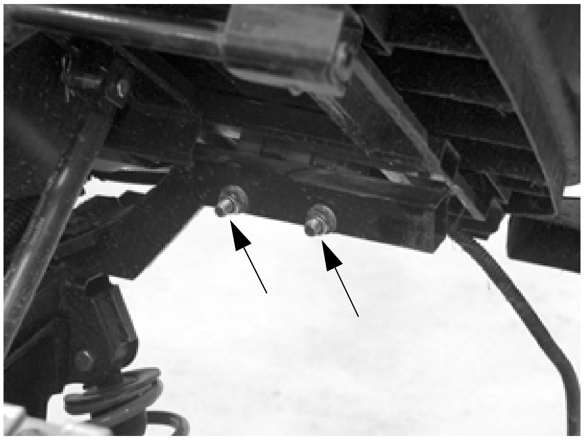


5. Once the red tab is pulled out, press in on the black tab and pull out to disconnect harness.

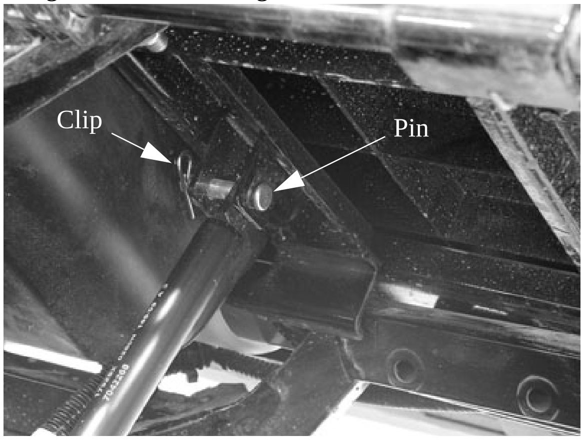


6. Lift up firmly in the cargo box release lever on either side of the ATV.

7. Remove the four bolts attaching the rear of the cargo box to the frame. There are two on each side.



8. Support the cargo box and remove the clip and pin holding the gas shock to the cargo box.



9. Carefully remove the cargo box from the ATV.

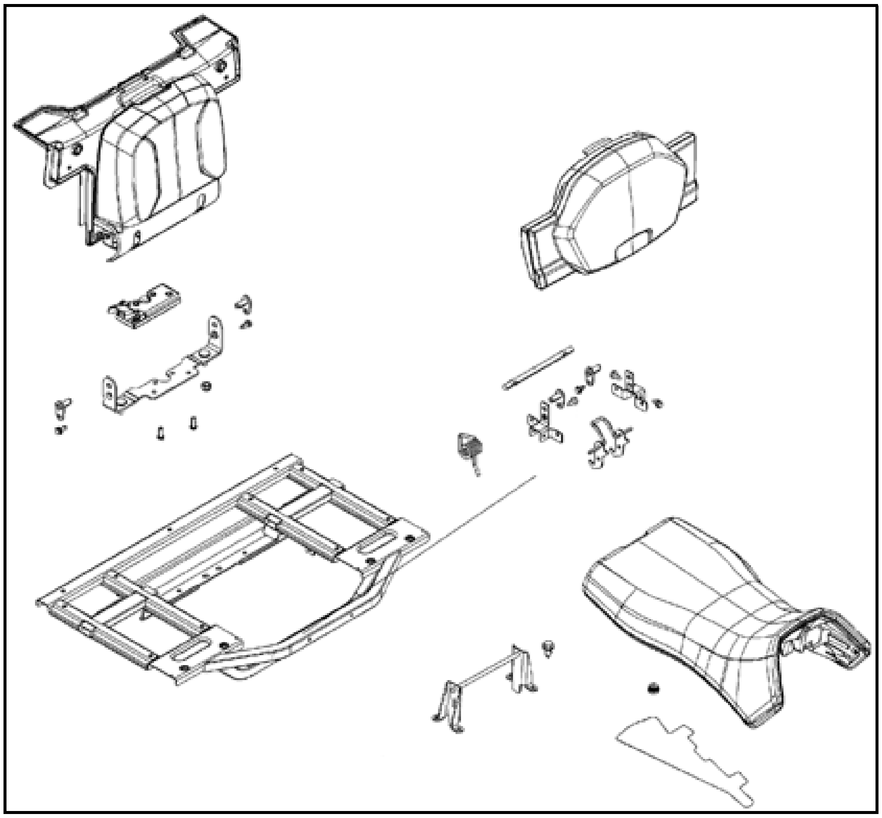
10. Reverse the removal steps to reinstall the cargo box. Refer to the standard fastener torque values in Chapter 1 during assembly.

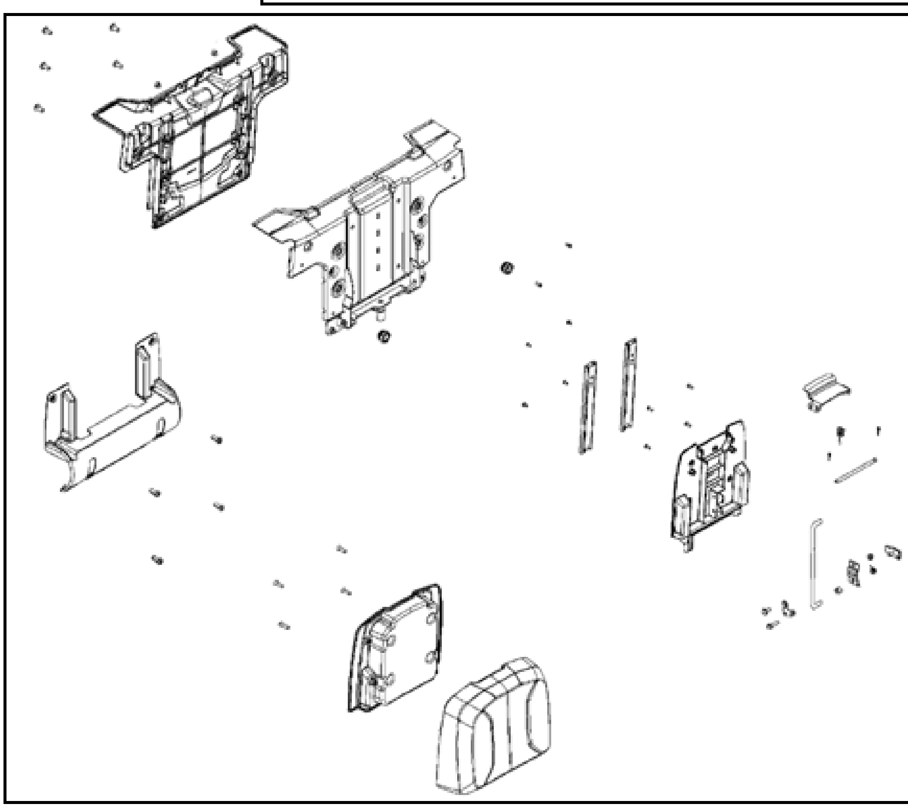
See “Standard Torque Specifications” on page 1.12.

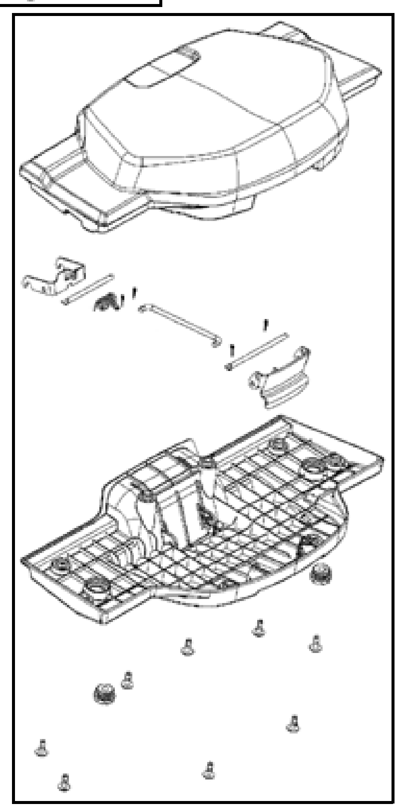
5

X2 SEAT ASSEMBLY

Exploded Views



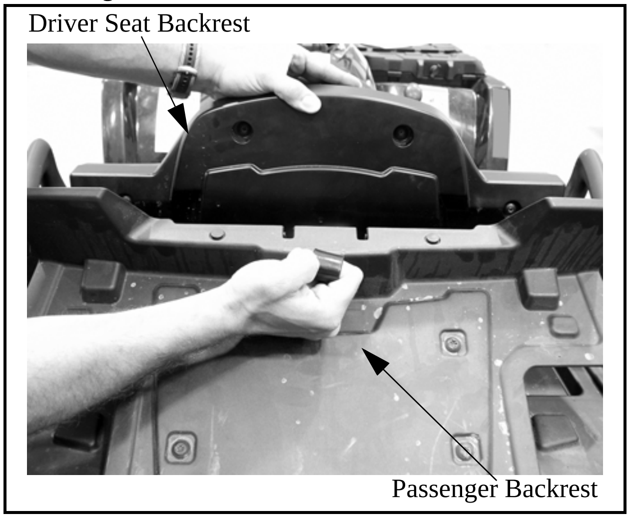




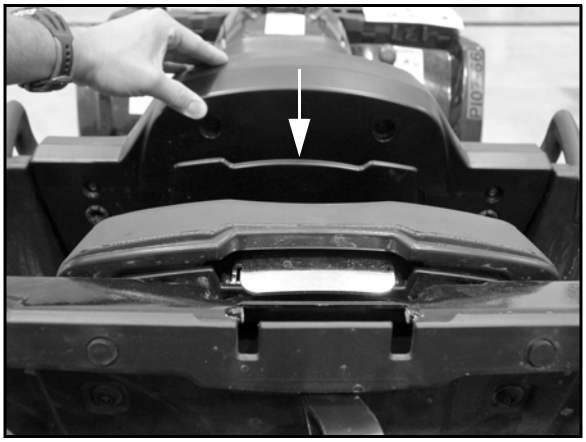
X2 Seat Operation - Configuring Cargo Box For Passenger Riding

1. Unlatch the driver seat backrest by turning the engagement knobs on each side in the directions shown below.

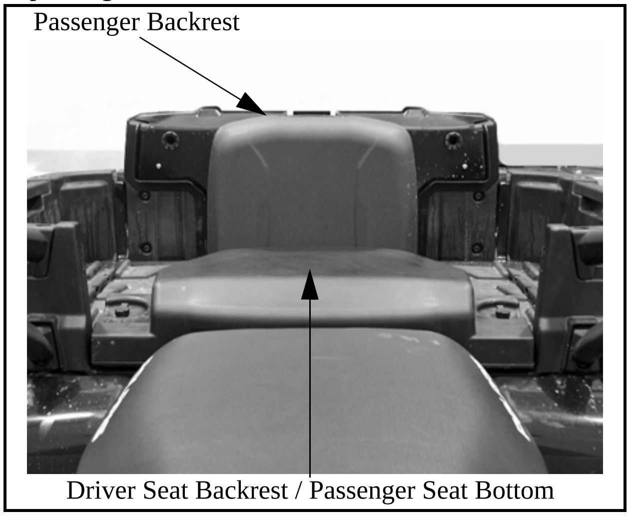
2. While pulling the backrest towards the front of the ATV, lift up on the passenger backrest loop that is face down in the cargo box.



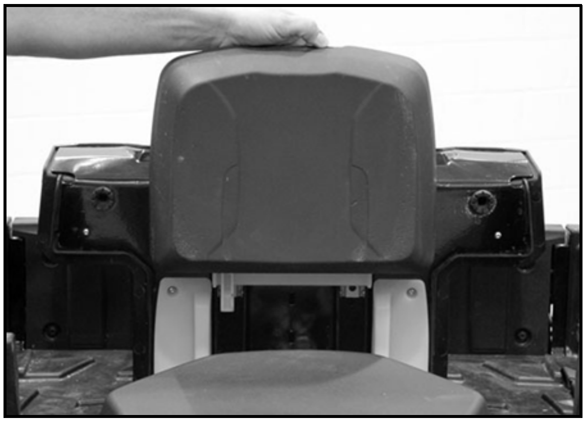
3. Lift the passenger backrest up and into place, then lay the driver seat backrest down into place



4. Fold the driver seat backrest down into place to serve as the passenger seat bottom.



5. Lift the latch on the passenger backrest to set the proper backrest height desired by the passenger.



5

Driver Seat Backrest Removal / Installation

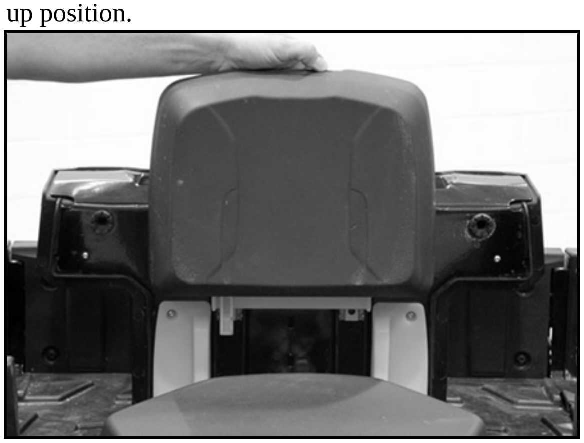
1. Configure the seating for 2-UP riding. With the passenger seat bottom in place, remove the two screws retaining the seat bottom.

2. Remove the two pivot pins holding the seat bottom to the frame and then lift up on the seat bottom to remove.

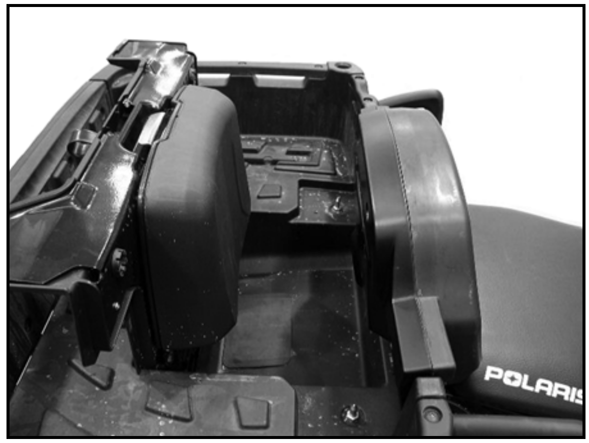
3. For installation, reverse the removal steps.

Passenger Seat Backrest Removal / Installation

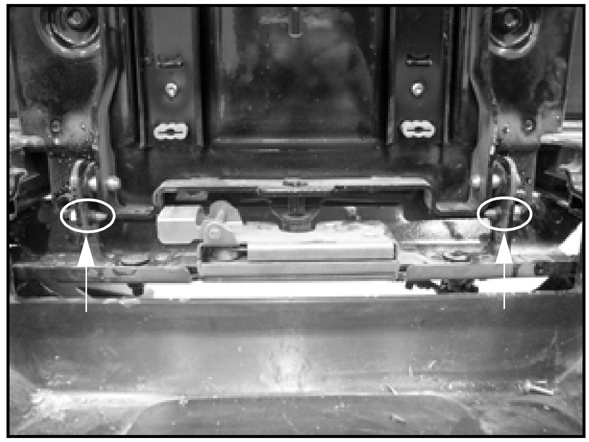
1. Configure the seating for 2-UP riding. Lift up on the latch for the passenger backrest and lift the backrest to the full up position.



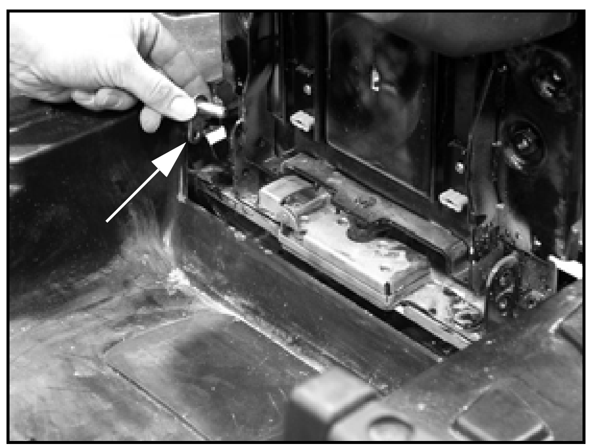
2. Lift up on the latch for the passenger seat bottom and lock it in the upright position as shown below.



3. Remove the two screws retaining the passenger backrest.



4. Remove the two pivot pins holding the backrest to the frame.



5. Lift up on the backrest latch and tilt the backrest in towards the cargo box and lift up to remove it.
6. For installation, reverse the removal steps.

CHAPTER 6

CLUTCH SYSTEM

SPECIAL TOOLS AND SPECIFICATIONS

Special Tools

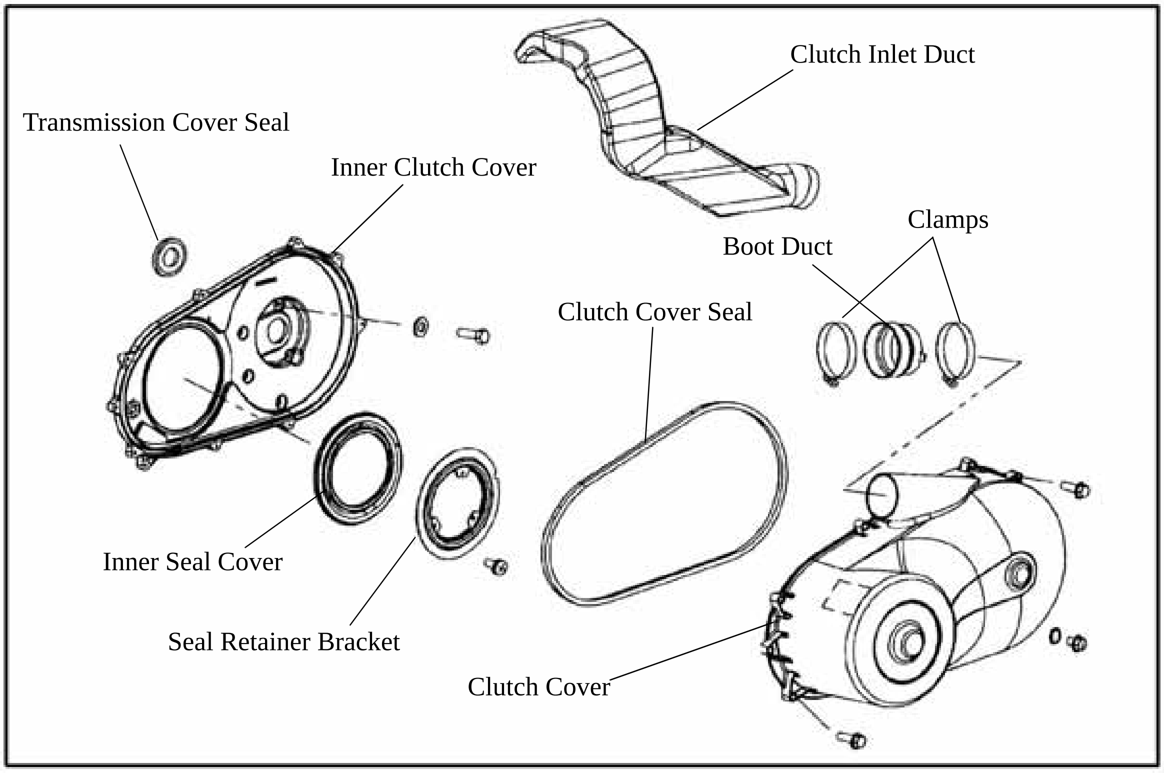
Tool Description	Part Number
Clutch Puller	2870506
Clutch Holding Wrench	9314177
Clutch Holding Fixture	2871358
Spider Nut Socket	2870338
Drive Clutch Spider Removal & Install Tool	2870341
Driven Clutch Puller	2870913
Roller Pin Tool	2870910
Clutch Bushing Replacement Tool Kit	2871226
Piston Pin Puller	2870386
EBS Clutch Alignment Tool	2872292
EBS Bushing Replacement Kit	2201379
Clutch Compression Tool	8700220
Clutch Bushing Replacement Tool Kit	2871025
Clutch Compression Tool Extensions	PS-45909

Component Fastener Torques

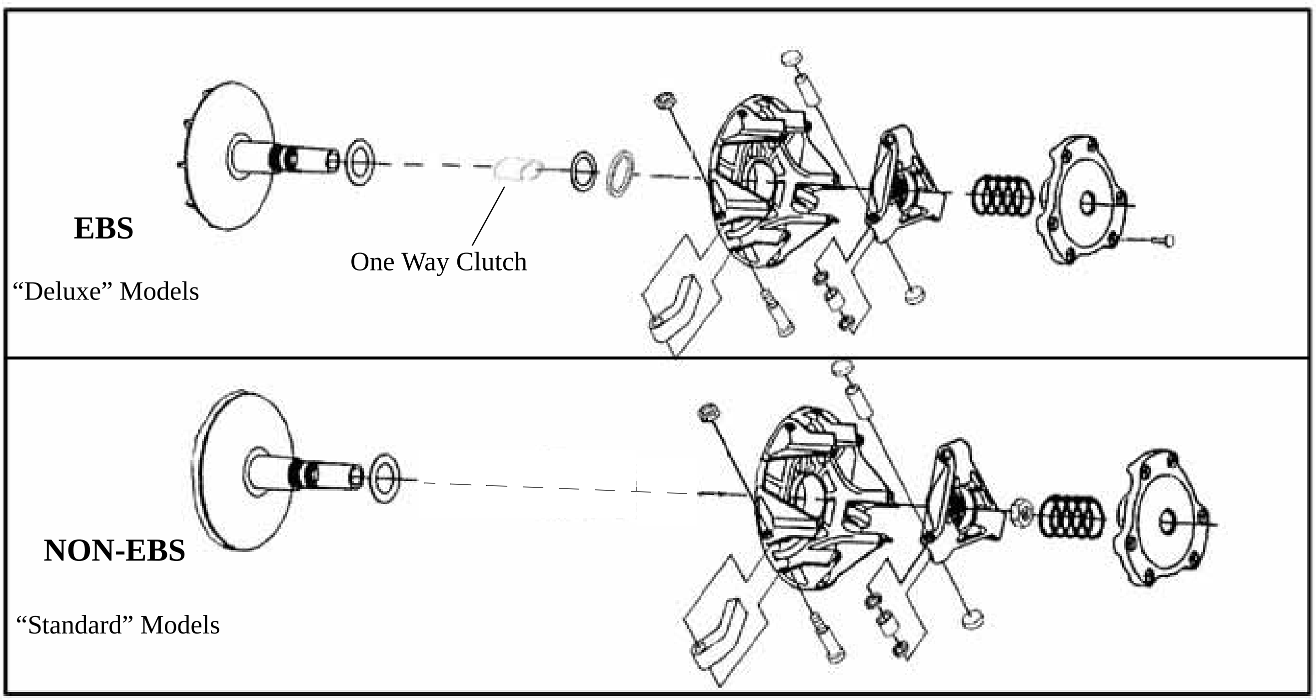
Component	ft.lbs. (in.lbs.)	Nm
Drive Clutch Retaining Bolt	40	54
Driven Clutch Retaining Bolt	17	23
PVT Inner Cover Bolts	12	16
Drive Clutch Spider EBS Clutch	200	271
Drive Clutch Spider Lock Nut	15	20.3
Drive Clutch Cover Plate	(90)	10

PVT EXPLODED VIEWS

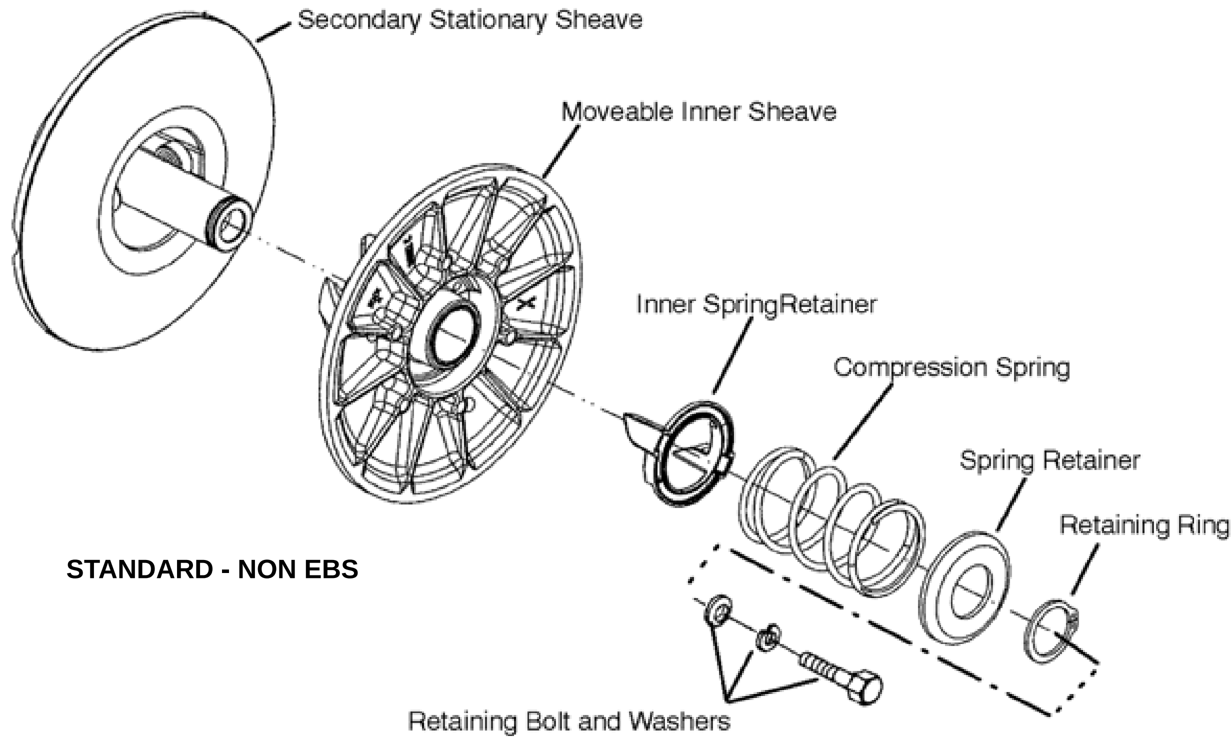
PVT Sealing And Ducting Components



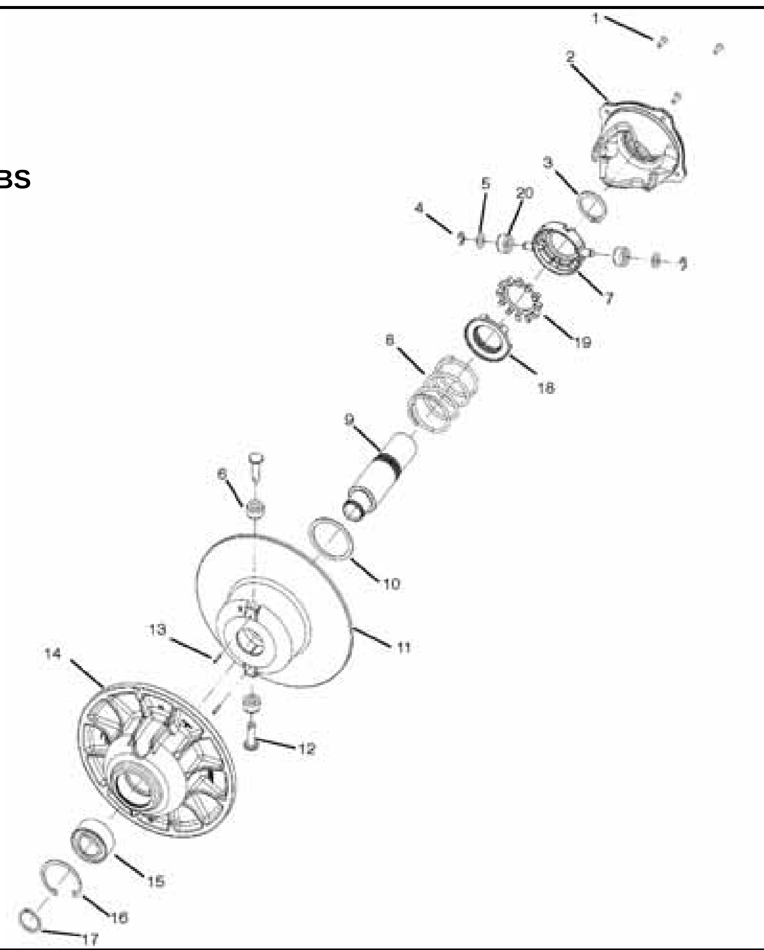
Drive Clutch Exploded Views (Standard and Deluxe)



Driven Clutch Exploded Views (Standard and Deluxe)

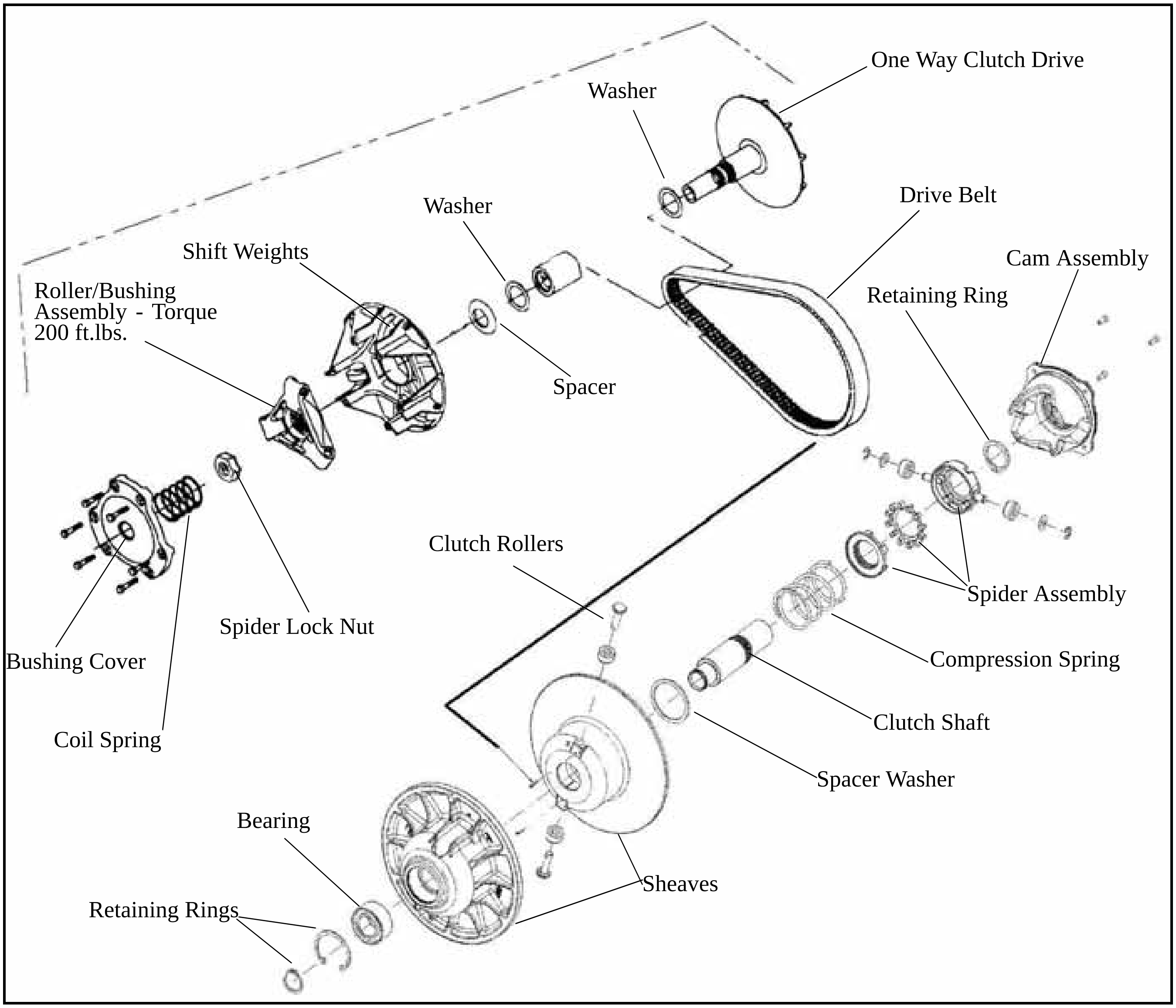


DELUXE - EBS



1. Torx Screw
2. Cam Assembly
3. Retaining Ring
4. E-clip
5. Washer
6. Roller
7. Outer Spider
8. Spring
9. Shaft
10. Thrust Washer
11. Moveable Sheave
12. Roller Pin
13. Spring Pin
14. Stationary Sheave
15. Bearing
16. Retaining Ring
17. Retaining Ring
18. Inner Spider Plate
19. Spider Dampener
20. Clutch Roller

Engine Braking System (EBS) Exploded View



6

PVT SYSTEM

PVT Operation Overview

WARNING

All PVT maintenance or repairs should be performed only 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; and 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 a Polaris ATV, 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.

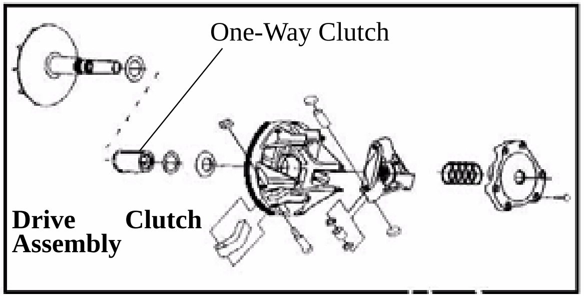
As engine RPM and horsepower increase, the load from the drive belt increases, resulting in the belt rotating up toward the outer diameter of the drive clutch sheaves and downward into the sheaves of the driven clutch. This action, which increases the driven clutch speed, is called upshifting.

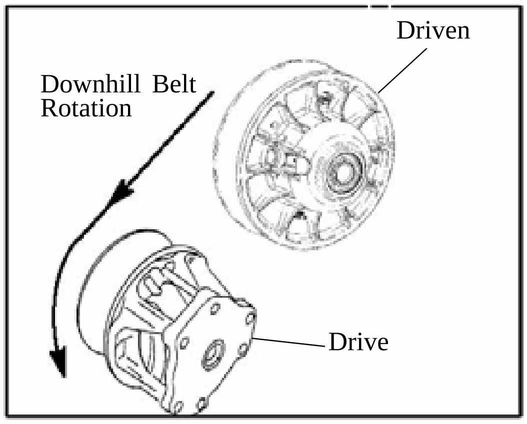
Should the throttle setting remain the same and the vehicle is subjected to a heavier load, the drive belt rotates back up toward the outer diameter of the driven clutch and downward into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called backshifting.

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.

EBS Clutch Operation

This EBS driven clutch provides the same engine braking abilities as the EBS drive clutch.





When the ATV is moving the drivetrain turns in the direction of engine rotation as the clutches, belt, and one-way clutches at the same speed. When the drivetrain rotational speed exceeds the one-way clutch rotation (see exploded view of drive clutch) , the one-way clutch locks to the clutch shaft and engine braking occurs. Essentially, the driven clutch has become the driving clutch. The spider assembly with the two rollers, fixed to the transmission shaft, rotates in the pockets of the sheave, allowing the stationary sheave to rotate with the moveable sheave as the rollers move to the other side of the ramp, providing instant EBS. Engine braking (EBS) continues until the drive clutch speed exceeds the one-way clutch speed, or until the throttle is applied and the engine reaches clutch engagement speed.

CAUTION

Driven clutches must be disassembled from the helix end to reduce spring pressure. Review all information below before proceeding.

PVT Maintenance / Inspection

Under normal operation the PVT system will provide years of trouble free operation. Periodic inspection and maintenance is required to keep the system operating at peak performance. The following list of items should be inspected and maintained to ensure maximum performance and service life of PVT components. Refer to the troubleshooting checklist at the end of this chapter for more information.

1. Drive to Driven Clutch Offset, Belt Width.

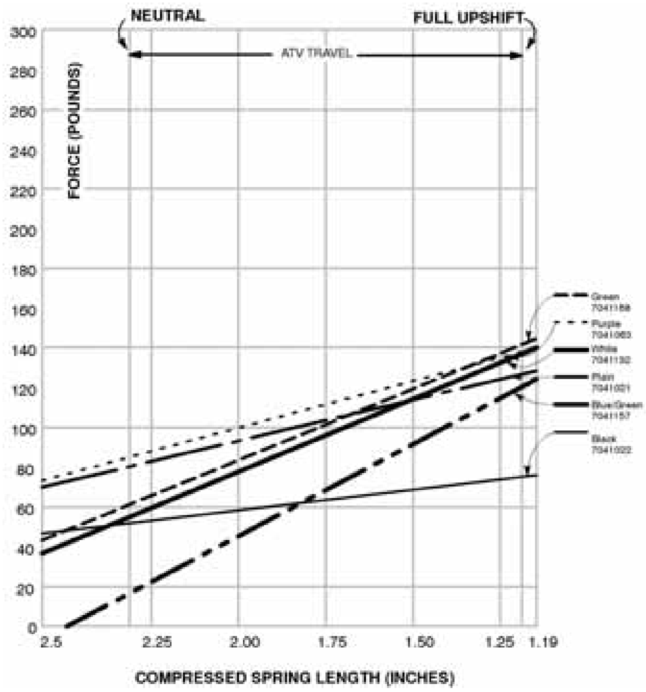
See “Clutch Alignment” on page 6.14.

2. Drive and Driven Clutch Rollers and Bushings, Drive Clutch Shift Weights and Pins, Drive Clutch Spider Rollers and Roller Pins, Drive and Driven Clutch Springs.

See “Drive Clutch Inspection” on page 6.17.

3. Sheave Faces. Clean and inspect for wear.
4. PVT System Sealing. Refer to appropriate illustrations and photos. The PVT system is air cooled by fins on the drive clutch stationary sheave. The fins create a low pressure area in the crankcase casting, drawing air into the system through an intake duct. The opening for this intake duct is located at a high point on the vehicle (location varies by model). The intake duct draws fresh air through a vented cover. All connecting air ducts, as well as the inner and outer covers, must be properly sealed to ensure clean air is being used for cooling the PVT system. This also will prevent water and other contaminants from entering the PVT area. A sealed PVT is especially critical on units subjected to frequent water forging.

Drive Clutch Spring



The drive clutch spring has two primary functions:

1. **Controls clutch engagement RPM.** The springs which have a higher rate when the clutch is in neutral will increase clutch engagement RPM.
2. **Controls the rate at which the drive belt moves upward in the drive clutch sheaves.** This is referred to as drive clutch upshift.

The drive clutch spring is one of the most critical components of the PVT system. It is also one of the easiest to service. Due to the severe stress the coil spring is subject to during operation, it should always be inspected for tolerance limits during any clutch diagnosis or repair.

There are other components which control upshift, but the spring is one of the primary components in insuring optimum performance. It is very important that the spring is of correct design and is in good condition.

CAUTION

Never shim a drive clutch spring to increase its compression rate. This may result in complete stacking of the coils and subsequent clutch component failure.

Measuring Spring Length: With the spring resting on a flat surface, measure its free length from the outer coil surfaces as shown. Refer to the spring specification chart for specific free length measurements and tolerances. Also check to see that spring coils are parallel to one another. Distortion of the spring indicates stress fatigue, requiring replacement.

Table 6-1: Primary Clutch Springs

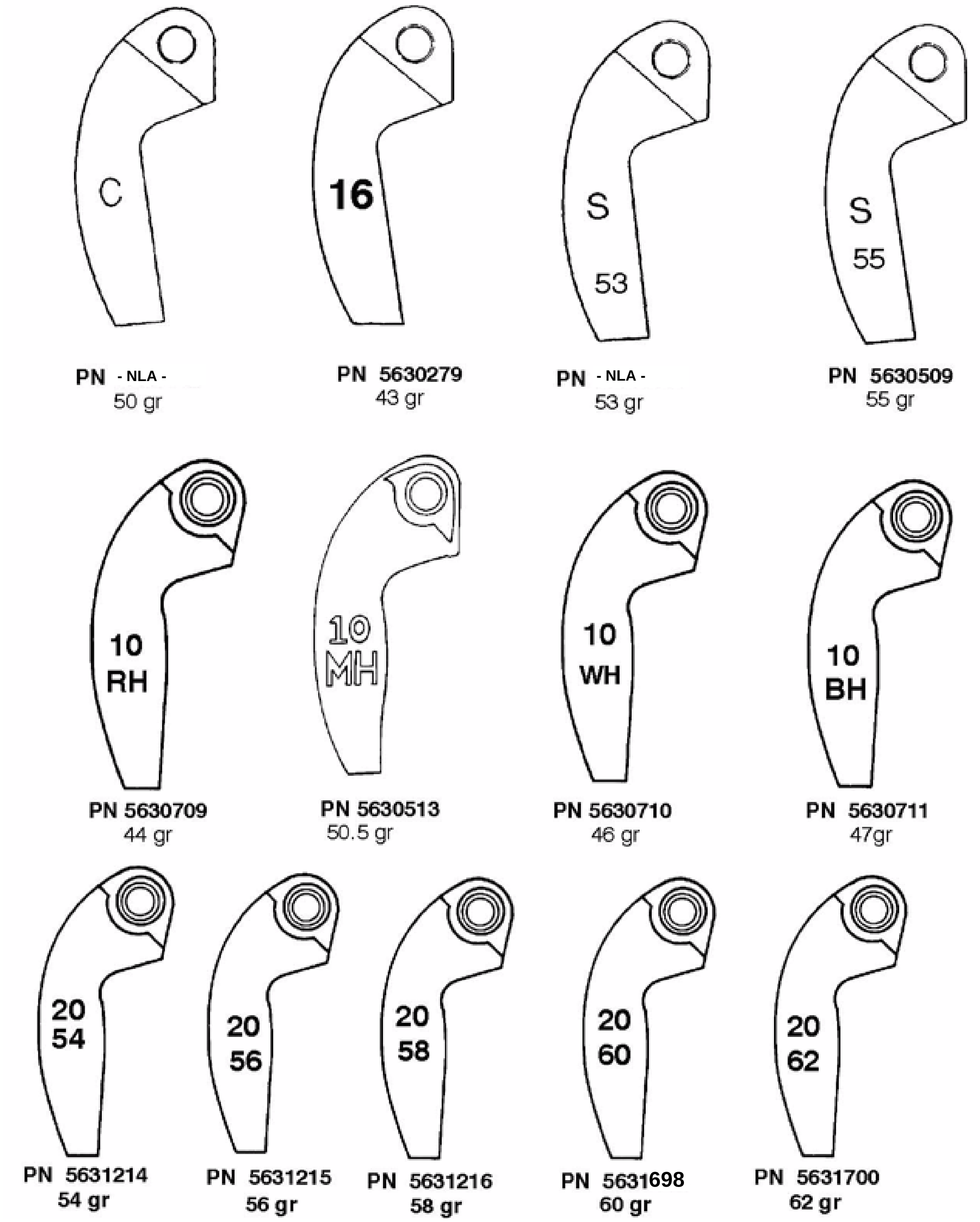
PART #	COLOR CODE	WIRE DIA.	FREE LENGTH ± .125”
7041021	Plain	.157”	4.38”
7041022	Black	.140”	4.25”
7041063	Purple	.168”	4.37”
7041132	White	.177”	2.92”
7041168	Green	.177”	3.05”
7041157	Blue/Green	.177”	2.53”

Table 6-2: Secondary Clutch Springs

PART #	DESCRIPTION
3234199	White

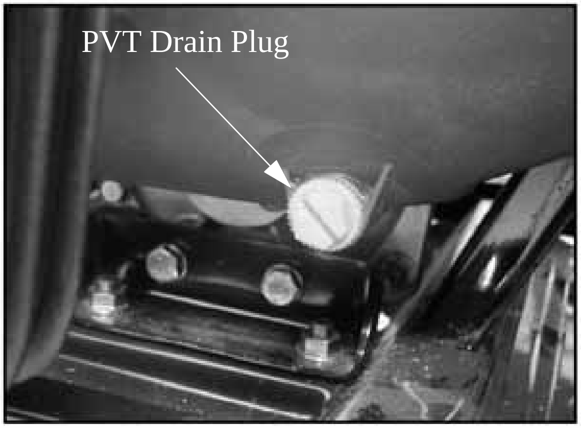
Optional Shift Weights

Shown below are optional shift weights which may be used in the PVT system. These shift weights have many different factors designed into them for controlling engagement RPM and shifting patterns. Shift weights should not be changed or altered without first having a thorough understanding the effects they have on belt to sheave clearance, clutch balance, engagement and shifting characteristics.



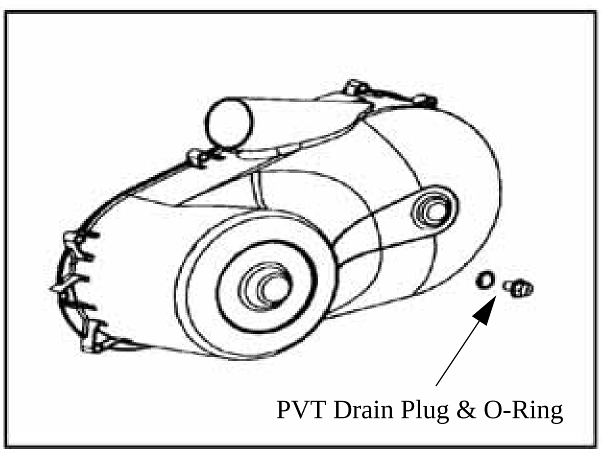
PVT Drying

IMPORTANT: If operating the ATV through water, be sure to check the PVT cover and other ATV components for water ingestion. The ATV should be checked immediately. Refer to Owner's Manual for Safe Riding Tips.



To drain any water that may be trapped inside the PVT cover, simply remove the PVT drain plug and O-ring located on the bottom of the PVT cover and let the water drain out. The PVT drain plug is shown below.

To further expel water in the PVT cover and to dry out the PVT system, shift the transmission to neutral and rev engine slightly to expel the moisture. This will also air-dry the belt and clutches. Allow engine RPM to settle to idle speed, shift transmission to lowest available range and test for belt slippage. Repeat as needed. Operate ATV in lowest available range for a short period of time until PVT system is dry.



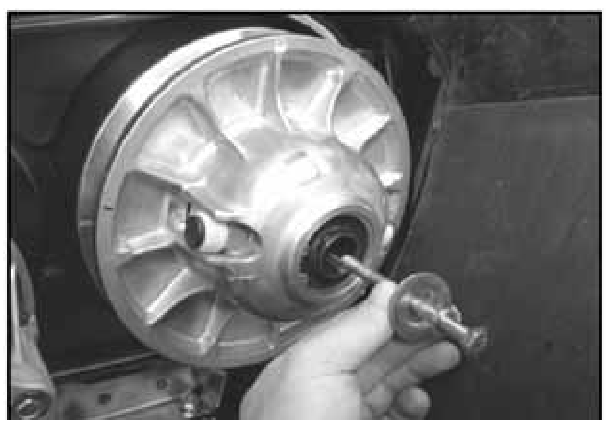
PVT Disassembly

NOTE: Some fasteners and procedures will vary. Refer to the appropriate parts manual for proper fasteners and fastener placement.

1. Remove seat.
2. Remove or loosen cab and footwell fasteners as necessary to gain access to PVT outer cover.
3. Remove PVT air outlet duct hose.
4. Remove outer PVT cover screws.
5. Mark the drive belt direction of rotation and remove drive belt. See the “DRIVE BELT REMOVAL” procedure later in this chapter.
6. Remove drive clutch retaining bolt and remove drive clutch using puller.

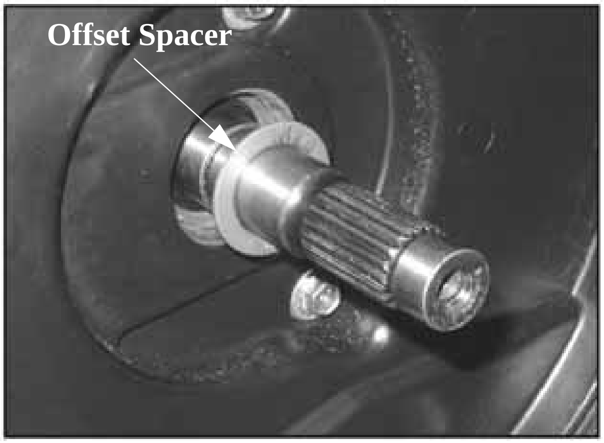
Drive Clutch Puller:	**(PN 2870506)**
Clutch Holding Wrench:	**(PN 9314177)**

7. Remove driven clutch retaining bolt and driven clutch. Use puller if necessary.

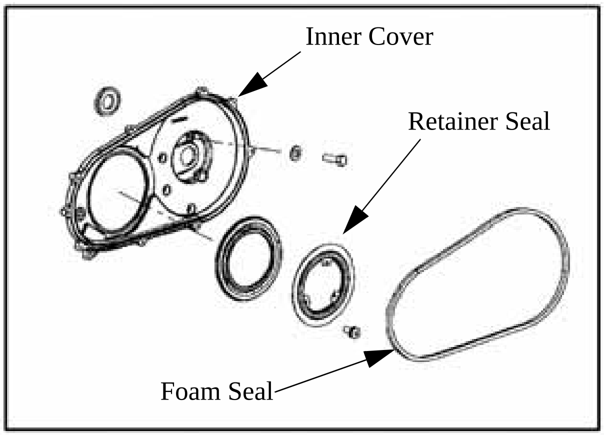


Driven Clutch Puller: (PN 2870913)

8. Remove driven clutch offset spacers from the transmission input shaft. NOTE: Remember to keep spacers in order for proper clutch offset on reassembly.



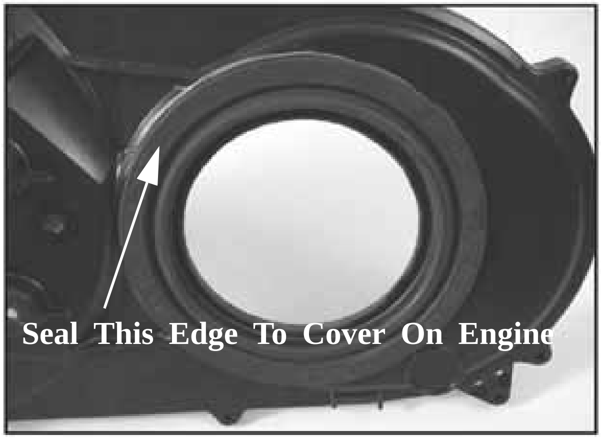
9. Remove cover screws and retainer plate.



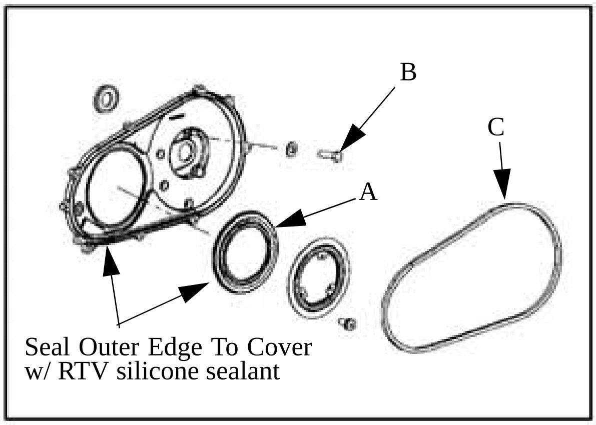
10. Remove inner cover retaining bolts at rear of cover.
11. Remove cover along with foam seal on back of cover or shaft.

PVT Installation

1. Inspect PVT inner cover-to-engine seal. Replace if cracked or damaged. Align the alignment mark on the cover with the mark on the engine seal.



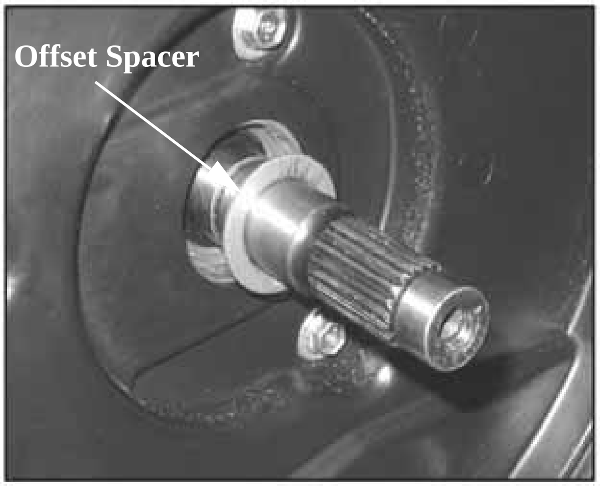
2. Place a new seal on transmission input shaft.
3. Apply RTV silicone sealant to outside edge of inner cover-to-engine seal, to ensure a water tight fit between the seal and the cover on engine side. Surfaces must be clean to ensure adhesion of silicone sealant.
4. Reinstall cover and tighten rear cover bolts just enough to hold it in place.
5. Fit lip of inner cover seal (A) to engine. Install seal retainer plate and tighten screws securely.
6. Torque rear inner cover bolts (B) to specification.



= T
Inner Cover Bolt Torque (B): **12 ft. lbs. (16.6 Nm)**

6

7. Install clutch offset spacer(s) on transmission input shaft.



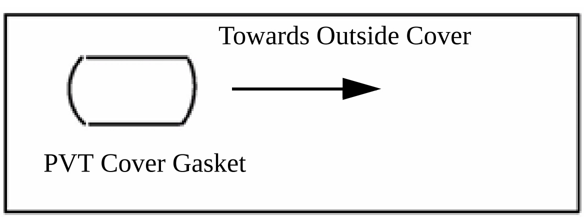
8. Clean splines inside driven clutch and on the transmission input shaft.
9. Apply a light film of grease to the splines on the shaft.
10. Install the driven clutch, washer, lock washer, and retaining bolt. Torque to specification.

= T
Driven Clutch Retaining Bolt Torque: **17 ft. lbs. (23.5 Nm)**

11. Clean end of taper on crankshaft and the taper bore inside drive clutch.
12. Install drive clutch and torque retaining bolt to specification.

= T
Drive Clutch Retaining Bolt Torque: **40 ft. lbs. (55 Nm)**

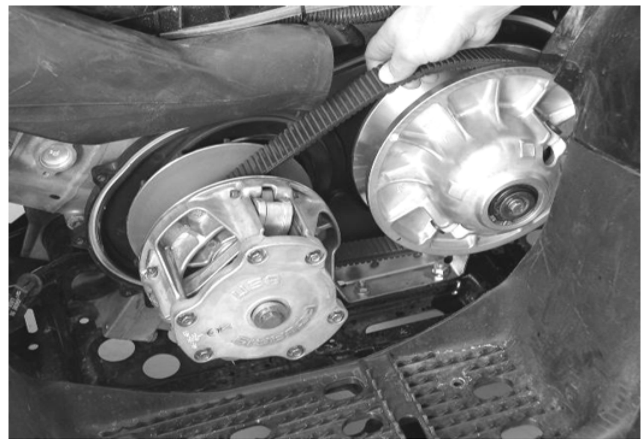
13. Reinstall drive belt noting direction of rotation. If a new belt is installed, install so numbers can be easily read.
14. Only replace PVT outer cover rubber gasket if it is damaged. Place the gasket with the narrow side out (C).

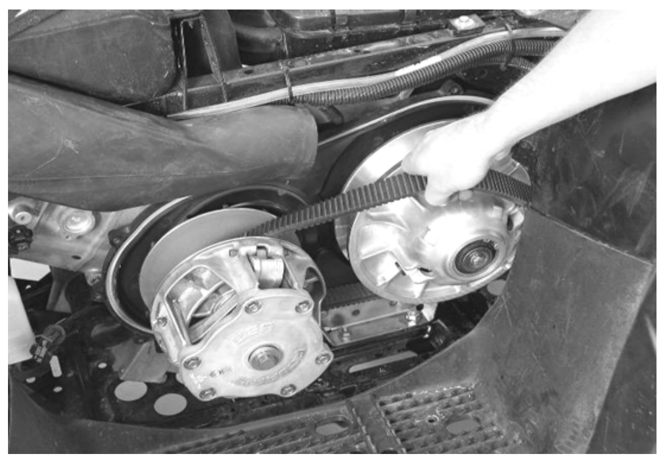


15. Reinstall PVT outer cover and secure with screws. Torque to specification.
16. Reinstall cab/footwell assembly, panel and seat.

Drive Belt Removal / Inspection

1. Remove outer PVT cover as described in PVT Disassembly.
2. Mark drive belt direction of rotation so that it can be installed in the same direction. The belt is normally positioned so part numbers are easily read.
3. To remove drive belt, apply brake, pull upward and rearward on belt while turning the back (moveable) driven sheave clockwise to open driven clutch sheaves. Pull out and down on belt to slip over the driven clutch outer sheave.



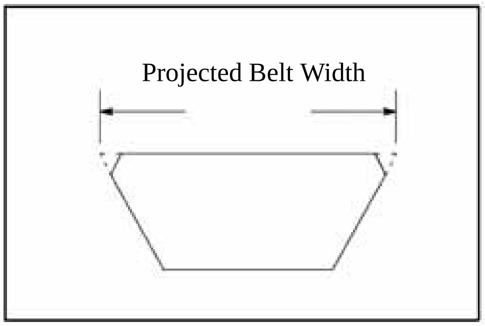


4. Measure belt width and replace if worn. Generally, belts should be replaced if clutches can no longer be adjusted to provide proper belt deflection.

NOTE: If the top edges are trimmed on some drive belts, it will be necessary to project the side profiles in order to measure from corner-to-corner.

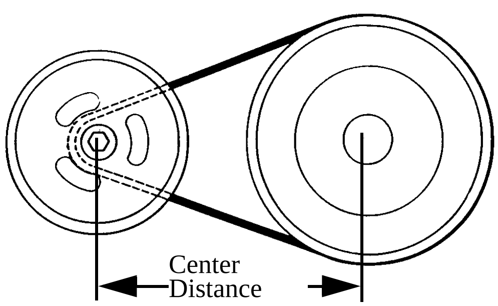
5. Place a straight edge on each side of the drive belt. Place another straight edge on top of belt.

6. Measure the distance where the side straight edges intersect the top, as shown in the illustration.



Belt Width:
Wear Limit 1.125" (2.86 cm)

7. Inspect belt for loose cords, missing cogs, cracks, abrasions, thin spots, or excessive wear. Replace if necessary.
8. 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 continuously in one spot.
9. Measure belt length with a tape measure around the outer circumference of the belt. Belts which measure longer than nominal length may require driven shimming or engine adjustment for a longer center distance to obtain proper belt deflection. Belts which measure shorter than nominal length may require driven shimming or a shorter center distance. Remember, proper belt deflection is the desired goal - not a specific center distance.
10. Replace belt if worn past the service limit. Belts with thin spots, burn marks, etc., should be replaced to eliminate noise, vibration, or erratic PVT operation. See Troubleshooting Chart at the end of this chapter for possible causes.



Clutch Center Distance:
10”±**.1-.05(254**±**2.51-.3mm)**
Belt Nominal Length:
40.875” ± 3/16 (103.8 ± .48 **cm**)

DRIVE BELT INSTALLATION

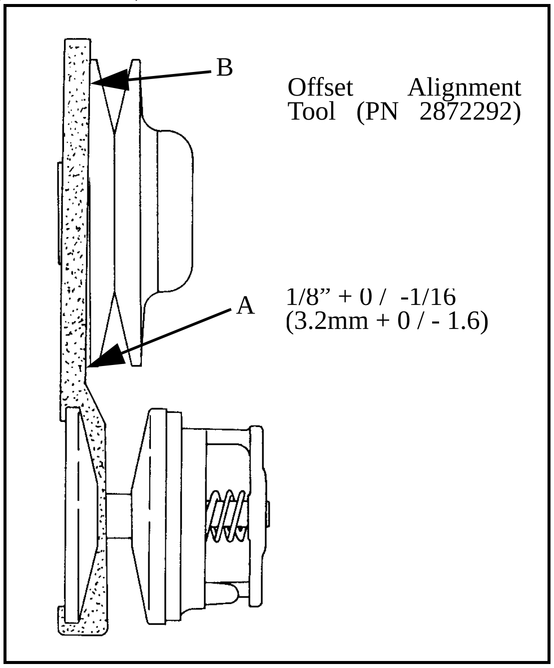
NOTE: Be sure to position belt so part number is easily read. Verify new belt is seated properly in the clutches before operating the ATV.

1. Loop belt over drive and over top of driven sheave.
2. While pushing down on top of belt, turn the back or moveable driven sheave clockwise.

3. The belt then should be able to be pushed down into and between the sheaves.
4. Install clutch cover temporarily. Verify engine is in PARK. Start engine and raise engine RPM enough to engage the clutch, rotating the belt and seating it in the clutches. Remove clutch cover and verify belt is seated properly before final cover installation.

Clutch Alignment

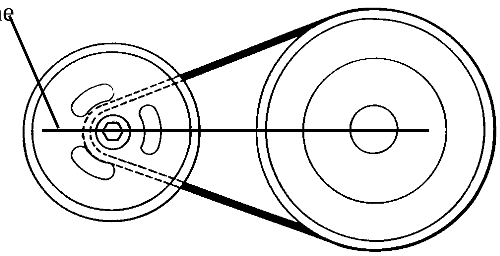
1. Remove belt and install the Clutch Offset Alignment Tool (PN 2872292) as shown.



2. With tool touching rear of driven clutch inner sheave, the distance at point "A" should be 1/8".

NOTE: If the distance is greater than 1/8, or less than 1/16,, clutch alignment must be adjusted as follows:

3. Remove drive and driven clutch. See "PVT DIASSEMBLY" at the beginning of the chapter.
4. Remove PVT inner cover.
5. Loosen all engine mounts. Move front of engine to the right or left slightly until alignment is correct.
6. Tighten engine mounts and verify alignment is correct.
7. Measure belt deflection and measure offset both above and below shaft centerlines. Adjust if necessary.



Measure Above and Below Centerline

NOTE: On some models, minor adjustments can be made by adding shims between the frame and front lower left engine mount to increase the distance at point "A". If a shim is present, it can be removed to decrease the distance at point "A".

Shim Kit (PN 2200126)

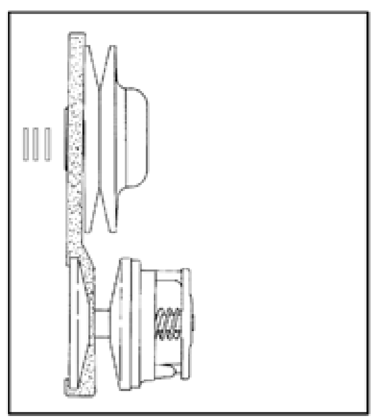
Clutch Offset

IMPORTANT: Inspect clutch alignment and center distance before adjusting offset.

Offset is correct when rear of tool contacts rear of inner sheave with driven clutch pushed completely inward, spacers installed (if required) on shaft and bolt torqued to specification.

Spacer Washer (PN 7556401)

1. Install alignment tool as shown. Remember to measure above and below the shaft centerlines.
2. Adjust offset by adding or removing spacer washers between back of driven clutch and spacer.

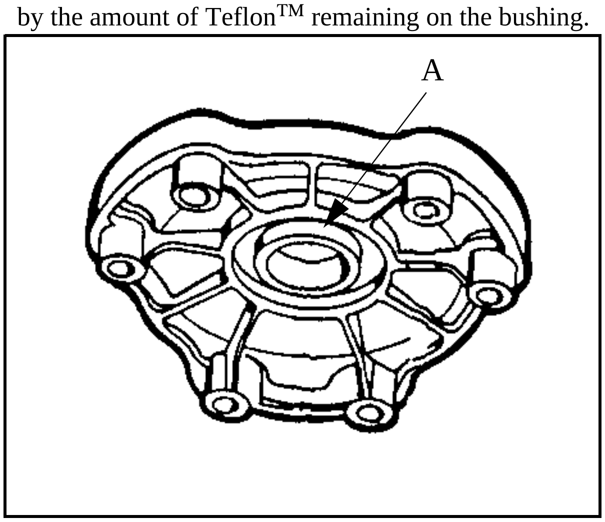


EBS DRIVE CLUTCH SERVICE

Drive Clutch Disassembly

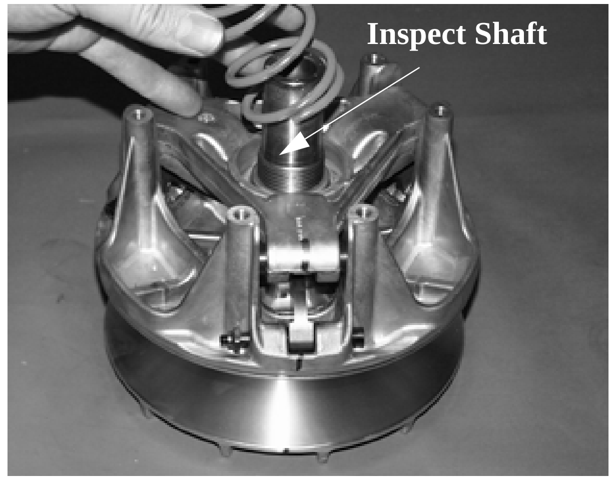
1. Using a permanent marker, mark the cover, spider, and moveable and stationary sheaves for reference, as the cast-in “X's” may not have been in alignment before disassembly.

2. Remove cover bolts evenly in a cross pattern and remove cover plate.
3. Inspect cover bushing (A). The outer cover bushing is manufactured with a Teflon™ coating. Wear is determined by the amount of Teflon™ remaining on the bushing.



Cover Bushing Inspection:
Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

4. Inspect area on shaft where bushing rides for wear, galling, nicks, or scratches. Replace clutch assembly if worn or damaged.
5. Remove and inspect spring. See “Drive Clutch Spring Specifications” for spring inspection.



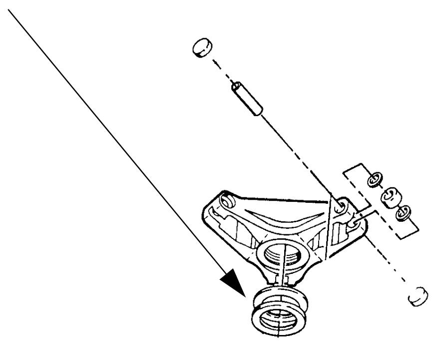
Spider Removal

1. Remove the limiter nut using the Clutch Spider Nut Socket (PN 2870338). Install clutch in holding fixture and loosen the spider (counterclockwise) using Clutch Spider Install Tool (PN 2870341).

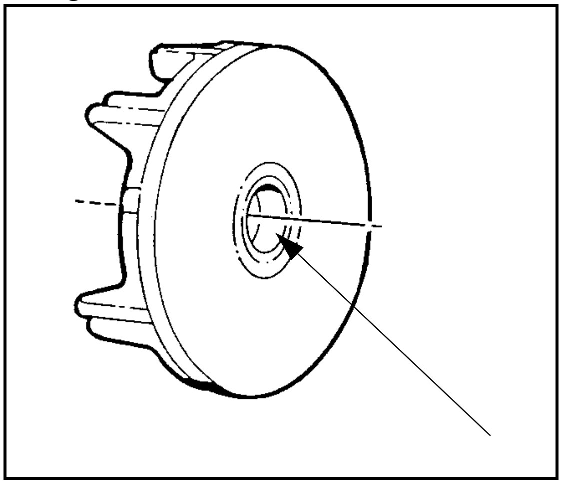
Clutch Holding Fixture: (PN 2871358)
Spider Removal Tool: (PN 2870341)

NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. Be sure to note the number and thickness of these washers.

To maintain proper clutch balance and belt-to-sheave clearance, be sure to reinstall original quantity and thickness washers

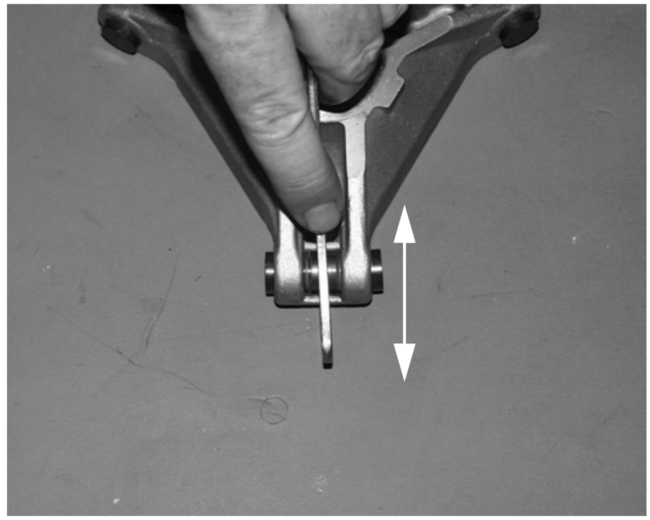


2. Inspect the Teflon™ coating on the moveable sheave bushing.



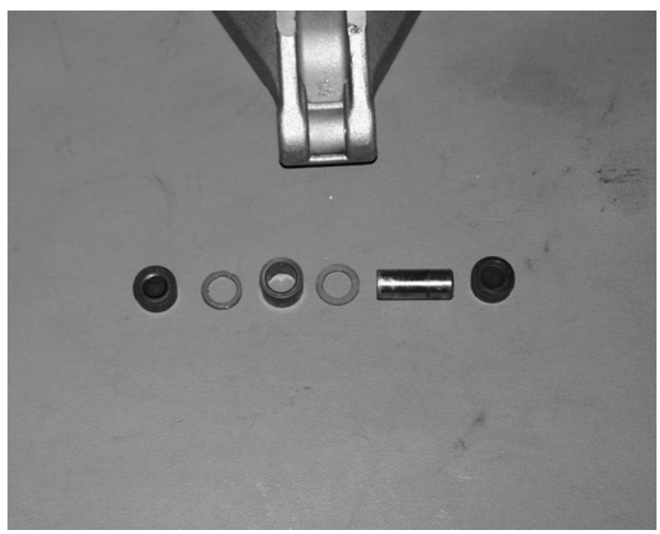
Moveable Sheave Bushing Inspection:
Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

3. Inspect all rollers, bushings and roller pins by pulling a flat metal rod across the roller. Turn roller with your finger. If you notice resistance, galling, or flat spots, replace rollers, pins and thrust washers in sets of three. Also inspect to see if roller and bushing are separating. Bushing must fit tightly in roller. Use the Roller Pin Tool (**PN 2870910**) to replace rollers and pins. Take care not to damage roller bushing or bearing surface of the new pin during installation.



4. Rubber-backed buttons can and should be used in all ATV clutches if the hollow roller pin is changed to a solid roller pin.

NOTE: Rubber side of the button is positioned toward the solid roller pin. It is recommended to switch all buttons to the rubber version during service (if needed).



Button To Tower Clearance Inspection

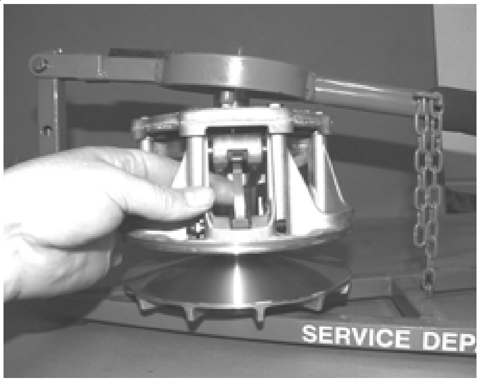
1. Inspect for any clearance between spider button to tower. If clearance exists, replace all buttons and inspect surface of towers. See “Spider Removal” procedure.

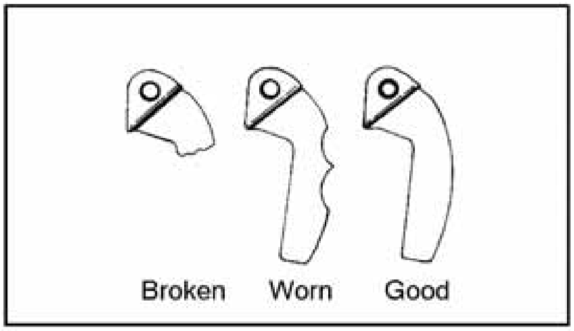
Button to Tower Clearance: .000-.001

2. Inspect sheave surfaces. Replace the entire clutch as an assembly if worn, damaged or cracked.

Shift Weight Inspection

1. If clutch is not disassembled, inspect as shown, using a clutch holding tool to compress the moveable sheave. The contact surface of the weight should be smooth and free of dents or gall marks. Remove shift weight bolts and weights.





2. Inspect the weight pivot bore and pivot bolts for wear or galling. If weights or bolts are worn or broken, replace in sets of three with new bolts.

NOTE: A damaged shift weight is usually caused by a damaged or stuck roller in the spider assembly. See roller inspection, see “Roller, Pin, and Thrust Washer Inspection”.

> **WARNING**
>
> The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!
> All PVT maintenance or repairs should be performed only 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 system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures.**

Drive Clutch Inspection

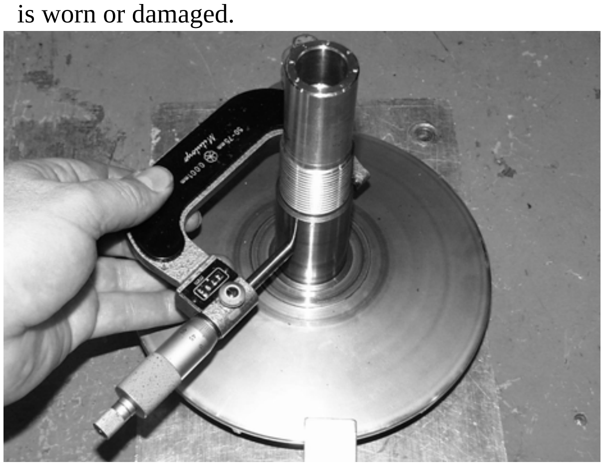
NOTE: Remove cover, spring, and spider following instructions for drive clutch removal, then proceed as follows:

1. Remove moveable sheave spacer sleeve (1) and the thrust washer (2). Visually inspect the washer for damage. Measure the thickness and compare to specification. Replace if worn or damaged.

Thrust Washer Thickness
Standard: .030, (.76mm)
Service Limit: .025, (.64mm)

2. Lift one-way clutch (3) and thrustwasher (4) off shaft. Replace as an assembly if worn, damaged, or if problems were noted.

3. 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.



= In. / mm.
Shaft Diameter: **Standard: 1.3745 - 1.375 (** **Service Limit: 1.3730”**

4. Visually inspect PTFE thrustwasher for damage. Measure the thickness and compare to specification. Replace if worn or damaged

= In. / mm.
PTFE Washer Thickness **Standard: .030” (.76mm)** **Service Limit: .025” (.64mm)**

Moveable Sheave Bushing Inspection

Inspect the Teflon™ coating (arrow) on the moveable sheave bushing. Inspect BOTH sheaves for signs of wear, grooving or cracking. De-glaze surfaces with a 3M™ pad if needed.

Moveable Sheave Bushing Inspection: Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

Drive Clutch Bushing Service

NOTE: Special Tool Required: EBS CLUTCH BUSHING REMOVAL AND INSTALLATION

Table 6-1: Special Tools

ITEM	QTY	PART DESCRIPTION	PART #
A, B	1	EBS Puller Tool	5132027
C	1	EBS Puller Nut	5132501
D	1	EBS Main Adapter	5132029
E	1	EBS Bushing Removal	5132028
--	1	Bushing Replacement Kit	2871226
--	1	Piston Pin Puller	2870386
--	1	Instructions	9915111

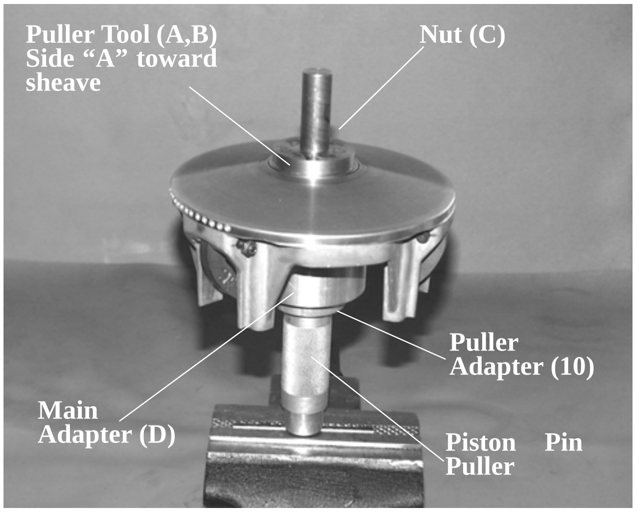
NOTE: Bushings are installed at the factory using Loctite™ 609. In order to remove bushings it will be necessary to apply heat evenly to the area around each bushing. Clean all residual Loctite™ from bushing bore prior to installing new bushing.

CAUTION

Clutch components will be hot! In order to avoid serious burns, wear insulated gloves during the removal process.

Drive Clutch Bushing Removal

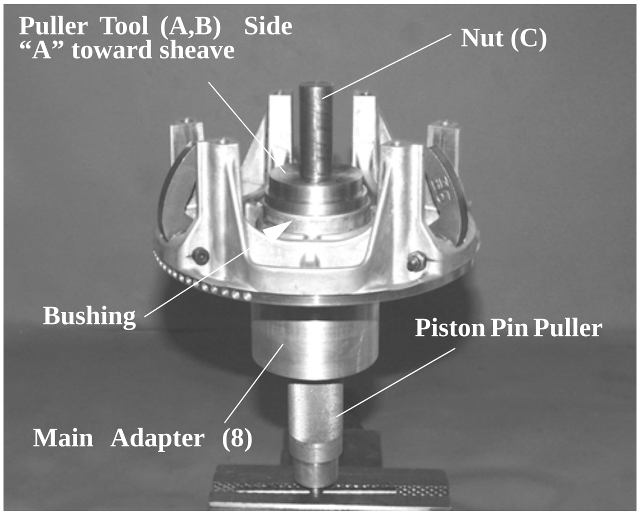
1. Remove clutch as outlined previously in this chapter.
2. Install handle end of Piston Pin Puller (**PN 2870386**) securely into bench vise and lightly grease puller threads.
3. Remove nut from puller rod and set aside.
4. Install puller adapter (Item 10 from kit **PN 2871226**).
5. Install main adapter (Item D) onto puller.



6. With towers pointing toward the vise, slide sheave onto puller rod.
7. Install removal tool (Item A/B) into center of sheave with A side" toward sheave. **NOTE:** Smooth One-way Clutch - Use **Bushing Tool PA-47336**.
8. Install nut (C) 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.
9. Turn sheave counterclockwise on puller rod until it comes free. Lift sheave off puller.
10. Remove nut from puller rod and set aside.
11. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

Drive Clutch Bushing Installation

1. Place main adapter (Item 8) on puller.



2. Apply Loctite™ 609 evenly to bushing bore inside moveable sheave.
3. Set bushing in place on sheave.
4. Insert installation puller tool (Item A/B) with “A” side down, into center of bushing. **NOTE:** 800 EFI Clutch - Use **Bushing Tool PA-47336**.
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.

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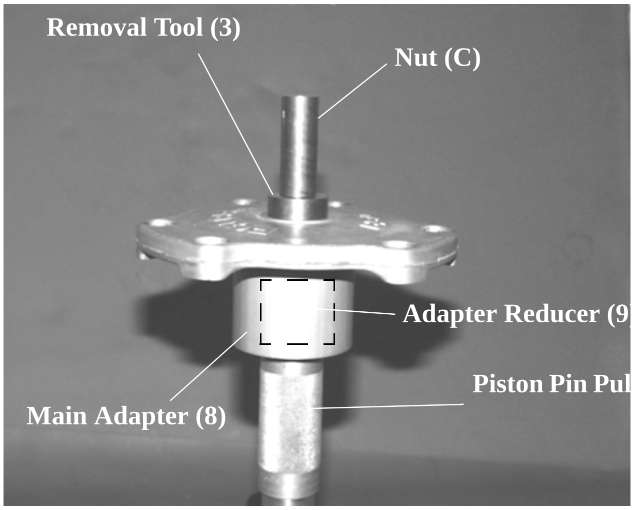
Cover Bushing Removal

1. Install main adapter (Item 8) on puller.



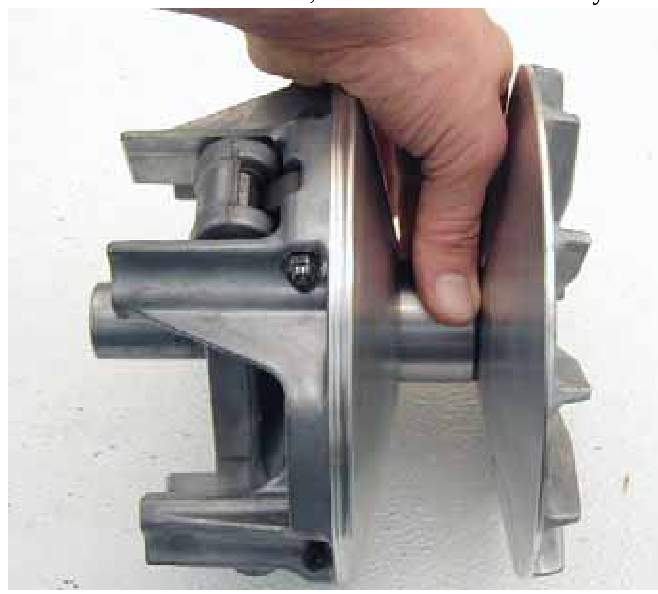
2. Install adapter reducer (Item 9).
3. From outside of clutch cover, insert removal tool (Item 3) into cover bushing.
4. With inside of cover toward vise, slide cover onto puller.
5. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.
6. Turn clutch cover counterclockwise on puller rod until bushing is removed and cover comes free.
7. Remove nut from puller rod and set aside.
8. Remove bushing and bushing removal tool from puller. Discard bushing.

Cover Bushing Installation

1. Apply Loctite™ 609 evenly to bushing bore in cover.
2. Working from inside of cover, insert new bushing and bushing installation tool into center of clutch cover.
3. With main adapter on puller, insert cover onto puller rod, placing outside of cover toward vise.
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.

One-Way Clutch Inspection (Drive Clutch)

1. Rotate one-way clutch clockwise (as viewed from the cover plate side). The clutch should rotate on the shaft with only slight amount of drag. Verify there is no binding or rough spots. When rotated counterclockwise, the clutch should lock to the shaft without slipping. If problems are noted in either direction, continue with disassembly.



Drive Clutch Reassembly

NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. The Teflon bushings are self-lubricating.

> **CAUTION**
>
> **Do not apply oil or grease to the bushings.**

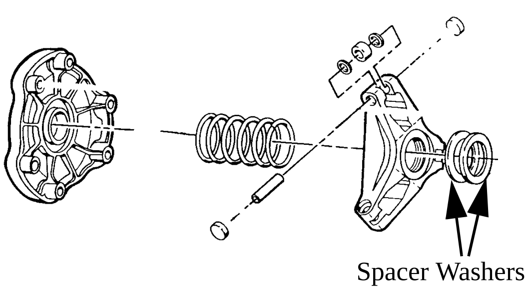
1. Reassemble drive clutch in the following sequence. Be sure the “X”, or the marks that were made earlier, are aligned during each phase of assembly.

A) “X”, or the marks that were made earlier on cover

B) “X” on spider, making sure spacer washers are installed underneath spider and positioned properly in recess

C) “X”, or the marks that were made earlier under weight

2. Install moveable sheave onto fixed sheave.
3. Install spider spacers. Use same quantity and thickness as were removed.
4. Compress spider buttons for each tower and install spider, making sure that “X”, or the marks that were made earlier, on spider aligns with “X”, or the marks that were made earlier on the moveable sheave.
5. Torque spider to specification using the holding fixture and spider tool. Torque with smooth motion to avoid damage to the stationary sheave.



CAUTION

Verify spider spacer washers are fully seated in the recessed area of the spider. Any misalignment will alter clutch balance. Inverting the clutch while initially tightening the spider will help position the washers.

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Spider Torque:
200 ft. lbs. (271 Nm)

6. Install limiter nut on top of spider using the Clutch Spider Nut Socket (**PN 2870338**). Torque to specification. Reinstall shift weights using new lock nuts on the bolts.

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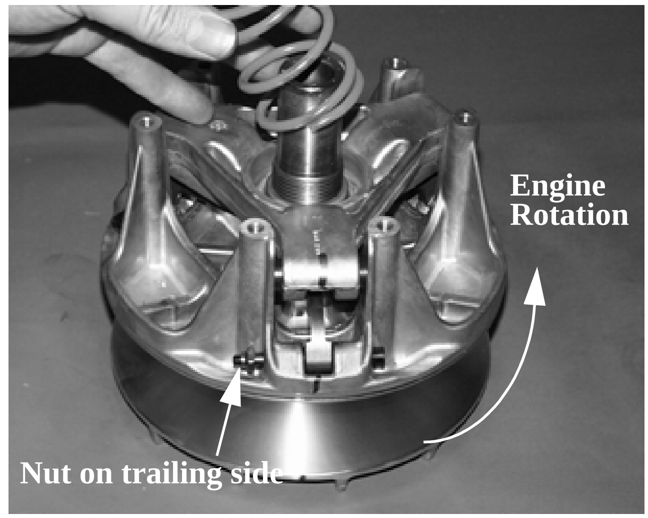
Spider Nut Torque:
15 ft. lbs. (20 Nm)

7. Reinstall clutch spring.



8. Reinstall cover, aligning bosses on the tower and cover. Torque cover bolts evenly to specification.

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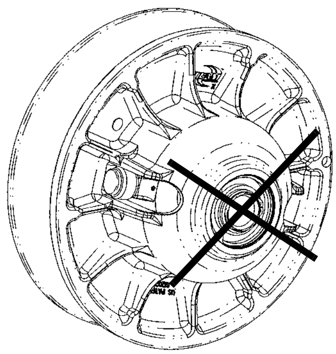
Cover Screw Torque:
90 in. lbs. (10.4 Nm)

6

EBS DRIVEN CLUTCH SERVICE

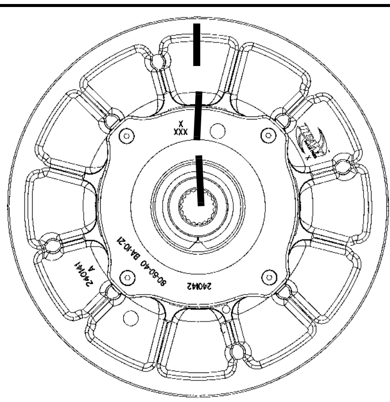
Driven Clutch Disassembly

1. Remove driven clutch from the transmission input shaft. Do not attempt disassembly of the driven clutch from the outside snap ring. The driven clutch must be disassembled from the helix side.



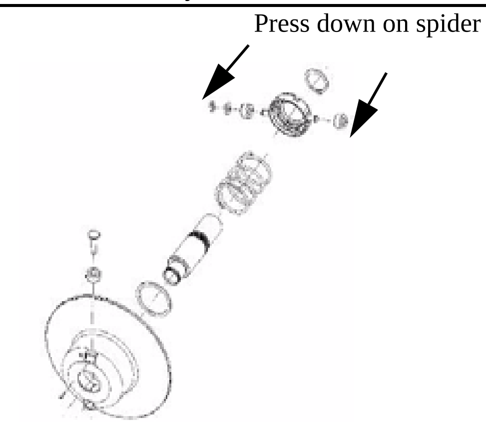
Do not disassemble from this side

2. It is important to mark the position of the shaft, cam cover, and sheave before disassembly or use the “X’s” on the components for reference. This will aid in reassembly and helps to maintain clutch balance after reassembly.

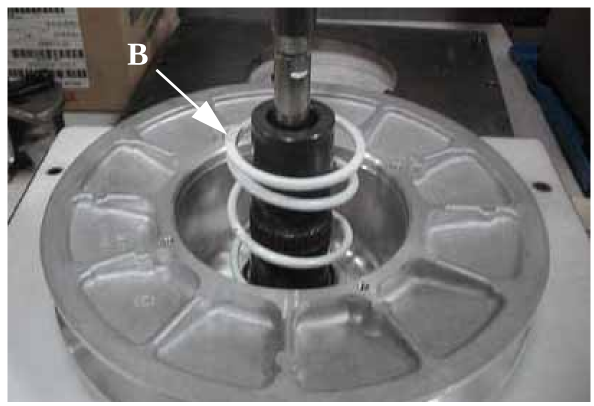


3. Remove the four torx screws that secure the cam assembly (helix) using a T25 torx.

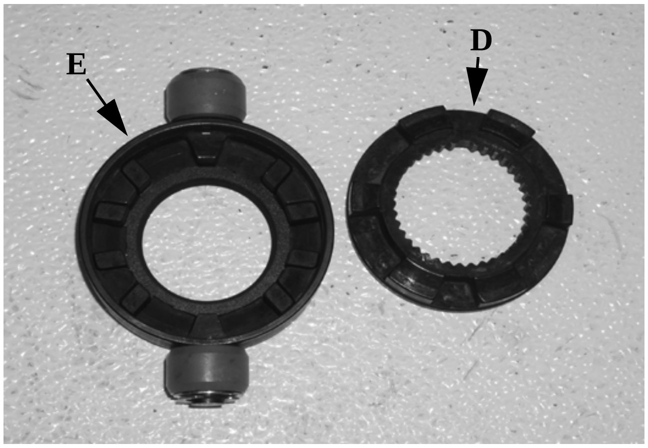
4. Place the clutch into Clutch Compression Tool **PN 8700220**. Using Compression Extensions **PN PS-45909**, Press down on top of the spider assembly, compressing the spider onto the shaft. Remove snap ring (A) and slowly release the assembly.



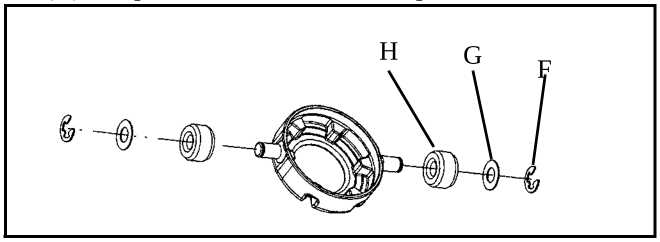
5. Remove the spider assembly, spring (B), and spacer washer (C). **NOTE:** Spring is compression only and has no torsional wind



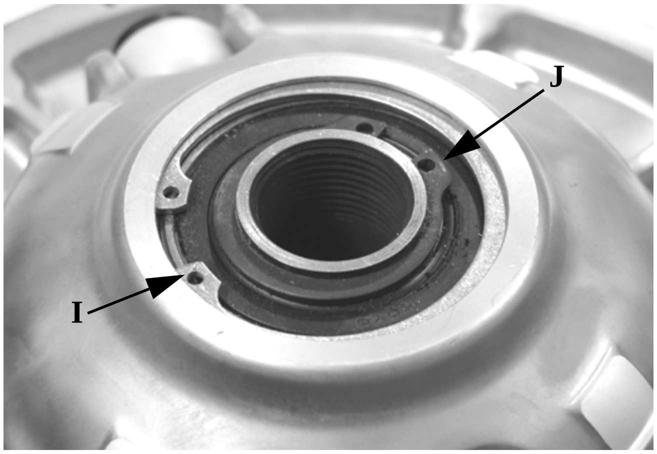
6. Remove the inside spider plate (D) and spider dampener (E). Inspect the spider dampener (E) for wear and replaced if needed.



7. Remove the E-clip (F), washer (G), and the clutch rollers (H). Inspect the rollers for wear replace if worn.

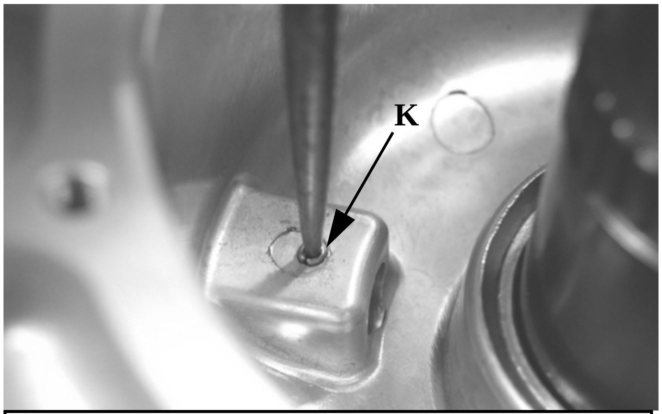


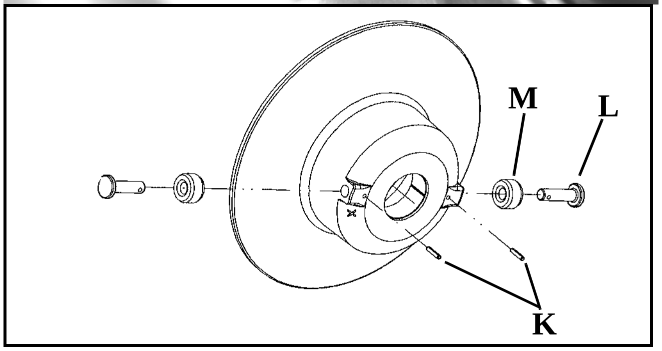
8. Remove the clutch assembly from the holding tool. Remove the large outer retaining ring (I) and the inner retaining ring (J).



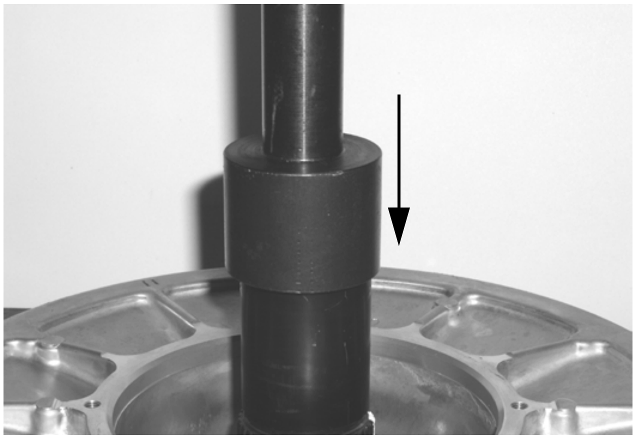
9. Press out the spring pins (K) in the inner sheave.

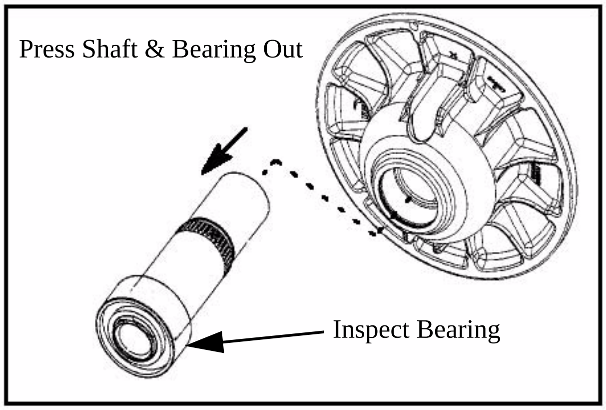
10. Pull out the clutch roller pins (L) and rollers (M).





11. Press the shaft and bearing out of the outer sheave using a press.





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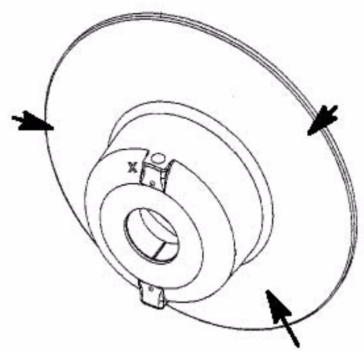
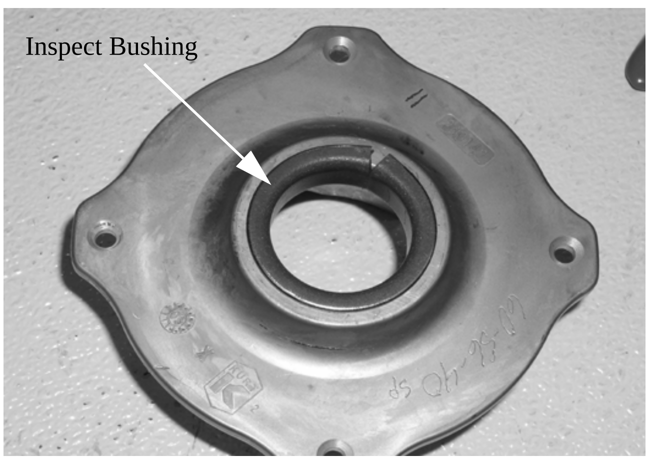
12. Inspect the bearing for wear. Spin the bearing, if the bearing does not spin smoothly replace as needed. To remove the bearing, simply press the bearing from the shaft.
13. Inspect the bearing for wear. Spin the bearing, if the bearing does not spin smoothly replace as needed. To remove the bearing, simply press the bearing from the shaft.



Inspect Sheave Surface

14. Inspect the cam assembly (helix) bushing for wear. If the bushing is worn or the shaft does not fit snug into the bushing, replace the cam assembly (cover).



DRIVEN CLUTCH BUSHING REMOVAL/ INSTALLATION

NOTE: Special Tool Required: EBS CLUTCH BUSHING REMOVAL AND INSTALLATION

Table 6-1:

ITEM	QTY	PART DESCRIPTION	PART #
A, B	1	EBS Puller Tool	5132027
C	1	EBS Puller Nut	5132501
D	1	EBS Main Adapter	5132029
E	1	EBS Bushing Removal Tool Instructions	5132028

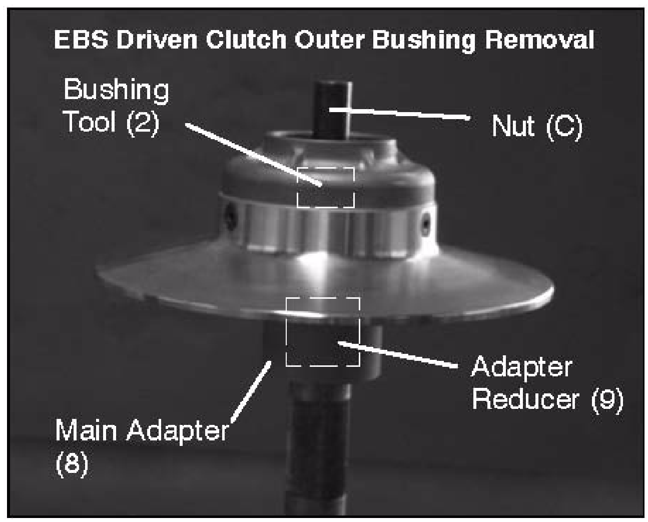
Table 6-1:

ITEM	QTY	PART DESCRIPTION	PART #
--	1	Bushing Replacement Kit	2871226
--	1	Piston Pin Puller	2870386
--	1	Instructions	9915111

NOTE: Bushings are installed at the factory using Loctite™ 609. In order to remove bushings it will be necessary to apply heat evenly to the area around each bushing. Clean all residual Loctite™ from bushing bore prior to installing new bushing.

Driven Clutch Bushing Removal

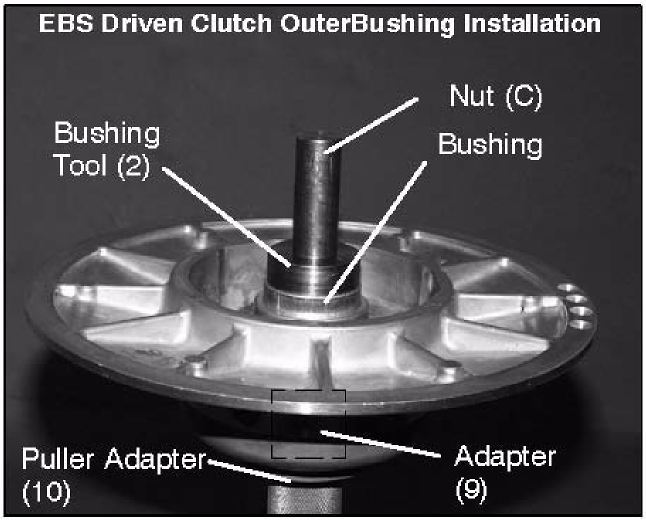
1. Install main puller adapter (Item 8) onto puller.
2. Install adapter reducer (Item 9).
3. Using a hand held propane torch, apply heat around outside of bushing until tiny smoke tailings appear.
4. Flip sheave over so bushing faces downward and install onto puller.
5. Install bushing tool (Item 2).



6. Install left hand nut (C) and spacer onto puller rod and tighten by hand. Turn puller barrel for further tension if needed.
7. Turn clutch sheave counterclockwise until bushing is removed and sheave comes free.
8. Remove nut (C) (left hand thread) from puller rod and set aside.
9. Remove adapters from puller.
10. Remove bushing and removal tool from adapters. Discard bushing.

Driven Clutch Bushing Installation

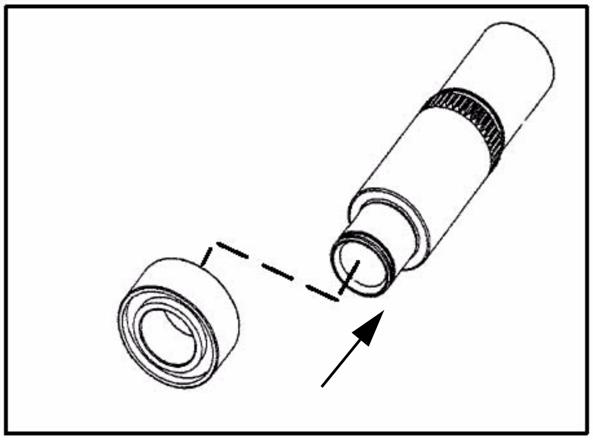
1. Install puller adapter (Item 10) onto puller.
2. Install adapter (Item 9) onto puller.



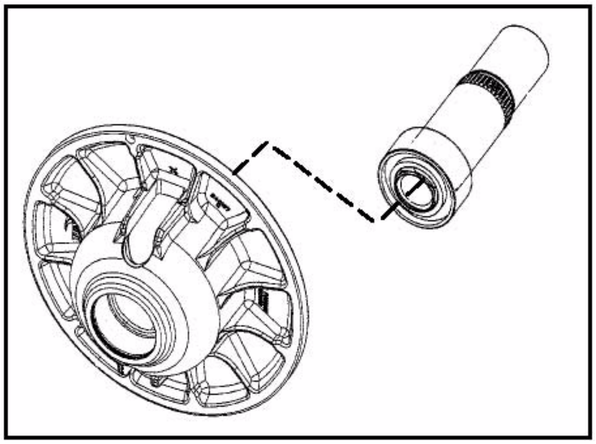
3. Apply Loctite™ 609 evenly to bushing bore inside moveable sheave.
4. Install sheave face down on puller.
5. Install new bushing on installation tool (Item 2) and install assembly into sheave.
6. Install left hand thread nut (C) onto puller rod and hand tighten against installation tool.
7. Turn clutch sheave counterclockwise, making sure bushing is drawn straight into bore. Continue until bushing is seated.
8. Remove nut (C) from puller rod and set aside.
9. Remove installation tool and clutch sheave from puller.

EBS DRIVEN CLUTCH REASSEMBLY

1. Press a new bearing onto the output shaft using a press.



2. Install the shaft/bearing into the outer sheave.



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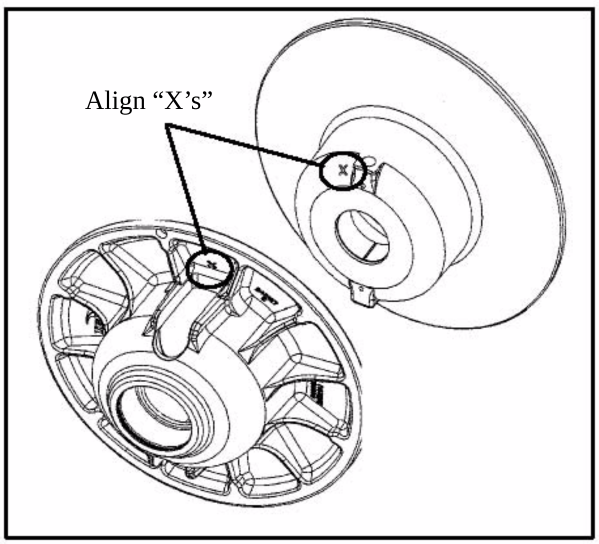
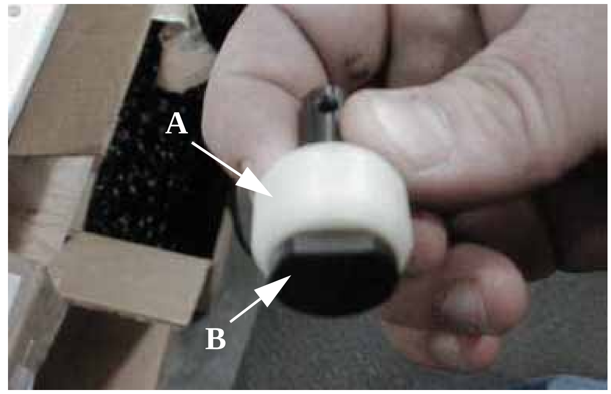
3. Install the small and large retaining rings into the outer sheave above the bearing.

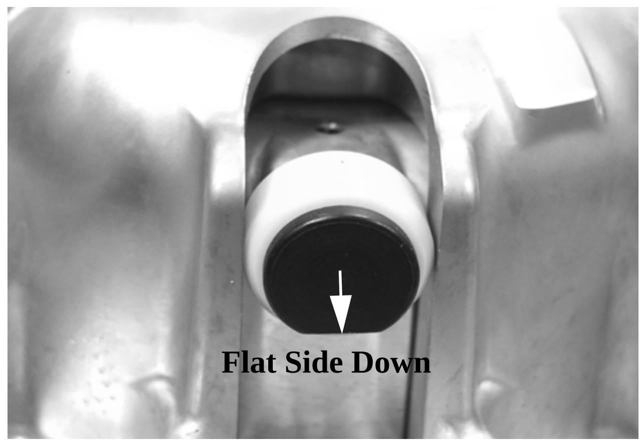
4. Line up the "X" on the moveable sheave with the "X" on the stationary sheave or use the marks previously used. Put the sheaves together.



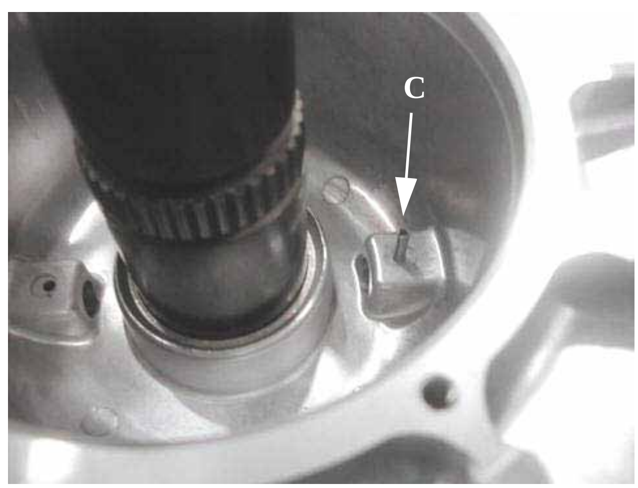
5. Install the roller (A) onto the roller pin (B). (Both Sides).



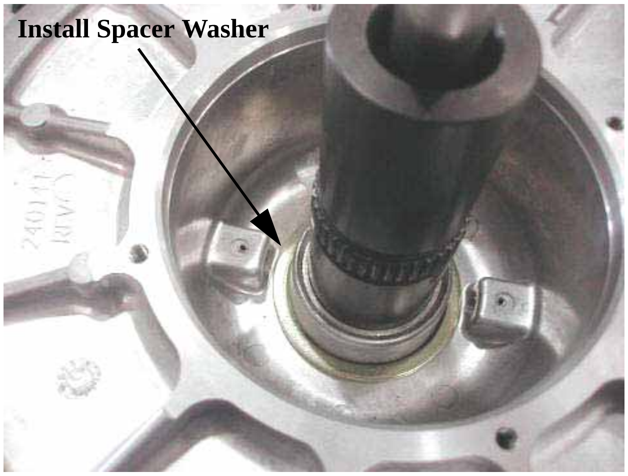
6. Install the roller pin into the sheave assembly. (Both sides). The flat side of the roller pin faces downward when the shaft side is laying flat on the bench.



7. Install the spring pins (C) to secure the roller pins. Install until flush with sheave surface.

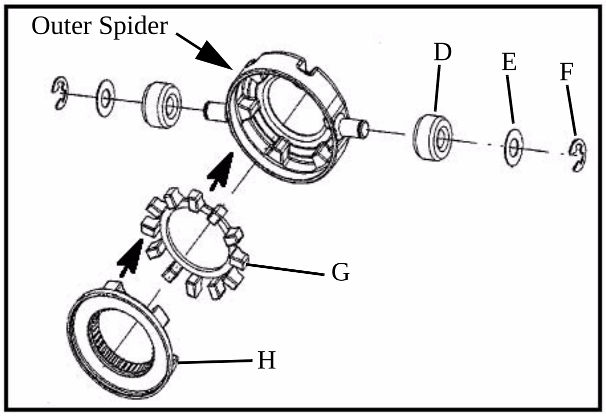


8. Install the spacer washer.

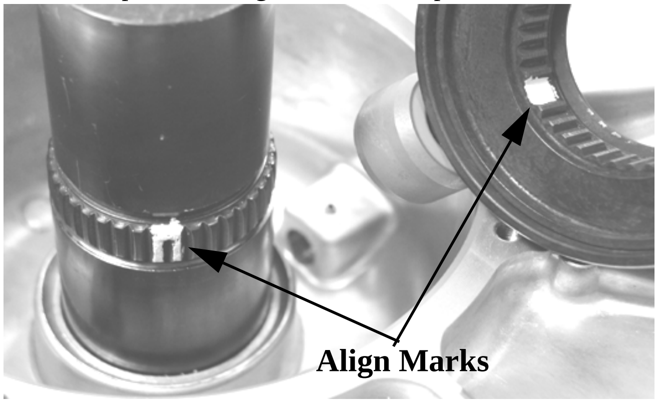


9. Install the spring over the shaft (arrow).

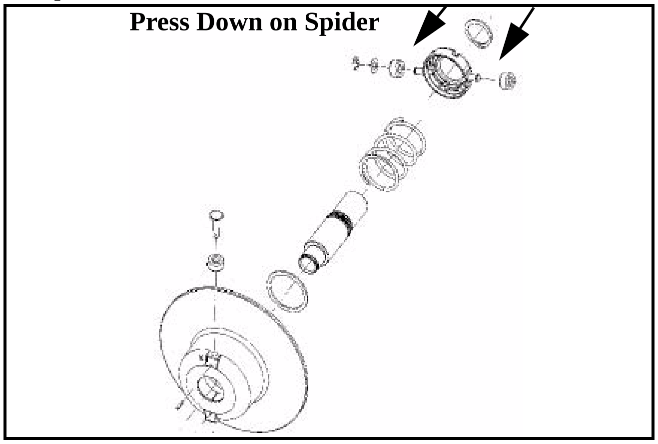
10. Install the clutch rollers (D) onto each side of the outside spider. Install the washers (E) and E-clips (F) to secure the rollers. Spin the roller, the rollers should spin freely.
11. Install the spider dampener (G) inside the outer spider and install the inside spider plate (H).



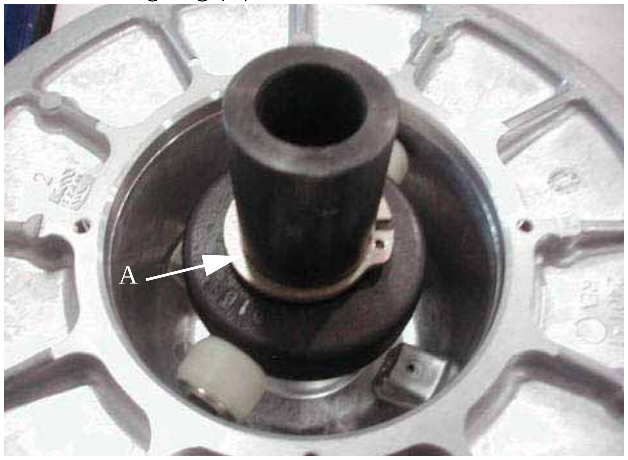
12. Install the spider assembly onto the shaft with the retaining ring on top of the spider. **NOTE:** Use the marks previously made to align the skip tooth spider, or use the “X” on top of the spider and align it with the skip tooth on the shaft.



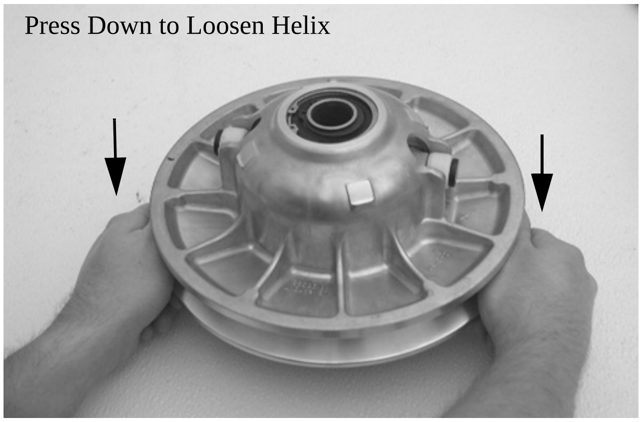
13. Place the clutch into Clutch Compression Tool **PN 8700220**. Using Compression Extensions **PN PS-45909**, Press down on the top of the spider assembly, pushing the spider onto the shaft.



14. Slowly compress the spider into place. If the spider appears to bind while compressing, stop and make sure the skip tooth on the shaft and the spider are aligned. Once the spider passes the retaining ring notch on the shaft, install the retaining ring (A).



15. Install the cam assembly (helix) over the shaft. Line up the "X" on the cam, "X" on spider, and "X" on the stationary sheave or use the marks previously made before disassembly. **NOTE:** If the cam assembly (helix) is difficult to install, be sure the sheaves are aligned. To align the sheaves place the clutch assembly on a flat surface with the cam assembly (helix) side down. Press down on the moveable sheave belt face with both hands and the helix will release.



16. Use a T25 torx to install the four torx screws and torque to specification.

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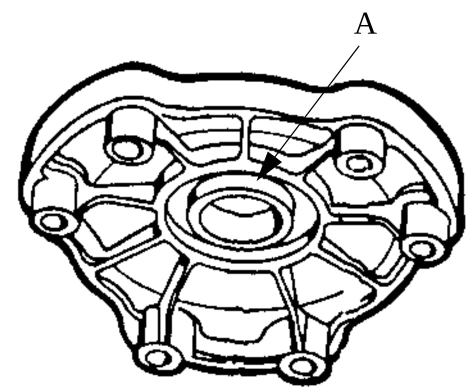
T25 Torx:
42-52 in. lbs. (4.75 - 5.88 Nm)

STANDARD DRIVE CLUTCH

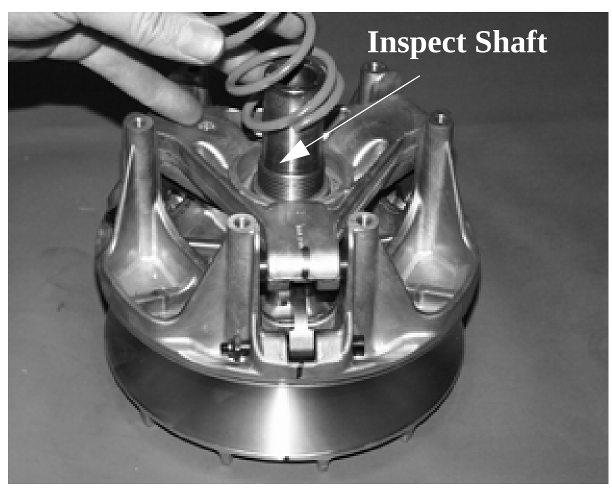
Drive Clutch Disassembly

1. Using a permanent marker, mark the cover, spider, and moveable and stationary sheaves for reference, as the previous "X's" may not have been in alignment before disassembly.
2. Remove cover bolts evenly in a cross pattern and remove cover plate.
3. Inspect cover bushing (A). The outer cover bushing is manufactured with a Teflon™ coating. Wear is determined by the amount of Teflon™ remaining on the bushing.



Cover Bushing Inspection:
Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

4. Inspect area on shaft where bushing rides for wear, galling, nicks, or scratches. Replace clutch assembly if worn or damaged.
5. Remove and inspect spring. See "Drive Clutch Spring Specifications" for spring inspection.



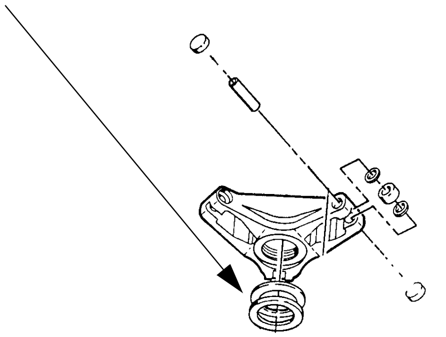
Spider Removal

1. Remove the limiter nut using the Clutch Spider Nut Socket **PN 2870338**. Install clutch in holding fixture and loosen the spider (counterclockwise) using Clutch Spider Install Tool **PN 2870341**.

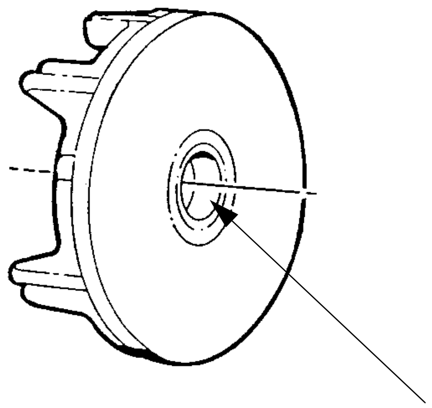
Clutch Holding Fixture: PN 2871358
Spider Removal Tool: PN 2870341

NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. Be sure to note the number and thickness of these washers.

To maintain proper clutch balance and belt-to-sheave clearance, be sure to reinstall original quantity and thickness washers under the spider assembly.

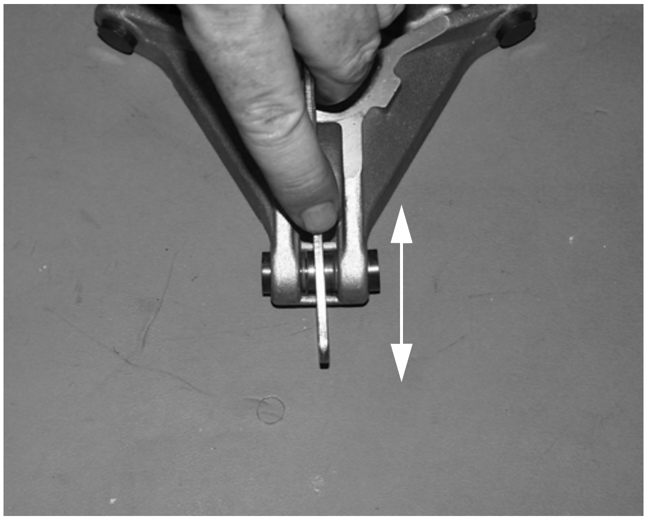


2. Inspect the Teflon™ coating on the moveable sheave bushing.



Moveable Sheave Bushing Inspection: Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

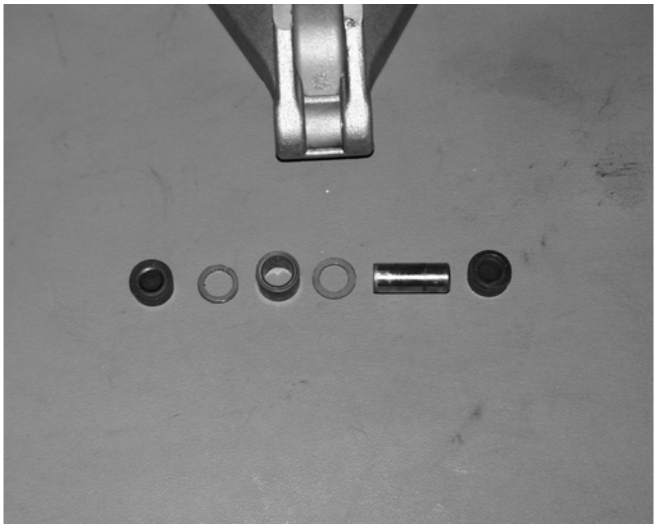
3. Inspect all rollers, bushings and roller pins by pulling a flat metal rod across the roller. Turn roller with your finger. If you notice resistance, galling, or flat spots, replace rollers, pins and thrust washers in sets of three. Also inspect to see if roller and bushing are separating. Bushing must fit tightly in roller. Use the Roller Pin Tool (**PN 2870910**) to replace rollers and pins. Take care not to damage roller bushing or bearing surface of the new pin during installation.



6

4. Rubber backed buttons can and should be used in all ATV clutches if the hollow roller pin is changed to a solid roller pin.

NOTE: The rubber side of the button is positioned toward the solid roller pin. It is recommended to switch all buttons to the rubber version during service (if needed).



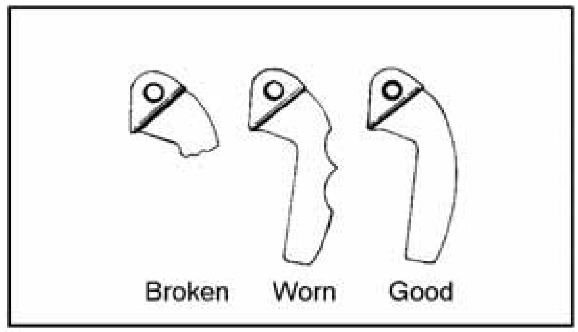
Button To Tower Clearance Inspection

1. Inspect for any clearance between spider button to tower. If clearance exists, replace all buttons and inspect surface of towers. See "Spider Removal" procedure.

2. Inspect sheave surfaces. Replace the entire clutch as an assembly if worn, damaged or cracked.

Shift Weight Inspection

1. If clutch is not disassembled, inspect as shown, using a clutch holding tool to compress the moveable sheave. The contact surface of the weight should be smooth and free of dents or gall marks. Remove shift weight bolts and weights.



2. Inspect the weight pivot bore and pivot bolts for wear or galling. If weights or bolts are worn or broken, replace in sets of three with new bolts.

NOTE: A damaged shift weight is usually caused by a damaged or stuck roller in the spider assembly. See roller inspection, see "Roller, Pin, and Thrust Washer Inspection".

> **⚠ WARNING**
>
> The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!
>
> All PVT maintenance or repairs should be performed only 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 system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures.**

Sheave / Bushing Inspection

Inspect the Teflon™ coating on the sheave bushings and cover bushing. Inspect BOTH sheaves for signs of wear, grooving or cracking. Clean sheave surfaces with a 3M™ pad if needed.

Cover / Sheave Bushing Inspection: Replace bushing if more brass than Teflon™ is visible on the bushing. Do not clean bushings.

Drive Clutch Bushing Service

NOTE: Special Tool Required: CLUTCH BUSHING REMOVAL AND INSTALLATION KIT

ITEM	QTY	PART DESCRIPTION	PART #
--	1	Bushing Replacement Kit	2871025
--	1	Piston Pin Puller	2870386

NOTE: Bushings are installed at the factory using Loctite™ 609. In order to remove bushings it will be necessary to apply heat evenly to the area around each bushing. Clean all residual Loctite™ from bushing bore prior to installing new bushing.

CAUTION

Clutch components will be hot!
In order to avoid serious burns, wear insulated gloves during the removal process.

Drive Clutch Bushing Removal

1. Remove clutch as outlined previously in this chapter.
2. Install handle end of Piston Pin Puller (**PN 2870386**) securely into bench vise and lightly grease puller threads.
3. Remove nut from puller rod and set aside.
4. Install puller adapter (Item 10 from kit **PN 2871226**).
5. Install main adapter onto puller.
6. With towers pointing toward the vise, slide sheave onto puller rod.
7. Install removal tool into center of sheave.
8. 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.
9. Turn sheave counterclockwise on puller rod until it comes free. Lift sheave off puller.
10. Remove nut from puller rod and set aside.
11. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

Drive Clutch Bushing Installation

1. Place main adapter on puller.
2. Apply Loctite™ 609 evenly to bushing bore inside moveable sheave.
3. Set bushing in place on sheave.
4. Insert installation puller tool 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 main adapter on puller.
2. Install adapter reducer.
3. From outside of clutch cover, insert removal tool into cover bushing.
4. With inside of cover toward vise, slide cover onto puller.
5. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.
6. Turn clutch cover counterclockwise on puller rod until bushing is removed and cover comes free.
7. Remove nut from puller rod and set aside.
8. Remove bushing and bushing removal tool from puller. Discard bushing.

Cover Bushing Installation

1. Apply Loctite™ 609 evenly to bushing bore in cover.
2. Working from inside of cover, insert new bushing and bushing installation tool into center of clutch cover.
3. With main adapter on puller, insert cover onto puller rod, placing outside of cover toward vise.
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.

Drive Clutch Reassembly

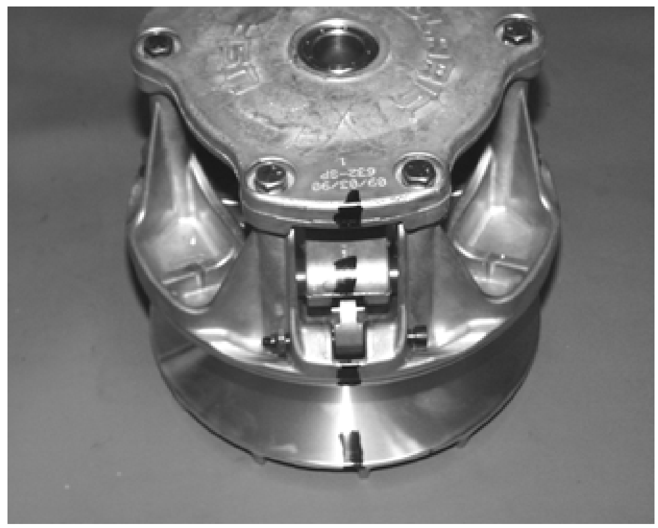
NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. The Teflon bushings are self-lubricating. Do not apply oil or grease to the bushings.

Reassemble drive clutch in the following sequence. Be sure the “X”, or the marks that were made earlier, are aligned during each phase of assembly.

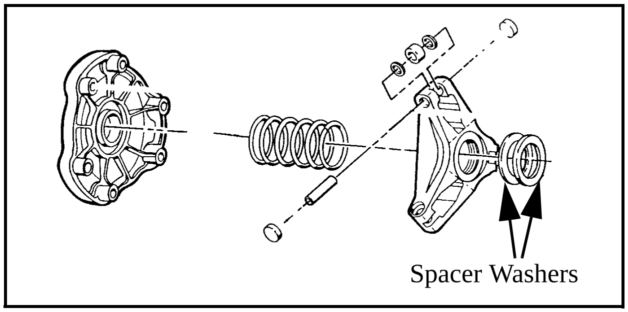
A) “X”, or the marks that were made earlier on cover

B) “X” on spider, making sure spacer washers are installed underneath spider and positioned properly in recess

C) “X”, or the marks that were made earlier under weight



1. Install moveable sheave onto fixed sheave.
2. Install spider spacers. Use same quantity and thickness as were removed.
3. Compress spider buttons for each tower and install spider towers on the moveable sheave. Verify that the alignment marks on spider align with the marks that were made on the moveable sheave.
4. Torque spider to specification using the holding fixture and spider tool. Torque with smooth motion to avoid damage to the stationary sheave.



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Spider Torque: **200 ft. lbs. (271 Nm)**

CAUTION

Verify spider spacer washers are fully seated in the recessed area of the spider. Any misalignment will alter clutch balance. Inverting the clutch while initially tightening the spider will help position the washers.

5. Install limiter nut on top of spider using the Clutch Spider Nut Socket (**PN 2870338**). Torque to specification.

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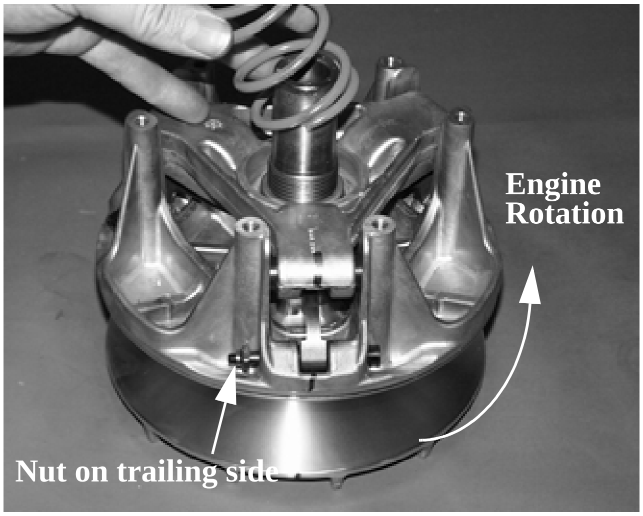
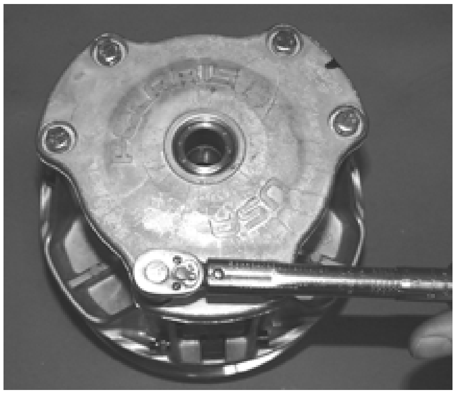
Spider Limiter Nut Torque: **15 ft. lbs. (20 Nm)**

6. Reinstall shift weights using new lock nuts on the bolts.
7. Reinstall clutch spring.



8. Reinstall cover, aligning bosses on the tower and cover. Torque cover bolts evenly to specification.



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Cover Screw Torque: **90 in. lbs. (10.4 Nm)**

6

STANDARD DRIVEN CLUTCH

Disassembly

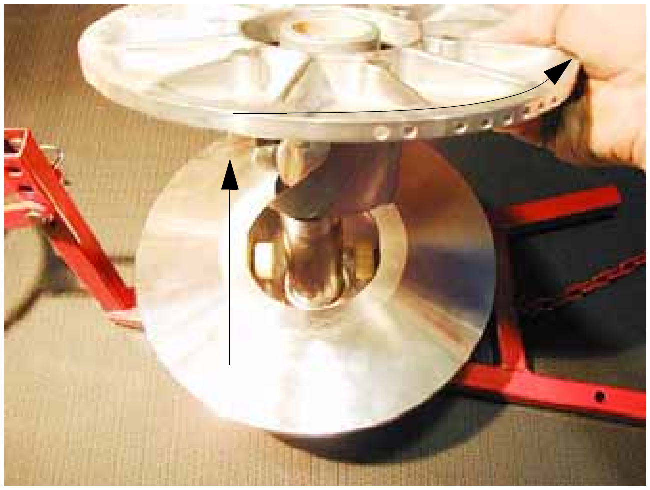
1. Using special tool **PN 8700220**, apply and hold downward pressure on the outer spring retainer and remove the snap ring (A).

CAUTION

Wear eye protection when working with spring tensioned components to avoid serious injury.

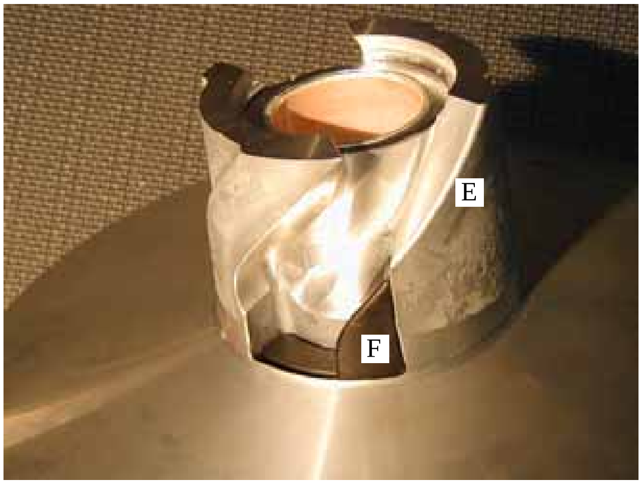
2. With snap ring (A) removed and spring pressure relieved, remove the outer retainer (B) and spring (C).

3. Separate the clutch sheaves by pulling upward while rotating the inner sheave.



Inspection

1. Inspect both the inner and outer sheave surfaces. Replace the entire clutch assembly if worn, damaged or cracked.
2. Inspect the inner sheave helix (E) and spring retainer (F) for signs of wear.



3. Remove the inner spring retainer (F) from the inner sheave and inspect for signs of wear.

4. Inspect the rollers in the stationary sheave for signs of wear.

NOTE: Rollers and helix are non-serviceable items. Replacement of clutch assembly is required if damaged beyond usable condition.

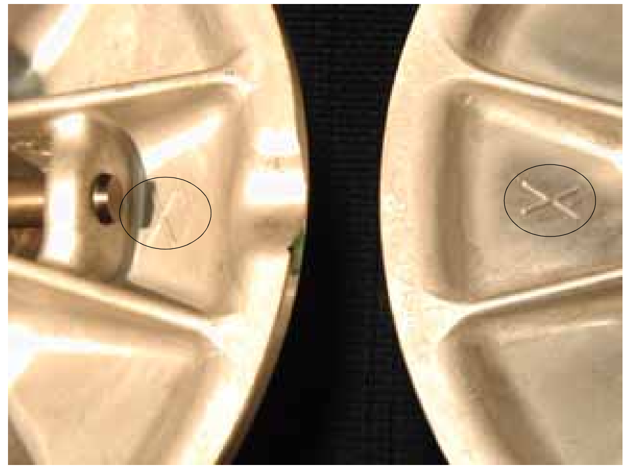
5. Inspect the bushings inside the moveable sheave. If replacement is required, use Bushing Removal Kit PN 2871226, following the instructions.

Sheave Bushing Inspection:
Replace bushing if more brass than Teflon™ is visible on the bushing. Do not clean bushings.

Assembly

1. Install inner spring retainer (if removed).
2. Install the inner sheave onto the outer sheave.

NOTE: Verify 'X' marks on each side of the sheaves are aligned upon reassembly of sheaves.



3. Install the compression spring.
4. Install the outer retainer on top of spring.
5. Using special tool **PN 8700220**, compress the outer retainer onto the shaft and install the snap ring.

CAUTION

Wear eye protection when working with spring tensioned components to avoid serious injury.

6

PVT TROUBLESHOOTING

Overheating

IMPORTANT: During routine maintenance or whenever PVT system overheating is evident, it's important to check the inlet and outlet ducting for obstructions. Obstructions to air flow through the ducts will significantly increase PVT system operating temperatures. The ATV should be operated in low range when pulling or plowing heavy loads, or if extended low speed operation is anticipated.

General Range Operation Guidelines

LOW RANGE: Heavy pulling, basic operational speeds less than 7 MPH, riding through rough terrain (swamps, mountains, etc..), low ground speeds.

HIGH RANGE: High ground speeds, speeds above 7 MPH.

Table 6-1: Cause and Remedy

DIAGNOSIS OF CLUTCH DRIVE BELT & COVER RELATED ISSUES:	
POSSIBLE CAUSES	**SOLUTIONS/WHAT TO DO**
Loading the ATV into a pickup or tall trailer when in high range.	Shift transmission to low range during loading of the ATV to prevent belt burning.
Starting out going up a steep incline.	When starting out on an incline, use low range, or dismount the ATV after first applying the park brake and perform the "K" turn.
Driving at low RPM or low ground speed (at approximately 3-7 MPH).	Drive at higher speed or use Low Range. The use of Low Range is highly recommended for cooler PVT operating temperatures and longer component life.
Insufficient warm-up of ATVs exposed to low ambient temperatures.	Warm engine at least 5 min., then with transmission in neutral, advance throttle to 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. Continuous operation at the point of engagement (initial vehicle movement) increases PVT temperatures and component wear.
Towing/Pushing at low RPM/low ground speed.	Use Low Range only.
Plowing snow, dirt, etc./utility use.	Use Low Range only.
Stuck in mud or snow.	Shift the transmission to Low Range, 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 Range, carefully use fast, aggressive, 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.	Shift the transmission to neutral. Using the throttle, vary the engine rpm from idle to 3/4 throttle. Engage transmission in the lowest possible range and test for belt slippage Repeat several times as required. During this procedure, the throttle should not be held at the full position for more than 10 seconds. PVT seals should be inspected for damage if repeated leaking occurs.
Clutch malfunction.	Inspection/repair of clutch components should be performed by a certified Polaris MSD technician.

Problem, Cause and Remedy Chart

Table 6-2: Problem, Cause and Remedy

SITUATION	POSSIBLE 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 wrong .	-Replace spring; refer to proper installation location
Erratic engine operating RPM during acceleration or load variations.	-Drive clutch binding.	a. Disassemble drive clutch; inspect shift weights for wear and free operation.
	-Belt worn unevenly - thin/burnt spots	Replace belt
	-Driven clutch malfunction.	a. Replace ramp buttons. b. Inspect movable sheave for excessive bushing
	-Sheave face grooved.	-Replace the clutch.
Engine RPM above specified operating range.	-Incorrect drive clutch spring (too high spring 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
	-Driven clutch binding.	-Disassemble, clean, and inspect driven clutch, noting worn sheave bushing and ramp buttons and helix
	-Converter 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.
	-Clutch alignment out of spec.	-Adjust alignment offset.
	-Engine mount broken or loose	-Inspect/adjust or replace.
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.
	-Use of High vs. low range	-Instruct operator on guidelines for operation in wet terrain as outlined in Owner's Safety and Maintenance
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
Belt Slipping	-Belt worn out	-Replace belt.
	-Water ingestion	-Inspect and seal PVT system.
	-Belt contaminated with oil or grease	-Inspect and clean.

Table 6-2: Problem, Cause and Remedy

SITUATION	POSSIBLE CAUSE	REMEDY
Belt burnt, thin spots	-Abuse (continued throttle application when vehicle is stationary, excess load)	-Caution operator to operate machine within guidelines.
	-Dragging brake	-Vehicle operated with park brake on. Inspect brake system.
	-Slow, easy clutch engagement	-Instruct firm, effective use of throttle for efficient engagement.
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 "jerks"	-Thin spots on belt, worn belt	-Replace belt. Refer to belt burnt troubleshooting and instruct operator.
	-Drive clutch bushings stick	-Inspect and repair clutches.

CHAPTER 7

FINAL DRIVE

SPECIFICATIONS

Torque Table

COMPONENT	FT.LBS. (IN.LBS.)	NM
F/R **Steel** Wheel Nuts	30	41
F/R **Aluminum** Wheel Nuts	90	122
Front Hub Nut	70	95
Rear Hub Nut	80	109
Front Gearcase Mount Bolts	30	41
Standard Gearcase Screws	14	19
Lower Hub Carrier Bolts	50	68
Upper Hub Carrier Bolts	35	48
ADC Pump Screws	(17-23)	1.9 - 2.5
ADC Cover Screws	7 - 11	9.4 - 14.9
ADC Bleed Valves	(80)	9

IMPORTANT: Verify which type of wheel ATV is equipped with (aluminum or steel) when torquing wheel nuts.

Special Tools

PART NUMBER	TOOL DESCRIPTION
2872608	Roller Pin Removal Tool
8700226	CV Boot Clamp Pliers
2870772	1 3/4” Straight Wrench
PA-48542	ADC Gearcase Piston Installation Tool

Gearcase Fluid / Capacity

GEARCASE	DESCRIPTION
Centralized Hilliard (Standard Models)	Demand Drive LT Premium Hub Fluid **8.97 oz. (265 ml)**
Centralized Hilliard w/ ADC (Deluxe Models)	Demand Drive LT Premium Hub Fluid **9.3 oz. (275 ml)**
ADC Gearcase Pump Reservoir	Polaris ADC or AW ISO 10 Hydraulic Fluid

FRONT DRIVE AXLE

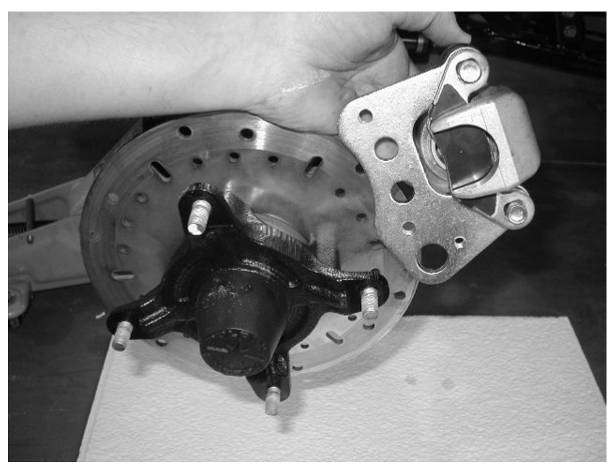
Removal

1. Set the ATV in park. Remove hub dust cap.
2. Remove cotter pin.
3. Loosen the hub retaining nut.
4. Loosen - but do not remove - the wheel nuts.
5. Safely lift and support the front of the ATV.

CAUTION

Serious injury could occur if machine tips or falls.

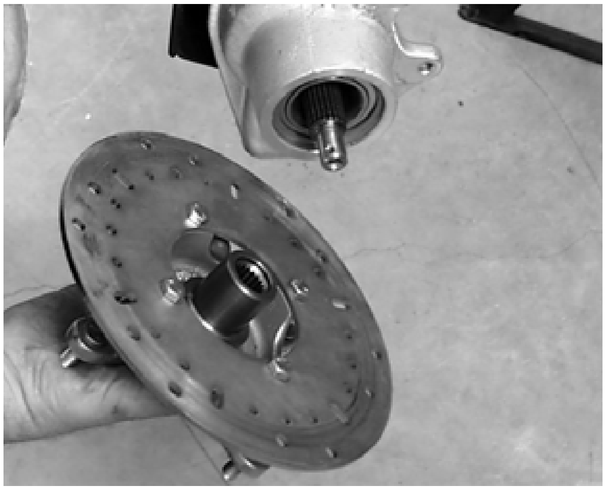
6. Remove wheel.
7. Remove the two brake caliper attaching bolts.



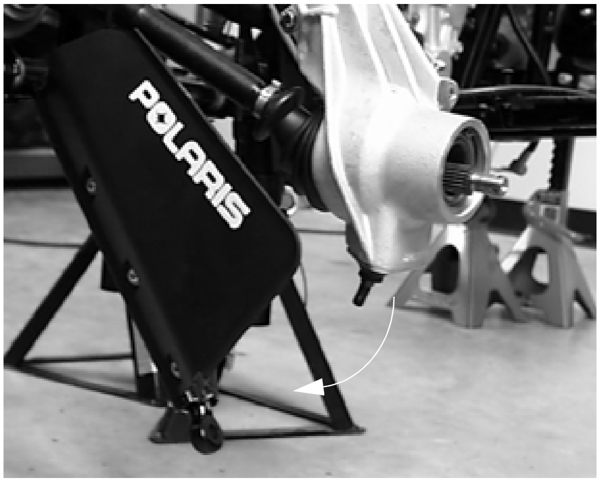
CAUTION

Do not hang the caliper by the brake line. Use wire to hang the caliper to prevent possible damage to the brake line.

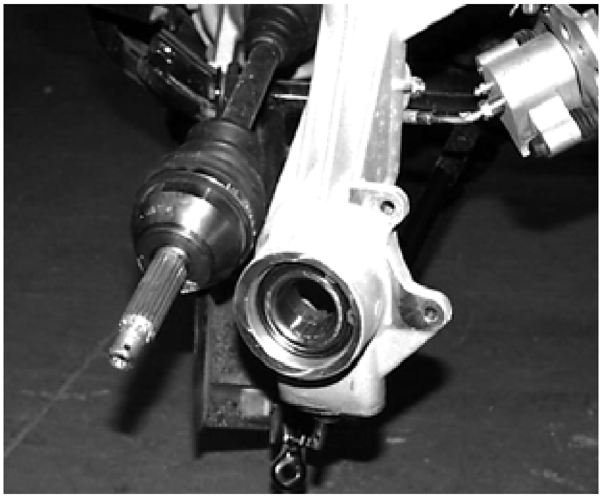
8. Remove hub.



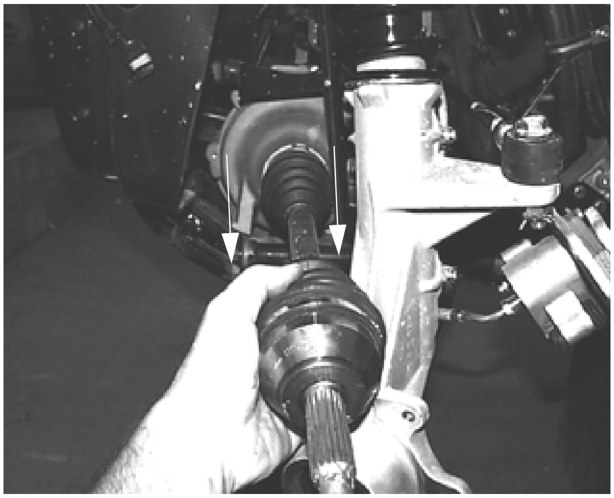
9. Remove cotter pin and nut from lower A-arm ball joint. Remove lower A-arm from ball joint.



10. Pull strut assembly out while pivoting front drive shaft downward until it clears strut assembly.



11. Pull strut assembly out while pivoting front drive shaft downward until it clears strut assembly.



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Installation

1. Install new spring ring on drive shaft. Apply an anti-seize compound to splines. Align splines of drive shaft with front gearcase and install by lightly tapping on drive shaft with rubber faced hammer.
2. Install drive shaft in strut.
3. Install lower ball joint, torque nut to specification and install new cotter pin.

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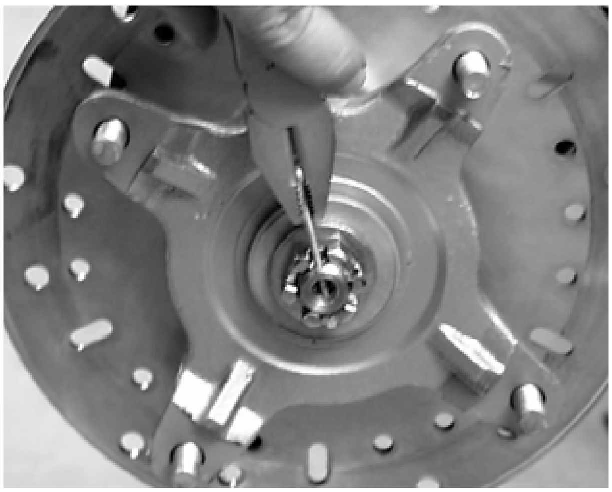
Ball Joint Retaining Nut Torque: **25 ft. lbs. (34.5 Nm)**



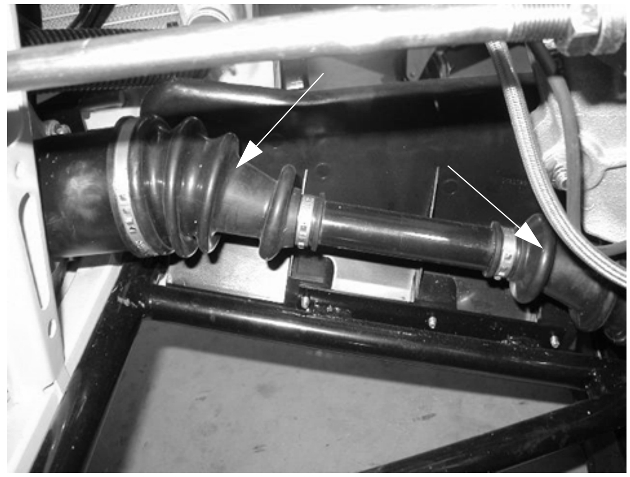
4. Install hub and tighten hub nut to specification.

= T
Front Hub Retaining Nut Torque: **70 ft. lbs. (95 Nm)**

FRONT DRIVE SHAFT (CV) BOOT

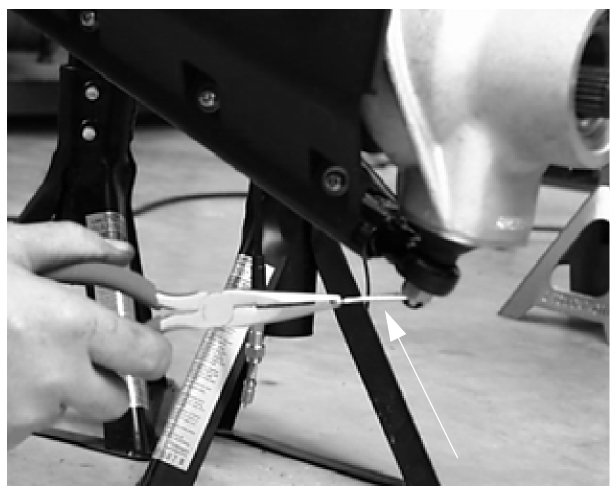
Inspection

Check the front and rear driveshaft CV boots for any tears or leaking grease. If the driveshaft boot loses all of the grease CV joint failure will occur.



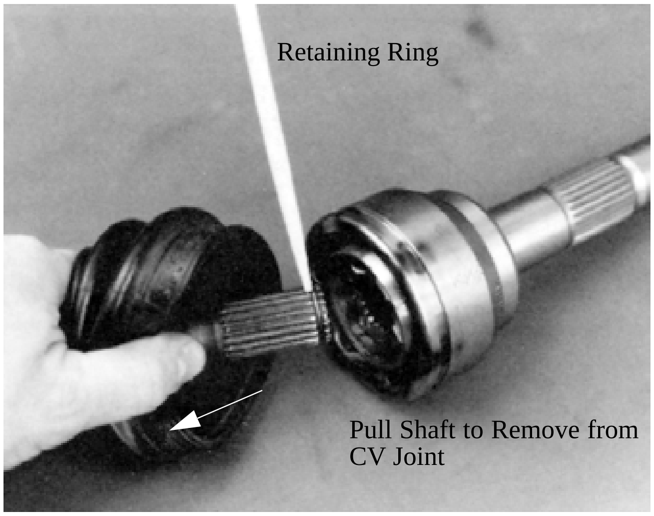
Replacement

1. Remove wheel, brake caliper, and wheel hub. Refer to “FRONT DRIVE AXLE REMOVAL” earlier in this chapter for procedure.
2. Remove cotter pin and castle nut from A-arm ball joint.



3. Disconnect A-arm from ball joint using a tie rod fork.

4. Slide strut off end of drive shaft and tie it up out of the way of the shaft.
5. Remove clamps from rubber boot using the proper boot clamp pliers.
6. Remove the large end of the boot from the CV joint, slide the boot back and separate the wheel spindle and CV joint assembly from the axle shaft by pulling the shaft sharply outward, away from the CV joint. It may be necessary to tap the CV joint assembly outward with a soft faced hammer.



7. Remove small clamp and boot from driveshaft.

NOTE: If the ATV has been operated with a damaged boot, the CV joint grease may be contaminated. Inspect the grease carefully for contamination, and clean the joint thoroughly if necessary. Front drive axle CV boot replacement requires 3.5 oz. of grease.

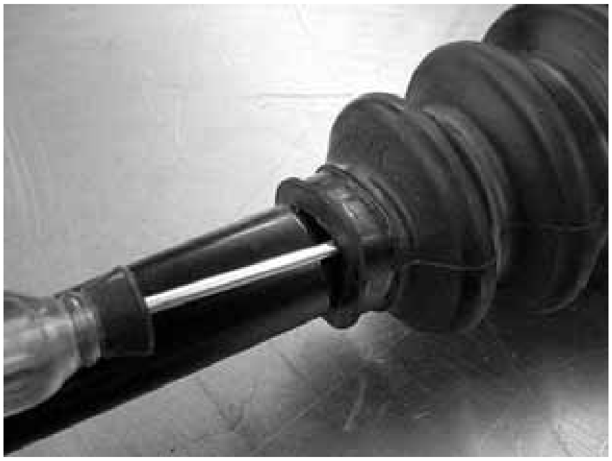
CV Joint Grease -3.5 oz.
(Refer to parts manual for boot kit)
CV Boot Clamp Pliers:
Earless Type: (PN 8700226)

Boot replacement with complete CV joint cleaning requires the entire 3.5 oz. of grease.

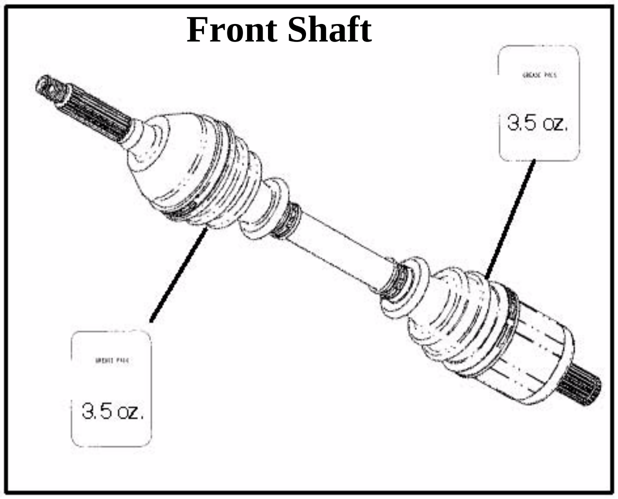
8. Before installing the new boot, remove all grease from the boot area and shaft.

NOTE: It is very important to use the correct type and quantity of grease. Use only the grease contained in the boot kit. DO NOT use a substitute grease and DO NOT overfill or under fill the CV joint.

9. Slide the new clamp and boot (small end first) over the splined shaft, then slide (tap) the CV joint into the splines of the axle.
10. Add grease through large end of boot.
11. Install a new boot onto the axle shaft and fill the CV joint and boot with the correct type and amount of grease.
12. 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 axle. CARE MUST BE TAKEN TO AVOID DAMAGE TO THE NEWLY INSTALLED BOOT.



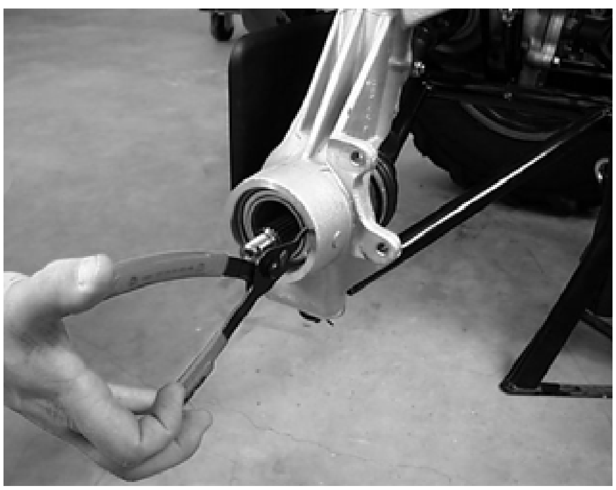
13. Install the small clamp on the boot.



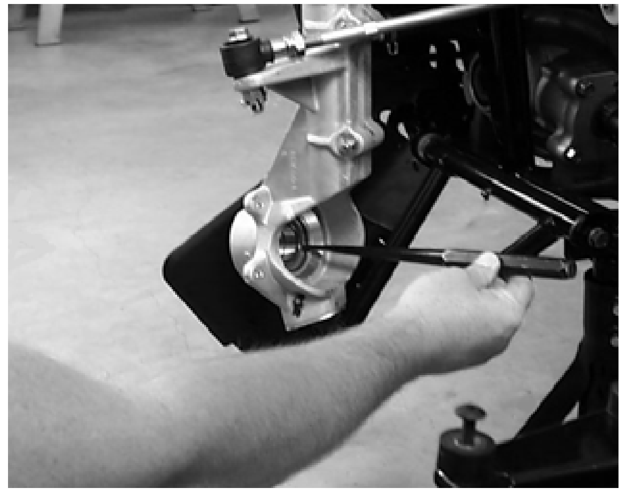
FRONT HUB

Disassembly

1. Remove outer snap ring.



2. From the back side, tap on the outer bearing race with a drift punch in the reliefs as shown.



NOTE: Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.

3. Inspect the bearing.

NOTE: 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.

4. Inspect bearing housing for scratches, wear or damage. Replace housing if damaged.

Assembly

1. Support bottom of hubstrut housing.
2. Start bearing in housing.
3. Press bearing into place until outer race bottoms on housing.

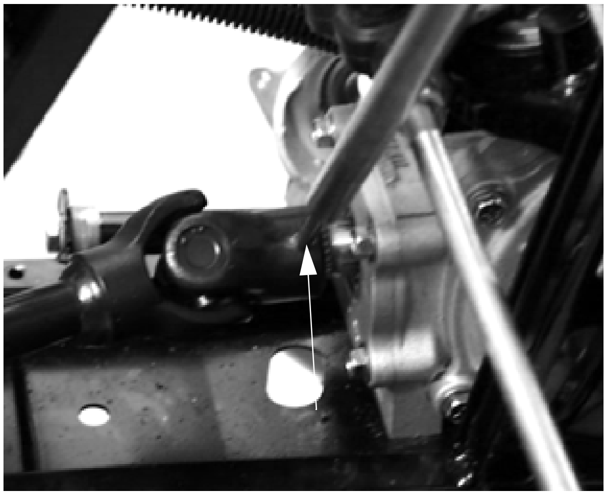
CAUTION
When using an arbor press be sure to press only on the outer race to avoid bearing damage.

4. Install snap ring into groove.

PROP SHAFT - FRONT OR REAR

Removal and Installation

1. Using Roll Pin Removal Tool (PN 2872608), remove the roll pin from prop shaft at rear of housing (front only) or transmission output shaft (rear only). Slide prop shaft back and away from housing, then pull sharply forward to remove from transmission shaft.
2. For installation, reverse the removal procedure.



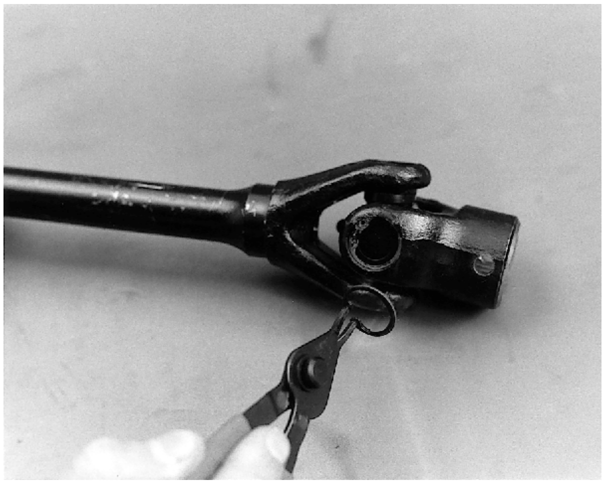
NOTE: If removing rear propshaft, loosening and/or removal of rear gearcase mounting bolts may be required to gain necessary clearance for propshaft removal.

U-JOINT

Disassembly

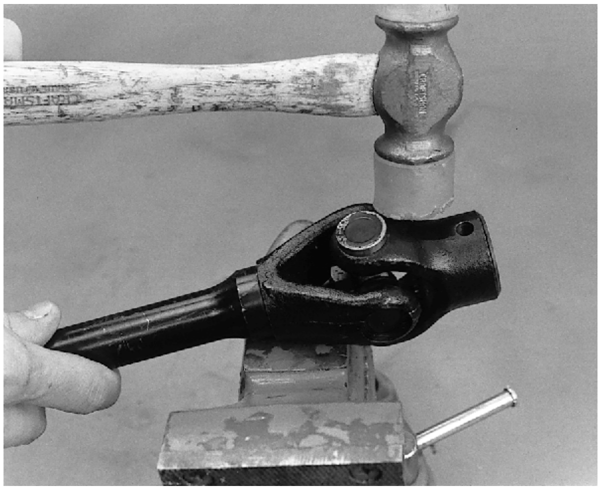
CAUTION
Always wear eye protection when working with spring-tensioned components

1. Remove internal or external snap ring from all bearing caps.



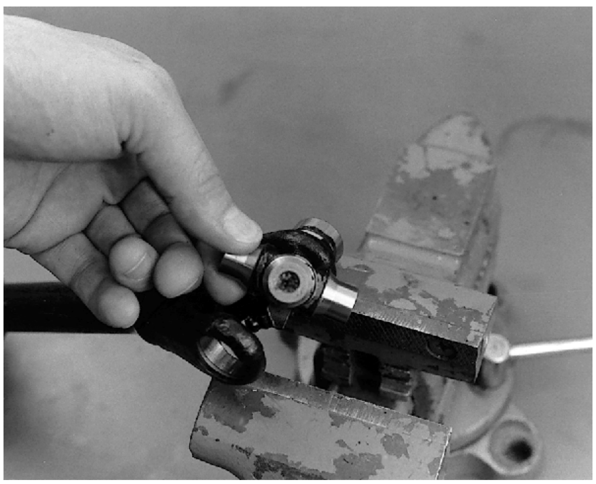
NOTE: If yoke or bearing is removed, cross bearing must be replaced. Note orientation of grease fitting (if equipped) and mark inner and outer yoke for correct re-positioning during installation.

2. Support inner yoke as shown and drive outer yoke down (bearing cap out) with a soft face hammer.



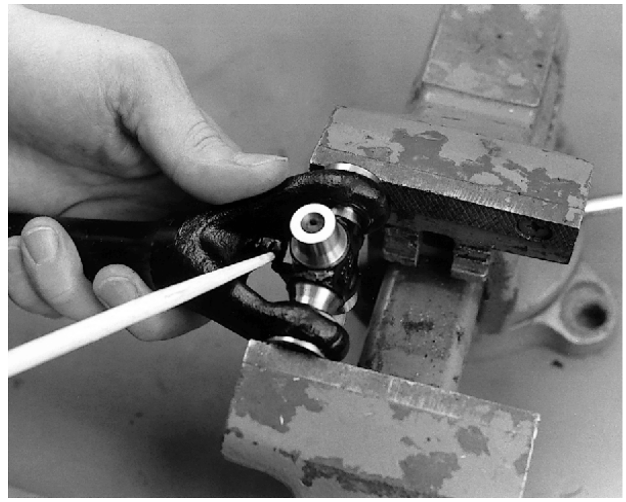
3. Support U-joint in vise as shown and drive inner yoke down to remove remaining bearing ca

4. Force U-joint cross to one side and lift out of inner yoke.

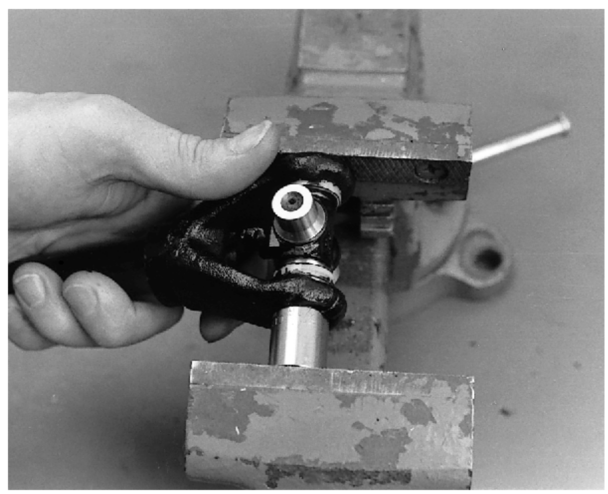


Assembly

1. Install new bearing caps in yoke by hand. Carefully install U-joint cross with grease fitting properly positioned inward toward center of shaft. Take care not to dislodge needle bearings upon installation of cross joint. Tighten vise to force bearing caps in.



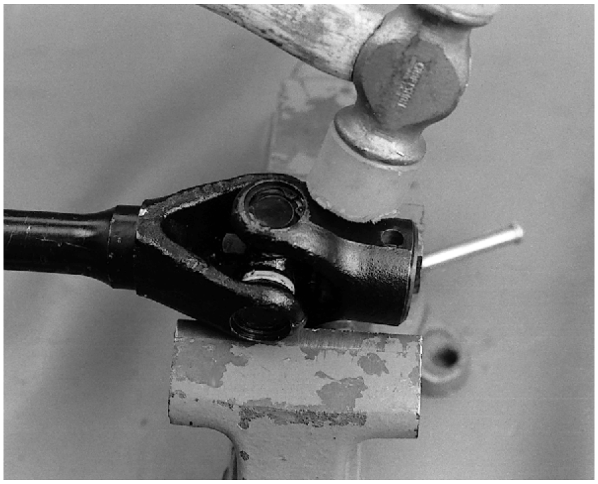
2. Using a suitable arbor, fully seat bearing cap in one side. Continually check for free movement of bearing cross as bearing caps using a suitable arbor, fully seat bearing cap in one side. Continually check for free movement of bearing cross as bearing caps are assembled. are assembled.



3. Install snap ring to contain bearing cap just installed. Repeat procedure for other side.

4. Install snap ring to contain bearing cap just installed. Repeat procedure for other side.

5. Install snap ring to contain bearing cap just installed. Repeat procedure for other side.
6. Seat all bearing caps against snap rings by supporting cross shaft and tapping on each corner as shown.



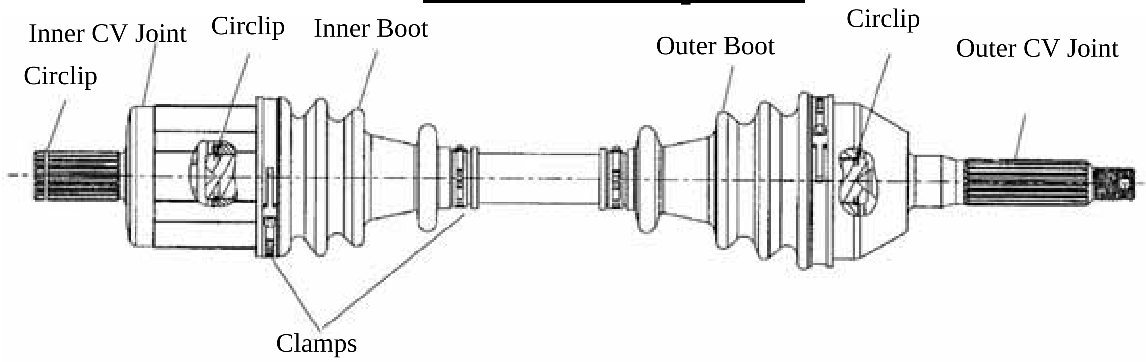
7. When installation is complete, yokes must pivot freely in all directions without binding. If the joint is stiff or binding, tap the yoke lightly to center the joint until it pivots freely in all directions.

DRIVE AXLE EXPLODED VIEWS

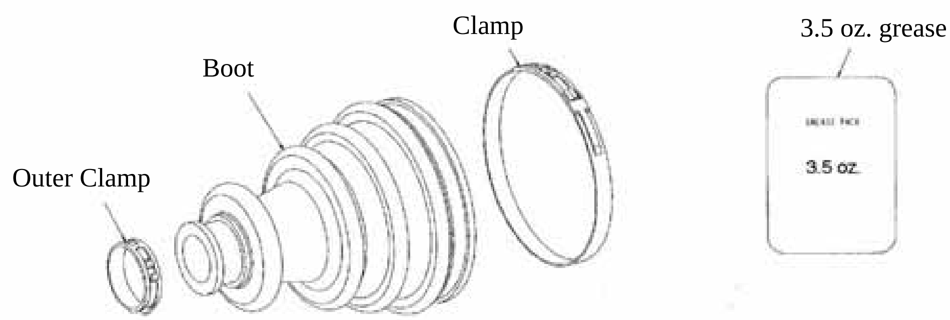
Drive Shafts and Propshafts

NOTE: Refer to your parts manual for the proper replacement parts.

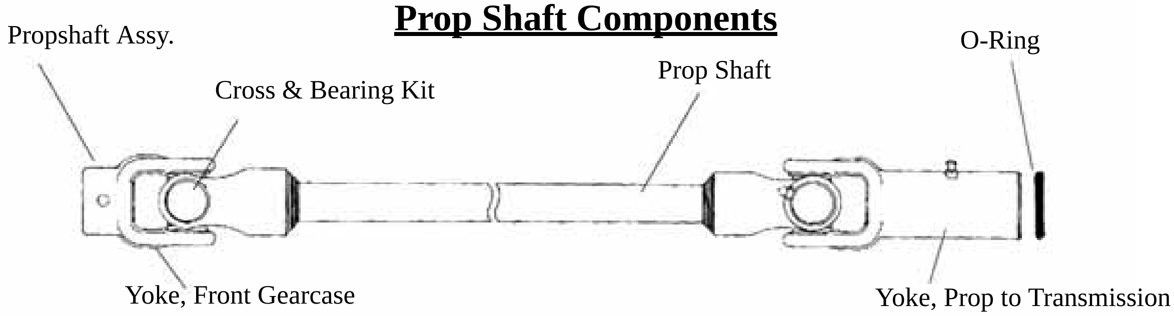
Drive Axle Components

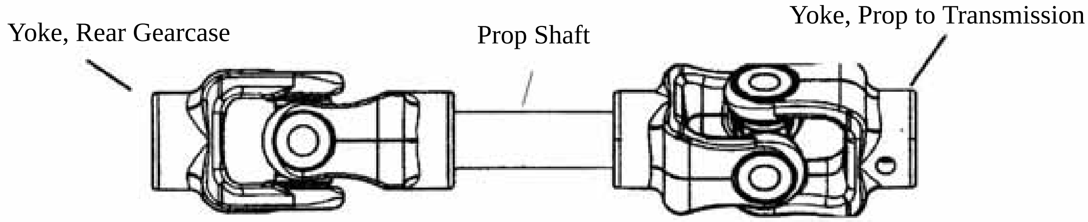


Drive Boot Replacement Kits



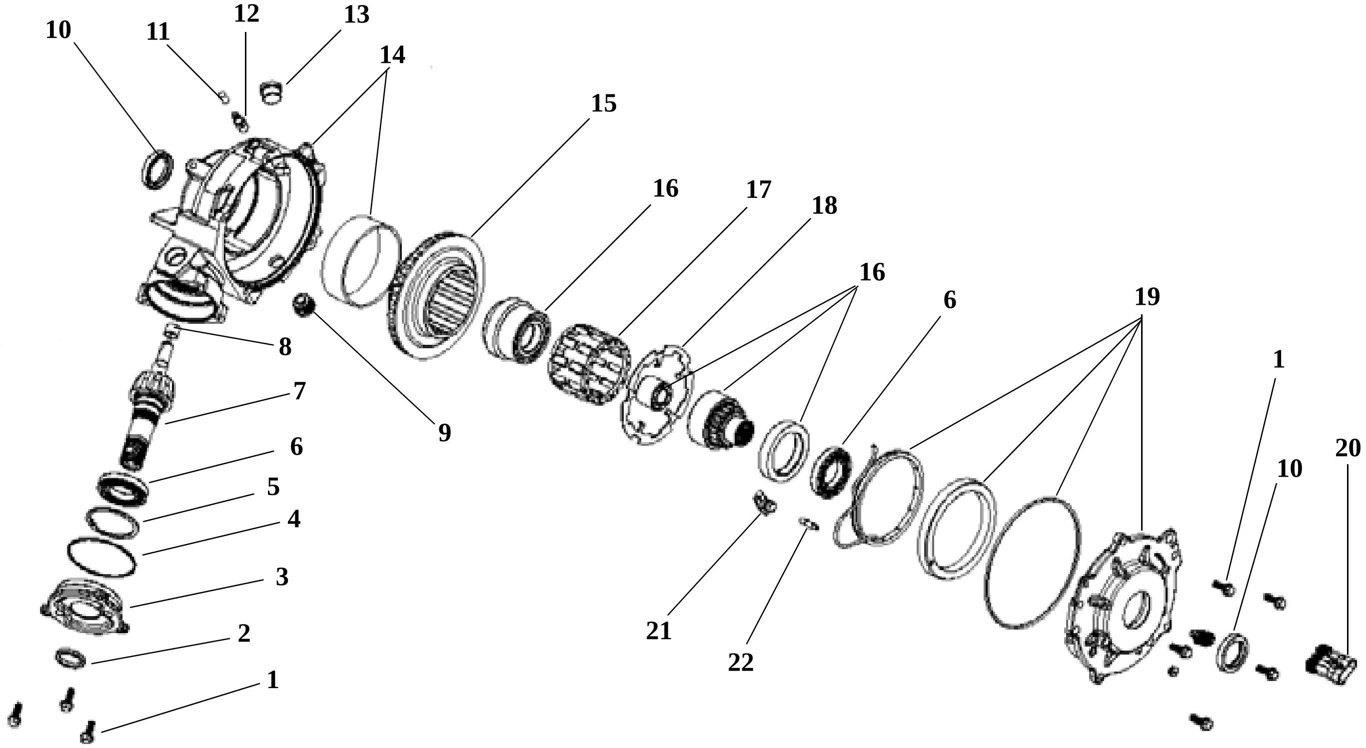
Prop Shaft Components





FRONT GEARCASE - CENTRALIZED HILLIARD (STANDARD MODELS)

Exploded View (Standard Models)



Ref. #	Description	Qty		Ref. #	Description	Qty
1	Bolt	8		12	Vent Tube	1
2	Oil Seal	1		13	Plug	1
3	Input Cover Plate Asm.	1		14	Gearcase Sub Asm.	1
4	O-Ring	1		15	Ring Gear / Clutch Housing	1
5	Retaining Ring	1		16	Output Hub Asm.	2
6	Bearing	3		17	Roll Cage Asm.	1
7	Pinion Gear Asm.	1		18	Armature Plate	1
8	Pinion Bushing	1		19	Output Cover Asm.	1
9	Magnetic Drain Plug	1		20	Connector Asm.	1
10	Oil Seal	2		21	Thrust Button Asm.	1
11	Plug Cap	1		22	Set Screw	1

Operation

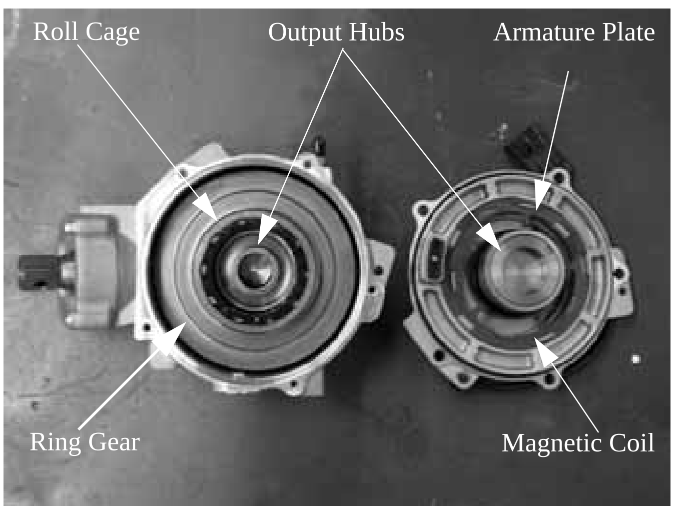
Engaging front gearcase: The AWD switch may be turned on or off while the vehicle is moving. AWD will not enable until the engine rpm is below 3100 RPM. Once enabled, the AWD remains engaged while the front gearcase is moving and will not disengage until the rear wheels regain traction.

Engage the AWD switch before getting into conditions where the front wheel drive may be needed. If the rear wheels are spinning , release the throttle before switching to AWD.

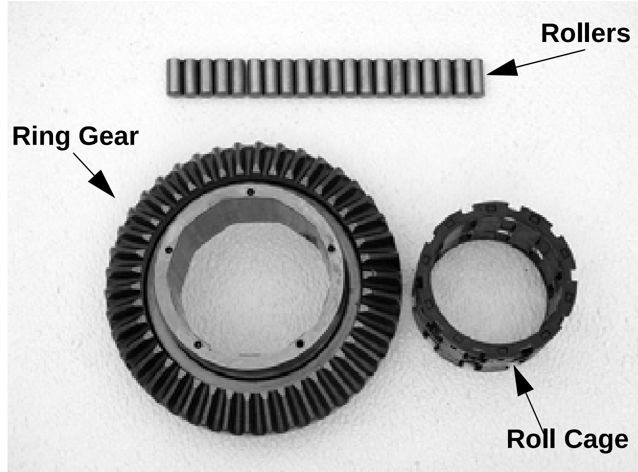
CAUTION

Switching to AWD while the rear wheels are spinning may cause severe drive shaft and gearcase damage. Always switch to AWD while the rear wheels have traction or are at rest.

With the AWD switch off the vehicle drives only the rear wheels (2 wheel drive). When the AWD switch is activated it engages the hilliard, locking both front axles into all wheel drive when there is a loss of rear wheel traction.



4x4 Engagement: When the AWD switch is activated, a 12 Vdc current charges the central coil, creating a magnetic field. This magnetic field attracts an armature plate keyed to a roller cage that contains 14 rollers and roller cam. The difference in rpm between the input shaft and front axles forces the rollers up the external cam. The rollers engage, or "wedge" themselves between the pinion gear and output hubs that link both front axles, resulting in true all wheel drive.



CAUTION

If the rear wheels are spinning, release the throttle before turning the AWD switch on. If AWD is engaged while the wheels are spinning, severe drive shaft and clutch damage could result.

Disengagement: As the front and rear wheels gain equal traction, rotating very close to the same speed, the transmission shaft "overdrives" the front gearcase input. The rollers are forced outward, disengaging the AWD. The vehicle is now back to rear wheel drive until the next loss of rear wheel traction.

Gearcase Removal

1. Stop engine, place machine in Park and set parking brake.
2. Loosen left front wheel nuts slightly.
3. Elevate the machine until the front wheels are off the ground and support machine under footrest/frame area.

CAUTION

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing and installing bearings and seals.

4. Remove left wheel nuts and wheel.

5. Remove cotter pin, lower ball joint nut and A-arm from ball joint.

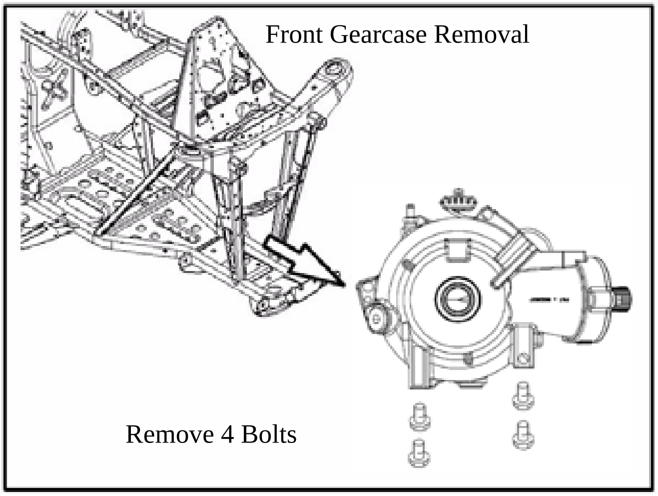
6. Pull the hub and strut assembly out and pull the drive-shaft out of the hub.

7. Remove the roller pin from the front prop shaft. Use the Roller Pin Removal Tool (**PN 2872608**).

8. Remove bolts securing the bottom of housing to the skid plate frame. Bolts and fluid drain plug are accessible through the skid plate.

9. Remove vent line.

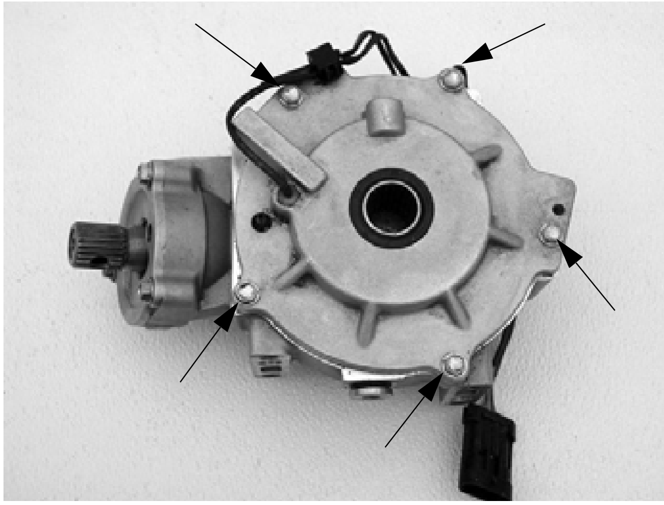
10. Remove the front gearcase from left side of frame, pulling both the remaining CV shaft and propshaft from the gearcase. Replace the circlips on the CV shaft ends prior to reassembly.



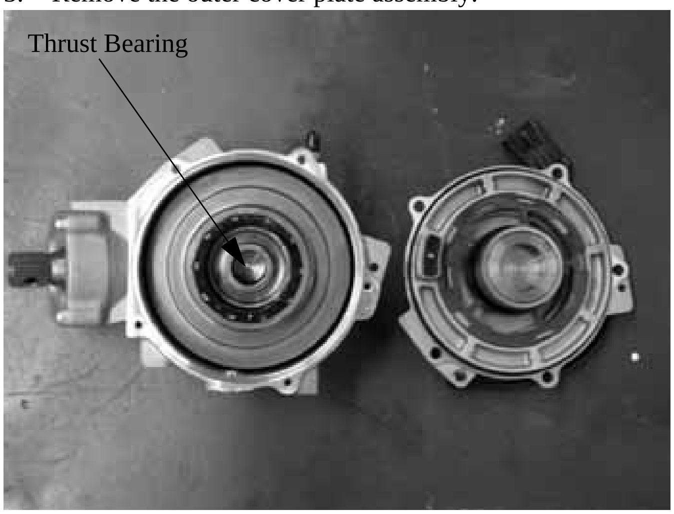
Disassembly / Inspection

1. Drain and properly dispose of used oil. Remove any metal particles from the drain plug magnet.

2. Remove bolts retaining the outer cover plate assembly.

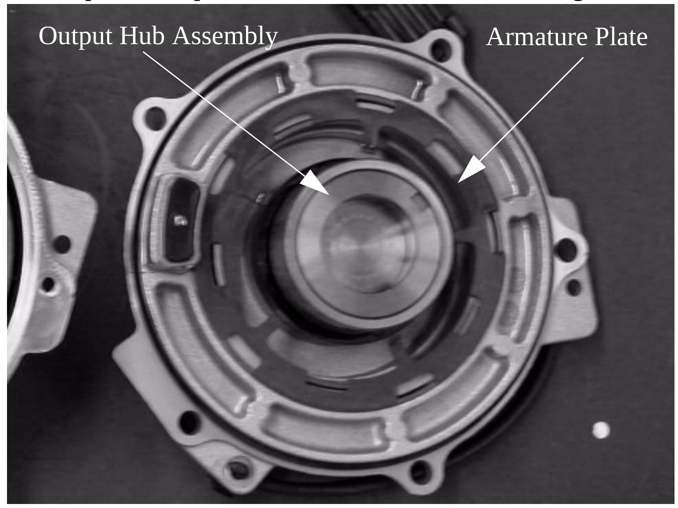


3. Remove the outer cover plate assembly.

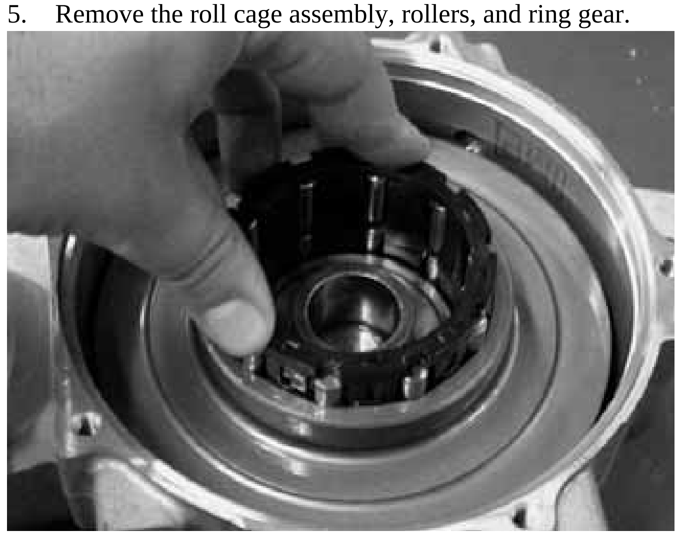


NOTE: Thrust bearing located between the two output hubs is pressed into assembly.

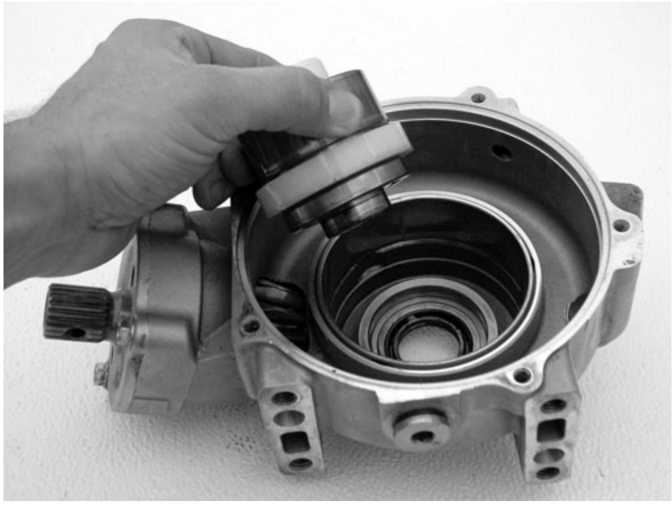
4. Remove the armature plate and RH output hub assembly from the outer cover plate. Inspect the bearing and contact surfaces of the output hub for signs of wear or damage. Replace component if found to be worn or damaged



5. Remove the roll cage assembly, rollers, and ring gear.

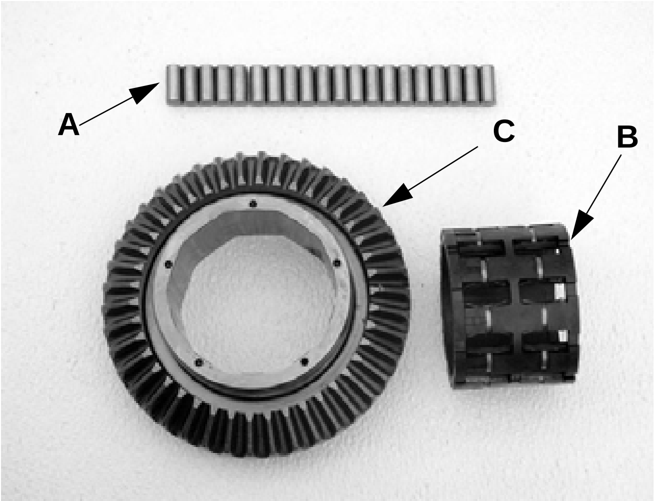


6. Remove the LH output hub. Inspect the bearing and contact surfaces of the output hub for signs of wear or damage. Replace component if found to be worn or damaged.

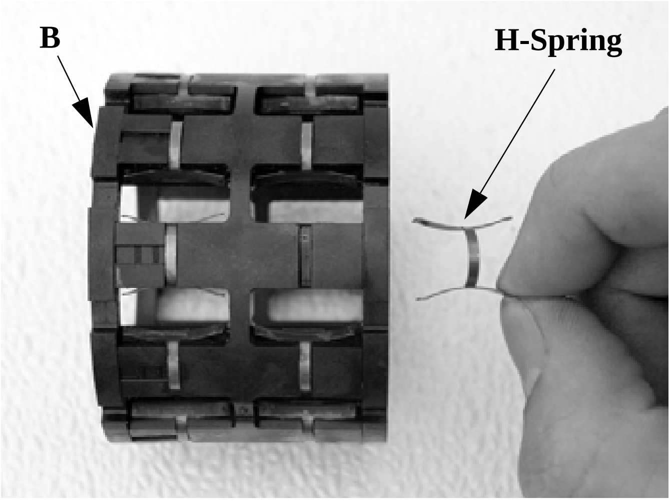


7. Thoroughly clean all parts. Inspect the bearing surfaces of the output hub. Inspect the rollers (A) for nicks, scratches and flat spots. Inspect the roll cage (B) for damage or cracks. The rollers must slide up and down freely within the roller cage surfaces.

8. Inspect the ring gear (C) for consistent wear patterns. The surfaces should be free of nicks or burrs.

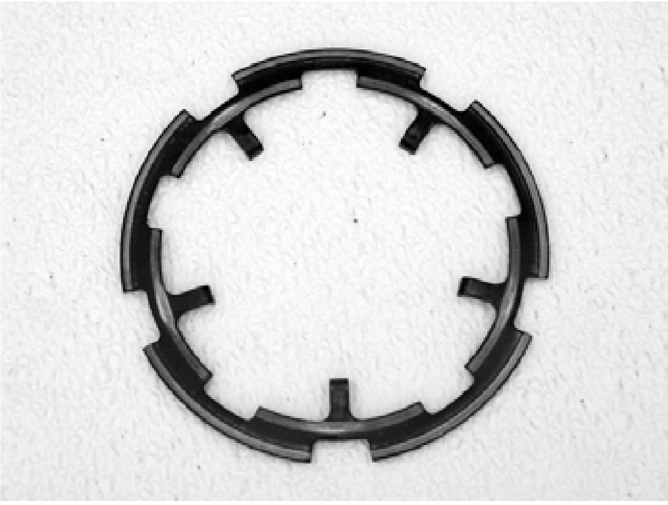


9. Inspect roll cage (B) sliding surface. This surface must be clean and free of nicks, burrs or scratches. **Inspect the H-springs, but do not remove them from the roll cage.**



10. Inspect the armature plate for a consistent wear pattern. Uneven wear of the armature plate indicates a warped plate, which may cause intermittent operation.

NOTE: See “FRONT GEARCASE DIAGNOSIS” later in this chapter for more details.



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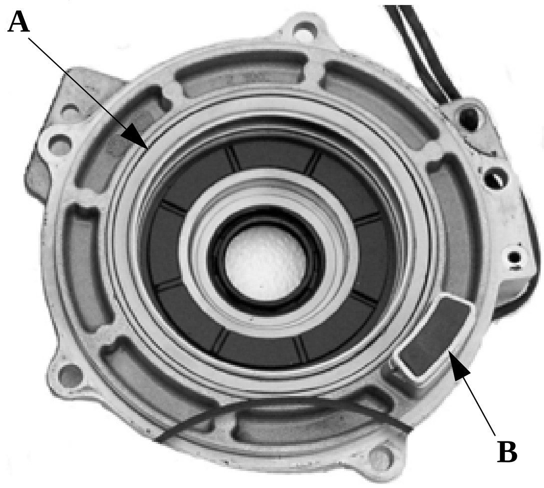
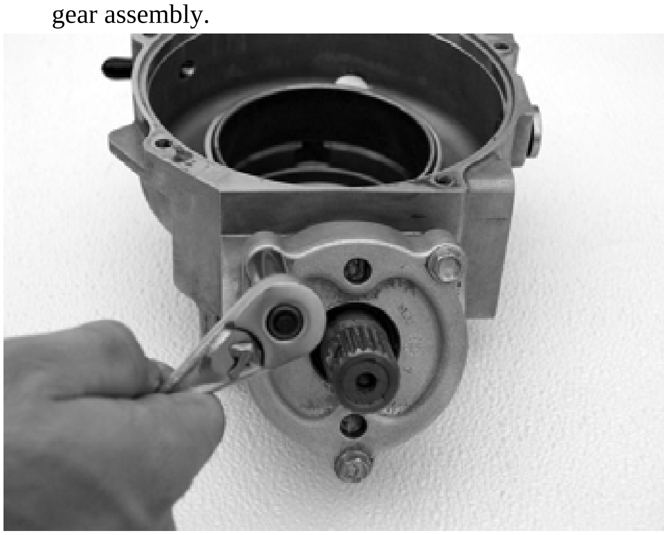
11. Inspect the magnetic coil (A) in the outer cover plate assembly. Inspect the backlash pad (B) for excessive wear.



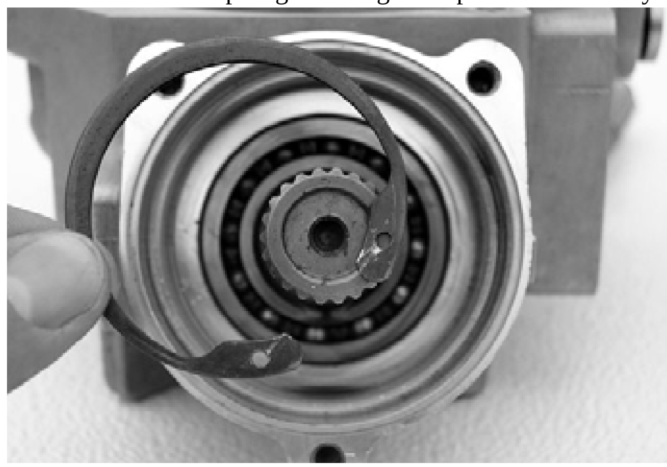
NOTE: See "FRONT GEARCASE DIAGNOSIS" later in this chapter for more details on the coil.

NOTE: The backlash for the centralized hilliard is set at the factory. No adjustment is required, unless the front cover needs to be replaced, or the back lash pad screw is removed. See the "FRONT GEARCASE ASSEMBLY" procedure later in this chapter for details on backlash setting.

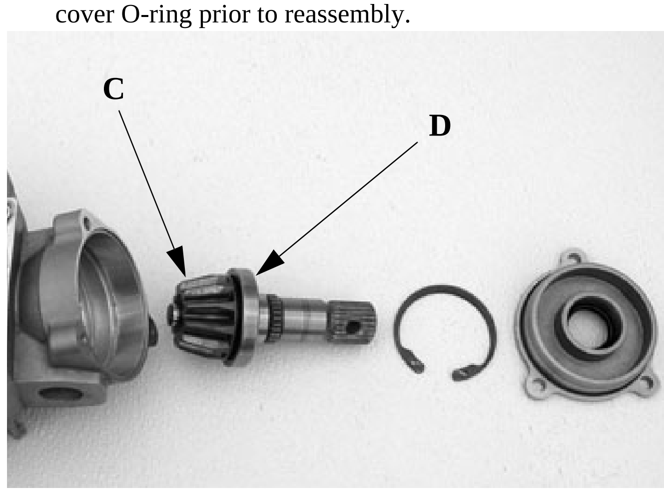
12. Remove the bolts retaining the input shaft cover and pinion gear assembly.



13. Remove the snap ring retaining the input shaft assembly.



14. Remove the input shaft assembly. Inspect the pinion gear (C) for chipped, broken, or missing teeth. Inspect the input shaft bearing (D) for signs of wear. Replace the input shaft cover O-ring prior to reassembly.

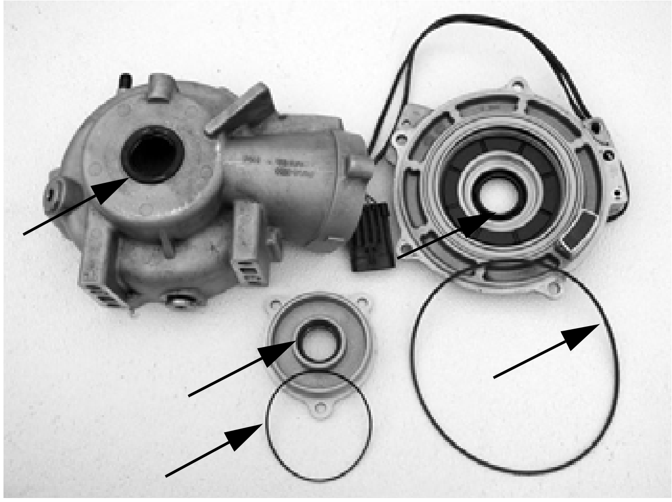


15. Inspect the input shaft bushing.

16. Thoroughly clean the gearcase components before beginning reassembly.

Reassembly / Inspection

1. Replace all O-rings, seals, and worn components.



2. Press the pinion shaft seal into the pinion cover, until the seal is flush with the sealing surface.

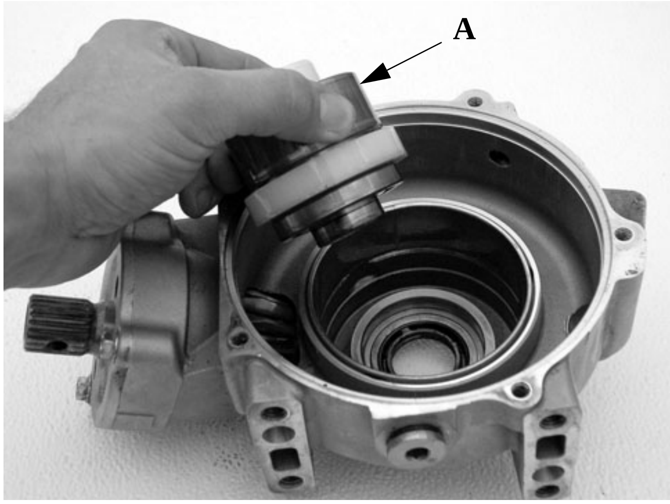
3. Inspect bearings on output and pinion shafts. To replace, press new bearing on to shaft.

NOTE: 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 side to side.

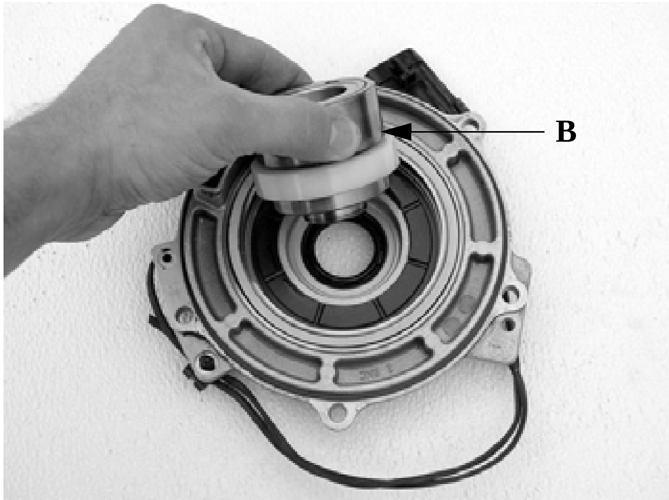
4. Install input shaft, bearing, snap ring, and input cover with new o-ring. Torque bolts to specification.

= T
Input Cover Bolt Torque **14 ft. lbs. (19 Nm)**

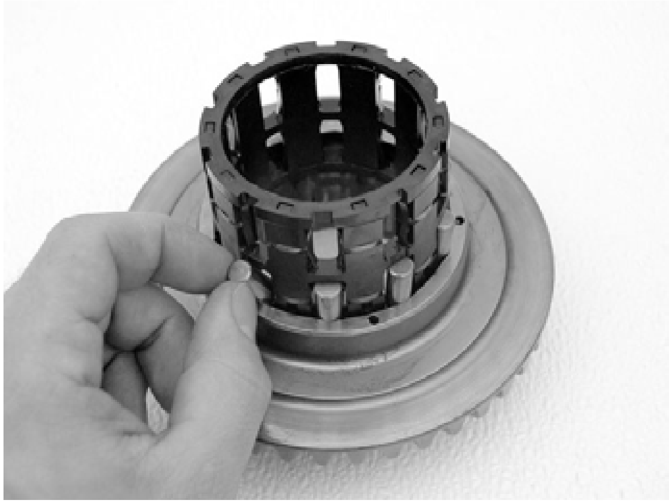
5. Install the LH output hub (A) into the gearcase housing. The output hub should spin freely.



6. Install the RH output hub (B) into the output cover. The output hub should spin freely.



7. Install the rollers and roll cage into the ring gear. Insert the rollers as the roll cage is installed.

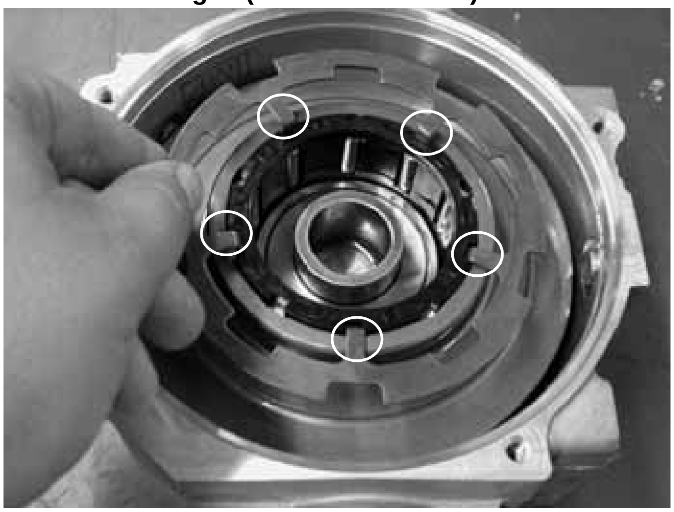


7

8. Install the ring gear and roll cage assembly into the gearcase housing.

9. Install the armature plate on top of the roll cage / ring gear assembly. Be sure that the armature plate tabs are fully engaged into the roll cage assembly.

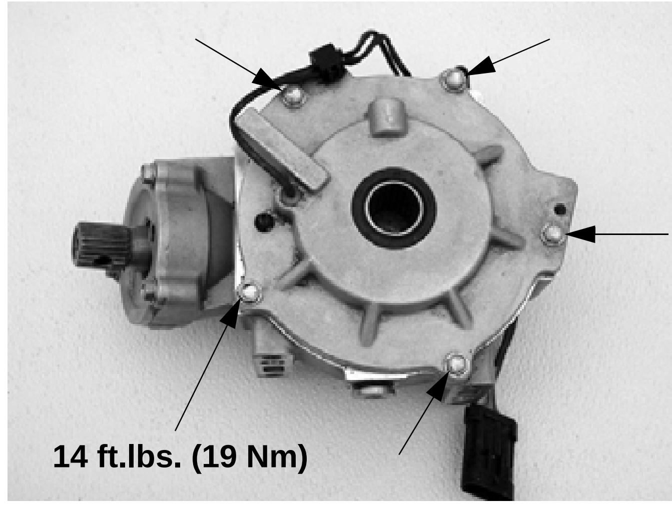
NOTE: Verify armature plate tabs are placed into the slots on roll cage. (See Photo Below)



10. Install the cover plate assembly with new o-ring onto the main gearcase.

NOTE: Verify the square O-ring (arrow) is placed flat on the cover surface. If the O-ring is twisted fluid leakage may occur.

11. Torque the cover plate bolts to specification.



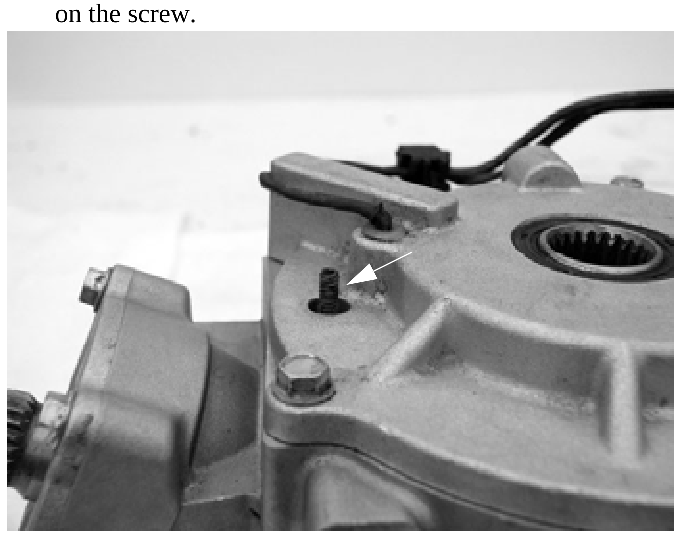
= T
Output Cover Bolt Torque **14 ft. lbs. (19 Nm)**

12. Lay the gearcase on the side with the output cover facing up.

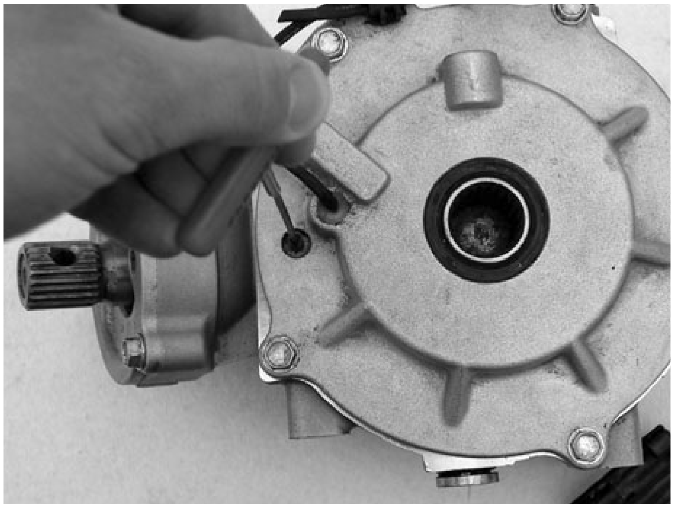
Setting Ring Gear Backlash

NOTE: Ring gear backlash is set at the factory. No adjustment is required, unless the front cover is replaced or the back lash pad screw is removed.

1. The backlash screw has locking agent that holds it into place. Use a heat gun to lightly heat up the locking agent on the screw.



2. Using a 3/32 hex wrench, turn the back-lash screw out 3-4 turns. Re-apply Loctite 262™ onto the bottom screw threads.



3. Turn the screw in until it is lightly seated, then turn the screw out 1/4 turn.
4. Set the gearcase upright. Rotate the input shaft at least 4 times. This ensures the ring gear completes one full rotation.

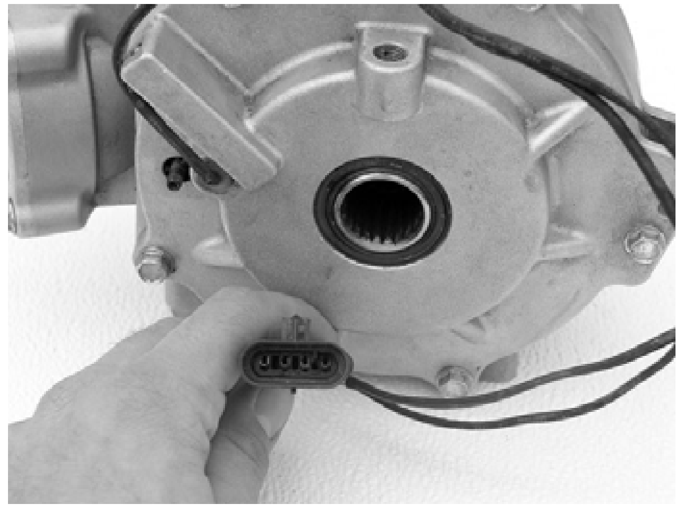
5. If a tight spot is felt during rotation, loosen the backlash screw another 1/8 turn. Perform the step 16 again. Repeat this procedure until the pinion shaft rotates smoothly 4 times (1 revolution of ring gear).

Front Gearcase Diagnosis

- Symptom: AWD Will Not Engage

1. Check the gearcase coil resistance. To test the gearcase coil resistance, use the coil harness (Grey & Brown/ White).

NOTE: To test the gearcase coil resistance, use the coil harness. The gearcase coil should measure between 22.8 ohms and 25.2 ohms.

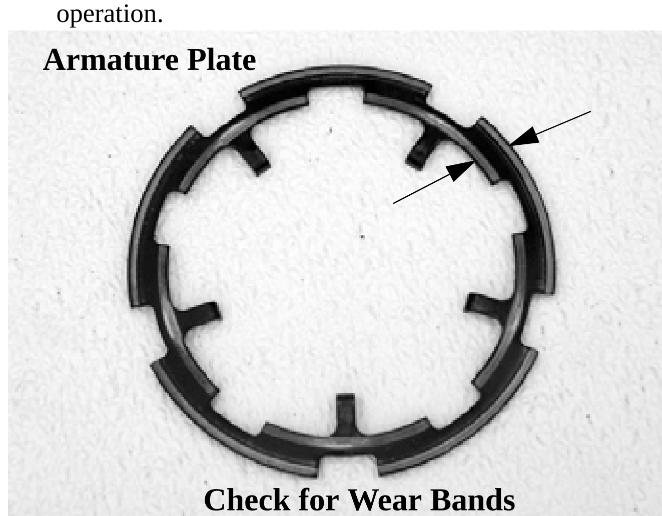


Front Gearcase Coil Resistance: **24 Ω ±10%**

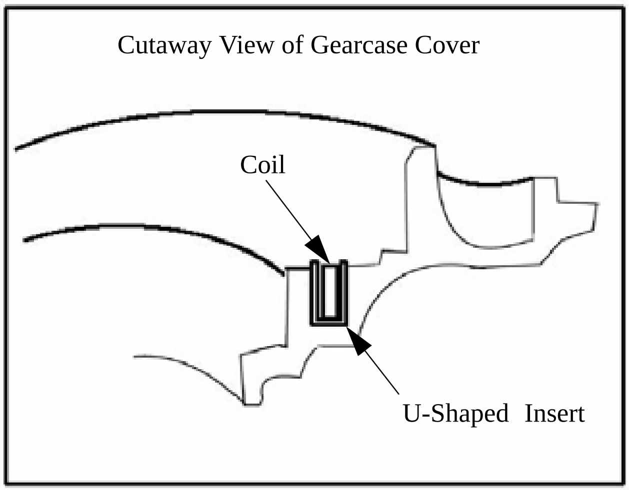
2. Check the minimum battery voltage at the Grey & Brown/ White wires that feed the hub coil wires. There should be a minimum of **11.80-12.0 Volts** present for proper operation.

AWD Coil Applied Battery Voltage: **11.80-12.0 Vdc**

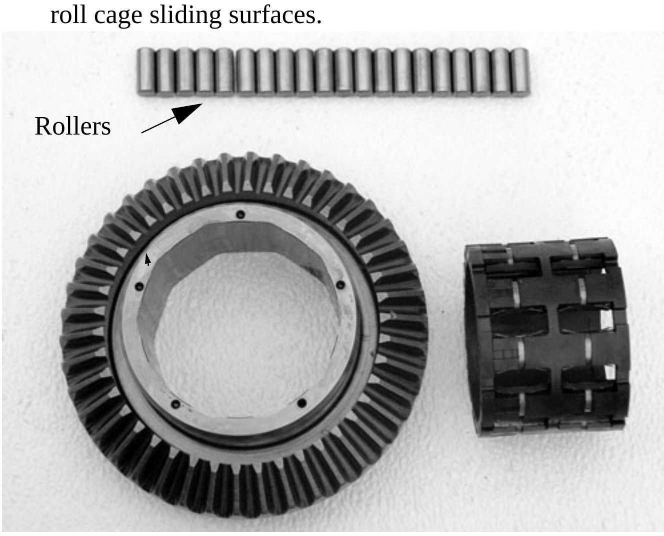
3. Inspect the armature plate for a consistent wear pattern. There should be two distinct wear bands (one band inside the other). If only one band of wear is present (or if there is wear between the two bands, inspect the coil area as indicated in Step 4. A band with an interrupted wear mark may indicate a warped plate, which may cause intermittent operation.



4. Check to make sure the coil is seated in the U-shaped insert that is pressed into the gearcase cover. The top of the coil should be seated below the U-shaped insert. The U-shaped insert controls the pole gap. If the top of the coil is above the surface of the U-shaped insert it raises the armature plate, thereby increasing pole gap. If the pole gap increases the coil will not be strong enough to engage the AWD system. If this is the cause order a new Cover Plate Assembly.

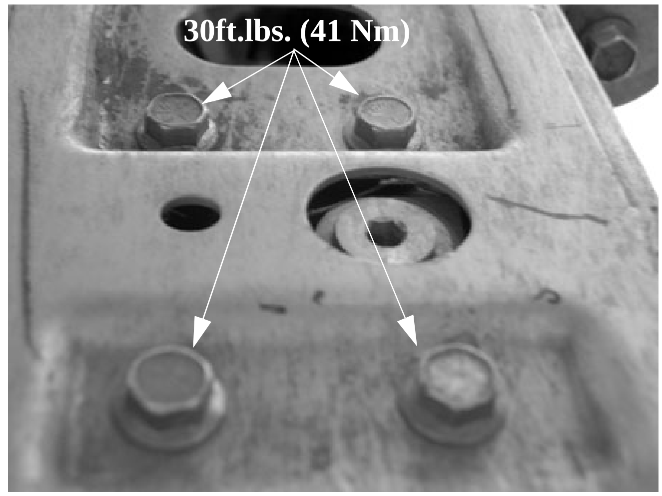


5. Inspect the rollers for nicks, scratches, and flat spots. Also inspect the roll cage for cracks and ensure the rollers are able to slide up and down and in and out freely within the roll cage sliding surfaces.

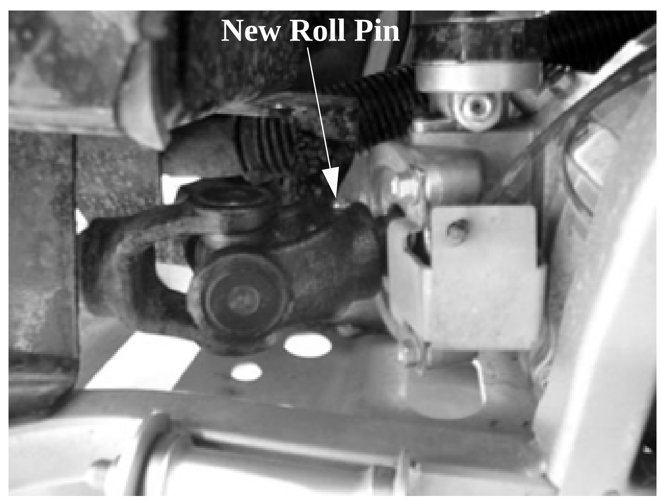


Gearcase Installation

1. To install gearcase, reverse removal procedures. Use new roll pin in front prop shaft.
2. Torque mounting bolts in skid plate to **30 ft.lbs. (41 Nm)**.



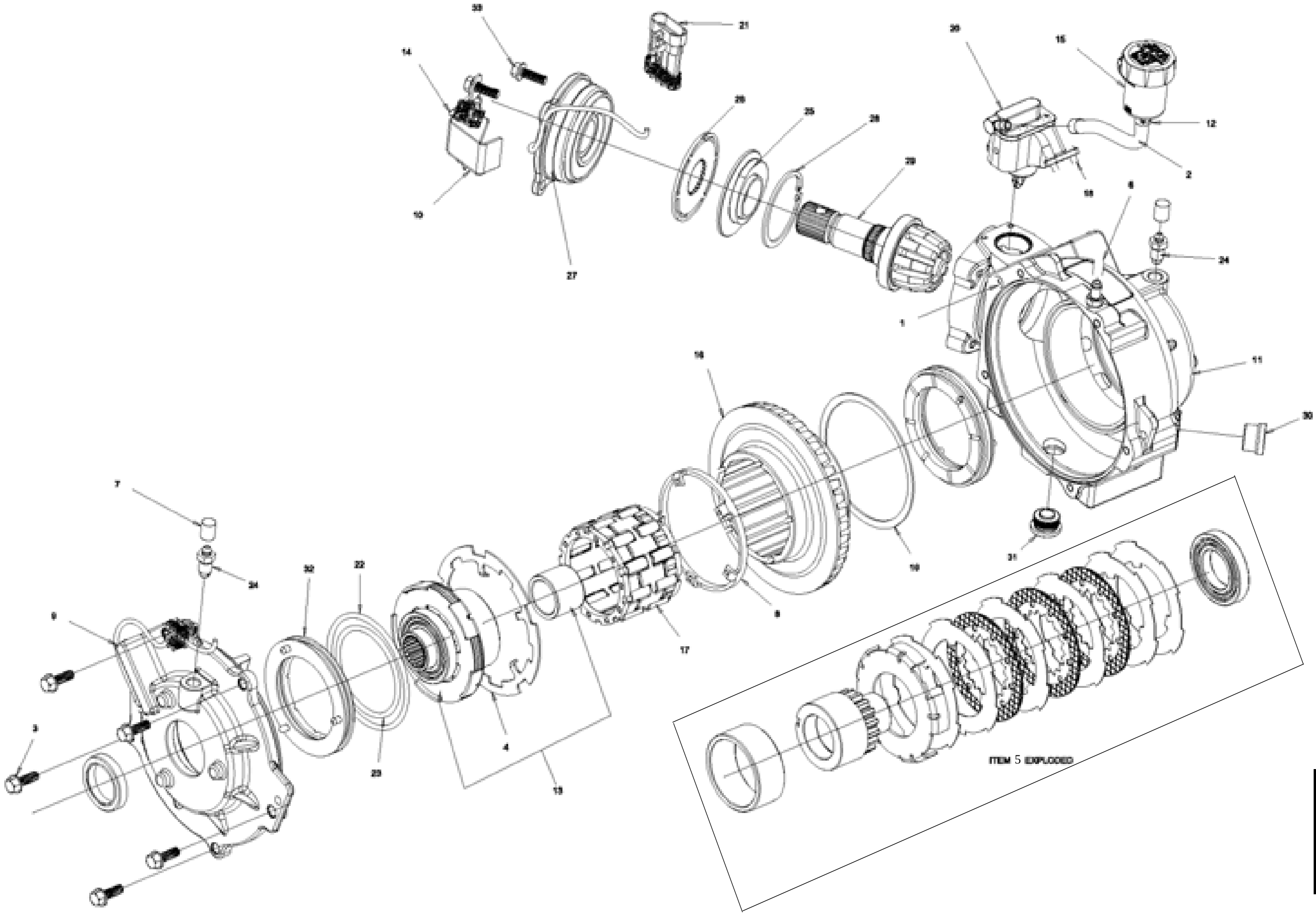
= T
Gearcase Mounting Bolt Torque: **30ft.lbs. (41 Nm)**



3. Add the proper lubricant to the front gearcase. Check drain plug for proper torque. Refer to Chapter 2 for fluid fill and change information.

FRONT GEARCASE - ACTIVE DESCENT CONTROL (DELUXE MODELS)

ADC Gearcase Exploded View (Deluxe Models)



Ref. #	Description	Qty		Ref. #	Description	Qty
1	O-ring	2		17	Roll Cage Assembly	1
2	1/4" Tubing	1		18	8-32 x 3/8" Screws	4
3	1/4-20 Screws	5		19	Spacer, Gear	1
4	Armature Plate	1		20	Pump Assembly	1
5	Clutch Assy - LH Exploded View	1		21	Wire Connector	1
6	Vent	1		22	O-ring, Outer	2
7	Cap, Bleed Screw	2		23	O-ring, Inner	2
8	Spacer, Clutch Basket	1		24	Bleeder Valve	2
9	Cover Assembly	1		25	Cam Assembly	1
10	Cover Bracket	1		26	Armature Plate	1
11	Gear Case Sub-Assembly	1		27	Pinion Cover Assembly	1
12	Hose Clamp	2		28	Retaining Ring	1
13	Clutch Assembly - RH	2		29	Pinion Gear Assembly	1
14	Plastic Clip	2		30	Fill Plug	1
15	Reservoir	1		31	Drain Plug	1
16	Ring Gear	1		32	Piston Assembly	2
				33	1/4-20 Screws	3

Operation

Engaging Front Gearcase: Active Descent Control (ADC) is controlled by the ECU and will not enable until the following conditions are met:

- Vehicle speed is below 15 Mph (24Kph)
- Throttle Position Sensor (TPS) is at idle position
- The AWD switch is switched to 'AWD'

Once the conditions are met for engagement, ADC remains engaged as long as the conditions are met.

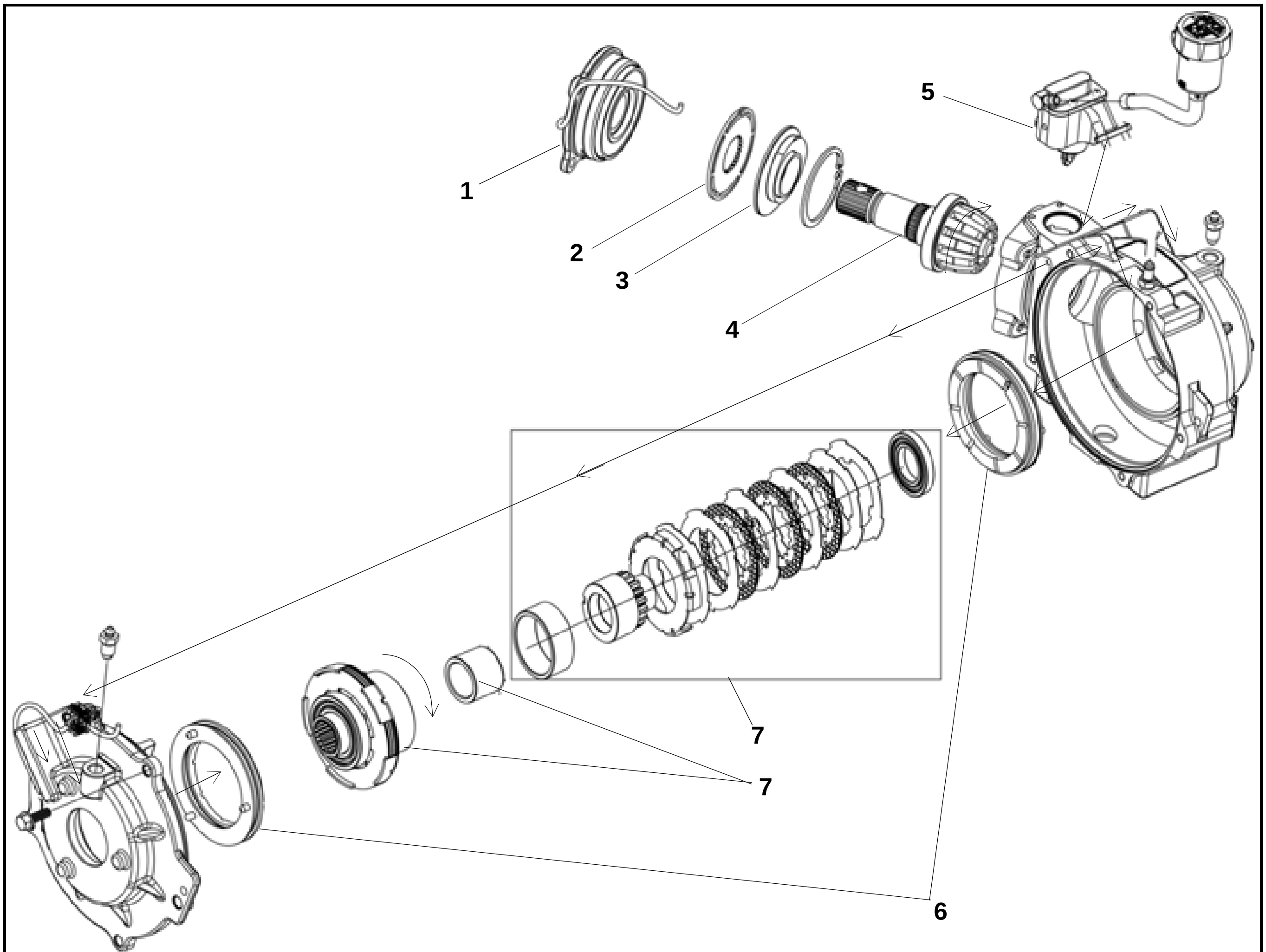
With the AWD switch off, the vehicle drives only the rear wheels (2 wheel drive). When the AWD switch is 'ON' the magnetic coils are active, the AWD coil indexes the clutch mechanism so that both front axles will engage when there is a loss of rear wheel traction. In addition to the rear wheel engine braking, the ADC coil provides front wheel engine braking at speeds less than 15 Mph (24Kph) with the TPS at idle position.

ADC Engagement: When the AWD switch is activated, a 12 Vdc current is present at the input shaft coil ***(1)***. Operation is controlled by the ECU grounding and ungrounding the coil. The coil's magnetic field attracts a splined armature plate ***(2)*** on the pinion (input) shaft ***(4)***. The energized splined armature plate attracts the unsplined eccentric cam ***(3)***, which begins to turn with the input shaft. The eccentric cam drives a hydraulic piston/pump assembly ***(5)***. The pressure created by the pump assembly forces hydraulic fluid through passages to the piston assemblies ***(6)*** located in each case half. Hydraulic pressure forces the piston assemblies inward to compress the splined clutch packs ***(7)*** forming a dynamic coupling to each front drive axle, resulting in true all-wheel EBS operation upon deceleration.

Disengagement: Current to the ADC coil is turned off by the ECU anytime the following conditions are met:

- Throttle Position Sensor (TPS) moves off idle position
- The AWD switch is switched to 'OFF'
- Vehicle speed is above 15 Mph (24Kph)

Hydraulic pressure stops and the pistons release, disengaging the ADC function. The vehicle returns to rear wheel drive until the next deceleration.



ADC Coil Testing

Refer to the following tests in Chapter 10:

See "ALL WHEEL DRIVE (AWD) COIL" on page 10.24.

See "ACTIVE DESCENT CONTROL (ADC) COIL" on page 10.24.

ADC Differential Hydraulic Circuit Bleeding

1. Make sure vehicle is parked on flat ground and allowed to sit at least 30 minutes prior to bleeding hydraulic circuit.
2. Thoroughly clean area around and on remote reservoir and hydraulic bleeders.
3. Remove reservoir cap and diaphragm assembly.
4. Make sure hydraulic oil inside reservoir is free of debris. If any debris is found, use clean rag or suction device to remove from the reservoir.

NOTE: Debris in reservoir may block porting and produce inadequate bleeding of the system. Decreased performance may be encountered with inadequate bleed of the hydraulic circuit.

5. Begin the bleeding process by filling reservoir to 'MAX' line with clean Polaris ADC oil . (AW ISO 10 hydraulic fluid equivalent).
6. Locate bleeder valves found on either side of differential and remove the protective caps.
7. Turn bleeder valves counter-clockwise to loosen. Loosen bleeder screw slowly, allowing oil and any trapped air to flow out of fitting.

IMPORTANT: Do not allow hydraulic fluid in reservoir to drain below minimum fill line. Close bleeder valve before oil level falls below minimum fill line. Refilling empty reservoir will result in air pockets becoming trapped.

NOTE: If empty reservoir is encountered, filling of fluid is still possible. Verify air is not trapped before proceeding with step 7.

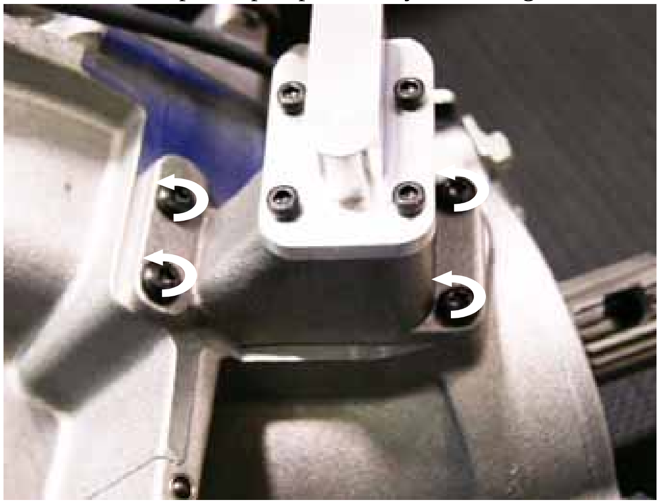
8. Continue steps 6-8 on both sides in sequence until no air bubbles are seen when bleeding occurs.
9. Re-torque both bleeder valves to specification and reinstall cover caps.

= T
Bleeder Valve Torque: **80 in. lbs. (9 Nm)**

10. Fill reservoir with to a level midway between 'MAX' and 'MIN' fill lines. Verify no debris is found in reservoir oil.
11. Replace reservoir cap securely and wipe clean any residue.

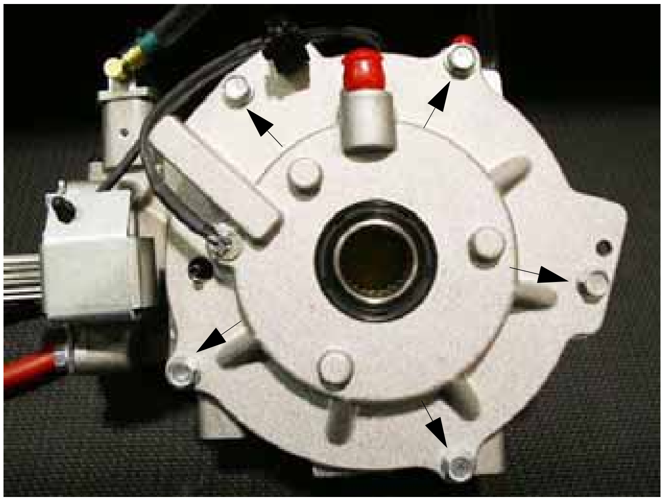
Disassembly / Inspection

1. Drain and properly dispose of used oil. Remove any metal particles from the drain plug magnet.
2. Remove the piston pump assembly from the gearcase.

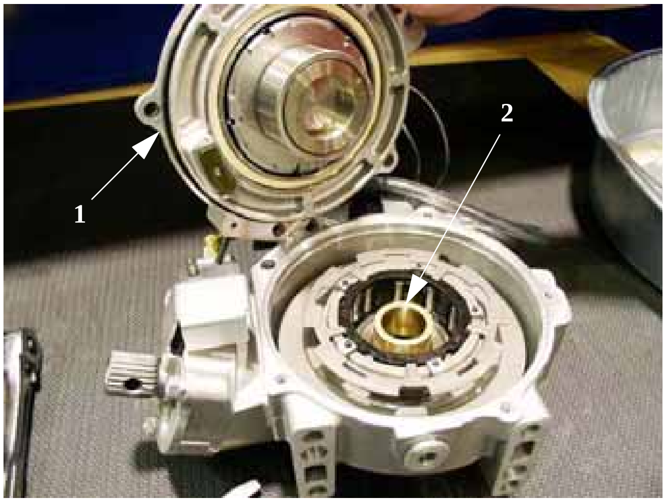


NOTE: Piston pump assembly is a non-serviceable item and should not be disassembled. Replace as an assembly if found to be damaged or non-working.

3. Remove bolts (arrows) retaining the outer cover plate assembly.



4. Remove the outer cover plate assembly. Remove and inspect the cover o-ring (1). Inspect thrust bearing (2) for wear. Replace items as required.



NOTE: Thrust bearing (2) located between the two output assemblies is pressed into the clutch pack and is not removable.

5. Remove the output clutch assemblies. Inspect the bearings, contact surfaces and splines of the output clutch for signs of wear or damage. Visually inspect the clutch plate area. If plates are steel-on-steel, or if the friction material is worn, the assembly should be replaced.

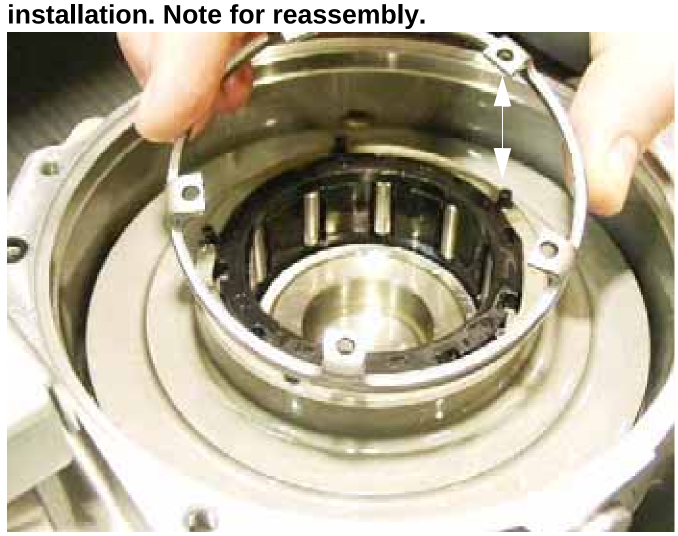
NOTE: Excessive debris in the oil and/or noise coming from the front drive on deceleration with ADC active are key indicators of clutch pack failure. Replace clutch as an assembly if found to be worn or damaged.

NOTE: Locating pins / holes (circle) aid installation. Note for reassembly.

6. Remove the armature plate. Inspect the armature plate for wear, distortion or other damage. Replace component as required.

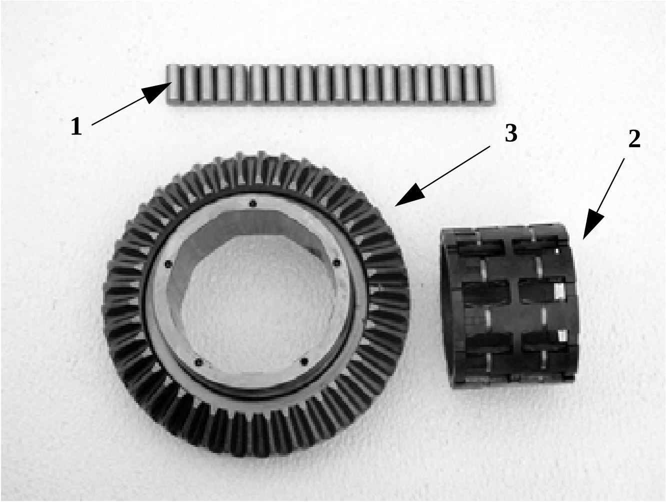
7. Remove the spacer. Inspect for signs of wear or damage. Replace component as required.

NOTE: locating pins (arrow) are for spacer installation. Note for reassembly.

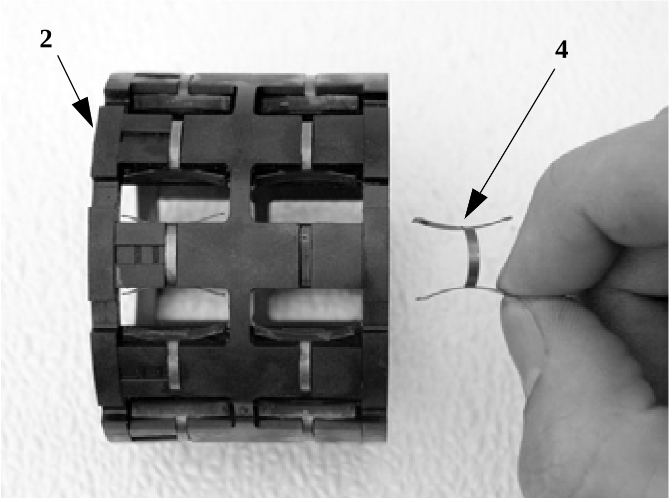


8. Remove the ring gear (1) and spacer (2).

9. Remove and inspect the bearing surfaces of the output hub.
10. Thoroughly clean all parts.
11. Inspect the rollers (1) for nicks, scratches and flat spots. Inspect the roll cage (2) for damage or cracks. The rollers must slide up and down freely within the roller cage surfaces. Inspect the ring gear (3) for consistent wear patterns. Surfaces should be free of nicks or burrs.



12. Inspect roll cage sliding surface (2). This surface must be clean and free of nicks, burrs or scratches. Remove and inspect the H-springs (4). Replace any components as required.



13. Inspect the armature plate for a consistent wear pattern. Uneven wear of the armature plate indicates a warped plate, which may cause intermittent operation.

NOTE: See "Front Gearcase Diagnosis" on page 7.19.

7

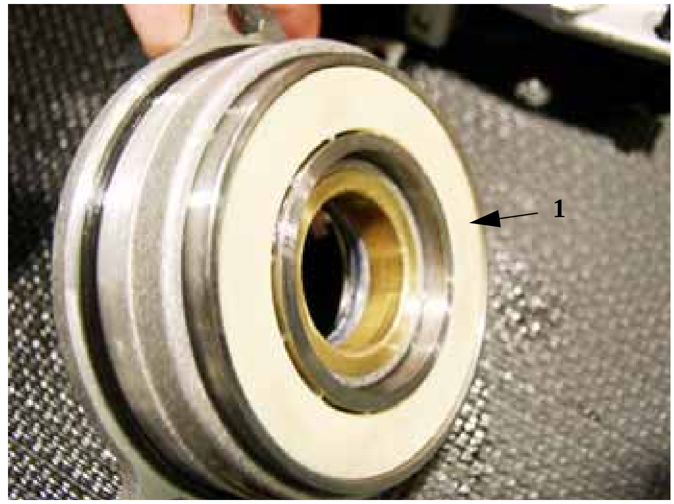
14. Inspect the magnetic coil (1) in the outer cover plate assembly. Inspect the backlash pad (2) for excessive wear.

NOTE: See "FRONT GEARCASE DIAGNOSIS" in this chapter.

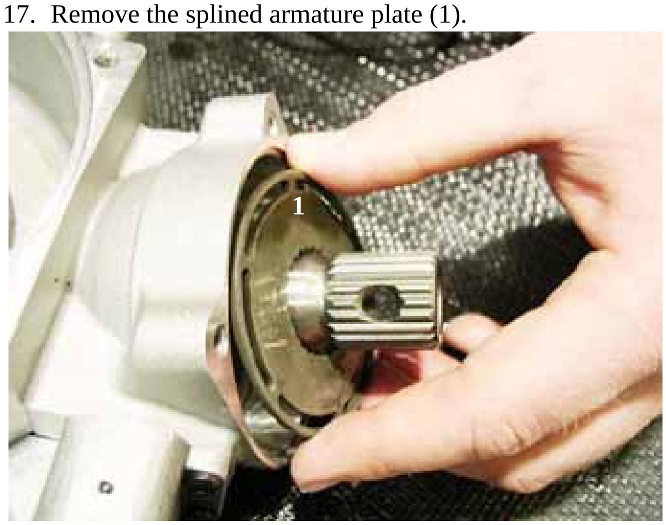
NOTE: Ring gear backlash (2) is set at the factory. No adjustment is required, unless the front cover is replaced or the back lash pad screw is removed. See the "FRONT GEARCASE ASSEMBLY" in this chapter for details on backlash setting.

15. Remove the bolts retaining the input shaft cover and pinion gear assembly.

16. Inspect the magnetic coil (1) and bushing in the input cover plate assembly. Replace the input cover seal.

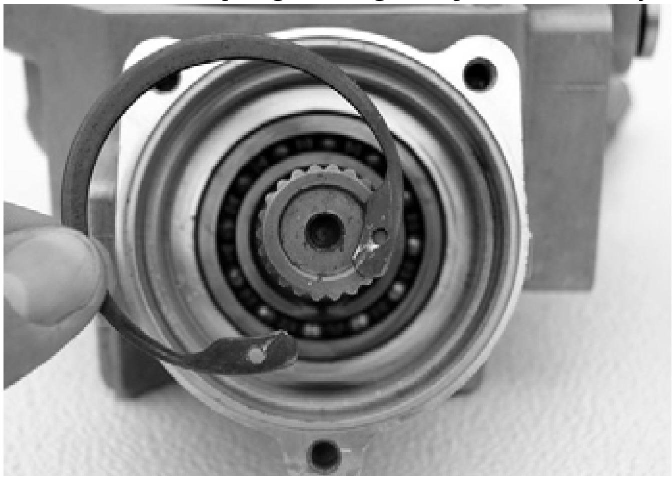


17. Remove the splined armature plate (1).

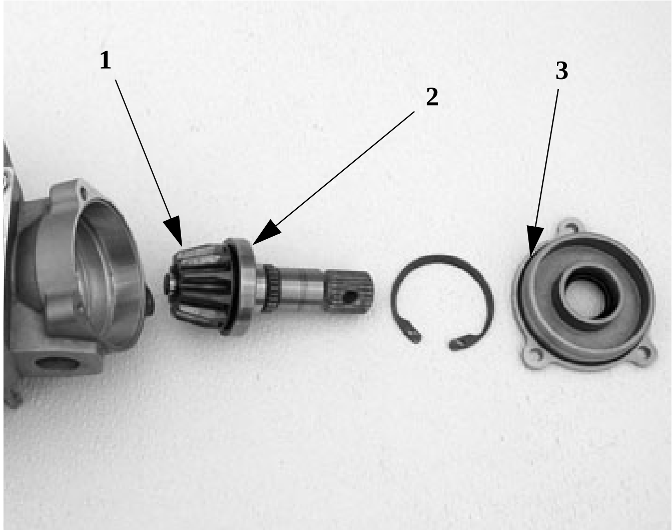


18. Remove the eccentric cam assembly. Inspect the cam (1) and bushing (2) for wear or damage. Replace component as required.

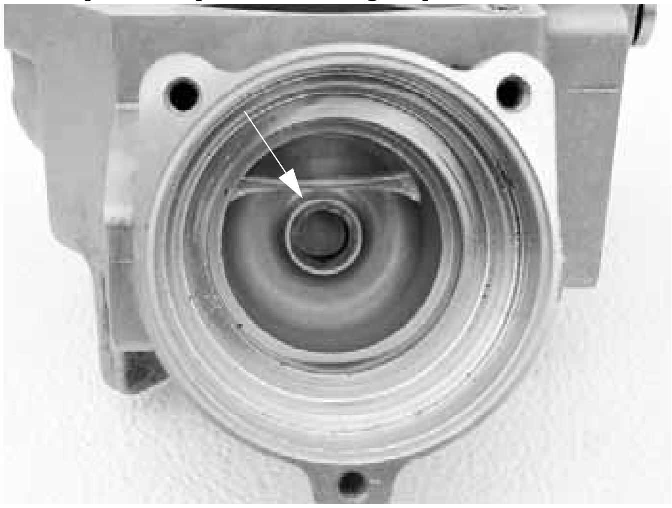
19. Remove the snap ring retaining the input shaft assembly.



20. Remove the input shaft assembly. Inspect the pinion gear (1) for chipped, broken, or missing teeth. Inspect the input shaft bearing (2) for signs of wear. Replace the input shaft cover O-ring (3) prior to reassembly.



21. Inspect the input shaft bushing. Replace case if worn.



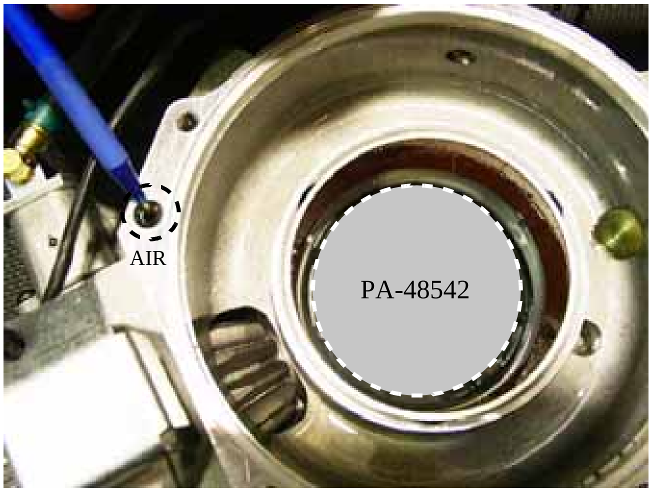
ADC Gearcase Piston Replacement Procedure

⚠ CAUTION

This repair procedure involves the use of compressed air. Safety glasses or a face shield are required.

1. Place ADC Piston Tool PA-48542 on top of the piston. Using moderate hand pressure, hold the tool on top of the piston while using compressed air at the gearcase passage (circled) to force piston up and out of the case. (See photo)

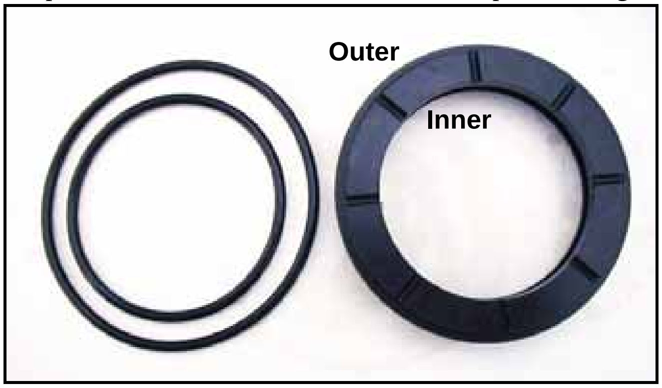
2. Repeat procedure for the other piston. (See photo)



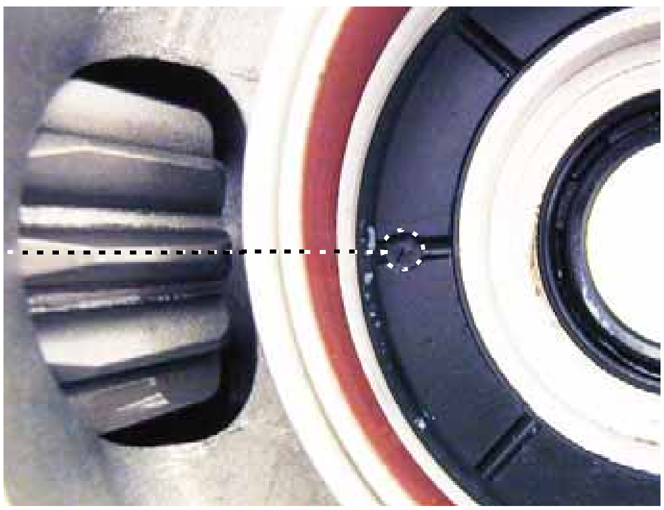
3. Remove and discard the inner and outer o-rings from the piston assembly.

NOTE: Never re-use o-rings. Always replace with new.

4. Coat new piston and o-rings with a moderate amount of white lithium grease or assembly lube. Coat the edges of the piston cavities. Install the inner and outer piston o-rings.



5. Place the piston in the piston cavity, aligning the pins with the pin bosses. Using the casting and piston marks as a guide as shown will aid pin alignment.



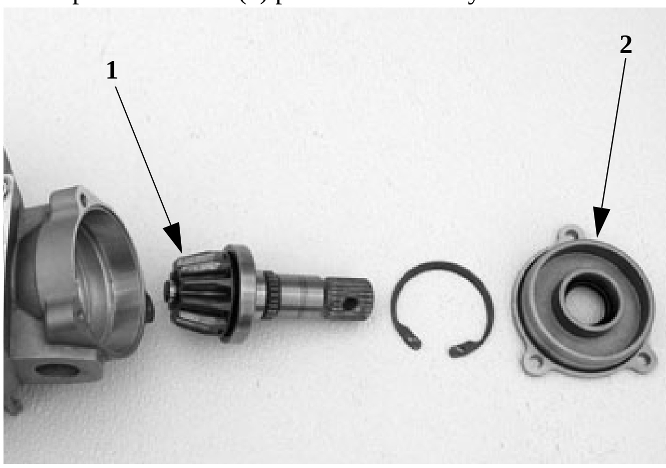
6. Place ADC Piston Tool PA-48542 on top of the piston and verify alignment of the sight hole (circled) and piston mark with the casting marks. Support the case and press the piston down evenly. The piston is fully seated and located in the pin bosses when the piston surface is just below the cavity edge.

7. Repeat procedure for the other gearcase half.

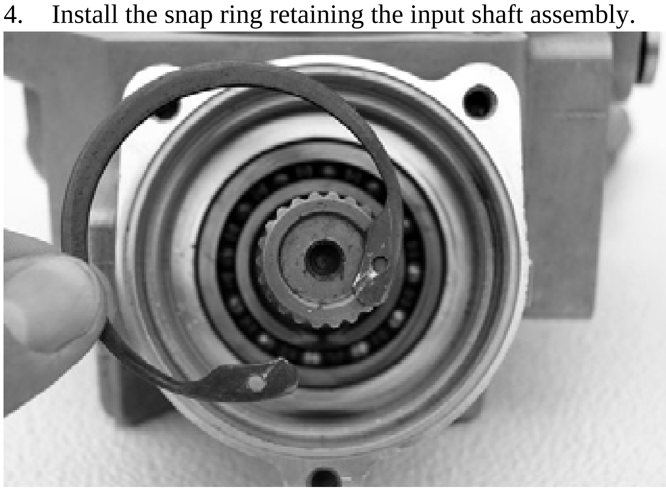
NOTE: Verify that the o-rings are seated properly and that no o-ring shavings exist outside of the piston area, which is an indication of damage during installation.

Assembly

1. Thoroughly clean the gearcase components before beginning reassembly.
2. Install a new seal in the main gearcase halve.
3. Install the input shaft assembly. Install the pinion gear/ bearing assembly (1). Install a new seal and o-ring the input shaft cover (2) prior to reassembly.

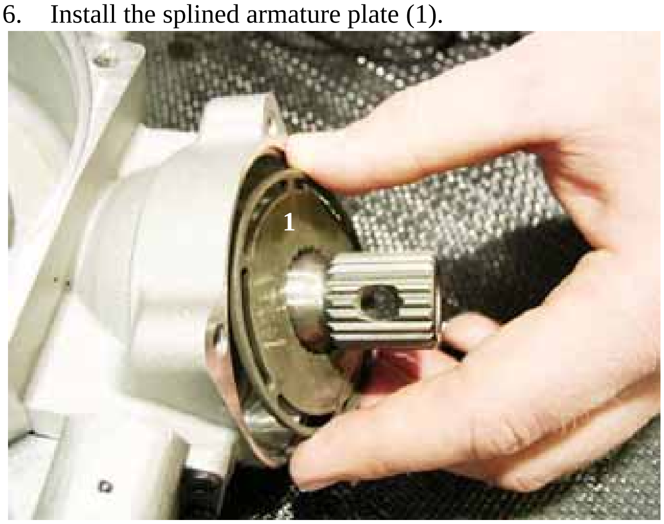


4. Install the snap ring retaining the input shaft assembly.

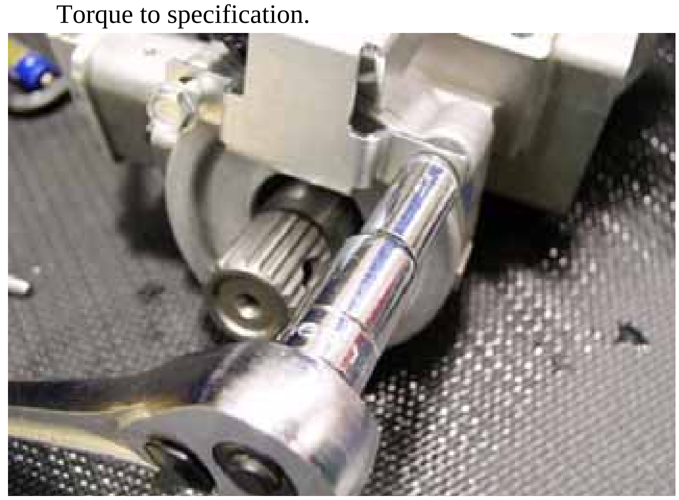


5. Install the eccentric cam assembly (1).

6. Install the splined armature plate (1).



7. Install the input shaft cover assembly, bolts and bracket. Torque to specification.

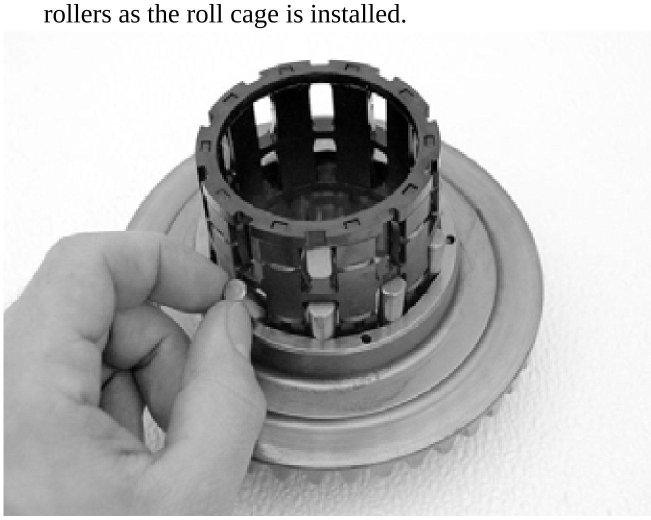


= T
Input Cover Bolt Torque: **7-11 ft. lbs. (9.4-14.9 Nm)**

8. Install a new seal (1) in the outer cover plate assembly. Install a new o-ring on the backlash pad (2) stem .

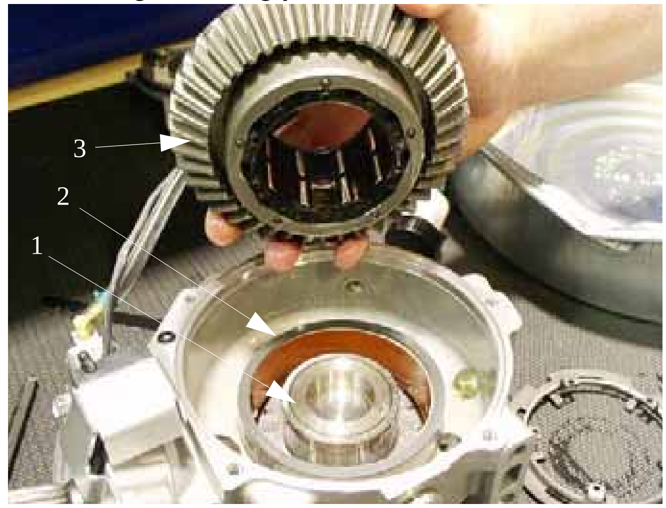
NOTE: Ring gear backlash (2) is set at the factory. No adjustment is required, unless the front cover is replaced or the back lash pad screw is removed.

9. Install the roll cage and rollers into the ring gear. Insert the rollers as the roll cage is installed.

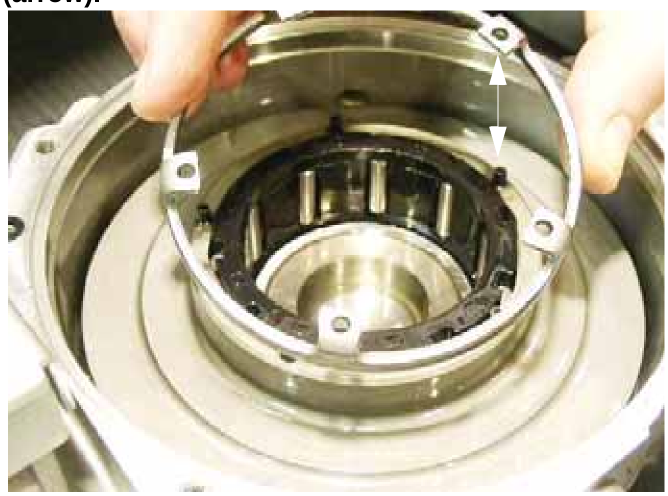


10. Install the clutch pack (1), spacer (2) and ring gear (3).

NOTE: Align locating pins / holes for installation.

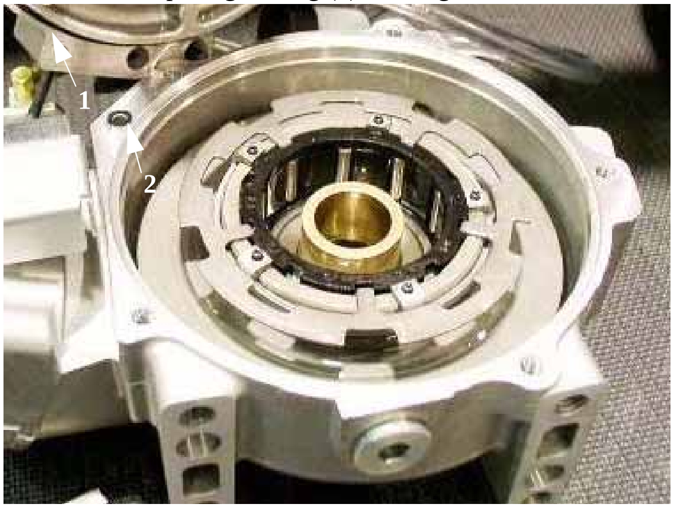


NOTE: Align locating pins / holes for installation (arrow).



11. Install the armature plate. Verify the armature plate tabs align with tab recesses in the roll cage.

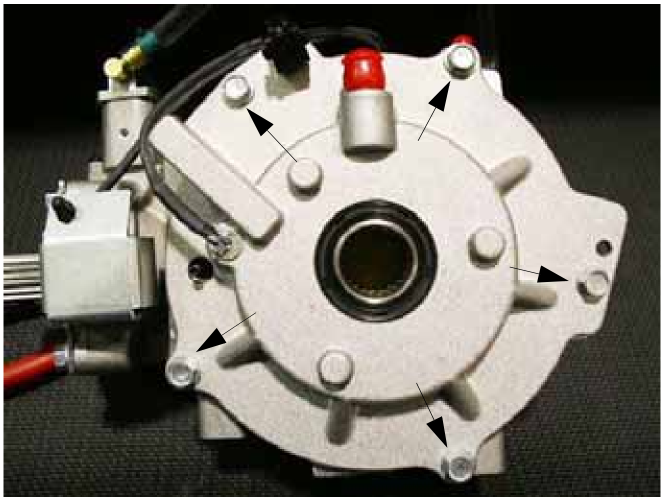
12. Install new cover o-ring (1) on the cover plate assembly and a new passage o-ring (2) on the gear case.



13. Install the remaining output clutch assembly.

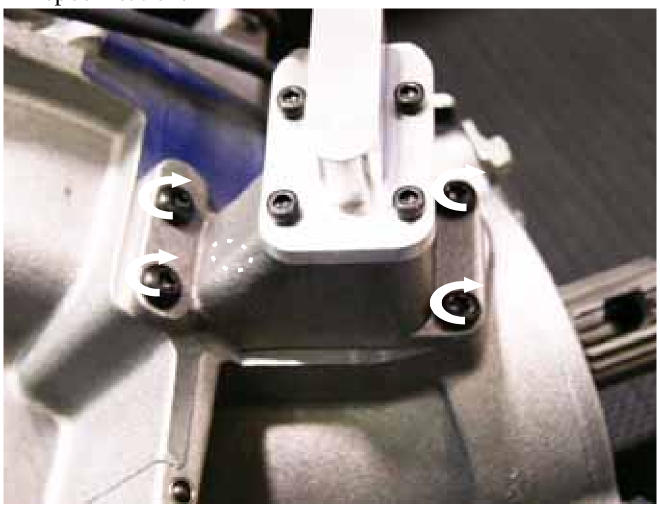
NOTE: Align locating pins / holes for installation.

14. Place cover assembly on Install bolts (arrows) retaining the outer cover plate assembly and torque to specification.



= T
Input Cover Bolt Torque: **7-11 ft. lbs. (9.4-14.9 Nm)**

15. Install a new passage o-ring (dotted circle) on the gearcase and install the piston pump assembly. Torque the screws to specification.



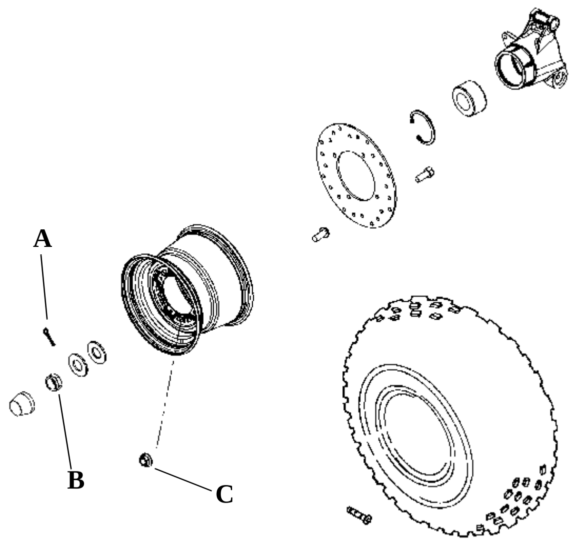
= T
Pump Assembly Screw Torque: **17-23 in. lbs. (1.9-2.5 Nm)**

NOTE: See “Gearcase Installation” on page 7.20. Properly route and install the ADC reservoir and line.

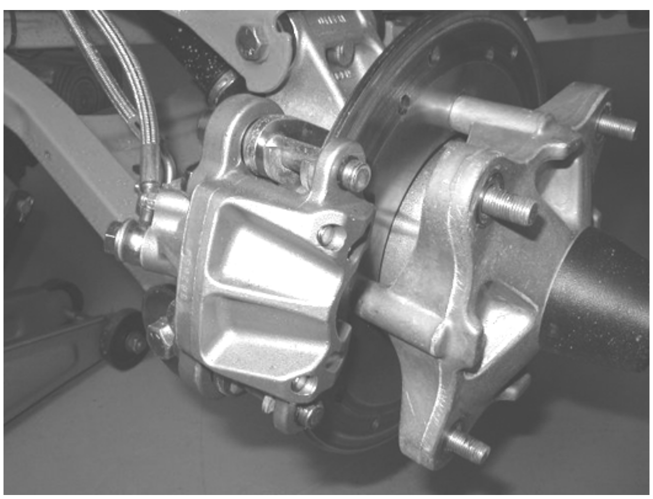
REAR HUB

Removal

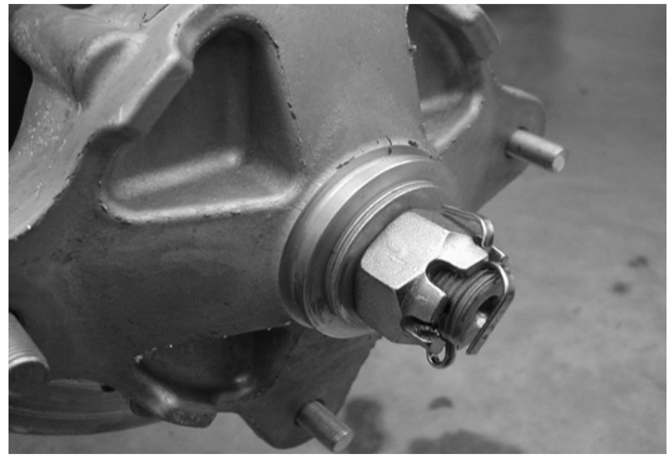
1. Place the ATV in Park and lock the parking brake. Remove rear hub cap.



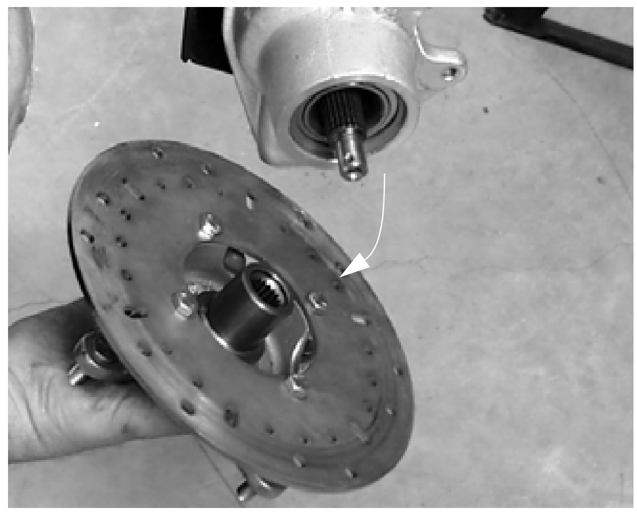
2. Remove cotter pin (A).
3. Loosen the hub retaining nut (B).
4. Loosen the wheel nuts (C).
5. Safely support the rear of the ATV.
6. Remove wheel nuts and wheel.
7. Remove the rear brake caliper and safely suspend the caliper from the frame with a piece of wire.



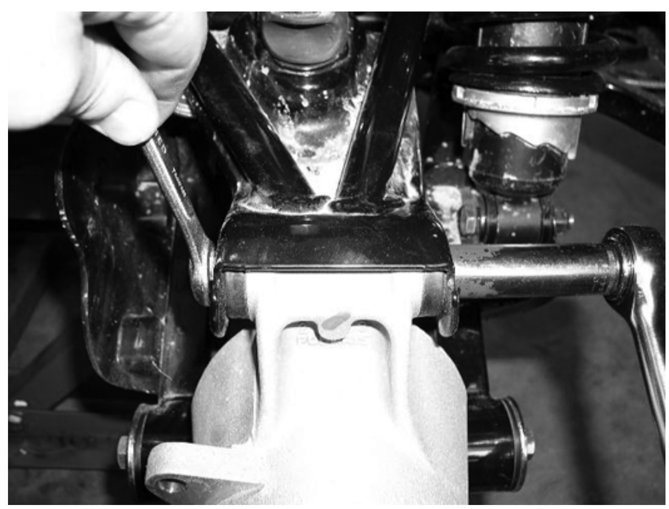
8. Remove hub nut, domed washer and flat washer.



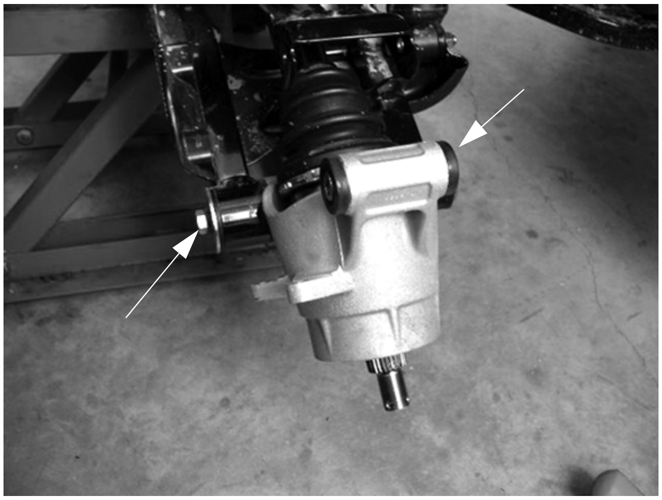
9. Remove hub.



10. Remove upper control arm bolt as shown.



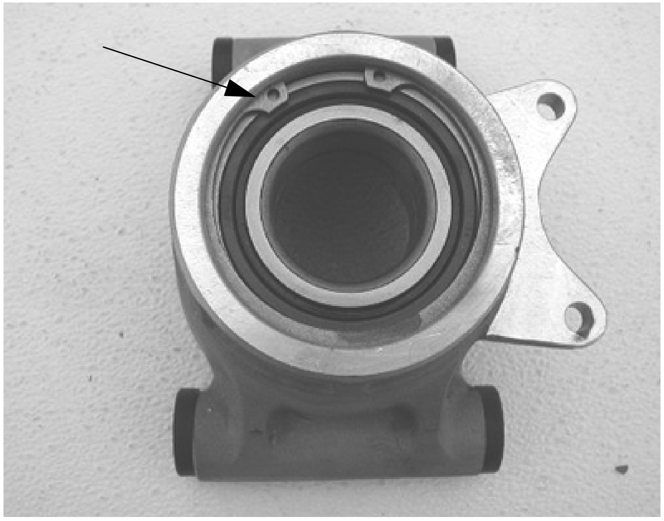
11. Remove both lower control arm bolts.



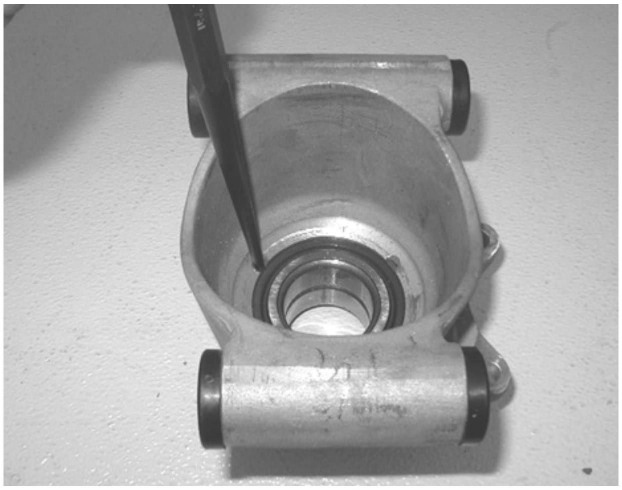
12. Remove bearing carrier.

Disassembly

1. Remove outer snap ring.



2. From the back side, tap on the outer bearing race with a drift punch in the reliefs as shown or press out using a hydraulic press.



NOTE: Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.

3. Inspect bearing.

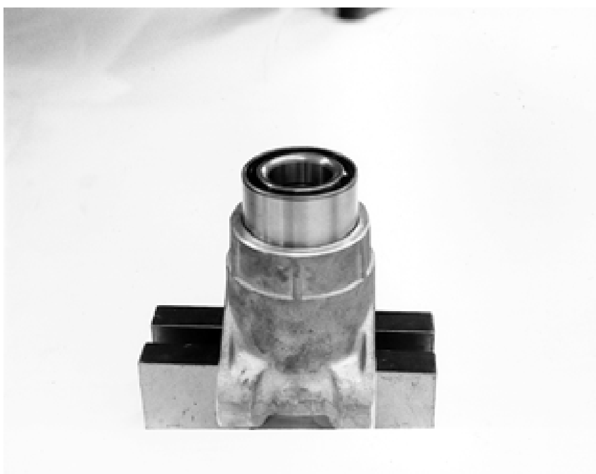
NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

4. Inspect bearing housing for wear or damage. Replace housing if damaged.

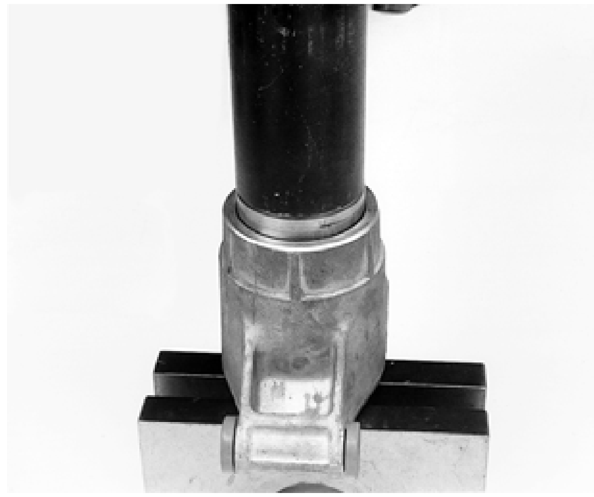
Assembly

1. Support bottom of bearing carrier housing.

2. Start bearing in housing.



3. Press bearing into place until outer race bottoms on housing.

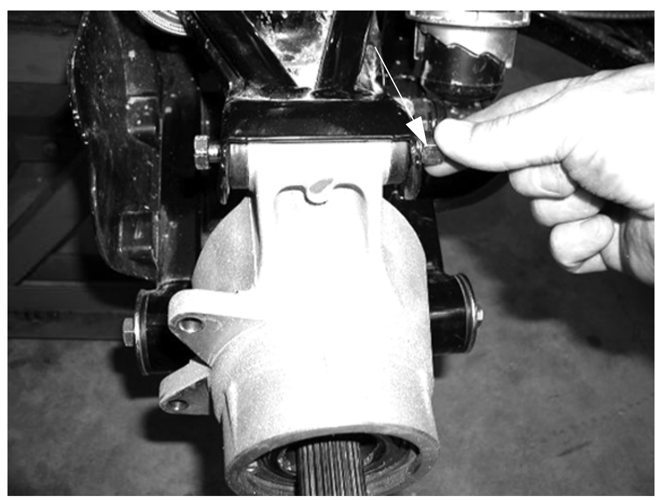


CAUTION
Use an arbor press only on the outer race to avoid bearing damage.

4. Install snap ring into groove.

Installation

1. Insert bearing carrier on drive shaft.
2. Align bottom of carrier housing and lower control arm. Grease and slide lower control arm bushings into place, securing corner housing.
3. Install and torque both lower control arm bolts.



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Upper Control Arm Bolt Torque: **35 ft. lbs. (48 Nm)**

= T

Lower Control Arm Bolt Torque:
50 ft. lbs. (68 Nm)

4. Lift bearing carrier until top aligns with upper control arm. Install and torque upper control arm bolt and torque to specification.
5. Pull drive shaft outward and install hub onto driveshaft splines.
6. Install cone washers with domed side facing outward.
7. Install retainer nut, wheel and wheel nuts.
8. Remove jackstand and torque axle nut and wheel nuts to specification.

= T

Wheel Nut Torque:
See “Torque Table” on page 7.2.

= T

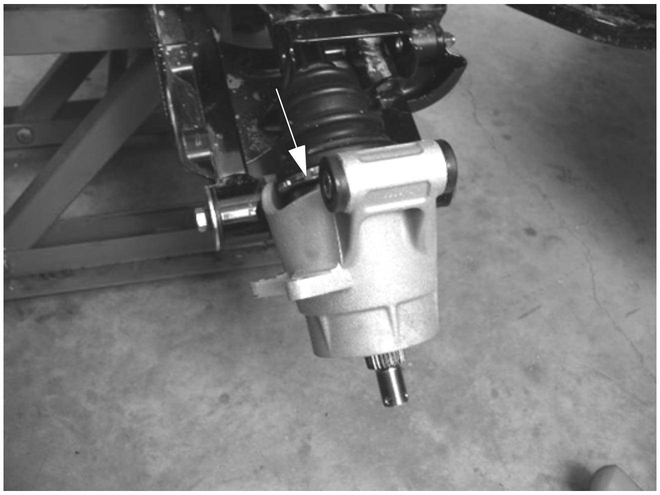
Hub Nut Torque:
80 ft. lbs. (109 Nm)

9. Install a new cotter pin. Tighten nut slightly to align holes if required.

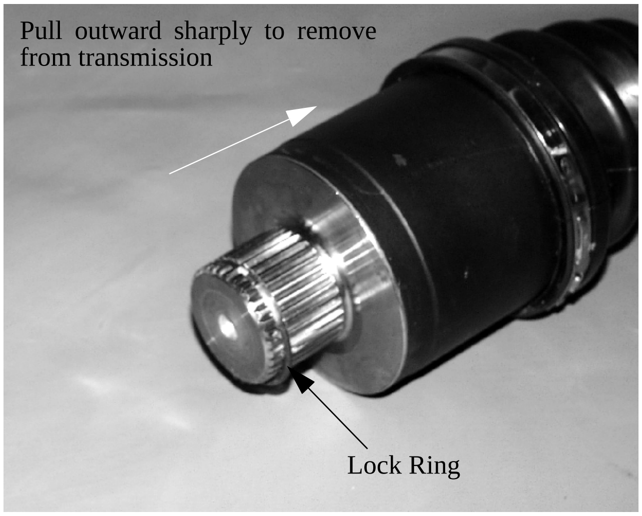
REAR DRIVE (CV) SHAFT

Removal

1. Remove rear hub, see “REAR HUB REMOVAL”.
2. Remove upper carrier bolt. Tip hub outward and remove shaft from carrier.

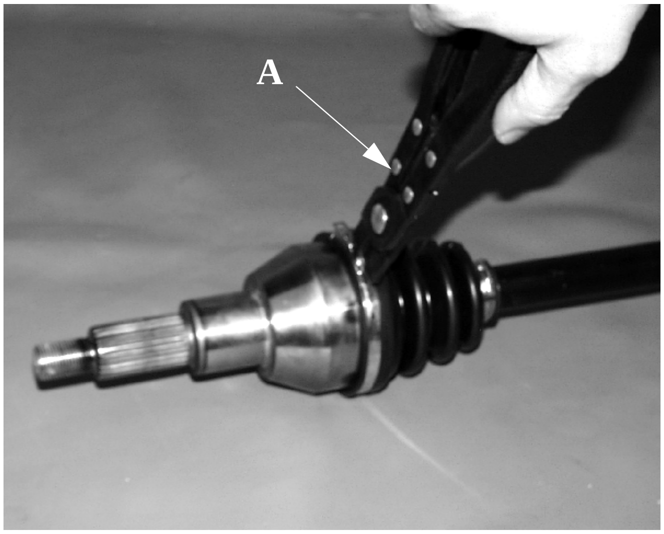


3. Pull sharply outward to remove shaft from transmission. Install a new lock ring upon assembly.



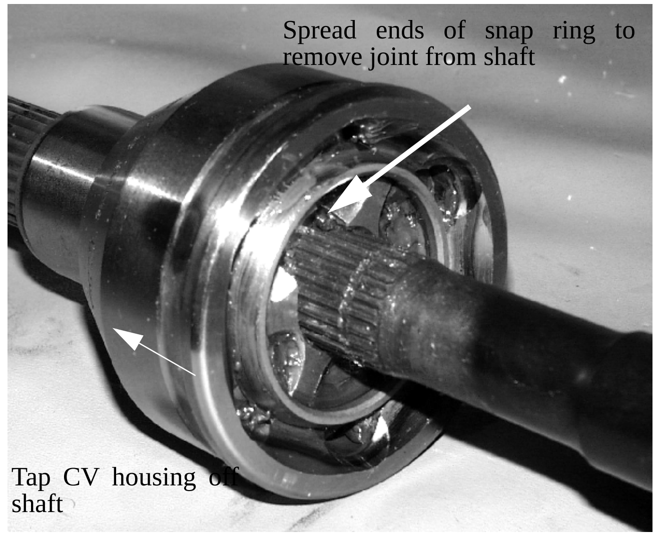
Service

1. Remove clamps from rubber boot(s) using the CV Boot Clamp Pliers **(PN 8700226**) (A).

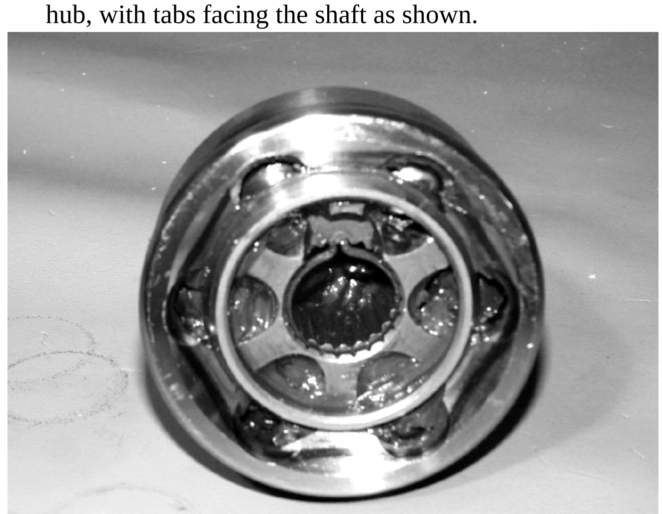


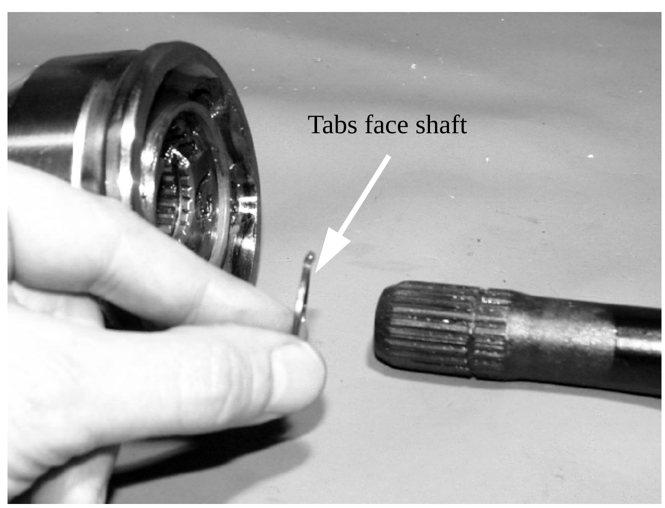
2. **Photo below is shown without shaft for clarity. Wipe grease away from recess in CV joint inner hub to locate snap ring**

3. Open the snap ring using a snap ring pliers or small needle nose pliers. Tap CV housing off shaft with a soft faced hammer while holding snap ring open.

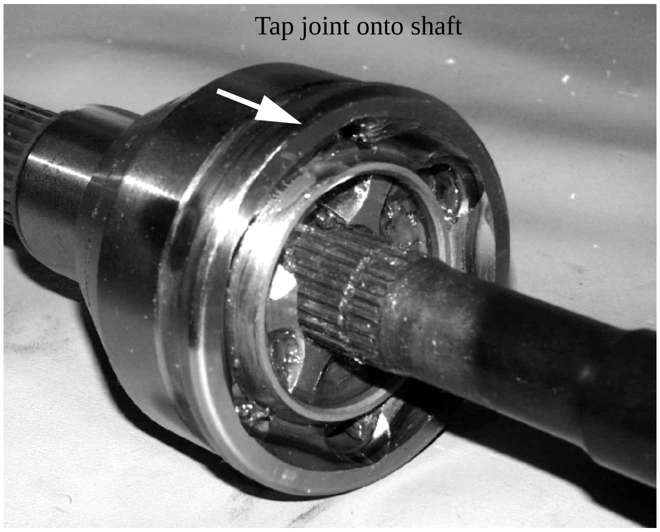


4. Place a new snap ring in the groove of the CV joint inner hub, with tabs facing the shaft as shown.

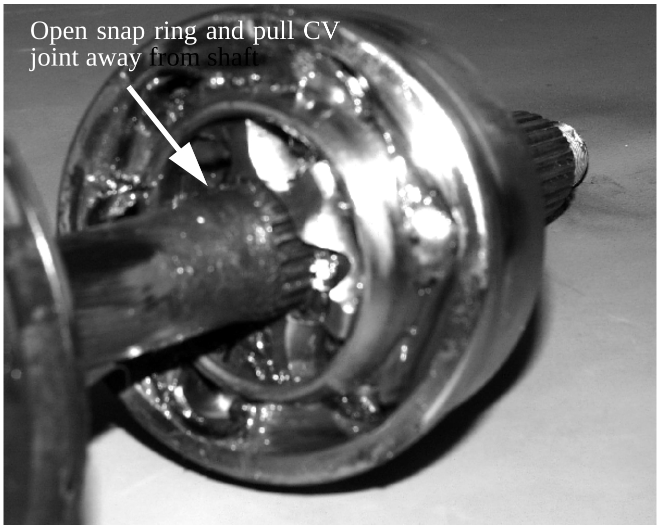




5. Refit CV joint on interconnecting shaft by tapping with a plastic hammer on the joint housing. Take care not to damage threads on the outboard CV joint. The joint is fully assembled when the snap ring is located in the groove on the interconnecting shaft.



6. Install and tighten large boot clamp with boot clamp pliers.
7. Remove excess grease from the CV joint's external surfaces and position joint boot over housing, making sure boot is seated in groove. Position clamp over boot end and make sure clamp tabs are located in slots. **NOTE**: Before tightening boot clamp on inboard joint, make sure any air pressure which may have built up in joint boot has been released. The air should be released after the plunging joint has been centered properly. Tighten boot clamp using boot clamp pliers.



CV Boot Replacement

1. Remove CV joint from end of shaft.
2. Remove boot from shaft.

NOTE: When replacing a damaged boot, check the grease for contamination by rubbing it between two fingers. A gritty feeling indicates contamination. If the grease is not contaminated, the boot can be replaced without cleaning the CV joint. Use the recommended amount of grease for boot replacement only (see below). Proceed to Boot Installation.

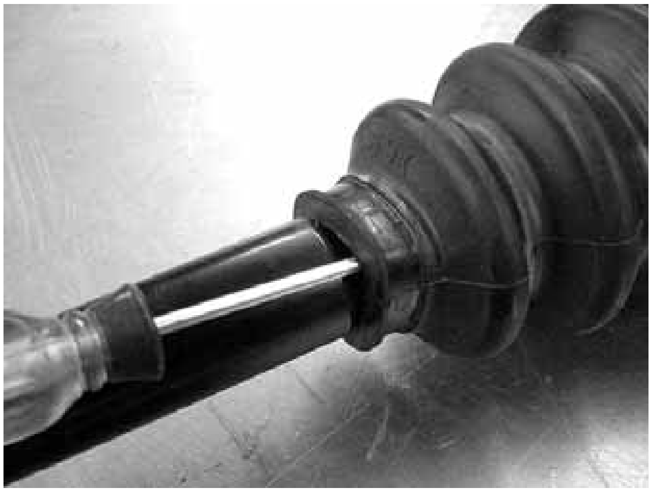
3. Thoroughly clean and dry the CV joint and inspect ball tracks and cages for wear, cracks or other damage.

NOTE: Shiny areas in ball tracks and on the cage spheres are normal. Do not replace CV joints because parts have polished surfaces. Replace CV joint only if components are cracked, broken, worn or otherwise unserviceable.

4. Add the recommended amount of grease for CV joint cleaning to the joint as shown below. Be sure grease penetrates all parts of the joint.
5. Refit CV joint on interconnecting shaft by tapping with a plastic hammer on the joint housing. Take care not to damage threads on the outboard CV joint. The joint is fully assembled when the snap ring is located in the groove on the interconnecting shaft.
6. Add grease through large end of boot.
7. Install a new boot onto the axle shaft and fill the CV joint and boot with the correct type and amount of grease.

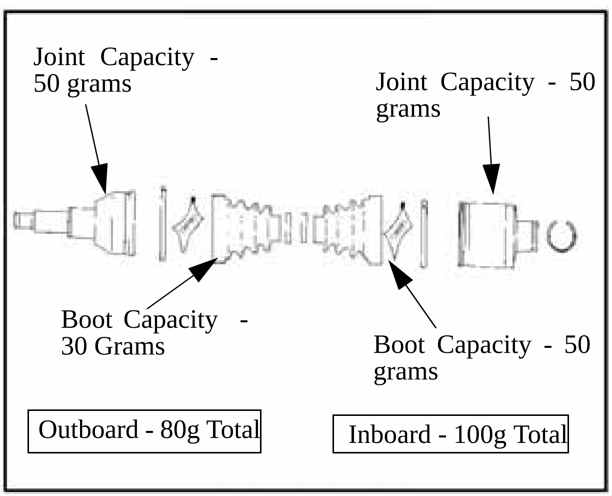
7

8. 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 axle.



9. Install the small clamp on the boot.
10. Be sure to use only the Constant Velocity Joint grease supplied with boot service kit. IF CV JOINT WAS CLEANED, add the recommended amount of grease to the joint in addition to the grease pack supplied with boot kit.

NOTE: CV Joint Grease Capacity:



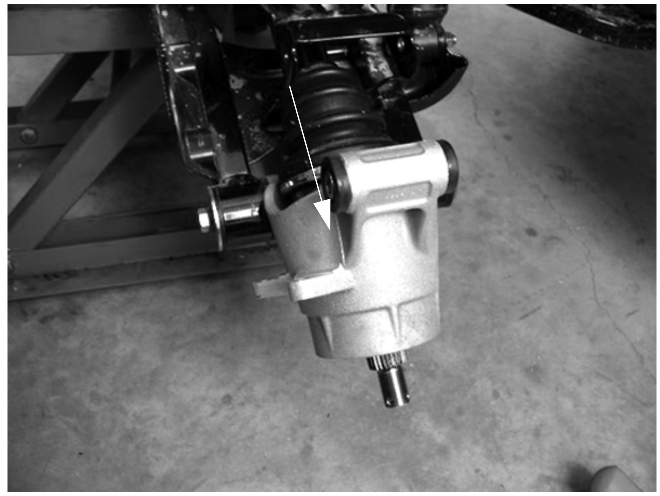
CV Joint Grease:
30g PN 1350046 50g PN 1350047

Outboard Joint - 30g if boot is replaced only. Another 50g (80 total) if joint is cleaned.

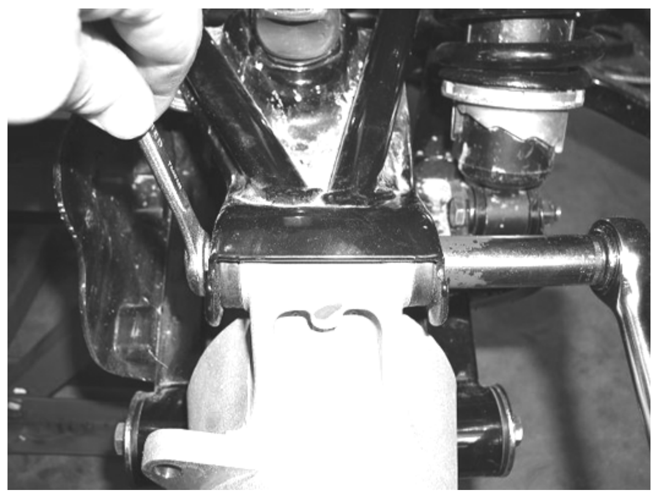
Inboard Joint - 50g if boot is replaced only. Another 50g (100 total) if joint is cleaned.

INSTALLATION

1. Slide shaft assembly into bearing carrier hub.



2. Apply anti-seize compound to splines of shaft.
3. Install a new lock ring and install the shaft.
4. Lift bearing carrier into place and install bolt to upper control arm. Torque bolt to specification.

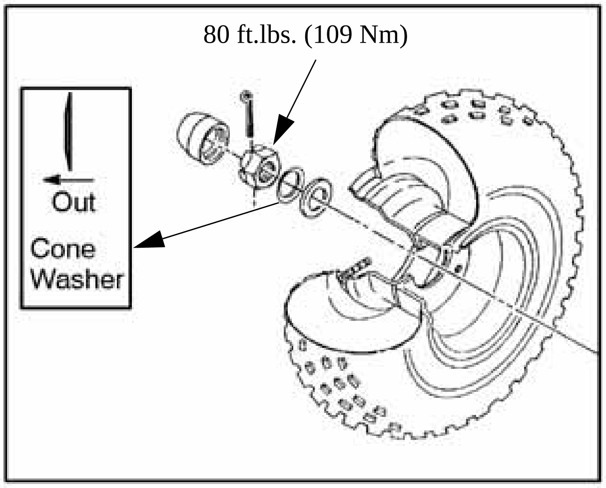


= T
Upper Hub Carrier Bolt Torque: **35 ft. lbs. (48 Nm)**

5. Install hub, flat washer, domed washer (domed side out) and nut. Torque center hub nut to specification. Install new cotter pin and hub cap.

= T
Hub Nut Torque: **80 ft. lbs. (109 Nm)**

6. Install rear wheel and torque wheel nuts to specification.



Refer to Page 7.2 for Wheel Nut Torque.

7. Grease all fittings thoroughly with Premium U-Joint Lubricant (**PN 2871551**).

Drive Shaft and CV Joint Handling Tips

Care should be exercised during driveshaft removal or when servicing CV joints. Driveshaft components are precision parts.

Cleanliness and following these instructions is very important to ensure proper shaft function and a normal service life.

- The complete driveshaft and joint should be handled by getting hold of the interconnecting shaft to avoid disassembly or potential damage to the driveshaft 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 driveshaft 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.

7

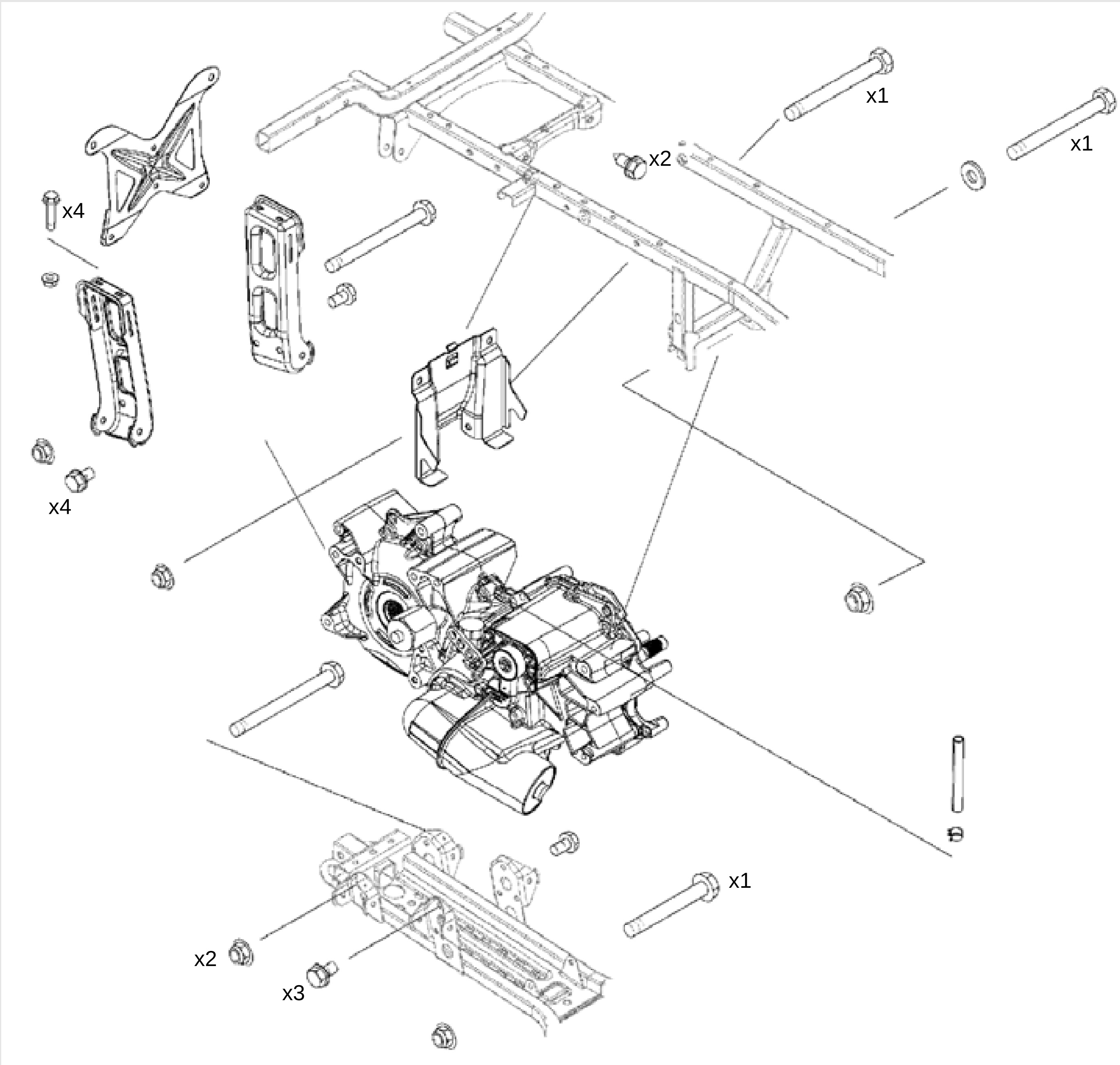
NOTES

CHAPTER 8
GENERAL INFORMATION

8

TRANSMISSION - GENERAL

Mounting Exploded View



Torque Specifications

COMPONENT	FT. LBS. (IN.LBS.)	NM
Transmission Case Bolts	25-30	36-43
Bell Crank Nut	12-18	17-26
Transmission Fill/Drain Plug	20-25	29-36
Trans. Mounting Bolts	40	57
Gear Sector Cover	8-12	11-17
Oil Deflector Screws	(20-30)	2-3.6
Snorkel Torx Screw	8-12	11-17
Bearing Cover	8-12	11-17
Carrier Cover	23-27	33-39
Shift Fort Retainer Screws	8-12	11-17
Park Plate	8-12	11-17

Special Tools

PART NUMBER	TOOL DESCRIPTION
2871695 (Part of **2871702** Kit)	Backlash Setting Tool
2871698 (Part of **2871702** Kit)	Rear Output Seal Driver
2871699 (Part of **2871702** Kit)	Rear Driveshaft Seal Guide
2871282	Bearing Seal Driver (50 mm)

Lubrication

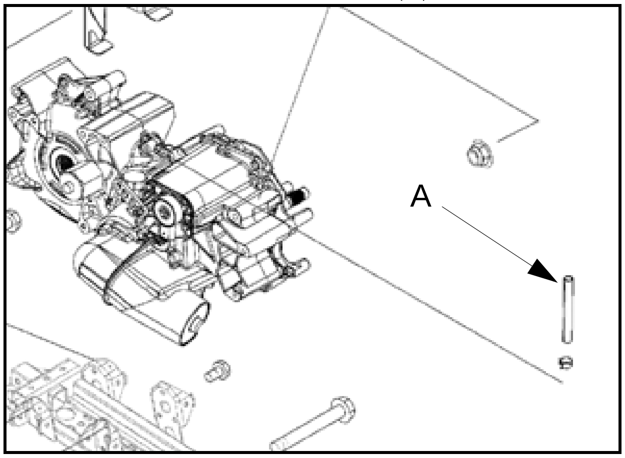
Refer to Chapter 2 for transmission lubricant type and capacity.

Gear Selector Removal

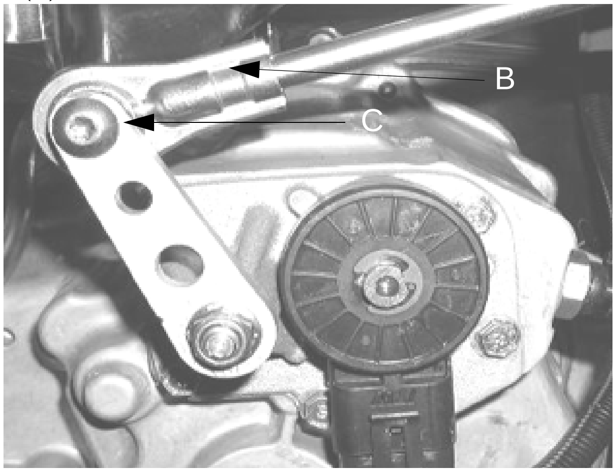
1. Disconnect linkage rod from gear selector handle.
2. Remove two bolts attaching gear selector mount to machine frame.
3. Lift gear selector out of mounting bracket and away from frame.

Transmission Removal

1. Place vehicle in "park". Raise and securely support rear of ATV at the frame. Remove both rear wheels.
2. Drain transmission lubricant (if required).
3. Remove seat, both side panels, both rear cab quarter panels and both footwells. See Chapter 5.
4. Disconnect the differential, speed sensor and gear selection switch connectors from the transmission.
5. Disconnect transmission vent line (A).



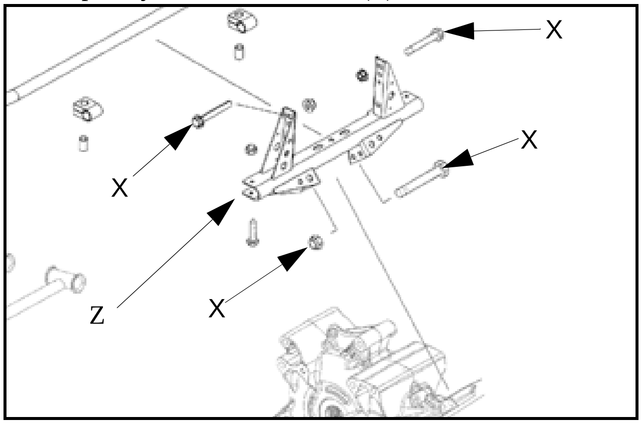
6. Disconnect shift rod end (B) from transmission bellcrank (C).



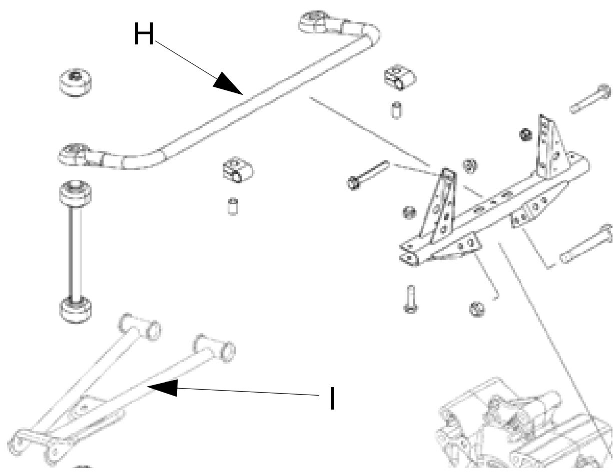
7. Remove PVT outer cover, drive and driven clutches, and the inner PVT cover. (refer to Clutch Removal in Chapter 6).
8. Remove both rear drive shafts. Brake caliper removal is required. Do not let calipers hang by the brake line. See Chapters 7 and 9.
9. Remove both upper shock absorber mounting bolts and swing shocks away from the transmission.
10. Remove the torsion bar mountings from the control arms.

8

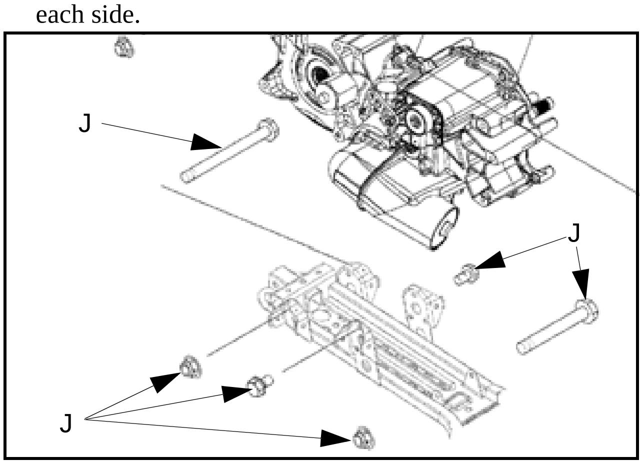
11. Remove all fasteners (X) attaching the torsion mount, and completely remove the mount (Z) from the ATV.



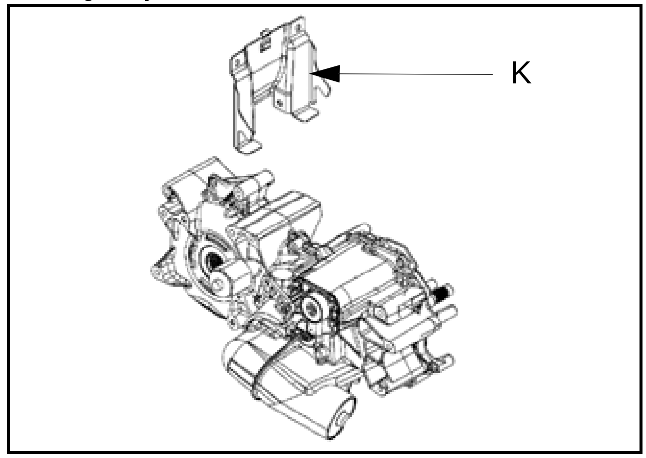
12. Remove both upper control arms (I). Refer to Chapter 7 for more details.



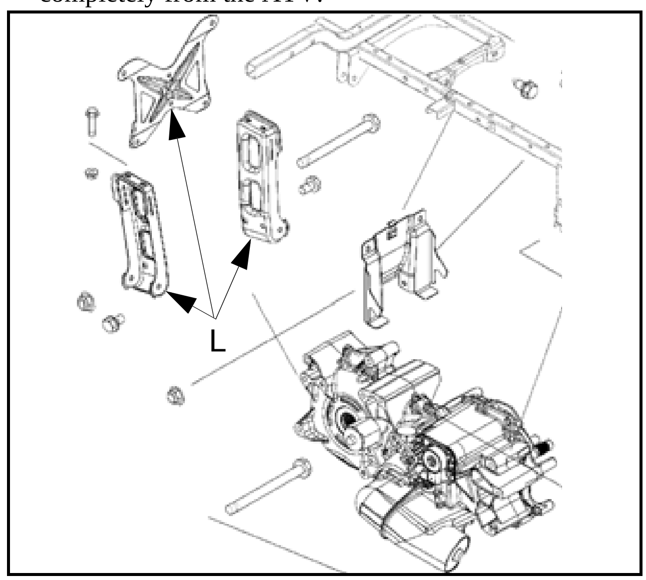
13. Remove all lower transmission mounting fasteners (J) from each side.



14. Remove the middle transmission support bracket (K) completely from the ATV.



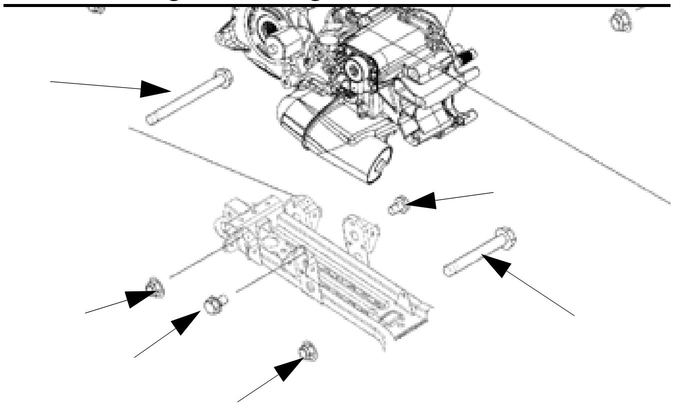
15. Remove the rear transmission support brackets (L) completely from the ATV.



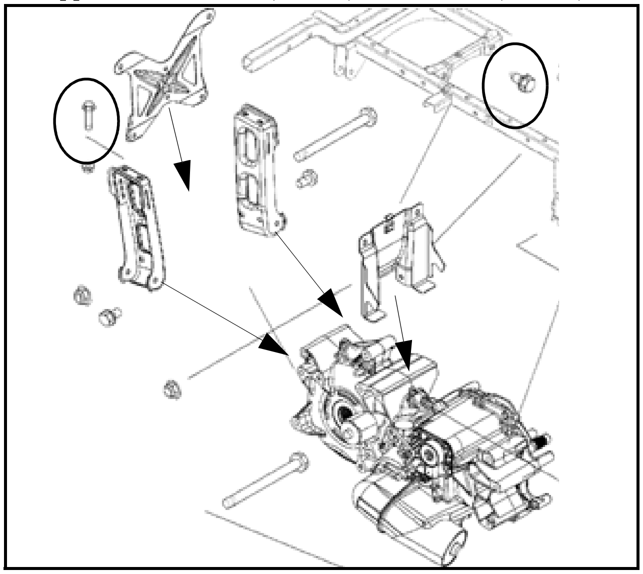
16. Lift and remove transmission out right side of frame while pulling the output shaft from the propshaft yoke.

Transmission Installation

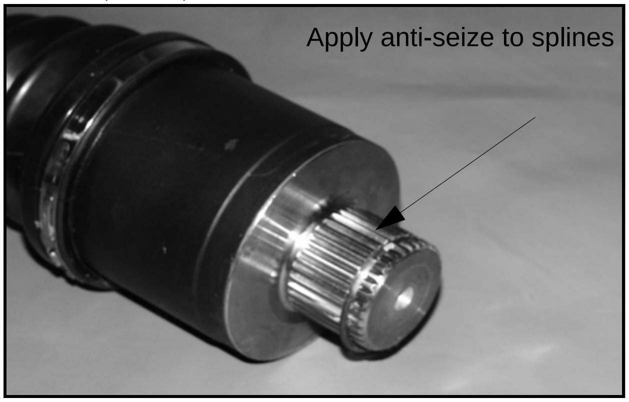
1. Apply Polaris Premium All Season Grease (PN 2871423) to splines of front output shaft ,install new O–ring in prop shaft.
2. *With the help of an assistant*, rotate transmission into place from the right side of the frame, aligning the forward transmission bracket into the rear engine mounting holes while ensuring that the output shaft and propshaft align and slide together.
3. Loosely install lower transmission mounting fasteners and forward engine mounting nuts.



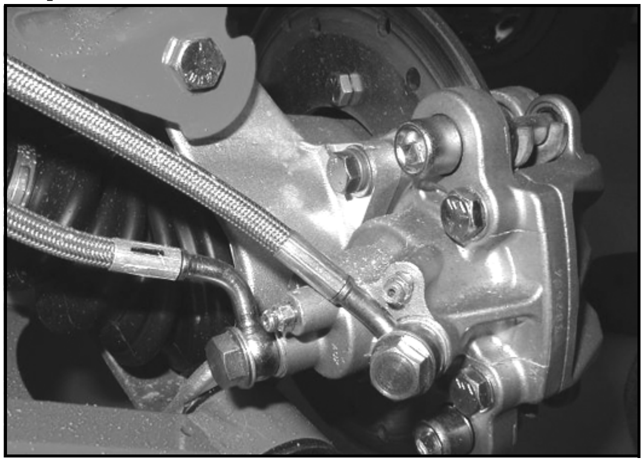
4. Install the rear support bracket, middle support bracket and torsion bar support bracket. Torque all lower bracket bolts to **40 ft.lbs. (57Nm)**. Torque all upper rear and middle support bracket bolts (circled) to **17 ft.lbs. (24 Nm)**.



5. Install the upper control arms. Refer to Chapter 5 for procedures and torque specifications.
6. Reconnect the torsion bar to both lower control arms. Torque to **17 ft.lbs. (24 Nm)**.
7. Install both upper shock absorber mounts and torque to **30 ft.lbs. (43 Nm)**.
8. Apply anti-seize to splines of rear drive shafts and insert drive shafts into carriers and transmission. Install rear carriers and hubs.
   Torque lower carrier bolts to **50 ft.lbs. (71 Nm)**. Torque all other control arm bolts and remaining carrier bolts to **35 ft.lbs. (50 Nm)**.



9. Install the rear hubs, rear brake disc and brake caliper. Refer to Chapters 5 and 9 for procedures and torque specifications.



10. Install PVT system. Refer to Chapter 6 PVT section for procedures and torque specifications.

11. Once the PVT system is installed. Tighten all remaining transmission mounting bolts to **40 ft.lbs. (57Nm)**. See page 8.2 for transmission bolt placement.
12. Install transmission vent line. Be sure vent line is not kinked or pinched.
13. Install seat, both side panels, both rear cab quarter panels and both footwells. See Chapter 5.
14. Reconnect the differential, speed sensor and gear selection switch connectors to the transmission.
15. Reconnect the shift rod. Torque to standard specification.
16. Install the rear wheel nuts and torque to specification.

Rear Wheel Nut Torque

Refer to Chapter 2

17. With the ATV on level ground, add Polaris AGL Gearcase Lubricant to the proper level. See Chapter 2 for proper fill procedures and Torque Specifications.

Polaris AGL Gearcase Lubricant

(PN 2873602) (12 oz.)
(PN 2873603) (Gallon)

Troubleshooting Checklist

Check the following items when shifting difficulty is encountered.

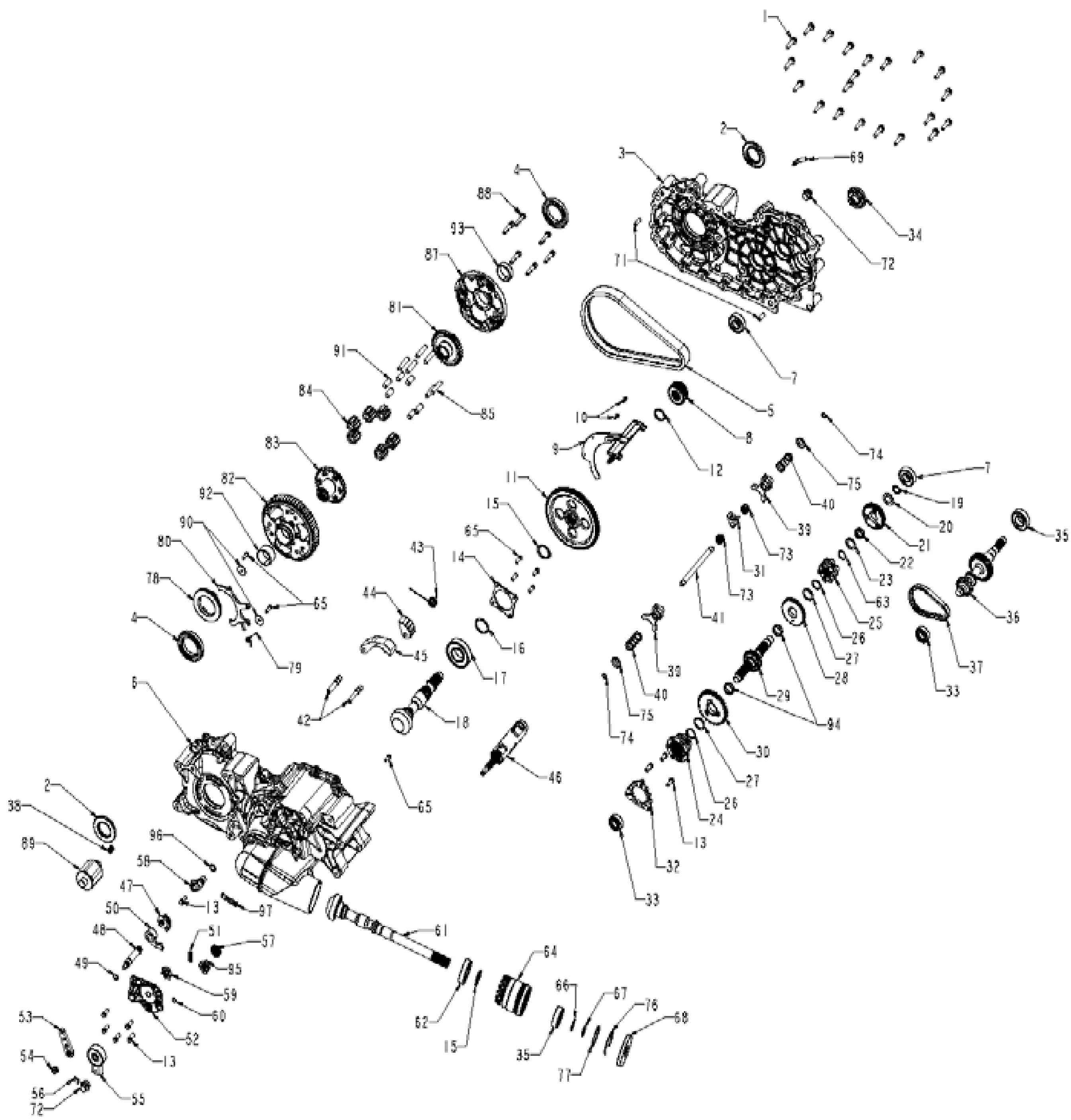
- Idle speed adjustment
- Transmission oil type/quality
- Drive belt deflection
- *Worn, broken or damaged internal transmission components

TRANSMISSION SERVICE

Exploded View

262 = THREAD LOCKING AGENT FOR ALL 'FT. LBS.' FASTENERS

242 = THREAD LOCKING AGENT FOR 'INCH LBS. ' FASTENERS

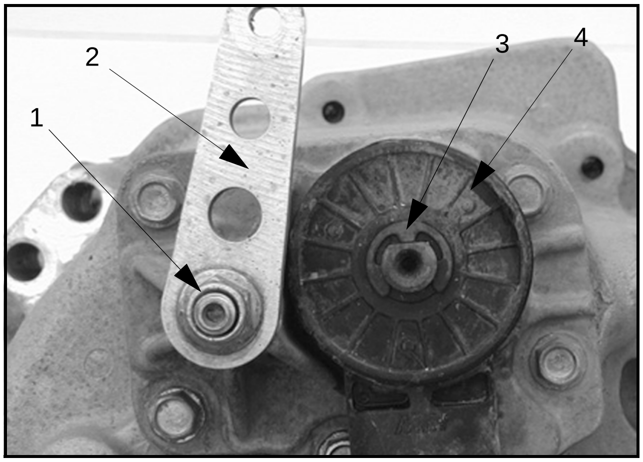


NO	QTY	DESCRIPTION
1	21	SCREW, TAPPING, HEX WASHER HD
	262	TORQUE 22-27 FT-LBS
2	2	SEAL, TRIPLE LIP 40 X 70 X 7
3	1	COVER, LH MACH
4	2	BEARING, BALL 6010 C3 50 X 80 X 10
5	1	CHAIN, SILENT, 17 WIDE X 1.0 X 86p
6	1	CASE, RH MACH
7	2	BEARING, BALL 6204 C3 20 X 47 X 14
8	1	SPROCKET 19T
9	1	DEFLECTOR, OIL
10	2	SCREW, TAPPING TORX, 8-32 X .50
	242	TORQUE 20-30 IN LBS
11	1	GEAR OUTPUT 91T
12	1	RTNG RING, RR 7200-118
13	9	SCREW, TAPPING HEX 1/4-20 UNC X .75
	262	TORQUE 8-12 FT-LBS
14	1	COVER, BEARING, CENTER DRIVE
15	2	RING, RETAINING
16	1	SHIM 1.700 X 1.385
17	1	BEARING, BALL 6207
18	1	PINION, 13T CENTER DRIVE
19	1	RING, RETAINING SHR-75
20	1	WASHER THRUST, 1.270 X .793 X .065
21		
22	1	BEARING, NEEDLE SPLIT CAGE 22 X 26 X 10
23	1	WASHER, 1.250 X .876 X .050
24	1	DOG, L/P
25	1	ENGAGEMENT DOG, 6-FACE
26	2	RING, RETAINING BASIC EXT .938
27	2	WASHER, THRUST 1.300 X .995 X .065
28	1	SPROCKET, 38T 6-FACE
29	1	SHAFT, REVERSE 26T
30	1	GEAR, 33T 6-FACE
31	1	COLLAR, SHIFT
32	1	PLATE, PARK 12-FACE
33	2	BEARING, BALL 6203 17 X 40 X 12
34	1	SEAL, DUAL LIP 25 X 47
35	2	BEARING, BALL 6205 C3 25 X 52 X 15
36		
37	1	SILENT CHAIN, .25P X .40 W X 50L
38	1	SPRING, COMPRESSION
39	2	FORK, SHIFT
40	2	COMPRESSION, SPRING .92 O.D X 2.000
41	1	RAIL, SHIFT SHAFT
42	2	PIN
43	1	TORSION SPRING
44	1	CAM, CHAIN TENSIONER
45	1	SHOE, CHAIN TENSIONER
46	1	DRUM, SHIFT
47	1	GEAR, SECTOR 31T
48	1	SHAFT, SHIFT
49	1	O-RING, -014
50	1	PAWL, DETENT
51	1	SPRING, COMPRESSION
52	1	COVER, SECTOR GEAR MACH
53	1	BELLCRANK, SHIFT DRUM
54	1	NUT, LOCK, HEX FLANGE NYLON 5/16-24
	262	TORQUE 12-18 FT LBS

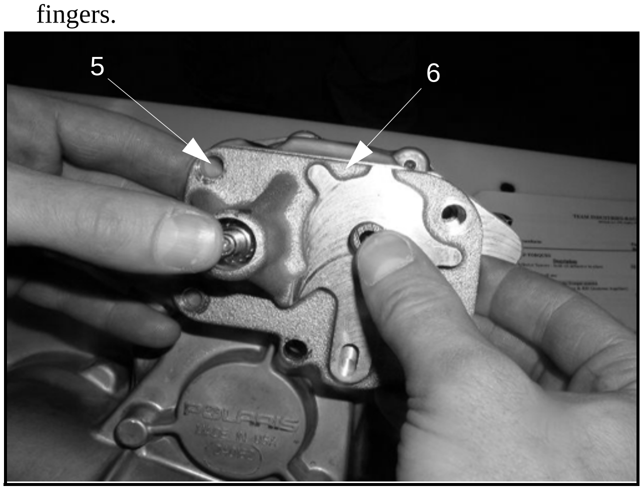
NO	QTY	DESCRIPTION
21	1	GEAR, SPUR 36T, DP16, PA14.5, HA27 RIGHT
36	1	SHAFT, INPUT 37T, DP16, PA14.5, HA27 LEFT
97	1	LABEL, TRANS, PDS 500 EFI
21	1	GEAR, SPUR 36T, DP16, PA14.5, HA28 RIGHT
36	1	SHAFT, INPUT 35T, DP16, PA14.5, HA28 LEFT
97	1	LABEL, TRANS, PDS 400 EFI
21	1	GEAR, SPUR 32T, DP16, PA14.5, HA21 RIGHT
36	1	SHAFT, INPUT 42T, DP16, PA14.5, HA21 LEFT
55	1	SWITCH, ROTARY 6-PIN ITW
56	1	RING, RETAINING, BASIC EXT.
57	1	GEAR, SECTOR 16T
58	1	SENSOR, SPEED
59	1	STAR, DETENT
60	1	O-RING, -012
61	1	GEAR, 13T SNORKEL
62	1	BEARING, BALL 6007 C3 35 X 62 X 14
63	1	RING, RETAINING BASIC EXT Ø22.0
64	1	TUBE, SNORKEL MACH
65	7	SCREW, TORX PAN HD 1/4-20 X .75
	262	TORQUE 8-12 FT-LBS
66	1	SHIM 1.180 X .995
67	1	RING, RETAINING
68	1	SEAL, TRIPLE LIP, 25 X 80 X 10
69	1	TUBE, VENT 90° 1/4" LINE
70	1	CAP, VENT PLUG, 5/16
71	2	PIN, DOWEL 5/16 X 1.0
72	2	PLUG, HEX FLANGE 3/4-16
		TORQUE 20-25 FT-LBS
73	2	COMPRESSION, SPRING
74	2	RETAINING, RING
75	2	WASHER, CUP
76	1	RING, RETAINING
77	1	SHIM, 2.040 X 1.63
78	1	DOG, ENGAGEMENT
79	1	TORSION SPRING
80	1	FORK, SHIFT
81	1	SIDE, GEAR 36T, SUBASSEMBLY
82	1	SPROCKET, CARRIER 59T
83	1	SIDE, GEAR 36T DISCONNECT, SUBASSEMBLY
84	6	SHAFT, PLANET
85	6	PIN, DOWEL 10 X 45
86		
87	1	COVER, CARRIER
88	6	SCREW, CAP HH 5/16-24 X 1.50
	262	TORQUE 23-27 FT-LBS
89	1	SOLENOID
		TORQUE 23-27 FT-LBS
90	2	WASHER, FENDER .256 X 1.00 X .047
91	6	BEARING , PLAIN
92	1	PLAIN, BEARING 40 X 44 X 25
93	1	BEARING, PLAIN, 40 X 44 X 15
94	2	BEARING, NEEDLE 25 X 29 X 10
95	1	DISC, LOCKOUT
96	1	O-RING, -113

Transmission Disassembly

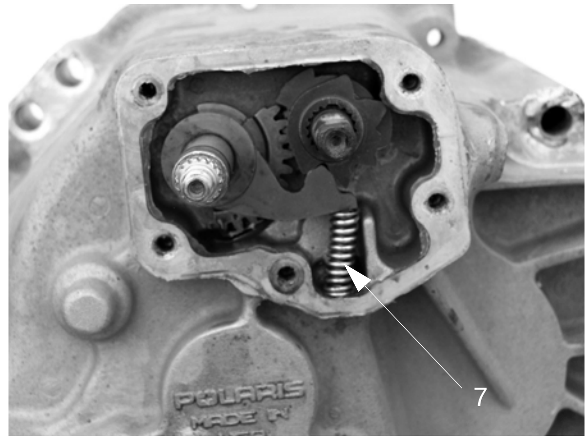
1. Place the transmission in the Neutral gear before disassembly.
2. Drain and properly dispose of transmission oil. See Chapter 2.
3. Remove the bellcrank nut (1) and remove the bellcrank (2).
4. Remove the c-clip (3) that holds the gear selector switch (4) onto the shaft and remove the selector switch.



5. Remove the sector cover bolts (5) and remove the sector cover (6). Removal can be aided by using your thumbs to press down on the shafts and pulling up the cover with your fingers.

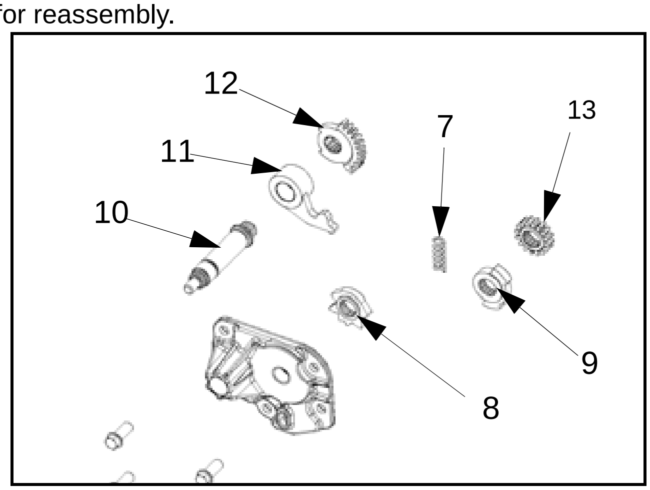


6. Remove the compression spring (7).

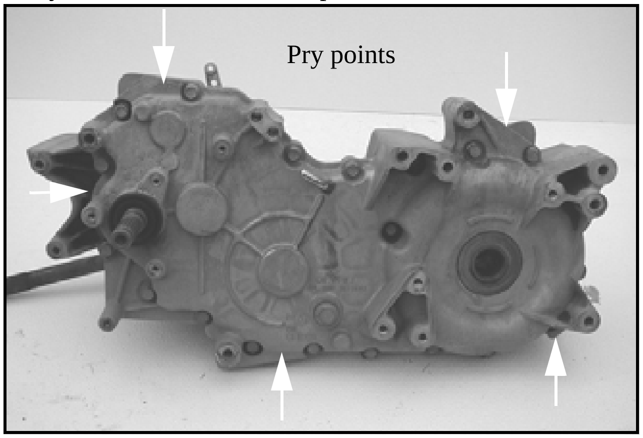


7. Remove the detent star (8). Note how the detent star fits onto the splined shaft and the raised edge facing outward for reassembly.
8. Remove the lockout disc (9). Note the raised edge facing outward for reassembly.
9. Remove the shift shaft (10) and the shift gears (11,12).

NOTE: Note the timing marks on the shift gears (12,13) for reassembly.

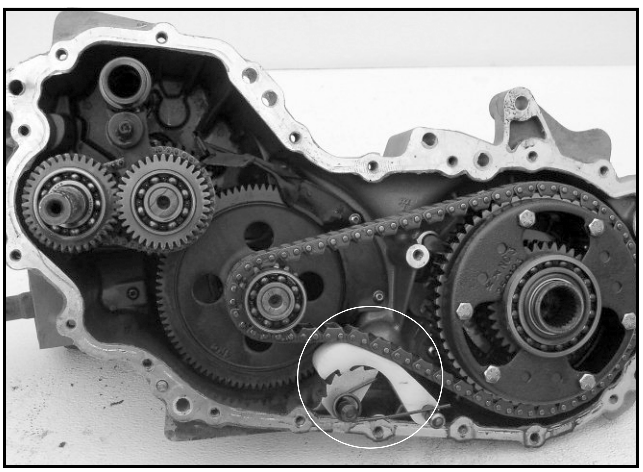


10. Remove all cover bolts. Using suitable pry tools, remove the cover using the designated pry points. Tap cover with soft face hammer to remove. The pry points are indicated by the white arrows in the photo below.



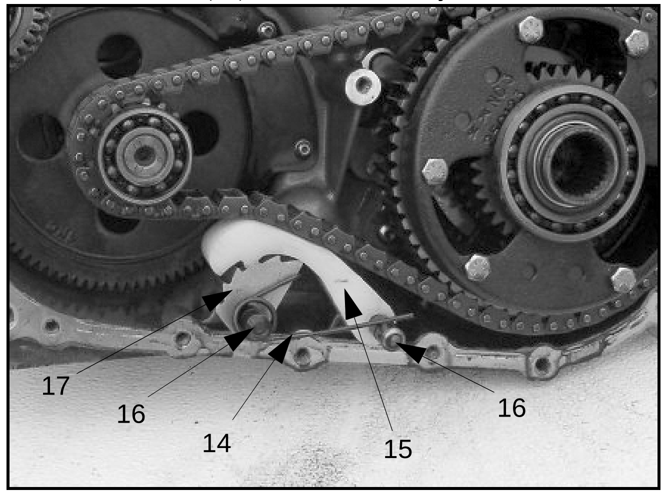
CAUTION

Do not pry on case half sealing surfaces. Use only the designated pry points on the transmission.

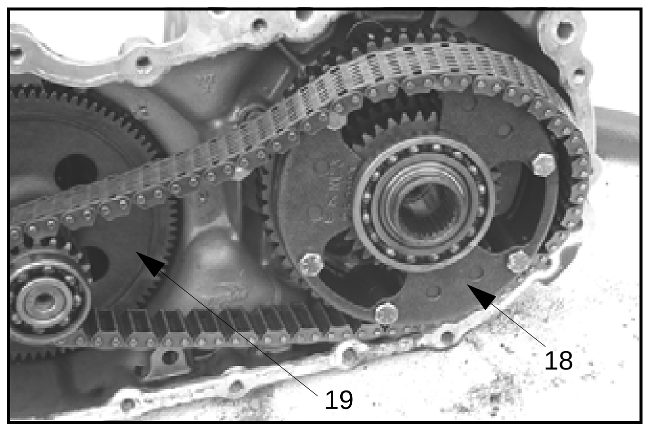


11. Note location of chain tensioner cam (17). If fully extended, chain is worn beyond service limit. Replace chain and chain tensioner shoe.

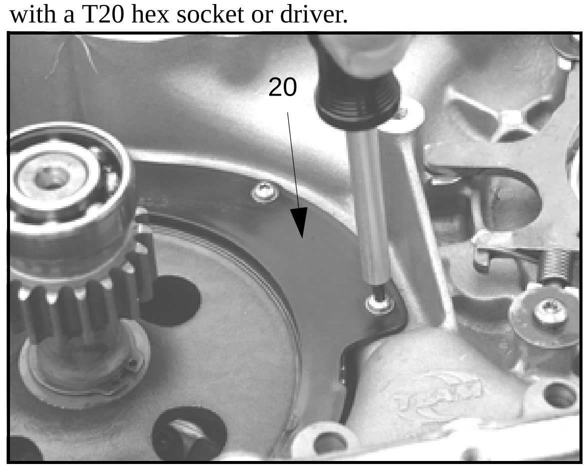
12. Remove the cam chain tensioner spring (14). Slide the cam chain tensioner shoe (15), pins (16), and cam chain tensioner cam (17) from the assembly.



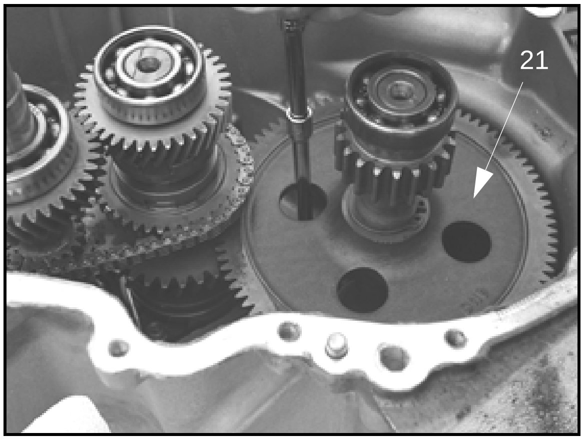
13. Remove the differential gear (18) and chain by gently prying underneath or tapping the differential gear from the opposite side until it tips toward the output gear (19). The differential gear is connected to the shift fork and must slide backwards to clear the fork arms once the chain is removed.



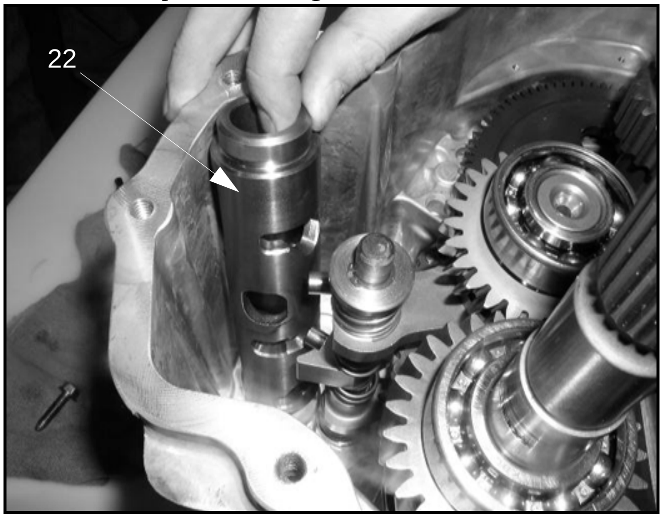
14. Remove the T20 screws that secure the oil deflector (20) with a T20 hex socket or driver.



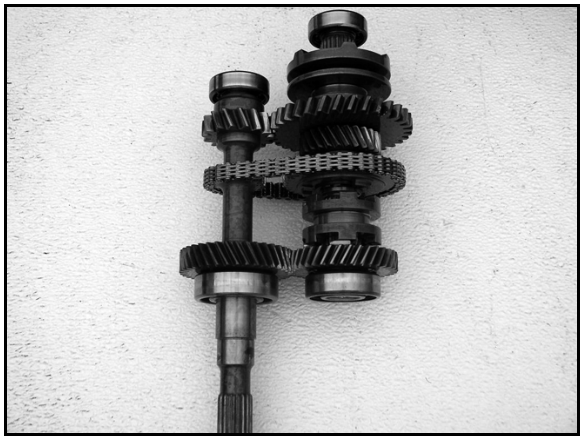
15. Remove the T27 screws that secure the output gear (21) with a T27 hex socket or driver.



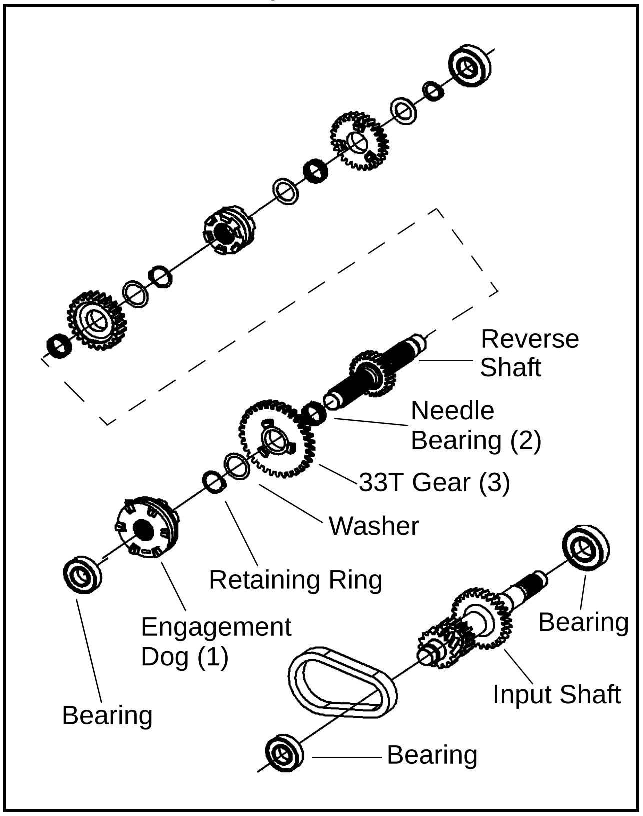
16. Remove the shift drum (22) from the gearcase by moving the drum up and to the right to clear the shift shaft.



17. Remove the output gear (21) and gear cluster assembly from the gearcase by pulling both assemblies straight up. Place the gear cluster assembly on a clean surface for inspection.

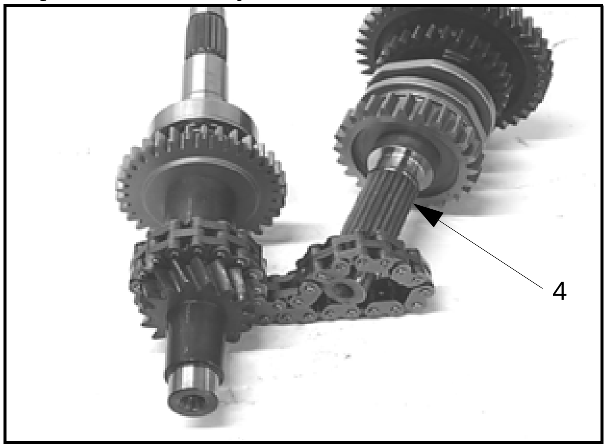


Gear Cluster Disassembly



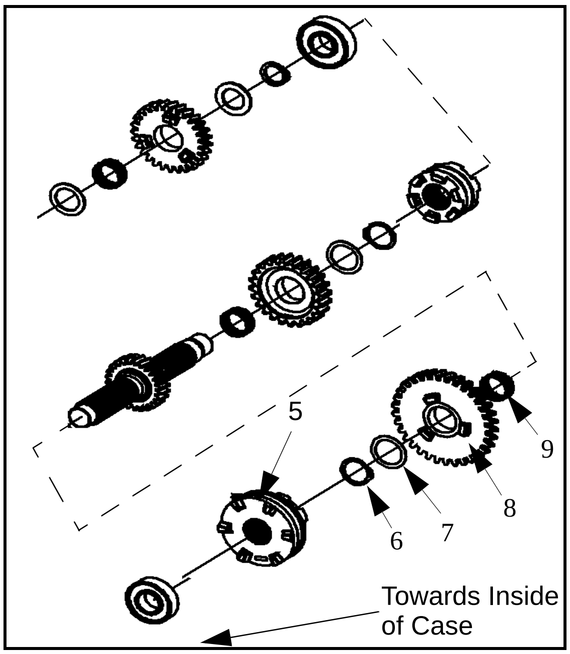
18. Remove the bearing from the reverse shaft using a bearing puller. Slide the engagement dog (1) off of the reverse shaft.
19. Remove the retaining ring and washer from the reverse shaft.
20. Remove the bearing from the input shaft using a bearing puller.
21. Remove the 33T gear (3) and needle bearing (2) from the reverse shaft.

22. The reverse shaft should slide out of the silent chain (4) to separate the assembly.



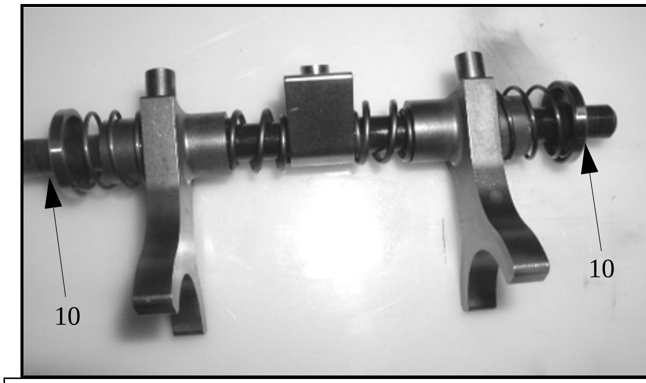
23. Remove the rest of the bearings from the shafts.
24. Remove the engagement dog (5) from the reverse shaft.

REVERSE SHAFT



25. Remove the retaining ring (6) and then washer (7), gear (8), and split bearing (9) from the reverse shaft.

26. To disassemble the shift fork rail remove the snap ring (10) from the end of the shift rail on either side.

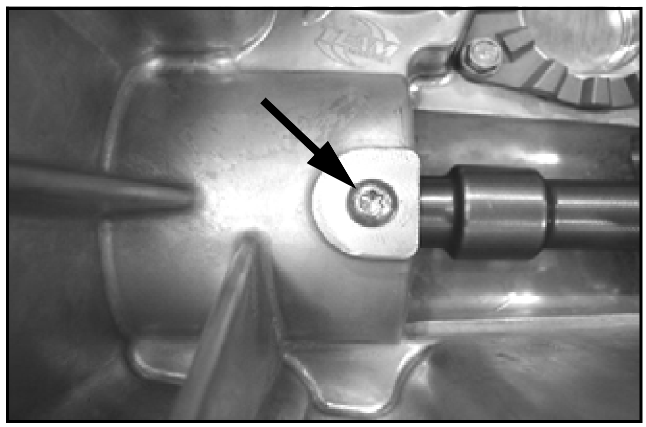


CAUTION

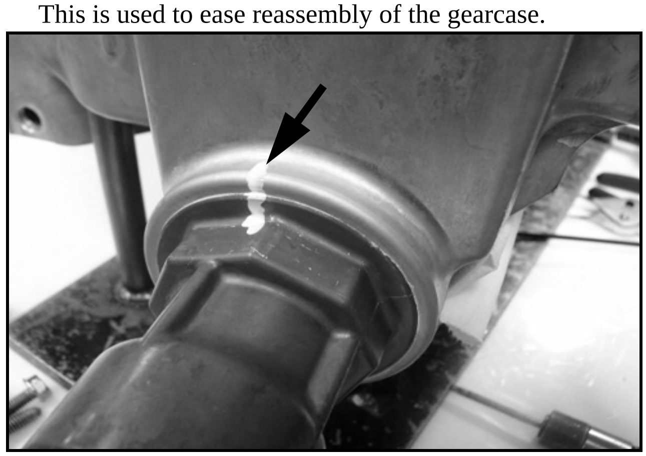
Use caution when disassembling the shift rail. The compressed springs on the shift rail may pop off causing eye or face injury.

Transmission Snorkel Shaft Removal

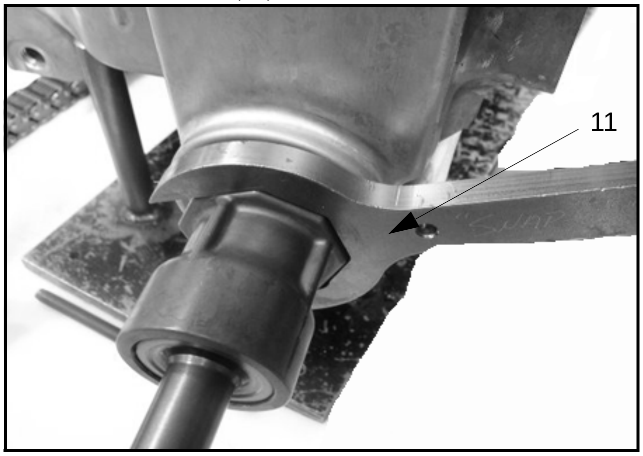
27. Remove the snorkel lock screw located inside the gearcase. Use a T27 hex socket or driver.



28. Mark the snorkel tube and case with a white pen or marker. This is used to ease reassembly of the gearcase.

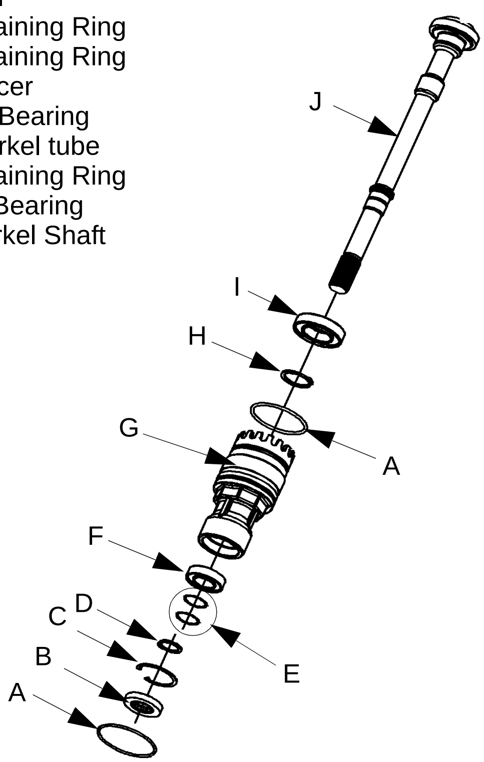


29. Use a 2 3/8” wrench to loosen and remove the front drive shaft snorkel tube (11).



Front Drive Snorkel Assembly

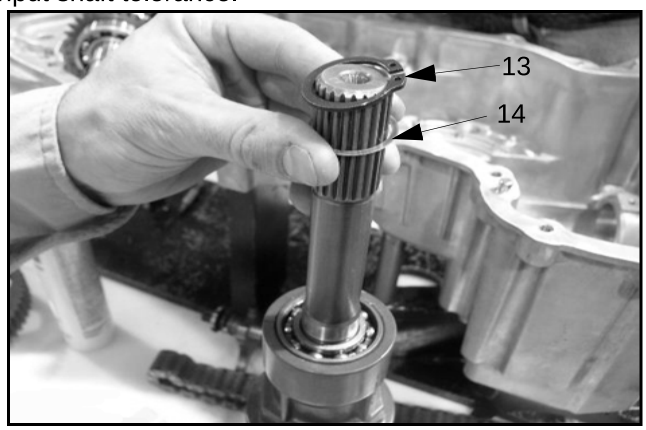
A. O-ring
B. Seal
C. Retaining Ring
D. Retaining Ring
E. Spacer
F. Ball Bearing
G. Snorkel tube
H. Retaining Ring
I. Ball Bearing
J. Snorkel Shaft



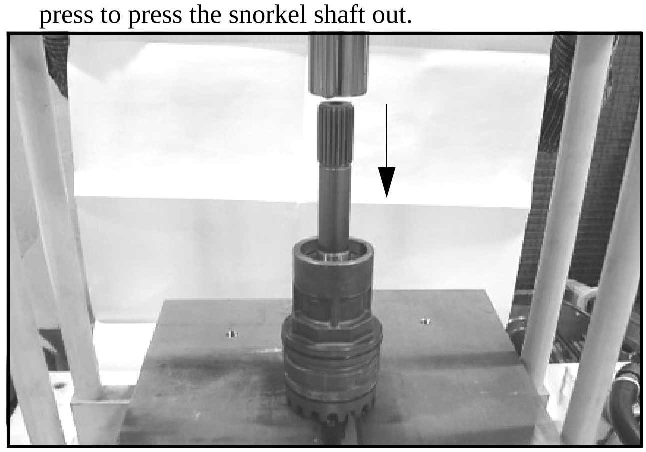
30. If needed, remove the seal from the front of the snorkel tube. Remove the snap ring (12).

31. Remove the second snap ring (13) and spacer (14) from the snorkel shaft.

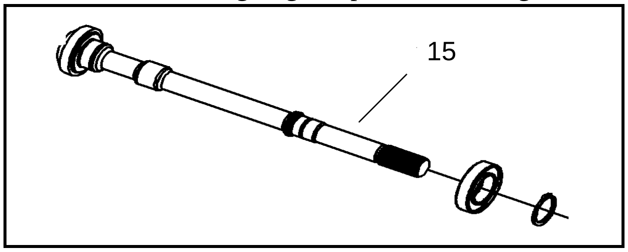
NOTE: Shim may or may not be present. Depending on input shaft tolerance.



32. To remove the snorkel shaft from the snorkel tube, use a press to press the snorkel shaft out.

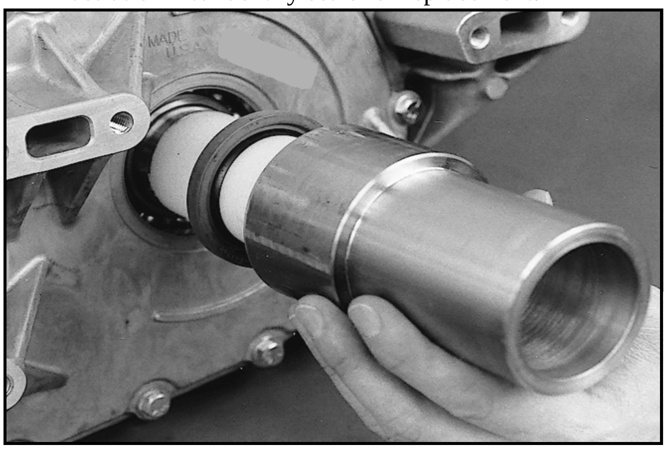


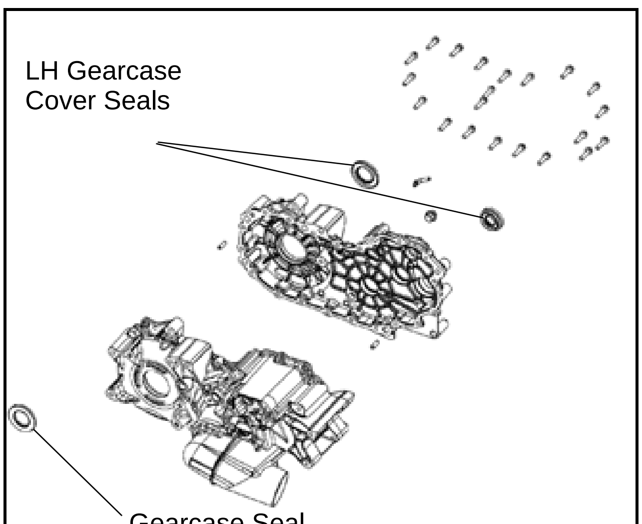
33. To remove the remaining bearing on the snorkel shaft (15), remove the retaining ring and press the bearing off.



Transmission Assembly

1. Install all new seals in the gearcases. Use the Rear Output Seal Driver (PN 2871698) and Rear Driveshaft Seal Guide (PN 2871699) to install the seals into the gearcases. See illustration 1 to identify seals for replacement.

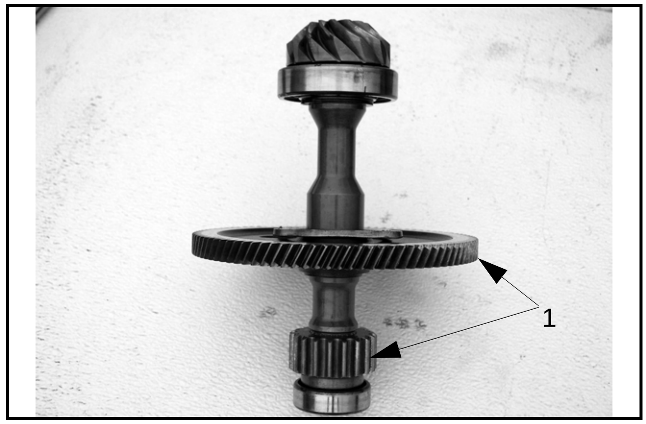




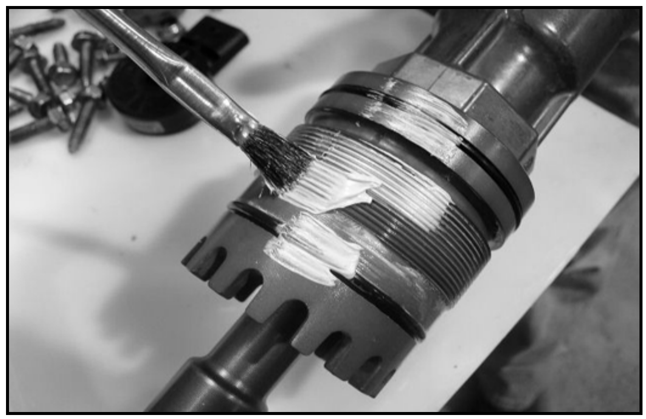
ILL 1

2. Reverse the disassembly procedure for the assembly of the snorkel shaft assembly.

3. Inspect the output gear assembly (1), replace bearings if needed. Inspect the 91T gear for nics, chips, or abnormal worn teeth.

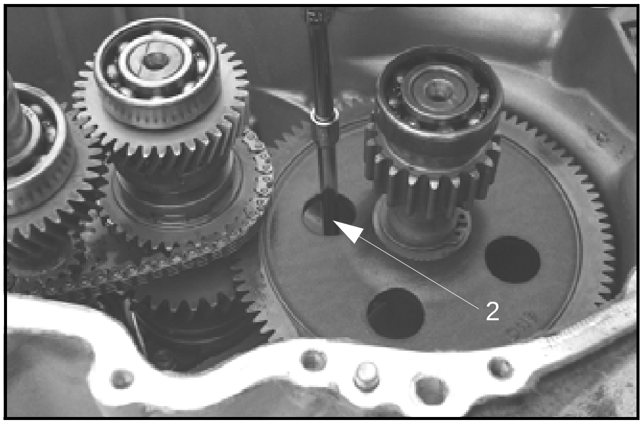


4. Install 2 new O-rings onto the snorkel tube. Apply a white lithium grease onto the O-rings and threads of the snorkel tube.



5. Install the snorkel shaft assembly into the gearcase. Install the snorkel shaft assembly in until the second O-ring is contacting the gearcase, but is still visible.

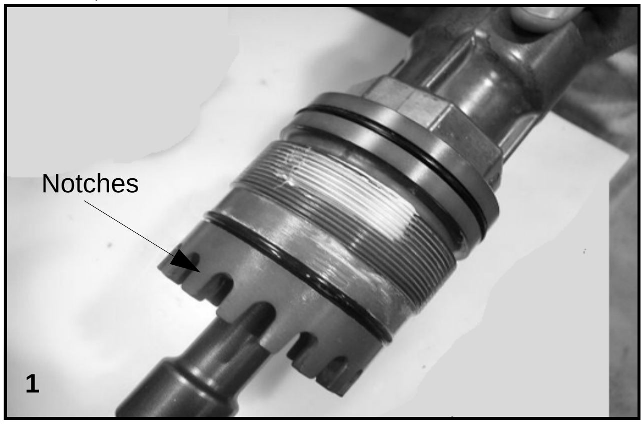
6. Install the output gear assembly. Be sure to properly mesh the snorkel shaft bevel gear with the output bevel gear. Install the 4 torx screws (2) to secure the output gear assembly into place. Torque screws to **8-12 ft.lbs. (11-17 Nm)**.
   NOTICE! : It is important to set zero lash between the output gear and the snorkel shaft gear. If there is binding or excess lash, tighten or loosen the snorkel shaft until there is zero lash.

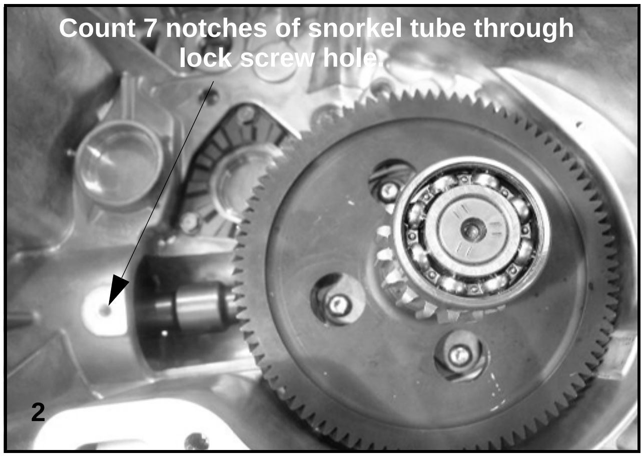


Transmission Front Output Shaft Backlash Procedure and Reassembly

1. The following steps must be performed to obtain proper front output gear backlash adjustment:

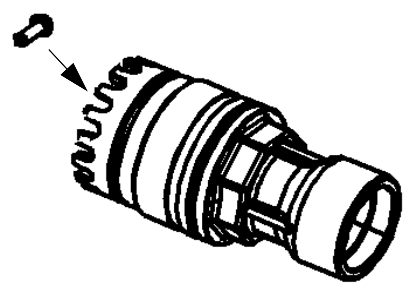
   - Upon completion of Step 6, make sure the snorkel gear and output bevel gear are lightly seated or meshing so there is 'zero' lash. **Do not overtighten. Gears should rotate freely without binding.**
   - Before turning the snorkel tube, look down into the gearcase at the snorkel lock screw hole opening (Photo 2) to reference your starting point. Next, slowly rotate the snorkel tube counterclockwise (Photo 3), counting the number of notches passing through the thread hole as you rotate the tube. **Rotate the snorkel tube to the 7th notch from 'seated' position** (Photo 1 & 2) using a 2 3/8" wrench.
   - Check the output shaft gear backlash again by feel. If the output shaft lash appears to be too tight, rotate the snorkel shaft counterclockwise to the next notch (or 8th) notch.

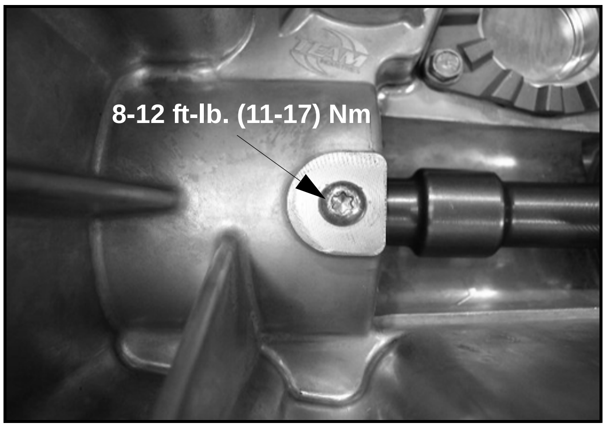




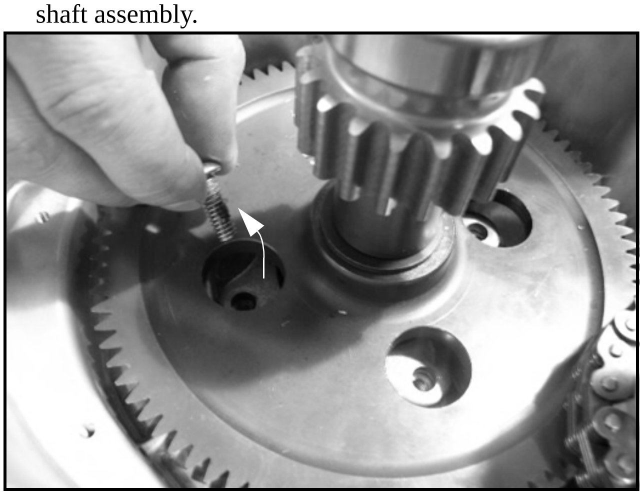
2. Once the gear backlash is found, to install the snorkel lock screw, you may have to rotate the snorkel tube clockwise or counterclockwise slightly. This will allow the lock screw to thread itself into one of the slots of the snorkel tube (See illustration below) to secure the snorkel tube.

Screw Fits in Slots of Snorkel Tube





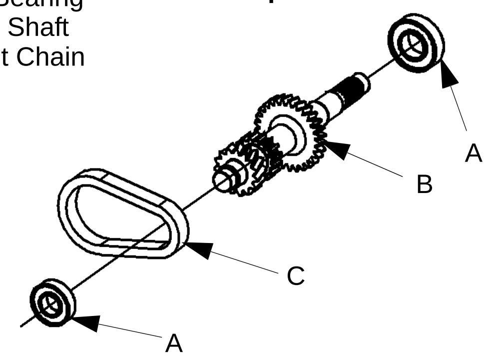
3. With the snorkel shaft assembly in place, remove the 4 Torx screws from the output shaft assembly. Remove the output shaft assembly.



4. Assemble the input shaft assembly if previously disassembled.

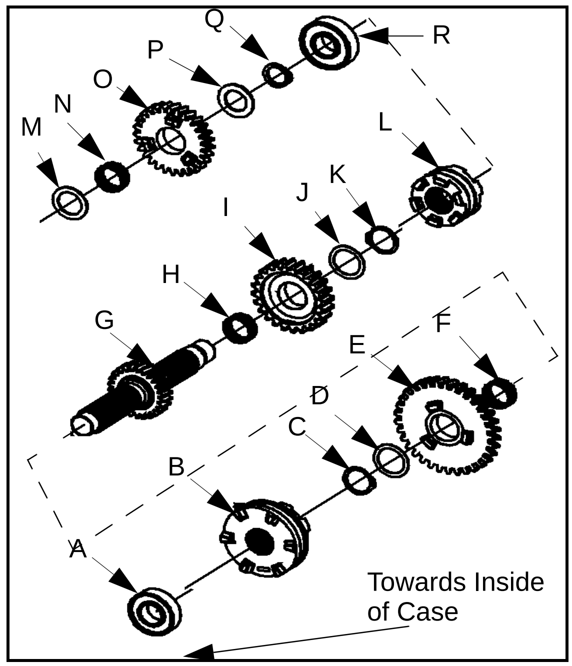
Input Shaft Assembly

A. Ball Bearing
B. Input Shaft
C. Silent Chain



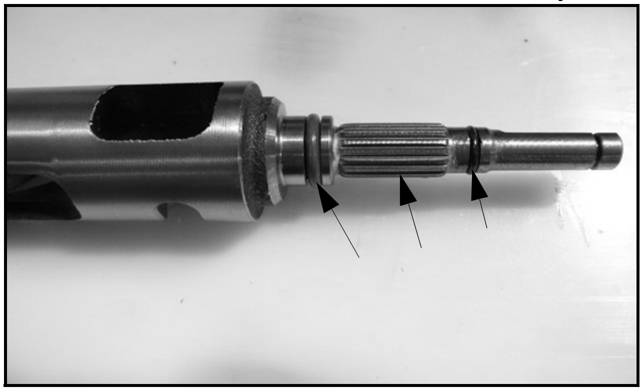
5. Assemble the reverse shaft assembly if previously disassembled.

REVERSE SHAFT



A. Ball Bearing
B. Engagement Dog
C. Retaining Ring
D. Washer
E. Gear
F. Needle Bearing
G. Reverse Shaft
H. Needle Bearing
I. Sprocket
J. Washer
K. retaining Ring
L. Engagement Dog
M. Washer
N. Needle Bearing
O. Gear
P. Washer
Q. Retaining Ring
R. Ball bearing

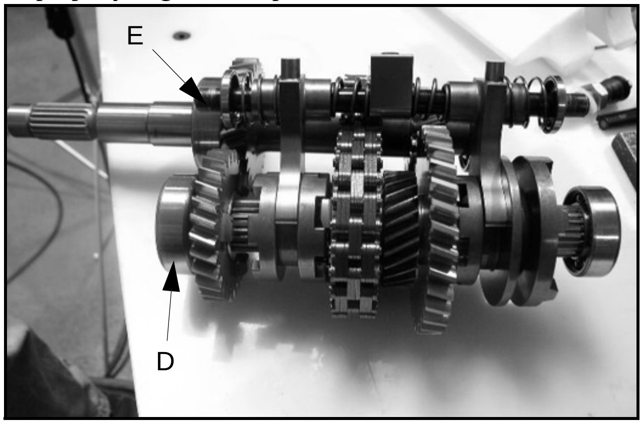
6. Inspect the shift drum for any damage or wear. Inspect the splines of the shift drum. Replace the O-rings on the end of the shift drum and lubricate them before assembly.



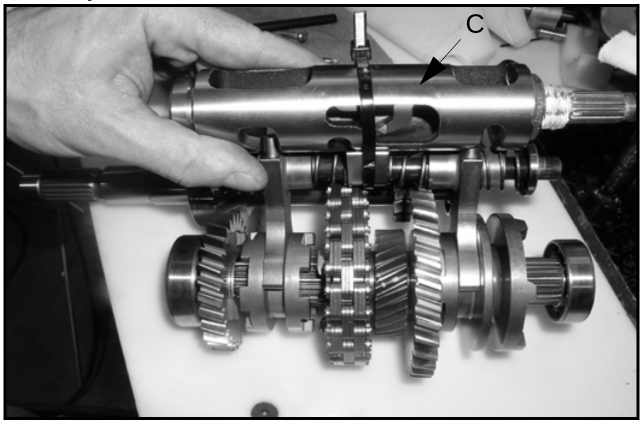
7. Stretch the silent chain on a flat surface and measure the length of 8 pitches in a minimum of three places on the chain. Replace the chain if the measurement is longer than **3.0904” (7.8496 cm)**.

Silent Chain Length:
3.0904” (7.8496 cm)

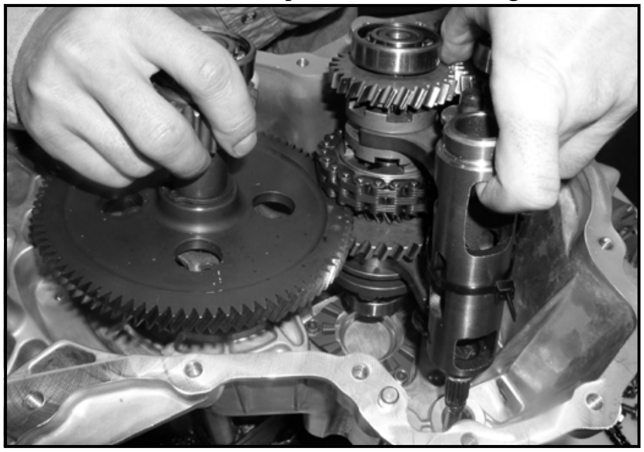
8. The shift drum (C), reverse shaft (D), input shaft (E), and output gear assembly must be installed at the same time to properly align all components.



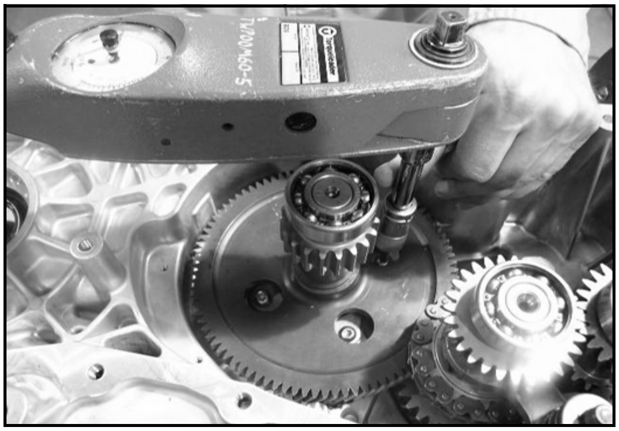
NOTE: To ease assembly use a plastic tie strap to hold the shift forks (D) and the shift drum (C) together during assembly.



9. With the gearcase on it’s side, hold the gear cluster assembly and output assembly together. Carefully install each shaft into their respective recess in the gearcase.



10. With all of the components in the correct positions install the 4 output gear assembly screws. Apply Loctite™ 262 (**PN 2871952**) to the threads of the screws. Torque the screws to **8-12 ft.lbs. (11-17 Nm)**. **NOTE:** If the transmission is in locked in Park, place the transmission in Neutral.



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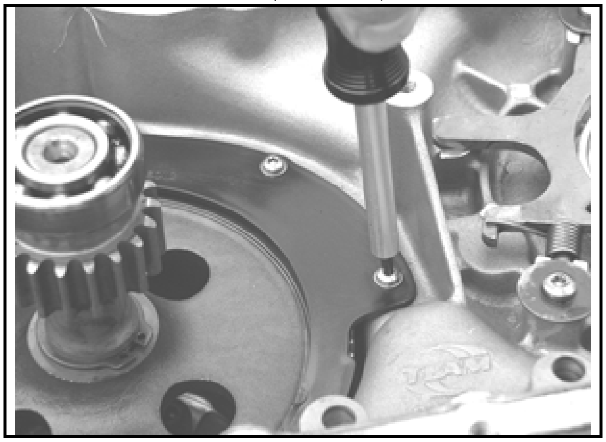
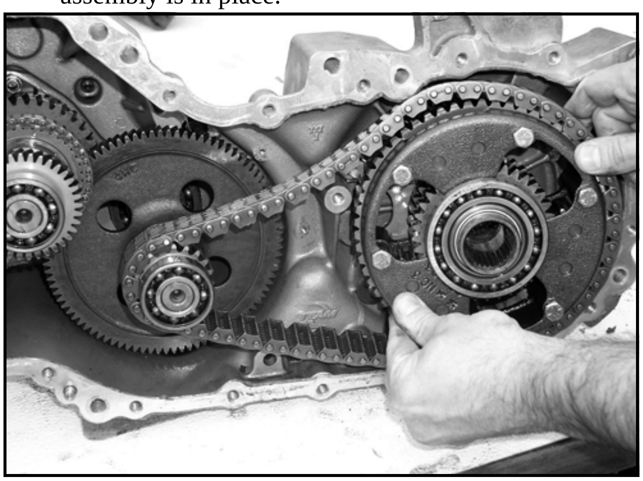
11. Install the oil deflector shield into the gearcase. Apply Loctite™ 242 to the threads of the screws. Torque the screws to **16-30 in.lbs. (2-3.6 Nm)**.



12. Install the rear drive differential and drive chain, following these precautions:

- The case half rear output seal should be removed prior to installation of the differential, as seal damage can occur with seal installed due to the angle of entry.
- Install the differential sliding geardog onto the shift fork arms at the same time the silent chain is installed.
- The differential gear bearing may be lightly tapped into place. The case half seal can be installed once the assembly is in place.

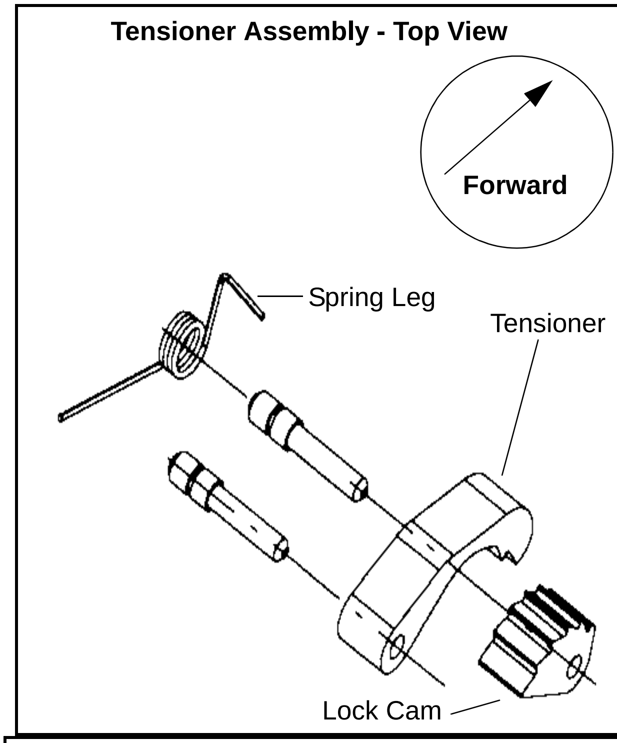


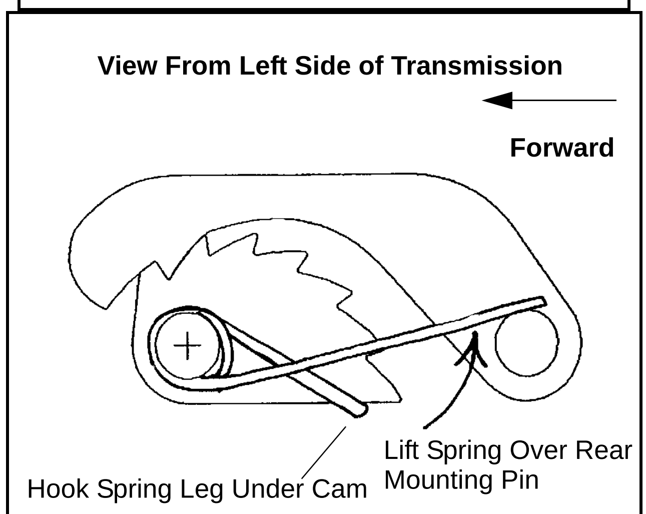
13. **Tensioner Installation:**

NOTE: Case-halve mating may be difficult due to tensioner installation. Release tension to aid installation.

- Place the tensioner cam on the front spacer and tensioner shoe on the rear spacer.
- Insert the pins through the cam and through the shoe.
- Place the spring over the front pin and hook the spring leg under the cam.

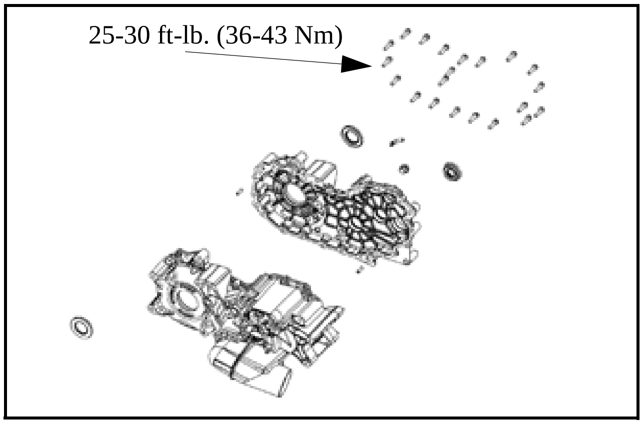
14. Lift the leg of the spring up and over the rear pin. The tensioner cam will lift the shoe and tension chain.



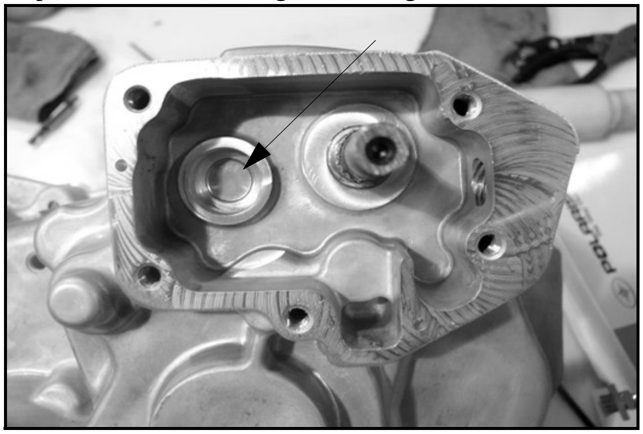


15. Apply a continuous bead of Crankcase Sealant (3-Bond) (**PN 2871557**) to the LH gearcase mating surface and install the cover. Install and tighten the 22 screws in a criss cross pattern to evenly secure the cover. Torque the screws to **25-30 ft.lbs. (36-43 Nm)**.

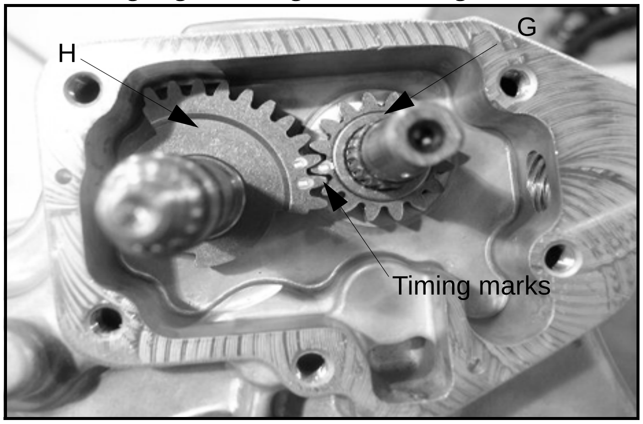
NOTE: Case-halve mating may be difficult due to tensioner installation. Release tension to aid installation.



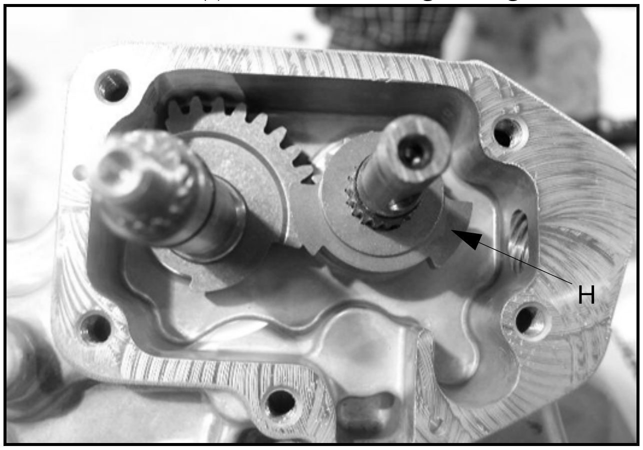
16. Place a small amount of grease (**PN 2871551**) into the pocket before installing the sector gear.



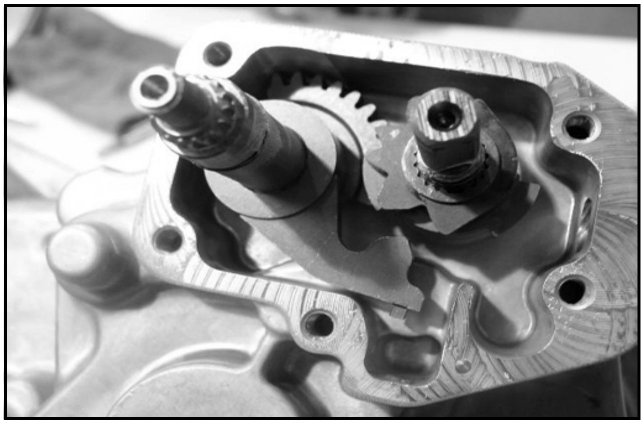
17. Install the shift gear (16T) (G) on the shift drum shaft. Install the sector gear (F) in the bushing pocket on the left side. Aligning the timing marks on the gears.



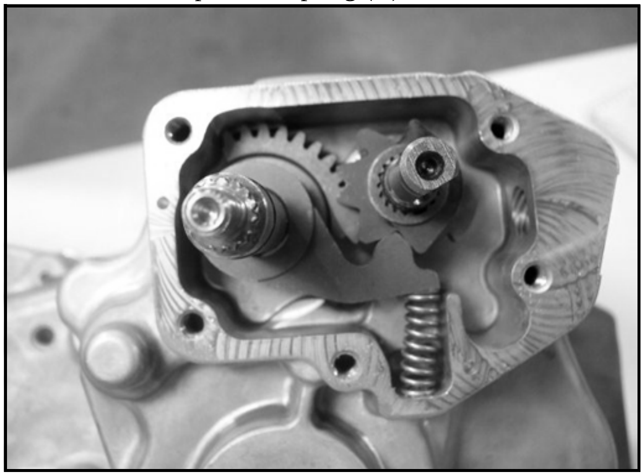
18. Install the O-ring (if not yet done) and lockout disc (H) onto the shift drum shaft. Be sure to install the lockout disc (H) and detent star (J) with the raised edge facing outward.



19. Install the detent pawl (I) onto the shift shaft. Install the detent star (J). Install a new O-ring onto the shift shaft. Apply a small amount of grease onto the O-rings and end of the shift drum.



20. Install the compression spring (K).



21. Apply Crankcase Sealant (3-Bond) (**PN 2871557**) onto the cover and case mating surfaces.

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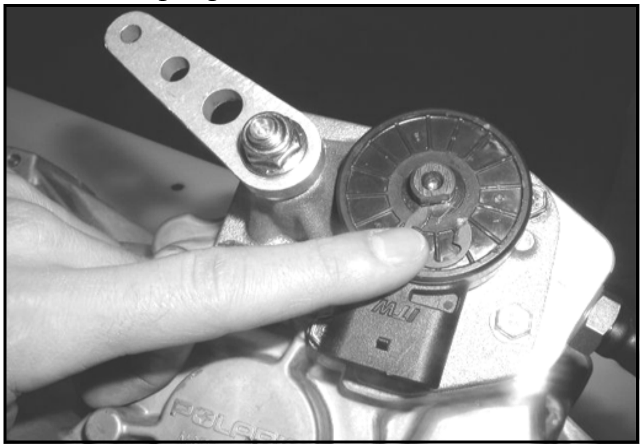
22. Install the bellcrank onto the shift shaft. Note the key splined on the bellcrank and shaft. Install the nut. Torque the nut to **12-18 ft.lbs. (16-26 Nm)**.
23. Install the transmission switch and secure the switch with the retaining ring.



CHAPTER 9
BRAKES

SPECIFICATIONS

Torque Table

TORQUE SPECIFICATIONS (Sportsman and X2)

ITEM	TORQUE FT.LBS. (IN.LBS.)	TORQUE NM
Front / Rear Caliper Mounting Bolts	18	24
Handlebar Master Cylinder Clamp Bolts	(25 in.lbs.)	3.0
Hand Master Cylinder Reservoir Cover Screws	(7 in.lbs.)	0.79
Brake Line Banjo Bolt	15.0	21
Brake Line Flared Fittings	12-15	16-21
Brake Disc Bolts	18.0	24
Brake Switch	12-15	16-21
Caliper Mounting Bolts	18.0	24
Sportsman Caliper Slide Pins	30-35	41-48
Rear Master Cylinder-to-Frame Bolts	8	11

NOTE: Refer to tightening procedures in this chapter. Some special procedures are used when torquing certain bolts and fasteners.

Component Service Limits

FRONT BRAKE CALIPER (Sportsman and X2)

ITEM	STANDARD	SERVICE LIMIT
Brake Pad Thickness	.298” / 7.6 mm	.180” / 4.6 mm
Brake Disc Thickness	.150-.165” / 3.81-4.19 mm	.140” / 3.556 mm
Brake Disc Thickness Variance	--	.002” / .051 mm
Brake Disc Runout	--	.010 / .254 mm

REAR BRAKE CALIPER (X2 ONLY)

ITEM	STANDARD	SERVICE LIMIT
Brake Pad Thickness	.298” / 7.6 mm	.180” / 4.6 mm
Brake Disc Thickness	.180-.195” / 4.57-4.95 mm	.170” / 4.318 mm
Brake Disc Thickness Variance	--	.002” / .051 mm
Brake Disc Runout	--	.010” / .254 mm

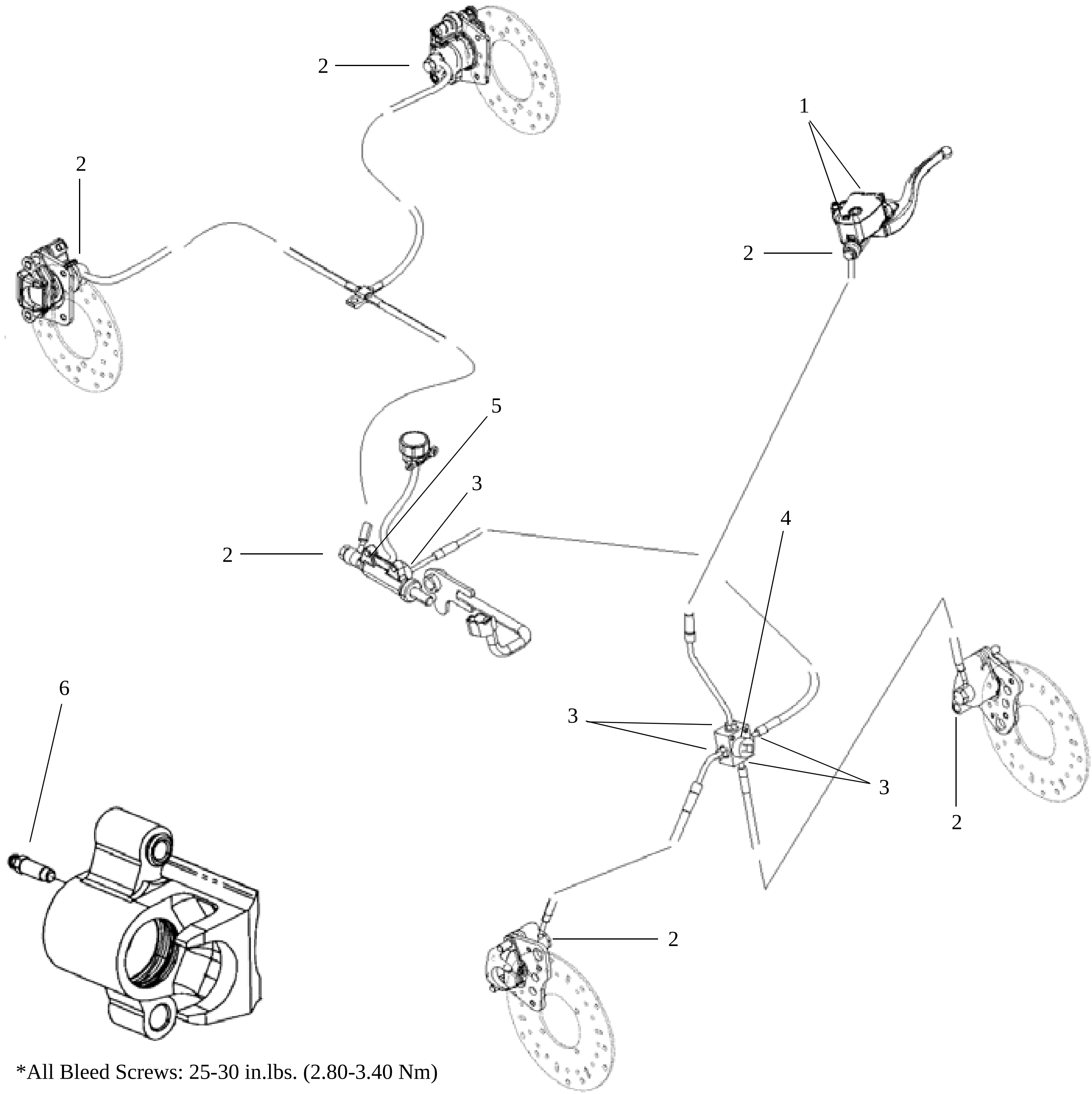
REAR BRAKE CALIPER (Sportsman ONLY)

ITEM	STANDARD	SERVICE LIMIT
Brake Pad Thickness	.318” / 7.6 mm	.180” / 4.6 mm
Brake Disc Thickness	.150-.165” / 3.81-4.19 mm	.140” / 3.56 mm
Brake Disc Thickness Variance	--	.002” / .051 mm
Brake Disc Runout	--	.010” / .254 mm

BRAKE SYSTEM EXPLODED VIEWS

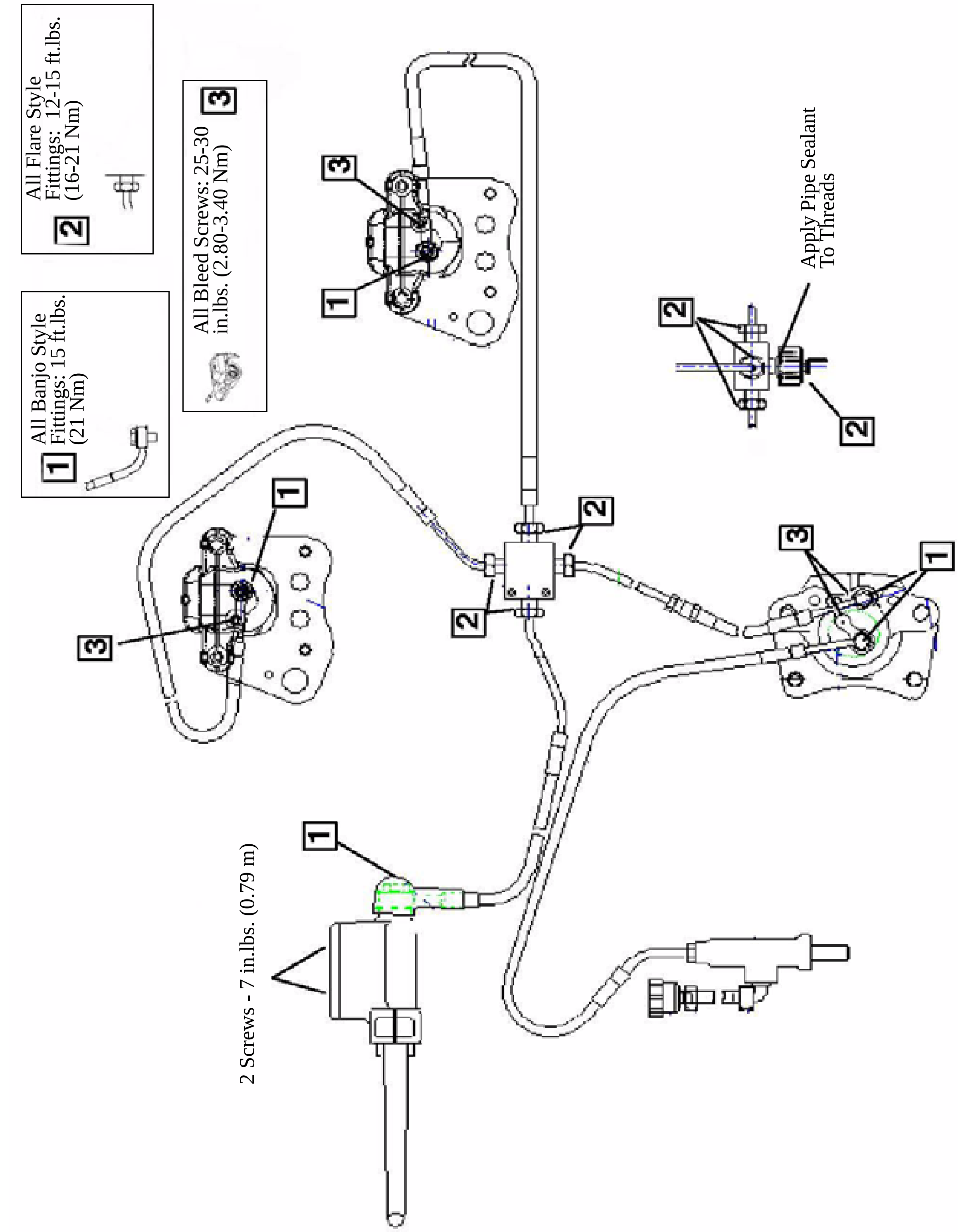
X2 System Component Exploded View

1) Master Cylinder Cover Screws: 7 in.lbs. (0.79 Nm)
2) Banjo Style Fitting: 15 ft.lbs. (21 Nm)
3) Flare Style Fittings: 12-15 ft.lbs. (16-21 Nm)
4) Brake Switch: 12-15 ft.lbs. (16-21 Nm) *Apply Pipe Sealant to Threads
5) Dual Input Master Cylinder and Bleed Screw: 25-30 in. lbs. (2.8-3.4 Nm)
6) Front and Rear Caliper Bleed Screws: 36-60 in. lbs. (4.07-6.78 Nm)



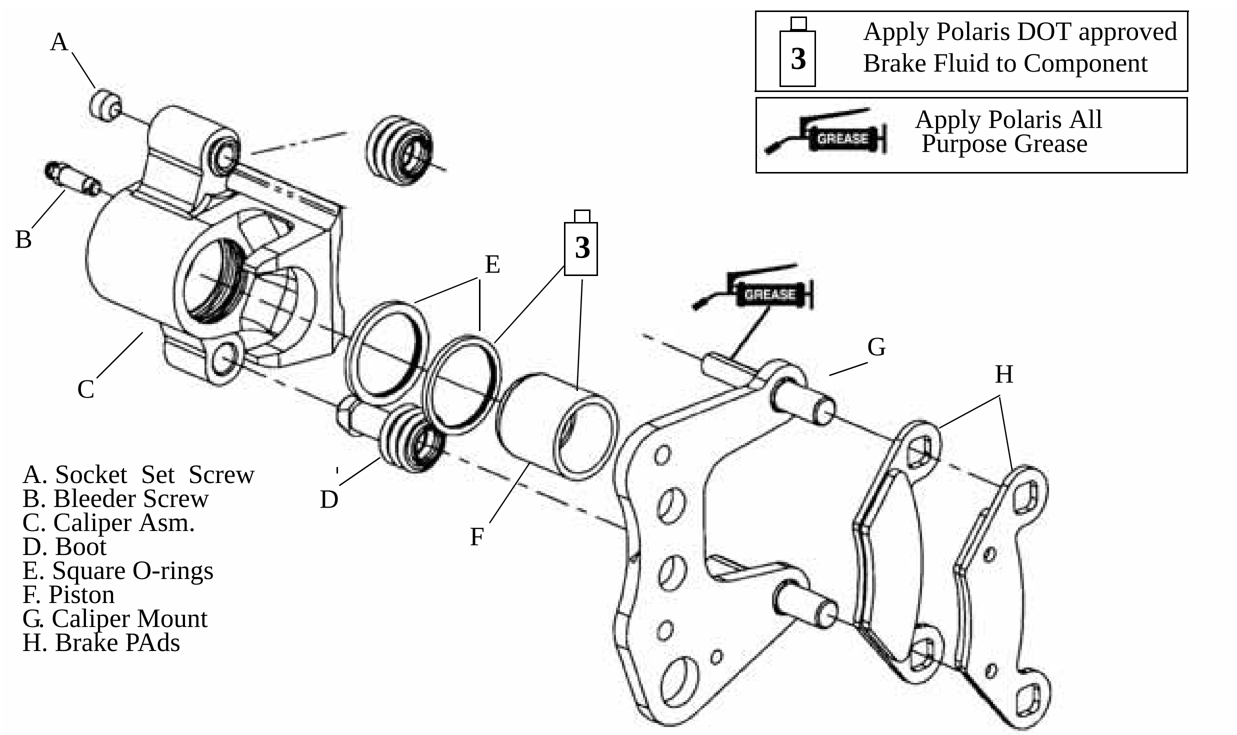
*All Bleed Screws: 25-30 in.lbs. (2.80-3.40 Nm)

Sportsman System Component Exploded View

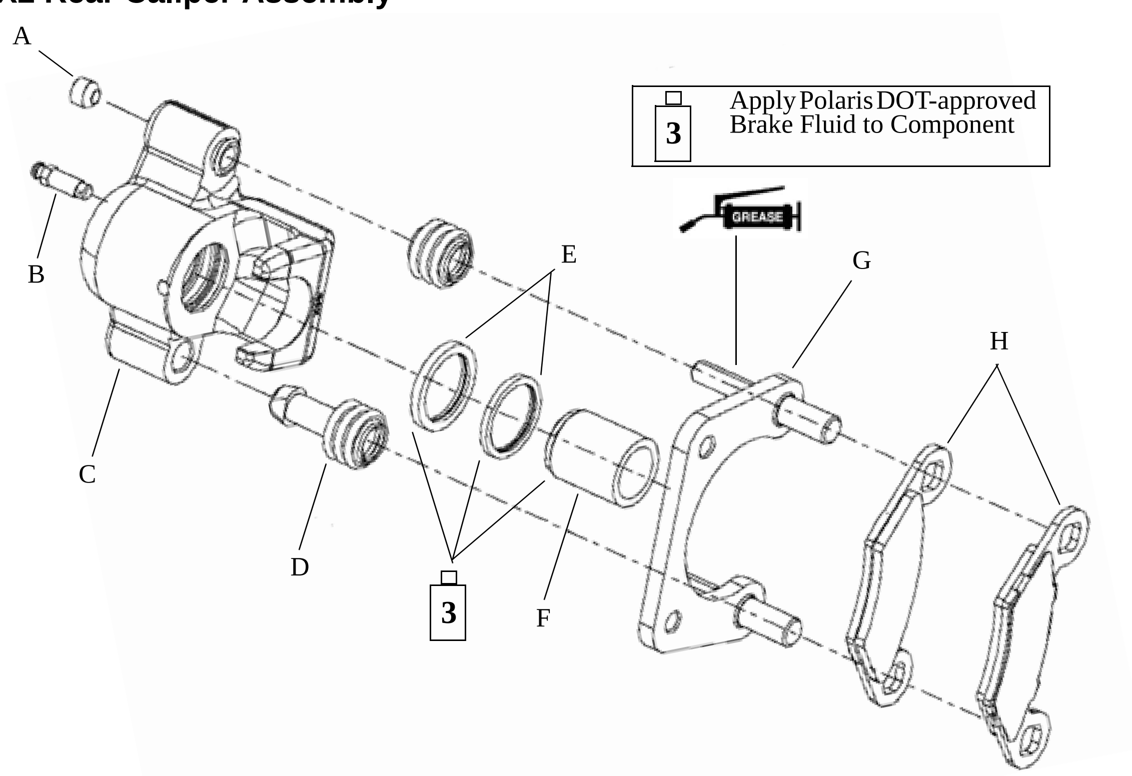


BRAKE CALIPER EXPLODED VIEWS

Sportsman and X2 Front Caliper Assembly



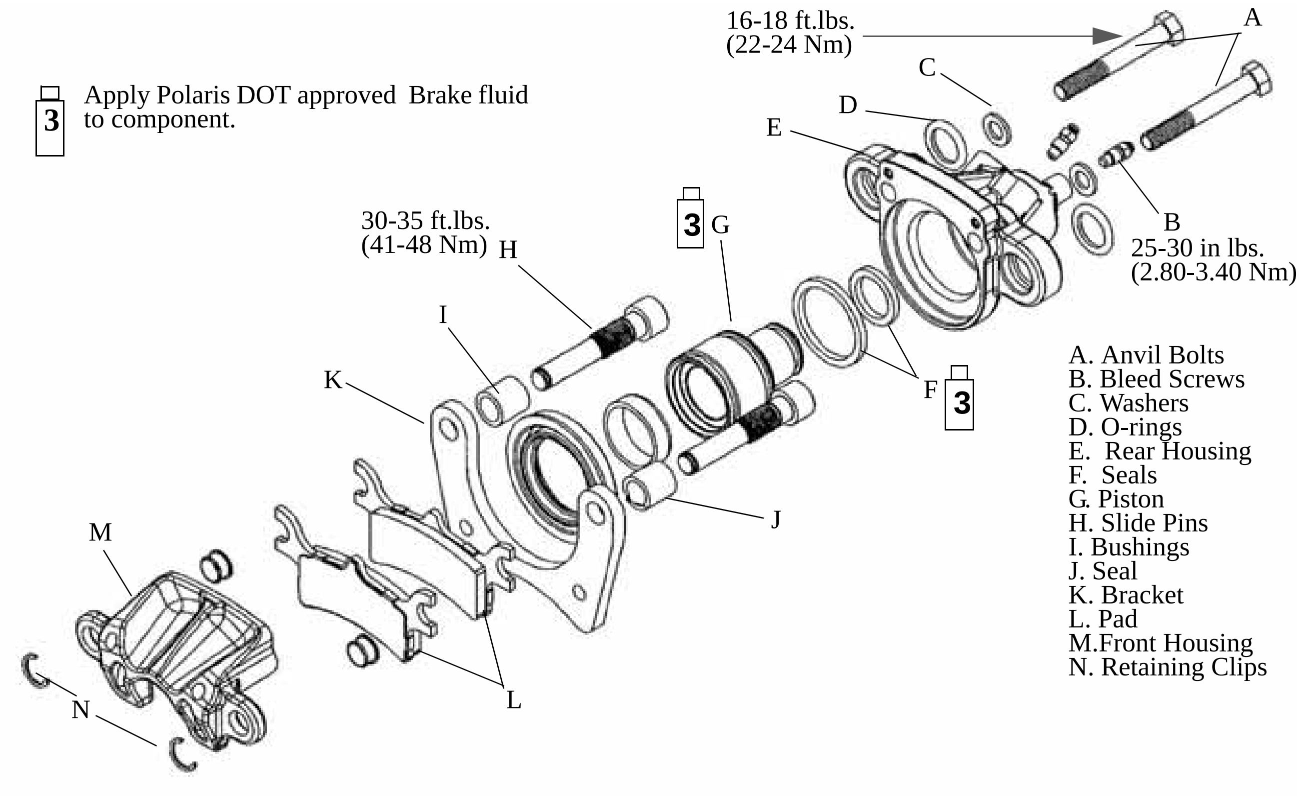
X2 Rear Caliper Assembly



A. Socket Set Screw
B. Bleeder Screw
C.Caliper Asm
D. Boot
E. Caliper Seals
F. Piston
G. Caliper Mount
H. Brake Pads

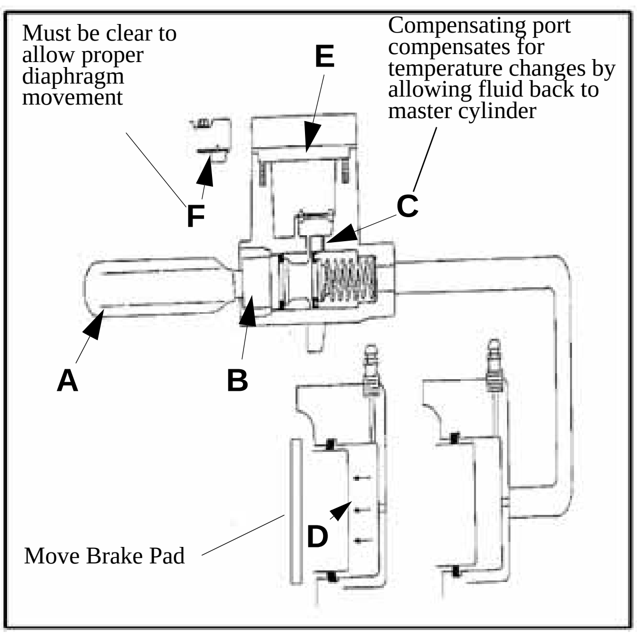
9

Sportsman Rear Caliper Assembly



HYDRAULIC BRAKE SYSTEM

Operation Overview



The Polaris disc brake system consists of the following components or assemblies: brake lever; master cylinder; hydraulic hose; brake calipers (slave cylinder); brake pads; and brake discs, which are secured to the drive line.

When the hand activated brake lever (A) is applied it contacts piston (B) within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port C) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the piston (D) located in the brake caliper moves outward and applies pressure to the brake pad. This pad contacts the brake disc and moves the caliper in its floating bracket, pulling the stationary side pad into the brake disc. The resulting friction reduces brake disc and vehicle speed. As the lever pressure is increased, the braking affect is also increased.

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 (C) which is opened and closed by the master cylinder piston assembly. The port is open when the lever is released and the master cylinder piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion (heated fluid) or contraction (cooled fluid). During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir has adequate space to allow for fluid expansion. **Never overfill the reservoir!** Fill to 1/4, - 5/16, (.64 - .80 cm) from top of the cylinder.

This system also incorporates a diaphragm (E) as part of the cover gasket; and a vent port (F) located between the gasket and the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Make sure the vent is open and allowed to function. If the reservoir is over filled or the diaphragm vent is plugged the expanding fluid may build pressure in the brake system leading to brake fail

When servicing Polaris ATV brake systems, use only Polaris DOT-approved brake fluid.

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 brake fade and the possible loss of control.

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, a product such as 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.

BRAKE NOISE TROUBLESHOOTING

POSSIBLE CAUSE	REMEDY
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with CRC Brake Kleen™ or 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 (noise or premature pad wear)	Adjust pad stop
Insufficient lever or pedal clearance	Set to proper level
Master cylinder reservoir overfilled	Check brake fluid level, adjust as needed
Master cylinder compensating port restricted, Master cylinder piston not returning completely, Caliper piston(s) not returning	Clean piston(s) seal

BRAKE NOISE TROUBLESHOOTING

POSSIBLE CAUSE	REMEDY
Operator error (riding the brake / park brake applied)	Educate operator
Loose wheel hub or bearings	Tighten wheel, hub nuts or replace bearings if worn
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary
Noise is from other source (chain, axle, hub, disc or wheel)	If noise does not change when brake is applied check other sources. Inspect and repair as necessary
Wrong pad for conditions	Change to a softer or harder pad (if available)

Brake Bleeding / Fluid Change

NOTE: When bleeding the brakes or replacing the fluid, always start with the caliper farthest from the master cylinder.

CAUTION

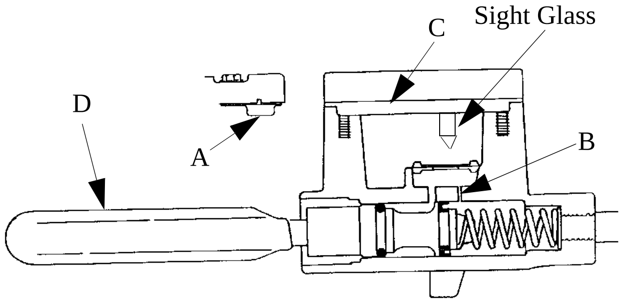
Always wear safety glasses during these procedures. Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

NOTE: Do not remove brake lever when reservoir fluid level is low.

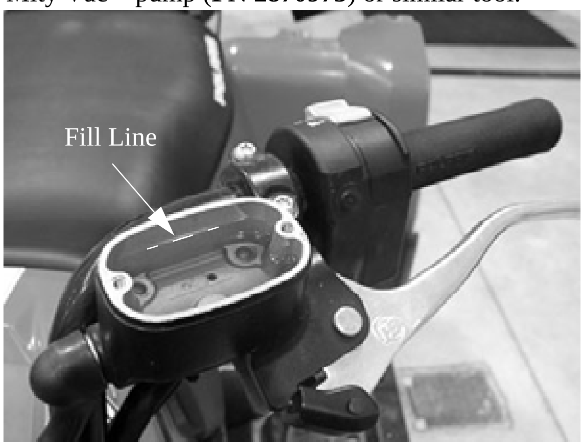
This procedure should be used to change fluid or bleed brakes during regular maintenance.

1. Clean reservoir cover thoroughly.
2. Remove screws, cover and diaphragm (C) from reservoir.

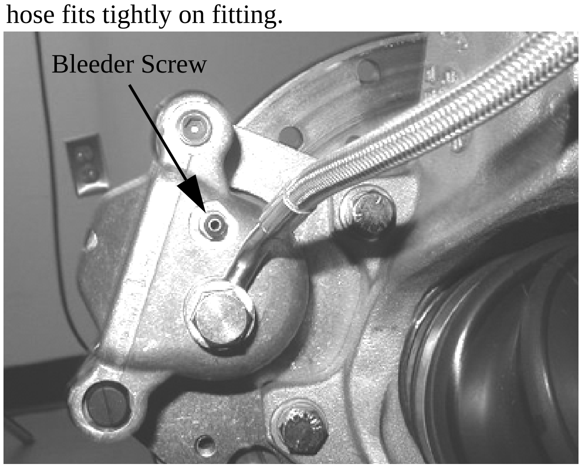
3. Inspect vent slots (A) in cover and remove any debris or blockage.



4. If changing fluid, remove old fluid from reservoir with a Mity Vac™ pump (**PN 2870975**) or similar tool.



5. Begin bleeding procedure with the caliper that is farthest from the master cylinder. 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.



NOTE: Fluid may be forced from supply port (B) when brake lever is pumped. Place diaphragm (C) in reservoir to prevent spills. Do not install cover. See Illustration above.

6. Slowly pump the brake lever until pressure builds and holds.

7. While maintaining lever pressure, open bleeder screw. Close bleeder screw and release brake lever.

NOTE: Do not release lever before bleeder screw is tight or air may be drawn into caliper.

8. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

⚠ CAUTION
Maintain at least 1/2", (1.27 cm) of brake fluid in the reservoir to prevent air from entering the master cylinder.

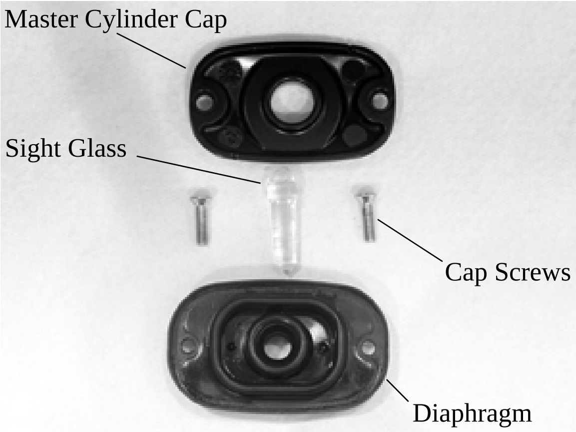
9. Tighten bleeder screw securely and remove bleeder hose. Torque the bleeder screw to specification.

= T
Bleeder Screw Torque: **25-30 in.lbs. (2.80-3.40 Nm)**

10. Repeat procedure Steps 5-9 for the remaining caliper(s).

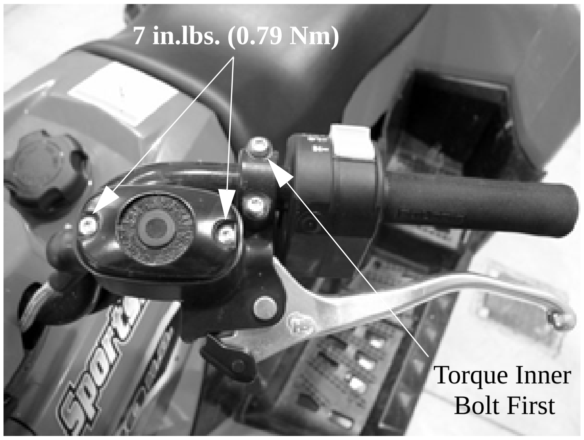
11. Add Polaris DOT-approved Brake Fluid to MAX level inside reservoir.

12. Install diaphragm, sight glass, cap and screws.



13. Wiggle and press down on the cap to be sure it fits evenly and snug.

14. Torque the screw to specification .



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Master Cylinder Cover Screw Torque: **7 in.lbs. (0.79 Nm)**

15. Field test machine at low speed before putting into service. Check for proper braking action and lever reserve. With lever firmly applied, lever reserve should be no less than 1/2", (1.3 cm) from handlebar.
16. Check brake system for fluid leaks and inspect all hoses and lines for wear or abrasion. Replace hose if wear or abrasion is found.

FRONT MASTER CYLINDER

Removal

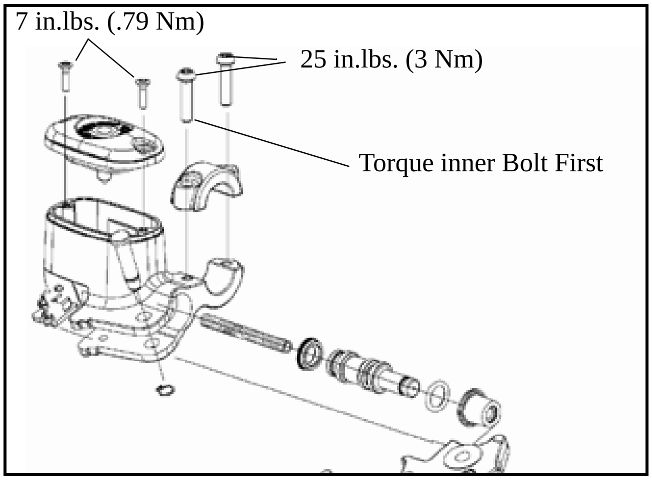
1. Clean master cylinder and reservoir assembly. Make sure you have a clean work area to disassemble brake components.
2. Remove master cylinder from handlebars.

CAUTION
Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

3. While holding upright, continue to remove master cylinder. Cover the brake line to avoid spillage when removing the brake line banjo bolt.

Installation

1. Install master cylinder on handlebars. Torque mounting bolts to specification. Torque the inner bolt first as indicated in the illustration below.



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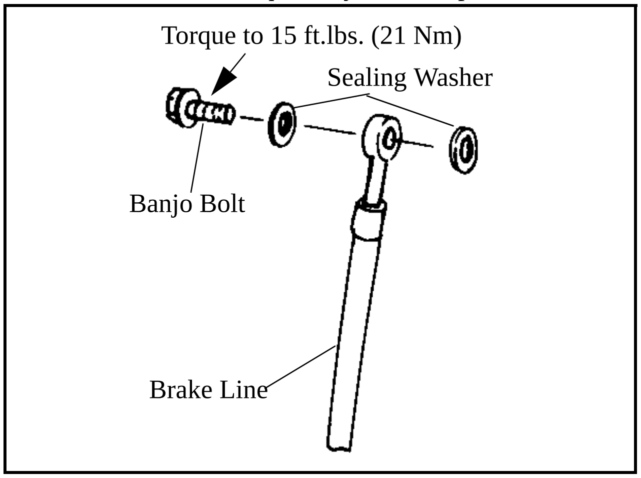
Master Cylinder Mount Bolt Torque: **25 in. lbs. (3 Nm)** Torque Inner Bolt First

2. Place new sealing washers on each side of banjo fitting on the brake line and torque banjo bolt to specification.



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Banjo Bolt Torque: **15 ft.lbs. (21 Nm)**

3. Fill reservoir with DOT-approved brake fluid.

NOTE: To speed up the brake bleeding procedure, the master cylinder can be purged of air before brake line is attached. Fill with DOT-approved brake fluid and pump lever slowly two to three times with finger over the outlet end to purge master cylinder of air.

4. Follow proper bleeding procedures. Check all connections for leaks and repair if necessary.

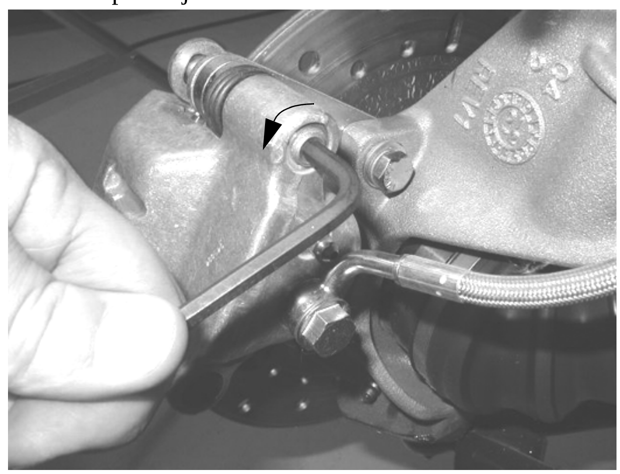
FRONT BRAKES

Pad Removal

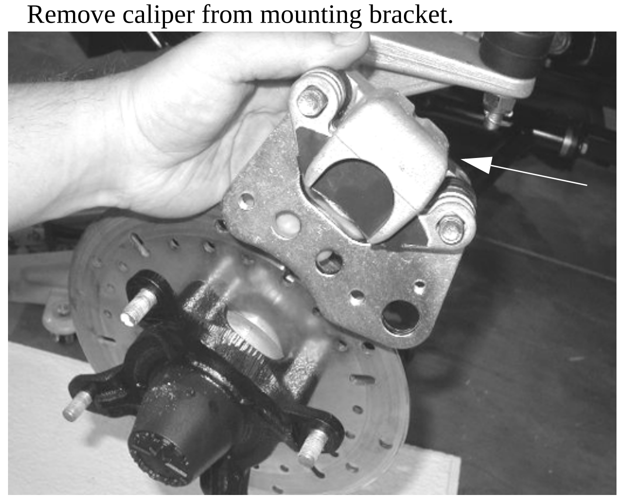
1. Elevate and support the of the ATV.

CAUTION
Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur.

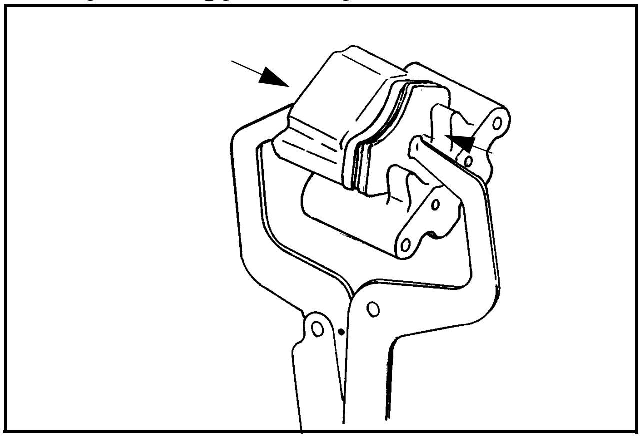
2. Remove the wheel.
3. Loosen pad adjuster screw 2-3 turns.



4. Remove caliper from mounting bracket.

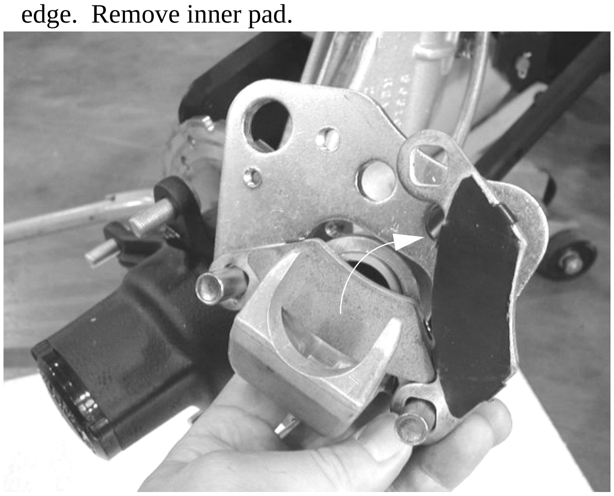


5. Push caliper piston into caliper bore slowly using a C-clamp or locking pliers with pads installed.

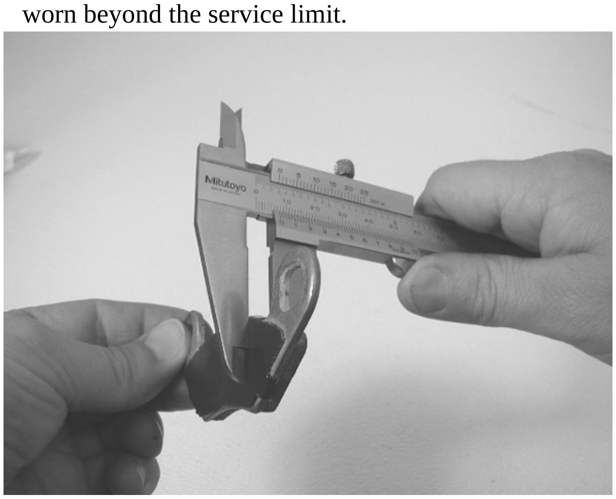


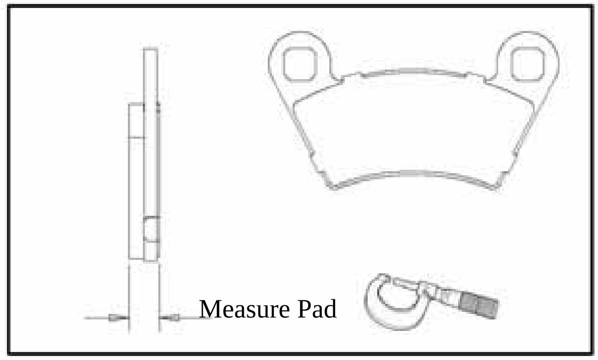
NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

6. Push mounting bracket inward and slip outer brake pad past edge. Remove inner pad.



7. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.



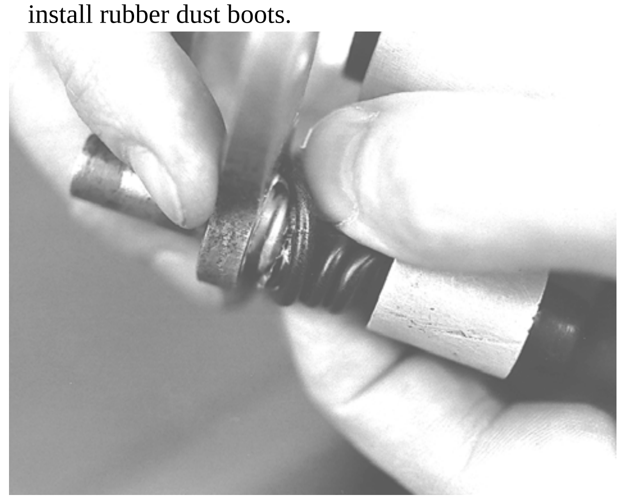


 = **In. / mm.**

Front Brake Pad Thickness Service Limit:
.180” / 4.6 mm

Assembly

1. Lubricate mounting bracket pins with a light film of Polaris Premium All Season Grease (**PN 2871423**), and install rubber dust boots.



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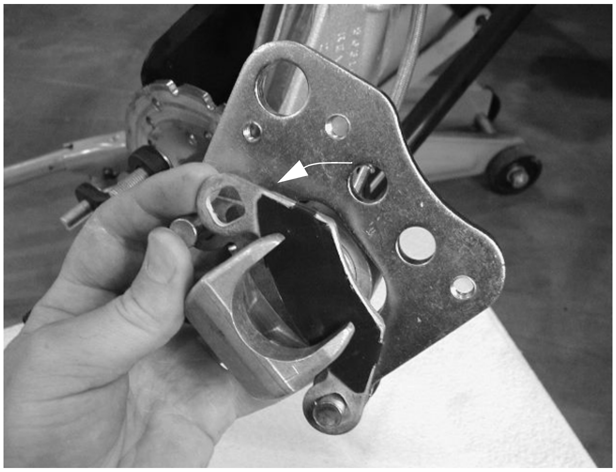
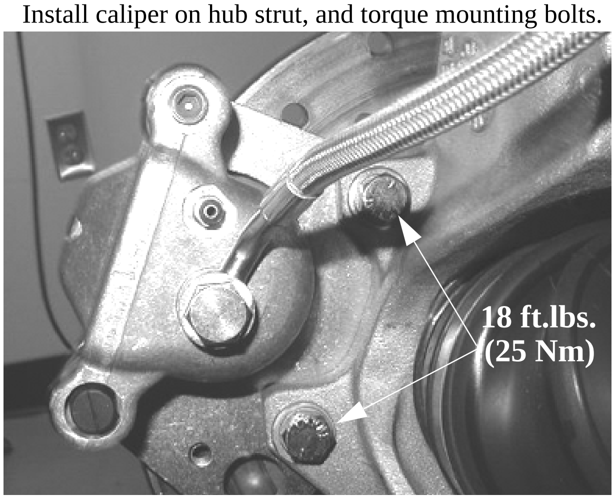
2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.



⚠ WARNING

If pads are contaminated with grease, oil, or liquid soaked do not use the pads. Use only new clean pads.

3. Install caliper on hub strut, and torque mounting bolts.



4. Slowly pump the brake lever 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.

5. Install the adjuster screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn (counterclockwise).

6. Verify fluid level in reservoir is up to MAX line inside reservoir and install reservoir cap.

7. Install wheels and torque wheel nuts. It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

NOTE: Front Wheel Nut Torque: Refer to Chapter 2.

Brake Burnishing Procedure

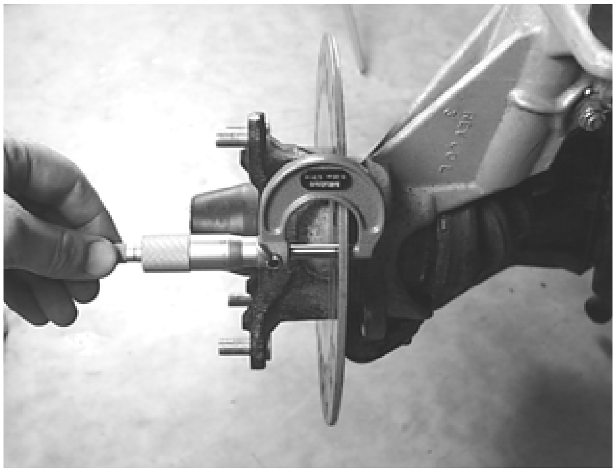
Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times.

FRONT BRAKE DISC

Inspection

1. Visually inspect the brake disc for nicks, scratches, or damage.

2. Measure the disc thickness at eight different points around the pad contact surface. Replace disc if worn beyond service limit.



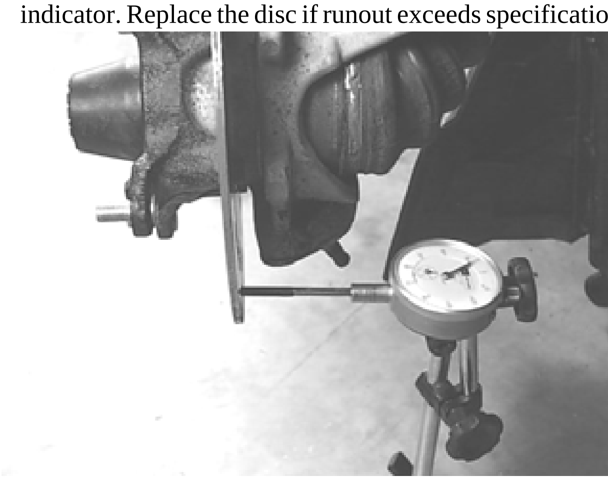
= In. / mm.

Brake Disc Thickness:
Service Limit: .140” / 3.556 mm

= In. / mm.

Brake Disc Thickness Variance Service Limit:
.002” (.051 mm) between measurements.

3. Mount dial indicator as shown to measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specifications.



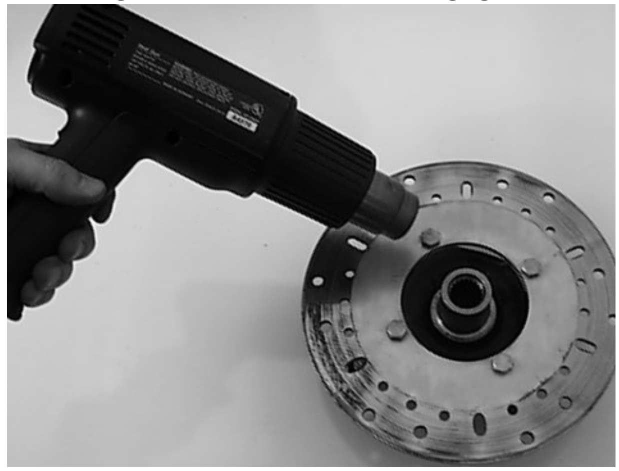
= In. / mm.

Brake Disc Runout Service Limit:
.010” / .254 mm

Removal / Replacement

NOTE: To reduce the possibility of warping, try removing the brake disc mounting bolts before applying heat to the bolts.

1. Apply heat to the hub in the area of the brake disc mounting bolts to soften the bolt locking agent.



2. Remove bolts and disc.
3. Clean mating surface of disc and hub.
4. Install disc on hub.
5. Install new bolts and tighten to specification.

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Brake Disc Bolt Torque:
18 ft.lbs. (24 Nm)

CAUTION

Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.

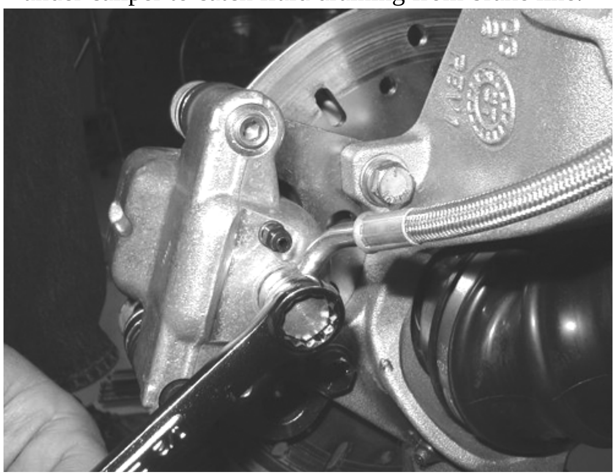
FRONT CALIPER

Removal

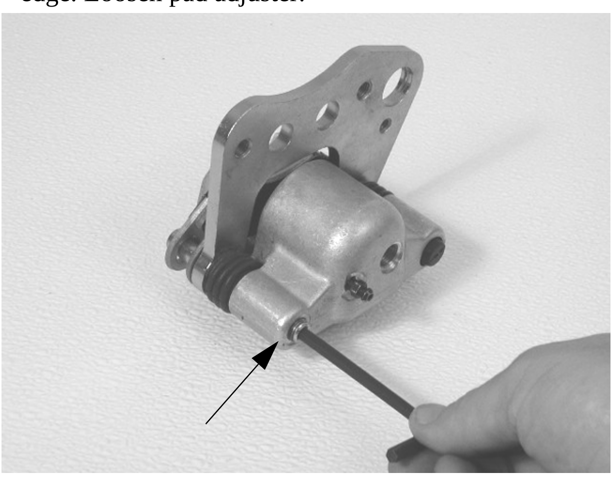
CAUTION

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur.

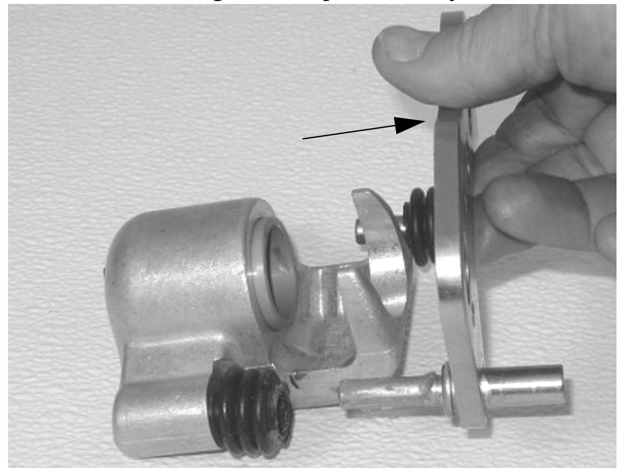
1. Loosen and remove brake line to caliper. Place a container under caliper to catch fluid draining from brake line.



2. Push upper pad retainer pin inward and slip brake pads past edge. Loosen pad adjuster.

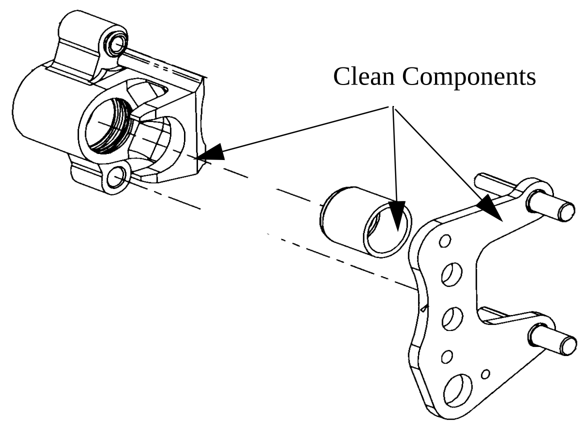


3. Remove mounting bracket, pin assembly and dust boot.



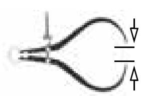
4. Remove piston, dust seals and piston seals.
5. Clean the caliper body, piston, and retaining bracket with brake cleaner or alcohol.

NOTE: Be sure to clean seal grooves in caliper body.



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.

 = In. / mm.

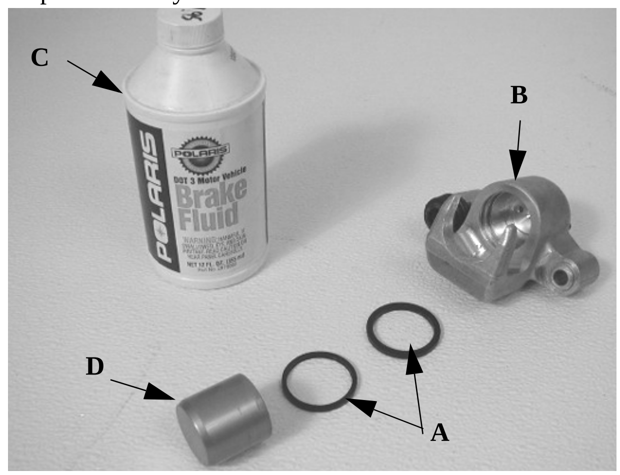
Front Caliper Piston Bore I.D.:
Service Limit: 1.193” (30.30 mm)

2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.

3. Inspect the brake disc and pads as outlined for brake pad replacement in this section. See “BRAKE PAD INSPECTION” earlier in this chapter.

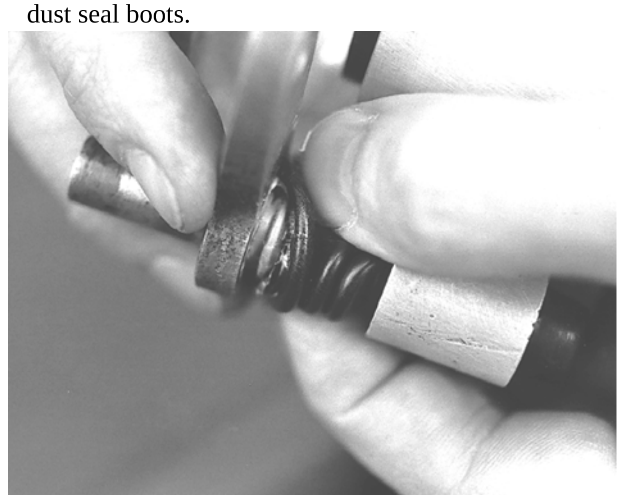
Reassembly

1. Install new caliper seals (A) in the caliper body (B). Be sure groove is clean and free of residue or brakes may drag upon assembly.



2. Coat piston with clean Polaris DOT-approved Brake Fluid (C). Install piston (D) 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 with Polaris Premium All Season Grease (**PN 2871423**), and install the rubber dust seal boots.



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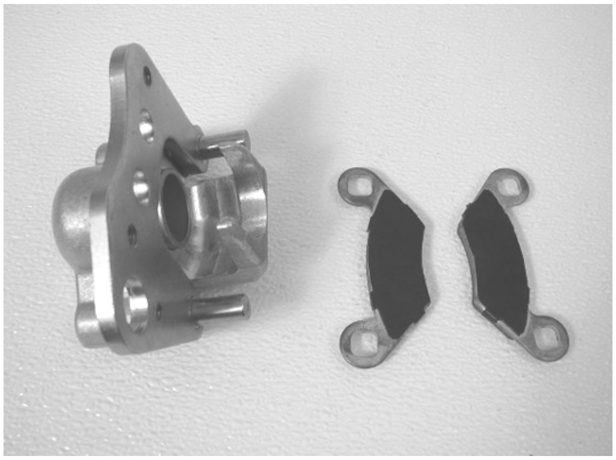
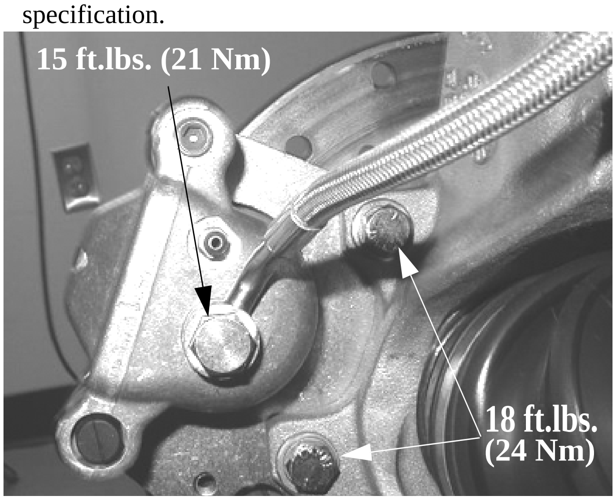
4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.



Installation

5. Install caliper on hub strut, and torque mounting bolts to specification.



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Brake Caliper Mounting Bolt Torque: **18 ft.lbs. (24 Nm)**

6. Install brake line and torque the banjo bolt to specification.

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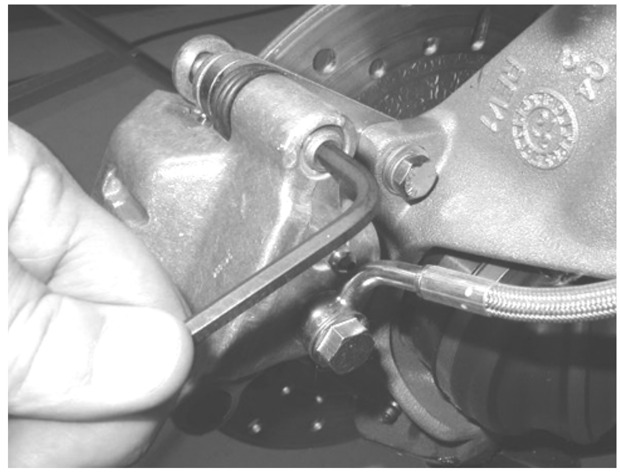
Brake Line Banjo Bolt Torque: **15 ft.lbs. (21 Nm)**

7. Install the adjuster screw and turn until stationary pad contacts disc, then back off 1/2 turn.



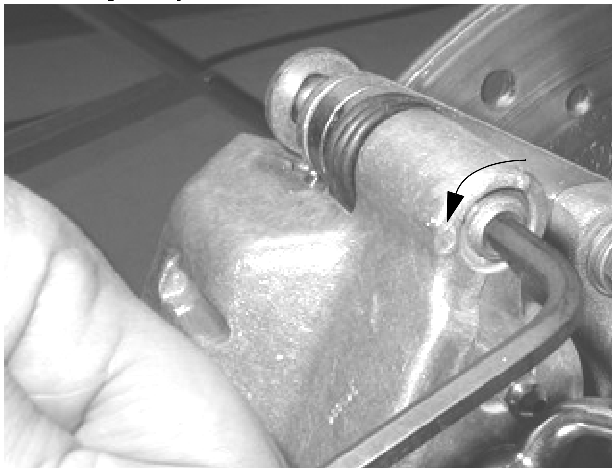
8. Perform brake bleeding procedure as outlined earlier in this chapter.

9. Install wheels and torque wheel nuts to specification. Refer to Chapter 2.

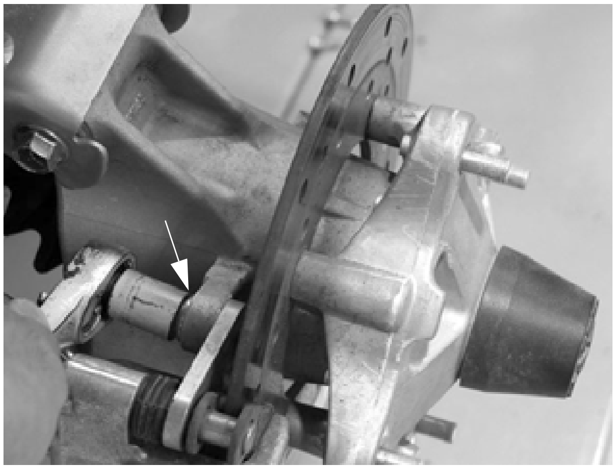
REAR BRAKE PAD

X2 Pad Removal

1. Elevate and support the rear of the ATV.
2. Remove the rear wheel
3. Loosen pad adjuster screw 2-3 turns.

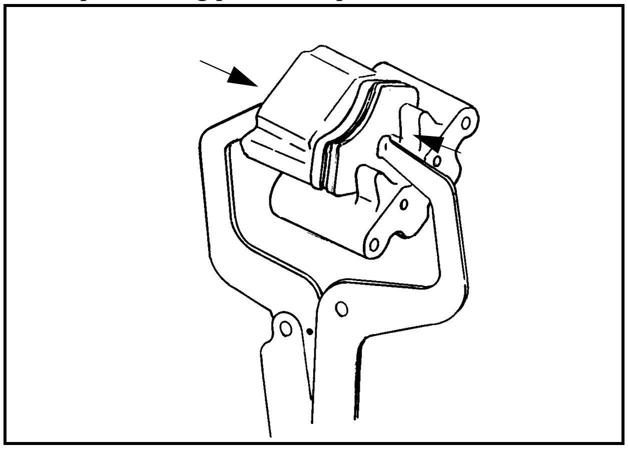


4. Remove the two caliper mounting bolts and lift caliper off the brake disc.



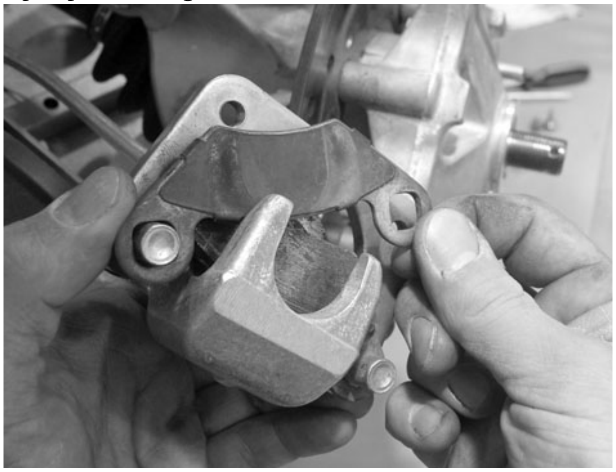
NOTE: When removing caliper, be careful not to damage brake line. Support caliper so as not to kink or bend brake line.

5. Push caliper piston into the caliper bore slowly using a C-clamp or locking pliers with pads installed.

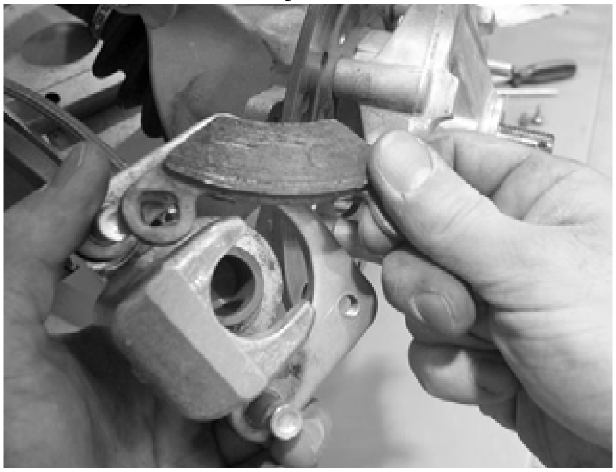


NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

6. Push caliper mounting bracket inward and slip outer brake pad past the edge to remove.



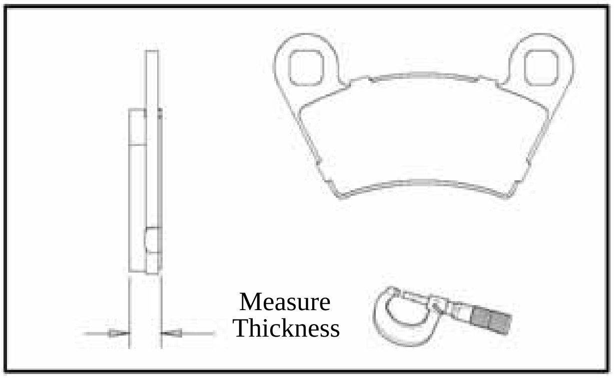
7. Remove the inner brake pad.



8. Clean the caliper with brake cleaner or alcohol.

9

9. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.

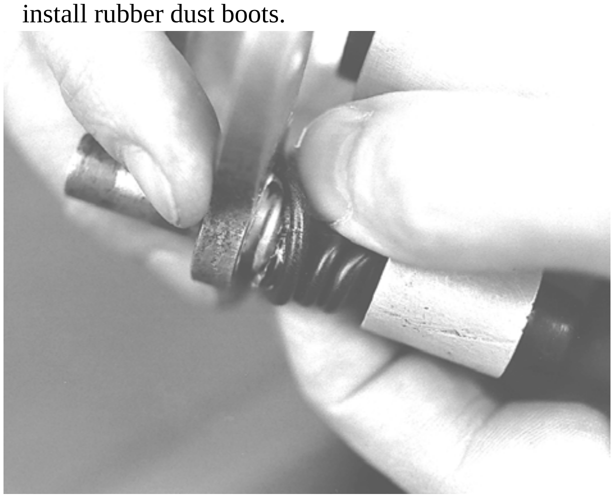


= In. / mm.

Rear Brake Pad Thickness
Service Limit: .180” (4.6 mm)

X2 Pad Installation

1. Lubricate mounting bracket pins with a light film of Polaris Premium All Season Grease (**PN 2871423**), and install rubber dust boots.

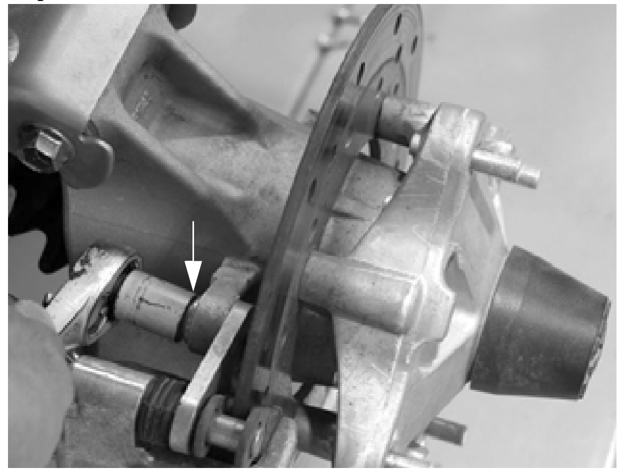


2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.

WARNING

If brake pads are contaminated with grease, oil, or liquid soaked do not use the pads. Use only new clean pads.

3. Install caliper and torque the mounting bolts to specification.



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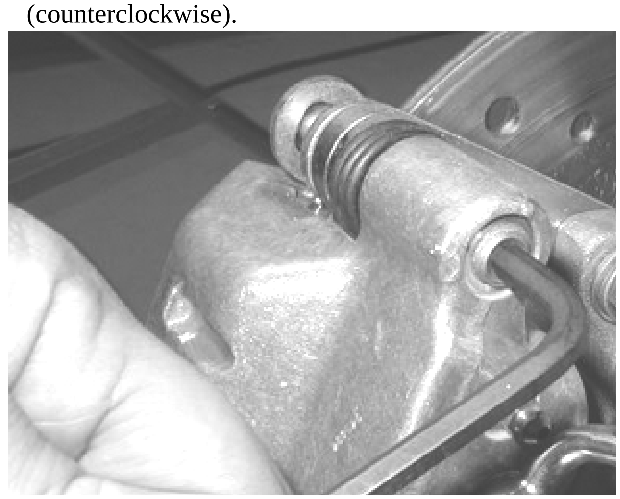
Caliper Mount Bolt Torque:
18 ft.lbs. (24 Nm)

4. Slowly pump the brake lever 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.

5. Install the adjuster screw and turn clockwise until the stationary pad contacts the disc, then back off 1/2 turn (counterclockwise).



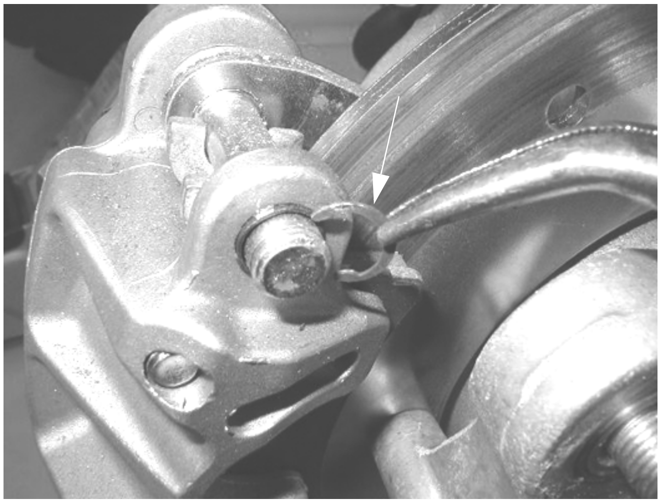
6. Verify fluid level in reservoir is up to the MAX line inside reservoir and install reservoir cap.

7. Install wheel(s) and torque wheel nut(s).

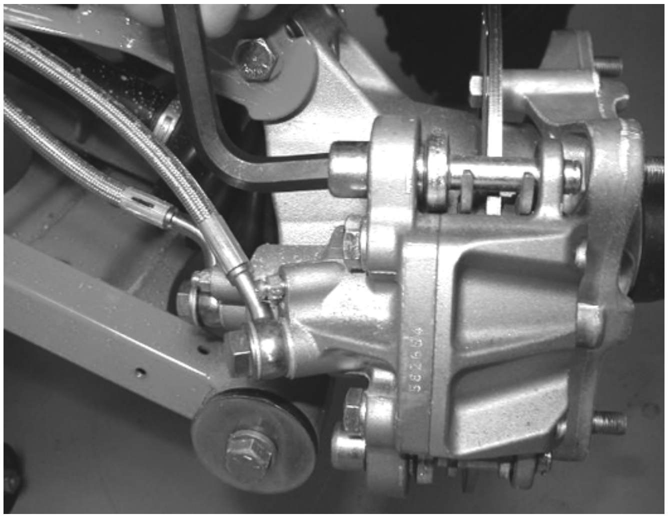
8. It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Sportsman Rear Pad Removal

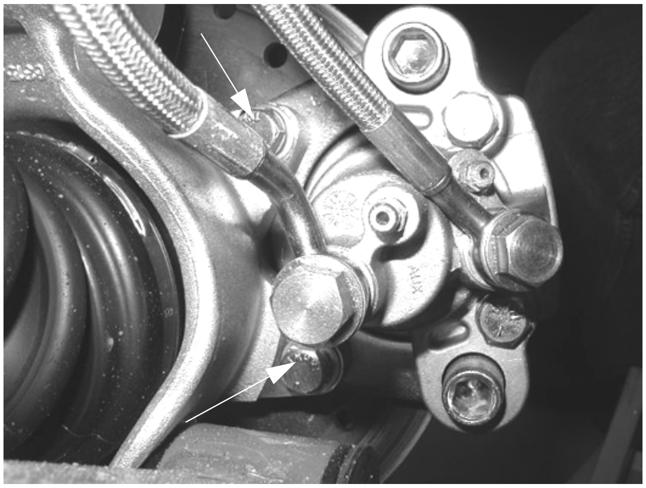
1. Support the machine. Remove the rear tire.
2. Remove the slide pin clips from the slide bolt.



3. Loosen the slide pins with a hex wrench.



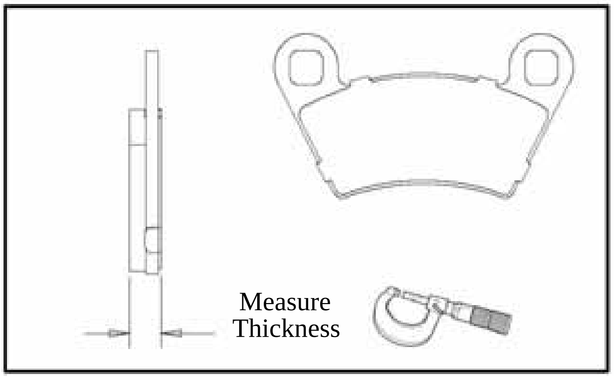
4. Remove caliper mounting bolts and lift caliper off of disc.

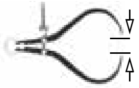


NOTE: When removing caliper, be careful not to damage brake line. Support caliper so as not to kink or bend brake line.

5. Push caliper pistons into caliper bore slowly with pads installed.
6. Remove the caliper slide pins and remove the brake pads from the caliper.

7. Clean the caliper with brake cleaner or alcohol.
8. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.





Rear Brake Pad Thickness
Service Limit: .180” (4.6 mm)

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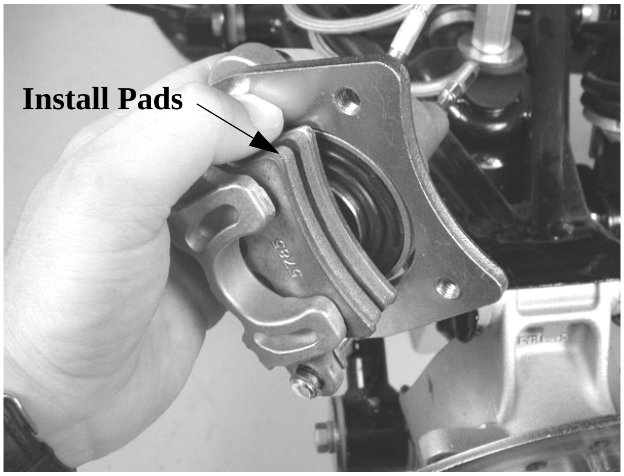
Sportsman Rear Pad Installation

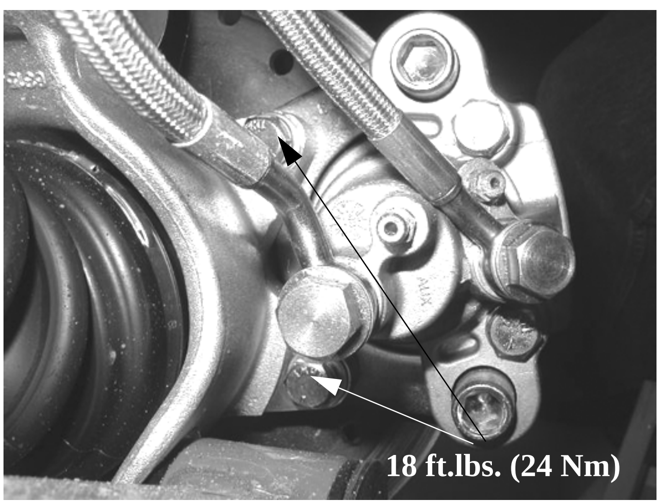
1. Install new brake pads in caliper body.



WARNING

If the brake pads are contaminated with grease, oil, or liquid soaked do not use the pads, use only new clean pads.

2. Install and tighten the slide pin with a hex wrench.
3. Install caliper and torque the mounting bolts to specification.



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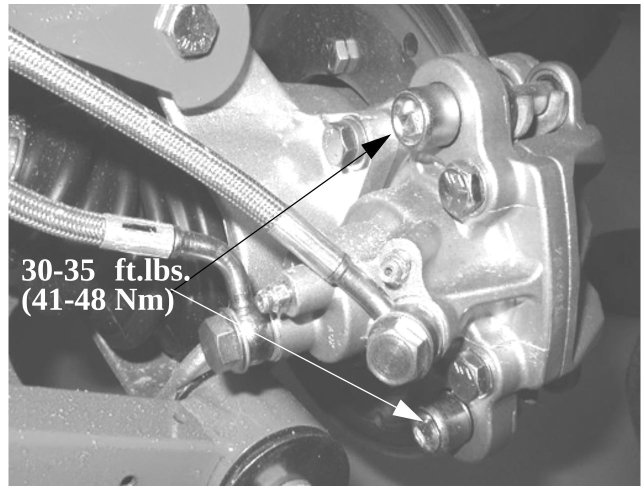
Caliper Mount Bolt Torque:
18 ft.lbs. (24 Nm)

4. Install the slide bolt snap ring. Torque the slide pin to specification.



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Caliper Slide Bolt Torque:
30-35 ft.lbs. (41-48Nm)

5. Slowly pump the brake lever 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 master cylinder.
6. It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Brake Burnishing Procedure

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.

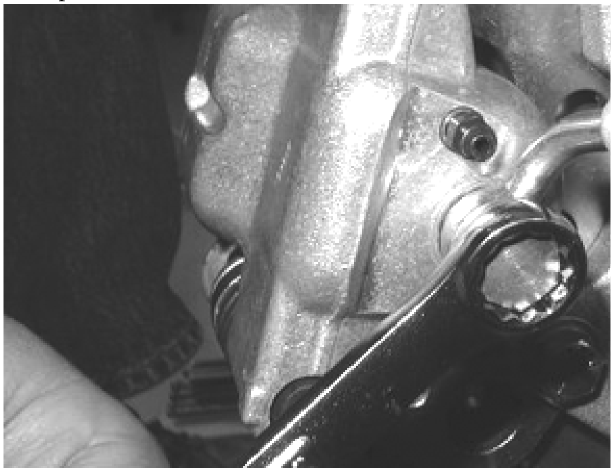
X2 REAR CALIPER

Removal

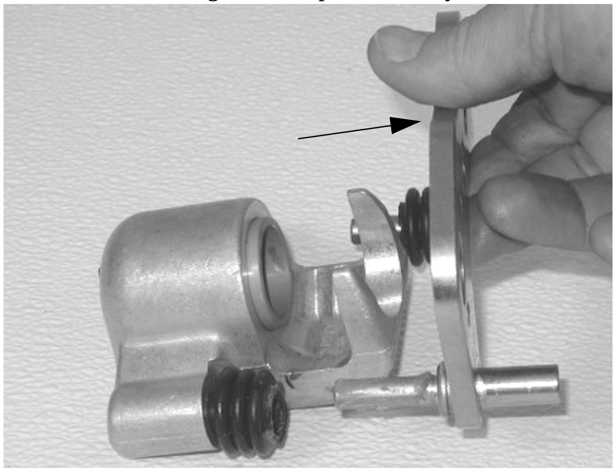
CAUTION

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur.

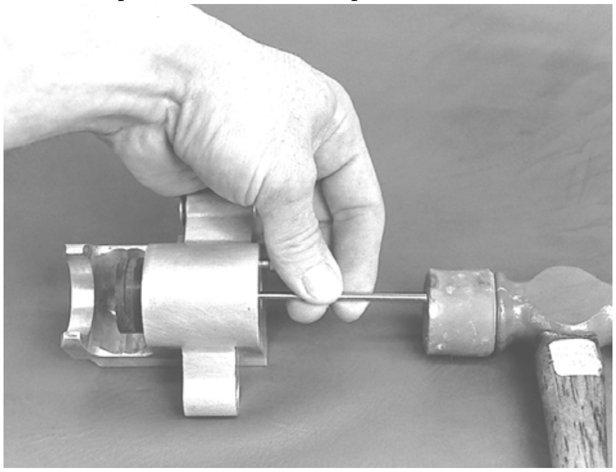
1. Clean caliper area before removal.
2. Place a container below the caliper to catch brake fluid that will drain from the brake line. Remove brake line from caliper



3. Remove the two caliper mounting bolts and the caliper.
4. Loosen the adjuster screw and remove the brake pads.
5. Remove mounting bracket, pin assembly and dust boot.

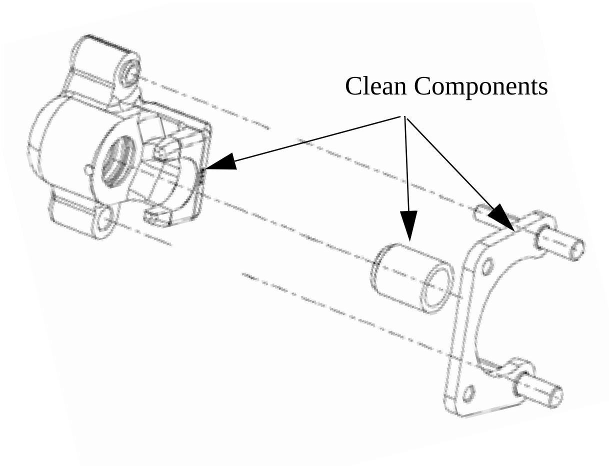


6. Remove piston, dust seals and piston seals.



7. Clean the caliper body, piston, and retaining bracket with brake cleaner or alcohol.

NOTE: Be sure to clean seal grooves in caliper body.



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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.

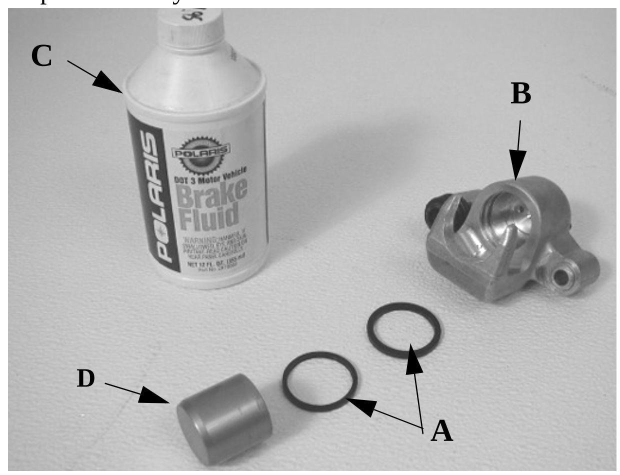
= In. / mm.
Rear Caliper Piston Bore I.D. **Service Limit: 1.193” (30.30 mm)**

2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.

3. Inspect the brake disc and pads as outlined for brake pad replacement in this section. See “BRAKE PAD INSPECTION” earlier in this chapter.

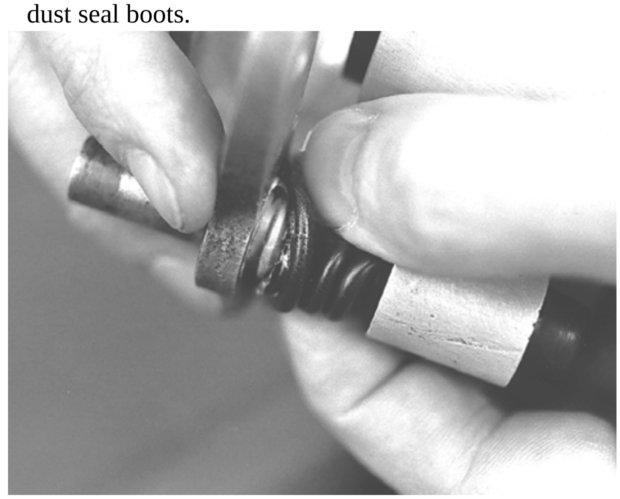
Reassembly

1. Install new caliper seals (A) in the caliper body (B). Be sure groove is clean and free of residue or brakes may drag upon assembly.

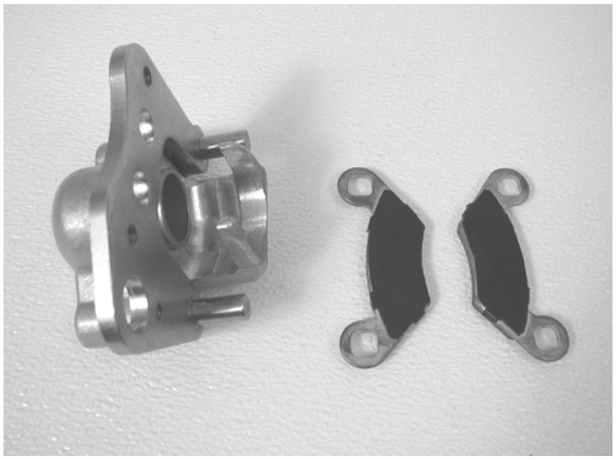


2. Coat piston with clean Polaris DOT-**approved** Brake Fluid (C). Install piston (D) with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly, with light resistance.

3. Lubricate the mounting bracket pins with Polaris Premium All Season Grease (**PN 2871423**), and install the rubber dust seal boots.



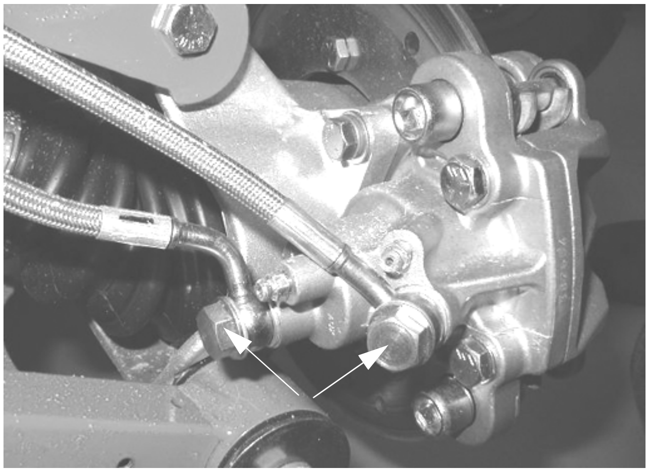
4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.



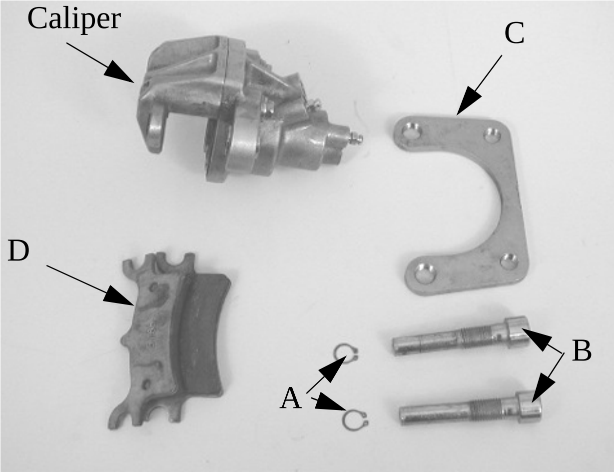
SPORTSMAN REAR CALIPER

Removal and Inspection

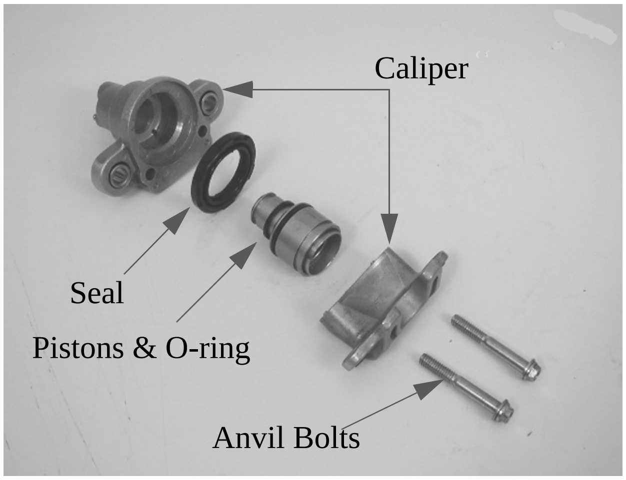
1. Clean caliper area before removal.
2. Using a flare nut wrench, remove hand brake (inner) and auxiliary brake (outer) lines (arrows). Place a container to catch brake fluid draining from brake lines.



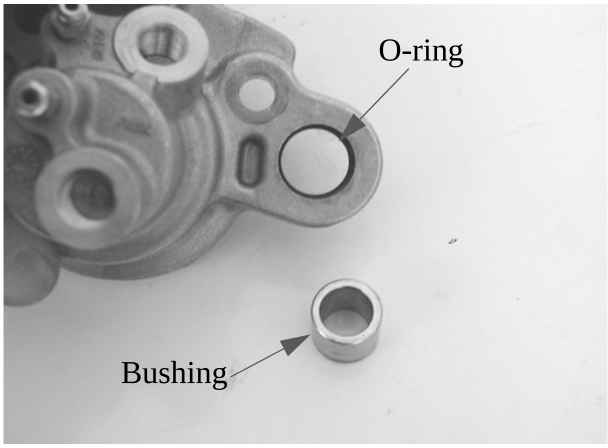
3. Remove the two caliper mounting bolts and the caliper.
4. Remove the slide bolt snap rings (A), the slide pins (B), the bracket pad (C), and the brake pads (D).



5. Remove the anvil bolts and separate caliper halves and remove pistons with piston pliers.



6. Remove seals and O-rings. Clean the O-ring grooves.
7. Clean disc, caliper body, and pistons with brake cleaner or alcohol.
8. Remove the slide bolt bushings. Inspect the bushings and O-rings and replace if necessary.



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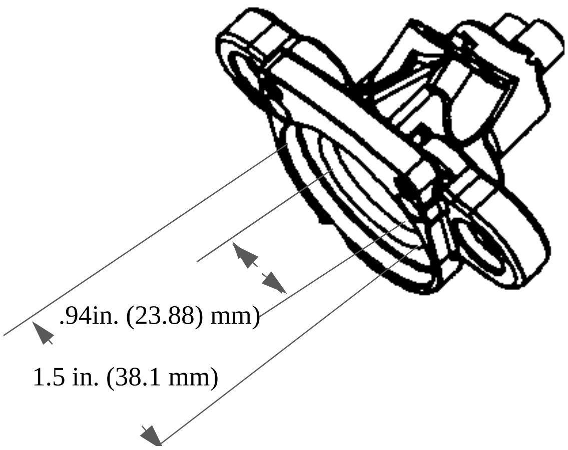
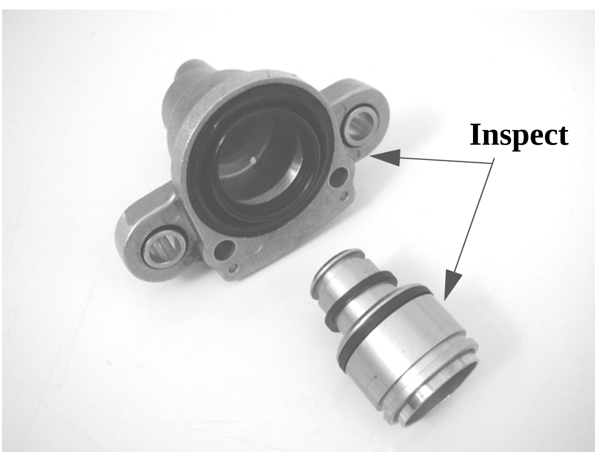
9. Measure the inside diameter of the rear caliper. The caliper body is a 2-step piston. The rear step is measured as well as the outside step.



= In. / mm.

Rear Caliper Piston Bore I.D.
Inner Bore Service Limit: .94" (23.88 mm)
Outer Bore Service Limit: 1.5" (38.1 mm)

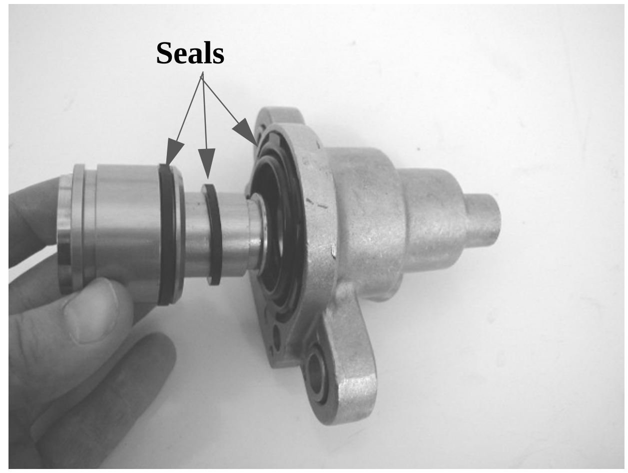
10. Inspect caliper piston bore for scratches, severe corrosion, or galling and replace if necessary.



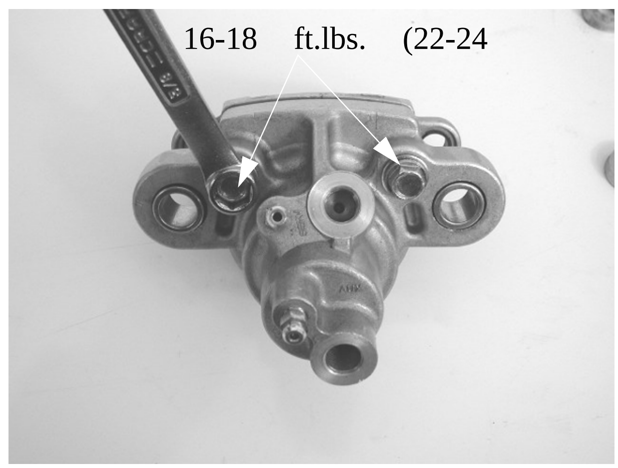
11. Inspect surface of caliper piston for nicks, scratches, or damage and replace if necessary.

Assembly

1. Install new O-rings in the slide bolt bushing holes. Be sure O-ring and seal grooves are thoroughly cleaned of all residue, or piston may bind in bore. Apply brake fluid to piston seals and install carefully with a twisting motion to ease assembly until fully seated.



2. Carefully assemble caliper body, making sure O-rings are properly positioned in groove. Tighten the caliper anvil bolts and then torque the anvil bolts evenly to specification.



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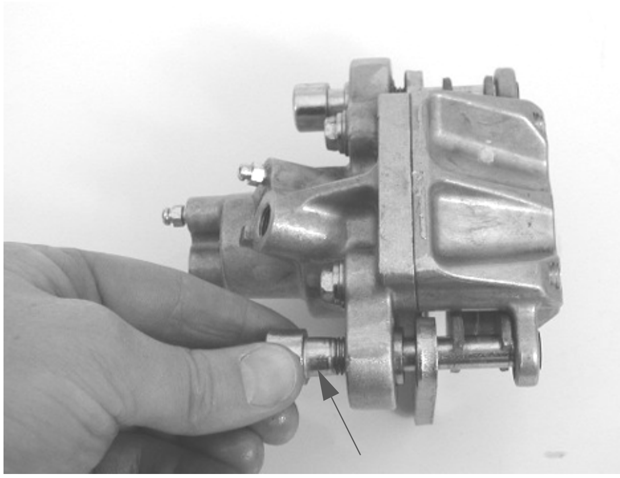
Caliper Anvil Bolt Torque:
16-18 ft.lbs. (22-24 Nm)

3. Install brake pads in caliper body with friction material facing each other. Install the slide pins and the slide pin retaining rings. Torque the slide pins to specification.

NOTE: The slide pins should be torqued when installed on caliper mount.



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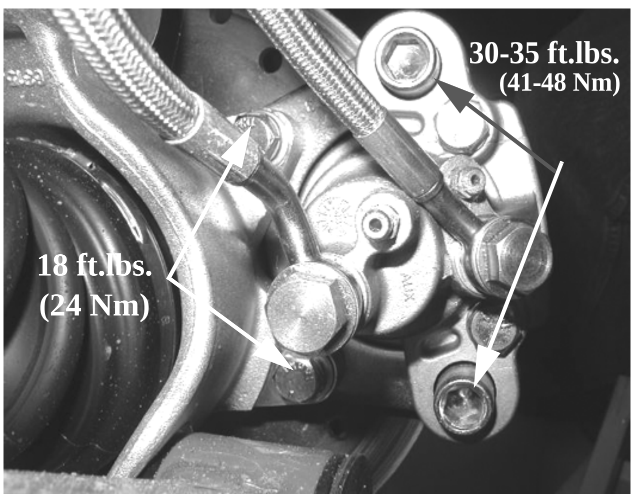
Slide Pin Torque:
30-35 ft.lbs. (41-48 Nm)

4. Install caliper and torque mounting bolts to specification.



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Caliper Mounting Bolt Torque:
16-18 ft.lbs. (22-24 Nm)

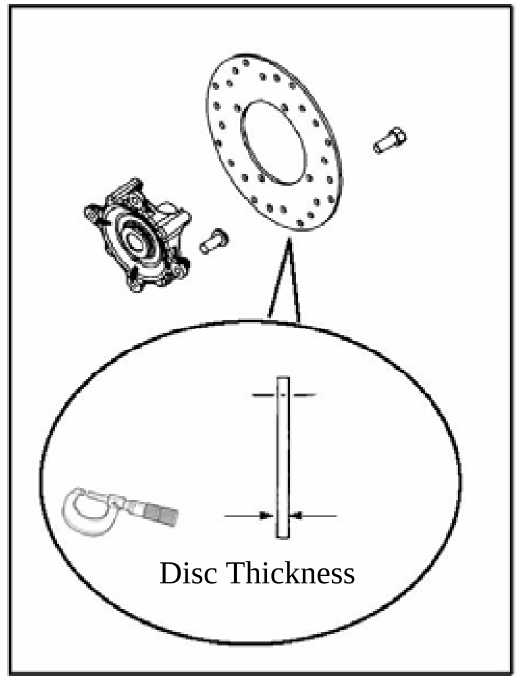
5. Install brake line and tighten securely with a line wrench. Torque the brake lines to the proper torque specification.
6. Follow bleeding procedure outlined in the "BLEEDING PROCEDURE" in this chapter.
7. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever is released. If the brake drags, re-check assembly and installation.

REAR BRAKE DISC

Inspection

1. Visually inspect disc for scoring, scratches, or gouges. Replace the disc if any deep scratches are evident.

2. Use a micrometer and measure disc thickness at 8 different points around perimeter of disc. Replace disc if worn beyond service limit.



= In. / mm.

Brake Disc Thickness:
Service Limit: .170" (4.318 mm)

= In. / mm.

Brake Disc Thickness Variance:
Service Limit: .002" (.051 mm)
Between Measurements

3. Mount dial indicator and measure disc runout. Replace the disc if runout exceeds specifications.

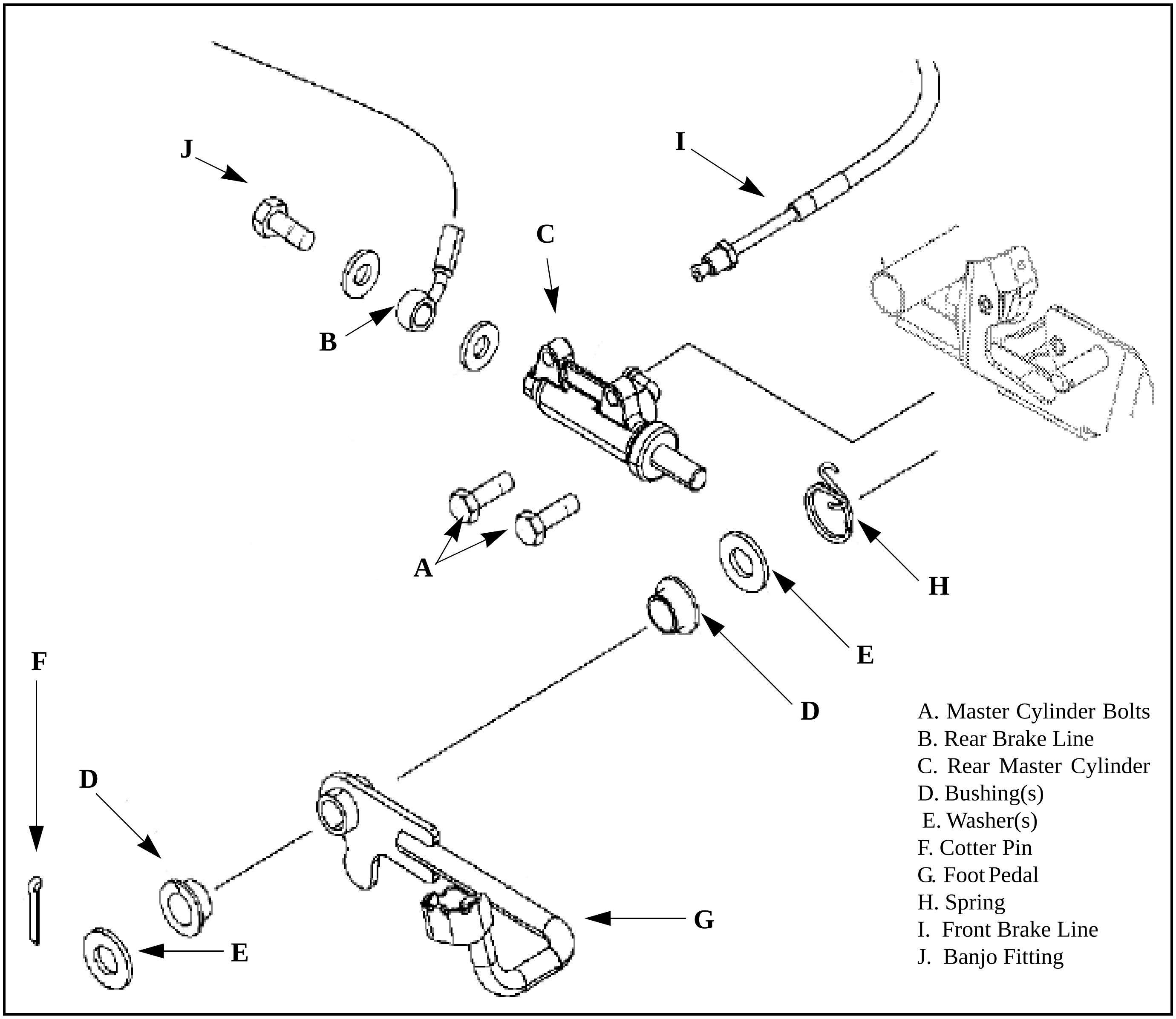
= In. / mm.

Brake Disc Runout
Service Limit: .010" / .254 mm

9

REAR MASTER CYLINDER

X2 Exploded View



Overview

Polaris disc brake systems are light weight, low maintenance and perform well in the conditions ATV's routinely encounter. However, 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.

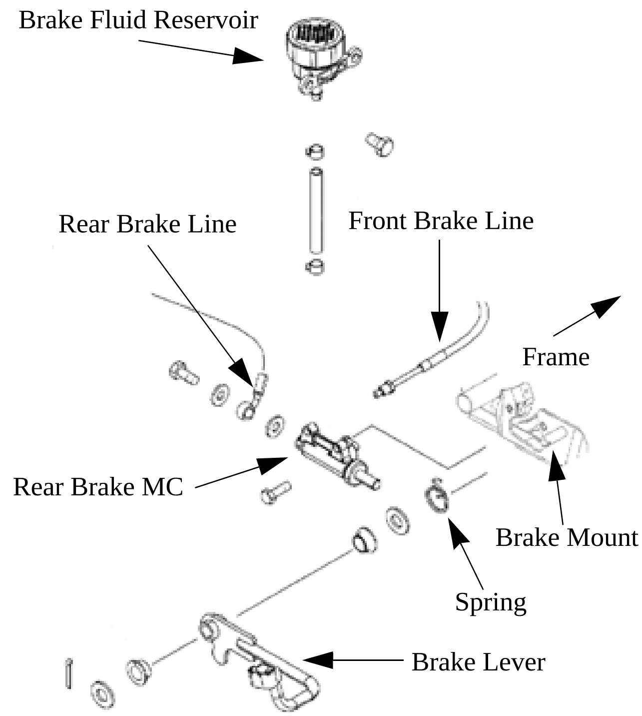
- Perform a brake burnishing procedure after installing new pads to maximize service life.
- Optional pads are available to suit conditions in your area. Select a pad to fit riding style and environment.
- Do not over-fill the master cylinder fluid reservoir.
- Make sure the brake lever and pedal returns freely and completely.
- Adjust stop pin on caliper (if applicable) after pad service.
- 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.

CAUTION

Use only DOT-approved brake fluid as an assembly aid for all procedures described in this chapter to prevent brake system contamination.
DO NOT USE LUBRICANTS OF ANY KIND FOR ASSEMBLY, AS THEIR USE CAN CAUSE RUBBER COMPONENTS TO SWELL.

X2 Rear Master Cylinder Removal and Installation

1. Remove the RH footwell to gain access to the rear master cylinder.
2. If required, remove the rear brake line from the master cylinder. Use a suitable container to catch the brake fluid. Dispose of brake fluid properly.



3. Remove the two bolts that secure the rear master cylinder to the frame. Replace parts as needed.
4. To install the rear master cylinder, mount the master cylinder to the frame and torque bolts to specification.

= T

Master Cylinder to Frame Bolt Torque:
8 ft.lbs. (11 Nm)

5. Reinstall the brake line and torque the banjo bolt to specification.

= T

Banjo Bolt Torque:
15 ft.lbs. (21 Nm)

6. Perform brake bleeding procedures as outlined in this chapter.

Sportsman Rear Master Cylinder Removal / Installation

1. Remove the RH footwell to gain access to the rear master cylinder.
2. Remove the rear brake lines from the master cylinder. Use a suitable container to catch the brake fluid. Dispose of brake fluid properly.
3. Remove the two bolts that secure the rear master cylinder to the brake mount plate. Replace parts as needed.
4. To install the rear brake master cylinder, mount the master cylinder to the mount plate and torque bolts to specification.

= T

Master Cylinder to Frame Bolt Torque:
8 ft.lbs. (11 Nm)

5. Reinstall the brake line and torque the banjo bolt to specification depending on the style of fitting.

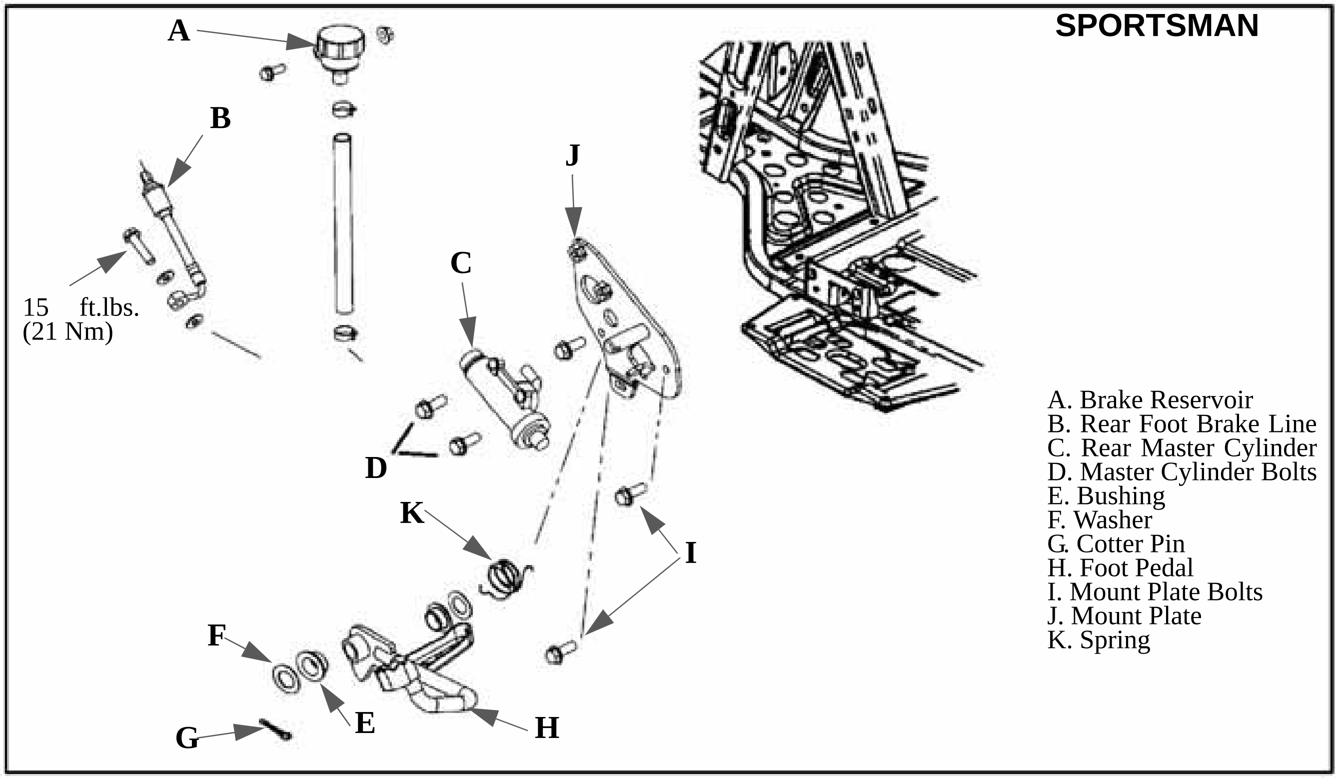
= T

Banjo Bolt Torque:
15 ft.lbs. (21 Nm)

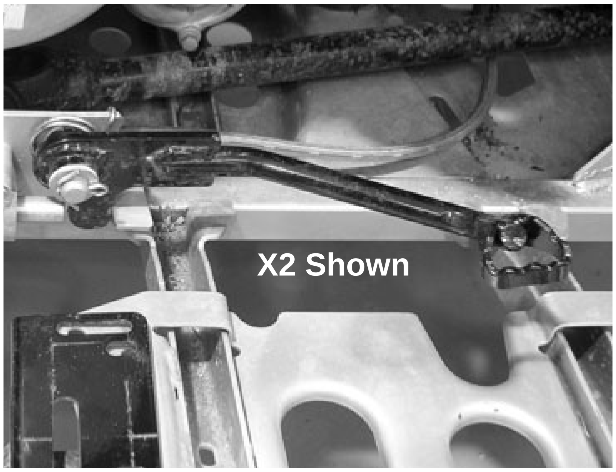
= T

Flare Stye Brake Line Torque:
12-15 ft.lbs. (16-20 Nm)

6. Perform brake bleeding procedures as outlined in this chapter.



Pedal Removal and Installation



1. Remove the RH footwell to gain access to the rear master cylinder.
2. Remove the cotter key.
3. Remove the washers, bushings, and tension spring.
4. Reverse the steps for installation, use a new cotter key during installation.

TROUBLESHOOTING

Brakes Squeal

- Dirty/contaminated friction pads
- Improper alignment
- Worn disc
- Worn disc splines

Poor Brake Performance

- Air in system
- Water in system (brake fluid contaminated)
- Caliper/disc misaligned
- Caliper dirty or damaged
- Brake line damaged or lining ruptured
- Worn disc and/or friction pads
- Incorrectly adjusted lever
- Incorrectly adjusted stationary pad
- Worn or damaged master cylinder or components
- Improper clearance between lever and switch

Lever Vibration

- Disc damaged
- Disc worn (runout or thickness variance exceeds service limit)

Caliper Overheats (Brakes Drag)

- Compensating port plugged
- Pad clearance set incorrectly
- Auxiliary brake pedal incorrectly adjusted
- Brake lever or pedal binding or unable to return fully
- Parking brake left on
- Residue build up under caliper seals
- Operator riding brakes

Brakes Lock

- Alignment of caliper to disc

NOTES

CHAPTER 10
ELECTRICAL

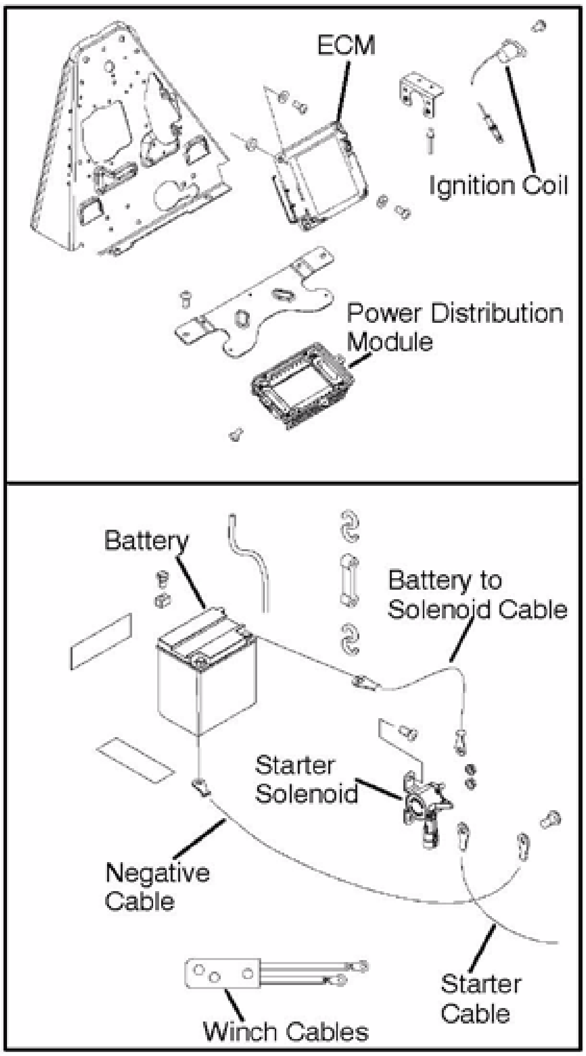
GENERAL INFORMATION

Special Tools

Table 10-1:

PART NUMBER	TOOL DESCRIPTION
PV-43568	Fluke™ 77 Digital Multimeter
2870630	Timing Light
2870836	Battery Hydrometer
2460761	Hall Sensor Probe Harness
2871745	Static Timing Light Harness

Ignition System / Basic Electrical Components



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 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. 10Ajack 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 for 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.

Troubleshooting

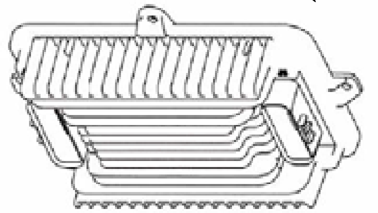
No Spark, Weak or Intermittent Spark

- Spark plug gap incorrect
- Fouled spark plug
- Faulty spark plug cap or poor connection to high tension lead
- Related wiring loose, disconnected, shorted or corroded
- Engine stop switch or ignition switch faulty
- ETC switch misadjusted or faulty
- Wire harness or connections wet, corroded or broken
- Poor ignition coil ground
- Incorrect wiring after repair (inspect color coding in connectors, etc.)
- Faulty ignition coil windings (measure resistance of primary and secondary)
- Sheared flywheel key
- Flywheel Loose or damaged
- Excessive crankshaft runout - should not exceed .0024"
- Faulty ECM
- Faulty CPS
- Low Battery

POWER DISTRIBUTION MODULES (PDM)

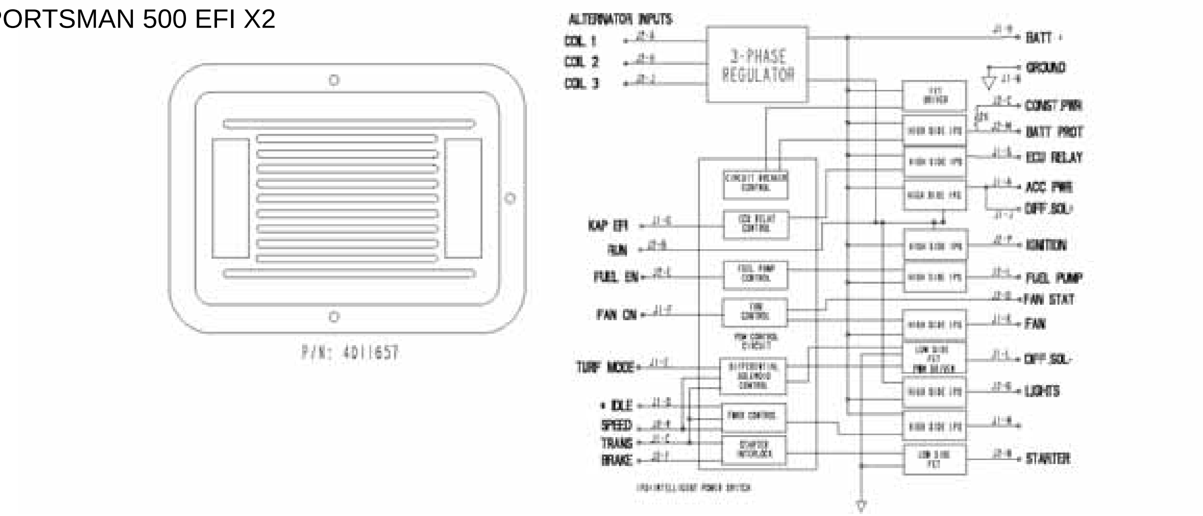
Sportsman EFI Overview

Power Distribution Module (PDM)

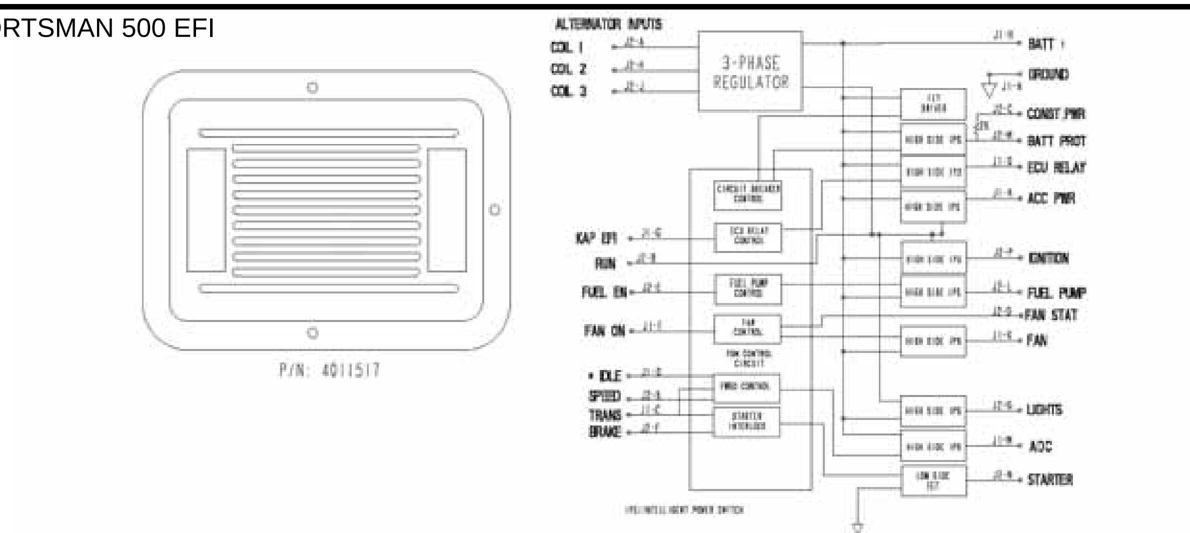


PDM Located Inside Front Grill Cover

SPORTSMAN 500 EFI X2



SPORTSMAN 500 EFI



The **Power Distribution Module (PDM)** integrates these electronic features found on Polaris 500 and 500 X2 EFI ATVs; ***rectifier/ regulator, main solid-state circuit breaker (SSCB) output, accessory power output, ignition relay output, fan relay controller, ECM relay output, ECM/cluster memory power, light output, starter lockout, active descent control (ADC) and differential solenoid drive (X2 ONLY)***. There are no service parts in the PDM. If the PDM fails, it must be replaced. Following are overviews of the various PDM circuits and how they function:

Regulator
The rectifier converts the output of the 3-phase alternator and applies it to the battery and the PDM loads. The regulator monitors the battery voltage and shuts off the rectifier when full-charge exists on the battery. SCR's are used to connect and disconnect the alternator from the battery to achieve regulation of the battery voltage. The regulator shuts off current on the BAT+ pin if the battery exceeds the over-voltage threshold. The regulator will not turn on unless there exists battery voltage in excess of the minimum battery voltage requirement. Therefore, do not attempt to charge dead batteries using the vehicle's charging system.

Battery Protected Output
The battery protected output (BAT_PROT) provides solid-state-circuit-breaker (SSCB) outputs and enables most of the functions on the PDM. The BAT_PROT output must be routed only to the vehicle key/run switch for proper power up sequence. BAT_PROT is enabled when the key/run switch connects the BAT_PROT output to loads (must include RUN input). This causes the micro-controller to power-up and energize BAT_PROT. When RUN input goes high, the micro-controller will remain 'ON' until RUN input goes low by disconnection of the BAT_PROT via the key switch or on/off switch. The BAT_PROT output is protected from overloads and short circuits. If this occurs, the output turns off. Once tripped, the SSCBs can be reset by removing the overload or cycling the key/run switches. The SSCBs will trip again if the issue causing the overload is not removed.

Fan Relay Controller
The FAN relay is a smart high-side power switch. The FAN controller requires the RUN input to be active and then is enabled by the FAN_ON signal. The FAN output current is monitored by the micro-controller. If the over-current limit is exceeded for the amount of delay time programmed, the output will shut off. If the maximum current limit is exceeded, the current will shut off immediately. The micro-controller disables the FAN output for a pre-programmed amount of time, then resets the FAN relay. This will continue until the issue causing the fault has been removed. When the FAN relay is off, the micro-controller also monitors the output to see if the fan has been disconnected.

Fan Status
The FAN_STAT output is control by the micro-controller. FAN_STAT will go low only when the fan is off. For overloads the FAN_STAT will go low after the pre-programmed delay time. For an open fan condition, the micro-controller will wait the programmed open-fan delay time and then indicate a fan fault. The FAN_STAT output is current-limited.

Accessory Power:
The ACC_PWR switch uses a smart high-side power switch. It is enabled when the RUN input is activated and disabled when it's removed. If the output current exceeds the short-circuit limit, the output current will be reduced until the ACC_PWR thermally shuts down. ACC_PWR will automatically turn back on when it has cooled, based on thermal recovery. Repeated cycles will cause the short-circuit limit to turn off repeatedly until the overload has been removed.

Ignition Relay Output
The IGNITION relay uses a smart high-side power switch. The IGNITION relay output is enabled when the RUN input is activated and disabled when it's removed. If the maximum output current threshold is exceeded, the output current will be reduced until the IGNITION circuit thermally shuts down. IGNITION will automatically turn back on when it has cooled, based on thermal recovery. Repeated cycles will cause the short-circuit limit to turn off repeatedly until the overload has been removed.

ECM Relay Output
The ECM_RELAY is a smart high-side power switch. The ECM_RELAY relay output is enabled when the RUN input is activated and KAP_EFI input is low. Once enabled, ECM_RELAY stays activated until the KAP_EFI input goes high. The ECM_RELAY output current is monitored by the micro-controller. If the over-current threshold is exceeded for the pre-programmed delay time, the output current will shut off. Exceeding the power switch maximum current limit shuts down the output immediately. Cycling the KAP_EFI via the key/run switches will reset the output if RUN is active. Note: If RUN is not active, the micro-controller powers down, therefore, the maximum current limit will be the only overload protection active until the KAP_EFI input disables the ECM_RELAY.

Fuel Pump Relay
The fuel pump circuit utilizes a and a smart high-side power switch output. The FUEL_PUMP output is enabled when RUN is activated and FUEL_EN is low. If the maximum output current threshold is exceeded, the output current will be reduced until the relay thermally shuts down. It will automatically turn back on when it has cooled, based on thermal recovery. Repeated cycles will cause the short-circuit limit to turn off repeatedly until the overload has been removed.

Active Descent Control
An IPS is provided for current flow to the hub coil. The PDM receives inputs from the TPS to determine throttle open/closed and the Speed Sensor signal to determine vehicle speed.

ECM Memory
The ECM_MEM output is a current-limited, high-side power switch for the ECM and cluster. This output is enabled whenever battery power is connected to the PDM.

Reverse Polarity Protection
The reverse polarity protection circuit if in series with the battery positive input of the PDM. It allows forward current to flow with little voltage drop. When the battery terminals are connected in reverse, the protection switch is forced off, interrupting any current flow other than -2mA of bias current.

Light Output
The LIGHTS switch uses a smart-side power switch. The LIGHTS output is enabled when the RUN input goes high and disabled when it is low. If the output current exceeds the short-circuit limit, the output current will be reduced until the device thermally shuts down. It will automatically turn back on when it has cooled, based on thermal hysteresis. Repeated cycles will use the repetitive short-circuit limit to turn off until the overload has been removed.

Starter Lockout
The starter lockout uses a low-side drive FET to connect the ground side of the starter solenoid when the lockout is enabled. To enable the lockout, the brake switch must be pulled high or the transmission must be in Park or Neutral. The starter solenoid positive side must be connected to BAT_PROT, as the lockout relies on the current limit of BAT_PROT.

Differential Solenoid (X2 ONLY)
The differential solenoid driver provides a current-regulated low-side drive for the solenoid coil. The low side driver sinks current from the inductive load that is sourced internally via the ACC_PWR output. The positive side of the differential solenoid is current limited via ACC_PWR. To active the solenoid driver, the TURF_MODE input must be high and the SPEED input must read less than the solenoid speed limit. Once enabled, the driver provides an initial "pull-in" current for a pre-determined time and then lowers to a "hold" current until the TURF_MODE input goes low or the TRANS input is in Park or Neutral and the SPEED is less than the solenoid speed limit.

CONNECTOR 1 - PIN #	SIGNAL NAME	DESCRIPTION - IPS = Intelligent Power Switch
J1-A	ACC_PWR	IPS that provides power to the accessories
J1-B	Unused	
J1-C	TRANS	Input signal from the transmission
J1-D	IDLE	Input signal for Active Descent Control (ADC)
J1-E (X2 Only)	**TURF_MODE**	High side enable to control differential solenoid. Uses SPEED and TRANS signals to determine differential solenoid operation (X2 Only)
J1-F	FAN_ON	Relay input to control operation of the fan
J1-G	KAP_EFI	Relay input to control operation of the ECM relay
J1-H	BAT+	Battery Positive
J1-J (X2 Only)	**DIFF_SOL+**	IPS that provides power to the differential solenoid
J1-K	FAN	IPS that operates the fan
J1-L (X2 Only)	**DIFF_SOL-**	Low side connection to the differential solenoid
J1-M	ADC	IPS that activates ADC hub coil
J1-N	GND	Battery Ground
J1-P	Unused	
J1-R	Unused	
J1-S	ECM_RELAY	IPS to the power the ECM relay output

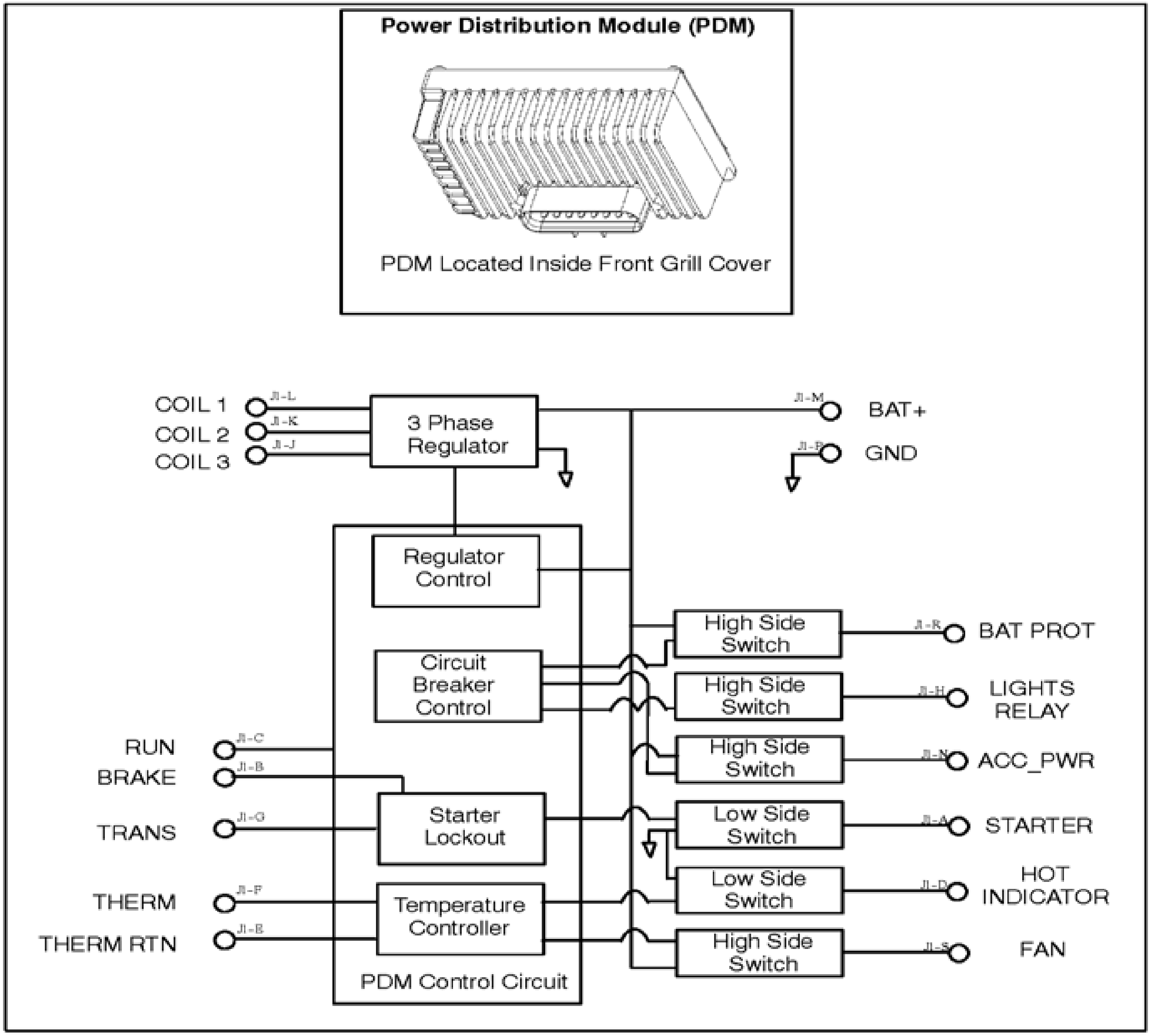
CONNECTOR 2 - PIN #	SIGNAL NAME	DESCRIPTION - IPS = Intelligent Power Switch
J2-A	COIL 1	Input from stator coil winding 1 - 15k resistance to ground
J2-B	RUN	Run input signal. Battery voltage when key/run is on and connected to BAT_PROT
J2-C	ECM_MEM	Used to provide the instrument cluster constant power for memory
J2-D	FAN_STAT	Open collector output. Pulsed low upon overload or disconnect of FAN
J2-E	FUEL_EN	Fuel pump control input
J2-F	BRAKE	Input from brake switch. Enables starter interlock when high
J2-G	LIGHTS	High side drive for vehicle lights
J2-H	COIL 2	Input from stator coil winding 2
J2-J	COIL 3	Input from stator coil winding 3
J2-K	SPEED	Input from speed sensor for ADC operation
J2-L	FUEL_PUMP	IPS to power the fuel pump output
J2-M	BAT_PROT	Protected battery output to general vehicle loads
J2-N	STARTER	Low side starter solenoid connection.
J2-P	IGNITION	IPS to power the ignition output.

CHARACTERISTIC	PARAMETER	UNIT	NOTE
Operating Temperature	-40 to +55	°C	Ambient temperatures at which module should remain within specified limits
Storage Temperature	-50 to +85	°C	Ambient temperatures which should have no adverse effects on module operation

CHARACTERISTIC	MIN	TYP	MAX	UNIT	NOTE
Battery Voltage	10.5	14.4	16	Vdc	PDM functions will operate over this range
Batt. Quiescent Current		1.5	2	mA	Min. draw from battery with key off
REGULATOR					
Regulator Voltage	14.1	14.4	14.8	Vdc	
Regulator Output		25	32	Adc	Max. total DC amperage available from regulator
Over-Voltage Threshold	16			Vdc	Battery voltage that will cause the regulator to temporarily turn off
Minimum Battery Voltage	2			Vdc	Min. voltage required on RUN for regulator to begin operation
Alternator Coil 1 Resistance		15k		Ohm	Resistance between alternator signal and ground Only on this designated alternator signal
BAT_PROT OUTPUT					
Output Current		20		Amp	Nominal Continuous output current
Limit		30		Amp	Current level that will cause turn off after delay
Time Delay		0.6		Sec	Time above limit until SSCB trips
Voltage	6.2			Vdc	Min Battery voltage for BAT_PROT to remain on
ECM RELAY OUTPUT					
Current Output		20		Amp	Nominal continuous output
Output Limit		30		Amp	Current level that will cause turn off after delay
Overload Delay		0.6		Sec	Time above limit until ECM Relay trips
IGNITION RELAY OUTPUT					
Output Current		10	25	Amp	Max. continuous current
Rep. Short-circuit Limit		26		Amp	Typical limit to cause repetitive thermal cycling
ACC_PWR OUTPUT					
Output Current		10	25	Amp	Max. continuous current
Rep. Short-circuit Limit		26		Amp	Typical limit to cause repetitive thermal cycling
FUEL PUMP OUTPUT					
Output Current		10	25	Amp	Max. continuous current
Rep. Short-circuit Limit		26		Amp	Typical limit to cause repetitive thermal cycling
FAN RELAY CONTROLLER					
Fan Motor Current		10	12	Amp	Current capability of the FAN output
Over-current Limit		18		Amp	Threshold to start fan stall delay timer
Fan Load Open Delay		5		Sec	Time delay after detection of open fan load
Fan Stall On Time		2		Sec	Time FAN output will remain on after current limit exceeded
Fan Stall Off Time	10			Sec	Time FAN output will remain off after current limit exceeded. FAN_STAT on during this time

CHARACTERISTIC	MIN	TYP	MAX	UNIT	NOTE
ECM_MEM OUTPUT (constant power for ECM and Instrument Cluster)					
MEM Circuit Limit	0.2		1.2	Amp	Current capability of the output
REVERSE POLARITY PROTECTION					
Battery Reverse Current		1.8	2	mA	Max reverse leakage current when connected in reverse
Reverse Bias Voltage			-55	Vdc	Absolute maximum reverse voltage before device breakdown.
DIFFERENTIAL SOLENOID DRIVER (X2 ONLY)					
Pull-in Current		9		A	Max pull-in current when solenoid is energized
Hold Current		2		A	Max holding current when solenoid is energized
TURF MODE Input	0		16	V	Input voltage range
TURF MODE Input Pull Down			5K	Ohm	Resistance to ground on input pin
Solenoid Speed Limit		15		MPH	Max SPEED input to prevent differential solenoid engagement
STARTER LOCKOUT					
STARTER Current			10	A	Maximum load current
TRANS Park Limits	0.32		1.02	V	Voltage range to enable STARTER output
TRANS Neutral Limits	1.83		2.53	V	Voltage range to enable STARTER output
BRAKE Input	0		16	V	Input voltage range

Sportsman 450 Overview



The Power Distribution Module (PDM) integrates these electronic features found on the Sportsman 450; ***rectifier/regulator, solid-state circuit breaker output, starter lockout output and engine temperature controller.*** There are no service parts in the PDM. If the PDM fails, it must be replaced. Following are overviews of the various PDM circuits and how they function:

Regulator

The rectifier converts the output of the 3-phase alternator (COIL 1,2,3) and applies it to the battery and the PDM loads. The regulator monitors the battery voltage and shuts off the rectifier when full-charge exists on the battery. SCR's are used to connect and disconnect the alternator from the battery to achieve regulation of the battery voltage. The regulator shuts off current on the BAT+ pin if the batter exceeds the over-voltage threshold. A high voltage transient will cause the regulator to turn off for a short period of time. If there truly is an open battery condition then the regulator will remain off, as the minimum battery requirement will not be met. The regulator will not turn on unless there exists battery voltage in excess of the minimum battery voltage requirement. Therefore, do not attempt to charge dead batteries using the vehicle's charging system. NOTE: COIL 1 has a resistance to ground.

Battery Protected Output

The battery protected output (BAT_PROT) provides solid-state-circuit-breaker (SSCB) outputs and enables most of the functions on the PDM. The BAT_PROT output must be routed only to the vehicle key/run switch for proper power up sequence. BAT_PROT is enabled when the key/run switch connects the BAT_PROT output to loads (must include RUN input). When RUN input goes high, the micro-controller will remain 'ON' until RUN input goes low by disconnection of the BAT_PROT via the key switch or on/off switch. It will remain 'ON' for 5 seconds before turning off The BAT_PROT output is protected from overloads and short circuits. If this occurs, the output turns off. Once tripped, the SSCBs can be reset by removing the overload or cycling the key/run switches. The SSCBs will trip again if the issue causing the overload is not removed.

Engine Temperature Controller

The engine temperature controller has several features and two outputs: HOT INDICATOR and FAN. The engine hot output is low and sinks the indicator signal to ground. The fan output is active high and sources battery power to turn on the fan. The controller's primary function is to control the fan motor. The fan motor is turned on and off at pre-set resistances as determined by the engine temperature thermistor. The FAN output is protected against short circuit and overload. If the fan current exceeds the overload limit longer than the time allowed for inrush, the fan will shut off and the HOT INDICATOR will turn on. After a delay, the FAN output will then reset itself and turn on again. If the overload persists, the controller will cycle the FAN output on and off at set interval until the overload is removed. If the maximum temperature of the switching device is exceeded the fan output will turn off. The fan will cycle on and off as previously described until the device temperature drops. The FAN output driver also monitors to see if the fan is connected during 'ON' state only. If the FAN output is open circuit upon power up, the engine temperature controller will activate the hot indicator. If the engine temperature exceeds the engine hot thermistor limit, or detects a fan overload condition, the hot indicator will activate. The controller also contains provisions for detecting an open or shorted thermistor. A thermistor fault will cause the engine hot indicator and FAN output to activate.

Accessory Power:

The ACC_PWR switch uses a smart high-side power switch. It is enabled when the RUN input is activated and disabled when it's removed. If the output current exceeds the short-circuit limit, the output current will be reduced until the ACC_PWR thermally shuts down. ACC_PWR will automatically turn back on when it has cooled, based on thermal recovery. Once tripped, this output will remain off until the key switch is cycled on and off again.

Lights Output

The LIGHTS output uses a smart high-side power switch. The LIGHTS relay output is enabled when the RUN input is activated and disabled when it's removed. If the maximum output current threshold is exceeded, the output current will be reduced until the LIGHTS circuit thermally shuts down. Once tripped, this output will remain off until the key switch is cycled on and off again.

HOT Indicator Output

The HOT Indicator output uses a low-side power switch 'smart FET' that indicates when the thermistor input exceeds the values programmed in the PDM. It also indicates a stalled or open fan condition. The output is protected against shorts to battery, overload, over-voltage and over-temperature conditions.

Starter Lockout

Starter Lockout monitors the brake input and transmission signal to determine if the STARTER output FET will enable a ground path for the starter solenoid. The output is enabled if either the BRAKE input is high or the TRANS signal voltage indicates PARK or NEUTRAL. TRANS voltage is based on a 5Vdc power supply with a 220-ohm with 24-ohm for park and 160-ohm for neutral. RUN input must be enabled for the starter lockout to function. This output is overload and short circuit protected by the BAT-PROT output on the high side.

Reverse Polarity Protection

The reverse polarity protection circuit is in series with the battery positive input of the PDM. It allows forward current to flow with little voltage drop. When the battery terminals are connected in reverse, the protection switch is forced off, interrupting any current flow other than -2mA of bias current.

CONNECTOR 1 - PIN #	SIGNAL NAME	DESCRIPTION - IPS = Intelligent Power Switch
J1-A	STARTER	Starter output provides ground path when active.
J1-B	BRAKE	Brake input for starter lockout. Active high.
J1-C	RUN	PDM enable input. Connected to BAT_PROT via ignition and run
J1-D	HOT_INDICATOR	Engine hot signal. Provides a ground path for the hot indicator lamp
J1-E	THERM_RTN	Thermistor ground
J1-F	THERM	Thermistor input
J1-G	TRANS	Transmission signal voltage input for starter lockout
J1-H	LIGHTS	Powers vehicle lighting
J1-J	COIL 3	Alternator coil input
J1-K	COIL 2	Alternator coil input
J1-L	COIL 1	Alternator coil input w/resistance to ground
J1-M	BAT+	Battery Positive
J1-N	ACC_PWR	Battery Ground
J1-P	GND	Cathode side of AWD circuit
J1-R	BAT_PROT	SSCB output provides battery power to loads
J1-S	FAN	Relay control input to enable operation of the fan

CHARACTERISTIC	PARAMETER	UNIT	NOTE
Operating Temperature	-40 to +55	°C	Ambient temperatures at which module should remain within specified limits
Storage Temperature	-50 to +85	°C	Ambient temperatures which should have no adverse eff**ects** on module operation

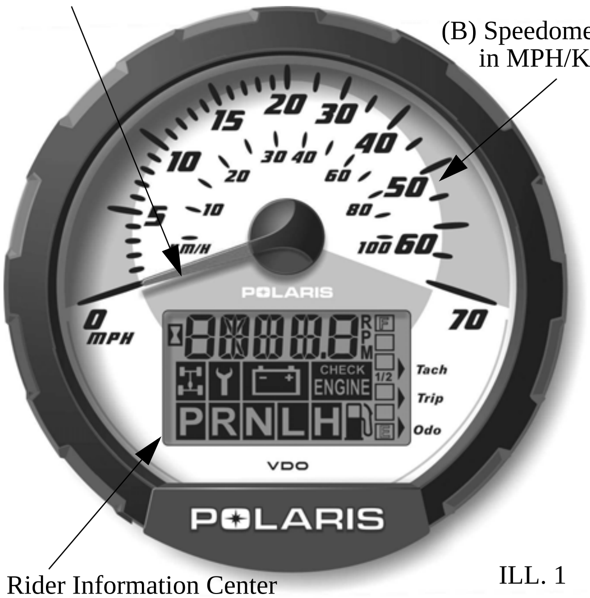
CHARACTERISTIC	MIN	TYP	MAX	UNIT	NOTE
Battery Voltage	7	14.4	16	Vdc	PDM functions will operate over this range
Batt. Quiescent Current			2	mA	Min. draw from battery with key off
REGULATOR					
Regulator Voltage	14.1	14.4	14.8	Vdc	
Regulator Output			18	Adc	Max. total DC amperage available from regulator
Minimum Battery Voltage	2			Vdc	Min. voltage required on RUN for regulator to begin operation
Alternator Coil 1 Resistance	14.7k	15k	15.2k	Ohm	Resistance between alternator signal and ground Only on this designated alternator signal
BAT_PROT OUTPUT					
Output Current			8	Amp	Nominal Continuous output current
Limit	9	11	20	Amp	Current level that will cause turn off after delay
Time Delay		100	150	mSec	Time above limit until SSCB trips
Voltage	5.5			Vdc	Min Battery voltage for BAT_PROT to remain on
ACC_PWR OUTPUT					
Output Current		10	25	Amp	Max. continuous current
Nominal Current		26		Amp	Current above which the output will shut off after 15 - 25 seconds
Overload Current	13	16	19	Amp	Current above which the output will shut off after 1.5 - 2.5 seconds
Peak Current - Hardware	31	50	65	Amp	Initial peak short circuit current limit above which the device will current limit then quickly shut down
Power Off Delay	7	10	13	Sec	Delay after run switch is turned off
LIGHTS OUTPUT					
Output Current			18	Amp	MAX Continuous Current
Current Limit	40	65	65	Amp	Current limit above which device will shut down within thermal shutdown time
Repetitive Short Circuit Limit		65		Amp	Current level that will cause turn off and on after delay
Inrush Time	50	100	500	mSec	Inrush time delay
STARTER OUTPUT					
Current			6	Amp	Current capability of the STARTER output
TRANS					
Park Voltage	118	490	870	mVdc	Current capability of the output
Neutral Voltage	1.73	2.11	2.48	Vdc	Current capability of the output
REVERSE POLARITY PROTECTION					
Battery Reverse Current		1.8	2	mA	Max reverse leakage current when connected in reverse
Reverse Bias Voltage		2	-55	Vdc	Absolute maximum reverse voltage before device breakdown.

INSTRUMENT CLUSTER

Overview

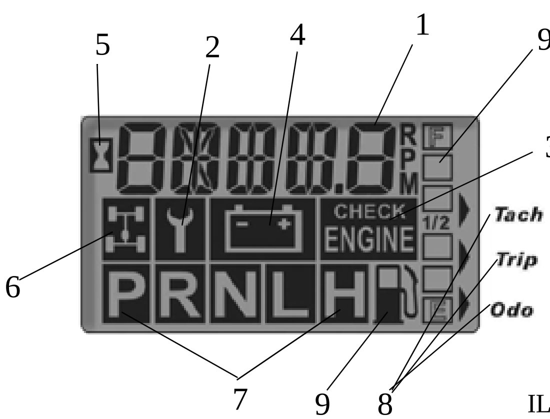
(A) Needle (also flashes during warning condition)

(B) Speedometer in MPH/KPH



(C) Rider Information Center

ILL. 1



ILL. 2

Introduction

Refer To Illustration 1:

The Polaris ATV Instrument Cluster is powered by battery voltage (12 VDC) and requires inputs from the engine RPM, transmission gear, and transmission speed sensor for proper operation. Two harnesses plug into the cluster head; one from the transmission speed sensor, and one from the vehicle main harness. A non-serviceable internal memory battery maintains odometer and hour meter data when the machine is not running. The illumination lamp inside the gauge is non-serviceable and is designed to last for the life of the unit. (A) The speedometer needle indicates speed from an electronic wheel speed sensor located on the transmission and the needle also flashes during a warning condition. The speedometer needle indicates speed in MPH and KPH. **NOTE: A flashing needle could indicate a hot engine, low battery warning, or the No. 10 Pin could be grounded.** (B) The speedometer features numbers in Mile Per Hour (MPH) and Kilometers Per Hour (KPH). (C) The Rider Information Center performs a number of functions (See Illustration 2):

1. Odometer / Tachometer / Trip meter / Hour Meter / Clock

- **Odometer -** records the miles traveled by the ATV.
- **Tachometer -** displays engine RPM. This feature will also display with the vehicle in motion NOTE: Small RPM fluctuations from day to day are normal because of changes in humidity, temperature, and elevation
- **Trip meter -** records the miles traveled by the ATV if reset before each trip or total miles to 999. To reset the trip meter, select the trip meter mode. Press and hold the mode button (override button) until the total changes to 0. NOTE: In the Rider Information Center, the trip meter display contains a decimal point, but the odometer displays without a decimal point.
- **Hour meter -** logs the total hours the engine has been in operation.
- **Clock -** displays hours and minutes.

2. Programmable Service Interval / Diagnostic Mode

- **Service Interval** - The purpose of the programmable service interval is to provide the consumer and the dealer with a convenient way to schedule routine maintenance. When the ATV leaves the factory, this feature is set at “50 hours". When the first 50 hours of engine operation are finished the wrench icon will flash for 10 seconds each time the ATV is started as a reminder that ATV maintenance is due. NOTE: To reset the Service Interval, follow the directions for “SETTING NEW SERVICE INTERVAL” later in this chapter.

3. Check Engine Warning Indicator

- The word HOT will display alpha numerically when the engine is overheating. Do not continue to operate the ATV if this warning appears. Refer to Chapter 3 “COOLING SYSTEM TROUBLESHOOTING” for help with diagnosis of overheating.

4. High/Low Battery Voltage

- This warning usually indicates that the ATV is being operated at an RPM too low to keep the battery charged. A low battery warning may also occur under normal operation if the machine is at idle and high electrical load (lights, cooling fan, accessories) is applied. Driving at a higher RPM or connecting a battery charger will usually clear the warning.

5. Engine Hour Display Indicator

- Displays number of hours of engine operation.

6. AWD Indicator

- Illuminates when the electrical portion of the AWD system is enabled.

7. Gear Indicator

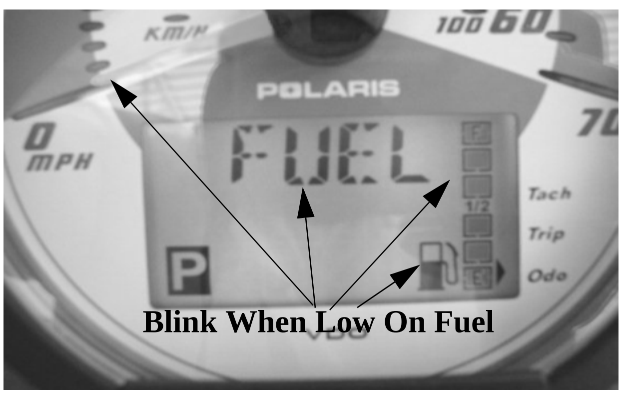
- Specifies what position the shift lever and transmission are in. This area is blank if a fault occurs.

8. Mode Indicator

- Indicates which modes are being utilized.

9. Fuel Gauge

- The segments of the fuel gauge indicate the level of fuel in the fuel tank. When the last segment clears, a low fuel warning is activated. All related icons will flash, “FUEL” will display in the LCD, and the speedometer needle will blink. If riding, be sure to refuel immediately.



Instrument Cluster Diagnostic Mode

NOTE: This gauge features auto shut-off protection if the voltage on the DC bus is excessive. This is usually the result of an open battery condition, and the gauge is designed to survive such an event.

NOTE: If the gauge will not indicate what gear it is in and will not allow AWD operation, AWD can still be enabled by holding in the mode/override button.

NOTE: As long as you are in the diagnostic mode, the wrench icon will remain lit.

NOTE: Any movement of the tires will trigger the speedometer out of the diagnostic mode and into standard display mode.

NOTE: To leave the diagnostic mode, turn the key switch off and on.

1. Turn the key switch off and wait 10 seconds.
2. Set the park brake and shift the transmission to neutral.
3. Hold the mode/reverse override button as you turn the key switch on.
4. Release the switch as soon as the display is activated.

Use the mode/reverse override button to toggle through the diagnostic screens.

NOTE: The initial screen display refers to the software version installed on your ATV. This information is only displayed briefly.

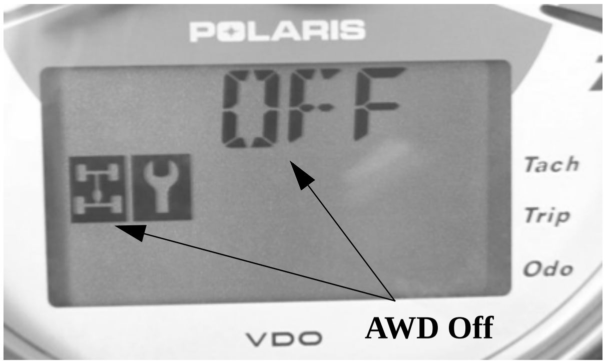
Screen 1: The first screen indicates battery voltage. Refer to Ill. 2.

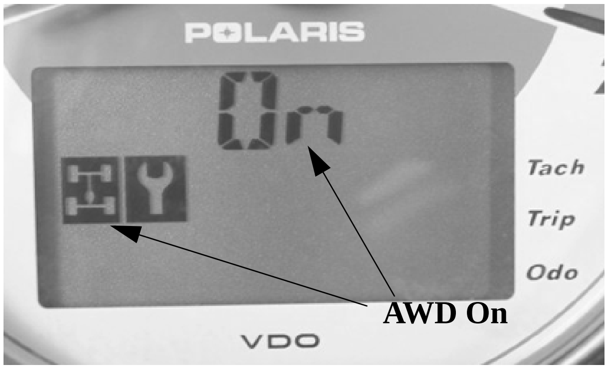
Ill. 2

Screen 2: Tachometer (Ill. 3) indicates engine rpm.

Ill.3

Screen 3: AWD diagnostic screen. This screen indicates whether or not current is flowing through the AWD coil on models with switchable AWD.

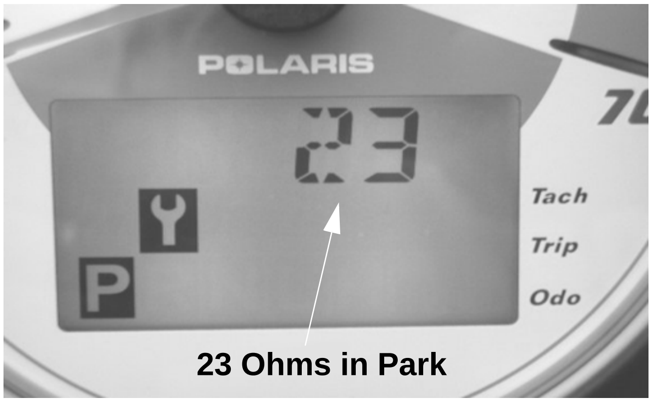


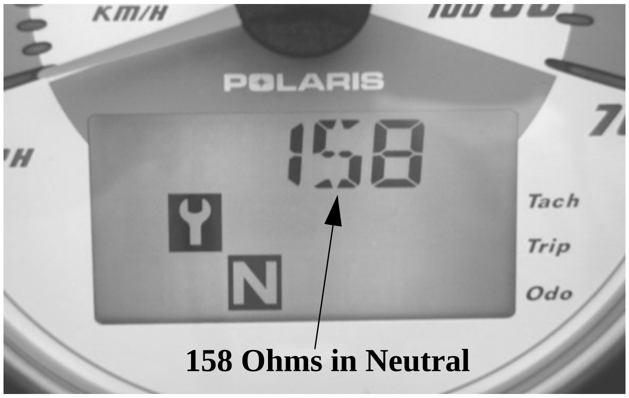


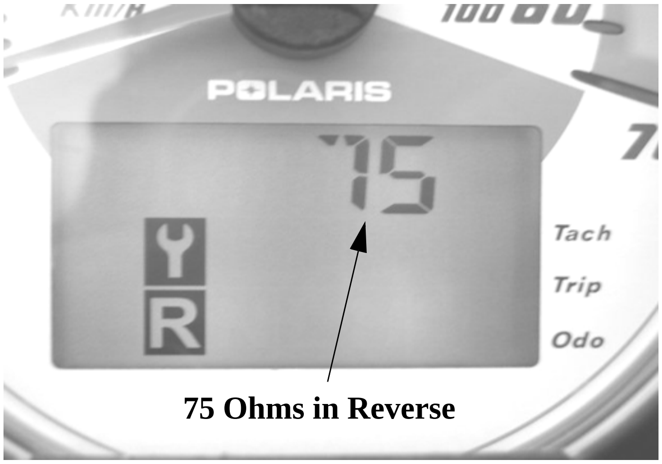
Screen 4: Gear Circuit Diagnostic

This screen displays the resistance value (in ohms) being read at the gear switch input of the gauge.

NOTE: 10-20% Variance from these reading is within normal parameters.







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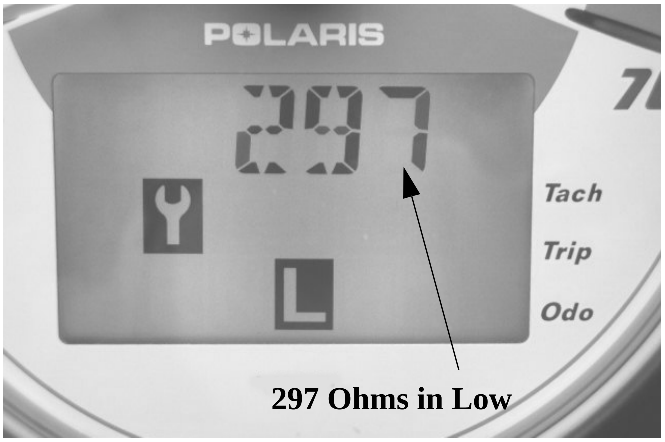
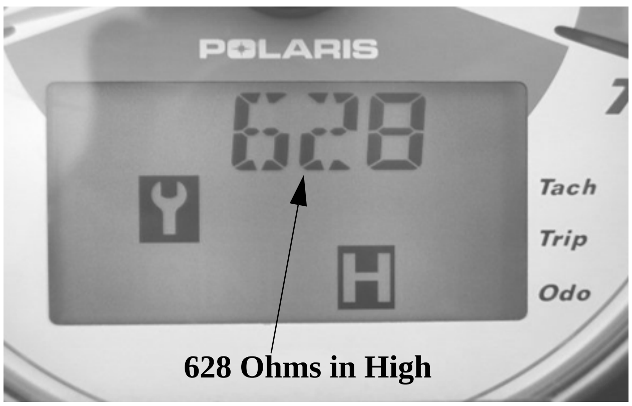


297 Ohms in Low

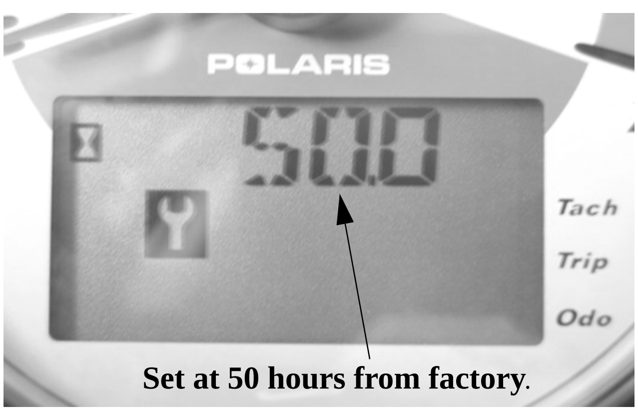


628 Ohms in High

5. Programmable Service Interval:

The purpose of the programmable service interval is to provide the consumer and dealer with a convenient reminder for routine maintenance. When the ATV leaves the factory, this feature is set at 50 hours.

Once the service interval mode is set with the hours when service is due, the hours of actual engine operation are subtracted from the set hours until 0 is reached. When the counter reaches 0, the wrench icon will flash quickly for 10 seconds each time the vehicle is started as a reminder that the periodic maintenance is due.



Set at 50 hours from factory.

Setting A New Service Interval

1. While in the service interval mode, press and hold the mode/override button until the wrench icon flashes. When it begins to flash, release the button.
2. The setting will increase by one hour each time the button is pressed. Pressing and holding the button will allow the numbers to escalate much faster.
3. When the desired time increment is displayed, release the button and wait for the wrench to stop flashing. When the wrench stops blinking, your service hours are set.

NOTE: If you scroll past the intended number, hold the button down until the count turns over to 0. You can then reset the number.

Turn Service Interval OFF:

1. If the service interval is enabled (functioning) on your ATV and you wish to turn it off, toggle to the service interval mode.
2. Press and hold the mode button for approximately 7 seconds until the word OFF appears in the Rider Information Center. The service interval is now OFF.To enable (turn on) the service interval mode, repeat the steps above in “Setting Service Interval After Countdown”.

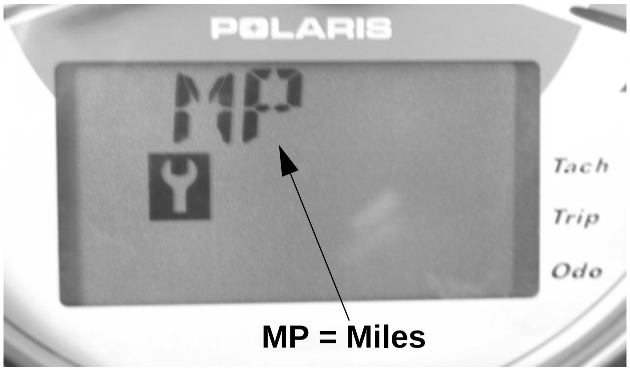
Change Service Interval Time:

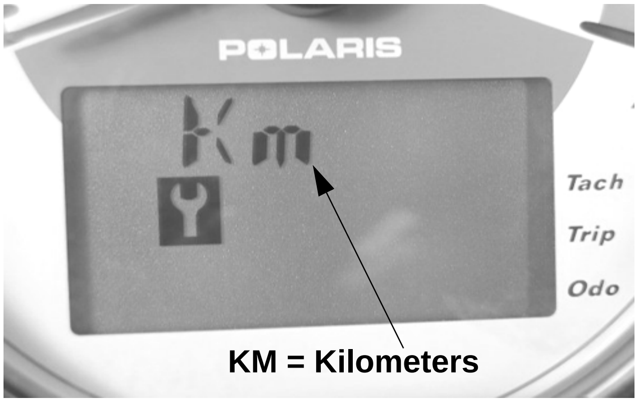
If you would like to change the service interval time, (for example change the interval from 50 hrs. to 55 hrs.). Follow the steps below:

1. While in the service interval mode, press and hold the mode button for approximately 7 seconds until the word OFF appears in the Rider Information Center.
2. Wait 5 seconds and then press the mode button in until the wrench icon flashes.
3. Press the mode button again to set the desired service increment.
4. Release the button and wait for the wrench icon to stop flashing. The new service interval is now set.

Screen 6: Miles/Kilometers:

The display in the trip meter and odometer can be changed to display either kilometers or miles. The current display mode will be shown as “KM” or “MP”. To change, hold in the mode button until the letters flash, then press and release the button once. When the display stops flashing, the mode has been set.



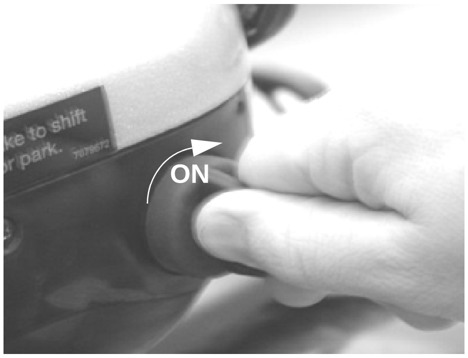


EFI Diagnostic Mode

NOTE: The EFI diagnostic mode is intended to quickly view fault codes stored in the EFI module. Polaris dealers are equipped with the proper diagnostic tools to further diagnose the blink codes.

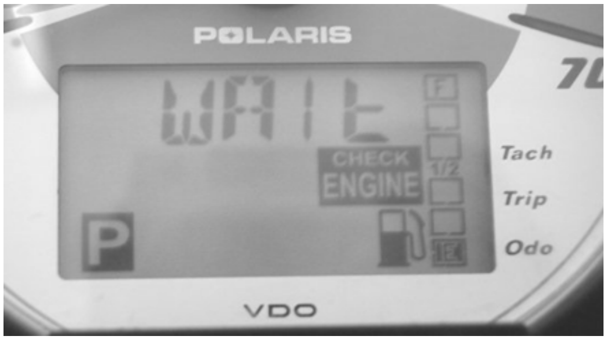
To recall blink codes (fail codes) from the ECM:

1. Verify the ATV key switch is off and the transmission is in park.
2. Turn the key switch ON and OFF 3 times within 5 seconds and leave the key switch in the ON position on the third turn.

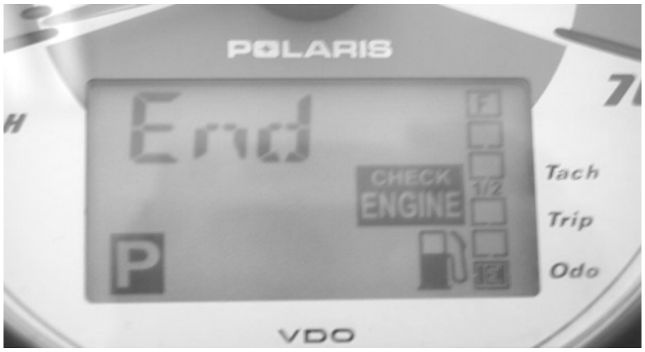


3. The word “Wait” will appear, the ECM is now searching for blink codes. READ AND RECORD THE NUMBER OF FLASHES OF THE ‘MIL’ (Check Engine) LIGHT. Codes ‘12’ and ‘61’ indicate the beginning and end of the check sequence.

NOTE: The ‘check engine’ icon (mil) will flash the codes during this mode. Record the flash sequences.

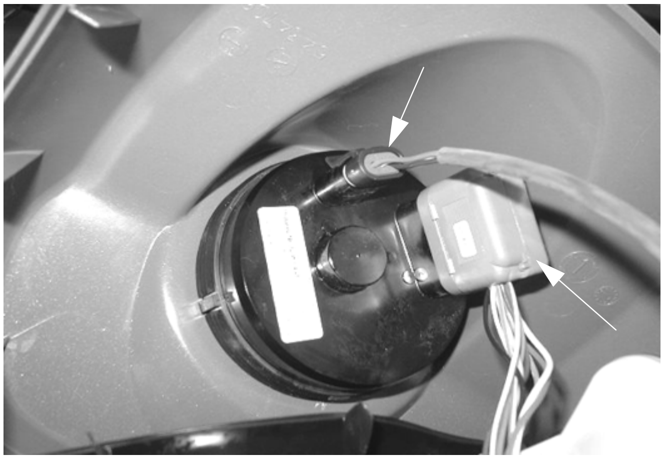


4. The word “End” will display after all of the codes have been displayed.

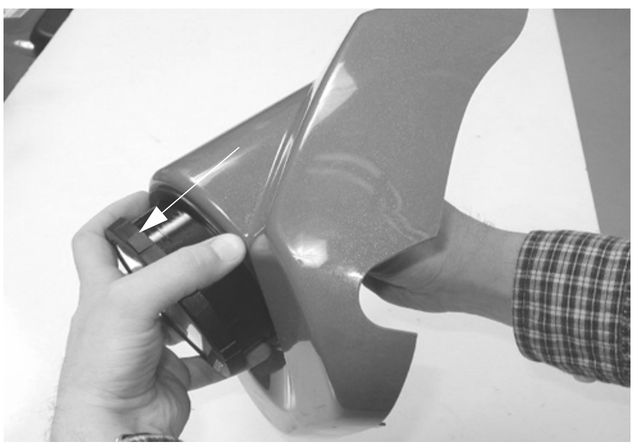


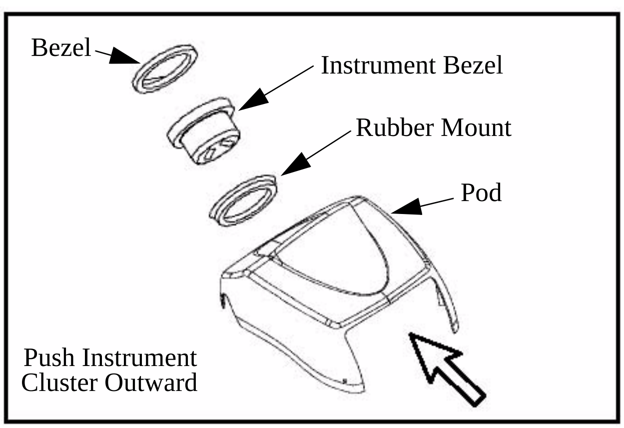
Speedometer Removal

1. Remove the three screws that secure the headlight pod cover and disconnect the wire connectors from the instrument cluster.



2. Push the instrument cluster out from the backside of the pod, while securely holding the pod.

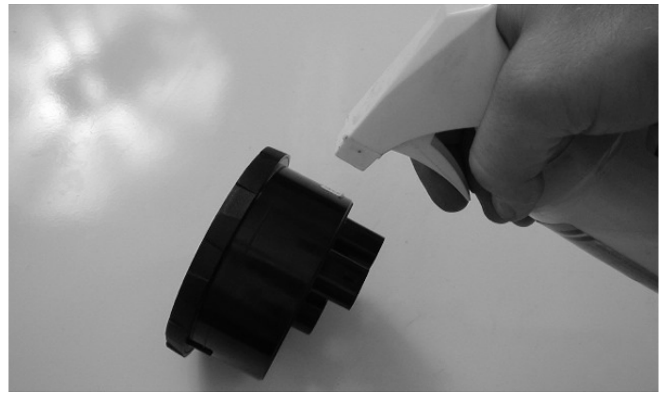




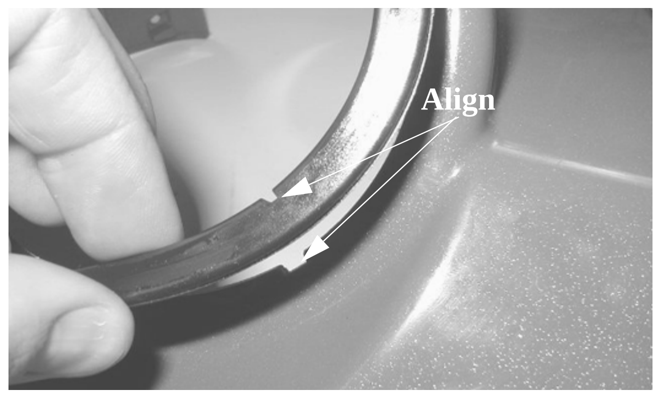
NOTE: Do not remove the rubber grommet in the pod. Only remove the rubber grommet if necessary. The bezel is a snap-on assembly and is a serviceable part.

Speedometer Installation

1. Spray a soap and water mixture onto the outer surface area of the instrument cluster. This will help the instrument cluster slide into the pod assembly more easily.



2. Be sure the rubber grommet inside the pod is fully installed and that the indexing key is in the headlight pod keyway.

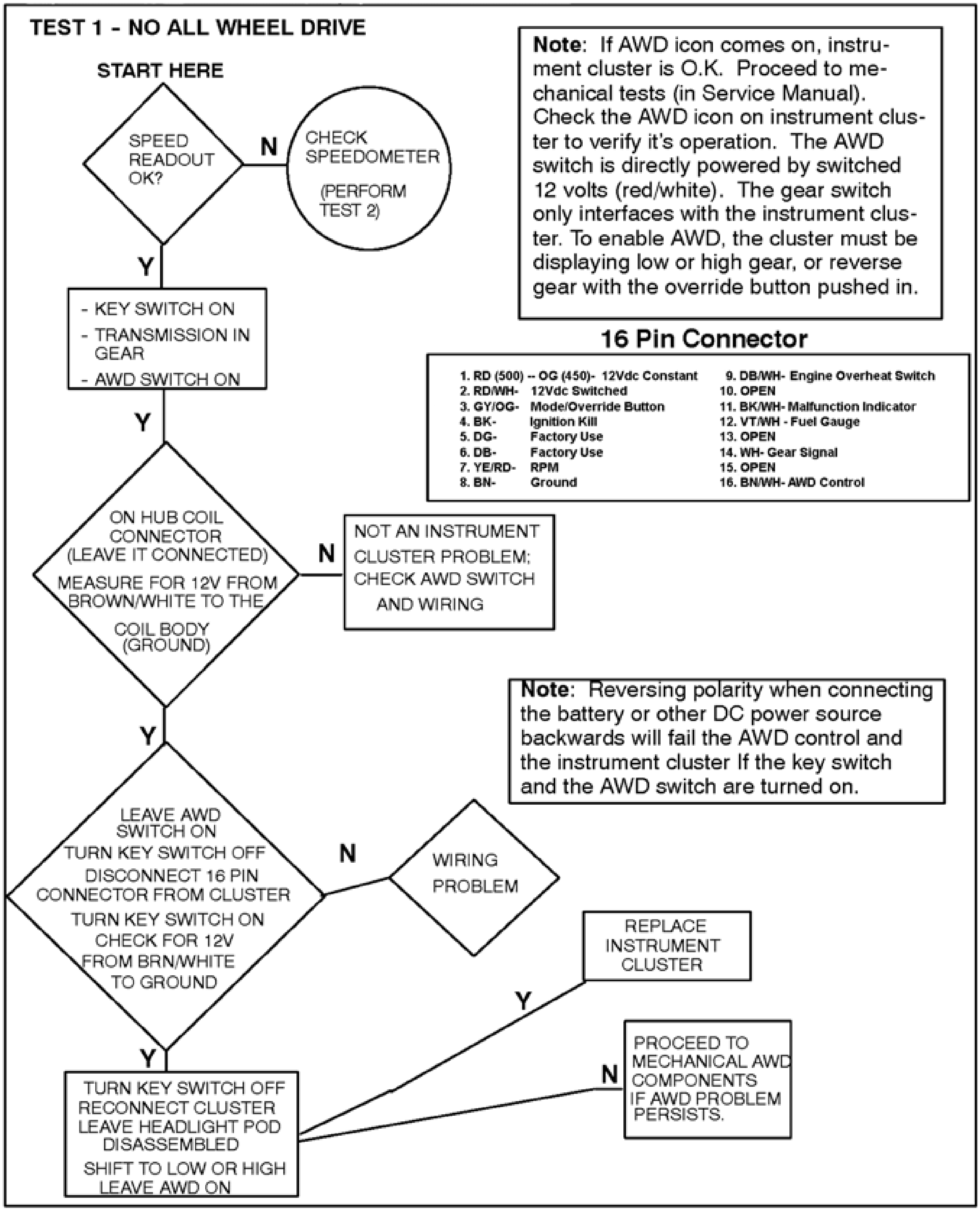


3. Hold the pod assembly securely and insert the instrument cluster into the pod assembly. Twist the instrument cluster gently in a clockwise motion to properly seat the instrument cluster into the pod assembly. Apply pressure on the bezel while pressing down on the instrument cluster.

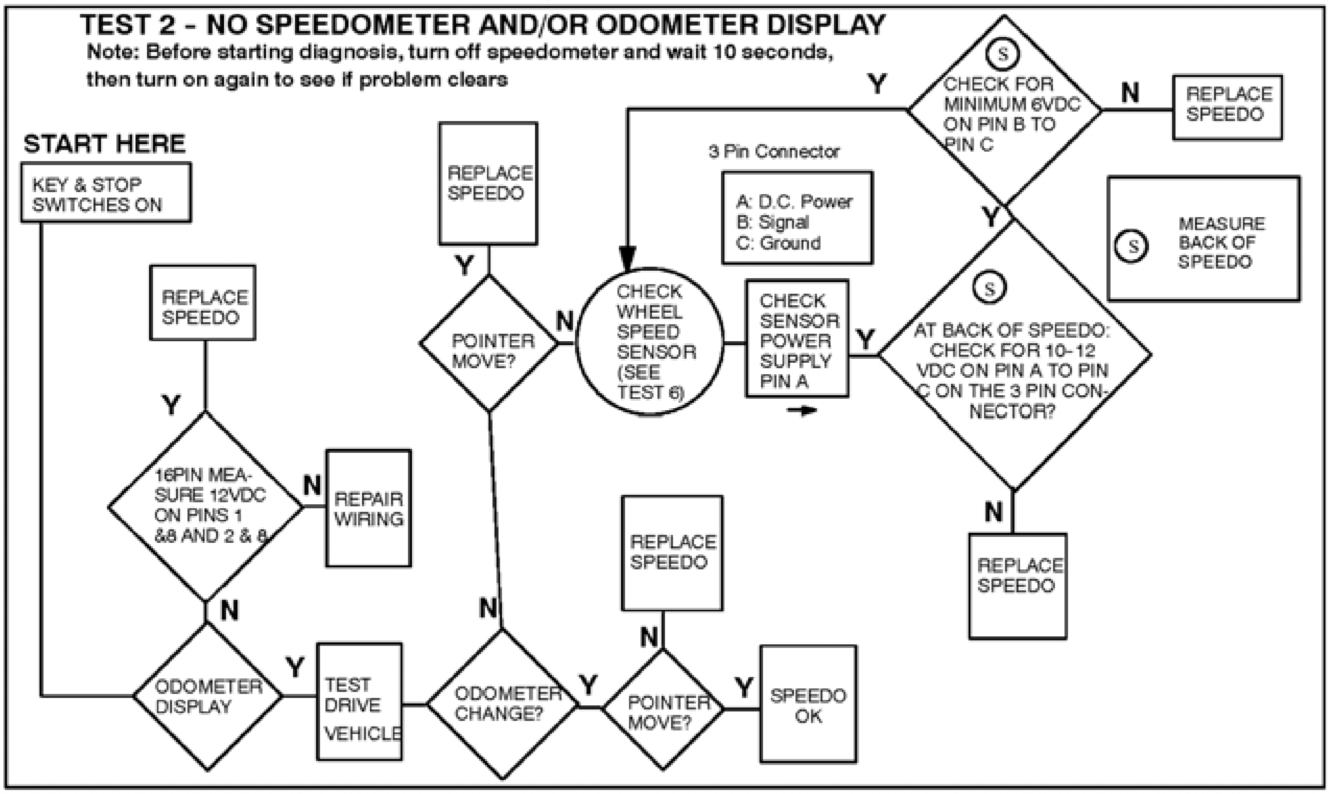
NOTE: Do not allow alcohol or petroleum products to come in contact with the instrument cluster lens.

ALL WHEEL DRIVE AND SPEEDOMETER TROUBLESHOOTING

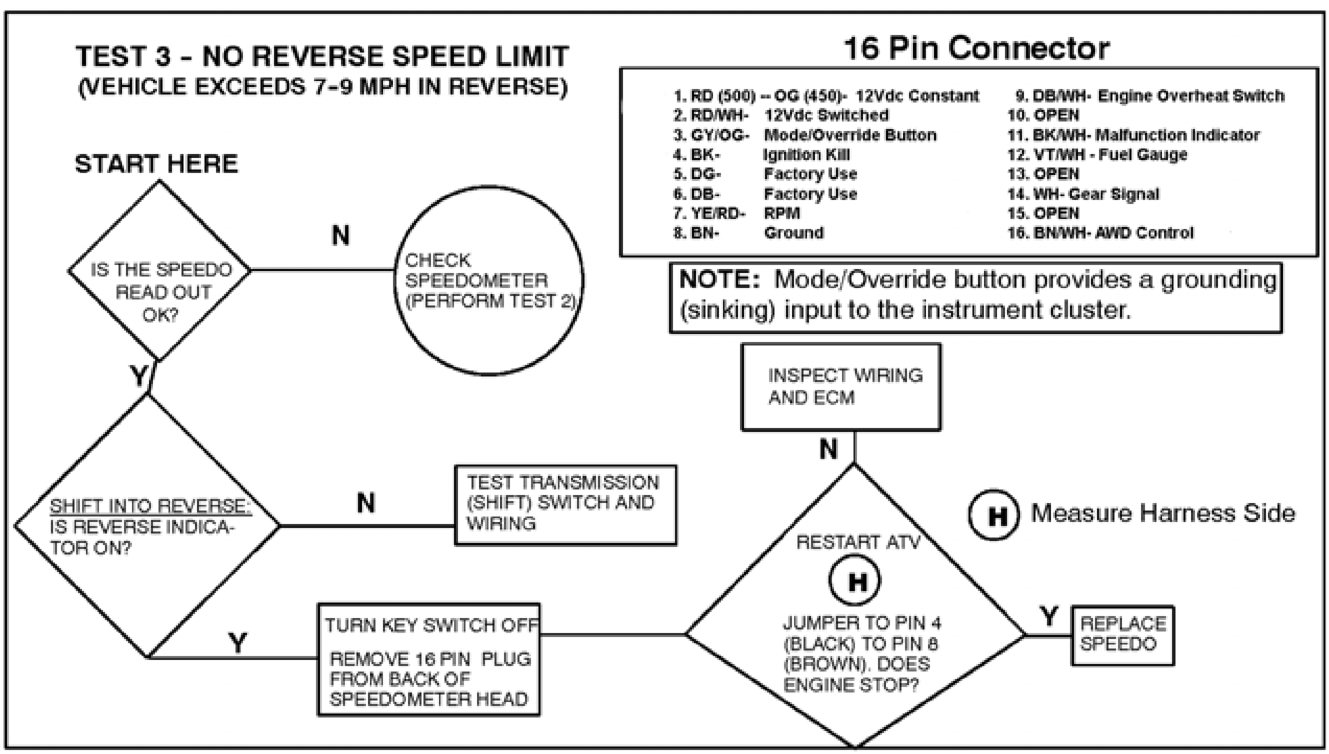
TEST 1 - No All Wheel Drive



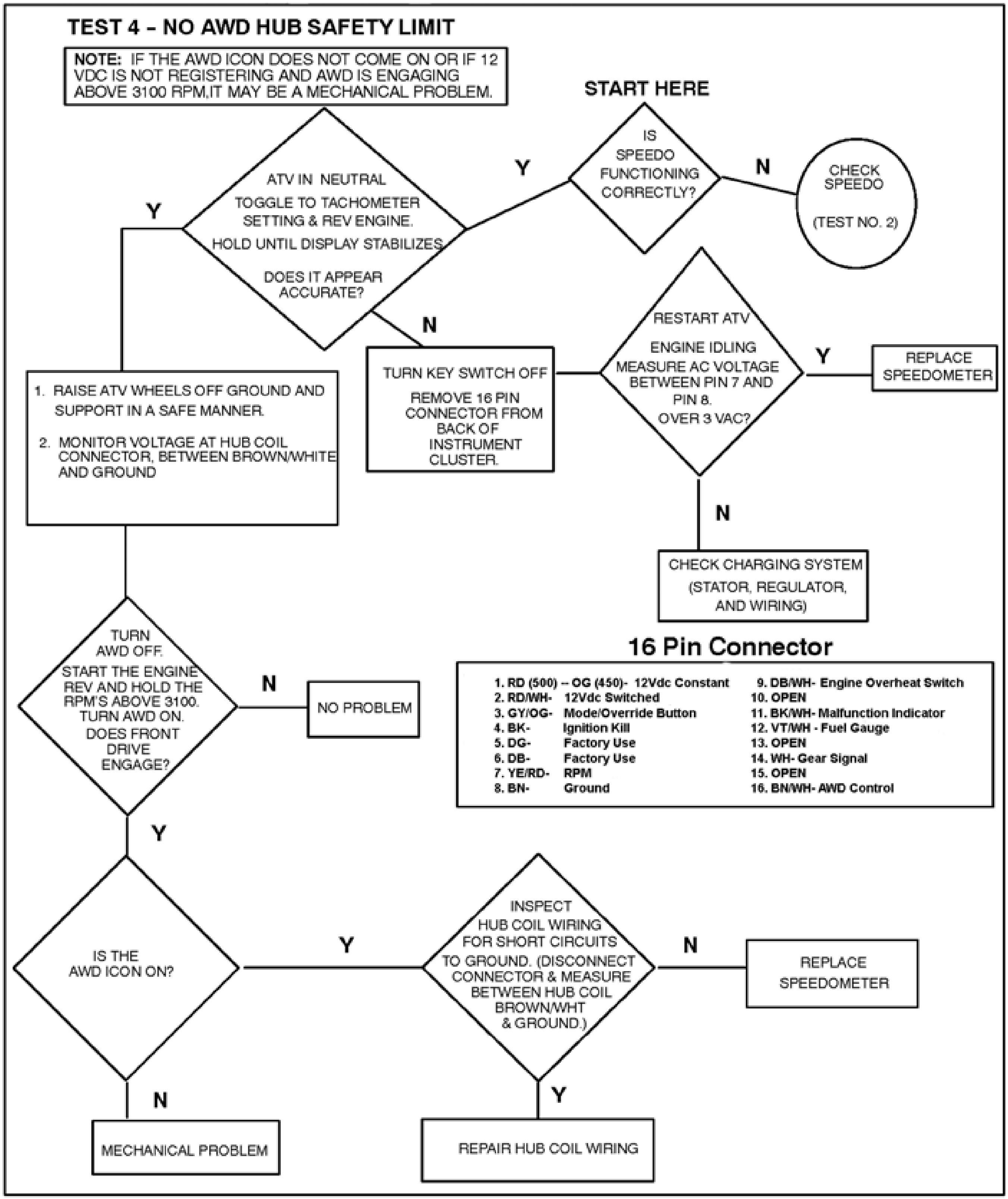
TEST 2 - No Speedometer Display



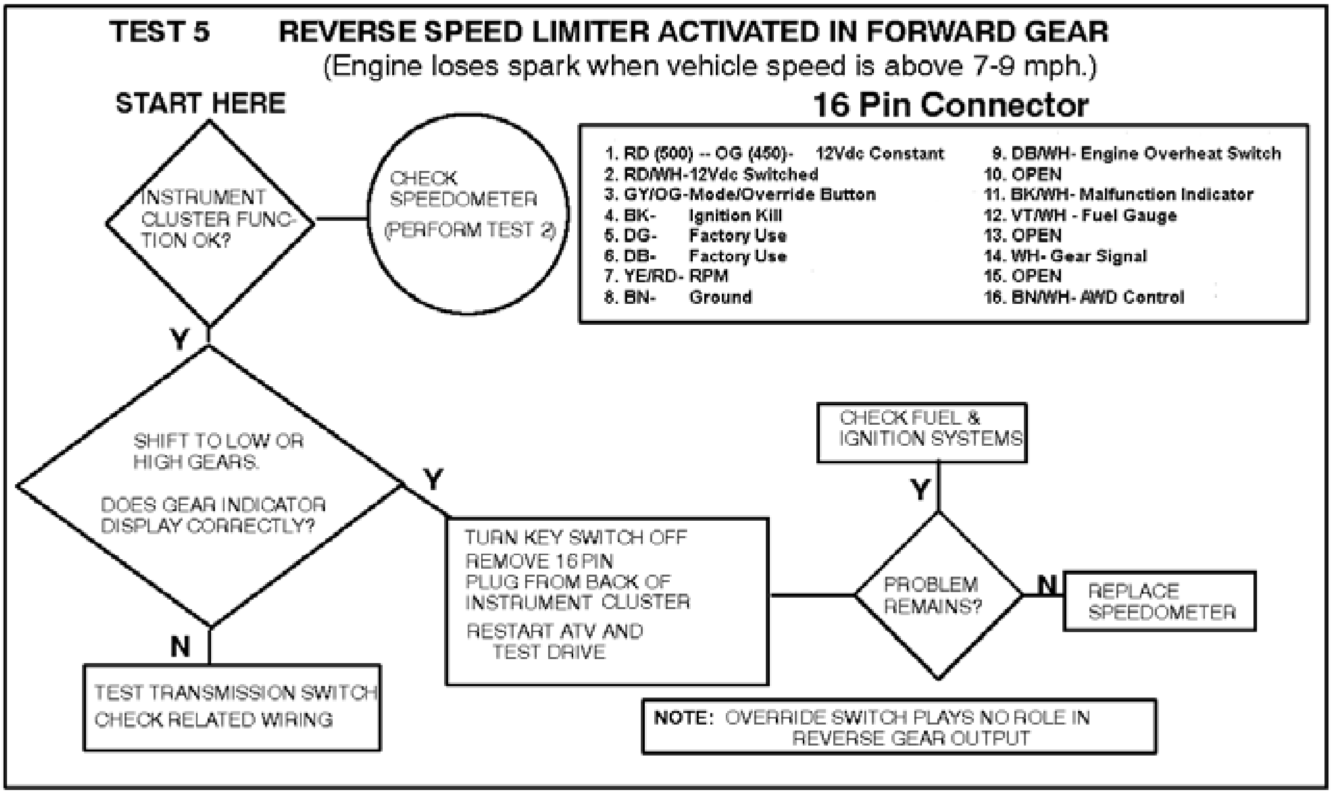
TEST 3 - No Reverse Speed Limit



TEST 4 - No AWD Hub Safety Limit



TEST 5 - Reverse Speed Limiter Activated In Forward Gear



TEST 6 - Wheel Speed Sensor

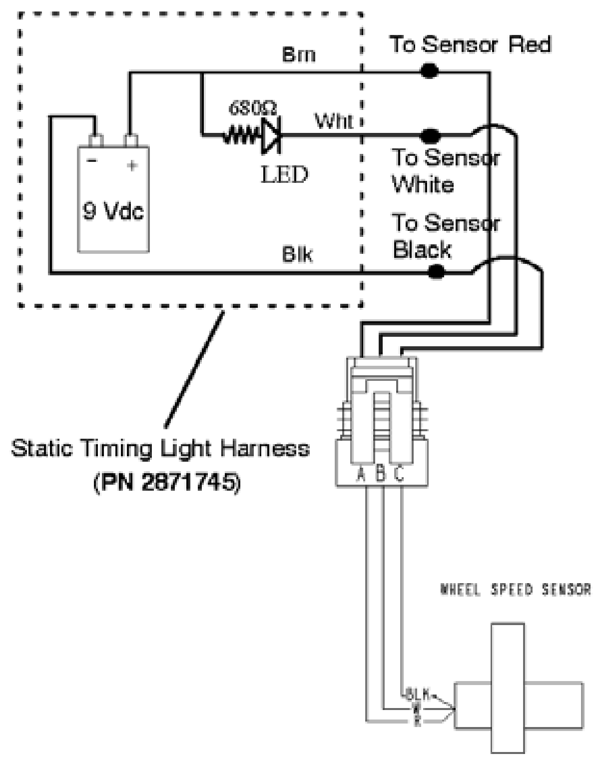
TEST 6 WHEEL SPEED SENSOR

Tools Required:

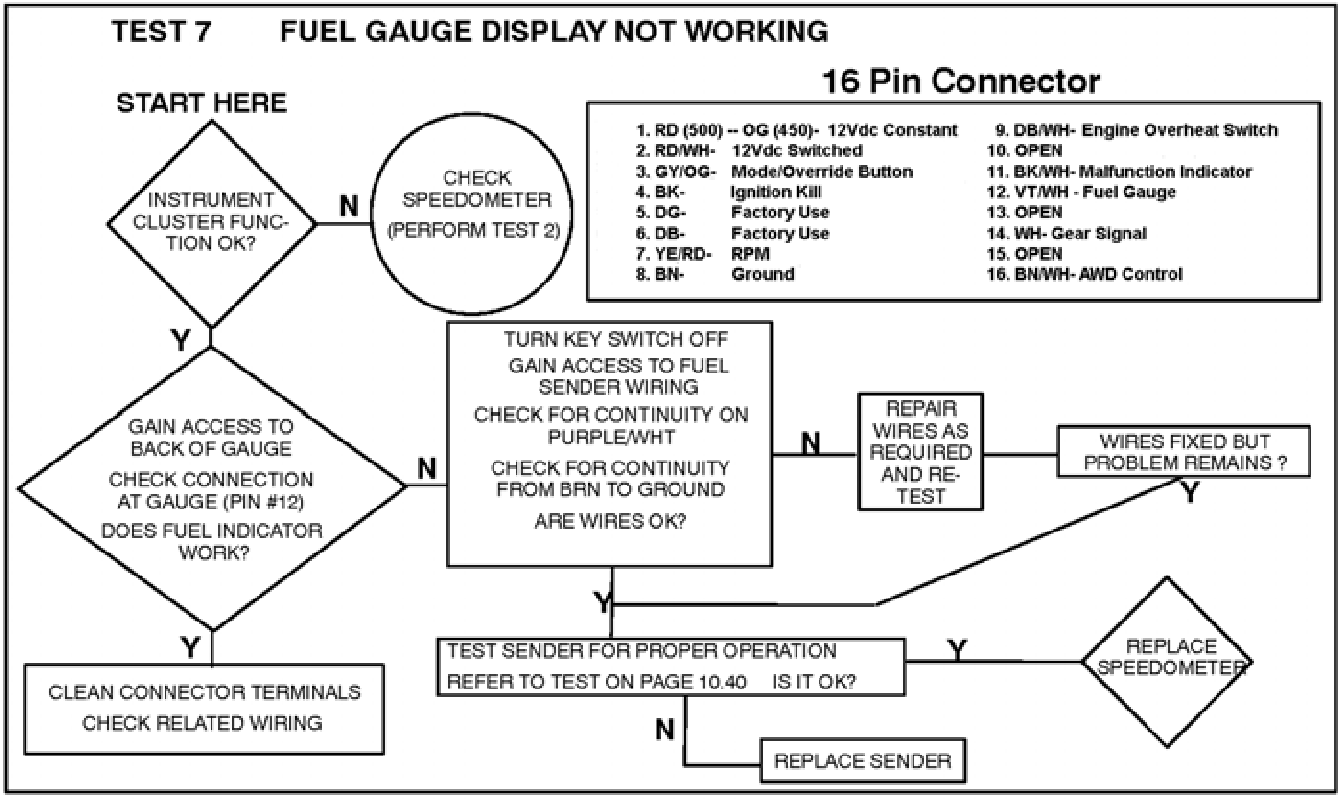
- Static Timing Light Harness **(PN 2871745)**
- Hall Sensor Probe Harness **(PN 2460761)** or equivalent jumper wires.

To test wheel speed sensor:

1. Disconnect 3 Pin connector from speedometer.
2. Connect wires from test light to sensor 3 Pin connector as shown at right, using the Hall Sensor Probe Harness **(PN 2460761)** or jumper leads.
3. Elevate end of vehicle sensor is located at until the tires are free to rotate.
4. Slowly turn the applicable wheel while observing the test light.
5. If light flashes, sensor is O.K. Be sure connections are good and 9 volt battery is in good condition.



TEST 7 - Fuel Gauge Display Not Working



TEST 8 - Shift Indicator Not Working

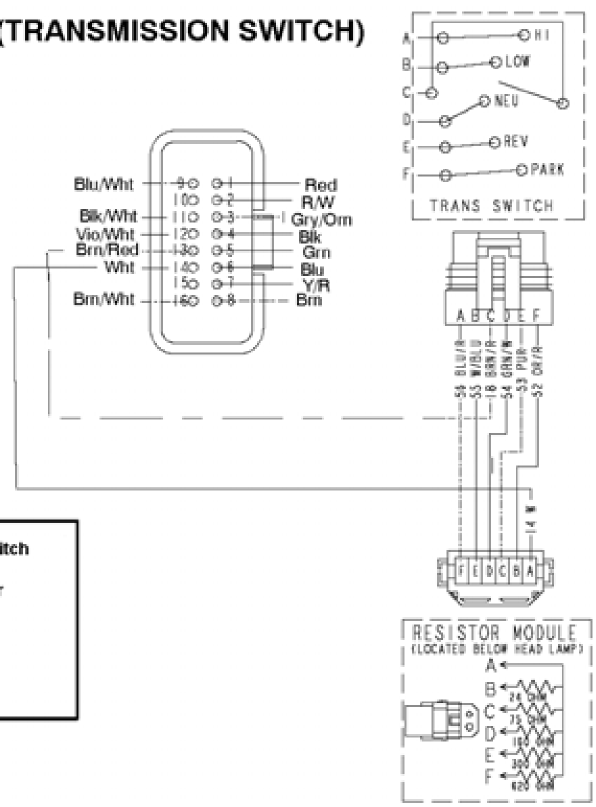
TEST 8 SHIFT INDICATOR NOT WORKING (TRANSMISSION SWITCH)

Operation:

The Instrument cluster sends a signal through the White wire to the resistor module. This signal completes it's path on the Brown/Red wire through the transmission switch. Depending on the transmission switch position, the Instrument cluster interprets the resistance reading and displays the corresponding shift position in the LCD panel.

Testing:

Use the diagram provided to test the continuity loop at each of the shift points with a multi-meter. **NOTE:** *The Instrument cluster contains this diagnostic feature.*



16 Pin Connector

1. RD (500) -- OG (450)- 12Vdc Constant	9. DB/WH- Engine Overheat Switch
2. RD/WH- 12Vdc Switched	10. OPEN
3. GY/OG- Mode/Override Button	11. BK/WH- Malfunction Indicator
4. BK- Ignition Kill	12. VT/WH - Fuel Gauge
5. DG- Factory Use	13. OPEN
6. DB- Factory Use	14. WH- Gear Signal
7. YE/RD- RPM	15. OPEN
8. BN- Ground	16. BN/WH- AWD Control

ACTIVE DESCENT CONTROL (ADC) COIL

Operation Overview

- AWD switch must be ‘ON’.
- PDM pin ‘M’ on SSCB #1 controls the power to the ADC hub coil for operation.
- PDM pin ‘C’ on SSCB #1 senses the gear signal indicating the transmission is engaged and is not in Park or Neutral.
- PDM pin ‘K’ on SSCB #2 senses the speed sensor signal for determining if vehicle speed is below 15 Mph.
- ECU pin #21 sends a signal to PDM pin ‘D’ on SSCB #1 to determine the TPS position and will cancel ADC operation if TPS moves off ‘idle’ position.
- System must be grounded to operate.

Diagnosing System Failures

- Verify the AWD switch is functional.
- Verify the ADC hub coil is functional. Test the ADC hub coil using an ohm meter.

ADC Hub Coil Resistance:
12 Ω ± 5%

- Verify the TPS is functioning correctly. Test using Digital Wrench Diagnostic Software. (Dealer Only)
- Verify the wiring harness, wiring, connectors, connector pins, grounds and PDM / ECU pin locations are undamaged, clean and connect properly.
- Verify continuity of wire connections with a known good volt/ohm meter.

IMPORTANT: Verify all wires and wiring connections have been tested properly with a known good volt/ ohm meter before suspecting a component failure. 80% of all electrical issues are caused by bad/failed connections and grounds.

NOTE: Refer to the ADC subsystem diagram located in ‘Wire Diagrams’ at the end of this chapter.

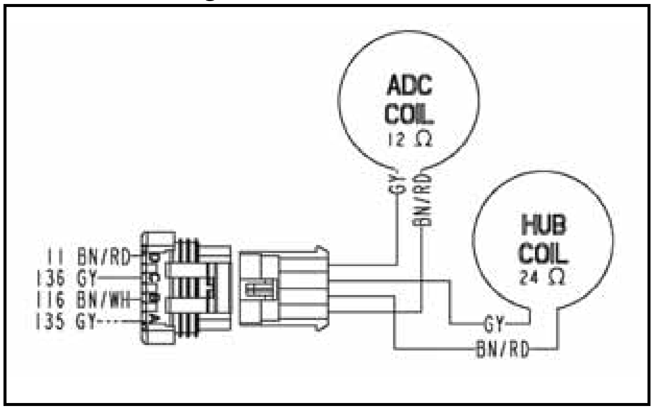
ALL WHEEL DRIVE (AWD) COIL

Operation Overview

- AWD switch must be ‘ON’. 12Vdc power is present at the ADC hub coil.
- The instrument cluster senses grounding at pin #16. AWD icon should turn on at the instrument cluster.
- System must be grounded to operate.

Diagnosing System Failures

- Verify the AWD switch is functional.
- Verify the AWD hub coil is functional. Test the AWD hub coil using an ohm meter.



AWD Hub Coil Resistance:
24 Ω ± 5%

- Verify the wiring harness, wiring, connectors, connector pins and grounds are undamaged, clean and connect properly.
- Verify continuity of wire connections with a known good volt/ohm meter.

IMPORTANT: Verify all wires and wiring connections have been tested properly with a known good volt/ ohm meter before suspecting a component failure. 80% of all electrical issues are caused by bad/failed connections and grounds.

COOLING SYSTEM COMPONENTS

Fan Control Circuit Operation

Power is supplied to the fan via the Orange/Black wire when the relay is ON. The ground path for the fan motor is through the Brown harness wire. Refer to "RELAYS" later in this chapter for more information on fan functions.

CAUTION

Keep hands away from fan blades during operation. Serious personal injury could result.

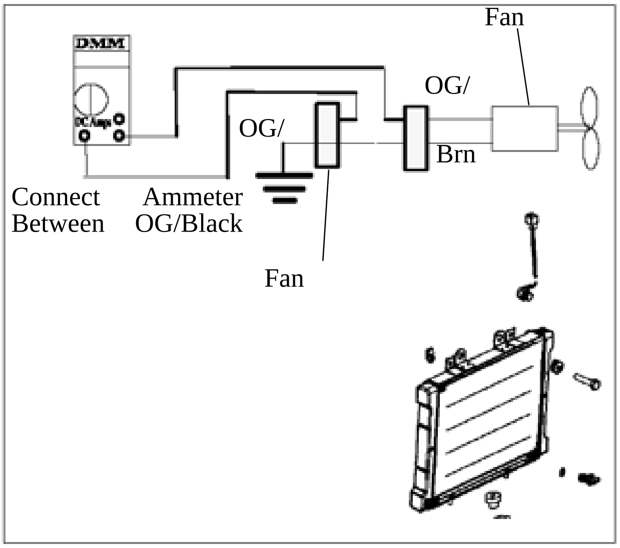
NOTE: The fan may not function or operation may be delayed if coolant level is low or if air is trapped in the cooling system. Be sure cooling system is full and purged of air. Refer to Maintenance Chapter 2 for cooling system information.

Fan Control Bypass Test

1. Disconnect harness from coolant temperature sensor on engine.
2. With the ATV in "Park" and with the parking brake on, turn the ignition key (and engine stop switch) "ON". The fan should start running.
3. If the fan does not run or runs slowly, check the fan motor wiring, ground, motor condition for proper operation (refer to "FAN MOTOR CURRENT DRAW" in this section). 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.

Fan Motor Current Draw Test

A current draw test will provide a good indication of fan motor condition. A worn or damaged fan motor will draw more current, which causes a reduction in blade speed and reduced cooling.



1. Disconnect the harness from the coolant sensor.
2. Connect a DC ammeter in between the fan switch harness wires as shown.
3. Be sure fan blade is free to rotate.
4. Turn ignition key and engine stop switch to ON" position. Read the current draw on ammeter with fan running.
5. If the fan motor draws more than 10 Amps, replace the motor.

Fan Motor Current Draw:
Should Be Less Than 10 Amps

NOTE: This fan motor current draw specification only applies to Sportsman EFI models.

Coolant Temperature Sensor

The coolant temperature sensor can be tested using an ohmmeter or voltmeter.

If the ECT circuit is open the engine Hot light and fan will both come on. With engine at an ambient temperature of 68°F (20°C), disconnect lead and measure the resistance of sensor between the two ECT terminals and compare to the specification listed.

1. With the engine and temperature sensor at room temperature (68°F = 20°C), disconnect the harness connector.
2. With the meter in the ohms mode, place the meter leads onto the sensor contacts.
3. Use the Temperature / Resistance table to determine if the sensor needs to be replaced.

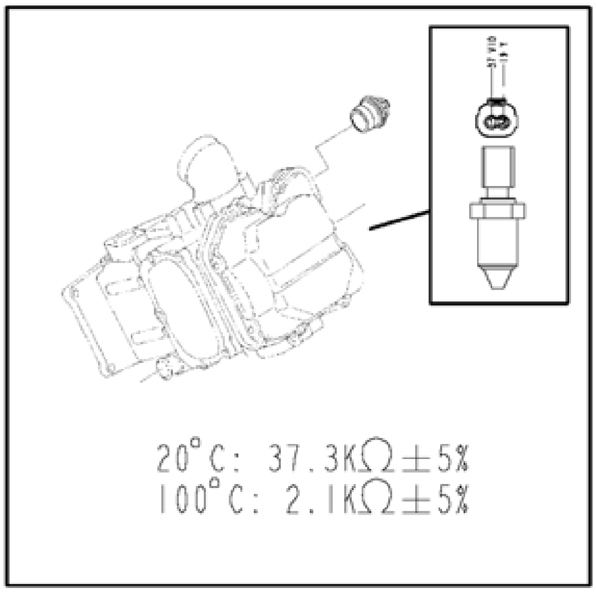


Table 10-1:

TEMPERATURE °F (°C)	RESISTANCE
68 °F (20 °C)	37.3 k Ω ± 5%
212 °F (100 °C)	2.1 k Ω ± 5%

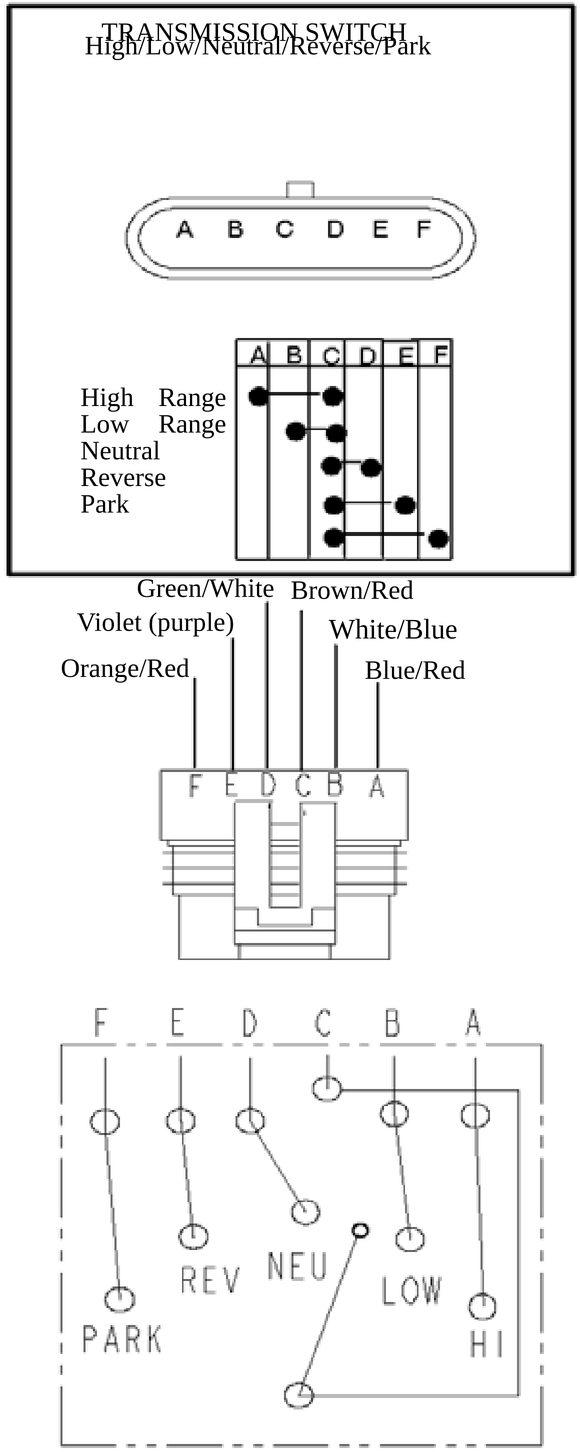
NOTE: If the coolant temperature sensor or circuit malfunctions the radiator fan will default to 'ON'.

NOTE: The fan may not function or operation may be delayed if coolant level is low or if air is trapped in the cooling system. Be sure cooling system is full and purged of air. Refer to Maintenance Chapter 2 for cooling system information.

GEAR POSITION INDICATOR SWITCH

Test Diagram

NOTE: Also see “INSTRUMENT CLUSTER TROUBLESHOOTING” for gear switch resistance.



ELECTRONIC THROTTLE CONTROL (ETC) SWITCH

Operation Overview

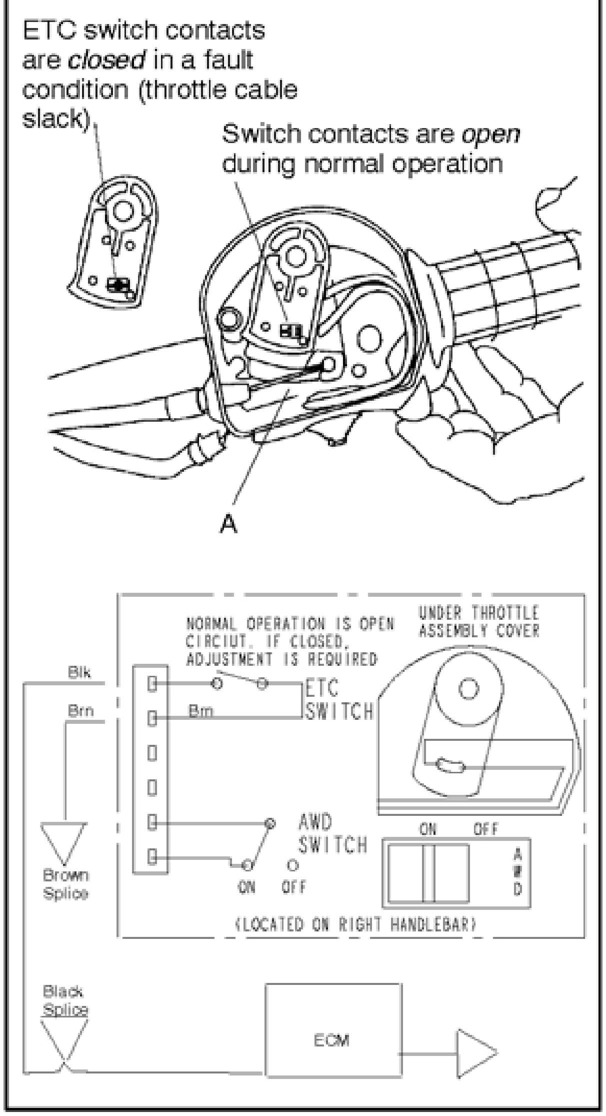
The Electronic Throttle Control (ETC) system is designed to stop the engine of an ATV in the event of a mechanical problem with the throttle mechanism. The ETC switch is mounted independently of the throttle actuator lever inside the throttle block assembly. This is a normally closed switch, and is held in the open position (contacts are separated (as shown below) by throttle cable tension. The contacts are open" during normal operation regardless of throttle lever position. In the event of a mechanical problem in the throttle mechanism (cable tension is lost), the switch contacts close, connecting the black wire to ground, which prevents ignition spark. This is the same as turning the key or engine stop switch “OFF”.

NOTE: Test the ETC switch at the harness connector. ETC will not activate unless there is throttle plate movement off of “zero” detected by the ECM. Adjust throttle cable freeplay (ETC switch) and make sure throttle mechanism is functioning properly before testing the switch. Refer to Maintenance Chapter 2 for cable adjustment procedure.

ETC Test

1. Remove throttle block cover by carefully releasing all tabs around edge of cover.
2. Place transmission in neutral and apply parking brake.
3. Start engine and open throttle lever slightly until engine RPM is just above idle speed.
4. Hold throttle cable with fingers at point “A” as shown below and release throttle lever. If the ETC system is functioning properly, the engine will lose spark and stop.

Electronic Throttle Control (ETC) Switch (Composite Throttle Housing)



10

IGNITION SYSTEM

Overview

The Sportsman has incorporated into it's design a DC/ CDI ignition system. The DC/ ignition system relies on battery power for ignition.

EFI - Instead of generating DC voltage via flywheel magnetic induction, a 12 volt DC current is supplied directly from the battery to the PDM. At the PDM, DC current is supplied to the ignition coil for the initial ignition charge. A small A/C signal from the CPS helps the ECM pre-determine Top Dead Center (TDC), which in turn signals the ECM to release the electrical charge collapsing the coil field for ignition (based on the ECM timing map).

CDI- A 12 volt DC current is supplied directly from the battery to the CDI. At the CDI, a current is supplied to the coil for the initial ignition charge. A small A/C signal from the stator pulse coil triggers the CDI to fire the coil.

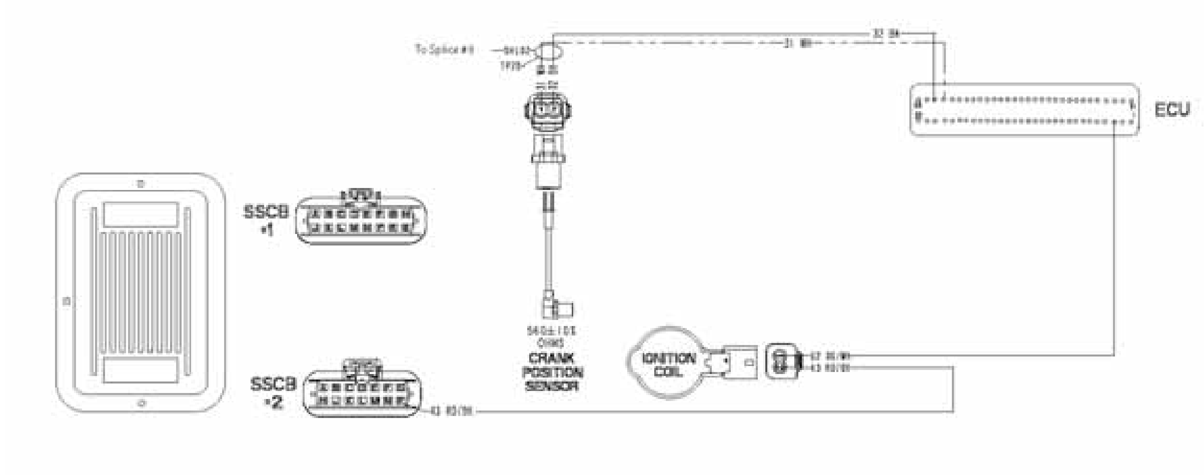
DC/ignition systems have the ability to ignite with as little as 6 volts of power.

Some of the advantages of DC ignition are:

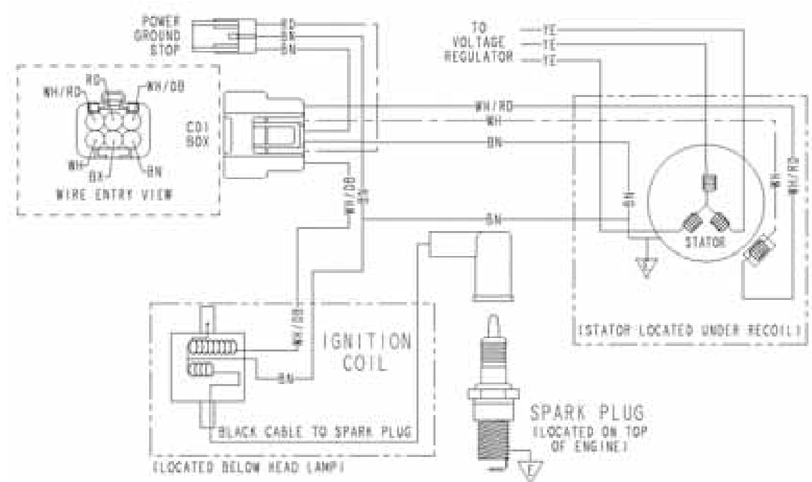
- Stronger, more consistent spark at low rpm for better performance
- Easier starts
- Fault detection by the ECM (EFI)

NOTE: Do not remove wiring harness while the key switch is on or while the engine is running. Damage to electronic components may occur!

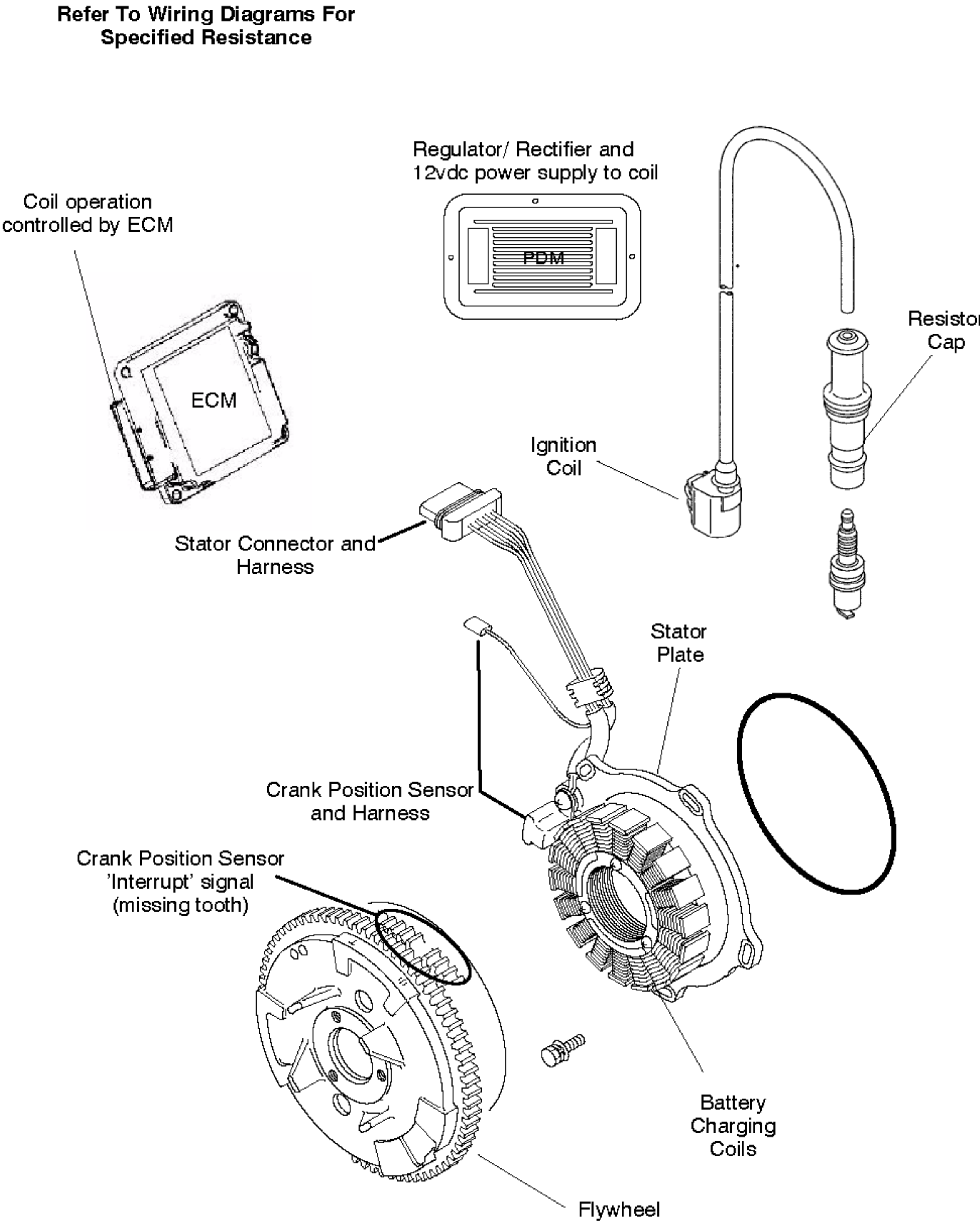
SPORTSMAN 500 / 500 X2 EFI



SPORTSMAN 450



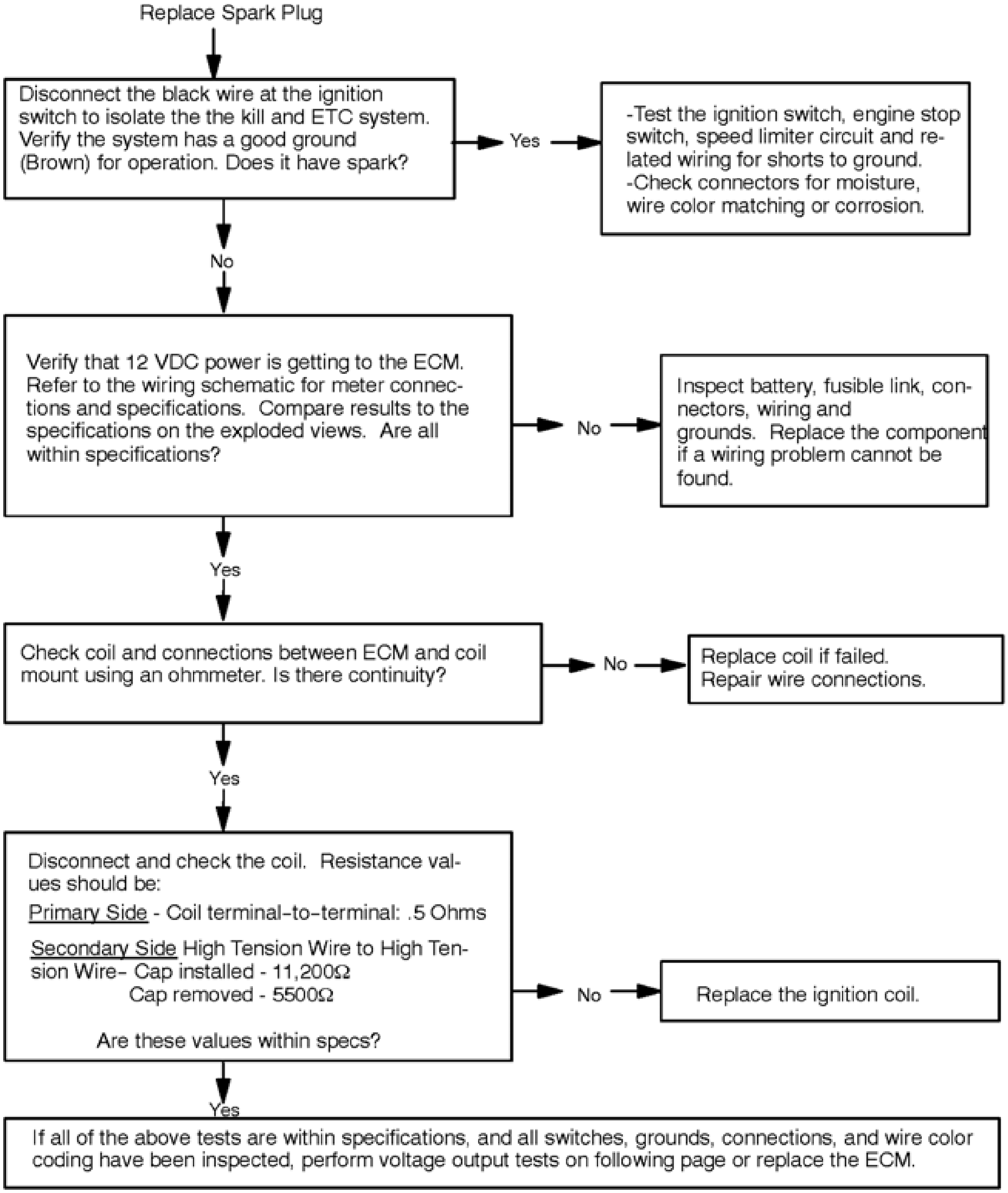
Components of EFI Alternator and DC / CDI Ignition System



EFI Ignition System Testing Flow Chart

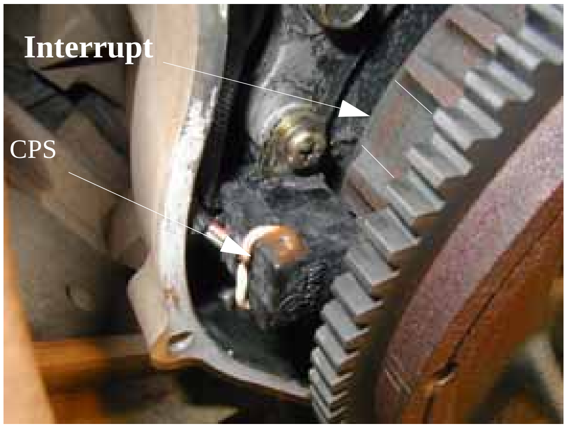
Whenever troubleshooting an electrical problem, first check all connections to be sure the pins are not damaged or loose / backed out, that the connectors are clean and fit together tight. Also be sure that colors match when wires are connected. Use the following as a guide for troubleshooting.

Condition: No Spark or intermittent spark



Crankshaft Position Sensor Gap

Measure trigger coil gap with a feeler gauge. The gap should be **0.4 - 1.2 mm (0.015 - .047 in.)**.



Crankshaft Position Sensor Gap:
0.4 - 1.2 mm (0.015 - .047 in.)

Ignition Troubleshooting

No Spark, Weak, or Intermittent Spark

- Spark plug gap incorrect
- Fouled spark plug
- Faulty spark plug cap or poor connection to high tension lead
- Related wiring loose, disconnected, shorted, or corroded
- Engine Stop switch or ignition switch faulty
- ETC switch misadjusted or faulty
- Wire harness or connections wet, corroded
- Poor ignition coil ground (e.g. coil mount loose or corroded)
- Incorrect wiring (inspect color coding in connectors etc)
- Faulty ignition coil winding (measure resistance of primary and secondary)
- Sheared flywheel key
- Flywheel loose or damaged
- Faulty ECU

Ignition Output Test Using Gap Tester

Re-connect all wires. Disconnect spark plug wire from the spark plug. Connect gap tester lead to engine ground and the other to the ignition coil primary wire leading from the coil. Crank engine and check output. Spark should jump a 1/4" (6mm) gap. Reconnect coil wire.

Table 10-1:

Test	Connect Gap Tester To:	Reading
Spark Gap Output Test	Spark plug lead and ground	White/Blue spark jumps 1/4" (6mm) gap

CHARGING SYSTEM

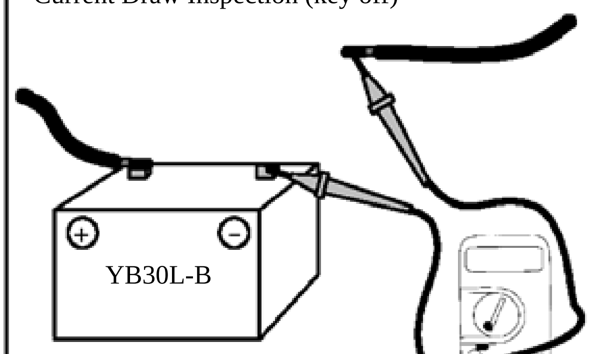
Current Draw - Key Off

⚠ CAUTION

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

Connect an ammeter in series with the negative battery cable. Check for current draw with the key off. If the draw is excessive, loads should be disconnected from the system one by one until the draw is eliminated. Check component wiring as well as the component for partial shorts to ground to eliminate the draw.

Current Draw Inspection (key off)



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

Break Even Test

⚠ CAUTION

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

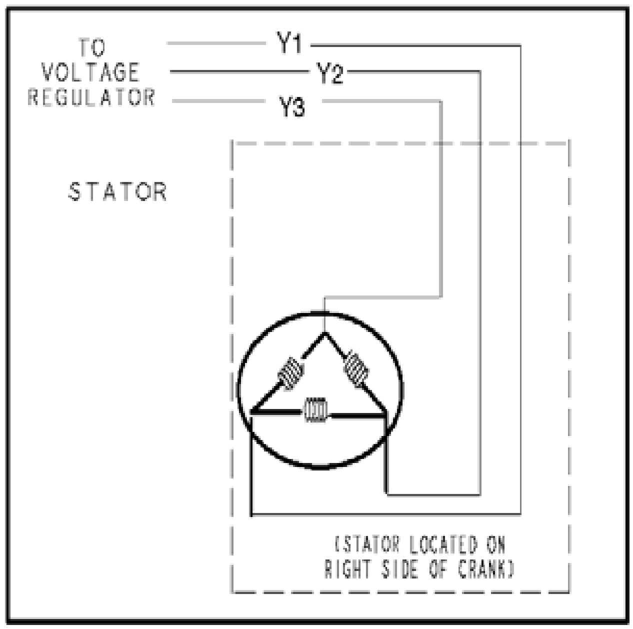
⚠ WARNING

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. Connect a tachometer to the engine.
2. Using an inductive amperage metering device, (set to DC amps) connect to the negative battery cable.
3. With engine off and the key, kill switch, and lights in the ON position, the ammeter should read negative amps (battery discharge). Reverse meter lead if a positive reading is indicated.
4. Shift transmission into Park and start the engine. With the engine running at idle, observe meter readings.
5. Increase engine RPM while observing ammeter and tachometer.
6. Note RPM at which the battery starts to charge (ammeter indication is positive).
7. With lights and other electrical loads off, the "break even" point should occur at approximately 1500 RPM or lower.
8. With the engine running, turn the lights on and engage parking brake lock to keep brake light on.
9. Repeat test, observing ammeter and tachometer. With lights on, charging should occur at or below 2000 RPM.

Alternator Output Test

Three tests can be performed using a multimeter to determine the condition of the stator (alternator).



TEST 1: Resistance Value of Each Stator Leg

1. Measure the resistance value of each of the three stator legs: Y1 to Y2, Y1 to Y3, and Y2 to Y3. Each should measure 0.19 Ω ± 15 %.

Table 10-2:

TEST	CONNECT METER WIRES TO:	READING IN OHMS
Charge Coil	Y1 to Y2	0.43 Ω ± 15%
Charge Coil	Y1 to Y3	0.43 Ω ± 15%
Charge Coil	Y2 to Y3	0.43 Ω ± 15%
Charge Coil	Y1, Y2, or Y3 to Ground	Open (Infinity)

NOTE: If there are any significant variations in ohm's readings between the three legs; it is an indication that one of the three stator legs maybe weak or failed.

TEST 2: Resistance Value of Stator Leg to Ground

1. Measure the resistance value of each of the stator legs to ground: Y1 to Ground, Y2 to Ground, Y3 to Ground.

NOTE: Any measurement other than Infinity (open) will indicate a failed or shorted stator leg.

TEST 3: Measure AC Voltage Output of Each Stator Leg at Charging RPM

1. Set the selector dial to measure AC Voltage.
2. Start the engine and let it idle.
3. While holding the ATV at a specified RPM, separately measure the voltage across each “leg” of the stator by connecting the meter leads to the wires leading from the alternator (Y1 to Y2, Y1 to Y3, Y2 to Y3).
4. Refer to the table below for approximate Voltage AC readings according to RPM. Test each leg at the specified RPM in the table. Example: The alternator voltage output reading should be no less than **30-40 Vac above 2000 RPM between each 'leg'.**

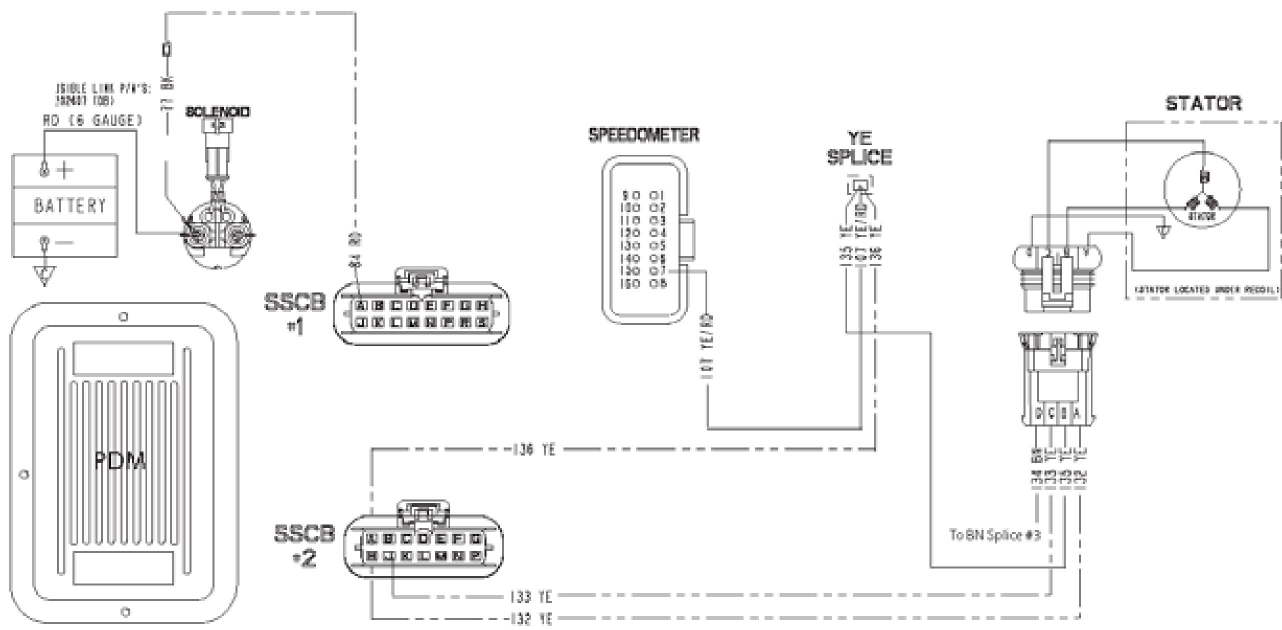
NOTE: If one or more of the stator leg output AC voltage varies significantly from the specified value, the stator may need to be replaced.

10

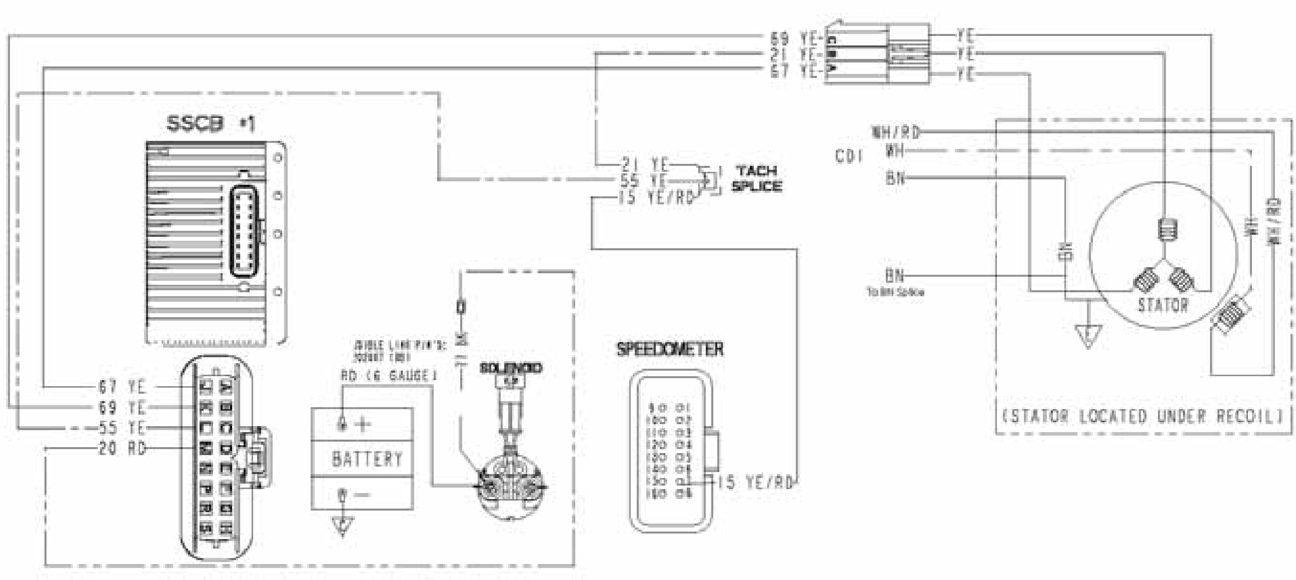
Charging System Testing Diagrams

Whenever charging system problems are suspected, proceed with the following system check after verifying that all wires are in good condition, connected and not kinked or pinched.

SPORTSMAN 500 / 500 X2 EFI



SPORTSMAN 450



Using a multitester set on D.C. volts, measure the battery open circuit voltage (See earlier test). It should be 12.4 volts or more. Is it?

No → Remove the battery and properly service. Reinstall the fully charged battery or a fully charged shop battery.

Yes ↓

Meter Setting: DC Volts

With the transmission in Park, start the engine and increase RPM to between 3000 and 4000. Read battery voltage with the multitester. Readings should increase to between 13.0 and 14.8 V D.C. Are they?

Yes → Check Key off Current Draw

No ↓

Meter Setting: DC Amps

Perform system **"Break Even Amperage"** test

Does charging occur as specified?

Yes → Check for owner modification, and discuss operating habits. The battery will continually discharge if operated below the "Break Even" RPM. Continued problems would call for battery inspection.

No ↓

Ohm stator wires. If bad, replace stator. If good, continue with alternator output test.

Meter Setting: AC Volts

Disconnect the wires from the regulator/rectifier. Using a multitester, perform an **Alternator Output (AC Volt) test**.

Is output **30-40V AC above 2000 RPM on each 'leg'**?

No → Inspect the wiring harness between the panel and the stator for damage. If no damage is found, remove the recoil and flywheel. Inspect the flywheel magnets, stator coils and stator wire harness for damage. Repair or replace any damaged components.

Yes ↓

Meter Setting: DC Volts

Reconnect the alternator wires. Note: Red wire must be connected to harness. Battery voltage must be present on red wire terminal on harness side of voltage regulator connector.

Is it?

No → Check regulator/rectifier connections and ground, battery connections, PDM circuits and connecting wires. Repair or replace faulty wiring or components.

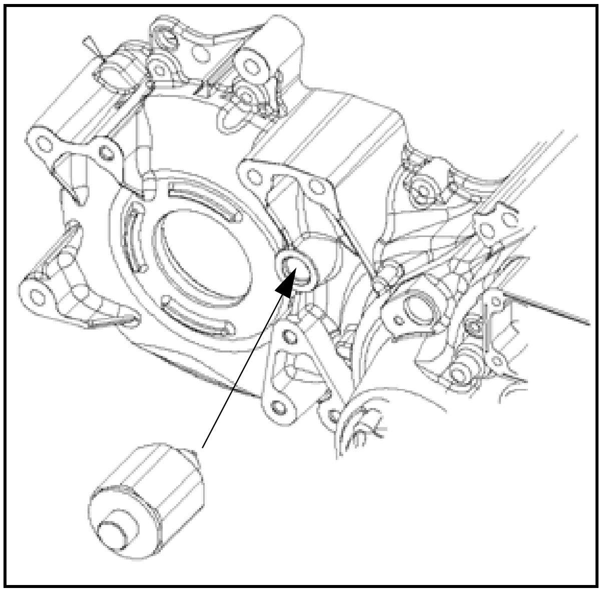
Yes ↓

If all of the previous tests indicate a good condition, but the charging voltage does not rise above battery voltage at the connector or wire harness, replace the voltage regulator. (PDM)

DIFFERENTIAL SOLENOID

Testing

Disconnect from the wire harness. Using a digital ohmmeter, test the solenoid at the connector leads and compare to the specification. Replacement of solenoid is required as it is not serviceable.



Differential Solenoid Resistance:
1.45 Ω ± 5 %

NOTE: See "Trouble Shooting Diagrams" in this chapter for a Differential Solenoid system break-out.

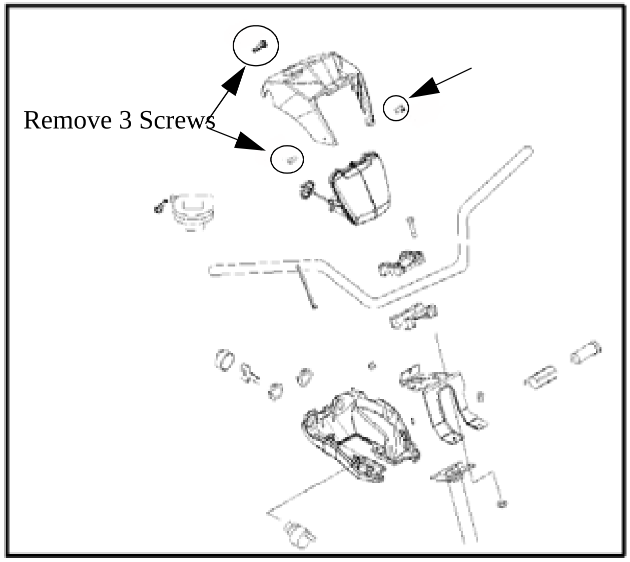
Replacement

1. Remove the solenoid using a suitable tool.
2. Coat threads of new solenoid with anti-seize compound or sealant.
3. Thread new solenoid into gearcase housing. Tighten to specification.

= T
Differential Solenoid Torque **23-27 ft. lbs. (31-37 Nm)**

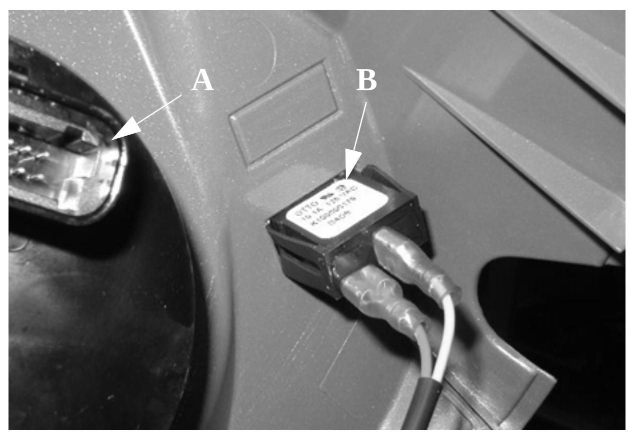
LIGHTING

High Beam Headlight Bulb Replacement

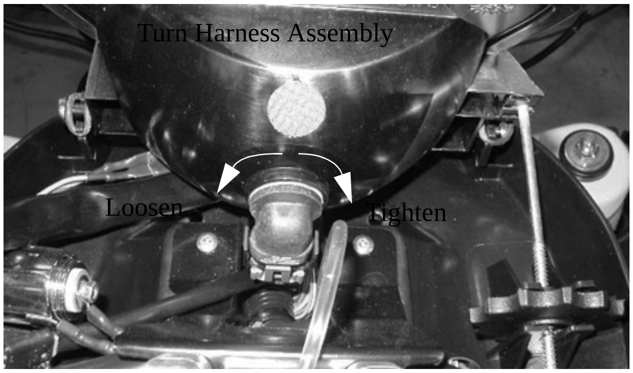


⚠ CAUTION
Do not service while headlight is hot. Serious burns may result. Protect lamp during install.

1. Remove three Phillips screws on the headlight pod.
2. Lift pod cover up.
3. Disconnect instrument cluster harness (A) and work light switch (B).

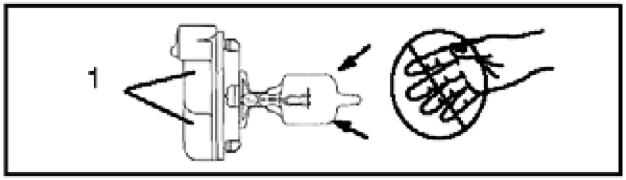


4. Turn the headlight lamp socket counter-clockwise and remove.



5. Carefully remove head lamp bulb from housing.
6. Remove the head lamp and replace with a new head lamp.

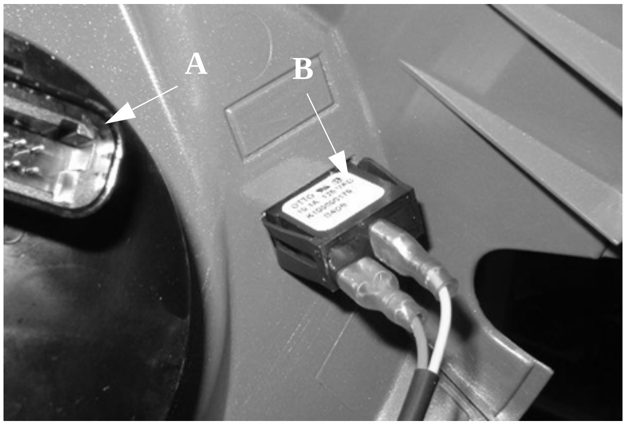
NOTE: Do not touch the lamp with bare fingers. Hold the plastic part (1) of the lamp. Oil from your skin leaves a residue, causing a hot spot that will shorten the life of the lamp.



7. Install the new head lamp and harness assembly into the headlight assembly. Turn the headlight harness clockwise to secure the head lamp into place.

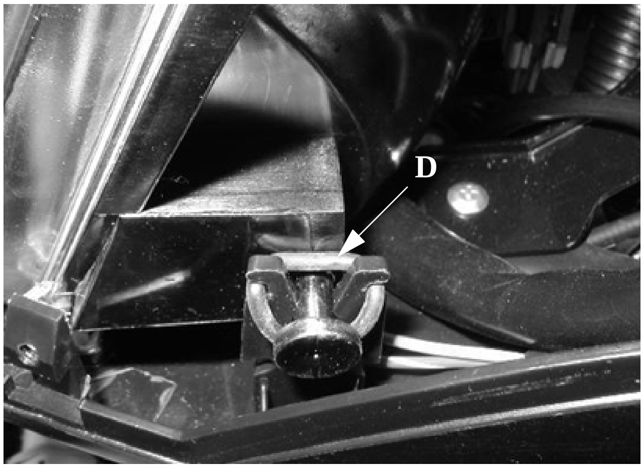
Headlight Housing Relacement

1. Remove three Phillips screws on the headlight pod.
2. Disconnect instrument cluster harness (A) and work light switch (B).

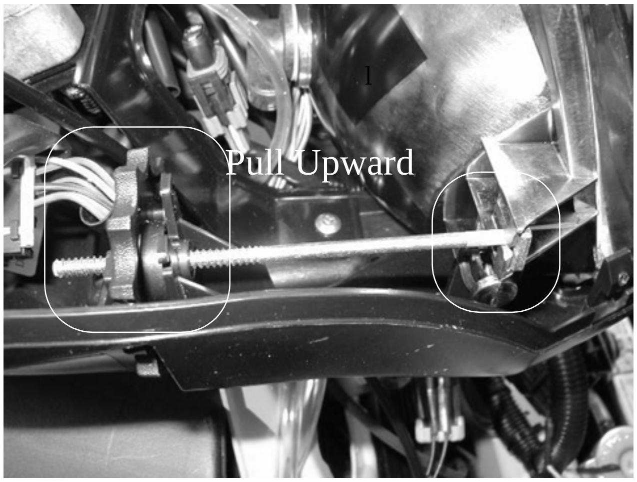


3. Unplug head lamp harness (C).

4. Remove O-Ring (D) from headlight pivot pins. (Both Sides)

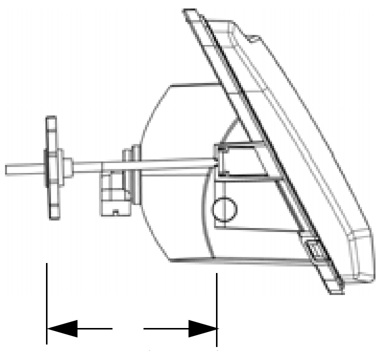


5. Pull the headlight housing up to release from the locking tabs.



6. Lift the adjusting knob up to remove from the locking tabs.
7. Carefully pull the assembly up and out of pod.

8. Reverse the steps to install the new housing and reassemble the pod.



NOTE: he distance from the head lamp parting line to the end of the adjustment knob stop is 5 1/8”, (13 cm). See illustration.

9. Adjust the headlight aim by turning the adjusting knob.

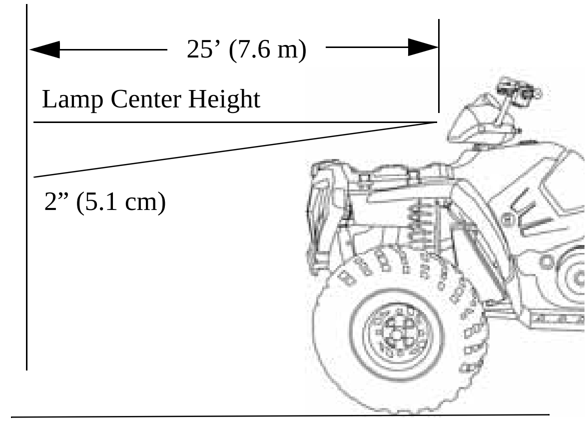
High Beam Headlight Adjustment

The headlight beam can be adjusted to any position desired by turning the adjusting knob located on the bottom right side of the headlight pod.

Raise Headlight - Turn knob counter- counterclockwise

Lower Headlight - Turn knob clockwise

1. Place the vehicle on a level surface with the headlight approximately 25' (7.6 m) from a wall.

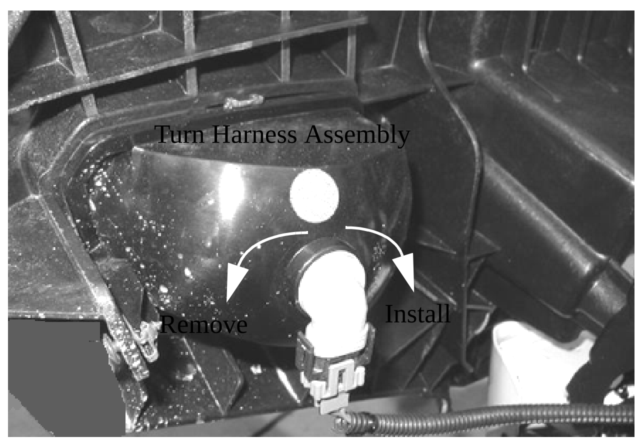


2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height.
3. Start the engine and turn the headlight switch to high beam.
4. Observe headlight aim. The most intense part of the headlight beam should be aimed 2” (5.1 cm) below the mark placed on the wall in Step 2.

NOTE: Rider weight must be included on the seat. On machines with separate low beam lights, the drop should be 8, (20.3 cm) in 25' from the center of the low beam lamp.

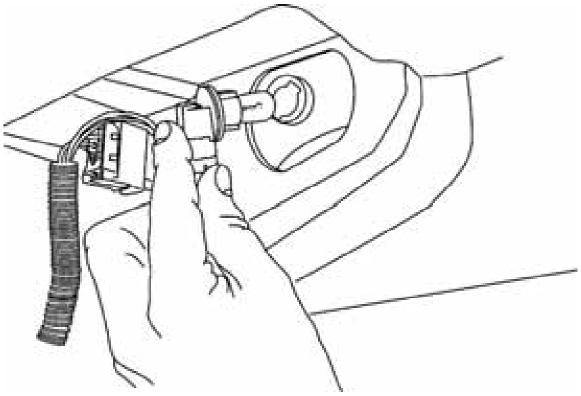
5. Adjust beam to desired position.

Lower Headlamp Removal / Installation



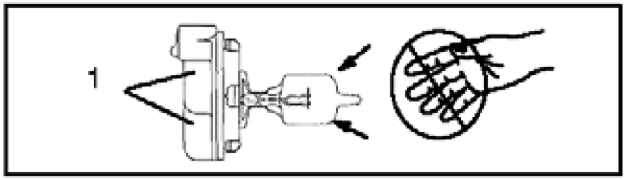
1. Turn the back of the head lamp harness in a counter-clockwise direction to loosen.

2. Pull the harness assembly out from the headlight assembly.



3. Remove the lamp and replace with a new head lamp.

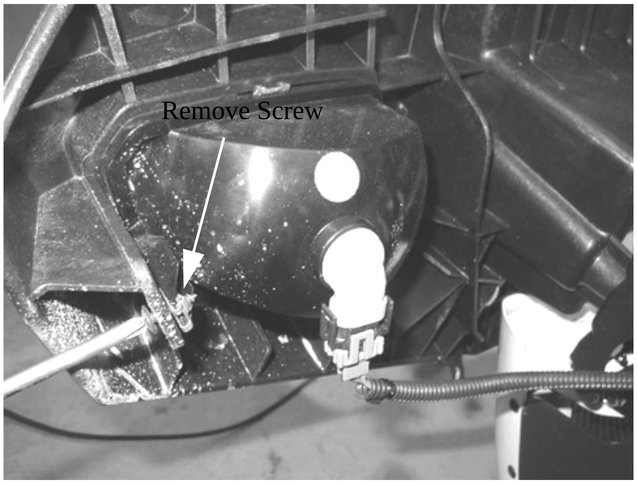
NOTE: Do not touch the new lamp with bare fingers. Hold the plastic part (1) of the lamp. Oil from your skin leaves a residue, causing a hot spot that will shorten the life of the lamp.



4. Install the harness assembly into the headlight assembly. Turn the headlight harness clockwise to secure the head lamp into place.

Lower Head Lamp Housing Removal (if required)

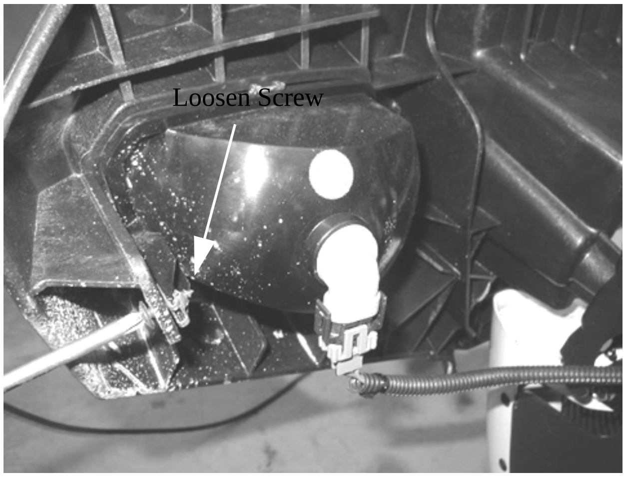
5. Remove the screw that secures the lower head lamp.



6. Pull the head lamp out of the locking tab.

Low Beam Headlight Adjustment

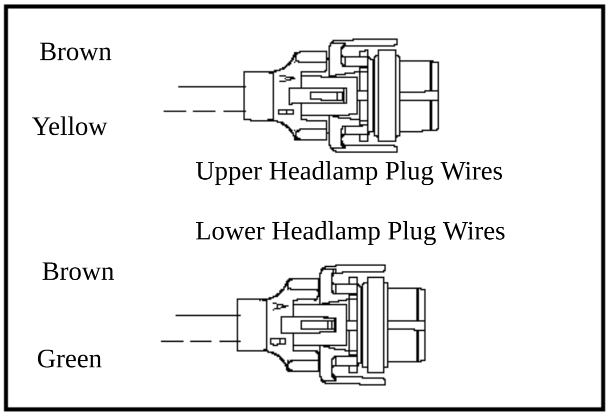
1. The low beam can be adjusted slightly upward or downward.



2. Loosen the phillips screw located at the rear of the head lamp.
3. Tilt the head lamp upward or downward.
4. Tighten the screw.

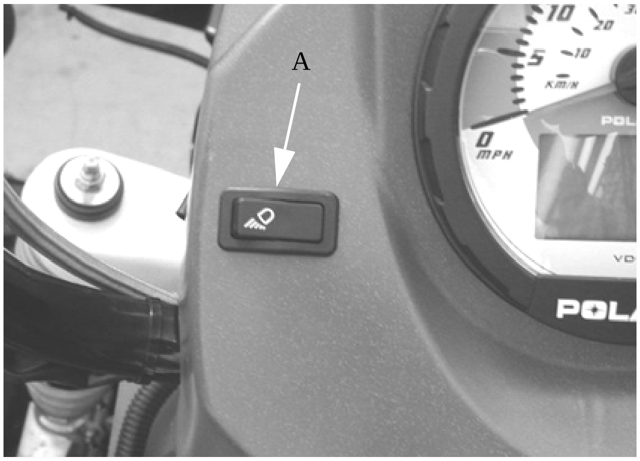
Headlamp Switch Test

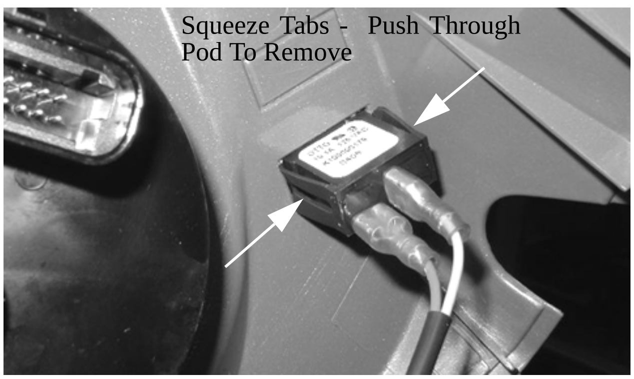
1. Remove the headlight pod cover.
2. Set meter to DC Volts and probe the head lamp plug wires (Brown and Yellow) at back of connector for 12 Volts.
3. Turn ignition and headlight on. If there is no power, continue with checks to the harness and PDM.



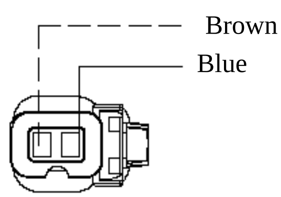
Work Light Switch

Remove the headlight pod cover to locate the switch wires. The switch (A) snaps out by pushing in on the tabs on both sides of the switch.





- Check for continuity between the switch contacts - Place meter leads between two contacts with switch in ON position.
- Probe the worklight plug wires at back of vehicle, there should be at least 12V at the plug.
- Check for 12 volt power at the blue wire.

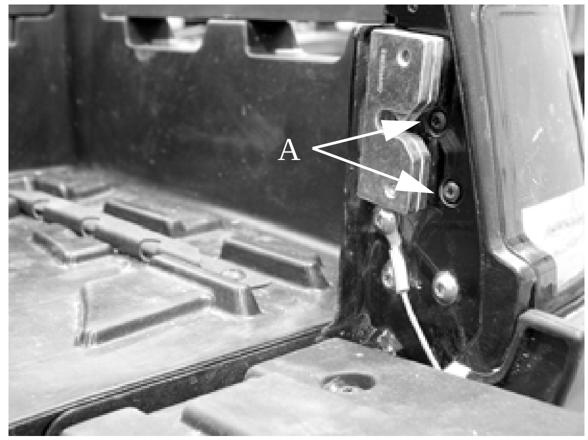


Worklight Connector Wires

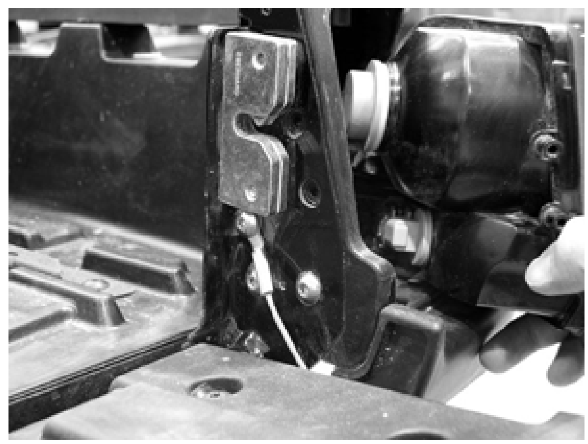
Brake Light / Work Light Replacement

The brake light (A) and the work light (B) are both located in the rear tail lamp housing.

1. **X2** - Open the tailgate and remove the 2 torx head screws (A) securing the rear taillights on each side of the cargo box as illustrated below.



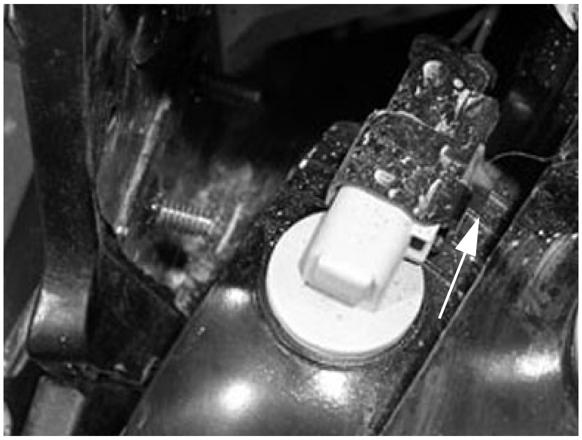
2. **X2** - Remove the taillight assembly from the cargo box.



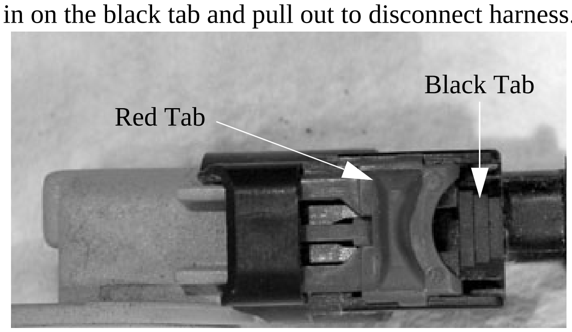
⚠ CAUTION

Use caution when disconnecting the smaller light bulb. Follow the procedures to keep from damaging the connector. Damaging a connector may require wire harness replacement.

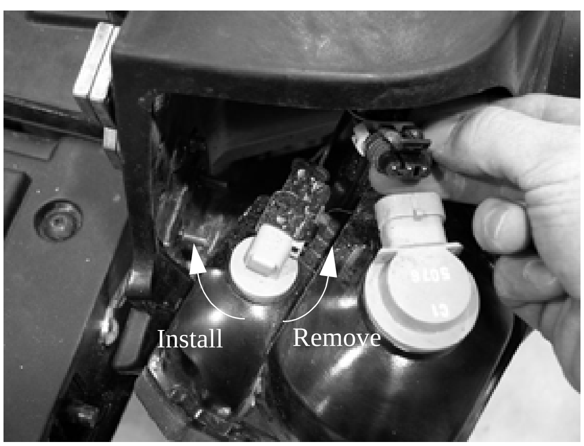
3. **X2 and Sportsman -** Carefully pull out the red locking tab on the connector.



4. **X2 and Sportsman -** Once the red tab is pulled out, press in on the black tab and pull out to disconnect harness.

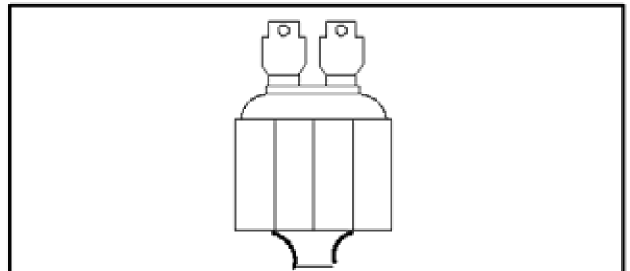


5. **X2 and Sportsman -** Disconnect the two wire harnesses connected to each of the taillights. Twist bulb housing to remove from lamp assembly and replace bulb.

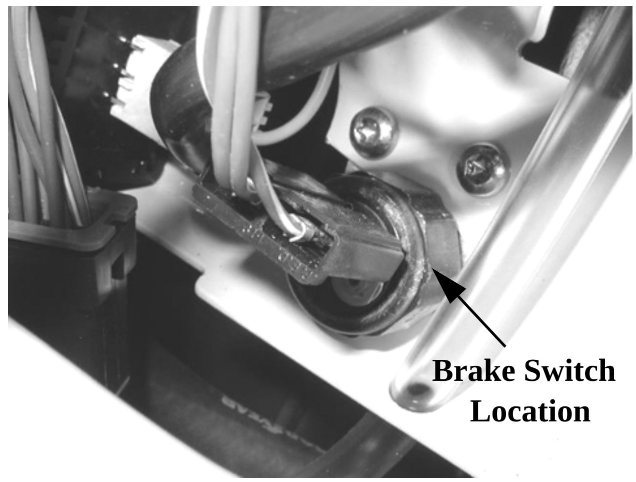


Brake Light Switch Test

1. Remove the front cover.



Brake Lamp Switch

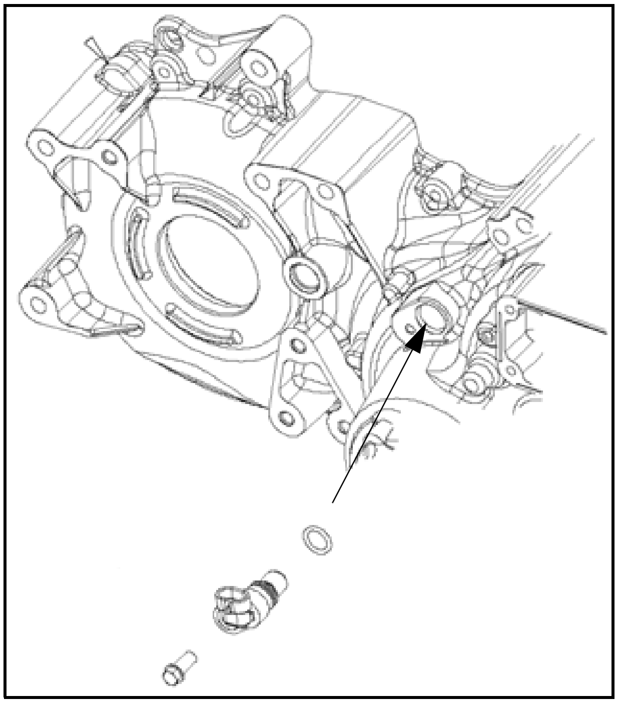


2. Disconnect wire harness from switch.
3. Connect an ohmmeter across switch contacts. Reading should be infinite (∞).
4. Apply brake at handlebar lever and check for continuity between switch contacts. Replace switch if there is no continuity or greater than .5 ohms resistance when the brake is applied with slight pressure.

SPEED SENSOR

Testing

Using the special tools listed, test the speed sensor according to the tester instructions. Remove sensor and inspect the o-ring seal for damage or wear and replace as required. Replacement of sensor is required as it is not serviceable.



Speed Sensor
Test Using Special Tools:

Static Timing Light Harness
PN 2871745
Hall Sensor Probe Harness
PN 2460761

Replacement

1. Remove the sensor retaining using a suitable tool.
2. Coat o-ring of new sensor with anti-seize compound or sealant.
3. Push new sensor into gearcase housing. Install bolt and tighten to specification.

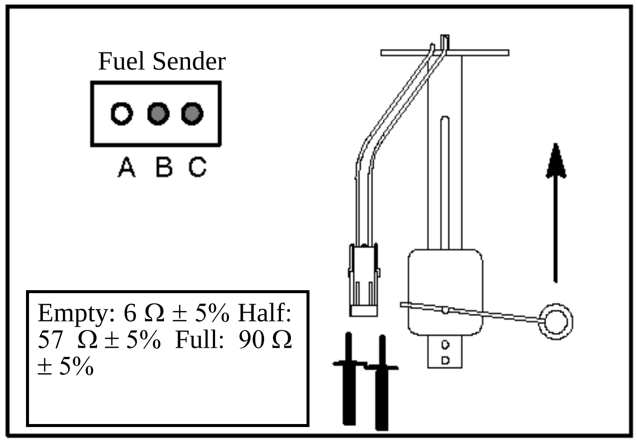
= T

Speed Sensor Bolt Torque
8-12 ft. lbs. (11-17 Nm)

FUEL SENDER

Testing

1. Drain the fuel tank and remove it from the ATV.
2. Set the fuel tank on a flat surface.
3. Hook up an ohm meter to the fuel sender harness wire (B) and wire (C).
4. With the sender float in the **empty position**, the meter should read **5 ohm**s.
5. Slowly tilt invert the tank so that gravity moves the sender float to the **full position**, the meter should now read **90 ohms.**



6. If the readings are not **between 5 ohms and 90 ohms**, or if the reading is erratic or LCD display “sticks”, check the following before replacing the tank assembly.

   - Loose float
   - Float contact with tank
   - Bent Float Rod

If none of the conditions exists, the sender assembly is faulty.

**Fuel tank assembly replacement is required on EFI models, as the sender assembly is not serviceable.

ACCESSORY POWER

Wire Connections

Winch Installation

The Sportsman models have the main winch cables routed and installed from the factory. This enables quick installation.

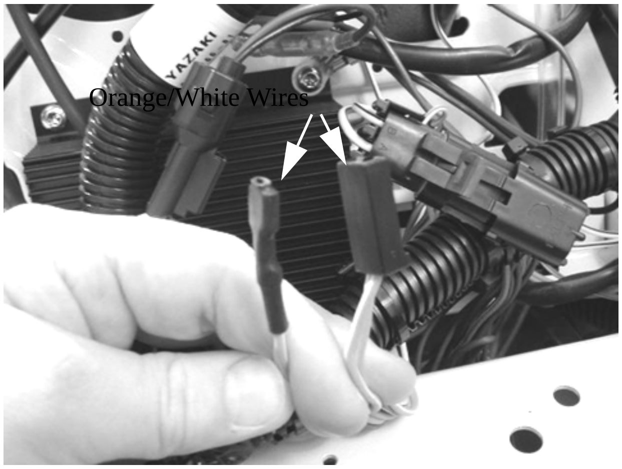
Refer to Chapter 2 for more information on winch installation and operation.

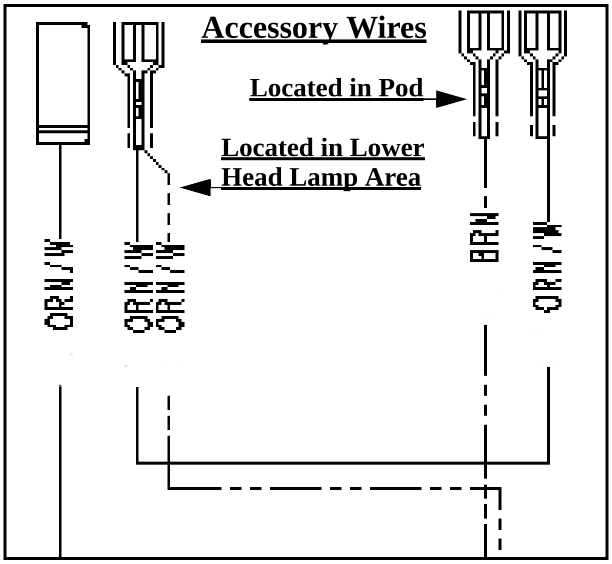
Accessory Power Wires

The accessory power leads for all accessories are located under the front cover. The wires are 12 Volt wires and are Orange / White in color. To locate the wires, remove the front cover. The wires will be located in the main wire loom on the right side.

If you have trouble locating the Orange / White wires remove the left side panel and search under the front fender area.

NOTE: Refer to the accessory instructions for accessory hook-up and installation.





STARTER SYSTEM

Troubleshooting

Starter Motor Does Not Run

- Battery discharged. Low specific gravity
- Loose or faulty battery cables or corroded connections (see Voltage Drop Tests)
- Related wiring loose, disconnected, or corroded
- Poor ground connections at battery cable, starter motor or starter solenoid (see Voltage Drop Tests)
- Faulty key switch
- Faulty kill switch
- Faulty starter solenoid or starter motor.
- Engine problem - seized or binding (Can engine be rotated easily with recoil starter?)
- Starter lockout malfunction

Starter Motor Turns Over Slowly

- Battery discharged - low specific gravity
- Excessive circuit resistance - poor connections (see Voltage Drop Test below)
- Engine problem - seized or binding (Can engine be rotated easily?)
- Faulty or worn brushes in starter motor

Starter Motor Turns - Engine Does Not Rotate

- Faulty starter drive
- Faulty starter drive gears or starter motor gear
- Faulty flywheel gear or loose flywheel

VOLTAGE DROP TEST

The Voltage Drop Test is used to test for bad connections. When performing the test, you are testing the amount of voltage drop through the connection. A poor or corroded connection will appear as a high voltage reading. Voltage shown on the meter when testing connections should not exceed .1 VDC per connection or component.

To perform the test, place the meter on DC volts and place the meter leads across the connection to be tested. Refer to the chart on 1.47 to perform voltage drop tests on the starter system.

Voltage should not exceed .1 DC volts per connection

Starter Lockout Troubleshooting- EFI Models

The starter lockout is controlled by the PDM. Pin 'C' on SSCB #1 of the PDM senses the transmission signal and determines if the switch is in Neutral or Park. When the conditions are met, the PDM will activate SSCB #2 Pin 'N' to ground the starter solenoid.

Pin 'G' on SSCB #2 of the PDM senses when the brake is applied and activates SSCB #2 pin ‘N’ to ground the solenoid. The PDM will allow starting in Neutral or Park without the brake applied. Applying the brake overrides this system and allows starting regardless of transmission shift position.

Items to check when diagnosing a no-start condition are:

- Transmission switch for proper function
- Starter solenoid for proper function
- Brake switch for proper function
- Wire harness, loose connections/pins (including the PDM) leading to and from these components
- Proper ground to frame

Should all these items be found in working order, the PDM may be at fault.

Starter Lockout Troubleshooting- Sportsman 450

The starter lockout is controlled by the PDM. Pin 'G' on SSCB #1 of the PDM senses the transmission signal and determines if the switch is in Neutral or Park. When the conditions are met, the PDM will activate Pin 'A' to ground the starter solenoid.

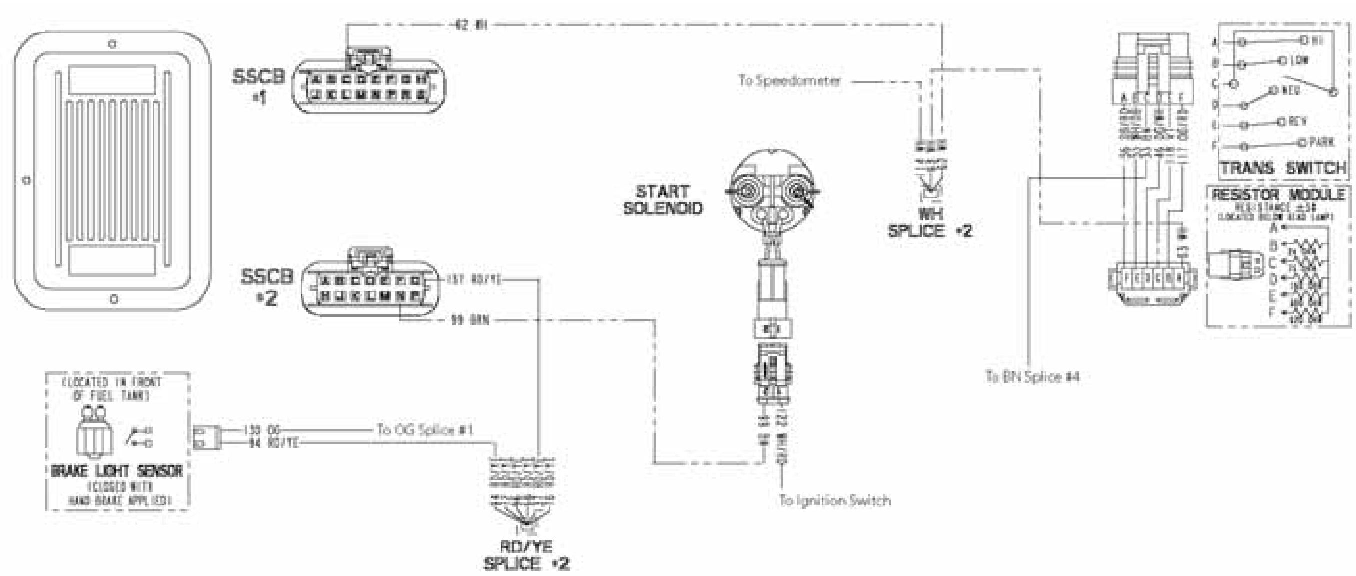
Pin 'H' on SSCB #1 of the PDM senses when the brake is applied and activates pin ‘A’ to ground the starter solenoid. The PDM will allow starting in Neutral or Park without the brake applied. Applying the brake overrides this system and allows starting regardless of transmission shift position.

Items to check when diagnosing a no-start condition are:

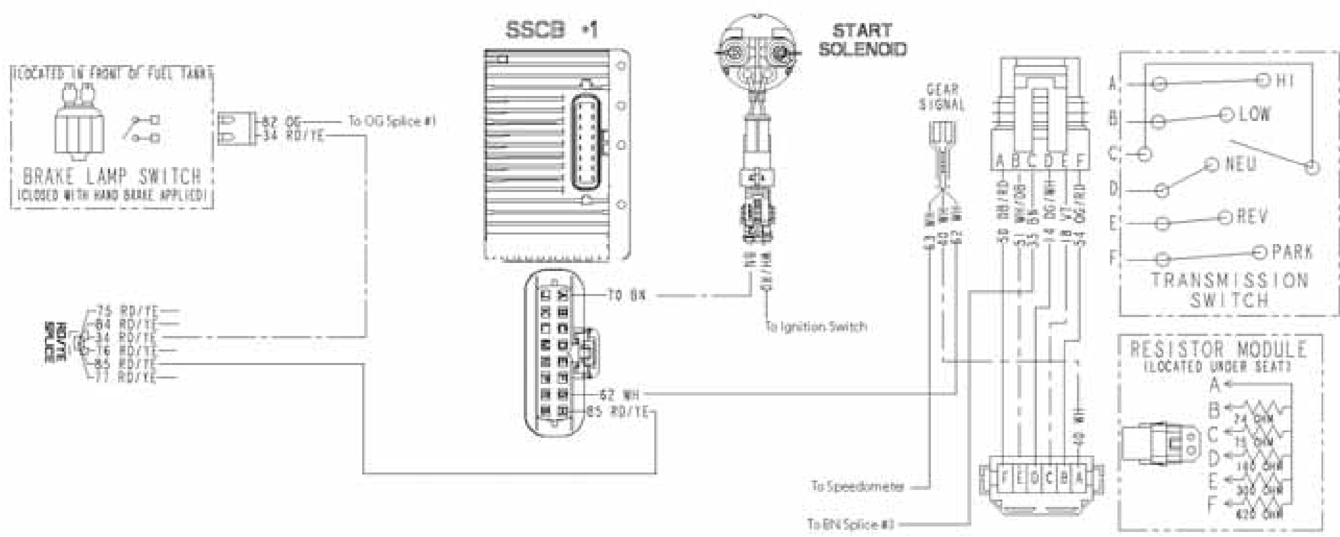
- Transmission switch for proper function
- Starter solenoid for proper function
- Brake switch for proper function
- Wire harness, loose connections/pins (including the PDM) leading to and from these components
- Proper ground to frame

Should all these items be found in working order, the PDM may be at fault.

Starter Lockout Diagram- EFI



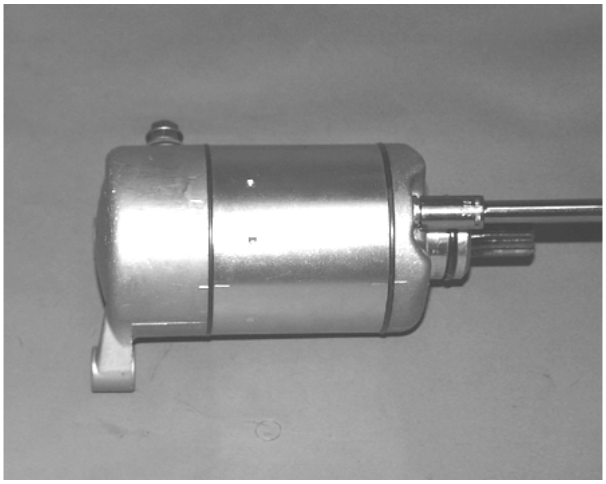
Starter Lockout Diagram- Sportsman 450



Starter Motor Removal / Disassembly

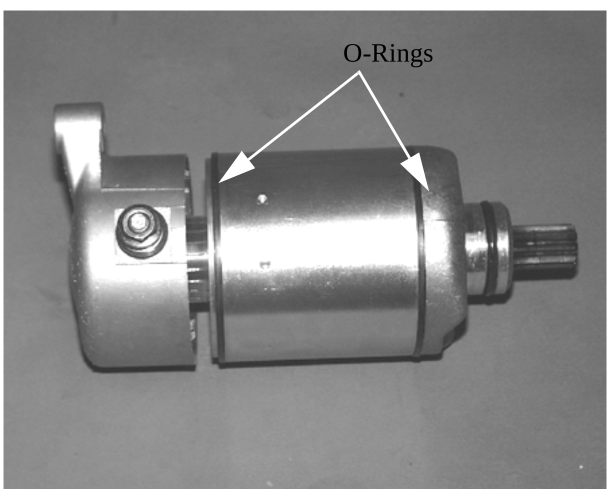
NOTE: Use electrical contact cleaner to clean starter motor parts. Some solvents may leave a residue or damage internal parts and insulation.

1. Remove the starter from the engine.
2. Remove the two bolts, washers, and sealing O-Rings. Inspect O-Rings and replace if damaged.

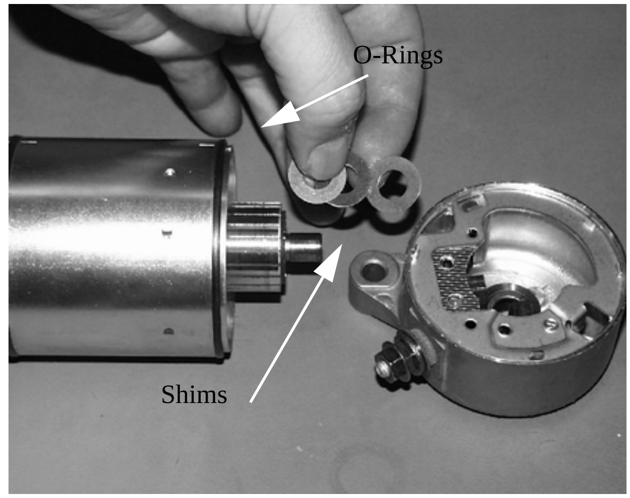


NOTE: Note the alignment marks on both ends of the starter motor casing. These marks must align during reassembly.

3. Remove the rear brush housing assembly, holding the front housing and armature assembly together.



4. Remove the shims from the armature shaft and inspect the O-rings located on the armature housing.



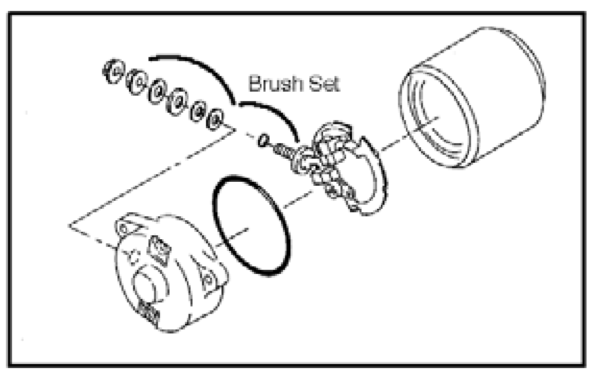
NOTE: The shims must be reinstalled during reassembly.

Brush Inspection / Replacement

CAUTION

Some cleaning solvents may damage the insulation in the starter. Care should be exercised when selecting an appropriate solvent. If the commutator needs cleaning use only electrical contact cleaner.

1. Measure resistance between starter input terminal and insulated brushes. The reading should be .3 ohms or less. Measure the resistance between the cable terminal and brush housing. Make sure the brush is not touching the case. The reading should be infinite.



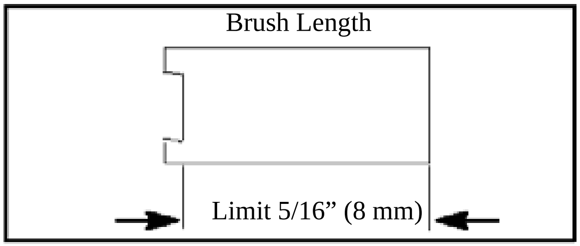
2. Remove nut, flat washer, large phenolic washer, two small phenolic washers, and O-Ring from brush terminal. Inspect the O-Ring and replace if damaged.
3. Remove brush plate and brushes. Measure length of brushes and replace if worn past the service limit. Replace springs if they are discolored or have inadequate tension.

NOTE: The electrical input post must stay with the field coil housing.

4. Inspect surface of commutator for wear or discoloration. See Steps 3-6 of ‘Armature Testing’.

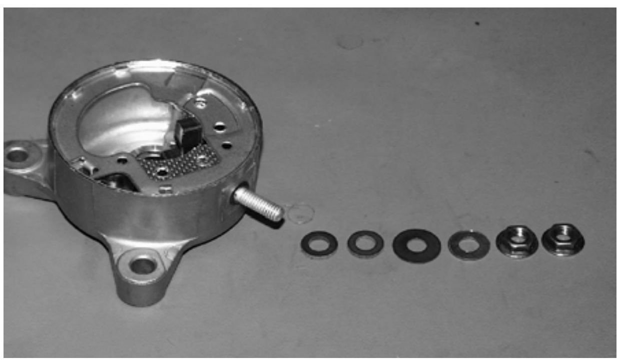
Brush Inspection

1. Measure length of each carbon brush. Replace brush assembly when worn to 5/16” (8 mm) or less. The brushes must slide freely in their holders.



Brush Replacement

1. Install a new carbon brush assembly in the brush housing. NOTE: Be sure that the terminal bolt insulating washer is properly seated in the housing, and the tab on the brush plate engages the notch in the brush plate housing.



2. Place a wrap of electrical tape on the threads of the terminal bolt to prevent O-Ring damage during reinstallation.
3. Install the O-Ring over the bolt. Make sure the O-ring is fully seated.
4. Remove the electrical tape and reinstall the two small phenolic washers, the large phenolic washer, flat washer, and nut.

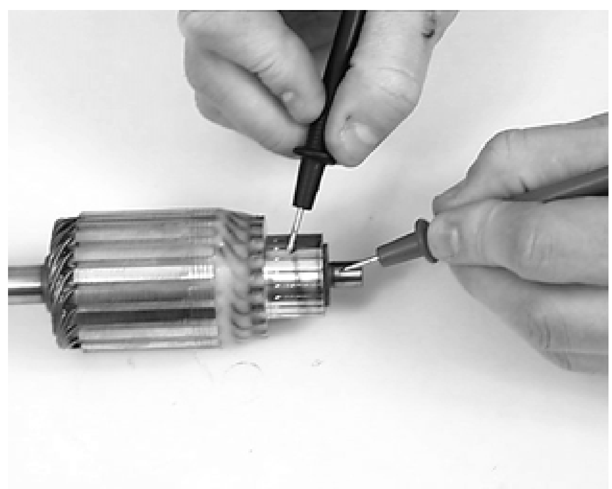
Armature Testing

1. Remove armature from starter casing.

NOTE: Note order of shims on drive end for reassembly.

2. Inspect surface of commutator. Replace if excessively worn or damaged.
3. Using a digital multitester, measure the resistance between each of the commutator segments. The reading should be .3 ohms or less.

4. Measure the resistance between each commutator segment and the armature shaft. The reading should be infinite (no continuity).



5. Check commutator bars for discoloration. Bars discolored in pairs indicate shorted coils, requiring replacement of the starter motor.
6. Place armature in a growler. Turn growler on and position a hacksaw blade or feeler gauge lengthwise 1/8” (.3 cm) above armature coil laminates. Rotate armature 360°. If hacksaw blade is drawn to armature on any pole, the armature is shorted and must be replaced.

Starter Reassembly

CAUTION

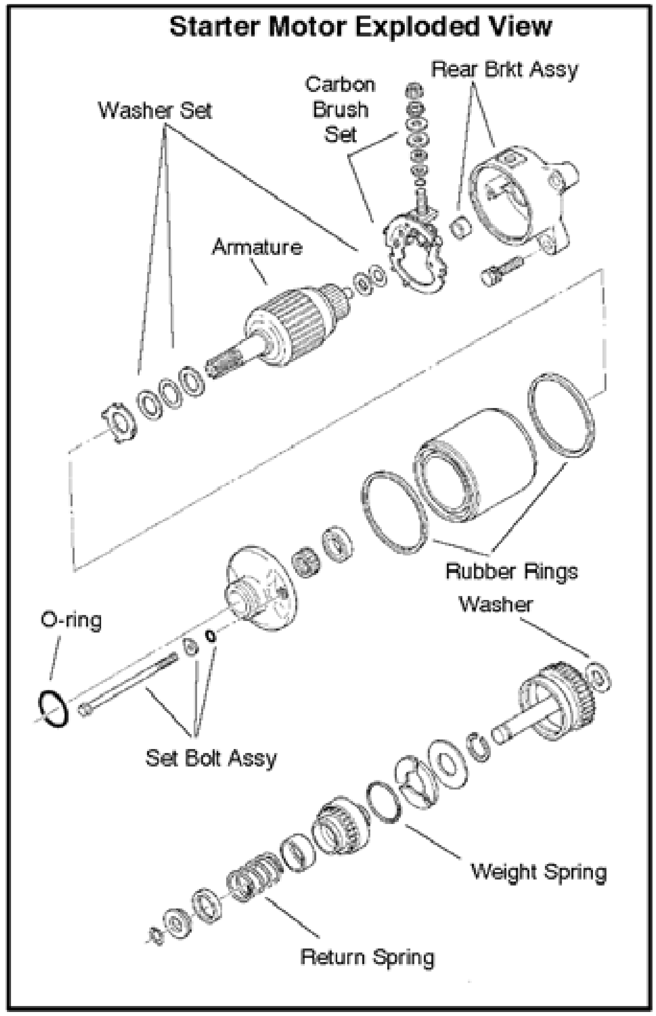
Use care when handling starter housing. Do not drop or strike the housing as magnet damage is possible. If magnets are damaged, starter must be replaced.

1. Inspect permanent magnets in starter housing. Make sure they are not cracked or separated from housing. Place armature in field magnet casing.
2. Place shims on drive end of armature shaft with phenolic washer outermost on shaft. Engage tabs of stationary washer in drive end housing, holding it in place with a light film of grease.
3. Install case sealing O-Ring. Make sure O-Ring is in good condition and not twisted on the case. Lubricate needle bearing and oil seal with a light film of grease, and install housing, aligning marks.
4. Install O-Ring on other end of field magnet casing. Make sure it is in good condition and not twisted on the case.
5. Align casing marks and install housing, pushing back brushes while installing shaft in bushing.
6. Reinstall starter motor housing bolts. Make sure O-Rings are in good condition and seated in groove.
7. Align brush plate and install cover and screws.
8. Install the starter onto the engine case. Hand tighten the starter bolt. **Torque the bolt to 9 ft.lbs. (12 Nm**).

Starter Solenoid Bench Test

To measure the resistance of the pull-in coil, connect one meter lead to the solenoid lead wire and the other to ground. The resistance should be 3.7 ohms ± 5 %. Refer to “Electric Starter System Testing” in this section to further test the solenoid.

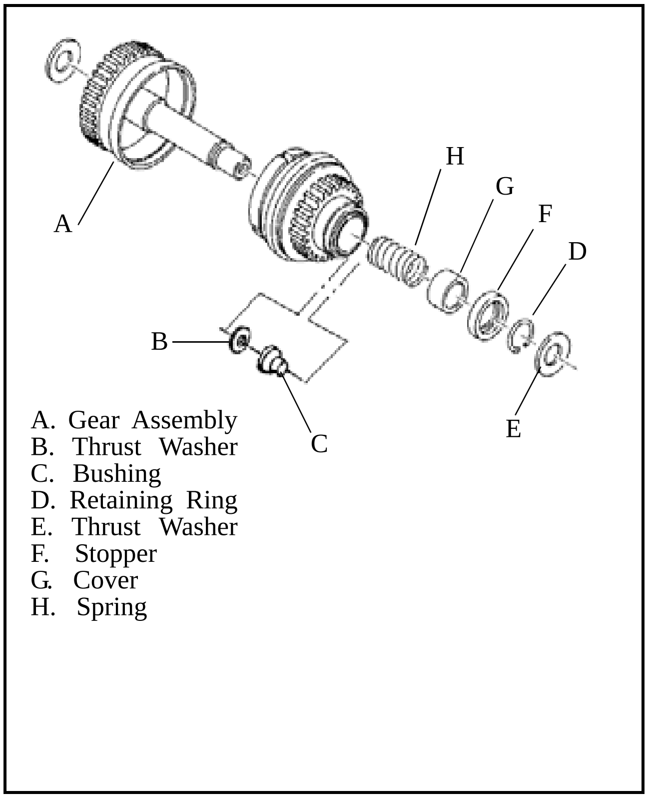
Starter Exploded View



STARTER DRIVE

Pinion Gear - Anti-Kick Out Shoe, Garter Spring Replacement

If the garter spring is damaged, the overrun clutch may fail to return properly. Use either of the following methods to remove and install a new garter spring:



1. Screw the overrun clutch out to the engaged position on the pinion shaft assembly. Use a small piece of wire with the end bent in a hook and pick the old spring out of its channel. Slide it off the end of the shaft. Slide the new spring over the overrun clutch and into the spring groove. Make sure that the spring is positioned between the shoe alignment pins and the back flange of the anti kick-out shoes.
2. Remove the retaining ring, thrust washer, spring retainers and clutch return spring. Screw the overrun clutch off the end of the pinion shaft. Remove the old spring and install a new one. Lightly grease the pinion shaft and reinstall the clutch, spring, retainers, end washer and lock ring in the reverse order. Make sure the end washer is positioned properly so that it will hold the lock ring in its groove.

STARTER SYSTEM TESTING FLOW CHART

Condition: Starter fails to turn motor. NOTE: Make sure engine crankshaft is free to turn before proceeding with dynamic testing of starter system. A digital multitester must be used for this test. This flow chart assumes that the starter lockout system is functional.

With the tester on the VDC position, place the tester's black lead on the battery negative and the red lead on the battery positive. Reading should be 12.4 V D. C. or greater.

No → Remove battery and properly service. Install fully charged shop battery to continue test.

Yes

Disconnect coil engagement wire from the starter solenoid. Connect tester black wire to battery ground. Connect red tester lead to harness wire at solenoid. Turn on ignition switch. Tester should read battery voltage.

No → Check voltage on both sides of circuit breaker, ignition switch/engine stop switch. The voltage on both sides should be the same. NOTE: The ignition switch and engine stop switch must be 'on'. Replace component if failed .

Yes → Test starter solenoid coil by connecting an ohmmeter between the solenoid wire and the solenoid mounting plate. Check solenoid ground path by measuring resistance between mounting plate and battery negative terminal (-). There should be no continuity.

Voltage Drop Testing

Reconnect the solenoid. Connect the tester black lead to the battery positive and the red lead to the solenoid end of the battery-to-solenoid wire. Depress starter button. Reading should be less than .1 V D.C.

No → Clean the battery-to-solenoid cable ends or replace the cable.

Yes

Connect the black tester lead to solenoid end of battery-to-solenoid cable. Connect red tester lead to solenoid end of solenoid-to-starter cable. Depress starter button. Reading should be less than .1 V D.C.

No → Replace the starter solenoid.

Yes

Connect the black tester lead to the solenoid end of the solenoid-to-starter cable. Connect the red tester lead to the starter end of the same cable. Depress the starter button. The reading should be less than .1 V D.C.

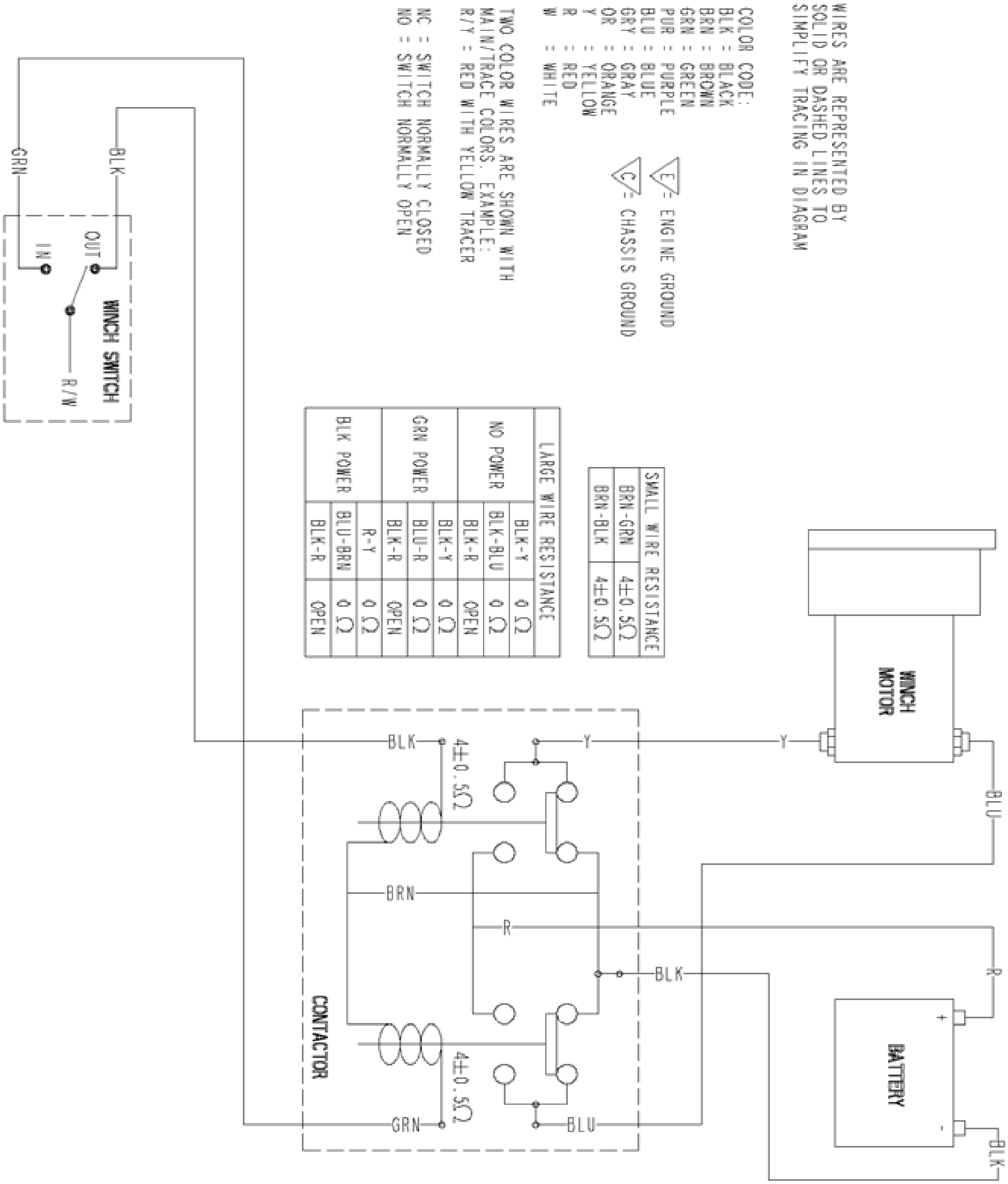
No → Clean the solenoid-to-starter cable ends or replace the cable.

Yes

If all of these indicate a good condition, yet the starter still fails to turn, the starter must be removed for static testing and inspection.

BASIC WINCH WIRING

Pre-wired Models



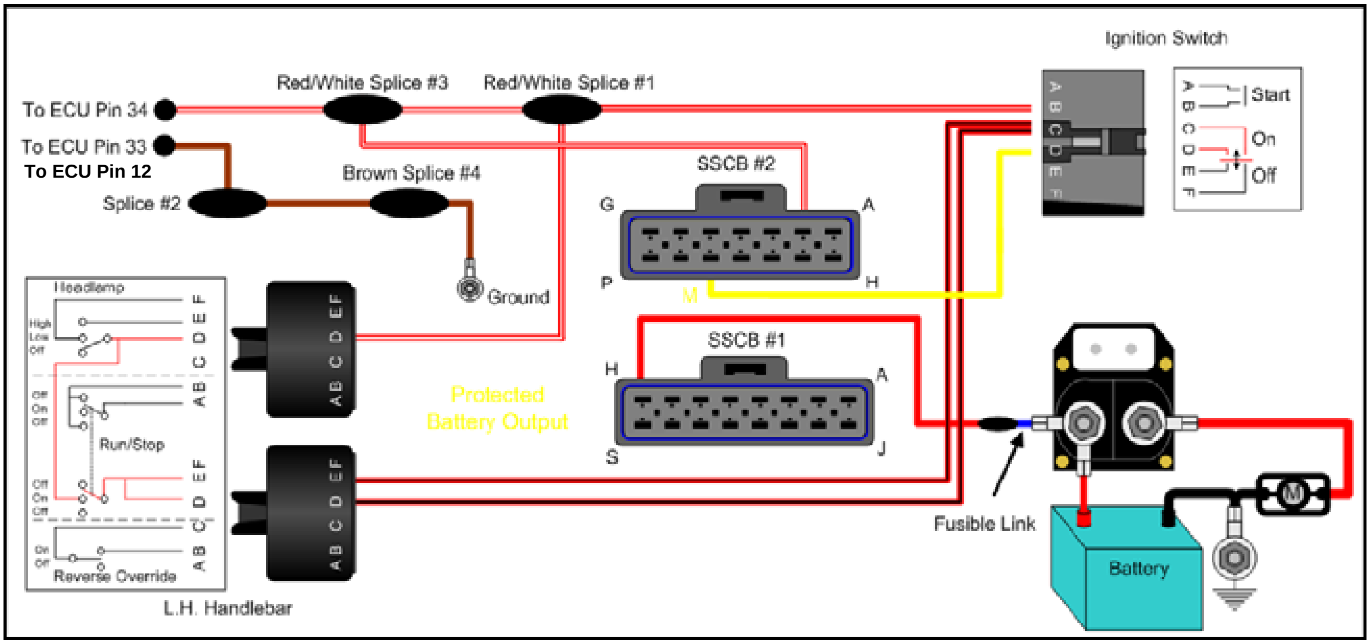
LARGE WIRE RESISTANCE		
NO POWER	BLK-Y	0 Ω
	BLK-BLU	0 Ω
	BLK-R	OPEN
GRN POWER	BLK-Y	0 Ω
	BLU-R	0 Ω
	BLK-R	OPEN
BLK POWER	R-Y	0 Ω
	BLU-BRN	0 Ω
	BLK-R	OPEN

SMALL WIRE RESISTANCE	
BRN-GRN	4±0.5Ω
BRN-BLK	4±0.5Ω

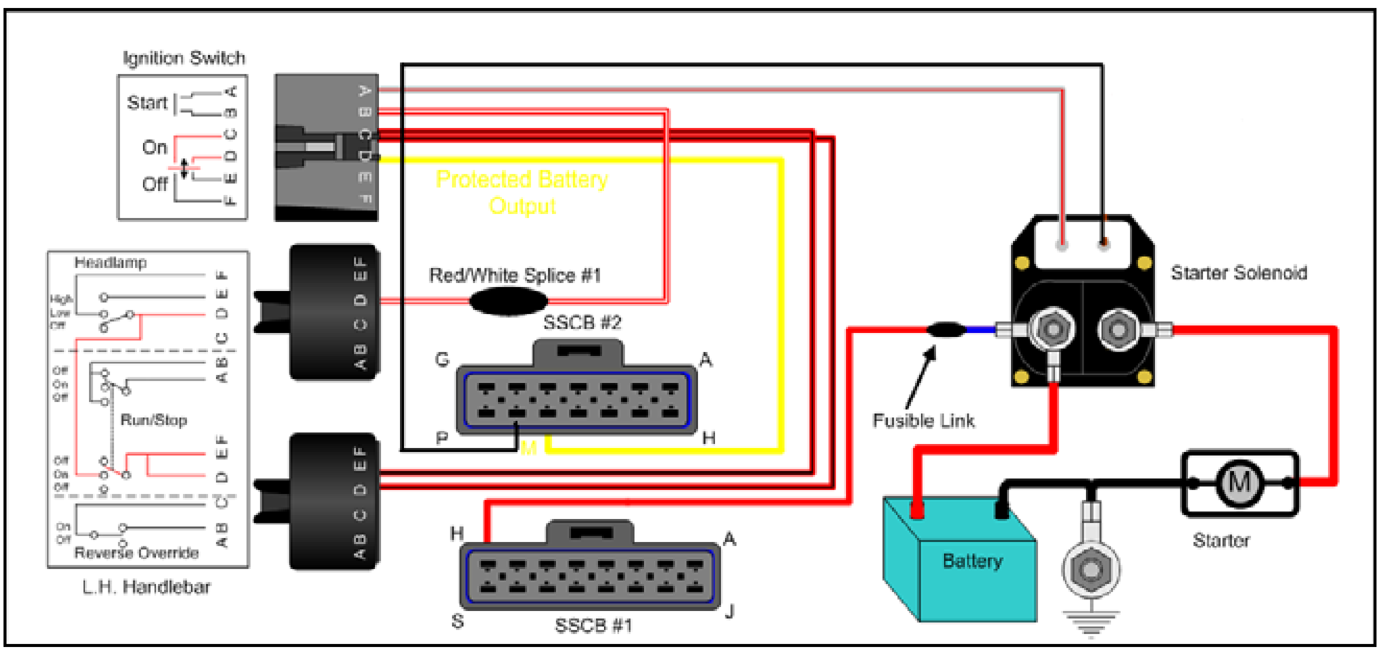
10

TROUBLESHOOTING DIAGRAMS

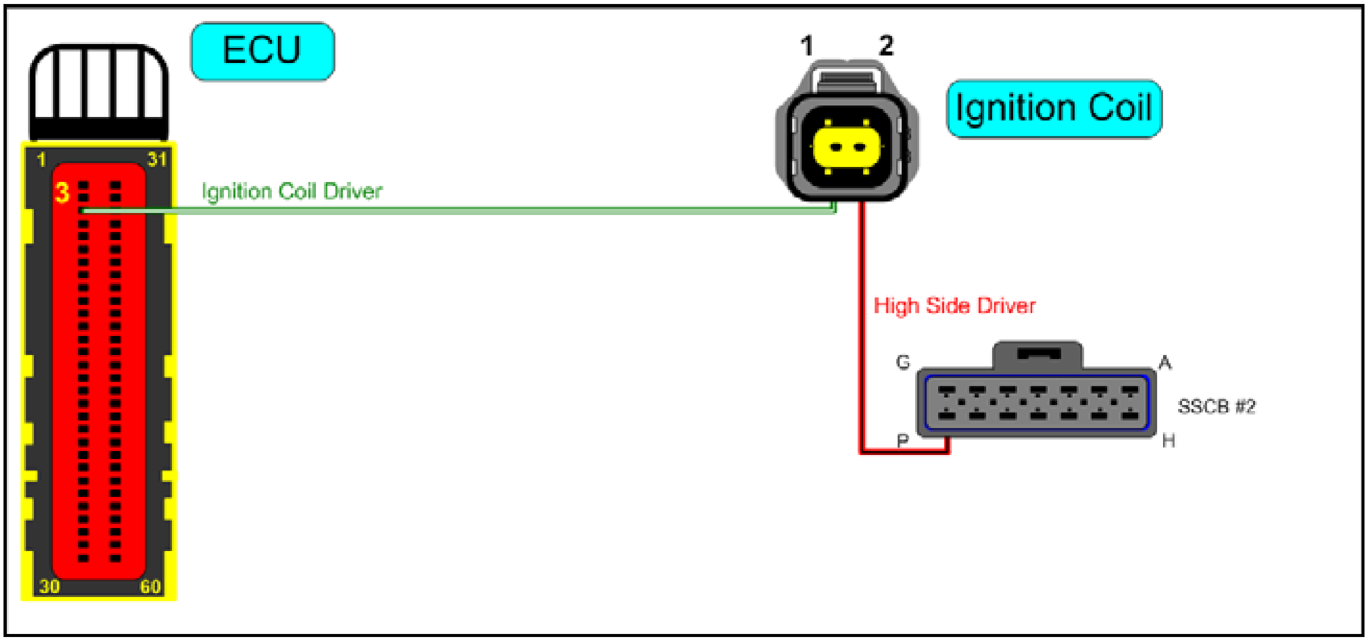
Power On - EFI



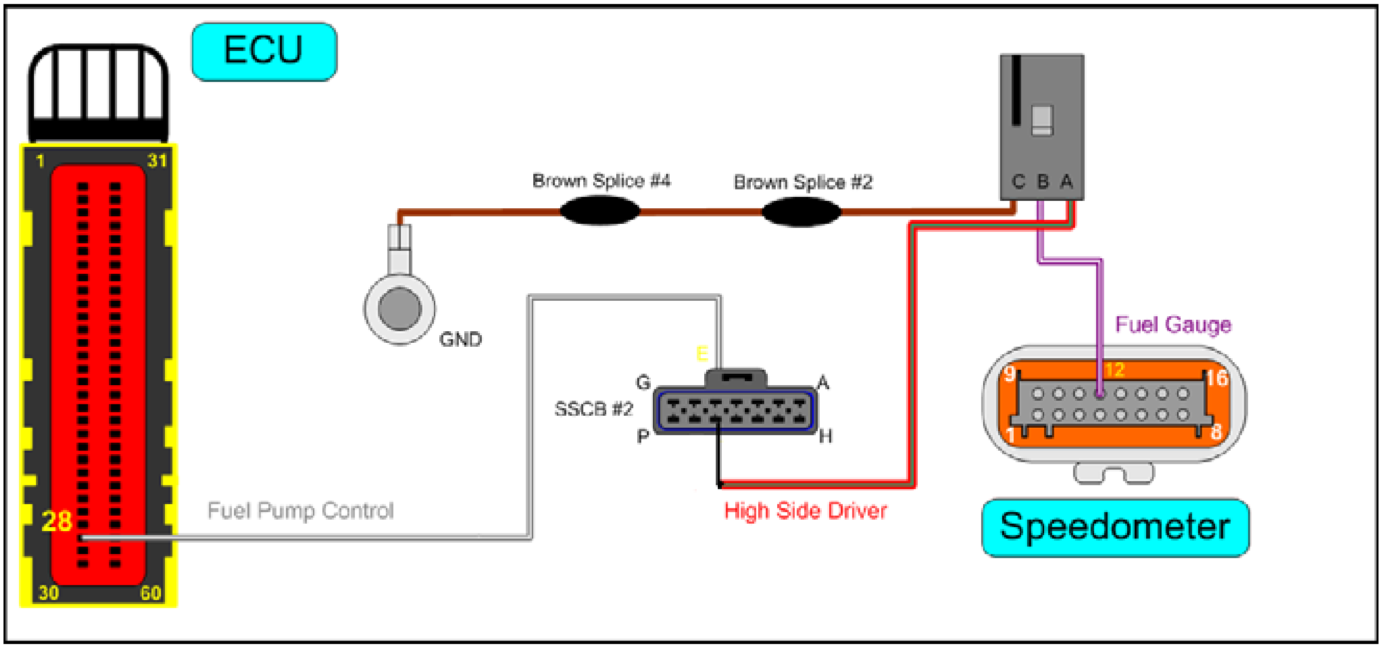
Start Circuit - EFI



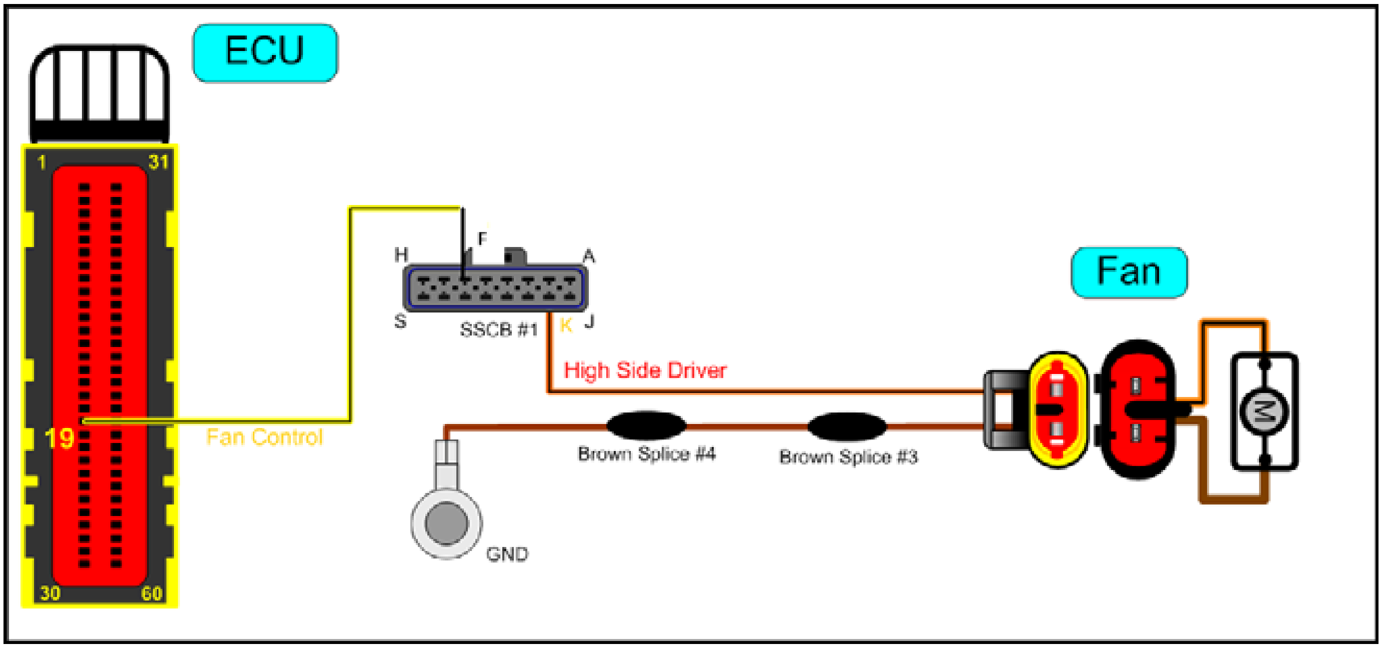
Ignition Coil - EFI



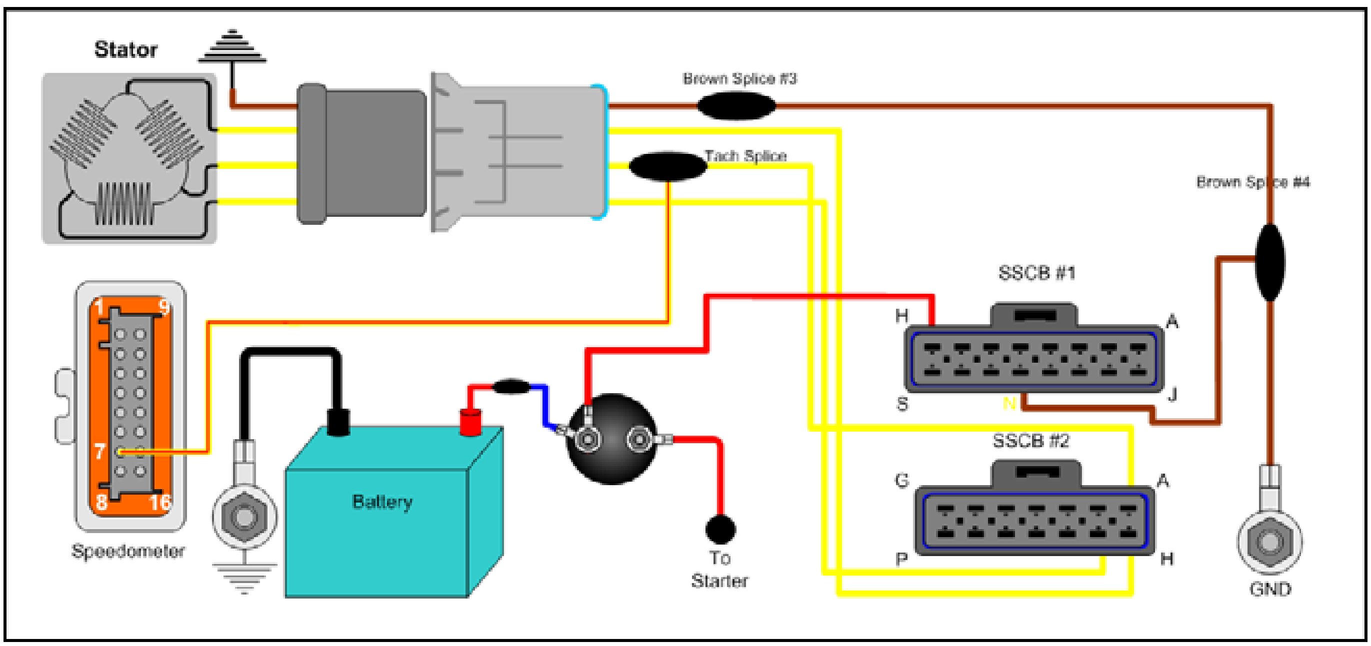
Fuel Pump - EFI



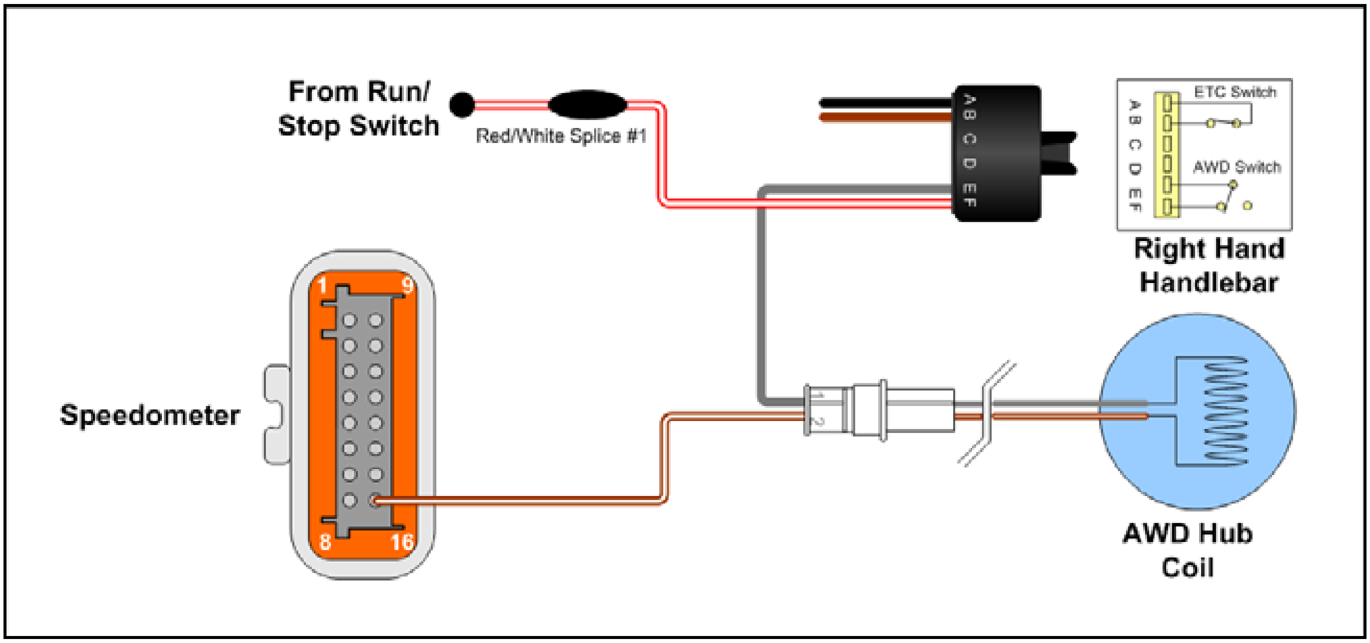
Fan - EFI



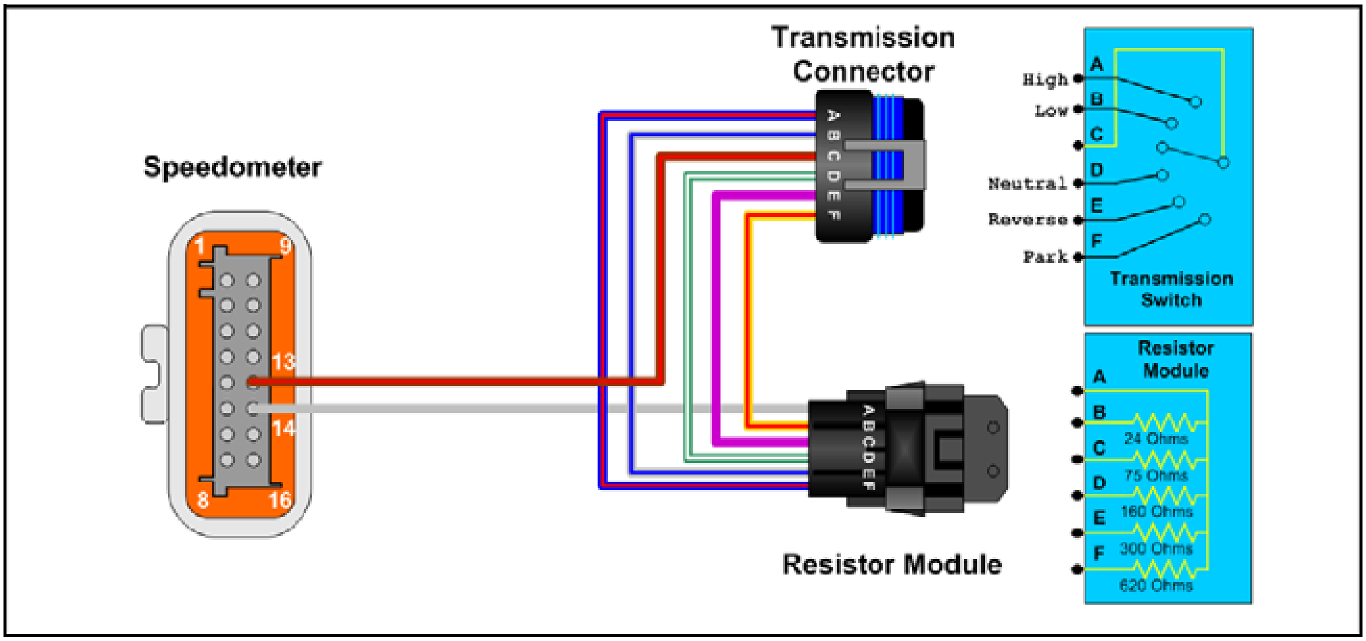
Charging System - EFI



All Wheel Drive - EFI

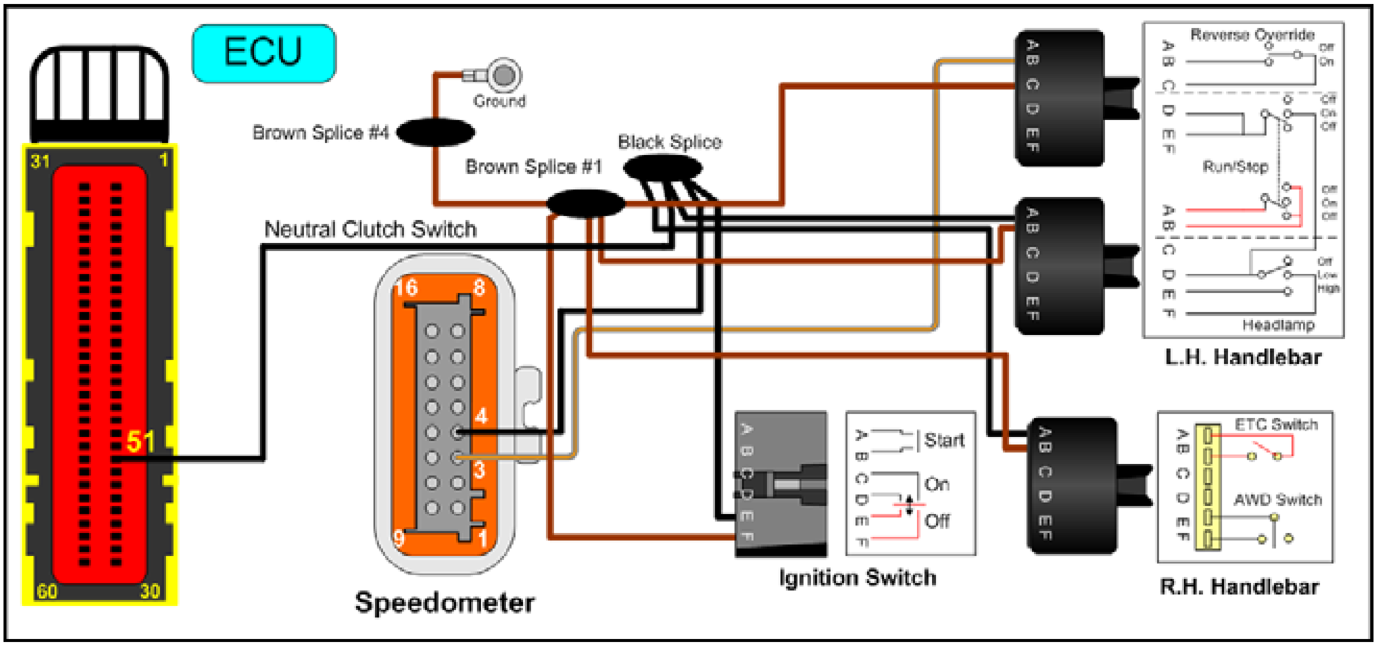


Transmission Switch - EFI

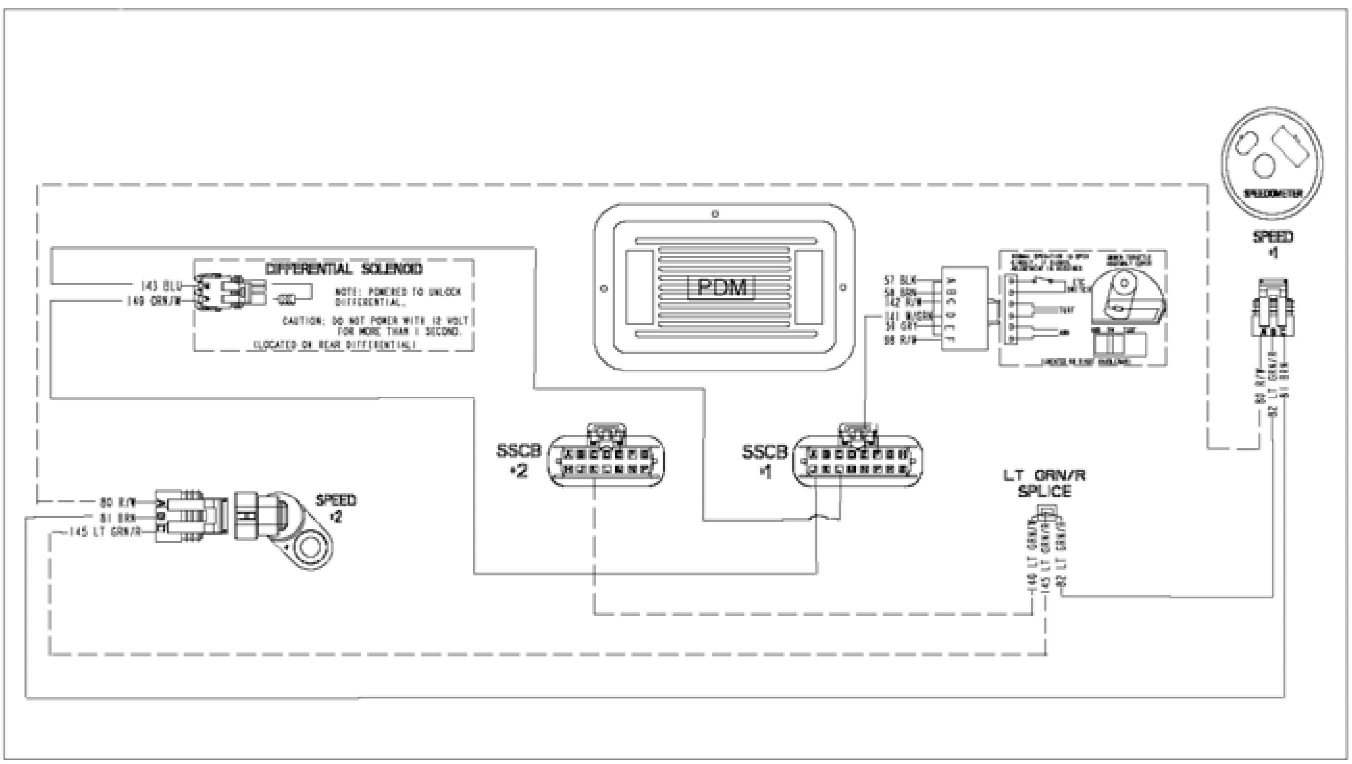


10

Reverse Override - EFI



Differential Solenoid - X2

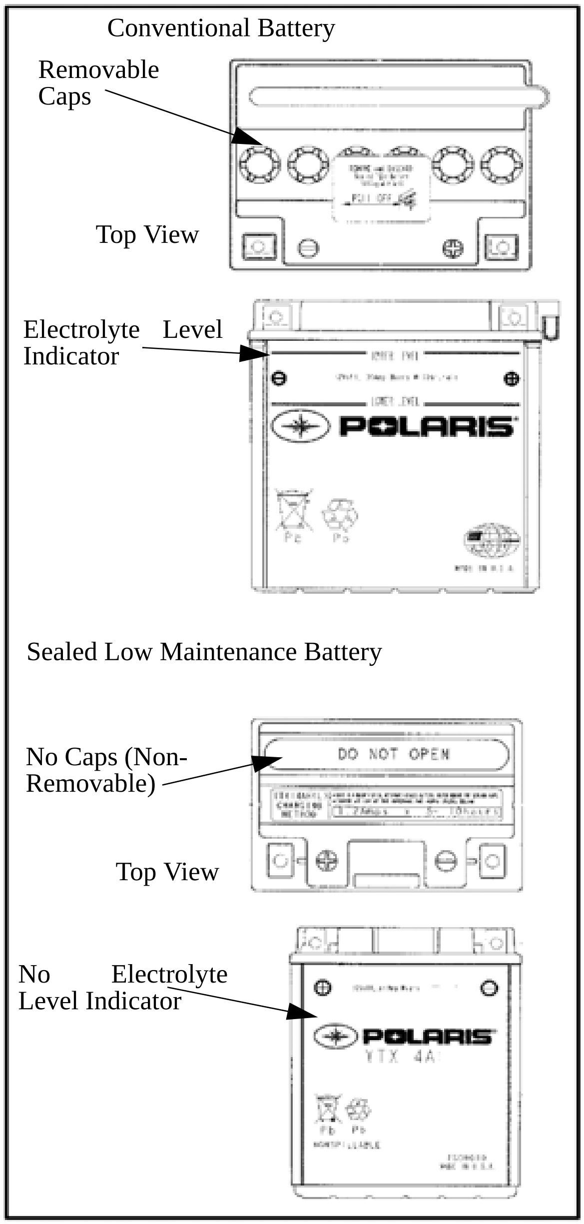


BATTERY

Battery Identification

NOTE: It is important to identify what type of battery you have installed in your ATV. Different types of batteries require different service procedures. Proper servicing and upkeep of your battery is very important for maintaining long battery life.

Your ATV may have a Conventional Battery or a Sealed Low Maintenance Battery. To identify which type of battery your ATV has, refer to the illustration below and follow the correct service and charging procedures that follow in the manual.



Battery Activation

⚠ 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.

⚠ WARNING

The gases given off by a battery are explosive. Any spark or open flame near a battery can cause an explosion which will spray battery acid on anyone close to it. Should there be contact with battery acid, wash the affected area with large quantities of cool water and seek immediate medical attention.

To ensure maximum service life and performance from a new battery, perform the following steps.

NOTE: Do not service the battery unless it will be put into regular service within 30 days. After initial service, add only distilled water to the battery. Never add electrolyte after a battery has been in service.

NOTE: New Battery: Battery must be fully charged before use or battery life will be significantly reduced 10-30% of the battery's full potential.

To activate a new battery:

1. Remove vent plug from vent fitting. Remove cell caps.
2. Fill battery with electrolyte to upper level marks on case.
3. Set battery aside to allow for acid absorption and stabilization for 30 minutes.

4. Add electrolyte to bring level back to upper level mark on case.

NOTE: This is the last time that electrolyte should be added. If the level becomes low after this point, add only distilled water.

5. Charge battery at 1/10 of its amp/hour rating. Examples: 1/10 of 9 amp battery = .9 amp; 1/10 of 14 amp battery = 1.4 amp; 1/10 of 18 amp battery = 1.8 amp (recommended charging rates).
6. Check specific gravity of each cell with a hydrometer to assure each has a reading of 1.270 or higher (excludes low maintenance batteries).

Terminal Preparation

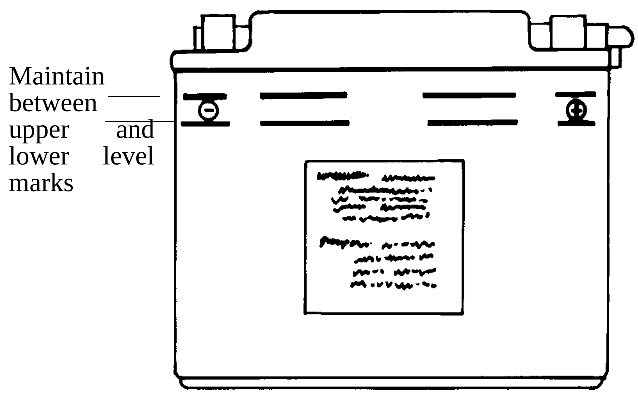
Use Polaris corrosion resistant Nyogel grease (**PN 2871329**) on battery bolts and terminals when installing a battery. This will help to prevent corrosion and maintain good electrical connection. See “BATTERY INSTALLATION”.

Battery Removal

SPORTSMAN - The battery is located under the seat.

X2 - The battery is located under fuel tank and can be accessed by removing the right hand side panel.

Inspect the battery fluid level. When the battery fluid nears the lower level, remove the battery and fill with distilled water only to the upper level line. To remove the battery:



1. Disconnect holder strap and remove covers.
2. Disconnect battery negative (-) (black) cable first, followed by the positive (+) (red) cable.

CAUTION

Whenever removing or reinstalling the battery, disconnect the negative (black) cable first and reinstall the negative cable last

3. Remove the battery.
4. Remove the filler caps and add distilled water only as needed to bring each cell to the proper level. Do not overfill the battery.

NOTE: Refill using only distilled water. Tap water contains minerals which are harmful to a battery.

NOTE: Do not allow cleaning solution or tap water inside the battery. Battery life may be reduced.

5. Reinstall the battery caps.

Battery Installation

1. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one cup water and one tablespoon baking soda. Rinse well with clean water and dry thoroughly.
2. Route the cables correctly.
3. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Nyogel Grease (PN 2871329).

4. Install clear battery vent tube from vehicle to battery vent.

> ⚠ WARNING
>
> Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. The vent tube should be routed away from frame and body to prevent contact with Route the cables correctly.

5. Reinstall the holder strap.

Off Season Storage

To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

- Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning. **NOTE:** Do not get any of the baking soda into the battery or the acid will be neutralized.
- Using a wire brush or knife, remove any corrosion from the cables and terminals.
- Make sure that the electrolyte is at the proper level. Add distilled water if necessary.
- Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the electrolyte's specific gravity reaches 1.270 or greater.
- Store the battery either in the machine with the cables disconnected, or store in a cool place.

NOTE: Recharge to full capacity every 30 to 60 days during a non-use period. If the battery is stored during the winter months, electrolyte will freeze at higher temperatures as the battery discharges. The chart below indicates freezing points by specific gravity.

Table 10-1: ELECTROLYTE FREEZING POINTS

SPECIFIC GRAVITY OF ELECTROLYTE	FREEZING POINT
1.265	-75° F
1.225	-35° F
1.200	-17° F
1.150	+5° F
1.100	+18° F
1.050	+27° F

Low Maintenance Battery Off-Season Storage

Battery voltage should be checked with a digital multitester. Readings of 12.8 volts or less require further battery testing and charging. See charts and Load Test.

- Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning.
- Using a wire brush or knife, remove any corrosion from the cables and terminals.
- Make sure that the electrolyte is at the proper level.
- Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the electrolyte's specific gravity reaches 1.270 or greater.
- Store the battery either in the machine with the cables disconnected, or store in a cool place.

NOTE: Stored batteries lose their charge at the rate of 1% per day. Recharge to full capacity every 30 to 60 days during a non-use period. If the battery is stored during the winter months, electrolyte will freeze at higher temperatures as the battery discharges. The chart below indicates freezing points by specific gravity.

Battery Testing

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first.

Following are three tests which can easily be made on a battery to determine its condition: OCV Test, Specific Gravity Test and Load Test.

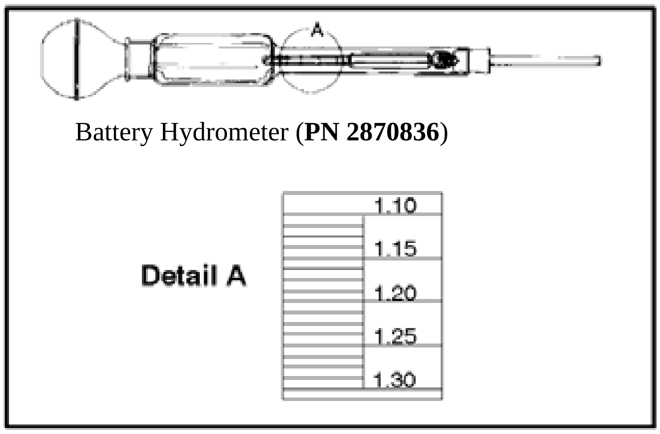
Conventional Battery OCV - Open Circuit Voltage Test

Battery voltage should be checked with a digital multitester. Readings of 12.6 volts or less require further battery testing and charging. See charts and Load Test below.

NOTE: Lead-acid batteries should be kept at or near a full charge as possible. Electrolyte level should be kept between the low and full marks. If the battery is stored or used in a partially charged condition, or with low electrolyte levels, hard crystal sulfation will form on the plates, reducing the efficiency and service life of the battery.

Conventional Battery Specific Gravity Test

A tool such as a Battery Hydrometer (**PN 2870836**) can be used to measure electrolyte strength or specific gravity. As the battery goes through the charge/discharge cycle, the electrolyte goes from a heavy (more acidic) state at full charge to a light (more water) state when discharged. The hydrometer can measure state of charge and differences between cells in a multicell battery. Readings of 1.270 or greater should be observed in a fully charged battery. Differences of more than .025 between the lowest and highest cell readings indicate a need to replace the battery.



Battery Hydrometer (**PN 2870836**)

Table 10-1: OPEN CIRCUIT VOLTAGE

STATE OF CHARGE	CONVENTIONAL LEAD - ACID	LOW MAINTENANCE
100%	12.60V	12.70V
Charged	12.40V	12.50V
75% Charged	12.10V	12.20V
50% Charged	11.90V	12.0V
25% Charged	less than 11.80V	Less than 11.90V
0% Charged	-	-

Table 10-2: SPECIFIC GRAVITY

STATE OF CHARGE*	CONVENTIONAL LEAD - ACID	LOW MAINTENANCE
100%	1.265	1.275
Charged	1.210	1.225
75% Charged	1.160	1.175
50% Charged	1.120	1.135
25% Charged	less than 1.100	Less than 1.115
0% Charged	-	-

* Measurement at 80° F

NOTE: Subtract .01 from the specific gravity reading at 40° F

Battery Load Test

⚠ CAUTION

To prevent shock or component damage, remove spark plug high tension leads and connect securely to engine ground before proceeding.

NOTE: This test can only be performed on machines with electric starters. This test cannot be performed with an engine or starting system that is not working properly.

A battery may indicate a full charge condition in the OCV test and the specific gravity 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, hook a multitester to the battery in the same manner as was done in the OCV test. The reading should be 12.6 volts or greater. Engage the starter and observe the battery voltage while cranking the engine. Continue the test for 15 seconds. During cranking the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.6 volts or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

Charging Procedure

1. Remove the battery from the ATV to prevent damage from leaking or spilled acid during charging.
2. Charge the battery with a charging output no larger than 1/10 of the battery's amp/hr rating. Charge as needed to raise the specific gravity to 1.270 or greater.
3. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with a corrosion resistant dielectric grease (**PN 2871329**).
4. Connect battery cables.

⚠ WARNING

To avoid the possibility of explosion, connect positive (red) cable first and negative (black) cable last.

5. After connecting the battery cables, install the cover on the battery and attach the hold down strap.

6. Install clear battery vent tube from vehicle to battery vent.

WARNING

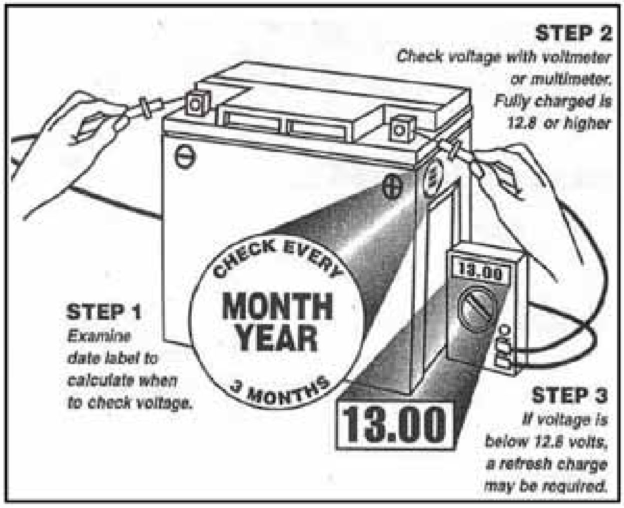
Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. Vent should be routed away from frame and body to prevent contact with electrolyte. Avoid skin contact with electrolyte, as severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.

7. Route cables so they are tucked away in front and behind battery.

Low Maintenance Battery Check:

NOTE: All Low Maintenance batteries are fully charged and tested at the factory before installation. Expected shelf life varies on storage conditions. As a general rule before placing the battery into service, check the battery condition and charge accordingly.

1. Check the date label on the side of the battery to calculate when to check voltage. The battery should be checked every 3 months.
2. Check the voltage with a voltmeter or multimeter. **A fully charged battery should be 12.8 V or higher.**
3. If the voltage is below 12.8 V, the battery will need to be recharged.



NEW BATTERIES: Batteries must be fully charged before use or battery life can be reduced by 10-30% of full potential. Charge battery for 3-5 hours using a variable rate charger. Do not use the alternator to charge a new battery. A high rate battery charger can cause battery damage.

Low Maintenance batteries are permanently sealed at the time of manufacture. The use of lead-calcium and AGM technology instead of lead-antimony allows the battery acid to be fully absorbed. For this reason, a Low Maintenance battery case is dark and the cell caps are not removable, since there is no need to check electrolyte level.

NEVER attempt to add electrolyte or water to a Low Maintenance battery. Doing so will damage the case and shorten the life of the battery. Refer to the Battery Activation and Maintenance Video (**PN 9917987**) for proper instruction on servicing Low Maintenance batteries.

NOTE: New Batteries: Batteries must be fully charged before use or battery life will be reduced by 10-30% of full potential. Charge battery for 3-5 hours at a current equivalent of 1/10 of the battery's rated amp/hour capacity. Do not use the alternator to charge a new battery. (Refer to Battery Activation and Maintenance video PN 9917987)

NEVER attempt to add electrolyte or water to a Low Maintenance battery. Doing so will damage the case and shorten the life of the battery. Refer to the Battery Maintenance Video (PN 9917987) for proper instruction on servicing Low Maintenance batteries.

TO SERVICE A LOW MAINTENANCE BATTERY:

1. Remove battery from the vehicle.
2. 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 capacity table.
3. Charge battery using a variable rate charger.

Low Maintenance Battery Charging

If battery voltage is 12.8 V or less, the battery may need recharging. When using an automatic charger, refer to the charger manufacturer's instructions for recharging. When using a constant current charger, use the following guidelines for recharging.

NOTE: Always verify battery condition before and 1-2 hours after the end of charging.

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.

Table 10-1: LOW MAINTENANCE BATTERY CHARGING REFERENCE TABLE

STATE OF CHARGE	VOLTAGE	ACTION	CHARGE TIME
100%	12.8-13 V	None, check voltage at 3 mos. after manufacture date	None Required
75-100%	12.5-12.8 V	May need slight charge	3-6 Hours
50-75%	12.0-12.5 V	Needs Charge	5-11 Hours
25-50%	11.5-12.0 V	Needs Charge	At least 13 hours, verify state of charge
0-25%	11.5 V or less	Needs Charge	At least 20 hours

Low Maintenance Battery - OCV- Open Circuit Voltage Test

Battery voltage should be checked with a digital multitester. Readings of 12.8 volts or less require further battery testing and charging. See charts and Load Test.

NOTE: Lead-acid batteries should be kept at or near a full charge as possible. If the battery is stored or used in a partially charged condition, or with low electrolyte levels, hard crystal sulfation will form on the plates, reducing the efficiency and service life of the battery.

NOTE: Use a voltmeter or multimeter to test battery voltage.

Table 10-1: OPEN CIRCUIT VOLTAGE

STATE OF CHARGE	LOW MAINTENANCE BATTERY	CONVENTIONAL BATTERY
100 %	13.0V	12.70V
75% Charged	12.80V	12.50V
50%	12.50V	12.20V
25%	12.20V	12.0V
0% Charged	less than 12.0V	less than 11.9V

* Measurement at 80° F

NOTE: Subtract .01 from the specific gravity reading at 40° F.

Low Maintenance Battery Load Test

CAUTION

To prevent shock or component damage, remove spark plug high tension leads and connect securely to engine ground before proceeding.

NOTE: This test can only be performed on machines with electric starters. Test cannot be performed with an engine or starting system that is not working properly.

A battery may indicate a full charge condition in the OCV test and the specific gravity 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:

1. Hook a multitester to the battery in the same manner as was done in the OCV test. The reading should be 12.8 volts or greater.
2. Engage the starter and observe the battery voltage while cranking the engine. Continue the test for 15 seconds.
3. During cranking the observed voltage should not drop below 9.5 volts.
4. If the beginning voltage is 12.8 volts or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

Low Maintenance Battery Charging Procedure

1. Remove the battery from the ATV to prevent damage from leaking or spilled acid during charging.
2. Charge the battery with a variable rate charging output. Charge as needed to raise the specific gravity to 1.270 or greater.
3. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with a corrosion resistant Nyogel Grease (**PN 2871329**).
4. Route cables so they are tucked away in front and behind battery.
5. Connect battery cables.

WARNING

To avoid the possibility of sparks and explosion, connect positive (red) cable first and negative (black) cable last.

6. Install cover on the battery and attach hold down strap.

NOTE: This chapter illustrates components that are unique to the Sportsman 500 EFI International and Quadricycle models. Except where noted, any servicing of these components or other components on the ATV can be done using this service manual’s procedures and illustrations.

500 EFI INTERNATIONAL / QUADRICYCLE BRAKE SYSTEM

Overview

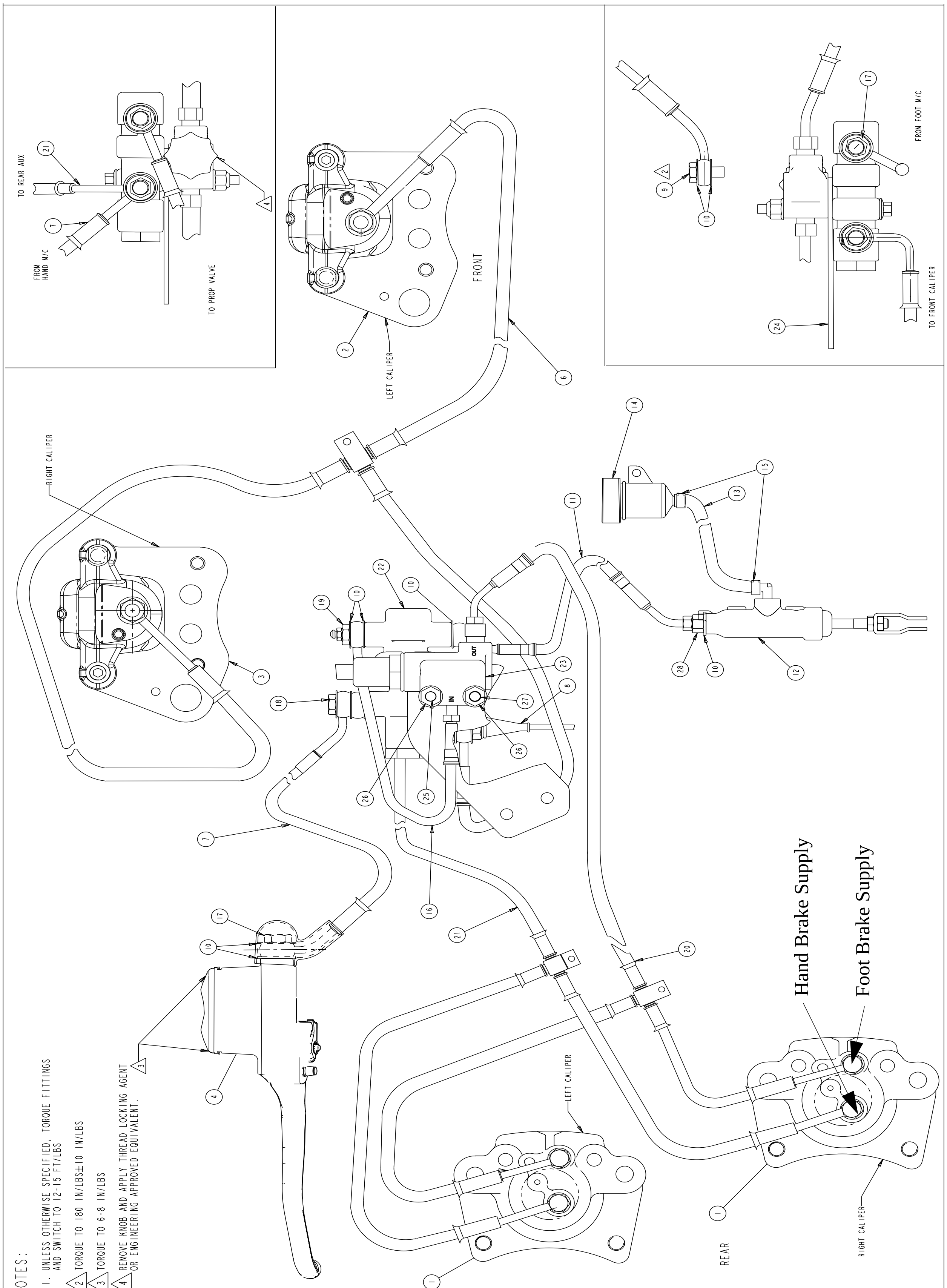
The Sportsman International / Quadricycle brake system consists of a complete hydraulic brake system. All-wheel braking is integrated into the foot brake and hand brake systems and allows 4 wheel braking from either control separately, or at the same time.

When the foot brake is applied, all brake calipers are active, as braking pressure is routed from the foot brake master cylinder through the proportioning valve and distribution block, exiting one line to the front calipers, while the other line exits the proportioning valve and feeds the outer line of the rear calipers.

When the hand brake is applied, all brake calipers are active, as braking pressure is routed from the hand brake master cylinder through the distribution block, exiting one line to the front calipers, while the other line feeds the inner line of the rear calipers.

ITEM	PART NAME	QTY.
28	ADAPTOR - M10 X 1.0, 3/8-24IF,BRASS	1
27	SCREW-1/4-20 X 1 3/4 HXHDCP-Z	1
26	NUT-1/4-20-NYLOK-Y	2
25	BOLT-1/4-20 X 2.75 - HXHDCP-GR5-Y	1
24	PLATE-BRAKE, VALVE, BLK	1
23	VALVE-REDUCING, BRAKE	1
22	BLOCK-DIST, BRAKE, LONG PISTON	1
21	LINE-BRAKE, REAR, AUX,800 INTL	1
20	LINE-BRAKE, REAR, SERVICE,800 INTL	1
19	BOLT-BANJO, 10MM X 1.25 W/BLEEDER	1
18	BOLT-DOUBLE BANJO, 10MM X 1.25	1
17	BOLT-BANJO, 10MM X 1.25 -6G	2
16	LINE-BRAKE, J/B TO P/VALVE,NPT	1
15	HOSE CLAMP,RED	2
14	ASM-RESERVOIR,REAR BRAKE	1
13	HOSE-RESERVOIR,1/4 ID,19.5	1
12	ASM-M/CYL FOOT 3/4",3.70 LONG	1
11	LINE-BRAKE,FT TO J/B, 800 INTL	1
10	SEAL-STAT-O, 3/8	24
9	BOLT-BANJO, 10MM X 1.00	6
8	SWITCH-PRESSURE,BRAKE,M10 X 1.25	1
7	LINE-BRAKE,HAND TO J/B	1
6	LINE-BRAKE,FRONT	1
5	FLUID BRAKE, DOT4	A/R
4	ASM-MASTER CYLINDER,HB,11/16"	1
3	ASM-CALIPER, BRAKE,1-1/4,RH, 9"	1
2	ASM-CALIPER, BRAKE,1-1/4,LH, 9"	1
1	ASM-CALIPER, DH4P, 165YPAD	2

Exploded View



11

500 EFI INTERNATIONAL / QUADRICYCLE STEERING POST AND LOCK

Steering Assembly Exploded View

The 500 EFI International / Quadricycle Sportsman is equipped with a steering locking mechanism to prevent theft or unauthorized use. Steering post removal may be required for lock service or repair.

Lock System Item Number / Description:

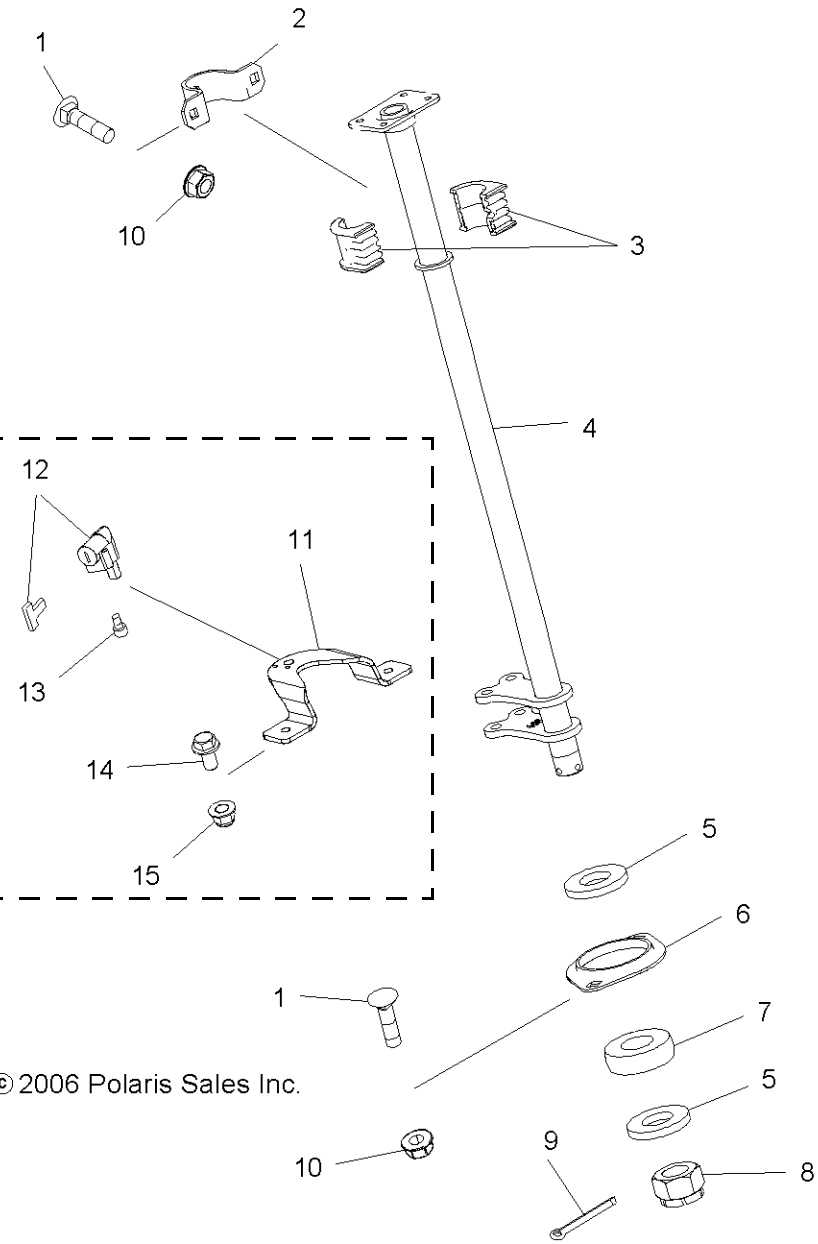
11. Lock Collar

12. Lock Set

13. Bolt, Lock Set

14. Bolt(s), Lock Collar

15. Nut(s), Lock Collar



500 EFI QUADRICYCLE EMISSIONS SYSTEM

Overview

500 EFI Quadricycle model ATVs are equipped with an emissions system from the factory. The emission system is designed to meet the various international emissions standards.

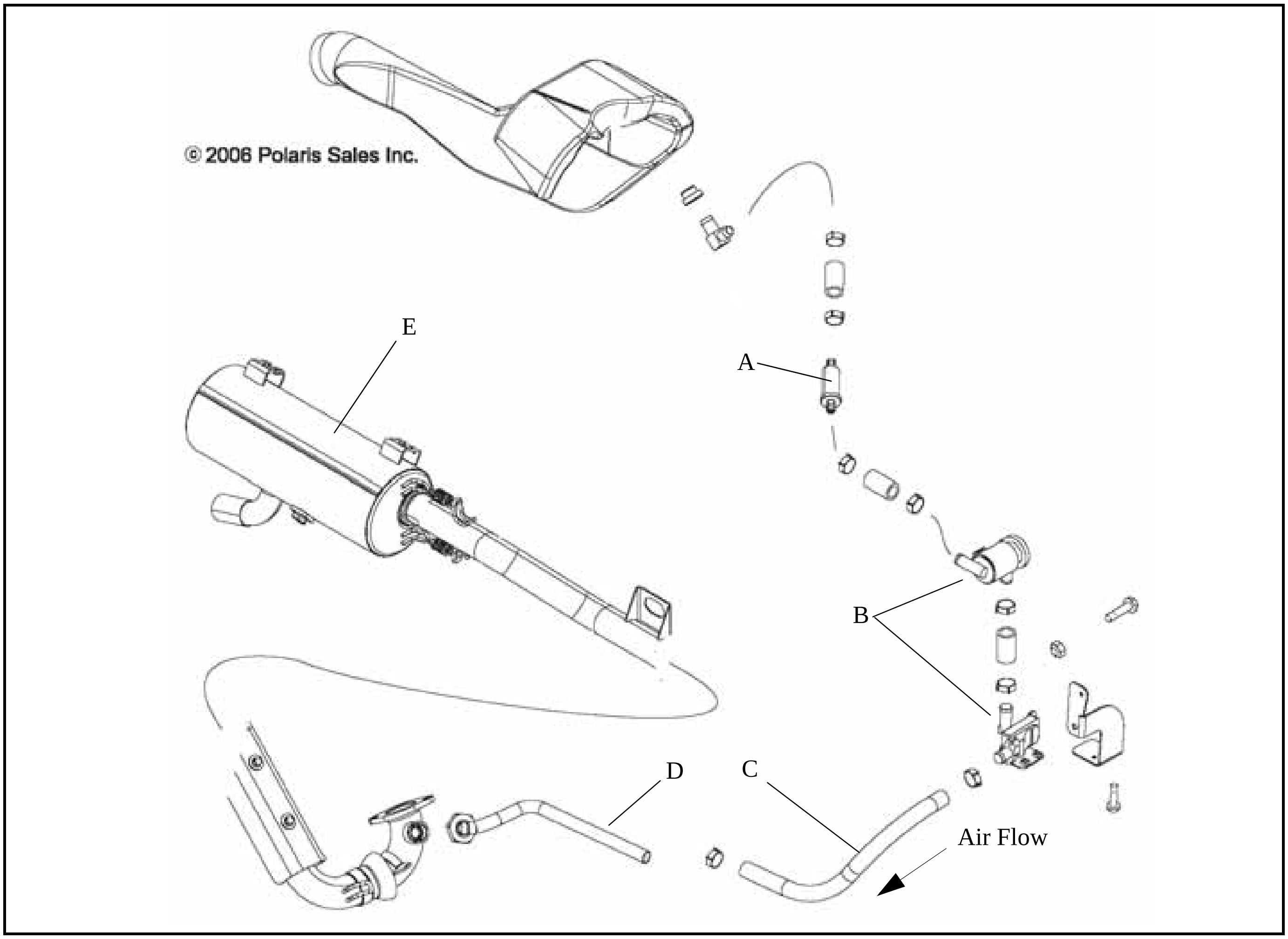
The emissions system consists of:

- A. Air Valve Filter
- B. Air Valve Assembly (one way operation)
- C. Tubing
- D. Air Injection Tube
- E. Catalyst

The emissions system utilizes an air valve filter (A), one-way air valve system (B), and vacuum to help reduce emissions. The air valve assembly (B) contains a vacuum shutoff. When engine RPM drops quickly or is at high RPM, the air valve closes. During idle through mid-range RPM the air valve is open and air is drawn into the from the PVT intake duct. The air valve assembly (B) opens and closes based on the vacuum pressure connected to the air duct.

The exhaust pipe creates a vacuum after each engine exhaust pulse. The air valve (B) opens and closes based on this engine pulse. Fresh air then travels through the air injection tubes (C and D) and into the exhaust. This air (oxygen) enters the exhaust pipe and mixes with the exhaust gases from the engine, reducing emissions. The air and exhaust gas mixture then passes through the silencer (E), which contains a catalyst. This catalyst also reduces emissions by interacting with the exhaust as it passes through the silencer.

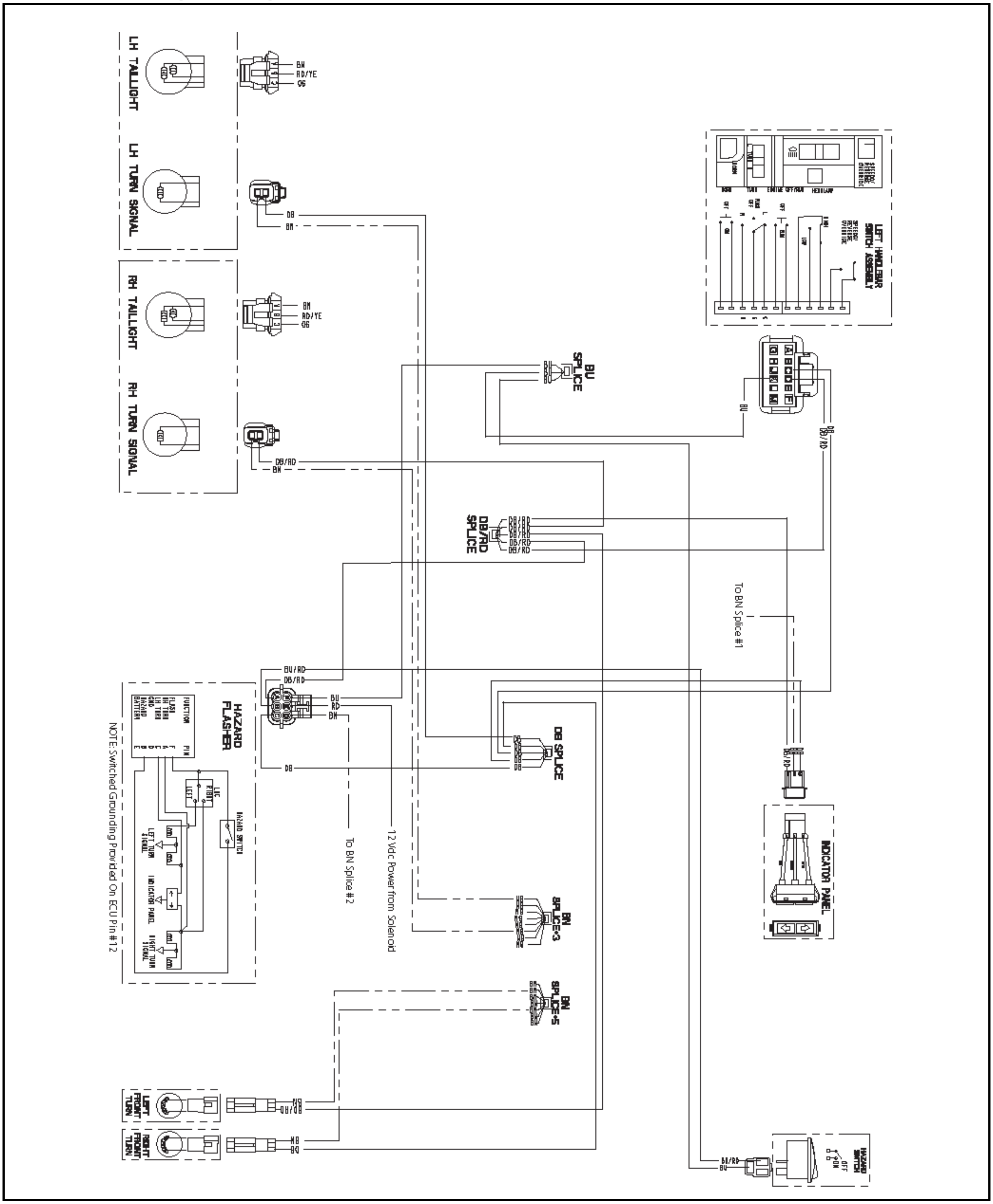
NOTE: No maintenance or service of the catalyst is required.



11

500 INTERNATIONAL & QUADRICYCLE ELECTRICAL

Turn / Hazard Signal Diagram



A

B

C

D

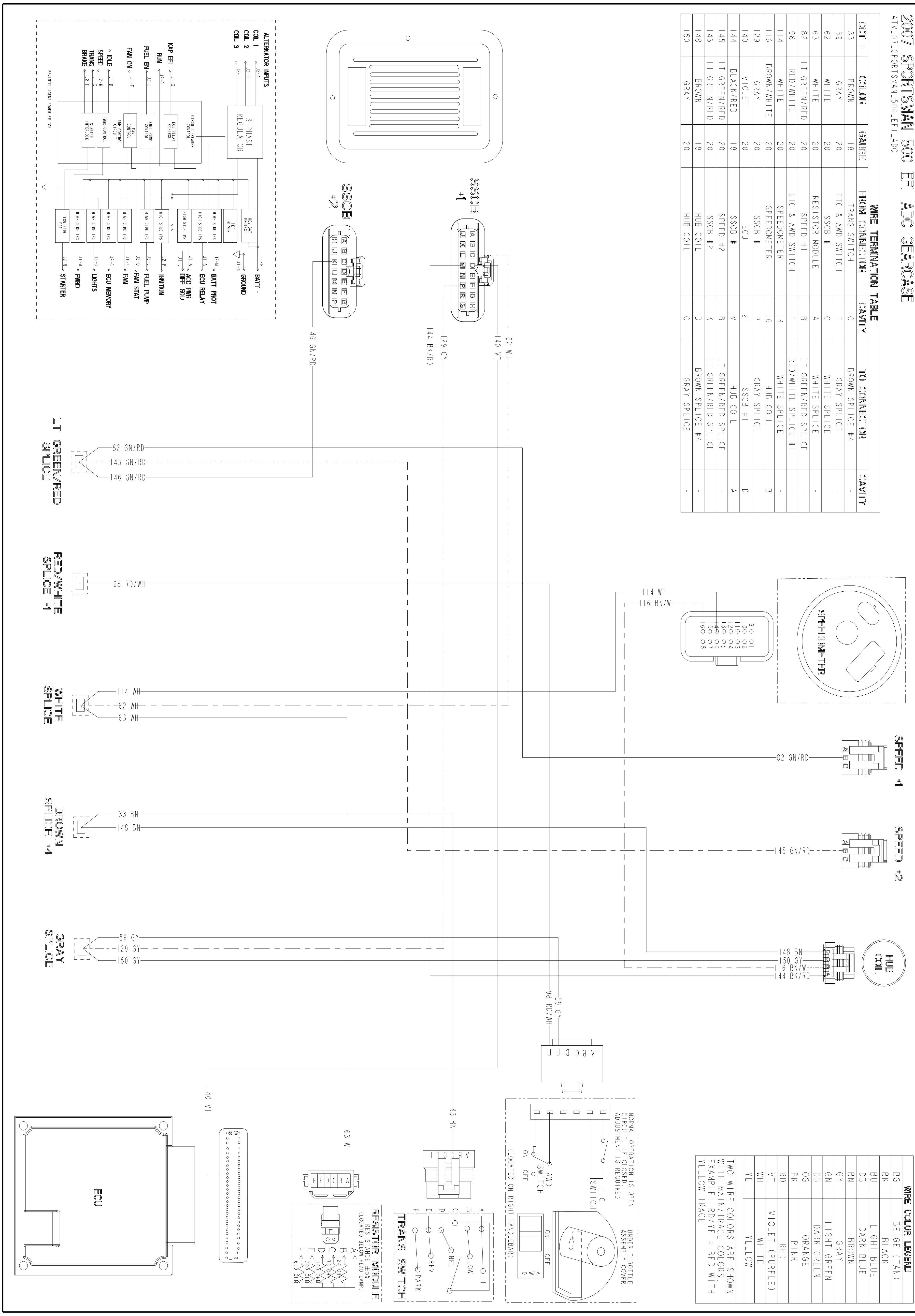
E

F

G

X

2007 SPORTSMAN ACTIVE DESCENT CONTROL (ADC) WIRE DIAGRAM



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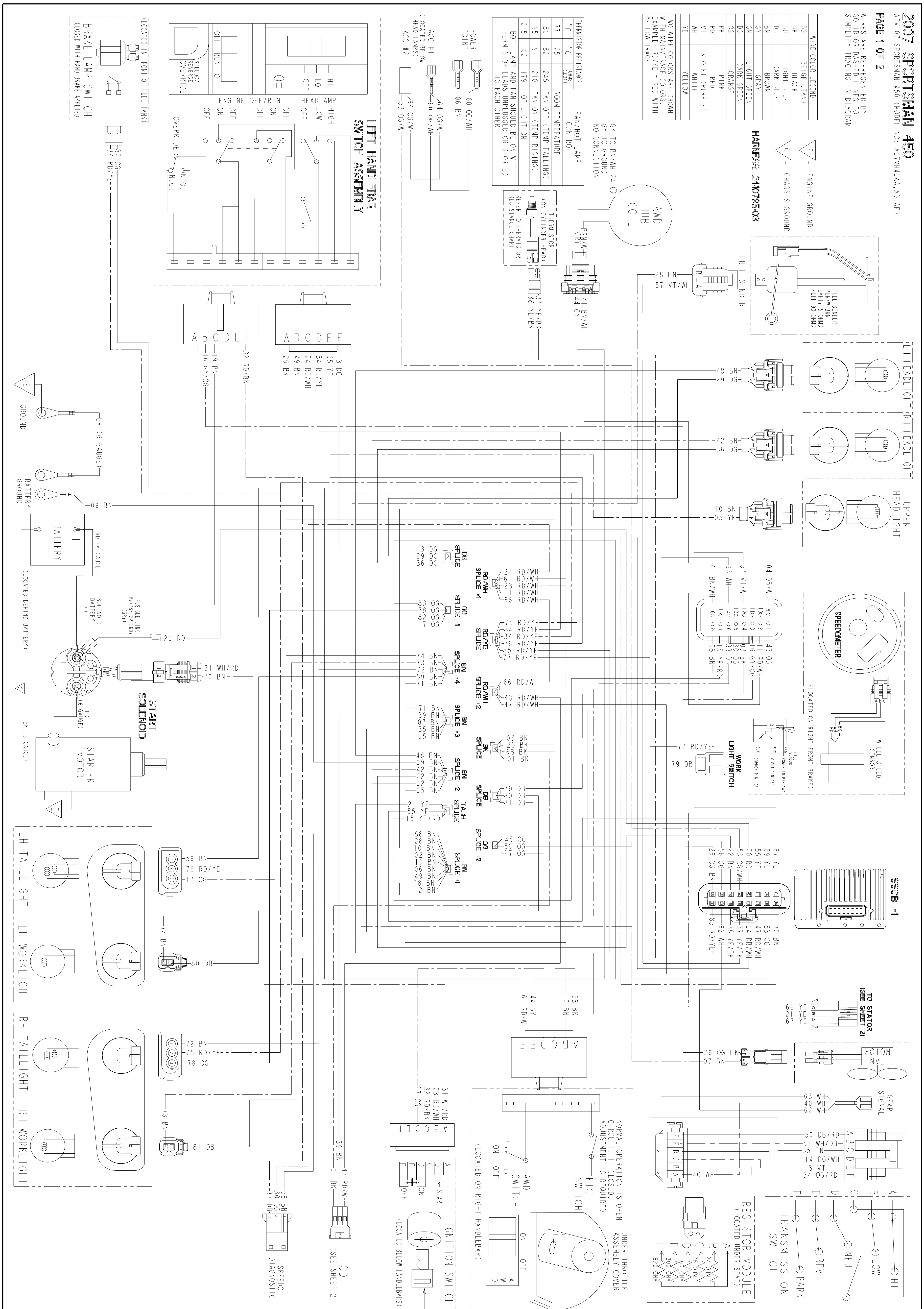
2007 SPORTSMAN 450 WIRE DIAGRAM



2007 SPORTSMAN 450

ATV_07_SPORTSMAN_450 (MODEL NO: A07MH46AA,AD,AF)

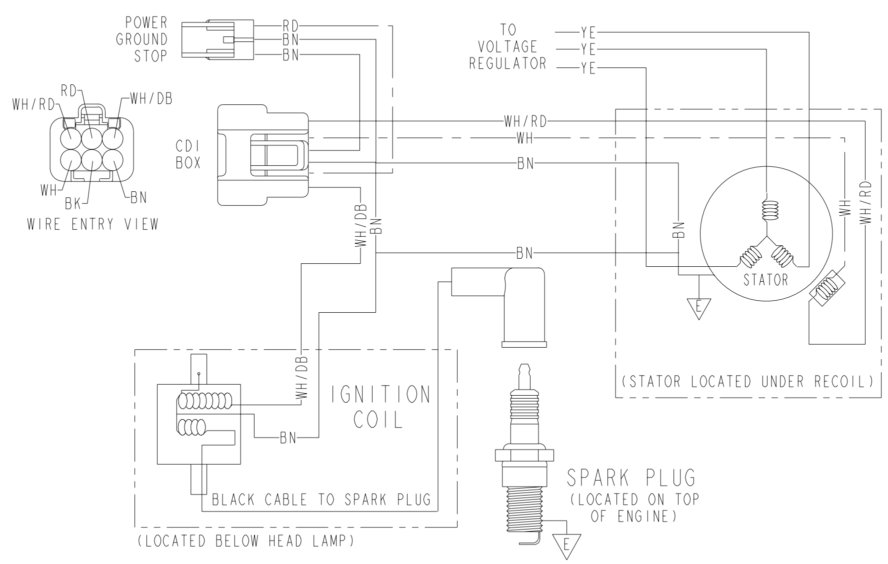
PAGE 2 OF 2

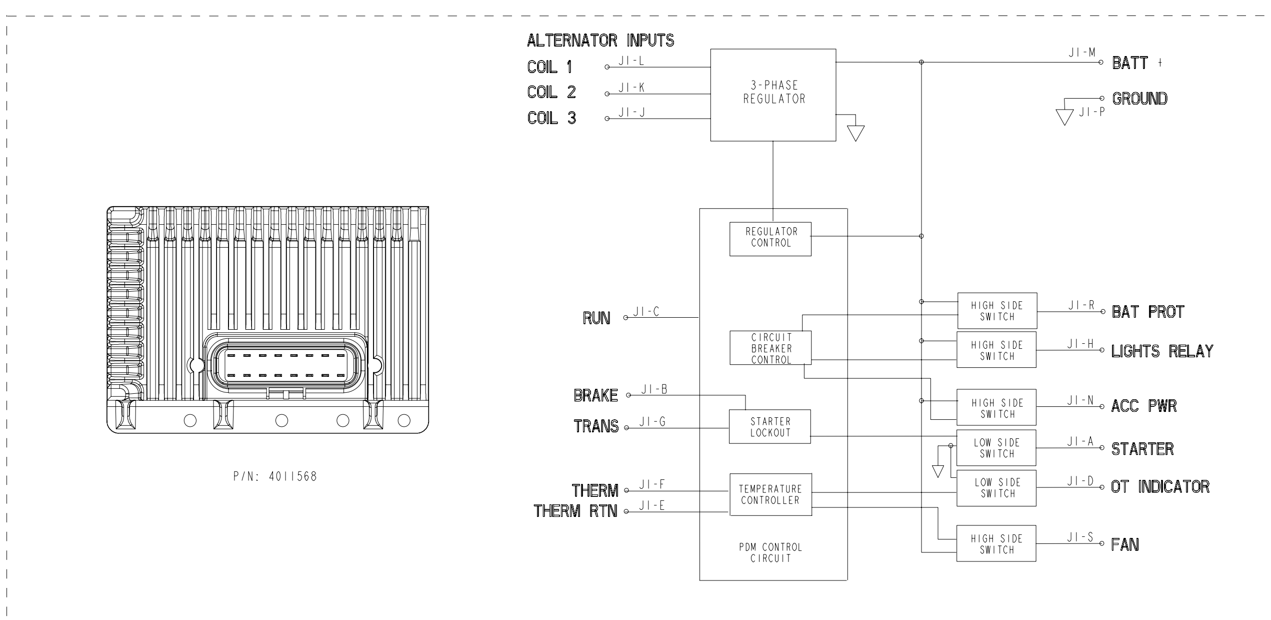
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM

DRAFTED BY: B.LANGLOIS 01-AUG-06
APPROVED BY: C.GUILLORY 01-AUG-06

SPORTSMAN 450

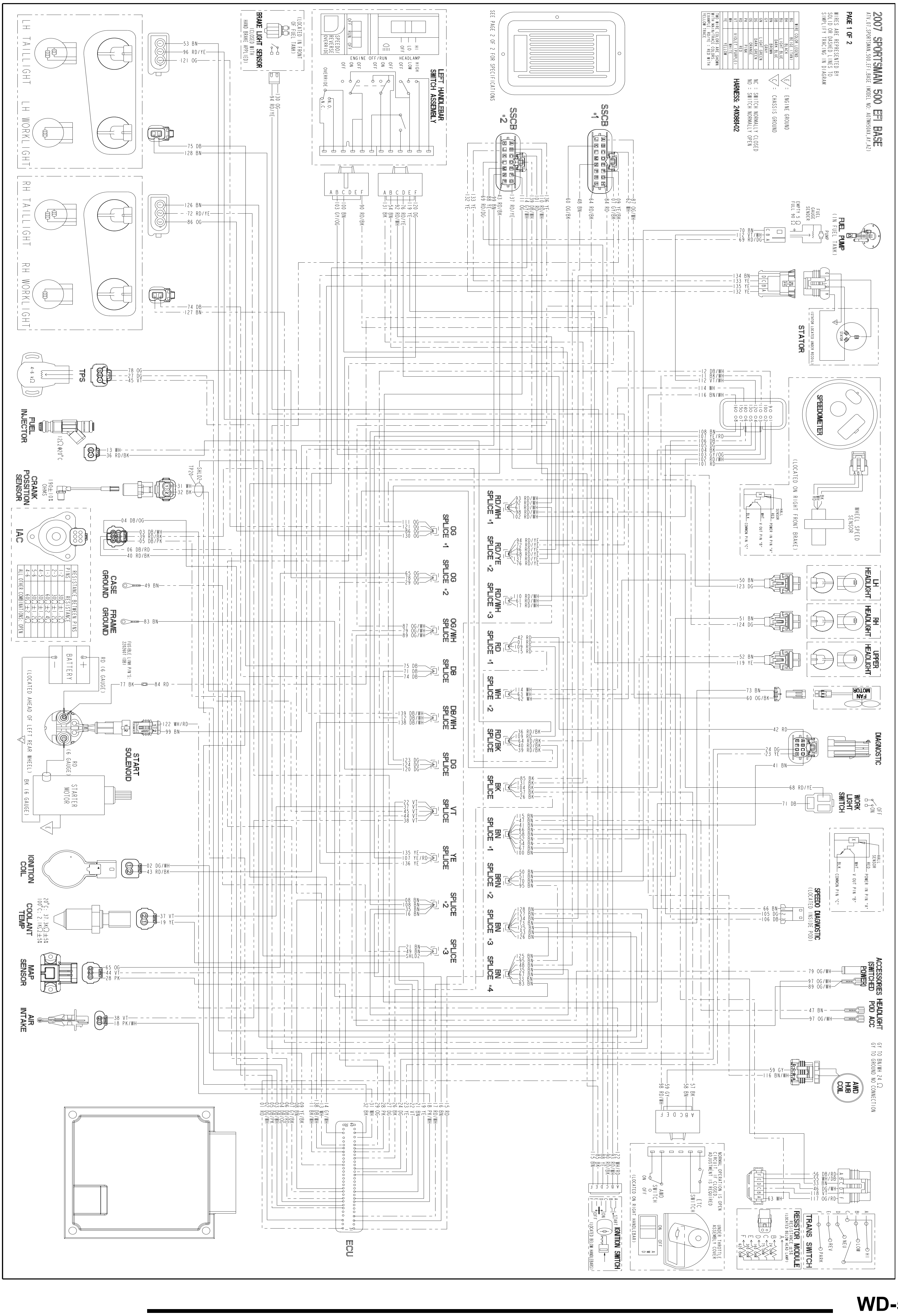
RESISTANCES (±20% @ 68°F/20°C)			
STATOR	PULSER COIL	WH/RD TO WH	185 Ω
		WH/RD TO GROUND	OPEN
	CHARGE COIL	YE TO YE	0.43 Ω
		YE TO GROUND	OPEN
IGNITION COIL		PRIMARY	0.11 Ω
		SECONDARY	6.7 KΩ





WIRE TERMINATION TABLE						
REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	BLACK	20	BLACK SPLICE	-	CDI	-
02	BROWN	14	BROWN SPLICE #1	-	BROWN SPLICE #2	-
03	BLACK	20	BLACK SPLICE	-	SPEEDOMETER	4
04	BLUE/WHITE	20	SPEEDOMETER	9	SSCB	D
05	YELLOW	18	UPPER HEADLIGHT	B	LH HANDLEBAR	E
06	BROWN	16	BROWN SPLICE #1	-	POWER POINT	1/4F
07	BROWN	16	BROWN SPLICE #3	-	FAN MOTOR	A
08	BROWN	20	BROWN SPLICE #1	-	SPEEDOMETER	8
09	BROWN	14	BROWN SPLICE #2	-	BATTERY GROUND	1/4R
10	BROWN	18	BROWN SPLICE #1	-	UPPER HEADLIGHT	A
11	RED/WHITE	20	RED/WHITE SPLICE #1	-	SPEEDOMETER	2
12	BROWN	20	BROWN SPLICE #1	-	ETC AND AWD SWITCH	B
13	GREEN	18	GREEN SPLICE	-	LH HANDLEBAR	F
14	GREEN/WHITE	18	TRANS SWITCH	D	RESISTOR MODULE	D
15	YELLOW/RED	20	TACH SPLICE	-	SPEEDOMETER	7
16	GRAY/ORANGE	20	SPEEDOMETER	3	LH HANDLEBAR	B
17	ORANGE	18	LH TAILLIGHT	3	ORANGE SPLICE #1	-
18	PURPLE	18	TRANS SWITCH	E	RESISTOR MODULE	C
19	BROWN	20	BROWN SPLICE #1	-	LH HANDLEBAR	C
20	RED	14	FUSIBLE LINK	-	SSCB	M
21	YELLOW	16	STATOR	B	TACH SPLICE	-
22	BROWN	14	BROWN SPLICE #2	-	SSCB	P
23	RED/WHITE	18	RED/WHITE SPLICE #1	-	IGNITION SWITCH	B
24	RED/WHITE	16	RED/WHITE SPLICE #1	-	LH HANDLEBAR	C
25	BLACK	20	BLACK SPLICE	-	LH HANDLEBAR	A
26	ORANGE/BLACK	16	SSCB	S	FAN MOTOR	B
27	ORANGE	16	IGNITION SWITCH	D	ORANGE SPLICE #2	-
28	BROWN	20	BROWN SPLICE #1	-	FUEL SENDER	B
29	GREEN	18	GREEN SPLICE	-	LH HEADLIGHT	B
30	GREEN	20	SPEEDOMETER	5	SPEEDO DIAGNOSTIC	2
31	WHITE/RED	18	START SOLENOID	1	IGNITION SWITCH	A
32	RED/BLACK	16	IGNITION SWITCH	C	LH HANDLEBAR	F
33	BLUE	20	SPEEDOMETER	6	SPEEDO DIAGNOSTIC	3
34	RED/YELLOW	18	RED/YELLOW SPLICE	-	BRAKE LIGHT SWITCH	-
35	BROWN	20	BROWN SPLICE #3	-	TRANS SWITCH	C
36	GREEN	18	GREEN SPLICE	-	RH HEADLIGHT	B
37	YELLOW/BLACK	18	SSCB	E	THERMISTOR	.156M
38	YELLOW/BLACK	18	SSCB	F	THERMISTOR	.156F
39	BROWN	18	BROWN SPLICE #3	-	CDI	-
40	WHITE	20	GEAR SIGNAL	1/4F	RESISTOR MODULE	A
41	BROWN/WHITE	20	SPEEDOMETER	16	HUB COIL	B
42	BROWN	18	BROWN SPLICE #2	-	RH HEADLIGHT	A
43	RED/WHITE	18	RED/WHITE SPLICE #2	-	CDI	-
44	GRAY	20	ETC AND AWD SWITCH	E	HUB COIL	C
45	ORANGE	20	SPEEDOMETER	1	ORANGE SPLICE #2	-
46	-	-	-	-	-	-
47	RED/WHITE	18	RED/WHITE SPLICE #2	-	SSCB	C
48	BROWN	18	BROWN SPLICE #2	-	LH HEADLIGHT	A
49	BROWN	20	BROWN SPLICE #1	-	LH HANDLEBAR	B
50	BLUE/RED	18	TRANS SWITCH	A	RESISTOR MODULE	F
51	WHITE/BLUE	18	TRANS SWITCH	B	RESISTOR MODULE	E
52	-	-	-	-	-	-
53	ORANGE/WHITE	16	ACC #2	-	SSCB	N
54	ORANGE/RED	18	TRANS SWITCH	F	RESISTOR MODULE	B
55	YELLOW	16	TACH SPLICE	-	SSCB	L
56	ORANGE	16	ORANGE SPLICE #2	-	SSCB	R
57	PURPLE/WHITE	20	SPEEDOMETER	12	FUEL SENDER	A
58	BROWN	20	BROWN SPLICE #1	-	SPEEDO DIAGNOSTIC	1
59	BROWN	18	BROWN SPLICE #4	-	LH TAILLIGHT	1
60	ORANGE/WHITE	16	POWER POINT	3/16F	ACC #1	1/4F
61	RED/WHITE	20	RED/WHITE SPLICE #1	-	ETC AND AWD SWITCH	F
62	WHITE	20	SSCB	G	GEAR SIGNAL	1/4F
63	WHITE	20	SPEEDOMETER	14	GEAR SIGNAL	1/4F
64	ORANGE/WHITE	16	ACC #1	1/4F	ACC #2	-
65	BROWN	14	BROWN SPLICE #2	-	BROWN SPLICE #3	-
66	RED/WHITE	16	RED/WHITE SPLICE #1	-	RED/WHITE SPLICE #2	-
67	YELLOW	16	STATOR	A	SSCB	J
68	BLACK	20	BLACK SPLICE	-	ETC AND AWD SWITCH	A
69	YELLOW	16	STATOR	C	SSCB	K
70	BROWN	18	SSCB	A	START SOLENOID	2
71	BROWN	18	BROWN SPLICE #3	-	BROWN SPLICE #4	-
72	BROWN	18	BROWN SPLICE #4	-	RH TAILLIGHT	1
73	BROWN	18	BROWN SPLICE #4	-	RH WORKLIGHT	-
74	BROWN	18	BROWN SPLICE #4	-	LH WORKLIGHT	-
75	RED/YELLOW	18	RED/YELLOW SPLICE	-	RH TAILLIGHT	2
76	RED/YELLOW	18	RED/YELLOW SPLICE	-	LH TAILLIGHT	2
77	RED/YELLOW	18	RED/YELLOW SPLICE	-	WORK LIGHT SWITCH	-
78	ORANGE	18	ORANGE SPLICE #1	-	RH TAILLIGHT	3
79	BLUE	18	BLUE SPLICE	-	WORK LIGHT SWITCH	-
80	BLUE	18	BLUE SPLICE	-	LH WORKLIGHT	-
81	BLUE	18	BLUE SPLICE	-	RH WORKLIGHT	-
82	ORANGE	18	ORANGE SPLICE #1	-	BRAKE LIGHT SWITCH	-
83	ORANGE	18	ORANGE SPLICE #1	-	SSCB	B
84	RED/YELLOW	16	RED/YELLOW SPLICE	-	LH HANDLEBAR	D
85	RED/YELLOW	16	RED/YELLOW SPLICE	-	SSCB	H

2007 SPORTSMAN 500 EFI ‘STANDARD’ WIRE DIAGRAM



2007 SPORTSMAN 500 EFI BASE

ATV_07_SPORTSMAN_500_EFI_BASE (MODEL NO: A07MH50AX,AY,AZ)

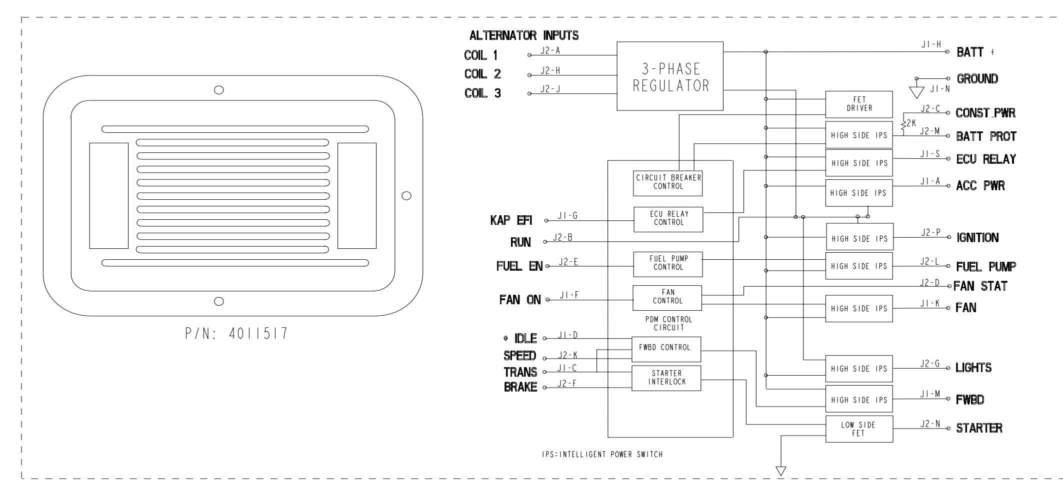
PAGE 2 OF 2

WIRE TERMINATION TABLE

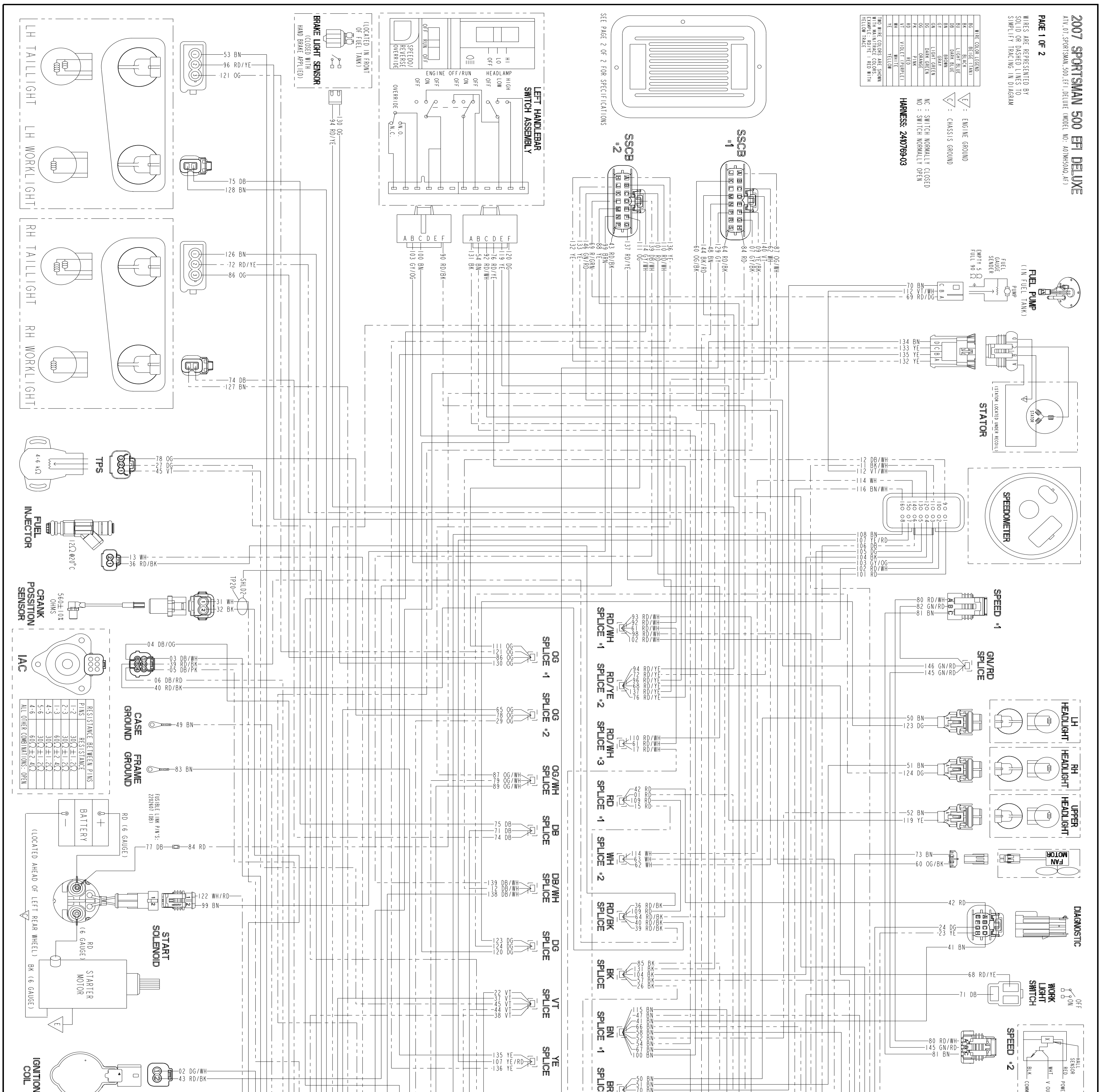
REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	RED	20	ECU	1	RED SPLICE #1	-
02	GREEN/WHITE	18	ECU	3	IGNITION COIL	1
03	BLUE/WHITE	20	ECU	7	IAC	1
04	BLUE/ORANGE	20	ECU	8	IAC	6
05	BLUE/PINK	20	ECU	6	IAC	3
06	BLUE/RED	20	ECU	9	IAC	4
07	GRAY/BLACK	20	ECU	11	SSCB #1	G
08	BROWN	20	ECU	12	SPLICE #2	-
09	YELLOW/BLACK	20	ECU	19	SSCB #1	F
10	-	-	-	-	-	-
11	BLACK/WHITE	20	ECU	23	SPEEDOMETER	11
12	BLUE/WHITE	20	BLUE/WHITE SPLICE	-	SPEEDOMETER	9
13	WHITE	18	ECU	25	FUEL INJECTOR	2
14	GRAYWHITE	20	ECU	28	SSCB #2	E
15	RED	20	ECU	31	RED SPLICE #1	-
16	BROWN	20	ECU	33	SPLICE #2	-
17	RED/WHITE	20	ECU	34	RED/WHITE SPLICE #3	-
18	PINK/WHITE	20	ECU	38	AIR INTAKE	1
19	YELLOW	20	ECU	39	COOLANT TEMP	1
20	-	-	-	-	-	-
21	BROWN	20	ECU	41	SPLICE #3	-
22	VIOLET	20	ECU	46	VIOLET SPLICE	-
23	YELLOW	TP20	ECU	47	DIAGNOSTIC	H
24	GREEN	TP20	ECU	48	DIAGNOSTIC	G
25	-	-	-	-	-	-
26	BLACK	20	ECU	51	BLACK SPLICE	-
27	GREEN	20	ECU	53	TPS	2
28	PINK	20	ECU	54	MAP SENSOR	1
29	ORANGE	20	ECU	55	ORANGE SPLICE #2	-
30	-	-	-	-	-	-
31	WHITE	TP20	ECU	57	CRANK	1
32	BLACK	TP20	ECU	58	CRANK	2
33	BROWN	18	TRANS SWITCH	C	BROWN SPLICE #4	-
34	-	-	-	-	-	-
35	BROWN	16	BROWN SPLICE #4	-	SPLICE #2	-
36	RED/BLACK	18	FUEL INJECTOR	1	RED/BLACK SPLICE	-
37	VIOLET	20	COOLANT TEMP	2	VIOLET SPLICE	-
38	VIOLET	20	AIR INTAKE	2	VIOLET SPLICE	-
39	RED/BLACK	20	IAC	2	RED/BLACK SPLICE	-
40	RED/BLACK	20	IAC	5	RED/BLACK SPLICE	-
41	BROWN	20	DIAGNOSTIC	D	BROWN SPLICE #1	-
42	RED	20	DIAGNOSTIC	A	RED SPLICE #1	-
43	RED/BLACK	18	IGNITION COIL	2	SSCB #2	P
44	VIOLET	20	MAP SENSOR	2	VIOLET SPLICE	-
45	VIOLET	20	TPS	1	VIOLET SPLICE	-
46	GREEN/WHITE	18	TRANS SWITCH	D	RESISTOR MODULE	D
47	BROWN	16	HEADLIGHT POD ACC	-	BROWN SPLICE #1	-
48	BROWN	12	SSCB #1	N	BROWN SPLICE #4	-
49	BROWN	20	CASE GROUND	-	SPLICE #3	-
50	BROWN	18	LH HEADLIGHT	A	BROWN SPLICE #2	-
51	BROWN	18	RH HEADLIGHT	A	BROWN SPLICE #2	-
52	BROWN	18	UPPER HEADLIGHT	A	BROWN SPLICE #1	-
53	BROWN	18	LH TAILLIGHT	1	BROWN SPLICE #3	-
54	BROWN	20	LH HANDLEBAR	B	BROWN SPLICE #1	-
55	WHITE/BLUE	18	TRANS SWITCH	B	RESISTOR MODULE	E
56	BLUE/RED	18	TRANS SWITCH	A	RESISTOR MODULE	F
57	BLACK	20	ETC & AWD SWITCH	A	BLACK SPLICE	-
58	BROWN	20	ETC & AWD SWITCH	B	BROWN SPLICE #1	-
59	GRAY	20	HUB COIL	C	ETC & AWD SWITCH	E
60	ORANGE/BLACK	16	FAN MOTOR	B	SSCB #1	K
61	RED/WHITE	16	RED/WHITE SPLICE #3	-	RED/WHITE SPLICE #1	-
62	WHITE	20	SSCB #1	C	WHITE SPLICE	-
63	WHITE	20	RESISTOR MODULE	A	WHITE SPLICE	-
64	RED/BLACK	16	SSCB #1	S	RED/BLACK SPLICE	-
65	ORANGE	20	MAP SENSOR	3	ORANGE SPLICE #2	-
66	BROWN	20	SPEEDO DIAGNOSTIC	1	BROWN SPLICE #1	-
67	BROWN	16	BROWN SPLICE #1	-	BROWN SPLICE #4	-
68	RED/YELLOW	18	WORK LIGHT SWITCH	-	RED/YELLOW SPLICE	-
69	RED/GREEN	18	FUEL PUMP	A	SSCB #2	L
70	BROWN	18	FUEL PUMP	C	BROWN SPLICE #2	-
71	BLUE	18	WORK LIGHT SWITCH	-	BLUE SPLICE	-
72	RED/YELLOW	18	RH TAILLIGHT	2	RED/YELLOW SPLICE	-
73	BROWN	16	FAN MOTOR	A	BROWN SPLICE #3	-
74	BLUE	18	RH WORKLIGHT	-	BLUE SPLICE	-
75	BLUE	18	LH WORKLIGHT	-	BLUE SPLICE	-
76	RED/YELLOW	16	LH HANDLEBAR	D	RED/YELLOW SPLICE	-
77	BLACK	1.0	SOLENOID BATTERY +	-	16/12 SPLICE	-
78	ORANGE	20	TPS	3	ORANGE SPLICE #2	-
79	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
80	-	-	-	-	-	-
81	-	-	-	-	-	-
82	-	-	-	-	-	-
83	BROWN	12	FRAME GROUND	-	BROWN SPLICE #4	-
84	RED	12	SSCB #1	H	16/12 SPLICE	-

WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
85	BLACK	20	IGNITION SWITCH	E	BLACK SPLICE	-
86	ORANGE	18	RH TAILLIGHT	3	ORANGE SPLICE #1	-
87	ORANGE/WHITE	16	SSCB #1	A	ORANGE/WHITE SPLICE	-
88	YELLOW	16	SSCB #2	M	IGNITION SWITCH	D
89	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
90	RED/BLACK	18	IGNITION SWITCH	C	LH HANDLEBAR	F
91	-	-	-	-	-	-
92	RED/WHITE	16	LH HANDLEBAR	C	RED/WHITE SPLICE #1	-
93	RED/WHITE	16	IGNITION SWITCH	B	RED/WHITE SPLICE #1	-
94	RED/YELLOW	16	BRAKE LIGHT SENSOR	-	RED/YELLOW SPLICE	-
95	BROWN	16	BROWN SPLICE #2	-	BROWN SPLICE #4	-
96	RED/YELLOW	18	LH TAILLIGHT	2	RED/YELLOW SPLICE	-
97	ORANGE/WHITE	16	HEADLIGHT POD ACC	-	ACCESSORIES (SW POWER)	-
98	RED/WHITE	20	ETC & AWD SWITCH	F	RED/WHITE SPLICE #1	-
99	BROWN	18	START SOLENOID	2	SSCB #2	N
100	BROWN	20	LH HANDLEBAR	C	BROWN SPLICE #1	-
101	RED	20	SPEEDOMETER	1	SSCB #2	C
102	RED/WHITE	20	SPEEDOMETER	2	RED/WHITE SPLICE #1	-
103	GRAY/ORANGE	20	SPEEDOMETER	3	LH HANDLEBAR	B
104	BLACK	20	SPEEDOMETER	4	BLACK SPLICE	-
105	GREEN	20	SPEEDOMETER	5	SPEEDO DIAGNOSTIC	2
106	BLUE	20	SPEEDOMETER	6	SPEEDO DIAGNOSTIC	3
107	YELLOW/RED	20	SPEEDOMETER	7	YELLOW SPLICE	-
108	BROWN	20	SPEEDOMETER	8	SPLICE #2	-
109	RED	20	RED SPLICE #1	-	RED/BLACK SPLICE	-
110	RED/WHITE	16	RED/WHITE SPLICE #3	-	SSCB #2	B
111	ORANGE	18	SSCB #2	F	ORANGE SPLICE #1	-
112	VIOLET/WHITE	20	SPEEDOMETER	12	FUEL PUMP	B
113	-	-	-	-	-	-
114	WHITE	20	SPEEDOMETER	14	WHITE SPLICE	-
115	BROWN	20	IGNITION SWITCH	F	BROWN SPLICE #1	-
116	BROWN/WHITE	20	SPEEDOMETER	16	HUB COIL	B
117	ORANGE/RED	18	TRANS SWITCH	F	RESISTOR MODULE	B
118	VIOLET	18	TRANS SWITCH	E	RESISTOR MODULE	C
119	YELLOW	18	LH HANDLEBAR	E	UPPER HEADLIGHT	B
120	GREEN	18	LH HANDLEBAR	F	GREEN SPLICE	-
121	ORANGE	18	LH TAILLIGHT	3	ORANGE SPLICE #1	-
122	WHITE/RED	18	IGNITION SWITCH	A	START SOLENOID	1
123	GREEN	18	LH HEADLIGHT	B	GREEN SPLICE	-
124	GREEN	18	RH HEADLIGHT	B	GREEN SPLICE	-
125	BROWN	16	BROWN SPLICE #3	-	BROWN SPLICE #4	-
126	BROWN	18	RH TAILLIGHT	1	BROWN SPLICE #3	-
127	BROWN	18	RH WORKLIGHT	-	BROWN SPLICE #3	-
128	BROWN	18	LH WORK LIGHT	-	BROWN SPLICE #3	-
129	-	-	-	-	-	-
130	ORANGE	18	BRAKE LIGHT SENSOR	-	ORANGE SPLICE #1	-
131	BLACK	20	LH HANDLEBAR	A	BLACK SPLICE	-
132	YELLOW	14	STATOR	A	SSCB #2	H
133	YELLOW	14	STATOR	C	SSCB #2	J
134	BROWN	14	STATOR	D	BROWN SPLICE #3	-
135	YELLOW	14	STATOR	B	YELLOW SPLICE	-
136	YELLOW	14	SSCB #2	A	YELLOW SPLICE	-
137	RED/YELLOW	16	SSCB #2	G	RED/YELLOW SPLICE	-
138	BLUE/WHITE	20	ECU	24	BLUE/WHITE SPLICE	-
139	BLUE/WHITE	20	SSCB #2	D	BLUE/WHITE SPLICE	-



2007 SPORTSMAN 500 EFI ‘DELUXE’ WIRE DIAGRAM



2007 SPORTSMAN 500 EFI DELUXE

ATV_07_SPORTSMAN_500_EFI_DELUXE (MODEL NO: A07MH50AQ,AF)

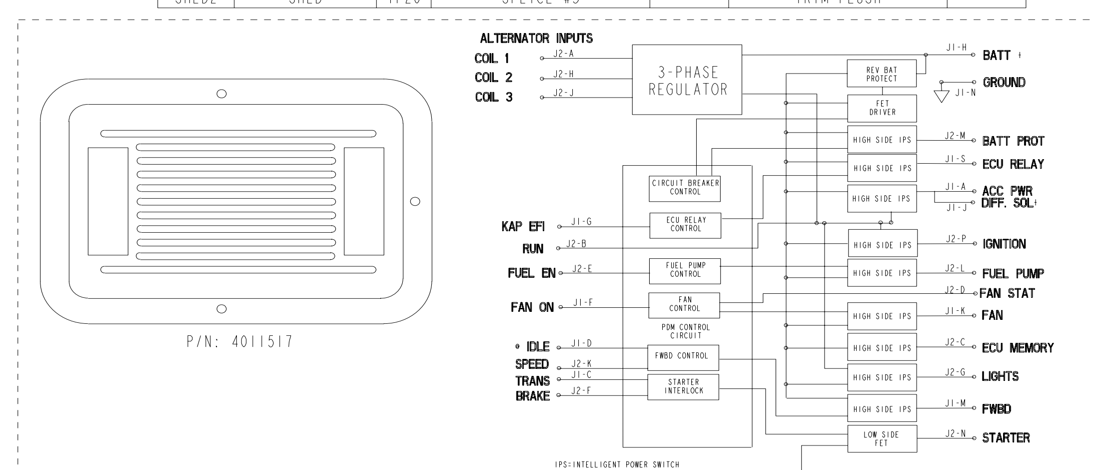
PAGE 2 OF 2

WIRE TERMINATION TABLE

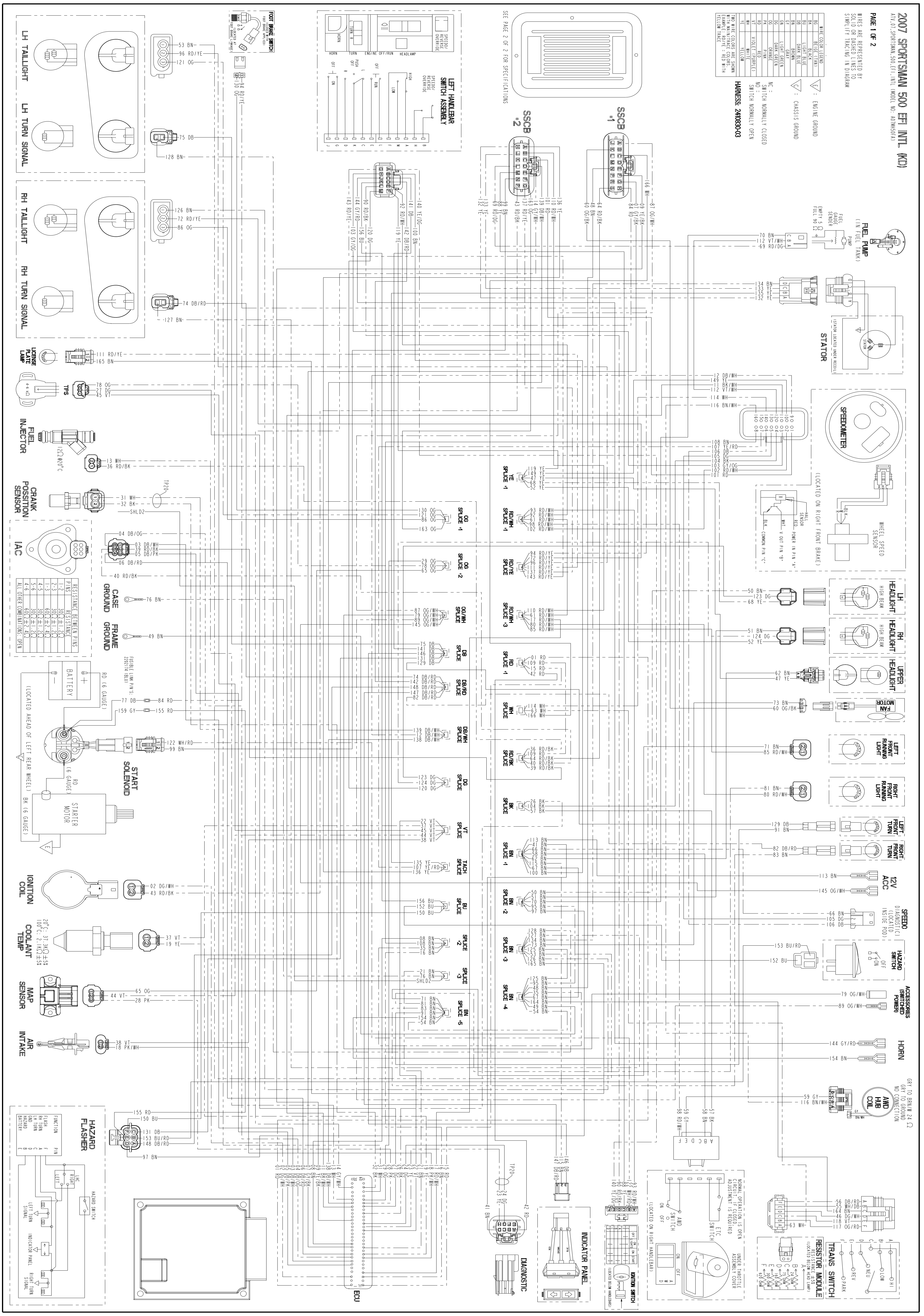
REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	RED	20	ECU	1	RED SPLICE #1	-
02	GREEN/WHITE	18	ECU	3	IGNITION COIL	1
03	BLUE/WHITE	20	ECU	7	IAC	1
04	BLUE/ORANGE	20	ECU	8	IAC	6
05	BLUE/PINK	20	ECU	6	IAC	3
06	BLUE/RED	20	ECU	9	IAC	4
07	GRAY/BLACK	20	ECU	11	SSCB #1	G
08	BROWN	20	ECU	12	SPLICE #2	-
09	YELLOW/BLACK	20	ECU	19	SSCB #1	F
10	-	-	-	-	-	-
11	BLACK/WHITE	20	ECU	23	SPEEDOMETER	11
12	BLUE/WHITE	20	BLUE/WHITE SPLICE	-	SPEEDOMETER	9
13	WHITE	18	ECU	25	FUEL INJECTOR	2
14	GRAYWHITE	20	ECU	28	SSCB #2	E
15	RED	20	ECU	31	RED SPLICE #1	-
16	BROWN	20	ECU	33	SPLICE #2	-
17	RED/WHITE	20	ECU	34	RED/WHITE SPLICE #3	-
18	PINK/WHITE	20	ECU	38	AIR INTAKE	1
19	YELLOW	20	ECU	39	COOLANT TEMP	1
20	-	-	-	-	-	-
21	BROWN	20	ECU	41	SPLICE #3	-
22	VIOLET	20	ECU	46	VIOLET SPLICE	-
23	YELLOW	TP20	ECU	47	DIAGNOSTIC	H
24	GREEN	TP20	ECU	48	DIAGNOSTIC	G
25	-	-	-	-	-	-
26	BLACK	20	ECU	51	BLACK SPLICE	-
27	GREEN	20	ECU	53	TPS	2
28	PINK	20	ECU	54	MAP SENSOR	1
29	ORANGE	20	ECU	55	ORANGE SPLICE #2	-
30	-	-	-	-	-	-
31	WHITE	TP20	ECU	57	CRANK	1
32	BLACK	TP20	ECU	58	CRANK	2
33	BROWN	18	TRANS SWITCH	C	BROWN SPLICE #4	-
34	-	-	-	-	-	-
35	BROWN	16	BROWN SPLICE #4	-	SPLICE #2	-
36	RED/BLACK	18	FUEL INJECTOR	1	RED/BLACK SPLICE	-
37	VIOLET	20	COOLANT TEMP	2	VIOLET SPLICE	-
38	VIOLET	20	AIR INTAKE	2	VIOLET SPLICE	-
39	RED/BLACK	20	IAC	2	RED/BLACK SPLICE	-
40	RED/BLACK	20	IAC	5	RED/BLACK SPLICE	-
41	BROWN	20	DIAGNOSTIC	D	BROWN SPLICE #1	-
42	RED	20	DIAGNOSTIC	A	RED SPLICE #1	-
43	RED/BLACK	18	IGNITION COIL	2	SSCB #2	P
44	VIOLET	20	MAP SENSOR	2	VIOLET SPLICE	-
45	VIOLET	20	TPS	1	VIOLET SPLICE	-
46	GREEN/WHITE	18	TRANS SWITCH	D	RESISTOR MODULE	D
47	BROWN	16	HEADLIGHT POD ACC	-	BROWN SPLICE #1	-
48	BROWN	12	SSCB #1	N	BROWN SPLICE #4	-
49	BROWN	20	CASE GROUND	-	SPLICE #3	-
50	BROWN	18	LH HEADLIGHT	A	BROWN SPLICE #2	-
51	BROWN	18	RH HEADLIGHT	A	BROWN SPLICE #2	-
52	BROWN	18	UPPER HEADLIGHT	A	BROWN SPLICE #1	-
53	BROWN	18	LH TAILLIGHT	1	BROWN SPLICE #3	-
54	BROWN	20	LH HANDLEBAR	B	BROWN SPLICE #1	-
55	WHITE/BLUE	18	TRANS SWITCH	B	RESISTOR MODULE	E
56	BLUE/RED	18	TRANS SWITCH	A	RESISTOR MODULE	F
57	BLACK	20	ETC & AWD SWITCH	A	BLACK SPLICE	-
58	BROWN	20	ETC & AWD SWITCH	B	BROWN SPLICE #1	-
59	GRAY	20	GRAY SPLICE	-	ETC & AWD SWITCH	E
60	ORANGE/BLACK	16	FAN MOTOR	B	SSCB #1	K
61	RED/WHITE	16	RED/WHITE SPLICE #3	-	RED/WHITE SPLICE #1	-
62	WHITE	20	SSCB #1	C	WHITE SPLICE	-
63	WHITE	20	RESISTOR MODULE	A	WHITE SPLICE	-
64	RED/BLACK	16	SSCB #1	S	RED/BLACK SPLICE	-
65	ORANGE	20	MAP SENSOR	3	ORANGE SPLICE #2	-
66	BROWN	20	SPEEDO DIAGNOSTIC	1	BROWN SPLICE #1	-
67	BROWN	16	BROWN SPLICE #1	-	BROWN SPLICE #4	-
68	RED/YELLOW	18	WORK LIGHT SWITCH	-	RED/YELLOW SPLICE	-
69	RED/GREEN	18	FUEL PUMP	A	SSCB #2	L
70	BROWN	18	FUEL PUMP	C	BROWN SPLICE #2	-
71	BLUE	18	WORK LIGHT SWITCH	-	BLUE SPLICE	-
72	RED/YELLOW	18	RH TAILLIGHT	2	RED/YELLOW SPLICE	-
73	BROWN	16	FAN MOTOR	A	BROWN SPLICE #3	-
74	BLUE	18	RH WORKLIGHT	-	BLUE SPLICE	-
75	BLUE	18	LH WORKLIGHT	-	BLUE SPLICE	-
76	RED/YELLOW	16	LH HANDLEBAR	D	RED/YELLOW SPLICE	-
77	BLUE	1.0	SOLENOID BATTERY +	-	16/12 SPLICE	-
78	ORANGE	20	TPS	3	ORANGE SPLICE #2	-
79	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
80	RED/WHITE	20	SPEED #1	A	SPEED #2	A
81	BROWN	20	SPEED #1	C	SPEED #2	C
82	LT GREEN/RED	20	SPEED #1	B	LT GREEN/RED SPLICE	-
83	BROWN	12	FRAME GROUND	-	BROWN SPLICE #4	-
84	RED	12	SSCB #1	H	16/12 SPLICE	-

WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
85	BLACK	20	IGNITION SWITCH	E	BLACK SPLICE	-
86	ORANGE	18	RH TAILLIGHT	3	ORANGE SPLICE #1	-
87	ORANGE/WHITE	16	SSCB #1	A	ORANGE/WHITE SPLICE	-
88	YELLOW	16	SSCB #2	M	IGNITION SWITCH	D
89	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
90	RED/BLACK	18	IGNITION SWITCH	C	LH HANDLEBAR	F
91	-	-	-	-	-	-
92	RED/WHITE	16	LH HANDLEBAR	C	RED/WHITE SPLICE #1	-
93	RED/WHITE	16	IGNITION SWITCH	B	RED/WHITE SPLICE #1	-
94	RED/YELLOW	16	BRAKE LIGHT SENSOR	-	RED/YELLOW SPLICE	-
95	BROWN	16	BROWN SPLICE #2	-	BROWN SPLICE #4	-
96	RED/YELLOW	18	LH TAILLIGHT	2	RED/YELLOW SPLICE	-
97	ORANGE/WHITE	16	HEADLIGHT POD ACC	-	ACCESSORIES (SW POWER)	-
98	RED/WHITE	20	ETC & AWD SWITCH	F	RED/WHITE SPLICE #1	-
99	BROWN	18	START SOLENOID	2	SSCB #2	N
100	BROWN	20	LH HANDLEBAR	C	BROWN SPLICE #1	-
101	RED	20	SPEEDOMETER	1	SSCB #2	C
102	RED/WHITE	20	SPEEDOMETER	2	RED/WHITE SPLICE #1	-
103	GRAY/ORANGE	20	SPEEDOMETER	3	LH HANDLEBAR	B
104	BLACK	20	SPEEDOMETER	4	BLACK SPLICE	-
105	GREEN	20	SPEEDOMETER	5	SPEEDO DIAGNOSTIC	2
106	BLUE	20	SPEEDOMETER	6	SPEEDO DIAGNOSTIC	3
107	YELLOW/RED	20	SPEEDOMETER	7	YELLOW SPLICE	-
108	BROWN	20	SPEEDOMETER	8	SPLICE #2	-
109	RED	20	RED SPLICE #1	-	RED/BLACK SPLICE	-
110	RED/WHITE	16	RED/WHITE SPLICE #3	-	SSCB #2	B
111	ORANGE	18	SSCB #2	F	ORANGE SPLICE #1	-
112	VIOLET/WHITE	20	SPEEDOMETER	12	FUEL PUMP	B
113	-	-	-	-	-	-
114	WHITE	20	SPEEDOMETER	14	WHITE SPLICE	-
115	BROWN	20	IGNITION SWITCH	F	BROWN SPLICE #1	-
116	BROWN/WHITE	20	SPEEDOMETER	16	HUB COIL	B
117	ORANGE/RED	18	TRANS SWITCH	F	RESISTOR MODULE	B
118	VIOLET	18	TRANS SWITCH	E	RESISTOR MODULE	C
119	YELLOW	18	LH HANDLEBAR	E	UPPER HEADLIGHT	B
120	GREEN	18	LH HANDLEBAR	F	GREEN SPLICE	-
121	ORANGE	18	LH TAILLIGHT	3	ORANGE SPLICE #1	-
122	WHITE/RED	18	IGNITION SWITCH	A	START SOLENOID	1
123	GREEN	18	LH HEADLIGHT	B	GREEN SPLICE	-
124	GREEN	18	RH HEADLIGHT	B	GREEN SPLICE	-
125	BROWN	16	BROWN SPLICE #3	-	BROWN SPLICE #4	-
126	BROWN	18	RH TAILLIGHT	1	BROWN SPLICE #3	-
127	BROWN	18	RH WORKLIGHT	-	BROWN SPLICE #3	-
128	BROWN	18	LH WORKLIGHT	-	BROWN SPLICE #3	-
129	GRAY	20	SSCB #1	P	GRAY SPLICE	-
130	ORANGE	18	BRAKE LIGHT SENSOR	-	ORANGE SPLICE #1	-
131	BLACK	20	LH HANDLEBAR	A	BLACK SPLICE	-
132	YELLOW	14	STATOR	A	SSCB #2	H
133	YELLOW	14	STATOR	C	SSCB #2	J
134	BROWN	14	STATOR	D	BROWN SPLICE #3	-
135	YELLOW	14	STATOR	B	YELLOW SPLICE	-
136	YELLOW	14	SSCB #2	A	YELLOW SPLICE	-
137	RED/YELLOW	16	SSCB #2	G	RED/YELLOW SPLICE	-
138	BLUE/WHITE	20	ECU	24	BLUE/WHITE SPLICE	-
139	BLUE/WHITE	20	SSCB #2	D	BLUE/WHITE SPLICE	-
140	VIOLET	20	ECU	21	SSCB #1	D
141	-	-	-	-	-	-
142	-	-	-	-	-	-
143	-	-	-	-	-	-
144	BLACK/RED	18	HUB COIL	A	SSCB #1	M
145	LT GREEN/RED	20	SPEED #2	B	LT GREEN/RED SPLICE	-
146	LT GREEN/RED	20	SSCB #2	K	LT GREEN/RED SPLICE	-
147	-	-	-	-	-	-
148	BROWN	18	HUB COIL	D	BROWN SPLICE #4	-
149	-	-	-	-	-	-
150	GRAY	20	HUB COIL	C	GRAY SPLICE	-
SHLD2	SHLD	TP20	SPLICE #3	-	TRIM FLUSH	-



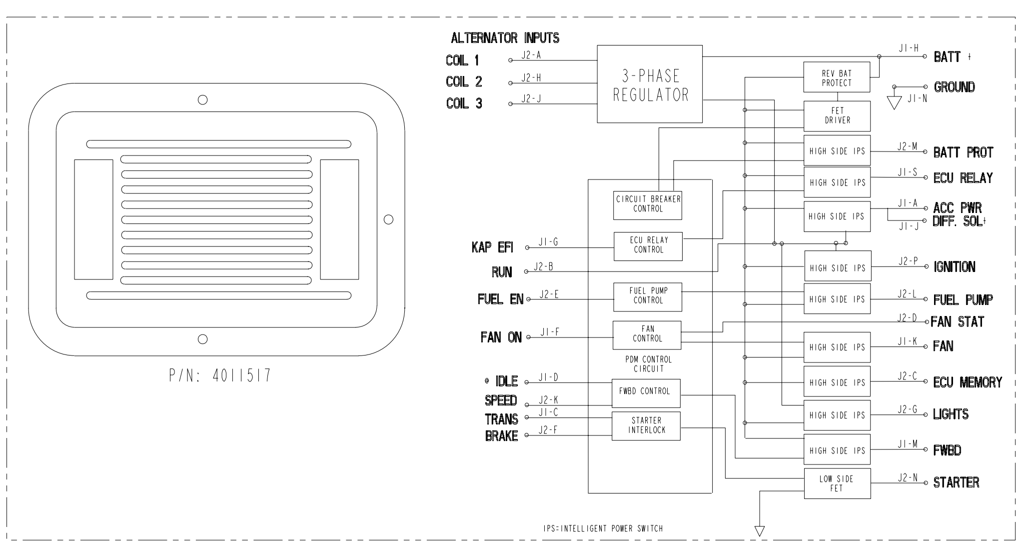
2007 SPORTSMAN 500 EFI INTERNATIONAL WIRE DIAGRAM



2007 SPORTSMAN 500 EFI INTL (KD)

ATV_07_SPORTSMAN_500_EFI_INTL (MODEL NO: A07MH50FA)

PAGE 2 OF 2



SERVICE PARTS			
ITEM	MANUFACTURER	PART NO.	DESCRIPTION
1	POLARIS	2202147	KIT-FUSIBLE LINK, 0.5MM (GRAY)
2	POLARIS	2202607	KIT-FUSIBLE LINK, 0.8MM (BLUE)
3	POLARIS	2202670	KIT-FUSIBLE LINK, 1.0MM (BLACK)
NOTE: SERVICE PARTS ARE FOR REFERENCE ONLY			

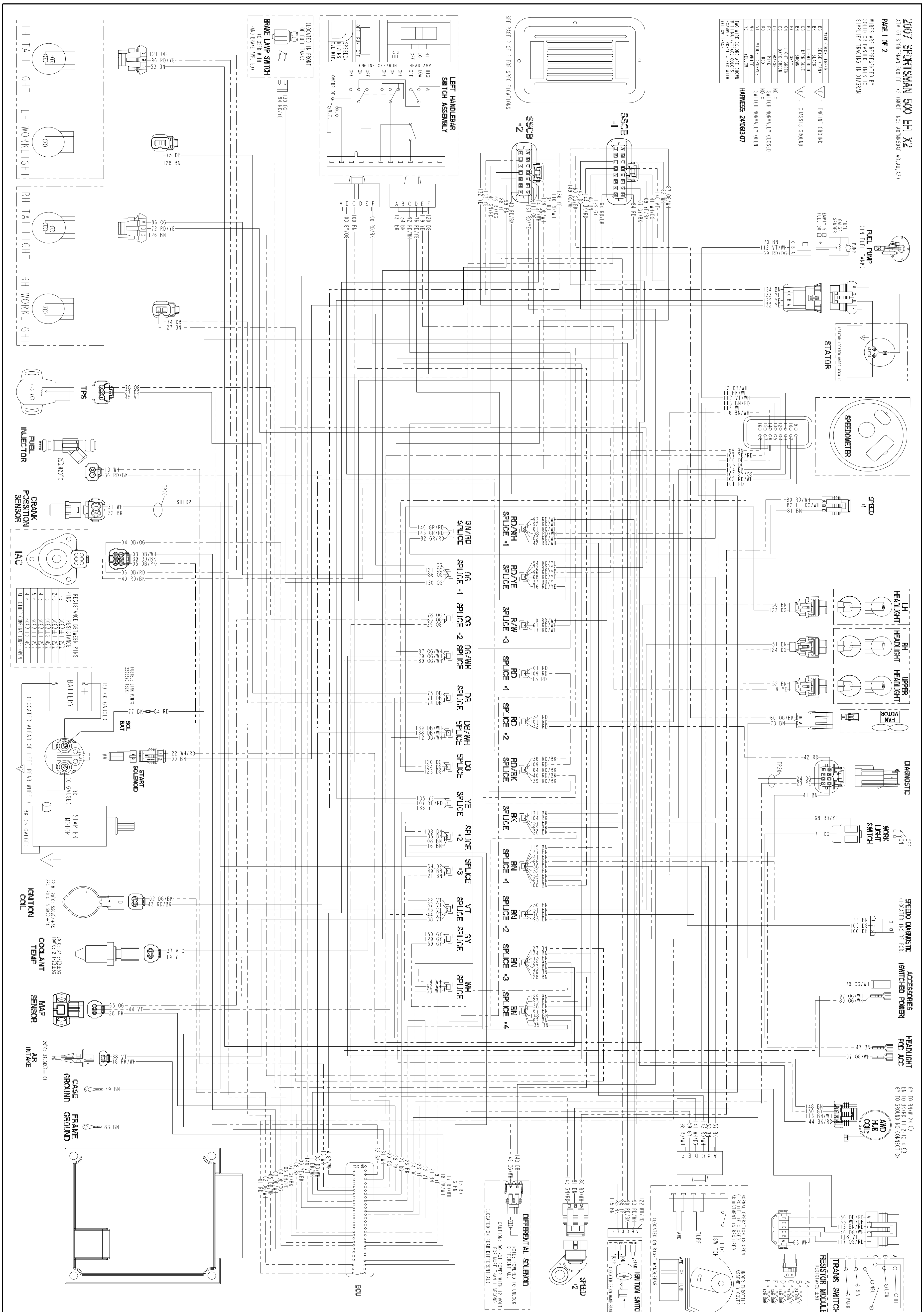
WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	RED	20	ECU	1	RED SPLICE #1	-
02	GREEN/WHITE	18	ECU	3	IGNITION COIL	1
03	BLUE/WHITE	20	ECU	7	IAC	1
04	BLUE/ORANGE	20	ECU	8	IAC	6
05	BLUE/PINK	20	ECU	6	IAC	3
06	BLUE/RED	20	ECU	9	IAC	4
07	GRAY/BLACK	20	ECU	11	SSCB #1	G
08	BROWN	20	ECU	12	SPLICE #2	-
09	YELLOW/BLACK	20	ECU	19	SSCB #1	F
10	-	-	-	-	-	-
11	BLACK/WHITE	20	ECU	23	SPEEDOMETER	11
12	BLUE/WHITE	20	BLUE/WHITE SPLICE	-	SPEEDOMETER	9
13	WHITE	18	ECU	25	FUEL INJECTOR	2
14	GRAYWHITE	20	ECU	28	SSCB #2	E
15	RED	20	ECU	31	RED SPLICE #1	-
16	BROWN	20	ECU	33	SPLICE #2	-
17	RED/WHITE	20	ECU	34	RED/WHITE SPLICE #3	-
18	PINK/WHITE	20	ECU	38	AIR INTAKE	2
19	YELLOW	20	ECU	39	COOLANT TEMP	2
20	-	-	-	-	-	-
21	BROWN	20	ECU	41	SPLICE #3	-
22	VIOLET	20	ECU	46	VIOLET SPLICE	-
23	YELLOW	TP20	ECU	47	DIAGNOSTIC	H
24	GREEN	TP20	ECU	48	DIAGNOSTIC	G
25	-	-	-	-	-	-
26	BLACK	20	ECU	51	BLACK SPLICE	-
27	GREEN	20	ECU	53	TPS	2
28	PINK	20	ECU	54	MAP SENSOR	3
29	ORANGE	20	ECU	55	ORANGE SPLICE #2	-
30	-	-	-	-	-	-
31	WHITE	TP20	ECU	57	CRANK	1
32	BLACK	TP20	ECU	58	CRANK	2
33	-	-	-	-	-	-
34	-	-	-	-	-	-
35	BROWN	16	BROWN SPLICE #4	-	SPLICE #2	-
36	RED/BLACK	18	FUEL INJECTOR	1	RED/BLACK SPLICE	-
37	VIOLET	20	COOLANT TEMP	1	VIOLET SPLICE	-
38	VIOLET	20	AIR INTAKE	1	VIOLET SPLICE	-
39	RED/BLACK	20	IAC	2	RED/BLACK SPLICE	-
40	RED/BLACK	20	IAC	5	RED/BLACK SPLICE	-
41	BROWN	20	DIAGNOSTIC	D	BROWN SPLICE #1	-
42	RED	20	DIAGNOSTIC	A	RED SPLICE #1	-
43	RED/BLACK	18	IGNITION COIL	2	SSCB #2	P
44	VIOLET	20	MAP SENSOR	2	VIOLET SPLICE	-
45	VIOLET	20	TPS	1	VIOLET SPLICE	-
46	GREEN/WHITE	18	TRANS SWITCH	D	RESISTOR MODULE	D
47	YELLOW	18	UPPER HEADLIGHT	B	YELLOW SPLICE #1	-
48	BROWN	12	SSCB #1	N	BROWN SPLICE #4	-
49	BROWN	12	FRAME GROUND	-	BROWN SPLICE #4	-
50	BROWN	18	LH HEADLIGHT	A	BROWN SPLICE #2	-
51	BROWN	18	RH HEADLIGHT	-	BROWN SPLICE #2	-
52	YELLOW	18	RH HEADLIGHT	-	YELLOW SPLICE #1	-
53	BROWN	18	LH TAILLIGHT	1	BROWN SPLICE #3	-
54	BROWN	16	BROWN SPLICE #4	-	BROWN SPLICE #5	-
55	WHITE/BLUE	18	TRANS SWITCH	B	RESISTOR MODULE	E
56	BLUE/RED	18	TRANS SWITCH	A	RESISTOR MODULE	F
57	BLACK	20	ETC & AWD SWITCH	A	BLACK SPLICE	-
58	BROWN	20	ETC & AWD SWITCH	B	BROWN SPLICE #1	-
59	GRAY	20	HUB COIL	C	ETC & AWD SWITCH	E
60	ORANGE/BLACK	16	FAN MOTOR	B	SSCB #1	K
61	RED/WHITE	16	RED/WHITE SPLICE #3	-	RED/WHITE SPLICE #1	-
62	BROWN	18	UPPER HEADLIGHT	A	BROWN SPLICE #1	-
63	WHITE	20	RESISTOR MODULE	A	WHITE SPLICE	-
64	RED/BLACK	16	SSCB #1	S	RED/BLACK SPLICE	-
65	ORANGE	20	MAP SENSOR	1	ORANGE SPLICE #2	-
66	BROWN	20	SPEEDO DIAGNOSTIC	1	BROWN SPLICE #1	-
67	BROWN	16	BROWN SPLICE #1	-	BROWN SPLICE #4	-
68	YELLOW	18	LH HEADLIGHT	-	YELLOW SPLICE #1	-
69	RED/GREEN	18	FUEL PUMP	A	SSCB #2	L
70	BROWN	18	FUEL PUMP	C	BROWN SPLICE #2	-
71	BROWN	18	LH FRONT RUNNING LIGHT	2	BROWN SPLICE #5	-
72	RED/YELLOW	18	RH TAILLIGHT	2	RED/YELLOW SPLICE	-
73	BROWN	16	FAN MOTOR	A	BROWN SPLICE #3	-
74	BLUE/RED	18	RH TURN SIGNAL	-	BLUE/RED SPLICE	-
75	BLUE	18	LH TURN SIGNAL	-	BLUE SPLICE	-
76	BROWN	20	CASE GROUND	-	SPLICE #3	-
77	BLUE	1.0	SOLENOID BATTERY +	-	16/12 SPLICE	-
78	ORANGE	20	TPS	3	ORANGE SPLICE #2	-
79	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
80	RED/WHITE	18	RH FRONT RUNNING LIGHT	1	RED/WHITE SPLICE #3	-
81	BROWN	18	RH FRONT RUNNING LIGHT	2	BROWN SPLICE #5	-
82	BLUE/RED	20	RH FRONT TURN SIGNAL	-	BLUE/RED SPLICE	-
83	BROWN	20	RH FRONT TURN SIGNAL	-	BROWN SPLICE #5	-
84	RED	12	SSCB #1	H	16/12 SPLICE	-
85	RED/WHITE	18	LH FRONT RUNNING LIGHT	1	RED/WHITE SPLICE #3	-
86	ORANGE	18	RH TAILLIGHT	3	ORANGE SPLICE #1	-

WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
87	ORANGE/WHITE	16	SSCB #1	A	ORANGE/WHITE SPLICE	-
88	YELLOW	16	SSCB #2	M	IGNITION SWITCH	C
89	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
90	RED/BLACK	16	IGNITION SWITCH	D	LH HANDLEBAR	L
91	BROWN	20	LH FRONT TURN SIGNAL	-	BROWN SPLICE #5	-
92	RED/WHITE	16	LH HANDLEBAR	E	RED/WHITE SPLICE #1	-
93	RED/WHITE	16	IGNITION SWITCH	A	RED/WHITE SPLICE #1	-
94	RED/YELLOW	18	FOOT BRAKE	1	RED/YELLOW SPLICE	-
95	BROWN	16	BROWN SPLICE #2	-	BROWN SPLICE #4	-
96	RED/YELLOW	18	LH TAILLIGHT	2	RED/YELLOW SPLICE	-
97	BROWN	18	HAZARD FLASHER	D	BROWN SPLICE #2	-
98	RED/WHITE	20	ETC & AWD SWITCH	F	RED/WHITE SPLICE #1	-
99	BROWN	18	START SOLENOID	2	SSCB #2	N
100	BROWN	20	LH HANDLEBAR	B	BROWN SPLICE #1	-
101	RED	20	SPEEDOMETER	1	SSCB #2	C
102	RED/WHITE	20	SPEEDOMETER	2	RED/WHITE SPLICE #1	-
103	GRAY/ORANGE	20	SPEEDOMETER	3	LH HANDLEBAR	H
104	BLACK	20	SPEEDOMETER	4	BLACK SPLICE	-
105	GREEN	20	SPEEDOMETER	5	SPEEDO DIAGNOSTIC	2
106	BLUE	20	SPEEDOMETER	6	SPEEDO DIAGNOSTIC	3
107	YELLOW/RED	20	SPEEDOMETER	7	TACH SPLICE	-
108	BROWN	20	SPEEDOMETER	8	SPLICE #2	-
109	RED	20	RED SPLICE #1	-	RED/BLACK SPLICE	-
110	RED/WHITE	16	RED/WHITE SPLICE #3	-	SSCB #2	B
111	RED/YELLOW	18	LICENSE PLATE LAMP	1	RED/YELLOW SPLICE	-
112	VIOLET/WHITE	20	SPEEDOMETER	12	FUEL PUMP	B
113	BROWN	16	12V ACC	.250F	BROWN SPLICE #1	-
114	WHITE	20	SPEEDOMETER	14	WHITE SPLICE	-
115	BROWN	20	INDICATOR PANEL	2	BROWN SPLICE #1	-
116	BROWN/WHITE	20	SPEEDOMETER	16	HUB COIL	B
117	ORANGE/RED	18	TRANS SWITCH	F	RESISTOR MODULE	B
118	VIOLET	18	TRANS SWITCH	E	RESISTOR MODULE	C
119	YELLOW	18	LH HANDLEBAR	F	YELLOW SPLICE #1	-
120	GREEN	18	LH HANDLEBAR	M	GREEN SPLICE	-
121	ORANGE	18	LH TAILLIGHT	3	ORANGE SPLICE #1	-
122	WHITE/RED	18	IGNITION SWITCH	B	START SOLENOID	1
123	GREEN	18	LH HEADLIGHT	B	GREEN SPLICE	-
124	GREEN	18	RH HEADLIGHT	-	GREEN SPLICE	-
125	BROWN	16	BROWN SPLICE #3	-	BROWN SPLICE #4	-
126	BROWN	18	RH TAILLIGHT	1	BROWN SPLICE #3	-
127	BROWN	18	RH TURN SIGNAL	-	BROWN SPLICE #3	-
128	BROWN	18	LH TURN SIGNAL	-	BROWN SPLICE #3	-
129	BLUE	20	LH FRONT TURN SIGNAL	-	BLUE SPLICE	-
130	ORANGE	18	FOOT BRAKE	2	ORANGE SPLICE #1	-
131	BLUE	18	HAZARD FLASHER	C	BLUE SPLICE	-
132	YELLOW	14	STATOR	A	SSCB #2	H
133	YELLOW	14	STATOR	C	SSCB #2	J
134	BROWN	14	STATOR	D	BROWN SPLICE #3	-
135	YELLOW	14	STATOR	B	TACH SPLICE	-
136	YELLOW	14	SSCB #2	A	TACH SPLICE	-
137	RED/YELLOW	16	RED/YELLOW SPLICE	-	SSCB #2	G
138	BLUE/WHITE	20	BLUE/WHITE SPLICE	-	ECU	24
139	BLUE/WHITE	20	BLUE/WHITE SPLICE	-	SSCB #2	D
140	YELLOW/GREEN	16	LH HANDLEBAR	A	IGNITION SWITCH	E
141	BLUE	18	LH HANDLEBAR	C	BLUE SPLICE	-
142	BLUE/RED	18	LH HANDLEBAR	D	BLUE/RED SPLICE	-
143	RED/YELLOW	18	LH HANDLEBAR	G	RED/YELLOW SPLICE	-
144	GRAY/RED	18	LH HANDLEBAR	J	HORN	.250F
145	ORANGE/WHITE	16	12V ACC	.188F	ORANGE/WHITE SPLICE	-
146	BLUE	18	INDICATOR PANEL	3	BLUE SPLICE	-
147	BLUE/RED	18	INDICATOR PANEL	1	BLUE/RED SPLICE	-
148	BLUE/RED	18	HAZARD FLASHER	A	BLUE/RED SPLICE	-
149	YELLOW	18	SPEEDOMETER	10	YELLOW SPLICE #1	-
150	LT BLUE	18	HAZARD FLASHER	F	LT BLUE SPLICE	-
151	-	-	-	-	-	-
152	LT BLUE	18	LT BLUE SPLICE	-	HAZARD SWITCH	-
153	LT BLUE/RED	18	HAZARD SWITCH	-	HAZARD FLASHER	B
154	BROWN	18	HORN	.250F	BROWN SPLICE #5	-
155	RED	18	HAZARD FLASHER	E	20/18 SPLICE	-
156	LT BLUE	18	LH HANDLEBAR	K	LT BLUE SPLICE	-
157	RED/YELLOW	18	HAND BRAKE	1	RED/YELLOW SPLICE	-
158	ORANGE	18	HAND BRAKE	2	ORANGE SPLICE #1	-
159	GRAY	0.5	SOLENOID BATTERY +	-	20/18 SPLICE	-
160	-	-	-	-	-	-
161	-	-	-	-	-	-
162	-	-	-	-	-	-
163	ORANGE	20	ORANGE SPLICE #1	-	SSCB #2	F
164	BROWN	20	BROWN SPLICE #4	-	TRANS SWITCH	C
165	BROWN	18	BROWN SPLICE #3	-	LICENSE PLATE LAMP	2
166	WHITE	20	WHITE SPLICE	-	SSCB #1	C
167	-	-	-	-	-	-
168	-	-	-	-	-	-
169	-	-	-	-	-	-
170	-	-	-	-	-	-
SHLD2	SHLD	TP20	SPLICE #3	-	TRIM FLUSH	-

2007 SPORTSMAN 500 EFI X2 WIRE DIAGRAM



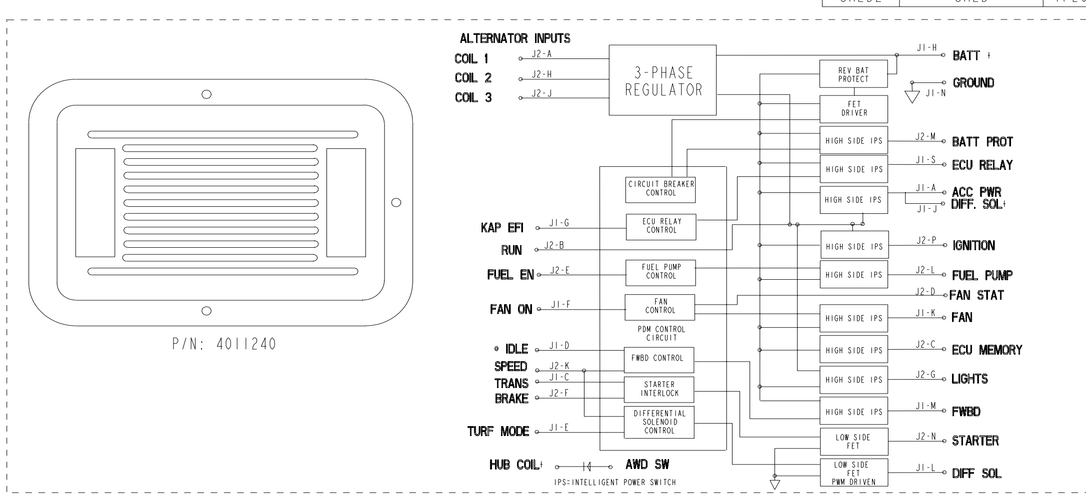
2007 SPORTSMAN 500 EFI X2

ATV_07_SPORTSMAN_500_EFI_X2 (MODEL NO: A07MN50AF,AQ,AU,AZ)

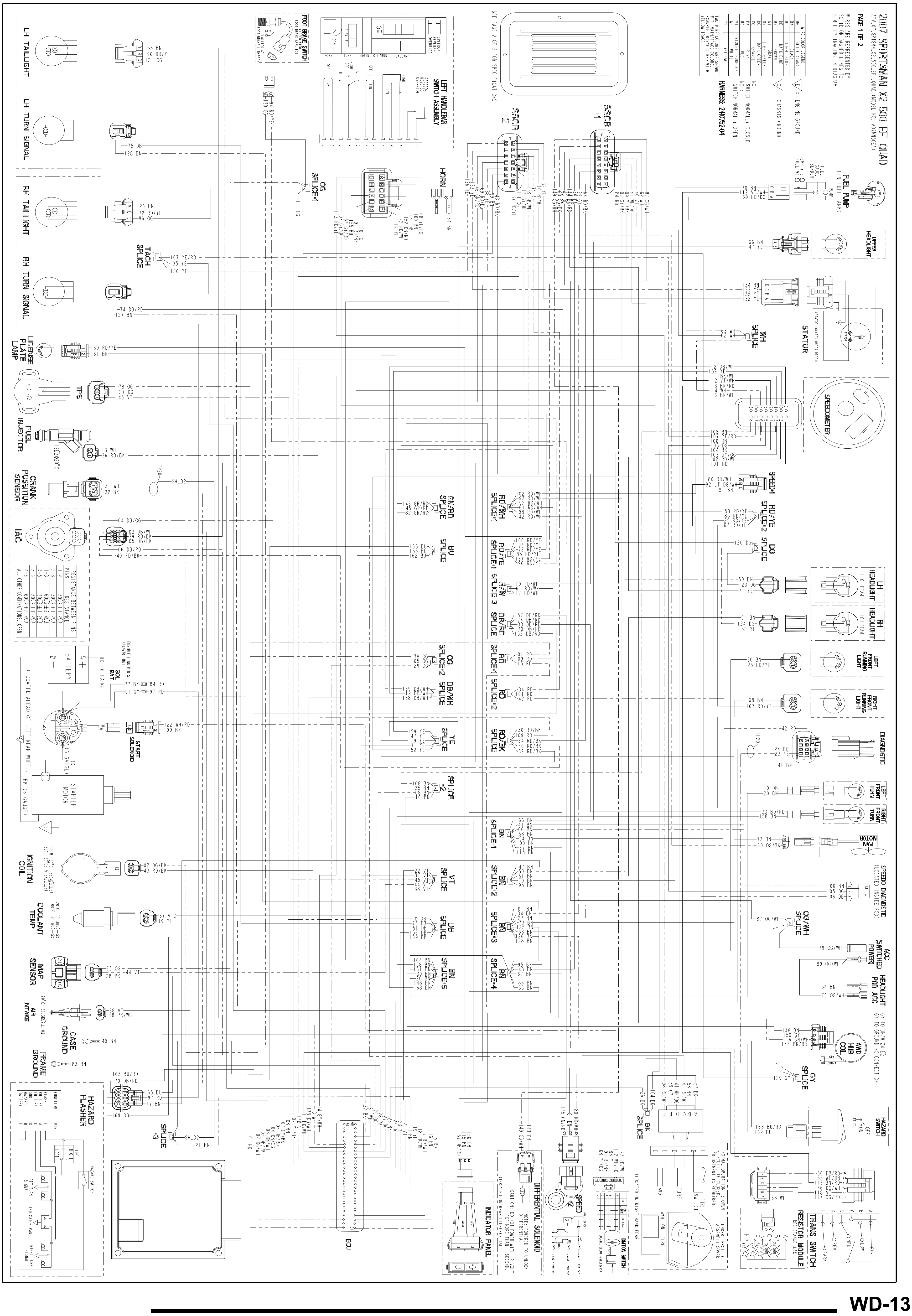
PAGE 2 OF 2

WIRE TERMINATION TABLE						
REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
85	BLACK	20	IGNITION SWITCH	E	BLACK SPLICE	-
86	ORANGE	18	RH TAILLIGHT	3	ORANGE SPLICE #1	-
87	ORANGE/WHITE	16	SSCB #1	A	ORANGE/WHITE SPLICE	-
88	YELLOW	16	SSCB #2	M	IGNITION SWITCH	D
89	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
90	RED/BLACK	18	IGNITION SWITCH	C	LH HANDLEBAR	F
92	RED/WHITE	16	LH HANDLEBAR	C	RED/WHITE SPLICE #1	-
93	RED/WHITE	16	IGNITION SWITCH	B	RED/WHITE SPLICE #1	-
94	RED/YELLOW	16	BRAKE LIGHT SENSOR	-	RED/YELLOW SPLICE	-
95	BROWN	16	BROWN SPLICE #2	-	BROWN SPLICE #4	-
96	RED/YELLOW	18	LH TAILLIGHT	2	RED/YELLOW SPLICE	-
97	ORANGE/WHITE	16	HEADLIGHT POD ACC	-	ACCESSORIES (SW POWER)	-
98	RED/WHITE	20	ETC & AWD SWITCH	F	RED/WHITE SPLICE #1	-
99	BROWN	18	START SOLENOID	2	SSCB #2	N
100	BROWN	20	LH HANDLEBAR	C	BROWN SPLICE #1	-
101	RED	20	SPEEDOMETER	1	RED SPLICE #2	-
102	RED/WHITE	20	SPEEDOMETER	2	RED/WHITE SPLICE #1	-
103	GRAY/ORANGE	20	SPEEDOMETER	3	LH HANDLEBAR	B
104	BLACK	20	SPEEDOMETER	4	BLACK SPLICE	-
105	GREEN	20	SPEEDOMETER	5	SPEEDO DIAGNOSTIC	2
106	BLUE	20	SPEEDOMETER	6	SPEEDO DIAGNOSTIC	3
107	YELLOW/RED	20	SPEEDOMETER	7	YELLOW SPLICE	-
108	BROWN	20	SPEEDOMETER	8	SPLICE #2	-
109	RED	20	RED SPLICE #1	-	RED/BLACK SPLICE	-
110	RED/WHITE	16	RED/WHITE SPLICE #3	-	SSCB #2	B
111	ORANGE	18	SSCB #2	F	ORANGE SPLICE #1	-
112	VIOLET/WHITE	20	SPEEDOMETER	12	FUEL PUMP	B
113	BROWN/RED	20	SPEEDOMETER	13	TRANS SWITCH	C
114	WHITE	20	SPEEDOMETER	14	WHITE SPLICE	-
115	BROWN	20	IGNITION SWITCH	F	BROWN SPLICE #1	-
116	BROWN/WHITE	20	SPEEDOMETER	16	HUB COIL	B
117	ORANGE/RED	18	TRANS SWITCH	F	RESISTOR MODULE	B
118	VIOLET	18	TRANS SWITCH	E	RESISTOR MODULE	C
119	YELLOW	18	LH HANDLEBAR	E	UPPER HEADLIGHT	B
120	GREEN	18	LH HANDLEBAR	F	GREEN SPLICE	-
121	ORANGE	18	LH TAILLIGHT	3	ORANGE SPLICE #1	-
122	WHITE/RED	18	IGNITION SWITCH	A	START SOLENOID	1
123	GREEN	18	LH HEADLIGHT	B	GREEN SPLICE	-
124	GREEN	18	RH HEADLIGHT	B	GREEN SPLICE	-
125	BROWN	16	BROWN SPLICE #3	-	BROWN SPLICE #4	-
126	BROWN	18	RH TAILLIGHT	1	BROWN SPLICE #3	-
127	BROWN	18	RH WORKLIGHT	-	BROWN SPLICE #3	-
128	BROWN	18	LH WORKLIGHT	-	BROWN SPLICE #3	-
129	GRAY	20	SSCB #1	P	GRAY SPLICE	-
130	ORANGE	18	BRAKE LIGHT SENSOR	-	ORANGE SPLICE #1	-
131	BLACK	20	LH HANDLEBAR	A	BLACK SPLICE	-
132	YELLOW	14	STATOR	A	SSCB #2	H
133	YELLOW	14	STATOR	C	SSCB #2	J
134	BROWN	14	STATOR	D	BROWN SPLICE #3	-
135	YELLOW	14	STATOR	B	YELLOW SPLICE	-
136	YELLOW	14	SSCB #2	A	YELLOW SPLICE	-
137	RED/YELLOW	16	SSCB #2	G	RED/YELLOW SPLICE	-
138	BLUE/WHITE	20	ECU	24	BLUE/WHITE SPLICE	-
139	BLUE/WHITE	20	SSCB #2	D	BLUE/WHITE SPLICE	-
140	VIOLET	20	ECU	21	SSCB #1	D
141	WHITE/GREEN	18	SSCB #1	E	ETC & AWD SWITCH	D
142	RED/WHITE	18	ETC & AWD SWITCH	C	RED/WHITE SPLICE #1	-
143	BLUE	18	DIFF SOLENOID	B	SSCB #1	L
144	BLACK/RED	18	HUB COIL	A	SSCB #1	M
145	LT GREEN/RED	20	SPEED #2	C	LT GREEN/RED SPLICE	-
146	LT GREEN/RED	20	SSCB #2	K	LT GREEN/RED SPLICE	-
148	BROWN	18	HUB COIL	D	BROWN SPLICE #4	-
149	ORANGE/WHITE	18	DIFF SOLENOID	A	SSCB #1	J
150	GRAY	20	HUB COIL	C	GRAY SPLICE	-
SHLD2	SHLD	TP20	SPLICE #3	-	TRIM FLUSH	-

WIRE TERMINATION TABLE						
REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	RED	20	ECU	1	RED SPLICE #1	-
02	GREEN/WHITE	18	ECU	3	IGNITION COIL	1
03	BLUE/WHITE	20	ECU	7	IAC	1
04	BLUE/ORANGE	20	ECU	8	IAC	6
05	BLUE/PINK	20	ECU	6	IAC	3
06	BLUE/RED	20	ECU	9	IAC	4
07	GRAY/BLACK	20	ECU	11	SSCB #1	G
08	BROWN	20	ECU	12	SPLICE #2	-
09	YELLOW/BLACK	20	ECU	19	SSCB #1	F
11	BLACK/WHITE	20	ECU	23	SPEEDOMETER	11
12	BLUE/WHITE	20	BLUE/WHITE SPLICE	-	SPEEDOMETER	9
13	WHITE	18	ECU	25	FUEL INJECTOR	2
14	GRAYWHITE	20	ECU	28	SSCB #2	E
15	RED	20	ECU	31	RED SPLICE #1	-
16	BROWN	20	ECU	33	SPLICE #2	-
17	RED/WHITE	20	ECU	34	RED/WHITE SPLICE #3	-
18	PINK/WHITE	20	ECU	38	AIR INTAKE	2
19	YELLOW	20	ECU	39	COOLANT TEMP	2
21	BROWN	20	ECU	41	SPLICE #3	-
22	VIOLET	20	ECU	46	VIOLET SPLICE	-
23	YELLOW	TP20	ECU	47	DIAGNOSTIC	H
24	GREEN	TP20	ECU	48	DIAGNOSTIC	G
26	BLACK	20	ECU	51	BLACK SPLICE	-
27	GREEN	20	ECU	53	TPS	2
28	PINK	20	ECU	54	MAP SENSOR	3
29	ORANGE	20	ECU	55	ORANGE SPLICE #2	-
31	WHITE	TP20	ECU	57	CRANK	1
32	BLACK	TP20	ECU	58	CRANK	2
34	RED	20	SSCB #2	C	RED SPLICE #2	-
35	BROWN	16	BROWN SPLICE #4	-	SPLICE #2	-
36	RED/BLACK	18	FUEL INJECTOR	1	RED/BLACK SPLICE	-
37	VIOLET	20	COOLANT TEMP	1	VIOLET SPLICE	-
38	VIOLET	20	AIR INTAKE	1	VIOLET SPLICE	-
39	RED/BLACK	20	IAC	2	RED/BLACK SPLICE	-
40	RED/BLACK	20	IAC	5	RED/BLACK SPLICE	-
41	BROWN	20	DIAGNOSTIC	D	BROWN SPLICE #1	-
42	RED	20	DIAGNOSTIC	A	RED SPLICE #2	-
43	RED/BLACK	18	IGNITION COIL	2	SSCB #2	P
44	VIOLET	20	MAP SENSOR	2	VIOLET SPLICE	-
45	VIOLET	20	TPS	1	VIOLET SPLICE	-
46	GREEN/WHITE	18	TRANS SWITCH	D	RESISTOR MODULE	D
47	BROWN	16	HEADLIGHT POD ACC	-	BROWN SPLICE #1	-
48	BROWN	12	SSCB #1	N	BROWN SPLICE #4	-
49	BROWN	20	CASE GROUND	-	SPLICE #3	-
50	BROWN	18	LH HEADLIGHT	A	BROWN SPLICE #2	-
51	BROWN	18	RH HEADLIGHT	A	BROWN SPLICE #2	-
52	BROWN	18	UPPER HEADLIGHT	A	BROWN SPLICE #1	-
53	BROWN	18	LH TAILLIGHT	1	BROWN SPLICE #3	-
54	BROWN	20	LH HANDLEBAR	B	BROWN SPLICE #1	-
55	WHITE/BLUE	18	TRANS SWITCH	B	RESISTOR MODULE	E
56	BLUE/RED	18	TRANS SWITCH	A	RESISTOR MODULE	F
57	BLACK	20	ETC & AWD SWITCH	A	BLACK SPLICE	-
58	BROWN	20	ETC & AWD SWITCH	B	BROWN SPLICE #1	-
59	GRAY	20	GRAY SPLICE	-	ETC & AWD SWITCH	E
60	ORANGE/BLACK	16	FAN MOTOR	B	SSCB #1	K
61	RED/WHITE	16	RED/WHITE SPLICE #3	-	RED/WHITE SPLICE #1	-
62	WHITE	20	SSCB #1	C	WHITE SPLICE	-
63	WHITE	20	RESISTOR MODULE	A	WHITE SPLICE	-
64	RED/BLACK	16	SSCB #1	S	RED/BLACK SPLICE	-
65	ORANGE	20	MAP SENSOR	1	ORANGE SPLICE #2	-
66	BROWN	20	SPEEDO DIAGNOSTIC	1	BROWN SPLICE #1	-
67	BROWN	16	BROWN SPLICE #1	-	BROWN SPLICE #4	-
68	RED/YELLOW	18	WORK LIGHT SWITCH	-	RED/YELLOW SPLICE	-
69	RED/GREEN	18	FUEL PUMP	A	SSCB #2	L
70	BROWN	18	FUEL PUMP	C	BROWN SPLICE #2	-
71	BLUE	18	WORK LIGHT SWITCH	-	BLUE SPLICE	-
72	RED/YELLOW	18	RH TAILLIGHT	2	RED/YELLOW SPLICE	-
73	BROWN	16	FAN MOTOR	A	BROWN SPLICE #3	-
74	BLUE	18	RH WORKLIGHT	-	BLUE SPLICE	-
75	BLUE	18	LH WORKLIGHT	-	BLUE SPLICE	-
76	RED/YELLOW	16	LH HANDLEBAR	D	RED/YELLOW SPLICE	-
77	BLACK	1.0	SOLENOID BATTERY +	-	16/12 SPLICE	-
78	ORANGE	20	TPS	3	ORANGE SPLICE #2	-
79	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
80	RED/WHITE	20	SPEED #1	A	SPEED #2	A
81	BROWN	20	SPEED #1	C	SPEED #2	B
82	LT GREEN/RED	20	SPEED #1	B	LT GREEN/RED SPLICE	-
83	BROWN	12	FRAME GROUND	-	BROWN SPLICE #4	-
84	RED	12	SSCB #1	H	16/12 SPLICE	-



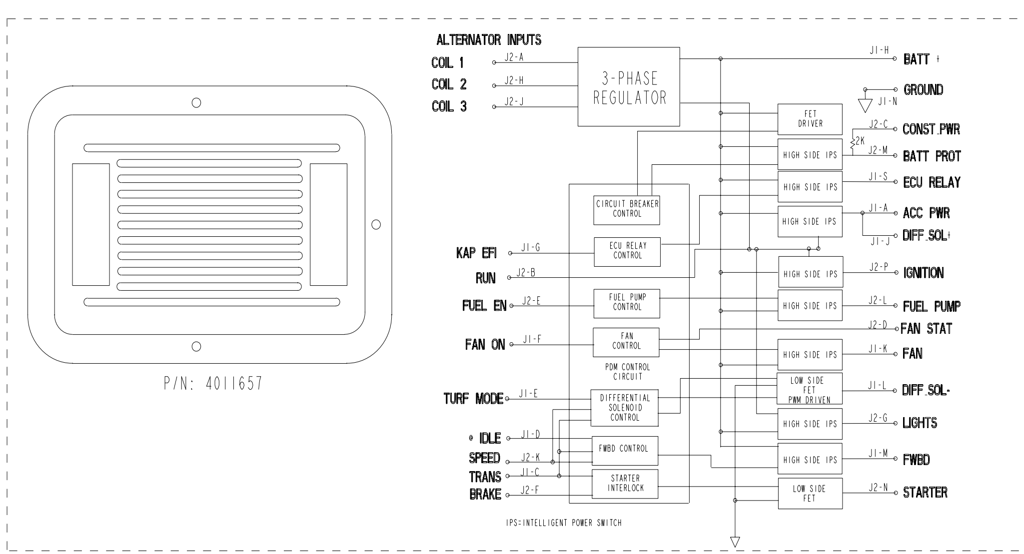
2007 SPORTSMAN 500 EFI X2 QUADRICYCLE WIRE DIAGRAM



2007 SPORTSMAN X2 500 EFI QUAD

ATV_07_SPTSMN_X2_500_EFI_QUAD (MODEL NO: A07MN50EA)

PAGE 2 OF 2



WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	RED	20	ECU	1	RED SPLICE #1	-
02	GREEN/WHITE	18	ECU	3	IGNITION COIL	1
03	BLUE/WHITE	20	ECU	7	IAC	1
04	BLUE/ORANGE	20	ECU	8	IAC	6
05	BLUE/PINK	20	ECU	6	IAC	3
06	BLUE/RED	20	ECU	9	IAC	4
07	GRAY/BLACK	20	ECU	11	SSCB #1	G
08	BROWN	20	ECU	12	SPLICE #2	-
09	YELLOW/BLACK	20	ECU	19	SSCB #1	F
10	BLUE	18	LH FRONT TURN SIGNAL	-	BLUE SPLICE	-
11	BLACK/WHITE	20	ECU	23	SPEEDOMETER	11
12	BLUE/WHITE	20	BLUE/WHITE SPLICE	-	SPEEDOMETER	9
13	WHITE	18	ECU	25	FUEL INJECTOR	2
14	GRAYWHITE	20	ECU	28	SSCB #2	E
15	RED	20	ECU	31	RED SPLICE #1	-
16	BROWN	20	ECU	33	SPLICE #2	-
17	RED/WHITE	20	ECU	34	RED/WHITE SPLICE #3	-
18	PINK/WHITE	20	ECU	38	AIR INTAKE	2
19	YELLOW	20	ECU	39	COOLANT TEMP	2
20	BROWN	18	LH FRONT TURN SIGNAL	-	BROWN SPLICE #5	-
21	BROWN	20	ECU	41	SPLICE #3	-
22	VIOLET	20	ECU	46	VIOLET SPLICE	-
23	YELLOW	TP20	ECU	47	DIAGNOSTIC	H
24	GREEN	TP20	ECU	48	DIAGNOSTIC	G
25	RED/YELLOW	18	LH FRONT RUNNING LIGHT	1	RED/YELLOW SPLICE #2	-
26	BLACK	20	ECU	51	BLACK SPLICE	-
27	GREEN	20	ECU	53	TPS	2
28	PINK	20	ECU	54	MAP SENSOR	3
29	ORANGE	20	ECU	55	ORANGE SPLICE #2	-
30	BROWN	18	LH FRONT RUNNING LIGHT	2	BROWN SPLICE #5	-
31	WHITE	TP20	ECU	57	CRANK	1
32	BLACK	TP20	ECU	58	CRANK	2
33	BLUE/RED	18	RH FRONT TURN SIGNAL	-	BLUE/RED SPLICE	-
34	RED	20	SSCB #2	C	RED SPLICE #2	-
35	BROWN	16	BROWN SPLICE #4	-	SPLICE #2	-
36	RED/BLACK	18	FUEL INJECTOR	1	RED/BLACK SPLICE	-
37	VIOLET	20	COOLANT TEMP	1	VIOLET SPLICE	-
38	VIOLET	20	AIR INTAKE	1	VIOLET SPLICE	-
39	RED/BLACK	20	IAC	2	RED/BLACK SPLICE	-
40	RED/BLACK	20	IAC	5	RED/BLACK SPLICE	-
41	BROWN	20	DIAGNOSTIC	D	BROWN SPLICE #1	-
42	RED	20	DIAGNOSTIC	A	RED SPLICE #2	-
43	RED/BLACK	18	IGNITION COIL	2	SSCB #2	P
44	VIOLET	20	MAP SENSOR	2	VIOLET SPLICE	-
45	VIOLET	20	TPS	1	VIOLET SPLICE	-
46	GREEN/WHITE	18	TRANS SWITCH	D	RESISTOR MODULE	D
47	BROWN	18	HAZARD FLASHER	D	BROWN SPLICE #2	-
48	BROWN	12	SSCB #1	N	BROWN SPLICE #4	-
49	BROWN	20	CASE GROUND	-	SPLICE #3	-
50	BROWN	18	LH HEADLIGHT	-	BROWN SPLICE #2	-
51	BROWN	18	RH HEADLIGHT	-	BROWN SPLICE #2	-
52	YELLOW	18	RH HEADLIGHT	-	YELLOW SPLICE	-
53	BROWN	18	LH TAILLIGHT	A	BROWN SPLICE #3	-
54	BROWN	16	HEADLIGHT POD ACC	-	BROWN SPLICE #1	-
55	WHITE/BLUE	18	TRANS SWITCH	B	RESISTOR MODULE	E
56	BLUE/RED	18	TRANS SWITCH	A	RESISTOR MODULE	F
57	BLACK	20	ETC & AWD SWITCH	A	BLACK SPLICE	-
58	BROWN	20	ETC & AWD SWITCH	B	BROWN SPLICE #1	-
59	GRAY	20	GRAY SPLICE	-	ETC & AWD SWITCH	E
60	ORANGE/BLACK	16	FAN MOTOR	B	SSCB #1	K
61	RED/WHITE	16	RED/WHITE SPLICE #3	-	RED/WHITE SPLICE #1	-
62	WHITE	20	SSCB #1	C	WHITE SPLICE	-
63	WHITE	20	RESISTOR MODULE	A	WHITE SPLICE	-
64	RED/BLACK	16	SSCB #1	S	RED/BLACK SPLICE	-
65	ORANGE	20	MAP SENSOR	1	ORANGE SPLICE #2	-
66	BROWN	20	SPEEDO DIAGNOSTIC	1	BROWN SPLICE #1	-
67	BROWN	16	BROWN SPLICE #1	-	BROWN SPLICE #4	-
68	YELLOW/GREEN	16	LH HANDLEBAR	A	IGNITION SWITCH	E
69	RED/GREEN	18	FUEL PUMP	A	SSCB #2	L
70	BROWN	18	FUEL PUMP	C	BROWN SPLICE #2	-
71	YELLOW	18	LH HEADLIGHT	-	YELLOW SPLICE	-
72	RED/YELLOW	18	RH TAILLIGHT	B	RED/YELLOW SPLICE #1	-
73	BROWN	16	FAN MOTOR	A	BROWN SPLICE #3	-
74	BLUE/RED	18	RH TURN SIGNAL	-	BLUE/RED SPLICE	-
75	BLUE	18	LH TURN SIGNAL	-	BLUE SPLICE	-
76	ORANGE/WHITE	16	HEADLIGHT POD ACC	-	ACCCESSORIES (SW POWER)	-
77	BLACK	1.0	SOLENOID BATTERY +	-	16/12 SPLICE	-
78	ORANGE	20	TPS	3	ORANGE SPLICE #2	-
79	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
80	RED/WHITE	20	SPEED #1	A	SPEED #2	A
81	BROWN	20	SPEED #1	C	SPEED #2	B
82	LT GREEN/RED	20	SPEED #1	B	LT GREEN/RED SPLICE	-
83	BROWN	12	FRAME GROUND	-	BROWN SPLICE #4	-
84	RED	12	SSCB #1	H	16/12 SPLICE	-
85	RED/YELLOW	16	RED/YELLOW SPLICE #1	-	RED/YELLOW SPLICE #2	-
86	ORANGE	18	RH TAILLIGHT	C	ORANGE SPLICE #1	-
87	ORANGE/WHITE	16	SSCB #1	A	ORANGE/WHITE SPLICE	-
88	YELLOW	16	SSCB #2	M	IGNITION SWITCH	C

WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
89	ORANGE/WHITE	16	ORANGE/WHITE SPLICE	-	ACCESSORIES (SW POWER)	-
90	RED/BLACK	18	IGNITION SWITCH	D	LH HANDLEBAR	L
91	GRAY	0.5	SOLENOID BATTERY +	-	18/20 SPLICE	-
92	RED/WHITE	16	LH HANDLEBAR	E	RED/WHITE SPLICE #1	-
93	RED/WHITE	16	IGNITION SWITCH	A	RED/WHITE SPLICE #1	-
94	RED/YELLOW	16	FOOT BRAKE	1	RED/YELLOW SPLICE #1	-
95	BROWN	16	BROWN SPLICE #2	-	BROWN SPLICE #4	-
96	RED/YELLOW	18	LH TAILLIGHT	B	RED/YELLOW SPLICE #1	-
97	RED	18	HAZARD FLASHER	E	18/20 SPLICE	-
98	RED/WHITE	20	ETC & AWD SWITCH	F	RED/WHITE SPLICE #1	-
99	BROWN	18	START SOLENOID	2	SSCB #2	N
100	BROWN	20	LH HANDLEBAR	B	BROWN SPLICE #1	-
101	RED	20	SPEEDOMETER	1	RED SPLICE #2	-
102	RED/WHITE	20	SPEEDOMETER	2	RED/WHITE SPLICE #1	-
103	GRAY/ORANGE	20	SPEEDOMETER	3	LH HANDLEBAR	H
104	BLACK	20	SPEEDOMETER	4	BLACK SPLICE	-
105	GREEN	20	SPEEDOMETER	5	SPEEDO DIAGNOSTIC	2
106	BLUE	20	SPEEDOMETER	6	SPEEDO DIAGNOSTIC	3
107	YELLOW/RED	20	SPEEDOMETER	7	TACH SPLICE	-
108	BROWN	20	SPEEDOMETER	8	SPLICE #2	-
109	RED	20	RED SPLICE #1	-	RED/BLACK SPLICE	-
110	RED/WHITE	16	RED/WHITE SPLICE #3	-	SSCB #2	B
111	ORANGE	18	SSCB #2	F	ORANGE SPLICE #1	-
112	VIOLET/WHITE	20	SPEEDOMETER	12	FUEL PUMP	B
113	BROWN/RED	20	SPEEDOMETER	13	TRANS SWITCH	C
114	WHITE	20	SPEEDOMETER	14	WHITE SPLICE	-
115	BROWN	20	INDICATOR PANEL	2	BROWN SPLICE #1	-
116	BROWN/WHITE	20	SPEEDOMETER	16	HUB COIL	B
117	ORANGE/RED	18	TRANS SWITCH	F	RESISTOR MODULE	B
118	VIOLET	18	TRANS SWITCH	E	RESISTOR MODULE	C
119	YELLOW	18	LH HANDLEBAR	F	YELLOW SPLICE	-
120	GREEN	18	LH HANDLEBAR	M	GREEN SPLICE	-
121	ORANGE	18	LH TAILLIGHT	C	ORANGE SPLICE #1	-
122	WHITE/RED	18	IGNITION SWITCH	B	START SOLENOID	1
123	GREEN	18	LH HEADLIGHT	-	GREEN SPLICE	-
124	GREEN	18	RH HEADLIGHT	-	GREEN SPLICE	-
125	BROWN	16	BROWN SPLICE #3	-	BROWN SPLICE #4	-
126	BROWN	18	RH TAILLIGHT	A	BROWN SPLICE #3	-
127	BROWN	18	RH TURN SIGNAL	-	BROWN SPLICE #3	-
128	BROWN	18	LH TURN SIGNAL	-	BROWN SPLICE #3	-
129	GRAY	20	SSCB #1	P	GRAY SPLICE	-
130	ORANGE	16	FOOT BRAKE	2	ORANGE SPLICE #1	-
131	BROWN	16	BROWN SPLICE #4	-	BROWN SPLICE #5	-
132	YELLOW	14	STATOR	A	SSCB #2	A
133	YELLOW	14	STATOR	C	SSCB #2	J
134	BROWN	14	STATOR	D	BROWN SPLICE #3	-
135	YELLOW	14	STATOR	B	TACH SPLICE	-
136	YELLOW	14	SSCB #2	H	TACH SPLICE	-
137	RED/YELLOW	16	SSCB #2	G	RED/YELLOW SPLICE #1	-
138	BLUE/WHITE	20	ECU	24	BLUE/WHITE SPLICE	-
139	BLUE/WHITE	20	SSCB #2	D	BLUE/WHITE SPLICE	-
140	VIOLET	20	ECU	21	SSCB #1	D
141	WHITE/GREEN	18	SSCB #1	E	ETC & AWD SWITCH	D
142	RED/WHITE	18	ETC & AWD SWITCH	C	RED/WHITE SPLICE #1	-
143	BLUE	18	DIFF SOLENOID	B	SSCB #1	L
144	BLACK/RED	18	HUB COIL	A	SSCB #1	M
145	LT GREEN/RED	20	SPEED #2	C	LT GREEN/RED SPLICE	-
146	LT GREEN/RED	20	SSCB #2	K	LT GREEN/RED SPLICE	-
147	YELLOW	18	UPPER HEADLIGHT	B	YELLOW SPLICE	-
148	BROWN	18	HUB COIL	D	BROWN SPLICE #5	-
149	ORANGE/WHITE	18	DIFF SOLENOID	A	SSCB #1	J
150	GRAY	20	HUB COIL	C	GRAY SPLICE	-
151	BLUE	18	LH HANDLEBAR	C	BLUE SPLICE	-
152	BLUE/RED	18	LH HANDLEBAR	D	BLUE/RED SPLICE	-
153	RED/YELLOW	18	LH HANDLEBAR	G	RED/YELLOW SPLICE #2	-
154	GRAY/RED	18	LH HANDLEBAR	J	HORN	.250F
155	LT BLUE	18	LH HANDLEBAR	K	LT BLUE SPLICE	-
156	BLUE	18	INDICATOR PANEL	3	BLUE SPLICE	-
157	BLUE/RED	18	INDICATOR PANEL	1	BLUE/RED SPLICE	-
158	BROWN	18	RH FRONT TURN SIGNAL	-	BROWN SPLICE #5	-
159	YELLOW	18	SPEEDOMETER	10	YELLOW SPLICE	-
160	RED/YELLOW	18	LICENSE PLATE LAMP	1	RED/YELLOW SPLICE #1	-
161	BROWN	18	LICENSE PLATE LAMP	2	BROWN SPLICE #3	-
162	LT BLUE	18	HAZARD SWITCH	-	LT BLUE SPLICE	-
163	LT BLUE/RED	18	HAZARD SWITCH	-	HAZARD FLASHER	B
164	BROWN	18	HORN	.250F	BROWN SPLICE #5	-
165	LT BLUE	18	HAZARD FLASHER	F	LT BLUE SPLICE	-
166	BROWN	18	UPPER HEADLIGHT	A	BROWN SPLICE #1	-
167	RED/YELLOW	18	RH FRONT RUNNING LIGHT	1	RED/YELLOW SPLICE #2	-
168	BROWN	18	RH FRONT RUNNING LIGHT	2	BROWN SPLICE #5	-
169	BLUE	18	HAZARD FLASHER	C	BLUE SPLICE	-
170	BLUE/RED	18	HAZARD FLASHER	A	BLUE/RED SPLICE	-
171	-	-	-	-	-	-
172	-	-	-	-	-	-
SHLD2	SHLD	TP20	SPLICE #3	-	TRIM FLUSH	-