



CHAPTER 1

GENERAL



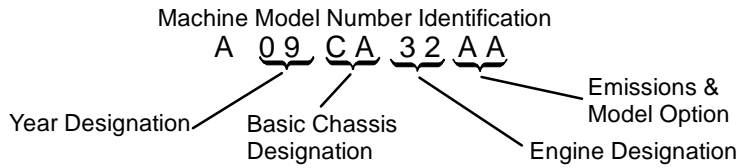
Model Identification	1.2
Serial Number Location	1.2
Replacement Keys	1.3
Machine Dimensions	1.3
Publication Numbers	1.3
Paint Codes	1.3
Specifications - Trail Boss 330	1.4-1.5
Specifications - Trail Blazer 330	1.6-1.7
Special Tools	1.8
Standard Torque Specifications	1.9
Tap / Drill Charts	1.10
Decimal Equivalent Chart	1.10
Unit of Measure Conversion Table	1.11
Glossary of Terms	1.12

PartsStark.com
877-999-5666



MODEL IDENTIFICATION

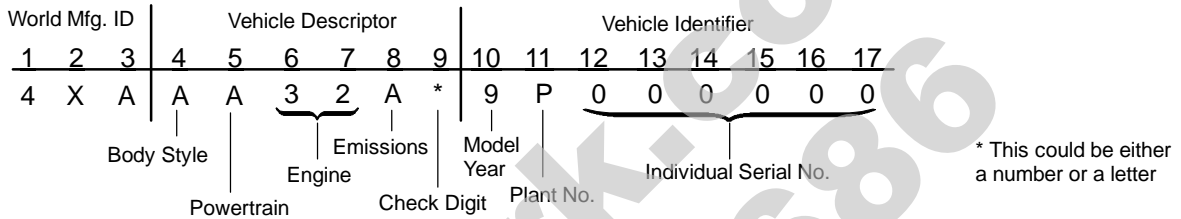
The machine model number must be used with any correspondence regarding warranty or service.



ENGINE DESIGNATION NUMBERS

ES32PFE Single, Air Cooled, SOHC 4 Stroke, Electric Start

VIN IDENTIFICATION

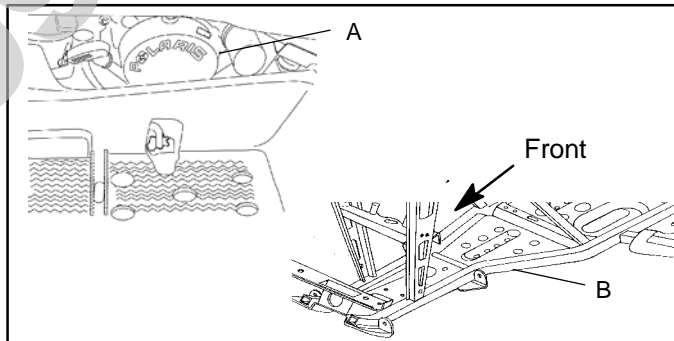


ENGINE SERIAL NUMBER LOCATION

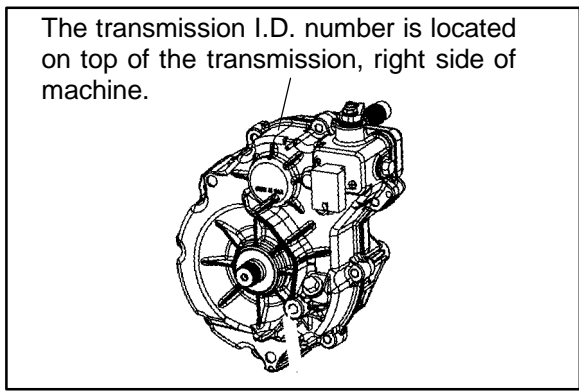
Whenever corresponding about an engine, be sure to refer to the engine model number and serial number. This information can be found on the sticker applied to the recoil housing on the right side of engine.(A) An additional number is stamped on the center top of crankcase beneath the cylinder coolant elbow.

UNIT MODEL NUMBER AND SERIAL NUMBER LOCATION

The machine model number and serial number are important for vehicle identification. The machine serial number is stamped on the lower left side of the frame tube.(B)



TRANSMISSION I.D. NUMBER LOCATION





PUBLICATION NUMBERS

Year	Model	Model No.	Owner's Manual PN	Parts Manual PN
2009	Trail Boss 330	A09CA32AA	9921784	9921774
2009	Trail Blazer 330	A09BA32AA	9921773	9921787

NOTE: When ordering service parts be sure to use the correct parts manual.

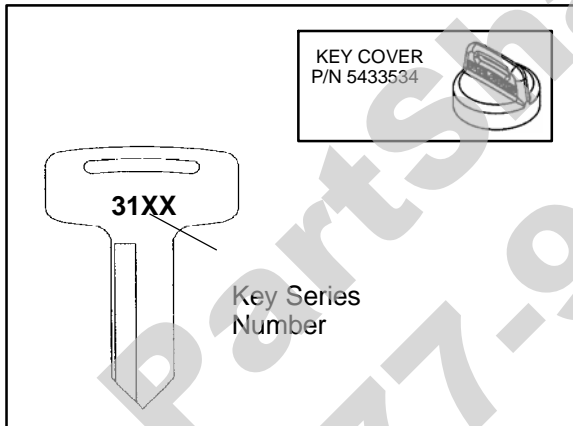
NOTE: Some manuals can be found at the Polaris website: www.polarisindustries.com or purchased from www.purepolaris.com.

PAINT CODES

FRAME COLOR - P067 Medium Gloss Black 9440 / 8520147.

REPLACEMENT KEYS

Replacement keys can be made from the original key. To identify which series the key is, take the first two digits on the original key and refer to the chart to the right for the proper part number. **Should both keys become lost, ignition switch replacement is required.**



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

GENERAL INFORMATION



MODEL: 2009 TRAILBOSS 330

MODEL NUMBER: . A09CA32AA

ENGINE MODEL: .. ES32PFE

Category	Dimension
Length	75 in./191 cm
Width	46 in./117 cm
Height	46 in./117 cm
Wheel Base	49.5 in./125.73 cm
Ground Clearance	5.5/13.97 cm
Dry Weight	505 lbs./230 kg
Gross Vehicle Weight	845 lbs./383 kg
Front Rack Capacity	75 lbs./34 kg
Rear Rack Capacity	125 lbs./57 kg
Towing Capacity	850 lbs./385 kg
Hitch Tongue Weight	85 lbs./14 kg
Body Style	Gen IV





GENERAL INFORMATION

MODEL: **2009 TRAILBOSS 330**

MODEL NUMBER: . **A09CA32AA**

ENGINE MODEL: .. **ES32PFE**

Engine	
Platform	Fuji 4 stroke, Single Cylinder
Engine Model Number	EH32PFE
Engine Displacement	329cc
Number of Cylinders	1
Bore & Stroke (mm)	78.5 x 68 mm
Compression Ratio	9.2:1
Compression Pressure	70-90 psi
Engine Idle Speed	1300 ± 100 Rpm
Cooling System/Capacity	Oil/ Air w/ fan assist 1.9qts./1.8 ltr
Overheat Warning	HOT Light on Panel
Lubrication	Wet Sump
Oil Requirements	Polaris 2W-50
Exhaust System	USFS Approved
Carburetion	
Carburetor model	Mikuni BST 34mm
Main Jet	122.5
Pilot Jet	42.5
Jet Needle	4HB48-3
Needle Jet	P-4 (829)
Pilot Screw	2 Turns Out (Initial starting point, may vary for each ATV)
Pilot Air Jet	160
Float Height	13 ± 1 mm (0.51 ± 0.40")
Fuel Delivery	Fuel Pump
Fuel Capacity / Requirement	3.25 gal. (12.3 L) 87 Octane (minimum) 89 Oxygenated
Electrical	
Alternator Output	200 w @ 5000 RPM
Voltage Regulator	3-Phase
Lights : High Beam	2x30 watts
Low Beam	2x30 watts
Brake	26.9 watts
Tail	8.26 watts
Ignition System	DC/CDI Ignition
Ignition Timing	30° ± 2° BTDC @ 5000 RPM
Spark plug / Gap	NGK BKR6E/ .036 in./ 0.9 mm
Battery / Model / Amp Hr	Maintenance-Free - 14 Amp Hr
Circuit Breakers	Harness 20 amp
Starting	Electric / Recoil Backup
Indicator Panel	Standard

Drivetrain	
Transmission Type	Inline H/N/R
Transmission Capacity	11.3 oz. (335 ml)
Gear Ratio :	High 2.68/1 Rev. 3.05/1 Final 11/40 78P
Chain Type	520 O-Ring
Clutch Type	PVT Non EBS
Belt	3211077
Steering / Suspension	
Front Suspension / Shock	A-arm / MacPherson Strut
Front Travel	8.2 in. / 20.83 cm
Rear Suspension Style / Shock	Progressive Rate Swingarm / Twin Tube Gas Charged
Rear Travel	10.5 in. / 26.67 cm
Ground Clearance	5.5 in. / 13.97 cm
Shock Preload Adjustment Front / Rear	Front - n/a Rear - Cam
Turning Radius	83 in. / 211 cm
Toe Out	1/8 - 1/4 in / 3 - 6.35 mm
Wheels / Brakes	
Wheel Size - Front / Pattern	23 x 7 - 10 / 4-156
Wheel Size - Rear / Pattern	22 x 11 - 10 / 4-102
Air Press. F/R Tires	4 psi Front / 3 psi Rear
Brake - Front	Dual Hydraulic Disc
Brake - Rear	Single Hydraulic Disc
Brake Fluid	Polaris DOT 4 Brake Fluid

JETTING CHART		AMBIENT TEMPERATURE	
		Below 40°F Below 5°C	+40°F to +80°F +5°C to +28°C
Altitude			
Meters (Feet)	0-1800 (0-6000)	127.5	122.5
	above 1800 (above 6000)	120	115

CLUTCH CHART

Altitude		Shift Weight	Drive Spring	Driven Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	10 RH (5630709)	Blu/Grn (7041157)	Black (7041782)	45° 2-2 (5131446)
	1800-3700 (6000-12000)	20-40 (5631356)	Blu/Grn (7041157)	Black (7041782)	45° 2-2 (5131446)

GENERAL INFORMATION



MODEL: **2009 TRAILBLAZER 330**
MODEL NUMBER: . **A09BA32AA**
ENGINE MODEL: .. **ES32PFE**

Category	Dimension
Length	75 in./191 cm
Width	46 in./117 cm
Height	46 in./117 cm
Wheel Base	48 in./121.9 cm
Ground Clearance	5.5/13.97 cm
Dry Weight	488 lbs./221 kg
Gross Vehicle Weight	830 lbs./377 kg
Front Rack Capacity (Accessory)	30 lbs./13.6 kg
Rear Rack Capacity (Accessory)	60 lbs./27.2 kg
Towing Capacity	850 lbs./385 kg
Hitch Tongue Weight (Accessory)	85 lbs./14 kg
Body Style	Gen III





GENERAL INFORMATION

MODEL: 2009 TRAILBLAZER 330

MODEL NUMBER: . A09BA32AA

ENGINE MODEL: .. ES32PFE

Engine	
Platform	Fuji 4 stroke, Single Cylinder
Engine Model Number	ES32PFE
Engine Displacement	329cc
Number of Cylinders	1
Bore & Stroke (mm)	78.5 x 68 mm
Compression Ratio	9.2:1
Compression Pressure	70-90 psi
Engine Idle Speed	1300 ± 100 Rpm
Cooling System/Capacity	Oil/ Air w/ fan assist 1.9qts./1.8 ltr
Overheat Warning	HOT Light on Panel
Lubrication	Wet Sump
Oil Requirements	Polaris 2W-50
Exhaust System	USFS Approved
Carburetion	
Carburetor model	Mikuni BST 34mm
Main Jet	122.5
Pilot Jet	42.5
Jet Needle	4HB48-3
Needle Jet	P-4 (829)
Pilot Screw	2 Turns Out (Initial starting point, may vary for each ATV)
Pilot Air Jet	160
Float Height	13 ± 1 mm (0.51 ± 0.40")
Fuel Delivery	Fuel Pump
Fuel Capacity / Requirement	3.25 gal. (12.3 L) 87 Octane (minimum) 89 Oxygenated
Electrical	
Alternator Output	200 w @ 5000 RPM
Voltage Regulator	3-Phase
Lights : Head	55 watts
Brake	26.9 watts
Tail	8.26 watts
Ignition System	DC/CDI Ignition
Ignition Timing	30° ± 2° BTDC @ 5000 RPM
Spark plug / Gap	NGK BKR6E/ .036 in./ 0.9 mm
Battery / Model / Amp Hr	Maintenance-Free - 14 Amp Hr
Circuit Breakers	Harness 20 amp
Starting	Electric / Recoil Backup
Indicator Panel	Standard

Drivetrain	
Transmission Type	Inline H/N/R
Transmission Capacity	11.3 oz. (335 ml)
Gear Ratio :	High 2.68/1 Rev. 3.05/1 Final 11/40 78P
Chain Type	520 O-Ring
Clutch Type	PVT Non EBS
Belt	3211077
Steering / Suspension	
Front Suspension / Shock	A-arm / MacPherson Strut
Front Travel	8.2 in. / 20.83 cm
Rear Suspension Style / Shock	Progressive Rate Swingarm / Twin Tube Gas Charged
Rear Travel	10.5 in. / 26.67 cm
Ground Clearance	5.5 in. / 13.97 cm
Shock Preload Adjustment Front / Rear	Front - n/a Rear - Cam
Turning Radius	83 in. / 211 cm
Toe Out	1/8 - 1/4 in / 3 - 6.35 mm
Wheels / Brakes	
Wheel Size - Front / Pattern	23 x 7 - 10 / 4-156
Wheel Size - Rear / Pattern	22 x 11 - 10 / 4-102
Air Press. F/R Tires	4 psi Front / 3 psi Rear
Brake - Front	Dual Hydraulic Disc
Brake - Rear	Single Hydraulic Disc
Brake Fluid	Polaris DOT 4 Brake Fluid

JETTING CHART		AMBIENT TEMPERATURE	
Altitude		Below 40°F Below 5°C	+40°F to +80°F +5°C to +28°C
Meters (Feet)	0-1800 (0-6000)	127.5	122.5
	above 1800 (above 6000)	120	115

CLUTCH CHART

Altitude		Shift Weight	Drive Spring	Driven Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	10 RH (5630709)	Blu/Grn (7041157)	Black (7041782)	45° 2-2 (5131446)
	1800-3700 (6000-12000)	20-40 (5631356)	Blu/Grn (7041157)	Black (7041782)	45° 2-2 (5131446)



SPECIAL TOOLS

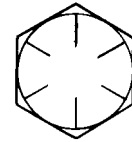
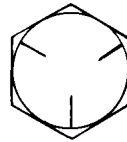
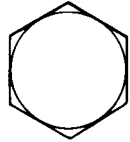
PART NUMBER	TOOL DESCRIPTION	CHAPTER TOOL USED IN
PA-44689	Valve Clutch Adjuster	2
2870872	Shock Spanner Wrench	2, 5
8712100DX or 8712500	Tachometer	2,10
2200634	Valve Seat Reconditioning Kit	3
2870390	Piston Support Block	3
2870159	Flywheel Puller	3
2871293	Slotted Nut Socket	3
PV-43527	Oil Filter Wrench	3
2872314	Carburetor Float Adjustment Tool	4
2870975	Mity Vact Pressure Test Tool	4, 9
2870871	Ball Joint Replacement Tool	5
2870623	Shock Absorber Spring Compression Tool	5
2871573	LH Strut Spring Compressor	5
2871574	RH Strut Spring Compressor	5
2870506	Clutch Puller	6
9314177	Clutch Holding Wrench	6
2871358	Clutch Holding Fixture	6
2870341	Drive Clutch Spider Removal and Install Tool	6
2870654	Clutch Offset Alignment Tool	6
2870913	Driven Clutch Puller	6
2870910	Roller Pin Tool	6
2871226	Clutch Bushing Replacement Tool Kit	6
2870386	Piston Pin Puller	6
8700220	Clutch Compression Tool	6
2871710	10" Center Distance Tool	8
PV-43568	Fluke 77 Digital Multimeter	10
2870630	Timing Light	10
2870836	Battery Hydrometer	10
8712100 or 8712500	Tachometer	10

NOTE: Polaris dealers can order the tools listed above through the SPX Service Tools catalog.



STANDARD TORQUE SPECIFICATIONS

The following torque specifications are to be used as a general guideline. **FOR SPECIFIC TORQUE VALUES OF FASTENERS Refer to exploded views in the appropriate section.** There are exceptions in the steering, suspension, and engine sections.



Bolt Size	Threads/In	Grade 2	Grade 5	Grade 8	
		<u>Torque in. lbs. (Nm)</u>			
#10	- 24	27 (3.1)	43 (5.0)	60 (6.9)	
#10	- 32	31 (3.6)	49 (5.6)	68 (7.8)	
<u>Torque ft. lbs. (Nm)*</u>					
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 / Torque					
6 x 1.0	72-78 In. lbs.	8 x 1.25	14-18 ft. lbs.	10 x 1.25	26-30 ft. lbs.

PartShare.com
877-999-1560





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		

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	... 5 mm = .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	... 8 mm = .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	... 13 mm = .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	... 16 mm = .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	

METRIC TAP DRILL SIZES

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

**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)
$\pi (3.14) \times R^2 \times H$ (height)		= Cylinder Volume

°C to °F: $9 (°C + 40) \div 5 - 40 = °F$

°F to °C: $5 (°F + 40) \div 9 - 40 = °C$





GLOSSARY OF TERMS

ABDC: After bottom dead center.

ACV: Alternating current voltage.

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.

CI: Cubic inches.

Clutch Buttons: Plastic bushings which aid rotation of the movable sheave in the drive and driven clutch.

Clutch Offset: Drive and driven clutches are offset so that drive belt will stay nearly straight as it moves along the clutch face.

Clutch Weights: Three levers in the drive clutch which relative to their weight, profile and engine RPM cause the drive clutch to close and grip the drive belt.

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.

Dial Bore Gauge: A cylinder measuring instrument which uses a dial indicator. Good for showing taper and out-of-round in the cylinder bore.

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).

End Seals: Rubber seals at each end of the crankshaft.

Engagement RPM: Engine RPM at which the drive clutch engages to make contact with the drive belt.

ft.: Foot/feet.

Foot Pound: Ft. lb. 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/cm²: 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.

lbs/in²: Pounds per square inch.

Left or Right 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.

Piston Clearance: Total distance between piston and cylinder wall.

psi.: Pounds per square inch.

PTO: Power take off.

PVT: Polaris Variable Transmission (Drive Clutch System)

qt.: Quart/quarts.

Regulator: Voltage regulator. Regulates battery charging system output at approx. 14.5 DCV as engine RPM increases.

Reservoir Tank: The fill tank in the liquid cooling system.

Resistance: In the mechanical sense, friction or load. In the electrical sense, ohms, resulting in energy conversion to heat.

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.

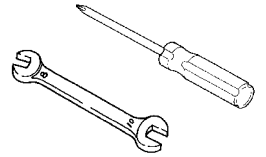




CHAPTER 2

MAINTENANCE

Periodic Maintenance Chart	2.2-2.5
Recommended Maintenance Products	2.6-2.7
Pre-Ride Inspection	2.8
ATV Component Locations	2.9
Lubricant and Maintenance Quick Reference	2.10-2.11
Transmission Lubrication	2.12
Lubrications/Grease Points	2.13
Transmission Linkage Adjustment	2.13
Throttle Operation / Choke Adjustment	2.14
Carburetor Adjustments	2.15-2.16
ETC Switch Adjustment	2.16-2.17
Fuel System	2.17-2.18
Compression Test	2.18
Battery Maintenance	2.19
Ignition / Sparkplug	2.20
Air Filter Service	2.20-2.21
Air Box Sediment Tube Service	2.22
Recoil Housing/PVT Drying	2.22
Oil Level/Change/Filter	2.23-2.24
Valve Clearance	2.24-2.25
Steering and Toe Alignment	2.25-2.27
Exhaust System Maintenance	2.28
Brake System Service	2.28-2.29
Drive Chain and Sprocket Service	2.29-2.32
Suspension Service / Controls	2.32-2.33
Wheel Removal / Installation	2.33-2.34
Tire Inspection	2.34





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

- G Frequent immersion in mud, water or sand
- G Racing or race-style high RPM use
- G Prolonged low speed, heavy load operation
- G Extended idle
- G 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:

H= 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, chain 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 J could result in component failure and lead to serious injury or death. Have an authorized Polaris dealer perform these services.

**MAINTENANCE AND LUBRICATION****Periodic Maintenance Chart**

Item	Maintenance Interval (whichever comes first)			Remarks	
	Hours	Calendar	Miles (Km)		
J 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	-		
" Drive Chain	-	Pre-Ride	-		
" Wheels/fasteners	-	Pre-Ride	-		
" Frame fasteners	-	Pre-Ride	-		
" E Engine oil level	-	Pre-Ride	-		Inspect; clean often
" E Air filter, pre-filter	-	Daily	-		
" E Air box sediment tube	-	Daily	-	Drain deposits when visible	
" Coolant (if applicable)	-	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	
" J 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)

J Have an authorized Polaris dealer perform these services.



MAINTENANCE AND LUBRICATION

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
J	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
"	Carburetor float bowl	50 H	6 M	310 (500)	Drain bowl periodically and prior to storage
J E	Throttle Cable/ ETC Switch	50 H	6 M	310 (500)	Inspect; adjust; lubricate; replace if necessary
J E	Choke cable	50 H	6 M	310 (500)	Inspect; adjust; lubricate; replace if necessary
E	Carburetor 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
J 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)

J Have an authorized Polaris dealer perform these services.

**MAINTENANCE AND LUBRICATION****Periodic Maintenance Chart**

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

J Have an authorized Polaris dealer perform these services.



POLARIS LUBES/FLUIDS FOR TRAILBOSS 330 MODELS

Pure Polaris Lubricants and Maintenance Kits can be purchased at your local Polaris dealer.



Premium Synthetic ATV AGL Gearcase Lube

- AGL Gearcase Lube minimizes wear while providing the best silicon protection in extreme operating conditions

- 2873602** Quart 12 per case
- 2873603** Gallon 4 per case
- 2873604** 2.5 Gallon 2 per case



Premium-4 Synthetic 4 Cycle Oil (0W-40)

- Extremely shear-stable for extended lubricant life at high RPM
- Durable additives keep engine components clean and running efficiently
- Excellent high temperature operation protection
- Protects during cold temperature start-up

- 2871281** Quart 12 per case
- 2871844** Gallon 4 per case
- 2871567** 16 Gallon
- 2871818** 55 Gallon

Aerosol Cleaners

- Professional-grade formulas quickly loosen and remove grease, oil and dirt



Carb and Throttle Body Cleaner

2872890 13 oz. 12 per case

Multi-Purpose Lubricant

2872891 12 oz. 12 per case

Electrical Contact Cleaner

2872892 12 oz. 12 per case

Engine Degreaser

2872893 12 oz. 12 per case



Engine Storage Kit

- This kit includes everything you need for proper off-season storage of your ATV:
 - 12 oz. of Polaris Rust Preventative Fogging Oil (aerosol)
 - 12 oz. of Polaris Fuel Stabilizer
 - 12 oz. of Polaris Multi-Purpose Lubricant (aerosol)
 - 3 oz. of All Season Grease

2859064

Carbon Clean Fuel Treatment



- Patented additive displaces moisture
- Excellent fuel stabilizer for storage
- Formulated for 2-cycle and 4-cycle Polaris engines
- 1 ounce treats 1 gallon of fuel

2871326 12 oz. 10 per case

All Season Premium Grease

- Engineered for the pressure and temperature demands of Polaris ATV
- Superior adhesion and water resistance
- High-shear stability

2871322 3 oz. 4-pack 6 per case
2871423 14 oz. 10 per case

Premium Starter Grease

2871460 2 oz. 12 per case

Premium U-Joint Grease

2871515 3 oz. 24 per case
2871551 14 oz. 10 per case



Premium Fuel Stabilizer

- Significantly reduces gum and varnish formation
- Formulated for 2-cycle and 4-cycle Polaris engines

2870652 16 oz. 12 per case

2872280 2.5 gallon 2 per case

Revival Detailing Kit

- Includes: Restore Swirl and Scuff Eliminator, Reflect Professional Final Finish Wax, Renew Vinyl and Rubber Protectant, foam applicator and buffing cloth
- Products also available separately

2872195 Revival/Detailing Kit

2872192 Restore Swirl and Scuff Eliminator 12 oz.

2872193 Reflect Professional Final Wax System 12 oz.

2872194 Renew Vinyl and Rubber Protectant 12 oz.



Grease Gun Kit



- All steel construction
- Custom hose and fittings
- Includes 3 oz. all-season grease cartridge
- Complete with standard zerk fitting, needle zerk fitting and flush nipple fitting adapters

2871312 4 per case



POLARIS LUBRICANTS, MAINTENANCE AND SERVICE PRODUCTS

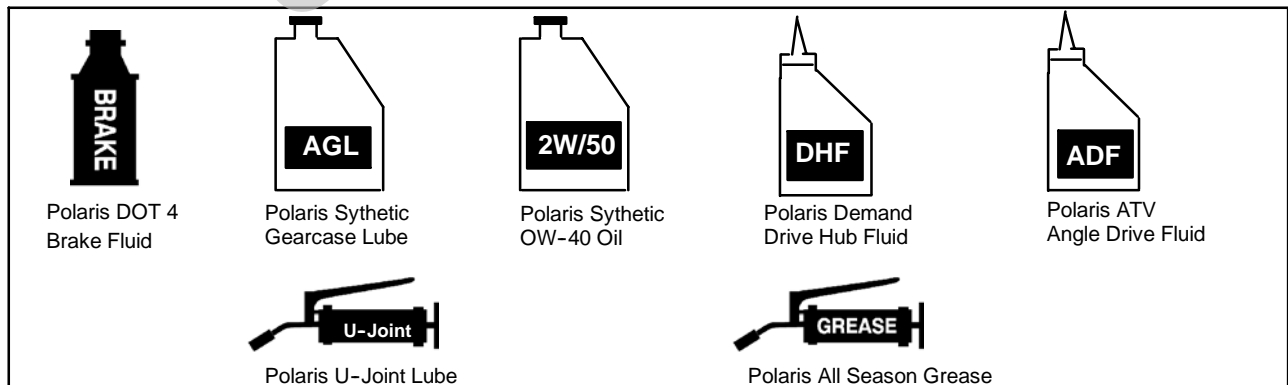
Part No.	Description
Engine Lubricant	
2870791	Fogging Oil (12 oz. Aerosol)
2876244	Engine Oil (Quart) Premium 4 Synthetic 2W-50 (4-Cycle) (12 Count)
2876245	Engine Oil (Gallon) Premium 4 Synthetic 2W-50 (4-Cycle) (4 Count)
Gearcase / Transmission Lubricants	
2873602	Premium Synthetic AGL Gearcase Lube (12 oz. bottle) (12 Count)
2873603	Premium Synthetic AGL Gearcase Lube (1 Gal.) (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
2871654	Premium Demand Drive Hub Fluid (8 oz.) (12 Count)
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 (Nyogelt)
Coolant	
2871323	60/40 Coolant (Gallon) (6 Count)
2871534	60/40 Coolant (Quart) (12 Count)

Part No.	Description
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)
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)
2872189	DOT 4 Brake Fluid (12 Count)
2871557	Crankcase Sealant, 3-Bond 1215 (5oz.)

NOTE: The number count indicated by each part number in the table above indicates the number of units that are shipped with each order.

NOTE: Each item can be purchased separately at your local Polaris dealer.

POLARIS LUBRICANT SYMBOL IDENTIFICATION





PRE-RIDE / DAILY INSPECTION

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

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

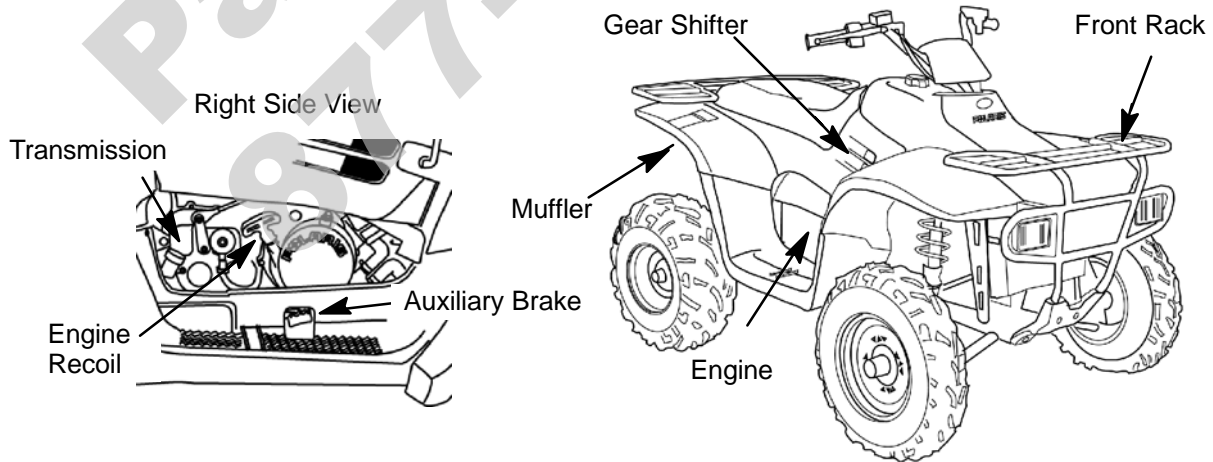
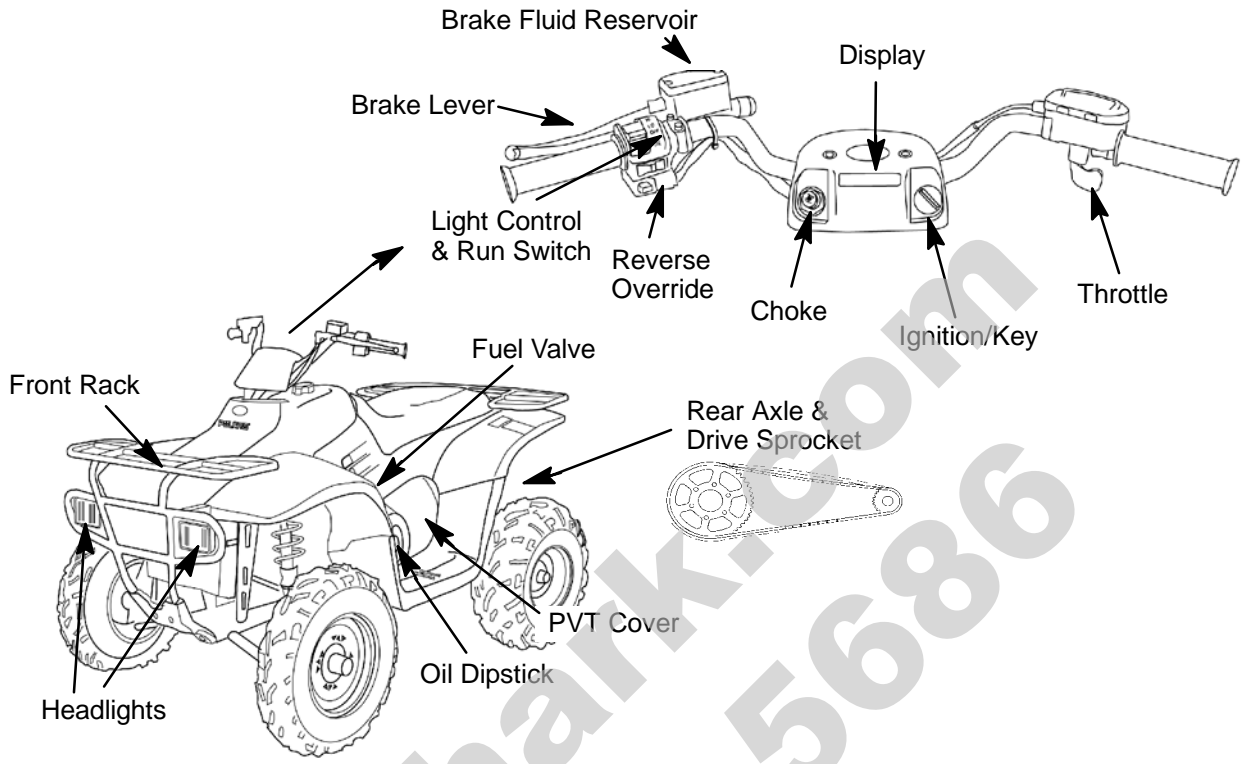
COLD WEATHER KITS FOR 4 STROKE ATVS

Engine Heater - (PN 2871507)





TRAIL BOSS 330 COMPONENT LOCATIONS

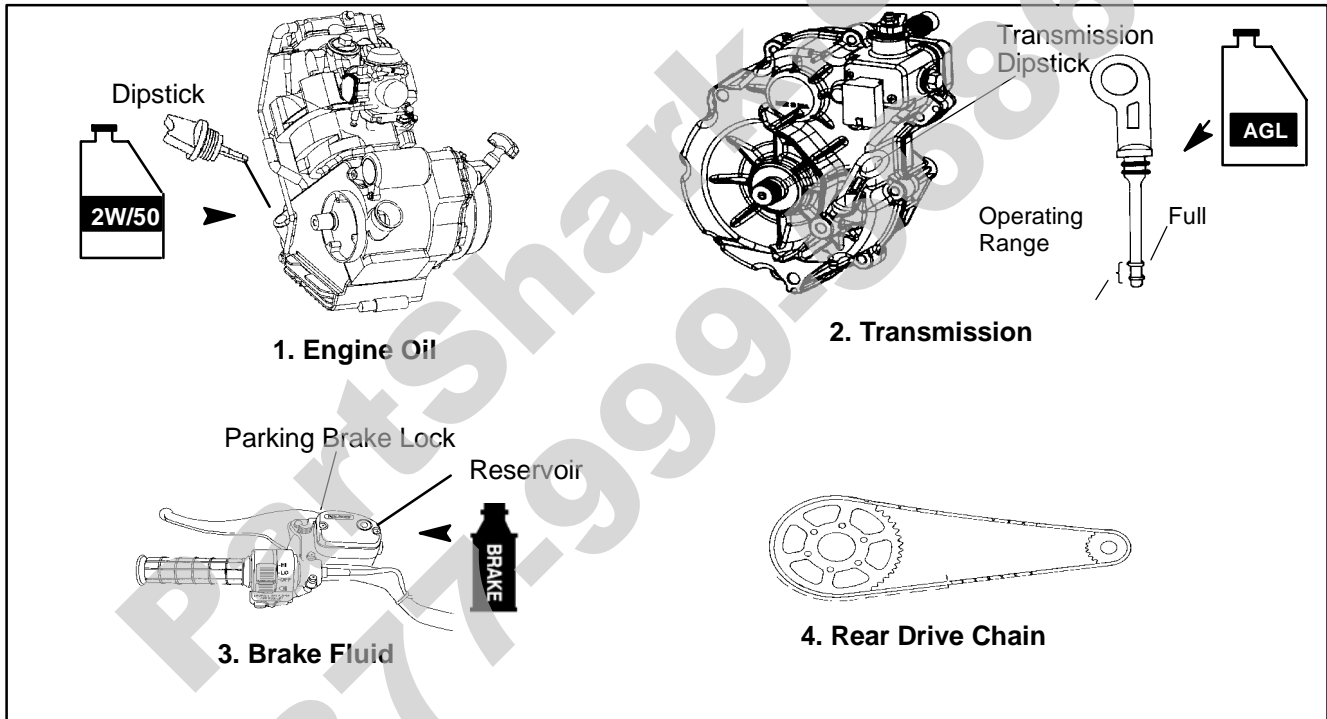




MAINTENANCE QUICK REFERENCE

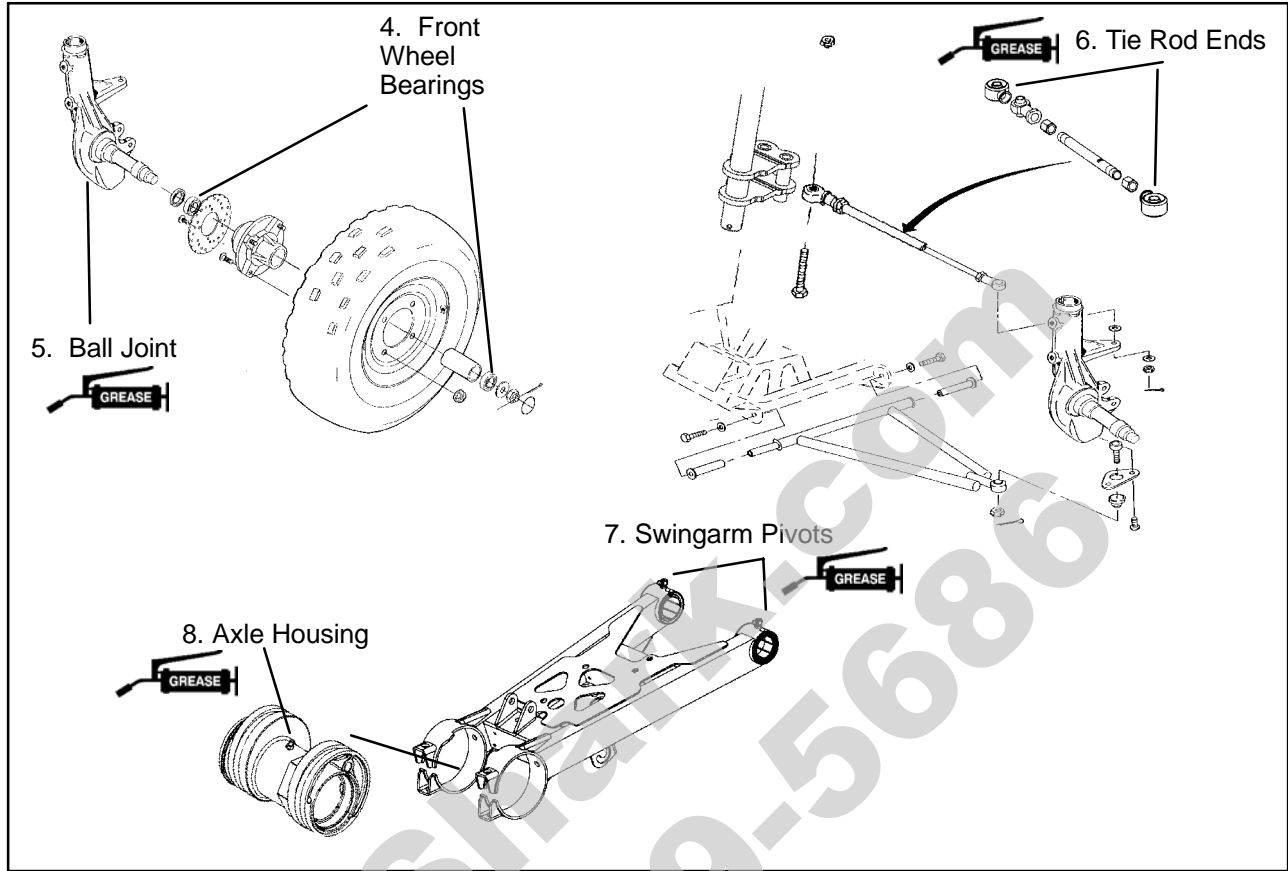
III. #	Item	Lube Rec.	Method	Frequency*
1	Engine Oil	Polaris 2W-50 Synthetic	Add oil to proper level.	Change after 1st month, 6 months or 100 hours thereafter; Change more often (25-50 hours) in extremely dirty conditions, or short trip cold weather operation.
2	Transmission	Polaris AGL Lubricant	Add lube to FULL level on dipstick.	Change annually ©
3	Brake Fluid	Polaris DOT 3 Brake Fluid	Fill master cylinder reservoir to indicated level inside reservoir. See Page 2.29.	As required. Change fluid every 2 years.
4	Drive Chain	Polaris Chain Lube or O-Ring chain lube	Apply to chain link plates and rollers.	As required*

NOTE: Refer to Page 2.6 for the Polaris Lubricant Identification table.





MAINTENANCE QUICK REFERENCE CONT'D



NOTE: Refer to Page 2.6 for the Polaris Lubricant Identification table.

Ill. #	Item	Lube Rec.	Method	Frequency*
4	Front Wheel Bearings	Sealed; Replace	Inspect and replace bearings if necessary	Annually ©
5	Ball Joint	Polaris All Season GreaseⒸ	Locate grease fitting on back side of struts and grease with grease gun.	Semi-annually i
6	Tie Rod Ends	Polaris All Season GreaseⒸ	Lift boot. Clean away dirt and grease. Apply fresh grease by hand and reassemble.	Semi-annually i
7	Swing Arm Bushings	Polaris All Season GreaseⒸ	Locate grease fitting on swing arm and grease with grease gun.	Semi-annually i
8	Rear Axle Housing	Polaris All Season GreaseⒸ	Locate grease fitting on eccentric and grease with grease gun.	Semi-annually i

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

i Semi-annually or 50 hours of operation (refer to Maintenance Schedule for additional information)

© Annually or 100 hours of operation (refer to Maintenance Schedule for additional information)

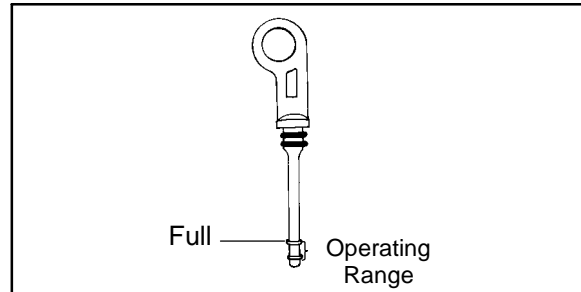
Ⓒ Grease conforming to NLGI No. 2, such as Polaris Premium All Season Grease, Conoco Superlube M or Mobilegrease Special



TRANSMISSION LUBRICATION

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

- G Be sure vehicle is level before proceeding.
- G Check vent hose to be sure it is routed properly and unobstructed.
- G Follow instructions on following pages to check / change transmission lubricant.



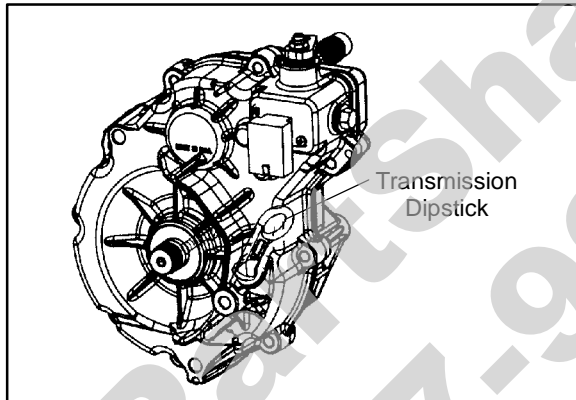
TRANSMISSION SPECIFICATIONS

Specified Lubricant:
Polaris AGL Gearcase Lubricant:
(PN 2873603) (Gallon) (PN 2873602) (12 oz.)

Capacity: 11.3 oz. (335 ml)

Drain Plug / Fill Plug Torque:

14 ft. lbs. (19.4 Nm)

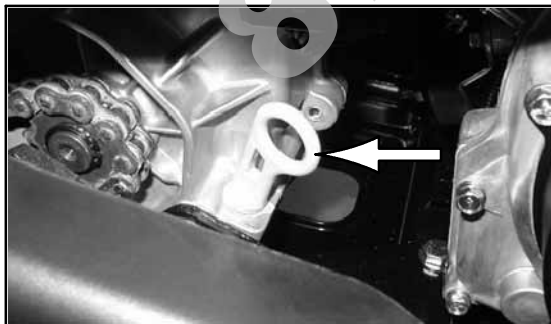


TRANSMISSION FLUID CHANGE/TORQUE STOP ADJUSTMENT

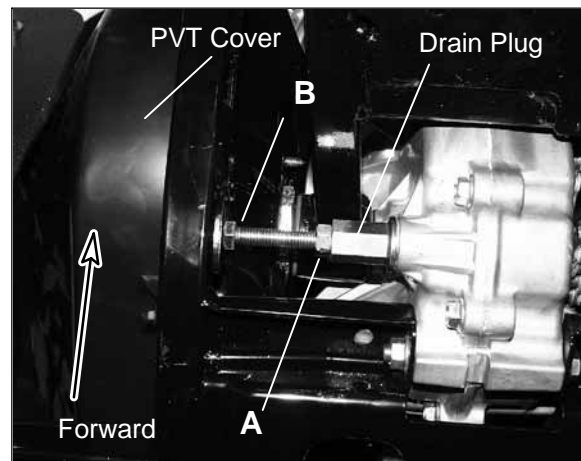
1. Remove skid plate (if necessary).
2. Place a drain pan beneath the transmission oil drain plug area.
3. Loosen jam nut (A).
4. Turn adjuster bolt (B) in to allow the removal of drain plug.
5. Remove the drain plug and wipe the magnetic end clean to remove accumulated metallic filings.
6. After the oil has drained completely, install a new sealing washer and install the drain plug. Torque to 14 ft. lbs. (19.3 Nm).
7. Turn adjuster bolt (B) out until it touches the frame, and then an additional 1/2 turn.

To check the level:

1. Remove dipstick and wipe clean.



2. Reinstall dipstick completely, remove and check the level. Add the proper lubricant as required to bring level into operating range as shown.

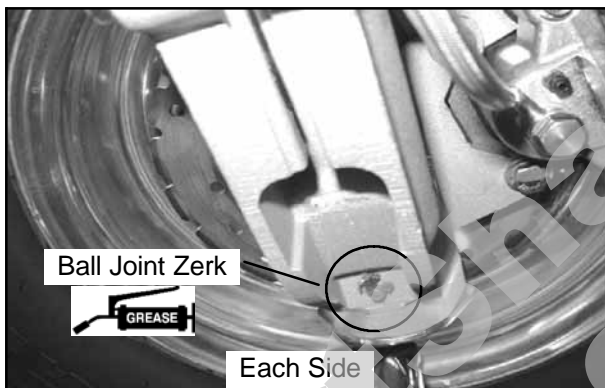
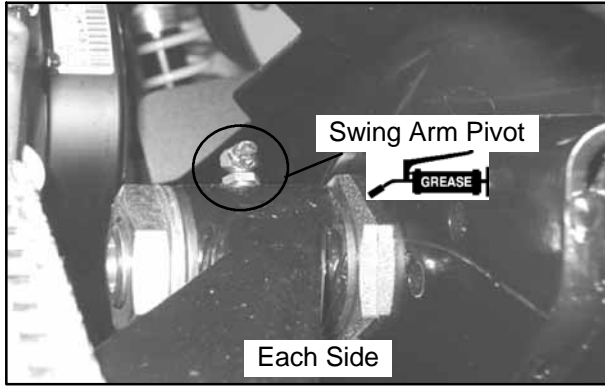


8. Tighten the jam nut securely while holding the adjuster bolt.
9. Add the proper lubricant through the dipstick hole until the oil level is between the upper and lower limits. Do not overfill.
10. Check for leaks.
11. Reinstall skid plate if removed in Step 1.

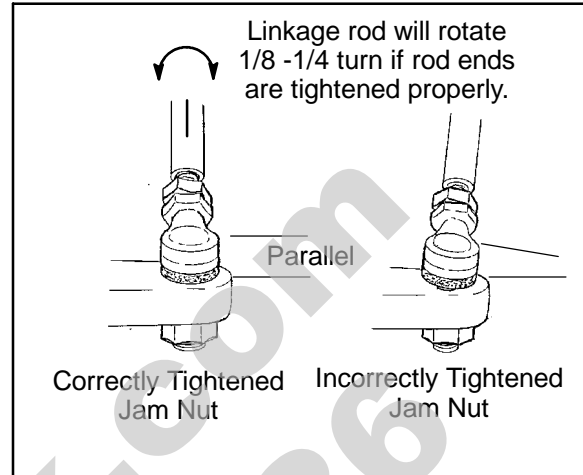


LUBRICATION / GREASE POINTS

As shown on Page 2.8, there are only five grease zerks on the Trail Boss, two front ball joints, two on the swing are pivots, and one on the rear axle housing.



TRANSMISSION GEARSHIFT LINKAGE ADJUSTMENT/INSPECTION



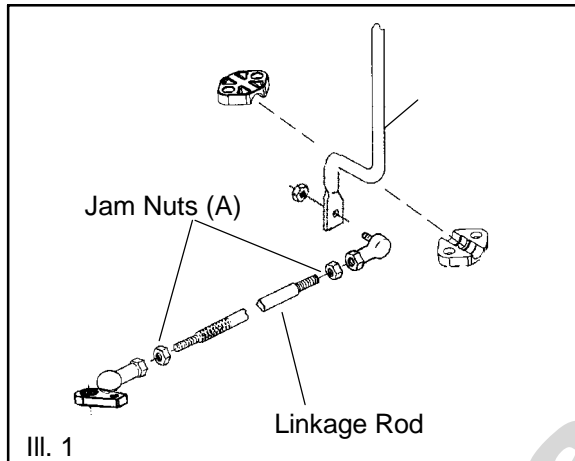
- G If shifting problems are encountered, the transmission linkage may require adjustment.
- G Visually check for contact of shift lever to shifter opening in the front fender. Ensure shift linkage or shift lever is not contacting the frame or exhaust components.
- G Tighten shift linkage rod end jam nuts properly after adjustment. You should be able to rotate the linkage rod between 1/8 and 1/4 turn after both jam nuts are tight.
- G The transmission shift linkage should be periodically inspected for wear and parts replaced as required to remove excess play from shift linkage.
- G Refer to Transmission chapter for more information.

NOTE: The rod end must be held when tightening the jam nut to prevent damage to the rod end.

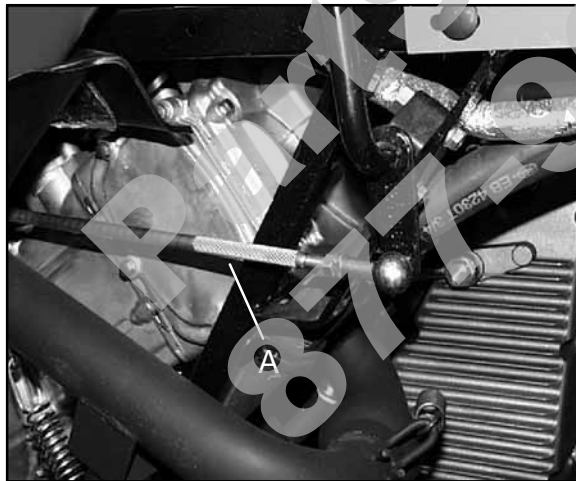


SHIFT LINKAGE ADJUSTMENT

1. Inspect shift linkage tie rod ends, clevis and pivot bushings and replace if worn or damaged.
2. Place gear selector in neutral.
3. Loosen rod end adjuster jam nuts (A) on both ends of linkage rod. **NOTE:** The jam nut closest to the knurled end is Left Hand thread.



4. Turn linkage rod (A) to shorten or lengthen rod until the shift lever is centered on hole in the fender.



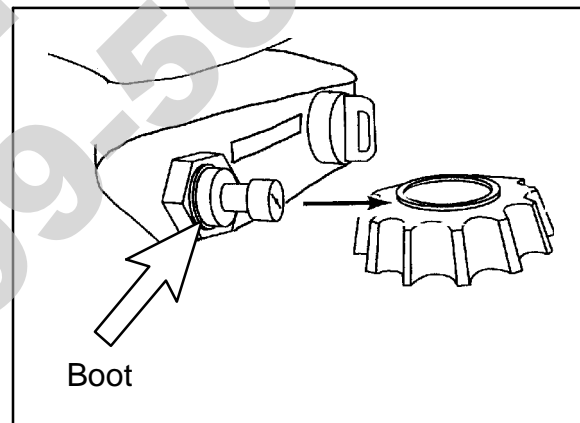
5. Hold rod end parallel to mounting surface and tighten jam nuts securely.

THROTTLE OPERATION - ALL MODELS

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 neutral.
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. If cable is routed properly and in good condition, repeat adjustment procedure.
5. Replace the throttle cable if worn, kinked, or damaged.

CHOKE (ENRICHER) ADJUSTMENT



If the choke knob does not stay out when pulled, adjust the choke tension by tightening the tensioner located under the rubber boot between the choke knob and nut. Firmly grasp the rubber boot and tighten until the choke slides freely but stays out when pulled.

Verify free play of 1/16-3/16" (1.6-4.76 mm) and smooth operation of choke cable.

If smooth choke operation is not obtainable, inspect choke cable for kinks or sharp bends in routing.



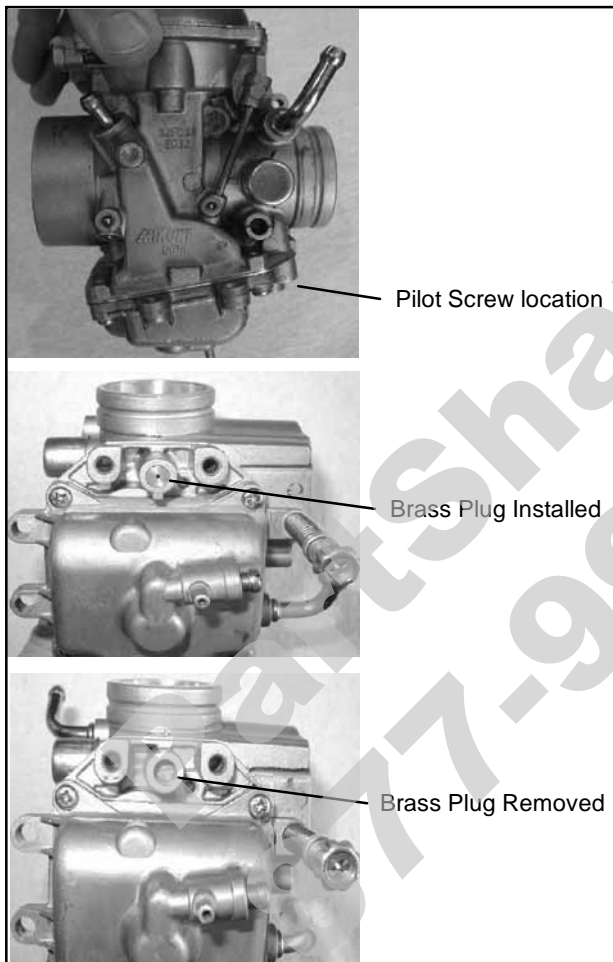


PILOT SCREW

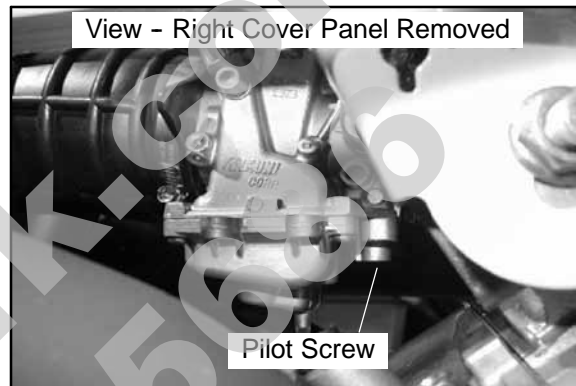
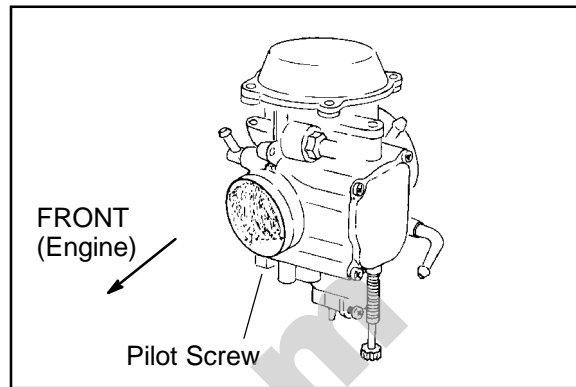
The pilot system supplies fuel during engine operation with the throttle valve closed or slightly opened. The fuel/air mixture is metered by pilot screw and discharged into the main bore through the pilot outlet.

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 ADJUSTMENT



1. Start engine and warm it up to operating temperature (about 10 minutes).
2. Turn pilot screw in (clockwise) until *lightly* seated. Turn screw out the specified number of turns. **NOTE:** Do not tighten the pilot screw forcefully against the seat or the screw and/or seat will be permanently damaged.

The pilot screw is set at the factory. Each carburetor will have a slightly different pilot screw setting, the adjustments below are the recommended settings, the settings may differ from these recommendations.

**Pilot Screw Adjustment:
Trailboss 330 - 2 Turns Out**

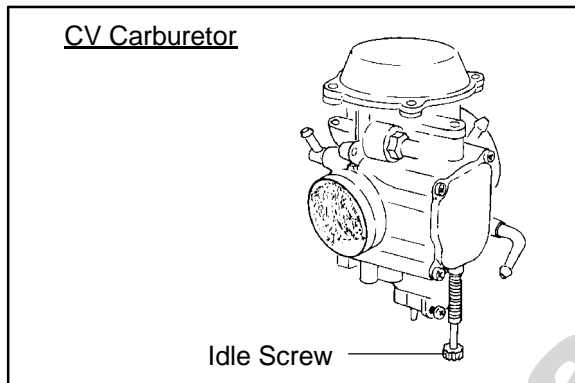
3. Connect an accurate tachometer that will read in increments of + or - 50 RPM such as the PET 2100DX (PN 8712100DX) or the PET 2500 (PN 8712500).
4. Set idle speed to 1200 RPM. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.
5. Slowly turn mixture screw clockwise using the pilot screw wrench until engine begins to miss.



- Slowly turn mixture screw counterclockwise until idle speed increases to maximum RPM. Continue turning counterclockwise until idle RPM begins to drop.
- Center the pilot screw between the points in Step 5 and 6.
- Re adjust idle speed if not within specification.

IDLE SPEED ADJUSTMENT

- Start engine and warm it up thoroughly.



Idle Speed:
1300 ± 100 RPM

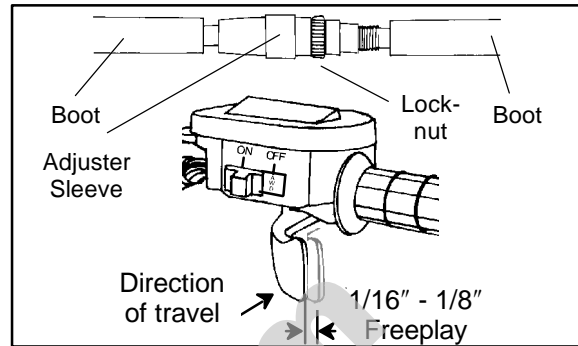
- Adjust idle speed by turning the idle adjustment screw in (clockwise) to increase or out (counterclockwise) to decrease RPM. (Refer to Ill. at right).

NOTE: Adjusting the idle speed affects throttle cable freeplay and electronic throttle control (ETC) adjustment. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.

ELECTRONIC THROTTLE CONTROL (ETC SWITCH)/ THROTTLE CABLE ADJUSTMENT

- Slide the boots off inline cable adjuster sleeve. Loosen adjuster locknut.
- With handlebars centered and wheels pointing forward, turn adjuster sleeve until 1/16" - 1/8" freeplay is achieved at the thumb lever. After making any adjustment, "flip" the lever slightly to

confirm adjustment.

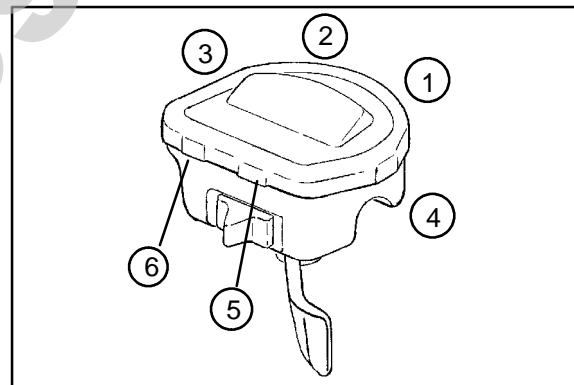


- Tighten locknut and slide boots over cable adjuster until they touch at the middle point of the adjuster.
- With engine running, turn the handlebars from full left to full right with transmission in neutral. Engine RPM should not change and the engine should not die. If either of these occur, return to the first step.

THROTTLE OPERATION

To remove the ETC cover:

- Use a medium flat blade screwdriver and insert blade into the pockets of the cover starting on the #1 position.

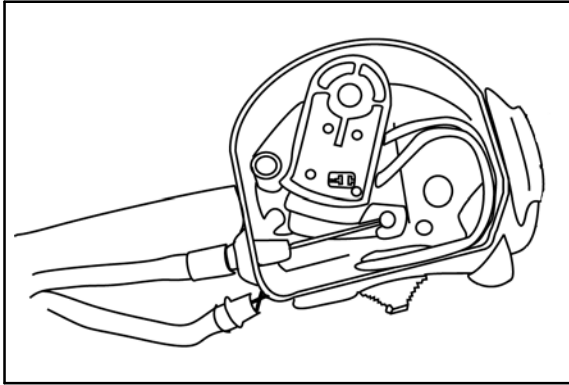


- Twist screwdriver slightly while lifting on the cover to release snap.
- Repeat procedure at the other five locations as shown. **NOTE:** Do not attempt to remove cover until all latch points are released.

Check for smooth throttle opening and closing in all handlebar positions. Throttle lever operation should be smooth and lever must return freely without binding. Replace the throttle cable if worn, kinked, or



damaged.



NOTE: When replacing the cover, check for correct placement of cover O-ring.

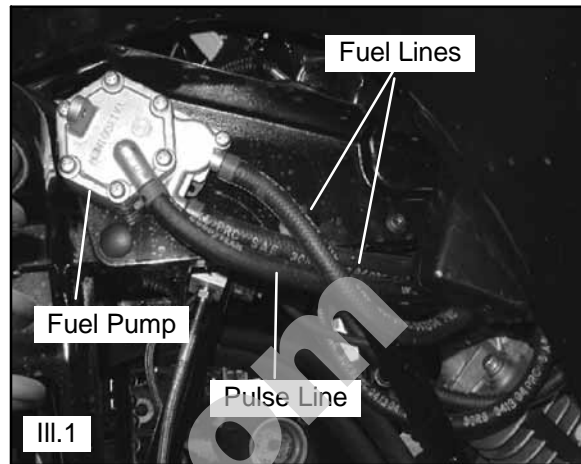
FUEL SYSTEM

▲ WARNING

Gasoline is extremely flammable and explosive under certain conditions.

- G Always stop the engine and refuel outdoors or in a well ventilated area.
- G Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.
- G Do not overfill the tank. Do not fill the tank neck.
- G If you get gasoline in your eyes or if you swallow gasoline, seek medical attention immediately.
- G If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.
- G 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.
- G Never drain the float bowl 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 and secured with cable ties. **CAUTION:** Make sure lines are not kinked or pinched.
3. Replace all fuel lines every two years.

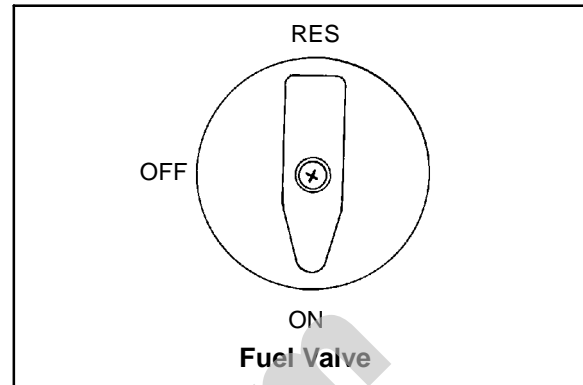
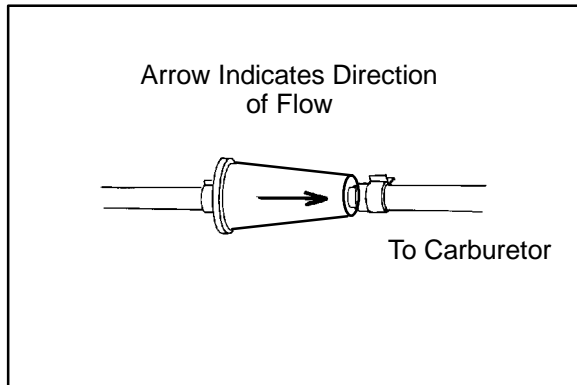
VENT LINES

1. Check fuel tank, oil tank, carburetor, battery and transmission vent lines for signs of wear, deterioration, damage or leakage. Replace every two years.
2. 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. The fuel filter is located between the fuel pump and carburetor.

1. Shut off fuel supply at fuel valve.
2. Remove line clamps at both ends of the filter.
3. Remove fuel lines from filter.
4. Install new filter and clamps onto fuel lines with arrow pointed in direction of fuel flow.



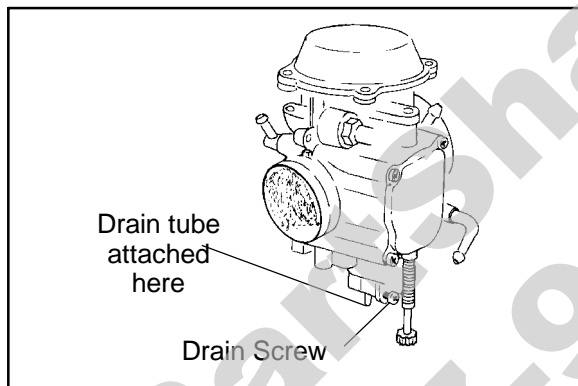
5. Install clamps on fuel line.
6. Turn fuel valve ON.
7. Start engine and inspect for leaks.

3. Turn drain screw out two turns and allow fuel in the float bowl and fuel line to drain completely.
4. Inspect the drained fuel for water or sediment.
5. Tighten drain screw.
6. Turn fuel valve to "ON".
7. Start machine and check for leaks.

CARBURETOR DRAINING

The carburetor float bowl should be drained periodically to remove moisture or sediment from the bowl, or before extended periods of storage.

NOTE: If there is a tube attached, it must be reattached as this will effect engine performance.



NOTE: The bowl drain screw is located on the bottom left side of the float bowl.

1. Turn fuel valve to the off position.
2. Place a clean container beneath the bowl drain spigot or bowl drain hose.

COMPRESSION TEST

NOTE: This Polaris 4-Stroke engine is equipped with an automatic decompressor. Compression readings will vary in proportion to cranking speed during the test. Average compression (measured) is about **70-90 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 tester 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 70-90 PSI

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



ENGINE MOUNTS

Inspect rubber engine mounts for cracks or damage.

ENGINE FASTENER TORQUE

Check engine fasteners and ensure they are tight.

BATTERY MAINTENANCE

! 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.**

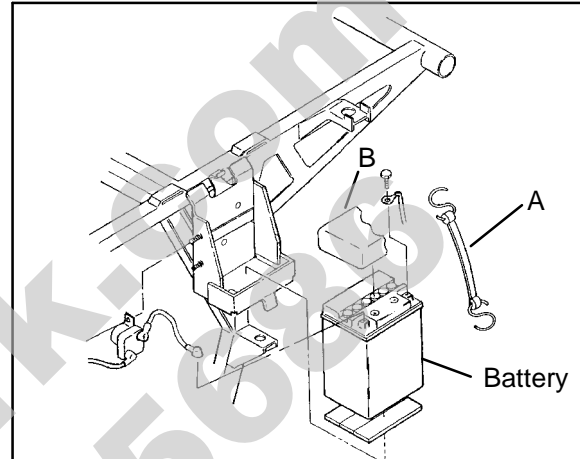
NOTE: All Trail Boss ATV batteries are Maintenance-Free design and construction. All Maintenance-Free batteries are fully charged and tested at the factory before installation. Expected shelf life is 6-8 months depending on storage conditions. As a general rule before placing the battery into service, check the battery condition and charge accordingly .

Maintenance-Free 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 Maintenance-Free

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 Maintenance-Free 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 Maintenance-Free batteries.

The battery is located under the left rear fender.



To remove the battery:

1. Disconnect holder strap (A) and remove cover (B).
2. Disconnect battery negative (-) (black) cable first, followed by the positive (+) (red) cable.

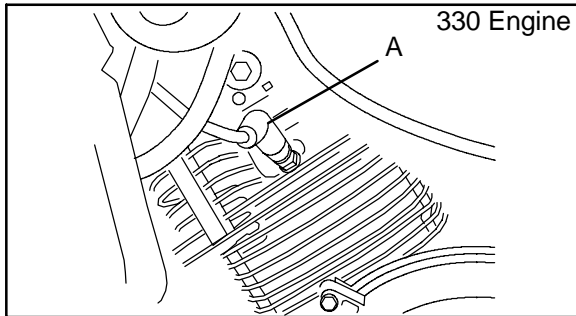
! CAUTION

To reduce the chance of sparks: Whenever removing the battery, disconnect the negative (black) cable first. When reinstalling the battery, install the negative cable last.

3. Remove the battery.
4. 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.
5. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable.
6. Coat terminals and bolt threads with Dielectric Grease (PN 2871329).
7. Reinstall battery cover and holder strap.

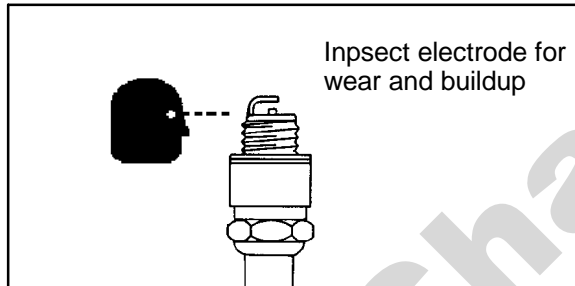


SPARK PLUG



Recommended Spark Plug:
NGK BKR6E
Spark Plug Torque: 9-11 Ft. Lbs.
(12-14 Nm)

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.



IGNITION TIMING

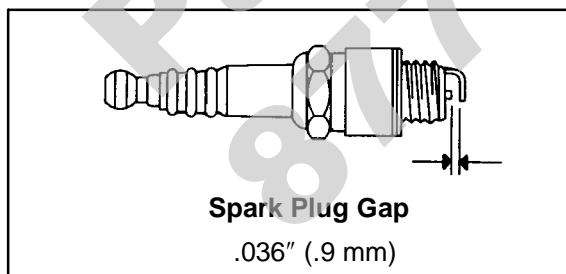
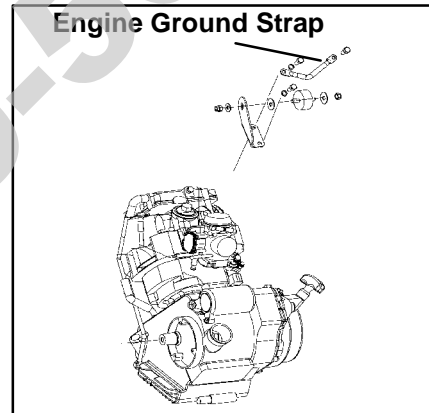
Refer to Electrical chapter for ignition timing procedure.

Ignition Timing:
30°±2° BTDC@5000RPM

ENGINE-TO-FRAME GROUND

Inspect engine-to-frame ground cable connection. Be sure it is clean and tight.

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.



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 9- 11 ft. lbs (12-14 Nm).

MAIN AIR FILTER CLEANING

It is advisable to replace the filter when it is dirty. However, in an emergency it is permissible to clean the main filter if you observe the following practices.

- G **Never** immerse the filter in water since dirt can be transferred to the clean air side of the filter.
- G If compressed air is used **never** exceed a pressure of 40 PSI. Always use a dispersion type nozzle to prevent filter damage and clean from the inside to the outside.



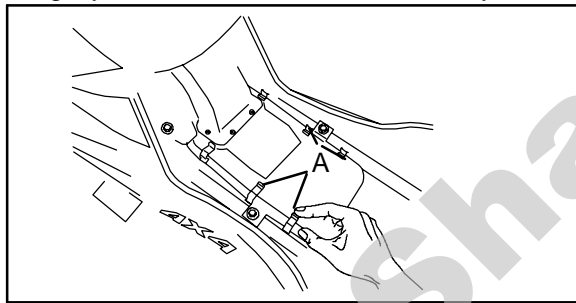
- G Replace the air filter every 50 hours, and possibly more often in very dirty conditions.

AIR FILTER/PRE-FILTER SERVICE

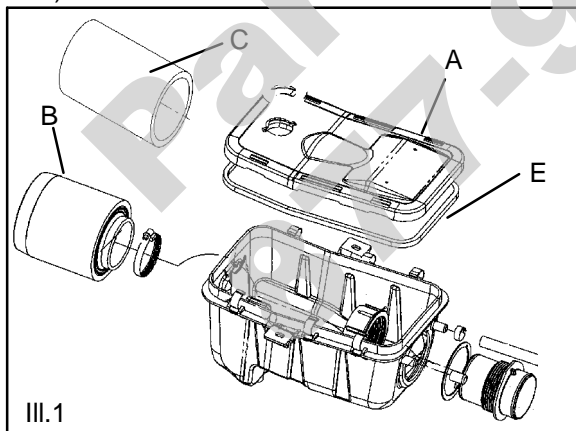
It is recommended that the air filter and pre filter be replaced annually. When riding in extremely dusty conditions, replacement is required more often.

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 from air box cover (A) and remove cover. Inspect the gasket (E). It should adhere tightly to the cover and seal all the way around.



4. Loosen clamp and remove air filter assembly (B & C).



Cleaning:

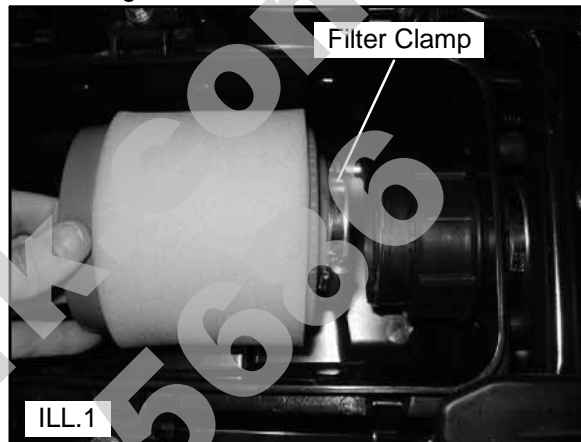
5. Slip the pre-filter element (C) off of main element. Clean the pre filter with hot soapy water.
6. Rinse and dry thoroughly.
7. Inspect element for tears or damage.

8. Inspect main filter and replace if necessary. If the filter has been soaked with fuel or oil it must be replaced.

Installation:

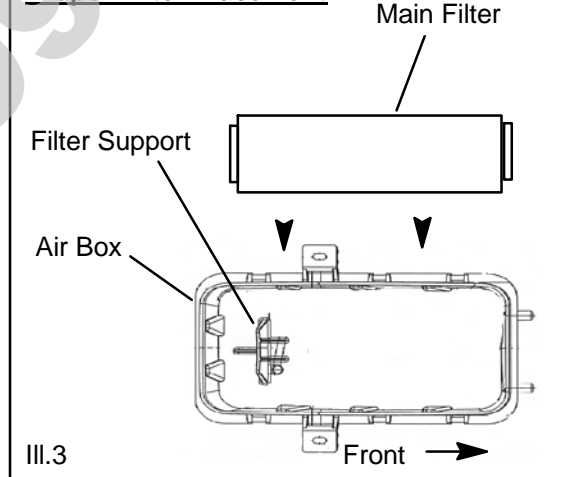
9. Reinstall pre-filter element over main filter. Be sure the element covers entire surface of main filter without folds, creases, or gaps.
10. Reinstall filter on main filter mount. Place filter clamp over the assembly and tighten.

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



ILL.1

Proper Filter Placement



III.3

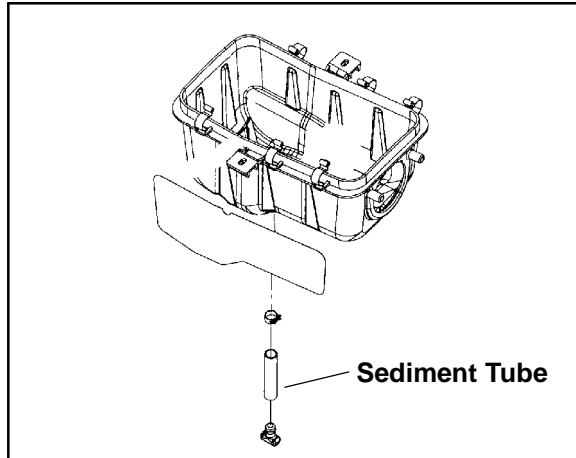
NOTE: The air filter should rest on the filter support. Proper placement of the air filter is important to prevent rattles and air leaks. See Illustration above.

11. 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.

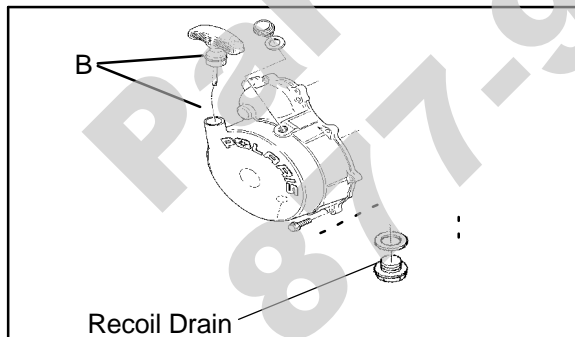


NOTE: The sediment tube will require more frequent service if the vehicle is operated in wet conditions or at high throttle openings for extended periods.

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

RECOIL HOUSING

- G Drain the housing periodically to remove moisture.



- G 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 10mm wrench. Reinstall screw once housing has been drained.
- G **CAUTION:** Make sure the manual start handle (B) is fully seated on the

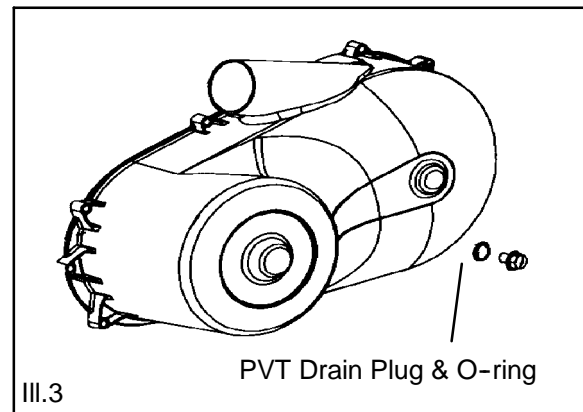
recoil housing, especially when travelling in wet areas. If it is not sealed properly, water may enter the recoil housing and damage components.

- G Water will enter the recoil housing if the starter handle (B) is disengaged from the rope guide when under water.
- G After travelling in wet areas, the recoil housing and starter should always be drained completely by removing the recoil.
- G Do not open the crankcase drain unless the engine has ingested water. Some engine oil will be lost if crankcase drain is opened.
- G If recoil handle seal has been damaged, the handle assembly should be replaced.

PVT DRAIN PLUG & DRYING

NOTE: If operating the ATV in or through water, be sure to check the PVT cover and other components for water ingestion. The ATV should be checked immediately.

1. To release any water that maybe trapped in 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.



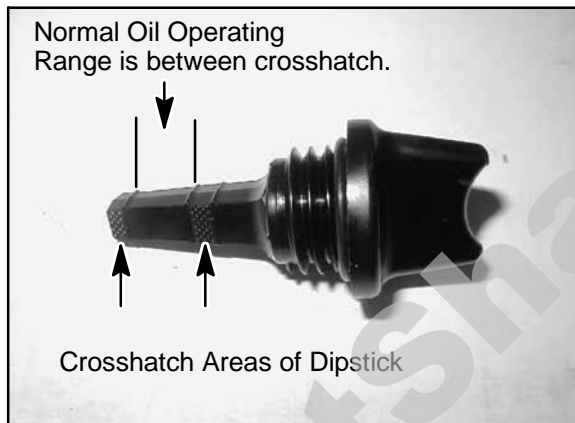
2. To further expel water from the cover and to dry out the PVT system, shift the transmission to neutral and rev engine slightly to expel the moisture and air-dry the belt and clutches. Allow engine RPM to settle to idle speed, shift transmission to lowest available range and test for belt slippage. Operate ATV in lowest available range for a short period of time until PVT system is dry.



ENGINE OIL LEVEL

To check the oil level:

1. Set machine on a level surface.
2. Start and run engine for 20-30 seconds. This will return oil to its true level in the engine sump.
3. Stop engine, remove dipstick and wipe dry with a clean cloth.
4. Reinstall dipstick, screwing into place.
5. 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 of the bottom crosshatched area and the bottom of the top crosshatched area. Add oil as indicated by the level on the dipstick. Do not overfill.



NOTE: Do not fill the over the normal oil operating range. Filling over the normal operating range could cause a mist of oil to enter the air box.

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.

Recommended Engine Oil:

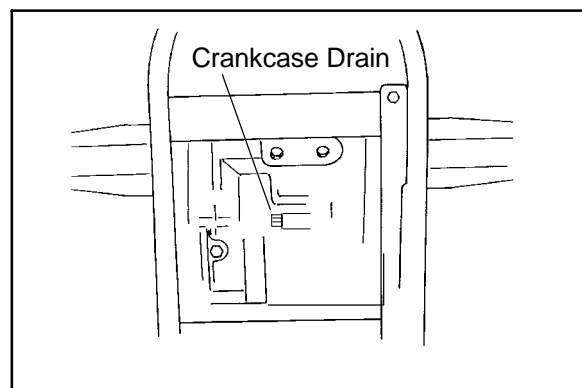
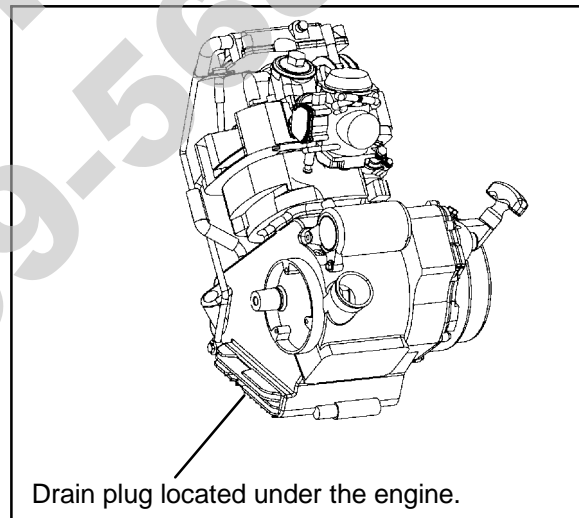
Polaris Premium 4 All Season Synthetic, 2W-50

OIL AND FILTER CHANGE

1. Place vehicle on a level surface.
2. Clean area around drain plug at bottom of oil pan.
3. Run engine two to three minutes until warm. Stop engine.
4. Place a drain pan beneath oil pan and remove drain plug from under the crankcase. **CAUTION:** Oil may be hot. Do not allow hot oil to come into contact with skin as serious burns may result.
5. Allow oil to drain completely.

NOTE: It is not necessary to drain the oil from the oil cooler, unless contaminants, water, or debris are found in the crankcase oil.

6. Replace sealing washer (A) on drain plug. **NOTE:** The sealing surfaces on drain plug and oil tank should be clean and free of burrs, nicks or scratches.
7. Reinstall drain plug and torque to 14 ft. lbs. (19 Nm).

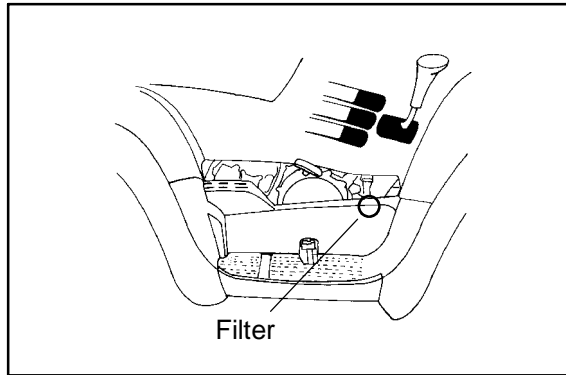


Engine Sump Drain Plug - Bottom View

8. The oil filter is located on the right side of the machine. Place shop towels beneath oil filter.



Using an oil filter wrench, turn filter counterclockwise to remove.



9. Using a clean dry cloth, clean filter sealing surface on crankcase.
10. Lubricate O-ring on new filter with a film of engine oil. Check to make sure the O-ring is in good condition.
11. Install new filter and turn by hand until filter gasket contacts the sealing surface, then turn and additional 1/2 turn.

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

12. Remove dipstick and fill tank with 2 quarts (1.9 l) of Polaris Premium 4 Synthetic Oil (PN 2871281).
13. Place gear selector in neutral and set parking brake.
14. Start the engine and let it idle for one to two minutes. Stop the engine and inspect for leaks.
15. Re-check the oil level on the dipstick and add oil as necessary to bring the level to the upper mark on the dipstick.
16. Dispose of used filter and oil properly.

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

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

Oil Filter Wrench:
(PV-43527)

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 plastic valve plugs.



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.

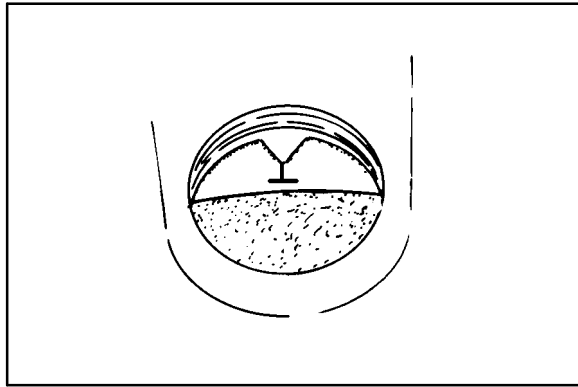
6. Rotate engine slowly with recoil rope, watching the intake valve(s) open and close.

NOTE: Observe the intake valve closing and then start to open, continue to rotate until the "T" aligns with pointer. 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:
0.006±0.0008l (0.15±0.02 mm)
BTDC on compression





1. Insert .006" feeler gauge between end of exhaust valve stem and adjuster screw.

EXHAUST VALVE CLEARANCE:
0.006±0.00081 (0.15±0.02 mm)
BTDC on compression

2. Loosen locknut and turn adjuster screw until there is a slight drag on feeler gauge.
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.
6. Inspect o-rings on the plastic valve plugs, replace if damaged. Securely fasten valve plugs.
7. Reinstall fuel tank and any body panels that were removed to gain access.

INTAKE VALVE CLEARANCE ADJUSTMENT

1. Insert a .006" (.15mm) feeler gauge between end of intake valve stem and clearance adjuster screw.
2. Using Valve/Clutch Adjuster (**PA-44689**), loosen adjuster lock nut and turn adjusting knob 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.

EXHAUST VALVE CLEARANCE ADJUSTMENT

NOTE: The exhaust valve is adjusted the same as the intake valve.

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

NOTE: Due to the critical nature of the procedures outlined in this chapter, Polaris recommends steering component repair and adjustment be performed by an authorized Polaris Dealer. Only a qualified technician should replace worn or damaged steering parts. Use only genuine Polaris replacement parts.

One of two methods can be used to measure toe alignment: The string method and the chalk method. If adjustment is required, refer to following pages for procedure.



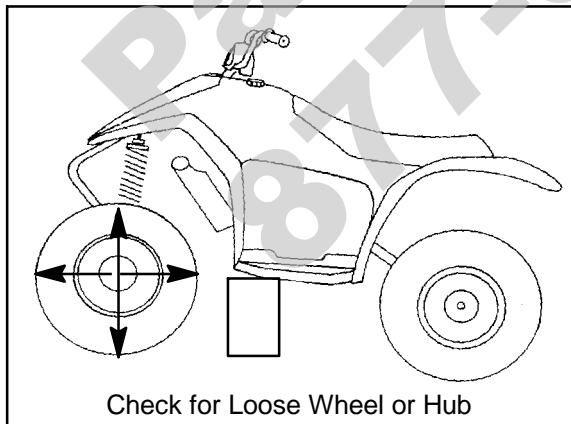
TIE ROD END / STEERING INSPECTION

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

- G Repeat inspection for inner tie rod end (on steering post).
- G Replace any worn steering components. Steering should move freely through entire range of travel without binding.



- G 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.



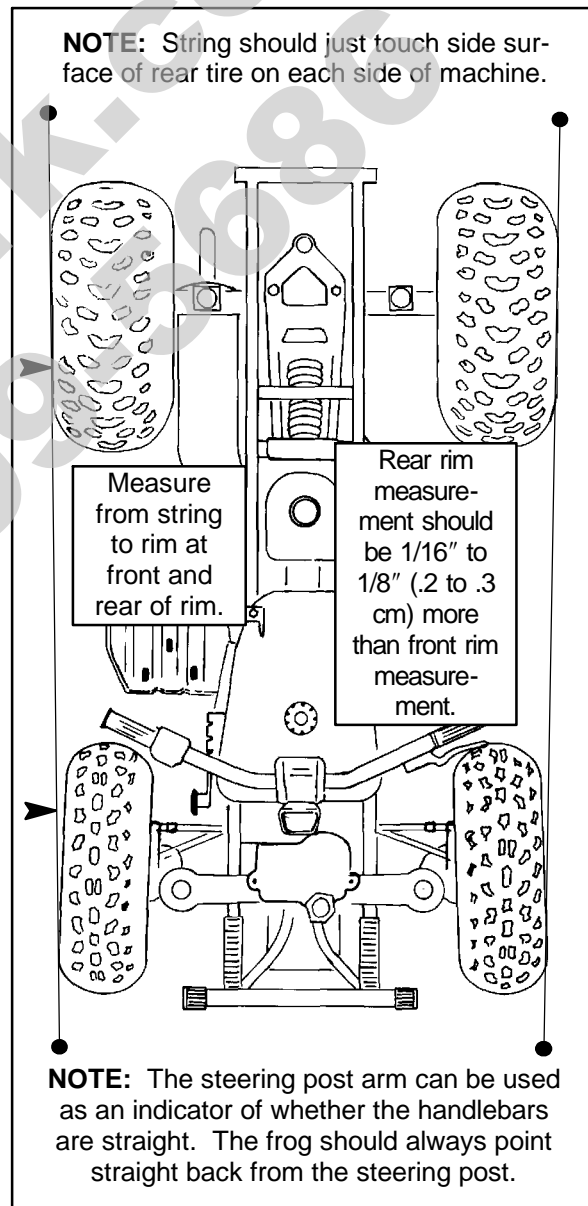
- G If abnormal movement is detected, inspect the hub and wheel assembly to determine the cause.
- G Refer to the Body/Steering or Final Drive chapter for more information.

CAMBER AND CASTER

The camber and caster are non-adjustable.

WHEEL ALIGNMENT METHOD: STRAIGHTEDGE OR STRING

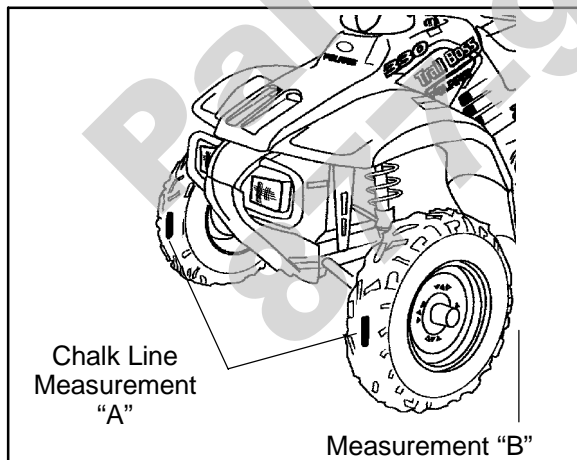
Be sure to keep handlebars centered. See notes below.





WHEEL ALIGNMENT METHOD 2: CHALK

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 can be used as an indicator of whether the handlebars are straight. The arm 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° 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).



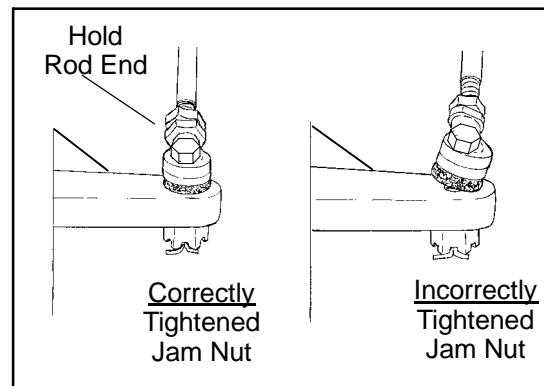
TOE ALIGNMENT ADJUSTMENT

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.

To adjust toe alignment:

- G Hold tie rod end to keep it from rotating.
- G Loosen jam nuts at both end of the tie rod.
- G Shorten or lengthen the tie rod until alignment is as required to achieve the proper toe setting. Method 1 (1/16" to 1/8") or Method 2 (1/8" to 1/4").
- G **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.





EXHAUST CLEANING

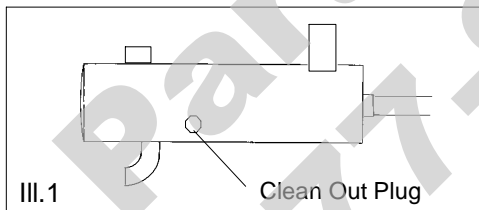
⚠ WARNING

- G 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.
- G To reduce fire hazard, make sure that there are no combustible materials in the area when purging the spark arrestor.
- G Wear eye protection.
- G Do not stand behind or in front of the vehicle while purging the carbon from the spark arrestor.
- G Never run the engine in an enclosed area. Exhaust contains poisonous carbon monoxide gas.
- G 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.

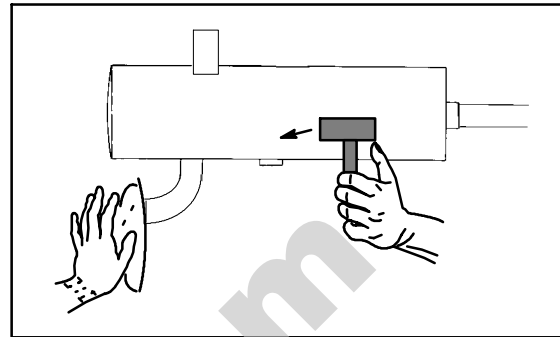
The exhaust pipe must be periodically purged of accumulated carbon as follows:

1. Remove the clean out plugs located on the bottom of the muffler as shown in illustration 1.



2. Place the transmission in neutral 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 while revving the engine several more times.

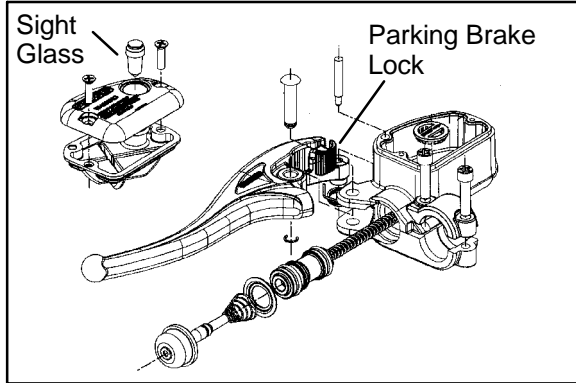


4. If particles are still suspected to be in the muffler, back the machine onto an incline so the rear of the machine is one foot higher than the front. Set the hand brake and block the wheels. Make sure the machine is in neutral and repeat Steps 2 and 3. **SEE WARNING ABOVE**
5. If particles are still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

- G Keep fluid level in the master cylinder reservoir to the indicated level inside reservoir.
- G Use Polaris DOT 4 Brake Fluid (PN 2872189).

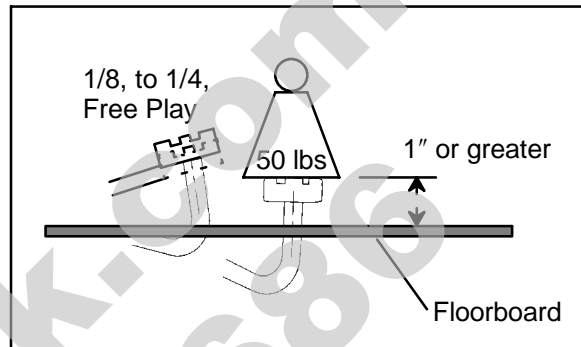


- G Check brake system for fluid leaks, excessive travel or spongy feel.
- G Check friction pads for wear, damage or looseness.
- G Check surface condition of the disc.
- G Inspect thickness of brake pad friction material.

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:

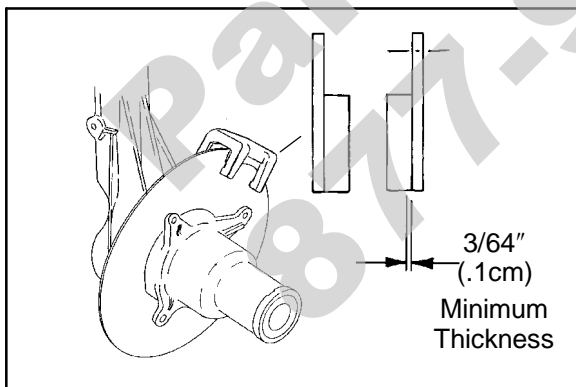
Free play of the brake pedal should be 1/8 - 1/4 inch (3.2 - 6.35 mm).

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.

BRAKE PAD INSPECTION



Pads should be changed when friction material is worn to 3/64" (.1 cm), or about the thickness of a dime.

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.

DRIVE CHAIN AND SPROCKET INSPECTION

Polaris ATV drive chains are equipped with O-ring sealed permanently greased pins and rollers. The sprockets and outer rollers require periodic lubrication. Lubricate the chain with Polaris O-Ring Chain Lubricant (PN 2872073).

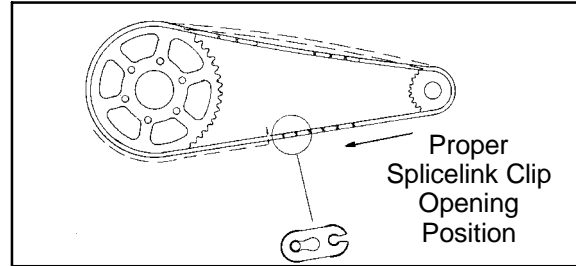
Inspect the drive chain for missing or damaged O-Rings, link plates, or rollers. Do not wash the chain with a high pressure washer, gasoline or solvents; do not use a wire brush to clean the chain as damage to the O-Rings may occur. Clean chain with hot soapy water and a soft bristled nylon brush.



Never allow battery acid to contact the drive chain.



Drive Chain Lubricant:
Polaris O-Ring Chain Lubricant
(PN 2872073)



Drive Chain Wear Limit-20 Pitch Length:
Std: 12.5" (32 cm)
Wear Limit: 12.875" (32.7 cm)

SPROCKET INSPECTION

Inspect the sprocket for worn, broken or bent teeth.

To check for wear, pull outward on the chain as shown. Replace sprocket if chain movement exceeds 1/4" (.6 cm).

DRIVE CHAIN INSPECTION

The chain must be replaced when it reaches 3% elongation.

1. Stretch the chain tightly in a straight line.
2. Measure a length of twenty pitches (pins) from pin center to pin center, and compare to the specification. Replace the chain if the length exceeds the wear limit.
3. When replacing or reinstalling drive chain, install the closed end of the splice link clip as shown, with the closed end leading in forward operation.

⚠ CAUTION: Never adjust or operate the vehicle with the rear drive chain too loose or too tight as severe damage to the transmission and drive components can result.

Break-In: It is extremely important to maintain proper chain tension to ensure the best possible chain life. There is a chain break-in period of approximately 100 miles or two (2) tanks of fuel. During this time chain tension should be watched very closely and loads to the chain should be kept light.

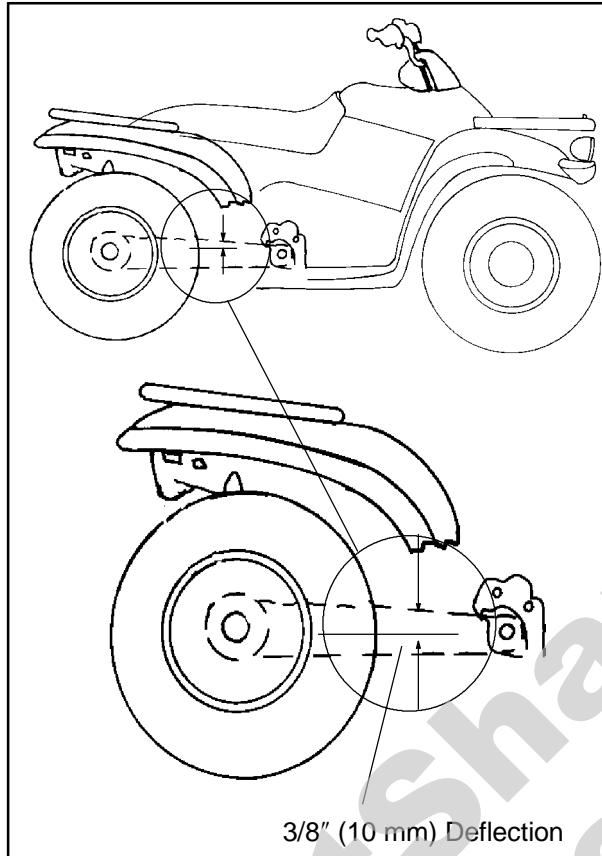
Checking Deflection: Inspect chain deflection by slowly moving the ATV forward so any slack that may have previously been on the under part of the chain is now on the top side of the chain. The bottom part of the chain should be taught during inspection. Measure the chain deflection as shown in the diagram. **Deflection should be approximately 3/8 in. (10 mm).**

After inspection, again slowly move the ATV forward until all the chain slack is on the top side of the chain and inspect the deflection. Repeat this procedure several times to check different spots on the chain.

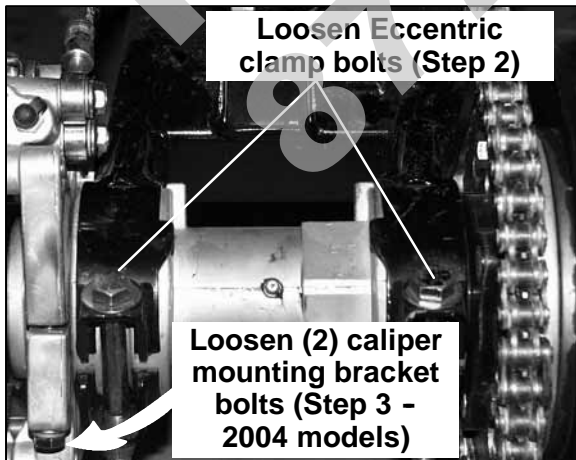
The chain is correctly adjusted when the tightest portion of the chain itself has approximately 3/8 in., (10 mm) of deflection. It's a common characteristic of



any chain to have one or more tight spots in the chain. Therefore, it is extremely important to check chain deflection in several areas of the chain to ensure deflection is correct at the tightest point.

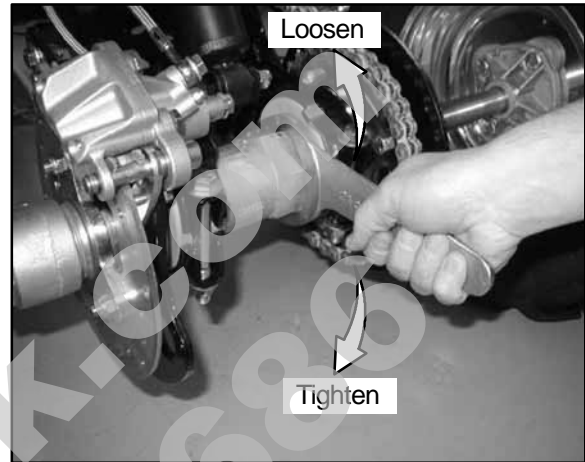


**ADJUSTMENT PROCEDURE -
CONCENTRIC SWINGARM
REAR AXLE**

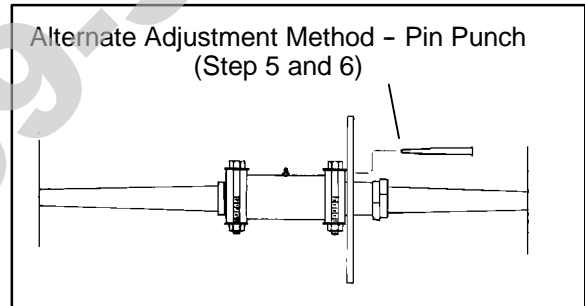


1. Loosen chain guard.

2. Loosen two eccentric clamp bolts.
3. **2004 Models** - Loosen caliper mounting bracket bolts.
4. Using a 2 1/2" wrench, rotate the housing to adjust chain slack to the proper dimension, and then proceed to Step 7; **or... follow Steps 5 and 6 for alternate method if 2 1/2" wrench is not available.**



5. Insert a pin punch through the sprocket hub and into the eccentric axle housing.



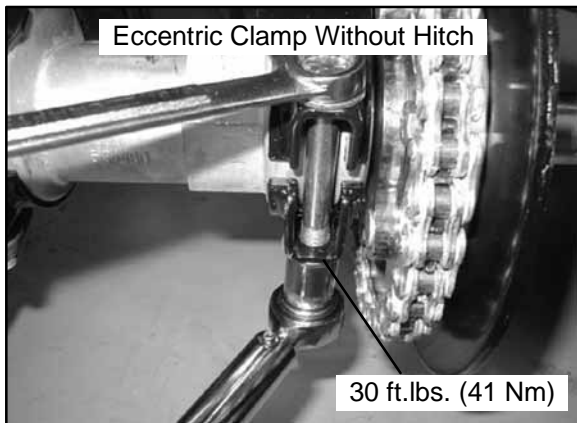
6. Roll the vehicle ahead or back to adjust chain slack to the proper dimension.
7. Tighten the eccentric clamp bolts to specification.

CAUTION: DO NOT OVER-TIGHTEN ECCENTRIC CLAMP BOLTS. PREMATURE BEARING FAILURE MAY RESULT.

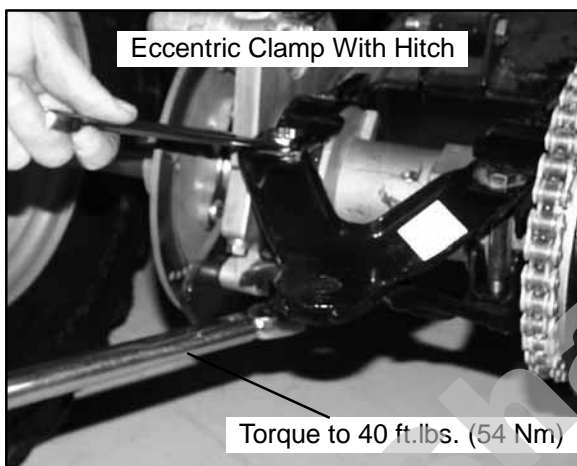
Eccentric Clamp Bolt Torque Specs

**Pinch Clamp Bolt Torque -
30 ft. lbs. (41 Nm)**

**Pinch Clamp Bolt Torque
w/ Trailer Hitch - 40 ft. lbs. (54 Nm)**



Without Trailer Hitch



With Trailer Hitch

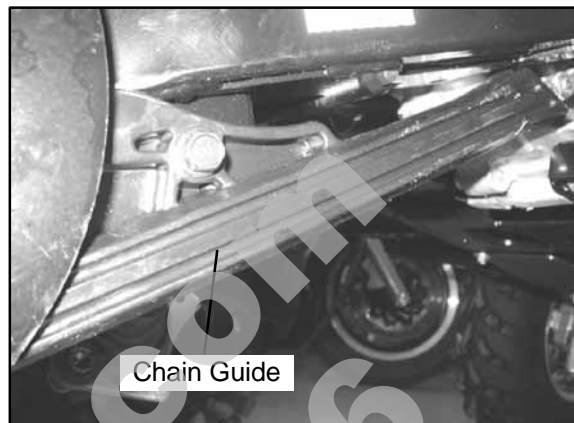
8. Remove the pin punch.
9. **2004 Models** - Tighten caliper mounting bracket bolts 10-12 ft. lbs. (14 - 17 Nm).



10. Verify chain adjustment is correct after tightening eccentric clamp bolts to specification by rolling ATV forward and checking chain tension in several places on chain. **The chain is adjusted correctly when the tightest portion of the**

chain has approximately 3/8 in. (10 mm) of deflection.

11. Reinstall the chain guard (where applicable). Reposition chain guide to allow 1/8" (.3 cm) clearance between sprocket and guide.



SUSPENSION SPRING PRELOAD ADJUSTMENT

Operator weight and vehicle loading affect suspension spring preload requirements. Adjust as necessary to avoid bottoming of the shocks.

FRONT SUSPENSION

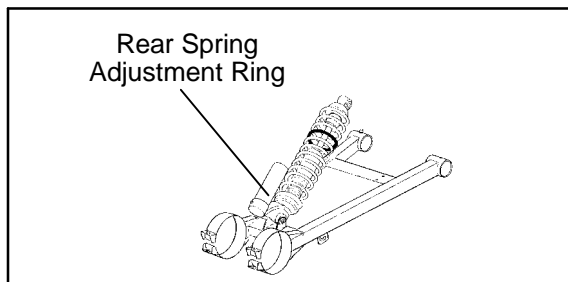
Compress and release front suspension. Damping should be smooth throughout the range of travel.

Check all front suspension components for wear or damage.

Inspect front strut cartridges for leakage.

REAR SUSPENSION

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



- G Check all rear suspension components for wear or damage.
- G Inspect shock for leakage.



Shock Spanner Wrench
(PN 2870872)

CONTROLS

Check controls for proper operation, positioning and adjustment.



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

WHEELS

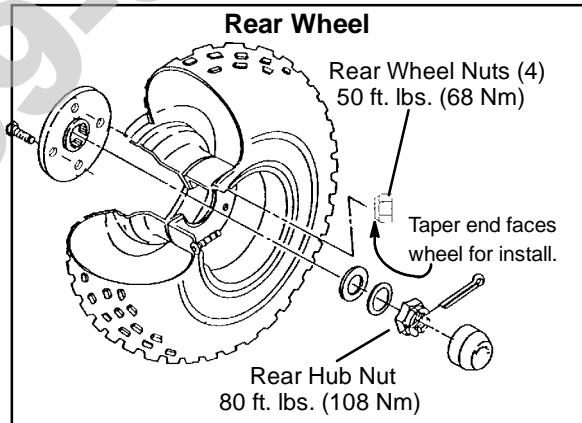
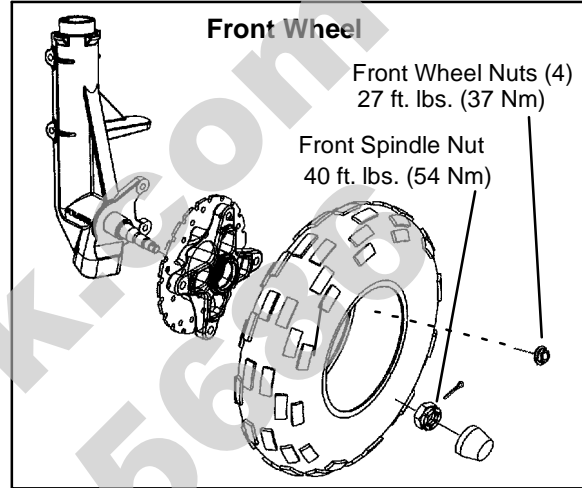
Inspect all wheels for runout or damage. Check wheel nuts and ensure they are tight. Do not over tighten the wheel nuts.

WHEEL, HUB, AND SPINDLE TORQUE TABLE

Item	Specification
Front Wheel Nuts	27 Ft. lbs. (37 Nm)
Rear Wheel Nuts	50 Ft. Lbs. (68 Nm)
Front Spindle Nut	40 Ft Lbs. (54Nm)
Rear Hub Retaining Nut	80 Ft. Lbs. (108 Nm)

WHEEL REMOVAL FRONT OR REAR

1. Stop the engine, place the transmission in gear and lock the parking brake.
2. Loosen the wheel nuts slightly.
3. Elevate the side of the vehicle by placing a suitable stand under the footrest frame.
4. Remove the wheel nuts and remove the wheel.



WHEEL INSTALLATION

1. With the transmission in gear 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.

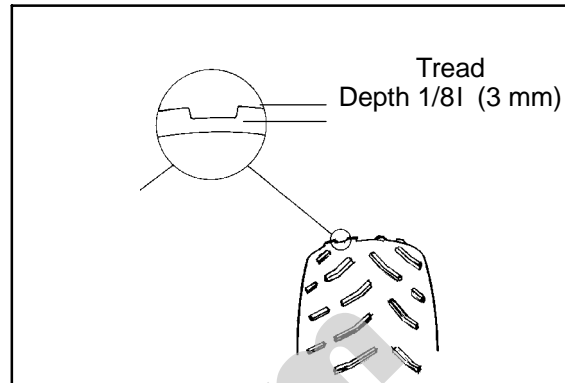
NOTE: Install the tapered end of the rear wheel nut goes into the taper of the wheel. See illustration above.



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. Be sure to properly torque and install all wheel nuts.



TIRE PRESSURE

Tire Pressure Inspection (PSI - Cold)	
Front	Rear
4	3

TIRE INSPECTION

▲ 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.

CAUTION:

- G Maintain proper tire pressure. Refer to the warning tire pressure decal applied to the vehicle.
- G Improper tire inflation may affect ATV maneuverability.
- G When replacing a tire always use original equipment size and type.
- G 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.

FRAME, NUTS, BOLTS, FASTENERS

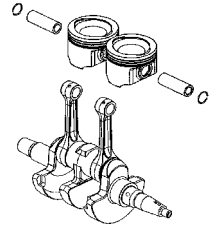
Periodically inspect the tightness of all fasteners in accordance with the maintenance schedule. Check that all cotter pins are in place. Refer to specific fastener torques listed in each chapter.



CHAPTER 3

ENGINE

Engine Service Data	3.2-3.3
Special Tools and Torque Specifications	3.4
Torque Patterns	3.4
Piston Identification	3.5
Engine Removal	3.5
Engine Installation Notes	3.6
Cylinder Honing	3.6-3.7
Engine Lubrication	3.7
Oil Pressure Test	3.7-3.8
Lubrication/Oil Flow	3.8-3.9
Engine Exploded View	3.10
Engine Top End Disassembly	3.11-3.18
Valve/ Valve Seat Service	3.18-3.22
Engine Bottom End Disassembly	3.22-3.32
Crankcase & Bearing Assembly	3.32
Crankshaft End Play Inspection	3.32-3.33
Engine Assembly/Inspection/Adjustments	3.33-3.43
Recoil Disassembly/Inspection/Reassembly	3.44-3.45
Spark Plug Fouling Checklist	3.46
Troubleshooting	3.46-3.47



3



ES32PFE10 ENGINE SERVICE DATA

Cylinder Head / Valve				ES32PFE10
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	1.3001-1.3041" (33.023-33.123 mm)
			Limit	1.2883" (32.723 mm)
		Ex	Std	1.3007-1.3047" (33.039-33.139 mm)
			Limit	1.2889" (32.739 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	.0022-.0035" (.055-.090 mm)
			Limit	.0039" (.10 mm)
Cylinder Head	Surface warpage limit			.0020" (.05 mm)
	Standard height			2.908" (73.8 mm)
Valve Seat	Contacting width	In	Std	.039" (1.0 mm)
			Limit	.055" (1.4 mm)
		Ex	Std	.059" (1.5 mm)
			Limit	.071" (1.8 mm)
Valve Guide	Inner diameter			.2362-.2367" (6.000-6.012 mm)
	Protrusion above head			.681-.689" (17.3-17.5 mm)
Valve	Margin thickness	In	Std	.039" (1.0 mm)
			Limit	.032" (0.8 mm)
		Ex	Std	.047" (1.2 mm)
			Limit	.032" (0.8 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	0.0014-0.0024" (0.035-0.062mm)
			Ex	0.0016-0.0026" (0.040-0.067mm)
		Limit	.0059" (0.15 mm)	
	Overall length		In	3.979" (101.0 mm)
			Ex	3.987" (101.2 mm)
Valve Spring	Free length		Std	1.673" (42.5 mm)
			Limit	---
	Squareness			0.075" (1.9 mm)



**ES32PFE10 ENGINE SERVICE DATA**

Cylinder / Piston / Connecting Rod				ES32PFE10		
Cylinder	Surface warpage limit (mating with cylinder head)			.0020" (0.050 mm)		
	Cylinder bore	Std		3.0906-3.0913" (78.50-78.520 mm)		
	Taper limit			.0020" (0.050 mm)		
	Out of round limit			.0020" (0.050 mm)		
	Piston clearance	Std		.0015-.0032" (0.038-0.082 mm)		
		Limit		.004" (0.11 mm)		
Boring limit			.0020" (0.5 mm)			
Piston	Outer diameter	Std		3.0881-3.0891" (78.438-78.462 mm)		
		.0098" (.25 mm) OS		3.0980-3.0989" (78.688-78.712 mm)		
		.0197" (.50 mm) OS		3.1078-3.1087" (78.938-78.962 mm)		
	Standard inner diameter of piston pin bore			.7095-.7097" (18.007-18.013 mm)		
Piston Pin	Outer diameter			.7092-.7095" (18.001-18.007 mm)		
	Standard clearance-piston pin to pin bore			0.0-.0005" (0.0-0.012 mm)		
	Degree of fit			Piston pin must be a push (by hand) fit at 68° F (20° C)		
Piston Ring	Piston ring installed gap	Top ring	Std	.0079-.0118" (0.20-0.30 mm)		
			Limit	.039" (1.0 mm)		
		Second ring	Std	.0138-.0197" (0.35-0.50 mm)		
			Limit	.039" (1.0 mm)		
		Oil ring	Std	.0079-.0236" (0.20-0.60 mm)		
			Limit	.059" (1.5 mm)		
Piston Ring	Standard clearance - piston ring to ring groove	Top ring	Std	.0014-.0030" (0.035-0.075 mm)		
			Limit	.0059" (0.15 mm)		
		Second ring	Std	.0010-.0026" (0.025-0.065 mm)		
			Limit	.0059" (0.15 mm)		
		Connecting Rod	Connecting rod small end ID			.7095-.7101" (18.007-18.023 mm)
			Connecting rod small end radial clearance	Std		0.0-.0009" (0.0-0.022 mm)
Limit				.0012" (0.03 mm)		
Connecting rod big end side clearance	Std			.0028-.0118" (0.07-0.30 mm)		
	Limit			.0138" (0.35 mm)		
Connecting rod big end bearing clearance	Std			0.0007-0.0021" (0.019-0.053 mm)		
	Limit		0.0026" (0.065 mm)			
Crankshaft	Crankshaft runout limit (PTO end)			0.0024" (0.060 mm)		
	Crankshaft end play			0.002-0.008" (0.05-0.20 mm)		

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



SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2200634	Valve Seat Reconditioning Kit
2870390	Piston Support Block
2871043	Flywheel Puller
2871293	Slotted Nut Socket
PV-43527	Oil Filter Wrench

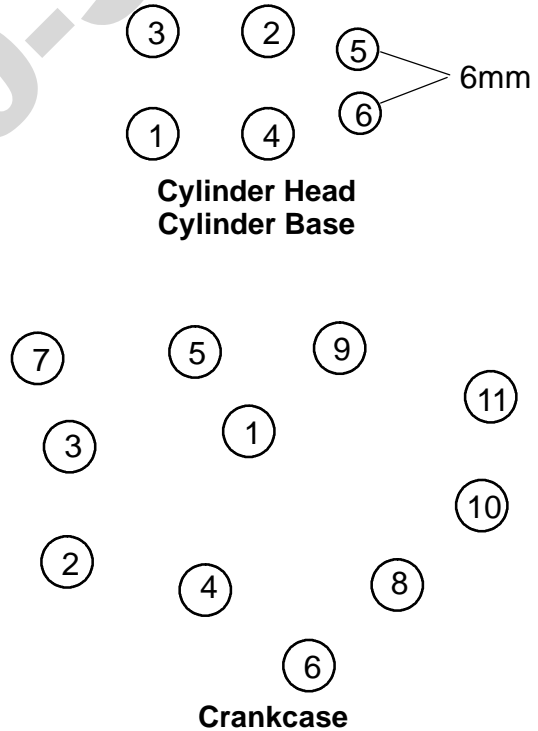
TORQUE SPECIFICATIONS

ENGINE TORQUE SPECIFICATIONS		
Fastener	Size	330 ES32PFE10 Ft. Lbs. (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	8-10 (11-14 Nm)
Camshaft Sprocket	10mm	25-29 (34-40 Nm)
Carburetor Adaptor	8mm	12-14 (16-20 Nm)
Connecting Rod	8.5mm	29-33 (39-45 Nm)
Crankcase	8mm	14-15 (19-21 Nm)
Crankshaft Slotted Nut (Drive Sprocket)	28mm	35-51 (47-69 Nm)
Cylinder Base Bolts	6mm	5-7 (7-9 Nm)
Cylinder Head Bolts	10mm	Refer to Engine Assembly for torque procedure
Drive Clutch Bolt	7/16 - 20	40 (55 Nm)
Flywheel	16mm	58-72 (78-98 Nm)
Oil Hose Fittings	1/2 & 9/16	20 (27 Nm)
Oil Delivery Pipe	12mm	11-15 (15-21 Nm)
Oil Drain Bolt (Crankcase)	14mm	14-17 (19-23 Nm)
Oil Filter Pipe Fitting (Connector)	20mm	36-43 (49-59 Nm)

Oil Line Fitting		20 (27 Nm)
Oil Pump Cover	6mm	4-5 (5-7 Nm)
Oil Relief Valve Plug	14mm	14.5-16.5 (20-23 Nm)
Recoil Housing	6mm	5-6.5 (7-9 Nm)
Rocker Cover	6mm	7-8 (9-11 Nm)
Rocker Cover Block Plug	28mm	39-44 (53-59)
Rocker Adjuster Screw Lock Nut	6mm	6-7 (8-10 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		3-3.6 (4-5 Nm)

ENGINE FASTENER TORQUE PATTERNS

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





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. The numbers or letters on all rings (except oil control rings) must be positioned upward. See text for oil control ring upper rail installation. Use the information below to identify pistons and rings.

Engine Model No.	Oversize Available* (mm)	Standard Piston Identification
ES32PFE	.25	None
	.50	

*Pistons and rings marked 25 are .25mm (.0101) oversized. Pistons and rings marked 50 are .50mm (.0201) oversized

ACCESSIBLE COMPONENTS

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

- G Flywheel
- G Alternator/Stator
- G Starter Motor/Starter Drive
- G Cylinder Head
- G Cylinder
- G Piston/RIngs
- G Oil pump
- G Rocker Arms
- G Cam Chain and Sprockets

The following components require engine removal for service:

- G Camshaft
- G Connecting Rod
- G Crankshaft
- G Crankshaft Main Bearings
- G Crankcase

ENGINE REMOVAL

1. Clean work area.
2. Thoroughly clean the ATV engine and chassis.
3. Disconnect battery negative (-) cable.
4. Remove the following parts as required.
 - G Seat
 - G Left and Right Side Covers (Refer to Chapter 5)
 - G Fuel Tank Cover / Front Cab (Refer to Chapter 5)
 - G Fuel Tank (Refer to Chapter 4)
5. Disconnect spark plug high tension lead.
6. Disconnect all electrical wires from the engine.
7. Remove springs from exhaust pipe and remove pipe.
8. Drain engine oil.
9. Remove airbox.
10. Remove carburetor. Insert a shop towel into the carburetor flange to prevent dirt from entering the intake port.
11. Loosen auxiliary brake master cylinder mount if necessary for clearance.
12. Refer to PVT System Chapter 6 to remove outer clutch cover, drive belt, drive clutch, driven clutch, and inner cover.
13. Starter motor. Note ground cable location. Mark positive (+) cable mounting angle and remove cable.
14. Remove transmission linkage rod(s) from gear selector and secure out of the way.
15. Remove engine to chassis ground cable.
16. Remove all engine mount nuts and / or engine mount plates.
17. 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

- G Install previously removed components using new gaskets, seals, and fasteners where applicable.
- G 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).

PVT System

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

Transmission

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

Exhaust

- G Replace exhaust gaskets. Seal connections with high temp silicone sealant.
- G Check to be sure all springs are in good condition.

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.

- G Use only Polaris Premium 4 All Season Synthetic Oil, or API certified "SH" oil.
- G Use fuel with a minimum octane of 87 (R+M)/2 method.
- G Change break-in oil and filter at 20 hours or 500 miles, whichever comes first.

CYLINDER HONE

SELECTION/HONING

PROCEDURE

CAUTION:

A hone which will straighten as well as remove material from the cylinder is very important. Using a common spring loaded glaze breaker for honing is not advised for nicasil cylinders. Polaris recommends using a rigid hone or arbor honing machine.

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.

HONING TO DEGLAZE

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:

- G 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.

- G Release the hone at regular intervals and inspect the bore to determine if it has been sufficiently deglazed, and to check for correct cross-hatch.

NOTE: Do not allow cylinder to heat up during honing.

- G After honing has been completed, inspect cylinder for thinning or peeling.

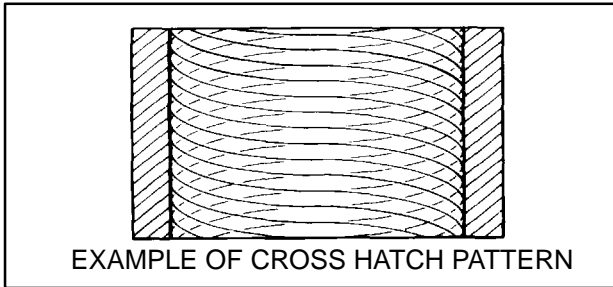
IMPORTANT: Clean the Cylinder After Honing

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. Use electrical contact cleaner if necessary to clean these areas. Rinse thoroughly, dry with compressed air, and oil the bore immediately with Polaris 4 Cycle Lubricant to prevent the formation of surface rust.





If cylinder wear or damage is excessive, it will be necessary to replace the cylinder. Hone only enough to deglaze the outer layer of the cylinder bore.



HONING TO OVERSIZE

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.

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 on **Page 3.2** before honing. Complete the sizing with fine grit stones to provide the proper cross-hatch finish and required piston clearance.

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:

- G 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 stone approximately 1/2" (1.3 cm) beyond the bore at the end of each stroke.
- G 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 an uneven bore.
- G 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.

IMPORTANT: Clean 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. Use electrical contact cleaner if necessary to clean these areas. Rinse thoroughly, dry with compressed air, and oil the bore immediately with Polaris 4 Cycle Lubricant to prevent the formation of surface rust.

ENGINE LUBRICATION - ES32PF10

Oil Type Polaris Premium 2W-50 Synthetic

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

Filter **PN 3084963**

Oil Filter Wrench ... **PV-43527**

Drain Plug/Screen Fitting 14 ft. lbs. (19 Nm)

Oil Pressure Specification (ES32PF10) 71-99 PSI @ 3000 RPM, Polaris 2W-50 Synthetic (Oil temp at 122_F 50_C)

OIL PRESSURE TEST ES32PF10

WARNING: Oil temperature and pressure can cause serious injury and damage. Wear the proper safety gear when performing these procedures.

1. Remove lower blind plug behind oil filter on crankcase.
2. Insert a 1/8" NPT oil pressure gauge adaptor into the crankcase and attach gauge.

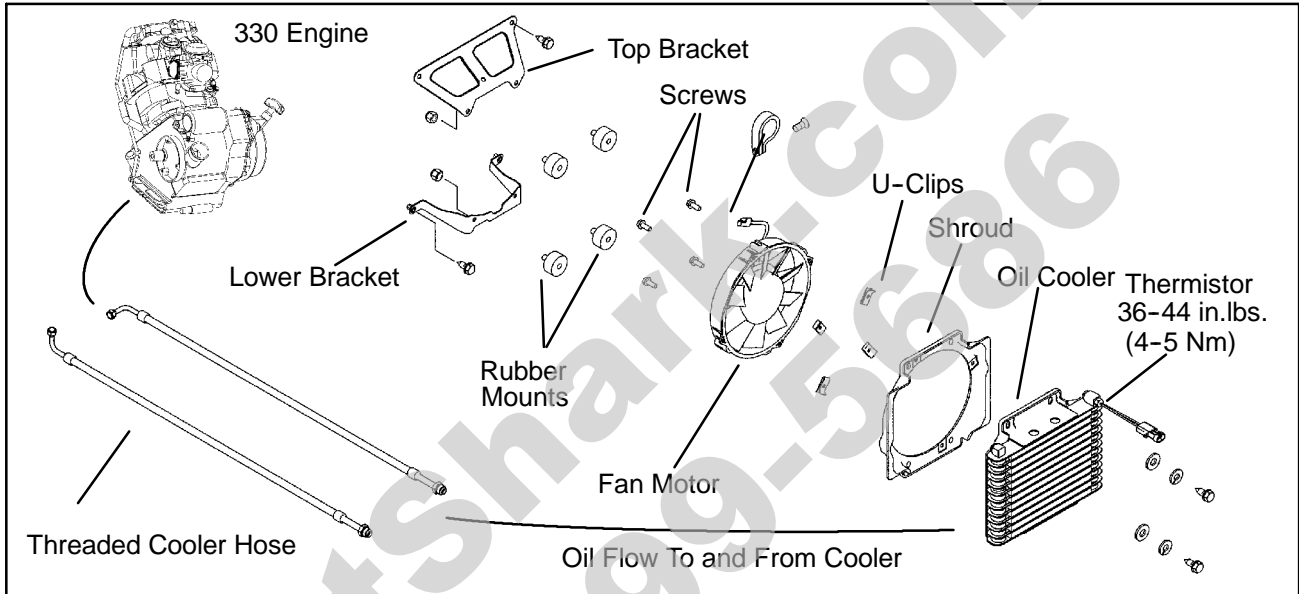


3. Start engine and allow it to reach operating temperature while monitoring gauge indicator.

NOTE: Use Polaris Premium 2W-50 Synthetic Engine Lubricant.

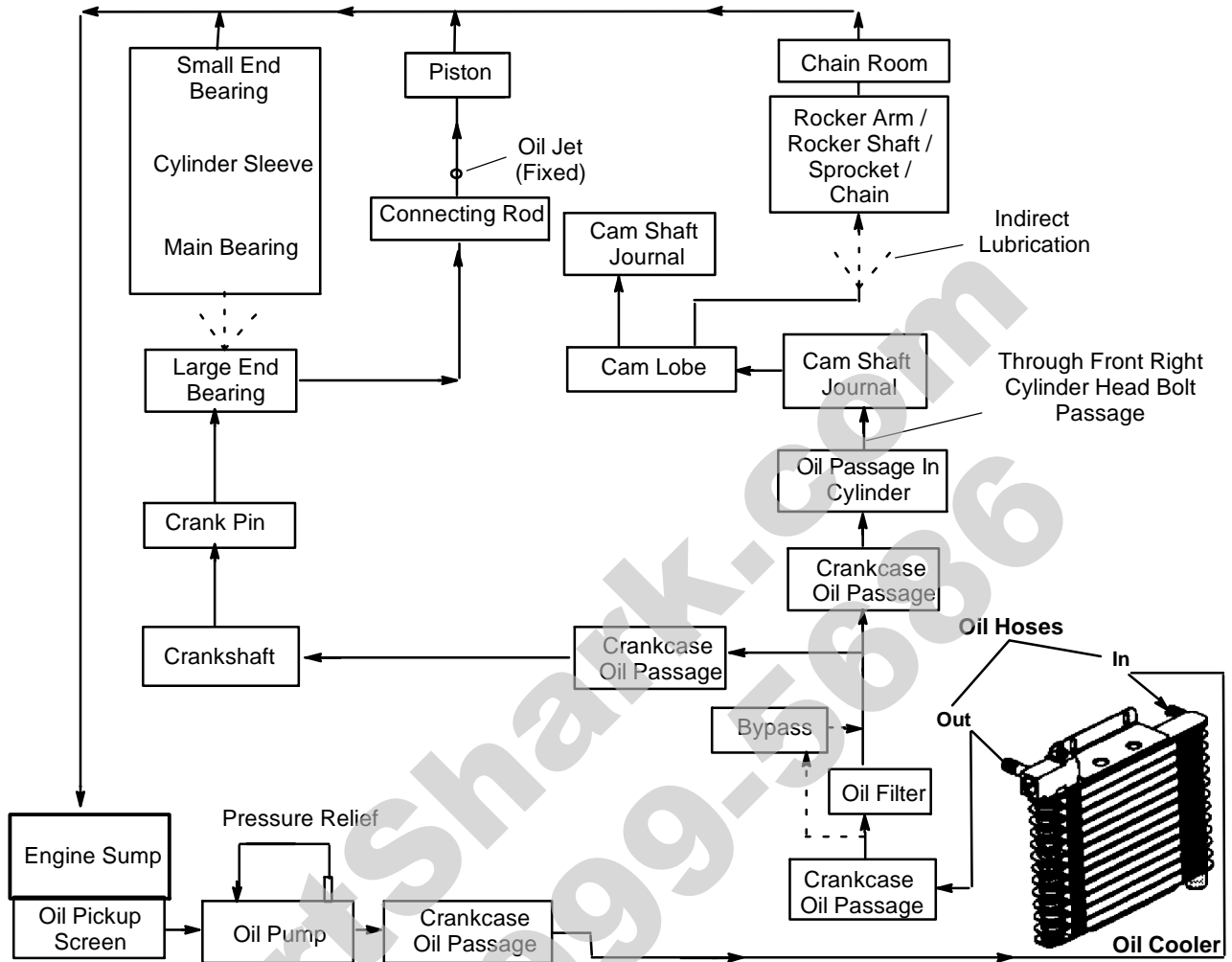
ES32PF10
Oil Pressure at 3000 RPM (Engine Hot):
Standard: 71-99 PSI
Minimum: 20 PSI at idle

OIL COOLER ASSEMBLY



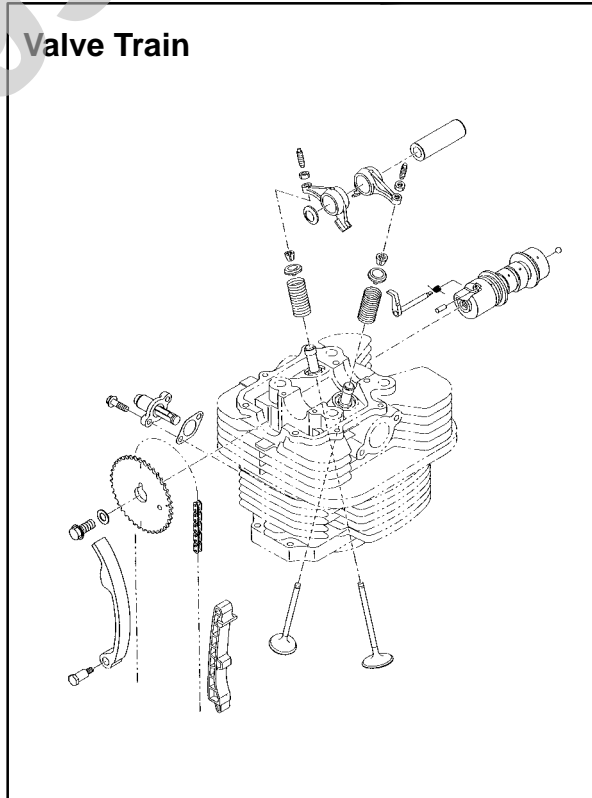
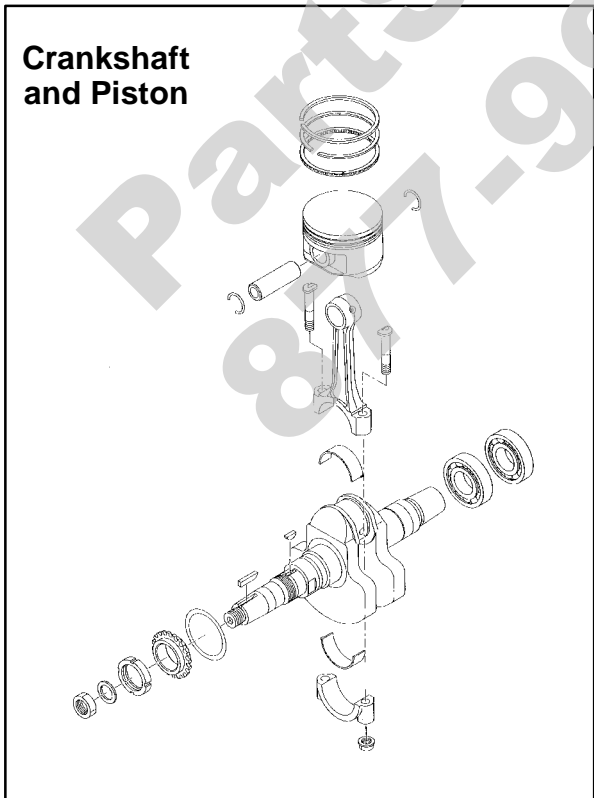
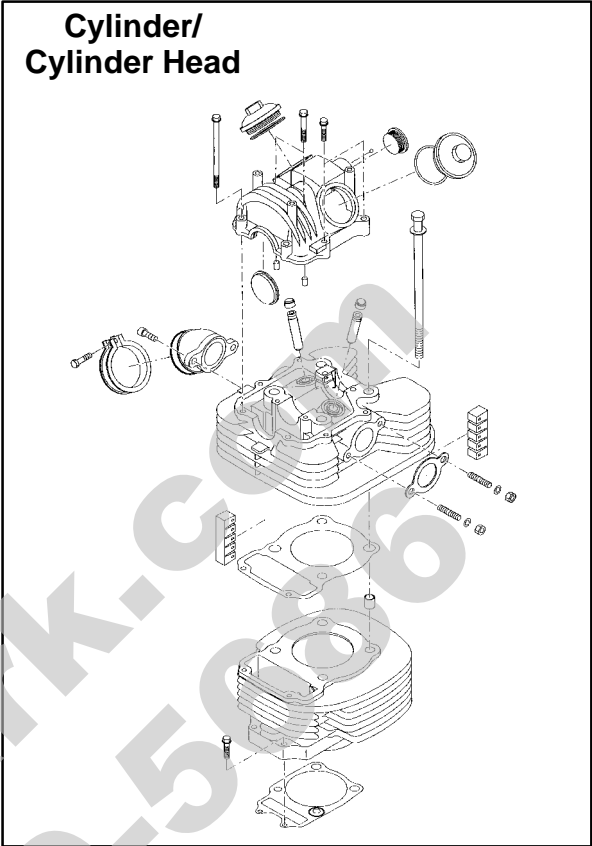
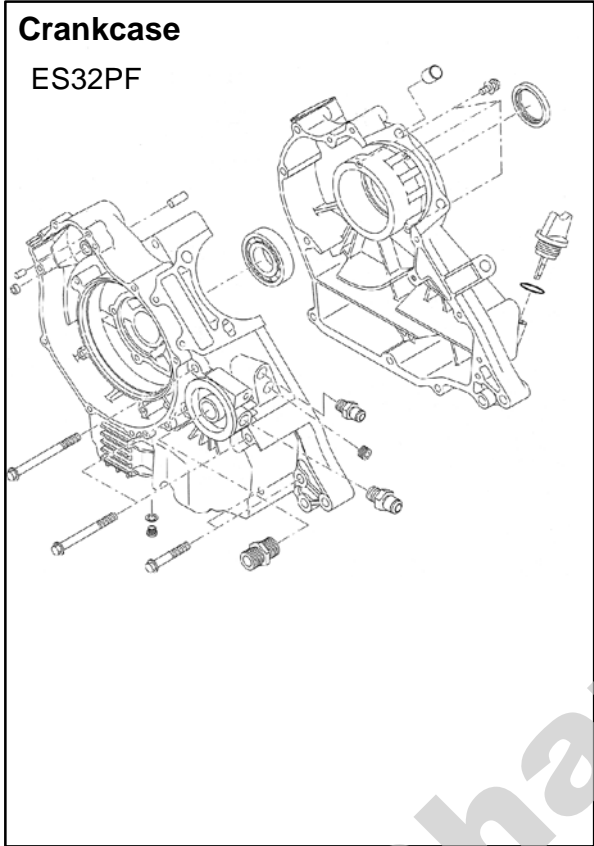


OIL FLOW DIAGRAM - ES32PF





ES32PFE ENGINE EXPLODED VIEW





ENGINE REMOVAL

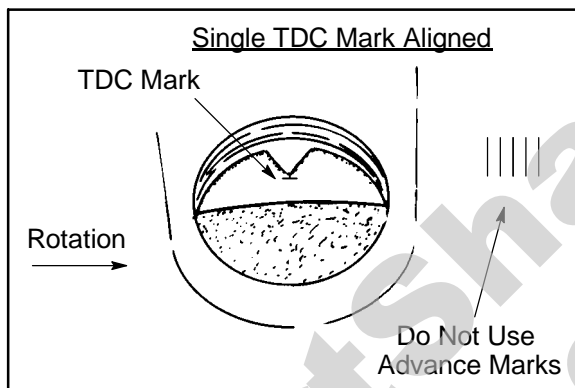
**REFER TO PAGE 3.5 - 3.6 FOR ENGINE
REMOVAL / INSTALLATION NOTES.**

CAM CHAIN TENSIONER REMOVAL

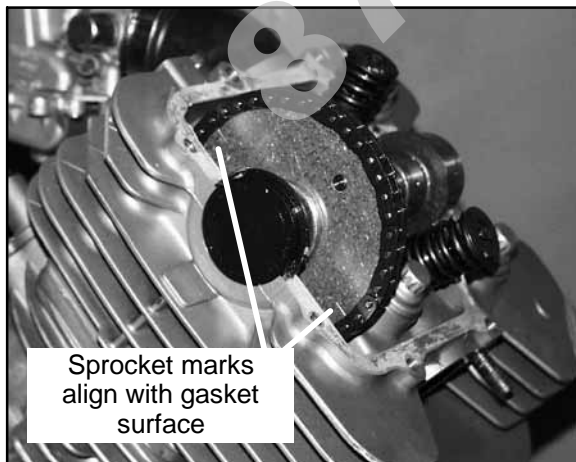
1. Remove ignition timing inspection plug from recoil housing.

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 sprocket marks align with gasket surface and the cam lobes should be pointing down and valves should have clearance at this point.

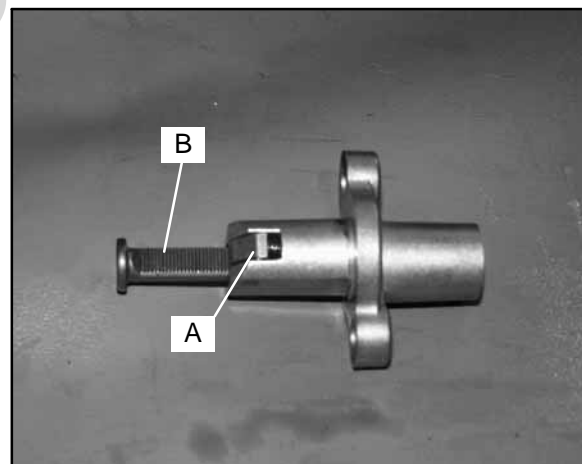


5. Remove cam chain tensioner plug, sealing washer, spring and pin. **CAUTION:** The plug is under spring tension. Maintain inward pressure while removing.
6. Remove the two 6x25 mm cam chain tensioner flange bolts.
7. Tap lightly on tensioner body with a soft face hammer and remove tensioner.



CAM CHAIN TENSIONER INSPECTION

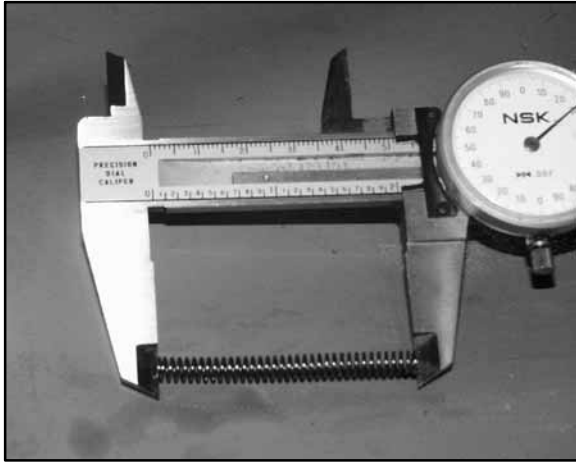
1. Pull cam chain tensioner plunger outward to the end of its travel. Inspect teeth on ratchet pawl (A) and plunger teeth (B) for wear or damage.



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.

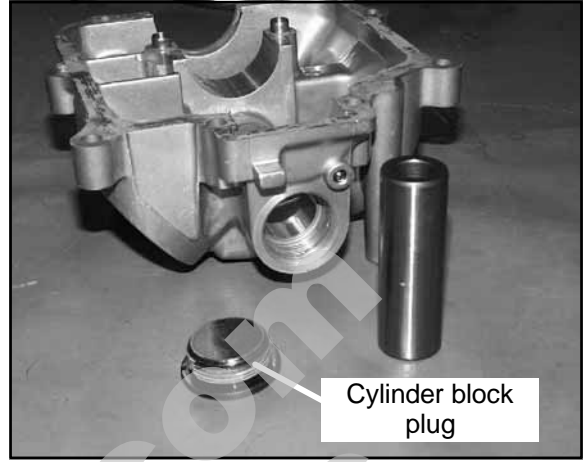


4. Measure free length of tensioner spring. Replace spring if excessively worn.



Tensioner Spring Free Length:
2.02" (5.13 cm) Std.
1.92" (4.88 cm) Limit

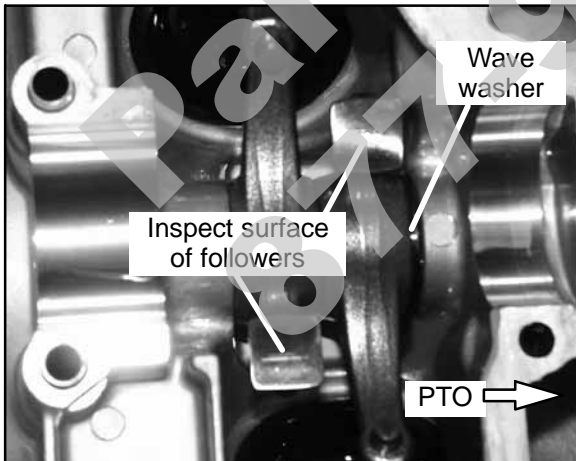
4. Remove cylinder block plug using a 14 mm hex head wrench.



5. Replace entire tensioner assembly if any part is worn or damaged.

ROCKER ARM/SHAFT INSPECTION

1. Remove rocker cover.
2. Mark or tag rocker arms to keep them in order for assembly.



3. 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.

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



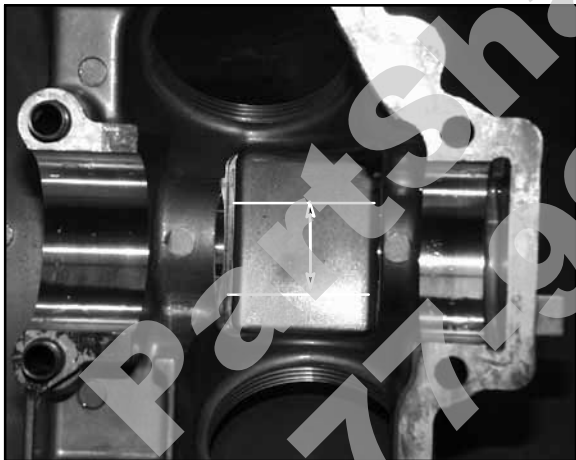
Rocker Shaft O.D.:
.8656-.8661 | (21.987-22.0 mm)

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



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

7. Measure I.D. of both rocker arm shaft support areas and visually inspect surface. Compare to specifications.

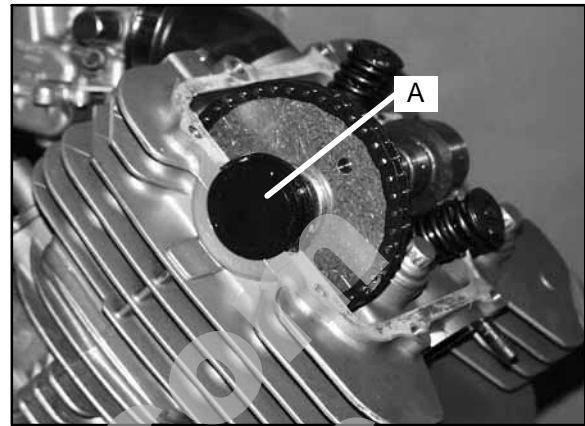


Rocker Shaft Oil Clearance:
Std: .0008-.0021| (.020-.054 mm)
Limit: .0039| (.10 mm)

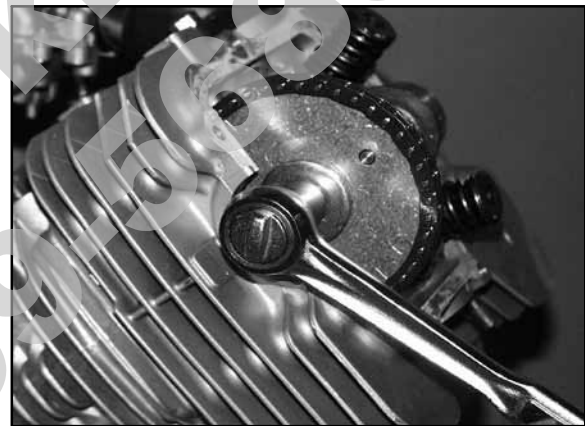
8. Inspect rocker adjuster screws for wear, pitting, or damage to threads of the adjuster or locknut. Replace all worn or damaged parts. **NOTE:** The end of the adjuster screw is hardened and cannot be ground or re-faced.

CAMSHAFT REMOVAL

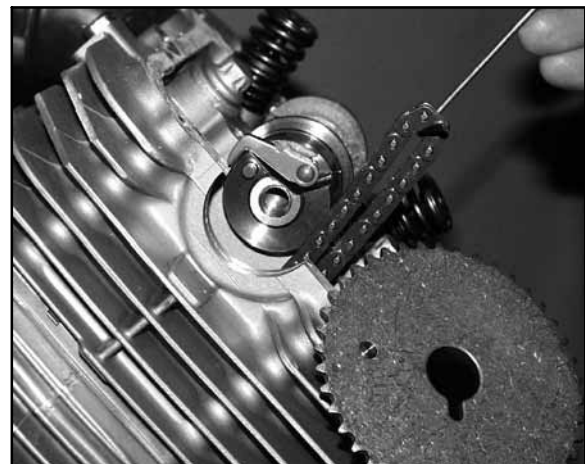
1. Remove cam shaft end plug (A).



2. Remove camshaft sprocket flange bolt and washer.



3. Place a clean shop towel in the area below cam chain sprocket.

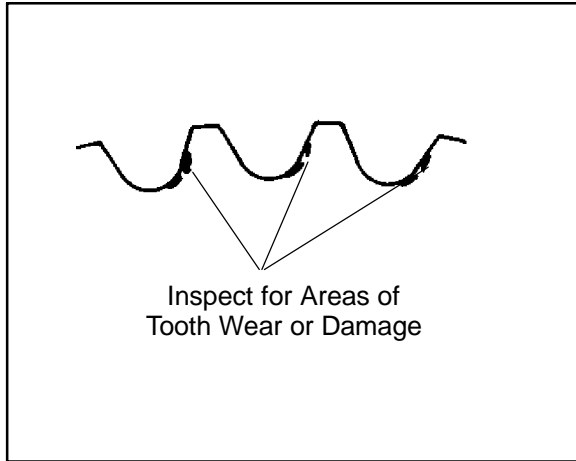


4. Remove sprocket from camshaft and chain.
5. Secure cam chain with a wire to prevent it from falling into the crankcase.

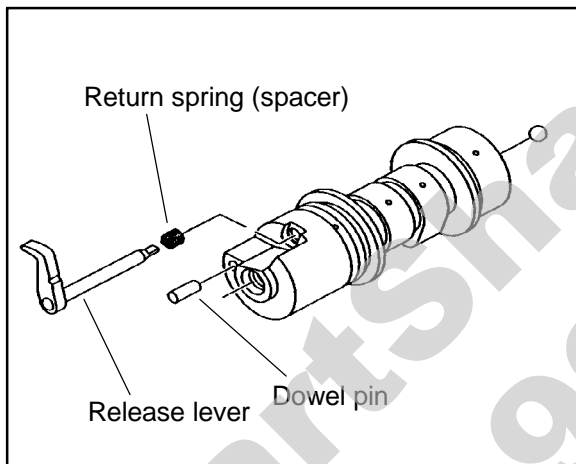


CAMSHAFT REMOVAL CONT'D

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



7. Remove camshaft.



AUTOMATIC COMPRESSION RELEASE REMOVAL/INSPECTION

NOTE: The automatic compression release mechanism can be inspected and serviced without removing the camshaft from the cylinder head.

1. Check release lever shaft for smooth operation throughout the entire range of rotation.



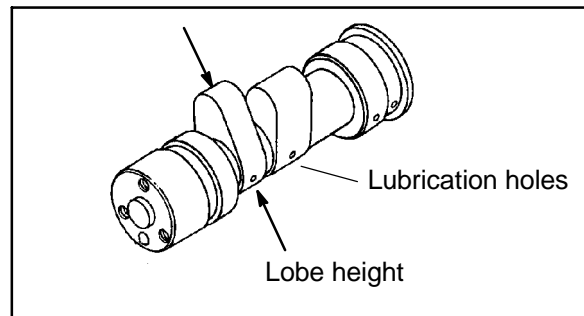
2. Remove release lever shaft and return spring (spacer).
3. Inspect shaft for wear or galling.
4. Inspect lobe on end of release lever shaft for wear and replace if necessary.

AUTOMATIC COMPRESSION RELEASE INSTALLATION

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

CAMSHAFT INSPECTION

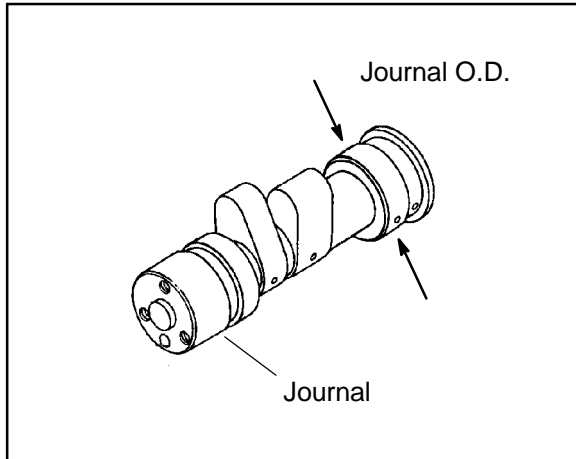
1. Visually inspect each cam lobe for wear, chafing or damage.



Cam Lobe Height	
<u>Intake</u>	
Std:	1.3001-1.3041 | (33.023-33.123 mm)
Limit:	1.2883 | (32.723 mm)
<u>Exhaust</u>	
Std:	1.3007-1.3047 | (33.039-33.139 mm)
Limit:	1.2889 | (32.739 mm)



2. Thoroughly clean the cam shaft, making sure the oil feed holes are not obstructed.
3. Measure height of each cam lobe using a micrometer. Compare to specifications.
4. Measure camshaft journal outside diameter (O.D.)



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

5. Measure ID of camshaft journal bore.

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

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

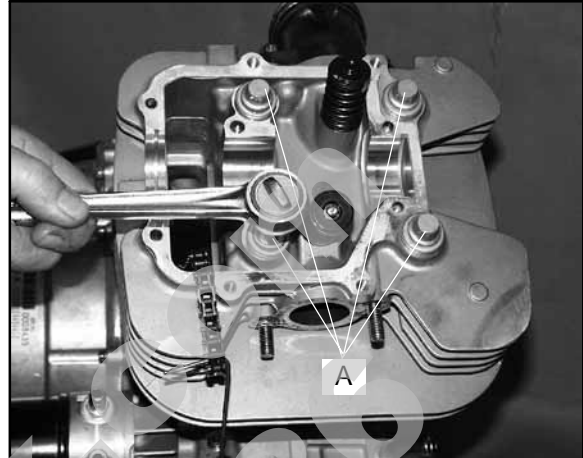
Camshaft Oil Clearance:
Std: .0022-.0035l (.055-.090 mm)
Limit: .0039l (.10 mm)

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

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

CYLINDER HEAD REMOVAL

1. Loosen each of the four cylinder head bolts evenly 1/8 turn each time in a cross pattern until loose.



2. Remove bolts (A) 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 casting.
3. Remove cylinder head and head gasket.



CYLINDER HEAD INSPECTION

1. Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon. **CAUTION:** Use care not to damage sealing surface.



CYLINDER HEAD WARPAGE

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 Warpage Limit:

.002" (.05mm)

CYLINDER HEAD DISASSEMBLY

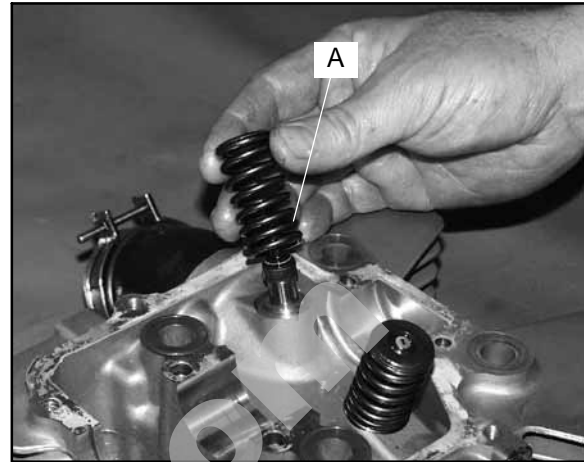
WARNING: Wear eye protection or a face shield during cylinder head disassembly and reassembly.

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

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

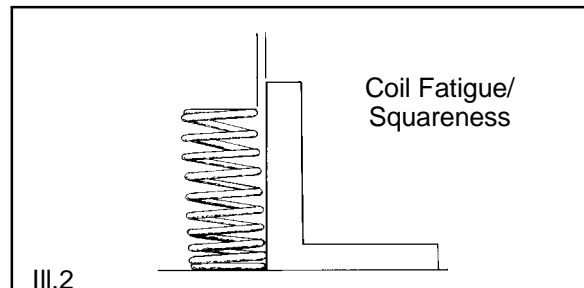
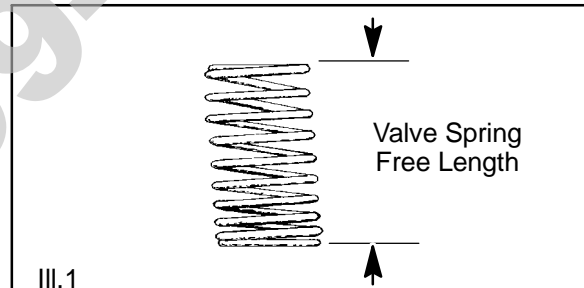


2. Remove spring retainer and spring.



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.
4. Measure free length of spring with a Vernier caliper, III.1. Check spring for squareness as shown in III.2. Compare to specifications. Replace spring if either measurement is out of specification.



Valve Spring Length:

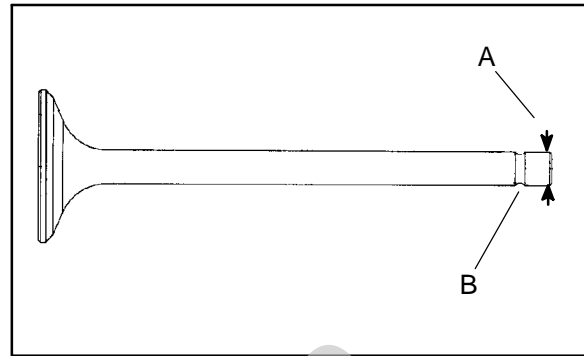
Std: 1.6731 (42.5 mm)

Squareness:

.0751 (1.9 mm)



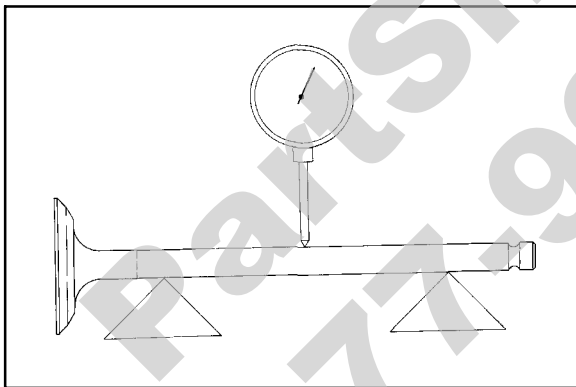
5. Remove valve seals. **CAUTION:** Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.



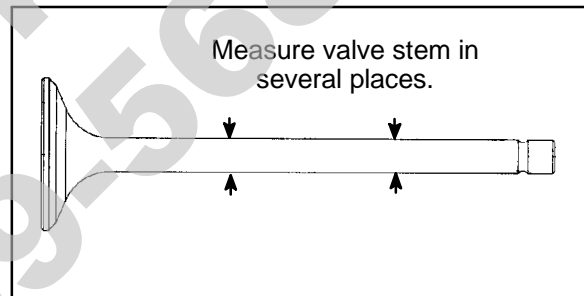
4. Inspect split keeper groove for wear or flaring of the keeper seat area (B). **NOTE:** The valves cannot be re-faced or end ground. They must be replaced if worn, bent, or damaged.
5. Measure diameter of valve stem with a micrometer in three places and in two different directions (six measurements total). Compare to specifications.

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 a dial indicator.



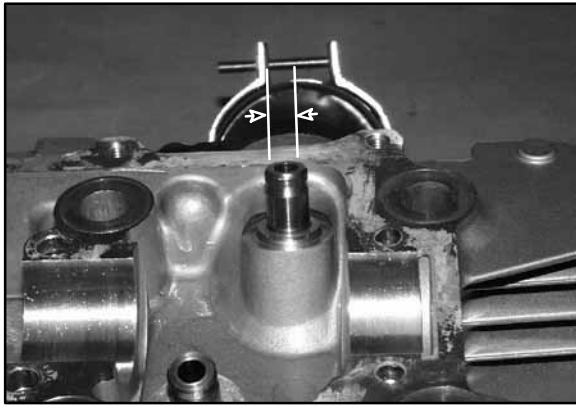
3. Check end of valve stem for flaring, pitting, wear or damage (A).



Valve Stem Diameter:

Intake: .2343-.2348 | (5.950-5.965 mm)
Exhaust: .2341-.2346 | (5.945-5.960 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.



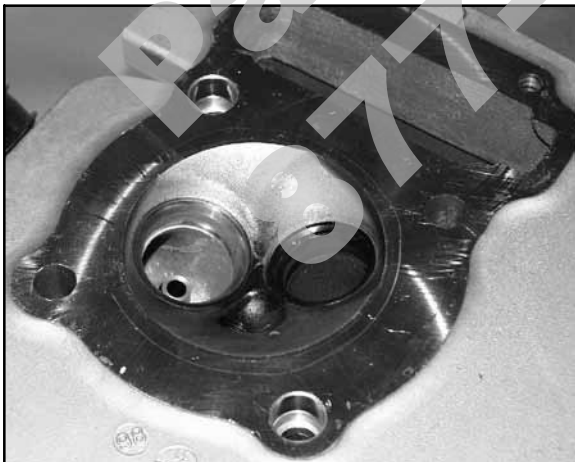
7. Subtract valve stem measurement to obtain stem to guide clearance. **NOTE:** Be sure to measure each guide and valve combination individually.
8. Replace valve and/or guide if clearance is excessive. Compare to specifications.

Valve Guide I.D.:
.2362-.23671 (6.0-6.012 mm)

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

COMBUSTION CHAMBER

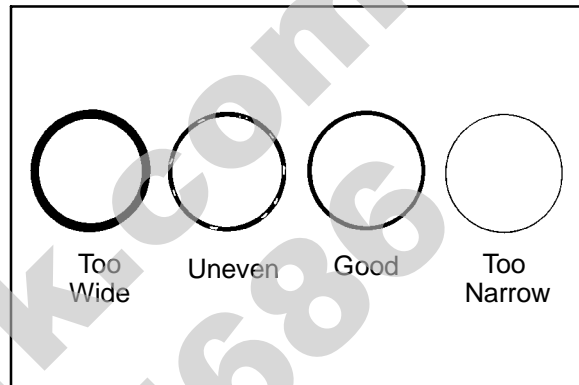
Clean all accumulated carbon deposits from combustion chamber and valve seat area with a soft wire brush.



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. See Valve Seat Reconditioning, Page 3.19-3.21. *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 Valve Seat Reconditioning Kit (PN 2200634).

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.

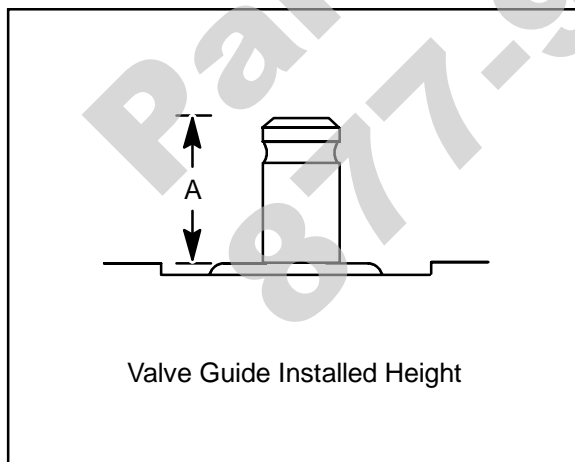




4. Follow the manufacturers instructions provided with the valve seat cutters in the Valve Seat Reconditioning Kit (PN 2200634). Abrasive stone seat reconditioning equipment can also be used. Keep valves in order with their respective seat.

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.

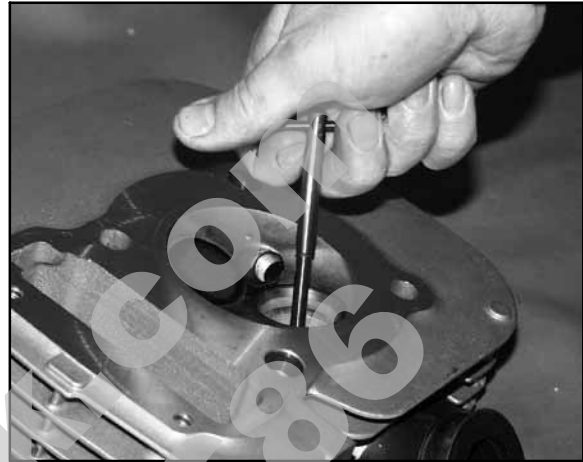
5. Once thoroughly heated, place cylinder head on blocks of wood which will allow the old guides to be removed.
6. Using valve guide driver, drive guides out of the cylinder head from the combustion chamber side. Be careful not to damage guide bore or valve seat when removing guides.
7. Place cylinder head on cylinder head table.
NOTE: Be sure cylinder head is still at 212° F (100° C) before installing new guides.
8. 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). Refer to specifications.
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.



Valve Guide Height:
.681-.689 (17.3-17.5 mm)

Reaming The Valve Guide

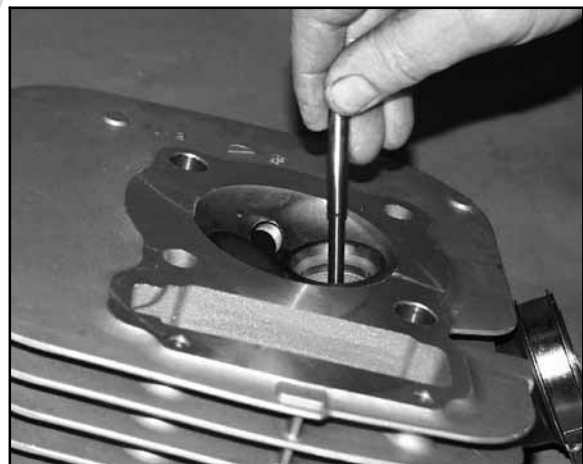
9. Allow cylinder head to cool to room temperature. Apply cutting oil to the reamer. Guides should be reamed from the valve spring side of the cylinder head. Ream each guide to size by turning the reamer clockwise continually. Continue to rotate reamer clockwise during removal of the tool.



10. Clean guides thoroughly with hot soapy water and a nylon brush. Rinse and dry with compressed air. Apply clean engine oil to guides.

VALVE SEAT RECONDITIONING

1. Install pilot into valve guide.



2. Apply cutting oil to valve seat and cutter.



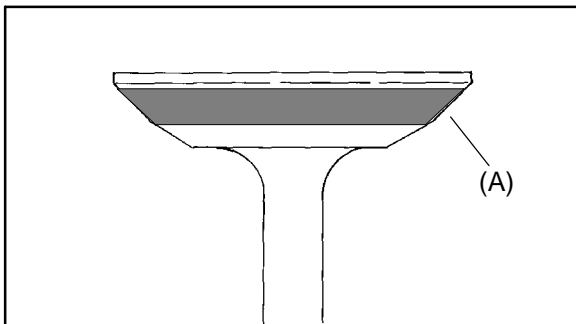
VALVE SEAT RECONDITIONING CONT'D

3. Place 46° cutter on the pilot and make a light cut.

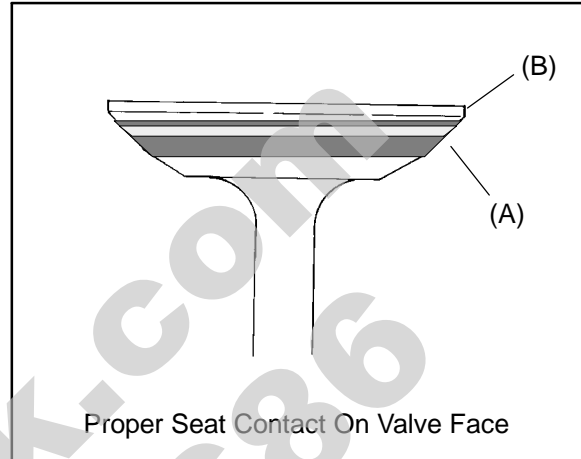


4. Inspect the cut area of the seat.
 - G If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.
 - G If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or runout. If the pilot is bent it must be replaced.
 - G 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.
 - G 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.

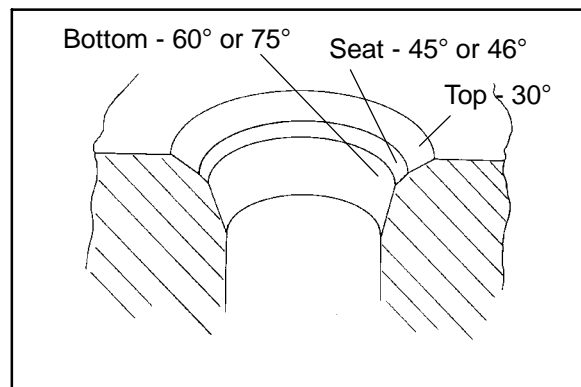
5. To check the contact area of the seat on the valve face, apply a thin coating of Prussian Blue[™] paste to the valve seat. If using an interference angle (46°) apply black marker to the entire valve face (A).



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

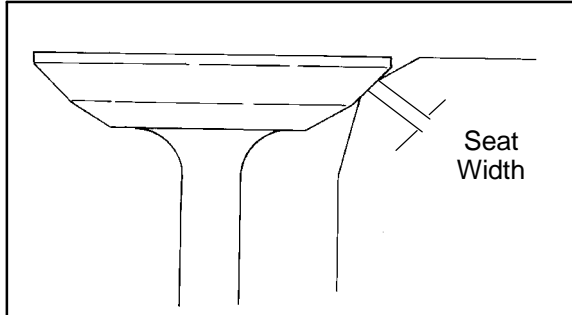


- G If the indicated seat contact is at the top edge of the valve face and contacts the margin area (B) it is too high on the valve face. Use the 30° cutter to lower the valve seat.
- G If too low use the 60° or 75° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.
- G If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.
- G 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.



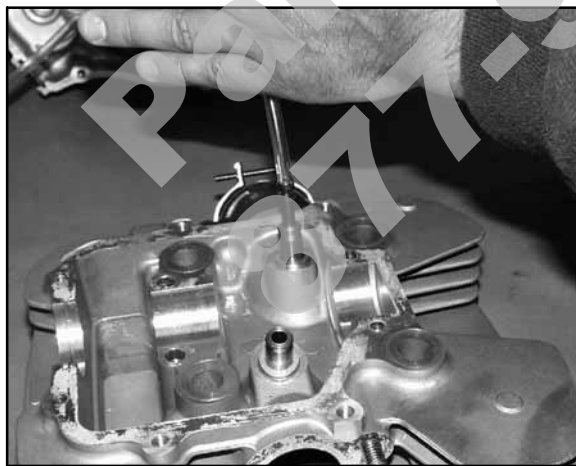


NOTE: When using an interference angle, the seat contact point on the valve will be very narrow, and is a normal condition. Look for an even and continuous contact point on the black marker, all the way around the valve face.

**Valve Seat Width:**

Intake Std: .0391 (1.0 mm)
Limit: .0551 (1.4 mm)
Exhaust Std: .0591 (1.4 mm)
Limit: .0711 (1.8 mm)

8. Clean all filings from the area with hot soapy water, rinse, and dry with compressed air.
9. 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.
10. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.



11. Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this four to five times until the valve is fully seated, and repeat process for the other valve.

12. Clean cylinder head, valves, and camshaft oil supply passage (A) thoroughly.



13. 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.

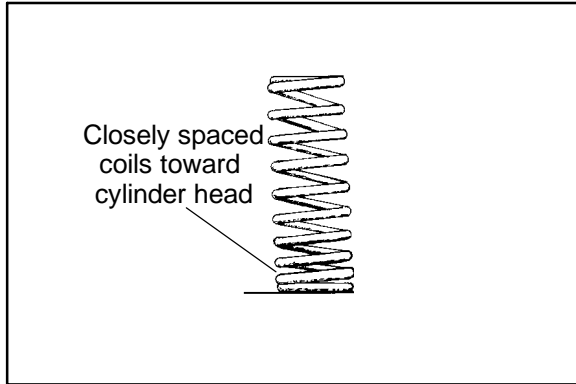


2. Apply engine oil to valve guides and seats.
3. Coat valve stem with molybdenum disulfide grease.
4. Install valve carefully with a rotating motion to avoid damaging valve seal.



CYLINDER HEAD ASSEMBLY CONT'D

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 spring and install valve spring compressor. Compress spring only enough to allow split keeper installation to 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

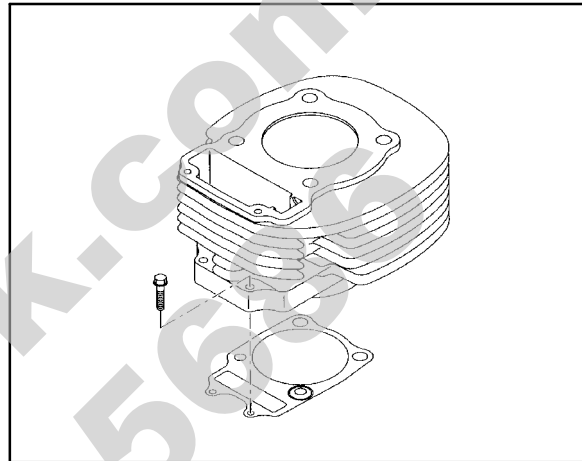
1. Clean and dry the combustion chamber area.
2. Pour a small amount of clean solvent into the intake port and check for leakage around each intake valve. The valve seats should hold fluid with no seepage.
3. Repeat for exhaust valves by pouring fluid into exhaust port.

**ENGINE BOTTOM END
DISASSEMBLY**

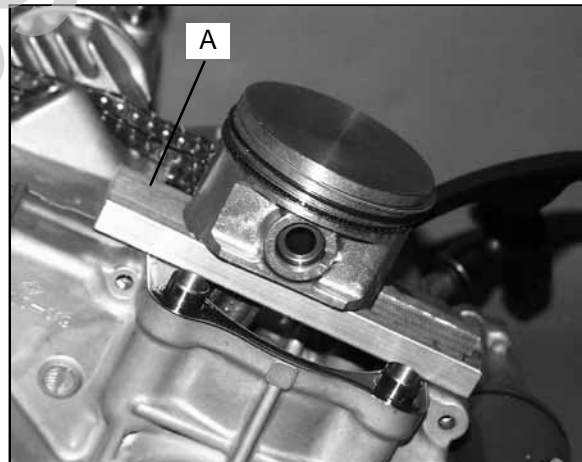
Cylinder Removal

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. Remove the two 6 mm cylinder base bolts.



3. Tap cylinder lightly with a plastic hammer in the reinforced areas only until loose.



4. Rock cylinder forward and backward and lift it from the crankcase, supporting piston and connecting rod. Support piston with Piston Support Block (PN 2870390) (A).
5. Remove dowel pins from crankcase.



PISTON REMOVAL

1. Remove circlip. Note that opening for circlip access is on the intake side.



2. Remove piston circlip and push piston pin out of piston. If necessary, heat the crown of the piston *slightly* with a propane torch. **CAUTION:** Do not apply heat to the piston rings. The ring may lose radial tension.
3. Remove top compression ring.



***Using a piston ring pliers:** Carefully expand ring and lift it off the piston. **CAUTION:** Do not expand the ring more than the amount 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.

4. 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.

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

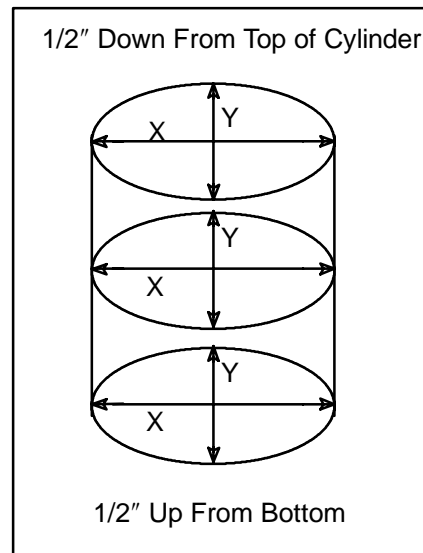
CYLINDER INSPECTION

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 Warpage:
.0020" (.05 mm) MAX

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).





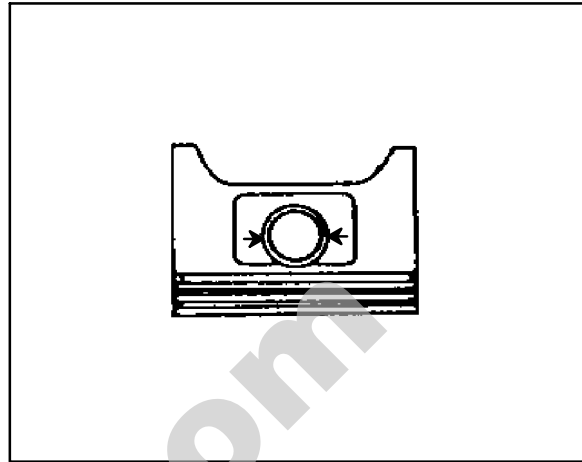
CYLINDER INSPECTION CONT'D

- 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.**

**Cylinder Standard Bore Size:
3.0906-3.0913| (78.50-78.520 mm)**

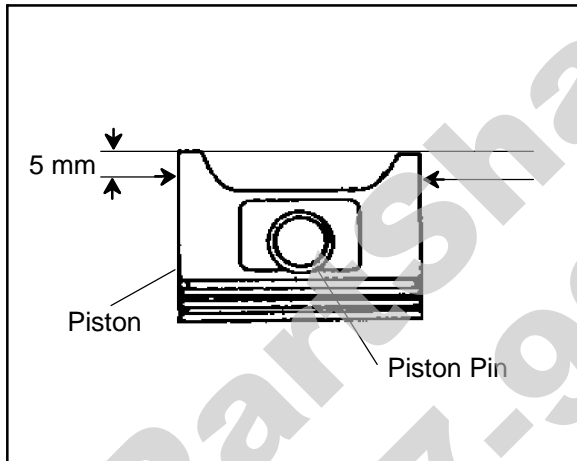
- Measure piston pin bore.



**Piston Pin Bore:
.7095-.7097| (18.007-18.013 mm)**

PISTON INSPECTION

- Measure piston outside diameter at a point 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.

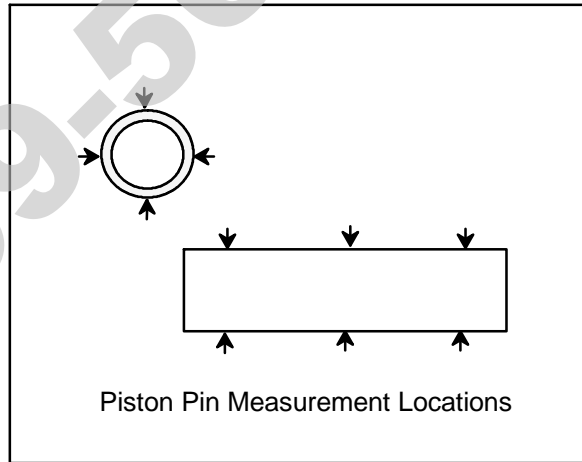


- Subtract this measurement from the maximum cylinder measurement obtained in Step 5.

**Piston to Cylinder Clearance
Std: .0015-.0032| (.038-.082 mm)
Limit: .004| (.11 mm)**

**Piston O.D.:
Std: 3.0881-3.0891| (78.438-77.462 mm)**

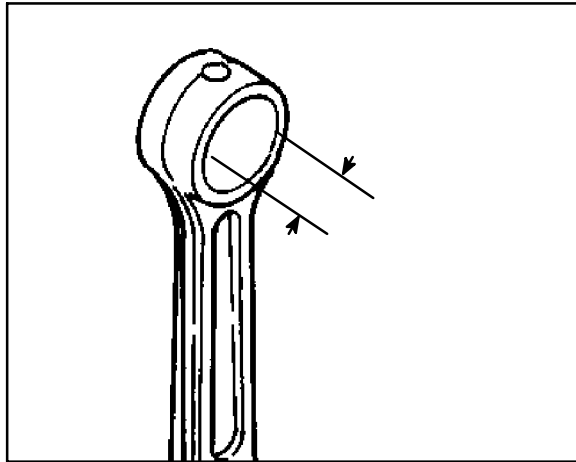
- Measure piston pin O.D. Replace piston and/or piston pin if out of tolerance.



**Piston Pin O.D.
.7092-.7095| (18.001-18.007 mm)**

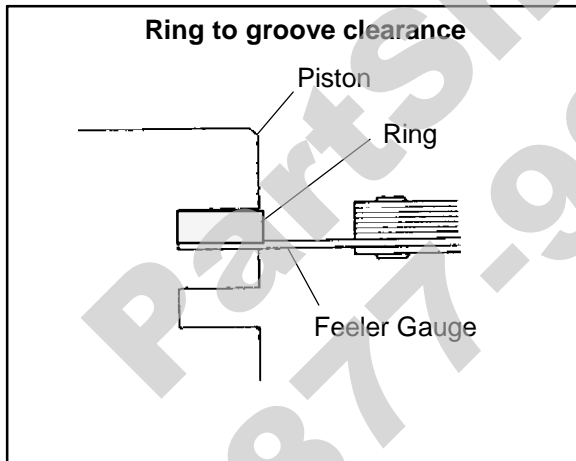


5. Measure connecting rod small end ID.



Connecting Rod Small End I.D.
.7095-.7101 (18.007-18.023 mm)

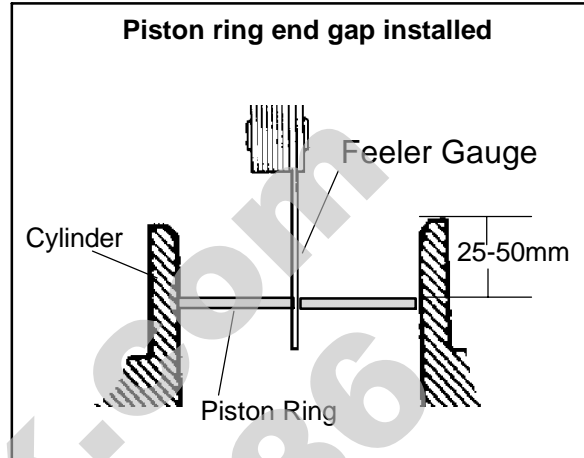
6. Measure piston ring to groove clearance by placing the ring in the ring land and measuring with a thickness gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.



Piston Ring-to-Groove Clearance
Top Ring Std: .0014-.0030 (.035-.075 mm)
Limit: .0059 (.15 mm)
Second Ring Std: .0010-.0026 (.025-.065 mm)
Limit: .0059 (.15 mm)

PISTON RING INSTALLED GAP

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



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.

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.

Piston Ring Installed Gap
Top Ring
Std: .0079-.0118 (.20-.36 mm)
Limit: .039 (1.0 mm)
Second Ring
Std: .0138-.0197 (.35-.50 mm)
Limit: .039 (1.0 mm)
Oil Ring
Std: .0079-.0236 (.20-.70 mm)
Limit: .059 (1.5 mm)

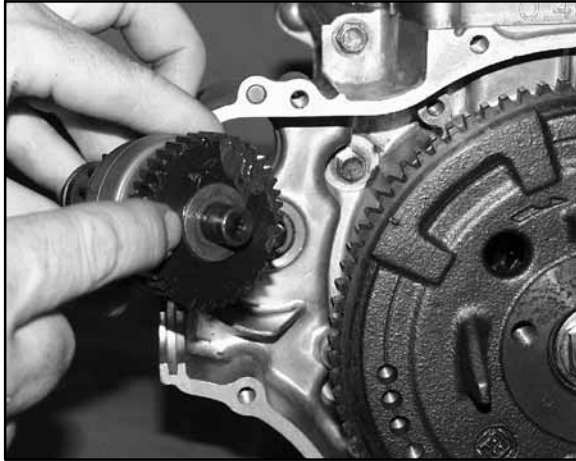
CRANKCASE DISASSEMBLY

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.

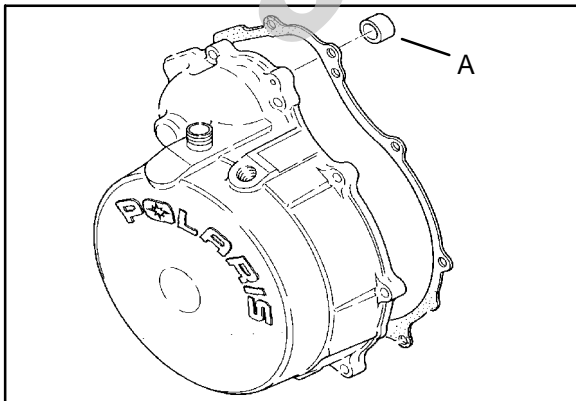


2. Remove starter drive assembly. Note the thrust washer located at the rear of the drive mechanism.
3. Inspect the thrust washer for wear or damage and replace if necessary.
4. Measure the OD of the starter drive shaft on both ends and record.

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

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

5. Measure the ID of the bushing in the recoil housing (A) and in the crankcase and record. Measure in two directions 90° apart to determine if bushing is out of round. Calculate bushing clearance. Replace bushing if clearance exceeds the service limit.



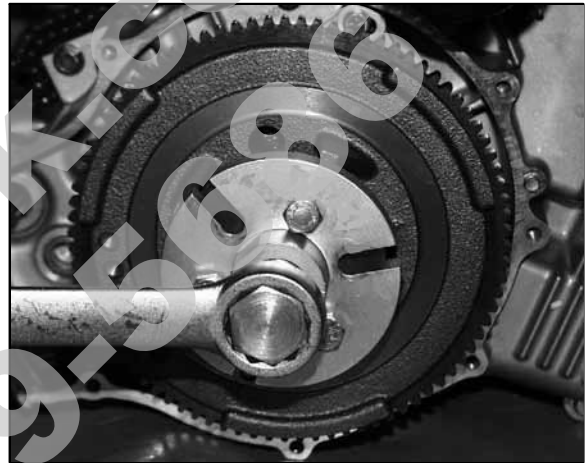
Starter Drive Bushing Clearance:
Std: .0015"-.004" (.038-.102 mm)

Service Limit:
008" (.203 mm)

6. Inspect gear teeth on starter drive. Replace starter drive if gear teeth are cracked, worn, or broken.

FLYWHEEL/STATOR REMOVAL/INSPECTION

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.

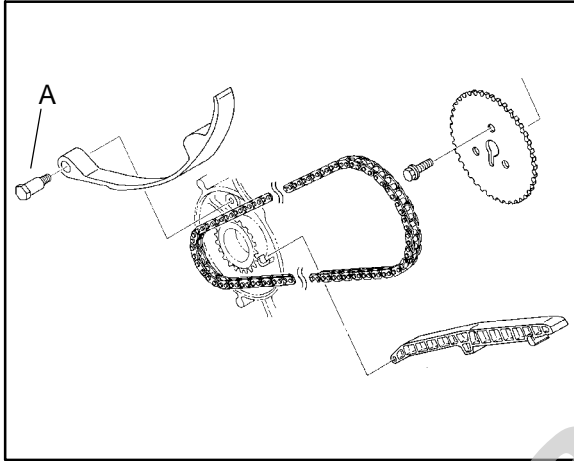




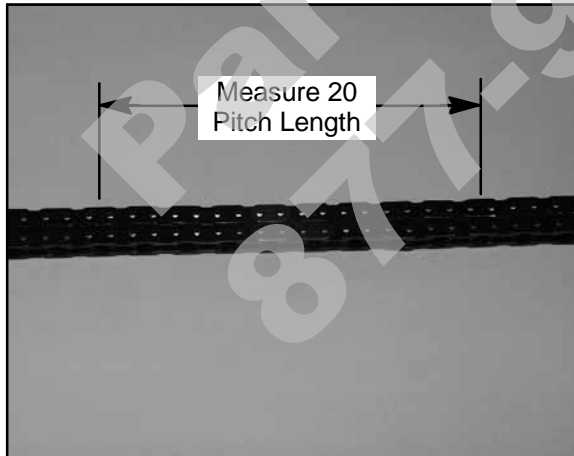
5. Replace crankshaft seal.
6. Remove large sealing O-Ring from outer edge of stator plate.

CAM CHAIN/TENSIONER BLADE

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



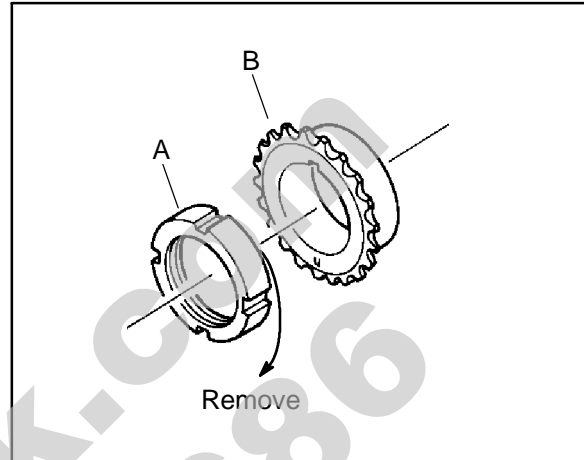
2. Remove blade and inspect for cracks, wear, or damage.
3. Remove cam chain. Inspect chain for worn or missing rollers or damage. Stretch chain tight on a flat surface and apply a 10 lb. (4.53 kg) load. Measure length of a 20 pitch section of chain. Replace if worn past service limit.



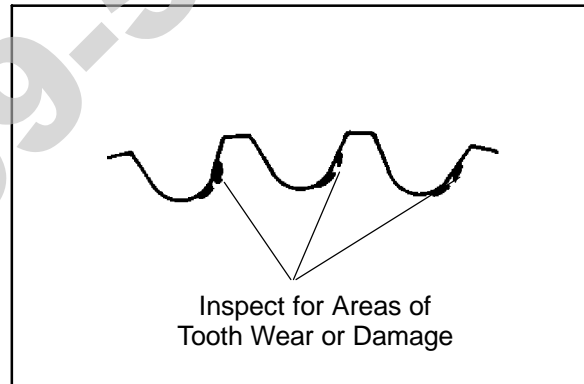
**Chain Service Limit:
5.407" (13.7 cm)**

DRIVE SPROCKET REMOVAL / INSPECTION

1. Using the Slotted Nut Socket (PN 2871293), remove the crankshaft slotted nut (A). **NOTE:** The slotted nut is a left hand thread.



2. Remove cam chain drive sprocket (B) and Woodruff key from crankshaft.
3. Inspect sprocket teeth for wear or damage.



4. Inspect Woodruff key for wear.
5. Replace any worn or damaged parts.

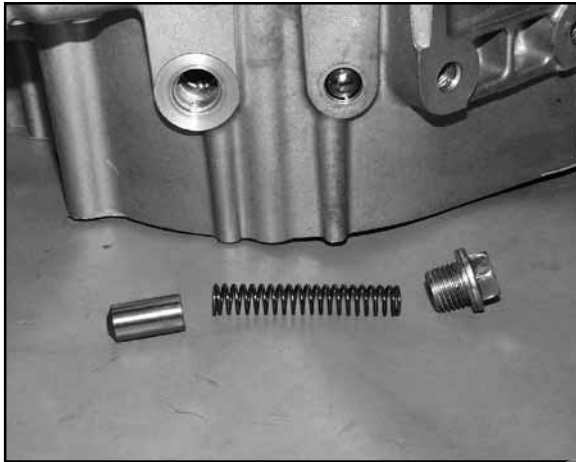
**Slotted Nut Socket
(PN 2871293)**



PRESSURE RELIEF VALVE

The pressure relief valve opens to relieve any excess pressure from the oil pump if oil pressure reaches approximately 71 psi. It must be clean and have adequate spring pressure in order to seal properly.

1. Remove cap bolt, sealing washer, spring, and relief valve from MAG side crankcase.



2. Inspect free length of spring and check coils for distortion.

Relief Valve Spring Free Length:
Std: 2.175" (5.52 cm)

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

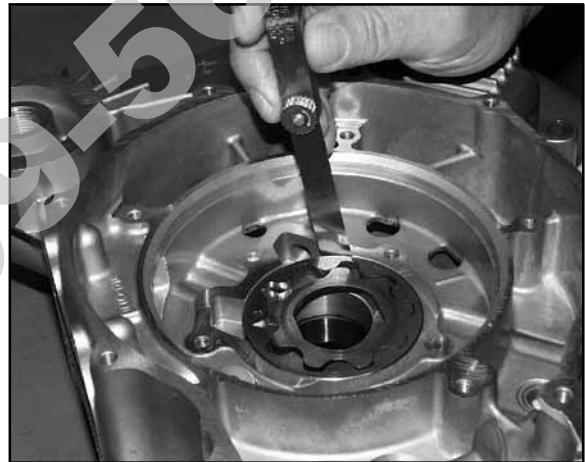
OIL PUMP
REMOVAL/INSPECTION

1. Remove the five screws on the oil pump cover with an impact driver.
2. Inspect rotors and mating surface of oil pump cover. Check for nicks, burrs, or surface irregularities.
3. Measure pump end clearance using a feeler gauge and straight edge.



Outer Feed Rotor to Crankcase Clearance:
Std: .001-.003 (.0254-.0762 mm)
Wear Limit: .004 (.1016 mm)

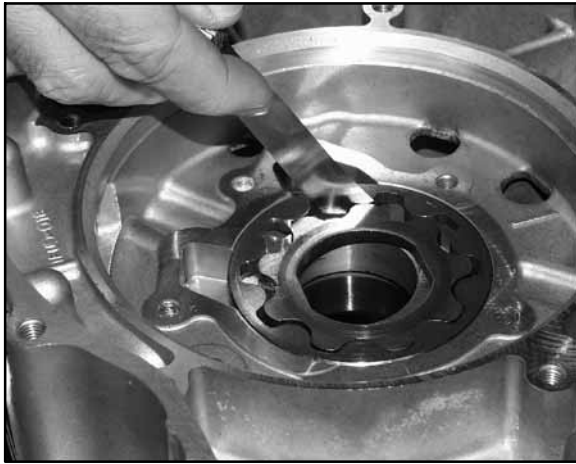
4. Measure clearance between outer feed rotor and crankcase pocket with a feeler gauge.



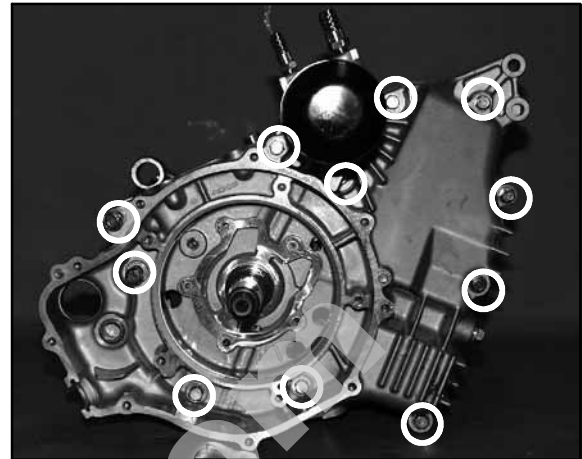
Pump End Clearance:
Std: .001-.003 (.0254-.0762 mm)
Wear Limit: .004 (.1016 mm)



5. Measure rotor tip clearance with a feeler gauge.



Rotor Tip Clearance:
Std: .005 (.127 mm)
Wear Limit: .008 (.2032 mm)



2. Separate crankcase by tapping with a soft faced hammer in reinforced areas.
3. Watch the gap along the crankcase mating surface and separate the crankcase evenly.
4. Remove the Mag (RH) crankcase from the PTO case.

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 cover mating surfaces or clearances will be incorrect, and oil passages may become plugged.
2. Install outer feed rotor and inner feed rotor drive pin.
3. Install inner feed rotor and feed chamber cover with screw.
4. Tighten screw securely.
5. Install oil pump on crankcase and torque bolts to 6 ft. lbs. (8 Nm).

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

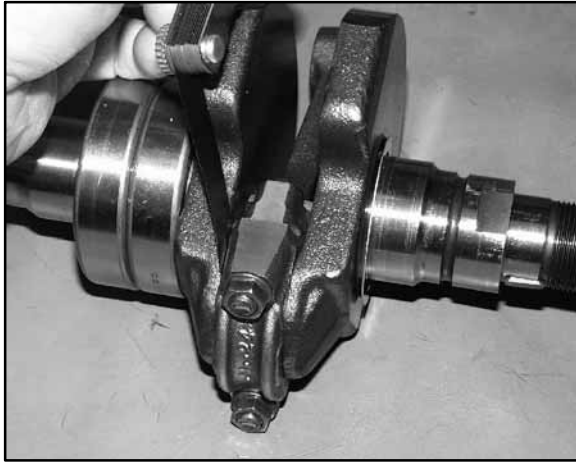
CRANKSHAFT REMOVAL/INSPECTION

1. Support the MAG side crankcase and crankshaft; press the crankshaft out. Be careful not to damage the crankcase mating surface or connecting rod.





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



Connecting Rod Big End Side Clearance:

Std: .0028-.0118 (0.07-0.30 mm)

Limit: .0138 (.35 mm)

3. If the clearance exceeds the service limit, either the crankshaft, connecting rod or both need to be replaced. Refer to Steps 1 & 2 under crankshaft inspection to determine which part(s) are outside of specifications.

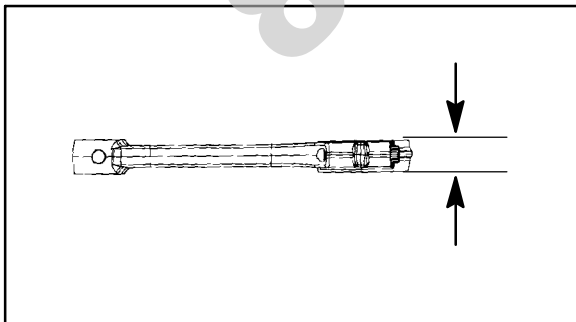
NOTE: Markings on connecting rod and cap that must be aligned for assembly. If marks are not clearly visible, mark the rod and cap with a permanent marker.

4. Remove the connecting rod nuts and connecting rod bearing cap.

NOTE: It may be necessary to lightly tap on the side of the cap with a plastic mallet to loosen it.

CRANKSHAFT INSPECTION

1. Measure the width of the rod bearing journal.

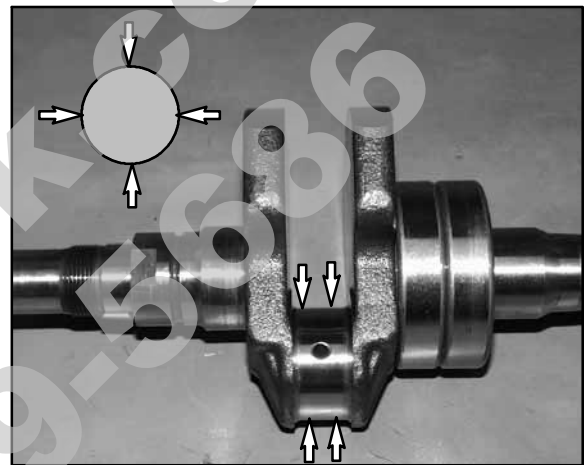


2. Measure the width of the connecting rod at the big end.

Connecting Rod Width:

Std: .8233-.8252l (20.88-20.93 mm)

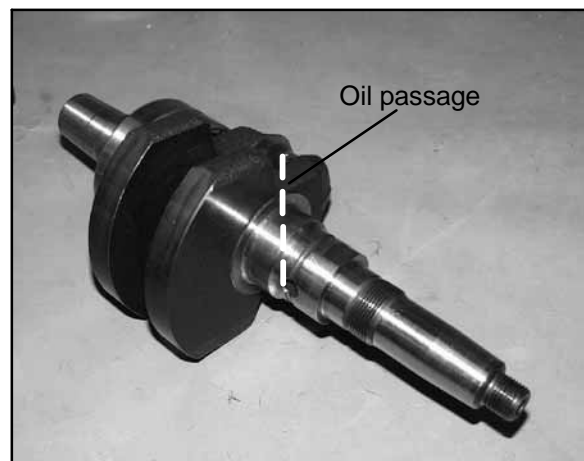
3. Visually inspect bearing journal for scoring, damage or excessive wear. Replace crankshaft if it fails visual inspection.
4. Measure the O.D. of the crankshaft rod journal in four places and in two directions away from the oil hole. Replace the crankshaft if it measures below the service limit, or if the journal is out of round.



Rod Bearing Journal O.D.:

Std: 1.6531-1.6535l (41.989-42.000 mm)

5. Check oil passage to make sure it is clear.





CRANKSHAFT MAIN BEARING INSPECTION

1. Inspect the crankshaft main bearings.

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 outer race of each bearing. The bearings should turn smoothly and quietly. The inner race of each bearing should fit tightly in the crankshaft. The outer race should be firm with minimal side to side movement and no detectable up and down movement.

2. Replace bearings if they fail visual inspection.

CONNECTING ROD BEARING INSPECTION

1. Inspect bearing inserts for unusual wear, peeling, scoring, damage etc. Replace as necessary.

NOTE: If one insert requires replacement, replace both connecting rod bearing inserts as a set.

CONNECTING ROD BEARING CLEARANCE INSPECTION

1. Clean all oil from bearing inserts and crank pin.
2. Place a strip of Plastigauge® across the complete width of the crank pin.
3. Install the connecting rod and bearing cap in the correct orientation.
4. Torque the rod nuts to specification.

Rod Nut Torque:

29-33 ft. lbs. (39-45 Nm)

5. Remove the bearing cap being careful not to disturb the Plastigauge®.
6. Use the measuring scale on the Plastigauge® wrapper to measure the thickness of the Plastigauge®. **The rod must not turn during this procedure.**



NOTE: Use the widest part of the Plastigauge® to determine the oil clearance.

Connecting Rod To Crankshaft Clearance:

Std: .0007-.0021 (.019-.053 mm)

Limit: .0026 (.065 mm)

7. If oil clearance is not within specification, install new rod bearings and recheck the oil clearance.
8. If service limit is still exceeded, determine if the crankshaft or connecting rod needs to be replaced per Crankshaft Inspection and Connecting Rod Inspection.
9. At completion of measurement procedure; remove all traces of Plastigauge® from bearing and crankshaft.

CRANKCASE BEARING INSPECTION

1. Inspect the crankshaft main bearing in the MAG side crankcase.

NOTE: Due to extremely close tolerances and minimal side wear, the bearing must be inspected visually and by feel. Look for signs of discoloration, scoring or galling. Turn the inner race of bearing. The bearing should turn smoothly and quietly. The outer race 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.

2. To remove crankshaft bearing, use a blind hole bearing puller.

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



CRANKCASE INSPECTION

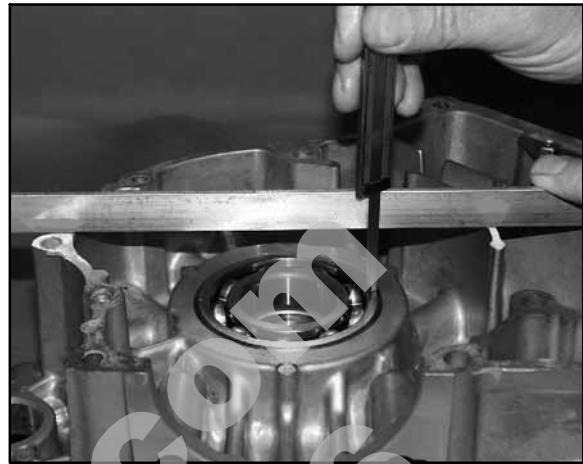
1. Remove all traces of gasket sealer from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.

BEARING INSTALLATION

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

1. Install the crankshaft bearing so the numbers are visible.
2. Drive or press the new bearing into the crankcase, using the proper driver. **CAUTION:** Press only on outer race of bearing to prevent bearing damage.
 - G Use a 70mm (2.755") driver- For crankshaft main bearings.

2. Measure the distance from the MAG side crankcase mating surface to the main bearing using a dial caliper and a straight edge.



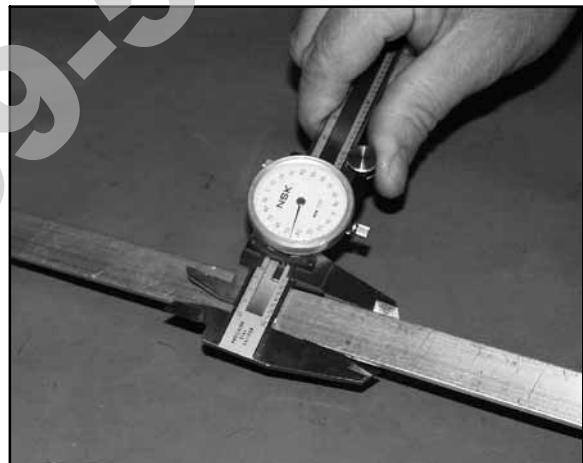
END PLAY INSPECTION/ADJUSTMENT

Before reassembling the crankcase, the following steps should be performed to determine the amount of crankshaft 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

1. Make sure crankshaft bearing is firmly seated in the MAG side crankcase.

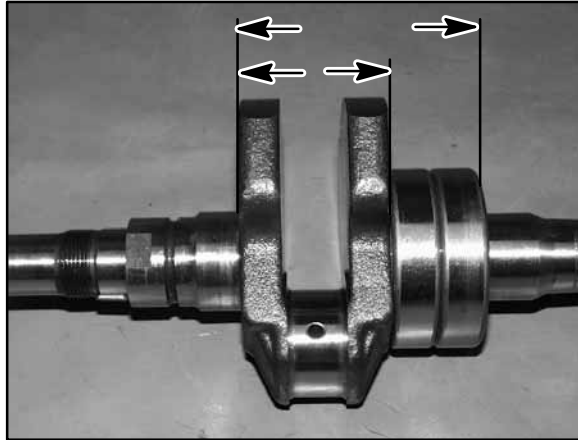
3. Subtract the thickness of the straightedge from the measurement obtained in Step 2 and record. Repeat Step 2 and 3 for the PTO case. If PTO bearings are not installed in the crankcase, measure to the bearing seat in the case.



MAG Case Depth _____
 + PTO Case Depth _____
 = Total Case Width _____



4. Measure the width of the crankshaft at the bearing seats or, if PTO bearings are installed, the width from MAG side bearing seat to the outside race of the PTO bearings with a micrometer or dial caliper and record.



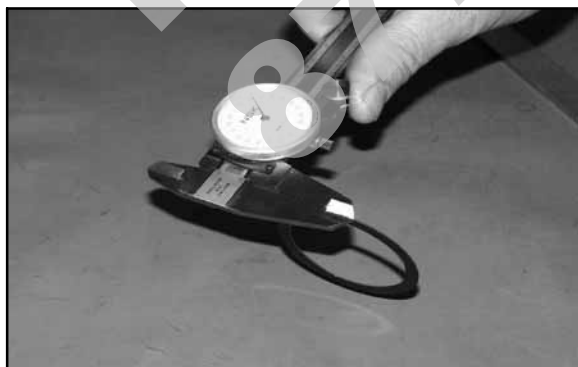
NOTE: If PTO bearings are not installed, measure the width of the bearings and add to crankshaft width.

Crankshaft Width _____

5. Subtract the Crankshaft Width measured in Step 4 from the Total Case Width recorded in Step 3, and record below.

Total End Play _____

6. Subtract the thickness of the existing shim from the result of Step 5 to determine if a different shim is required. The result must be within the specified range listed below. Increase or decrease shim thickness as required to bring end play within range.



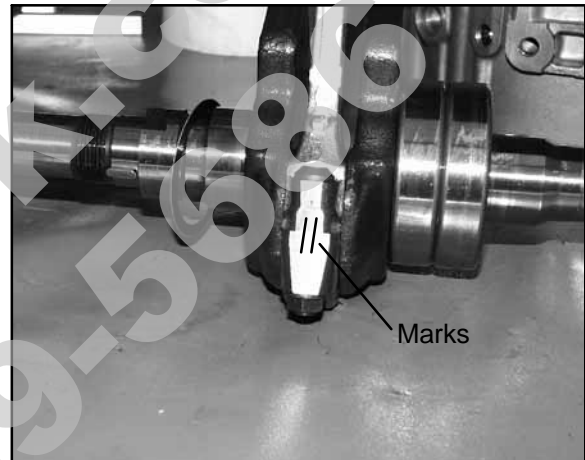
Crankshaft End Play:
008"-.016" (.02-.04 cm)

ENGINE ASSEMBLY/ CONNECTING ROD INSTALLATION

1. Clean all oil off connecting rod, connecting rod cap and bearing inserts.
2. Install bearing inserts onto connecting rod and cap.

NOTE: First, install bearing tab into groove, then press the rest of the bearing into place.

3. Apply assembly lube onto the connecting rod bearings and crank pin.
4. Install rod and cap onto the crankshaft. Ensure that I.D. marks are aligned.



NOTE: Procedure during disassembly called for marking of connecting rod and cap. Ensure that each part is installed in its original location by noting the marks placed on the parts during disassembly.

5. Tighten rod cap nuts to 1/2 torque specification, then full torque.

Rod Nut Torque:
29-33 ft. lbs. (39-45 Nm)

6. Verify that the connecting rod is free to rotate on the crankshaft journal.



CRANKSHAFT INSTALLATION

Lubricate all bearings with clean engine oil before assembly.

1. Install the crankshaft into the PTO side crankcase.
2. Install the proper shim on the magneto end of the crankshaft.

CRANKCASE OIL STRAINER INSPECTION

1. Remove bolt securing oil strainer to the MAG side crankcase.
2. Remove oil strainer and visually inspect for any rips, tears or obstructions in screen.
3. Replace oil strainer if it fails visual inspection.

CRANKCASE REASSEMBLY

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. Mate the crankcase halves by tapping lightly with a soft faced hammer. Continually check alignment of the cases during installation, closing the gap equally until the surfaces are tightly sealed.
3. Install the crankcase flange bolts and tighten to specified torque in 3 steps according to the torque pattern. See Page 3.4.

Crankcase Bolt Torque:

14-15 ft. lbs. (19-21 Nm)

Crankcase Sealant :

(PN 2871557)

OIL PUMP INSTALLATION

1. Inspect the oil pump sealing surface on the crankcase. Apply a light film of engine oil to the surfaces. Install outer and inner rotors over crankshaft .

2. Install oil pump cover. Torque screws to specified torque.

Oil Pump Cover Screw Torque:

4-5 ft. lbs. (5-7 Nm)

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

OIL RELIEF VALVE INSTALLATION

Install the oil relief valve, spring, and plug using a new sealing washer.

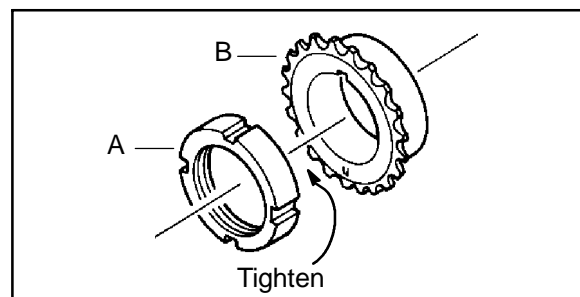


Oil Relief Valve Plug Torque:

14-17 ft. lbs. (19-23 Nm)

CAM CHAIN DRIVE SPROCKET INSTALLATION

1. Install the Woodruff key, drive sprocket, and slotted nut. Using the Slotted Nut Socket (PN 2871293), tighten the nut to the specified torque.



Slotted Nut Torque:

45 ft. lbs. (61 Nm)





TENSIONER BLADE INSTALLATION

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

Tensioner Blade Mounting Bolt Torque:

5-6.5 ft. lbs. (7-9 Nm)

OIL FILTER INSTALLATION

1. Apply clean engine oil to oil filter gasket. Install filter until gasket lightly touches seat and then tighten an additional 3/4 of a turn.

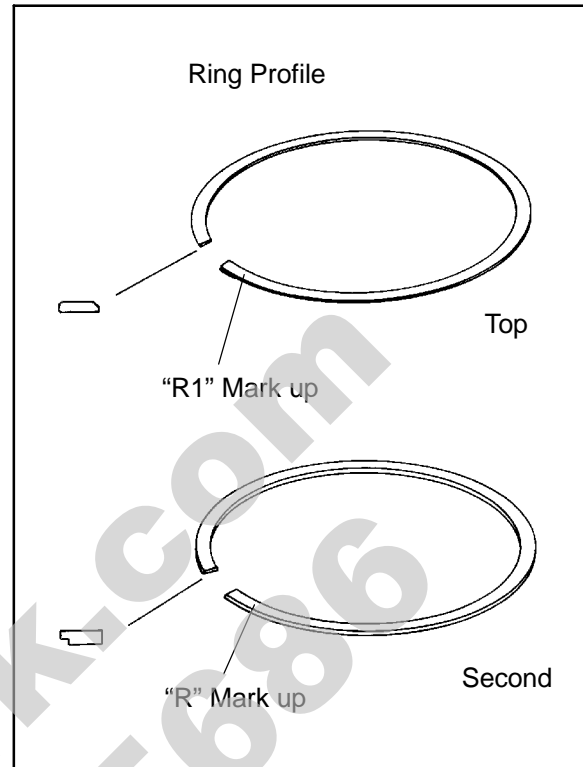
Oil Filter Connector Torque:

36-43 ft. lbs. (49-59 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. See Page 3.36. 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 with the end gap at least 30° from the end of the expander.
3. Install the bottom rail with the gap at least 30° from the end of the expander on the side opposite the top rail gap.



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 "R1" mark facing up and the end gap facing forward (toward the exhaust).
6. Check to make sure the rings rotate freely in the groove when compressed.

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*.

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.



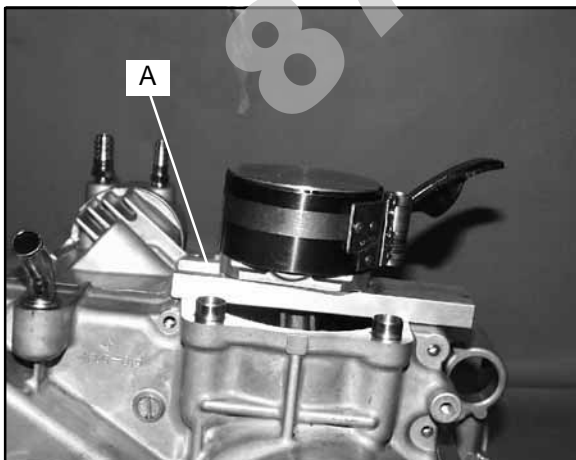
4. Apply clean engine oil to the piston rings, ring lands, piston pin bore, piston pin, and piston skirt. Lubricate the connecting rod (both ends) and crankshaft main bearing area.
5. **Install the piston on the connecting rod with the pin casting notch facing the rear of engine (starter side). The piston pin should be a push fit in the piston.**



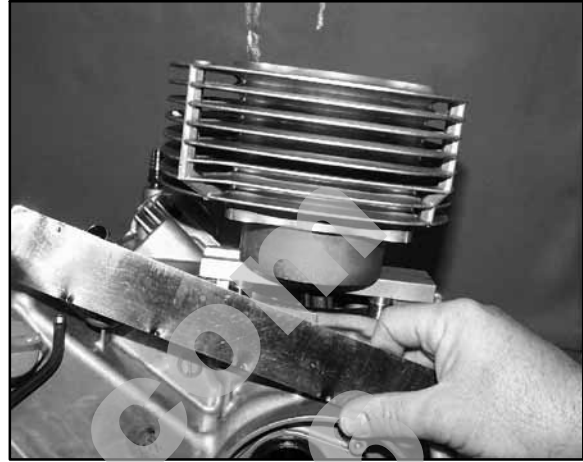
6. Install the other circlip with the gap facing up or down. (See Caution with Step 3 above). Push the piston pin in both directions to make sure the clips are properly seated in the groove.
7. Place the dowel pins in the crankcase and install a new cylinder base gasket.
8. Lubricate the piston and rings with assembly lube and install a sleeve-type ring compressor on the piston assembly. Verify that the ring gaps are 120 degrees apart from each other before installation.

CYLINDER INSTALLATION

1. Position the Piston Support Block (PN 2870390) (A) beneath the piston skirt to support the piston during cylinder installation.



2. 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.



3. Remove the ring compressor and support block.
4. Push the cylinder downward until fully seated on the base gasket.

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.

5. Install the two 6 mm bolts, but do not tighten.

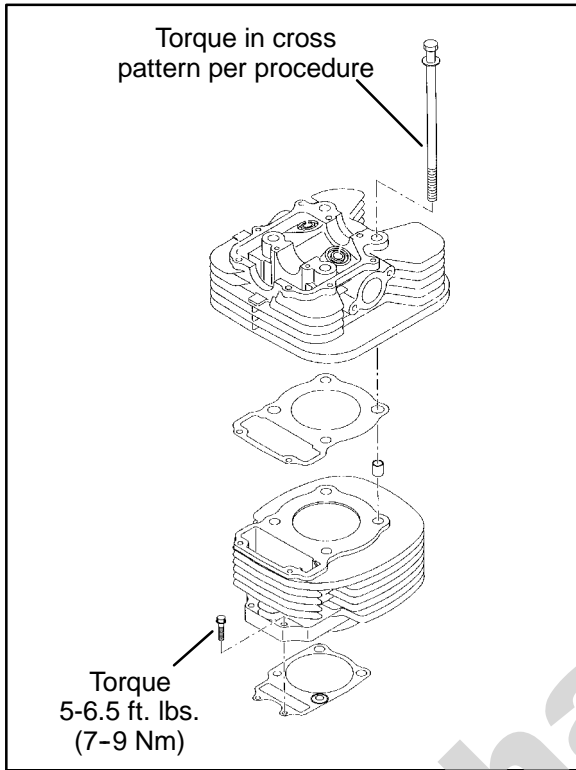
CYLINDER HEAD INSTALLATION

Clean the gasket surfaces on the cylinder head and cylinder. Remove all traces of old gasket material.

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 cross pattern. Apply oil to bolt threads

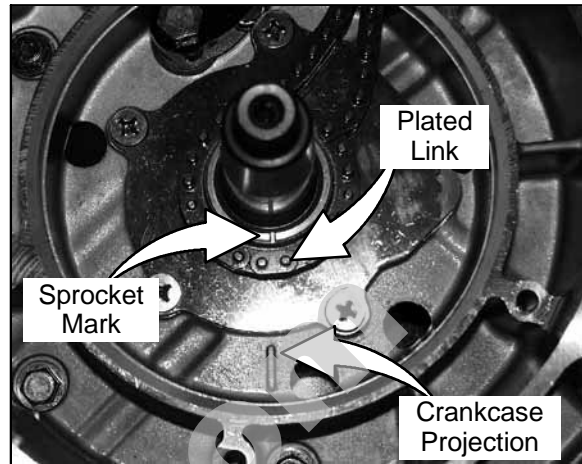
- *Torque bolts to 18 ft. lbs. (24.5 Nm)**
- *Loosen bolts evenly 180° (1/2 turn)**
- *Torque bolts to 11 ft. lbs. (14.7 Nm)**
- *From this point, tighten bolts evenly 90° (1/4 turn)**
- *Finally, tighten another 60° (1/6 turn)**

Torque 6mm case bolts to 5-6.5 ft. lbs. (7-9 Nm)

CAM CHAIN/CAMSHAFT INSTALLATION

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

Install the cam chain over the crankshaft.



IMPORTANT CAMSHAFT TIMING NOTE: In order to time the camshaft to the crankshaft, the piston must be precisely located at Top Dead Center (TDC). This can be accomplished using one of two methods.

When the stator assembly is removed, follow the procedure outlined in Method 1. This method uses the cam chain plate links to time the camshaft and the dot on the cam chain drive sprocket to establish TDC (see below, Method 1). It is important to note that this method can *only* be used when the stator is removed and the cam chain drive sprocket is in view. The plate links *are not* used to time the camshaft when the flywheel is installed.

When the stator assembly is installed, use Method 2. This method establishes accurate Top Dead Center (TDC) by aligning the single mark on the flywheel with the notch in the timing inspection hole (see Method 2, Page 3.40). The camshaft sprocket alignment marks are parallel to the gasket surface, the alignment pin faces to the intake side, and camshaft lobes are pointing down.

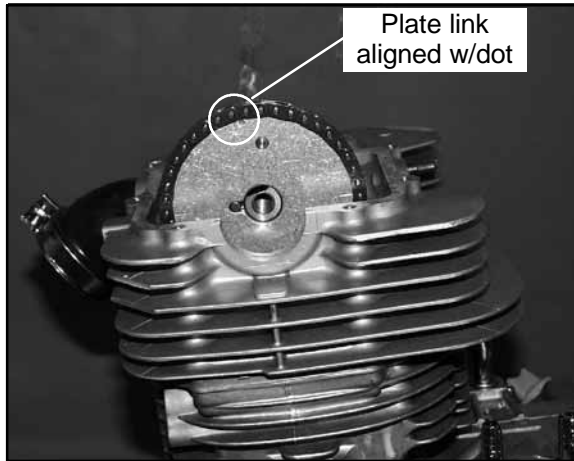
Camshaft Installation - Timing Method 1 Refer to Illustration Page 3.39

If the stator assembly is removed: **NOTE:** Use this method only when the stator is removed and cam chain drive sprocket is in view.

1. Rotate the crankshaft until the mark on the cam chain drive sprocket is aligned with the crankcase projection (mark facing downward).
2. Align the single plated link on the cam chain with the marked tooth of the cam chain drive sprocket. Use a wire to pull the chain up through the cylinder and cylinder head, and secure it to hold the chain in place.



- Apply Polaris Low Temp Grease (PN 2870577), or engine assembly lubricant to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil. (To install the compression release mechanism, refer to Page 3.14).



- Install the camshaft with the lobes facing downward and the sprocket alignment pin facing toward intake.
- Disconnect the wire from the cam chain and install the cam sprocket with the dot facing outward.
- Loop the cam chain over the cam sprocket, aligning the plated link on the chain with the dot on the sprocket.
- Install the sprocket on the camshaft. Apply Loctite[®] 242 (PN 2871949) to the cam sprocket bolt and torque to specifications.

Cam Sprocket Bolt Torque:

25-29 ft. lbs. (34-40 Nm)

- Check all cam timing marks to verify proper cam timing, and install the cam chain tensioner. See Cam Chain Tensioner Installation Page 3.41. **NOTE:** The plate links will not align after engine is rotated.

Camshaft Installation - Timing Method 2 Refer to Page 3.40

- Apply Polaris Low Temp Grease (PN 2870577), or molybdenum disulfide grease to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil. (To install the compression release mechanism, refer to Page 3.18).
- Install the camshaft with the lobes facing downward and the sprocket alignment pin facing toward intake.
- 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.
- Loop the cam chain onto the cam sprocket with the dot on the sprocket facing outward and the alignment marks parallel with gasket surface.
- 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 is facing to the intake side.
- Install the sprocket on the camshaft. Apply Loctite[®] 242 (PN 2871949) to the cam sprocket bolt and torque to specifications.
- Check all cam timing marks to verify proper cam timing, and install the cam chain tensioner body with a new gasket.
- After tensioner installation, rotate engine at least two revolutions and re-check marks/timing.

Cam Sprocket Bolt Torque:

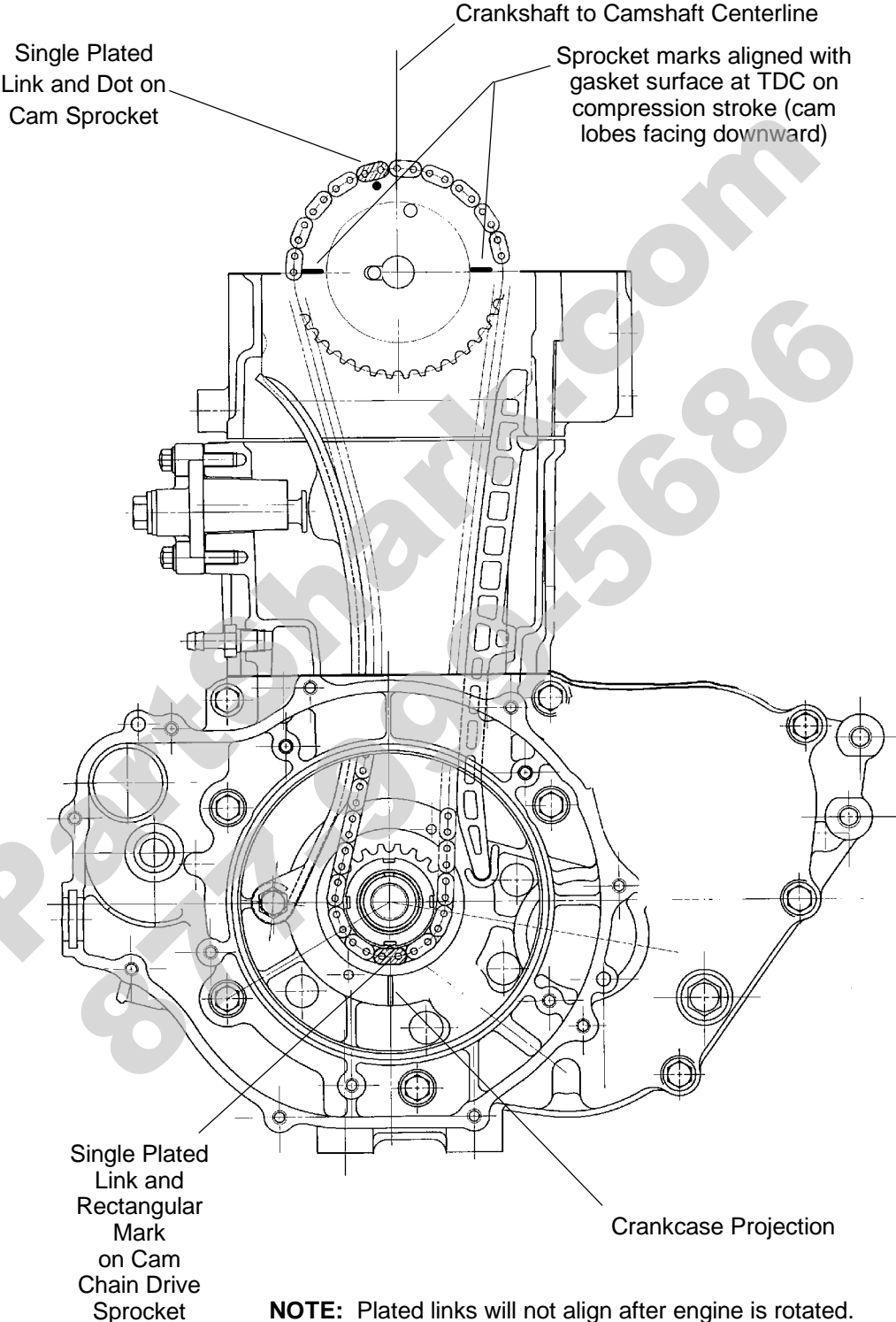
25-29 ft. lbs. (34-40 Nm)





CAMSHAFT TIMING - METHOD 1

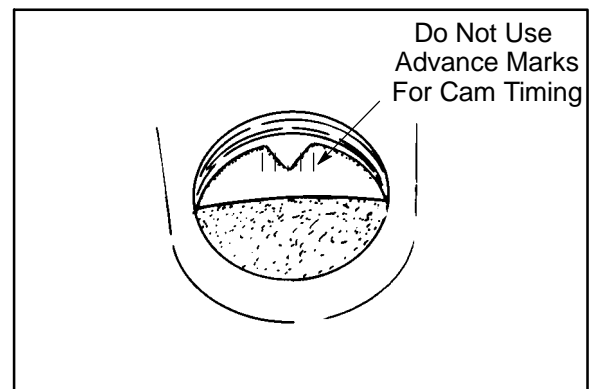
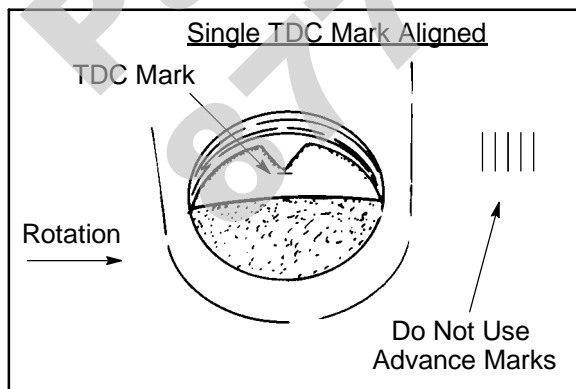
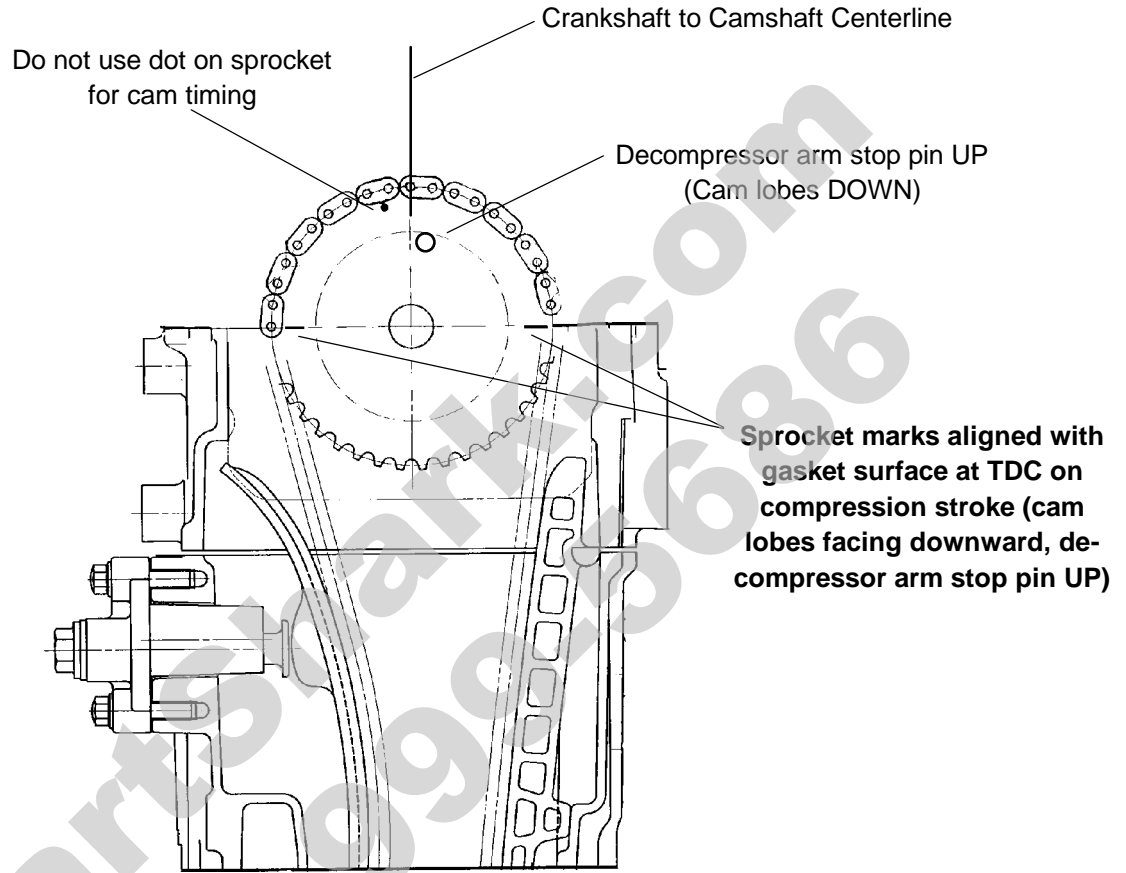
Method 1 - Camshaft Timing with Stator Removed





CAMSHAFT TIMING - METHOD 2

Method 2 - Camshaft Timing Using Flywheel TDC Mark



Cam Timing

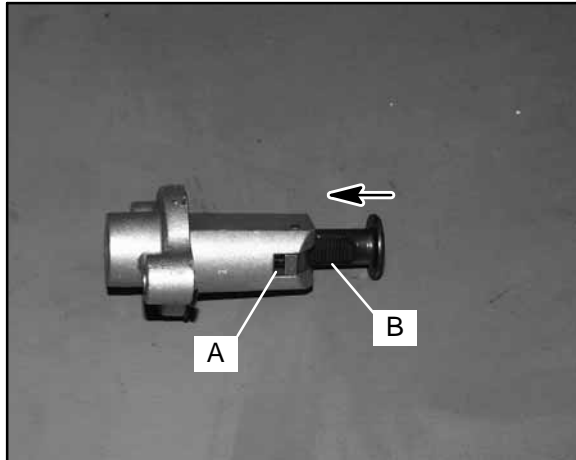
(View through timing inspection hole)

Position crankshaft at TDC



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 to specification.

Tensioner Bolt Torque:
8-10 ft. lbs. (11-14 Nm)

3. Install the spring, pin, new sealing washer, and tensioner plug. Torque plug to specification.



Tensioner Plug Torque:
14-19 ft. lbs. (20-25 Nm)

4. Slowly rotate engine two to three revolutions and re-check cam timing once chain is tight.

STATOR 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. Apply Crankcase Sealant (**PN 2871557**) to the stator plate outer surface and install a new O-Ring.
3. 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.
4. Torque bolts evenly to specification.

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

5. Seal stator wire grommet with Crankcase Sealant (**PN 2871557**).



FLYWHEEL INSTALLATION

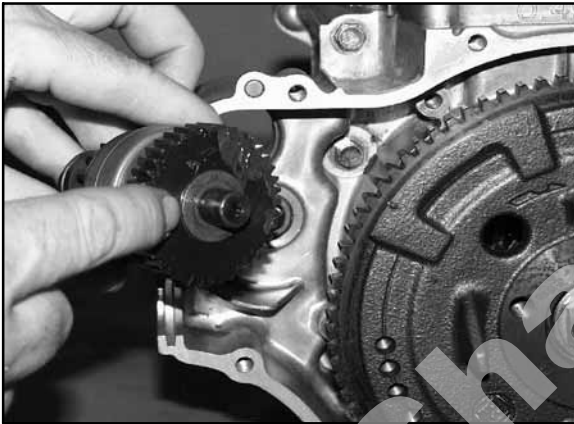
1. Install flywheel, washer, and nut. Torque flywheel to specification.

Flywheel Nut Torque:

58-72 ft. lbs. (78-98 Nm)

STARTER DRIVE ASSEMBLY

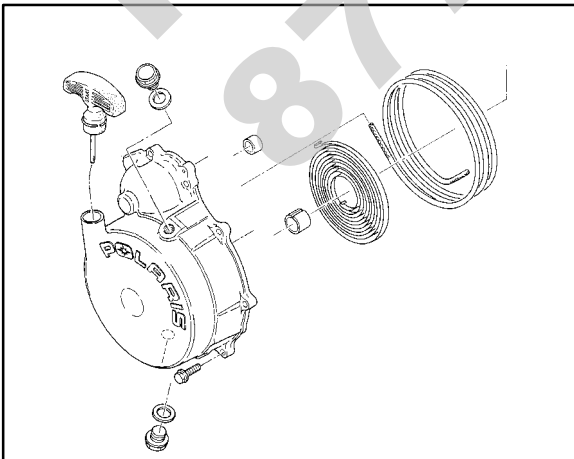
1. Be sure the washer is positioned on the back of the drive gear.



Starter Drive Grease:

(PN 2871460)

2. Apply Starter Drive Grease (PN 2871460) to the drive bushing in the crankcase and all moving surfaces of the starter drive mechanism. Install the starter drive.



3. Install recoil housing.

ROCKER SHAFT/ARM INSTALLATION

1. Assemble rocker arms, rocker shaft and wave washer into rocker cover.
2. Install and tighten rocker shaft block plug.
3. Apply engine assembly lube to the cam lobes and cam follower surfaces.
4. Rotate the engine until the cam lobes are pointing downward.
5. Apply clean engine oil liberally to the valve springs, cam chain, rocker arms, and camshaft.
6. Apply Crankcase Sealant (PN 2871557) to the rocker cover mating surfaces. Be sure the alignment pins are in place.
7. Install the rocker cover assembly.
8. Install rocker cover bolts and torque to specifications.

Rocker Cover Bolt Torque:

7-8 ft. lbs. (9-11 Nm)

9. Adjust valves according to the "INTAKE VALVE CLEARANCE PROCEDURE" on next page.
10. Install rocker cover block plug.

Rocker Cover Block Plug Torque:

39-44 ft. lbs. (53-59 Nm)

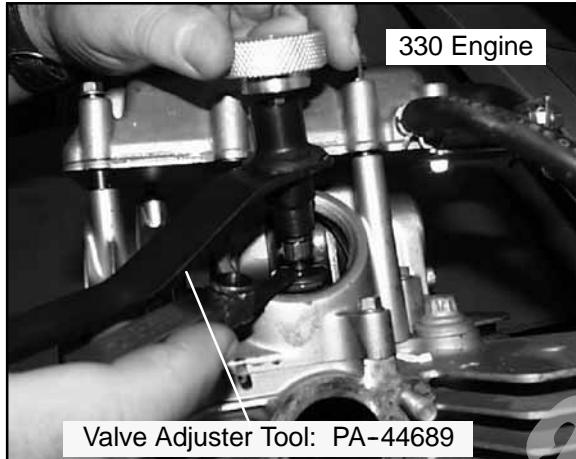
11. Install valve adjustment caps with new o-rings. Tighten securely.





INTAKE VALVE CLEARANCE ADJUSTMENT

1. Insert a .006" (.15mm) feeler gauge between end of intake valve stem and clearance adjuster screw.
2. Using Valve/Clutch Adjuster Tool (**PN PA-44689**), loosen adjuster lock nut and turn adjusting knob 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.

EXHAUST VALVE CLEARANCE ADJUSTMENT

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).

NOTE: The 330 exhaust valve is adjusted the same as the intake valve. The Valve/Clutch Adjuster Tool (**PN PA-44689**) can be used to adjust the 330 engines valves.

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.

VALVE CLEARANCE 330 Engines

.006" (.15 mm)

6. 330: Inspect o-rings on the plastic valve plugs, replace if damaged. Securely fasten valve plugs.
7. Scrape gasket surfaces to remove all traces of the old gasket.
8. Remove the shop towel from the spark plug cavity.
9. Install the spark plug. Torque to 14 ft. lbs. (19 Nm).
10. Install the spark plug high tension lead.
11. Install parts removed for access.

**330 Engine
Spark Plug Torque: 14 ft. lbs. (19 Nm)**

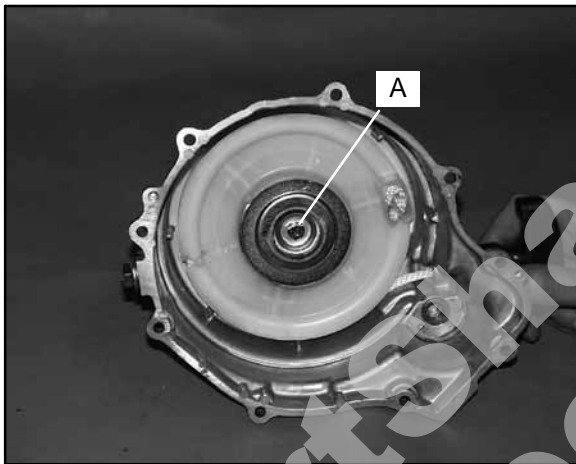


RECOIL DISASSEMBLY/INSPECTION

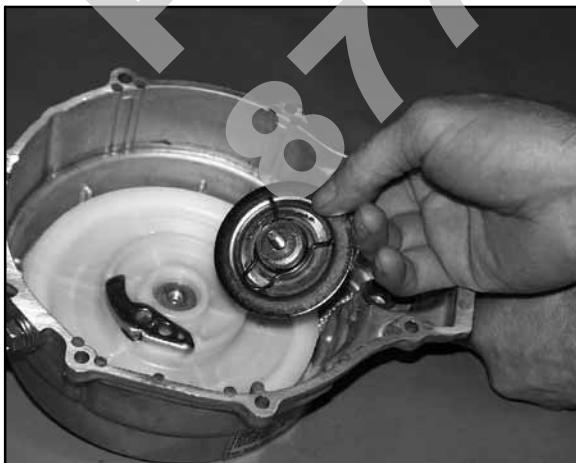
CAUTION: Recoil is under spring tension. A face shield or eye protection is required during this procedure.

Replace any parts found to be worn or damaged.

1. Remove bolts and recoil housing from engine.
2. Pull recoil rope so it is extended approximately 12-18". 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.
NOTE: The handle must seal tightly on the recoil housing to prevent water and dirt from entering.
3. Remove center bolt from recoil friction plate (A).



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



5. 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 rests against pawl.

6. Hold reel firmly in housing. Pull rope handle until 12-18" of rope is exposed, and hold reel in place.

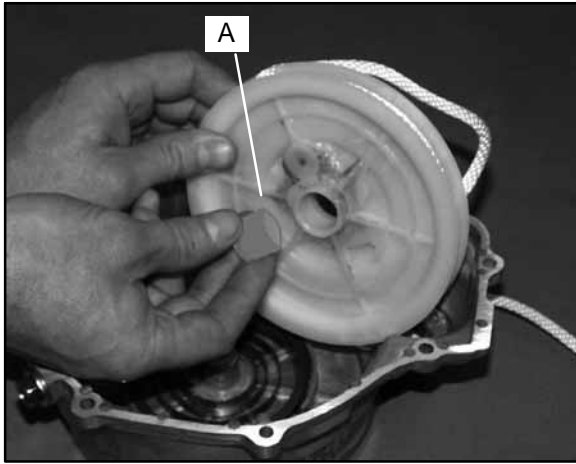


7. Place rope in notch on outer edge of reel. Release tension on hub and allow reel to unwind approximately 6-7 turns until spring tension is released.





8. 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.



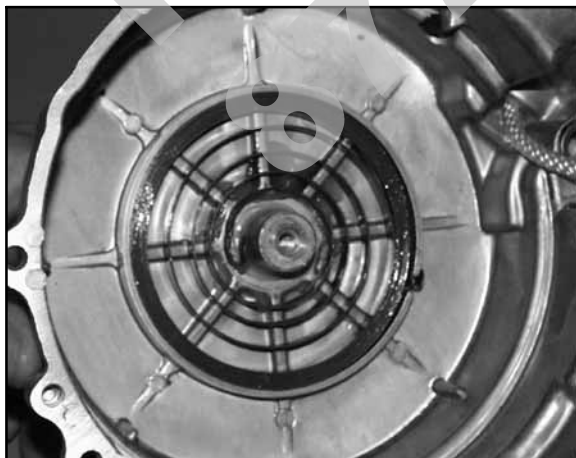
9. Unwind rope and inspect for cuts or abrasions.
10. Inspect drive tab on hub return spring for damage. To remove hub return spring, hold outer coils in place with one hand and slowly remove spring one coil at a time from the inside out.
11. Pull knot out of of recoil reel. Untie knot. Remove rope from reel.

RECOIL ASSEMBLY

CAUTION: Recoil is under spring tension. A face shield or eye protection is required during 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.



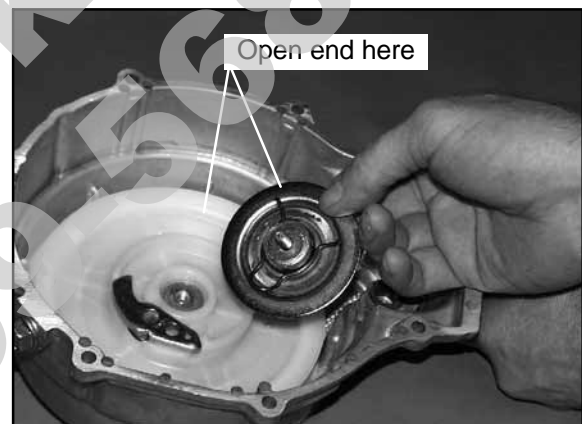
2. Hold spring in place and cut retaining wire.

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.

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. Apply Crankcase Sealant (**PN 2871557**) to the recoil housing outer edge. Reinstall recoil housing. Seal stator wire harness grommet with RTV silicone.



SPARK PLUG FOULING

TROUBLESHOOTING

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

TROUBLESHOOTING

Engine Turns Over But Fails to Start

- G No fuel
- G Dirt in fuel line or filter
- G Fuel will not pass through fuel valve
- G Fuel pump inoperative/restricted
- G Tank vent plugged
- G Carb starter circuit

- G Engine flooded
- G Low compression (high cylinder leakage)
- G No spark (Spark plug fouled)

Engine Does Not Turn Over

- G Dead battery
- G Starter motor does not turn
- G Engine seized, rusted, or mechanical failure
- G Recoil components damaged

Engine Runs But Will Not Idle

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

Engine Idles But Will Not Rev Up

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

Engine Has Low Power

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





TROUBLESHOOTING

Piston Failure - Scoring

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

Excessive Smoke and Carbon Buildup

- G Excessive piston-to-cylinder clearance
- G Worn rings, piston, or cylinder
- G Worn valves, guides or seals
- G Restricted breather
- G Air filter dirty or contaminated

Low Compression

- G Decompressor stuck
- G Cylinder head gasket leak
- G No valve clearance or incorrectly adjusted
- G Cylinder or piston worn
- G Piston rings worn, leaking, broken, or sticking
- G Bent valve or stuck valve
- G Valve spring broken or weak
- G Valve not seating properly (bent or carbon accumulated on valve area)
- G Rocker arm sticking

Backfiring

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





NOTES

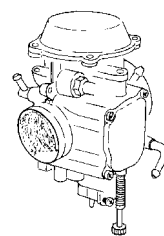
Lined area for notes, featuring horizontal lines and a large diagonal watermark reading "PartShark.com 877-999-5686".



CHAPTER 4

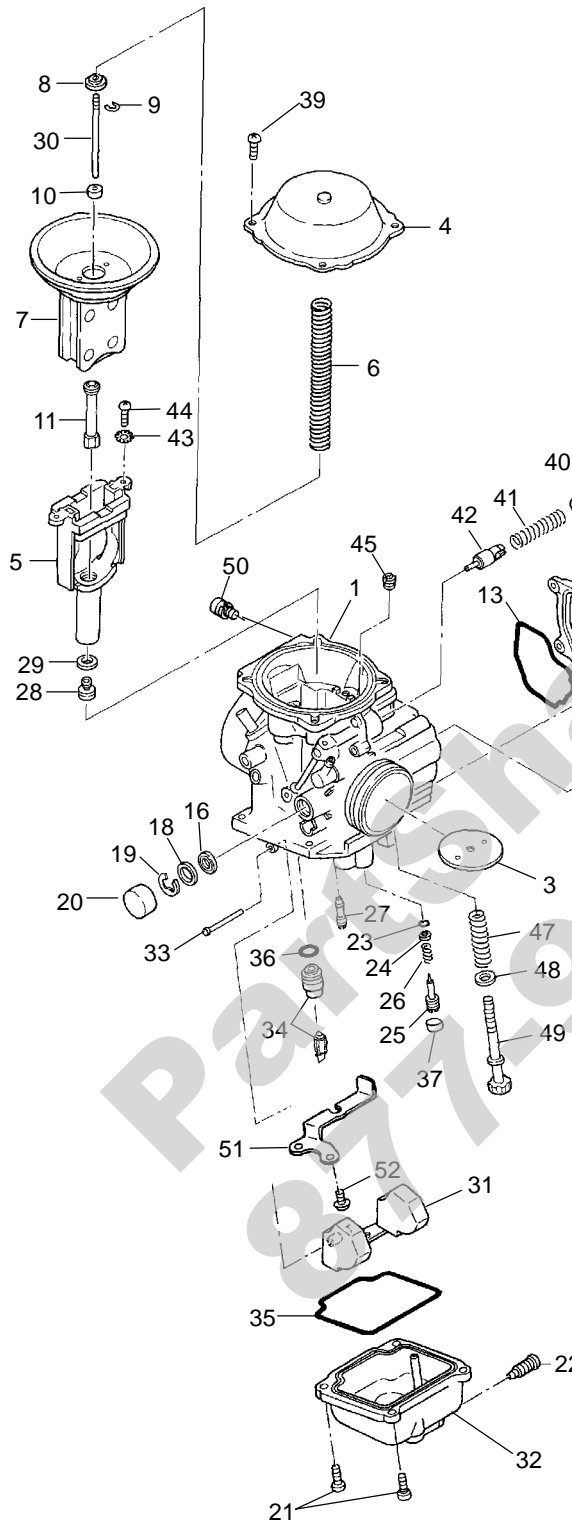
FUEL/CARBURETION

Exploded View, Mikuni BST 34 Carburetor . . .	4.2
Fuel Pump Exploded View	4.3
Fuel Tank Asm. Exploded View	4.4
Fuel Flow Diagram	4.4
Special Tools & Jetting Guidelines	4.5
Carburetor Jetting	4.6
Main Jet / Pilot Jet Part Numbers	4.6
CV Carburetor System Function (4 Cycle) . . .	4.6
CV Carburetor Vent System (4 Cycle)	4.7
CV Carburetor Operation	4.7-4.9
Pilot Screw	4.9
Disassembly, CV Carburetor	4.10
Cleaning, CV Carburetor	4.11
Inspection, CV Carburetor	4.11
Assembly, CV Carburetor	4.12
Float Adjustment, CV Carburetor	4.13
Needle & Seat Leakage Test	4.13
Fuel Level	4.14
Fuel Pump Service	4.14
Troubleshooting	4.15

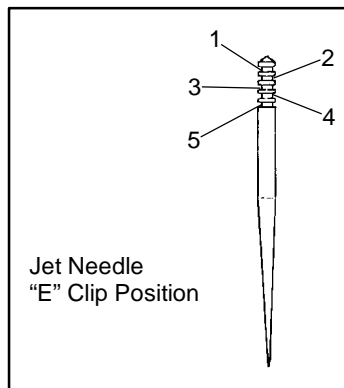




BST 34 CARBURETOR EXPLODED VIEW



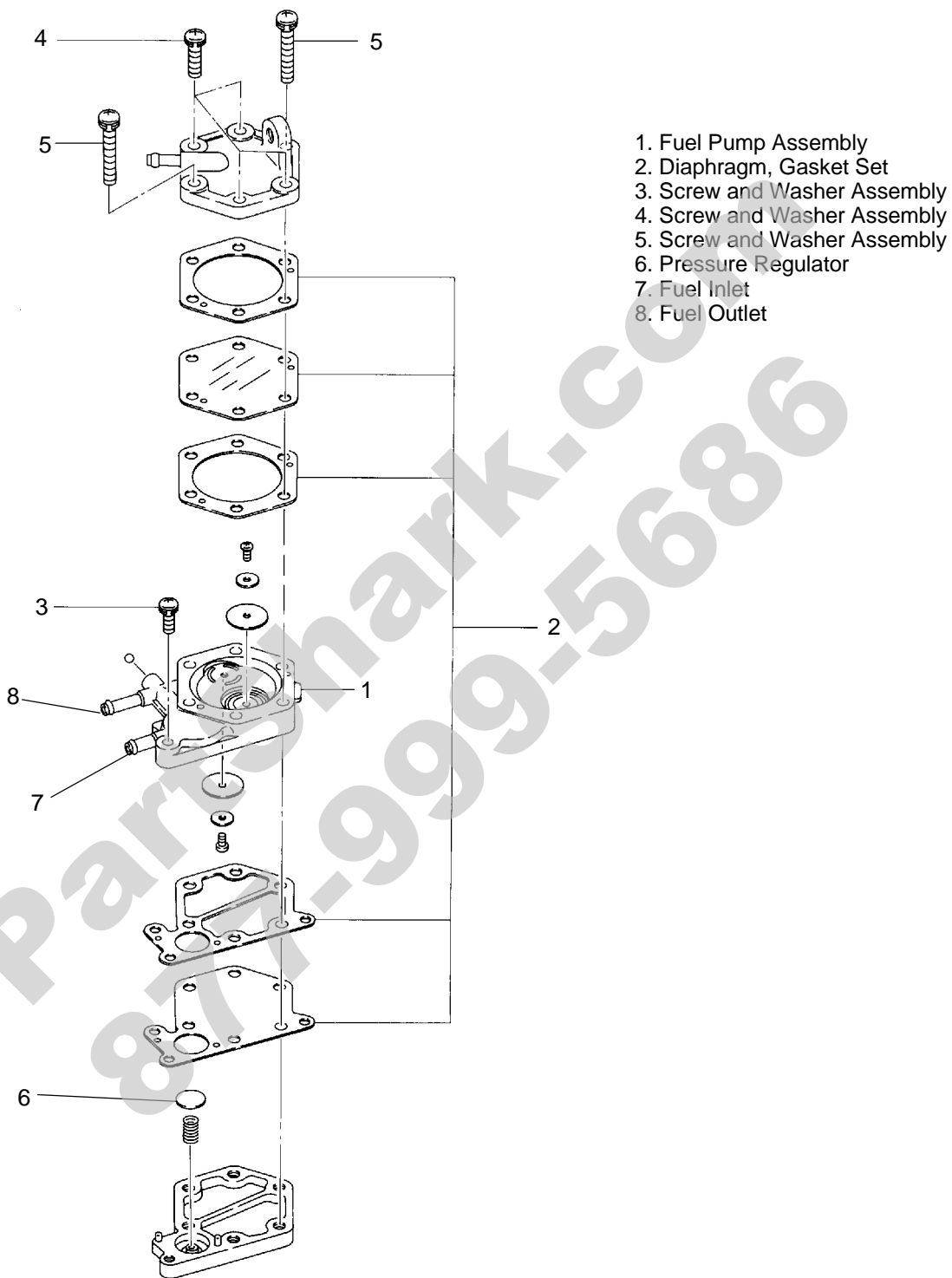
Refer to Page 4.5 for Jet Part Numbers



1. Carburetor Assembly
2. Screw
3. Throttle Valve
4. Cover, Diaphragm
5. Jet Block Assembly
6. Spring
7. Diaphragm Assembly
8. Ring
9. "E" Ring
10. Ring
11. Needle Jet
12. Cover
13. O-Ring
14. Throttle Shaft Assembly
15. Ring
16. Seal
17. Spring
18. Packing
19. "E" Ring
20. Cap
21. Screw
22. Drain Screw
23. O-Ring
24. Washer
25. Adjuster
26. Spring
27. Pilot Jet
28. Main Jet
29. Washer
30. Jet Needle
31. Float Assembly
32. Float Body Assembly
33. Float Pin
34. Needle Valve
35. O-Ring
36. O-Ring
37. Plug
38. Screw
39. Screw
40. Guide Holder
41. Spring
42. Plunger Assembly
43. Spring Washer
44. Screw
45. Air Jet
46. Cable Guide
47. Spring
48. Ring
49. Adjust Screw
50. Screw and Washer Assy.
51. Plate
52. Screw

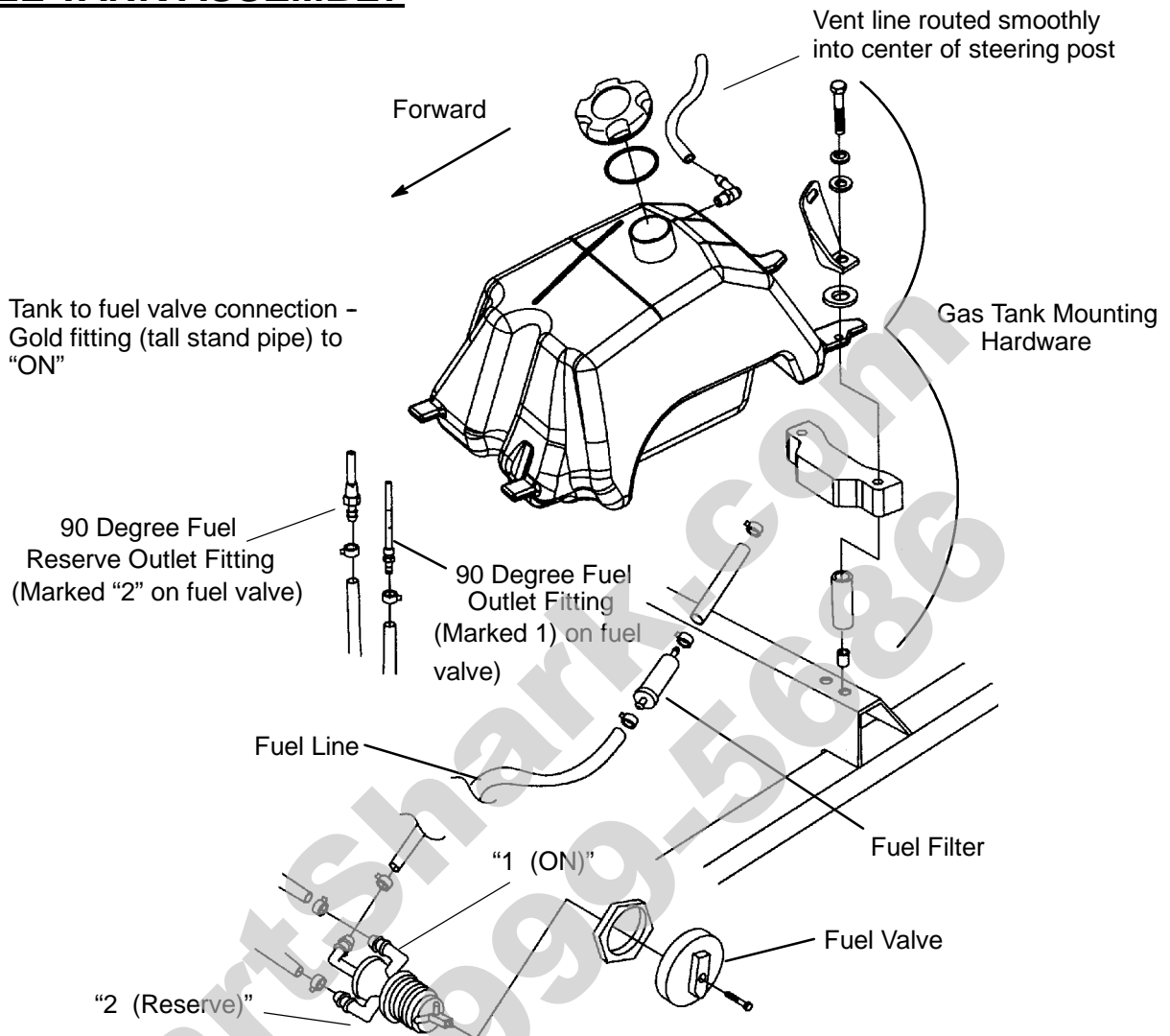


FUEL PUMP EXPLODED VIEW



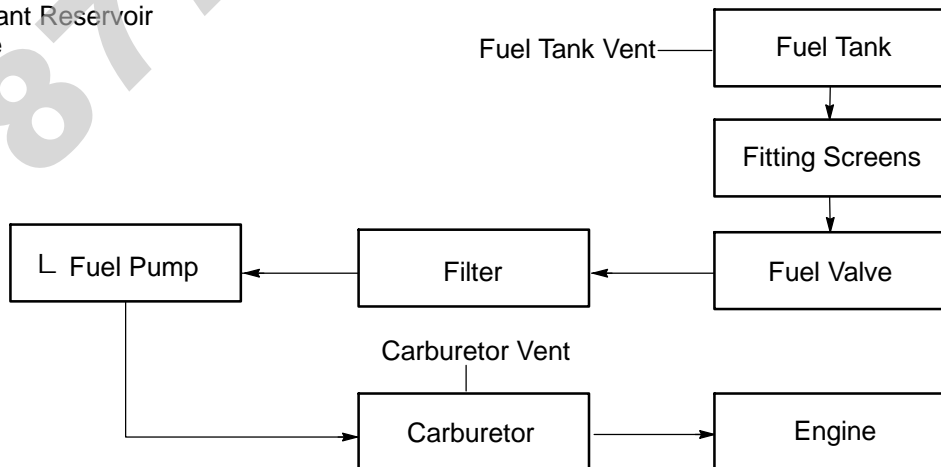


FUEL TANK ASSEMBLY



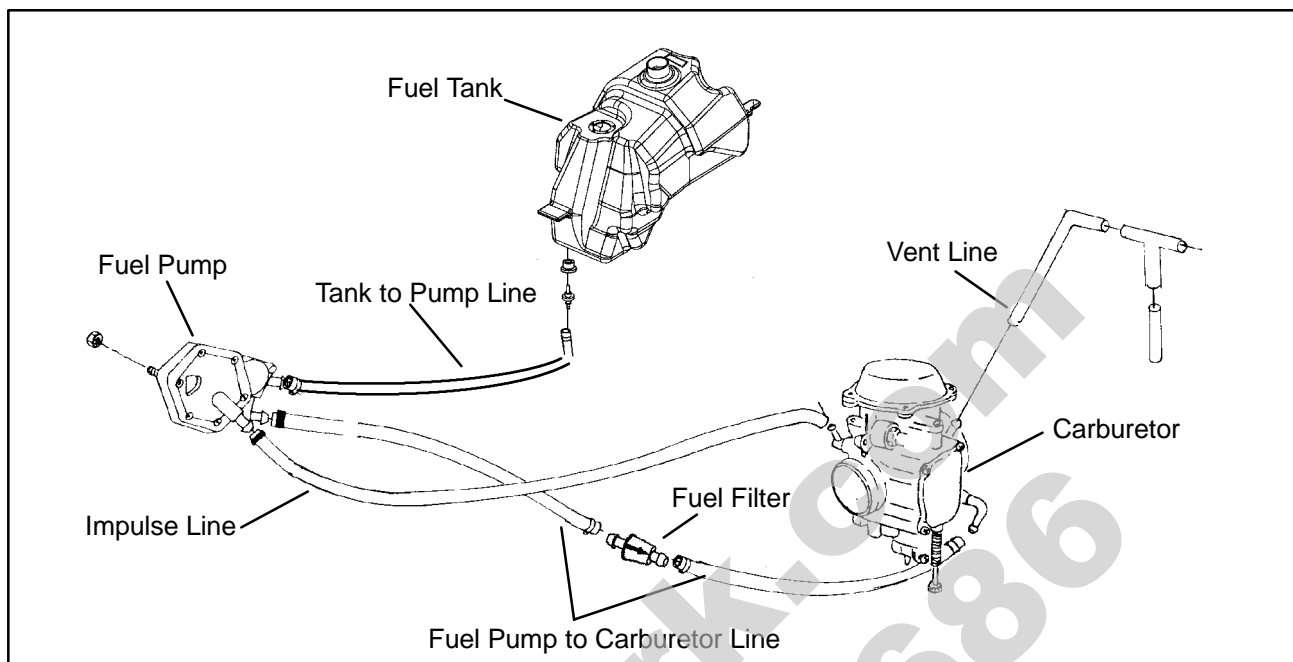
FUEL FLOW DIAGRAM

L Located Above Coolant Reservoir Above LH Front Tire





FUEL SYSTEM COMPONENT OVERVIEW



SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2870975	Mity Vact 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.

JETTING GUIDELINES

Changes in altitude and temperature affect air density, which is essentially the amount of oxygen available for combustion. In low elevations and cold temperatures, the air is more dense and has more oxygen. In higher elevations and higher temperatures, the air is less dense with reduced oxygen.

Polaris ATV Carburetors are calibrated for an altitude of 0-6000 ft. (0-1800 meters) and ambient temperatures between +40 and +80° F (+5° to +26° C). Carburetors must be re-calibrated if operated outside this temperature and/or altitude range. The jetting installed in production is not intended for all altitudes and/or temperatures. In addition, air screw



/ pilot screw adjustments and PVT adjustments may be required to suit operating conditions.

CARBURETOR JETTING

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.

IMPORTANT: The following guidelines must be followed when establishing a main jet setting:

1. Select the lowest anticipated temperature at which the machine will be operated.
2. Determine the lowest approximate altitude at which the machine will be operated.
3. Select the correct main jet from the chart on page on the Specifications page.
4. Clutching changes may also be required for changes in elevation. Refer to clutching chart in the Specifications section for recommendations.

MIKUNI JET PART NUMBERS

Main Jets		Pilot Jets	
Jet Number	Part Number	Jet Number	Part Number
112.5	3130554	40.0	3130624
115	3130555	42.5	3130526
117.5	3130556		
120	3130557	50.0	3131132
122.5	3130558		
125	3130559		
127.5	3130560		
130	3130561		
132.5	3130562		
135	3130563		
137.5	3130564		
140	3130527		
142.5	3130566		
145	3130567		
147.5	3130568		
150	3130569		
152.5	3130570		
155	3130571		
157.5	3130572		
160	3131141		
162.5	3131142		
165	3131143		
167.5	3131144		
170	3131145		

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, Bypass 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



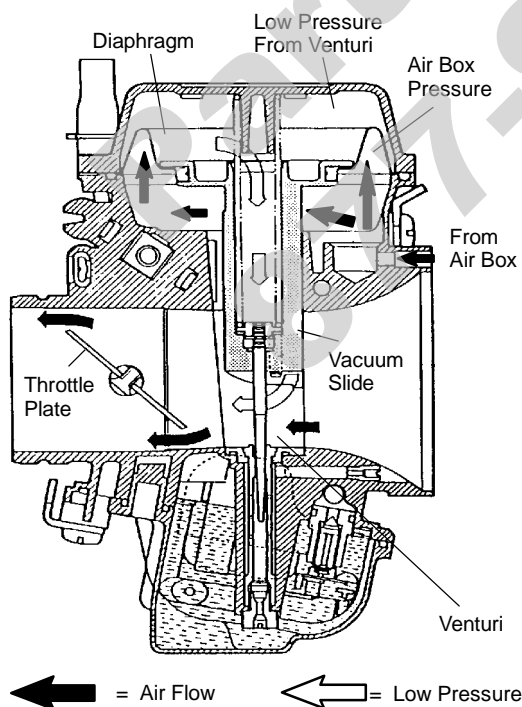
VENT SYSTEMS - CV CARBURETOR

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

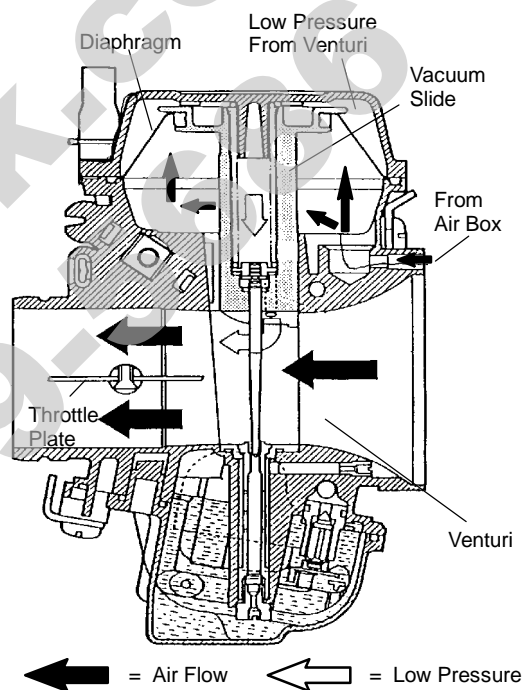
The constant velocity carburetor incorporates a mechanically operated throttle plate and a vacuum controlled slide valve (vacuum slide). The venturi cross-sectional area in the carburetor bore is increased or decreased automatically by the vacuum slide, which moves according to the amount of negative 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.



CARBURETOR OPERATION CONT'D

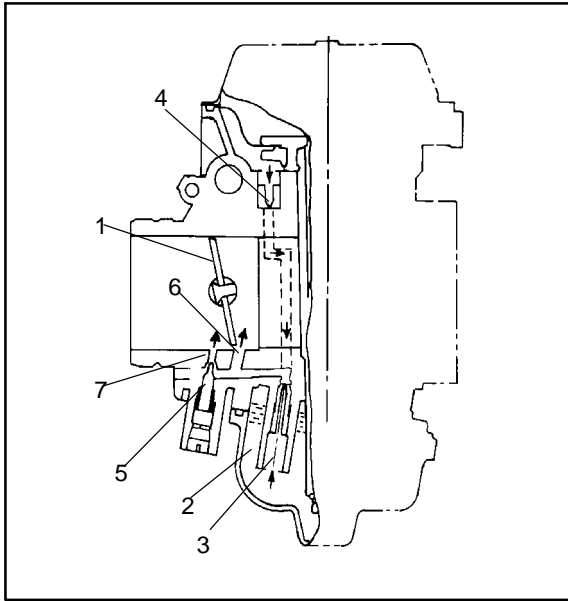
When the throttle plate is opened and engine speed begins to increase, the pressure in the venturi (and therefore in the chamber above the diaphragm) becomes significantly lower than atmospheric. Atmospheric pressure in the chamber below the diaphragm forces the diaphragm upward, raising the slide against spring pressure. 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 Mikuni BST carburetor.

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).

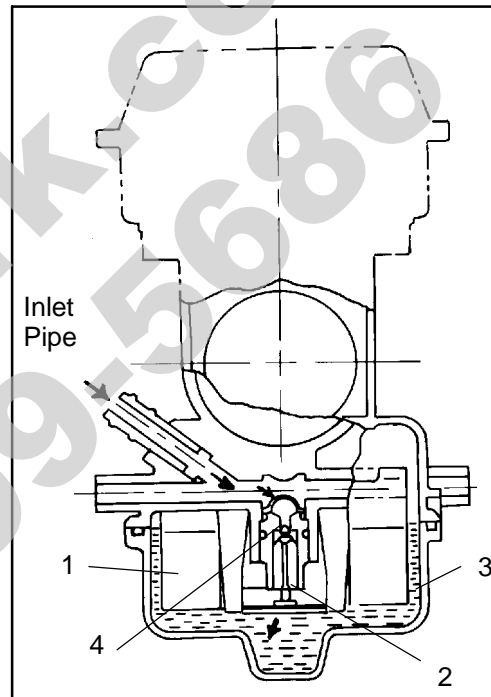
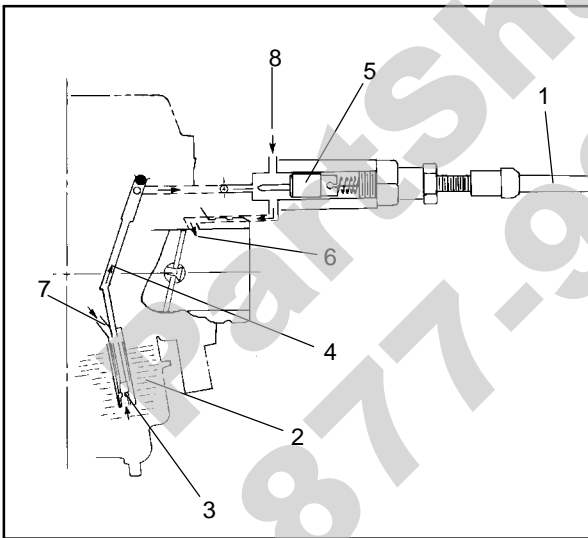


FLOAT SYSTEM

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 admit fuel into the chamber. In this manner, the needle valve admits and shuts off fuel alternately to maintain a practically constant fuel level inside the float chamber.

STARTER SYSTEM (CHOKE OR ENRICHMENT)

When the choke cable (1) is activated, the starter plunger (5) is lifted off the seat.

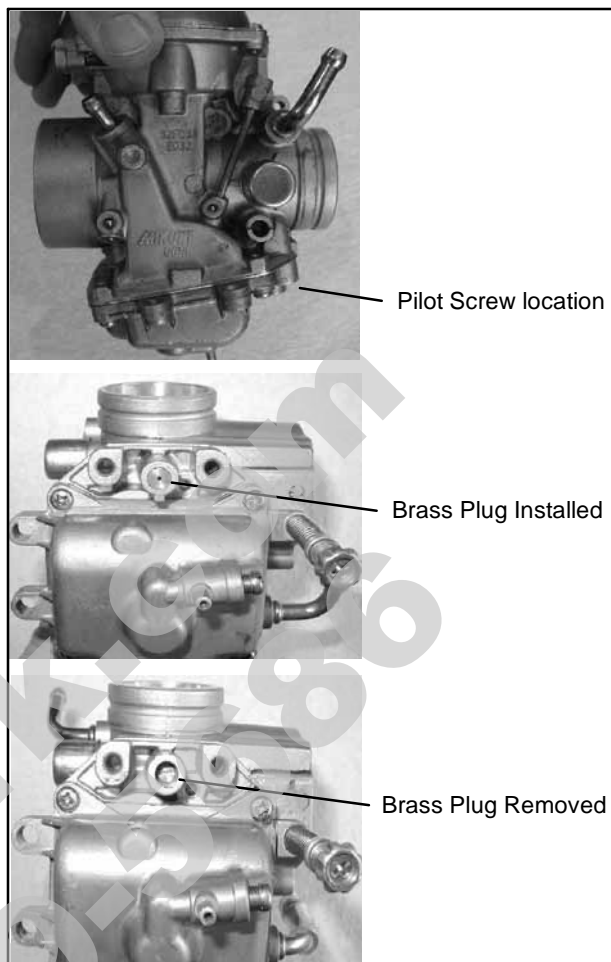
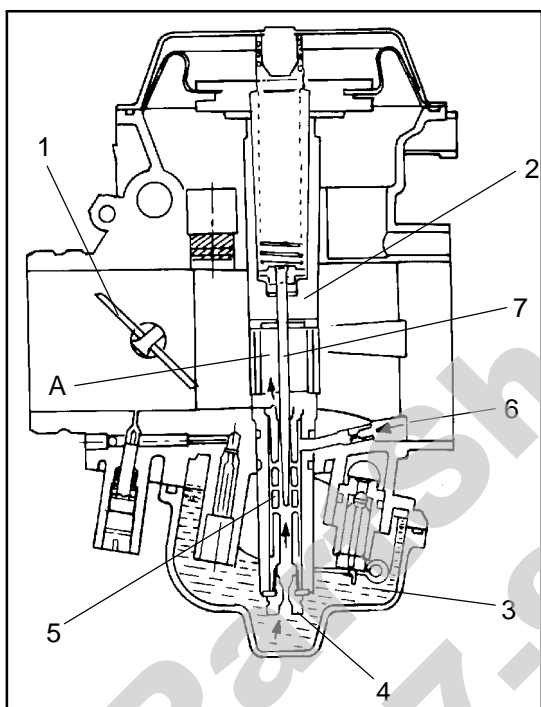


Fuel is drawn into the starter circuit from the float chamber (2) through the starter jet (3). Starter jet meters this fuel, which then flows into starter pipe (4) and mixes with the air (7) coming from the float chamber. The mixture, rich in fuel content, reaches starter plunger and mixes again with 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 the main bore.



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.



Pilot Screw location

Brass Plug Installed

Brass Plug Removed

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.



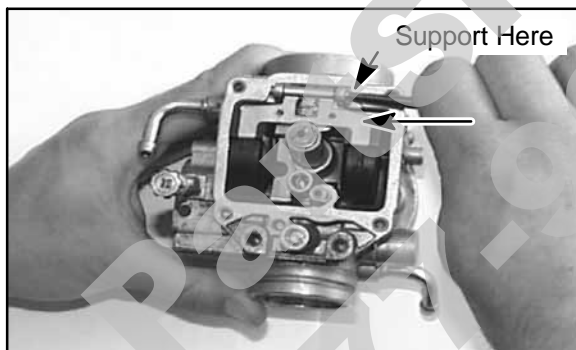
CARBURETOR DISASSEMBLY - MIKUNI CV

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.

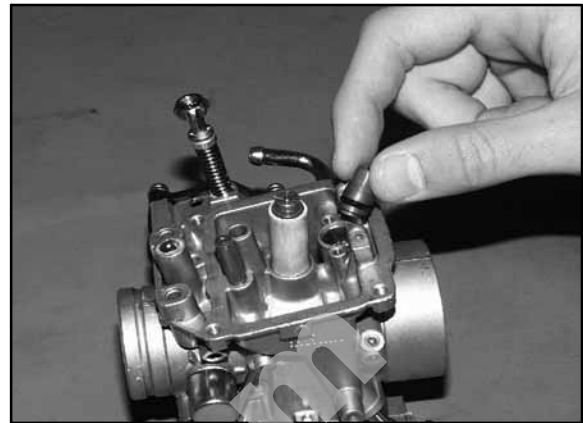


2. Remove float bowl and carefully remove the pressed float pin.

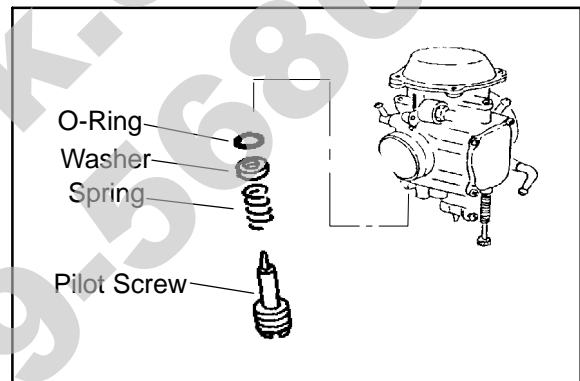


NOTE: Be careful not to damage the float pin tower during the float pin removal. Support the float pin tower while removing the float pin. This helps to prevent the float pin towers from breaking off.

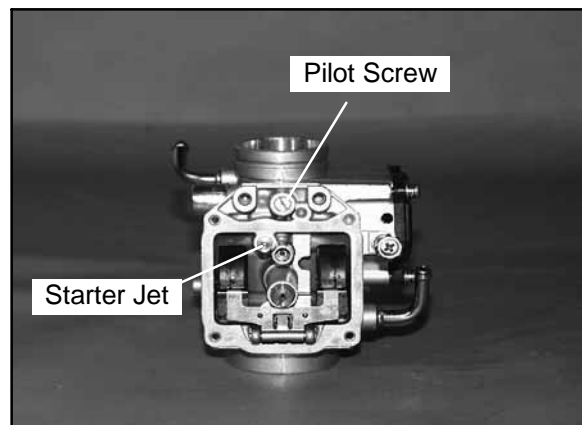
3. Remove inlet needle seat retaining screw along with plate, and carefully remove needle seat. **NOTE:** Do not use a pliers to remove the seat or permanent damage may occur.



4. Remove the pilot mixture screw, spring, flat washer, and O-Ring. **NOTE:** If an anti-tamper plug is installed over the pilot screw cavity, it must be removed for access.



NOTE: The starter jet is not removeable. Upon disassembly, place the parts in a container for safe keeping.





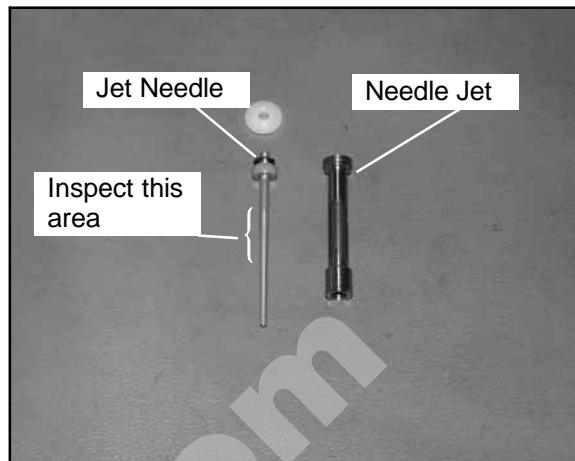
CARBURETOR CLEANING

⚠ WARNING

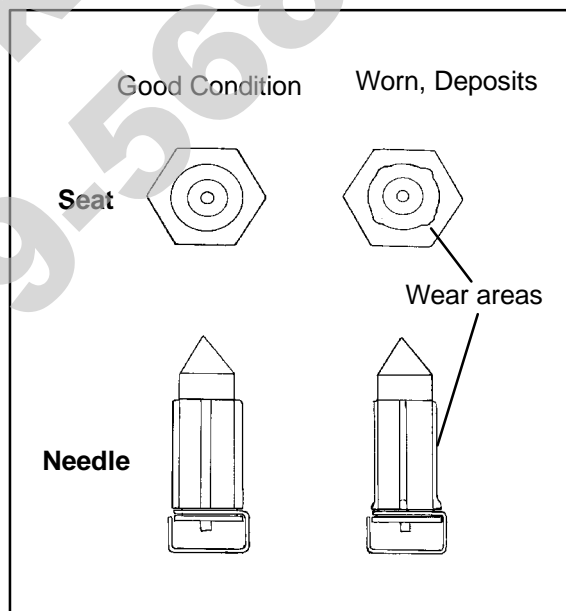
Protect eyes from contact with cleaner. Take appropriate safety measures during these procedures. Safety glasses and chemical resistant gloves are required. Should you get cleaner in your eyes or if you swallow cleaner, seek medical attention immediately.

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. Irreparable 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.



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 INSPECTION

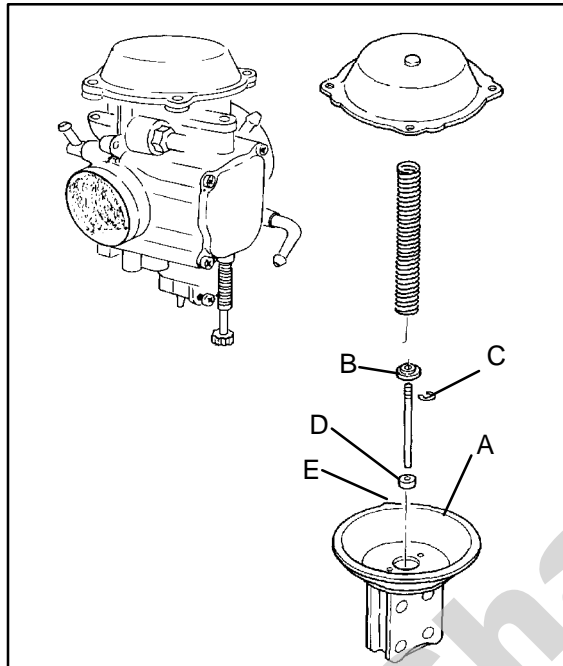
1. Inspect jet needle and needle jet for wear. Look for discoloration, shiny spots, or an area that looks different than the rest of the needle. The middle to upper portion of the needle contacts the needle jet and is the most likely wear point. If jet needle shows signs of wear replace *both the needle 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.



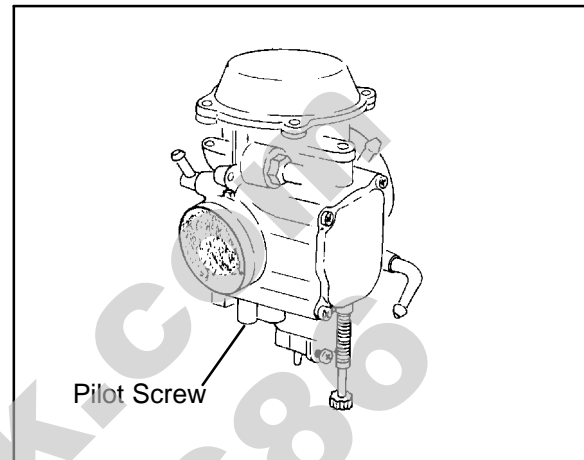


CARBURETOR ASSEMBLY

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.



3. Replace parts in proper order. The spring seat washer (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.
4. Be sure the tab (E) on outer edge of diaphragm is positioned properly in the carburetor body.



5. 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 2.11.

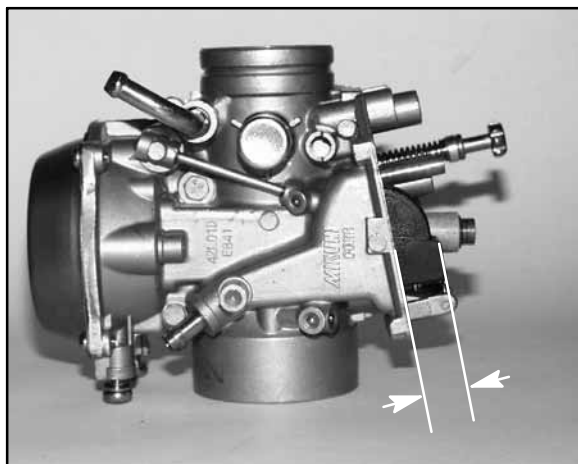
**Pilot Mixture Screw Base Setting
(Set at Factory)**

Refer to Specifications Chapter 1



FLOAT HEIGHT ADJUSTMENT

1. Place the carburetor on a level surface as shown at right to remove weight from float arm. In this position, the float tongue will rest lightly on the inlet needle valve pin without compressing the spring.

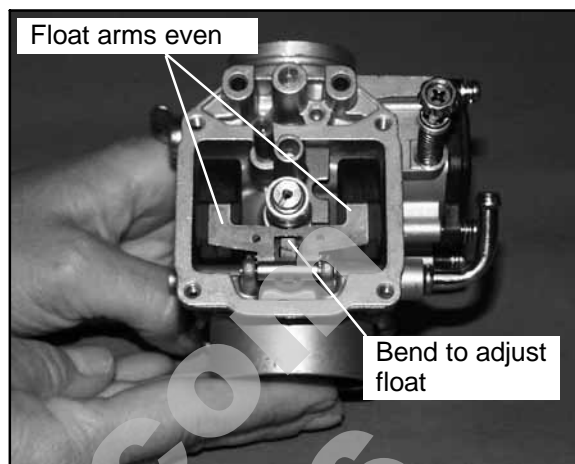


Float Height BST 34:

13-14 mm (.51-.55 inches)

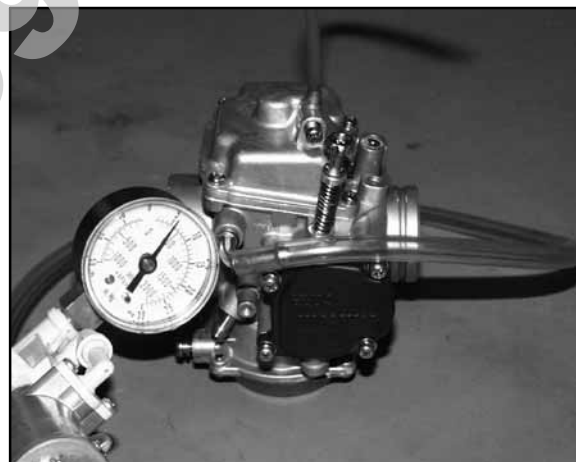
2. Measure the height from the float bowl mating surface to the top of step in float as shown. Both sides of float should be parallel to each other. The measurement should be made at the mid-point on the top of the float using Float Adjustment Tool (PN 2872314) or a vernier caliper. When measuring the height be sure the inlet needle valve spring is not compressed.

3. 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.



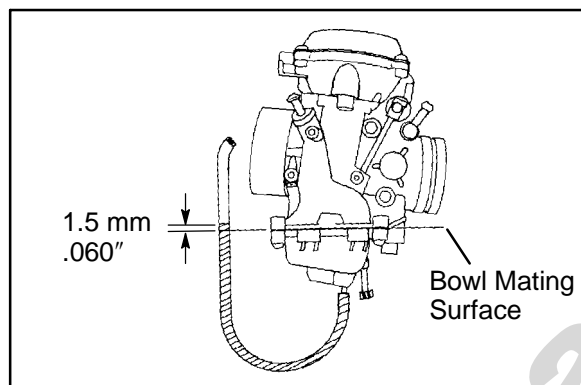
Mity Vac[†] (PN 2870975)



FUEL LEVEL

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.

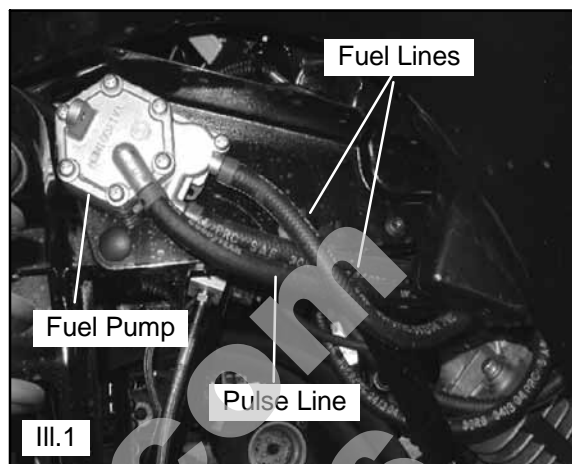
FUEL PUMP SERVICE

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 diaphragm cover. Note the location of the two longer screws.
2. Remove the diaphragm cover gasket, diaphragm, and valve body gasket.
3. Remove the outlet check valve cover, diaphragm, and gasket.

FUEL PUMP

INSPECTION/ASSEMBLY

1. Inspect inlet and outlet check valves for cracks, warpage or damage. Inspect the diaphragms for cracks, holes or swelling.
2. To clean the valves or pump body, remove the set screw and washer. Remove the valve and wash with soap and water. Carburetor cleaner may be used to clean the pump body when the check valves are removed. **CAUTION:** Some carburetor cleaners are very caustic and should not be used to clean the non-metal parts of the fuel pump.
3. Check the sealing surfaces of the pump body and covers. Carefully remove all traces of old gasket and check the surfaces for damage. Replace diaphragms and gaskets as a set.
4. Reassemble the pump in the reverse order of disassembly. Tighten all screws evenly.





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.

- G No fuel in tank
- G Restricted tank vent, or routed improperly
- G Fuel lines or fuel valve restricted
- G Fuel filter plugged
- G Carburetor vent line(s) restricted
- G Plugged or restricted inlet needle and seat screen or inlet passage
- G Clogged jets or passages
- G Float stuck, holding inlet needle closed or inlet needle stuck
- G Float level too low
- G Fuel pump inoperative
- G Air leak at impulse line
- G Restricted impulse line (kinked, pinched)
- G Intake air leak (throttle shaft, intake ducts, airbox or air cleaner cover)
- G Ruptured vacuum slide diaphragm, Vacuum slide stuck closed or sticky
- G Improper spring
- G Jet needle position incorrect
- G 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.

- G Air intake restricted (inspect intake duct)
- G Air filter dirty/plugged
- G Choke plunger sticking, incorrectly adjusted choke
- G Choke cable binding or improperly routed
- G Incorrect pilot air/fuel screw adjustment
- G Faulty inlet needle and seat
- G Faulty inlet needle seat O-Ring
- G Float level too high
- G Poor fuel quality (old fuel)

- G Loose jets
- G Worn jet needle/needle jet or other carburetor parts
- G Dirty carburetor (air bleed passages or jets)
- G Weak or damaged vacuum piston return spring
- G Fouled spark plug

POOR IDLE

Idle Too High

- G Idle adjusted improperly/idle mixture screw damaged
- G Sticky vacuum slide
- G Throttle cable sticking, improperly adjusted, routed incorrectly
- G Choke cable sticking, improperly adjusted, routed incorrectly
- G Plugged or restricted idle jet

Idle Too Low

- G Choke cable bending or incorrectly adjusted
- G Idle speed set incorrectly
- G Idle mixture screw misadjusted or damaged
- G Belt dragging
- G Ignition timing incorrect
- G Worn jet needle/needle jet
- G Plugged or restricted idle jet

Erratic Idle

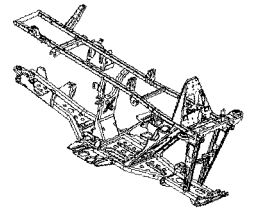
- G Choke cable bending or incorrectly adjusted
- G Throttle cable incorrectly adjusted
- G Air leaks, dirty carburetor passages (pilot circuit)
- G Pilot mixture screw damaged or adjusted incorrectly
- G Tight valves
- G Ignition timing incorrect
- G Belt dragging
- G Dirty air cleaner
- G Engine worn
- G Spark plug fouled
- G Idle speed set incorrectly (speed limiter)
- G Worn jet needle/needle jet
- G Plugged or restricted idle jet



CHAPTER 5

BODY AND STEERING

Trail Boss Body Assembly, Exploded View	5.2
Trail Blazer Body Assembly, Exploded View	5.3
Steering Assembly, Exploded View	5.3
Torque Specifications and Special Tools	5.4
Cover/Panel Removal	5.5
Side Panel Removal	5.5
A-Arm Replacement	5.6
Concentric Swing Arm Removal	5.7
Concentric Swing Arm Assembly/Installation	5.8
Front Strut Exploded View	5.9
Strut Assembly and Service	5.10
Front Strut Ball Joint Replacement	5.10-5.11
Steering Post Assembly	5.12
Decal Replacement	5.12

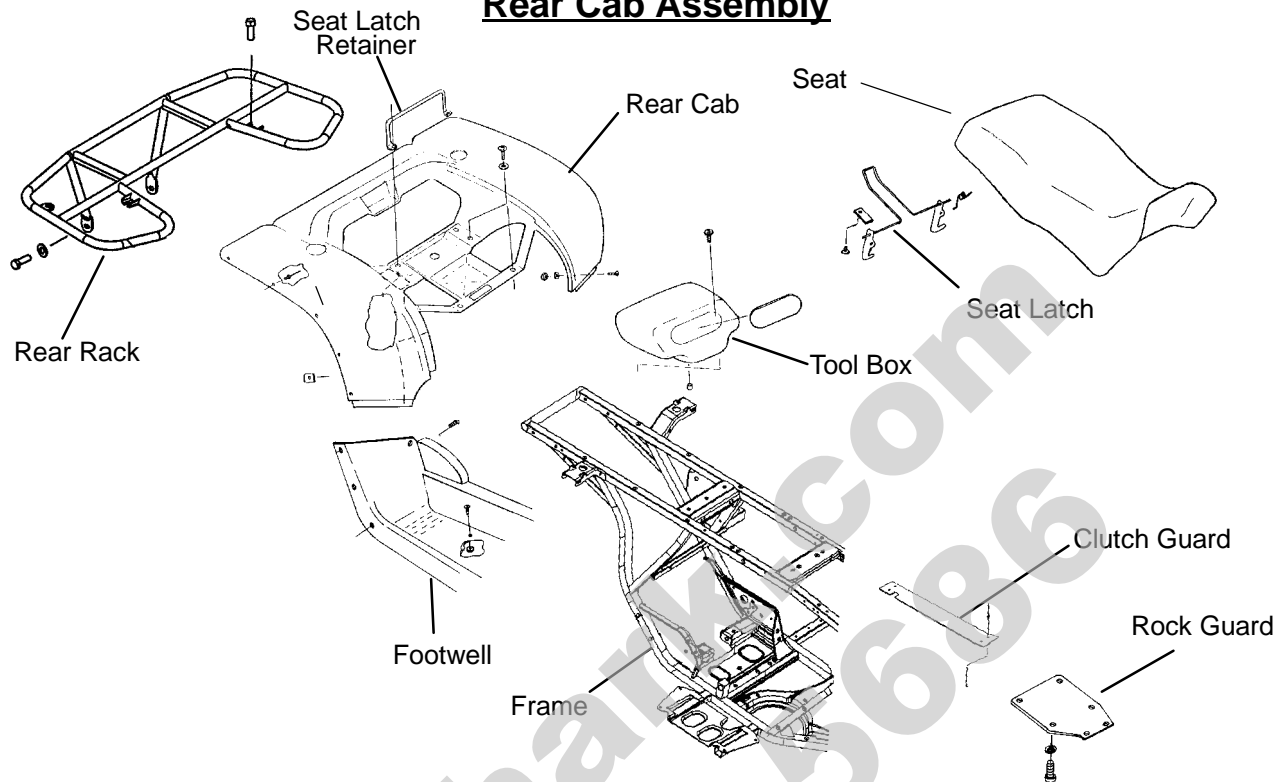


5

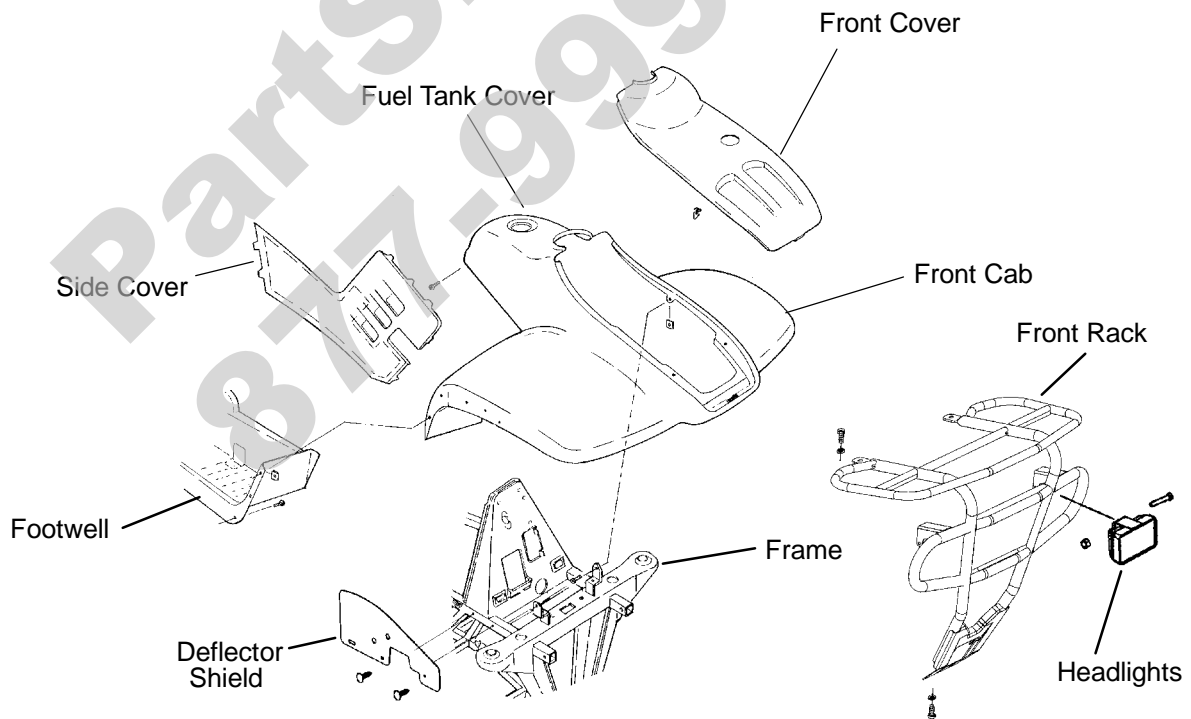


TRAIL BOSS BODY ASSEMBLY EXPLODED VIEW

Rear Cab Assembly



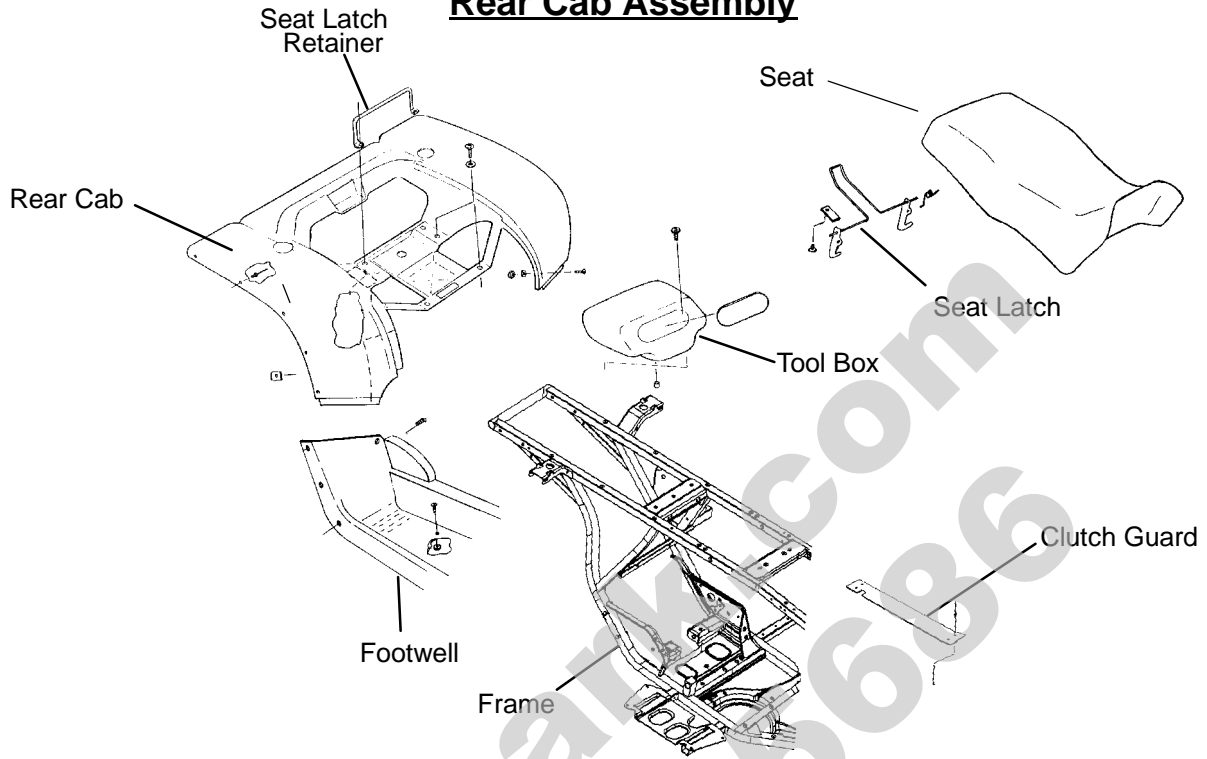
Front Cab Assembly



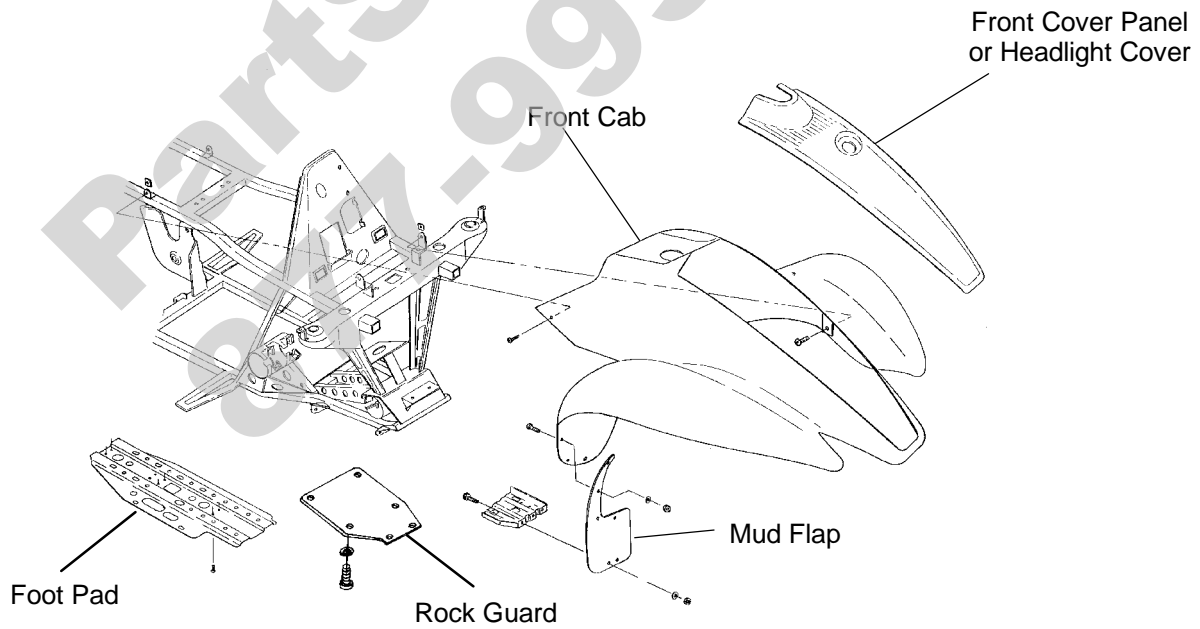


TRAIL BLAZER BODY ASSEMBLY EXPLODED VIEW

Rear Cab Assembly



Front Cab Assembly

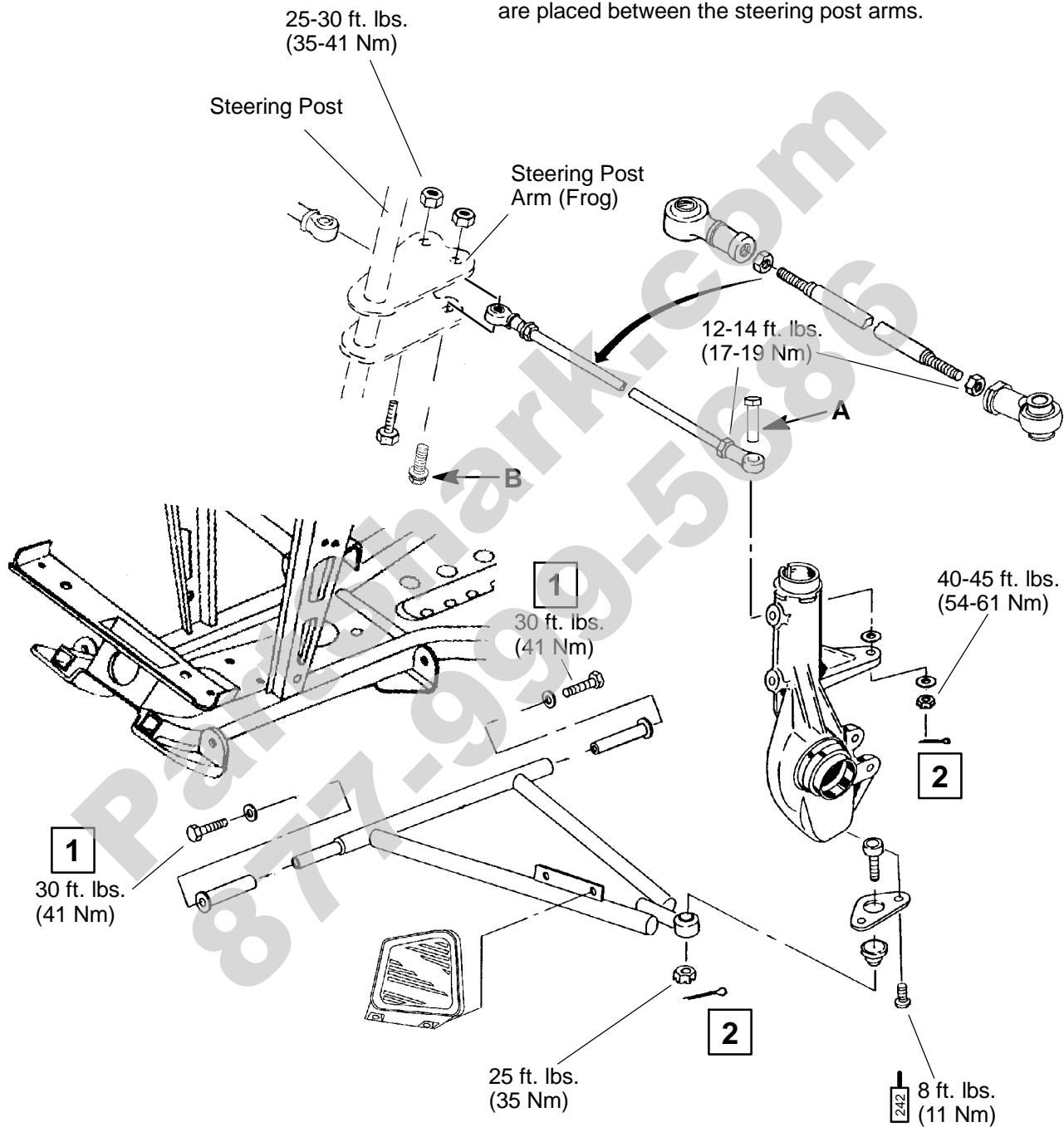




STEERING ASSEMBLY, EXPLODED VIEW

242 Apply Loctite[®] 242 to the 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. Be sure inner rod ends are placed between the steering post arms.



1 Always use new bolts upon reassembly

2 Always use new cotter pins upon reassembly. Install w/ open end toward rear of machine.



TORQUE SPECIFICATIONS

Front A-Arm Attaching Bolt	30 ft. lbs. (41 Nm)
Front A-Arm Ball Joint Stud Nut	25 ft. lbs. (35 Nm)
Handlebar Adjuster Block	10-12 ft. lbs. (14-17 Nm)
Master Cylinder	45-55 <u>in. lbs.</u> (5.2-6.3 Nm)
Rear Axle Nut - (Tapered Roller Bearings)	
(Left side)	120 ft. lbs. (165 Nm)
(Right side)	8-10 ft. lbs. (11-14 Nm)
Rear Shock Bolt (upper)	25 ft. lbs. (35 Nm)
Rear Shock Bolt (lower)	25 ft. lbs. (35 Nm)
Rear Wheel Hub Nut	80 ft. lbs. (110 Nm)
Rear Wheel Nut	50 ft. lbs. (69 Nm)
Strut Rod Retaining Nut (Top)	15 ft. lbs. (21 Nm)
Strut Casting Pinch Bolt	15 ft. lbs. (21 Nm)
Swing Arm Pivot Bolt	150 ft. lbs. (207 Nm)
Tie Rod End Jam Nut	12-14 ft. lbs. (17-19 Nm)
Tie Rod End Castle Nut	23-24 ft. lbs. (32-33 Nm)
Tie Rod End Attaching Bolt	25-30 ft. lbs. (35-41 Nm)

NOTE: Refer to exploded views throughout this chapter for identification and location of components.

SPECIAL TOOLS

PART NUMBER	TOOL 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

COVER/PANEL REMOVAL

To remove, perform these steps:

Seat:

- G Pull release lever at the rear of the seat
- G Lift and pull seat rearward, disengaging seat from tabs at the rear of the fuel tank

Side Panels

- G Remove: Seat
- G Disengage tabs at front and rear

Front Cover

- G Remove: Seat
- G Disengage tabs at front and rear
- G Lift panel out

Rear Rack

- G Remove: Seat
- G 2 bolts at rear of rack
- G 2 bolts at front of rack

Rear Cab Assembly

- G Remove: Seat
- G Rear rack
- G 1 screw, nut and washer at rear of inner left footrest
- G 4 screws at bottom of left rear mudflap
- G 1 screw, nut and washer at rear of inner right footrest
- G 4 screws at bottom of right rear mudflap
- G 4 bolts and flat washers from top of cab assembly, under seat
- G 2 screws at rear bottom of cab assembly near tail light
- G Disconnect taillight harness



Front Rack

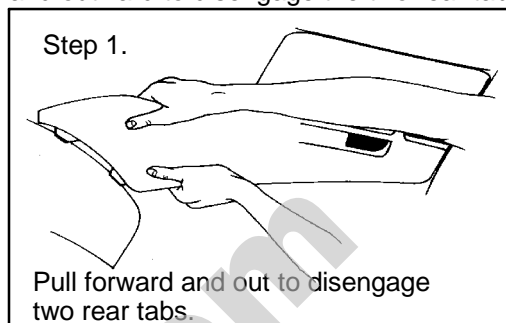
- G Remove: 4 screws, lock washers, and flat washers

Front Cab Assembly

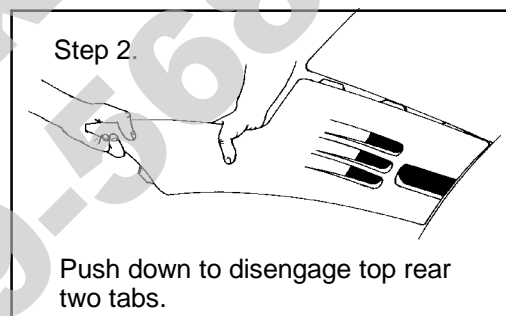
- G Remove: Seat
- G Side panels
- G 2 screws at rear of cab at fuel tank mount bracket
- G Front rack
- G Front bumper
- G Front cover panel
- G 3 screws from bottom left mudflap
- G 3 screws from bottom right mudflap
- G 1 inner screw from front cab to foot rest on each side
- G 2 screws under front panel

SIDE PANEL REMOVAL

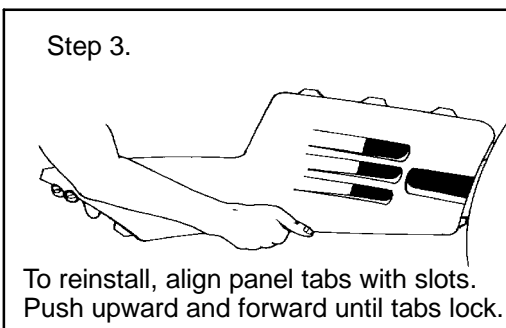
1. Remove seat. Grasp rear of panel near rear cab. With a quick and firm motion, pull panel forward and outward to disengage the two rear tabs.



2. Place hand on top of side panel behind the fuel tank. With a quick and firm motion, push down on the side panel to disengage the top rear tabs. Then pull up on side panel to disengage front tabs.



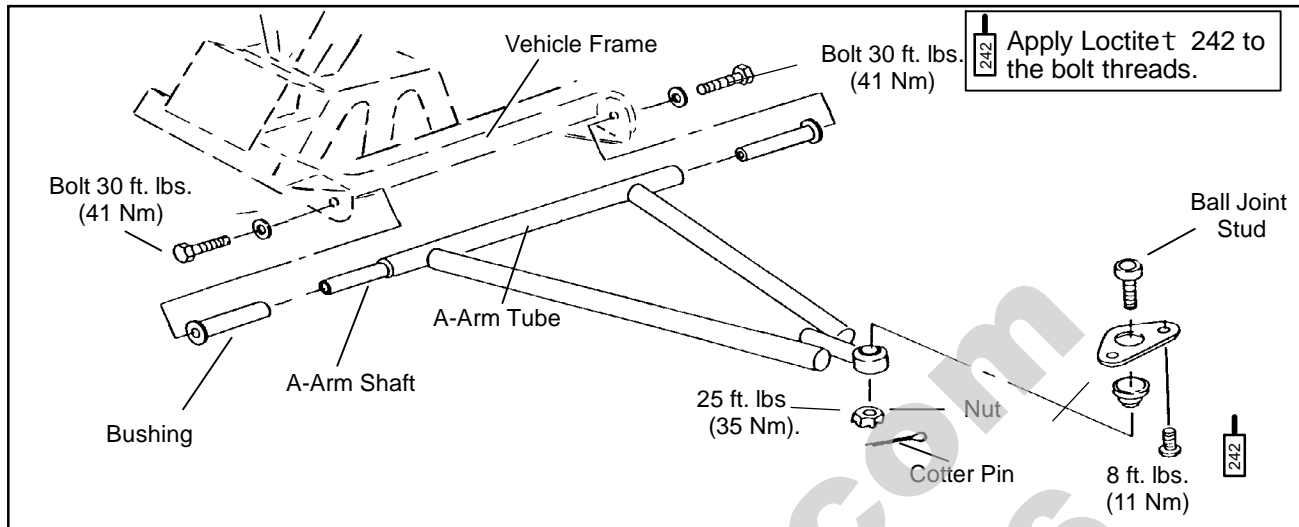
3. To reinstall side panel, align panel tabs with slots on front cab. Push panel upward and forward until tabs lock. Bend rear of side panel and insert the two tabs into the rear cab.



PartShark.com 877-999-1688



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. Install new A-arm assembly onto vehicle frame. Torque new bolts to 30 ft. lbs. (41 Nm).
7. Attach A-arm to hub strut assembly. Tighten ball joint nut to 25 ft. lbs. (35 Nm). 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.
8. Locate grease fitting in center of A-arm tube and pump A-arm full of grease.

▲ 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.

5. Examine A-arm shaft. Replace if worn. Discard hardware.
6. Install new A-arm assembly onto vehicle frame. Torque new bolts to 30 ft. lbs. (41 Nm).

▲ WARNING

Upon A-arm installation completion, test vehicle at low speeds before putting into regular service.

A-arm Attaching Bolt Torque:

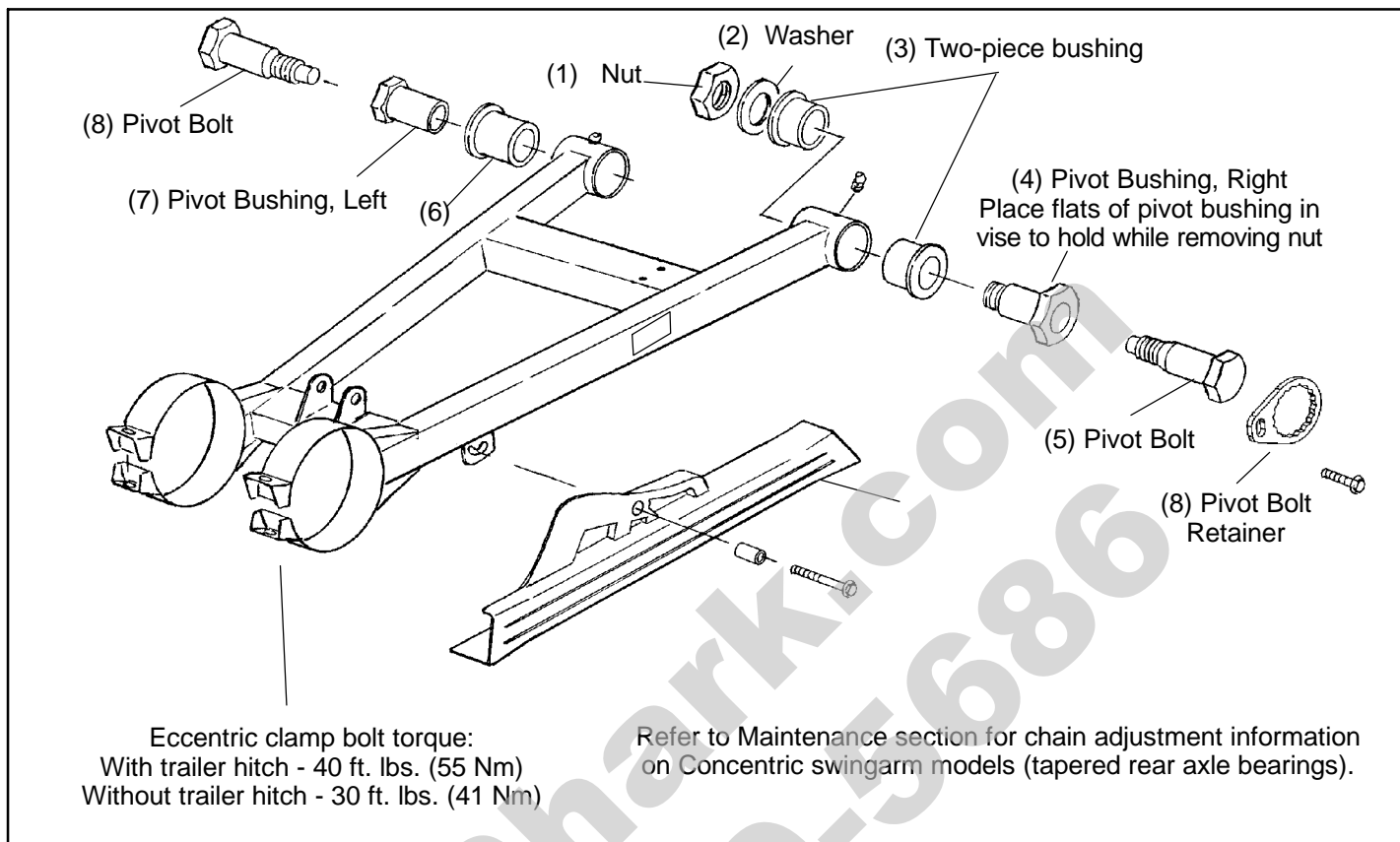
30 ft. lbs. (41 Nm)

Ball Joint Stud Nut Torque:

25 ft. lbs. (35 Nm)



CONCENTRIC SWING ARM REMOVAL



Removal / Disassembly

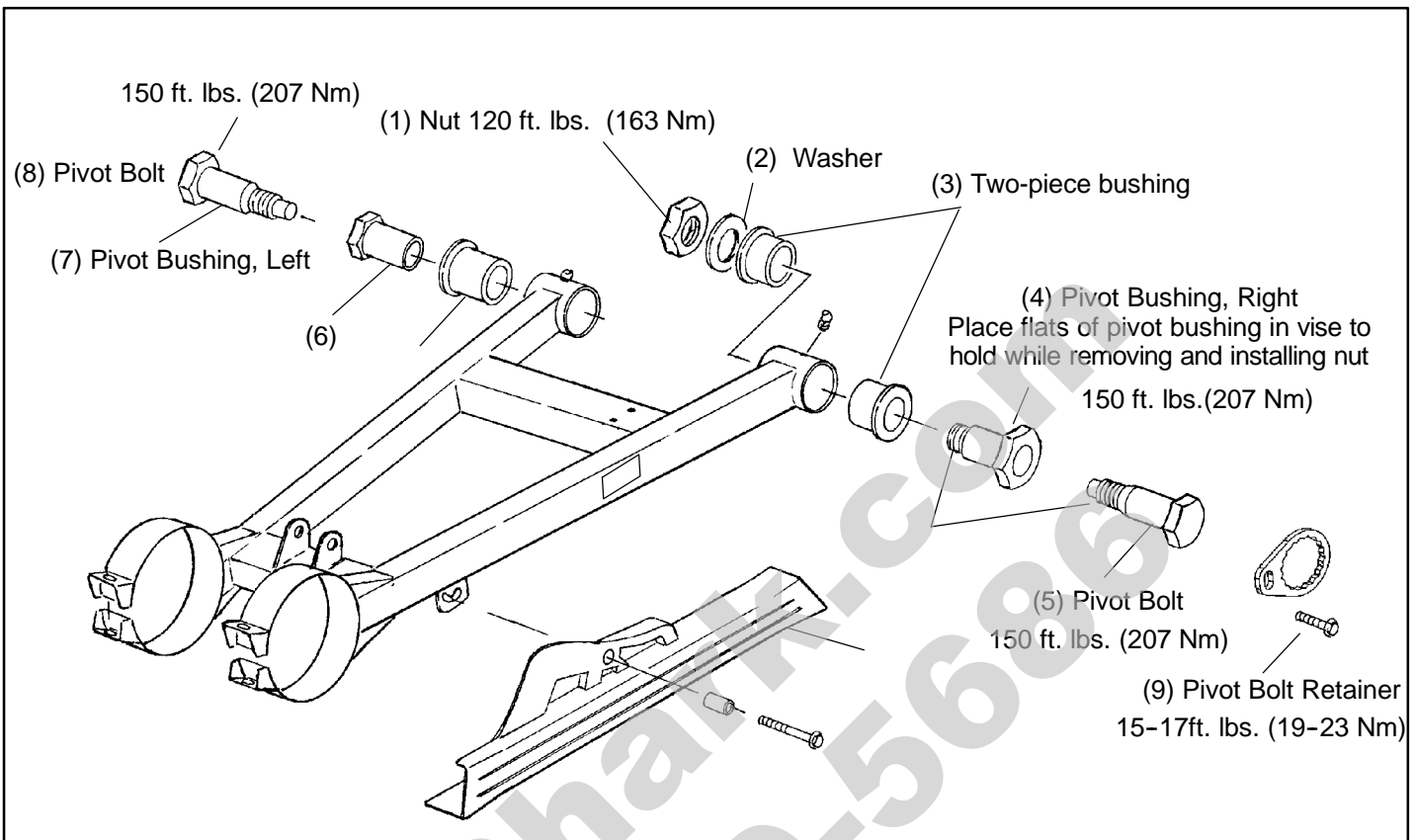
1. Lift rear of machine and support securely with wheels off the floor.
2. Remove drive chain.
3. Remove rear caliper.
CAUTION: Do not allow the caliper to hang by the brake line. Brake line damage may result.
4. Remove rear wheels and/or hubs and Pivot bolt retainers (8).
5. Loosen both swingarm pivot bolts (5 and 8) and then remove both bolts while supporting swingarm.

6. Remove lower shock bolt.
7. Remove swingarm.
8. Remove LH pivot bushing (7) and swingarm bushing (6) from swingarm.
9. Place flats of right side pivot bushing (4) in a vise to hold while removing nut (1).
10. Remove two-piece bushing (3) and RH pivot bushing (4) from swingarm.
11. Clean and inspect parts for wear. Replace worn parts.





CONCENTRIC SWING ARM ASSEMBLY/INSTALLATION



Assembly / Installation

NOTE: There are pivot bolt retainers attached to prevent the pivot bushings from turning when the pivot bolts are tightened. The flats of the pivot bushings must be oriented correctly to align with the frame plate, or the pivot bolt holes will not be aligned. The top flat on the nut should be approximately parallel with top surface of the swingarm.

1. Install bushing (6) in left side of swingarm and two-piece bushings (3) in right side.
2. Clean threads of nut (1) and pivot bushings (4)
3. Install right pivot bushing (4) through the two-piece bushing (3).
4. Install washer (2) and nut (1). Hold pivot bushing (4) in vise and torque nut (1) to 120 ft. lbs. (163 Nm).
5. Install left pivot bushing (7).
6. Install swingarm assembly in frame.

7. Install and tighten pivot bolts slowly until the flats of the pivot bushings (4) and (7) engage the stop plate on the frame.

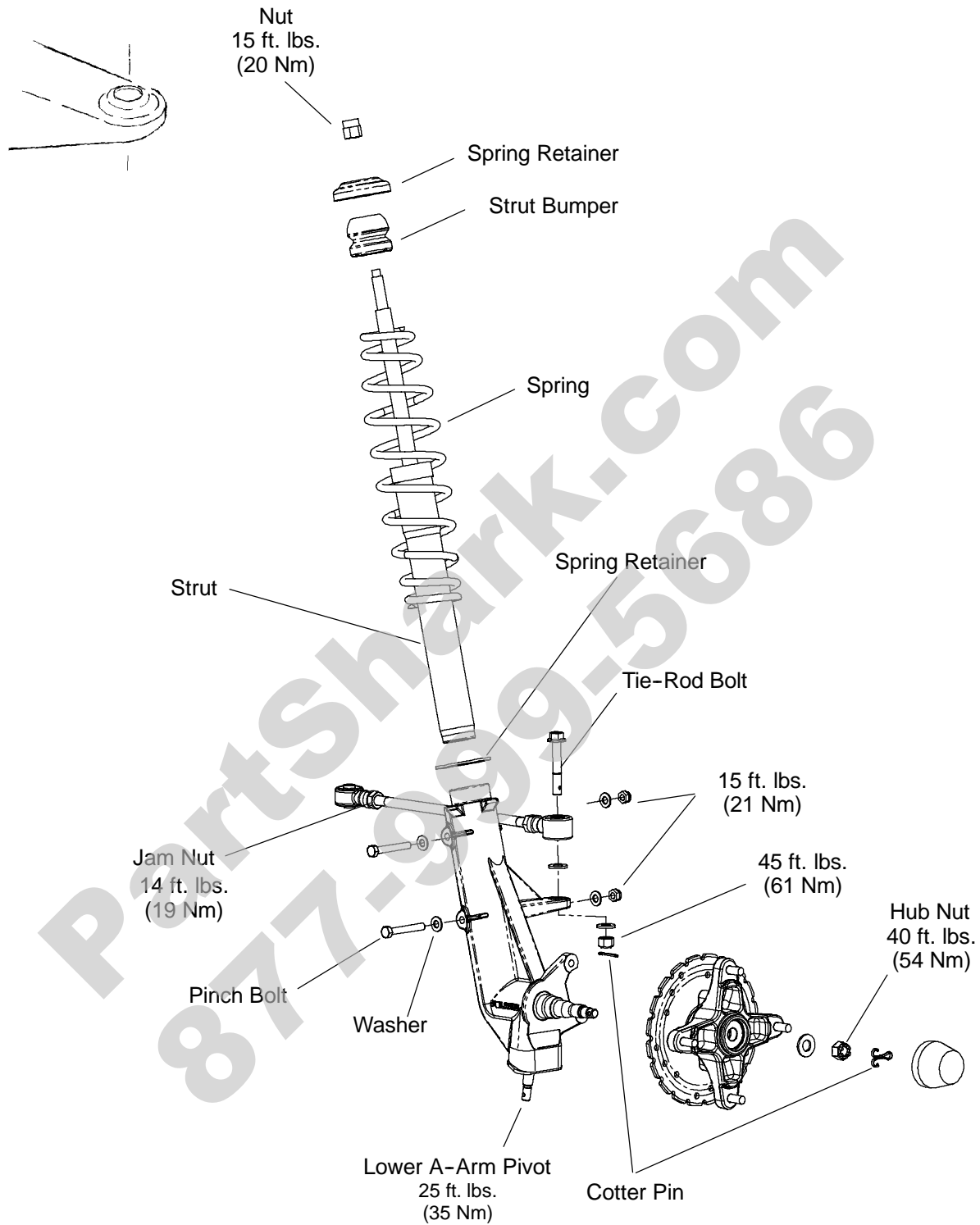
8. Torque pivot bolts (5) and (8) to 150 ft. lbs. (207 Nm).

9. Install the pivot bolt retainers and install bolts. Torque to 15-17ft. lbs. (19-23 Nm). *NOTE: If retainers cannot be aligned for bolt installation, tighten pivot bolt until alignment is achieved.*

9. Install lower rear shock bolt. Torque to 25 ft. lbs. (35 Nm). Assemble rear axle, brake caliper, caliper mount, hubs, wheels and chain. (Refer to Chapter 7)



STRUT ASSEMBLY





FRONT STRUT CARTRIDGE REPLACEMENT

REFER TO ILLUSTRATION ON PAGES

5.9.

1. Hold strut rod and remove top nut.
2. Compress spring using strut spring compressor tools.

Strut Spring Compressor Tools

(PN 2871573) and (PN 2871574)

3. Remove upper strut pivot assembly.
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 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 nut.

Strut Rod Nut Torque

15 ft. lbs. (21 Nm)

BALL JOINT REPLACEMENT

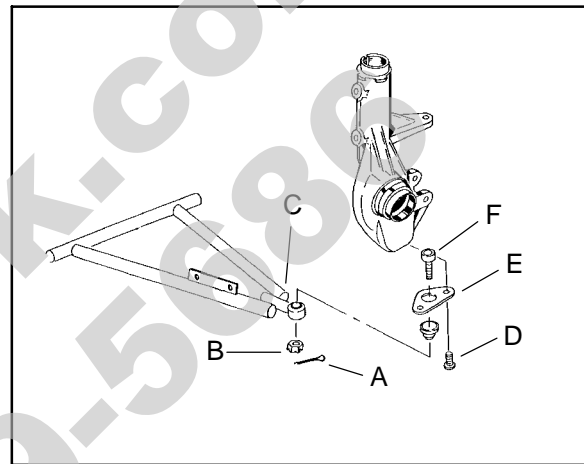
REFER TO ILLUSTRATION ON PAGES

5.9.

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.

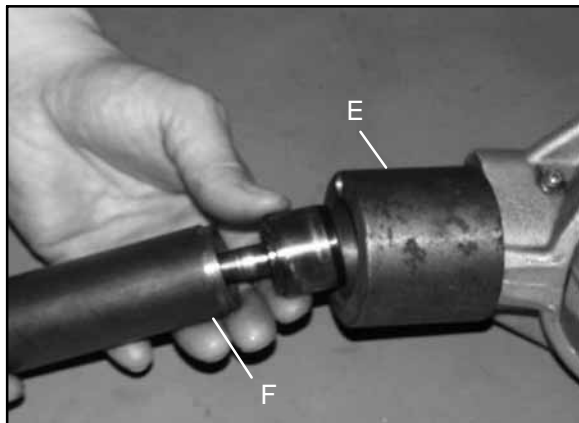


5. Remove castle nut (B) and separate A-arm (C) from ball joint stud.
6. Remove screws (D) and ball joint retaining plate (E).
7. Using the Ball Joint Replacement Tool (**PN 2870871**), remove ball joint (F) from strut housing. Refer to photos.

- G Install puller guide (A) with extension cap (B).
- G Apply grease to extension cap and threads of puller bolt to ease removal.
- G Thread bolt (D) with nut (C) onto ball joint stud as shown.
- G Hold bolt (D) and turn nut (C) clockwise until ball joint is removed from strut housing.



- 8. To install new ball joint:
 - G Remove extension cap and attach puller guide using short bolts provided in the kit.
 - G Insert new ball joint (E) into driver (F).



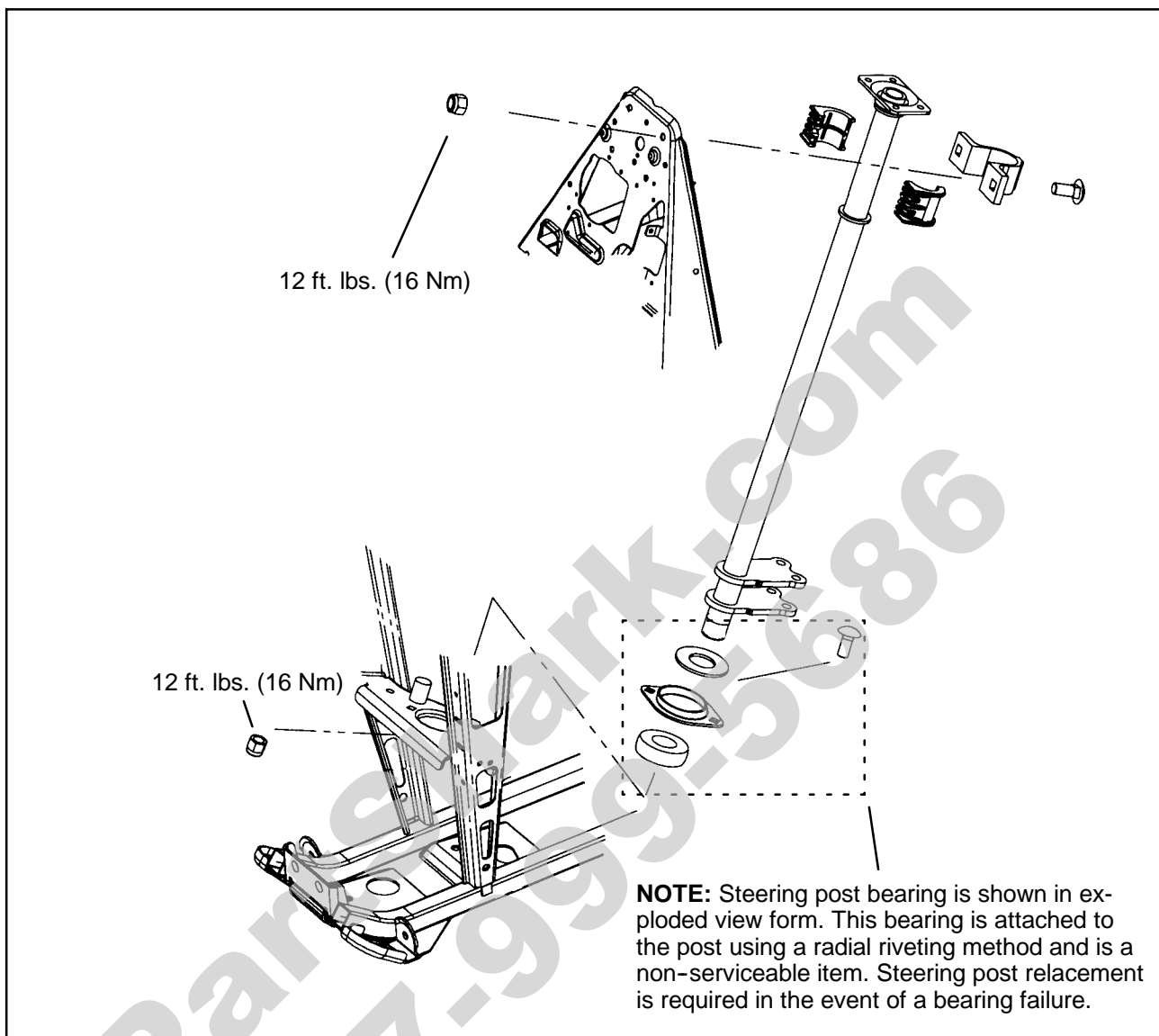
- G Slide ball joint/driver assembly into guide.
 - G Drive new joint into strut housing until fully seated.
- 9. Apply Loctite[®] 242 (**PN 2871949**) to threads of retaining plate screws or install new screws with pre-applied locking agent. Torque screws to 8 ft. lbs. (11 Nm).
 - 10. Install A-arm on ball joint and torque castle nut to 25 ft. lbs. (35 Nm).
 - 11. Reinstall cotter pin with open ends toward rear of machine.

SAFETY REMINDER:
Remember to use safety glasses and other protective equipment when performing these procedures

NOTES



STEERING POST ASSEMBLY



DECAL REPLACEMENT

▲ WARNING

The following procedure involves the use of an open flame. Perform this procedure in a well ventilated area, away from gasoline or other flammable materials. Be sure the area to be flame treated is clean and free of gasoline or flammable residue.

The side panels, front and rear fender cabs are plastic polyethylene material. Therefore, they must be "flame treated" prior to installing a decal to ensure good adhesion. A bonus of the flame treating procedure is it can be used to reduce or eliminate the whitish stress marks that are sometimes left after a fender or cab is bent, flexed, or damaged.

To flame treat the decal area:

1. Pass the flame of a propane torch back and forth quickly over the area where the decal is to be applied until the surface appears slightly glossy. This should occur after just a few seconds of flame treating. Do not hold the torch too close to the surface. (2-3 inches from the flame tip is recommended) Keep the torch moving to prevent damage.
2. Apply the decal on one edge first. Slowly lay down remainder of the decal while rubbing lightly over the decal surface to eliminate any air bubbles during the application.



NOTES

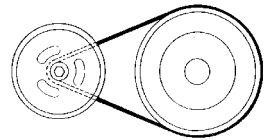
Two columns of horizontal lines for taking notes.

PartShark.com
877-999-5686



CHAPTER 6 CLUTCHING

Service Tools and Supplies	6.2
PVT System Torques	6.2
PVT System Operation Overview	6.2-6.3
PVT Maintenance/Inspection	6.3
PVT Drying	6.3
PVT Over heating	6.4
PVT Disassembly	6.5
PVT Assembly	6.6
PVT Sealing and Ducting Components	6.7
Drive Clutch Exploded View	6.7
Drive Clutch Spring Specifications	6.8
Shift Weights	6.9
Drive Clutch Inspection	6.10
Drive Clutch Disassembly/Inspection	6.10-6.12
Drive Clutch Assembly	6.12-6.13
Drive Belt Tension	6.13
Drive Belt Removal/Inspection	6.14-6.15
Drive Belt Installation	6.15
Clutch Alignment /Offset	6.15-6.16
Drive Clutch Bushing Service	6.16-6.18
Driven Clutch Disassembly/Inspection	6.19-6.20
Driven Clutch Assembly	6.20
Driven Clutch Bushing Service	6.21-6.22
Troubleshooting	6.23-6.24





SPECIAL TOOLS AND SUPPLIES

PART NUMBER	TOOL DESCRIPTION
2870506	Clutch Puller
9314177	Clutch Holding Wrench
2871358	Clutch Holding Fixture
2870341	Drive Clutch Spider Removal and Install Tool
2870654	Clutch Offset Alignment Tool
2870913	Driven Clutch Puller
2870910	Roller Pin Tool
2871226	Clutch Bushing Replacement Tool Kit
2870386	Piston Pin Puller
8700220	Clutch Compression Tool
2871025	Clutch Bushing Replacement Tool Kit

SPECIAL SUPPLIES PART NUMBER

Loctite[®] 680 **2870584**
 RTV Silicone Sealer **2870661**
 Loctite[®] Gasket Remover **2870601**

PVT SYSTEM FASTENER TORQUES

PVT COMPONENT	TORQUE VALUE
Drive Clutch Retaining Bolt	40 ft. lbs. (54 Nm)
Driven Clutch Retaining Bolt	17 ft. lbs. (23 Nm)
PVT Inner Cover Bolts	12 ft. lbs. (16 Nm)
Drive Clutch Cover Plate	90 in. lbs. (10 Nm)
Drive Clutch Spider (EBS)	200 ft.lbs. (271 Nm)

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.



DRIVEN CLUTCH OPERATION CONT'D

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.

PVT MAINTENANCE/INSPECTION

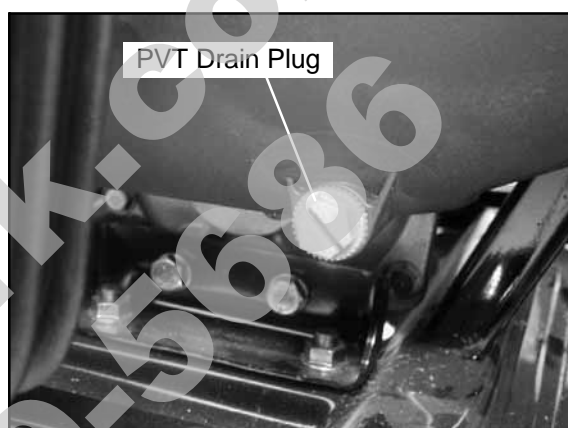
Under normal operation the PVT system will provide years of trouble free operation. Periodic inspection and maintenance is required to keep the system operating at peak performance. The following list of items should be inspected and maintained to ensure maximum performance and service life of PVT components. Refer to the troubleshooting checklist at the end of this chapter for more information.

1. **Drive to Driven Clutch Offset, Belt Width.** See Page-6.16-6.18
2. **Drive and Driven Clutch Buttons and Bushings, Drive Clutch Shift Weights and Pins, Drive Clutch Spider Rollers and Roller Pins, Drive and Driven Clutch Springs.** See Pages 6.11-6.12
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.

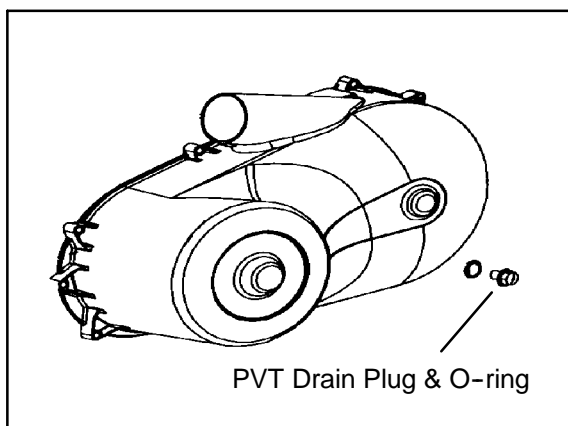
PVT DRYING

NOTE: 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 OVERHEATING/DIAGNOSIS

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 (if equipped) when pulling or plowing heavy loads, or if extended low speed operation is anticipated.

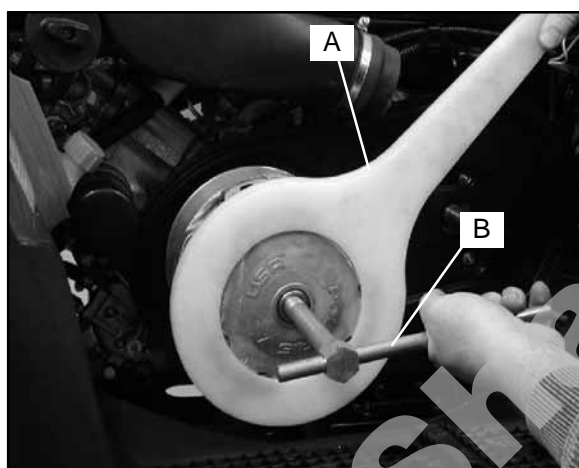
GENERAL RANGE OPERATION GUIDELINES:	Low Range: Heavy pulling, basic operational speeds less than 7 MPH, riding through rough terrain (swamps, mountains, etc.), low ground speeds.
	High Range: High ground speeds, speeds above 7 MPH.
Diagnosis of Clutch Drive Belt & Cover Related Issues:	
Possible Causes	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. (if equipped)
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. (if equipped) 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 approx. 1/8 throttle in short bursts, 5 to 7 times. The belt will become more flexible and prevent belt burning.
Slow and easy clutch engagement.	Fast, effective use of the throttle for efficient engagement. 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. (if equipped)
Plowing snow, dirt, etc./utility use.	Use Low Range only. (if equipped)
Stuck in mud or snow.	Shift the transmission to Low Range (if equipped), 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 (if equipped), 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 (if equipped) 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.



PVT DISASSEMBLY

NOTE: Some fasteners and procedures will vary. Refer to the appropriate parts manual for proper fasteners and fastener placement. (See Page 6.7).

1. Remove seat.
2. Remove or loosen rear cab fasteners as necessary to gain access to PVT outer cover.
3. Remove PVT air outlet duct hose.
4. Remove outer cover screws. Refer to Page 6.6.
5. Mark the drive belt direction of rotation and remove drive belt. See Page 6.14 for drive belt removal.



6. Install the Drive Clutch Holder (PN 9314177) (A).
7. Remove drive clutch retaining bolt and remove drive clutch using the Drive Clutch Holder (PN 9314177) (B).

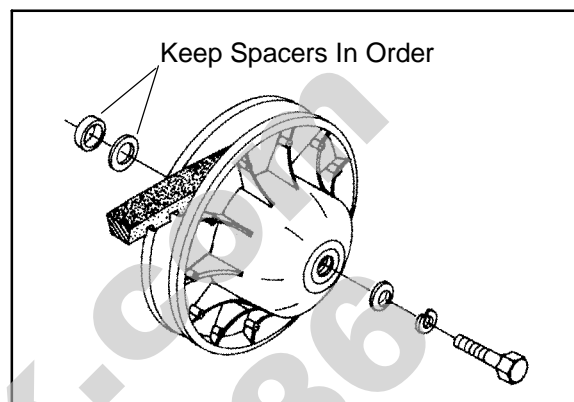
Drive Clutch Puller (PN 2870506)

Drive Clutch Holder (PN 9314177)

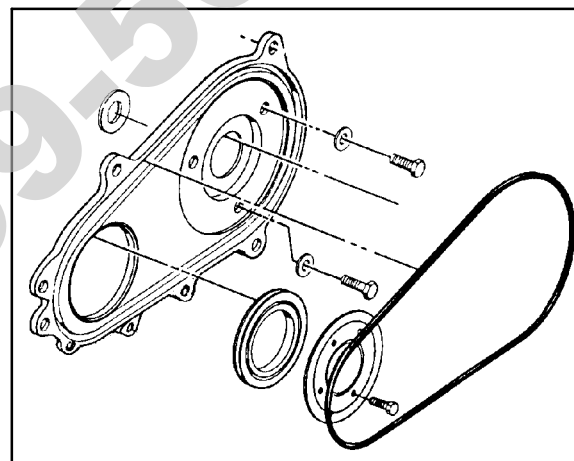


8. Remove driven clutch retaining bolt and driven clutch. Use the Driven Clutch Puller (PN 2870913) if necessary.

Driven Clutch Puller (PN 2870913)



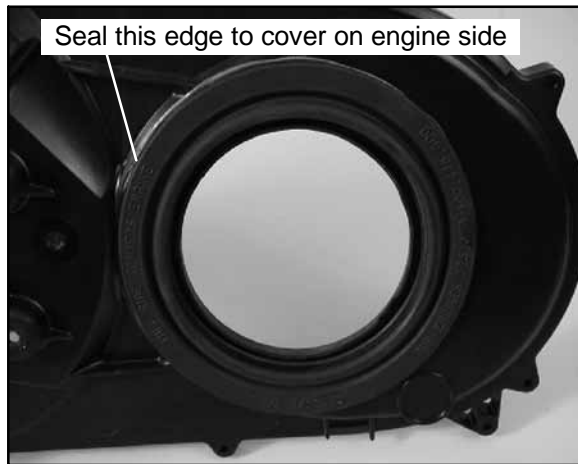
9. Remove driven clutch offset spacers from the transmission input shaft.



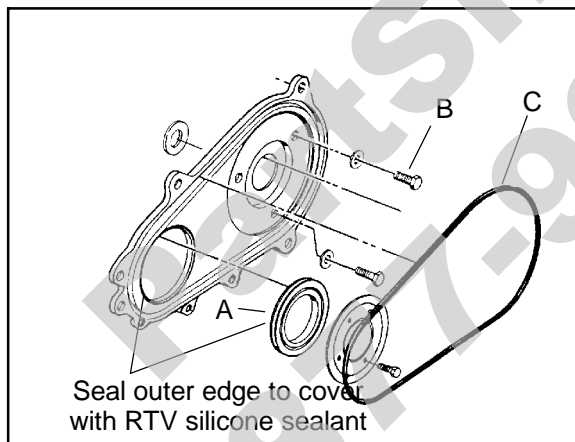
10. Remove screws and retainer plate.
11. Remove inner cover retaining bolts at rear of cover.
12. Remove cover along with foam seal on back of cover or shaft.



PVT ASSEMBLY



1. Inspect PVT inner cover-to-engine seal. Replace if cracked or damaged.
2. Place a new foam 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. 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.

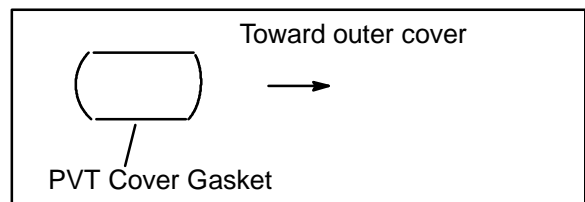
Inner Cover Bolt Torque (Rear):
12 ft. lbs. (16.6 Nm)

Driven Clutch Retaining Bolt Torque:
17 ft. lbs. (23.5 Nm)

Drive Clutch Retaining Bolt Torque:
40 ft. lbs. (55 Nm)



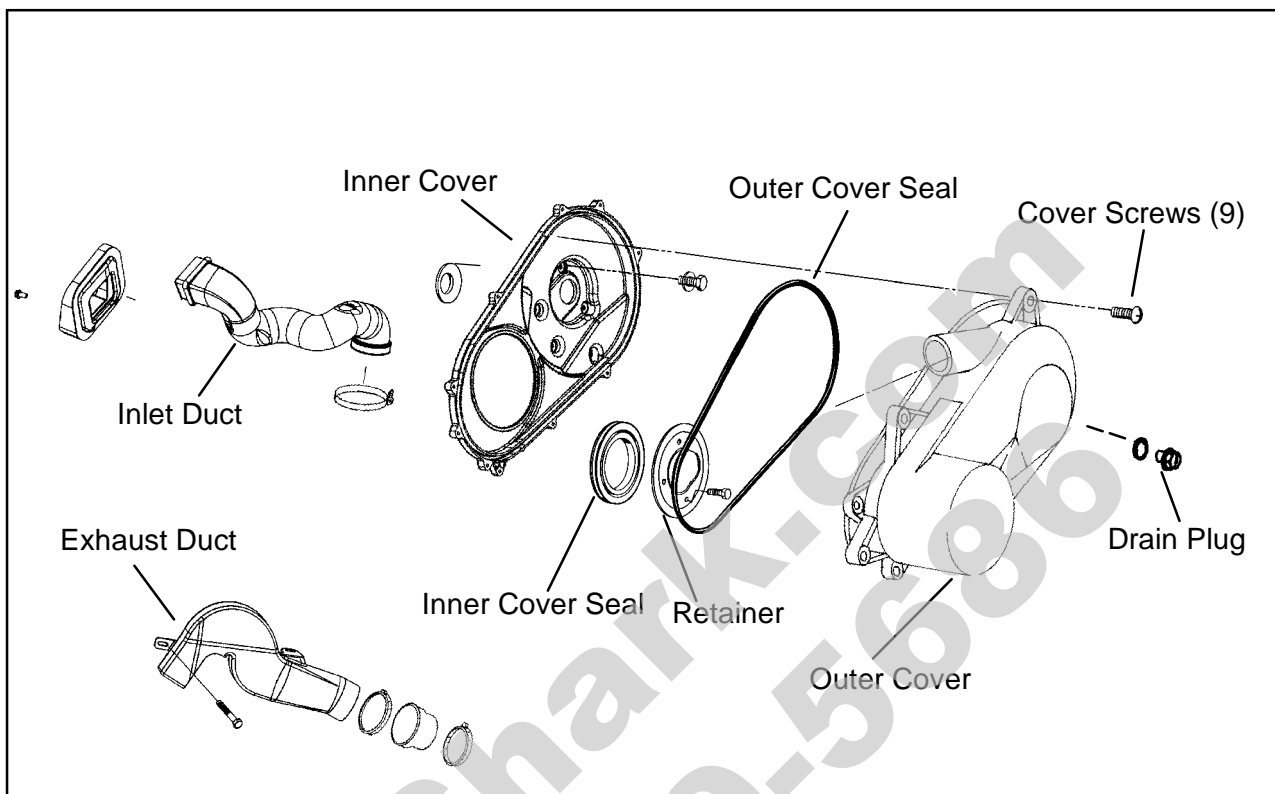
7. Install clutch offset spacers on transmission input shaft.
8. Clean splines inside driven clutch and on the transmission input shaft.
9. Apply a light film of grease to the splines on the shaft.
10. Install the driven clutch, washer, lock washer, and retaining bolt. Torque to specification.
11. Clean end of taper on crankshaft and the taper bore inside drive clutch.
12. Install drive clutch and torque retaining bolt to specification.
13. Reinstall drive belt noting direction of rotation. If a new belt is installed, install so numbers can be easily read.



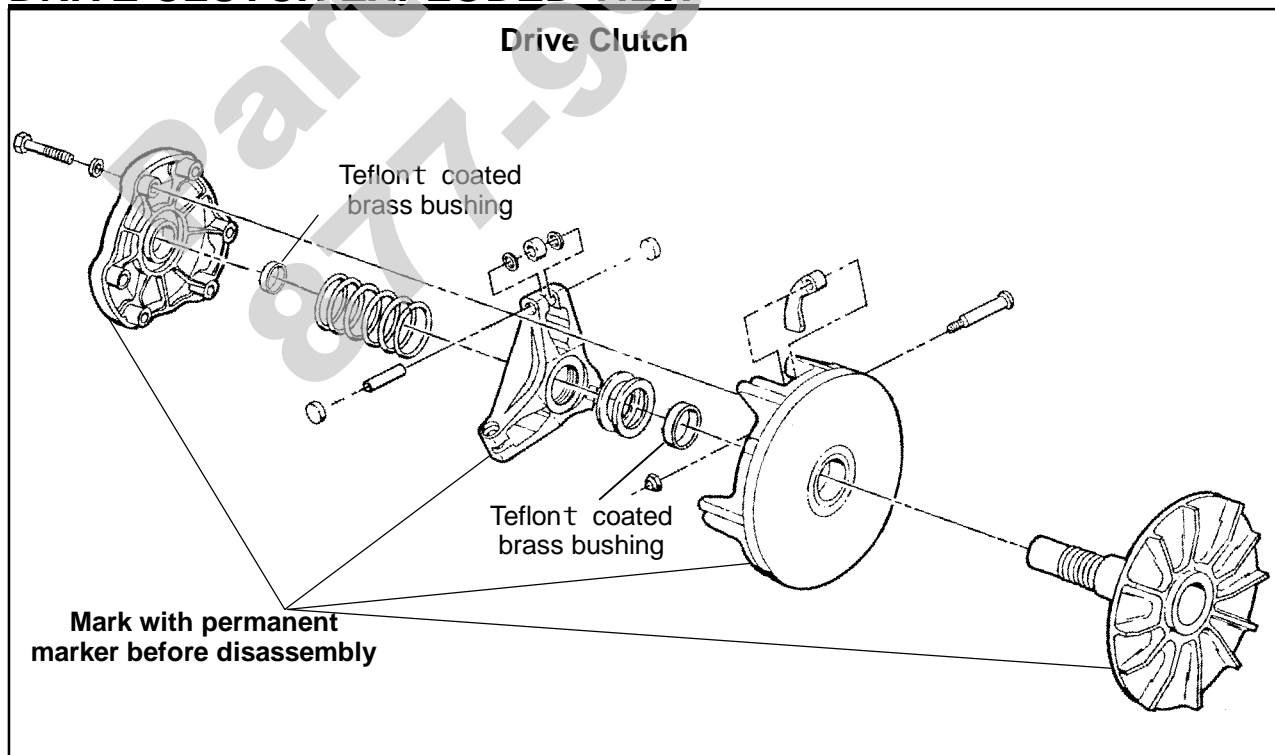
14. Replace PVT outer cover rubber gasket with the narrow side out (C).
15. Reinstall PVT outer cover and secure with screws.
16. Reinstall rear cab assembly and seat.



PVT SEALING AND DUCTING COMPONENTS



DRIVE CLUTCH EXPLODED VIEW





DRIVE CLUTCH SPRING SPECIFICATIONS

The drive clutch spring has two primary functions:

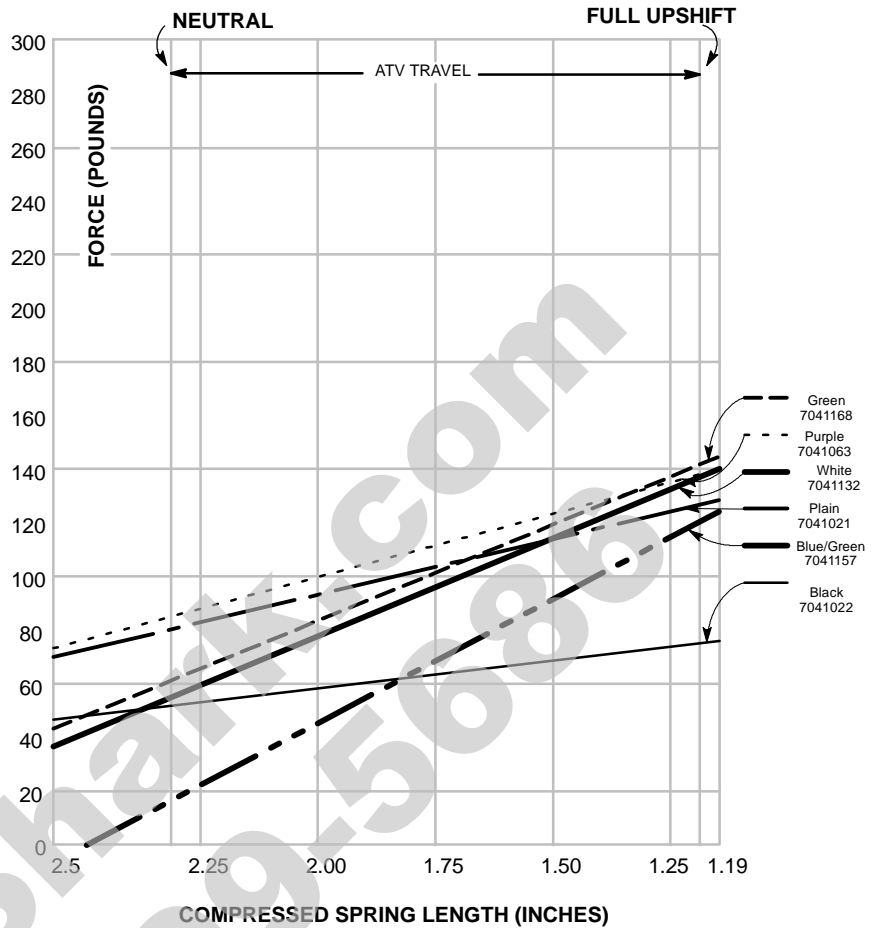
1. **To control clutch engagement RPM.** The springs which have a higher rate when the clutch is in neutral will increase clutch engagement RPM.
2. **To control the rate at which the drive belt moves upward in the drive clutch sheaves.** This is referred to as drive clutch upshift.

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 the 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 cover failure.

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 spring is subject to during operation, it should always be inspected for tolerance limits during any clutch operation diagnosis or repair.

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.



Primary Clutch Springs

PART NUMBER	COLOR CODE	WIRE DIAMETER	FREE LENGTH ± .1251
7041021	Plain	.1571	4.381
7041022	Black	.1401	4.251
7041063	Purple	.1681	4.371
7041132	White	.1771	2.921
7041168	Green	.1771	3.051
7041157	Blue/Green	.1771	2.531

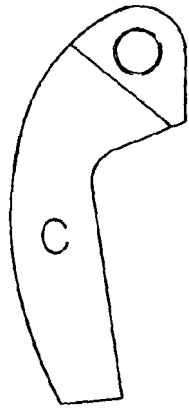
Secondary Clutch Springs

PART NUMBER	DESCRIPTION
7041198	Red
7041782	Black 5-coil
7041501	Gold 6-coil
7041499	Silver
7041296	Blue
7041646	Silver/Blue

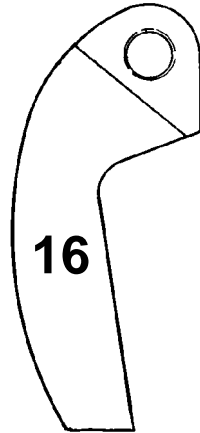


SHIFT WEIGHTS

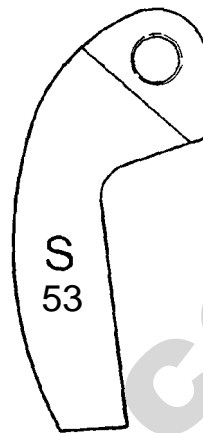
Shown below are the shift weights which have been designed for, or which may be used in the PVT system. These shift weights have many factors designed into them for controlling engagement RPM and shifting patterns. Shift weights should not be changed or altered without first having a thorough understanding of their positioning and the effects they may have on belt to sheave clearance, clutch balance and shifting pattern.



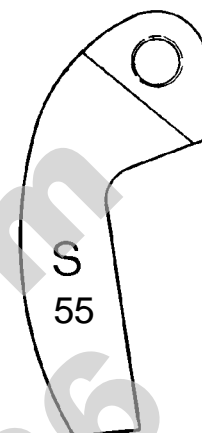
PN 5630418
50 gr



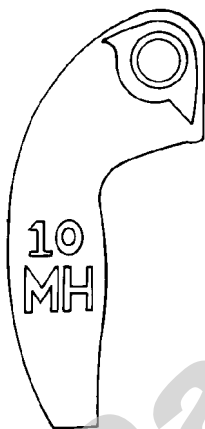
PN 5630279
43 gr



PN 5630095
53 gr



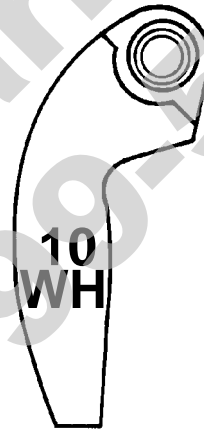
PN 5630509
55 gr



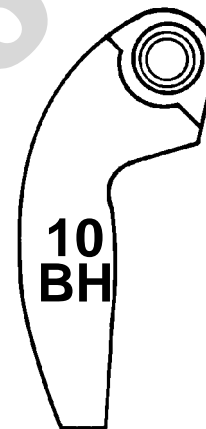
PN 5630513
50.5 gr



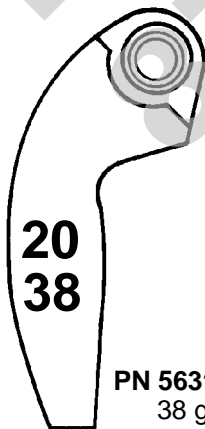
PN 5630709
44 gr



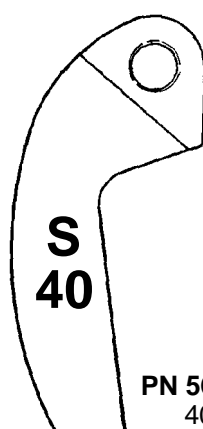
PN 5630710
46 gr



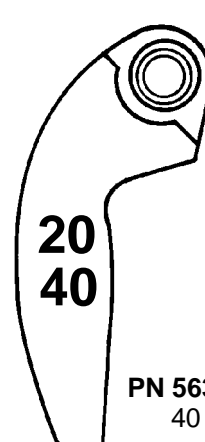
PN 5630711
47gr



PN 5631356
38 gr



PN 5631358
40 gr



PN 5631357
40 gr



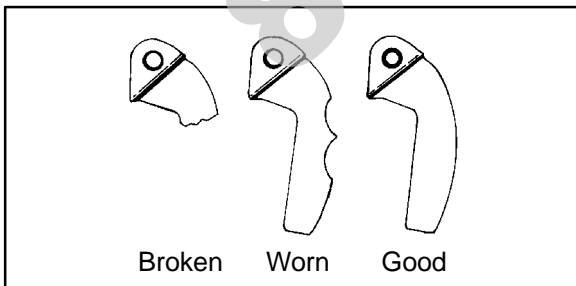
DRIVE CLUTCH INSPECTION

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!

All PVT system maintenance repairs must be performed only by an authorized Polaris service technician who has attended a Polaris sponsored service training seminar and understands the proper procedures as 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.**

1. Remove shift weight bolts and weights. Inspect as shown. The contact surface of the weight should be smooth and free of dents or gall marks. 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, PIN AND THRUST WASHER INSPECTION", Page 6.12.



BUTTON TO TOWER CLEARANCE INSPECTION

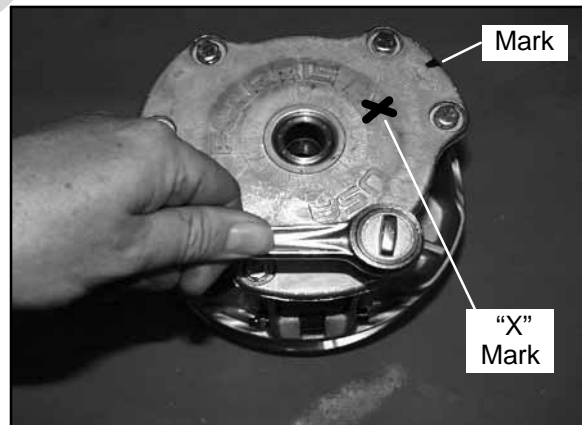
1. Inspect for any clearance between spider button to tower. If clearance exists, replace all buttons and inspect surface of towers. See "SPIDER REMOVAL" Page 6.11.



**Button to Tower Clearance:
.000 - .001**

2. Inspect sheave surfaces. Replace the *entire service clutch* if worn, damaged or cracked.

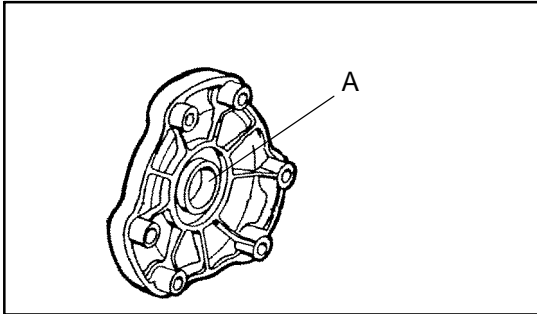
DRIVE CLUTCH DISASSEMBLY



1. Using a permanent marker, mark the cover, spider, moveable and stationary sheaves, and steel post to the stationary sheave for reference. The X's may not have been in alignment before disassembly.



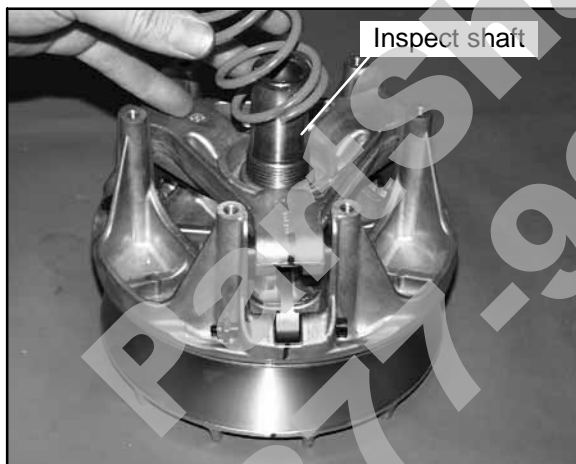
2. Remove cover bolts evenly in a cross pattern, and remove cover plate.



Cover Bushing Inspection:

Replace the cover bushing if more brass than Teflon^t is visible on the bushing. Refer to bushing replacement in this chapter.

3. Inspect cover bushing (A). The outer cover bushing is manufactured with a Teflon^t coating. Bushing wear is determined by the amount of Teflon^t remaining on the bushing.



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 Page 6.8)

SPIDER REMOVAL



Clutch Holding Fixture:
(PN 2871358)

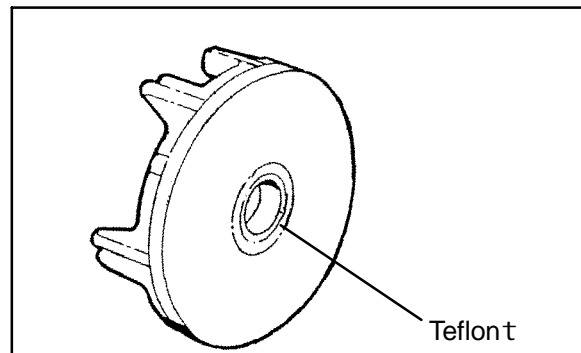
Spider Removal Tool:
(PN 2870341)

1. Install clutch in holding fixture and loosen the spider (counterclockwise) using spider removal tool.

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.

Moveable Sheave Bushing Inspection

2. Inspect the Teflon^t coating on the moveable sheave bushing.

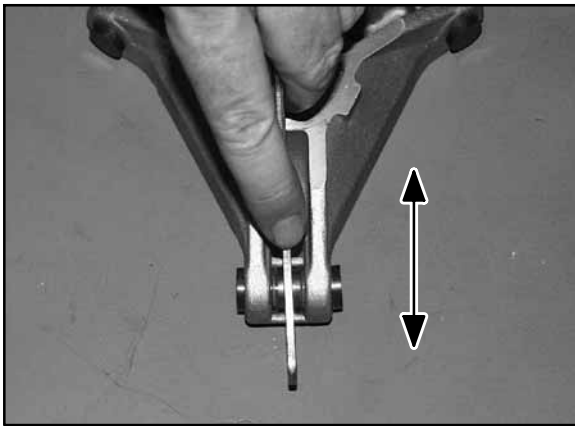


Moveable Sheave Bushing Inspection:

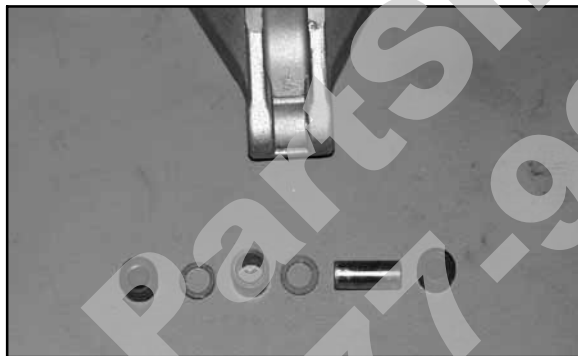
Replace the cover bushing if more brass than Teflon^t is visible on the bushing. Refer to bushing replacement in this chapter.



ROLLER, PIN AND THRUST WASHER INSPECTION



1. 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.



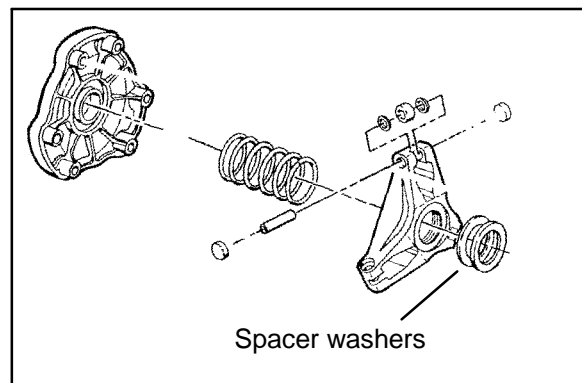
2. Rubber backed buttons can be used in all ATV clutches if the hollow roller pin is changed to the solid roller pin. **NOTE:** The rubber side of the button is positioned toward the solid roller pin.

DRIVE CLUTCH ASSEMBLY



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.**

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) 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



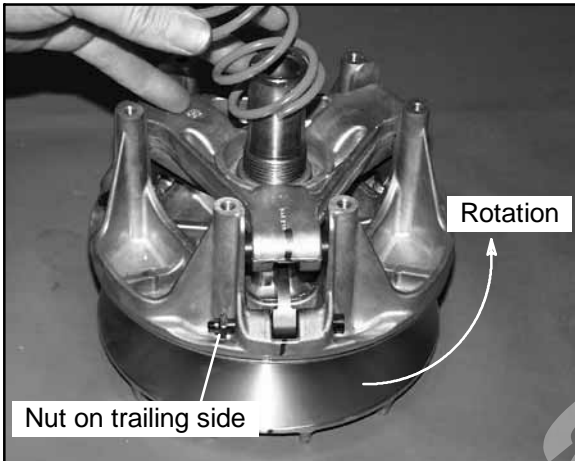
2. Install moveable sheave onto fixed sheave.
3. Install spider spacers. Use same quantity and thickness as were removed.
4. Compress spider buttons for each tower and install spider, making sure that "X", or the marks that were made earlier, on spider aligns with "X", or the marks that were made earlier, in moveable sheave.



- Torque spider to specification using the holding fixture and spider tool. Torque with smooth motion to avoid damage to the stationary sheave. Refer to Page 6.2 for torque specification.

CAUTION:

Be sure the spider spacer washers are fully seated in the recessed area in the spider. Any misalignment will alter clutch balance. Inverting the clutch while initially tightening the spider will help position the washers.



- Install shift weights using new lock nuts on the bolts.
- Reinstall clutch spring.



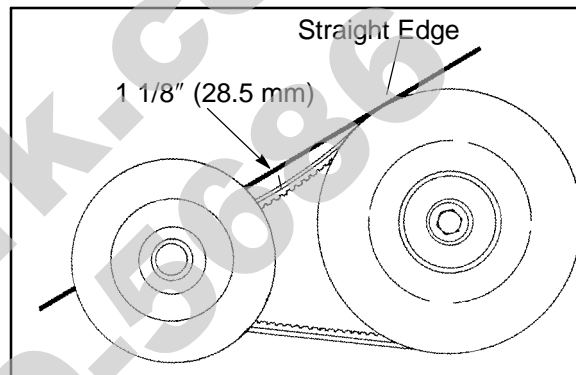
Spider Torque:
200 ft. lbs. (276 Nm)

Cover Screw Torque:
90 in. lbs. (10.4 Nm)

- Reinstall cover, aligning bosses on the tower and cover. Torque cover bolts evenly to specification.



DRIVE BELT TENSION



Belt Deflection (Tension):
1 1/8" (2.9 cm) - 1 1/4" (3.2 cm)

NOTE: Pinch the sheaves lightly together with clamp to prevent the belt from being pushed into the driven sheave.

- Place a straight edge on top of the belt between drive and driven clutch.
- Push down on drive belt until it is lightly tensioned.
- Measure belt deflection as shown in photo.

NOTE: If belt deflection is out of specification, adjust by removing or adding shims between the driven clutch sheaves.

- G Remove shims to decrease belt deflection
- G Add shims to increase belt deflection

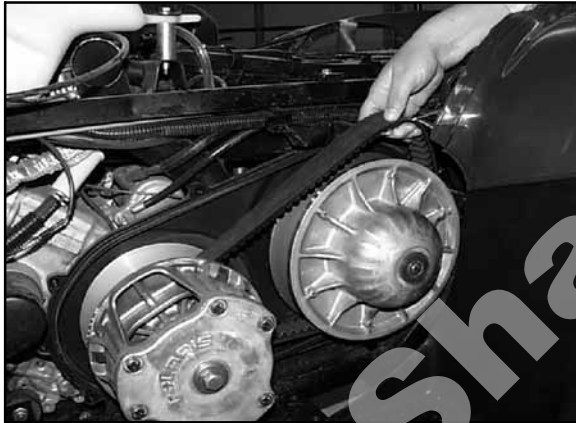
See DRIVEN CLUTCH DISASSEMBLY/INSPECTION, Pages 6.19 - 6.20.



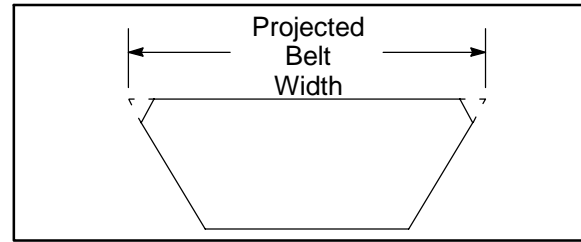
NOTE: At least one shim must remain between the inner and outer sheave of the driven clutch. If proper belt deflection cannot be obtained, measure drive belt width, length, and center distance of drive and driven clutch, outlined in this section; all have an effect on belt deflection.

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. **NOTE:** Normally positioned so part numbers are easily read.

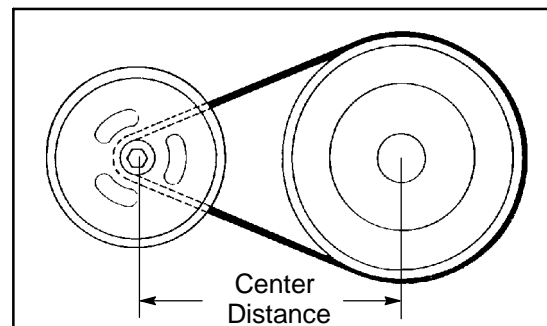


3. To remove drive belt: apply brake, pull upward and rearward on belt to open driven clutch sheaves, pull out and down on belt to slip over the driven clutch outer sheave.



Belt Width:
New 1.174 - 1.188" (2.98-3.02 cm)
Wear Limit 1.125" (2.86 cm)

4. Measure belt width and replace if worn severely. Generally, belt should be replaced if clutches can no longer be adjusted to provide proper belt deflection.
 - G The top edges have been trimmed on some drive belts. It will be necessary to project the side profiles and measure from corner to corner.
 - G Place a straight edge on each side of the drive belt.
 - G Place another straight edge on top of belt.
 - G Measure the distance where the side straight edges intersect the top, as shown in the illustration below.
5. Inspect belt for loose cords, missing cogs, cracks, abrasions, thin spots, or excessive wear. Replace if necessary.
6. 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.



Clutch Center Distance -
10" +.1 / -.05 (254 +2.5 / -1.3mm)
Belt Nominal Length - 40.875" ± 3/16
(103.8 cm ± .48 cm)

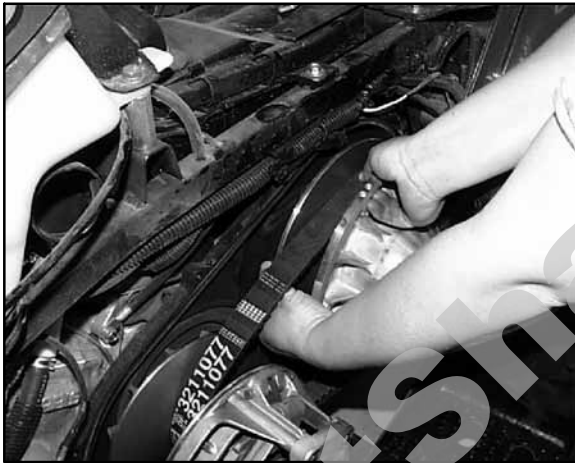
7. Measure belt length with a tape measure around the outer circumference of the belt. Belts which



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.*

- 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. **NOTE:** If a new belt is installed, check belt deflection.

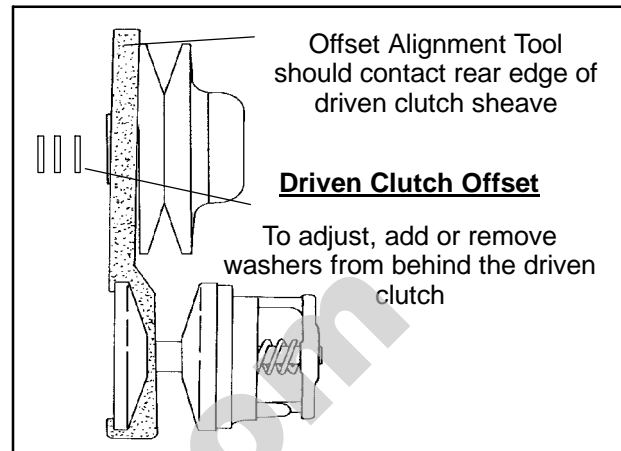
DRIVE BELT INSTALLATION



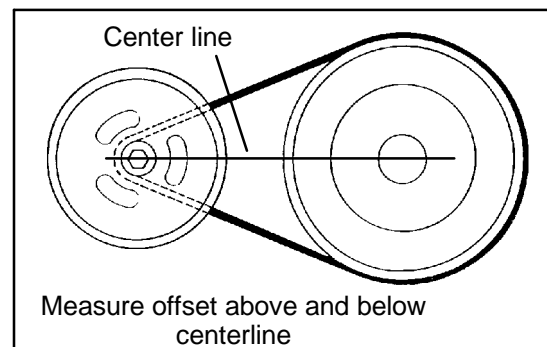
- Loop belt over drive and over top of driven sheave.
- While pushing down on top of belt, turn the back or moveable driven sheave clockwise.
- The belt then should be able to be pushed down into and between the sheaves.

NOTE: Be sure to position belt so part number is easily read.

CLUTCH ALIGNMENT



- Remove belt and install the Clutch Offset Alignment Tool (PN 2870654) as shown.
- With tool touching rear of driven clutch inner sheave, the distance at point "A" should be 1/8". If the distance is greater than 1/8" or less than 1/16", clutch alignment must be adjusted as follows:
 - Remove drive and driven clutch. See PVT Disassembly, Pages 6.5.
 - Remove PVT inner cover.
 - Loosen all engine mounts. Move front of engine to the right or left slightly until alignment is correct.
 - Tighten engine mounts and verify alignment is correct.



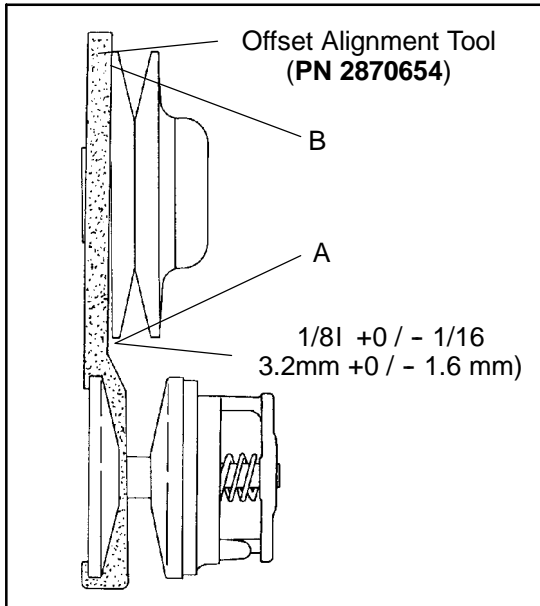
- Measure belt deflection and measure offset both above and below sheave centerlines. Adjust if necessary.

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.

1. Install offset alignment tool as shown. Offset is correct when rear of tool contacts rear of inner sheave with driven clutch pushed completely inward on shaft and bolt torqued. Adjust offset by adding or removing spacer washers between back of driven clutch and spacer as shown.

Spacer Washer (PN 7556401)

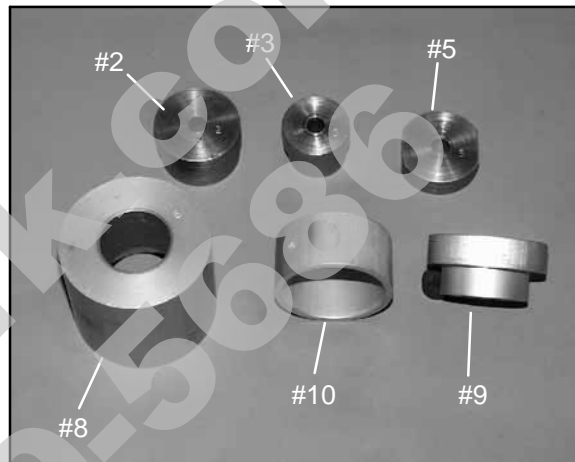
DRIVE CLUTCH BUSHING SERVICE

*Clutch Bushing Replacement Tool Kit (PN 2871226)

Stamp	Qty.	Part Description	Part #
#2	1	P-90 Drive/Driven Clutch Bushing Install Tool	5020628
#3	1	Drive Clutch Cover Bushing Removal/Installation Tool (all clutches)	5020629

#5	1	P-90 Driven Clutch Cover Bushing Removal Tool	5020631
#8	1	Main Puller Adapter	5020632
#9	1	Adapter Reducer	5010279
#10	1	Number Two Puller Adapter	5020633

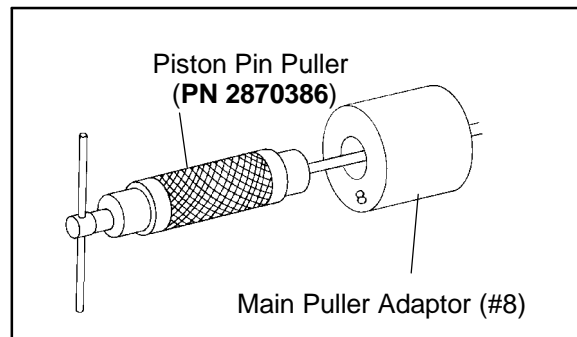
DRIVE CLUTCH MOVEABLE SHEAVE - BUSHING REMOVAL



1. Install handle end of the Piston Pin Puller (PN 2870386) securely into bench vise and lightly grease puller threads.

Piston Pin Puller (PN 2870386)

2. Remove nut from puller rod and set aside.

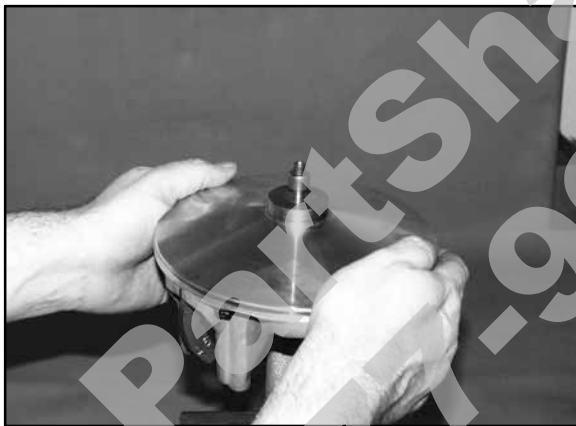




3. Install the Main Puller Adapter (#8) (PN 5020632) onto the Piston Pin Puller (PN 2870386).



4. Insert the Number Two Adapter (#10) (PN 5020633) into the bushing from belt side as shown. With towers pointing toward vise, slide sheave and bushing onto puller rod.
5. Install the nut removed in Step 2 onto end of puller rod and hand tighten. Turn puller barrel to increase tension on sheave if needed. Nut is left hand thread



6. Turn sheave and puller barrel together counterclockwise on puller rod until bushing is removed.
7. Remove nut from puller rod and set aside.
8. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

DRIVE CLUTCH MOVEABLE SHEAVE - BUSHING INSTALLATION

1. Place the Main Puller Adapter (#8) (PN 5020632) onto the puller.

2. Apply Loctite[®] 680 (PN 2870584) to the back side of new bushing. Push bushing into center of sheave on tower side by hand.

Bushing (PN 3576504)

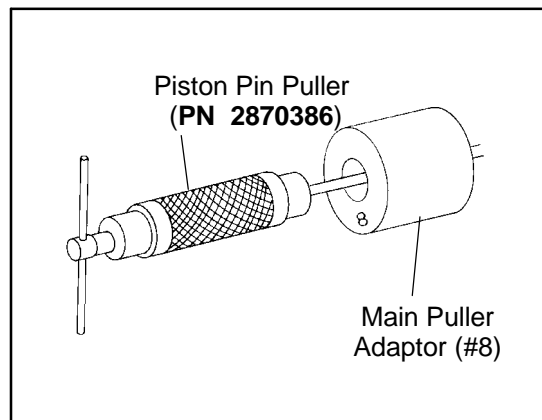
Loctite[®] 680 (PN 2870584)

3. Insert the Clutch Bushing Installation Tool (#2) (PN 5020628) into center of sheave and with towers pointing away from vise, slide sheave onto puller rod.
4. Install nut on puller rod and hand tighten. Turn barrel to apply additional tension if needed.



5. Turn sheave and barrel together counterclockwise until bushing is seated.
6. Remove nut from puller rod and set aside.
7. Remove sheave from puller.
8. Remove installation tool.

DRIVE CLUTCH COVER - BUSHING REMOVAL





1. Install the Main Puller Adapter (#8) (PN 5020632) onto the Piston Pin Puller (PN 2870386).



Bushing (PN 3576510)
Loctite[®] 680 (PN 2870584)

2. From outside of clutch cover, insert the Drive Cover Bushing Remover (#3) (PN 5020629) into cover bushing.
3. With inside of cover toward vise, slide cover onto puller.
4. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.

2. With the Main Puller Adapter (#8) (PN 5020632) on the puller, insert cover onto puller rod, placing outside of cover toward vise.



5. Turn clutch cover counterclockwise on puller rod until bushing is removed.
6. Remove nut from puller rod and set aside.
7. Remove bushing and bushing removal tool from puller. Discard bushing.

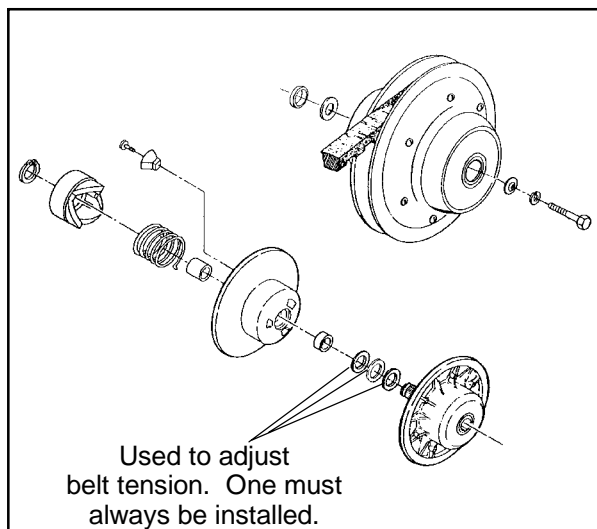
3. Install nut on rod and hand tighten. Turn puller barrel to apply more tension if needed.
4. Turn clutch cover and barrel together counterclockwise on puller rod until bushing is seated.
5. Remove nut from puller rod and take installation tool and clutch cover off rod.

DRIVE CLUTCH COVER - BUSHING INSTALLATION

1. Apply Loctite[®] 680 (PN 2870584) to the back side of new bushing. Working from inside of cover, insert bushing and bushing installation tool into center of clutch cover.



DRIVEN CLUTCH DISASSEMBLY/INSPECTION



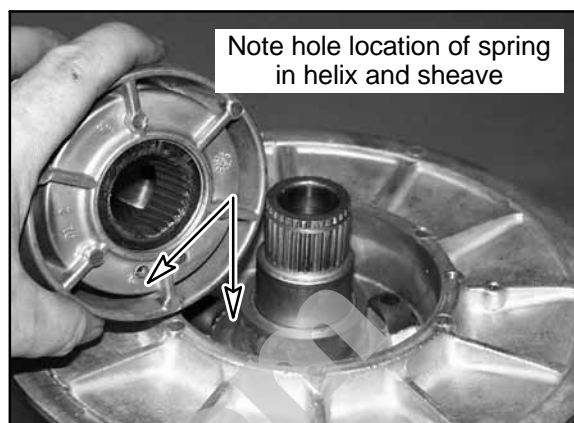
CAUTION:

Wear eye protection when removing snap ring to prevent serious personal injury.

1. Apply and hold downward pressure on the helix, or place driven clutch in the Clutch Compression Tool (PN 8700220).



2. Remove snap ring retainer.



3. Note the location of the spring and remove helix.
4. Note the location of the spring in the moveable sheave, and remove the spring.
5. Check alignment of tabs on spring. Replace the spring if tabs are misaligned or the spring coils are distorted.



6. Inspect ramp buttons in the moveable sheave and replace if worn. **NOTE:** The ramp buttons are secured by Torx screws (T20).





- Remove moveable sheave and note the number of spacer washers. One spacer must remain between the sheaves when adjusting belt deflection.



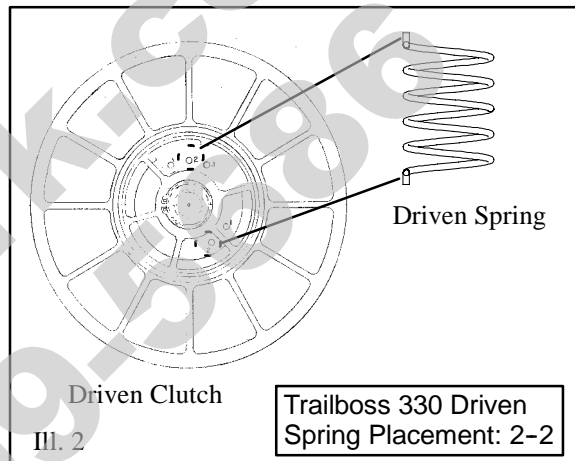
Moveable Sheave Bushing Inspection:

Replace the bushing if more brass than Teflon[®] is visible on the bushing. Refer to bushing replacement in this chapter.

- Inspect the Teflon[®] coating on the moveable sheave bushing.
- Inspect driven clutch faces for wear or damage.
- Clean and inspect splines on helix and transmission input shaft.
- Lube splines with a light film of grease. **Do not lubricate the bushings!**

- Install moveable sheave with spacer washers. **Important:** At least one spacer washer must be installed. Teflon[®] bushings are self-lubricating. Do not apply oil or grease to the bushings.
- Install spring, inserting spring tab into proper hole in moveable sheave.
- Insert spring tab into proper hole in helix. See specifications Chapter 1 or Illustration 2 below.

The driven clutch, helix/moveable assembly has several different spring locations which affect clutch shifting and RPMs. The greatest amount of spring tension will raise engine RPMs during clutch upshift and allow quicker backshift or downshift when pulling or negotiating a hill, for example. The least amount of tension will create a slower downshift and a harder upshift.



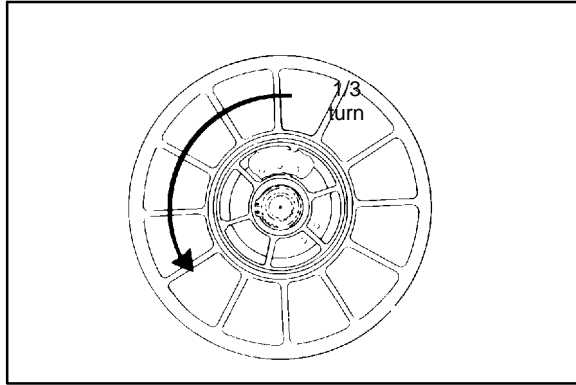
DRIVEN CLUTCH ASSEMBLY

Example:	Helix	Moveable Sheave	Spring Tension
	2	- 1	Heavy
Spring/ Position	2	- 2	↕
	1	- 1	
	2	- 3	
	1	- 2	
	1	- 3		Soft

Refer to General Information Chapter 1 for driven clutch spring color and production setting.



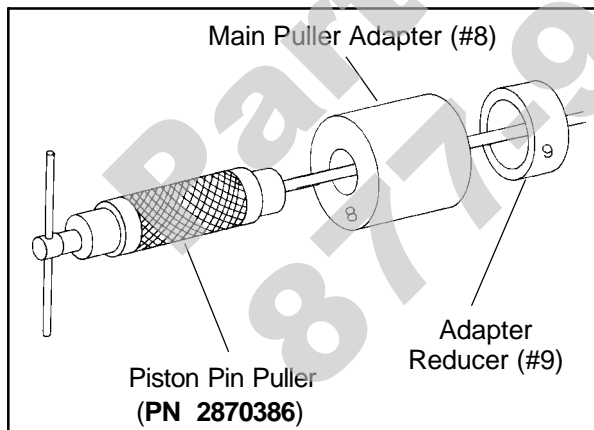
- Line up boss spline and push helix down until it engages the splines 1/2" to 3/4".



5. While holding downward pressure on helix, wind moveable sheave counterclockwise approximately 1/3 turn (120°).
6. Push helix into place and install snap ring.

DRIVEN CLUTCH MOVEABLE SHEAVE - BUSHING REMOVAL

NOTE: Bushings are installed at the factory using Loctite . In order to remove the bushing it will be necessary to apply heat. A press can be used to remove and install some of the bushings. Be sure to support the sheave or cover as close as possible to the bushing bore when using a press.



1. Install Main Puller Adapter (#8) (PN 5020632) onto the Piston Pin Puller (PN 2870386).
2. Insert Adapter Reducer (#9) (PN 5010279) onto the puller, sliding it inside the main adapter.

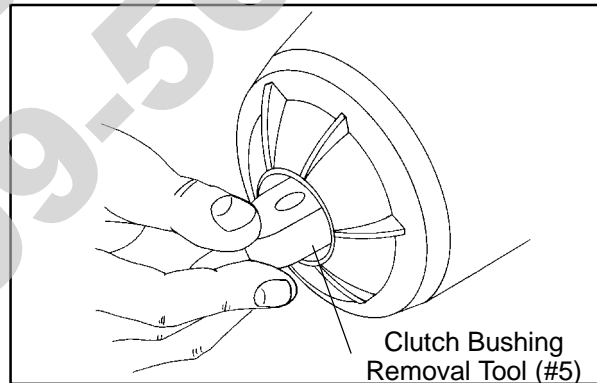
3. Remove ramp buttons from moveable sheave.



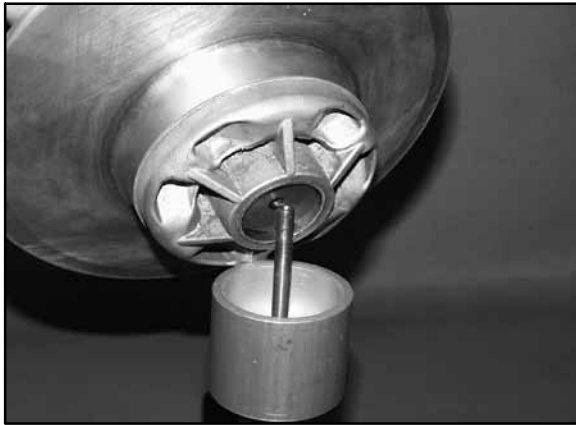
4. Using an electric or hand held propane torch, apply heat directly on bushing until tiny smoke tailings appear.

CAUTION:

Clutch components will be hot! In order to avoid serious burns, wear some type of insulated gloves for the rest of the removal process.



5. Working from the top, install Driven Clutch Bushing Removal Tool (#5) (PN 5020631) into the center of clutch sheave with smaller diameter toward bushing to be removed. See illustration at above.



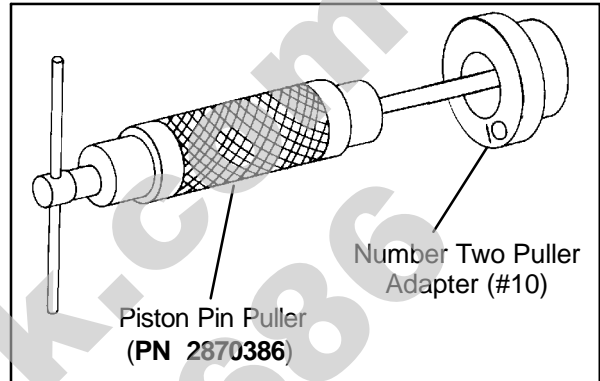
6. Install sheave onto puller.
7. Install nut onto puller rod and tighten by hand. Turn puller barrel for further tension if needed.



8. Turn clutch sheave counterclockwise until bushing is removed. Repeat Steps 5 - 8 for other bushing.

9. Remove nut from puller rod and set aside.
10. Remove adapters from puller.
11. Remove bushing and removal tool from adapters. Discard bushing.

DRIVEN CLUTCH MOVEABLE SHEAVE - BUSHING INSTALLATION



1. Working from the top, insert Number Two Puller Adapter (#10) (PN 5020633) onto the puller. See illustration at above.
2. Start new bushing evenly in moveable sheave. Apply Loctite 680 (PN 2870584) to the back side of new bushing.



3. Install sheave onto puller with new bushing upward as shown. Install the Number Two Puller Adapter (#10) (PN 5020633).



4. Install nut onto puller rod and hand tighten against installation tool.
5. Turn clutch sheave counterclockwise until bushing is seated.

6. Remove nut from puller rod and set aside.
7. Remove installation tool and clutch sheave from puller.



8. Repeat installation procedure for other moveable bushing.

TROUBLESHOOTING

Situation	Probable Cause	Remedy
Engine RPM below specified operating range, although engine is properly tuned.	<ul style="list-style-type: none"> -Wrong or broken drive clutch spring. -Drive clutch shift weight too heavy. -Driven clutch spring broken or installed in wrong helix location. 	<ul style="list-style-type: none"> -Replace with recommended spring. -Install correct shift weight kit to match engine application. -Replace spring; refer to proper installation location.
Erratic engine operating RPM during acceleration or load variations.	<ul style="list-style-type: none"> -Drive clutch binding. -Belt worn unevenly - thin/burnt spots -Driven clutch malfunction. -Sheave face grooved. 	<ul style="list-style-type: none"> a. Disassemble drive clutch; inspect shift weights for wear and free operation. b. Clean and polish stationary shaft hub; reassemble clutch without spring to determine problem area. Replace belt a. Replace ramp buttons. b. Inspect movable sheave for excessive bushing clearance/replace. -Replace the clutch.
Engine RPM above specified operating range.	<ul style="list-style-type: none"> -Incorrect drive clutch spring (too high spring rate). -Drive clutch shift weights incorrect for application (too light). -Drive clutch binding. -Driven clutch binding. -Converter sheaves greasy; belt slippage. 	<ul style="list-style-type: none"> -Install correct recommended spring. -Install correct recommended shift weights. -Disassemble and clean clutch, inspecting shift weights and rollers. Reassemble without the spring and move sheaves through entire range to further determine probable cause. -Disassemble, clean, and inspect driven clutch, noting worn sheave bushing and ramp buttons and helix spring location. -Clean sheaves with denatured alcohol or brake cleaner, install new belt.

CLUTCH



Harsh drive clutch engagement.	<ul style="list-style-type: none"> -Drive belt worn too narrow. -Excessive belt/sheave clearance with new belt. 	<ul style="list-style-type: none"> -Replace belt. -Perform belt/sheave clearance adjustment with shim washers beneath spider.
Drive belt turns over	<ul style="list-style-type: none"> -Wrong belt for application. -Clutch alignment out of spec. -Engine mount broken or loose. 	<ul style="list-style-type: none"> -Replace with correct belt. -Adjust alignment offset. -Inspect/adjust or replace.
PVT cover overheating (melting)	<ul style="list-style-type: none"> -Plugged air intake or outlet -Belt slippage due to water, oil, grease, etc., rubbing on cover -Clutches or weight being applied to cover while in operation -High vs. low range 	<ul style="list-style-type: none"> -Clear obstruction. -Inspect system. Clean, repair or replace as necessary. Seal PVT system ducts. -Remove weight. Inform operator. -Instruct operator on guidelines for operation in proper driving range for different terrain as outlined in Owner's Safety and Maintenance Manual.
Water ingestion	<ul style="list-style-type: none"> -Cover seals or ducts leaking -Operator error 	<ul style="list-style-type: none"> -Find leak and repair as necessary. -Instruct operator on guidelines for operation in wet terrain as outlined in Owner's Safety and Maintenance Manual.
Belt slippage	<ul style="list-style-type: none"> -Belt worn out -Water ingestion -Belt contaminated with oil or grease 	<ul style="list-style-type: none"> -Replace belt. -Inspect and seal PVT system. -Inspect and clean.
Belt burnt, thin spots	<ul style="list-style-type: none"> -Abuse (continued throttle application when vehicle is stationary, excess load) -Dragging brake -Slow, easy clutch engagement 	<ul style="list-style-type: none"> -Caution operator to operate machine within guidelines. -Vehicle operated with park brake on. Inspect brake system. -Fast, effective use of throttle for efficient engagement.
PVT noise	<ul style="list-style-type: none"> -Belt worn or separated, thin spots, loose belt -Broken or worn clutch components, cover hitting clutches 	<ul style="list-style-type: none"> -Replace belt. -Inspect and repair as necessary.
Engagement erratic or stabby	<ul style="list-style-type: none"> -Thin spots on belt, worn belt -Drive clutch bushings stick 	<ul style="list-style-type: none"> -Replace belt. Refer to belt burnt troubleshooting and instruct operator. -Inspect and repair clutches.

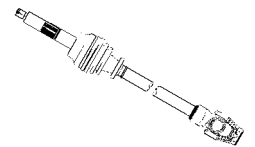




CHAPTER 7

FINAL DRIVE

Special Tools / Torque Specifications	7.2
Front Hub Disassembly/Inspection	7.2-7.3
Front Hub Assembly	7.4
Front Hub Installation	7.4-7.5
Front Hub Exploded View	7.6
Rear Axle Removal	7.7-7.8
Rear Axle Installation	7.8-7.10
Rear Housing Removal	7.10
Rear Housing Disassembly	7.11
Rear Housing Installation	7.11
Rear Axle Exploded View	7.12

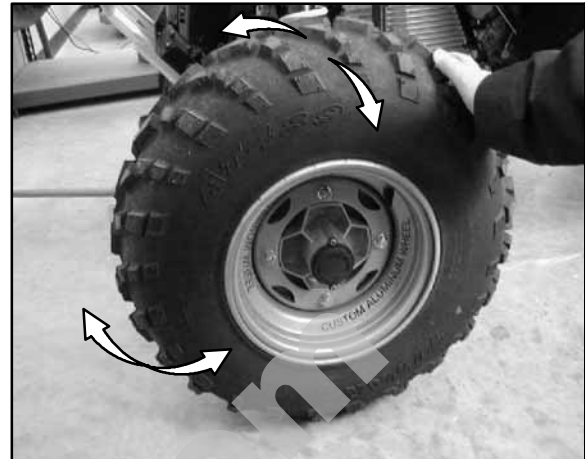


7



SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2870872	Shock Spanner Wrench
2870871	Ball Joint Replacement Tool
2870623	Shock Absorber Spring Compression Tool
2871572	Strut Rod Wrench
2871573	LH Strut Spring Compressor
2871574	RH Strut Spring Compressor
2871199	Seal Sleeve Installation Tool Kit



WHEEL, HUB, AND SPINDLE TORQUE TABLEⁱ

Item	Specification
Front Wheel Nuts	27 Ft. Lbs. (37 Nm)
Rear Wheel Nuts	50 Ft. Lbs. (68 Nm)
Front Spindle Nut	40 Ft. Lbs. (54 Nm)
Rear Hub Retaining Nut	80 Ft. Lbs. (109 Nm)

ⁱ Refer to exploded views and text for torque values of other fasteners

CAUTION: Locking nuts, and bolts with preapplied locking agent should be replaced if removed. The self-locking properties of the nut or bolt are reduced or destroyed during removal.

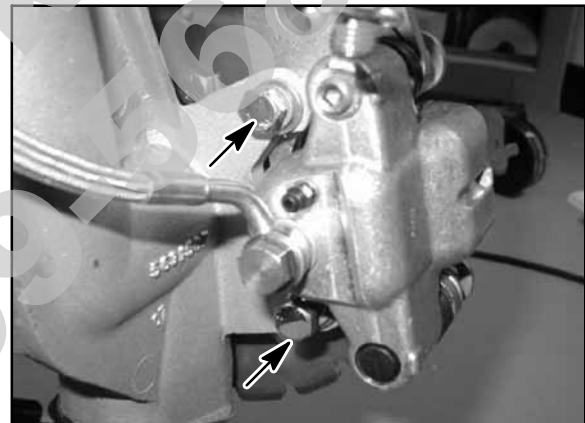
FRONT HUB DISASSEMBLY/INSPECTION

1. Elevate front end 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. Wear eye protection when removing bearings and seals.

2. Check bearings for side play by grasping tire / wheel firmly (top and bottom) and checking for movement. It should rotate smoothly without binding or rough spots.

3. Remove wheel nuts and wheel.
4. Remove the two brake caliper bolts and the brake caliper. Use mechanic's wire or other suitable material to support the caliper assembly. Do not allow caliper assembly to hang by the brake line!



5. Remove hub cap, cotter pin, front spindle nut, and washer.

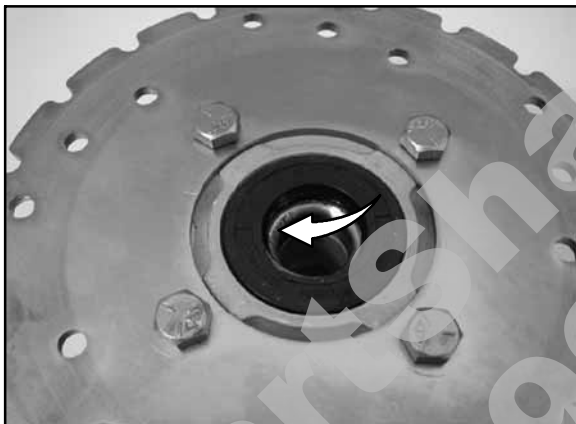




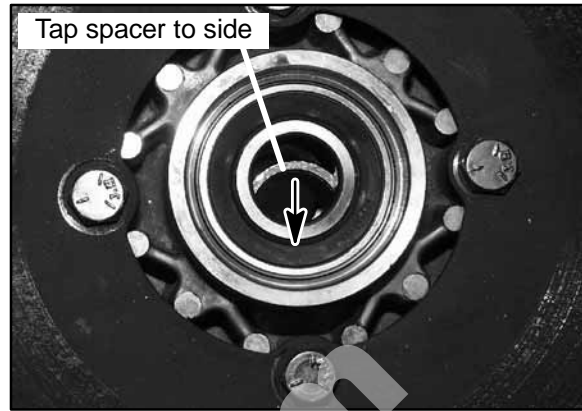
6. Rotate each bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion. Replace bearing if moisture, dirt, corrosion, or roughness is evident.



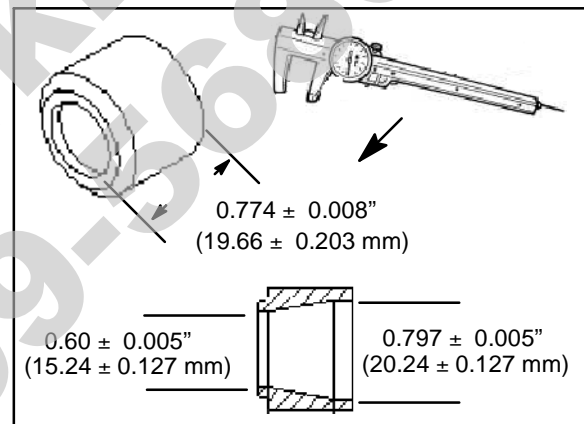
7. Use a flat head screw driver to carefully pry the seal out of the hub.



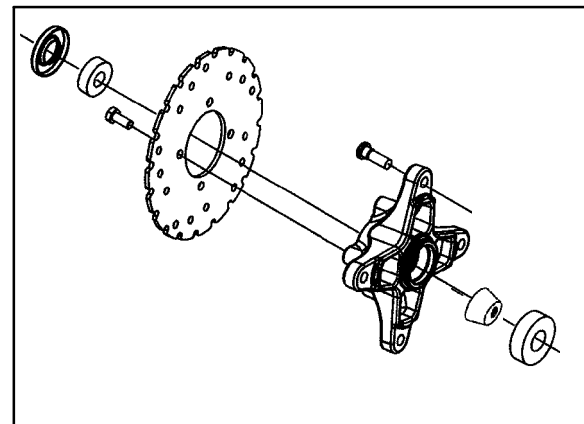
8. Using a brass drift, tap bearing spacer to one side to expose inner bearing race. Drive bearing out using a drift through opposite side of hub and discard.



9. Remove spacer. Drive other bearing out and discard.
10. Clean hub and spacer thoroughly.
11. Inspect spacer for wear or damage. Measure length of spacer and replace if worn beyond service limit or if ends are rounded.



12. Lay out parts for reassembly.

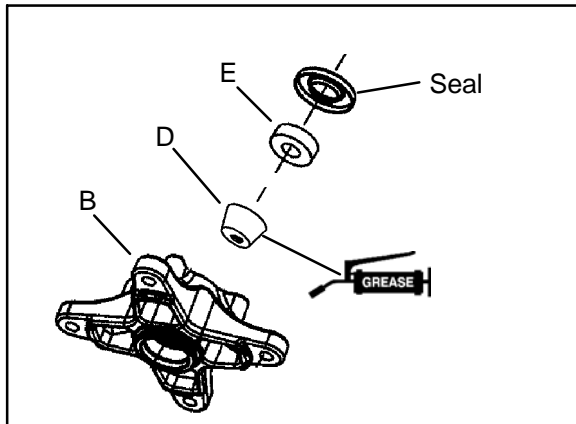




FRONT HUB ASSEMBLY

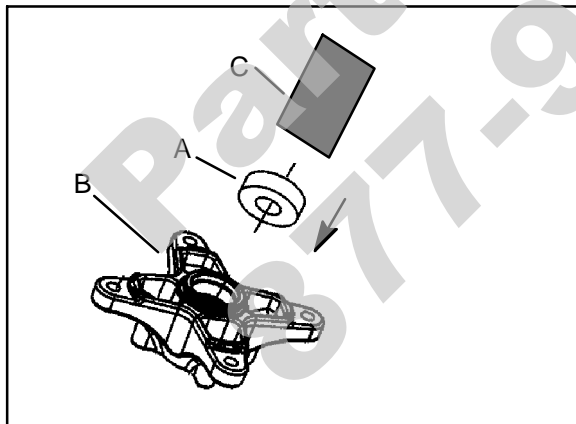
1. Insert spacer (D), small end facing, into backside of hub. Drive or press one new bearing (A) into hub (B) using a bearing driver (C).

CAUTION: Do not drive on the inner race of the bearing.

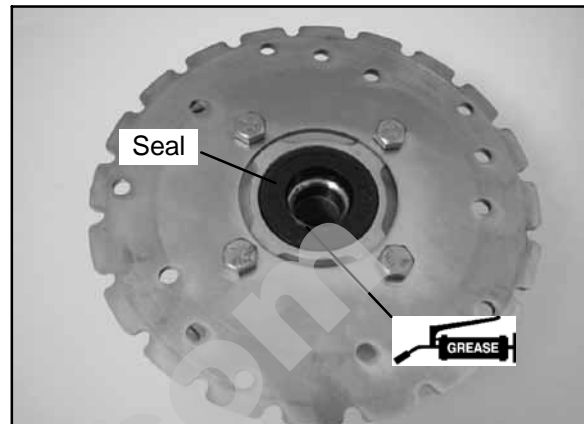


Premium All-Season Grease
 (PN 2871322) (3 oz. Tube)
 (PN 2871423) (14 oz. Tube)

2. Coat bearing spacer (D) with grease and install into hub (B). Drive or press the other bearing (E) into hub until seated against spacer.

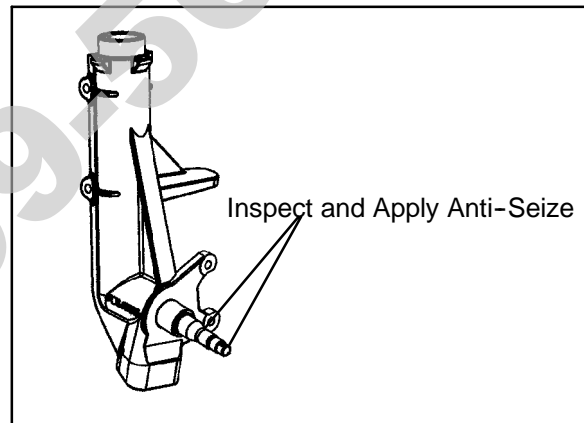


3. Install seal into hub backside (numbers facing out) until flush with end of seal bore. Apply grease to the seal lip before mounting to spindle.

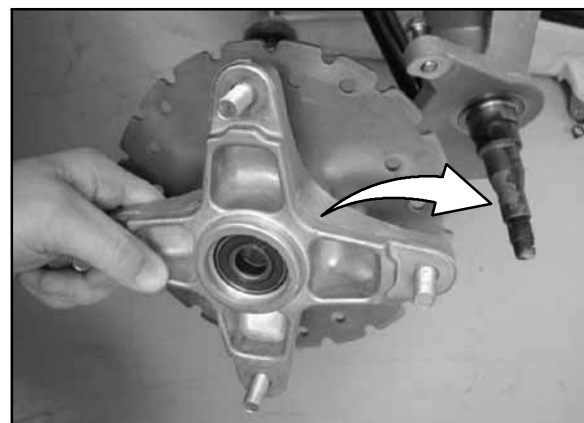


FRONT HUB INSTALLATION

1. Inspect spindle seal and bearing surface for wear or damage. Apply anti-seize compound to the spindle area.



2. Install hub on spindle.

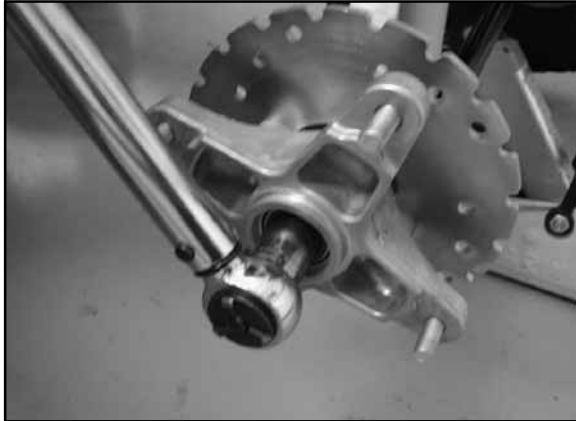




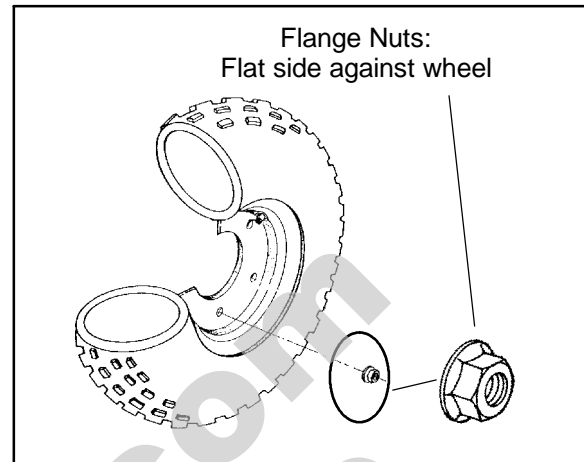
3. Install spindle nut and tighten to specification.

**2 x 4 Spindle Nut Torque: 40 ft. lbs.
(55.0 Nm)**

**2 x 4 Wheel Nut Torque: 27 ft. lbs.
(36 Nm)**

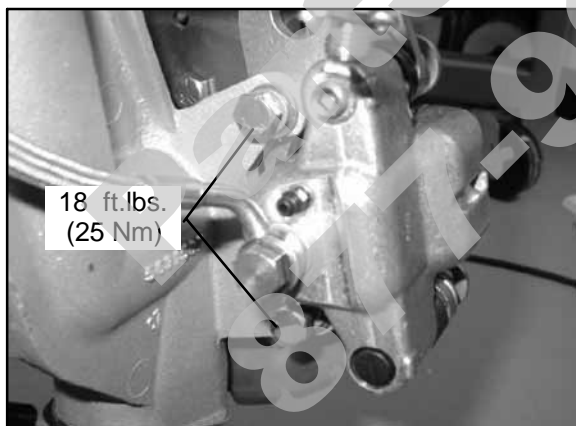


9. Install wheel and wheel nuts and tighten evenly in a crossing pattern to specified torque.



**2 x 4 Wheel Nut Torque: 27 ft. lbs.
(37 Nm)**

4. Install a new cotter pin. Tighten nut slightly if necessary to align cotter pin holes.
5. Bend both ends of cotter pin around end of spindle in different directions.
6. Install hub cap.
7. Rotate hub. It should rotate smoothly without binding or rough spots or side play.
8. Install brake caliper, bolts, flat washers and lock washers. Tighten bolts to specified torque.

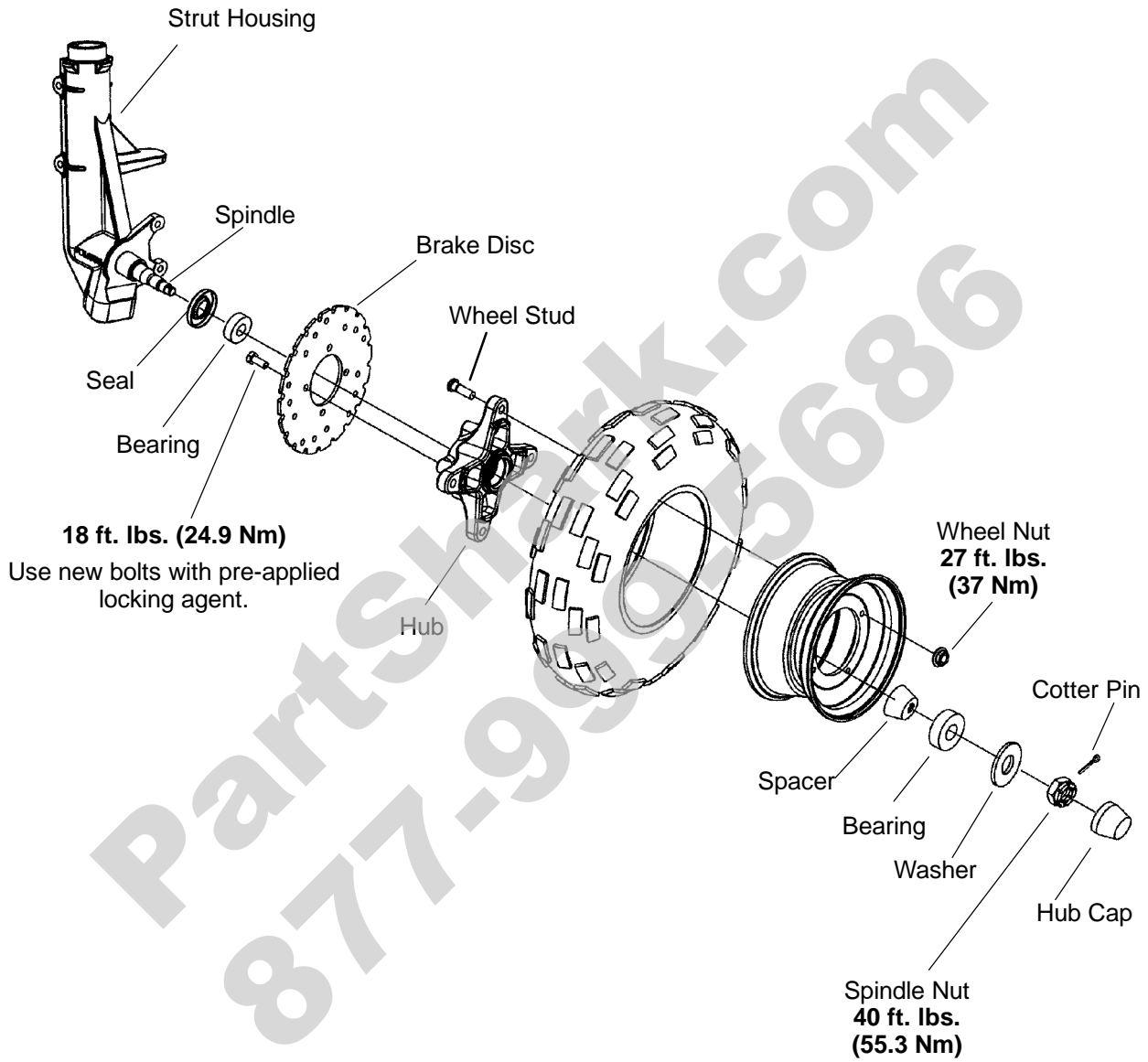


Caliper Mounting Bolt Torque

18 ft. lbs. (25 Nm)



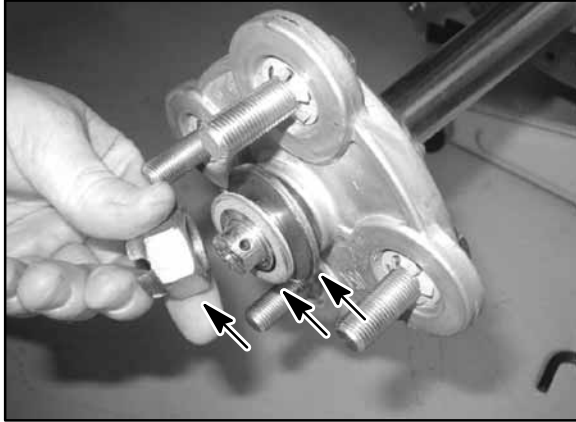
FRONT HUB EXPLODED VIEW



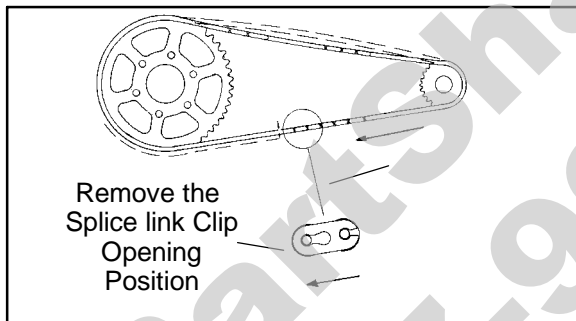


CONCENTRIC SWINGARM REAR AXLE REMOVAL

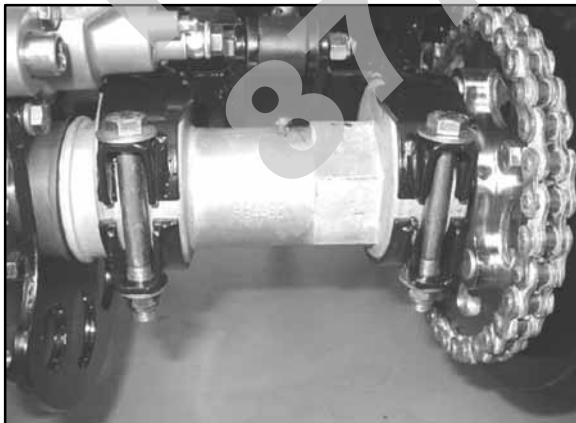
1. Securely support rear of machine with rear wheels off the floor. Remove rear wheels.
2. Removing the cotter pin, hub nut, and washer, Pull off the left side hub.



3. Remove the splice link clip and remove the drive chain. Loosen or remove the chain guard located at the bottom of the swingarm under the chain.



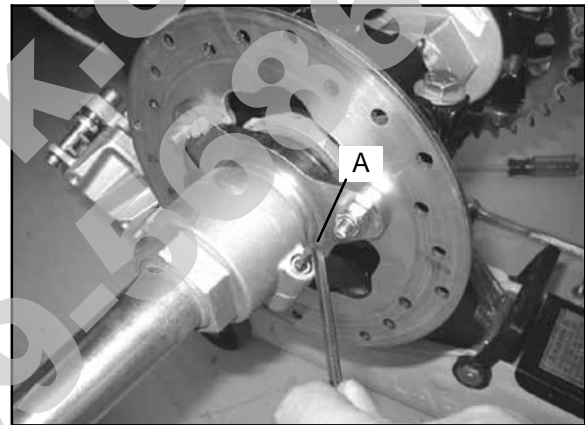
4. Loosen the concentric clamp bolts.



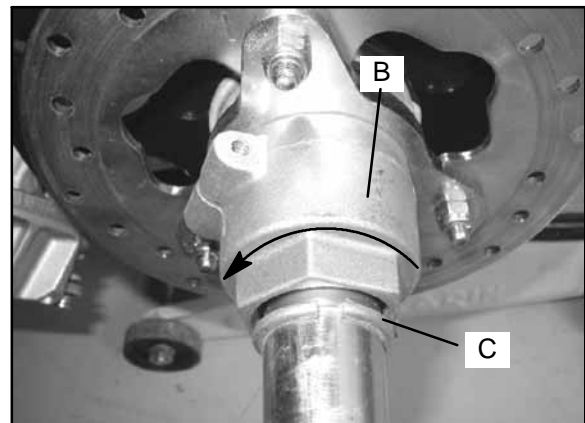
5. Remove the two bolts that secure the brake caliper. Support the rear caliper with wire or a tie strap. Do not hang the caliper by brake line.



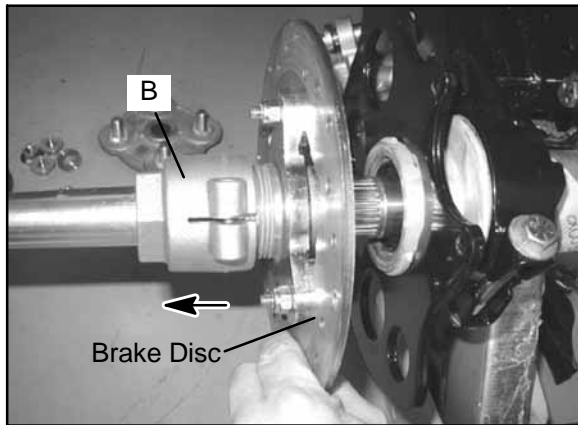
6. Loosen the hex screw (A) to loosen the axle nut.



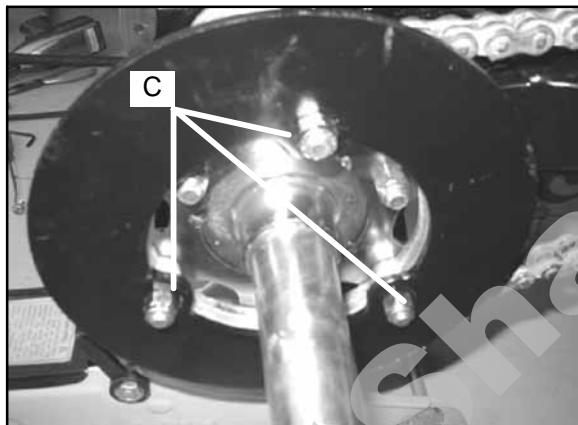
7. Turn the axle nut collar (B) counter clockwise with a 1 3/4" Wrench (PN 2870772) until the retaining ring (C) is visible. Slide the retaining ring (C) down the axle.



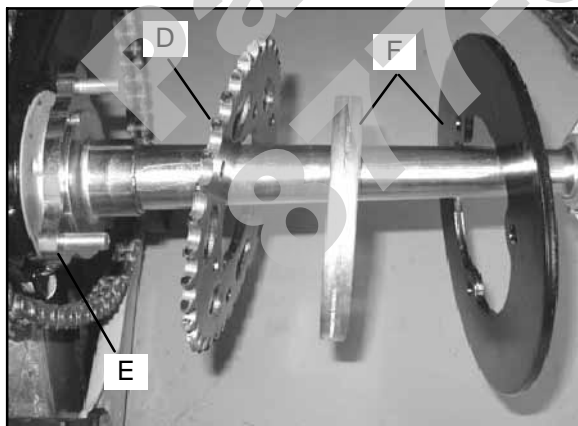
8. Slide the axle nut collar (B) and brake disc from the axle.



- Remove the three bolts that secure the sprocket guard (C) on the other side of the axle.



- Remove the three nuts that secure the sprocket (D) to the sprocket hub (E). Pull the sprocket (D), sprocket hub (E), and guard assembly (F) from the axle.



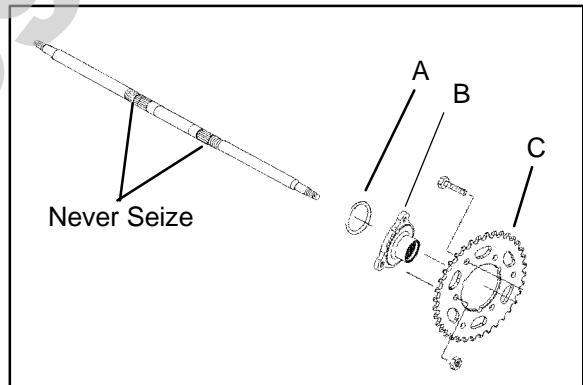
- Remove the O-rings from left side of the axle.



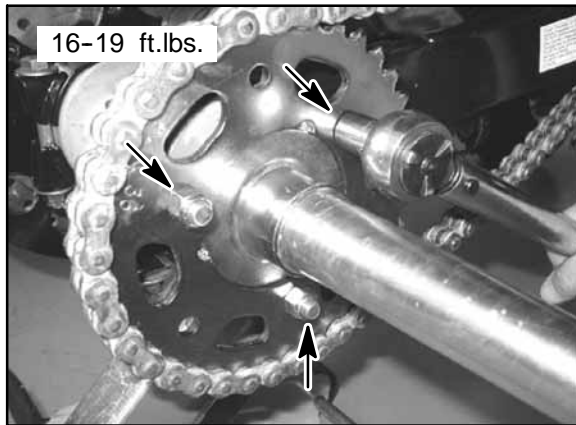
- Slide the axle out the right side of the axle housing.

CONCENTRIC SWINGARM REAR AXLE ASSEMBLY/INSTALLATION

- Apply Never Seize onto the splines of the axle. Lubricate and install the O-ring (A), sprocket hub (B), and sprocket (B). Slide the axle into the right side of the axle housing.



- Mount sprocket to sprocket hub and install sprocket nuts. Torque sprocket nuts to **16-19 ft.lbs. (22-26 Nm)**.



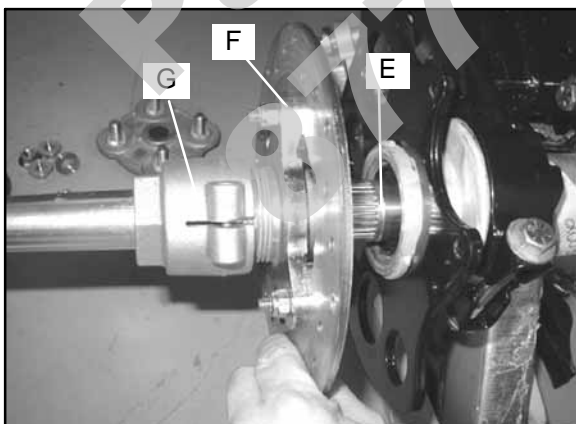
16-19 ft.lbs.

NOTE: The chain maybe installed at this point or later in the procedure.

3. Install the spacer and sprocket guard (D). Install the sprocket guard nuts, torque to **25-30 ft.lbs.** (34-41 Nm).

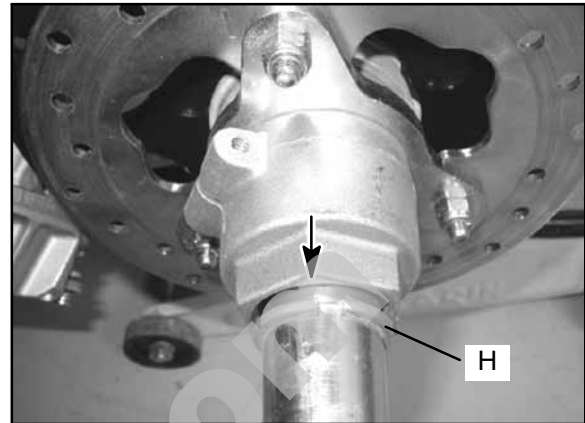


4. Install the O-ring (E), brake disc (F), and axle nut (G) onto the axle.

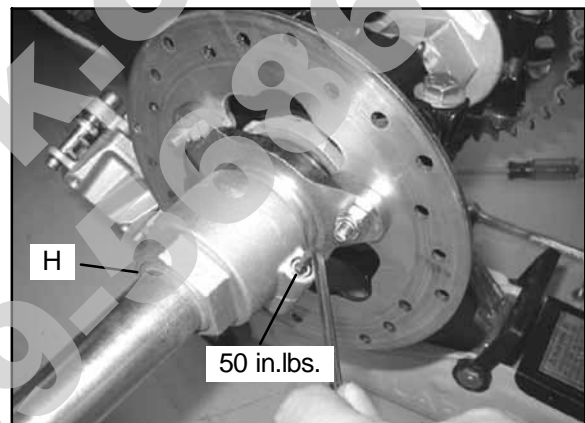


5. Install the retaining ring (H) onto the axle. It should fully seat into the groove.
6. Turn the axle nut outward with a 1 3/4" Wrench (PN 2870772) until the end of the axle nut (G) just covers the retaining ring (H). The retaining ring

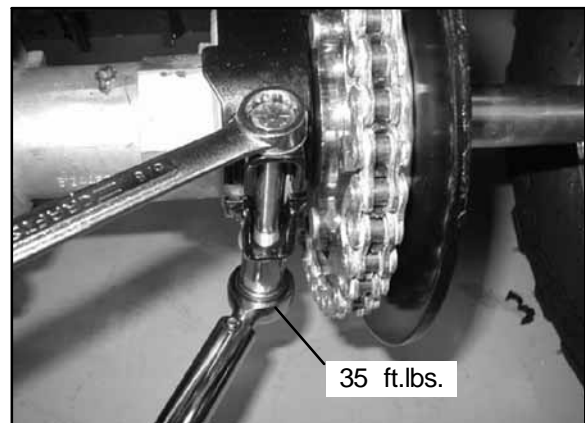
should still be visible under the axle nut from an angle. Torque to **8-10 ft.lbs.** (11-14 Nm)



7. Torque the axle nut pinch bolt to 50 in.lbs. (6 Nm).



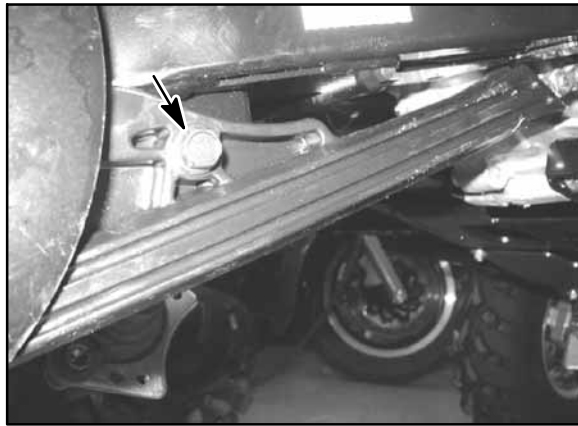
8. Reinstall the chain and master link. To verify proper chain tension, refer to Chapter 2 "DRIVE CHAIN INSPECTION" for this procedure.
9. Torque the eccentric clamp bolts to **35 ft.lbs. (47 Nm)**.



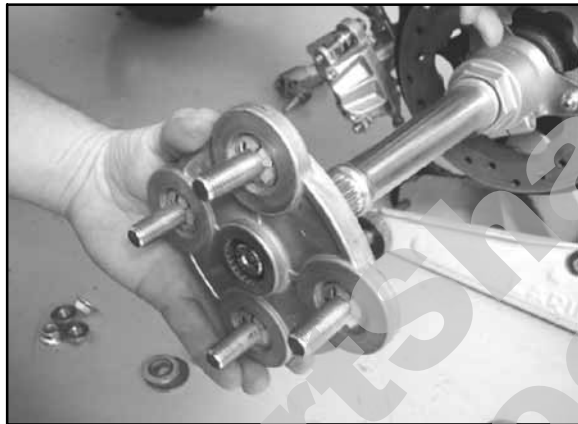
10. Install caliper, two mounting bolts and lock washers. Torque mounting bolts to **18 ft.lbs. (25 Nm)**.



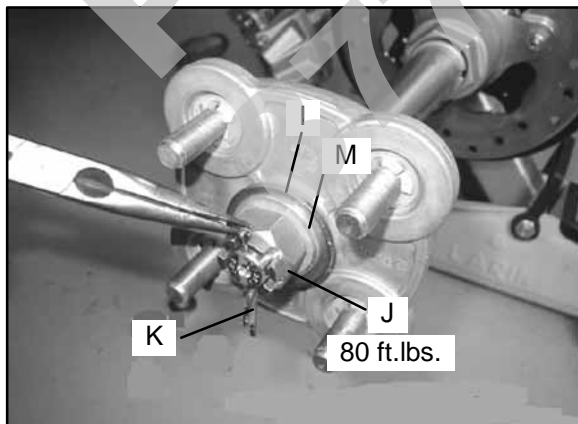
11. Install the chain guard if previously removed. Install the bolt and spacer to secure the chain guard into place.



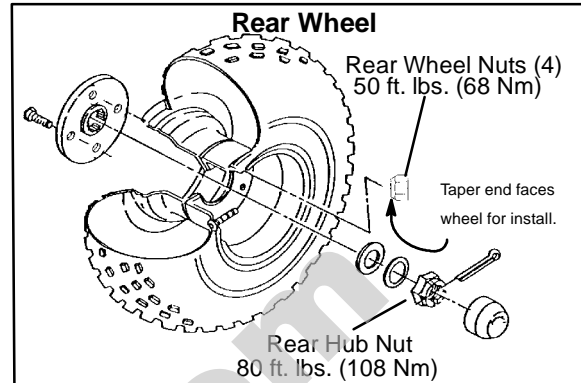
12. Apply Anti-Seize lube to the axle splines. Install the rear wheel hubs on both sides.



13. Install flat washer (l), cupped washer (m) and hub nut (J). Torque the hub nut to **80 ft.lbs. (109 Nm)**. Install a new cotter pin (K).



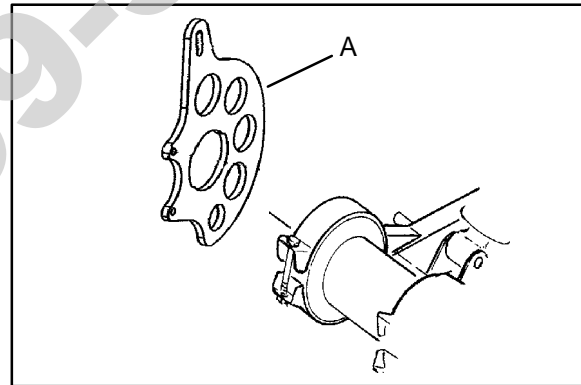
14. Install the rear wheels and torque wheel nuts to **50 ft. lbs. (68 Nm)**.



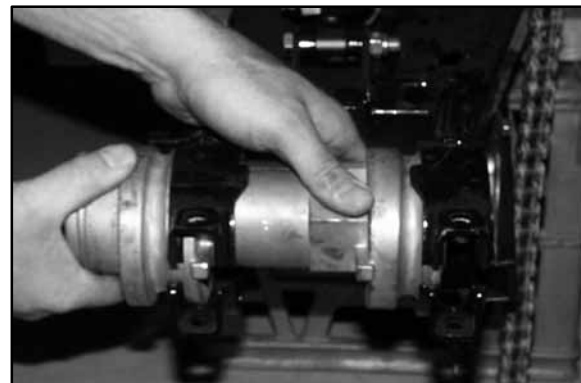
15. Lubricate the axle housing through the grease fitting with Polaris All Season Grease (PN 2871423).

CONCENTRIC SWINGARM REAR HOUSING REMOVAL

1. Remove rear axle.
2. Remove the caliper mounting bracket (A) from the side of the axle housing.



3. Remove the rear housing from the swingarm.

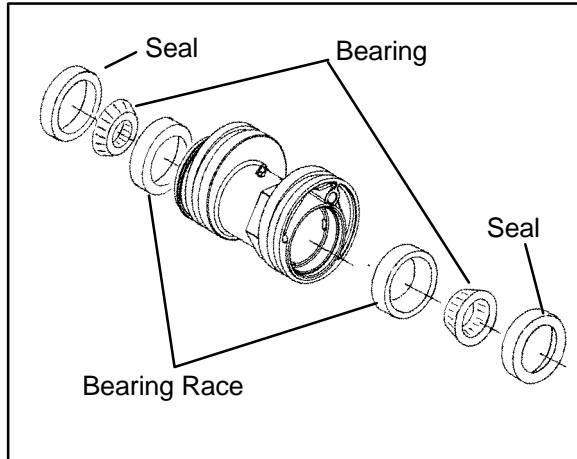


4. Inspect housing for cracks or wear. Replace if damaged.



REAR HOUSING DISASSEMBLY/BEARING SERVICE

1. Remove seals from housing.



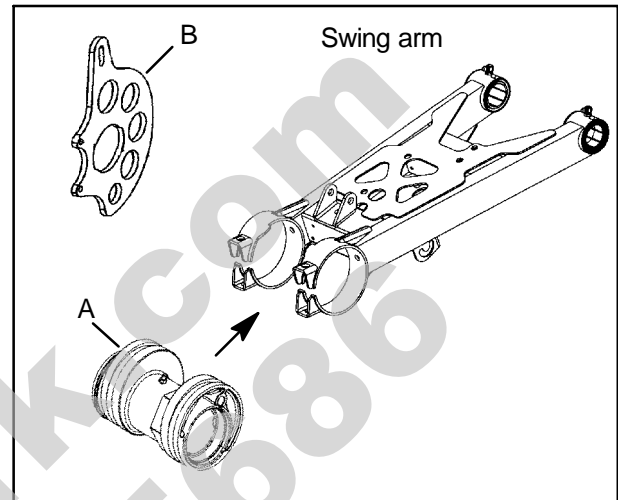
2. Remove bearings.
3. Drive bearing race out from opposite sides.
4. Inspect housing for cracks or wear. Replace if damaged.

REAR HOUSING ASSEMBLY/BEARING SERVICE

1. Drive in new bearing race with brass drift, making sure that race fully seats in the housing.
2. Lubricate and install new tapered bearings.
3. Lubricate and install new seals.

CONCENTRIC SWINGARM REAR HOUSING INSTALLATION

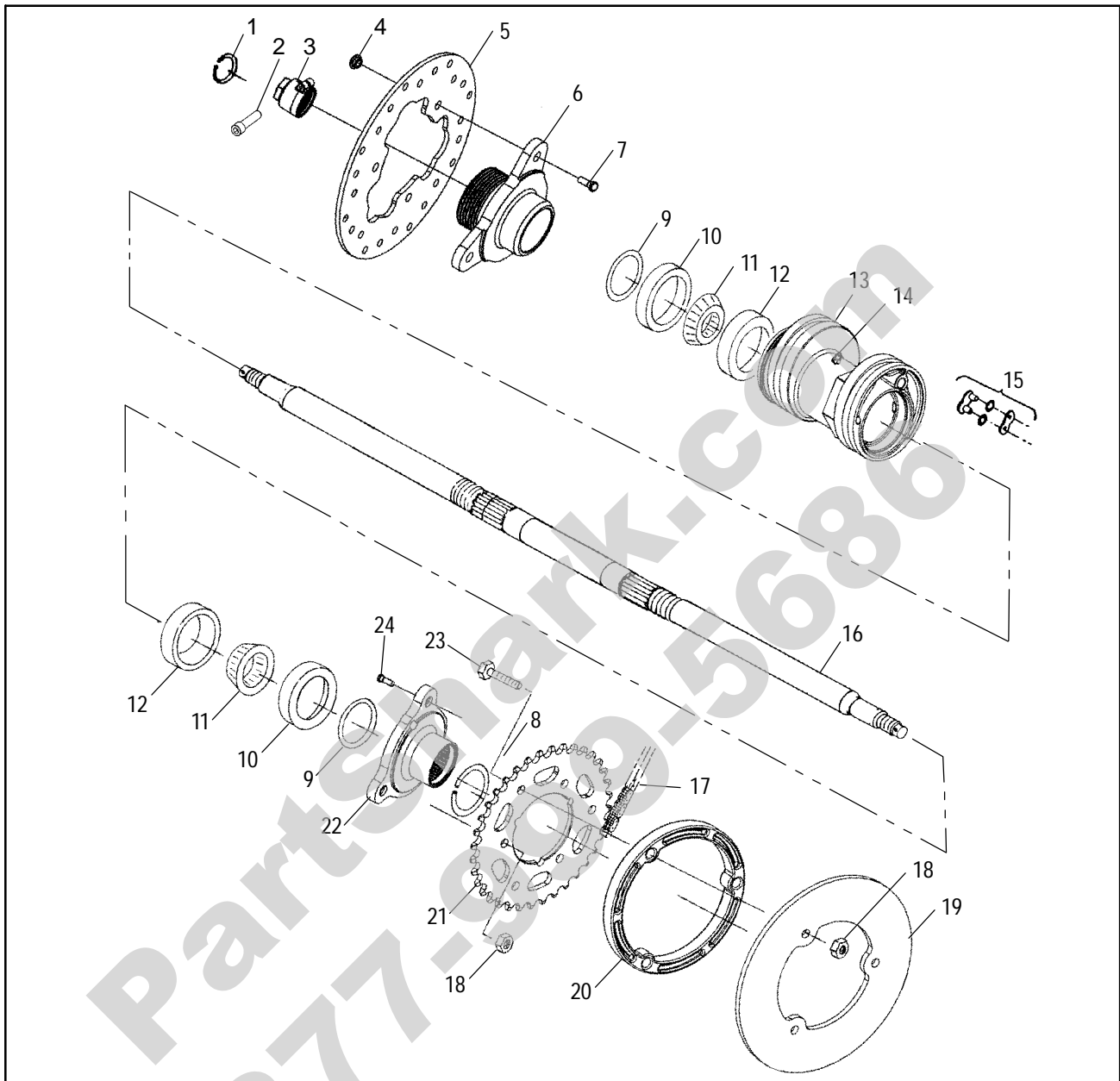
1. Re-install the housing (A) into the swing arm mounts. Re-install the brake caliper mounting bracket (B) onto the housing.



2. Install rear axle. (See Page 7.22)
3. Fill housing with grease until grease purges from both seals.



CONCENTRIC SWINGARM REAR AXLE ASSY, EXPLODED VIEW



1.	1	Ring, Retaining
2.	1	Screw
3.	1	Nut, Axle
4.	3	Nut, Nylok
5.	1	Disc, Brake
6.	1	Hub, Brake Disc
7.	3	Screw
8.	1	Ring, Retaining
9.	2	O-Ring
10.	2	Seal
11.	2	Bearing, Cone, Tapered
12.	2	Bearing, Cup, Tapered

13.	1	Housing, Axle, Rear
14.	1	Fitting, Lubrication
15.	1	Link, Connector, 520
16.	1	Axle, Rear
17.	1	Chain, 520 O-Ring
18.	6	Nut, Nylok
19.	1	Guard, Sprocket
20.	1	Spacer
21.	1	Sprocket, 36T
22.	1	Asm., Hub, Sprocket (Incl. 24.)
23.	3	Screw
24.	3	Stud

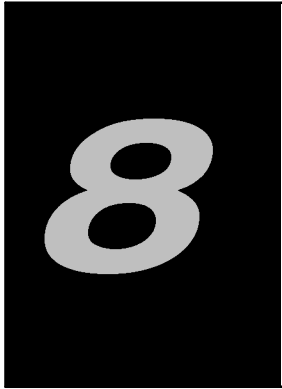
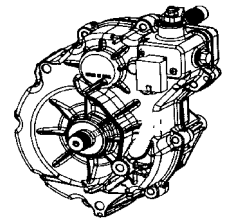


CHAPTER 8

TRANSMISSION

Special Tools	8.2
Torque Specifications	8.2
Transmission Remove/Install	8.2
Transmission Disassembly	8.2-8.5
Transmission Assembly	8.6-8.7
Troubleshooting	8.7
Transmission Exploded View	8.7-8.8

PartShark.com
877-999-5686





SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2871710	10" Center Distance Tool

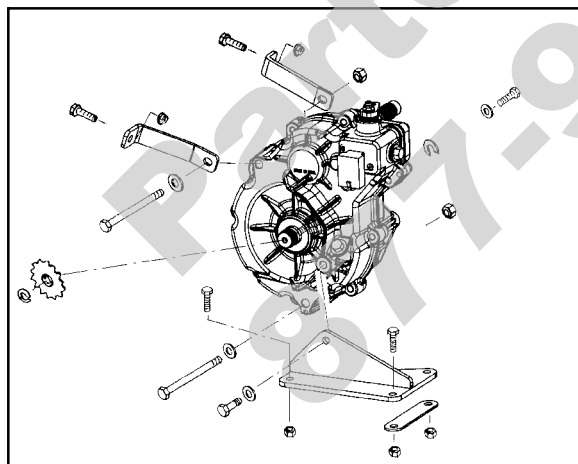
TORQUE SPECIFICATIONS

Item	Specification
Transmission Case Bolts	12 ft. lbs. (16.6 Nm)
Bell Crank Nut	12 ft. lbs. (16.6 Nm)
Transmission Drain Plug	14 ft. lbs. (19.3 Nm)
Transmission Mounting Bolts	25 ft. lbs. (34.5 Nm)
Swing Arm Pivot Bolts (Concentric Swingarm)	150 ft. lbs. (207.5 Nm)

LUBRICATION

Refer to maintenance section for transmission lubricant type and capacity.

TRANSMISSION REMOVAL



1. Remove seat, cab and air box.
2. Remove right side heat and reservoir bracket.
3. Remove PVT outer cover, both drive and driven clutch, and inner PVT cover (refer to Clutch Chapter 6).
4. Remove rear PVT bracket.
5. Remove carburetor.

6. Disconnect harness from gear position switch.
7. Remove drive chain and sprocket.
8. Remove mounting bolts and brackets as shown.
9. Remove through-bolt from bottom of transmission.
10. Remove transmission from right side of frame.

TRANSMISSION INSTALLATION

1. Reverse removal steps to install transmission.

NOTE: Install the Center Distance Tool (PN 2871710) on engine and transmission input shaft before tightening transmission mounting bolts. Align clutches as outlined in Clutch Chapter 6.

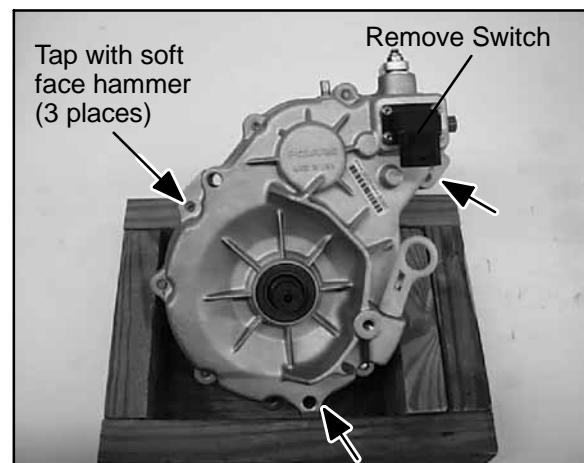
TRANSMISSION DISASSEMBLY

1. Remove gear position switch.

CAUTION:

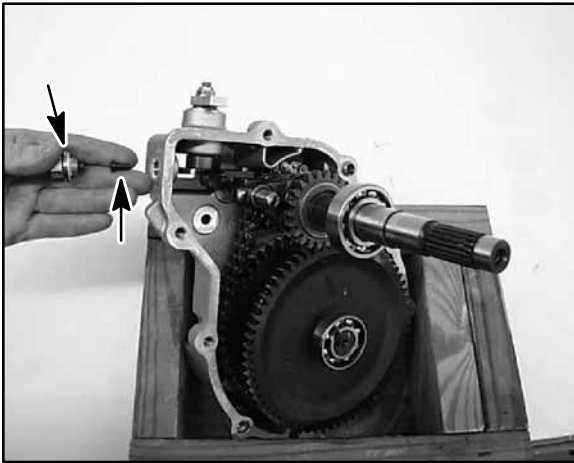
If switch is not removed prior to disassembly, switch damage will result.

2. Place bellcrank in neutral position.
3. Remove sprocket retaining clip and sprocket.
4. Remove the transmission cover bolts.
5. With a soft face hammer tap on the (3) cover bosses and carefully remove the cover.

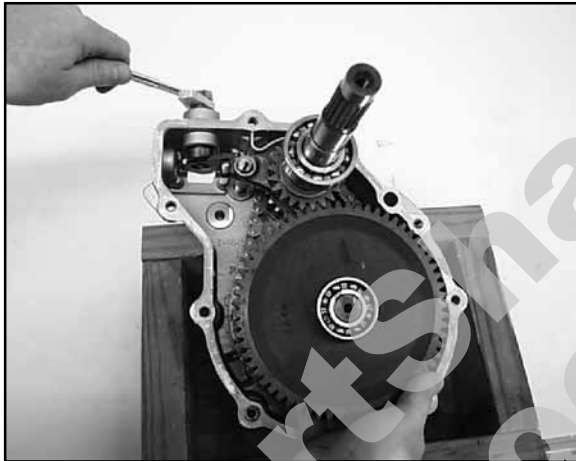


6. Remove detent plug, washer, spring and shifting bullet.

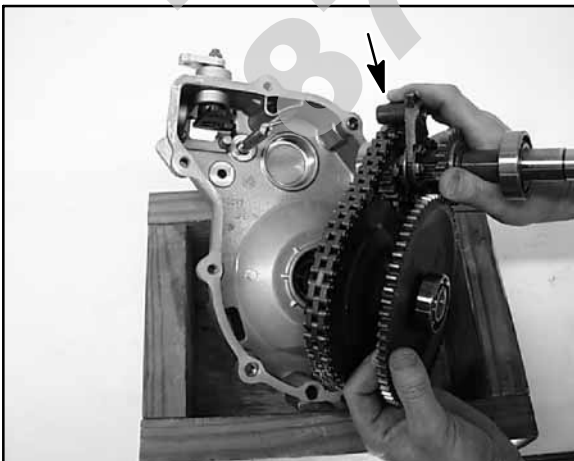
NOTE: Shifting bullet has a radiused end making it directional.



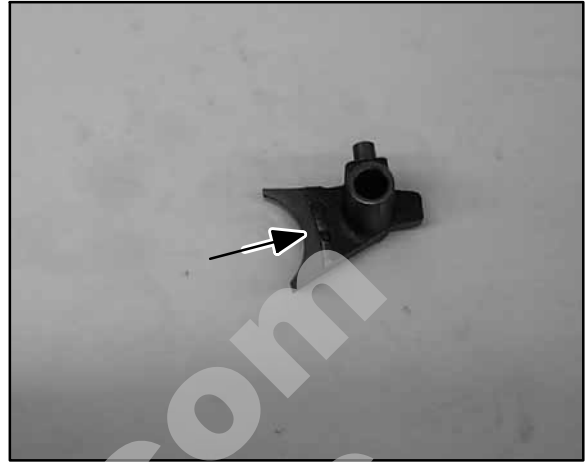
7. Using a wrench on the nut of the bellcrank, turn in a clockwise direction to assist with removal of shift assembly and drive gear.



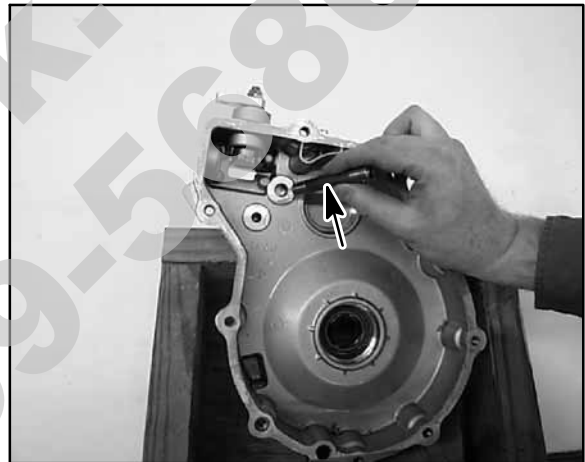
8. Remove shift assembly and gear as an assembly.
NOTE: Direction of shift fork.



9. Inspect shift fork surface for wear or damage. Replace if necessary.



10. Remove shift fork guide pin.



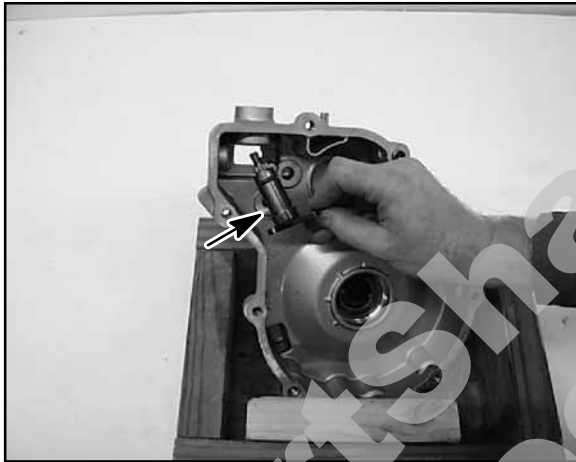
11. Mark orientation of bellcrank to the shift fork shaft.



12. Remove bellcrank. Use a small puller if necessary.



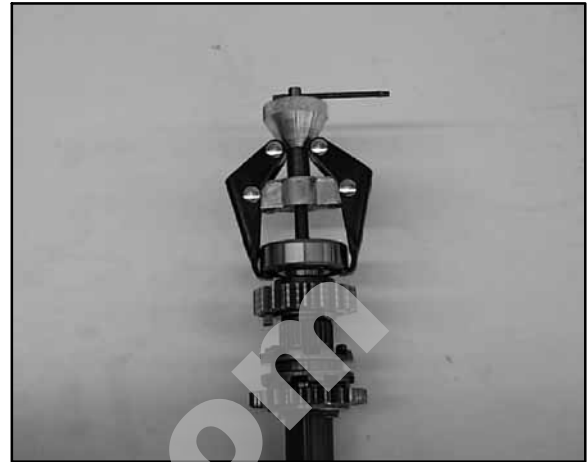
13. Remove snap ring and washer. Pull down and rotate shift fork shaft back and forth to remove.



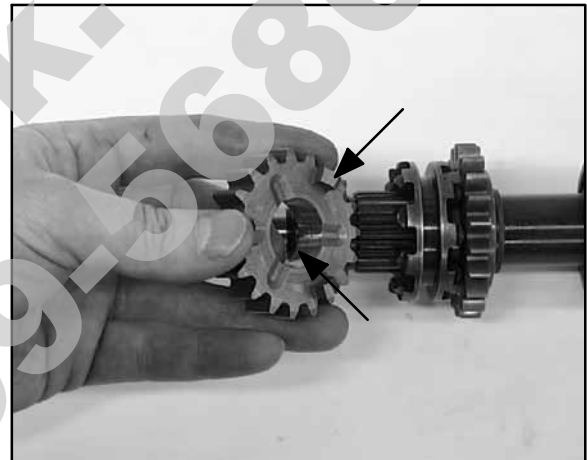
14. Inspect shift fork shaft O-ring. Replace if necessary. Lubricate O-ring to ease in reassembly and to protect O-ring during assembly.



15. Remove input shaft bearing.



16. Inspect gears for galling and wear on teeth and bearing surface. Replace if necessary.

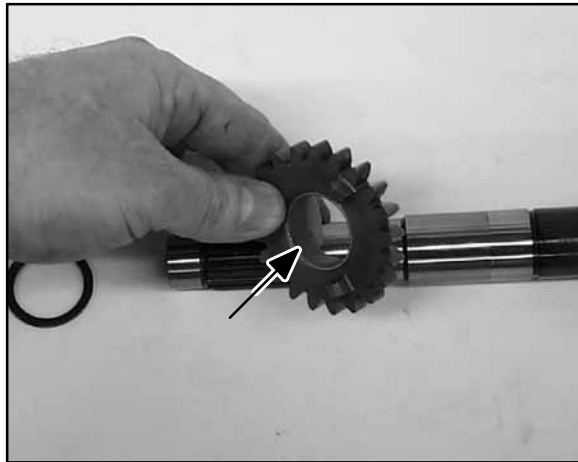


17. Remove bearing from other end of input shaft. Remove two snap rings and gear.

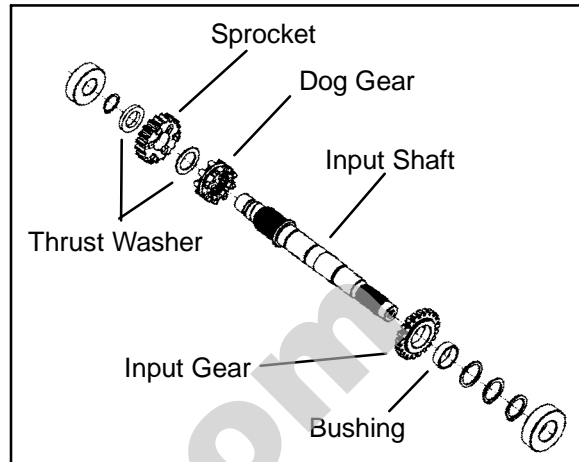




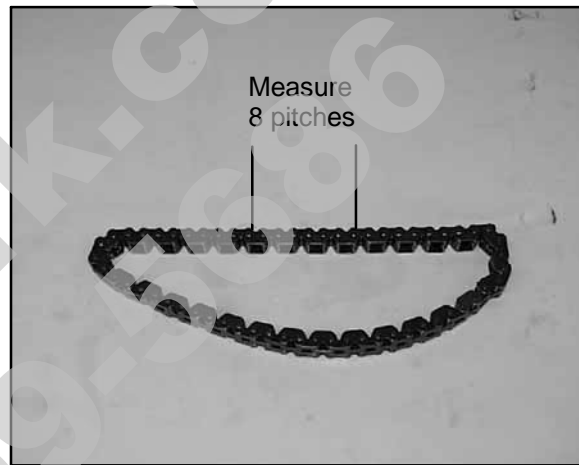
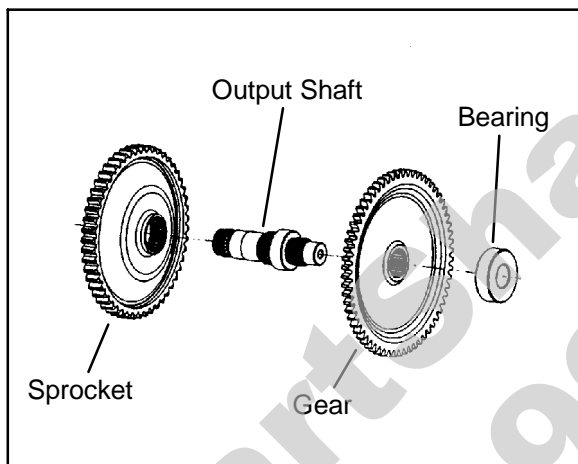
18. Inspect gear bushing. Replace if half of teflon surface is gone.



NOTE: Input gear cogs face inward on input shaft.



19. Inspect output shaft gear, sprocket and bearing. Replace if necessary.



20. Stretch chain tight on a flat surface and measure the length of 8 pitches in a minimum of three places on chain. Replace chain if measurement is longer than 3.09041.

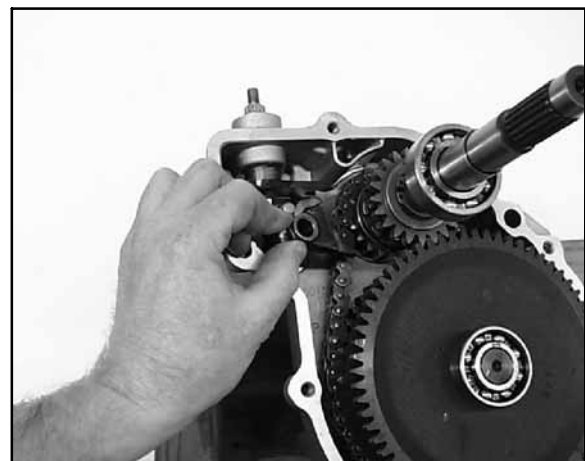
Chain Stretch Limit
8 pitch length = 3.09041 Maximum

2. Assemble output shaft with sprocket, gear and bearing if they were disassembled.
3. Assemble output shaft assembly with chain to the input shaft assembly.
4. Install shift shaft, driven sprocket and gear into the case.
5. Install shift fork.

TRANSMISSION ASSEMBLY

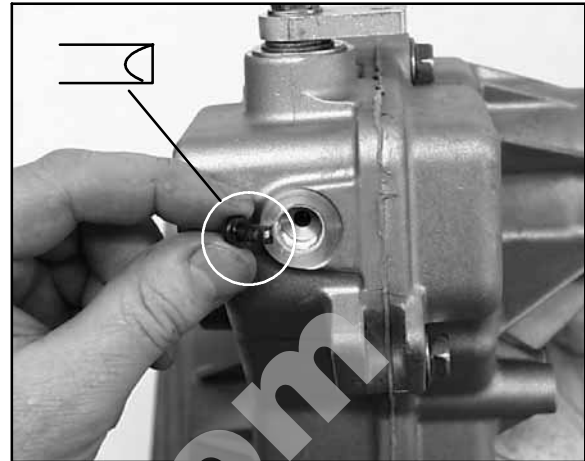
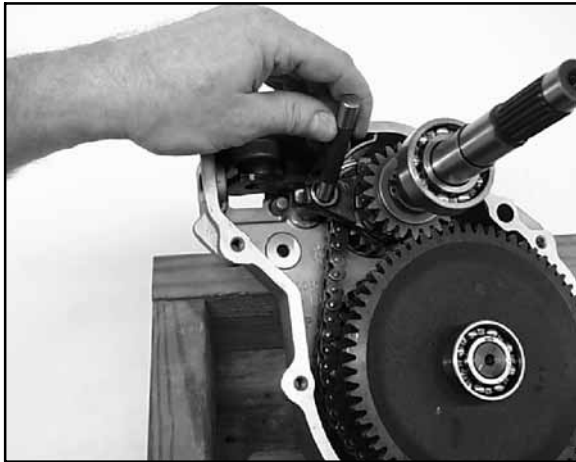
1. Assemble input shaft assembly.

NOTE: Install bearings with numbers and letters facing out so they can be read after assembly. Sprocket cogs face the dog gear.

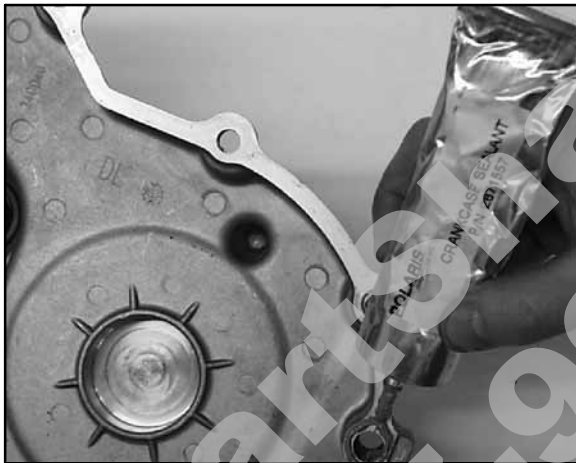




6. Insert fork guide pin.



7. Prior to reinstalling the cover make sure the mating cover surfaces are clean and dry. Apply Crankcase Sealant (PN 2871557) to mating surfaces.



11. Install transmission and add Polaris AGL Gearcase Lubricant (PN 2873602) in the recommended amount. Refer to Maintenance Chapter 2.
12. Install gear indicator switch. Apply Loctite t 242 (PN 2871949) to threads of switch screws and torque to 13-16 in. lbs. (1.5-1.9 Nm).



8. Reinstall cover and torque bolts in a criss-cross pattern in 3 steps to 18 ft. lbs. (25 Nm).
9. Install drain plug with a new sealing washer. Torque drain plug to 14 ft. lbs. (19 Nm).
10. Insert shifting bullet with tip in position as shown. Insert spring and plug. Torque plug to 14 ft. lbs. (19 Nm).



TROUBLESHOOTING CHECKLIST

Check the following items when shifting difficulty is encountered.

- S Idle speed adjustment
- S Transmission oil type/quality
- S Transmission torque stop adjustment
- S Drive belt deflection
- S Loose fasteners on rod ends
- S Loose fasteners on shifter
- S Worn rod ends, clevis pins, or pivot arm bushings

- S Linkage rod adjustment and rod end positioning
- S *Worn, broken or damaged internal transmission components

***NOTE:** To determine if shifting difficulty or problem is caused by an internal transmission problem, isolate the transmission by disconnecting linkage rods from transmission bellcranks. Manually select each gear range at the transmission bellcrank, and test ride vehicle. If it functions properly, the problem is outside the transmission.

If transmission problem remains, disassemble transmission and inspect all gear dogs for wear (rounding), damage. Inspect all bearings for wear.

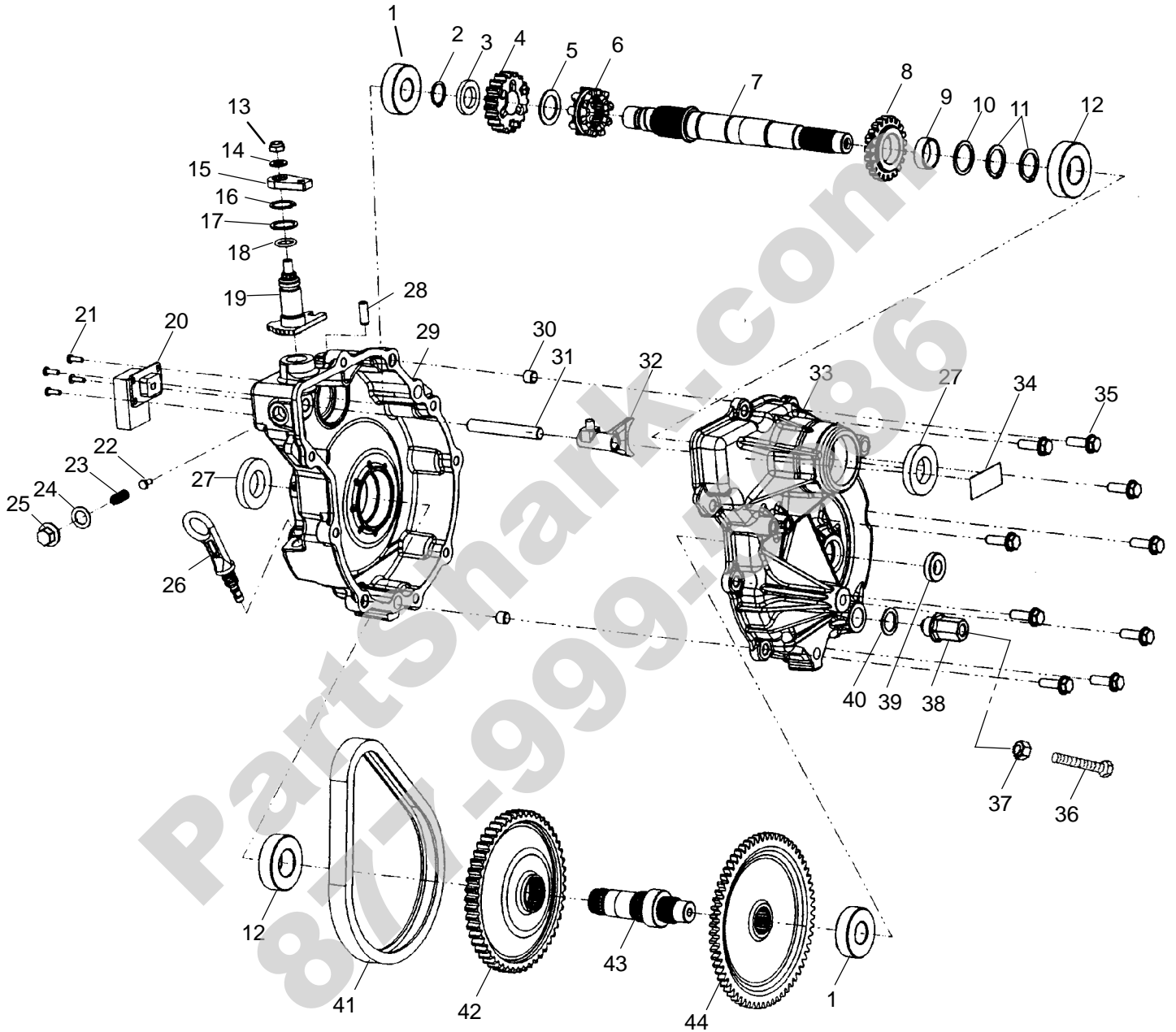
TRANSMISSION EXPLODED VIEW

NOTE: See next page for exploded view of transmission.

Ref.	Qty	Description	Ref.	Qty	Description
	1	Asm., Gearcase	24.	1	Washer
1.	2	Bearing	25.	1	Plug, Detent, Extension
2.	1	Ring, Retaining	26.	1	Dipstick
3.	1	Washer, Thrust	27.	2	Seal
4.	1	Sprocket, 19T	28.	1	Tube, Vent
5.	1	Washer, Thrust	29.	1	Gearcase, RH
6.	1	Dog, Engagement, High/Reverse	30.	2	Pipe, Knock
7.	1	Shaft, Input	31.	1	Shaft, Shift
8.	1	Gear, 21T	32.	2	Fork, Shift
9.	1	Bushing	33.	1	Gearcase, LH
10.	1	Washer	34.	1	Decal, Switch
11.	2	Snap Ring	35.	9	Screw
12.	2	Bearing	36.	1	Screw
13.	1	Nut, FLEXLOC	37.	1	Nut
14.	1	Washer	38.	1	Plug, Torque Stop
15.	1	Bellcrank, HLR	39.	1	Bushing, Pivot
16.	1	Ring, Retaining	40.	1	Washer
17.	1	Washer	41.	1	Chain, Silent, 60P, 11W
18.	1	O-Ring	42.	1	Sprocket, 51T
19.	1	Shaft, Shift	43.	1	Shaft, Output
20.	1	Switch	44.	1	Gear, 64T
21.	4	Screw			
22.	1	Bullet, Shifting			
23.	1	Spring, Compression			



TRANSMISSION EXPLODED VIEW

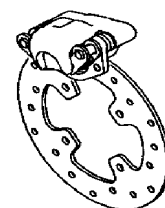




CHAPTER 9

BRAKES

Special Tools/Specifications/Torques	9.2
Hydraulic Brake System Overview	9.3
Brake System Service Notes	9.4
Brake Noise Troubleshooting	9.4
Hydraulic Caliper Bleeding	9.5
Brake Bleeding / Fluid Change	9.6-9.8
Master Cylinder Removal	9.8
Master Cylinder Installation	9.9
Front Pad Removal	9.10
Front Pad Installation	9.11
Brake Burnishing	9.11
Front Disc Inspection	9.12
Front Disc Removal/Replacement	9.12
Front Caliper Removal	9.13
Front Caliper Disassembly	9.13
Front Caliper Inspection	9.14
Front Caliper Reassembly	9.14-9.15
Front Caliper Installation	9.15
Front Caliper Exploded View	9.16
Rear Pad Removal	9.17
Rear Pad Installation	9.18
Rear Caliper Removal/Inspection	9.19-9.20
Rear Caliper Reassembly	9.20-9.21
Rear Disc Inspection	9.21
Rear Caliper Exploded View	9.22
Auxiliary Master Cylinder Remove/Install	9.23
Troubleshooting	9.24





SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2870975	Mity Vac t Test Tool

SPECIFICATIONS

Front Brake Caliper		
Item	Standard	Service Limit
Brake Pad Thickness	.298 ± .0073" (7.6mm ± .185 mm)	.180" (4.6mm)
Brake Disc Thickness	.150-.165" (3.81mm 4.191 mm)	.140" (3.556mm)
Brake Disc Thickness Variance Between Measurements	-	.002" (.051mm)
Brake Disc Runout	-	.005" (.50mm)

Rear Axle Brake Caliper		
Item	Standard	Service Limit
Brake Pad Thickness	.3177 ± .0073" (8.07 ± .185mm)	.180" (4.6mm)
Brake Disc Thickness	.150 - .165" (3.810-4.166mm)	.140" (3.556mm)
Brake Disc Thickness Variance Between Measurements	-	.002" (.051mm)
Brake Disc Runout	-	.005" (.25mm)

Master Cylinder I.D. - Front	.750"
Master Cylinder I.D. - Aux. Rear	.500"

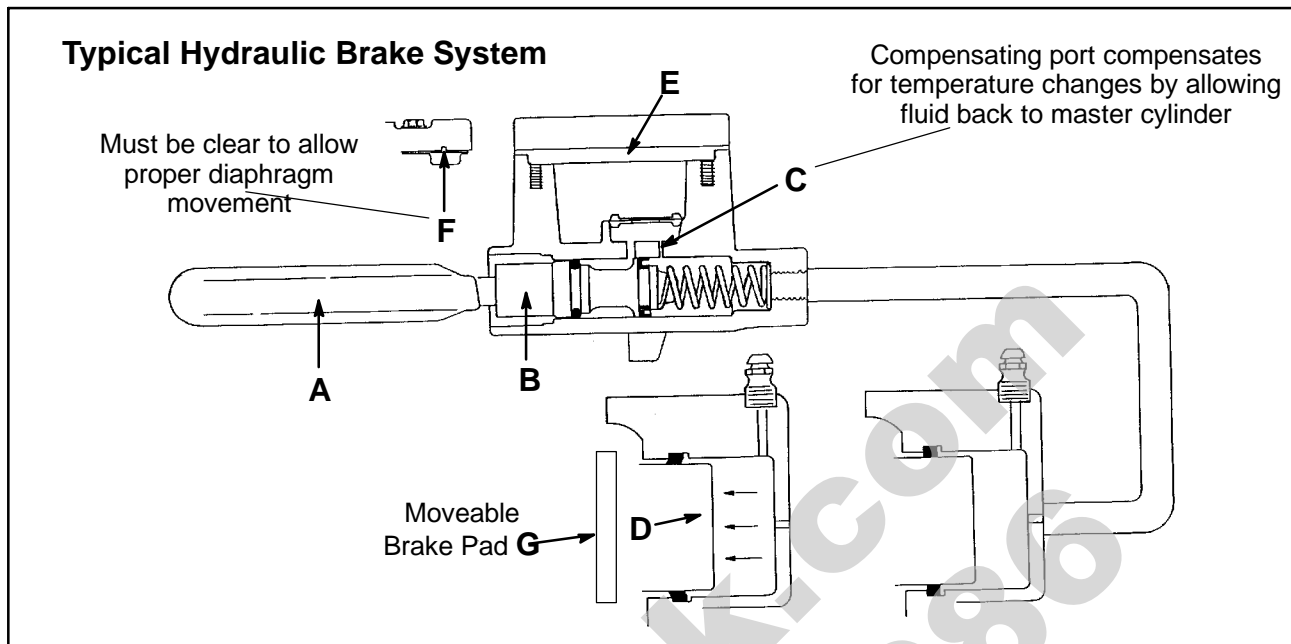
TORQUE SPECIFICATIONS

Item	Torque (ft. lbs. except where noted*)	Torque (Nm)
Caliper Mounting Bolts	18.0	24
Handlebar Master Cyl. Clamp Bolts	*25 in. lbs.	3.0
Handlebar Master Cyl. Reservoir Cover Bolt	*5 in. lbs.	0.56
Brake Line Banjo Bolts	15.0	21
Brake Disc Mount Bolts	18.0	25
Rear Master Cyl Mounting Bolts	8-11	11-15
Bleeder Screws	*25-30 in. lbs.	3-3.3

NOTE: Refer to the tightening procedures in this chapter when torquing the bolts. Some special procedures are used when torquing certain bolts and fasteners.



HYDRAULIC BRAKE SYSTEM OPERATION



The Polaris 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 a 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 moveable 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.

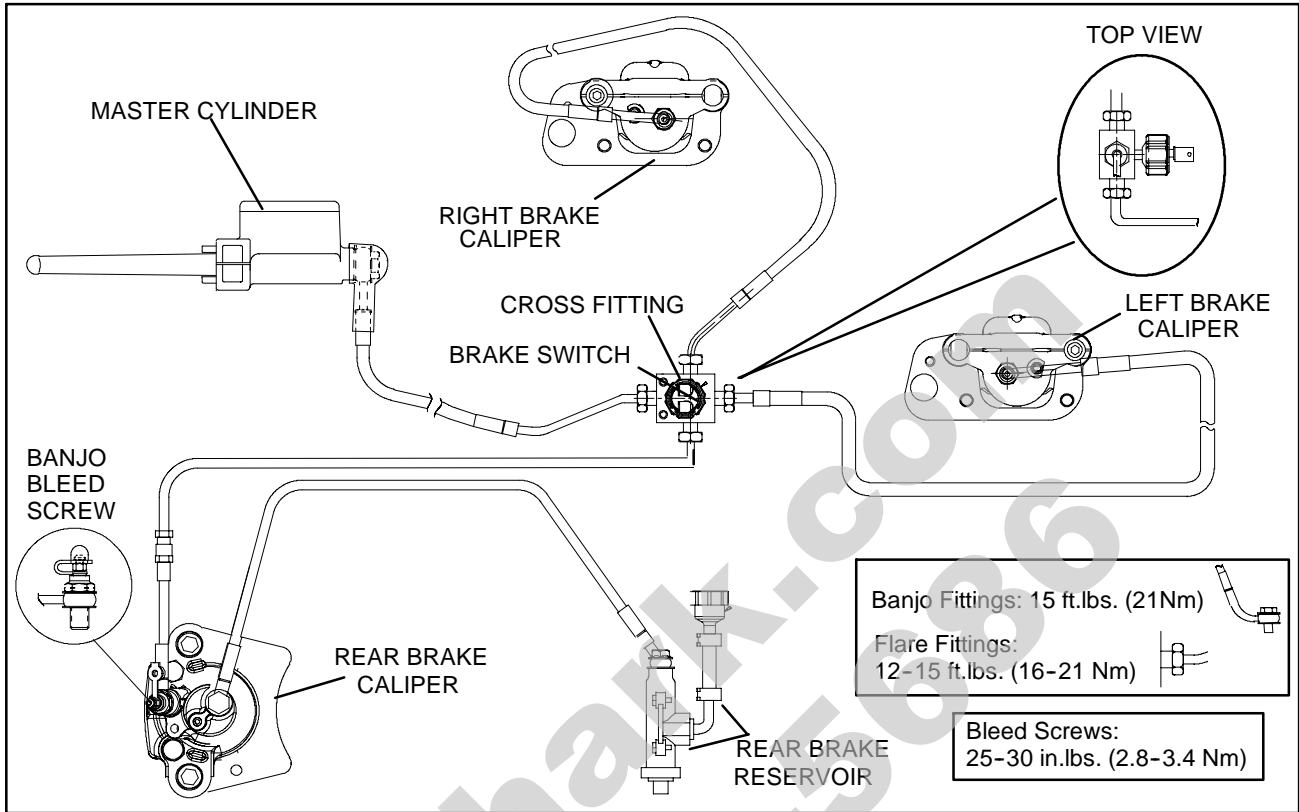
Located within the master cylinder is the compensating port (C) which is opened and closed by the master cylinder piston assembly. The port is open when the lever is released and the master cylinder piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid 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 have 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 failure.

When servicing Polaris ATV brake systems use only Polaris DOT 4 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 early brake fade and the possibility of serious injury.



BRAKE SYSTEM MAIN COMPONENTS



BRAKE SYSTEM SERVICE NOTES

Polaris disc brake systems are light weight, low maintenance and perform well in the conditions ATVs 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.

- G Perform a brake burnishing procedure after installing new pads to maximize service life.
- G Optional pads are available to suit conditions in your area. Select a pad to fit riding style and environment.
- G Do not over-fill the master cylinder fluid reservoir.
- G Make sure the brake lever and pedal returns freely and completely.
- G Adjust stop pin on front caliper after pad service.
- G Check and adjust master cylinder reservoir fluid level after pad service.
- G Make sure atmospheric vent on reservoir is unobstructed.

- G Test for brake drag after any brake system service and investigate cause if brake drag is evident.
- G Make sure caliper moves freely on guide pins (where applicable).
- G Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.

CAUTION:

Use only DOT 4 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.**



BRAKE NOISE TROUBLESHOOTING

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

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

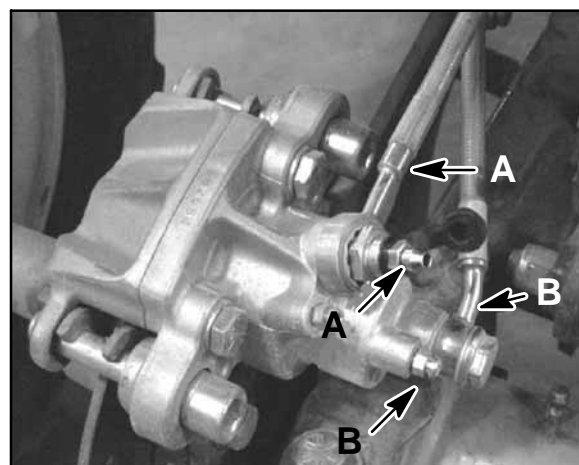
Brake Noise Troubleshooting	
Possible Cause	Remedy
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with CRC Brake Kleen [™] or equivalent non-flammable aerosol brake cleaner. Remove pads and/or disc hub to clean imbedded material from disc or pads.
<u>Pad(s) dragging on disc (noise or premature pad wear)</u>	Adjust pad stop (front calipers) Check position of controls & switches.
Improper adjustment	Set to proper level
Insufficient lever or pedal clearance	Clean compensating port Inspect.
Master cylinder reservoir overfilled	Repair as necessary Clean piston(s) seal
Master cylinder compensating port restricted	Educate operator
Master cylinder piston not returning completely	
Caliper piston(s) not returning	
Operator error (riding the brake / park brake applied)	
Loose wheel hub or bearings	Check wheel and hub for abnormal movement.
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary

HYDRAULIC CALIPER BLEEDING

This caliper is a single piston design. The caliper pistons are “T”-shaped, which allows both hand and foot brake to use the same caliper piston, but remain separated by seals. The hand brake system applies hydraulic pressure to both front calipers and only the *outer* diameter of the rear caliper pistons. The auxiliary (foot) brake applies pressure to the inner portion of the rear caliper pistons. Because the hand and foot brake hydraulic systems are separate, there are also two bleed screws – one for the outer fluid chamber (hand brake), and one for the inner fluid chamber (foot brake). The basic procedure for bleeding the brake system is the same as outlined in this chapter, however, each system must be bled separately.

Hydraulic Auxiliary Brake inspection and adjustment is outlined in Chapter 2.

NOTE: Top (Uppermost) bleed screw (A) and brake line (A) is for hand brake system
Lower screw (B) and brake line (B) is for auxiliary (foot) brake system.





BRAKE BLEEDING - FLUID CHANGE

NOTE: When bleeding the brakes or replacing the fluid, always start with the caliper farthest from the master cylinder.

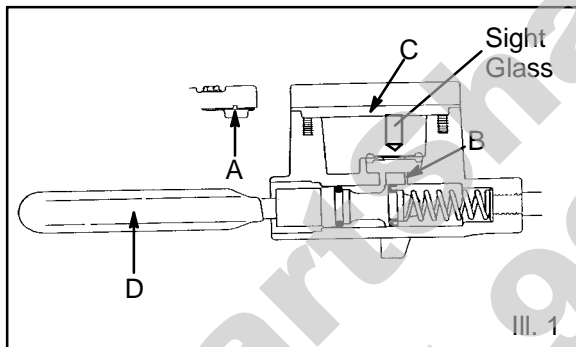
CAUTION:

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 Vact pump or similar tool.

Mity Vact (PN 2870975)

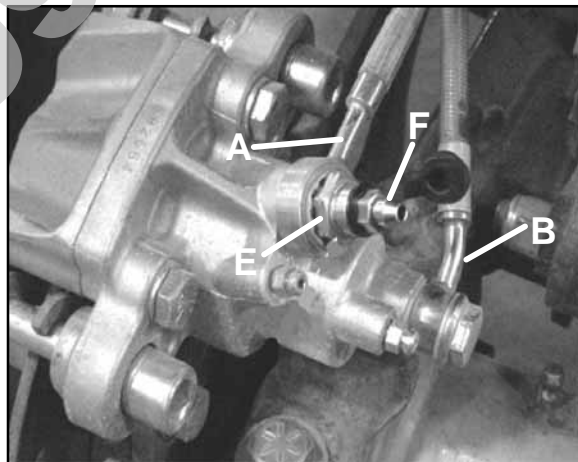
5. Add brake fluid to the indicated MAX level inside reservoir.



**Polaris DOT 3 Brake Fluid
(PN 2870990)**

Rear Brake Caliper Bleeding Procedure

6. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Be sure the hose fits tightly on fitting. (B) is Auxiliary Brake Line, (A) is Hand Brake Line



- G Install a wrench on the brake line banjo bolt (E) to hold the banjo bolt in place. Install a box end wrench on the caliper bleeder screw (F).
- G Attach a clean, clear hose to bleeder screw (F) and place the other end in a clean container.



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 1.

7. *Slowly* pump brake lever (D) until pressure builds and holds.
8. While maintaining lever pressure, hold the banjo bolt (E) with the wrench and open the top bleeder screw (F). Close bleeder screw and release brake lever. **NOTE:** Do not release lever before bleeder screw is tight or air may be drawn into caliper.

Bleeder Screw Torque**25-30 in.lbs. (2.80 -3.40 Nm)**

9. 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.

10. Tighten bleeder screw securely and remove bleeder hose. Torque the bleeder screw to 25-30 in.lbs. (2.80 -3.40 Nm).

Front Brake Caliper Bleeding Procedure

11. Locate the bleeder screw on one of the front calipers.



12. Install a box end wrench on the bleeder screw.

13. Attach a clean, clear hose to bleeder screw and place the other end in a clean container.

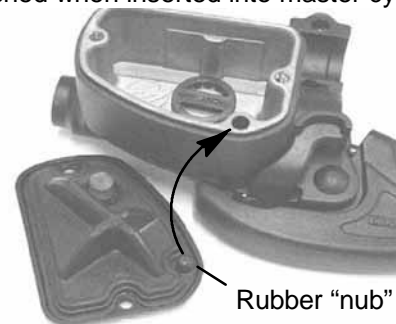
14. Repeat Steps 7-10 for the remaining caliper(s).
15. Add Polaris Dot 4 Brake Fluid to MAX level inside reservoir.

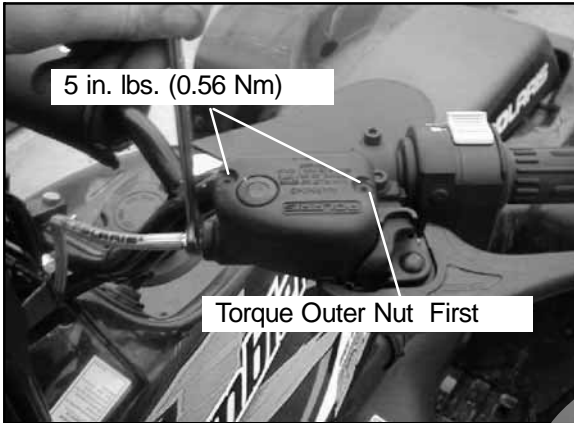
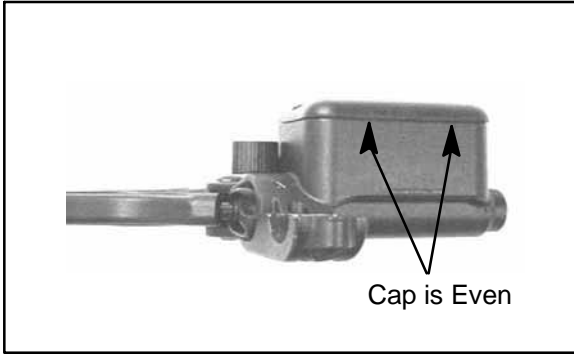
**Master Cylinder Fluid Level:****MAX level inside reservoir****Sight glass must look dark, if sight glass is clear, fluid level is too low**

16. Install diaphragm, cover and screws. Align the nub (if present) into the proper hole in the master cylinder. Wiggle and press down on the cap to be sure it fits evenly and snug. Torque the screw on the handle side first then torque other screw to **5 in. lbs. (0.56 Nm)**.

NOTE: Be sure the master cylinder cap is even all the way around. If the cap is cocked to one side, repeat the process.

Rubber "nub" must be aligned and not pinched when inserted into master cylinder





MASTER CYLINDER REMOVAL

1. Clean master cylinder and reservoir assembly. Make sure you have a clean work area to disassemble brake components.



2. Place a shop towel under brake line connection at master cylinder. Loosen banjo bolt; remove bolt and sealing washers.

CAUTION:

Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

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.

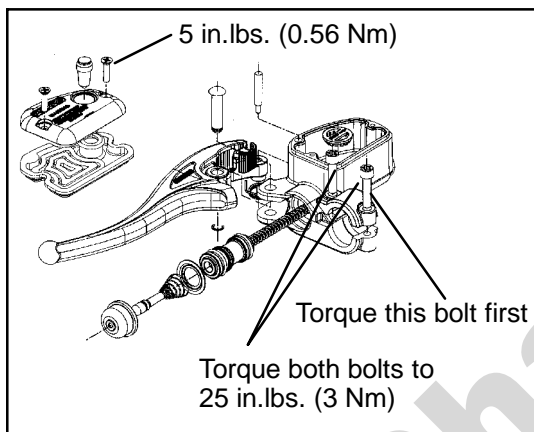
3. Remove master cylinder from handlebars.
4. Hold brake upright and continue to remove master cylinder. Cover brake line to avoid spillage.



MASTER CYLINDER INSTALLATION

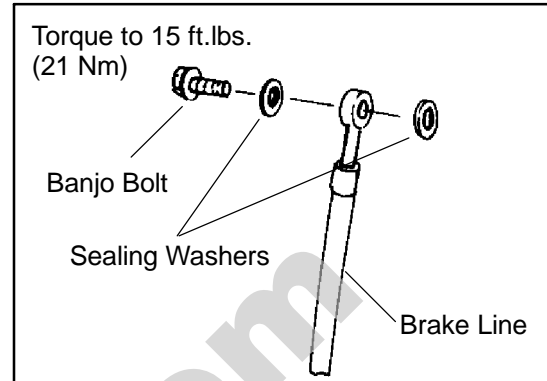
Notice: When replacing the brake master cylinder assembly or master cylinder parts, use the correct parts. There are different brake master cylinders for the different Polaris ATV models. Refer to your parts manual or guide for the correct parts. **The master cylinder is not serviceable and is replaced as a unit.**

1. Install master cylinder on handlebars. Torque clamp bolts to 25 in. lbs. (3 Nm). Torque the inside bolt first as indicated in the illustration to the right.



NOTE: To speed up the brake bleeding procedure, the master cylinder can be purged of air before brake line is attached. Fill with DOT 4 Brake Fluid and pump lever slowly two to three times with finger over the outlet end to purge master cylinder of air.

2. Place new sealing washers on each side of banjo line and torque banjo bolt to specification.



**Handlebar Master Cyl. Clamp Bolt
Torque 25 in. lbs. (3 Nm)**

**Brake Line Banjo Bolt Torque
15 ft. lbs. (21 Nm)**

3. Fill reservoir with DOT 4 Brake Fluid.



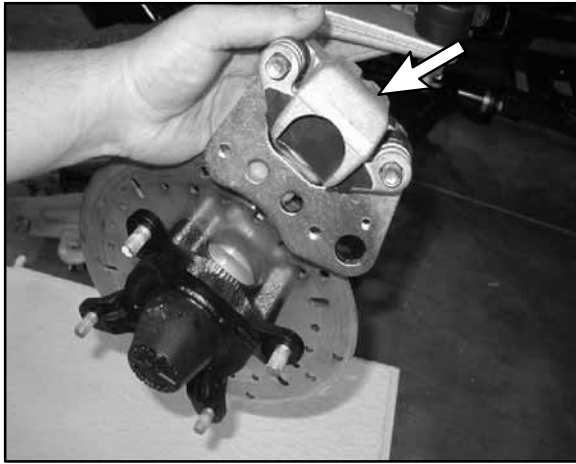
**Polaris DOT 3 Brake Fluid
(PN 2870990)**

4. Follow bleeding procedures as outlined in this chapter. Check all connections for leaks and repair if necessary.



FRONT PAD REMOVAL

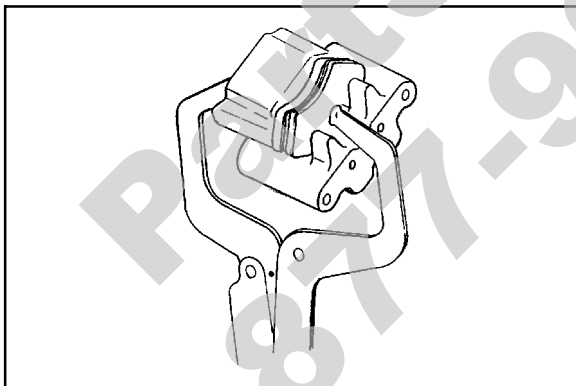
1. Elevate and support front of machine.



CAUTION:

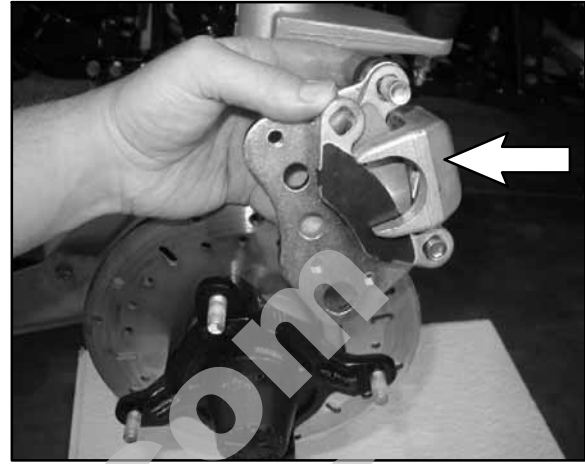
Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

2. Remove the front wheel. Loosen pad adjuster screw 2-3 turns.
3. Remove caliper mounting bolts.
4. Push caliper piston into caliper bore slowly using a C-clamp or locking pliers with pads installed.

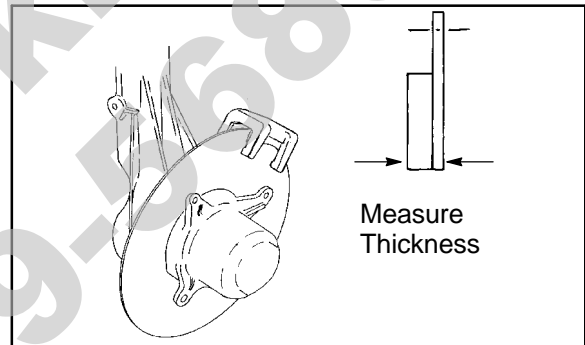


NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

5. Push mounting bracket inward and slip outer brake pad past edge. Remove inner pad.



6. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.



Front Brake Pad Thickness	
New	.298" / 7.6 mm
Service Limit	.180" / 4.0 mm



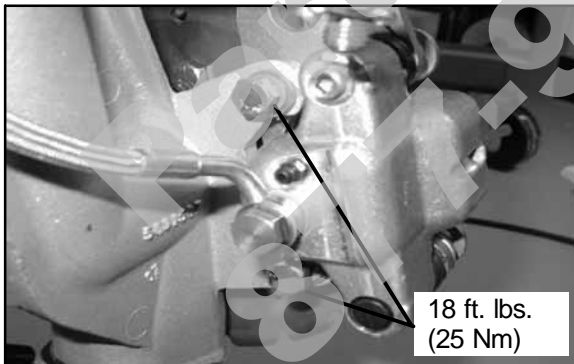
FRONT PAD INSTALLATION

1. Lubricate mounting bracket pins with a light film of Polaris Premium All Season Grease, and install rubber dust boots.



Polaris Premium All Season Grease
(PN 2871423)

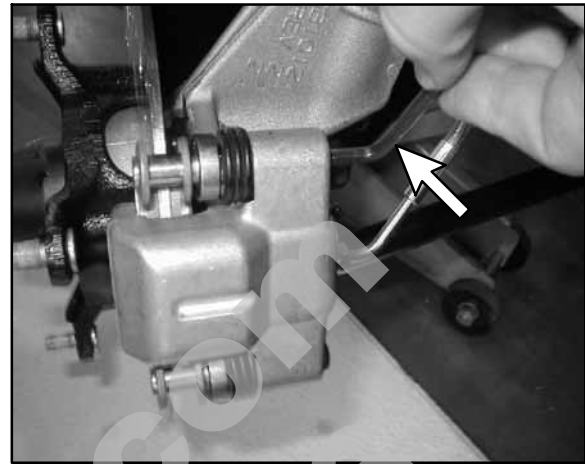
2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other. Be sure pads and disc are free of dirt or grease.
3. Install caliper on hub strut, and torque mounting bolts.



Front Caliper Mounting Bolts
Torque: 18 ft. lbs. (25Nm)

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.

Master Cylinder Fluid
Up to MAX line inside reservoir

7. Install wheels and torque wheel nuts.

Front Wheel Nut Torque
20 ft. lbs. (27 Nm)

BRAKE BURNISHING PROCEDURE

It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warpage may result. Repeat this procedure 10 times.



FRONT DISC INSPECTION

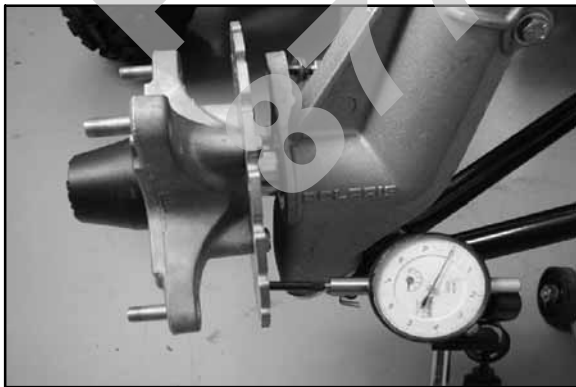
1. Visually inspect the brake disc for nicks, scratches, or damage.
2. Measure the disc thickness at eight different points around the pad contact surface using a 0-1" micrometer. Replace disc if worn beyond service limit.



Brake Disc Thickness
New .150-.164" (3.810-4.166 mm)
Service Limit .140" / 3.556 mm

Brake Disc Thickness Variance
Service Limit: .002" (.051 mm)
difference 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.



Brake Disc Runout
Service Limit .010" (.254 mm)

FRONT BRAKE DISC REMOVAL / REPLACEMENT

NOTE: To reduce the possibility of warpage, 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 specified torque.

Front Brake Disc Mounting Bolt Torque
18 ft. lbs. (25 Nm)

CAUTION: Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.

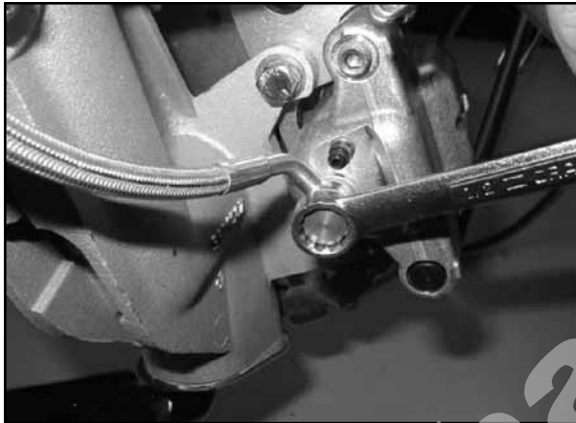


FRONT CALIPER REMOVAL

CAUTION:

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

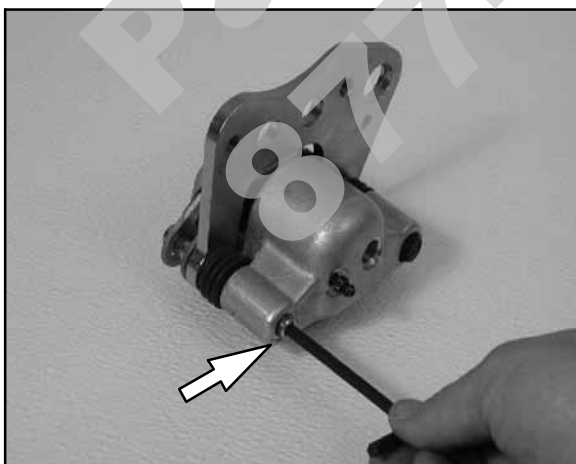
1. Remove brake pads.
2. Use a 1/2 wrench, loosen and remove brake line to caliper. Place a container under caliper to catch fluid draining from brake line.



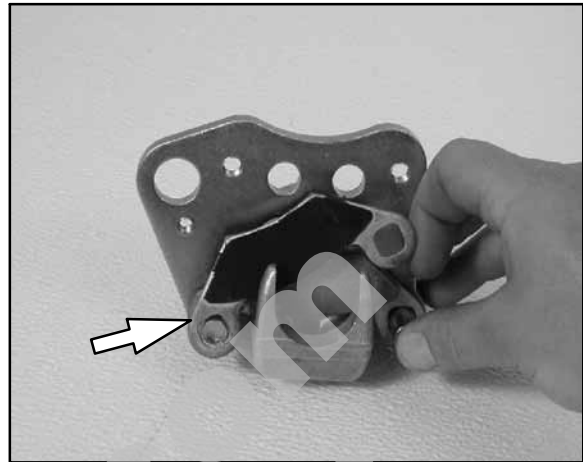
3. Remove two brake caliper mounting bolts.
4. Remove brake caliper and drain fluid into container. Do not reuse brake fluid.

FRONT CALIPER DISASSEMBLY

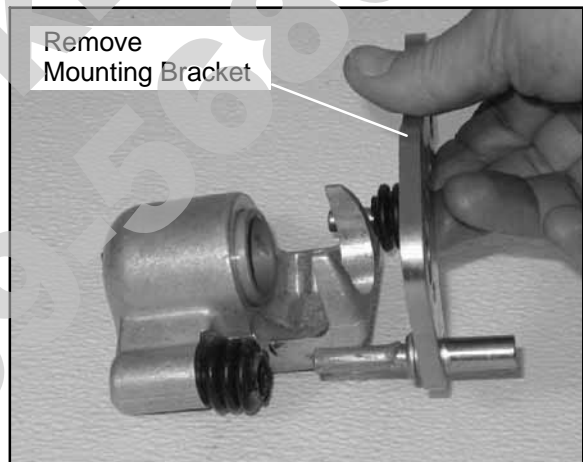
1. Remove brake pad adjuster screw.



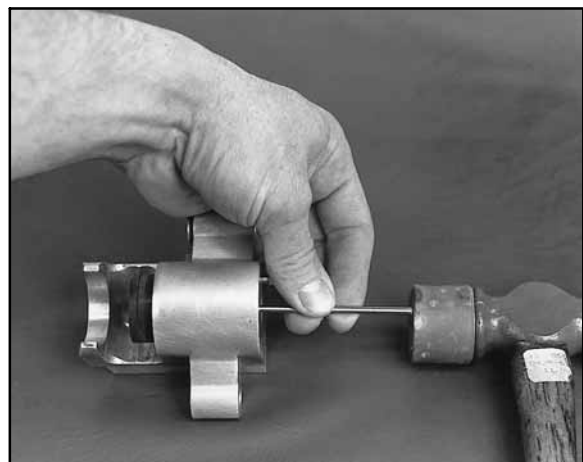
2. Push upper pad retainer pin inward and slip brake pads past edge.



3. Remove mounting bracket, pin assembly and dust boot.



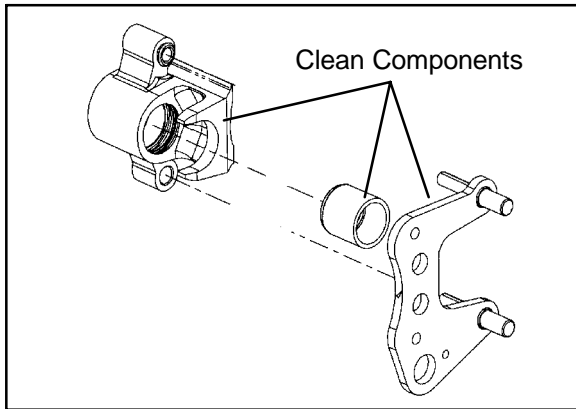
4. Remove piston, dust seal and piston seal.





5. Clean the caliper body, piston, and retaining bracket with brake cleaner or alcohol.

NOTE: Be sure to clean seal grooves in caliper body.



2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.



FRONT CALIPER INSPECTION

1. Inspect caliper body for nicks, scratches or wear. Measure bore size and compare to specifications. Replace if damage is evident or if worn beyond service limit.

Front Caliper Piston Bore I.D.

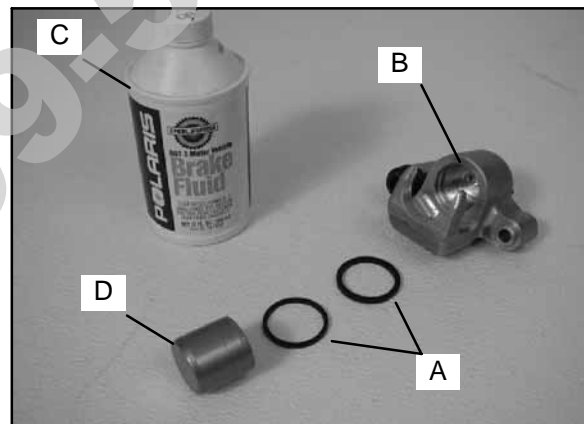
Std. 1.191-1.192" (30.25-30.28 mm)
Service Limit 1.193" (30.30 mm)



3. Inspect the brake disc and pads as outlined for brake pad replacement this section.

FRONT CALIPER REASSEMBLY

1. Install new O-rings (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 3 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, and install the rubber dust seal boots.



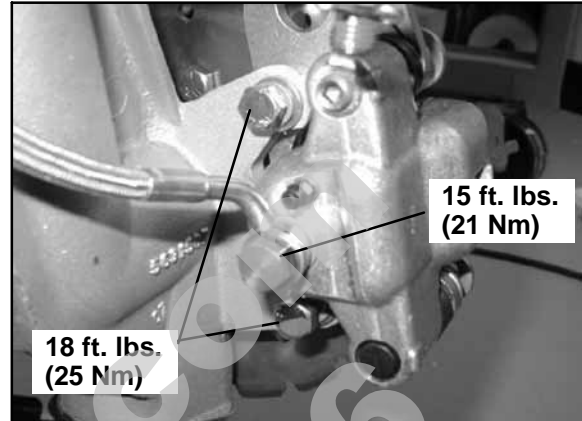
**Polaris Premium All Season Grease
(PN 2871423)**

4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.



FRONT CALIPER INSTALLATION

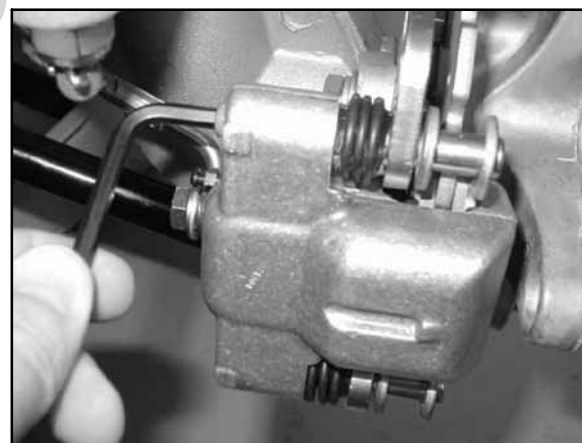
1. Install caliper on hub strut, and torque mounting bolts.



**Front Caliper Mounting Bolt Torque
18 ft. lbs. (25 Nm)**

**Brake Line Torque
Banjo Style: 15 ft. lbs. (21 Nm)**

2. Install brake line and tighten securely with a line wrench. Torque the brake lines to the proper torque of 15 ft.lbs. (21 Nm).
3. Install the adjuster screw and turn until stationary pad contacts disc, then back off 1/2 turn.



4. Follow brake bleeding procedure outlined in this chapter.
5. Install wheels and torque wheel nuts to specification.

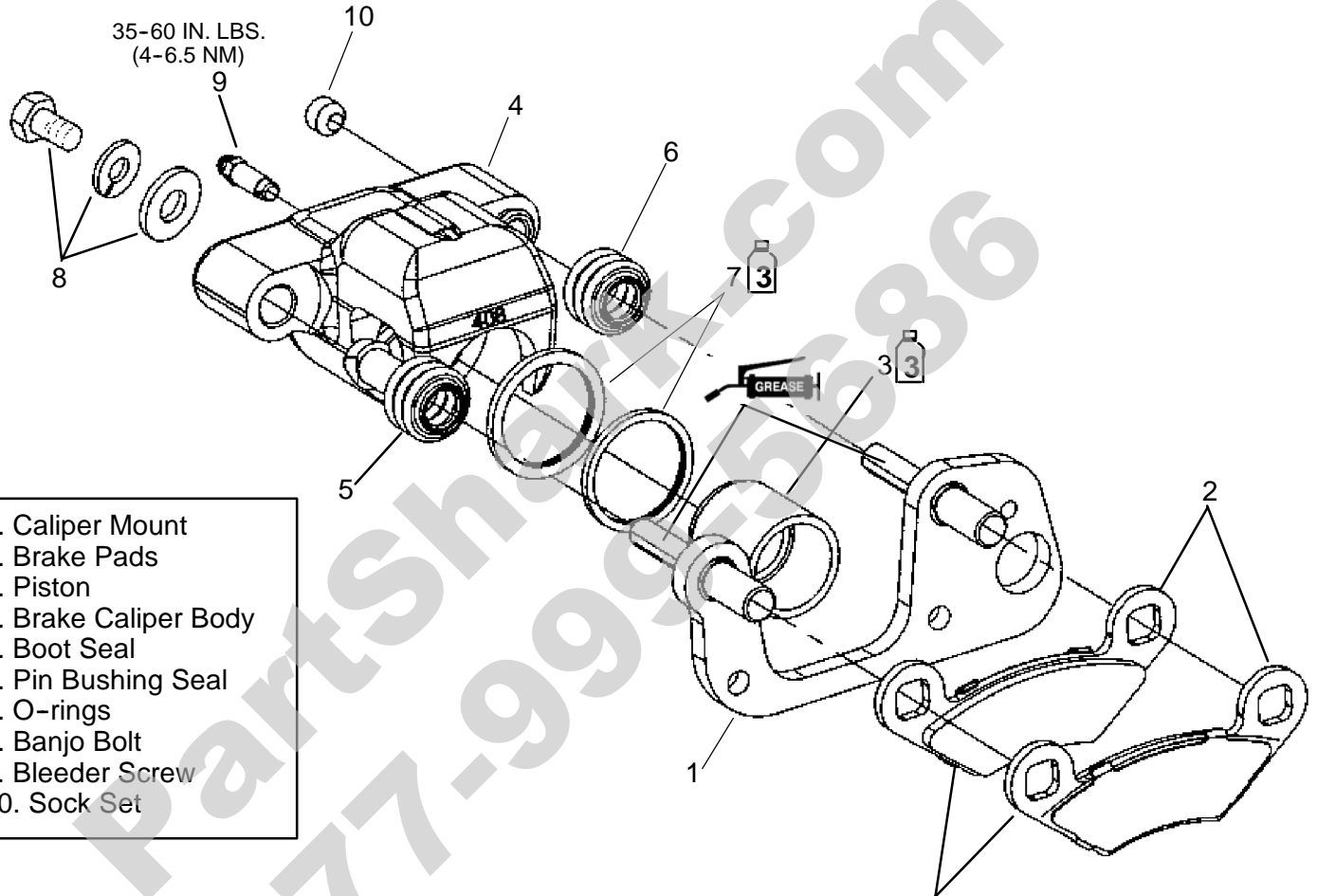
**Front Wheel Nut Torque
27 ft. lbs. (37 Nm).**



FRONT BRAKE CALIPER EXPLODED VIEW

4 APPLY POLARIS DOT 4 BRAKE FLUID TO COMPONENT

GREASE APPLY POLARIS ALL PURPOSE GREASE



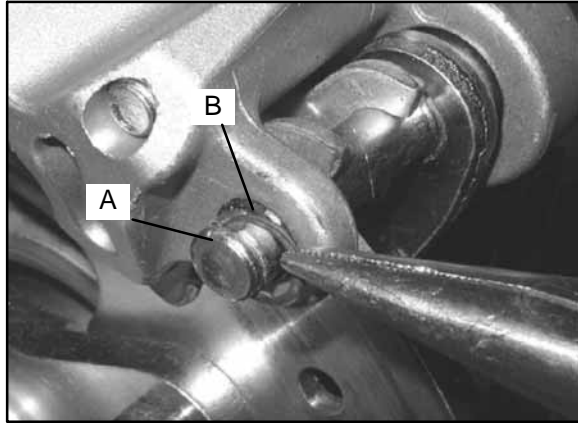
- 1. Caliper Mount
- 2. Brake Pads
- 3. Piston
- 4. Brake Caliper Body
- 5. Boot Seal
- 6. Pin Bushing Seal
- 7. O-rings
- 8. Banjo Bolt
- 9. Bleeder Screw
- 10. Sock Set

NOTE: IF PADS ARE DIRTY, GREASY, OILY, OR FLUID SOAKED, REPLACE WITH NEW PADS

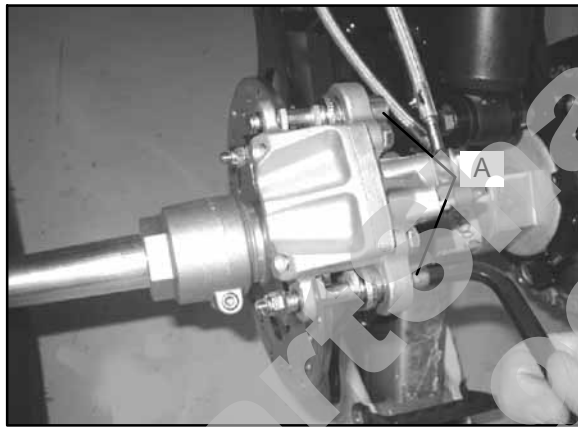


REAR BRAKE PAD REMOVAL

1. Remove the snap ring (B) from the bottom slide pin (A).



2. Loosen (do not remove) the bottom caliper slide pin (A).

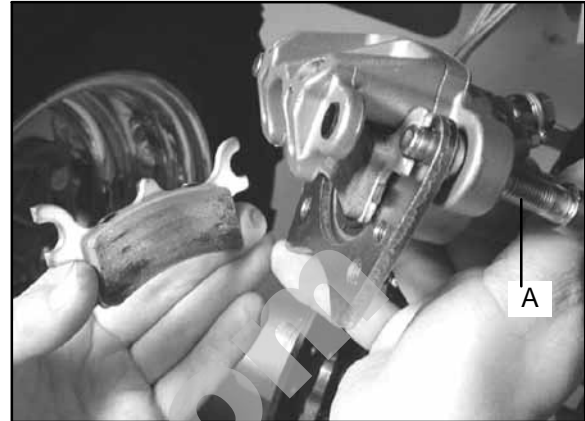


NOTE: When removing caliper, be careful not to damage brake line. Support caliper so as not to kink or bend brake line.

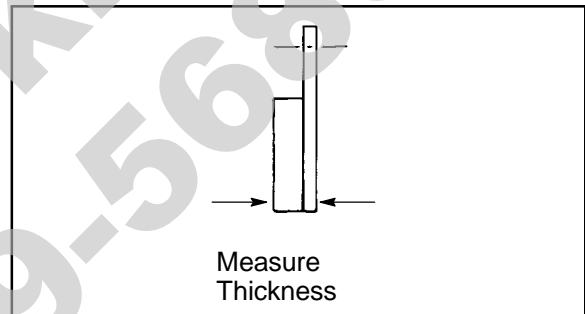
3. Loosen or remove the master cylinder cap. With the pads installed, press the piston into the caliper body.

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.

4. Remove the loose slide pin (A). The brake pad will now slide out.



5. Clean the caliper with brake cleaner or alcohol.
6. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.

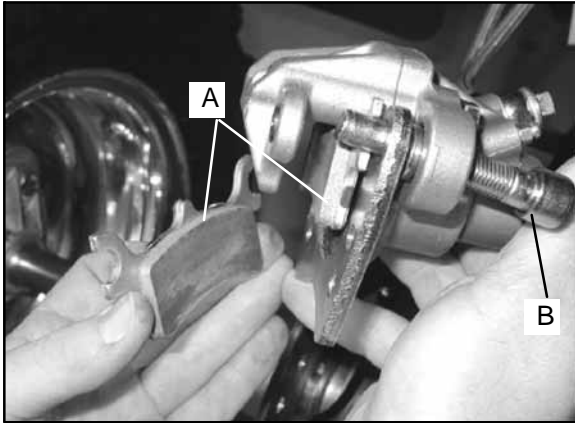


Rear Brake Pad Thickness
New: .318" (8.0 mm)
Service Limit: .180" (4.6 mm)

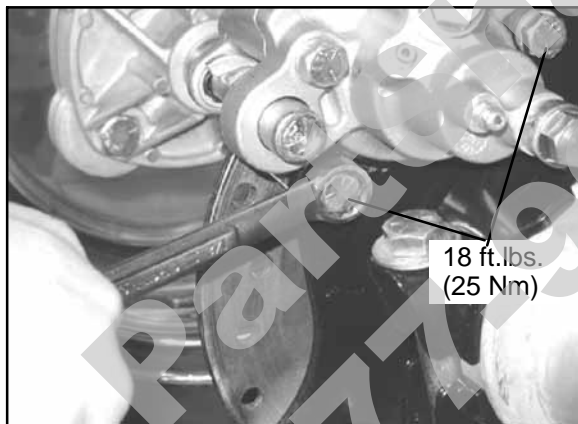


REAR BRAKE PAD INSTALLATION

1. Insert new brake pads into the caliper.
- NOTE:** If pads are greasy, dirty, oily, or fluid soaked DO NOT use the pads, use only new clean pads.

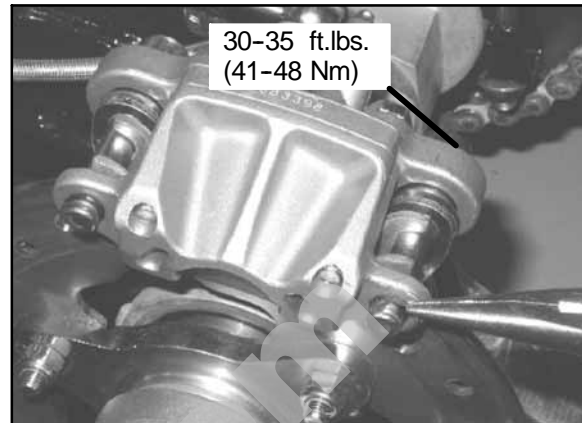


2. Install slide pin (B) finger tight.
3. Install the caliper onto the caliper mount. Install two bolts and tighten, then torque to 18 ft.lbs. (25 Nm).



4. Torque the slide pin to 30-35 ft.lbs. (41-48 Nm).

5. Install the snap ring.



6. 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.
7. It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat procedure 10 times.

BRAKE BURNISHING PROCEDURE

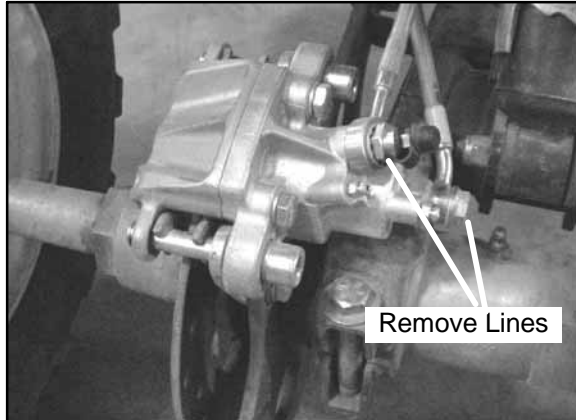
It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warpage may result. Repeat this procedure 10 times.

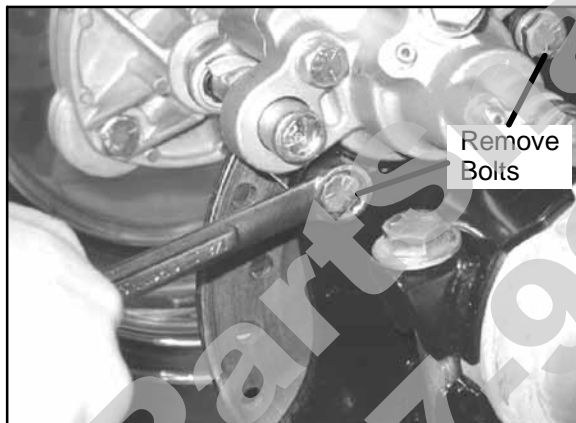


REAR CALIPER REMOVAL/INSPECTION

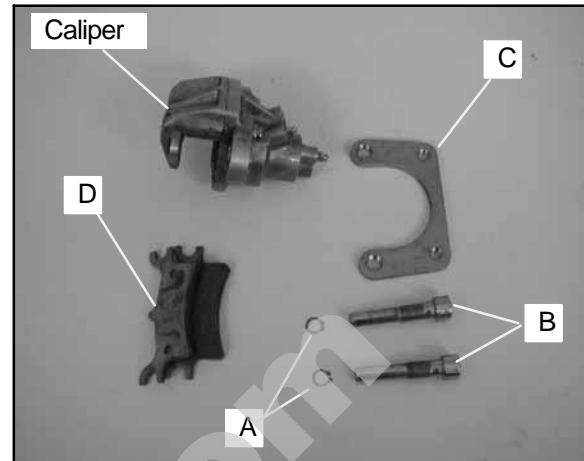
1. Clean caliper area before removal.
2. Remove hand brake (inner) and auxiliary brake (outer) lines. Place a container to catch brake fluid draining from brake lines.



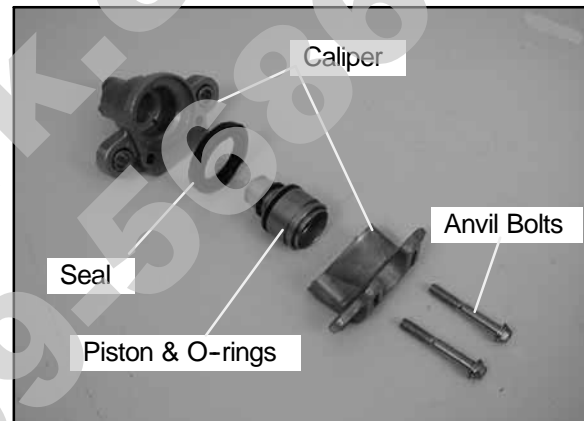
3. Remove the two caliper bolts and the caliper.



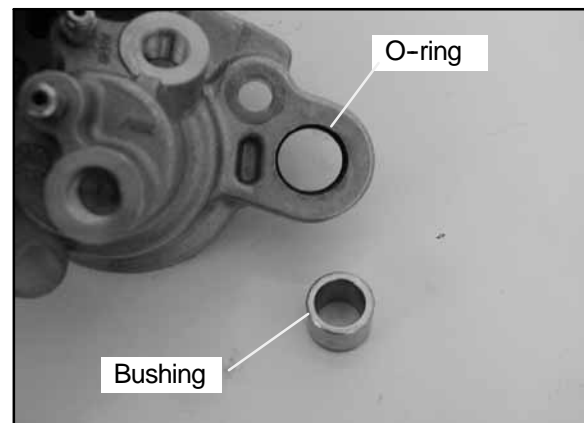
4. Remove the slide bolt snap rings (A), the slide pins (B), the bracket pad (C), and the brake pads (D).



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.

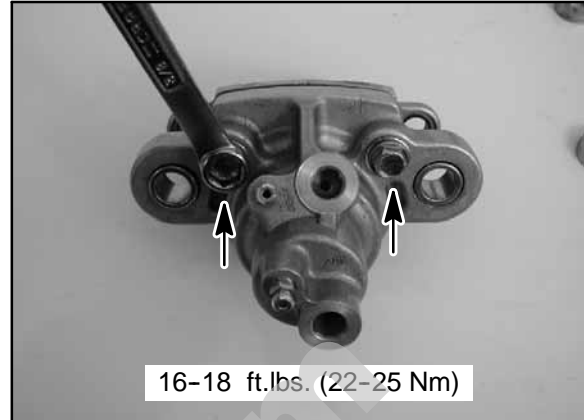




- Inspect caliper piston bore for scratches, severe corrosion, or galling and replace if necessary.



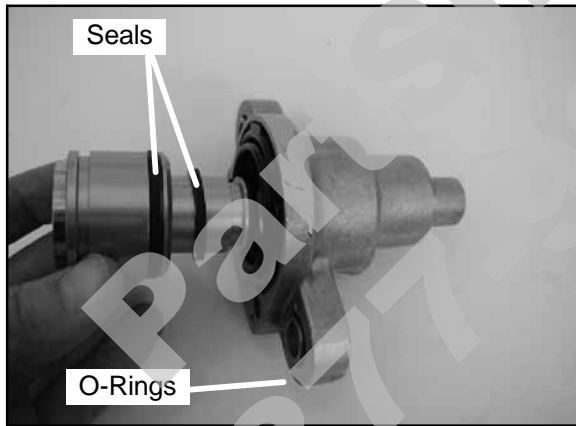
- Inspect surface of caliper piston for nicks, scratches, or damage and replace if necessary.



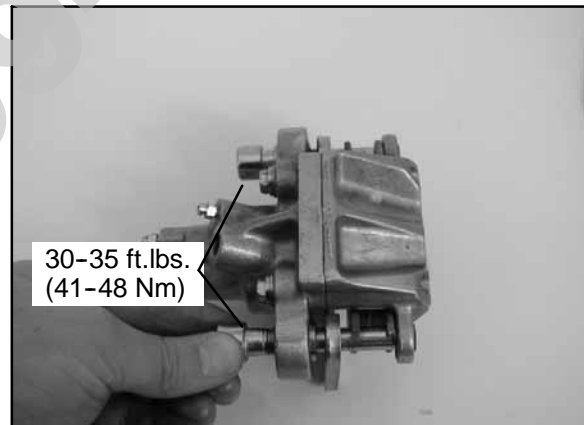
Caliper Anvil Bolt Torque:
16-18 ft. lbs. (22 Nm-25 Nm)

REAR CALIPER ASSEMBLY

- 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.
- Install brake pads in caliper body with friction material facing each other. Install the slide pins and the slide pin retaining ring. Torque the slide pins to **30-35 ft.lbs. (41-48 Nm)**.
 NOTE: Torquing the slide pins while the caliper is mounted on the ATV simplifies the torque procedure.



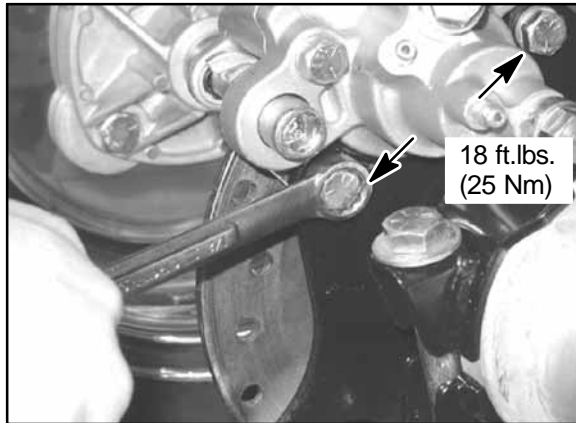
- Carefully assemble caliper body, making sure O-rings are properly positioned in groove. Tighten the caliper anvil bolts and then torque the anvil bolts evenly to **16-18 ft. lbs. (22-25 Nm)**.



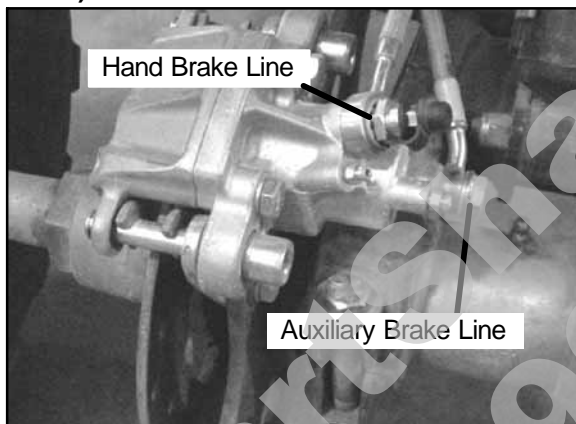
Caliper Slide Pin Torque:
30-35 ft. lbs. (41 Nm-48 Nm)



4. Install caliper and tighten mounting bolts, then torque mounting bolts to **18 ft.lbs (25 Nm)**.



5. Install brake line and tighten securely with a line wrench. Torque the brake lines to **15 ft.lbs (21 Nm)**.



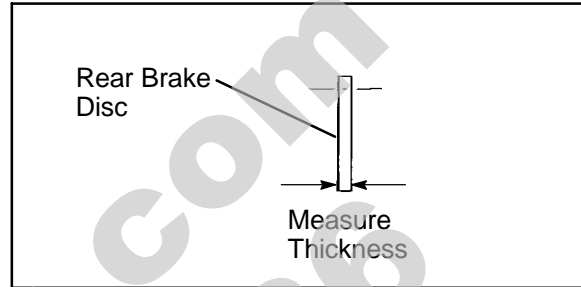
Brake Line Torque

Banjo Brake Line: 15 ft. lbs. (21 Nm)

6. Follow bleeding procedure outlined 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 0-1" micrometer and measure disc thickness at 8 different points around perimeter of disc. Replace disc if worn beyond service limit.



Brake Disc Thickness

New .150-.165" (3.81-4.19 mm)
Service Limit .140" (3.55 mm)

Brake Disc Thickness Variance

Service Limit .002" (.051 mm)
difference between measurements

3. Mount dial indicator and measure disc runout. Replace the disc if runout exceeds specifications.

Brake Disc Runout

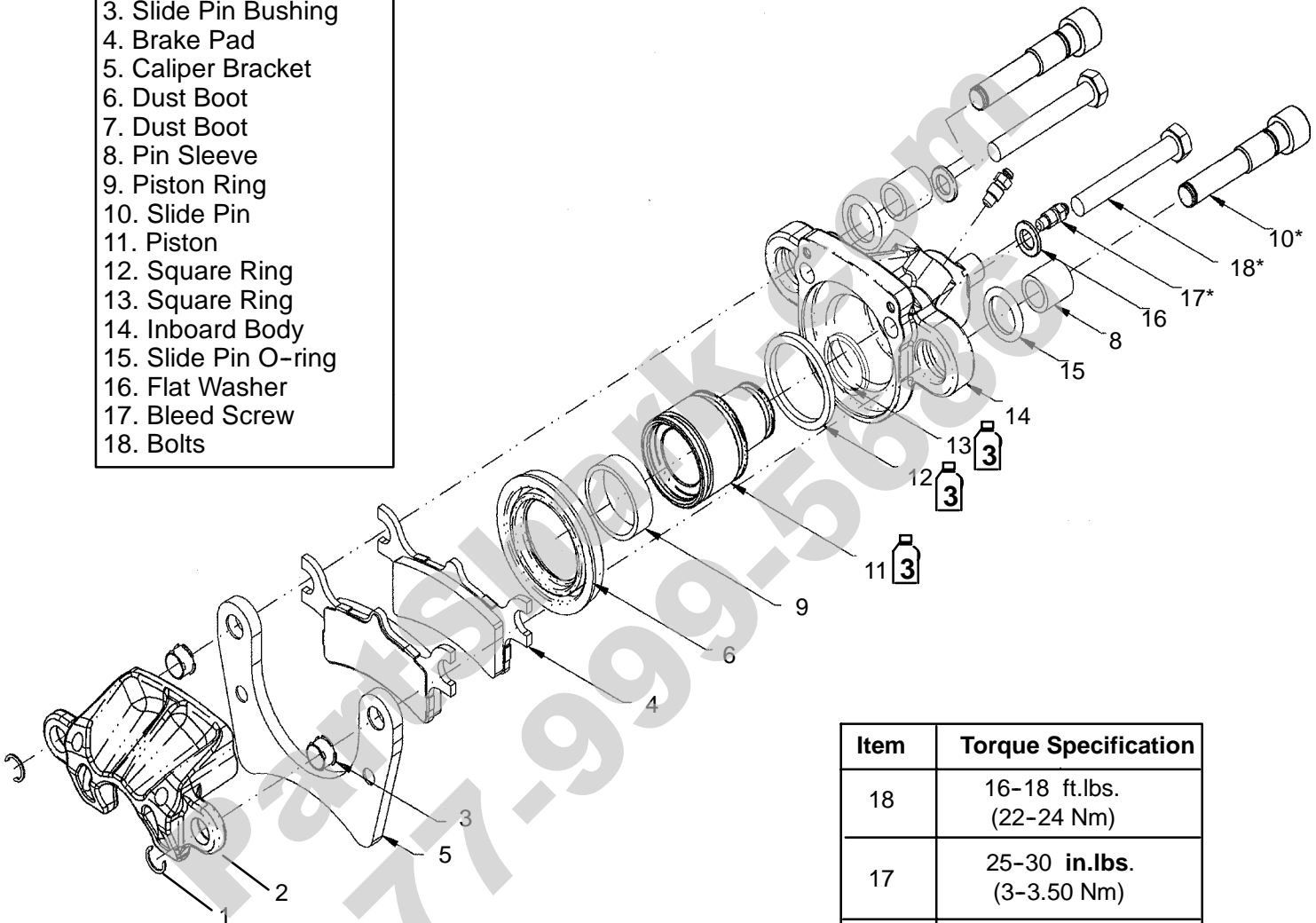
Service Limit .010" (.254 mm)



REAR CALIPER EXPLODED VIEW

3 APPLY POLARIS DOT 3 BRAKE FLUID TO COMPONENT

- 1. Snap Ring
- 2. Outboard Anvil Body
- 3. Slide Pin Bushing
- 4. Brake Pad
- 5. Caliper Bracket
- 6. Dust Boot
- 7. Dust Boot
- 8. Pin Sleeve
- 9. Piston Ring
- 10. Slide Pin
- 11. Piston
- 12. Square Ring
- 13. Square Ring
- 14. Inboard Body
- 15. Slide Pin O-ring
- 16. Flat Washer
- 17. Bleed Screw
- 18. Bolts



Item	Torque Specification
18	16-18 ft.lbs. (22-24 Nm)
17	25-30 in.lbs. (3-3.50 Nm)
10	30-35 ft.lbs. (41-47 Nm)



AUXILIARY BRAKE REMOVAL / INSTALL

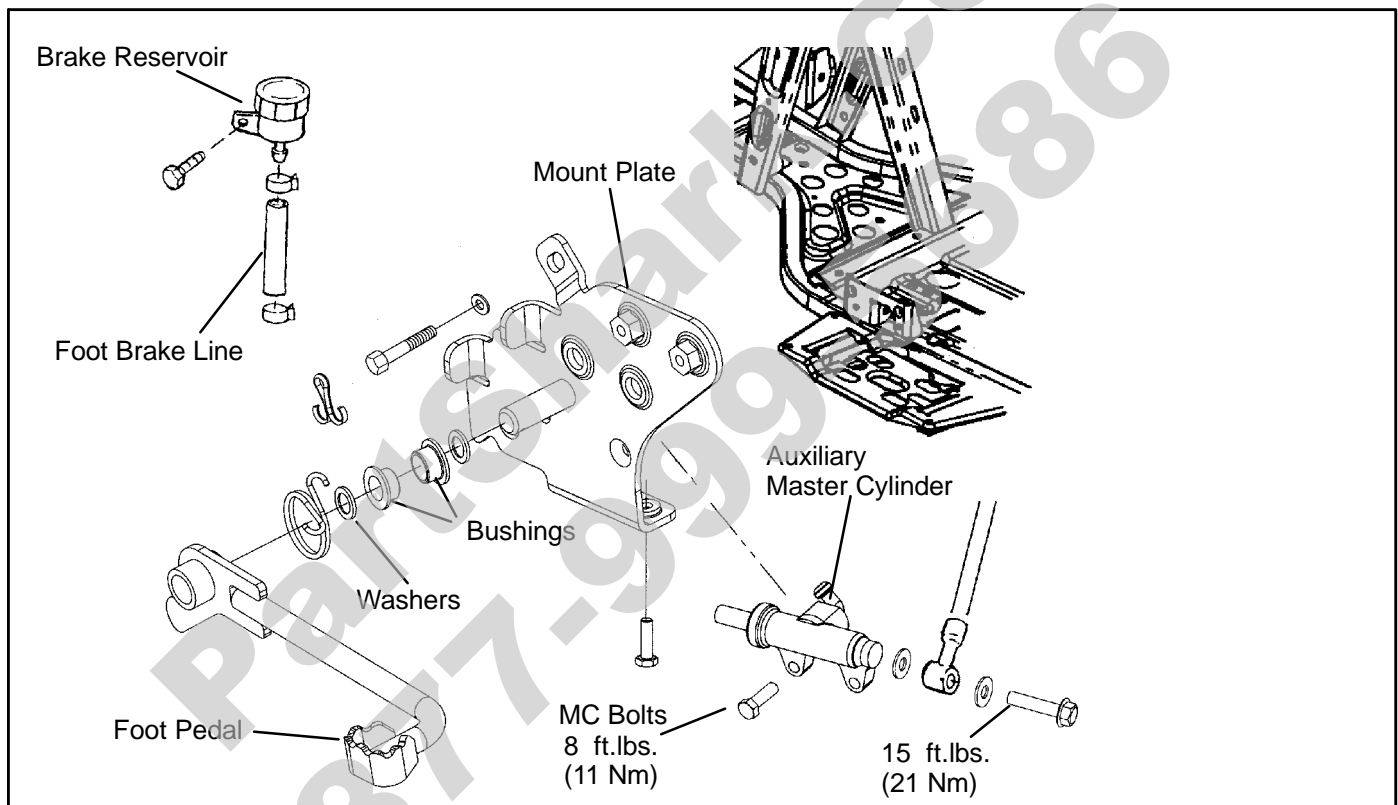
Brake Pedal Removal / Install

1. To remove the brake pedal:
 - G Remove the footwell
 - G Remove the cotter key that secures the brake pedal
 - G Remove the washers, bushings, and tension spring
2. Reverse the steps for installation, use a new cotter key during installation.

Rear Brake Master Cylinder Removal / Install

1. If necessary, remove the rear brake line from the master cylinder. Use a suitable container to catch the brake fluid. Dispose of brake fluid properly.
2. Remove the two bolts that secure the rear master cylinder to the brake mount plate. Replace parts as needed.
3. To install the rear brake master cylinder, mount the master cylinder to the mount plate and torque bolts to 8 ft.lbs. (11 Nm).
4. Reinstall the brake line and torque the banjo bolt to 15 ft.lbs. (21 Nm).

AUXILIARY MASTER CYLINDER ASSEMBLY





REAR BRAKE CALIPER EXPLODED VIEW

TROUBLESHOOTING

Brakes Squeal

- S Dirty/contaminated friction pads
- S Improper alignment
- S Worn disc
- S Worn disc splines

Poor Brake Performance

- S Air in system
- S Water in system (brake fluid contaminated)
- S Caliper/disc misaligned
- S Caliper dirty or damaged
- S Brake line damaged or lining ruptured
- S Worn disc and/or friction pads
- S Incorrectly adjusted lever
- S Incorrectly adjusted stationary pad
- S Worn or damaged master cylinder or components
- S Improper clearance between lever and switch

Lever Vibration

- S Disc damaged
- S Disc worn (runout or thickness variance exceeds service limit)

Caliper Overheats (Brakes Drag)

- S Compensating port plugged
- S Pad clearance set incorrectly
- S Auxiliary brake pedal incorrectly adjusted
- S Brake lever or pedal binding or unable to return fully
- S Parking brake left on
- S Residue build up under caliper seals
- S Operator riding brakes

Brakes Lock

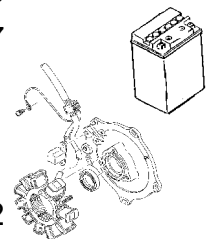
- S Alignment of caliper to disc.



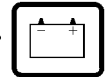
CHAPTER 10

ELECTRICAL

Special Tools and Electrical Service Notes	10.2
Timing Check Procedure	10.2
Transmission Gear Position Switch Testing	10.3
Reverse Speed Limiter System	10.3
Reverse Speed Limiter Wiring Diagram	10.4
Reverse Speed Limiter Troubleshooting	10.5
PDM Operation	10.6-10.10
Fan Circuit Operation	10.10
Fan Motor Current Draw Test	10.11
Thermistor / Fan Control Testing	10.11
Electronic Throttle Control System Operation ...	10.12
Flywheel Identification - DC/CDI Operation	10.13
ES32PF 210 Watt Alternator, Exploded View	10.14
Ignition System Testing	10.15
Ignition System Troubleshooting	10.16
Cranking Output Tests	10.16
Charging System Testing	10.17-10.18
Battery Service	10.19-10.26
Headlight/Tail Light Service	10.26-10.27
Starter System Testing	10.28
Starter System / Starter Lockout Troubleshooting	10.29
Starter Motor Service	10.30-10.32
Starter Drive	10.33
Wiring Diagram	Ch. End



10



SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
PV-43568	Fluke t 77 Digital Multimeter
2870836	Battery Hydrometer
2870630	Timing Light
8712100 or 8712500	Tachometer

ELECTRICAL SERVICE

NOTES

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

Refer to wiring diagram for stator and electrical component resistance specifications.

When measuring resistance of a component that has a low resistance value (under 10 Ohms), remember to subtract meter lead resistance from the reading. Connect the leads together and record the resistance. The resistance of the component is equal to tested value minus the lead resistance.

Become familiar with the operation of your meter. Be sure leads are in the proper jack for the test being performed (i.e. 10A jack for current readings). Refer to the Owner's manual included with your meter for more information.

Voltage, amperage, and resistance values included in this manual are obtained with a Fluke t 77 Digital Multimeter (PV-43568). This meter is acceptable for use when diagnosing electrical problems. Readings obtained with other meters may differ.

Pay attention to the prefix on the 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.

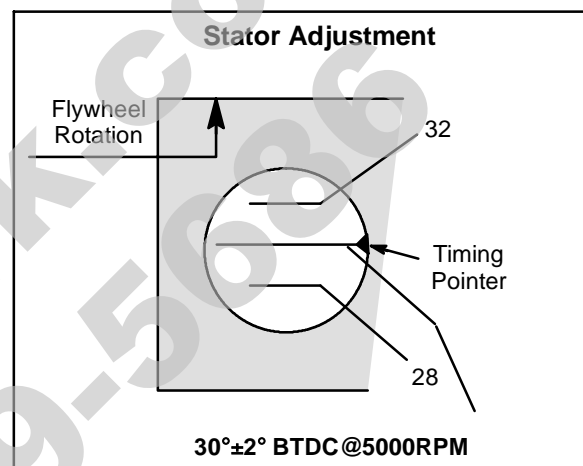
TIMING CHECK PROCEDURE

1. The ignition timing check hole is in the starter recoil/magneto housing. Remove the check plug.

NOTE: The ignition timing marks are stamped on the outside of the flywheel. Ignition timing must be inspected with the engine at room temperature (68°F / 20° C).

2. With the transmission in neutral, start the engine and set engine speed to 5000 +/- 200 RPM.

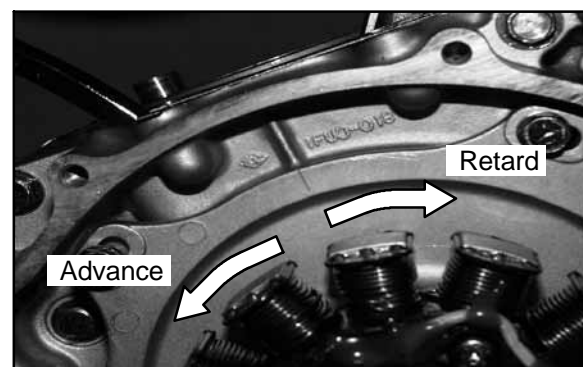
3. Direct the timing light at the ignition timing check hole and check the ignition timing. **NOTE:** Do not allow the engine to warm up. The timing will retard approximately 2° when the engine is warm.



Stator Adjustment

If the ignition timing is not within the specified range, adjust the stator plate position as described below.

1. Remove the magneto housing.
2. Remove the flywheel.
3. Loosen the stator plate screws and adjust the stator plate position. **NOTE:** Moving the stator plate clockwise retards (delays) the ignition timing. Moving the plate counterclockwise advances it.





GEAR POSITION INDICATOR SWITCH TEST

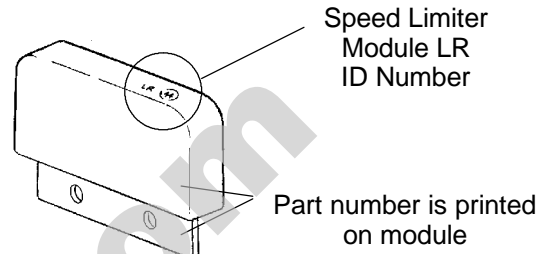
Switch Continuity Table

High/Neutral/Reverse Switch

	D	C	B	A
High Range		F	F	F
Reverse			F	F
Neutral	F			F

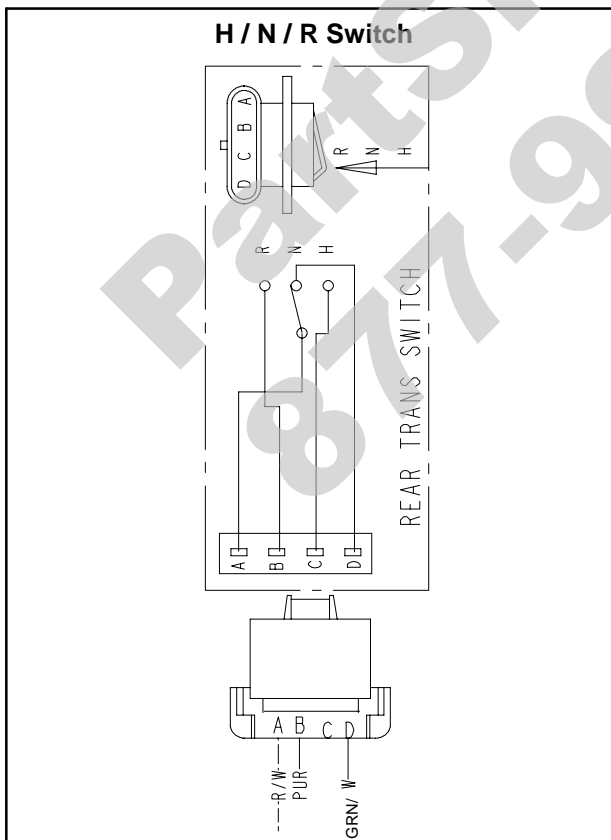
LIMITER SPECIFICATIONS

NOTE: The part number is printed on some late model LR modules. Whenever possible, use part number to identify the module. Modules may have same "LR" I.D. number, with different part numbers, terminals, and internal function.



LIMITER SPECIFICATIONS	
(Refer to parts manual or microfiche for part number and application.)	
TYPE	FUNCTION / LIMIT RPM
LR44	Reverse Limit - 3500

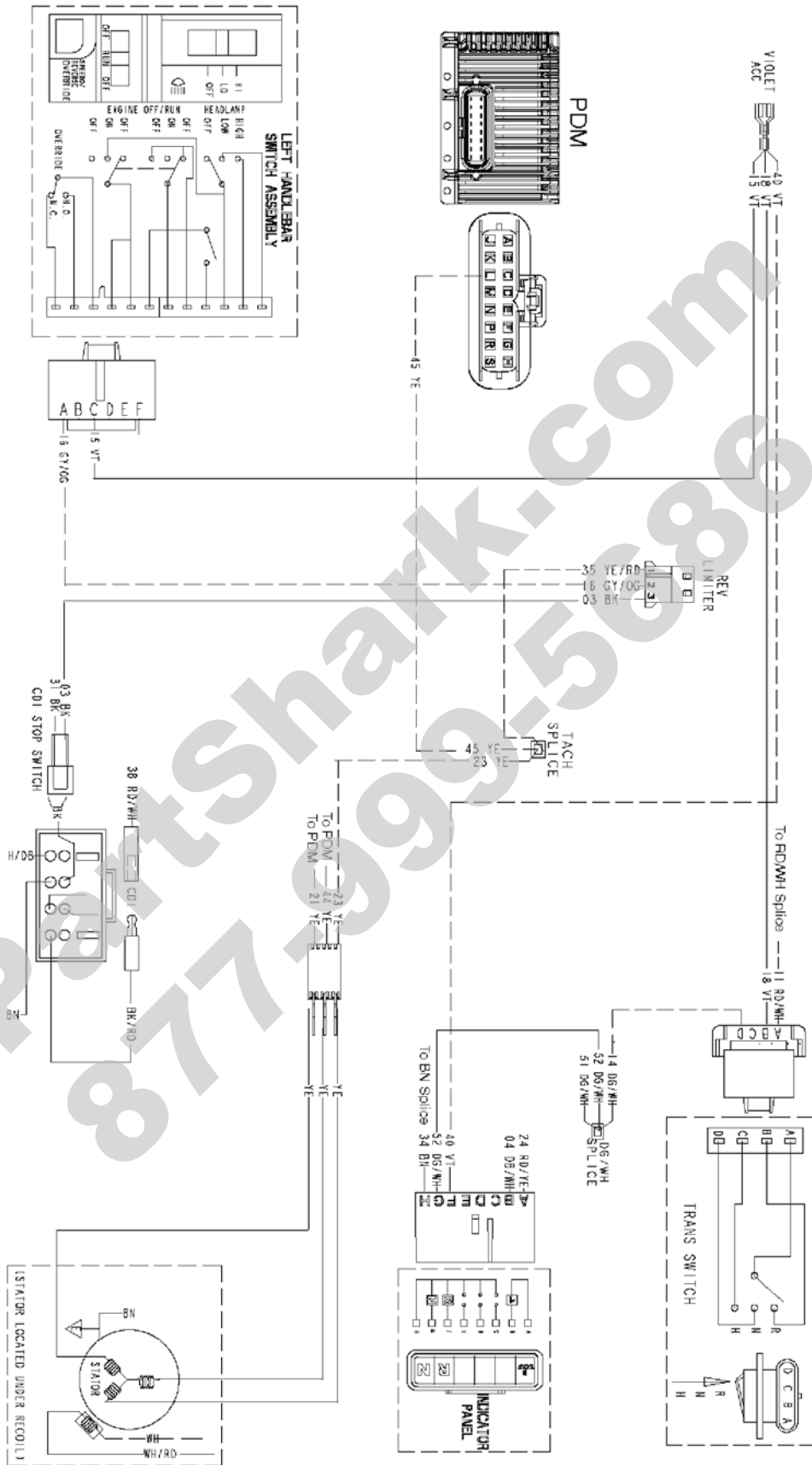
NOTES





REVERSE LIMIT SYSTEM

TRAIL BOSS 330 REVERSE LIMITER SYSTEM

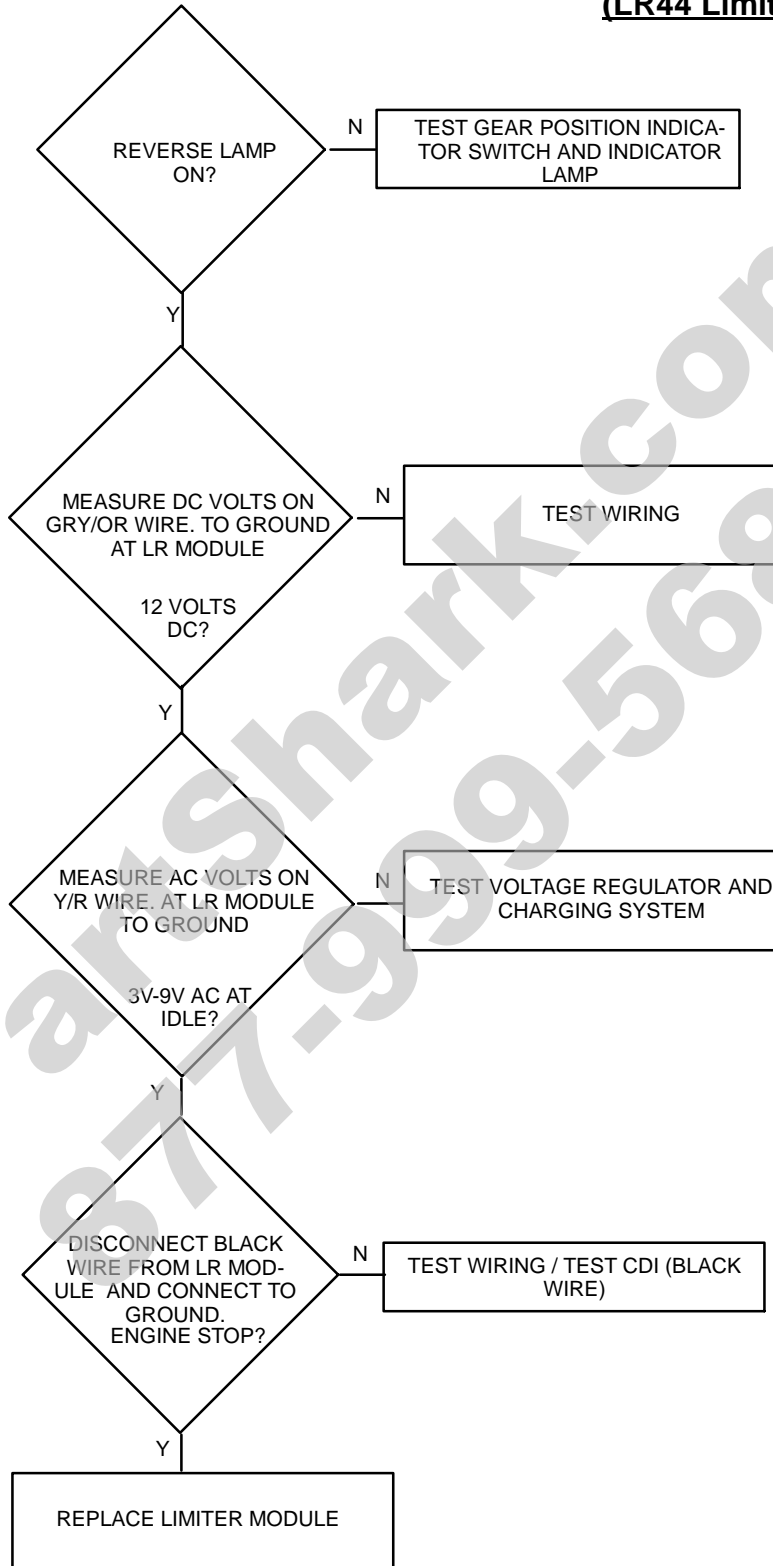


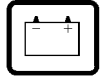


REVERSE SPEED LIMIT SYSTEM

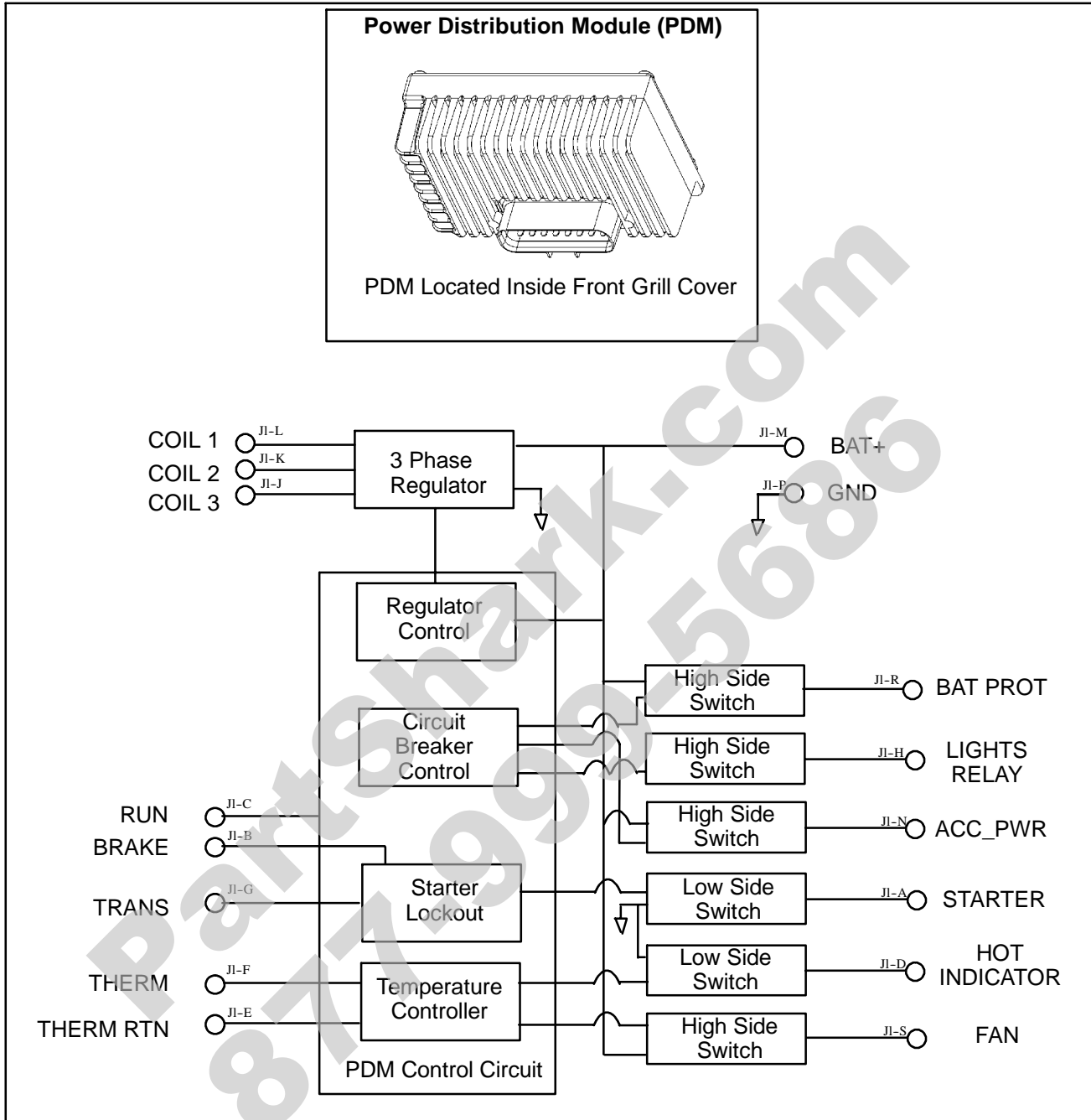
APPLY PARKING BRAKE. START ENGINE.
SHIFT TO REVERSE GEAR

NO REVERSE SPEED LIMIT (LR44 Limit Module)





POWER DISTRIBUTION MODULE (PDM)



The Power Distribution Module (PDM) integrates these electronic features found on Polaris ATVs; **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 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

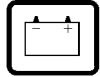
The HOT Indicator output uses a low-side power switch 'smart FET' that indicates when the thermistor input exceeds the values programmed in the PDM. It also indicates a stalled or open fan condition. The output is protected against shorts to battery, over-load, over-voltage and over-temperature conditions.

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 load, 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.



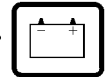
Connector 1 Pin #	Signal Name	Description <small>IPS = Intelligent Power Switch</small>
J1-A	STARTER	Starter output provides ground path when active.
J1-B	BRAKE	Brake input for starter lockout. Active high.
J1-C	RUN	PDM enable input. Connected to BAT_PROT via ignition and run switches.
J1-D	HOT_INDICATOR	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	IPS that provides power to the accessories
J1-P	GND	Battery Ground
J1-R	BAT_PROT	SSCB output provides battery power to loads. Also provides constant power for real time clock.
J1-S	FAN	Relay control input to enable operation of the fan

PartShair.com
877-999-5686

**PDM SPECIFICATIONS**

Characteristic	Parameter	Unit	Note
Operating Temperature	-40 to +55	dC	Ambient temperatures at which module should remain within specified limits
Storage Temperature	-50 to +85	dC	Ambient temperatures which should have no adverse effects 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	Vdc	Max. total DC amperage available from regulator
Minimum Battery Voltage	4.5		5.0	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		Amp	Max. continuous current
Nominal Current	9	11	14	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.



Characteristic	MIN	TYP	MAX	UNIT	Note
STARTER Output					
Current			6	Amp	Current capability of the STARTER output
TRANS					
Neutral Voltage	4.5	-	16	Vdc	
BRAKE On					
Input Voltage	2	14	16	Vdc	Voltage on BRAKE input to activate the STARTER 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
TEMPERATURE CONTROLLER					
Open Thermistor Resistance	50k			ohm	Above this resistance is assumed to be an open thermistor, causing the FAN and HOT indicator to activate
Fan OFF Resistance	3362	3466	3570	ohm	Thermistor resistance <i>above</i> this value will turn off the fan
Fan ON Resistance	2426	2519	2612	ohm	Thermistor resistance <i>below</i> this value will turn on the fan
Engine Temperature Indicator ON Resistance	1534	1607	1680	ohm	Thermistor resistance <i>below</i> this value will cause the HOT indicator output to pull low
Engine Temperature Indicator OFF Resistance	1534	1607	1680	ohm	Thermistor resistances <i>above</i> this value will not activate the HOT indicator output

'HOT' LIGHT OPERATION

With the ignition switch (and engine stop switch) "ON", power is delivered to the hot light via the Red/White wire. The Blue/White wire (ground) out of the light socket is connected to the PDM. If engine coolant reaches the specified temperature, the thermistor sends a signal to the PDM, which completes the ground path for the light. An open thermistor will cause the engine hot indicator to light and cause the fan motor to come on.

HOT LIGHT CIRCUIT TEST

1. Disconnect the thermistor.
2. Turn key and auxiliary switch to "ON" position. The hot lamp (and fan) should come on. Check the bulb and related wiring if the lamp does not illuminate. Check PDM for proper operation.

FAN OPERATION / TESTING

Power to the fan is supplied via the PDM when the ignition key and auxiliary shut-off switch are ON. When the thermistor reaches the specified resistance, the signal is read by the PDM, which turns on power to Orange/Blk wire. The ground path for the fan motor is through the Brown wire in the harness.

CAUTION: Keep hands away from fan blades during this procedure. Serious personal injury could result.

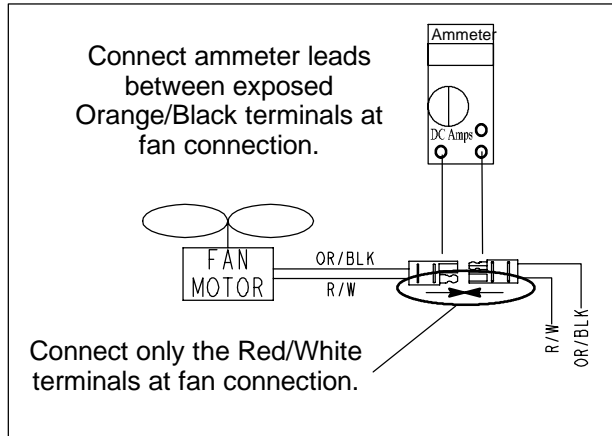
NOTE: The fan switch may not function or operation may be delayed if oil level is low or if air is trapped in the system. Be sure system is full and purged of air. Refer to Maintenance Chapter 2.

FAN BYPASS TEST

1. Disconnect the harness from the thermistor.
2. Turn ignition key (and engine stop switch) "ON". The fan (and hot indicator) should turn on.
3. If the fan does not run or runs slowly check the fan motor wiring, ground, motor condition (refer to Fan Motor Testing this section) and PDM. Repair or replace as necessary.



FAN MOTOR CURRENT DRAW



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. Turn key to off.
2. Disconnect the thermistor.
3. Reconnect fan motor connector to place a DC ammeter in series as shown in the illustration.
4. Be sure fan blade is free to rotate.
5. Turn ignition key and engine stop switch to "ON" position. Read the current draw on ammeter with fan running.
6. If the fan motor draws more than 7.5 Amps, replace the motor.

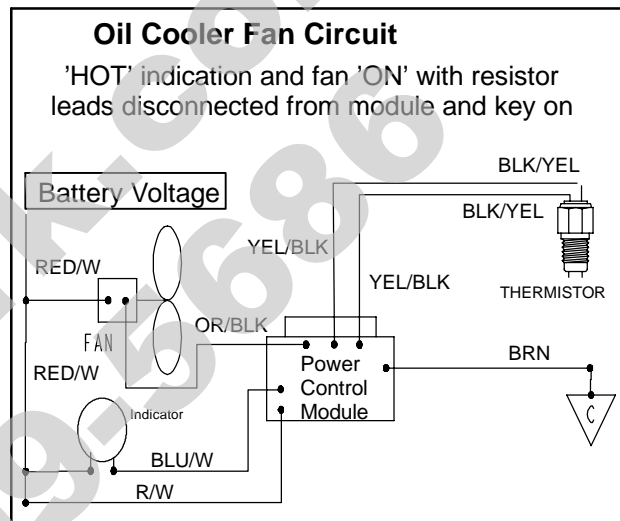
Fan Motor Current Draw:
Less Than 7.5 Amps

OIL COOLER FAN CONTROL TEST

Oil Cooler Fan Notes

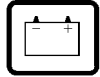
- GThermistor resistance decreases with temperature increase
- GBoth fan and hot indicator should be on with the thermistor unplugged
- GFan blade should rotate drawing air in through cooler (blowing on engine)

THERMISTOR RESISTANCE VS. TEMPERATURE			
Oil Temperature	Resistance ± 20%	Fan ON/OFF	Hot Light ON/OFF
77° F (25° C)	100KΩ	Fan OFF	OFF
240° F (116° C)	3.5KΩ	Fan OFF	OFF
260° F (127° C)	2.5KΩ	Fan ON	OFF
290° F (143° C)	1.6KΩ	Fan ON	Hot Indicator ON



Thermistor / Fan Control Test

- GTurn key switch to ON and engine stop switch to RUN. Do not start engine.
- GTTest voltage on R/W wire at vehicle control module. R/W wire should have 12-14 Volts DC (battery voltage)
- GDisconnect thermistor leads from the main harness (Black/Yellow wires) - Fan and Hot indicator ON? (If not, test speedometer, fan motor and circuit)
- GTTest the resistance of the thermistor (refer to temperature/resistance table).
Replace thermistor if out of specified range. See the wiring diagram or chart for thermistor resistance values at various oil temperatures. The resistance of the thermistor is approximately 100kΩ at 77°F.
- GReplace vehicle control module and test system if all else appears okay.



ELECTRONIC THROTTLE CONTROL (ETC) SWITCH (COMPOSITE THROTTLE HOUSING)

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 in Illustration 1) by throttle cable tension. The contacts are “open” in 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 CDI black wire to ground, preventing ignition spark. This is the same as turning the key or engine stop switch “OFF”.

Test the ETC switch at the harness connector. **NOTE:** 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 OPERATION 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.

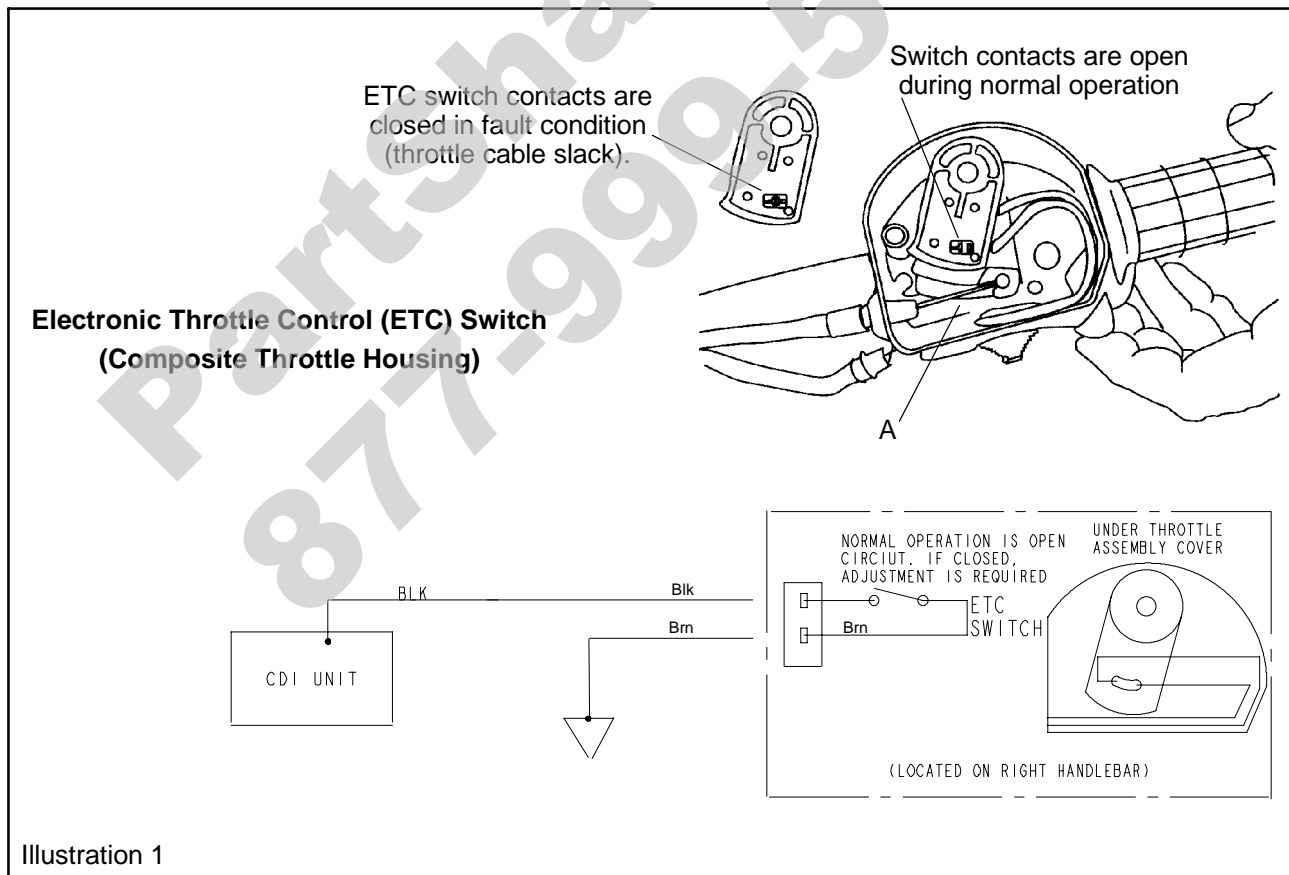
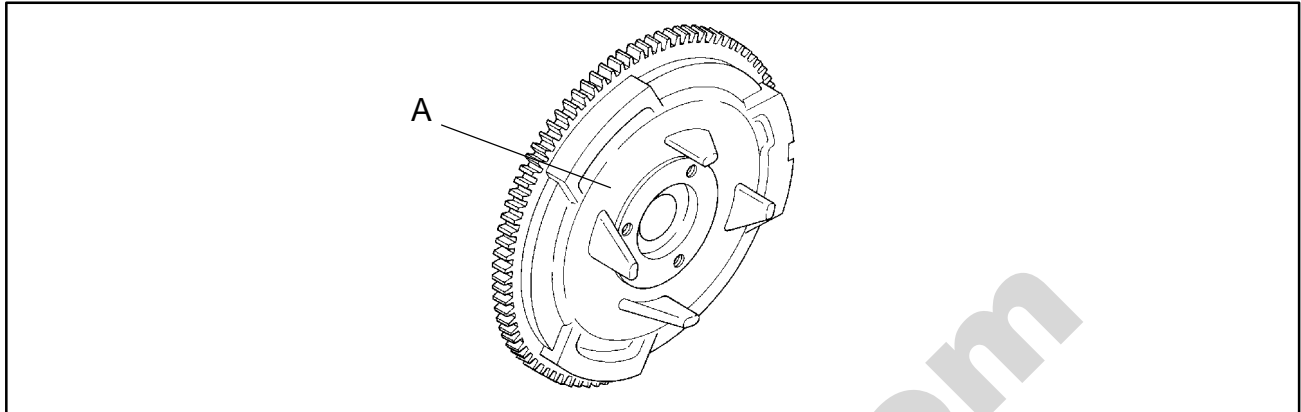


Illustration 1





FLYWHEEL IDENTIFICATION



Flywheel Identification Stamp Location

The flywheel can be identified by the stamp mark in location A. Refer to "I.D." location in chart below. Do not use the cast mark to determine flywheel application.

Engine Application	Type	Cast	Stamp	Comment	I.D. Stamp
ES32PFE	N/A	N/A	N/A	210W	N/A

330 - DC/CDI IGNITION

The Trail Boss 330 has incorporated into its design a DC/CDI ignition system.

Some of the advantages of DC ignition are:

- ↳ Stronger, more consistent spark at low rpm for better performance
- ↳ Easier starts
- ↳ Simpler component design for ease of trouble shooting and maintenance

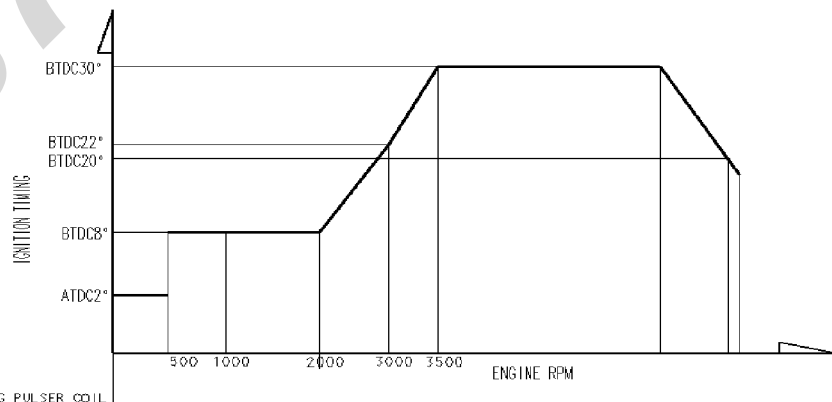
At the CDI, 12 volt DC current charges an internal capacitor to build up the initial ignition charge. A small A/C signal from the Trigger (Pulse) coil closes a thyristor (located in the CDI) at a point pre-determined in the crankshaft rotation by magnets on the flywheel's outer diameter. This signal releases the electrical charge which saturates the coil for ignition. DC/CDI systems have the ability to ignite with as little as 6 volts of power.

Operation Overview:

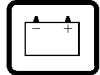
The DC/CDI system relies on battery power for ignition. Instead of generating DC voltage via magnetic induction, a 12 volt DC current is supplied directly to the CDI unit from the battery.

NOTE:

DC/CDI systems and components are not interchangeable with any other system.



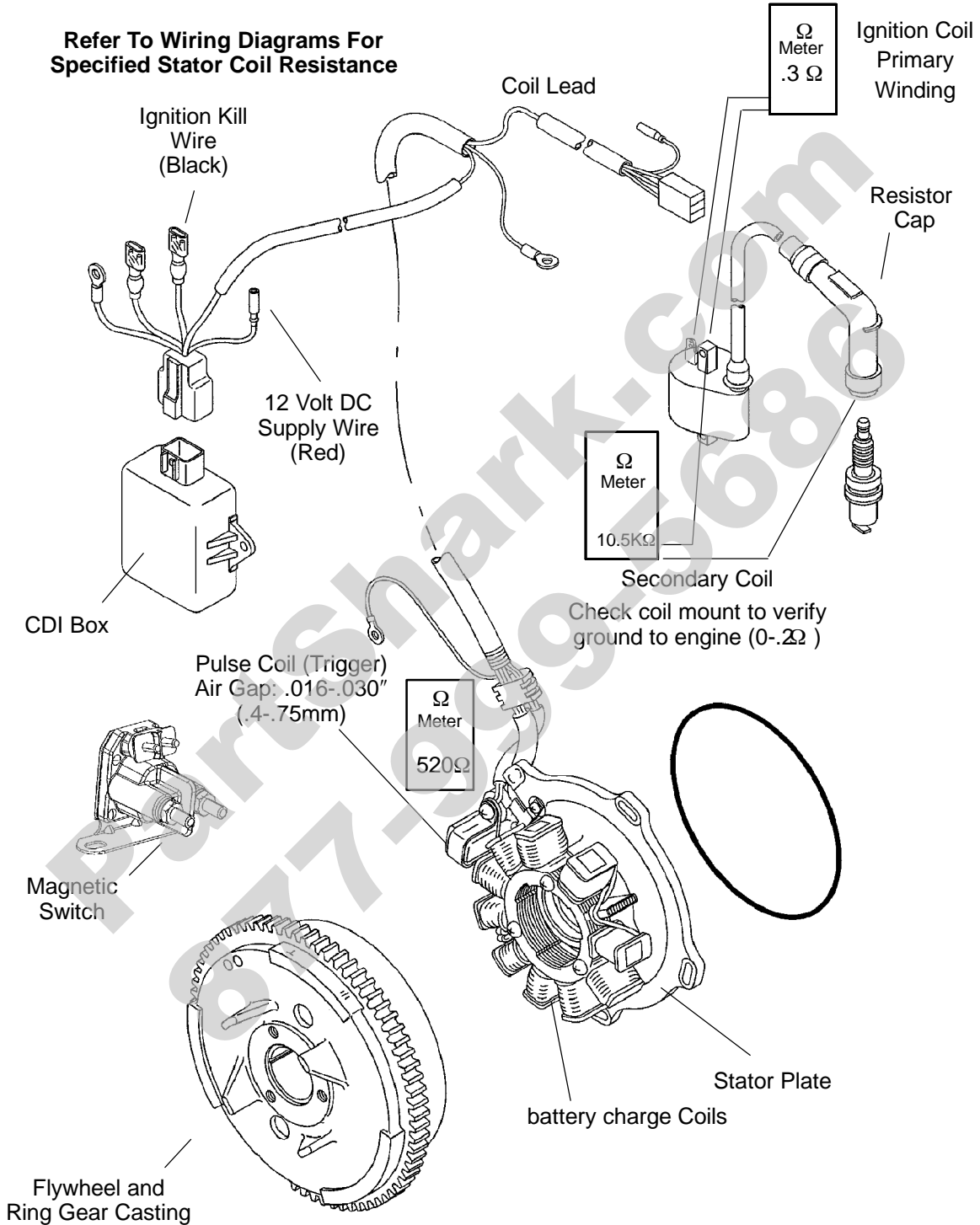
Typical Timing Curve Shown



COMPONENTS OF ES32PF / 210 WATT ALTERNATOR

Note: DC/CDI components are not compatible with any other type of ignition

Refer To Wiring Diagrams For Specified Stator Coil Resistance



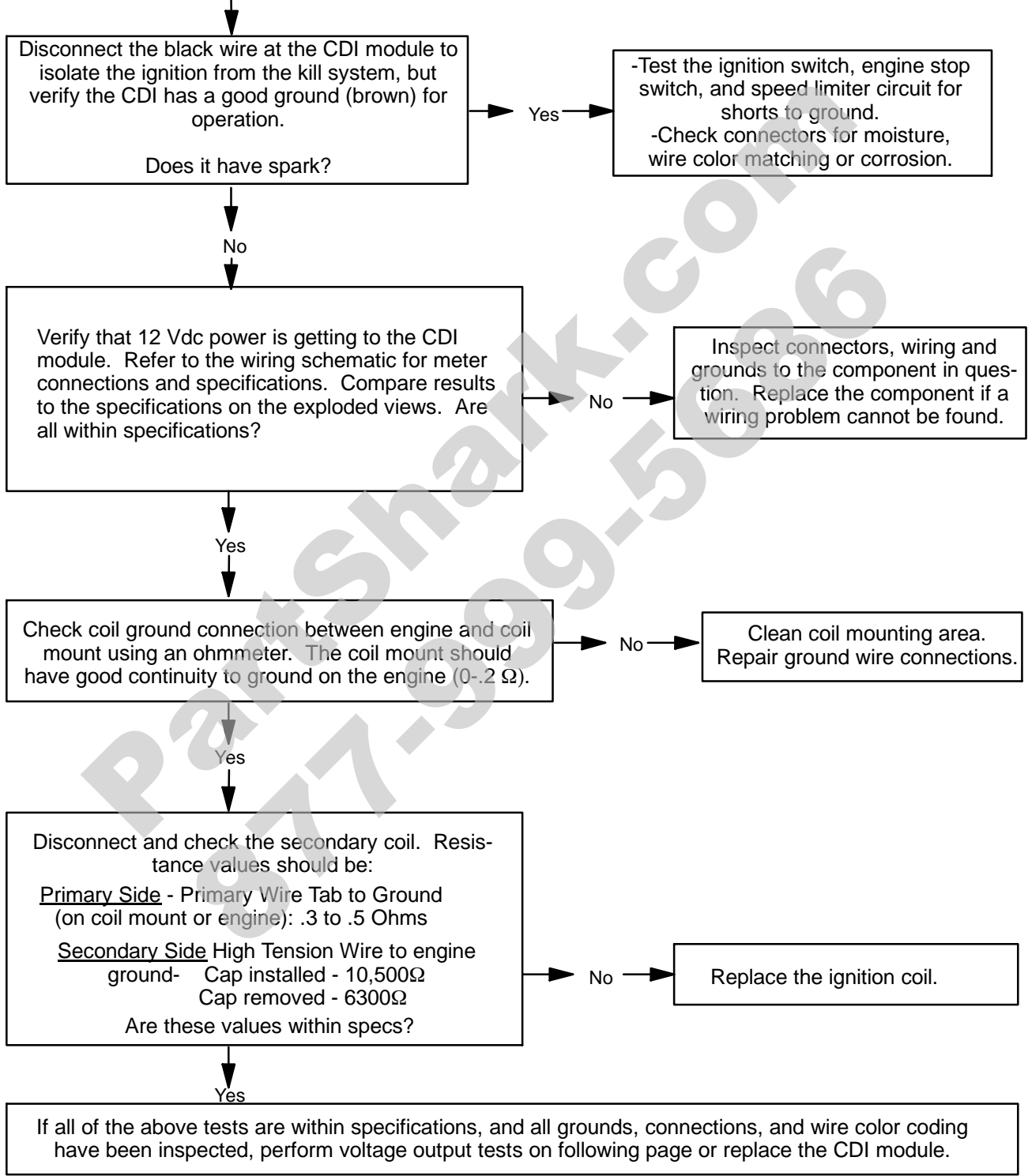


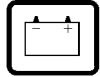
IGNITION SYSTEM TESTING

Whenever troubleshooting an electrical problem you should first check all terminal connections to be sure they are clean and tight. Also be sure that colors match when wires are connected. Use the following pages as a guide for troubleshooting. The resistance values are also given on the specification pages.

Condition: No Spark or intermittent spark

Verify 12 Volt DC power is present on the red wire to CDI. Replace Spark Plug.





IGNITION SYSTEM TROUBLESHOOTING

No Spark, Weak or Intermittent Spark

- GNo 12 volt power or ground to CDI
- GSpark plug gap incorrect
- GFouled spark plug
- GFaulty spark plug cap or poor connection to high tension lead
- GRelated wiring loose, disconnected, shorted, or corroded
- GEngine Stop switch or ignition switch faulty
- GETC switch misadjusted or faulty
- GPoor ignition coil ground (e.g. coil mount loose or corroded)
- GFaulty stator (measure resistance of all ignition related windings)
- GIncorrect wiring (inspect color coding in connectors etc)
- GFaulty ignition coil winding (measure resistance of primary and secondary)
- GWorn magneto (RH) end Crankshaft bearings
- GSheared flywheel key
- GFlywheel loose or damaged
- GExcessive crankshaft runout on magneto (RH) end - should not exceed .005"
- GFaulty CDI module

CDI OUTPUT TEST USING PEAK READING ADAPTOR

Re-connect all CDI wires to stator wires. Disconnect CDI module wire from ignition coil primary terminal. Connect one meter lead to engine ground and the other to the ignition coil primary wire leading from the CDI module. Set meter to read DC Volts. Crank engine and check output of CDI wire to coil. Reconnect CDI wire to coil.

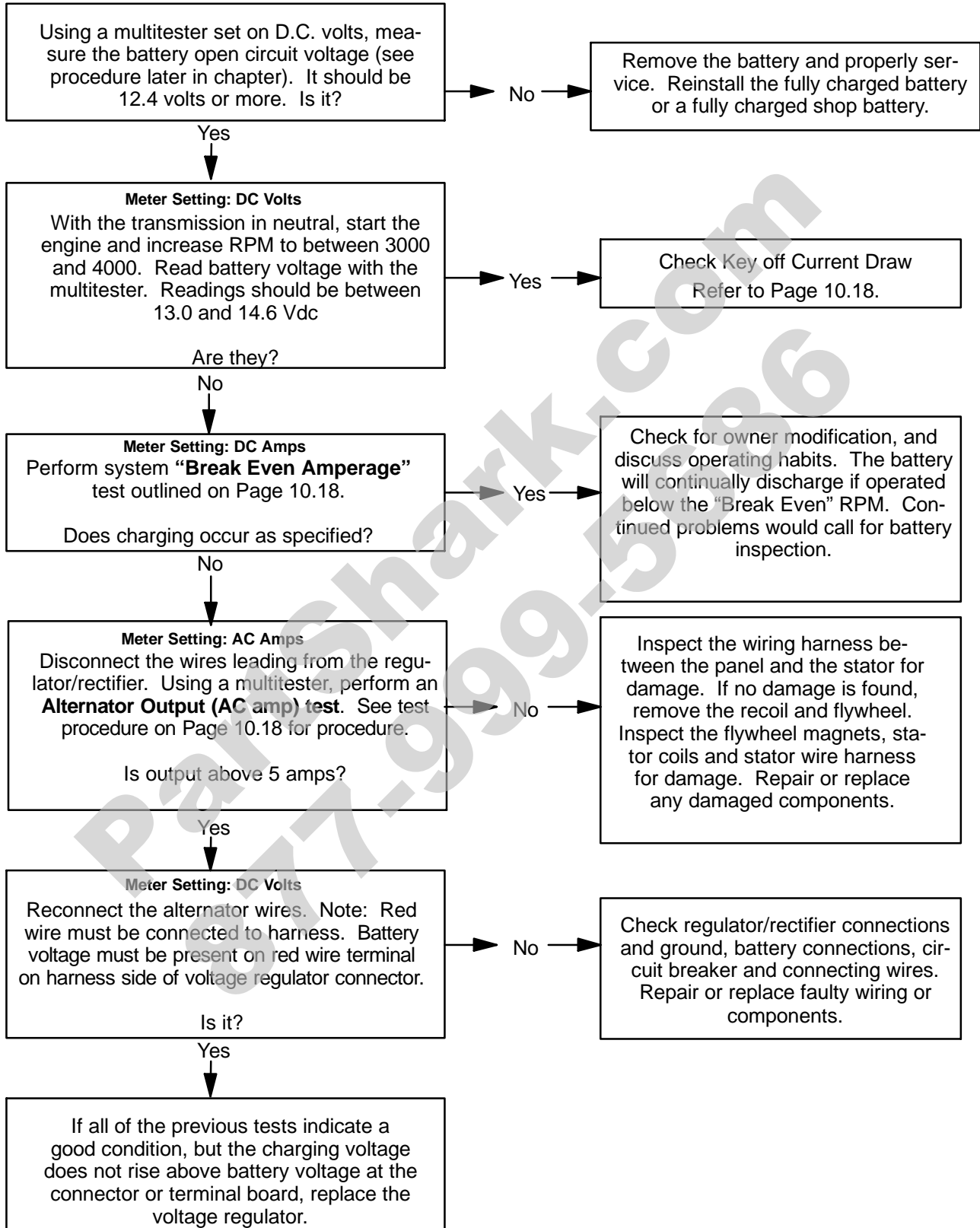
**Output w/ Peak output tester
130 Vdc
Average Output w/ Digital Voltmeter
20 Vdc**

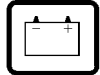




CHARGING SYSTEM TESTING

Whenever charging system problems are suspected, proceed with the following system checks:





CURRENT DRAW - KEY OFF

CAUTION: Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to light bulbs and speed limiter.

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 - Key Off:
Maximum of .02 Adc (20 mA)**

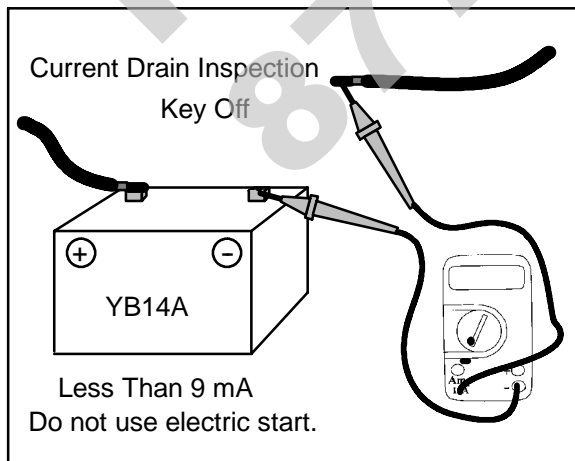
CHARGING SYSTEM “BREAK EVEN” TEST

CAUTION: Do not connect or disconnect the battery cable or ammeter with the engine running.

CAUTION: Never use the electric starter with the ammeter connected, as damage to the meter or meter fuse may result. Do not run test for extended period of time. Do not run test with high amperage accessories.

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.

Connect an ammeter (set to DC amps) in series between the negative battery cable and terminal.



Connect a tachometer according to manufacturer’s instructions.

With engine off and the key and kill switch in the ON position, the ammeter should read negative amps (battery discharge). Reverse meter leads if a positive reading is indicated.

Shift transmission into neutral. **Start engine with recoil only.**

Increase engine RPM while observing ammeter and tachometer.

Note RPM at which the battery starts to charge (ammeter indication is positive).

With lights and other electrical load off, this should occur at approximately 1500 RPM or lower.

Turn the lights on and lock parking brake to keep brake light on.

Repeat test, observing ammeter and tachometer. With lights on, charging should occur at or below 2000 RPM.

ALTERNATOR OUTPUT TEST (AC AMP)

This test measures AC amperage from the alternator.

CAUTION: This test simulates a “full load” on the alternator. Do not perform this test longer than required to obtain a reading or the alternator stator windings may overheat. Do not exceed idle rpm during this test.

To Calculate Available Alternator Output

$$I = \frac{P}{E} = \frac{150W}{12V} = 12.5 \text{ Amps}$$

I = Current in Amps

P = Power in Watts

E = Electromotive Force (Volts)

**Alternator Current Output:
Minimum of 7 AC Amps**

Maximum alternator output will be indicated on the meter. It is *not* necessary to increase engine RPM above idle.

Place the red lead on the tester in the 10A jack.

Turn the selector dial to the AC amps (A μ) position.

Connect the meter leads to the wires leading from the alternator (see schematic for proper wiring colors).

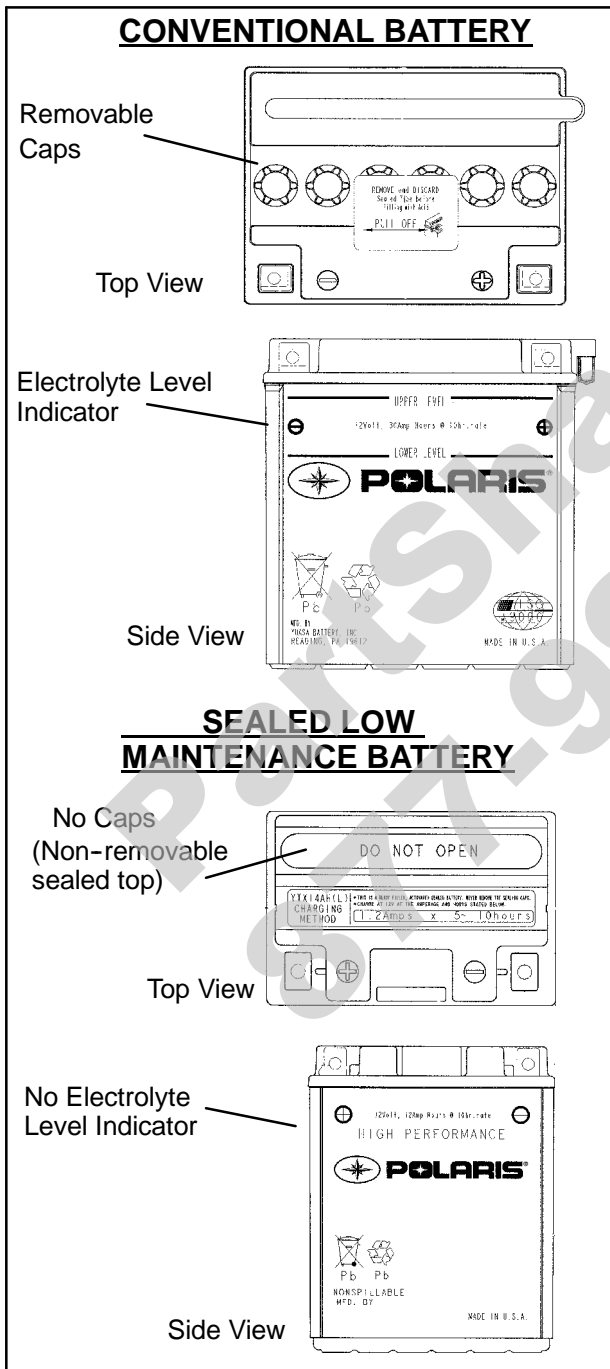
Start the engine and let it idle. Reading should be a minimum of 7A at idle.



BATTERY IDENTIFICATION

NOTICE: 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.

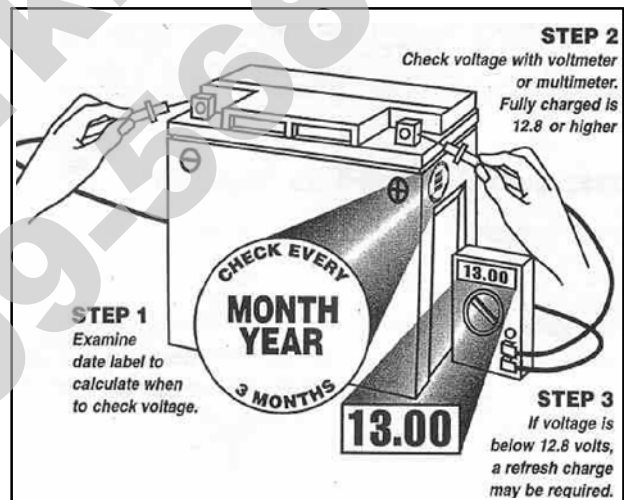


SEALED LOW MAINTENANCE BATTERY

NOTE: All Low Maintenance batteries are fully charged and tested at the factory before installation. Expected shelf life varies upon storage conditions. As a general rule before placing the battery into service, check the battery condition and charge accordingly.

Battery Check:

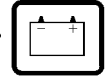
1. Check the date label on the side of the battery to calculate when to check voltage. The battery should be checked every 3 months.
2. Check the voltage with a voltmeter or multimeter. **A fully charged battery should be 12.8 V or higher.**
3. If the voltage is below 12.8 V, the battery will need to 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.

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.

How 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.

SEALED 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.

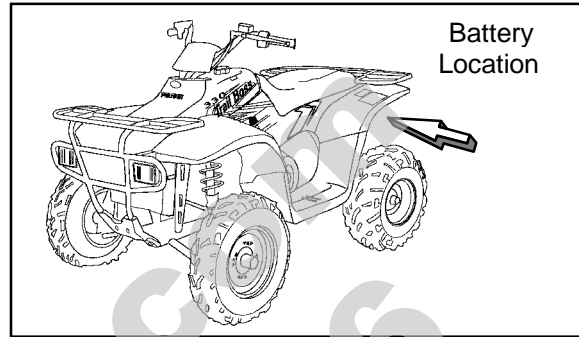
WARNING: An overheated battery could explode, causing severe injury or death. Always watch charging times carefully. Stop charging if the battery becomes very warm to the touch. Allow it to cool before resuming charging.

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

SEALED LOW MAINTENANCE BATTERY INSPECTION/REMOVAL

The battery is located under the seat and right rear fender.



1. Disconnect holder strap and remove cover.
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.

SEALED LOW MAINTENANCE 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.



- Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Nyogel[®] Grease (PN 2871329).
- Reinstall the holder strap.

SEALED LOW MAINTENANCE 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.

SEALED LOW MAINTENANCE BATTERY - OCV - OPEN CIRCUIT VOLTAGE TEST

Battery voltage should be checked with a digital multimeter. 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.

OPEN CIRCUIT VOLTAGE		
State of charge	Maintenance Free	Conventional Lead / Acid
100%	13.0V	12.70V
75% Charged	12.80V	12.50V
50% Charged	12.50V	12.20V
25% Charged	12.20V	12.0V
0% Charged	less than 12.0V	less than 11.9V

* At 80_F

NOTE: Subtract .01 from the specific gravity reading at 40_ F.

SEALED 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. 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 multimeter 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.

SEALED LOW MAINTENANCE BATTERY OFF-SEASON STORAGE

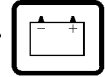
To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

GRemove 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.

GUsing a wire brush or knife, remove any corrosion from the cables and terminals.

GCharge at a rate no greater than 1/10 of the battery's amp/hr capacity until the voltage reaches 13.0 Vdc or greater.

GStore 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 up to 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.

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

SEALED 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 voltage to 12.8 Vdc or greater.
3. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with a corrosion resistant Nyogelt 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. After connecting the battery cables, install the cover on the battery and attach the hold down strap.

CONVENTIONAL BATTERY ACTIVATION/ SVC

To ensure maximum service life and performance from a battery, perform the following steps.

NOTE: This section contains information for both

Conventional Lead-Acid batteries and Sealed Low Maintenance batteries. Before service, identify the battery type in the vehicle. Use the section that applies to the battery.

▲ 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.

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).



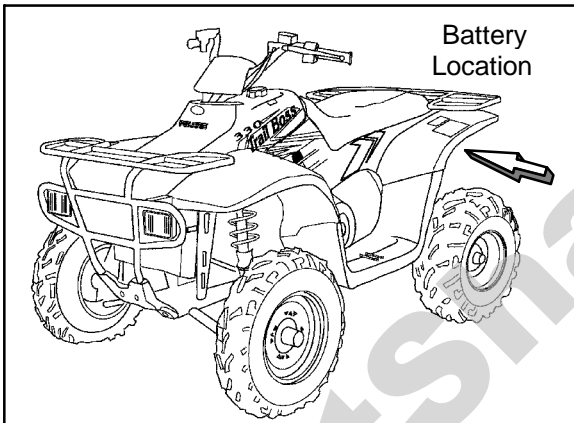
6. Check specific gravity of each cell with a hydrometer to assure each has a reading of 1.270 or higher.

BATTERY TERMINALS/TERMINAL BOLTS

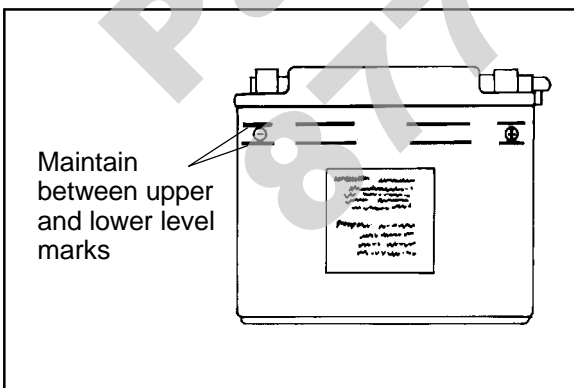
Use Polaris corrosion resistant Nyogelt[®] grease (PN 2871329) on battery bolts. See Battery Installation.

CONVENTIONAL BATTERY INSPECTION/REMOVAL

The battery is located under the seat and the right rear fender.



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.

Refill using only distilled water. Tap water contains minerals which are harmful to a battery.

Do not allow cleaning solution or tap water inside the battery. Battery life may be reduced.

5. Reinstall the battery caps.

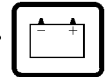
CONVENTIONAL BATTERY INSTALLATION

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 Nyogelt[®] 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 electrolyte. Avoid skin contact with electrolyte, as severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.
5. Reinstall the holder strap.

CONVENTIONAL 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 multimeter. Readings of 12.6 volts or less require further battery testing and charging. See charts and Load Test on 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.

OPEN CIRCUIT VOLTAGE	
State of charge	Conventional Lead-acid
100% Charged	12.60V
75% Charged	12.40V
50% Charged	12.10V
25% Charged	11.90V
0% Charged	less than 11.80V

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 multi-cell 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.

SPECIFIC GRAVITY	
State of charge*	Conventional lead-acid
100% Charged	1.265
75% Charged	1.210
50% Charged	1.160
25% Charged	1.120
0% Charged	less than 1.100

* At 80_F

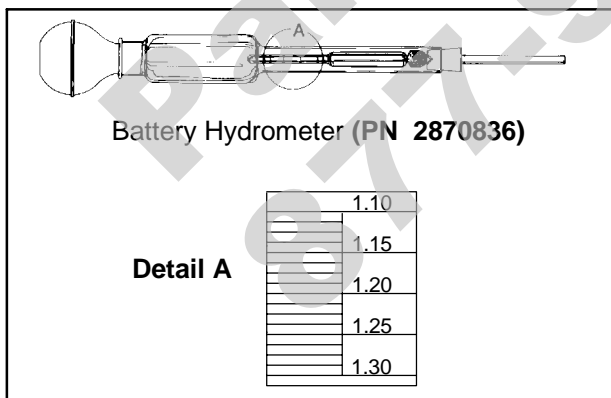
NOTE: Subtract .01 from the specific gravity reading at 40_ F.

CONVENTIONAL 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 multimeter 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.



Continued on next page



CONVENTIONAL BATTERY OFF SEASON STORAGE

To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

- GRemove 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.
- GUsing a wire brush or knife, remove any corrosion from the cables and terminals.
- GMake sure that the electrolyte is at the proper level. Add distilled water if necessary.
- GCharge 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.
- GStore 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.

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

CONVENTIONAL 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.

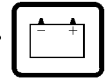
**Dielectric Grease
(PN 2871329)**

4. Connect battery cables.

WARNING!

To avoid the possibility of sparks and/or explosion, connect positive (red) cable first and negative (black) cable last.

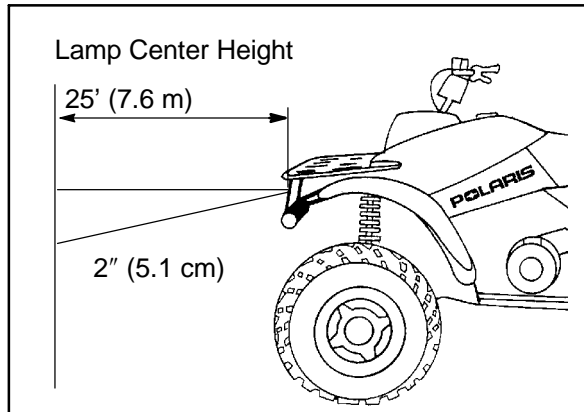
5. After connecting the battery cables, install the cover on the battery and attach the hold down strap.
6. Install clear battery vent tube from vehicle to battery vent. **WARNING:** Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and 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.
8. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Dielectric Grease (PN 2871329).
9. (Conventional Lead/Acid Batteries Only) 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 battery electrolyte, severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.
10. Route cables so they are tucked away in front and behind battery.
11. Reinstall battery cover and holder strap.



HEADLIGHT ADJUSTMENT

The headlight beam can be adjusted up and down and side to side.

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. Shift transmission to neutral, 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. For machines with separate low beam lights, the drop should be 8" (20.3 cm) in 25'.
5. Adjust beam to desired position by moving headlight.

HEADLIGHT LAMP REPLACEMENT

NOTE: Allow lamp to cool before proceeding. Do not touch a halogen lamp with bare fingers. Oil from your skin leaves a residue, causing a hot spot which will shorten the life of the lamp. Hold the bulb by the base only.

Headlight Assembly Removal

1. Carefully unsnap the electrical harness from the back of the headlight assembly and remove the harness.
2. Remove the screws and nuts from the sides of the headlight assembly.
3. Remove the headlight assembly.

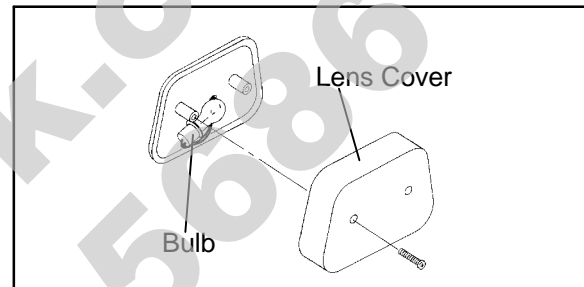
Headlamp Replacement

1. With the headlight assembly in place, unsnap the electrical harness from the back the headlight assembly.
2. Turn and pull out the connector on the back of the headlight assembly. Gently pull the bulb out and replace with the new bulb. Snap the harness back into place.

TAILLIGHT/BRAKELIGHT LAMP REPLACEMENT

If the taillight/brakelight does not work the lamp may need to be replaced.

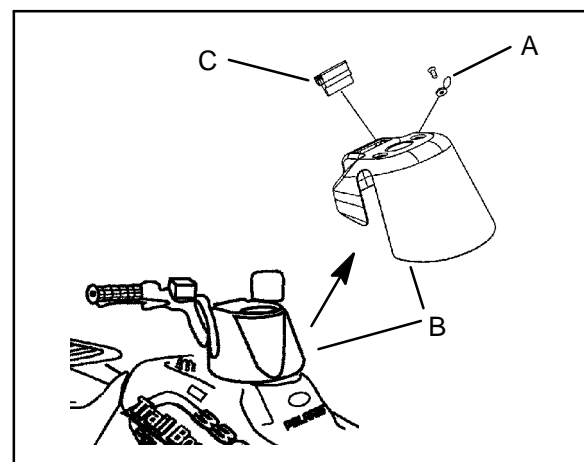
1. From the rear of the taillight remove two screws holding lens cover in place and remove lens cover.



2. Remove lamp and replace it with recommended lamp. Apply Dielectric Grease (PN 2871329).
3. Reinstall the lens cover removed in Step 1.
4. Test the taillight/brakelight to see that it's working.

POD ASSEMBLY REMOVAL / INDICATOR LAMP REPLACEMENT

1. Remove the two screw covers (A) and screws from the pod assembly (B).

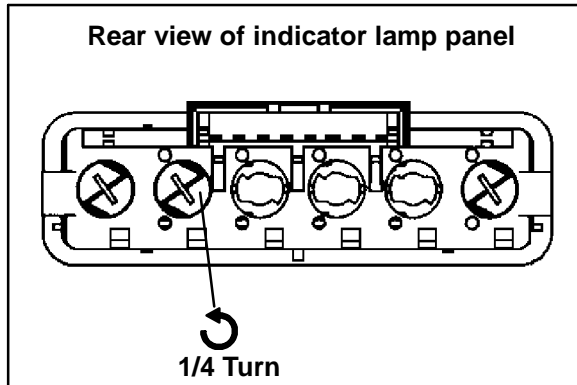




2. Disconnect indicator light panel from harness, by lifting the retaining latch from the wire connector.

NOTE: The indicator panel (C) does not have to be removed from the pod to replace an indicator light.

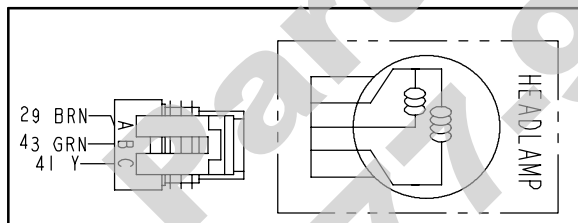
3. To remove defective light: Use a small screwdriver and turn light holder a quarter turn, pull light holder out with a needle nose pliers or equivalent. Replace with new holder and bulb assembly and reassemble pod.



4. Reverse the above steps for installation.

HEADLAMP SWITCH

Follow procedure, Headlight Lamp Replacement, on Page 10.26 to access connector. Probe the headlamp plug wires (Brown, Green, Yellow) at back of connector. Turn headlight on. Test for battery voltage across the connections.



Check continuity across pins of the left handle bar switch assembly. See illustration below.

Continuity

	R/W	Grn
Off		
On	F	F

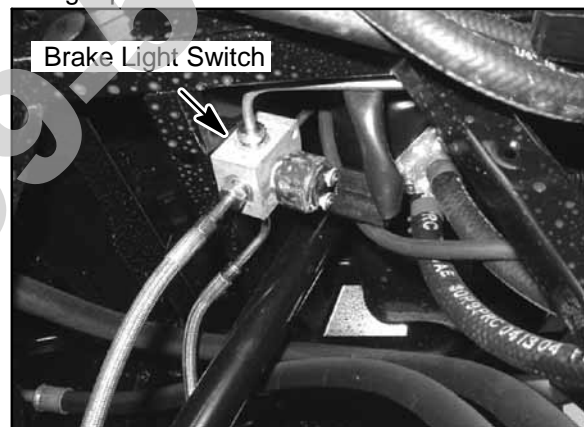
NEUTRAL LIGHT CIRCUIT OPERATION

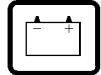
Power is supplied to the transmission switch from the Red/White wire when the key and engine stop switch are on. When neutral is selected, power flows through the switch to the Green/White wire, through the lamp and to ground via the Brown wire.

If the light is not on when neutral is selected, check the bulb. If the bulb is good, check the wiring, transmission switches, and lamp socket ground path.

BRAKE LIGHT SWITCH

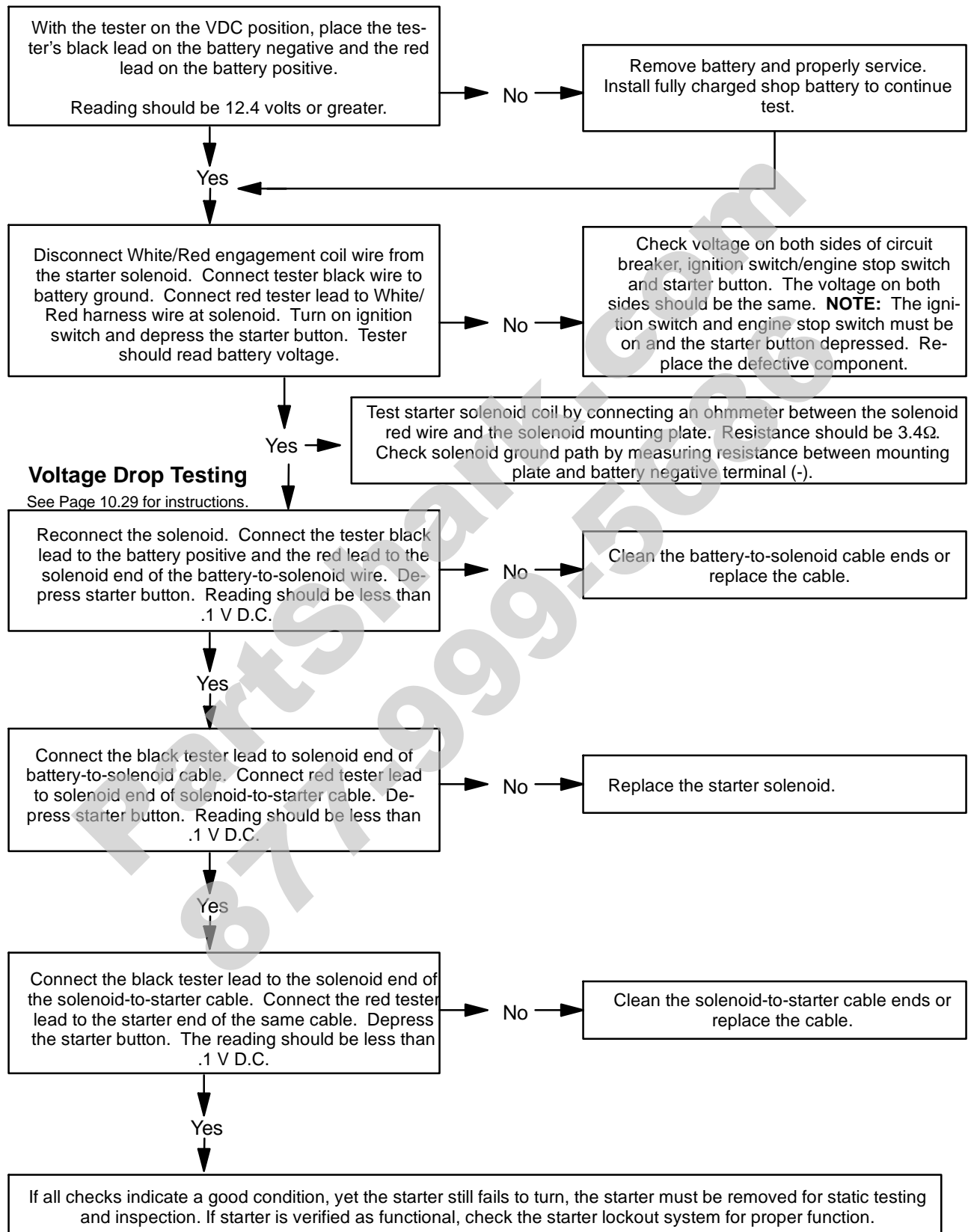
1. Remove front cover, if necessary. Look under front fender area for switch location.
2. Disconnect wire harness from switch.
3. Connect an ohmmeter across switch contacts. Reading should be infinite (∞).
4. Apply brake at handlebar lever and check for continuity between switch contacts. Replace switch if there is no continuity or greater than .5 ohms resistance when the brake is applied with slight pressure.





STARTER SYSTEM TESTING

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 multimeter must be used for this test.





STARTER SYSTEM TROUBLESHOOTING

Starter Motor Does Not Turn

- G Battery discharged - low specific gravity
- G Loose or faulty battery cables or corroded connections (see Voltage Drop Tests)
- G Related wiring loose, disconnected, or corroded
- G Poor ground connections at battery cable, starter motor or starter solenoid (see Voltage Drop Tests)
- G Faulty starter button
- G Faulty ignition switch (Do other systems function?)
- G Faulty starter solenoid or starter motor.
- G Engine problem - seized or binding (Can engine be rotated easily with recoil starter?)

Starter Motor Turns Over Slowly

- G Battery discharged - low specific gravity
- G Excessive circuit resistance - poor connections (see Voltage Drop Test below)
- G Engine problem - seized or binding (Can engine be rotated easily with recoil starter?)
- G Faulty or worn brushes in starter motor
- G Automatic compression release inoperative

Starter Motor Turns - Engine Does Not Rotate

- G Faulty starter drive
- G Faulty starter drive gears or starter motor gear
- G 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 next page to perform voltage drop tests on the starter system.

**Voltage should not exceed:
1 DC volts per connection**

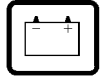
STARTER LOCKOUT TROUBLESHOOTING

The starter lockout is controlled by the PDM. Pin 'G' 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 'B' of the PDM senses when the brake is applied. 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:

- G Transmission switch for proper function
- G Starter solenoid for proper function
- G Brake switch for proper function
- G Wire harness, loose connections/pins (including the PDM) leading to and from these components
- G Proper ground to frame

Should all these items be found in working order, the PDM may be at fault.



STARTER MOTOR DISASSEMBLY

NOTE: Use electrical contact cleaner to clean starter motor parts. Some solvents may leave a residue or damage internal parts and insulation.



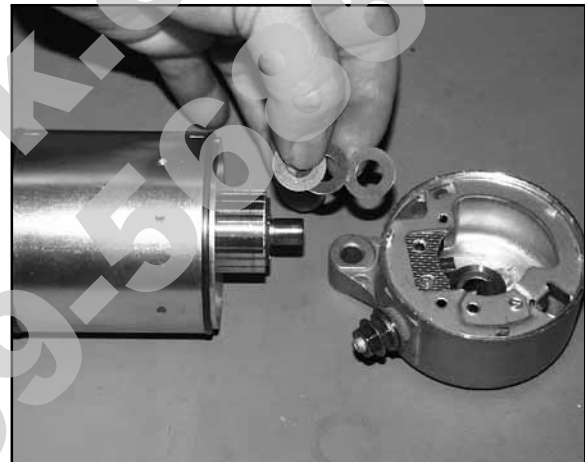
1. Note the alignment marks on both ends of the starter motor casing. These marks must align during reassembly.



2. Remove the two bolts, washers, and sealing O-Rings. Inspect O-Rings and replace if damaged.



3. Remove brush terminal end of housing while holding other two sections together.

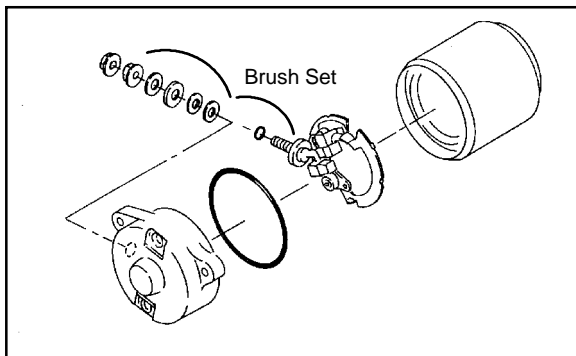


4. Remove shims from armature shaft. **NOTE:** All shims must be replaced during reassembly.

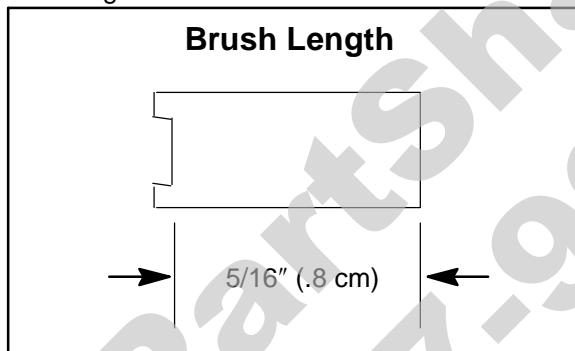




BRUSH INSPECTION/REPLACEMENT



1. Using a digital multimeter, measure the resistance between the cable terminal and the insulated brush. 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.



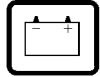
**Brush Length Service Limit:
5/16" (1.3 cm)**

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.

4. Inspect surface of commutator for wear or discoloration. See Steps 3-6 of armature testing on Page 10.32.
5. 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.
6. Place a wrap of electrical tape on the threads of the terminal bolt to prevent O-Ring damage during reinstallation.
7. Install the O-Ring over the bolt. Make sure the O-ring is fully seated.

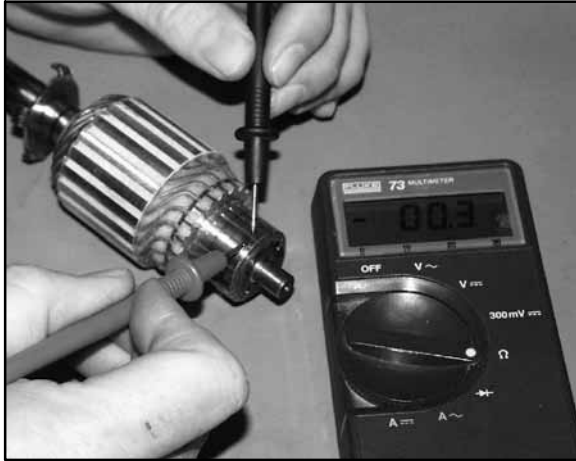


8. Remove the electrical tape and reinstall the two small phenolic washers, the large phenolic washer, flat washer, and nut.



ARMATURE TESTING

1. Remove armature from starter casing. Note order of shims on drive end for reassembly.
2. Inspect surface of commutator. Replace if excessively worn or damaged.



3. Using a digital multimeter, 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.

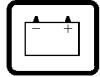
STARTER ASSEMBLY



1. 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. Inspect permanent magnets in starter housing. Make sure they are not cracked or separated from housing.

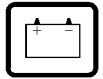
CAUTION: Use care when handling starter housing. Do not drop or strike the housing as magnet damage is possible. If magnets are damaged, starter must be replaced.





NOTES

Lined area for notes, containing a large diagonal watermark: PartShark.com 877-999-5686



WIRING DIAGRAM 2009 TRAIL BOSS

2009 TRAIL BOSS
ATV 09 - TRAIL BOSS

PAGE 1 OF 2
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACKING IN DIAGRAM

WIRE COLOR LEGEND

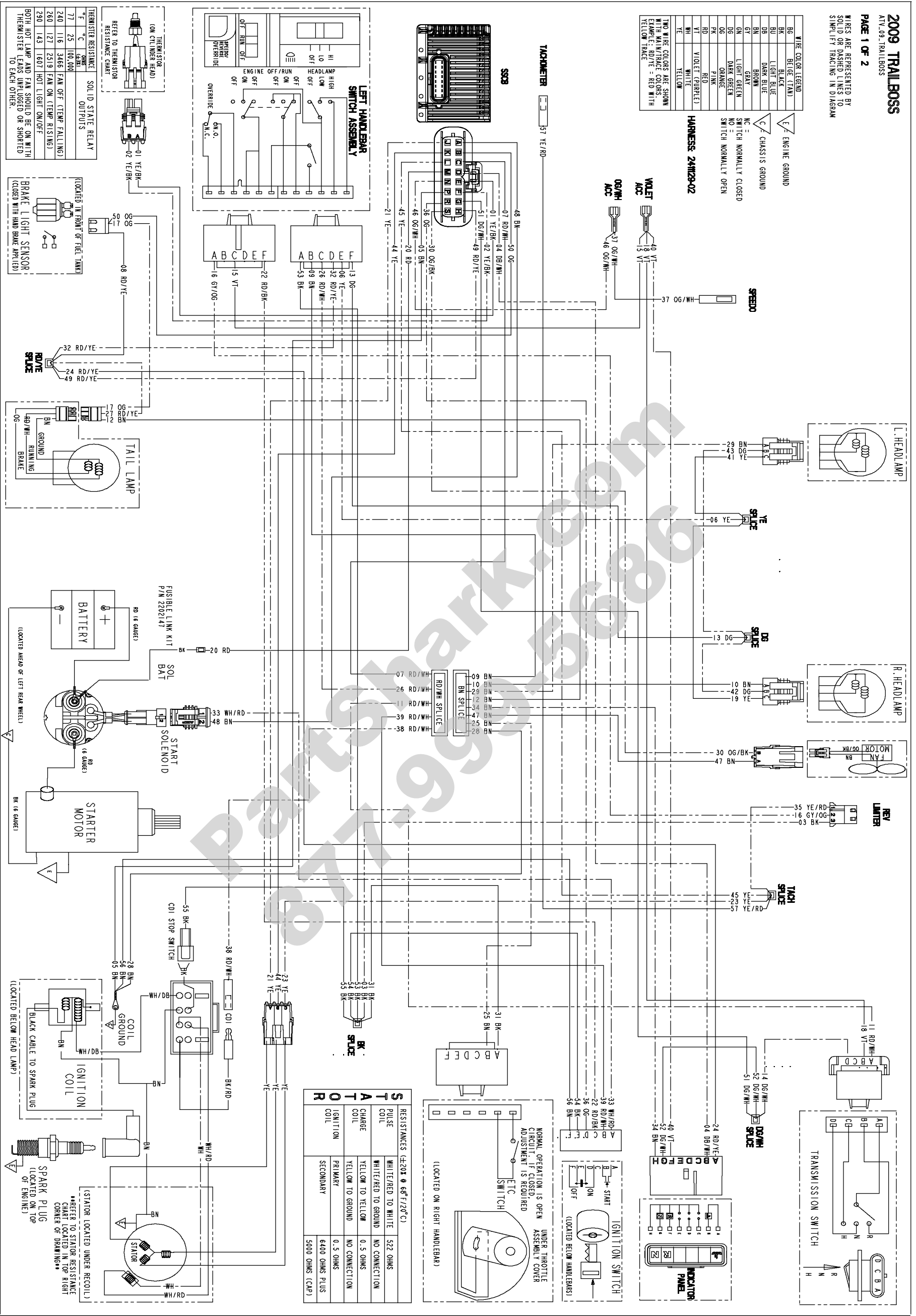
BG	BEIGE (TAN)
BK	BLACK
BL	LIGHT BLUE
DB	DARK BLUE
BN	BROWN
GT	GREEN
GN	LIGHT GREEN
OG	DARK GREEN
OS	ORANGE
PK	PINK
RD	RED
VT	VIOLET (PURPLE)
WH	WHITE
YE	YELLOW

ENGINE GROUND
CHASSIS GROUND

NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN

HARNESSES 24M/29-02

TWO WIRE COLORS ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: RD/YE = RED WITH YELLOW TRACE



STARTER

RESISTANCES (±20% @ 68°F/20°C)	
PULSE COIL	522 OHMS
WHITE/RED TO WHITE	NO CONNECTION
WHITE/RED TO GROUND	NO CONNECTION
CHARGE COIL	0.5 OHMS
YELLOW TO YELLOW	NO CONNECTION
YELLOW TO GROUND	NO CONNECTION
PRIMARY COIL	0.5 OHMS
SECONDARY COIL	6400 OHMS PLUS 5000 OHMS (CAP)

THEMISTERS RESISTANCE CHART

Temp (°F)	Temp (°C)	Resistance (OHMS)
77	25	1100/100
240	116	3466
260	127	2519
290	143	1607

SOLID STATE RELAY

REFER TO THEMISTERS RESISTANCE CHART

BOTH HOT LAMP AND FAN SHOULD BE ON WITH THEMISTERS LEADS UNPLUGGED OR SHORTED TO EACH OTHER.

FUSIBLE LINK KIT P/N 2202147

BATTERY

STARTER SOLENOID

STARTER MOTOR

IGNITION COIL

SPARK PLUG

SPARK PLUG (LOCATED ON TOP OF ENGINE)

IGNITION SWITCH

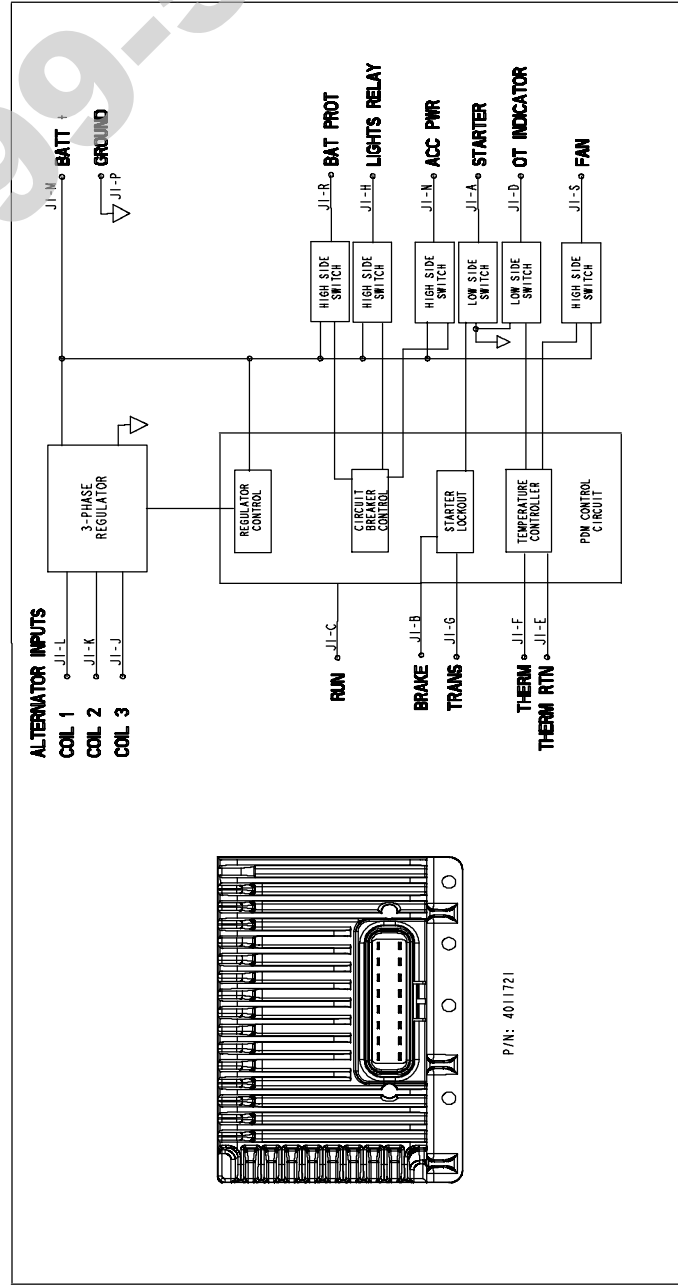
THROTTLE POSITION ADJUSTMENT IS REQUIRED



WIRING DIAGRAM 2009 TRAIL BOSS

WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	YELLOW/BLACK	20	SSCB	E	THERMISTOR	A
02	YELLOW/BLACK	20	SSCB	F	THERMISTOR	B
03	BLACK	18	BLACK SPLICE	-	REV LIMITER	3
04	DK BLUE/WHITE	18	INDICATOR LIGHTS	B	SSCB	D
05	BROWN	16	COIL GROUND	.197R	SSCB	P
06	YELLOW	18	LH HANDLEBAR	E	YELLOW SPLICE	-
07	RED/WHITE	18	SSCB	C	RED/WHITE SPLICE	-
08	RED/YELLOW	18	BRAKE LIGHT SENSOR	-	RED/YELLOW SPLICE	-
09	BROWN	18	LH HANDLEBAR	B	BROWN SPLICE	-
10	BROWN	18	RH HEADLIGHT	A	BROWN SPLICE	-
11	RED/WHITE	18	TRANSMISSION SWITCH	A	RED/WHITE SPLICE	-
12	BROWN	18	TAILLIGHT	.180M	BROWN SPLICE	-
13	DK GREEN	18	LH HANDLEBAR	F	DK GREEN/WHITE SPLICE	-
14	DK GREEN/WHITE	18	TRANSMISSION SWITCH	D	DK GREEN/WHITE SPLICE	-
15	VIOLET	18	LH HANDLEBAR	C	VIOLET ACCESSORIES	.250F
16	GRAY/ORANGE	18	REV LIMITER	2	LH HANDLEBAR	A
17	ORANGE	18	TAILLIGHT	.180F	BRAKE LIGHT SENSOR	-
18	VIOLET	18	TRANSMISSION SWITCH	B	VIOLET ACCESSORIES	.250F
19	YELLOW	18	RH HEADLIGHT	C	YELLOW SPLICE	-
20	RED	14	FUSIBLE LINK (SPLICE)	-	SSCB	M
21	YELLOW	16	STATOR	A	SSCB	J
22	RED/BLACK	18	LH HANDLEBAR	F	IGNITION SWITCH	C
23	YELLOW	18	STATOR	C	TACH SPLICE	-
24	RED/YELLOW	18	INDICATOR LIGHTS	A	RED/YELLOW SPLICE	-
25	BROWN	18	ETC AND AWD SWITCH	B	BROWN SPLICE	-
26	RED/WHITE	16	LH HANDLEBAR	C	RED/WHITE SPLICE	-
27	RED/YELLOW	18	TAILLIGHT	.180F	RED/YELLOW SPLICE	-
28	BROWN	16	COIL GROUND	.197R	BROWN SPLICE	-
29	BROWN	18	LH HEADLIGHT	A	BROWN SPLICE	-
30	ORANGE/BLACK	18	FAN MOTOR	B	SSCB	S
31	BLACK	20	BLACK SPLICE	-	ETC AND AWD SWITCH	A
32	RED/YELLOW	16	LH HANDLEBAR	D	RED/YELLOW SPLICE	-
33	WHITE/RED	18	IGNITION SWITCH	A	STARTER SOLENOID	I
34	BROWN	18	INDICATOR LIGHTS	H	BROWN SPLICE	-
35	YELLOW/RED	18	TACH SPLICE	-	REV LIMITER	I
36	ORANGE	16	IGNITION SWITCH	D	SSCB	R
37	ORANGE/WHITE	18	ORANGE/WHITE ACCESSORIES	.250F	SPEEDO	.156F
38	RED/WHITE	18	CDI	.180F	RED/WHITE SPLICE	-
39	RED/WHITE	18	IGNITION SWITCH	B	RED/WHITE SPLICE	-
40	VIOLET	18	INDICATOR LIGHTS	F	VIOLET ACCESSORIES	.250F
41	YELLOW	18	LH HEADLIGHT	C	YELLOW SPLICE	-
42	DK GREEN	18	RH HEADLIGHT	B	DK GREEN SPLICE	-
43	DK GREEN	18	LH HEADLIGHT	B	DK GREEN SPLICE	-
44	YELLOW	16	STATOR	B	SSCB	K
45	YELLOW	16	TACH SPLICE	-	SSCB	L
46	ORANGE/WHITE	18	SSCB	N	ORANGE/WHITE ACCESSORIES	.250F
47	BROWN	18	FAN MOTOR	A	BROWN SPLICE	-
48	BROWN	18	STARTER SOLENOID	2	SSCB	A
49	RED/YELLOW	16	SSCB	H	RED/YELLOW SPLICE	-
50	ORANGE	18	SSCB	B	BRAKE LIGHT SENSOR	-
51	DK GREEN/WHITE	20	SSCB	G	DK GREEN/WHITE SPLICE	-
52	DK GREEN/WHITE	18	INDICATOR LIGHTS	G	DK GREEN/WHITE SPLICE	-
53	BLACK	18	LH HANDLEBAR	A	BLACK SPLICE	-
54	BLACK	18	IGNITION SWITCH	E	BLACK SPLICE	-
55	BLACK	18	CDI STOP WIRE	-	BLACK SPLICE	-
56	BROWN	18	IGNITION SWITCH	F	COIL GROUND	.197R
57	YELLOW/RED	18	TACHOMETER	.180F	TACH SPLICE	-



P/N: 40.1721

2009 TRAILBLAZER 330

ATV-09-TRAILBLAZER

PAGE 1 OF 2

WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM

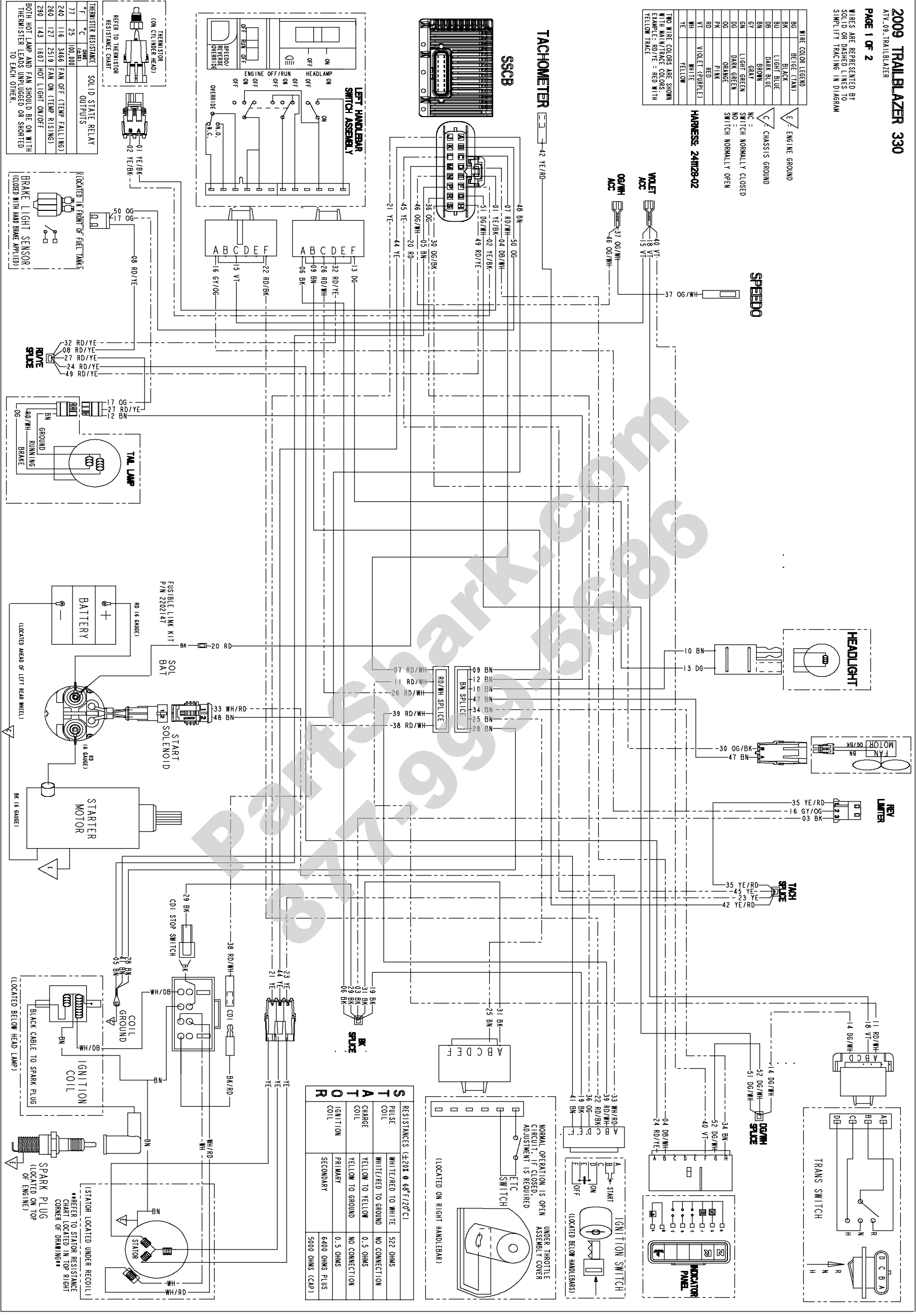
WIRE COLOR LEGEND

BG	BEIGE (TAN)
BL	BLACK
BU	LIGHT BLUE
DB	DARK BLUE
BR	BROWN
GR	GRAY
GN	LIGHT GREEN
DG	DARK GREEN
OR	ORANGE
PK	PINK
RD	RED
VT	VIOLET (PURPLE)
WH	WHITE
YE	YELLOW

ENGINE GROUND (E)
CHASSIS GROUND (C)
NC - SWITCH NORMALLY CLOSED
NO - SWITCH NORMALLY OPEN

HARNESS: 24H28-02

TWO WIRE COLORS ARE SHOWN WITH MAIN TRACE COLORS
 EXAMPLE: RD/YE - RED WITH YELLOW TRACE



STARTER

RESISTANCES (±20% @ 68°F/20°C)	
PULSE COIL	WHITE/RED TO WHITE 522 OHMS
CHARGE COIL	WHITE/RED TO GROUND NO CONNECTION
IGNITION COIL	YELLOW TO YELLOW 0.5 OHMS
	YELLOW TO GROUND NO CONNECTION
PRIMARY	0.5 OHMS
SECONDARY	6400 OHMS PLUS 5000 OHMS (CWP)

TEMPERATURE RESISTANCE SOLID STATE RELAY OUTPUTS

T	°C	OHMS
77	25	100/200
240	116	3466
260	127	2519
280	143	1607

REFER TO TEMPERATURE RESISTANCE CHART

BOTH HOT LAMP AND FAN SHOULD BE ON WITH THEMISTER LEADS UNLUGGED OR SHORTED TO EACH OTHER.

(LOCATED IN FRONT OF FUEL TANK)

(LOCATED WITH HAND BRAKE APPLIED)

(LOCATED AHEAD OF LEFT REAR WHEEL)

(LOCATED BELOW HEAD LAMP)

(STARTER LOCATED UNDER RECOIL)

REFER TO STARTER RESISTANCE CHART LOCATED IN TOP RIGHT CORNER OF DRAWING



WIRING DIAGRAM 2009 TRAIL BLAZER

2009 TRAILBLAZER 330
ATV_09_TRAILBLAZER
PAGE 2 OF 2

WIRE TERMINATION TABLE

REF #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	YELLOW/BLACK	20	SSCB	E	THERMISTOR	A
02	YELLOW/BLACK	20	SSCB	F	THERMISTOR	B
03	BLACK	18	BLACK SPLICE	-	REV LIMITER	3
04	DK BLUE/WHITE	18	INDICATOR LIGHTS	B	SSCB	D
05	BROWN	16	COIL GROUND	.197R	SSCB	P
06	BLACK	18	LH HANDLEBAR	A	BLACK SPLICE	-
07	RED/WHITE	18	SSCB	C	RED/WHITE SPLICE	-
08	RED/YELLOW	18	BRAKE LIGHT SENSOR	-	RED/YELLOW SPLICE	-
09	BROWN	18	LH HANDLEBAR	B	BROWN SPLICE	-
10	BROWN	18	HEADLIGHT	.180M	BROWN SPLICE	-
11	RED/WHITE	18	TRANSMISSION SWITCH	A	RED/WHITE SPLICE	-
12	BROWN	18	TAILLIGHT	.180M	BROWN SPLICE	-
13	DK GREEN	18	LH HANDLEBAR	F	HEADLIGHT	.180F
14	DK GREEN/WHITE	18	TRANSMISSION SWITCH	D	DK GREEN/WHITE SPLICE	-
15	VIOLET	18	LH HANDLEBAR	C	VIOLET ACCESSORIES	.250F
16	GRAY/ORANGE	18	REV LIMITER	2	LH HANDLEBAR	A
17	ORANGE	18	TAILLIGHT	.180F	BRAKE LIGHT SENSOR	-
18	VIOLET	18	TRANSMISSION SWITCH	B	VIOLET ACCESSORIES	.250F
19	BLACK	18	IGNITION SWITCH	E	BLACK SPLICE	-
20	RED	14	FUSIBLE LINK (SPLICE)	-	SSCB	M
21	YELLOW	16	STATOR	A	SSCB	J
22	RED/BLACK	18	LH HANDLEBAR	F	IGNITION SWITCH	C
23	YELLOW	16	STATOR	C	TACH SPLICE	-
24	RED/YELLOW	18	INDICATOR LIGHTS	A	RED/YELLOW SPLICE	-
25	BROWN	18	ETC AND AWD SWITCH	B	BROWN SPLICE	-
26	RED/WHITE	16	LH HANDLEBAR	C	RED/WHITE SPLICE	-
27	RED/YELLOW	18	TAILLIGHT	.180F	RED/YELLOW SPLICE	-
28	BROWN	16	COIL GROUND	.197R	BROWN SPLICE	-
29	BLACK	18	CDI STOP WIRE	-	BLACK SPLICE	-
30	ORANGE/BLACK	18	FAN MOTOR	B	SSCB	S
31	BLACK	20	BLACK SPLICE	-	ETC AND AWD SWITCH	A
32	RED/YELLOW	16	LH HANDLEBAR	D	RED/YELLOW SPLICE	-
33	WHITE/RED	18	IGNITION SWITCH	A	STARTER SOLENOID	I
34	BROWN	18	INDICATOR LIGHTS	H	BROWN SPLICE	-
35	YELLOW/RED	18	TACH SPLICE	-	REV LIMITER	I
36	ORANGE	16	IGNITION SWITCH	D	SSCB	R
37	ORANGE/WHITE	18	ORANGE/WHITE ACCESSORIES	.250F	SPEEDO	.156F
38	RED/WHITE	18	CDI	.180F	RED/WHITE SPLICE	-
39	RED/WHITE	18	IGNITION SWITCH	B	RED/WHITE SPLICE	-
40	VIOLET	18	INDICATOR LIGHTS	F	VIOLET ACCESSORIES	.250F
41	BROWN	18	IGNITION SWITCH	F	COIL GROUND	.197R
42	YELLOW/RED	18	TACHOMETER	.180F	TACH SPLICE	-
43	-	-	-	-	-	-
44	YELLOW	16	STATOR	B	SSCB	K
45	YELLOW	16	TACH SPLICE	-	SSCB	L
46	ORANGE/WHITE	18	SSCB	N	ORANGE/WHITE ACCESSORIES	.250F
47	BROWN	18	FAN MOTOR	A	BROWN SPLICE	-
48	BROWN	18	STARTER SOLENOID	2	SSCB	A
49	RED/YELLOW	16	SSCB	H	RED/YELLOW SPLICE	-
50	ORANGE	18	SSCB	B	BRAKE LIGHT SENSOR	-
51	DK GREEN/WHITE	20	SSCB	G	DK GREEN/WHITE SPLICE	-
52	DK GREEN/WHITE	18	INDICATOR LIGHTS	G	DK GREEN/WHITE SPLICE	-

