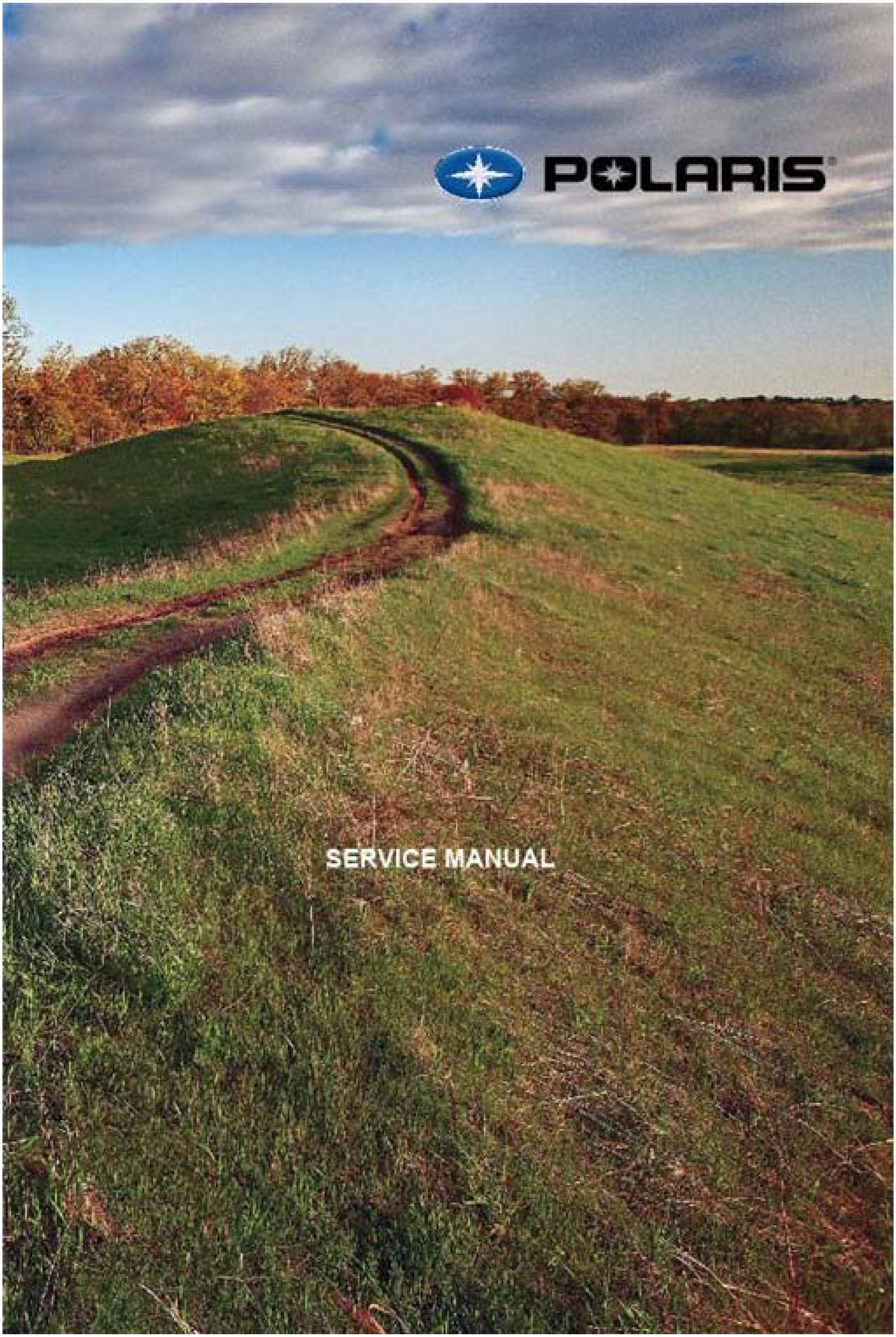

POLARIS
SERVICE MANUAL

CHAPTER 1

GENERAL INFORMATION / SPECIFICATIONS

Engine Serial Number Location

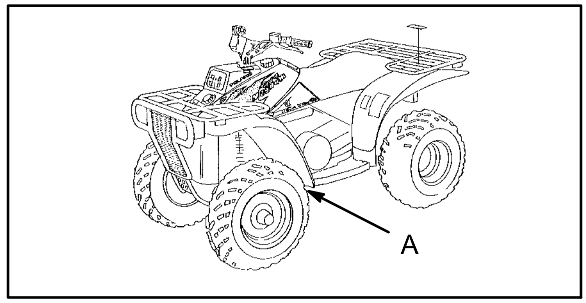
Whenever corresponding about an engine, be sure to refer to the engine model number and serial number. This information can be found on the sticker applied to the manual starter recoil housing. An additional number is stamped in one of the following locations:

- 4 stroke models - center top of crankcase beneath the cylinder coolant elbow
- 2 stroke liquid cooled models - center top of crankcase beneath the carburetor mounting flange
- 2 stroke air cooled models - top of crankcase near right side of cylinder

Machine Model Number and VIN Number Location

The machine Model Number and Vehicle Identification Number (VIN) are important for vehicle identification. The VIN number will be stamped into the frame in one of the following locations:

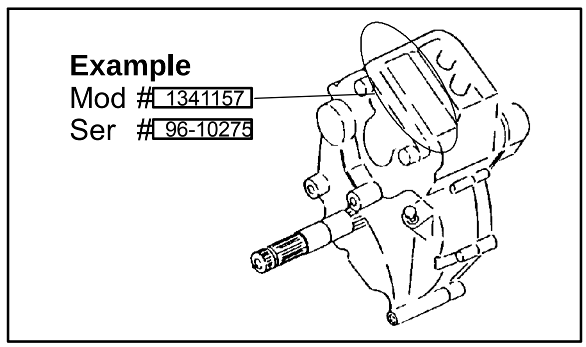
- 1998-Current
  On the left hand lower frame rail (A) near the rear A-arm mount.



VIN Location - 1998-Current

Transmission I.D. Number Location

Transmission model and serial numbers are located on top of the transmission case below the shifting bell-cranks.

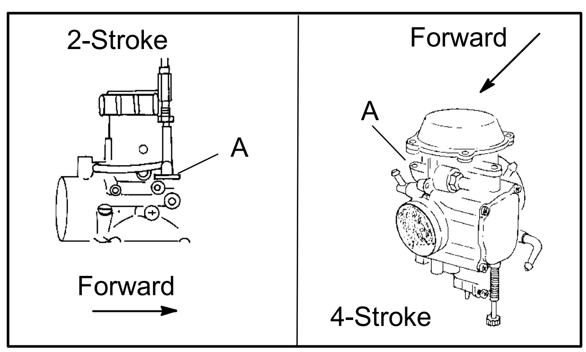


Transmission I.D. Numbers

Carburetor I.D. Number Location

The carburetor I.D. number (A) is in one of the following locations:

- 4 stroke models - right side center of the carburetor body
- 2 stroke models - right side of carburetor body near choke plunger boss

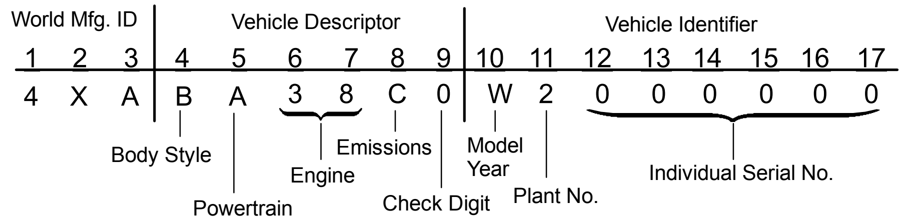


Carburetor I.D. Number

Vehicle Identification Number

Current ATVs and 6X6 Vehicles have a 17 digit Vehicle Identification Number (VIN). The VIN is organized as follows: Digits 1-3: World Manufacturer Identifier. For Polaris ATVs, this is 4XA. Digits 4-9: Vehicle Descriptor Section. Digits 10-17: Vehicle Indicator Section. Digits 4-8 of the VIN identify the body style, drive type, engine type, and emissions equipment. The VIN number and the model number must be used with any correspondence regarding service or repair.

Example of Current VIN Number



Vehicle Identification Number / Model Number Key

Body Style	Powertrain	Engine	Emissions	Options
A=Gen II	A=2x4 chain	25=EC25PF(250cc)	A=Approved by CARB ¡ ©	A=Option 1
B=Gen III	C=4x4 chain	28=EC28PF(300 cc)	B=England	B=Option 2
C=Gen IV	D=4x4 shaft	33=ES33PF(335 cc)	C=Non CARB Approved ¡	
R=*RANGER*	E=6x6 chain	38=EC38PL(400 cc)	D=Norway	
	F=6x6 shaft	42=EH42PL (425 cc)	E=Sweden	
	G=4x4 chain rear/ shaft front	50=EH50PL (500 cc)		

¡ CARB = California Air Resources Board
© CARB Approved or not a regulated type

Year / Letter Identification

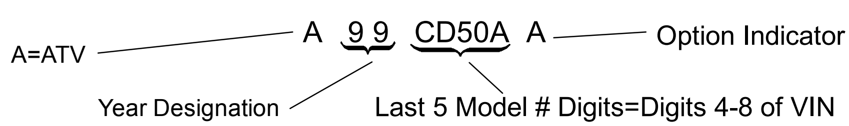
The tenth digit of a 17 digit VIN is the model year of the vehicle. Example: W = 1998; X = 1999 etc. Refer to the listing below.

V 1997
W 1998
X 1999
Y 2000

Current Model Numbers

The model year is also listed in the model number. The last 4 digits in the model number correspond to digits 4 through 8 of the Vehicle Identification Number (VIN). The example below is a 1999 Magnum 500.

Machine Model Number Identification



1999 Publication Part Numbers

DESCRIPTION	PART NUMBER
1995-1999 4 Stroke ATV / 6x6 Service Manual	9915686
1996 ATV Service Manual Volume II	9913680
1998 ATV Service Manual Vol. II Update	9914752
1999 ATV / 6x6 Service Manual Volume III	9915083
Diesel ATV Service Manual	9915234
RANGER Service Manual	9914985

SERVICE TRAINING VIDEOS		
VIDEO TITLE	**PART NUMBER**	**DESCRIPTION**
Magnum 4-Stroke Introduction	9912996	Includes 4 Stroke theory of operation, engine removal, disassembly, and assembly techniques, and general tech-tips.
Ignition System Diagnostics	9913533	Describes all current Polaris ignition systems. Provides working knowledge of ignition system theory and diagnostics.
Charging System Diagnostics	9913278	Describes all current Polaris charging systems. Provides working knowledge of charging system theory and diagnostics.
Polaris Variable Transmissions (PVT)	9913987	Theory, disassembly, assembly and troubleshooting of the Polaris PVT system.
Fuels and Fuel Delivery	9914393	Describes fuel properties including octane and vapor pressure; fuel mixture and burn characteristics; VM and CV carburetor theory and adjustments.

Service Bulletin Index

Always consult latest service information. Bulletins published after 3-15-99 are not listed in the following index.

1999 Model	Bulletin #	Type	Notes
Big Boss 500 6x6	None		
Sportsman 500	None		
Scrambler 500	None		
Magnum 4x4	None		
Magnum 2x4	None		
Xplorer 400	None		
Scrambler 400	None		
Sport 400	None		
Xplorer 300	None		
Xpress 300	None		
Trail Blazer	ATV-99-01	Service Bulletin	Rear Eccentric Bearing Lubrication
Trail Boss	ATV-98-01	Service Bulletin	Foil Missing From Rear Brake Disc Guard
Applies to All 1999 Models	None		

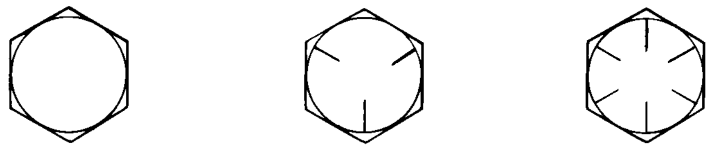
1999 Paint Codes

Model	Item	Color	Material No. (Polaris #)	PPG Ditzler No.
Big Boss 500 6X6	Springs / Front Rack	Eddie B Green	8520150 (P195)	44931
	Rims	Aluminum	(P117)	
Sportsman 500 RSE	Springs / Rims	Black	8520147 (P067)	9440
Sportsman 500 EBS (Opt. A)	Springs / Rims	Black	8520147 (P067)	9440
Sportsman 500 EBS (Opt. B)	Rims	Aluminum	(P117)	
	Spring, Front	Fire Red	8520149 (P093)	72060
	Spring, Rear	Bonnie Blue	8520148 (P157)	12908
Magnum 500	Springs	Black	8520147 (P067)	9440
	Rims	Aluminum	(P117)	
Scrambler 500	Springs	Fire Red	8520149 (P093)	72060
	Rims	Aluminum	(P117)	
Xplorer 400	Springs	Burnished Brown	P218	
	Rims	Aluminum	(P117)	
Scrambler 400	Springs	Fire Red	8520149 (P093)	72060
	Rims	Bright White	8520153 (P133)	2185
Sport 400L	Springs	Fire Red	8520149 (P093)	72060
	Rims	Bright White	8520153 (P133)	2185
Sportsman 335 (Opt. A)	Springs / Rims	Black	8520147 (P067)	9440
Sportsman 335 (Opt. B)	Springs	Black	8520147 (P067)	9440
	Rims	Aluminum	(P117)	
Xplorer 300	Springs	Fire Red	8520149 (P093)	72060
	Rims	Aluminum	(P117)	
Xpress 300	Springs	Bonnie Blue	8520148 (P157)	12908
	Rims	Aluminum	(P117)	
Trail Blazer	Springs	Fire Red	8520149	72060
	Rims	Bright White	8520153 (P133)	2185
Trail Boss	Springs	Fire Red	8520149 (P093)	72060
	Rims	Bright White	8520153 (P133)	2185
	Rack(s)	Fire Red	8520149 (P093)	72060

Order direct from Midwest Industrial Coatings (612-942-1836). Mix as directed.

Frames (Medium Black) P067 / 8520147 / Ditzler 9440

The following torque specifications are to be used as a general guideline when a specific torque is not listed for a fastener. Some fasteners require a special torque procedure and/or the application of a locking agent or locking device during installation. Always refer to the appropriate chapter for specific torque specifications and procedures before using standard torque.



Bolt Size		Threads/In	Grade 2	Grade 5	Grade 8
			Torque in. lbs. (N-m)		
#10	-	24	27 (3.1)	43 (5.0)	60 (6.9)
#10	-	32	31 (3.6)	49 (5.6)	68 (7.8)
			Torque ft. lbs. (N-m)*		
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 in In. lb. / Ft. lb. (N-m)

6 x 1.0	72-78 In. lbs. (8-9)
8 x 1.25	14-18 ft. lbs. (19-25)
10 x 1.25	26-30 ft. lbs. (36-41)

*****To convert Ft. lbs. to N-m multiply foot pounds by 1.383.
*****To convert N-m to Kg-m move the decimal point to the left one position.

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	

Unit of Measure	Multiplied by	Converts to
ft. lbs.	x 12	= in. lbs.
in. lbs.	x .0833	= ft. lbs.
ft. lbs.	x .1383	= kg-m
ft. lbs.	x 1.383	= N-m
in. lbs.	x .0115	= kg-m
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)
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)
Cubic centimeters (cc)	x .03381	= Fluid Ounces (fl.oz.)
Fluid Ounces (fl.oz.)	x 29.57	= Cubic centimeters (cc) or milliliters (ml)
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)

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

SAE Tap Drill Sizes

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

Metric Tap Drill Sizes

Tap Size	Drill Size	Decimal Equivalent	Nearest Fraction
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

Service Tips

In order to perform service work efficiently and to prevent costly errors, the technician should read the text in this manual, thoroughly familiarizing him/herself with procedures before beginning. Pictures and illustrations have been included with the text as an aid. Notes, cautions and warnings have also been included for clarification of text and safety concerns. However, a knowledge of mechanical theory, tool use and shop procedures is necessary to perform the service work safely and satisfactorily. Use only genuine Polaris service parts.

⚠ Cleanliness of parts and tools as well as the work area is of primary importance. Dirt and foreign matter will act as an abrasive and cause damage to precision parts. Clean the vehicle before beginning service. Clean new parts before installing.

⚠ Watch for sharp edges which can cause personal injury. Protect hands with gloves when working with sharp components.

⚠ If difficulty is encountered in removing or installing a component, look to see if a cause for the difficulty can be found. If it is necessary to tap the part into place, use a soft face hammer and tap lightly.

⚠ Some of the fasteners were installed with locking agents. Use of impact drivers or wrenches will help avoid damage to fasteners.

⚠ Always follow torque specifications as outlined throughout this manual. Incorrect torquing may lead to serious machine damage or, as in the case of steering components, can result in injury or death for the rider(s).

⚠ If a torquing sequence is indicated for nuts, bolts or screws, start all fasteners in their holes and hand tighten. Then, following the method and sequence indicated in this manual, tighten evenly to the specified torque value. When removing nuts, bolts or screws from a part with several fasteners, loosen them all about 1/4 turn before removing them.

⚠ If the condition of any gasket or O-Ring is in question, replace it with a new one. Be sure the mating surfaces around the gasket are clean and smooth in order to avoid leaks.

⚠ Some procedures will require removal of retaining rings or clips. Because removal weakens and deforms these parts, they should always be replaced with new parts. When installing new retaining rings and clips use care not to expand or compress them beyond what is required for installation.

⚠ Because removal damages seals, replace any oil or grease seals removed with new parts.

⚠ Polaris recommends the use of Polaris lubricants and greases, which have been specially formulated for the top performance and best protection of our machines. In some applications, such as the engine, warranty coverage may become void if other brands are substituted.

⚠ Grease should be cleaned from parts and fresh grease applied before reassembly of components. Deteriorating grease loses lubricity and may contain abrasive foreign matter.

⚠ Whenever removing or reinstalling batteries, care should be taken to avoid the possibility of explosion resulting in serious burns. Always disconnect the negative (black) cable first and reconnect it last. Battery electrolyte contains sulfuric acid and is poisonous! Serious burns can result from contact with the skin, eyes or clothing. **ANTIDOTE:** External - Flush with water. Internal - Drink large quantities or 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.

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.

CDI: Capacitor discharge ignition. Ignition system which stores voltage generated by the stator plate exciter coil in a capacitor or condenser (in CDI box). At the proper moment a voltage generated by the stator plate pulser coil closes an electronic switch (thyristor) in the CDI box and allows the voltage in the capacitor to discharge into the primary windings of the ignition coil.

Center Distance: Distance between center of crankshaft and center of driven clutch shaft.

Chain Pitch: Distance between chain link pins (520 = 5/8″ or 1.6 cm). Chain length is measured in number of pitches (pins). A 520 x 86 has 86 total pins, including the master link pins.

CI: Cubic inches.

Clutch Buttons: Plastic bushings which transmit rotation of the clutch to 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.

Condenser/Capacitor: A storage reservoir for electricity, used in both E.T. and CDI systems.

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 lower half of crankcase. Measure at various points especially at PTO. Maximum allowable run-out is .006″ (.02 cm).

DCV: Direct current voltage.

Detonation: The spontaneous ignition of the unburned fuel/air mixture after normal spark ignition. Piston looks “hammered” through, rough appearance around hole. Possible causes: 1) too high a compression ratio for the fuel octane; 2) low octane fuel; 3) over-advanced ignition timing.

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

Driven Clutch: (Also-Secondary Clutch). The torque sensitive clutch in a CVT system which is located on the transmission input shaft.

Electrical Open: Open circuit. An electrical circuit which isn’t complete. (i.e. poor connections or broken wire at hi-lo beam switch resulting in loss of headlights.

Electrical Short: Short circuit. An electrical circuit which is completed before the current reaches the intended component. (i.e. a bare wire touching the grounded 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.

EBS: Engine Braking System

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.

Head Volume: Cylinder head capacity in cc, head removed from engine with spark plug installed.

High Tension Lead: The heavy insulated wire which carries the high secondary voltage from the coil to the spark plug.

Holed Piston: Piston in which a hole has formed on the dome. Possible causes: Lean mixture; Incorrect ignition timing

HP: Horsepower.

ID: Inside diameter.

Ignition Coil: A type of transformer which increases voltage in the primary windings (approx. 200V) to a higher voltage in the secondary windings (approx. 14KV - 32KV) through induction. Secondary voltage is high enough to ionize (jump) the air gap at the spark plug.

Ignition Generating Coil: Exciter coil, primary charge coil. Stator plate coil which generates primary ignition voltage.

in.: Inch/inches.

Inch Pound: In. lb. 12 in. lbs. = 1 ft. lb.

kg/cm^2: 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/in^2: Pounds per square inch.

Left Side: Always referred to based on normal operating position of the driver.

m: Meter/meters.

Mag: Magneto.

Magnetic Induction: As a conductor (coil) is moved through a magnetic field, a voltage will be generated in the windings. The common method used to convert mechanical energy to electrical energy in the battery charging coil, ignition generating coils, and ignition trigger (pulse) coil.

mi.: Mile/miles.

mm: Millimeter. Unit of length in the metric system. 1mm = .040″.

N-m: Newton meters.

OD: Outside diameter.

Ohm: The unit of electrical resistance opposing current flow.

oz.: Ounce/ounces.

Piston Clearance: Total difference between piston outside diameter and cylinder inside diameter.

Piston Erosion: Piston dome melts. Usually occurs at the exhaust port area. Possible causes: 1) Detonation due to lean fuel/air mixture, improper spark plug heat range, excess heat buildup, poor fuel quality / octane rating.

Pre-Ignition: A problem in combustion where the fuel/air mixture is ignited before normal spark ignition. Piston looks melted at area of damage. Possible causes: 1) incorrect spark plug heat range; 2) spark plug not properly torqued; 3) “glowing” piece of head gasket, metal burr or carbon in the combustion chamber; 4) lean fuel/air mixture.

Primary Circuit: This circuit is responsible for the voltage build up in the CDI capacitor. In the CDI system the parts include the exciter coil, the trigger coil (pulse coil), the wires from stator plate to CDI box and to the low resistance primary windings in the ignition coil.

Primary Clutch: Drive clutch on engine. Mainly RPM sensitive.

psi.: Pounds per square inch.

PTO: Power take off.

PVT: Polaris Variable Transmission (Drive Clutch System)

qt.: Quart/quarts.

RPM: Revolutions per minute.

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

Right Side: Always referred to based on normal operating position of the driver.

RPM: Revolutions per minute.

Running Time: Ignition timing when fully advanced or at specified RPM.

Secondary Circuit: This circuit consists of the large secondary coil windings, high tension wire and ground through the spark plug air gap.

Secondary Clutch: (Also-Driven Clutch) The torque sensitive clutch in a CVT system which is located on the transmission input shaft.

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;

Spark Plug Reach: Length of threaded portion of spark plug. Polaris uses 3/4″ (2 cm) reach plugs.

Static Timing: Ignition timing when engine is at zero RPM.

Stator Plate: The plate mounted under the flywheel supporting the primary ignition components and lighting coil.

TDC: Top dead center. Piston's most outward travel from crankshaft.

Trigger Coil: Pulser coil. Generates the voltage for triggering (closing) the thyristor and timing the spark in CDI systems. Small coil mounted at the top of the stator plate next to the ignition generating coil.

Voltage Regulator: Maintains Prevents over-charging of battery or damage to electrical components as engine RPM increases.

Venturi: An area of air constriction. A venturi is used in carburetors to speed up air flow which lowers pressure in venturi to below atmospheric pressure, causing fuel to be pushed through jets, etc., and into the venturi to be mixed with air and form a combustible air/fuel mixture.

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.

SPECIAL TOOLS

Special tool part numbers and usage are listed in each section of this manual as required for a specific service procedure. For complete tool information , refer to the S P X Special Tool w e b s i t e . U.S. dealers can obtain a current price list or get tool information by contacting the SPX Company at the address, phone or FAX number listed below. Dealers serviced by a distributor should follow tool ordering procedures established by their respective distributor parts department.

SPX Service Solutions

28635 Mound Road

Warren, MI 48092-5509

TO PLACE AN ORDER

1-800-328-6657

www.polaris.spx.com

Tool Order **FAX** Number

1-800-328-6657

MODEL: .... TRAIL BLAZER
MODEL NUMBER: . A99BA25CA
ENGINE MODEL: . . EC25PFE13

CARBURETION

Type .... VM30SS Mikuni
Main Jet 130
Pilot Jet 40
Jet Needle 5DP7-3
Needle Jet .... 0-4(169)
Cutaway 2.0
Air Screw .... 1.0 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	150	140	130	120
	900-1800 (3000-6000)	140	130	120	110
	1800-2700 (6000-9000)	125	120	110	100
	2700-3700 (9000-12000)	115	110	100	95

- Turn AS out 1/2 – 3/4 turn CCW from seat
Raise needle clip 1 position to lower jet needle

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188" (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12"
Center Distance .... 10±.12" (254.5mm)
Clutch Offset .... 0.5" (12.7mm)
Shift Weights .... G
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... 40°
Spring Position (Helix) 2
Spring Position (Sheave) . . 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	G	Blue/Green	2-2
	900-1800 (3000-6000)	G	Blue/Green	2-1
	1800-2700 (6000-9000)	16	Blue/Green	2-2
	2700-3700 (9000-12000)	16	Blue/Green	2-1

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 244 cc
Bore .... 2.8346" (72mm)
Stroke .... 2.3622" (60mm)
Compression Ratio .... 6.1/1 Effective
Cooling .... Air
Lubrication Type .... Oil Injected
Piston / Cylinder Clearance ... 0.0011 - 0.0021" (0.03 - 0.05mm)
Service Limit .... 0.006" (0.15mm)
Piston Marking 3W,4W
Piston Ring End Gap .... .009"-.018" (.23mm-.46mm)
Operating RPM±200 .... 5800 RPM
Idle RPM±200 .... 700 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... TRAIL BLAZER
MODEL NUMBER: ... A99BA25CA
ENGINE MODEL: EC25PFE13

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2167
Alternator Output	150 Watts
Ignition Timing	25° BTDC@3000RPM±1.5°
Spark Plug / Gap	NGK BR8ES / 0.028" (0.7mm)
Lights: Head	Halogen 55 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39-1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L)	PP2*
Coolant	N / A	
Transmission	11 oz. (325ml)	PPS*
Gearcase Oil (Front)	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	N / A	
Engine Oil	N / A	
Brake (Hand)	–	Dot 3
Brake (Foot)	–	Dot 3
Front Hubs (AWD)	N / A	
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant

SUSPENSION / CHASSIS

Body Style	Gen III
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60" (152.4cm)
Toe Out	1/8"-1/4" (3-6.35mm)
Ground Clearance	6" (15.24cm)
Front Vertical Travel	6.7" (17.02cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	8.2 in. (20.8cm)
Rear Shock	2" Gas Charged Mono
Shock Adjustment	Cam
Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46.5" (118.11cm)
Total Length	74.5" (189.23cm)
Total Height	46" (116.84cm)
Wheel Base	49.75" (126.37cm)
Weight - Dry	440 lbs. (199.76kg)

DRIVE TRAIN (Concentric Drive)

Chain Type	520 O-Ring
Gear Reduction-Low	N / A
Gear Reduction-Rev	3.05/1
Gear Reduction-High	2.68/1
Front Drive Ratio	N / A
Center Drive Ratio	N / A
Final Drive Ratio	11/38 78P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Accy)	30 lbs.
Rear Rack (Accy)	60 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041777-067 Option 125 lb/in.	7041778-067 Standard 150 lb/in.	7041815-067 Option 175 lb/in.
Front Strut Spring	7041471-067 Option 41 lb/in.	7041238-067 Standard 61 lb/in.	7041375-067 Option 64/113 lb/in.

MODEL: .... TRAIL BOSS 250
MODEL NUMBER: . A99AA25CA
ENGINE MODEL: . . EC25PFE10

CARBURETION

Type .... VM30SS Mikuni
Main Jet 145
Pilot Jet 40
Jet Needle 5DP7-3
Needle Jet .... 0-4(169)
Cutaway 2.0
Air Screw .... 1.0 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	170	155	145	135
	900-1800 (3000-6000)	155	145	135	125
	1800-2700 (6000-9000)	140	130	120	115
	2700-3700 (9000-12000)	130	120	110	100

- Turn AS out 1/2 – 3/4 turn CCW from seat

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188” (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12”
Center Distance .... 10±.12” (254.5mm)
Clutch Offset .... 0.5” (12.7mm)
Shift Weights 16
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... 40°
Spring Position (Helix) 2
Spring Position (Sheave) .. 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	16	Blue/Green	2-2
	900-1800 (3000-6000)	16	Blue/Green	2-1
	1800-2700 (6000-9000)	16 Mod	Blue/Green	2-2
	2700-3700 (9000-12000)	16 Mod	Blue/Green	2-2

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 244 cc
Bore .... 2.8346” (72mm)
Stroke .... 2.3622” (60mm)
Compression Ratio .... 6.1/1 Effective
Cooling .... Air
Lubrication Type .... Oil Injected
Piston / Cylinder Clearance ... 0.0011 - 0.0021” (0.03 - 0.05mm)
Service Limit .... 0.006” (0.15mm)
Piston Marking 3W,4W
Piston Ring End Gap .... .009”-.018” (.23mm-.46mm)
Operating RPM±200 .... 6000 RPM
Idle RPM±200 .... 700 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... TRAIL BOSS 250
MODEL NUMBER: ... A99AA25CA
ENGINE MODEL: EC25PFE10

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2167
Alternator Output ...	150 Watts
Ignition Timing	25° BTDC@3000RPM±1.5°
Spark Plug / Gap ...	NGK BR8ES / 0.028” (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39-1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L) ..	PP2*
Coolant	N / A	
Transmission	16 oz. (473ml)	PPS*
Gearcase Oil (Front) .	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	N / A	
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant

SUSPENSION / CHASSIS

Body Style	Gen II
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60” (152.4cm)
Toe Out	1/8”-1/4” (3-6.35mm)
Ground Clearance ..	5.5” (13.97cm)
Front Vertical Travel	6.25” (15.88cm)
Rear Suspension ...	Progressive Rate Swing Arm
Rear Travel	8.5 in. (21.6cm)
Rear Shock	1” Bore Gas Bag
Shock Adjustment ..	Cam

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	44” (111.76cm)
Total Length	73.2” (185.93cm)
Total Height	44” (111.76cm)
Wheel Base	49.75” (126.37cm)
Weight - Dry	448 lbs. (203.4kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low .	N / A
Gear Reduction-Rev .	3.42/1
Gear Reduction-High	2.68/1
Front Drive Ratio	N / A
Center Drive Ratio ...	N / A
Final Drive Ratio	12/42 88P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Mechanical

LOAD CAPACITY

Front Rack (Accy)	75 lbs.
Rear Rack	125 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041518-067 Option 175 lb/in.	7041204-067 Standard 190 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041471-067 Option 41 lb/in.	7041238-067 Standard 61 lb/in.	7041375-067 Option 64/113 lb/in.

MODEL: .... XPRESS 300
MODEL NUMBER: . A99CA28CA
ENGINE MODEL: . . EC28PFE02

CARBURETION

Type .... VM30SS Mikuni
Main Jet 155
Pilot Jet 40
Jet Needle 5DP7-3
Needle Jet .... 0-4(169)
Cutaway 2.0
Air Screw .... 1.25 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	180	170	155	145
	900-1800 (3000-6000)	165	150	140	130
	1800-2700 (6000-9000)	150	140	130	120
	2700-3700 (9000-12000)	135	125	115	110

- Drop jet needle one position (raise E-Clip)

- Turn air screw in 1/2 to 3/4 turn

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188" (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12"
Center Distance .... 10±.12" (254.5mm)
Clutch Offset .... 0.5" (12.7mm)
Shift Weights .... G
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... Compound
Spring Position (Helix) 2
Spring Position (Sheave) .. 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	G 48GR	Blue/Green	2-2
	900-1800 (3000-6000)	G 48GR	Blue/Green	2-2 or 2-1
	1800-2700 (6000-9000)	F 45GR	Blue/Green	2-2
	2700-3700 (9000-12000)	F 45GR	Blue/Green	2-1

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 283 cc
Bore .... 2.9331" (74.5mm)
Stroke .... 2.5591" (65mm)
Compression Ratio .... 6.1/1 Effective
Cooling .... Air
Lubrication Type .... Oil Injected
Piston / Cylinder Clearance ... 0.0012 - 0.0026" (0.03 - 0.07mm)
Service Limit .... 0.006" (0.15mm)
Piston Marking 28
Piston Ring End Gap .... .012"-.022" (.31mm-.56mm)
Operating RPM±200 .... 5600 RPM
Idle RPM±200 .... 600 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... XPRESS 300
MODEL NUMBER: . . . A99CA28CA
ENGINE MODEL: EC28PFE02

ELECTRICAL

Flywheel I.D. ...... Refer to Electrical Section
CDI Marking CU2513
Alternator Output . . . 150 Watts
Ignition Timing ..... 25° BTDC@3000RPM±2 °
Spark Plug / Gap . . . NGK BR8ES / 0.028” (0.7mm)
Lights: Head (Twin) Halogen 30/30 watts
Tail .... 8.26 watts
Brake ...... 26.9 watts
Voltage Regulator . . LR39–1
Electric Start .... Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L) . .	PP2*
Coolant	N / A	
Transmission	20 oz. (592ml)	PPS*
Gearcase Oil (Front) .	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) . . .	N / A	
Shift Selector Box . . .	1 oz. (30ml) . .	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W40 Synthetic Engine Lubricant

SUSPENSION / CHASSIS

Body Style .... Gen IV
Front Suspension . . MacPherson Strut
Tow Capacity ...... 850 lbs. (385.9kg)
Turning Radius ..... 60” (152.4cm)
Toe Out .... 1/8”-1/4” (3-6.35mm)
Ground Clearance . . 6.5” (16.51cm)
Front Vertical Travel 6.25” (15.88cm)
Rear Suspension . . . Progressive Rate Swing Arm
Rear Travel .... 8.5″ (21.59cm)
Rear Shock .... 1″ Gas Bag
Shock Adjustment . . Cam

DRIVE TRAIN

Chain Type .... 520 O-Ring
Gear Reduction-Low . 6.64/1
Gear Reduction-Rev . 5.13/1
Gear Reduction-High 3.29/1
Front Drive Ratio .... N / A
Center Drive Ratio . . . N / A
Final Drive Ratio 13/38 86P
Brake (Hand) .... Single Lever, Hyd. Disc
Brake (Auxiliary Foot) Mechanical

TIRES

Tire Size - Front .... 23 x 7 - 10
Tire Size - Rear .... 24 x 11 - 10
Tire Size - Center . . N / A
Tire Pressure - F/R . 4/3 lbs.
Total Width .... 46” (116.84cm)
Total Length .... 79.5” (201.93cm)
Total Height .... 45.5” (115.57cm)
Wheel Base .... 49.75” (126.37cm)
Weight - Dry .... 512 lbs. (224.73kg)

LOAD CAPACITY

Front Rack (Std) ..... 90 lbs.
Rear Rack (Std) ...... 180 lbs.
Tongue Weight .... 30 lbs.
Tow Hitch .... Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041518-067 Option 175 lb/in.	7041204-067 Standard 190 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375–157 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

MODEL: .... XPLORER 300
MODEL NUMBER: . A99CC28CA
ENGINE MODEL: . . EC28PFE02

CARBURETION

Type . . . . VM30SS Mikuni
Main Jet 155
Pilot Jet 40
Jet Needle 5DP7–3
Needle Jet . . . . 0-4(169)
Cutaway 2.0
Air Screw . . . . 1.25 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or
89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	180	170	155	145
	900-1800 (3000-6000)	165	150	140	130
	1800-2700 (6000-9000)	150	140	130	120
	2700-3700 (9000-12000)	135	125	115	110

- Drop jet needle one position (raise E–Clip)

- Turn air screw in 1/2 to 3/4 turn

CLUTCH

Type . . . . PVT
Belt 3211077
Belt Width (Projected) . . . . . 1.188” (30.18mm)
Side Angle (Overall) . . . . . . 26°
Outside Circumference . . . . 40.86 ±.12”
Center Distance . . . . 10±.12” (254.5mm)
Clutch Offset . . . . 0.5” (12.7mm)
Shift Weights . . . . G
Primary Spring . . . . Blue/Green
Secondary Spring . . . . Red
Driven Helix . . . . Compound
Spring Position (Helix) 2
Spring Position (Sheave) . . 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	G 48GR	Blue/Green	2–2
	900-1800 (3000-6000)	G 48GR	Blue/Green	2–2 or 2–1
	1800-2700 (6000-9000)	F 45GR	Blue/Green	2–2
	2700-3700 (9000-12000)	F 45GR	Blue/Green	2–1

ENGINE

Type . . . . 2 Cycle, Single Cyl.
Displacement . . . . 283 cc
Bore . . . . 2.9331” (74.5mm)
Stroke . . . . 2.5591” (65mm)
Compression Ratio . . . . 6.1/1 Effective
Cooling . . . . Air
Lubrication Type . . . . Oil Injected
Piston / Cylinder Clearance . . . 0.0012 - 0.0026” (0.03 - 0.07mm)
Service Limit . . . . 0.006” (0.15mm)
Piston Marking 28
Piston Ring End Gap . . . . .012”-.022” (.31mm-.56mm)
Operating RPM±200 . . . . 5600 RPM
Idle RPM±200 . . . . 600 RPM
Compression Pressure . . . . (Std) ±15%

MODEL: .... XPLORER 300
MODEL NUMBER: . . . A99CC28CA
ENGINE MODEL: EC28PFE02

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2513
Alternator Output	150 Watts
Ignition Timing	25° BTDC@3000RPM±2 °
Spark Plug / Gap	NGK BR8ES / 0.028" (0.7mm)
Lights: Head	Halogen 30/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39–1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L)	PP2*
Coolant	N / A	
Transmission	20 oz. (592ml)	PPS*
Gearcase Oil (Front)	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	N / A	
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	57" (144.78cm)
Toe Out	1/8"-1/4" (3-6.35mm)
Ground Clearance	6" (15.24cm)
Front Vertical Travel	6.25" (15.88cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	8.5" (21.59cm)
Rear Shock	1" Bore Gas Bag
Shock Adjustment	Cam

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	24 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46" (116.84cm)
Total Length	81" (205.74cm)
Total Height	45.5" (115.57cm)
Wheel Base	49.75" (126.37cm)
Weight - Dry	567 lbs. (252.4kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low	6.64/1
Gear Reduction-Rev	5.13/1
Gear Reduction-High	3.39/1
Front Drive Ratio	12/22 64P
Center Drive Ratio	11/22 70P
Final Drive Ratio	13/40 88P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Mechanical

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041518-067 Option 175 lb/in.	7041204-067 Standard 190 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375–157 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

MODEL: .... SPORTSMAN 335
MODEL NUMBER: . A99CH33CA/B, A99CH33AA/AB(CALIF. APPROVED)
ENGINE MODEL: . . ES33PFE01, ES33PFE02(CALIF. APPROVED)

CARBURETION

Type .... BST 34 Mikuni
Main Jet 150
Pilot Jet 40
Jet Needle 5F14–3
Needle Jet P-9
Throttle Valve .... #100
Pilot Screw .... 2.5 Turns Out
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	162.5	155	150	145
	900-1800 (3000-6000)	155	150	145	137.5
	1800-2700 (6000-9000)	150	145	137.5	132.5
	2700-3700 (9000-12000)	142.5	137.5	130	125

- Pilot screw in 1/2 turn

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188” (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12”
Center Distance .... 10±.12” (254.5mm)
Clutch Offset .... 0.5” (12.7mm)
Shift Weights 16
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... Compound
Spring Position (Helix) 2
Spring Position (Sheave) . . 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	16	Blue/Green	2-2
	900-1800 (3000-6000)	16	Blue/Green	2-1
	1800-2700 (6000-9000)	16 Mod	Blue/Green	2-2
	2700-3700 (9000-12000)	16 Mod	Blue/Green	2-2

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 334 cc
Bore .... 3.0732” (78mm)
Stroke .... 2.758” (70mm)
Compression Ratio .... 9.2/1 Full Stroke
Cooling .... Air W/ Oil Cooler Assist
Lubrication Type .... Dry Sump
Piston / Cylinder Clearance . . . 0.0012 - 0.0035” (0.03 - 0.09mm)
Service Limit .... 0.0043” (0.11mm)
Piston Marking ....
Piston Ring End Gap (top) .... .0079”-.0138” (.20mm-.36mm)
Piston Ring End Gap (second) .0138”-.0197” (.36mm-.50mm)
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... SPORTSMAN 335
MODEL NUMBER: ... A99CH33CA/B, A99CH33AA/AB(CALIF. APPROVED)
ENGINE MODEL: .... ES33PFE01, ES33PFE02(CALIF. APPROVED)

ELECTRICAL

Flywheel I.D. ...... Refer to Electrical Section
CDI Marking CU2557
Alternator Output ... 200 Watts
Ignition Timing ..... 30° BTDC@3500RPM±1.5°
Spark Plug / Gap ... NGK BKR7E / 0.028" (0.7mm)
Lights: Head ...... Halogen 60/60 watts
Tail .... 8.26 watts
Brake ...... 26.9 watts
Voltage Regulator .. LR39
Electric Start .... Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.2L)	
Injector Oil	N / A	
Coolant	N / A	
Transmission	32 oz.	PPS*
Gearcase Oil (Front) .	3.25 oz.	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	2.25 qts. (2.1L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75ml)	PDD*
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style .... Gen IV
Front Suspension .. MacPherson Strut
Tow Capacity ...... 850 lbs. (385.9kg)
Turning Radius ..... 65" (165.1cm)
Toe Out .... 1/8"-1/4" (3-6.35mm)
Ground Clearance .. 10.25" (26.04cm)
Front Vertical Travel 6.25" (15.88cm)
Rear Suspension ... Progressive Rate Independent
Rear Travel .... 9.5" (24.13cm)
Rear Shock .... 1" Bore Gas Bag
Shock Adjustment .. Cam

TIRES

Tire Size - Front .... 23 x 7 - 10
Tire Size - Rear .... 24 x 11 - 10
Tire Size - Center .. N / A
Tire Pressure - F/R . 5/5 lbs.
Total Width .... 46" (116.84cm)
Total Length .... 81" (205.74cm)
Total Height .... 46" (118.22cm)
Wheel Base .... 50.50" (128.27cm)
Weight - Dry .... 670 lbs. (304.2kg)

DRIVE TRAIN

Chain Type .... Shaft Drive
Gear Reduction-Low . 6.89/1
Gear Reduction-Rev . 5.17/1
Gear Reduction-High 3.56/1
Front Drive Ratio 2:1
Center Drive Ratio ... N / A
Final Drive Ratio 3.16:1
Brake (Hand) .... Single Lever, Hyd. Disc
Brake (Auxiliary Foot) Hydraulic

LOAD CAPACITY

Front Rack (Std) ..... 90 lbs.
Rear Rack (Std) ...... 180 lbs.
Tongue Weight .... 30 lbs.
Tow Hitch .... Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041517-067 Option 80 lb/in.	7041546-067 Standard 100 lb/in.	7041519-067 Option 140 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375-067 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

MODEL: .... SPORT 400
MODEL NUMBER: . A99BA38CA
ENGINE MODEL: . . EC38PLE09

CARBURETION

Type .... VM34SS Mikuni
Main Jet 230
Pilot Jet 35
Jet Needle 6CEY6-3
Needle Jet .... 0-6(480)
Cutaway 1.5
Air Screw .... 1.5 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	270 MJ 0.5 AS	250 MJ 1.0 AS	230 MJ 1.5 AS	210 MJ 1.5 AS
	900-1800 (3000-6000)	250 MJ 0.5 AS	230 MJ 1.0 AS	210 MJ 1.5 AS	195 MJ 1.75 AS
	1800-2700 (6000-9000)	220 MJ 1.5 AS	210 MJ 1.5 AS	195 MJ 1.75 AS	175 MJ 1.75 AS
	2700-3700 (9000-12000)	200 MJ 1.5 AS	190 MJ 1.75 AS	175 MJ 1.75 AS	160 MJ 1.75 AS

MJ = Main Jet

AS = Air Screw (Turns Out)

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188” (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12”
Center Distance .... 10±.12” (254.5mm)
Clutch Offset .... 0.5” (12.7mm)
Shift Weights S55
Primary Spring .... White
Secondary Spring .... Red
Driven Helix .... 40°
Spring Position (Helix) 2
Spring Position (Sheave) . . 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	S-55	White	2-2
	900-1800 (3000-6000)	S-55	White	2-2 or 2-1
	1800-2700 (6000-9000)	S	White	2-1
	2700-3700 (9000-12000)	S or 10MH	White	2-1

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 378 cc
Bore .... 3.2677” (83mm)
Stroke .... 2.7559” (70mm)
Compression Ratio .... 6.9/1 Effective
Cooling .... Liquid
Lubrication Type .... Oil Injected
Piston / Cylinder Clearance . . . 0.0023 - 0.0037” (0.06 - 0.09mm)
Service Limit .... 0.006” (0.15mm)
Piston Marking ....
Piston Ring End Gap .... .007”-.015” (.18mm-.38mm)
Operating RPM±200 .... 5700 RPM
Idle RPM±200 .... 600 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... SPORT 400
MODEL NUMBER: . . . A99BA38CA
ENGINE MODEL: EC38PLE09

ELECTRICAL

Flywheel I.D. ...... Refer to Electrical Section
CDI Marking CU2515
Alternator Output ... 150 Watts
Ignition Timing ..... 23.5° BTDC@3000RPM±1.5°
Spark Plug / Gap ... NGK BR8ES / 0.028" (0.7mm)
Lights: Head ...... Halogen 60/60 watts
Tail .... 8.26 watts
Brake ...... 26.9 watts
Voltage Regulator .. LR39-1
Electric Start .... Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L)	PP2*
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	11 oz. (325ml)	PPS*
Gearcase Oil (Front)	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	100ml	10W30
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	N / A	
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PP4 Polaris 0W/40 Synthetic Engine Lubricant

SUSPENSION / CHASSIS

Body Style .... Gen III
Front Suspension .. MacPherson Strut
Tow Capacity ...... 850 lbs. (385.9kg)
Turning Radius ..... 60" (152.4cm)
Toe Out .... 1/8"-1/4" (3-6.35mm)
Ground Clearance .. 6" (15.24cm)
Front Vertical Travel 8.2" (20.83cm)
Rear Suspension ... Progressive Rate Swing Arm
Rear Travel .... 8.2" (20.83cm)
Rear Shock .... 2" Gas Charged Mono
Shock Adjustment .. Thread Adjuster

TIRES

Tire Size - Front .... 23 x 7 - 10
Tire Size - Rear .... 22 x 11 - 10
Tire Size - Center .. N / A
Tire Pressure - F/R . 4/3 lbs.
Total Width .... 46.5" (118.11cm)
Total Length .... 74.5" (189.23cm)
Total Height .... 47" (119.38cm)
Wheel Base .... 49.75" (126.37cm)
Weight - Dry .... 475 lbs. (215.6kg)

DRIVE TRAIN

Chain Type .... 520 O-Ring
Gear Reduction-Low . N / A
Gear Reduction-Rev . 3.05/1
Gear Reduction-High 2.68/1
Front Drive Ratio .... N / A
Center Drive Ratio ... N / A
Final Drive Ratio 13/36 76P
Brake (Hand) .... Single Lever, Hyd. Disc
Brake (Auxiliary Foot) Hydraulic

LOAD CAPACITY

Front Rack (Accy) .... 30 lbs.
Rear Rack (Accy) .... 60 lbs.
Tongue Weight .... 30 lbs.
Tow Hitch .... Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041389-067 Option 175 lb/in.	7041691-067 Standard 170/210 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041471-067 Option 41 lb/in.	7041238-067 Standard 61 lb/in.	7041375-067 Option 64/113 lb/in.

MODEL: .... SCRAMBLER 400
MODEL NUMBER: . A99BG38C(A or B)
ENGINE MODEL: . . EC38PLE09

CARBURETION

Type .... VM34SS Mikuni
Main Jet 230
Pilot Jet 35
Jet Needle 6CEY6-3
Needle Jet .... 0-6(480)
Cutaway 1.5
Air Screw .... 1.5 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	270 MJ 0.5 AS	250 MJ 1.0 AS	230 MJ 1.5 AS	210 MJ 1.5 AS
	900-1800 (3000-6000)	250 MJ 0.5 AS	230 MJ 1.0 AS	210 MJ 1.5 AS	195 MJ 1.75 AS
	1800-2700 (6000-9000)	220 MJ 1.5 AS	210 MJ 1.5 AS	195 MJ 1.75 AS	175 MJ 1.75 AS
	2700-3700 (9000-12000)	200 MJ 1.5 AS	190 MJ 1.75 AS	175 MJ 1.75 AS	160 MJ 1.75 AS

MJ = Main Jet

AS = Air Screw (Turns Out)

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188” (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12”
Center Distance .... 10±.12” (254.5mm)
Clutch Offset .... 0.5” (12.7mm)
Shift Weights S55
Primary Spring .... White
Secondary Spring .... Red
Driven Helix .... 40°
Spring Position (Helix) 2
Spring Position (Sheave) . . 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	S-55	White	2-2
	900-1800 (3000-6000)	S-55	White	2-2 or 2-1
	1800-2700 (6000-9000)	S	White	2-1
	2700-3700 (9000-12000)	S or 10MH	White	2-1

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 378 cc
Bore .... 3.2677” (83mm)
Stroke .... 2.7559” (70mm)
Compression Ratio .... 6.9/1 Effective
Cooling .... Liquid
Lubrication Type .... Oil Injected
Piston / Cylinder Clearance . . . 0.0023 - 0.0037” (0.06 - 0.09mm)
Service Limit .... 0.006” (0.15mm)
Piston Marking ....
Piston Ring End Gap .... .007”-.015” (.18mm-.38mm)
Operating RPM±200 .... 5700 RPM
Idle RPM±200 .... 600 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... SCRAMBLER 400
MODEL NUMBER: ... A99BG38CB
ENGINE MODEL: EC38PLE09

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2515
Alternator Output ...	150 Watts
Ignition Timing	23.5° BTDC@3000RPM±3°
Spark Plug / Gap ...	NGK BR8ES / 0.028" (0.7mm)
Lights: Head	Halogen 30/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39-1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L) ..	PP2*
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	16 oz. (473ml)	PPS*
Gearcase Oil (Front) .	3.25 oz.	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	100ml	10W30
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75ml)	PDD*
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen III
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60" (152.4cm)
Toe Out	1/8"-1/4" (3-6.35mm)
Ground Clearance ..	6.5" (16.51cm)
Front Vertical Travel	8.2" (20.83cm)
Rear Suspension ...	Progressive Rate Swing Arm
Rear Travel	8.8" (22.35cm)
Rear Shock	Fox t Gas Charged w/remote res.
Shock Adjustment ..	Thread Adjuster

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low .	N / A
Gear Reduction-Rev .	4.36/1
Gear Reduction-High	2.82/1
Front Drive Ratio	2:1
Center Drive Ratio ...	N / A
Final Drive Ratio	13/36 76P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	45.5" (115.57cm)
Total Length	74.5" (189.23cm)
Total Height	47" (119.38cm)
Wheel Base	48.5" (123.19cm)
Weight - Dry	519 lbs. (235.6kg)

LOAD CAPACITY

Front Rack (Accy)	30 lbs.
Rear Rack (Accy)	60 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041389-067 Option 175 lb/in.	7041691-067 Standard 170/210 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041471-067 Option 41 lb/in.	7041238-067 Standard 61 lb/in.	7041375-067 Option 64/113 lb/in.

MODEL: .... XPLORER 400
MODEL NUMBER: . A99CG38CA
ENGINE MODEL: . . EC38PLE08

CARBURETION

Type .... VM34SS Mikuni
Main Jet 210
Pilot Jet 35
Jet Needle 6CEY6-3
Needle Jet .... 0-6(480)
Cutaway 1.5
Air Screw .... 1.5 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	240	230	210	195
	900-1800 (3000-6000)	220	210	195	180
	1800-2700 (6000-9000)	200	190	175	165
	2700-3700 (9000-12000)	185	175	160	150

- Drop jet needle one position (raise E-Clip)

- Turn air screw in 1/2 to 3/4 turn

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188” (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12”
Center Distance .... 10±.12” (254.5mm)
Clutch Offset .... 0.5” (12.7mm)
Shift Weights S55
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... Compound
Spring Position (Helix) 2
Spring Position (Sheave) . . 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	S-55	Blue/Green	2-2
	900-1800 (3000-6000)	S-55	Blue/Green	2-2 or 2-1
	1800-2700 (6000-9000)	S	Blue/Green	2-1
	2700-3700 (9000-12000)	S	Blue/Green	2-1

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 378 cc
Bore .... 3.2677” (83mm)
Stroke .... 2.7559” (70mm)
Compression Ratio .... 6.9/1 Effective
Cooling .... Liquid
Lubrication Type .... Oil Injected
Piston / Cylinder Clearance ... 0.0023 - 0.0037” (0.06 - 0.09mm)
Service Limit .... 0.006” (0.15mm)
Piston Marking ....
Piston Ring End Gap .... .007”-.015” (.18mm-.38mm)
Operating RPM±200 .... 5700 RPM
Idle RPM±200 .... 600 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... XPLORER 400
MODEL NUMBER: ... A99CG38CA
ENGINE MODEL: EC38PLE08

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2510
Alternator Output	200 Watts
Ignition Timing	23.5° BTDC@3000RPM±1.5°
Spark Plug / Gap	NGK BR8ES / 0.028” (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39-1
Electric Start	Standard
Electronic Speedo	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L)	PP2*
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	16 oz. (473ml)	PPS*
Gearcase Oil (Front)	3.25 oz.	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	3.3 oz. (100ml)	10W30
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	65” (165.1cm)
Toe Out	1/8”-1/4” (3-6.35mm)
Ground Clearance	7.5” (19.05cm)
Front Vertical Travel	6.7” (17.02cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	9“ (22.86cm)
Rear Shock	3/8” Bore Gas Charged
Shock Adjustment	Cam

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46” (116.84cm)
Total Length	81” (205.74cm)
Total Height	47” (119.38cm)
Wheel Base	49.75” (126.37cm)
Weight - Dry	588 lbs. (266.95kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low	6.14/1
Gear Reduction-Rev	4.74/1
Gear Reduction-High	3.06/1
Front Drive Ratio	2:1
Center Drive Ratio	N / A
Final Drive Ratio	13/36 76Pitch Chain
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041518-067 Option 175 lb/in.	7041204-067 Standard 190 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375-195 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

MODEL: .... SCRAMBLER 500
MODEL NUMBER: . A99BG50AA
ENGINE MODEL: .. EH50PLE04

CARBURETION

Type .... BST 40 Mikuni
Main Jet 155
Pilot Jet 40
Jet Needle 6H25–94–3
Needle Jet .... Y–O
Throttle Valve .... #120
Pilot Screw 2.0
Pilot Air Jet 1.3
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	167.5	160	155	147.5
	900-1800 (3000-6000)	160	155	147.5	142.5
	1800-2700 (6000-9000)	152.5	147.5	142.5	135
	2700-3700 (9000-12000)	145	140	135	130

- Pilot screw in 1/2 turn (light shading: 1800-2700 Above +80_F; 2700-3700 +40_to +80_F and Above +80_F)

- Pilot screw out 1/2 turn (dark shading: 0-900 Below 0°F and 0_ to +40_F; 900-1800 Below 0°F)

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188” (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12”
Center Distance .... 10±.12” (254.5mm)
Clutch Offset .... 0.5” (12.7mm)
Shift Weights 10WH
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... 40°
Spring Position (Helix) 1
Spring Position (Sheave) .. 1

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	10WH	Blue/Green	1-1
	900-1800 (3000-6000)	10WH	Blue/Green	2-1
	1800-2700 (6000-9000)	10RH	Blue/Green	1-1
	2700-3700 (9000-12000)	10RH	Blue/Green	2-1

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 499 cc
Bore .... 3.6248” (92mm)
Stroke .... 2.955” (75mm)
Compression Ratio .... 10/2 Full Stroke
Cooling .... Liquid
Lubrication Type .... Dry Sump
Piston / Cylinder Clearance ... 0.0006 - 0.0018” (0.015 - 0.046mm)
Service Limit .... 0.0024” (0.061mm)
Piston Marking ....
Piston Ring End Gap .... .008”-.015” (.20mm-.38mm)
Operating RPM±200 .... 6500 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... SCRAMBLER 500
MODEL NUMBER: ... A99BG50AA
ENGINE MODEL: EH50PLE04

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2544
Alternator Output ...	250 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap ...	NGK BKR6E / 0.028" (0.7mm)
Lights: Head (Twin)	Halogen 30/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.5 gals. (13.2L)	
Injector Oil	N / A	
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	16 oz. (473ml)	PPS*
Gearcase Oil (Front) .	4.0 oz.	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	2 qts. (1.9L) ..	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75ml)	PDD*
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PPS Polaris Premium Synthetic Gear Case Oil
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen III
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60" (152.4cm)
Toe Out	1/8"-1/4" (3-6.35mm)
Ground Clearance ..	6.5" (16.51cm)
Front Vertical Travel	8.2" (20.83cm)
Rear Suspension ...	Progressive Rate Swing Arm
Rear Travel	8.8" (22.35cm)
Rear Shock	Fox t Gas Charged w/remote res
Shock Adjustment ..	Thread Adjuster

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low .	N / A
Gear Reduction-Rev .	4.74/1
Gear Reduction-High	3.06/1
Front Drive Ratio	2:1
Center Drive Ratio ...	N / A
Final Drive Ratio	13/36 76P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	45.5" (115.57cm)
Total Length	74.5" (189.23cm)
Total Height	47" (119.38cm)
Wheel Base	48.5" (123.19cm)
Weight - Dry	542 lbs. (246.1kg)

LOAD CAPACITY

Front Rack (Accy)	30 lbs.
Rear Rack (Accy)	60 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041389-067 Option 175 lb/in.	7041691-067 Standard 170/210 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041548-067 Option 75/100 lb/in.	7041503-215 Standard 75/110 lb/in.	7041647-067 Option 80/120 lb/in.

MODEL: .... MAGNUM 500
MODEL NUMBER: . A99CD50AA
ENGINE MODEL: . . EH50PLE08

CARBURETION

Type .... BST 34 Mikuni
Main Jet 157.5
Pilot Jet 40
Jet Needle 4HB40-2
Needle Jet .... Q-O
Throttle Valve .... #100
Pilot Screw .... 2 5/8 Turns Out
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	170	165	157.5	152.5
	900-1800 (3000-6000)	165	160	155	147.5
	1800-2700 (6000-9000)	162.5	155	150	145
	2700-3700 (9000-12000)	157.5	150	145	140

- Pilot screw in 1/2 turn

CLUTCH

Type .... PVT
Belt 3211069
Belt Width (Projected) ..... 1.188" (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12"
Center Distance .... 10±.12" (254.5mm)
Clutch Offset .... 0.5" (12.7mm)
Shift Weights 10MH
Primary Spring .... Blue/Green
Secondary Spring .... White w/Green Stripe
Driven Helix .... Compound (EBS)
Spring Position (Helix) .... N / A
Spring Position (Sheave) .. N / A

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	10MH	Blue/Green	EBS
	900-1800 (3000-6000)	10BH	Blue/Green	EBS
	1800-2700 (6000-9000)	10WH	Blue/Green	EBS
	2700-3700 (9000-12000)	10RH	Blue/Green	EBS

* EBS requires no helix adjustment

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 498 cc
Bore .... 3.6248" (92mm)
Stroke .... 2.955" (75mm)
Compression Ratio .... 10/2 Full Stroke
Cooling .... Liquid
Lubrication Type .... Dry Sump
Piston / Cylinder Clearance ... 0.0006 - 0.0018" (0.015 - 0.046mm)
Service Limit .... 0.0024" (0.061mm)
Piston Marking ....
Piston Ring End Gap .... .008"-.015" (.20mm-.38mm)
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... **MAGNUM 500**
MODEL NUMBER: ... **A99CD50AA**
ENGINE MODEL: **EH50PLE08**

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2557
Alternator Output	250 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap	NGK BKR5E / 0.028” (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39
Electric Start	Standard
Electronic Speedo	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.2L)	
Injector Oil	N / A	
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	13.5 oz.(400 ml)	PPS*
Gearcase Oil (Front)	5. oz (150ml)	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	10.0 oz. (300ml)	80-90 GL5
Engine Counter Bal.	N / A	
Engine Oil	2 qts. (1.9L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	65” (165.1cm)
Toe Out	1/8”-1/4” (3-6.35mm)
Ground Clearance	7.25” (18.42cm)
Front Vertical Travel	6.7” (17.02cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	6.5“ (16.51cm)
Rear Shock	2” Gas Charged Mono
Shock Adjustment	Cam

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46” (116.84cm)
Total Length	81” (205.74cm)
Total Height	47” (119.38cm)
Wheel Base	49.75” (126.37cm)
Weight - Dry	647 lbs. (293.7kg)

DRIVE TRAIN

Chain Type	N / A
Gear Reduction-Low	7.46/1
Gear Reduction-Rev	5.12/1
Gear Reduction-High	3.3/1
Front Drive Ratio	3.7/1 (Shaft)
Center Drive Ratio	N / A
Final Drive Ratio	3.1/1 (Shaft)
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring		7041777-067 Standard 125 lb/in.	7041778-067 Option 150 lb/in.
Front Strut Spring		7041375-067	

MODEL: .... **SPORTSMAN 500 / SPORTSMAN 500 RSE***
MODEL NUMBER: . A99CH50AA/AB/AC
ENGINE MODEL: . . EH50PLE09

CARBURETION

Type .... BST 34 Mikuni
Main Jet 155
Pilot Jet 40
Jet Needle 4HB41-3
Needle Jet Q-0
Throttle Valve .... #100
Pilot Screw .... 2 5/8 Turns Out
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	167.5	162.5	155	150
	900-1800 (3000-6000)	162.5	157.5	152.5	145
	1800-2700 (6000-9000)	160	152.5	147.5	142.5
	2700-3700 (9000-12000)	155	147.5	142.5	137.5

- Pilot screw in 1/2 turn

CLUTCH

Type .... PVT
Belt 3211069
Belt Width (Projected) ..... 1.188" (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12"
Center Distance .... 10±.12" (254.5mm)
Clutch Offset .... 0.5" (12.7mm)
Shift Weights 10MH
Primary Spring .... Blue/Green
Secondary Spring .... White w/Green Stripe
Driven Helix .... Compound (EBS)
Spring Position (Helix) .... N / A
Spring Position (Sheave) . . N / A

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	10MH	Blue/Green	EBS
	900-1800 (3000-6000)	10BH	Blue/Green	EBS
	1800-2700 (6000-9000)	10WH	Blue/Green	EBS
	2700-3700 (9000-12000)	10RH	Blue/Green	EBS

* EBS requires no helix adjustment

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 498 cc
Bore .... 3.625" (92mm)
Stroke .... 2.955" (75mm)
Compression Ratio .... 10/2 Full Stroke
Cooling .... Liquid
Lubrication Type .... Dry Sump
Piston / Cylinder Clearance ... 0.0006 - 0.0018" (0.015 - 0.046mm)
Service Limit .... 0.0024" (0.061mm)
Piston Marking ....
Piston Ring End Gap .... .008"-.015" (.20mm-.38mm)
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Pressure .... (Std) ±15%

*Remington t Special Edition

MODEL: .... SPORTSMAN 500 / SPORTSMAN 500 RSE*
MODEL NUMBER: . . . A99CH50AA/AB/AC
ENGINE MODEL: EH50PLE09

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2557
Alternator Output	250 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap	NGK BKR5E / 0.028” (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	5.25 gals. (19.9L)	
Injector Oil	N / A	
Coolant	2.25 qts.	PP6*
Transmission	32 oz.	PPS*
Gearcase Oil (Front)	3.25 oz.	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	N / A	
Engine Oil	2 qts. (1.9L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

Lubricant Key
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension	MacPherson Strut
Tow Capacity	1225 lbs. (556.2kg)
Turning Radius	65” (165.1cm)
Toe Out	1/8”-1/4” (3-6.35mm)
Ground Clearance	11” (27.94cm)
Front Vertical Travel	6.25” (15.88cm)
Rear Suspension	Progressive Rate Independent
Rear Travel	9.5“ (24.13cm)
Rear Shock	1 3/8” Bore Gas Bag
Shock Adjustment	Cam

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	5/5 lbs.
Total Width	46” (116.84cm)
Total Length	85” (215.9cm)
Total Height	47” (119.38cm)
Wheel Base	50.50” (128.27cm)
Weight - Dry	697 lbs. (316.4kg)
Weight - Dry (RSE)	730 lbs. (331.4kg)

DRIVE TRAIN

Chain Type	Shaft Drive
Gear Reduction-Low	6.69/1
Gear Reduction-Rev	5.17/1
Gear Reduction-High	3.34/1
Front Drive Ratio	2/1
Center Drive Ratio	N / A
Final Drive Ratio	3.16/1
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041453-067 Standard 100 lb/in.	7041519-067 Option 140 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375-067 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

*Remington t Special Edition

MODEL: 500 6X6
MODEL NUMBER: . A99AE50AA
ENGINE MODEL: .. EH50PLE06

CARBURETION

Type .... BST 34 Mikuni
Main Jet 140
Pilot Jet 40
Jet Needle 4D33-3
Needle Jet Q-6
Throttle Valve .... #100
Pilot Screw 2
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	150	145	140	135
	900-1800 (3000-6000)	145	140	135	130
	1800-2700 (6000-9000)	137.5	135	130	122.5
	2700-3700 (9000-12000)	132.5	127.5	122.5	117.5

- Pilot screw in 1/2 turn

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188” (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12”
Center Distance .... 10±.12” (254.5mm)
Clutch Offset .... 0.5” (12.7mm)
Shift Weights 10MH
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... Compound
Spring Position (Helix) 2
Spring Position (Sheave) .. 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	10MH	Blue/Green	2-2
	900-1800 (3000-6000)	10BH	Blue/Green	2-2
	1800-2700 (6000-9000)	10WH	Blue/Green	2-1
	2700-3700 (9000-12000)	10RH	Blue/Green	2-1

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 498 cc
Bore .... 3.625” (92mm)
Stroke .... 2.955” (75mm)
Compression Ratio .... 10/2 Full Stroke
Cooling .... Liquid
Lubrication Type .... Dry Sump
Piston / Cylinder Clearance ... 0.0006 - 0.0018” (0.015 - 0.046mm)
Service Limit .... 0.0024” (0.061mm)
Piston Marking ....
Piston Ring End Gap .... .008”-.015” (.20mm-.38mm)
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Pressure .... (Std) ±15%

MODEL: 500 6X6
MODEL NUMBER: ... A99AE50AA
ENGINE MODEL: EH50PLE06

ELECTRICAL

Flywheel I.D.	Refer to Electrical Section
CDI Marking	CU2557
Alternator Output	250 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap	NGK BKR5E / 0.028” (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.5 gals. (13.2L)	
Injector Oil	N / A	
Coolant	2.25 qts.	PP6*
Transmission	20 oz.	PPS*
Gearcase Oil (Front)	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	N / A	
Engine Oil	2 qts. (1.9L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

Lubricant Key
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen II
Front Suspension	MacPherson Strut
Tow Capacity	1225 lbs. (556.2kg)
Turning Radius	98” (248.9cm)
Toe Out	1/8”-1/4” (3-6.35mm)
Ground Clearance	5.5” (13.97cm)
Front Vertical Travel	6.25” (15.88cm)
Rear Suspension	Swing Arm w/Scissor Stabilizer
Rear Travel	7.25“ (18.42cm)
Rear Shock	5mm Bore Gas Bag
Shock Adjustment	Cam
Center Suspension	Progressive Rate Swing Arm
Center Travel	5” (12.7cm)
Center Shock	1” Bore
Shock Adjustment	Cam

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center	25 x 11 - 10
Tire Pressure - F/R	5/5/5 lbs.
Total Width	46” (116.84cm)
Total Length	103” (261.62cm)
Total Height	47” (119.38cm)
Wheel Base	75” (190.5cm)
Weight - Dry	870 lbs. (395kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low	6.64/1
Gear Reduction-Rev	5.13/1
Gear Reduction-High	3.29/1
Front Drive Ratio	11/22 68P
Center Drive Ratio	11/24 72P
Final Drive Ratio	12/42 88P
Axle to Axle	30/30 116P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Accy)	75 lbs.
Rear Rack (Accy)	125 lbs.
Tongue Weight (Accy)	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041303-067 Standard 250 lb/in.	N / A
Mid Compression Spring	N / A	7041305-067 Standard 60 lb/in.	N / A
Front Strut Spring			

SPECIFICATIONS
2000 Model Specifications

MODEL: .... TRAIL BLAZER
MODEL NUMBER: . A00BA25CA
ENGINE MODEL: . . EC25PFE13

CARBURETION

Type .... VM30SS Mikuni
Main Jet 130
Pilot Jet 40
Jet Needle 5DP7-3
Needle Jet .... 0-4(169)
Cutaway 2.0
Air Screw .... 1.0 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	150	140	130	120
	900-1800 (3000-6000)	140	130	120	110
	1800-2700 (6000-9000)	125	120	110	100
	2700-3700 (9000-12000)	115	110	100	95

- Turn AS out 1/2 – 3/4 turn CCW from seat
Raise needle clip 1 position to lower jet needle

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188″ (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12″
Center Distance .... 10±.12″ (254.5mm)
Clutch Offset .... 0.5″ (12.7mm)
Secondary Spring .... Red
Driven Helix .... 40°

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	G	Blue/Green	2–2
	1800-3700 (6000-12000)	16	Blue/Green	2–2

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 244 cc
Bore .... 2.8346″ (72mm)
Stroke .... 2.3622″ (60mm)
Compression Ratio .... 6.1/1 Effective
Cooling .... Air
Lubrication Type .... Oil Injected
Piston Marking 3W,4W
Operating RPM±200 .... 5800 RPM
Idle RPM±200 .... 700 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... TRAIL BLAZER
MODEL NUMBER: ... A00BA25CA
ENGINE MODEL: EC25PFE13

ELECTRICAL

Flywheel I.D.	FF45
CDI Marking	CU2167
Alternator Output	150 Watts
Ignition Timing	25° BTDC@3000RPM±3°
Spark Plug / Gap	NGK BR8ES / 0.028″ (0.7mm)
Lights: Head	Halogen 55 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39-1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L)	PP2*
Coolant	N / A	
Transmission	11 oz. (325ml)	PPS*
Gearcase Oil (Front)	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	N / A	
Engine Oil	N / A	
Brake (Hand)	–	Dot 3
Brake (Foot)	–	Dot 3
Front Hubs (AWD)	N / A	
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant

SUSPENSION / CHASSIS

Body Style	Gen III
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60″ (152.4cm)
Toe Out	1/8″-1/4″ (3-6.35mm)
Ground Clearance	6″ (15.24cm)
Front Vertical Travel	6.7″ (17.02cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	8.2″ (20.8cm)
Rear Shock	2″ Gas Charged Mono
Shock Adjustment	Cam
Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46.5″ (118.11cm)
Total Length	74.5″ (189.23cm)
Total Height	46″ (116.84cm)
Wheel Base	49.75″ (126.37cm)
Weight - Dry	440 lbs. (199.76kg)

DRIVE TRAIN (Concentric Drive)

Chain Type	520 O-Ring
Gear Reduction-Low	N / A
Gear Reduction-Rev	3.05/1
Gear Reduction-High	2.68/1
Front Drive Ratio	N / A
Center Drive Ratio	N / A
Final Drive Ratio	11/38 78P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Accy)	30 lbs.
Rear Rack (Accy)	60 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041777-067 Option 125 lb/in.	7041778-067 Standard 150 lb/in.	7041815-067 Option 175 lb/in.
Front Strut Spring	N/A	7041850-067 Standard 41 lb/in.	7041375-067 Option 64/113 lb/in.

MODEL: .... XPLORER 4X4
MODEL NUMBER: . A00AG25CA
ENGINE MODEL: . . EC25PFE12

CARBURETION

Type .... VM30SS Mikuni
Main Jet 130
Pilot Jet 40
Jet Needle 5DP7-3
Needle Jet .... 0-4(169)
Cutaway 2.0
Air Screw .... 1 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	150	140	130	120
	900-1800 (3000-6000)	140	130	120	110
	1800-2700 (6000-9000)	125	120	110	100
	2700-3700 (9000-12000)	115	110	100	95

- Turn air screw out 1/2 turn (counterclockwise)
Raise needle clip 1 position to lower jet needle

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) 1.188I (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12I
Center Distance .... 10±.12I (254.5mm)
Clutch Offset 0.5I (12.7mm)
Secondary Spring .... Red
Driven Helix .... 40°

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	G	Blue/Green	2-2
	1800-3700 (6000-12000)	16	Blue/Green	2-2

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 244 cc
Bore 2.8346I (72mm)
Stroke 2.3622I (60mm)
Compression Ratio .... 6.1/1 Effective
Cooling .... Air
Lubrication Type .... Oil Injected
Operating RPM±200 .... 5800 RPM
Idle RPM±200 .... 700 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... XPLORER 4X4
MODEL NUMBER: ... A00AG25CA
ENGINE MODEL: EC25PFE12

ELECTRICAL

Flywheel I.D.	FF45
CDI Marking	CU2167
Alternator Output	150 Watts
Ignition Timing	25° BTDC@3000RPM±3°
Spark Plug / Gap	NGK BR8ES / 0.028″ (0.7mm)
Lights: Head	1 Dual Beam 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39–1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L)	PP2*
Coolant	N / A	
Transmission	32 oz. (947ml)	PPS*
Gearcase Oil (Front)	4 oz. (118ml)	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	N / A	
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen II
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60″ (152.4cm)
Toe Out	1/8″-1/4″ (3-6.35mm)
Ground Clearance	6″ (15.24cm)
Front Vertical Travel	6.7″ (17.02cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	9″ (22.86cm)
Rear Shock	2″ Gas Charged Twin Tube
Shock Adjustment	Cam

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	24 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	45.5″ (115.57cm)
Total Length	73″ (185.42cm)
Total Height	44.5″ (113.03cm)
Wheel Base	49.75″ (126.37cm)
Weight - Dry	534 lbs. (234.39kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low	N / A
Gear Reduction-Rev	3.05/1
Gear Reduction-High	3.34/1
Front Drive Ratio	2:01
Center Drive Ratio	N / A
Final Drive Ratio	12/42 82P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041518-067 Option 175 lb/in.	7041877-067 Standard 160/200 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041873–067 Standard 55/105 lb/in.	7041450-067 Option 101 lb/in.

MODEL: .... TRAIL BOSS 325
MODEL NUMBER: . A00AA32CA/AA
ENGINE MODEL: . . ES32PFE02/04

CARBURETION

Type . . . . BST 31 Mikuni
Main Jet PFE02 . . . . . . 142.5
Main Jet PFE04 145
Pilot Jet 50
Jet Needle PFE02 . . . . 5F14-2
Jet Needle PFE04 . . . . 5F14–3
Needle Jet PFE02 . . . . P-0(829)
Needle Jet PFE04 . . . . P-2(829)
Throttle Valve . . . . #120
Pilot Screw . . . . 2 Turns Out
Pilot Air Jet 175
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART-ES32PFE02

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below 5°C	+40_F to +80_F +5_C to +26_C
Meters (Feet)	0-1800 (0-6000)	147.5	142.5
	above 1800 (above 6000)	140	135

JETTING CHART-ES32PFE04

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below 5°C	+40_F to +80_F +5_C to +26_C
Meters (Feet)	0-1800 (0-6000)	150	145
	above 1800 (above 6000)	142.5	137.5

CLUTCH

Type . . . . PVT
Belt 3211077
Belt Width (Projected) . . . . . 1.188″ (30.18mm)
Side Angle (Overall) . . . . . . 26°
Outside Circumference . . . . 40.86 ±.12″
Center Distance . . . . 10±.12″ (254.5mm)
Clutch Offset . . . . 0.5″ (12.7mm)
Secondary Spring . . . . White w/Green Stripe
Spring Position (Helix) . . . . N / A
Spring Position (Sheave) . . N / A

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	10RH	Blue/Green	2-2
	1800-3700 (6000-12000)	16 Mod	Blue/Green	2-2

* 40_ helix, black driven spring

ENGINE

Type . . . . 4 Cycle, Single Cyl.
Displacement . . . . 324 cc
Bore . . . . 3.073″ (78mm)
Stroke . . . . 2.679″ (68mm)
Valve Clearance In/Ex . . . . 0.006/0.006″ @ BTDC on compression
Cooling . . . . Air w/fan assisted oil cooler
Lubrication Type . . . . Dry Sump
Piston Marking . . . . None
Operating RPM±200 . . . . 6000 RPM
Idle RPM±200 (lights off) . . . . . 1300 RPM
Compression Ratio 9.2:1
Compression Pressure . . . . (Std) ±15%

MODEL: .... TRAIL BOSS 325
MODEL NUMBER: ... A00AA32CA/AA
ENGINE MODEL: ES32PFE02/04

ELECTRICAL

Flywheel I.D. ...... F1475ER ......
CDI Marking F8T19271
Alternator Output ... 200 Watts
Ignition Timing ..... 30°±2° BTDC@5000RPM
Spark Plug / Gap ... NGK BKR6E / 0.036I (0.9mm)
Lights: Head ...... Dual Beam 60/60 watts
Tail .... 8.26 watts
Brake ...... 26.9 watts
Voltage Regulator .. LR35
Electric Start .... Standard
Electronic Speedo .. N/A

FLUID

FLUID	Capacity	Type
Fuel Tank	3.7 gals. (14.0L)	
Injector Oil	N / A	
Coolant	N / A	
Transmission	11.3 oz. (335 ml)	PPS*
Gearcase Oil (Front) .	N / A	
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	1.9 qts. (1.8L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	N / A	
Shift Selector Box ...	N / A	

*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style .... Gen II
Front Suspension .. MacPherson Strut
Tow Capacity ...... 850 lbs. (385.9kg)
Turning Radius 60I (152.4cm)
Toe Out 1/8I-1/4I (3-6.35mm)
Ground Clearance .. 5.5I (13.97cm)
Front Vertical Travel 6.7I (17.02cm)
Rear Suspension ... Progressive Rate Swing Arm
Rear Travel 9.0I (22.86cm)
Rear Shock .... 2I Gas Charged Twin Tube
Shock Adjustment .. Cam

TIRES

Tire Size - Front .... 23 x 7 - 10
Tire Size - Rear .... 22 x 11 - 10
Tire Size - Center .. N / A
Tire Pressure - F/R . 4/3 lbs.
Total Width 46.5I (118.11cm)
Total Length 71.5I (181.61cm)
Total Height 46I (116.84cm)
Wheel Base 49.5I (125.73cm)
Weight - Dry .... 504 lbs. (228.8kg)

DRIVE TRAIN

Chain Type .... 520 O-Ring
Gear Reduction-Low . N / A
Gear Reduction-Rev . 3.05/1
Gear Reduction-High 2.68/1
Front Drive Ratio .... N / A
Center Drive Ratio ... N / A
Final Drive Ratio 11/42 80P
Brake (Hand) .... Single Lever, Hyd. Disc
Brake (Auxiliary Foot) Hydraulic

LOAD CAPACITY

Front Rack (Accy) .... 75 lbs.
Rear Rack (Std) ...... 125 lbs.
Tongue Weight .... 30 lbs.
Tow Hitch .... Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041518-067 175 lb/in.	7041303-067 250 lb/in.
Front Strut Spring	N / A	7041850-067 41 lb/in.	7041375-067 64 - 113 lb/in.

MODEL: .... MAGNUM 325
MODEL NUMBER: . (2x4's) A00CB32CA - (4x4's) A00CD32CA
ENGINE MODEL: . . ES32PFE01

CARBURETION

Type .... BST 31 Mikuni
Main Jet 142.5
Pilot Jet 50
Jet Needle 5F14-2
Needle Jet .... P-0(829)
Throttle Valve .... #120
Pilot Screw .... 2 Turns Out
Pilot Air Jet 175
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below 5°C	+40_F to +80_F +5_C to +26_C
Meters (Feet)	0-1800 (0-6000)	147.5	142.5
	above 1800 (above 6000)	140	135

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) 1.188I (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12I
Center Distance .... 10±.12I (254.5mm)
Clutch Offset 0.5I (12.7mm)
Shift Weights 10RH
Primary Spring .... Blue/Green
Secondary Spring .... White w/Green Stripe
Driven Helix 2–2
Spring Position (Helix) .... N / A
Spring Position (Sheave) . . N / A

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	16	Blue/Green	2-2
	1800-3700 (6000-12000)	16 Mod	Blue/Green	2-2

* 40_ helix, black driven spring

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 324 cc
Bore 3.073I (78mm)
Stroke 2.679I (68mm)
Valve Clearance In/Ex .... 0.006/0.006I @ TDC on compression
Cooling .... Air w/fan assisted oil cooler
Lubrication Type .... Dry Sump
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1300 RPM
Compression Ratio 9.2:1
Compression Pressure .... (Std) ±15%

MODEL: .... MAGNUM 325
MODEL NUMBER: . . . (2x4's) A00CB32CA - (4x4's) A00CD32CA
ENGINE MODEL: ES32PFE01

ELECTRICAL

Flywheel I.D.	F1475ER
CDI Marking	F8T19271
Alternator Output	200 Watts
Ignition Timing	30°±2° BTDC@5000RPM
Spark Plug / Gap	NGK BKR6E / 0.036I (0.9mm)
Lights: Head	2 Single Beam/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR35
Electric Start	Standard
Electronic Speedo	N/A

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.2L)	
Injector Oil	N / A	
Coolant	N / A	
Transmission	13.5 oz. (400 ml)	PPS*
Gearcase Oil (Front)	5 oz. (150 ml)	80-90 Lube
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	10 oz. (300ml)	80-90 Lube
Engine Counter Bal.	N / A	
Engine Oil	2 qts. (1.9L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75 ml)	PDD*
Shift Selector Box	1 oz. (30 ml)	PP4*

*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	65I (165.1cm)
Toe Out	1/8I-1/4I (3-6.35mm)
Ground Clearance	7.25I (18.42cm)
Front Vertical Travel	6.7I (17.02cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	6.5I (16.51cm)
Rear Shock	2I Gas Charged Mono
Shock Adjustment	Cam

TIRES

Tire Size - Front	24 x 8 - 12
Tire Size - Rear	24 x 11.5 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46I (116.84cm)
Total Length	81I (205.74cm)
Total Height	46I (116.84cm)
Wheel Base	49.75I (126.37cm)
Weight - Dry (2x4)	574 lbs. (260.5kg)
Weight - Dry (4x4)	620 lbs. (281.4kg)

DRIVE TRAIN

Chain Type	N / A
Gear Reduction-Low	7.46/1
Gear Reduction-Rev	5.12/1
Gear Reduction-High	3.3/1
Front Drive Ratio	3.7/1 (Shaft)
Center Drive Ratio	N / A
Final Drive Ratio	3.1/1 (Shaft)
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041777-067 125 lb/in.	7041849-067 125 - 180 lb/in.	7041815-067 175 lb/in.
Front Strut Spring	7041238-067 61 lb/in.	7041375-067 64 - 113 lb/in.	7041450-067 101 lb/in.

MODEL: .... MAGNUM 325
MODEL NUMBER: . (2x4's) A00CB32CA & A00CB32AA - (4x4's) A00CD32CA & A00CD32AA
ENGINE MODEL: .. ES32PFE04 & ES32PFE05

CARBURETION

Type .... BST 31 Mikuni
Main Jet 145
Pilot Jet 50
Jet Needle 5F14-3
Needle Jet .... P-2(829)
Throttle Valve .... #120
Pilot Screw .... 2 Turns Out
Pilot Air Jet 175
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below 5°C	+40_F to +80_F +5_C to +26_C
Meters (Feet)	0-1800 (0-6000)	150	145
	above 1800 (above 6000)	142.5	137.5

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188″ (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12″
Center Distance .... 10±.12″ (254.5mm)
Clutch Offset .... 0.5″ (12.7mm)
Shift Weights 10RH
Primary Spring .... Blue/Green
Secondary Spring .... White w/Green Stripe
Driven Helix 2–2
Spring Position (Helix) .... N / A
Spring Position (Sheave) .. N / A

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	16	Blue/Green	2-2
	1800-3700 (6000-12000)	16 Mod	Blue/Green	2-2

* compound helix, black driven spring

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 324 cc
Bore .... 3.073″ (78mm)
Stroke .... 2.679″ (68mm)
Valve Clearance In/Ex .... 0.006/0.006″ @ TDC on compression
Cooling .... Air w/fan assisted oil cooler
Lubrication Type .... Dry Sump
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1300 RPM
Compression Ratio 9.2:1
Compression Pressure .... (Std) ±15%

MODEL: .... **MAGNUM 325**
MODEL NUMBER: ... **(2x4's) A00CB32CA & A00CB32AA - (4x4's) A00CD32CA & A00CD32AA**
ENGINE MODEL: .... **ES32PFE04 & ES32PFE05**

ELECTRICAL

Flywheel I.D.	F1475ER
CDI Marking	F8T19271
Alternator Output ...	200 Watts
Ignition Timing	30°±2° BTDC@5000RPM
Spark Plug / Gap ...	NGK BKR6E / 0.036I (0.9mm)
Lights: Head	2 Single Beam/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR35
Electric Start	Standard
Electronic Speedo ..	N/A

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.2L)	
Injector Oil	N / A	
Coolant	N / A	
Transmission	13.5 oz. (400 ml)	PPS*
Gearcase Oil (Front) .	5 oz. (150 ml)	80-90 Lube
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	10 oz. (300ml)	80-90 Lube
Engine Counter Bal. .	N / A	
Engine Oil	2 qts. (1.9L) ..	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75 ml)	PDD*
Shift Selector Box ...	1 oz. (30 ml) .	PP4*

*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	65I (165.1cm)
Toe Out	1/8I-1/4I (3-6.35mm)
Ground Clearance ..	7.25I (18.42cm)
Front Vertical Travel	6.7I (17.02cm)
Rear Suspension ...	Progressive Rate Swing Arm
Rear Travel	6.5I (16.51cm)
Rear Shock	2I Gas Charged Mono
Shock Adjustment ..	Cam

TIRES

Tire Size - Front	24 x 8 - 12
Tire Size - Rear	24 x 11.5 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	46I (116.84cm)
Total Length	81I (205.74cm)
Total Height	46I (116.84cm)
Wheel Base	49.75I (126.37cm)
Weight - Dry (2x4) ..	574 lbs. (260.5kg)
Weight - Dry (4x4) ..	620 lbs. (281.4kg)

DRIVE TRAIN

Chain Type	N / A
Gear Reduction-Low .	7.46/1
Gear Reduction-Rev .	5.12/1
Gear Reduction-High	3.3/1
Front Drive Ratio	3.7/1 (Shaft)
Center Drive Ratio ...	N / A
Final Drive Ratio	3.1/1 (Shaft)
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041777-067 125 lb/in.	7041849-067 125 - 180 lb/in.	7041815-067 175 lb/in.
Front Strut Spring	7041238-067 61 lb/in.	7041375-067 64 - 113 lb/in.	7041450-067 101 lb/in.

MODEL: .... XPEDITION 325
MODEL NUMBER: . A00CK32AA
ENGINE MODEL: . . ES32PLE03

CARBURETION

Type . . . . BST 31 Mikuni
Main Jet 152.5
Pilot Jet 47.5
Jet Needle 4HB40-3
Needle Jet . . . . P-0(829)
Throttle Valve . . . . #120
Pilot Screw . . . . TBD
Pilot Air Jet 100
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE Below 40°F Below 5°C	AMBIENT TEMPERATURE +40_F to +80_F +5_C to +26_C
Meters (Feet)	0-1800 (0-6000)	157.5	152.5
	above 1800 (above 6000)	150	145

ENGINE

Type . . . . 4 Cycle, Single Cyl.
Displacement . . . . 325 cc
Bore 3.071I (78mm)
Stroke 2.677I (68mm)
Valve Clearance In/Ex . . . . 0.006/0.006I @ TDC on compression
Cooling . . . . Air
Lubrication Type . . . . Wet Sump
Piston Marking . . . . None
Operating RPM±200 . . . . 6500 RPM
Idle RPM±200 (lights off) . . . . . 1350 RPM
Compression Ratio 9.2:1
Compression Pressure . . . . (Std) ±15%

SUSPENSION / CHASSIS

Body Style . . . . Gen IV
Front Suspension . . MacPherson Strut
Tow Capacity . . . . . . 850 lbs. (385.9kg)
Turning Radius 65I (165.1cm)
Toe Out (Total) 1/8I-1/4I (3-6.35mm)
Ground Clearance . . 7.25I (18.42cm)
Front Vertical Travel 6.7I (17.02cm)
Rear Suspension . . . Progressive Rate Swing Arm
Rear Travel 7.0I (17.78cm)
Rear Shock . . . . 1-5/8I Gas Charged Twintube
Shock Adjustment . . Cam

DRIVE TRAIN

Gear 1 Ratio 4.182
Gear 2 Ratio 2.562
Gear 3 Ratio 1.522
Gear 4 Ratio 1.111
Gear 5 Ratio 0.813
Reverse 4.128
Primary 2.655
Secondary (at chain) 1.333
Secondary (at bevel drive) . . . 1.313
Front Drive Ratio . . . . 3.7/1 (Shaft)
Final Drive Ratio . . . . 3.1/1 (Shaft)
Brake (Hand) . . . . S/L Hyd. Disc
Brake (Auxiliary Foot) . . . . Hydraulic

MODEL: .... XPEDITION 325
MODEL NUMBER: . . . A00CK32AA
ENGINE MODEL: ES32PLE03

ELECTRICAL

Flywheel I.D.	F4T757
CDI Marking	F8T19271
Alternator Output ...	200 Watts
Ignition Timing	30° BTDC@3500RPM±2°
Spark Plug / Gap ...	NGK BKR6E / 0.036I (0.9mm)
Lights: Head	(2) Dual beam 30/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39
Electric Start	Standard
Electronic Speedo ..	Accessory

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.9L)	
Injector Oil	N / A	
Coolant	N / A	
Transmission	N / A	
Gearcase Oil (Front) .	5 oz. (150 ml)	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	10 oz. (300 ml)	80-90 GL5
Engine Counter Bal. .	N / A	
Engine Oil	4.5 qts. (4.25L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75 ml)	PDD*
Shift Selector Box ...	N / A	

*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

TIRES

Tire Size - Front	24 x 8 - 12
Tire Size - Rear	24 x 11.5 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	46I (116.84cm)
Total Length	81I (205.74cm)
Total Height	47I (119.38cm)
Wheel Base	49.75I (126.37cm)
Weight - Dry	635 lbs. (288kg)

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041777-067 125 lb/in.	7041849-067 125 - 180 lb/in.	7041815-067 175 lb/in.
Front Strut Spring	7041238-067 61 lb/in.	7041375-067 64 - 113 lb/in.	7041450-067 101 lb/in.

MODEL: .... SPORTSMAN 335
MODEL NUMBER: . A00CH33AA/AB(CALIF. APPROVED)
ENGINE MODEL: .. ES33PFE02(CALIF. APPROVED)

CARBURETION

Type .... BST 34 Mikuni
Main Jet 150
Pilot Jet 40
Jet Needle 5F14–3
Needle Jet P-9
Throttle Valve .... #100
Pilot Screw .... 2.5 Turns Out
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	162.5	155	150	145
	900-1800 (3000-6000)	155	150	145	137.5
	1800-2700 (6000-9000)	150	145	137.5	132.5
	2700-3700 (9000-12000)	142.5	137.5	130	125

- Pilot screw in 1/2 turn

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) 1.188Ι (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12Ι
Center Distance .... 10±.12Ι (254.5mm)
Clutch Offset 0.5Ι (12.7mm)
Shift Weights 16
Primary Spring .... Blue/Green
Secondary Spring .... Red
Driven Helix .... Compound
Spring Position (Helix) 2
Spring Position (Sheave) .. 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-900 (0-3000)	16	Blue/Green	2–2
	900-1800 (3000-6000)	16	Blue/Green	2–1
	1800-2700 (6000-9000)	16 Mod	Blue/Green	2–2
	2700-3700 (9000-12000)	16 Mod	Blue/Green	2–2

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 334 cc
Bore 3.0732Ι (78mm)
Stroke 2.758Ι (70mm)
Valve Clearance In/Ex .... 0.006/0.006Ι @ TDC on compression
Compression Ratio .... 9.2/1 Full Stroke
Cooling .... Air W/ Oil Cooler Assist
Lubrication Type .... Dry Sump
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... SPORTSMAN 335
MODEL NUMBER: ... A00CH33AA/AB(CALIF. APPROVED)
ENGINE MODEL: .... ES33PFE02(CALIF. APPROVED)

ELECTRICAL

Flywheel I.D.	FF97
CDI Marking	CU2557
Alternator Output ...	200 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap ...	NGK BKR7E / 0.028I (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.2L)	
Injector Oil	N / A	
Coolant	N / A	
Transmission	32 oz.	PPS*
Gearcase Oil (Front) .	4 oz. (120ml) .	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	2.25 qts. (2.1L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75ml)	PDD*
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	65I (165.1cm)
Toe Out	1/8I-1/4I (3-6.35mm)
Ground Clearance ..	10.25I (26.04cm)
Front Vertical Travel	6.25I (15.88cm)
Rear Suspension ...	Progressive Rate Independent
Rear Travel	9.5I (24.13cm)
Rear Shock	1I Bore Gas Bag
Shock Adjustment ..	Cam

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	24 x 11 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	5/5 lbs.
Total Width	46I (116.84cm)
Total Length	81I (205.74cm)
Total Height	46I (118.22cm)
Wheel Base	50.50I (128.27cm)
Weight - Dry	670 lbs. (304.2kg)

DRIVE TRAIN

Drive Type	Shaft Drive
Gear Reduction-Low .	6.89/1
Gear Reduction-Rev .	5.17/1
Gear Reduction-High	3.56/1
Front Drive Ratio	2:1
Center Drive Ratio ...	N / A
Final Drive Ratio	3.16:1
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N/A	7041453-067 Standard 100 lb/in.	7041519-067 Option 140 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375-067 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

SPECIFICATIONS
2000 Model Specifications

MODEL: .... XPLORER 400
MODEL NUMBER: . A00CG38CA
ENGINE MODEL: . . EC38PLE08

CARBURETION

Type .... VM34SS Mikuni
Main Jet 210
Pilot Jet 35
Jet Needle 6CEY6-3
Needle Jet .... 0-6(480)
Cutaway 1.5
Air Screw .... 1.5 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	240	230	210	195
	900-1800 (3000-6000)	220	210	195	180
	1800-2700 (6000-9000)	200	190	175	165
	2700-3700 (9000-12000)	185	175	160	150

- Drop jet needle one position (raise E-Clip)

- Turn air screw in 1/2 to 3/4 turn

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) 1.188I (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12I
Center Distance .... 10±.12I (254.5mm)
Clutch Offset 0.5I (12.7mm)
Secondary Spring .... Red
Driven Helix .... Compound

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	S55	Blue/Green	2-2
	1800-3700 (6000-12000)	S	Blue/Green	2-1

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 378 cc
Bore 3.2677I (83mm)
Stroke 2.7559I (70mm)
Compression Ratio .... 6.9/1 Effective
Cooling .... Liquid
Lubrication Type .... Oil Injected
Operating RPM±200 .... 5700 RPM
Idle RPM±200 .... 600 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... XPLORER 400
MODEL NUMBER: . . . A00CG38CA
ENGINE MODEL: EC38PLE08

ELECTRICAL

Flywheel I.D.	FF95
CDI Marking	CU2510
Alternator Output	200 Watts
Ignition Timing	23.5° BTDC@3000RPM±1.5°
Spark Plug / Gap	NGK BR8ES / 0.028I (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39-1
Electric Start	Standard
Electronic Speedo	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L)	PP2*
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	16 oz. (473ml)	PPS*
Gearcase Oil (Front)	4 oz (118ml)	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	3.3 oz. (100ml)	10W30
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	65I (165.1cm)
Toe Out	1/8I-1/4I (3-6.35mm)
Ground Clearance	7.5I (19.05cm)
Front Vertical Travel	6.7I (17.02cm)
Rear Suspension	Progressive Rate Swing Arm
Rear Travel	9I (22.86cm)
Rear Shock	2I Gas Charged Twintube
Shock Adjustment	Cam

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46I (116.84cm)
Total Length	81I (205.74cm)
Total Height	47I (119.38cm)
Wheel Base	49.75I (126.37cm)
Weight - Dry	588 lbs. (266.95kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low	6.14/1
Gear Reduction-Rev	4.74/1
Gear Reduction-High	3.06/1
Front Drive Ratio	2:1
Center Drive Ratio	N / A
Final Drive Ratio	13/36 76Pitch Chain
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041518-067 Option 175 lb/in.	7041204-067 Standard 190 lb/in.	7041303-067 Option 250 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375-067 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

MODEL: .... SCRAMBLER 400 2x4
MODEL NUMBER: . A00BA38CA
ENGINE MODEL: . . EC38PLE09

CARBURETION

Type .... VM34SS Mikuni
Main Jet 230
Pilot Jet 35
Jet Needle 6CEY6-3
Needle Jet .... 0-6(480)
Cutaway 1.5
Air Screw .... 1.5 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	270 MJ 0.5 AS	250 MJ 1.0 AS	230 MJ** 1.5 AS	210 MJ 1.5 AS
	900-1800 (3000-6000)	250 MJ 0.5 AS	230 MJ 1.0 AS	210 MJ 1.5 AS	195 MJ 1.75 AS
	1800-2700 (6000-9000)	220 MJ 1.5 AS	210 MJ 1.5 AS	195 MJ 1.75 AS	175 MJ 1.75 AS
	2700-3700 (9000-12000)	200 MJ 1.5 AS	190 MJ 1.75 AS	175 MJ 1.75 AS	160 MJ 1.75 AS

MJ = Main Jet

AS = Air Screw (Turns Out)

** For 87 Octane Oxygenated Fuel Refer to jetting recommendation in Fuel System / Carburetion section.

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) ..... 1.188″ (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12″
Center Distance .... 10±.12″ (254.5mm)
Clutch Offset .... 0.5″ (12.7mm)
Secondary Spring .... Red
Driven Helix .... 40°
Spring Position (Helix) 2
Spring Position (Sheave) .. 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	S55	White	2-2
	1800-3700 (6000-12000)	S	White	2-1

40° Helix, Red Driven

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 378 cc
Bore .... 3.2677″ (83mm)
Stroke .... 2.7559″ (70mm)
Compression Ratio .... 6.9/1 Effective
Cooling .... Liquid
Lubrication Type .... Oil Injected
Piston Marking ....
Operating RPM±200 .... 5700 RPM
Idle RPM±200 .... 600 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... SCRAMBLER 400 2x4
MODEL NUMBER: ... A00BA38CA
ENGINE MODEL: EC38PLE09

ELECTRICAL

Flywheel I.D.	FF95
CDI Marking	CU2515
Alternator Output ...	150 Watts
Ignition Timing	23.5° BTDC@3000RPM±3°
Spark Plug / Gap ...	NGK BR8ES / 0.028I (0.7mm)
Lights: Head	Halogen 30/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39-1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L) ..	PP2*
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	11 oz. (325ml)	PPS*
Gearcase Oil (Front) .	4 oz (118ml) ..	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	100ml	10W30
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	N / A	
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen III
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60I (152.4cm)
Toe Out	1/8I-1/4I (3-6.35mm)
Ground Clearance ..	5.5I (13.97cm)
Front Vertical Travel	8.2I (20.83cm)
Rear Suspension ...	Progressive Rate Swing Arm
Rear Travel	10.5I (26.67cm)
Rear Shock	2I Gas Charged Mono Tube
Shock Adjustment ..	Thread Adjuster

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	46.5I (118.11cm)
Total Length	74.5I (189.23cm)
Total Height	47I (119.38cm)
Wheel Base	49.75I (126.37cm)
Weight - Dry	501 lbs. (227.4kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low .	N / A
Gear Reduction-Rev .	3.05/1
Gear Reduction-High	2.68/1
Front Drive Ratio	N / A
Center Drive Ratio ...	N / A
Final Drive Ratio	13/36 76P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Accy)	30 lbs.
Rear Rack (Accy)	60 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041865/864-067 Standard 180/280 lb/in.	N / A
Front Strut Spring	N / A	7041868-067 Standard 55/80 lb/in.	7041776-067 Option 60/85 lb/in.

MODEL: .... SCRAMBLER 400 4x4
MODEL NUMBER: . A00BG38CA
ENGINE MODEL: . . EC38PLE09

CARBURETION

Type .... VM34SS Mikuni
Main Jet 230
Pilot Jet 35
Jet Needle 6CEY6-3
Needle Jet .... 0-6(480)
Cutaway 1.5
Air Screw .... 1.5 Turn
Valve Seat 2.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0_ to +40_F -18_to +5_C	+40_to +80_F +5_ to +26_C	Above +80_F Above +26_C
Meters (Feet)	0-900 (0-3000)	270 MJ 0.5 AS	250 MJ 1.0 AS	230 MJ** 1.5 AS	210 MJ 1.5 AS
	900-1800 (3000-6000)	250 MJ 0.5 AS	230 MJ 1.0 AS	210 MJ 1.5 AS	195 MJ 1.75 AS
	1800-2700 (6000-9000)	220 MJ 1.5 AS	210 MJ 1.5 AS	195 MJ 1.75 AS	175 MJ 1.75 AS
	2700-3700 (9000-12000)	200 MJ 1.5 AS	190 MJ 1.75 AS	175 MJ 1.75 AS	160 MJ 1.75 AS

MJ = Main Jet

AS = Air Screw (Turns Out)

** For 87 Octane Oxygenated Fuel Refer to jetting recommendation in Fuel System / Carburetion section.

CLUTCH

Type .... PVT
Belt 3211077
Belt Width (Projected) 1.188I (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12I
Center Distance .... 10±.12I (254.5mm)
Clutch Offset 0.5I (12.7mm)
Secondary Spring .... Red
Driven Helix .... 40°
Spring Position (Helix) 2
Spring Position (Sheave) .. 2

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	S55	White	2-2
	1800-3700 (6000-12000)	S	White	2-1

40° Helix, Red Driven

ENGINE

Type .... 2 Cycle, Single Cyl.
Displacement .... 378 cc
Bore 3.2677I (83mm)
Stroke 2.7559I (70mm)
Compression Ratio .... 6.9/1 Effective
Cooling .... Liquid
Lubrication Type .... Oil Injected
Piston Marking ....
Operating RPM±200 .... 5700 RPM
Idle RPM±200 .... 600 RPM
Compression Pressure .... (Std) ±15%

MODEL: .... SCRAMBLER 400 4x4
MODEL NUMBER: ... A00BG38CA
ENGINE MODEL: EC38PLE09

ELECTRICAL

Flywheel I.D.	FF95
CDI Marking	CU2515
Alternator Output ...	150 Watts
Ignition Timing	23.5° BTDC@3000RPM±3°
Spark Plug / Gap ...	NGK BR8ES / 0.028I (0.7mm)
Lights: Head	Halogen 30/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39-1
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4 gals. (15.1L)	
Injector Oil	2 qts. (1.9L) ..	PP2*
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	32 oz. (946ml)	PPS*
Gearcase Oil (Front) .	4 oz (118ml) ..	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	100ml	10W30
Engine Oil	N / A	
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75ml)	PDD*
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PP2 Polaris Premium TC-W3 2 Stroke Oil
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen III
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60I (152.4cm)
Toe Out	1/8I-1/4I (3-6.35mm)
Ground Clearance ..	5.5I (13.97cm)
Front Vertical Travel	8.2I (20.83cm)
Rear Suspension ...	Progressive Rate Swing Arm
Rear Travel	10.5I (26.67cm)
Rear Shock	Fox t Gas Charged w/remote res.
Shock Adjustment ..	Thread Adjuster

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	45.5I (115.57cm)
Total Length	74.5I (189.23cm)
Total Height	47I (119.38cm)
Wheel Base	48.5I (123.19cm)
Weight - Dry	541 lbs. (245.6kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low .	N / A
Gear Reduction-Rev .	4.36/1
Gear Reduction-High	2.82/1
Front Drive Ratio	2:1
Center Drive Ratio ...	N / A
Final Drive Ratio	13/36 76P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Accy)	30 lbs.
Rear Rack (Accy)	60 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041865/864-067 Standard 180/280 lb/in.	N / A
Front Strut Spring	7041648-067 Option 75/100 lb/in.	7041603-067 Standard 75/110 lb/in.	7041647-067 Option 80/120 lb/in.

SPECIFICATIONS
2000 Model Specifications

MODEL: .... XPEDITION 425
MODEL NUMBER: . A00CK42AA/AB
ENGINE MODEL: . . EH42PLE03

CARBURETION

Type .... BST 34 Mikuni
Main Jet 150
Pilot Jet 42.5
Jet Needle 4HB41-3
Needle Jet P-8
Throttle Valve .... #100
Pilot Screw .... 2 5/8 Turns Out
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or
89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below 5°C	+40_F to +80_F +5_C to +26_C
Meters (Feet)	0-1800 (0-6000)	155	150
	above 1800 (above 6000)	147.5	142.5

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 425 cc
Bore .... 3.461″ (87.9mm)
Stroke .... 2.756″ (70mm)
Valve Clearance In/Ex .... 0.006/0.006″ @ TDC on compression
Cooling .... Liquid
Lubrication Type .... Wet Sump
Piston Marking .... “257”
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Ratio .... 9.2/1 Full Stroke
Compression Pressure .... 60-90 lbs.

SUSPENSION / CHASSIS

Body Style .... Gen IV
Front Suspension . . MacPherson Strut
Tow Capacity ...... 850 lbs. (385.9kg)
Turning Radius ..... 65″ (165.1cm)
Toe Out (Total) ..... 1/8″-1/4″ (3-6.35mm)
Ground Clearance . . 7.25″ (18.42cm)
Front Vertical Travel 6.7″ (17.02cm)
Rear Suspension . . . Progressive Rate Swing Arm
Rear Travel .... 6.5″ (16.51cm)
Rear Shock .... 2″ Gas Charged Mono
Shock Adjustment . . Cam

DRIVE TRAIN

Gear 1 Ratio 4.182
Gear 2 Ratio 2.562
Gear 3 Ratio 1.522
Gear 4 Ratio 1.036
Gear 5 Ratio 0.758
Reverse 4.484
Primary 2.406
Secondary (at chain) 1.333
Secondary (at bevel drive) . . . 1.313
Front Drive Ratio .... 3.7/1 (Shaft)
Final Drive Ratio .... 3.1/1 (Shaft)
Brake (Hand) .... S/L Hyd. Disc
Brake (Auxiliary Foot) .... Hydraulic

MODEL: .... XPEDITION 425
MODEL NUMBER: ... A00CK42AA/AB
ENGINE MODEL: EH42PLE03

ELECTRICAL

Flywheel I.D.	FF95
CDI Marking	CU2557
Alternator Output	200 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap	NGK BKR5E / 0.028I (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39
Electric Start	Standard
Electronic Speedo	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.2L)	
Injector Oil	N / A	
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	N / A	
Gearcase Oil (Front)	5 oz. (150 ml)	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	10 oz. (300 ml)	80-90 GL5
Engine Counter Bal.	N / A	
Engine Oil	5.5 qts. (5.2L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75 ml)	PDD*
Shift Selector Box	N / A	

*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	4/3 lbs.
Total Width	46I (116.84cm)
Total Length	81I (205.74cm)
Total Height	47I (119.38cm)
Wheel Base	49.75I (126.37cm)
Weight - Dry	647 lbs. (293.7kg)

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041777-067 125 lb/in.	7041849-067 125 - 180 lb/in.	7041815-067 175 lb/in.
Front Strut Spring	7041238-067 61 lb/in.	7041375-067 64 - 113 lb/in.	7041450-067 101 lb/in.

MODEL: . . . . MAGNUM 500
MODEL NUMBER: . . A00CD50AA
ENGINE MODEL: . . EH50PLE08

CARBURETION

Type . . . . BST 34 Mikuni
Main Jet 157.5
Pilot Jet 40
Jet Needle 4HB40-2
Needle Jet . . . . Q-O
Throttle Valve . . . . #100
Pilot Screw . . . . 2 5/8 Turns Out
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE Below 40°F Below 5°C	AMBIENT TEMPERATURE +40_F to +80_F +5_C to +26_C
Meters (Feet)	0-1800 (0-6000)	162.5	157.5
	above 1800 (above 6000)	155	150

CLUTCH

Type . . . . PVT
Belt 3211082
Belt Width (Projected) . . . . . 1.188″ (30.18mm)
Side Angle (Overall) . . . . . . 28°
Outside Circumference . . . . 41.44 ±.12″
Center Distance . . . . 10±.12″ (254.5mm)
Clutch Offset . . . . 0.5″ (12.7mm)
Shift Weights 10MH
Primary Spring . . . . Blue/Green
Secondary Spring . . . . White w/Green Stripe
Driven Helix . . . . Compound (EBS)
Spring Position (Helix) . . . . N / A
Spring Position (Sheave) . . N / A

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	10MH	Blue/Green	EBS
	1800-3700 (6000-12000)	10WH	Blue/Green	EBS

* EBS requires no helix adjustment

ENGINE

Type . . . . 4 Cycle, Single Cyl.
Displacement . . . . 498 cc
Bore . . . . 3.6248″ (92mm)
Stroke . . . . 2.955″ (75mm)
Valve Clearance In/Ex . . . . 0.006/0.006″ @ TDC on compression
Cooling . . . . Liquid
Lubrication Type . . . . Dry Sump
Piston Marking . . . . Arrow to MAG side
Operating RPM±200 . . . . 6000 RPM
Idle RPM±200 (lights off) . . . . . 1200 RPM
Compression Ratio . . . . 10/2 Full Stroke
Compression Pressure . . . . (Std) ±15%

MODEL: .... MAGNUM 500
MODEL NUMBER: ... A00CD50AA
ENGINE MODEL: EH50PLE08

ELECTRICAL

Flywheel I.D. FF97
CDI Marking CU2557
Alternator Output ... 250 Watts
Ignition Timing ..... 30° BTDC@3500RPM±1.5°
Spark Plug / Gap ... NGK BKR5E / 0.028″ (0.7mm)
Lights: Head ...... Halogen 60/60 watts
Tail .... 8.26 watts
Brake ...... 26.9 watts
Voltage Regulator .. LR39
Electric Start .... Standard
Electronic Speedo .. Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.75 gals. (14.2L)	
Injector Oil	N / A	
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	13.5 oz. (400 ml)	PPS*
Gearcase Oil (Front) .	5 oz. (150 ml)	80−90 Lube
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	2 qts. (1.9L) ..	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75 ml)	PDD*
Shift Selector Box ...	1 oz. (30 ml) .	PP4*

*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style .... Gen IV
Front Suspension .. MacPherson Strut
Tow Capacity ...... 850 lbs. (385.9kg)
Turning Radius ..... 65″ (165.1cm)
Toe Out .... 1/8″-1/4″ (3-6.35mm)
Ground Clearance .. 7.25″ (18.42cm)
Front Vertical Travel 6.7″ (17.02cm)
Rear Suspension ... Progressive Rate Swing Arm
Rear Travel .... 6.5″ (16.51cm)
Rear Shock .... 2″ Gas Charged Mono
Shock Adjustment .. Cam

TIRES

Tire Size - Front .... 25 x 8 - 12
Tire Size - Rear .... 25 x 11 - 10
Tire Size - Center .. N / A
Tire Pressure - F/R . 4/3 lbs.
Total Width .... 46″ (116.84cm)
Total Length .... 81″ (205.74cm)
Total Height .... 47″ (119.38cm)
Wheel Base .... 49.75″ (126.37cm)
Weight - Dry .... 647 lbs. (293.7kg)

DRIVE TRAIN

Chain Type .... N / A
Gear Reduction-Low . 7.46/1
Gear Reduction-Rev . 5.12/1
Gear Reduction-High 3.3/1
Front Drive Ratio .... 3.7/1 (Shaft)
Center Drive Ratio ... N / A
Final Drive Ratio .... 3.1/1 (Shaft)
Brake (Hand) .... Single Lever, Hyd. Disc
Brake (Auxiliary Foot) Hydraulic

LOAD CAPACITY

Front Rack (Std) ..... 90 lbs.
Rear Rack (Std) ...... 180 lbs.
Tongue Weight .... 30 lbs.
Tow Hitch .... Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	7041777-067 125 lb/in.	7041849-067 125 - 180 lb/in.	7041815-067 175 lb/in.
Front Strut Spring	7041238-067 61 lb/in.	7041375-067 64 - 113 lb/in.	7041450-067 101 lb/in.

SPECIFICATIONS
2000 Model Specifications

MODEL: .... SCRAMBLER 500
MODEL NUMBER: . A00BG50AA
ENGINE MODEL: . . EH50PLE04

CARBURETION

Type . . . . BST 40 Mikuni
Main Jet 155
Pilot Jet 40
Jet Needle 6H25-94-3
Needle Jet . . . . Y-O
Throttle Valve . . . . #120
Pilot Screw 2.0
Pilot Air Jet 1.3
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or
89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below +5°C	+40_to +80_F +5_ to +26_C
Meters (Feet)	0-1800 (0-6000)	160	155
	Above 1800 Above (6000)	152.5	147.5

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	10WH	Blue/Green	1-1
	1800-3700 (6000-12000)	10RH	Blue/Green	1-1

40_ helix, silver driven

CLUTCH

Type . . . . PVT
Belt 3211077
Belt Width (Projected) . . . . . 1.188″ (30.18mm)
Side Angle (Overall) . . . . . . 26°
Outside Circumference . . . . 40.86 ±.12″
Center Distance . . . . 10±.12″ (254.5mm)
Clutch Offset . . . . 0.5″ (12.7mm)
Shift Weights 10WH
Primary Spring . . . . Blue/Green
Secondary Spring . . . . Silver
Driven Helix . . . . 40°
Spring Position (Helix) 1
Spring Position (Sheave) . . 1

ENGINE

Type . . . . 4 Cycle, Single Cyl.
Displacement . . . . 499 cc
Bore . . . . 3.6248″ (92mm)
Stroke . . . . 2.955″ (75mm)
Valve Clearance In/Ex . . . . 0.006/0.006″ @ TDC on compression
Compression Ratio . . . . 10/2 Full Stroke
Cooling . . . . Liquid
Lubrication Type . . . . Dry Sump
Operating RPM±200 . . . . 6500 RPM
Idle RPM±200 (lights off) . . . . . 1200 RPM
Compression Pressure . . . . (Std) ±15%

MODEL: .... SCRAMBLER 500
MODEL NUMBER: . . . A00BG50AA
ENGINE MODEL: EH50PLE04

ELECTRICAL

Flywheel I.D.	FF97
CDI Marking	CU2544
Alternator Output ...	250 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap ...	NGK BKR6E / 0.028I (0.7mm)
Lights: Head (Twin)	Halogen 30/30 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	3.5 gals. (13.2L)	
Injector Oil	N / A	
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	32 oz. (946ml)	PPS*
Gearcase Oil (Front) .	4.0 oz. (118ml)	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	2 qts. (1.9L) ..	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75ml)	PDD*
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

***Lubricant**
*PPS Polaris Premium Synthetic Gear Case Oil
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen III
Front Suspension ..	MacPherson Strut
Tow Capacity	850 lbs. (385.9kg)
Turning Radius	60I (152.4cm)
Toe Out	1/8I-1/4I (3-6.35mm)
Ground Clearance ..	5.5I (13.97cm)
Front Vertical Travel	8.2I (20.83cm)
Rear Suspension ...	Progressive Rate Swing Arm
Rear Travel	10.5I (26.67cm)
Rear Shock	Fox t Gas Charged w/remote res
Shock Adjustment ..	Thread Adjuster

TIRES

Tire Size - Front	23 x 7 - 10
Tire Size - Rear	22 x 11 - 10
Tire Size - Center ..	N / A
Tire Pressure - F/R .	4/3 lbs.
Total Width	45.5I (115.57cm)
Total Length	74.5I (189.23cm)
Total Height	47I (119.38cm)
Wheel Base	48.5I (123.19cm)
Weight - Dry	542 lbs. (246.1kg)

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low .	N / A
Gear Reduction-Rev .	4.74/1
Gear Reduction-High	3.06/1
Front Drive Ratio	2:1
Center Drive Ratio ...	N / A
Final Drive Ratio	13/36 76P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

LOAD CAPACITY

Front Rack (Accy)	30 lbs.
Rear Rack (Accy)	60 lbs.
Tongue Weight	30 lbs.
Tow Hitch	Accy

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041865/864-067 Standard 180/280 lb/in.	N / A
Front Strut Spring	7041648-067 Option 75/100 lb/in.	7041603-067 Standard 75/110 lb/in.	7041647-067 Option 80/120 lb/in.

MODEL: .... SPORTSMAN 500 / SPORTSMAN 500 RSE*
MODEL NUMBER: . A00CH50AA/AB/AC
ENGINE MODEL: .. EH50PLE09

CARBURETION

Type .... BST 34 Mikuni
Main Jet 155
Pilot Jet 40
Jet Needle 4HB41-3
Needle Jet Q-0
Throttle Valve .... #100
Pilot Screw .... 2 5/8 Turns Out
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below +5°C	+40_to +80_F +5_ to +26_C
Meters (Feet)	0-1800 (0-6000)	162.5	155
	Above 1800 Above (6000)	157.5	147.5

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	10MH	Blue/Green	EBS
	1800-3700 (6000-12000)	10WH	Blue/Green	EBS

* EBS requires no helix adjustment

CLUTCH

Type .... PVT
Belt 3211069
Belt Width (Projected) 1.188I (30.18mm)
Side Angle (Overall) ...... 26°
Outside Circumference .... 40.86 ±.12I
Center Distance .... 10±.12I (254.5mm)
Clutch Offset 0.5I (12.7mm)
Shift Weights 10MH
Primary Spring .... Blue/Green
Secondary Spring .... White w/Green Stripe
Driven Helix .... Compound (EBS)
Spring Position (Helix) .... N / A
Spring Position (Sheave) .. N / A

ENGINE

Type .... 4 Cycle, Single Cyl.
Displacement .... 498 cc
Bore 3.625I (92mm)
Stroke 2.955I (75mm)
Valve Clearance In/Ex .... 0.006/0.006I @ TDC on compression
Compression Ratio .... 10/2 Full Stroke
Cooling .... Liquid
Lubrication Type .... Dry Sump
Operating RPM±200 .... 6000 RPM
Idle RPM±200 (lights off) ..... 1200 RPM
Compression Pressure .... (Std) ±15%

*Remington t Special Edition

MODEL: .... SPORTSMAN 500 / SPORTSMAN 500 RSE*
MODEL NUMBER: ... A00CH50AA/AB/AC
ENGINE MODEL: EH50PLE09

ELECTRICAL

Flywheel I.D.	FF97
CDI Marking	CU2557
Alternator Output	250 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap	NGK BKR5E / 0.028l (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator	LR39
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	5.25 gals. (19.9L)	
Injector Oil	N / A	
Coolant	2.25 qts.	PP6*
Transmission	32 oz.	PPS*
Gearcase Oil (Front)	4 oz. (120ml)	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear)	N / A	
Engine Counter Bal.	N / A	
Engine Oil	2 qts. (1.9L)	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD)	2.5 oz. (75ml)	PDD*
Shift Selector Box	1 oz. (30ml)	PP4*

Lubricant Key
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension	MacPherson Strut
Tow Capacity	1225 lbs. (556.2kg)
Turning Radius	65l (165.1cm)
Toe Out	1/8l-1/4l (3-6.35mm)
Ground Clearance	11l (27.94cm)
Front Vertical Travel	6.7l (17.02cm)
Rear Suspension	Progressive Rate Independent
Rear Travel	9.5l (24.13cm)
Rear Shock	2l Twin Tube
Shock Adjustment	Cam

DRIVE TRAIN

Chain Type	Shaft Drive
Gear Reduction-Low	6.69/1
Gear Reduction-Rev	5.17/1
Gear Reduction-High	3.34/1
Front Drive Ratio	2/1
Center Drive Ratio	N / A
Final Drive Ratio	3.16/1
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center	N / A
Tire Pressure - F/R	5/5 lbs.
Total Width	46l (116.84cm)
Total Length	81l (205.74cm)
Total Length (RSE)	85l (215.9cm)
Total Height	47l (119.38cm)
Wheel Base	50.50l (128.27cm)
Weight - Dry	697 lbs. (316.4kg)
Weight - Dry (RSE)	730 lbs. (331.4kg)

LOAD CAPACITY

Front Rack (Std)	90 lbs.
Rear Rack (Std)	180 lbs.
Tongue Weight	35 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041453-067 Standard 100 lb/in.	7041519-067 Option 140 lb/in.
Front Strut Spring	7041238-067 Option 61 lb/in.	7041375-067 Standard 64/113 lb/in.	7041450-067 Option 101 lb/in.

*Remington t Special Edition

MODEL: . . . . SPORTSMAN 6X6
MODEL NUMBER: . . A00CL50AA
ENGINE MODEL: . . EH50PLE10

CARBURETION

Type . . . . BST 34 Mikuni
Main Jet 142.5
Pilot Jet 40
Jet Needle 4HB41-3
Needle Jet Q-4 (829)
Throttle Valve . . . . #100
Pilot Screw 3
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40°F Below +5°C	+40_to +80_F +5_ to +26_C
Meters (Feet)	0-1800 (0-6000)	147.5	142.5
	Above 1800 Above (6000)	140	135

CLUTCH CHART

Altitude		Shift Weight	Clutch Spring	Driven Helix
Meters (Feet)	0-1800 (0-6000)	10MH	Blue/Green	2-2
	1800-3700 (6000-12000)	10WH	Blue/Green	2-2

40_ helix, red driven

CLUTCH

Type . . . . PVT
Belt 3211077
Belt Width (Projected) 1.188I (30.18mm)
Side Angle (Overall) . . . . . . 26°
Outside Circumference . . . . 40.86 ±.12I
Center Distance . . . . 10±.12I (254.5mm)
Clutch Offset 0.5I (12.7mm)
Shift Weights 10MH
Primary Spring . . . . Blue/Green
Secondary Spring . . . . Red
Driven Helix . . . . Compound
Spring Position (Helix) 2
Spring Position (Sheave) . . 2

ENGINE

Type . . . . 4 Cycle, Single Cyl.
Displacement . . . . 498 cc
Bore 3.625I (92mm)
Stroke 2.955I (75mm)
Valve Clearance In/Ex . . . . 0.006/0.006I @ TDC on compression
Compression Ratio . . . . 10/2 Full Stroke
Cooling . . . . Liquid
Lubrication Type . . . . Dry Sump
Operating RPM±200 . . . . 6000 RPM
Idle RPM±200 (lights off) . . . . . 1200 RPM
Compression Pressure . . . . (Std) ±15%

MODEL: .... **SPORTSMAN 6X6**
MODEL NUMBER: ... **A00CL50AA**
ENGINE MODEL: **EH50PLE10**

ELECTRICAL

Flywheel I.D.	FF97
CDI Marking	CU2557
Alternator Output ...	250 Watts
Ignition Timing	30° BTDC@3500RPM±1.5°
Spark Plug / Gap ...	NGK BKR5E / 0.028″ (0.7mm)
Lights: Head	Halogen 60/60 watts
Tail	8.26 watts
Brake	26.9 watts
Voltage Regulator ..	LR39
Electric Start	Standard

FLUID

FLUID	Capacity	Type
Fuel Tank	4.25 gals. (16L)	
Injector Oil	N / A	
Coolant	2.25 qts. (2.1L)	PP6*
Transmission	32 oz (946ml)	PPS*
Gearcase Oil (Front) .	4 oz. (118ml) .	80-90 GL5
Gearcase Oil (Center)	N / A	
Gearcase Oil (Rear) .	N / A	
Engine Counter Bal. .	N / A	
Engine Oil	2 qts. (1.9L) ..	PP4*
Brake (Hand)		Dot 3
Brake (Foot)		Dot 3
Front Hubs (AWD) ...	2.5 oz. (75ml)	PDD*
Shift Selector Box ...	1 oz. (30ml) ..	PP4*

Lubricant Key
*PP6 Polaris Premium 60/40 Antifreeze/Coolant
*PPS Polaris Premium Synthetic Gear Case Oil
*PP4 Polaris 0W/40 Synthetic Engine Lubricant
*PDD Premium Demand Drive Hub Fluid

SUSPENSION / CHASSIS

Body Style	Gen IV
Front Suspension ..	MacPherson Strut
Tow Capacity	1225 lbs. (556.2kg)
Turning Radius	98″ (248.9cm)
Toe Out	1/8″-1/4″ (3-6.35mm)
Ground Clearance ..	5.5″ (13.97cm)
Front Vertical Travel	6.7″ (17.02cm)
Rear Suspension ...	Swing Arm w/Scissor Stabilizer
Rear Travel	7.5″ (19.06cm)
Rear Shock	2″ Gas Charged Twin Tube
Shock Adjustment ..	N / A
Center Suspension .	Progressive Rate Swing Arm
Center Travel	6.5″ (16.5cm)
Center Shock	1-5/8″ Twin Tube
Shock Adjustment ..	Cam

DRIVE TRAIN

Chain Type	520 O-Ring
Gear Reduction-Low .	6.691
Gear Reduction-Rev .	5.17/1
Gear Reduction-High	3.34/1
Front Drive Ratio	2/1
Center Drive Ratio ...	N / A
Final Drive Ratio	12/38 80P
Axle to Axle	30/30 116P
Brake (Hand)	Single Lever, Hyd. Disc
Brake (Auxiliary Foot)	Hydraulic

TIRES

Tire Size - Front	25 x 8 - 12
Tire Size - Rear	25 x 11 - 10
Tire Size - Center ..	25 x 11 - 10
Tire Pressure - F/R .	5/5/5 lbs.
Total Width	46″ (116.84cm)
Total Length	105″ (266.7cm)
Total Height	48″ (121.92cm)
Wheel Base	76.5″ (194.3cm)
Weight - Dry	895 lbs. (406.4kg)

LOAD CAPACITY

Front Rack	75 lbs.
Rear Rack	800 lbs.
Tongue Weight	35 lbs.
Tow Hitch	Std

OPTIONAL SUSPENSION SPRINGS

	SOFT	STANDARD	FIRM
Rear Compression Spring	N / A	7041880-067 Standard 210/250 lb/in.	N / A
Mid Compression Spring	N / A	7041878-067 Standard 100/160 lb/in.	N / A
Front Strut Spring	7041375-067 Option 64/113 lb/in.	7041450-067 Standard 101 lb/in.	7041696-067 Option 140/190 lb/in.

NOTES

CHAPTER 2
MAINTENANCE

Inspection, adjustment and lubrication intervals of important components is listed in the following chart. Maintenance intervals are based upon average riding conditions and a vehicle speed of approximately 10 mph. Inspect, clean, lubricate, adjust or replace parts as necessary. **NOTE:** Inspection may reveal the need for replacement parts. Always use genuine Polaris parts.

■**CAUTION:** Due to the nature of these adjustments, it is recommended that service be performed by an authorized Polaris dealer.

▶Vehicles subjected to severe use (operation in wet or dusty areas, low speed heavy load operation, prolonged idle) should be inspected and serviced more frequently. For engine oil, short trip cold weather riding also constitutes severe use. Pay special attention to oil level. A rise in oil level in cold weather can indicate moisture collecting in the oil tank. Change oil immediately if oil level begins to rise.

E Emission Control System Service (California).

PERIODIC MAINTENANCE - ENGINE					
		Frequency (Whichever comes first)			
	Item	**Hours**	**Calendar**	**Miles (Km)**	**Remarks**
E▶	Engine Oil - Level/Change	100 hrs	6 months	1000 (1600)	Check Level Daily; Break In service at 1 month
E	Oil Filter (4-strokes)	100 hrs	6 months	1000 (1600)	Replace with oil change
	Oil Filter (2-strokes)	100 hrs	12 months	1000 (1600)	Replace
	Oil Pump Cable (2-strokes)	50 hrs	6 months	500 (800)	Inspect, Adjust, Lubricate, Replace if Required
E▶	Air Filter - Foam Pre-Cleaner	Daily	Daily		Inspect-Clean & oil more often in dirty conditions.
E▶	Air Filter - Main Element	Weekly	Weekly		Inspect - Replace if necessary
▶	Air Box Sediment Tube	-	Daily		Drain deposits whenever visible
▶	Engine Breather Filter	20 hrs	Monthly	200 (320)	Inspect and replace if necessary
▶	Oil Tank Vent Hose	100 hrs	12 months	1000 (1600)	Inspect hose routing /hose condition
E■	Valve Clearance (4-strokes)	100 hrs	12 months	1000 (1600)	Inspect/Adjust
▶	Counter Balancer Fluid (400s)	100 hrs	12 months	1000 (1600)	Check Monthly / Change Annually
E	Idle Speed	As required	As required		Adjust
■	Throttle Cable / ETC Switch	50 hrs	6 months	500 (800)	Inspect -Adjust, Lubricate, Replace if necessary
	Choke (Enricher) Cable	50 hrs	6 months	500 (800)	Inspect -Adjust, Lubricate, Replace if necessary
	Carburetor Float Bowl	50 hrs	6 months	500 (800)	Drain bowl periodically and prior to storage
	Carburetor Air Intake Ducts/Flange	50 hrs	6 months	500 (800)	Inspect all ducts for proper sealing/air leaks
E■	Fuel System	100 hrs	12 months	1000 (1600)	Check for leaks at tank cap, lines, fuel valve, filter, pump & carburetor. Replace lines every 2 years.
E■	Fuel Filter	100 hrs	12 months	1000 (1600)	Replace filter annually
	Coolant/Level Inspection	Daily	Daily		Replace engine coolant every 2 years
	Coolant Strength / Pressure Test System	100 hrs	6 months	1000 (1600)	Inspect strength seasonally; Pressure test system annually
	Radiator	100 hrs	12 months	1000 (1600)	Inspect / Clean external surface
	Cooling System Hoses	100 hrs	12 months	1000 (1600)	Inspect
	Engine Mounts	100 hrs	12 months	1000 (1600)	Inspect
	Drain Recoil Housing	Weekly	Weekly		More often if operating in wet environment
	Exhaust Muffler / Pipe	100 hrs	12 months	1000 (1600)	
ELECTRICAL					
E	Spark Plug	100 hrs	12 months	1000 (1600)	Inspect - Replace if necessary
	Ignition Timing	100 hrs	12 months	1000 (1600)	Inspect
	Battery	20 hrs	Monthly	200 (320)	Check terminals; Clean; Check fluid level
	Headlight Aim	As required	As required		Adjust if Necessary
	Headlamp Inspection	Daily	Daily		Check operation daily; Apply Polaris Dielectric Grease to connector when lamp is replaced
	Tail Lamp Inspection	Daily	Daily		Check Operation Daily; Apply Polaris Dielectric Grease to socket when lamp is replaced

CHASSIS					
		Frequency (Whichever comes first)			
	Item	Hours	Calendar	Miles (Km)	Remarks
▶	General Lubrication	50 hrs	3 months	500 (800)	Lubricate All Fittings, Pivots, Cables, Etc.
▶	Front Hubs/Fluid Check	50 hrs	6 months	500 (800)	Check monthly
▶	Front Hubs/Fluid Change	100 hrs	12 months	1000 (1600)	Check monthly
■	Front Wheel Bearings (2x4)	Annually	12 months		Inspect and replace if necessary
■	Front Hub Spindle Nut Torque (AWD Models)	Annually	12 months		Inspect Torque and Locking Fastener and replace if necessary
	Drive Belt	50 hrs	6 months	500 (800)	Inspect - Adjust, Replace if Necessary
	Clutches (Drive And Driven)	100 hrs	12 months	1000 (1600)	Inspect, Clean
▶	Transmission Oil Level	25 hrs	Monthly	250 (400)	Inspect Monthly; Change Annually
	Shift Linkage	50 hrs	6 months	500 (800)	Inspect,Lubricate, Adjust
	Shift Selector Box	200 hrs	24 months	2000 (3200)	Change Lubricant Every Two Years
■	Steering	50 hrs	6 months	500 (800)	Inspect Daily, Lubricate
■	Toe Adjustment	As required	As required		Periodic Inspection, Adjust When Parts are Replaced
▶	Rear Axle	50 hrs	6 months	500 (800)	Inspect Bearings, Grease Fitting
▶	Front Suspension	50 hrs	6 months	500 (800)	Inspect - Lubricate
▶	Rear Suspension	50 hrs	6 months	500 (800)	Inspect - Lubricate
	Drive Chain	50 hrs	6 months	500 (800)	Inspect Daily, Adjust and Lubricate if Needed
	Tires	Pre-ride	Pre-ride		Inspect Daily, Pre-Ride Inspection Item
■	Brake Fluid	200 hrs	24 months	2000 (3200)	Change Every Two Years
▶	Brake Fluid Level	Pre-ride	Pre-ride		Inspect Daily, Pre-Ride Inspection Item
▶	Brake Lever Travel	Pre-ride	Pre-ride		Inspect Daily, Pre-Ride Inspection Item
■	Brake Pad Wear	10 hrs	Monthly	100 (160)	Inspect Periodically
	Auxiliary Brake Adjustment	As required	As required		Inspect Deflection Daily; Adjust
	Output Shaft Bearing	Monthly	Monthly		Grease Monthly
	Brake System	Pre-ride	Pre-ride		Pre-Ride Inspection Item
	Wheels	Pre-ride	Pre-ride		Pre-Ride Inspection Item
	Frame Nuts, Bolts, Fasteners	Pre-ride	Pre-ride		Pre-Ride Inspection Item

Pre-Ride / Daily Inspection

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

- Tires - check condition and pressures
- Fuel and oil tanks - fill both tanks to their proper level; Do not overfill 4-stroke oil tank
- All brakes - check operation and adjustment (includes auxiliary brake)
- Throttle - check for free operation and closing
- Headlight/Taillight/Brakelight - check operation of all indicator lights and switches
- Engine stop switch - check for proper function
- Wheels - check for tightness of wheel nuts and axle nuts; check to be sure axle nuts are secured by cotter pins
- Drive chain - condition and slack; refer to drive chain adjustment
- Air cleaner element - check for dirt; clean or replace
- Steering - check for free operation noting any unusual looseness in any area
- Loose parts - visually inspect vehicle for any damaged or loose nuts, bolts or fasteners
- Engine coolant - check for proper level at the recovery bottle

Recommended Lubricants - Quick Reference

Lubricants and maintenance product part numbers are listed on page 2.4. Refer to Specifications Chapter 1 for capacity information.

Item	Type	Notes	See Chapter
Engine Oil 4-Strokes	Polaris Premium 4 Synthetic, 0W/40	Add to proper level on dipstick.	2
Engine Injector Oil (2-Strokes)	Polaris Premium TC-W3 2-Stroke oil	Add to top of oil reservoir as required.	2
Counter Balancer Oil (400L Engines)	SAE 10W30 Motor Oil (SG/SH Rated)	Add to proper level on dipstick.	2
Transmission	Polaris Synthetic Gear Case Lubricant	Refer to procedures outlined later in this chapter.	2
Front Gear Case (Shaft Drive)	Premium Front Gearcase Fluid or GL5 80-90 Gear Lube	Refer to procedures outlined later in this chapter.	2
Gear Shift Selector Box	Polaris 0W/40 Synthetic Engine Lubricant or 10W Motor Oil	Oil in selector box should be at the center line of the shift selector plungers. Do not overfill or the selector may hydro-lock.	8
Coolant Level	Polaris Premium 60/40 Pre-mixed Antifreeze/ Coolant or a 50/50 mixture high quality antifreeze/ coolant and distilled water	Fill reservoir tank to full line. Add if necessary. If reservoir was empty or extremely low, allow engine and cooling system to cool completely and check level in radiator. Fill to top of filler neck.	2
Front Hubs (AWD Models)	Premium Demand Drive Hub Fluid	Fill hub at 4:00 or 8:00 position until fluid trickles out. Do not force fluid into hub.	2
Brake Fluid	Polaris DOT 3 Brake Fluid	-Fill between “Min” & “Max” indicators on plastic reservoir.	2

Cold Weather Kits for 4 Cycle ATVs and 6x6

Oil Tank Cover – PN 287187

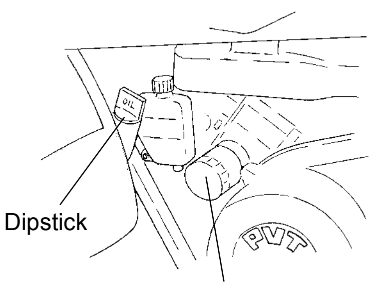
Engine Heater – PN 2871507

Oil Tank Heater – PN 2871873

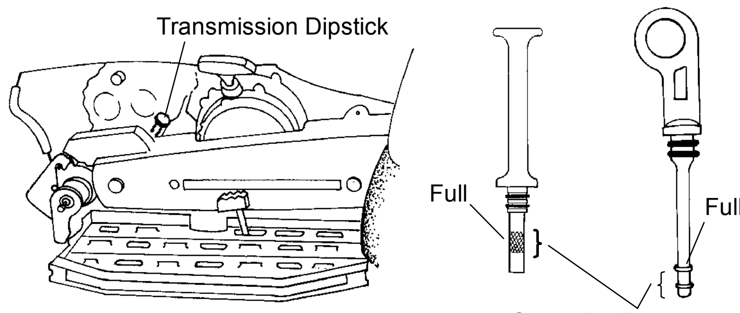
Polaris Premium Lubricant and Maintenance Product Part Numbers

Part No.	Description
	Engine Lubricant
2870791	Fogging Oil
2871281	Engine Oil (Quart) Premium 4 Synthetic 0-W40 (4-Cycle)
2871567	Engine Oil (16 Gallon) Premium 4 Synthetic 0-W40 (4-Cycle)
2871098	Premium 2 Cycle Engine Oil (Quart)
2871097	Premium 2 Cycle Engine Oil (Gallon)
2871240	Premium 2 Cycle Engine Oil (2.5 Gallon)
2871566	Premium 2 Cycle Engine Oil (16 Gallon)
2871385	Premium 2 Cycle Engine Oil (30 Gallon)
2871240	Premium 2 Cycle Engine Oil (55 Gallon)
2871721	Premium Gold 2 Cycle Synthetic Lubricant
	Gearcase / Transmission Lubricants
2871477	Premium Synthetic Gearcase Lubricant (1 Gal.)
2871478	Premium Synthetic Gearcase Lubricant (12 oz.. bottle)
2870465	Oil Pump for Gearcase Oil
2871653	Premium Front Gearcase Fluid (12 oz..)
	Grease / Specialized Lubricants
2871322	Premium All Season Grease (3 oz.. cartridge)
2871423	Premium All Season Grease (14 oz.. cartridge)
2871460	Starter Drive Grease
2871515	Premium U-Joint Lube (3 oz..)
2871551	Premium U-Joint Lube (14 oz..)
2871312	Grease Gun Kit
1350046	CV Joint Grease Pack (30g)
1350047	CV Joint Grease Pack 50g
2871329	Dielectric Grease (Nyogel t)
2871654	Premium Demand Drive Hub Fluid (12 oz..)
	Coolant
2871323	60/40 Coolant Gallon
2871534	60/40 Coolant Quart
	Additives / Sealants / Thread Locking Agents / Misc.
2870585	Loctite t Primer N, Aerosol, 25g
2871949	Loctite t Threadlock 242 (50ml.)
2871950	Loctite t Threadlock 242 (6ml.)
2871951	Loctite t Threadlock 262 (50ml.)
2871952	Loctite t Threadlock 262 (6ml.)
2871953	Loctite t Threadlock 271 (6ml.)
2871954	Loctite t Threadlock 271 (36ml.)
2870584	Loctite t RC 680-Retaining Compound (10ml.)
2870587	Loctite t 518 Gasket Eliminator / Flange Sealant (50ml.)
2871326	Premium Carbon Clean 12 oz..
2870652	Fuel Stabilizer 16 oz..
2871957	Black RTV Silicone Sealer (3 oz.. tube)
2871958	Black RTV Silicone Sealer (11 oz.. cartridge)
8560054	Marine Grade Silicone Sealer (14 oz.. cartridge)
2870990	DOT3 Brake Fluid
2872113	Disc Brake Quiet, Aerosol, (9 oz..)
2871557	Crankcase Sealant, 3-Bond 1215

Ill. #	Item	Lube Rec.	Method	Frequency*
1	Engine Oil (4 Strokes)	Polaris 0W/40 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 Synthetic Gear Case Lubricant	Add lube to FULL level on dipstick. NOTE: See page 2.10 for models without a dipstick.	Change annually ©
3	Brake Fluid	Polaris DOT 3 Brake Fluid	Fill master cylinder reservoir to 1/4″ (6.4mm) from top, or between indicated lines. See page 2.57 .	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*
5	Middle Chain			
6	Front Chain			

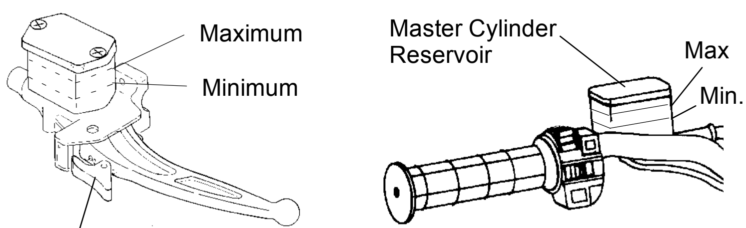


1. Engine Oil and Filter (4 Cycle)

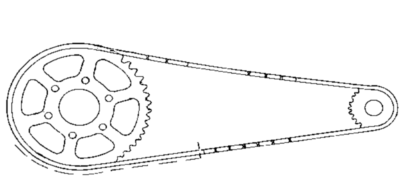


2. Transmission (Models Equipped With A Dipstick)

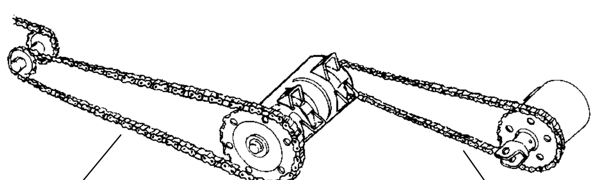
Operating Range



3. Brake Fluid (Left hand Master Cylinder)

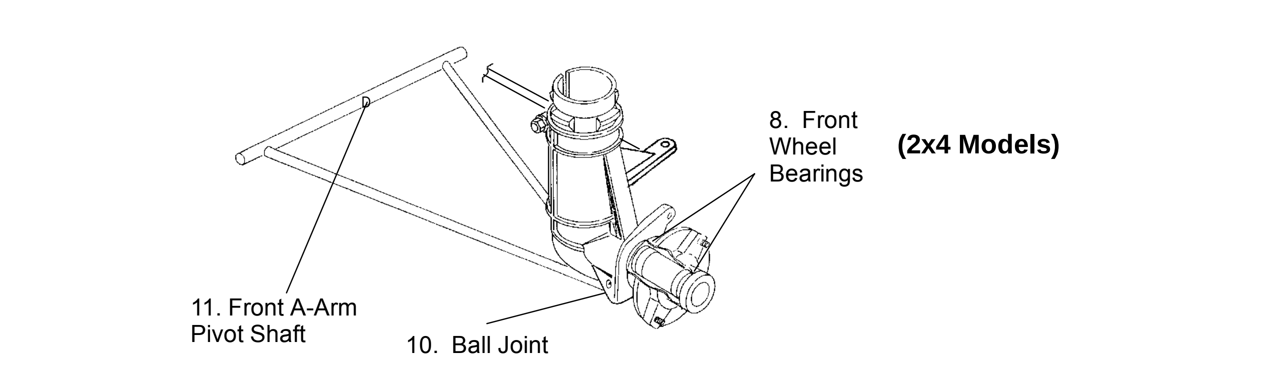


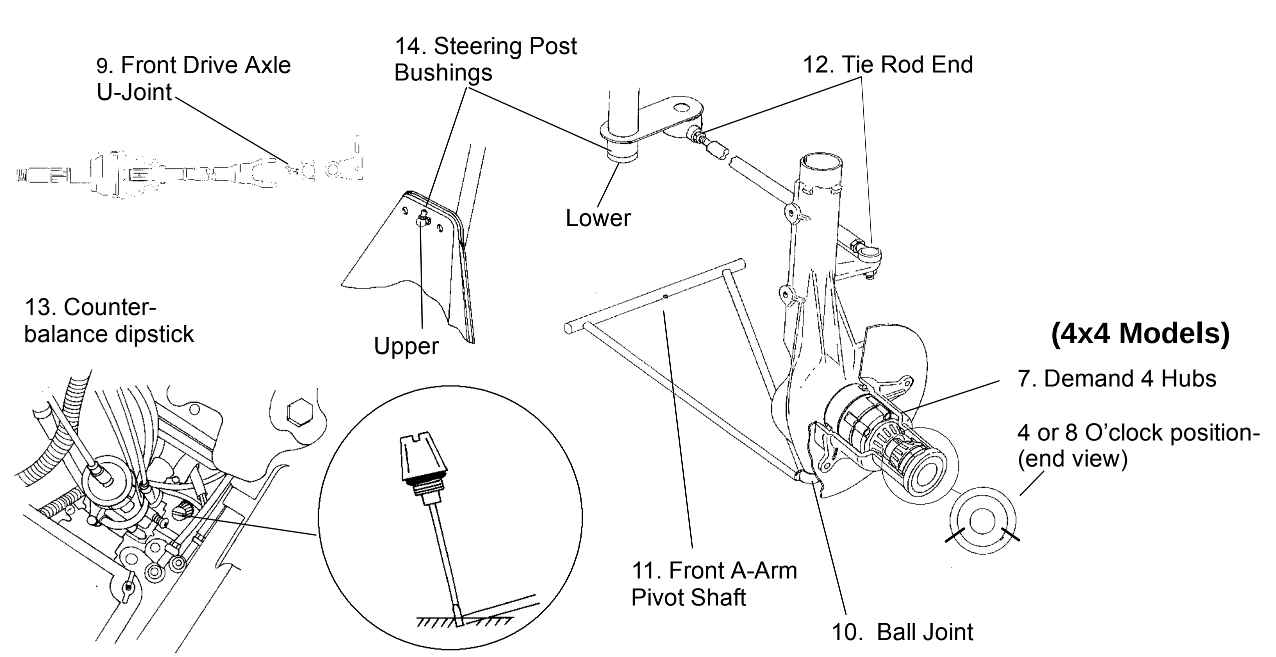
4. Rear Drive Chain



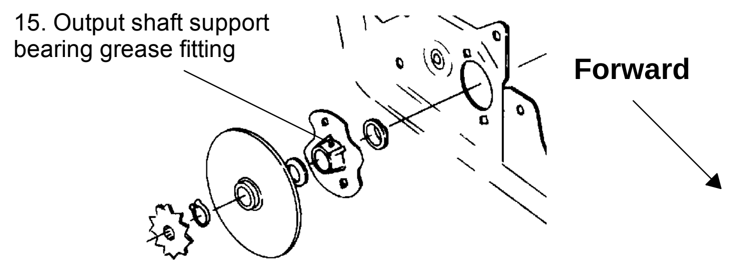
5. Middle Drive Chain

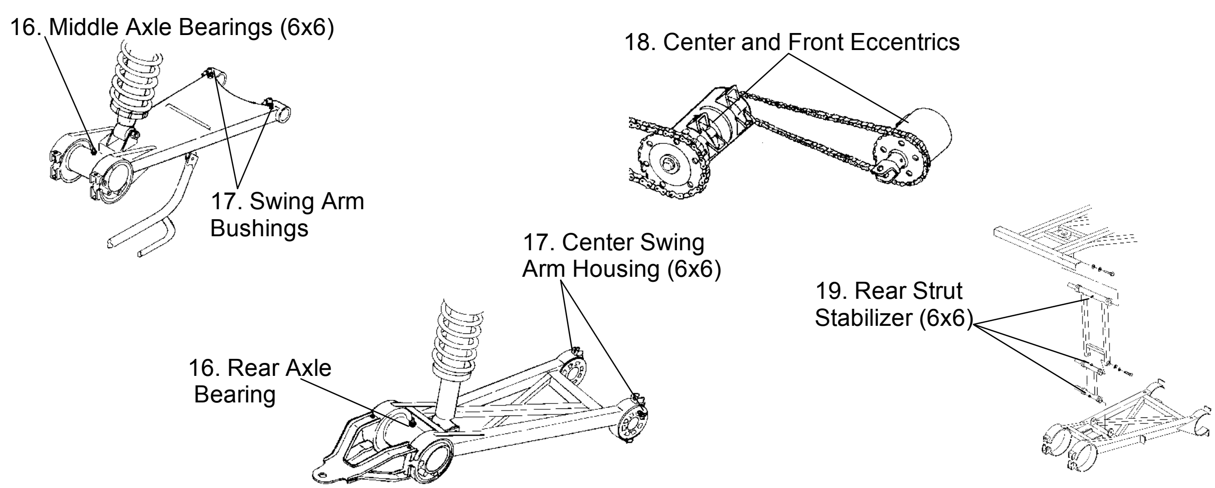
6. Front Drive Chain





Ill. #	Item	Lube Rec.	Method	Frequency*
7	Demand 4 Hubs - All Wheel Drive ATVs	Polaris Demand Drive Hub Fluid or ATF Type F	Remove filler hole screw in hubs. Rotate wheels to 4 or 8 O'clock position. If lubricant is not visible add until it flows from filler hole. Reinstall screw.	Semi-annually ¡
8	Front Wheel Bear-ings - Non - driving front wheels	Sealed; Replace	Inspect and replace bearings if necessary	Annually ©
9	Front Drive Axle "U" Joints	Polaris U-Joint Grease ¢	Locate grease fitting and grease with grease gun.	Semi-annually ¡
10	Ball Joint	Polaris All Season Grease ¢	Locate grease fitting on back side of struts and grease with grease gun.	Semi-annually ¡
11	Front A-Arm Pivot Shaft	Polaris All Season Grease ¢	Locate grease fitting on pivot shaft and grease with grease gun.	Semi-annually ¡
12	Tie Rod Ends	Polaris All Season Grease ¢	Lift boot. Clean away dirt and grease. Apply fresh grease by hand and reassemble.	Semi-annually ¡
13	Counter Balance Housing (400L)	10W30 Motor Oil	Check level on dipstick and add oil as necessary. Change annually. To change oil see page 2.16.	Change Annually ©
14	Steering Post Bush-ings	All Season Grease ¢	Locate fittings on upper and lower steering post and grease with grease gun.	Semi-annually ¡





Ill. #	Item	Lube Rec.	Method	Frequency*
15	Transmission Output Shaft	Polaris All Season Grease ¢	Locate grease fitting on transmission output shaft and grease with grease gun.	Semi-annually ¡
16	Rear and Middle Axle Bearings (6x6)	Polaris All Season Grease ¢	Locate grease fitting on eccentric and grease with grease gun.	Semi-annually ¡
17	Swing Arm Bushings and Center Swing Arm Housing (6x6)	Polaris All Season Grease ¢	Locate grease fitting on swing arm and grease with grease gun.	Semi-annually ¡
18	Chain Adjusters (Center and Front Eccentrics)	Polaris All Season Grease ¢	Locate grease fitting on center eccentric and grease. Locate grease fitting on front eccentric (side opposite chain) and grease.	Semi-annually ¡
19	Rear Strut (6x6)	Polaris All Season Grease ¢	Locate fitting on rear strut and grease with grease gun.	Semi-annually ¡

***** More often under severe use, such as wet or dusty conditions

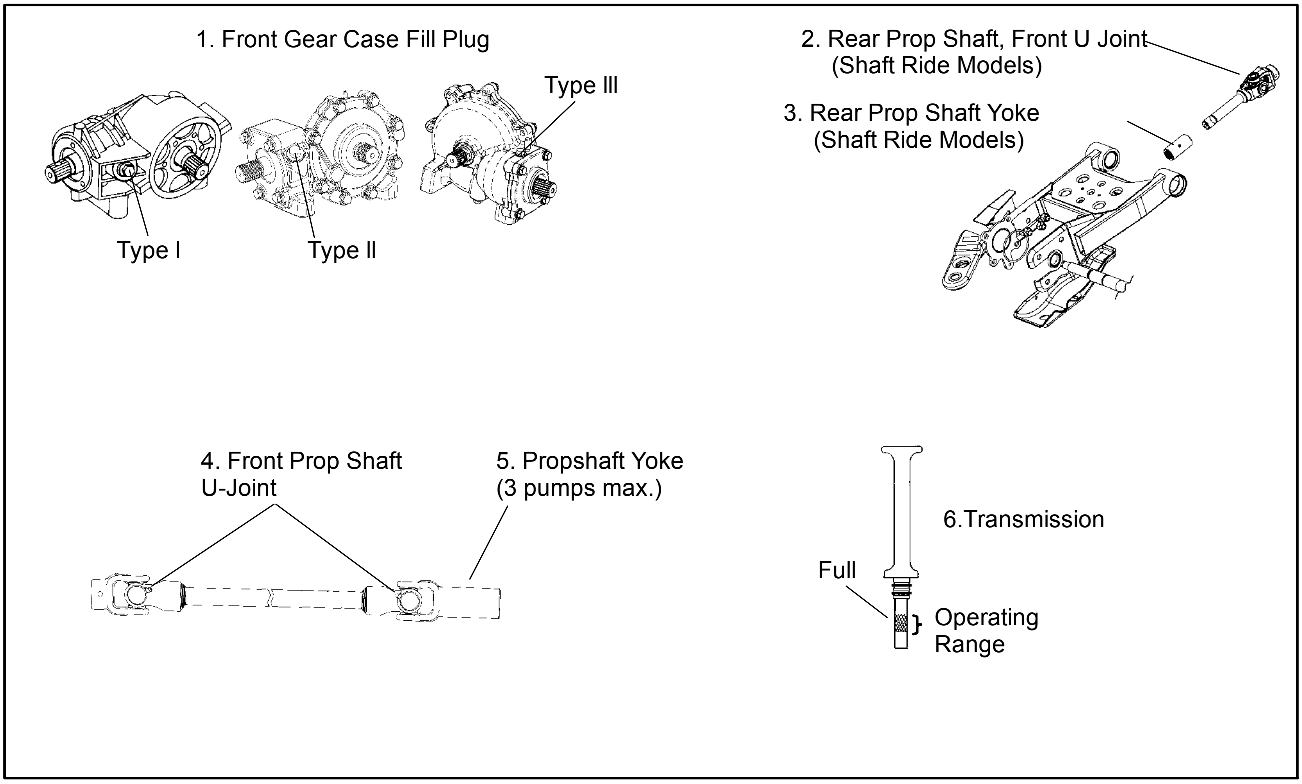
¡ Semi-annually or 50 hours of operation (refer to Maintenance Schedule for additional information)

© 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

Lubrication - Shaft Drive Models

NOTE: On Shaft Drive models, lubricate these areas in addition to applicable general lubrication items.



Ill. #	Item	Lube Rec.	Method	Frequency*
1	Front Gearcase Oil	GL5 80-90 Weight Gear Lube	Add to bottom of fill plug threads. See page NO TAG	Change annually ©
2	U-Joint - Rear Prop Shaft, Front (Shaft Ride Models)	Premium U-Joint Grease	Locate Fittings and Grease	Semi-annually ¡
3	Yoke - Rear Prop Shaft (Shaft Ride Models)	Premium U-Joint Grease	Locate Fittings and Grease	Semi-annually ¡
4	U-Joints - Front Prop Shaft	Premium U-Joint Grease	Locate Fittings and Grease	Semi-annually ¡
5	Propshaft Yoke	Premium U-Joint Grease	Locate fittings and grease - 3 pumps maximum	Annually ©
6	Transmission	Synthetic Transmission Lubricant	Add to proper level on dipstick. Approx. 20 oz.. at change; Approx. 32 oz.. initial fill after disassembly.	Inspect Monthly; Change annually ©

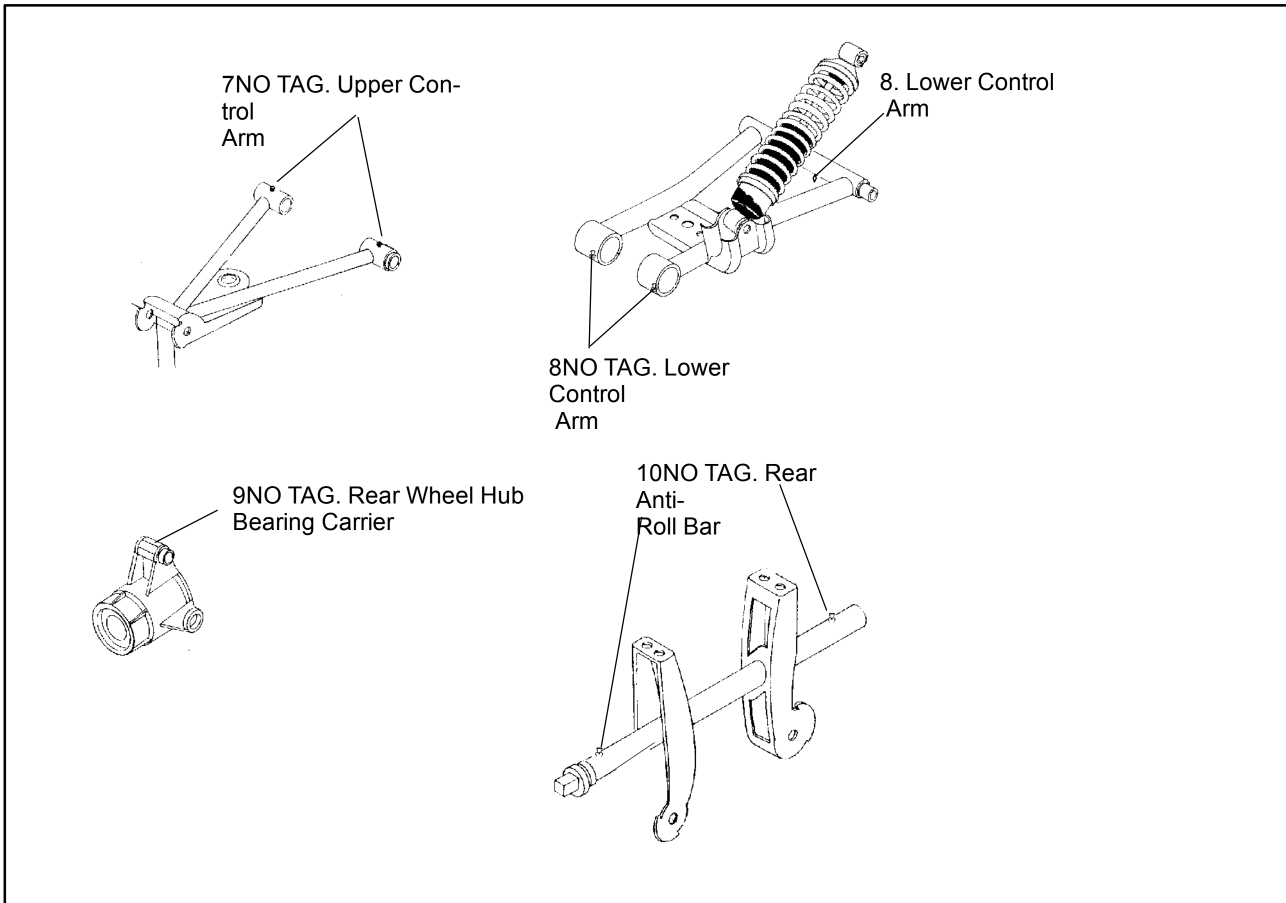
* More often under severe use, such as wet or dusty conditions

¡ 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

NOTE: On Shaft Drive models, lubricate these areas in addition to applicable general lubrication items.



Ill. #	Item	Lube Rec.	Method	Frequency*
7	Upper Control Arms	Polaris All Season Grease ¢	Locate fittings and grease	Semi-annually ¡
8	Lower Control Arms	Polaris All Season Grease ¢	Locate fittings and grease	Semi-annually ¡
9	Rear Wheel Hub Bearing Carrier	Polaris All Season Grease ¢	Locate fittings and grease	Semi-annually ¡
10	Rear Anti-Roll Bar	Polaris All Season Grease ¢	Locate fittings and grease	Semi-annually ¡

* More often under severe use, such as wet or dusty conditions

¡ 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

Gearcase Lubrication - Quick Reference

Refer to the following chart and the illustrations on the following pages for gearcase capacity and maintenance procedures.

1999 MODEL (Except where noted)	MODEL #	GEAR - CASE	TYPE	OIL QUANTITY (fl.oz.. / ml..)	OIL TYPE*	CHECK METHOD
Trail Boss 250	A99AA25CA	Trans.		16.5 oz. / 489 ml.	PPS	Dipstick
Trail Blazer	A99BA25CA	Trans.		11.3 oz.. / 335 ml.	PPS	Dipstick
Xplorer 300	A99CC28CA	Trans.		20 oz.. / 592 ml.	PPS	Dipstick
Xpress 300	A99CA28CA	Trans.		20 oz.. / 592 ml.	PPS	Dipstick
Sportsman 335	A99CH33CA	Trans.		32 oz.. / 984 ml. ¡	PPS	Dipstick
		Front (Early)	Type I Front	4 oz.. / 118 ml.	80-90 GL-5	Bottom of fill plug threads
		Front (Late)	Type II Front	4 oz.. / 118 ml.	80-90 GL-5	Drain/Refill w/ proper amount
Scrambler 400	A99BG38CA	Trans.		32 oz.. / 948 ml.	PPS	Bottom of fill hole
		Front	Type II Front	4 oz. / 118 ml.	80-90 GL-5	Drain/Refill w/ proper amount
Xplorer 400	A99CG38CA	Trans.		32 oz.. / 948 ml.	PPS	Bottom of fill hole
		Front	Type II Front	4 oz.. / 118 ml.	80-90 GL-5	Drain/Refill w/ proper amount
Sport 400	A99BA38CA	Trans.		11.3 oz.. / 335 ml.	PPS	Dipstick
Scrambler 500	A99BG50AA	Trans.		32 oz.. / 948 ml.	PPS	Bottom of fill hole
		Front	Type II Front	4 oz.. / 118 ml.	80-90 GL-5	Drain/Refill w/ proper amount
Magnum 500	A99CD50AA	Trans.		13.5 oz.. / 400 ml.	PPS	Bottom of fill hole
		Front	Type III Front	5 oz.. / 150 ml.	80-90 GL-5	Drain/Refill w/ proper amount
		Rear		10 oz.. / 300 ml.	80-90 GL-5	Bottom of fill hole
Sportsman 500	A99CH50AA	Trans.		32 oz.. / 948 ml. ¡	PPS	Dipstick
		Front (Early)	Type I Front	4 oz.. / 118 ml.	80-90 GL-5	Bottom of fill plug threads
		Front (Late)	Type II Front	4 oz.. / 118 ml.	80-90 GL-5	Drain/Refill w/ proper amount
Big Boss 6x6	A99AE50AA	Trans.		20 oz.. / 592 ml.	PPS	Dipstick
		Front (Early)	Type I Front	4 oz.. / 118 ml.	80-90 GL-5	Bottom of fill plug threads
		Front (Late)	Type II Front	4 oz.. / 118 ml.	80-90 GL-5	Drain/Refill w/ proper amount

Approximately 30 ml. (30 cc) = 1 fluid oz..

***(PPS =)Polaris Premium Synthetic Gearcase Lubricant**

¡ Capacity when disassembled completely. Capacity at change (after draining) is approximately 20 fl. oz.. (592 ml.)

© Middle Angle Drive (Complete Assembly) is P/N 1341239

¢ Rear Angle Drive (Complete Assembly) is P/N 1341246

Front Gearcase Lubrication

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

- Be sure vehicle is level before proceeding.
- Check vent hose to be sure it is routed properly and unobstructed.
- Current gearcases in use are shown by illustration. Refer to illustrations to determine type, and follow instructions to check / change gearcase lubricant.
- The correct gearcase lubricant to use is Polaris Premium GL5 80-90 Gear Lube, or an equivalent lubricant with a GL5 rating.

FRONT GEARCASE SPECIFICATIONS
(Type I, II, and III)

Specified Lubricant:
Polaris Front Gearcase Lube PN 2871653

...Or API GL5 80-90 Gearlube

Capacity: Type I & II . . 4.0 Oz. (120ml.)
Type III . . . . . 5.0 Oz. (150ml.)
Drain Plug / Fill Plug Torque:

14 ft. lbs. (19.4 Nm)

TYPE I

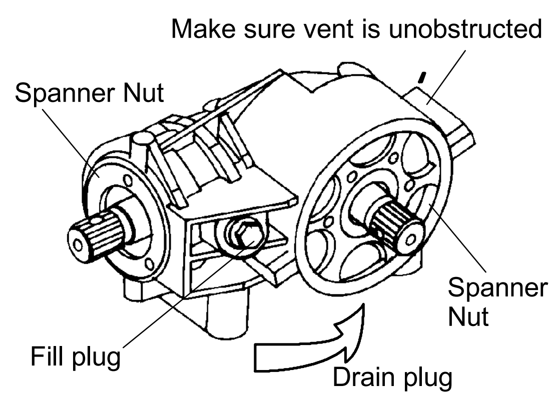
To check the level:

1. Remove fill / check plug.
2. Add proper lubricant if necessary until level with bottom of fill hole threads.
3. Install fill / check plug.

To change lubricant:

1. Remove gearcase drain plug located on the bottom and drain oil. Catch and discard used oil properly.
2. Clean and reinstall drain plug using a new sealing washer.
3. Remove fill plug.
4. Add proper lubricant to bottom of fill hole threads. Refer to page 2.10.
5. Install fill plug.
6. Check for leaks.

TYPE I



Front Gearcase Lubrication, Cont.

TYPE II

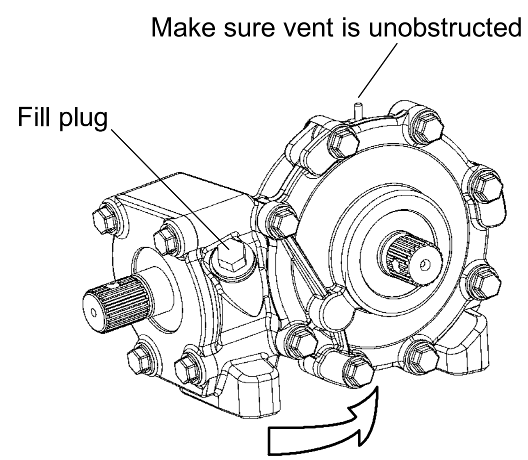
To check the level:

1. The Type II front gearcase lubricant level *cannot be checked* with a dipstick or by visual reference. The gearcase must be drained and re-filled with the proper amount of lubricant. Refer to procedure below.

To change lubricant:

1. Remove gearcase drain plug located on the bottom and drain oil. Catch and discard used oil properly.
2. Clean and reinstall drain plug using a new sealing washer.
3. Remove fill plug.
4. Add proper amount of lubricant. Refer to page 2.10.
5. Install fill plug.
6. Check for leaks.

TYPE II



TYPE III

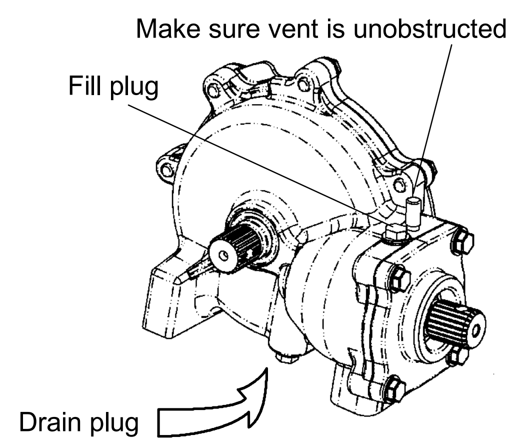
To check the level:

1. The Type III front gearcase lubricant level *cannot be checked* with a dipstick or by visual reference. The gearcase must be drained and re-filled with the proper amount of lubricant. Refer to procedure below.

To change lubricant:

1. Remove gearcase drain plug located on the bottom and drain oil. Catch and discard used oil properly.
2. Clean and reinstall drain plug using a new sealing washer.
3. Remove fill plug.
4. Add proper amount of lubricant. Refer to page 2.10.
5. Install fill plug.
6. Check for leaks.

TYPE III



Rear Gearcase Lubrication

To check the level:

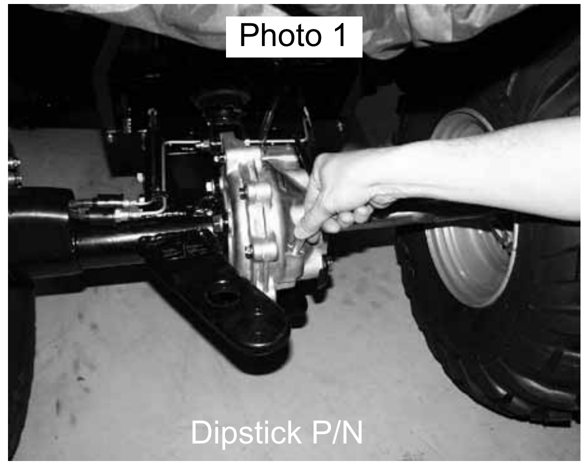
1. With machine on level ground, remove fill plug from rear gearcase.
2. Insert dipstick until it stops squarely against the fill plug gasket surface, and then remove it (Photo 1). Lubricant level is acceptable if it is within the knurled area on the stick. The level can be checked without a dipstick. Refer to Photo 2 (below right).
3. If level is low, add the proper lubricant until level correct on the dipstick, or until it is even with the center of the machined drill point inside the gearcase when viewed through the fill plug. Hypoid or non-hypoid gearlube can be used, provided it is API GL5 rated.

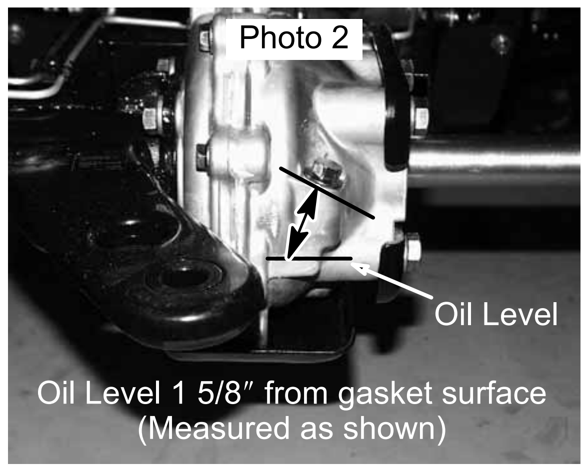
NOTE: Do not add lubricant to the bottom of the fill plug threads. Tighten securely (14 ft. lbs/1.93 kgm).

4. Reinstall fill plug.
5. Check for leaks.

To change the lubricant:

1. Remove gearcase drain plug located on the bottom and drain the oil. Catch and discard used oil properly.
2. Clean and reinstall the drain plug with a new sealing washer and tighten securely (14 ft. lbs/1.93 kgm).
3. Remove fill plug.
4. Add 300 ml. of GL5 80-90 Weight Gear Lube and inspect level. Oil level should be even with the center of the machined drill point inside the gearcase, viewed through the fill plug. Hypoid or non-hypoid gearlube can be used, provided it is API GL5 rated.
5. Reinstall fill plug. Tighten securely (14 ft. lbs/1.93 kgm).
6. Check for leaks.





REAR GEARCASE SPECIFICATIONS

Specified Lubricant:
Polaris Front Gearcase Lube PN 2871653
...Or API GL5 80-90 Gearlube

Capacity: .... 10.0 Oz. (300ml.)

Drain Plug / Fill Plug Torque:

14 ft. lbs. (19.4 Nm)

Transmission Lubrication

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

- Be sure vehicle is level before proceeding.
- Check vent hose to be sure it is routed properly and unobstructed.
- Current gearcases in use are shown by illustration. Refer to illustrations and Quick Reference Chart on page 2.10 to determine type. Follow instructions on following pages to check / change transmission lubricant.

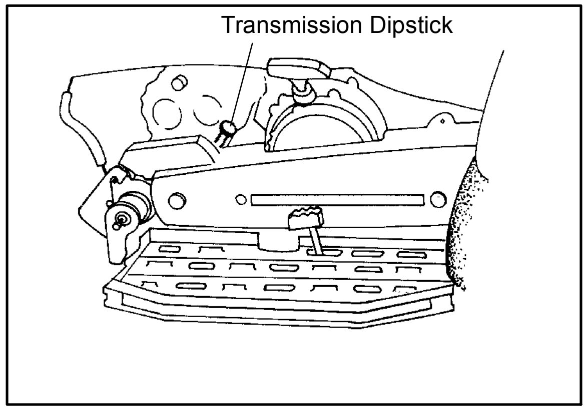
TRANSMISSION SPECIFICATIONS

Specified Lubricant:
Polaris Premium Synthetic Gearcase Lubricant
PN 2871477 (Gallon) PN 2871478 (12 oz..)

Capacity: .... Refer to Quick Reference Chart page 2.10

Drain Plug / Fill Plug Torque:

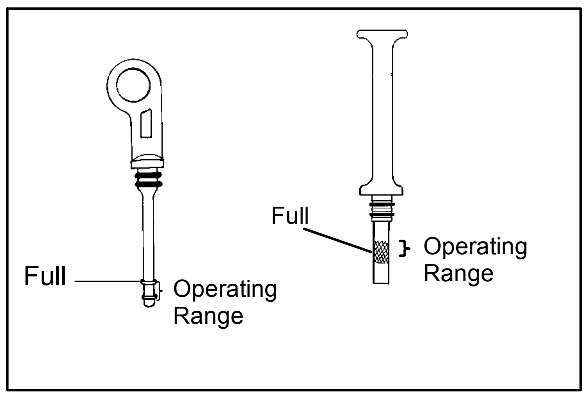
14 ft. lbs. (19.4 Nm)



Dipstick Models

To check the level:

1. Remove fill plug/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 in Ill. 1 and Ill. 2.



To change lubricant:

1. Remove skid plate (if necessary).
2. Place a drain pan beneath the transmission oil drain plug area.
3. Remove the drain plug and wipe the magnetic end clean to remove accumulated metallic filings.
4. After the oil has drained completely, install a new sealing washer and install the drain plug. Torque to 14 ft. lbs. (1.93 kg-m).
5. Add the proper lubricant through the dipstick hole until the oil level is between the upper and lower limits. Do not overfill.
6. Check for leaks.
7. Reinstall skid plate if removed in step 1.

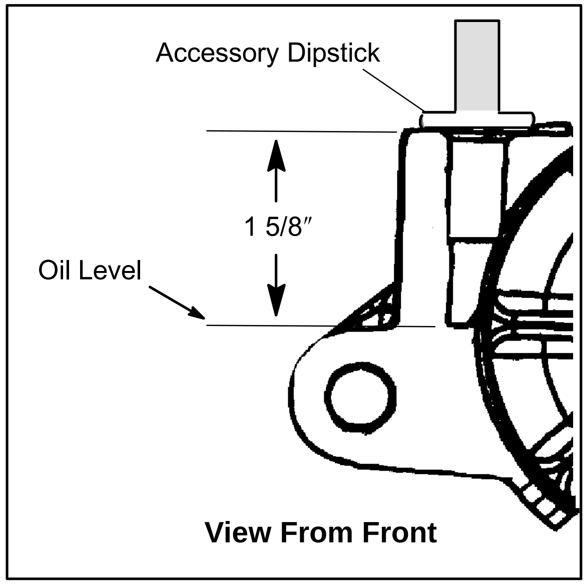
Transmission Lubrication, cont.

Shaft / Chain Models Without Dipstick

To check the level:

1. Remove propshaft shield from the right side of the vehicle.

2. Remove fill plug and visually inspect the oil level. Level is correct when it reaches the bottom of the fill hole as shown at right.



View From Front

To change lubricant:

1. Remove propshaft shield from the right side of the vehicle.

2. Remove transmission drain plug drain the oil. Catch and discard used oil properly.

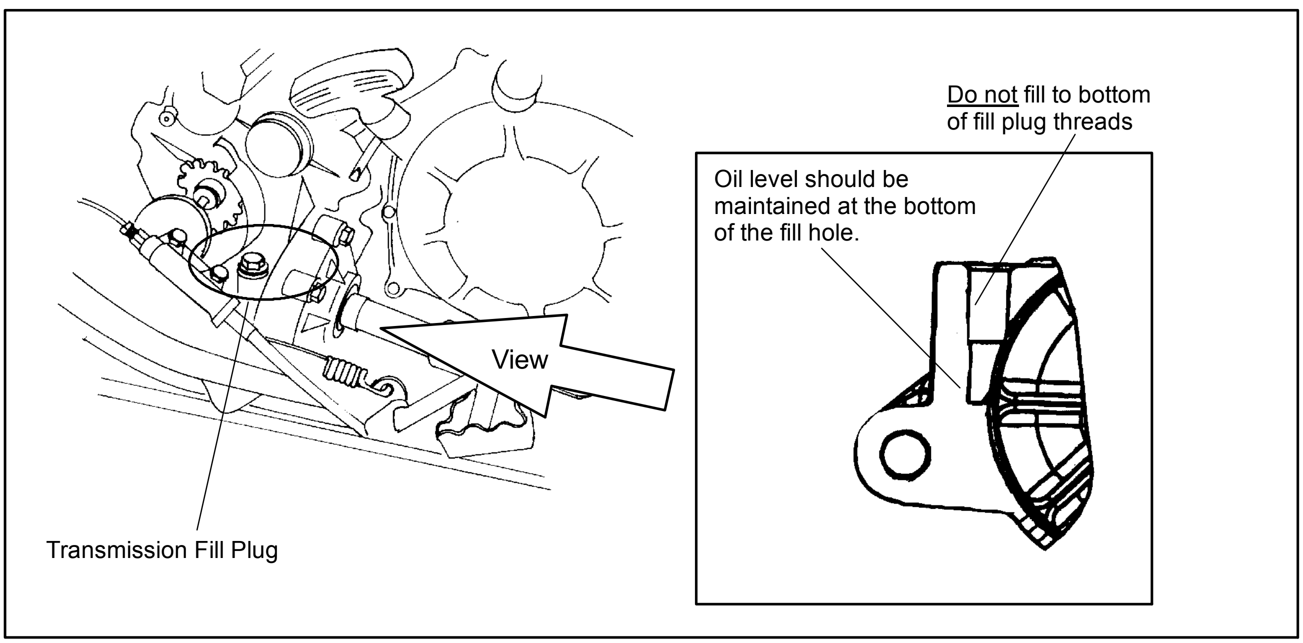
3. Clean and reinstall the drain plug with a new sealing washer. Torque to specification.

4. Remove fill plug.

5. Add Polaris Premium Synthetic Gearcase Lubricant to proper level as described above.

6. Check for leaks.

7. Reinstall propshaft shield.



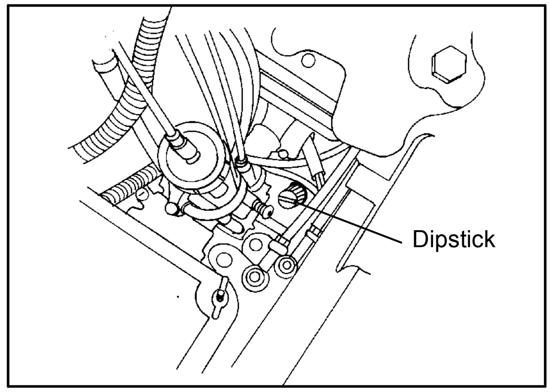
Counter Balancer Lubrication (400cc Engines)

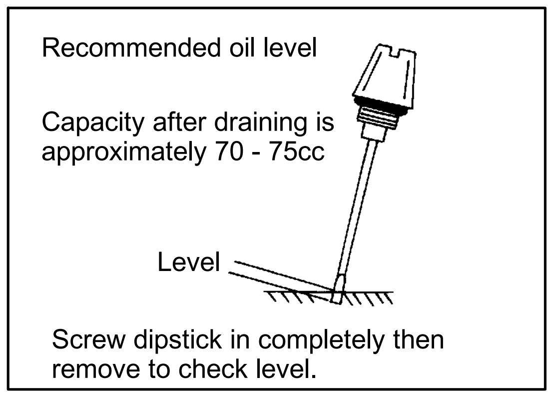
The counter balance oil should be checked semi-annually, especially before off season storage. If the machine is used in wet conditions the oil should be checked more frequently. If the oil has a milky white or gray appearance it should be changed as soon as possible. Failure to properly maintain this important area can result in premature wear or possible failure of the counter balancer components. Always use SAE 10W30 oil.

Procedure for Adding Oil (400)

NOTE: Check with engine at room temperature. Do not overfill. If overfilled, excess oil will be expelled through the vent hose.

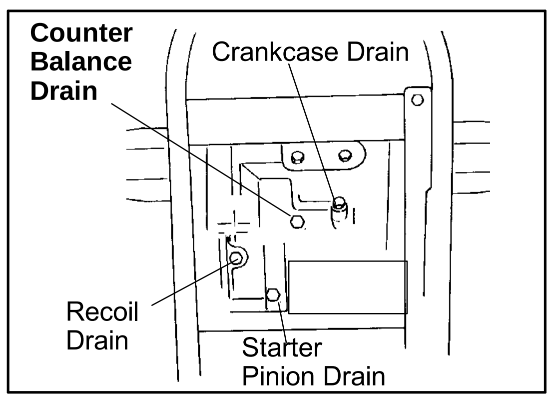
1. Remove seat and locate dipstick. Remove by loosening with a long handled screwdriver.
2. Remove dipstick and wipe clean.
3. Screw dipstick in fully and remove to check.
4. Read level shown on stick.
5. Add SAE 10W30 oil with a transmission fluid funnel. The recommended oil level is indicated by the knurled area on the dipstick.
6. Reinstall dipstick with new sealing o-ring. Do not over tighten.
7. Inspect counter balancer vent line for kinks or obstructions.





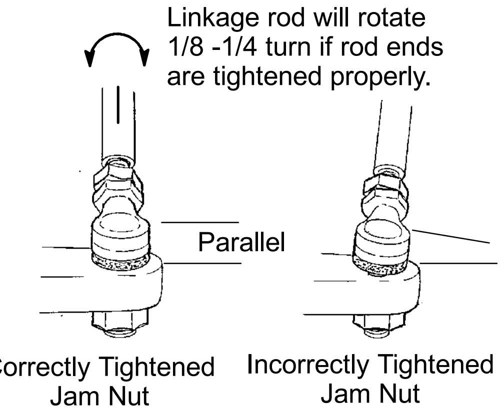
Counter Balance Oil Changing Procedure

1. Remove seat. Locate and remove dipstick.
2. Remove drain plug and drain oil. Catch and discard used oil properly.
3. Clean and reinstall drain plug.
4. Add SAE 10W30 oil using a transmission fluid funnel. The recommended oil level is indicated by the knurled area on the dipstick. The dipstick should be screwed in fully to check. Do not overfill. If overfilled, excess oil will be expelled through the vent hose.
5. Reinstall dipstick.
6. Check for leaks.



Transmission Gearshift Linkage Adjustment, Preliminary Inspection

- If shifting problems are encountered, the transmission linkage can be adjusted on some chain drive models.
- Refer to the procedures and illustrations on the following pages to identify the type.
- 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.
- The transmission shift linkage should be periodically inspected for wear and parts replaced as required to remove excess play from shift linkage.
- Perform torque stop adjustment (on models so equipped) before adjusting shift linkage.
- Refer to Transmission chapter for more information.



All models with adjustable linkage

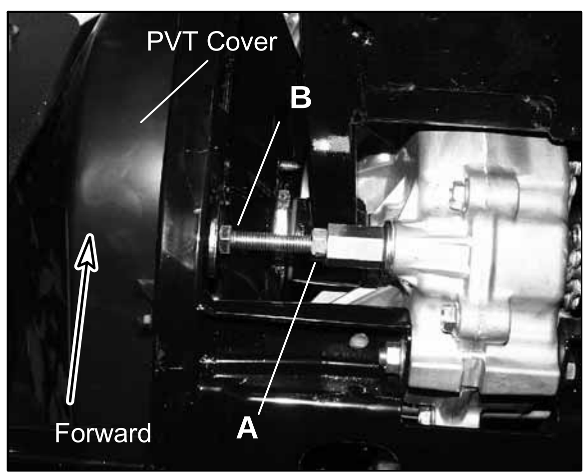
Torque Stop Adjustment

Adjust the torque stop:

- Prior to shift linkage adjustment;
- When shifting difficulties are encountered;
- If transmission has been removed from the frame.

NOTE: The torque stop is located on the bottom left hand side of the transmission (where applicable).

1. Loosen jam nut (A).
2. Turn adjuster bolt (B) out until it touches the frame, and then an additional 1/2 turn.
3. Tighten the jam nut securely while holding the adjuster bolt.



Shift Linkage Adjustment -High/Low/Reverse Transmissions

Linkage rod adjustment is necessary when symptoms include:

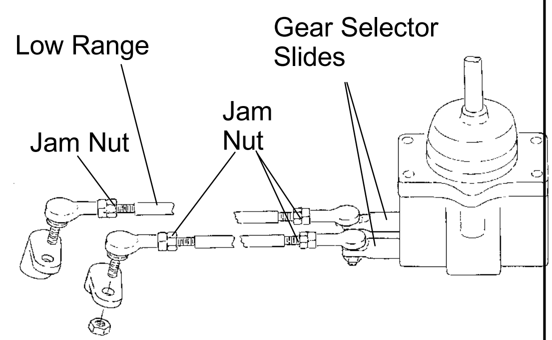
- No All Wheel Drive light
- Noise on deceleration
- Inability to engage a gear
- Excessive gear clash (noise)
- Shift selectors moving out of desired range

NOTE: When adjusting linkage, always adjust both linkage rods (where applicable). The adjustment of one rod can prevent proper adjustment of the other rod. Remove necessary components to gain access to shift linkage rod ends (i.e. exhaust heat shield, exhaust pipe, etc.).

1. If model is equipped with a transmission torque stop, adjust it as outlined previously.
2. Inspect shift linkage tie rod ends, clevis pins, and pivot bushings and replace if worn or damaged. Lubricate the tie rod ends with a light aerosol lubricant or grease.
3. Loosen all rod end adjuster jam nuts see Ill. 1.
4. Note orientation of tie rod end studs with stud up or down. Remove both rod end studs from transmission bell cranks.
5. Be sure idle speed is adjusted properly.

NOTE: It is important to disconnect *both* rod ends from the transmission bell cranks. If one linkage rod is incorrectly adjusted, it can affect the adjustment of the other rod. (Disconnect Low range linkage rod end from pivot arm on Sportsman 500 style linkage).

6. Place gear selector in neutral. Make sure the transmission bell cranks are engaged in the neutral position detents.

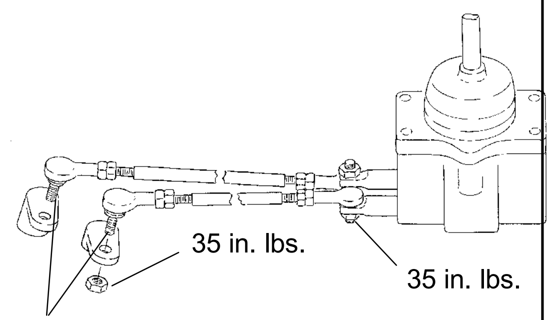


NOTE: Rod end orientation (up or down) varies by model. Note before disassembly.

Ill. 1

Shift Linkage Adjustment - High/Low/Reverse, Cont.

7. Be sure the shift linkage rod ends are firmly attached to the gear selector slides. Adjust the low range (inside) rod so the rod end is centered on the transmission bell crank (or centered on the pivot arm on Sportsman 500 style). Install the lock nut to the rod end and torque to 35 in. lbs.



Ill. 2

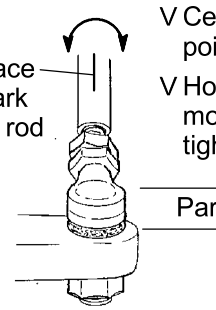
8. Rotate the linkage rod clockwise until resistance is felt. Mark the rod so revolutions can be easily counted. See Ill. 3 at right.

9. Rotate the linkage rod counterclockwise until the same resistance is felt, counting the revolutions as the rod is turned.

10. Turn the rod clockwise again one half of the revolutions counted in Step 9.

11. Tighten the rod end jam nuts securely while holding the rod end. The jam nuts must be tightened with both front and rear rod ends parallel to each other. If jam nuts are properly tightened, the rod should rotate freely 1/4 turn without binding.

12. Repeat steps 7-10 for the High/Reverse rod.



Ill. 3

Shift Linkage Adjustment (High/Reverse Transmissions)

1. If model is equipped with a transmission torque stop, adjust as outlined previously in Torque Stop Adjustment.

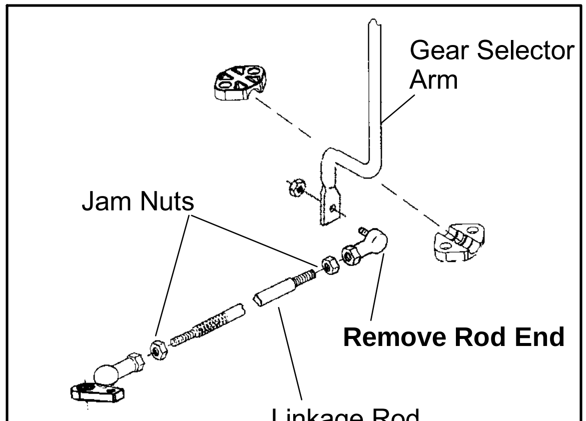
2. Inspect shift linkage tie rod ends, clevis pins, and pivot bushings and replace if worn or damaged. Lubricate the tie rod ends with a light aerosol lubricant or grease.

3. Place gear selector in neutral.

4. Loosen rod end adjuster jam nuts (A) on both ends of linkage rod.

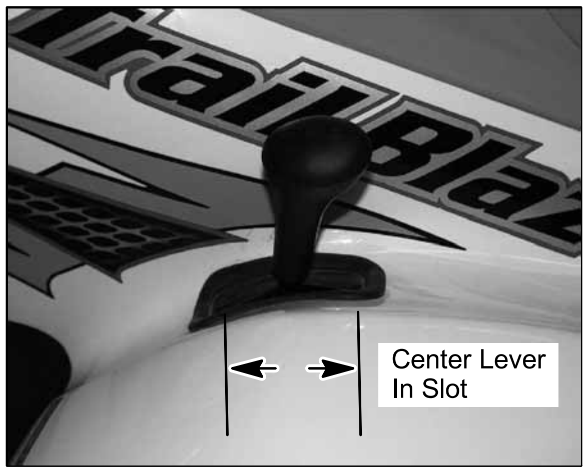
5. Note orientation of tie rod end studs (which way the stud goes through the transmission bell crank and gear selector arm).

6. Remove rod end from gear selector arm (Ill. 1).



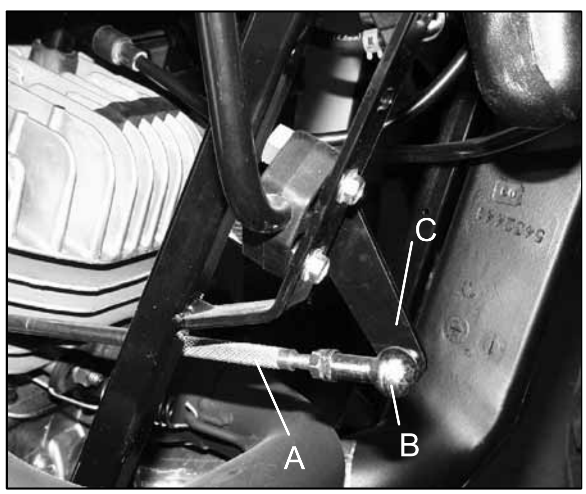
Ill. 1

7. Place gear selector lever in center of travel range as shown at right. Be sure the lever does not move from this position.



8. Turn linkage rod (A) to shorten or lengthen rod until end stud (B) is centered on hole in gear selector arm (C).

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



Carburetor Adjustments

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.

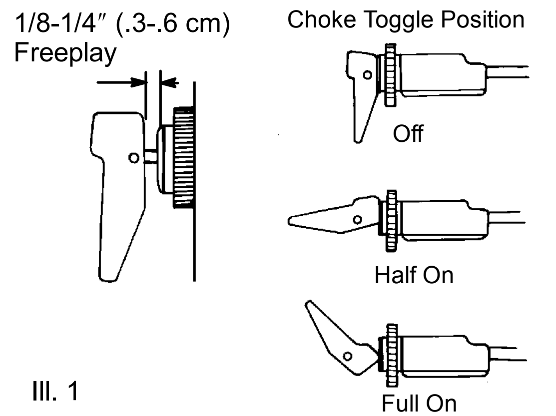
1. Place the gear selector in neutral.
2. Set parking brake.
3. Start the engine and let it idle.
4. Turn handlebars from full right to full left. If idle speed increases at any point in the turning range, inspect throttle cable routing and condition.
5. Replace the throttle cable if worn, kinked, or damaged.

Choke (Enricher) Adjustment

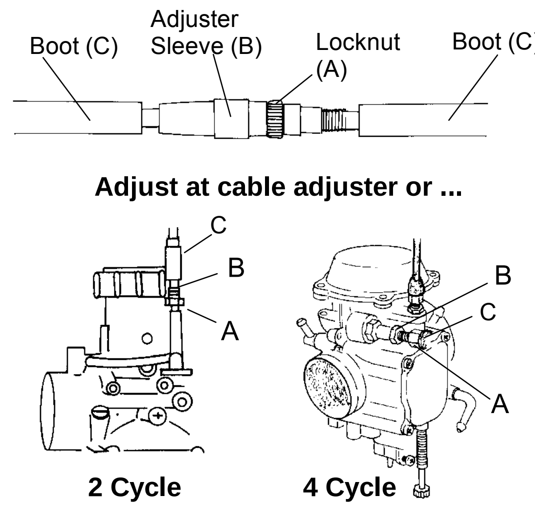
With the choke control toggle flipped to the full off position, the choke plunger must be seated on the fuel passage way in the carburetor. If the plunger is not seated on the fuel passage way inside the carburetor (not enough cable free-play), the engine will flood or run too rich, causing plug fouling and poor performance. (Ill 1.)

If cable slack is excessive, the choke fuel passage will not open far enough, which may cause cold starting difficulty. Also, the half-choke position used for intermittent applications will not function properly.

1. Flip choke toggle to full off position.
2. Slide boots (C) off choke cable adjuster and lock nut. (Ill. 2)
3. Loosen adjustment locknut (A) on cable sleeve (in-line adjusters) or on carburetor.
4. Turn cable sleeve adjusting nut (B) clockwise on carburetor until 1/4″ (6 mm) or more choke toggle free play is evident.
5. Turn cable sleeve adjusting nut counterclockwise until toggle has zero free play, then rotate it clockwise until 1/8″-1/4″ (3-6 mm) toggle free play is evident.
6. Tighten locknut (A).
7. Slide boots back over cable adjuster sleeve until they touch at the middle point of the sleeve (in-line adjusters) or until seated fully over adjuster.



Ill. 1



Ill. 2

Choke Lever Freeplay -

1/8 - 1/4″ (.3 - .6 cm)

Air Screw Adjustment

2-Stroke Models

1. Turn carburetor air screw in until lightly seated. Back screw out the specified number of turns.

Air Screw Adjustment (2-Stroke engines)
Refer to Specifications

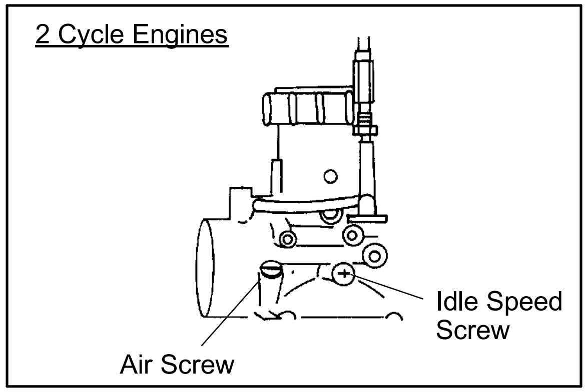
2. Warm up the engine to operating temperature (about 10 minutes).

3. Set idle speed to 600-800 RPM.

NOTE: Adjusting the air screw may affect idle speed. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.

4. Turn the screw in (to richen) or out (to lean) the mixture. Adjust air screw for best throttle response and smooth idle.

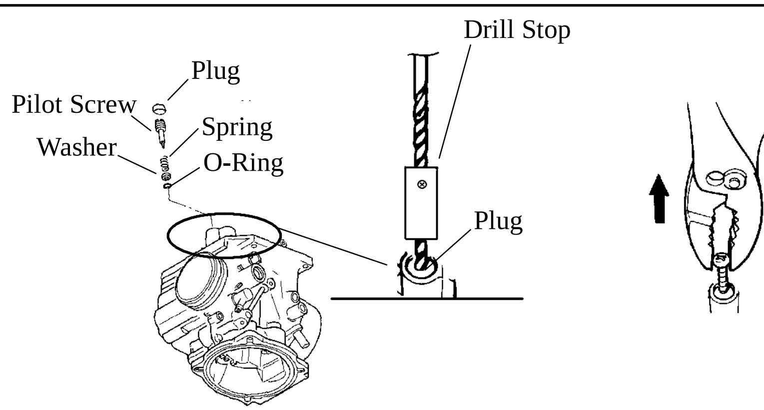
5. Re-adjust idle speed if necessary.



Pilot Screw Anti-Tamper Plug Removal

NOTE: The pilot screw is pre-set at the factory. The following adjustment procedure should be used after carburetor disassembly and cleaning, or if the pilot screw is replaced. Be sure all engine maintenance items have been performed and are within specifications before adjusting pilot screw. Some models have an anti-tamper plug covering the pilot screw. If pilot screw adjustment is required, remove it following the procedure outlined below.

1. Remove the carburetor.
2. Drain the carburetor bowl and cover all openings to prevent metal shavings from entering.
3. Invert the carburetor and carefully drill out the center of the plug with a 1/8″ or 5/32″ (3 or 4mm) drill bit. Before drilling, set a drill stop on the shank of the drill bit to prevent drilling beyond 3/16″. CAUTION: Be careful not to drill into the pilot screw!
4. Drill the plug at slow drill speeds. Use a self-tapping metal screw and a pliers to remove the plug if it does not rotate out with the drill bit.
5. Turn the screw in until lightly seated. Back out the specified number of turns. This is the pilot screw base setting. Do not tighten the pilot screw forcefully against the seat or the screw and/or seat will be permanently damaged.
6. Refer to pilot screw adjustment procedure.



Pilot Screw (Idle Mixture) Adjustment Notes

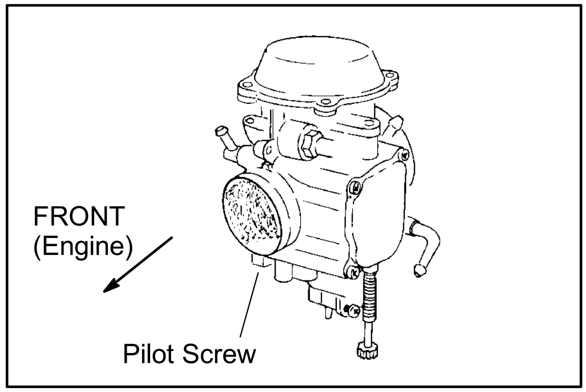
Do not tighten the pilot screw forcefully against the seat or the screw and/or seat will be permanently damaged. Start engine and warm it up to operating temperature (about 10 minutes). This is a very important step.

Pilot Screw Adjustment - 425 / 500 4-Stroke Models

1. Turn pilot screw in (clockwise) until *lightly* seated. Turn screw out the specified number of turns.

Pilot Screw Adjustment

Refer to Specifications

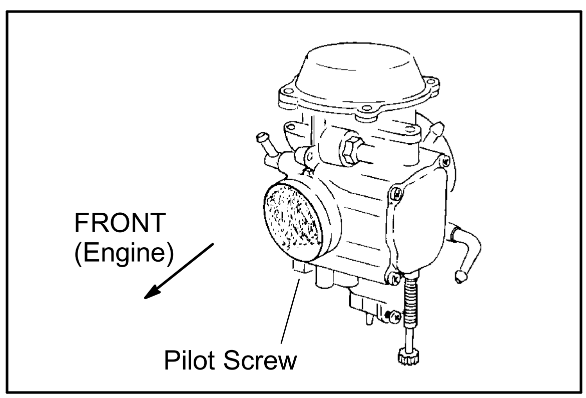


2. Connect an accurate tachometer that will read in increments of + or – 50 RPM such as the PET 2100DX (P/N 8712100DX) or the PET 2500 (P/N 8712500).
3. Set idle speed to 1200 RPM. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.
4. Slowly turn mixture screw clockwise using the pilot screw wrench until RPM begins to decrease by 50 RPM or greater.
5. Slowly turn mixture screw counterclockwise until idle speed increases to maximum RPM. Continue turning counterclockwise until idle RPM begins to drop.
6. Center the pilot screw between the points in step 5 and 6.
7. Re adjust idle speed if not within specification.

Pilot Screw Adjustment - 335 4-Stroke Models

IMPORTANT NOTE: Idle speed is specified with the lights OFF. On the idle speed will drop between 100-150 RPM when the lights are turned on.

1. Remove anti-tamper plug and connect an accurate tachometer such as the PET 2100DX (P/N 8712100DX) or the PET 2500 (P/N 8712500).
2. Adjust idle speed using the idle speed screw to about 1600 RPM.
3. Turn the pilot screw (mixture screw) in or out *slowly* using the pilot screw wrench to obtain the highest idle RPM.
4. Re-adjust idle speed to specified RPM (1300 +100).
5. Again turn the pilot screw in or out *slowly* to obtain the highest idle RPM.
6. Turn the pilot screw out (counterclockwise) 1/8 to 1/4 turn.
7. Re-adjust idle speed to specified RPM (1300 +100).



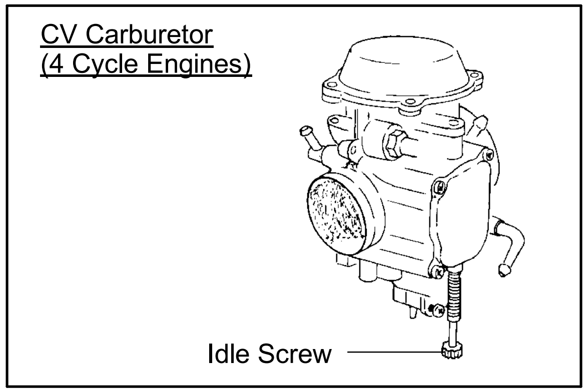
Idle Speed Adjustment

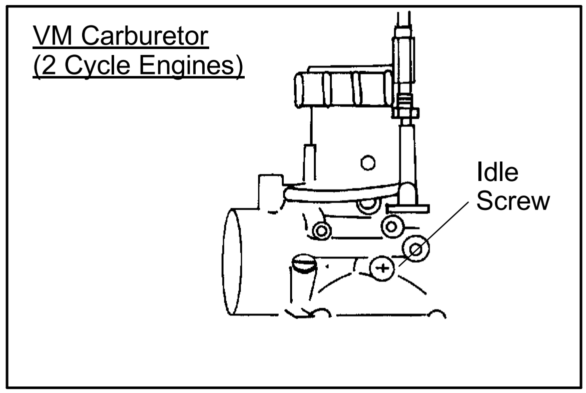
1. Start engine and warm it up thoroughly.

2. 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.

Idle Speed:
Refer to Specifications





Throttle Cable / Electronic Throttle Control (ETC Switch) Adjustment

1. Slide boot off throttle cable adjuster and jam nut.
2. Place shift selector in neutral and set parking brake.
3. Start engine and set idle to specified RPM.

NOTE: Be sure the engine is at operating temperature. See Idle Speed Adjustment.

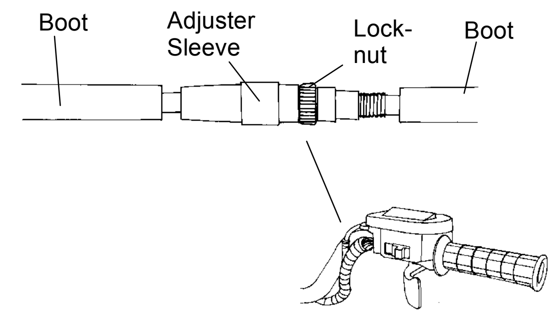
4. Loosen lock nut on in-line cable adjuster (Ill. 1).
5. Turn cable adjuster out until engine RPM begins to increase.
6. Turn cable adjuster back in until throttle lever has 1/16″ (.16 cm) of travel before engine RPM increases (Ill. 2).

NOTE: On models with aluminum throttle block (cover is held on by 3 screws - see Ill. 4) be sure ETC switch plunger is held inward by throttle cable tension.

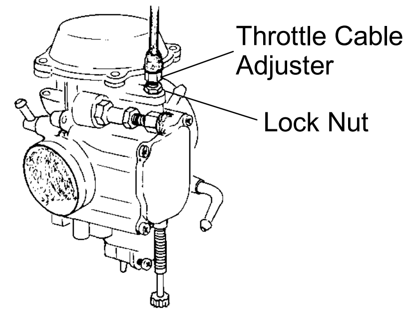
7. Tighten lock nut securely and slide boot completely in place to ensure a water-tight seal.

NOTE: On 2 stroke models, whenever throttle cable adjustments are made, always check oil pump adjustment and re-adjust if necessary.

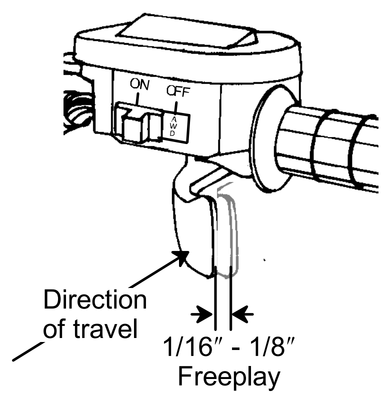
8. Turn handlebars from left to right through the entire turning range. If idle speed increases, check for proper cable routing. If cable is routed properly and in good condition, repeat adjustment procedure.



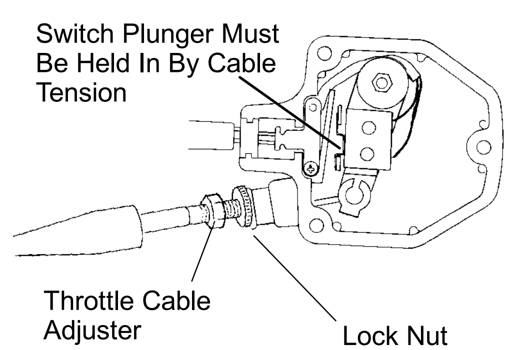
Ill. 1



Ill. 2



Ill. 3

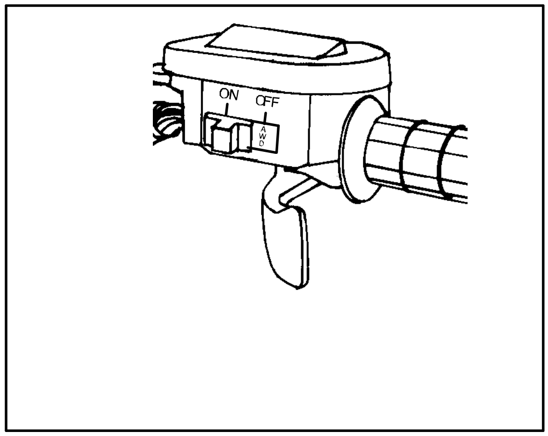


Ill. 4

Oil Pump Adjustment Procedure

250cc / 300cc Engines

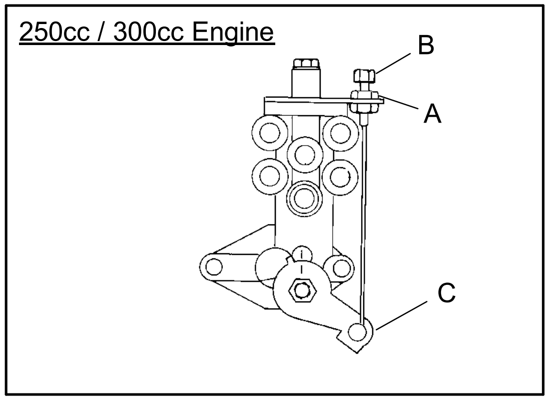
1. Before adjusting the oil pump, check engine idle RPM and set to specification. Adjust if necessary.
2. Check and adjust throttle lever free play (ETC switch).
3. Place gear selector in neutral and apply parking brake.
4. Start the engine and let it idle.
5. Place very slight pressure on the throttle lever until all freeplay is removed from throttle cable to carburetor (to the point where the carb slide is just starting to rise and engine RPM begins to increase).

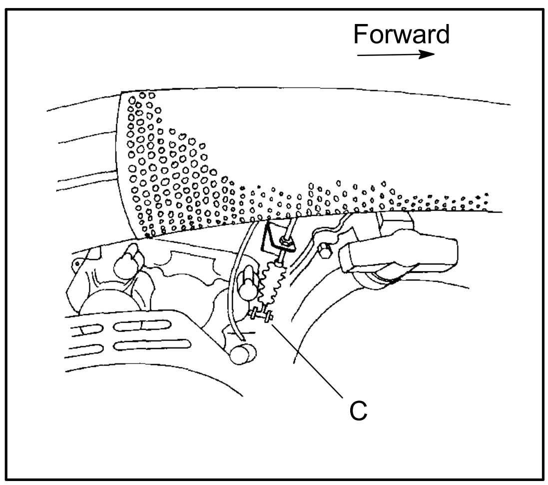


6. Loosen locknut (A).
7. Turn adjuster (B) in or out until all freeplay is removed from oil pump cable (the point where the oil pump arm (C) is just starting to move off of its stop).

NOTE: The pump stop keeps the pump arm from rotating any farther down than the idle position so no visual alignment of marks is necessary.

8. Tighten the locknut.

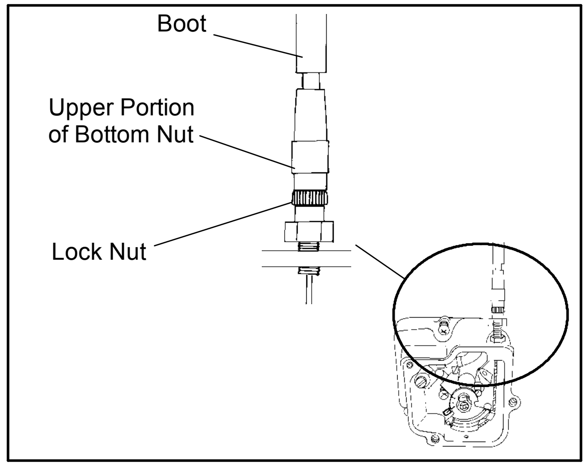




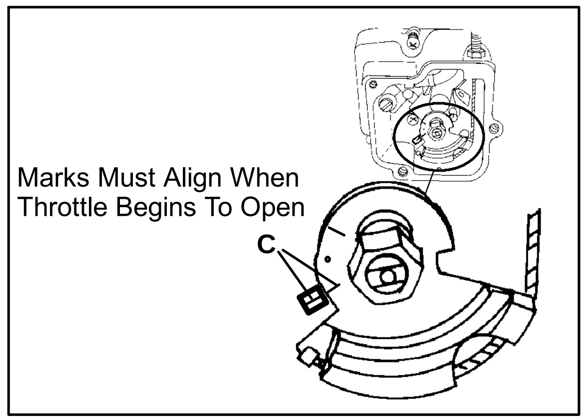
Oil Pump Adjustment (2 Cycle Engines)

Oil Pump Adjustment Procedure (400cc Engines)

1. Before adjusting the oil pump, check engine idle and adjust to specification if necessary.
2. Check and adjust throttle lever free play (ETC switch) if necessary.
3. Place gear selector in neutral and apply parking brake.
4. Start the engine and let it idle.
5. Lift boot (A) up off adjuster sleeve on cable. Remove the oil pump cover. Loosen the cable adjuster locknut (B). Adjust oil pump cable until marks align (C) when the throttle slide just begins to raise.

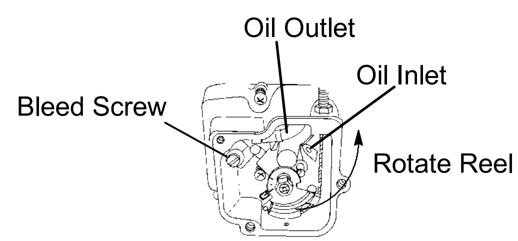


6. Adjust oil pump cable until marks align when throttle slide just begins to raise and engine speed just begins to increase.
7. Tighten jam nuts.
8. Reinstall the ETC cover removed in step 1. , making sure cover gasket is properly seated. If not, moisture can enter the ETC and damage the switch.

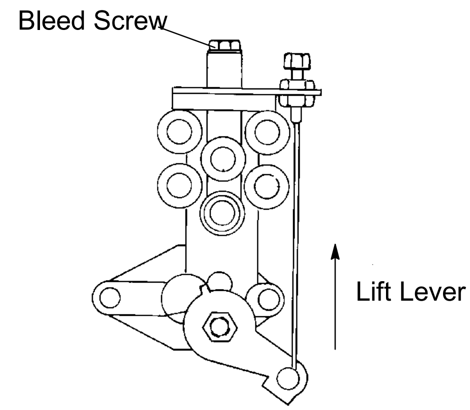


Oil Pump Bleeding Procedure

1. Fill the oil reservoir with Polaris injector oil.
2. Loosen the pump bleed screw one full turn. Allow oil to flow from the bleed screw for five to ten seconds. Tighten bleed screw. **CAUTION:** Never run the engine with the bleed screw loose. Loss of oil will cause serious engine damage.
3. Start the engine and lift the oil pump lever or reel to its full up (open) position. Allow engine to idle with the lever or wheel in this position for ten to twenty seconds to make sure all air is out of the system.



400 Oil Pump Bleeding



250/300 Oil Pump Bleeding

Oil Pump Troubleshooting Procedure

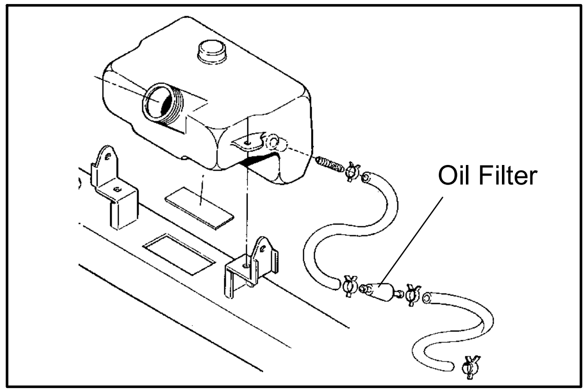
<u>To verify oil delivery to engine, proceed as follows:</u>

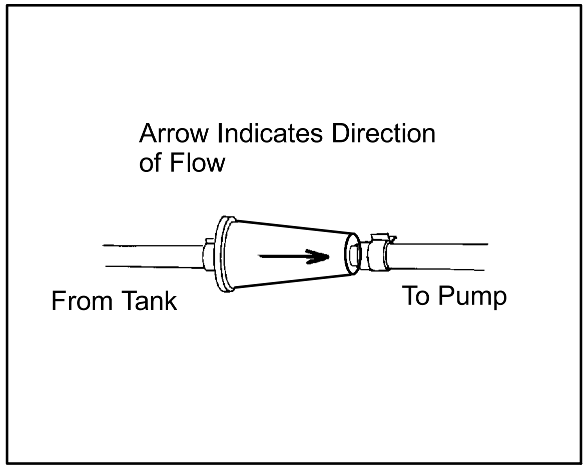
1. Premix fuel in tank at a 40:1 fuel/oil ratio.
2. With the oil reservoir full and the pump bled, remove the oil delivery line from the intake manifold.
3. Test the oil delivery check valve with a low pressure pump and gauge. (See Page 3.22).
4. Start engine and lift oil pump lever to full open position.
5. Oil should pulse from the delivery line every few seconds. If it does not, suspect one of the following:
   A. Oil line or filter plugged
   B. Oil tank vent line restricted
   C. Oil lines leaking or blocked
   D. Faulty oil pump or drive mechanism

Oil Filter (2 Strokes)

The oil filter is located in-line between the oil tank and the oil pump on all 2-stroke models. The in-line oil filter is a special type and must not be substituted. Replace the oil filter in accordance with the Maintenance Schedule or whenever water or debris has entered the oil tank. Do not attempt to clean this filter.

1. Remove clamps, securing lines to filter.
2. Remove lines and replace filter with arrow pointing in direction of oil flow (towards pump).
3. Reinstall clamps on each line and check for leaks.





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 smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

Do not overfill the tank. Do not fill the tank neck.

If you get gasoline in your eyes or if you swallow gasoline, see your doctor immediately.

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

Never start the engine or let it run in an enclosed area. 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.

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.

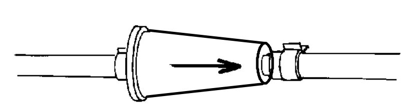
Vent Lines

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 or whenever sediment is visible in the filter.

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.
8. Reinstall fuel tank.



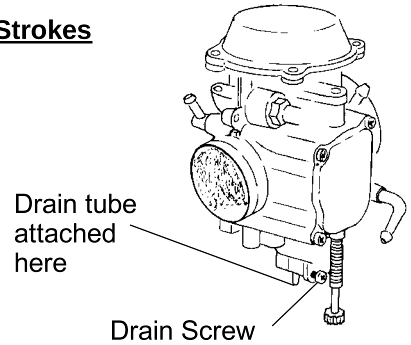
Carburetor Draining

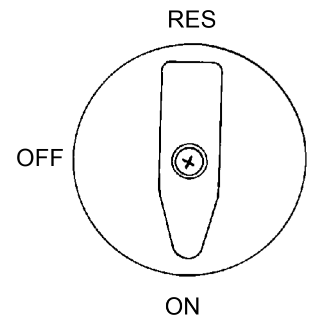
The carburetor float bowl should be drained periodically to remove moisture or sediment from the bowl, or before extended periods of storage.

NOTE: The bowl drain screw is located on the bottom left side of the float bowl on 4-stroke models. A drain plug (which also acts as a water/sediment trap) is located on the bottom of the float bowl on 400cc 2-stroke models.

1. Turn fuel valve to the off position.
2. Place a clean container beneath the bowl drain spigot or bowl drain hose.
3. Turn drain screw out two turns (remove drain plug for 2-Strokes) 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.

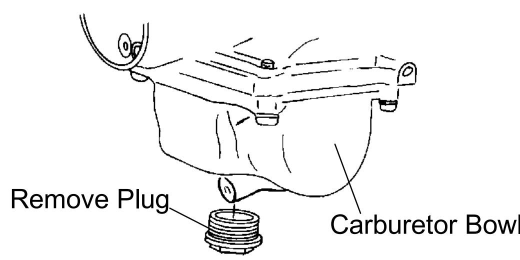
4-Strokes





Fuel Valve

2-Strokes (400cc)



Compression Test - 2 Stroke

1. Remove spark plug and install compression tester.
2. Connect high tension lead to a good ground on engine.
3. Open throttle and crank engine until maximum reading is obtained (approximately 3-5 revolutions).

Cylinder Compression (2-Stroke)	
Service Limit	**115 PSI**
Cylinder Compression (4-Stroke)	
Standard (See Note Below)	**50-90 PSI**

Compression Test - 4 Stroke

NOTE: 4-Stroke engines are equipped with an automatic decompressor. Compression readings will vary in proportion to cranking speed during the test. Average compression (measured) is about 50-90 psi during a compression test.

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

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

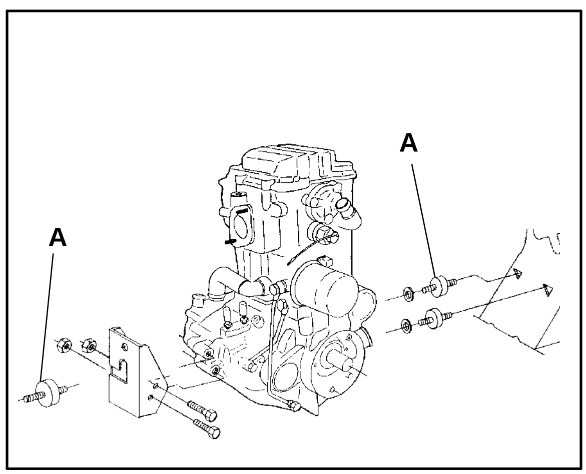
Cylinder Leakage	
Service Limit (4-Stroke)	**10 %**
(Inspect for cause if leakage exceeds 10%)	

Engine Mounts

Inspect rubber engine mounts (A) for cracks or damage.

Fastener Torque - Engine

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.

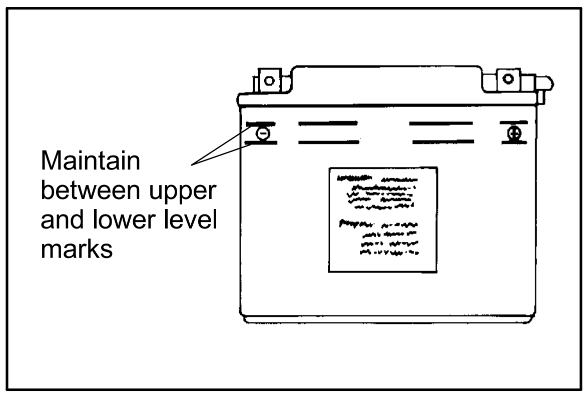
Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

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.

The battery is located under the left rear fender.

Inspect the battery fluid level. When the battery fluid nears the lower level, the battery should be removed and distilled water should be added to the upper level line. To remove the battery:



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. Disconnect the vent hose.
4. Remove the battery.
5. Remove the filler caps and add *distilled water only* as needed to bring each cell to the proper level. Do not overfill the battery.

⚠ To refill use only distilled water. Tap water contains minerals which are harmful to a battery.

⚠ Do not allow cleaning solution or tap water to enter the battery. It will shorten the life of the battery.

6. Reinstall the battery caps.
7. 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.
8. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable.
9. Reattach vent hose making sure it is properly routed and not kinked or pinched.
10. Coat terminals and bolt threads with Polaris dielectric grease.
11. Reinstall battery cover and holder strap.

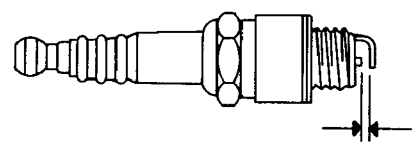
Spark Plug

1. Remove spark plug high tension lead. Clean plug area so no dirt and debris can fall into engine when plug is removed.
2. Remove spark plug.
3. Inspect electrodes for wear and carbon buildup. Look for a sharp outer edge with no rounding or erosion of the electrodes.
4. Clean with electrical contact cleaner or a glass bead spark plug cleaner only. **CAUTION:** A wire brush or coated abrasive should not be used.
5. Measure gap with a wire gauge. Refer to specifications for proper spark plug type and gap. Adjust gap if necessary by bending the side electrode carefully.
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 14 ft. lbs.

Recommended Spark Plug:

Refer to Specifications

Spark Plug Torque: **14 Ft. Lbs. (19 Nm)**



Spark Plug Gap

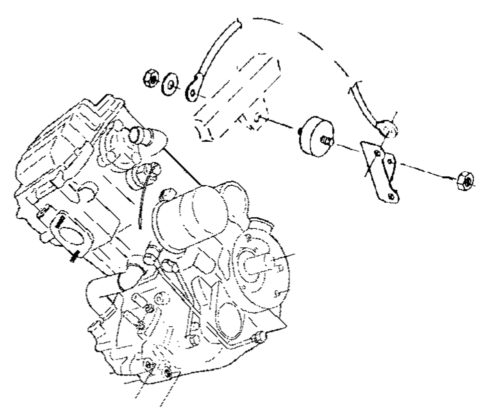
.024 - .028″ (.6 - .7 mm)

Ignition Timing

Refer to Electrical chapter for ignition timing procedure.

Engine-To-Frame Ground

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



Liquid Cooling System Overview

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

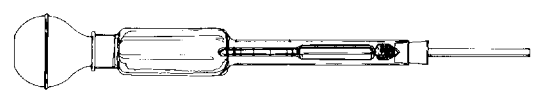
As coolant operating temperature increases, the expanding (heated) excess coolant is forced out of the radiator past the pressure cap and into the recovery bottle. As engine coolant temperature decreases the contracting (cooled) coolant is drawn back up from the tank past the pressure cap and into the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

- Some coolant level drop on new machines is normal as the system is purging itself of trapped air. Observe coolant levels often during the break-in period.
- Polaris Premium 60/40 is already premixed and ready to use. Do not dilute with water.

Coolant Strength / Type

Test the strength of the coolant using an antifreeze hydrometer.

- A 50/50 or 60/40 mixture of antifreeze and distilled water will provide the optimum cooling, corrosion protection, and antifreeze protection.
- Do not use tap water, straight antifreeze, or straight water in the system. Tap water contains minerals and impurities which build up in the system.
- Straight water or antifreeze may cause the system to freeze, corrode, or overheat.



Antifreeze Hydrometer

Polaris 60/40 Anti-Freeze / Coolant
PN 2871323

Cooling System Hoses

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

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

Radiator

1. Check radiator air passages for restrictions or damage.
2. Carefully straighten any bent radiator fins.
3. Remove any obstructions with compressed air or low pressure water.

Cooling System Pressure Test

Refer to page 3.6 for pressure test procedure.

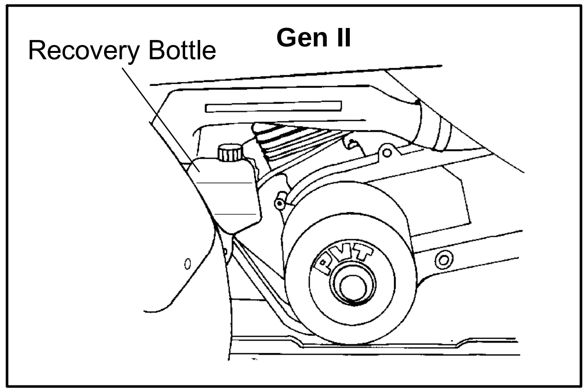
Coolant Level Inspection

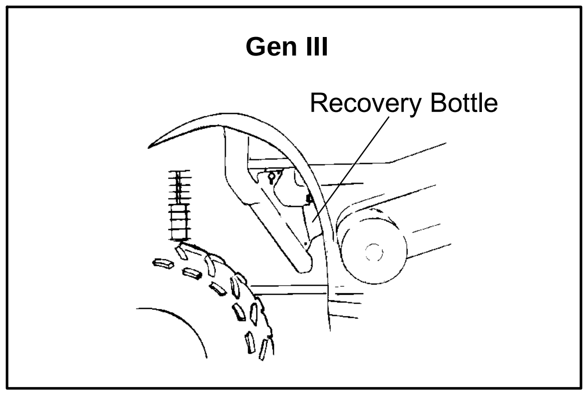
The recovery bottle, located on the left side of the machine, must be maintained between the minimum and maximum levels indicated on the recovery bottle.

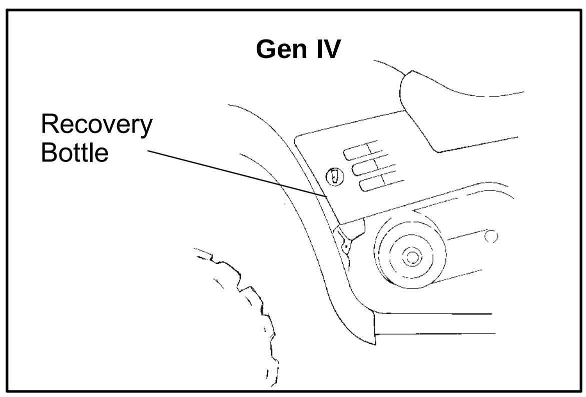
With the engine at operating temperature, the coolant level should be between the upper and lower marks on the coolant reservoir. If not:

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

NOTE: If overheating is evident, allow system to cool completely and check coolant level in the radiator.







Engine Cooling System

Radiator Coolant Level Inspection

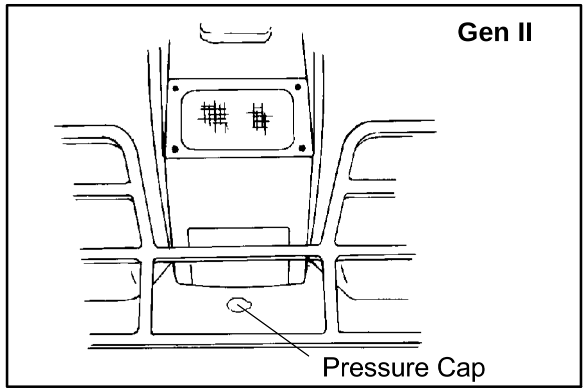
NOTE: This procedure is only required if the cooling system has been drained for maintenance and/or repair. However, if the recovery bottle has run dry, or if overheating is evident, the level in the radiator should be inspected and coolant added if necessary.

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

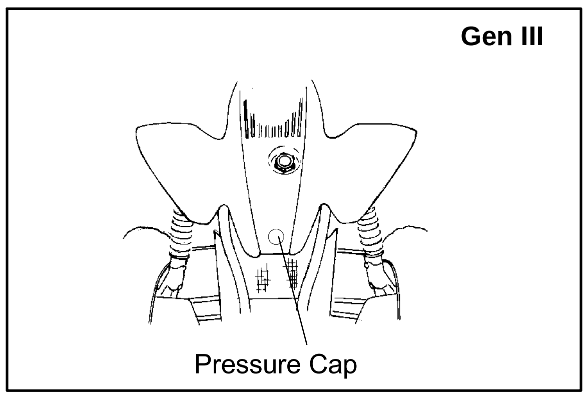
NOTE: Use of a non-standard pressure cap will not allow the recovery system to function properly.

To access the radiator pressure cap:

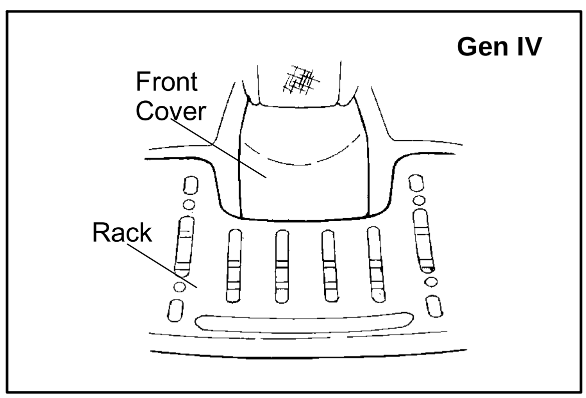
Gen II - To access the pressure cap, remove the access cover on the front of the ATV just below the oil cap. Using a flat, stubby screwdriver loosen the screw 1/4 turn and pull the cover forward and up to remove.



Gen III - To access the pressure cap, clean the area around the oil cap and remove the oil cap (2-cycle models). Remove front cover by placing your fingers under the front of the cover and pulling upward. Reinstall oil cap.

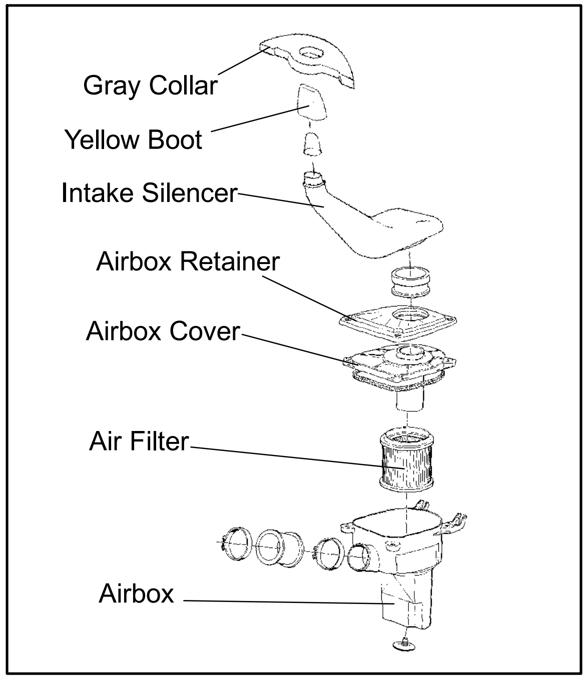


Gen IV - Remove the four screws securing front rack. Remove front cover by placing your fingers under the front of the cover and pulling upward.

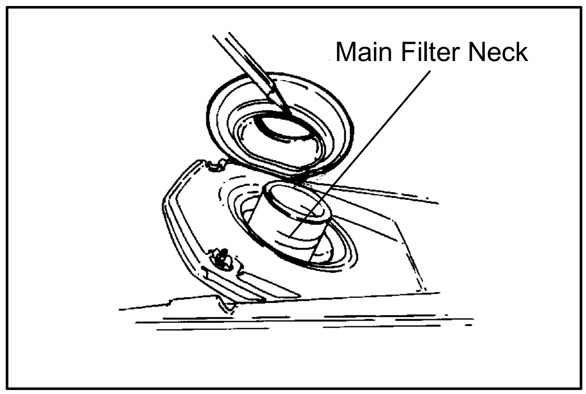


Air Filter Service (Trail Blazer Style)

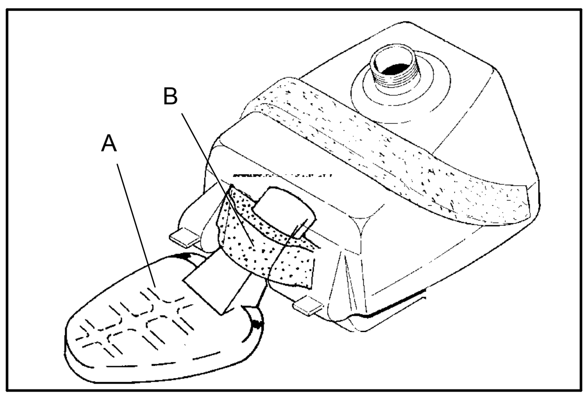
1. Release seat latch and lift up on the rear of the seat.
2. Pull the seat back and free of the tabs.
3. Remove the primary air filter box.
4. Remove the yellow pre-cleaner foam boot, held in place by a gray collar, from the air box. Do not remove the collar.
5. Carefully wash the yellow foam boot in soapy water and dry it.
6. Oil the foam boot with engine injection oil (1 to 2 teaspoons). Squeeze out the excess into an absorbant cloth.
7. Reinstall the yellow foam boot onto the air filter box.



8. Reinstall the primary air filter box removed in step 2. **NOTE:** There will be some resistance. Be sure the black rubber sealing ring is securely positioned over the main filter neck.

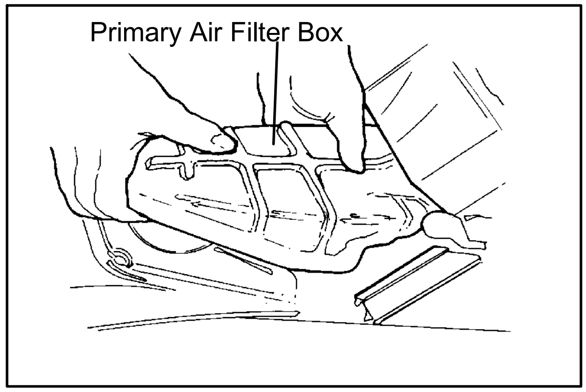


CAUTION: When installing the primary air filter box be sure the gray foam collar (B) is below the intake opening of the air box intake (A). Improper installation will restrict airflow to the engine possibly resulting in engine damage.



Dual Stage Air Cleaner - 300 Style

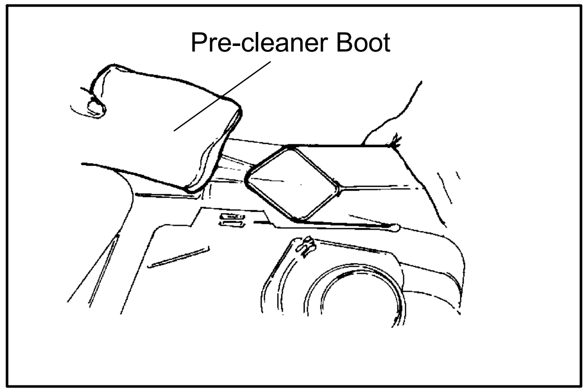
The primary pre-cleaner foam boot is designed to remove the majority of dust particles before they reach the secondary dry filter element.



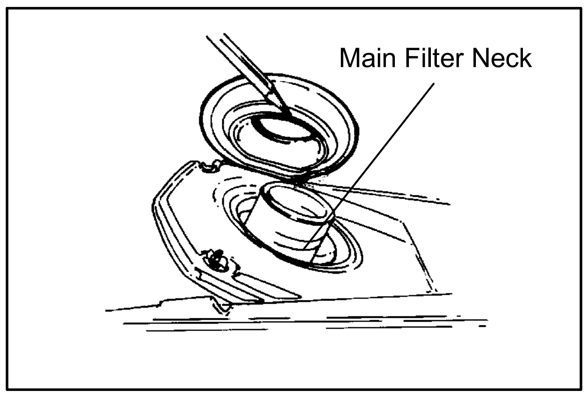
Primary Pre-cleaner Foam Boot

Inspect the primary air cleaner boot in accordance with the maintenance schedule.

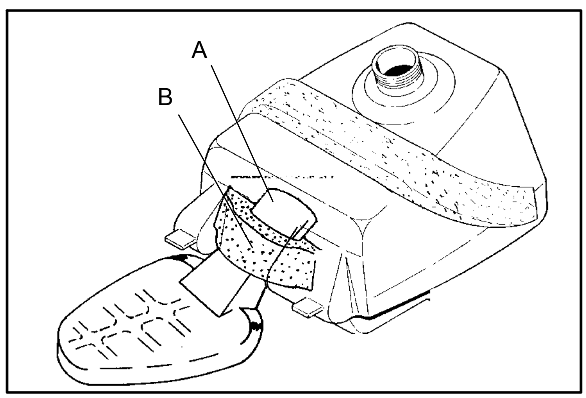
1. Remove the seat.
2. Remove the primary air filter box.
3. Remove the yellow pre-cleaner foam boot, held in place by a gray collar, from the air box. Do not remove the collar.



4. Carefully wash the foam boot in soapy water and dry it thoroughly. Replace the pre-filter if the element is torn or damaged.
5. Apply 1 to 2 teaspoons 2 cycle injection oil to the foam pre-filter. Squeeze filter gently to distribute oil evenly over entire filter. Squeeze out the excess into an absorbant cloth.
6. Reinstall the foam boot onto the air filter box.
7. Reinstall the primary air filter box removed in step 2. **NOTE:** There will be some resistance. Be sure the black rubber sealing ring is securely positioned over the main filter neck.



CAUTION: When installing the primary air filter box be sure the gray foam collar (B) is below the air intake opening of the air box intake duct (A). Improper installation will restrict airflow to the engine possibly resulting in a rich mixture and poor running.



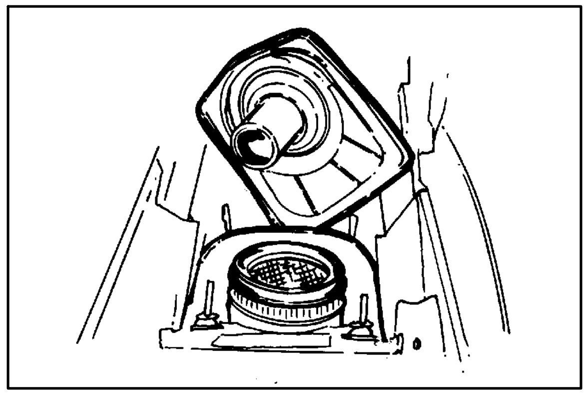
Air Cleaner Maintenance - 300 Style, Cont.

Secondary (Main) Filter

Inspect the secondary filter in accordance with the maintenance schedule.

Secondary filter removal and installation:

1. Remove seat.
2. Remove primary air filter box.
3. Remove four wing nuts holding cover assembly to secondary air filter housing.
4. Remove filter element.
5. Inspect gaskets on both sides of filter. Replace if required.
6. Coat top and bottom gaskets of filter with a generous amount of grease.
7. Check condition of air box and replace if necessary. Inspect air ducts and clamps for proper sealing.
8. Install filter into airbox. Be sure filter element seats securely.
9. Check cover gasket and replace if required. Be sure cover is seated properly and wing nuts are finger tightened securely.
10. Reinstall primary air filter box as per instructions found on previous page.
11. Reinstall seat.



Cleaning the Main Filter

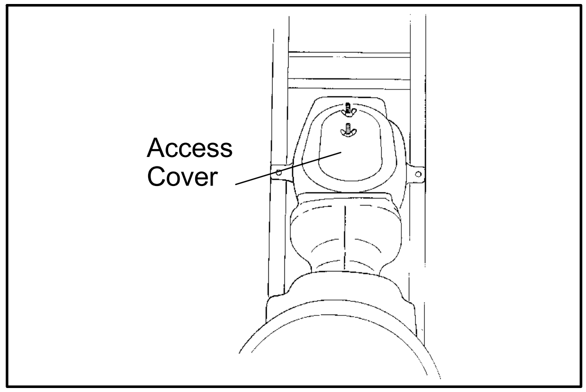
Important:

It is advisable to replace the filter when it is dirty. However, in a new filter is not immediately available, it is permissible to clean the main filter if you observe the following practices.

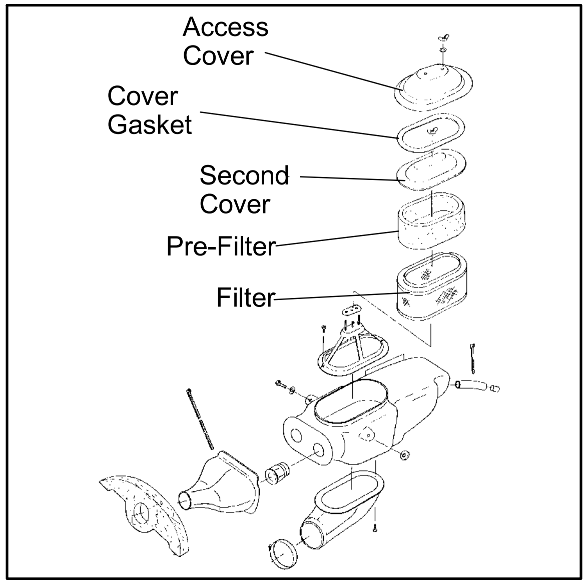
1. **Never** immerse the filter in water since dirt can be transferred to the clean air side of the filter. In addition, the filtering ability of the treated paper element will be significantly reduced.
2. If compressed air is used **never** exceed a pressure of 40 PSI. Always use a dispersion type nozzle to prevent filter damage and clean from the outside to the inside.

Main Air Filter Service, 400 Style

1. Release seat latch and lift up on the rear of the seat.
2. Pull the seat back and free the tab from front cab.
3. Remove the two wing nuts and washers securing the air filter access cover.
4. Remove the cover. Inspect the gasket. It should adhere tightly to the cover and seal all the way around.



5. Remove the wing nut and washer securing the second cover. The cover should be straight and not distorted.
6. Remove pre filter from main filter and discard the main air filter.
7. Carefully wash the pre-filter in soapy water and dry it thoroughly. Replace the pre-filter if the element is torn or damaged.
8. Install dry pre-filter over new main filter and install. **NOTE:** Apply a small amount of general purpose grease to the sealing edges of the filter before installing.



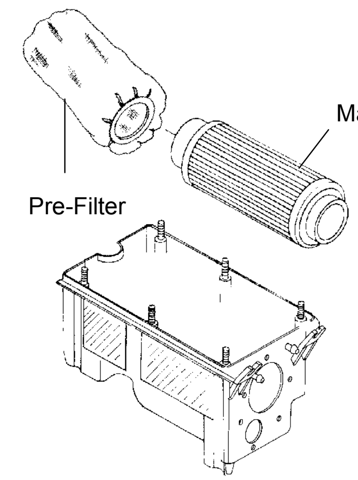
Cleaning the Main Filter

Important:

It is advisable to replace the filter when it is dirty. However, in a new filter is not immediately available, it is permissible to clean the main filter if you observe the following practices.

1. **Never** immerse the filter in water since dirt can be transferred to the clean air side of the filter. In addition, the filtering ability of the treated paper element will be significantly reduced.
2. 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.

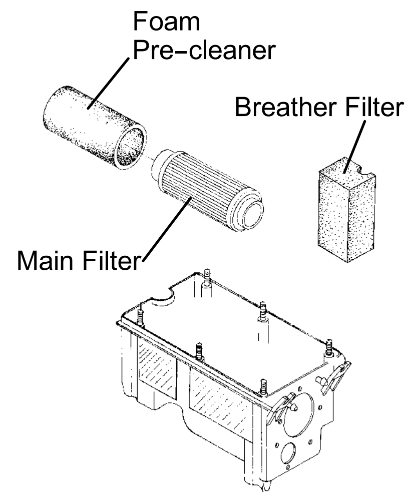
Air Filter Service
Scrambler 500 Style

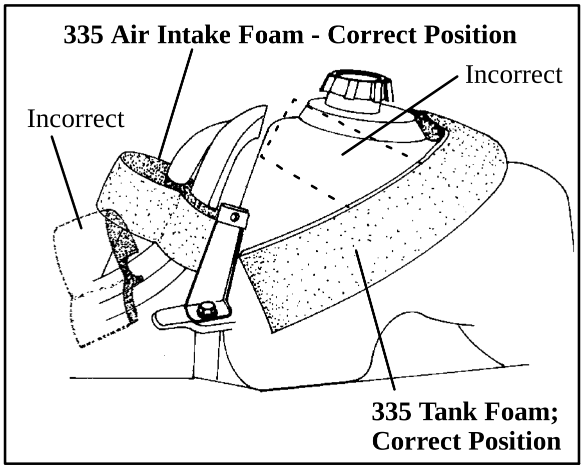


1. Remove seat.
2. Release clips and remove air box cover.
3. Loosen clamp and remove filter assembly.
4. Remove fabric pre-filter from main filter.
5. Carefully wash the pre-filter in soapy water and dry it thoroughly. Replace the pre-filter if the element is torn or damaged.
6. Replace main filter if dirty.
7. Install dry pre-filter over new main filter and install.
8. Reinstall pre-filter in main filter. Replace main filter as required.

Air Filter Service
Sportsman 335, 500 / Magnum 500 Style

1. Remove seat.
2. Remove spring clamps securing the airbox lid and remove lid.
3. Pull foam breather filter out.
4. Loosen clamp and remove filter.
5. Remove foam pre-cleaner from main filter.
6. Carefully wash the pre-filter in soapy water and dry it thoroughly. Replace the pre-filter if the element is torn or damaged.
7. Install dry pre-filter over new main filter and reinstall.
8. Push foam breather filter straight down into airbox until flush with upper edge of box (Sportsman 500). Make certain foam is flush with front edge of airbox so air cannot enter engine breather fitting hole without first passing through the foam.



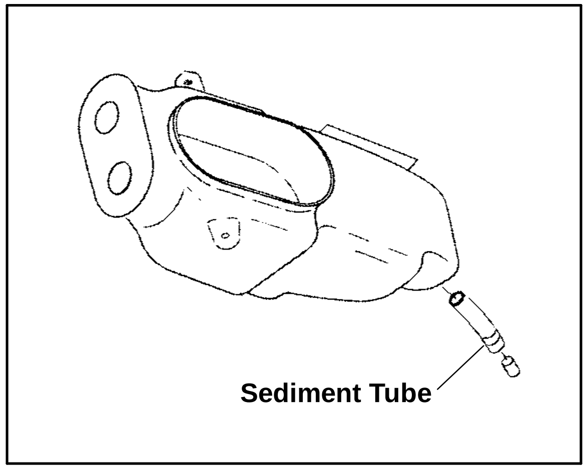


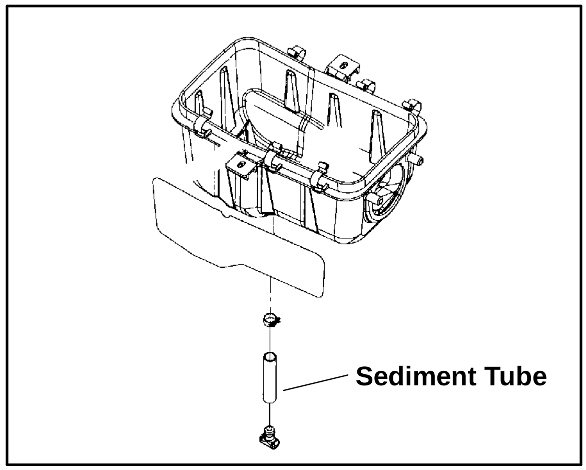
Air Box Sediment Tube

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.





Breather Filter Inspection

Four cycle ATV engines are equipped with a breather filter. The in-line filter is similar in appearance to a fuel filter, and is visible on the left side (Location A) or right side (location B) of the vehicle. Some models have a foam breather filter in the air box (location C). Some models are equipped with both in-line and foam breather filters.

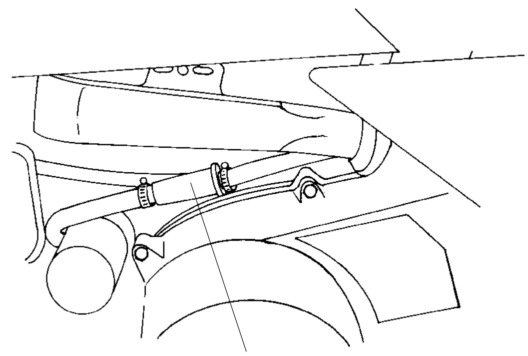
1. Inspect the breather filter(s) for obstruction. Replace if necessary. In-line breather filters should be installed with the arrow pointing toward the engine (away from the air box).

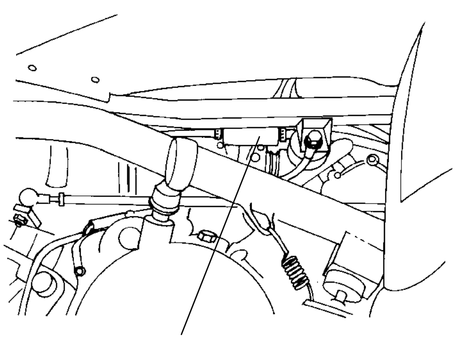
NOTE: In-line breather filter service life is extended when the foam air box pre-filter is in place and maintained properly. Never operate the engine without the pre-filter(s).

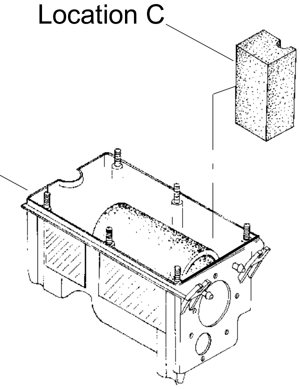
Breather Hose

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

Typical Breather Filter Location



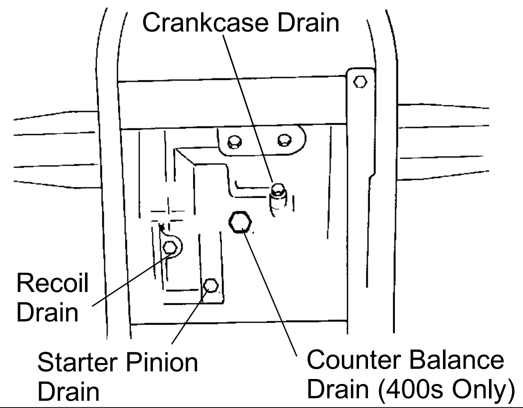




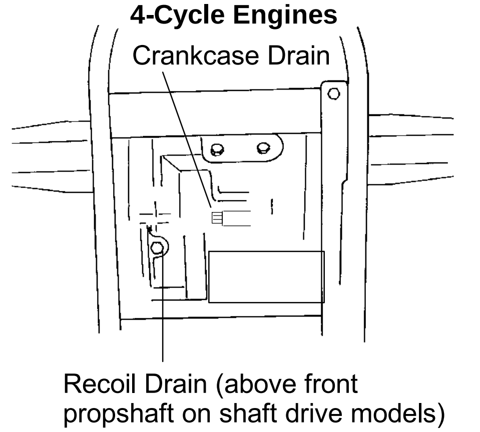
Recoil Housing

- Drain the housing periodically to remove moisture.
- Drain the recoil housing after operating the ATV in very wet conditions. This should also be done before storing the ATV. The drain screw is located at the bottom of the recoil housing. Remove the screw with a 10mm wrench. Reinstall screw once housing has been drained.
- **CAUTION:** Make sure the manual start handle is fully seated on the recoil housing, especially when travelling in wet areas. If it is not sealed properly, water may enter the recoil housing and damage components.
- Water will enter the recoil housing if the starter handle is disengaged from the rope guide when under water.
- After travelling in wet areas the recoil housing and starter should always be drained completely by removing the recoil.
- Do not open the crankcase drain unless the engine has ingested water. On 4-cycle engines, some engine oil will be lost if crankcase drain is opened.
- On the Trail Blazer, the recoil handle **must be behind the heat shield** for it to seal properly. If it is not sealed properly, water may enter the recoil housing and damage components.

250/300 and 400 Engines



4-Cycle Engines

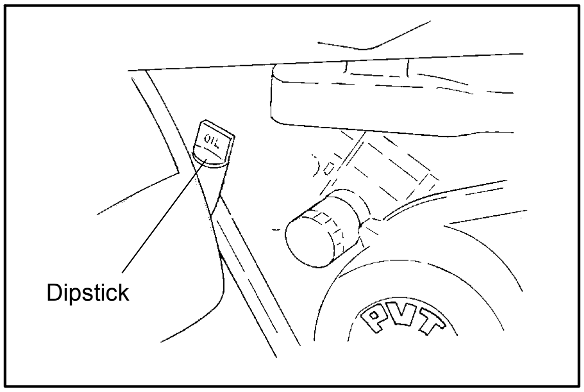


Engine Oil Level (4 Stroke)

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

1. Set machine on a level surface.
2. Start and run engine for 20-30 seconds. This will return oil to its true level in the oil tank. About a cup of oil will remain in the crankcase.
3. Stop engine, remove dipstick and wipe dry with a clean cloth.
4. Reinstall dipstick, screwing into place.

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



5. Remove dipstick and check to see that the oil level is in the normal range. Add oil as indicated by the level on the dipstick. Do not overfill.

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

Maintain Oil Level In Normal Range

Screw in completely to check

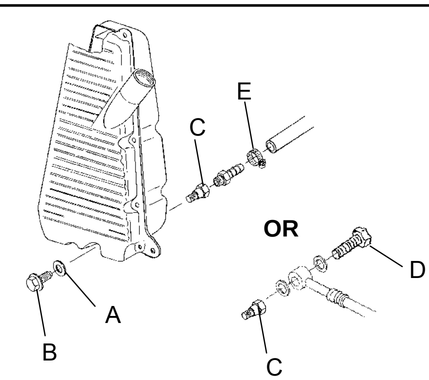
Oil and Filter Change (4 Stroke)

1. Place vehicle on a level surface.
2. Run engine two to three minutes until warm. Stop engine.
3. Clean area around drain plug (B) at bottom of oil tank.
4. Place a drain pan beneath oil tank and remove drain plug. **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.
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. (1.9 kgm).
8. Loosen clamp (E) or bolt (D).
9. Remove oil hose from screen fitting (C) on bottom of oil tank.
10. Remove screen fitting (C).
11. Clean screen thoroughly.
12. Apply Loctite t PST 505 or an equivalent pipe thread sealant or PTFE sealant tape to clean, oil free threads of fitting.
13. Install fitting and torque to 14-17 ft./lbs..
14. Install oil hose on fitting and tighten clamp to 25 inch/lbs.

Recommended Engine Oil:

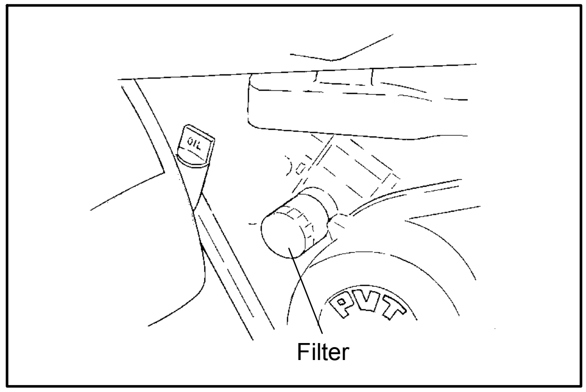
Polaris Premium 4 All Season Synthetic, 0W/40, PN 2871281

Ambient Temperature Range: -40° F to 120° F



Oil and Filter Change, Cont. (4 Stroke)

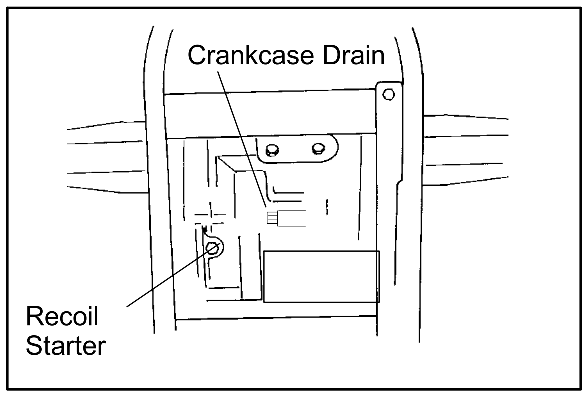
15. Place shop towels beneath oil filter. Using an oil filter wrench, turn filter counterclockwise to remove.
16. Using a clean dry cloth, clean filter sealing surface on crankcase.
17. Lubricate O-ring on new filter with a film of engine oil. Check to make sure the O-ring is in good condition.
18. Install new filter and turn by hand until filter gasket contacts the sealing surface, then turn and additional 1/2 turn.



19. Approximately 1 cup of engine oil will remain in the crankcase. To drain, remove drain plug found on lower right side of crankcase.

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

20. Reinstall drain plug.
21. Remove dipstick and fill tank with 2 quarts (1.9 l) of Polaris Premium 4 synthetic oil.
22. Place gear selector in neutral and set parking brake.
23. Start the engine and let it idle for one to two minutes. Stop the engine and inspect for leaks.
24. Re-check the oil level on the dipstick and add oil as necessary to bring the level to the upper mark on the dipstick.
25. Dispose of used filter and oil properly.



Engine Sump Drain Plug - Bottom View

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

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:
Snap On t PN YA997 or 2 1/2 inch

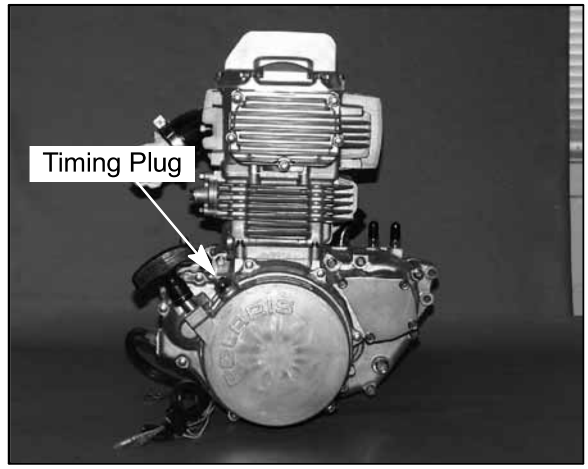
Oil Tank Screen Fitting Torque:
14-17 ft. lbs. (19 Nm)

Valve Clearance - 335, 425, 500cc Engines

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

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

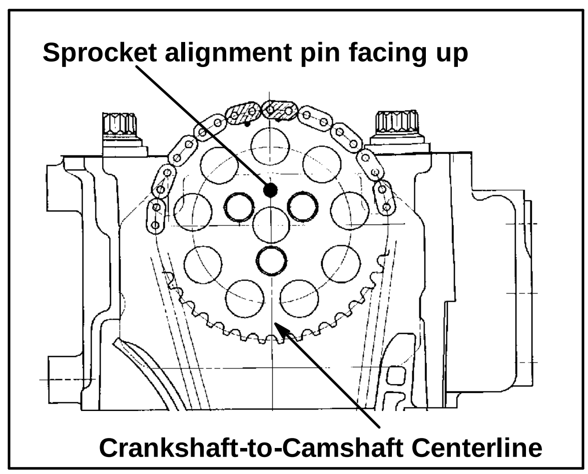
   NOTE: It may be necessary to tap cover lightly with a soft-faced hammer to loosen it from the cylinder head.
5. Remove timing inspection plug from recoil housing.



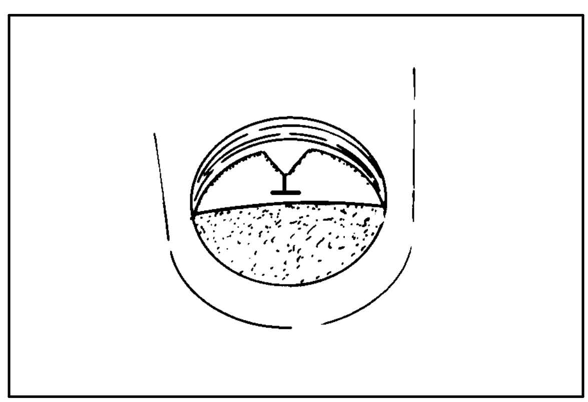
CAUTION: Failure to position the crankshaft at TDC on compression stroke will result in improper valve adjustment.

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

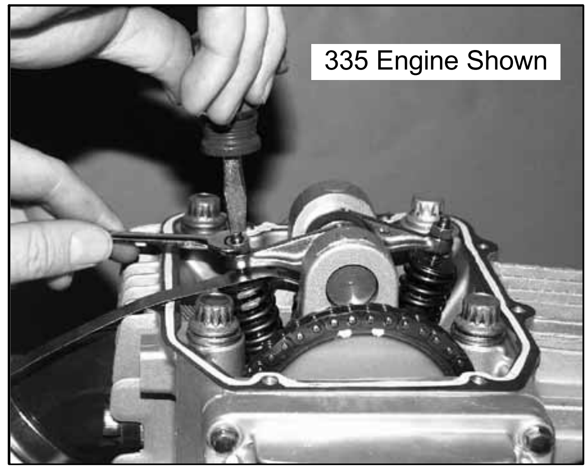
NOTE: At this point watch the camshaft sprocket locating pin and slowly rotate engine until locating pin is facing upward, directly in line with the crankshaft to camshaft center line as shown. The camshaft lobes should be pointing downward.



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



Intake Valve Clearance Adjustment

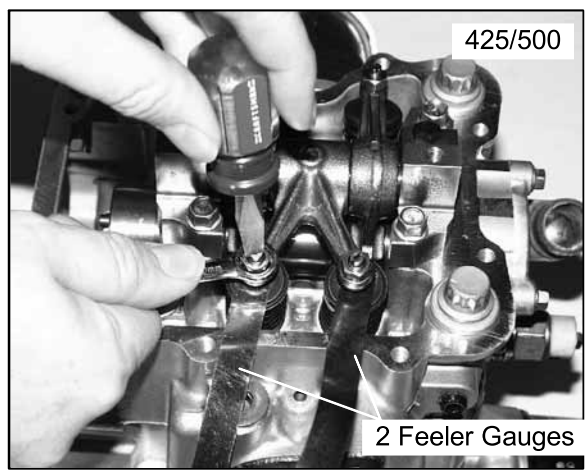


1. Insert a .006″ (.15mm) feeler gauge between end of intake valve stem and clearance adjuster screw.
2. Using a 10 mm wrench and a screwdriver, loosen adjuster lock nut and turn adjusting screw until there is a slight drag on the feeler gauge.
3. Hold adjuster screw and tighten adjuster lock nut securely.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

INTAKE VALVE CLEARANCE
335 / 425 / 500 Engines
.006″ (.15 mm)

Exhaust Valve Clearance Adjustment

NOTE: The exhaust valves on 425 and 500cc share a common rocker arm, and must be adjusted using two feeler gauges.



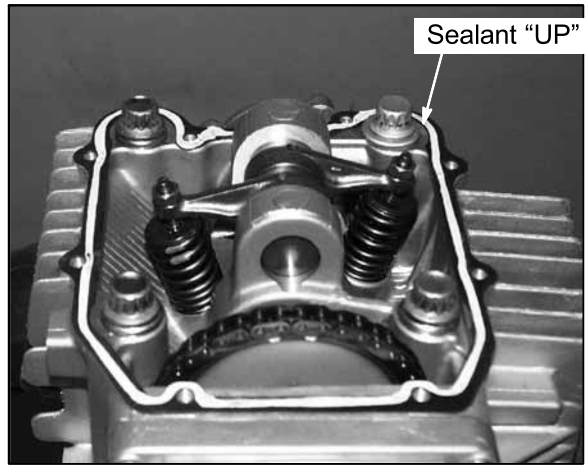
1. Insert .006 feeler gauge(s) between end of exhaust valve stem and adjuster screw(s).
2. Loosen locknut(s) and turn adjuster screw(s) until there is a slight drag on feeler gauge(s). **NOTE:** Both feeler gauges should remain inserted during adjustment of each valve on 4 valve models.

EXHAUST VALVE CLEARANCE
335 / 425 / 500 Engines
.006″ (.15 mm)

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

Exhaust Valve Clearance Adjustment Cont.

6. Scrape gasket surfaces to remove all traces of the old gasket. **CAUTION:** Use care not to damage the sealing surface of the cover or cylinder head.
7. Reinstall the cover using a new gasket.
8. Torque cover bolts to 78 in. lbs.
9. Remove the shop towel from the spark plug cavity.
10. Reinstall the spark plug. Torque to 14 ft. lbs. (19 Nm).
11. Reinstall the spark plug high tension lead.
12. Reinstall the fuel tank.
13. Reinstall the fuel tank shroud.
14. Reinstall the left and right body panels.



Cover Bolt Torque:	**72 in. lbs.**
Spark Plug Torque:	**14 ft. lbs.**

Steering

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

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

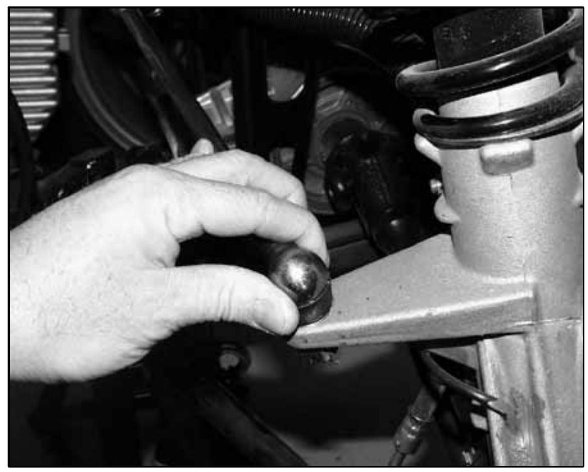
⚠ WARNING

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

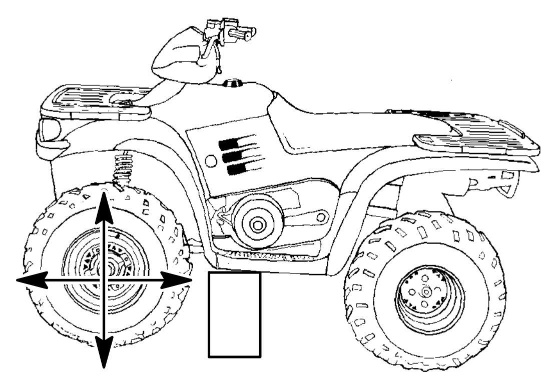
One of two methods can be used to measure toe alignment. The string method and the chalk method. If adjustment is required, refer to following pages for procedure.

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



- Elevate front end of machine so front wheels are off the ground. Check for any looseness in front hub / wheel assembly by grasping the tire firmly at top and bottom first, and then at front and rear. Try to move the wheel and hub by pushing inward and pulling outward.
- If abnormal movement is detected, inspect the hub and wheel assembly to determine the cause (loose wheel nuts, loose front hub nut (4x4) or spindle nut (2x4).
- Refer to the Body/Steering or Final Drive chapter for more information.



Check for Loose Wheel or Hub

Camber and Caster

The camber and caster are non-adjustable.

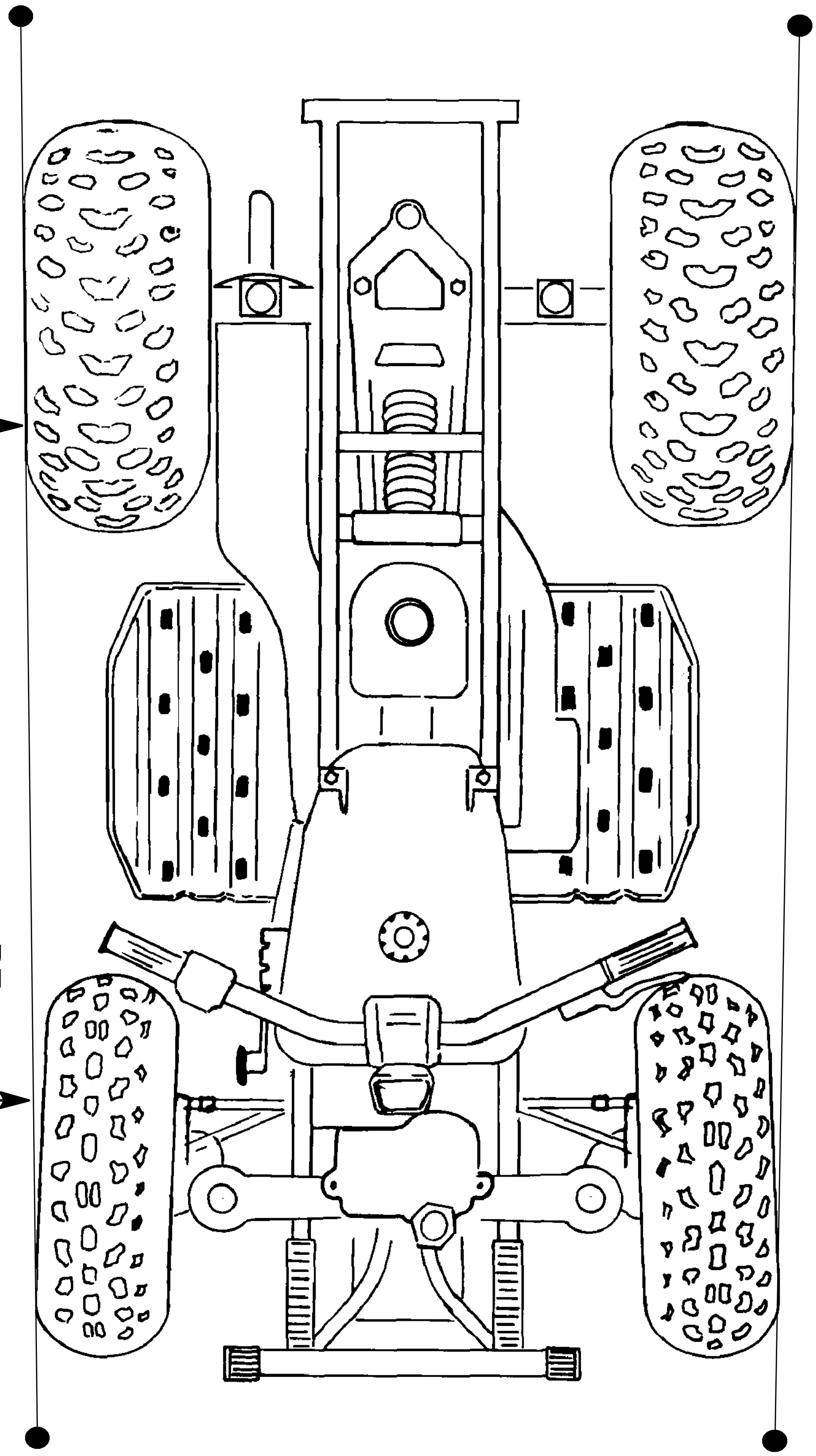
Method 1: Straightedge or String

Be sure to keep handlebars centered. See note below.

NOTE: String should just touch side surface of rear tire on each side of machine.

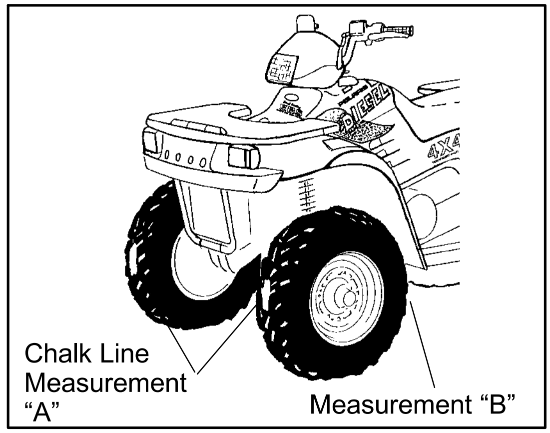
Measure from string to rim at front and rear of rim.

Rear rim measurement should be 1/16″ to 1/8″ (.2 to .3 cm) more than front rim measurement.



NOTE: The steering post arm (frog) can be used as an indicator of whether the handlebars are straight. The frog should always point straight back from the steering post.

Method 2 Chalk



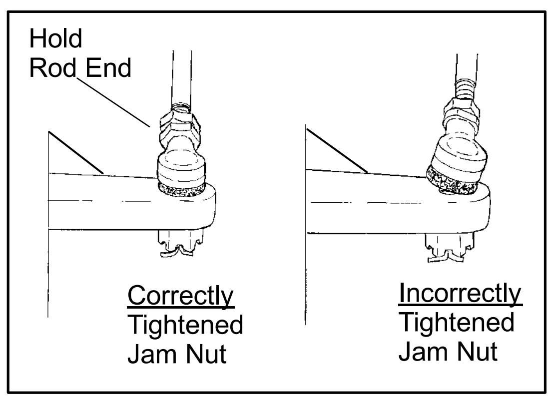
1. Place machine on a smooth level surface.
2. Set handlebars in a straight ahead position and secure handlebars in this position. **NOTE:** The steering frog can be used as an indicator of whether the handlebars are straight. The frog should always point straight back from the steering post.
3. Place a chalk mark on the face of the front tires approximately 10″ (25.4 cm) from the floor as close to the hub/axle center line as possible. **NOTE:** It is important that both marks be equally positioned from the ground 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

7. 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.

<u>To adjust toe alignment:</u>



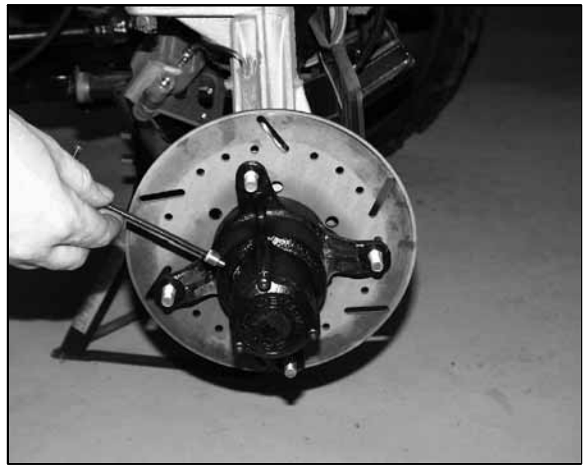
- Hold tie rod end to keep it from rotating.
- Loosen jam nuts at both end of the tie rod.
- Shorten or lengthen the tie rod until alignment is as required to achieve the proper toe setting as specified in Method 1 (1/16″ to 1/8″) or Method 2 (1/8″ to 1/4″).
- When the tie rod end jam nuts are tightened, be sure to hold tie rod ends so they are parallel with the steering arm or the steering frog, respectively, to prevent rod end damage.

8. After alignment is complete, torque jam nuts to 12-14 ft. lbs. (1.66-1.93 kg-m).

Front Hub Fluid Level Inspection (AWD Models)

To check front hub fluid:

1. Place vehicle on a level surface.
2. Turn wheel until front hub fill/check plug is in either the 4:00 or 8:00 position.



3. Remove fill/check plug.
4. Add Polaris Demand Drive Hub Fluid if necessary until fluid trickles out. **NOTE:** Do not force the fluid into the hub under pressure or seal damage may occur.
5. Reinstall plug.
6. Repeat procedure for other hub.

Front Hub Fluid Change (AWD Models)

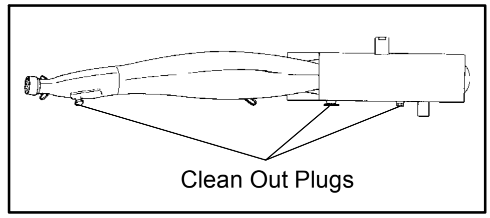
1. Place a drain pan beneath the hub.
2. Remove (3) screws and hub cap. Pry equally in notches provided until cap is removed.
3. Allow fluid to drain completely.
4. Inspect hub cap O-rings for nicks, cuts or abrasions. Replace if necessary.
5. Remove check/fill plug.
6. Reinstall the hub cap. **NOTE:** The check/fill plug must be removed before reinstalling the hub cap.
7. Turn wheel until front hub fill/check plug is in either the 4:00 or 8:00 position.
8. Add Polaris Demand Drive Hub Fluid until fluid trickles out. **NOTE:** Do not force the fluid into the hub under pressure or seal damage may occur.

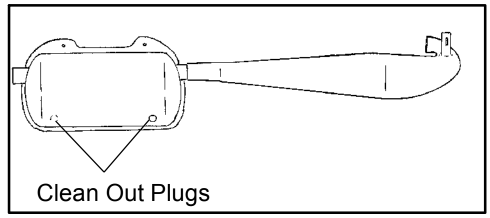
Polaris Demand Drive Hub Fluid:
PN 2871654 - 8 oz..
PN 2872277 - 2.5 gallon

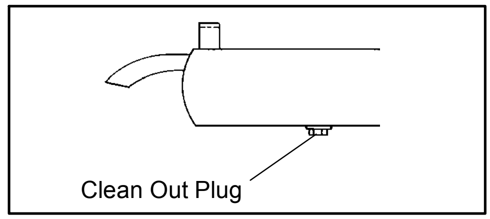
Exhaust Pipe

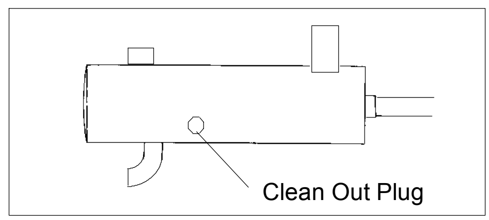
The exhaust pipe must be periodically purged of accumulated carbon as follows:

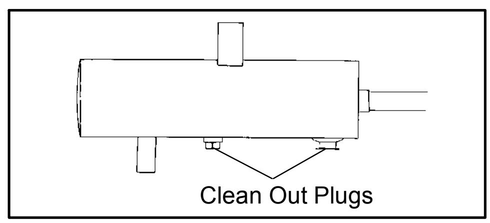
1. Remove the clean out plugs located on the bottom of the muffler as shown at right.
2. Place the transmission in neutral and start the engine. Purge accumulated carbon from the system by momentarily revving the engine several times.
3. If some carbon is expelled, cover the exhaust outlet and rap on 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 parking brake and block the wheels. Make sure the machine is in neutral and repeat steps 2 and 3. **WARNING:** SEE BELOW.
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 parking brake and block the wheels. Make sure the machine is in neutral and repeat steps 2 and 3. **WARNING:** SEE BELOW.
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.











⚠ WARNING

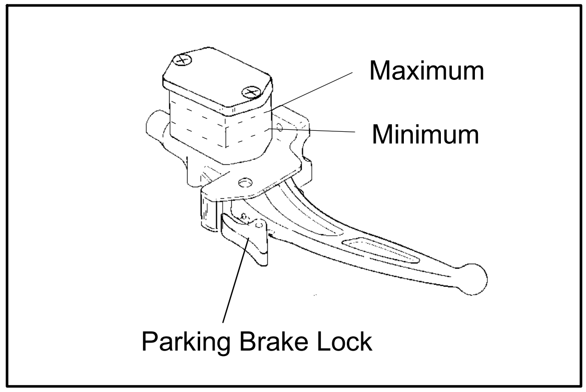
- Do not perform this operation immediately after the engine has been run because the exhaust system becomes very hot.
- Because of the increased fire hazard, make sure that there are no combustible materials in the area when purging the spark arrestor.
- Wear eye protection.
- Do not stand behind or in front of the vehicle while purging the carbon from the spark arrestor.
- Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas.
- Do not go under the machine while it is inclined.

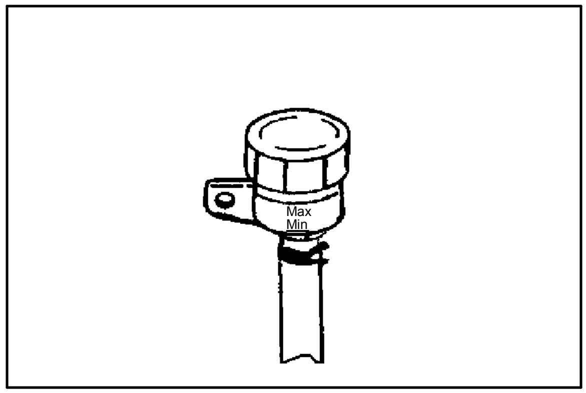
Failure to heed these warnings could result in serious personal injury or death.

Brake System Inspection

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

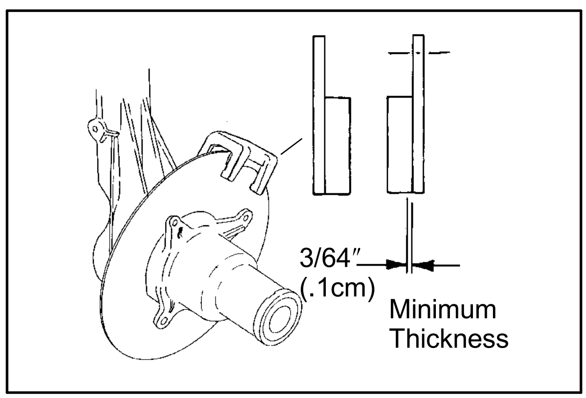
- Keep fluid level in the master cylinder reservoir between "Min" & "Max" lines at all times.
- Use Polaris DOT 3 brake fluid (PN 2870990).
- Check brake system for fluid leaks.
- Check brake for excessive travel or spongy feel.
- Check friction pads for wear, damage and looseness.
- Check surface condition of the disc.
- Inspect thickness of brake pad friction material.





Brake Pad Inspection

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



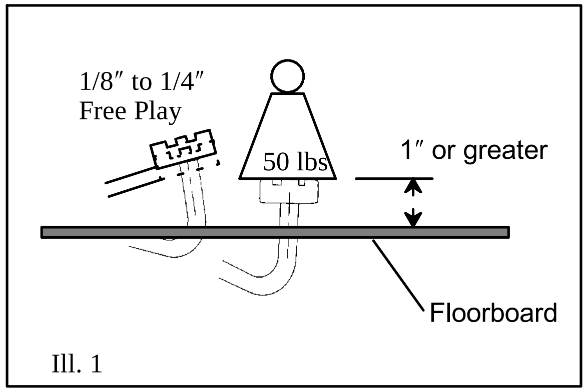
Hose/Fitting Inspection

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

Auxiliary Brake Adjustment (Hydraulic)

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

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



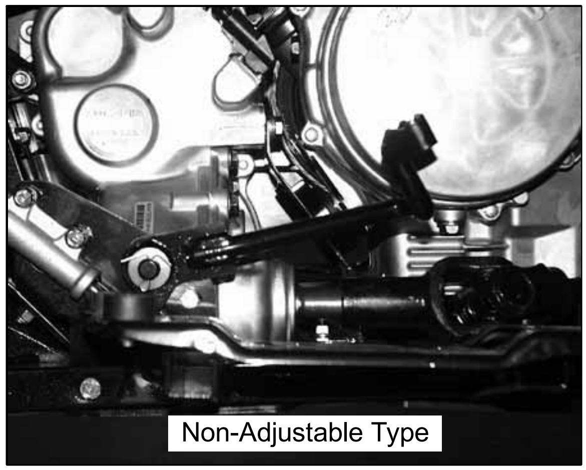
Ill. 1

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

Free Play:

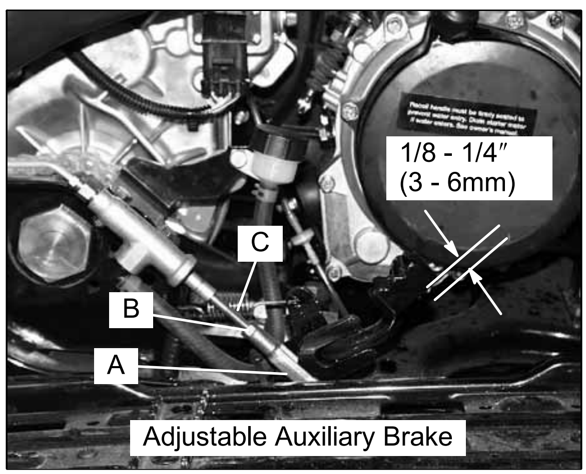
Free play of the brake pedal should be 1/8 - 1/4 inch (3.2 - 6.35 mm).

Free play can be adjusted on some models by altering the length of the pushrod, which is connected to the brake pedal by a clevis. Other models are non-adjustable type (right). If free play is excessive on a non-adjustable brake, inspect pedal, linkage, and master cylinder for wear or damage and replace any worn parts.


Non-Adjustable Type

To adjust the linkage:

- Remove right hand drive cover to gain access to brake pushrod.
- Hold clevis (A) and loosen clevis adjuster lock nut (B).
- To **increase** free play, shorten the pushrod (C).
- To **decrease** free play, lengthen the pushrod (C).
- Hold clevis and tighten lock nut (B) securely.
- Reinstall drive cover.



Adjustable Auxiliary Brake

Bleeding:

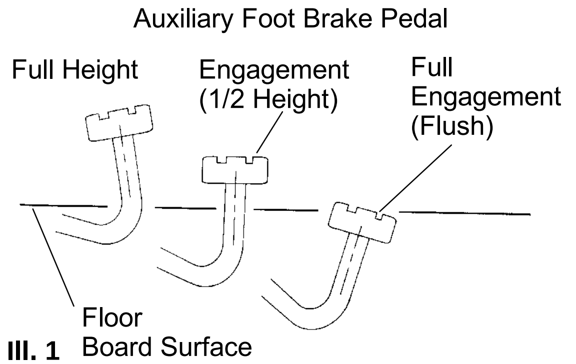
If free play is correct and brake pedal travel is still excessive, air may be trapped somewhere in the system. Bleed the hydraulic auxiliary brake system in a conventional manner, following the procedure outlined in the Brake chapter.

Auxiliary Mechanical Brake System

Auxiliary Brake Testing

The auxiliary brake should be checked for proper adjustment.

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

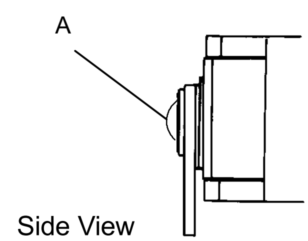


Ill. 1

Auxiliary Brake Adjustment - Mechanical

The mechanical auxiliary brake should be adjusted if the brake pedal deflection is under 1/2″ (1.3 cm) or exceeds 3/4″ (1.9 cm) prior to brake activation.

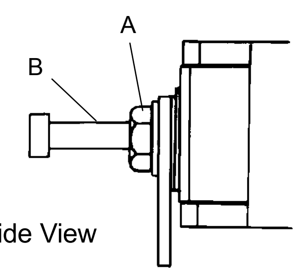
1. Place the machine in neutral. Stop engine.
2. **Type I:** If adjustment is necessary turn adjuster bolt (A) clockwise until disc rotation becomes difficult. Turn adjuster bolt counterclockwise until brake engagement starts at approximately 1/2 of the total pedal travel (See Illustration 1 and 2).



Auxiliary Brake Adjustment - Type I
Ill. 2

   Type II:If adjustment is necessary, loosen jam nut (A) and turn adjuster bolt (B) clockwise until disc rotation becomes difficult. Turn adjuster bolt counterclockwise until brake engagement starts at approximately 1/2 of the total pedal travel (See Illustration). Tighten the lock nut securely. (See Illustration 1 and 3).

3. Check brakes to be sure they are not dragging. Readjust pedal deflection if necessary.



Auxiliary Brake Adjustment - Type II
Ill. 3

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 2871079).

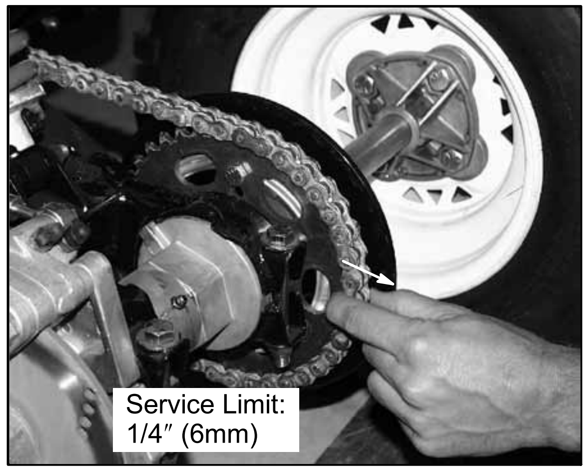
Inspect the drive chain for missing or damaged O-Rings, link plates, or rollers. Do not wash the chain with a high pressure washer, gasoline or solvents; do not use a wire brush to clean the chain as damage to the O-Rings may occur. Clean chain with hot soapy water and a soft bristled nylon brush.

Never allow battery acid to contact the drive chain.

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).

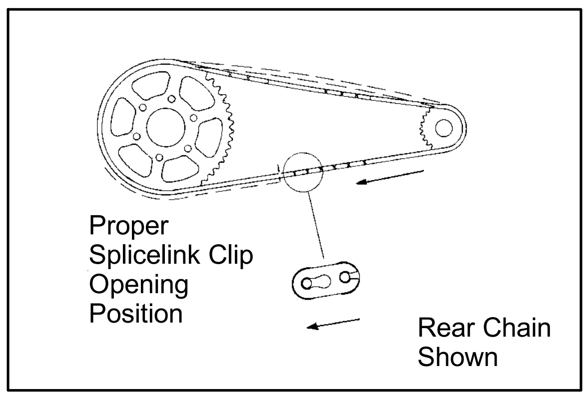


Drive Chain Lubricant:
Polaris O-Ring Chain Lubricant PN 2871079

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.



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

Rear Drive Chain Tension Inspection - Standard Swingarm

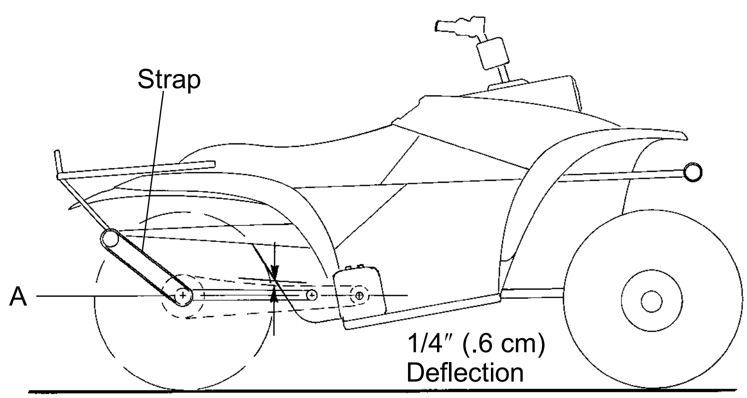
Rear drive chain tension must be measured with the swingarm in the position shown below in Ill.1. to ensure accurate measurement.

NOTE: On models with concentric swingarm (all rear chain drive *except* Xplorer and Xpress 300), chain tension can be measured at any point in the swingarm arc. It is not necessary to compress the suspension on concentric models. Refer to following page for drive chain adjustment on models with concentric swingarm.

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.
- Check the amount of chain slack by moving the vehicle slightly forward to gain slack at the top side of the rear chain.
- Collapse the suspension by using an adjustable (buckle type) trailer tie down.
- Fasten the strap around the axle and rear bumper tube. Tighten until a straight line (A) can be drawn from the axle to the transmission output shaft intersecting the swing arm pivot.
- If the chain needs adjustment, use the following procedure.

Standard Swingarm Drive Chain Adjustment

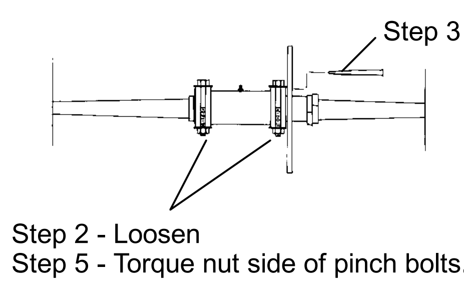


IMPORTANT: On models with standard swingarm (non-concentric) suspension must be compressed as shown to check drive chain tension.
Ill. 1

Rear Drive Chain Tension Adjustment - Standard Swingarm

1. Loosen chain guard.
2. Loosen two eccentric locking bolts.
3. Insert a pin punch through the sprocket hub and into the eccentric axle housing.
4. Roll the vehicle ahead or back to adjust chain slack to 1/4 inch (6mm) in the center of the chain as shown above.
5. Tighten the nut side of eccentric pinch bolts to **60 ft. lbs. (83 Nm)** while holding the bolt with a wrench. Verify proper chain deflection measurement after pinch bolts are tight, and readjust if necessary.
6. Reinstall chain guard (where applicable).
7. Adjust stone guard to allow 1/8″ clearance between sprocket and guide.

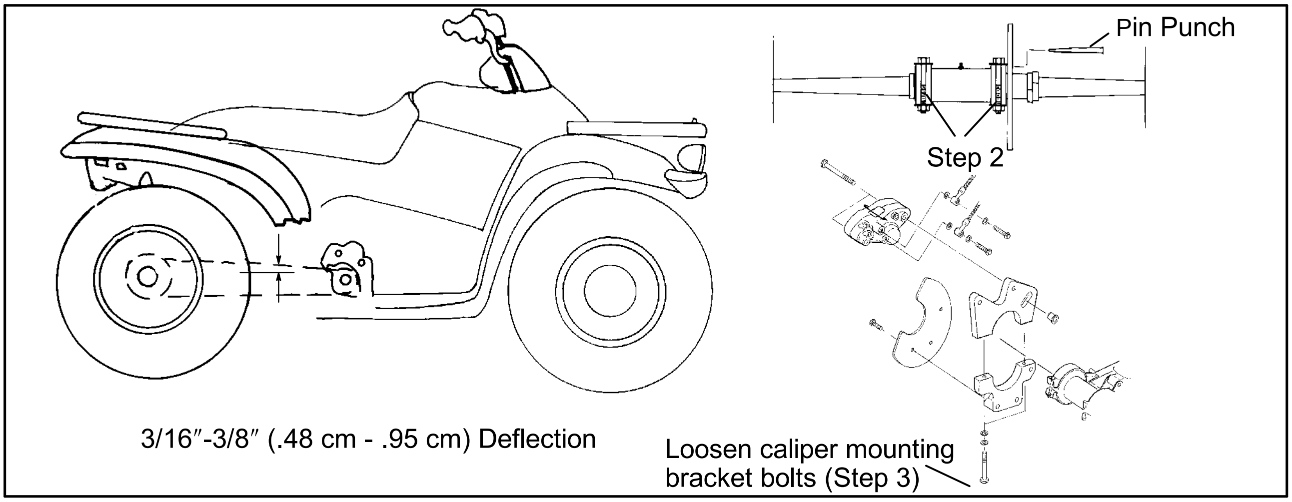
Rear Drive Chain Adjustment



Drive Chain Adjustment, Concentric Swingarm

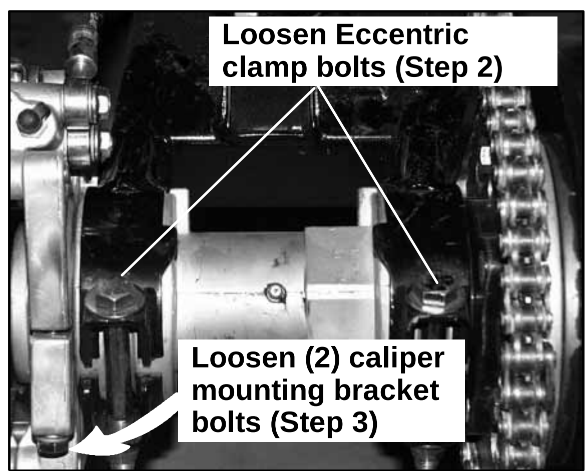
⚠ **CAUTION:** Never adjust or operate the vehicle with the rear drive chain too loose or too tight as severe damage to the transmission and drive components can result.

Check the amount of chain slack by moving the vehicle slightly forward to gain slack at the top side of the rear chain. At this point the chain should have 3/16″-3/8″ (5-10 mm) deflection. If the chain needs adjustment, use the following procedure.



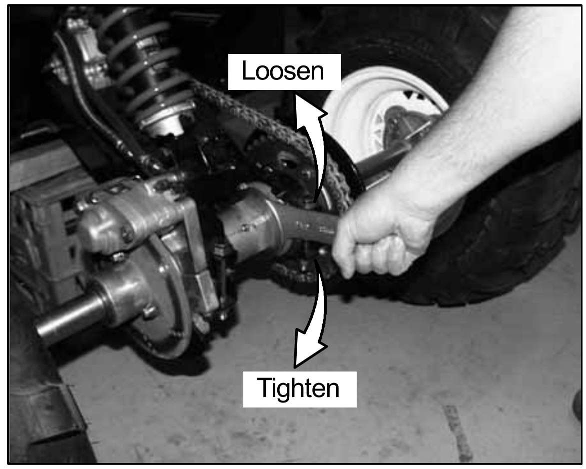
Adjustment Procedure - Concentric Swingarm Rear Axles (Tapered Roller Bearings)

1. Loosen chain guard.
2. Loosen two eccentric clamp bolts.
3. Loosen caliper mounting bracket bolts.



Adjustment Procedure - Concentric Swingarm Rear Axles (Tapered Roller Bearings), Cont.

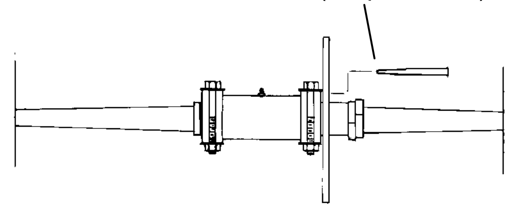
4. Using a 2 1/2″ wrench, rotate the housing to adjust chain slack to the proper dimension, and then proceed to Step 7;
   or... follow Steps 5 and 6 for alternate method if 2 1/2″ wrench is not available.



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.

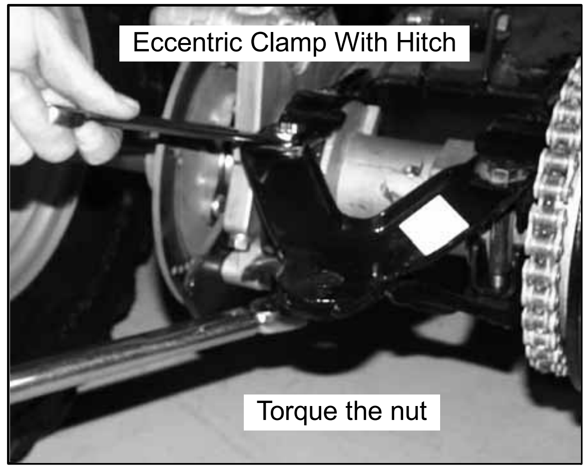
Alternate Adjustment Method – Pin Punch (Step 5 and 6)



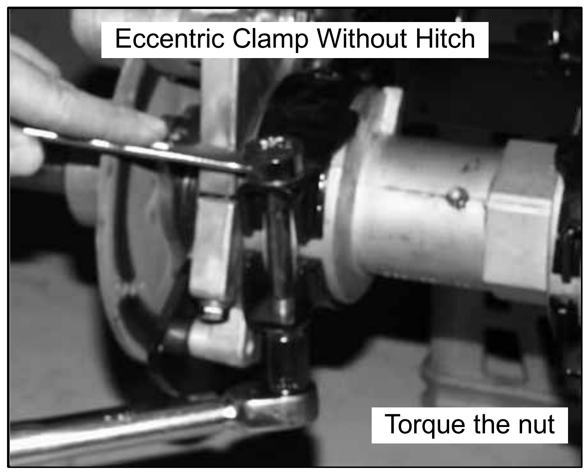
7. Tighten the eccentric clamp bolts to specification.

WITH TRAILER HITCH - 40 ft. lbs. (55 Nm)

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

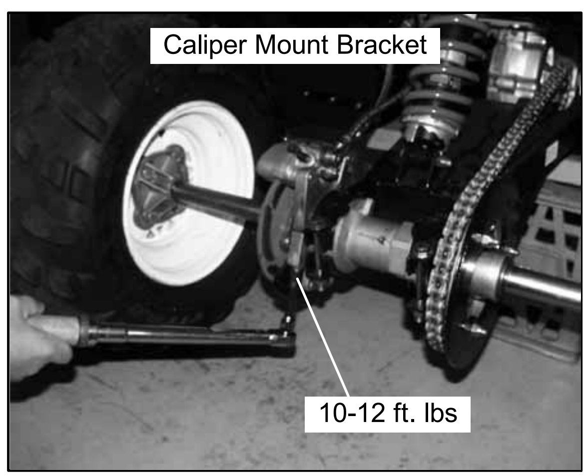


WITHOUT TRAILER HITCH - 30 ft. lbs. (41 Nm)



8. Verify chain adjustment is correct after tightening eccentric clamp bolts to specification.
9. Tighten caliper mounting bracket bolts 10-12 ft. lbs. (14 - 17 Nm)
10. Reinstall chain guard (where applicable).

NOTE: Reposition chain guide to allow 1/8″ (.3 cm) clearance between sprocket and guide.



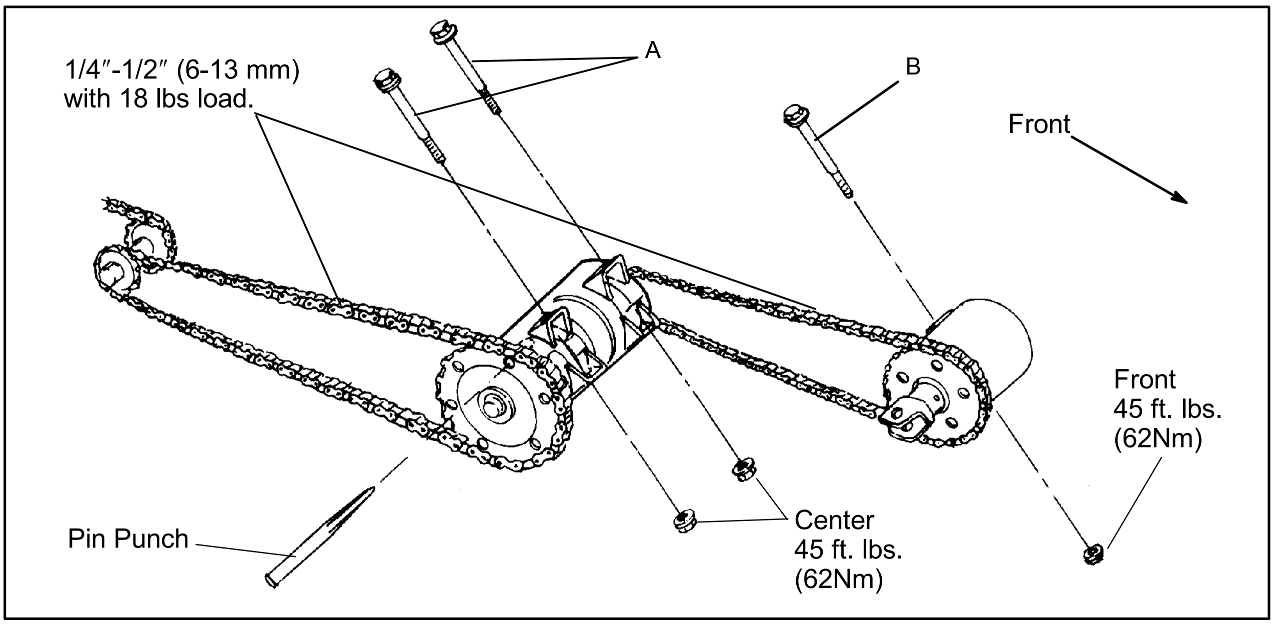
Center/Front Drive Chain Slack Adjustment

The center chain should be adjusted before the front chain. This adjustment affects the front chain slack.

Center/Front Drive Chain Inspection/Adjustment

1. Remove center chain guard attaching hardware. Press brake pedal downward and remove guard.
2. Remove forward chain guard attaching bolts and guard.
3. Loosen center chain eccentric clamp bolts (A).
4. Rotate vehicle forward or rearward until one of sprocket holes aligns with hole provided in eccentric.
5. Insert a large punch or screwdriver through sprocket and into eccentric hole. Rotate vehicle rearward to tighten chain. Chain deflection should be 1/4-1/2″ (6-13 mm) with 18 lbs. (8.18 kg) of force at center of chain.
6. Tighten eccentric clamp bolts to 45 ft. lbs. (62 Nm). **NOTE:** This does not include nut rolling torque. Check chain tension.
7. Loosen forward chain eccentric clamp bolt (B). Install punch as was done previously and adjust chain to 1/4-1/2″ (6-13 mm) with 18 lbs. (8.18 kg) force at center of chain.
8. Tighten forward eccentric clamp bolt to 45 ft. lbs. (62 Nm). **NOTE:** This does not include nut rolling torque. When this bolt is tightened the chain deflection may change. Check deflection and adjust again if needed.

Center and Front Drive Chain Adjustment:
1/4-1/2″ (6-13 mm) with 18 lbs. load (8.18 kg)



Drive Chain Inspection/Adjustment - 6x6

CAUTION:

Never adjust or operate the vehicle with the rear drive chain slack out of the specified range, as severe damage to the transmission and drive components can result.

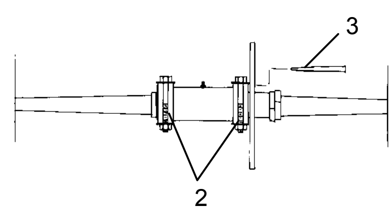
6x6 Chain Inspection

Check the amount of chain slack by moving the vehicle slightly forward to gain slack at the top side of the chain. Then pull up and down on the chain. Total slack should be as specified below. If slack is not within specification, adjust the chain.

6x6 Middle Axle Chain Adjustment

1. Loosen chain guard.
2. Loosen two eccentric locking bolts.
3. Insert a pin punch through the sprocket hub and into the eccentric axle housing.
4. Roll the vehicle ahead or back to adjust chain slack to the proper dimension. Correct chain slack adjustment is 1 1/4″ to 1 1/2″ (30-38 mm) total at the midpoint.
5. Tighten the eccentric locking bolts to 60 ft. lbs.
6. Reinstall chain guard.

Drive Chain Adjustment



NOTE: Reposition chain guide to allow 1/8″ (.3 cm) clearance between sprocket and guide.

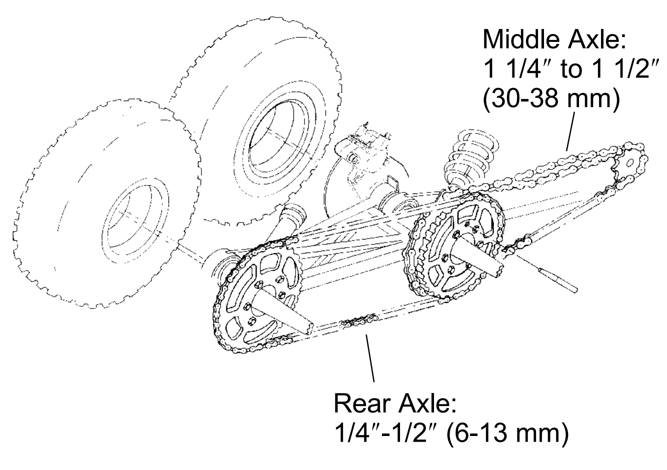
6x6 Rear Axle Drive Chain Adjustment

To adjust the rear axle drive chain on 6x6 models, loosen the rear most eccentric and rotate using the same method as outlined for the middle axle chain. Total slack, however, should be adjusted to 1/4″-1/2″ (6-13 mm).

6x6 Chain Deflection

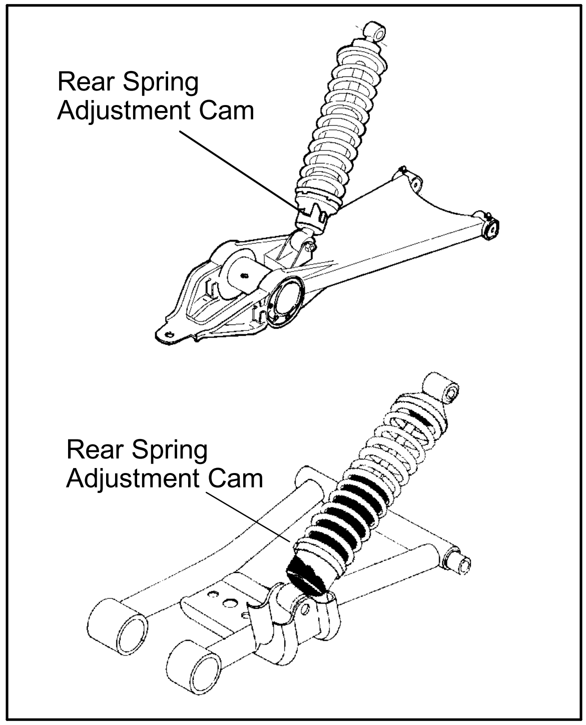
Middle Axle:
1 1/4- 1 1/2″(30- 38 mm)

Rear Axle:
1/4-1/2″(6-13 mm)



Suspension Spring Preload Adjustment

Operator weight and vehicle loading affect suspension spring preload requirements. Adjust as necessary.



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.

Check all rear suspension components for wear or damage.

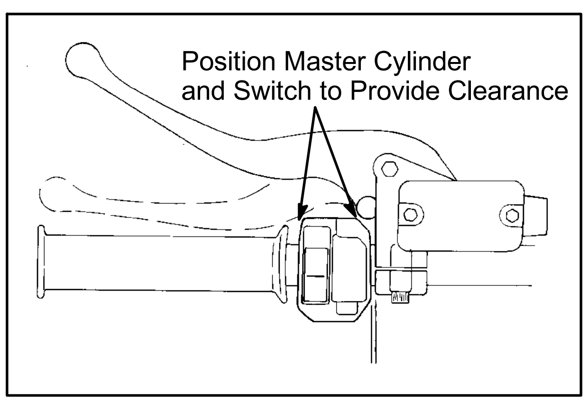
Inspect shock for leakage.

Shock Spanner Wrench
PN 2870872

Controls

Check controls for proper operation, positioning and adjustment.

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



Wheels

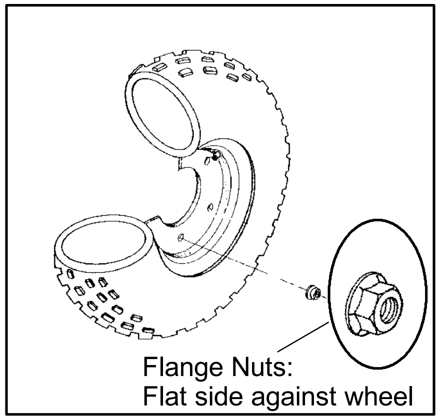
Inspect all wheels for runout or damage. Check wheel nuts and ensure they are tight. Do not over tighten the wheel nuts.

Wheel, Hub, and Spindle Torque Table

Model	Item	Specification
2x4	Front Wheel Nuts	15 Ft. Lbs.
	Rear Wheel Nuts	50 Ft. Lbs.
	Front Spindle Nut	40 Ft. Lbs.
	Rear Hub Retaining Nut	80 Ft. Lbs.
4x4 Chain Drive and Chain/Shaft Models and Magnum 500	Front Wheel Nuts	15 Ft. Lbs.
	Rear Wheel Nuts	50 Ft. Lbs.
	Front Spindle Nut	Refer to procedure listed in Chapter 7
	Rear Hub Retaining Nut	80 Ft. Lbs.
4 x 4 Shaft Drive (All except Magnum 500)	Front Wheel Nuts	15 Ft. Lbs.
	Rear Wheel Nuts	15 Ft. Lbs.
	Front Spindle Nut	Refer to procedure listed in Chapter 7
	Rear Hub Retaining Nut	100 Ft. Lbs.

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.

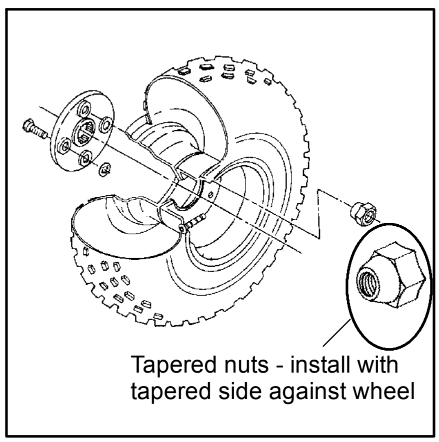


Wheel Installation

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.
3. Lower the vehicle to the ground.
4. Securely tighten the wheel nuts to the proper torque listed in the table above.

CAUTION:

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



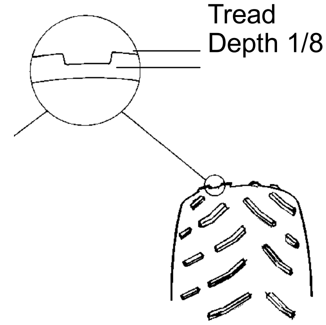
Tire Pressure

Tire Pressure Inspection (PSI - Cold)			
1999 Model	**Front**	**Center**	**Rear**
All Models Except Listed Below	4	–	3
Sportsman Models (Independent Rear Suspension)	5	–	5
6x6	5	5	5

Tire Inspection

CAUTION:

- Maintain proper tire pressure. Refer to the warning tire pressure decal applied to the vehicle.
- Improper tire inflation may affect ATV maneuverability.
- When replacing a tire always use original equipment size and type.
- The use of non-standard size or type tires may affect ATV handling.



Tire Tread Depth

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

⚠ WARNING

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

Worn tires can cause an accident.

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

Frame, Nuts, Bolts, Fasteners

Periodically inspect the 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.

NOTES

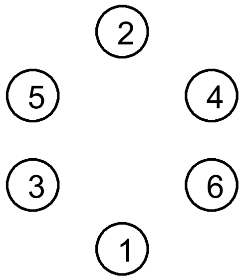
CHAPTER 3
ENGINE

TORQUE SPECIFICATIONS				
2 CYCLE ENGINES				
Fastener	**Size**	**250 EC25PFE Ft. Lbs. (Nm)**	**300 EC28PFE Ft. Lbs. (Nm)**	**400 EC38PLE Ft. Lbs. (Nm)**
Cylinder Head Bolts	8mm	18-20 (24-27)	18-20 (24-27)	18-20 (24-27)
Cylinder Base Bolts	10mm	25-29 (34-40)	25-29 (34-40)	25-29 (34-40)
Crankcase	8mm	17-18 (23-24)	17-18 (23-24)	17-18 (23-24)
Crankcase	6mm	6-8 (8-11)	6-8 (8-11)	6-8 (8-11)
Crankshaft Slotted Nut	16mm	-	-	29-44 (40-60)
Water Pump Impeller Nut	6mm	-	-	5-6.5 (7-9)
Stator Plate	6mm	5-6.5 (7-9)	5-6.5 (7-9)	5-6.5 (7-9)
Flywheel	16mm	44-62 (60-85)	44-62 (60-85)	29-44 (40-60)
Starter Motor	6mm	5-6.5 (7-9)	5-6.5 (7-9)	5-6.5 (7-9)
Recoil Housing	6mm	5-6.5 (7-9)	5-6.5 (7-9)	5-6.5 (7-9)
Spark Plug (New)	14mm	9-11 (12-15)	9-11 (12-15)	9-11 (12-15)
Spark Plug (Used)	14mm	17-20 (23-27)	17-20 (23-27)	17-20 (23-27)
Drive Clutch Bolt	7/16 - 20	40 (55)	40 (55)	40 (55)

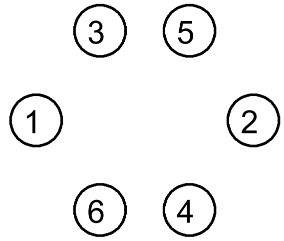
Torque Specifications - 4 Cycle

TORQUE SPECIFICATIONS				
4 CYCLE ENGINES				
Fastener	**Size**	**335** **ES33PFE** **Ft. Lbs. (Nm)**	**425** **EH42PLE** **Ft. Lbs. (Nm)**	**500** **EH50PLE** **Ft. Lbs. (Nm)**
Blind Plug (Oil Pressure)	1/8 Pipe Thread	6.5-11 (9-15 Nm)	6.5-11 (9-15 Nm)	6.5-11 (9-15 Nm)
Camshaft Sprocket	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Camshaft Chain Tensioner Lever	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Camshaft Chain Tensioner	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Camshaft Chain Tensioner Cap	11mm	14-19 (20-25 Nm)	14-19 (20-25 Nm)	14-19 (20-25 Nm)
Carburetor Adaptor	8mm	12-14 (16-20 Nm)	12-14 (16-20 Nm)	12-14 (16-20 Nm)
Crankcase	8mm	14-15 (19-21 Nm)	14-15 (19-21 Nm)	14-15 (19-21 Nm)
Crankshaft Slotted Nut (Cam Chain Drive Sprocket)	28mm	35-51 (47-69 Nm)	35-51 (47-69 Nm)	35-51 (47-69 Nm)
Cylinder Base Bolts	10mm 6mm	45-49 (61-67 Nm) 6-8 (9-11 Nm)	45-49 (61-67 Nm) 6-8 (9-11 Nm)	45-49 (61-67 Nm) 6-8 (9-11 Nm)
Cylinder Head Bolts	11mm 6mm	47-53 (64-72 Nm) 5-7 (7-9 Nm)	Refer to Engine Assembly for torque procedure	
Drive Clutch Bolt	7/16 - 20	40 (55 Nm)	40 (55 Nm)	40 (55 Nm)
Flywheel	16mm	58-72 (78-98 Nm)	58-72 (78-98 Nm)	58-72 (78-98 Nm)
Oil Delivery Pipe	12mm	11-15 (15-21 Nm)	11-15 (15-21 Nm)	11-15 (15-21 Nm)
Oil Drain Bolt (Crankcase)	14mm	14-17 (19-23 Nm)	14-17 (19-23 Nm)	14-17 (19-23 Nm)
Oil Filter Pipe Fitting	20mm	36-43 (49-59 Nm)	36-43 (49-59 Nm)	36-43 (49-59 Nm)
Oil Hose Fitting	1/8 Pipe Thread	6.5-11 (9-15 Nm)	6.5-11 (9-15 Nm)	6.5-11 (9-15 Nm)
Oil Pump	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Oil Pump Case Screw	5mm	1.5-2 (2-3 Nm)	1.5-2 (2-3 Nm)	1.5-2 (2-3 Nm)
One Way Valve	11mm	14-19 (20-25 Nm)	14-19 (20-25 Nm)	14-19 (20-25 Nm)
Recoil Housing	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Rocker Cover	6mm	7-8 (9-11 Nm)	7-8 (9-11 Nm)	7-8 (9-11 Nm)
Rocker Support	8mm	-	8-10 (11-13 Nm)	8-10 (11-13 Nm)
Rocker Adjuster Screw	6mm	6-7 (8-10 Nm)	6-7 (8-10 Nm)	6-7 (8-10 Nm)
Water Pump Impeller Nut	6mm	-	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Water Pump Housing Cover	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Stator Plate	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Starter Motor	6mm	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)	5-6.5 (7-9 Nm)
Spark Plug	14mm	9-11 (12-15 Nm)	9-11 (12-15 Nm)	9-11 (12-15 Nm)

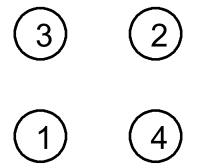
Tighten cylinder head, cylinder base, and crankcase fasteners in 3 steps following the sequence outlined below.



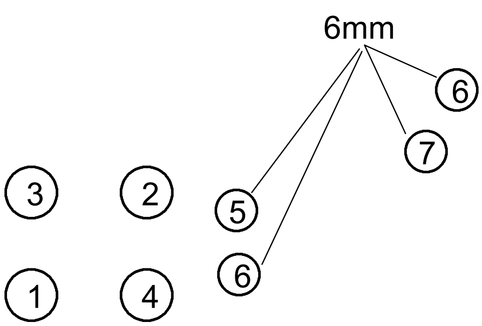
Cylinder Head
250 / 300



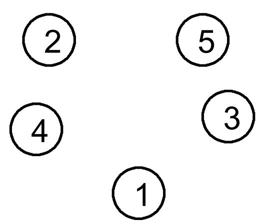
Cylinder Head
400



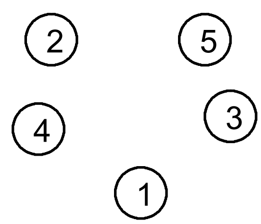
Cylinder Base
250 / 300 / 400



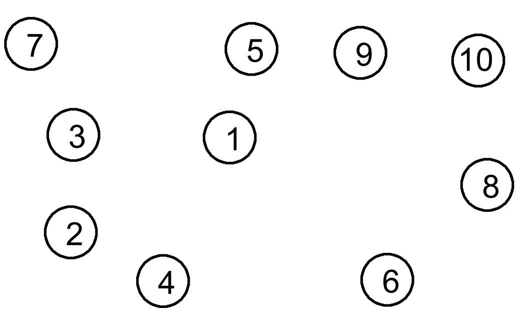
Cylinder Head
Cylinder Base
335 / 425 / 500



Crankcase
400L



Crankcase
250/300



Crankcase
335 / 425 / 500

Piston Identification

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. Two stroke rings are keystone design. Four stroke engine rings are rectangular profile. The numbers or letters on all rings (except 4-stroke oil control rings) must be positioned upward. See text for 4 stroke oil control ring upper rail installation. Use the information below to identify pistons and rings.

Engine Model No.	Oversize Available* (mm)	Piston Length	Standard Piston Identification
EC25PFE-08, 09, 10, 11, 13	.25 .50 1.00	68 mm	3W, 4W
EC28PFE-01, 02	.25 .50	70 mm	28
ES33PFE01/02	.25 .50	52.5 mm	None
EC38PLE-04, 05	.25 .50	78mm	38A
EC38PLE-06, 07, 08, 09	.25 .50	78mm	38B
EH42PL-02	.25 .50	66mm	B
EH50PLE04, 06, 08, 09	.25 .50	72mm	C

*****

Pistons and rings marked 25 equal .25mm (.010I) oversized
Pistons and rings marked 50 equal .50mm (.020I) oversized
Pistons and rings marked 10 equal 1.0mm (.040I) oversized (250 engines only)

Piston Clearance Specifications (2 Stroke Engines)

NOTE: See page 3.5 - 3.8 for 4 Stroke engine service data.

Machine Model	Engine Model	Cyl. Disp. (CCs)	Bore (in./mm)	Stroke (in./mm)	Piston Ring End Gap (Installed) in. (mm)	Piston Clearance in. (mm)	Clearance Svc. Limit (in. / mm)
Trail Blazer Trail Boss	EC25PF	244	2.8346 / 72	2.362 / 60	.009-.018 (.23-.46)	.0011-.0021 (.03-.05)	.006 / .15
Xpress 300 Xplorer 300	EC28PF	283	2.935 / 74.5	2.561 / 65	.012-.022 (.31-.56)	.0012-.0026 (.03-.07)	.006 / .15
Xplorer 400 Sport Scrambler 400	EC38PLE- 08, 09	379	3.270 / 83	2.758 / 70	.007-.015 (.18-.38)	.0023-.0037 (.06-.09)	.006 / .15

ES33PFE01 / 02 Engine Service Data

Cylinder Head / Valve				ES33PFE01 / 02
Rocker Arm	Rocker arm ID			.8669-.8678″ (22.020-22.041 mm)1.
	Rocker shaft OD			.8656-.8661″ (21.987-22.0 mm)
	Rocker shaft Oil Clearance		Std	.0008-.0021″ (.020-.054 mm)
			Limit	.0039″ (.10 mm)
Camshaft	Cam lobe height	In	Std	1.2884-1.2924″ (32.726-32.826 mm)
			Limit	1.2766″ (32.426 mm)
		Ex	Std	1.2884-1.2924″ (32.726-32.826 mm)
			Limit	1.2766″ (32.426 mm)
	Camshaft journal OD		Mag	1.4935-1.4941″ (37.935-37.950 mm)
			PTO	1.4935-1.4941″ (37.935-37.950 mm)
	Camshaft journal bore ID		Mag	1.4963-1.4970″ (38.005-38.025 mm)
			PTO	1.4963-1.4970″ (38.005-38.025 mm)
	Camshaft Oil clearance		Std	.0022-.0035″ (.055-.090 mm)
			Limit	.0039″ (.10 mm)
Cylinder Head	Surface warpage limit			.0020″ (.05 mm)
	Standard height			3.870″ (98.3 mm)
Valve Seat	Contacting width	In	Std	.028″ (.7 mm)
			Limit	.055″ (1.4 mm)
		Ex	Std	.039″ (1.0 mm)
			Limit	.071″ (1.8 mm)
Valve Guide	Inner diameter			.2362-.2367″ (6.0-6.012 mm)
	Protrusion above head			.689-.709″ (17.5-18.0 mm)
Valve	Margin thickness	In	Std	.039″ (1.0 mm)
			Limit	.031″ (.8 mm)
		Ex	Std	.047″ (1.2 mm)
			Limit	.031″ (.8 mm)
Valve	Stem diameter		In	.2343-.2348″ (5.950-5.965 mm)
			Ex	.2341-.2346″ (5.945-5.960 mm)
	Stem oil clearance	Std	In	.0014-.0024″ (.035-.062 mm)
			Ex	.0016-.0026″ (.040-.067 mm)
		Limit		.0059″ (.15 mm)
	Overall length		In	3.976″ (101.0 mm)
			Ex	3.984″ (101.2 mm)
Valve Spring	Free length		Std	1.654″ (42.0 mm)
			Limit	1.575″ (40.0 mm)
	Squareness			.075″ (1.9 mm) 2.5°

ES33PFE01 / 02 Engine Service Data

Cylinder / Piston / Connecting Rod				ES33PFE01
Cylinder	Surface warpage limit (mating with cylinder head)			.0020″ (.05 mm)
	Cylinder bore		Std	3.0732-3.0740″ (78.000-78.020 mm)
	Taper limit			.002″ (.05 mm)
	Out of round limit			.002″ (.05 mm)
	Piston clearance		Std	.0012-.0035″ (.030-.090 mm)
			Limit	.0043″ (.11 mm)
	Boring limit			.020″ (.5 mm)
Piston	Outer diameter	Std		3.0704-3.0720″ (77.93-77.97 mm)
		.0098″ (.25 mm) OS		3.0803-3.0819″ (78.18-78.22 mm)
		.0197″ (.50 mm) OS		3.0901-3.0917″ (78.43-78.47 mm)
	Standard inner diameter of piston pin bore			.9055-.9057″ (23.0-23.006 mm)
Piston Pin	Outer diameter			.9053-.9055″ (22.994-23.0 mm)
	Standard clearance-piston pin to pin bore			.0002-.0003″ (.004-.008 mm)
	Degree of fit			Piston pin must be fitted into position with thumb at 68° F (20° C)
Piston Ring	Piston ring installed gap	Top ring	Std	.0079-.0138″ (.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-.0276″ (.20-.70 mm)
			Limit	.059″ (1.5 mm)
Piston Ring	Standard clearance - piston ring to ring groove	Top ring	Std	.0014-.0030″ (.035-.075 mm)
			Limit	.0059″ (.15 mm)
		Second ring	Std	.0010-.0026″ (.025-.065 mm)
			Limit	.0059″ (.15 mm)
Connecting Rod	Connecting rod small end ID			.9058-.9063″ (23.007-23.020 mm)
	Connecting rod small end radial clear- ance		Std	.0003-.0010″ (.007-.026 mm)
			Limit	.0020″ (.05 mm)
	Connecting rod big end side clearance		Std	.0039-.0256″ (.1-.65 mm)
			Limit	.0315″ (.80 mm)
	Connecting rod big end radial clear- ance		Std	.0004-.0015″ (.011-.038 mm)
			Limit	.0020″ (.05 mm)
Crankshaft	Crankshaft runout limit			.0024″ (.06 mm)

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

EH42PLE02 / EH50PLE04, 06, 08, 09 Engine Service Data

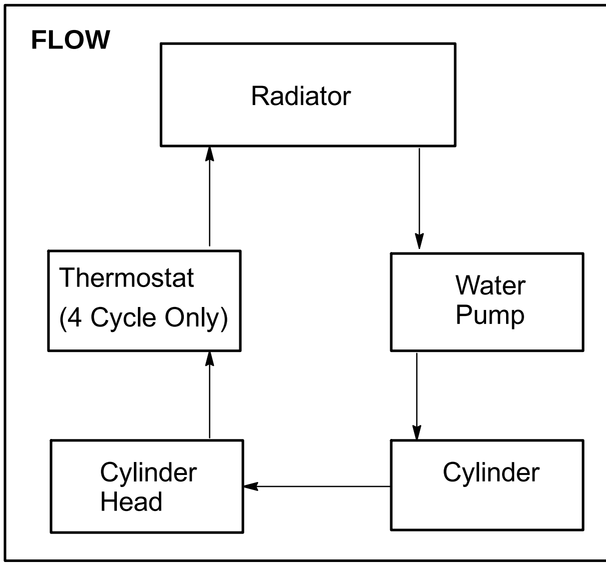
Cylinder Head / Valve				EH42PLE-01	EH50PLE-01
Rocker Arm	Rocker arm ID			.8669-.8678″ (22.020-22.041 mm)1.	.8669-.8678″ (22.020-22.041 mm)
	Rocker shaft OD			.8656-.8661″ (21.987-22.0 mm)	.8656-.8661″ (21.987-22.0 mm)
	Rocker shaft Oil Clearance		Std	.0008-.0021″ (.020-.054 mm)	.0008-.0021″ (.020-.054 mm)
			Limit	.0039″ (.10 mm)	.0039″ (.10 mm)
Camshaft	Cam lobe height	In	Std	1.2884-1.2924″ (32.726-32.826 mm)	1.2884-1.2924″ (32.726-32.826 mm)
			Limit	1.2766″ (32.426 mm)	1.2766″ (32.426 mm)
		Ex	Std	1.2884-1.2924″ (32.726-32.826 mm)	1.2884-1.2924″ (32.726-32.826 mm)
			Limit	1.2766″ (32.426 mm)	1.2766″ (32.426 mm)
	Camshaft journal OD		Mag	1.4935-1.4941″ (37.935-37.950 mm)	1.4935-1.4941″ (37.935-37.950 mm)
			PTO	1.4935-1.4941″ (37.935-37.950 mm)	1.4935-1.4941″ (37.935-37.950 mm)
	Camshaft journal bore ID		Mag	1.4963-1.4970″ (38.005-38.025 mm)	1.4963-1.4970″ (38.005-38.025 mm)
			PTO	1.4963-1.4970″ (38.005-38.025 mm)	1.4963-1.4970″ (38.005-38.025 mm)
	Camshaft Oil clearance		Std	.0022-.0035″ (.055-.090 mm)	.0022-.0035″ (.055-.090 mm)
			Limit	.0039″ (.10 mm)	.0039″ (.10 mm)
Cylinder Head	Surface warpage limit			.0020″ (.05 mm)	.0020″ (.05 mm)
	Standard height			3.870″ (98.3 mm)	3.870″ (98.3 mm)
Valve Seat	Contacting width	In	Std	.028″ (.7 mm)	.028″ (.7 mm)
			Limit	.055″ (1.4 mm)	.055″ (1.4 mm)
		Ex	Std	.039″ (1.0 mm)	.039″ (1.0 mm)
			Limit	.071″ (1.8 mm)	.071″ (1.8 mm)
Valve Guide	Inner diameter			.2362-.2367″ (6.0-6.012 mm)	.2362-.2367″ (6.0-6.012 mm)
	Protrusion above head			.689-.709″ (17.5-18.0 mm)	.689-.709″ (17.5-18.0 mm)
Valve	Margin thickness	In	Std	.039″ (1.0 mm)	.039″ (1.0 mm)
			Limit	.031″ (.8 mm)	.031″ (.8 mm)
		Ex	Std	.047″ (1.2 mm)	.047″ (1.2 mm)
			Limit	.031″ (.8 mm)	.031″ (.8 mm)
Valve	Stem diameter		In	.2343-.2348″ (5.950-5.965 mm)	.2343-.2348″ (5.950-5.965 mm)
			Ex	.2341-.2346″ (5.945-5.960 mm)	.2341-.2346″ (5.945-5.960 mm)
	Stem oil clearance	Std	In	.0014-.0024″ (.035-.062 mm)	.0014-.0024″ (.035-.062 mm)
			Ex	.0016-.0026″ (.040-.067 mm)	.0016-.0026″ (.040-.067 mm)
		Limit		.0059″ (.15 mm)	.0059″ (.15 mm)
	Overall length		In	3.976″ (101.0 mm)	3.976″ (101.0 mm)
			Ex	3.984″ (101.2 mm)	3.984″ (101.2 mm)
Valve Spring	Overall length		Std	1.654″ (42.0 mm)	1.654″ (42.0 mm)
			Limit	1.575″ (40.0 mm)	1.575″ (40.0 mm)
	Squareness			.075″ (1.9 mm)	.075″ (1.9 mm)

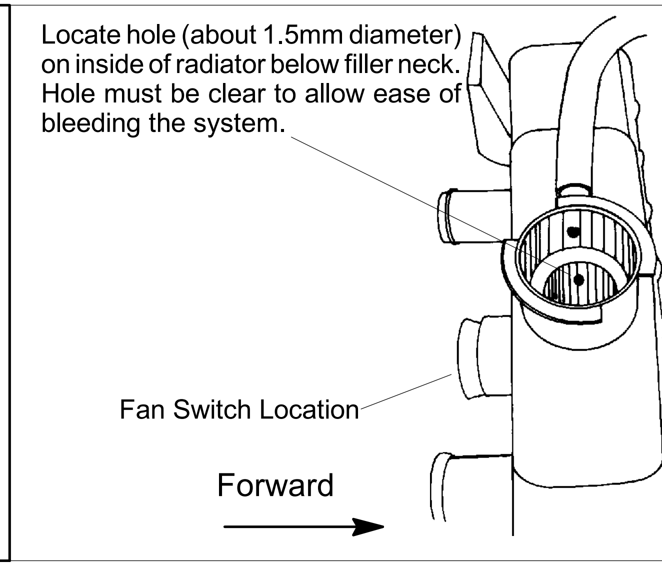
EH42PLE02 / EH50PLE04, 06, 08, 09 Engine Service Data

Cylinder / Piston / Connecting Rod				EH42PL	EH50PL
Cylinder	Surface warpage limit (mating with cylinder head)			.0020″ (.05 mm)	.0020″ (.05 mm)
	Cylinder bore		Std	3.4606-3.4614″ (87.900-87.920 mm)	3.6216-3.6224″ (91.99-92.01 mm)
	Taper limit			.0020″ (.050 mm)	.0020″ (.050 mm)
	Out of round limit			.0020″ (.050 mm)	.0020″ (.050 mm)
	Piston clearance		Std	.0006-.0018″ (.015-.045 mm)	.0006-.0018″ (.015-.045 mm)
			Limit	.0024″ (.060 mm)	.0024″ (.060 mm)
	Boring limit			.020″ (.5 mm)	.020″ (.5 mm)
Piston	Outer diameter	Std		3.4596-3.4600″ (87.875-87.885 mm)	3.6206-3.6210″ (91.96-91.97 mm)
		.0098″ (.25 mm) OS		3.4695-3.4699″ (88.125-88.135 mm)	3.6304-3.6310 (92.21-92.23 mm)
		.0197″ (.50 mm) OS		3.4793-3.4797″ (88.375-88.385 mm)	3.6403-3.6407 (92.46-92.47 mm)
	Standard inner diameter of piston pin bore			.9055-.9057″ (23.0-23.006 mm)	.9055-.9057″ (23.0-23.006 mm)
Piston Pin	Outer diameter			.9053-.9055″ (22.994-23.0 mm)	.9053-.9055″ (22.994-23.0 mm)
	Standard clearance-piston pin to pin bore			.0002-.0003″ (.004-.008 mm)	.0002-.0003″ (.004-.008 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-.0138″ (.20-.36 mm)	.0079-.0138″ (.20-.36 mm)
			Limit	.039″ (1.0 mm)	.039″ (1.0 mm)
		Second ring	Std	.0079-.0138″ (.20-.36 mm)	.0079-.0138″ (.20-.36 mm)
			Limit	.039″ (1.0 mm)	.039″ (1.0 mm)
		Oil ring	Std	.0079-.0276″ (.20-.70 mm)	.0079-.0276″ (.20-.70 mm)
			Limit	.059″ (1.5 mm)	.059″ (1.5 mm)
Piston Ring	Standard clearance - piston ring to ring groove	Top ring	Std	.0016-.0031″ (.040-.080 mm)	.0016-.0031″ (.040-.080 mm)
			Limit	.0059″ (.15 mm)	.0059″ (.15 mm)
		Second ring	Std	.0012-.0028″ (.030-.070 mm)	.0012-.0028″ (.030-.070 mm)
			Limit	.0059″ (.15 mm)	.0059″ (.15 mm)
Connecting Rod	Connecting rod small end ID			.9058-.9063″ (23.007-23.020 mm)	.9058-.9063″ (23.007-23.020 mm)
	Connecting rod small end radial clearance		Std	.0003-.0010″ (.007-.026 mm)	.0003-.0010″ (.007-.026 mm)
			Limit	.0020″ (.05 mm)	.0020″ (.05 mm)
	Connecting rod big end side clearance		Std	.0039-.0256″ (.1-.65 mm)	.0039-.0256″ (.1-.65 mm)
			Limit	.0315″ (.80 mm)	.0315″ (.80 mm)
	Connecting rod big end radial clearance		Std	.0004-.0015″ (.011-.038 mm)	.0004-.0015″ (.011-.038 mm)
			Limit	.0020″ (.05 mm)	.0020″ (.05 mm)
Crankshaft	Crankshaft runout limit			.0024″ (.06 mm)	.0024″ (.06 mm)

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

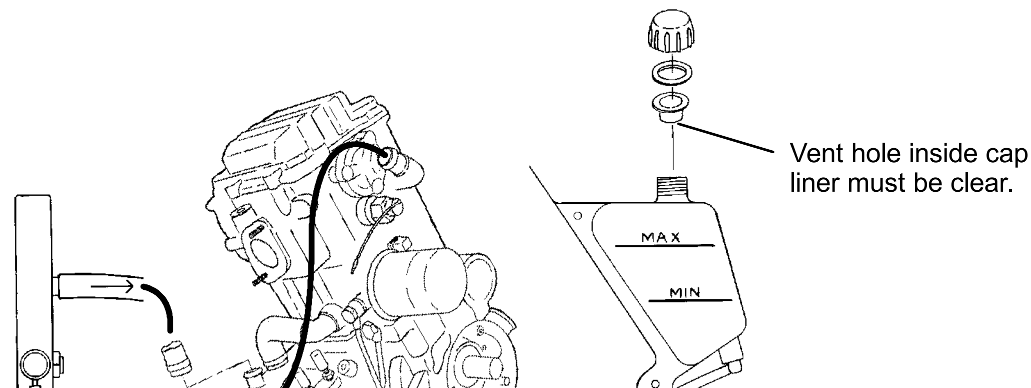
WARNING: Never remove radiator cap when engine is warm or hot. The cooling system is under pressure and serious burns may result. Allow the engine and cooling system to cool before servicing.

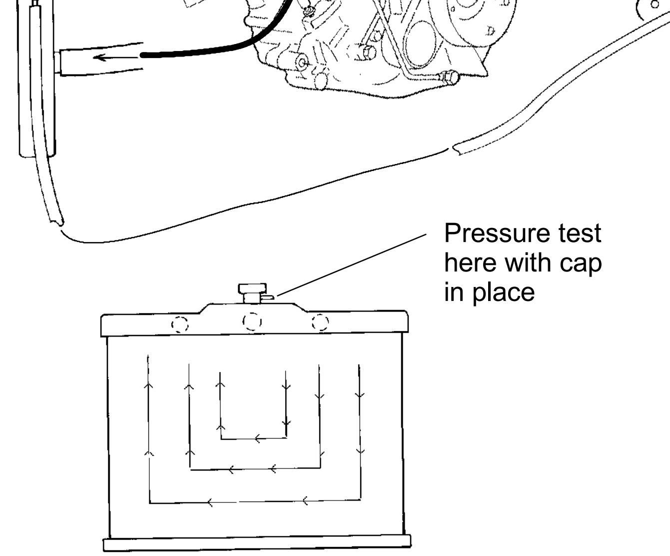




Bleed Hole Inspection

When coolant is added, air is purged through a bleed hole at the top between the two halves (see illustration above). If there is difficulty bleeding the cooling system or if overheating problems are encountered, remove the radiator cap and inspect to see if the bleed hole is clear.



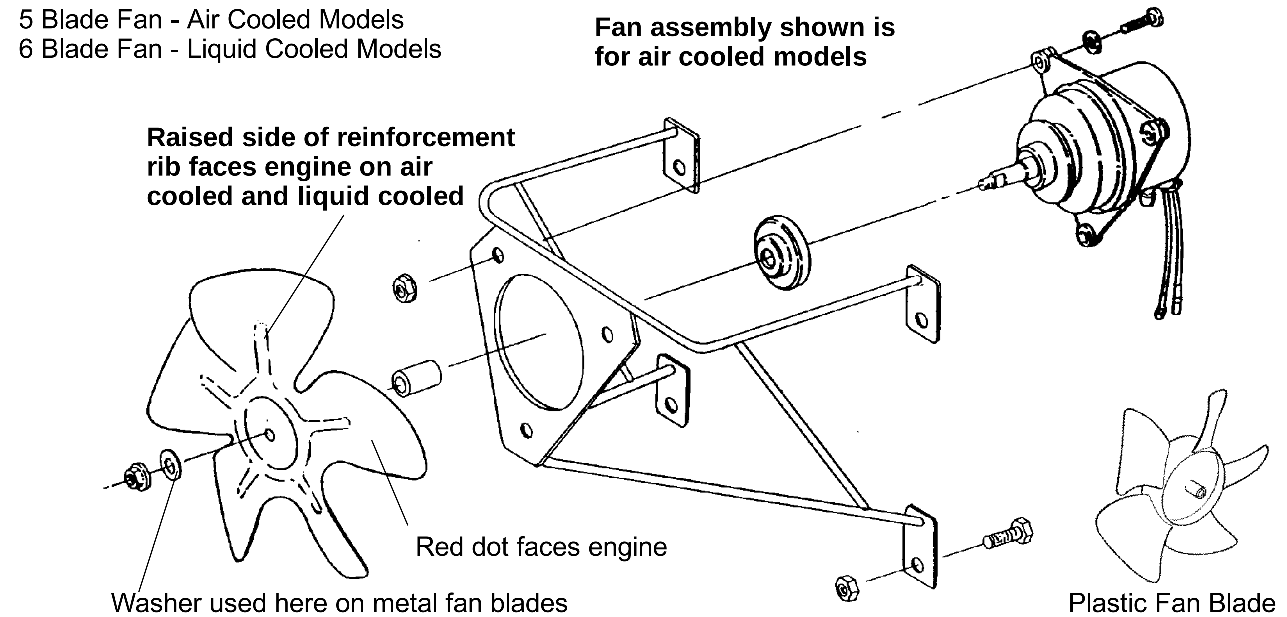


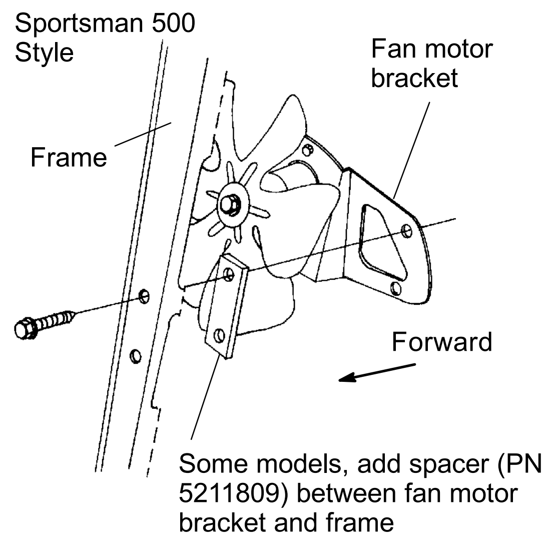
System Pressure Test

1. Remove radiator cap access panel from front of headlamp housing.
2. Remove recovery bottle hose from radiator.
3. Connect a Mity Vac™ (PN 2870975) to radiator and pressurize system to 10 PSI. The system must retain 10 lbs of pressure for five minutes or longer. If pressure loss is evident within five minutes, check radiator, all cooling system hoses and clamps, or water pump seal.

Radiator Cap Pressure Test

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





Recommended Coolant

Use only high quality antifreeze/coolant mixed with *distilled* water in a 50/50 or 60/40 ratio, depending on freeze protection required in your area. **CAUTION:** Using tap water in the cooling system will lead to a buildup of deposits which may restrict coolant flow and reduce heat dissipation, resulting in possible engine damage. Polaris Premium 60/40 Antifreeze/Coolant is recommended for use in all cooling systems, and comes pre-mixed and ready to use.

Cooling System Specifications

	250/300	Scrambler and Sport	Liquid Cooled Except Scrambler and Sport
Fan Switch (Off) Fan Switch (On)	210° F (99° C) ± 10° 235° F (113° C)	154° F (68° C) ± 5° 174° F (79° C)	175° F (79° C) ± 5° 190° F (88° C)
Hot Light On - 4 Strokes	-	-	221° F (105° C)
Hot Light On - 2 Strokes	-	205° F (96° C)	205° F (96° C)
System Capacity	-	2.25 Quarts	2.25 Quarts
Radiator Cap Relief Pressure	-	13 PSI	13 PSI

Accessible Components - All Models

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

- Flywheel
- Alternator/Stator
- Starter Motor/Starter Drive
- Cylinder Head
- Cylinder
- Piston/RIngs
- Oil pump (250 / 400)
- Counterbalance Shaft or Bearing(s) (400 engines)
- Camshaft (4 Strokes)
- Rocker Arms
- Cam Chain and Sprockets (4 Strokes)
- Water Pump / Water Pump Mechanical Seal*

The following components require engine removal for service:

- Oil pump / Oil Pump Drive Gear (300, 335, 425, 500)
- Counterbalance Shaft or Bearing(s) (4 Cycle engines)
- Connecting Rod
- Crankshaft
- Crankshaft Main Bearings
- Crankcase

*****It may be necessary to loosen engine mounts and move engine slightly to access water pump on some 4 stroke models. Special tool PN 2872105 is required to replace mechanical seal with engine in frame.

Engine Removal (Typical)

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

Engine Installation Notes

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

General Items

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

PVT System

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

Transmission

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

Exhaust

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

Bleed Cooling System

1. Remove radiator cap and slowly add coolant to top of filler neck.
2. Fill coolant reservoir tank to full mark.
3. Loosen bleed screw at top of cylinder head (400) until all air is purged from engine. Tighten bleed screw.
4. Install radiator cap and squeeze coolant lines to force air out of system.
5. Again remove radiator cap and slowly add coolant to top of fill neck.
6. Start engine and observe coolant level in the radiator. Allow air to purge and top off as necessary. Reinstall radiator cap and bring engine to operating temp. Check level in reservoir tank after engine is cool and add coolant if necessary.

Engine Break In Period - 2 Cycle

2 Cycle Engine Break-In Period is defined as the first 3 hours of engine operation, or one full tank of fuel.

1. (2 - Cycle) Pre-mix the first FULL tank of fuel at a 40:1 ratio with Polaris Premium 2 Cycle Lubricant.
2. Fill the oil tank with Polaris injection oil. Never substitute or mix oil brands. Serious engine damage can result.
3. Bleed oil pump thoroughly. Refer to Chapter 2.
4. Verify proper oil usage from oil tank during the first tank of fuel. Instruct operator to observe oil level in tank during the first tank of fuel. If the level has not dropped, repeat the oil pump bleeding procedure, fill the tank with pre-mix, and investigate problem (oil tank vent or supply line restriction, pump problem, etc.).
5. Avoid prolonged idle, heavy loads, or periods of sustained full throttle. Use low gear if available. Vary throttle settings during the break in period.

Engine Break In Period - 4 Cycle

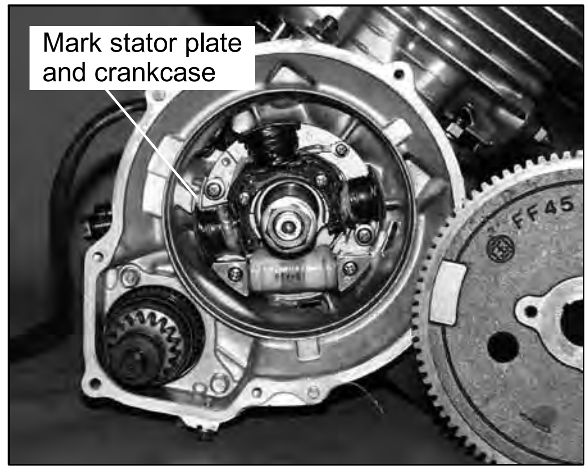
4 Cycle Engine Break-In Period is defined as the first 10 hours of engine operation, or 2 full tanks of fuel.

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

Disassembly

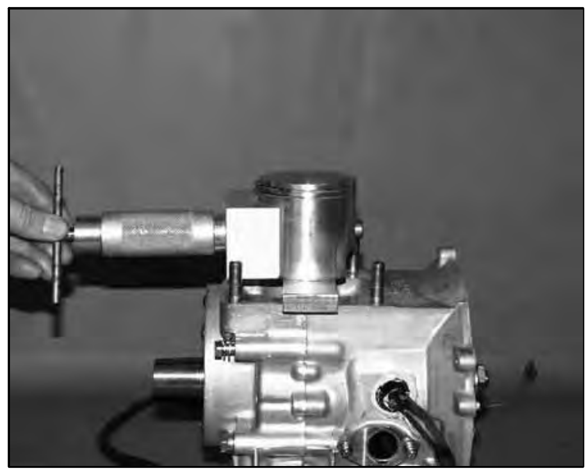
NOTE: Inspect all parts during disassembly as outlined on page 3.35-3.40.

1. Remove the flywheel nut and flywheel with puller (PN 2871043). Mark position of stator plate on crankcase, remove stator plate screws and stator assembly.



Flywheel Puller **PN 2871043** **Flywheel Holder** **PN 8700229**

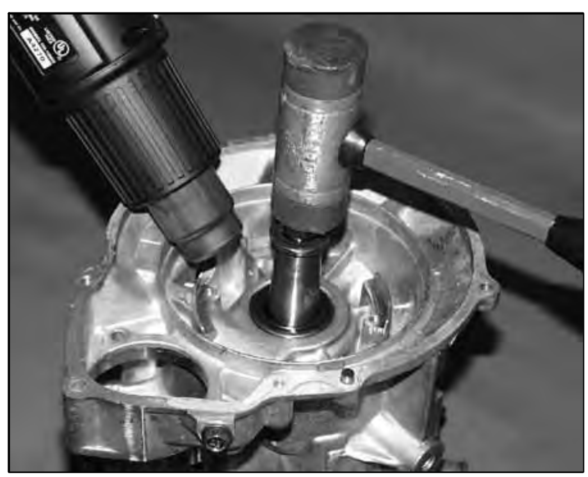
2. Remove cylinder head and cylinder. Remove piston pin clips. Use Piston Pin Puller to remove piston pin from piston.
3. Refer to Top End Component Parts Inspection on page 3.36-3.39 to inspect cylinder, piston, rings and connecting rod small end bearing.



Piston Pin Puller **PN 2870386**

4. Remove the crankcase half attaching bolts. Heat crankcase in the bearing support areas. After applying heat, tap on PTO end and magneto end to separate case half from crankshaft.

5. After removing the crankshaft, thoroughly clean the bearings and lubricate. Check the crankshaft runout as outlined in Crankshaft Inspection procedure on page 3.40.



Disassembly, cont.

Connecting Rod Side Clearance

1. Measure clearance between lower rod and counterweight with a feeler gauge (connecting rod big end side clearance). New measurement should be between .016″-.020″ (.4-.5 mm). Clearance should not exceed .036″ (.9mm).

Crankshaft Main Bearing Inspection

1. Clean crankshaft thoroughly and oil main and connecting rod bearings with Polaris Premium 2 engine oil. Carefully check each main bearing on the shaft.

NOTE: Due to extremely close tolerances, 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 on the crankshaft. The outer race should be firm with minimal side to side movement and no detectable up and down movement. Replace any loose or rough bearings.

Refer to crankshaft inspection on page 3.40.

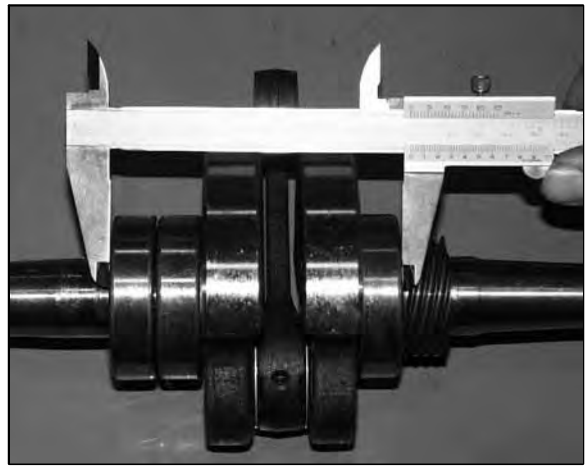
Engine Assembly

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

Measure Crankshaft Width - Bearings Installed

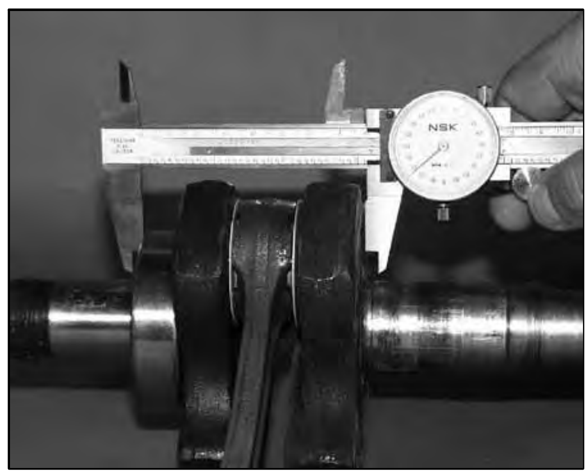
1. Measure distance from outer edge of PTO end bearing race to outer edge of mag side bearing race. Record measurement.

If bearings and spacers are already installed, measure distance as shown in photo at right, then proceed to Step 5.

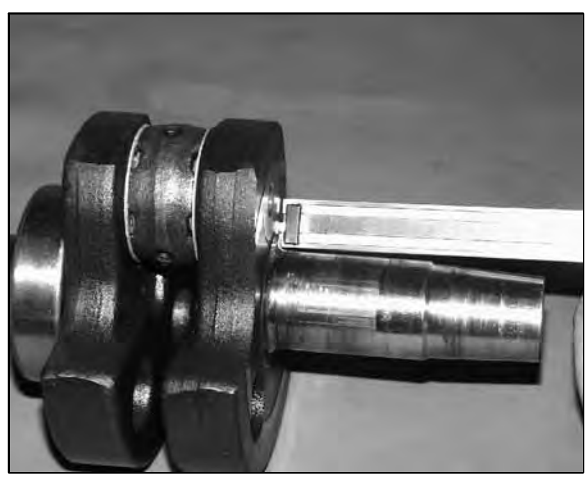


or...

If PTO end bearings have not yet been installed, measure distance as shown in photo at right, then proceed to Step 2.

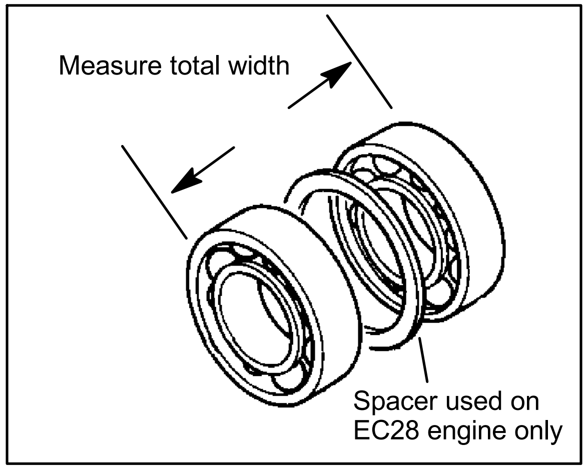


2. Measure distance from crank wheel to bearing seating surface (A). Record measurement.



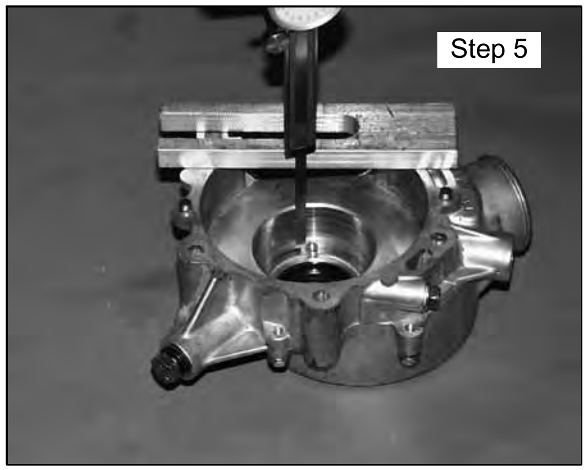
Assembly, Cont.

3. Measure total width of main bearings with bearings. Add the thickness of the spacer between the bearings on EC28 engines. Record total measurement.



4. Add all recorded measurements from Steps 1, 2, and 3 and record the total on line A below. If PTO bearings were assembled on crankshaft, record the measurement from Step 1.

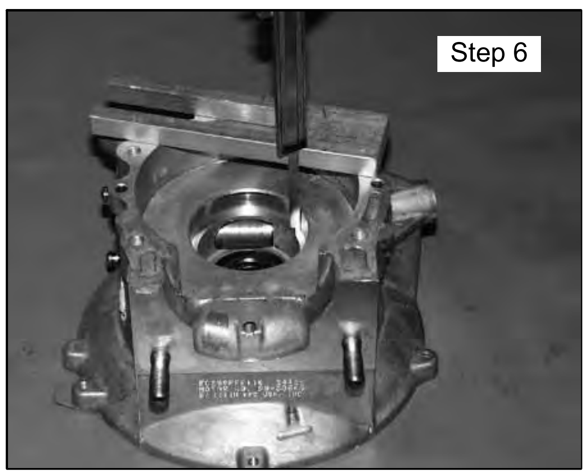
5. Measure PTO crankcase half as shown to determine depth of case. Place a piece of flat stock on the case mating surface and measure from this surface to the bearing seating surface. Subtract thickness of flat stock and record the measurement on line B below.



6. Measure magneto side case half using the same procedure. Record measurement on line C below. (Remember to subtract thickness of flat stock.)

7. Add the readings from steps 5 and 6 and record on line D. Subtract line A from line D. The result is the amount of crankshaft end play.

8. If adjustment is required, determine the amount of spacers needed to achieve proper end play. Install spacers on crankshaft followed by PTO bearings.



Total from Step 1, 2, and 3.
(or from Step 1 only if PTO bearings were installed). **(A)**________________

Step 5 Result **(B)**__________

Step 6 Result **(C)**__________

Line B + Line C = **(D)** ________________

Line D – Line A = End Play ________________

Subtract Target End Play **- .012**″ (.3mm)

Shim Thickness Required =

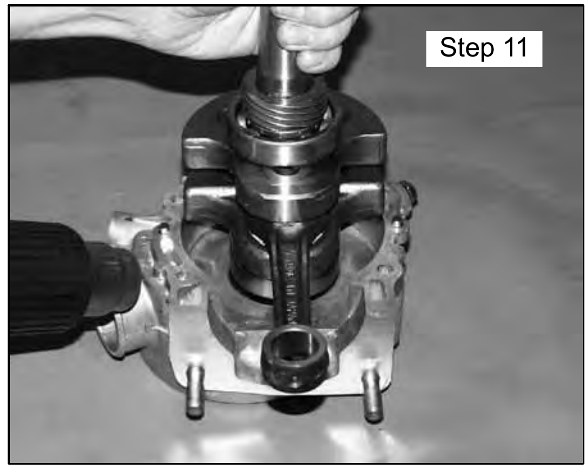
Correct crankshaft end play is .008″ - .016″ (.2 - .4 mm). End play is adjusted by adding or subtracting spacer washers from between the inner PTO end bearing and the crank wheel. Two different thickness spacers are available for EC 25 and EC28 engines:
For EC25PF - PN 3083629 - .008″ (.2 mm); and PN 3083630 - .004″ (.1 mm).
For EC28PF and EC38PL - PN 3084778 - .008″ (.2 mm); and PN 3084779 - .012″ (.3 mm).

Assembly, Cont.

9. Remove crankcase end seals and thoroughly clean the case half mating surfaces.

10. Heat PTO side case half until it is hot to the touch.

11. Reinstall crankshaft into heated case. Allow case to cool to room temperature before proceeding.



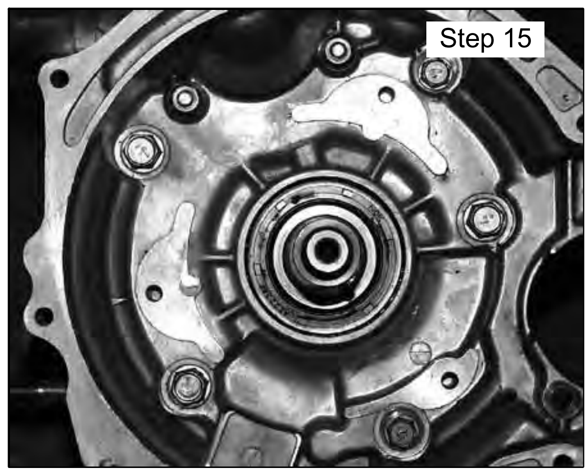
12. Heat mag side case half until it is hot to the touch.

13. Place Loctite 518 gasket eliminator on one of the case halves.

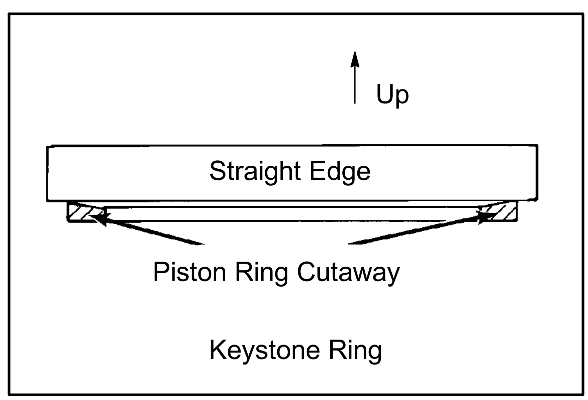
14. Reinstall the mag side half.

15. Torque case half attaching bolts in three steps to torque specified on page 3.1. Follow the torque pattern shown on page 3.3.

NOTE: Before proceeding, check piston to cylinder clearance, ring end gap and cylinder honing procedures on page 3.36 - 3.38.



16. Install piston rings, beveled side up, onto piston. Keystone rings are beveled to the inside. This bevel must be toward the top of the piston (letter and/or number marks near end gap of ring face upward.



Assembly, Cont.

17. Position C clip onto driver of C-clip installation tool (PN 2870773) with open end down. Slide portion of tool barrel over driver.

18. Install guide pin at the driver into the piston pin and position the barrel up against the piston. While holding the barrel against the piston, push the driver in until you hear the clip engage into the piston groove.

19. Rotate driver to complete engagement of clip.

20. Visually inspect the C-clip to be sure it is fully seated in the groove.

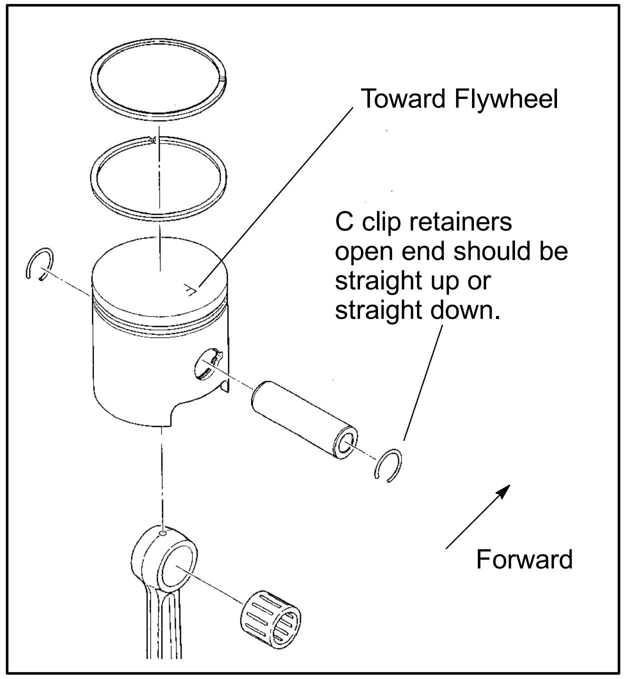
21. Reinstall piston onto rod with “F” mark or →toward the magneto side of the engine. Support with support block.

22. Lubricate piston pin and pin bearing with 2 Stroke oil.

23. Reinstall piston pin. Warm piston crown lightly with heat gun to ease pin installation.

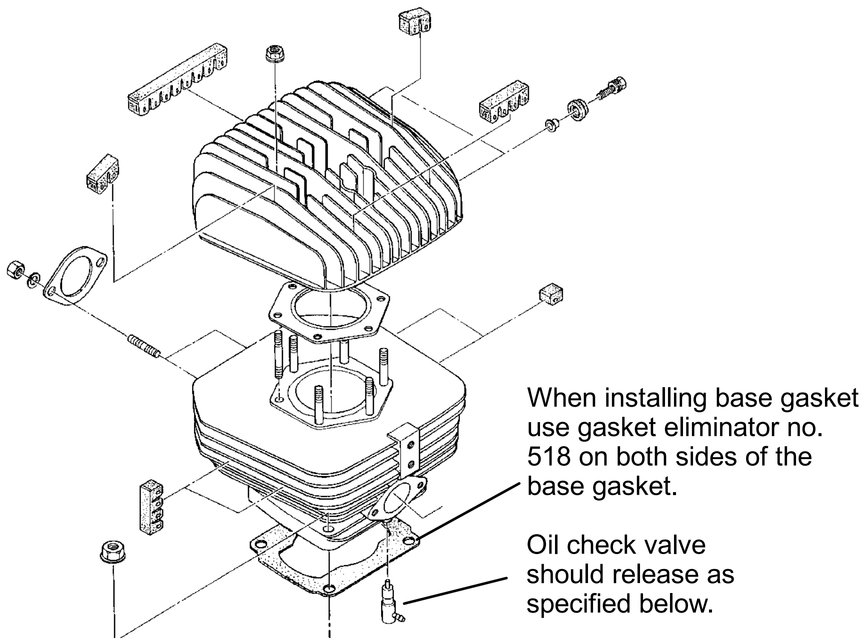
CAUTION: Do not overheat piston. Do not apply heat to piston rings or loss of temper may result.

24. Repeat Step 17 through 20 for other C-clip.

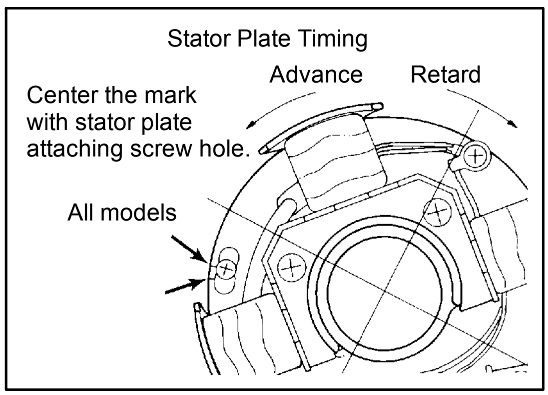


Assembly, Cont.

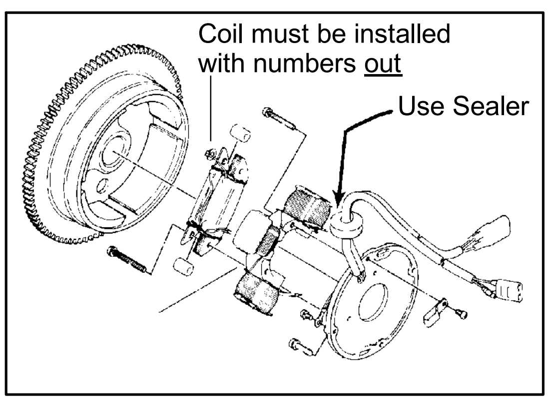
25. Apply Loctite No. 518 Gasket Eliminator to both sides of the cylinder base gasket. Install the base gasket and cylinder. Torque the cylinder base nuts in 3 steps to 28 ft. lbs. (3.9 kg-m). Install the head gasket and head. Torque nuts to 20 ft. lbs. (2.8 kg-m) following pattern on page 3.2.



1. Reinstall stator plate and align timing marks. Refer to Electrical Chapter 10 for dynamic ignition timing.
2. Reinstall flywheel.
3. Reinstall magneto housing.
4. Torque flywheel bolt to specification found on page 3.1.
5. Reinstall recoil starter assembly.



6. Seal wire harness grommet to crankcase using RTV silicone sealant.
7. Refer to electrical section of this manual for starter motor inspection. Reinstall starter motor.



Assembly

Oil Pump End Play Adjustment

The oil pump is a positive displacement type pump. Whenever the oil pump, oil pump bushing, or crankcase are replaced, the end play clearance must be checked. Target clearance is .008-.024″ (.2-.6mm) between the oil pump boss and the bushing in the crankcase. Symptoms of excessive gear end play include: noticeable engine noise at idle; pump lever arm binds in the 1/2 open position (will release when engine is rotated).

NOTE: Some 250/300 cc ATV engine oil pumps were produced with a plastic oil pump drive gear (PN 3084825). The plastic drive gear is no longer available and subs to a metal drive gear (PN 3083429). If you are replacing a plastic drive gear with a metal one, you must also order and install thrust washer (PN 3083428). If you install the metal drive gear without the thrust washer you will not be able to achieve the proper drive gear end play as outlined below. Refer to the Illustration on page 3.22

250/300 Models

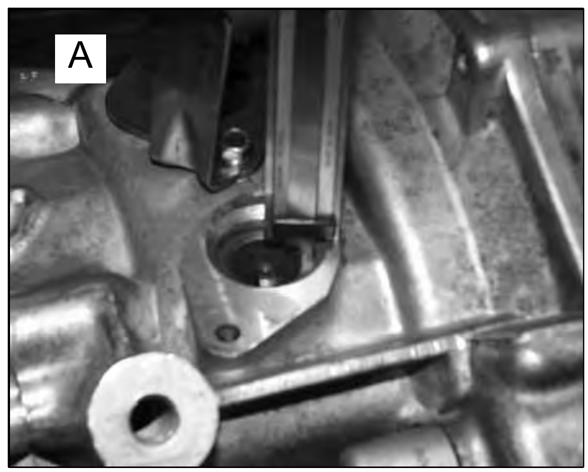
Refer to Illustration on following page.

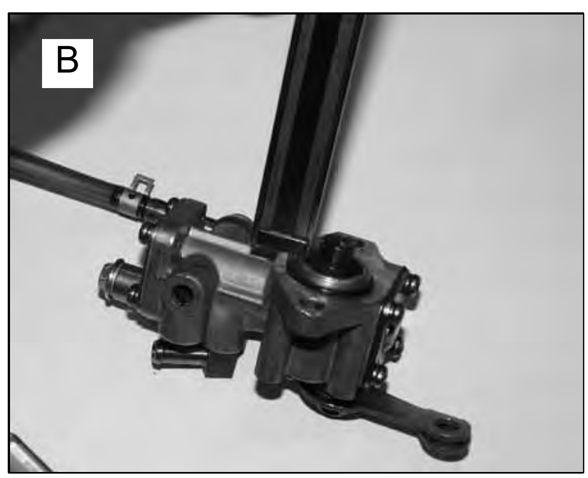
1. Lubricate and install pump drive gear thrust washer, pump drive gear, and bushing into crankcase. Make sure parts are completely seated.

2. Measure the distance from the pump bushing to the crankcase pump mounting surface. Record this as measurement A. Example: 4.8mm (Refer to example below)

3. Measure distance from pump shoulder to pump mounting flange. Record this as measurement B. (Example: 3.9mm Refer to example below)

4. Subtract measurement B (Step 3) from measurement A (Step 2). See example below. The difference between these two measurements is the end play the pump bushings will have without shims. Subtract the target clearance from measured and add shims equal to that amount.





EXAMPLE:	A (Step 2)		4.8
	B (Step 3)	–	3.9
		=	.9
	Target clearance	–	(.2-.6 mm)
	Total thickness of shims required	=	.3–.7mm

Spacer shim part numbers:

PN 3083671 .15 mm/.006″

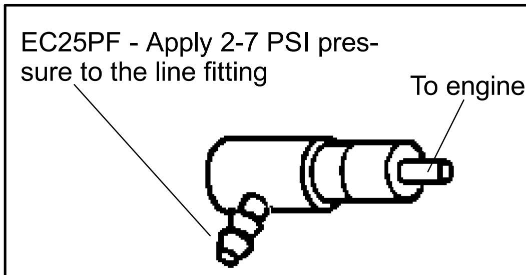
PN 3083672 .3 mm/.012″

PN 3083673 .6 mm/.024″

Assembly

Oil Check Valve Testing (EC25PF)

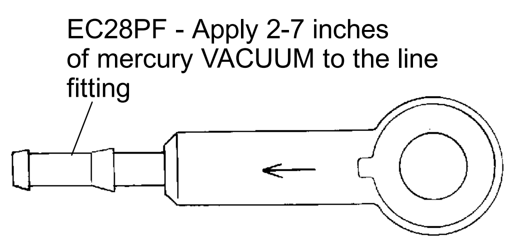
The oil pump check valve on the EC25PF engine must be tested by applying 2-7 PSI of pressure to the line spigot of the check valve. Use a Mity Vac (PN2870975) or similar tester. The valve should release between 2 and 7 PSI. The check valve is located on the cylinder.



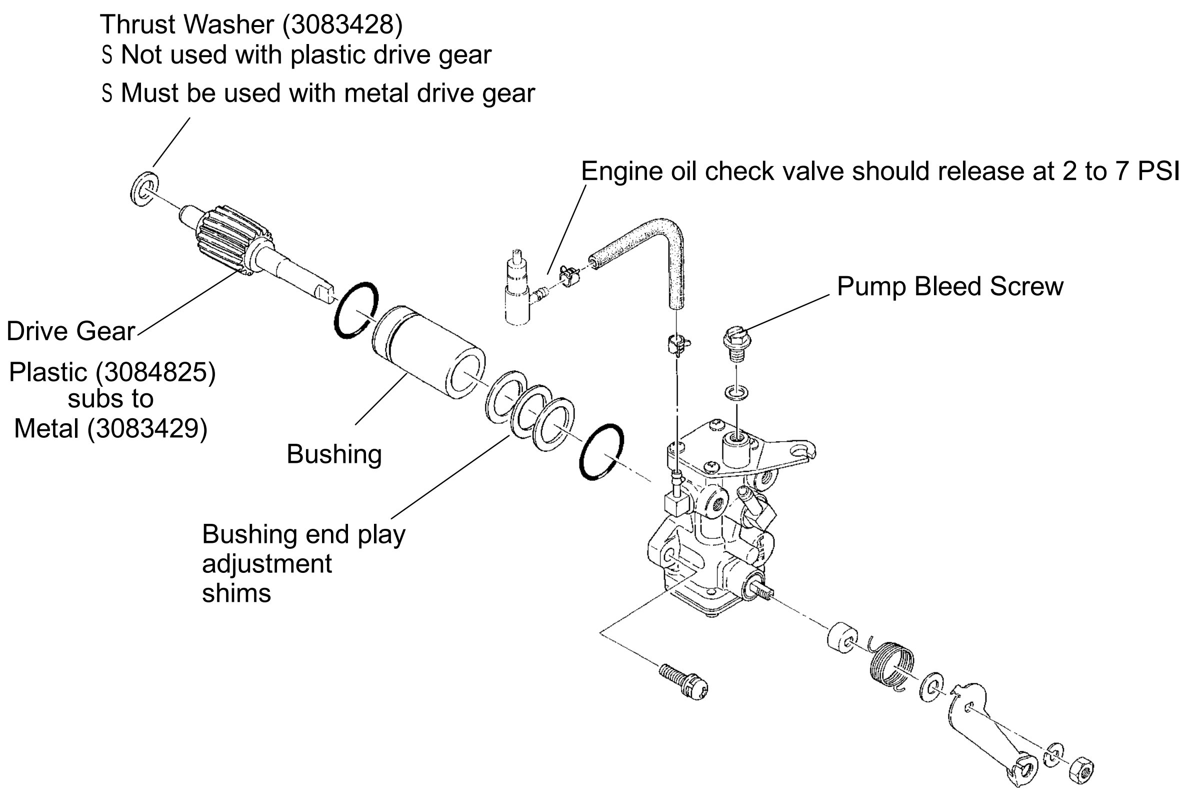
250 Engine

Oil Check Valve Testing (EC28PF)

The oil pump check valve on the EC28PF engine must be tested by applying 3-7 inches of mercury VACUUM to the line spigot of the check valve. The valve should release between 3 and 7 inches of mercury. Use a Mity Vac (PN2870975) or similar vacuum tester. The check valve is located on the oil pump.



300 Engine



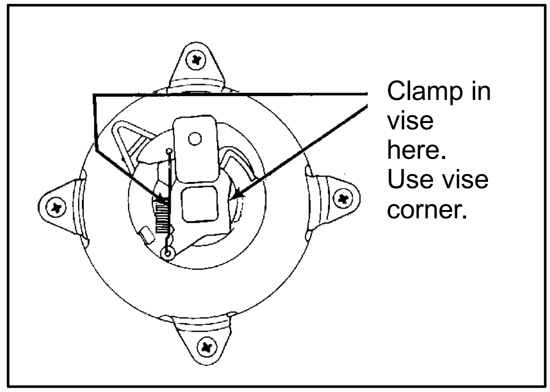
Recoil Disassembly

1. Remove four 6mm bolts securing reel housing to flywheel housing. **NOTE:** When the last bolt is removed, the reel housing will rotate, unwinding the recoil spring.

2. Remove reel housing. **NOTE:** If rope replacement is the only service necessary, it may be replaced without any further disassembly.

3. Remove pawl return spring.

4. Clamp sides of ratchet pawl bracket in the corner of the jaws of a vise.

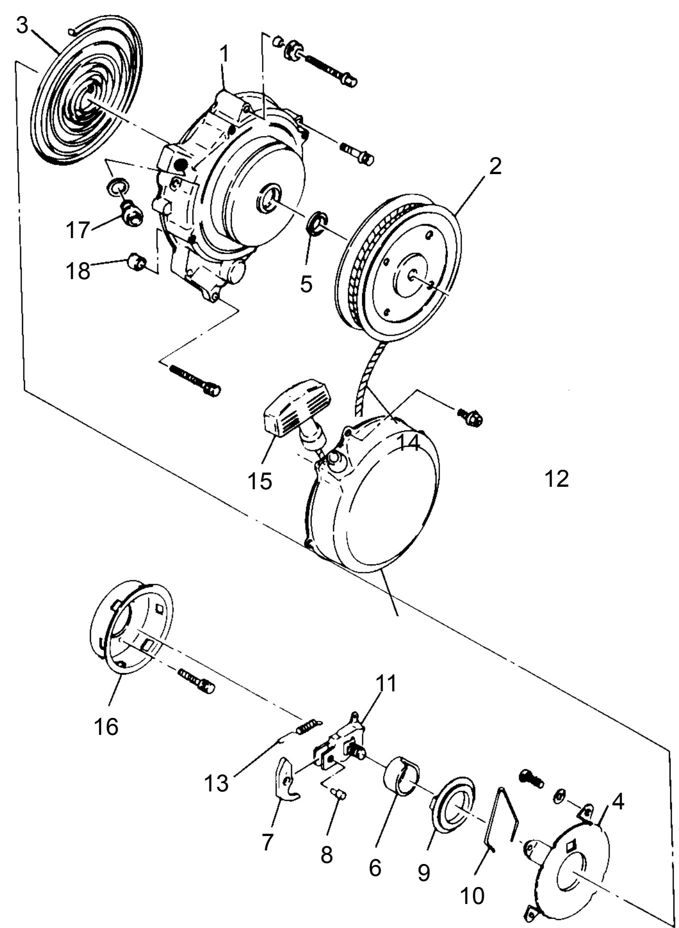


5. Using a cloth belt type strap wrench wrapped around the outside edge of the reel, unscrew the reel counterclockwise to remove it from the ratchet pawl bracket shaft.

6. Remove the ratchet pawl bracket, spring hook, ratchet friction ring and friction spring. **NOTE:** It is not necessary to remove the spring retainer plate and spring unless it is damaged.

7. Clean and inspect all parts. Repair or replace as required.

1. Flywheel Housing
2. Reel
3. Recoil Spring
4. Spring Retaining Plate
5. Seal
6. Spring Hook
7. Ratchet Pawl
8. Pawl Pin
9. Ratchet Friction Ring and Pawl Guide
10. Friction Spring
11. Ratchet Pawl Bracket
12. Reel Housing
13. Pawl Return Spring
14. Recoil Rope
15. Rope Handle
16. Recoil Cup
17. Timing Plug
18. Bushing



Recoil Assembly

1. If the recoil spring was removed, reinstall it in its recess in the flywheel housing. The spring should spiral counterclockwise toward the center.

2. Grease spring with Polaris low temperature grease.

3. Install recoil spring retaining plate.

4. Grease and install spring hook, making sure it properly engages the spring end.

5. Install ratchet friction ring and friction spring assembly. The friction spring should engage the bent tab on the recoil spring retaining plate. The “L” on the friction ring should be positioned as shown in the photo at right.

6. Grease the center hole and seal in the flywheel housing.

7. Install ratchet pawl bracket. The alignment pin and the square drive on the bracket shaft should properly align in the spring hook.

8. While holding the bracket tight against the spring hook, flip the flywheel housing over and thread the reel onto the pawl bracket shaft.

9. Clamp the ratchet pawl bracket in the corner of the jaws of a vise. Firmly hand tighten the reel.

10. If the rope was removed, or if a new rope is being installed, attach one end of the rope to the reel, pass the other end of the rope through the guide in the reel housing and attach it to the rope handle.

11. Install the rope housing over the reel.

12. Holding the flywheel housing with one hand, rotate the rope housing clockwise until the rope is completely re-wound.

13. Rotate the housing three more turns and reinstall bolts.

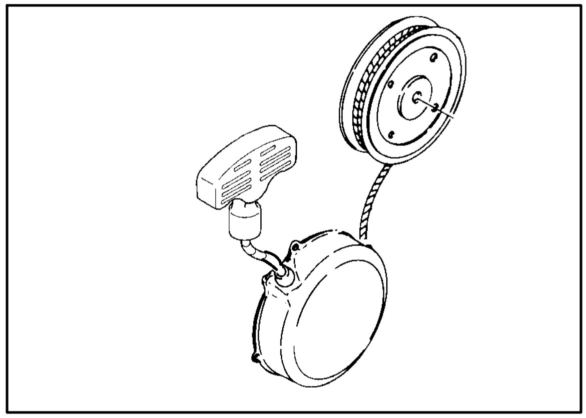
14. Reinstall pawl return spring.

15. Check recoil and ratchet operation.

16. When reinstalling assembly onto engine, use Loctite 518 Gasket Eliminator between the flywheel housing and crankcase.

Recoil Assembly

1. Pass the free end of recoil rope through the reel housing.
2. Holding the flywheel housing with one hand, rotate the reel clockwise until the rope is completely re-wound.
3. Rotate the housing three more turns and install the pawl return spring with the large end of the spring going into rope housing; reinstall retainer plate, lock washer and bolt.
4. Check recoil and ratchet operation.
5. When reinstalling assembly onto engine, use Loctite 518 Gasket Eliminator between the flywheel housing and crankcase.



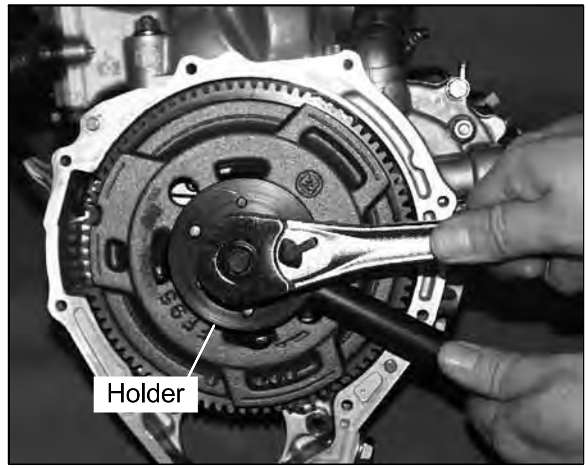
Disassembly

1. Remove the six bolts retaining the starter assembly and flywheel cover.

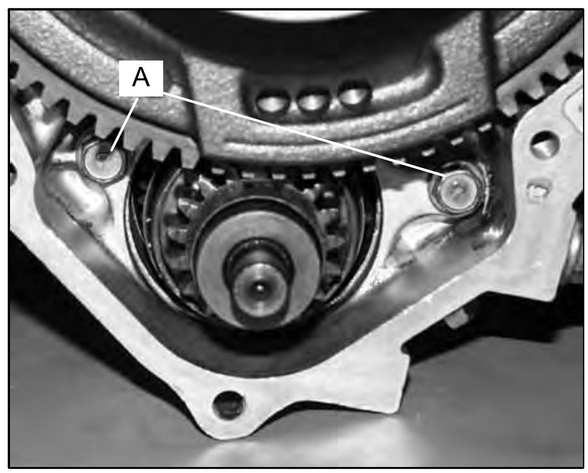
2. Remove starter pulley and flywheel nut.

3. Hold flywheel with holder tool and remove flywheel nut.

Flywheel Holder PN 8700229



4. For starter removal, remove bolts retaining starter bracket on PTO side, and two bolts (A) on mag side.



5. Remove flywheel using puller.

Flywheel Puller PN 2871043

Disassembly, Cont.

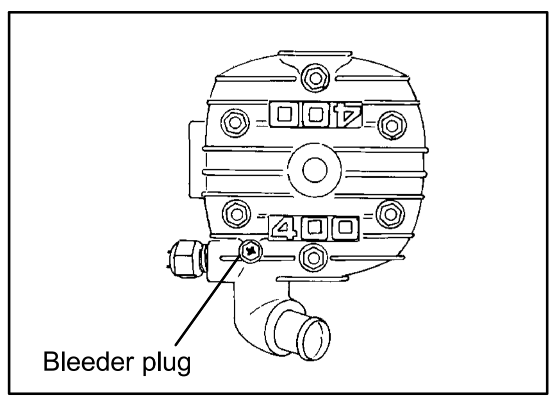
6. Remove stator assembly.

Reassembly Note: During reassembly be sure to seal rubber grommet (A) completely with silicone sealer to avoid water or dirt ingestion into stator assembly.

150 Watt alternator shown at right.

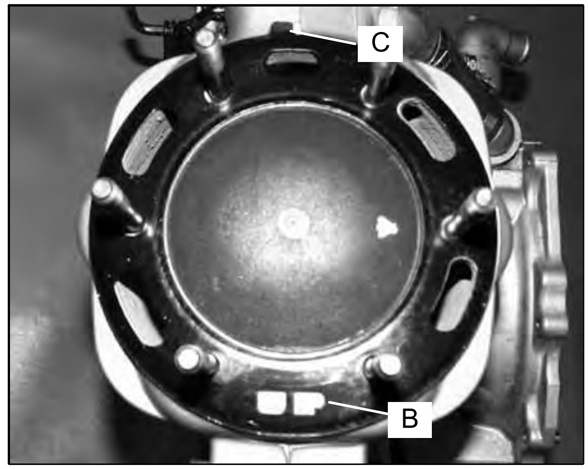
200 Watt alternator shown at right.

7. Remove six cylinder head bolts using a 12 mm socket. Note the position of the bleeder plug for the coolant system.



Disassembly, Cont.

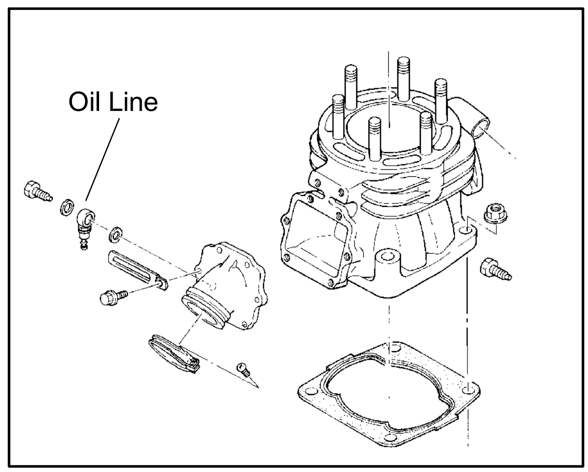
Reassembly Note: The head gasket should have the word *UP* (B) toward the cylinder head and the tab (C) toward the exhaust, matching the tab area on the cylinder.



400L Head Gasket pictured at right.

NOTE: Small hole in cylinder above exhaust port is a decompression aid for starting.

8. Remove oil line from intake boot.

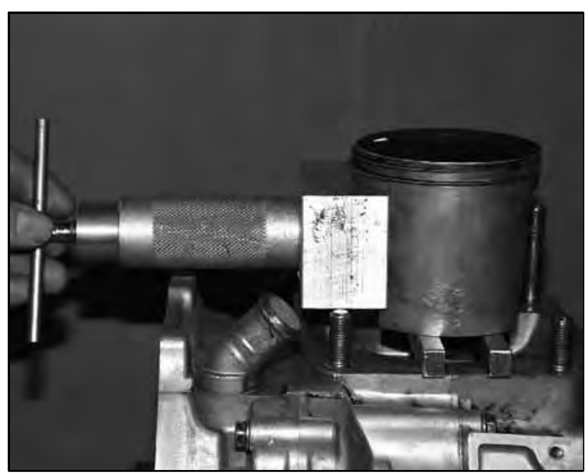


9. Loosen clamps retaining coolant transfer hose and remove the four cylinder nuts. **NOTE:** Use a 14 mm socket on the exhaust side. A 14 mm wrench will be necessary on the intake side.
10. Remove cylinder.
11. Refer to page 3.35-3.40 to inspect parts.

Reassembly Note: Due to limited clearance, a torque adaptor must be used to apply specified torque to base nuts upon reassembly.

12. Install piston support block and remove C clips.

Reassembly Note: When reinstalling C clips, make sure that the open end of the retainer clip points either up or down, not to the side.

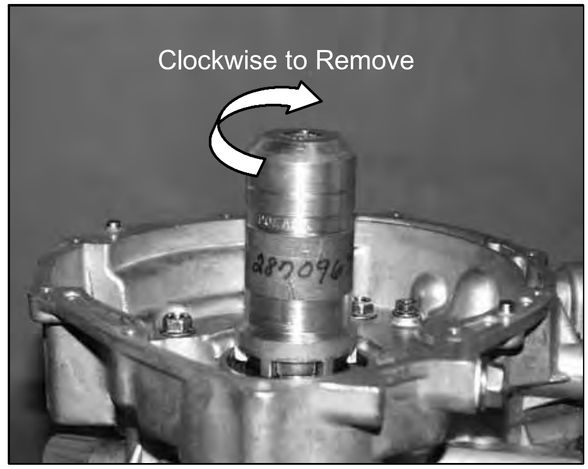


13. Remove piston pin using Polaris piston pin puller (PN 2870386).
14. Refer to page 3.35-3.40 to inspect parts.

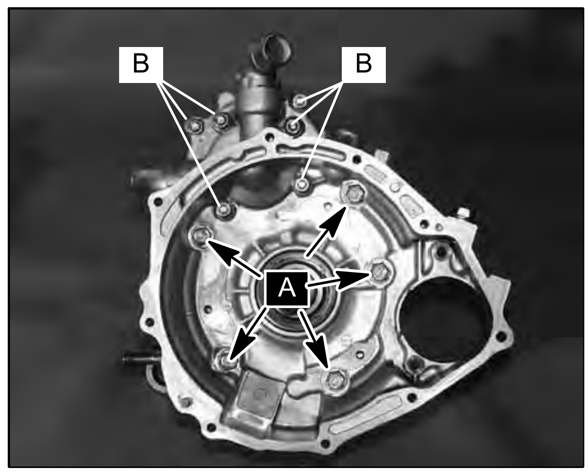
Disassembly, Cont.

15. Remove slotted *left hand thread* crankshaft nut using Polaris tool (PN 2870967).

Reassembly Note: Refer to page 3.1 for torque specification upon reassembly.

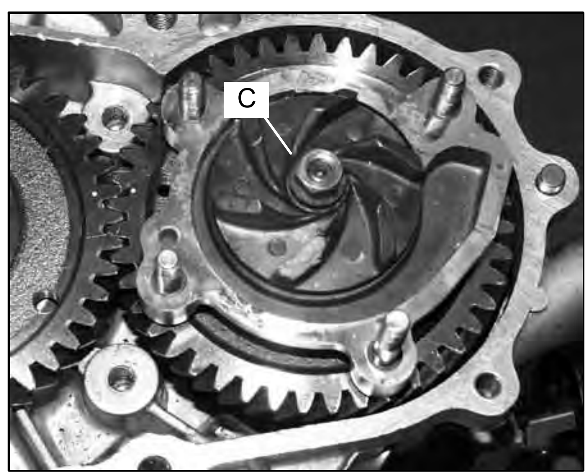


16. Remove five crankcase bolts (A) indicated in the photo at right with a 12 mm socket.
17. Remove four nuts and two bolts (B) indicated in the photo at right with a 10 mm socket.
18. Remove cover, tapping lightly with a soft face hammer if necessary.



19. Using a 10 mm socket, remove the impeller nut (C).
20. Slide water pump assembly from counterbalance assembly.

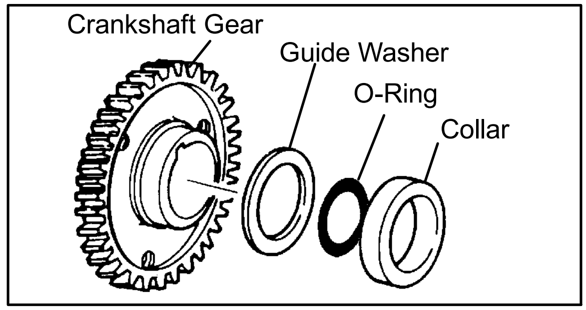
Reassembly Note: Watch for adjuster shims which may be between the impeller and pump housing. Make sure to reinstall any shims removed. Apply Loctite 242™ to impeller nut.



Disassembly, Cont.

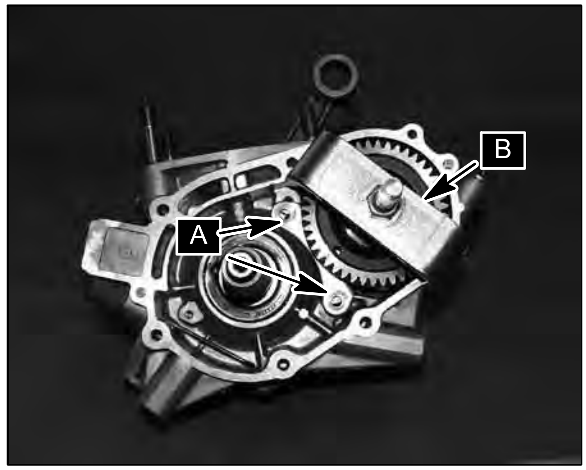
21. Remove collar, O-ring, guide washer and crankshaft gear.

22. Remove oil pump assembly (D).

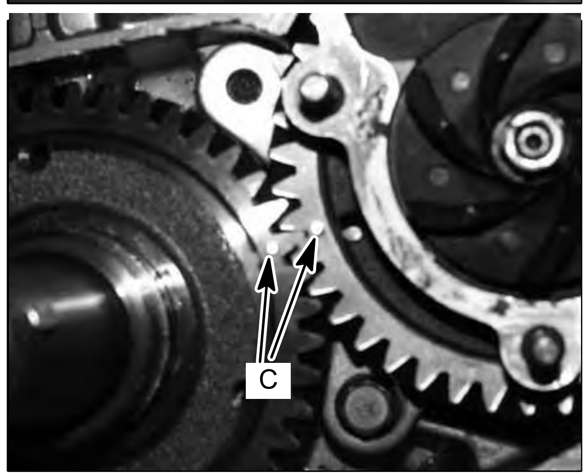


23. Remove two bolts securing the counter balance retaining bracket (A) using a 10 mm socket. **CAUTION:** Complete Step 20 and 21 before removing the counterbalance assembly, or damage may result.

24. Attach counterbalance puller (B) onto counter balance shaft and position as shown in the photo at right.



Reassembly Note: The retainer bracket must be in position on the counterbalance assembly before the assembly is installed in the crankcase. Punch marks (C) on both gears must be across from each other during reassembly. See photo three at right.

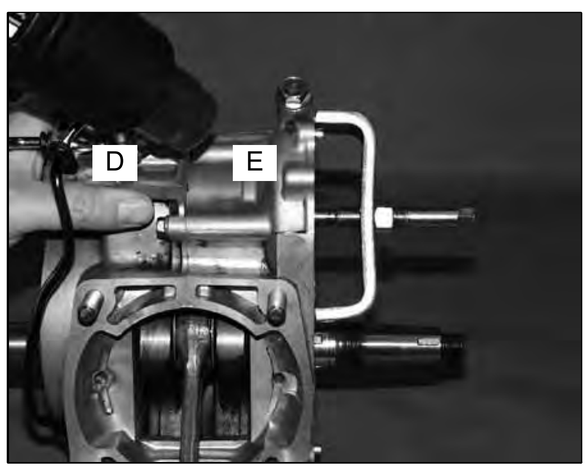


Counter Balance Puller
PN 2870968

25. Heat counter balance bearing areas (D) and (E) on the crankcase with a heat gun for approximately one to two minutes.

WARNING: Oil and gasoline are highly flammable and explosive under certain conditions. Use extreme caution when using a heat gun or propane torch in this environment.

26. Once these areas are thoroughly heated, add tension to the puller by turning the large nut. Continue tensioning the puller until the counterbalance assembly is completely removed.

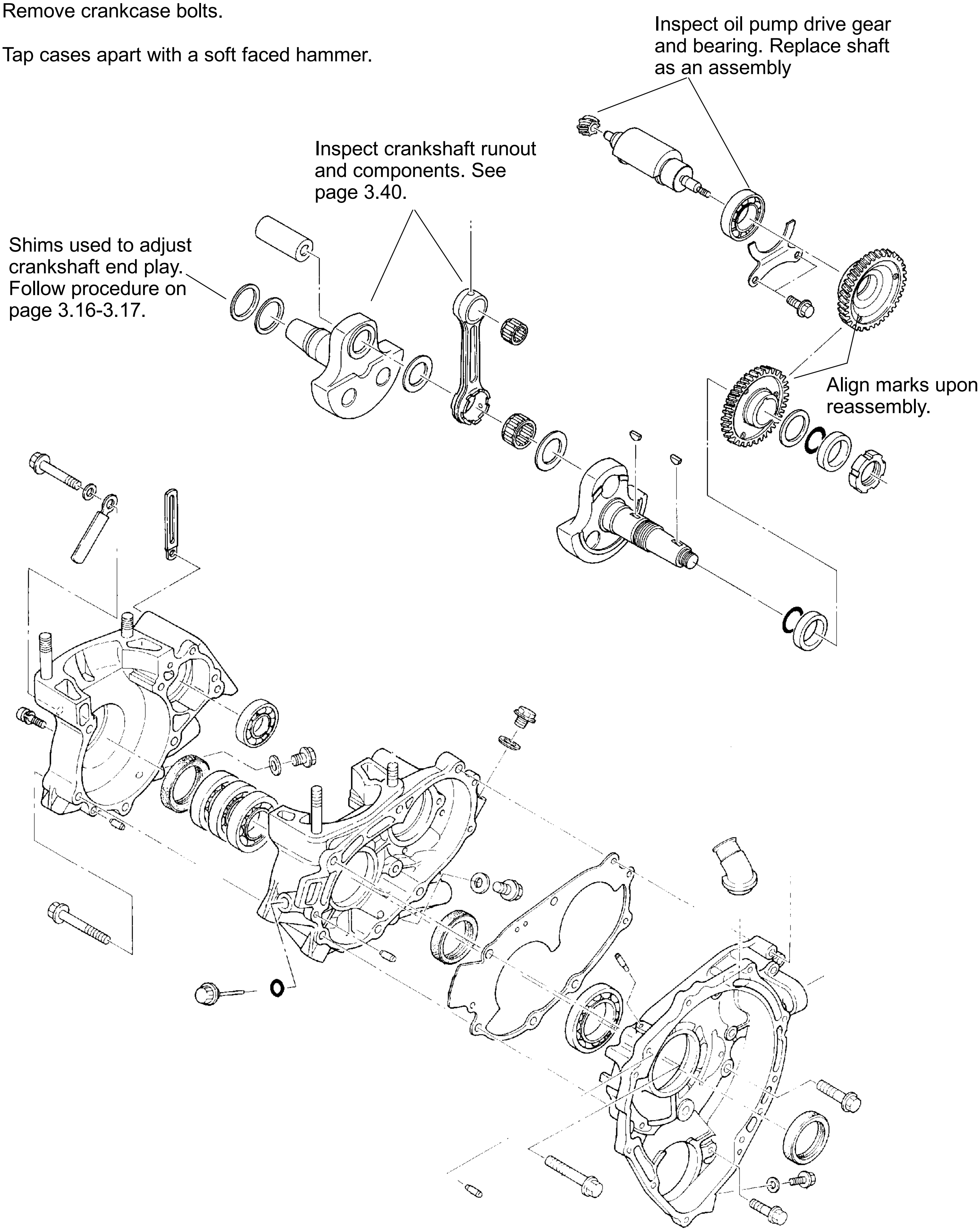


Reassembly Note - Counter Balance Shaft: For reassembly of counterbalancer shaft after crankcase assembly, heat areas (D) and (E) and press the balancer and bracket back into place.

Disassembly, Cont.

27. Remove crankcase bolts.

28. Tap cases apart with a soft faced hammer.



Connecting Rod Side Clearance

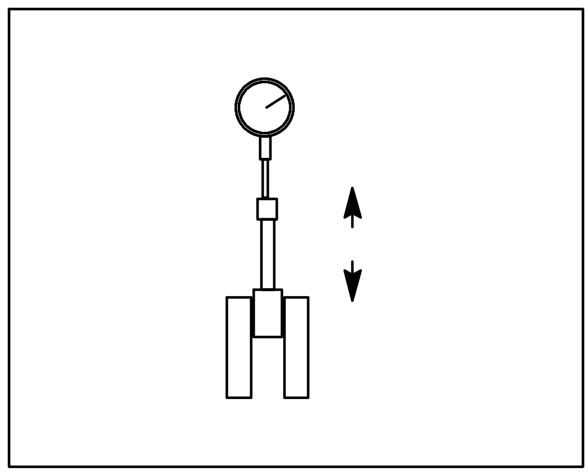
29. Remove crankshaft. Inspect connecting rod side clearance.

30. Measure clearance between lower rod and counterweight with a feeler gauge (connecting rod big end side clearance). New measurement should be between .016″-.020″ (.4-.5 mm). Clearance should not exceed .036″ (.9mm).

Connecting Rod Side Clearance:	
Standard	**.016″-.020″ (.4-.5mm)**
Service Limit	**.036″ (.9mm)**

Connecting Radial Clearance

31. Measure the total movement of the connecting rod big end bearing. Movement should not exceed .0013″ (.033mm).



32. Remove seals from crankcase.

33. Clean crankcase thoroughly and install new seals until flush with edge of seal bore.

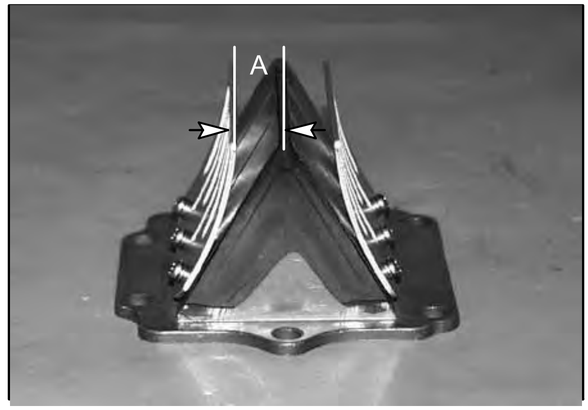
Reassembly Notes:

1. Before assembling the crankcase, calculate crankshaft end play and place shims between as required. Follow procedure on page 3.16 - 3.17.

Refer to page 3.40 for crankshaft inspection.

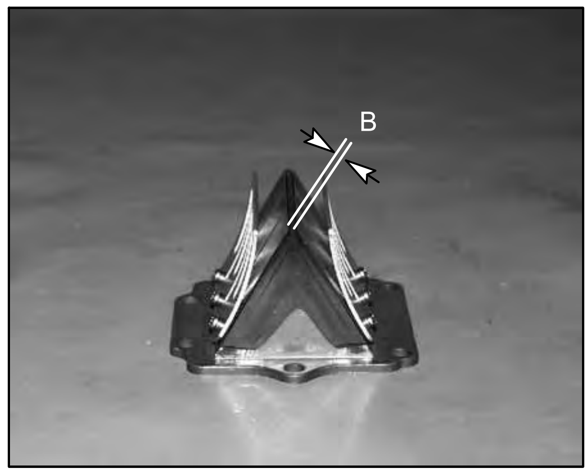
Reed Valve Inspection

1. Measure reed stop height (A). Recommended stop height is .350″ (9 mm).



2. Measure the air gap of each reed valve petal with a feeler gauge (B) as shown in the photo at right. The air gap should not exceed .015″ (.4 mm). **NOTE:** An early sign of reed valve failure may be hard starting, and poor low-end performance.

3. Check each reed valve petal for white stress marks or missing material. Replace if necessary.

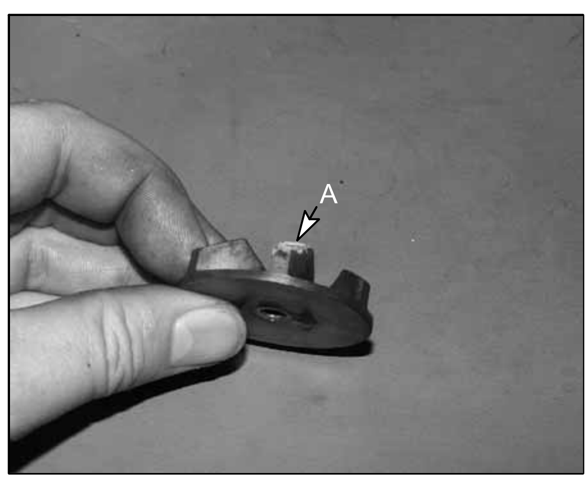


Water Pump Impeller Clearance

Whenever the counterbalance assembly is removed it will be necessary to verify impeller clearance. Following is a recommended procedure for measuring water pump impeller clearance.

1. Apply a small amount of putty or clay to the top of one impeller blade (A).

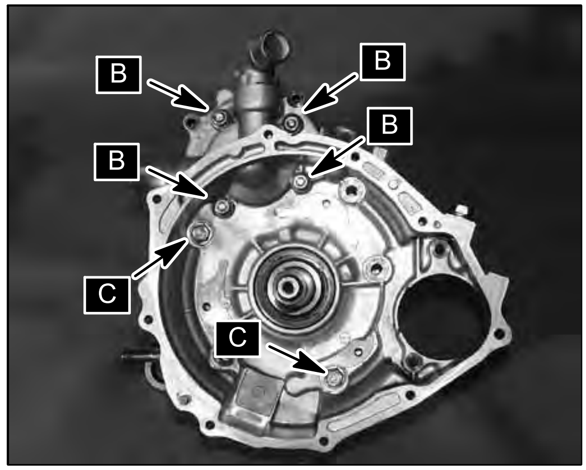
2. Assemble impeller and bearing/seal housing on balancer shaft.



Water Pump Impeller Clearance, cont.

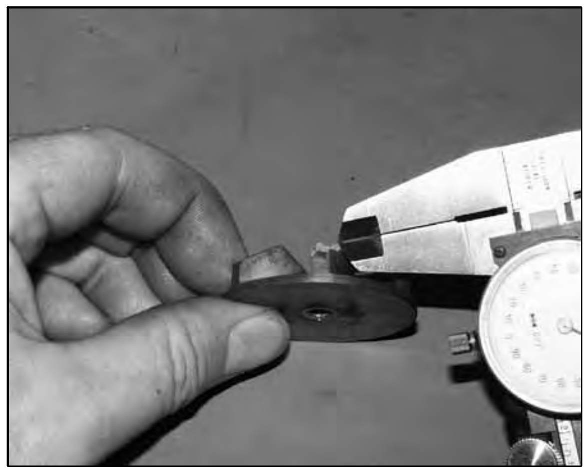
3. Reinstall case gasket and bolt case together in areas (B) and (C) as indicated on the photo at right.

4. Carefully remove case cover.



5. Remove water pump impeller and check clearance measurement. Acceptable clearance measured with a dial caliper is between .020″ - .040″ (.05 -.1 cm). **CAUTION:** If the clearance is less than .020″ (.05 cm) the impeller may grind against the case. If the clearance is more than .040″ (.1 cm) the water pump may cavitate and cause overheating.

6. The photo at right illustrates checking clearance measurement with a dial caliper. A feeler gauge can also be used to check thickness by removing half of the putty or clay from the impeller blade.



Impeller Spacer shim part numbers:

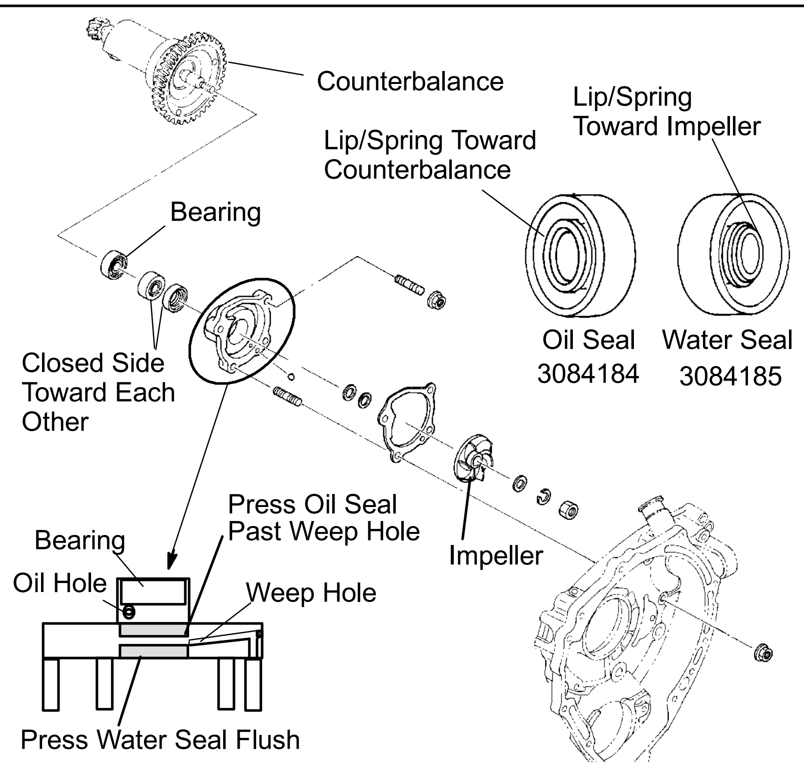
PN 3084188 0.1 mm/.004″

PN 3084189 0.2 mm/.008″

The illustration depicts correct positioning of the seals. The water seal is identified by counting the number of sealing "lips". It is a triple lip seal and has a protruding edge that faces away from the spring.

The oil seal is a double lip variety. The lip (on the spring end) angles back toward the spring. The spring end of the seals (open side) must face the oil or coolant as shown in the illustration.

To assemble the pump casing, press the bearing into the casing until *flush* with the casting. Note: *Do not* press the bearing in until it seats against the shoulder, or the oil hole will be covered by the bearing outer race. Next, press the oil seal into the seal bore until the weep hole is visible. Now press the water seal in until flush with the outer edge of the seal bore.

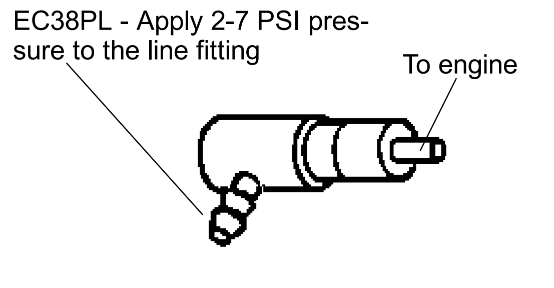


Assembly

Oil Check Valve Testing (EC38PL)

The oil pump check valve on the EC38PL engine must be tested by applying 2-7 PSI of pressure to the line spigot of the check valve. Use a Mity Vac (PN2870975) or similar tester. The valve should release between 2 and 7 PSI. The check valve is located on the cylinder.

NOTE: Refer to page 3.22 for check valve testing on 250 and 300cc engines.



400 Check Valve

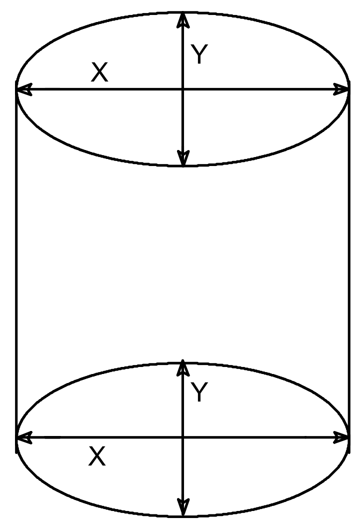
Cylinder Inspection/Measurement

CAUTION

Careless handling of the cylinder, pistons or rings may cause irreparable damage. Handle these parts with care. Do not damage the gasket surfaces during the cleaning operation.

Inspect cylinder for wear, scratches, or damage. If no damage is evident, measure cylinder for taper and out of round with a telescoping gauge and micrometer or a dial bore gauge. Measure bore 1/2″ down from top of cylinder in two directions - in line with piston pin and 90° to the pin to determine if bore is out-of-round. Repeat measurements at bottom of cylinder to determine taper or out of round. Record all measurements.

1/2″ Down From Top of Cylinder



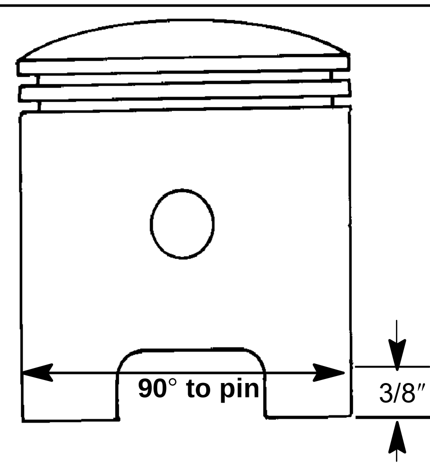
1/2″ Up From Bottom

Piston Inspection/Measurement (2 Stroke)

1. Check piston for scoring or cracks in piston crown or pin area. Excessive carbon buildup below the ring lands is an indication of piston, ring or cylinder wear.
2. Measure piston outside diameter at a point 10 mm (3/8″) up from bottom of skirt at a 90° angle to the direction of the piston pin. Record the measurement.

NOTE: The piston must be measured at this point to provide accurate piston-to-cylinder clearance measurement.

3. Subtract this measurement from the maximum cylinder measurement recorded previously. If clearance exceeds the service limit, determine if piston or cylinder is worn (calculate clearance with a new piston) and recondition the cylinder or replace piston as necessary. Refer to page 3.4 for piston to cylinder clearance specifications.



Measure 3/8″ (10 mm) up from bottom of skirt

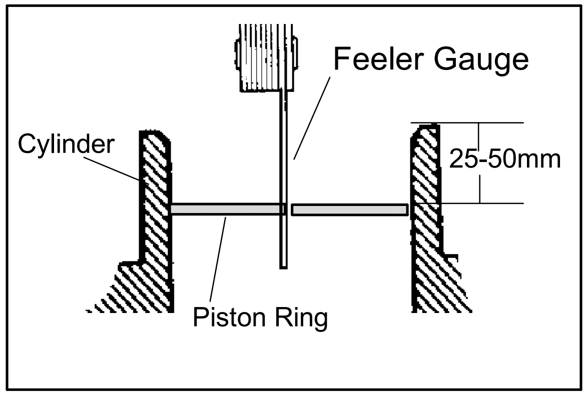
Piston Ring Installed Gap

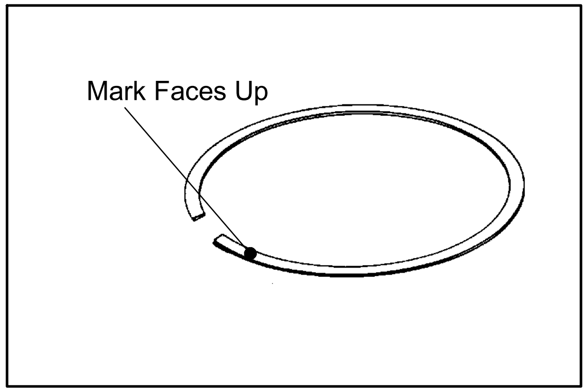
1. Position each piston ring 1/2I (1.3 cm) from the top of the cylinder using the piston to push it squarely into place. Measure installed gap with a feeler gauge at both the top and bottom of the cylinder.

NOTE: A difference in end gap between the bottom and top of the cylinder indicates cylinder taper. The cylinder should be measured for excessive taper and out of round. Replace rings if the installed end gap exceeds the service limit. Refer to page 3.4 for specifications.

NOTE: Always check piston ring installed gap after re-boring a cylinder or when installing new rings.

NOTE: Install rings with mark facing UP.





Cylinder Hone Selection/Honing Procedure

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

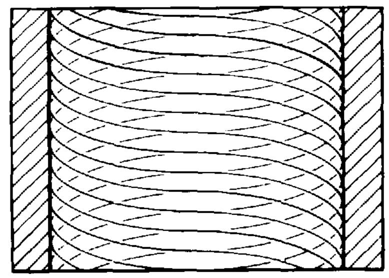
Cylinders may be wet or dry honed depending upon the hone manufacturer's recommendations. Wet honing removes more material faster and leaves a more distinct pattern in the bore.

CAUTION:

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



EXAMPLE OF CROSS HATCH PATTERN

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

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

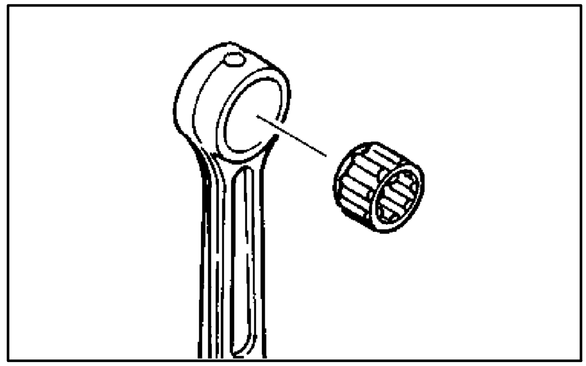
IMPORTANT:

Cleaning the Cylinder After Honing

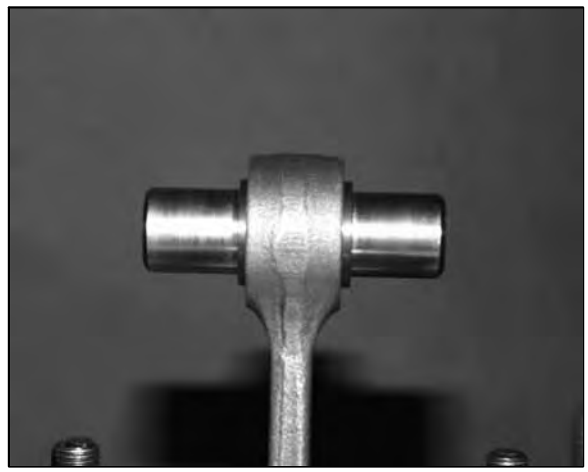
It is very important that the cylinder be thoroughly cleaned after honing to remove all grit material. Wash the cylinder in a solvent, then in hot, soapy water. Pay close attention to areas where the cylinder sleeve meets the aluminum casting (transfer port area). Use electrical contact cleaner if necessary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

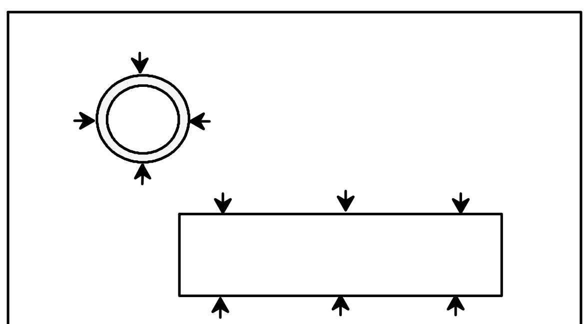
Connecting Rod Small End Bearing Inspection

1. Clean small end of connecting rod and inspect inner bore with a magnifying glass. Look for any surface irregularities including pitting, wear, or dents.
2. Feel the bearing surface inside the rod and check for rough spots, galling, or wear.
3. Clean needle bearing in solvent and dry with compressed air.
4. Inspect needle cage carefully for cracks or shiny spots which indicate wear. Replace needle bearing if worn or cracked, and always replace if piston damage has occurred.



5. Visually inspect piston pin for damage, discoloration, or wear. Feel along the length of the pin and replace it if any rough spots, galling or wear is detected.
6. Oil and install needle bearing and pin in connecting rod. Rotate pin slowly and check for rough spots or any resistance to movement. Slide pin back and forth through bearing while rotating and check for rough spots.
7. With pin and bearing centered in rod, twist ends back and forth in all directions to check for excessive axial play. Pull up and down evenly on both ends of pin to check for radial play. Replace pin *and* bearing if there is any resistance to rotation or excessive axial or radial movement. If play or roughness is evident with a new pin and bearing, replace the connecting rod.





Piston Pin Measurement Locations

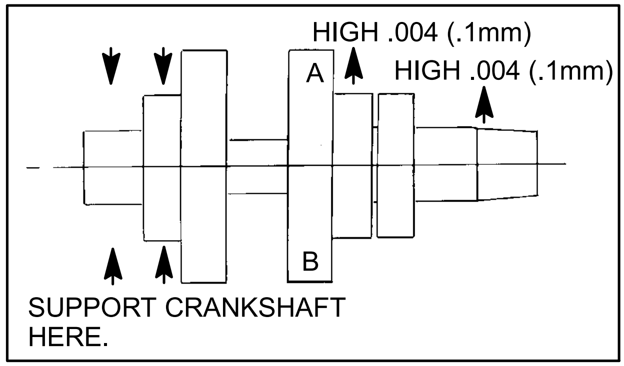
Crankshaft Straightening

Lubricate the bearings and clamp the crankshaft securely in the holding fixture. Refer to the illustrations below.

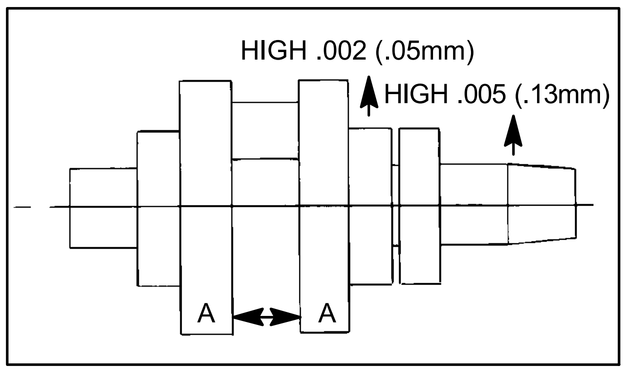
Crankshaft Alignment Fixture **PN 2870569**

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

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

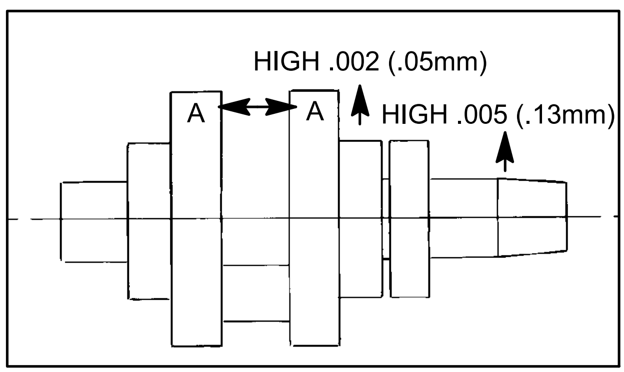


9. To correct a situation like the one shown in the illustration at right, squeeze the crankshaft at point A. (Use tool from alignment kit).



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

NOTE: Maximum allowable runout is .004 l (.1 mm) for 2 stroke engines and .0024 for 4 stroke engines.



4 Stroke Engine Service

Notes

Engine Lubrication - ES33PF / EH50PL

Oil Type	Polaris Premium 4 Synthetic (PN 2871281); or API certified “SH” 5W30 oil
Capacity	Approximately 2 U.S. Quarts (1.9 l)
Filter	PN 3084963
Filter Wrench	Snap On PN YA997 or equivalent
Drain Plug / Screen Fitting	14 ft. lbs. (19 Nm)
Oil Pressure Specification	20 PSI @ 5500 RPM, Polaris 0W/40 Synthetic (Engine Hot)

Oil Pressure Test - ES33PF / EH50PL

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

NOTE: Use Polaris Premium 4 Synthetic Engine Lubricant

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

Oil Flow - ES33PF

The ES33PF engine is equipped with a thermostatically controlled valve that directs oil returning to the tank through a cooler when the oil is hot. Valve operation is described below. The chart on page 3.44 describes the flow of oil through the ES33PF engine and oil cooler. Beginning at the oil tank, the oil flows through a screen fitting in the bottom of the tank and into the oil supply hose. The feed side of the oil pump draws oil through the hose and into the crankcase inlet oil passage, and then pumps the oil through another passage to the one way valve. (Note: The one way valve closes under light spring pressure when the engine is off to prevent oil in the tank from draining into the crankcase. The valve requires very little maintenance). After passing through the one-way valve, oil is pumped through a delivery pipe to the oil filter. If the oil filter is obstructed, a bypass valve contained in the filter allows oil to bypass the filter element.

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

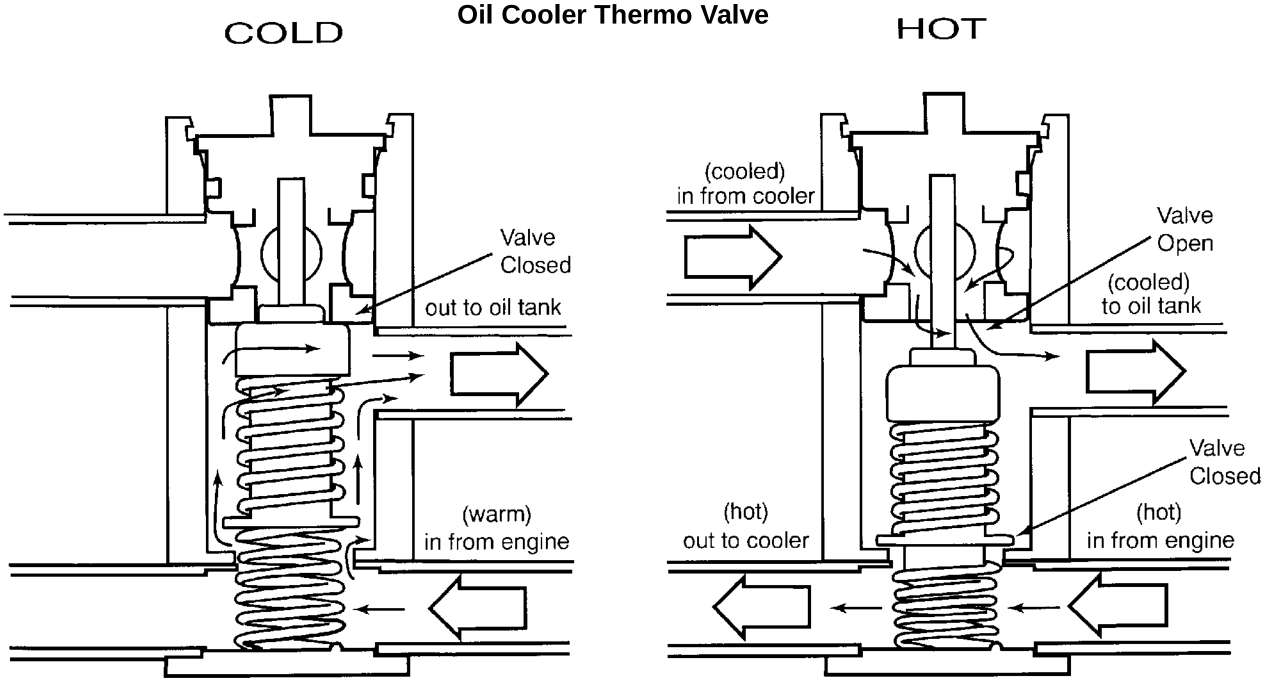
The other oil path from the filter leads through a delivery pipe to the crankcase main oil gallery, which leads to the stator plate oil passage. Here it passes through the slotted friction bearing (located in the stator plate) into the crankshaft. An oil seal on the stator plate prevents oil from entering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

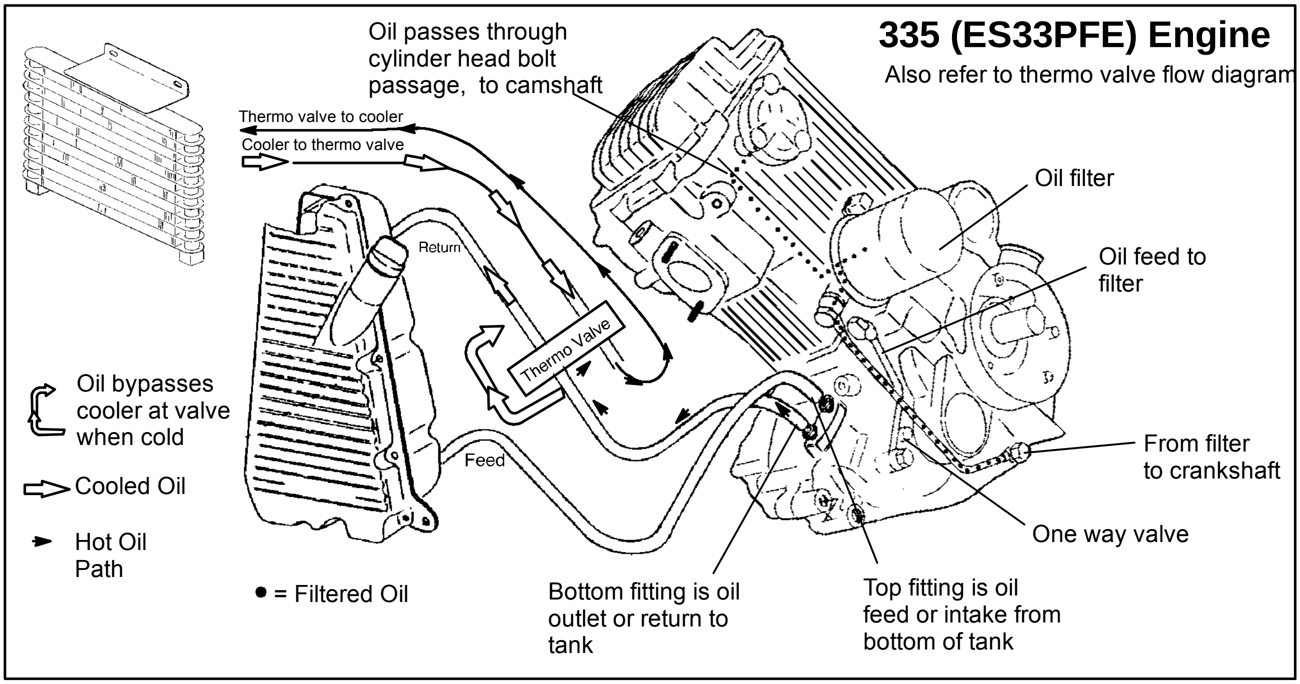
Residual oil from the lubrication of the crankshaft and connecting rod indirectly lubricates the cylinder wall, piston, rings, connecting rod small end bearing, piston pin, oil/water pump drive gears, cam chain and drive sprocket, and Magneto end crankshaft main bearing.

After returning to the engine sump, oil is drawn by the scavenge pump out of the sump and through a screen. Scavenged oil is directed through another crankcase oil passage through the outlet hose to the thermo-valve, and directly back to the oil tank. When the oil reaches a pre-determined temperature, the thermo-valve opens to direct oil through the cooler, and then back to the tank

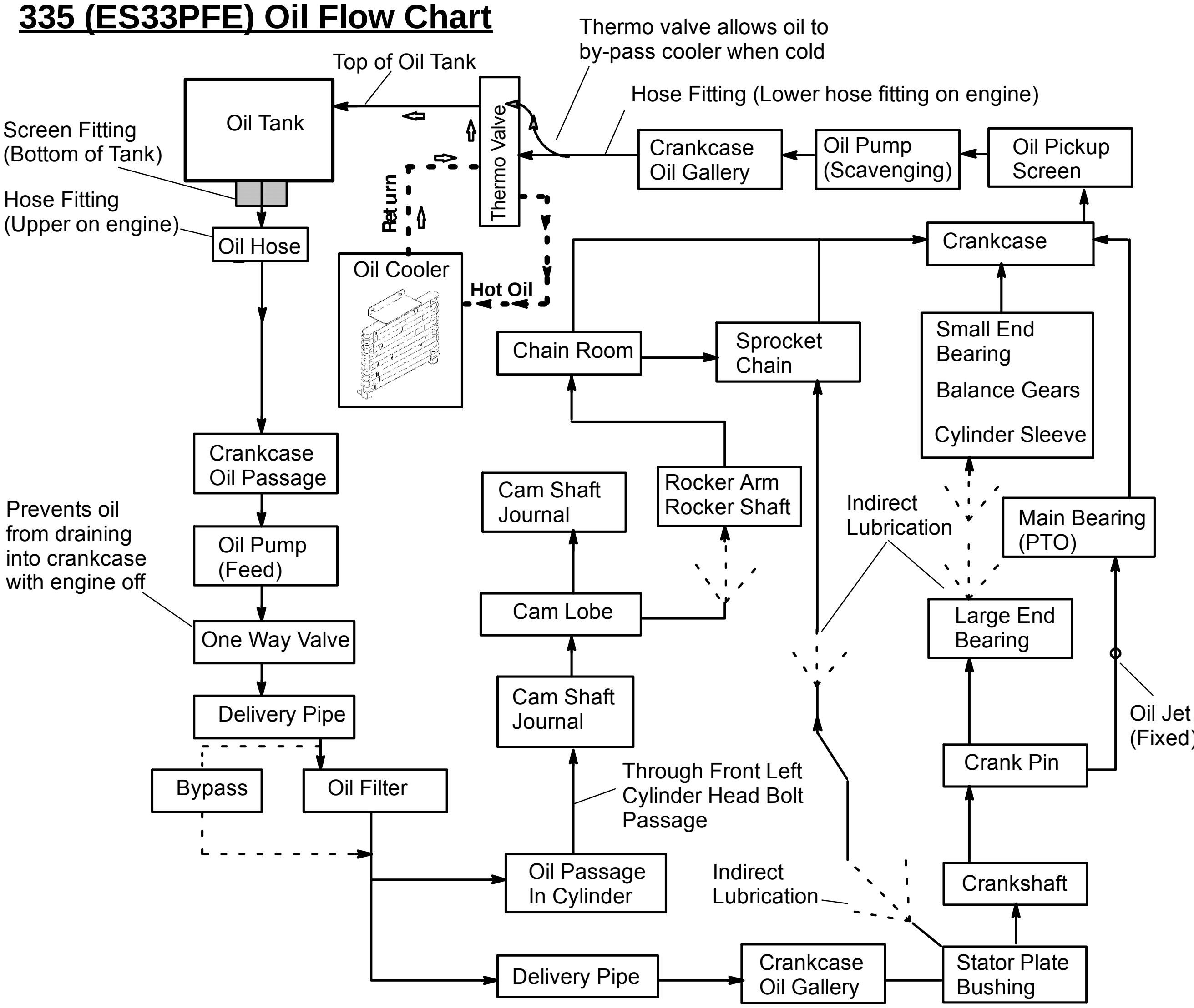
ES33

Oil Cooler Thermo Valve





335 (ES33PFE) Oil Flow Chart



Oil Flow - EH50PL

The chart on page 3.47 describes the flow of oil through the EH50PL engine. Beginning at the oil tank, the oil flows through a screen fitting in the bottom of the tank and into the oil supply hose. The feed side of the oil pump draws oil through the hose and into the crankcase oil gallery, and then pumps the oil through another passage to the one way valve. (When the engine is off, the one way valve closes to prevent oil in the tank from draining into the crankcase.) The oil is pumped through a delivery pipe to the oil filter. If the oil filter is obstructed, a bypass valve contained in the filter allows oil to bypass the filter element.

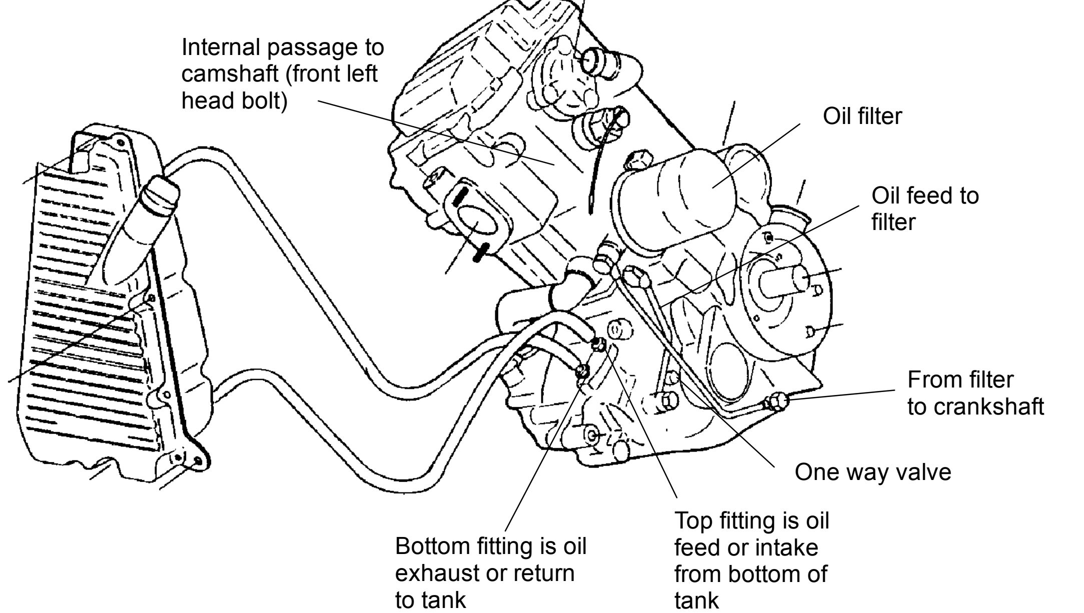
At this point, the oil is diverted in two directions. Oil is supplied to the camshaft through the left front cylinder stud, and an oil passage in the head. Oil enters the camshaft through the PTO (L) journal. The camshaft journals, cam lobes, and rocker arms are lubricated through holes in the camshaft.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

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

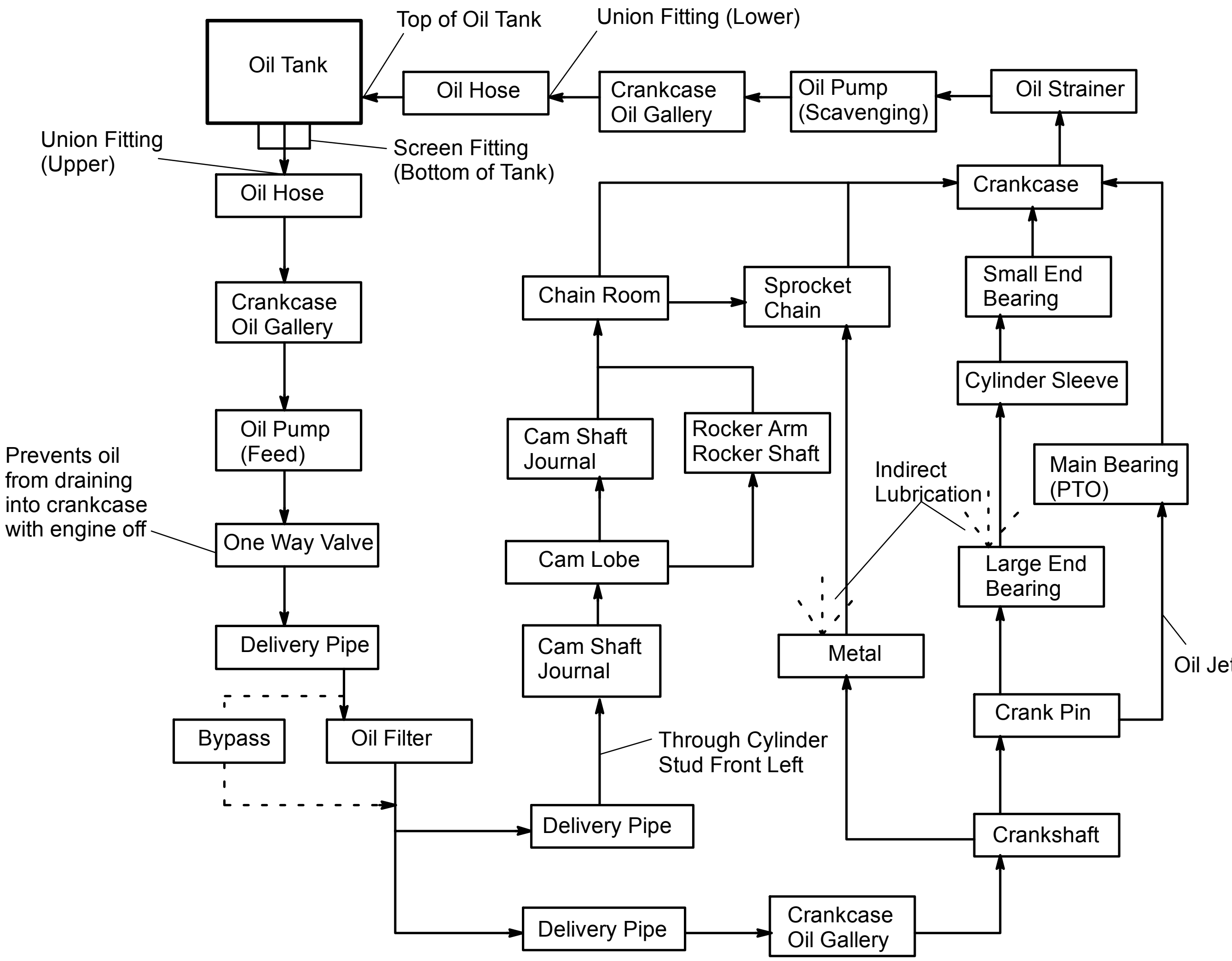
Residual oil from the lubrication of the crankshaft and connecting rod indirectly lubricates the cylinder wall, piston, rings, connecting rod small end bearing, piston pin, oil/water pump drive gears, cam chain and drive sprocket, and Magneto end crankshaft main bearing.

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

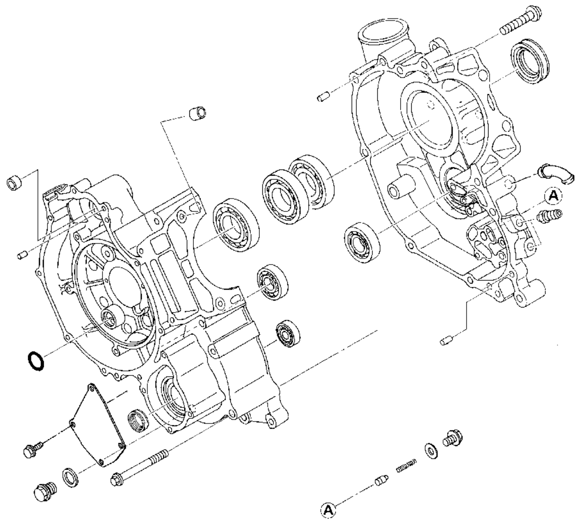
EH50PL Engine



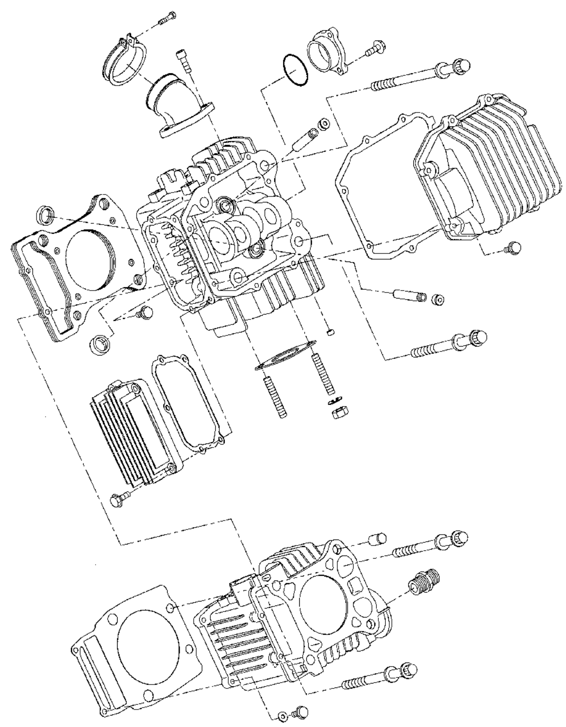
EH50PL Oil Flow Chart



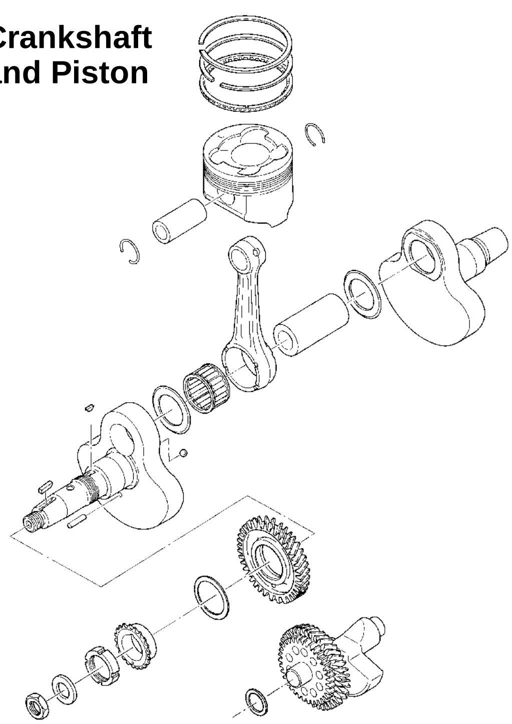
Crankcase



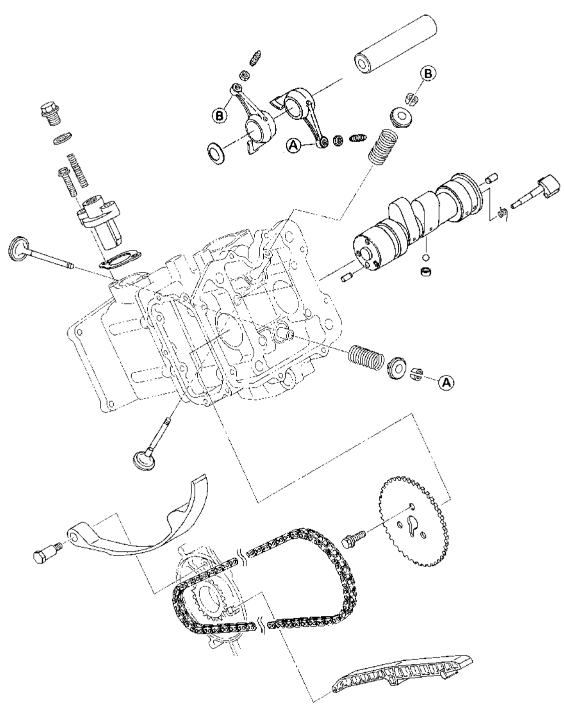
Cylinder/
Cylinder Head



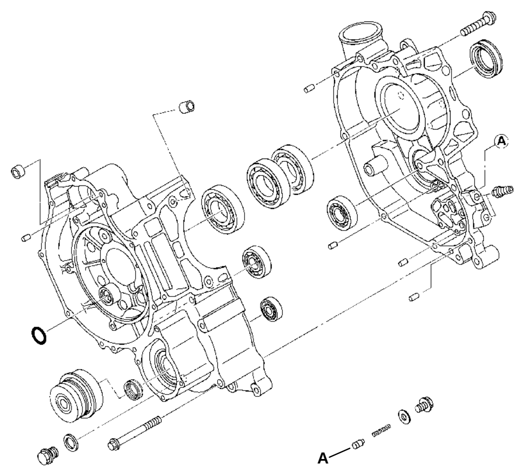
Crankshaft
and Piston



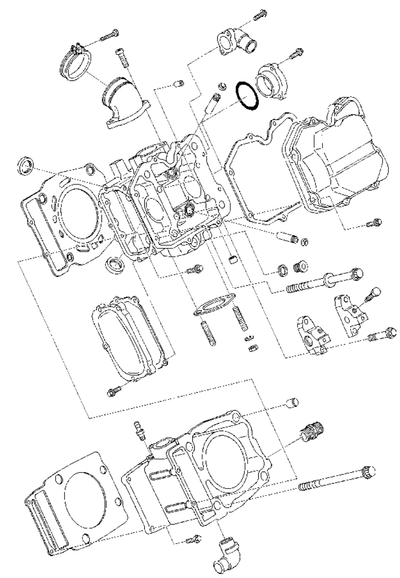
Valve Train



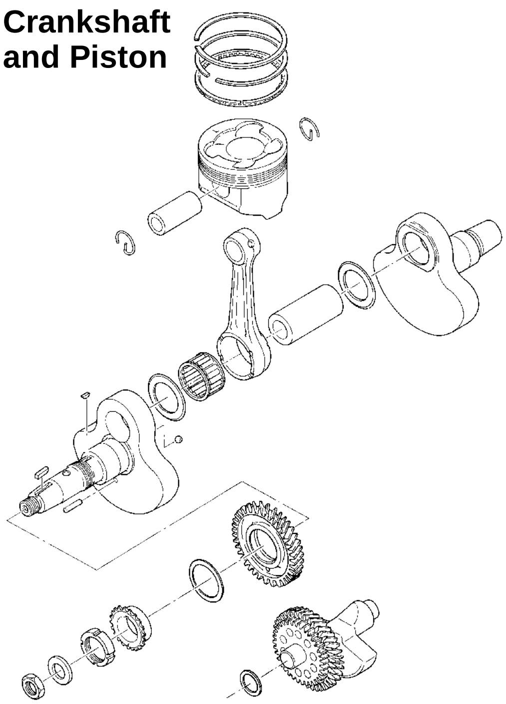
Crankcase



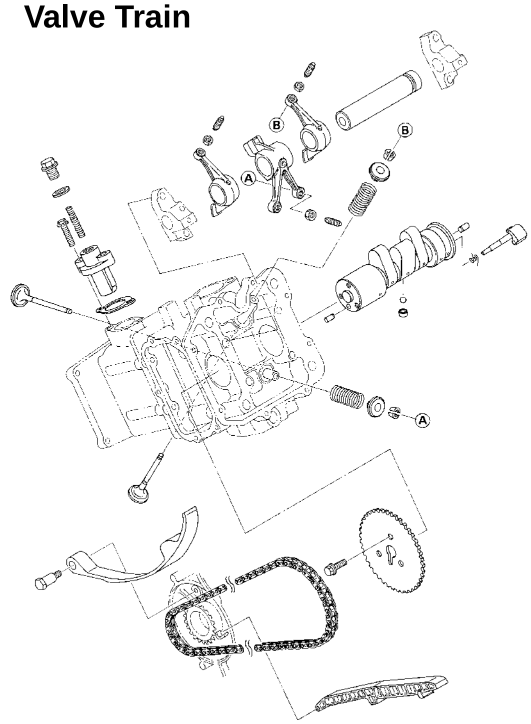
Cylinder/ Cylinder Head



Crankshaft and Piston



Valve Train



Engine Removal
Refer to page 3.11 - 3.13 for engine removal / installation notes.

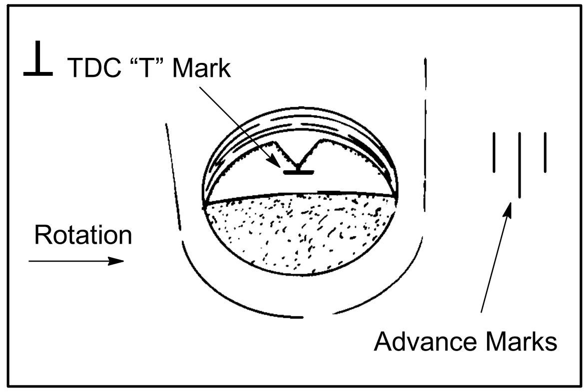
The following service procedures are for the ES33PF and EH50PL engines. Difference are noted where necessary.

Engine Disassembly / Inspection

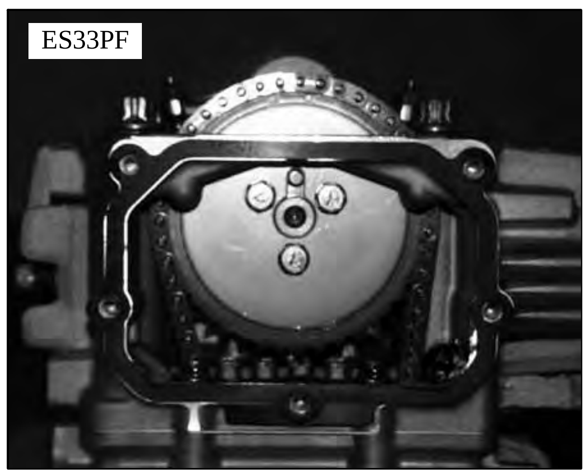
Cam Chain Tensioner/Rocker Arm/Camshaft Removal

1. Remove ignition timing inspection plug from recoil housing.

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



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



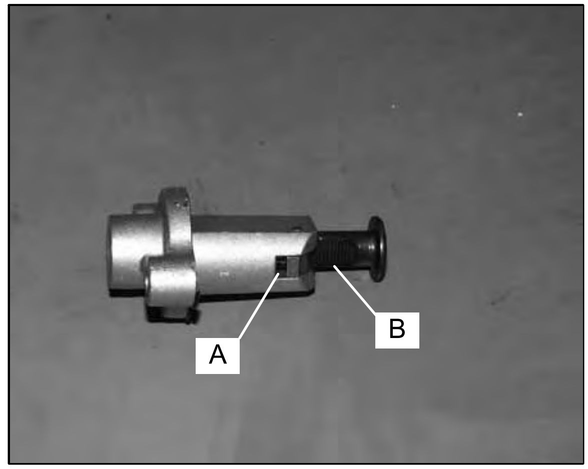
4. Align single (TDC) mark on flywheel with projection in inspection hole, and the cam sprocket pin (facing upward) aligned with the camshaft to crankshaft center line. **NOTE:** The cam lobe should be pointing down and valves should have clearance at this point.

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

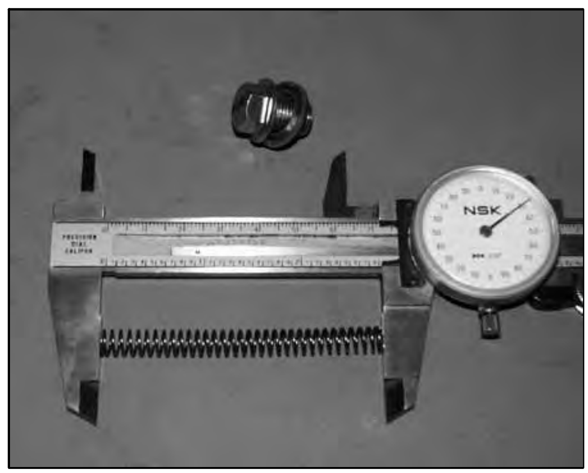
Engine Disassembly, Cont.

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. Compare to specifications on page 3.5 - 3.8.

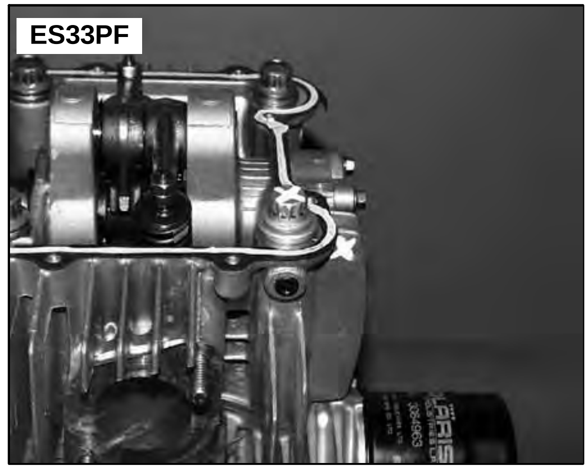


5. Replace entire tensioner assembly if any part is worn or damaged.

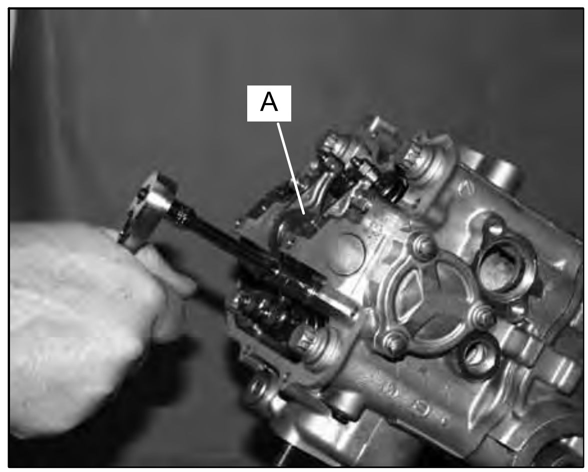
Rocker Arm/Shaft Removal

ES33PF

1. Slide shaft out of support boss, keeping rocker arms in order. Note position of spring washer on rocker shaft. Flats face out, toward the shaft support.



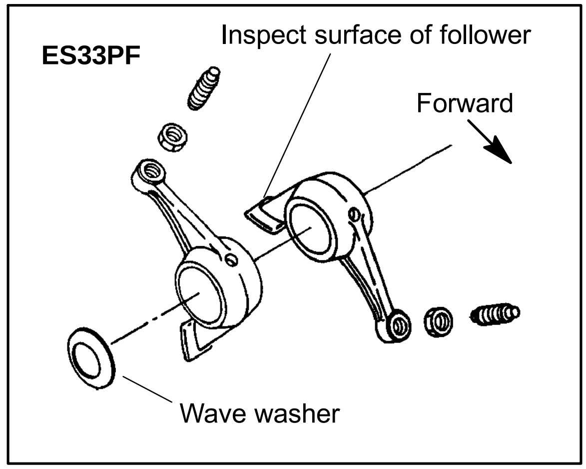
1. Loosen rocker shaft retaining bolt (A) to remove shaft.
2. Remove the four bolts securing rocker shaft supports, and remove the supports, rocker shaft and rocker arms as an assembly, being careful not to drop the dowel pins into the engine.

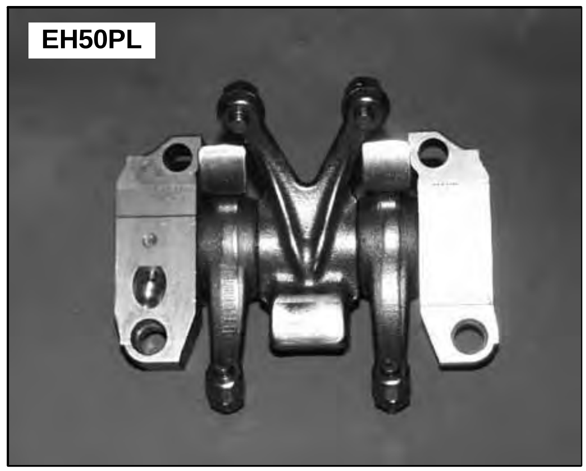


Rocker Arm/Shaft Inspection

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

2. Inspect each rocker arm cam follower surface. If there is any damage or uneven wear, replace the rocker arm. **NOTE:** Always inspect camshaft lobe if rocker arms are worn or damaged.



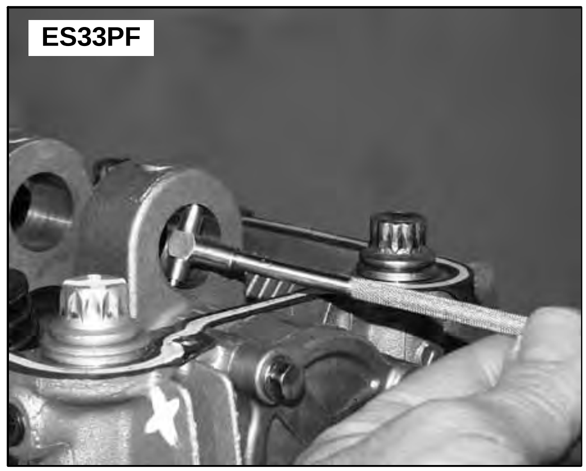


3. Measure O.D. of rocker shaft. Inspect it for wear or damage. Compare to specifications on page 3.5 - 3.8.

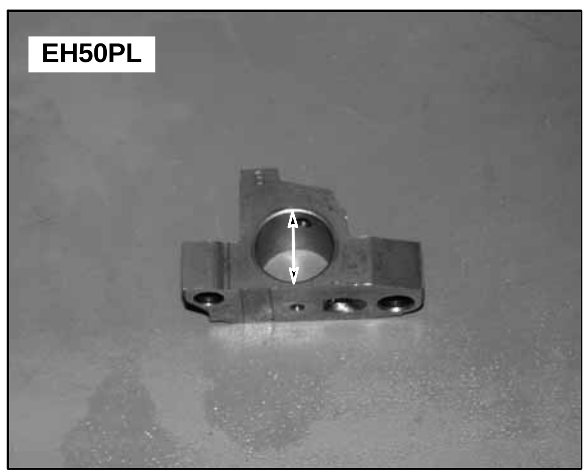
Rocker Arm/Shaft Inspection, cont.

4. Measure I.D. of each rocker arm and compare to specifications on page 3.5 - 3.8.

5. Measure I.D. of both rocker arm shaft supports and visually inspect surface. Compare to specifications on page 3.5 - 3.8.



6. 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 camshaft sprocket inspection cover.
2. Loosen three camshaft sprocket bolts.

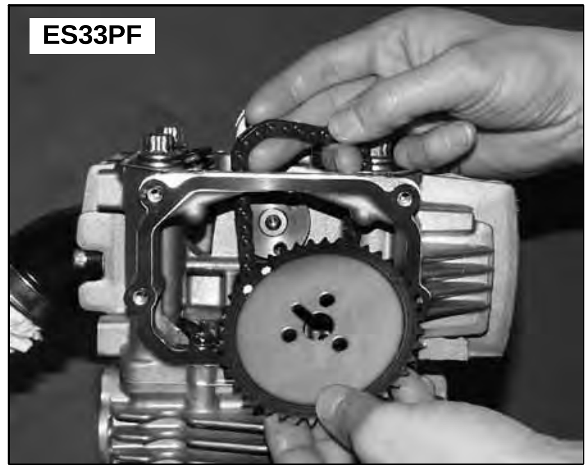
3. Remove camshaft end cap and O-Ring.

4. Inspect camshaft end cap (thrust face) for wear. Replace if worn or damaged.

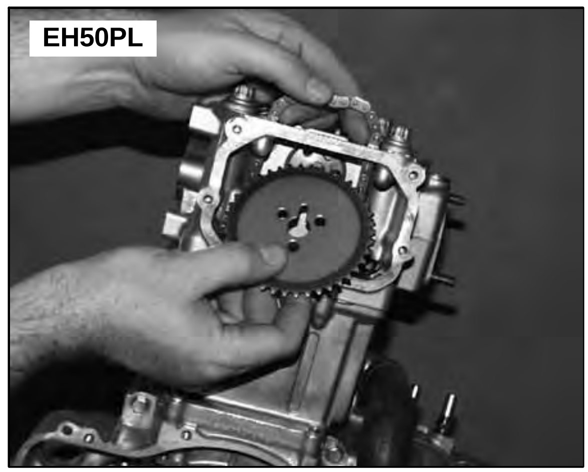
Engine Disassembly, Cont.

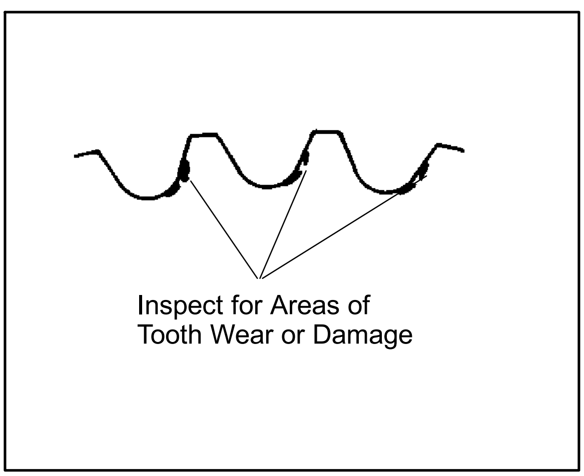
5. Place a clean shop towel in the area below cam chain sprocket and remove sprocket retaining bolts.

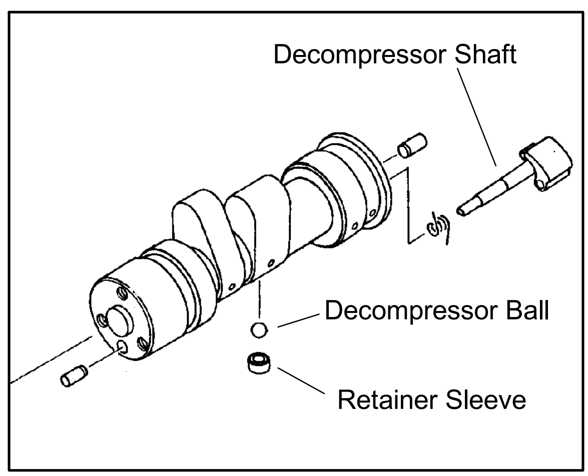
6. Slide camshaft inward to allow removal of cam sprocket and remove sprocket from camshaft and chain.



7. Secure cam chain with a wire to prevent it from falling into the crankcase.
8. Inspect cam sprocket teeth for wear or damage. Replace if necessary.
9. Slide camshaft out the PTO side of the cylinder head.







Engine Disassembly, Cont.

Automatic Compression Release Removal/Inspection

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

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

Automatic Compression Release Installation

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

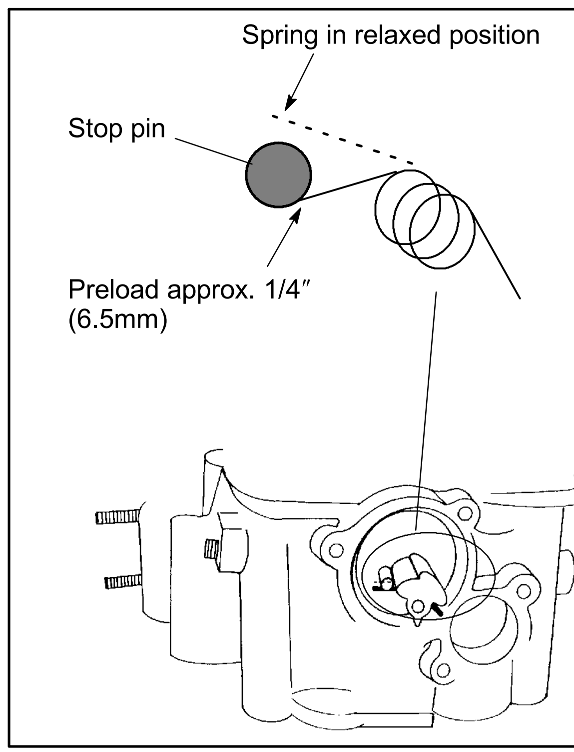
The actuator ball must be held outward to allow installation of the release lever shaft.

If Camshaft Is Removed From Engine:

3. Turn the camshaft until the actuator ball is in the lowest position and install the release lever shaft, pre-winding the spring approximately 1/4″ (6.5mm).

If Camshaft Is Installed In The Engine:

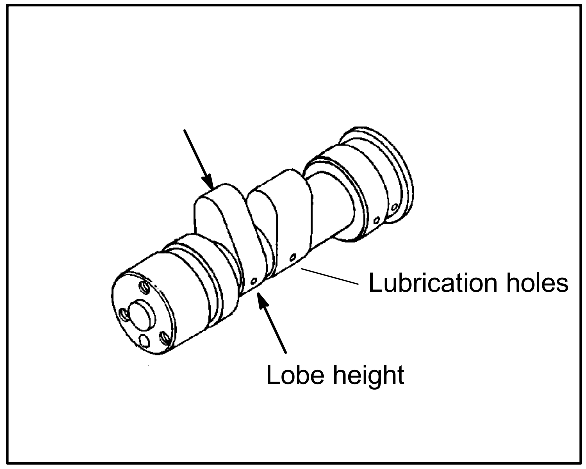
4. Use a small magnet to draw the actuator ball outward, or rotate the engine until the cam lobes face upward and install release lever shaft.
5. Position camshaft as shown at bottom of illustration at right.
6. Place arm of spring under stop pin as shown and push release lever inward until fully seated. *Do not* pre-wind the spring one full turn or the compression release will not disengage when the engine starts. Check operation of mechanism as outlined in step 1 of Removal (above).
   NOTE: When shaft is properly installed, actuator ball will be held in the “out” position. It is important to note that spring pressure is very light.



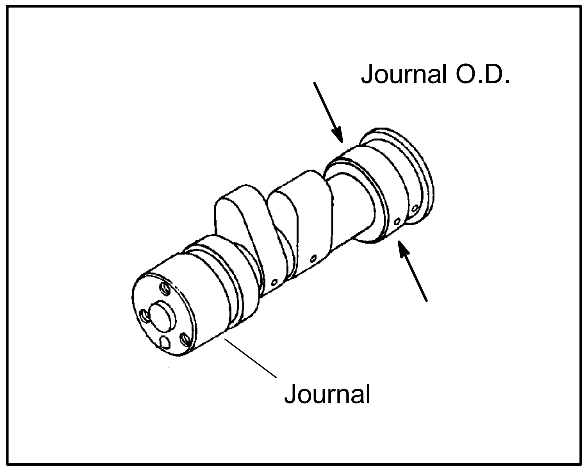
Engine Disassembly, Cont.

Camshaft Inspection

1. Visually inspect each cam lobe for wear, chafing or damage.
2. Thoroughly clean the cam shaft, making sure the oil feed holes are not obstructed.
3. Measure height of each cam lobe using a micrometer. Compare to specifications on page 3.5 - 3.8.



4. Measure camshaft journal outside diameter (O.D.)
5. Measure ID of camshaft journal bore.
6. Calculate oil clearance by subtracting journal OD from journal bore ID. Compare to specifications on page 3.5 - 3.8.

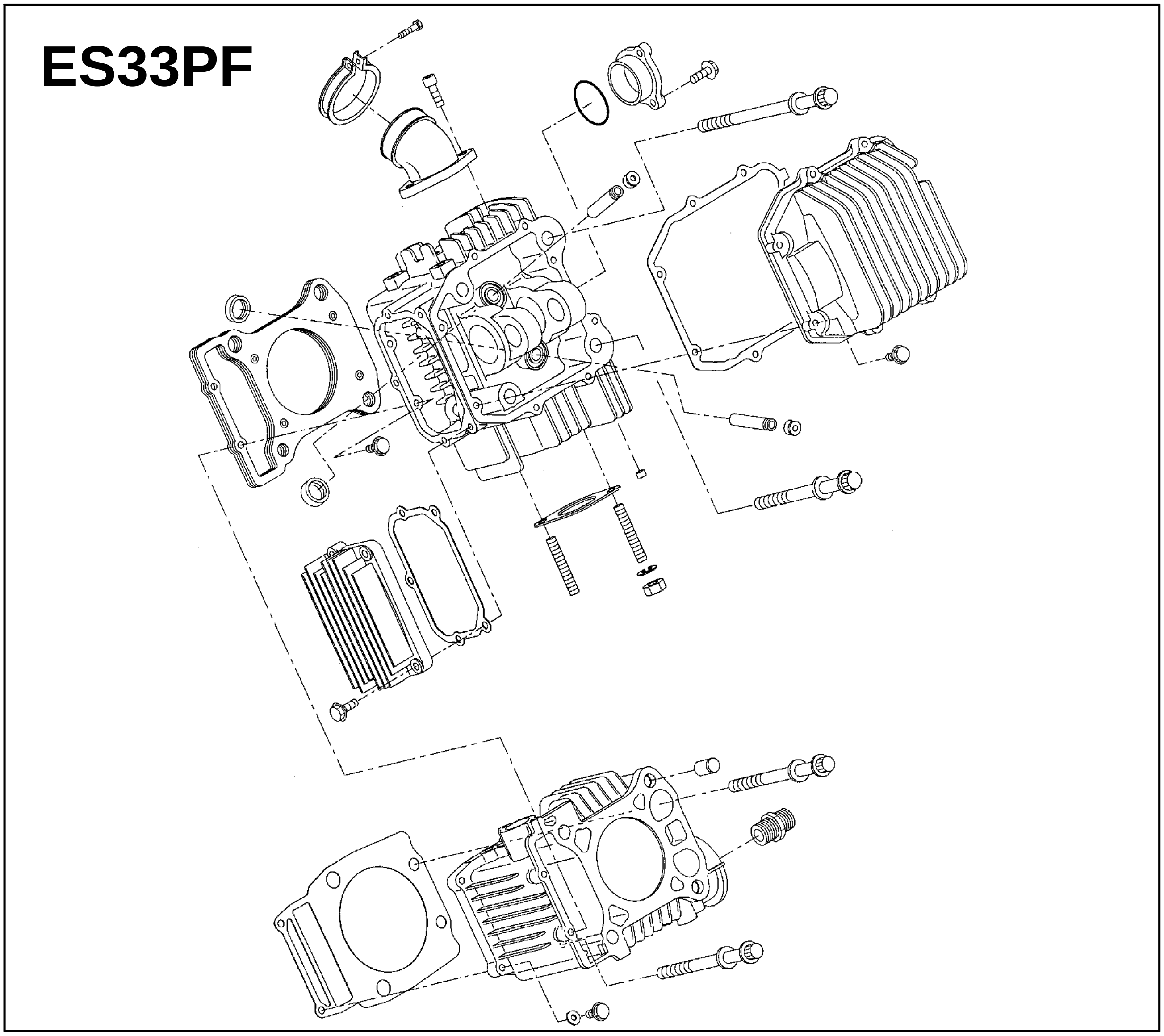


Replace camshaft if damaged or if any part is worn past the service limit.

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

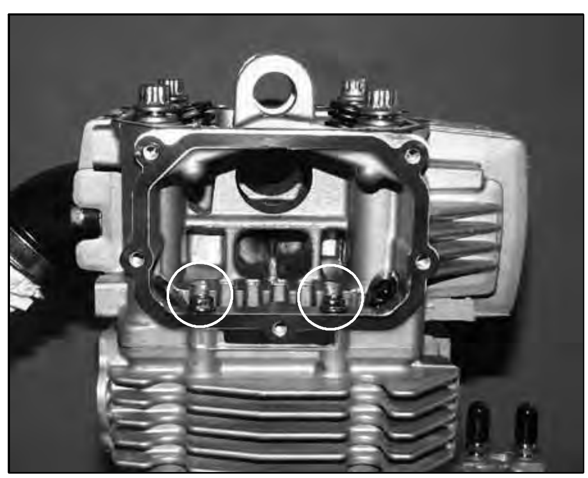
Engine Disassembly, Cont.

Cylinder Head Exploded View, ES33PF



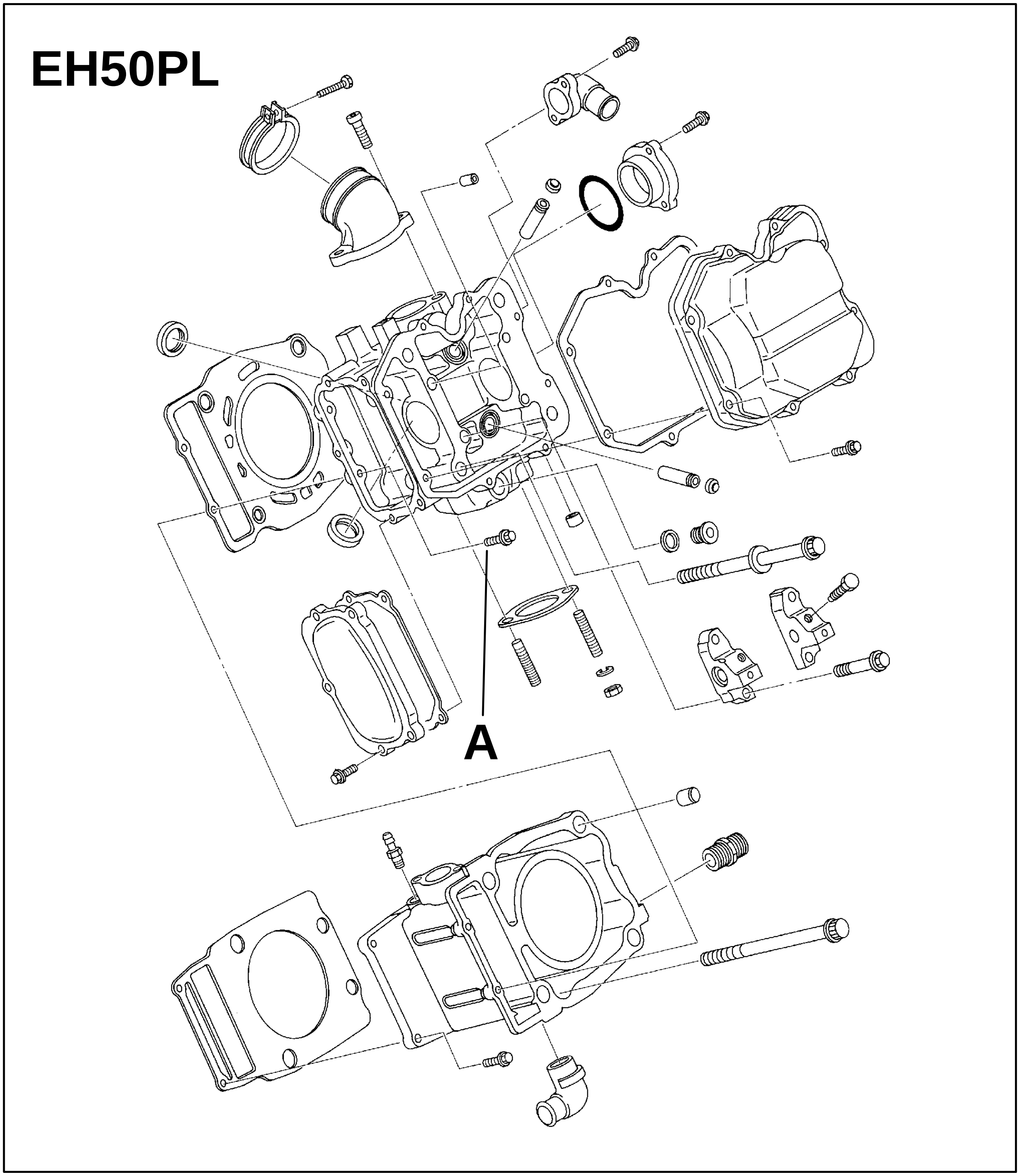
ES33PF

1. Remove the two 6mm flange bolts from cylinder head.



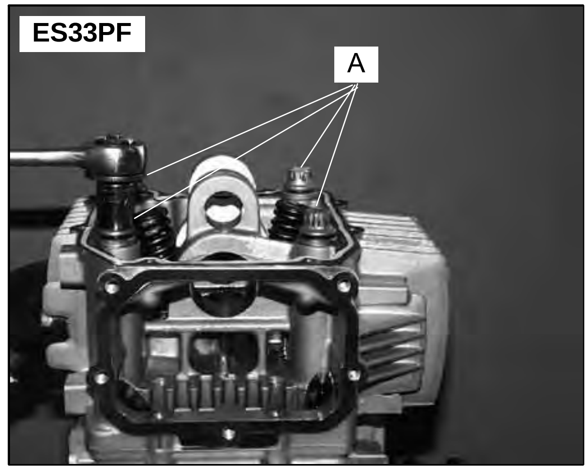
Cylinder Head Exploded View, EH50PL

1. Remove the two 6mm flange bolts (A) from cylinder head.

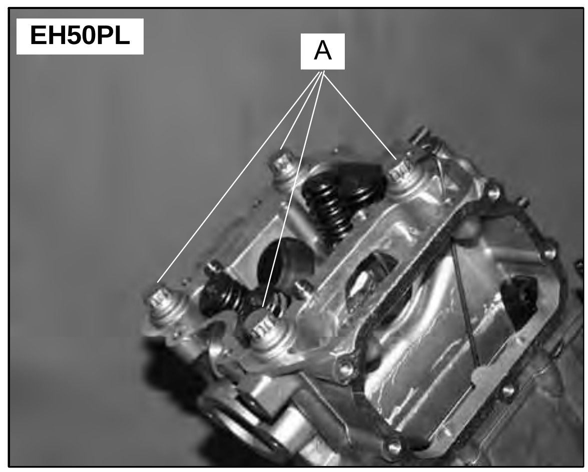


Engine Disassembly, Cont.

2. Loosen each of the four cylinder head bolts evenly 1/8 turn each time in a criss-cross pattern until loose.
3. 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.



4. Remove cylinder head and head gasket.

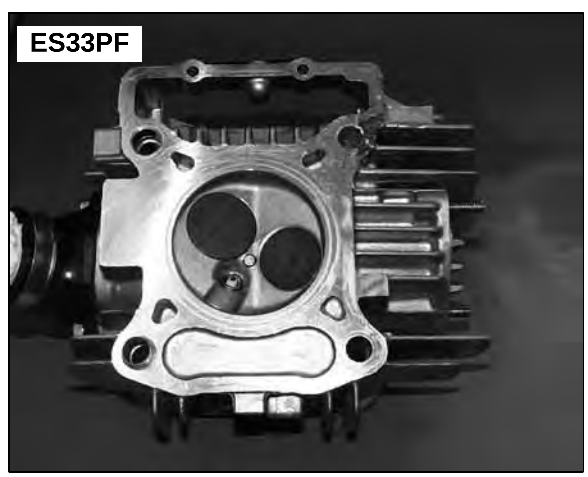


ES33PF

New head gasket must be installed with sealant facing upward.

Cylinder Head Inspection

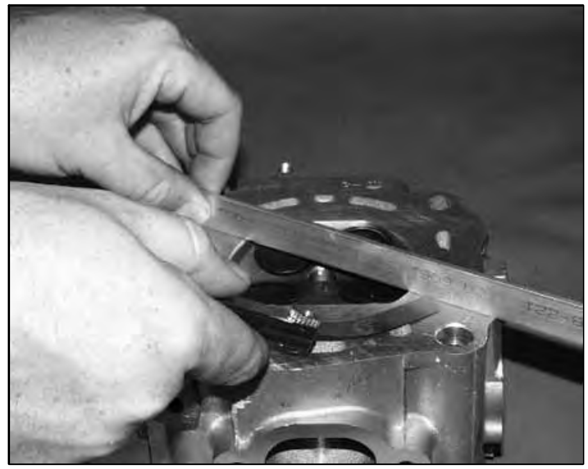
1. Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon. **CAUTION:** Use care not to damage sealing surface.



Engine Disassembly, Cont.

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.



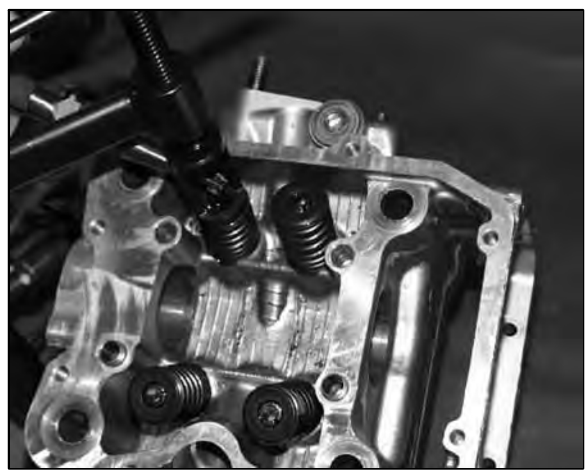
Cylinder Head Warpage Limit:
.002″ (.05 mm)

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. The EH50 cylinder head is shown in examples throughout cylinder head service section. The ES33 cylinder head is similar to EH50.

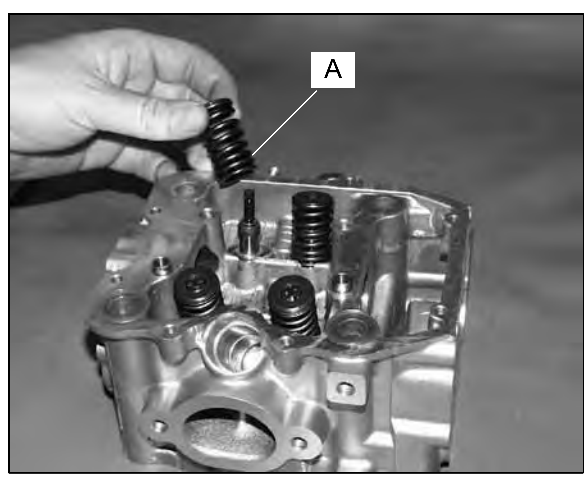
1. Using a valve spring compressor, compress the valve spring and remove the split keeper. **NOTE:** To prevent loss of tension, do not compress the valve spring more than necessary.



2. Remove spring retainer and spring.

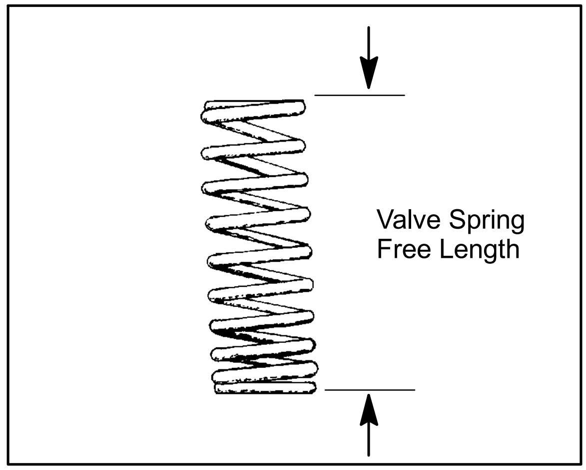
NOTE: The valve springs should be positioned with the tightly wound coils against the cylinder head on progressively wound springs (A).

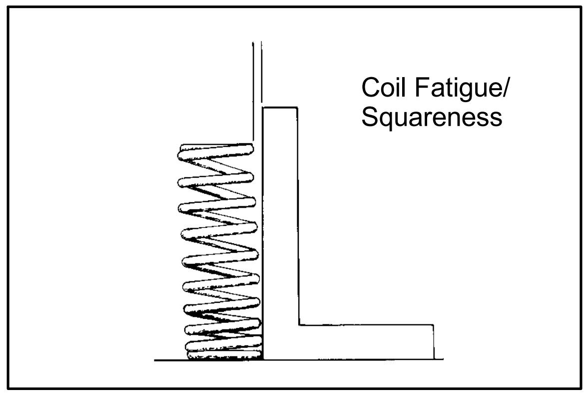
3. Push valve out, keeping it in order for reassembly in the same guide.



Engine Disassembly, Cont.

4. Measure free length of spring with a Vernier caliper. Check spring for squareness. Compare to specifications on page 3.5 - 3.8. Replace spring if either measurement is out of specification.



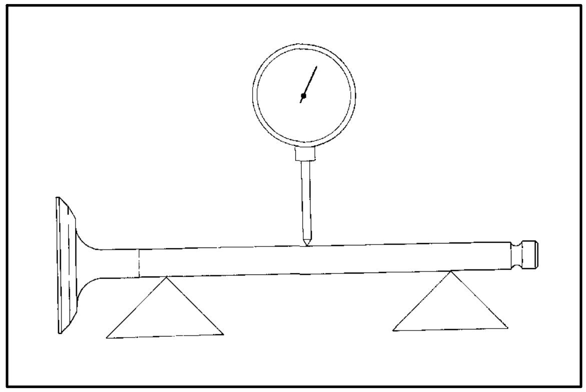


5. Remove valve seals. **CAUTION:** Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.

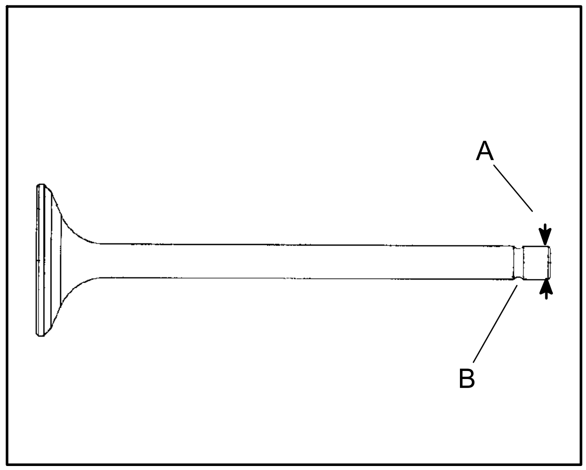
Engine Disassembly, Cont.

Valve Inspection

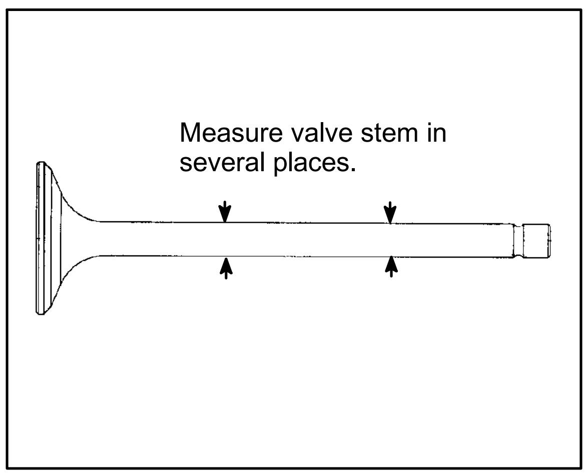
1. Remove all carbon from valve with a soft wire wheel.
2. Check valve face for runout, pitting, and burnt spots. To check for bent valve stems, mount valve in a drill or use “V” blocks and a dial indicator.



3. Check end of valve stem for flaring, pitting, wear or damage (A).
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 on page 3.5 - 3.8.



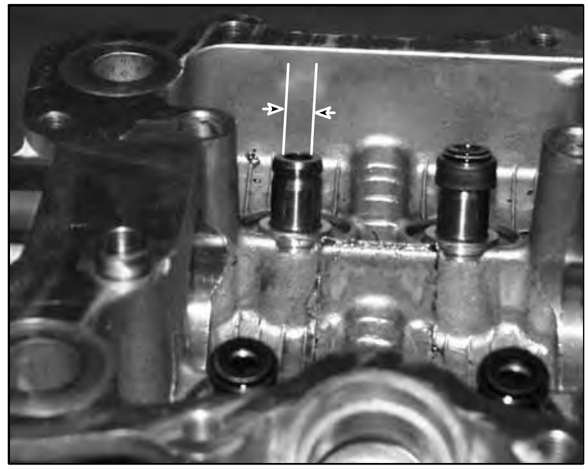
Engine Disassembly, Cont.

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 on page 3.5 - 3.8.

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 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 3.67. *If the valve seat is cracked the cylinder head must be replaced.*

Cylinder Head Reconditioning

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

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

Valve Guide Removal/Installation

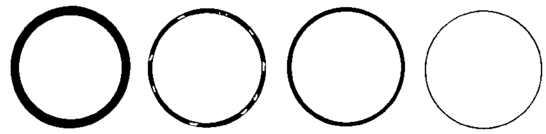
1. Remove all carbon deposits from the combustion chamber, valve seat and valve guide area before attempting to remove valve guides. **CAUTION:** Carbon deposits are extremely abrasive and may damage the valve guide bore when guides are removed.

2. Place new valve guides in a freezer for at least 15 minutes while heating cylinder head.

3. Heat cylinder head in an oven or use a hot plate to bring cylinder head temperature to 212° F (100° C). **CAUTION:** Do not use a torch to heat cylinder head or warpage may result from uneven heating. Head temperature can be checked with a pyrometer or a welding temperature stick.

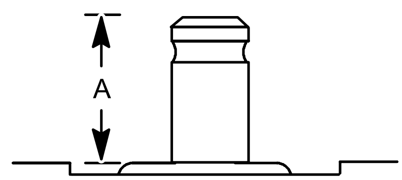
Valve Seat Reconditioning

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



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

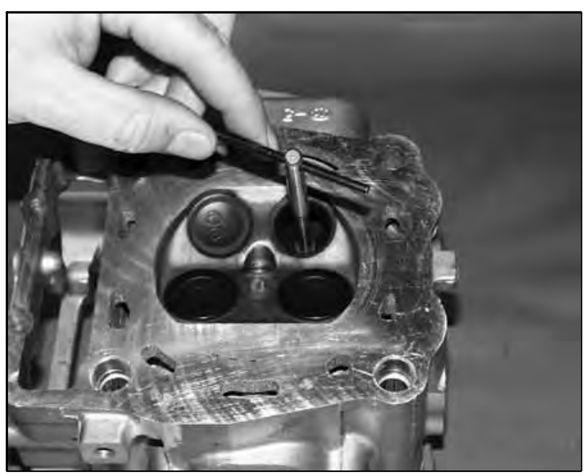
1. When thoroughly heated, place cylinder head on blocks of wood which will allow the old guides to be removed.
2. Using valve guide driver, drive guides out of the cylinder head from the combustion chamber side. Be careful not to damage guide bore or valve seat when removing guides.
3. Place cylinder head on cylinder head table. **NOTE:** Be sure cylinder head is still at 212° F (100° C) before installing new guides.
4. Place a new guide in the valve guide installation tool and press guide in to proper depth. Check height of each guide above the cylinder head (A). Refer to specifications on page 3.5 - 3.8. **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 Installed Height

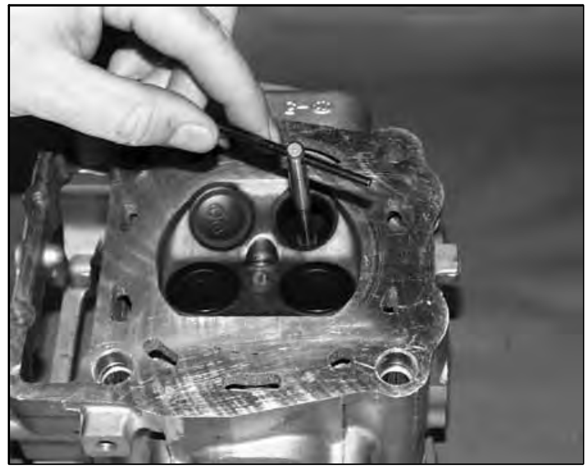
Reaming The Valve Guide

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

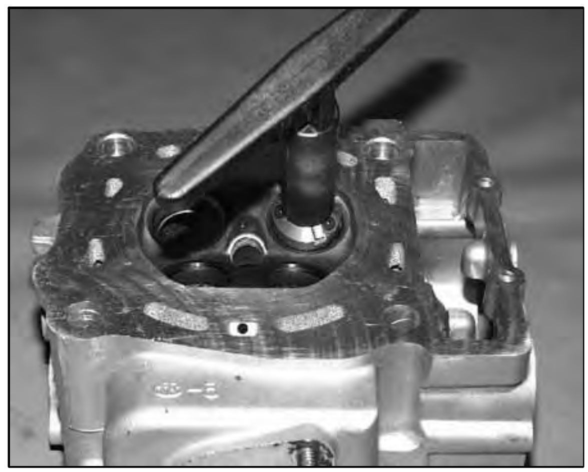


Valve Seat Reconditioning, cont.

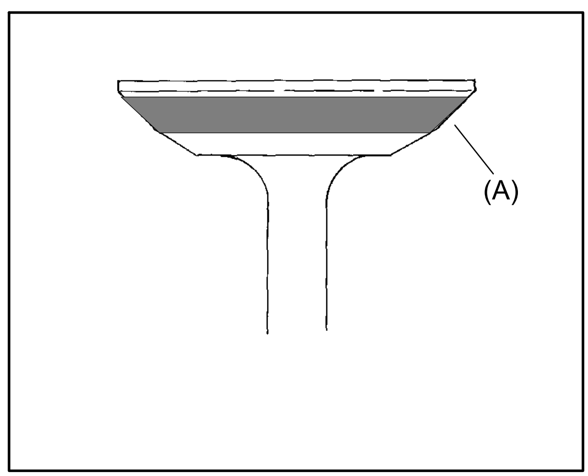
1. Install pilot into valve guide.
2. Apply cutting oil to valve seat and cutter.



3. Place 46° cutter on the pilot and make a light cut.
4. Inspect the cut area of the seat.
   - If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.
   - If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or runout. If the pilot is bent it must be replaced.
   - If the contact area of the cutter is in the same place, the valve guide is distorted from improper installation and must be replaced. Be sure the cylinder head is at the proper temperature and replace the guide.
   - If the contact area of the initial cut is greater than 75%, continue to cut the seat until all pits are removed and a new seat surface is evident. **NOTE:** Remove only the amount of material necessary to repair the seat surface.

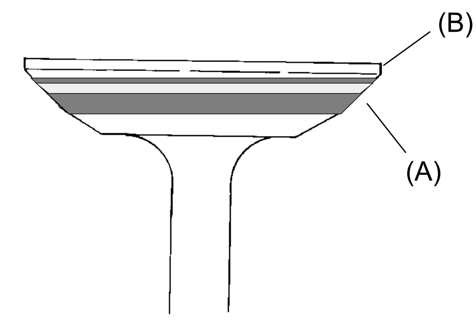


5. To check the contact area of the seat on the valve face, apply a thin coating of Prussian Blue™ paste to the valve seat. If using an interference angle (46°) apply black permanent marker to the entire valve face (A).
6. Insert valve into guide and tap valve lightly into place a few times.



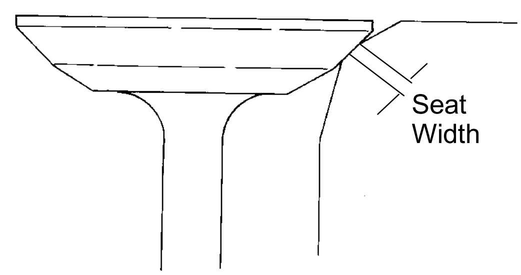
Valve Seat Reconditioning, cont.

7. Remove valve and check where the Prussian Blue™ indicates seat contact on the valve face. The valve seat should contact the middle of the valve face or slightly above, and must be the proper width.
   - If the indicated seat contact is at the top edge of the valve face and contacts the margin area(B) it is too high on the valve face. Use the 30° cutter to lower the valve seat.
   - If too low use the 60° or 75° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.
   - If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.
   - If the seat is too narrow, widen using the 45° cutter and re-check contact point on the valve face and seat width after each cut.



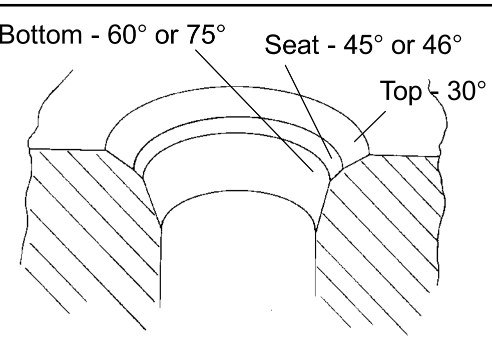
Proper Seat Contact On Valve Face

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.



ES33PF / EH50PL Valve Seat Width:

Refer to Engine Service Specifications on Page 3.5 - 3.8.

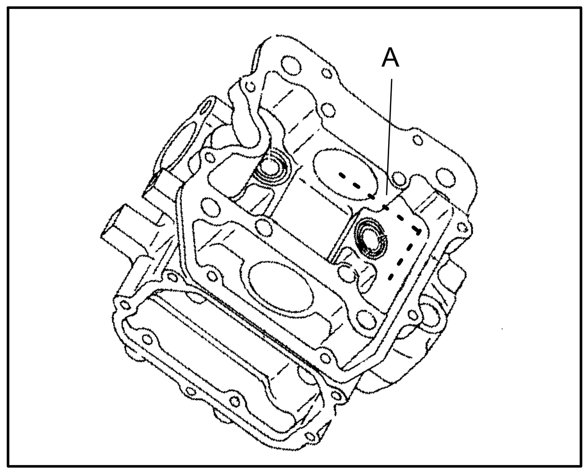


8. Clean all filings from the area with hot soapy water, rinse, and dry with compressed air.
9. Lubricate the valve guides with clean engine oil, and apply oil or water based lapping compound to the face of the valve. Lapping is not required with an interference angle.

Valve Seat Reconditioning, cont.

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

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



13. If oil passage blind plug was removed, apply 3 Bond 1215 or equivalent sealer to the threads and install, torquing to 8 ft. lbs. (1.1 kg-m). **CAUTION:** Do not allow sealant to enter oil passage.
14. Spray electrical contact cleaner into oil passage and dry using compressed air.

Cylinder Head Assembly

CAUTION: Wear eye protection during assembly.

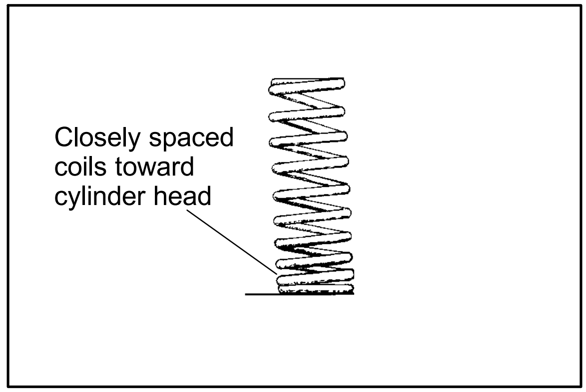
NOTE: Assemble the valves one at a time to maintain proper order.

1. Install new valve seals on valve guides.

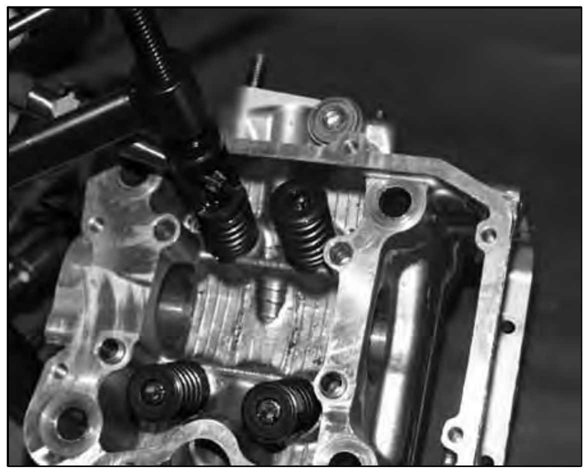
2. Apply engine oil to valve guides and seats.
3. Coat valve stem with molybdenum disulfide grease.
4. Install valve carefully with a rotating motion to avoid damaging valve seal.

Cylinder Head Assembly, Cont.

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

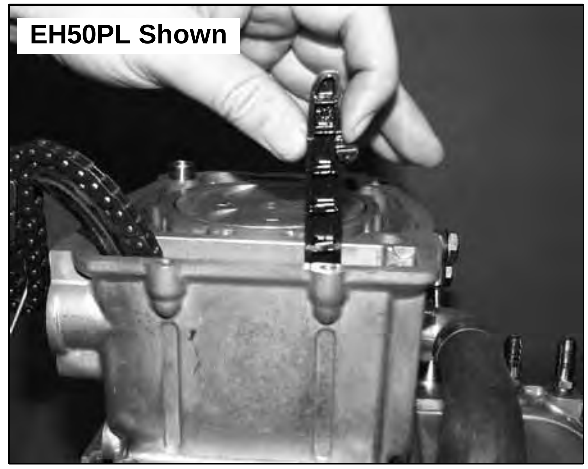
1. Clean and dry the combustion chamber area.
2. Pour a small amount of clean, high flash point solvent into the intake port and check for leakage around each intake valve. The valve seats should hold fluid with no seepage.
3. Repeat for exhaust valves by pouring fluid into exhaust port.

Engine Bottom End Disassembly

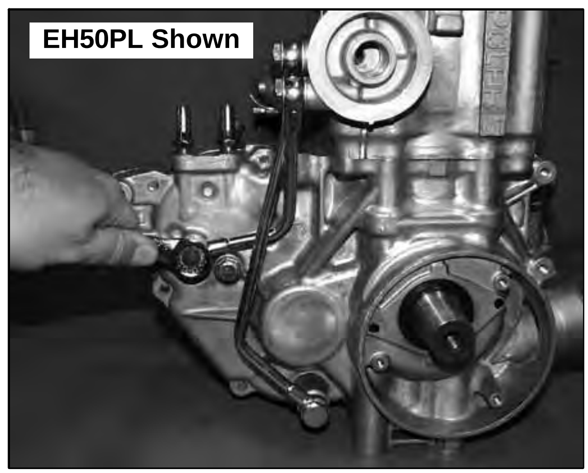
Cylinder/Piston Removal and Inspection

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

1. Remove cam chain guide at front of cylinder.

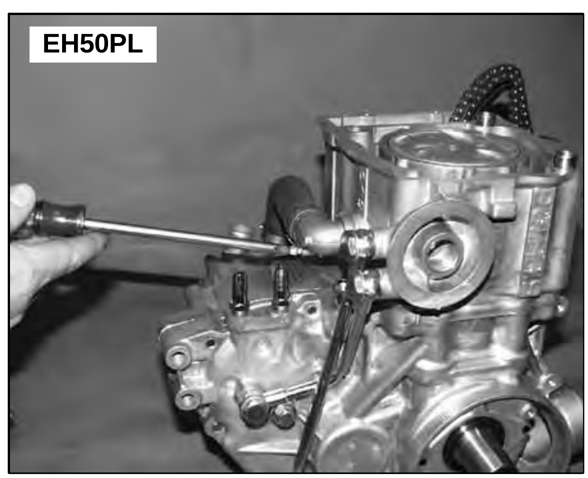


2. Loosen all four oil pipe banjo bolts and then remove the bolts and eight sealing washers. Remove the pipes.



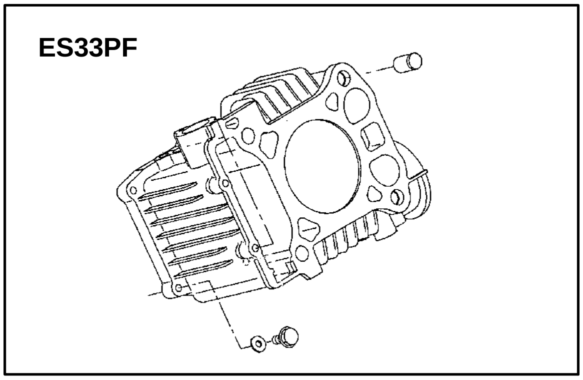
EH50PL

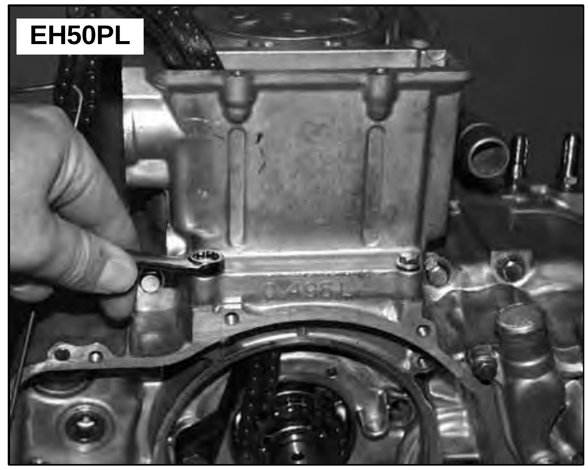
3. Loosen hose clamps and remove coolant inlet hose.



Engine Disassembly, Cont.

4. Remove the two 6 mm cylinder base bolts.





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

EH50PL

The bolts are inside the water jacket.

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

Engine Disassembly, Cont.

Piston Removal

ES33PF

1. Remove circlip. Note piston orientation with circlip removal notch facing the front or rear. The ES33 piston is non-directional. A new piston can be installed with the circlip notch facing either way. However, if a used piston is re-installed, install in the same direction as removed.

EH50PL

1. Remove circlip. Note piston directional arrow pointing toward the right (Mag) side of engine.

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.

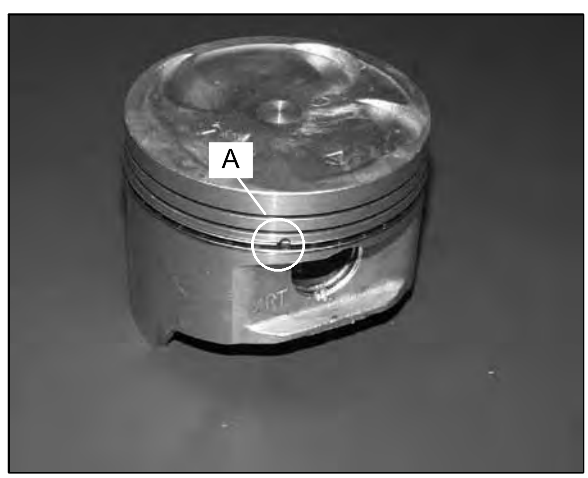
3. Remove top compression ring.

***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.

EH50PL

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



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

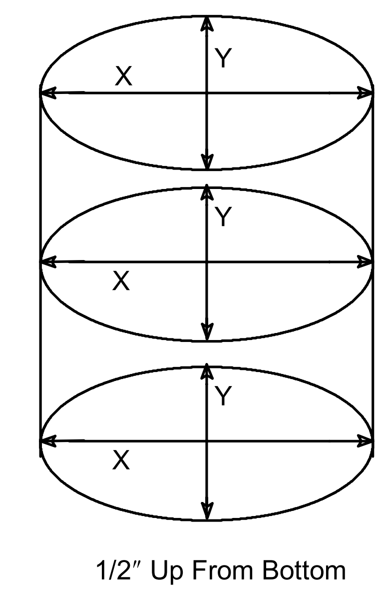
Cylinder Inspection

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:
.002″ (.05 mm)

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

4. Inspect cylinder for taper and out of round with a telescoping gauge or a dial bore gauge. Measure in two different directions, front to back and side to side, on three different levels (1/2″ down from top, in the middle, and 1/2″ up from bottom).



Engine Disassembly, Cont.

5. Record measurements. If cylinder is tapered or out of round beyond .002, the cylinder must be re-bored oversize, or replaced.

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

Standard Bore Size:

Refer to Page 3.5 - 3.8

Piston-to-Cylinder Clearance

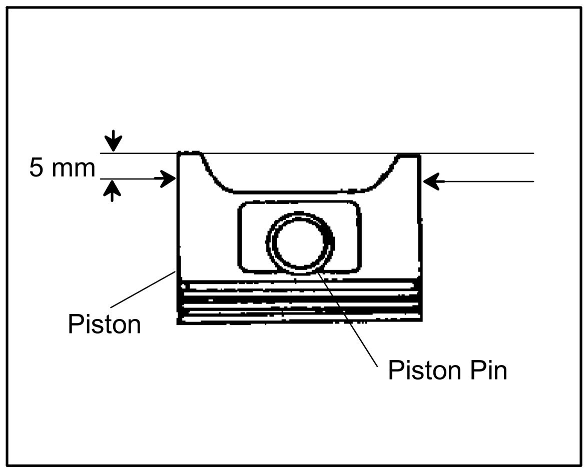
1. Measure piston outside diameter at a point 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.
2. Subtract this measurement from the maximum cylinder measurement obtained in step 5 above.

Piston to Cylinder Clearance

Refer to Page 3.5 - 3.8

Piston O.D.:

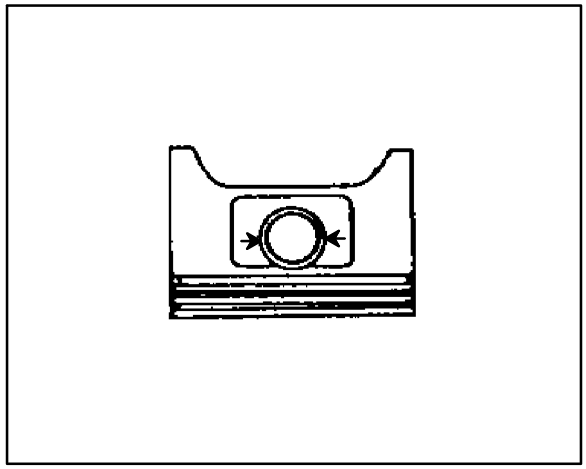
Refer to Page 3.5 - 3.8



Engine Disassembly, Cont.

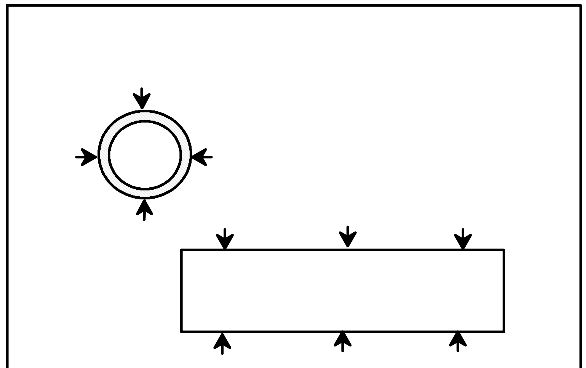
3. Measure piston pin bore.

Piston Pin Bore: **Refer to Specifications on Page 3.5 - 3.8**



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

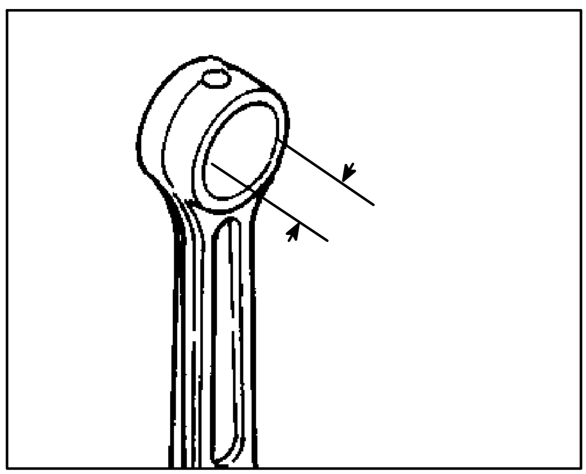
Piston Pin O.D. **Refer to Specifications on Page 3.5 - 3.8**



Piston Pin Measurement Locations

5. Measure connecting rod small end ID.

Connecting Rod Small End I.D. **Refer to Specifications on Page 3.5 - 3.8**

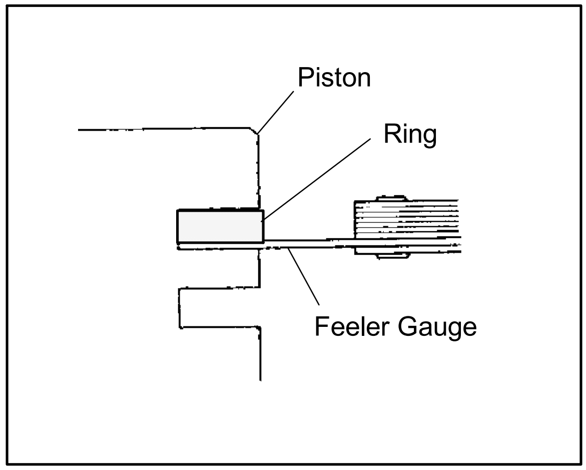


6. Measure piston ring to groove clearance by placing the ring in the ring land and measuring with a thickness gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.

Piston Ring-to-Groove Clearance **Refer to Specifications on Page 3.5 - 3.8**

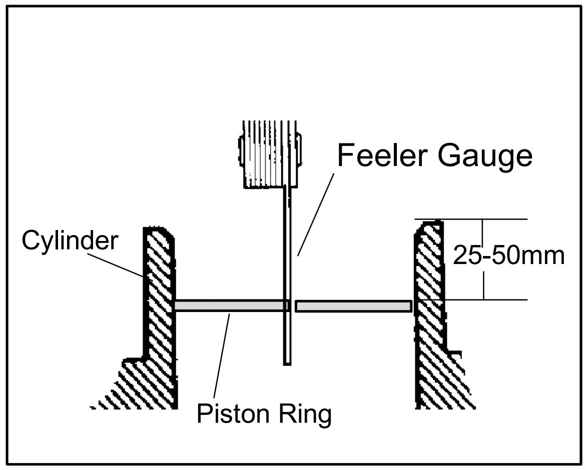
Piston Ring Installed Gap

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



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

Second Ring

Oil Ring

Refer to Specifications on Page 3.5 - 3.8

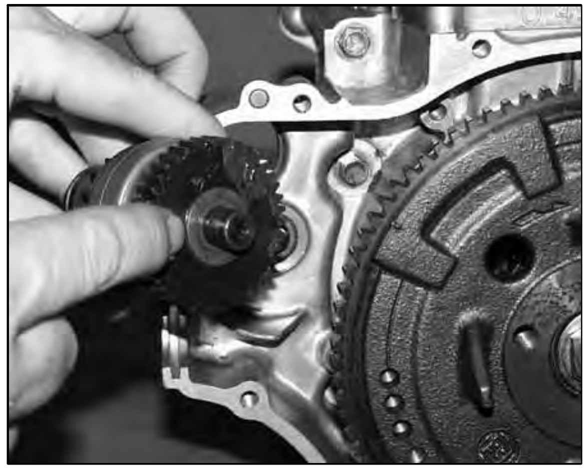
Engine Disassembly, Cont.

Crankcase Disassembly

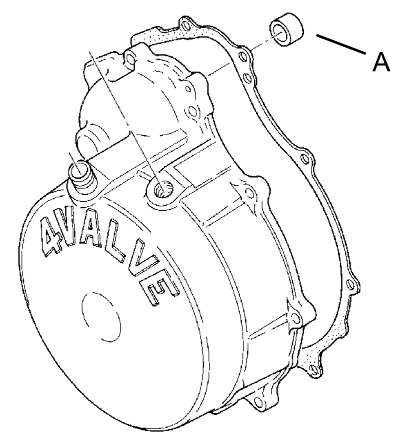
NOTE: The recoil starter, starter motor, starter drive, flywheel, stator, cam chain and sprockets can be serviced with the engine in the frame.

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.
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.



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

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

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

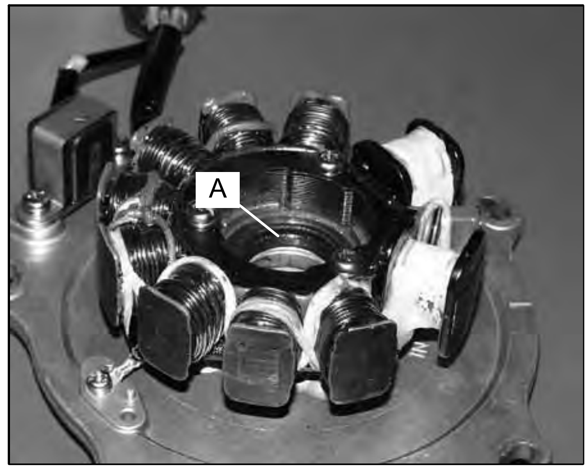
Service Limit:
.008″ (.203 mm)

Engine Disassembly, Cont.

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 2870159) 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.

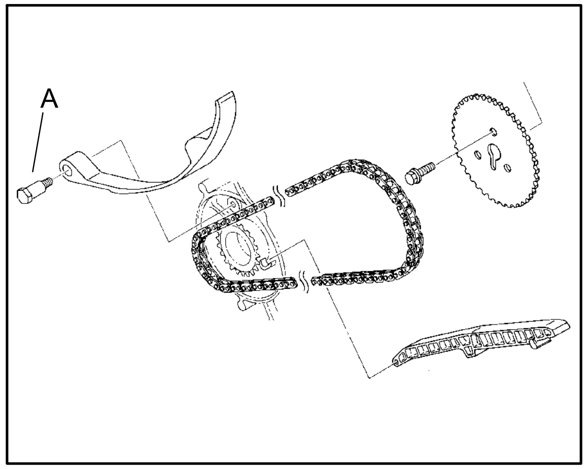


6. Remove oil passage O-Ring.

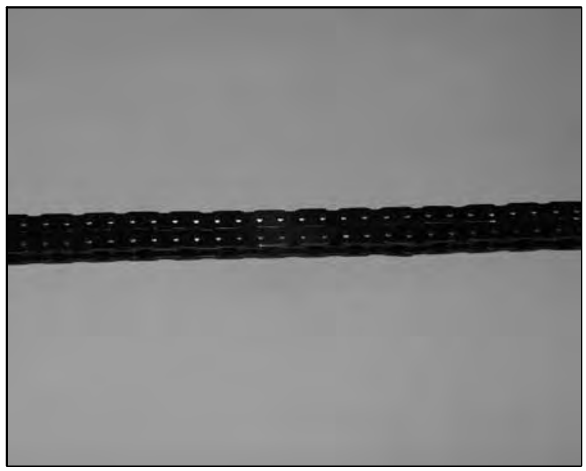
7. Remove large sealing O-Ring from outer edge of stator plate.

Cam Chain/Tensioner Blade

1. Remove bolt securing tensioner blade to crankcase (A).
2. Remove blade and inspect for cracks, wear, or damage.



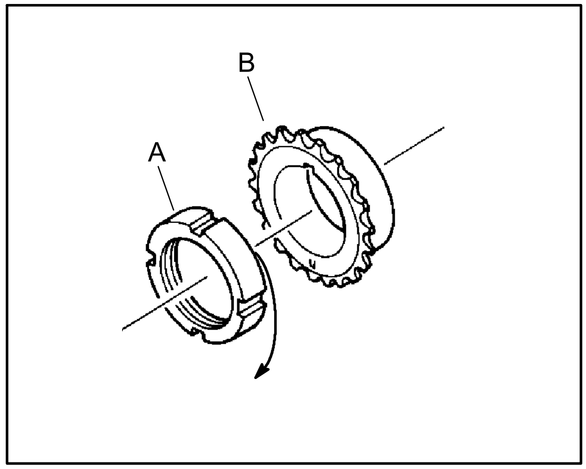
3. Remove cam chain. Inspect chain for worn or missing rollers or damage. Stretch chain tight on a flat surface and apply a 10 lb. (4.53 kg) load. Measure length of a 20 pitch section of chain. Replace if worn past service limit.

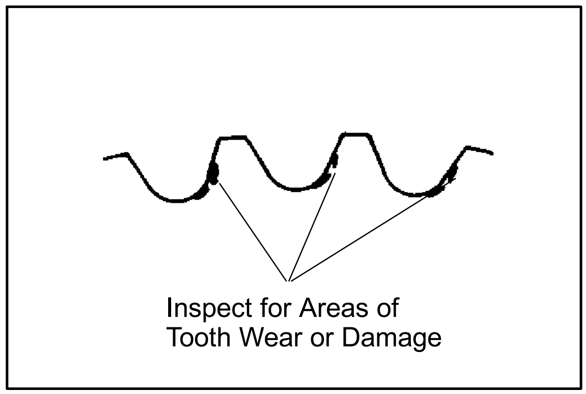


Chain Service Limit:
5.407″ (13.7 cm)

Engine Disassembly, Cont.

4. Using the special socket, remove the crankshaft slotted nut (A). **NOTE:** The slotted nut is a left hand thread.
5. Remove cam chain drive sprocket (B) and Woodruff key from crankshaft.
6. Inspect sprocket teeth for wear or damage.
7. Inspect Woodruff key for wear.
8. Replace any worn or damaged parts.





One Way Valve

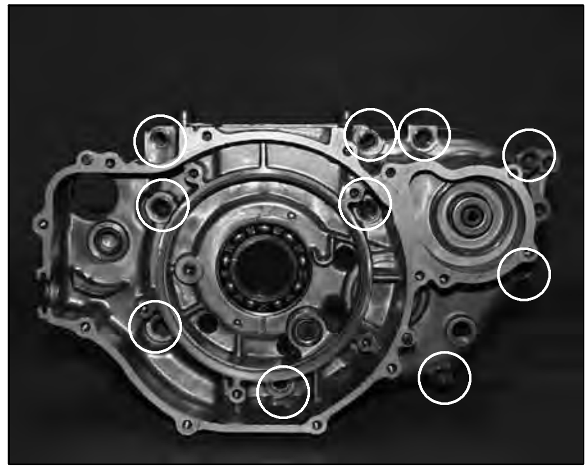
The one way valve prevents oil from draining out of the oil tank and into the crankcase when the engine is off. It must be clean and have adequate spring pressure in order to seal properly.

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

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

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

Crankcase Separation



1. Remove flange bolts (10) from magneto side crankcase evenly in a criss-cross pattern.

2. Separate crankcase by tapping with a soft faced hammer in reinforced areas.

3. Tap lightly on balancer gear with a brass drift through the hole in the crankcase if necessary, to ensure the balancer shaft stays in the PTO side crankcase. Watch the gap along the crankcase mating surface and separate the crankcase evenly. It may also be necessary to tap the oil pump shaft lightly to separate the crankcase.

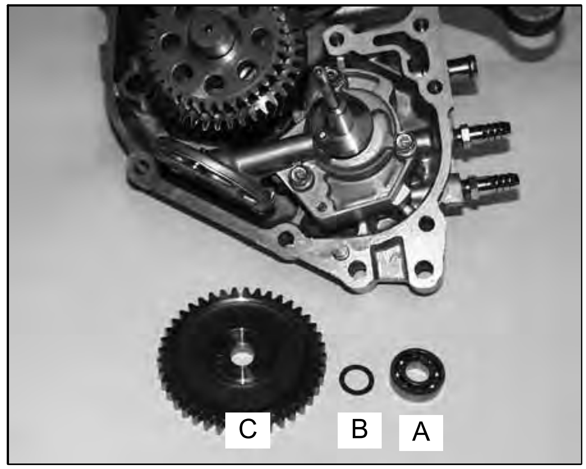
CAUTION: Do not strike the oil pump shaft at an angle or the shaft may bend, causing irreparable damage. Tap only *lightly* on the pump shaft if necessary.

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

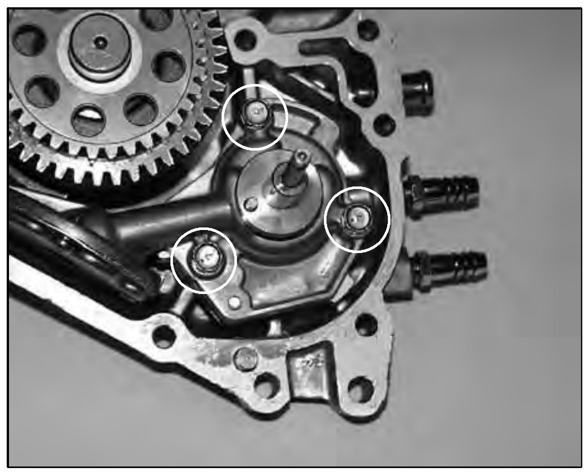
Engine Disassembly, Cont.

Oil Pump Removal/Inspection

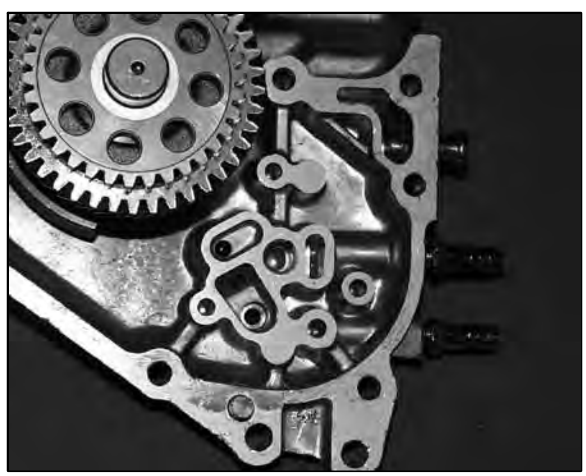
1. Remove pump shaft bearing (A) and thrust washer (B) from pump shaft.
2. Remove pump drive gear (C).
3. Inspect drive gear teeth for cracks, damage or excessive wear.



4. Remove three oil pump retaining bolts and pump.

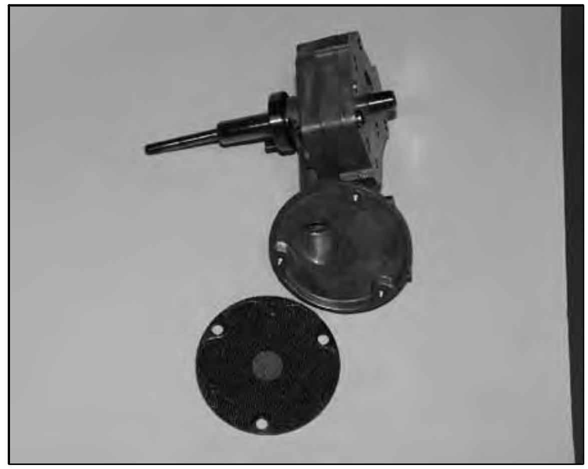


5. Inspect mating surface of crankcase and oil pump. Check for nicks, burrs, or surface irregularities.

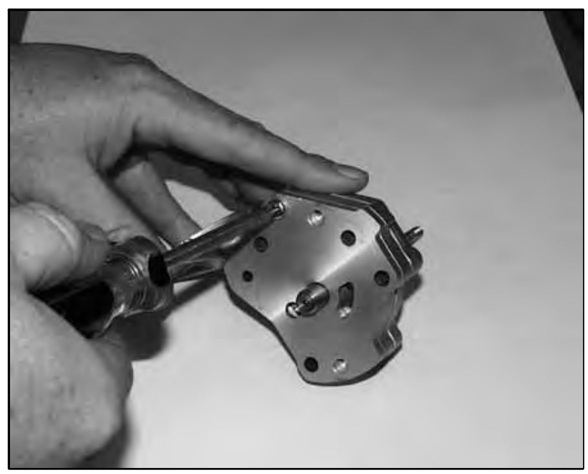


Engine Disassembly, Cont.

6. Remove the three screws and strainer screen from pump.
7. Clean screen thoroughly.



8. Remove pump body screw and feed chamber cover.

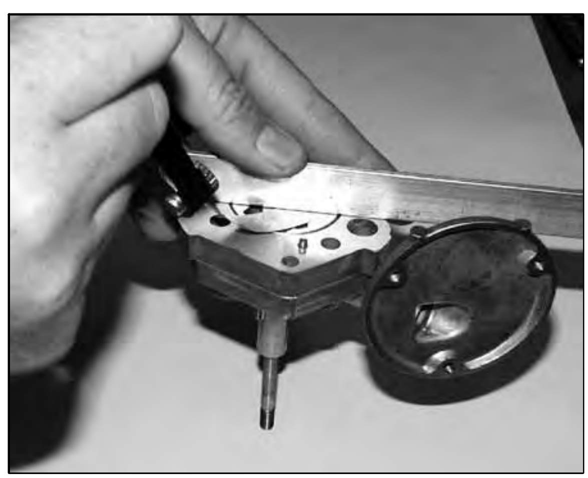


9. Measure pump end clearance using a feeler gauge and straight edge.

Pump End Clearance:

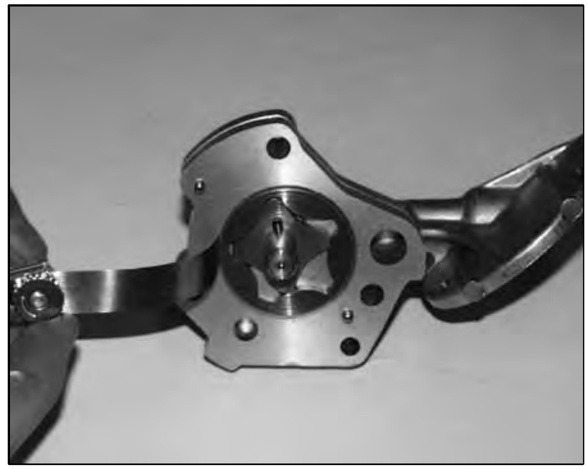
Std: .001-.003 (.0254-.0762 mm)

Wear Limit: .004 (.1016 mm)



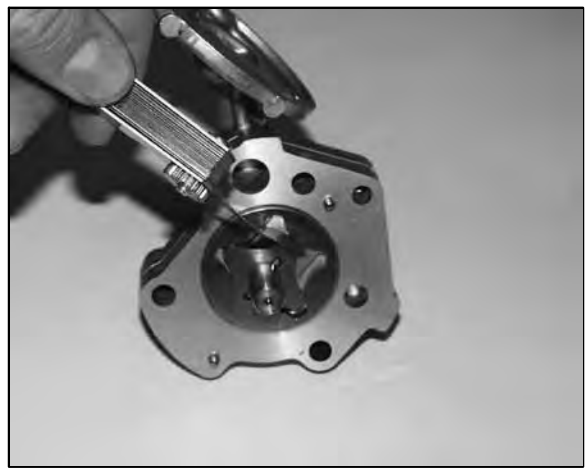
Engine Disassembly, Cont.

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



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

11. Measure rotor tip clearance with a feeler gauge.



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

12. Remove inner and outer feed rotor and pump chamber body.
13. Repeat measurements for scavenge rotor.
14. Remove inner and outer scavenge rotor and inspect pump shaft for wear.

Oil Pump Assembly

1. Clean and dry all parts thoroughly. Apply clean engine oil to all parts. *Do not* use gasket sealer on the pump body mating surfaces or oil passages will become plugged.
2. Install pump shaft and scavenge rotor drive pin.
3. Install outer scavenge rotor, inner scavenge rotor, and scavenge casing.
4. Install outer feed rotor and inner feed rotor drive pin.
5. Install inner feed rotor and feed chamber cover with screw.
6. Tighten screw securely.
7. Install screen on pump body.
8. Install oil pump on crankcase and torque bolts to 6 ft. lbs. (.828 kg-m).

Oil Pump Attaching Bolt Torque: **6 ft. lbs. (.828 kg-m)**

Engine Disassembly, Cont.

Counter Balancer Shaft Removal/Inspection

1. Remove the shim washer from the counter balancer shaft.

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

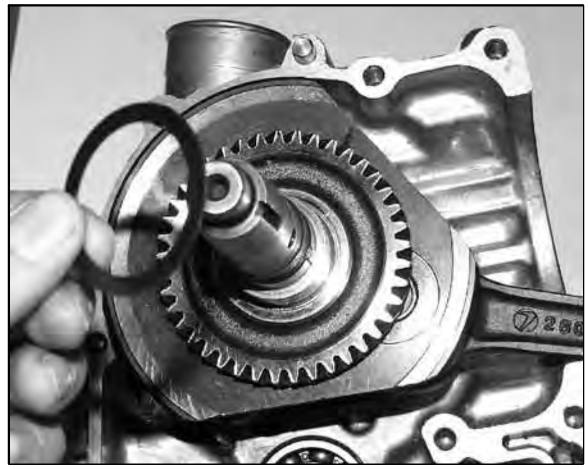
3. Turn the shaft until balancer counter weights clear the crankshaft and remove the balancer shaft from the crankcase.
4. Inspect the balancer drive gear and pump shaft drive gear.
5. Replace the shaft if gear teeth are abnormally worn or damaged.
6. Inspect the balancer shaft bearings.

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

Engine Disassembly, Cont.

Crankshaft Removal/Inspection

1. Remove the shim washer from the crankshaft.



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

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

Connecting Rod Big End Side Clearance:

Refer to page 3.5-3.8.

4. Place the crankshaft in a truing stand or V-blocks and measure the runout on both ends with a dial indicator. Refer to page 3.40.

Max Runout: .0024″ (.06 mm)

5. Measure the connecting rod big end radial clearance.

Big End Radial Clearance:

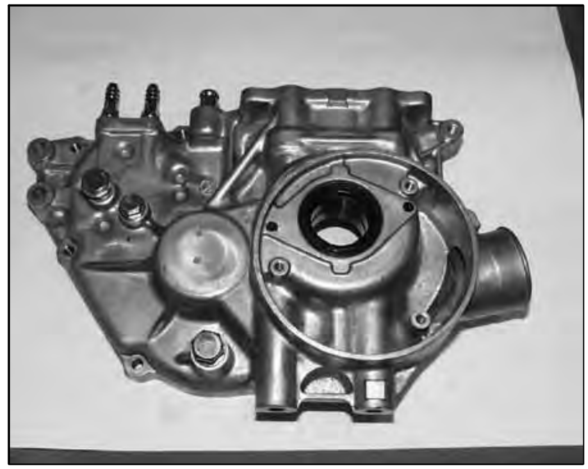
Refer to page 3.5-3.8.

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

Engine Disassembly, Cont.

Crankcase Bearing Inspection

1. Remove the seal from the PTO side crankcase.



2. Inspect the crankshaft main bearings, balancer shaft bearings, and pump shaft bearing.

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

3. Support the crankcase and drive or press the main bearings out of each crankcase.

4. To remove balancer shaft bearings and pump shaft bearing use a blind hole bearing puller.

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

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

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

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

1. Remove the pump shaft bearing from the Magneto (right hand) side crankcase.

2. Pry out the oil seal, noting the direction of installation with the spring side facing IN (toward inside of case).

3. Drive the water pump mechanical seal out of the crankcase from inside to outside. Note: The new mechanical seal must be installed <u>after</u> the crankcases are assembled, using a special tool. See Mechanical Seal Installation.

Assembly

Crankcase Assembly

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

Bearing Installation

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

1. Install the bearings so the numbers are visible.
2. Drive or press new bearings into the crankcases, using the proper driver. **CAUTION:** Press only on outer race of bearing to prevent bearing damage.
   - 70mm (2.755″) driver- For crankshaft main bearings.
   - 46mm (1.810″) For counter balancer bearings.
   - 28mm (1.100″) For pump shaft bearing.

Assembly, Cont.

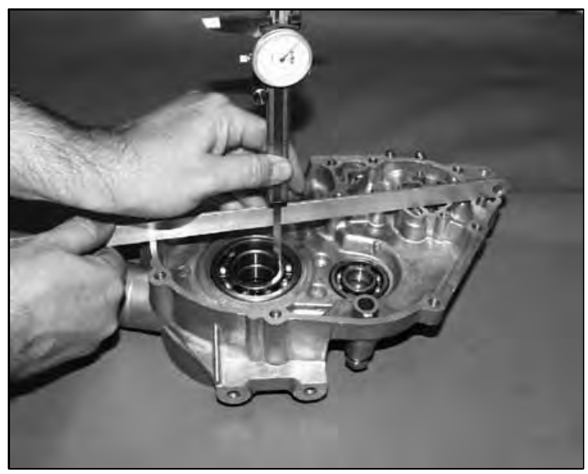
End Play Inspection/Adjustment

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

Crankshaft End Play Adjustment

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

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

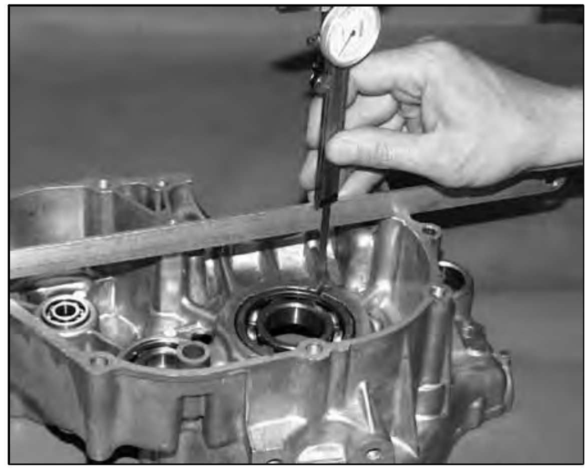


3. Subtract the thickness of the straightedge from the measurement obtained in Step 2 and record.

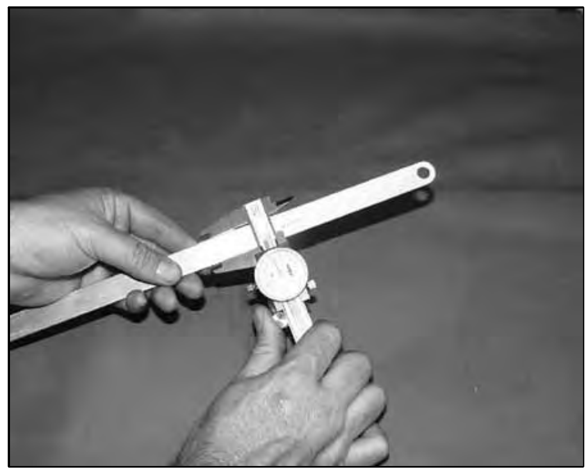
PTO Case Depth___________________

Crankshaft End Play Adjustment, cont.

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



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

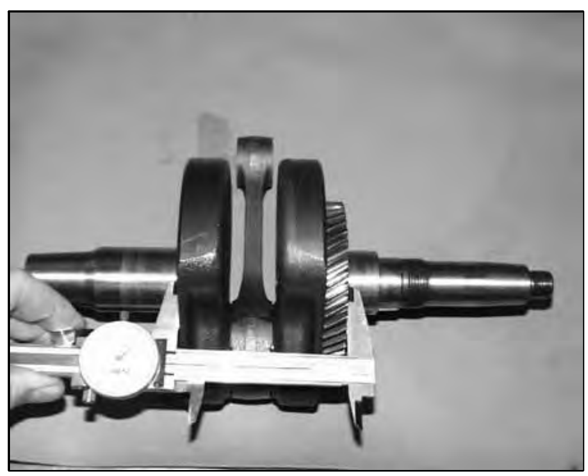


   Mag Case Depth__________________

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

   Total Case Width__________________

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



   Crankshaft Width__________________

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

   Total End Play______________

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

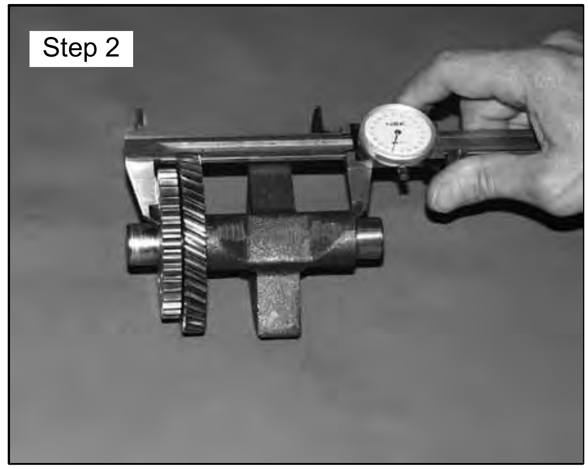
Crankshaft End Play:

.008″-.016″ (.02-.04 cm)

Assembly, Cont.

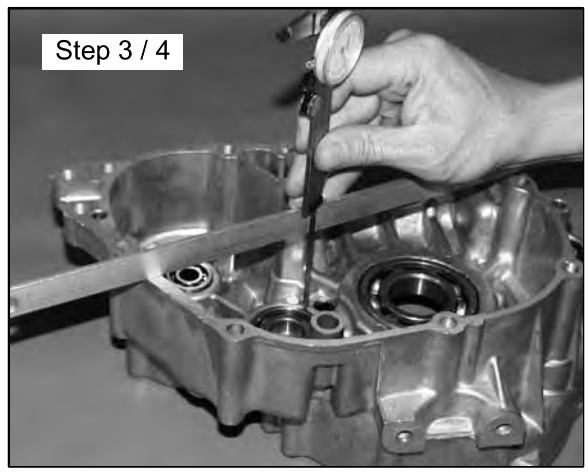
Counter Balancer Shaft End Play Adjustment

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



3. Measure the distance from the Mag crankcase mating surface to the balance shaft bearing using a dial caliper and a straight edge. Subtract the thickness of the straightedge and record.

4. Measure the distance from the PTO crankcase mating surface to the bearing using the same method outlined in Step 1, 2, and-3.



5. Add the readings obtained in Step 3 and Step 4.

6. Subtract the counter balancer shaft width measured in step 2 from the figure obtained in step 5.

7. Subtract the thickness of the existing shim from the result of step 6 to determine if a different shim is needed. The result must be within the specified range listed below.

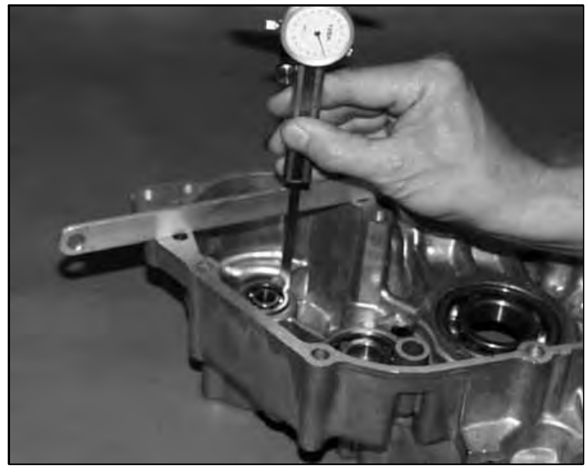
Counter Balancer Shaft End Play:

.008″-.016″ (.02-.04 cm)

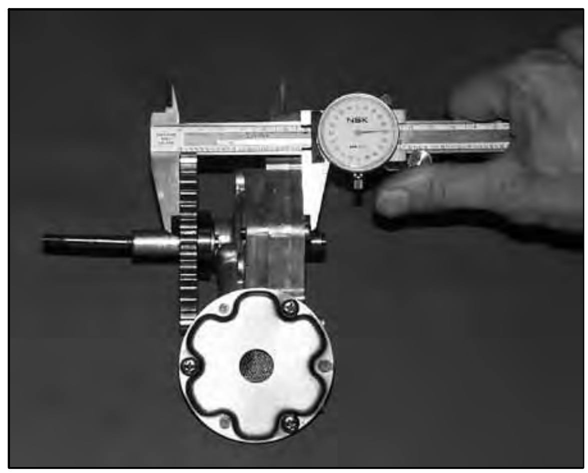
Assembly, Cont.

Pump Shaft

1. Make sure the pump shaft bearing is firmly seated in the Magneto side crankcase.
2. Measure the distance from the magneto crankcase mating surface to the bearing using a dial caliper and a straight edge. Subtract the thickness of the straightedge and record.



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



Pump Shaft End Play:

.008″-.016″ (.02-.04 cm)

Pump Shaft Oil Seal Installation

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

Assembly, Cont.

Crankshaft, Counter Balancer, and Oil Pump Installation

Lubricate all bearings with clean engine oil before assembly. See engine disassembly photos page 3.50-3.89 for reference.

Use the crankshaft installation tool kit PN 2871283 to prevent damage to the crankshaft and main bearings during installation.

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

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

Oil Pump Bolt Torque:

6. ft. lbs. (.828 kg-m)

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

Crankcase Assembly

1. Apply 3 Bond 1215 (P/N 2871557) to the crankcase mating surfaces. Be sure the alignment pins are in place.
2. Set the crankcase in position carefully to avoid damaging the pump shaft seal, and install the magneto end crankshaft installation tool (follow instructions provided with tool kit PN 2871283). Draw the crankcase halves together by tightening the nut on the tool and tapping lightly in the pump shaft area with a soft faced hammer to maintain alignment. Continually check alignment of the cases during installation, closing the gap equally until the surfaces are tightly seated.
3. Remove the tool.
4. Install the crankcase flange bolts and tighten in 3 steps in a criss-cross pattern to specified torque.

Crankcase Bolt Torque:

14 ft. lbs. (19-20 Nm)

Crankcase Sealant:

PN 2871557

Water Pump Mechanical Seal Installation (EH50PL)

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

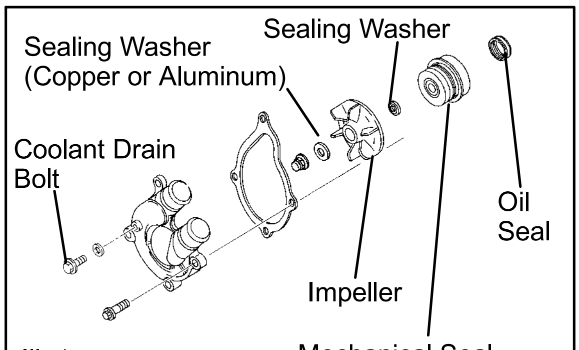
Water Pump Mechanical Seal Removal - Engine Installed (EH50PL)

Water pump mechanical seal removal tool:	2872105
Replacement T-handle for 2872105:	2872106

This tool allows a technician to replace the mechanical water pump seal on EH42PL & EH50PL engines without removing the engine and splitting the cases.

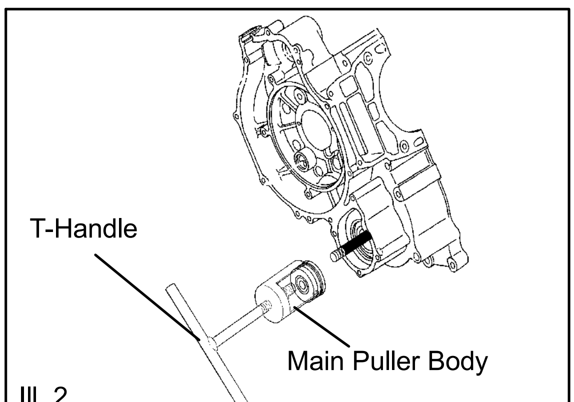
CAUTION: Improper or careless use of this tool or procedure can result in a bent water pump shaft. Pump shaft replacement requires engine removal and crankcase separation. Use caution while performing this procedure. Make sure that the puller is parallel to the shaft at all times. Do not place side loads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

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



Ill. 1

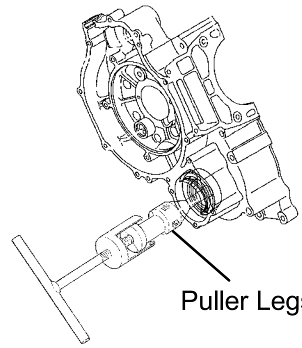
2. Slide the main puller body over the outer portion of the mechanical seal as shown in Ill. 2 and turn T-Handle clockwise until it contacts water pump shaft. Continue rotating until outer portion of mechanical seal is separated from the metal seal body.



Ill. 2

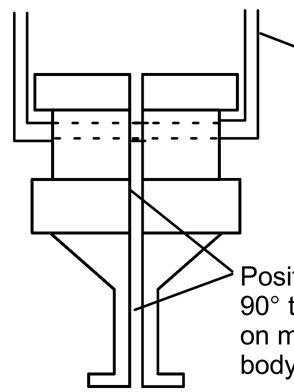
Water Pump Mechanical Seal Removal - Engine Installed, Cont.

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



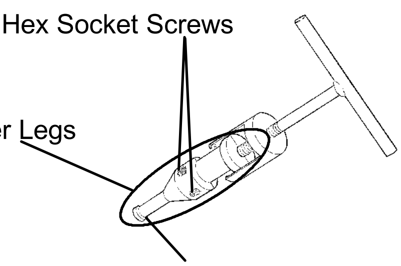
Ill. 3

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



Ill. 4

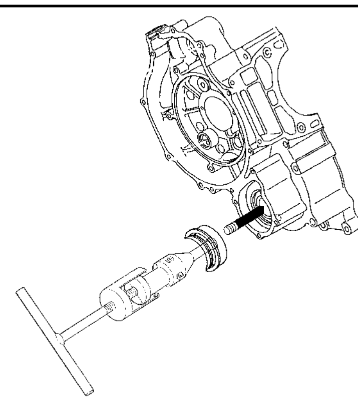
5. Tighten the hex socket screws on the puller legs sufficiently so the lip of the puller legs will grasp the mechanical seal. Ill. 5



Ill. 5

6. Turn the puller T-Handle clockwise until it contacts the water pump shaft. Continue rotating until the remaining portion of mechanical seal has been removed from the cases. Ill. 6 Pump shaft oil seal can also be replaced at this time if necessary.

7. Special tool (PN 5131135) is required to install the new mechanical seal. This tool is available separately and it is also included in the Crankshaft/Water Pump Seal Installation Kit (PN 2871283).


Ill. 6

Assembly, Cont.

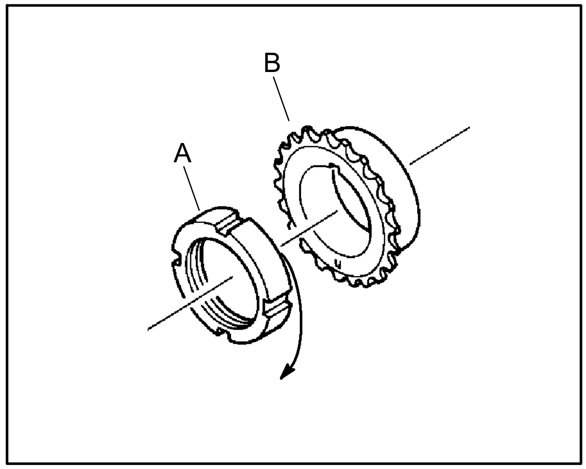
One Way Valve Installation

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

One Way Valve Plug Torque:
16 ft. lbs. (2.2 kg-m)

Cam Chain Drive Sprocket Installation

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



Slotted Nut Torque:
35-51 ft. lbs. (4.71-6.86 kg-m)

Tensioner Blade Installation

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

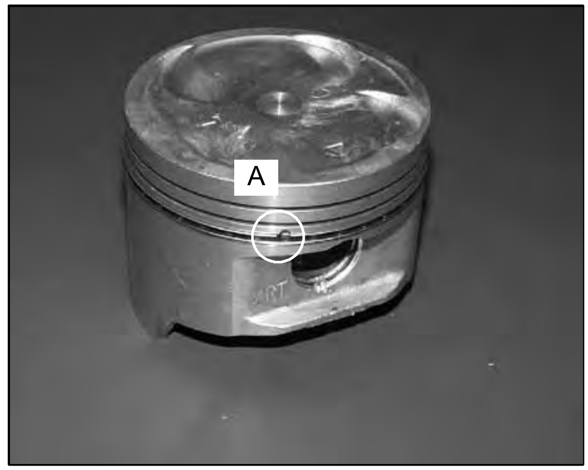
Tensioner Blade Mounting Bolt Torque:
6 ft. lbs. (.828 kg-m)

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 3.74. If the piston has been in service clean any accumulated carbon from the ring grooves and oil control ring holes.

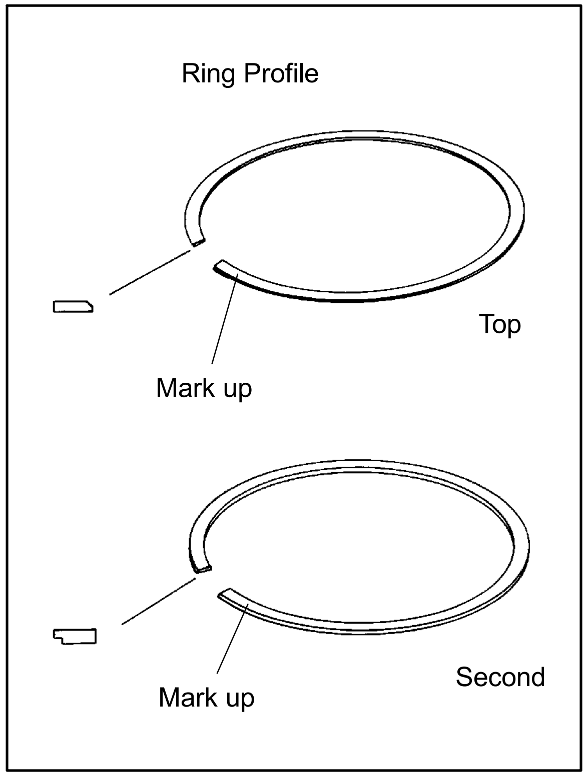
1. Place the oil control ring expander in oil ring groove with the end gap facing forward. The expander has no up or down marking and can be installed either way. The ends should butt squarely together and must not overlap.
2. Install the oil ring top rail.

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



Assembly, Cont.

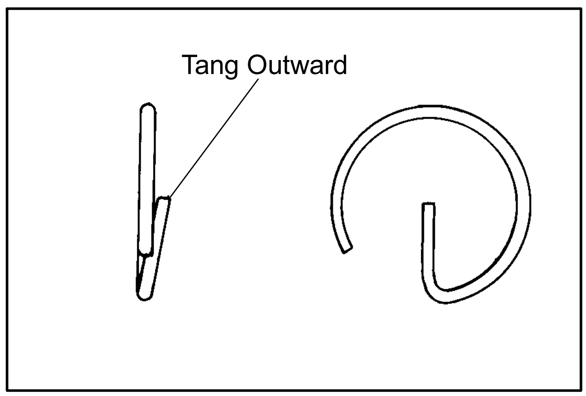
3. Install the bottom rail with the gap at least 30° from the end of the expander on the side opposite the top rail gap.(See Ill.).
4. Install the second ring with the "R" mark facing up. Position the end gap toward the rear (intake) side of the piston.
5. Install the top ring (chrome faced) with the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



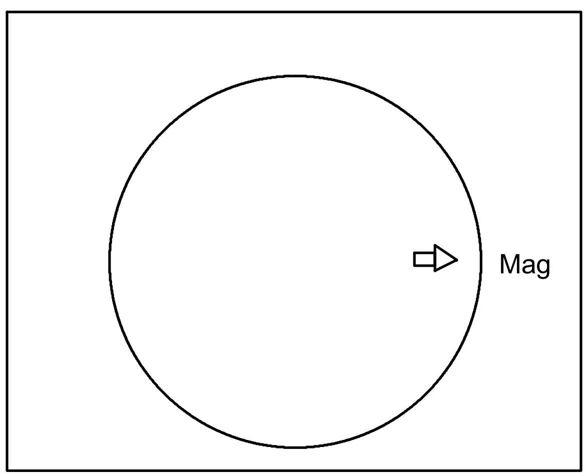
Piston Installation

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,* and tang outward.

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



4. Apply clean engine oil to the piston rings, ring lands, piston pin bore, piston pin, and piston skirt. Lubricate the connecting rod (both ends), balancer drive gear, and crankshaft main bearing area.
5. Install the piston on the connecting rod with the arrow facing the magneto (RH) end of the crankshaft. The piston pin should be a push fit in the piston.
6. Install the other circlip with the gap facing up or down and tang outward. (See Caution with step 3 above). Push the piston pin in both directions to make sure the clips are properly seated in the groove.

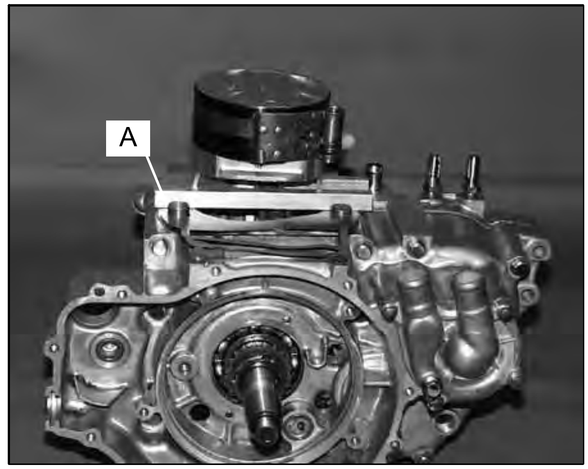


Assembly, Cont.

7. Place the dowel pins in the crankcase and install a new cylinder base gasket.

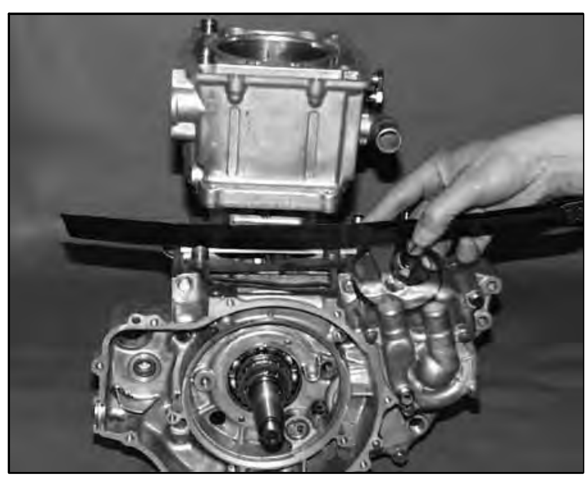
Cylinder Installation

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 to the ring compressor (Snap On™ PN RCL30) and install the compressor following manufacturers instructions. **CAUTION:** Make sure the oil control ring upper rail tab is positioned properly in the notch of the piston. Verify all ring end gaps are correctly located.



3. 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.

4. Remove the ring compressor.



5. Push the cylinder downward until fully seated on the base gasket.

Assembly, Cont.

6. Apply a light film of oil to the threads and flange surface of the cylinder mounting bolts.
7. Install all four bolts finger tight. Rotate the engine and position the piston at BDC.

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

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

Cylinder Bolt Torque:

10mm - 46 ft. lbs. (6.348 kg-m)
6mm - 6 ft. lbs. (.828 kg-m)

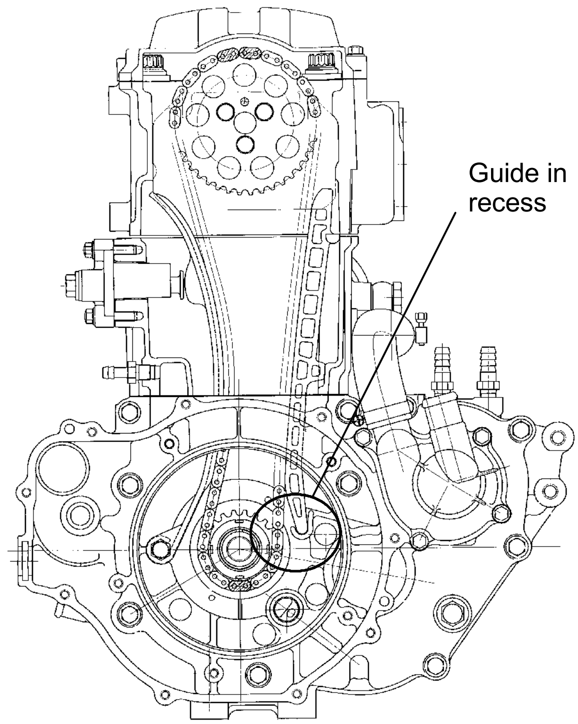
Assembly, Cont.

Cylinder Head Installation

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

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

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



Torque all bolts evenly in a criss cross pattern

***Torque bolts to 22 ft. lbs. (3.04 kg-m)**

***Torque bolts to 51 ft. lbs. (7.04 kg-m)**

***Loosen bolts evenly 180° (1/2 turn)**

***Loosen bolts again another 180° (1/2 turn)**

***Torque bolts to 11 ft. lbs. (1.52 kg-m)**

***From this point, tighten bolts evenly 90° (1/4 turn)**

***Finally, tighten another 90° (1/4 turn)**

***Install two 6mm bolts and torque to 6 ft. lbs. (.828 kg-m)**

Cam Chain/Camshaft Installation

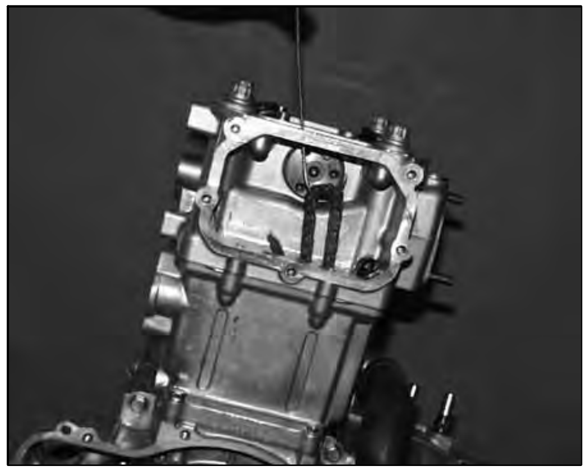
Install the cam chain over the crankshaft.

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

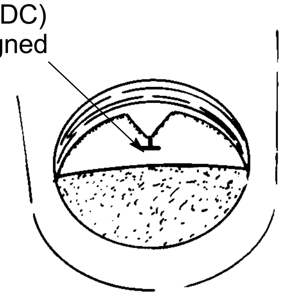
IMPORTANT CAMSHAFT TIMING NOTE: In order to time the camshaft to the crankshaft, the piston must be precisely located at Top Dead Center (TDC).

Camshaft Timing

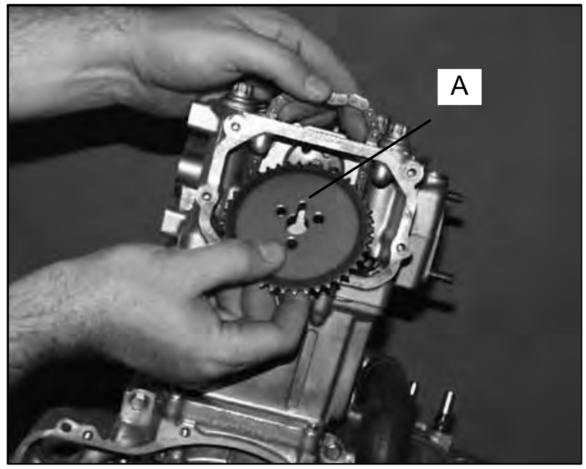
1. Apply Polaris Premium Starter Drive grease to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil. (To install the compression release mechanism, refer to page 3.57).
2. Install the camshaft with the lobes facing downward and the sprocket alignment pin facing upward.



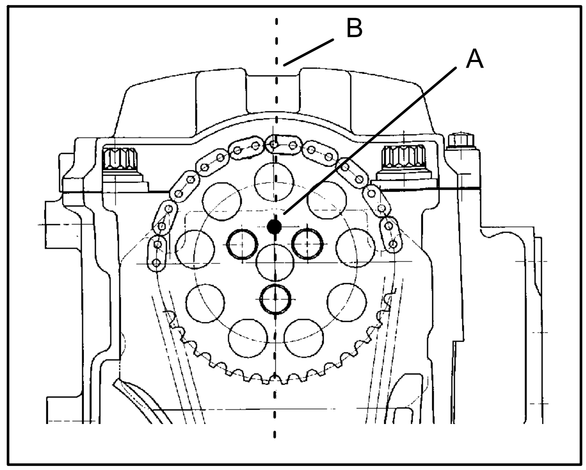
3. Disconnect the wire from the cam chain and rotate the engine to align the single (TDC) timing mark (Top Dead Center) on the flywheel with the notch in the timing inspection window. Be sure to use the *single* TDC mark when installing the cam. Do not use the advance marks. See Ill. on next page.



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



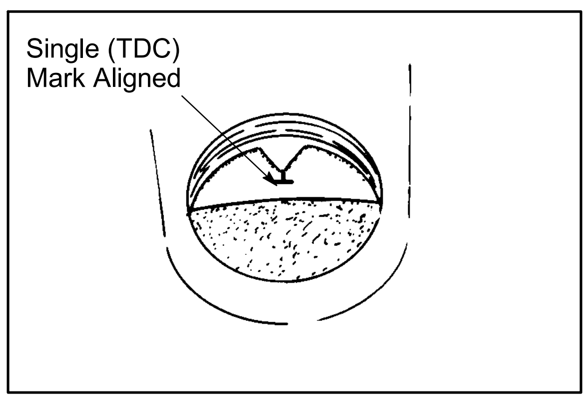
5. Before positioning the sprocket on the camshaft, check the position of the cam sprocket alignment pin. When the cam is positioned properly, the cam sprocket alignment pin (A) is directly in line with the crankshaft/camshaft centerline (B).
6. Install the sprocket on the camshaft. Apply Loctite 242 to the cam sprocket bolts and torque to specifications.



Cam Sprocket Bolt Torque:

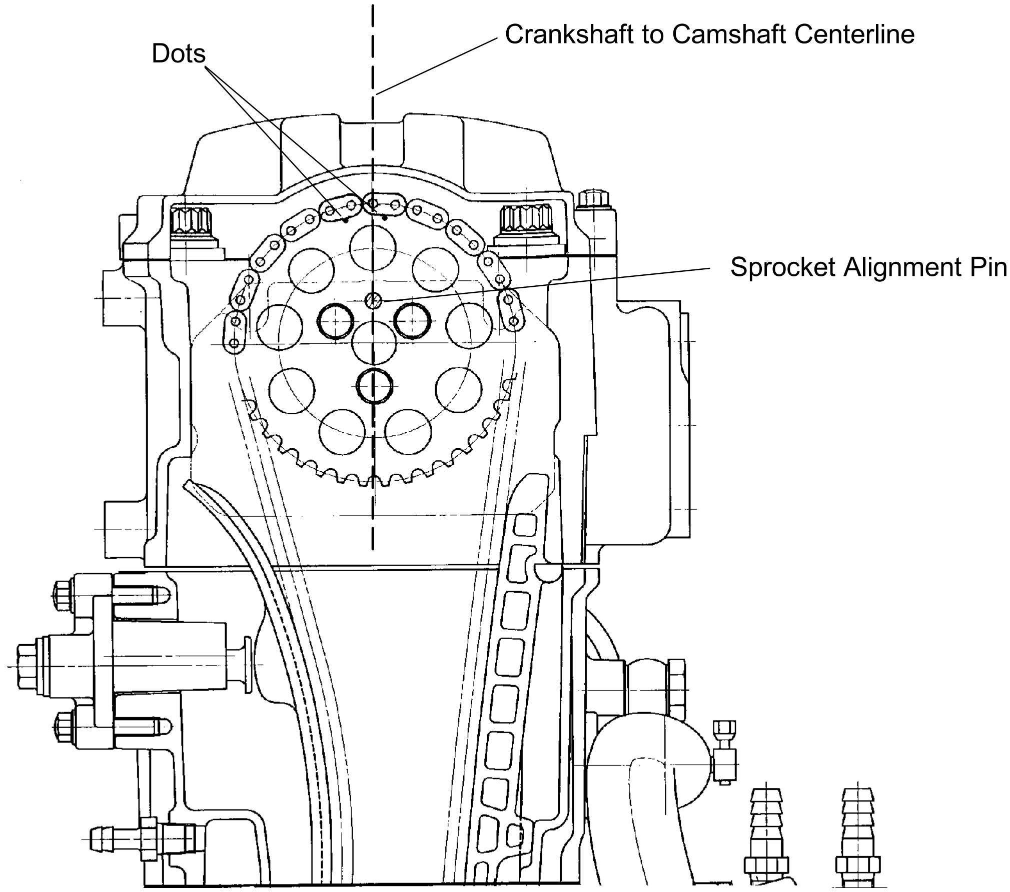
6 ft. lbs. (.828 kg-m)

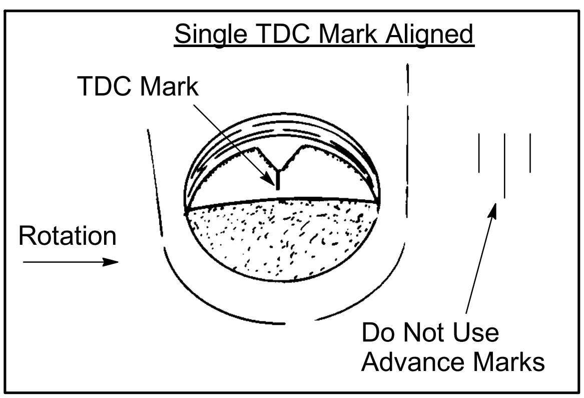
7. Verify TDC mark in timing inspection hole and alignment pin is directly in line with crankshaft to camshaft centerline. Refer to Ill. on following page.



8. Apply Loctite 515 or 518 Gasket Eliminator, or 3 Bond 1215 to the camshaft end cap and install using a new O-Ring.
9. Check all cam timing marks to verify proper cam timing, and install the cam chain tensioner body with a new gasket.
10. After tensioner installation, rotate engine at least two revolutions and re-check marks/timing.

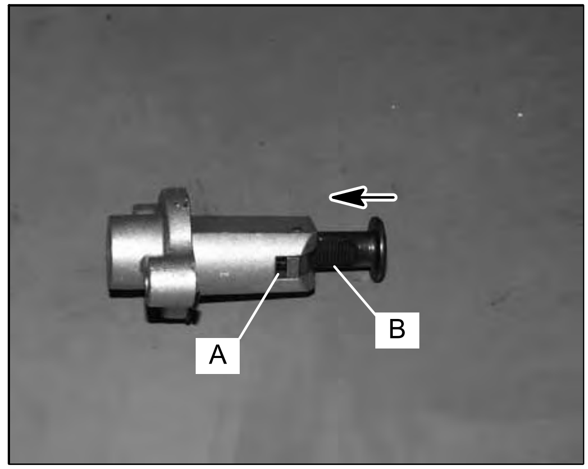
Camshaft Timing





Assembly, Cont.

Cam Chain Tensioner Installation



1. Release the ratchet pawl (A) and push the tensioner plunger (B) all the way into the tensioner body.
2. Install the tensioner body with a new gasket and tighten the bolts.

> **Tensioner Bolt Torque:**
>
> **6 ft. lbs. (.828 kg-m)**

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

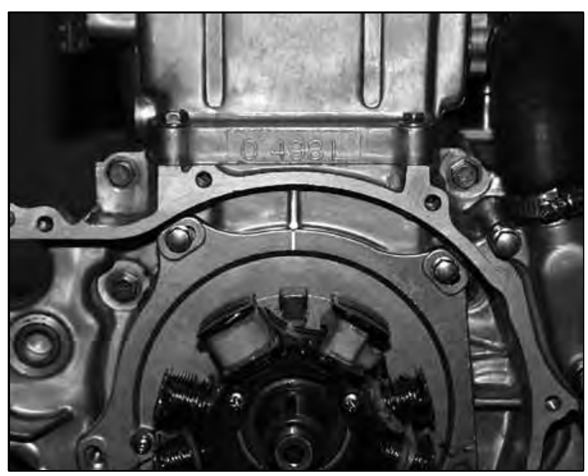
> **Tensioner Plug Torque:**
>
> **17 ft. lbs. (2.346 kg-m)**

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

Stator, Flywheel and Starter Drive Installation

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

Stator



1. Apply a light film of grease to the crankshaft seal. Apply molybdenum disulfide grease or assembly lubricant to the crankshaft bushing.
2. Install a new O-Ring in the oil passage recess in the crankcase.
3. Apply 3 Bond 1215, Loctite 515 or 518, or an equivalent sealer to the stator plate outer surface and install a new O-Ring.
4. Install the stator plate being careful not to damage the seal. Align timing reference marks on the plate and crankcase. Be sure the plate is fully seated. NOTE: This is a static timing mark. Strobe timing should be performed after start up.

Assembly, Cont.

5. Torque bolts evenly to specification.

Stator Plate Bolt Torque:
5.1-6.5 ft. lbs. (.68-.88 kg-m)

6. Seal stator wire grommet with 3 Bond 1215 or equivalent sealer.

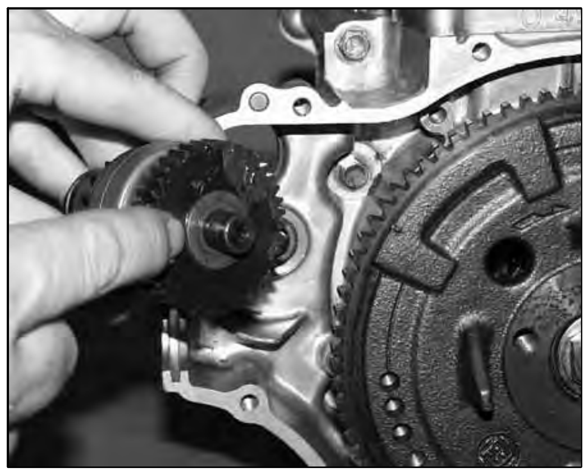
Flywheel

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

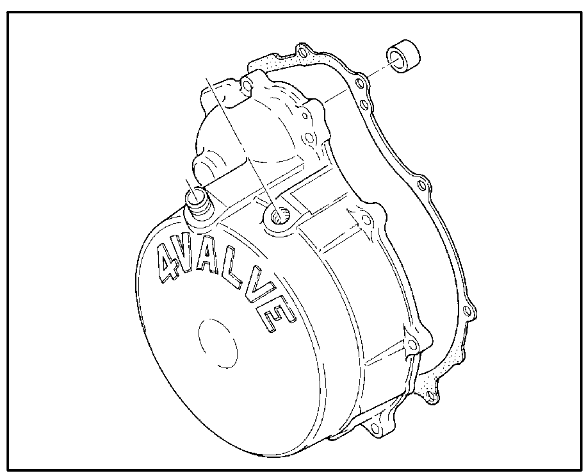
Flywheel Nut Torque:
58-72 ft. lbs. (7.85-9.81 kg-m)

Starter Drive

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



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



Starter Drive Grease:
PN 2871460

Assembly, Cont.

Rocker Shaft/Rocker Arm Assembly Installation

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

Rocker Shaft Support Tower Bolt Torque:

9 ft. lbs. (1.242 kg-m)

Rocker Shaft Locating Bolt Torque:

6 ft. lbs. (.828 kg-m)

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

Rocker Cover Bolt Torque:

6 ft. lbs. (.828 kg-m)

Thermostat Installation

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

Oil Pipes

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

Oil Pipe Bolt Torque:

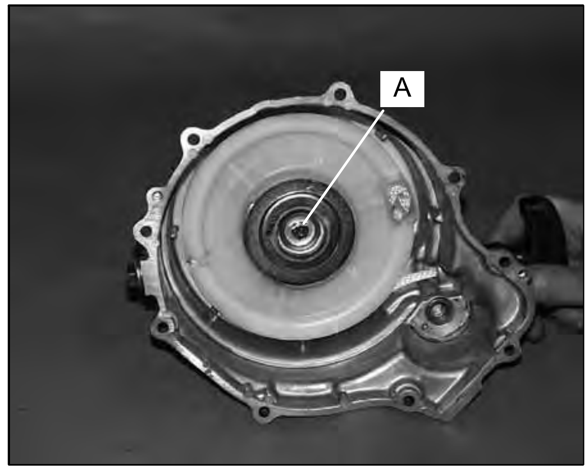
20 ft. lbs. (2.76 kg-m)

Recoil Disassembly/Inspection

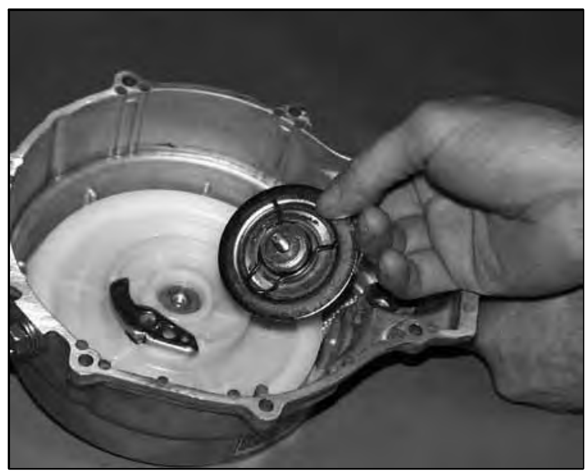
CAUTION: The recoil is under spring tension. A face shield and eye protection is required during this procedure.

Replace any parts found to be worn or damaged.

1. Remove bolts and recoil housing.
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 through the rope. **NOTE:** The handle must seal tightly on the recoil housing to prevent water from entering.

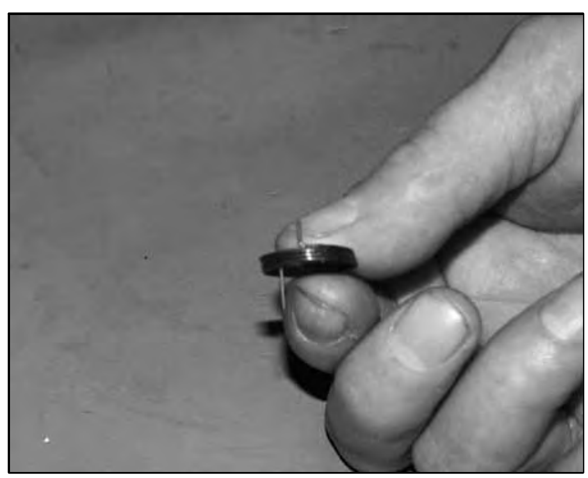


3. Remove center bolt from recoil friction plate (A).
4. Inspect plate for wear or damage. Inspect plate friction spring for wear, damage, and proper tension. The spring should fit tightly on friction plate.



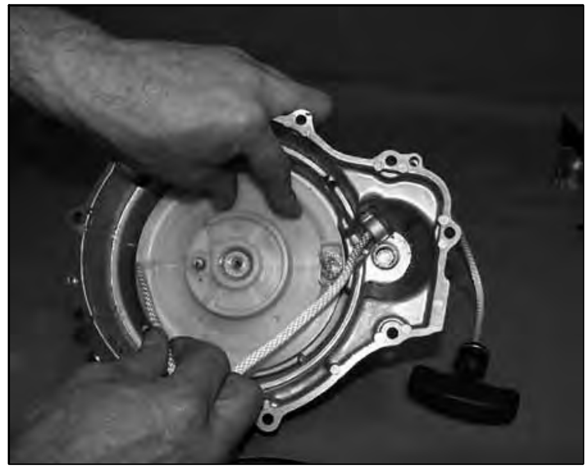
5. Remove ratchet pawl with spring and inspect. Replace spring or ratchet pawl if worn, broken, or damaged.

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

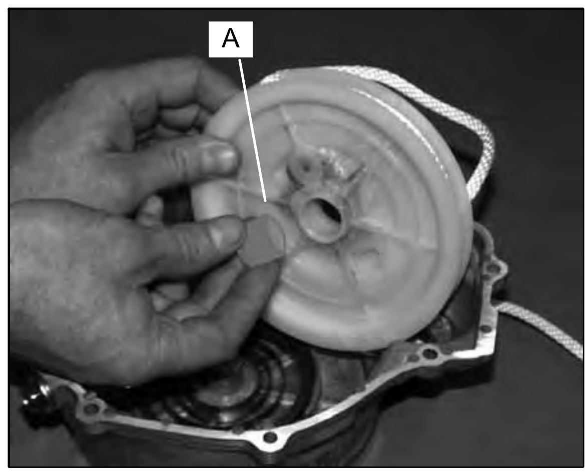


Recoil Disassembly/Inspection, Cont.

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.

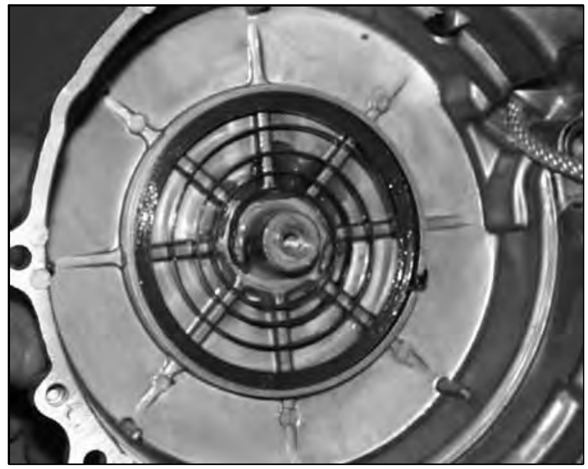


Recoil Assembly

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

To install a new spring:

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

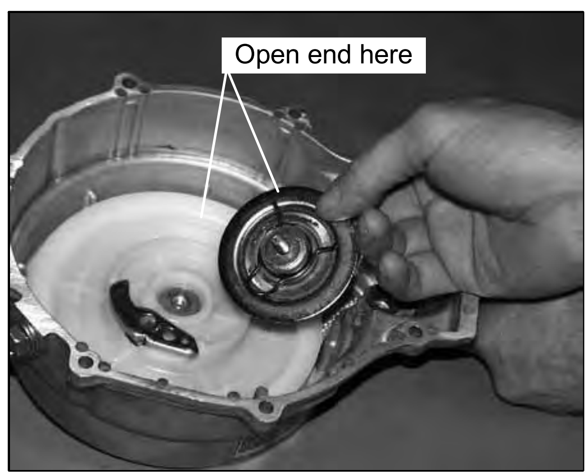


To reinstall an old spring:

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

To complete recoil assembly:

1. Route rope through guide bushing in recoil housing and into reel. Tie a secure knot in end of the rope.
2. Wind rope counterclockwise onto the reel, as viewed from ratchet side of reel.
3. Lock rope into notch on outer edge of reel.
4. Apply a small amount of grease or equivalent to the center post of the housing and the bushing.
5. Install reel into housing making sure the spring drive tab on the reel engages the spring and the reel is fully seated in the housing.
6. Apply downward pressure on the reel and rotate counterclockwise approximately 6-7 turns to pre-wind the spring. Continue rotating counterclockwise until rope on outer edge aligns with rope guide bushing.
7. Release rope from notch and allow reel to rewind completely. If more pre-wind is required, place rope in notch and add additional turns of pre-wind.
8. Install ratchet pawl and return spring, with long leg of spring engaged in reel.
9. Reinstall friction plate. **NOTE:** The friction plate must be positioned with both end tabs of the friction spring opposite the ratchet pawl.
10. Torque friction plate retaining bolt to 5-6 ft. lbs. (7-9 Nm).
11. Reinstall recoil housing using a new gasket. Seal stator wire harness grommet with RTV silicone.



Spark Plug Fouling - 2 Stroke Engines

- Oil pump adjusted incorrectly
- Adjustment (pilot screw)
- Restricted air filter (main or pre-cleaner)
- Improperly assembled air intake system
- Oil pump shaft seal leaking (fills crankcase)
- Oil pump arm or reel not returning properly (cable, arm or reel sticking)
- Spark plug cap loose or faulty
- Choke cable adjustment or plunger/cable sticking
- Foreign material on choke plunger seat or plunger
- Incorrect spark plug heat range or gap
- Carburetor inlet needle and seat worn
- Jet needle and/or needle jet worn or improperly adjusted
- Excessive carburetor vibration (loose or missing needle jet locating pins)
- Loose jets in carburetor or calibration incorrect for altitude/temperature
- Incorrect float level setting
- PVT system calibrated incorrectly or components worn or mis-adjusted
- Fuel quality poor (old) or octane too high
- Low compression
- Restricted exhaust
- Weak ignition (loose coil ground, faulty coil, stator, or ETC switch)
- ETC switch mis-adjusted
- Oil line check valve leaking

Spark Plug Fouling - 4 Stroke Engines

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

2 Stroke Engine Troubleshooting

Condition	Possible Cause	Action/Possible Cause
Engine turns over but does not start	-No fuel -Dirt in fuel line or filter -Fuel will not pass through on-off valve (petcock) -Tank vent plugged -Carb starter circuit -Engine flooded -Low compression (below 100 PSI at sea level) -No spark	-Add fuel as required -Clean line, replace filter -Clean or replace valve as necessary -Repair vent system -Clean or replace as needed -Turn off fuel and drain crankcase a. Inspect carb venting system for obstructions b. Inspect carb needle and seat a. Inspect head gasket b. Inspect piston and cylinder (repair as required) -Repair ignition system (refer to ignition trouble-shooting
Engine does not turn over	-Dead battery -Starter motor does not turn -Engine stuck	-Charge or replace battery (refer to battery testing) -Repair starter (refer to starter testing) -Repair engine as required
Engine runs but will not idle	-Plugged carb pilot system -Carb misadjusted -Choke not adjusted properly -Low compression -Crankcase leak	-Clean or replace pilot jet -Adjust as per specification -Adjust choke as per specification -Repair engine as required -Repair crankcase as required
Engine idles but will not rev up	-Broken throttle cable -Obstruction in air intake -Incorrect carb jetting -ETC limiting speed (1989 and newer) -Reverse speed limiter limiting speed -Incorrect ignition timing -Restricted exhaust system	-Replace cable -Clean or repair air intake -Jet as per jetting chart -Repair ETC (refer to ETC troubleshooting) -Repair reverse speed limiter (refer to reverse speed limiter troubleshooting chart) -Check and adjust ignition timing -Repair or replace exhaust system
Engine has low power	-Cylinder, piston and ring wear or damage (check compression) -PVT not operating properly -Plugged exhaust	-Repair cylinder and piston as needed -Clean, repair or replace as required -Repair or replace exhaust system
Piston failure Scoring Melted piston top Skirt breakage Excessive smoke and carbon buildup	-Lack of lubrication -Engine overheating -Lean air fuel ratio -Air leak in crankcase -Low octane fuel -Incorrect ignition timing -Incorrect spark plug -Piston fatigue from scoring -Excessive piston-to-cylinder clear-ance -Oil pump misadjusted -Oil pump cable not allowing pump to return to idle position	-Fill oil tank and bleed pump -Check pump for proper operation, pinched vent line -Restricted oil delivery (lines, filter, check valve) -Oil pump drive gear failure -Install fan or check fan operation, test cooling sys tem, loose or broken impeller -Clean carb and jet as per chart -Repair as needed -Use 87 octane minimum -Adjust timing as per specifications -Install recommended spark plug -Repair cylinder (Check air filter and air box) -Synchronize pump to carb (refer to oil pump bleed-ing and adjustment) -Lubricate or replace cable
Engine coolant found in counter balance assem-bly (Liquid cooled mod-els)	-Water pump gasket -Water pump seal	-Inspect/replace gasket -Replace

(Some items may not apply to all engines)

- Oil tank empty; oil wrong type or contaminated
- Oil filter restricted
- Oil pump inoperative (drive gear, cable, pump); oil check valve restricted or faulty
- Lean carburetion or oil delivery due to: Vent lines pinched, kinked, or restricted (carburetor, oil tank, fuel tank etc.); Restricted oil or fuel passages, incorrect jetting for altitude/temperature
- Inoperative fan or low fan RPM (check fan motor amp draw-should be less than 6.5 amps; low battery, fan switch or connections, wiring)
- Cooling system, cooling fins, radiator fins restricted, air flow obstructed
- Incorrect piston to cylinder clearance
- Air leaks in intake tract / air intake ducts / mounting flange (damaged or loose)
- Foreign material ingestion
- Air in oil pump / lines
- Air in cooling system / low coolant level
- Poor fuel quality
- Restricted exhaust
- Incorrect ignition timing
- Spark plug heat range incorrect
- Fan blade incorrectly installed or damaged
- Air box, carburetor, or exhaust modified

4 Stroke Troubleshooting

Engine Turns Over But Fails to Start

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

Engine Does Not Turn Over

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

Engine Runs But Will Not Idle

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

Engine Idles But Will Not Rev Up

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

Engine Has Low Power

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

Piston Failure - Scoring

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

Excessive Smoke and Carbon Buildup

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

Low Compression

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

Backfiring

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

EH42PL/EH50PL Cooling System Troubleshooting

Overheating

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

Temperature Too Low

- Thermostat stuck open

Leak at Water Pump Weep Hole

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

CHAPTER 4
FUEL SYSTEM/CARBURETION

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 has more oxygen. In higher elevations and higher temperatures, the air is less dense.

Carburetors on Polaris ATV and 6x6 vehicles are calibrated for an altitude of 0-3000 ft. (0-900 meters) and ambient temperatures between +40 and +80° F (+5° to +26° C). Carburetors must be re-calibrated if operated outside the production temperature and/or altitude range. The main jet installed in production is not correct for all altitudes and/or temperatures. In addition, air screw / pilot screw adjustments may be required to suit operating conditions.

CAUTION:

A main jet that is too small will cause a lean operating condition and may cause serious engine damage. Select the correct main jet carefully for elevation and temperature according to the charts in the General/ Specifications Chapter, or in the Owner's Safety and Maintenance Manual for each particular model.

Air Screw (2 Cycle) / Pilot Screw (4 Cycle) Adjustment

NOTE: Maximum engine efficiency and horsepower are directly related to proper carburetor and clutch settings. The jetting charts should be used as a guideline for selecting optimum jetting for varying temperature and altitude conditions. Air screw or fuel screw adjustment will affect mixture from approximately idle to 1/4 throttle setting. Refer to Maintenance Chapter 2 for complete adjustment procedure, and the following guidelines for minor altitude adjustments.

<u>Air Screw</u> (2 stroke models)

Turn the air screw in (clockwise) 1/4 turn for each 30° below 60° F. Turn the air screw out (counterclockwise) 1/4 turn for each 30° above 60° F.

<u>Fuel Screw</u> (4 stroke models)

Turn the fuel screw in (clockwise) 1/4 turn for each 30° above 60° F. Turn the fuel screw out (counterclockwise) 1/4 turn for each 30° below 60° F.

Main Jet Selection

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.
4. Clutching changes may also be required for changes in elevation. Refer to clutching charts in General / Specifications Chapter 1 for recommendations.

MODEL: 500 6X6

MODEL NUMBER: . A99AE50AA

ENGINE MODEL: . . EH50PLE06

CARBURETION

Type .... BST 34 Mikuni
Main Jet 140
Pilot Jet 40
Jet Needle 4D33-3
Needle Jet Q-6
Throttle Valve .... #100
Pilot Screw 2
Pilot Air Jet 160
Valve Seat 1.5
Fuel Octane (R+M/2) . 87 Non-Oxygenated or 89 Oxygenated

EXAMPLE ONLY (Refer to Chapter 1)

Production Main Jet outlined in BOLD

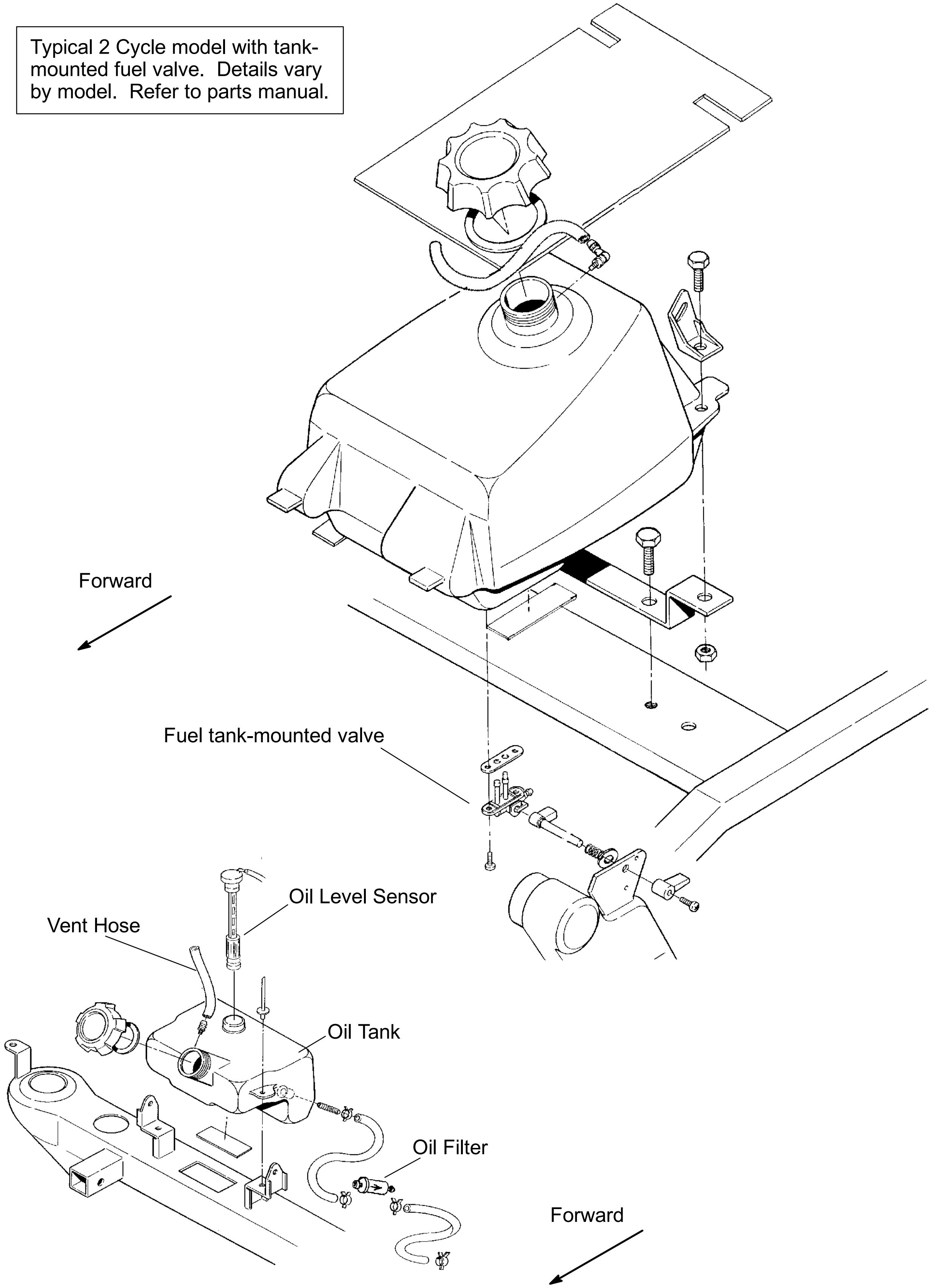
JETTING CHART

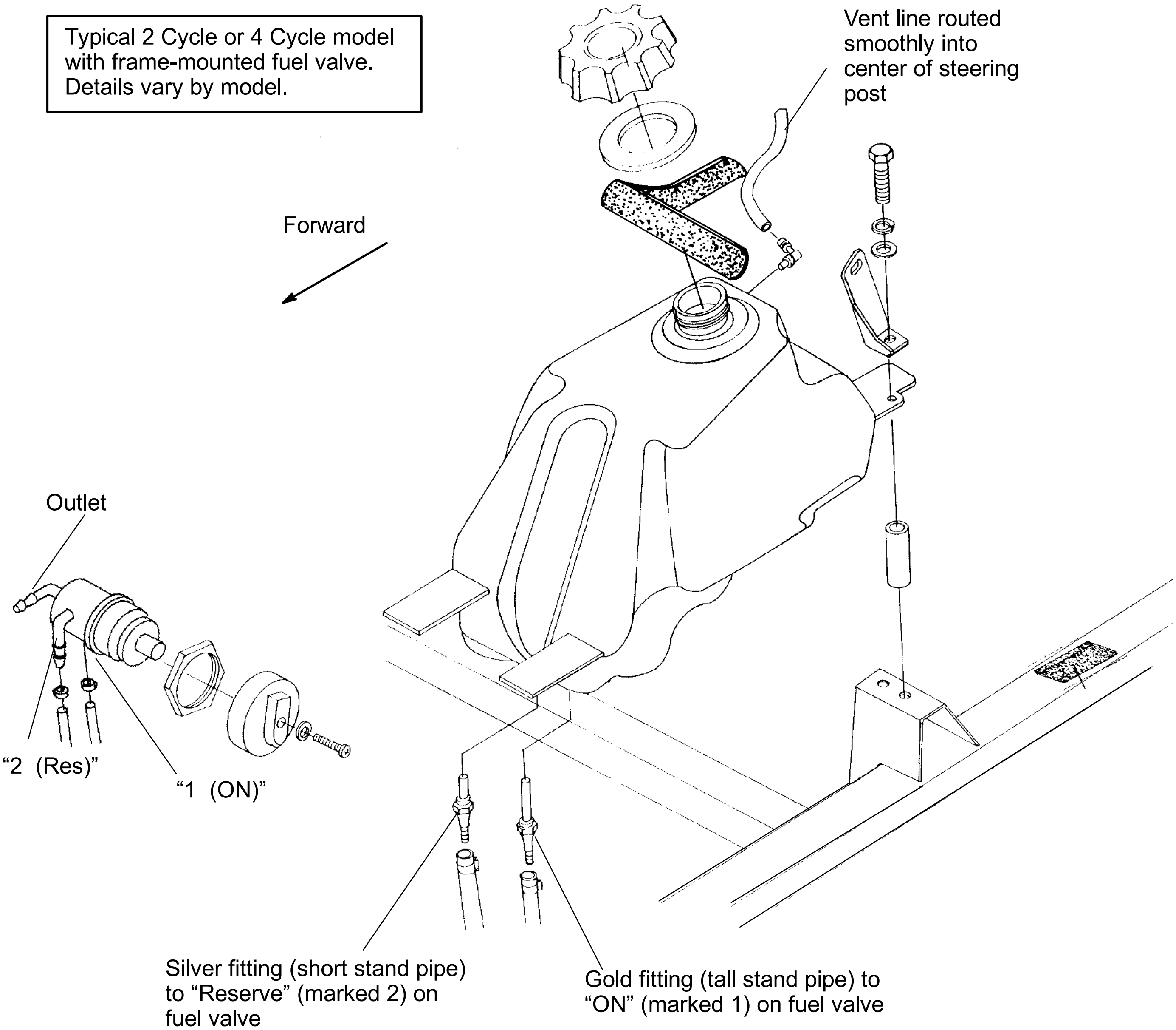
Altitude		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	Above +80°F Above +26°C
Meters (Feet)	0-900 (0-3000)	150	145	**140**	135
	900-1800 (3000-6000)	145	140	135	130
	1800-2700 (6000-9000)	137.5	135	130	122.5
	2700-3700 (9000-12000)	132.5	127.5	122.5	117.5

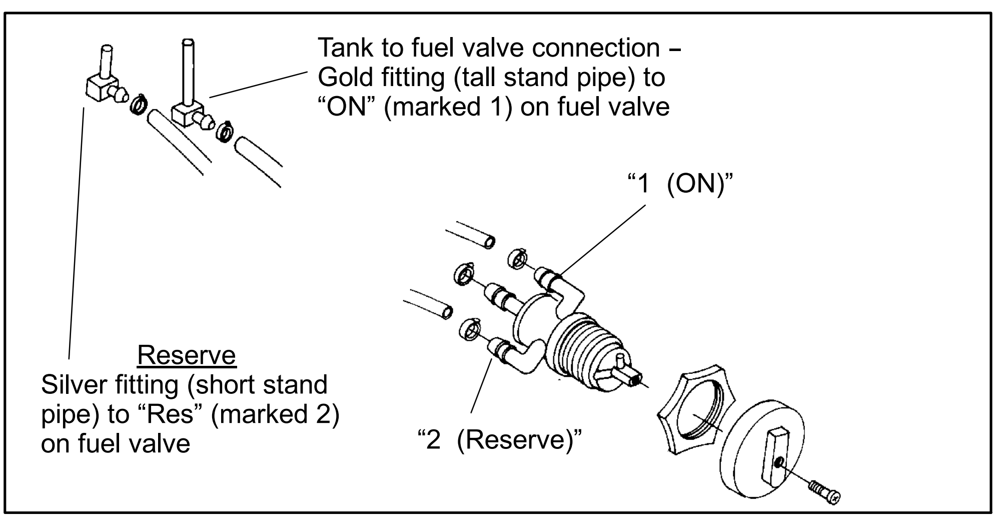
- Pilot screw in 1/2 turn

Fuel Tank Assembly / Oil Tank Assembly

Typical 2 Cycle model with tank-mounted fuel valve. Details vary by model. Refer to parts manual.

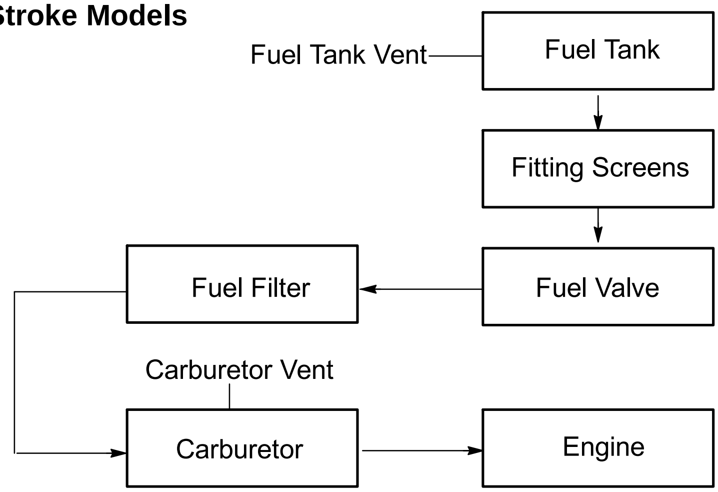



Typical 2 Cycle or 4 Cycle model with frame-mounted fuel valve. Details vary by model.
Vent line routed smoothly into center of steering post
Forward
Outlet
“2 (Res)”
“1 (ON)”
Silver fitting (short stand pipe) to “Reserve” (marked 2) on fuel valve
Gold fitting (tall stand pipe) to “ON” (marked 1) on fuel valve

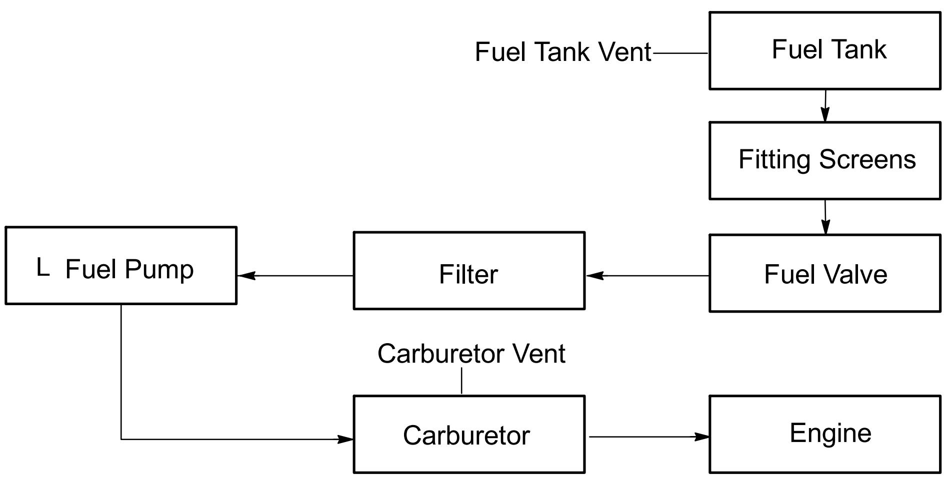

Tank to fuel valve connection – Gold fitting (tall stand pipe) to “ON” (marked 1) on fuel valve
“1 (ON)”
Reserve
Silver fitting (short stand pipe) to “Res” (marked 2) on fuel valve
“2 (Reserve)”

Fuel Flow Diagrams

Fuel System Diagram - 2 Stroke Models



Fuel System Diagram - 4 Stroke Models



L 325 / 425 Under Headlamp Cover
335 / 500 Above Oil Tank

Pilot Jets Part Numbers
Mikuni VM (2 Cycle)

Jet No.	Part No.
30	3130331
35	3130066
40	3130067
45	3130068
50	3130069

Hex Main Jet Part Numbers
Mikuni VM (2 Cycle)

Jet No.	Part No.
110	3130105
115	3130106
120	3130107
125	3130108
130	3130109
135	3130110
140	3130111
145	3130112
150	3130113
155	3130114
160	3130115
165	3130116
170	3130117
175	3130118
180	3130119
185	3130120
190	3130121
195	3130122
200	3130123
210	3130124
220	3130125
230	3130126
240	3130127
250	3130128
260	3130129
270	3130130
280	3130131
290	3130132
300	3130133
310	3130134
320	3130135

Main Jet Part Numbers (4 Cycle)
Mikuni BST Carburetor

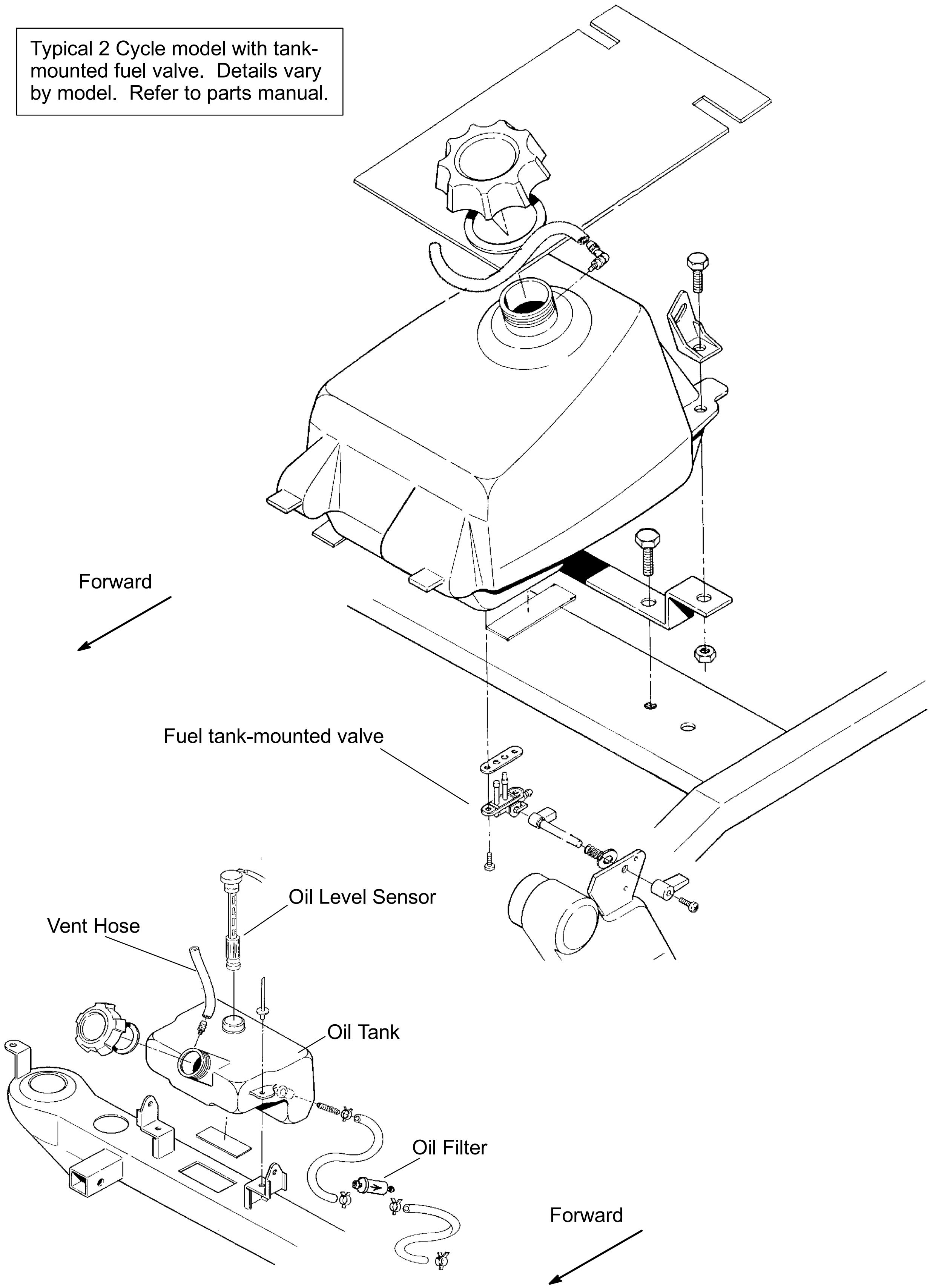
Jet Number	Part Number
112.5	3130554
115	3130555
117.5	3130556
120	3130557
122.5	3130558
125	3130559
127.5	3130560
130	3130561
132.5	3130562
135	3130563
137.5	3130564
140	3130527
142.5	3130566
145	3130567
147.5	3130568
150	3130569
152.5	3130570
155	3130571
157.5	3130572
160	3131141
162.5	3131142
165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

Pilot Jet Part Numbers (4 Cycle)
Mikuni BST Carburetor

Jet Number	Part Number
40.0	3130624
42.5	3130526

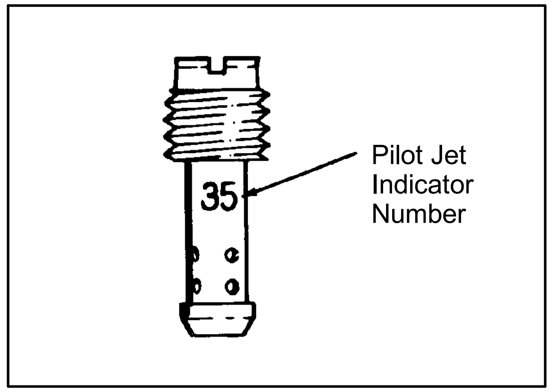
Fuel Tank Assembly / Oil Tank Assembly

Typical 2 Cycle model with tank-mounted fuel valve. Details vary by model. Refer to parts manual.



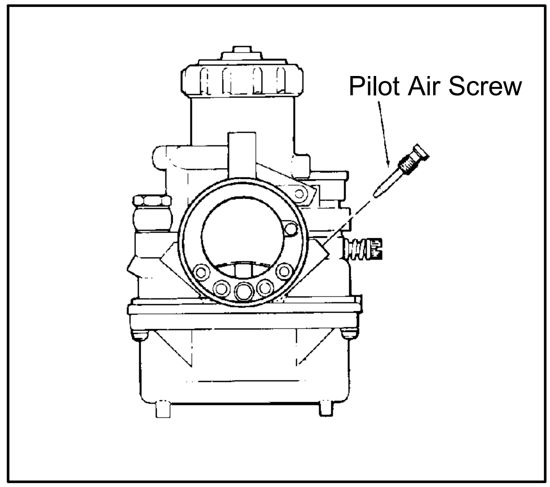
Pilot Jet

From idling to low speeds, the fuel supply is metered by the pilot jet. There are several air bleed openings in the sides of the pilot jet which reduce the fuel to mist. The number stamped on the jet is an indication of the amount of fuel in cc's which passes through the jet during a one minute interval under a given set of conditions.



Pilot Air Screw

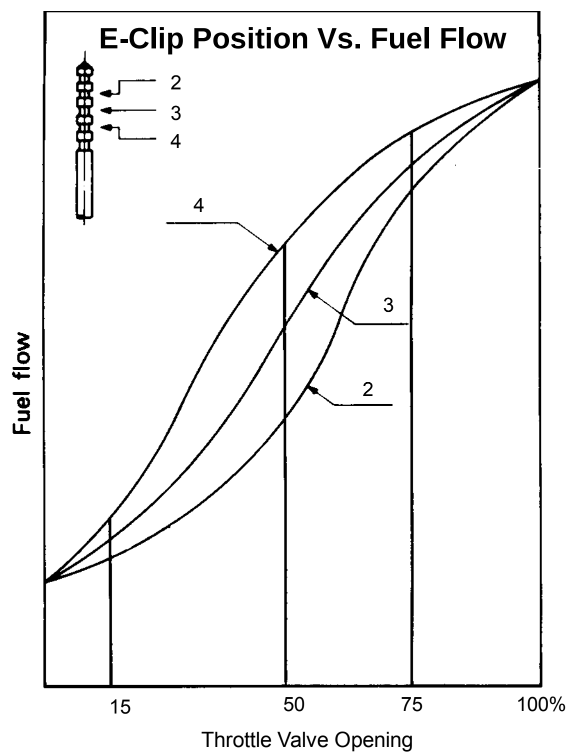
The pilot air screw controls the fuel mixture from idle to low speeds. The tapered tip of the air screw projects into the air passage leading to the pilot jet air bleeds. By turning the screw in or out, the cross sectional area of the air passage is varied, in turn varying the pilot jet air supply and changing the mixture ratio.



Air/Fuel Mixture Ratio

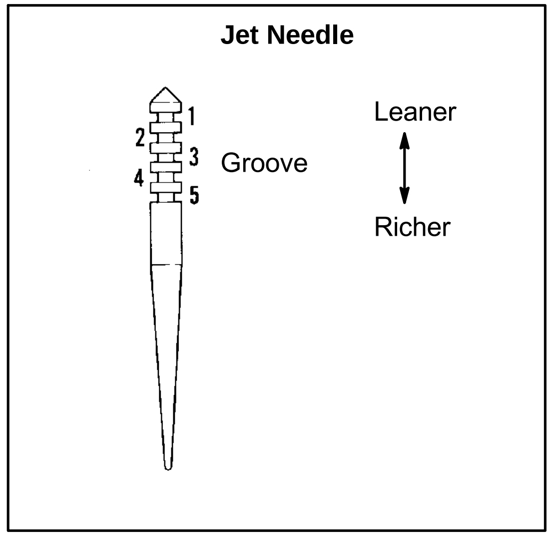
A carburetor with a piston type throttle valve is also called a variable venturi type carburetor. In this type of carburetor, the needle jet and jet needle serve to control a proper air/fuel mixture ratio at the medium throttle valve opening (between 1/4 and 3/4 opening). Having the proper needle jet and jet needle has a major impact on engine performance at partial load.

The jet needle tapers off at one end and the clearance between the jet needle and the needle jet increases as the throttle valve opening gets wider. The air/fuel mixture ratio is controlled by the height of the "E" ring inserted into one of the five slots provided in the head of the jet needle. The chart at right shows the variation of fuel flow based on the height of the "E" ring.



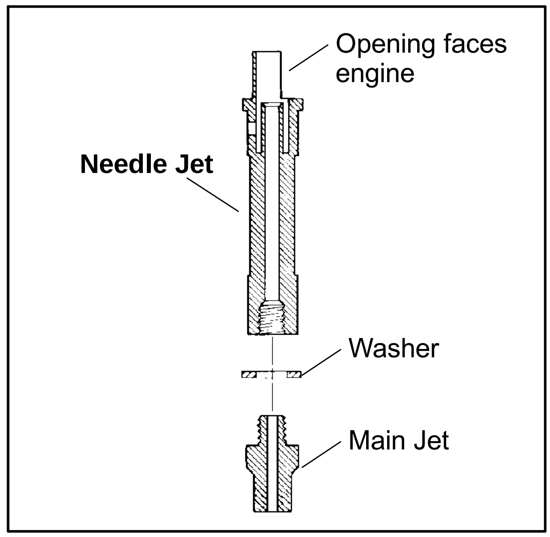
Jet Needle

The jet needle has five adjustment grooves cut into the upper portion, and is tapered from approximately the middle of the needle to the lower end. The top is fixed to the center of the throttle valve by the needle clip, and the tapered end extends into the needle jet. Fuel flows through the space between the needle jet and jet needle. This space does not vary until the throttle reaches the 1/4 open point. At that time the tapered portion of the needle begins to move out of the jet, affecting fuel flow as the opening enlarges. If the needle clip is changed from the standard position to a lower groove, the needle taper starts coming out of the jet sooner, resulting in a richer mixture. Moving the clip higher produces a leaner mixture. If the taper is worn due to vibration, fuel flow may be significantly affected.



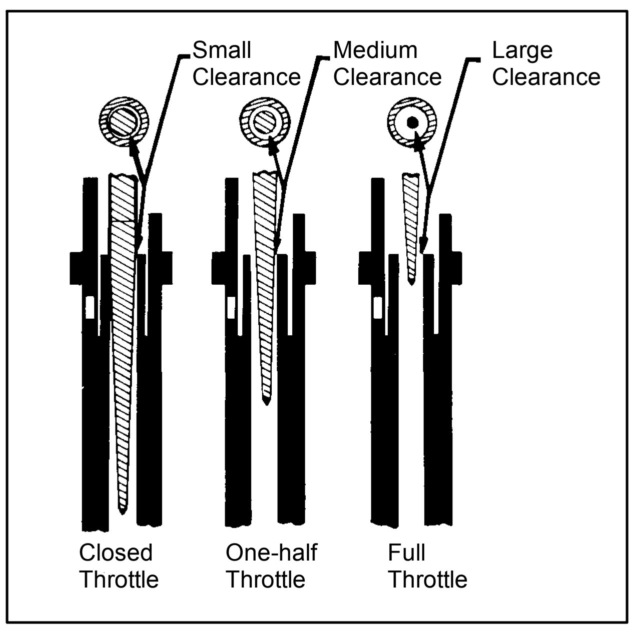
Needle Jet

The needle jet works in conjunction with the jet needle to regulate fuel flow rate. An air bleed opening in the side of the needle jet brings in air measured by the air jet. This air initiates the mixing and atomizing process inside the needle jet. Mixing is augmented by a projection at the needle jet outlet, called the primary choke. The letter number code stamped on the jet indicates jet inside diameter.



Throttle Opening vs. Fuel Flow

In a full throttle condition the cross sectioned area between the jet needle and the needle jet is larger than the cross sectioned area of the main jet. The main jet therefore has greater control over fuel flow.

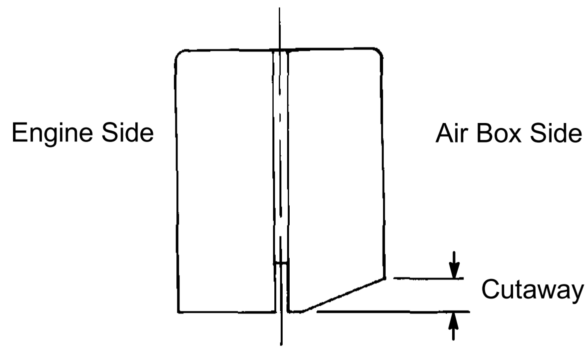


Throttle Valve

The throttle valve controls the rate of engine air intake by moving up and down inside the main bore. At small throttle openings, air flow control is performed chiefly by the cutaway. By controlling air flow the negative pressure over the needle valve is regulated, in turn varying the fuel flow.

The throttle valves are numbered 1.0, 1.5, 2.0, etc., according to the size of the cutaway. The higher the number, the leaner the gasoline/air mixture.

Throttle Valve



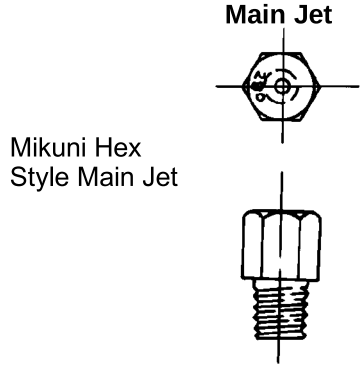
Higher cutaway number = leaner mixture

Main Jet

When the throttle opening becomes greater and the area between the needle jet and jet needle increases, fuel flow is metered by the main jet. The number on the jet indicates the amount of fuel CCs which will pass through it in one minute under controlled conditions. Larger numbers give a greater flow, resulting in a richer mixture.

Main jets are screwed directly into the needle jet base.

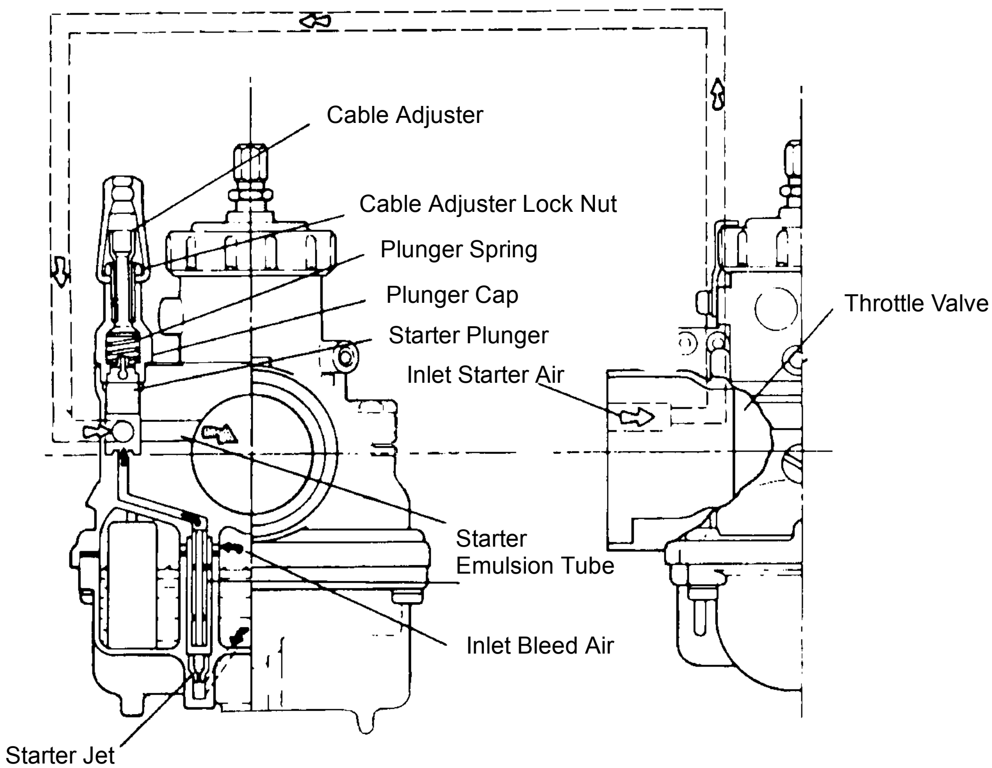
Main Jet



Larger Number = Richer Mixture

FUEL SYSTEM/CARBURETION
Starter System - Closed Throttle (2 Cycle)

Mikuni carburetors use a starter system rather than a choke. In this type of carburetor, fuel and air for starting the engine are metered with entirely independent jets. The fuel metered in the starter jet is mixed with air and is broken into tiny particles in the emulsion tube. The mixture then flows into the plunger area, mixes again with air coming from the air intake port for starting and is delivered to the engine through the fuel discharge nozzle in the optimum air/fuel ratio. The starter is opened and closed by means of the starter plunger. The starter type carburetor is constructed to utilize the negative pressure of the inlet pipe, so it is important that the throttle valve is closed when starting the engine.

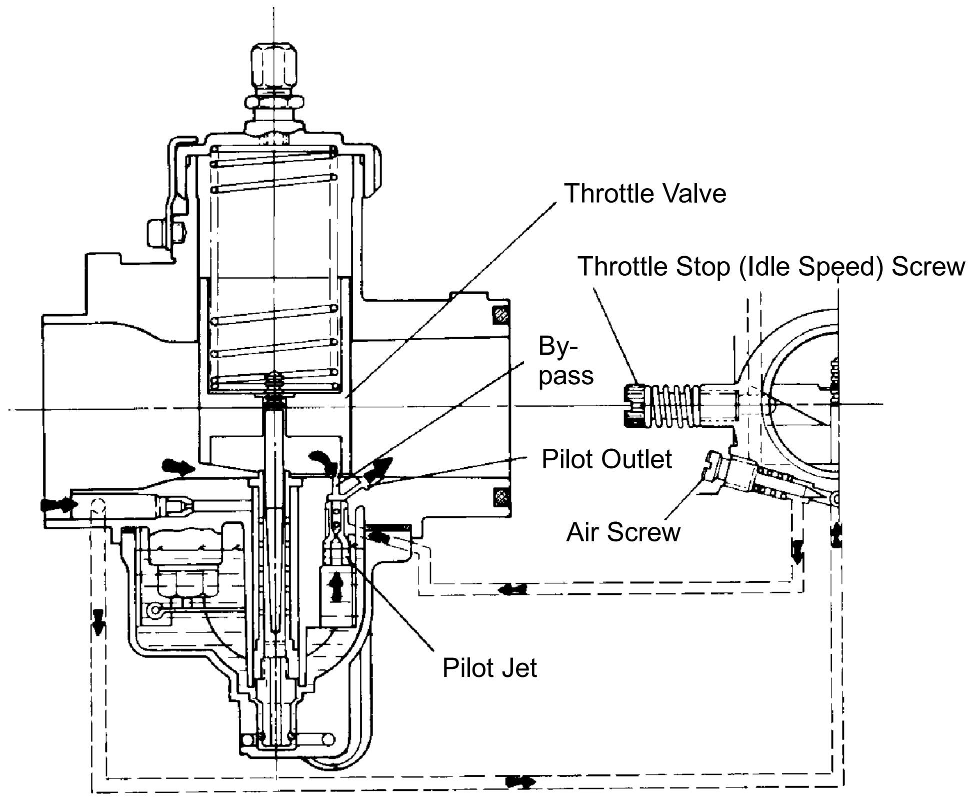


Pilot System (0-3/8 Throttle) (2 Cycle)

The pilot system's main function is to meter fuel at idle and low speed driving. Though its main function is to supply fuel at low speed, it does feed fuel continuously throughout the entire operating range.

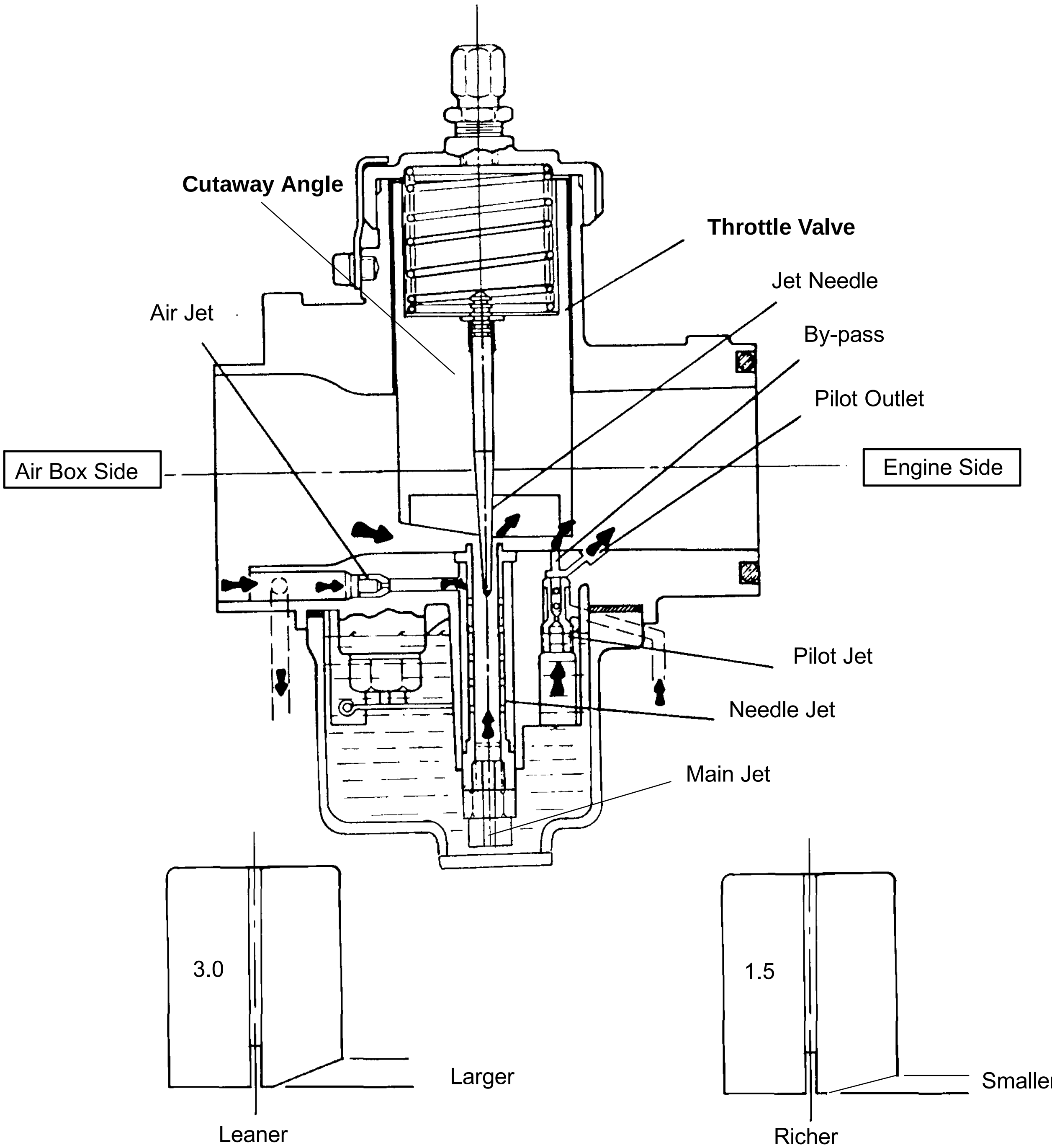
Fuel for the pilot jet is drawn from the float bowl, mixed with air regulated by the air screw, and delivered to the engine through the pilot outlet.

The mixture is regulated to some degree by adjusting the air screw. When the air screw is closed, the fuel mixture is made richer as the amount of air is reduced. When the air screw is opened, the mixture is made more lean as the amount of air is increased.



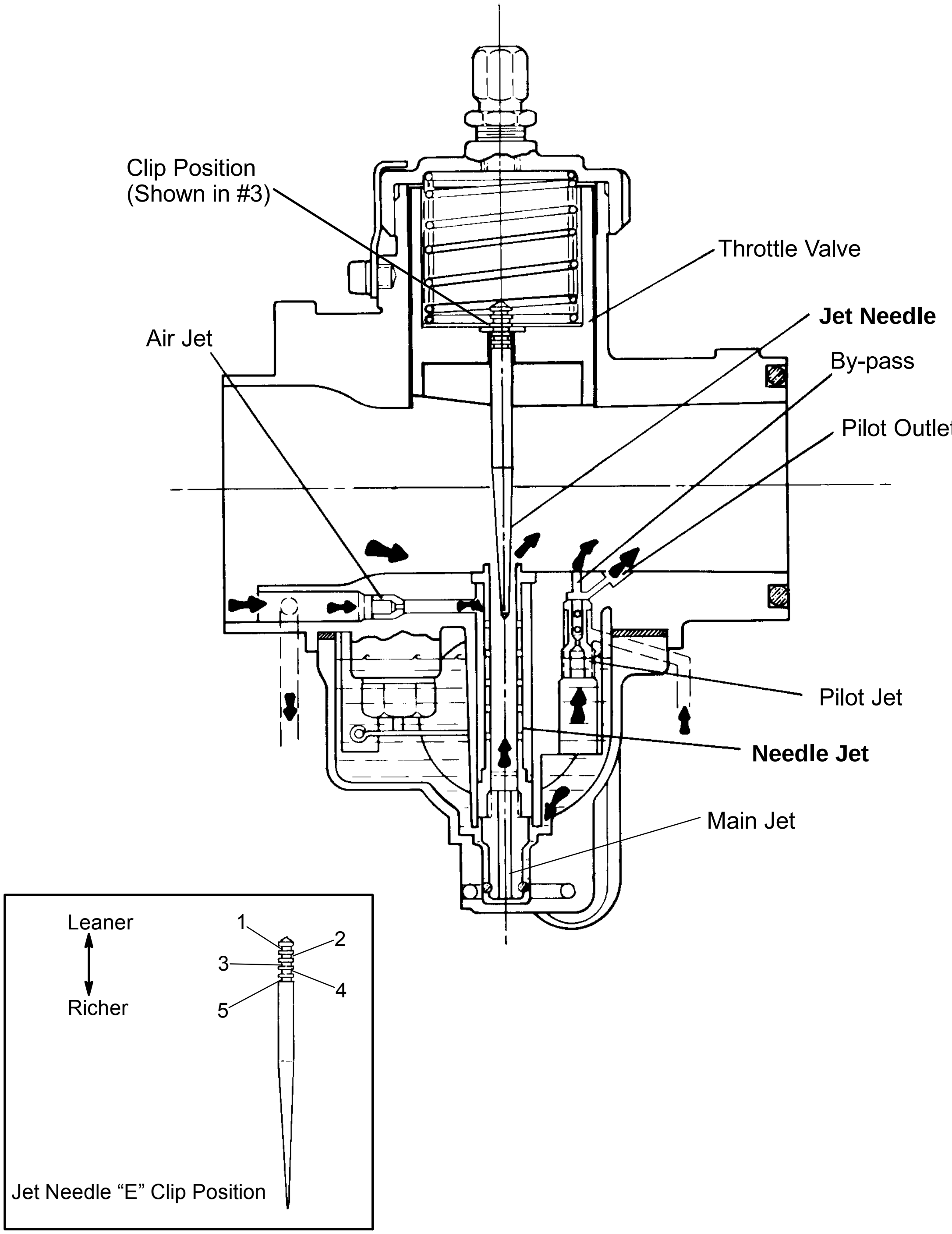
FUEL SYSTEM/CARBURETION
Slide Cutaway (1/8-3/8 Throttle) (2 Cycle)

Throttle valve cutaway effect is most noticeable at 1/4 throttle opening. The amount of cutaway is pre-determined for a given engine to maintain a 14:1 air/fuel ratio at part throttle. A steep angle would indicate a fairly lean mixture because there is less resistance to air flow. A flat angle would provide a much richer mixture because there is more resistance to air flow. The venturi shape can be adjusted for each engine's breathing characteristics by using a different valve cutaway angle. A number will be stamped into the bottom of the valve (e.g. 2.5) indicating the size of the cutaway. The higher the number, the steeper the angle.



Jet Needle/Needle Jet (3/8-3/4 Throttle) (2 Cycle)

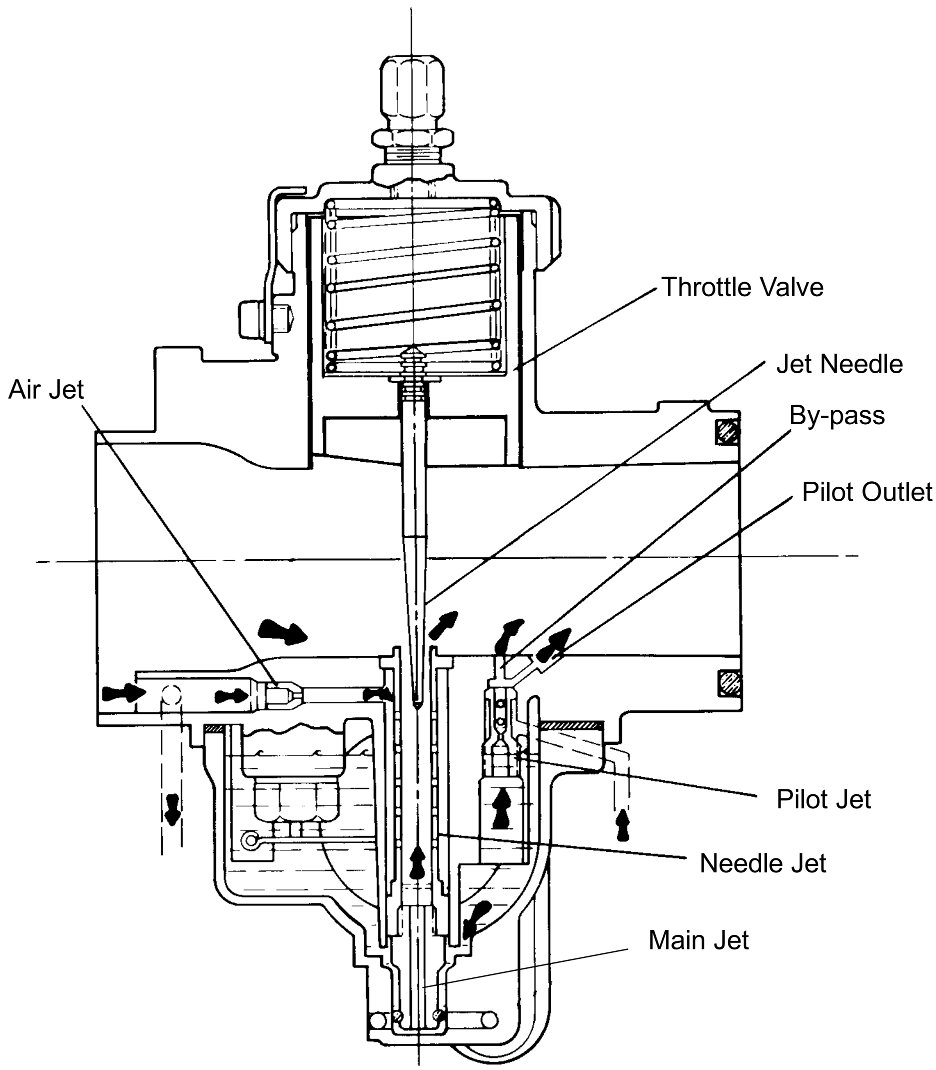
The jet needle and needle jet have the most effect between 3/8 and 3/4 throttle opening. Some mixture adjustment can be accomplished by changing the location of the “E” clip on the needle. Moving the clip down raises the needle in the jet passage and richens the mixture. Moving the clip up lowers the needle in the jet passage and leans the mixture. Letter and number codes are stamped into the needle and the jet indicating sizes and tapers of each.



Main System (3/4 to Full Throttle) (2 Cycle)

The main system is designed for delivering fuel between low speed and high speed operation. This system is made up of the jet needle, needle jet, and main jet. The main system begins to take effect as soon as there is enough air flow into the carburetor venturi to draw fuel up through the main jet and needle jet assembly. This system works in conjunction with the needle jet system.

During low speed driving, there is very little clearance between the jet needle and the needle jet; therefore, very little fuel from the main jet can pass between the jet needle and the needle jet. As the throttle valve opening is increased, the tapered jet needle is raised farther out of the needle jet, allowing greater fuel flow. Under full throttle opening, the cross sectioned area of clearance between the jet needle and the needle jet becomes greater than the cross sectioned area of the main jet. Thus the main jet is now controlling the amount of fuel flow.



Mikuni Fuel Delivery (2 Cycle)

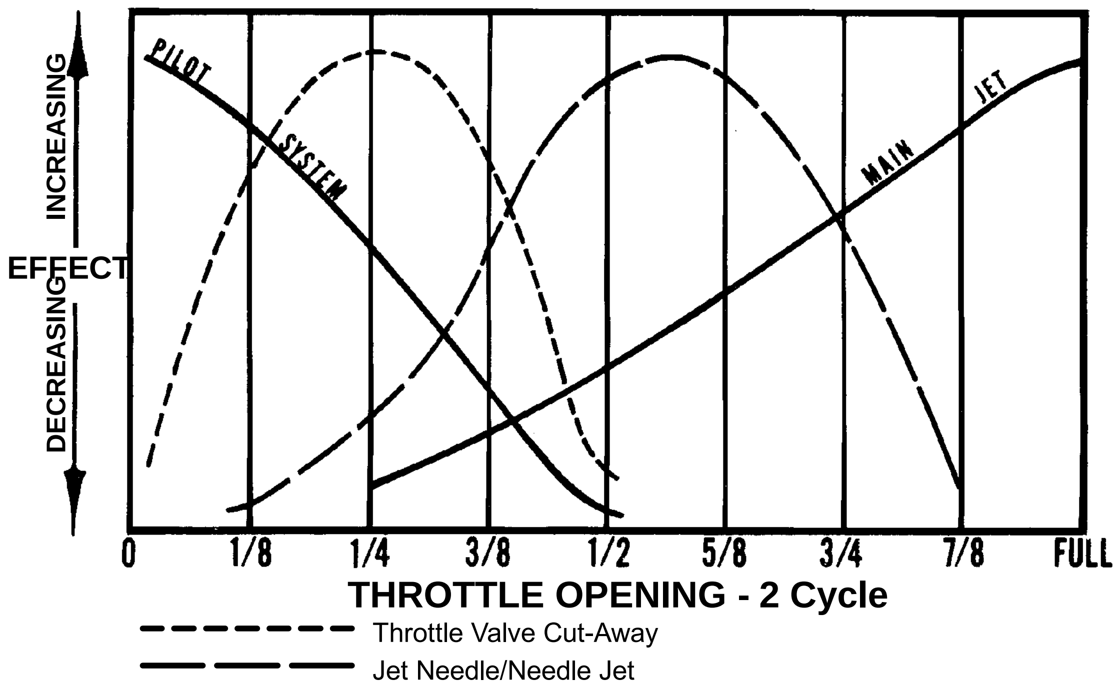
The throttle opening chart below demonstrates component relationship to fuel flow versus throttle valve opening.

The pilot system's main function is that of a low speed jet. Its most effective range of fuel delivery is from idle to approximately 3/8 throttle valve opening.

The throttle valve controls the rate of engine air by its movement up and down in the carburetor venturi. At small throttle openings the air flow is regulated chiefly by the valve cutaway, with greatest effectiveness at 1/4 throttle opening. Throttle valves are numbered 1.0, 1.5, 2.0, etc., according to the size of the cutaway. Decreasing the cutaway number will increase the amount of fuel delivered in its effective range.

The jet needle and needle jet have an effective operating range from approximately 1/8 to 7/8 throttle opening. The amount of fuel delivered during this range relies upon the jet needle clip position, as well as the needle jet size and other specifications.

The main jet affects fuel delivery at 1/4 throttle and consistently increases to full throttle opening.

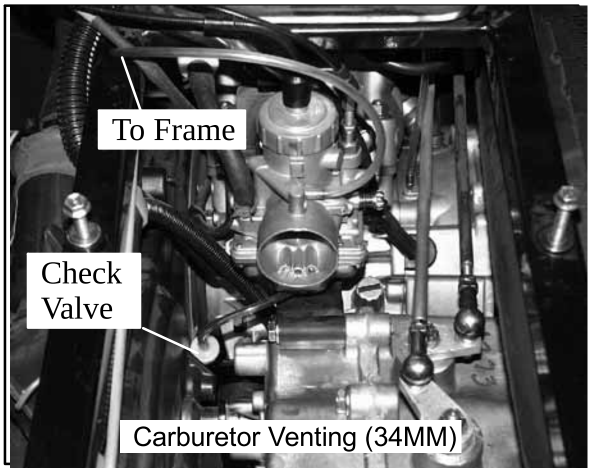


Carburetor Component Function - 2 Cycle			
System	**Main Components**	**Main Function**	**Main Affect**
Float System (Fuel Level Control)	Inlet Pipe, Needle and Seat, Floats, Float Pins	Maintains specified fuel level in float chamber (carburetor float bowl)	All systems All throttle ranges
Venting	Vent Passages in Carburetor, Vent line	Supplies atmospheric pressure to fuel in float chamber	All systems All throttle ranges
Starter (Choke/Enrichment)	Choke Lever, Cable, Choke Plunger, Return Spring, Carb Passages (Starter Jet, passage in float bowl)	Supplies additional fuel air mixture necessary for cold starting	All throttle ranges Greatest effect at low throttle settings and idle speeds
Pilot (Idle System)	Pilot Jet/Passageways, Pilot Air Screw with Spring, By-pass Port (Beneath Throttle Slide), Air Jet, Pilot Outlet, Throttle Valve Cutaway	Primarily supplies fuel at idle and low throttle settings	Mainly idle to 1/4 throttle Minimal effect after 1/2 throttle
Main System	Main Jet, Main Air Passage, Needle Jet, Jet Needle, Throttle Valve	Supplies fuel at mid-range and high throttle settings.	1/4 to full throttle

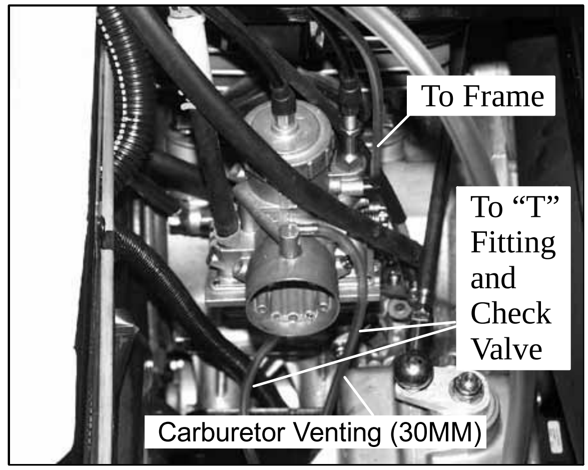
Vent Systems - 2 Cycle

The fuel tank and carburetor float bowl vent lines supply atmospheric pressure to the fuel in the tank and float bowl. The lines must be free of kinks and restrictions to prevent lean mixture and possible engine damage. Vent lines must be properly routed to prevent damage to the line and to prevent contaminants from entering the carburetor or fuel tank.

A one-way check valve is in place on the bowl overflow hose, to allow overflow fuel out, and prevent water or other contaminants from entering the bowl. (See photo below right).



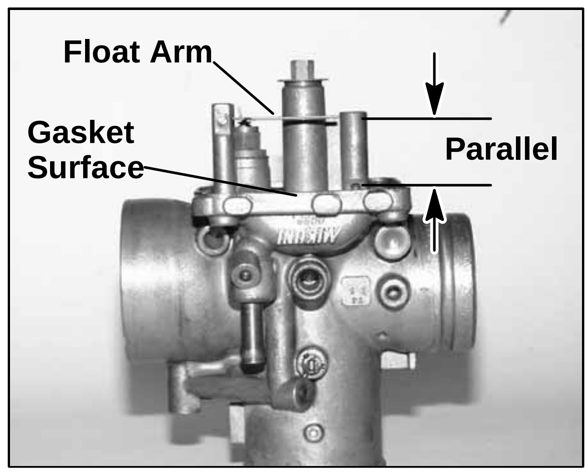
Carburetor Venting (34MM)



Carburetor Venting (30MM)

Float Height - 2 Cycle

1. Invert the carburetor and remove float bowl.
2. Rest the float tongue lightly on the inlet needle valve pin without compressing the spring.
3. Measure height from float bowl mating surface to float arm as shown. Both sides of float arm must be parallel to each other. Use float adjustment tool (PN 2872314) or a vernier caliper. When measuring height, be sure inlet needle valve spring is not compressed. If adjustment is necessary, bend the tongue slightly.



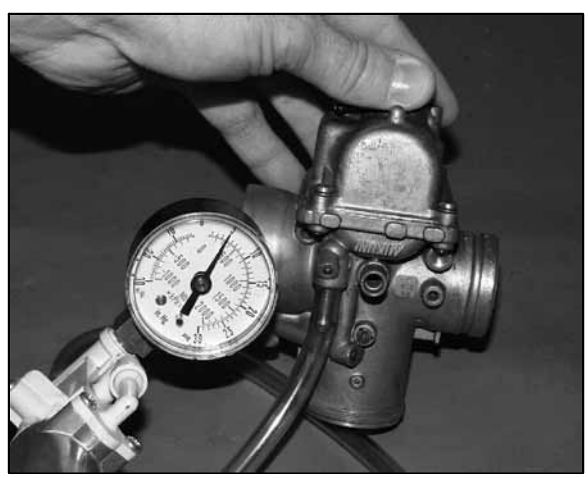
Float Height:

VM 30 Parallel to Gasket Surface ± 1mm

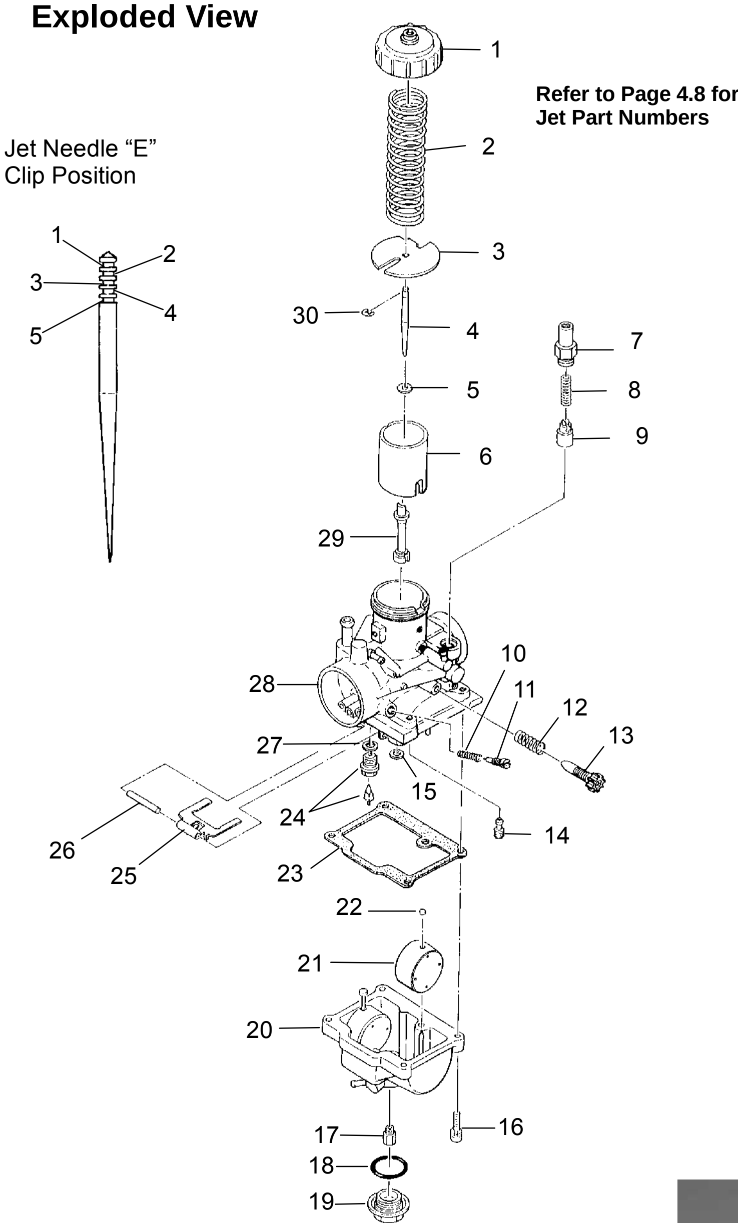
VM 34 Parallel to Gasket Surface ± 1mm

Needle and Seat Leakage Test - 2 Cycle

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 or gasket.

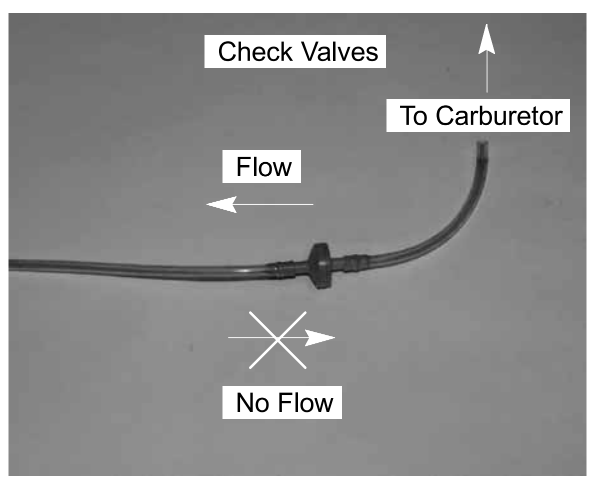


2 Cycle
Mikuni VM30SS / VM34SS Carburetor
Exploded View



1. Cap
2. Spring
3. Plate, Cable Retainer
4. Jet Needle
5. Washer
6. Valve, Throttle
7. Cap, Plunger
8. Spring
9. Starter Plunger
10. Spring, Air Adj. Screw
11. Screw, Air Adjust
12. Spring, Throttle Stop Screw
13. Screw, Throttle Stop
14. Pilot Jet
15. Washer, Main Jet
16. Screw and Washer Assy.
17. Main Jet
18. O-Ring
19. Drain Plug
20. Float Bowl
21. Float
22. Cap
23. Gasket
24. Valve, Inlet Needle
25. Arm, Float
26. Pin, Float
27. Gasket, Inlet Valve
28. Carb Body Assy. (1-30)
29. Needle Jet
30. E-Clip

Use a spring loaded center punch to remove press-fit float pin.

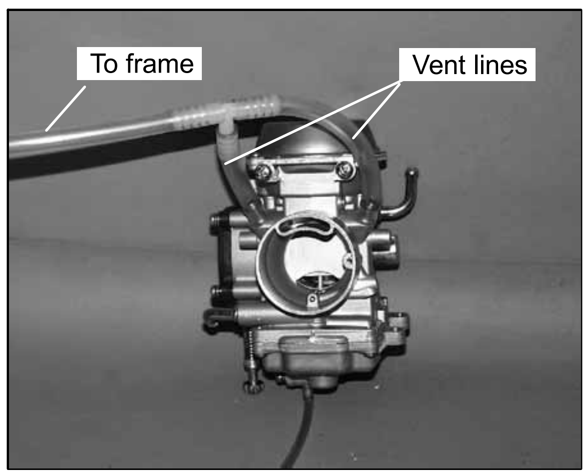


4 Cycle CV Carburetor System Function

Carburetor Component Function - 4 Cycle			
System	**Main Components**	**Main Function**	**Main Affect**
Float System (Fuel 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	Vent Passages in Carburetor, Vent lines (2) into (1) to frame	Supplies atmospheric pressure to fuel in float chamber	All systems All throttle ranges
Starter (Choke/Enrichment)	Choke Lever, Cable, Choke 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/Passageways, 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 settings	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 - 4 Cycle CV Carburetor

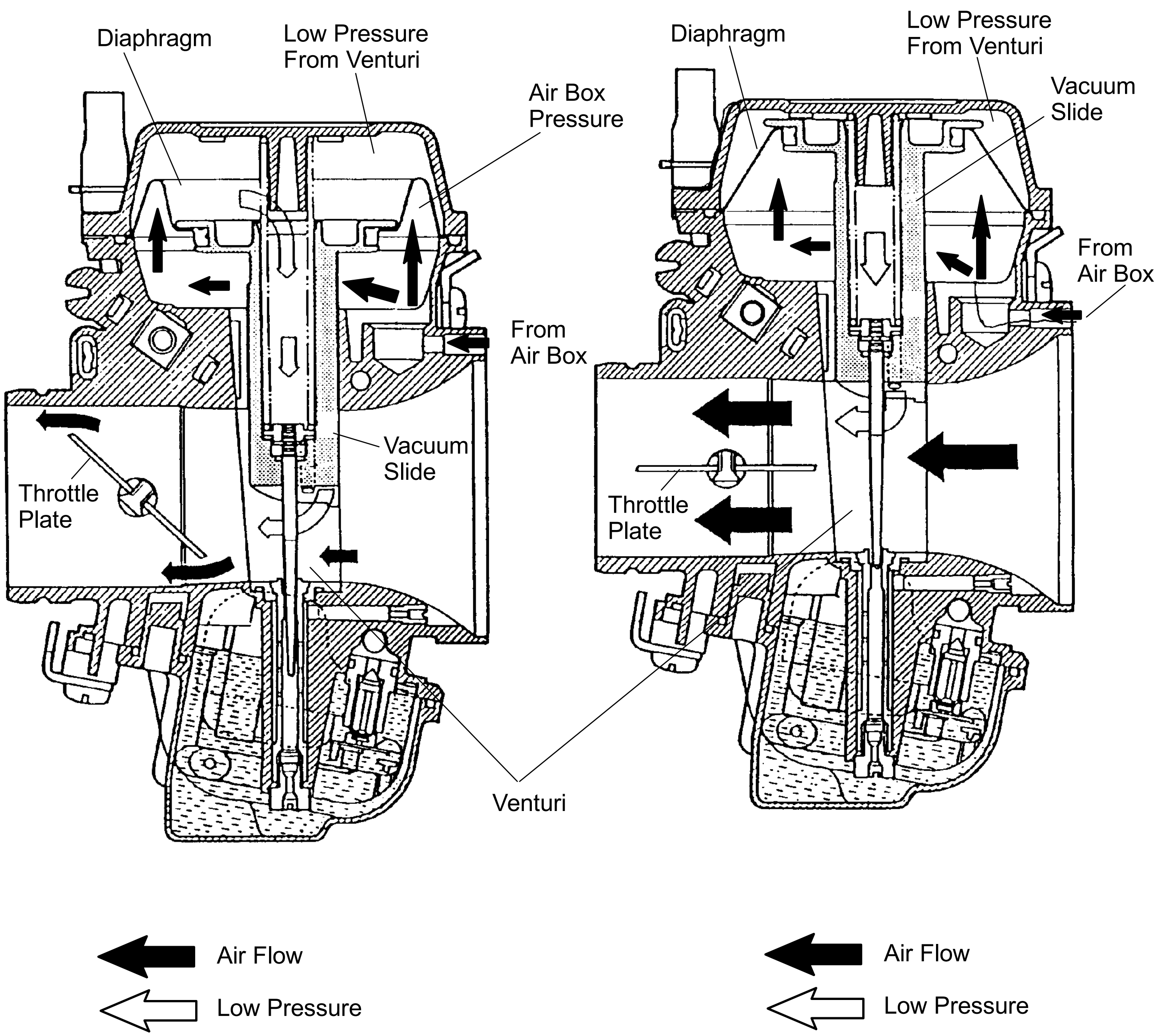
The carburetor float bowl vent lines supply atmospheric pressure to the fuel in the float bowl. The lines must be free of kinks and restrictions and be properly routed to allow fuel to flow in the proper amount and to prevent contaminants from entering the carburetor.



The constant velocity carburetor used on Polaris 4 Cycle ATVs and 6x6 incorporates a mechanically operated throttle plate and a vacuum controlled slide valve (vacuum slide). The venturi cross-sectional area in the carburetor bore is increased or decreased automatically by the vacuum slide, which moves according to the amount of negative pressure (less than atmospheric) present in the venturi.

A diaphragm attached to the top of the vacuum slide is sealed to the slide and to the carburetor body forming two chambers. The chamber above the diaphragm is connected to the venturi area by a drilled orifice in the center of the vacuum slide. The chamber below the diaphragm is vented to atmospheric pressure by a passage on the air box side of the carburetor. A spring, installed in the center of the vacuum slide, dampens the slide movement and assists the return of the slide.

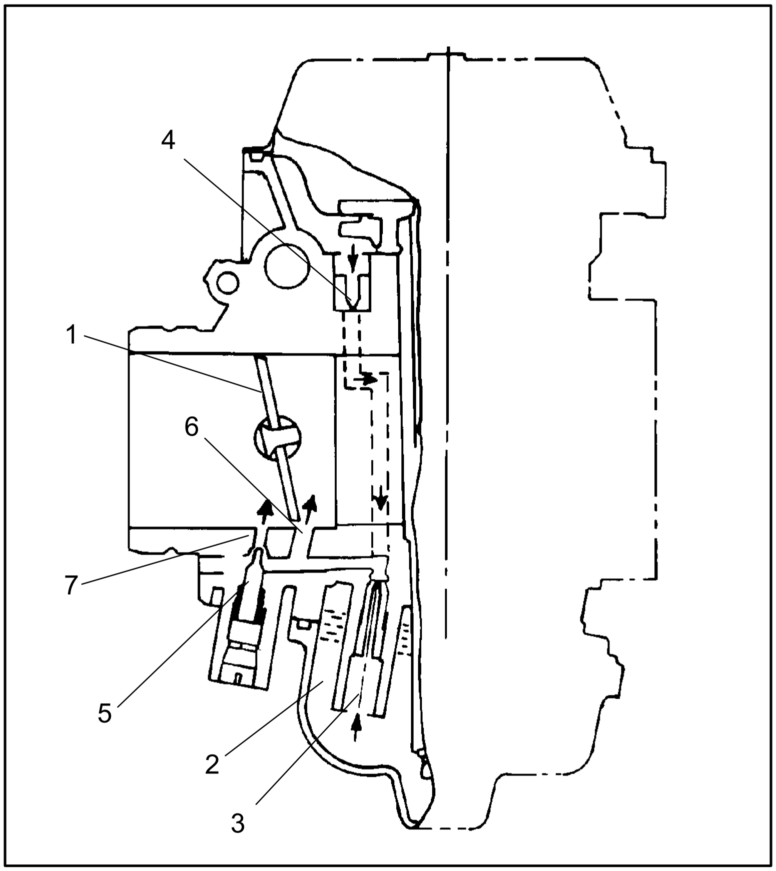
When the throttle plate is opened and engine speed begins to increase, the pressure in the venturi (and therefore in the chamber above the diaphragm) becomes significantly lower than atmospheric. Atmospheric pressure in the chamber below the diaphragm forces the diaphragm upward, raising the slide against spring pressure. 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 34 / BST 40 carburetor.

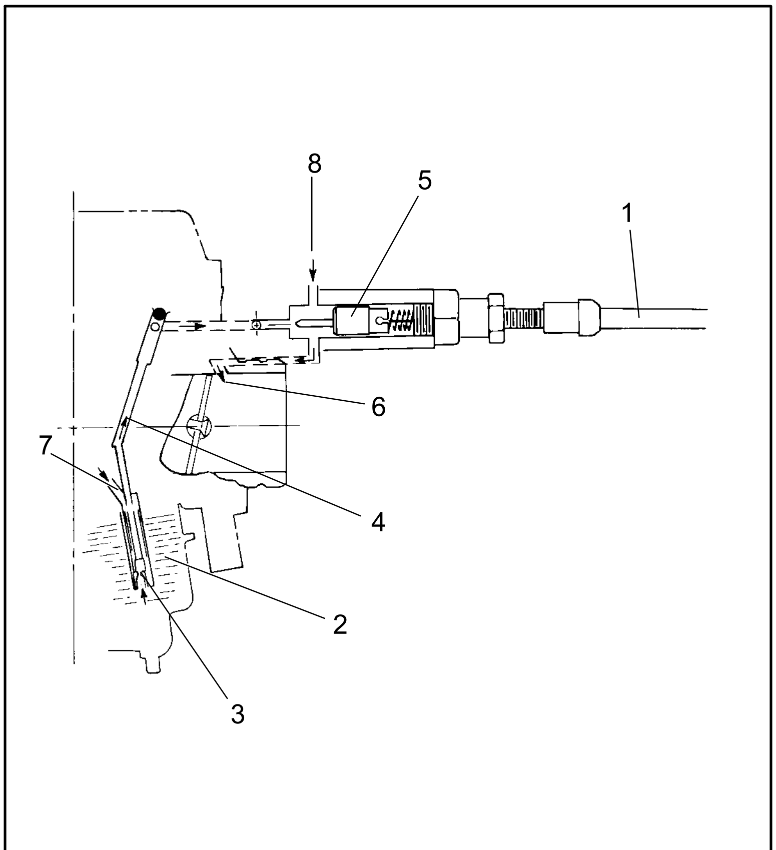
Pilot (Idle and Slow) System

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).



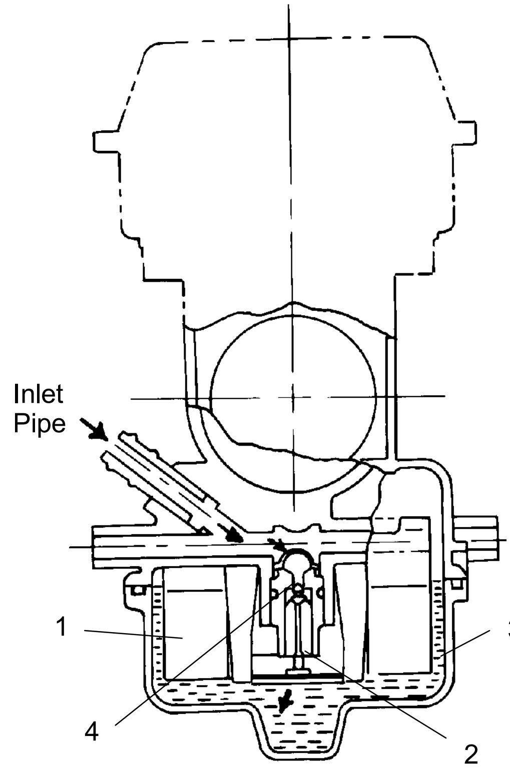
Starter System (Choke or Enrichment)

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.



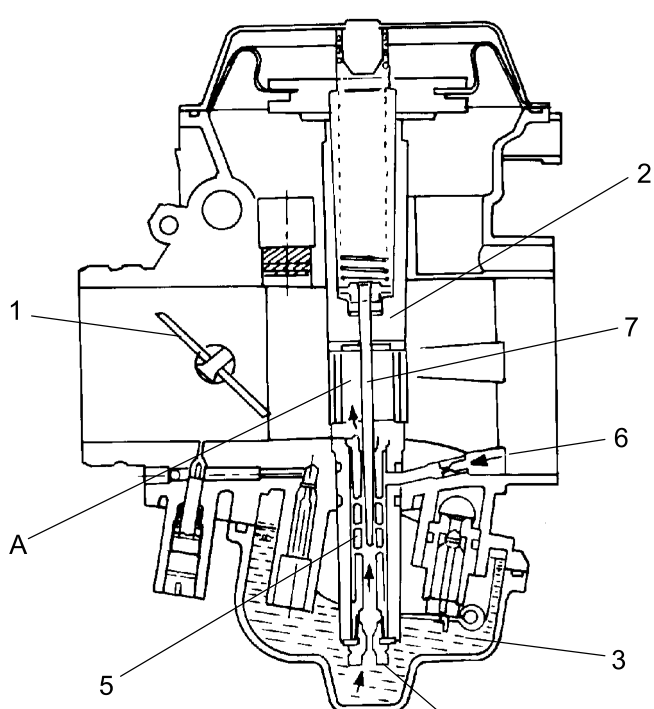
Float System

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.

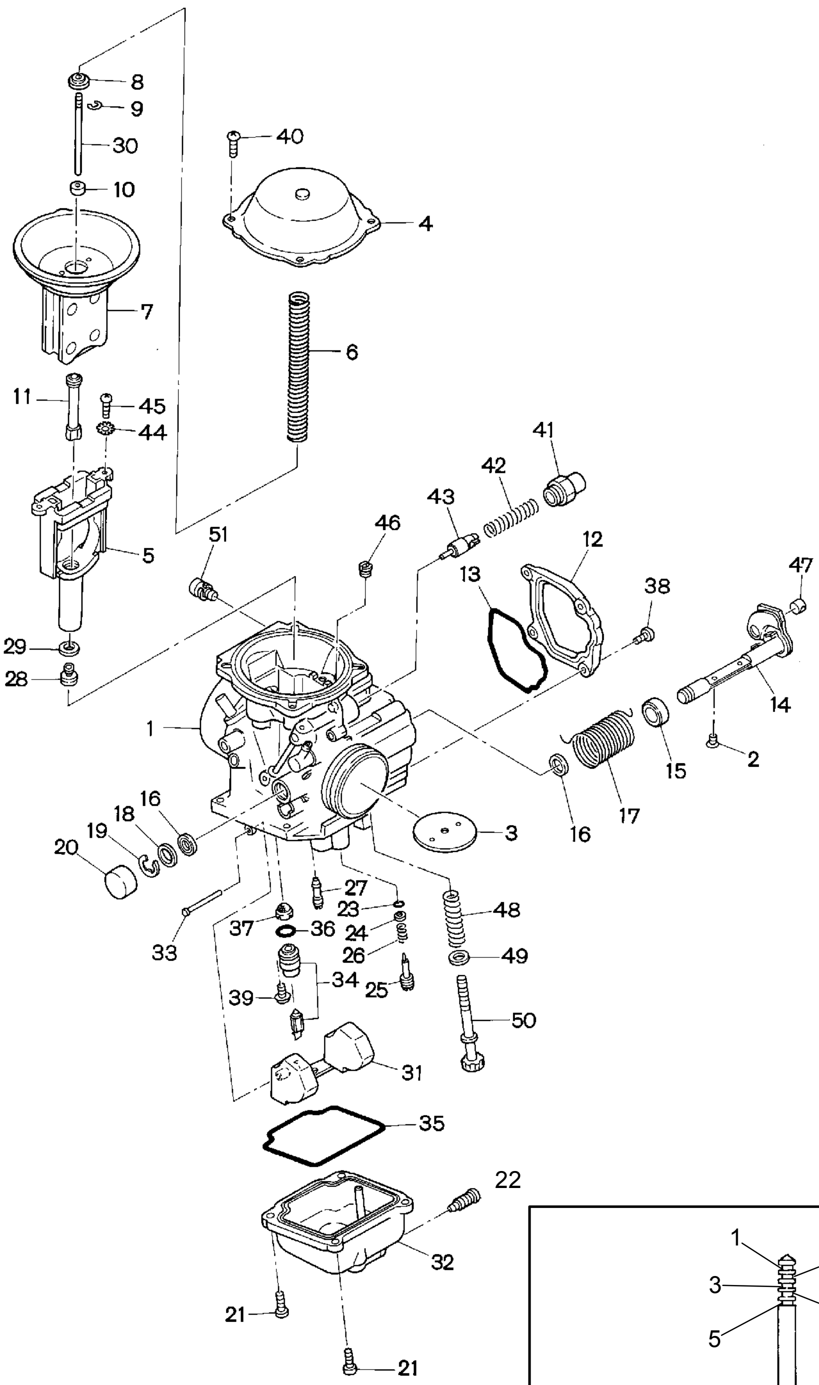


Main System

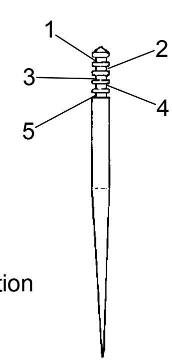
As throttle valve (1) is opened, engine speed rises, and this increases negative pressure in the venturi. Consequently the vacuum slide (2) moves upward. The fuel in float chamber (3) is metered by main jet (4), and the metered fuel enters needle jet (5), in which it mixes with the air admitted through 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.



Mikuni BST 34 Carburetor Exploded View



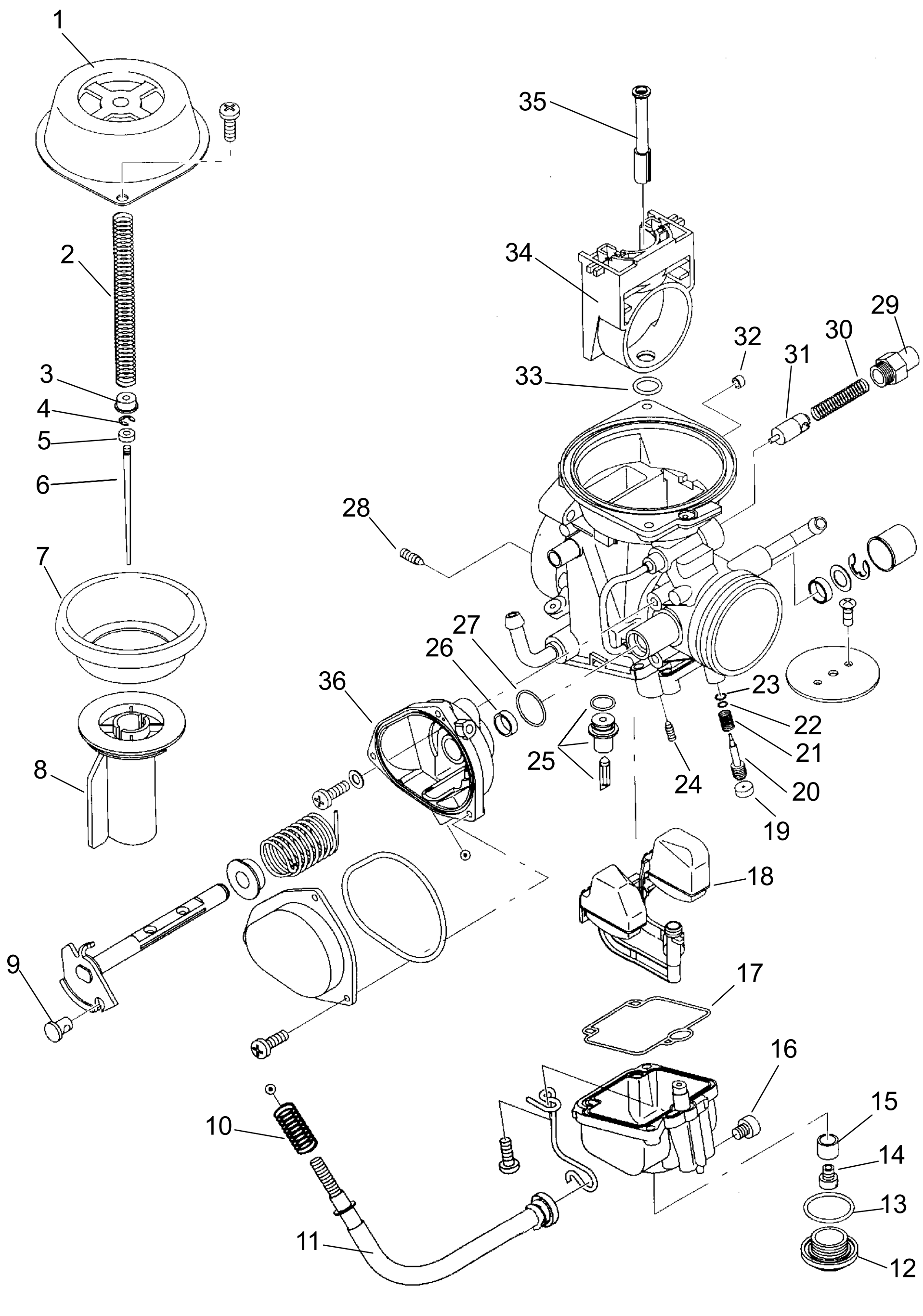
Refer to Page 4.5 for Jet Part Numbers



Jet Needle
"E" Clip Position

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. Filter
38. Screw
39. Screw
40. Screw
41. Guide Holder
42. Spring
43. Plunger Assembly
44. Spring Washer
45. Screw
46. Air Jet
47. Cable Guide
48. Spring
49. Ring
50. Adjust Screw
51. Screw and Washer Assy.

Mikuni BST 40 Carburetor Exploded View



1. Cover, Diaphragm
2. Spring
3. Spring Seat
4. “E” Clip
5. Spacer
6. Jet Needle
7. Diaphragm Assembly
8. Throttle Valve
9. Cable Guide
10. Spring
11. Adjuster Cable
12. Drain Plug
13. O-Ring
14. Jet, Main
15. Spacer Ring
16. Drain Screw
17. O-Ring
18. Float Assembly
19. Plug
20. Pilot Screw
21. Spring
22. Washer
23. O-Ring
24. Pilot Jet
25. Valve, Inlet Needle
26. Shaft Seal
27. O-Ring
28. Air Jet
29. Choke Plunger Guide
30. Spring
31. Choke Plunger
32. Cap
33. O-Ring
34. Jet Block Assembly
35. Needle Jet
36. Case

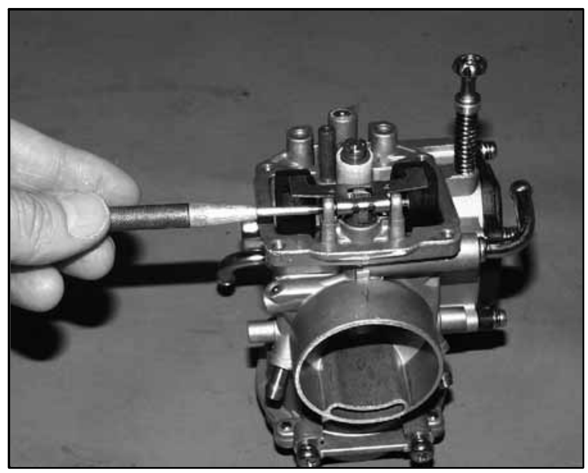
Refer to Page 4.5 for Jet Part Numbers

Carburetor Disassembly Notes- Mikuni CV

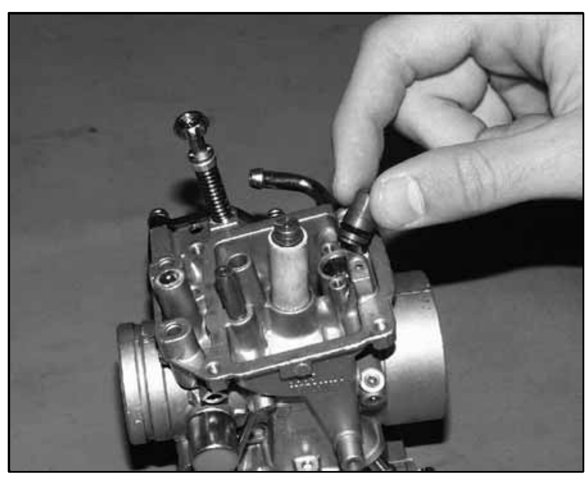
Use the following disassembly, assembly, and inspection techniques to service a CV carburetor.

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.

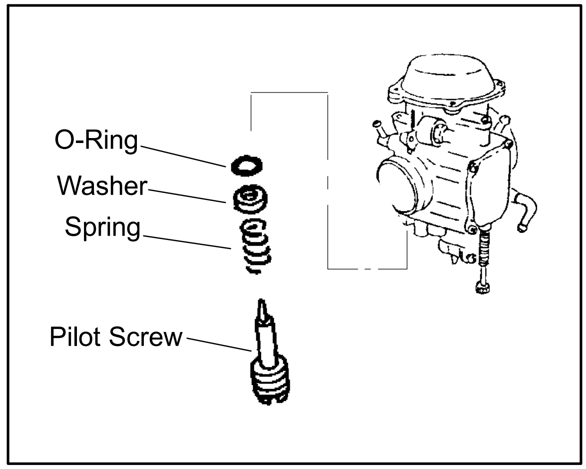
2. Use a small spring loaded center punch to remove pressed float pin.



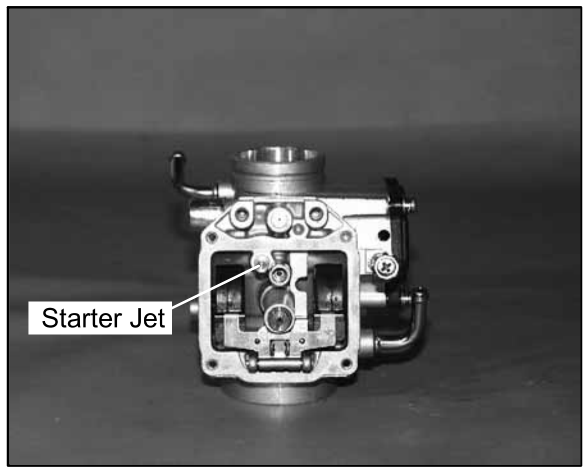
3. Remove inlet needle seat retaining screw along with plate, and carefully remove needle seat. **NOTE:** Do not use a pliers to remove the seat or permanent damage may occur.



4. Do not misplace the pilot mixture screw, spring, flat washer, or O-Ring. If anti-tamper plug is installed in pilot screw cavity, refer to Maintenance chapter 2 for removal procedure.



5. **NOTE:** The starter jet is not removeable.



Carburetor Cleaning

1. Thoroughly clean the carburetor body, jets, and all passages with carburetor cleaner or electrical contact cleaner.

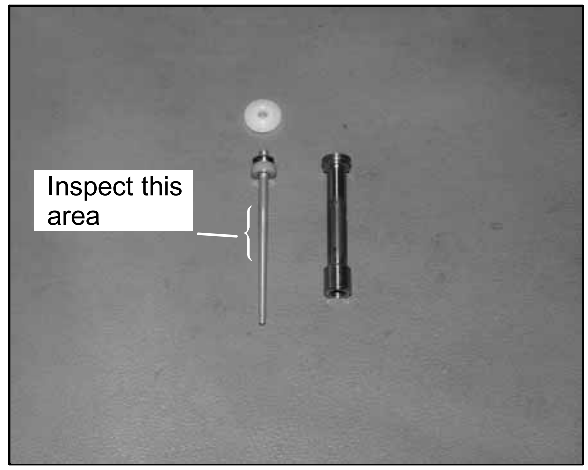
WARNING

Protect eyes from contact with cleaner. If you get cleaner in your eyes or if you swallow cleaner, see your doctor immediately. Some carburetor cleaners are extremely caustic and 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.

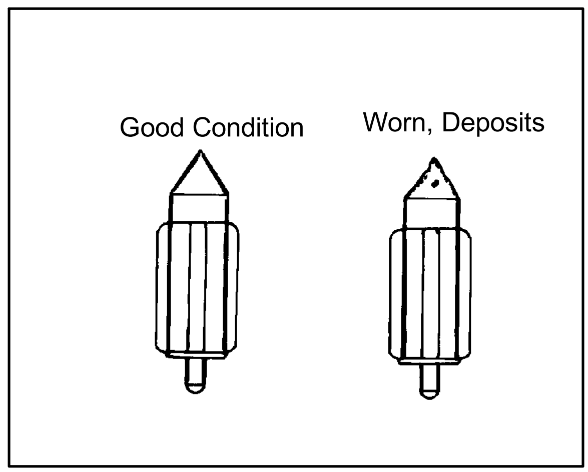
2. If the carburetor is extremely dirty or contaminated with fuel residue and varnish, soak for short periods only in carburetor cleaner, and rinse in hot water.
3. Replace the jets if they are extremely dirty or have a buildup of fuel residue or bacterial growth. Even a small amount of residue will 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 on the jets as the orifice size may be altered.
5. Use low pressure air to dry carburetor body and all components.

Carburetor Inspection

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



2. Inspect the inlet needle tapered surface for any sign of wear or damage. Be sure the spring loaded pin is free moving and returns freely when pushed. The inlet needle and seat should be pressure tested after assembly.

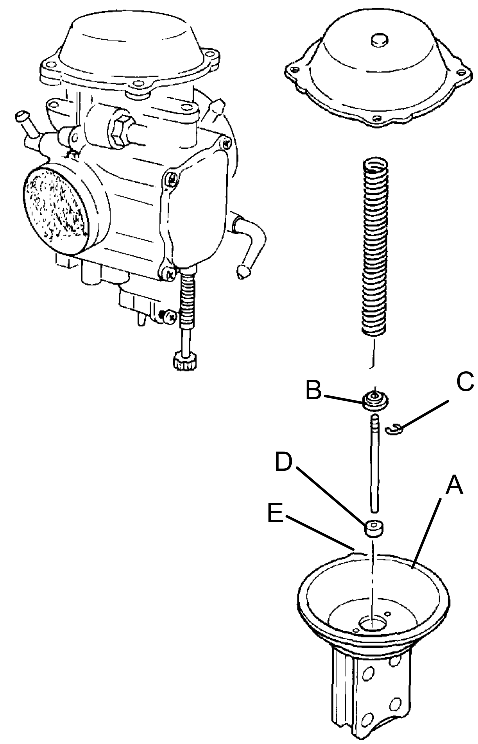


Carburetor Assembly

1. 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.

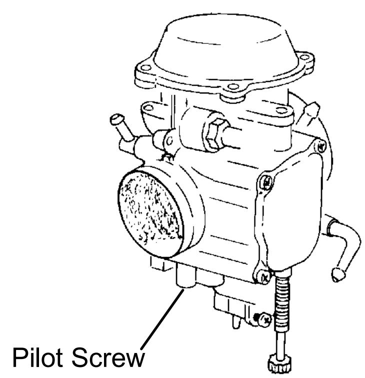
2. Replace parts in proper order. The spring seat washer (B) is stepped and must be placed on TOP of “E” Clip (C). Spacer washer (D) must be installed below the E-Clip. Refer to parts manual for more information.

3. Be sure the tab (E) on outer edge of diaphragm is positioned properly in the carburetor body.



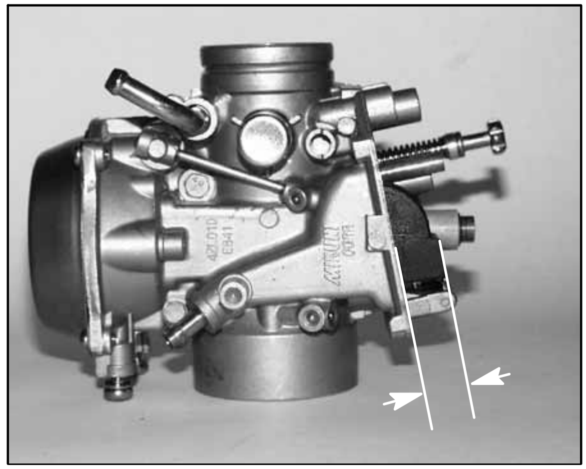
4. Install the pilot mixture screw, spring, washer, and O-ring as an assembly. Lubricate the O-Ring with oil or light grease before installation. **CAUTION:** Do not damage the O-ring during installation. Turn the screw in until it *lightly* contacts the seat. Back out the specified number of turns. NOTE: The final pilot (idle) mixture must be adjusted with
   the engine running. Refer to Page 2.12a.

Pilot Mixture Screw Base Setting (Turns Out) **Refer to General / Specifications Chapter 1**



Float Height Adjustment

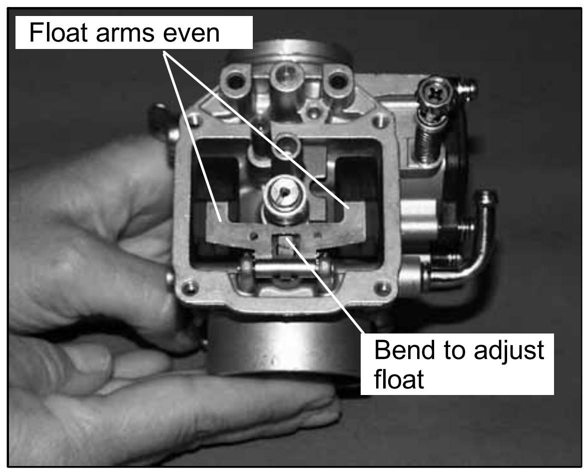
1. Place the carburetor on a level surface as shown at right to remove weight from float arm. In this position, the float tongue will rest lightly on the inlet needle valve pin without compressing the spring.
2. Measure the height from the float bowl mating surface to the top of step in float as shown. 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.



Float Height:

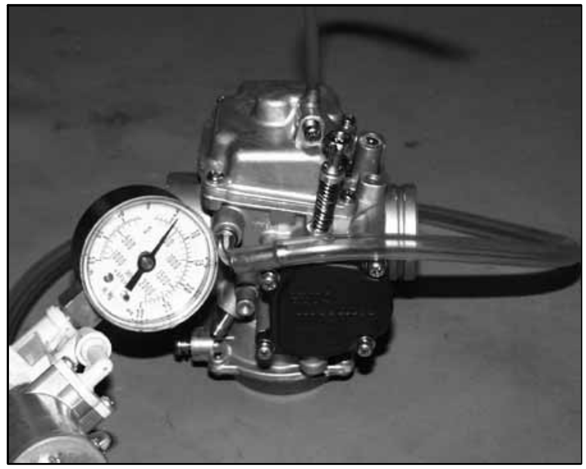
Std:	**BST 34**	**13.0mm (.51″) ± 1 mm**
	BST 40	**14.7mm (.58″) ± 1 mm**

3. If adjustment is necessary, bend the tongue slightly. Be sure float arms are even on left and right side.



Needle and Seat Leakage Test

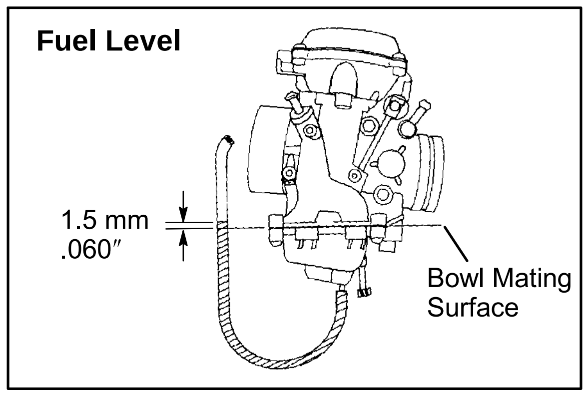
1. Install the float bowl. Invert the carburetor and install a Mity-Vac™ (PN 2870975) to the fuel inlet fitting. Apply 5 PSI pressure to inlet fitting. The needle and seat should hold pressure indefinitely. If not, inspect needle and seat and seat O-ring.



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. Be sure to review all fuel warnings on page 4.41 and 4.44.



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.

Fuel Pump

4 Cycle models are equipped with a pressure regulated fuel pump (about 1-3 PSI). The pump is located under the headlight cover at the front of the machine or on lower left side of fuel tank (near oil tank). Refer to illustration on following page for fuel pump component identification.

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.

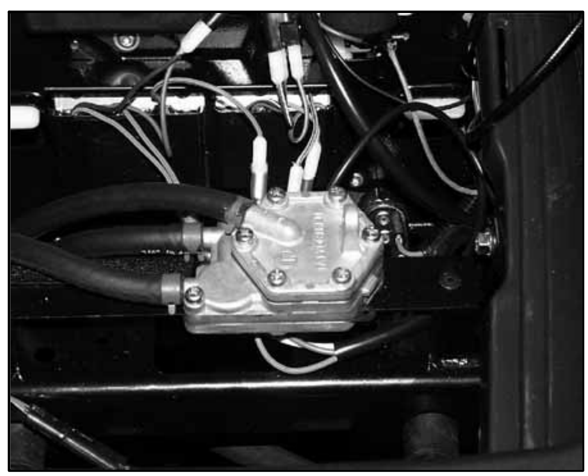
If fuel is present in the impulse line or vacuum chamber of the pump, the diaphragm is ruptured and the pump diaphragms must be replaced.

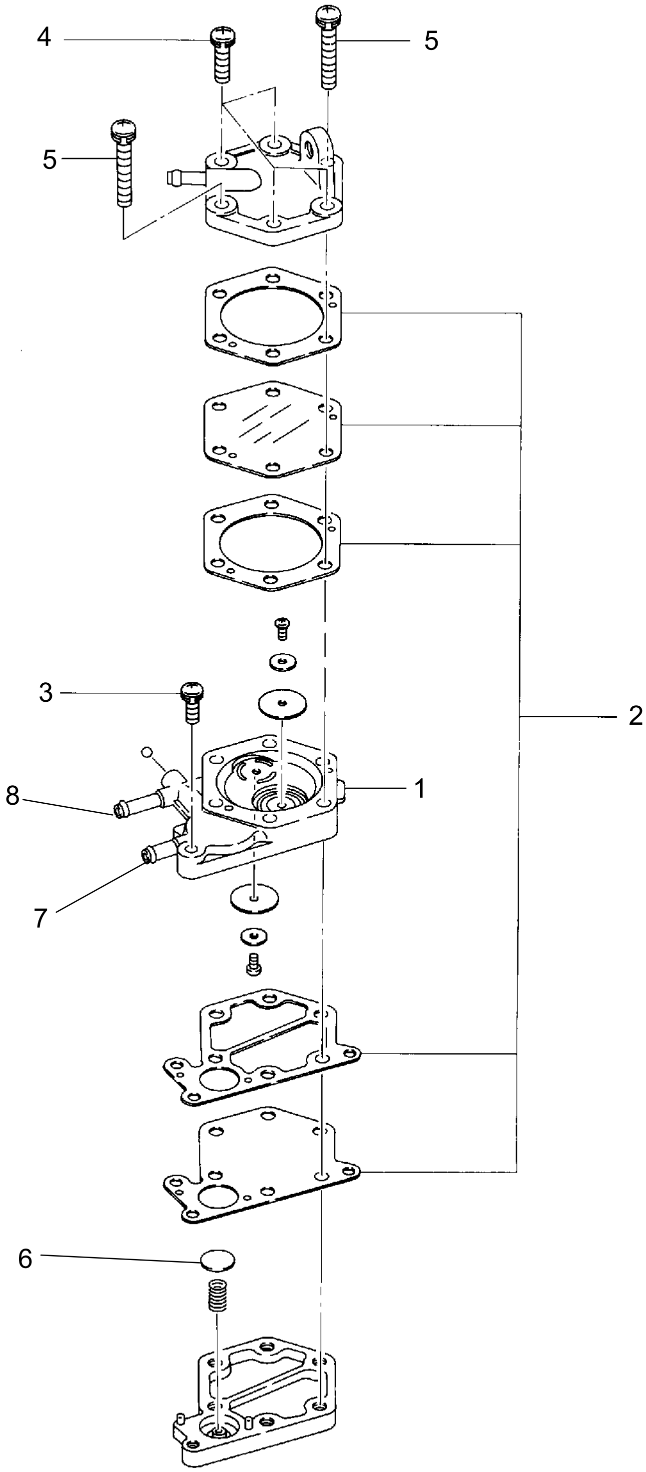
Fuel Pump Disassembly

1. Refer to illustration on following.
2. Remove the screws from the pump diaphragm cover. Note the location of the two longer screws.
3. Remove the diaphragm cover gasket, diaphragm, and valve body gasket.
4. 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.





Fuel Pump
Exploded View

1. Fuel Pump Assembly
2. Diaphragm, Gasket Set
3. Screw and Washer Assembly
4. Screw and Washer Assembly
5. Screw and Washer Assembly
6. Pressure Regulator
7. Fuel Inlet
8. Fuel Outlet

Fuel Starvation/Lean Mixture

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

- No fuel in tank
- Restricted tank vent, or routed improperly
- Fuel lines or fuel valve restricted
- Fuel filter plugged
- Carburetor vent line(s) restricted
- Plugged or restricted inlet needle and seat screen or inlet passage
- Clogged jets or passages
- Float stuck, holding inlet needle closed or inlet needle stuck
- Float level too low
- Fuel pump inoperative (4 Strokes)
- Air leak at impulse line (4 Strokes)
- Restricted impulse line (kinked, pinched) (4 Strokes)
- Intake air leak (throttle shaft, intake ducts, airbox or air cleaner cover)
- Ruptured vacuum slide diaphragm, Vacuum slide stuck closed or sticky (4 Strokes)
- Improper spring (4 Strokes)
- Jet needle position incorrect
- Incorrect pilot screw adjustment

Rich Mixture

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

- Air intake restricted (inspect intake duct)
- Air filter dirty/plugged
- Choke plunger sticking, incorrectly adjusted choke
- Choke cable binding or improperly routed
- Incorrect pilot air/fuel screw adjustment
- Faulty inlet needle and seat
- Faulty inlet needle seat O-Ring
- Float level too high
- Poor fuel quality (old fuel)
- Loose jets
- Worn jet needle/needle jet or other carburetor parts
- Dirty carburetor (air bleed passages or jets)
- Weak or damaged vacuum piston return spring (4 Strokes)
- Fouled spark plug

Poor Idle

Symptoms: Idle too high.

- Idle adjusted improperly/idle mixture screw damaged
- Sticky vacuum slide (4 Strokes) or throttle valve (2 strokes)
- Throttle cable sticking, improperly adjusted, routed incorrectly
- Choke cable sticking, improperly adjusted, routed incorrectly

Troubleshooting

Idle Too Low

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

Erratic Idle

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

CHAPTER 5
BODY / STEERING / SUSPENSION

Torque Specifications

*Suspension / Steering

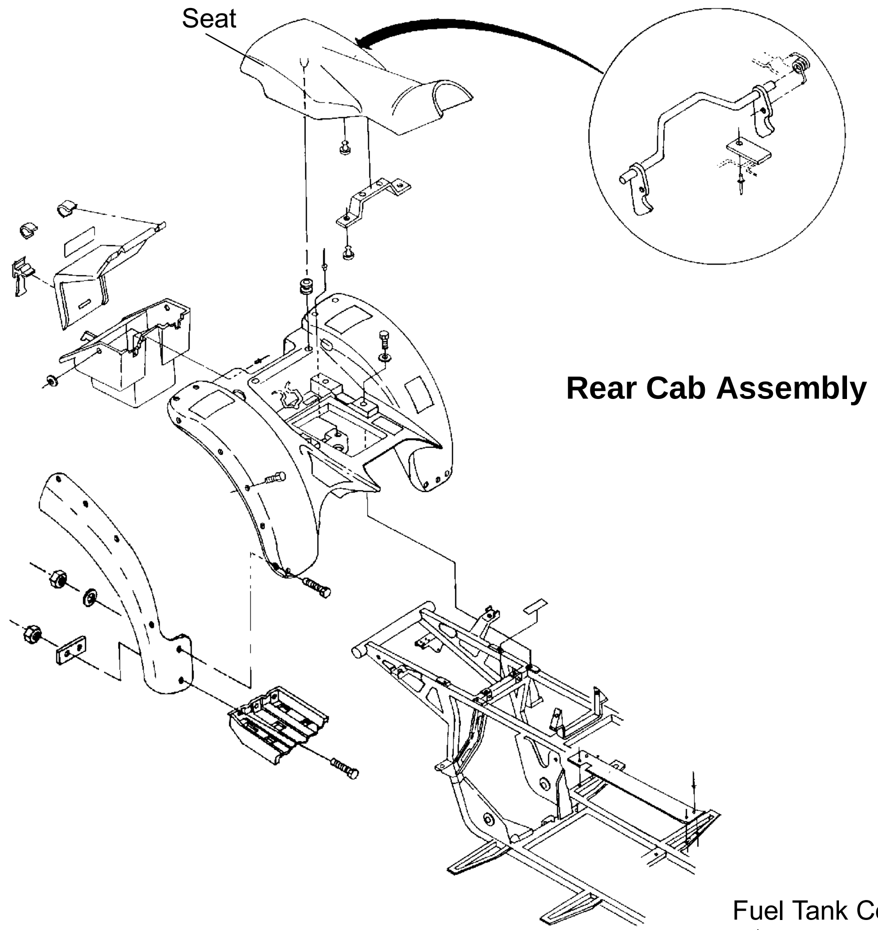
Front A-Arm Attaching Bolt	30 ft. lbs. (41 Nm)
Front A-Arm Ball Joint Stud Nut	25 ft. lbs. (35 Nm)
Handlebar Adjuster Block	10-12 ft. lbs. (14-17 Nm)
Master Cylinder	45-55 in. lbs. (5.2-6.3 Nm)
Rear Axle Nut and Lock Nut (Std. Swingarm)	150 ft. lbs. (207 Nm)
Rear Axle Nut - Concentric Swingarm (Tapered 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 (Shaft Drive Models)	100 ft. lbs. (138 Nm)
Rear Wheel Hub Nut	80 ft. lbs. (110 Nm)
Rear Wheel Nuts (Chain Drive Models)	50 ft. lbs. (69 Nm)
Rear Wheel Nuts (Shaft Drive Models)	15 ft. lbs. (21 Nm)
Strut Rod Retaining Nut (Top)	15 ft. lbs. (21 Nm)
Strut Casting Pinch Bolt	15 ft. lbs. (21 Nm)
Swing Arm Pivot Bolt (standard swingarm)	55 ft. lbs. (76 Nm)
Swing Arm Pivot Bolt (concentric swingarm)	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)

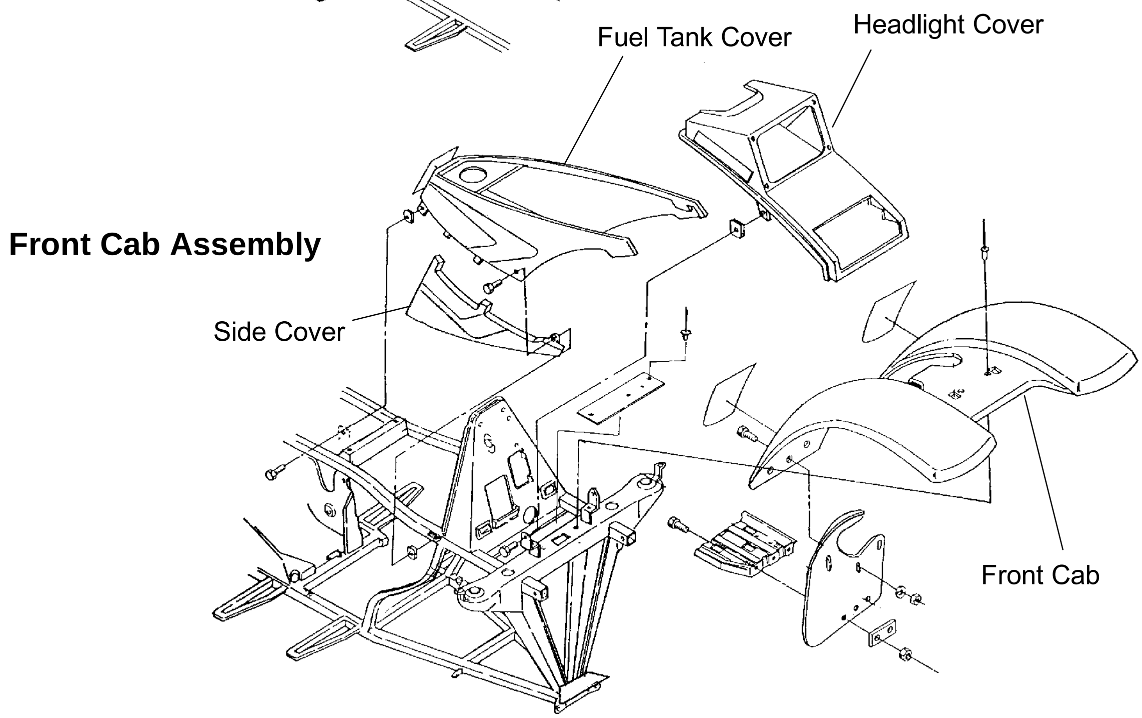
NOTE: Refer to exploded views throughout this chapter for identification and location of components.

Special Tools

Description	Part No.
Strut and Ball Joint Tool Set	2870871
Shock Spanner Wrench	2870872
Shock Spring Compressor Tool	2870623
Strut Rod Holding Wrench	2871572
Strut Spring Compressor Tool (LH)	2871573
Strut Spring Compressor Tool (RH)	2871574
Body Holding Tool	2871017
Safety Needle	7052069
Shock Spring Compressor Tool	2870623
Gas Shock Recharging Kit	2200421
Damper Rod Holding Tool	2871352
Fox™ Shock IFP Tool	2871351

Body Assembly Exploded View (Gen II - Typical)



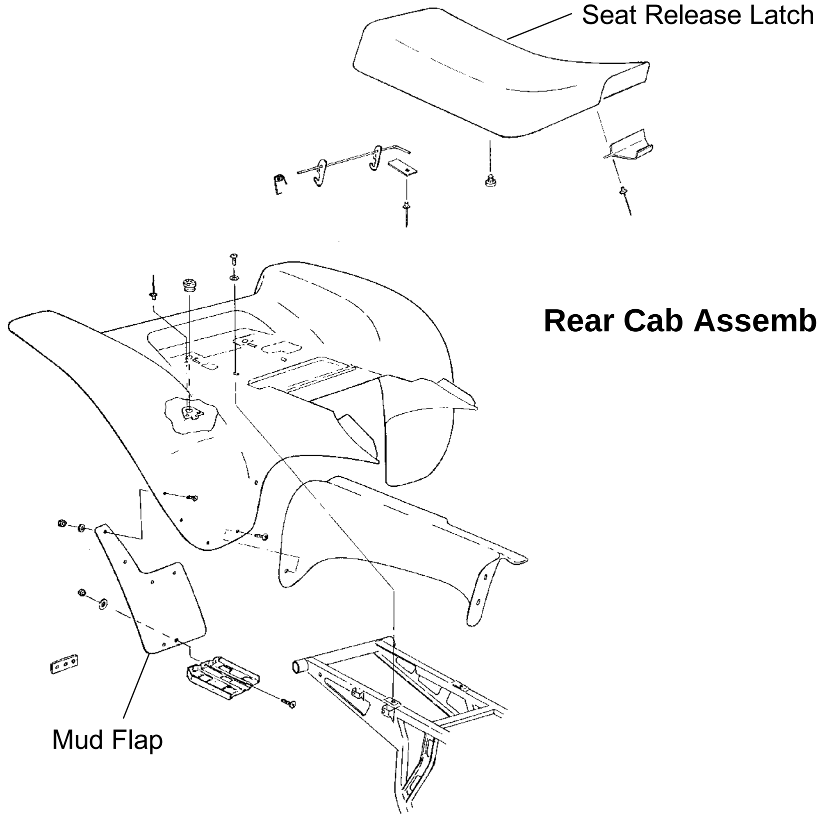


All warning information labels must be in place when body parts are assembled.

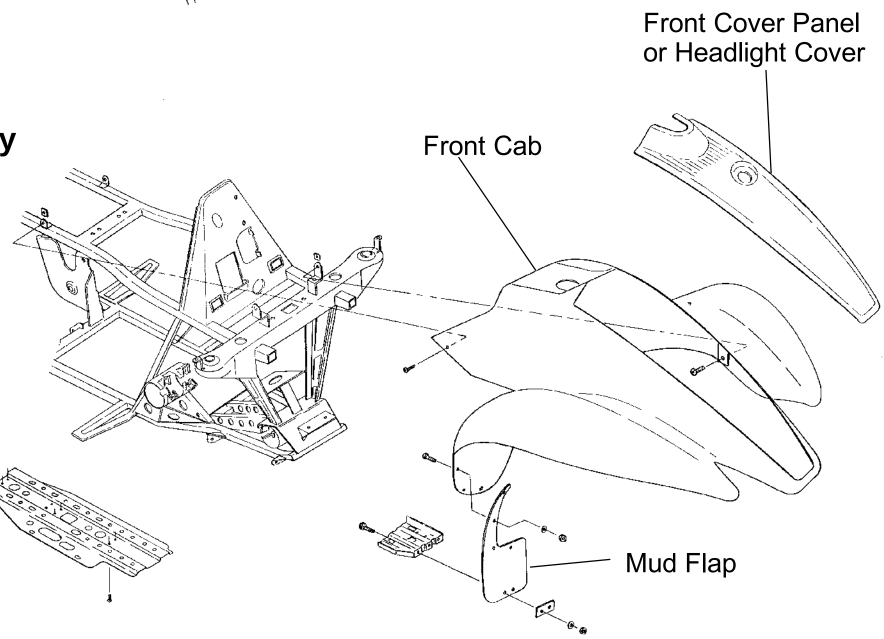
To Remove:	**Perform These Steps:**
Seat	Pull release lever at the rear of the seat Lift and pull seat rearward, disengaging seat from tabs at the rear of the fuel tank
Fuel tank cover	Remove: Seat Ignition key Side panels Fuel cap 2 retaining screws at rear of fuel tank cover 2 retaining screws at side of fuel tank cover Disengage tabs at front of cover on left and right side
Side panels	Remove: Seat 1 screw on left side front 1 screw on right side front
Headlight cover	Remove: Seat Fuel tank cover 2 Torx™ screws at rear of cover 1 screw on left front 1 screw on right front Disconnect headlamp wiring harness
Radiator cap access panel	Turn fastener at front 1/4 turn
Rear rack	Remove: Seat 2 bolts, nuts and washers at rear of rack 2 bolts, nuts and washers at front of rack
Rear cab assembly	Remove: Seat Rear rack 3 screws, nuts and washer plate at rear of left footrest 2 screws, nuts and washer plate at rear of right footrest 6 bolts and flat washers from top of cab assembly, under seat 2 screws at front of muffler guard
Front rack	Remove: 4 bolts, nuts and washers
Front cab assembly	Remove: Seat Side panels Fuel tank cover Headlight cover Front rack Fuel pump bracket 3 screws, nuts and washers from left footrest 2 screws, nuts and washers from right footrest 2 rivets at top of cab beneath fuel pump bracket

Body Assembly Exploded View (Gen III - Typical)

Rear Cab Assembly

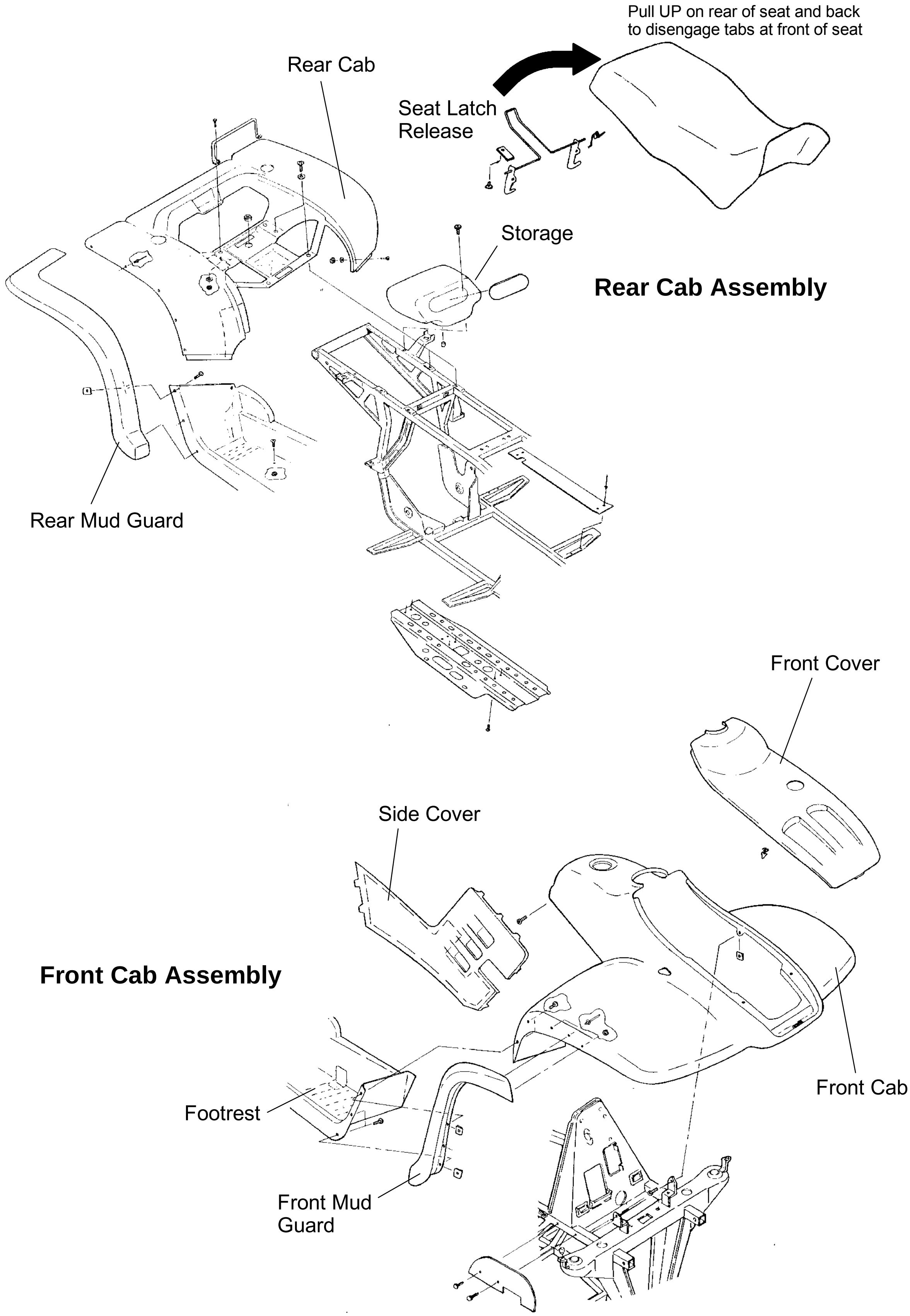


Front Cab Assembly



To Remove:	Perform These Steps:
Seat	Pull release lever at left rear of seat Lift and pull seat rearward, disengaging seat from tabs at the rear of the fuel tank
Front Panel / Headlight Cover	Remove: Oil tank cap Disengage tabs on both sides and rear Disconnect headlamp wiring harness (where applicable)
Rear cab assembly	Remove: Seat 3 screws, nuts and washer plate at rear of left footrest 2 screws, nuts and washer plate at rear of right footrest 4 bolts and flat washers from top of cab assembly 2 screws at rear of muffler guard 2 screws at rear of front cab on each side Disconnect taillight harness
Front cab assembly	Remove: Seat Fuel tank cap Headlight cover 3 screws, nuts and washers from left footrest 2 screws, nuts and washers from right footrest 2 rivets at top of cab beneath fuel pump bracket 2 screws at rear of front cab on each side 2 screws in front top of cab 2 Torx™ screws on key switch face plate Key Key switch face plate

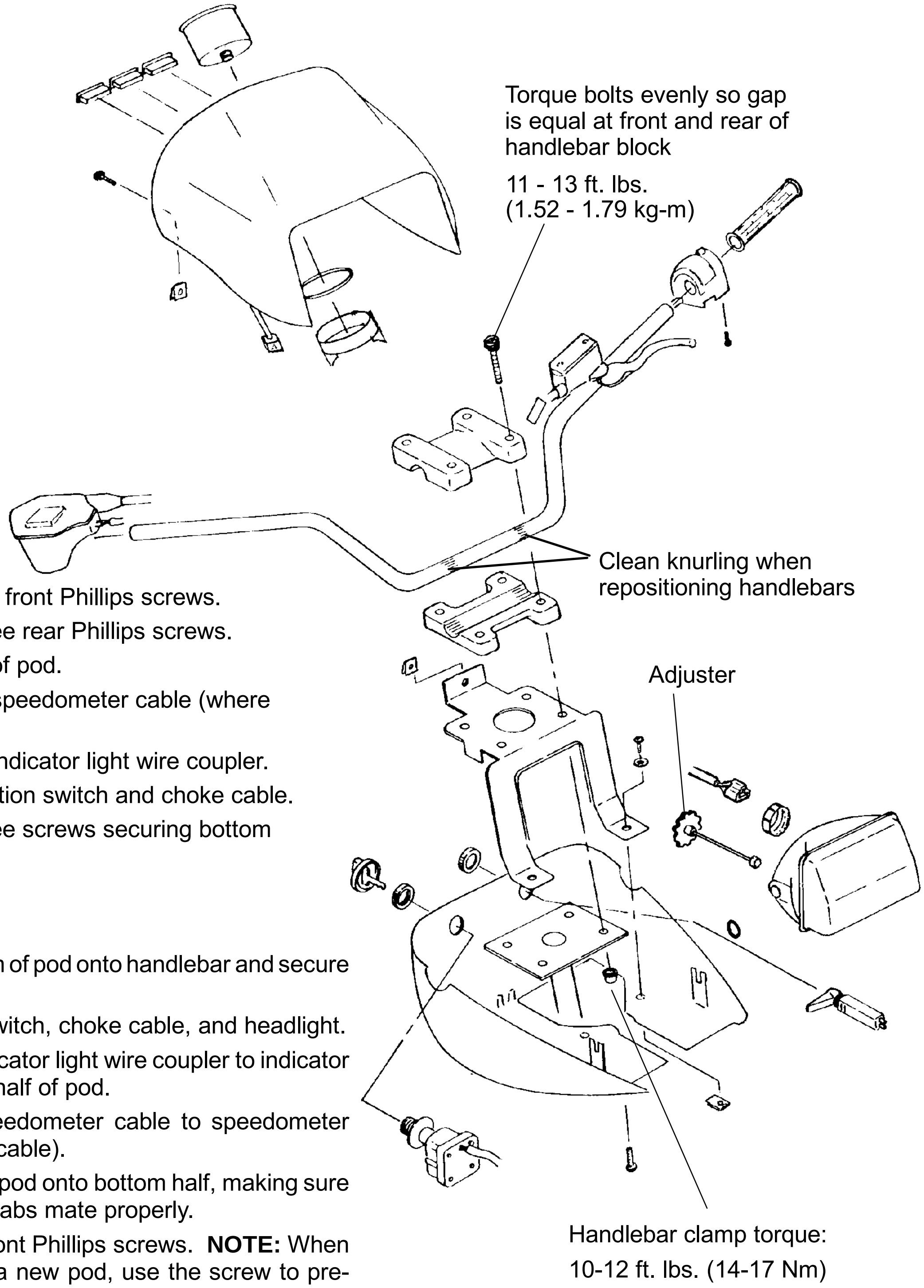
Body Assembly Exploded View (Gen IV - Typical)



Cover/Panel Removal (Gen IV - Typical)

To Remove:	Perform These Steps:
Seat	Pull release lever at the rear of the seat Lift and pull seat rearward, disengaging seat from tabs at the rear of the fuel tank
Side panels (See page 5.9) . . .	Remove: Seat Disengage tabs at front and rear
Headlight pod (See page 5.8)	
Front cover	Remove: Front rack Disengage tabs at front and rear Lift panel out
Rear rack	Remove: Seat 2 bolts at rear of rack 2 bolts at front of rack
Rear cab assembly	Remove: Seat Rear rack 1 screw, nut and washer at rear of inner left footrest 4 screws at bottom of left rear mudflap 1 screw, nut and washer at rear of inner right footrest 4 screws at bottom of right rear mudflap 4 bolts and flat washers from top of cab assembly, under seat 2 screws at rear bottom of cab assembly near tail light Disconnect taillight harness
Front rack	Remove: 4 screws, lock washers, and flat washers
Front cab assembly	Remove: Seat Side panels 2 screws at rear of cab at fuel tank mount bracket Front rack Front bumper Front cover panel 3 screws from bottom left mudflap 3 screws from bottom right mudflap 1 inner screw from front cab to foot rest on each side 2 screws under front panel

Headlight Pod Exploded View (Gen IV - Typical)



Disassembly

- Remove two front Phillips screws.
- Remove three rear Phillips screws.
- Lift top half of pod.
- Disconnect speedometer cable (where applicable).
- Disconnect indicator light wire coupler.
- Remove ignition switch and choke cable.
- Remove three screws securing bottom half of pod.

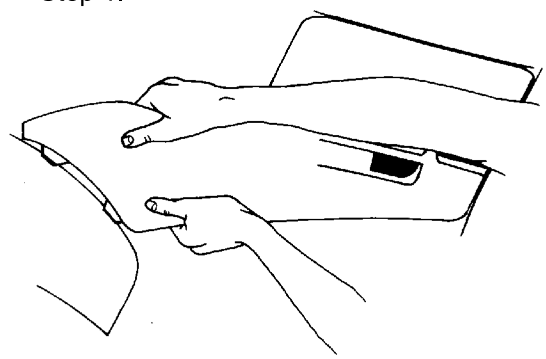
Assembly

- Install bottom of pod onto handlebar and secure to brackets.
- Install key switch, choke cable, and headlight.
- Connect indicator light wire coupler to indicator lights in top half of pod.
- Connect speedometer cable to speedometer (where applicable).
- Install top of pod onto bottom half, making sure interlocking tabs mate properly.
- Install two front Phillips screws. **NOTE:** When assembling a new pod, use the screw to pre-thread the two front holes in the top pod before mating halves.
- Install three rear Phillips screws, aligning with Tinnerman™ clips.
- To adjust headlight, refer to procedure outlined in Maintenance chapter.

Side panel removal may be difficult until the locking tabs and receivers have been snapped and un-snapped a few times.

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

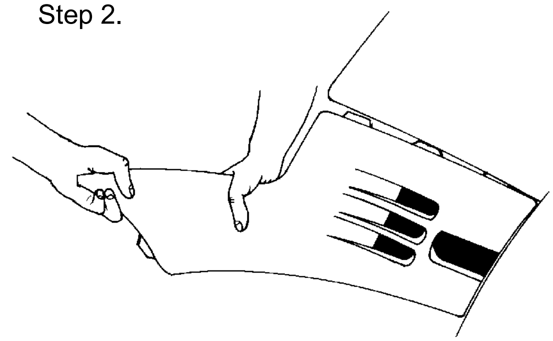
Step 1.



Pull forward and out to disengage 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 two tabs. Then pull up on side panel to disengage front upper and lower tab.

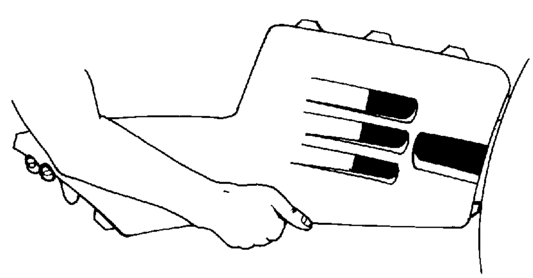
Step 2.



Push down to disengage top rear two tabs.

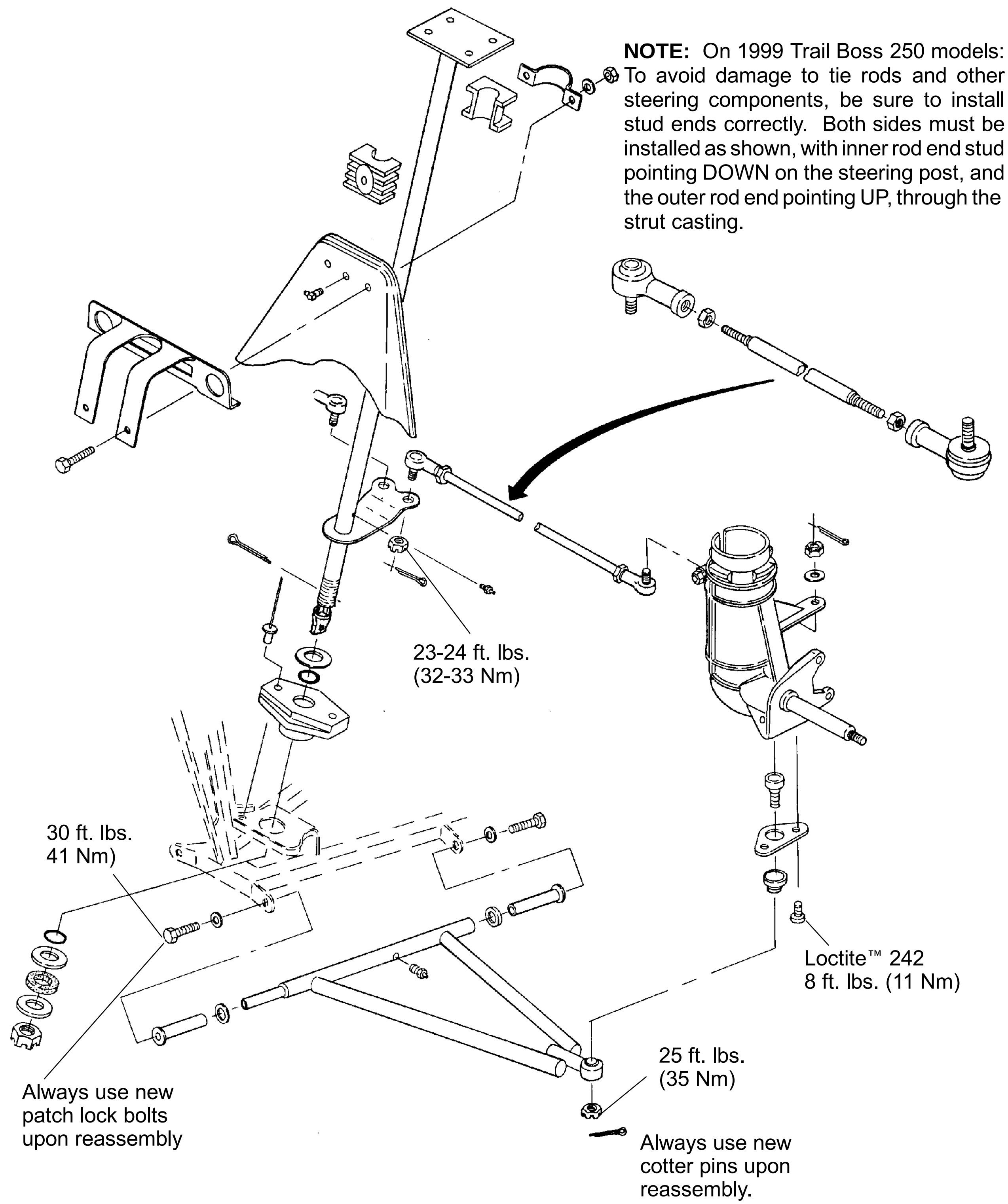
3. To reinstall side panel, align panel tabs with slots on front cab. Push panel upward and forward until tabs lock. Bend rear of side panel and insert the two tabs into the rear cab.

Step 3.

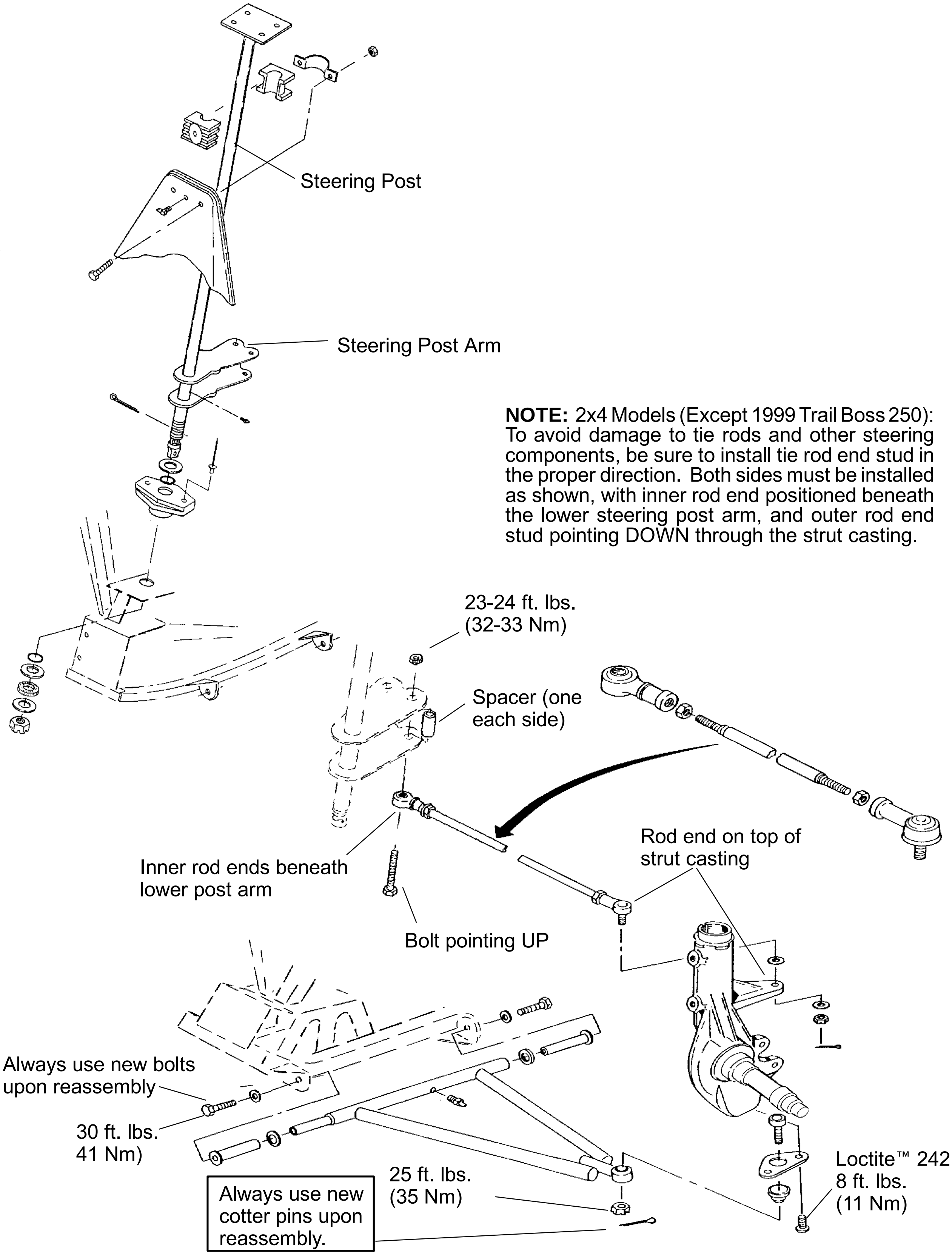


To reinstall, align panel tabs with slots. Push upward and forward until tabs lock.

Typical Steering Assembly, Exploded View, '99 Trail Boss 250



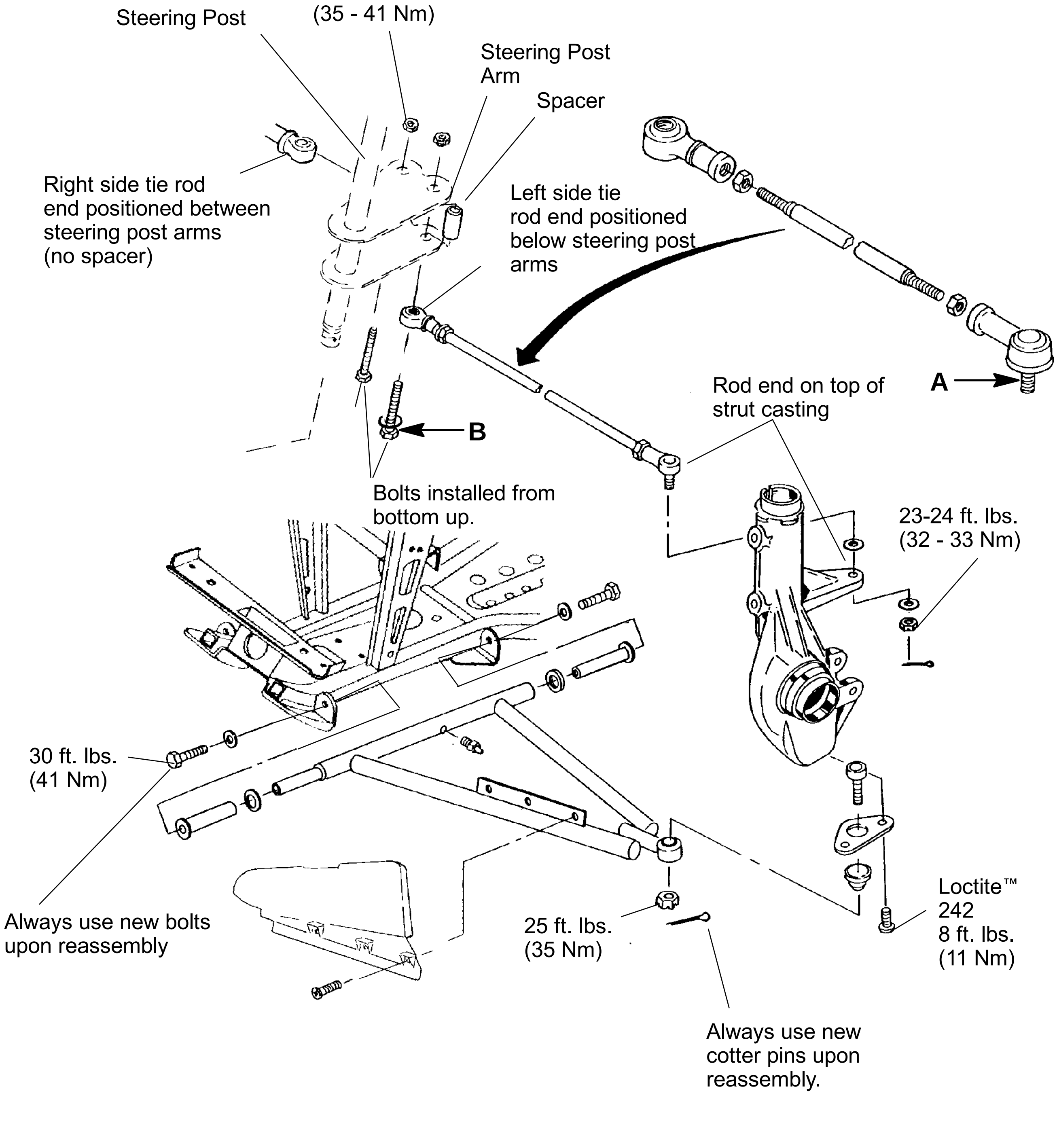
Steering Assembly, Exploded View, - 2x4 Models (Except ’99 Trail Boss 250)



NOTE: 2x4 Models (Except 1999 Trail Boss 250): To avoid damage to tie rods and other steering components, be sure to install tie rod end stud in the proper direction. Both sides must be installed as shown, with inner rod end positioned beneath the lower steering post arm, and outer rod end stud pointing DOWN through the strut casting.

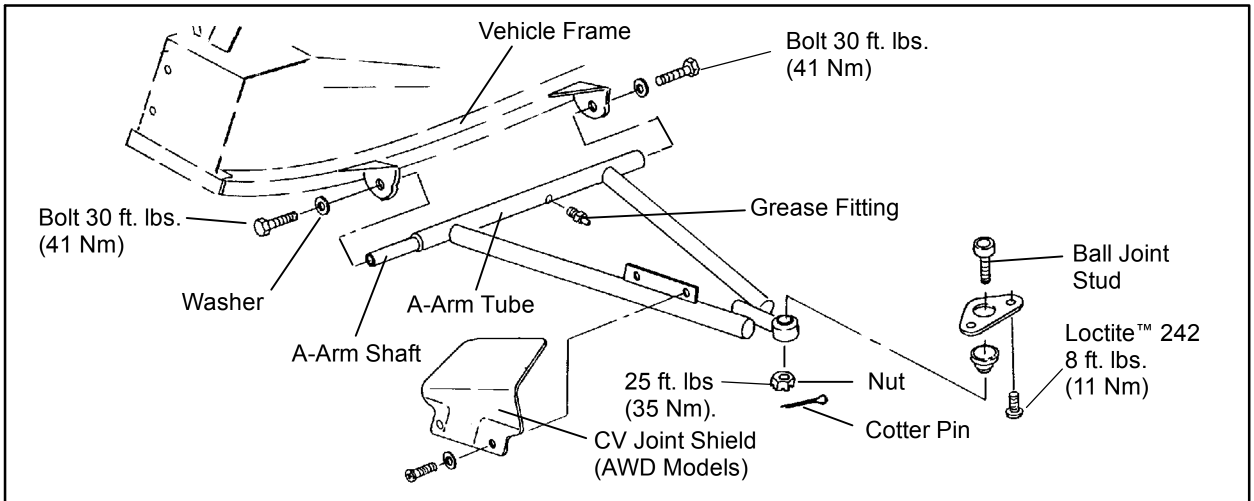
Steering Assembly, Exploded View All 4x4 and 6x6 Models

NOTE: All 4x4 and 6x6 Models:
To avoid damage to tie rods and other steering components, be sure to install tie rod end studs in the proper direction. The steering post arm bolt (B) points up; the rod end studs (A) point down. Be sure inner rod ends are positioned properly. The Right inner rod end must be placed between the steering post arms. The Left inner rod end must be below the lower arm as shown. Both outer rod end studs must point DOWN through the strut casting.



A-Arm Replacement

1. Elevate and safely support vehicle with weight removed from front wheel(s).
2. Remove cotter pin from ball joint stud at wheel end of A-arm and loosen nut until it is flush with end of stud.
3. Using a soft face hammer, tap nut to loosen A-arm from bolt. Remove nut and A-arm from hub strut assembly.
4. Loosen two bolts on A-arm tube by alternating each about 1/3 of the way until A-arm can be removed.
5. Examine A-arm shaft. Replace if worn. Discard hardware.
6. Insert A-arm shaft into new A-arm. **NOTE:** On AWD models, install CV joint shields. See Ill.



7. Install new A-arm assembly onto vehicle frame. Torque new bolts to 30 ft. lbs. (4.14 kg-m).

⚠ 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.

8. 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.
9. Locate grease fitting in center of A-arm tube and pump A-arm full of grease.

A-arm Attaching Bolt Torque:

30 ft. lbs. (41 Nm)

Ball Joint Stud Nut Torque:

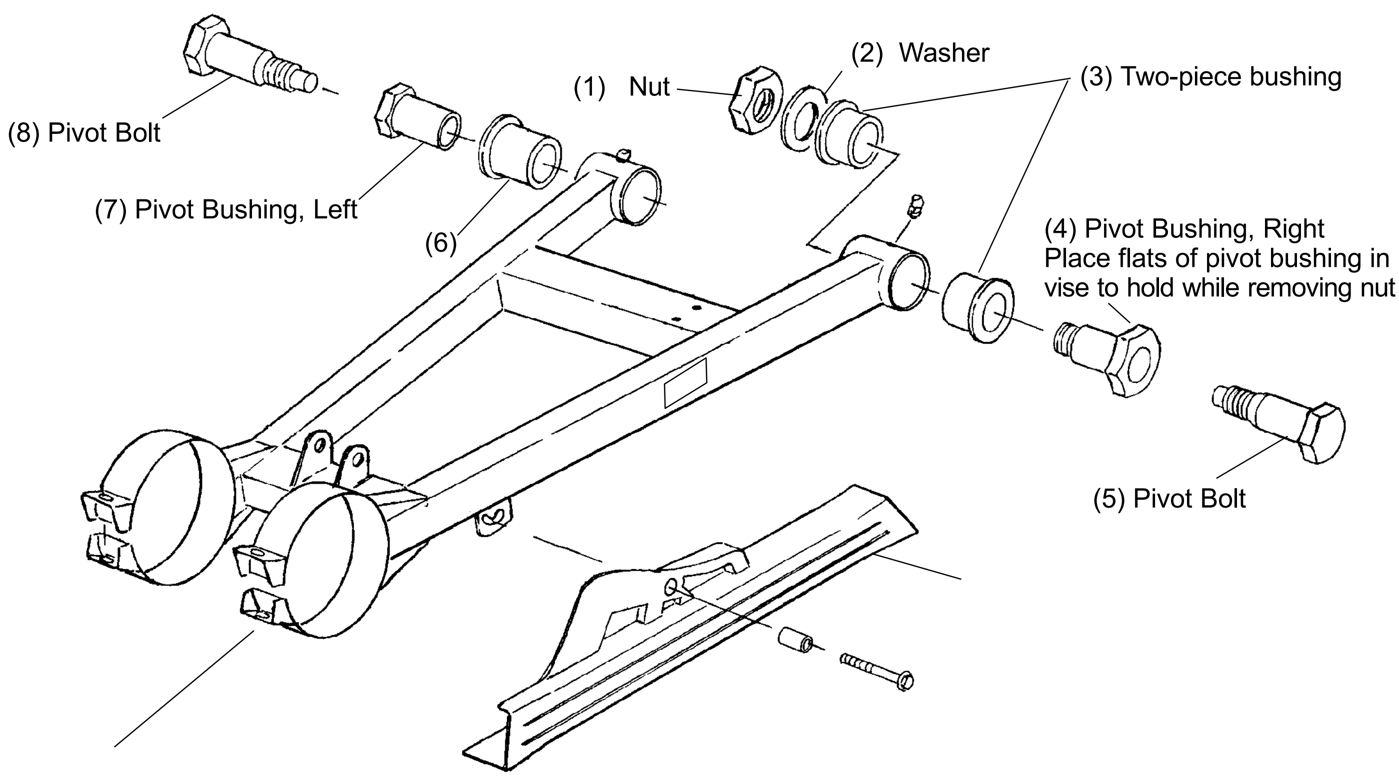
25 ft. lbs. (35 Nm)

⚠ WARNING

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

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.
5. Remove lower shock bolt.
6. Loosen both swingarm pivot bolts (5 and 8) and then remove both bolts while supporting swingarm.
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.



Eccentric clamp bolt torque:
Models with trailer hitch - 40 ft. lbs. (55 Nm)
Models without trailer hitch - 30 ft. lbs. (41 Nm)

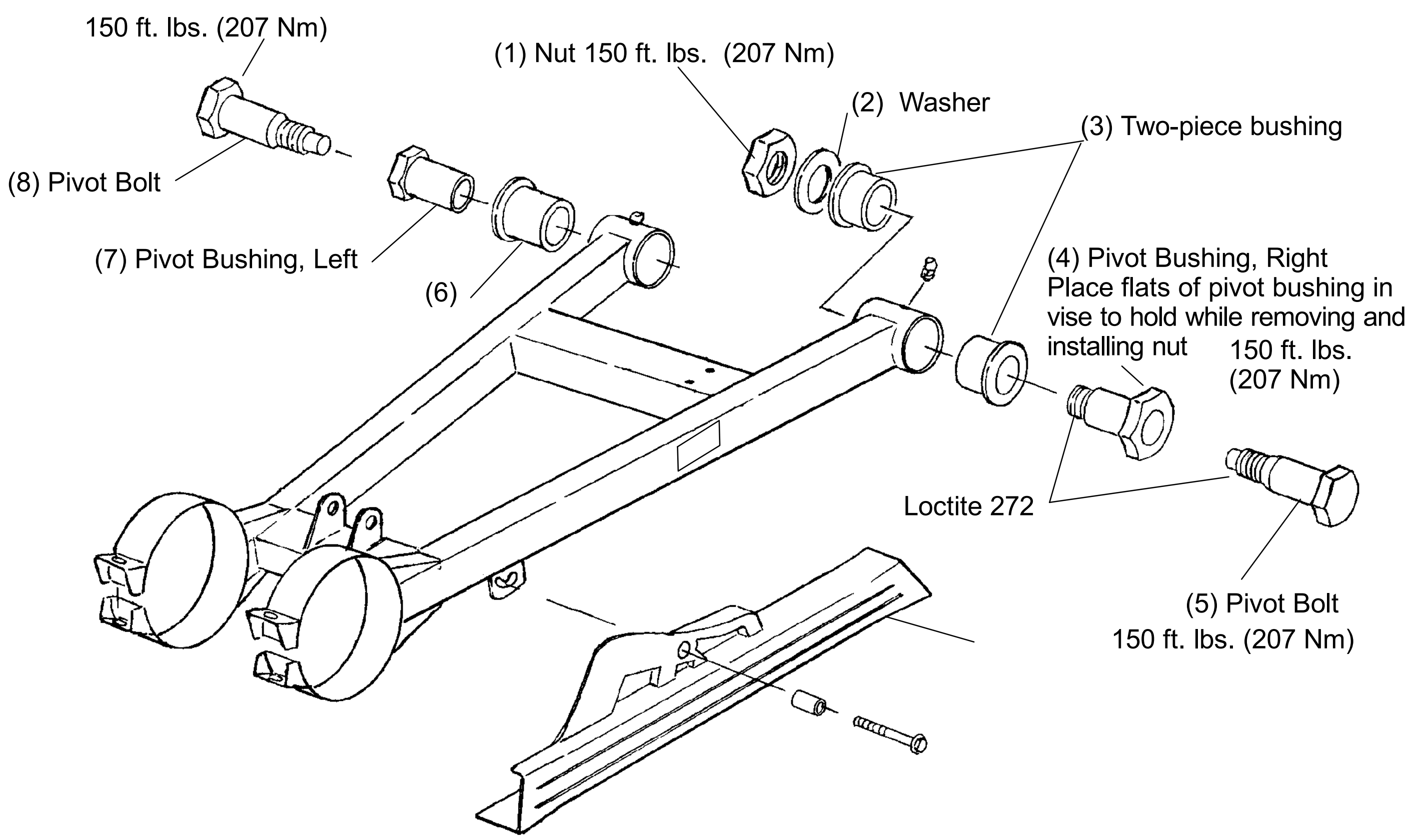
Refer to Maintenance section for chain adjustment information on Concentric swingarm models (tapered rear axle bearings).

Assembly / Installation

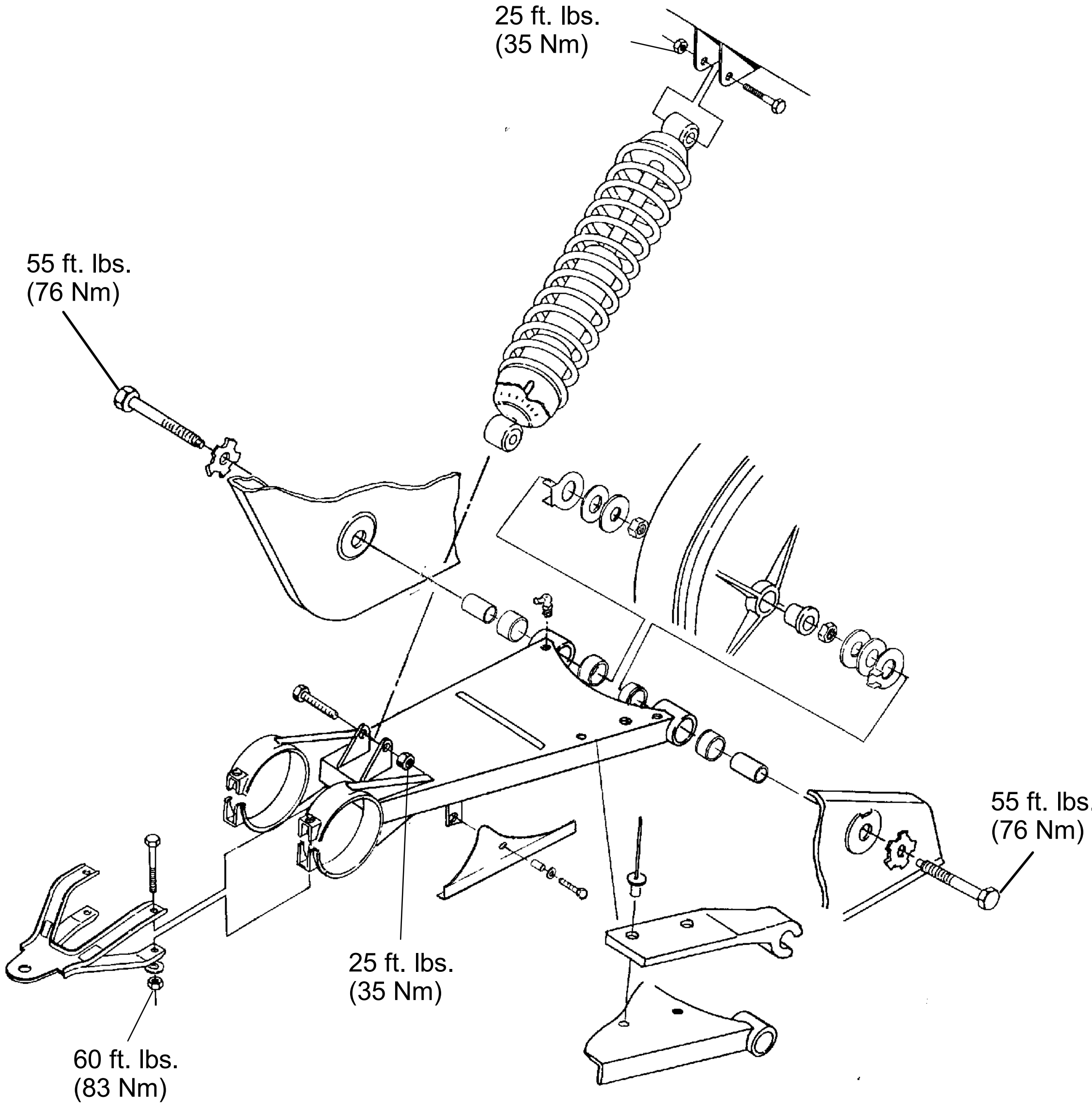
1. Lubricate and install bushing (6) in left side of swingarm and two-piece bushings (3) in right side.
2. Clean threads of nut (1), pivot bolts (5) and (8), and pivot bushings (4) and (7) with Loctite Primer T or Primer N. Apply Loctite 272 to threads of pivot bushing (4) and nut (1).
3. Install right 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 150 ft. lbs. (207 Nm).
5. Install left pivot bushing (7).

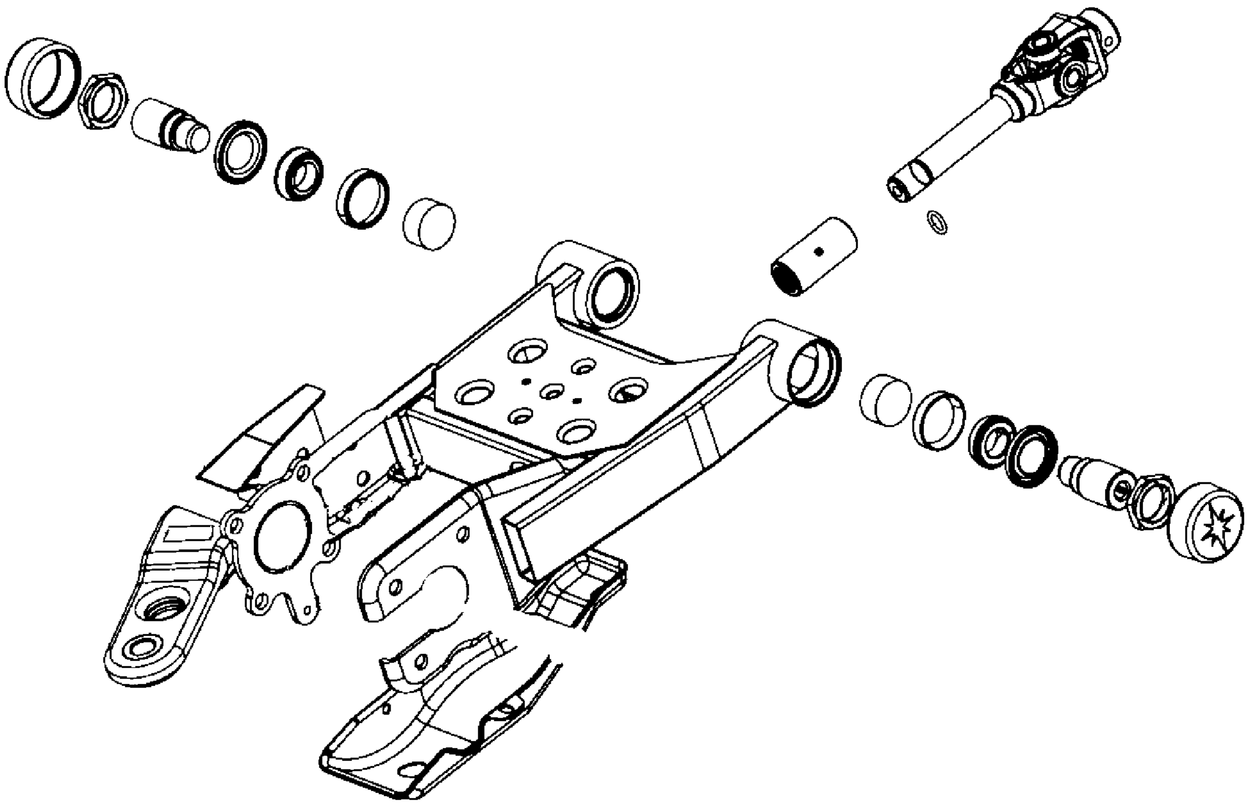
Note: There are stop plates attached to the inside of the frame to prevent the pivot bushings from turning when the pivot bolts are tightened. The flats of the pivot bushings must be oriented correctly to align with the frame plate, or the pivot bolt holes will not be aligned. The top flat on the nut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

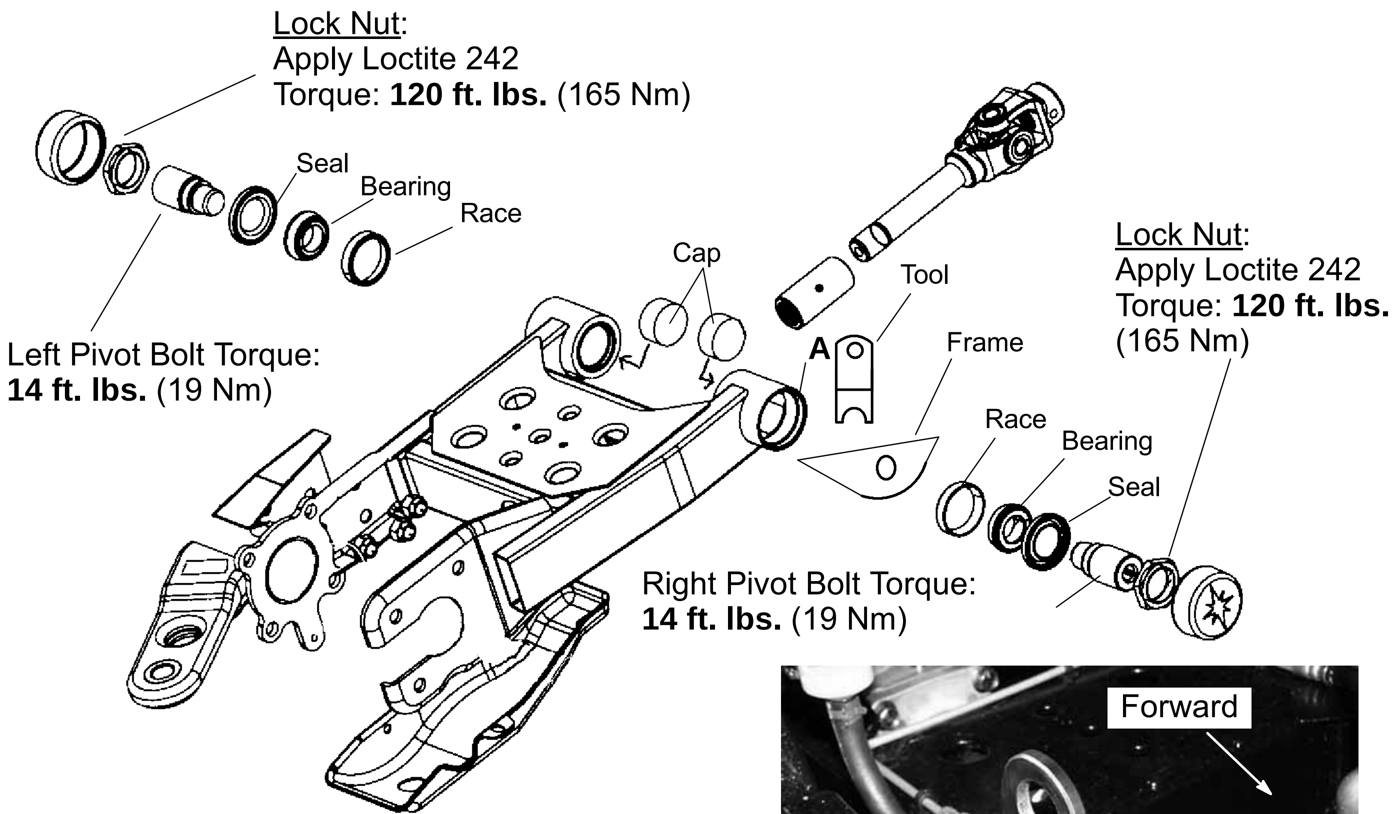
6. Install swingarm assembly in frame.
7. Apply Loctite 272 to threads of pivot bolts (5 and 8). Install and tighten pivot bolts slowly until the flats of the pivot bushings (4) and (7) engage the stop plate on the frame.
8. Torque pivot bolts (5) and (8) to 150 ft. lbs. (207 Nm).
9. Install lower rear shock bolt. Torque to 25 ft. lbs. (35 Nm). Assemble rear axle, brake caliper, caliper mount, hubs, wheels and chain. (Refer to Chapter 7)

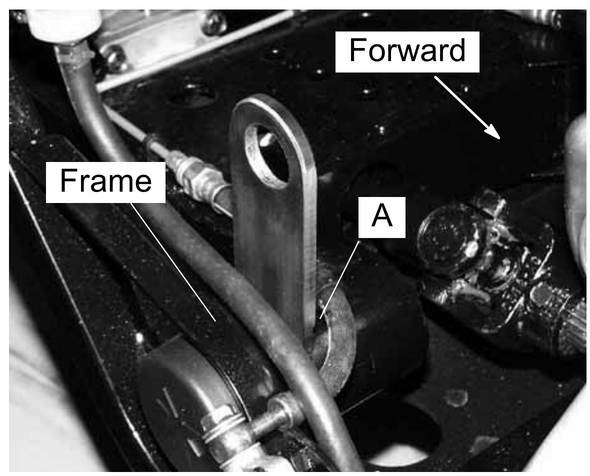


Standard Swing Arm and Rear Suspension Exploded View





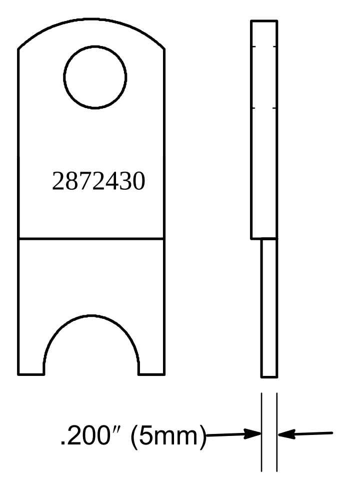




Swingarm Installation

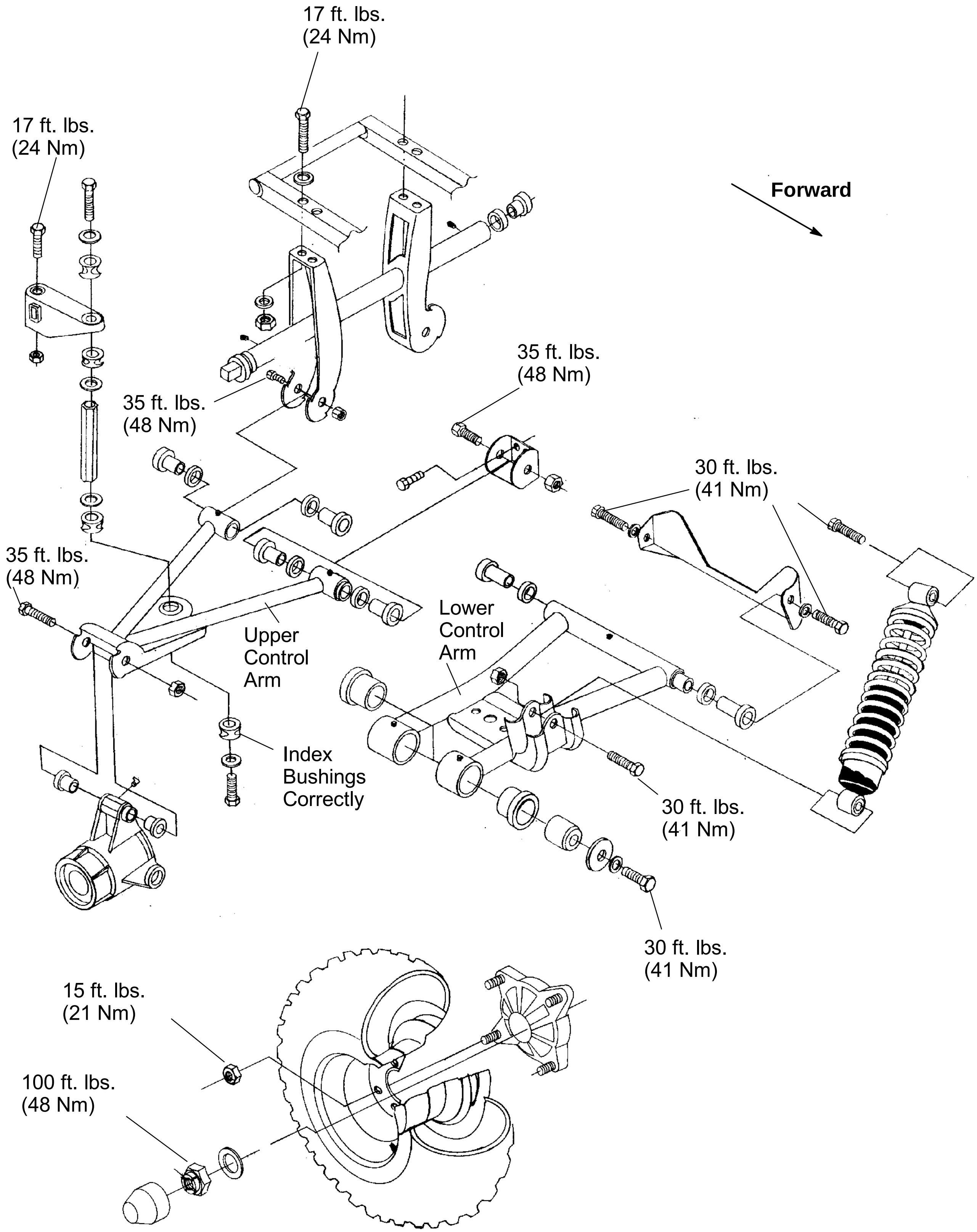
- Screw pivot bolts into frame on each side (about 3 turns).
- Install swingarm in frame with lubricated bearing, race, and seal installed in each side of swingarm.
- Tighten pivot bolts until both are engaged in bearings.
- Place Swingarm Spacer Tool (PN 2872430) or an equivalent .200″ (5mm) spacer between right side of swingarm and frame at point "A" as shown.
- Adjust left side pivot bolt inward until spacer tool (on right side) is trapped between frame and right side of swingarm at point "A".
- Adjust right side pivot bolt inward until firmly seated against bearing.
- With tool in place, torque left side pivot bolt to 14 ft. lbs. (19 Nm).
- Torque right side pivot bolt to 14 ft. lbs. (19 Nm). Try to remove spacer tool. If tool cannot be removed, tighten right side pivot bolt an additional 1/4 turn. Remove tool. If tool cannot be removed, repeat process.
- Apply Loctite 242 (Blue) to exposed threads of pivot bolts and lock nuts.
- Torque lock nuts to 120 ft. lbs. (165 Nm).

Swingarm Alignment Tool

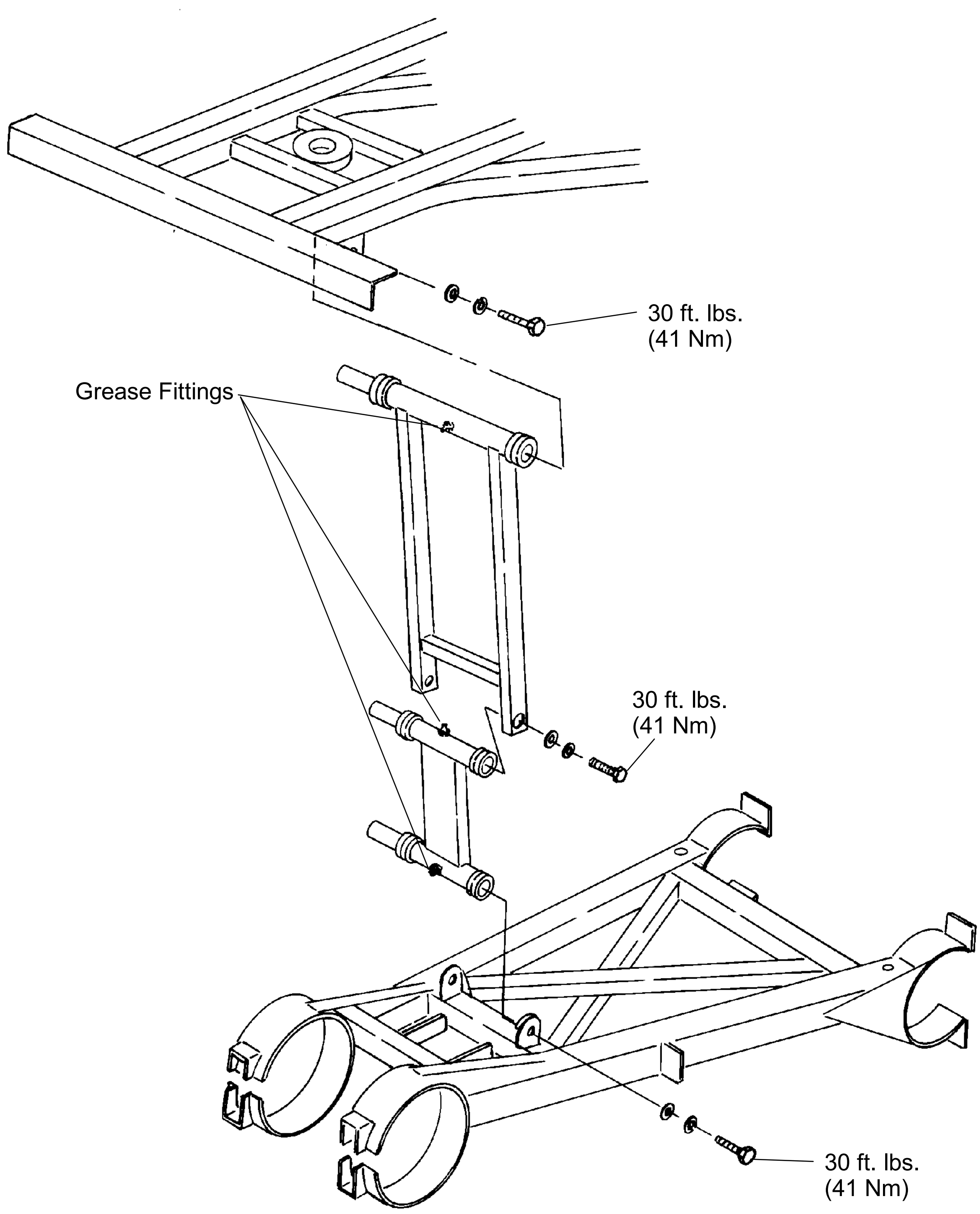


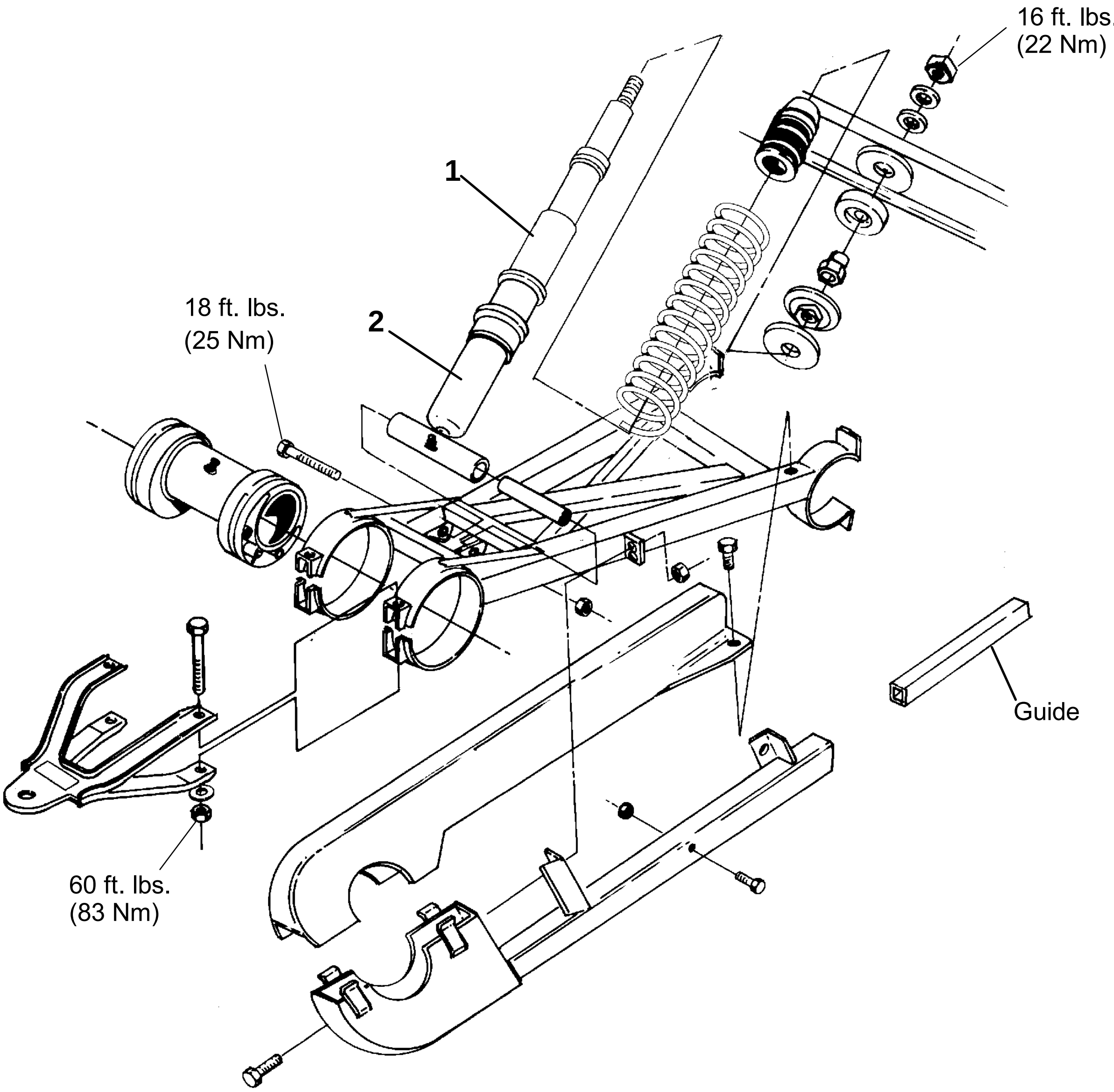
Rear Suspension Assembly, - Shaft Drive Models

NOTE: When servicing, check model number for correct replacement parts. Be sure fasteners are properly torqued.



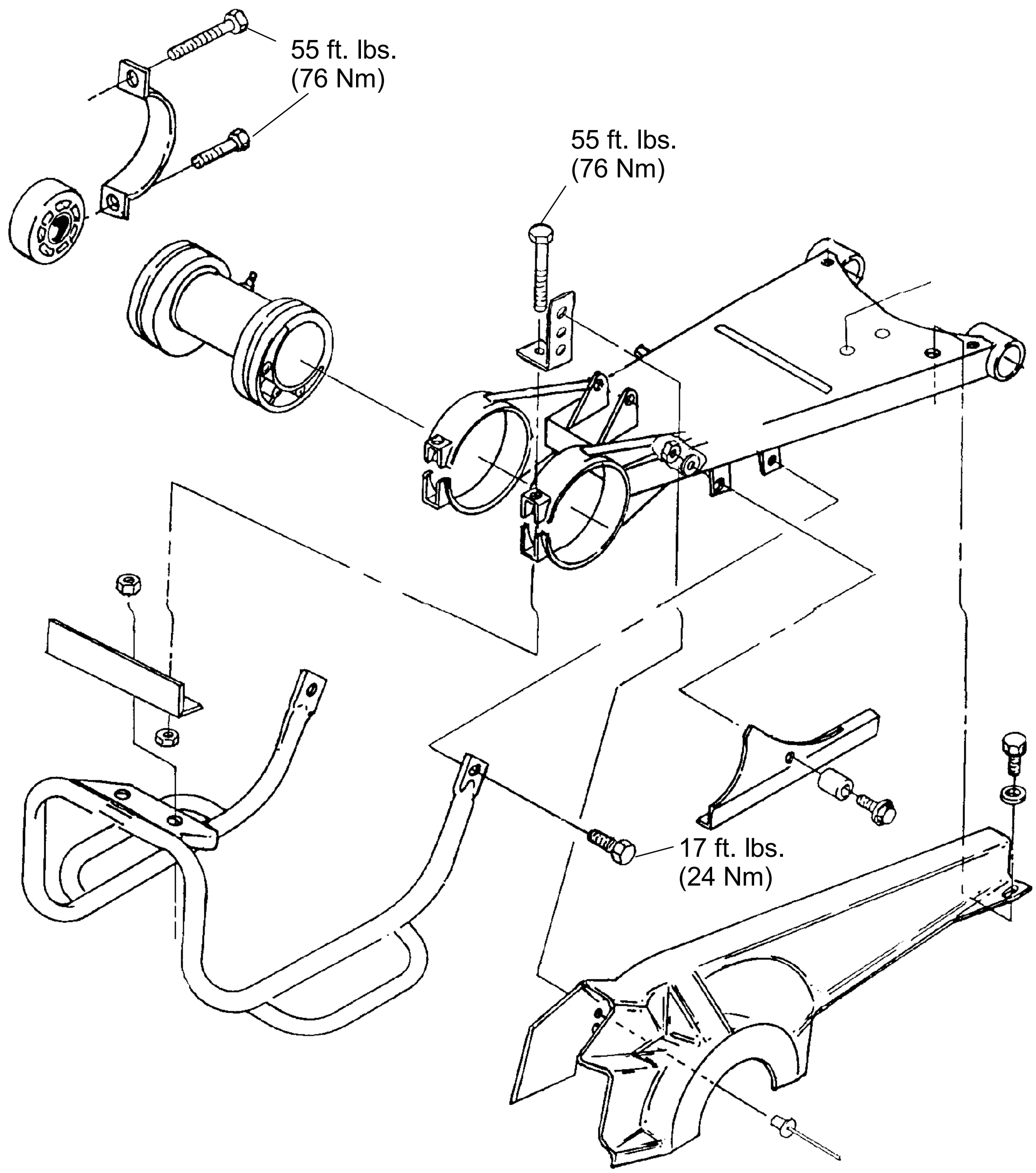
Rear Strut Stabilizer, 6x6 Models



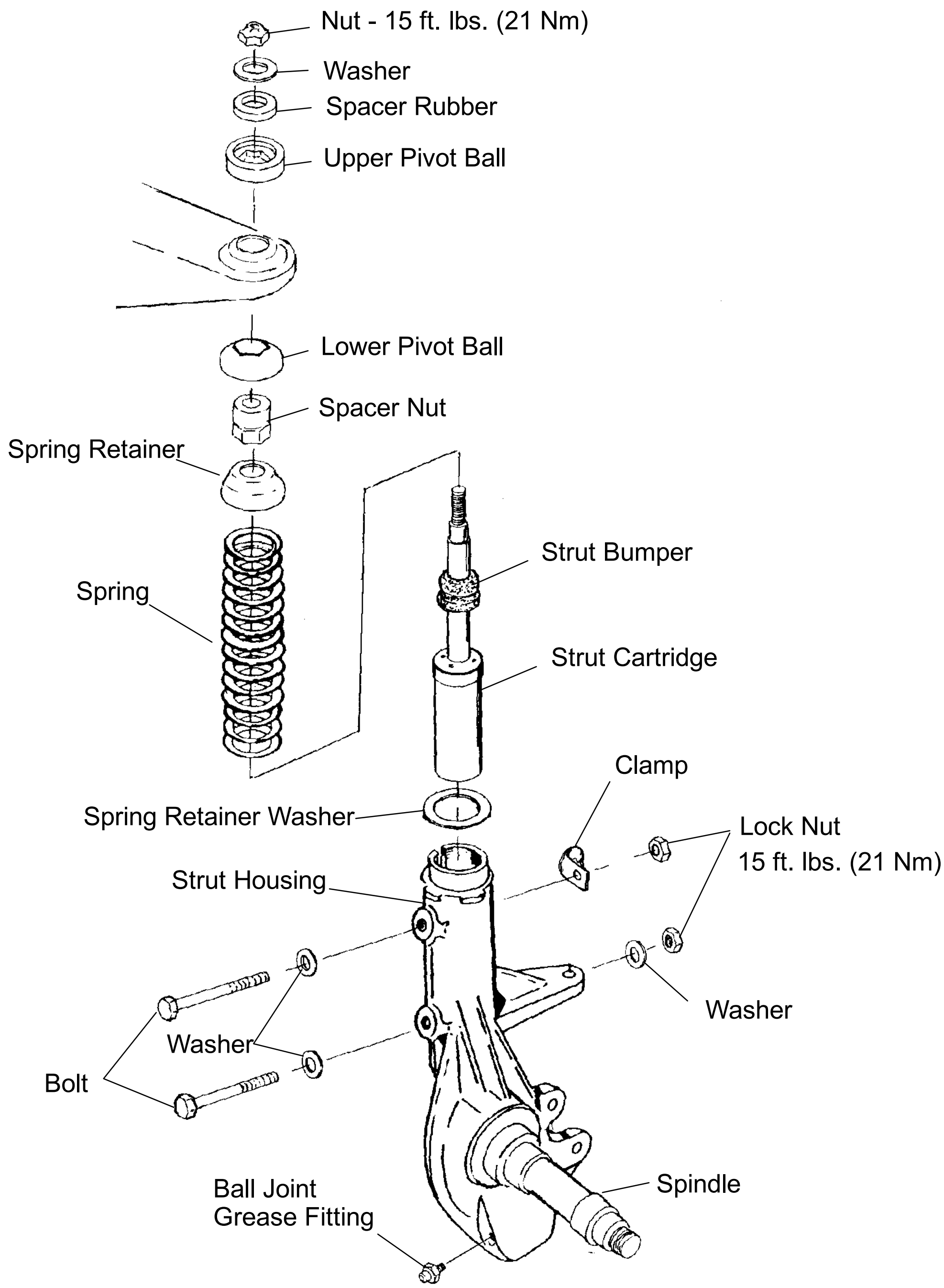


- Rear strut (1) and weldment (2) can only be replaced as an assembly. They are pressed and welded together at the factory and cannot be disassembled.
- Grease fittings (3 and 4). Check lubrication guide for service intervals.

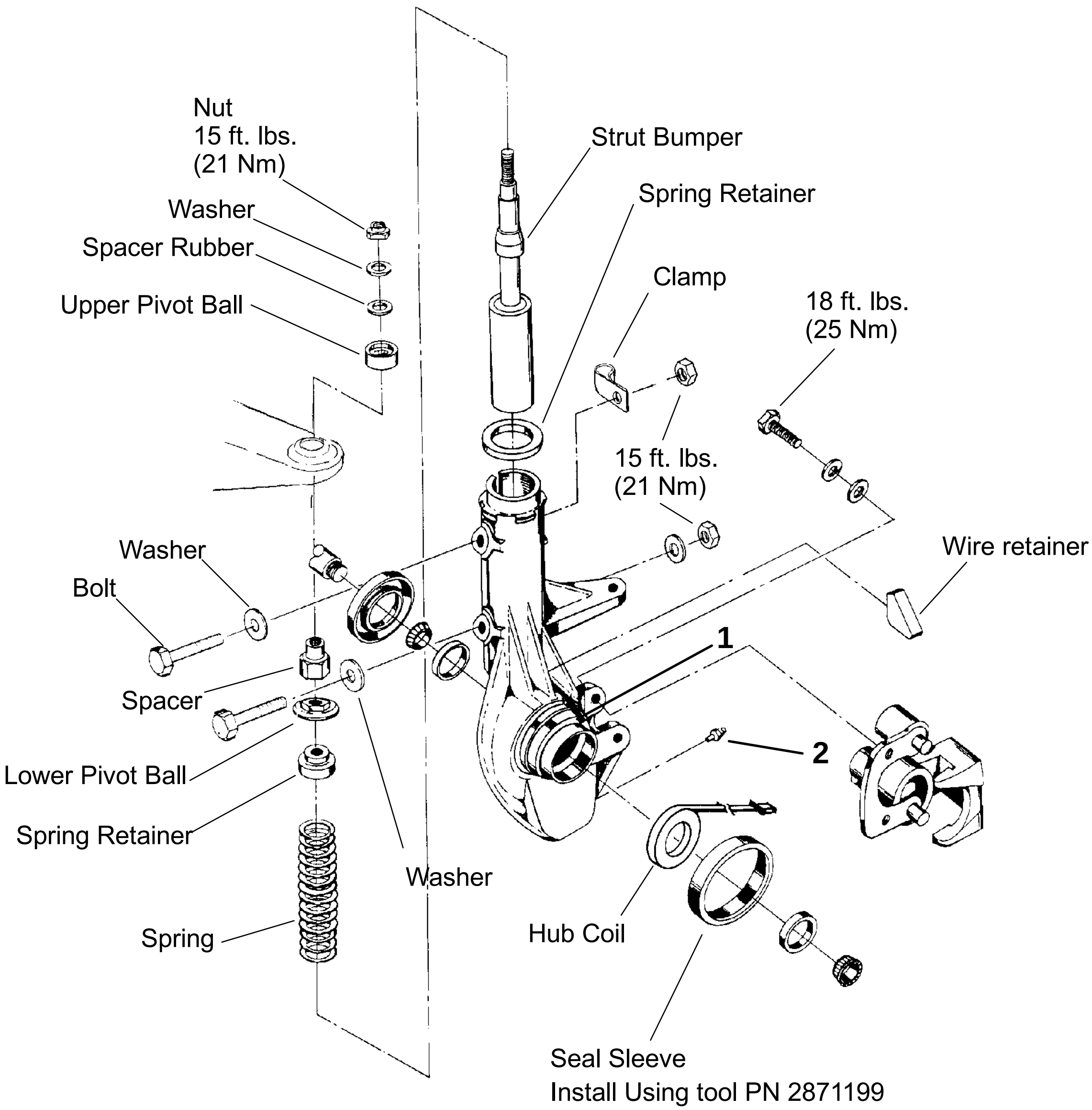
Front Swing Arm Weldment, 6x6 Models



2x4


Nut - 15 ft. lbs. (21 Nm)
Washer
Spacer Rubber
Upper Pivot Ball
Lower Pivot Ball
Spacer Nut
Spring Retainer
Strut Bumper
Spring
Strut Cartridge
Clamp
Spring Retainer Washer
Lock Nut
15 ft. lbs. (21 Nm)
Strut Housing
Washer
Washer
Bolt
Ball Joint
Grease Fitting
Spindle

AWD



NOTE: Be sure steel insert notch (1) and strut casting notch are lined up and provide a channel for the magnetic coil wires to lie in. If insert and strut do not match, strut replacement will be necessary.

Grease fitting (2) location. Check lubrication guide for recommended service intervals.

Specified pole gap is 0-.001″ (0-.0254mm)

Front Strut Cartridge Replacement
Refer to Illustrations on Page 5.23 and 5.24.

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

> **Strut Rod Holder Wrench PN 2871572**
>
> **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)**

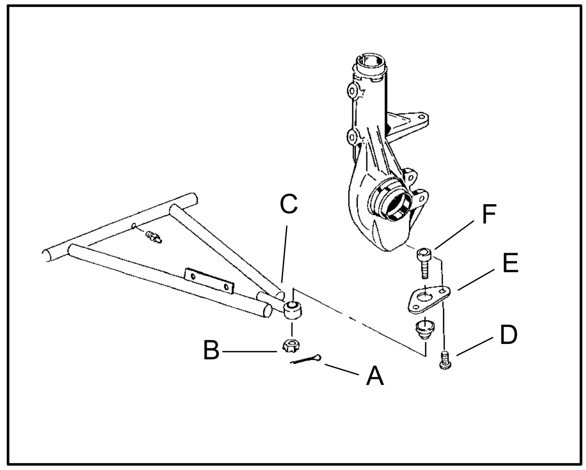
Front Strut Ball Joint Replacement

Ball Joint Replacement
Refer to Illustrations on Page 5.23 and 5.24.

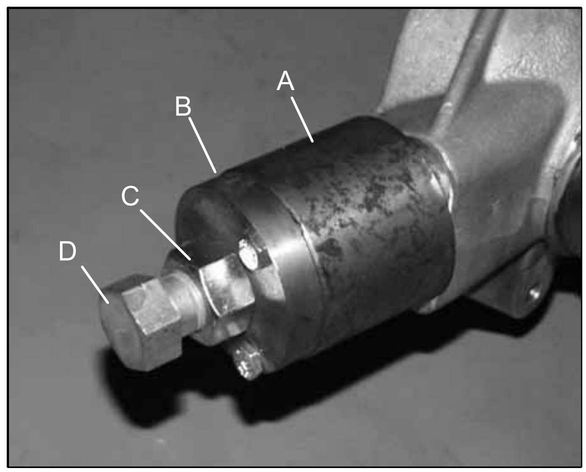
1. Loosen front wheel nuts slightly.
2. Elevate and safely support machine under footrest/frame area.

CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.

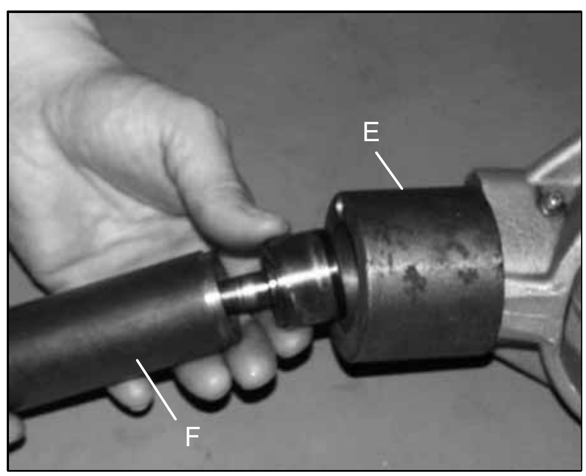
3. Remove wheel nuts and wheels.
4. Remove cotter pin (A) from ball joint castlenut.
5. Remove castle nut (B) and separate A-arm (C) from ball joint stud.
6. Remove screws (D) and ball joint retaining plate plate (E).



7. Using ball joint removal / installation tool kit (PN 2870871), remove ball joint (F) from strut housing. Refer to photos at right.
   - Install puller guide (A) with extension cap (B).
   - Apply grease to extension cap and threads of puller bolt to ease removal.
   - Thread bolt (D) with nut (C) onto ball joint stud as shown.
   - Hold bolt (D) and turn nut (C) clockwise until ball joint is removed from strut housing.



8. To install new ball joint:
   - Remove extension cap and attach puller guide using short bolts provided in the kit.
   - Insert new ball joint (E) into driver (F).
   - Slide ball joint/driver assembly into guide.
   - Drive new joint into strut housing until fully seated.
9. Apply Loctite t 242 (blue) 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.



MODEL	PAINTED PART	COLOR DESCRIPTION	DITZLER NUMBER	POLARIS NUMBER
Trail Boss	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
	Rack	Fire Red	72060	8520149
Trail Blazer	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
Xpress 300	Springs	Bonnie Blue	12908	8520148
Xplorer 300	Springs	Fire Red	72060	8520149
Sportsman 335	Springs	Black	9440	8520147
	Rims	Black	9440	8520147
Sport 400	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
Xplorer 400	Springs	Burnished Brown	¡	¡
	Rims	Brushed Aluminum	N/A	N/A
Scrambler 400	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
Scrambler 500	Springs	Fire Red	72060	8520149
Magnum 500	Springs	Black	9440	8520147
	Rims	Brushed Aluminum	N/A	N/A
Sportsman 500	Springs, Front (AA)	Black	9440	8520147
	Springs, Front (AB)	Fire Red	72060	8520149
	Spring, Rear (AA)	Black	9440	8520147
	Spring, Rear (AB)	Bonnie Blue	12908	8520148
	Rims (AA)	Black	9440	8520147
Sportsman 500 RSE	Springs	Black	9440	8520147
	Rims	Black	9440	8520147
Big Boss 500 6x6	Springs	Eddie Bauer Green	44931	8520150
	Rims	Aluminum ¡		
	Rack	Eddie Bauer Green	44931	8520150
	Box	Eddie Bauer Green	44931	8520150

FRAME COLOR - (All) P067 Medium Gloss Black 9440 / 8520147.

¡ Contact Midwest Industrial Coatings (612)-942-1836.

2000 Paint Codes

MODEL	PAINTED PART	COLOR DESCRIPTION	DITZLER NUMBER	POLARIS NUMBER
Trail Blazer	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
Xplorer 4x4	Springs	Black	9440	8520147
	Rims	Aluminum	N/A	N/A
Trail Boss 325	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
	Rack	Fire Red	72060	8520149
Magnum 325 2x4	Springs	Bonnie Blue	12908	8520148
	Rims	Aluminum	N/A	N/A
Magnum 325 4x4	Springs	Black	9440	8520147
	Rims	Aluminum	N/A	N/A
Xpedition 325	Springs	Black	9440	8520147
	Rims	Black	9440	8520147
Sportsman 335	Springs	Black	9440	8520147
	Rims(AA)	Black	9440	8520147
	Rims(AB)	Aluminum	N/A	N/A
Xplorer 400	Springs	Burnished Brown	¡	¡
	Rims	Aluminum	N/A	N/A
Scrambler 400	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
Xpedition 425	Springs	Black	9440	8520147
	Rims	Black	9440	8520147
Magnum 500	Springs	Black	9440	8520147
	Rims	Aluminum	N/A	N/A
Scrambler 500	Springs	Fire Red	72060	8520149
	Rims	Aluminum	N/A	N/A
Sportsman 500	Springs, Front (AA)	Black	9440	8520147
	Springs, Front (AB)	Bonnie Blue	12908	8520148
	Spring, Rear (AA)	Black	9440	8520147
	Spring, Rear (AB)	Bonnie Blue	12908	8520148
	Rims (AA)	Black	9440	8520147
	Rims (AB)	Aluminum	N/A	N/A
Sportsman 500 RSE	Springs	Black	9440	8520147
	Rims	Black	9440	8520147
Sportsman 6x6	Springs	Black	9440	8520147
	Rims	Aluminum	N/A	N/A

FRAME COLOR - (All) P067 Medium Gloss Black 9440 / 8520147.

¡ Contact Midwest Industrial Coatings (612)-942-1836.

Plastic polyethylene material must be “flame treated” prior to installing a decal to ensure good adhesion. The flame treating procedure can often be used to reduce or eliminate the whitish stress marks that are sometimes left after a fender or cab is bent, flexed, or damaged.

⚠ WARNING

The following procedure involves the use of an open flame. 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.

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. Keep the torch moving to prevent damage.
2. Apply the decal.

NOTES

CHAPTER 6
CLUTCHES

Special Service Tools and Supplies

Description	Part Number
Drive Clutch Puller	2870506
Clutch Holding Fixture	2871358
Spider Removal Tool	2870341
Offset / Alignment Tool (Std)	2870654
EBS Offset / Alignment Tool	2872292
Driven Clutch Puller	2870913
Spider Pin Tool	2870910
Clutch Bushing Removal & Installation	2871226
Piston Pin Puller (Also used with 2871226)	2870386
Loctite t 680	2870584
RTV Silicone Sealer	2870661
Loctite Gasket Remover	2870601

PVT System Fastener Torques

Drive Clutch Retaining Bolt	40 ft. lbs.
Driven Clutch Retaining Bolt	17 ft. lbs.
PVT Inner Cover Bolts	12 ft. lbs.
Drive Clutch Spider (Standard Clutch)	200 ft. lbs.
Drive Clutch Spider (EBS Clutch)	185 ft. lbs.
Drive Clutch Spider Lock Nut (Plastic)	5 ft. lbs.
Drive Clutch Cover Plate	90 in. lbs.

Refer to General Chapter 1 for Specifications by model.

PVT Operation

The Polaris variable transmission (PVT) consists of three major assemblies: 1) drive clutch; 2) drive belt; and 3) driven clutch. The internal components of the drive clutch and driven clutch control clutch engagement (for initial vehicle movement), clutch upshifting and backshifting. During the development of an ATV, the PVT system is matched first of all to the engine power curve; then to average riding conditions and to vehicle design usage. Modifications to the PVT or variations of components at random are never recommended. Proper PVT system setup and careful inspection of existing components must be the primary objective when troubleshooting and tuning.

WARNING

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.**

Drive Clutch Operation

The drive clutch primarily senses engine RPM. The two major components which control its shifting function are the shift weights and the coil spring. When the engine RPM is increased, the centrifugal force of the shift weights working against the coil spring increases. When this force reaches a force higher than the preload in the spring, the moveable sheave of the drive clutch will move inward, contacting the drive belt. The force will pinch the belt between the spinning sheaves and cause the drive belt to move. This movement in turn rotates the driven clutch.

At light throttle settings the drive belt will stay low in the drive clutch and high in the driven clutch. As engine RPM increases, so does the centrifugal force on the shift weights, causing the drive belt to be forced upward in the drive clutch and downward into the driven clutch. The forces in the driven clutch will now affect the upshift.

Driven Clutch Operation

The driven clutch primarily senses torque. It opens and closes according to the forces applied to it from the drive belt and the transmission input shaft. If the torque resistance on the input shaft is greater than the load from the drive belt, it will keep the drive belt outward at the top of the driven clutch sheaves. As the throttle setting and engine horsepower increase, there will be a greater load on the drive belt, pulling the belt down into the driven clutch and up on the drive clutch. This action, which increases the driven clutch speed, is called upshifting.

If the throttle setting remains the same and the vehicle is subjected to a heavier load, the driven clutch senses this load, moving the belt back up on the sheaves of the driven clutch and down into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called downshifting.

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 will hold the engine RPMs 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 change throttle position, as a governor does, the PVT system changes engine load requirements by either upshifting or downshifting.

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. **Belt Tension, Drive to Driven Clutch Offset, Belt Width.** See pages 6.22-6.24.
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 6.11-6.13 and 6.16-6.19.
3. **Sheave Faces.** Clean and inspect for wear.
4. **PVT System Sealing.** Refer to appropriate illustration below and on the following pages. 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 and also to prevent water and other contaminants from entering the PVT area. This is especially critical on units subjected to frequent water forging.

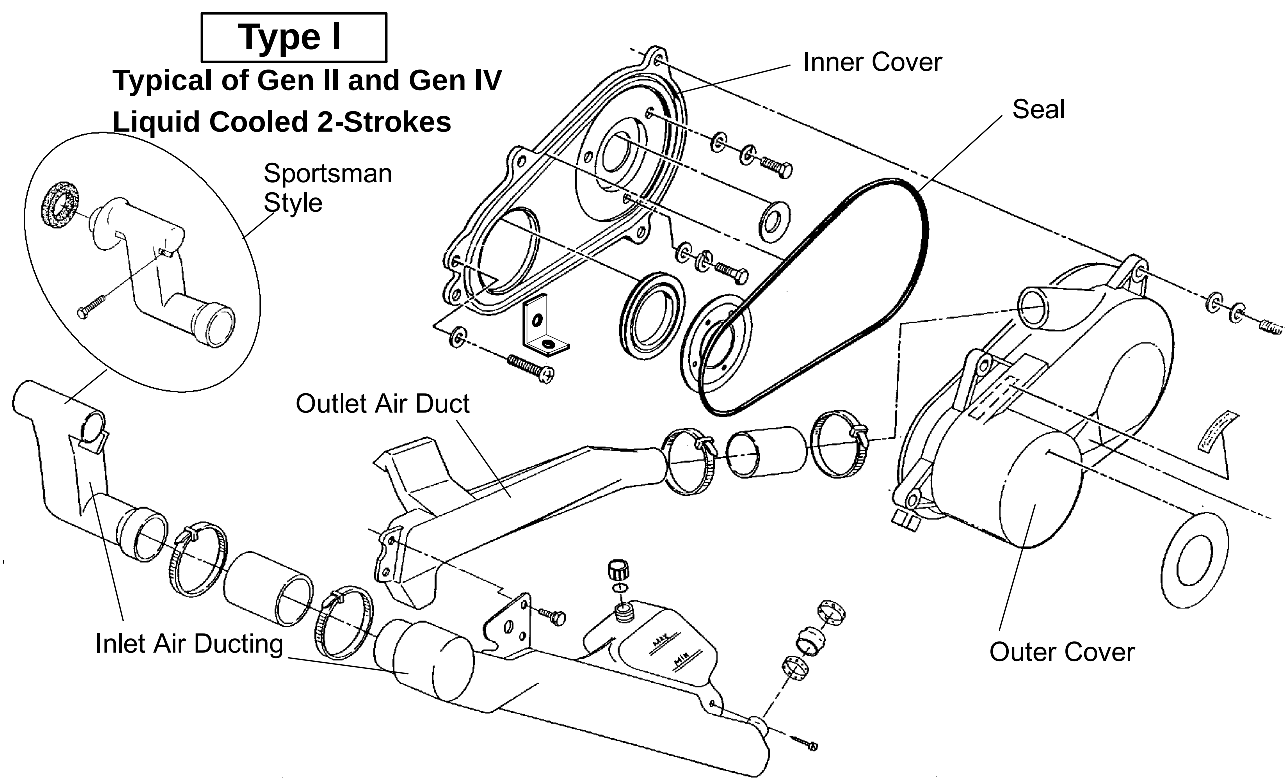
PVT Drying

If water is ingested, shift 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 low range and test for belt slippage. Operate ATV in low range for a short period of time until PVT system is dry.

PVT Overheating

During routine maintenance or whenever PVT system overheating is evident, it's important to check the inlet *and* outlet ducting for obstructions. Obstructions to air flow through the ducts will significantly increase PVT system operating temperatures. The ATV should be operated in LOW RANGE when pulling or plowing heavy loads, or if extended low speed operation is anticipated.

PVT Sealing and Ducting Components



PVT Disassembly

NOTE: Some fasteners and procedures will vary. Refer to the appropriate parts manual for proper fasteners and fastener placement. (See pages 6.7-6.9).

1. Remove seat.

2. Remove or loosen rear cab fasteners as necessary to gain access to PVT outer cover.

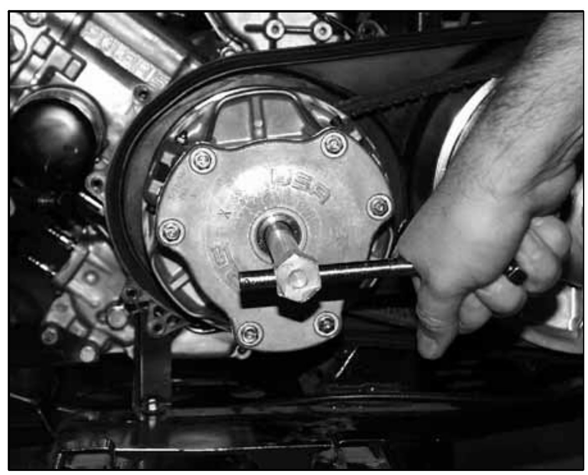
3. Remove PVT air outlet duct hose.

4. Remove outer cover screws and clamps. Refer to pages 6.7-6.9.

5. Mark the drive belt direction of rotation and remove drive belt. The belt is normally installed so the numbers can be easily read. To remove drive belt, apply brake, pull upward and rearward on belt to open driven clutch sheaves, push down on belt to hold sheaves open, and slip belt over driven clutch outer sheave.

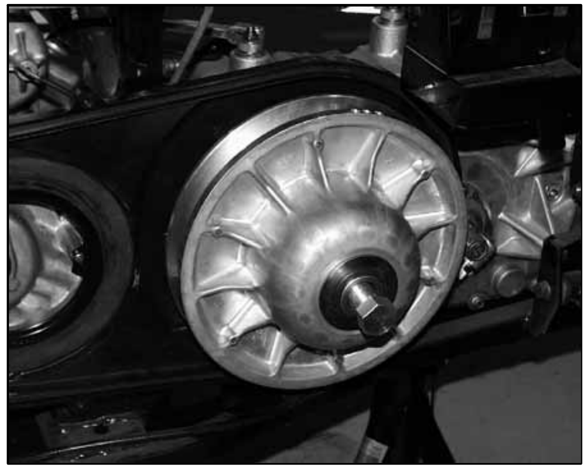
6. Remove drive clutch retaining bolt and remove drive clutch using puller.

Drive Clutch Puller PN 2870506

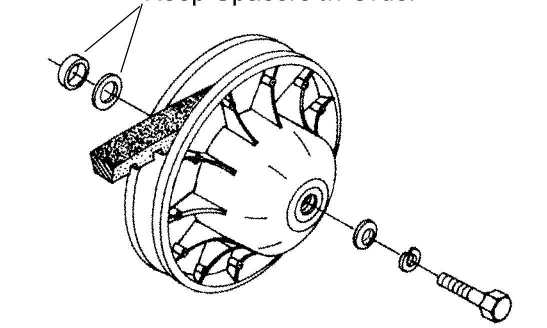


7. Remove driven clutch retaining bolt and driven clutch. Use puller if necessary.

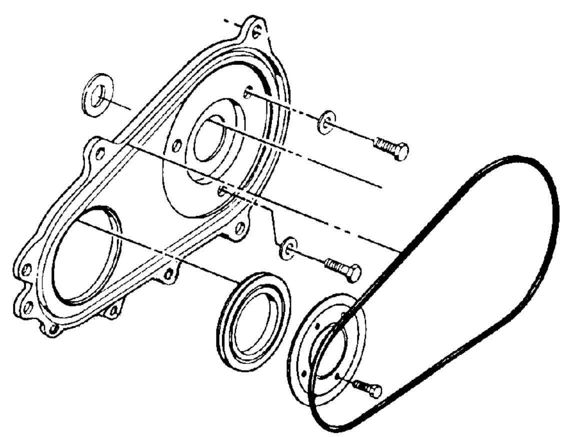
Driven Clutch Puller PN 2870913



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



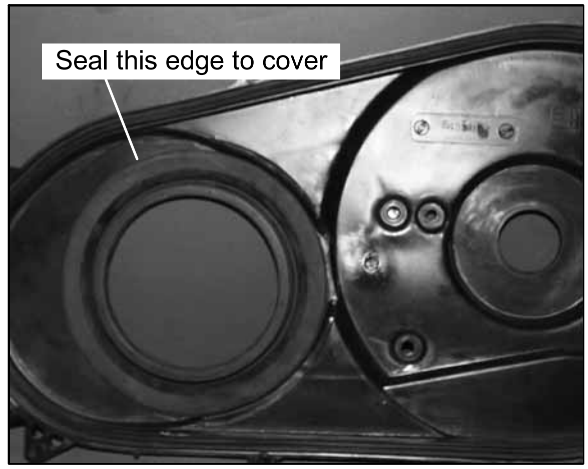
9. Bend back retainer tabs on three screws at the front of the inner cover (where applicable). Remove screws and retainer plate.
10. Remove inner cover retaining bolts at rear of cover.

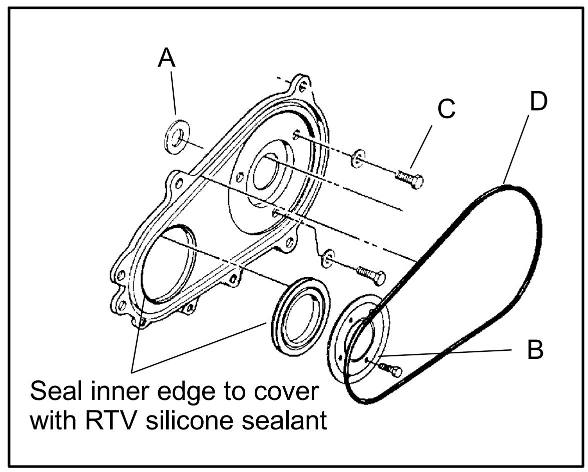


11. Remove cover along with foam seal on back of cover or shaft.

PVT 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. Bend screw retainer tabs (B) over screws (where applicable).
7. Torque rear inner cover bolts (C) to specification.



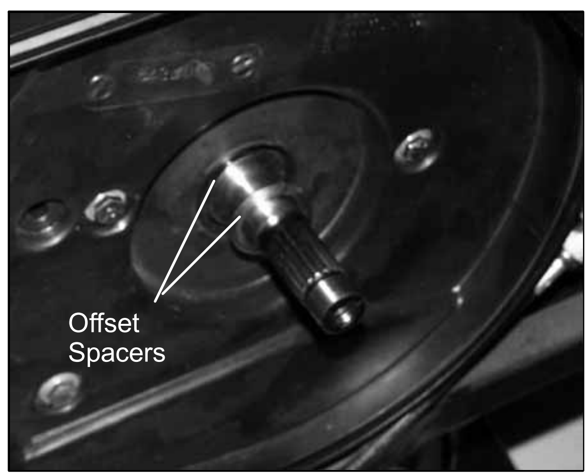


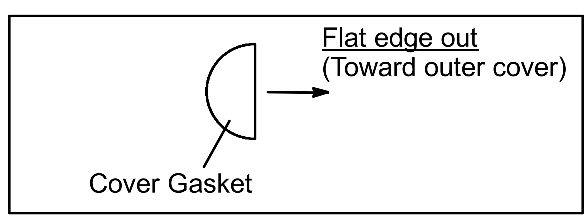
Inner Cover Bolt Torque (Rear):
12 ft. lbs. (1.66 kg-m)

Driven Clutch Retaining Bolt Torque:
17 ft. lbs. (2.35 kg-m)

Drive Clutch Retaining Bolt Torque:
40 ft. lbs. (5.5 kg-m)

8. Install clutch offset spacers on transmission input shaft.
9. Clean splines inside driven clutch and on the transmission input shaft.
10. Apply a light film of grease to the splines on the shaft.
11. Install the driven clutch, washer, lock washer, and retaining bolt. Torque to specification.
12. Clean end of taper on crankshaft and the taper bore inside drive clutch.
13. Install drive clutch and torque retaining bolt to specification.
14. Reinstall drive belt noting direction of rotation. If a new belt is installed, install so numbers can be easily read.
15. Replace PVT outer cover rubber gasket with the square side out, and ends of O-ring positioned at highest point on cover (D).
16. Apply a small amount of RTV silicone to the ends.
17. Reinstall PVT outer cover and secure with screws. Apply anti-seize compound to screw threads before installation.
18. Reinstall rear cab assembly and seat.

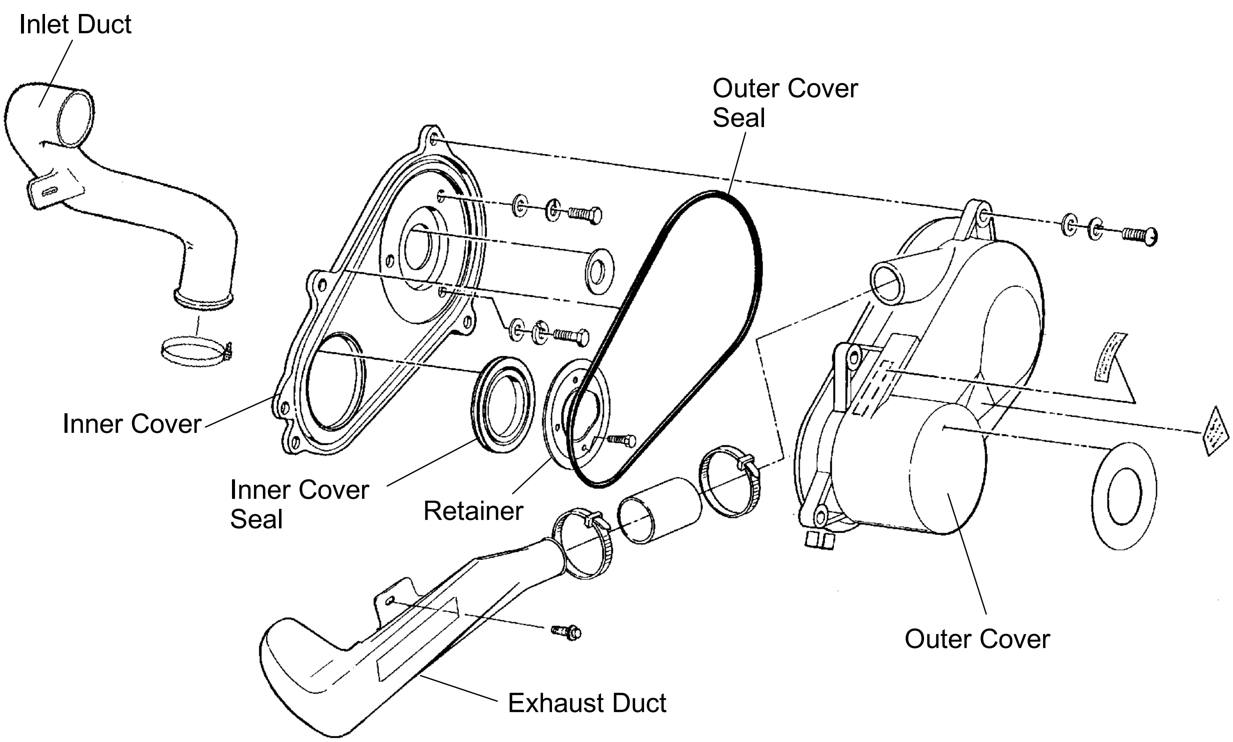




PVT Sealing and Ducting Components

Type II

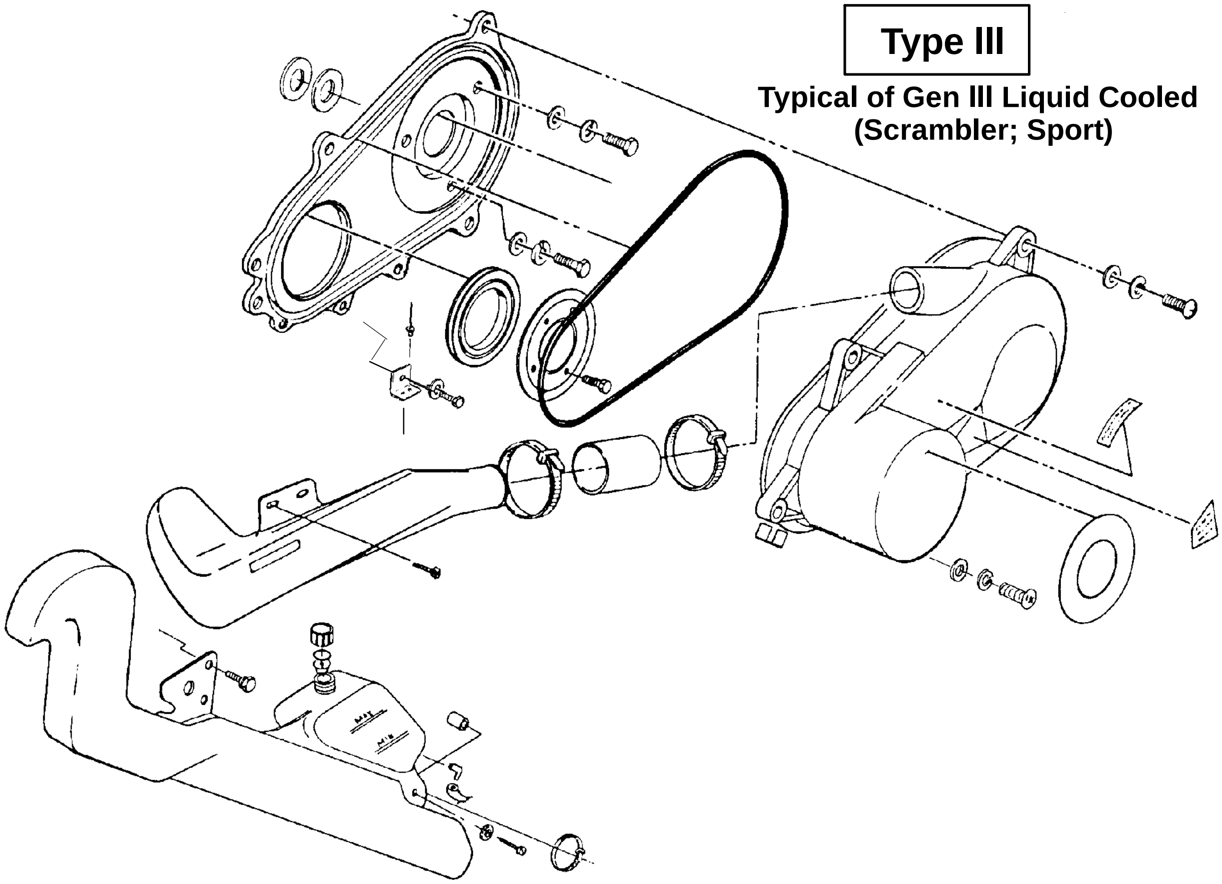
Typical of Gen II 4-strokes



PVT Sealing and Ducting Components

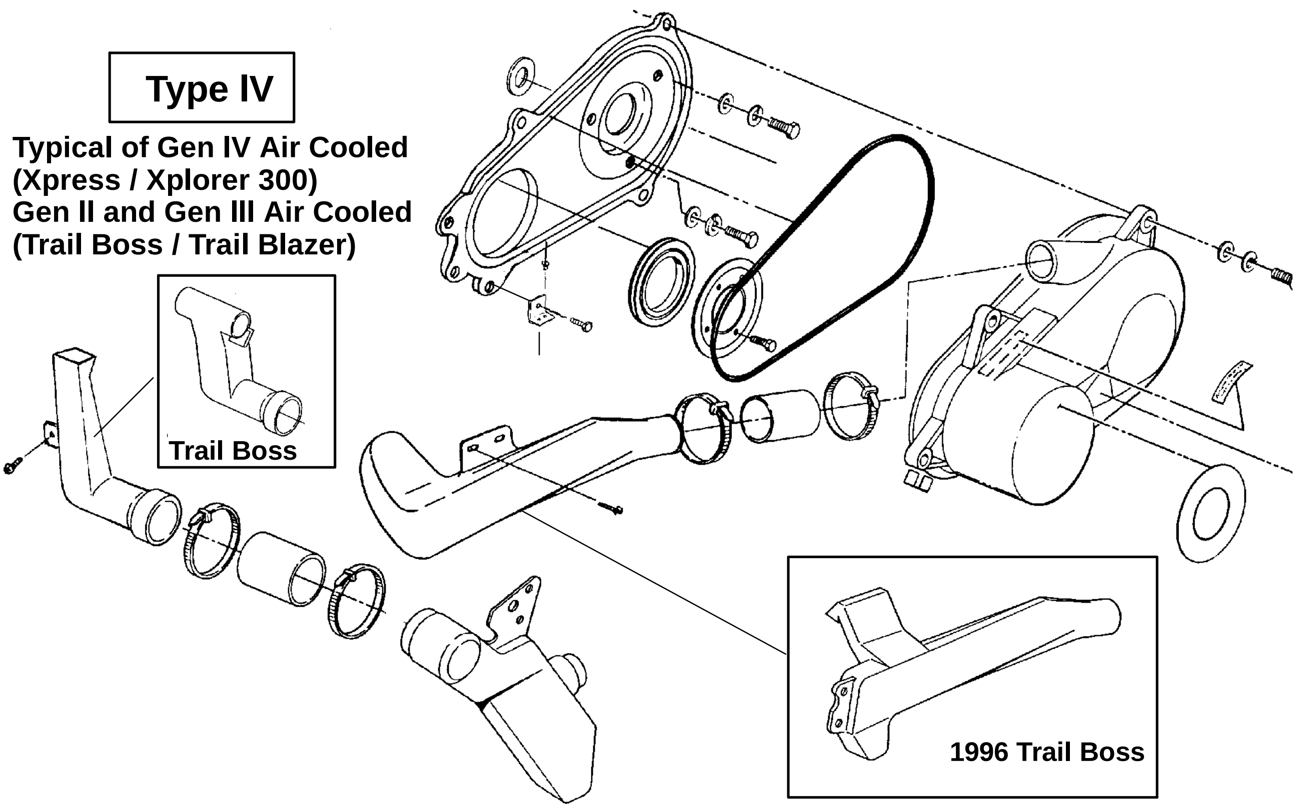
Type III

Typical of Gen III Liquid Cooled (Scrambler; Sport)



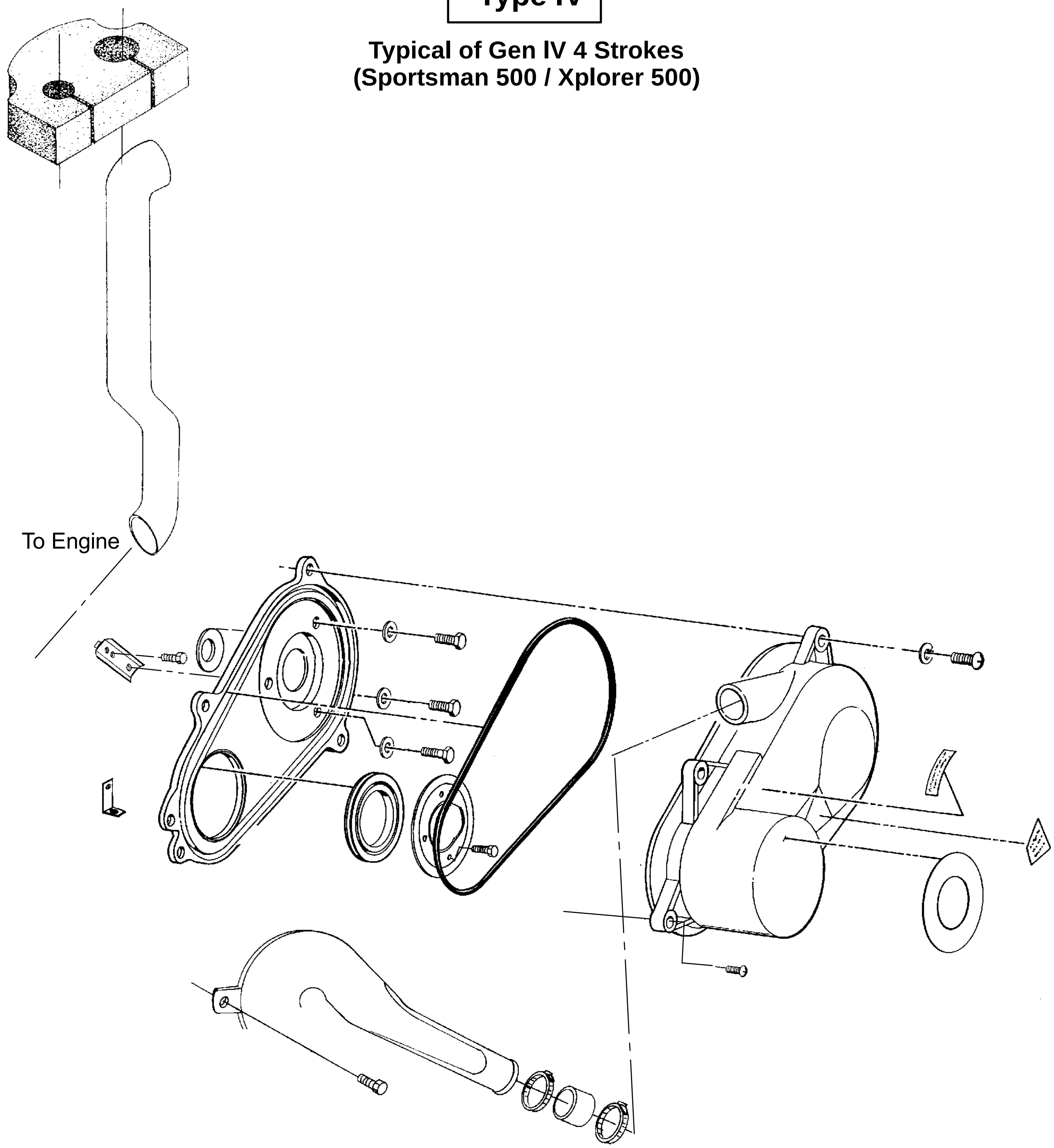
Type IV

Typical of Gen IV Air Cooled (Xpress / Xplorer 300)
Gen II and Gen III Air Cooled (Trail Boss / Trail Blazer)



Type IV

**Typical of Gen IV 4 Strokes
(Sportsman 500 / Xplorer 500)**



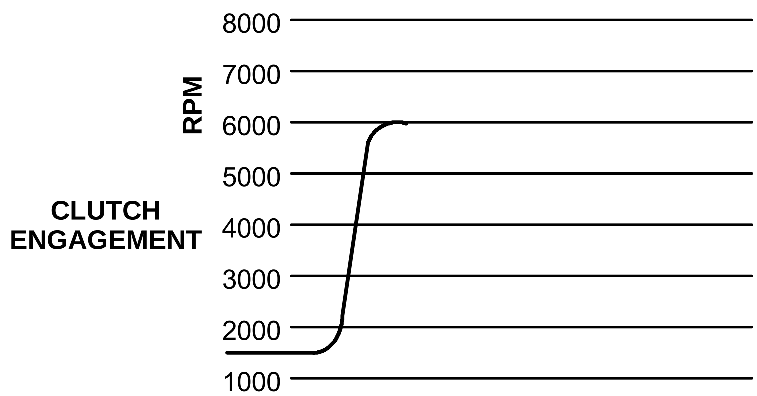
Relationship of Drive Clutch Weights and Spring in Maintaining Operating RPM

The drive clutch is an RPM and torque sensing unit designed to transfer the maximum amount of horsepower from the engine to the ground. This is accomplished through weights and a spring inside the unit which react to the centrifugal force applied to the clutch from the engine RPM.

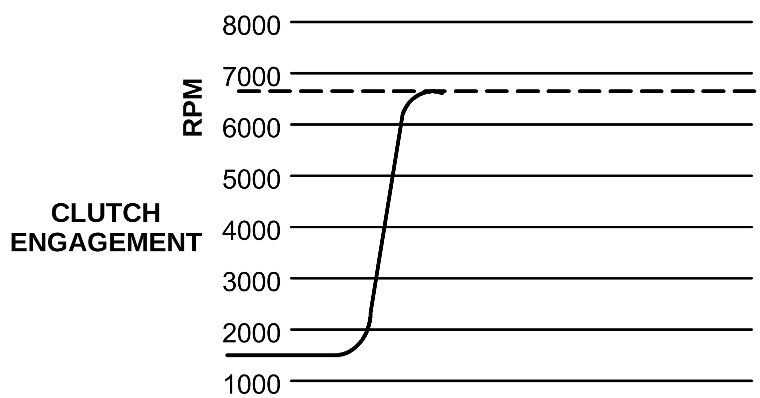
The spring and weights work in combination. In a properly set up clutch, the maximum desired operating RPM will be reached immediately after clutch engagement, under full throttle conditions. To gain optimum power this RPM should be maintained. As centrifugal force pushes the weights against the rollers, the moveable sheave will force the belt to climb up the drive clutch sheave and increase vehicle speed.

If the weights and spring are matched properly, the engine RPM will go to the desired range and remain there on both the upshift and backshift.

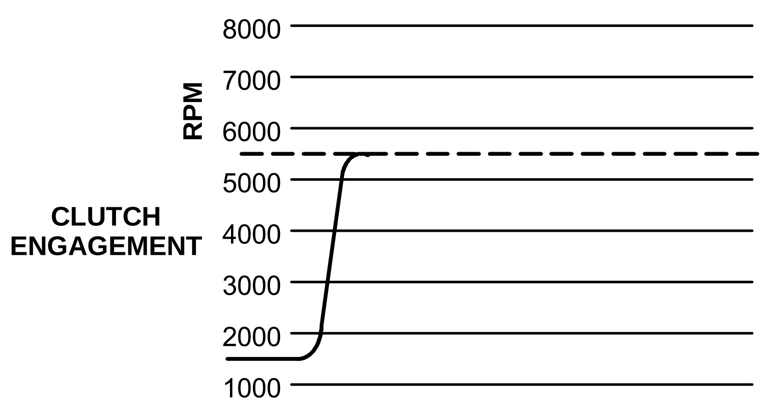
Example : Engine Operating RPM 6000 ± 200



If the weights are too light, or the spring rate too high, the maximum RPM will be too great and the drive belt will not move into high gear at the top of the clutch.



If the weights are too heavy, or the spring rate too low, the engine RPM will be low and the drive clutch will upshift too fast, keeping the engine out of its power band.



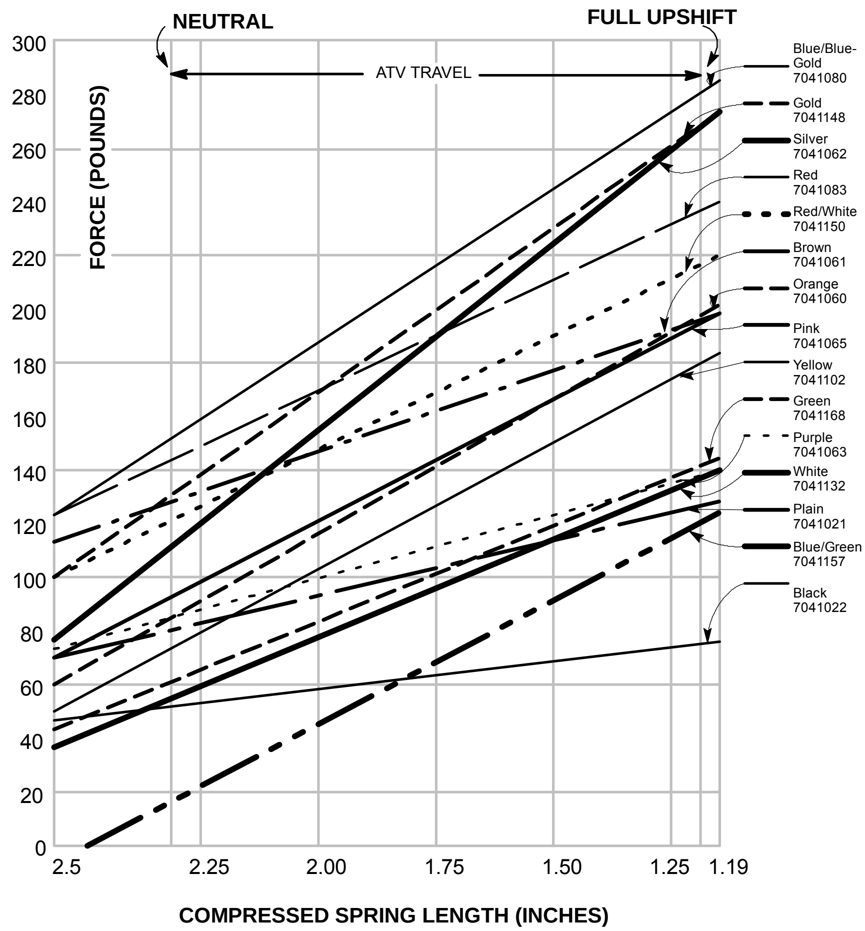
The drive clutch spring has two primary functions:

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.

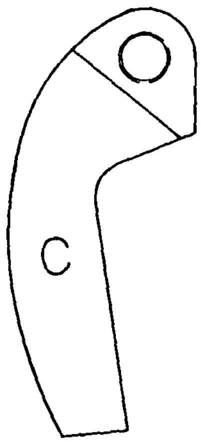


With the spring resting on a flat surface, measure its free length from the outer coil surfaces as shown. Refer to the spring specification chart for specific free length measurements and tolerances. Also check to see that spring coils are parallel to one another. Distortion of the spring indicates stress fatigue, requiring replacement.

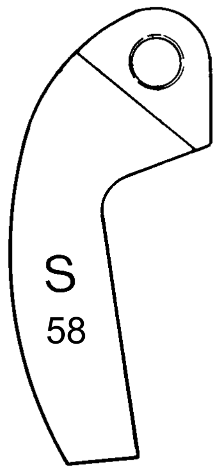
PART NUMBER	COLOR CODE	WIRE DIAMETER	FREE LENGTH ¦ .125I
7041021	Plain	.157I	4.38I
7041022	Black	.140I	4.25I
7041063	Purple	.168I	4.37I
7041062	Silver	.208I	3.12I
7041065	Pink	.177I	4.69I
7041060	Orange	.196I	3.37I
7041080	Blue/Gold	.207I	3.50I
7041083	Red	.192I	3.77I
7041102	Yellow	.192I	2.92I
7041061	Brown	.200I	3.06I
7041132	White	.177I	2.92I
7041168	Green	.177I	3.05I
7041148	Gold	.207I	3.25I
7041150	Red/White	.192I	3.59I
7041157	Blue/Green	.177I	2.53I

CLUTCH
Shift Weights

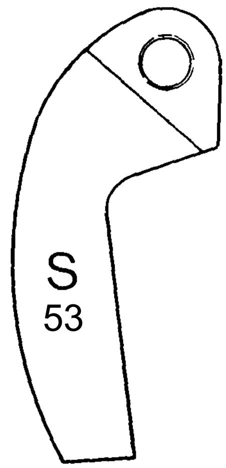
Shown below are the shift weights which have been designed for, or which may be used in the PVT system. These shift weights have many factors designed into them for controlling engagement RPM and shifting patterns. Shift weights should not be changed or altered without first having a thorough understanding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



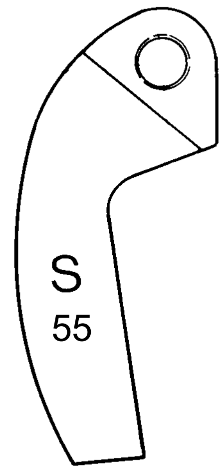
PN 5630418
50 gr
(High Alt. 350L)



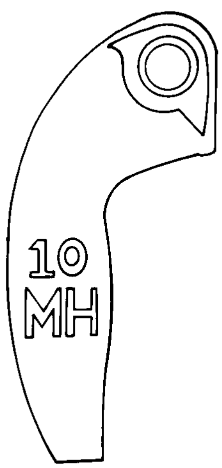
PN 5630581
58 gr



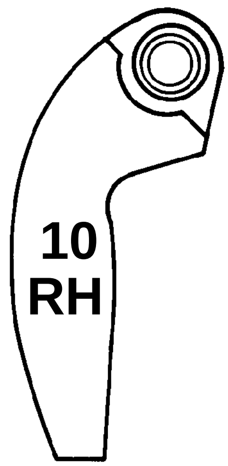
PN 5630095
53 gr



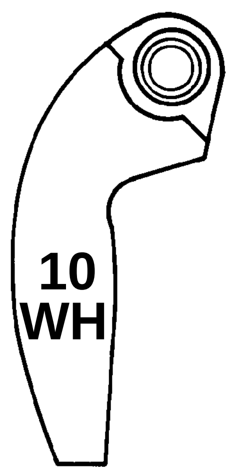
PN 5630509
55 gr



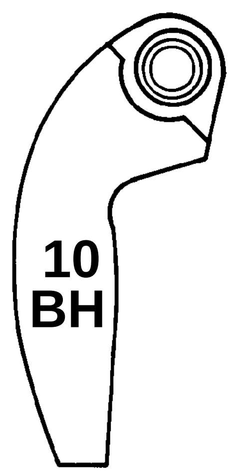
PN 5630513
50.5 gr



PN 5630709*
44 gr



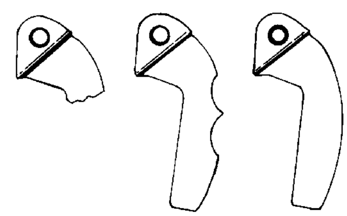
PN 5630710*
46 gr



PN 5630711*
47gr

Shift Weight Inspection

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 inspection, page 6.17.



Button To Tower Clearance Inspection

2. Inspect spider button to tower clearance. If clearance exists, replace all buttons (and O-ring or washer where applicable) and inspect surface of towers. See spider removal page 6.16.

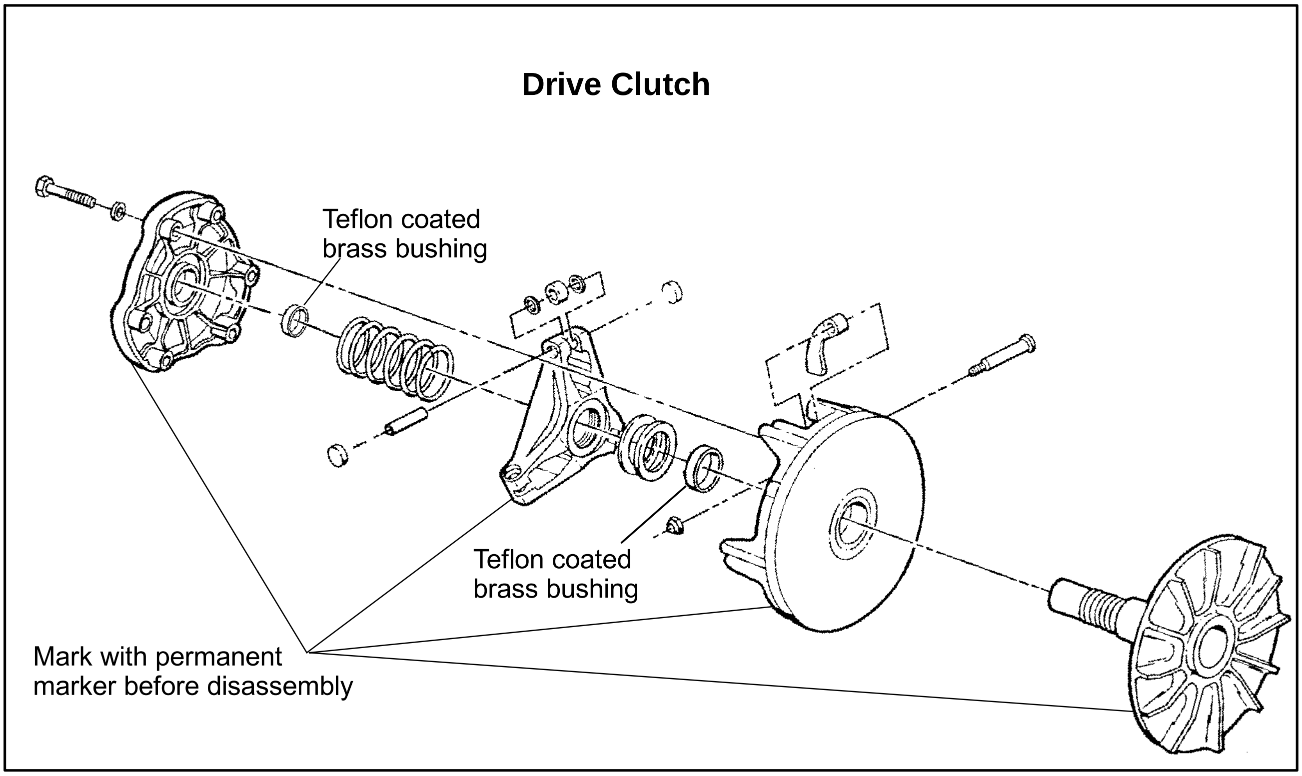
3. Inspect sheave surfaces. Replace the *entire service clutch* if worn, damaged or cracked.

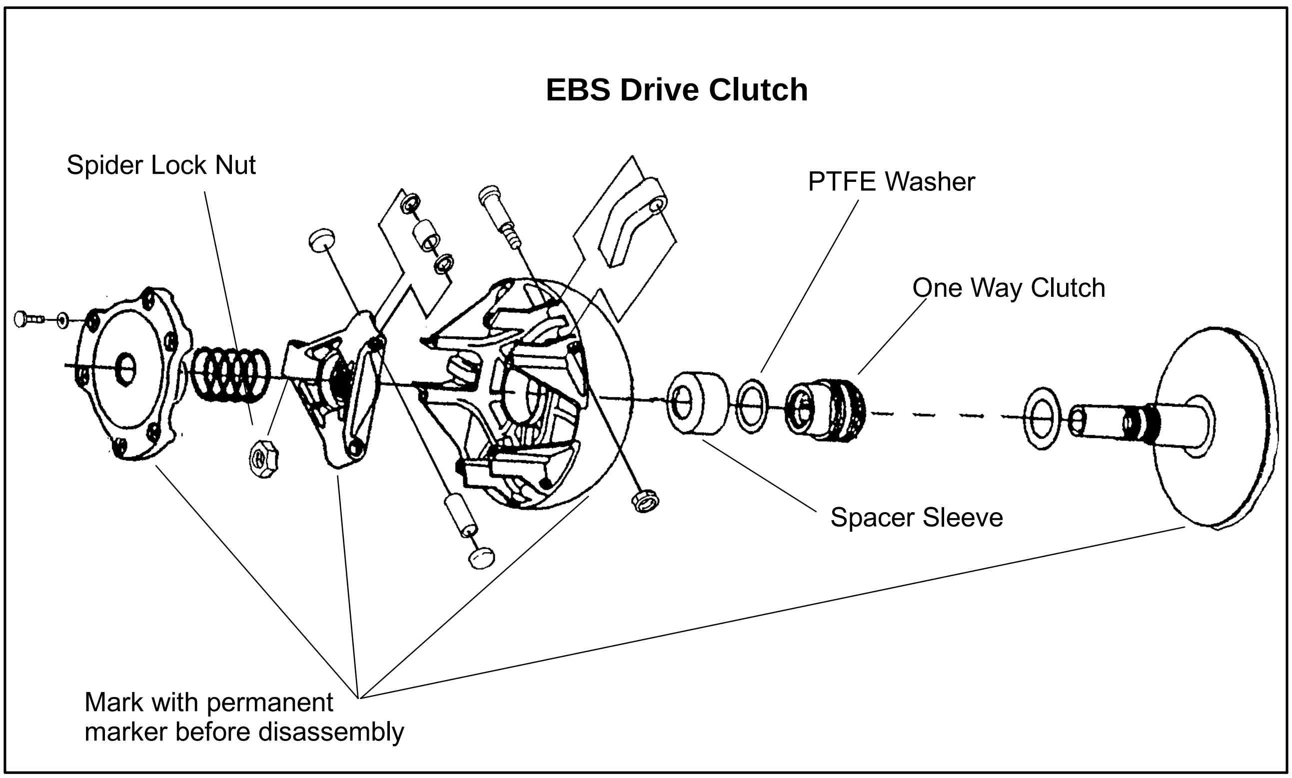
⚠ WARNING

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.**

Drive Clutch Exploded View

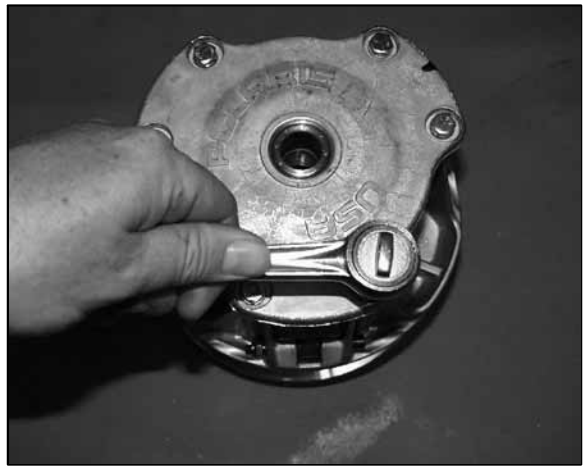




Drive Clutch Disassembly

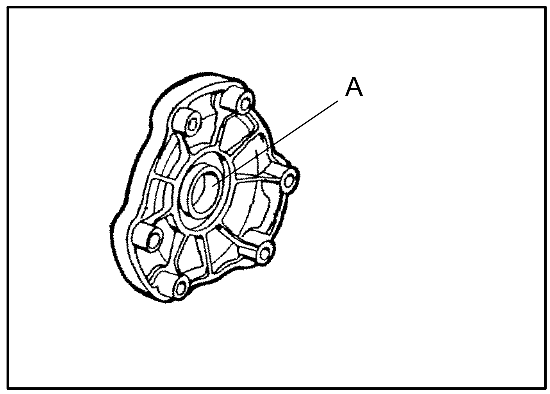
1. Using a permanent marker, mark the cover, spider, and moveable and stationary sheaves for reference. X marks on castings must be aligned.

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



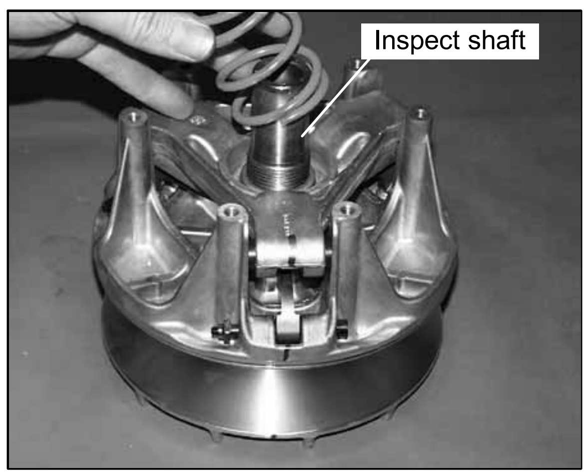
3. Inspect cover bushing (A). The outer cover bushing is manufactured with a Teflon™ coating. Bushing wear is determined by the amount of Teflon™ remaining on the bushing.

> **Cover Bushing Inspection:**
>
> **Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.**



4. Inspect area on shaft where bushing rides for wear, galling, nicks, or scratches. Replace clutch assembly if worn or damaged.

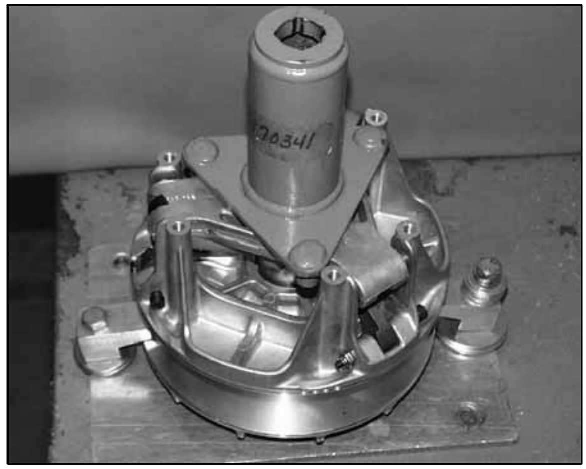
5. Remove and inspect spring. (See page 6.11)



Drive Clutch Inspection

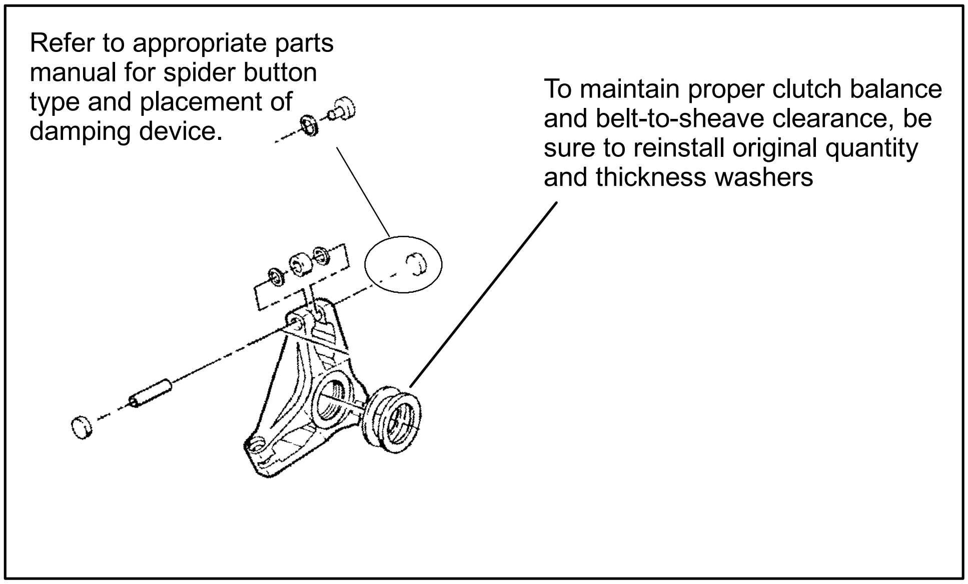
Spider Removal

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



> **Clutch Holding Fixture:**
> **PN 2870547 or 2871358**
>
> **Spider Removal Tool:**
> **PN 2870341**

NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. Be sure to note the number and thickness of these washers.



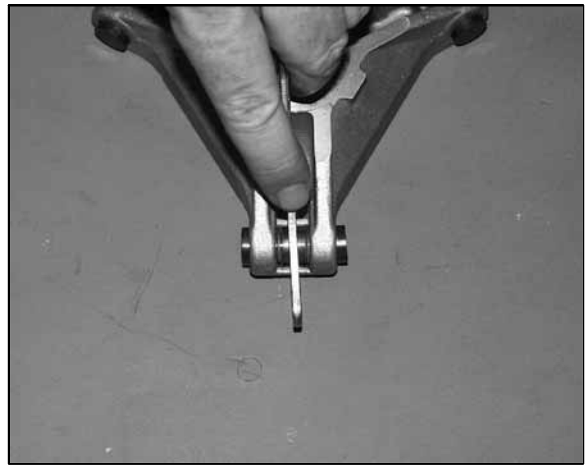
Moveable Sheave Bushing Inspection

2. Inspect the Teflon™ coating on the moveable sheave bushing.

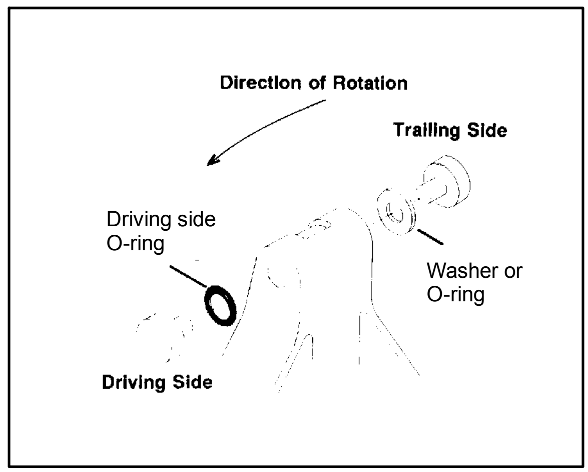
> **Moveable Sheave Bushing Inspection:**
>
> **Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.**

Roller, Pin and Thrust Washer Inspection

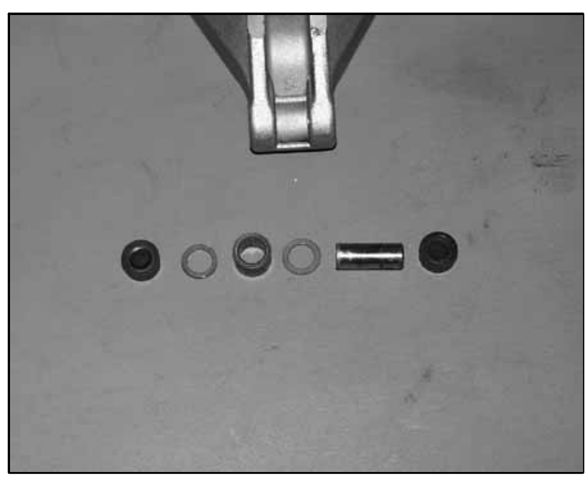
3. Inspect all rollers, bushings and roller pins by pulling a flat metal rod across the roller. Turn roller with your finger. If you notice resistance, galling, or flat spots, replace rollers, pins and thrust washers in sets of three. Also inspect to see if roller and bushing are separating. Bushing must fit tightly in roller. Use pin removal tool PN 2870910 to replace rollers and pins. Take care not to damage roller bushing or bearing surface of the new pin during installation.



4. Shown at right is a pin style spider button used on some models. This arrangement uses a hollow roller pin. Other models have a solid roller pin and rubber backed buttons (below).
   NOTE: Some models use an O-ring (on the driving side of the spider) and a flat rubber washer (on the trailing side of the spider). Pre-mature wear will result if the heat resistant O-rings are substituted with another type. Use only genuine Polaris parts. Do not install a flat washer on the driving side of the spider. Refer to the appropriate parts manual for placement and part numbers.



5. 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.



CLUTCH
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.

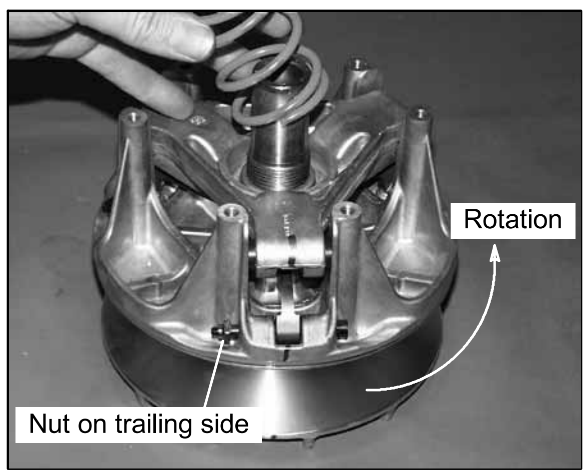
1. Reassemble drive clutch in the following sequence, making sure the “X” marks are aligned:
   a) “X” mark cover
   b) spider, making sure spacer washers are installed underneath spider and positioned properly in recess
   c) “X” mark under weight

2. Install moveable sheave.
3. Install spider, making sure spacers installed are the same quantity and thickness, and that “X” mark on spider aligns with “X” mark in moveable sheave.
4. Torque spider to specification using the holding fixture and spider tool. Torque with smooth motion to avoid damage to the stationary sheave.

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 tightening the spider will help position the washers.

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



7. Reinstall cover, aligning “X” mark with other marks. Torque cover bolts evenly to specification.

Spider Torque:
200 ft. lbs. (27.6 kg-m)
Spider Torque EBS:
180 ft.lbs. (25.5 kg-m)

Cover Screw Torque:
90 in. lbs. (1.04 kg-m)

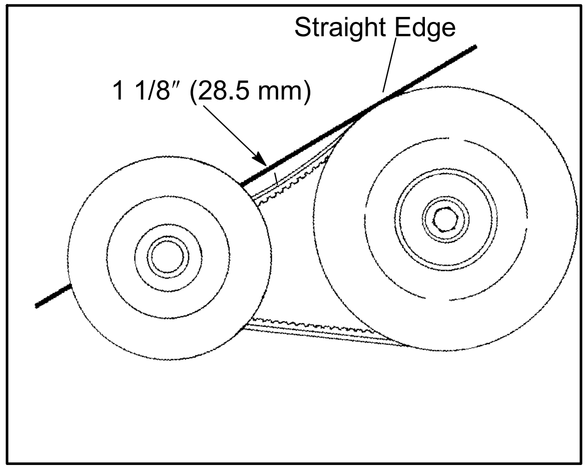
Standard P-90 (Non-EBS) Clutch

NOTES

Drive Belt Tension

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

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



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

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

See Driven Clutch Disassembly/Inspection, pages 6.30 - 6.32.

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.

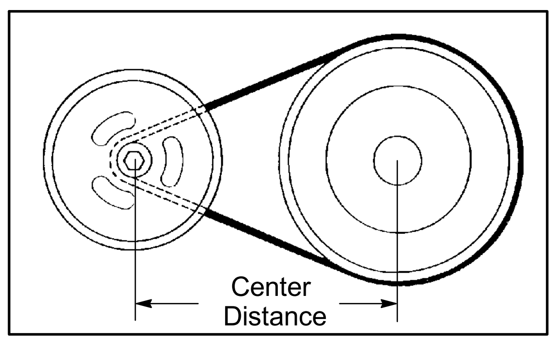
Drive Belt Removal/Inspection

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, push moveable (inner) sheave toward inner cover to open driven clutch sheaves, push down on belt to hold sheaves open, and slip belt over driven clutch outer sheave.

4. Inspect belt width, measuring across the top of the belt with a dial caliper.

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

5. 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.*
6. 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.



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

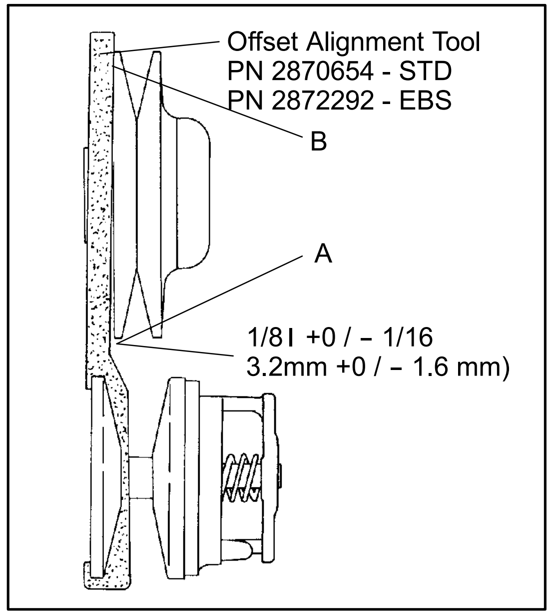
Clutch Alignment

1. Remove belt and install offset/alignment tool as shown.
2. 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:

3. Remove drive and driven clutch. See PVT Disassembly, pages 6.4 - 6.5.
4. Remove PVT inner cover.
5. Loosen all engine mounts. Move front of engine to the right or left slightly until alignment is correct.
6. Tighten engine mounts and verify alignment is correct.
7. Measure belt deflection and offset and 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".



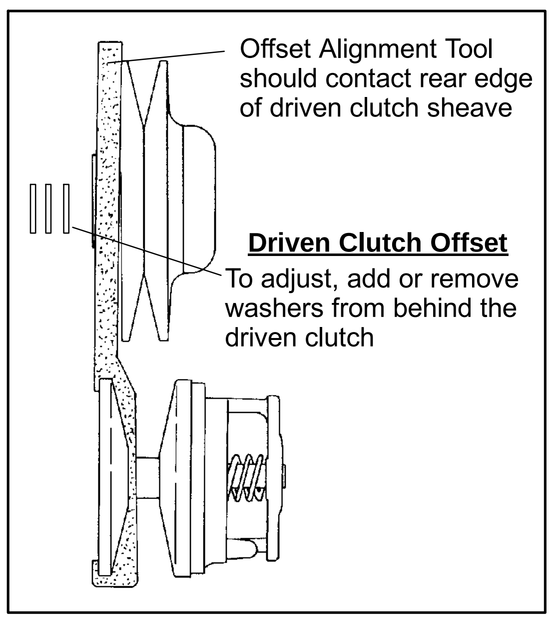
Shim Kit PN 2200126

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

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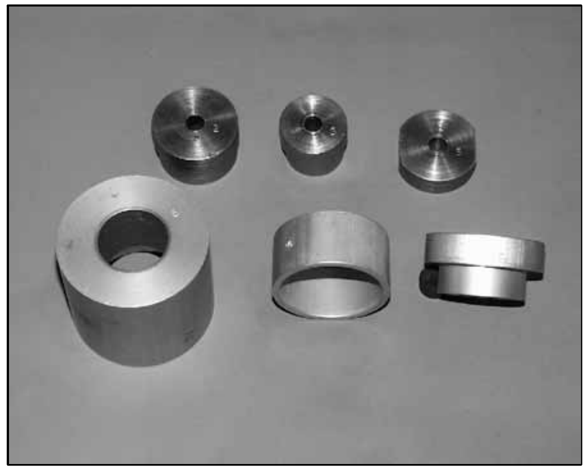
Drive Clutch Bushing Service

Polaris Kit PN 2871226

Item	Qty.	Part Description	Part No.
2	1	P-90 Drive Clutch and Driven Clutch Bushing Installation Tool	5020628
3	1	Drive Clutch Cover Bushing Removal and Installation Tool (for all drive clutches)	5020629
5	1	P-90 Driven Clutch 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

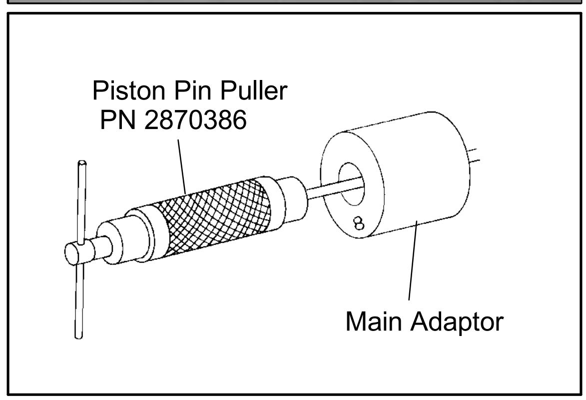
1. Install handle end of piston pin puller securely into bench vise and lightly grease puller threads.



Piston Pin Puller PN 2870386

2. Remove nut from puller rod and set aside.

3. Install main adapter (Item 8) onto puller.



4. Insert adaptor #2 into bushing from belt side as shown. With towers pointing toward vise, slide sheave and bushing onto puller rod.

5. Install 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 main adapter (Item 8) on puller.
2. Apply Loctite 680 retaining compound to the back side of new bushing. Push bushing into center of sheave on tower side by hand.

Bushing PN 3576504

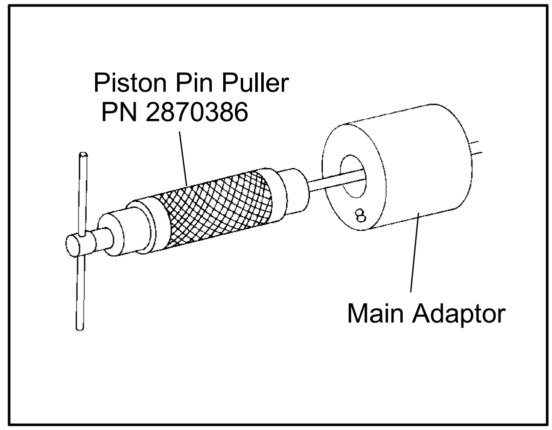
Loctite t 680 PN 2870584

3. Insert installation tool (Item 2) 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 Bushing Service

Drive Clutch Cover - Bushing Removal

1. Install main adapter (Item 8) on puller.

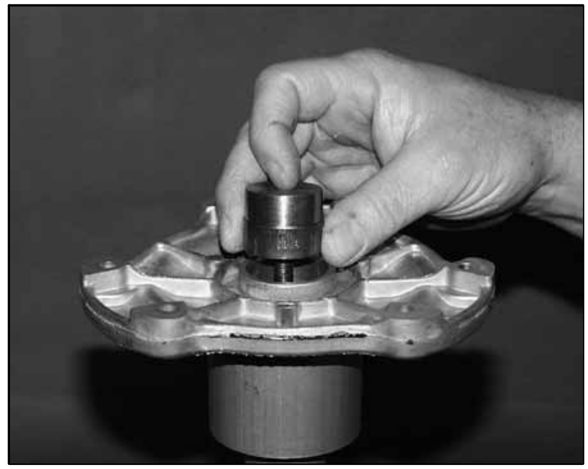


2. From outside of clutch cover, insert removal tool (Item 3) into cover bushing.
3. With inside of cover toward vise, slide cover onto puller.
4. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.

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.

Drive Clutch Cover - Bushing Installation

1. Apply Loctite 680 retaining compound to the back side of new bushing. Working from inside of cover, insert bushing and bushing installation tool into center of clutch cover.

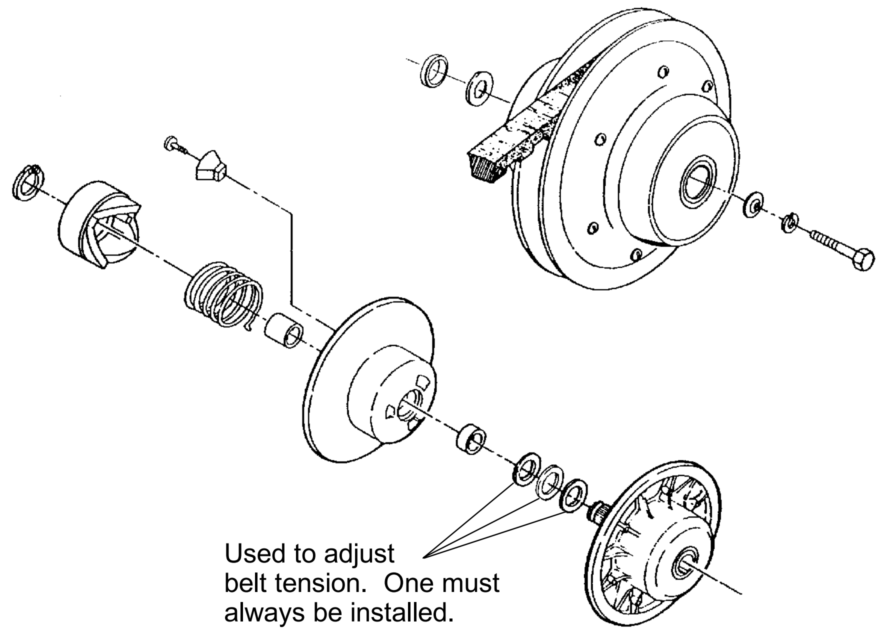


Bushing PN 3576510
Loctite t **680 PN 2870584**

2. With main adapter on puller, insert cover onto puller rod, placing outside of cover toward vise.
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.

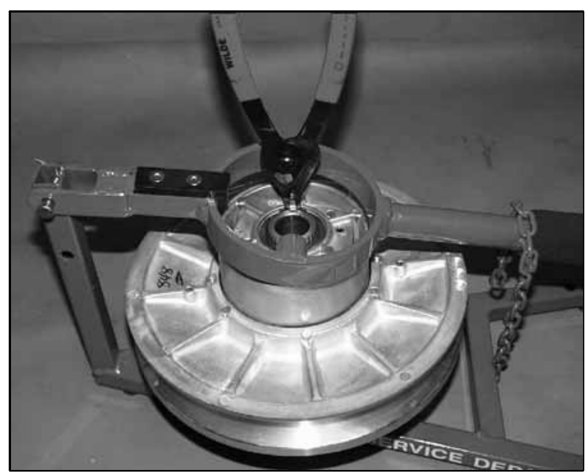
Driven Clutch Disassembly/Inspection



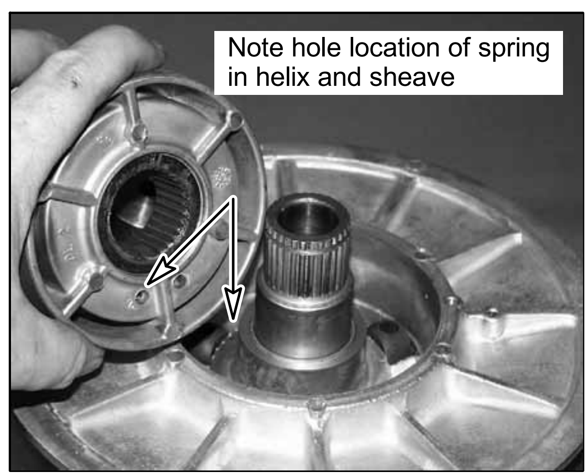
CAUTION:

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 compressor tool PN 8700220.
2. Remove snap ring retainer.

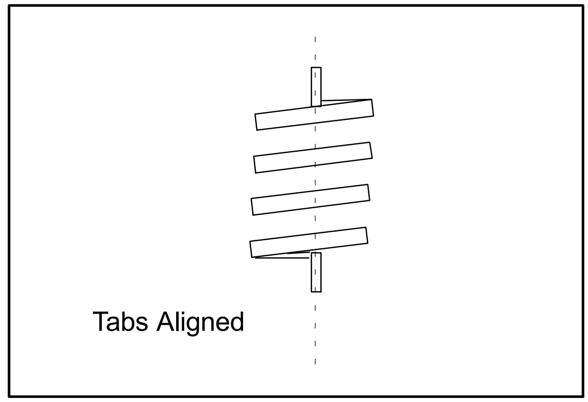


3. Note location of spring and remove helix.
4. Note location of spring in the moveable sheave, and remove the spring.



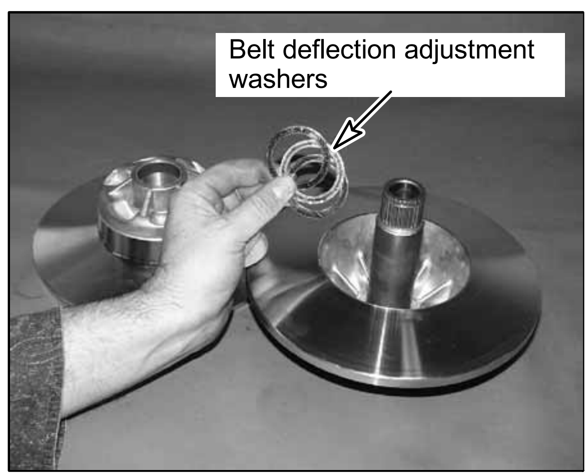
Driven Clutch Disassembly / Inspection, Cont.

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.

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



Driven Clutch Disassembly / Inspection, Cont.

8. Inspect the Teflon™ coating on the moveable sheave bushing.

> **Moveable Sheave Bushing Inspection:**
>
> **Replace the bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.**

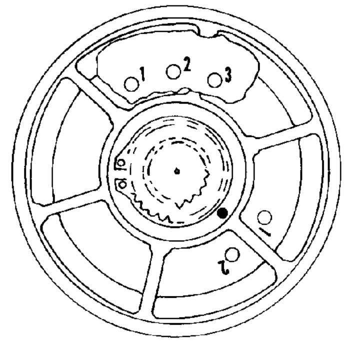
9. Inspect driven clutch faces for wear or damage.
10. Clean and inspect splines on helix and transmission input shaft.
11. Lube splines with a light film of grease.

1. 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.

2. Install spring, inserting spring tab into proper hole in moveable sheave.

3. Insert spring tab into proper hole in helix. See specifications at the beginning of this section.

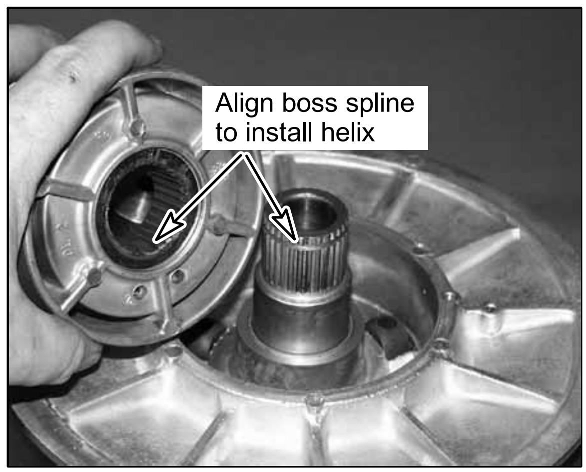
The driven clutch, helix/moveable assembly has several different spring locations which affect clutch shifting and RPMs. The greatest amount of spring tension will raise engine RPMs during clutch upshift and allow quicker backshift or downshift when pulling or negotiating a hill, for example. The least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



Example:	Helix		Moveable Sheave	Spring Tension
	2	–	1	Heavy
Spring/	2	–	2	↑
Position	1	–	1	
	2	–	3	
	1	–	2	↓
	1	–	3	Soft

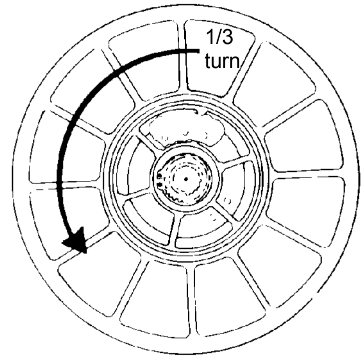
Refer to General Information Chapter 1 for driven clutch spring color and production setting.

4. 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.



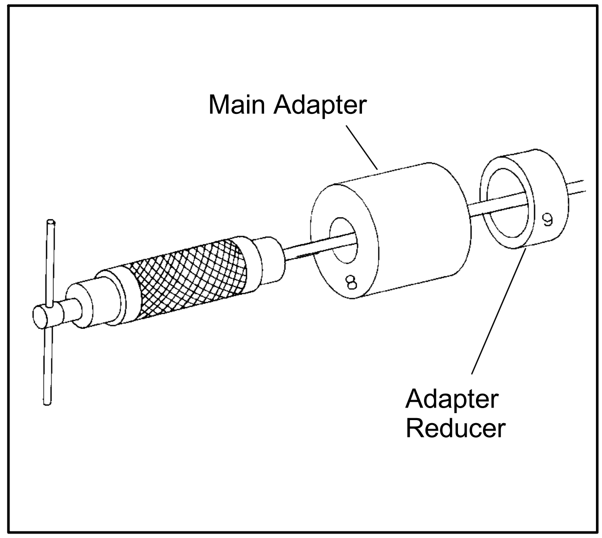
Driven Clutch Moveable Sheave - Bushing Removal

NOTE: Bushings are installed at the factory using Loctite. In order to remove the bushing it will be necessary to apply heat.

1. Install main adapter (Item 8) onto puller.

2. Insert adapter reducer (Item 9) onto puller, sliding it inside the main adapter..

3. Remove ramp buttons from moveable sheave.

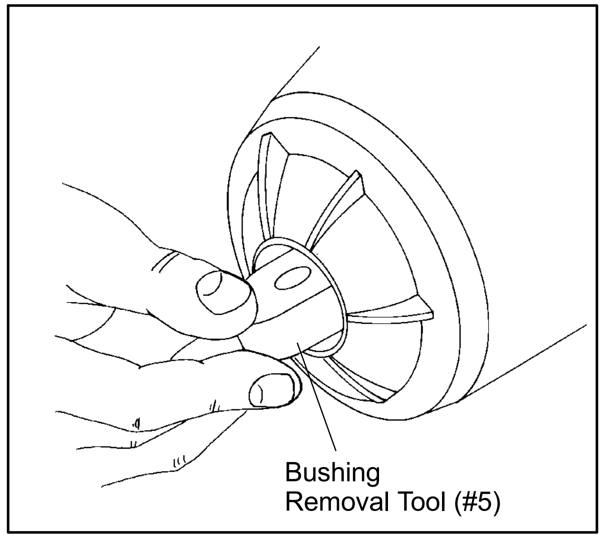


4. Using a hand held propane torch, apply heat directly on bushing until tiny smoke tailings appear.

CAUTION:

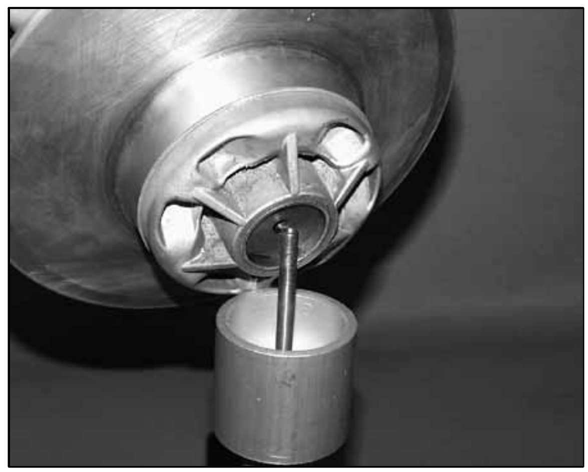
Clutch components will be hot! In order to avoid serious burns, wear some type of insulated gloves for the rest of the removal process.

5. Working from the top, install bushing removal tool (Item 5) into center of clutch sheave with smaller diameter toward bushing to be removed. See illustration at right.



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.

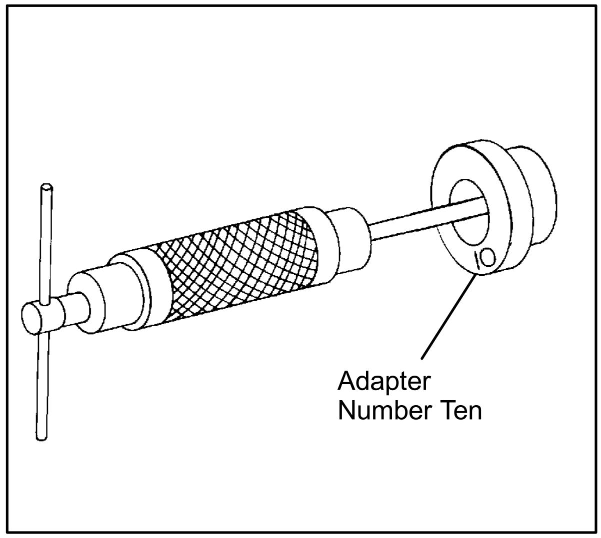
9. Remove nut from puller rod and set aside.

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 adapter number ten onto puller. See illustration at right.



2. Start new bushing evenly in moveable sheave. Apply Loctite 680 retaining compound to the back side of new bushing.

3. Install sheave onto puller with new bushing upward as shown. Install adaptor number two.

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.

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ENGINE BRAKING SYSTEM (EBS) Clutch

EBS Theory Of Operation

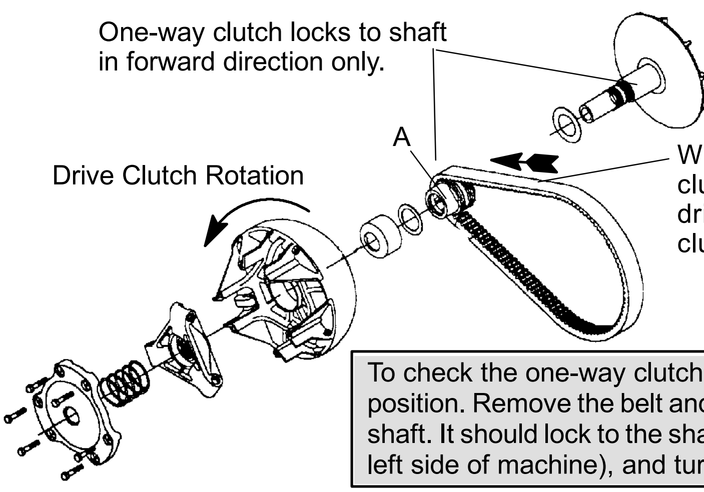
The Engine Braking System (EBS) combines the standard “no-shift” feature of the Polaris Variable Transmission (PVT) system with the added benefit of engine braking. Outwardly, both drive and driven clutch resemble those used in a standard PVT system, however, there are some important differences in the EBS clutches:

- Belt Deflection - It’s important to note that the belt is always “tight” in an EBS system. Belt deflection is not adjustable. Consequently, there are no shims in the driven clutch for changing drive belt deflection.
- Special Drive Belt - The bottom side of the belt is grooved for better contact with the one-way clutch (A).
- One-Way Clutch - One-way clutch (A) located on the drive clutch shaft is the key to system operation.

  In a standard PVT system, engine braking occurs briefly on deceleration until engine RPM falls below belt engagement speed and the drive clutch returns to the neutral position (sheaves open). At this point the drive belt is no longer engaged with the drive clutch, and no further engine braking occurs.

  Drive clutch operation is the same on a machine equipped with EBS at engine speeds above belt engagement. However, the difference with EBS is evident when engine RPM is below engagement speed and the drive clutch sheaves are open in the neutral position. In a standard PVT system, the belt is loose on the drive clutch shaft when the clutch is disengaged due to the nominal belt deflection of 1 1/4″ (loose belt). If the vehicle is moving downhill or coasting, the belt simply freewheels on the drive clutch shaft and engine braking does not occur. With EBS, the belt is tight and engaged with the one-way clutch. If the vehicle is moving downhill or coasting, the drive train turns the driven clutch, belt, and one way clutch in the direction of engine rotation. When the one-way clutch rotational speed exceeds drive clutch rotational speed, the one-way clutch locks to the drive clutch shaft, and engine braking occurs. Essentially, the driven clutch has become the “driving” clutch. Engine braking will continue until drive clutch speed exceeds one-way clutch speed, or until the throttle is applied and engine RPM reaches clutch engagement speed, lifting the belt off the one-way clutch.

  When the engine is idling and the vehicle is at rest, the one-way clutch simply “freewheels” on the drive clutch shaft.



To check the one-way clutch (A), turn the key and engine stop switch to “OFF” position. Remove the belt and try to rotate the one-way clutch on the drive clutch shaft. It should lock to the shaft when rotated counter-clockwise (as viewed from left side of machine), and turn freely when turned in the opposite direction.

- Driven Clutch Spring - Unlike a standard PVT driven clutch spring, the EBS driven clutch spring has no torsional wind. It is a compression spring only. The only difference between a 2-stroke and a 4-stroke EBS kit is the color (and tension) of the driven spring. Like the EBS drive clutch, the driven clutch also utilizes a one-way clutch, which locks to the shaft during engine braking. To check it, remove the belt and try to rotate the stationary sheave counterclockwise (as viewed from the left side of the machine). The sheave should lock to the shaft when rotated counterclockwise, and turn freely when rotated clockwise.
- High Elevation Setup - As with a standard PVT system, calibration changes are required for optimum performance at elevations above 3000 feet (900 meters).

OPERATION GUIDELINES FOR EBS CLUTCHES

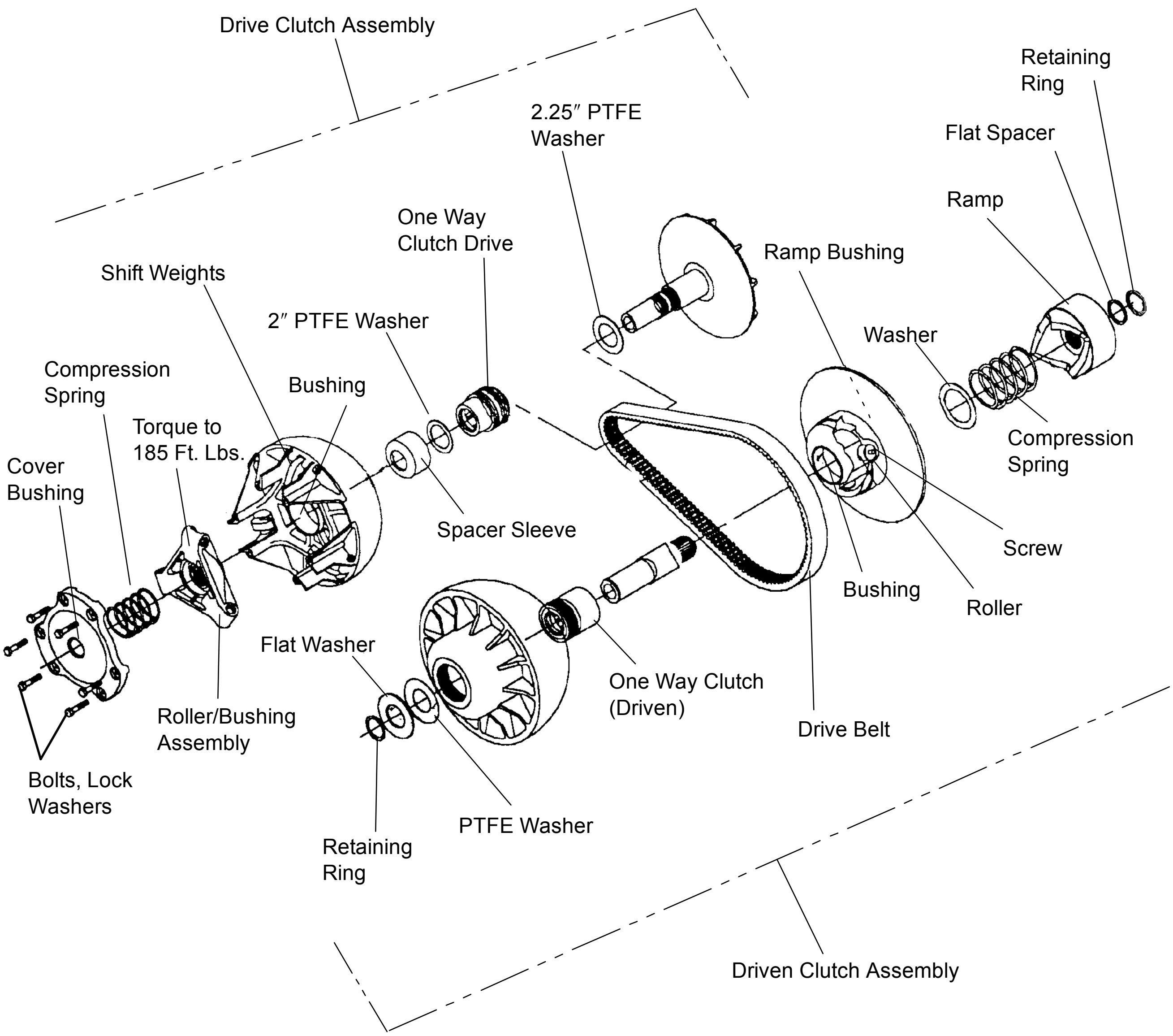
- EBS clutches have a slightly higher starting gear ratio between the drive and driven clutch due to the location of the one-way clutch on the clutch shaft. For best performance and belt life, *always* use low-range in hilly terrain and when towing or hauling a load. In fact, High Range should only be used when traveling on level ground with light or no load.
- EBS kits are recommended for models equipped with High / Low / Reverse transmissions only. Engine braking is enhanced when operating in low range.
- When an operator makes the transition to and from engine braking engagement, the driven clutch helix changes from the acceleration side to the deceleration side. An audible engagement noise may be heard during this transition and is a normal condition.
- Changes to drive clutch calibration are recommended if the vehicle will be operated at elevations above 3000 ft (900 meters). Refer to the model specific clutching chart for type of drive clutch weight and/or drive clutch spring to install for high elevation. ¡

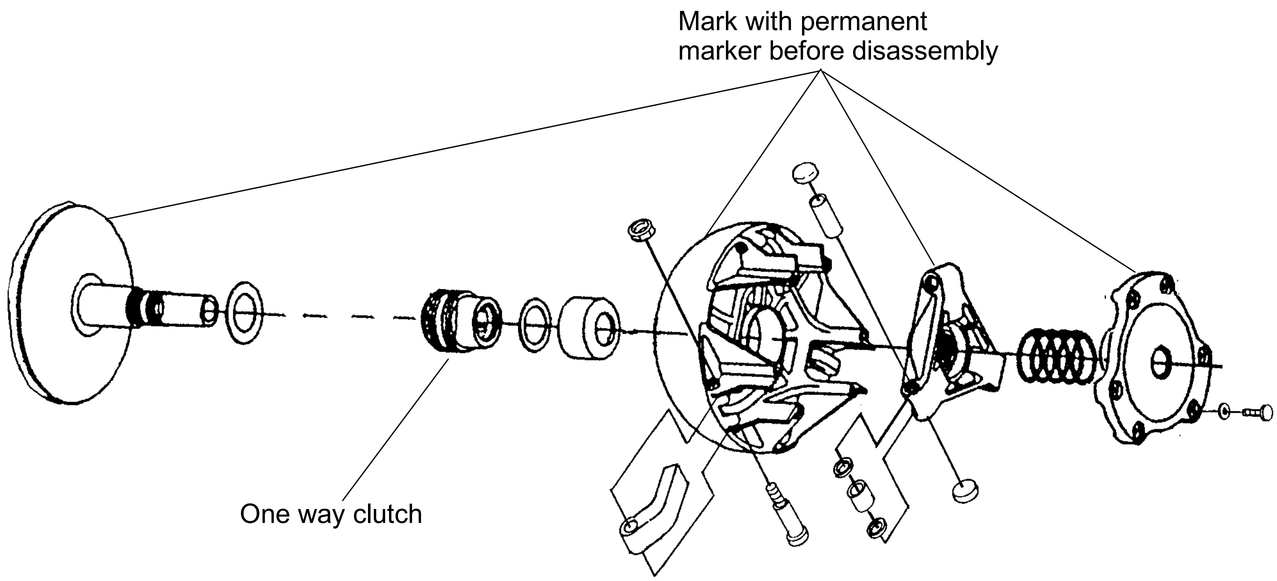
WARNING

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 PVT system maintenance and repair procedures. **Because of the critical nature and precise balance of components within the PVT system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures.**

¡ Disregard references to the driven clutch helix position. Helix adjustments do not apply to the EBS driven clutch.

EBS Exploded View

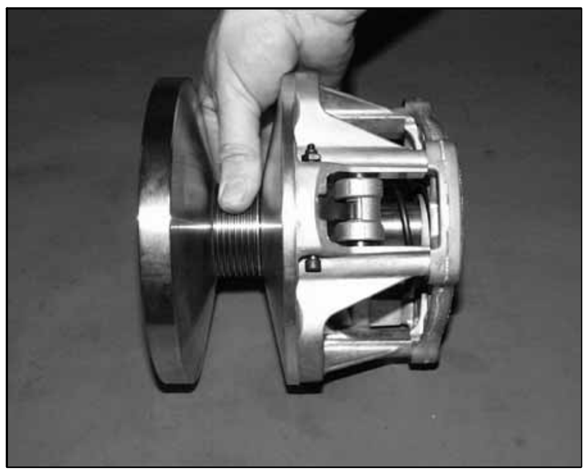




EBS Drive Clutch

One-Way Clutch Inspection (Drive Clutch)

1. Rotate one-way clutch clockwise (as viewed from the cover plate side). The clutch should rotate on the shaft with only slight amount of drag. There should not be any binding or rough spots. When rotated counterclockwise, the clutch should lock to the shaft without slipping. If problems are noted in either direction, continue with disassembly.



Drive Clutch Inspection

1. Remove moveable sheave spacer sleeve and the 2″ PTFE washer. Visually inspect the washer for damage. Measure the thickness and compare to specification. Replace if worn or damaged.

> **PTFE Washer Thickness**
> **Standard: .030″ (.76mm)**
> **Service Limit: .025″ (.64mm)**

2. Remove moveable sheave.

3. Lift one-way clutch off shaft. Replace as an assembly if worn, damaged, or if problems were noted on page 6.13.

4. Inspect surface of shaft for pitting, grooves, or damage. Measure the outside diameter and compare to specifications. Replace the drive clutch assembly if shaft is worn or damaged.

Shaft Diameter
Standard: 1.3745″ - 1.375″
Service Limit: 1.3730″

5. Remove 2 1/2″ PTFE washer from shaft. Visually inspect the washer for damage. Measure the thickness and compare to specification. Replace if worn or damaged.

PTFE Washer Thickness
Standard: .030″ (.76mm)
Service Limit: .025″ (.64mm)

Moveable Sheave Bushing Inspection

1. Inspect the Teflon™ coating on the moveable sheave bushing.

Moveable Sheave Bushing Inspection:

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

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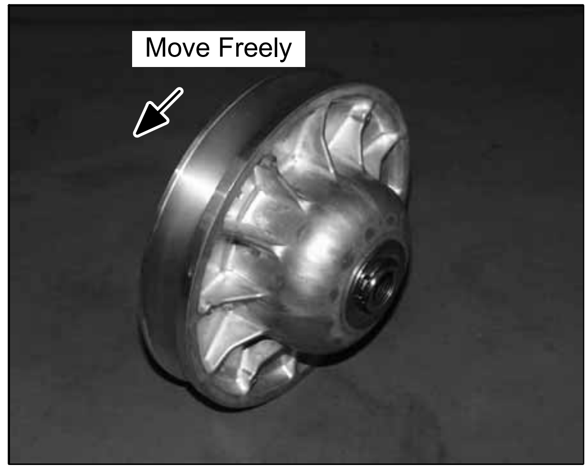
Driven Clutch Disassembly/Inspection - EBS

CAUTION: The driven clutch must be disassembled from the helix end to lessen the chance of damage to seals in the one-way clutch. Review all information below before proceeding.

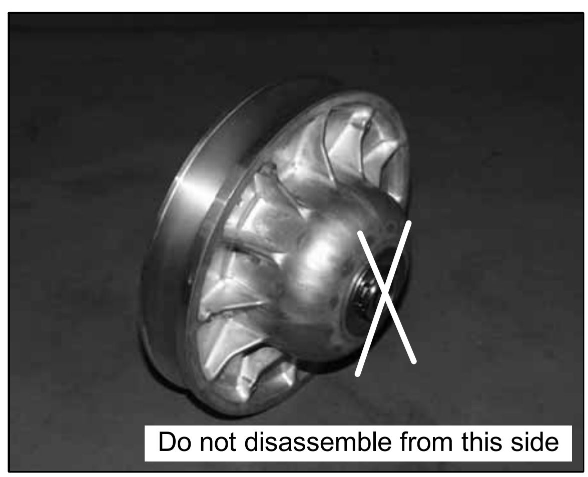
One-Way Clutch Preliminary Inspection (Driven)

1. With drive belt removed and transmission in neutral, hold the outer sheave and rotate the inner sheave of the driven clutch (moveable) in a counterclockwise direction as shown at right. The sheave should rotate on the shaft with only a slight amount of drag. There should not be any binding or rough spots.



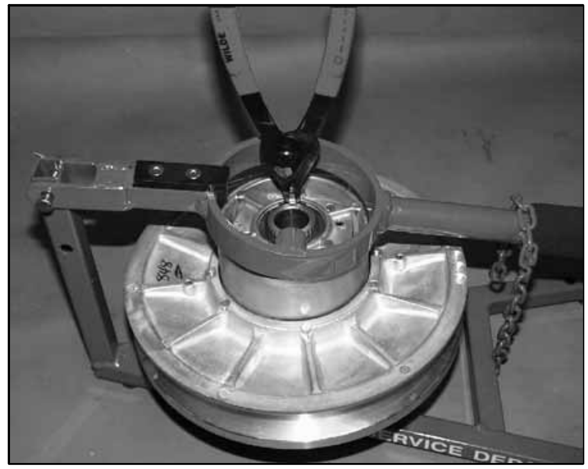
2. When rotated clockwise, the inner (moveable) sheave should lock to the shaft and outer sheave without slipping.

3. Remove driven clutch from the transmission input shaft. Do not disassemble the driven clutch from the outside snap ring. The driven clutch must be disassembled from the helix side or the one-way clutch seals may be damaged.



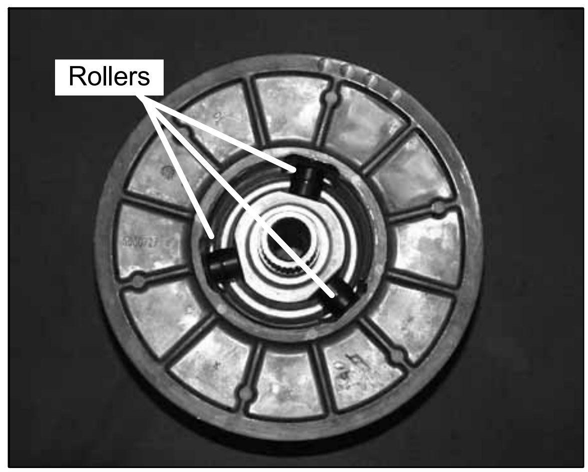
Driven Clutch Disassembly/ Inspection, Cont.

4. Push helix inward. Remove snap ring, washer, helix, and spring. The spring is a compression spring only and has no torsional wind.

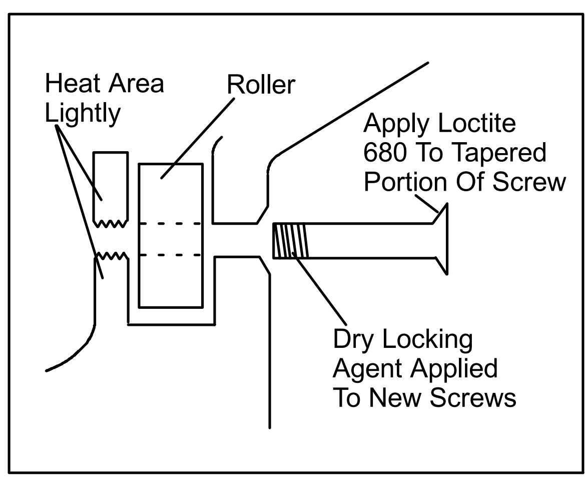


5. Remove spring seat washer and inspect for wear or damage. Replace if worn.

6. Inspect surface of rollers for flat spots and wear. Rollers must rotate freely on pins without excessive clearance. Check the roller pin and roller bore for wear and replace if necessary.



NOTE: ROLLER PIN DISASSEMBLY New roller retaining bolts have a dry locking agent applied to the threads. Before attempting to remove the roller pins, heat the threaded area lightly with a propane torch. Use a high quality hexagonal wrench (Allen t) in good condition to avoid screw damage. A small amount of valve grinding compound can be applied to the tip of the hex wrench to ensure a tight fit. Always use new bolts if they are removed for inspection. Apply Loctite 680 retaining compound sparingly to the <u>tapered head</u> portion of the roller retaining screws. Do not allow locking agent to contact the inside of the rollers. Do not lubricate the roller or roller pin.

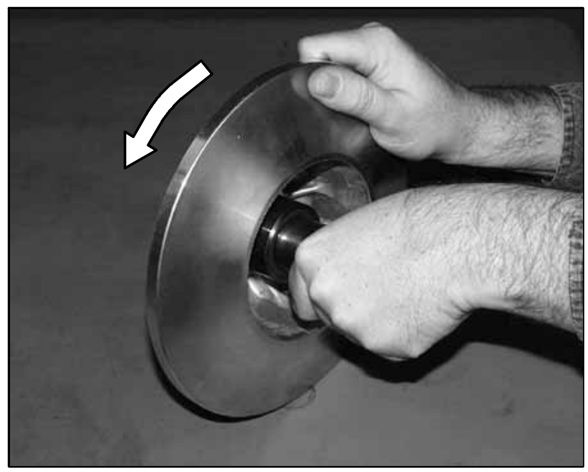


7. Inspect moveable sheave bushing for wear.

Moveable Sheave Bushing Inspection:

Replace the bushing if more brass than Teflon™ is visible on the surface of the bushing.

8. Check for movement of the driven clutch shaft in the one-way clutch. If the shaft can be moved laterally, or if the one-way clutch does not function properly as described in Step 1 and 2 on page 6.46, replace driven clutch assembly.



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EBS CLUTCH BUSHING REMOVAL AND INSTALLATION

Use Tool Kit PN 2201379

The contents of this kit include:

Item	Qty.	Part Description	Part No.
A/B	1	EBS Drive Clutch and Driven Clutch Puller Tool	5132027
C	1	EBS Drive Clutch and Driven Clutch Puller Nut	
D	1	EBS Main Adapter	5132029
E	1	EBS Bushing Removal Tool	5132028
	1	Instruction	9915111

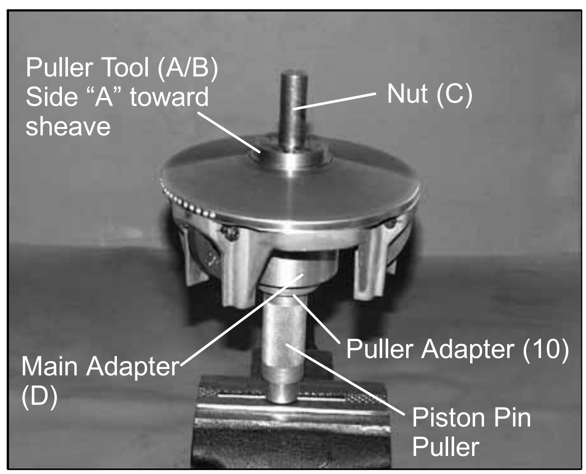
Also required:
Clutch Bushing Removal/Installation Tool Kit PN 2871226 (ATV Clutch Kit) or 2871025 (For all clutches)
Piston pin puller (PN 2870386)

REMOVAL AND INSTALLATION INSTRUCTIONS

NOTE: Bushings are installed at the factory using Loctite t 609. In order to remove bushings it will be necessary to apply heat evenly to the area around each bushing. Clean all residual Loctite from bushing bore prior to installing new bushing.

EBS Drive Clutch Moveable Sheave - Bushing Removal

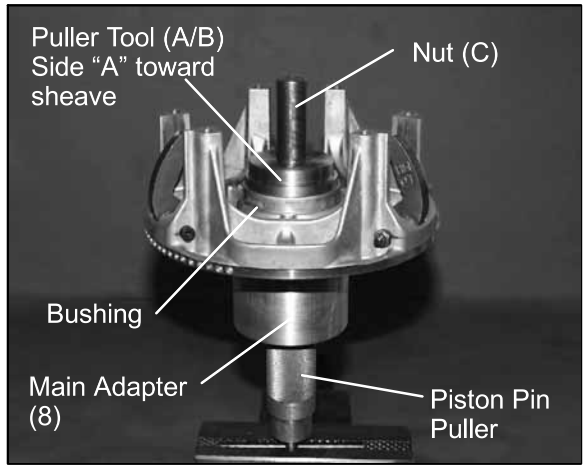
1. Remove clutch as outlined previously in this chapter.
2. Install handle end of piston pin puller (PN 2870386) securely into bench vise and lightly grease puller threads.
3. Remove nut from puller rod and set aside.
4. Install puller adapter (Item 10 from kit 2871226).
5. Install main adapter (Item D) onto puller.
6. With towers pointing toward the vise, slide sheave onto puller rod.
7. Install removal tool (Item A/B) into center of sheave with “A side” toward sheave.
8. Install nut (C) onto end of puller rod and hand tighten. Turn puller barrel to increase tension on sheave if needed. Using a hand held propane torch, apply heat around outside of bushing until tiny smoke tailings appear.



9. Turn sheave counterclockwise on puller rod until it comes free. Lift sheave off puller.
10. Remove nut from puller rod and set aside.
11. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

EBS Drive Moveable - Bushing Installation

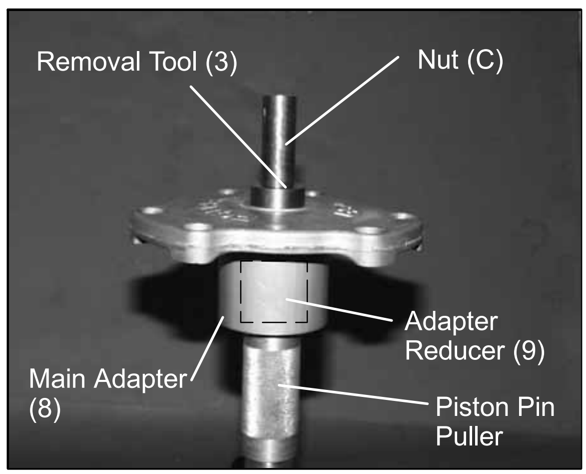
1. Place main adapter (Item 8) on puller.
2. Apply Loctite t 609 evenly to bushing bore inside moveable sheave.
3. Set bushing in place on sheave.
4. Insert installation puller tool (Item A/B) with "A" side down, into center of bushing.
5. With towers pointing upward, slide sheave, bushing and tool onto puller rod.
6. Install nut on puller rod and hand tighten. Turn barrel to apply additional tension if needed.
7. Turn sheave counterclockwise, making sure bushing is drawn straight into bore. Continue until bushing is seated.
8. Remove nut from puller rod and set aside.
9. Remove sheave from puller.
10. Remove installation tool.



EBS Drive Clutch Moveable Sheave Bushing Installation

EBS Clutch Cover - Bushing Removal

1. Install main adapter (Item 8) on puller.
2. Install adapter reducer (Item 9).
3. From outside of clutch cover, insert removal tool (Item 3) into cover bushing.
4. With inside of cover toward vise, slide cover onto puller.
5. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.
6. Turn clutch cover counterclockwise on puller rod until bushing is removed and cover comes free.
7. Remove nut from puller rod and set aside.
8. Remove bushing and bushing removal tool from puller. Discard bushing.



EBS Drive Clutch Cover Bushing Removal

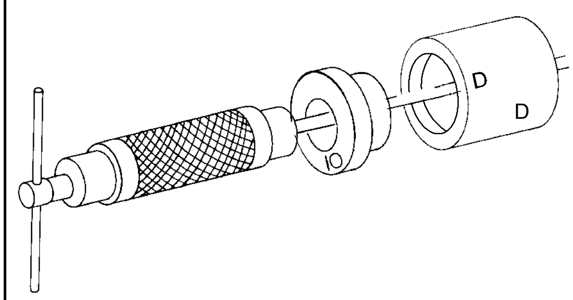
EBS Clutch Cover - Bushing Installation

1. Apply Loctite t 609 evenly to bushing bore in cover.
2. Working from inside of cover, insert new bushing and bushing installation tool into center of clutch cover.
3. With main adapter on puller, insert cover onto puller rod, placing outside of cover toward vise.
4. Install nut on rod and hand tighten. Turn puller barrel to apply more tension if needed.
5. Turn clutch cover counterclockwise on puller rod until bushing is seated.
6. Remove nut from puller rod and take installation tool and clutch cover off rod.

Bushing Replacement, EBS Driven

EBS Driven - Bushing Removal

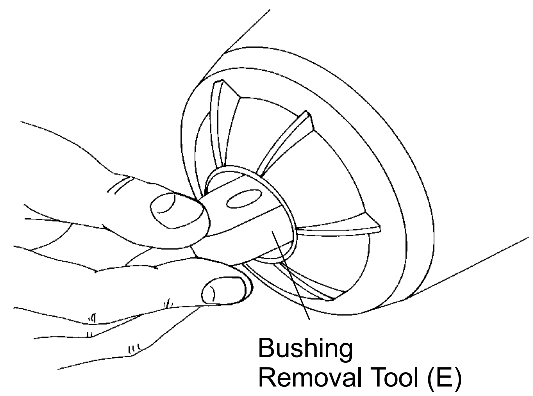
1. Install puller adapter (Item 10) onto puller.
2. Insert EBS main adapter (Item D) onto puller. See Ill. 1.



Ill. 1

3. Install bushing removal tool (Item E) into center of clutch sheave. See Ill. 2.
4. Install sheave onto puller.
5. Install left hand nut onto puller rod and tighten by hand. Turn puller barrel for further tension if needed.
6. Using a hand held propane torch, apply heat around outside of 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.

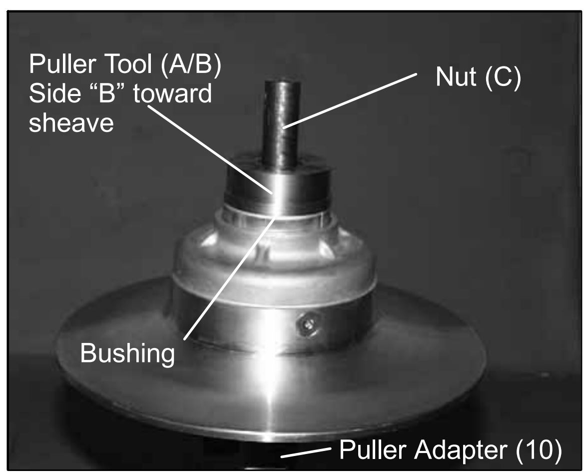


Ill. 2

7. Turn clutch sheave counterclockwise until bushing is removed and sheave comes free.
8. Remove nut (C) (left hand thread) from puller rod and set aside.
9. Remove adapters from puller.
10. Remove bushing and removal tool from adapters. Discard bushing.

EBS Driven - Bushing Installation

1. Slide adapter (Item 10) onto puller.
2. Apply Loctite t 609 evenly to bushing bore inside moveable sheave.
3. Install sheave onto puller (belt surface up).
4. Place new bushing on side B of installation tool (Item A/B) and slide both over puller rod.
5. Install nut (C) onto puller rod and hand tighten against installation tool.
6. Turn clutch sheave counterclockwise until bushing is seated.
7. Remove nut (C) (left hand thread) from puller rod and set aside.
8. Remove installation tool and clutch sheave from puller.



EBS Driven Clutch Bushing Installation

EBS Driven - Backside (Outer) Bushing Removal

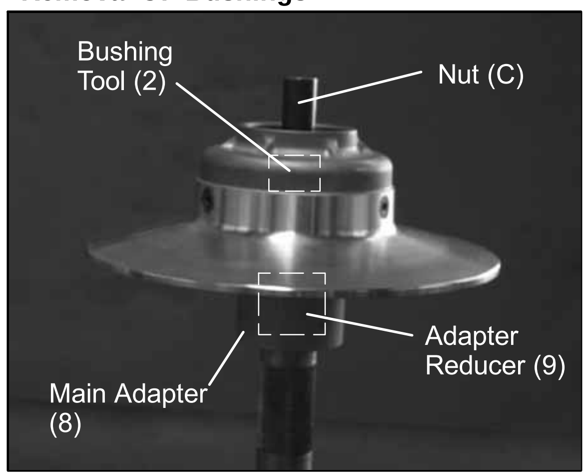
1. Install main puller adapter (Item 8) onto puller.
2. Install adapter reducer (Item 9).
3. Using a hand held propane torch, apply heat around outside of bushing until tiny smoke tailings appear.

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.

4. Flip sheave over onto puller.
5. Install bushing tool (Item 2).

Heat Bushing Surface Prior To Installation/ Removal OF Bushings

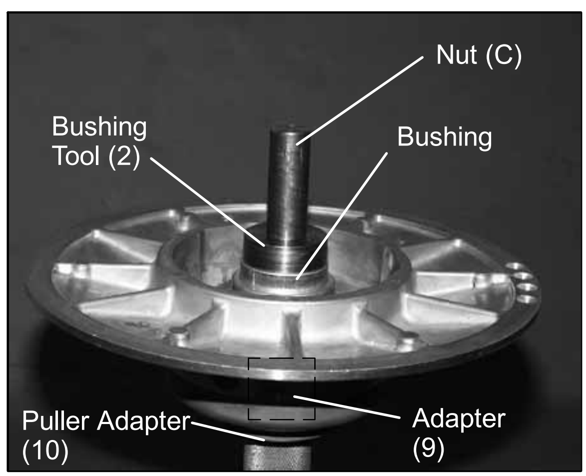
6. Install left hand nut (C) and spacer onto puller rod and tighten by hand. Turn puller barrel for further tension if needed.
7. Turn clutch sheave counterclockwise until bushing is removed and sheave comes free.
8. Remove nut (C) (left hand thread) from puller rod and set aside.
9. Remove adapters from puller.
10. Remove bushing and removal tool from adapters. Discard bushing.



EBS Driven Clutch Outer Bushing Removal

EBS Driven - Backside (Outer) Bushing Installation

1. Install puller adapter (Item 10) onto puller.
2. Install adapter (Item 9) onto puller.
3. Apply Loctite t 609 evenly to bushing bore inside moveable sheave.
4. Install sheave face down on puller.
5. Install new bushing on installation tool (Item 2) and install assembly into sheave.
6. Install left hand thread nut (C) onto puller rod and hand tighten against installation tool.
7. Turn clutch sheave counterclockwise, making sure bushing is drawn straight into bore. Continue until bushing is seated.
8. Remove nut (C) (left hand thread) from puller rod and set aside.
9. Remove installation tool and clutch sheave from puller.



EBS Driven Clutch Outer Bushing Installation

Troubleshooting

Situation	Probable Cause	Remedy
Engine RPM below specified operating range, although engine is properly tuned.	-Wrong or broken drive clutch spring. -Drive clutch shift weight too heavy. -Driven clutch spring broken or installed in wrong helix location. -Converter sheaves greasy; belt slippage.	-Replace with recommended spring. -Install correct shift weight kit to match engine application. -Replace spring; refer to proper installation location. -Install new belt.
Erratic engine operating RPM during acceleration or load variations.	-Drive clutch binding. -Belt worn unevenly - thin/burnt spots -Driven clutch malfunction. -Sheave face grooved.	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 rollers. b. Inspect movable sheave for excessive bushing clearance/ replace. -Replace the clutch.
Engine RPM above specified operating range.	-Incorrect drive clutch spring (too high spring rate). -Drive clutch shift weights incorrect for application (too light). -Drive clutch binding. -Driven clutch binding.	-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.
Harsh drive clutch engagement.	-Drive belt worn too narrow. -Excessive belt/sheave clearance with new belt.	-Replace belt. -Perform belt/sheave clearance adjustment with shim washers beneath spider.
Drive belt turns over	-Wrong belt for application. -Clutch alignment out of spec. -Engine mount broken or loose.	-Replace with correct belt. -Adjust alignment offset. -Inspect/adjust or replace.
PVT cover overheating (melting)	-Plugged air intake or outlet -Belt slippage due to water, oil, grease, etc., rubbing on cover -Use of high range in wrong application -Clutches or weight being applied to cover while in operation	-Clear obstruction. -Inspect system. Clean , repair or replace as necessary. Seal PVT system ducts. -Use low range when pulling load, carrying weight or in hilly terrain. -Remove weight. Inform operator.
Water ingestion	-Cover seals or ducts leaking -Operator error	-Find leak and repair as necessary. -Instruct operator on guidelines for operation in wet terrain as outlined in Owner's Safety and Maintenance Manual.

NOTES

Situation	Probable Cause	Remedy
Belt slippage	-Belt worn out -Water ingestion -Belt contaminated with oil or grease	-Replace belt. -Inspect and seal PVT system. -Inspect and clean.
Belt burnt, thin spots	-Abuse (continued throttle application when vehicle is stationary, excess load) -Dragging brake -Slow, easy clutch engagement	-Caution operator to use low gear when pulling heavy loads, and operate machine within guidelines. -Vehicle operated with park brake on. Inspect brake system. -Fast, effective use of throttle for efficient engagement.
PVT noise	-Belt worn or separated, thin spots, loose belt -Broken or worn clutch components, cover hitting clutches	-Replace belt. -Inspect and repair as necessary.
Engagement erratic or stabby	-Thin spots on belt, worn belt -Drive clutch bushings stick	-Replace belt. Refer to belt burnt troubleshooting and instruct operator. -Inspect and repair clutches.

CHAPTER 7
FINAL DRIVE

Wheel, Hub, and Spindle Torque Table [i]

Model	Item	Specification
2x4	Front Wheel Nuts	15 Ft. Lbs.
	Rear Wheel Nuts	50 Ft. Lbs.
	Front Spindle Nut	40 Ft. Lbs.
	Rear Hub Retaining Nut	80 Ft. Lbs.
4x4 Chain Drive and Chain/Shaft Models	Front Wheel Nuts	15 Ft. Lbs.
	Rear Wheel Nuts	50 Ft. Lbs.
	Front Hub Nut	Refer to text for procedure (Pg 7.11)
	Rear Hub Retaining Nut	80 Ft. Lbs.
4 x 4 Shaft Drive	Front Wheel Nuts	15 Ft. Lbs.
	Rear Wheel Nuts	15 Ft. Lbs.
	Front Hub Nut	Refer to text for procedure (Pg 7.11)
	Rear Hub Retaining Nut	100 Ft. Lbs.

[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.

2x4 Hub Bearing / Seal Replacement

2x4 Front Hub Disassembly/Inspection

1. Elevate front end and safely support machine under footrest / frame area.

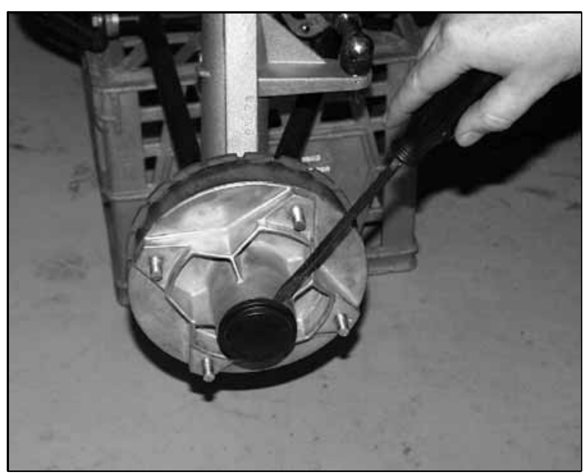
CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

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

3. Remove wheel nuts and wheel.

4. Remove brake caliper.

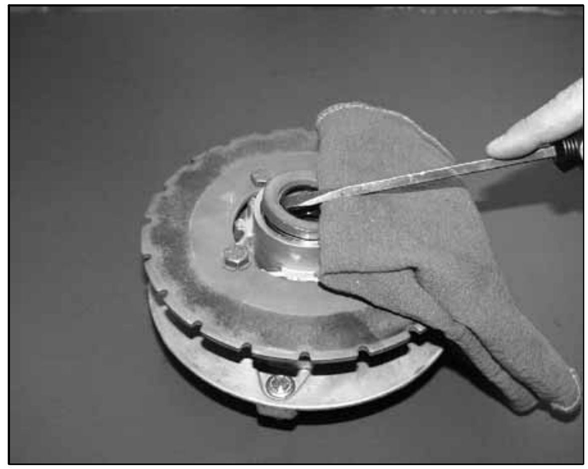
5. Remove hub cap, cotter pin, front spindle nut, and washer.
6. Rotate each bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion. Replace bearing if moisture, dirt, corrosion, or roughness is evident.



NOTE: If bearings are removed, they must be replaced.

2x4 Front Hub Disassembly, Cont.

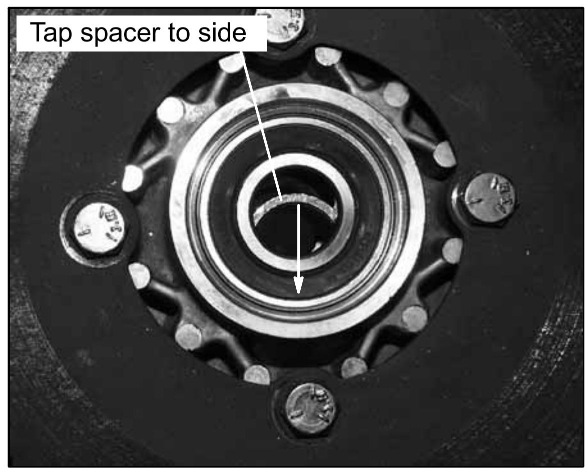
7. Place a shop towel on hub to protect surface. Carefully pry seal out of hub.



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.

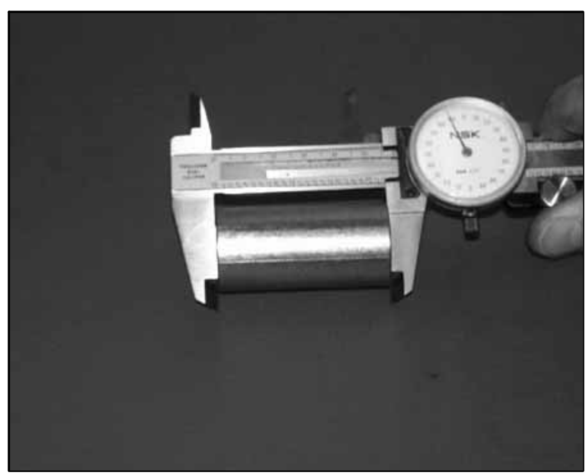
9. Remove spacer and drive other bearing out and discard.

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.

Bearing Spacer Length:
Service Limit: 2.1850″ (5.55 cm)



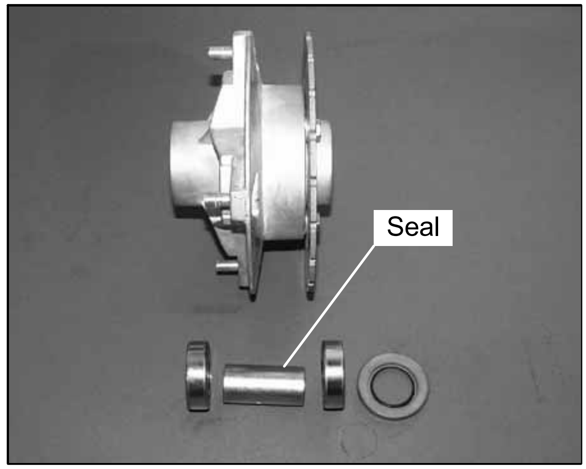
2x4 Hub Bearing / Seal Replacement

2x4 Front Hub Assembly

1. Drive or press one new bearing into hub using a 1.180 (46 mm) bearing driver.

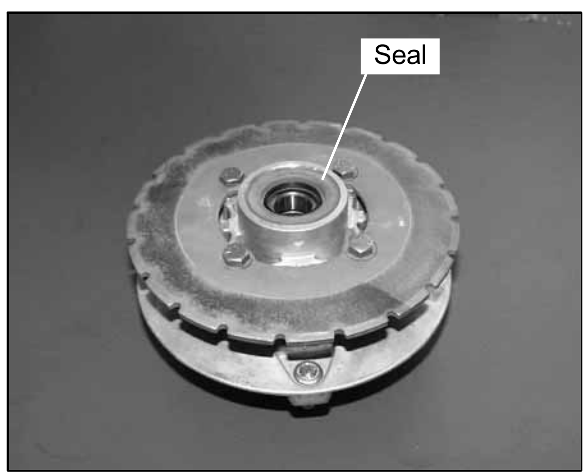
   CAUTION: *Do not* drive on the inner race of the bearing.

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

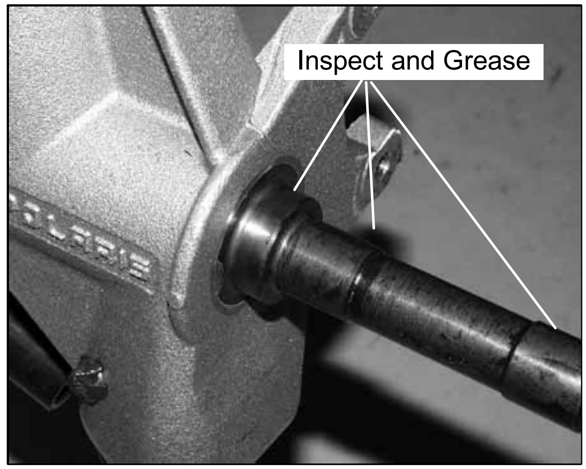


2. Coat bearing spacer with grease and install into hub. Drive or press the other bearing into hub until seated against spacer.

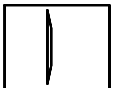
3. Install seal into hub (with numbers facing out) until flush with end of seal bore.



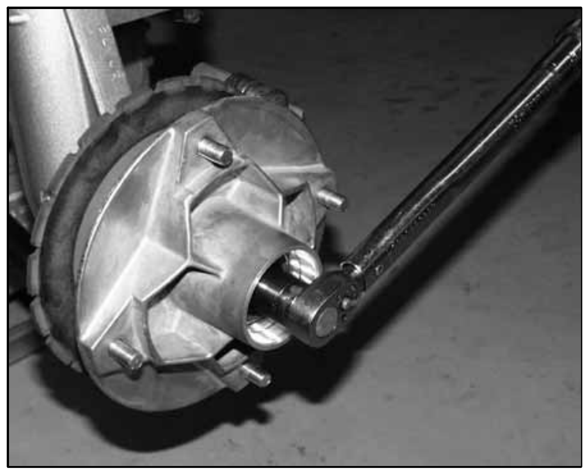
2x4 Front Hub Installation



1. Inspect spindle seal and bearing surface for wear or damage.
2. Apply grease to spindle.
3. Install hub on spindle.
4. Apply grease to washer and install with domed side out.



5. Install spindle nut and tighten to specification.

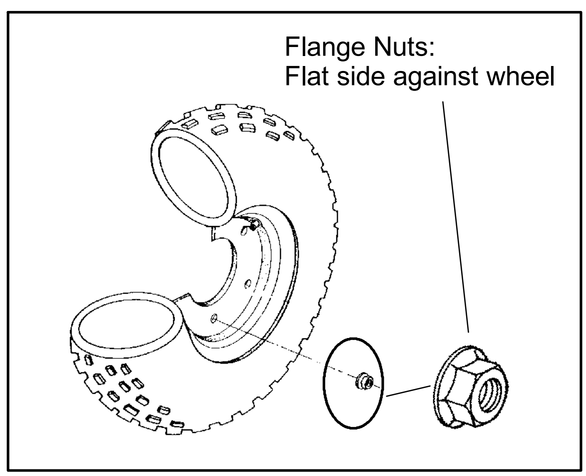


2 x 4 Spindle Nut Torque:
40 ft. lbs. (55.0 Nm)

6. Install a new cotter pin. Tighten nut slightly if necessary to align cotter pin holes.
7. Rotate wheel and check for smooth operation. Bend both ends of cotter pin around end of spindle in different directions.
8. Lightly grease a new O-ring and install on hub cap.
9. Install hub cap.
10. Rotate hub. It should rotate smoothly without binding or rough spots or side play.
11. Install brake caliper using new bolts. Tighten bolts to specified torque.

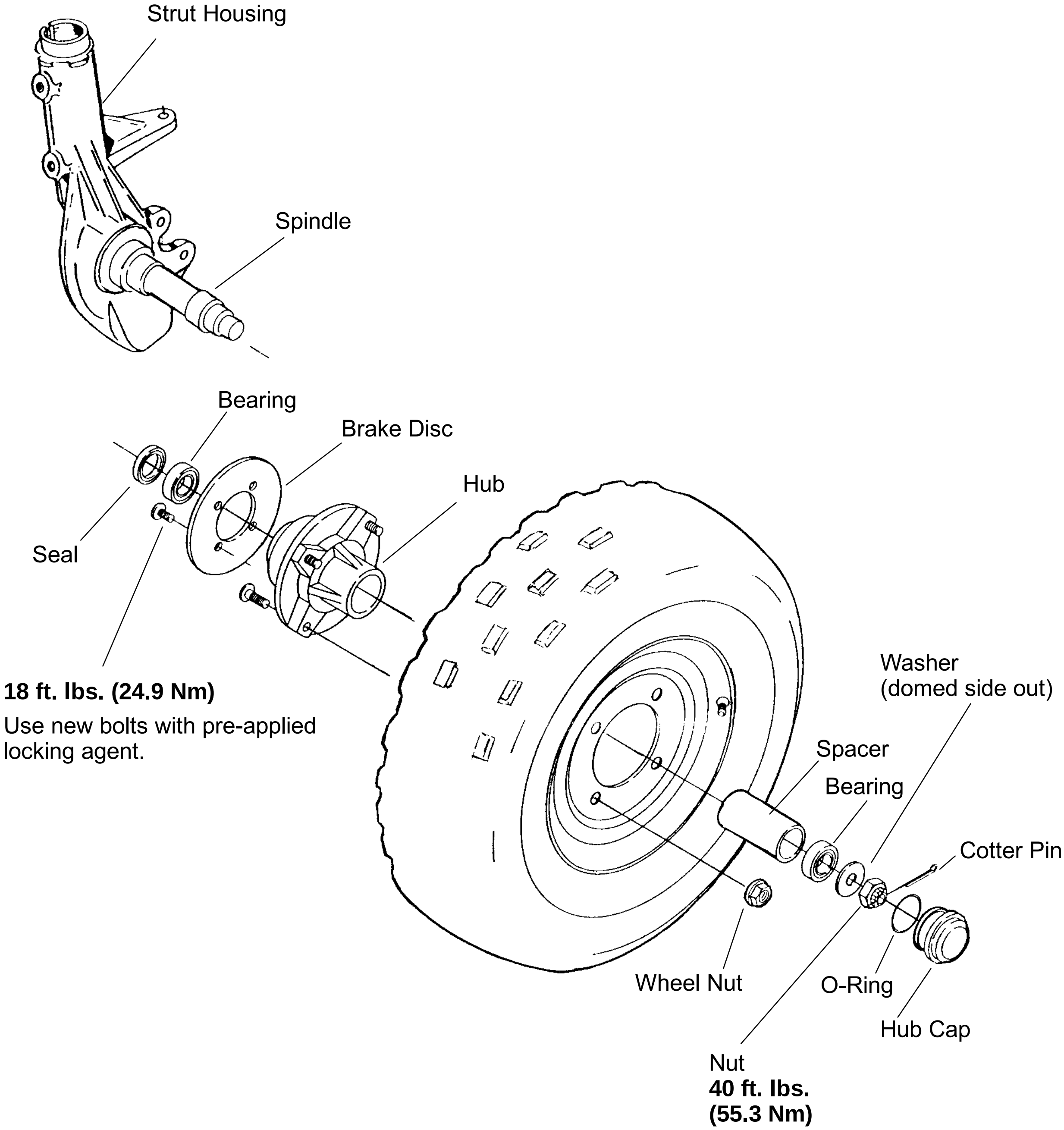
CAUTION: New bolts have a pre-applied locking agent which is destroyed upon removal. Always use new brake caliper mounting bolts upon assembly.

12. Install wheel and wheel nuts and tighten evenly in a cross pattern to specified torque.



Front Wheel Nut Torque
15 ft. lbs. (20.7 Nm)

2x4 Front Hub Assembly



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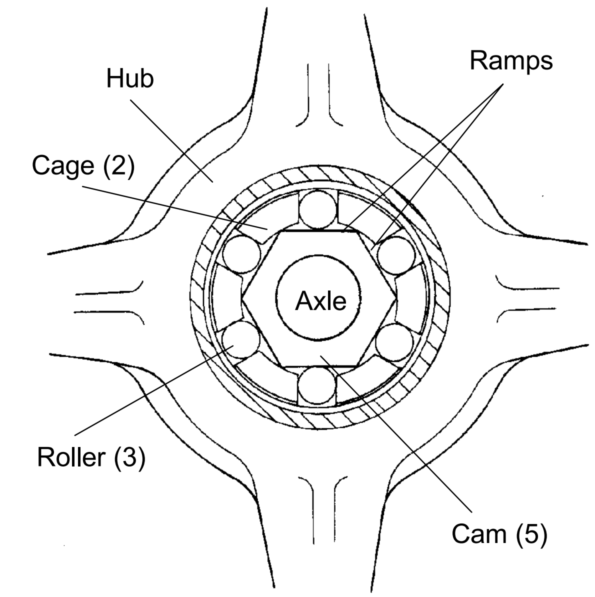
AWD Operation Overview

With the Polaris All Wheel Drive System activated (AWD selected), the machine operates as a 2 wheel drive vehicle until the rear wheels lose traction. If the rear wheels lose traction the front wheel rotational speed will decrease, causing the front drive axle speed to exceed front wheel speed. Restricting the rotation of the drive clutch roller cage (2) (see Electric Hub Operation) will cause the rollers (3) to climb the ramps of the cam (5), and become squeezed between the ramps and the ring in the hub. See Ill. 1.

When the hub clutch assembly, wheel hub, and drive axle are engaged, the front wheels will drive and stay engaged until rear wheel traction is regained. When traction is regained, the front wheels will overdrive the hub clutch, pushing the clutch rollers (3) toward the lower part of the cam (5), disengaging the clutch. The rollers are held in place by the spring (4). See Ill. 2. The tension of this spring is critical to AWD hub operation. Always use the correct spring (refer to appropriate parts manual) and use installation tool PN 2870888.



Ill. 1

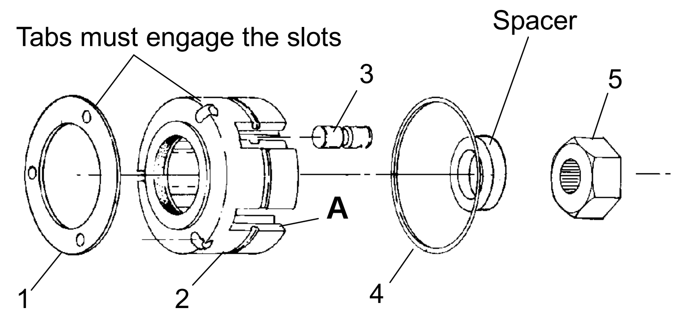
⚠ WARNING

It is important that the front and rear axle drive ratio and tire size are not changed. Changing this ratio will cause erratic engagement, which could result in a loss of vehicle control and serious injury or death.

Electric Hub Engagement (AWD)

When AWD is selected in a forward gear, current flows through a coil of wire located in the strut housing, creating a magnetic field. An armature plate (1) coupled to the roller cage (2) is attracted to the magnetic field, and resists rotation, creating drag on the drive roller cage assembly. This causes the roller to climb the ramps of the cam, engaging the hub. **NOTE:** In reverse gear the override button must be pushed to deliver power to the wheel coil. Electric hub engagement offers an advantage over mechanical systems. When the AWD button is switched off, the machine will have the steering ease of a 2 wheel drive unit; and with the switch turned on, All wheel drive will be engaged whenever the rear wheels lose traction.

1. Armature Plate
2. Roller Cage
3. Roller
4. Garter Spring
5. Cam



Ill. 2

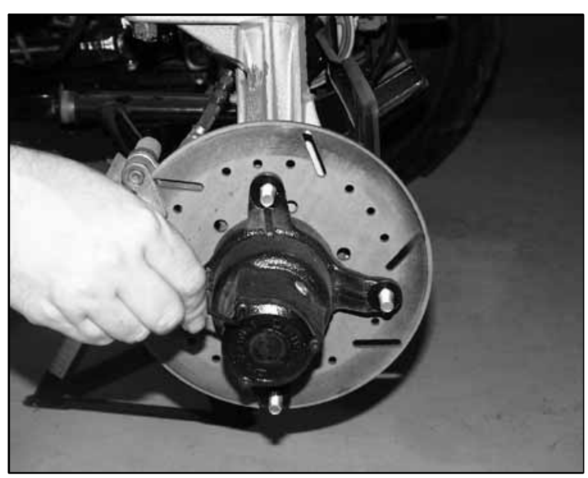
Front Hub Removal (AWD)

If an AWD problem is encountered, thoroughly inspect the electrical portion of the system as well as the front hub mechanism. Refer to the electrical chapter.

1. Carefully lift and support the front end of the machine as shown with the jack stands under the front end of the foot rests. **CAUTION:** Make sure the machine is solidly supported before proceeding. Serious injury could occur if the machine tips or falls.
2. Remove the front wheels and thoroughly clean the area around the hub, strut casting, brake caliper and brake disc.

3. Remove the two brake caliper attaching bolts. **CAUTION:** Do not hang the caliper by the brake hose. Use wire to hang the caliper to prevent possible damage to the brake line.

4. Place a catch pan beneath the front hub and remove the hub cap.
5. Remove cotter pin and nut.
6. Remove front hub and bearings.



Hub/Wheel Bearing Installation

1. Thoroughly inspect the hub internally. If the hub bearing sleeve is damaged or shows signs of movement, the hub assembly must be replaced. When the sleeve is pressed into the hub it should be flush with the outside surface of the hub.

2. Grease hub seal to allow it to slide over roller clutch components.

3. Install wheel hub inner bearing.
   NOTE: All bearings must slide freely onto the spindle. If bearings do not slide freely, wheel bearing torque will be affected.

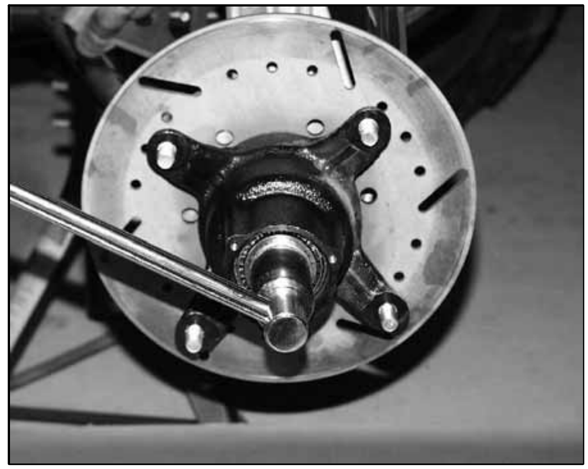
4. Install wheel hub, outer bearing, washer, and attaching nut. **NOTE:** It is very important that the hub is not moved outward once installed, or the seal on the hub will disengage the armature plate.

WARNING

The following bearing adjustments are very important. Incorrect adjustment will increase bearing wear, reduce braking action, and may affect front drive hub engagement, which could result in serious personal injury or death.

AWD Front Hub Bearing Adjustment

1. Torque spindle nut to 160-170 inch lbs. while rotating hub continuously.
2. Back off nut 1/2 turn.
3. Rotate axle several revolutions by raising rear of machine and rotating rear wheels with the machine in gear.
4. Re-torque hub nut to 108-144 inch lbs.



Front Spindle Nut Torque:
108-144 in. lbs.

Brake Caliper Retaining Bolt Torque:
18 ft. lbs. (2.5 kg-m)

5. Install cotter pin. Bend each leg of cotter pin around castle nut in different directions.

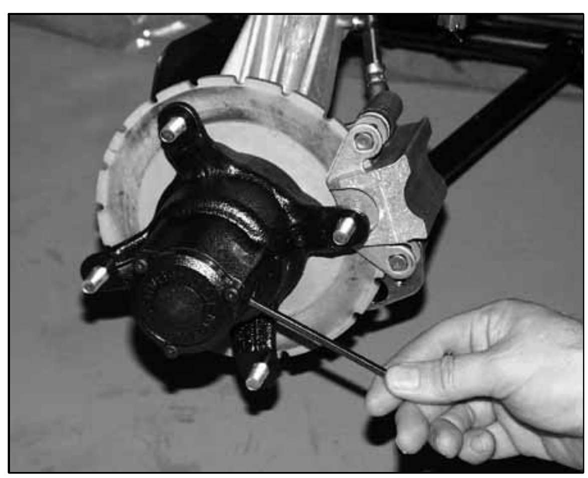
NOTE: If cotter pin hole does not align, tighten slightly to align and install pin. Do not exceed 144 in. lbs.

6. Reinstall hub cap.
7. Remove fill check plug and rotate hole to either 4:00 or 8:00 position.
8. Fill with Polaris Premium Demand Drive Hub Fluid or Type F Automatic Transmission Fluid until fluid trickles out. **NOTE:** Do not force the oil into the hub under pressure. This can cause seal damage and leaks.

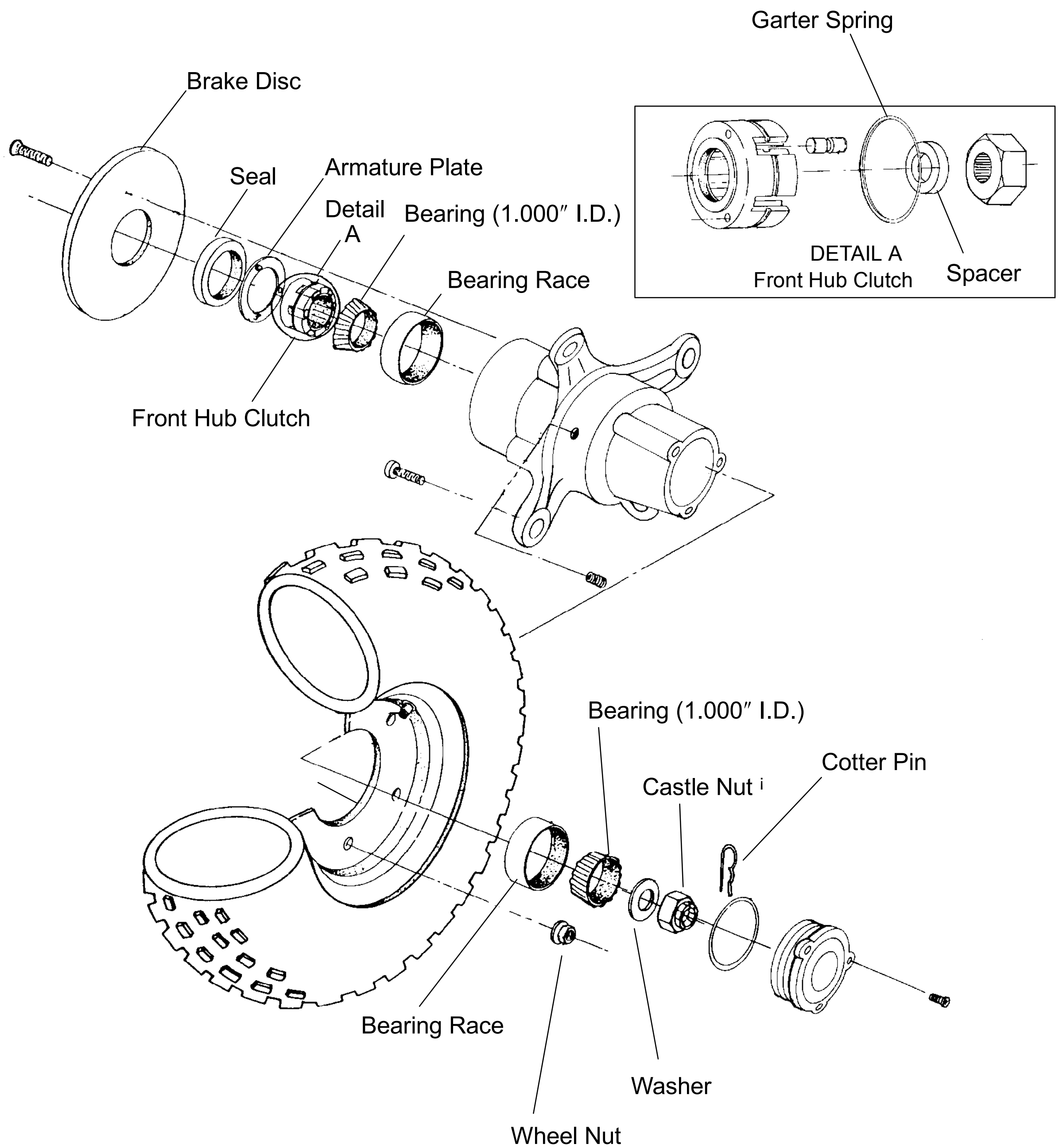
Premium Demand Drive Hub Fluid

PN 2871654 (8 oz.)
PN 2872277 (2.5 gal.)

9. Reinstall plug.
10. Reinstall brake caliper assembly. Torque retaining bolts to 18 ft. lbs. (2.5 kg-m).
11. Reinstall front wheels. Torque retaining nuts to 15 ft. lbs. (2.1 kg-m).
12. Carefully lower vehicle.
13. Field test vehicle for proper operation of brake system and AWD operation.



AWD Front Hub



i **Refer to text on page 7.11 for more information.**

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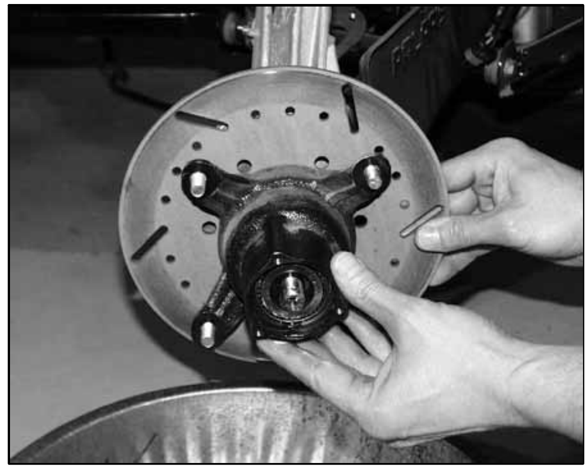
AWD Hub Seal Replacement

1. Remove and disassemble front hub. Refer to page 7.9.
2. Remove brake disc attaching bolts and brake disc.
   NOTE: If the attaching bolts are difficult to remove, it may be helpful to heat the outer surfaces of the hub in the area of the disc mounting bolts, to soften the locking agent.



3. Apply heat to the hub seal area. When the hub becomes too hot to touch, pry out the old seal as shown. Do not damage the surface of the seal cavity. Clean the hub in the seal mating area.

4. With spring side of new seal facing toward hub casting, press it in until flush with brake disc mating surface. **CAUTION:** Do not use a hammer as damage to the seal will result.
5. Thoroughly clean the brake disc with brake cleaner. It is very important that the brake disc be free of any oil or solvents.
6. Reinstall the brake disc using genuine Polaris OEM bolts that have a pre-applied locking agent. Do not substitute bolts or use old ones.
7. Install attaching bolts and torque to 18 ft. lbs. (25 Nm).

Magnetic Coil Removal

1. Remove the front drive axle as described later in this chapter.
2. Remove the seal sleeve from the strut casting using a drift punch and hammer, tapping evenly on each side until the sleeve slides off.
3. Remove the existing coil and clean the coil wire channel, coil mount area, and the seal sleeve mounting area of all silicone and foreign matter.
4. Disconnect the coil wires at the connector or terminal board.

Magnetic Coil Installation

1. Apply 1/4I (.6 cm) bead of silicone in the coil wire channel.
2. Install the coil to the coil mount surface and press the coil wires into the silicone in the coil wire channel.
3. Apply 1/4I (.6 cm) bead of Loctite™ Ultra Blue silicone around the seal sleeve mounting area. **NOTE:** This includes applying silicone over the coil lead wires again. Always allow 12 hours' cure time for silicone.
4. Press on the seal sleeve until even with the inner pole. See page 7.24 for additional information. Once the seal sleeve is properly positioned, a 1/16I (.16 cm) bead of silicone should remain around the inner edge. Clean off all excess silicone. The seal sleeve area must be free of silicone or the hub seal may leak.

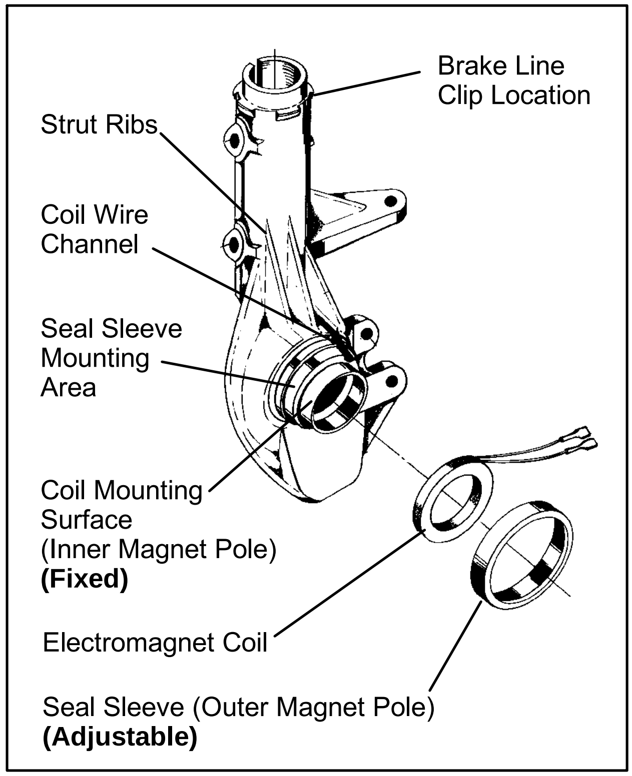
   NOTE:

   - Always install a new seal sleeve when replacing the coil.
   - It may be necessary to apply more silicone (or an equivalent fast drying glue) to the wire channel area to properly secure and protect the coil wires.

5. Apply 401 Loctite t to the inside of the strut ribs and press the foam block to contain the coil wires. Make sure the foam block is bonded well to protect the coil wires.

NOTE: Coil wires must be contained in the brake line clip on the back side of the upper strut casting and the wires must be snug against the casting.

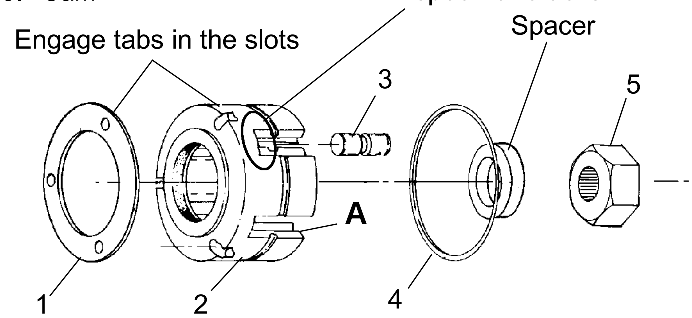
6. Route the wires smoothly and away from any moving parts and secure in place with tie straps.
7. Assemble front axle and connect hub wires.



Hilliard Clutch Disassembly/Inspection

1. Remove front hub. See page 7.9.
2. Remove Hilliard clutch assembly.
3. Disassemble the roller clutch and thoroughly clean all parts. **CAUTION:** Do not remove the garter spring. If the spring is removed, it will become over stressed and will require replacement.
4. Inspect roll cage sliding surface (A). This surface must be clean and free of nicks, burrs or scratches. Inspect roller cage (2) carefully for cracks.
5. Inspect rollers (3). The rollers must slide up and down freely within the roller cage sliding surfaces A.
6. Without removing the garter spring, inspect the coils for consistency. If coils are distorted or uneven, cut the old spring with a side cutter to remove it, and replace it.

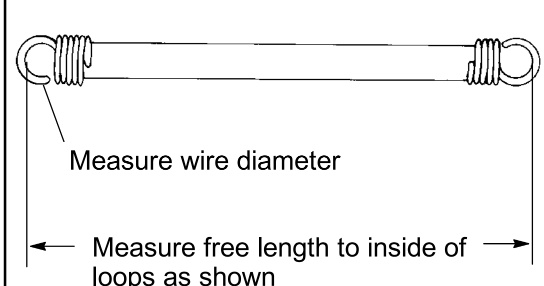
1. Armature Plate **NOTE:** Armature plate is positioned with tabs in round holes of cage.
2. Roller Cage
3. Roller
4. Garter Spring
5. Cam



7. If garter spring replacement is necessary, *it is very important that the correct installation procedure and special tool be used*. Hold rollers in place on roller cage with a light film of grease. Gently and evenly roll the spring down the tapered tool (PN 2870888) and into the groove of the rollers and cage. **WARNING:** If this procedure is not followed the spring will be over stressed and lose its tension. Springs with incorrect tension may allow rollers to move outward at high vehicle speeds. If the rollers move outward, the front hub(s) will engage and cause vehicle instability, which could result in serious injury or death.

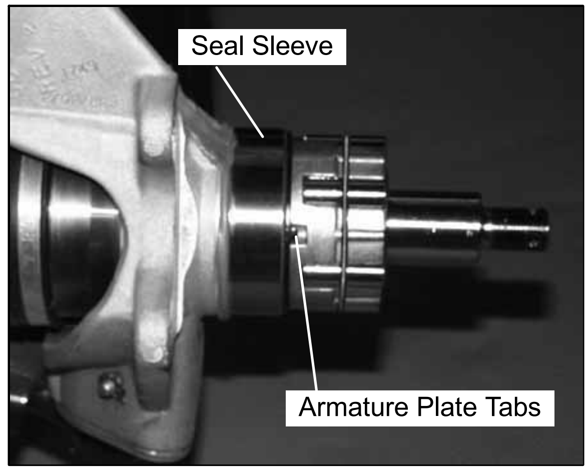
WARNING: Be sure to use correct garter spring. These springs are very similar in appearance to those used on earlier models. If the old, lighter springs were installed on a machine requiring the heavier spring, the front wheels may engage at high speed, possibly resulting in serious injury or death. **Check springs before installation. Always verify the correct replacement spring part number by referring to the appropriate parts manual.**

Current electro-mechanical spring, PN 3250032; wire diameter .018″ (.46 mm); spring free length end to end inside hooks 6.968″ (177 mm).



AWD Armature Plate Inspection

1. As the armature plate is engaged, it should contact the outer magnet pole (seal sleeve) and the inner magnet pole. Also, the armature plate must be flat when placed on a flat surface. Bent armature plates should be replaced.
   NOTE: It is not unusual to see a double wear ring on the armature plate; however, the wear rings should be even.
2. Install the roller clutch (Hilliard Clutch) assembly and be sure the armature plate (A) is positioned properly. Also, when installing the hub assembly, be sure the armature plate tabs remain engaged with the roller clutch cage.



CAUTION: After the hub is installed, the slightest movement outward with the hub may cause the armature plate tabs to disengage from the roller clutch cage. If the unit is driven with the armature plate out of position, it will cause roller clutch damage.

AWD Front Drive Axle Removal

1. Loosen front wheel nuts slightly.
2. Elevate and support machine under footrest/frame area with front wheels elevated.

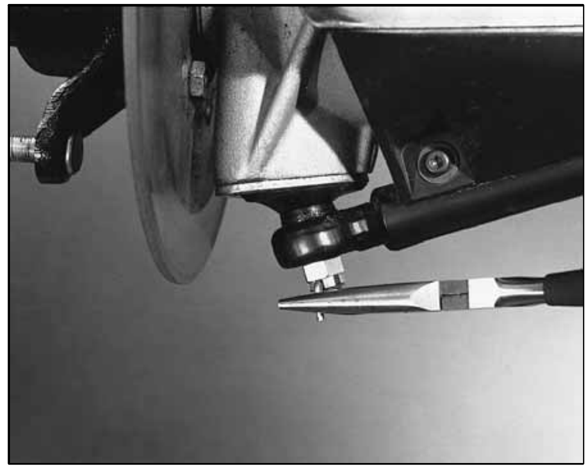
CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing and installing drive axles or component parts.

3. Remove wheel nuts and wheels.

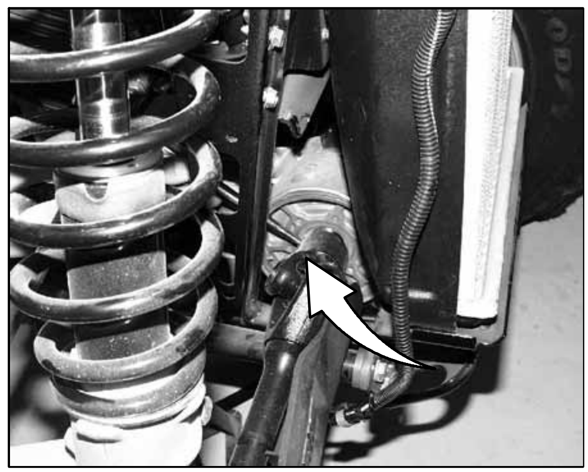
4. Remove hub cap.
5. Remove the two brake caliper attaching bolts. **CAUTION:** Do not hang the caliper by the brake hose. Use wire to hang the caliper to prevent possible damage to the brake line.
6. Place a catch pan beneath the front hub and remove the hub cap.

7. Remove cotter pin and nut.
8. Remove hub, bearings, hilliard assembly, and armature plate.

9. Remove cotter pin and nut from lower A-arm ball joint. Remove lower A-arm from ball joint.



10. Using a drift punch remove roll pin at front housing.
11. Remove the spindle and axle assembly from the strut casting bearing by pulling the strut outward as shown. Drive out the old seal, taking care not to damage the tapered roller bearing. Install the new seal until it bottoms against the shoulder in the strut casting.



AWD Front Drive Axle Installation

1. Install spring washer and drive shaft. Align hole in U-joint yoke with hole in eccentric shaft, and install new roll pin.
2. Install new seal in strut casting. Refer to page 7.10.
3. Install drive shaft in strut.
4. Install lower ball joint, torque nut to 25 ft. lbs. (3.45 kg-m) and install new cotter pin.
5. Follow procedure to install hilliard clutch components and hub as outlined on page 7.7.
6. Tighten hub nut following procedure on 7.11.

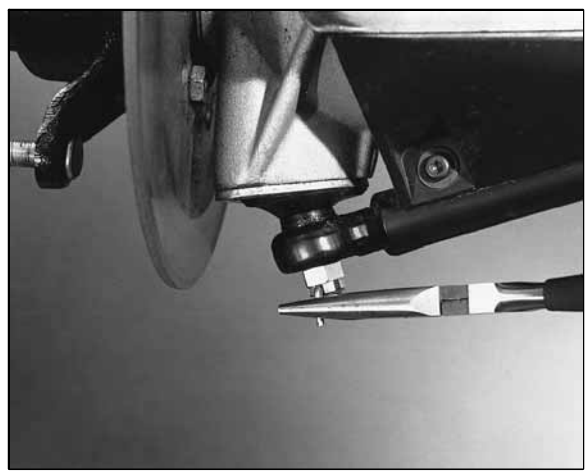
Driveshaft and CV Joint Handling Tips

Care should be exercised during driveshaft removal or when servicing CV joints. Driveshaft components are precision parts.
Cleanliness and following these instructions is very important to ensure proper shaft function and a normal service life.

- The complete driveshaft and joint should be handled by getting hold of the interconnecting shaft to avoid disassembly or potential damage to the driveshaft joints.
- Over-angling of joints beyond their capacity could result in boot or joint damage.
- Make sure surface-ground areas and splines of shaft are protected during handling to avoid damage.
- Do not allow boots to come into contact with sharp edges or hot engine and exhaust components.
- The driveshaft is not to be used as a lever arm to position other suspension components.
- Never use a hammer or sharp tools to remove or to install boot clamps.
- Be sure joints are thoroughly clean and that the proper amount and type of grease is used to refill when joint boots are replaced and when joints are cleaned. Refer to text for grease capacity of CV joints and CV joint boots.

Front Drive Shaft CV Joint Boot Replacement

1. Remove wheel, brake caliper and wheel hub. Refer to front hub disassembly page NO TAG for procedure.
2. Remove cotter pin and castle nut from A-arm ball joint.

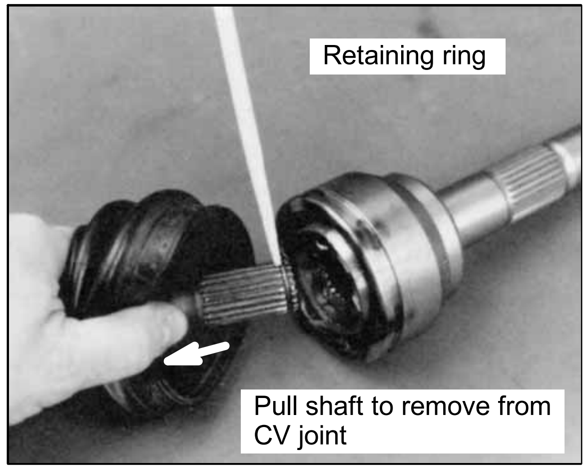


3. Disconnect A-arm from ball joint using a tie rod fork.
4. Slide strut off end of drive shaft and tie it up out of the way of the shaft.

NOTE: Be careful not to damage the wheel coil wires when positioning the strut.

Front Drive Shaft CV Joint Boot Replacement Cont.

5. Remove clamps from rubber boot using the proper boot clamp pliers.
6. Remove the large end of the boot from the CV joint, slide the boot back and separate the wheel spindle and CV joint assembly from the axle shaft by pulling the shaft sharply outward, away from the CV joint. It may be necessary to tap the CV joint assembly outward with a soft faced hammer.
7. Remove small clamp and boot from driveshaft.



If the ATV has been operated with a damaged boot, the CV joint grease may be contaminated. Inspect the grease carefully for contamination, and clean the joint thoroughly if necessary. Front drive axle CV boot replacement requires 30g of grease. If CV joint is cleaned, an additional 30g of grease is required. Refer to information below.

8. Before installing the new boot, remove all grease from the boot area and shaft.

NOTE: It is very important to use the correct type and quantity of grease by using the grease contained in the boot kit. DO NOT use a substitute grease and DO NOT overfill or underfill the CV joint.

9. Slide the new clamp and boot (small end first) over the splined shaft, then slide (tap) the CV joint into the splines of the axle. Install small boot clamp.
10. Add grease through large end of boot.
11. Position large end of boot on CV joint and secure with clamp.

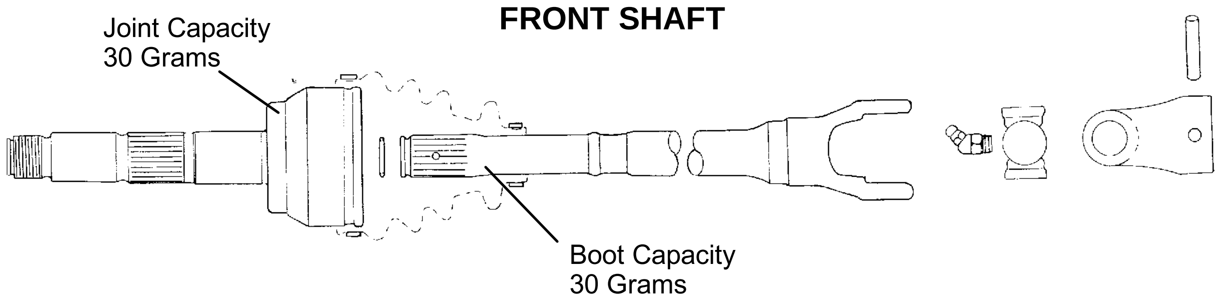
CV Joint Grease - 30g PN 1350046

CV Boot Clamp Pliers:
Earless Type 8700226

Boot Replacement requires 30g

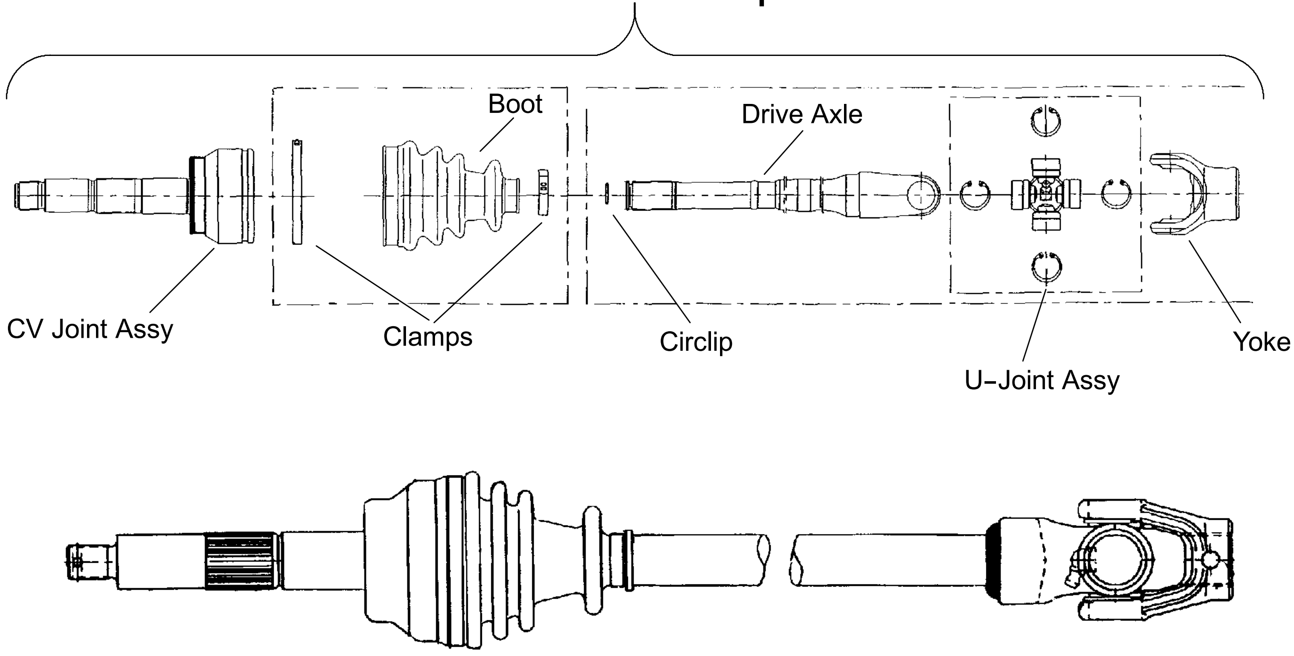
Boot replacement with complete CV joint cleaning requires an additional 30g. (Total 60g)

FRONT SHAFT

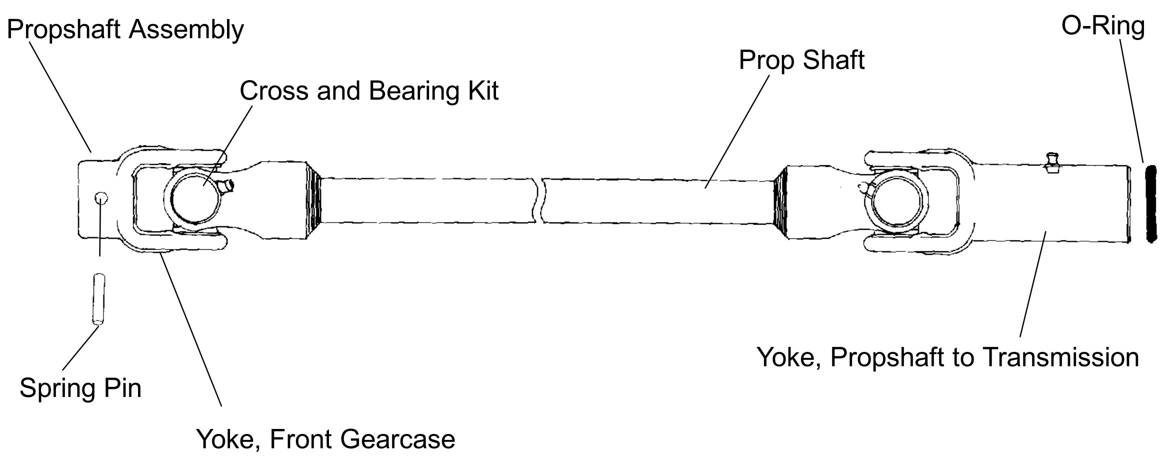


Front outboard joint capacity: 30g if boot is replaced only.
Another 30g (60g total) if joint is cleaned.

Front Drive Axle Components

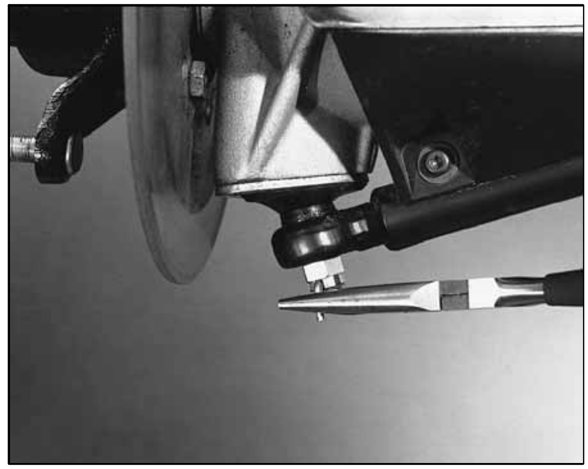


Front Prop Shaft Components



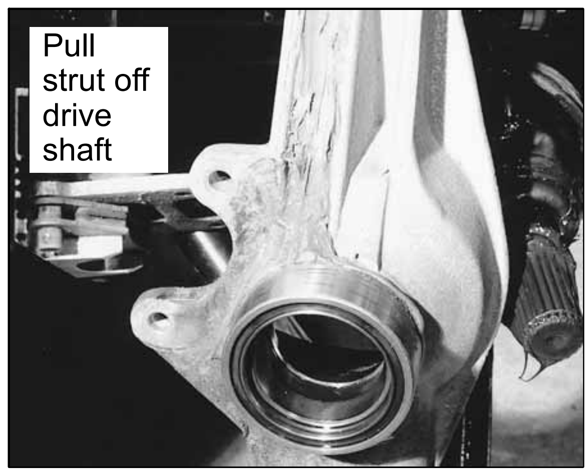
AWD Strut Casting Front Drive Axle Seal Replacement

1. Disassemble front hub. Refer to page NO TAG.
2. Remove the cotter pin and castle nut from the A-arm ball joint. Separate A-arm from ball joint.



3. Remove the spindle and axle assembly from the strut casting bearing by pulling the strut outward as shown. Drive out the old seal, taking care not to damage the tapered roller bearing. Install the new seal until it bottoms against the shoulder in the strut casting.
4. Apply grease to the seal inner lip, reinstall the spindle and axle assembly.
5. Reinstall the A-arm to the ball joint. Torque to 25 ft. lbs. (3.5 kg-m).

NOTE: If the cotter pin hole does not align at the above torque, tighten slightly until the cotter pin hole aligns and install the pin with open ends *toward rear* of machine.



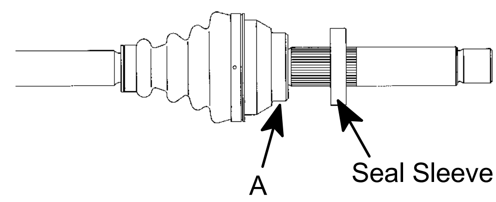
Bearing Replacement Note For Front Drive Axle and Front Hub

NOTE: The front axle bearings have a larger I.D. (1.0625″) than the hub bearings (1.000″). Be sure to install the bearings with the larger I.D. in the strut housing, and the bearings with the smaller I.D. in the hub.

Seal Sleeve Replacement

Front Drive Axle Seal Sleeve

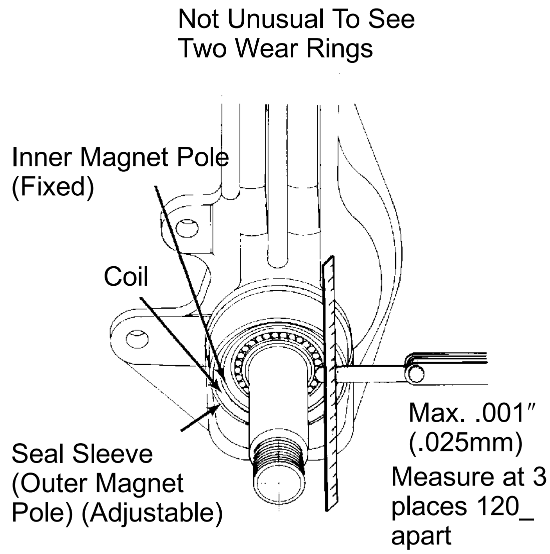
1. If front axle sleeves become damaged and leak fluid they are replaceable. Using a hammer and drift punch, remove the seal sleeve by driving it off evenly being careful not to nick or damage the sleeve mounting area (A).
2. Coat the sleeve mounting area (A) with silicone and using extreme care, press the new seal sleeve onto area (A) until it bottoms. Allow 12 hours for silicone to cure.



NOTE: New front drive axle CV joint assemblies and drive axle assemblies have the seal sleeve installed from the factory.

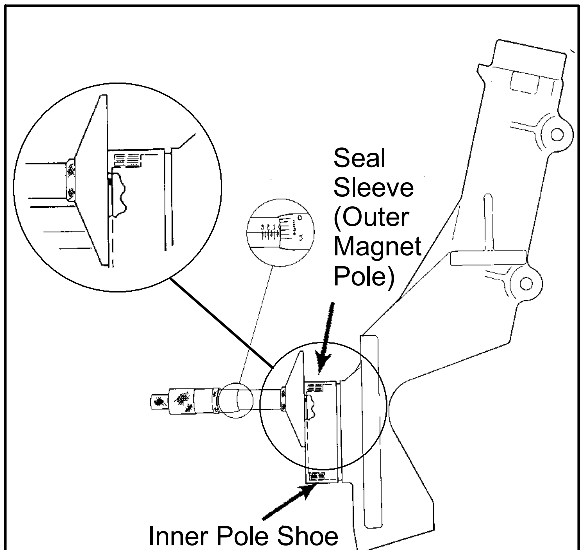
Hub Seal Sleeve Replacement

3. The hub seal sleeve must be driven onto the strut casting until flush with the inner magnet pole. Use the flat side (no step) of tool PN 2871199.
4. To check the gap between the inner and outer poles place a straight edge on the outer pole so that it just intersects with the inner pole. The gap between the straight edge and inner pole should be 0 to .001″ (0-.025mm). This measurement should be checked in three different positions around the pole assemblies. The three measurements must be within .0005″ (.013 mm) of each other. If the gap is excessive, the hub may not engage.

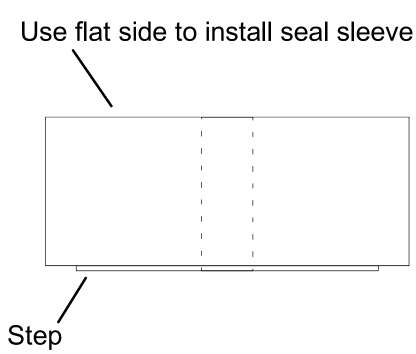


Pole Gap:
.000″-.001″ (.00-.025mm)

Seal Sleeve Installation Tool Set
PN 2871199



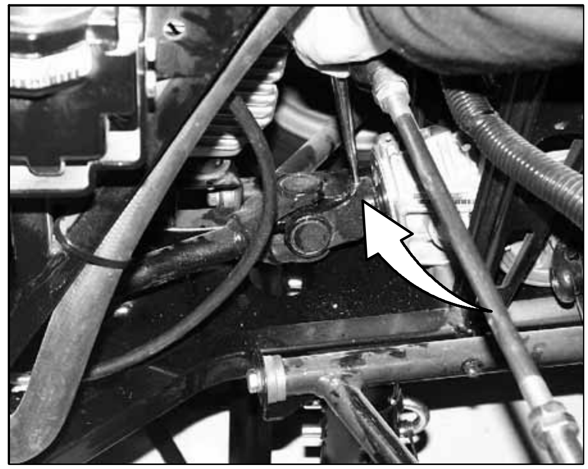
Seal Sleeve Tool



AWD Front Prop Shaft Removal

1. Using a drift punch, remove the roll pin from prop shaft at rear of housing. Slide prop shaft back and away from front housing. Pull sharply forward to remove from transmission shaft.

NOTE: If removing front housing, use a drift punch to remove the roll pins from both front drive axles.

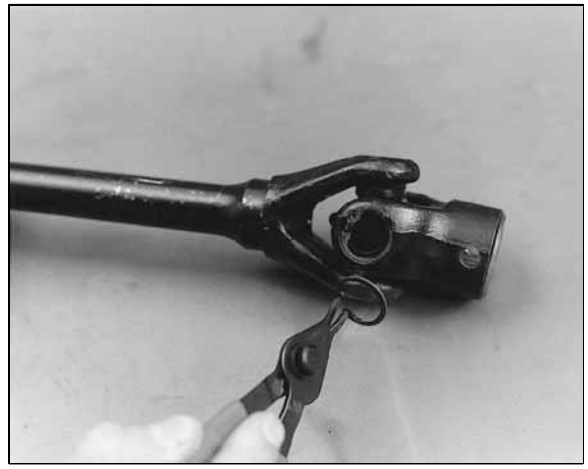


U-Joint Disassembly (Typical)

CAUTION: Always wear eye protection.

1. Remove internal or external snap ring from all bearing caps.

NOTE: If yoke or bearing is removed, cross bearing must be replaced. Note orientation of grease fitting and mark inner and outer yoke for correct re-positioning during installation.

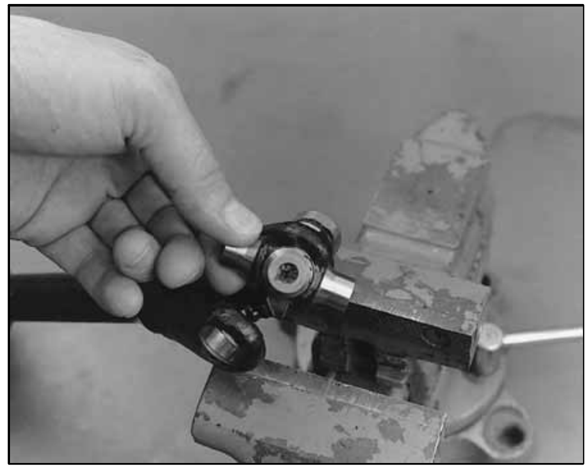


2. Support inner yoke as shown and drive outer yoke down (bearing cap out) with a soft face hammer.

3. Support U-joint in vise as shown and drive inner yoke down to remove remaining bearing caps.

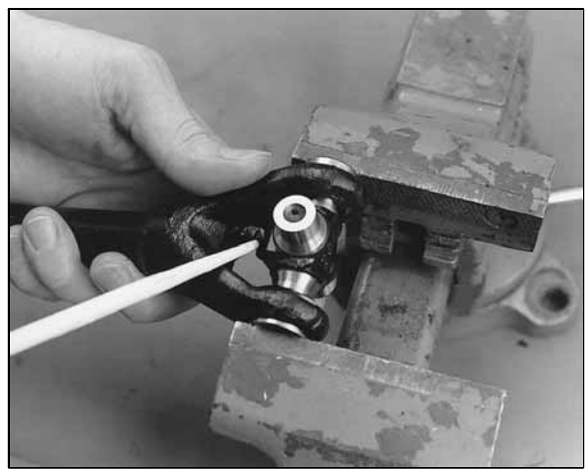
U-Joint Disassembly cont.

4. Force U-joint cross to one side and lift out of inner yoke.



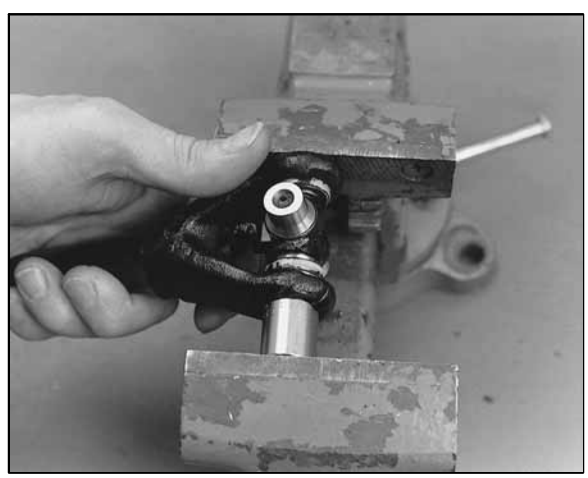
U-Joint Assembly

1. Install new bearing caps in yoke by hand. Carefully install U-joint cross with grease fitting properly positioned inward toward center of shaft. Take care not to dislodge needle bearings upon installation of cross joint. Tighten vise to force bearing caps in.



2. Using a suitable arbor, fully seat bearing cap in one side. Continually check for free movement of bearing cross as bearing caps are assembled.

3. Install snap ring to contain bearing cap just installed. Repeat procedure for other side.

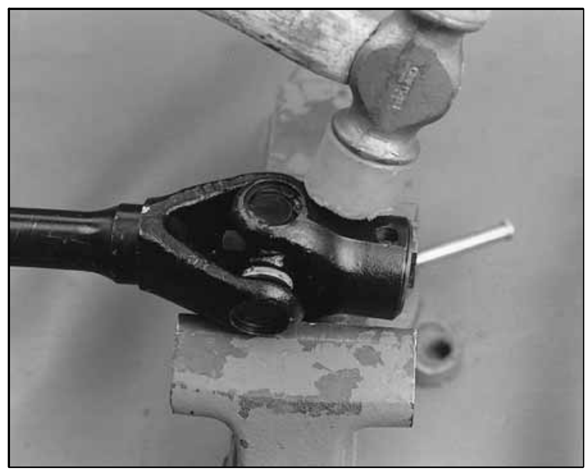


U-Joint Assembly, cont.

4. Install outer yoke, aligning marks made before disassembly.
5. Repeat steps 1-3 to install bearing caps on outer yoke.

6. Seat all bearing caps against snap rings by supporting cross shaft and tapping on each corner as shown.

7. When installation is complete, Yokes must pivot freely in all directions without binding. If the joint is stiff or binding, tap the yoke lightly to center the joint until it pivots freely in all directions.

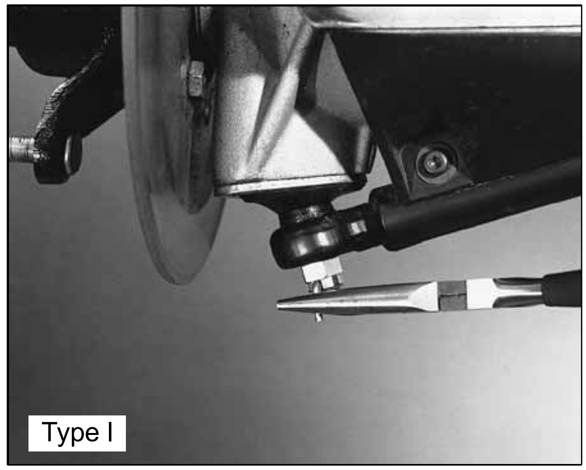


AWD Front Housing Removal

1. Stop engine, place machine in gear and set parking brake.
2. Loosen front wheel nuts slightly.
3. Elevate and support machine under footrest/frame area.

CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing and installing bearings and seals.

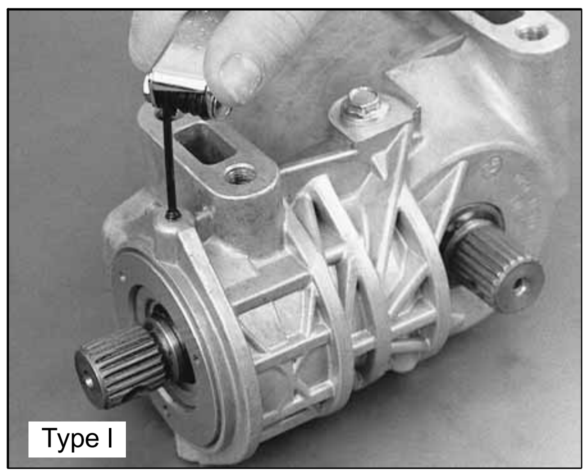
4. Remove wheel nuts and wheels.
5. Remove cotter pin, lower ball joint nut and A-arm from ball joint.
6. Remove bolts securing bottom of housing to frame. Remove vent line, and remove housing from right side of frame.


Type I

Front Housing Disassembly

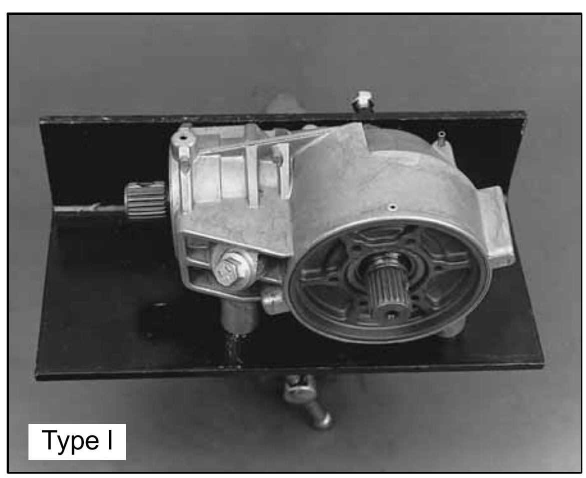
NOTE: Type I front gear case shown. Type II and Type III differences noted.
REFER TO EXPLODED VIEWS ON PAGE 7.37.

1. Drain and properly dispose of used housing oil. Loosen both Allen set screws on input side of Type I housing. This step does not apply to Type II and Type III front housings, which have bolts securing the pinion cover and output shaft covers.


Type I

2. Mount housing to front housing holding fixture as shown.

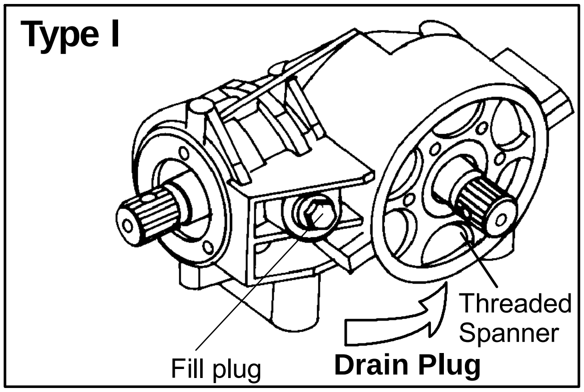
Front Housing Holding Fixture **PN 2871696**

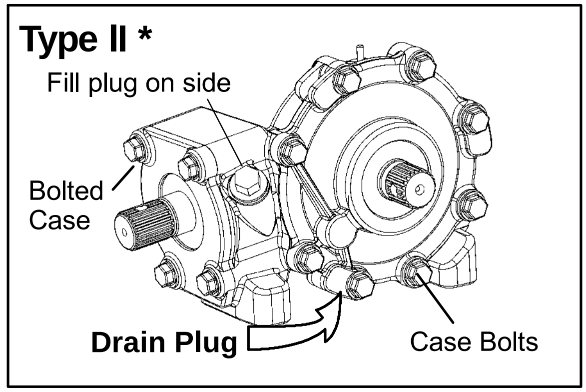

Type I

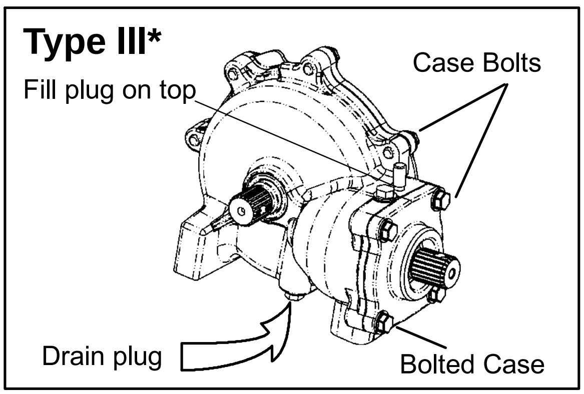
AWD Front Housing Identification

There are 3 types of front housings (Type I and Type II and Type III). Identify which is used on your machine and follow procedures that are unique to the type.

Refer to the appropriate parts manual for parts information.



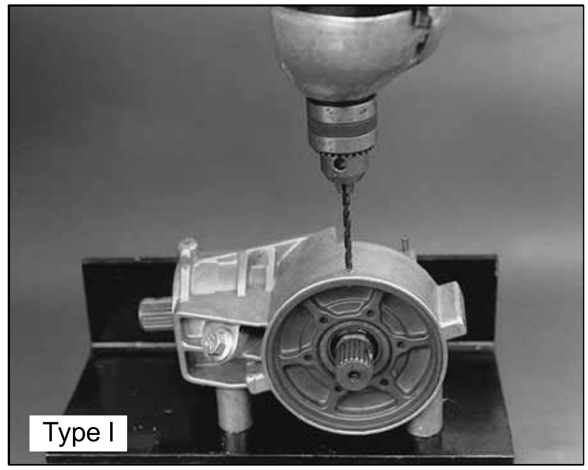




* Primary difference between Type II and Type III is the drain plug location.

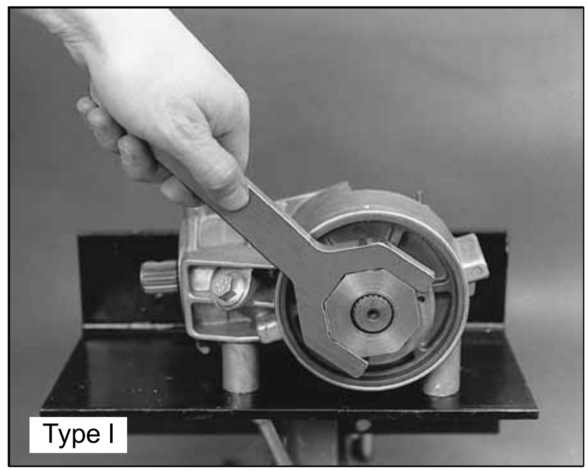
AWD Front Housing Disassembly

3. Using an 1/8 inch drill bit. Remove rivet securing side cover to front housing. (Type I)



4. Install spanner socket on side cover. Use 2 1/8″ wrench on spanner socket to remove side cover. Turn cover counterclockwise as viewed from the right side (standard threads). On Type II and Type III, remove bolts and output shaft cover.

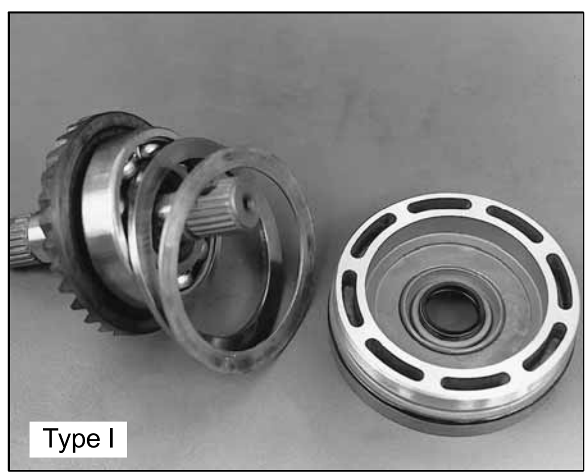
Spanner Socket	**PN 2871693**
2-1/8 Spanner Wrench	**PN 2871701**



5. Remove cover, brass spacer, steel spacer, ring gear assembly and shaft. On Type II and III, remove output shaft assembly, large shim, and thrust button with its small shim.

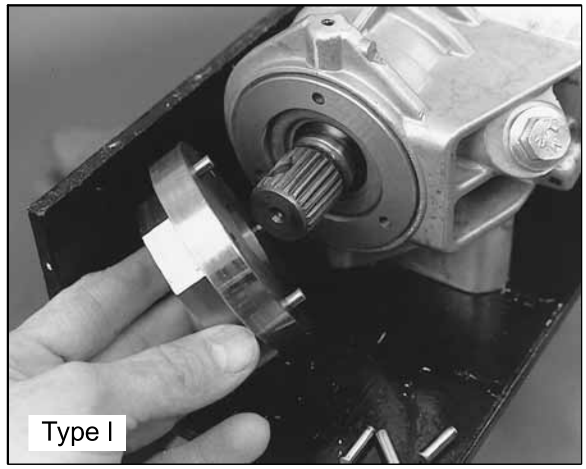
6. Clean all parts and inspect spacers for wear. Inspect ring gear for chipped, broken, or missing teeth.

NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.



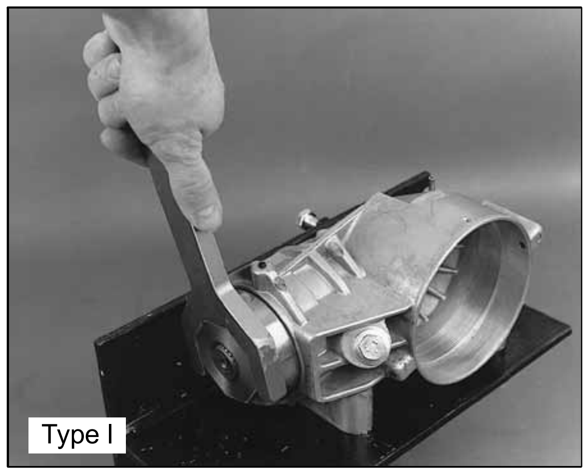
AWD Front Housing Disassembly

7. Some housings may have a pinion shaft retainer with three holes. It will be necessary to remove three drive pins on spanner socket to match these covers (Type I).

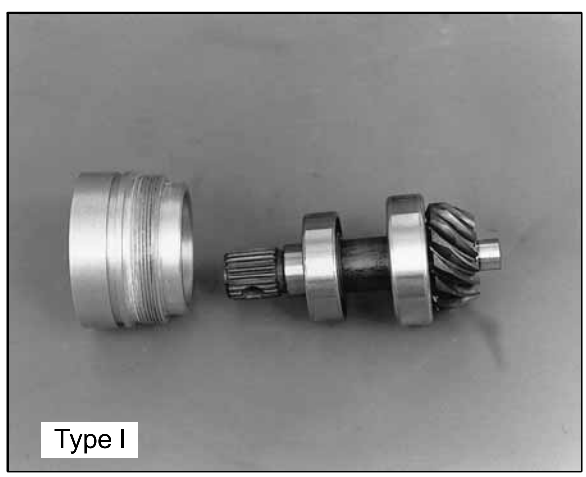

Type I

8. Install spanner socket on pinion shaft retainer. Use 2-1/8″ wrench and turn spanner socket counter clockwise (as viewed from end of pinion shaft) to remove retainer (Type I). On Type II and Type III, remove pinion cover, O-ring, and pinion shaft.

Spanner Socket	**PN 2871693**
2-1/8 Spanner Wrench	**PN 2871701**


Type I

9. Remove pinion shaft assembly. Inspect pinion gear for chipped broken or missing teeth. Remove cover, brass spacer, steel spacer, ring gear assembly and shaft. Clean all parts and inspect spacers for wear. Inspect ring gear for chipped, broken, or missing teeth.

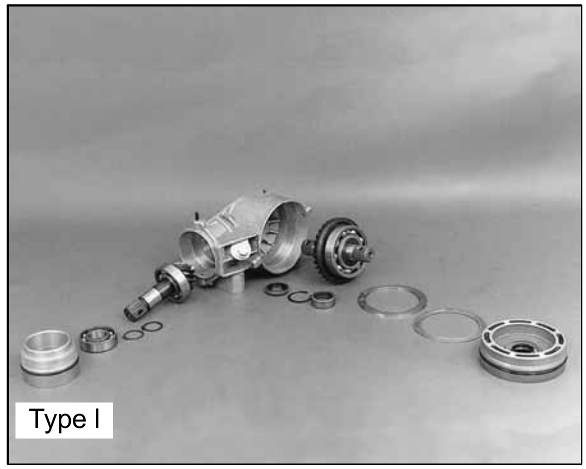

Type I

AWD Front Housing Assembly

NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

1. Replace all O-rings, seals, and worn components.

2. Install needle bearing, snap ring, and left side seal.



Type I

3. Press bearing on pinion shaft, install both snap rings, and slide outer bearing into place.
   NOTE: On Type I, thoroughly lubricate cover O-ring and cover threads before installation. Do not install seal in pinion cover until after backlash is adjusted.

Type I

Pinion Shaft Retainer Nut Torque

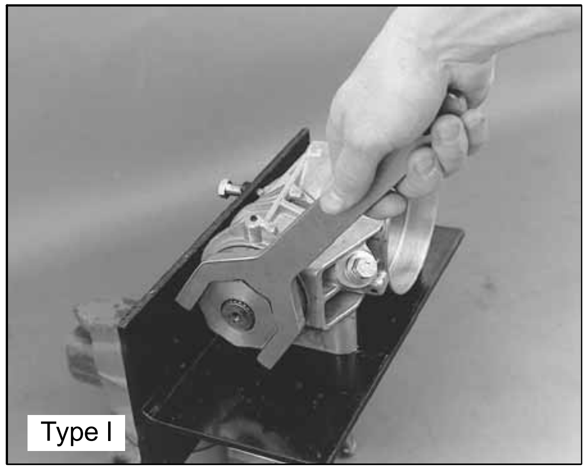
20 ft. lbs. (2.76 kg-m)

NOTE: On Type II and Type III, apply sealant and torque bolts to 14 ft. lbs. (19.4 Nm)..

AWD Front Housing Assembly, cont.

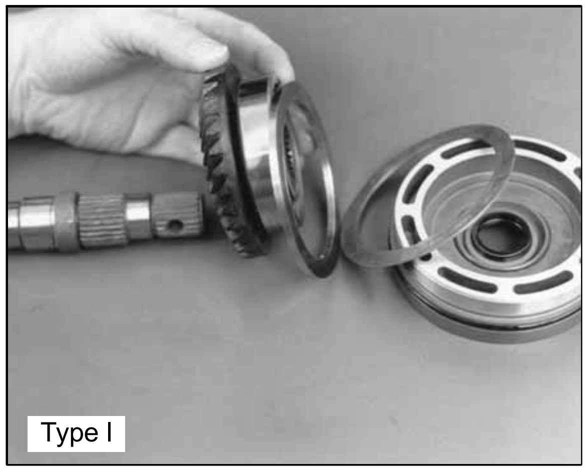
4. Install pinion shaft assembly in case and tap lightly to seat. Grease O-ring on pinion shaft retainer nut and install. Tighten nut securely to 20 ft. lbs. The pinion shaft should have no detectable end play. Tighten set screw. On Type II and III housings, install pinion shaft and cover plate (without seal) and torque bolts to 14 ft. lbs.

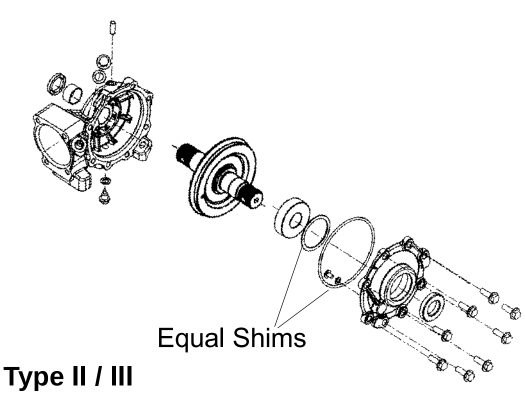
NOTE: For proper back lash measurement, both ring gear and pinion gear should be free of oil and grease when installed.


Type I

5. Install ring gear assembly, steel spacer, brass spacer and side cover. Make sure lock bolt on holding fixture is backed out of the way. Rotate pinion shaft while slowly turning side cover inward until gears mesh. As gear backlash is reduced to zero, the shaft will begin to bind. At this point back off 1/4 turn. On Type II and Type III housings, apply sealant, install cover and torque bolts to 14 ft. lbs.
   NOTE: The same shim thickness placed behind ring gear bearing must also be put behind the cover button.

Type II Cover Bolts Torque
14 ft. lbs.

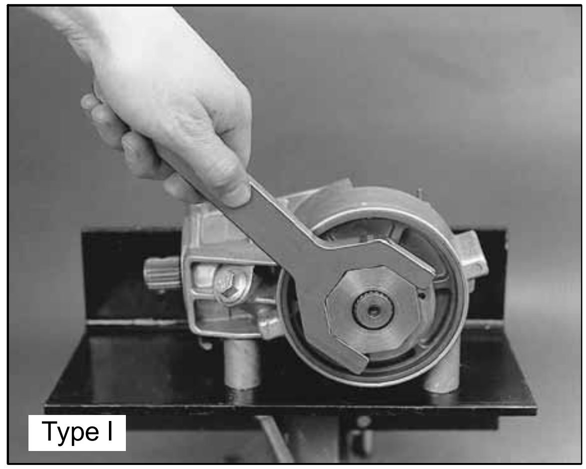

Type I



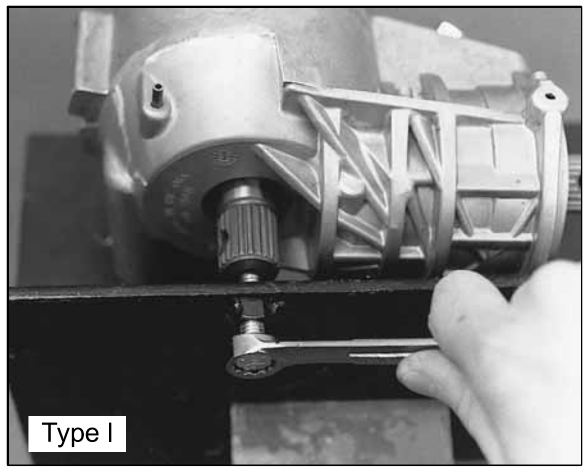
Type II / III

AWD Front Housing Assembly

6. Tighten locking bolt on holding fixture against drive shaft until shaft is held securely and will not rotate. This will also force ring gear against cover to maximize backlash.



7. Install backlash tool on pinion shaft as shown. Position dial indicator 1.875″ (47.63mm) from center line of shaft which is indicated by first mark on tool. Be sure dial indicator shaft is perpendicular to surface of tool. If dial indicator is placed at any other distance or angle, backlash measurement will be inaccurate.

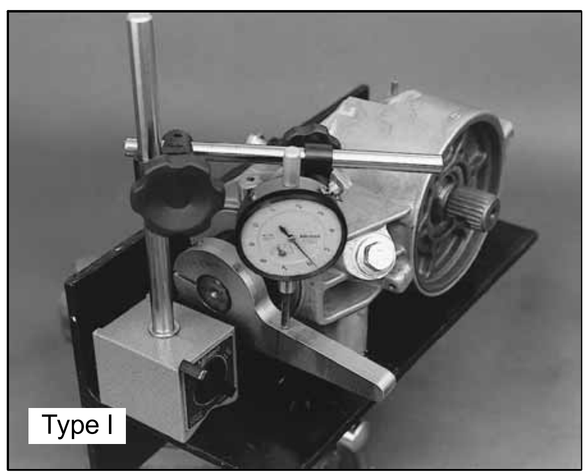


Backlash Tool PN 2871695

8. Rotate pinion shaft back and forth to read total dial indicator movement. Backlash must be between .004″-.007″ total movement.

NOTE: When changing backlash:

- To reduce backlash, loosen output shaft lock bolt on holding fixture. Rotate output cover clockwise as viewed from cover side. (On Type II, remove cover and add a slightly thicker shim behind ring gear and thrust button). Reinstall cover and torque bolts to specifications.
- To increase backlash, loosen output shaft lock bolt on holding fixture. Rotate side cover counterclockwise as viewed from cover side. (On Type II, remove cover and add a slightly thinner shim behind ring gear and thrust button). Reinstall cover and torque bolts to specifications.
- Be sure to tighten the lock bolt against shaft when rechecking backlash.
- When backlash is properly set, rotate output shaft 180° and verify proper backlash at this point on the ring gear.



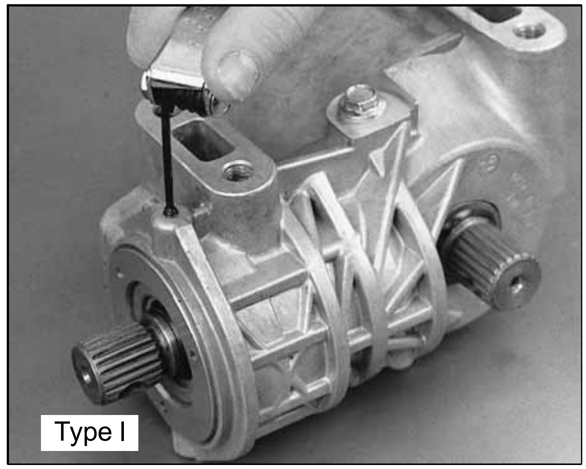
9. Install pinion shaft seal and both output shaft seals. Electrical tape can be applied to all shafts to protect seals during installation.

AWD Front Housing Assembly, cont.

10. On Type I, re-install 1/8″ steel rivet securing side cover in place if a rivet used originally.

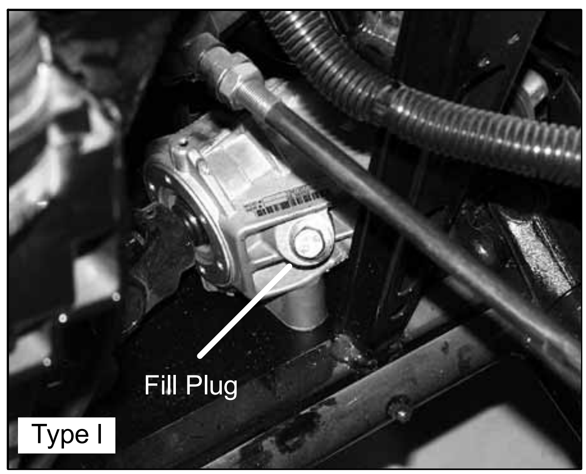
CAUTION: Do not overtighten set screw or cover damage will result.

11. Remove front housing from holding fixture and tighten bottom pinion shaft retaining nut set screw. (Type I)



Front Housing Installation

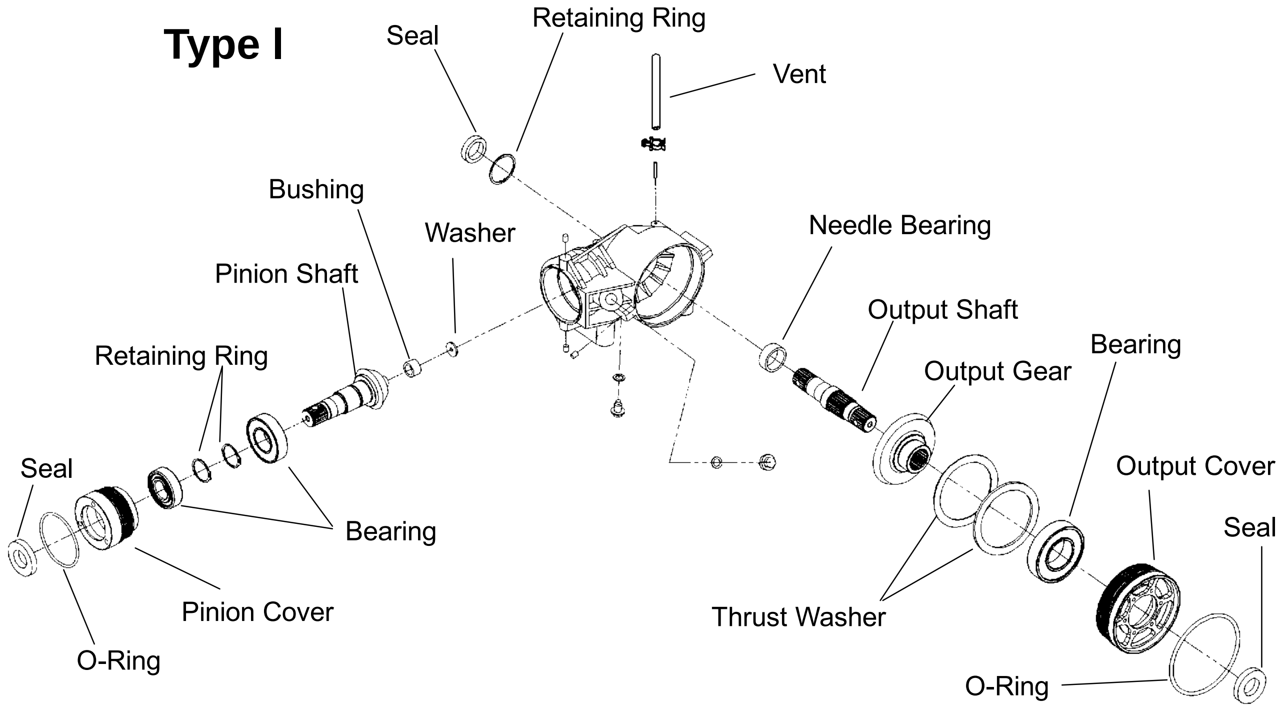
1. To install housing, reverse removal procedure. Use new roll pins in drive shafts.
2. Add Polaris Premium Front Housing Lubricant or GL5 80-90 gear lube to front housing. Check drain plug for proper torque.



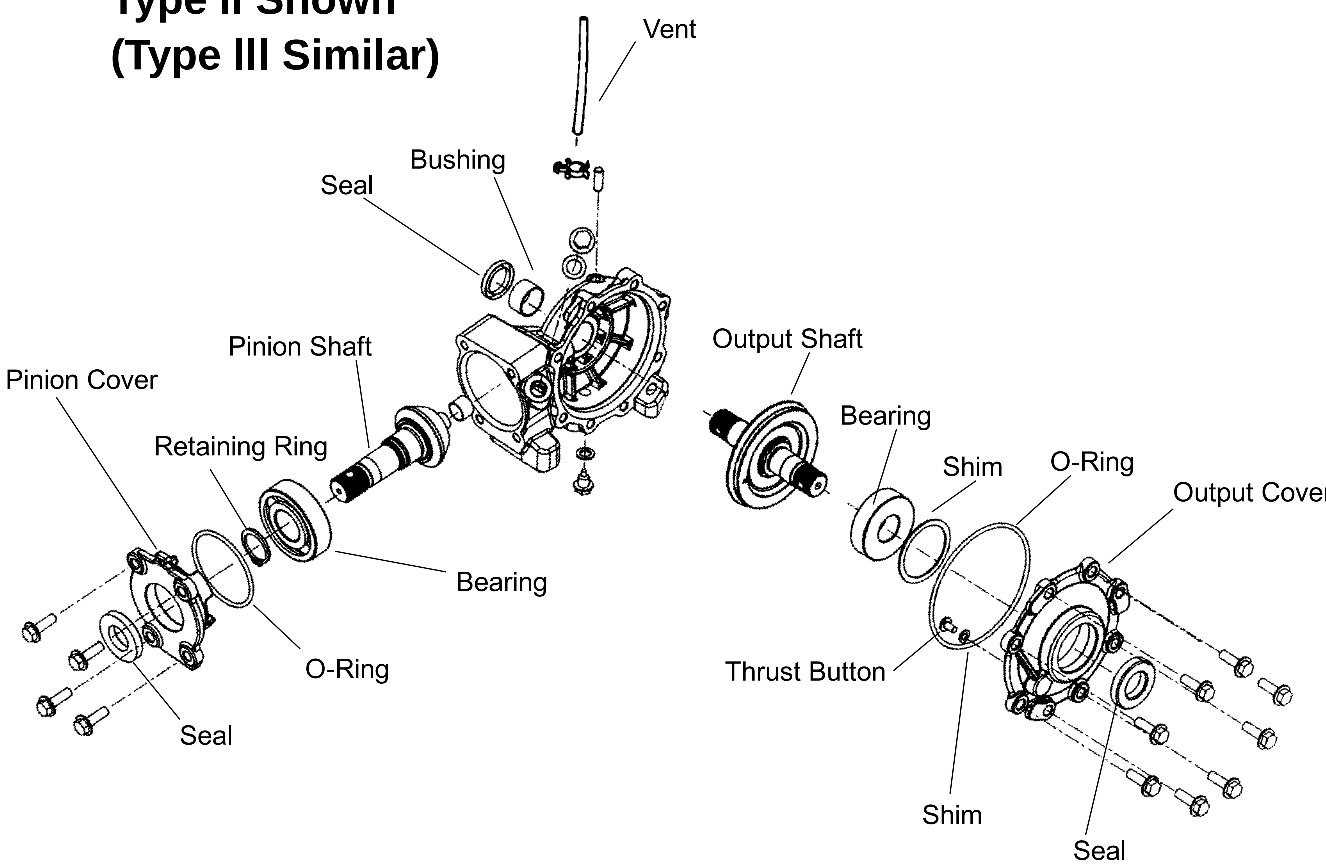
Premium Front Housing Fluid
PN 2871653 (12 oz.)

<u>All Types</u>
Front Housing Capacity
120cc (4.0 fl. oz.)

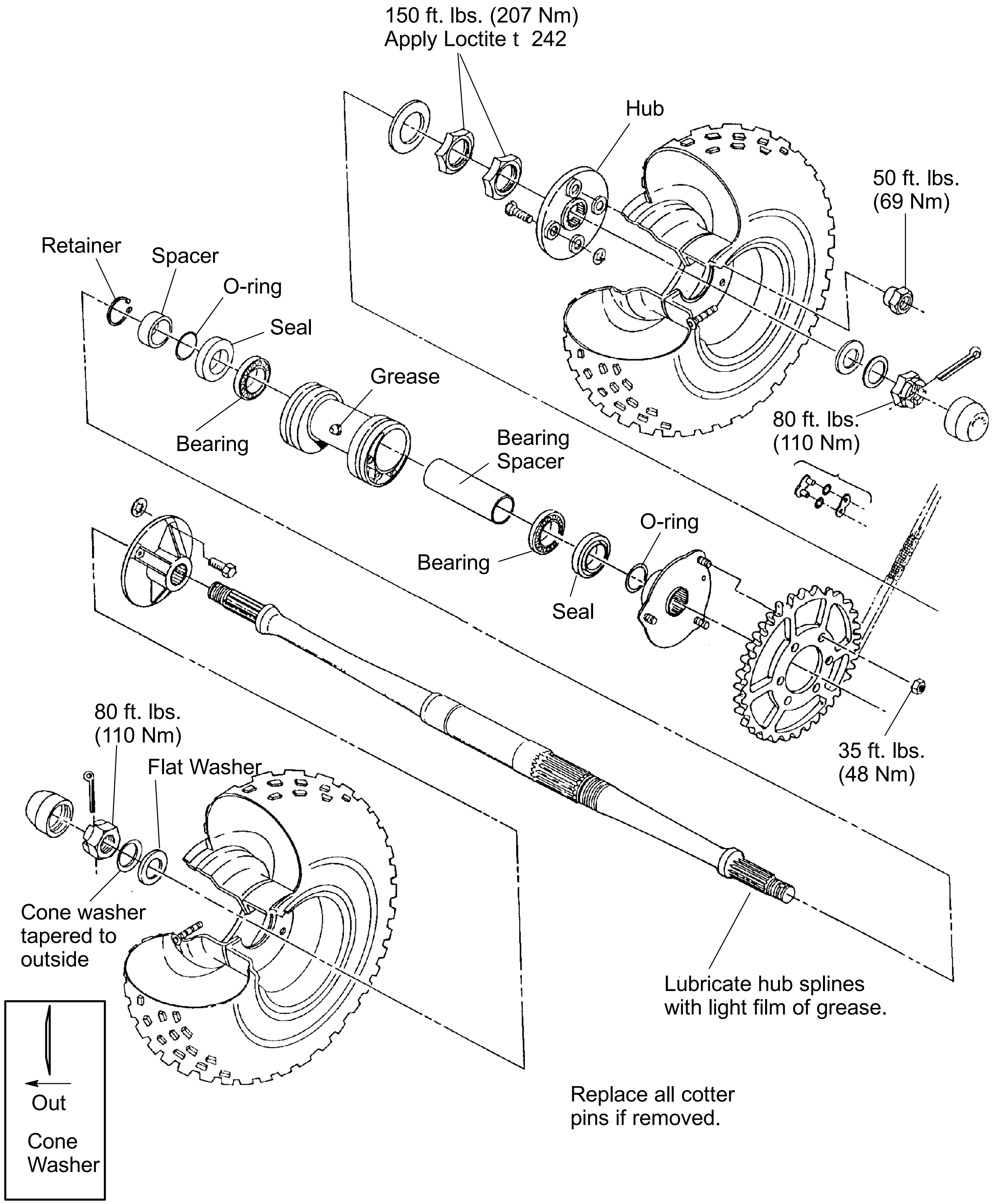
Type I



Type II Shown (Type III Similar)



Rear Drive



Rear Axle Bend

The rear axle shaft is hardened to approximately 3″ to 4″ (7.6 to 10 cm) from the outer ends. This allows the shaft to bend in case of impact or accident. Small amounts of axle runout can be straightened using V blocks, a hydraulic press, and a dial indicator. **CAUTION:** Do not use heat on any part of the axle. Heat will destroy the temper and cause the shaft to become brittle.

Rear Axle Removal

REFER TO EXPLODED VIEW ON PAGE 7.39

1. 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. Wear eye protection when removing and installing bearings and seals.

2. Remove wheels and hubs.
3. Hold inner axle nut and remove outer axle nut.
4. Remove axle nut and washer.
5. Place a block of wood on end of axle or use a soft face hammer, and drive axle out from right to left.
6. Tap locating collar on left side of axle toward the right enough to expose the circlip retainer. Remove retainer and locating collar.
7. Inspect locating collar on left side of axle and replace if worn or damaged. A worn collar will allow dirt to enter axle bearing area.

1 3/4″ Axle Nut Wrench

PN 2870772

Rear Axle Installation

1. Slide locating collar on left end of axle with recess facing outward.
2. Install a new circlip.
3. Tap locating collar back towards left end of axle until it captivates circlip.
4. Apply a light coat of grease to axle and install a new O-Ring.
5. Insert axle from left to right.
6. Install O-Ring, sprocket hub, and washer.
7. Clean axle nut threads with a wire brush. Apply Loctite 242 to threads and install axle nut. Torque to 150 ft. lbs. (207 Nm). Rotate axle and check for smooth operation.
8. Install lock nut and torque to 150 ft. lbs.
9. Lightly grease splines of axle and install wheel hubs, flat washers, and cone washers with concave side facing flat washer.
10. Torque hub nuts to 80 ft. lbs. (110 Nm) and install new cotter pin, bending one leg of cotter pin inward and one outward against end of axle.
11. Install hub cap.
12. Place wheels on hubs and install wheel nuts with tapered side facing in. Torque evenly to specifications.

Rear Axle Retaining Nut:
150 ft. lbs. (207 Nm)

Rear Hub Retaining Nut:
80 ft. lbs. (110 Nm)

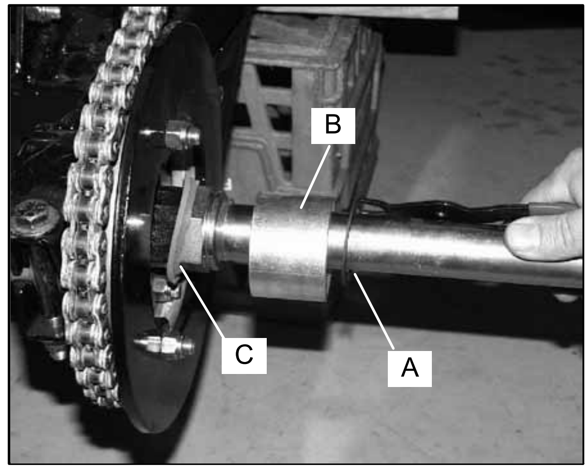
Rear Wheel Nuts:
50 ft. lbs. (69 Nm)

Concentric Swingarm Rear Axle Removal

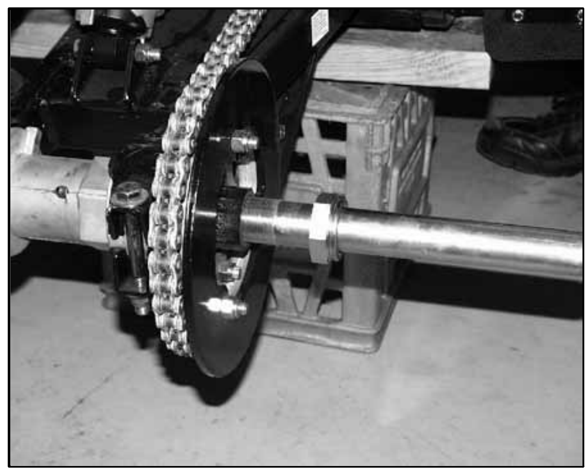
1. Securely support rear of machine with rear wheels off the floor. Remove rear wheels and hubs.

2. Remove drive chain.

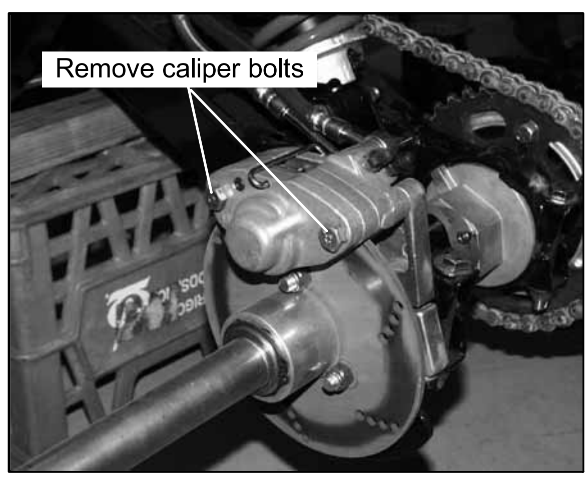
3. Remove snap ring (A), lock sleeve (B) and foam seal (C) from axle.



4. Remove sprocket hub nut.



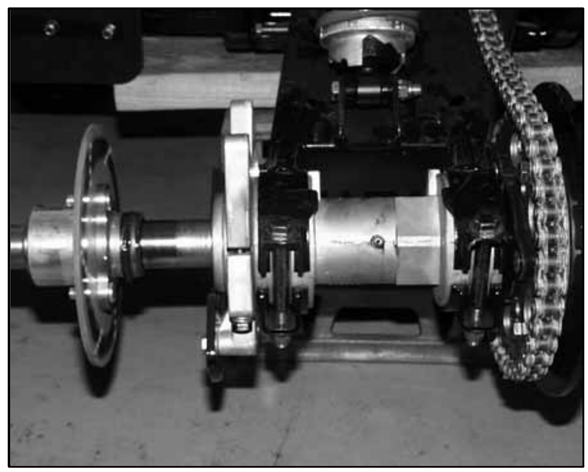
5. Remove rear brake caliper.



Concentric Swingarm Rear Axle Removal, Cont.

6. Support rear caliper with wire or a tie strap. Do not hang caliper by brake line.

7. Slide axle assembly out left side.

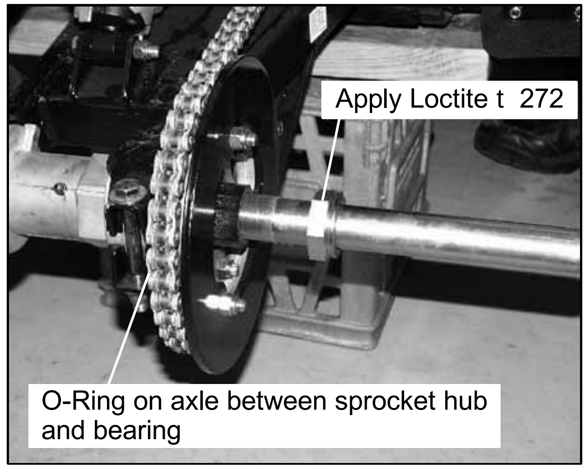


Concentric Swingarm Rear Axle Installation

1. Lubricate and install axle from left to right.

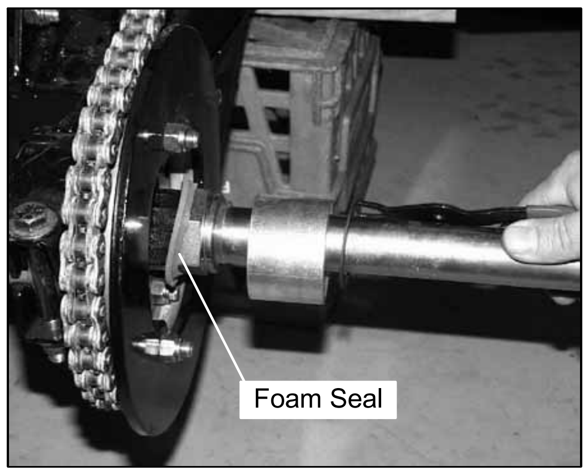
2. Lubricate and install a new O-ring on right side of axle. Slide new O-ring against RH axle bearing seal. Apply grease to sealing area on inside of sprocket hub and slide sprocket hub assembly onto the axle. Seat the hub against O-ring and bearing.

3. Apply Loctite t 262 to threads of and install nut. Tighten nut with wrench to approximately 8-10 ft. lbs. (11-14 Nm). Axle must rotate smoothly without binding. If axle binds the nut is too tight. If axle movement (up and down or side to side) is detected, axle is too loose.

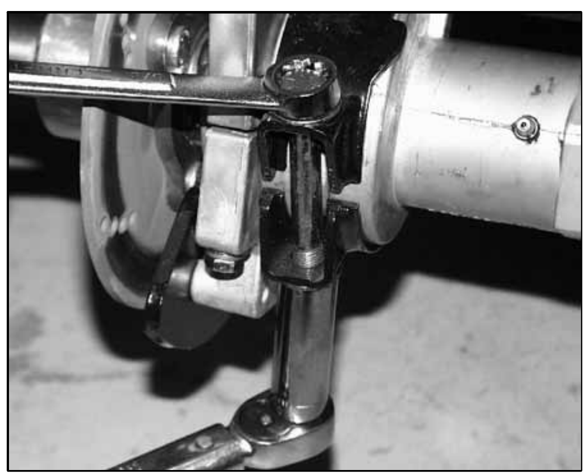


Axle Nut (Sprocket Side) Torque:
8-10 ft. lbs. (11-14 Nm)

4. Install foam seal and slide lock sleeve onto hub and install lock sleeve with taper inward. Install snap ring.



5. Install brake caliper and drive chain. Adjust drive chain (refer to Maintenance Chapter 2 for procedure). Torque eccentric pinch bolts to **30 ft. lbs. (41 Nm)** on models without a trailer hitch, or **40 ft. lbs. (55 Nm)** on models with a trailer hitch. Verify proper chain adjustment after torquing eccentric.

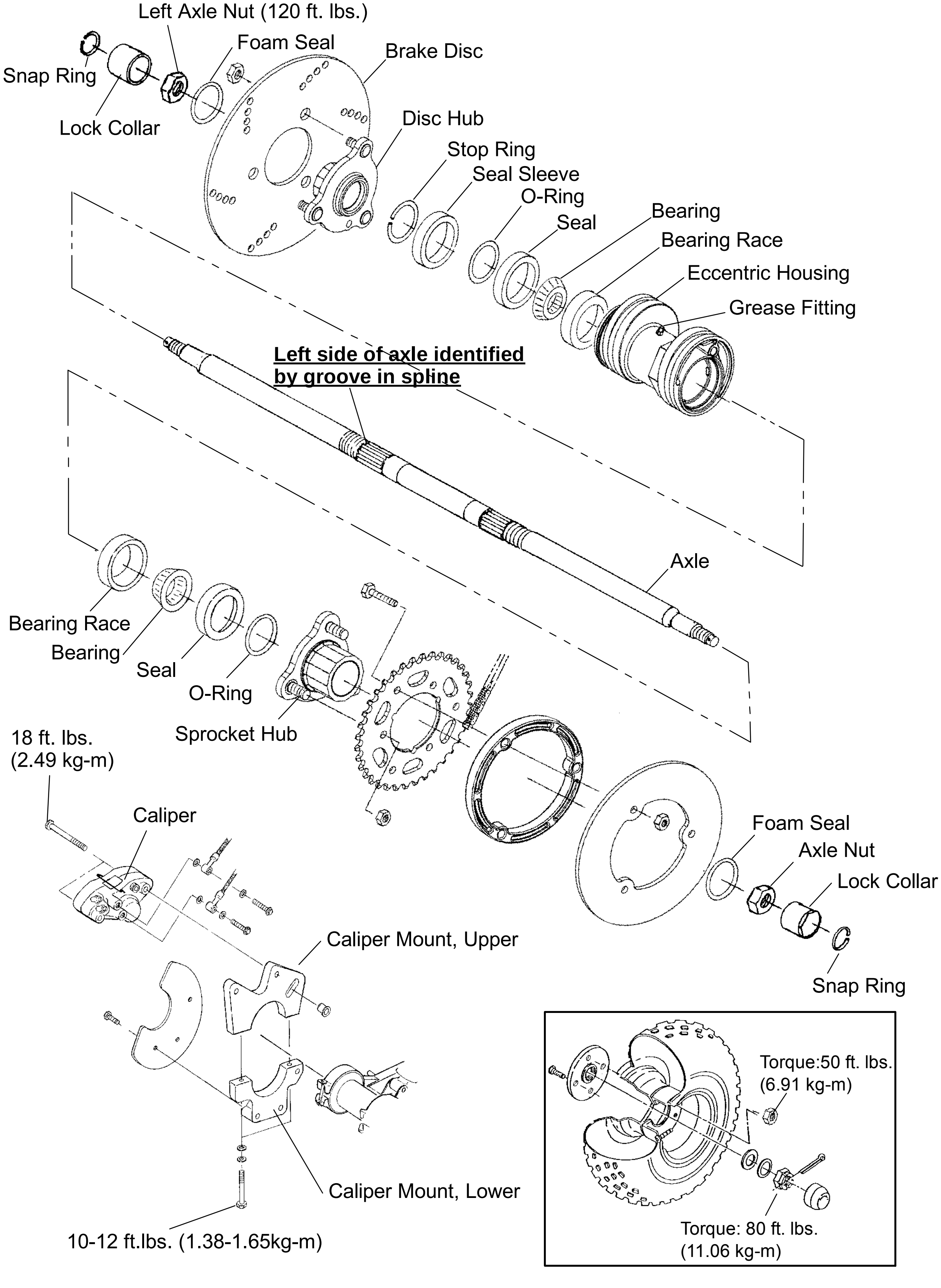


6. Torque brake caliper mounting bolts to 10-12 ft. lbs. (14-16 Nm).

7. Install rear wheel hubs. Torque center hub nut to 80 ft. lbs. and install a new cotter pin. Torque wheel nuts to 50 ft. lbs.

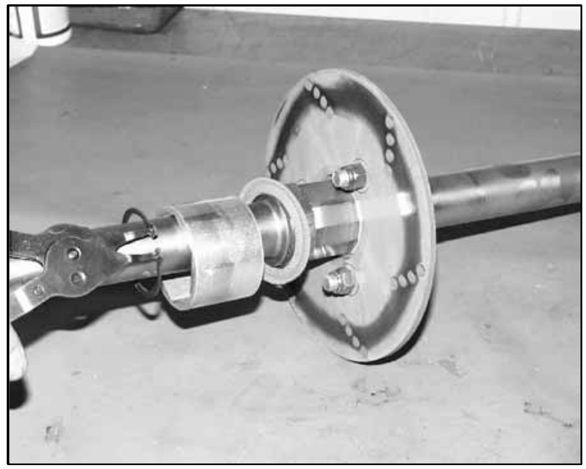
8. Lubricate eccentric housing grease fitting with Polaris Premium All Season Grease.

FINAL DRIVE
Concentric Swingarm Rear Axle Assembly, Exploded View

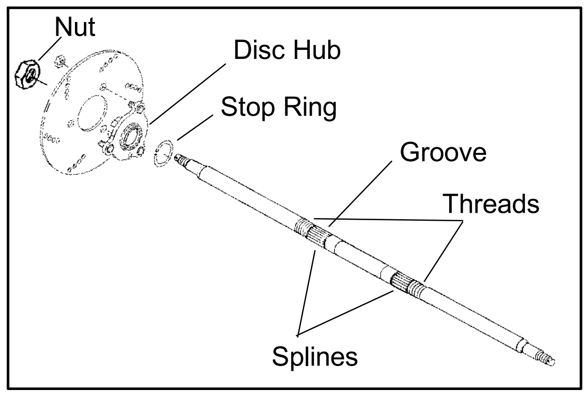


Concentric Swingarm Rear Axle Disassembly

1. Remove rear axle. (See page 7.39)
2. Remove snap ring, collar, foam seal and disc hub.

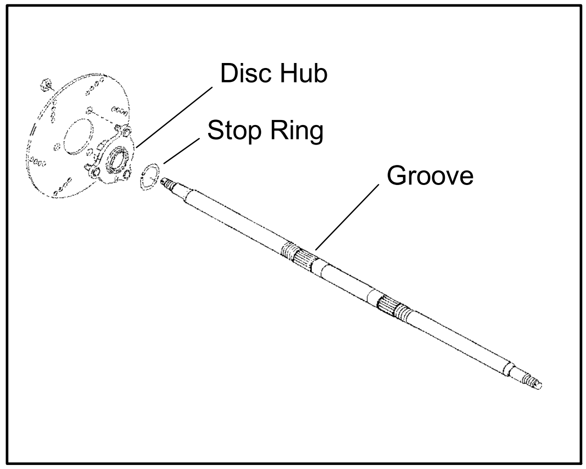


3. Remove nut, disc assembly, and stop ring.

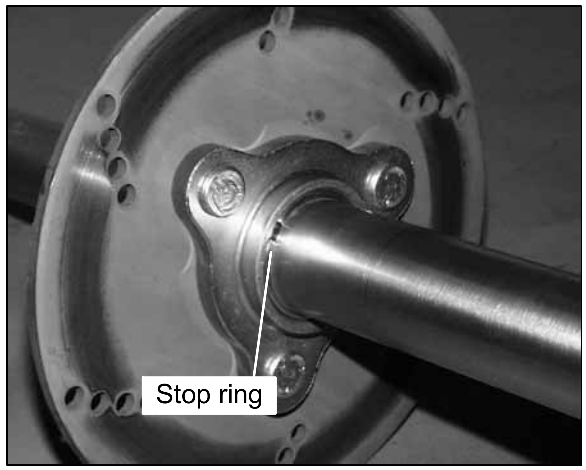


Concentric Swingarm Rear Axle Assembly

1. Install stop ring in groove on left side of axle.



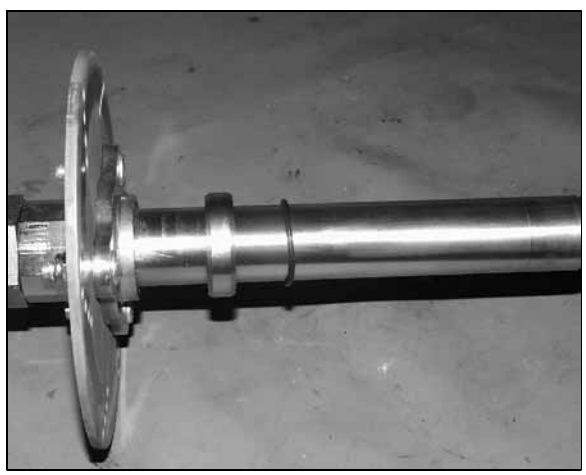
2. Install disc hub assembly on axle. Be sure hub covers stop ring. Install disc in soft jawed vise. Apply Loctite 272 to threads, install left axle nut and tighten to 120 ft. lbs (166 Nm).



Axle Nut (Disc Side) Torque:

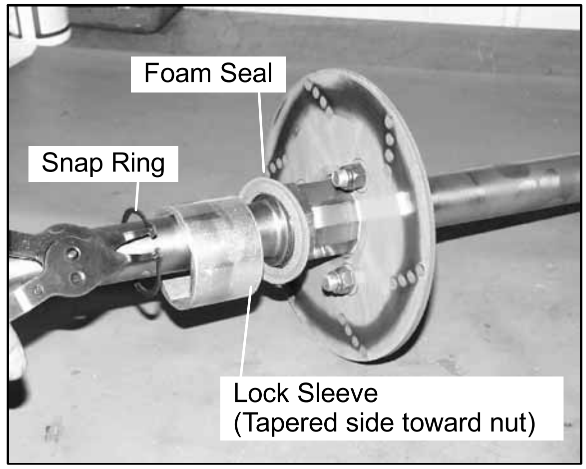
120 ft. lbs. (166 Nm)

3. Lubricate spacer and new O-ring. Install on axle.



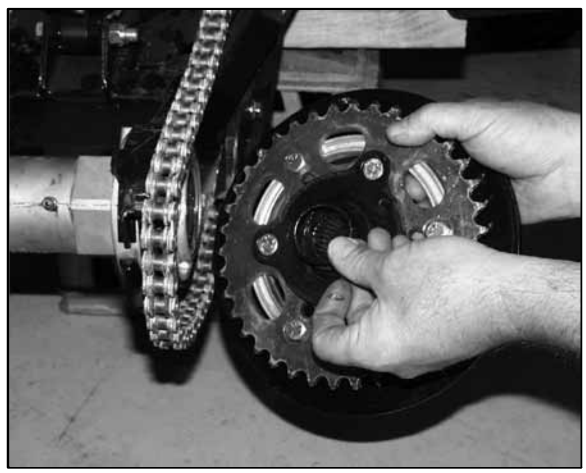
Concentric Swingarm Rear Axle Assembly, Cont.

4. Install foam seal and axle nut lock sleeve with taper toward nut. Install snap ring to retain the lock sleeve.

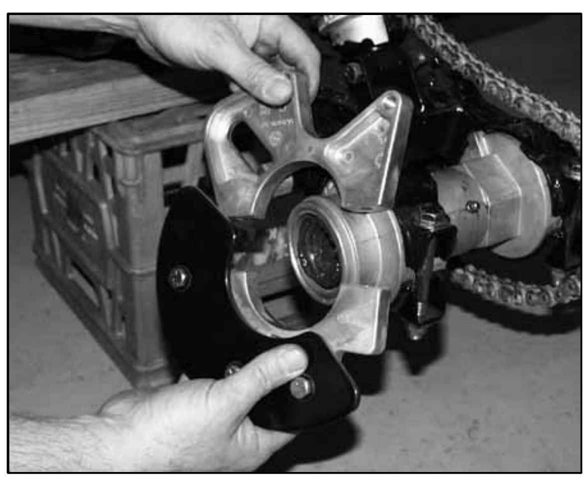


Concentric Swingarm Rear Housing Removal

1. Remove rear axle. (See page 7.39)
2. Remove sprocket hub. Note sealing O-ring between sprocket hub and bearing.



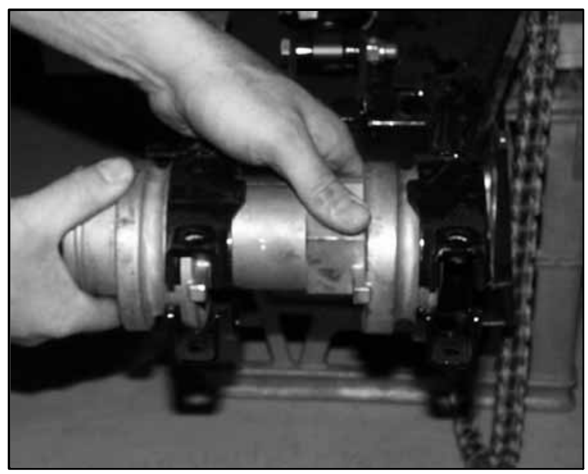
3. Remove brake caliper mounting bracket.



Concentric Swingarm Rear Housing Removal, Cont.

4. Remove brake caliper pivot bushing from stud. NOTE: Flange inward as shown.

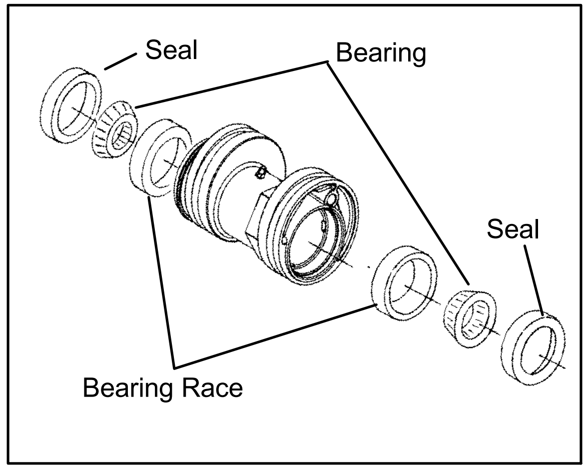
5. Remove rear housing.



Concentric Swingarm Rear Housing Service

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.

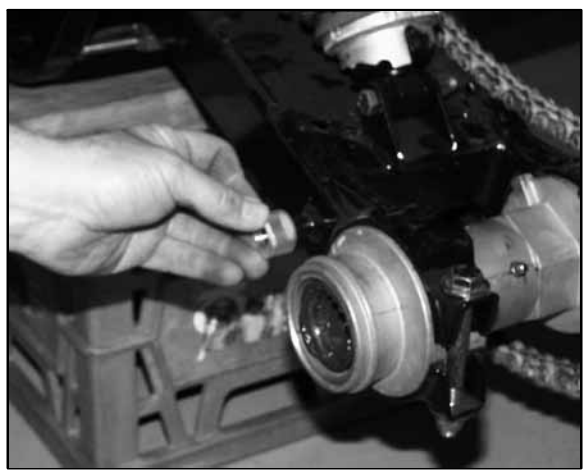


Rear Housing Assembly/Bearing Service

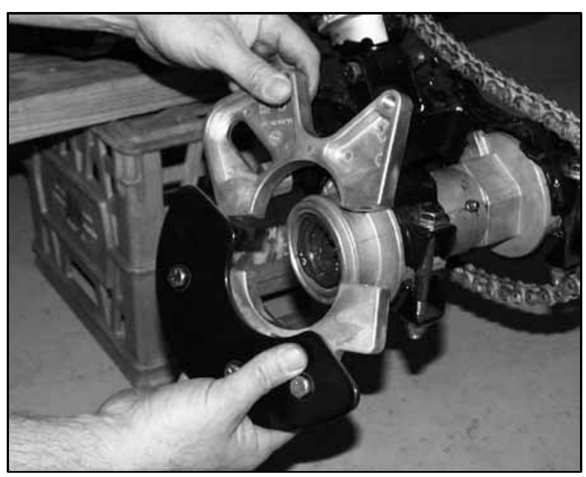
1. Drive in new bearing race with brass drift. (Use heat)
2. Lubricate and install new tapered bearings.
3. Lubricate and install new seals.

Concentric Swingarm Rear Housing Installation

1. Place brake caliper pivot bushing on stud with flange inward as shown.



2. Loosely assemble upper and lower brake caliper mount. Do not tighten at this time.
3. Install rear axle. (See page 7.41)



Rear Hub Inspection

1. Support machine securely with rear wheels elevated.
2. Grasp wheel/hub and check for movement.
3. If movement is detected, inspect hub, hub nut torque and bearing condition and correct as necessary.

Rear Axle Removal

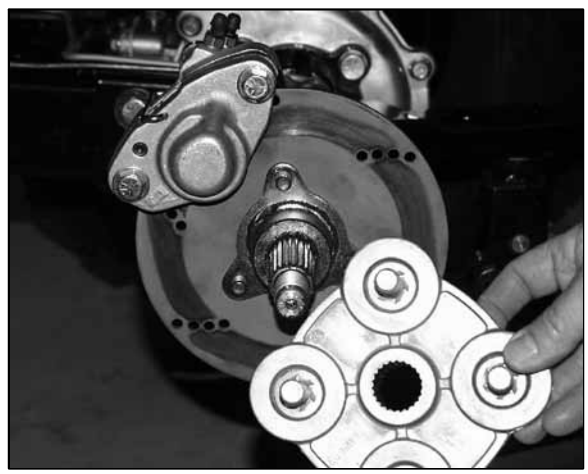
1. Lock the parking brake. Remove left rear hub cap.
2. Remove cotter pin.

3. Loosen the hub retaining nut.
4. Loosen - but do not remove - the wheel nuts.
5. Safely support the rear of the ATV.

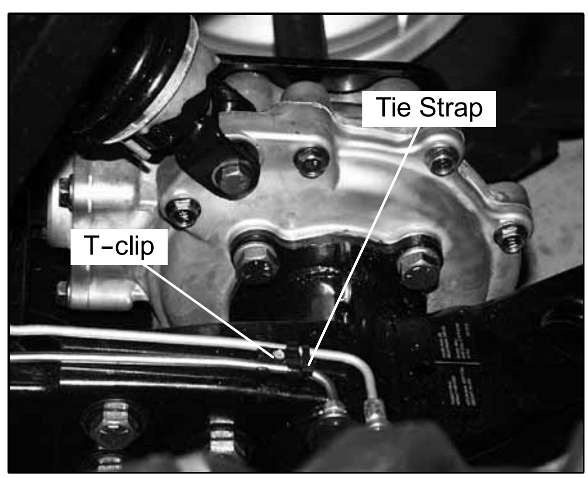
CAUTION:

Serious injury could occur if machine tips or falls.

6. Remove left wheel.
7. Remove hub.

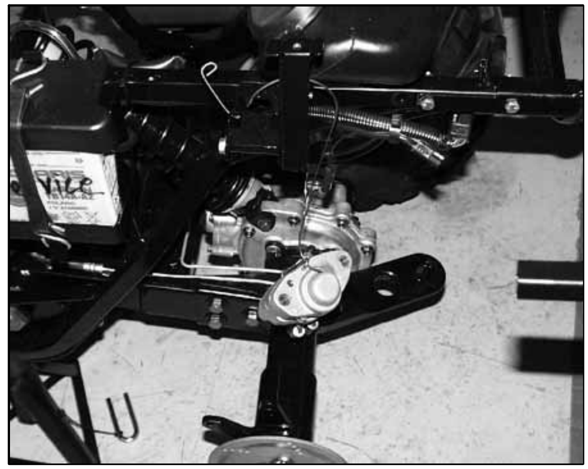


8. Remove brake line shield. Clip tie wrap from brake line tubes. Carefully unsnap brake lines from T-clip.



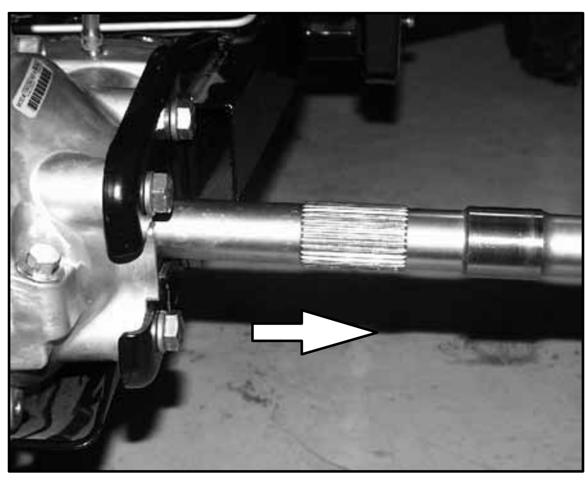
Rear Axle Removal

9. Remove rear brake caliper and support it from machine frame.
10. Remove rear brake disc.
11. Remove skid plate.



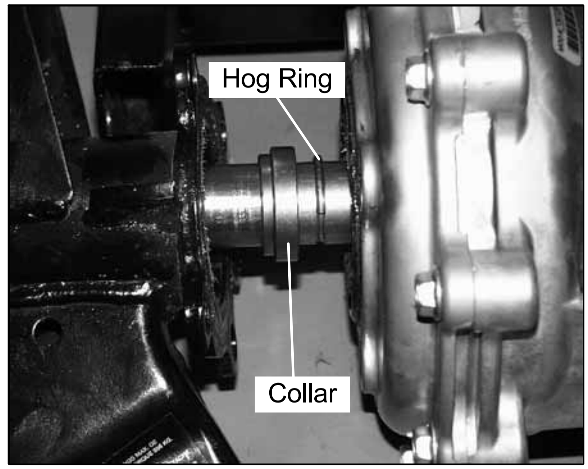
12. Remove (3) left swing arm bolts.
13. Remove (4) axle tube bolts from rear gearcase.

14. Slide axle through rear gearcase to the right enough to allow the axle tube to slip off between axle and and swingarm.



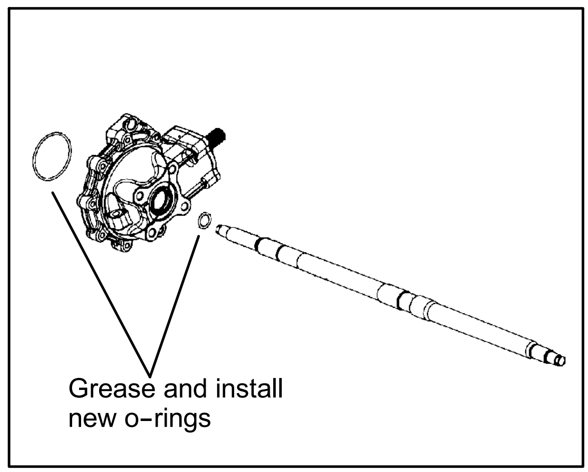
Rear Axle Removal

15. Remove hog ring and collar from axle.
16. Slide axle through the gearcase and remove from vehicle.
17. Remove o-ring seals from both sides of gearcase and discard.

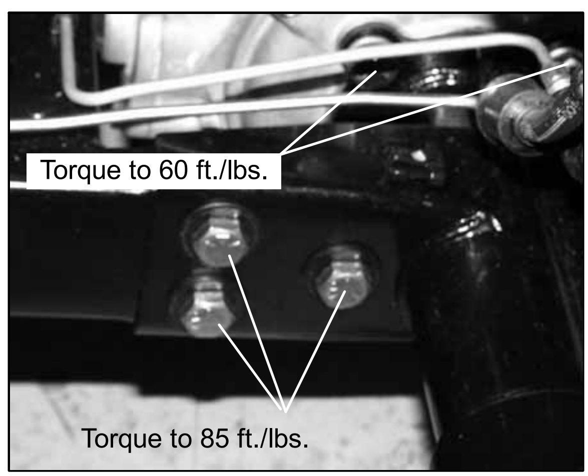


Rear Axle Installation

1. Grease and install new o-rings on rear gearcase.
2. Slide axle through rear gearcase until hog ring groove is accessible to the left of gearcase.
3. Install new hog ring and collar. NOTE: Collar should enclose hog ring. See previous photo on removal step 15.
4. Slide axle tube assembly over axle shaft until it engages the swingarm.
5. Install (4) new axle tube bolts loosely.

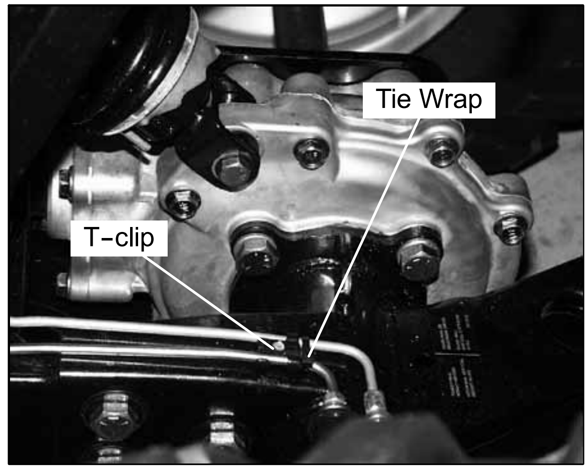


6. Install (3) left swing arm bolts and torque to 85 ft./lbs.
7. Torque (4) axle tube bolts in a cross pattern to 60 ft./lbs.
8. Re-install skid plate and torque bolts to 25 ft./lbs.
9. Install new greased o-ring on axle and slide brake disc on splines of the axle.
10. Install brake caliper on brake disc and torque bolts to 18 ft./lbs.
11. Install brake line shield.



Rear Axle Installation

12. Anchor the brake lines to the swing arm using the T-clip. Tie wrap lines together.
13. Install wheel hub, large flat washer.
14. Install cone washer with domed side facing outward.
15. Remove jackstand and torque axle nut and wheel nuts.

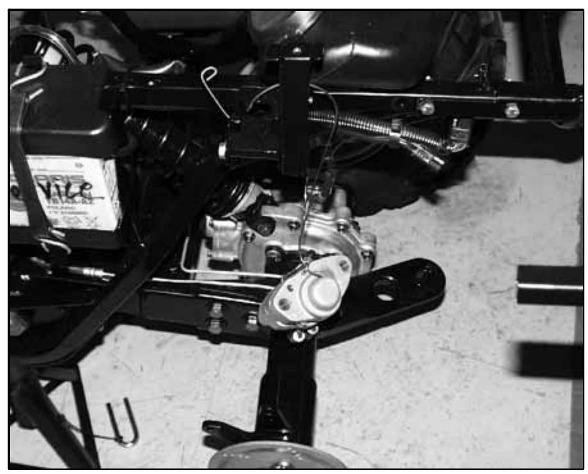


> **Rear Hub Nut Torque:**
> **80 ft. lbs. (11.06 kg-m)**
>
> **Rear Wheel Nut Torque**
> **15 ft. lbs. (2.07 kg-m)**

16. Install a new cotter pin. Tighten nut slightly to align holes if required.
17. Install hub cap.

Rear Axle Bearing Removal

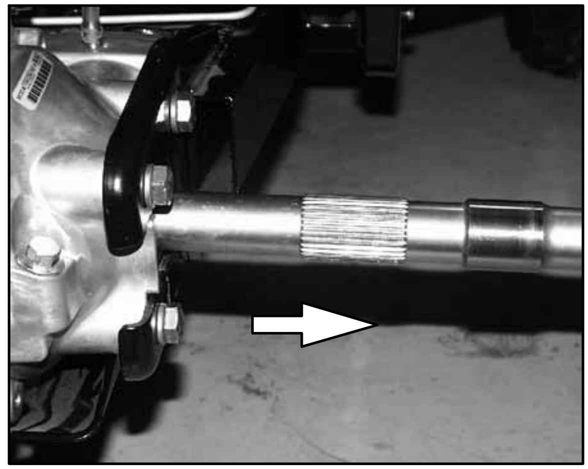
1. Remove left wheel and hub. (See page 7.20 of rear axle removal, steps 1 - 7)
2. Remove rear brake caliper and support it from machine frame.
3. Remove rear brake disc.



4. Remove and discard o-ring from axle shaft.

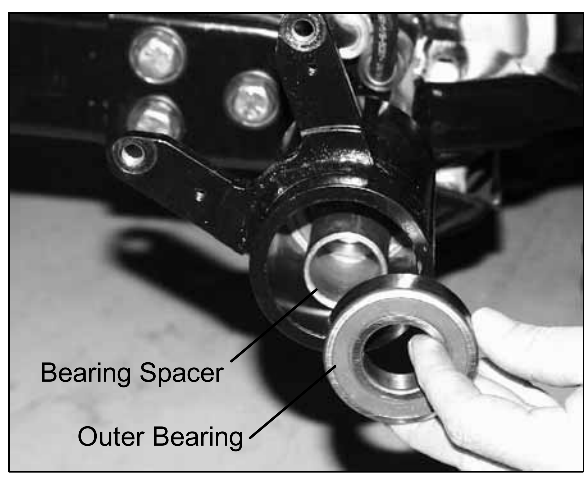
Rear Axle Bearing Removal

5. Slide axle through rear gearcase to the right as far as it will go.



6. Remove outer axle seal and discard.

7. Remove outer bearing and spacer.



Rear Axle Bearing Removal, Cont.

8. Remove inner bearing retaining ring and inner bearing.

Rear Axle Bearing Installation

1. Clean bearing service of axle tube and install new bearings, retaining ring and seals reversing steps 1 - 8 of rear axle bearing removal.
2. Torque brake caliper, rear hub nut, and rear wheel nuts to specifications.

Brake Caliper Torque:
18 ft. lbs. (2.48 kg-m)

Rear Hub Nut Torque:
80 ft. lbs. (11.06 kg-m)

Rear Wheel Nut Torque
15 ft. lbs. (2.07 kg-m)

Rear Hub/Bearing Carrier Removal

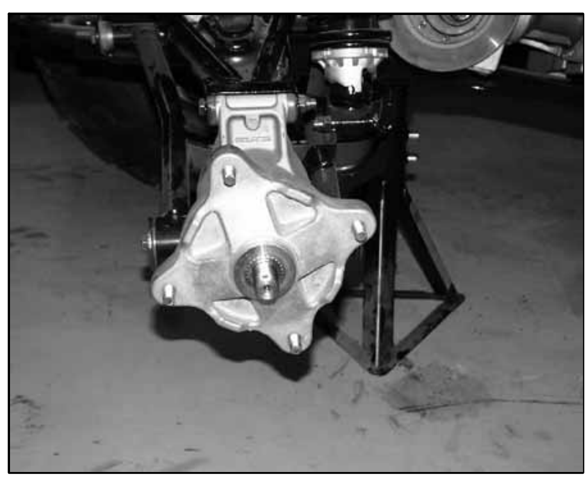
1. Lock the parking brake. Remove rear hub cap.
2. Remove cotter pin.
3. Loosen the hub retaining nut.
4. Loosen the wheel nuts.
5. Safely support the rear of the ATV.

CAUTION:

Serious injury could occur if machine tips or falls.

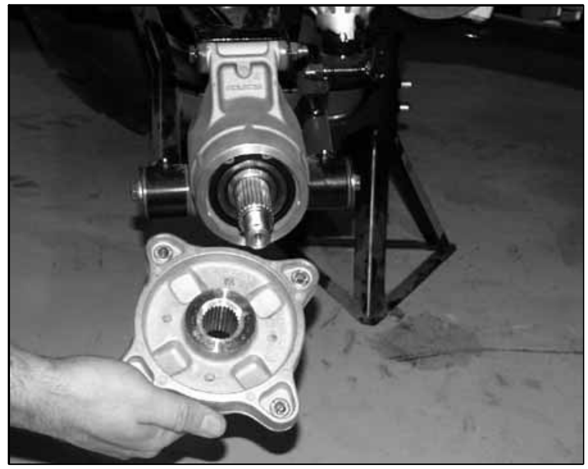
6. Remove hub nut, domed washer and flat washer.

7. Remove wheel nuts and wheel.

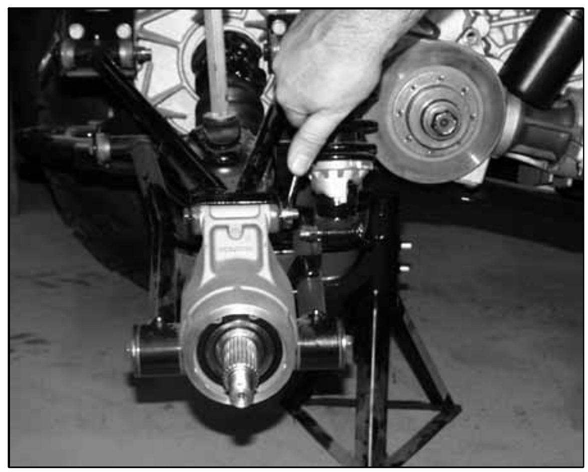


Rear Hub/Bearing Carrier Removal

8. Remove hub.



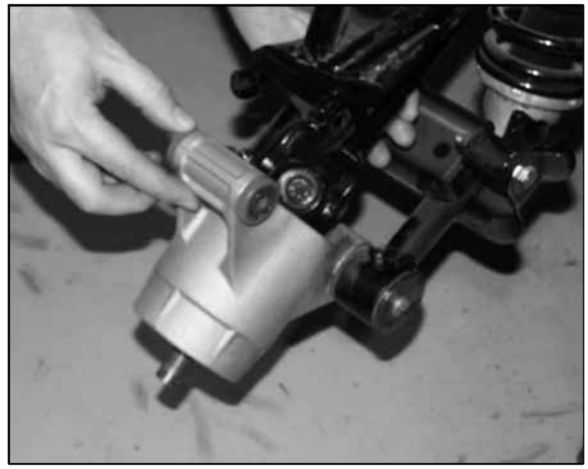
9. Remove upper control arm bolt as shown.



10. Remove both lower control arm bolts.
11. Remove bearing carrier.

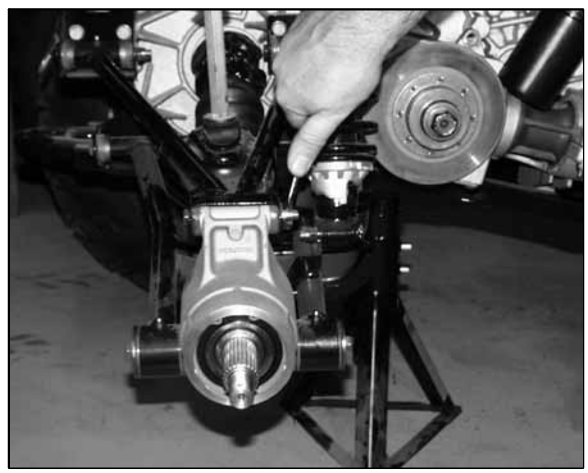
Rear Hub Installation

1. Start bearing carrier on drive shaft.
2. Align bottom of carrier housing and lower control arm. Grease and slide lower control arm bushings into place, securing corner housing.
3. Install and torque both lower control arm bolts.



> **Lower Control Arm Bolt Torque:**
> **30 ft. lbs. (4.14 kg-m)**
>
> **Upper Control Arm Bolt Torque:**
> **35 ft. lbs. (4.83 kg-m)**

4. Lift bearing carrier until top aligns with upper control arm. Install and torque upper control arm bolt and torque to specification.
5. Pull drive shaft outward and install hub onto driveshaft splines.
6. Install cone washers with domed side facing outward.
7. Install retainer nut, wheel and wheel nuts.
8. Remove jackstand and torque axle nut and wheel nuts.



> **Rear Hub Nut Torque:**
> **100 ft. lbs. (13.83 kg-m)**
>
> **Rear Wheel Nut Torque**
> **15 ft. lbs. (2.07 kg-m)**

9. Install a new cotter pin. Tighten nut slightly to align holes if required.
10. Install hub cap.

Rear Hub Disassembly

1. Remove outer snap ring.

2. From the back side, tap on the outer bearing race with a drift punch in the reliefs as shown.

NOTE: Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.

3. Inspect bearing.

NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

4. Inspect bearing housing for scratches, wear or damage. Replace housing if damaged.

Rear Hub Assembly

1. Support bottom of bearing carrier housing.

2. Start bearing in housing.

3. Press bearing into place until outer race bottoms on housing.

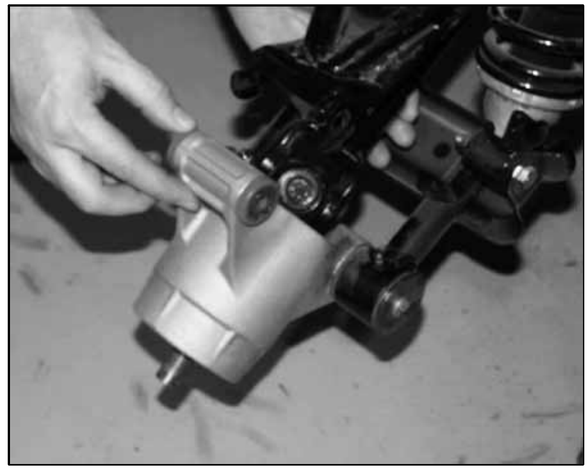
CAUTION:

Use an arbor and press only on the outer race, as bearing damage may occur.

4. Install snap ring into groove.

Rear Drive Shaft Removal

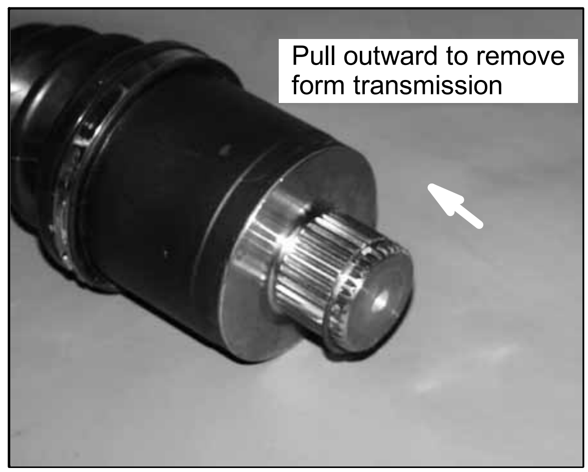
1. Remove rear hub and bearing carrier. (See pages 7.48 - 7.49, steps 1- 9).
2. Tip hub outward and remove shaft from hub.



3.

   U-Joint Style Shafts - Remove bolt from inner drive shaft U-joint yoke.

   Dual CV Joint Style - On rear drive shafts with dual CV joints, pull sharply outward to remove shaft from transmission. Install a new lock ring upon assembly.



Driveshaft and CV Joint Handling Tips

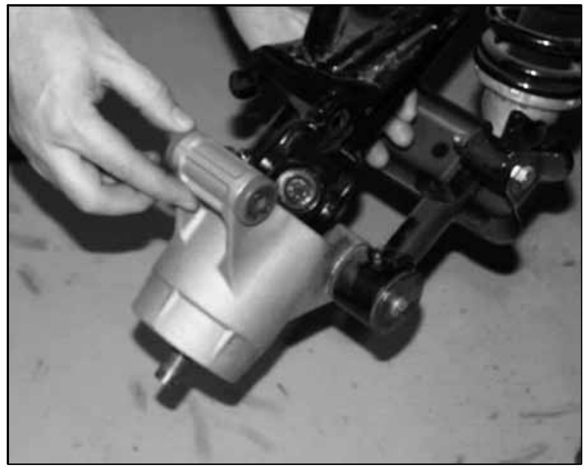
Care should be exercised during driveshaft removal or when servicing CV joints. Driveshaft components are precision parts. Cleanliness and following these instructions is very important to ensure proper shaft function and a normal service life.

- The complete driveshaft and joint should be handled by getting hold of the interconnecting shaft to avoid disassembly or potential damage to the driveshaft joints.
- Over-angling of joints beyond their capacity could result in boot or joint damage.
- Make sure surface-ground areas and splines of shaft are protected during handling to avoid damage.
- Do not allow boots to come into contact with sharp edges or hot engine and exhaust components.
- The driveshaft is not to be used as a lever arm to position other suspension components.
- Never use a hammer or sharp tools to remove or to install boot clamps.
- Be sure joints are thoroughly clean and that the proper amount and type of grease is used to refill when joint boots are replaced and when joints are cleaned. Refer to text for grease capacity of CV

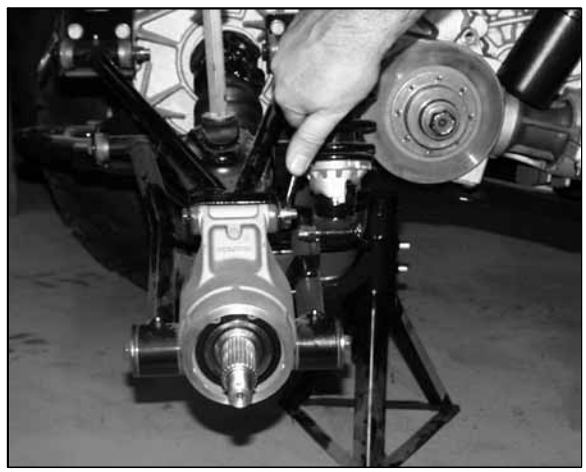
joints and CV joint boots.

Rear Drive Shaft Installation

1. Slide shaft assembly into bearing carrier hub.
2. Apply anti-seize compound to splines of shaft.



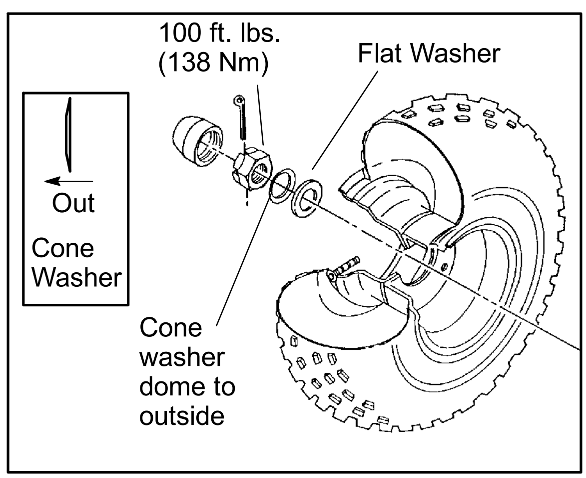
3. U-Joint shafts - Apply Loctite 272 to threads of driveshaft mounting bolt. Install and tighten bolt to 35 ft. lbs. (48 Nm).
   Dual CV Joint shafts - Install a new lock ring and install the shaft.
4. Lift bearing carrier into place and install bolt to upper control arm. Torque bolt to 35 ft. lbs. (48 Nm).
5. Install hub, flat washer, domed washer (domed side out) and nut. Torque center nut to 100 ft. lbs. Install new cotter pin and hub cap.



Rear Hub Nut Torque:	
100 ft. lbs.	**(138 Nm)**

6. Install rear wheel and torque wheel nuts to specification.

Rear Wheel Nut Torque:	
15 ft. lbs.	**(21 Nm)**

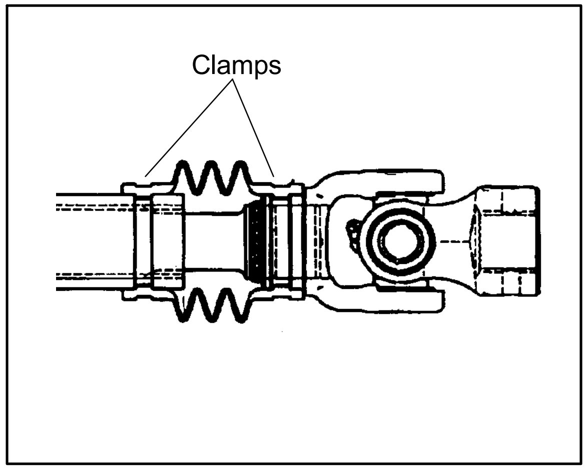


7. Grease all fittings thoroughly with Premium U-Joint Lubricant.

Rear Drive Shaft Disassembly (U-Joint Style)

NOTE: U-joint style drive shafts must be aligned properly to avoid vibration. Before disassembling driveshaft, be sure to mark the shaft and all U-joints, taking note of the position of grease fittings to ensure access after assembly.

1. Remove shaft boot clamp.
2. Separate drive shaft halves.
3. Inspect the inner and outer splines.
4. Refer to page 7.26 for axle cardan U-Joint service procedure. When disassembling U-Joint, the yoke bore alignment must be inspected as outlined below.



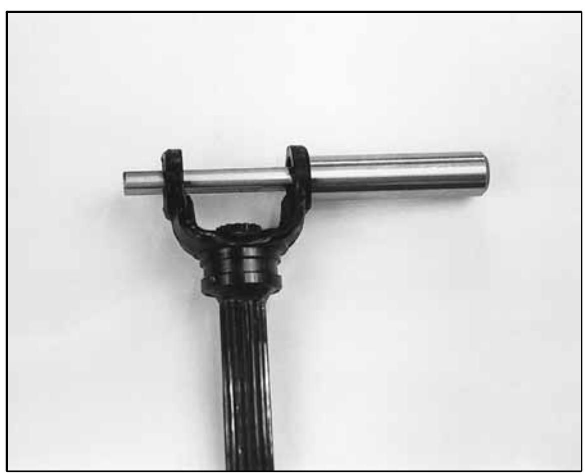
U-Joint Inspection - Rear Drive Shafts

NOTE: When rebuilding rear drive shaft U-Joints it is necessary to inspect the yoke cap bores for alignment or warpage. If a yoke cap bore is warped or twisted, the yoke must be replaced.

1. Make sure yoke bores are free of nicks or burrs from disassembly.
2. Slide the appropriate tool through both bores as shown. Hold the tool so the flat portion is in line with the yoke centerline.

Yoke Alignment Tools	
Large Yoke (1.060″)	**2871813**
Small Yoke (.9958″)	**2871814**

3. Pull tool out and turn 90°. Slide tool through both bores. Tool must slide freely into both bores. If yoke tool does not slide freely in both bores, replace yoke.

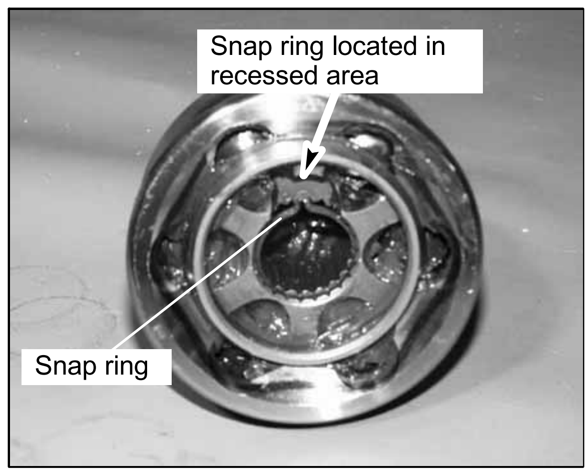


Rear Drive Shaft Disassembly (Dual CV Joint Style)

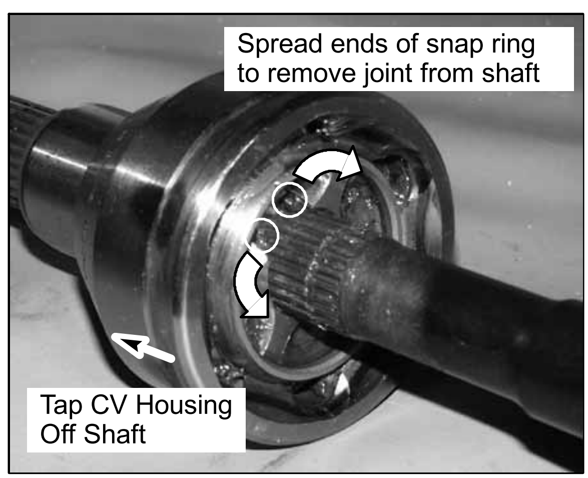
1. Remove clamps from rubber boot(s) using the proper boot clamp pliers.

CV Boot Clamp Pliers:
Earless Type 8700226

2. NOTE: Photo at right is shown without shaft for clarity. Wipe grease away from recess in CV joint inner hub to locate snap ring.

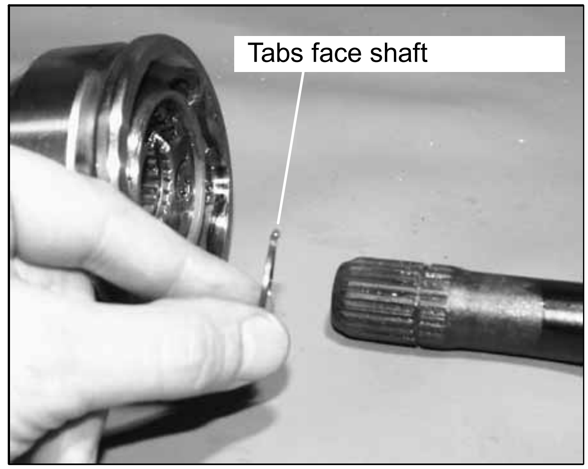


3. Open the snap ring using a snap ring pliers or small needle nose pliers. Tap CV housing off shaft with a soft faced hammer while holding snap ring open.



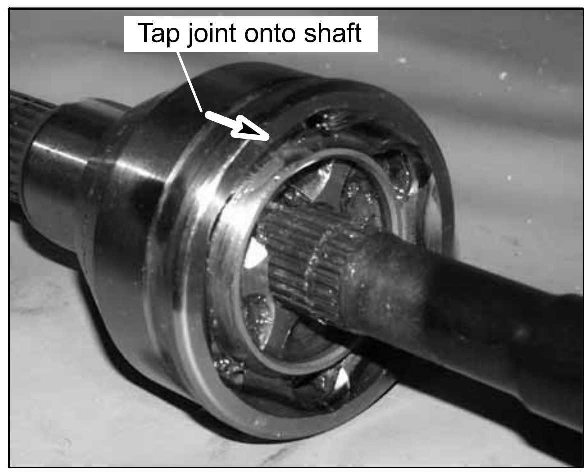
CV Joint Assembly Procedure

4. Place a new snap ring in the groove of the CV joint inner hub, with tabs facing the shaft as shown.

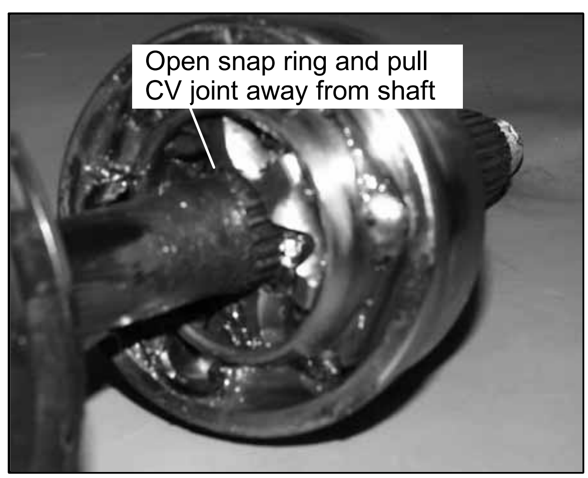


5. Refit CV joint on interconnecting shaft by tapping with a plastic hammer on the joint housing. Take care not to damage threads on the outboard CV joint. The joint is fully assembled when the snap ring is located in the groove on the interconnecting shaft.

6. Install and tighten large boot clamp with boot clamp pliers.



7. Remove excess grease from the CV joint's external surfaces and position joint boot over housing, making sure boot is seated in groove. Position clamp over boot end and make sure clamp tabs are located in slots. *Note:* Before tightening boot clamp on inboard joint, make sure any air pressure which may have built up in joint boot has been released. The air should be released after the plunging joint has been centered properly. Tighten boot clamp using boot clamp pliers.



(Boot Replacement)

1. Remove CV joint from end of shaft. (See page 7.56)
2. Remove boot from shaft.

NOTE: When replacing a damaged boot, check the grease for contamination by rubbing it between two fingers. A gritty feeling indicates contamination. If the grease is not contaminated, the boot can be replaced without cleaning the CV joint. Use the recommended amount of grease for *boot replacement* only (see below). Proceed to Boot Installation.

(CV Joint Cleaning / Replacement)

3. Thoroughly clean and dry the CV joint and inspect ball tracks and cages for wear, cracks or other damage.

NOTE: Shiny areas in ball tracks and on the cage spheres are normal. Do not replace CV joints because parts have polished surfaces. Replace CV joint only if components are cracked, broken, worn or otherwise unserviceable.

4. Add the recommended amount of grease for *CV joint cleaning* to the joint as shown below. Be sure grease penetrates all parts of the joint.

(Boot Installation)

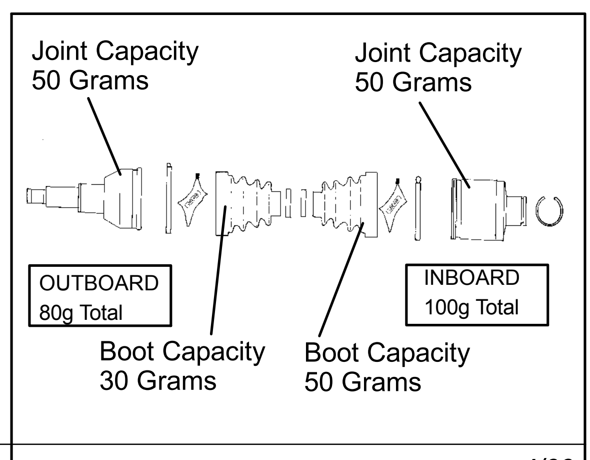
5. Fit joint boot and clamps on interconnecting shaft. Make sure small end of boot is fully seated in groove.
6. Position small clamp over small end of boot. Be sure it is seated all the way around in the clamp recess on the boot.
7. Tighten boot clamp using boot clamp pliers.
8. Fill boot with grease supplied with boot service kit and spread remaining grease evenly inside CV joint. Be sure to use only the Constant Velocity Joint grease supplied with boot service kit. IF CV JOINT WAS CLEANED, add the recommended amount of grease to the joint *in addition* to the grease pack supplied with boot kit.

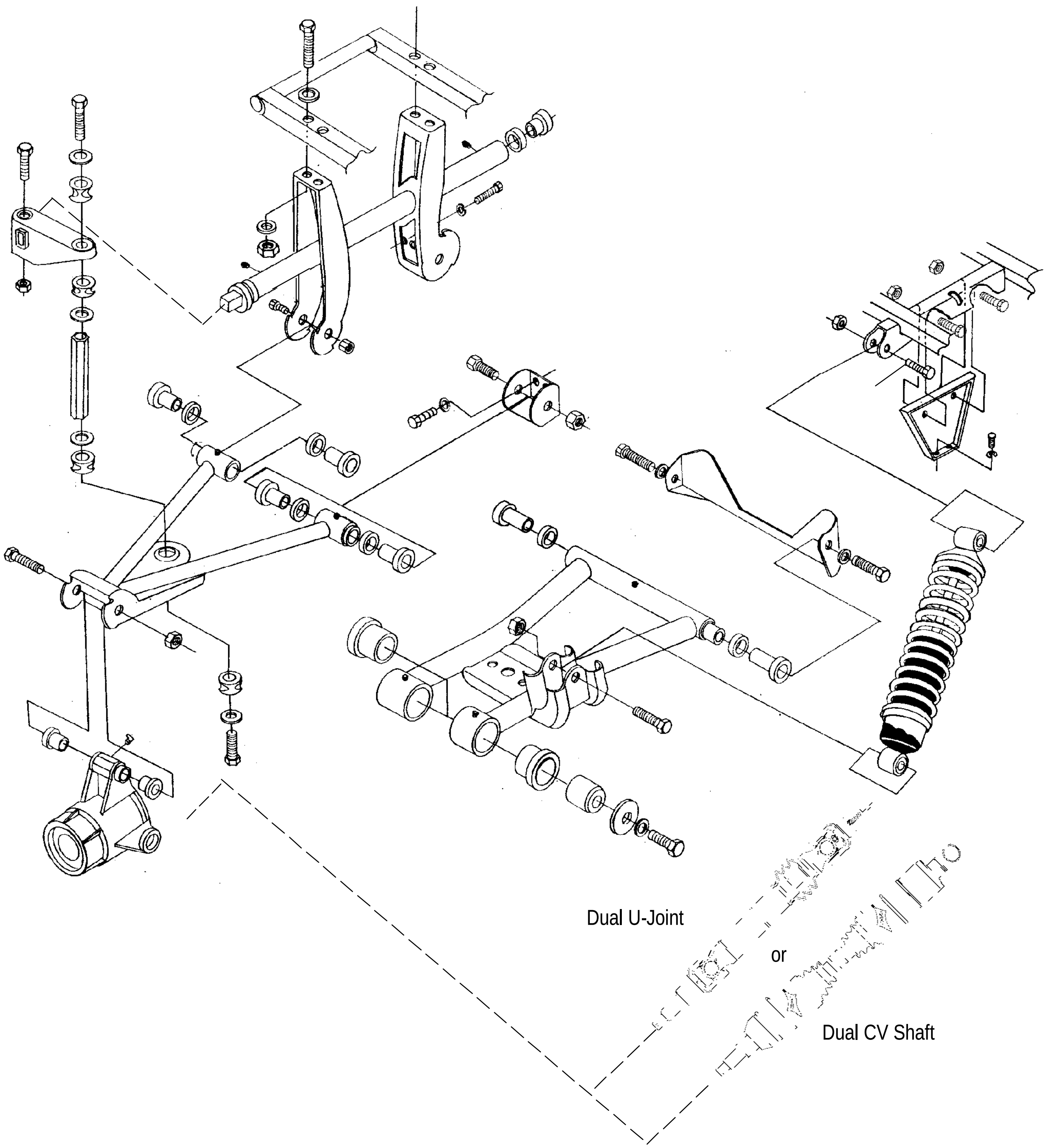
NOTE: CV Joint Grease Capacity:

Outboard joint - 30g if boot is replaced only. Another 50g (80 total) if joint is cleaned.

Inboard joint - 50g if boot is replaced only. Another 50g (100 total) if joint is cleaned.

CV Joint Grease - 30g PN 1350046
50g PN 1350047

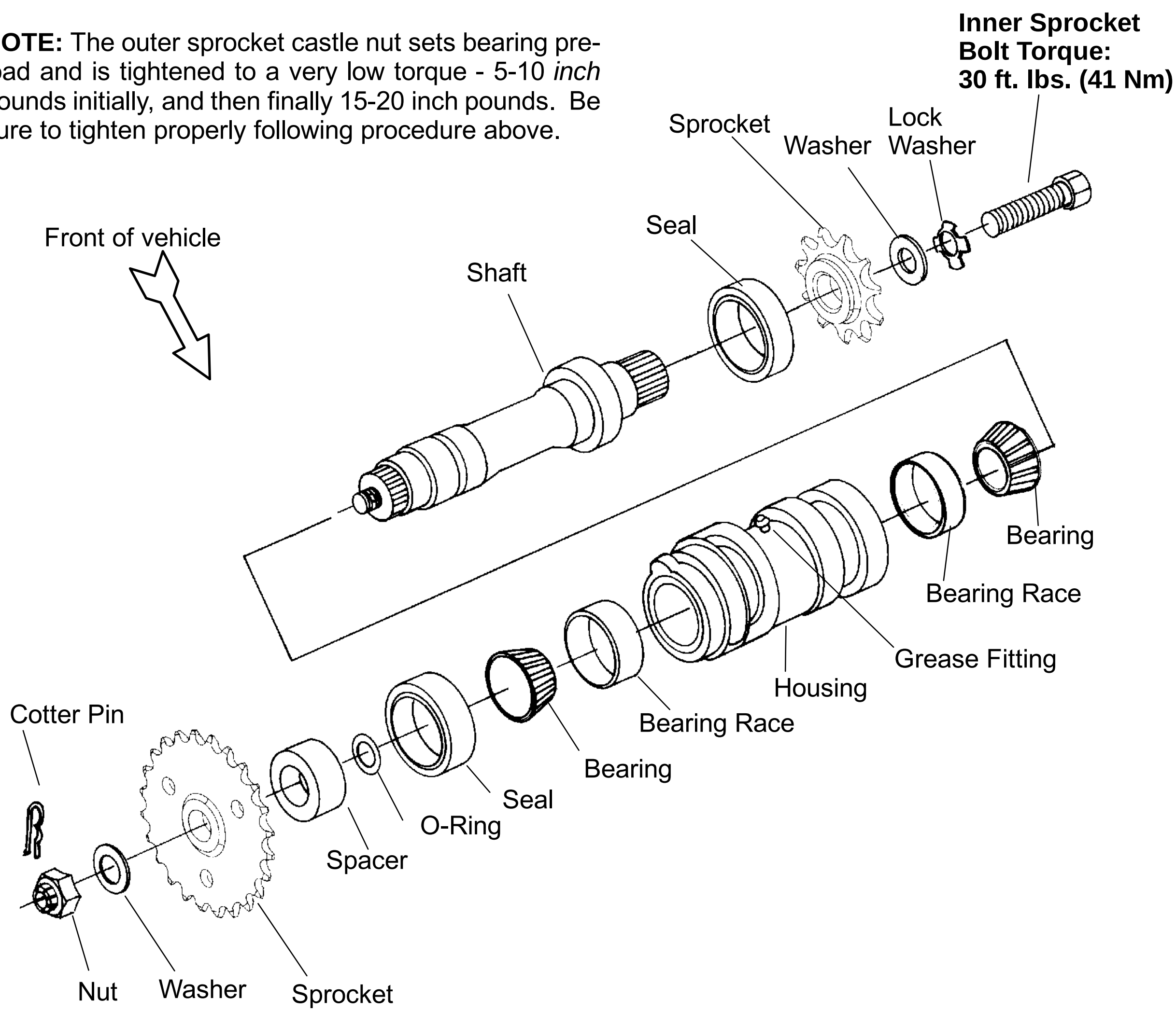


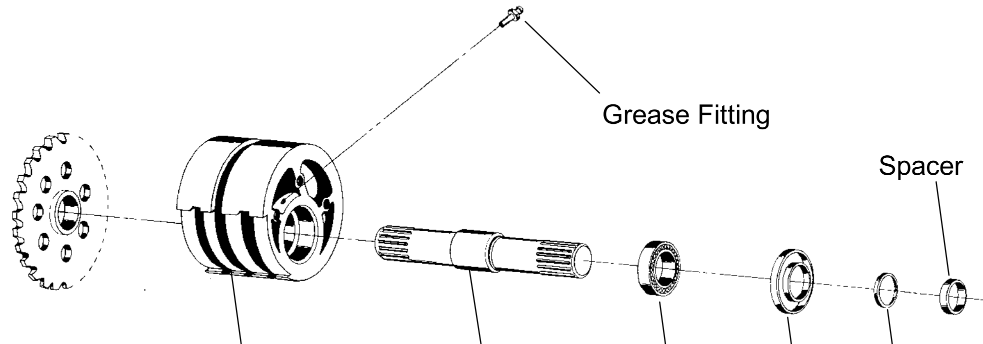

Dual U-Joint
or
Dual CV Shaft

Tapered Bearing Center Eccentric Assembly Procedure

- Press bearing races into housing.
- Lubricate and install bearings and seals.
- Install shaft.
- Install O-ring, spacer, sprocket, and washer on outer end of shaft.
- Loosely install nut on outer end of shaft.
- Loosen front eccentric pich bolt and rotate eccentric to provide maximum chain slack.
- Install front drive sprocket (inner), washer, and lock washer on inner end of shaft.
- Install eccentric assembly in frame.
- Tighten outer sprocket nut to 10 *inch* pounds.
- Loosen nut one full turn.
- Tighten nut to final torque of 15-20 inch pounds.
- Install cotter pin.
- Lubricate housing.
- Install and adjust chains (refer to maintenance section for adjustment procedure.

NOTE: The outer sprocket castle nut sets bearing pre-load and is tightened to a very low torque - 5-10 *inch* pounds initially, and then finally 15-20 inch pounds. Be sure to tighten properly following procedure above.





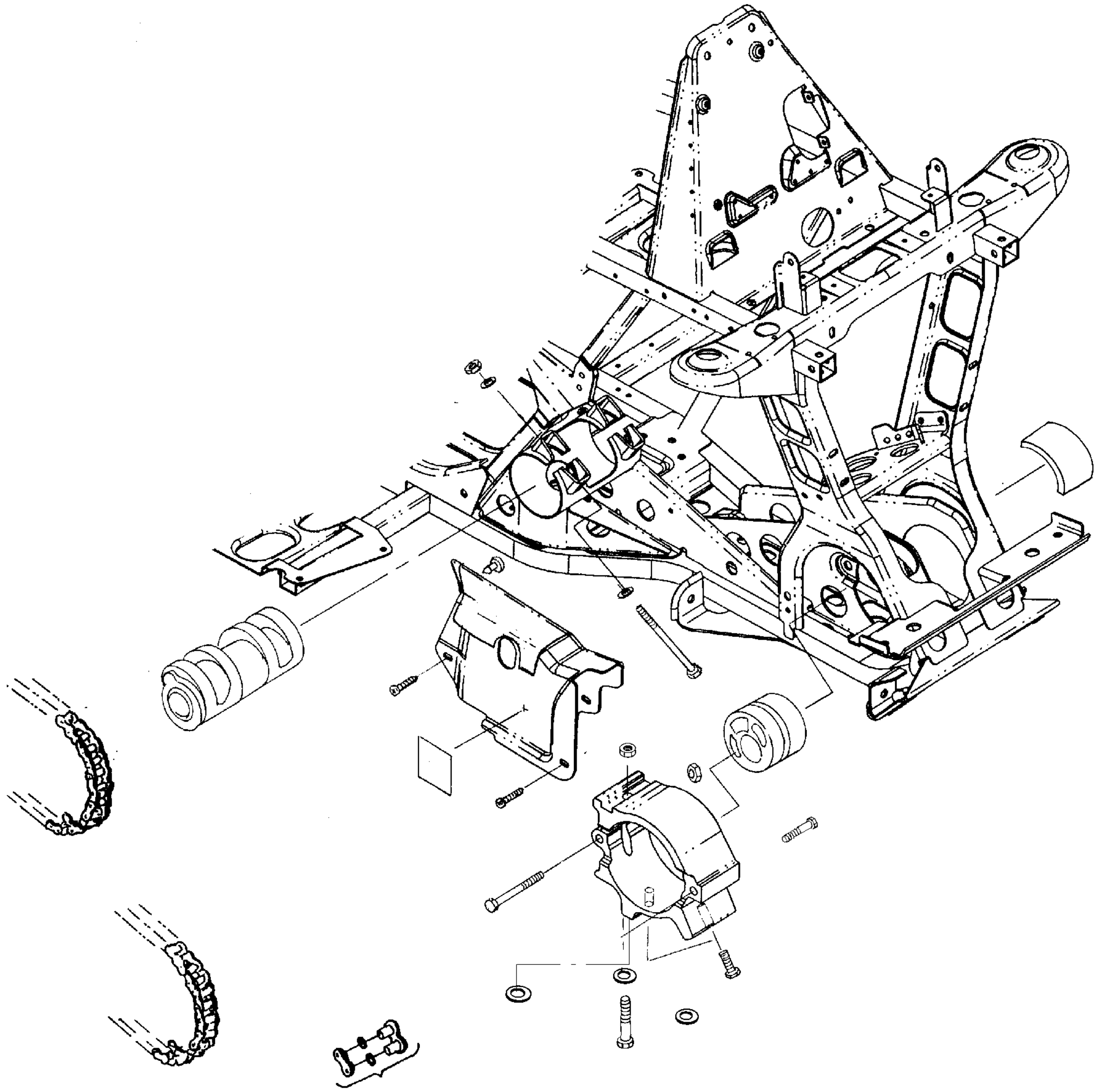
Front Eccentric Removal / Installation Procedure

- Remove front drive axles from eccentric as outlined on page 7.18. NOTE: It is not necessary to disassemble the front wheel hub.
- Pull strut and axle off eccentric shaft.
- REMOVE front eccentric housing pinch bolt.
- Rotate eccentric housing until opening in eccentric casting aligns with stop bracket.
- Remove housing out left side of vehicle. Note location of foam spacer.
- Reverse removal procedure to install.
- Refer to Maintenance Chapter 2 to adjust chain.

Front Eccentric Disassembly / Assembly Procedure

- Remove spacers and O-rings from both ends of shaft.
- Tap on end of shaft with a soft faced hammer to drive seal and bearing out opposite end of housing.
- Remove bearing from shaft and re-install shaft to drive other bearing and seal from housing.
- Inspect shaft for wear in the bearing area.
- Inspect housing for wear, cracks, or damage.
- Warm the housing and place bearings in freezer to ease assembly.
- Install a new bearing, pressing on the outer race only, until bearing is fully seated in left end of housing (left side has grease fitting). Outer race of bearings must fit tightly in housing.
- Turn housing over and support inner race of bearing installed in previous step.
-
- Install shaft.

Center / Front Chain Tightener Exploded View



NOTES

CHAPTER 8
TRANSMISSION SERVICE

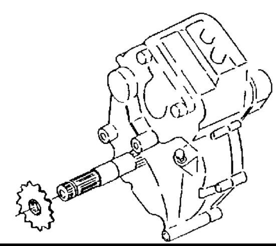
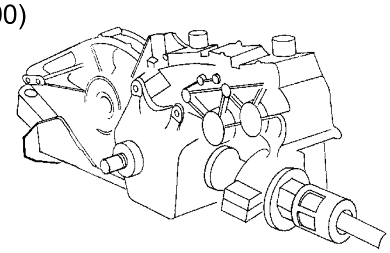
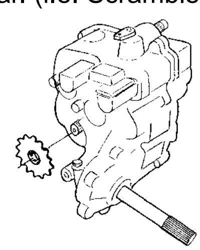
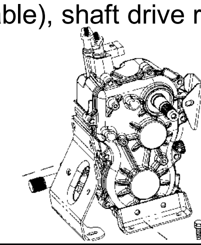
Torque Specifications

Transmission Case Bolts	12 ft. lbs. (1.66 kg-m)
Bell Crank Nut	12 ft. lbs. (1.66 kg-m)
Transmission Drain Plug	14 ft. lbs. (1.93 kg-m)
Speedometer Angle Drive	11 ft. lbs. (1.52 kg-m)
Transmission Mounting Bolts	25 ft. lbs. (3.45 kg-m)
Drive Sprocket Bolt	17 ft. lbs. (2.35 kg-m)
Output Shaft Bearing Mounting Nuts	12 ft. lbs. (1.66 kg-m)
Swing Arm Pivot Bolts (Std)	55 ft. lbs. (7.59 kg-m)
Swing Arm Pivot Bolts (Concentric Swingarm)	150 ft. lbs. (20.75 kg-m)

Lubrication

Refer to maintenance section for transmission lubricant type and capacity.

Transmission Type Identification

TRANSMISSION TYPE	DESCRIPTION
Type III EZ Shift (High/Reverse, High/Low/Reverse)	Chain drive front (where applicable) Chain drive rear 
Type IV Shaft Drive (High/Low/Reverse)	Used on independent rear suspension models (i.e. Sportsman 500) 
Type V Shaft / Chain (High/Low/Reverse, High/Reverse)	Shaft drive front, chain drive rear. (i.e. Scrambler 400 / 500) 
Type VI Shaft Ride (High/Reverse, High/Low/Reverse)	Used on models with Shaft Ride rear suspension. Shaft drive front (where applicable), shaft drive rear. 

Gear Shift Selector Removal

NOTE: On most models, the *shift selector switch* (where applicable) can be replaced with the shift selector box remaining in the frame. To change fluid, remove selector box assembly, disassemble, clean, and assemble.

1. Remove parts that interfere with access to shift selector (seat, right side panel, and exhaust heat shield, etc.).
2. Disconnect wiring harness noting the location and routing of the wires.
3. Pull wiring harness through to gear shift selector side of machine.
4. Disconnect the two linkage rods from gear shift selector slides.
5. Remove three bolts attaching gear shift selector to the mounting bracket.
6. Lift gear selector out of mounting bracket and away from frame.

Gear Shift Selector Disassembly

CAUTION:

Wear eye protection during this procedure. Read each step completely before proceeding. Essential parts may be lost or damaged if you do not heed this caution!

1. Clamp gear selector body lightly in a soft jawed vice. Using a criss-cross pattern, loosen each of the five screws holding the gear shift selector cover to the gear shift selector body. Loosen each screw only a few turns, then proceed to another screw.

NOTE: These parts are under pressure from the internal spring.

Gear Shift Selector Disassembly, Cont.

2. Carefully pull the gear shift selector cover and rod from the gear shift selector body.

CAUTION: *Be very careful* to pull the cover away vertically and slowly to avoid damage to the internal gear selector switch. The selector switch is easily damaged.

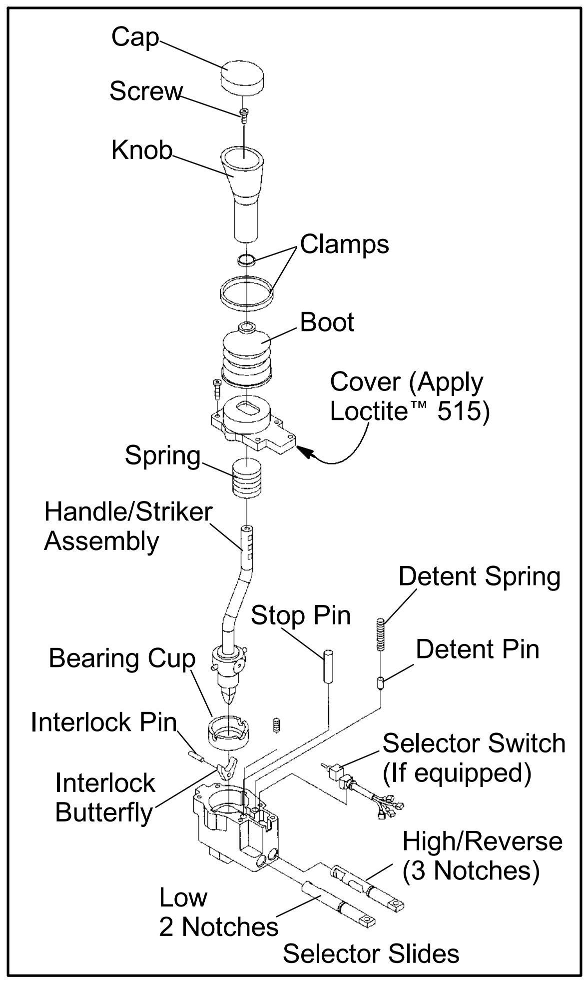
3. Set the cover/rod assembly aside.
4. *Very carefully* remove the gear shift selector switch from gear shift selector body.
5. Remove the white plastic bearing cup and three springs from gear shift selector.
6. Slowly tilt gear shift selector body sideways to drain oil.

NOTE: *Do not* tip gear shift selector body upside down or detent bullets and stop pin may fall out. Check for signs of moisture in the selector body. Inspect shift boot closely if moisture is present in selector box.

7. Tap gear shift selector body, top down, against a hard, smooth, flat surface to jar the stop pin and two detent bullets loose. Pull the detent bullets and the stop pin out of the gear shift selector body.
8. Hold the interlock butterfly out of the way and remove the two slides, one at a time.
9. Remove interlock butterfly and inspect for wear or damage.

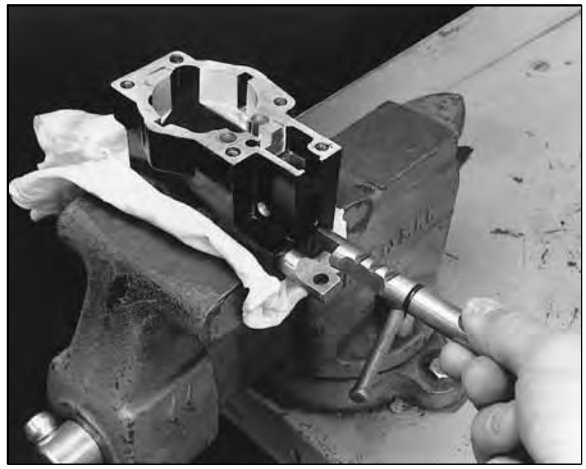
NOTE: The LH slide has two notches and the RH slide has three. The slides must be replaced in the proper channels.

10. Inspect O-rings for damage. Replace if any damage is found.
11. Flush housing with parts washer fluid or penetrating oil to remove all moisture.
12. Dry all gear shift selector parts and remove any corrosion with a wire brush.



Gear Shift Selector Assembly

1. Install interlock butterfly.
2. Insert slides into gear shift selector body, taking care not to cut or tear O-rings in the process.



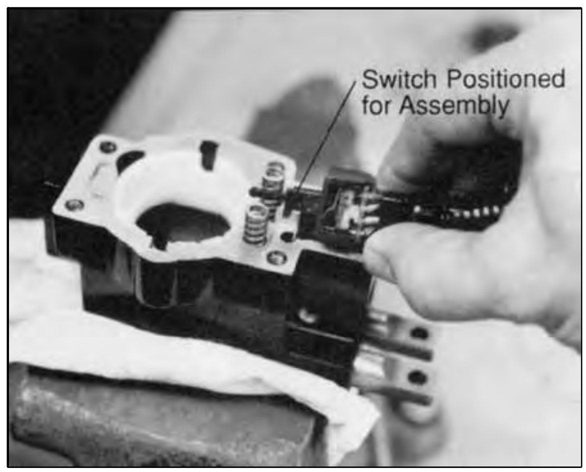
NOTE: The LH slide has two notches and the RH side has three. The slides must be replaced in the proper channels for the shifter to function properly.

3. Replace detent bullets, stop pin, springs and white plastic bearing cup by reversing steps 5 - 7 of Gear Shift Selector Disassembly.
4. Clamp gear shift selector body lightly in a soft jawed vise.
5. Fill selector body with Polaris 0W-40 All Season Synthetic motor oil. The oil level should be at one half the height of the slides.

Polaris 0W-40 All Season Synthetic Oil **PN 2871281 - Quart** **PN 2871844 - Gallon**

CAUTION: Too much oil could cause the selector to hydrolock. Be sure the selector box is level when adding oil.

6. Carefully reinstall the gear shift selector switch. The hook on the switch faces downward toward shift slides. This hook catches on the selector body to prevent the switch from moving out of place.



NOTE: Switch must be positioned properly or AWD may not function.

7. Wipe gear selector dry, clean surfaces of cover and selector box with Loctite™ Primer T and place a bead of Loctite™ 518 Gasket Eliminator or 3 Bond 1215 completely around the edge of the gear shift selector body.

8. *Carefully* reattach cover/rod assembly to gear shift selector body. Make sure slides are in neutral, or butterfly may be damaged.

CAUTION: Be very careful not to damage the selector switch while assembling these parts. Tab end of selector switch must be positioned in hole of striker as shown at right. If not, assembling cover will damage switch. Torque cover screws to 12 ft. lbs. (1.7 kg-m).

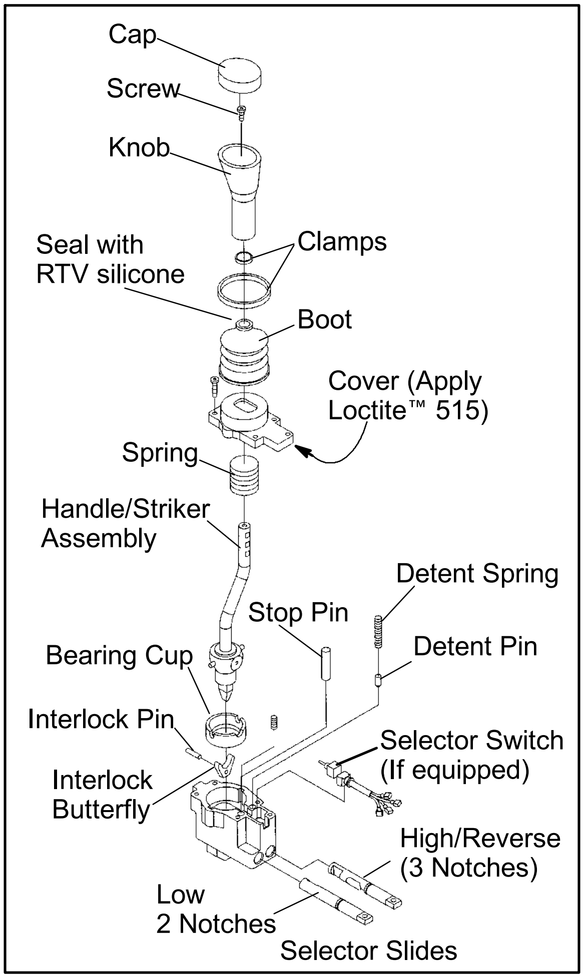
Gear Shift Selector Installation

1. Place gear shift selector back into the mounting bracket and replace three bolts.
2. Reconnect linkage rods to gear shift selector slides. Adjust as required. See linkage adjustment procedures.
3. Route gear shift selector switch wiring harness properly and secure in place with cable ties.
4. Reconnect the wiring harness leads.
5. Secure the gear shift selector switch wiring harness to the frame.
6. Replace remaining parts.

Boot Replacement

NOTE: If moisture is found in the gear shift selector the boot should be replaced.

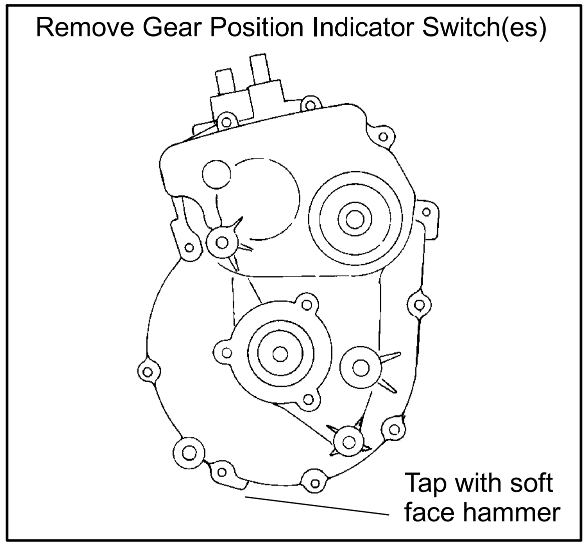
1. Using a slotted screwdriver, remove cap from gear shift knob.
2. Remove torx screw securing knob to selector rod.
3. Pull selector knob off selector rod.
4. Remove band clamps on rubber boot.
5. Slide boot off selector rod and replace with a new one.
6. Apply RTV silicone to selector rod to seal top of boot.
7. Place band clamps in position and tighten using CV boot clamp pliers.
8. Replace shift knob, securing it to selector rod with screw removed in step 2.
9. Push shift knob cover back into place. Allow approximately 12 hours for RTV silicone to cure.



Type III, EZ-Shift Transmission

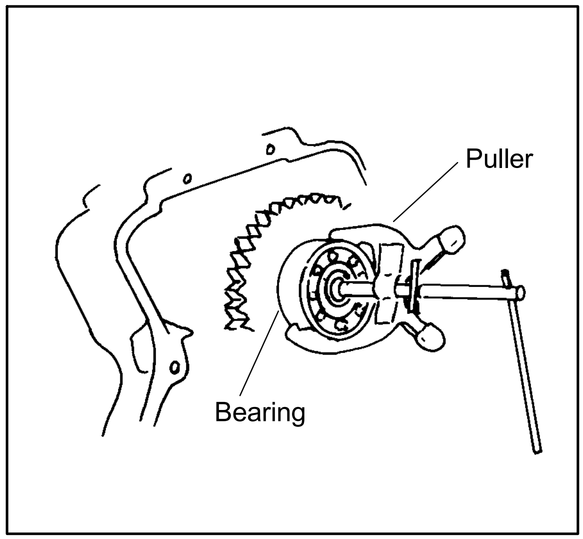
Disassembly (Typical)

1. Remove speedometer angle drive, sprocket retaining circlip and sprocket.
   CAUTION: On transmissions equipped with gear position indicator switch(es), remove switch BEFORE removing case cover.
2. Remove the transmission cover bolts.
3. With a soft face hammer tap on the cover bosses and carefully remove the cover. See Ill. 1.



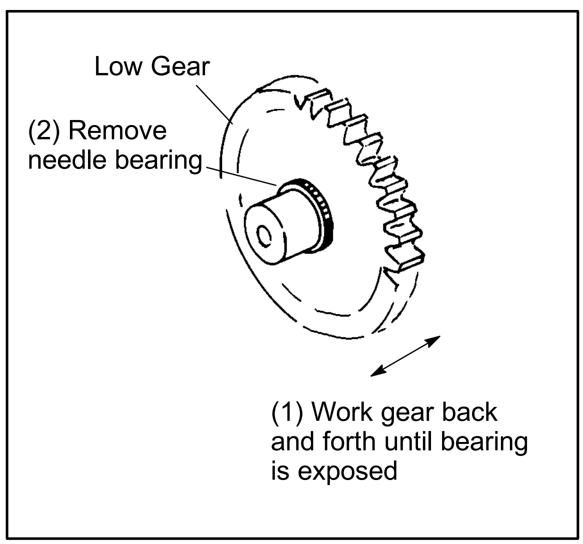
Ill. 1

4. Using the battery cable clamp puller, remove the bearing from the sliding gear shaft. See Ill. 2.
5. Remove outer thrust washer.



Ill. 2

6. To remove the needle bearing from the low gear, tip transmission to point end of shaft downward. Work gear back and forth as shown until bearing is exposed and slide bearing out. See Ill. 3.



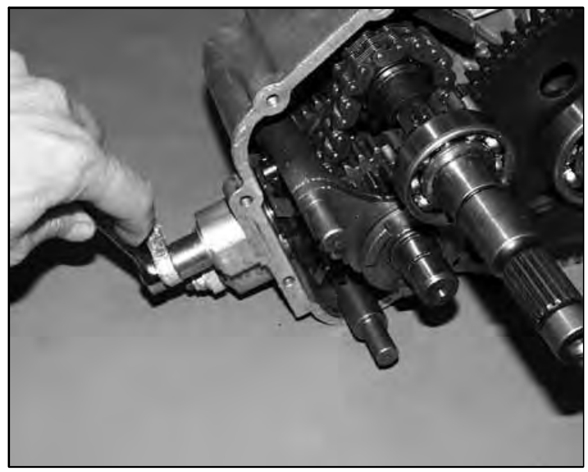
Ill. 3

Disassembly (Typical), Cont.

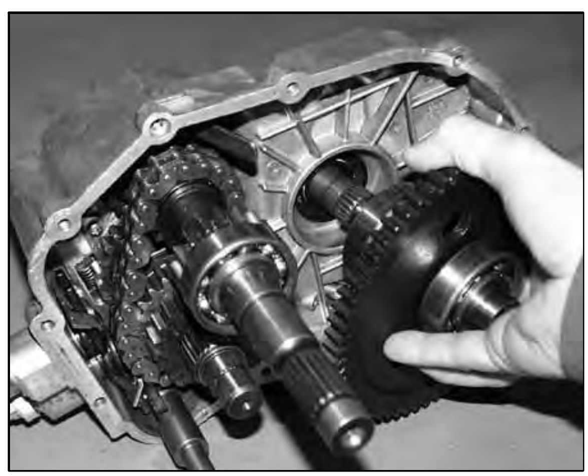
7. Remove the low gear and inner thrust washer.

8. Use a 1/2″ wrench on gearshift bell crank retaining nuts to aid in moving the shift fork shaft.
9. Remove the low range shift fork shaft with engagement dog by rotating the low gear shift arm clockwise and pulling outward on shift fork shaft.

NOTE: High/Reverse bell crank must be in neutral to remove Low gear shift fork shaft.



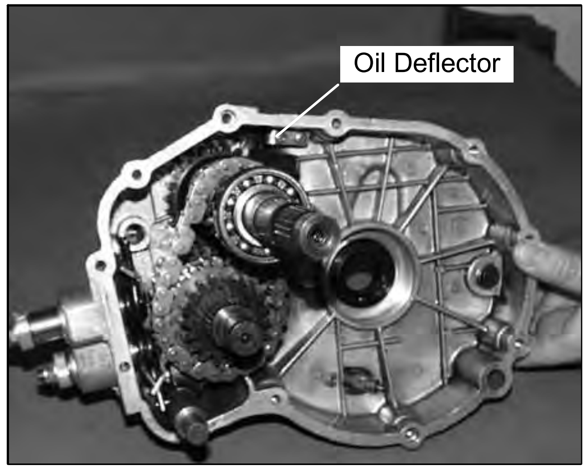
10. Remove output shaft and gear assembly by tapping on shaft with a soft faced hammer, from the back side of the gear case assembly.

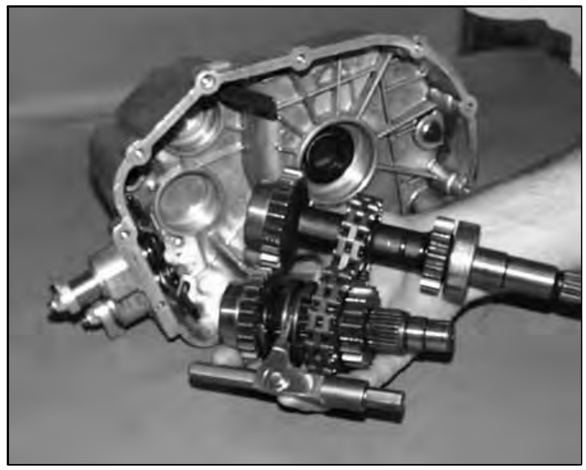


Disassembly (Typical), Cont.

11. Remove sliding gear shaft with high/reverse shift shaft and input shaft as an assembly by gradually pulling assemblies from their bearing mounts while rotating the high/reverse shift arm counterclockwise.

NOTE: Make sure input shaft gear clears oil deflector, but do not remove the oil deflector.





12. Clean all components in a parts washer and inspect for wear.

13. Inspect engagement dogs of gears and replace if edges are rounded.

14. Inspect gear teeth for wear, cracks, chips or broken teeth.

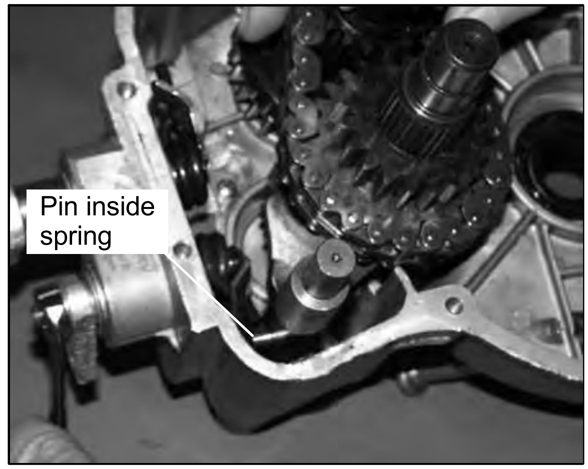
15. Remove seals from transmission case.

NOTE: New seals should be installed after the transmission is completely assembled.

16. Inspect bearings for smooth operation. Check for excessive play between inner and outer race.

Assembly (Typical)

1. Carefully install high/reverse shaft assembly and gear cluster as a unit into their respective bearing case areas. Make sure input shaft clears oil deflector. Tap with a soft face hammer to seat shaft assemblies.



NOTE: Make sure high/reverse shift shaft pin is properly positioned within legs of shift fork shaft return spring.

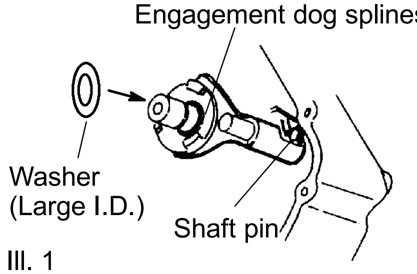
2. Seat the shafts and shift the assembly into neutral position.

NOTE: After installation, the High / Reverse shift arm must be placed in the neutral position to complete reassembly.

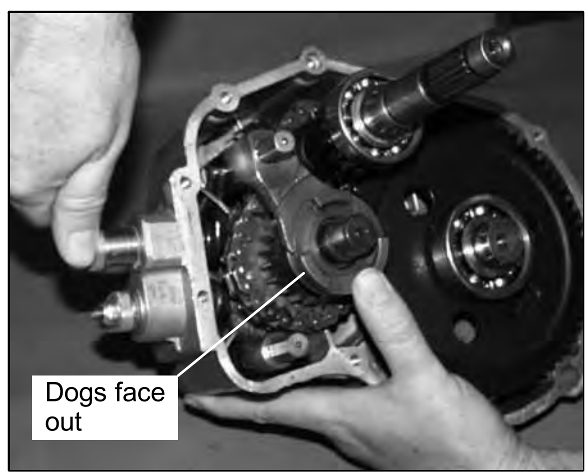
3. Install the output shaft and gear assembly into the gear case.
4. Install engagement dog on low range shift shaft.

NOTE: Dogs should face toward the mating gear.

5. Install low shift shaft assembly, aligning pin on shift shaft between ends of return spring, the engagement dog splines with the sliding gear shaft splines, and the end of shift shaft to the gearcase.
   See Ill. 1.



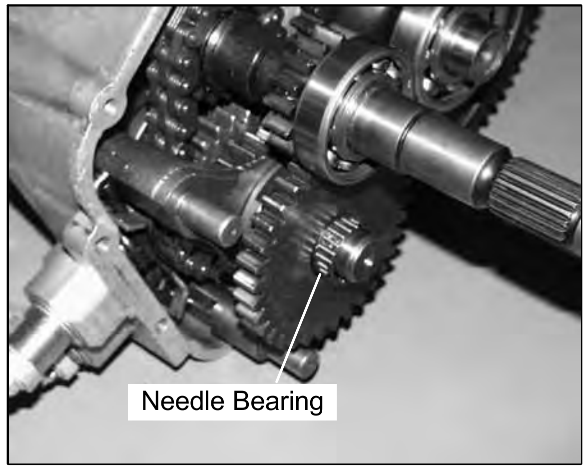
Ill. 1



6. Install *large* I.D. washer on shaft (against splines).

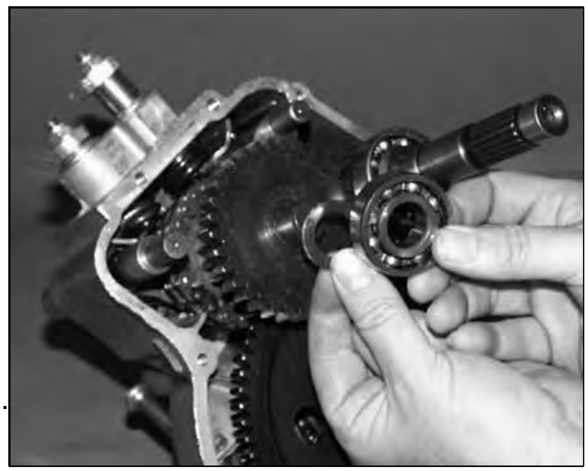
Assembly (Typical), cont.

7. Install low gear on shaft with engagement dogs inward.
8. Lubricate and install needle bearing into gear.



9. Install smaller I.D. washer and then ball bearing.

NOTE: The bearing should be flush with the shaft when seated correctly.



10. Prior to reinstalling the cover make sure the mating cover surfaces are clean and dry. Apply Loctite t 518 or 3-Bond 1215 to mating surfaces.
11. Reinstall cover and torque bolts in 3 steps to 12 ft. lbs. (17 Nm) using a criss-cross pattern.
12. Install transmission and add Polaris Premium Synthetic Gear Case Lubricant in the recommended amount. Refer to Maintenance Chapter 2.
13. Reinstall transmission switch(es). Apply Loctite t 242 (blue) to threads of switch screws and torque to 13-16 in. lbs. (1.5-1.9 Nm).

Premium Synthetic Gear Case Lubricant

PN 2871178 (12 oz.)
PN 2870464 (Gallon)

Installation (Typical)

1. Install transmission from right side of ATV with output shaft side down and input shaft side up toward right rear corner of frame.

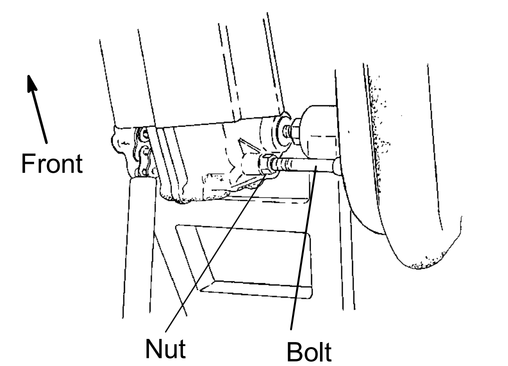
NOTE: As you are guiding the output shaft into its mounting, the rear drive chain can be installed onto shaft and sprocket. Make sure chain is properly positioned on axle sprocket.

2. Loosely install lower mounting bolt and nut.

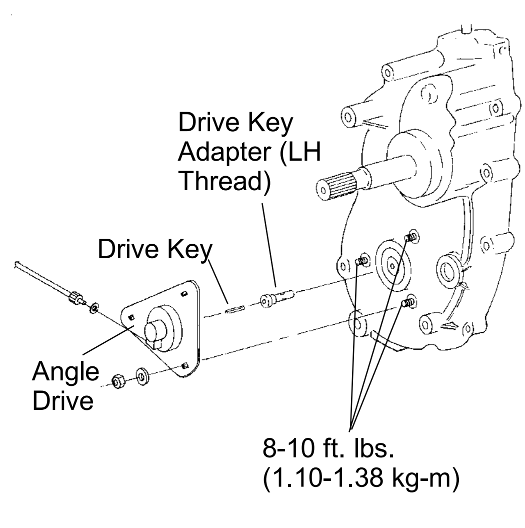
CAUTION:

Be sure bolts are proper length or transmission damage may occur.

3. Loosely install right side **3/8-16 x 3/4″** mounting bolt in top right hole.
4. Attach washer, nut and roller chain guide to the right side swing arm bolt.
5. Align transmission case bushing with bolt and torque nut to 55 ft. lbs. (76 Nm). Bend the tab washer to lock the bolt in place.
6. Loosely install left side **3/8-16 x 3/4″** top mounting bolt.
7. Install washer and nut on the left side swing arm bolt.
8. Align transmission case bushing with bolt and torque nut to 55 ft. lbs. (76 Nm). Bend the tab washer to lock the bolt in place.
9. Align transmission with engine (See Clutch Section for center distance and alignment procedure. Torque lower mounting bolt to 25 ft. lbs. (35 Nm). Torque right and left 3/8-16 x 3/4″ bolts to 25 ft. lbs. (35 Nm).
10. Adjust torque stop by adjusting bolt until it contacts the frame. Then tighten an additional one half turn using a wrench. Hold the adjuster bolt and tighten the jam nut.
11. Attach speedometer cable to angle drive and tighten.
12. Install skid plate and torque bolts to 5 ft. lbs. (7 Nm).
13. Install driven clutch spacer and dust seal(s).
14. Install inner cover and all PVT system components. Refer to PVT Section for procedure.



Transmission Torque Stop Adjustment



Installation (Typical)

15. Grease support bearing and install on output shaft.

Swing Arm Bolt Torque:
55 ft. lbs. (76 Nm)

Transmission Mounting Bolt Torque:
25 ft. lbs. (35 Nm)

Skid Plate Bolt Torque:
5 ft. lbs. (7 Nm)

Inner Cover Bolt Torque:
12 ft. lbs. (17 Nm)

Drive Clutch Torque:
40 ft. lbs. (5.5 Nm)

Driven Clutch Torque:
12 ft. lbs. (17 Nm)

16. Slide output shaft support bearing inward against frame. Be sure to hold bearing square with shaft.
17. Visually inspect gap between frame and upper or lower mounting boss on support bearing. If a gap exists on upper or lower boss, measure with a feeler gauge and add shim(s) as required to maintain proper alignment when mounting nuts are tightened. Torque to specification.

Mounting Nut Torque:
18 ft. lbs. (25 Nm)

Shim Kit PN 2200126 includes:
(2) 5210764 .020″
(2) 5210759 .063″
(2) 5210760 .080″

18. Apply silicone to splines of brake disk and reinstall disk.
19. Install brake caliper on disk and bolt to frame with the rear caliper shield. Torque to specification.

Caliper Attaching Bolt Torque:
12 ft. lbs. (17 Nm)

Installation (Typical), Cont.

20. Install snap ring onto output shaft securing brake disk.
21. On 4x4 Models, install sprockets and middle chain. Install sprocket with bolt, lock washer and retaining washer and torque output shaft sprocket bolt to 17 ft. lbs. (23 Nm). Torque center eccentric sprocket bolt to 30 ft. lbs. (41 Nm). Install chain guard with spacer. Adjust rear and center chains. Refer to Maintenance Section for details.
22. Install brake disk cover.
23. Install top mounting bolts of brake disk cover, rear caliper shield and caliper to frame. Torque caliper mounting bolts to 12 ft. lbs. (17 Nm).
24. Attach brake caliper arm to moveable cam and adjust foot pedal to 1/2″ deflection. (See Maintenance Section) Lock the jam nut.
25. Install air cleaner assembly, making sure carb boot seals on air box correctly. Tighten hose clamp.
26. Reinstall pre-cleaner duct work and pre-cleaner.
27. Proceed with linkage rod adjustment found in the Maintenance Chapter 2.

Output Shaft Bearing Retaining Bolt Torque:
17 ft. lbs. (23 Nm)
Brake Caliper Attaching Bolt Torque:
12 ft. lbs. (17 Nm)
Output Shaft Sprocket Bolt Torque:
17 ft. lbs. (23 Nm)
Center Eccentric Sprocket Bolt Torque:
30 ft. lbs. (41 Nm)

Speedometer Service

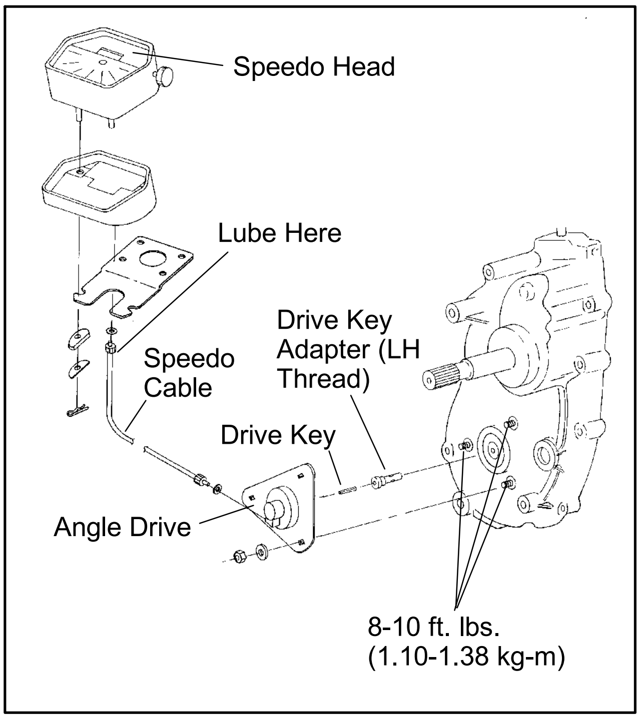
1. Remove speedometer cable from the speedometer head and lubricate it periodically with Polaris cable lube (PN 2870510).

Polaris Cable Lube

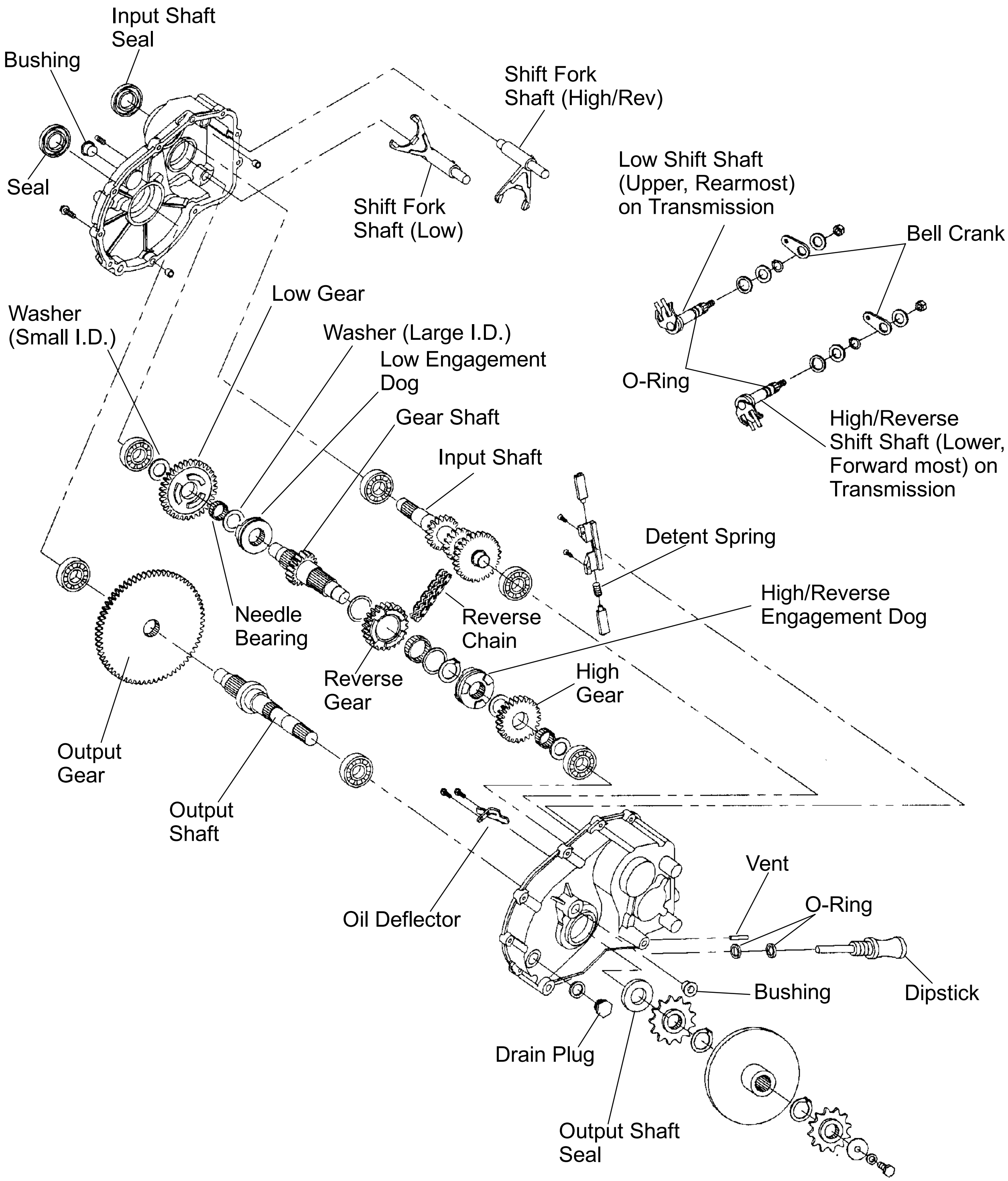
PN 2870510

2. Use a generous bend (radius) when installing cable. Do not kink cable.
3. If cable is binding or routing is incorrect, the small drive key may twist off at the drive adaptor. It will be necessary to remove the drive key adaptor out of the transmission shaft

NOTE: The drive adapter has left hand threads.



Type III Transmission Exploded View



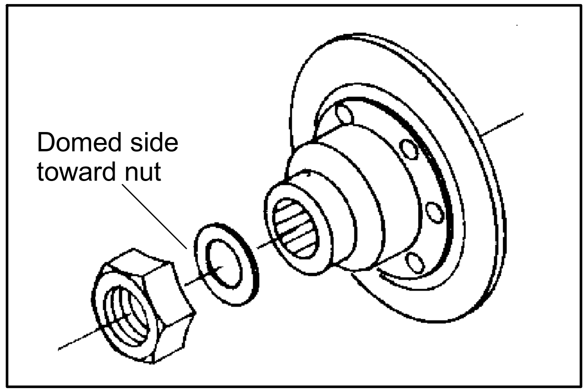
Transmission Removal

All operations regarding transmission front output housing assembly can be performed with transmission installed in frame.

1. Remove the inner PVT cover. Refer to Clutch Chapter. Remove speedometer cable.
2. Remove complete airbox assembly and transmission vent line.
3. Loosen rear wheel nuts slightly.
4. Elevate and support machine under footrest/frame area.

CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing and installing bearings and seals.

5. Remove wheel nuts and wheels.
6. Apply hand and auxiliary brake and remove brake disc retaining nut and washer. **NOTE:** Domed side of washer faces nut.



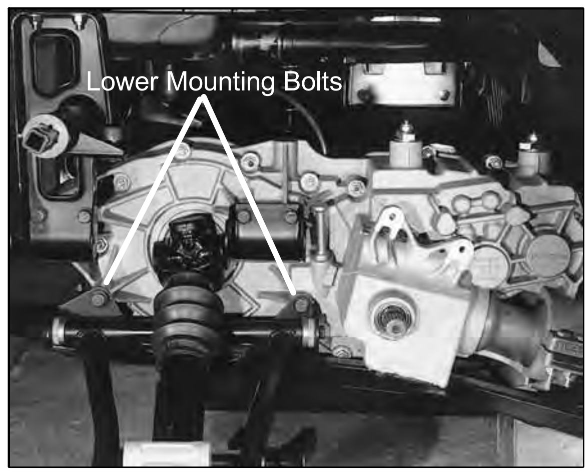
7. Remove rear (auxiliary) brake caliper and disc (where applicable). Support caliper on right hand foot rest.

8. Disconnect transmission shift linkage rods. Remove right hand shock absorber.
9. Disconnect the sway bar from both sides. Remove right side upper control arm.

Transmission Removal, Cont.

10. Remove left side upper control arm attaching bolts at transmission. Pivot upper control arm away from transmission as shown.

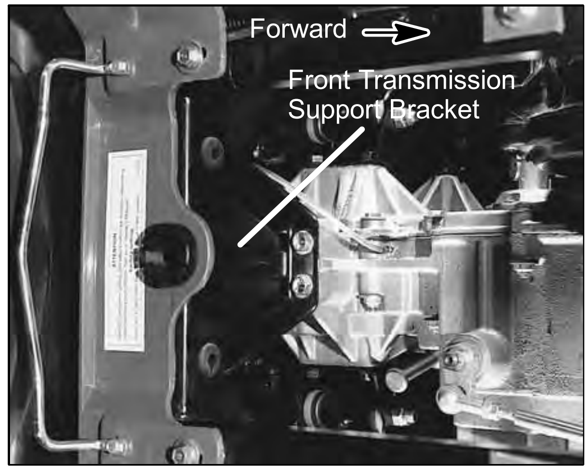
11. Remove both lower transmission mounting bolts from each side.



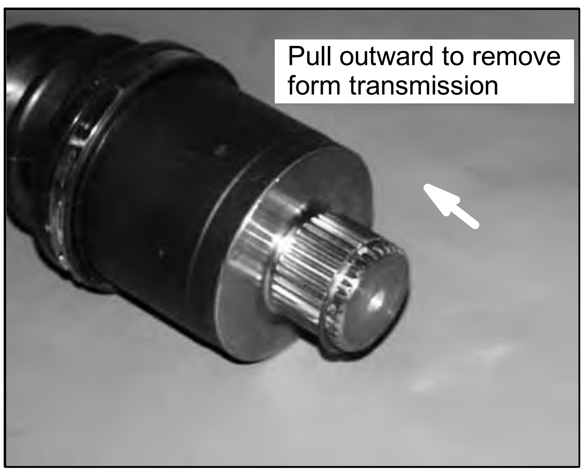
12. Remove all 8 bolts attaching the stabilizer support bracket, and remove support.

Transmission Removal, Cont.

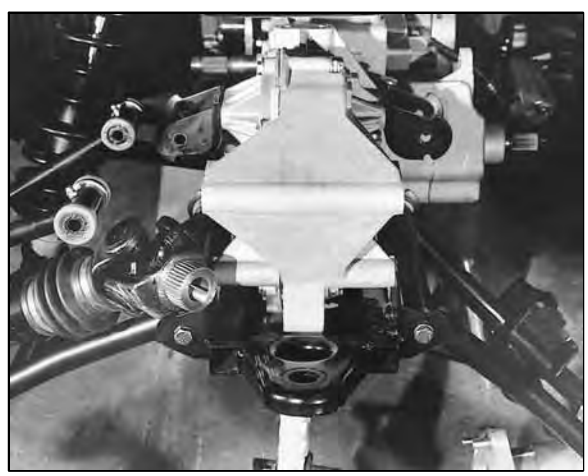
13. Remove front support bracket.



14. Using open end of a 9/16" wrench, loosen both side bolts securing drive shafts to transmission, and remove drive shafts.
    Dual CV Joint Shafts
    On models with CV joint shafts, pull the shaft sharply outward to dislodge locking ring from transmission (below).

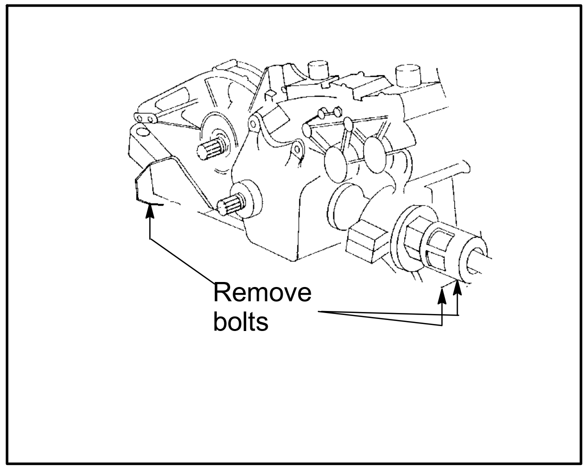


15. Lift right side drive shaft and hub up and out of the way. This will provide access to remove transmission out right side of frame.



Transmission Removal, Cont.

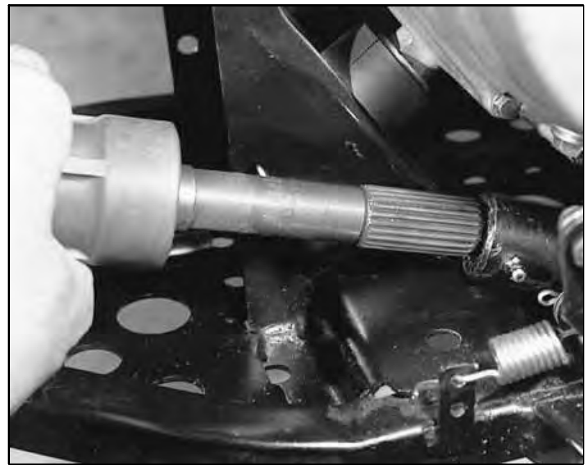
16. Remove bottom transmission bolts as shown in illustration.



17. Lift and remove transmission out right side of frame.

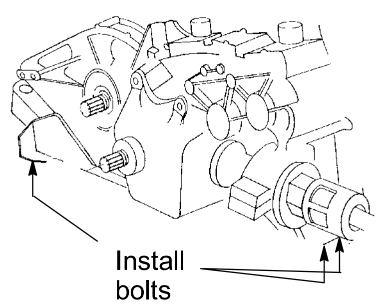
Transmission Installation

1. Apply anti-seize compound to splines of front output shaft and insert into prop shaft.



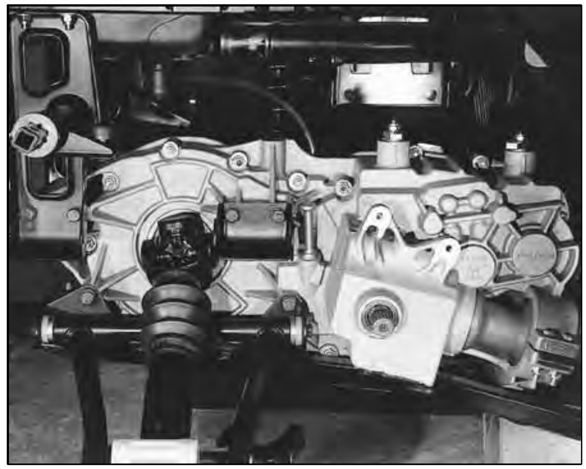
2. Rotate transmission into place from right side of frame.

3. *Loosely* install bottom transmission bolts.



Transmission Installation, Cont.

4. Install lower right and left transmission mounting bolts, front transmission bracket, and rear stabilizer support bracket. Tighten transmission bolts securely in the following sequence.
   - Front support bracket upper and lower.
   - Stabilizer bracket upper and lower.
   - Bottom transmission bolts.
   - Lower left and right transmission mounting bolts.



5. Apply Loctite™ 272 to right hand drive shaft bolt and install internally threaded spacer onto bolt. Torque to specification.

Rear Drive Shaft Retaining Bolt Torque
35 ft. lbs. (4.85 kg-m)

Apply Loctite™ 272

6. Apply anti-seize to splines of drive shaft and install right side drive shaft in transmission with opening in U-joint upward. Support right hand hub and install right hand upper control arm attaching bolts. Install stabilizer bar arm on stabilizer bar.

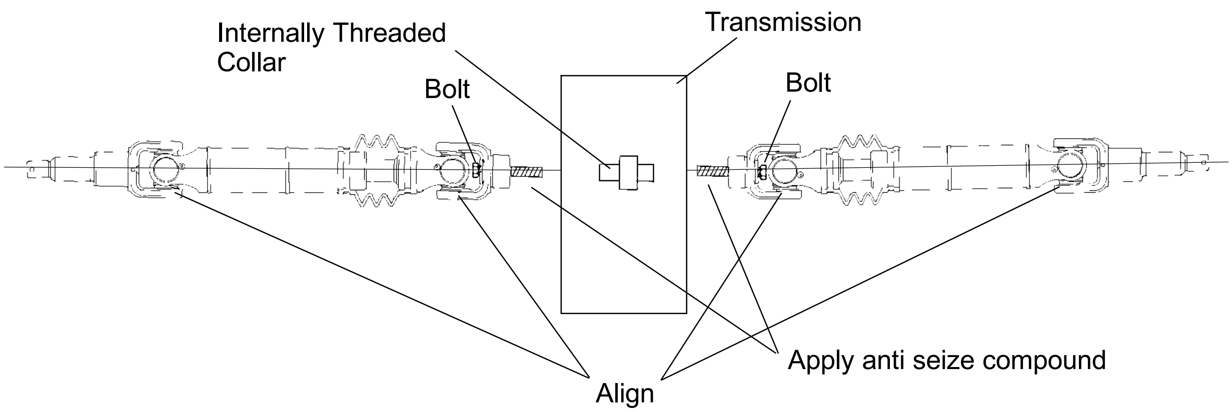
Transmission Installation, Cont.

7. Apply Loctite™ 272 to left hand drive shaft bolt and install in transmission, aligning all U-joint yokes and grease fittings with the right side. Install left hand upper control arm attaching bolts.

NOTE: Start left hand driveshaft bolt before installing driveshaft completely into splined hub. Torque left drive shaft bolt to specification.

Rear Drive Shaft Retaining Bolt Torque:
35 ft. lbs. (4.85 kg-m)

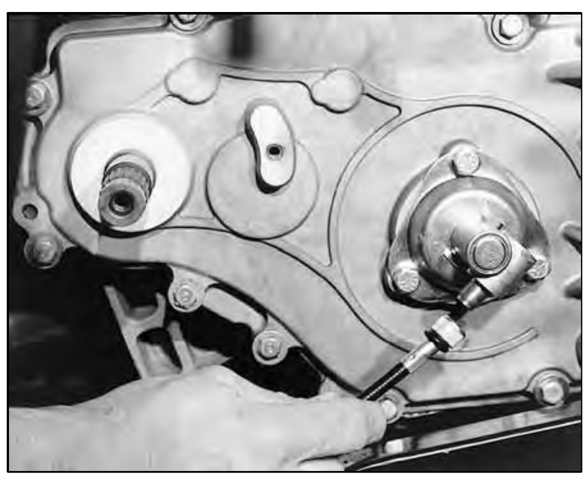
Apply Loctite™ 272



U Joint Style Shafts

Whenever the drive shafts are disassembled, the inner and outer U-joint yokes on each shaft must be aligned as shown to prevent excessive driveline vibration. It is not necessary to align the left shaft yokes to the right.

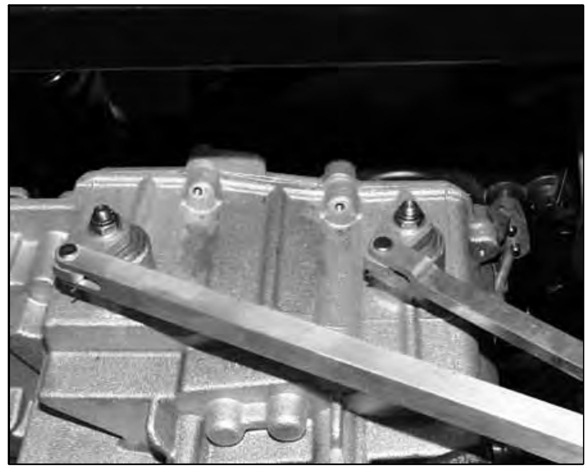
8. Attach speedometer cable.



Transmission Installation, Cont.

9. Install brake disc and washer with domed side out, against nut.
10. Install caliper, auxiliary brake master cylinder, and transmission shift linkage rods. Install right hand shock absorber.
11. Apply brake and torque disc nut to 45 ft./lbs.

12. Install PVT system. Refer to PVT section for procedure.



13. Install airbox assembly and transmission vent line. Be sure vent line is not kinked or pinched.

14. Add Polaris Premium Synthetic Gearcase Lubricant to the proper level on dipstick. (Approximately 1 quart). Do not overfill.

Premium Synthetic Gear Case Lubricant
PN 2871478 (12 oz.)
PN 2871477 (Gallon)

15. Install rear wheel nuts and torque to specification.

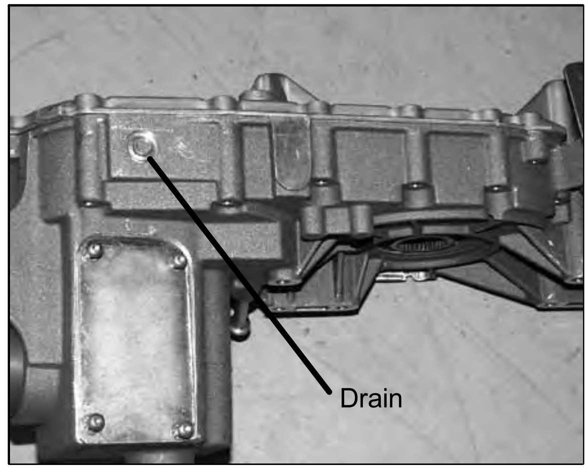
Rear Wheel Retaining Bolt Torque

15 ft. lbs. (2.08 kg-m)

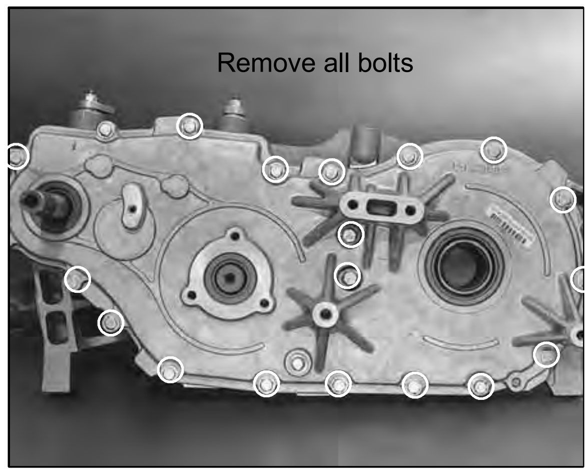
16. Refer to Maintenance Section to adjust transmission linkage.

Transmission Disassembly

1. Drain and properly dispose of transmission oil.



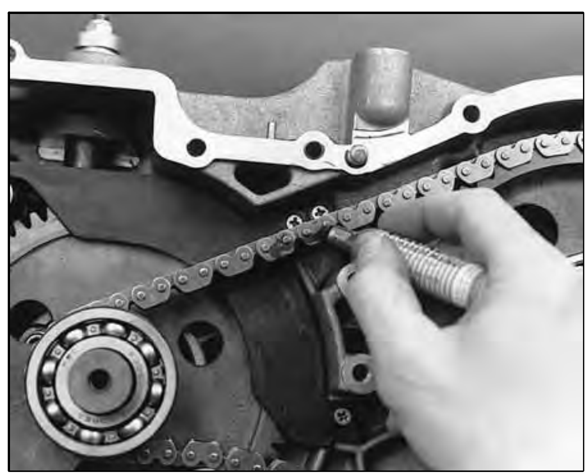
2. Remove all cover bolts. Tap cover with soft face hammer to remove. Note 2 bolts in center of cover.



CAUTION:

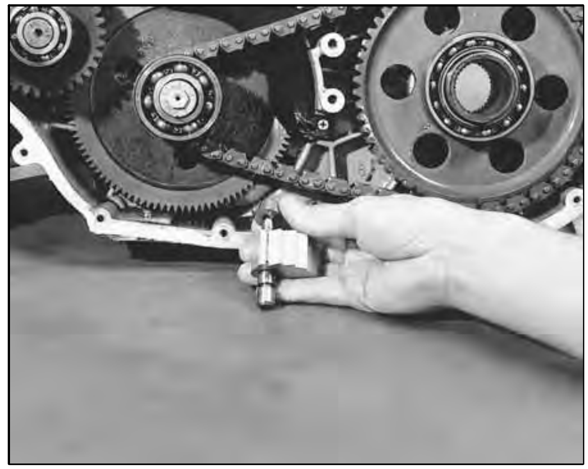
Remove gear indicator switch(es) (if equipped) BEFORE disassembly.
Do not pry on case half sealing surfaces.

3. Mark chain rotation direction for assembly. Note location of chain tensioner cam. If fully extended, chain is worn beyond service limit. Replace chain and chain tensioner shoe.

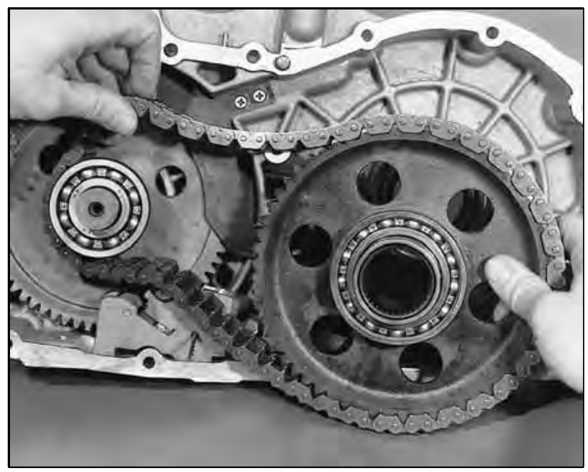


Transmission Disassembly, Cont.

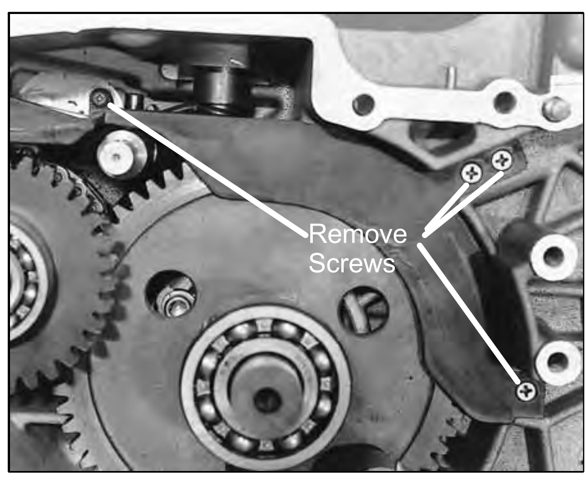
4. Remove chain tensioner along with mounting pins and spacers. Note position of spacers for assembly.



5. Remove rear output gear and chain as an assembly by lifting straight outward.

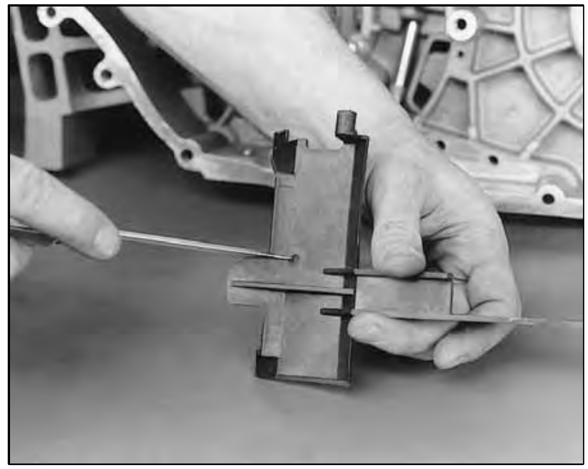


6. Remove oil deflector.



Transmission Disassembly, Cont.

7. Make sure hole in oil deflector is clear and unobstructed.



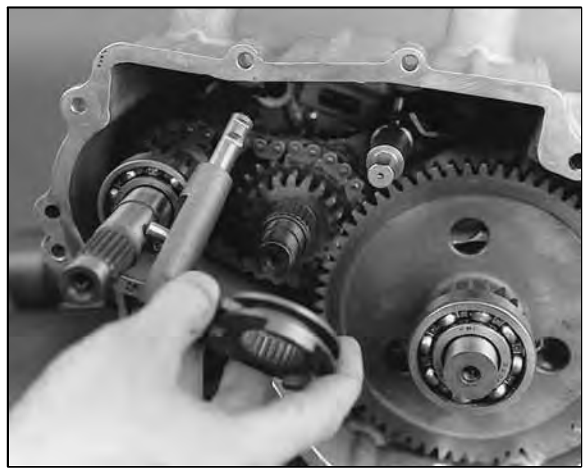
8. Using a puller remove Hi/Lo/Reverse (HLR) shaft bearing, and bearing thrust washer.

9. Turn transmission so shafts are pointing down. Slide the Low gear in and out until needle bearing slides out of gear and can be removed. Remove needle bearing, low gear, and inner thrust washer.

Transmission Disassembly, Cont.

10. Inspect shift dogs for excessive rounding on the leading edges. Replace if worn.

11. Remove low range shift fork and dog. Replace along with mating gear if wear is evident.

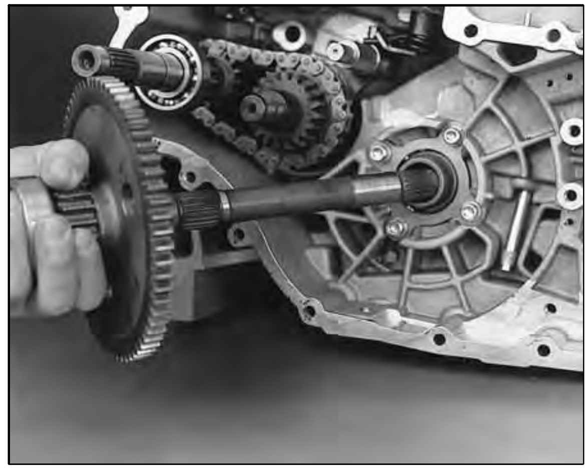


12. Inspect face of shift fork for excessive wear, discoloration, or bending.

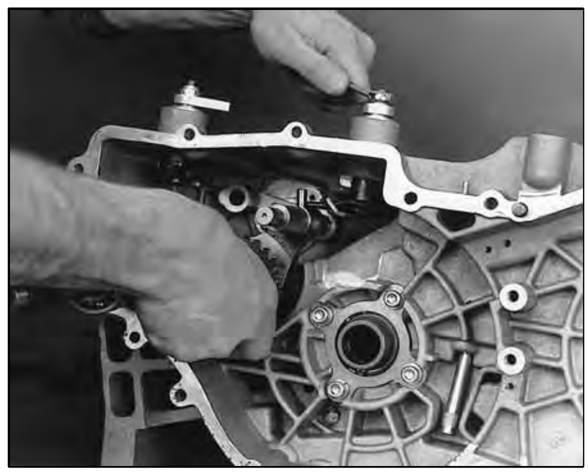
Transmission Disassembly, Cont.

13. Remove center shaft assembly by tapping on opposite side with a soft face hammer.

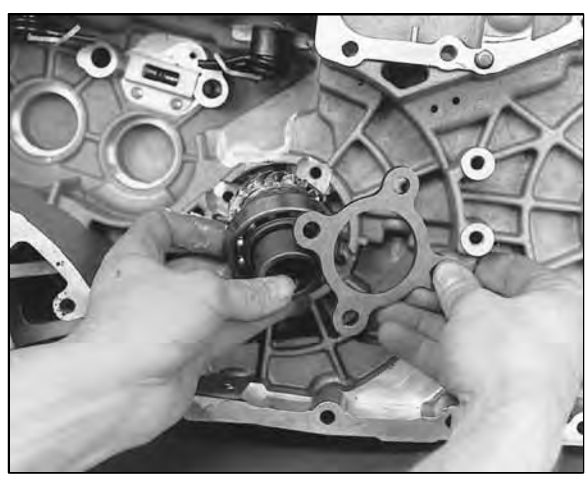
NOTE: Be sure drain plug is removed, or magnet will interfere with gear.



14. Remove the remaining gears and shafts as an assembly. Rotate the shift bellcrank with a 1/2″ wrench to aid in removal.

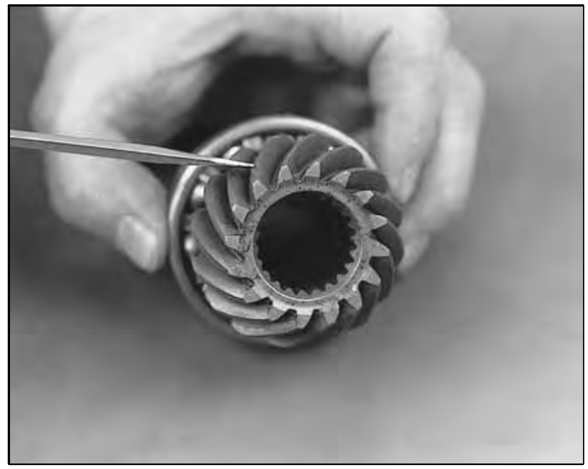


15. Remove pinion gear retaining plate and pinion gear assembly.

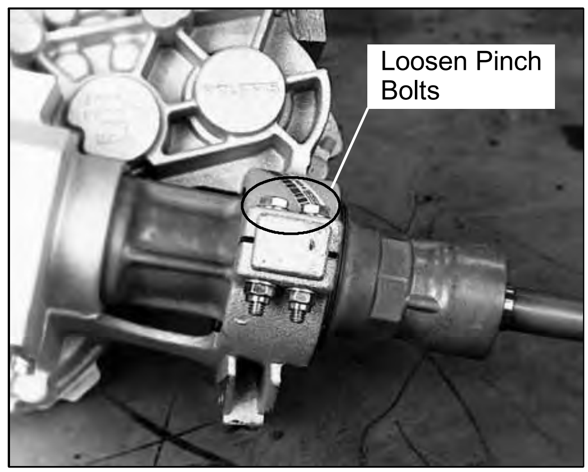


Transmission Disassembly, Cont.

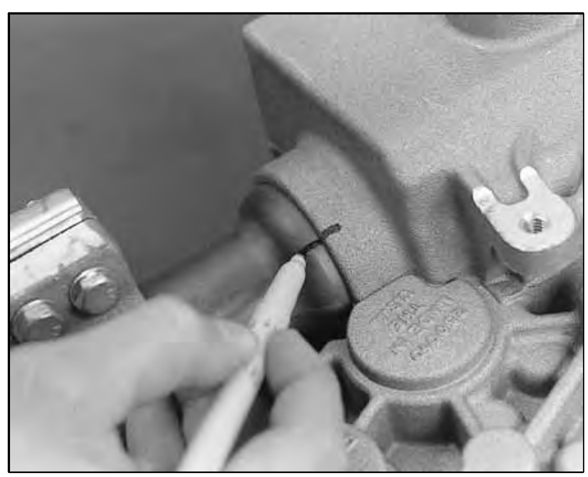
16. Inspect pinion gear for broken, chipped, or worn teeth. Check bearing condition, and snap ring location.



17. Loosen front output housing pinch bolts.



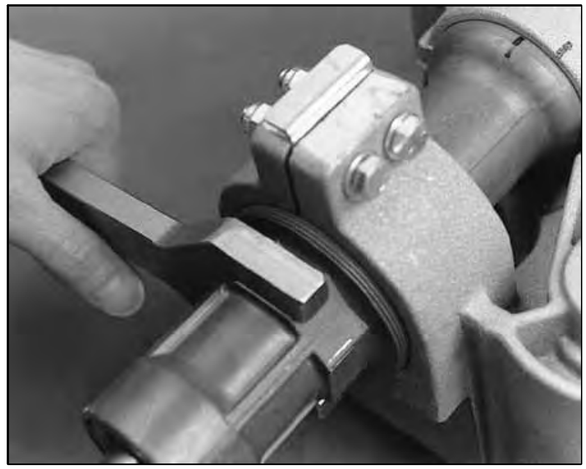
18. Mark housing and casting for reference upon reassembly.



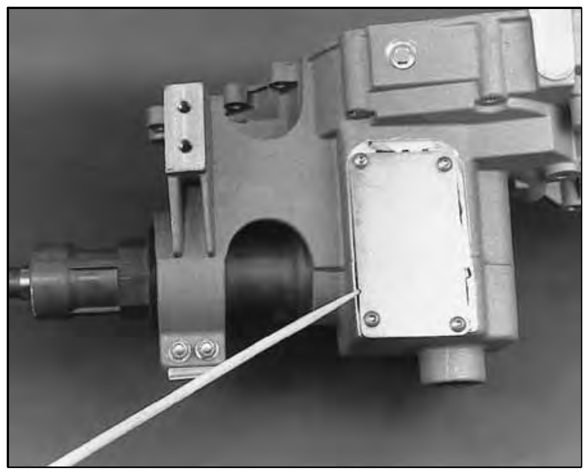
Transmission Disassembly, Cont.

19. Using 2 1/8″ wrench (PN 2871701) unscrew the front drive housing from the transmission casting until O-ring is exposed 1/2″ (13mm).

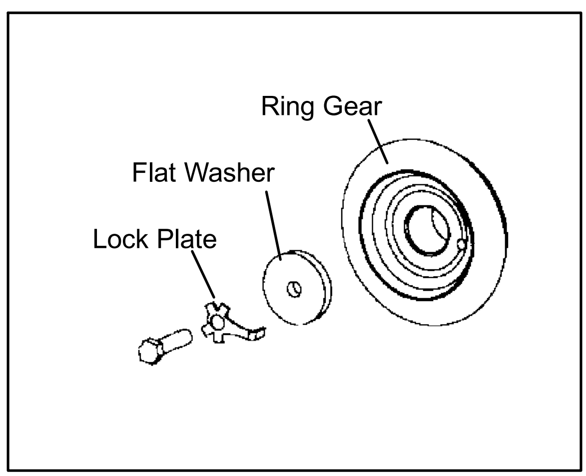
NOTE: Do not attempt to unscrew the front drive housing completely at this time.



20. Remove bottom access plate.
21. Bend the lock plate tab away from ring gear retaining bolt.

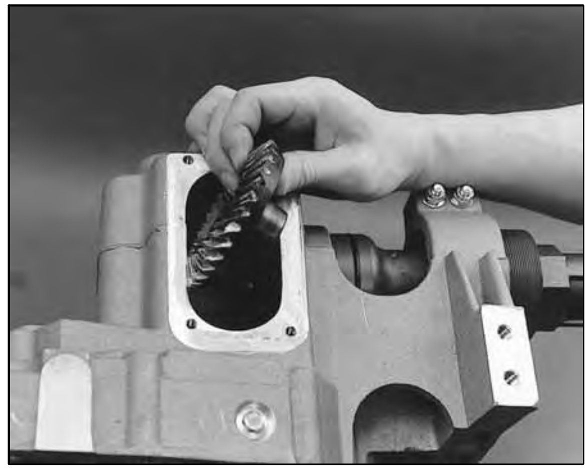


22. Using a strap wrench on splines to hold shaft, remove front output ring gear retaining bolt, lock tab washer, and flat washer.



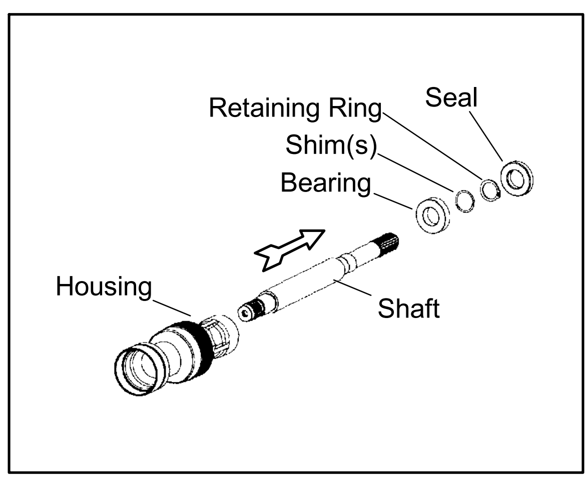
Transmission Disassembly, Cont.

23. Remove front output ring gear. Inspect for broken, chipped, or worn teeth.



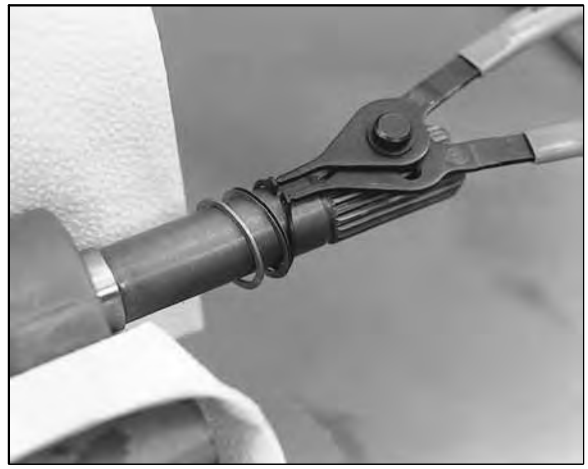
24. Unscrew front drive housing and remove it from case. Apply electrical tape to threads of housing to prevent damage.

25. Using a brass hammer or a press, drive the shaft, bearing, retaining ring, and seal out of the housing from rear to front.



Transmission Disassembly, Cont.

26. Slide seal off shaft and remove snap ring and shims. Record # of shims and thickness of each for reference.



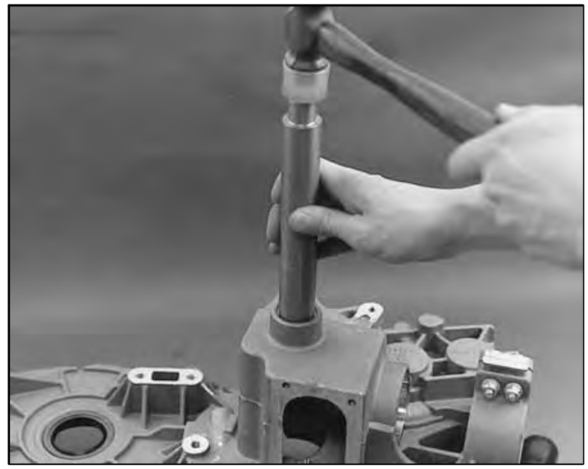
27. Inspect center shaft bushing for wear. If necessary, remove with the large end of bushing drive tool.

Bushing Drive Tool
PN 2871697

28. Remove all remaining seals from transmission cases and clean all parts thoroughly.

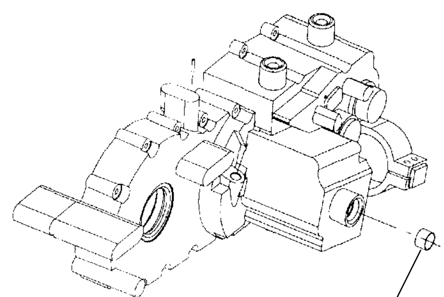
Bushing Installation, Transmission Center Shaft

1. Install center shaft (brake disc shaft) bushing using small end of bushing installation tool.



Bushing Drive Tool
PN 2871697

2. Apply Loctite t 243 (blue) to threads of screws and install center shaft cover. Tighten screws securely.



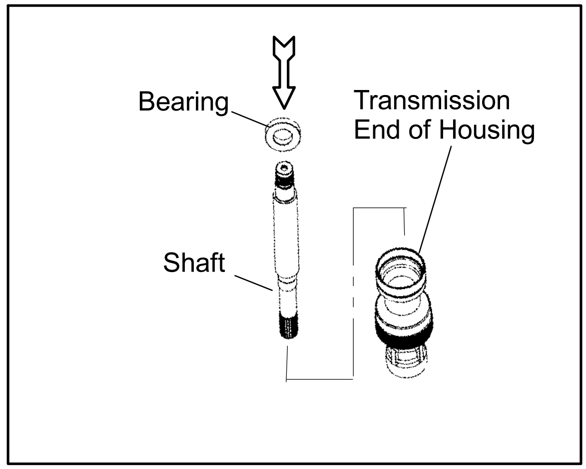
Front Output Housing (Snorkel) Assembly

1. Bearing is a light press fit on ring gear end of front output shaft. Heat inner bearing on a hot plate or with a heat gun to ease installation. Install bearing on shaft until inner race bottoms on flange of shaft.

CAUTION: Do not use a torch - bearing damage may result.

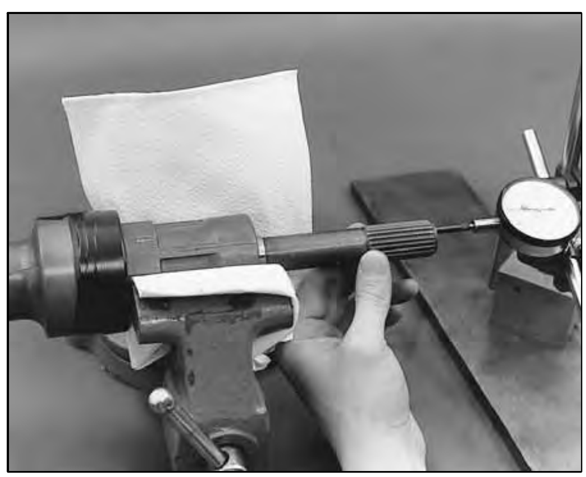
Front Output Housing Assembly, Cont.

2. Install shaft with bearing in front output housing.



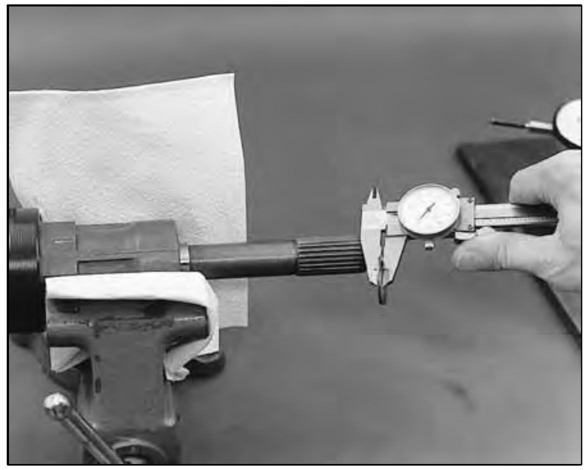
3. Turn housing, shaft, and bearing assembly over and install front bearing until fully seated.

4. Front output shaft end play must be measured and adjusted if shaft or housing was replaced.
   To measure end play:
   Install snap ring on shaft <u>without</u> shims in place. Clamp housing lightly in soft jawed vise.
5. Set up a dial indicator to measure shaft end play.



Front Output Housing (Snorkel) Installation

6. Measured end play will be between .030″ -.070″. Shims must be added between bearing and circlip to reduce end play. To calculate proper end play, subtract total shim thickness from end play measured in step 8. Add or subtract shims as required to obtain specified end play (.000-.003″). Remove snap ring, install shims, reinstall snap ring. It may be necessary to tap snap ring into place.

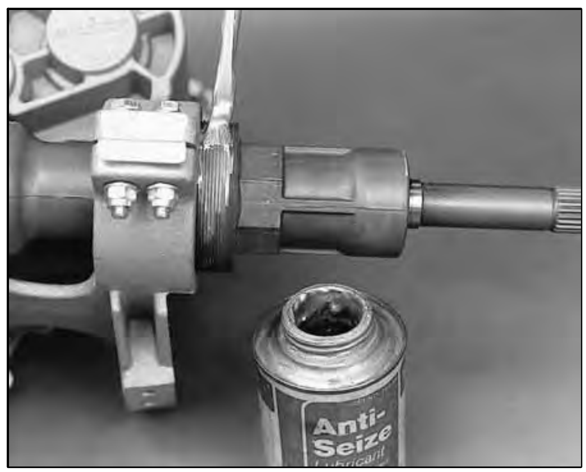


NOTE: Shaft should rotate freely when finished. Confirm end play measurement with dial indicator. *Do not* install front housing seal until backlash is adjusted.

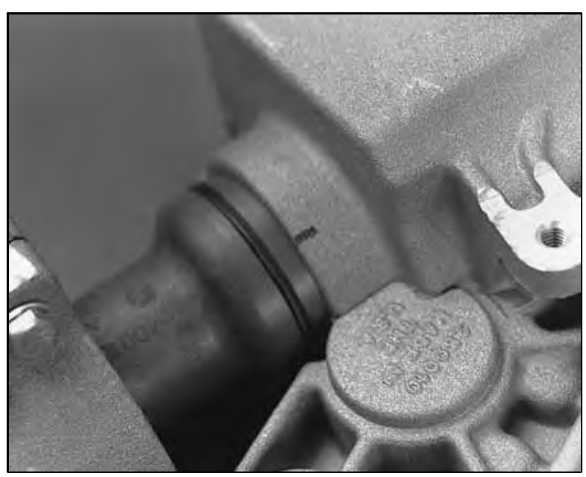
Final Installed Shaft End Play

.000″ - .003″ (0mm - .075mm)

7. Remove electrical tape and liberally apply anti-seize compound to the threads of the front output housing.



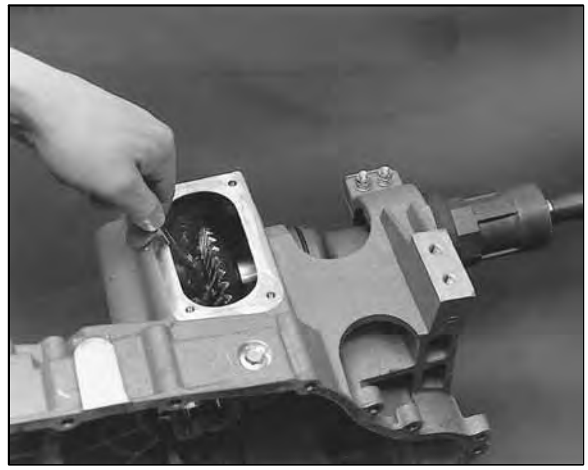
8. Screw in housing until O-ring is approximately 1/4″ (8mm) from transmission housing.



Front Output Housing (Snorkel) Installation

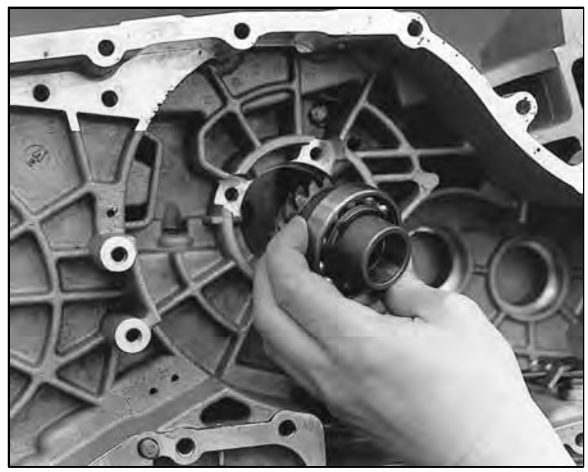
9. Install front output ring gear, washer, and retaining bolt with a new lock plate. Hold shaft with strap wrench and tighten retaining bolt. Clean threads of bolt and shaft with Loctite™ Primer N. Apply Loctite™ 242 or 243 (blue) to retaining bolt threads. Torque bolt to specification and bend lock plate against hexagonal portion of bolt.

Ring Gear Retaining Bolt
17 - 20 ft. lbs. (2.35 - 2.7 kg-m)
Apply Loctite™ 242 or 243 (Blue)



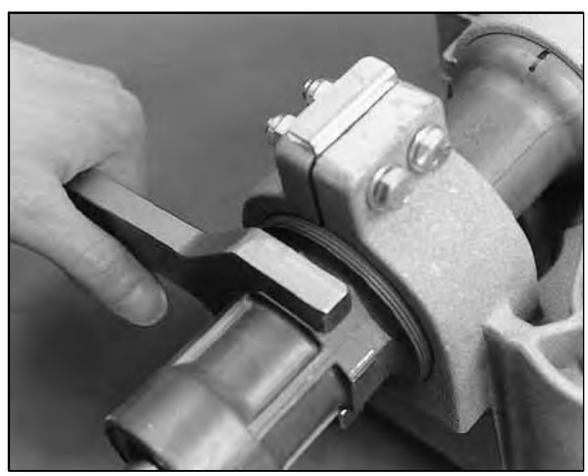
10. Install pinion gear assembly and retaining plate. Use Loctite™ Primer N on threads and housing. Apply Loctite™ 242 to bolts and torque to specification.

Pinion Gear Retainer Screws:
17 - 20 ft. lbs. (2.35 - 2.7 kg-m)
Apply Loctite™ 242 or 243 (Blue)



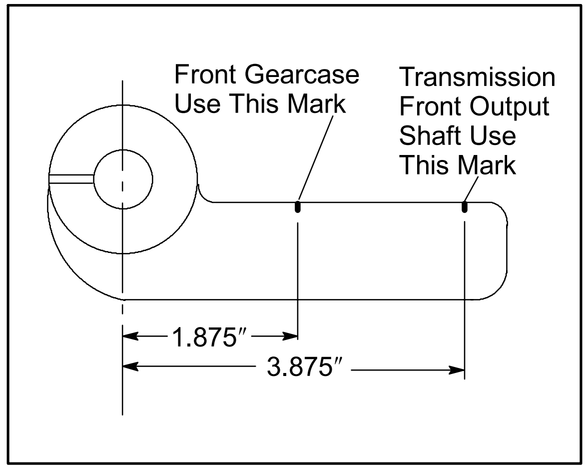
Front Output Housing (Snorkel) Backlash Adjustment

11. Lubricate front housing O-ring thoroughly with Polaris All Season grease. Continue to screw front housing in, making sure O-ring enters housing without damage. Be sure ring and pinion gear teeth mesh properly.
12. Rotate front shaft while slowly turning housing inward. As gear backlash is reduced to zero, the shaft will begin to bind. At this point back off 1/4 turn.

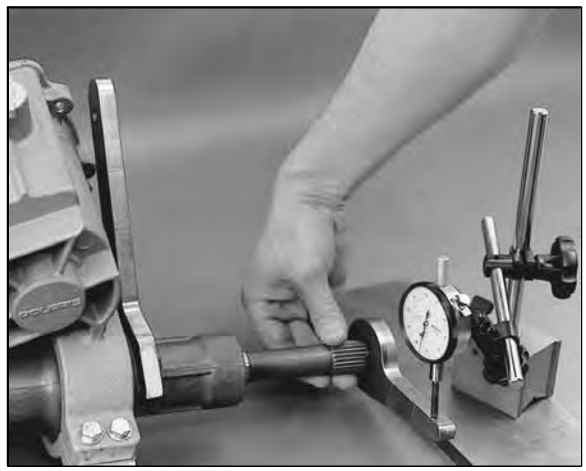


Transmission Output Gear Backlash Inspection/ Adjustment

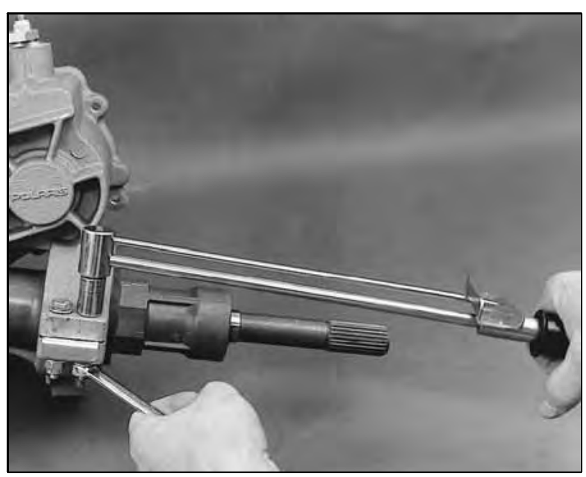
13. The following steps must be performed to obtain proper front output gear backlash adjustment:
    - The pinion gear must be held securely.
    - Do not lubricate the gear teeth until backlash adjustment is complete. Both Gears should be free of grease and oil.
    - Perform adjustment with front output housing seal removed and end play properly adjusted.
    - Measure backlash using tool (PN 2871695). The measurement point is 3.875″ (98.43mm) from shaft centerline.
    - Set backlash at .008″ - .014″ (.20 -.36mm).
    - Check backlash in several locations of ring gear.



14. Install special tool (PN 2871695) on shaft as shown. With pinion gear held stationary, rotate output shaft back and forth, reading the total movement of dial indicator. The dial indicator must be positioned as shown at the proper distance (aligned with outermost mark on tool, and 90° to the tool surface), or indicated backlash will be inaccurate.
    - To reduce backlash, rotate housing clockwise as viewed from front of housing.
    - To increase backlash, rotate housing counter-clockwise.



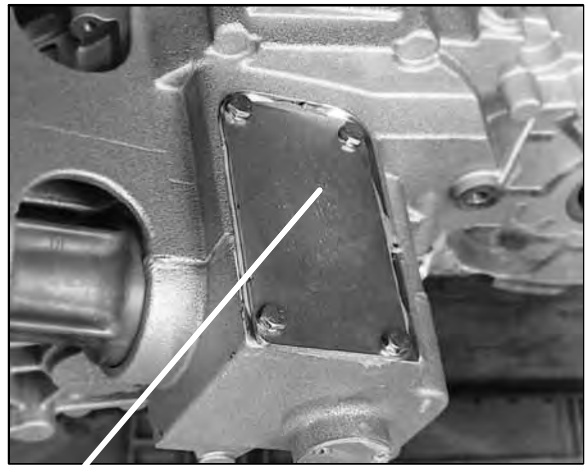
15. Torque pinch bolts to specification. Verify backlash measurement.



Transmission Assembly, Cont.

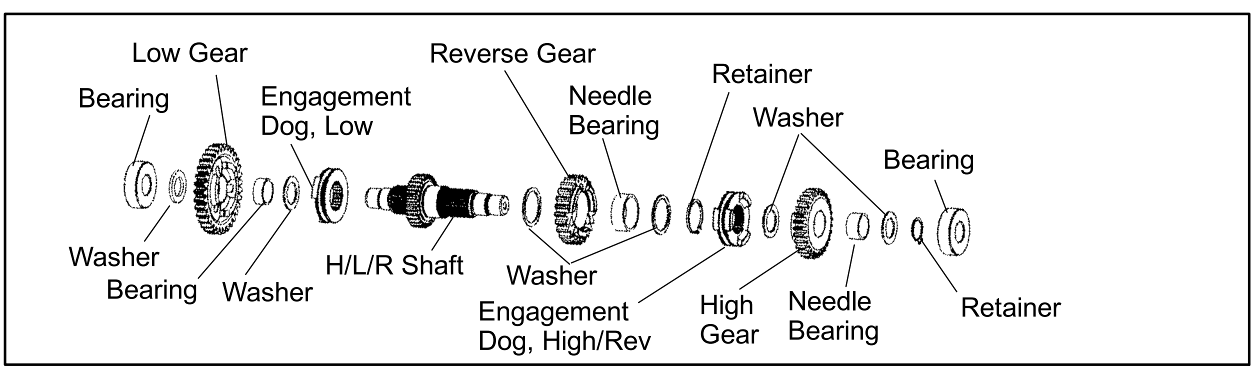
16. Make sure surface of access plate and transmission are clean and free of oil and grease.
    Apply 3Bond t 1215 to mating surface of transmission case. Install access plate with notch to front as shown, torque screws to specification.

Access Plate Screws:
8 - 10 ft. lbs. (1.10 - 1.38 kg-m)



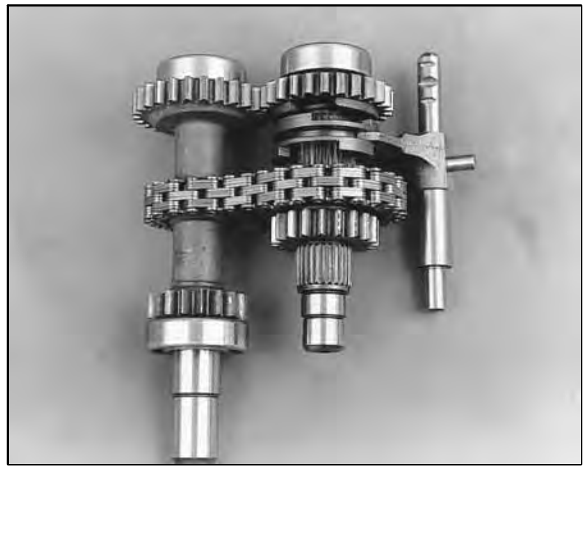
17. Using the Magnum crankshaft installation tool, lubricate and carefully install the front seal until flush with housing.

18. Assemble Hi/Low/Reverse shaft as shown. Machined (flat) side of circlip should face direction of thrust. Sliding high/reverse engagement dog is symmetrical and can be installed either way. The outer gear dogs must face each other.

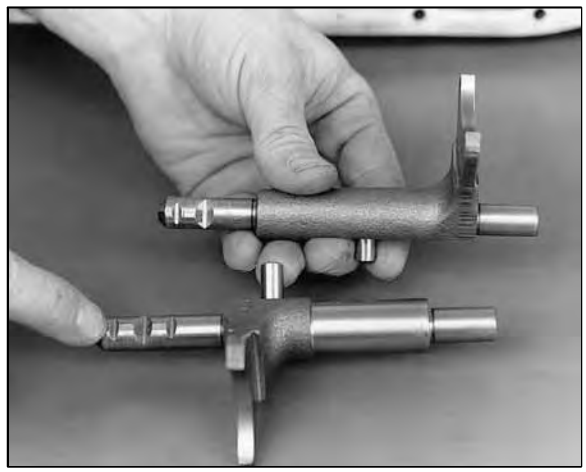


Transmission Assembly, Cont.

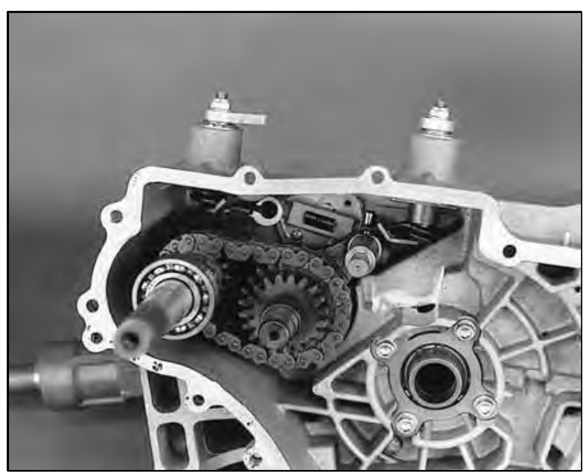
19. Assemble the input shaft and Hi/Low/Reverse gear cluster as shown.



20. The two shift forks can be easily identified by the indentations. Low/Neutral shaft has 2 detents, and Hi/Neutral/Reverse has 3 detents.

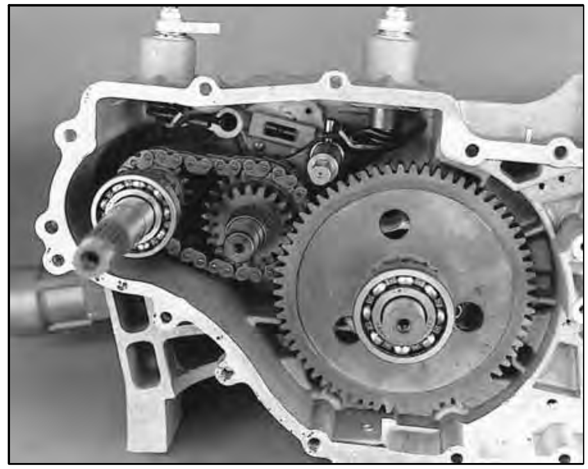


21. Install Hi/Reverse cluster in transmission as an assembly. If necessary use a soft face hammer to install shafts until fully seated. Make sure the hi/reverse shift pin is located between the spring tail ends. Place the Hi/Reverse shift assembly in neutral position. If it is not located in neutral, the interlock mechanism will prevent installation of the low range shift fork in step 25.



Transmission Assembly, Cont.

22. Install center shaft assembly.



23. Install Low shift fork with sliding dog in place. Dogs must be positioned outward (toward you). Slide the shift dog over the spline and the low range shift shaft into the detent lock. Make sure the shift shaft pin is located between the tail ends of the return spring.

24. Lubricate and install inner thrust washer, low gear, and needle bearing.

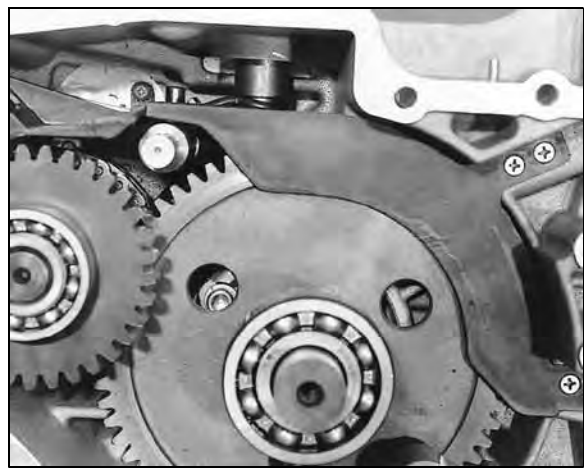
Transmission Assembly, Cont.

25. Install outer thrust washer and bearing.

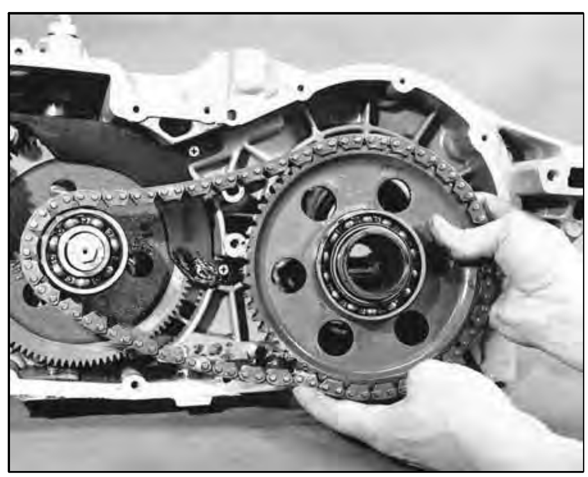
26. Install plastic oil deflector. Apply Loctite™ 242 or 243 (blue) to all screw threads.

NOTE: Do not over-tighten deflector screws, or deflector may crack.

Oil Deflector Screws
Loctite™ 242 or 243 (Blue)

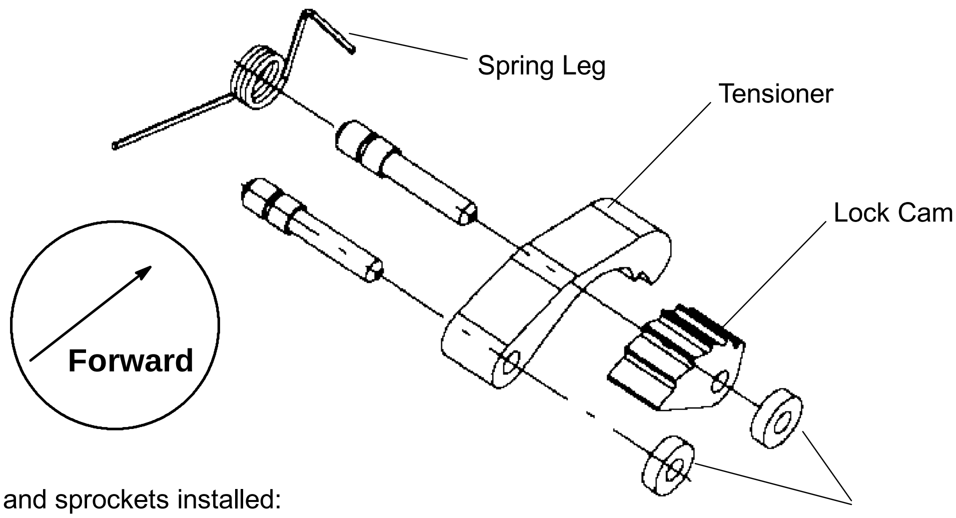


27. Install drive gear with chain.
28. Install chain tensioner. Refer to Illustration on following page.



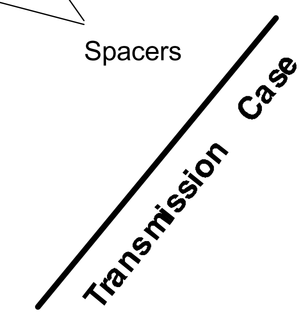
Tensioner Installation

Tensioner Assembly - Top View

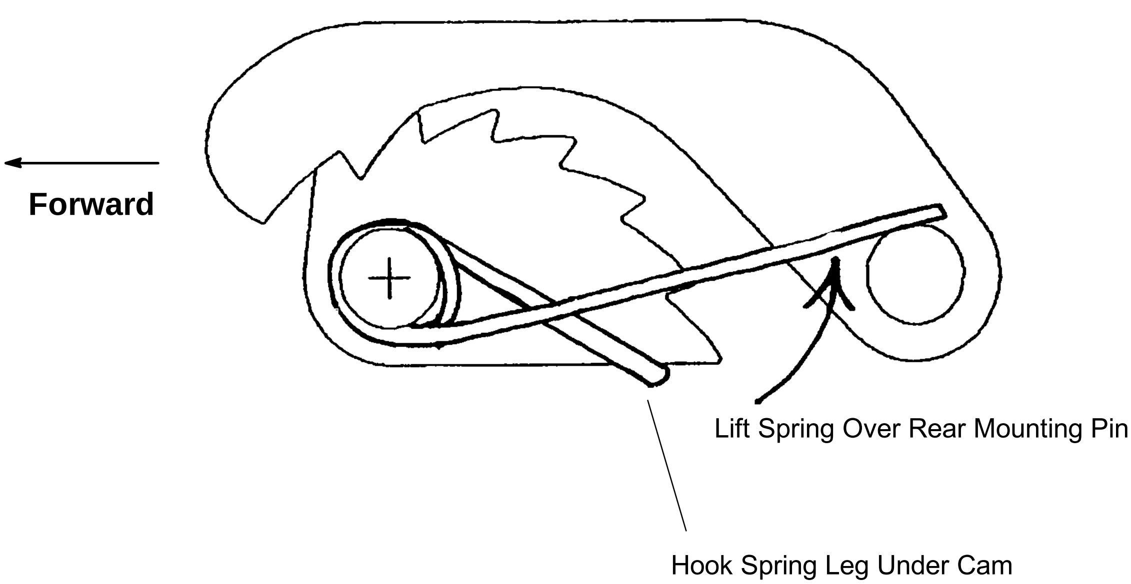


With chain and sprockets installed:

1. Place spacers in case.
2. Place tensioner cam on front spacer and tensioner shoe on rear spacer.
3. Insert pins through cam and spacer, and through shoe and spacer.
4. Place spring over front pin and hook spring leg under cam.
5. Lift leg of spring up and over the rear pin. Tensioner cam will lift shoe and tension chain.

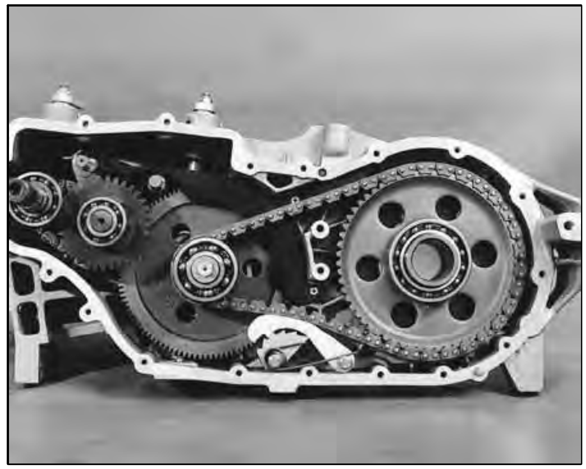


View From Left Side of Transmission



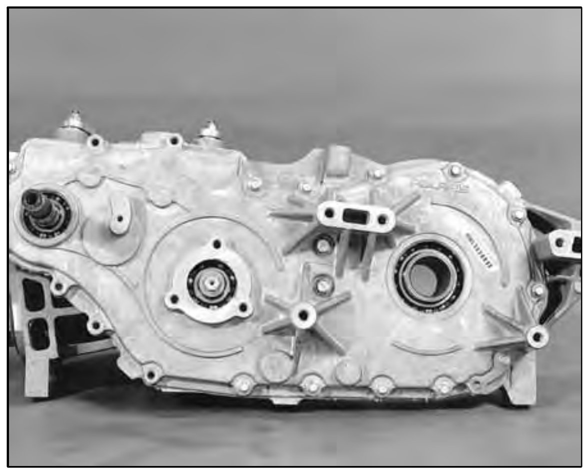
Transmission Assembly, Cont.

29. Pre-lubricate all bearings with Polaris Premium Synthetic GearCase Lubricant before installing cover.



30. Be sure sealing surfaces of cover and transmission case are clean. Apply 3Bond t 1215 to surface of case and install cover bolts. Torque to specification in three steps, following a criss cross pattern. Start with the center (2) bolts.

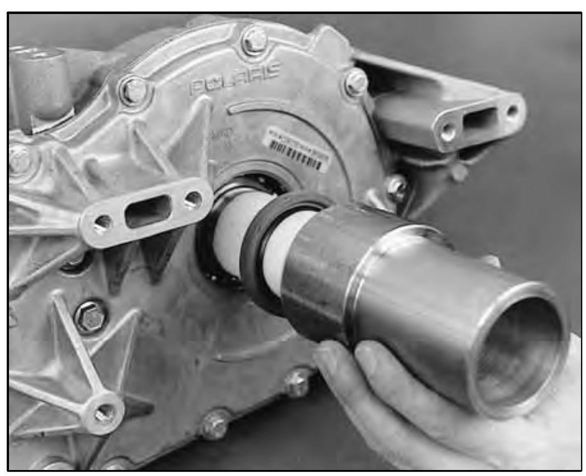
Torque 5/16 bolts (2)
17 - 20 ft. lbs. (2.35 - 2.77 kg-m)
Torque 1/4 bolts
8 - 10 ft. lbs. (1.11 - 1.14 kg-m)



31. Install seal installation tool in drive gear as shown. Lubricate new seal with grease and slide onto tool. Drive seal into place using large end of slide hammer. Repeat procedure for other side.

Seal Installation Tool

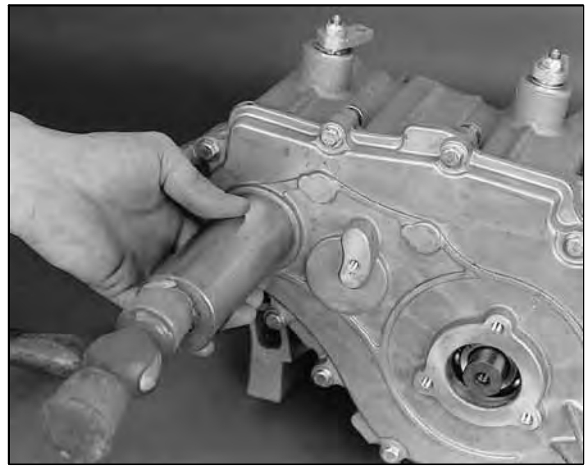
(Slide Hammer) PN 2871698
(Seal Guide) PN 2871699



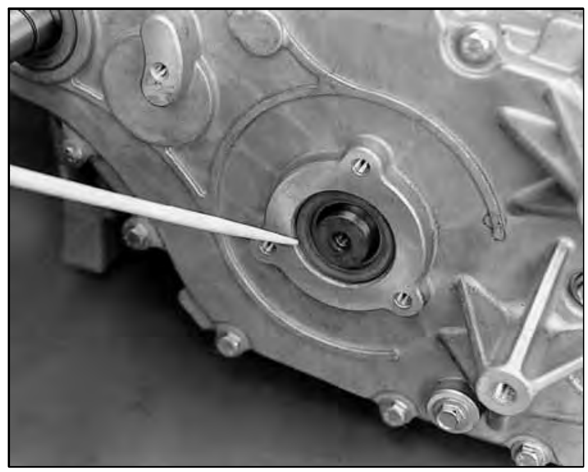
Transmission Assembly, Cont.

32. Apply grease to the lip of a new input shaft seal. Install the seal, being careful to work the lip of the seal over the step in the shaft before using installation tool. Install the seal flush with transmission housing.

Seal Installation Tool
PN 2871282

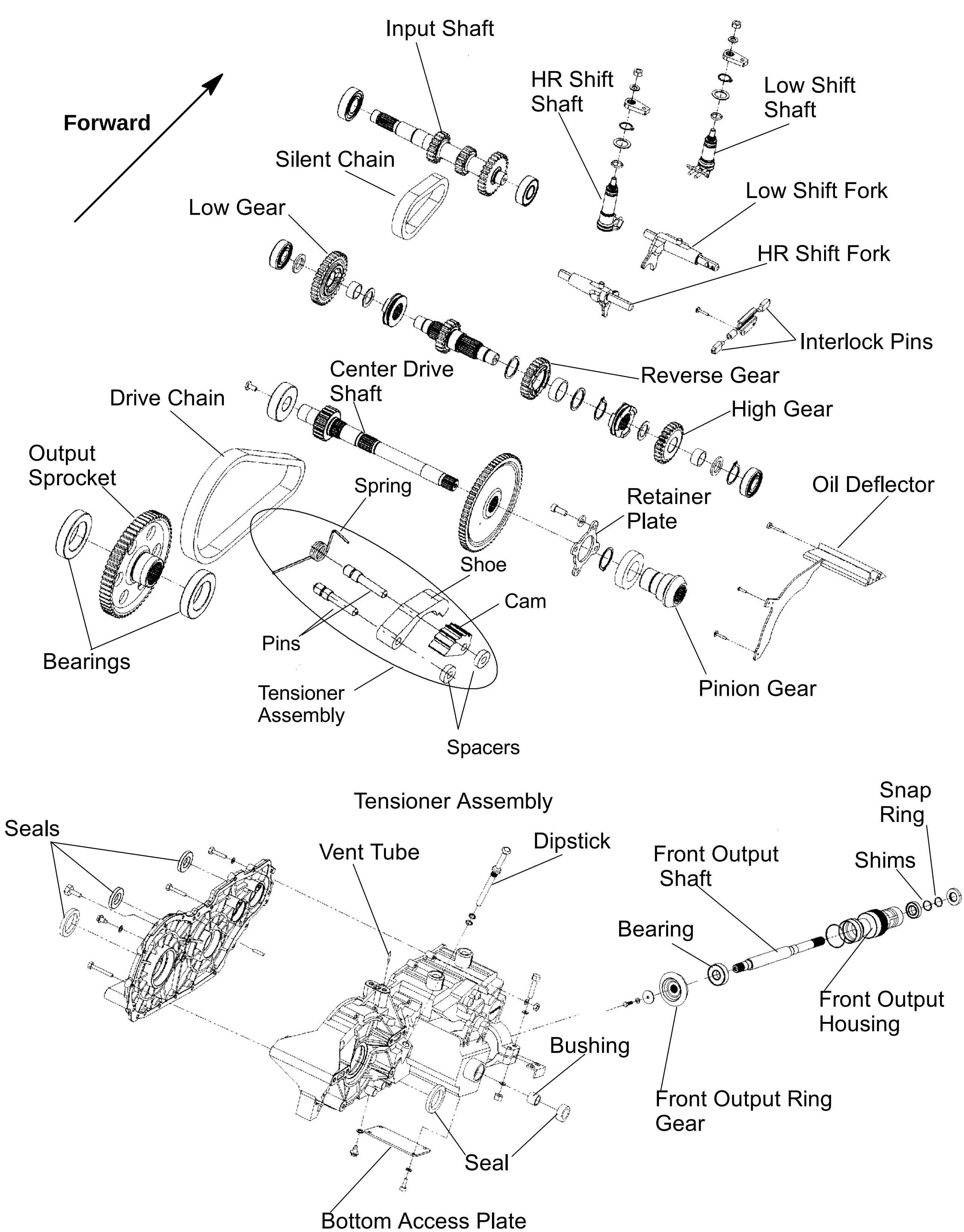


33. Apply grease to the lip of a new center drive shaft seal. Install seal, being careful to work the lip of the seal over the step in the shaft. Install seal to a depth of 1/8″ below the transmission housing. Refer to photo.



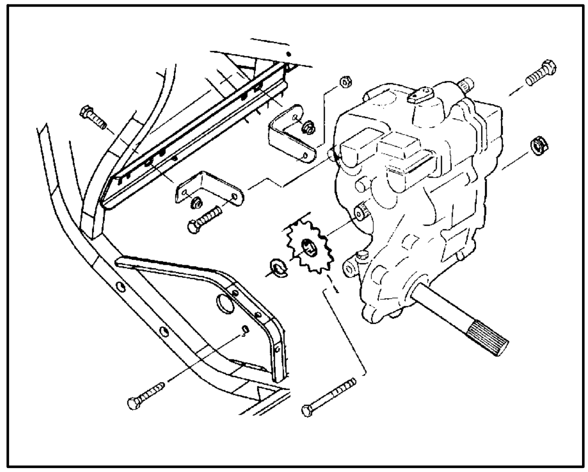
34. Install gear indicator switch(es). Apply Loctite t 242 (blue) to threads of switch screws and torque to 13-16 in. lbs. (1.5-1.9 Nm).

Transmission Exploded View



Transmission Removal/Installation

1. Remove seat, cab and air box.
2. Remove right side shield and auxiliary brake master cylinder and reservoir.
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 pin from front prop shaft at front housing. Position U-joint to allow pin to clear skid plate.
6. Remove carburetor.
7. Disconnect gear indicator switch(es).
8. Remove drive chain and sprocket.
9. Remove mounting bolts and brackets as shown in Ill. 1.
10. Remove through-bolt from bottom of transmission.
11. Loosen left side swingarm bolt until clear of transmission case.
12. Remove recoil.
13. Remove transmission from right side of frame.



Transmission Installation

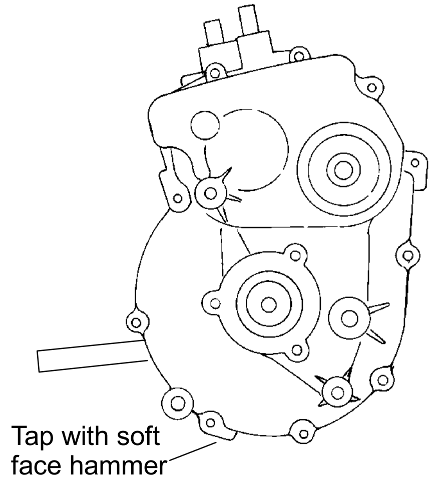
1. Reverse removal steps to install transmission.

NOTE: Install 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

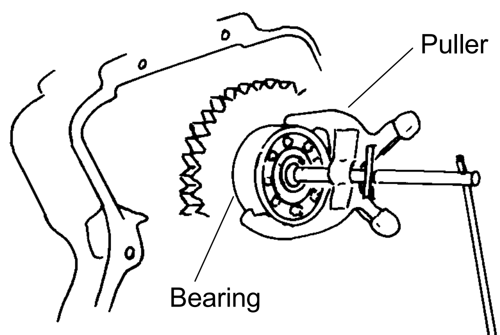
1. Place both bellcranks in neutral position.
2. Remove sprocket retaining clip and sprocket..
   CAUTION: On transmissions equipped with gear position indicator switch(es), remove switch(es) BEFORE removing case cover.
3. Remove the transmission cover bolts.
4. With a soft face hammer tap on the cover bosses and carefully remove the cover. See Ill. 1.

Remove Gear Indicator Switch(es)



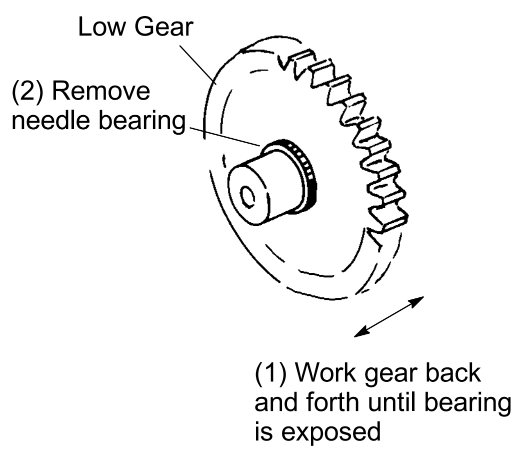
Ill. 1

5. Using the battery cable clamp puller, remove the bearing from the sliding gear shaft. See Ill. 2.
6. Remove outer thrust washer.



Ill. 2

7. To remove the needle bearing from the low gear, tip transmission to point end of shaft downward. Work gear back and forth as shown until bearing is exposed and slide bearing out. See Ill. 3.



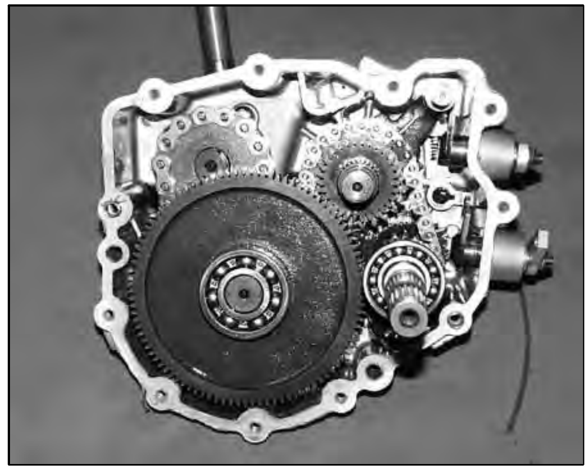
Ill. 3

Transmission Disassembly, cont.

8. Remove the low gear and inner thrust washer.

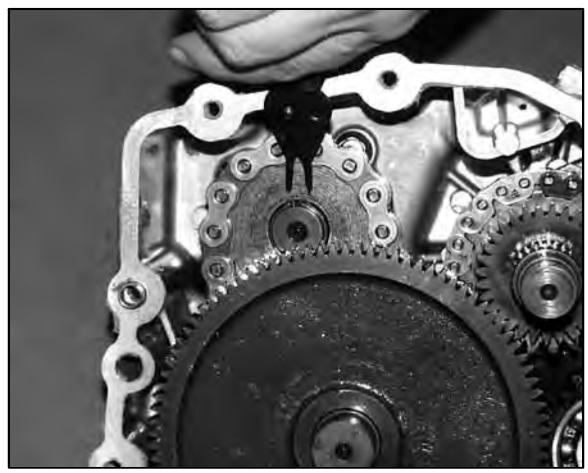
9. Use a 1/2″ wrench to rotate the low range bellcrank and remove low range shift fork with dog gear.

NOTE: High/Reverse bell crank must be in neutral to remove low gear shift fork shaft.



10. Remove snap ring from front drive input shaft.

11. Remove output shaft and gear assembly along with sprocket and chain, by tapping on shaft with a soft faced hammer, from the back side of the gear case.



12. Use a 1/2″ wrench to rotate high/reverse bell crank and remove shift fork along with shafts.

Transmission Disassembly, cont.

13. Remove front drive input shaft bearing retainer plate.

14. Remove pinion shaft assembly.

15. Remove front output shaft cover and ring gear assembly.

16. Clean all components in a parts washer and inspect for wear.

17. Inspect engagement dogs of gears and replace if edges are rounded.

18. Inspect gear teeth for wear, cracks, chips or broken teeth.

19. Remove seals from transmission case.

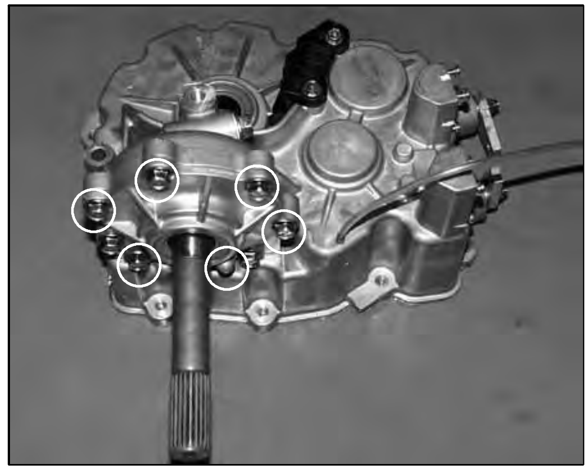
NOTE: New seals should be installed after the transmission is completely assembled.

20. Inspect bearings for smooth operation. Check for excessive play between inner and outer race.

Transmission Assembly

1. Install front output shaft cover and ring gear assembly.

2. Torque bolts in 3 steps using a criss-cross pattern to 18 ft. lbs. (25 Nm).



3. Install pinion shaft assembly.
4. Install retainer plate with flat side toward bearing.
5. Apply Loctite t 242 (Blue) to bolts and torque to 18 ft. lbs. (25 Nm).

6. Carefully install high/reverse shaft assembly and gear cluster as a unit into their respective bearing case areas. Tap with a soft face hammer to seat shaft assemblies.

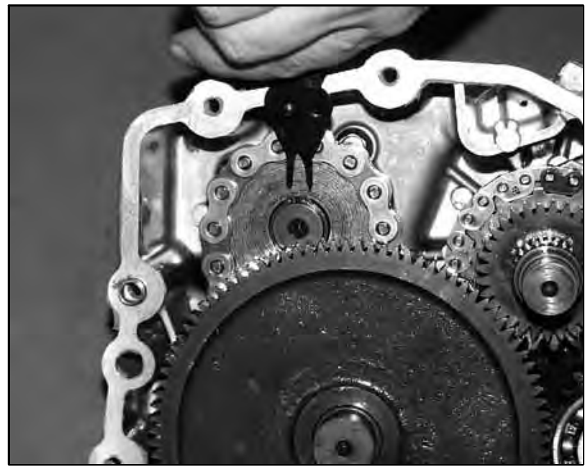
NOTE: Make sure high/reverse shift shaft pin is properly positioned within legs of shift fork shaft return spring.

NOTE: After installation, the High / Reverse shift arm must be placed in the neutral position to complete reassembly.

Transmission Assembly, cont.

7. Install output shaft and gear assembly along with sprocket and chain.

8. Install snap ring.

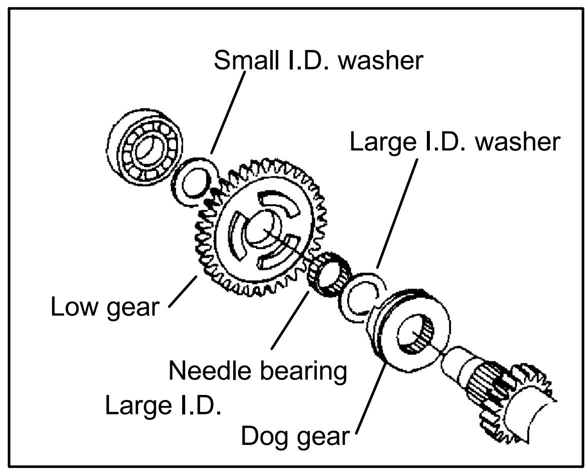


9. Place shift fork and dog gear assembly (dogs face outward) on shaft. Place dog gear on shaft and shift fork shaft into case, aligning splines of gear with shaft while engaging shift shaft pin in legs of shift fork shaft return spring. Push the assembly into case until seated..

10. Install thrust washer (with larger inside diameter) on shaft (against splines of shaft).

11. Install low gear with slots facing dog gear.

12. Lubricate and install needle bearing in low gear.

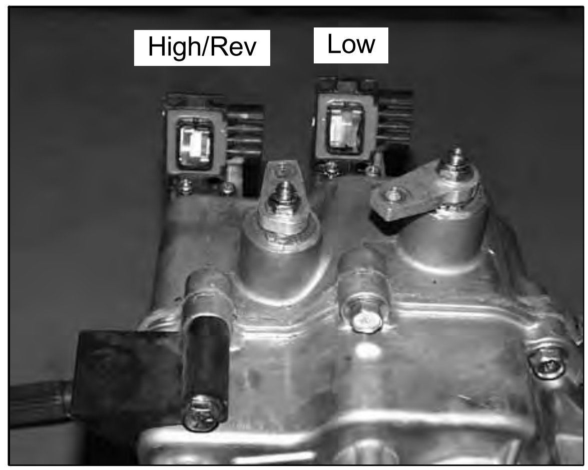


13. Install washer (small inside diameter) on shaft.

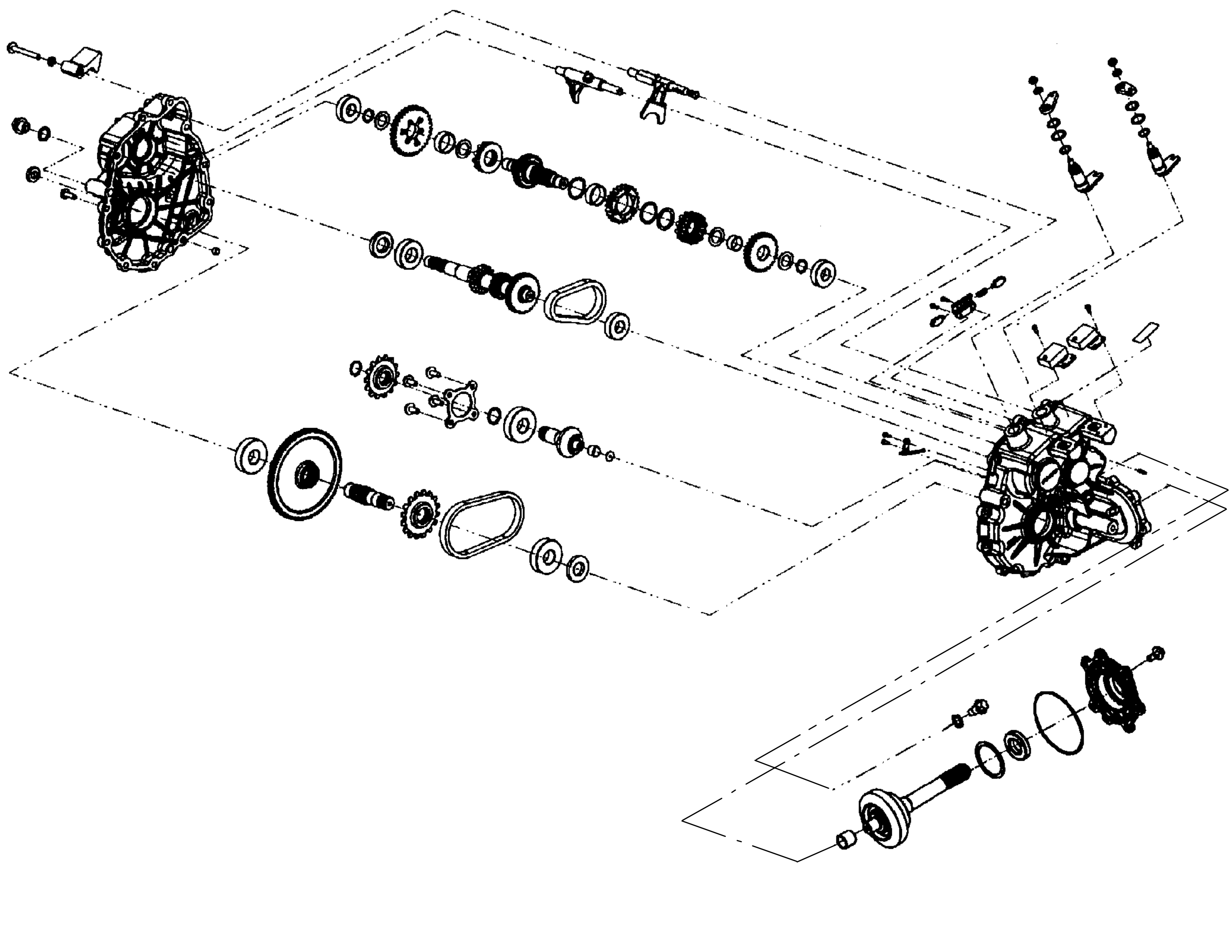
14. Install ball bearing.

Transmission Assembly, cont.

15. Prior to reinstalling the cover make sure the mating cover surfaces are clean and dry. Apply Loctite t 518 or 3-Bond 1215 to mating surfaces.
16. Reinstall cover and torque bolts in a criss-cross pattern in 3 steps to 18 ft. lbs. (25 Nm).
17. Install drain plug with a new sealing washer. Torque drain plug to 14 ft. lbs. (19 Nm).
18. Install transmission and add Polaris Premium Synthetic Gear Case Lubricant in the recommended amount. Refer to Maintenance Chapter 2.
19. Install gear indicator switch(es). Apply Loctite t 242 (blue) to threads of switch screws and torque to 13-16 in. lbs. (1.5-1.9 Nm).

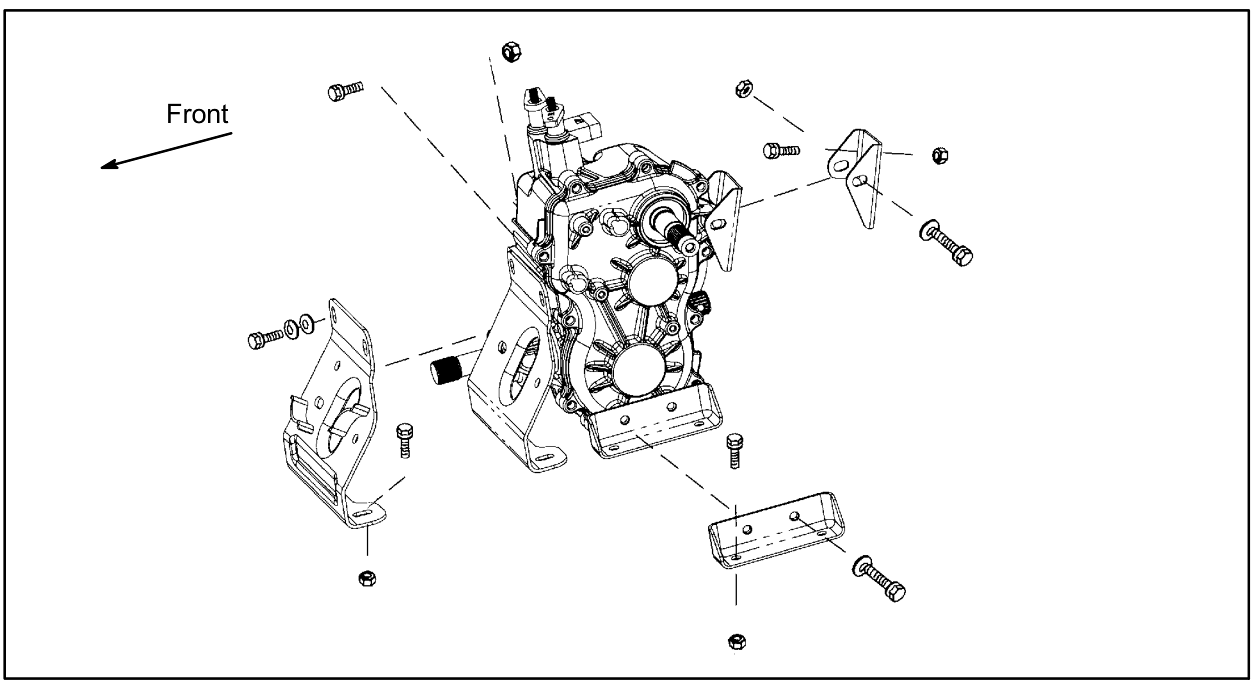


Transmission Exploded View



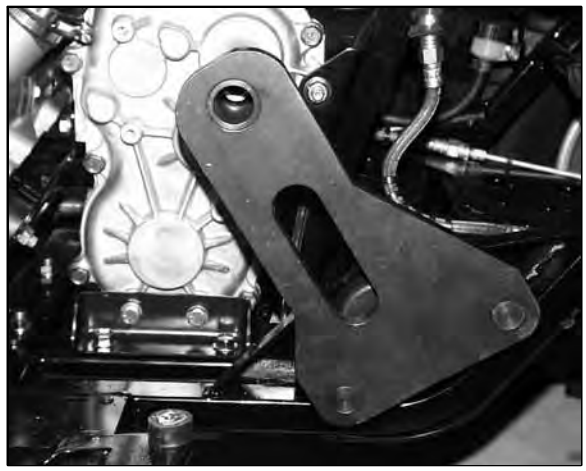
Transmission Removal

1. Remove seat, rear rack, rear cab, air box, and exhaust system (if required for access).
2. Drain transmission lubricant.
3. Remove shift linkage rod ends from transmission bellcranks.
4. Remove auxiliary brake mounting bracket and master cylinder reservoir.
5. Remove PVT outer cover, both drive and driven clutch, and inner PVT cover (refer to Clutch Chapter 6).
6. Remove rear PVT bracket.
7. Remove pin from front prop shaft at front housing, and remove prop shaft.
8. Drive roll pin from rear driveshaft yoke.
9. Disconnect gear position indicator switch(es).
10. Remove left side transmission bracket, rear bracket, and lower right bracket bolt.
11. Remove through-bolt from bottom of transmission.
12. Remove front transmission-to-engine mount bolts.
13. Position rear U-joint so front of transmission can be lifted up.
14. Remove recoil for added removal clearance.
15. Remove transmission from right side of frame.



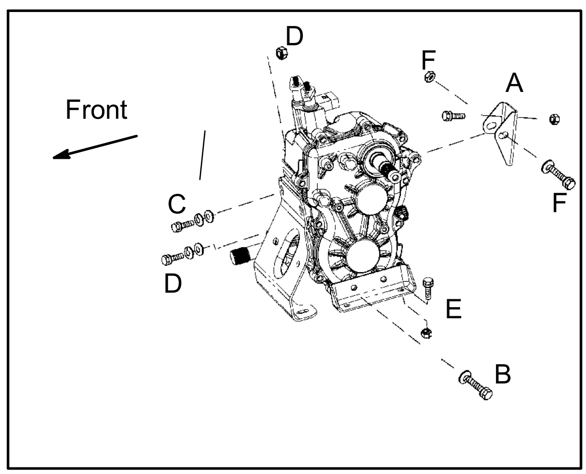
Transmission Installation

1. Install transmission from right side of vehicle.
2. Align rear output shaft to rear propshaft yoke and roll pin hole.
3. Slide rear output shaft and into propshaft yoke.
4. Position transmission in frame.
5. Install front propshaft and roll pin.
6. Loosely install left side and rear mounting brackets.
7. Loosely install lower right bracket bolt.
8. Loosely install front mounting bolts.
9. Install transmission alignment tool PN 2872315 as shown.



10. Tighten mounting fasteners in order A-F as shown.

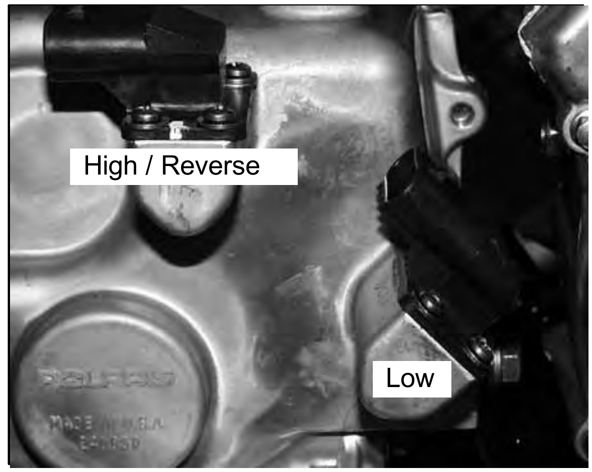
NOTE: Align clutches as outlined in Clutch Chapter 6.



Transmission Disassembly

1. Place both bellcranks in neutral position.

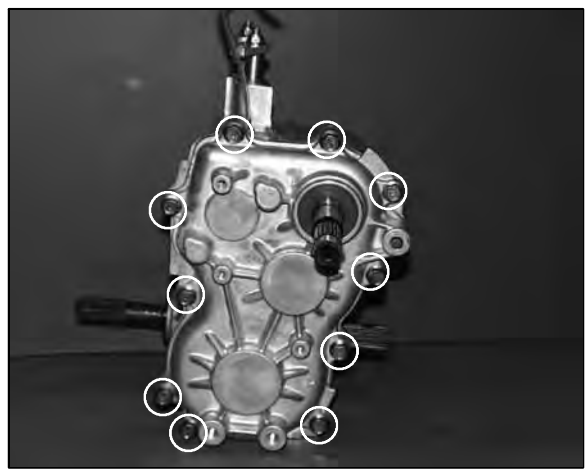
2. Remove gear position indicator switch(es).



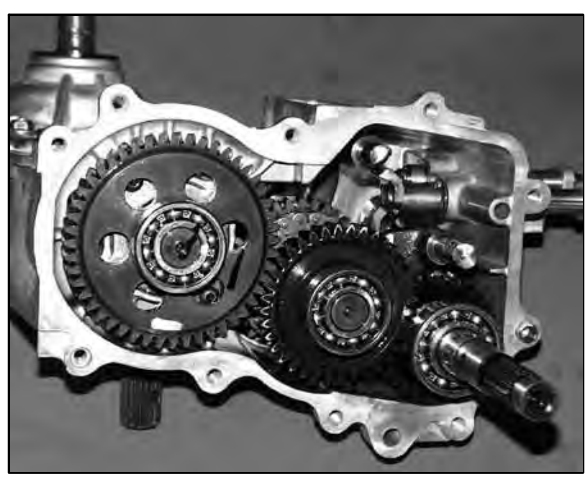
3. Remove case cover screws.

4. Remove the transmission cover bolts.

5. With a soft face hammer tap on the cover bosses and carefully remove the cover.

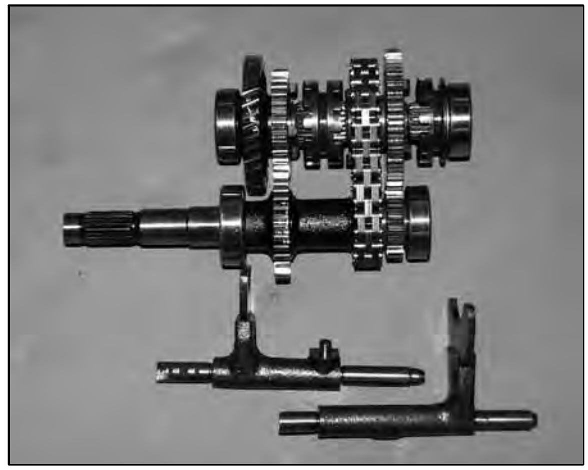


6. Remove bearing and 41 tooth helical gear.

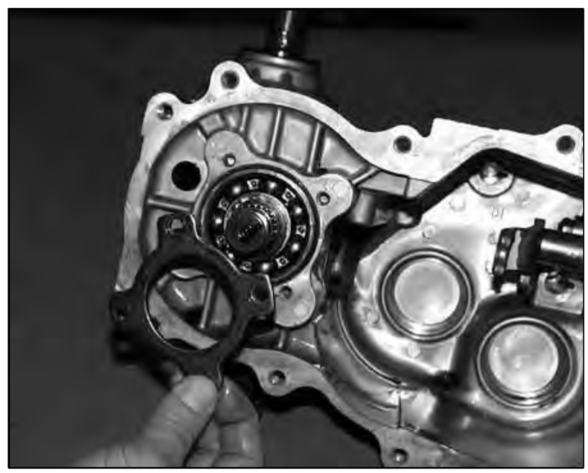


Transmission Disassembly, cont.

7. Remove input shaft, reverse shaft, and both shift for shafts as an assembly.



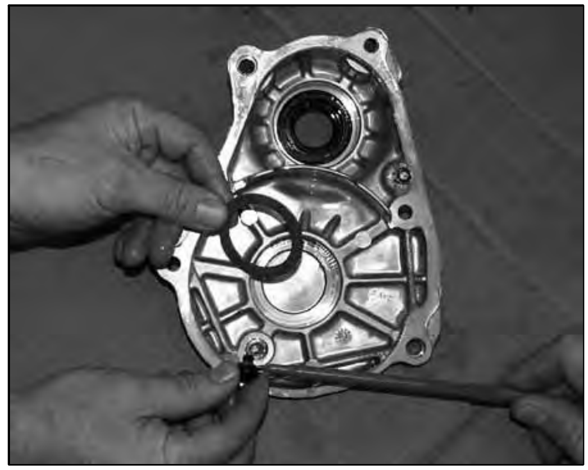
8. Remove pinion shaft retainer plate and pinion shaft.



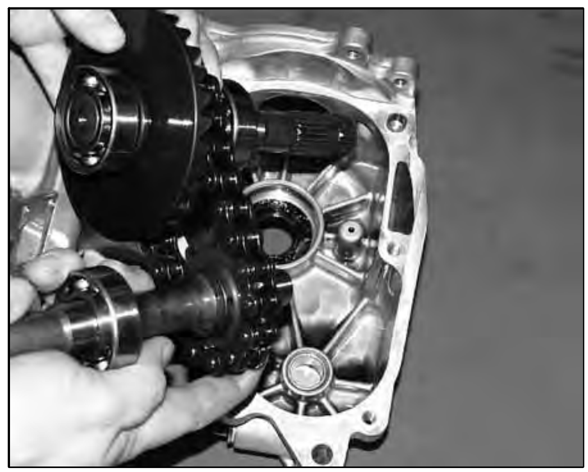
9. Remove front drive output housing cover screws.

Transmission Disassembly, cont.

10. Note position of shim washers and thrust button.



11. Remove shafts as an assembly.



12. Clean all components in a parts washer and inspect for wear.

13. Inspect engagement dogs of gears and replace if edges are rounded.

14. Inspect gear teeth for wear, cracks, chips or broken teeth.

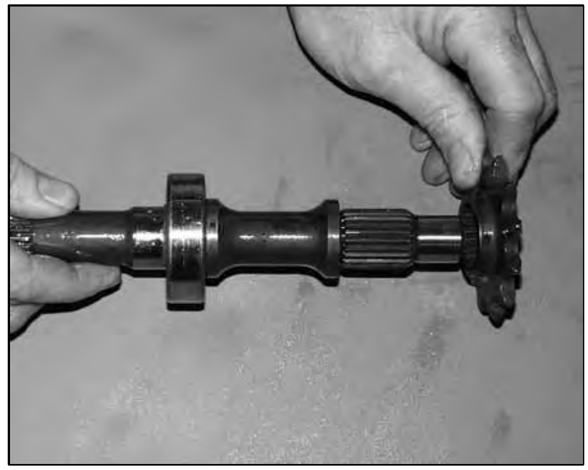
15. Remove seals from transmission case.

NOTE: New seals should be installed after the transmission is completely assembled.

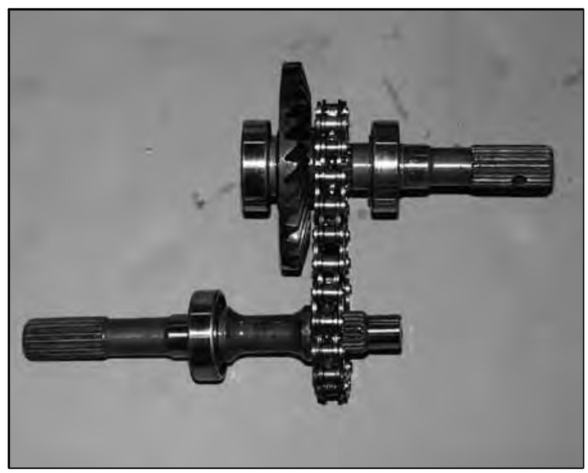
16. Inspect bearings for smooth operation. Check for excessive play between inner and outer race.

Transmission Assembly

1. Install sprocket on front output shaft with sprocket boss side inward as shown.



2. Assemble front and rear output shafts.



3. Install front and rear output shafts with chain as an assembly.

4. Reinstall cover and torque bolts in a criss-cross pattern in 3 steps to 18 ft. lbs. (25 Nm).

5. Install new front and rear output shaft seals.

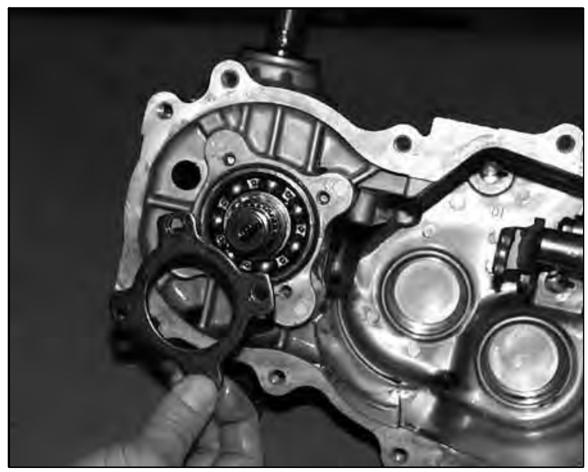
Transmission Assembly, cont.

6. Before installing the cover make sure the sealing surfaces are clean and dry, and shafts are fully seated in the transmission case. Apply Loctite t 518 or 3-Bond 1215 to mating surfaces.

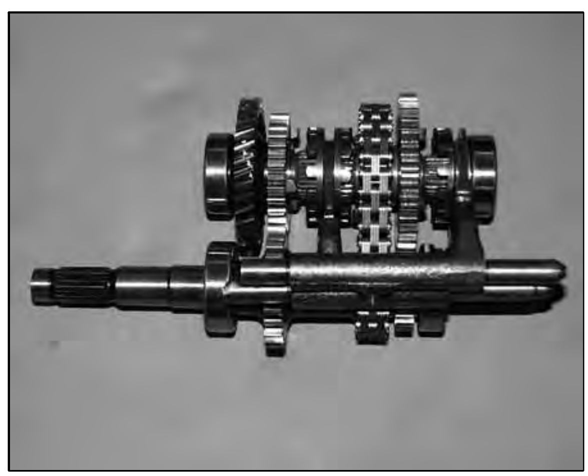
7. Install pinion shaft with bearing.

8. Install retainer plate with flat side toward bearing.

9. Apply Loctite t 242 (Blue) to screw threads and torque screws to 18 ft. lbs. (25 Nm).



10. Assemble shafts with chain and shift forks.

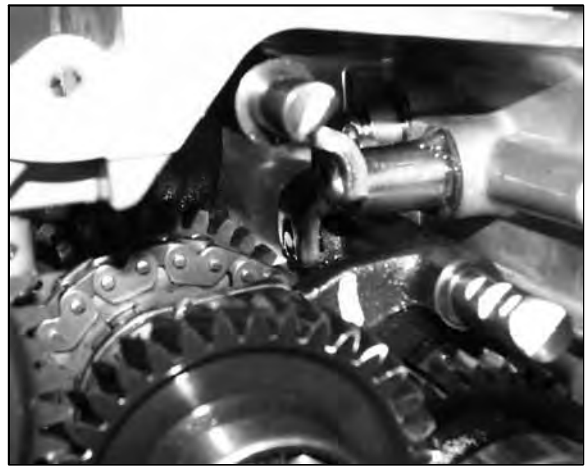


Transmission Assembly, cont.

11. Carefully install high/reverse shaft assembly and gear cluster as a unit into their respective bearing case areas. Tap with a soft face hammer to seat shaft assemblies.

NOTE: Make sure shift shaft pins are properly positioned in the slot on selector arms.

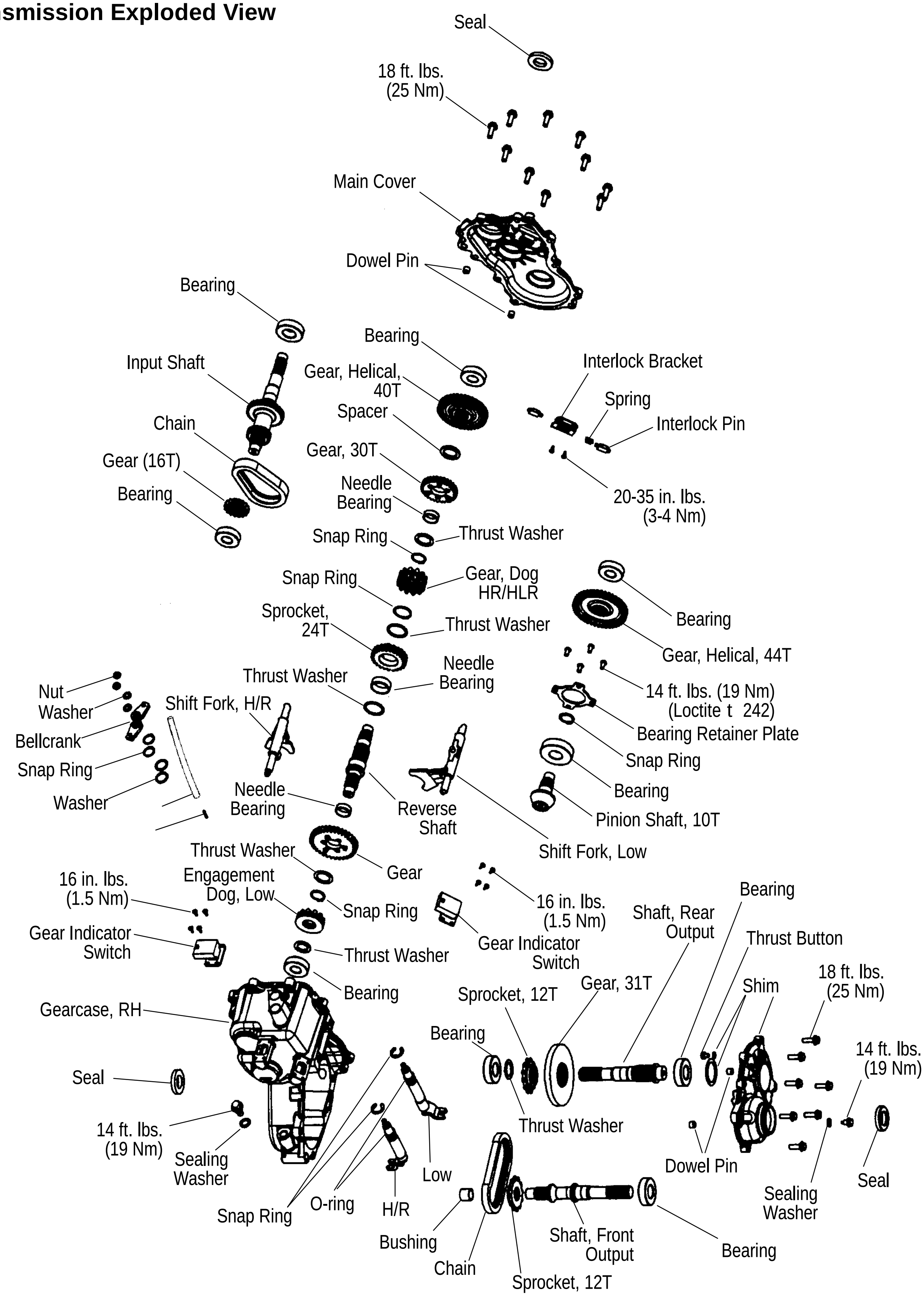
NOTE: Be sure gear position indicator switch(es) are removed from transmission case before installing shafts.



12. Install output shaft and gear assembly along with sprocket and chain.
13. Prior to reinstalling the cover make sure the mating cover surfaces are clean and dry, and shafts are fully seated in transmission case. Apply Loctite t 518 or 3-Bond 1215 to mating surfaces.
14. Reinstall cover and torque bolts in a criss-cross pattern in 3 steps to 18 ft. lbs. (25 Nm).
15. Install new input shaft seal.
16. Install drain plug with a new sealing washer. Torque drain plug to 14 ft. lbs. (19 Nm).
17. Install transmission and add Polaris Premium Synthetic Gear Case Lubricant in the recommended amount. Refer to Maintenance Chapter 2.

18. Install gear indicator switch(es). Apply Loctite t 242 (blue) to threads of switch screws and torque to 13-16 in. lbs. (1.5-1.9 Nm).

Transmission Exploded View



Troubleshooting

Troubleshooting Checklist

Check the following items when shifting difficulty is encountered.

- Idle speed adjustment
- Transmission oil type/quality
- Transmission torque stop adjustment
- Engine torque stop adjustment
- Drive belt deflection
- Loose fasteners on rod ends
- Loose fasteners on selector box
- Worn rod ends, clevis pins, or pivot arm bushings
- Linkage rod adjustment and rod end positioning
- Shift selector rail travel
- *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.

CHAPTER 9
BRAKES

Front Brake Caliper		
Item	**Standard**	**Service Limit**
Brake Pad Thickness	.275″ / 7.0mm	.150″ / 3.81mm
Brake Disc Thickness	.150-.164″ / 3.810-4.166mm	.140″ / 3.556mm
Brake Disc Thickness Variance Between Measurements	-	.002″ / .051mm
Brake Disc Runout	-	.020″ / .50mm

Output Shaft Brake Caliper		
Item	**Standard**	**Service Limit**
Brake Pad Thickness	.275″ / 7.0mm	.150″ / 3.81mm
Brake Disc Thickness	.177-.187″ /4.496-4.750mm	.167″ / 4.242mm
Brake Disc Thickness Variance Between Measurements	-	.002″ / .051mm
Brake Disc Runout	-	.010″ / .25mm

Rear Axle Brake Caliper		
Item	**Standard**	**Service Limit**
Brake Pad Thickness	.490″ / 12.45mm	.150″ / 3.81mm
Brake Disc Thickness	.177-.187″ /4.496-4.750mm	.167″ / 4.242mm
Brake Disc Thickness Variance Between Measurements	-	.002″ / .051mm
Brake Disc Runout	-	.010″ / .25mm

Torque Specifications

Item	Torque (ft. lbs. except where noted*)	Torque (Nm)
Front Caliper Mounting Bolts	18.0	25
Output Shaft Caliper Mounting Bolts	15.0	21
Rear Axle Caliper Mounting Bolts	18.0	25
Master Cylinder Mounting Bolts	*55 in. lbs.	6.0
Master Cylinder Reservoir Cover Bolt	*45 in. lbs.	5.0
Brake Line Banjo Bolt	15.0	21
Front Brake Disc	18.0	25
Rear Brake Disc (6x6)	24.0	33
Front Wheel Mounting Nuts	15.0	21

Brake Pad Basics

Disc brake systems are light weight, low maintenance, and perform well in the conditions ATVs routinely encounter. There are a few things to remember when replacing disc brake pads or performing brake system service to ensure proper system function and maximum pad service life.

- Optional pads are available to suit conditions in your area. Select a pad to fit riding style and environment.
- Do not over-fill the master cylinder fluid reservoir.
- Make sure the brake lever and pedal returns freely and completely.
- Adjust stop pin on front caliper after pad service.
- Check and adjust master cylinder reservoir fluid level after pad service.
- Make sure atmospheric vent on reservoir is unobstructed.
- Adjust auxiliary brake after pad service.
- Test for brake drag after any brake system service and investigate cause if brake drag is evident.
- Make sure caliper moves freely on guide pins (where applicable).
- Inspect caliper piston seals for foreing material that could prevent caliper pistons from returning freely.
- Perform a brake burnishing procedure after installing new pads to maximize service life.

Brake Pad Kits

NOTE: Brake pad part numbers are stamped on the back of the pad for identification purposes. This part number cannot be ordered – it is included in the chart for reference only. **Part numbers on the following chart may change or supercede to a new number. Always refer to the current parts manual for part numbers.**

Part No.	Type	Description	Application
FRONT BRAKE PAD KITS*			
2201149 - Kit	Soft	**Front** brake pad kit. (Contains 4 pads PN 1930731)	For dry, dusty conditions.
1930731 - Pad		Pad contained in kit PN 2201149	For dry, dusty conditions.
2200465 - Kit	Medium	**Front** brake pad kit. (Contains 4 pads PN 1930815)	Production pad (For average use)
1930815 - Pad		Pad contained in kit PN 2200815	Production pad (For average use)
2200901 - Kit	Severe Duty	**Front** brake pad kit. (Contains 4 pads PN 1930811)	For muddy conditions.
1930811 - Pads		Pad contained in kit PN 2200901	For muddy conditions.
REAR BRAKE PAD KITS			
2201150 - Kit	Soft	**Rear** brake pad kit. (Contains 2 pads PN 1930741)	For dry, dusty conditions.
1930741 - Pad		Pad contained in kit PN 2201150	For dry, dusty conditions.
2200464 - Kit	Medium	**Rear** brake pad kit. (Contains 2 pads PN 1930814)	Production Pad (For average use)
1930814 - Pad		Pad contained in kit PN 2200464	Production Pad (For average use)
2200899 - Kit	Severe Duty	**Rear** brake pad kit.. (Contains 2 pads PN 1930810)	For muddy conditions.
1930810 - Pad		Pad contained in kit PN 2200899	For muddy conditions.
2201093 - Kit		**Sportsman 500 Rear** brake pad kit (contains 2 pads 1930859 for hydraulic auxiliary brake)	Production rear pad for most Sportsman hydraulic auxiliary brake
2201189 - Kit		**Rear** brake pad kit **Scrambler 400 / 500**	Production pad for most Scrambler models

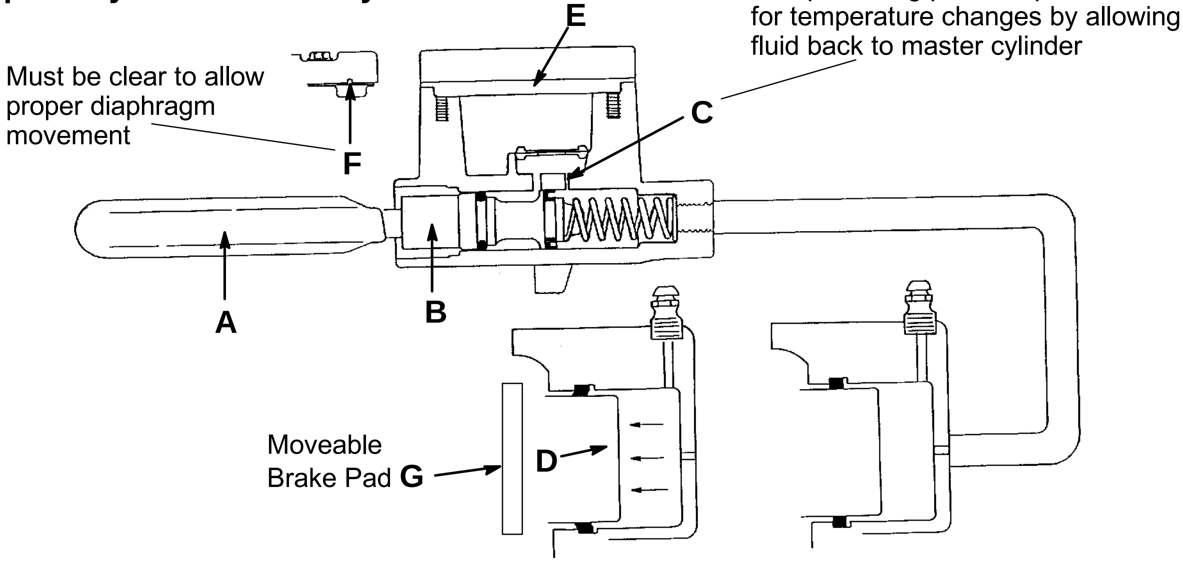
Brake Noise Troubleshooting

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 t Disc Brake Quiet (available from most auto parts stores) can be applied to the back of the pads. Follow directions on the package. This will keep pads in contact with caliper piston(s) to reduce the chance of squeaks caused by dirt or dust.

Brake Noise Troubleshooting

Possible Cause	Remedy
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with CRC Brakeleen t or an 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> Improper adjustment Insufficient lever or pedal clearance Master cylinder reservoir overfilled Master cylinder compensating port restricted Master cylinder piston not returning completely Caliper piston(s) not returning Operator error (riding the brake / park brake applied)	 Adjust pad stop (front calipers) or adjust auxiliary brake Check position of controls & switches. Set to proper level Clean compensating port Inspect. Repair as necessary Clean piston(s) seal Educate operator
Loose wheel hub or bearings	Check wheel and hub for abnormal movement.
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary
Noise is from other source (chain, axle, hub, disc or wheel)	If noise does not change when brake is applied check other sources. Inspect and repair as necessary
Wrong pad for conditions	Change to a softer or harder pad

Typical Hydraulic Brake System



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.

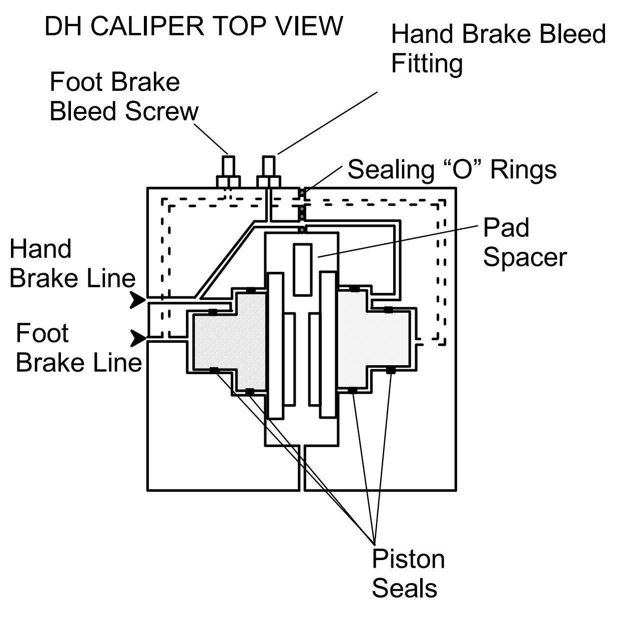
This system also incorporates a diaphragm (E) as part of the cover gasket; and a vent port (F) located between the gasket and the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Make sure the vent is open and allowed 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 3 high temperature brake fluid (PN 2870990). Polaris brake fluid is sold in 5.5 oz. bottles. **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 from the air. This causes the boiling temperature of the brake fluid to drop, which can lead to early brake fade and the possibility of serious injury.

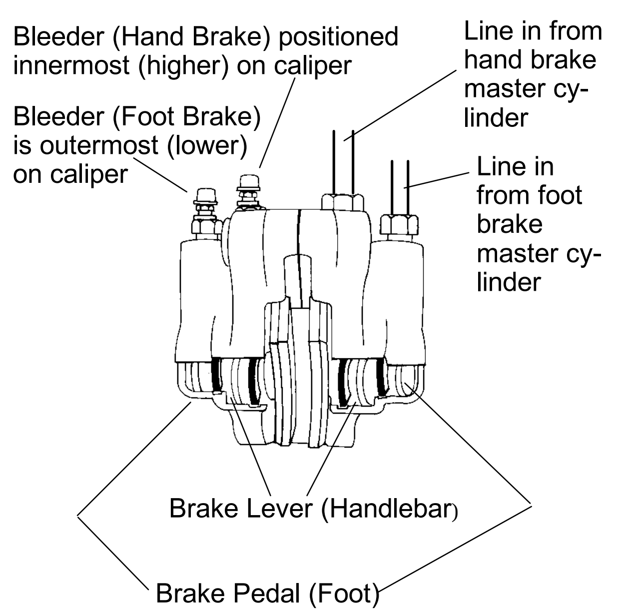
Dual Hydraulic Caliper Bleeding

This caliper is a dual opposed piston design, with two independent hydraulic systems contained in the same caliper body (**see Ill.1**). 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 on page 9.8 - 9.9; however, each system must be bled separately.

Hydraulic Auxiliary Brake inspection and adjustment is outlined on page 9.7.



Ill. 1

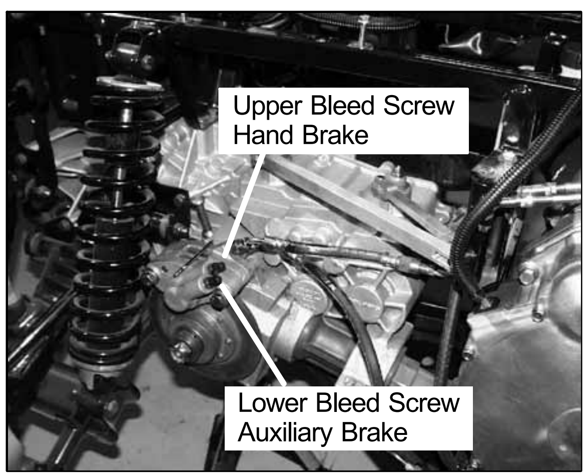


Ill. 2 **Cutaway View Of DH Caliper**

NOTE: Caliper style and location of brake lines and bleeder screws may differ

Upper bleed screw and brake line (A) is for hand brake system.

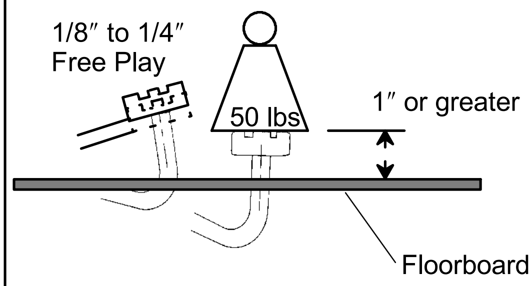
Lower bleed screw and brake line (B) is for auxiliary (foot) brake system.



Auxiliary Brake Adjustment (Hydraulic)

Use the following procedure to inspect the auxiliary (foot) brake system and bleed if necessary.

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



Ill. 1

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

If freeplay is excessive, be sure master cylinder piston is returning to the fully extended position. If freeplay is less than 1/8″ (3.2mm) be sure dust seal is fully seated in groove on master cylinder body. See photo on page 9.11.

Bleeding:

If the free play is correct, but pedal travel is excessive or spongy, then air is trapped somewhere in the system. Bleeding the auxiliary brake system is accomplished in a conventional manner, except that there are two brake lines and bleeder screws on the Dual Hydraulic caliper. Refer to page 9.6 for theory of operation and bleeding procedure. The auxiliary brake line applies pressure to the small (inner) diameter of the caliper piston. Use the outermost (lower) bleed screw to purge air. See photo on page 9.6.

BRAKES
Fluid Replacement/Bleeding Procedure

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

CAUTION:

Always wear safety glasses.

CAUTION:

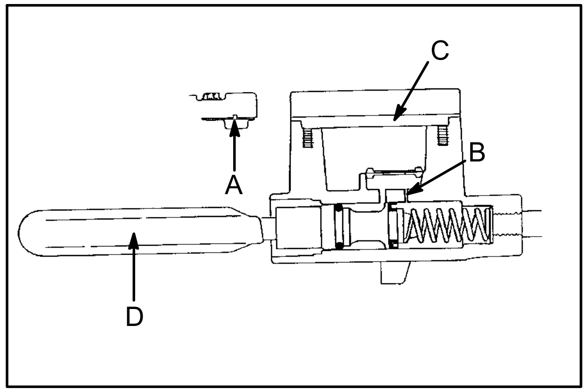
Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

Brake Bleeding - Fluid Change

This procedure should be used to change fluid or bleed brakes during regular maintenance.

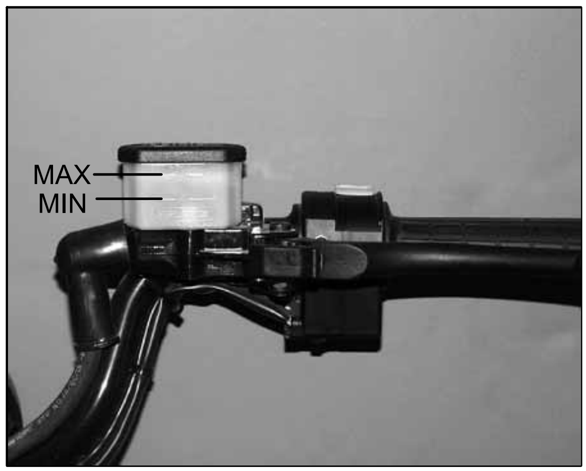
1. Clean reservoir cover thoroughly.
2. Remove screws, cover, and diaphragm (C) from reservoir.
3. Inspect vent slots (A) in cover and remove any debris or blockage.
4. If changing fluid, remove old fluid from reservoir with a Mity Vac™ pump or similar tool.

NOTE: Do not remove brake lever when reservoir fluid level is low.



Mity Vac™ PN 2870975

5. Add brake fluid to the upper level mark on reservoir.

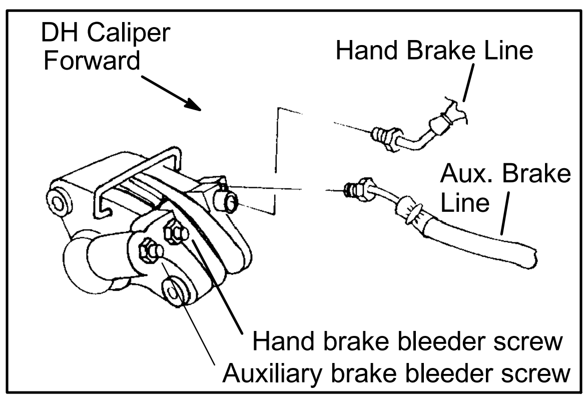


Polaris DOT 3 Brake Fluid

PN 2870990

6. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Install a box end wrench on caliper bleeder screw fitting. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.

NOTE: Fluid may be forced from compensation port (B) when brake lever is pumped. Place diaphragm (C) in reservoir to prevent spills. Do not install cover.



Brake Bleeding - Fluid Change Cont.

7. *Slowly* pump brake lever (D) until pressure builds and holds.
8. While maintaining lever pressure, open bleeder screw. Close bleeder screw and release brake lever. **NOTE:** Do not release lever before bleeder screw is tight or air may be drawn into caliper.
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.
11. Repeat procedure steps 5-9 for the front right caliper.
12. Repeat procedure steps 5-9 for the front left caliper.
13. Add brake fluid to the proper level.

Master Cylinder Fluid Level

Between MIN and MAX lines

14. Install diaphragm, cover, and screws. Tighten screws to specification.

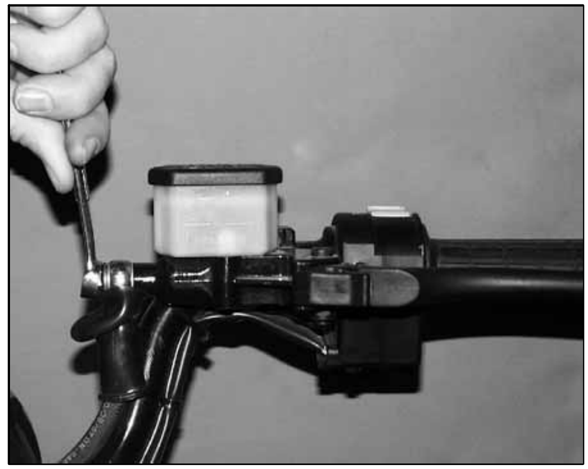
Reservoir Cover Torque -

45 in. lbs. (.52 kg-m)

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.

Master Cylinder Disassembly

Disassembly



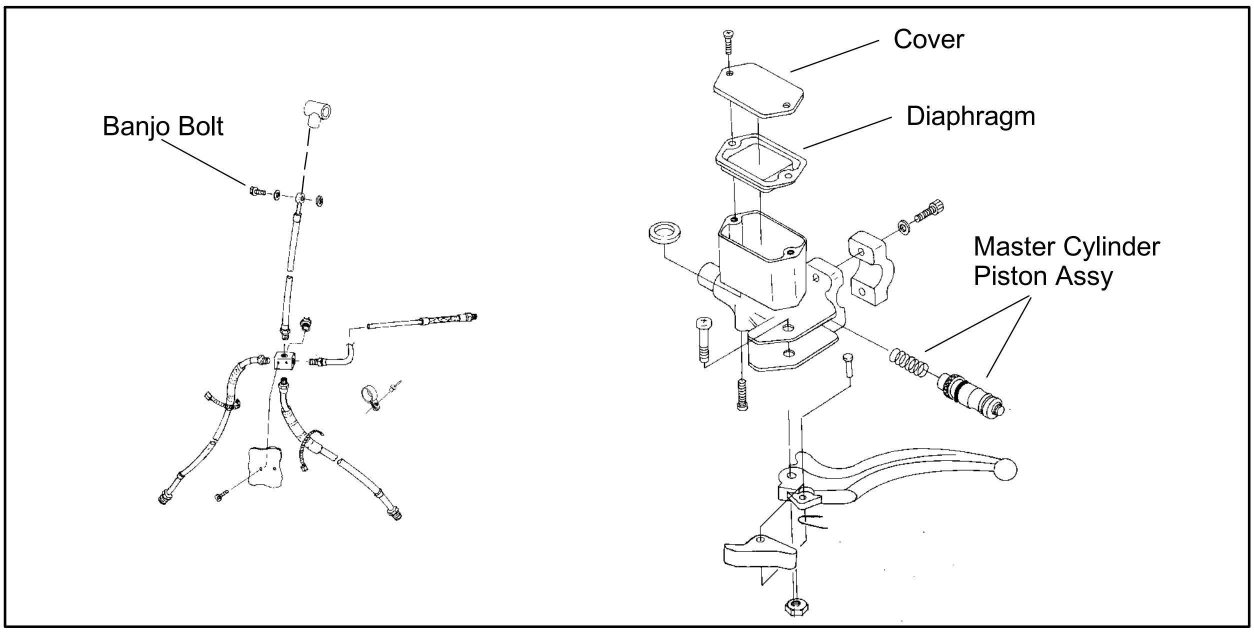
1. Clean master cylinder and reservoir assembly. Make sure you have a clean work area to disassemble brake components.

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.

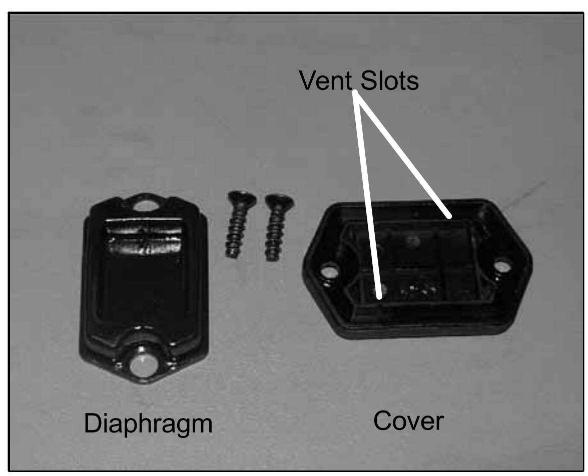
3. Remove master cylinder from handlebars.



4. Remove cover and diaphragm from master cylinder and dispose of the fluid properly.

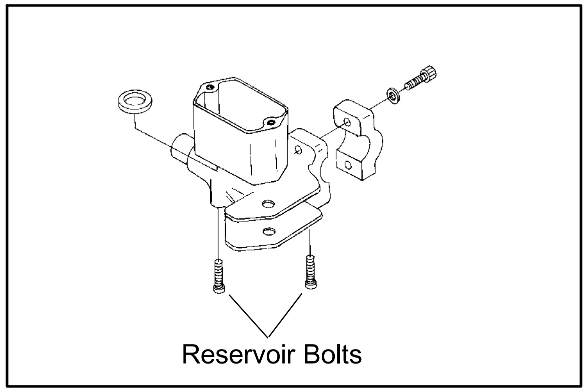
5. Be sure vents in cover are clean and unobstructed.

6. Remove brake lever.

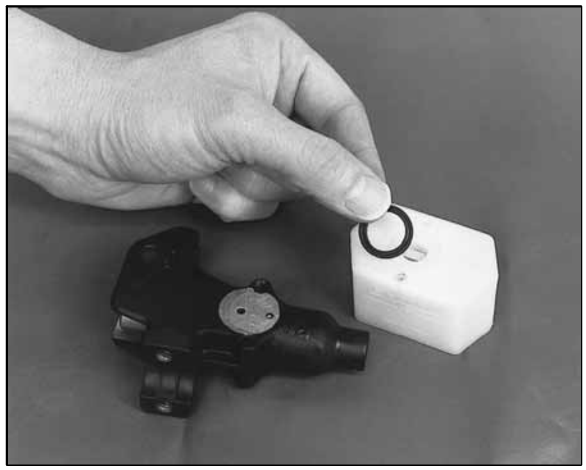


Disassembly Cont.

7. Remove reservoir screws and reservoir.

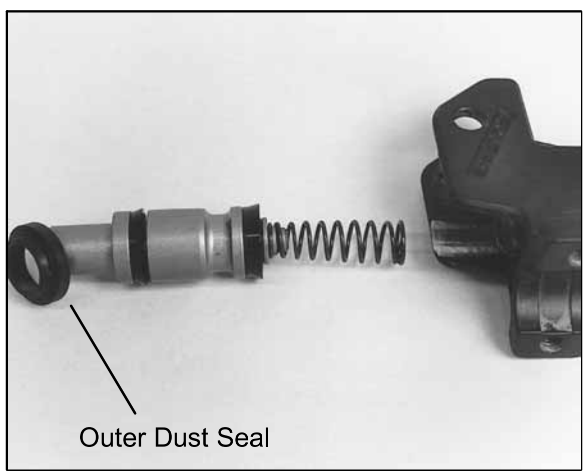


8. Inspect reservoir seal and replace if worn or damaged. Clean surfaces of the reservoir and master cylinder body. Be sure compensating (A) and supply (B) ports are clean before reassembly.



9. Remove outer dust seal. Be ready to catch piston assembly. **NOTE:** The return spring may force piston out when dust seal has been removed.

10. Remove piston assembly and return spring from master cylinder. Replace piston assembly and spring.



Master Cylinder Assembly

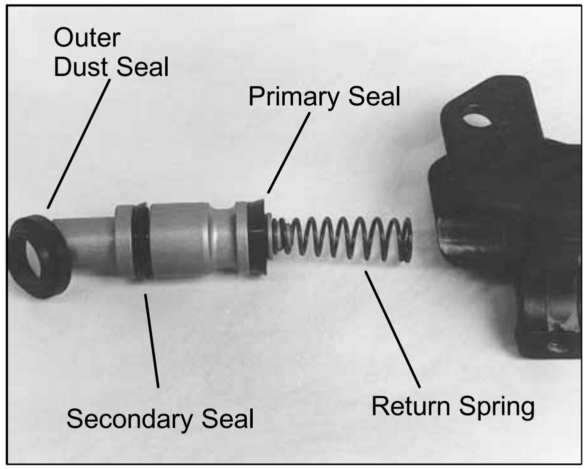
Inspection

1. Clean the master cylinder assembly with clean Dot 3 brake fluid, brake parts cleaner, or denatured alcohol. Dry thoroughly. Inspect the bore for nicks, scratches or wear. Replace if damage is evident or if worn.

2. Inspect parking brake for wear. If teeth or locking cam are worn, replace lever.

Assembly

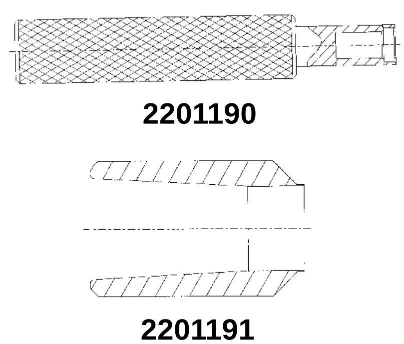
1. Install new primary and secondary seals on the piston.



2. Select the appropriate master cylinder piston installation tool and insert into master cylinder bore. A typical installation tool is shown at right.

Type IV Master Cylinder (Hand Brake)
.750 (19mm)

Installation Tool #2200879



Components of Kit 2200879

Assembly

3. Dip piston in clean DOT 3 brake fluid, attach spring to piston, and install assembly into installation tool.

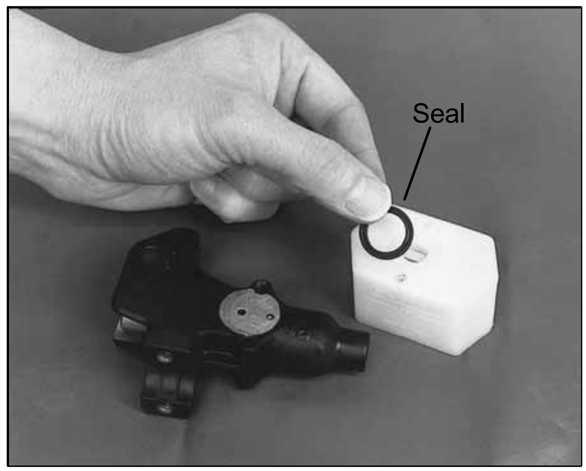
CAUTION:

Do not attempt to install the piston without the required installation tool. Do not allow the lip of the seals to turn inside out or fold.

4. Push the piston assembly through the installation tool sleeve using the plunger handle (included with installation tool kit). Continue pushing until plunger is solid against installation tool. Both tools can now be removed.

5. Hold piston assembly inward, and install a new dust seal. Be sure dust seal is completely seated in the groove.

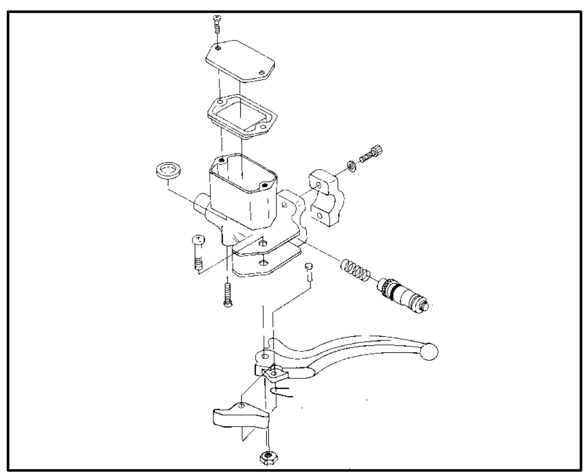
NOTE: The Piston assembly should spring back against the seal when compressed.



6. Install reservoir with new seal. Be careful to install and torque screws evenly.

7. Apply a light film of grease to the lever bolt. Install lever and tighten bolt securely.

8. Install parking brake lever assembly.

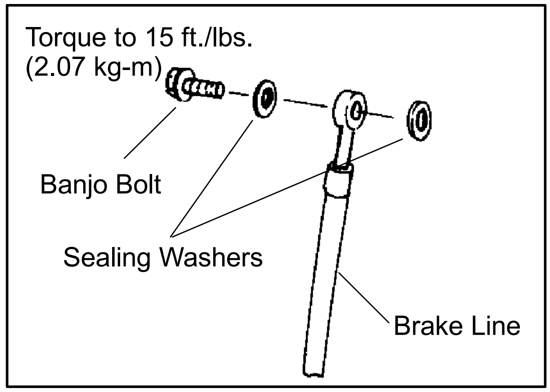


Installation

1. Install master cylinder on handlebars. Torque mounting bolts to 55 in. lbs. (.62 Kg-m).

NOTE: To speed up the brake bleeding procedure the master cylinder can be purged of air before it is installed on the brake line. Fill with DOT3 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.



Master Cylinder Mounting Bolt Torque 55 in. lbs. (.62 kg-m)

Brake Line Banjo Bolt Torque 15 ft. lbs. (2.07 kg-m)

3. Fill reservoir with DOT 3 fluid.

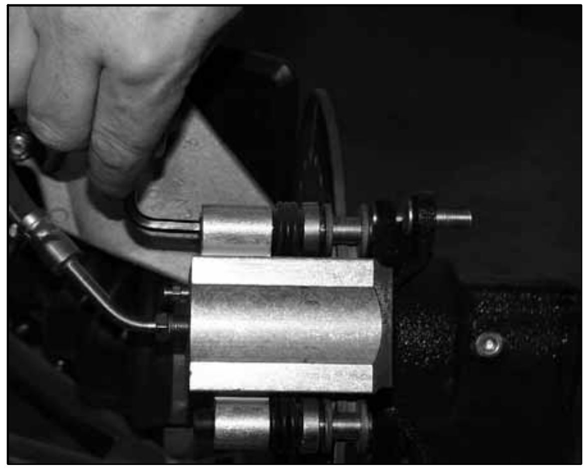
4. Follow bleeding procedure on pages 9.8-9.9. Check all connections for leaks and repair if necessary.

Polaris DOT 3 Brake Fluid

PN 2870990

Front Pad Removal

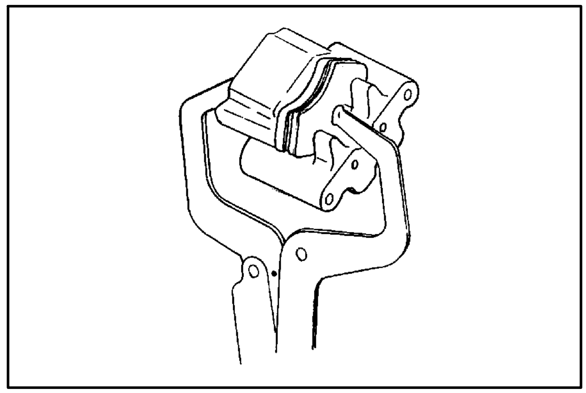
1. Elevate and support front of machine.



CAUTION:

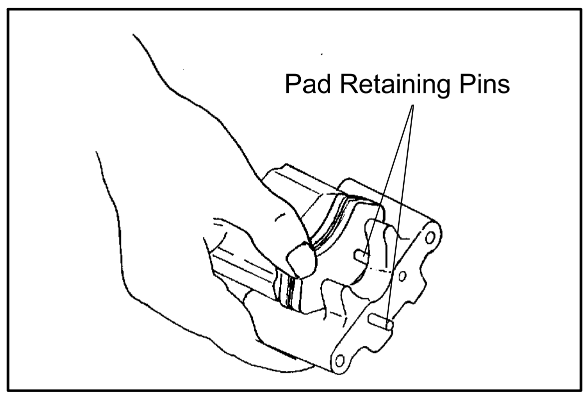
Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

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

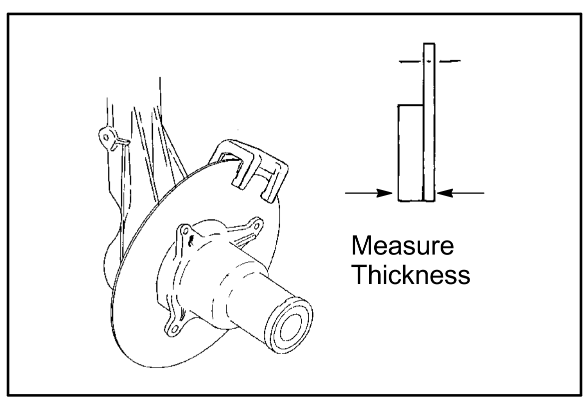


NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

5. Push upper pad retainer pin 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 .275″/7.0 mm
Service Limit .150″ / 3.81 mm

BRAKES
Front Pad Brake Service
Assembly

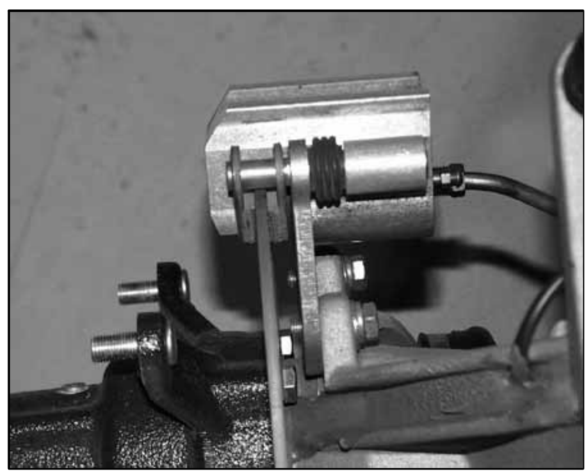
1. Lubricate mounting bracket pins with a light film of Polaris Premium All Season Grease, and install rubber dust seal boots.

Polaris Premium All Season Grease   **PN 2871423**

2. Compress mounting bracket and make sure dust seals 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. (2.48 kg-m)**

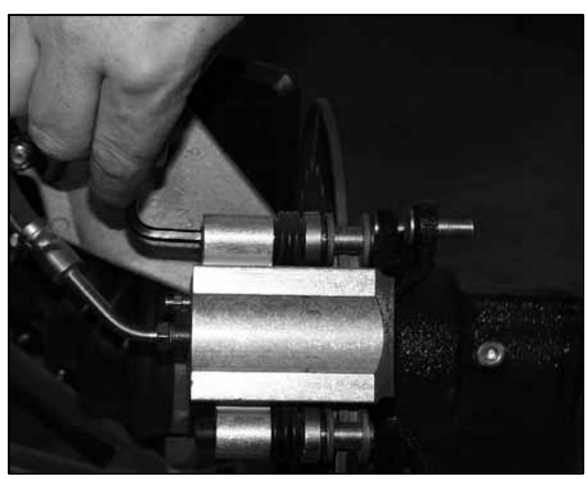


4. Slowly pump the brake lever until pressure has been built up. Maintain at least 1/2″ (12.7 mm) of brake fluid in the reservoir to prevent air from entering the brake system.

Pad Adjustment

5. Install the adjuster screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn (counterclockwise).

Master Cylinder Fluid   **Between MIN and MAX lines**



Assembly Cont.

6. Install wheels and torque wheel nuts.

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.

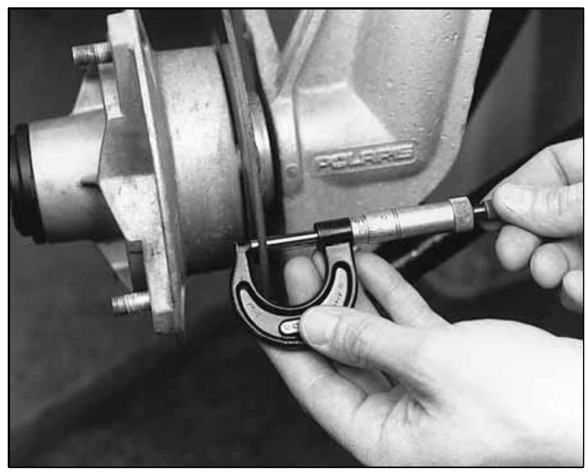
Front Wheel Nut Torque

15 ft. lbs. (2.07 kg-m)

Front Disc Inspection

1. Visually inspect the brake disc for nicks, scratches, or damage.

2. Measure the disc thickness at 8 different points around the pad contact surface using a 0-1″ micrometer. Replace disc if worn beyond service limit.

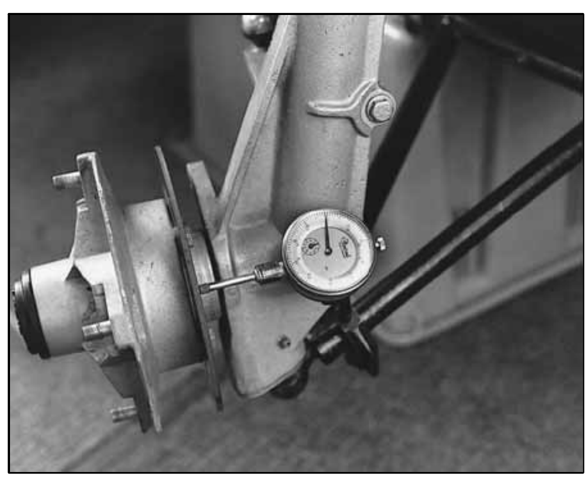


Brake Disc Thickness
New .150-.164″ (3.810-4.166 mm)
Service Limit .140″ / 3.556 mm

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

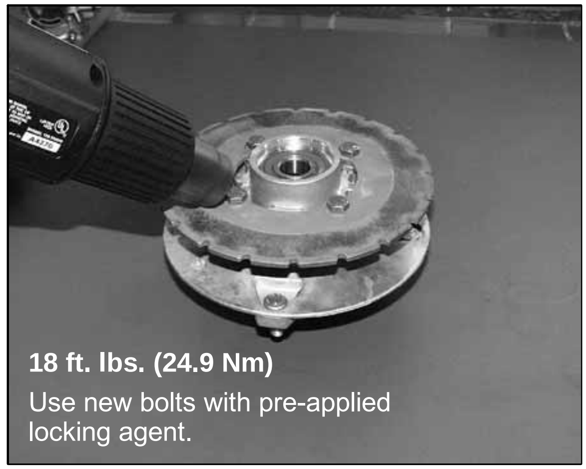
Service Limit .020″ (.50 mm)

Front Brake Disc Removal / Replacement

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.

CAUTION: Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.

Front Brake Disc Mounting Bolt Torque
18 ft. lbs. (24.9 Nm)



Caliper Removal

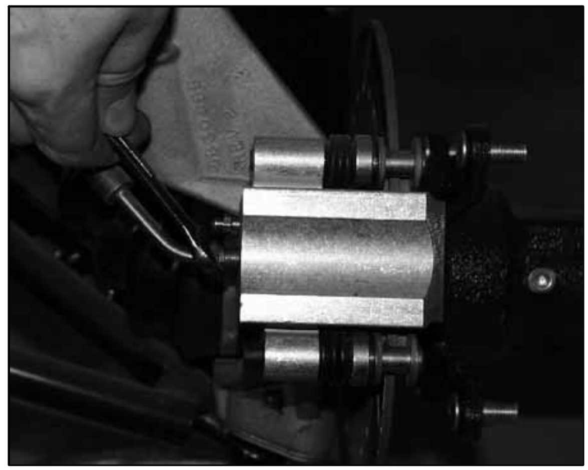
CAUTION:

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. See page 9.15.

2. Using a line wrench, loosen and remove brake line to caliper. Place a container under caliper to catch fluid draining from brake line.

3. Remove brake caliper and drain fluid into container.

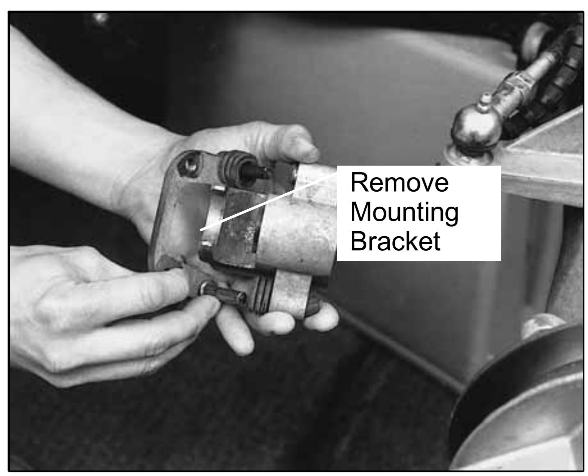


Caliper Disassembly

1. Remove brake pad adjuster screw.

2. Push upper pad retainer pin inward and slip brake pads past edge.

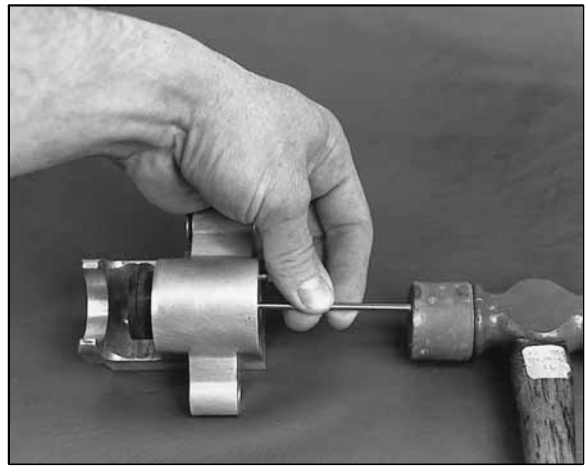
3. Remove mounting bracket, pin assembly and dust boot.



Disassembly Cont.

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.

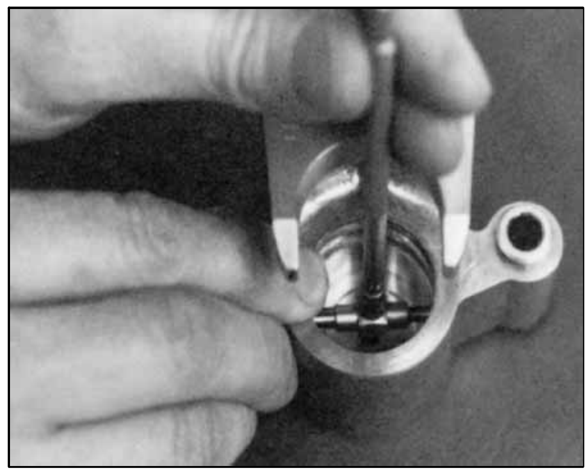


Inspection

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)



2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.

Front Caliper Piston O.D.

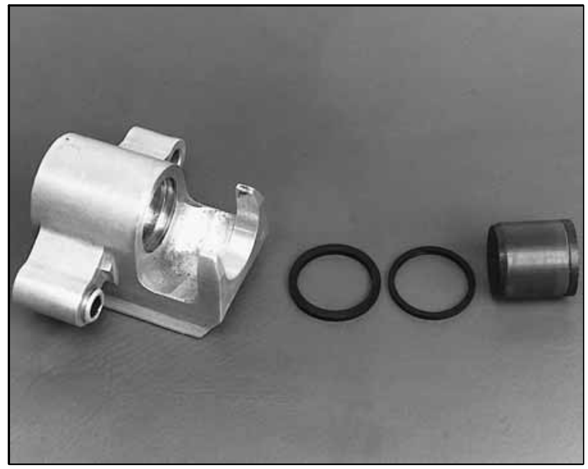
Std. 1.186-1.1875″ (30.13-30.16 mm)
Service Limit 1.1855″ (30.11 mm)

3. Inspect the brake disc and pads as outlined for brake pad replacement this section. See page 9.17.

Assembly

1. Install new O-rings in the caliper body. Be sure groove is clean and free of residue or brakes may drag.

2. Coat piston with clean DOT 3 brake fluid. Install piston 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.

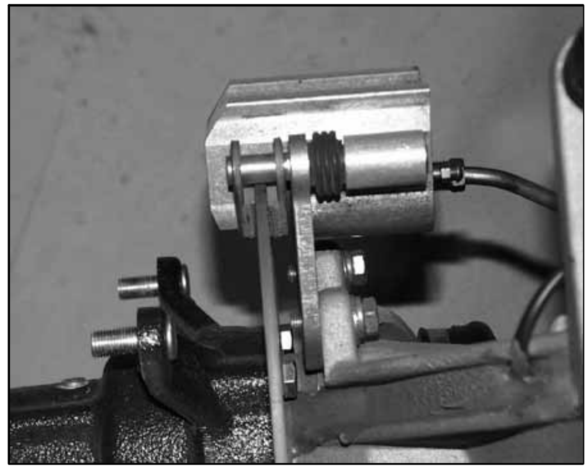
Polaris Premium All Season Grease

PN 2871423

4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the pads as shown on page 9.16. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.

Installation

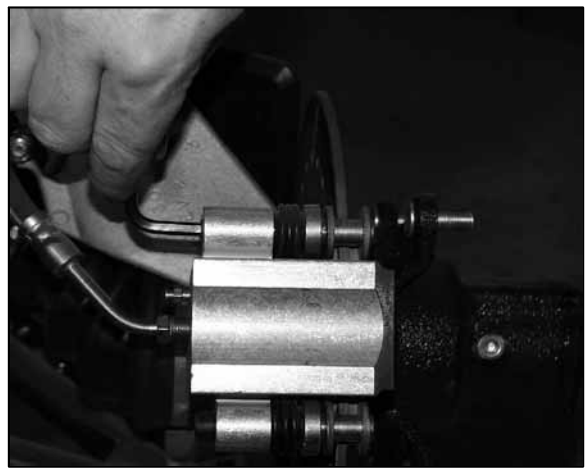
1. Install caliper on hub strut, and torque mounting bolts.



Front Caliper Mounting Bolt Torque
18 ft. lbs. (2.48 kg-m)

2. Install brake line and tighten securely with a line wrench.

3. Install the adjuster screw and turn until stationary pad contacts disc, then back off 1/2 turn.

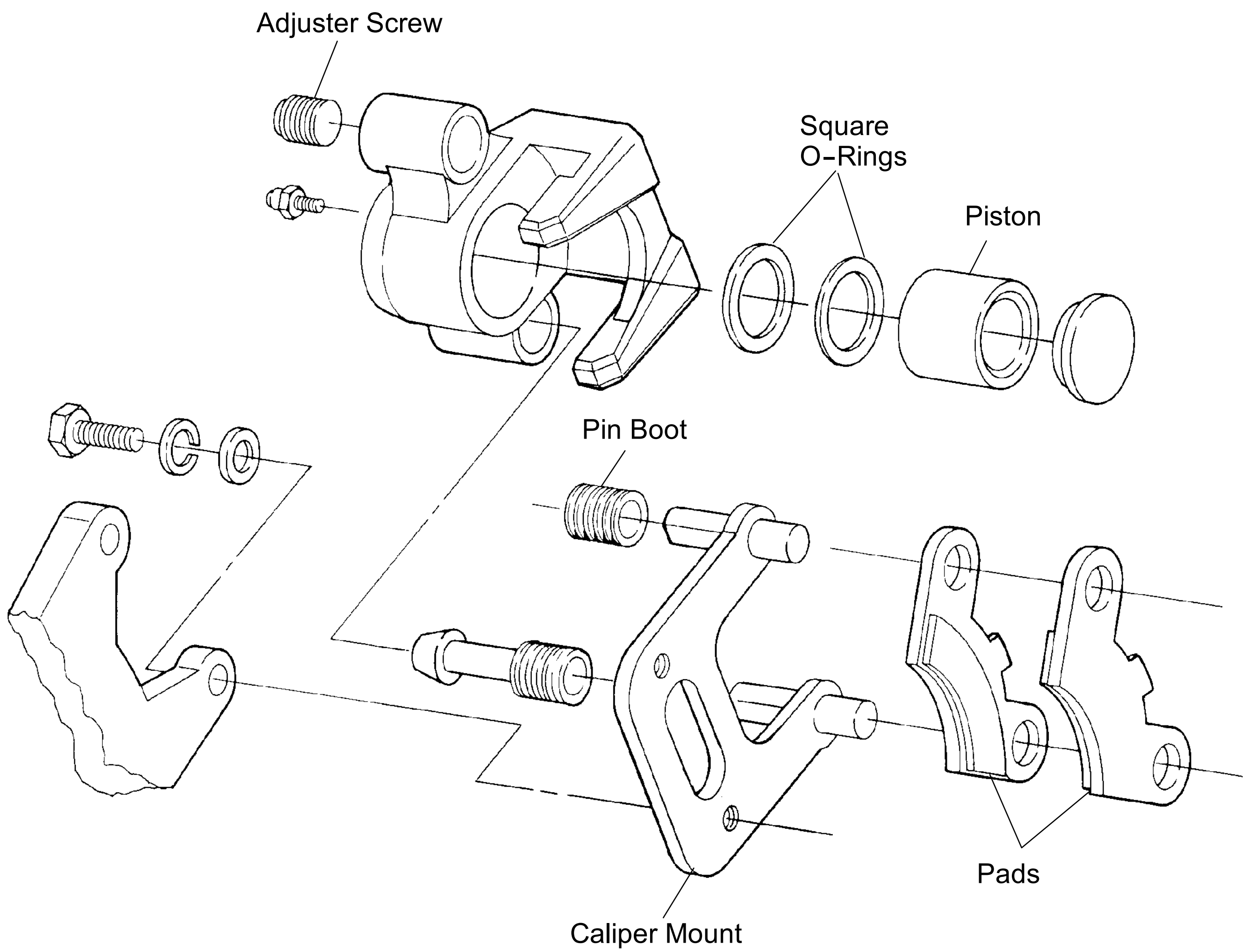


4. Follow brake bleeding procedure outlined on pages 9.8-9.9.

5. Install wheels and torque wheel nuts to specification.

Front Wheel Nut Torque
15 ft. lbs. (2.07 kg-m).

NOTE: If new brake pads are installed, it is recommended that a burnishing procedure be performed to extend pad service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat procedure 10 times.

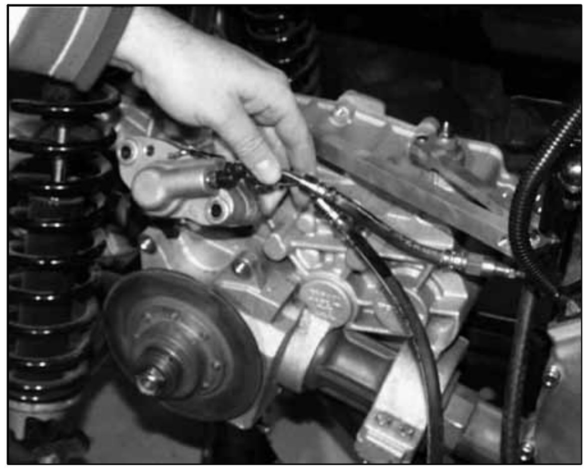

Adjuster Screw
Square
O-Rings
Piston
Pin Boot
Pads
Caliper Mount

Dual Hydraulic Brake Caliper

Brake Pad Removal

1. Remove caliper mounting bolts and lift caliper off of disc.

NOTE: When removing caliper, be careful not to damage brake line. Support caliper so as not to kink or bend brake line.



2. Push caliper piston into caliper bore slowly with pads installed.

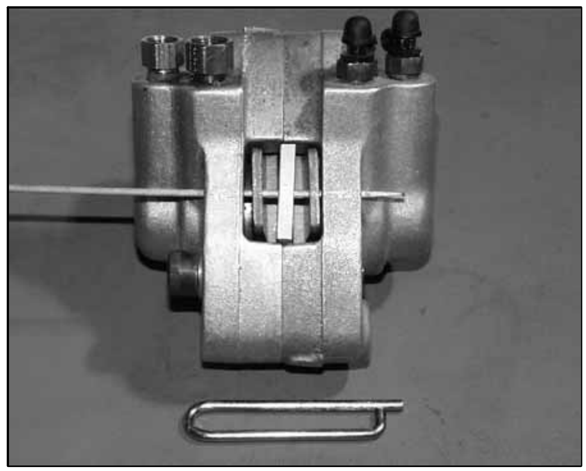
NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

3. Remove brake pad retaining pin, and pad spacer.

NOTE: This is a spring pin, do not spread apart farther than necessary to remove it.

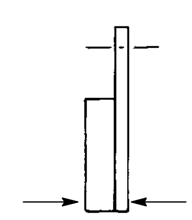
4. Clean pad retainer pins with a wire brush.

5. Clean the caliper w/ brake cleaner or alcohol.



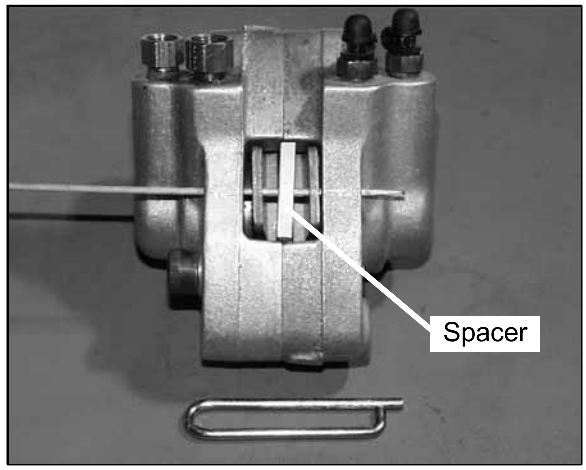
6. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.

Rear Brake Pad Thickness
New .275″ (7.0 mm)
Service Limit .150″ (3.81 mm)



Brake Pad Installation

1. Install new pads in caliper body. Be sure to put aluminum spacer between pads.
2. Install caliper and torque mounting bolts.



> **DH Brake Caliper**
>
> **Torque 18 ft. lbs. (2.48 kg-m)**

3. 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.

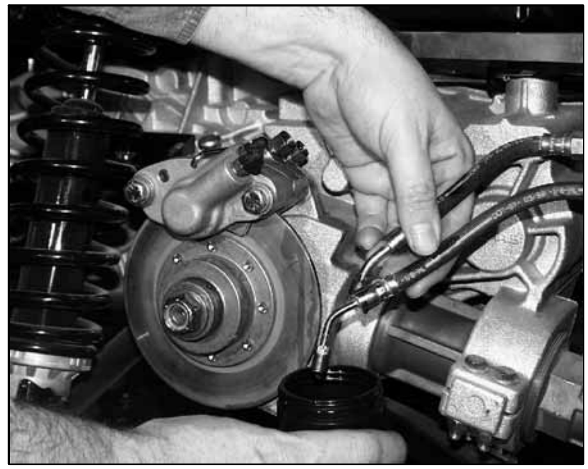
> **Auxiliary Brake Master Cylinder Fluid Level**
>
> **Between MIN and MAX lines**

4. 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.

Dual Hydraulic Brake Caliper

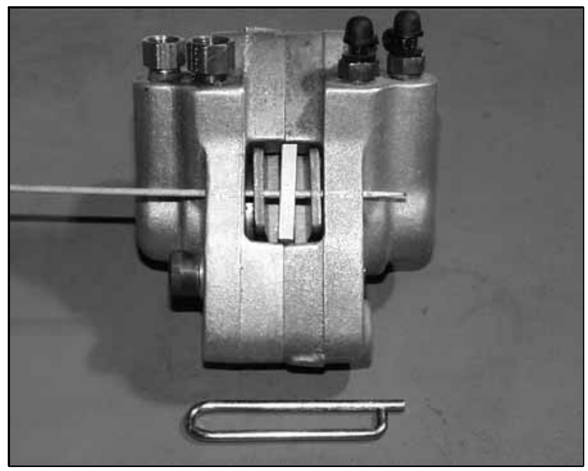
Removal/Inspection

1. Clean caliper area before removal.
2. Using a flare nut wrench, remove hand brake (inner) and auxiliary brake (outer) lines. Place a container to catch brake fluid draining from brake lines.
3. Remove caliper.

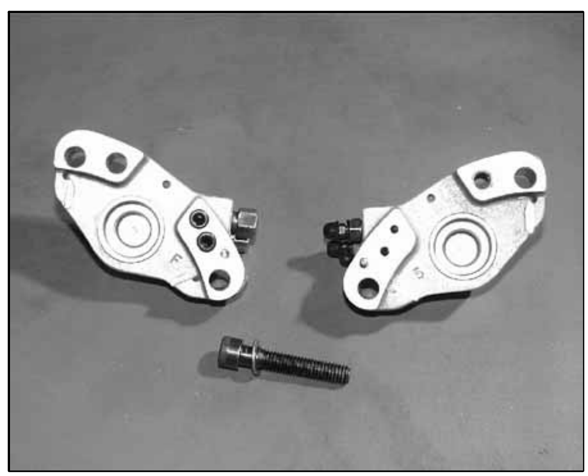


4. Remove brake pad retaining pin pads, and pad spacer.

NOTE: This is a spring pin. Do not spread apart farther than necessary to remove it.



5. Remove Allen head screw and separate caliper halves and remove pistons with piston pliers.
6. Remove O-rings and clean O-ring grooves.
7. Clean disc, caliper body, and pistons with brake cleaner or alcohol.



Removal/Inspection Cont.

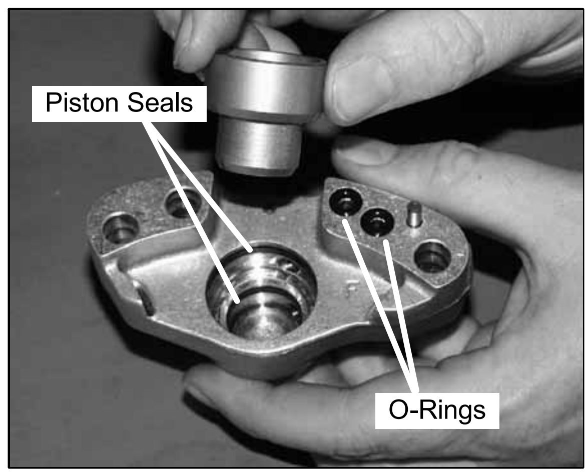
8. Inspect caliper piston bore for scratches, severe corrosion, or galling and replace if necessary.

9. Inspect surface of caliper piston for nicks, scratches, or damage and replace if necessary.

Assembly

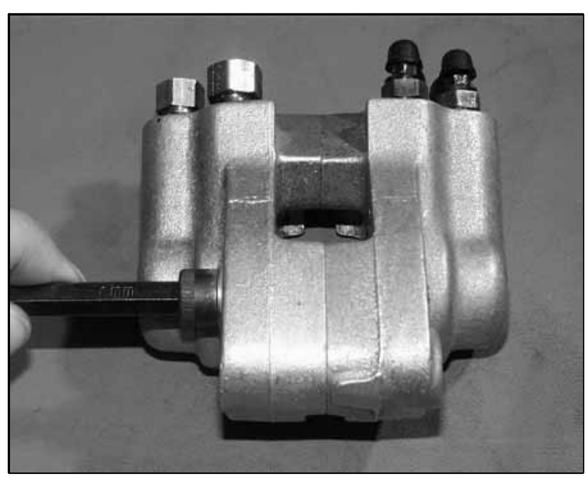
1. Install new O-rings in caliper body (2 piston seals per caliper half). Be sure O-ring grooves are thoroughly cleaned of all residue, or piston may bind in bore. Apply brake fluid to pistons and install carefully with a twisting motion to ease assembly until fully seated.

2. Install new O-rings between caliper halves.



3. Carefully assemble caliper body, making sure O-rings are properly positioned in groove. Torque body screw evenly to 18 ft. lbs.

Caliper Body Torque
18 ft. lbs. (2.49 kg-m)

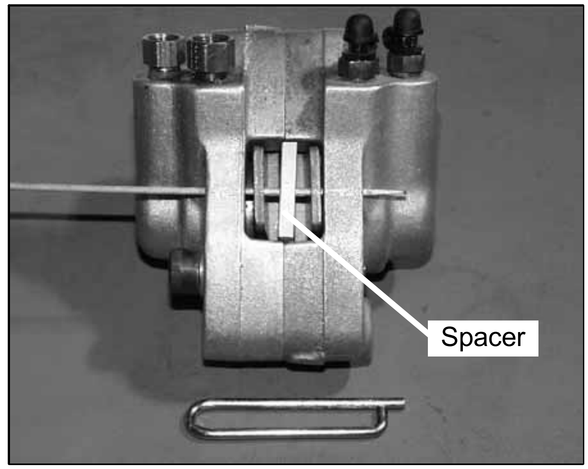


Assembly Cont.

4. Install brake pads in caliper body with friction material facing each other. If equipped with a pad spacer, install the spacer between the pads. Install retaining pin through outer pad, pad spacer and inner pad.

5. Install caliper and torque mounting bolts.

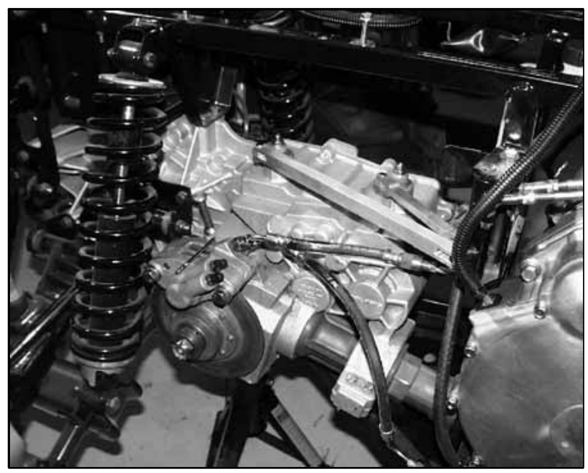
Caliper Mounting Bolt Torque
18 ft. lbs. (2.49 kg-m)



6. Install brake lines and tighten with a flare nut wrench.

7. Follow bleeding procedure outlined on pages 9.8-9.9 of this section and refer to system overview and illustration on page 9.6.

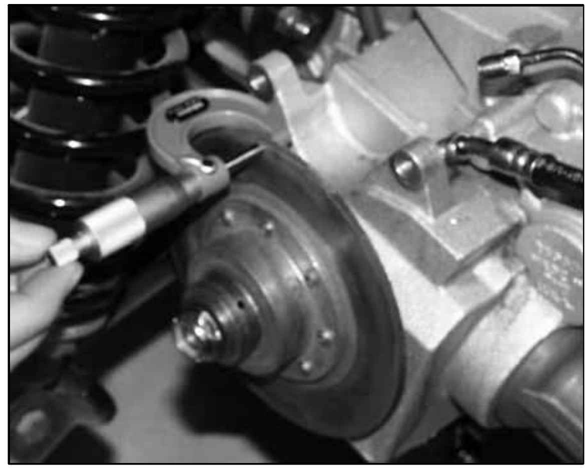
8. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever is released. If the brake drags, re-check assembly and installation.



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 .177-.187″ (4.496-4.750 mm)
Service Limit .167″ (4.242 mm)

Brake Disc Thickness Variance

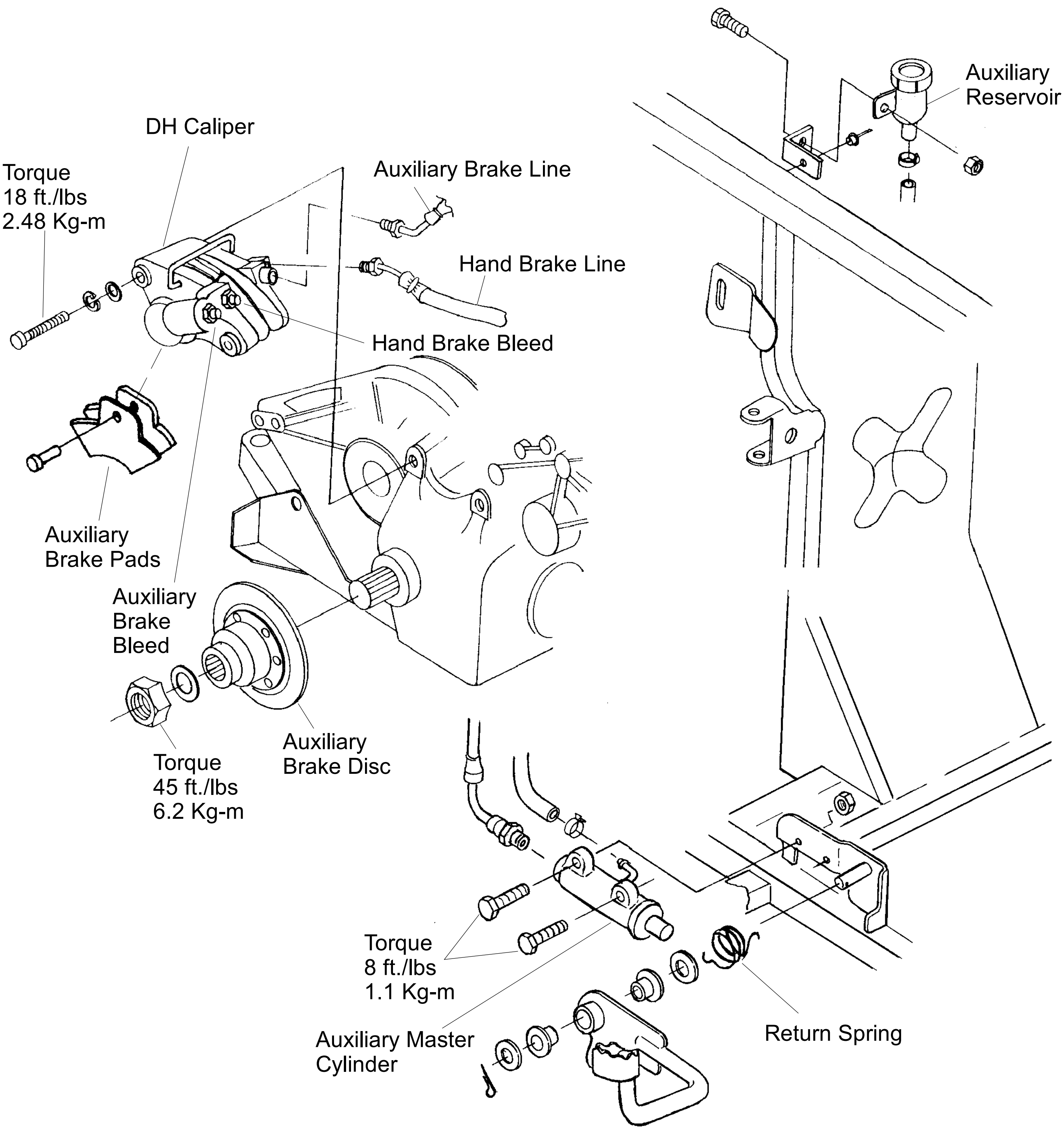
Service Limit .002″ (.051 mm)
difference between measurements

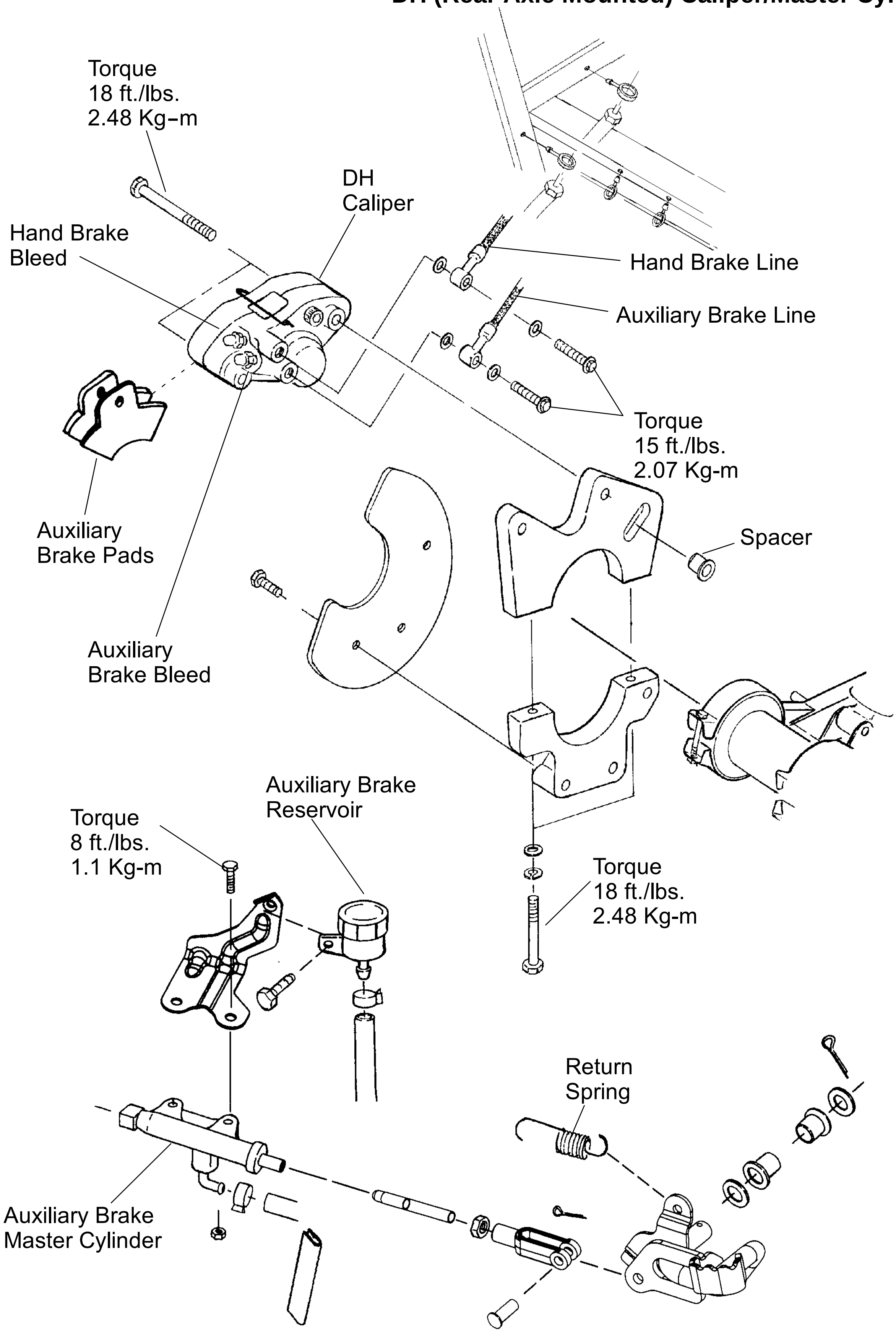
3. Mount dial indicator and measure disc runout. Replace the disc if runout exceeds specifications.

Brake Disc Runout

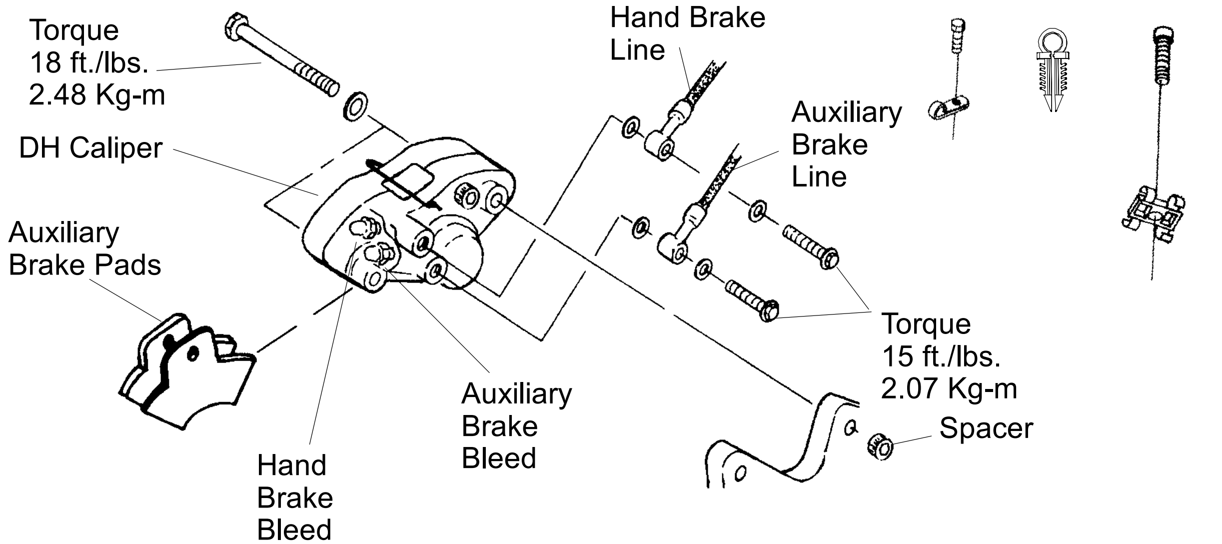
Service Limit .010″ (.25 mm)

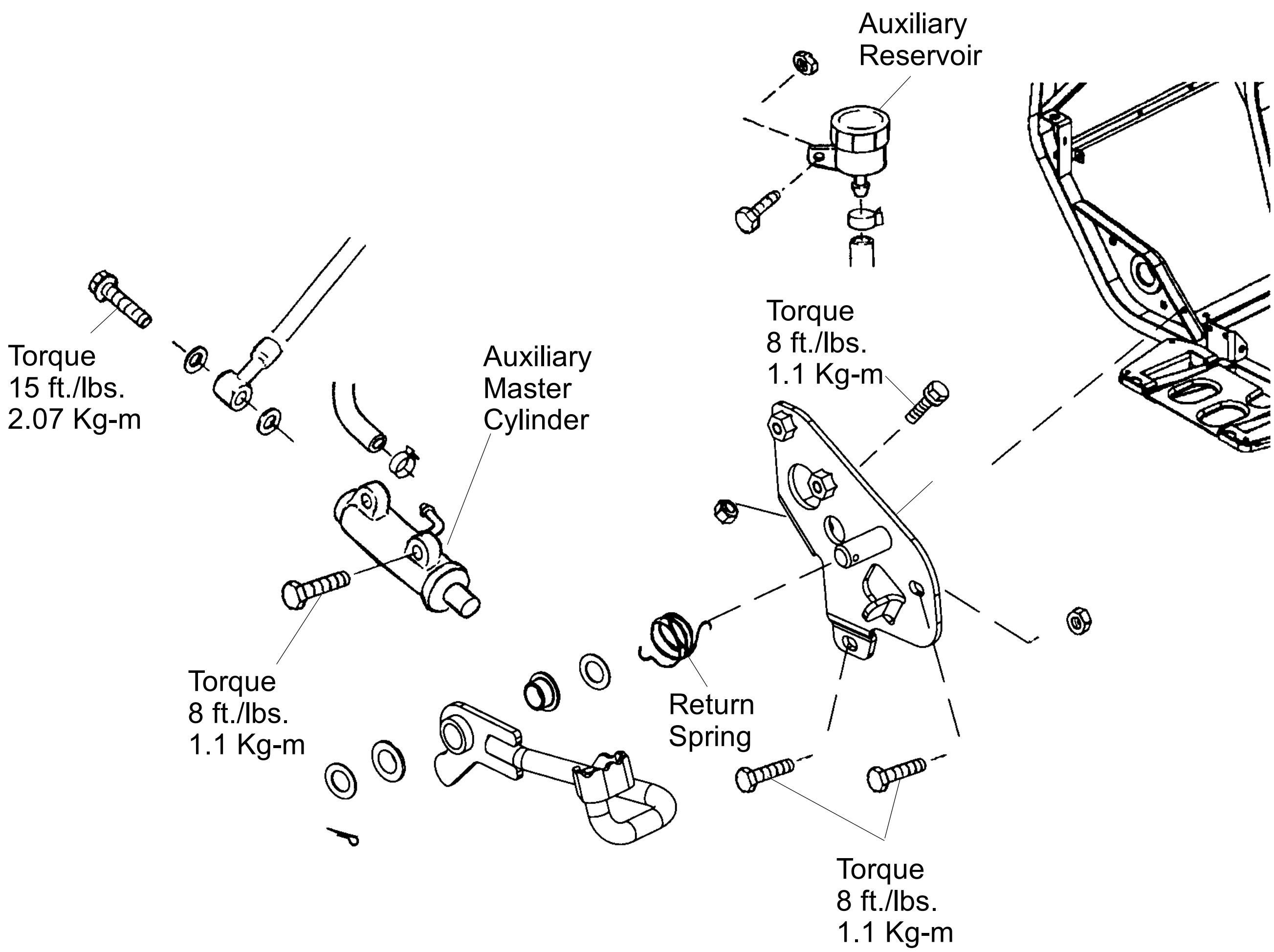
DH (Trans. Mounted) Caliper/Master Cylinder




Torque
18 ft./lbs.
2.48 Kg-m
DH
Caliper
Hand Brake
Bleed
Hand Brake Line
Auxiliary Brake Line
Torque
15 ft./lbs.
2.07 Kg-m
Spacer
Auxiliary
Brake Pads
Auxiliary
Brake Bleed
Auxiliary Brake
Reservoir
Torque
8 ft./lbs.
1.1 Kg-m
Torque
18 ft./lbs.
2.48 Kg-m
Return
Spring
Auxiliary Brake
Master Cylinder

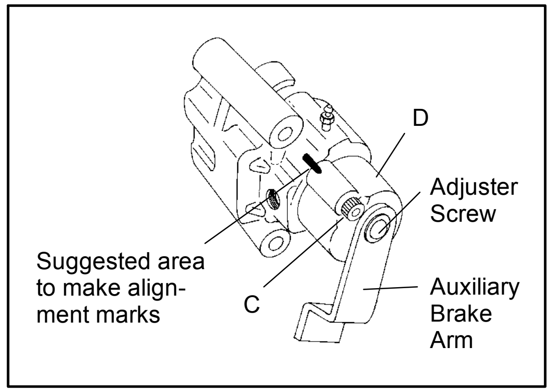
DH (Shaft Ride) Caliper/Master Cylinder



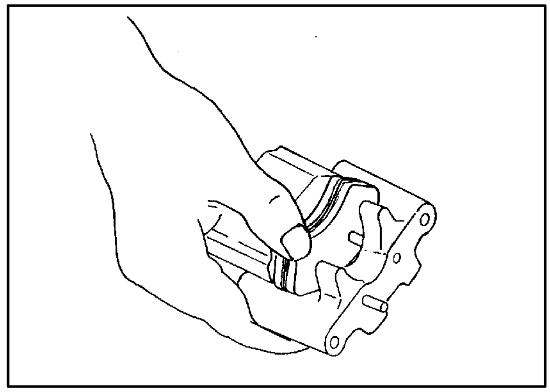


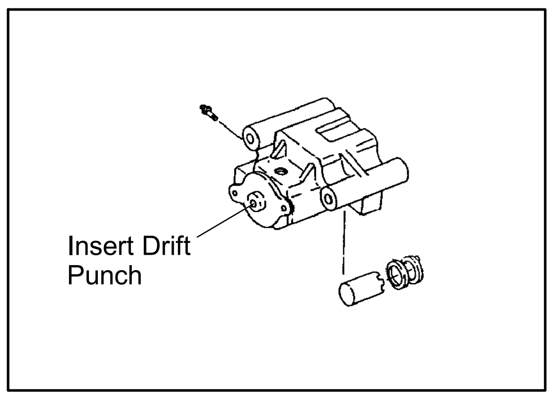
Disassembly

1. Make alignment marks on stationary ramp and caliper housing as shown in Ill.1.
2. Remove cotter pin and washer from actuator rod at brake arm.
3. Remove stationary ramp attaching screws (C).
4. Remove ramp assembly (D). It is not necessary to remove auxiliary brake arm unless brake arm or piston pin are being replaced. **NOTE:** To remove auxiliary brake arm or pin, turn the adjuster screw clockwise with a 3/16″ Allen wrench until the piston pin falls out. To remove brake arm, insert a deep well socket into moveable cam to hold lock nut while backing out the adjuster screw.
5. Apply downward pressure on brake pads directly over retaining pin, releasing pin pressure. Shake pin out of caliper or use a needle nose pliers to remove pin. **NOTE:** If pins are corroded it may be necessary to spray penetrating oil on pins.
6. Remove pins and brake pads.
7. Insert a drift punch in piston pin hole and tap with a soft face hammer. This will drive out the caliper piston. See Ill. 3.
8. By hand, walk caliper piston back and forth until it can be pulled out of caliper or remove with a caliper piston pliers (internal expanding).
9. Straighten a large paper clip and form a small hook on one end. Polish the end of the clip so there are no sharp edges. **CAUTION:** Extreme care must be used to avoid scratching the cylinder bore seal ring groove surfaces.
10. Position clip in cylinder bore. With a pushing, twisting action remove large inside seal and small outer dust seal and two small O-ring seals from brake caliper pin hole.
11. **Important:** Flush cylinder bore with brake fluid and clean with compressed air.



Ill. 1

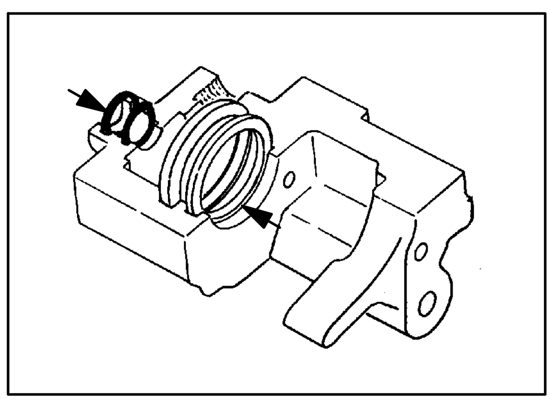

Ill. 2



Ill. 3

Inspection

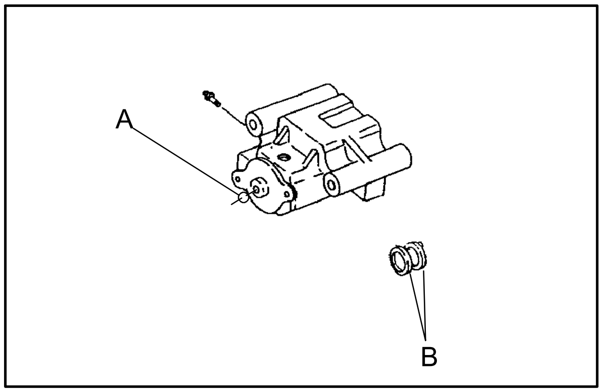
1. Inspect cylinder bore for scoring, pitting, or corrosion. A corroded or scored casting should be replaced; light scores and stains may be removed by polishing. Polish any discolored or stained area with **crocus cloth only**. **CAUTION:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. **Do not use any other type of abrasive or abrasive cloth.**
2. Inspect piston.


Ill. 4

Assembly

NOTE: Clean and inspect all components before reassembling.

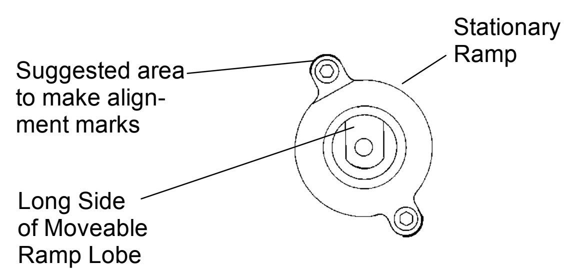
1. Lubricate new O-rings (A) with brake fluid and install into caliper pin bore.
2. Lubricate new seals (B) with brake fluid and install into caliper.
3. If piston pin or axillary brake arm were removed, lubricate all sliding surfaces of stationary and moveable brake ramps with a thin coat of Polaris high temp grease.



Polaris High Temp Grease

PN 2870616

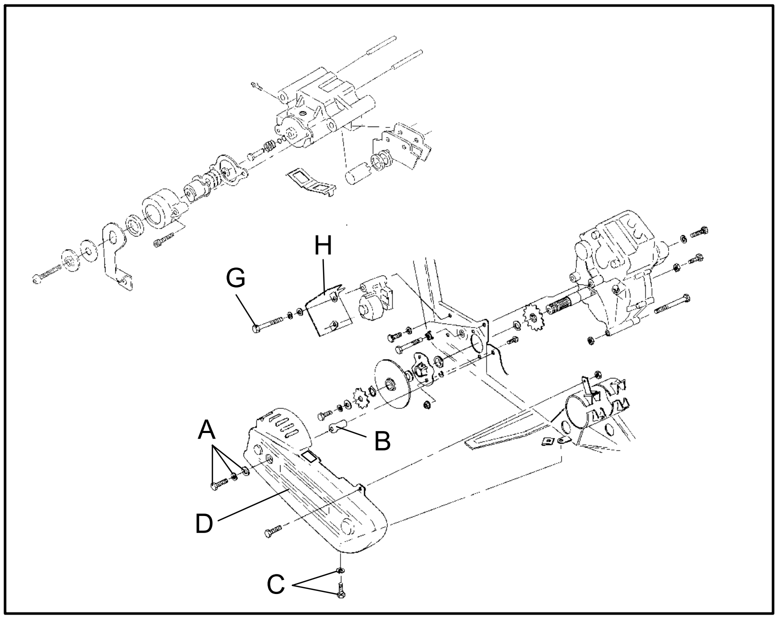
4. Align mark of stationary and moveable cam so long side of lobe is in the up position and just to the right of mark on stationary. Alignment marks must be matched and cam positioned correctly, as there are six possible combinations.
5. Reassemble adjuster screw through arm and moveable cam. Install washer on screw inside of cam. Reinstall lock nut and tighten until seated, then turn an additional 1/2 turn tighter.
6. Using a new gasket, assemble ramp to brake caliper. **NOTE:** Align marks of stationary and caliper made in step 1. Torque bolts to 5-6 ft. lbs.



7. Hold caliper so that the brake line fitting hole can be covered with your finger. Close bleeder fitting and add approximately 1/4 ounce of brake fluid to piston bore. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
8. Lubricate piston with brake fluid and install in caliper piston bore, flat beveled end first.
9. Compress piston until seated in caliper and wipe off excess brake fluid from piston area.
10. Attach brake line to caliper assembly and tighten fitting with a flare nut wrench. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
11. Reinstall spring plate, brake pads and pad pins to caliper.
12. Pump the handle 10 to 15 times to purge any fluid which may have accumulated between the seals during assembly.
13. Thoroughly wipe the piston and caliper dry.
14. Pressurize the brake system for approximately one minute. **NOTE:** The parking brake may be used to hold the pressure.
15. Check for “low pressure” leaks by lightly pumping the handle 5 to 10 times.
16. Compress piston into caliper until seated.

NOTE: The brake pads will need to be spread enough to accept the brake disc when reinstalling the caliper assembly.

Installation



1. Reinstall caliper assembly onto brake disc.
2. Install upper and lower caliper bolts, lock washers, and flat washers (G) to caliper shield (H) and secure caliper assembly to its mounting.
3. Torque caliper mount bolts to specification.
4. Install pedal rod on brake arm with existing washer and a new cotter key.
5. Adjust foot pedal at 1/2″ to 3/4″ (12.7 - 19.05 mm) travel of the pedal by turning adjuster screw clockwise.
6. (4 x 4 Models) Reinstall the middle chain guard (D) with rear most bolt, lock washer, flat washer (A) and spacer (B). Bolt the forward end of chain guard to the mounting brackets with hardware (C).

Caliper Mount Bolt Torque

10 - 12 ft. lbs. (1.4 - 1.7 kg-m)

7. Reinstall right front and rear mud flap bolt in footrest.
8. Refill master cylinder with DOT 3 brake fluid and reinstall cover and diaphragm.

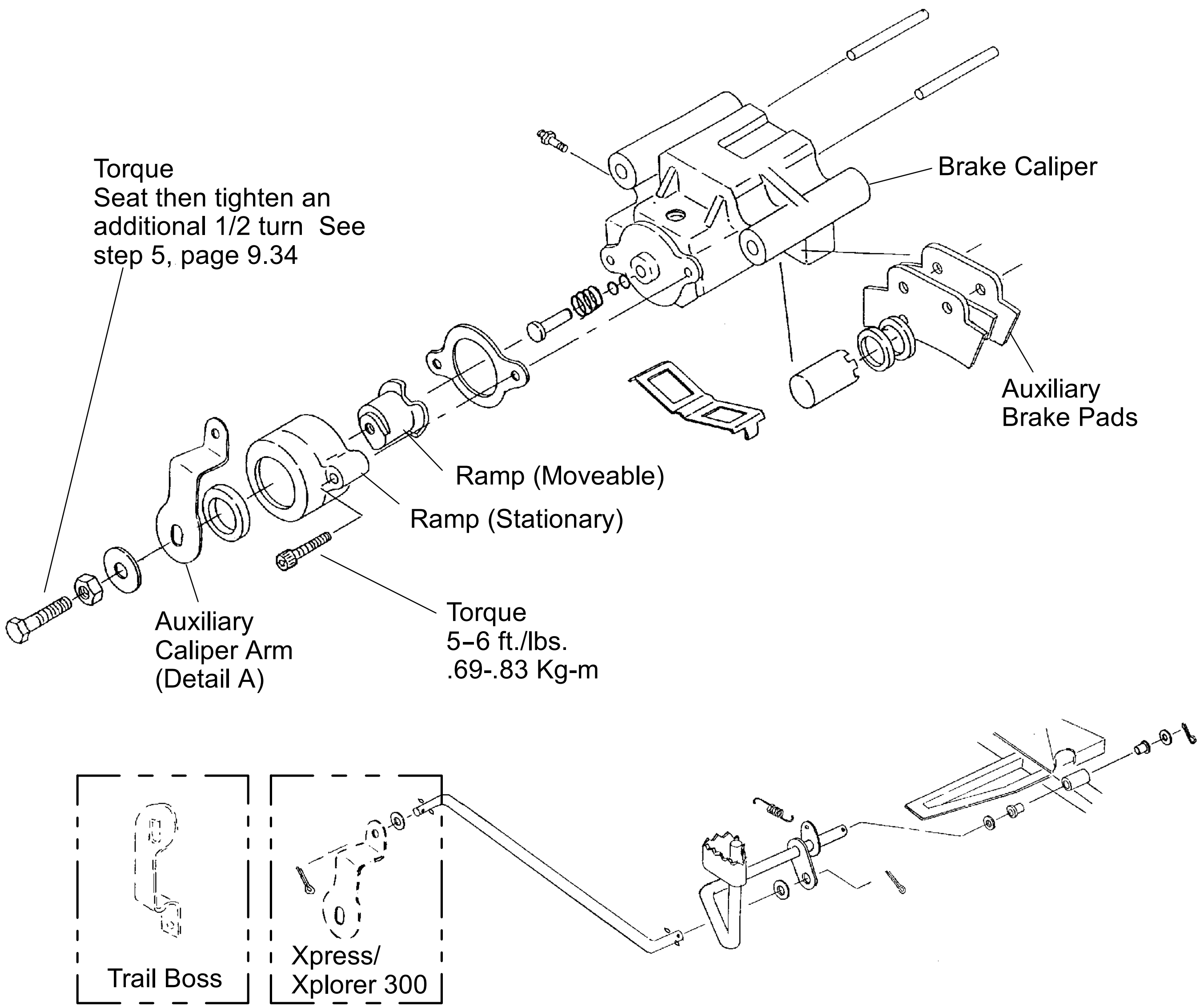
Polaris DOT 3 Brake Fluid

PN 2870990

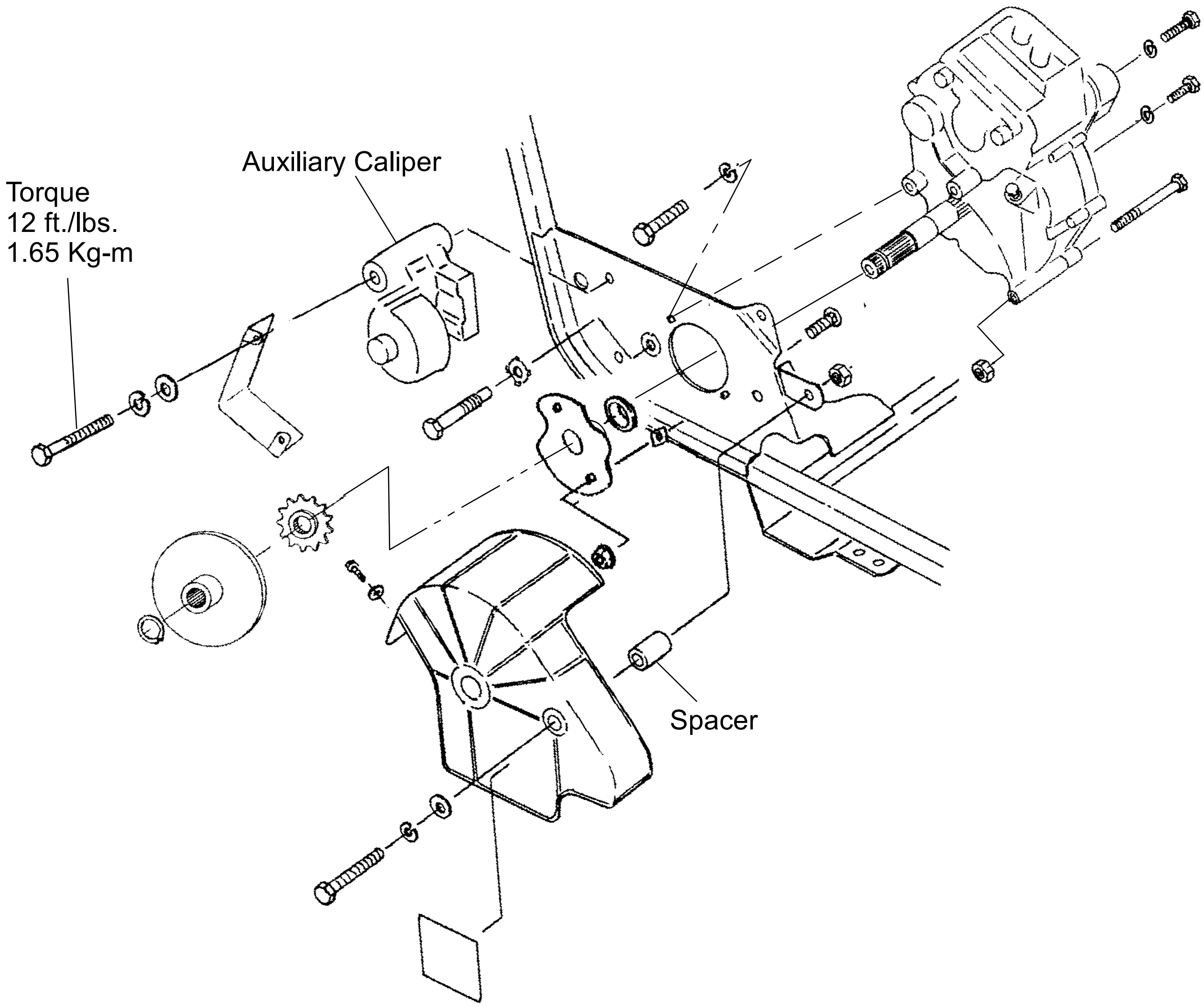
Master Cylinder Fluid Level

1/4″ - 5/16″ (6 - 8 mm) below top of master cylinder

9. Refer to brake bleeding instructions in this chapter and bleed system.
10. 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/pedal is released. If the brake drags, re-check assembly, installation and adjustment.
11. Machine should be stopped at least ten (10) times from at least 30 miles per hour using the auxiliary brake pedal only.


Torque
Seat then tighten an
additional 1/2 turn See
step 5, page 9.34
Brake Caliper
Auxiliary
Brake Pads
Ramp (Moveable)
Ramp (Stationary)
Auxiliary
Caliper Arm
(Detail A)
Torque
5–6 ft./lbs.
.69-.83 Kg-m
Trail Boss
Xpress/
Xplorer 300

Detail A


Auxiliary Caliper
Torque
12 ft./lbs.
1.65 Kg-m
Spacer

Troubleshooting

Brakes Squeal

- Dirty/contaminated friction pads
- Improper alignment
- Worn disc
- Worn disc splines

Poor Brake Performance

- Air in system
- Water in system (brake fluid contaminated)
- Caliper/disc misaligned
- Caliper dirty or damaged
- Brake line damaged or lining ruptured
- Worn disc and/or friction pads
- Incorrectly adjusted lever
- Incorrectly adjusted stationary pad
- Worn or damaged master cylinder or components
- Improper clearance between lever and switch

Lever Vibration

- Disc damaged
- Disc worn (runout or thickness variance exceeds service limit)

Caliper Overheats (Brakes Drag)

- Compensating port plugged
- Pad clearance set incorrectly
- Auxiliary brake pedal incorrectly adjusted
- Brake lever or pedal binding or unable to return fully
- Parking brake left on
- Residue build up under caliper seals
- Operator riding brakes

Brakes Lock

- Alignment of caliper to disc.

CHAPTER 10
ELECTRICAL

Special Tools

Fluke 73 Multitester or Tektronix DMM 155	PN 2870659
Strobe Timing Light	PN 2870630
Hydrometer	PN 2870836
Tachometer	PN 8712100 or PN 8712500
Test Harness, Wheel Speed Sensor	PN 2460761

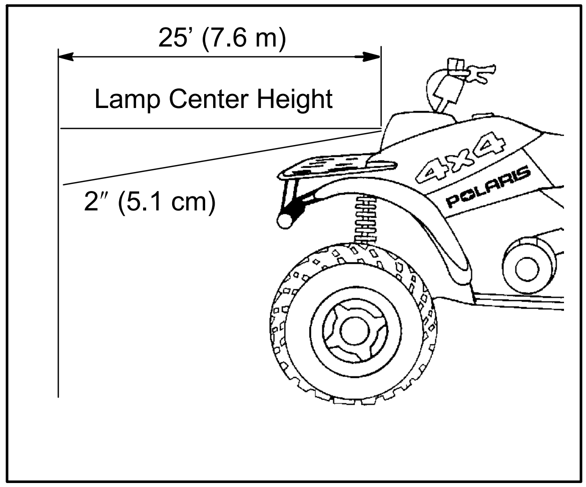
Special Tools

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 (under10 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™ 73 Digital Multimeter or a Tektronix DMM155. Both of these meters are 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.

Headlight Adjustment (Gen II)

The high beam headlight can be adjusted to any position desired by turning the four screws at the outer corners of the lamp housing. Use the following procedure:

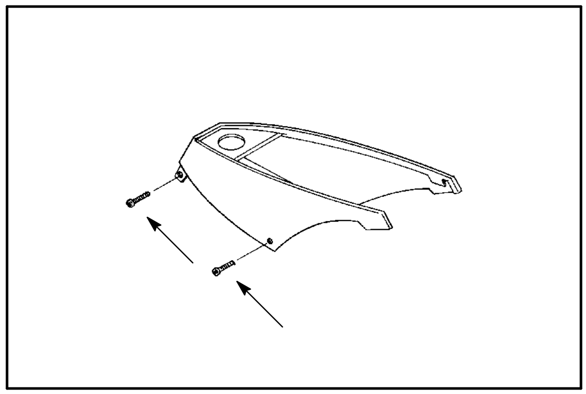


1. Place the vehicle on a level surface with the headlight approximately 25’ (7.6 m) from a wall.
2. Measure the distance from the floor to the center of the headlight and make a mark on the wall.
3. Shift transmission to neutral, start engine and turn headlight switch to high beam.
4. Observe headlight 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 screws at outer corners of lamp housing to achieve proper aim.

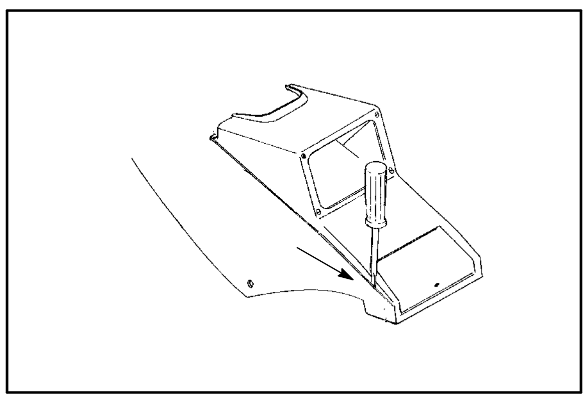
Headlight Lamp Replacement (Gen II)

⚠ **WARNING:** Due to the nature of ATVs and where they are ridden, headlight lenses become dirty. Frequent washing is necessary to maintain lighting quality. Riding with poor lighting can result in severe injury or death.

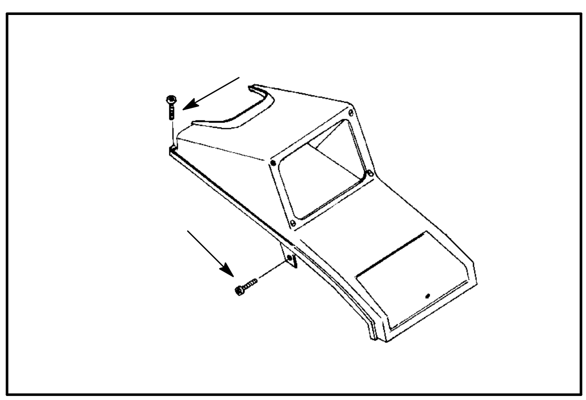
1. Remove the seat.
2. Remove the plastic panel surrounding the upper portion of the gas tank by first removing the gas tank cap.



3. Remove the Phillips screws on either side of the panel at the junction of this panel, the lower panels, and the rear of the front fenders.
4. Remove the Phillips screws on either side of the rear of the upper panel which were revealed by the removal of the seat.
5. Remove the door on the front of the ATV covering the radiator cap by turning the fastener one quarter turn.



6. Disengage the tabs at the front of the upper panel where they snap into the lower panel surrounding the headlight assembly. Also disengage the tabs on the upper panel which engage with the lower triangular panels on either side of the machine. Lift off the upper panel and set it aside.
7. Reinstall the gas tank cap.
8. Remove the panel surrounding the headlight by removing the Phillips screws from either side of this panel. Also remove the two Torx™ screws at the rear of this panel.



9. Ease the panel forward and up to allow you to reach the socket connected to the headlight lamp.

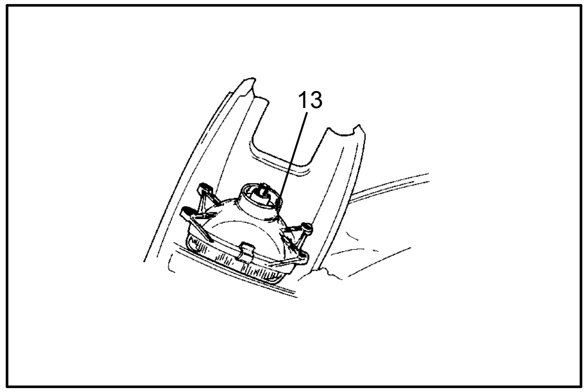
Headlight Lamp Replacement (Gen II)

10. Carefully unplug the socket from the lamp. Remove the panel and set it aside.

CAUTION: Do not service while headlight is hot. Serious burns may result.

11. Stand the panel containing the headlight assembly on end to allow access to the back of the headlight assembly.
12. Disengage the wire bail holding the headlight lamp in place and move it out of the way.
13. Grasp the base of the lamp and lift it out.
14. Reverse the previous steps to replace the lamp and reassemble the panels.

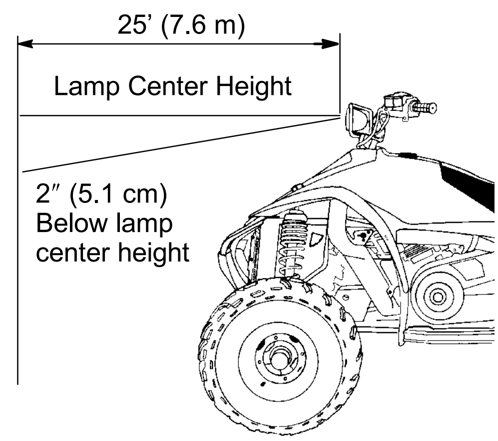
NOTE: Do not touch a halogen lamp with bare fingers. Oil from your skin leaves a residue, causing a hot spot which will shorten the life of the lamp. Hold the lamp by the base.



Headlight Adjustment (Gen III -Scrambler, Trail Blazer and Sport)

The headlight beam can be adjusted up and down and side to side.

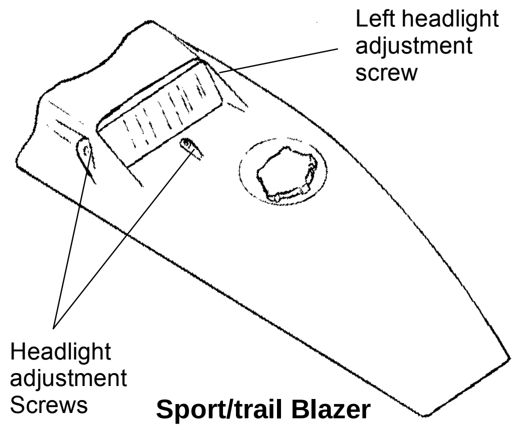
1. Place the vehicle on a level surface with the headlight approximately 25' (7.6 m) from a wall.
2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height.
3. Start the engine and turn the headlight switch to high beam.
4. Observe headlight 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.
5. On Scrambler models, loosen nut and bolt securing lamp to handlebars.
6. Adjust beam to desired position.
7. Tighten nut and bolt.



Scrambler

Adjustment - Trail Blazer and Sport

8. adjust beam to desired position by turning adjustment screws in headlight cover. Turning right screw clockwise moves the intense spot of light up to the left. Turning the left screw clockwise moves intense spot of light up to the right. Turning the bottom screw clockwise adjusts the light upwards.



Sport/trail Blazer

Headlight Lamp Replacement (Gen III)

NOTE: 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.

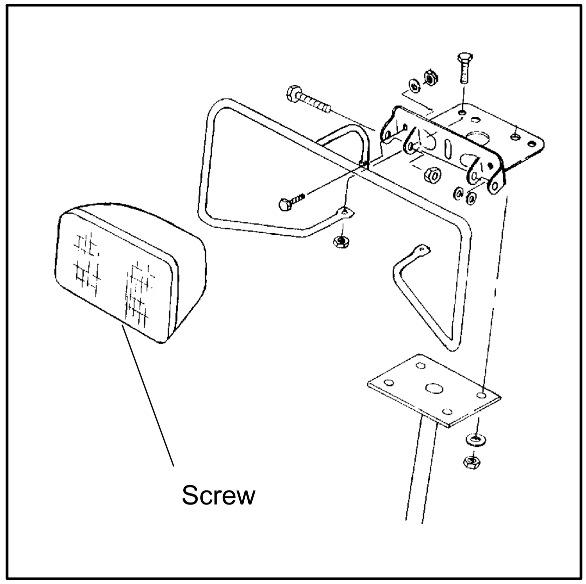
Trail Blazer and Sport

1. Remove rubber cap from back of headlight to reveal retention screw.
2. Remove small phillips head screw and carefully remove bulb from housing.
3. Unplug headlight lead wire from yellow jumper, and ground wire from terminal board.
4. Insert new bulb into housing and tighten retention screw.
5. Plug lead and ground wire back into terminal board and jumper.
6. Insert light assembly back into front cover and mount cover on machine.
7. Properly adjust headlight aim.

Headlight Lamp Replacement (Gen III)

Scrambler

1. Remove Phillips screw from bottom of headlamp.
2. Remove plastic lens retaining bracket.
3. Grasp base of bulb at back of housing and twist. Carefully remove bulb from housing.
4. Gently pull back locking tabs on wire harness terminal until base of bulb is released. Unplug bulb from harness.
5. Plug new bulb into wire harness, making sure it snaps into place.
6. Carefully insert bulb into back of housing. Twist to lock in place.
7. Reinstall plastic lens retaining bracket.
8. Reinstall Phillips screw in bottom of headlamp.

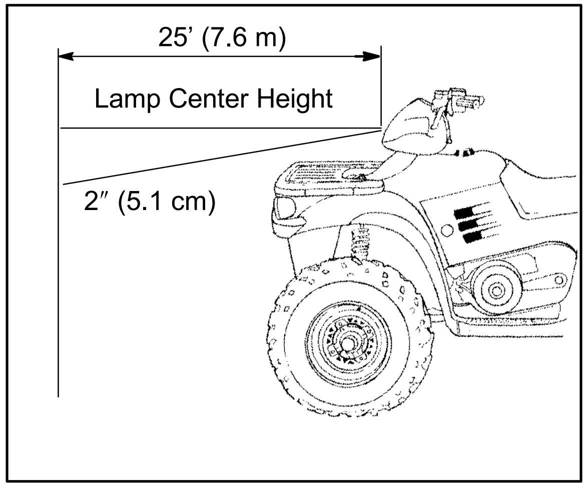


Headlamp Service - Gen IV

High Beam Headlight Adjustment (Gen IV)

The headlight beam can be adjusted to any position desired by turning the adjusting knob located on the bottom right side of the headlight pod.

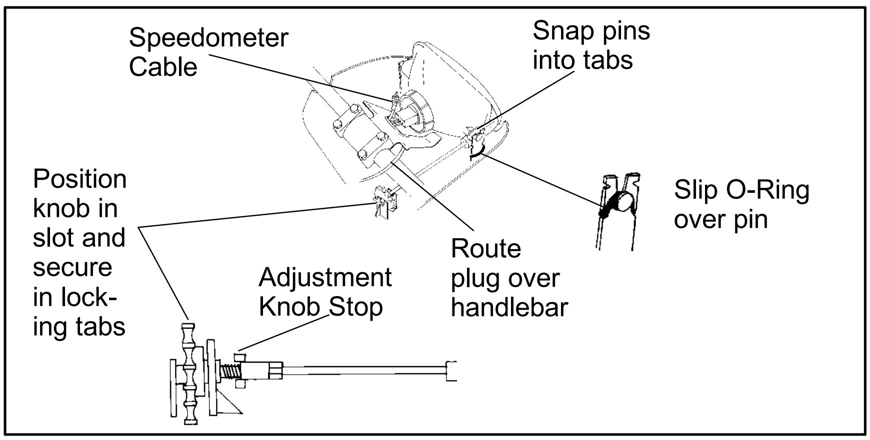
1. Place the vehicle on a level surface with the headlight approximately 25' (7.6 m) from a wall.
2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height.
3. Start the engine and turn the headlight switch to high beam.
4. Observe headlight aim. The most intense part of the headlight beam should be aimed 2″ (5.1 cm) below the mark placed on the wall in step 2. **NOTE:** Rider weight must be included on the seat. On machines with separate low beam lights, the drop should be 8″ (20.3 cm) in 25' from the center of the low beam lamp.
5. Adjust beam to desired position .



Headlight Lamp Replacement (Gen IV)

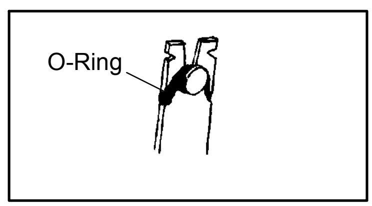
CAUTION: Do not service while headlight is hot. Serious burns may result.

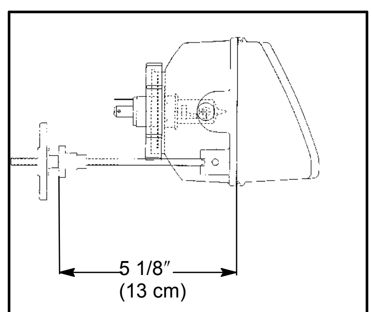
1. Remove Phillips screw from bottom of headlamp.
2. Remove plastic lens retaining bracket.
3. Grasp base of bulb at back of housing and twist. Carefully remove bulb from housing.
4. Gently pull back locking tabs on wire harness terminal until base of bulb is released. Unplug bulb from harness.



Headlight Housing Replacement (Gen IV)

1. Remove three Phillips screws at back of headlight pod.
2. Remove Phillips screws from bottom of headlight pod at each front corner. **NOTE:** To aid in accessing these screws, it may be helpful to turn handlebars to left or right and use a short, stubby screwdriver. Removal of the front rack and cover will also allow easier access.
3. Lift pod cover up. Using a pliers, disconnect speedometer cable. Unplug indicator lights from harness and remove pod cover.
4. Unplug headlamp from wiring harness.
5. Remove O-Ring from headlight pivot pins.
6. Pull headlight housing up to release from locking tabs.
7. Lift adjusting knob up to remove from locking tabs.
8. Carefully pull assembly up and out of pod.
9. Reverse steps to install new housing and reassemble pod.
10. Adjust headlight aim by turning adjusting knob.



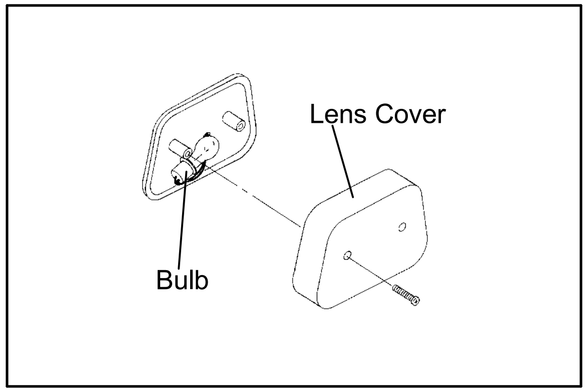


Distance from headlamp parting line to end of adjustment knob stop is 5 1/8″ (13 cm).

Taillight/Brakelight Lamp Replacement

If the taillight/brakelight does not work the lamp may need to be replaced.

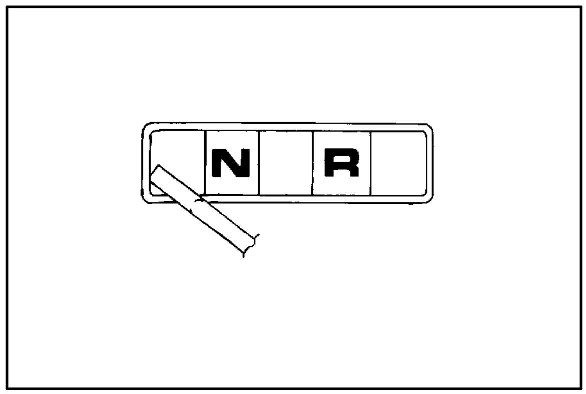
1. From the rear of the taillight remove two screws holding lens cover in place and remove lens cover.
2. Remove lamp and replace it with recommended lamp. Apply dielectric grease PN 2871027.
3. Reinstall the lens cover removed in step 1.
4. Test the taillight/brakelight to see that it's working.



Indicator Lamp Replacement (Gen II)

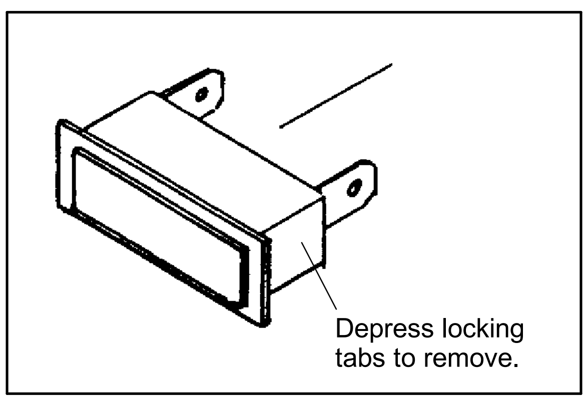
1. With a small, flat screwdriver gently pry loose the indicator light cover.
2. Using a small flexible tube (such as an oil delivery hose) grasp the burned out lamp and remove it.
3. Replace the removed lamp with a Polaris PN 4030042.
4. Replace the indicator light cover.

NOTE: Check all lights daily for proper operation replace or repair if necessary.



Indicator Lamp Replacement (Gen III and Gen IV)

1. Follow steps 1 - 3 of Indicator Lamp Replacement.
2. Disconnect light from harness, depress locking tabs and remove from pod.
3. Install new light and reassemble pod.



Timing Check Procedures

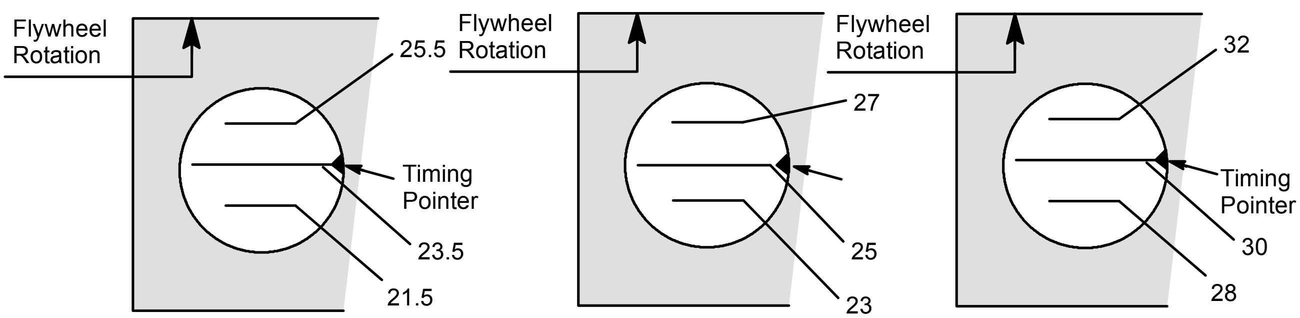
1. The ignition timing check hole is in the starter recoil/magneto housing. Remove the check plug.

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 3000 +/- 200 RPM (3500 ± 200 RPM for ES33PF, EH42PL, EH50PL).

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.

If the ignition timing is not within the specified range, adjust the stator plate position as described below.



EC38-PL

All EC25PFE- 09 and EC28PF(E)-01

ES33PF EH42PL, EH50PL

All Engines

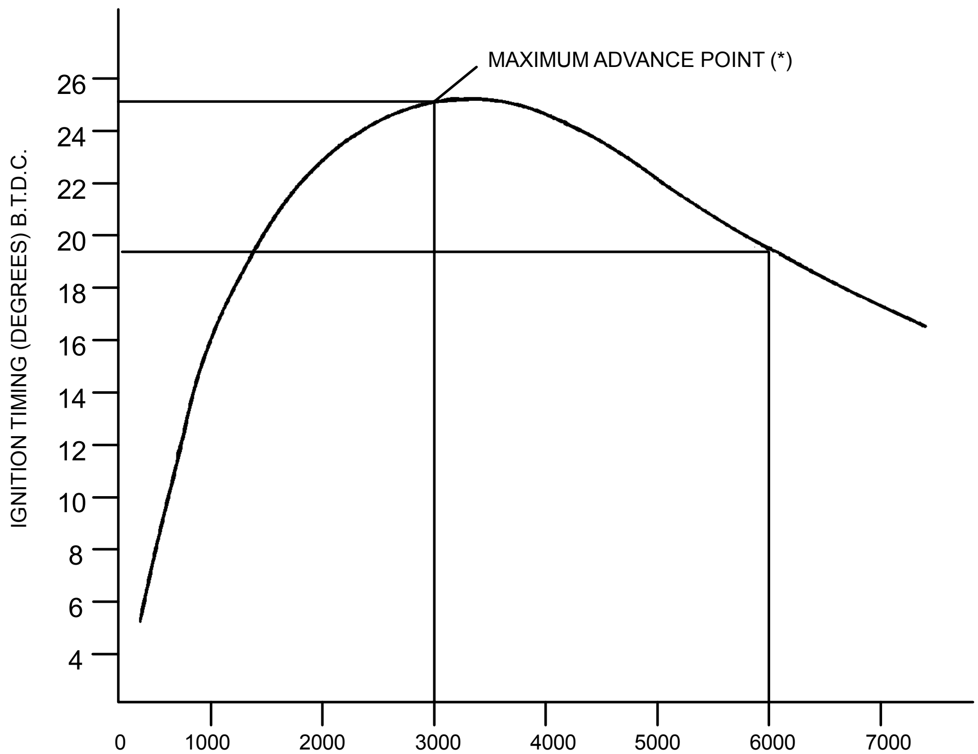
1. Remove the magneto housing.

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.

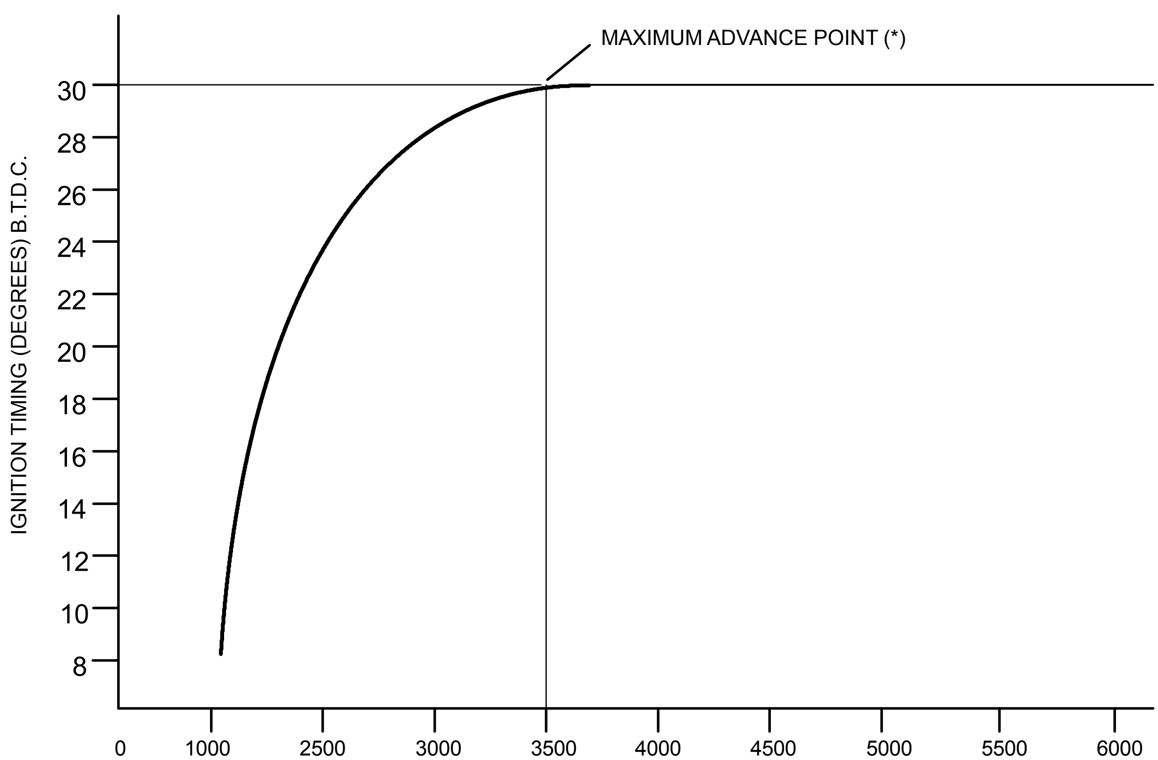
* Actual advance point may vary by several hundred RPM either above or below 3000. Use the point of maximum advance when checking ignition timing.

Typical 2-Stroke



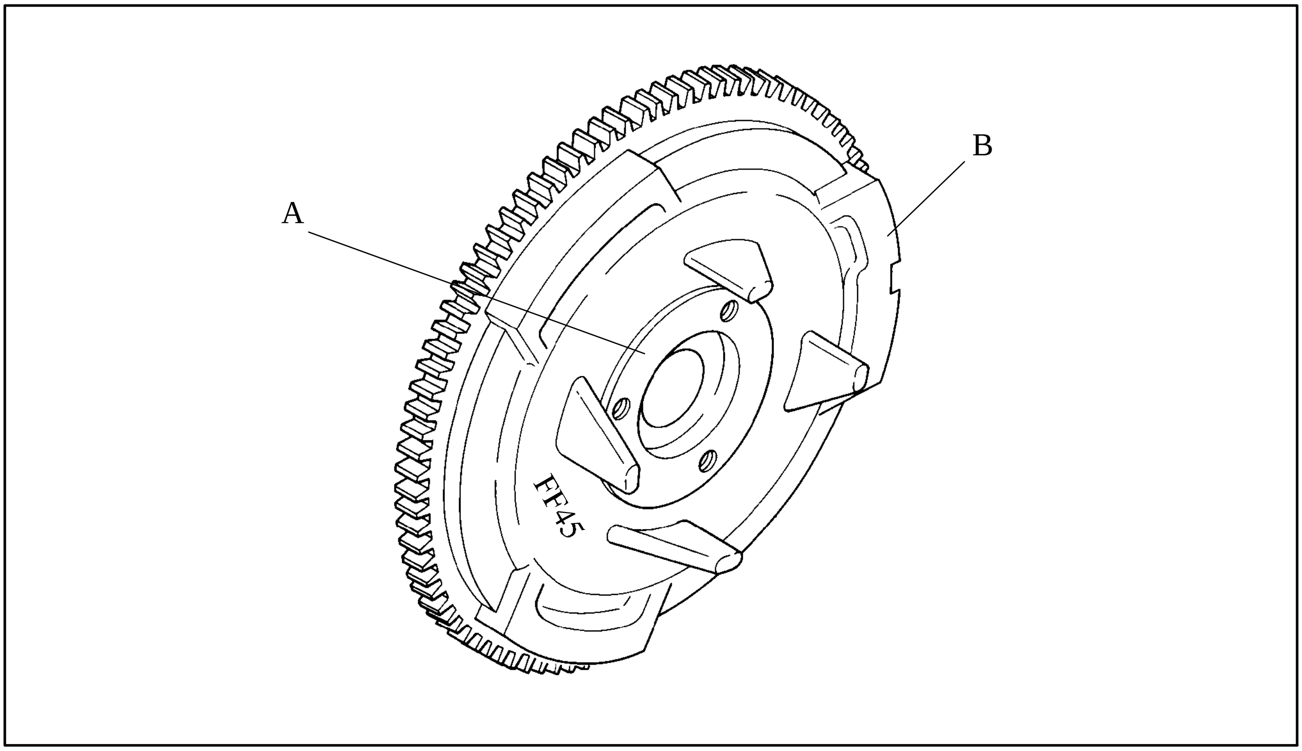
Typical 4-Stroke

* Actual advance point may vary by several hundred RPM either above or below 3500. Use the point of maximum advance when checking ignition timing.



Crankshaft Degree to Piston Position Conversion Chart (2 Stroke Engines)

Degrees	120 MM Rod 60 MM Stroke		120 MM Rod 65 MM Stroke		130 MM Rod 70 MM Stroke	
	EC25PF		EC28PF		EC35/38PL	
	MM	Inch	MM	Inch	MM	Inch
1	.006	.0002	.006	.0002	.007	.0003
2	.023	.0010	.025	.0010	.027	.0011
3	.051	.0020	.056	.0022	.061	.0024
4	.091	.0040	.100	.0040	.108	.0043
5	.143	.0060	.157	.0062	.169	.0070
6	.205	.0080	.226	.0089	.243	.0100
7	.279	.0110	.307	.0121	.331	.0130
8	.365	.0140	.401	.0158	.432	.0170
9	.461	.0180	.508	.0200	.546	.0220
10	.569	.0220	.626	.0247	.674	.0270
11	.688	.0270	.757	.0298	.815	.0320
12	.818	.0320	.900	.0355	.969	.0380
13	.959	.0380	1.055	.0416	1.136	.0450
14	1.111	.0440	1.223	.0482	1.316	.0520
15	1.274	.0500	1.402	.0552	1.509	.0590
16	1.447	.0570	1.593	.0627	1.714	.0680
17	1.632	.0640	1.796	.0707	1.933	.0760
18	1.827	.0720	2.011	.0792	2.164	.0850
19	2.033	.0800	2.238	.0881	2.407	.0950
20	2.249	.0890	2.476	.0975	2.663	.1050
21	2.475	.0970	2.725	.1073	2.931	.1150
22	2.712	.1070	2.985	.1175	3.211	.1260
23	2.959	.1170	3.257	.1282	3.504	.1380
24	3.216	.1270	3.540	.1394	3.808	.1500
25	3.482	.1370	3.633	.1509	4.124	.1620
26	3.759	.1480	4.138	.1629	4.451	.1750
27	4.045	.1590	4.453	.1753	4.790	.1890
28	4.341	.1710	4.778	.1881	5.140	.2020
29	4.646	.1830	5.114	.2013	5.501	.2170
30	4.960	.1950	5.459	.2149	5.872	.2310

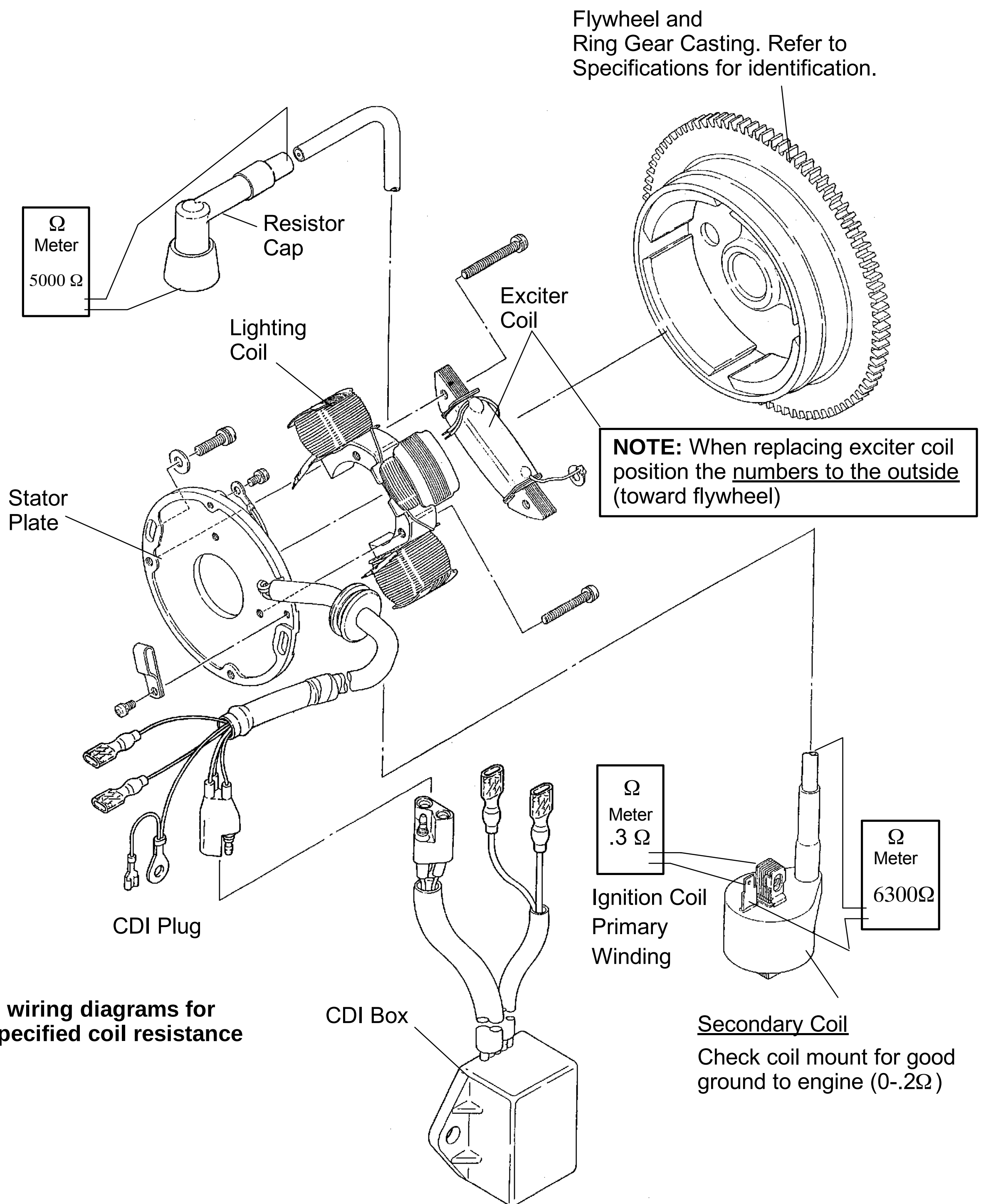


Flywheel Identification Stamp Location

The flywheel can be identified by the stamp mark in location A or B. Refer to "I.D." location in chart below. Do not use the cast mark to determine flywheel application.

1999 Engine Application	Type	Cast	Stamp	Comment	Flywheel I.D. Stamp
Trail Boss / Trail Blazer EC25PFE10, EC25PFE13	FF4564	FF45	64	With Ring Gear	B
300 Xplorer, Xpress EC28PFE02	FF4574	FF95	4574	150W	A
Sportsman 335 ES33PFE01, ES33PFE02	FF9502	FF95	02	200W	A
Xplorer 400 EC38PLE08	FF9504	FF95	04	200W	A
Scrambler 400, Sport 400 EC38PLE09	FF4576	FF95	4576	150W	A
Magnum EH50PLE08	FF9706	FF97	06	250W	A
Sportsman 500 and RSE EH50PLE09	FF9706	FF97	06	250W	A
Big Boss 500 6x6 and RSE EH50PLE09	FF9706	FF97	06	250W	A
Scrambler 500 EH50PLE04	FF9706	FF97	06	250W	A

Components of EC25/28PL 150 Watt Alternator (Exploded View)



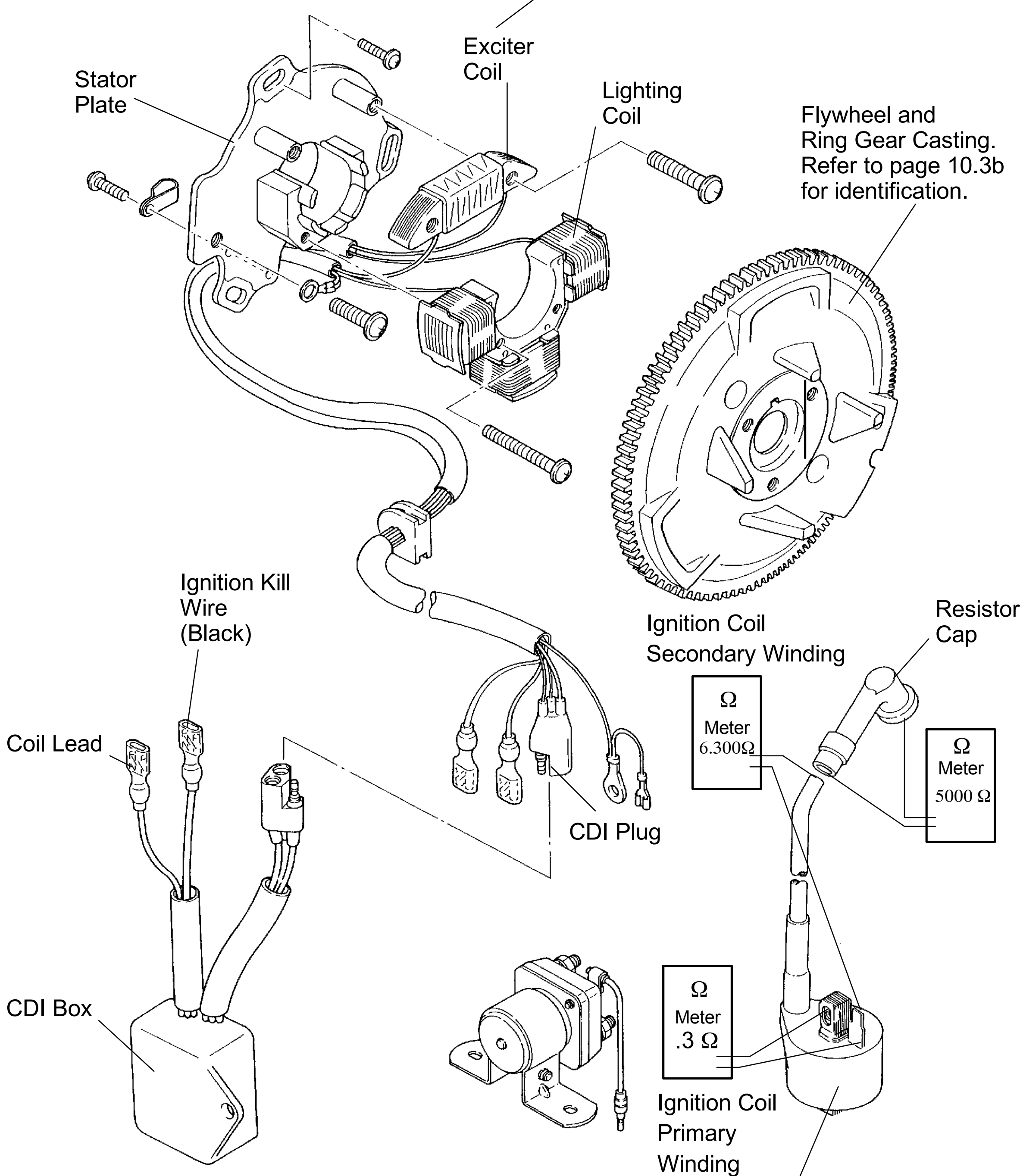
Refer to wiring diagrams for stator specified coil resistance

NOTE: CDI boxes may look the same but have different internal circuitry. Be sure to always use the correct CDI box part number.

Components of EC38PL 150 Watt Alternator (Exploded View)

Refer to wiring diagrams for specified stator coil resistance

NOTE: When replacing exciter coil position the numbers to the outside (toward flywheel).

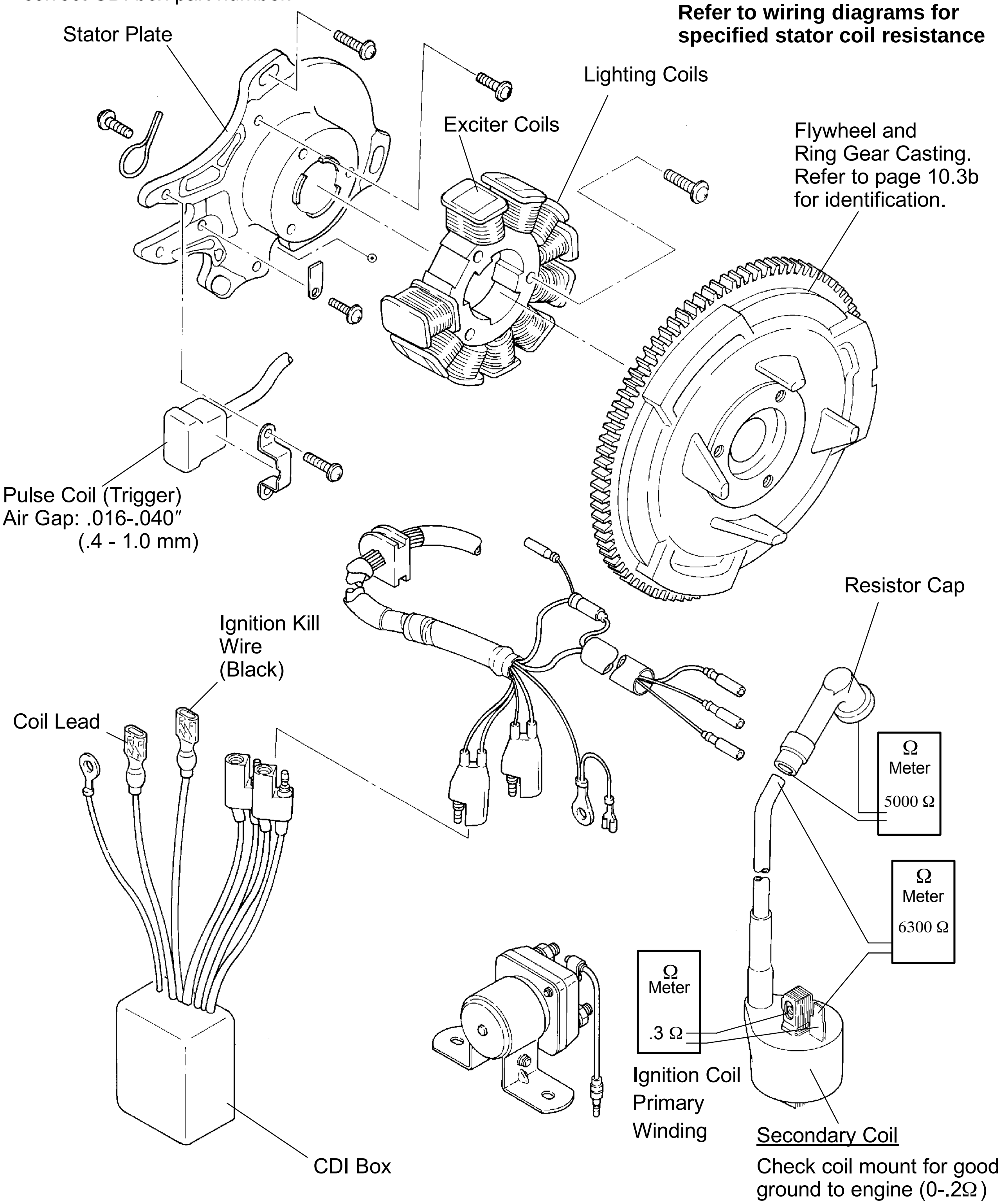


Secondary Coil
Check coil mount for good ground to engine (0-.2Ω)

NOTE: CDI boxes may look the same but have different internal circuitry. Be sure to always use the correct CDI box part number.

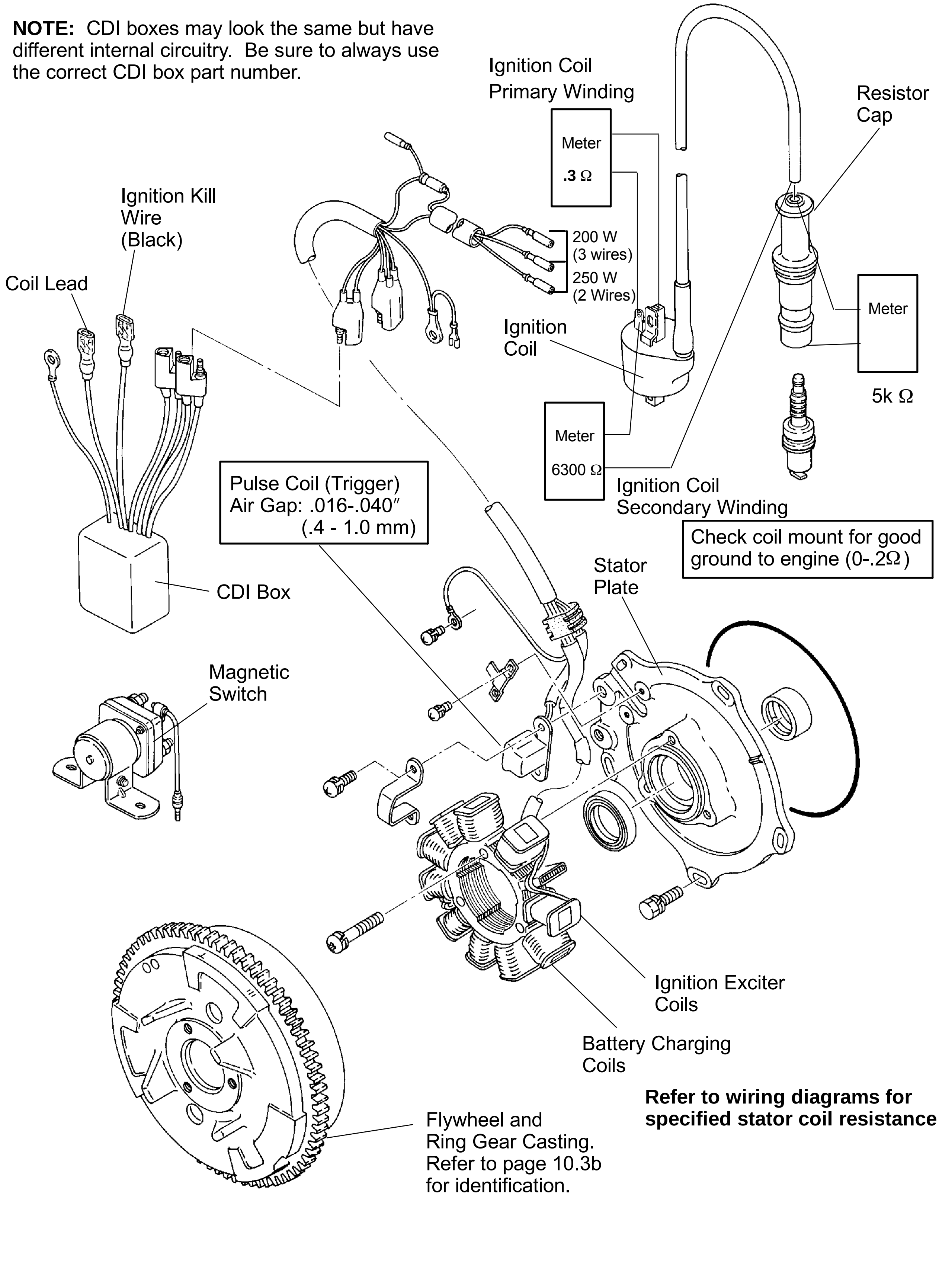
ELECTRICAL
Components of EC38PL 200 Watt Alternator (Exploded View)

NOTE: CDI boxes may look the same but have different internal circuitry. Be sure to always use the correct CDI box part number.



Components of ES33PF/EH50PL 200 / 250 Watt Alternator (Exploded View)

NOTE: CDI boxes may look the same but have different internal circuitry. Be sure to always use the correct CDI box part number.



Refer to wiring diagrams for specified stator coil resistance

Ignition System

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

Replace Spark Plug

Disconnect the black wire at the CDI module to isolate the ignition from the kill system.

Does it have spark?

Yes → -Test the ignition switch, engine stop switch, and speed limiter circuit for shorts to ground.
-Check terminal board or connectors for moisture, wire color matching or corrosion.

No ↓

Disconnect the exciter coil and pulse coil connector from the CDI module. Measure the resistance of the exciter coil and pulse coil (where applicable). Refer to the chart on page 10.3 or the wiring schematic for meter connections and specifications. Compare results to the specifications on the chart. Are all within specifications?

No → Inspect connectors, wiring and grounds to the component in question. Replace the component if a wiring problem cannot be found.

Yes ↓

Check coil ground connection between engine and coil mount using an ohmmeter. The coil mount should have good continuity to ground on the engine (0-.2 Ω).

No → Clean coil mounting area. Repair ground wire connections.

Yes ↓

Disconnect and check the secondary coil. Resistance values should be:

Primary Side - Primary Wire Tab to Ground (on coil mount or engine): .3 to .5 Ohms

Secondary Side High Tension Wire to engine ground- Cap installed - 11,300Ω
Cap removed - 6300Ω

Are these values within specs?

No → Replace the ignition coil.

Yes ↓

If all of the above tests are within specifications, and all grounds, connections, and wire color coding have been inspected, perform voltage output tests on following page or replace the CDI module.

Cranking Output Test With Peak Reading Voltmeter

The following peak voltage tests will measure the amount of output directly from each component. A peak reading voltmeter must be used to perform the tests. A variety of peak reading adaptors are commercially available for use with the Fluke ™ 73 Digital Multitester, Tektronix DMM155, and other digital VOMs which will allow peak voltage tests to be performed accurately. Follow the directions provided with the adaptor. All measurements are indicated in DC Volts. Readings obtained without a peak reading adaptor will be significantly different.

Disconnect the stator connectors from the CDI module. Test output from exciter coil, pulse (trigger) coil, and compare to the chart. The following measurements are obtained when cranking the engine with the electric starter, spark plug installed. The starter system must be in good condition and the battery fully charged.

200 / 250 Watt 4 Stroke

Coil	Connect Meter Wires To:	Reading (With Peak Reading Volt meter)
Exciter 1	Black/Red and Red	140 DCV
Exciter 2	Black/Red and Green	140 DCV
Exciter 3	Green and Red	5 DCV
Pulse (Trigger)	White/Red and White	2.5 DCV

200 Watt 2 Stroke

Coil	Connect Meter Wires To:	Reading (With Peak Reading Volt meter)
Exciter	Black/Red - Red	140 DCV
Pulse (Trigger)	White/Red -White	2.5 DCV

150 Watt 2 Stroke

Coil	Connect Meter Wires To:	Reading (With Peak Reading Volt meter)
Exciter	Black/Red - Brn/White	130 DCV

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. Crank engine and check output of CDI wire to coil (130 DCV). Reconnect coil wire to CDI.

Output w/ Peak output tester
130 DCV
Average Output w/ Digital Voltmeter
20 DCV

Ignition System Troubleshooting

No Spark, Weak or Intermittent Spark

- Spark plug gap incorrect
- Fouled spark plug
- Faulty spark plug cap or poor connection to high tension lead
- Related wiring loose, disconnected, shorted, or corroded
- Engine Stop switch or ignition switch faulty
- ETC switch misadjusted or faulty
- Terminal board or connections wet, corroded
- Poor ignition coil ground (e.g. coil mount loose or corroded)
- Faulty stator (measure resistance of all ignition related windings)
- Incorrect wiring (inspect color coding in connectors etc)
- Faulty ignition coil winding (measure resistance of primary and secondary)
- Worn magneto (RH) end Crankshaft bearings
- Sheared flywheel key
- Flywheel loose or damaged
- Trigger coil air gap too wide (where applicable) - should be .016-.040″ (.4-1.0 mm)
- Excessive crankshaft runout on magneto (RH) end - should not exceed .005″
- White stator wire (150W alternators) not grounded to engine
- Faulty CDI module**

Initial Battery Service

> **⚠ 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. If battery acid gets on anyone, wash the affected area with large quantities of cool water and seek immediate medical attention.

To ensure maximum service life and performance from a new battery, perform the following steps. **NOTE:** Do not service the battery unless it will be put into regular service within 30 days. After initial service, add only distilled water to the battery. Never add electrolyte after a battery has been in service.

1. Remove vent plug from vent fitting.
2. Fill battery with electrolyte to upper level marks on case.
3. Set battery aside and allow it to cool and stabilize 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.

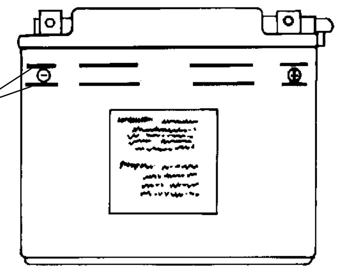
Battery Terminals/Terminal Bolts

Use Polaris corrosion resistant dielectric grease (PN 2871027) on battery bolts. See Battery Installation on page 10.20.

Battery Inspection/Removal

The battery is located under the left rear fender.

Inspect the battery fluid level. When the battery fluid nears the lower level, the battery should be removed and distilled water should be added to the upper level line. To remove the battery:



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. Disconnect the vent hose.
4. Remove the battery.
5. Remove the filler caps and add *distilled water only* as needed to bring each cell to the proper level. Do not overfill the battery.

To refill use only distilled water. Tap water contains minerals which are harmful to a battery.

Do not allow cleaning solution or tap water to enter the battery. It will shorten the life of the battery.

6. Reinstall the battery caps.

Battery Installation

1. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one cup water and one tablespoon baking soda. Rinse will with clean water and dry thoroughly.
2. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Polaris dielectric grease PN 2871027.
3. 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.
4. Route cables so they are tucked away in front and behind battery.
5. Reinstall battery cover and holder strap.

Do not start the engine with the battery disconnected. Vehicle lamps will burn out if battery is disconnected during vehicle operation. Also, the reverse speed limiter can be damaged.

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.

OCV - Open Circuit Voltage Test

Battery voltage should be checked with a digital multitester. Readings of 12.6 or less require further battery testing and charging. See charts and Load Test on page 10.21.

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.

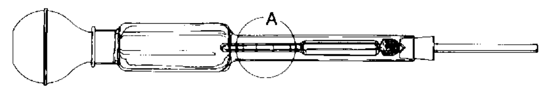
Specific Gravity Test

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.

OPEN CIRCUIT VOLTAGE		
State of charge	Conventional Lead-acid	YuMicron™ Type
100% Charged 75% Charged 50% Charged 25% Charged 0% Charged	12.60V 12.40V 12.10V 11.90V less than 11.80V	12.70V 12.50V 12.20V 12.0V less than 11.9V

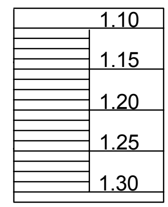
SPECIFIC GRAVITY		
State of charge*	Conventional lead-acid	YuMicron™ Type
100% Charged 75% Charged 50% Charged 25% Charged 0% Charged	1.265 1.210 1.160 1.120 less than 1.100	1.275 1.225 1.175 1.135 less than 1.115

* At 80_F
NOTE: Subtract .01 from the specific gravity reading at 40_ F.



Polaris PN 2870876

Detail A



Load Test

CAUTION: Remove spark plug high tension leads and connect securely to engine ground before proceeding.

NOTE: This test can only be performed on machines with electric starters. This test cannot be performed with an engine or starting system that is not working properly.

A battery may indicate a full charge condition in the OCV test and the specific gravity test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered. To perform this test, hook a multitester to the battery in the same manner as was done in the OCV test. The reading should be 12.6 volts or greater. Engage the electric starter and view the registered battery voltage while cranking the engine. Continue the test for 15 seconds. During this cranking period, the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.6 or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

Off Season Storage

To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

- Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning. **NOTE:** Do not get any of the baking soda into the battery or the acid will be neutralized.
- Using a wire brush or knife, remove any corrosion from the cables and terminals.
- Make sure that the electrolyte is at the proper level. Add distilled water if necessary.
- Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the electrolyte's specific gravity reaches 1.270 or greater.
- Store the battery either in the machine with the cables disconnected, or put it on a piece of wood and store in a cool place. **NOTE:** Stored batteries lose their charge at the rate of 1% per day. They should be recharged to a full charge every 30 to 60 days during a non-use period. If the battery is stored during the winter months the electrolyte will freeze at a higher temperature as the battery discharges. The chart at right indicates freezing points by specific gravity.

Charging Procedure

Charge the battery with a charger no larger than 1/10 of the battery's amp/hr rating for as many hours as needed to raise the specific gravity to 1.270 or greater.

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

1. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with Polaris corrosion resistant dielectric grease.

Polaris Dielectric Grease

PN 2871329 (Nyogel)

⚠ WARNING

To avoid the possibility of explosion, connect positive (red) cable first and negative (black) cable last.

2. Connect battery cables.
3. After connecting the battery cables, install the cover on the battery and attach the hold down strap.
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. 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.
5. Route cables so they are tucked away in front and behind battery.

Charging System Testing

Whenever charging system problems are suspected, proceed with the following system check.

Using a multitester set on D.C. volts, measure the battery open circuit voltage (See page 10.21). It should be 12.4 volts or more. Is it?

→ No → Remove the battery and properly service. Reinstall the fully charged battery or a fully charged shop battery.

↓ Yes

Meter Setting: DC Volts
With the transmission in neutral, start the engine and increase RPM to between 3000 and 4000. Read battery voltage with the multitester. Readings should be between 13.0 and 14.6 V D.C.

Are they?

→ Yes → Check Key off Current Draw

↓ No

Meter Setting: DC Amps
Perform system **"Break Even Amperage"** test outlined on page NO TAG.

Does charging occur as specified?

→ Yes → Check for owner modification, and discuss operating habits. The battery will continually discharge if operated below the "Break Even" RPM. Continued problems would call for battery inspection.

↓ No

Meter Setting: AC Amps
Disconnect the Yellow/Red, Yellow, and Yellow/Brn (if applicable) wires from the regulator/rectifier. Using a multitester, perform an **Alternator Output (AC amp) test**. See test procedure on page NO TAG for procedure.

Is output above 5 amps?

→ No → Inspect the wiring harness between the panel and the stator for damage. If no damage is found, remove the recoil and flywheel. Inspect the flywheel magnets, stator coils and stator wire harness for damage. Repair or replace any damaged components.

↓ Yes

Meter Setting: DC Volts
Reconnect the alternator wires. Note: Red wire must be connected to harness. Battery voltage must be present on red wire terminal on harness side of voltage regulator connector.

Is it?

→ No → Check regulator/rectifier connections and ground, battery connections, circuit breaker and connecting wires. Repair or replace faulty wiring or components.

↓ Yes

If all of the previous tests indicate a good condition, but the charging voltage does not rise above battery voltage at the connector or terminal board, replace the voltage regulator.

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 DCA (20 mA)

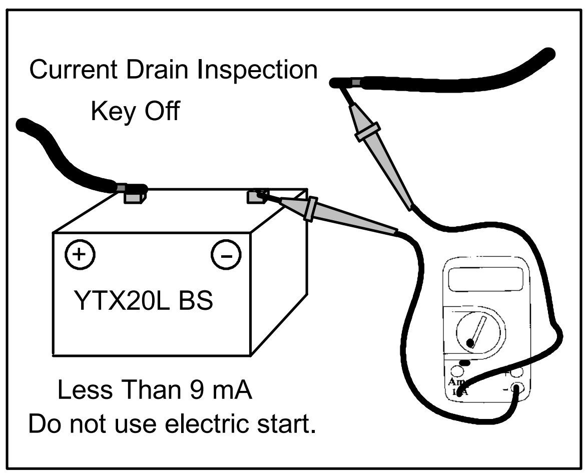
Charging System "Break Even" Test

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, or 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 on 150, 200, and 250 watt alternators.
- 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 3000 RPM on 150 watt alternators and below 2000 RPM on 200 and 250 watt alternators.



Alternator Output Test (AC amp)

This test measures AC amperage from the alternator.

- 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 Yellow and Yellow/Red wires leading from the alternator.
- Start the engine and let it idle. Reading should be a minimum of 7A at idle.

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. 10-15 seconds is acceptable.

Alternator Current Output:
Minimum of 7 AC Amps

To Calculate Available Alternator Output

$$I = \frac{P}{E}$$

$$\frac{150W}{12V} = 12.5 \text{ Amps}$$

$$\frac{200W}{12V} = 16.7 \text{ Amps}$$

$$\frac{250W}{12V} = 20.8 \text{ Amps}$$

I = Current in Amps
P = Power in Watts
E = Electromotive Force (Volts)

Starter System Troubleshooting

Starter Motor Does Not Turn

- Battery discharged - low specific gravity
- Loose or faulty battery cables or corroded connections (see Voltage Drop Tests)
- Related wiring loose, disconnected, or corroded
- Poor ground connections at battery cable, starter motor or starter solenoid (see Voltage Drop Tests)
- Faulty starter button
- Faulty ignition switch (Do other systems function?)
- Faulty starter solenoid or starter motor.
- Engine problem - seized or binding (Can engine be rotated easily with recoil starter?)

Starter Motor Turns Over Slowly

- Battery discharged - low specific gravity
- Excessive circuit resistance - poor connections (see Voltage Drop Test below)
- Engine problem - seized or binding (Can engine be rotated easily with recoil starter?)
- Faulty or worn brushes in starter motor
- Automatic compression release inoperative

Starter Motor Turns - Engine Does Not Rotate

- Faulty starter drive
- Faulty starter drive gears or starter motor gear
- Faulty flywheel gear or loose flywheel

Voltage Drop Test

The Voltage Drop Test is used to test for bad connections. When performing the test, you are testing the amount of voltage drop through the connection. A poor or corroded connection will appear as a high voltage reading. Voltage shown on the meter when testing connections should not exceed .1 VDC per connection or component.

To perform the test, place the meter on DC volts and place the meter leads across the connection to be tested. Refer to the chart on next page to perform voltage drop tests on the starter system.

Voltage should not exceed:
.1 DC volts per connection

Condition: Starter fails to turn motor. **NOTE:** Make sure engine crankshaft is free to turn before proceeding with dynamic testing of starter system. A digital multitester must be used for this test.

With the tester on the VDC position, place the tester's black lead on the battery negative and the red lead on the battery positive.

Reading should be 12.4 or greater.

No → Remove battery and properly service. Install fully charged shop battery to continue test.

Yes

Disconnect White/Red engagement coil wire from the starter solenoid. Connect tester black wire to battery ground. Connect red tester lead to White/Red harness wire at solenoid. Turn on ignition switch and depress the starter button. Tester should read battery voltage.

No → Check voltage on both sides of circuit breaker, ignition switch/engine stop switch and starter button. The voltage on both sides should be the same. **NOTE:** The ignition switch and engine stop switch must be on and the starter button depressed. Replace the defective component.

Yes → Test starter solenoid coil by connecting an ohmmeter between the solenoid red wire and the solenoid mounting plate. Resistance should be 3.4Ω. Check solenoid ground path by measuring resistance between mounting plate and battery negative terminal (-).

Voltage Drop Testing

See Page NO TAG for instructions.

Reconnect the solenoid. Connect the tester black lead to the battery positive and the red lead to the solenoid end of the battery-to-solenoid wire. Depress starter button. Reading should be less than .1 V D.C.

No → Clean the battery-to-solenoid cable ends or replace the cable.

Yes

Connect the black tester lead to solenoid end of battery-to-solenoid cable. Connect red tester lead to solenoid end of solenoid-to-starter cable. Depress starter button. Reading should be less than .1 V D.C.

No → Replace the starter solenoid.

Yes

Connect the black tester lead to the solenoid end of the solenoid-to-starter cable. Connect the red tester lead to the starter end of the same cable. Depress the starter button. The reading should be less than .1 V D.C.

No → Clean the solenoid-to-starter cable ends or replace the cable.

Yes

If all of these indicate a good condition, yet the starter still fails to turn, the starter must be removed for static testing and inspection.

Starter Motor Disassembly (Typical)

NOTE: Use electrical contact cleaner to clean starter motor parts. Some solvents may leave a residue or damage internal parts and insulation.

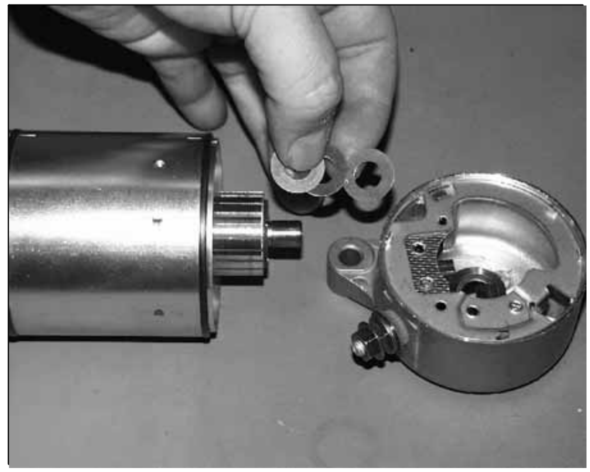
1. Note the alignment marks on both ends of the starter motor casing. These marks must align during reassembly.

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.

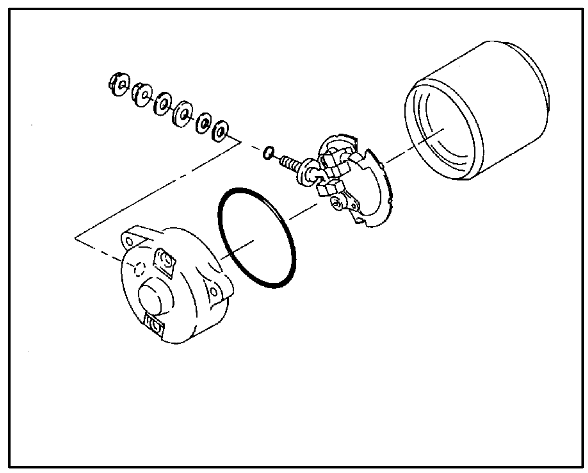
Starter Motor Disassembly, cont.

4. Remove shims from armature shaft. **NOTE:** All shims must be replaced during reassembly.



Brush Inspection/Replacement

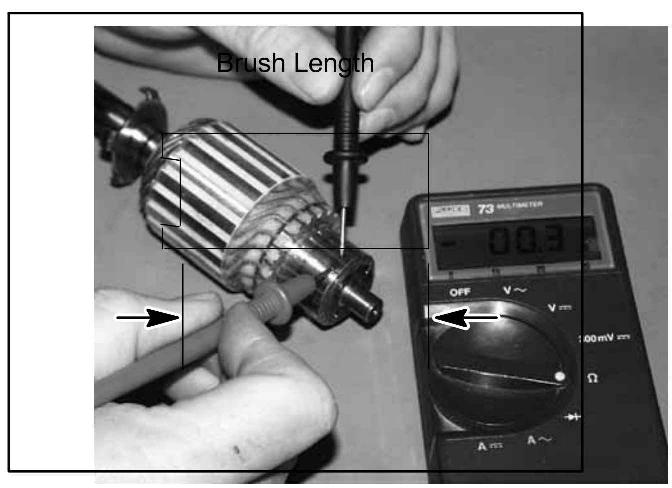
1. Using a digital multitester, measure the resistance between the cable terminal and the insulated brush. The reading should be .3 ohms or less. Measure the resistance between the cable terminal and brush housing. Make sure the brush is not touching the case. The reading should be infinite.
2. Remove nut, flat washer, large phenolic washer, two small phenolic washers, and O-Ring from brush terminal. Inspect the O-Ring and replace if damaged.
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.



Brush Length Service Limit:
5/16″ (.8 cm)

4. Inspect surface of commutator for wear or discoloration. See steps 3-6 of armature testing on page 10.31.

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.



Brush Inspection/Replacement

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.

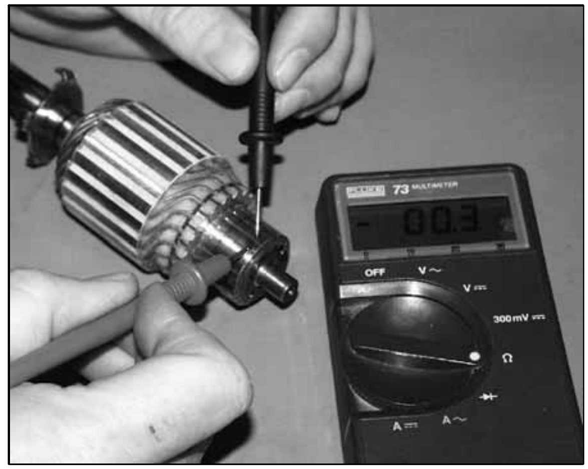
8. Remove the electrical tape and reinstall the two small phenolic washers, the large phenolic washer, flat washer, and nut.

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 multitester, measure the resistance between each of the commutator segments. The reading should be .3 ohms or less.



4. Measure the resistance between each commutator segment and the armature shaft. The reading should be infinite (no continuity).
5. Check commutator bars for discoloration. Bars discolored in pairs indicate shorted coils, requiring replacement of the starter motor.
6. Place armature in a growler. Turn growler on and position a hacksaw blade or feeler gauge lengthwise 1/8″ (.3 cm) above armature coil laminates. Rotate armature 360°. If hacksaw blade is drawn to armature on any pole, the armature is shorted and must be replaced.

Starter 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.
   ES33PF, EH50PL: Make sure O-Rings are in good condition and seated in groove.
   EC38PL, EC28PF, EC25PF: Install new gasket on starter flange.
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.

Starter Motor Installation (EC38PL)

1. Loosely assemble support bracket to starter.

NOTE: Bracket bolts must be loose to allow installation of support bracket to engine bolts.

2. Install a new gasket and place the starter motor in place.
3. Install the starter motor to magneto housing bolt first.
4. Install both support bracket to engine bolts.
5. Tighten all support bracket bolts.
6. Install starter motor cable. Make sure red protective cover is properly in place.
7. Install rock guard.
8. Install two bolts to starter from inside magneto housing.
9. Install magneto housing.
10. Install all components removed to gain access to magneto housing.

Starter Drive

Pinion Gear - Anti Kick-out Shoe, Garter Spring Replacement

If the garter spring is damaged, the overrun clutch may fail to return properly. The replacement spring is PN 7042039. Use either of the following methods to remove and install a new garter spring.

Polaris Premium Starter Drive Grease

PN 2871460

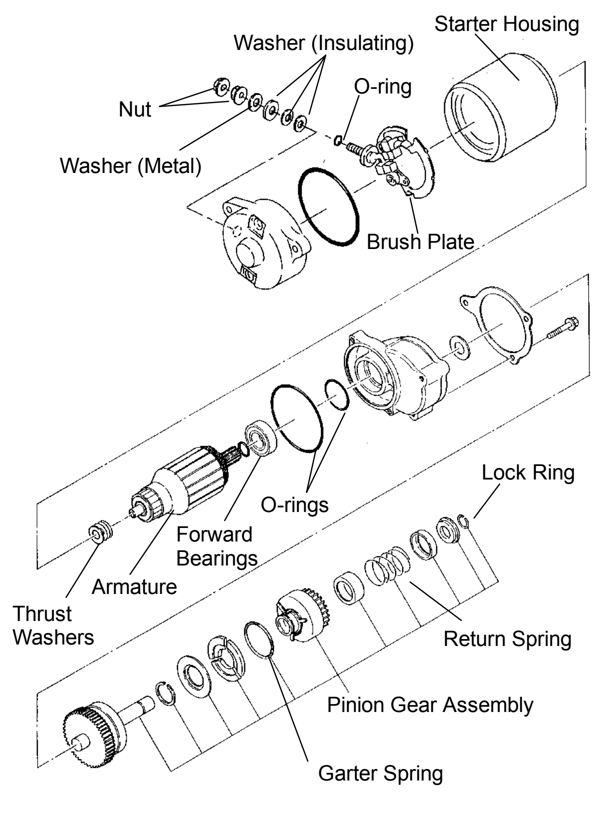
1. Screw the overrun clutch out to the engaged position on the pinion shaft assembly. Use a small piece of wire with the end bent in a hook and pick the old spring out of its channel. Slide it off the end of the shaft. Slide the new spring over the overrun clutch and into the spring groove. Make sure that the spring is positioned between the shoe alignment pins and the back flange of the anti kick-out shoes.

2. Remove the lock ring, end washer, spring retainers and clutch return spring. Screw the overrun clutch off the end of the pinion shaft. Remove the old spring and install a new one. Lightly grease the pinion shaft and reinstall the clutch, spring, retainers, end washer and lock ring in the reverse order. Make sure the end washer is positioned properly so that it will hold the lock ring in its groove.

Starter Solenoid Bench Test

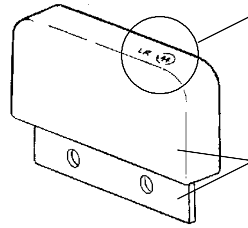
It is difficult to test the high amp side of the solenoid accurately on the bench. The only test which can be done on the bench is the pull-in coil resistance. The reading should be 3.4 ohms.

Starter Motor Exploded View



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.



1999 LIMIT SPECIFICATIONS (Refer to parts manual or microfiche for part number and application.)			
PART NO.	**TYPE**	**FUNCTION / LIMIT RPM**	**COMMENTS**
4060085	LR44	Reverse Limit - 3500 ETC Limit - 1900	Trail Boss, Xpress / Xplorer
4060186	LR49-1	Reverse Limit - ETC Limit -	Trail Blazer, Sport 400
4060199	LR83-1		Scrambler 400
4060201	LR83-2	Reverse Limit - 3100 ETC Limit - 1400	Scrambler 500
4060205	LR83	Reverse Limit - 3100 ETC Limit - 1400	Sportsman 335
4060204	LR44-2	Reverse Limit - 3100 ETC Limit - 1400	Big Boss 6x6

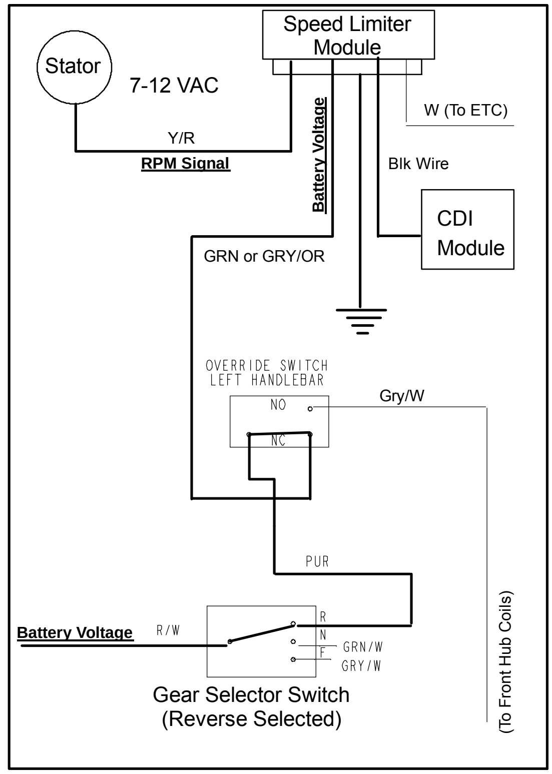
Speed Limiter System - Theory of Operation (Sportsman 335, Xplorer/Xpress 300, Trail Boss) (LR44)

The Speed Limiter system controls vehicle speed by electronically limiting engine RPM in reverse, or in the event of a mechanical problem in the throttle control mechanism. There are two separate limiting systems - the Reverse Speed Limiter system and the Electronic Throttle Control (ETC) system. Although the two systems are independent of each other, they share a common part – the limiter module. When activated, the limiter module grounds the ignition stop circuit through the CDI black wire, creating a "misfire" which prevents engine RPM from going above the "Reverse Limit" or "ETC Limit" RPM. The limits are designed into the limiter module for a given model, and cannot be changed or adjusted.

Reverse Speed Limiter System - In order to fully understand and troubleshoot the Reverse Speed Limiter system, it is important to remember that limiting will occur whenever two input "signals" are present at the limiter module:

1. The limiter module must receive voltage through the reverse light circuit (Green or Gray/Orange wire).
and...
2. Engine RPM must be at or above the "Reverse Limit". The RPM signal is delivered to the limiter module via the Yellow/Red alternator wire.

When both of these inputs are present, the system will limit. Below the "reverse limit" RPM, the ignition system will operate normally.



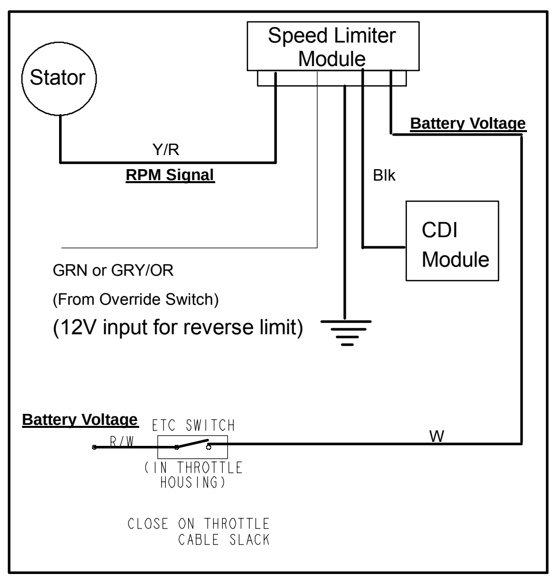
Speed Limiter Circuit (Typical)
Speed Limiter Circuit Wires Shown In **Bold**

Electronic Throttle Control (ETC) - Theory of Operation (Sportsman 335, Xplorer/Xpress 300, Trail Boss)(LR44)

The limiter also incorporates a throttle safety feature called the Electronic Throttle Control (ETC). When there is a mechanical problem in the throttle mechanism (throttle plate, throttle shaft, or cable) and the throttle lever is released, the ETC switch contacts close. Power is delivered to the limiter module through the white wire, and engine RPM is limited to the "ETC limit". It is important to remember that ETC limiting will occur whenever two input "signals" are present at the limiter module:

1. The limiter module must receive voltage through the ETC switch circuit (White wire).
and...
2. Engine RPM must be at or above the "ETC Limit". The RPM signal is delivered to the limiter module via the Yellow/Red alternator wire.

Refer to following pages for test procedure.



Electronic Throttle Control Circuit (Typical)
Electronic Throttle Control Circuit Wires Shown In **Bold**

NOTE: The reverse RPM limit will override the ETC Limit when both are receiving voltage.

Speed Limiter System Testing (LR44 - Sportsman 335, Xplorer/Xpress 300, Trail Boss)

WARNING: The speed limiter is a safety feature and should never be disabled, except for testing purposes. Serious injury or death may result if the limiter system is disabled.

When problems occur that sound like a spark-related "miss", the speed limiter system may be at fault. To determine if the limit system is causing the problem, the system can be temporarily disabled.

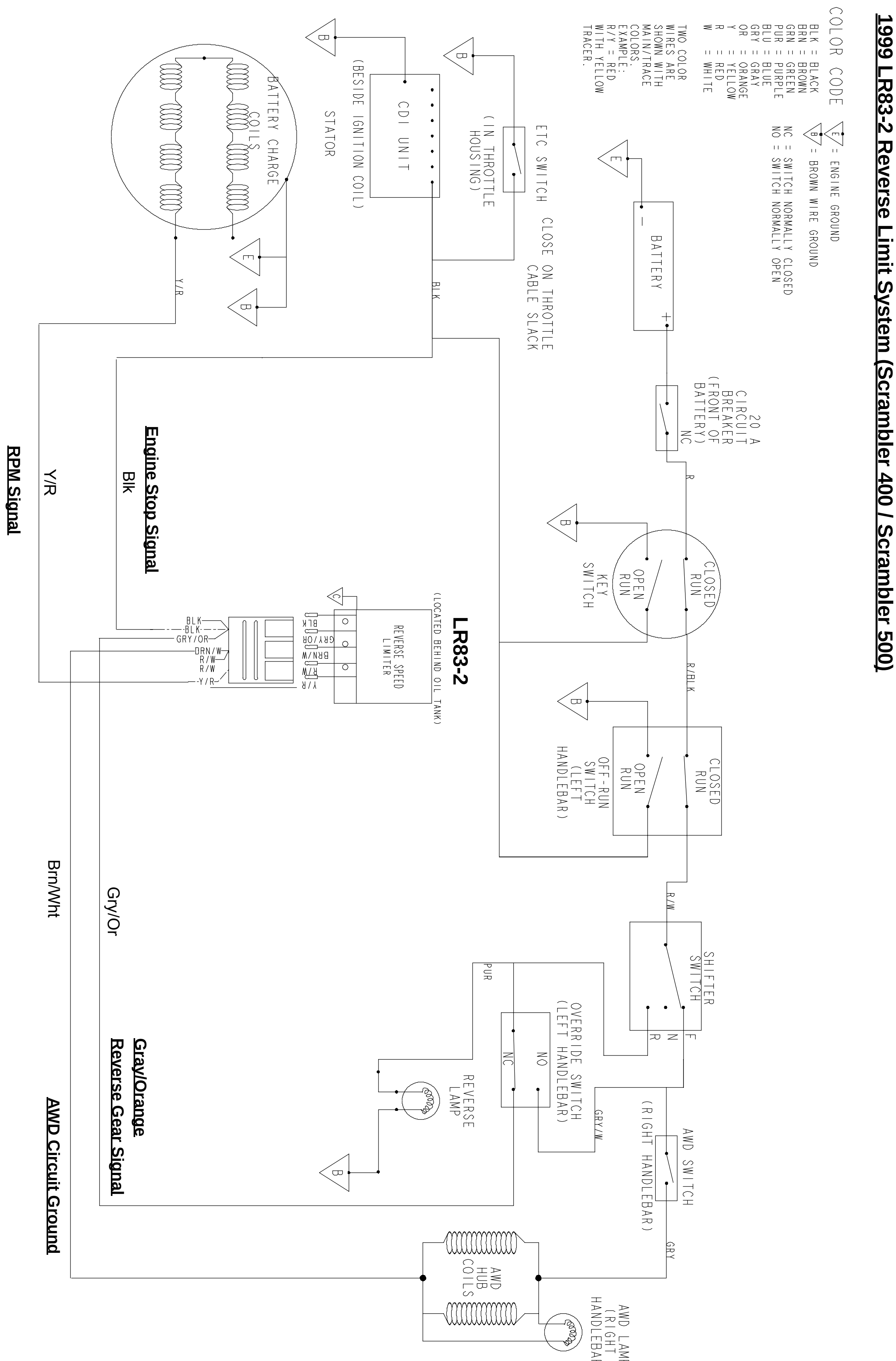
1. Disconnect the black wire from the CDI module. The limiter system will then be disabled. If the problem still exists, the limit system is not the cause. If the problem goes away, re-connect the black wire and proceed with limiter system tests on the following pages. Verify all wires are clean and tight.

Module Wire Color Function

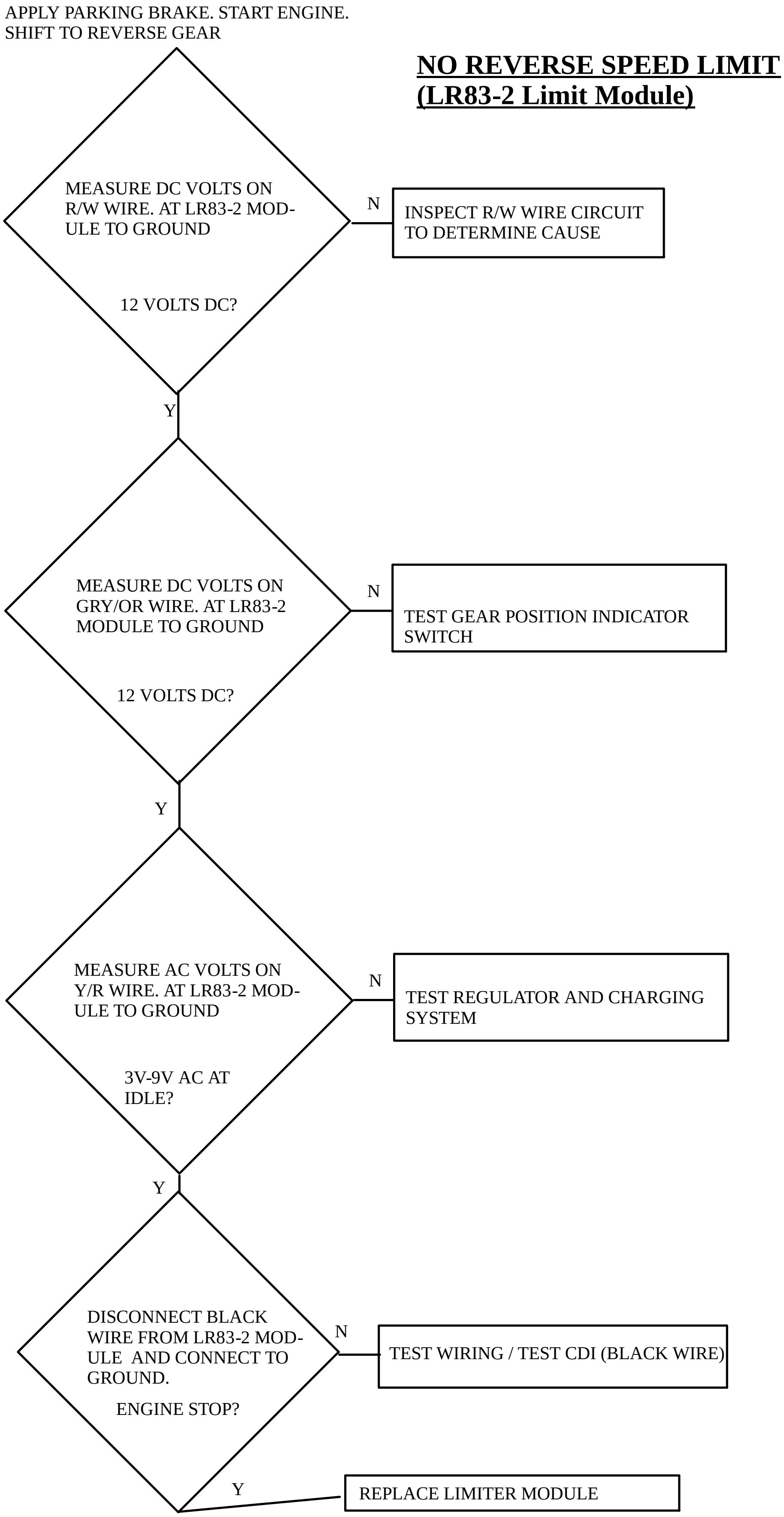
NOTE: Refer to the model specific wiring diagram for wire colors. Modules may not have all wires indicated below.

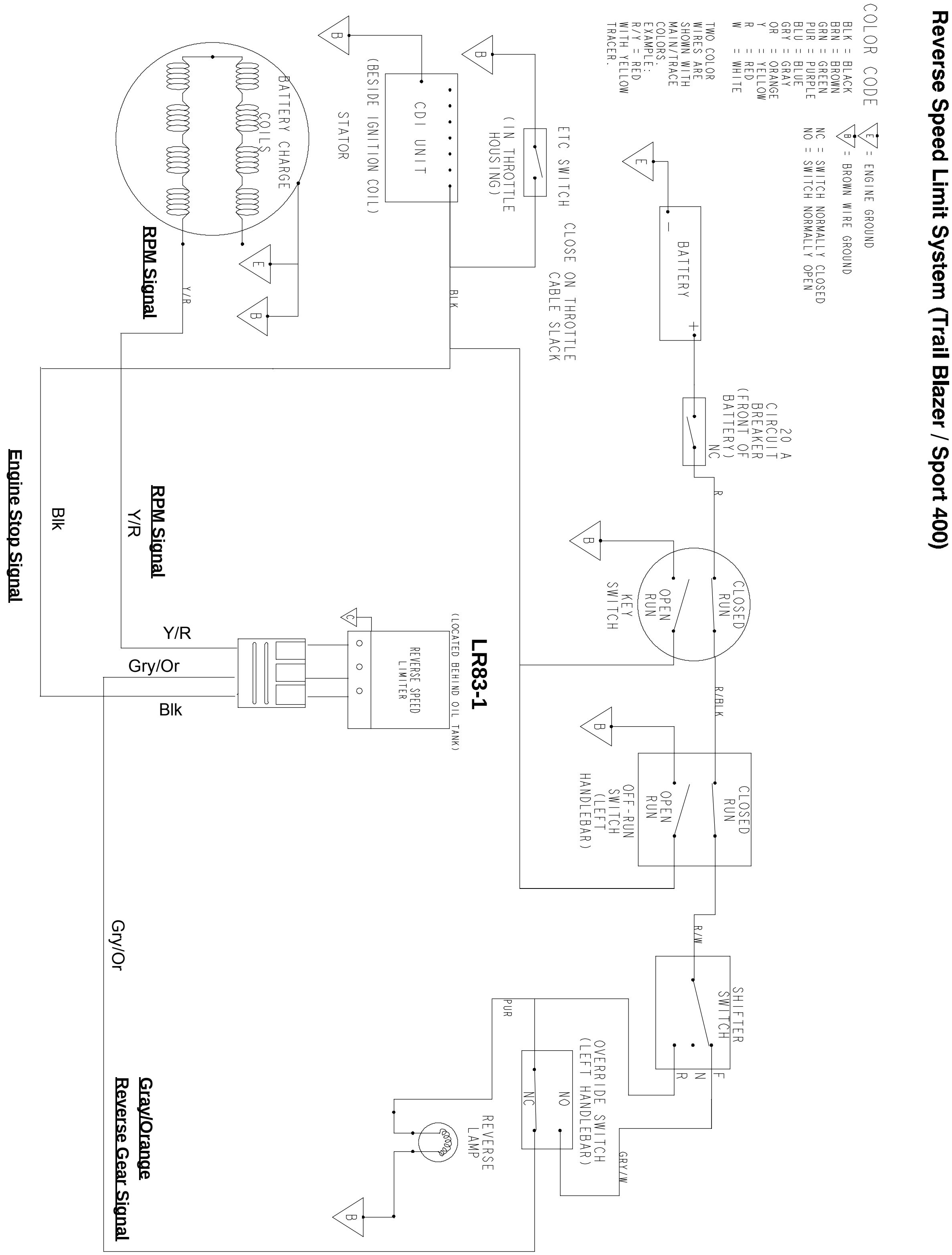
<u>Black wire</u> - provides ignition control to the CDI module
<u>Green or Gray/Orange wire</u> - receives reverse gear indicator light signal from purple wire through override button
<u>White wire</u> - receives a voltage signal from the ETC switch
<u>Yellow/Red wire</u> - receives the engine speed/ RPM signal from alternator

SYMPTOM		CAUSE	CURE
Limits in forward	High Limit (Reverse Limit)	-Voltage to Green or Gray/Orange wire in forward gear	-Check circuit to determine reason for voltage to green in forward gear
	Low Limit (ETC Limit)	-Voltage to white wire. Most often caused by moisture in ETC switch. -Inadequate throttle cable tension.	-Clean, dry, repair or replace the ETC switch assembly as required, inspect/adjust throttle cable/ETC switch, or determine reason for voltage on white wire
Engine miss at idle or rough idle		-ETC switch adjusted incorrectly -Idle speed adjusted incorrectly	-Adjust ETC switch until switch plunger is completely depressed. <u>No plunger Clearance</u>. 1/16-1/8″ throttle lever free play. (Readjust Idle)
Backfire on deceleration (disappears when black wire is disconnected from speed limiter)		-ETC switch adjusted incorrectly	-Adjust ETC switch until switch plunger is completely depressed. <u>No plunger Clearance</u>.1/16-1/8″ throttle lever free play. (Readjust Idle)
		-Faulty ETC switch	-Dry out switch with electrical contact cleaner, replace switch, or adjust throttle cable freeplay
No limit in reverse		-12V not present on Green or Gray/Orange speed limiter module wire	-Check and repair reverse light circuit or gear selector switch. NOTE: if reverse light functions properly, the gear selector switch is not the problem
		-Black wire from limiter module not connected to CDI module black	-Repair black wire between limiter and CDI
		-Yellow/Red wire on limiter module not receiving an RPM signal	-Check wiring and alternator output
		-Override switch not closing	-Test override switch function
		-Faulty or incorrect limiter module	-Replace module
Limits at wrong RPM		-Improperly charged battery	-Charge or replace battery
		-Incorrect limiter module for machine application	-Check parts manual application
		-Incorrect alternator output	-Check wiring and alternator output
		-Faulty limiter module	-Replace limiter module


1999 LR83-2 Reverse Limit System (Scrambler 400 / Scrambler 500)
COLOR CODE
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
E = ENGINE GROUND
B = BROWN WIRE GROUND
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE: R/Y = RED WITH YELLOW TRACER.
BATTERY
20 A CIRCUIT BREAKER (FRONT OF BATTERY) NC
ETC SWITCH (IN THROTTLE HOUSING)
CLOSE ON THROTTLE CABLE SLACK
CDI UNIT (BESIDE IGNITION COIL)
BATTERY CHARGE COILS
STATOR
KEY SWITCH
CLOSED RUN
OPEN RUN
OFF-RUN SWITCH (LEFT HANDLEBAR)
LR83-2
REVERSE SPEED LIMITER
(LOCATED BEHIND OIL TANK)
SHIFTER SWITCH
OVERRIDE SWITCH (LEFT HANDLEBAR)
REVERSE LAMP
AWD SWITCH (RIGHT HANDLEBAR)
AWD HUB COILS
AWD LAMP (RIGHT HANDLEBAR)
Engine Stop Signal
Blk
RPM Signal
Y/R
Brn/Wht
Gry/Or
Gray/Orange Reverse Gear Signal
AWD Circuit Ground

NO REVERSE SPEED LIMIT
(LR83-2 Limit Module)




Reverse Speed Limit System (Trail Blazer / Sport 400)
COLOR CODE
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.
E = ENGINE GROUND
B = BROWN WIRE GROUND
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
BATTERY
20 A CIRCUIT BREAKER (FRONT OF BATTERY) NC
ETC SWITCH (IN THROTTLE HOUSING)
CLOSE ON THROTTLE CABLE SLACK
CDI UNIT (BESIDE IGNITION COIL)
BATTERY CHARGE COILS
STATOR
RPM Signal
Y/R
BLK
KEY SWITCH
CLOSED RUN
OPEN RUN
R
R/BLK
OFF-RUN SWITCH (LEFT HANDLEBAR)
Engine Stop Signal
Blk
RPM Signal
Y/R
LR83-1
REVERSE SPEED LIMITER
(LOCATED BEHIND OIL TANK)
C
Y/R
Gry/Or
Blk
R/W
SHIFTER SWITCH
F N R
PUR
OVERRIDE SWITCH (LEFT HANDLEBAR)
NO NC
GRY/W
REVERSE LAMP
Gry/Or
Gray/Orange Reverse Gear Signal

('99 & Early 2000 Sportsman 335, '99 Xplorer 300)

All Wheel Drive Activation In Reverse: For AWD in reverse gear, the override button must be pushed in addition to selecting "All Wheel Drive". Power is delivered through the transmission switch, the override button, the AWD button, and then to the front wheel coils.

All Wheel Drive (AWD) Testing

The All Wheel Drive (AWD) system is activated when battery voltage is supplied to the front wheel coils. Always check battery voltage when an AWD problem is encountered. Charge battery and check charging system if necessary. If only one wheel hub does not engage, test wheel coil resistance and inspect wheel coil wires for damage. Check for a mechanical problem if resistance measurements are within specifications.

1. Remove cover(s) as required to gain access to terminal board.
2. Turn ignition key on and shift transmission to a forward gear.
3. Select AWD with AWD button.
4. Check for battery voltage on gray terminal at terminal board or harness connector. **NOTE:** If power is present and bulb is good, All Wheel Drive lamp will be lit.

   *If voltage is present:

   - Disconnect Gray and Brown wheel coil wires and test resistance across the small wheel coil wires. There should be 25-30Ω of resistance.
   - Test Gray wire to ground on strut casting. It should be an open circuit (∞). Move wheel coil wiring harness while performing the tests to check for an intermittent open or short.

   AWD Wheel Coil Resistance
   Gray to Brown 25-30Ω
   (No continuity to ground on strut casting)

   - Repair wiring harness or replace wheel coil if necessary.

   *If no voltage is present on the Gray terminal check the AWD switch and transmission switch. (If voltage is present on the Gray/White terminal transmission switch is functioning properly.) Refer to AWD and Transmission Switch Testing this section.

No AWD in Reverse

If AWD functions properly in forward but not in reverse, perform the following tests:

NOTE: Override button must be pushed for AWD in reverse.

1. Turn ignition key on and shift transmission to reverse.
2. If reverse lamp is on, the gear selector switch is functioning properly. If reverse lamp is off (not illuminated), check the bulb and test gear selector switch and related wiring (Page 10.38).
3. Check for battery voltage on Purple wire in left hand switch wire harness.

   *If battery voltage is present:
4. Press the override button and check for voltage on any Gray/White wire.

   - Check override switch and related wiring if voltage is not present on Gray/White wire(s).

If the entire AWD circuit tests correctly, inspect the wheel hubs for a mechanical problem.

No All Wheel Drive (AWD) on Shaft Drive Models Equipped With Hub Safety Module

(Refer to specific wiring diagram for application).

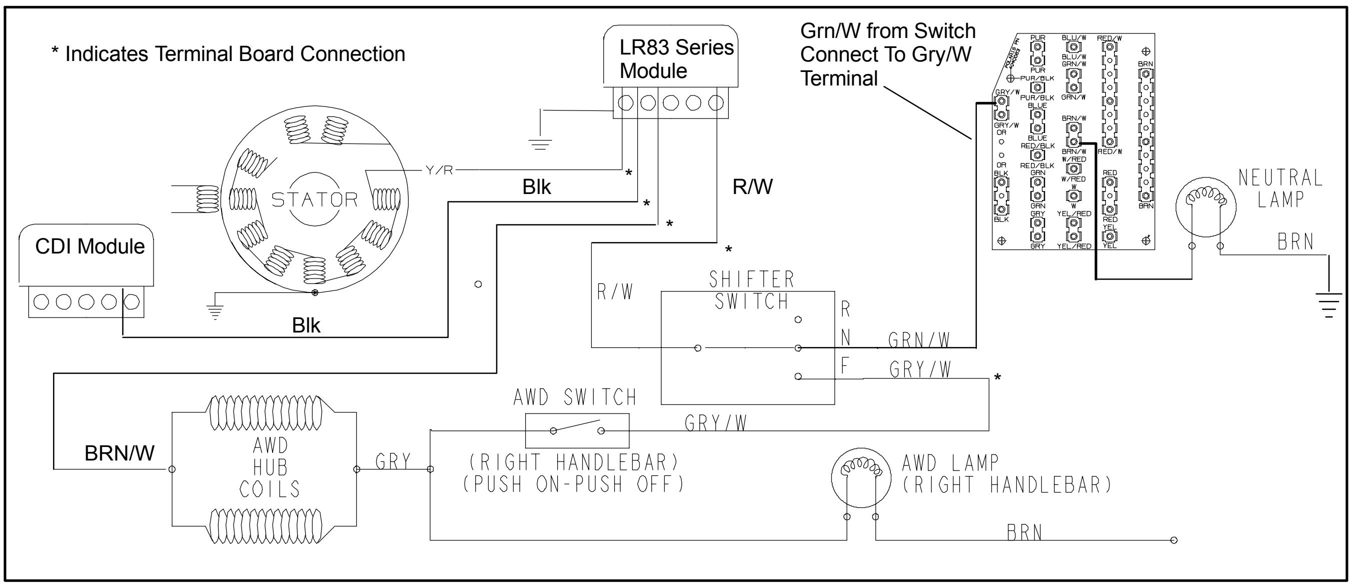
1. Perform circuit tests above. If the tests are within specifications, proceed with the following module by-pass test.
2. Inspect the Red/White and Brown/White wires leading from hub safety module to the terminal board. Connections must be clean, tight, and properly color-matched to the terminals.
3. Disconnect Brown/White wheel coil wires from terminal board and connect to Brown (ground) terminals. If All Wheel Drive functions properly, replace wires on proper terminals and proceed with next step.
4. Disconnect the Yellow/Red wire from the Hub Safety module.
5. Test AC voltage input at the Yellow/Red wire (on alternator side). Voltage should be a minimum 5 AC volts at idle. Refer to charging system testing if voltage is below 5 AC volts.
6. If voltage is present on the Yellow/Red wire and the system does not function correctly, replace the module.

ELECTRICAL
All Wheel Drive System
('99 & Early 2000 Sportsman 335, '99 Xplorer 300)
Front Hub Engagement Limiter (Front Shaft Drive Models)

Front Shaft Drive Models are equipped with a front hub engagement limiter system which prevents engagement of All Wheel Drive (AWD) if engine RPM is above 4000. This is accomplished by the use of an LR83 module (attached to the bulkhead under the front cover), which monitors engine RPM via the Yellow/Red alternator wire. AWD must be selected (button pushed) prior to reaching 4000 RPM, or the Hub Limiter Module will electronically disconnect the ground path for the front hub coils (Brown/White wire) until RPM falls below 4000. If AWD is selected (button pushed) below 4000 RPM, the connection to ground will be maintained by the module at any RPM. The ground path is interrupted only if an attempt is made to engage the front hubs with engine RPM above 4000. Refer to the diagram and test procedure below.

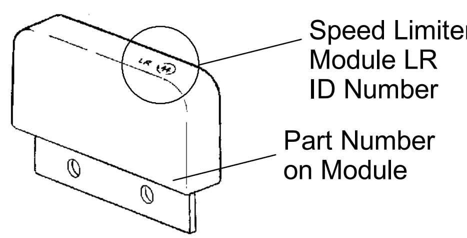
WARNING: The engagement limiter is a safety feature designed to protect the front drive components and should never be disabled, except for testing purposes. Serious injury or death may result if the limiter system is disabled or left in the testing mode. Return all wires to the proper terminal on the terminal board (according to color) and verify proper neutral light operation after testing.

CAUTION: The speed limiter control module may be permanently damaged if the machine is operated with the voltage regulator damaged and/or the battery disconnected.

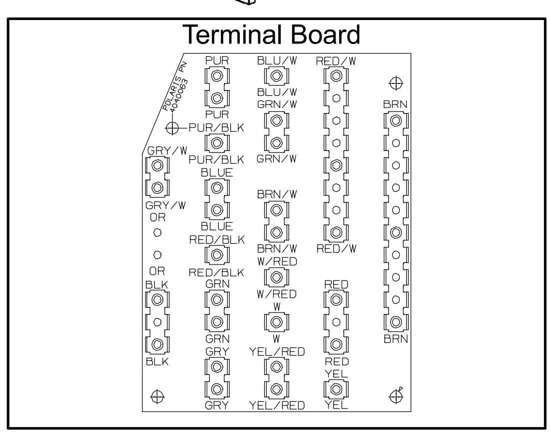


Hub Engagement Limiter RPM Test

Perform this test to check hub engagement limiter RPM.



1. To perform this test, the neutral light must function properly and the battery must be in a good state of charge. Turn the key and engine stop switch on. Shift transmission to neutral and check for proper neutral light function. Repair neutral light if necessary before proceeding. Turn key to OFF position.
2. Remove front rack and terminal board cover (where applicable).
3. Verify all electrical connections are clean, tight, and on the proper terminal. Make sure voltage is present on the Red/White terminal with the key on.
4. Locate shift selector switch harness (R/W, PUR,GRY/W, and GRN/W wires.
5. Locate Green/White wire in switch harness and follow it to the terminal board. Disconnect this Green/White wire from the board and connect it to Gray/White terminal on terminal board.



('99 & Early 2000 Sportsman 335, '99 Xplorer 300)

Hub Engagement Limiter RPM Test Procedure, cont.

6. Disconnect the remaining (neutral light) Green/White wire from the Green/White terminal on the board and connect it to the Brown/White terminal on the board.
7. Connect the Green/White wire disconnected in step 6 to the Brown/White terminal on the terminal board.
8. Connect a tachometer following manufacturer's instructions.
9. Apply and lock the parking brake.
10. Start the engine. Be sure the machine is in neutral before starting.
11. Place the All Wheel Drive (AWD) switch in the OFF position (button out - no AWD).
12. Slowly increase RPM above 4000.
13. Push the AWD button to select All Wheel Drive. The neutral light should light up, indicating an interrupted ground path through the LR83 (power on the Brown/White terminal is finding ground through the neutral light bulb.
14. Slowly let RPM drop back to idle. The neutral light should go out below approximately 4000 RPM, indicating a good ground through the LR83 module. The neutral light should not illuminate whenever AWD is selected below 4000 RPM.

WARNING: The procedures outlined above are for testing purposes only. Return all wires to the proper terminal on the terminal board (according to color) after testing. Verify proper neutral light operation.

Electronic Speedometer Troubleshooting Overview of Operation

The Polaris Electronic ATV speedometer is powered by battery voltage (12 VDC) and requires engine RPM, transmission gear, and wheel speed sensor input signals for proper operation. Wiring to the speedometer head consists of a three-pin connector from the wheel speed sensor and a six-pin connector from the main ATV wiring harness.

A non-serviceable internal memory battery maintains odometer and hour meter data when the machine is not running.

The illumination lamp inside the gauge is non-serviceable and is designed to last for the life of the unit.

In addition to the ground speed in Miles Per Hour (MPH) or Kilometers Per Hour (KPH), odometer, and trip odometer, the electronic speedometer provides the following functions:

- Records Engine Run Time in Hours
- Reverse Speed Limit - (Polaris Variable Transmission [PVT] models only)
- Prevents AWD engagement: When engine RPM is too high

<u>Vehicle Speed and Odometer</u>

An electronic wheel speed sensor located on the right front brake caliper bracket senses vehicle speed. The sensor “reads” notches in the rotating brake rotor (disc) and sends a signal through the three-pin harness pin B. The wheel speed sensor receives approximately 10 VDC power from the speedometer head and does not differentiate between forward and reverse wheel rotation. LED Test Light PN 2871745 can be used to quickly test the sensor.

<u>Engine Run Time Hour Meter</u>

If the engine is running, the hour meter is recording the run time. The hour meter (RPM) signal comes from the stator to the speedometer on pin D (typically the yellow/red wire).

<u>Reverse Speed Limit (PVT models only)</u>

The transmission gear signal is sent to the speedometer on pin F. The operating speed of the ATV is limited when the transmission is shifted into reverse gear. The ignition spark to the engine is turned off if the ground speed exceeds 7 to 9 MPH in reverse gear. Ignition spark returns when the vehicle speed drops below 7 MPH in reverse.

NOTE: If the speedometer does not detect a wheel speed sensor (motion of the front wheel) it will limit RPM to approximately 3600 in reverse.

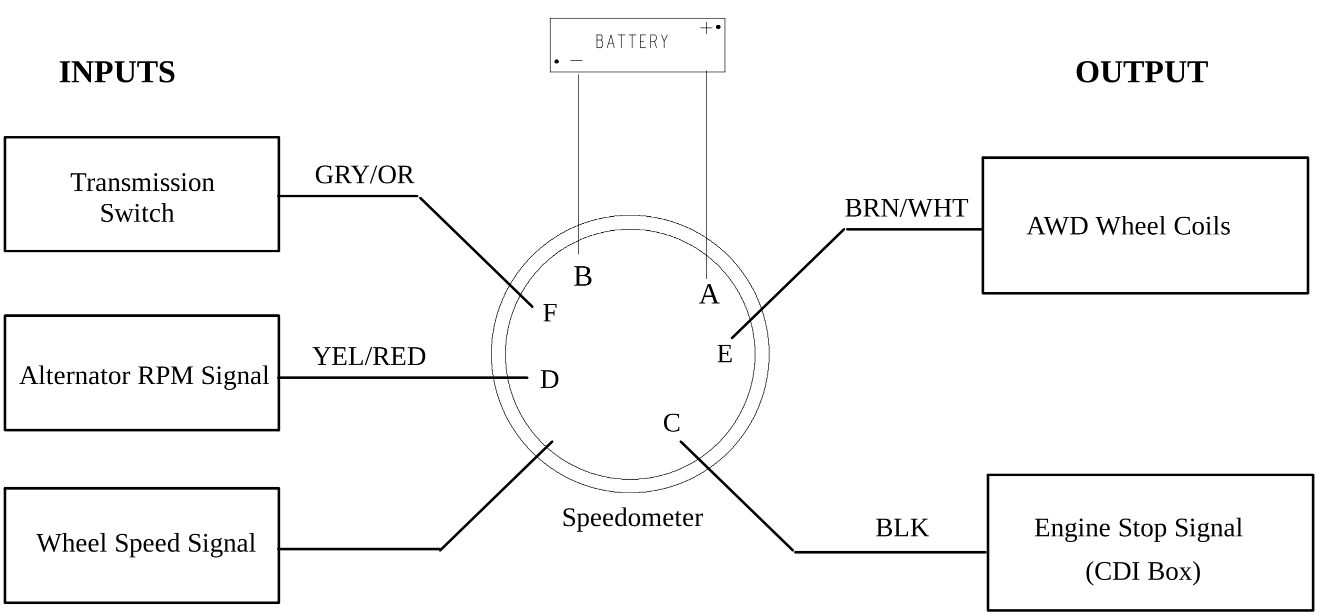
<u>High RPM AWD Hub Engagement Disable</u>

The electronic speedometer prevents AWD engagement at high RPM. If engine RPM is above 3000, the ground connection for the AWD wheel coils and AWD indicator lamp (Pin E) is not supplied by the speedometer.
The engine RPM signal is sent to the speedometer on Pin D (typically the yellow/red wire). It is important to note that a failed voltage regulator can prevent AWD engagement.

<u>Override Button (PVT models only)</u>

The override button (on the left handlebar switch block) interrupts the transmission gear signal allowing AWD engagement in reverse as long as the override button is depressed.

Refer to the flowcharts and schematic diagrams to troubleshoot the electronic speedometer.



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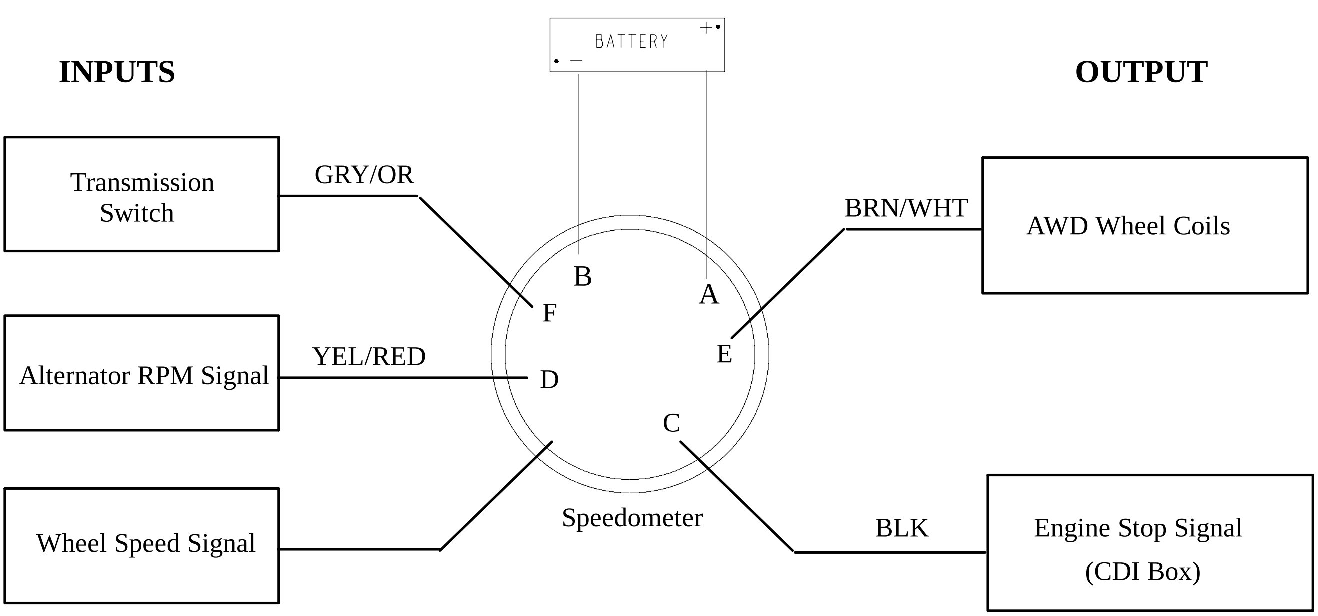
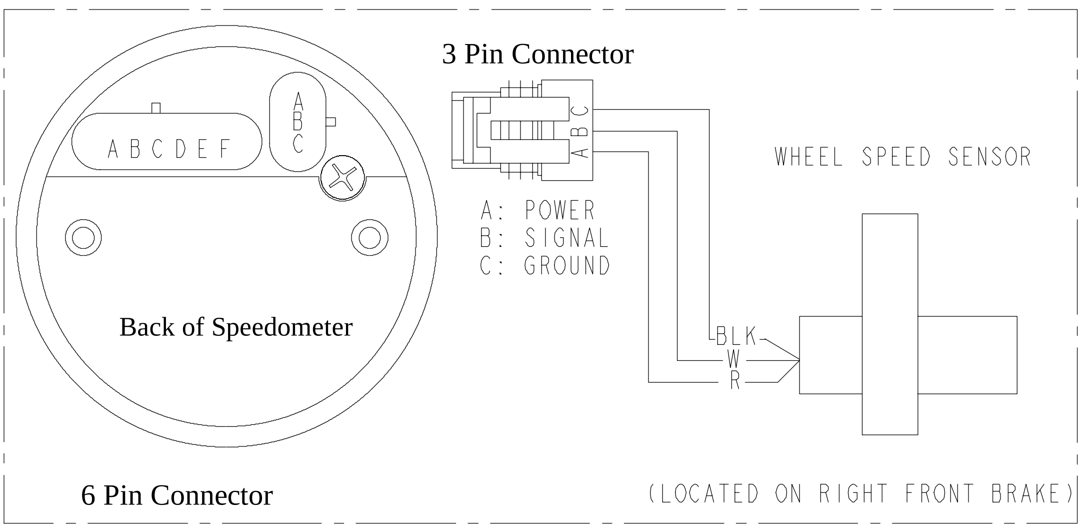


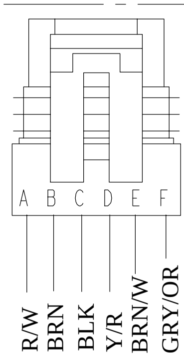
ELECTRONIC SPEEDOMETER (PVT MODELS)

ELECTRONIC SPEEDOMETER HARNESS WIRE LOCATION AND FUNCTION
(6 Pin Connector)

All tests done with key and engine stop switch “ON”. All voltages are with reference to pin B (ground). Polaris probe kit #2201209 will help in measurements but is not necessary if care is used when probing the connectors.

PIN NUMBER	WIRE COLOR	FUNCTIONS AND VALUES
A	RED/WHITE	Battery voltage (around 12 V DC).
B	BROWN	Ground. Should show continuity to ignition coil core and engine.
C	BLACK	Engine stop. Test with engine idling. 200 or 250 Watt alternator: 6 - 12 V DC. 150 Watt alternator: more than 10 V AC. **⚠ WARNING** → Some 150 W alternators have high voltage on this wire Shorting C to B should stop engine.
D	YELLOW/RED	Alternator signal. Test with engine idling. More than 3 V AC. 0 V DC.
E	BROWN/WHITE	AWD hub coil ground. With AWD switch on, and transmission in either (A) Reverse with override button pushed or (B) Forward: around 12 V DC. Measured current from E to B should be around 1 Amp DC, and the AWD lamp should light.
F	GRAY/ORANGE	Reverse signal. With transmission in reverse: around 12 V DC. Should go to 0 V DC when the override button is pushed.





A: BATTERY VOLTAGE
B: GROUND
C: ENGINE STOP SIGNAL
D: ALTERNATOR
E: AWD COIL (GROUND SIDE)
F: REVERSE SIGNAL

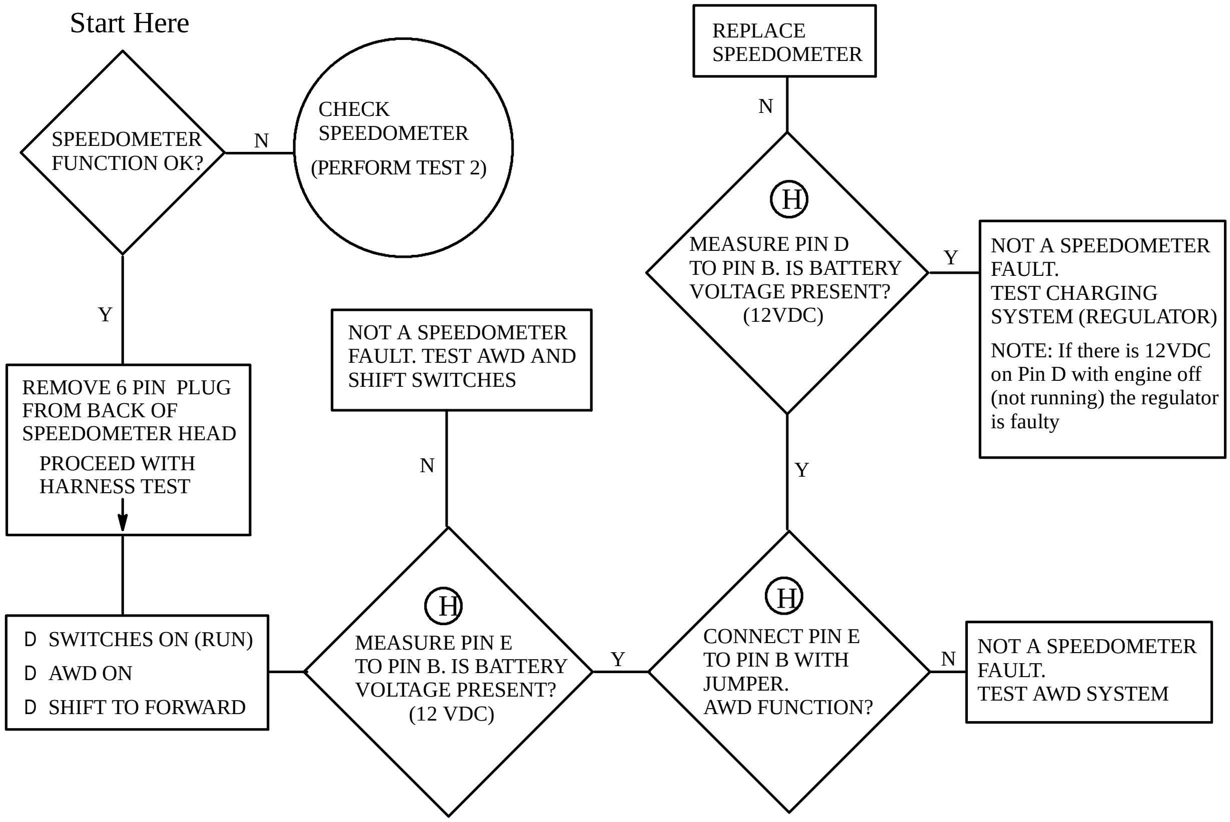
HOW TO USE THE TROUBLESHOOTING FLOWCHARTS

SH = HARNESS (Test is performed on harness connector)

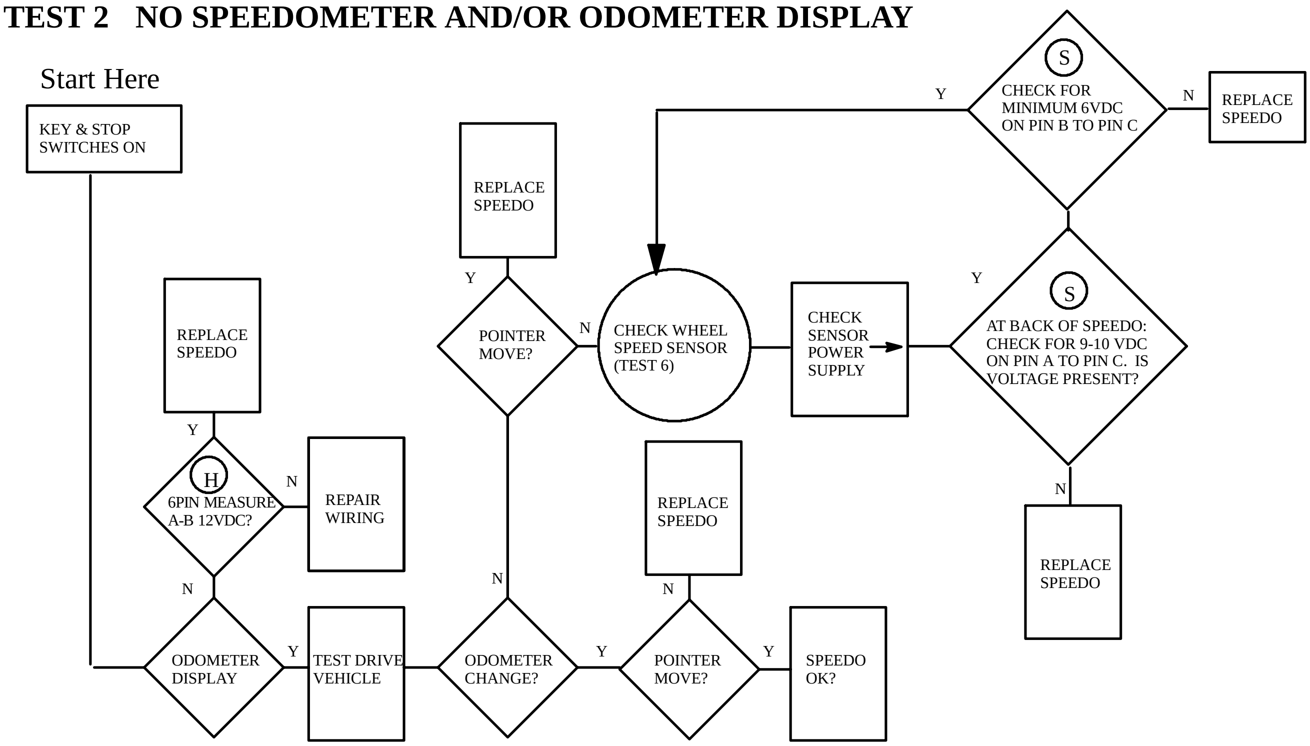
SS = SPEEDOMETER (Test is performed on the pins on the back of the speedometer with harness unplugged)

TEST 1 NO ALL WHEEL DRIVE

Note: If AWD light comes on, speedometer is O.K. Proceed to AWD system tests (in Service Manual). Check hub coils, related wiring, and mechanical system for fault and repair as necessary.

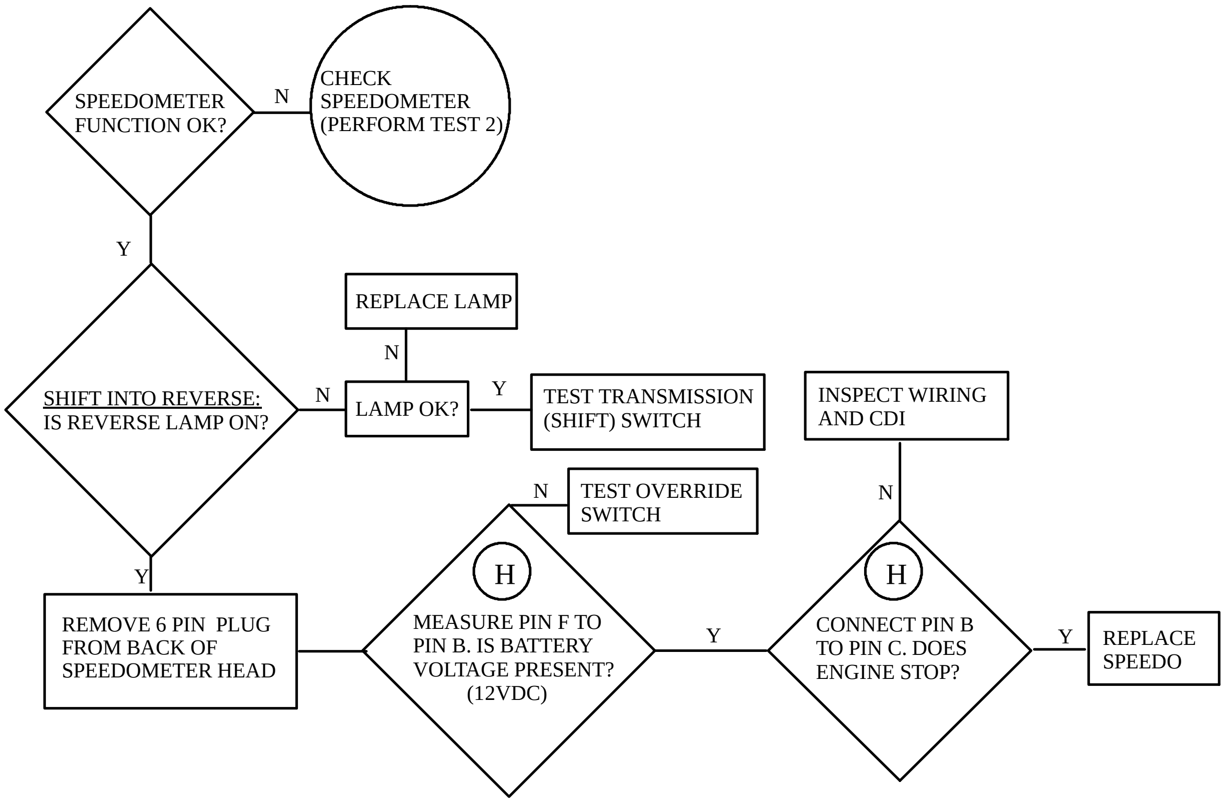


TEST 2 NO SPEEDOMETER AND/OR ODOMETER DISPLAY

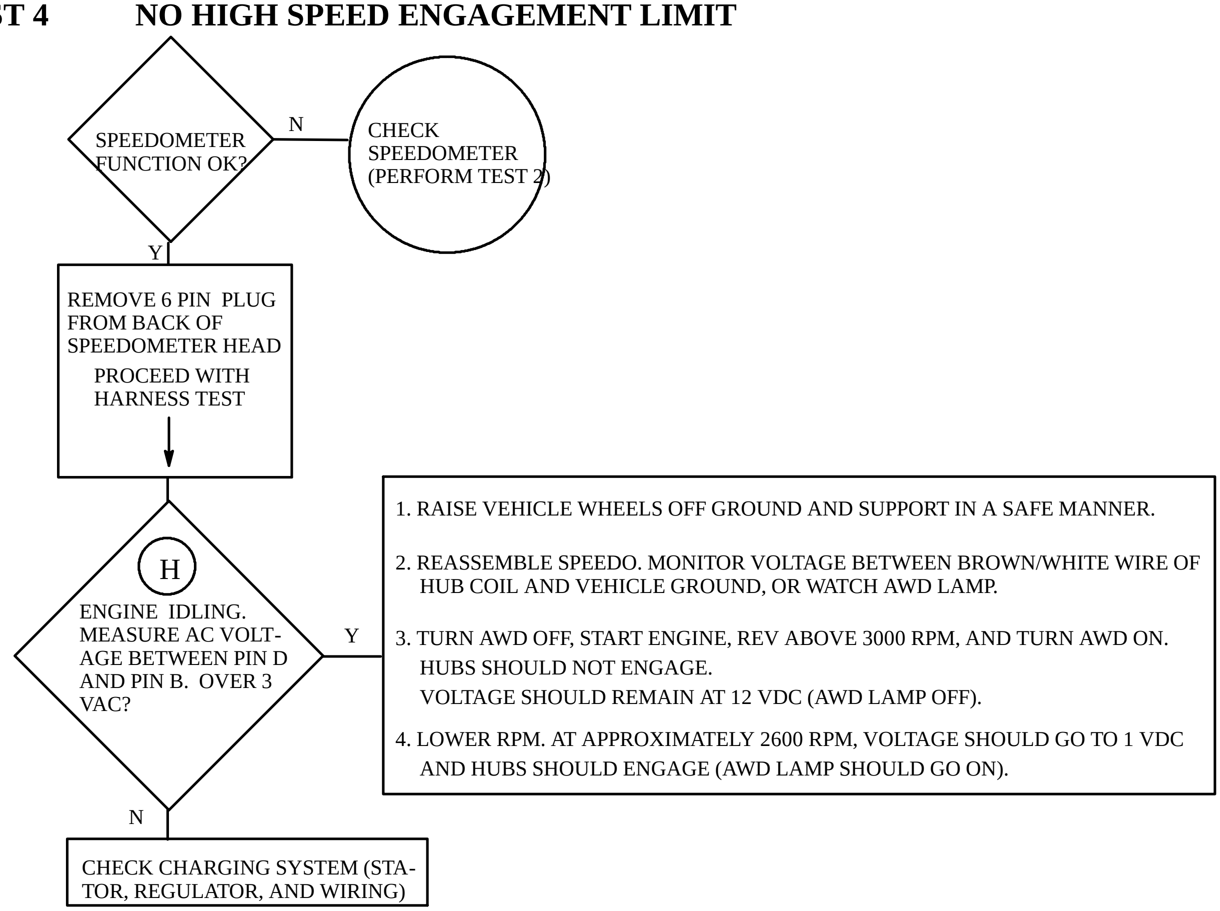


TEST 3 **NO REVERSE SPEED LIMIT (Vehicle will exceed 7-9mph in reverse)**

NOTE: Vehicle speed (wheel) sensor is located on right front wheel.

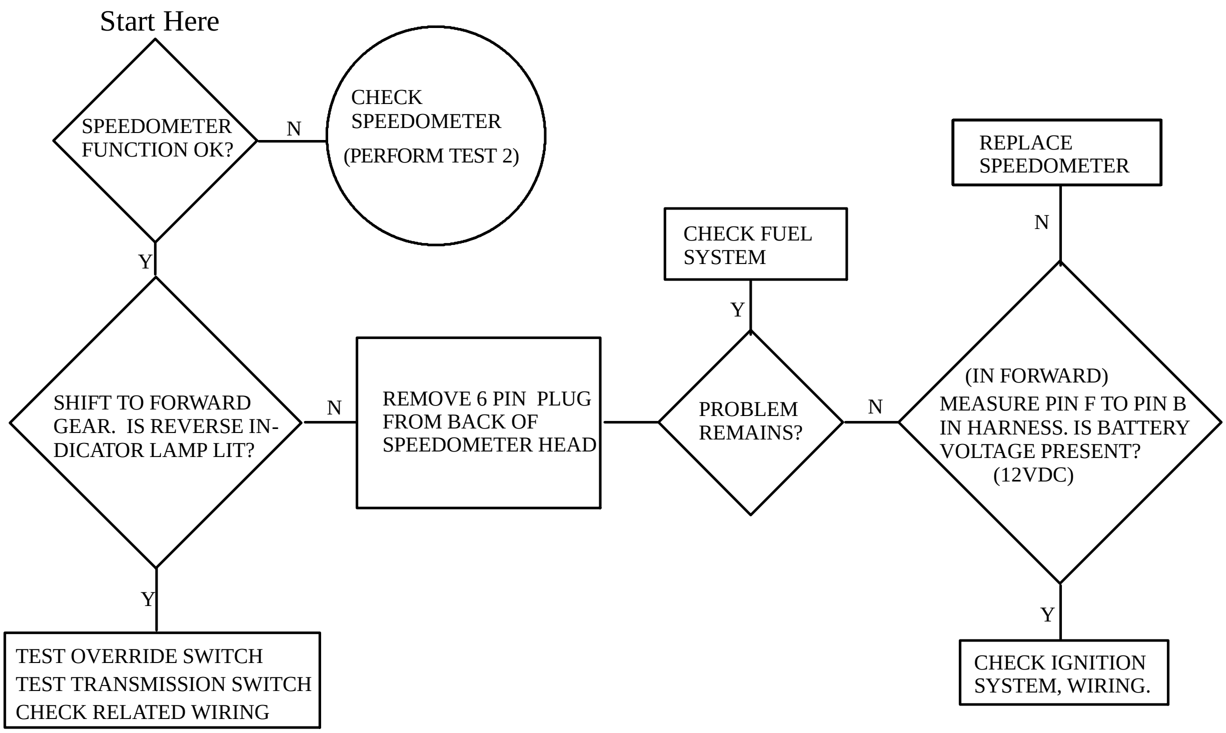


TEST 4 **NO HIGH SPEED ENGAGEMENT LIMIT**



TEST 5 REVERSE SPEED LIMITER ACTIVATED IN FORWARD GEAR(S)

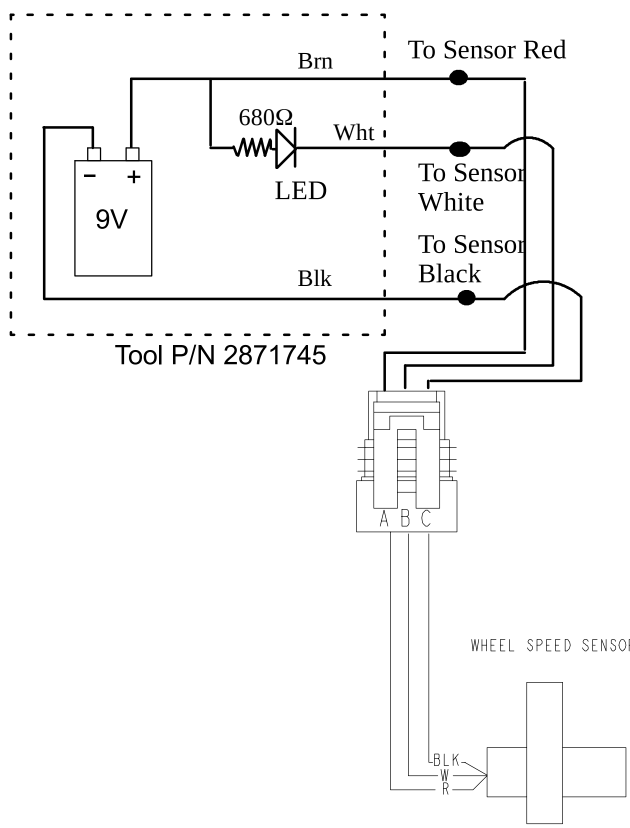
(Engine loses spark when vehicle speed is above 7-9 mph.)



TEST 6 WHEEL SPEED SENSOR

Tools Required:

- L.E.D. Test Light tool P/N 2871745
- Adaptor Harness P/N 2460761 or equivalent jumper wires.



To test wheel speed sensor:

1. Disconnect 3 Pin connector from speedometer.
2. Connect wires from test light to sensor 3 Pin connector as shown at right, using adaptor harness P/N 2460761 or jumper leads.
3. Elevate front right side of vehicle until tire is off the ground.
4. Slowly turn right front wheel while observing the test light.
5. If light flashes, sensor is O.K. Be sure connections are good and 9 volt battery is in good condition.

TEST 7 RESET SPEEDOMETER

If the key switch or engine stop switch is turned off with the vehicle in motion, the speedometer indicator needle may stick, indicating the speed at which the vehicle was traveling when the speedometer lost powr. For example: If the ATV was traveling 30 mph when the engine stop switch is turned off, speedo may indicate 30 mph until reset.

1. Operate vehicle at a speed greater than indicated on speedometer (past point where needle is stuck). Needle will return to normal operation.
2. In the above example, the ATV speed would have to exceed 30 mph to reset.

ELECTRONIC SPEEDOMETER WIRING DIAGRAM (PVT MODELS)

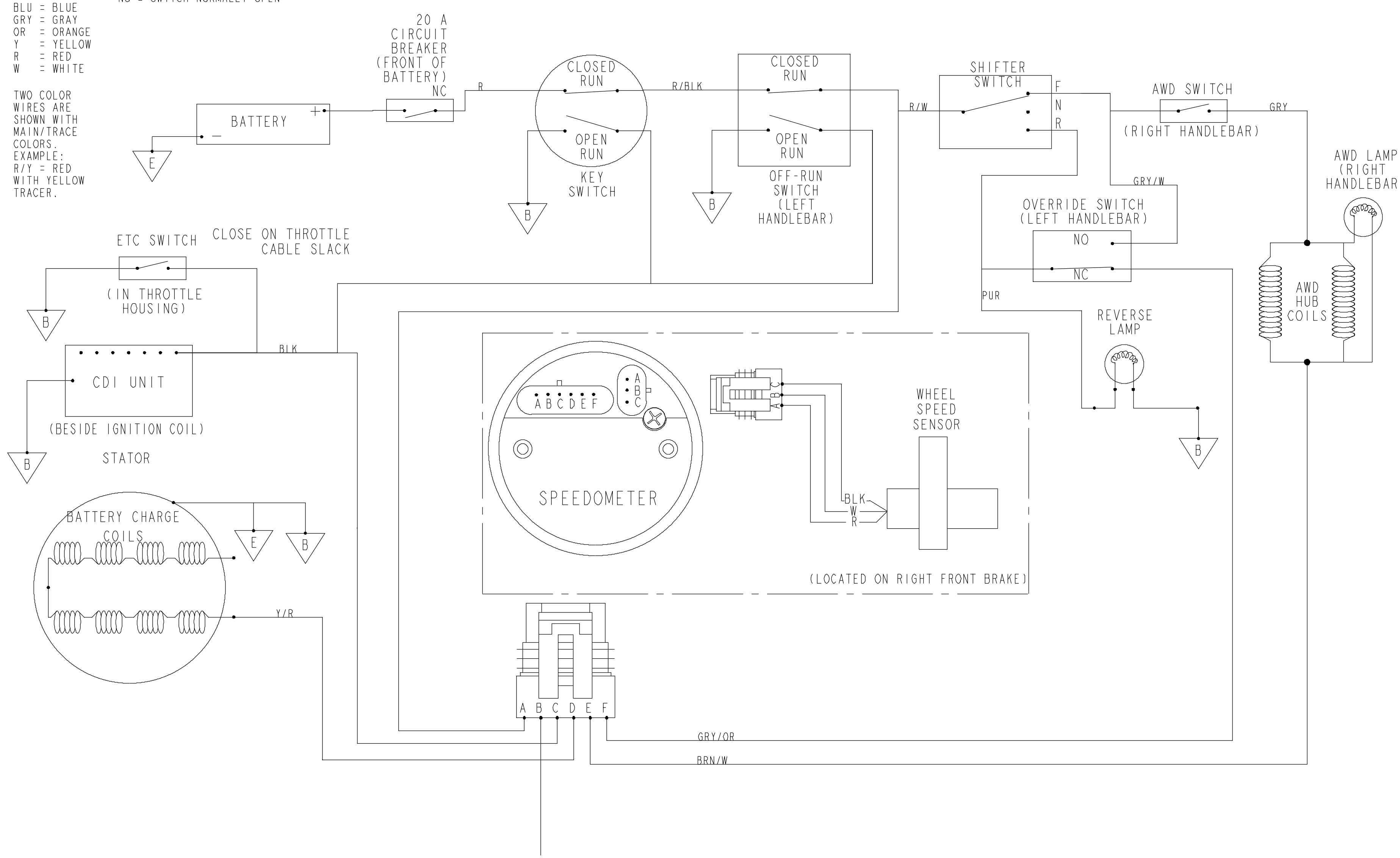
COLOR CODE

E = ENGINE GROUND
B = BROWN WIRE GROUND

NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN

BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE

TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.



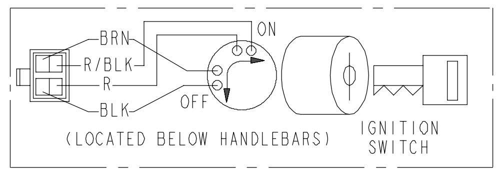
Most of the switches on the vehicle can be tested at the terminal board or at the harness connectors located under the front panel (Gen III / Gen IV) or tank cover (Gen II). To access the terminal board or connectors:

- Remove seat and top fuel tank cover (Gen II models). Refer to Chapter 5.
- Remove front rack (if equipped) and front cover under headlight (Gen III & Gen IV models). Refer to Chapter 5.

Key Switch/Auxiliary Shut Off (Kill) Switch

Turn key and engine stop switch "ON" and check for battery voltage on Red/Black terminal or harness side of connector. If battery voltage is present, switch function is O.K. Disconnect switch wires at terminal board or connector. Check continuity of wires in each switch position. Continuity should exist between color coded wires as shown in the chart below.

	Blk	Brn	R/Blk	R
Off	F	F		
On			F	F



"Off" Continuity between Black and Brown wires. No continuity between Red/White and Red wires.

"On" Continuity between Red/White and Red wires. No continuity between Black and Brown wires.

Starter Switch

Check starter switch at terminal board or at the harness connector. Terminal boards - Disconnect the White/Red wire from the switch at the panel. Turn key and engine stop switch "ON". The wire should show battery voltage when the starter button is depressed. Connector style harness - perform continuity test below with coupler disconnected.

Continuity Test - Turn key off. Disconnect Red/White and White/Red switch wires at terminal board or connector. Continuity should exist between color coded wires as shown in the chart below.

	R/W	W/R
Free		
Pushed	F	F

Replace the switch if resistance is indicated or if voltage drop is greater than .1 DCV.

Override Button

Disconnect the Purple, Gray/White, and Green wires at the terminal board or connector. Continuity should exist between color coded wires as shown in the chart below. Make sure to verify no continuity as well as continuity.

	Pur	Gry/W	Grn
Free	F		F
Pushed	F	F	

All Wheel Drive (AWD) Switch (AWD Model)

Disconnect the AWD switch at the terminal board or harness connector. Continuity should exist between color coded wires as shown in the chart below.

	Gry/W	Gry	AWD Light	Brn
Out (Off)	F	F		
In (On)	F		F	F

Gear Selector Switch/Neutral Light

The transmission switch can be tested at the terminal board or harness connector. Turn ignition switch (and engine stop switch) to "On" position. Shift transmission and check for battery voltage on each of the wires when the specific range is selected.

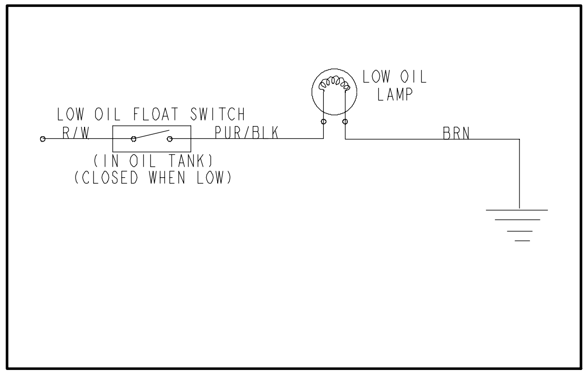
	R/W	Gry/W	Grn/W	Purple
Forward	F	F		
Neutral	F		F	
Reverse	F			F

NOTE: Make sure transmission linkage is adjusted correctly or disconnect linkage rods before testing switch. Inspect wiring between switch and terminal board and repair or replace if damaged. Replace the switch if battery voltage is not indicated or if voltage is present when the selector is moved out of the specific range.

Oil Level Sensor Testing (2 Stroke Models)

1. Disconnect Purple/Black and Red/White sensor wires.
2. Test for continuity between the wires with the float on the bottom (oil level empty or low), and off the bottom (safe level).
3. The wires should have continuity when oil level is low or empty, and no continuity when float is off the bottom.

	PUR/BLK	R/W
Empty/Low	F	F
Safe Level		



Oil Level Warning Light Testing (2 Stroke Models)

1. Disconnect Purple/Black and Red/White wires from sensor to remove the sensor from the circuit.
2. With ignition key off, connect the wires (on the harness side) together.
3. Turn key (and auxiliary switch) on. The light should illuminate. If not, check for battery voltage on R/W wire to sensor, check bulb condition, and related wiring.

Coolant Temperature Sensor Test (Hot Light)

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 coolant temperature sensor on the cylinder head. In normal operating conditions, the temperature sensor is non-conductive (open). If engine coolant reaches the specified temperature, the sensor becomes conductive completing the ground path for the light.

With engine cold, disconnect lead and measure resistance of sensor between connector terminal and ground. There should be no continuity or very high resistance (megohms). To test the “ON” temperature, heat the switch in a water bath to the temperature shown in table below. The switch should become conductive (low resistance) at indicated temperature. Do not immerse switch past the threads or allow switch to contact container when heating.

	Scrambler and Sport	**All Liquid Cooled Except Scrambler and Sport**
Hot Light On - 4 Strokes	-	221° F (105° C)
Hot Light On - 2 Strokes	205° F (96° C)	205° F (96° C)

Hot Light Circuit Test

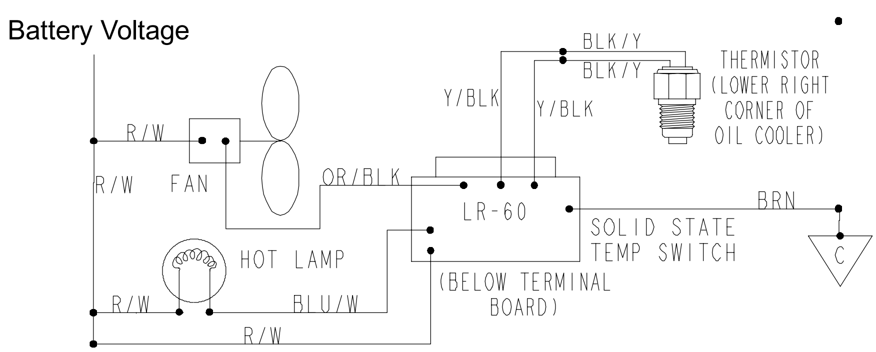
Disconnect temperature sensor wire lead and short it to ground on the cylinder head. Turn key and auxiliary switch to “ON” position. The hot lamp should come on. Check the bulb and related wiring if the lamp does not illuminate.

Oil Cooler Fan Notes

- Thermistor resistance decreases with temperature
- Both fan and hot light should be on with thermistor leads shorted together
- Fan blade should rotate drawing air in through cooler (blowing on engine)

THERMISTOR RESISTANCE VS. TEMPERATURE			
Temperature	**Resistance ± 20%**	**Fan ON/OFF**	**Hot Light ON/OFF**
77° F (25° C)	100KΩ	Fan OFF	
240° F (116° C)	3.5KΩ	Fan ON	
260° F (127° C)	2.5KΩ	Fan ON	
290° F (143° C)	1.6KΩ	Fan ON	Hot Light ON/OFF

Oil Cooler Fan Circuit



Thermistor / LR60 Fan Control Test

- Turn ON and engine stop switch to RUN.
- Test voltage on R/W wire to ground - R/W wire should have 12 Volts DC (battery voltage)
- Short thermistor leads together - fan and hot light ON? (If not, test hot light, fan motor and circuit)
- Disconnect thermistor wires and test the resistance of the thermistor (refer to temperature/resistance table). Replace thermistor if out of specified range.
- Replace LR60 and test system.

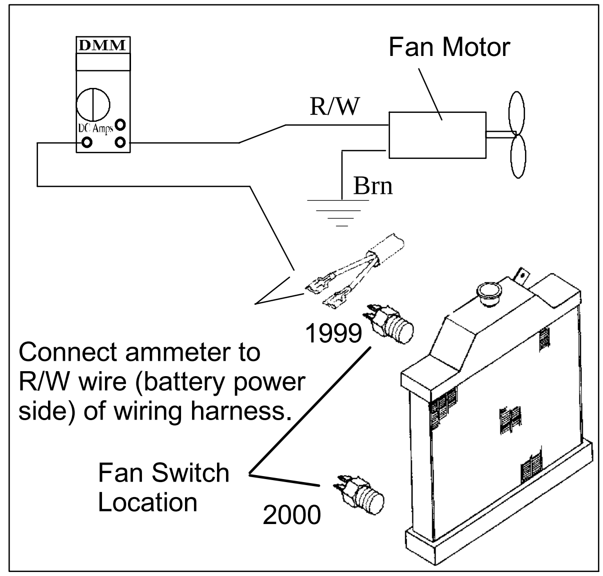
Fan Motor Current Draw

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. Disconnect the Red/White wire from the fan motor.
2. Connect a DC ammeter in series between the battery and fan motor as shown at right. Use the Red/White wire in the wiring harness as the power supply.
3. Be sure fan blade is free to rotate.
4. Turn ignition key and engine stop switch to "ON" position. Read the current draw on ammeter with fan running.
5. If the fan motor draws more than 6.5 Amps, replace the motor.

Fan Motor Current Draw:

Less Than 6.5 Amps



Brake Light Switch

1. Remove fuel tank.
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.

Headlamp Switch

Remove the fuel tank and top cover. Disconnect the headlamp switch wires (Red/White, Green, and Yellow) at the panel or connector (R/W) and from the headlamp high beam harness (Y) and low beam harness. Test the switch connections and compare to the chart.

Continuity

	R/W	Grn	Y
Off			
Low	F	F	
High	F		F

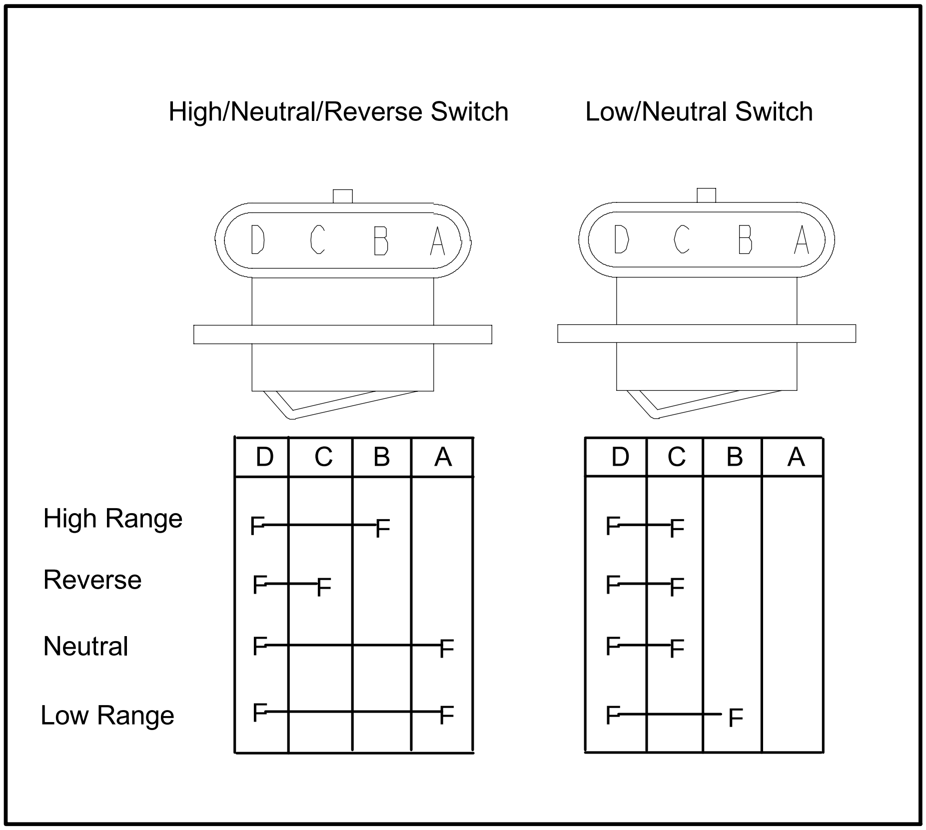
Neutral Light Circuit Operation

Power is supplied to the transmission switch from the Red/White wire when the key is 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.

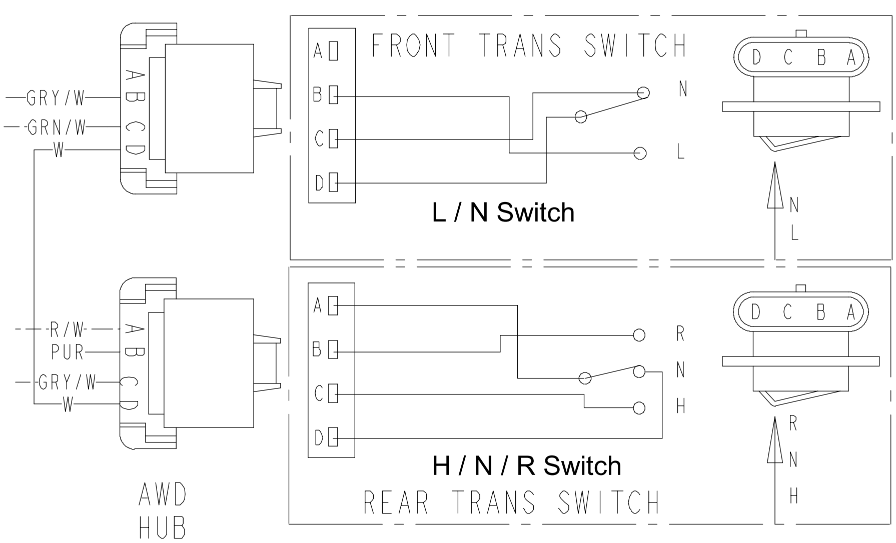
If the light is not on when neutral is selected, check the bulb. If the bulb is good, check the wiring, transmission switch, and lamp socket ground path.

Gear Position Indicator Switch Test

Switch Continuity Table



Switch Schematic



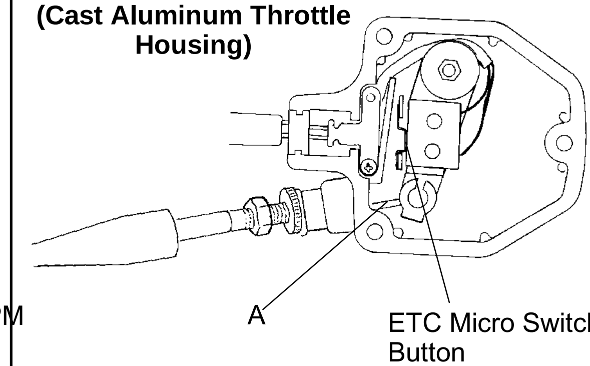
Electronic Throttle Control (ETC) Switch (Cast Aluminum Throttle Housing)
This system is used on 1999 Trail Boss, Sportsman 335, Xplorer 300, Xpress 300, Scrambler 400 (Early), and Big Boss 500 6x6 models.

The Electronic Throttle Control (ETC) system is designed to limit the engine RPM 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 (micro switch button depressed) by throttle cable tension. The switch is "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 (switch pin is released) delivering battery voltage to the Speed Limiter module via the white wire. Battery voltage on the white wire will cause the ignition system to misfire at the "ETC Limit" listed on page 10.37.

Test the ETC switch at the terminal board or 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. Terminal board models - Disconnect White wire on terminal board that leads from the ETC switch. Turn ignition key (and engine stop switch) "On". If voltage is present on the White wire and throttle cable is adjusted properly, replace the ETC switch.

	R/W	W
Normal		
Fault	F	F

Electronic Throttle Control (ETC) Switch (Cast Aluminum Throttle Housing)



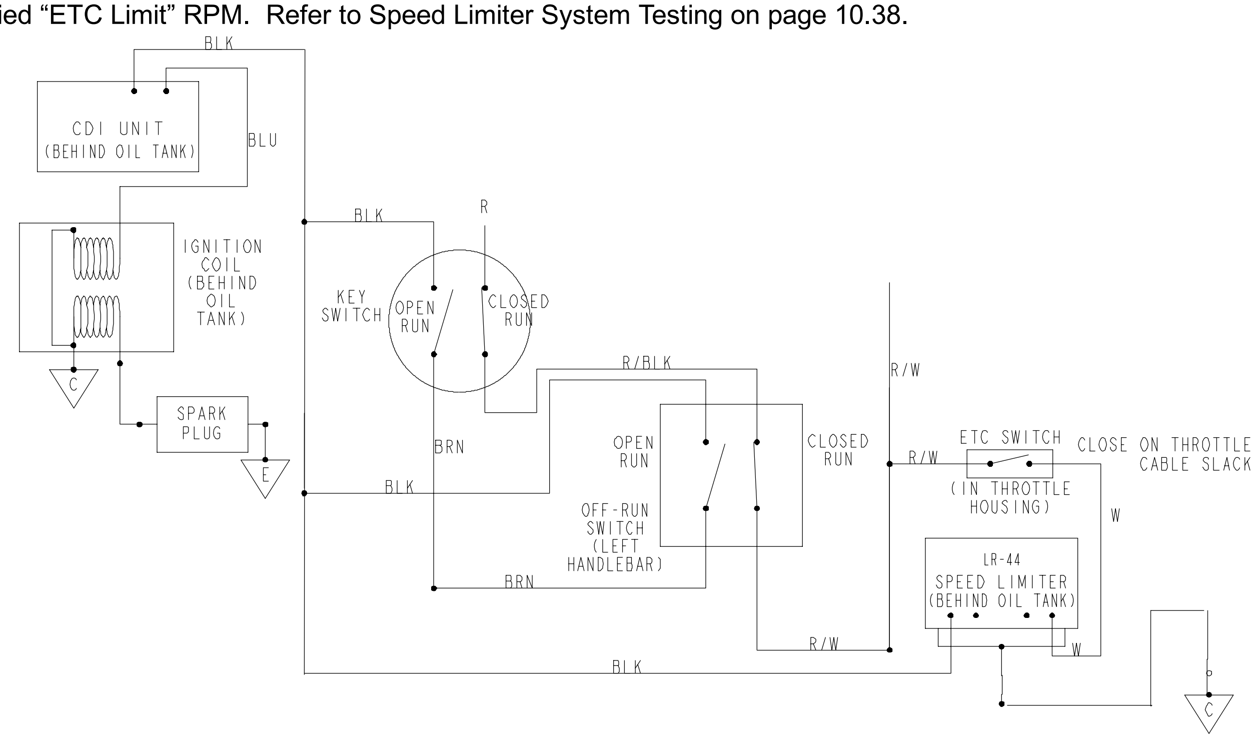
ETC Operation Test

Remove throttle block cover.

Place transmission in neutral and apply parking brake.

Start engine and open throttle lever slightly until engine RPM is above the "ETC Limit" (see page 10.37 for LR module ETC limits.

Hold throttle cable with fingers at point "A" as shown at right and release throttle lever. If the ETC system is functioning properly engine RPM will be limited to the specified "ETC Limit" RPM. Refer to Speed Limiter System Testing on page 10.38.



Electronic Throttle Control (ETC) Switch (Composite Throttle Housing)
This system is used on all 1999 Trail Blazer, Sport 400, Scrambler 400 (Late), Xplorer 400, Scrambler 500, Magnum 500, Sportsman 500, Sportsman 500 RSE models.

The Electronic Throttle Control (ETC) system is designed to limit the engine RPM 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 Ill. 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.

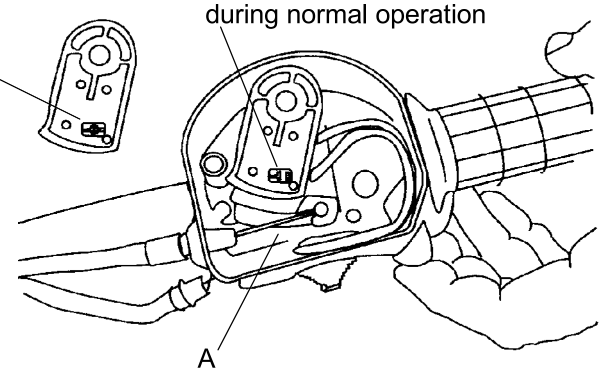
ETC Operation Test

Remove throttle block cover by carefully releasing all tabs around edge of cover.

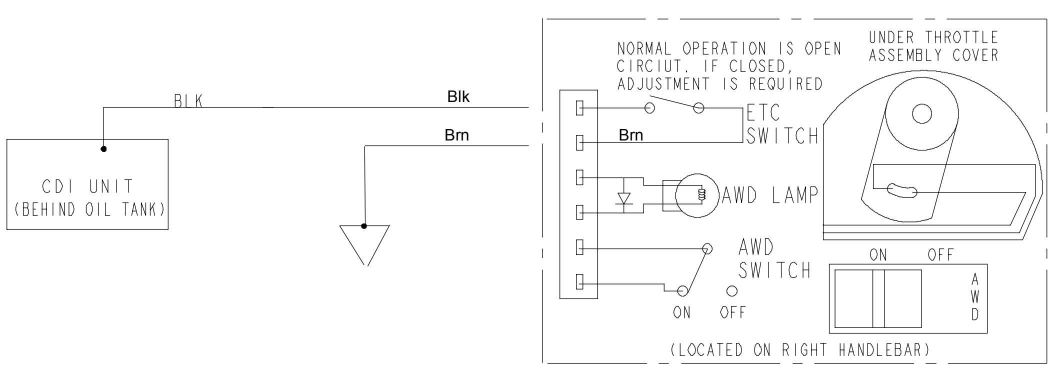
Place transmission in neutral and apply parking brake.

Start engine and open throttle lever slightly until engine RPM is just above idle speed.

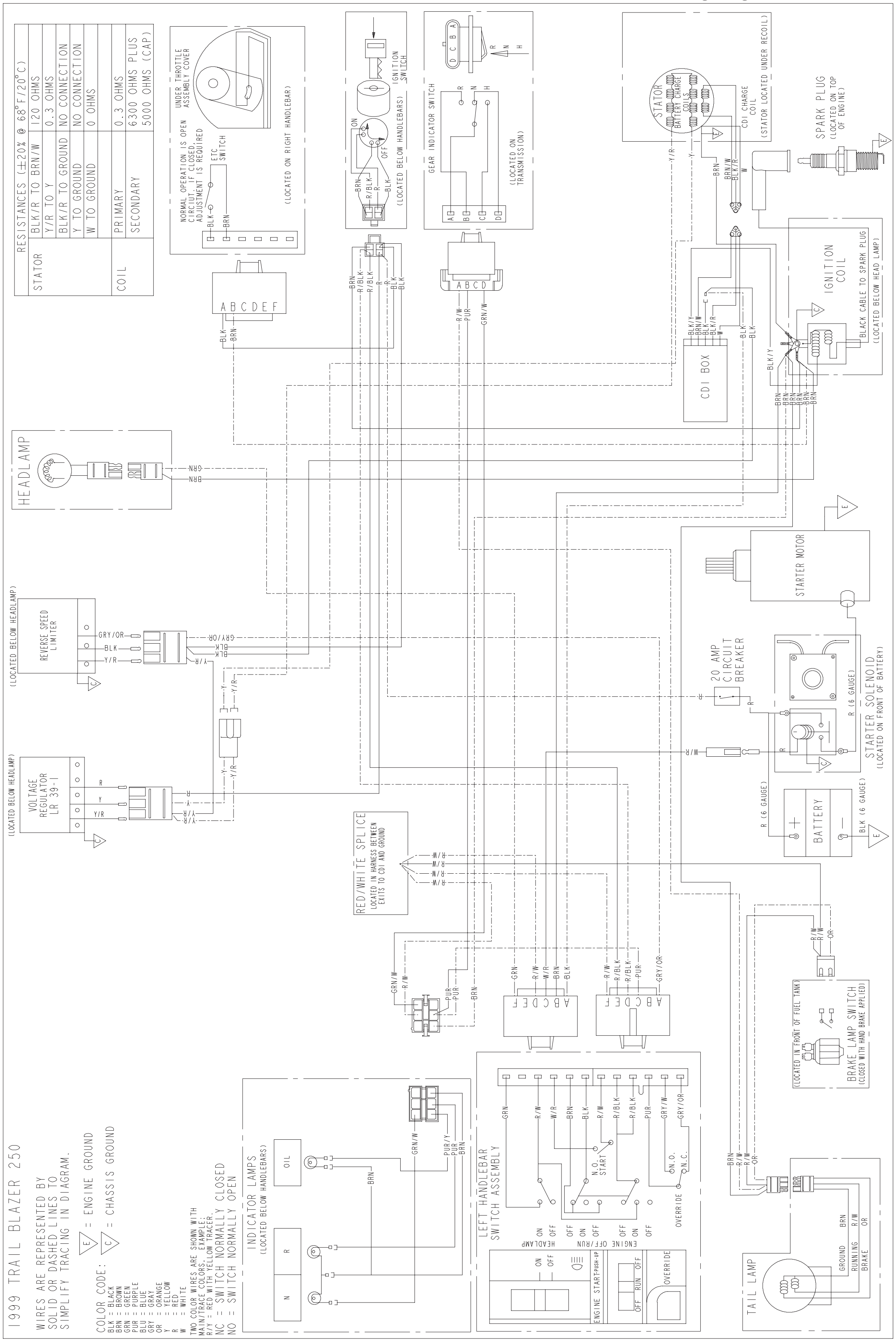
Hold throttle cable with fingers at point "A" as shown below and release throttle lever. If the ETC system is functioning properly, the engine will lose spark and stop.

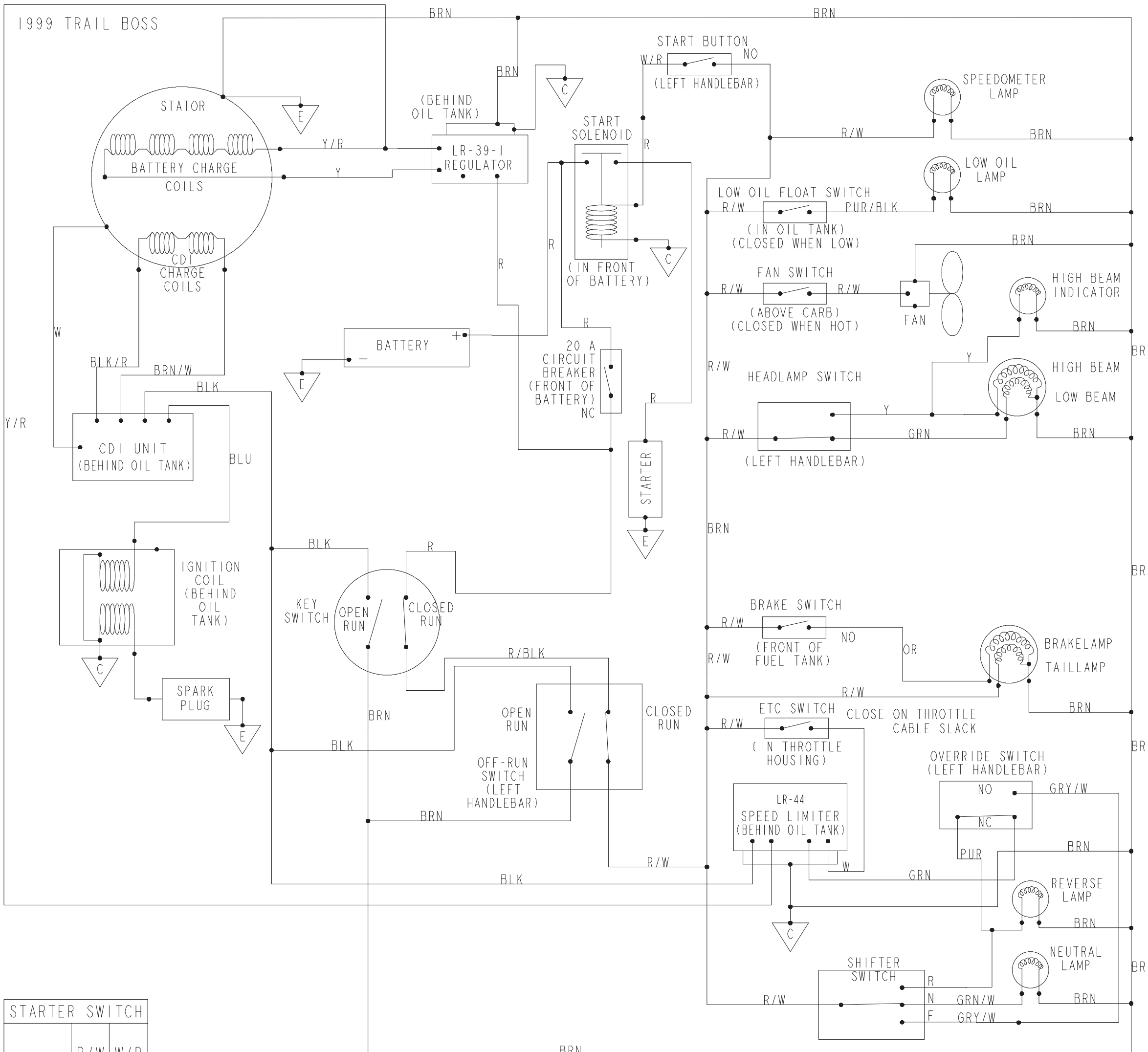


Electronic Throttle Control (ETC) Switch (Composite Throttle Housing)



CHAPTER 11
WIRING DIAGRAMS


1999 TRAIL BLAZER 250
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.
E = ENGINE GROUND
C = CHASSIS GROUND
COLOR CODE:
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
RESISTANCES (±20% @ 68°F/20°C)
STATOR
BLK/R TO BRN/W 120 OHMS
Y/R TO Y 0.3 OHMS
BLK/R TO GROUND NO CONNECTION
Y TO GROUND NO CONNECTION
W TO GROUND 0 OHMS
COIL
PRIMARY 0.3 OHMS
SECONDARY 6300 OHMS PLUS 5000 OHMS (CAP)
NORMAL OPERATION IS OPEN CIRCUIT. IF CLOSED, ADJUSTMENT IS REQUIRED
ETC SWITCH
UNDER THROTTLE ASSEMBLY COVER
(LOCATED ON RIGHT HANDLEBAR)
IGNITION SWITCH
(LOCATED BELOW HANDLEBARS)
GEAR INDICATOR SWITCH
(LOCATED ON TRANSMISSION)
STATOR
BATTERY CHARGE COILS
CDI CHARGE COIL
(STATOR LOCATED UNDER RECOIL)
SPARK PLUG
(LOCATED ON TOP OF ENGINE)
IGNITION COIL
BLACK CABLE TO SPARK PLUG
(LOCATED BELOW HEAD LAMP)
CDI BOX
HEADLAMP
REVERSE SPEED LIMITER
(LOCATED BELOW HEADLAMP)
VOLTAGE REGULATOR LR 39-1
(LOCATED BELOW HEADLAMP)
STARTER MOTOR
20 AMP CIRCUIT BREAKER
STARTER SOLENOID
(LOCATED ON FRONT OF BATTERY)
R (6 GAUGE)
BATTERY
BLK (6 GAUGE)
RED/WHITE SPLICE
LOCATED IN HARNESS BETWEEN EXITS TO CDI AND GROUND
BRAKE LAMP SWITCH
(CLOSED WITH HAND BRAKE APPLIED)
(LOCATED IN FRONT OF FUEL TANK)
INDICATOR LAMPS
(LOCATED BELOW HANDLEBARS)
OIL
R
N
LEFT HANDLEBAR SWITCH ASSEMBLY
HEADLAMP
ENGINE OFF/RUN
ENGINE START (PUSH-UP)
OVERRIDE
N.O. START
N.O.
N.C.
TAIL LAMP
GROUND BRN
RUNNING R/W
BRAKE OR



STARTER SWITCH		
	R/W	W/R
FREE		
PUSHED	○	○

HEADLAMP SWITCH			
	R/W	GRN	Y
OFF			
LO	○	○	
HI	○	═	○

TRANSMISSION SWITCH				
	R/W	GRY/W	GRN/W	PUR
FWD	○	○		
N	○	═	○	
REV	○	═	═	○

AUX SHUT OFF SWITCH				
	BLK	BRN	R/W	R/BLK
OFF	○	○		
RUN			○	○

OVERRIDE SWITCH			
	PUR	GRY/W	GRN
FREE	○	═	○
PUSHED	○	○	

KEY SWITCH				
	BLK	BRN	R/BLK	R
OFF	○	○		
ON			○	○

ETC SWITCH		
	R/W	W
NORMAL		
FAULT	○	○

RESISTANCES (±20% @ 68°F/20°C)		
STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	0.3 OHMS
	BLK/R TO GROUND	NO CONNECTION
	Y TO GROUND	NO CONNECTION
	W TO GROUND	0 OHMS
COIL	PRIMARY	0.3 OHMS
	SECONDARY	6300 OHMS PLUS 5000 OHMS (CAP)

COLOR CODE

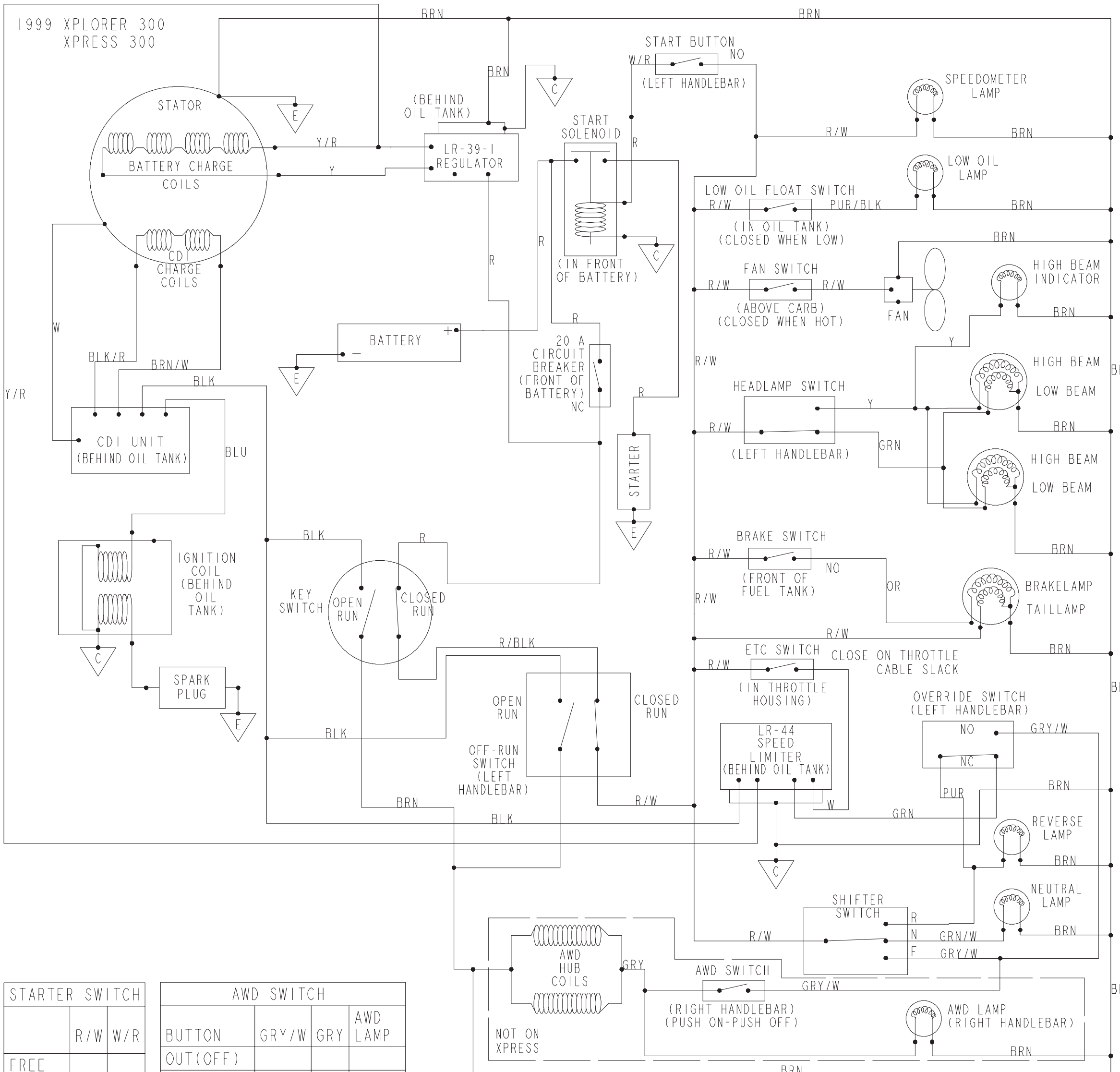
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE

TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.

E = ENGINE GROUND
C = CHASSIS GROUND

NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN

1999 TRAIL BOSS



STARTER SWITCH

	R/W	W/R
FREE		
PUSHED	O=	=O

AWD SWITCH

BUTTON	GRY/W	GRY	AWD LAMP
OUT(OFF)			
IN (ON)	O=	=O	
IN (ON)	O=	=	=O

HEADLAMP SWITCH

	R/W	GRN	Y
OFF			
LO	O=	=O	
HI	O=	=	=O

TRANSMISSION SWITCH

	R/W	GRY/W	GRN/W	PUR
FWD	O=	=O		
N	O=	=	=O	
REV	O=	=	=	=O

AUX SHUT OFF SWITCH

	BLK	BRN	R/W	R/BLK
OFF	O=	=O		
RUN			O=	=O

OVERRIDE SWITCH

	PUR	GRY/W	GRN
FREE	O=	=	=O
PUSHED	O=	=O	

KEY SWITCH

	BLK	BRN	R/BLK	R
OFF	O=	=O		
ON			O=	=O

ETC SWITCH

	R/W	W
NORMAL		
FAULT	O=	=O

RESISTANCES (±20% @ 68°F/20°C)

STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	0.3 OHMS
	BLK/R TO GROUND	NO CONNECTION
	Y TO GROUND	NO CONNECTION
	W TO GROUND	0 OHMS
COIL	PRIMARY	0.3 OHMS
	SECONDARY	6300 OHMS PLUS 5000 OHMS (CAP)
FRONT WHEEL DRIVE COILS	GRY TO BRN	24 OHMS (EACH)

COLOR CODE

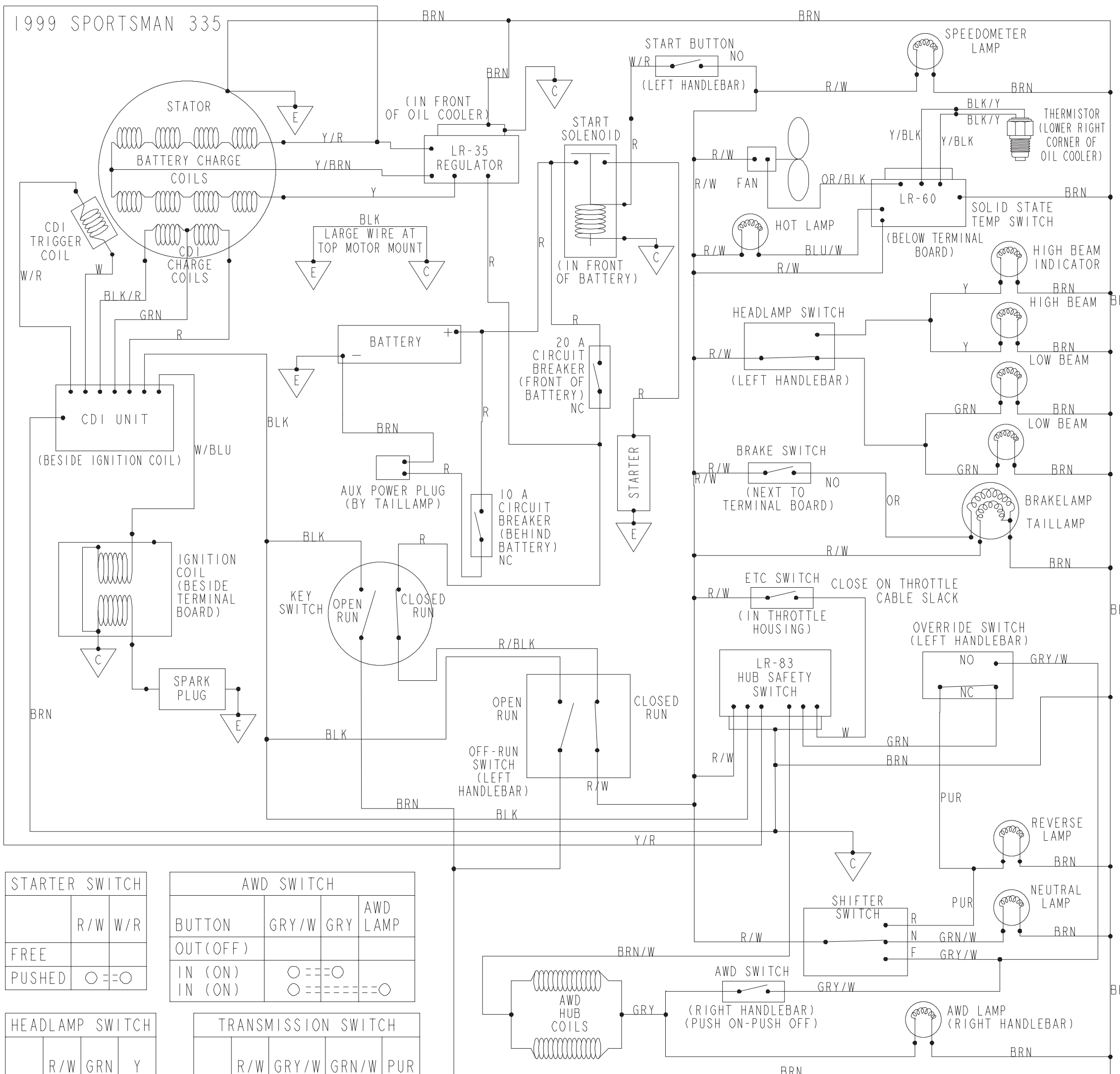
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE

TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.

E = ENGINE GROUND
C = CHASSIS GROUND

NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN

1999 300



STARTER SWITCH	R/W	W/R
FREE		
PUSHED	○	○

AWD SWITCH BUTTON	GRY/W	GRY	AWD LAMP
OUT(OFF)			
IN (ON)	○	○	
IN (ON)	○		○

HEADLAMP SWITCH	R/W	GRN	Y
OFF			
LO	○	○	
HI	○		○

TRANSMISSION SWITCH	R/W	GRY/W	GRN/W	PUR
FWD	○	○		
N	○		○	
REV	○			○

AUX SHUT OFF SWITCH	BLK	BRN	R/W	R/BLK
OFF	○	○		
RUN			○	○

KEY SWITCH	BLK	BRN	R/BLK	R
OFF	○	○		
ON			○	○

OVERRIDE SWITCH	PUR	GRY/W	GRN
FREE	○		○
PUSHED	○	○	

ETC SWITCH	R/W	W
NORMAL		
FAULT	○	○

THERMISTER RESISTANCE °F	°C	OHMS (±3%)	SOLID STATE RELAY OUTPUTS
77	25	100,000	
240	116	3466	FAN OFF (TEMP FALLING)
260	127	2519	FAN ON (TEMP RISING)
290	143	1607	HOT LIGHT ON/OFF

BOTH LAMP AND FAN SHOULD BE ON WITH THERMISTER LEADS SHORTED TO EACH OTHER. CHECK THAT FAN ROTATION DIRECTION IS CLOCKWISE VIEWED FROM FRONT OF ATV.

E = ENGINE GROUND
C = CHASSIS GROUND
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN

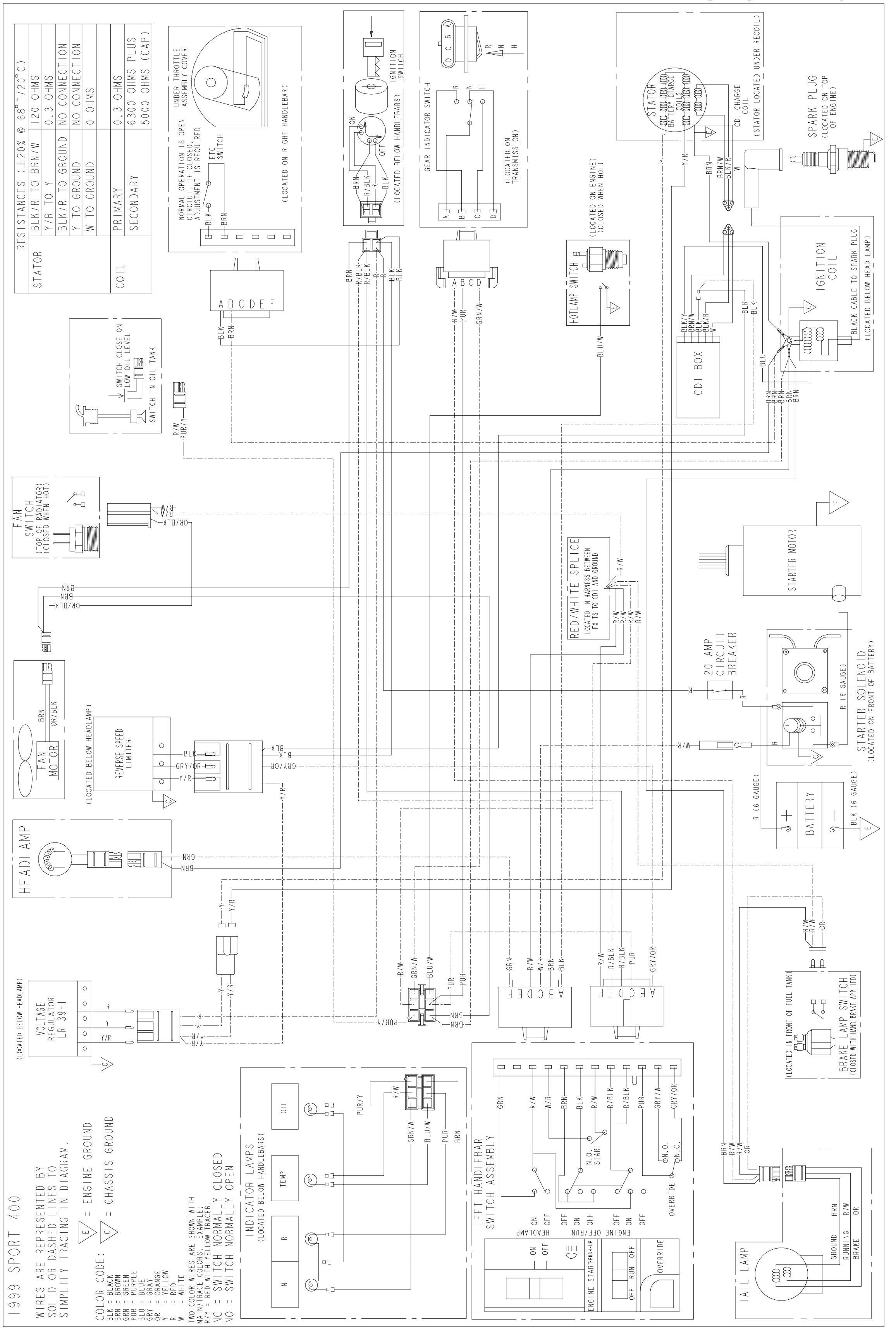
	RESISTANCES (±20% @ 68°F/20°C)		
STATOR	CAPACITOR CHARGE COIL	GRN TO BLK/R	446 OHMS
		GRN TO R	3.2 OHMS
		GRN TO GROUND	NO CONNECTION
	TRIGGER COIL	W TO W/R	97 OHMS
		W TO GROUND	NO CONNECTION
	BATTERY CHARGE COIL	Y TO Y/BRN	0.17 OHMS
		Y/R TO Y/BRN	0.17 OHMS
		Y TO GROUND	NO CONNECTION
	IGNITION COIL	PRIMARY	0.3 OHMS
		SECONDARY	6300 OHMS PLUS 5000 OHMS (CAP)
	FRONT WHEEL DRIVE COILS	GRY TO BRN	24 OHMS (EACH)

COLOR CODE

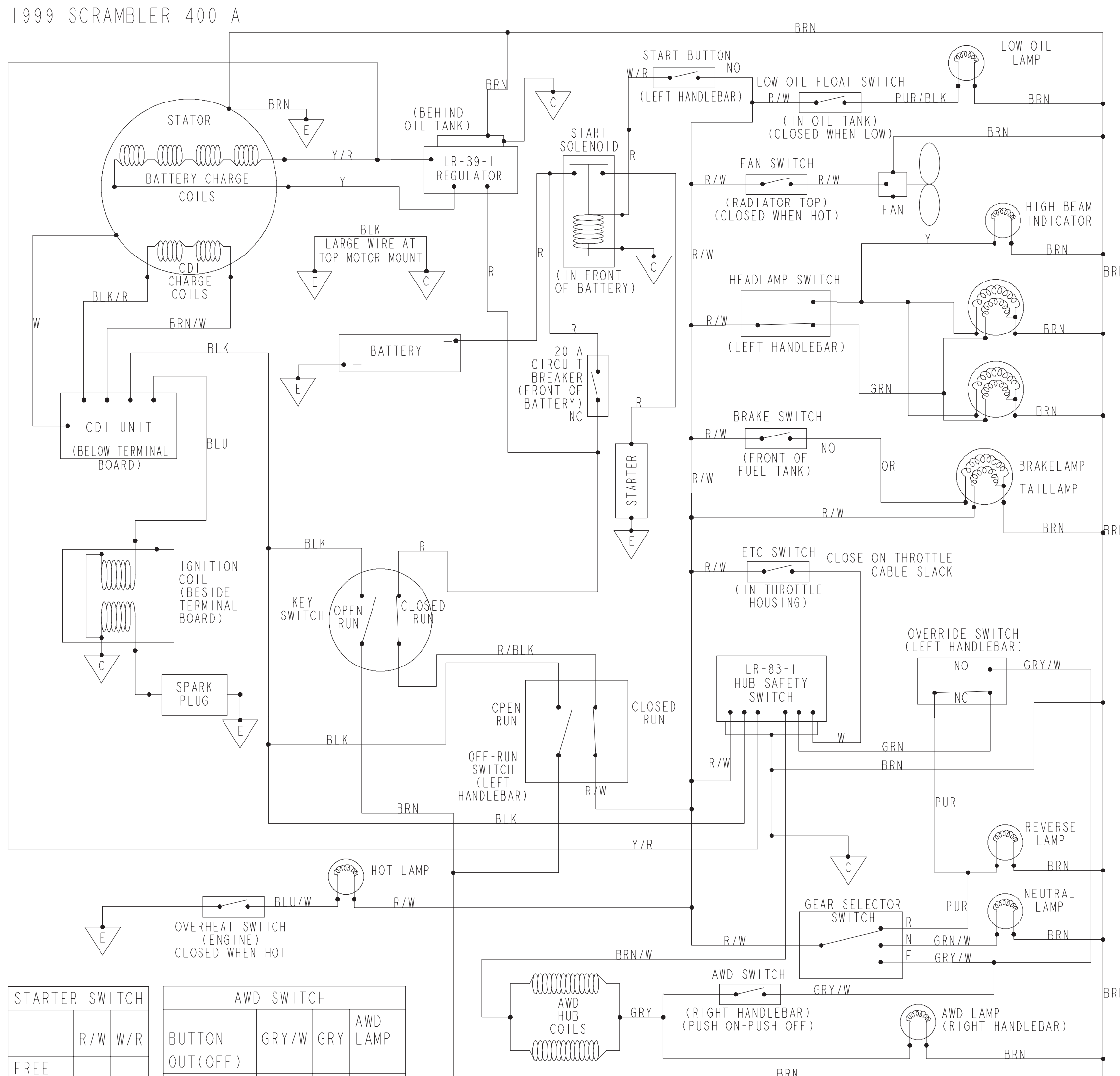
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE

TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.

1998 SMAN 335


1999 SPORT 400
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.
STATOR
SPARK PLUG
IGNITION COIL
CDI BOX
STARTER MOTOR
STARTER SOLENOID
BATTERY
20 AMP CIRCUIT BREAKER
RED/WHITE SPLICE
HOTLAMP SWITCH
GEAR INDICATOR SWITCH
IGNITION SWITCH
FAN SWITCH
FAN MOTOR
REVERSE SPEED LIMITER
HEADLAMP
VOLTAGE REGULATOR LR 39-1
INDICATOR LAMPS
LEFT HANDLEBAR SWITCH ASSEMBLY
BRAKE LAMP SWITCH
TAIL LAMP

1999 SCRAMBLER 400 A



STARTER SWITCH	R/W	W/R
FREE		
PUSHED	O	O

AWD SWITCH BUTTON	GRY/W	GRY	AWD LAMP
OUT(OFF)			
IN (ON)	O	O	
IN (ON)	O		O

HEADLAMP SWITCH	R/W	GRN	Y
OFF			
LO	O	O	
HI	O		O

GEAR SELECTOR SWITCH	R/W	GRY/W	GRN/W	PUR
FWD	O	O		
N	O		O	
REV	O			O

AUX SHUT OFF SWITCH	BLK	BRN	R/W	R/BLK
OFF	O	O		
RUN			O	O

OVERRIDE SWITCH	PUR	GRY/W	GRN
FREE	O		O
PUSHED	O	O	

KEY SWITCH	BLK	BRN	R/BLK	R
OFF	O	O		
ON			O	O

ETC SWITCH	R/W	W
NORMAL		
FAULT	O	O

E = ENGINE GROUND
C = CHASSIS GROUND

NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN

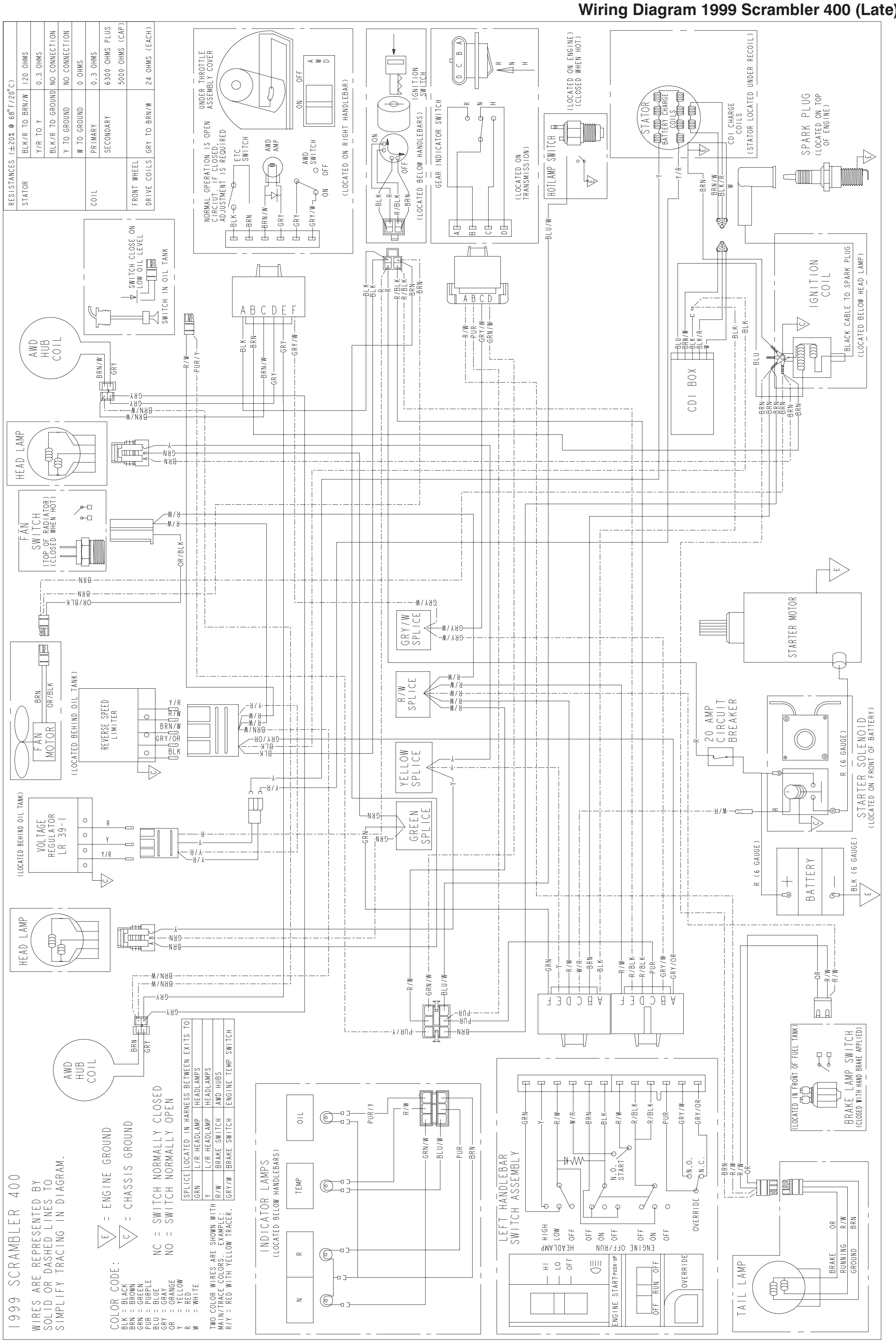
RESISTANCES (±20% @ 68°F/20°C)		
STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	0.3 OHMS
	BLK/R TO GROUND	NO CONNECTION
	Y TO GROUND	NO CONNECTION
	W TO GROUND	0 OHMS
COIL	PRIMARY	0.3 OHMS
	SECONDARY	6300 OHMS PLUS 5000 OHMS (CAP)
FRONT WHEEL DRIVE COILS	GRY TO BRN/W	24 OHMS (EACH)

COLOR CODE

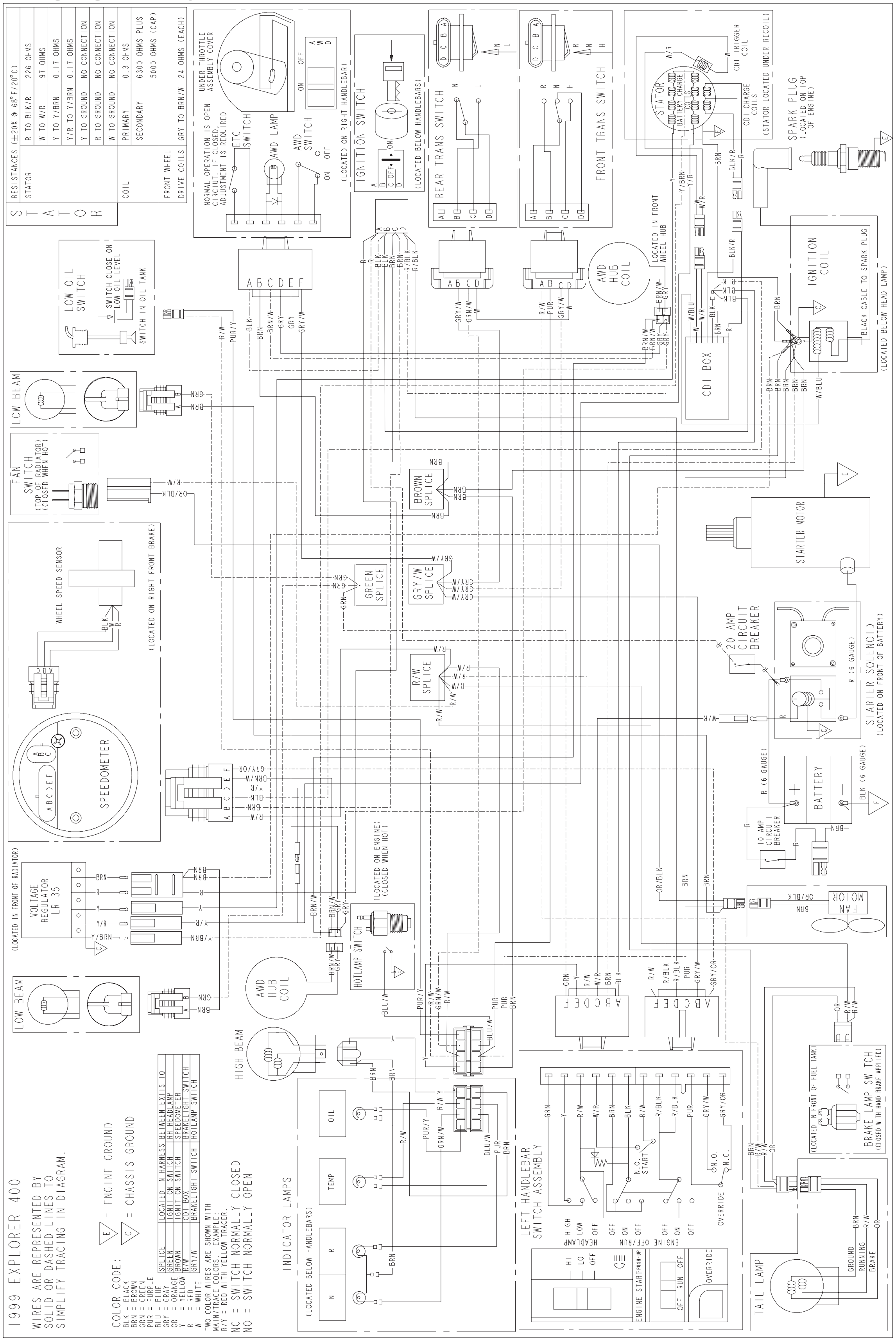
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE

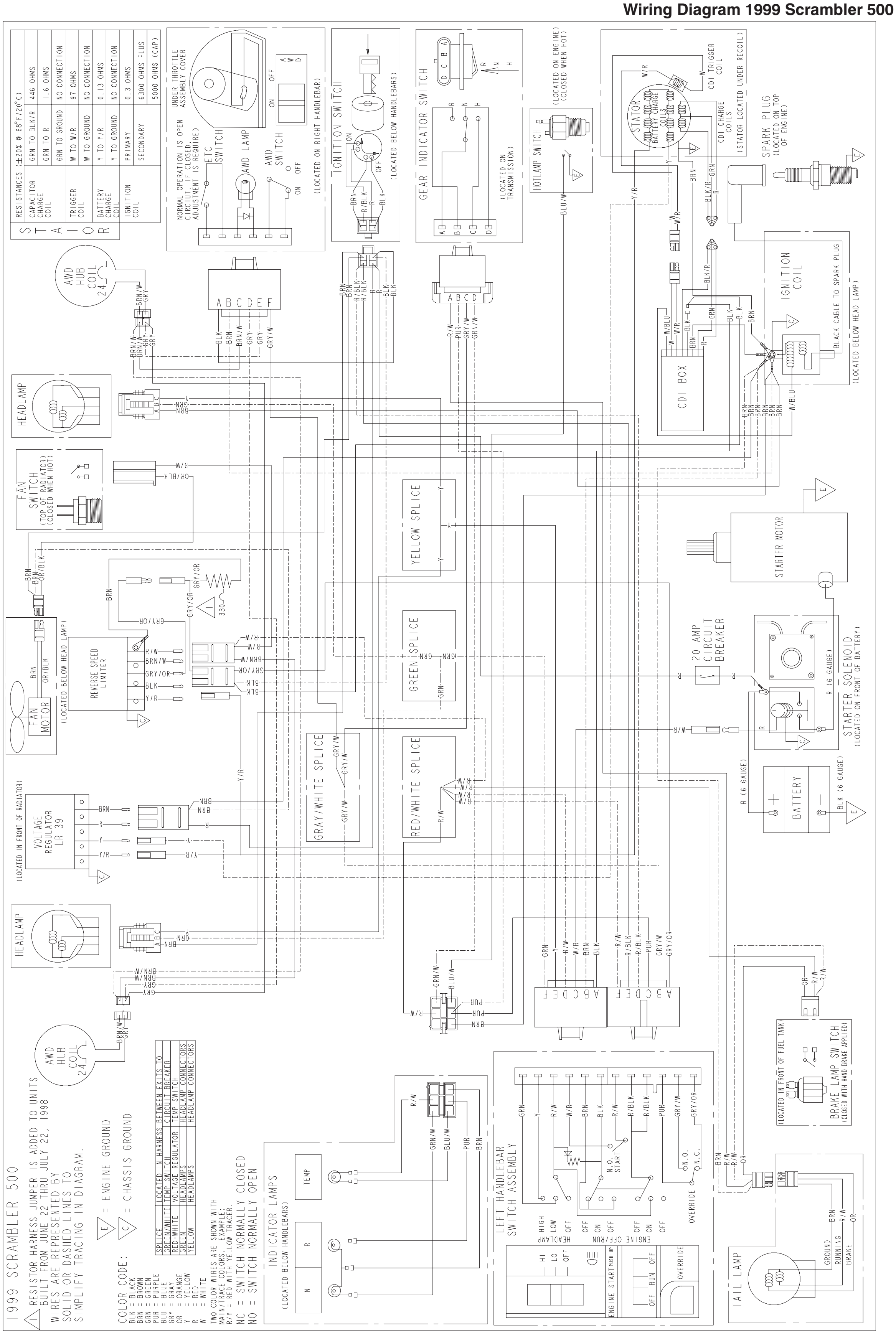
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.

1999 SCR 400 A

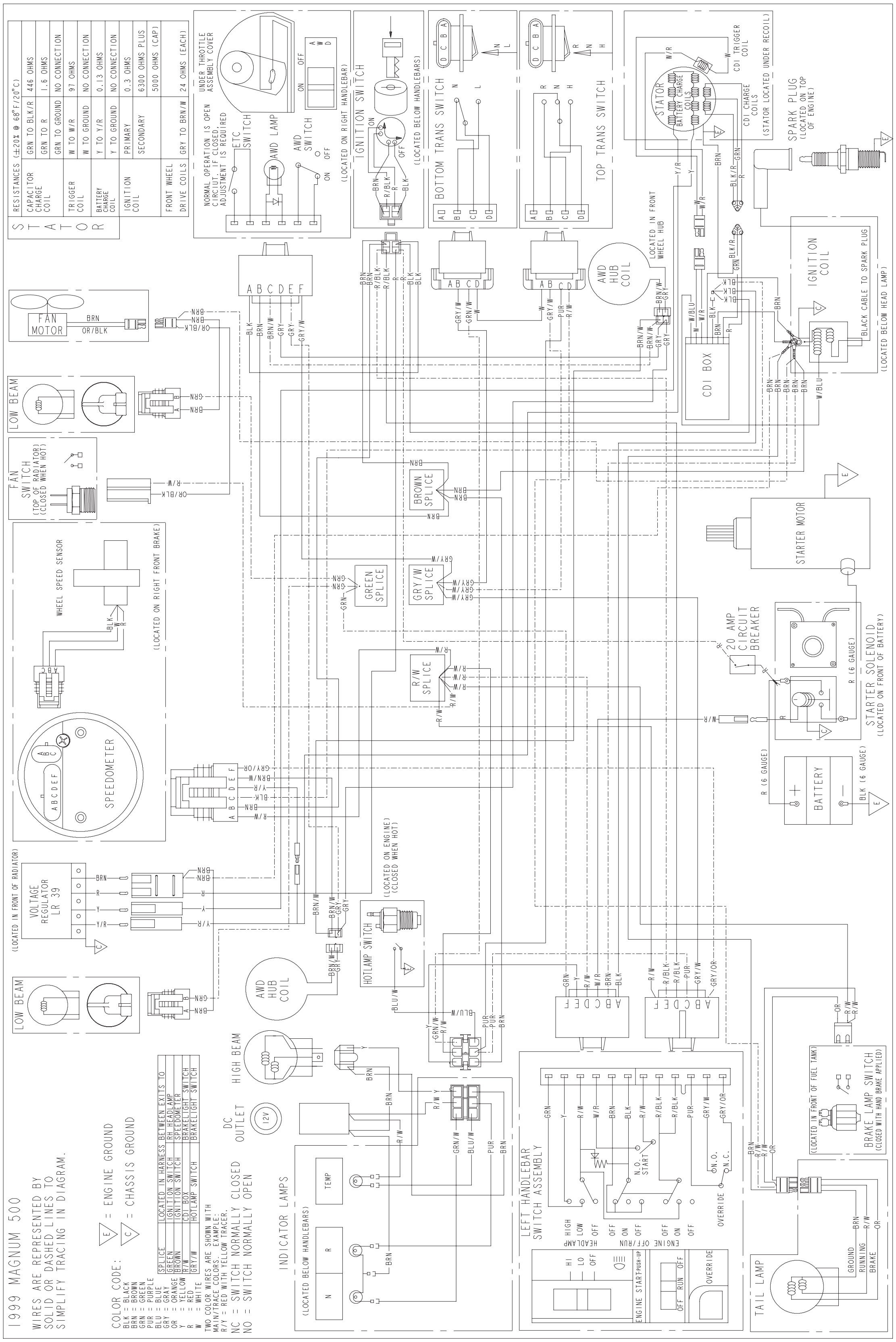

1999 SCRAMBLER 400
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.
COLOR CODE: BLK = BLACK BRN = BROWN GRN = GREEN PUR = PURPLE BLU = BLUE GRY = GRAY OR = ORANGE Y = YELLOW R = RED W = WHITE
E = ENGINE GROUND
C = CHASSIS GROUND
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.
AWD HUB COIL
HEAD LAMP
FAN SWITCH
FAN MOTOR
REVERSE SPEED LIMITER
VOLTAGE REGULATOR LR 39-1
GRY/W SPLICE
R/W SPLICE
YELLOW SPLICE
GREEN SPLICE
IGNITION SWITCH
GEAR INDICATOR SWITCH
HOTLAMP SWITCH
STATOR
SPARK PLUG
IGNITION COIL
CDI BOX
STARTER MOTOR
20 AMP CIRCUIT BREAKER
STARTER SOLENOID
BATTERY
BRAKE LAMP SWITCH
TAIL LAMP
LEFT HANDLEBAR SWITCH ASSEMBLY
INDICATOR LAMPS

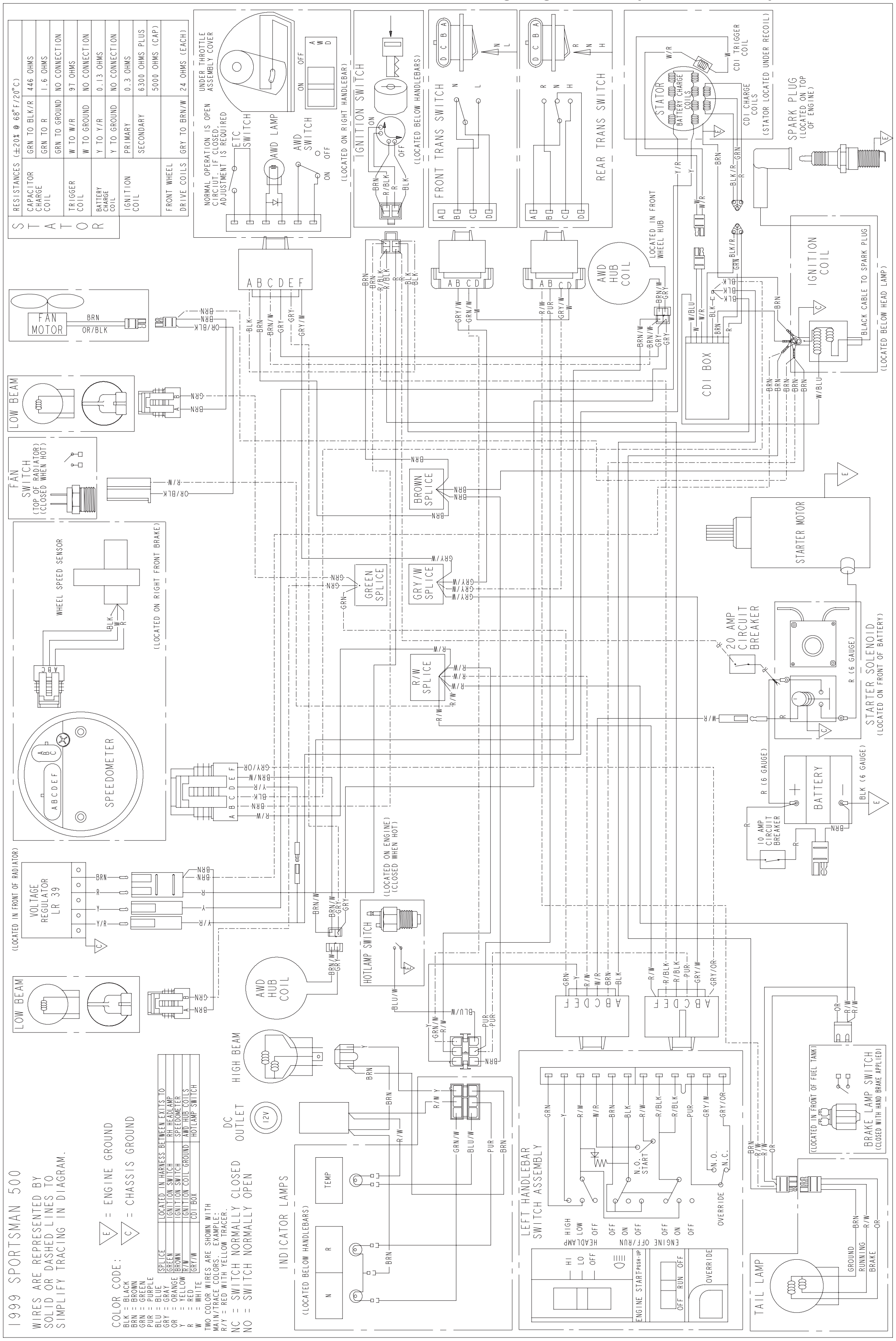
Wiring Diagram 1999 Xplorer 400



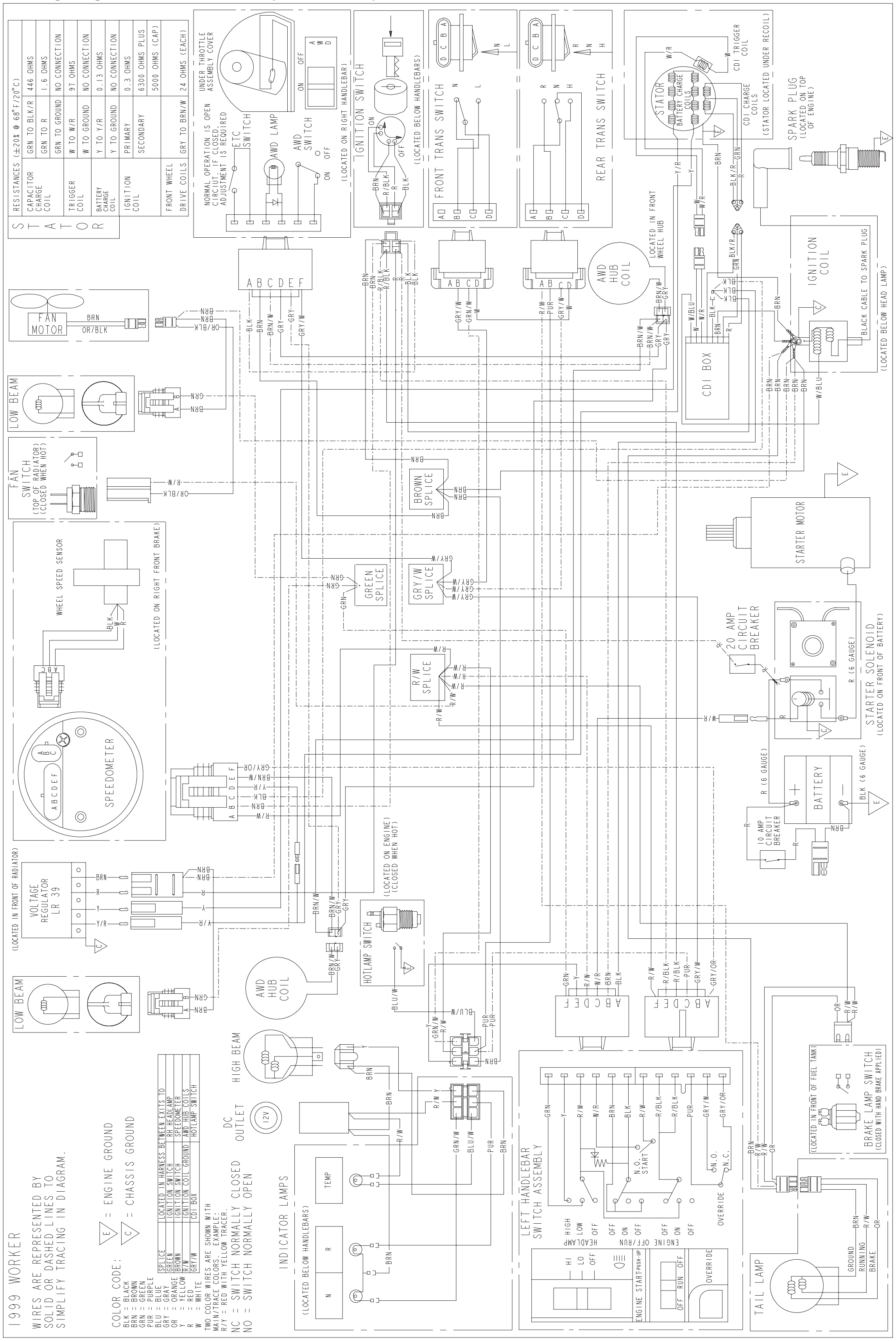

1999 SCRAMBLER 500
RESISTOR HARNESS JUMPER IS ADDED TO UNITS BUILT FROM JUNE 22 THRU JULY 22, 1998
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.
E = ENGINE GROUND
C = CHASSIS GROUND
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
INDICATOR LAMPS
(LOCATED BELOW HANDLEBARS)
LEFT HANDLEBAR SWITCH ASSEMBLY
TAIL LAMP
BRAKE LAMP SWITCH
HEADLAMP
AWD HUB COIL
FAN SWITCH
FAN MOTOR
REVERSE SPEED LIMITER
VOLTAGE REGULATOR LR 39
YELLOW SPLICE
GREEN SPLICE
GRAY/WHITE SPLICE
RED/WHITE SPLICE
IGNITION SWITCH
GEAR INDICATOR SWITCH
HOTLAMP SWITCH
STATOR
CDI BOX
IGNITION COIL
SPARK PLUG
STARTER MOTOR
20 AMP CIRCUIT BREAKER
STARTER SOLENOID
BATTERY

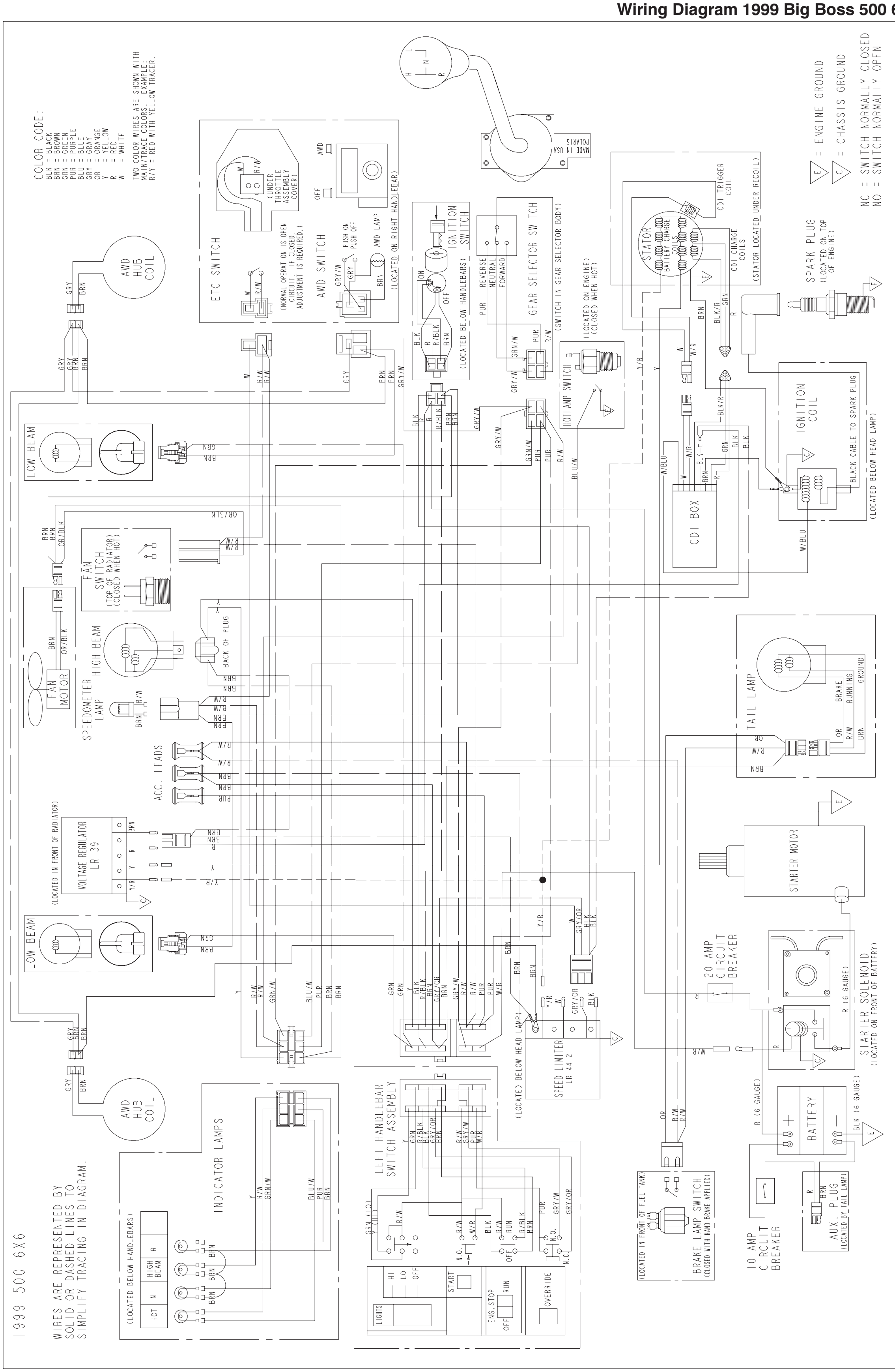
Wiring Diagram 1999 Magnum 500



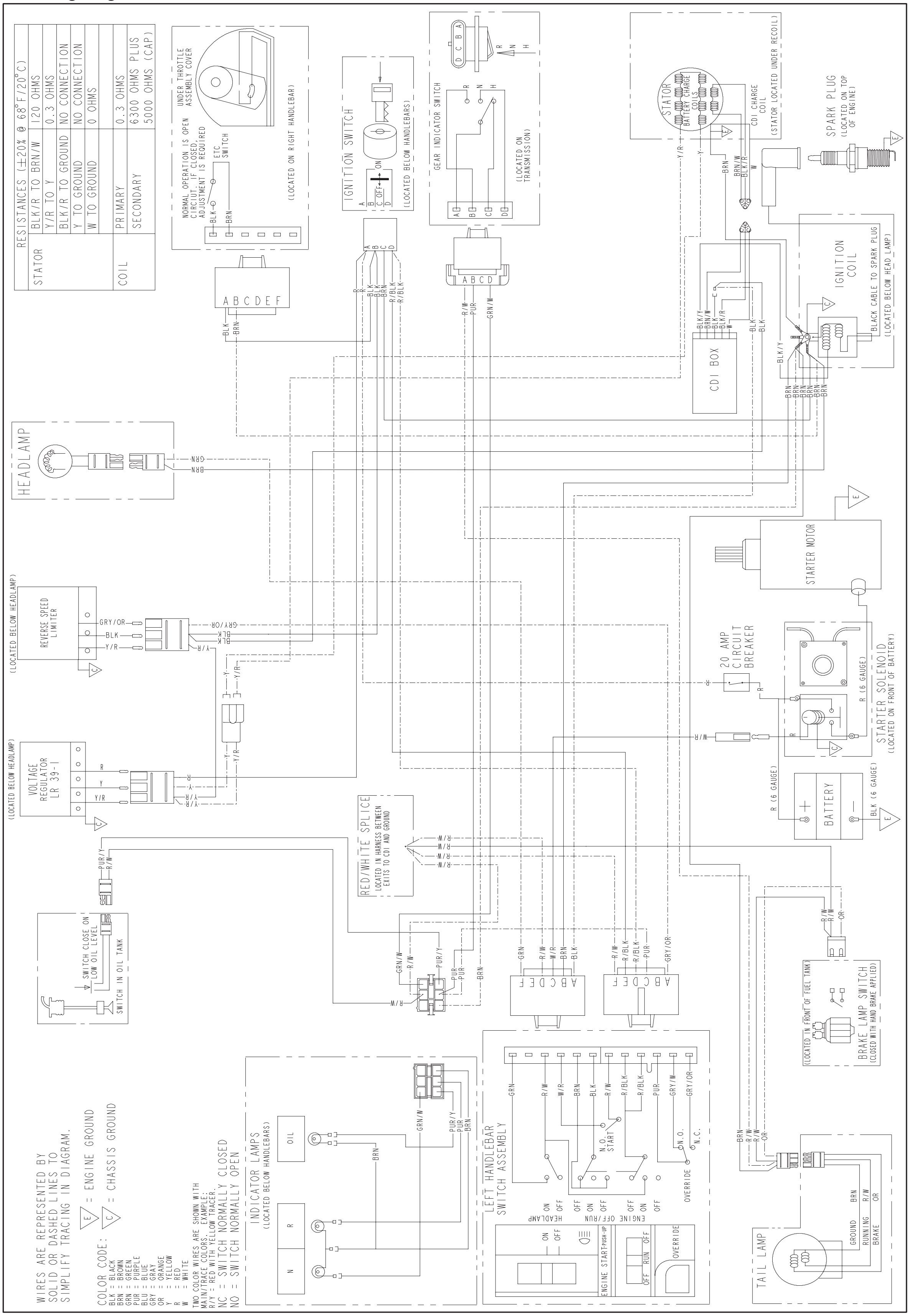

1999 SPORTSMAN 500
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.
COLOR CODE:
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
= ENGINE GROUND
= CHASSIS GROUND
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
FAN MOTOR
LOW BEAM
FAN SWITCH
WHEEL SPEED SENSOR
SPEEDOMETER
VOLTAGE REGULATOR LR 39
HIGH BEAM
DC OUTLET
AWD HUB COIL
HOTLAMP SWITCH
INDICATOR LAMPS
LEFT HANDLEBAR SWITCH ASSEMBLY
TAIL LAMP
BRAKE LAMP SWITCH
BATTERY
STARTER SOLENOID
20 AMP CIRCUIT BREAKER
10 AMP CIRCUIT BREAKER
STARTER MOTOR
IGNITION COIL
CDI BOX
SPARK PLUG
STATOR
IGNITION SWITCH
FRONT TRANS SWITCH
REAR TRANS SWITCH
ETC SWITCH
AWD SWITCH
BROWN SPLICE
GREEN SPLICE
GRY/W SPLICE
R/W SPLICE

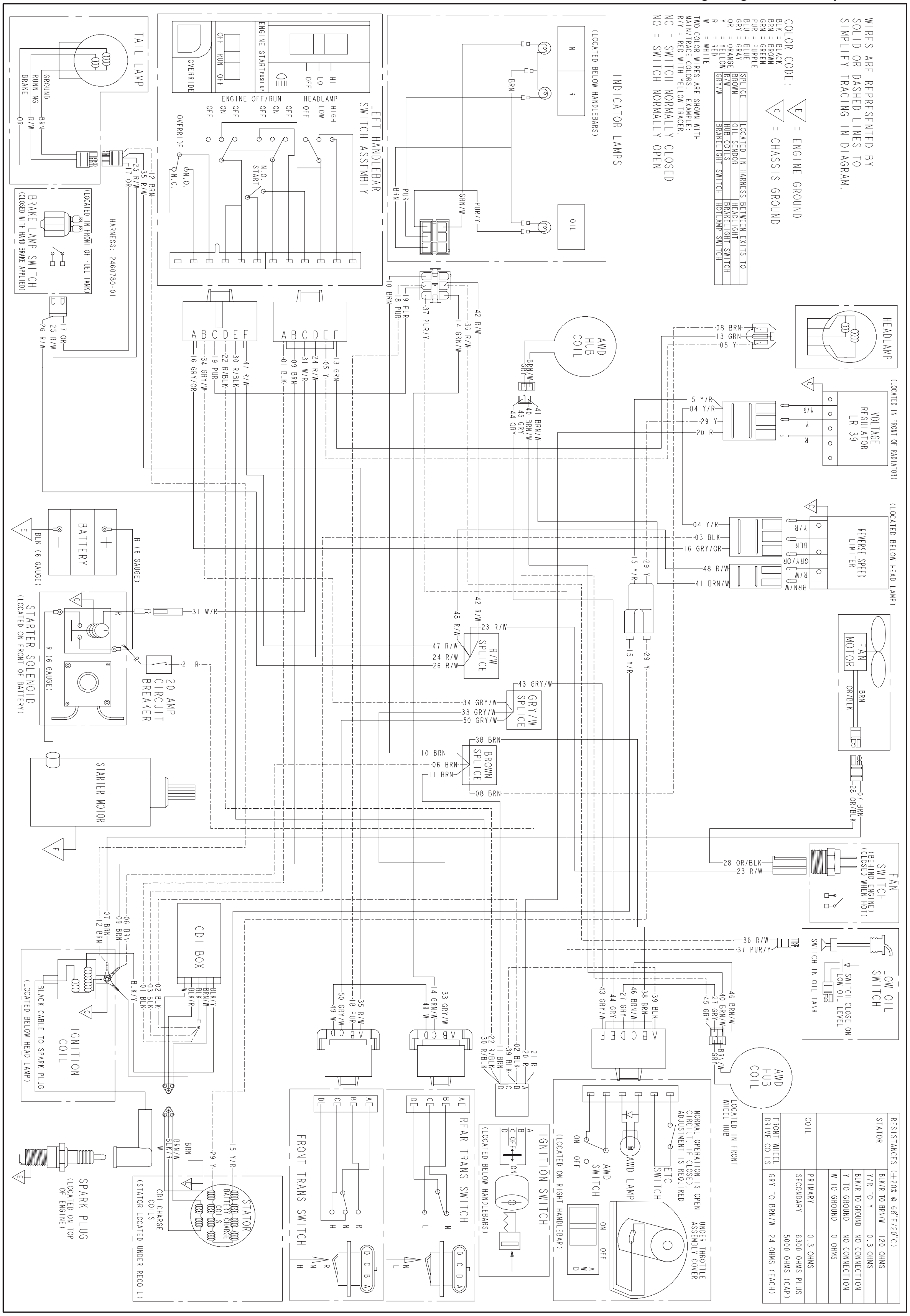
Wiring Diagram 1999 Worker 500 (International)



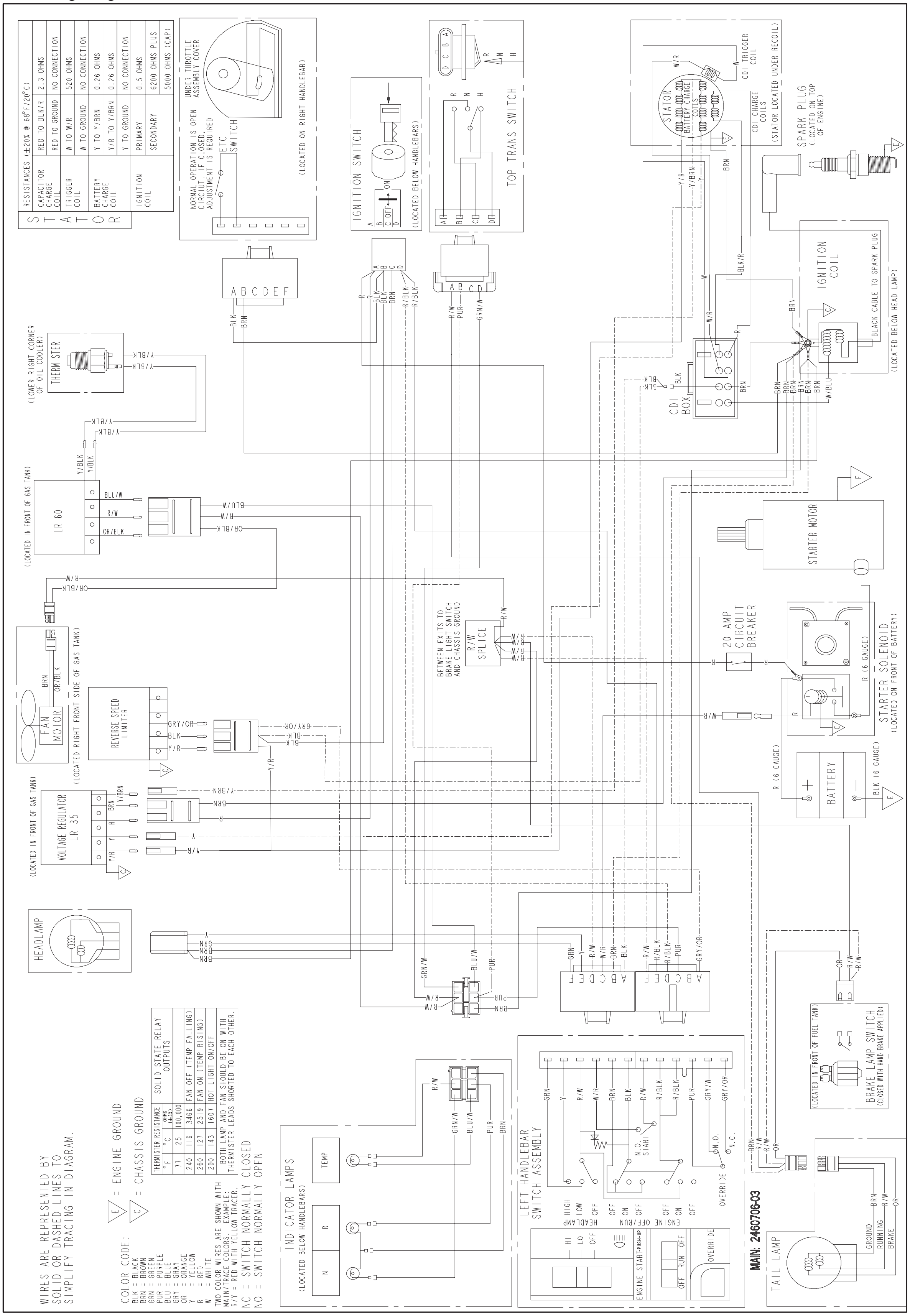

COLOR CODE:
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.
E = ENGINE GROUND
C = CHASSIS GROUND
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
AWD HUB COIL
ETC SWITCH
AWD SWITCH
IGNITION SWITCH
GEAR SELECTOR SWITCH
HOTLAMP SWITCH
STATOR
SPARK PLUG
IGNITION COIL
CDI BOX
LOW BEAM
HIGH BEAM
FAN SWITCH
FAN MOTOR
SPEEDOMETER LAMP
ACC. LEADS
VOLTAGE REGULATOR LR 39
TAIL LAMP
STARTER MOTOR
20 AMP CIRCUIT BREAKER
STARTER SOLENOID
SPEED LIMITER LR 44-2
LEFT HANDLEBAR SWITCH ASSEMBLY
INDICATOR LAMPS
BATTERY
BRAKE LAMP SWITCH
10 AMP CIRCUIT BREAKER
AUX. PLUG
1999 500 6X6
WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.

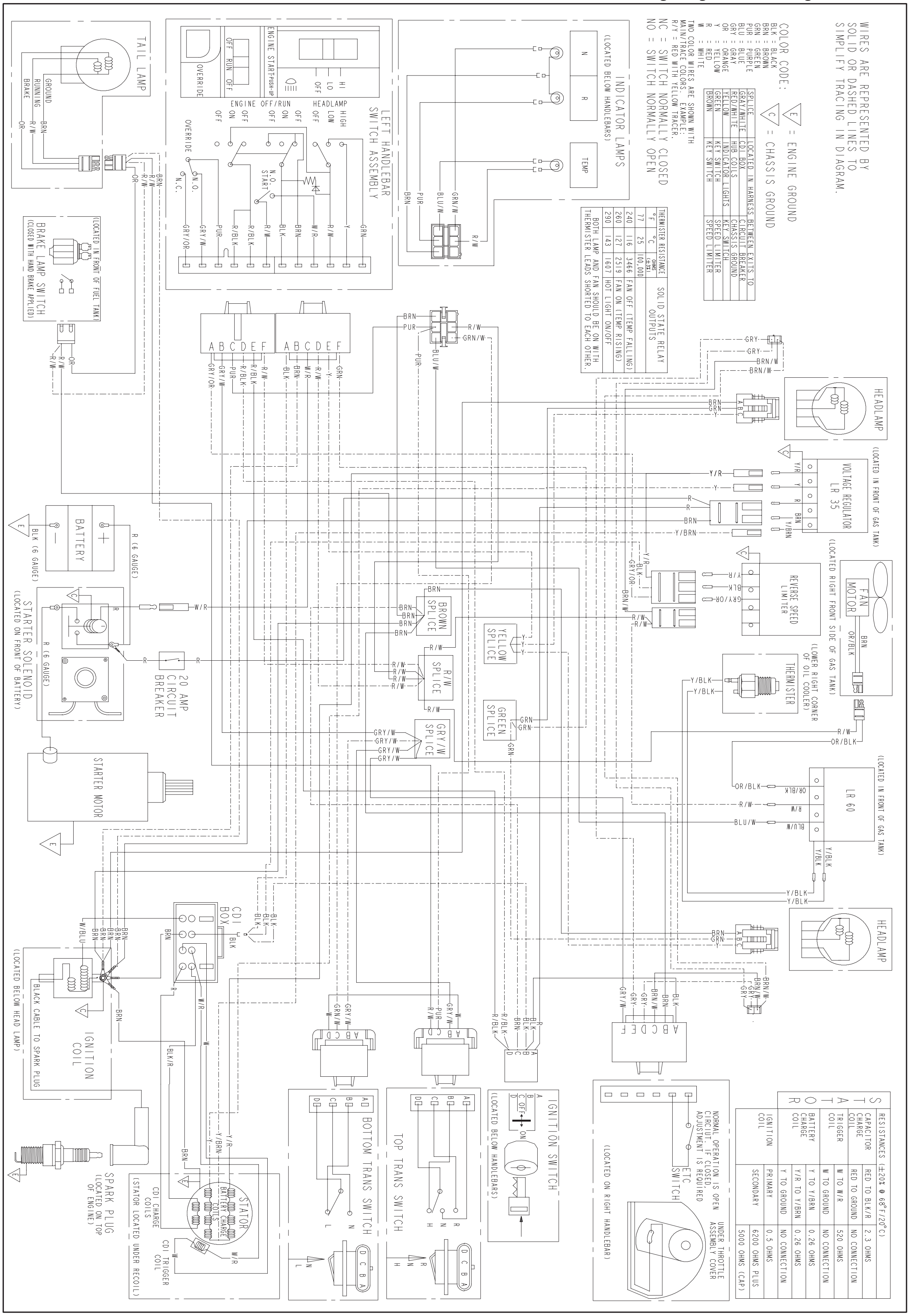
Wiring Diagram 2000 Trail Blazer



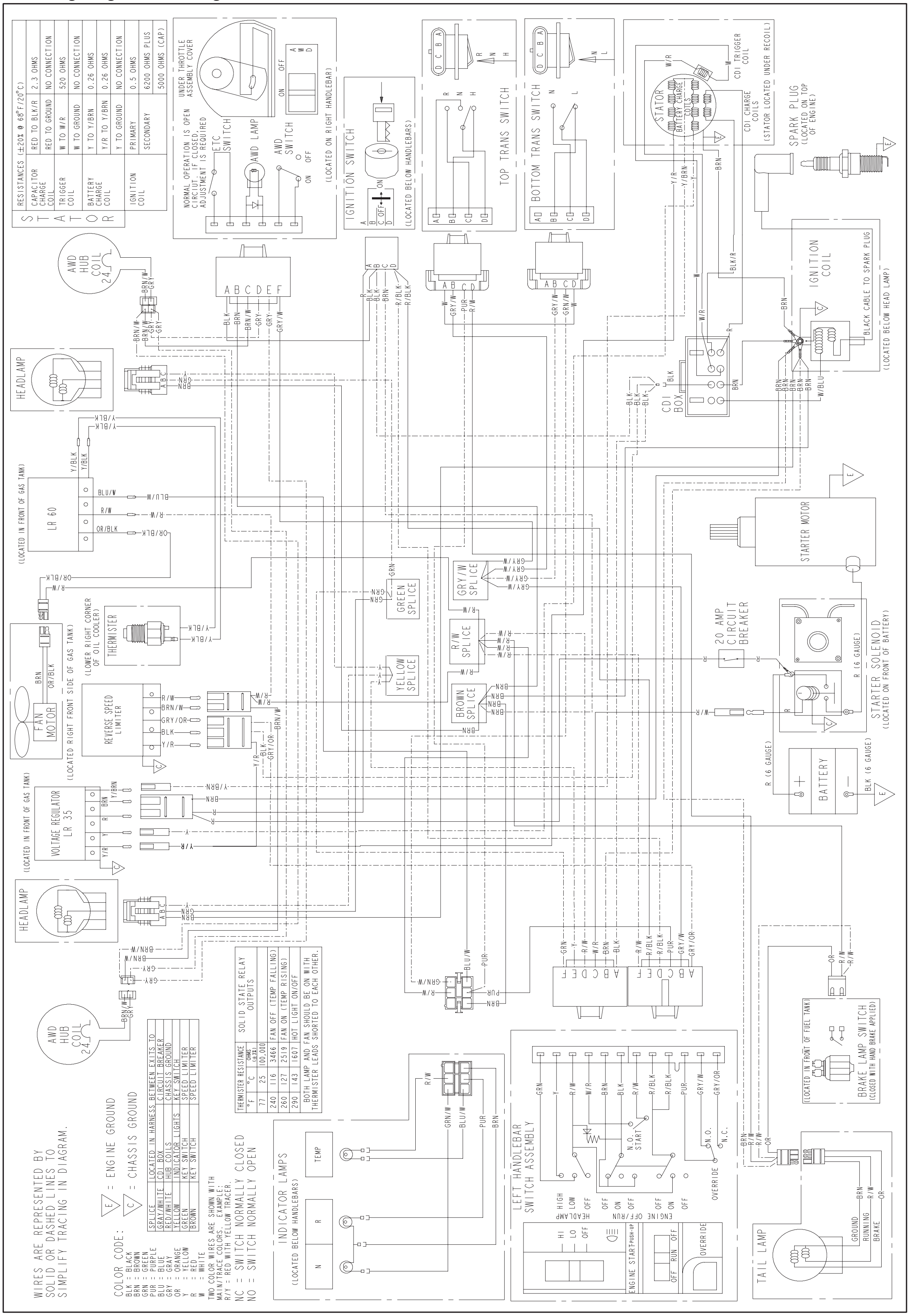


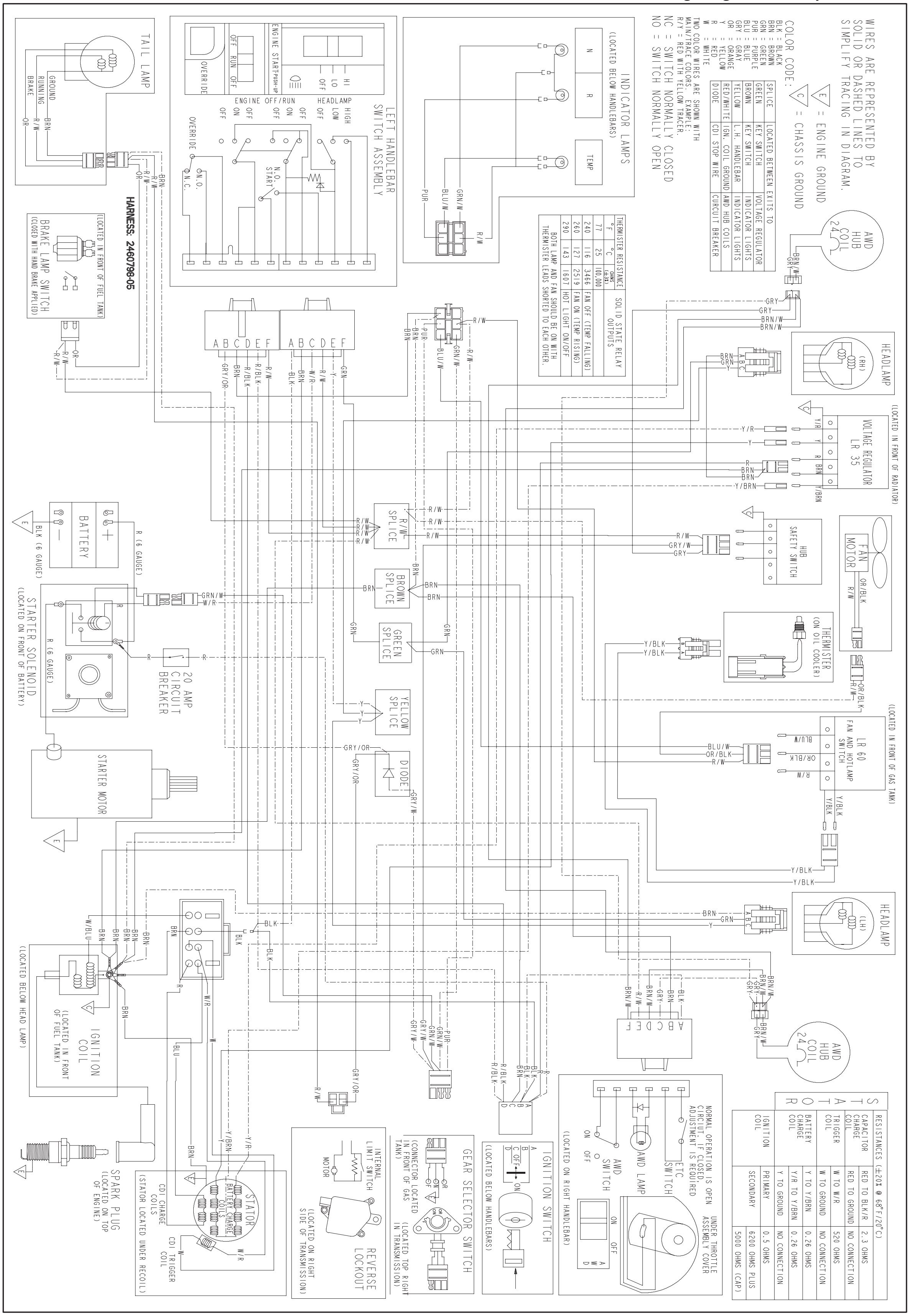
Wiring Diagram 2000 Trail Boss 325



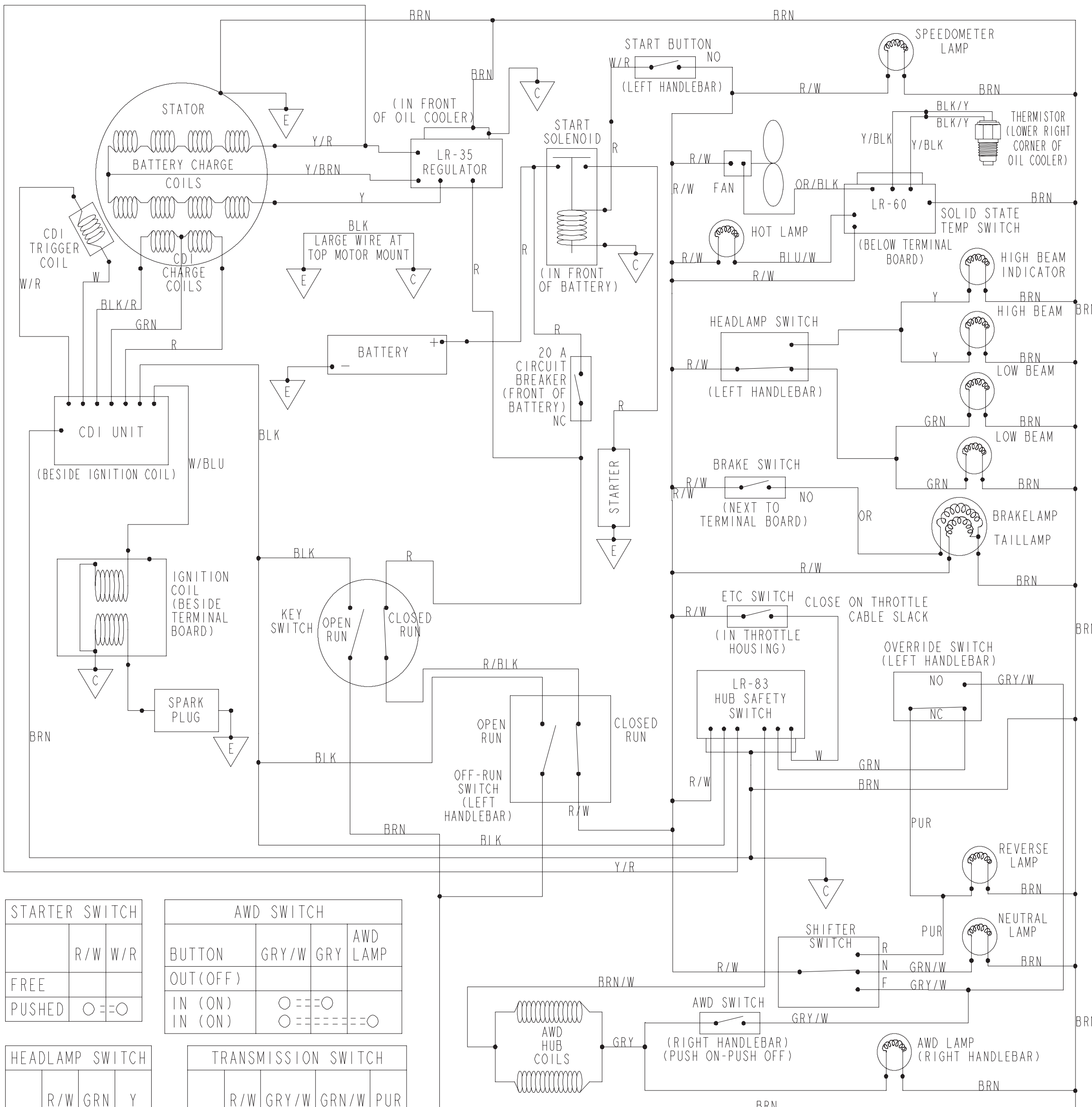

TAIL LAMP
BRAKE LAMP SWITCH
LEFT HANDLEBAR SWITCH ASSEMBLY
INDICATOR LAMPS
BATTERY
STARTER SOLENOID
20 AMP CIRCUIT BREAKER
STARTER MOTOR
BROWN SPLICE
R/W SPLICE
GRY/W SPLICE
YELLOW SPLICE
GREEN SPLICE
HEADLAMP
VOLTAGE REGULATOR LR 35
REVERSE SPEED LIMITER
FAN MOTOR
THERMISTER
LR 60
CDI BOX
IGNITION COIL
SPARK PLUG
STATOR
BOTTOM TRANS SWITCH
TOP TRANS SWITCH
IGNITION SWITCH
ETC SWITCH

Wiring Diagram 2000 Magnum 325 4x4




TAIL LAMP
LEFT HANDLEBAR SWITCH ASSEMBLY
INDICATOR LAMPS
HARNESS: 2460798-05
BRAKE LAMP SWITCH
BATTERY
STARTER SOLENOID
20 AMP CIRCUIT BREAKER
STARTER MOTOR
R/W SPLICE
BROWN SPLICE
GREEN SPLICE
YELLOW SPLICE
DIODE
IGNITION COIL
SPARK PLUG
STATOR
REVERSE LOCKOUT
GEAR SELECTOR SWITCH
IGNITION SWITCH
HEADLAMP
VOLTAGE REGULATOR LR 35
HUB SAFETY SWITCH
FAN MOTOR
THERMISTER
AWD HUB COIL

Wiring Diagram 2000 Sportsman 335 (Early)



STARTER SWITCH	R/W	W/R
FREE		
PUSHED	○ =	= ○

AWD SWITCH BUTTON	GRY/W	GRY	AWD LAMP
OUT (OFF)			
IN (ON)	○ =	= ○	
IN (ON)	○ =	=	= ○

HEADLAMP SWITCH	R/W	GRN	Y
OFF			
LO	○ =	= ○	
HI	○ =	=	= ○

TRANSMISSION SWITCH	R/W	GRY/W	GRN/W	PUR
FWD	○ =	= ○		
N	○ =	=	= ○	
REV	○ =	=	=	= ○

E = ENGINE GROUND
C = CHASSIS GROUND

NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN

AUX SHUT OFF SWITCH	BLK	BRN	R/W	R/BLK
OFF	○ =	= ○		
RUN			○ =	= ○

KEY SWITCH	BLK	BRN	R/BLK	R
OFF	○ =	= ○		
ON			○ =	= ○

OVERRIDE SWITCH	PUR	GRY/W	GRN
FREE	○ =	=	= ○
PUSHED	○ =	= ○	

ETC SWITCH	R/W	W
NORMAL		
FAULT	○ =	= ○

THERMISTER RESISTANCE °F	°C	OHMS (±3%)	SOLID STATE RELAY OUTPUTS
77	25	100,000	
240	116	3466	FAN OFF (TEMP FALLING)
260	127	2519	FAN ON (TEMP RISING)
290	143	1607	HOT LIGHT ON/OFF

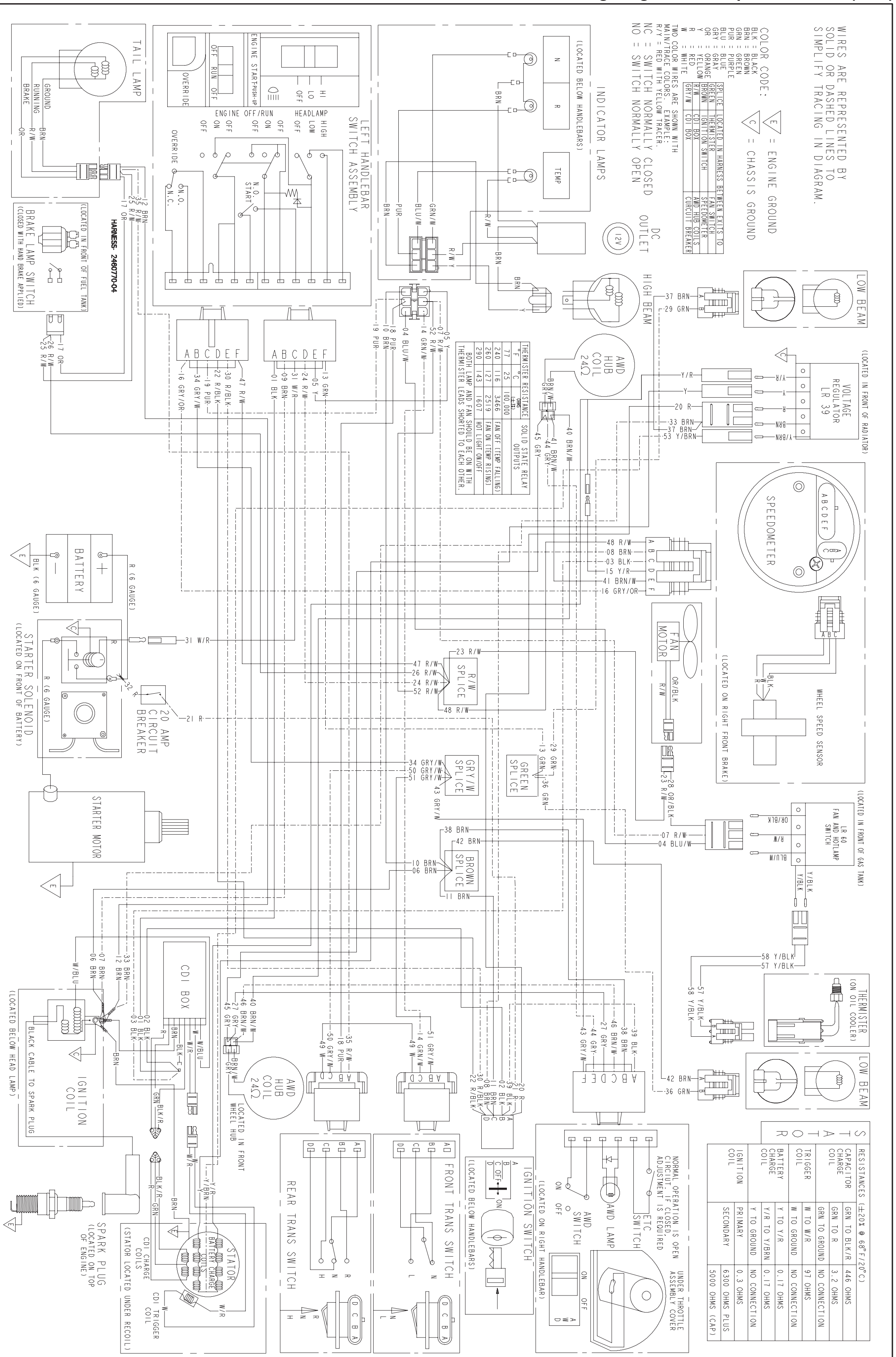
BOTH LAMP AND FAN SHOULD BE ON WITH THERMISTER LEADS SHORTED TO EACH OTHER. CHECK THAT FAN ROTATION DIRECTION IS CLOCKWISE VIEWED FROM FRONT OF ATV.

	RESISTANCES (±20% @ 68°F/20°C)		
STATOR	CAPACITOR CHARGE COIL	GRN TO BLK/R	446 OHMS
		GRN TO R	3.2 OHMS
		GRN TO GROUND	NO CONNECTION
	TRIGGER COIL	W TO W/R	97 OHMS
		W TO GROUND	NO CONNECTION
	BATTERY CHARGE COIL	Y TO Y/BRN	0.17 OHMS
		Y/R TO Y/BRN	0.17 OHMS
		Y TO GROUND	NO CONNECTION
	IGNITION COIL	PRIMARY	0.3 OHMS
		SECONDARY	6300 OHMS PLUS 5000 OHMS (CAP)
	FRONT WHEEL DRIVE COILS	GRY TO BRN	24 OHMS (EACH)

COLOR CODE

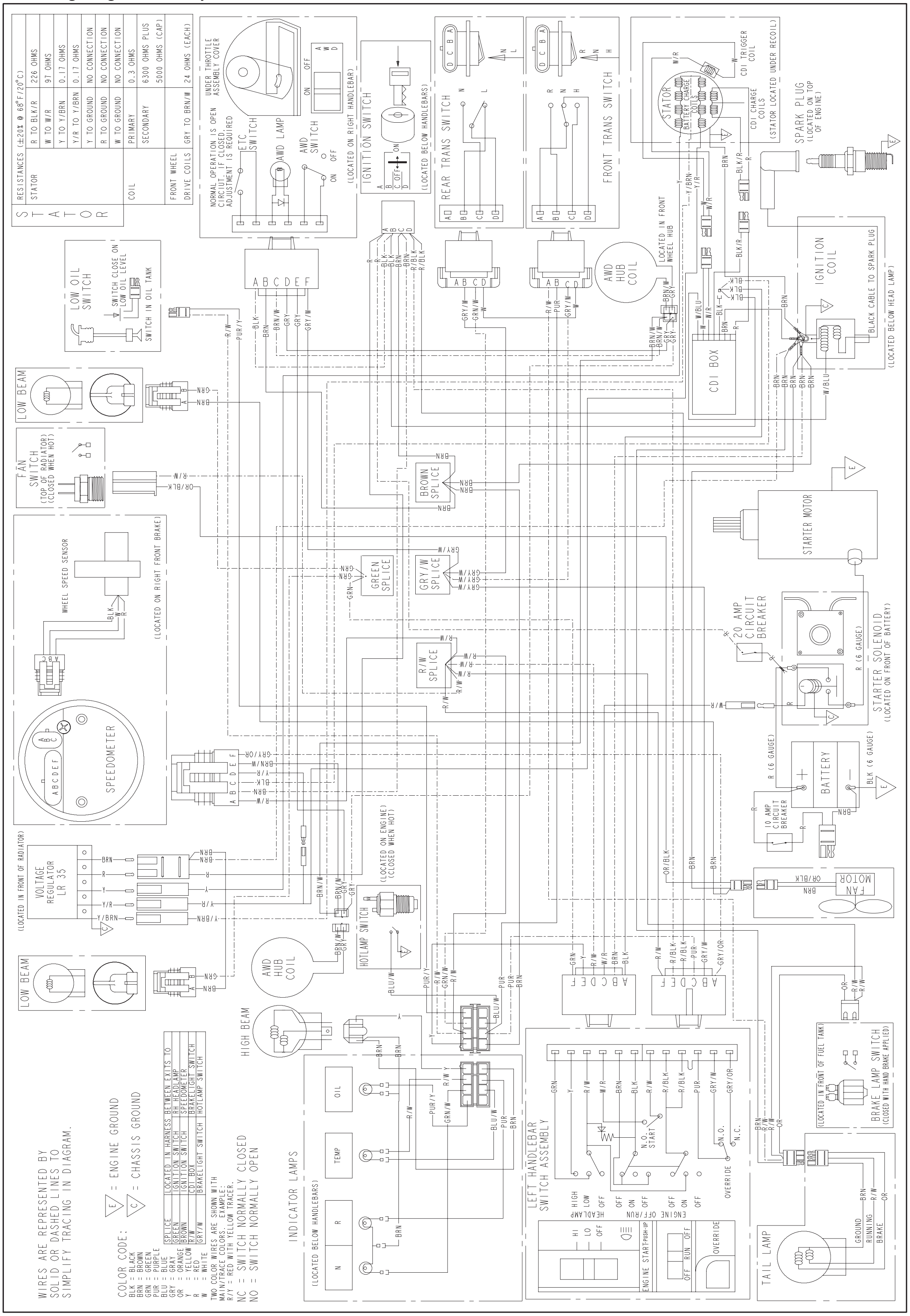
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE

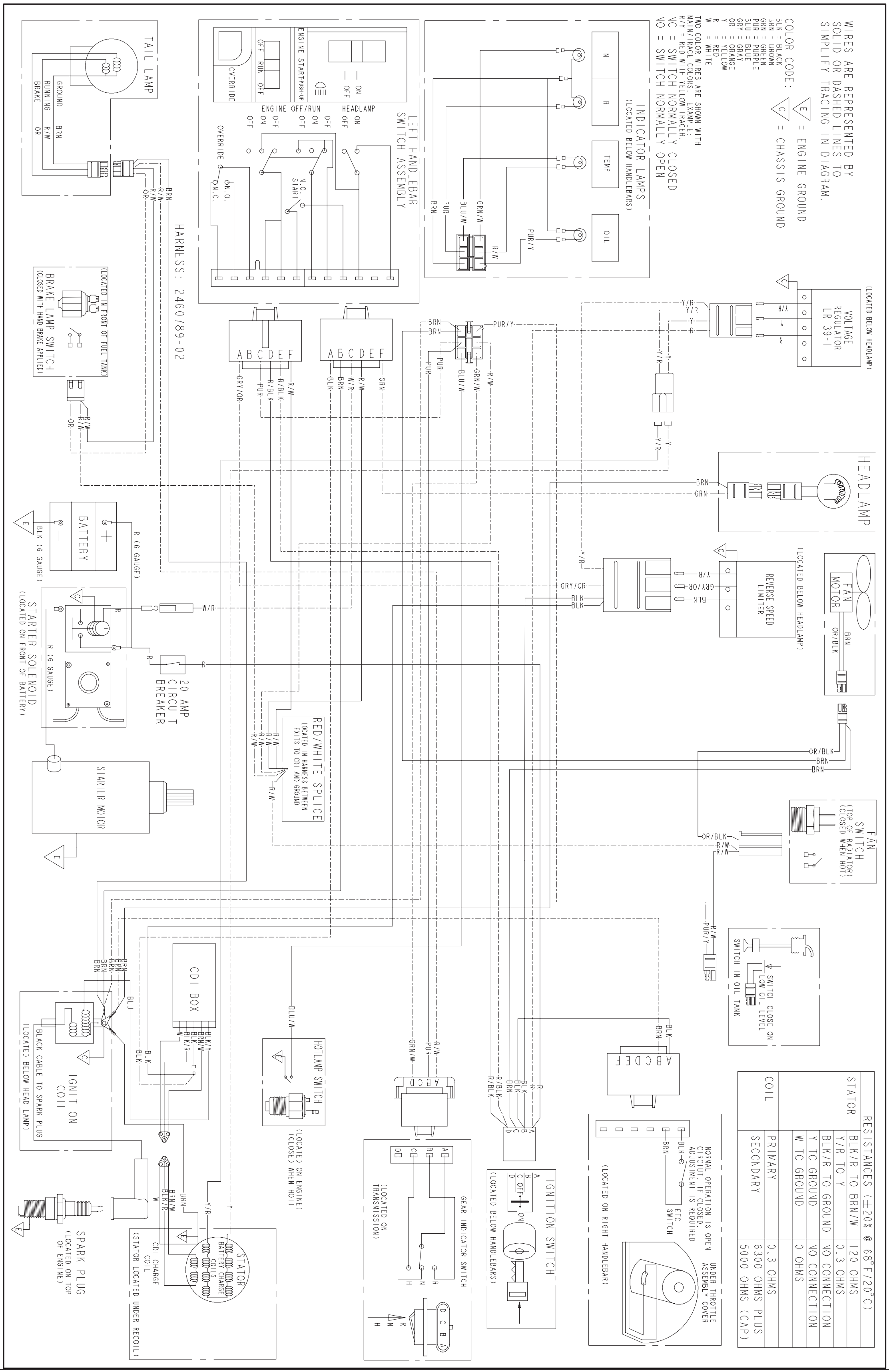
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.



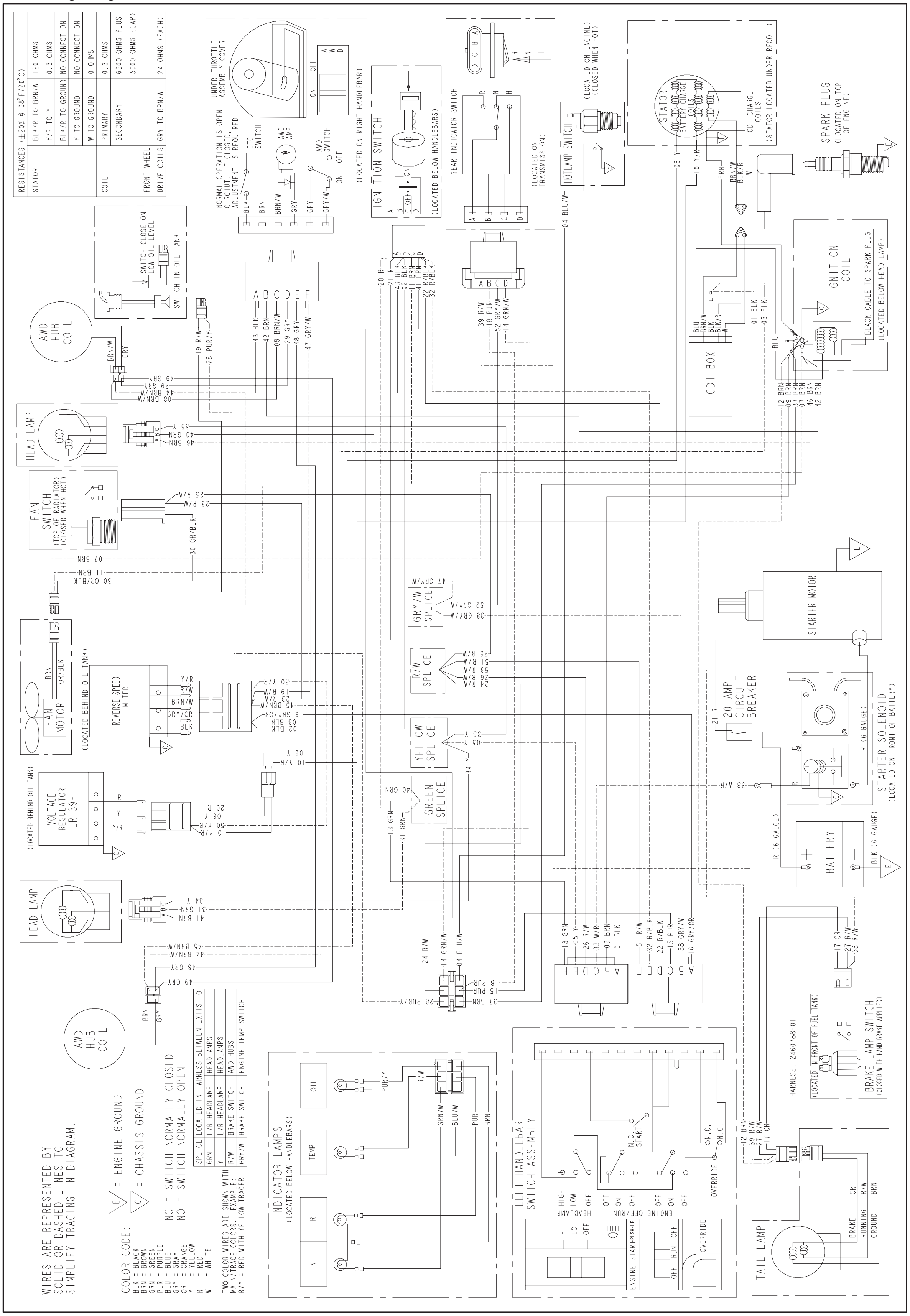
For the following models: A00CH33AC and A00CH33AD

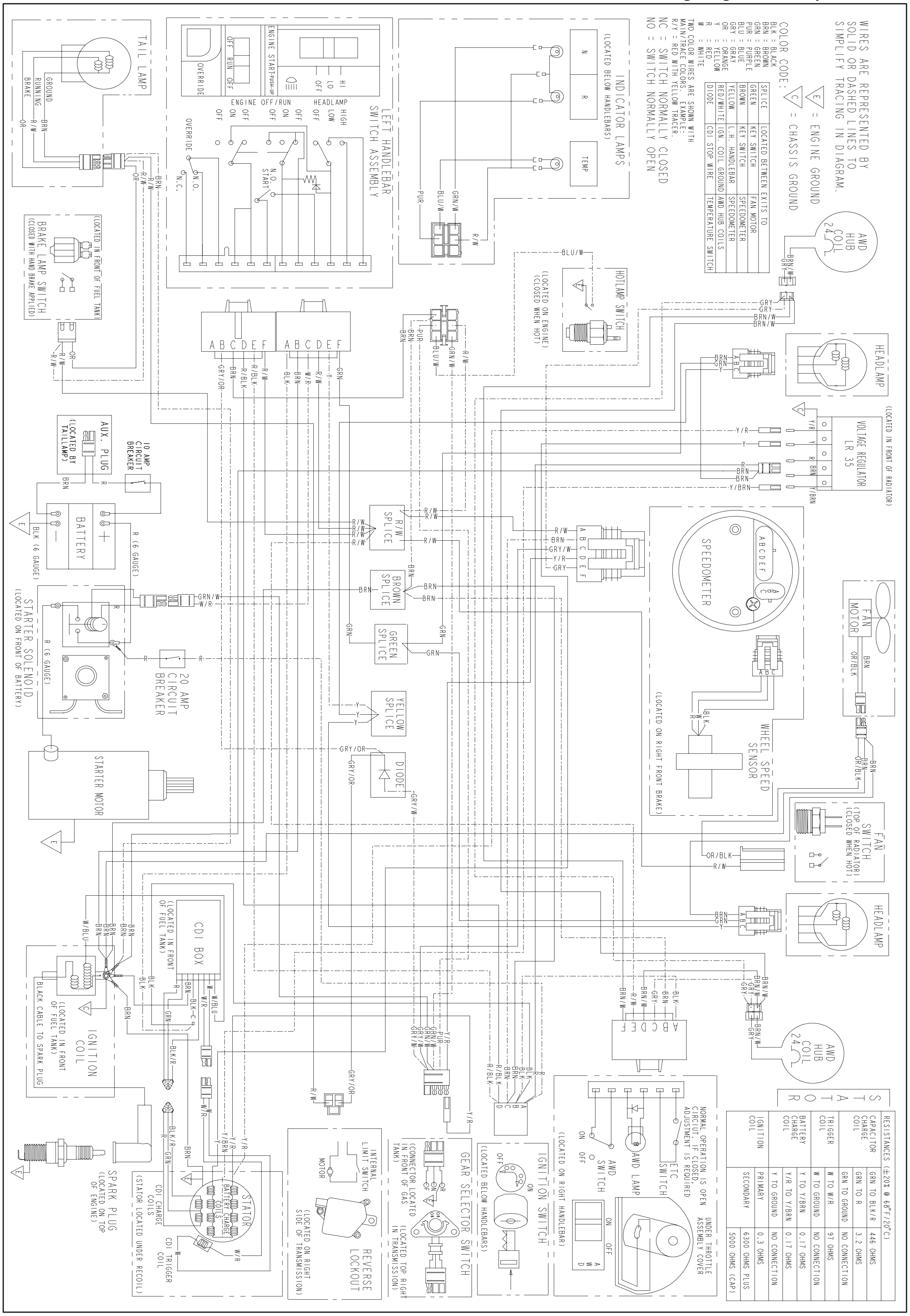
Wiring Diagram 2000 Xplorer 400



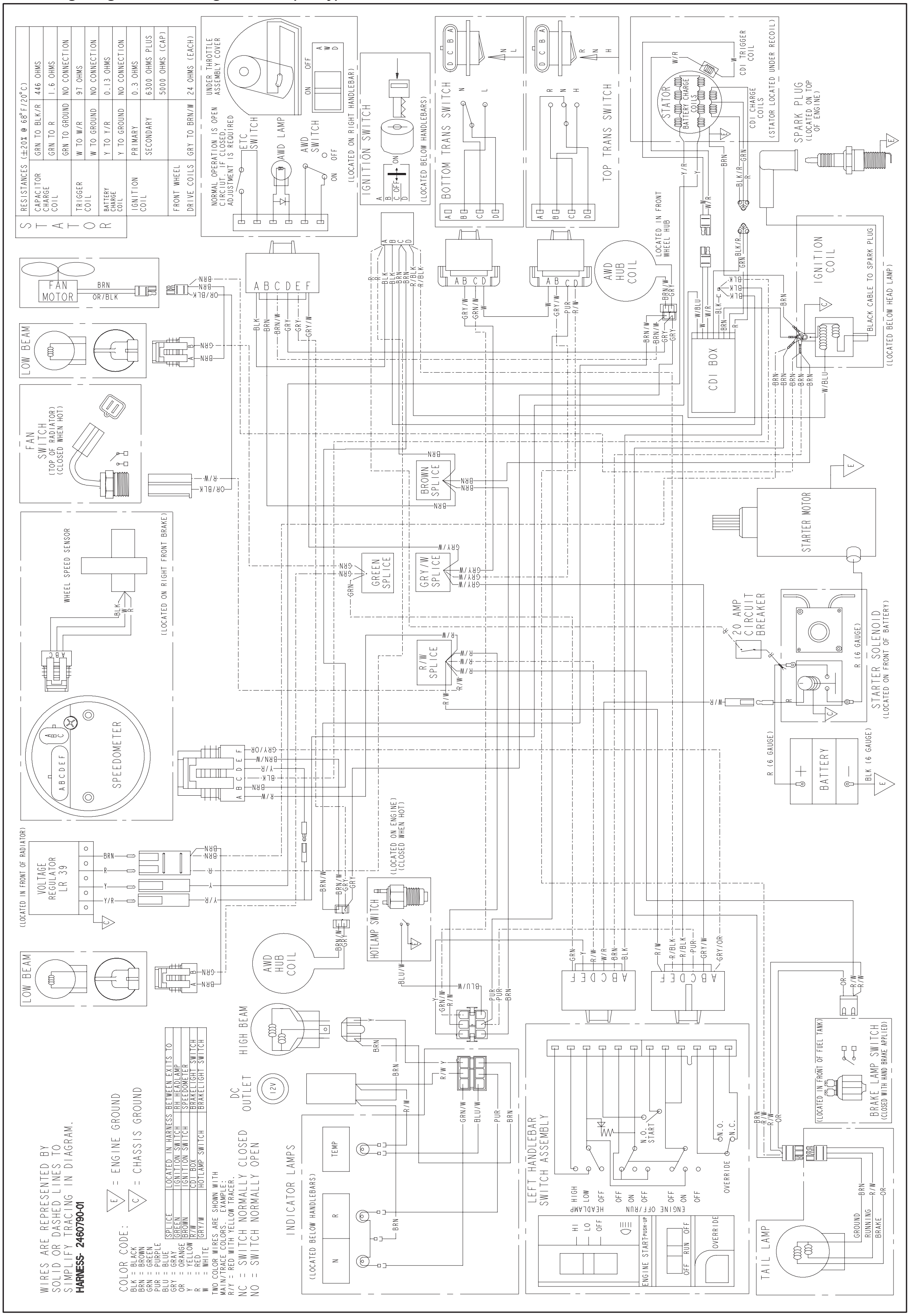


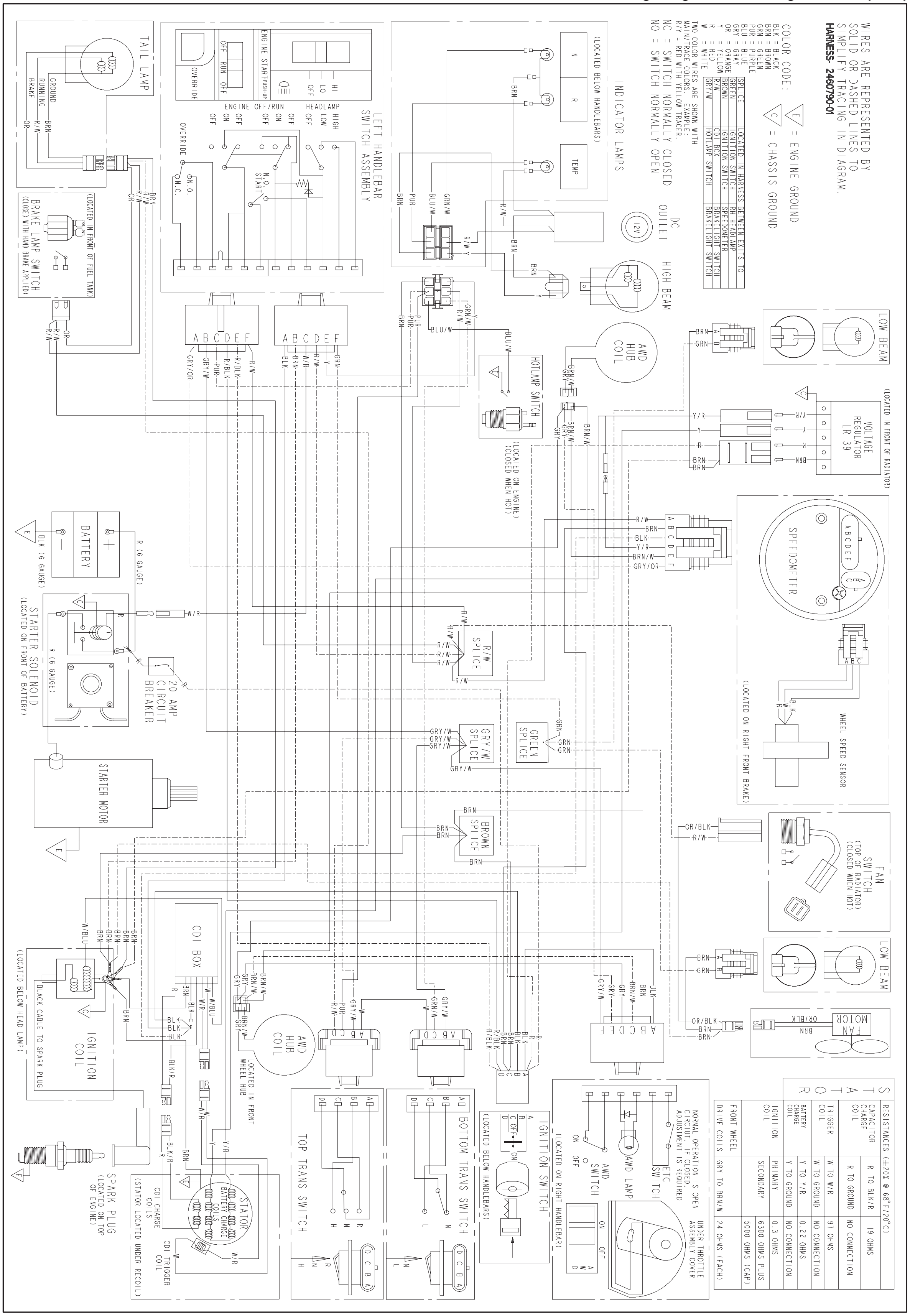
Wiring Diagram 2000 Scrambler 400 4x4



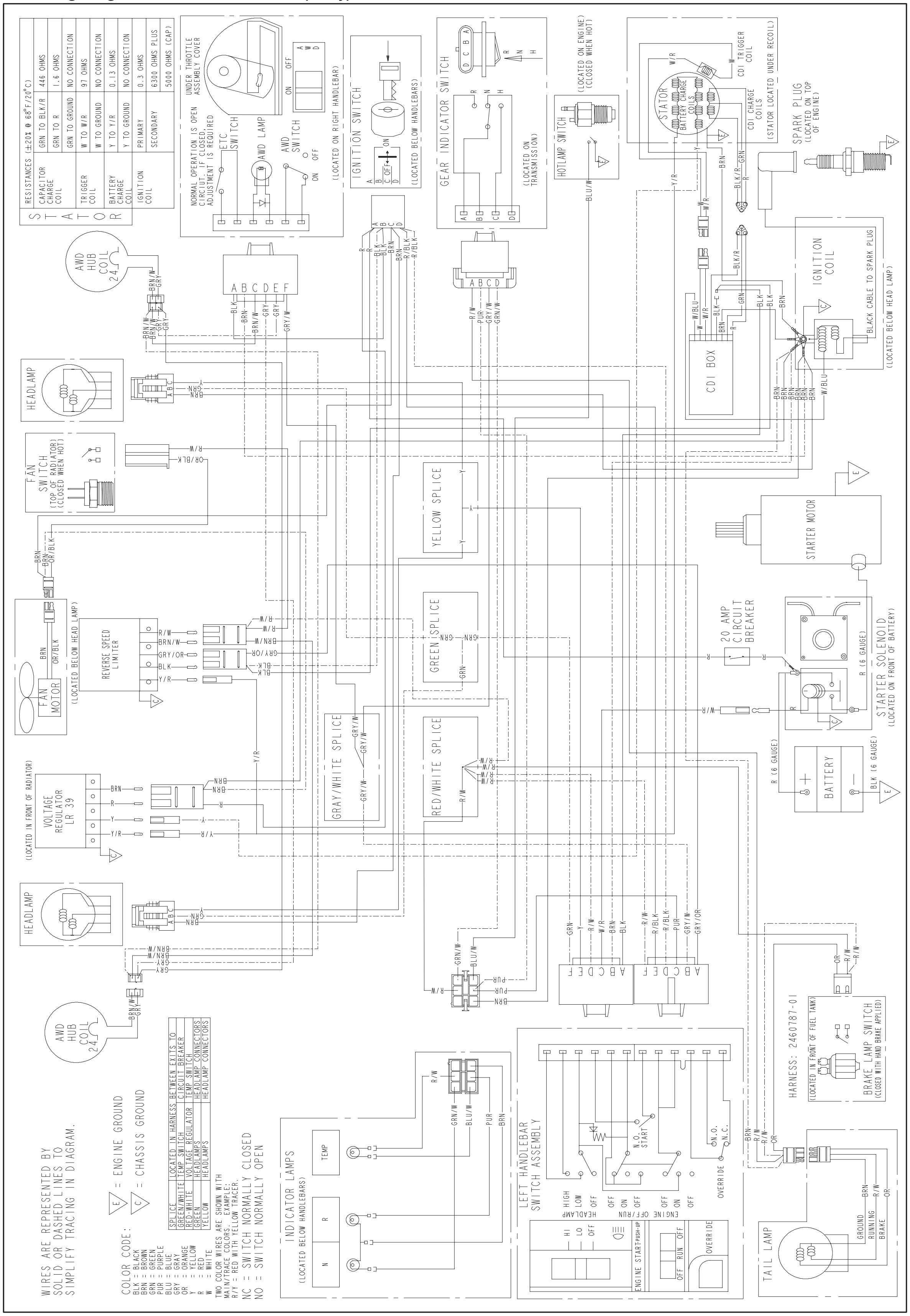

TAIL LAMP
LEFT HANDLEBAR SWITCH ASSEMBLY
INDICATOR LAMPS
BRAKE LAMP SWITCH
AWD HUB COIL
HOTLAMP SWITCH
HEADLAMP
AUX. PLUG
10 AMP CIRCUIT BREAKER
VOLTAGE REGULATOR LR 35
BATTERY
R/W SPLICE
BROWN SPLICE
GREEN SPLICE
YELLOW SPLICE
SPEEDOMETER
FAN MOTOR
STARTER SOLENOID
20 AMP CIRCUIT BREAKER
WHEEL SPEED SENSOR
DIODE
STARTER MOTOR
FAN SWITCH
CDI BOX
IGNITION COIL
SPARK PLUG
STATOR
REVERSE LOCKOUT
GEAR SELECTOR SWITCH
IGNITION SWITCH
AWD SWITCH
AWD LAMP
ETC SWITCH
RESISTANCES

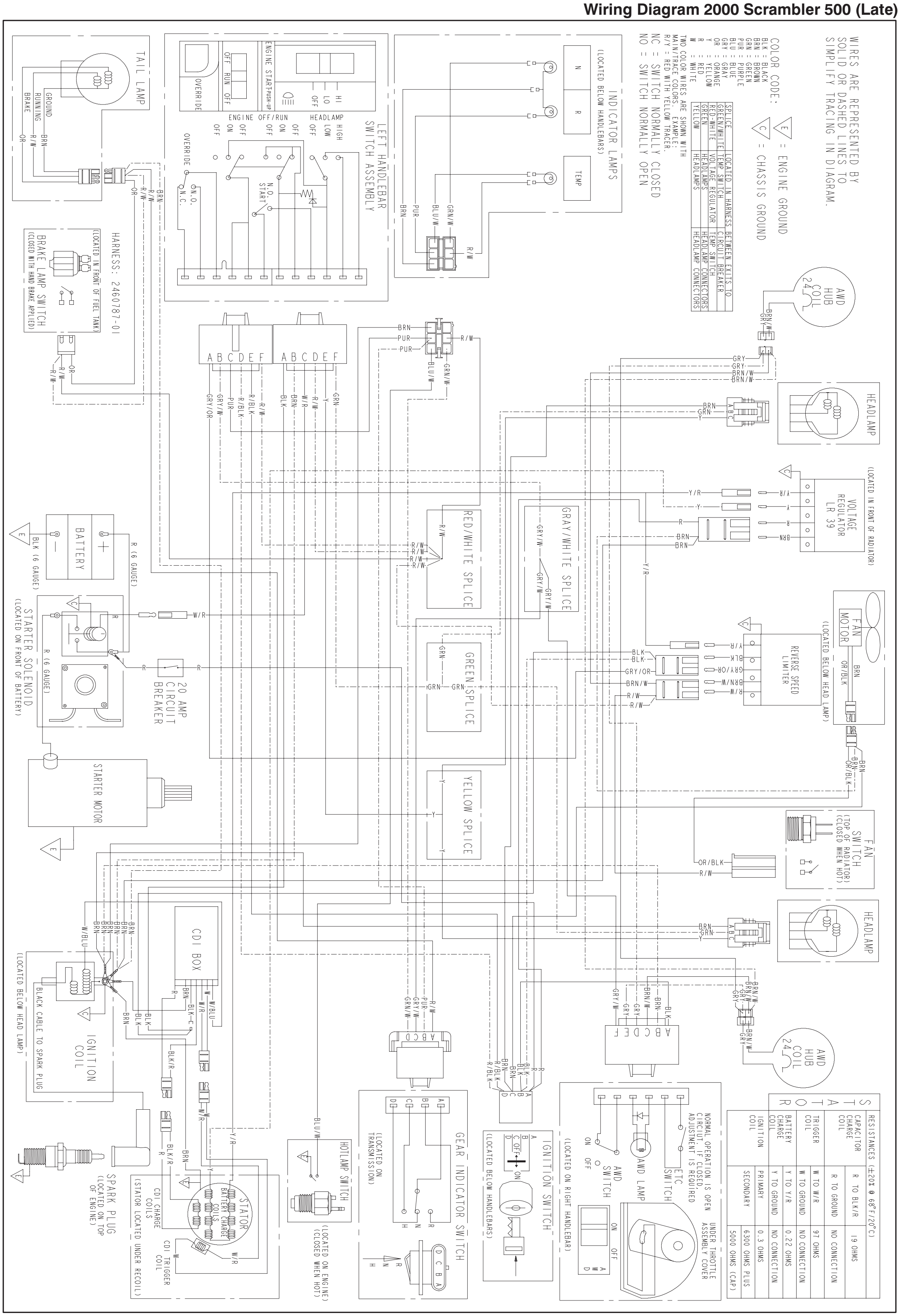
Wiring Diagram 2000 Magnum 500 (Early)





Wiring Diagram 2000 Scrambler 500 (Early)




WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.
E = ENGINE GROUND
C = CHASSIS GROUND
COLOR CODE:
BLK = BLACK
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GRN = GREEN
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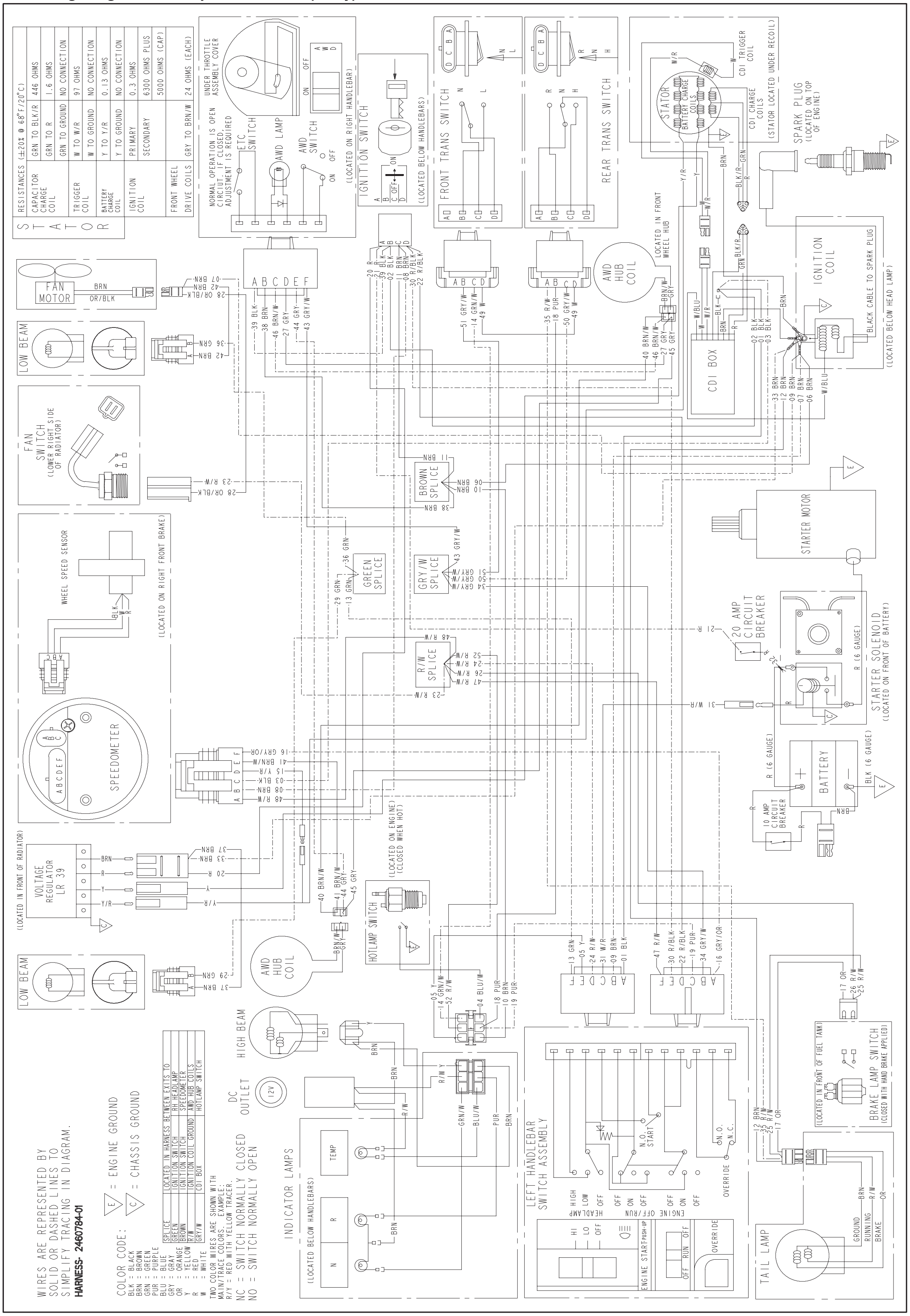
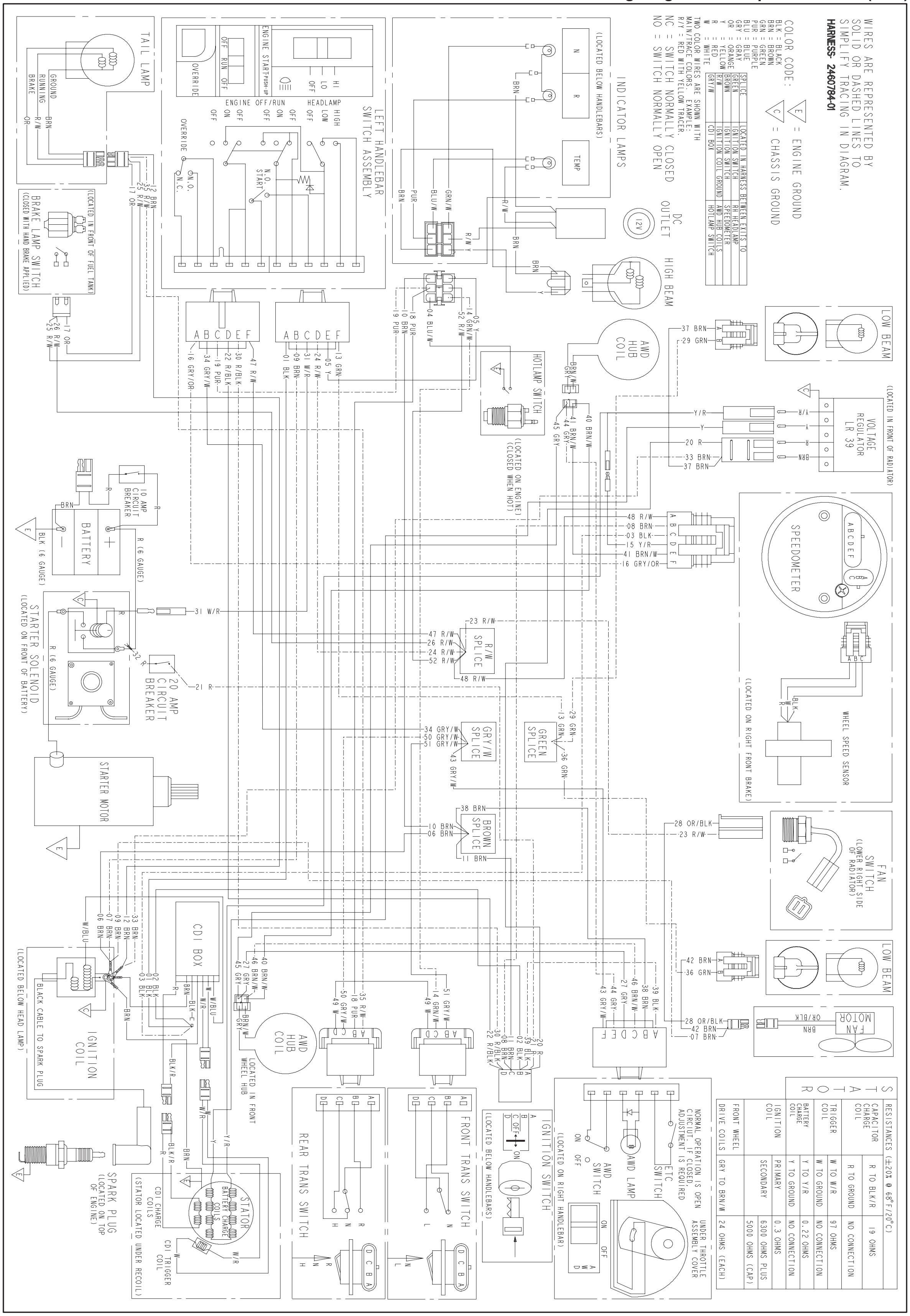
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
TAIL LAMP
LEFT HANDLEBAR SWITCH ASSEMBLY
INDICATOR LAMPS
(LOCATED BELOW HANDLEBARS)
BRAKE LAMP SWITCH
HARNESS: 2460787-01
BATTERY
STARTER SOLENOID
20 AMP CIRCUIT BREAKER
STARTER MOTOR
RED/WHITE SPLICE
GRAY/WHITE SPLICE
GREEN SPLICE
YELLOW SPLICE
HEADLAMP
VOLTAGE REGULATOR LR 39
FAN MOTOR
REVERSE SPEED LIMITER
FAN SWITCH
AWD HUB COIL 24
CDI BOX
IGNITION COIL
SPARK PLUG
STATOR
GEAR INDICATOR SWITCH
HOTLAMP SWITCH
IGNITION SWITCH
AWD SWITCH
AWD LAMP
ETC SWITCH
RESISTANCES (±20% @ 68°F/20°C)

Wiring Diagram 2000 Sportsman 500 (Early)




WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM.
HARNESS- 2460784-01
= ENGINE GROUND
= CHASSIS GROUND
COLOR CODE:
NC = SWITCH NORMALLY CLOSED
NO = SWITCH NORMALLY OPEN
TAIL LAMP
BRAKE LAMP SWITCH
LEFT HANDLEBAR SWITCH ASSEMBLY
INDICATOR LAMPS
DC OUTLET
HIGH BEAM
LOW BEAM
AWD HUB COIL
HOTLAMP SWITCH
VOLTAGE REGULATOR LR 39
BATTERY
10 AMP CIRCUIT BREAKER
STARTER SOLENOID
20 AMP CIRCUIT BREAKER
STARTER MOTOR
SPEEDOMETER
WHEEL SPEED SENSOR
R/W SPLICE
GRY/W SPLICE
GREEN SPLICE
BROWN SPLICE
FAN SWITCH
FAN MOTOR
CDI BOX
IGNITION COIL
SPARK PLUG
STATOR
REAR TRANS SWITCH
FRONT TRANS SWITCH
IGNITION SWITCH
AWD SWITCH
AWD LAMP
ETC SWITCH
RESISTANCES (±20% @ 68°F/20°C)

Electronic Throttle Control (ETC) Switch (Composite Throttle Housing)
This system is used on all 1999 Trail Blazer, Sport 400, Scrambler 400 (Late), Xplorer 400, Scrambler 500, Magnum 500, Sportsman 500, Sportsman 500 RSE models.

The Emergency Throttle Control (ETC) system is designed to limit the engine RPM 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 Ill. 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.

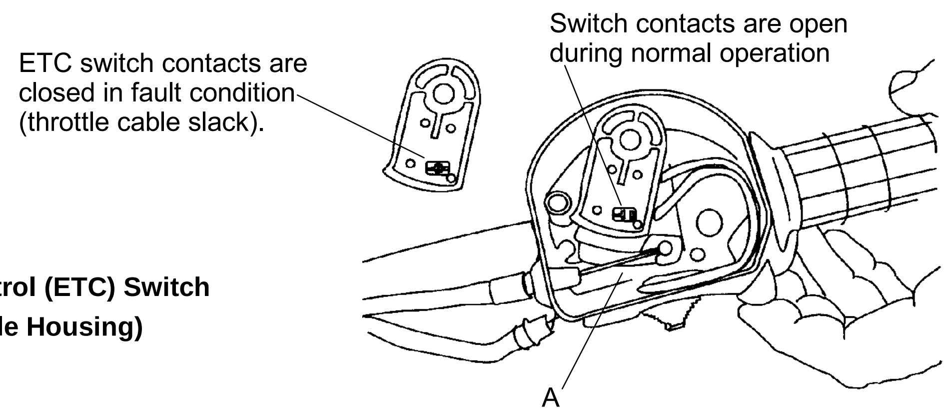
ETC Operation Test

Remove throttle block cover by carefully releasing all tabs around edge of cover.

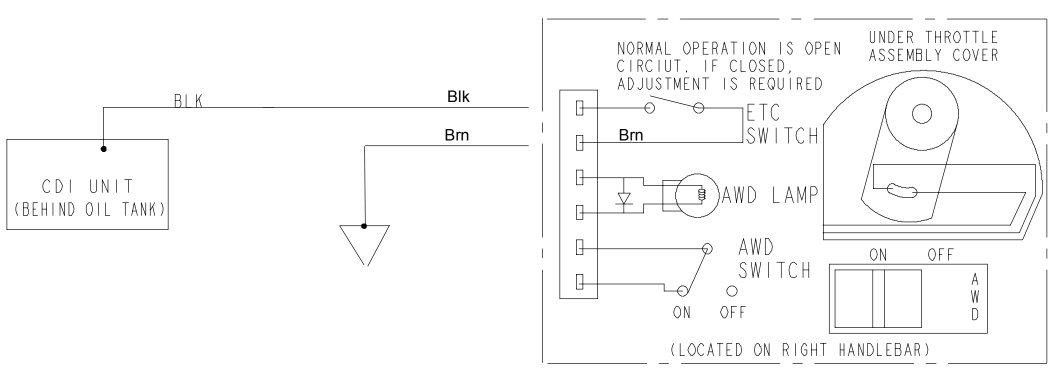
Place transmission in neutral and apply parking brake.

Start engine and open throttle lever slightly until engine RPM is just above idle speed.

Hold throttle cable with fingers at point "A" as shown below and release throttle lever. If the ETC system is functioning properly, the engine will lose spark and stop.



Electronic Throttle Control (ETC) Switch (Composite Throttle Housing)



A

B

C

D

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