POLARIS®
The Way Out.

SCRAMBLER 50
SCRAMBLER 90
SPORTSMAN 90
PREDATOR 90

SERVICE MANUAL

PN 9918068

POLARIS®
The Way Out.

2003 Scrambler 50, Predator 90, Scrambler 90 , Sportsman 90
SERVICE MANUAL

Foreword

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

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

This manual includes procedures for maintenance operations, component identification and unit repair, along with service specifications for the 2003 Polaris Scrambler 50, Predator 90, Scrambler 90, and Sportsman 90. Comments or suggestions about this manual may be directed to: Service Publications Dept. @ Polaris Sales Inc. 2100 Hwy 55 Medina Minnesota 55340.

2003 Sportsman Youth ATV Service Manual (PN 9918068)

UNDERSTANDING SAFETY LABELS AND INSTRUCTIONS

Throughout these instructions, important information is brought to your attention by the following symbols:

The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠ DANGER

Failure to follow DANGER instructions will result in severe injury or death to the operator, bystander or person inspecting or servicing the ATV.

⚠ WARNING

Failure to follow WARNING instructions could result in severe injury or death to the operator, bystander or person inspecting or servicing the ATV.

CAUTION:

A CAUTION indicates special precautions that must be taken to avoid personal injury, or ATV or property damage.

NOTE:

A NOTE provides key information to clarify instructions.

Trademarks

Polaris acknowledges the following products mentioned in this manual:

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STA-BIL, Registered Trademark of Gold Eagle
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Fluke, Registered Trademark of John Fluke Mfg. Co.
Mity Vac, Registered Trademark of Neward Enterprises, Inc.
Ammco, Registered Trademark of Ammco Tools, Inc.
Torx, Registered Trademark of Textron

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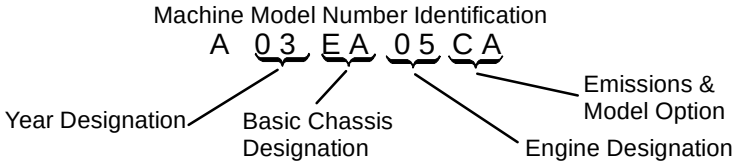
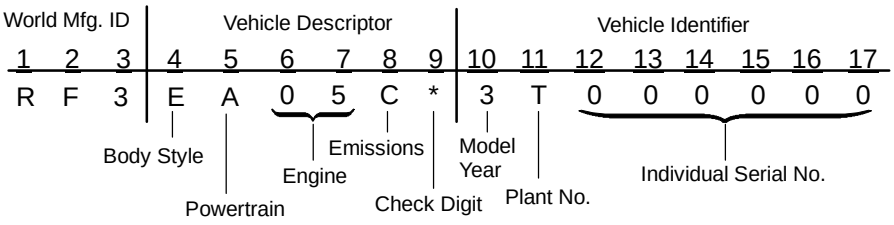
CHAPTER 1
GENERAL INFORMATION/ MAINTENANCE

MODEL IDENTIFICATION

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



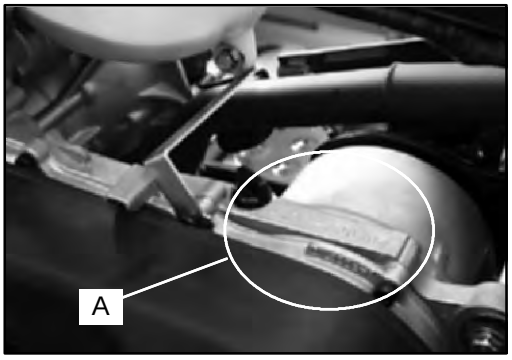
VIN IDENTIFICATION

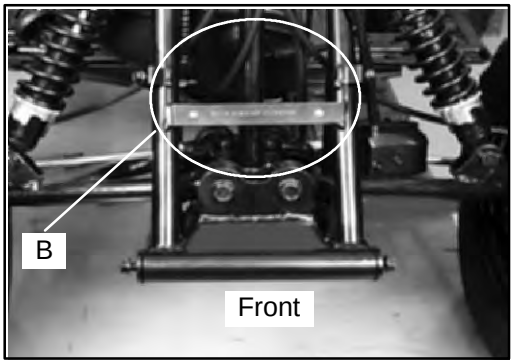


* This could be either a number or a letter

SERIAL NUMBER LOCATIONS

Whenever corresponding about an engine, be sure to refer to the engine serial number. This information can be found stamped on the transmission section located by the transmission oil fill plug(A). The machine model number and serial number are important for vehicle identification. The machine serial number is stamped on the front of the frame (B).





2003 YOUTH MODEL ATVS

SCRAMBLER 50
SCRAMBLER 90

SPORTSMAN 90

PREDATOR 90

NOTE: Colors will vary upon model.

SPECIFICATIONS

MODEL	SCRAMBLER 50	SCRAMBLER 90	PREDATOR 90	SPORTSMAN 90
ENGINE TYPE	2-Stroke Horizontal (AR03-01)	2-Stroke Horizontal (AR07-01)	2-Stroke Horizontal (AR07-01)	2-Stroke Horizontal (AR07-01)
NUMBER OF CYLINDERS	1	1	1	1
DISPLACEMENT	49.3 cc	89.2 cc	89.2 cc	89.2 cc
BORE AND STROKE	1.58x1.54″ (40x39.2 mm)	2.05x1.65″ (52x42 mm)	2.05x1.65″ (52x42 mm)	2.05x1.65″ (52x42 mm)
COMPRESSION RATIO	6.8:1	7.7:1	7.7:1	7.7:1
SPARK PLUG	BPR7HS	BPR7HS	BPR7HS	BPR7HS
ALTERNATOR OUTPUT	70 Watts @ 4000 RPM	70 Watts @ 4000 RPM	70 Watts @ 4000 RPM	70 Watts @ 4000 RPM
IGNITION TIMING **	14° @ 1500 RPM**	16° @ 1500 RPM**	16° @ 1500 RPM**	16° @ 1500 RPM**
MAX. TORQUE	4 ft.lbs (5.4 Nm) @ 6000 RPM	6.5 ft.lbs (8.82 Nm) @ 6000 RPM	6.5 ft.lbs (8.82 Nm) @ 6000 RPM	6.5 ft.lbs (8.82 Nm) @ 6000 RPM
CARBURETOR	Sunworld H68K	Mikuni VM16	Mikuni VM16	Mikuni VM16
STARTING	Electric/Kick Start	Electric/Kick Start	Electric/Kick Start	Electric/Kick Start
BATTERY	GTX5L-BS, 4.85 amp	GTX5L-BS, 4.85 amp	GTX5L-BS, 4.85 amp	GTX5L-BS, 4.85 amp
LUBRICATION	Oil Injection	Oil Injection	Oil Injection	Oil Injection
OIL CAPACITY	1.057 Quarts (1 Liter)	1.057 Quarts (1 Liter)	1.057 Quarts (1 Liter)	1.057 Quarts (1 Liter)
TRANSMISSION	Automatic (C.V.T. System)	Automatic (C.V.T. System)	Automatic (C.V.T. System)	Automatic (C.V.T. System)
FRONT SUSPENSION	A-arm with 4.25″ (10.8 cm) Travel	A-arm with 4.25″ (10.8 cm) Travel	A-arm with 4.25″ (10.8 cm) Travel	A-arm with 4.25″ (10.8 cm) Travel
REAR SUSPENSION	Single Shock/Swing Arm with 4.25″ (10.8 cm) Travel	Single Shock/Swing Arm with 4.25″ (10.8 cm) Travel	Single Shock/Swing Arm with 4.25″ (10.8 cm) Travel	Single Shock/Swing Arm with 4.25″ (10.8 cm) Travel
FRONT BRAKE	Drum	Drum	Drum	Drum
REAR BRAKE	Drum	Drum	Drum	Drum
PARKING BRAKE	Mechanical Lock	Mechanical Lock	Mechanical Lock	Mechanical Lock
FRONT TIRES	16x8-7	18x7-7	18x7-7	19x7-8
REAR TIRES	16x8-7	18x9.5-8	18x9.5-8	18x9.5-8
TIRE PRESSURE	2 psi	3 psi	3 psi	3 psi
OVERALL DIMENSIONS	54.6x34x34.7″ (138.7x86.3x88.2 cm)	57x35.75x36″ (145x91x91.8 cm)	57x35.75x36″ (145x91x91.8 cm)	57x35.75x36″ (145x91x91.8 cm)
WHEELBASE	35.4″ (90 cm)	38.5″ (98 cm)	38.5″ (98 cm)	38.5″ (98 cm)
TURNING RADIUS	74.8″ (190 cm)	98.4″ (250 cm)	98.4″ (250 cm)	98.4″ (250 cm)
SEAT HEIGHT	22.5″ (57 cm)	24.5″ (62 cm)	24.5″ (62 cm)	24.5″ (62 cm)
GROUND CLEARANCE	3″ (8 cm)	4″ (10 cm)	4″ (10 cm)	5″ (12 cm)
DRY WEIGHT	211.6 lbs. (96 kg)	233.7 lbs. (106 kg)	233.7 lbs. (106 kg)	238.1 lbs. (108 kg)
MAX. LOAD CAPACITY	100 lbs. (45.4 kg)	160 lbs. (72 kg)	160 lbs. (72 kg)	190 lbs. (86 kg)
FUEL REQUIREMENTS	87 Octane Unleaded	87 Octane Unleaded	87 Octane Unleaded	87 Octane Unleaded
FUEL CAPACITY	1.32 Gallons (5 Liters)	1.32 Gallons (5 Liters)	1.32 Gallons (5 Liters)	1.32 Gallons (5 Liters)
FRONT RACK CAPACITY	N/A	N/A	N/A	10 lbs. (4.54 kg)*
REAR RACK CAPACITY	N/A	N/A	N/A	20 lbs. (9.08 kg)*

NOTE: * Check owner's manual for loading requirements and restrictions.** **Specification is reference only - not adjustable.**

PUBLICATION NUMBERS

Model	Model No.	Owner's Manual PN	Parts Manual PN	Parts Micro Fiche PN
Scrambler 50	A03EA05	9917873	9917875	9917876
Sportsman 90	A03FA09	9917873	9917885	9917886
Scrambler 90	A03EA09	9917873	9917880	9917881
Predator 90	A03KA09	9918312	9918313	9918314

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

PAINT CODES

PAINTED PART	COLOR DESCRIPTION	DITZLER NUMBER	POLARIS NUMBER
Scrambler 50 Springs	Yellow	N/A	P-216
Sportsman 90 Springs	Medium Gloss Black	9440	P-067
Scrambler 90 Springs	Yellow	N/A	P-216
Predator 90 Springs	Indy Red	N/A	P-293
Frame - All	Medium Gloss Black	9440	P-067

Order direct from Midwest Industrial Coatings (952-242-2000).

INSPECTION SCHEDULE

Service Item	Initial Service (After two weeks)	Monthly	Every 6 Months	Yearly
Air Cleaner		C		
Fuel Filter			I	
Fuel/Oil Lines		I		
Battery		I		I
Brake Shoes			I	
Spark Plug			I	
Chain Lubrication		I		
Steering Lubrication		I		
Carburetor			C	
Throttle Control		I		
Tire Pressure		I		
Fasteners		T		
Gear Oil	R			R

R = Replace C = Clean T =Tighten I = Inspect

NOTE: Inspection schedules are for reference only. If the vehicle is used often, more frequent inspections will be required.

STANDARD TORQUE SPECIFICATIONS

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

FASTENER	TORQUE (ft.lbs. / in.lbs.)	TORQUE (Nm)
5 mm bolts and nuts	39-52 in.lbs.	4.5-6 Nm
6 mm bolts and nuts	69-104 in.lbs.	8-12 Nm
8 mm bolts and nuts	13-18 ft.lbs	18-25 Nm
10 mm bolts and nuts	22-29 ft.lbs.	30-40 Nm
12 mm bolts and nuts	36-43 ft.lbs.	50-60 Nm
4 mm screws	22-30 in.lbs.	2.5-3.4 Nm
5 mm screws	30-43 in.lbs.	3.5-5 Nm
6 mm Hex bolts	87-121 in.lbs.	10-14 Nm
8 mm Hex bolts	17-22 ft.lbs.	24-30 Nm
10 mm Hex bolts	25-32 ft.lbs.	35-45 Nm

SPECIAL TOOLS

DESCRIPTION	PART NUMBER
Crankshaft Removal Tool	**0450697**
Flywheel Puller	**PA-45153**
Oil Pump Drive Gear Removal Tool	**0450699**
Crankcase Separating Tool	**0450700**
Shock Spanner Wrench	**2870872**
Shock Spring Compressor Tool	**2870623**
Battery Charger	**PV-37453**

NOTE: Special tools can be ordered by Polaris Dealers only through SPX Corporation at (800) 328-6657.

POLARIS LUBRICANT AND MAINTENANCE PRODUCTS

Part No.	Description
Engine Lubricant	
2870791	Fogging Oil
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 (Quart)
2871722	Premium Gold 2 Cycle Synthetic Lubricant (Gallon)
Gearcase / Transmission Lubricants	
2871477	Premium Synthetic Gearcase Lubricant (1 Gal.)
2871478	Premium Synthetic Gearcase Lubricant (12 oz.. bottle)
2870465	Oil Pump for Gearcase Oil
Grease / Specialized Lubricants	
2871322	Premium All Season Grease (3 oz.. cartridge)
2871423	Premium All Season Grease (14 oz.. cartridge)
2871460	Starter Drive Grease
2871312	Chain Lube (6.25 oz.)
2871312	Grease Gun Kit
2871329	Nyogel™ Grease
Additives / Sealants / Thread Locking Agents / Misc.	
2871326	Premium Carbon Clean 12 oz..
2870652	Fuel Stabilizer 16 oz..

CONVERSION TABLE

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

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

DECIMAL EQUIVALENTS

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

GLOSSARY OF TERMS

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

2003 MODEL YOUTH ATV SPEED RESTRICTION

Per ANSI / SVIA–1–2001 (sec. 6.1.3)
AS DELIVERED TO THE CONSUMER:
The speed of youth models is restricted to under 10 MPH for the 50 cc models and under 15 MPH for the 90 cc models. The dealer **CANNOT**, under any circumstances, either prior to the sale or later, **even at the consumers request**, remove or adjust any speed limiting device These are to be adjusted/removed only by the consumer. Speed limiting devices can only be removed or adjusted **by the consumer** when they determine their child is capable of the additional speed. Per ANSI / SVIA–1–2001 (sec. 6.2) the unrestricted top speed is less than 15 MPH for the 50 cc models and less than 30 MPH for the 90 cc models.

SPEED CONTROL SYSTEMS

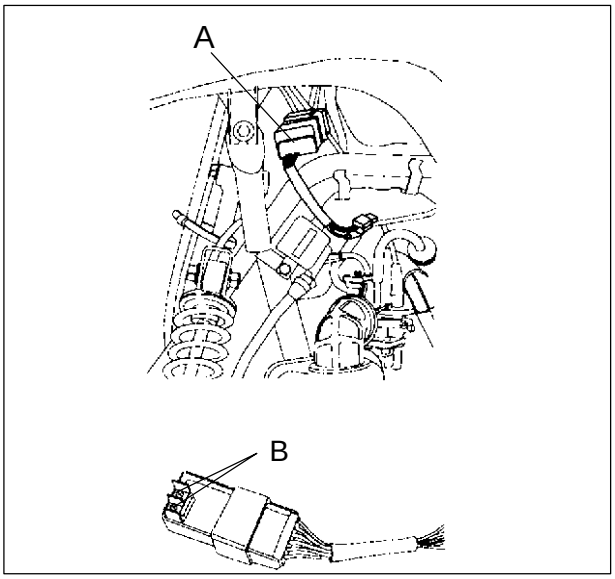
Electronic Speed Control System

Your Polaris ATV is equipped with an electronic speed control system, which controls the engine RPM and speed of the ATV.

Speed can be adjusted by removing or installing the jumper on the CDI (A). With the jumper installed, 50cc models will travel no faster than 10 mph and 90cc models will travel no faster than 15 mph. With the jumper removed, 50cc models will travel no faster than 15 mph and 90cc models will travel no faster than 30 mph.

Jumper Removal and Installation

1. Remove the CDI and its rubber mounting strap from the mounting tab, which is located on the frame bulkhead near the steering post. It can be accessed through the left front fender.
2. Remove the two screws (B) from the jumper to remove or install the jumper. Reinstall the screws.
3. Reinstall the CDI and mounting strap onto the mounting tab.

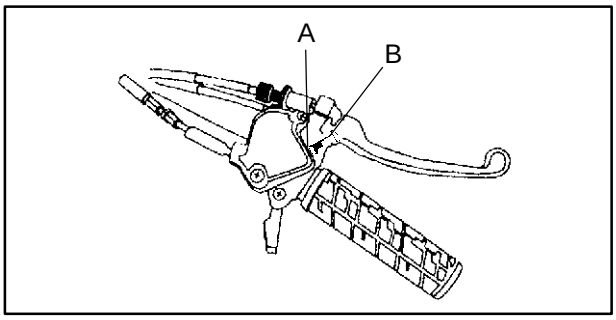


SPEED CONTROL SYSTEMS

Throttle Stop Speed Control System

Adjusting speed at the CDI is the recommended method of speed control, but the throttle stop system may also be used. Use the following procedure to control how far the throttle opens.

1. Loosen the jam nut (A)
2. Turn the screw (B) inward to reduce speed or outward to increase speed.
3. Tighten the jam nut after adjusting.



VEHICLE INSPECTION

FRONT BRAKE

1. Each front brake has a cable connected to the right hand brake lever.

2. Loosen the adjuster nuts at the right hand brake lever. Turn the cable adjuster until the proper brake setting is achieved. Tighten nuts.

Front Brake Lever Free Play:

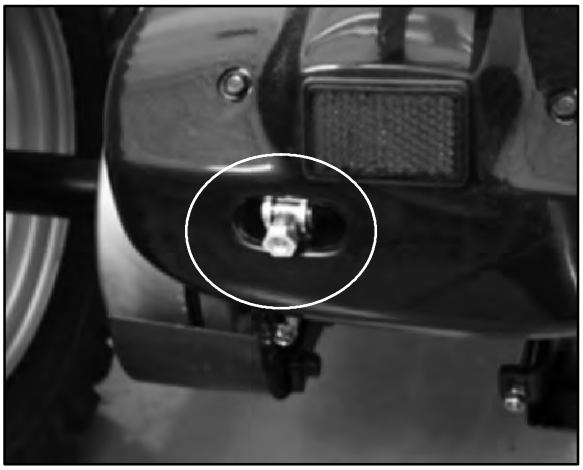
.40-.80″ (10-20 mm)

Front Brake Lever Travel:

50 cc= 1 1/8″ (28 mm)
90 cc = 1 3/4″ (45 mm)

REAR BRAKE

3. The rear brake is operated using the left hand brake lever. To adjust the rear brake setting, turn the rear brake adjuster nut until brake is set to specification.



Rear Brake Lever Free Play:

.40-.80″ (10-20 mm)

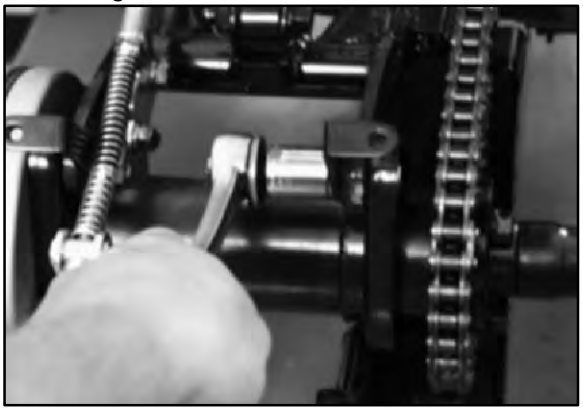
Rear Brake Lever Travel:

50 cc= 1 1/8″ (28 mm)
90 cc = 2 1/2″ (65 mm)

VEHICLE INSPECTION

CHAIN ADJUSTMENT

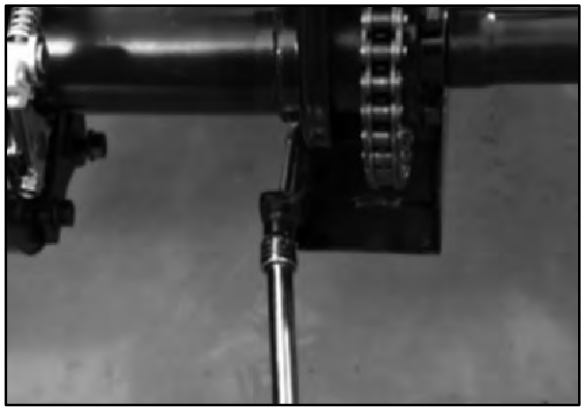
1. Remove the rear cover and loosen the four bearing housing bolts.



Chain Tension Specification:

1/4-1/2″ (10-20 mm) Deflection

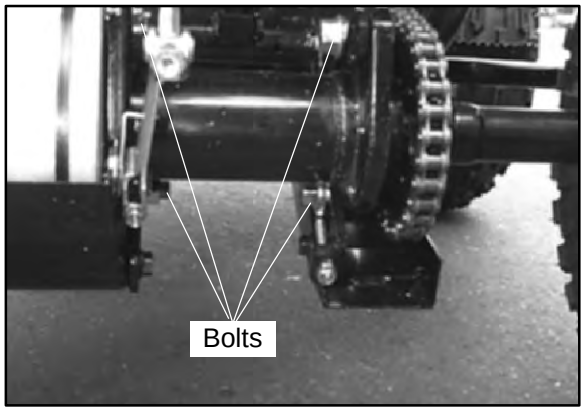
2. Loosen the four bearing housing bolts. Loosen the chain adjuster lock nut. Turn the chain adjuster clockwise until chain is set to specification **1/4"–1/2" (6–12 mm)**. Tighten the chain adjuster lock nut to specification.



Chain Adjuster Lock Nut Torque:

84 in.lbs (9.4 Nm)

3. Tighten the four bearing housing bolts to specification. Re-install rear cover.

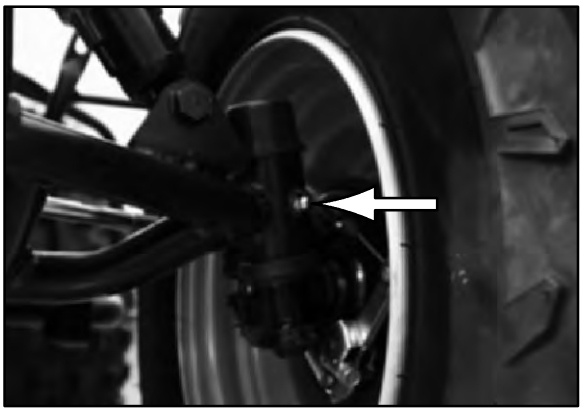


Bearing Housing Bolt Torque:

43 ft.lbs (60 Nm)

LUBRICATION

1. Lubricate grease fittings on spindles monthly with Polaris All Season Grease, or more frequently if used often.



Polaris Premium All Season Grease
14 oz. (PN 2871423)

Grease Gun Kit PN 2871312

FRONT SHOCKS AND SPRINGS

1. Inspect the front shocks and springs to ensure proper function. If the shock is leaking oil, replace. The spring preload can be adjusted on the Sportsman 90 by turning the adjuster nut. Inspect the A-arm and weldments for any sign damage.

REAR SHOCK AND SPRING

1. Inspect the rear shock and spring to ensure proper function. If the shock is leaking oil, replace. Inspect the swing arm and weldments for any sign of damage.

VEHICLE INSPECTION CONT'D

WHEEL NUTS

2. Inspect the front and rear wheel nuts for tightness. Re-torque wheel nuts monthly to specification.

Wheel Nut Torque:

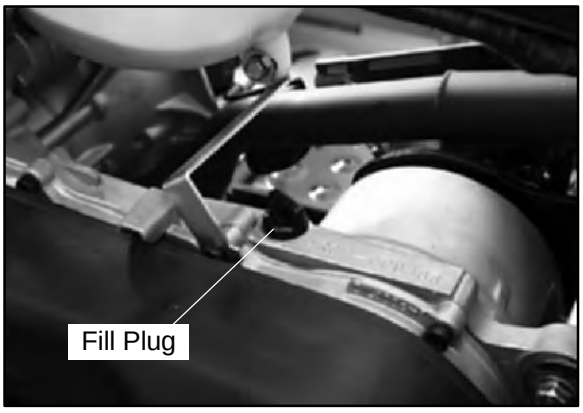
22-29 ft.lbs (30-40 Nm)

TRANSMISSION LUBRICATION

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

Remember to:

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



TRANSMISSION SPECIFICATIONS

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

Capacity: 10 fl.oz. / 300 ml
Capacity at Change: ..... 7 oz. / 200ml

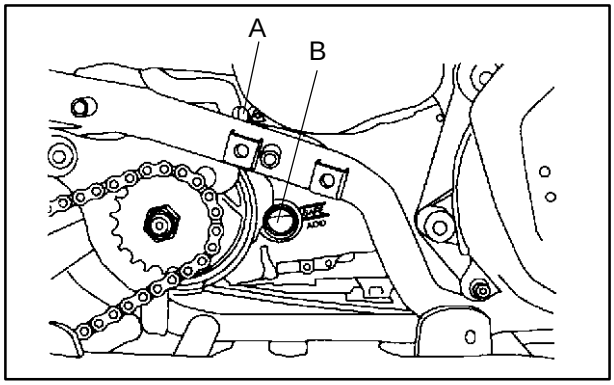
Operating Range: Oil level visible in sight glass safe zone.

Drain Plug Torque:
14 ft. lbs. (19.4 Nm)

To check the level:

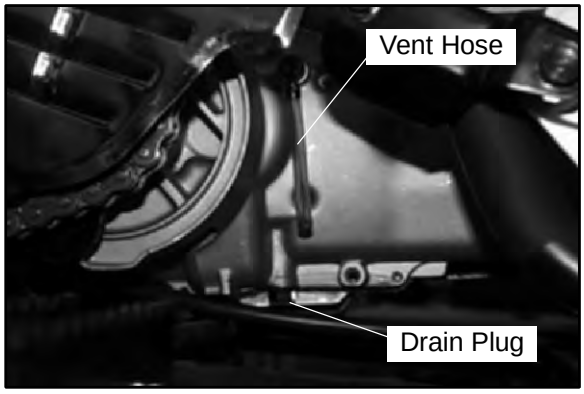
The gearcase fill plug (A) is located on the top of the gearcase. The sight glass (B) is on the right-hand side of the gearcase. The oil level must be maintained in the safe zone of the sight glass. It should be checked monthly and changed annually.

With the ATV on a level surface, check the oil level through the sight glass. If the level is low, add Polaris Premium Synthetic Gearcase Lubricant. See page 1.6 for the part numbers of Polaris-recommended products.



To change lubricant:

1. Place a drain pan beneath the transmission lubricant drain plug area.
2. Remove the drain plug and wipe the magnetic end clean to remove accumulated metallic filings.



3. After the lubricant has drained completely, install a new sealing washer and install the drain plug. Torque to 14 ft. lbs. (19.3 Nm).
4. Add the proper lubricant through the fill plug hole. Do not overfill. An indication of over filling is lubricant leaking from the vent hose after operation.
5. Check for leaks. Discard used lubricant properly.

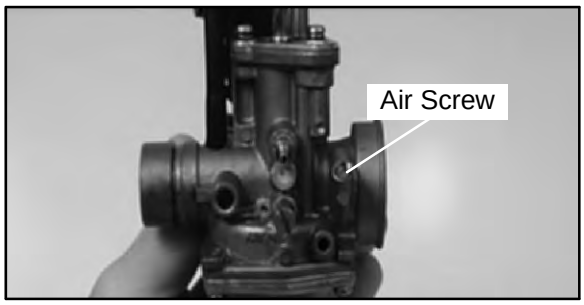
THROTTLE OPERATION

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

1. Start the engine and let it idle.
2. 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.
3. Replace the throttle cable if worn, kinked, or damaged.

AIR SCREW ADJUSTMENT

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



Air Screw Adjustment:
50 cc: 1/2 Turn Out from Lightly Seated
90 cc: 1 Turn Out from Lightly Seated

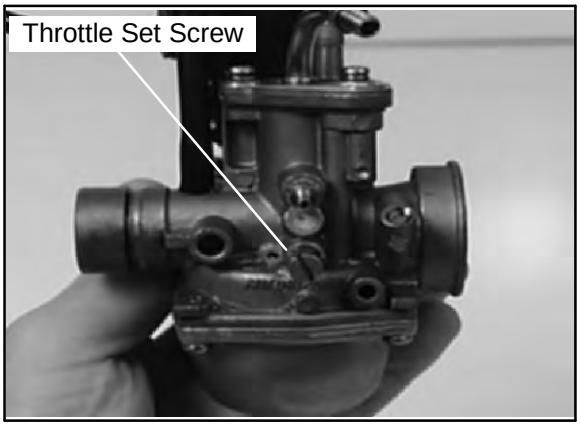
2. Warm up the engine to operating temperature (about 10 minutes).
3. Set idle speed to 800 RPM.

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.

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.

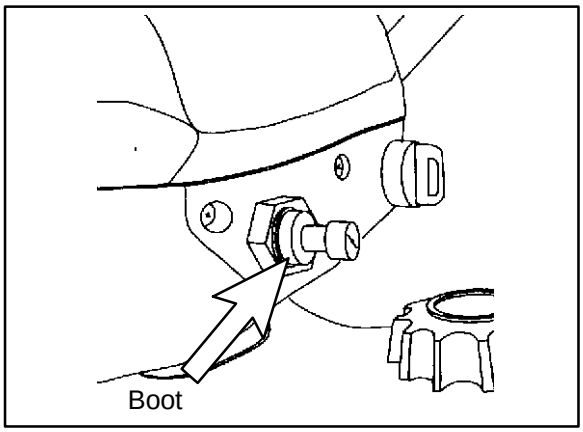
Idle Speed:

800 ± 200 RPM

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.

CHOKE (ENRICHER) ADJUSTMENT

2003 Youth ATVs are fitted with a new manual choke system. Adjust the choke tension by tightening the tensioner located under the rubber boot between the choke knob and nut. Firmly grasp the rubber boot and tighten until the choke slides freely but stays out when pulled.

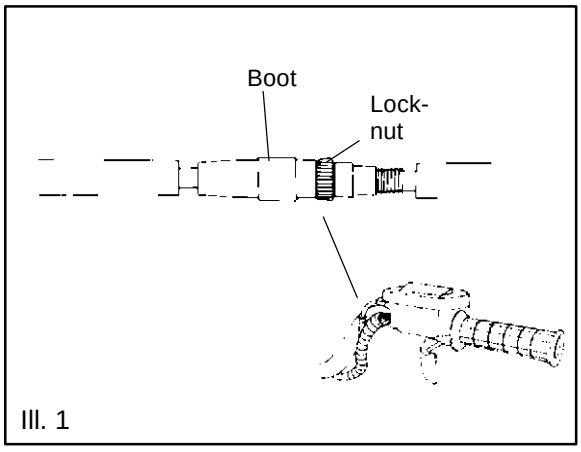


Verify free play of 1/16–3/16" (1.6–4.76 mm) and smooth operation of choke cable.

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

THROTTLE CABLE / ELECTRONIC THROTTLE CONTROL (ETC SWITCH) ADJUSTMENT

1. Slide boot off throttle cable adjuster and jam nut.

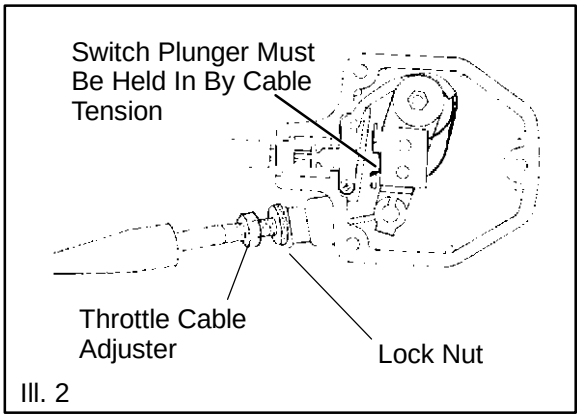


Ill. 1

2. 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.

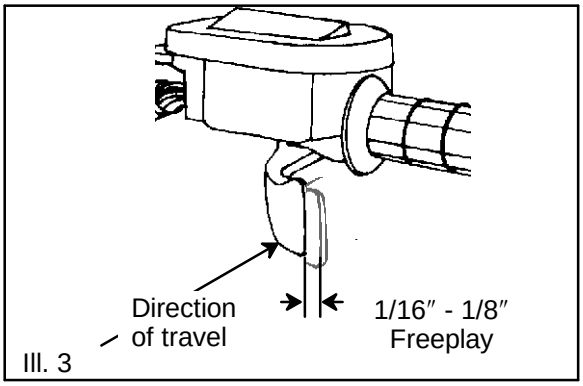
4. Loosen lock nut on in-line cable adjuster (Ill. 1).
5. Turn cable adjuster out until engine RPM begins to increase.
6. Turn cable adjuster back in until throttle lever has 1/16″ (.16 cm) of travel before engine RPM increases.
7. Tighten lock nut securely and slide boot completely in place to ensure a water-tight seal.



Ill. 2

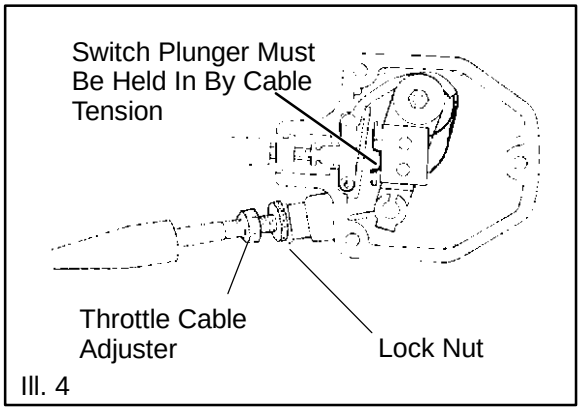
NOTE: Be sure ETC switch plunger is held inward by throttle cable tension (see Ill. 2).

NOTE: Whenever throttle cable adjustments are made, always check oil pump adjustment and re-adjust if necessary.



Ill. 3

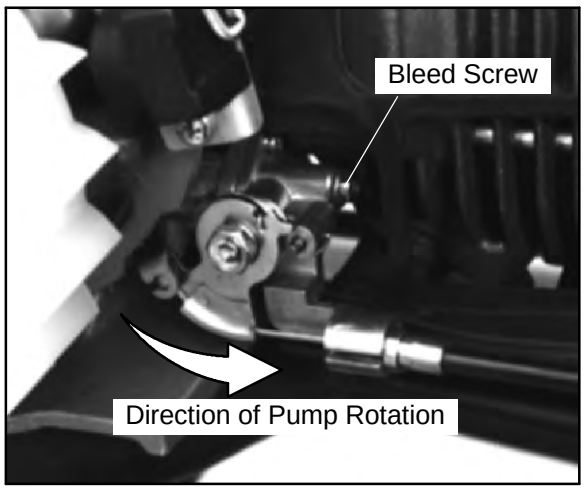
8. Turn handlebars from left to right through the entire turning range. If idle speed increases, check for proper cable routing. If cable is routed properly and in good condition, repeat adjustment procedure.



Ill. 4

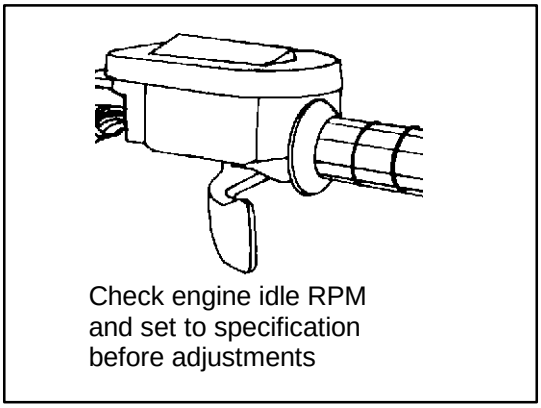
OIL PUMP BLEEDING

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 turn the oil pump lever or reel to its full up (open) position. Allow engine to idle with the lever in this position for 10 to 20 seconds to make sure all air is purged out of the system.

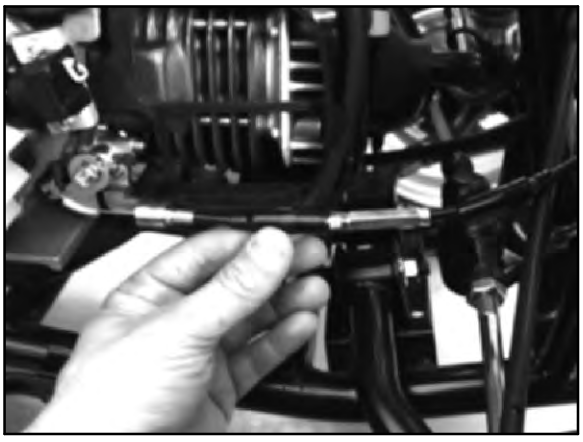


OIL PUMP ADJUSTMENT PROCEDURE

1. Before adjusting the oil pump, check engine idle RPM and set to specification. Adjust if necessary.


Check engine idle RPM and set to specification before adjustments

2. Check and adjust throttle lever free play (ETC switch).
3. Apply parking brake.
4. Remove fan shroud.
5. Start the engine and let it idle.
6. Keep away from moving fan.
7. 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).
8. Expose oil pump adjuster. Loosen lock nut and turn adjuster in or out until all freeplay is removed from oil pump cable (the point where the oil pump arm 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.

9. Replace oil pump adjuster covers.

OIL PUMP TROUBLESHOOTING PROCEDURE

To verify oil delivery to engine, proceed as follows:

Premix fuel in tank at a 40:1 fuel/oil ratio.

With the oil reservoir full and the pump bled, remove the oil delivery line from the intake manifold.

Test the oil delivery check valve with a low pressure pump and gauge.

Start engine and lift oil pump lever to full open position.

Oil should pulse from the delivery line every few seconds. If it does not, suspect one of the following:

A. Oil line plugged

B. Oil line leaking or blocked

C. Faulty oil pump or drive mechanism

D. Air in oil Lines

E. Insufficient/Improper oil in oil tank

FUEL SYSTEM

⚠ 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. Fill the tank to the bottom of the filler neck. This will allow for thermal expansion.

⚠ If you get gasoline in your eyes or 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, causing 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.

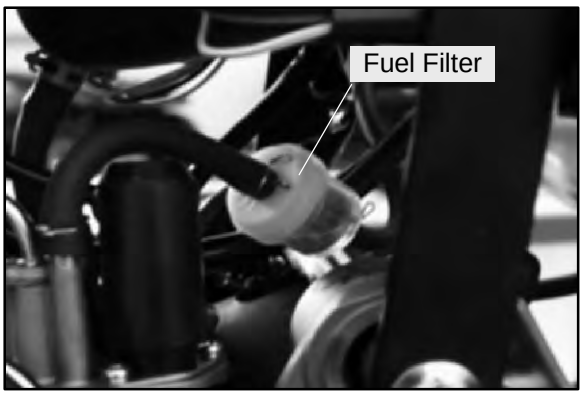
VENT LINES

1. Check fuel tank, carburetor,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 2003 youth models have been upgraded to a molded-in screen type fuel filter.

The fuel filter should be replaced in accordance with the Periodic Maintenance Chart or whenever sediment is visible in the filter.



To service the fuel filter:

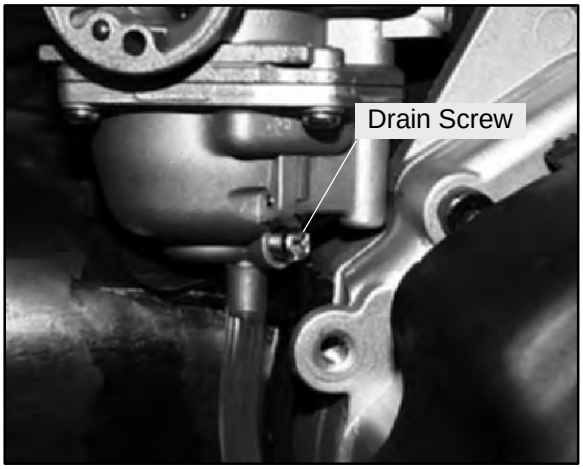
1. Shut off fuel supply at fuel valve.
2. Remove line clamps at both ends of the filter.
3. Remove fuel lines from filter.
4. Install new filter and clamps onto fuel lines.
5. Turn fuel valve **ON**.
6. Start engine and inspect for leaks.

OIL TANK

The oil tank cap is located under the seat. The tank cap is threaded for positive sealing and eases installation. Periodically check the level of the oil tank. Use Premium 2 Cycle Engine Oil when filling the tank.

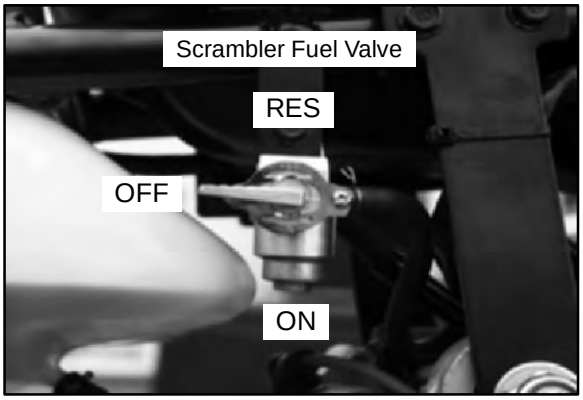
CARBURETOR DRAINING

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



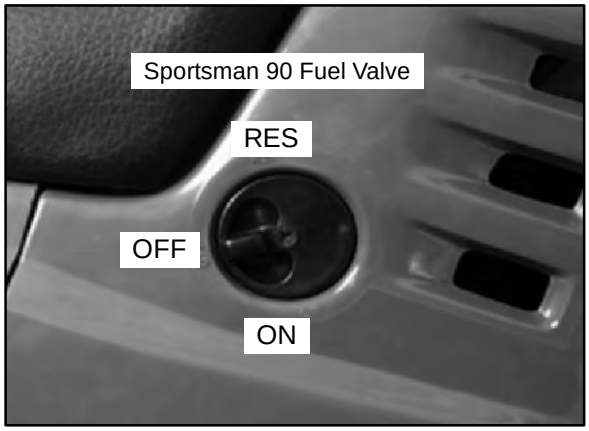
NOTE: Drain plug is located on the side of the float bowl.

1. Turn fuel valve to the off position.
2. Place a container beneath the bowl drain spigot or bowl drain hose.
3. Loosen drain screw 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. Check for fuel leaks.

8. Start engine and re-check for leaks.



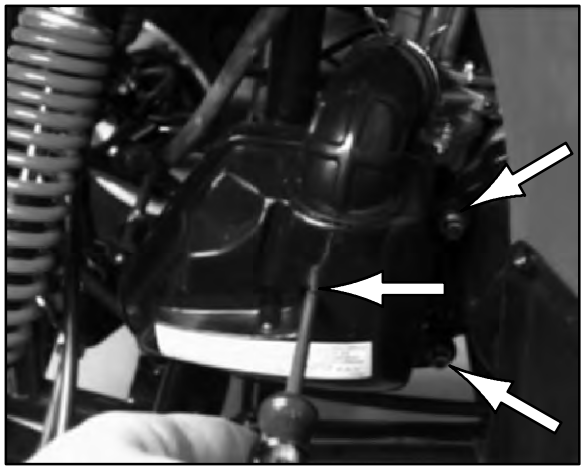
COMPRESSION TEST

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 seconds).

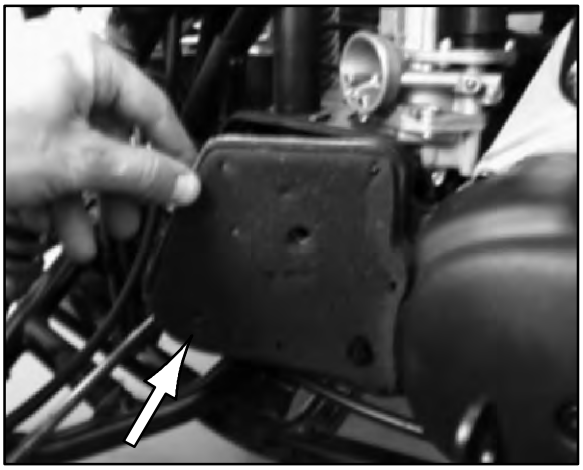
Cylinder Compression: 0–1000 ft (0–300m)	
50 cc models:	130–135 psi
90 cc models:	110–130 psi

AIR FILTER SERVICE

1. Remove three (3) screws on the airbox. Slide carburetor boot clamp off of carburetor.



2. Remove the airbox cover to expose the filter element.



3. Carefully wash the element in soapy water and dry it. Replace filter if necessary.
4. Lightly grease the sealing surfaces of the air filter cover. Install cover.
5. Install three (3) screws and boot clamp.

WHEELS

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

WHEEL, HUB, AND SPINDLE TORQUE TABLE

Item	Specification
Front Wheel Bolts	22-29 Ft. Lbs. (30-40 Nm)
Rear Wheel Bolts	22-29 Ft. Lbs. (30-40 Nm)
Front Spindle Nut	42-45 Ft. Lbs. (58-62 Nm)
Rear Hub Retaining Nut	78-81 Ft. Lbs. (108-112 Nm)

WHEEL REMOVAL FRONT/REAR

1. Stop the engine and lock the parking brake.
2. Loosen the wheel bolts 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.

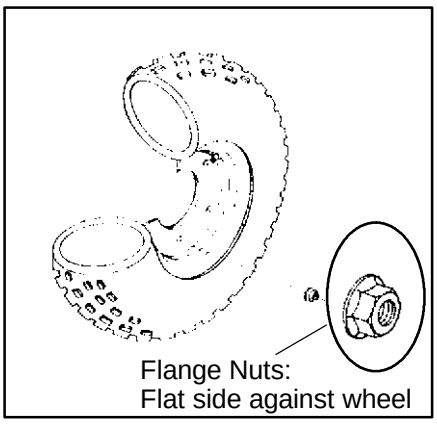
WHEEL INSTALLATION

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 on page 1.6.

CAUTION:

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



TIRE PRESSURE

Tire Pressure Inspection (PSI - Cold)	
Front	**Rear**
2 (Scrambler 50)	2 (Scrambler 50)
3 (Scrambler 90)	3 (Scrambler 90)
3 (Sportsman 90)	3 (Sportsman 90)
3 (Predator 90)	3 (Predator 90)

⚠ 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.

TIRE INSPECTION

CAUTION:

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

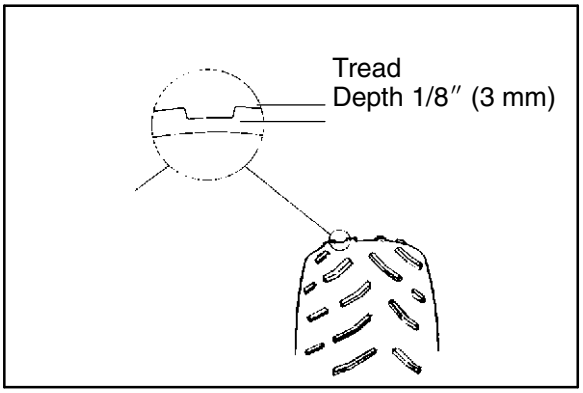
Improper tire inflation may affect ATV maneuverability.

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. See Illustration on next page.



FRAME, NUTS, BOLTS, FASTENERS

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

CAMBER AND CASTER

The camber and caster are non-adjustable.

STEERING

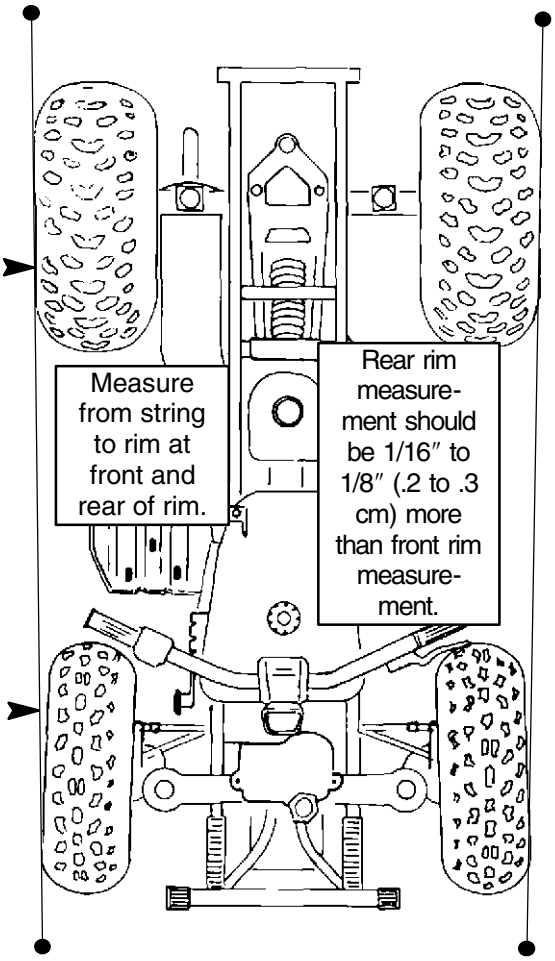
The steering components should be checked periodically for loose fasteners, worn tie rod ends, and damage. Also check to make sure all cotter pins are in place. If cotter pins are removed, they must not be re-used. Always use new cotter pins.

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.

WHEEL ALIGNMENT METHOD 1: STRAIGHTEDGE OR STRING

Be sure to keep handlebars centered. See notes below.

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

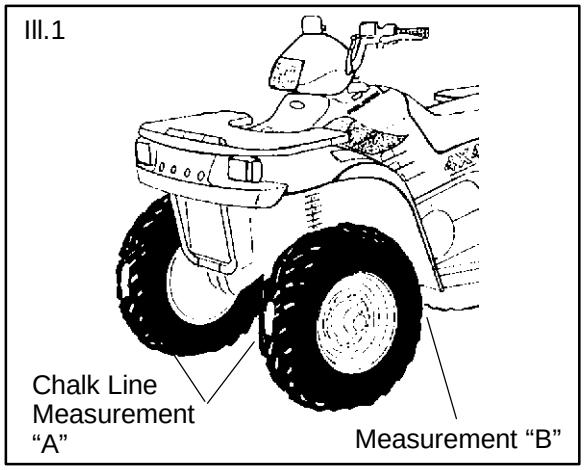


NOTE: The steering post arm “frog” can be used as an indicator of whether the handlebars are straight. The frog should always point straight back from the steering post.

WHEEL ALIGNMENT METHOD 2: CHALK

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

Ill.1



TOE ALIGNMENT ADJUSTMENT

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

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

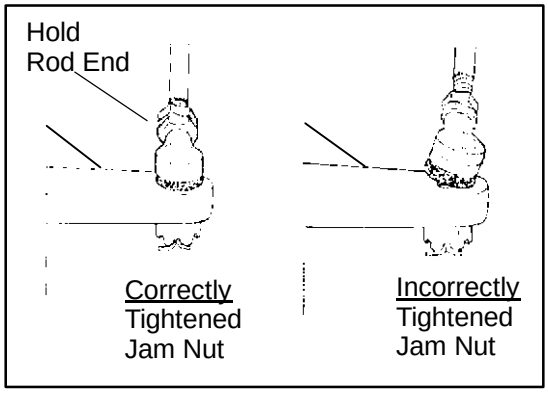
To adjust toe alignment:

old 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″).

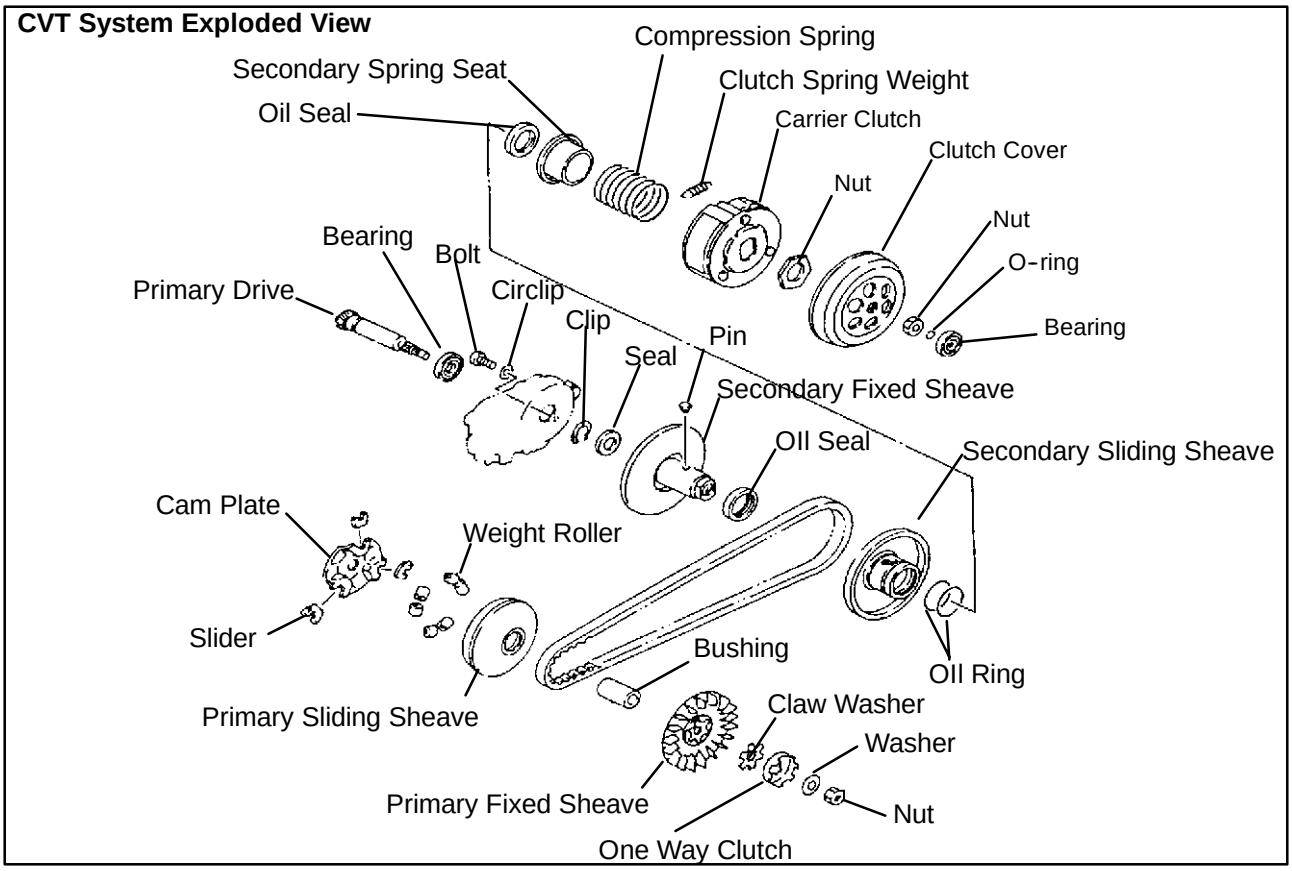
When the tie rod end jam nuts are tightened, be sure to hold tie rod ends so they are parallel with the steering arm or the steering frog, respectively, to prevent rod end damage.



2. After alignment is complete, torque jam nuts to 33-40 ft. lbs. (45-55 Nm).

CHAPTER 2
ENGINE/TRANSMISSION/CVT

CVT System Exploded View



TORQUE SPECIFICATIONS

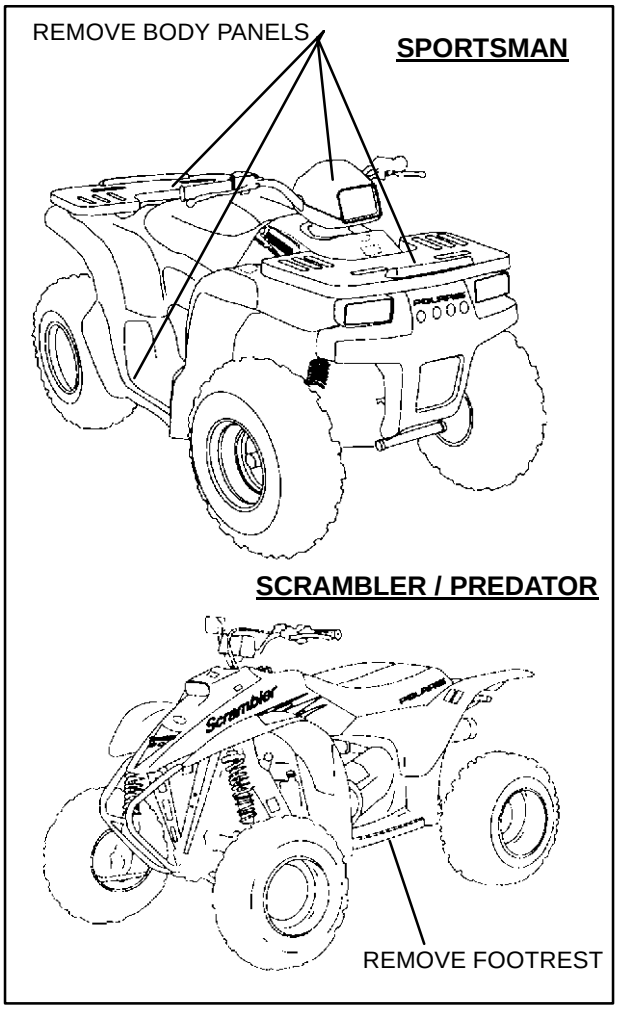
TORQUE SPECIFICATIONS	
Fastener	**Torque**
Carburetor Adaptor	20 in.lbs (2.25 Nm)
Crankcase	86 in.lbs (10 Nm)
Intake Manifold Bolts	108 in.lbs (12 Nm)
Cylinder Head Nuts	14 ft.lbs (19 Nm)
Drive Clutch Nut	29 ft.lbs (39 Nm)
Driven Clutch Nut Torque	25 ft.lbs (34 Nm)
Transmission Cover Bolts	84 in.lbs (9.5 Nm)
Flywheel	25 ft.lbs (34 Nm)
Oil Drain Bolt (Transmission)	14 ft.lbs (19 Nm)
Oil Pump Bolts	43 in.lbs (5 Nm)
Fan Housing	84 in.lbs (9.5 Nm)
Fan Bolts	84 in.lbs (9.5 Nm)
Stator Plate	84 in.lbs (9.5 Nm)
Starter Motor Bolts	84 in.lbs (9.5 Nm)
Spark Plug	11 ft.lbs (15 Nm)

SPECIAL TOOLS

DESCRIPTION	PART NUMBER
Crankshaft Removal Tool	**0450697**
Flywheel Puller	**PA-45153**
Oil Pump Drive Gear Removal Tool	**0450699**
Crankcase Separating Tool	**0450700**

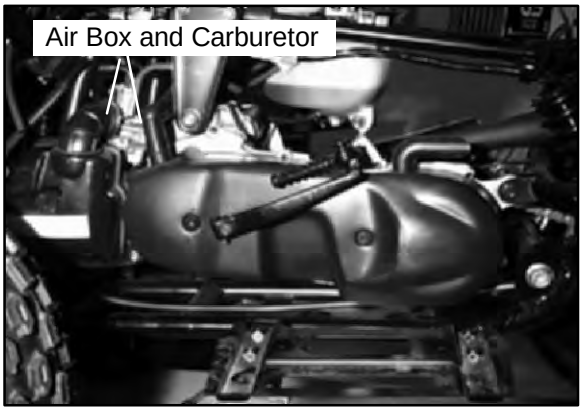
NOTE: Special tools can be ordered by Polaris Dealers only through SPX Corporation at (800) 328-6657.

ENGINE REMOVAL

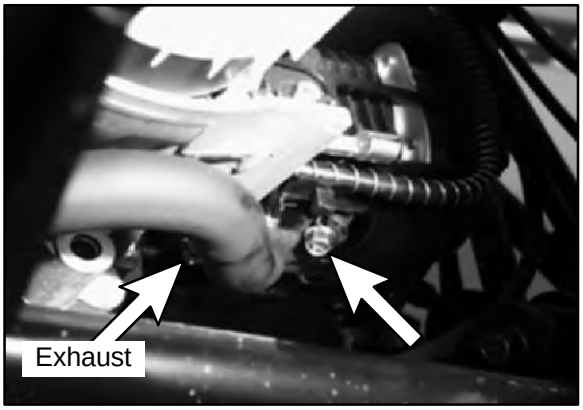


1. To remove the engine from the chassis some body panels have to be taken off the machine. Refer to the Illustration above for removal of the proper body panels. The Sportsman requires all of the body panels to be removed. The Scrambler requires the footrest and the muffler guard to be removed.

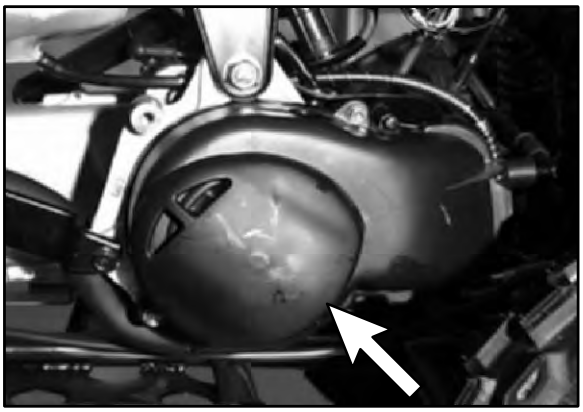
2. Remove the air box and carburetor from the chassis.



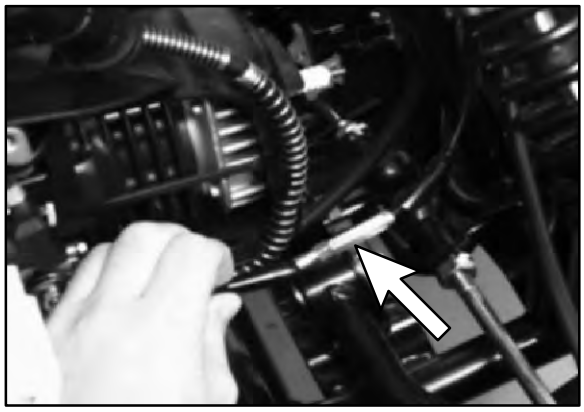
3. Loosen and remove the drive chain from the drive sprocket. Loosen the exhaust mounting bolts from under the engine. Remove any other muffler mountings from the engine.



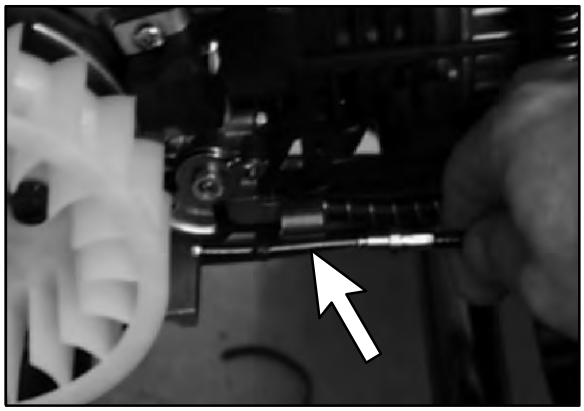
4. Remove the fan cover.



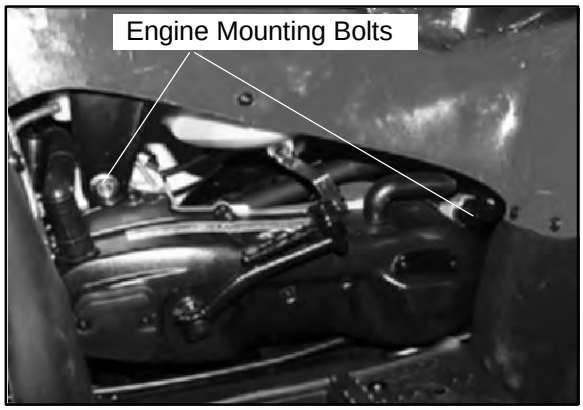
5. Loosen the oil pump cable.



6. Remove the oil pump adjustment cable.



7. Loosen the engine mounting nuts. Carefully support the engine and remove the engine mounting bolts and spacer. Pull the engine from the chassis.



ENGINE INSTALLATION

General Items

1. Install previously removed components in reverse sequence using new gaskets, seals, and fasteners where applicable.
2. Perform checks on fluid levels, controls, and all important areas on the vehicle as outlined in the daily pre-ride inspection checklist.

Exhaust

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

Engine Break In Period

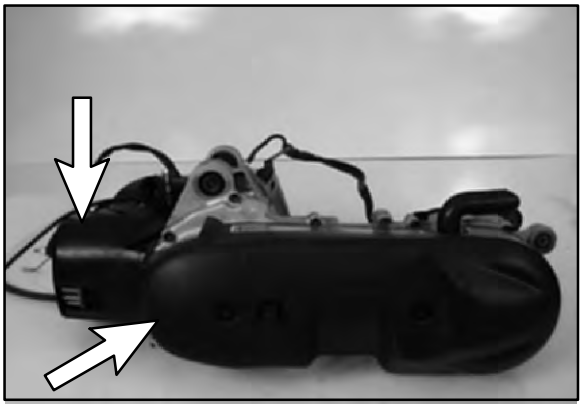
Engine Break-In Period is defined as the first 10 hours of engine operation, or 2 full tanks of fuel.

1. Use only Polaris Premium 2 cycle engine 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.

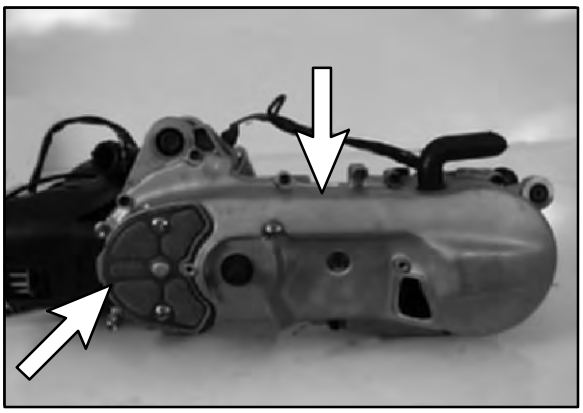
ENGINE DISASSEMBLY

NOTE: It is not necessary to remove the kick drive lever or components to remove the LH cover.

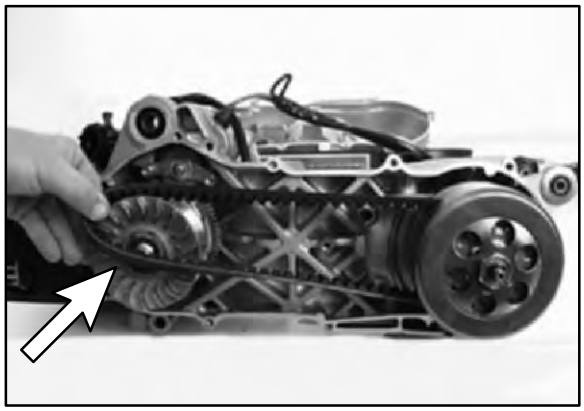
1. Remove cylinder air shroud and deflector. Remove the kick arm assembly and the plastic case cover.



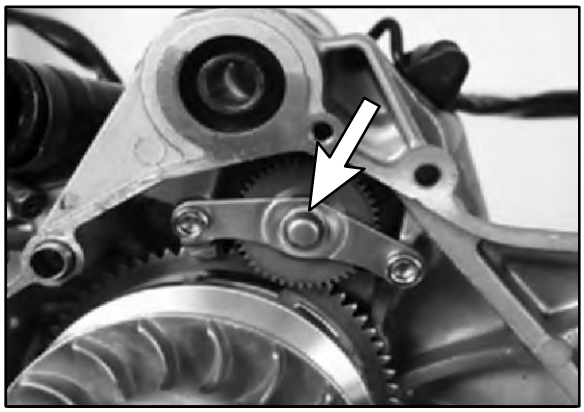
2. Remove the air filter and the crankcase cover.



3. Remove the drive belt.



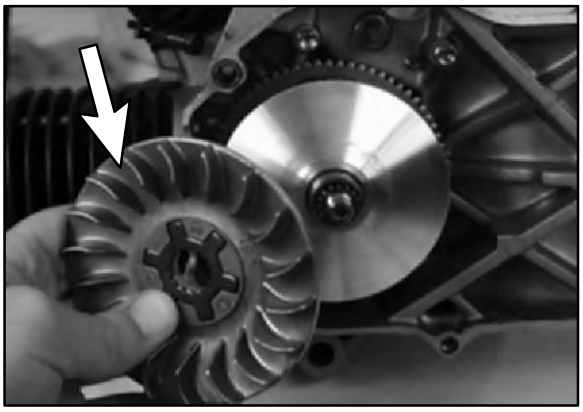
4. Remove the idle gear plate, two washers, and idle gear from the pin shaft.



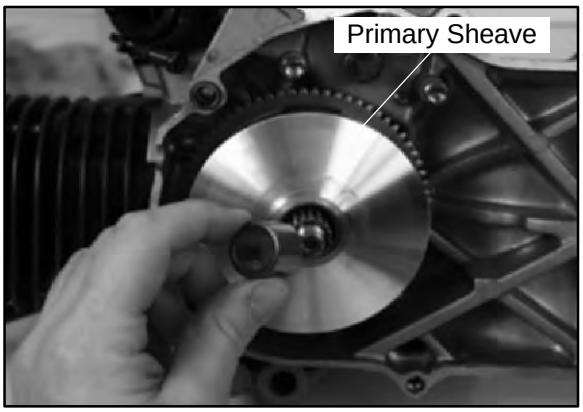
NOTE: There is one washer on the inside of the idle gear and one washer on the outside of the idle gear.

5. Remove the nylon lock nut, the cone spring washer, and the one way clutch from the crankshaft.

6. Remove the primary fixed sheave and washer claw.

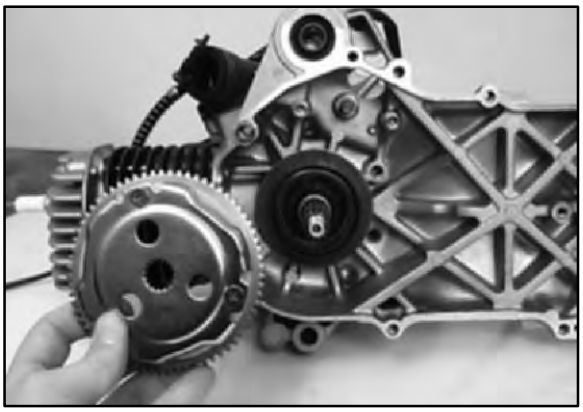


7. Remove the bushing, the primary sliding sheave, and the cam plate assembly.

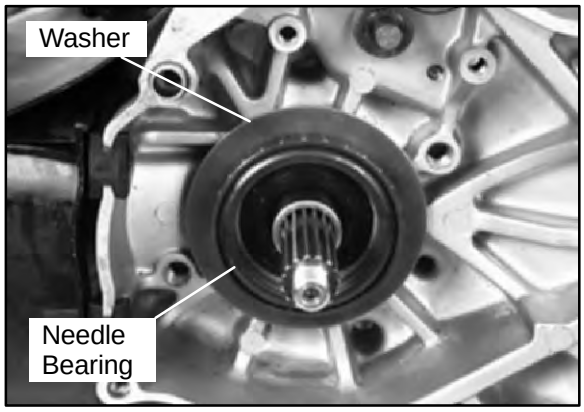


NOTE: When removing the primary sliding sheave and the cam plate assembly, use two hands to hold the cam plate and the primary sliding sheave together. This prevents the roller weights from falling out of the assembly.

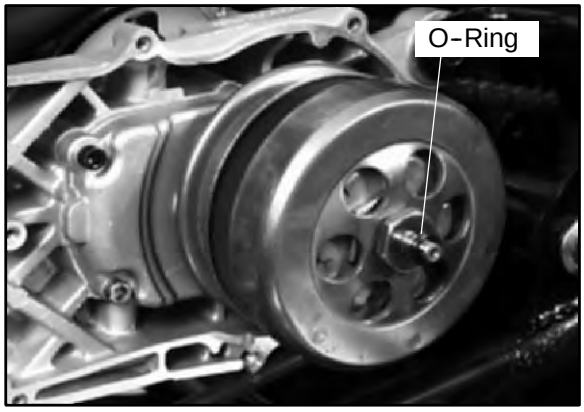
8. Carefully remove the starter one-way assembly.



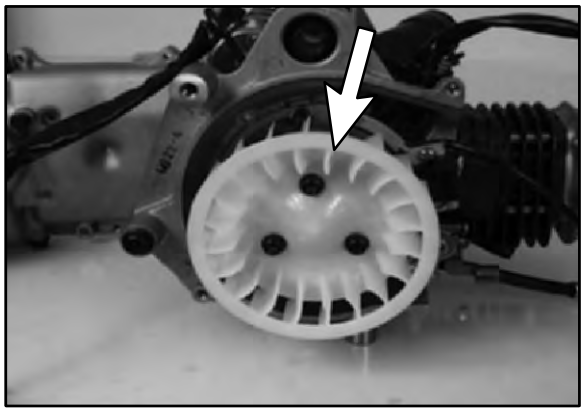
9. Remove the washer and needle bearing.



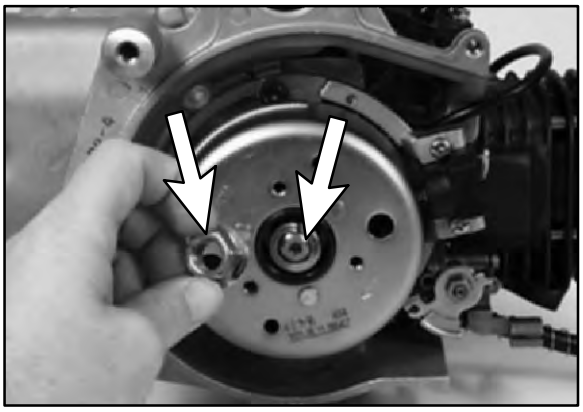
10. Remove the driven clutch assembly by removing the O-ring and nut from the shaft. . Replace the O-ring as needed.



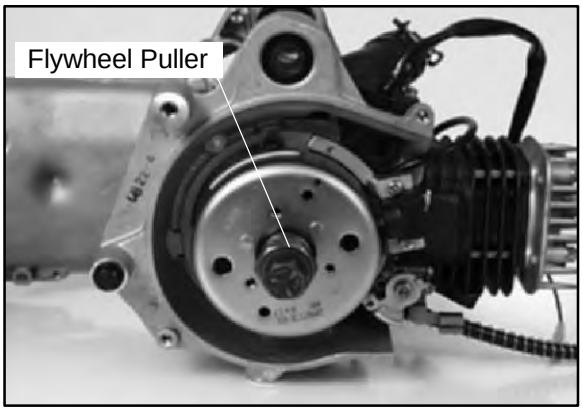
11. Remove the three phillips screws holding the fan in place. Remove the fan.



12. Remove the spring washer and nut from the shaft.



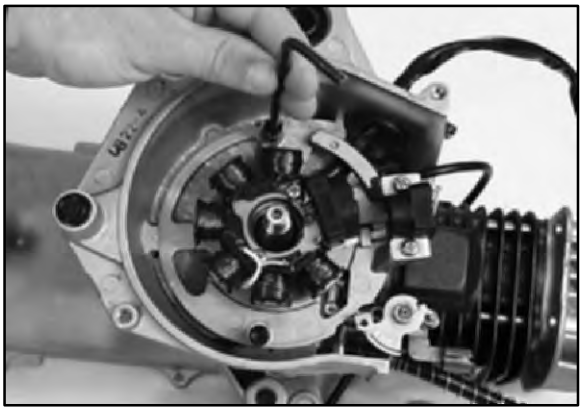
13. Remove the flywheel using flywheel puller.



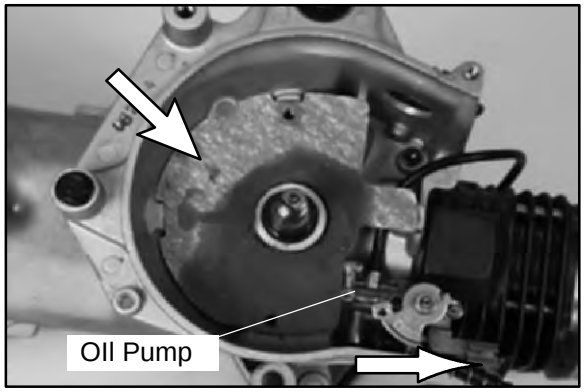
Flywheel Puller

(PA-45153)

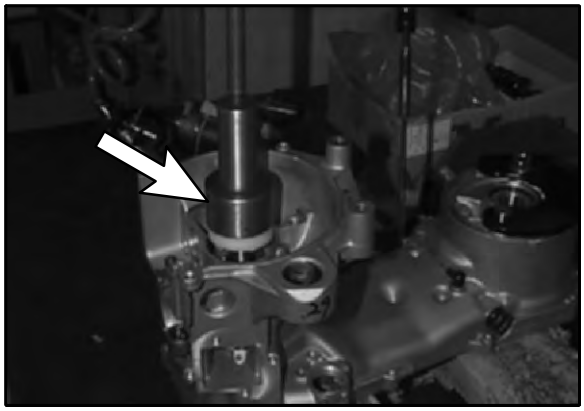
14. Scribe an alignment mark on the stator backing plate and the crankcase for proper alignment upon engine assembly. Remove stator assembly.



15. Remove the stator gasket, clean the area thoroughly. Loosen and remove the oil pump. The oil pump slides out in the forward direction.



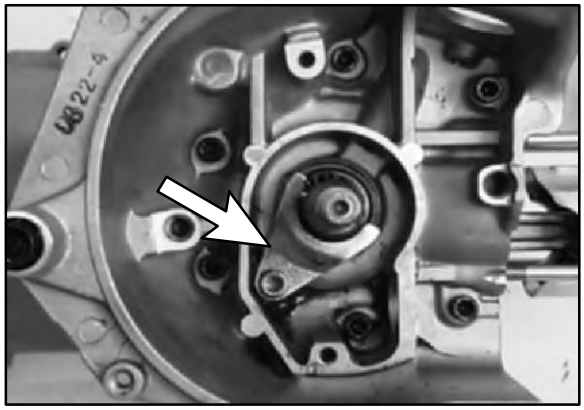
16. Use the oil pump drive gear removal tool to remove the oil pump drive gear.



Oil Pump Drive Gear Removal Tool:

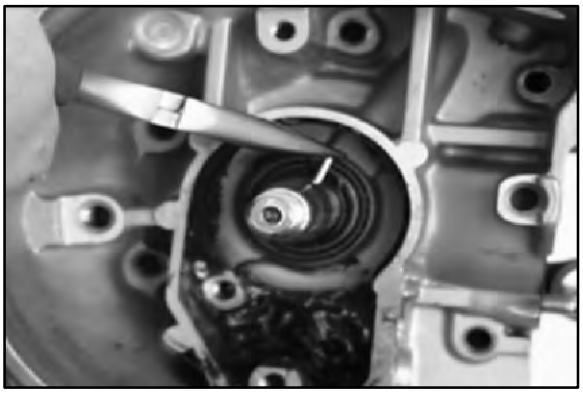
(PN 0450699)

17. Remove the oil seal bracket.

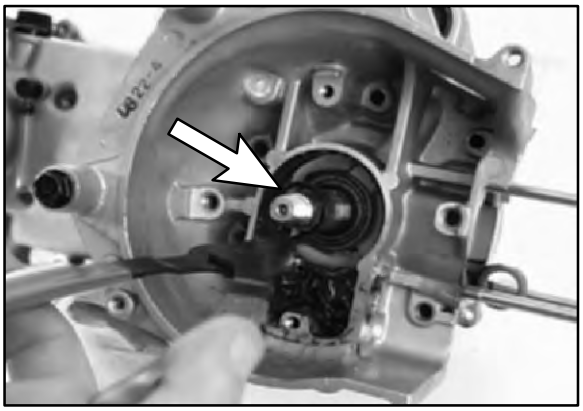


NOTE: To ease disassembly, clean the grease out of the oil pump chamber area and note the amount. That same amount of grease is reinserted into the chamber later in the engine assembly.

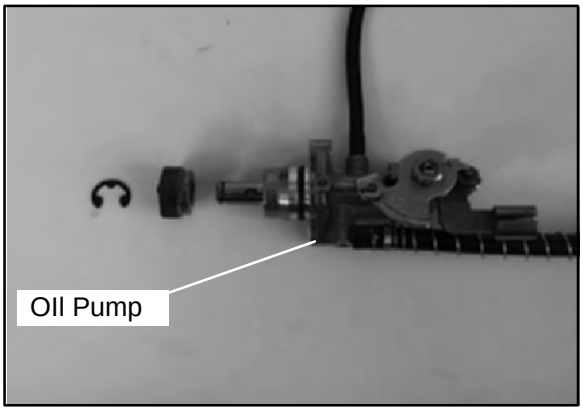
18. Remove the dowel pin from the crankshaft.



19. Remove the external circlip from the crankshaft.



20. Remove the circlip to disassemble the oil pump gear.

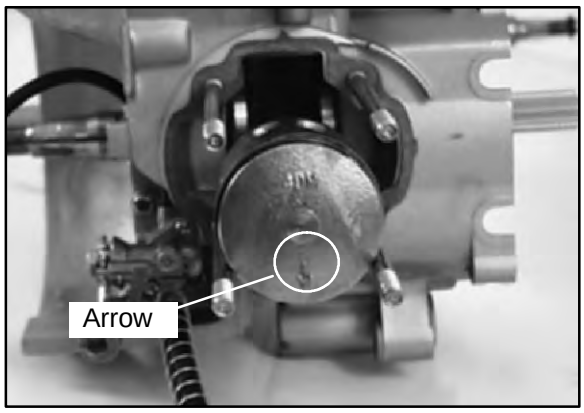


21. Remove the cylinder head nuts and remove the cylinder head. Clean the cylinder head using parts washer solvent.

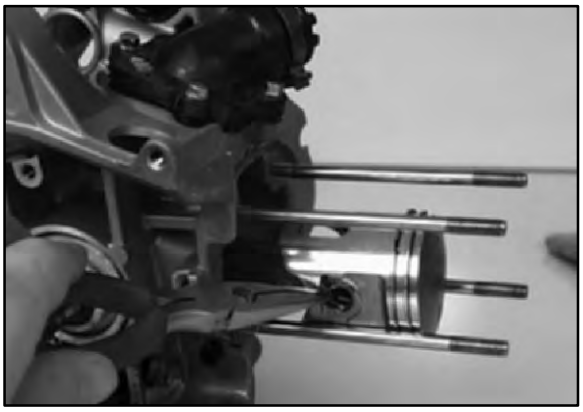
NOTE: During reassembly use new gaskets.

22. Remove the cylinder and gaskets.

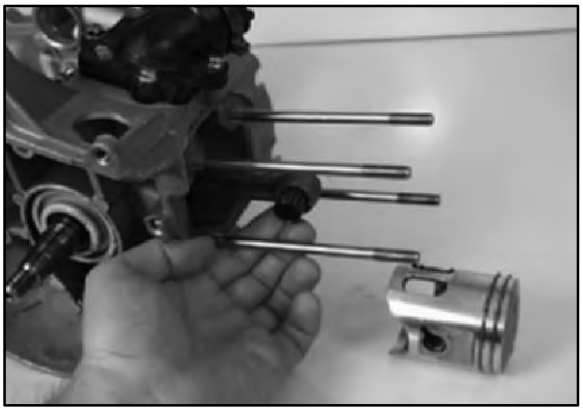
23. Make note of the orientation of the piston. There is an arrow on the piston head pointing toward the exhaust side.



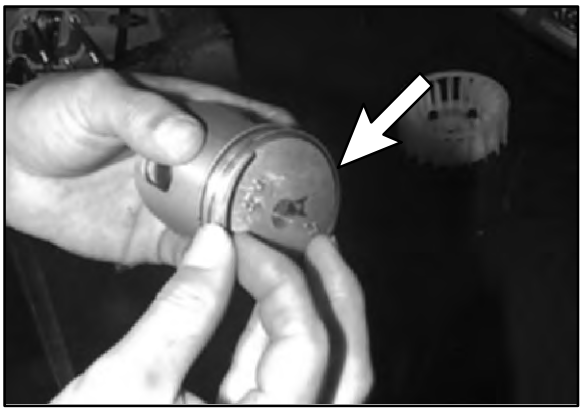
24. Remove the piston pin clip and the piston pin.



25. Remove the needle bearing from the piston pin bore.

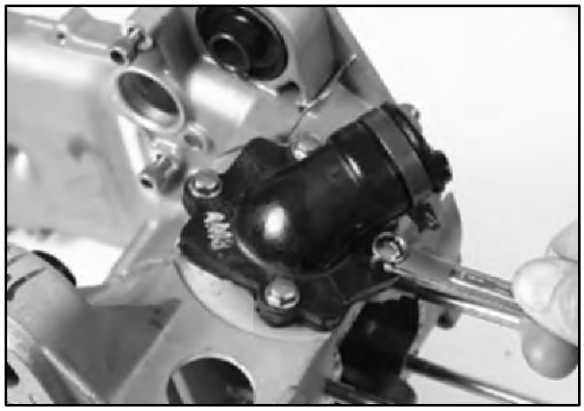


26. Carefully remove the piston rings so no damage is done to the ring lands. Discard the rings and replace them with new rings.



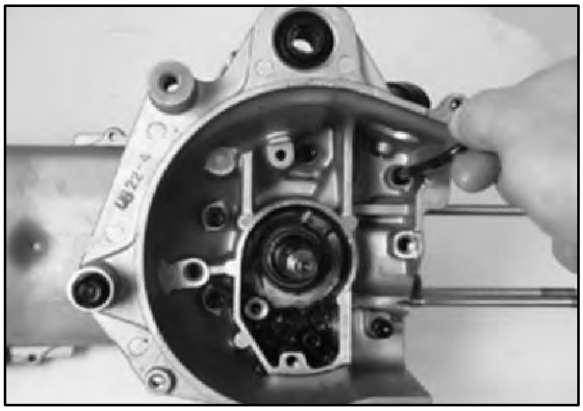
OIl Pump

27. Remove the intake manifold and reed valve assembly. Replace all gaskets.

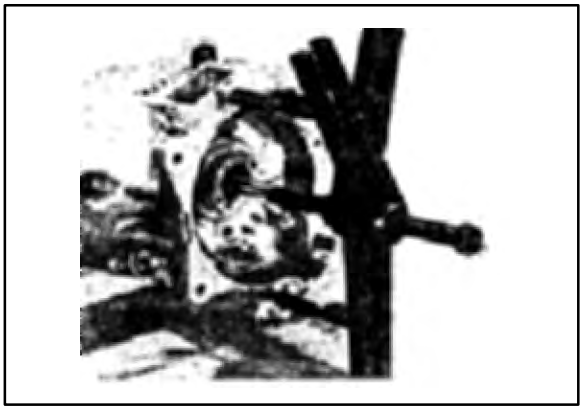


Crankcase Separation

28. Remove all of the bolts from the crankcase to split the case.



29. Use the crankcase separating tool to disassemble the right and left crankcase halves.



Crankcase Separating Tool:

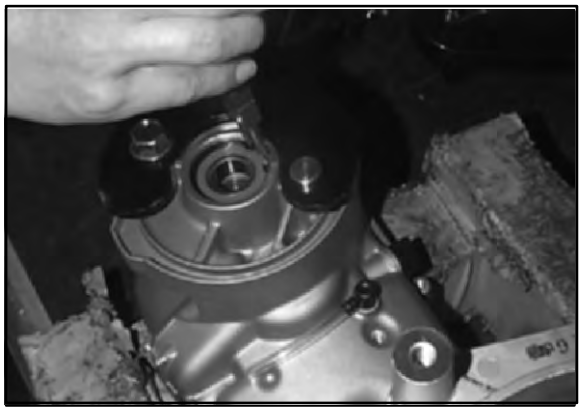
(PN 0450700)

30. Use the crankshaft removal tool to remove the crankshaft.

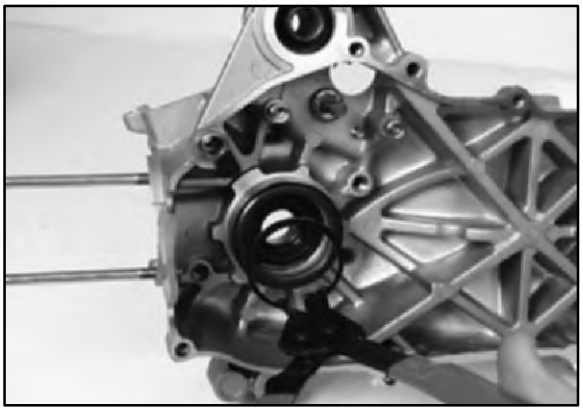
Crankshaft Removal Tool:

(PN 0450697)

31. Remove the external snap ring on the output shaft bearing and remove the oil seal. Replace the seals or bearing as needed.



32. Remove the external snap ring to remove the crankshaft bearing.

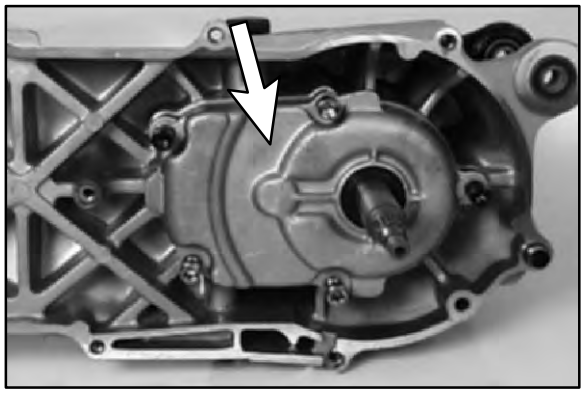


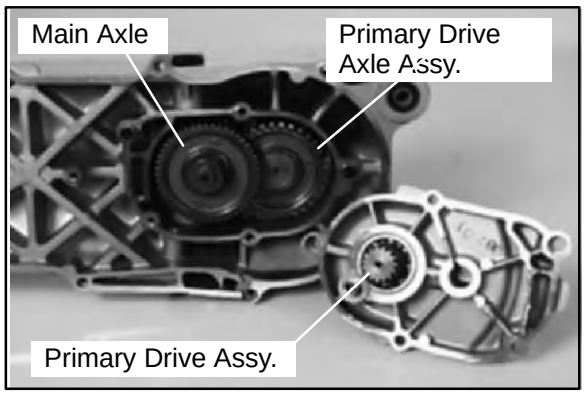
TRANSMISSION SERVICE

NOTE: Engine removal is required to service transmission components. Refer to beginning of this chapter for removal instructions.

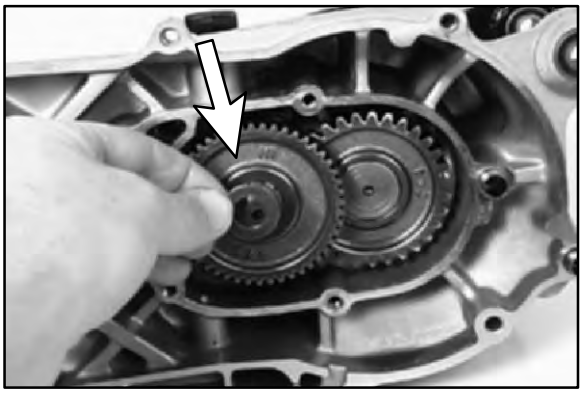
1. Drain the oil from the gear case.

2. Remove the transmission cover and gasket.

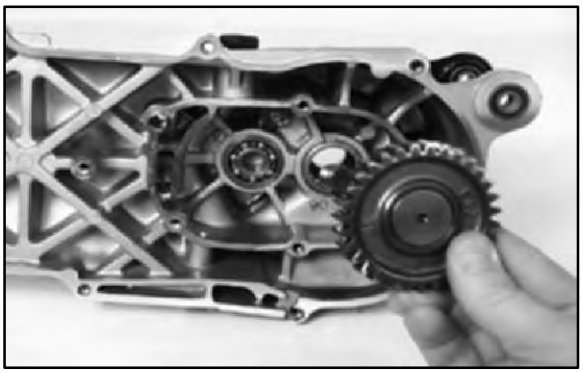




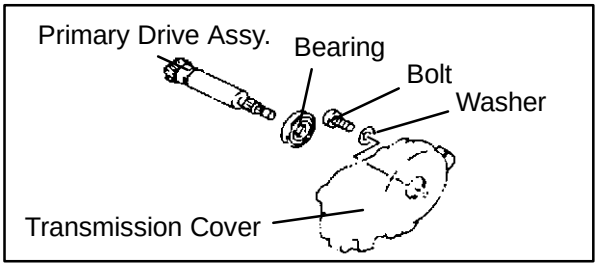
3. Remove the washer and the driven clutch gear.

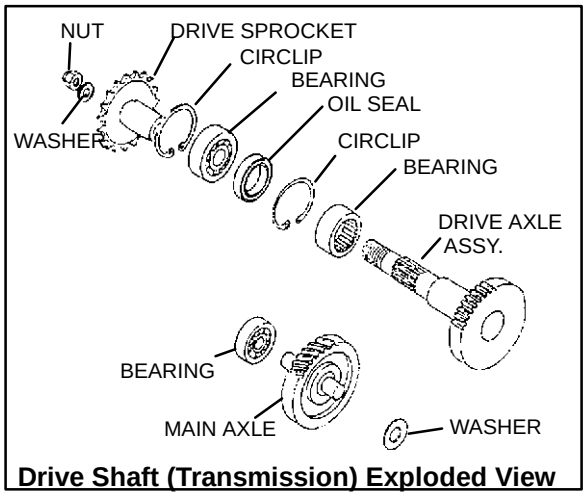


4. Remove the drive axle assembly. Inspect for signs of wear.



5. Remove the bolt and washer to aid removal of the bearing and the primary drive assembly.

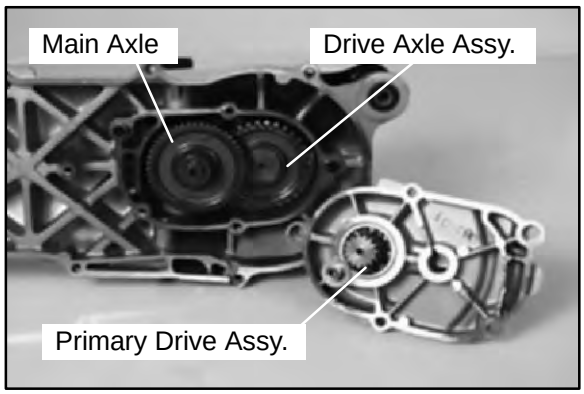




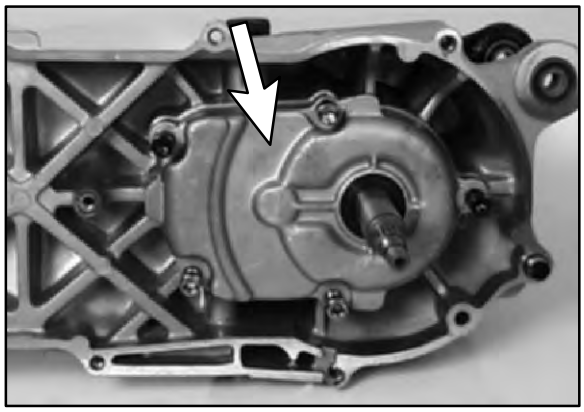
Drive Shaft (Transmission) Exploded View

Driveshaft (Transmission) Assembly

6. Install the drive axle assembly, washers, main axle and primary axle. Refer to 2.10 for order of assembly.



7. Install the transmission cover gasket and install the transmission cover while mating the splines together. Torque the bolts to specification.



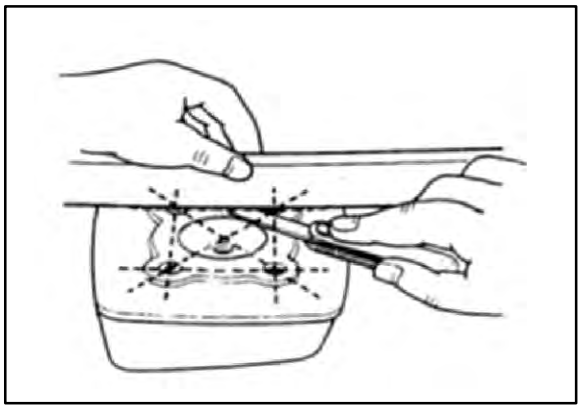
Transmission Cover Bolt Torque:

84 in.lbs. (9.5 Nm)

ENGINE COMPONENT INSPECTION

Cylinder Head Inspection

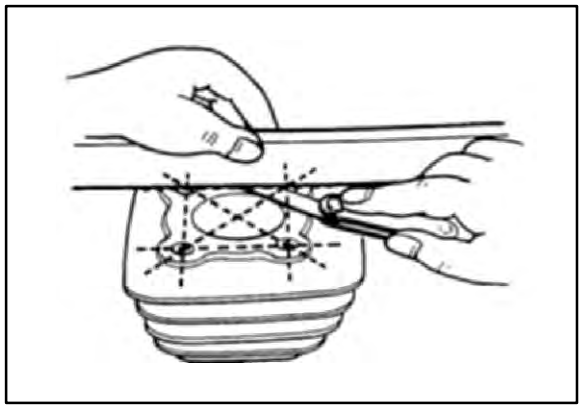
1. Inspect the surface of the cylinder head for warpage. Clean all gasket residue completely from sealing surface. Use a feeler gauge and straight edge. Measure the gap six (6) different ways as shown in illustration at left. Normal gap should be .002″ (0.05 mm) or less. If gap is excessive, resurfacing head or replacement is needed.



Cylinder Head Warp
Service Limit:
.002″ (0.05 mm)

Cylinder Inspection

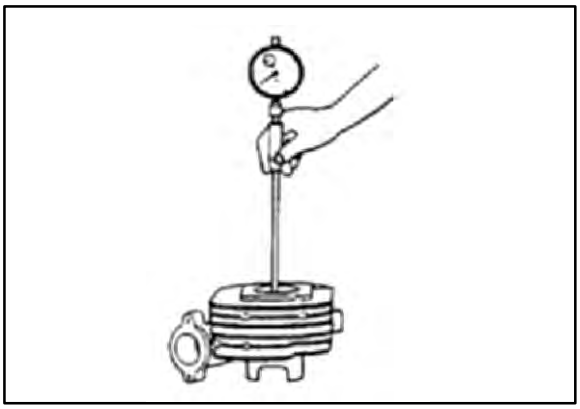
1. Inspect the surface of the cylinder for warpage. Clean all gasket residue completely from sealing surface. Use a feeler gauge and straight edge. Measure the gap six (6) different ways as shown in illustration at left. Normal gap should be .002″ (0.05 mm) or less. If gap is excessive, resurfacing cylinder or replacement is needed.



Cylinder Warp
Service Limit:
.002″ (0.05 mm)

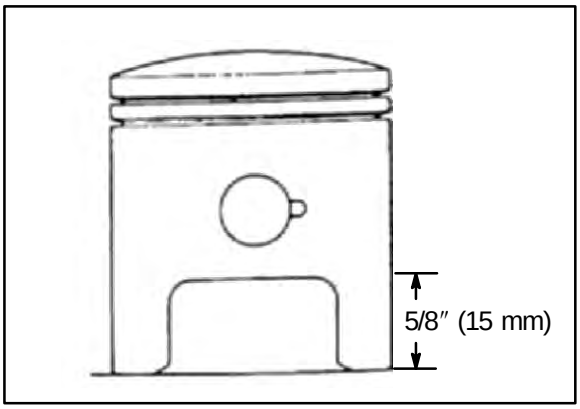
2. Inspect the cylinder walls for damage or scoring. The cylinder bore must be de-glazed whenever new piston rings are installed. If cylinder wear or damage is excessive, it will be necessary to oversize the cylinder using a new oversize piston

and rings. See **Honing to Oversize** in this chapter. Inspect cylinder for out of round.



Piston Inspection

1. Inspect the piston for scoring or cracks in piston crown or pin area. Excessive carbon buildup below the ring land is an indication of piston, ring, or cylinder wear. If damage is excessive, replace piston. Piston-to-cylinder clearance should not exceed .0047″ (0.12 mm). Measure the piston 5/8″ (15 mm) from bottom. Then measure inside diameter of cylinder. The difference between these measurements should not exceed .0047″ (0.12 mm).

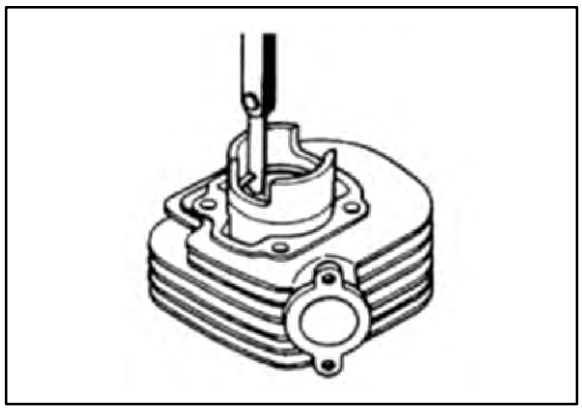


Piston to Cylinder Clearance:

50 cc: .00138–.00177" (.035–.045 mm).
90 cc: .00118–.00197" (0.03 – .05 mm)

Piston Ring Installed Gap

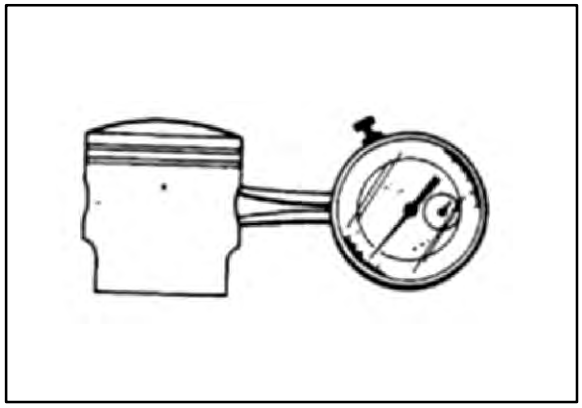
2. Position piston ring 1/2″ (1.3 cm) from the top of the cylinder using the piston to push it squarely into place. Measure installed gap with a feeler gauge at both the top and bottom of the cylinder. Replace rings if the installed end gap exceeds the service limit.



Piston Ring Installed Gap
Service Limit:
.030″ (0.75 mm)

Piston Pin Hole Inspection

1. Using a telescoping gauge or similar bore gauge, measure the inside diameter of the piston pin hole on both sides of the piston. Replace if diameter exceeds .395″ (10.03 mm)



Piston Pin Hole
Service Limit:
.395″ (10.03 mm)

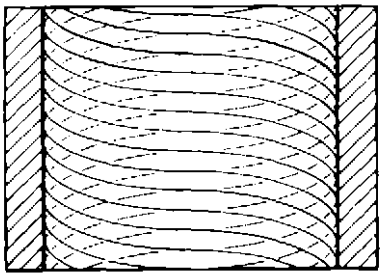
HONING -- CYLINDER HONE SELECTION & PROCEDURE

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

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

HONING TO 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 rough honing followed by finish honing.



EXAMPLE OF CROSS HATCH PATTERN

For oversize honing, always wet hone using the specified oil and coarse roughing stones. 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 2.17 before honing. Complete the sizing with fine grit stones to provide the proper cross-hatch finish and required piston clearance.

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

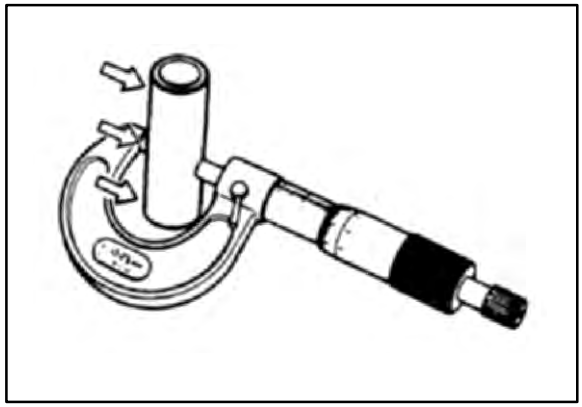
- Use a motor speed of approximately 300-500 RPM, run the hone in and out of the cylinder rapidly until cutting tension decreases. Remember to keep the hone drive shaft centered (or cylinder centered on arbor) and to bring the stone approximately 1/2″ (1.3 cm) beyond the bore at the end of each stroke.
- 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.

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 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 to prevent the formation of rust.

Piston Pin Inspection

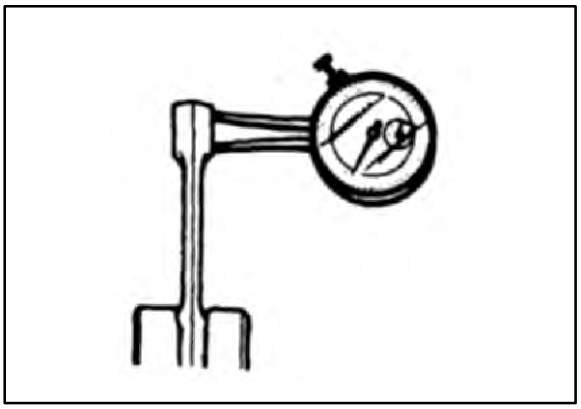
1. Inspect the surface of the piston pin for damage. Measure the diameter of the piston pin in three areas with a micrometer. The service limit for the piston pin is .393″ (9.980 mm).



Piston Pin
Service Limit:
.393″ (9.980 mm)

Connecting Rod Inspection

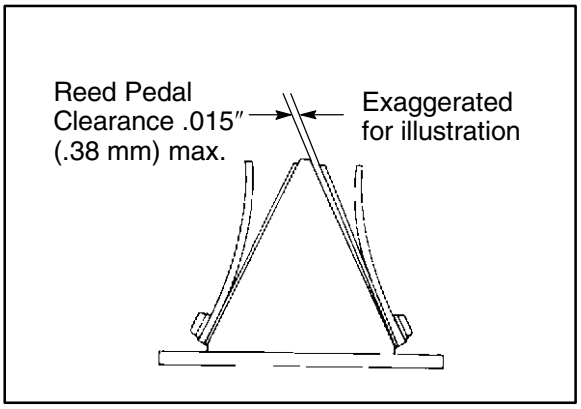
1. Inspect the inner surface of the small end of the connecting rod for wear or damage. Oil and install needle bearing and pin in connecting rod. Rotate pin slowly and check for rough spots or any resistance to movement. Replace both pin and bearing if there is any resistance to rotation. Measure the inner diameter of the small end of the connecting rod. The service limit is .553″ (14.04 mm).



Connecting Rod Small End
Service Limit
.553″ (14.04 mm)

Reed Valve Inspection

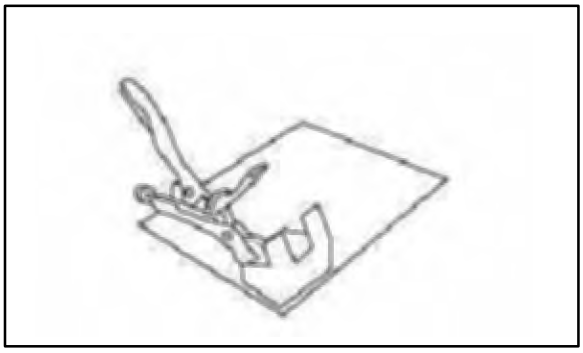
1. Measure the air gap between fiber reed and reed block as shown. The air gap should not exceed .015″ (.40 mm) If clearance is excessive DO NOT attempt to reverse the reeds to reduce the air gap. *Always replace them if damaged.* Check each fiber reed for stress marks or missing material.



Reed Valve Air Gap
Service Limit:
.015″ (0.4 mm)

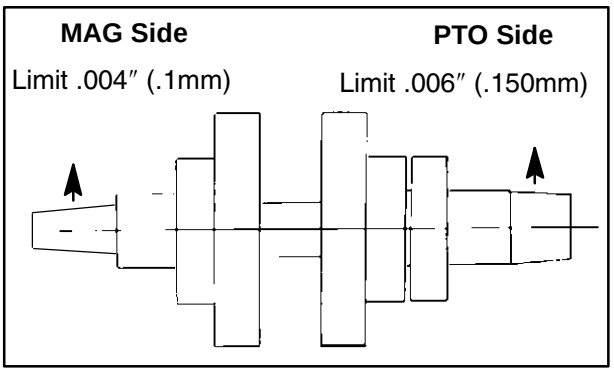
CRANKSHAFT RUNOUT

Lubricate the bearings and clamp the crankshaft securely in the holding fixture. Refer to the illustrations.



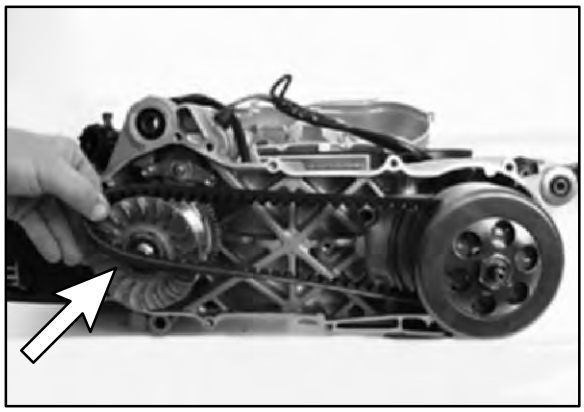
Crankshaft Alignment Fixture
(PN 2870710)

1. If the runout of the crankshaft is more than .004″ (.100mm) on the MAG side, or .006″ (.150mm) on the PTO side, the crankshaft must be replaced.



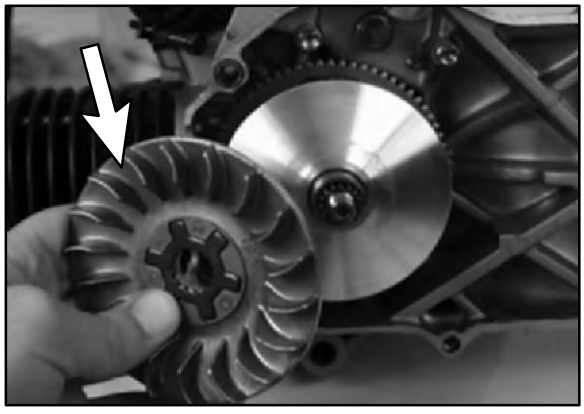
CVT SYSTEM DISASSEMBLY

1. Remove the drive belt.

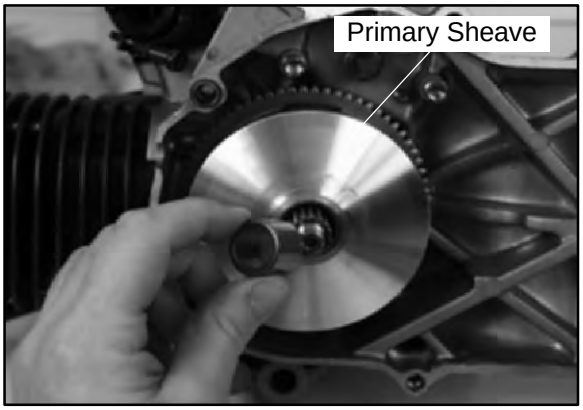


2. Remove the nylon lock nut, the cone spring washer, and the one way clutch from the crankshaft.

3. Remove the primary fixed sheave and washer claw.

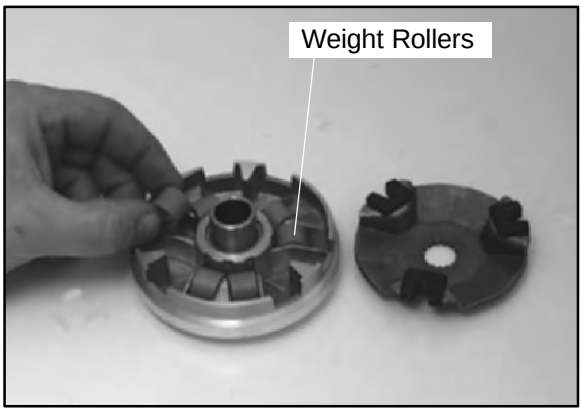


4. Remove the bushing, the primary sliding sheave, and the cam plate assembly. Inspect the sheaves for scoring, grooving, or abnormal wear.

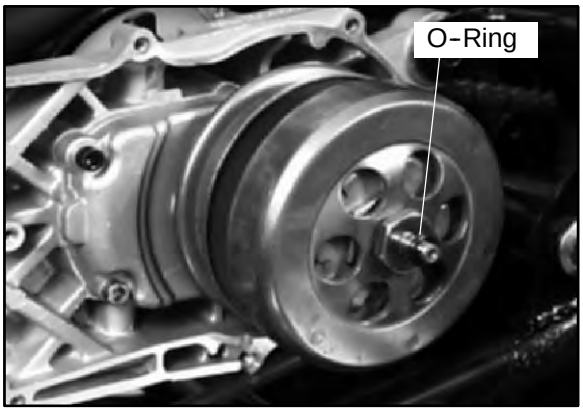


NOTE: When removing the primary sliding sheave and the cam plate assembly, use two hands to hold the cam plate and the primary sliding sheave together. This prevents the roller weights from falling out of the assembly.

5. Remove the roller weights from the primary sliding sheave. Check the rollers for wear and scoring.

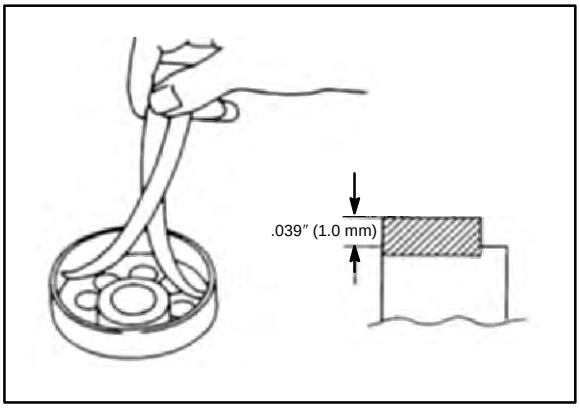


6. Remove the driven clutch assembly by removing the O-ring and nut from the shaft. Replace the O-ring as needed.



CVT Driven Clutch Cover and Lining

1. Inspect the condition of the clutch cover. Measure the inside diameter of the cover using a caliper. The inner diameter service limit is 4.43″ (112.5 mm). Inspect the condition and diameter of the lining. The service limit of the lining is .039″ (1.0 mm). If either of these measurements exceeds the limit, replace the clutch cover.

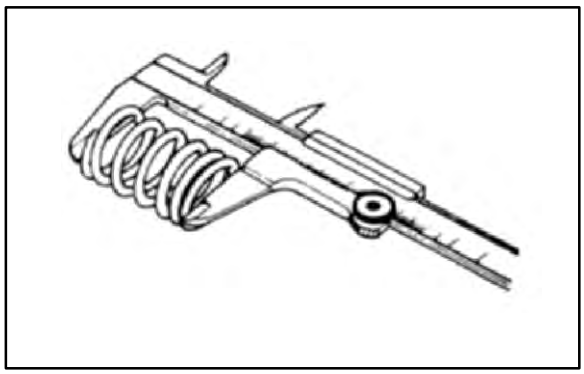


Driven Clutch Cover Inner Diameter
Service Limit: 4.43″ (112.5 mm)

Driven Inner Lining
Service Limit: .039″ (1.0 mm)

Driven Compression Spring

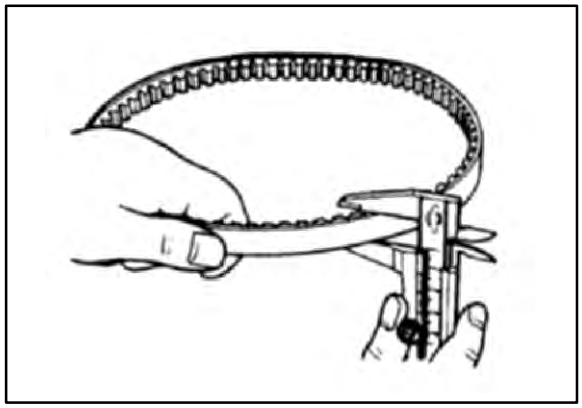
2. Use a vernier caliper to check the length of the compression spring. At full extension, the measurement should be no less than 2.74″ (69.7 mm). If out of specification, replace the spring.



Driven Compression Spring
Service Limit:
2.74″ (69.7 mm)

CVT Belt Inspection

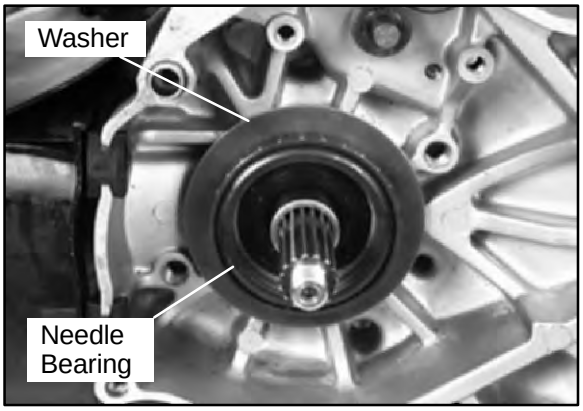
1. Inspect the surface of the drive belt for uneven wear or grease deposits. Using a vernier caliper, measure the width of the belt. The service limit of the belt is .626″ (15.9 mm). If the width of the belt is less than the service limit, or if the belt is worn, glazed or hourglassed, replace.



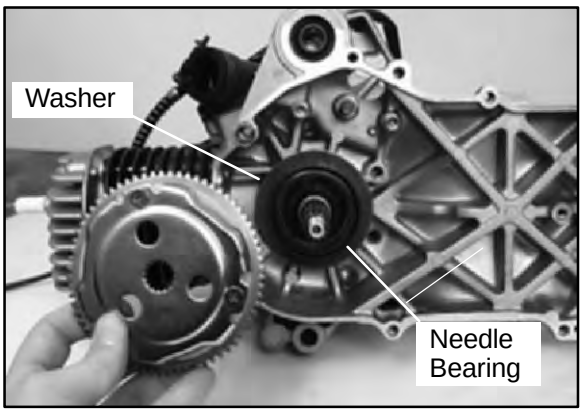
CVT Drive Belt Width
Service Limit
.626″ (15.9 mm)

CVT REASSEMBLY

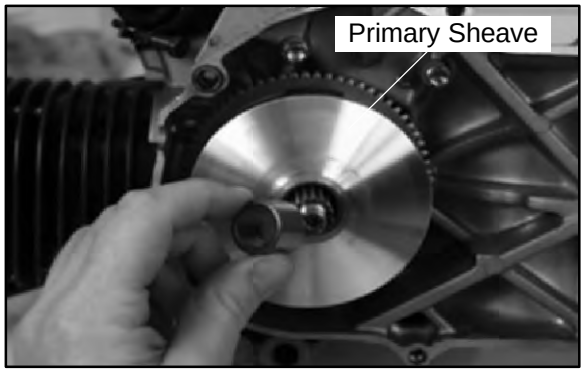
1. Install the washer and needle bearing.



2. Carefully install the starter wheel onto the crankshaft.

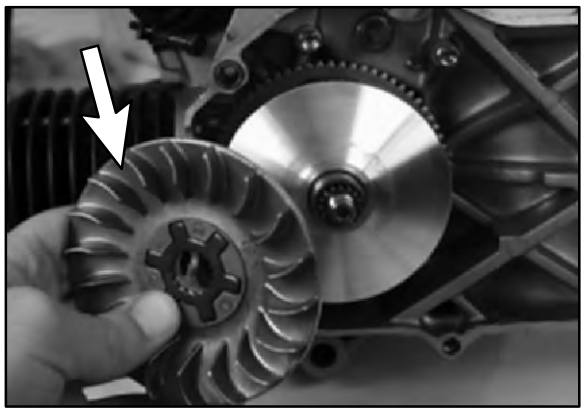


3. Install the bushing, the primary sliding sheave, and the cam plate assembly.



NOTE: When installing the primary sliding sheave and the cam plate assembly, use two hands to hold the cam plate and the primary sliding sheave together. The weight rollers will fall out if the assembly is not installed properly.

4. Install the primary fixed sheave and washer claw.



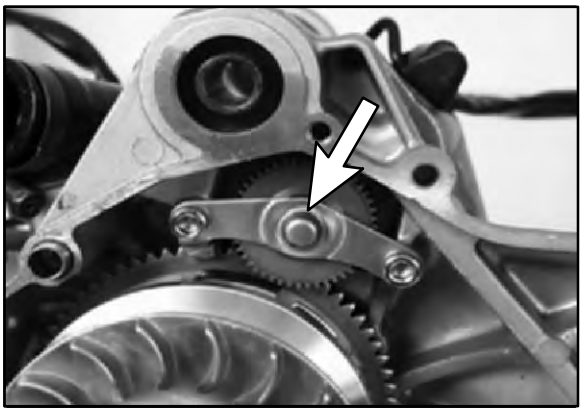
5. Install the nylon lock nut, the cone spring washer, and the one way clutch onto the crankshaft. Torque the drive clutch nut to specification.

Drive Clutch Nut Torque:

29 ft.lbs. (39 Nm)

6. Install the inside washer, the idle gear, and the outside washer onto the pin shaft.

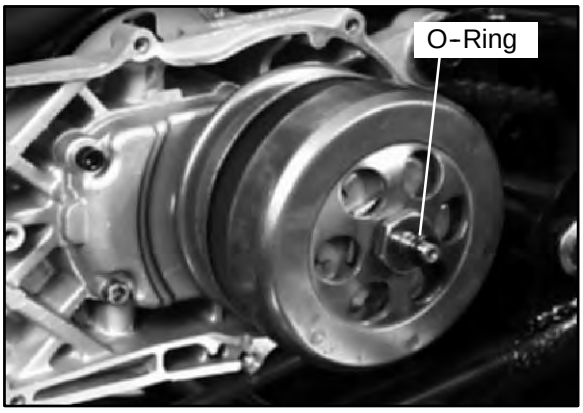
7. Install the idle gear plate. Torque the bolts to specification.



Idle Gear Bolt Torque:

84 in.lbs. (9.5 Nm)

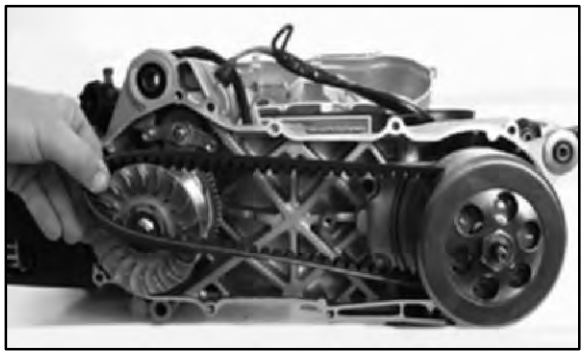
8. Install the driven clutch assembly, driven clutch nut, and the O-ring



Driven Clutch Nut Torque:

24 ft.lbs. (34 Nm)

9. Install the drive belt.



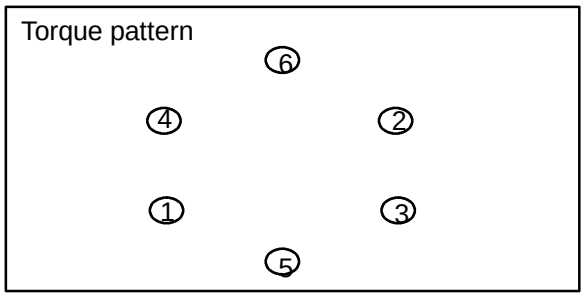
ENGINE REASSEMBLY

NOTE: Be sure to reinstall all of the bearings, seals, and retaining rings before the crankcase is reassembled.

Crankcase

1. Install a new output shaft oil seal and replace the snap ring.

2. Install the crankshaft in one of the crankcase halves. Install a new crankcase gasket and install the other side of the crankcase. Torque the crankcase bolts to the specification and pattern.

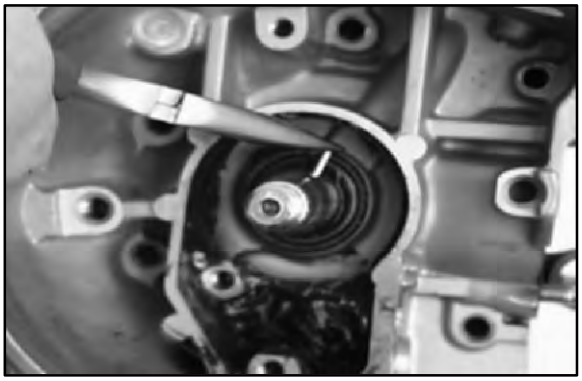


Crankcase Bolt Torque:

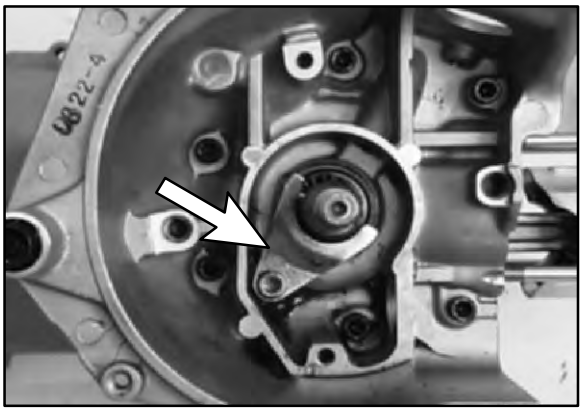
86 in.lbs. (10 Nm)

Oil Pump Installation

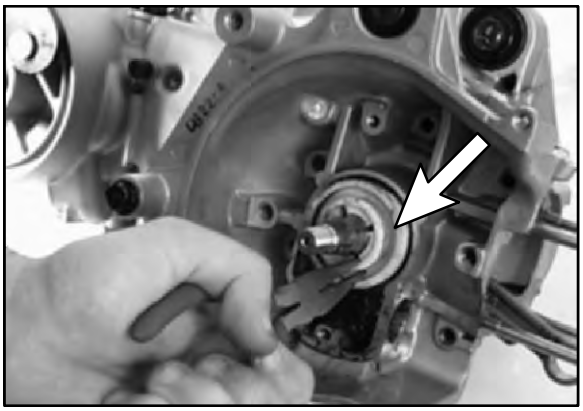
3. Install the dowel pin into the crankshaft.



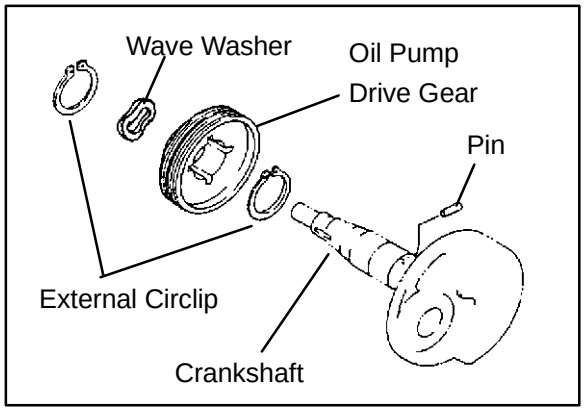
4. Install the oil seal bracket.



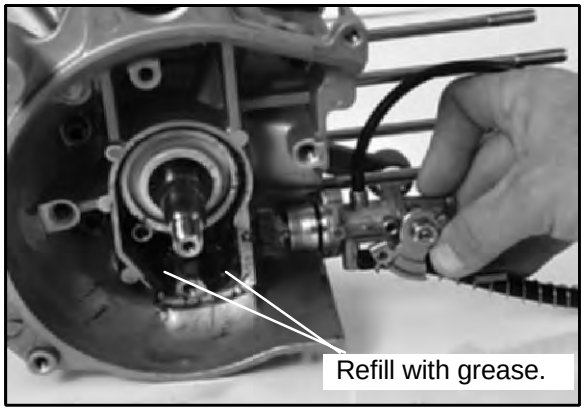
5. Carefully install the oil pump drive gear on the inside of the MAG side of the crankcase.



6. Install the wave washer and then install the external circlips. Install the dowel pin into the crankshaft.



7. Install the oil pump assembly. Install the oil pump and torque to specification.



Oil Pump Bolt Torque

43 in.lbs. (5 Nm)

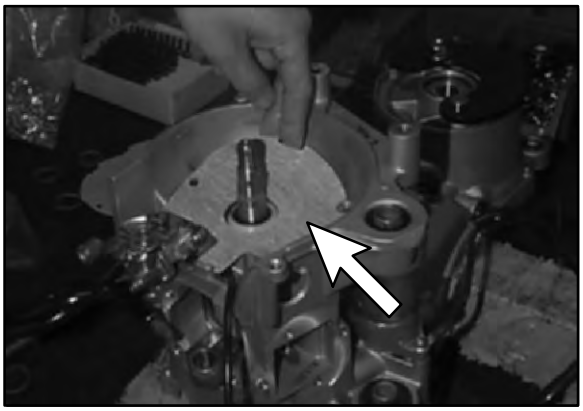
8. Refill the oil pump gear chamber with the same amount of grease that was removed from the chamber during disassembly.

Polaris All Season Grease (14 oz)

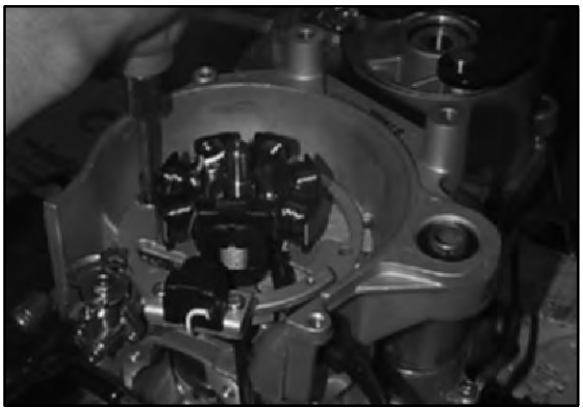
(PN 2871423)

Stator Installation

9. Install a new stator gasket.



10. Install the stator. Use the alignment marks previously made during the disassembly of the stator. Torque the bolts to specification.



Stator Mounting Bolt Torque:

84 in.lbs. (9.5 Nm)

Stator Trigger / Flywheel Gap:

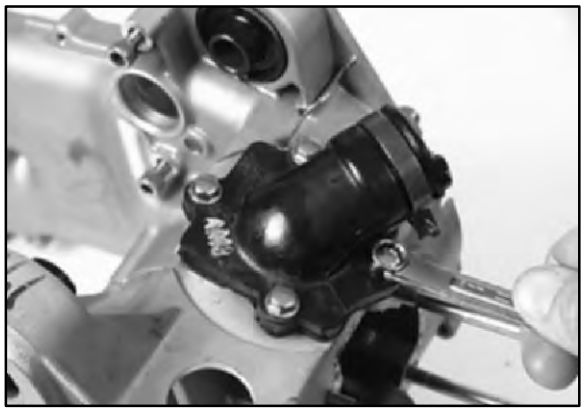
.020-.040" (.5-1.0 mm)

11. Install the flywheel and flywheel nut. Torque to specification.

Flywheel Nut Torque:

25 ft.lbs. (34 Nm)

12. Install the new intake manifold gasket, reed valve assembly, and intake manifold. Torque the intake manifold to specifications.



Intake Manifold Bolt Torque:

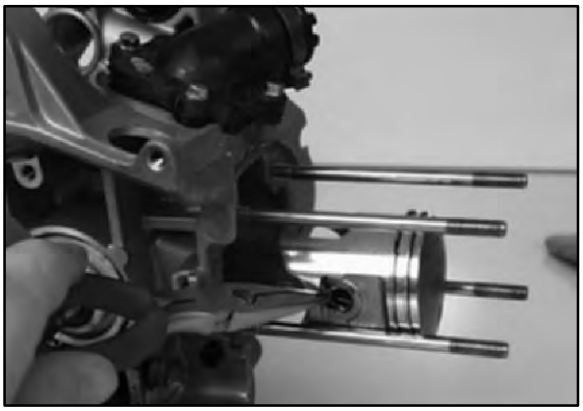
108 in.lbs. (12 Nm)

13. Carefully install the new piston rings, so no damage is done to the piston or ring lands.

Piston Installation

14. Install the needle bearing into the piston pin bore.

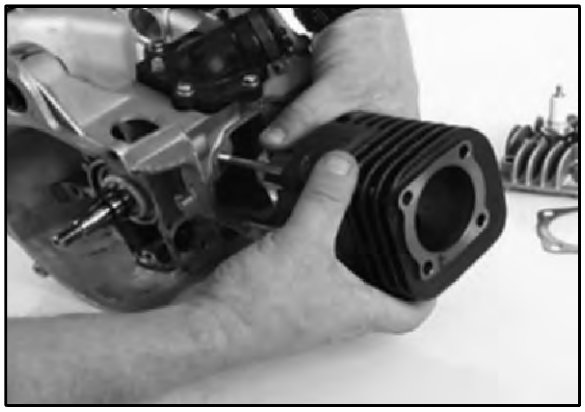
15. Install the piston pin and the piston pin clip.



NOTE: The piston pin clip gap should face up or down. (3 o'clock or 9 o'clock position, see illustration) Properly lubricate the rings and connecting parts before installation.

NOTE: Make sure the arrow on the top of the piston faces the same direction (to exhaust side) during the piston disassembly. Refer to Page 2.8.

16. Make sure cylinder surfaces are clean and free from debris. Install the cylinder gasket, cylinder, cylinder head gasket, and cylinder head. Torque the cylinder head nuts to specification.



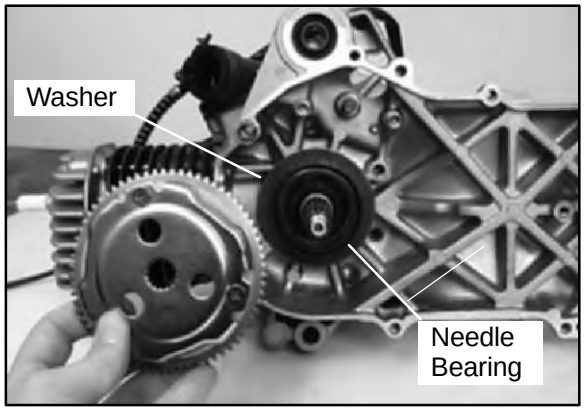
Cylinder Head Nut Torque:

14 ft.lbs. (19 Nm)

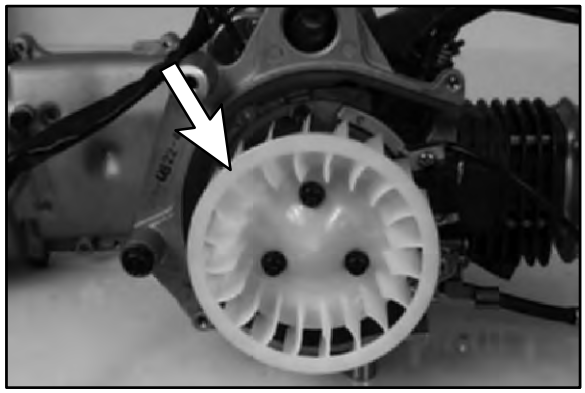
17. Install new spark plug. The spark plug gap should be .024–.028" (.6–.7 mm).

Starter Wheel Installation

18. Install the washer and needle bearing. Carefully install the starter wheel onto the crankshaft.



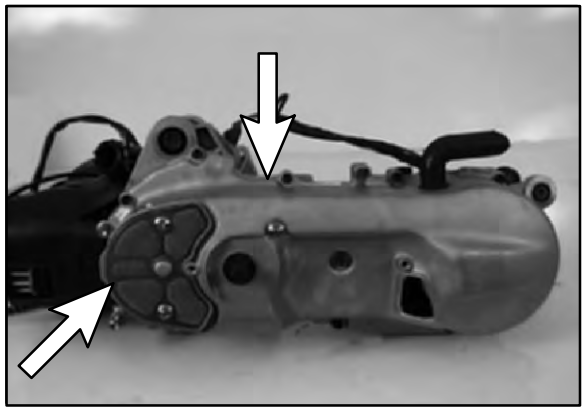
19. Install the fan. Torque the fan bolts to specification.



Fan Bolt Torque:

84 in.lbs. (9.5 Nm)

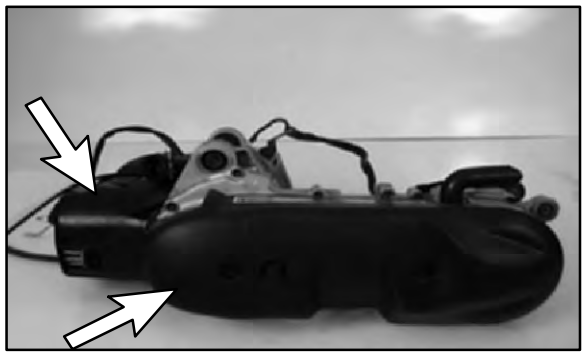
20. Install a new crankcase cover gasket, grommets, and crankcase breather tube. Install the air filter and the crankcase cover. Torque the crankcase bolts to specifications.



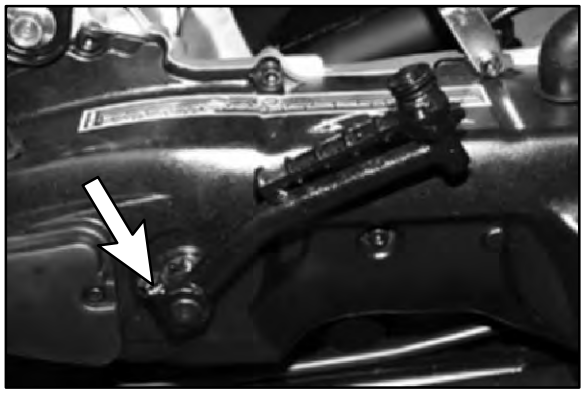
Crankcase Cover Bolt Torque:

84 in.lbs. (9.5 Nm)

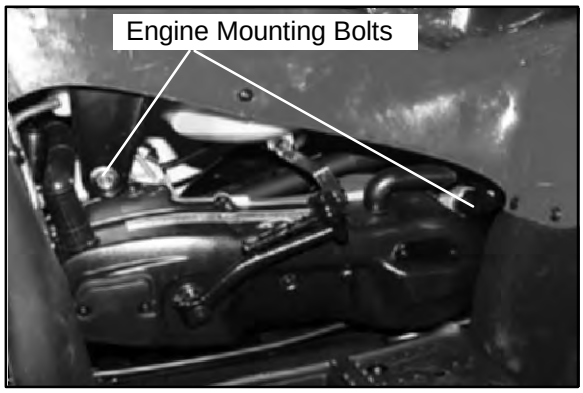
21. Install the cylinder air shroud and deflector. Install the plastic crankcase cover.



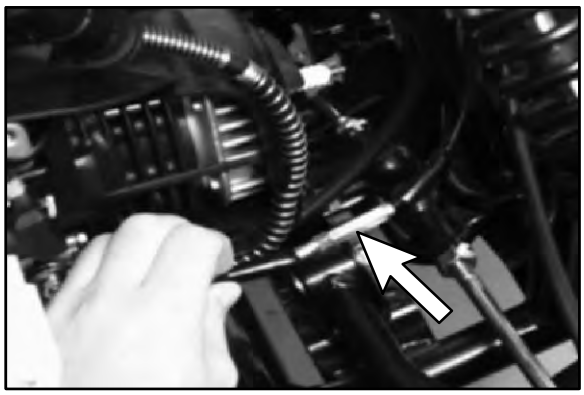
22. Install the kick crank assembly onto the kick shaft.



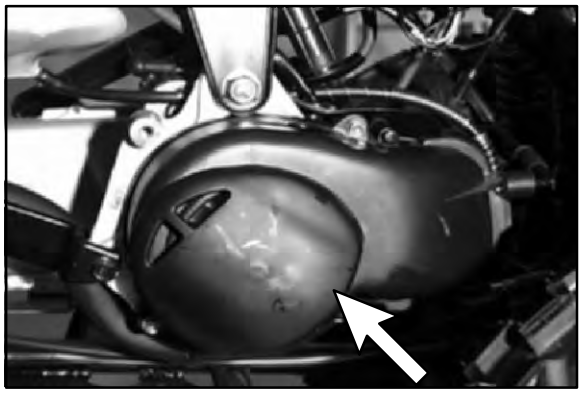
23. Carefully install the engine into the chassis. Secure the engine with the engine mounting bolts.



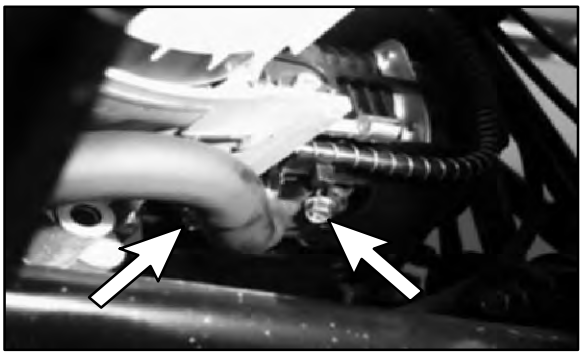
24. Connect the oil cable to the oil pump. Tighten the cable.



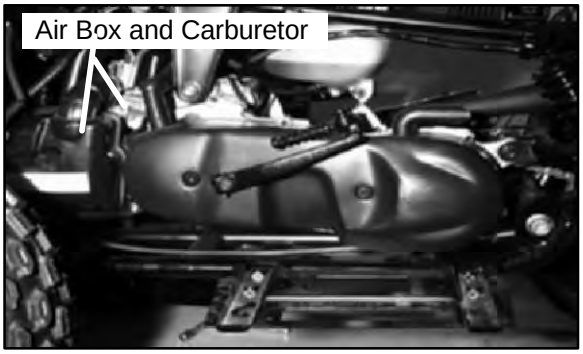
25. Install the fan cover.



26. Connect the exhaust pipe to the engine and frame mounting areas.



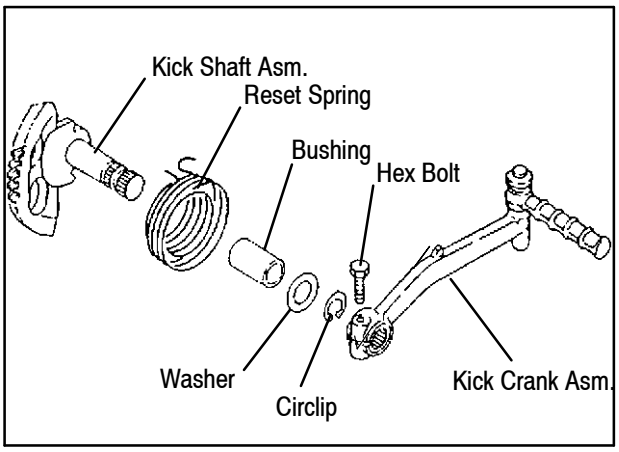
27. Install the air box and carburetor.



28. Install the body panels.

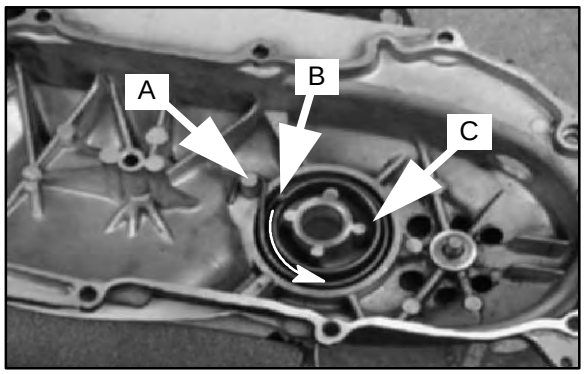
KICK START ASSEMBLY

NOTE: This procedure is used to re-wind the kick start spring if the spring or any related components are disassembled for service. **It is not necessary to remove the kick start lever or kick drive components to remove the engine cover.**



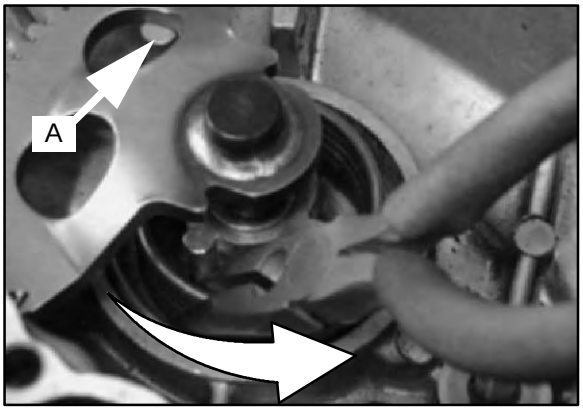
1. Secure cover lightly in a vise as shown. Protect the surface of the cover with a shop towel.

2. Install the spring as shown with the hook (A) positioned on post. Note the spring tab (B). The tab must be pre-wound approximately 5/8 turn (about 225 degrees) to point C in order to install the kick shaft/gear assembly.

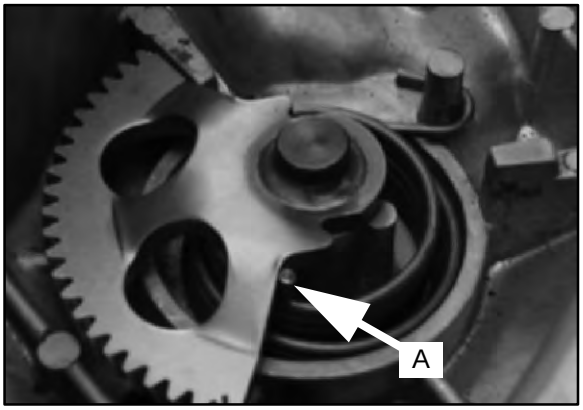


3. Grease and install the bushing in the kick shaft boss.

4. Install the kick shaft as shown, with the edge of the gear resting on the spring hook post (A). Grasp the spring firmly with duckbill or needle nose pliers between the inner and outer spring coils. Wind the spring approximately 225 degrees counter-clockwise, while also rotating the gear counter-clockwise into final position.



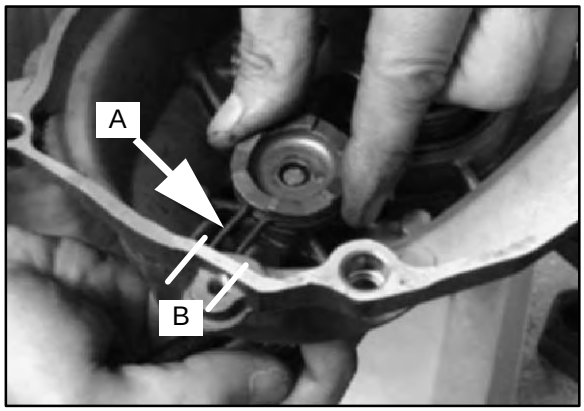
5. Push the shaft/gear assembly in and release the spring. The tab should be located against the edge of the gear as shown (A).



6. Release the cover from the vise. Turn the cover over while holding the spring and shaft assembly in place, and install the washer.

7. Install the snap ring.

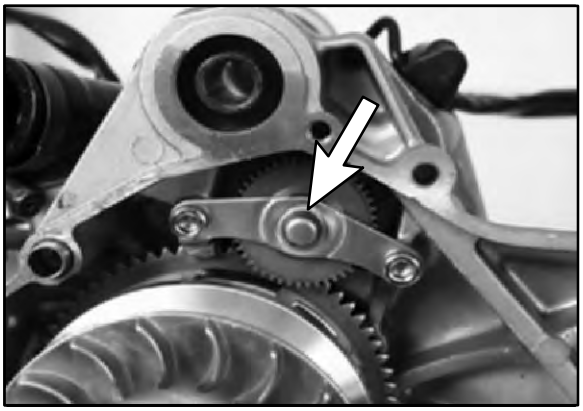
8. Install the kick pinion with the end of the drag spring (A) engaged in the slot (B).



STARTER DRIVE ONE-WAY INSPECTION

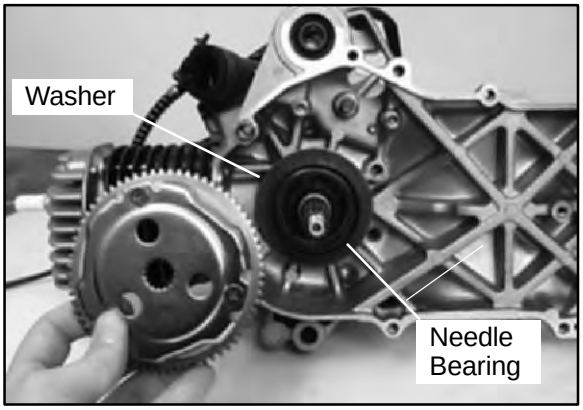
1. Remove the CVT cover, belt and drive clutch components to gain access to the one-way drive.

2. Remove the idle gear plate, two washers, and idle gear from the pin shaft.

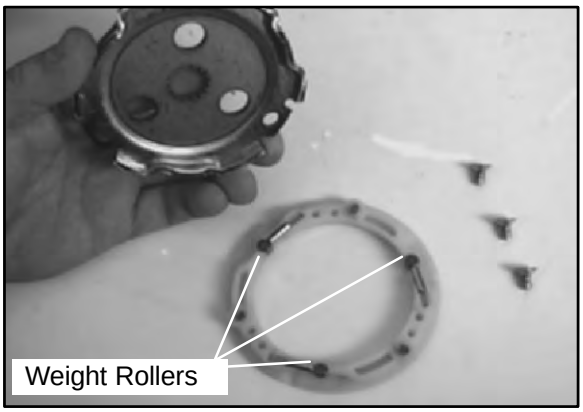


NOTE: There is one washer on the inside of the idle gear and one washer on the outside of the idle gear.

3. Remove the washer and needle bearing. Carefully remove the starter wheel from the crankshaft.



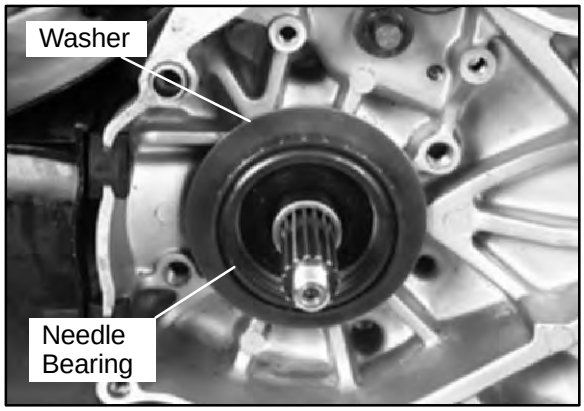
4. To disassemble the one-way assembly, remove the three phillips screws from the starter wheel. Inspect components for signs of wear or sticking. Replace any components that interfere with correct operation.



NOTE: Use caution when disassembling the starter wheel, the starter wheel contains springs and pins

that easily come out of place. *Upon assembly, do not lubricate the one way rollers with heavy grease, as this will cause the one-way drive to malfunction.*

5. Inpect the washer and needle bearing. Replace if any roughness or wear is present.



6. To reinstall the starter drive one-way, reverse the procedures.

TROUBLESHOOTING

Spark Plug Fouling

- Spark plug cap loose or faulty
- Choke plunger sticking or inoperative
- 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 clips)
- Loose jets in carburetor or calibration incorrect for altitude/temperature
- Incorrect float level setting
- CVT system calibrated incorrectly/ components worn or mis-adjusted
- Fuel quality poor (old) or octane too high
- Low compression
- Plugged exhaust
- Weak ignition (loose coil ground, faulty coil, stator, or ETC switch)
- ETC switch mis-adjusted
- Restricted air filter (main or pre-cleaner) or breather system
- Improperly assembled air intake system
- Restricted air breather system
- Oil contaminated

Engine Turns Over But Fails to Start

- No fuel
- Dirt in fuel line or filter
- Fuel will not pass through fuel valve
- Tank vent plugged or pinched
- Carb starter circuit plugged
- Engine flooded
- Low compression (high cylinder leakage)
- No spark (Spark plug fouled) ignition component failure
- Safety switches malfunctioning (Ignition, Kill, Brake-to-start)
- Electrical malfunction

Engine Does Not Turn Over

- Dead battery
- Starter motor does not turn
- Engine seized, rusted, or mechanical failure
- Safety switches malfunctioning (Ignition, Kill, Brake-to-start)

Engine Runs But Will Not Idle

- Restricted carburetor pilot system
- Carburetor misadjusted
- Low compression
- Air 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
- Carburetor slide sticking, damaged
- Incorrect ignition timing
- Restricted exhaust system

Engine Has Low Power

- Spark plug fouled
- Cylinder, piston, ring, or reed wear or damage (check compression)
- CVT not operating properly
- Restricted exhaust muffler
- Carburetor slide sticking or 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
- Worn rings, piston, or cylinder
- Restricted breather
- Air filter dirty or contaminated
- Oil pump misadjusted or faulty

Low Compression

- Cylinder head gasket leak
- Cylinder or piston worn
- Piston rings worn, leaking, broken, or sticking
- Reeds broken or bent

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
- Reeds broken or bent
- Air leaks in intake or crankcase
- Lean condition

Overheating

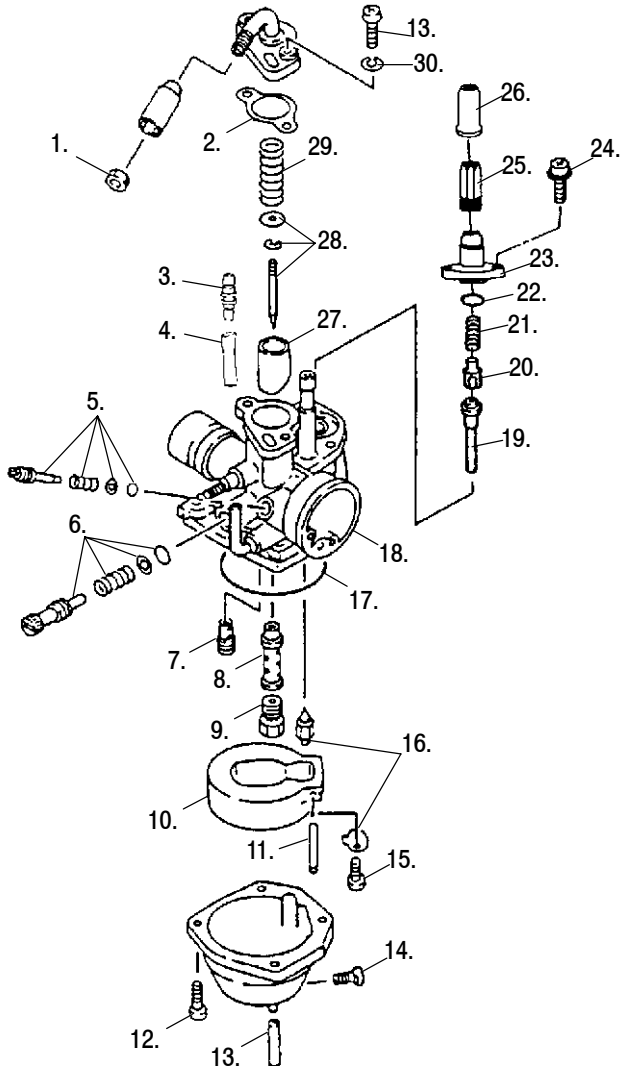
- Restricted air flow (mud or debris in cooling fins causing restriction to air flow, accident damage)
- Lean mixture (restricted jets, vents, fuel pump or fuel valve)
- Fuel pump output weak causing lean condition
- Electrical malfunction
- Internal Mag-side fan damaged or plugged with debris.
- Ignition timing misadjusted
- Spark plug incorrect heat range

CHAPTER 3
CARBURETION

3

CARBURETOR

90cc A03FA09CA / 50cc A03EA05CA



Ref.	Part No.	Qty.	Description
1.	0450120	1	Nut, Cable Adjust
2.	0450847	1	Gasket
3.	0451014	1	Plug, Oil
4.	0451013	1	Pipe, Oil
5.	0450103	1	Screw Set, Air Adjust
6.	0450114	1	Screw Set, Throttle
7.	0451024	1	Jet, Pilot - 90cc
	0450100		Jet, Pilot - 50cc
8.	0450093	1	Nozzle, Needle
9.	0450097	1	Nozzle, Main - 90cc
	0450096	1	Nozzle, Main - 50cc
10.	0450976	1	Float, Carb
11.	0450118	1	Pin, Float
12.	0450086	6	Bolt, Pan, Phillips
13.	0450099	1	Tube, Overflow
14.	0450105	1	Plug, Drain

Ref.	Part No.	Qty.	Description
15.	0450108	1	Bolt, Pan, Phillips
16.	0450895	1	Valve Set, Needle
17.	0450095	1	Seal, Float Chamber
18.	0451022	1	Asm., Carburetor (Incl. 1.-30.)
19.	0450923	1	Nozzle, Choke
20.	0451026	1	Valve, Choke
21.	0451029	1	Spring, Choke Return
22.	0451028	1	O-Ring
23.	0451027	1	Base, Manual Choke
24.	0451025	2	Screw, Pan w/Washer
25.	0451031	1	Support, Cable
26.	0451030	1	Cover, Cable Support
27.	0450089	1	Valve, Throttle
28.	0450090	1	Needle Set
29.	0451023	1	Spring, Throttle Stop
30.	0450087	2	Washer, Spring

SPECIAL TOOLS

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

⚠ WARNING

Gasoline is extremely flammable and explosive under certain conditions.

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

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

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

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

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

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

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

JETTING GUIDELINES

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

Polaris Youth Carburetors are calibrated for an altitude of 0-6000 ft. (0-1800 meters) and ambient temperatures between +40 and +80° F (+5° to +26° C).

Carburetors must be re-calibrated if operated outside this temperature and/or altitude range. The jetting installed in production is not intended for all altitudes and/or temperatures. In addition, air screw / pilot screw adjustments and CVT adjustments may be required to suit operating conditions.

CARBURETOR SYSTEM FUNCTION

Carburetor Component Function			
System	**Main Components**	**Main Function**	**Main Affect**
Float System (Level Control)	Inlet Pipe, Needle and Seat, Float, Float Pin	Maintains specified fuel level in float chamber (carburetor float bowl)	All systems All throttle ranges
Venting	Passages in Carburetor, Vent lines to frame	Supplies atmospheric pressure to float chamber	All systems All throttle ranges
Auto By-Starter (Choke/Enrichment)	Thermal Expansion unit Plunger, Return Spring, Carb Passages)	Supplies additional fuel air mixture necessary for cold starting	Greatest effect at low throttle settings and idle
Pilot (Idle System)	Pilot Jet-Passageways, By-pass Ports (Under Throttle Slide), Pilot Jet, Pilot Outlets, Throttle Slide	Primarily supplies fuel at idle and low throttle positions	Mainly idle to 1/4 throttle Minimal effect after 1/2 throttle
Main System	Main Jet, Main Air Passage, Needle Jet, Jet Needle, Throttle Slide	Supplies fuel at mid-range and high throttle settings.	1/4 to full throttle

CARBURETOR SPECIFICATIONS

The carburetor has been updated to accommodate the choke system. The oil check valve has a higher resistance spec to eliminate leaking oil into the carb.

Scrambler 50	
Cutaway	3.0
Air Screw	1/2 turn out from lightly seated
Needle & Seat	1.2
Pilot Jet	25
Main Jet	75
E-Clip	#3 from top
Scrambler 90 - Sportsman 90 - Predator 90	
Cutaway	3.0
Air Screw	1 turn out from lightly seated
Needle & Seat	1.5
Pilot Jet	25
Main Jet	82.5
E-Clip	#4 from top

OPTIONAL MAIN JETS

Part Number	Size	Part Number	Size
3131337	65	3131343	80
3131338	67.5	3131344	82.5
3131339	70	3131345	85
3131340	72.5	3131346	87.5
3131341	75	3131347	90
3131342	77.5		

CAUTION:

A main jet that is too small will cause a lean operating condition resulting in serious engine damage.

HIGH ALTITUDE OPERATION

2003 Youth ATVs have been tested to 12,000 ft above sea level to assure satisfactory performance. No jetting or clutching changes are required for high altitude operation.

CARBURETOR JETTING

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

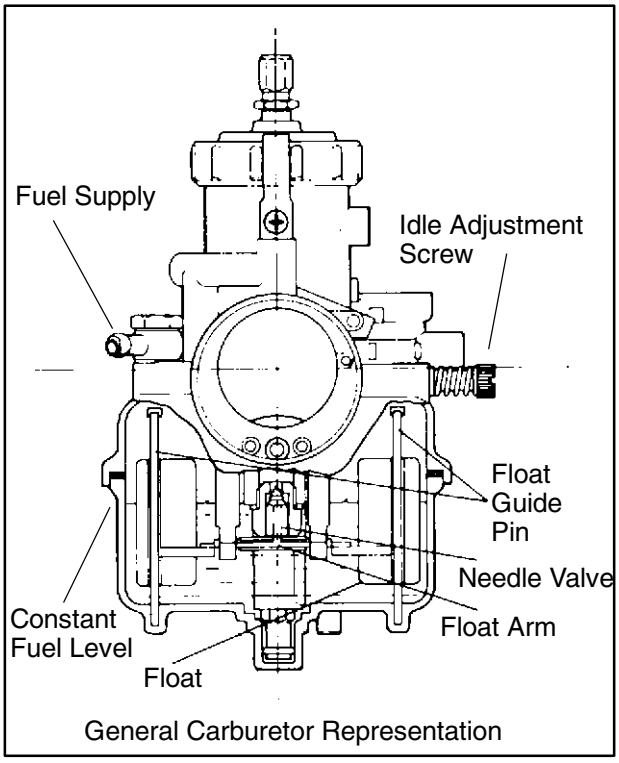
1. Select the lowest anticipated temperature at which the machine will be operated.
2. Determine the lowest approximate altitude at which the machine will be operated.
3. Select the correct main jet from the chart in the specifications section.

CAUTION:

A main jet that is too small will cause a lean operating condition resulting in serious engine damage. Select the correct main jet carefully for elevation and temperature according to the charts in the Specifications section or in the Owner's Safety and Maintenance Manual for each particular model.

CARBURETOR OPERATION

The function of a carburetor is to produce a combustible air/fuel mixture by breaking fuel into tiny particles in the form of vapor, to mix the fuel with air in a proper ratio, and to deliver the mixture to the engine. A proper ratio means an ideal air/fuel mixture which can burn without leaving an excess of fuel or air. Whether the proper mixture ratio is maintained or not is the key to efficient engine operation.



General Carburetor Representation

This carburetor has varying operations depending upon varying driving conditions. It is constructed of a float system, pilot system, main system, and starter system or initial starting device.

The engine of a vehicle is operated under a wide range of conditions, from idling with the throttle valve remaining almost closed, to full load or maximum output with the throttle valve fully opened. In order to meet the requirements for the proper mixture ratio under these varying conditions, a low speed fuel system, or pilot system, and a main fuel system are provided in these type of carburetors.

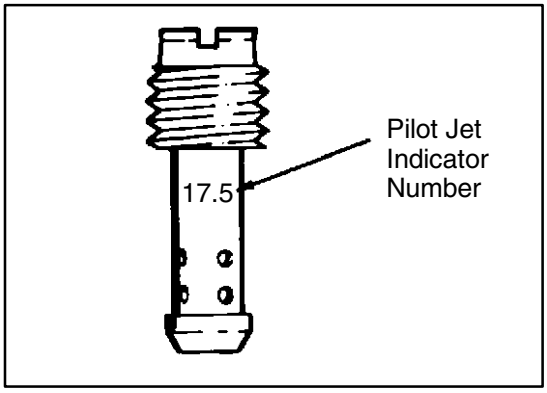
FLOAT SYSTEM

The float system is designed to maintain a constant height of gasoline during operation. When the fuel flowing from the fuel pump into the float chamber through the needle valve reaches the constant fuel level, the floats rise. When the buoyancy of the float and the fuel pressure of the fuel pump balance, the needle valve seals the orifice in the needle seat, preventing further fuel delivery, and the level of fuel in the bowl remains relatively constant.

The fuel level in the bowl assists in controlling the amount of fuel in the fuel mixture. Too high a level allows more fuel than necessary to leave the nozzle, enriching the mixture. Too low a level results in a leaner mixture, since not enough fuel leaves the nozzle. Therefore, the predetermined fuel level should not be changed arbitrarily.

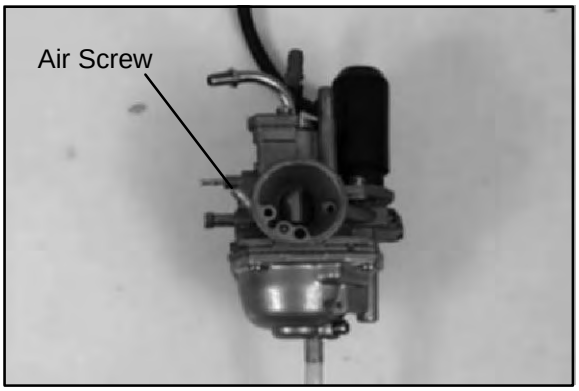
PILOT JET

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.

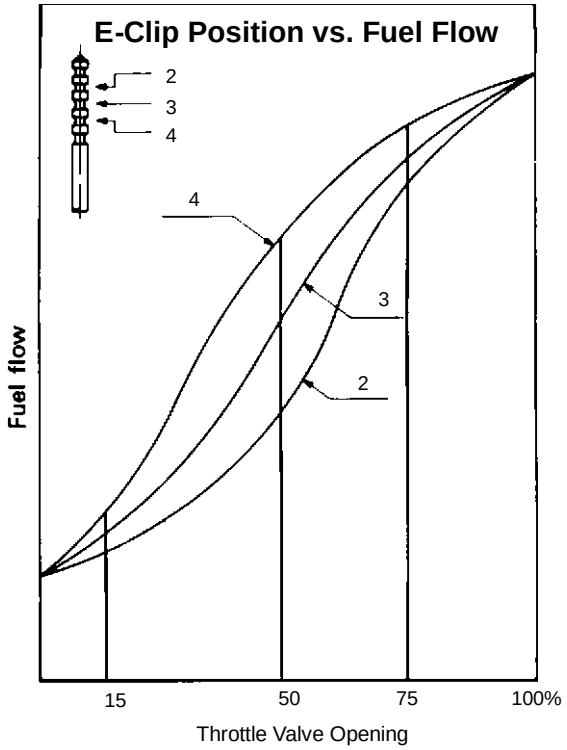


AIR SCREW

The 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

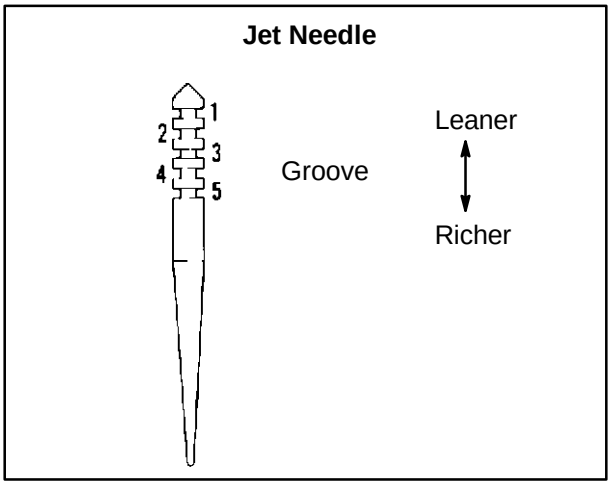


A carburetor with a slide type throttle valve is also called a variable venturi type carburetor. In this type of carburetor, the needle jet and jet needle serve to control proper air/fuel mixture ratio at the medium throttle valve opening (between 1/4 and 3/4 opening).

Having the proper needle jet and jet needle has a major impact on engine performance at partial load. The jet needle tapers off at one end and the clearance between the jet needle and the needle jet increases as the throttle valve opening gets wider. The air/fuel mixture ratio is controlled by the height of the “E” clip inserted into one of the five slots provided in the head of the jet needle. The previous chart shows the variation of fuel flow based on the height of the “E” clip.

JET NEEDLE

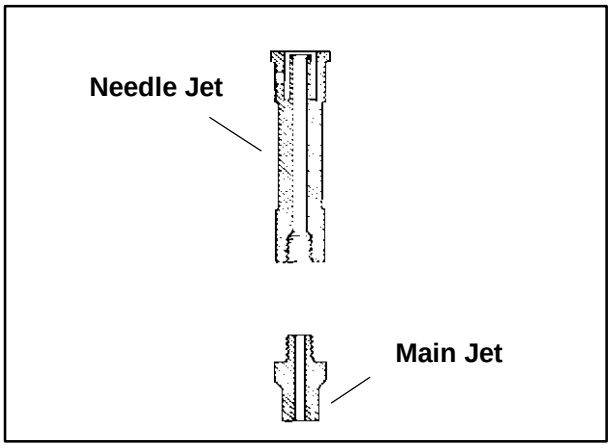
The jet needle has five adjustment grooves cut into the upper portion, and is tapered from approximately the middle of the needle to the lower end. The top is fixed to the center of the throttle valve by the needle clip, and the tapered end extends into the needle jet. Fuel flows through the space between the needle jet and jet needle. This space does not vary until the throttle reaches the 1/4 open point. At that time the tapered portion of the needle begins to move out of the jet, affecting fuel flow as the opening enlarges. If the needle clip is changed from the standard position to a lower groove, the needle taper starts coming out of the jet sooner, resulting in a richer mixture. Moving the clip higher produces a leaner mixture. If the taper is worn due to vibration, fuel flow may be significantly affected.



NEEDLE JET

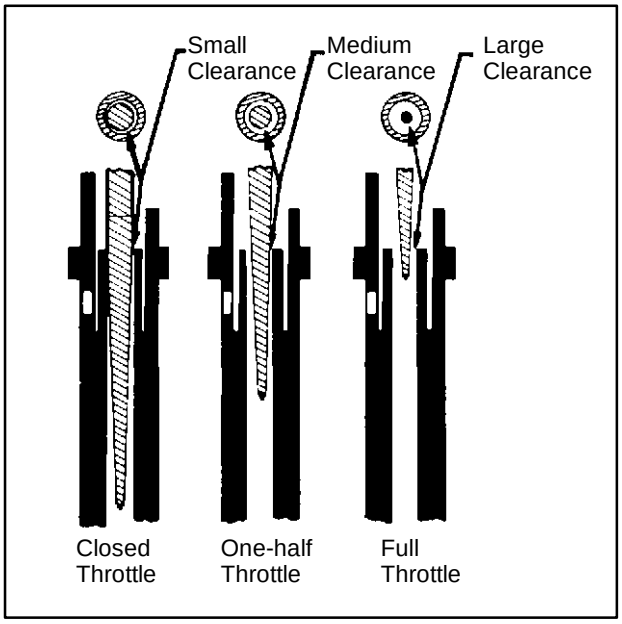
The needle jet works in conjunction with the jet needle to regulate fuel flow rate. An air bleed opening in the side of the needle jet brings in air measured by the air jet. This air initiates the mixing and atomizing process

inside the needle jet.



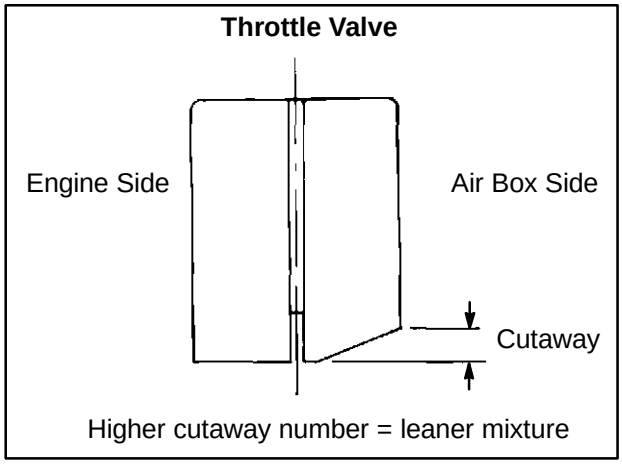
THROTTLE OPENING VS. FUEL FLOW

In a full throttle condition the cross sectioned area between the jet needle and the needle jet is larger than the cross sectioned area of the main jet. The main jet therefore has greater control over fuel flow.



THROTTLE SLIDE

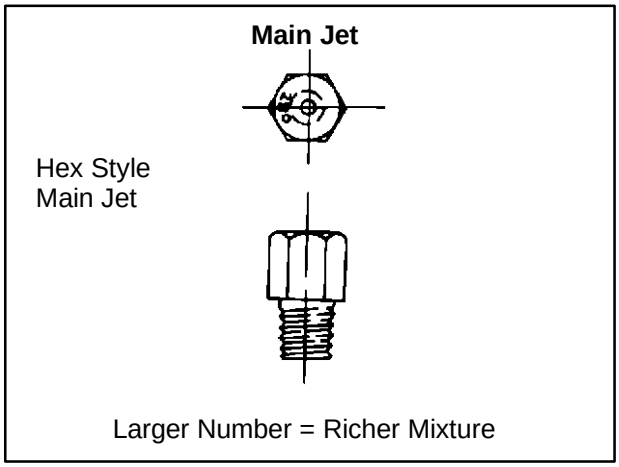
The throttle slide controls the rate of engine air intake by moving up and down inside the main bore. At small throttle openings, air flow control is performed chiefly by the cutaway. By controlling air flow the negative pressure over the needle jet is regulated, in turn varying the fuel flow.



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.

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.



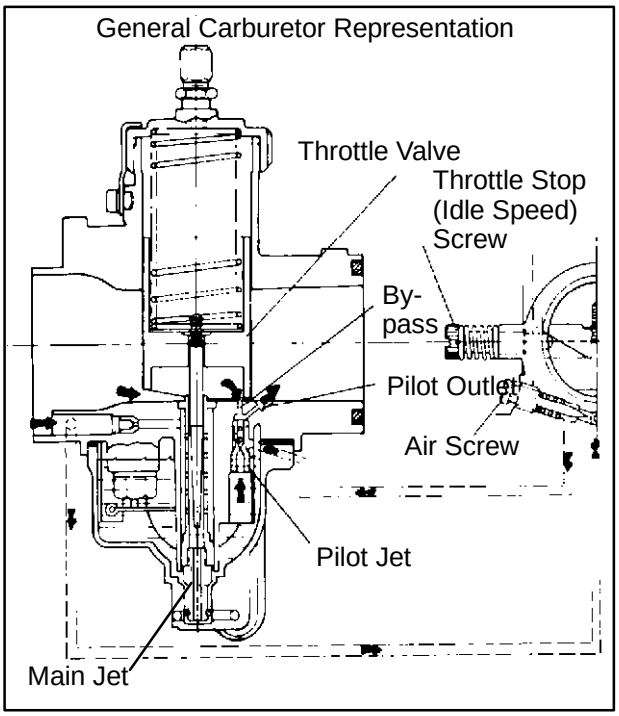
Main jets are screwed directly into the needle jet base.

PILOT SYSTEM (Idle-3/8 THROTTLE)

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.

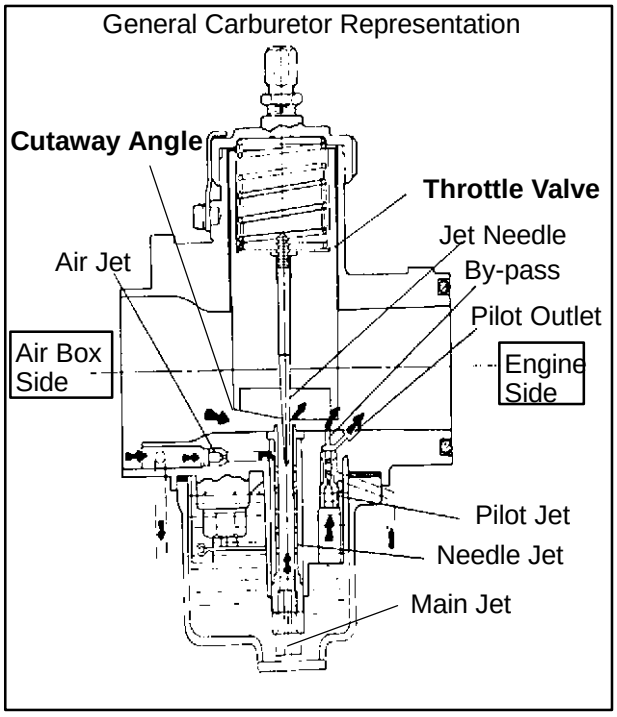
The mixture is regulated to some degree by adjusting the air screw. When the air screw is closed, the fuel mixture is made richer as the amount of air is reduced. When the air screw is opened, the mixture is made more lean as the amount of air is increased.



SLIDE CUTAWAY (1/8-3/8 Throttle)

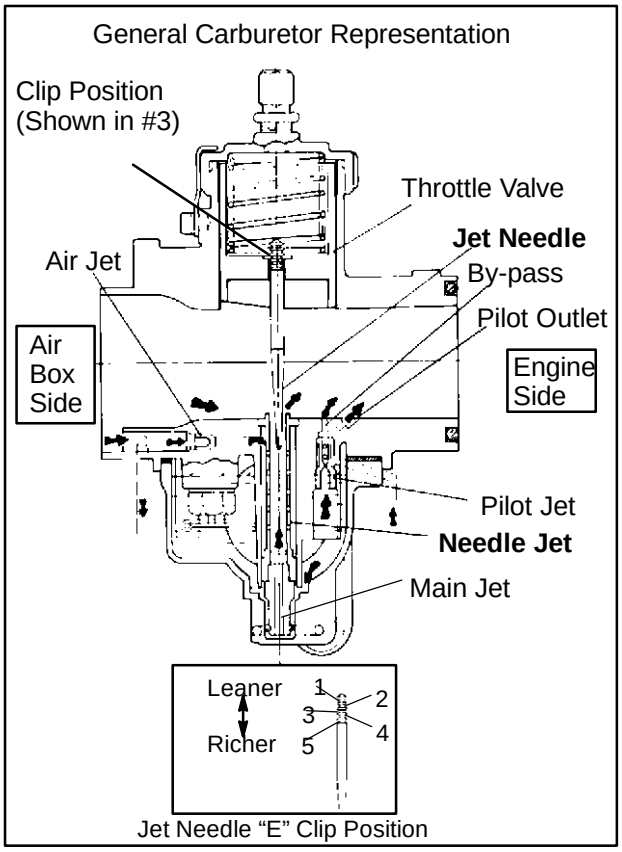
Throttle valve cutaway effect is most noticeable at 1/4 throttle opening. The amount of cutaway is pre-determined for a given engine to maintain a 14:1 air/fuel ratio at part throttle. A steep angle would indicate a fairly lean mixture because there is less resistance to air flow. A flat angle would 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)

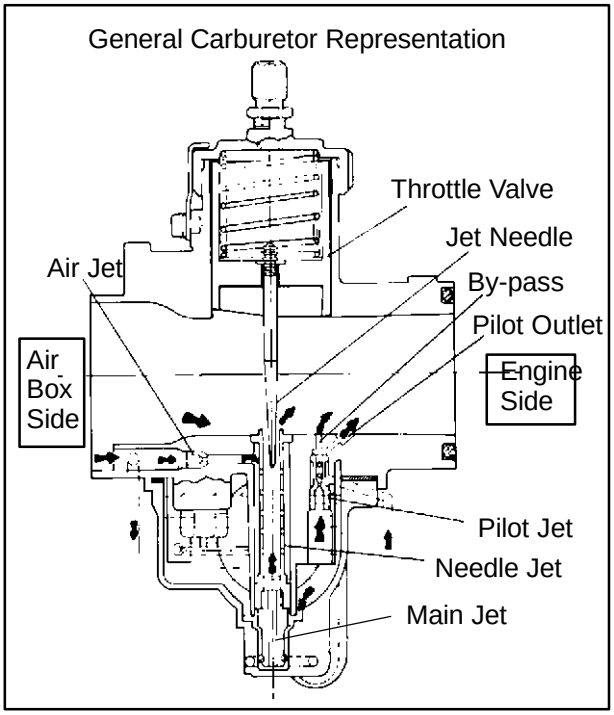
The jet needle and needle jet have the most effect between 3/8 and 3/4 throttle opening. Some mixture adjustment can be accomplished by changing the location of the "E" clip on the needle. Moving the clip down raises the needle in the jet passage and richens the mixture. Moving the clip up lowers the 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)

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.



FUEL DELIVERY (2 CYCLE)

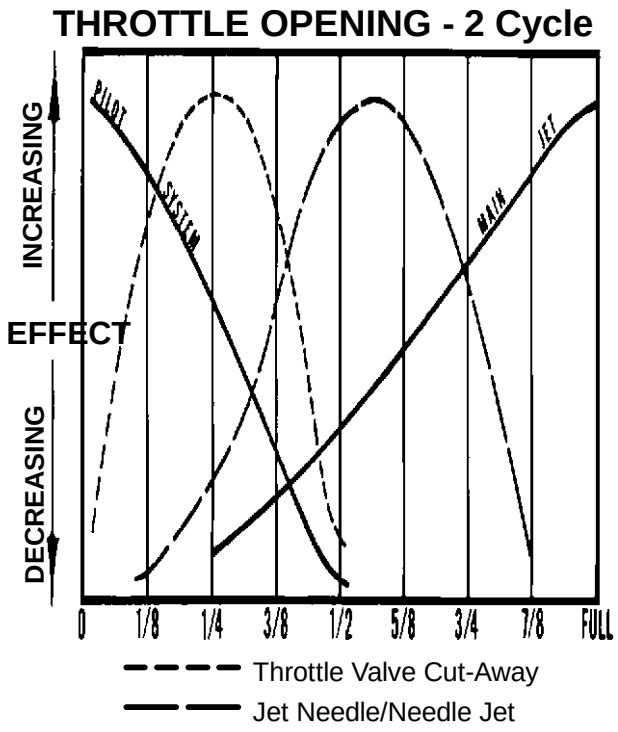
The throttle opening chart below demonstrates component relationship to fuel flow versus throttle valve opening.

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 slide 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.

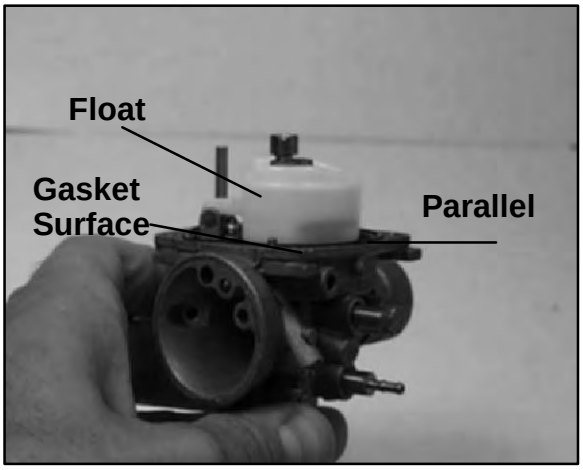


VENT SYSTEMS

The fuel tank vent line supplies atmospheric pressure to the fuel in the tank. This line must be free of kinks and restrictions to prevent lean mixture and possible engine damage. All vent lines must be properly routed to prevent damage to the line and to prevent contaminants from entering the fuel system.

FLOAT HEIGHT

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. The float should be parallel ±1 mm to the gasket surface on all youth model ATV carburetors. When setting the float, be sure inlet needle valve spring is not compressed. If adjustment is necessary, bend the tongue slightly.



Float Height:

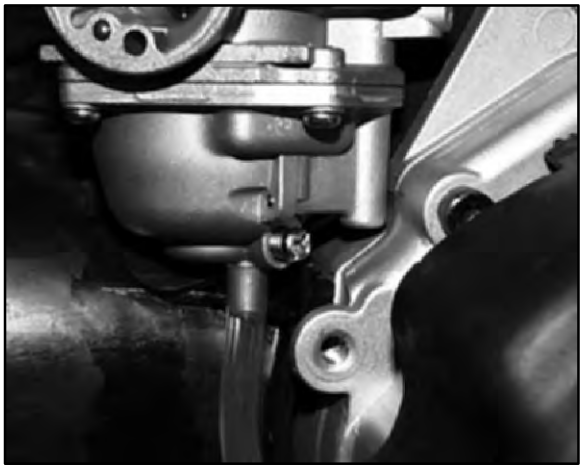
Parallel to Gasket Surface ± 1mm

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 or gasket.

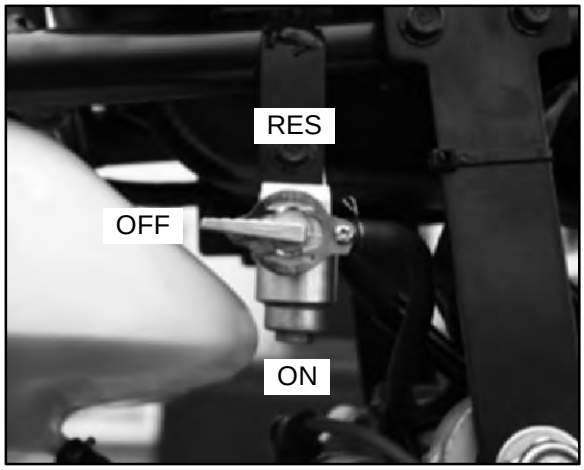
CARBURETOR FLOAT BOWL DRAINING

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



NOTE: A drain plug is located on the side of the float bowl.

1. Turn fuel valve to the off position.
2. Place a clean container beneath the bowl drain spigot or bowl drain hose.
3. Loosen drain plug 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 plug.
6. Turn fuel valve to “ON”.



7. Inspect carburetor for fuel leaks.
8. Start machine and re-check for leaks.

COLD WEATHER STARTING PROCEDURE

Youth ATV Cold Weather Starting Procedure (Less Than 40°F (4°C))

NOTE: Polaris Youth ATVs are factory jetted for 40–80°F (4–27°C).

1. If the ATV has not been driven recently or has “summer gas”, replace the fuel in the tank with “winter gas” and drain the fuel from the float bowl until it has fresh fuel (photo 1).
2. Turn key and ignition to the “on position’ and engage starter for 5 seconds.
3. If the engine does not start, wait 5 seconds for the choke circuit to re–fill.
4. If the battery is not charged enough to rotate the engine effectively, place a charger on the battery or use the kick start lever.
5. Engage the starter again for 5 seconds or kick start. Repeat this procedure up to 10 times.
6. If engine doesn’t fire after several attempts perform the following manual choke procedure.

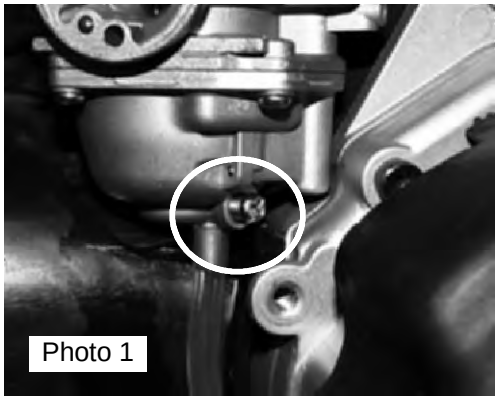


Photo 1

MANUAL CHOKE PROCEDURE

1. Block the end of the air inlet tube to the air box and engage the starter for 5 seconds (photo 2).
2. If the engine doesn’t start, wait 5 seconds for the choke circuit to re–fill.
3. Engage starter again for 5 seconds.
4. If the battery is not charged enough to rotate the engine effectively, place a battery charger on the battery or use the kick start lever.
5. If engine will not start, check spark plug for fouling.

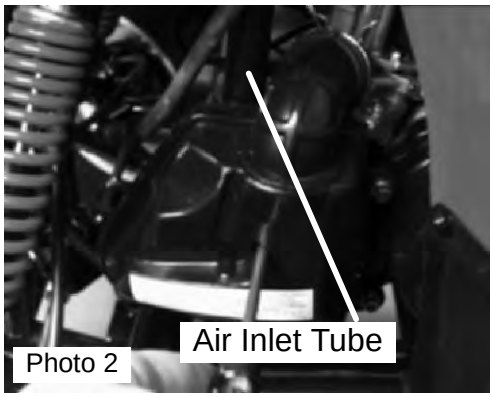


Photo 2

DEALER SET–UP FUEL SYSTEM RECOMMENDATIONS

1. Loosen carburetor drain plug screw and drain old fuel (photo1).
2. Remove fuel line at carburetor and pressurize the fuel tank or vacuum the fuel line hose to make certain there is a fresh and consistent fuel supply to the carburetor.
3. Make certain the fuel line from the fuel petcock is routed below the oil injection tank and runs “downhill” to the carburetor.
4. Make certain the fuel tank vent near the fule cap is not pinched. To eliminate pinching, it may be necessary to lower the front fuel tank mounting tab so the bottom surface of the tab is level with the upper frame tubes.
5. The fuel passages of the youth models (i.e. petcock, pilot jet, needle jet and seat, main jet, and choke circuit) are smaller compared to the full size ATVs, so it is even more important to use fuel that is free of contamination. If the ATV runs poorly, it may be necessary to remove and disassemble the carburetor and petcock to make certain all fuel passages are free from contamination.

TROUBLESHOOTING

FUEL STARVATION/LEAN MIXTURE

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

- No fuel in tank
- Restricted tank vent, or routed improperly
- Fuel lines or fuel valve restricted
- Fuel filter plugged
- Carburetor vent line(s) restricted
- Plugged or restricted inlet needle and seat screen or inlet passage
- Clogged jets or passages
- Float stuck, holding inlet needle closed or inlet needle stuck
- Float level too low
- Intake air leak (crankcase seal throttle shaft, intake ducts, airbox or air cleaner cover)
- Jet needle position incorrect
- Incorrect pilot screw adjustment

RICH MIXTURE

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

- Air intake restricted (inspect intake duct)
- Air filter dirty/plugged
- Electric choke inoperative
- Incorrect pilot air/fuel screw adjustment
- Faulty inlet needle and seat
- Faulty inlet needle seat O-Ring
- Float level too high
- Poor fuel quality (old fuel)
- Loose jets
- Worn jet needle/needle jet or other carburetor parts
- Dirty carburetor (air bleed passages or jets)
- Fouled spark plug

POOR IDLE

Symptoms: Idle too high.

- Idle adjusted improperly/idle mixture screw damaged
- Sticky throttle valve
- Throttle cable sticking, improperly adjusted, routed incorrectly

IDLE TOO LOW

- Idle speed set incorrectly
- Idle mixture screw misadjusted or damaged
- CVT system dragging
- Ignition timing incorrect
- Worn jet needle/needle jet

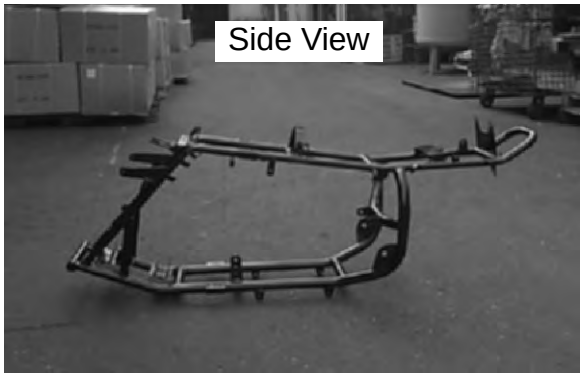
ERRATIC IDLE

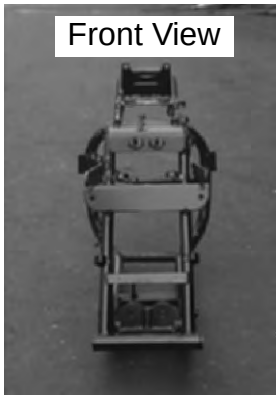
- Choke not working properly
- Throttle cable incorrectly adjusted
- Air leaks, dirty carburetor passages (pilot circuit)
- Pilot mixture screw damaged or adjusted incorrectly
- Ignition timing incorrect
- Belt dragging
- Dirty air cleaner
- Engine worn
- Spark plug fouled
- Idle speed set incorrectly (speed limiter)
- Worn jet needle/needle jet

NOTES

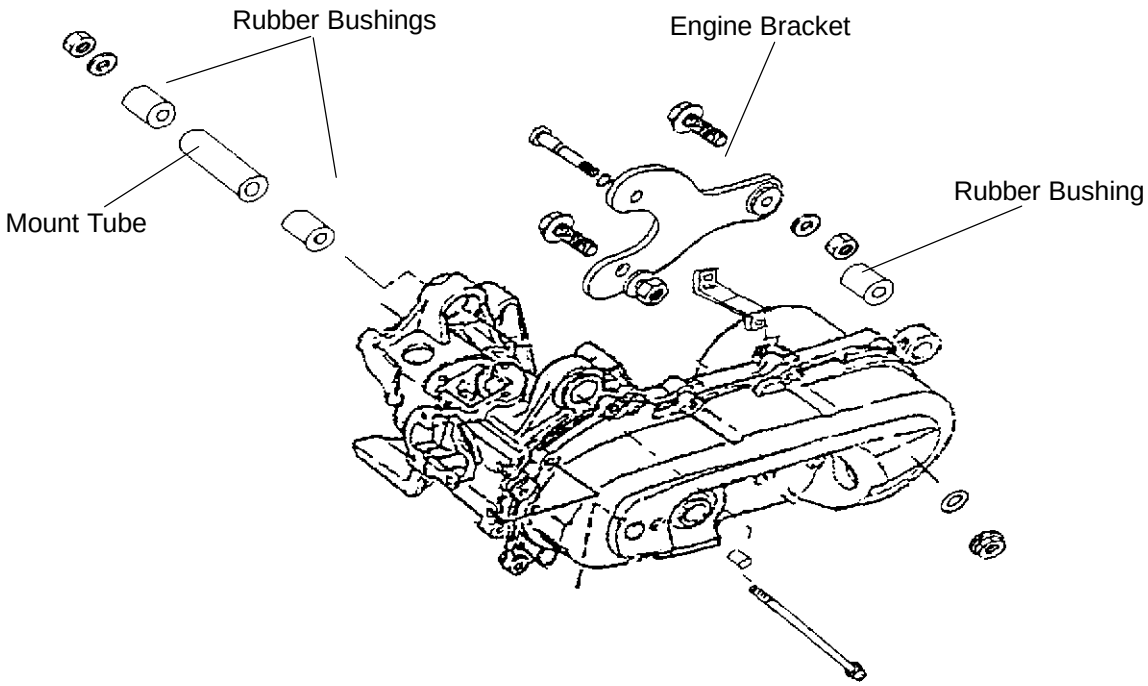
CHAPTER 4
BODY/STEERING/SUSPENSION

FRAME





ENGINE MOUNTING



TORQUE SPECIFICATIONS

A-Arm Attaching Bolt	26-30 ft. lbs. (36-40 Nm)
Handlebar Adjuster Block	84 in. lbs. (10 Nm)
Rear Shock Bolts	25 ft. lbs. (35 Nm)
Rear Wheel Hub Nut	78-81 ft. lbs. (108-112 Nm)
Front Shock Bolts	15 ft. lbs. (20 Nm)
Swing Arm Mounting Bolt	26-30 ft. lbs. (36-40 Nm)
Inner Tie Rod Bolts	33-40 ft. lbs. (45-55 Nm)
Outer Tie Rod Bolts	33-40 ft. lbs. (45-55 Nm)
Tie Rod Jam Nuts	12-14 ft. lbs (17-19 Nm)
Motor Mount Bolts-M8	22-25 ft. lbs (30-35 Nm)
Motor Mount Bolts-M10	33-40 ft. lbs (45-55 Nm)
Spindle Nuts	40-45 ft. lbs (58-62 Nm)
Steering Post Mount Nuts	103 in. lbs (11.6 Nm)
Steering Post Nut	62-65 ft. lbs (86-90 Nm)
Steering Nuts	62-65 ft. lbs (86-90 Nm)
Sprocket Bolts	18 ft. lbs (25 Nm)
Chain Tensioner Bolt	84 in. lbs (10 Nm)
Bearing Carrier Mounting Bolts	43 ft. lbs (60 Nm)
Rear Cover Mounting Bolts	84 in. lbs (10 Nm)
Fuel Tank Mounting Bolts	103 in. lbs (12 Nm)
Oil Tank Mounting Bolts	103 In. lbs (12 Nm)
Front Bumper Mounting Bolts	103 in. lbs (12 Nm)
Cab Mounting Bolts	103 in. lbs (12 Nm)
Muffler Mounting Bolts	25 ft. lbs (34 Nm)

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

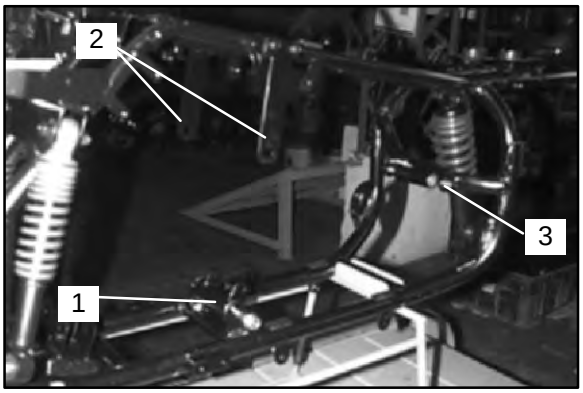
SPECIAL TOOLS

Description	Part No.
Shock Spanner Wrench	**2870872**
Shock Spring Compressor Tool	**2870623**

ENGINE MOUNTING

1. Install rubber dampers under footrest and install footrest on frame body.

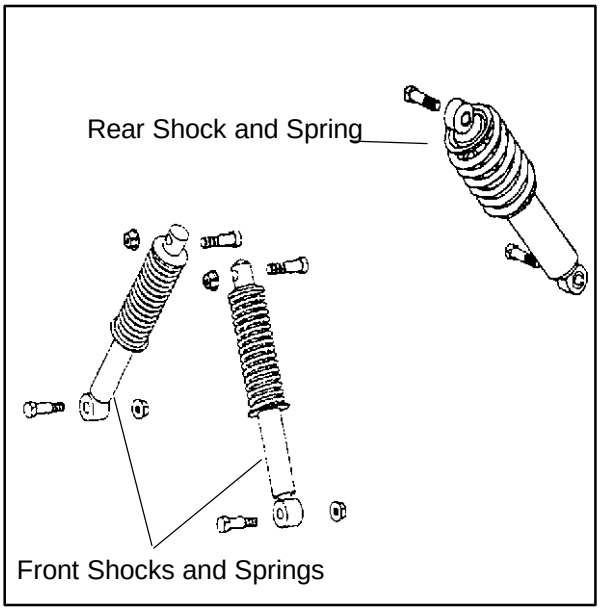
2. Tighten footrest bolts.
3. There are three (3) engine mounting positions on the frame. Check each bushing of the engine brackets for damage or wear before mounting the engine to the frame body.



4. Insert the engine into the frame body. Mount to the brackets including the fix tube, spacer tube, and engine holder seat.

Motor Mount Bolt Torque:
M10= 33-40 ft.lbs. (45-55 Nm)
M8= 22-25 ft.lbs. (30-35 Nm)

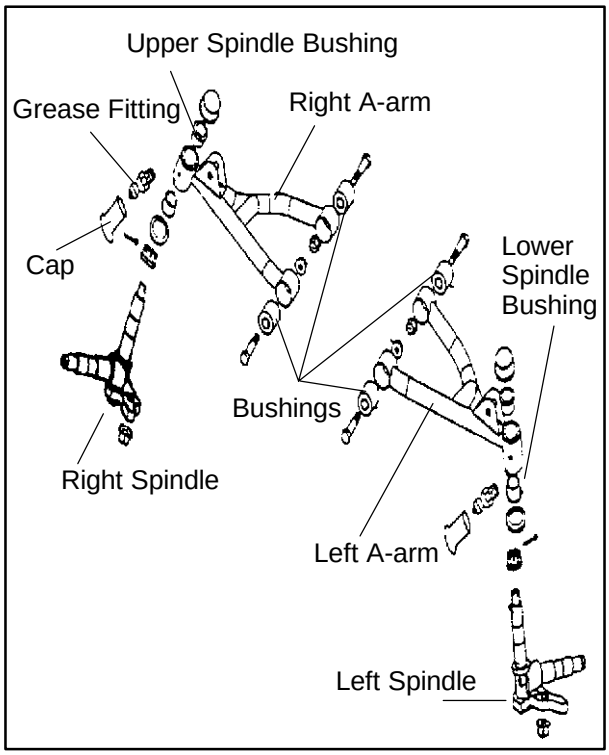
SHOCKS AND SPRINGS



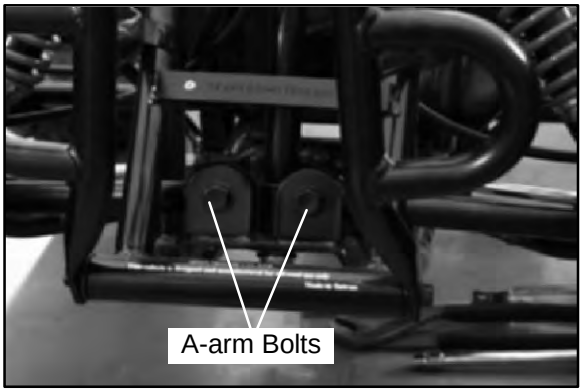
1. The front shocks and springs are mounted on the frame and A-arm. The front springs on the Sportsman 90 can be adjusted for more or less spring preload depending on rider preference.

2. The rear shock and spring is mounted to the frame and swing arm. The rear spring can be adjusted for more or less spring preload depending on rider preference.

SUSPENSION A-ARMS



1. Mount the A-arms to the frame body. The A-arm marked "R" is for right side, and A-arm marked "L" is for left side. Torque the bolts to specification. Mount the shock in the A-arm and torque bolt to specification.

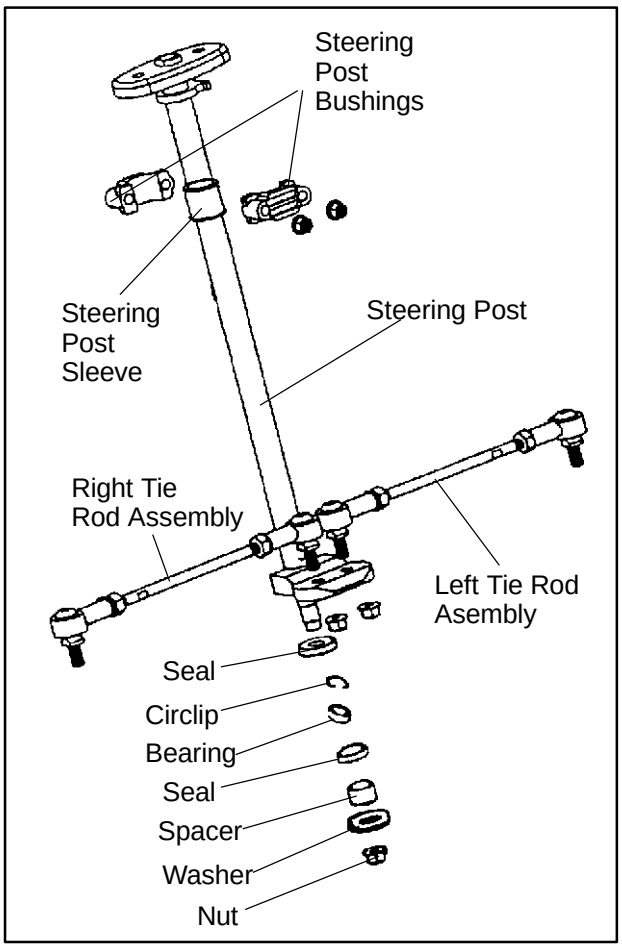


A-arm Mounting Bolt Torque:
26-30 ft.lbs. (36-40 Nm)
Shock Mounting Bolt Torque:
15 ft.lbs. (20 Nm)

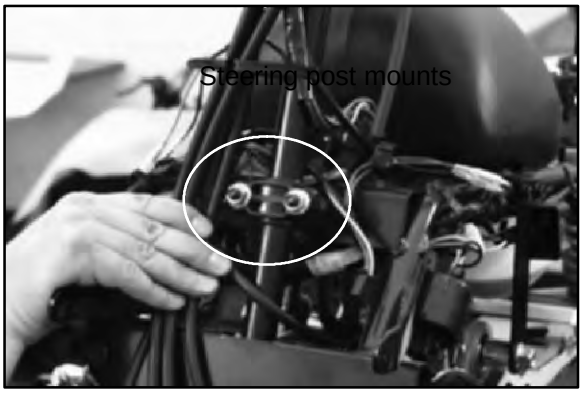
2. Grease spindles and mount the spindles on the A-arms. The spindle marked “R” is for right side, and “L” for left side. Torque the spindle nut to specification. Insert cotter key.

Spindle Nut Torque:
40-45 ft.lbs (58-62 Nm)

STEERING

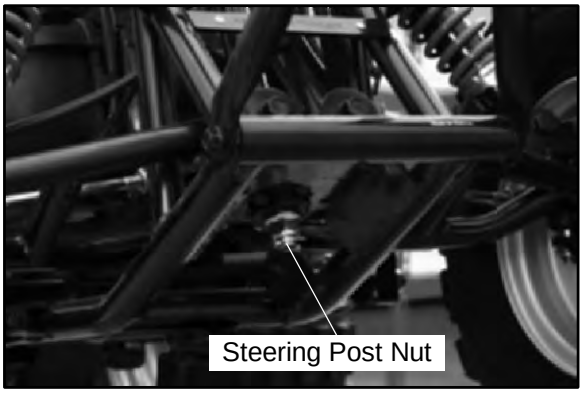


1. Grease the steering post sleeve and insert in place. Mount the steering post clamps on post. Install the steering post and tighten the steering post mount nuts to specification.



Steering Post Mount Nut Torque:
103 in.lbs. (11.6 Nm)

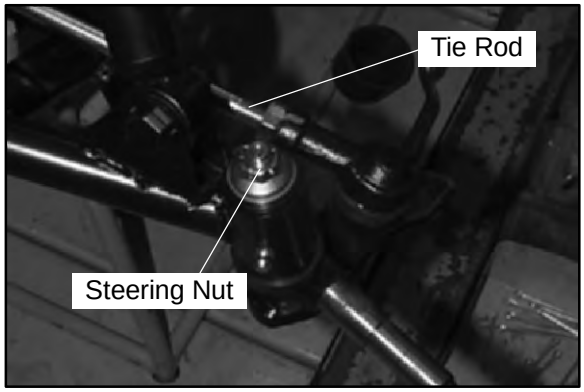
2. Install oil seals, bearing, steering nut and associated hardware on the bottom of the steering post. Torque nut to specification.



Steering Post Nut Torque:
62-65 ft.lbs. (86-90 Nm)

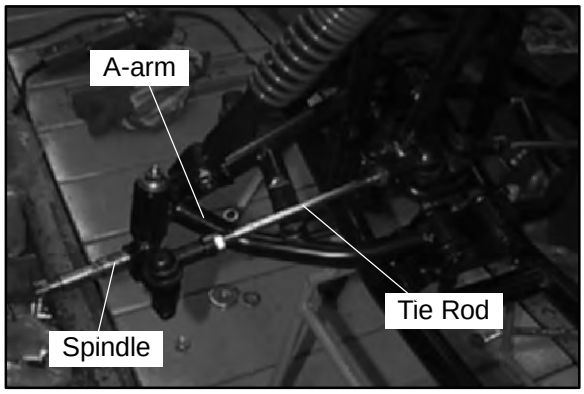
NOTE: Turn the steering post after mounting to make sure the post turns freely in both directions without binding.

3. Mount the tie rod to the steering post and to the spindle. Mount the tie rod so that the end with the flats is toward the spindle.



Steering Nut Torque:
62-65 ft.lbs. (86-90 Nm)

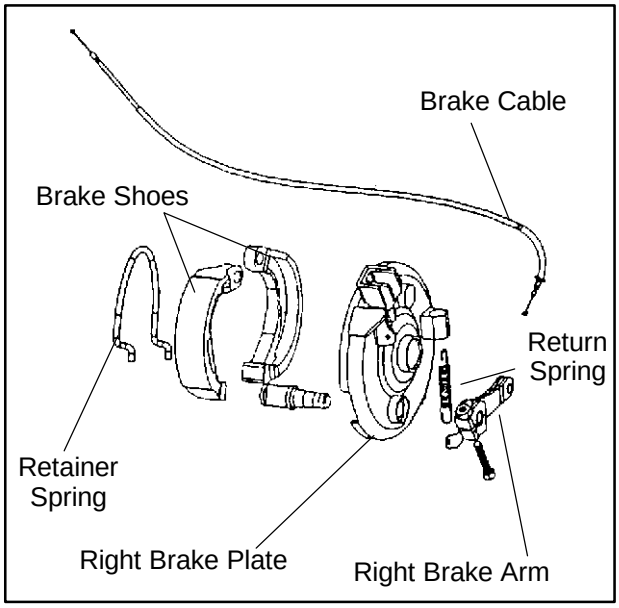
4. Tighten inner and outer tie rod bolts to specification.



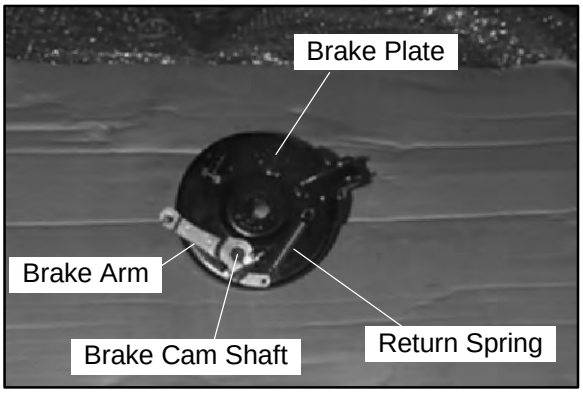
Inner Tie Rod Bolt Torque:
33-40 ft.lbs (45-55 Nm)
Outer Tie Rod Bolt Torque:
33-40 ft.lbs (45-55 Nm)

Tie Rod Jam Nut Torque:
12-14 ft.lbs (17-19 Nm)

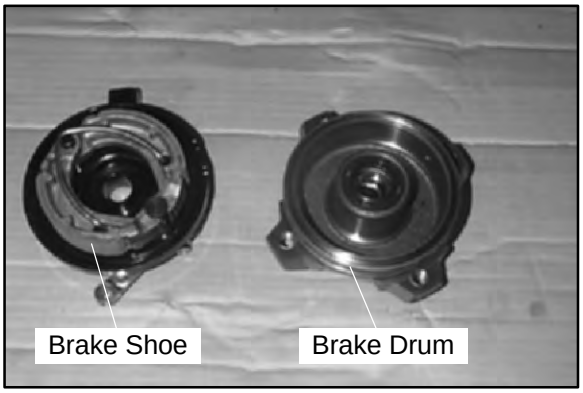
FRONT BRAKE



1. Front brake backing plate assembly components.



2. Front brake shoe and brake drum. There are oil seals and bearings in the front brake drums. Upon disassembly, inspect the bearings and seals for damage. Replace bearings and seals if necessary.



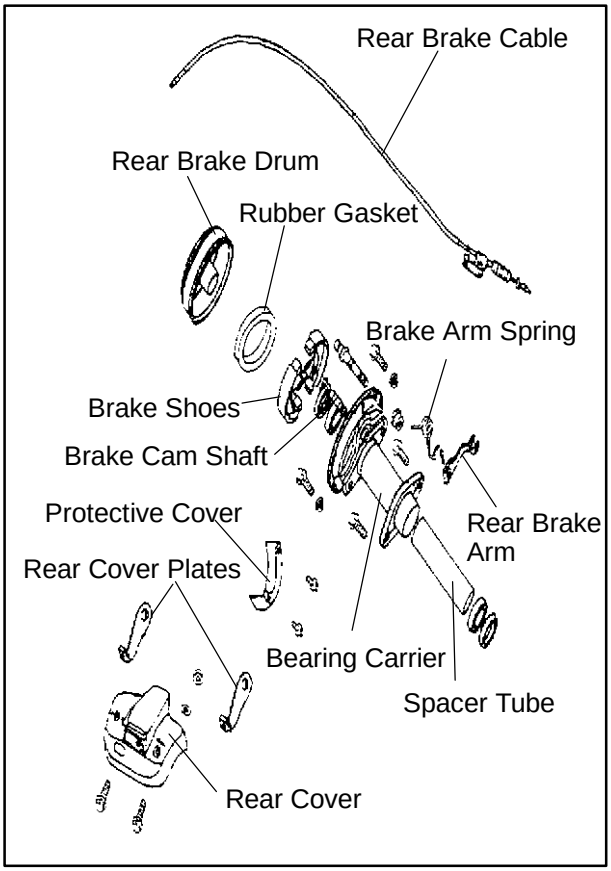
3. Mount the front brake assembly on the spindle.

4. Mount the brake drum on the backing plate assembly and tighten the spindle nut to specification.

Spindle Nut Torque:
42-45 ft.lbs. (58-62 Nm)

5. Connect the brake cable with brake arm.
6. Install the rubber cap.

REAR BRAKE AND AXLE



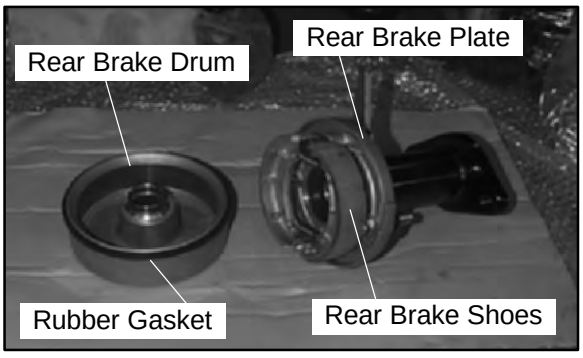
1. Apply grease to the swing arm spacer tube. The swing arm assembly must be mounted first.

NOTE: The swing arm assembly includes chain protector.

2. Install the swing arm to the frame and tighten the mounting bolt to specification. Install rear shock and spring. Tighten shock mounting bolts to specification.

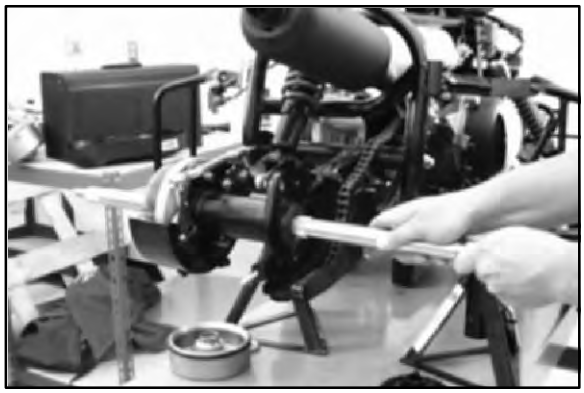
Swing Arm Mounting Bolt Torque:
26-30 ft.lbs. (36-40 Nm)
Rear Shock Mounting Bolt Torque:
25 ft.lbs. (35 Nm)

3. Inspect the protective rubber gasket on the rear brake drum for damage. Replace if needed. Mount the rear brake plate, shoes, and springs on the bearing carrier. Install the brake drum.

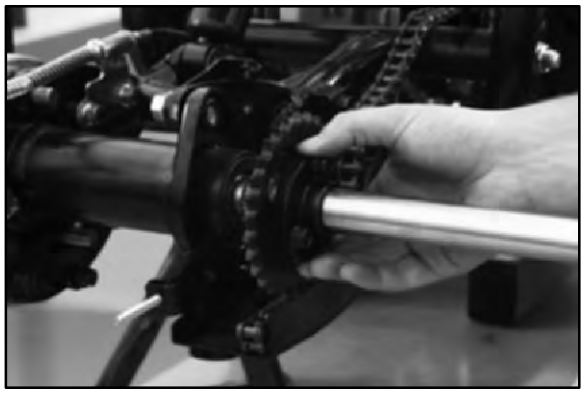


4. Install the rear axle bearing carrier and rear brake assembly on swing arm.

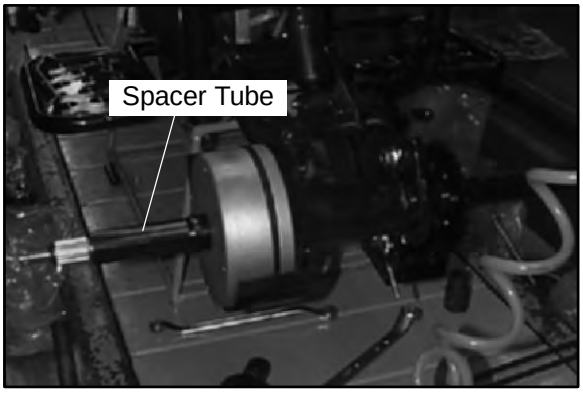
5. Install rear axle. Tighten the bolts until snug. The rear axle bearing carrier needs to be adjusted for chain tension. Do not tighten to specified torque at this time.



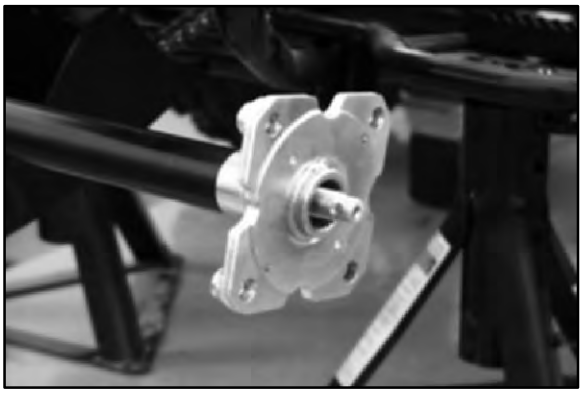
6. Install the drive sprocket on the rear wheel axle.



7. Install the right and left spacer tube on the rear wheel axle.



8. Install the wheel hub and tighten axle nut to specification.



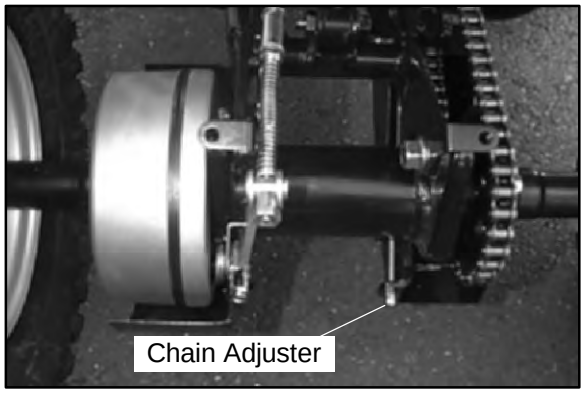
Axle Nut Torque:
78-81 ft.lbs. (108-112 Nm)

9. Install rear brake cable on brake arm.

10. Install chain on drive sprocket and tighten sprocket bolts to specification.

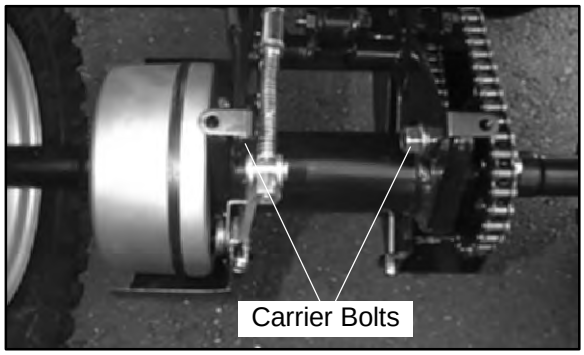
Sprocket Bolt Torque:
18 ft.lbs. (25 Nm)

11. Set the chain tension to specification by loosening the lock nuts on the chain adjuster. Turn the adjuster until the chain tension is set. Tighten the adjuster nuts.



Chain Tension Specification:
.40-.80″ (10-20 mm) slack
Chain Tensioner Nut Torque:
84 in.lbs. (10 Nm)

12. Tighten all bearing carrier bolts to specification.



Bearing Carrier Bolt Torque:
43 ft.lbs. (60 Nm)

13. Install the rear cover. Torque bolts to specification

Rear Cover Bolt Torque:
84 in.lbs. (10Nm)

FUEL AND OIL TANK

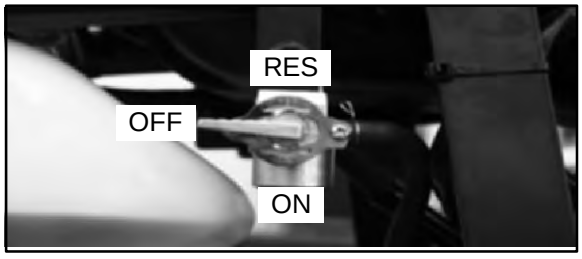
1. Install fuel tank in the frame and tighten bolts to specification. Make sure the fuel tank pads are in place and in good condition and the vent line is unobstructed.

Fuel Tank Mounting Bolt Torque:
103 in.lbs. (12 Nm)

2. Install the oil tank to the frame and tighten bolts to specification. Always fill the oil reservoir before riding.

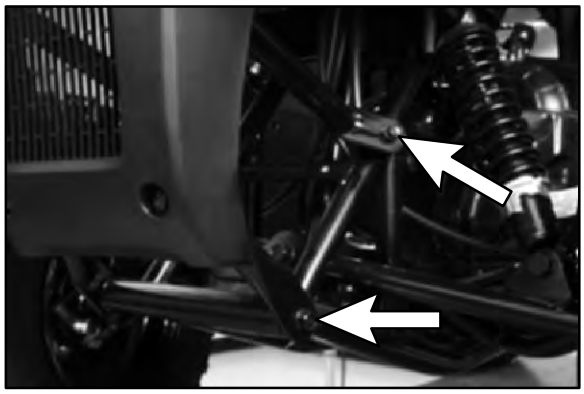
Oil Tank Mounting Bolt Torque:
103 in.lbs. (12 Nm)

3. The fuel petcock has “ON”, “OFF”, and “RES”. Make note of these positions on the petcock. Always turn fuel off when transporting an ATV.



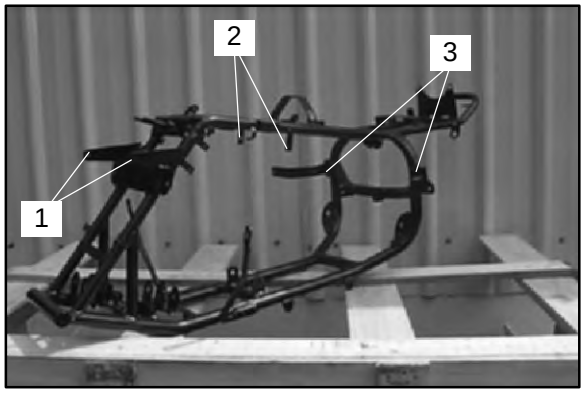
SCRAMBLER FRONT AND REAR CAB INSTALLATION

1. Install the bumper to the frame and tighten mounting bolts to specification.

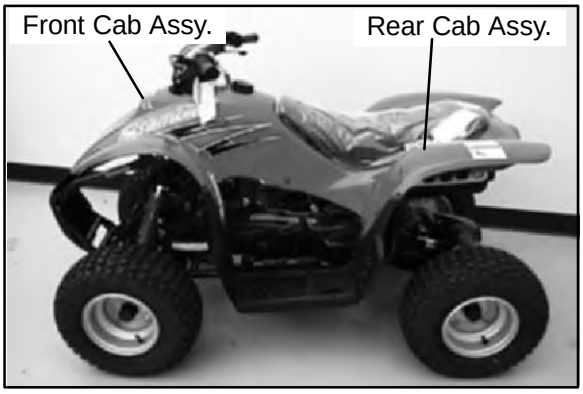


Front Bumper Mounting Bolt Torque: 103 in.lbs. (12 Nm)

2. There are three (3) mounting positions for the front and rear cab to the frame. The front cab is mounted on positions 1 and 2. The rear cab is mounted on position 3.

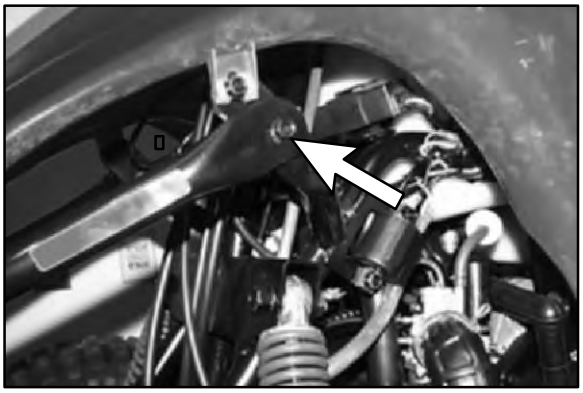


3. Install the front and rear cab to the frame and tighten the mounting bolts to specification.



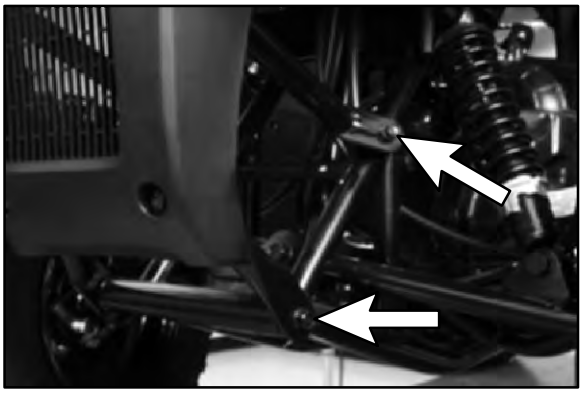
Cab Mounting Bolt Torque: 103 in.lbs. (12 Nm)

4. The front cab mounts to the front bracket of the frame.



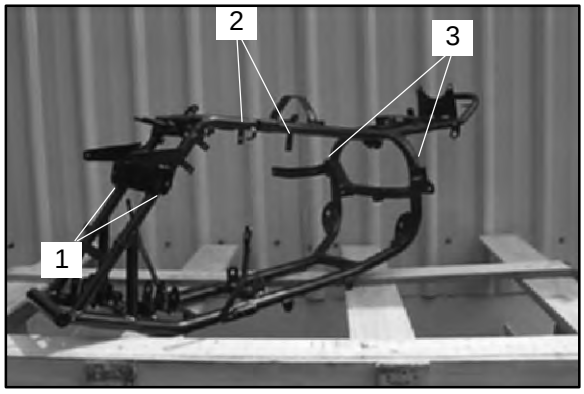
SPORTSMAN FRONT AND REAR CAB INSTALLATION

1. Install the bumper to the frame and tighten mounting bolts to specification.

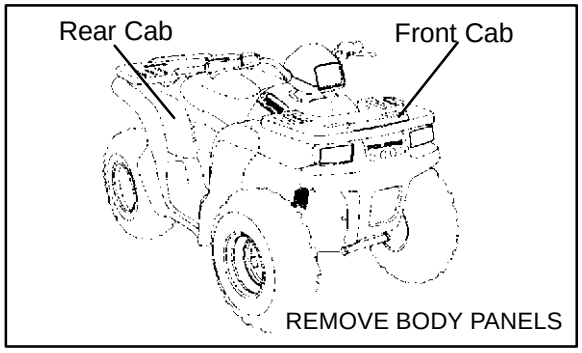


Front Bumper Mounting Bolt Torque: 103 in.lbs. (12 Nm)

2. There are three (3) mounting positions for the front and rear cab to the frame. The front cab is mounted on positions 1 and 2. The rear cab is mounted on position 3.

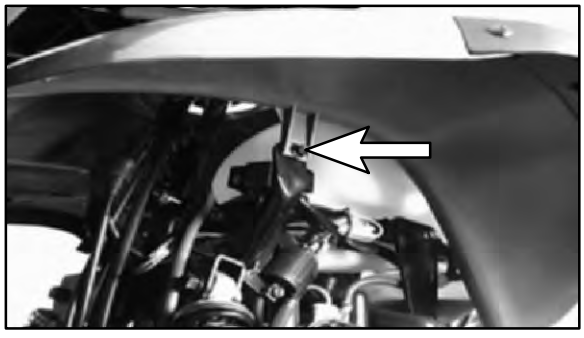


3. Install the front cab and rear cab to the frame and tighten the mounting bolts to specification.

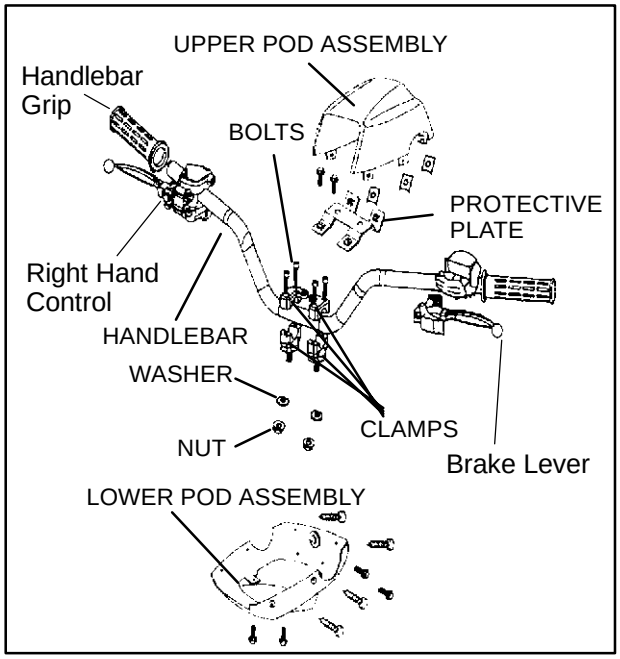


Cab Mounting Bolt Torque: 103 in.lbs. (12 Nm)

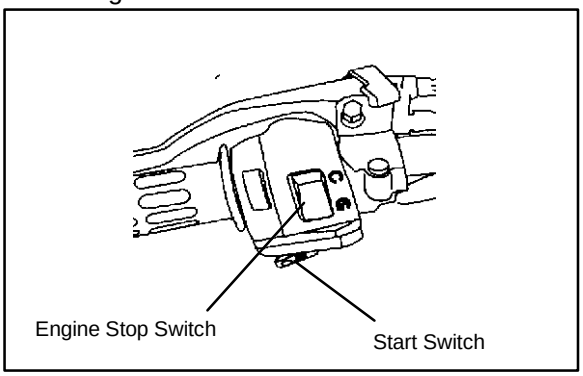
4. The front cab mounts to the front bracket of the frame.

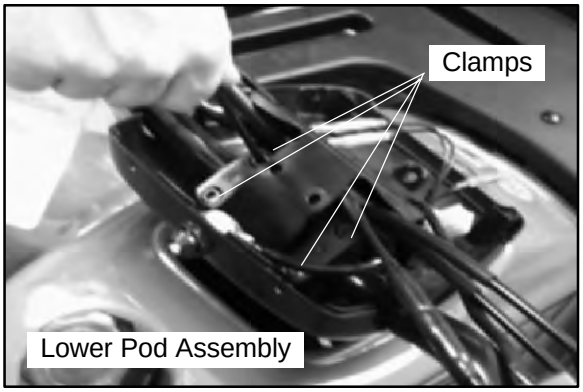


SPORTSMAN HANDLEBAR ASSEMBLY

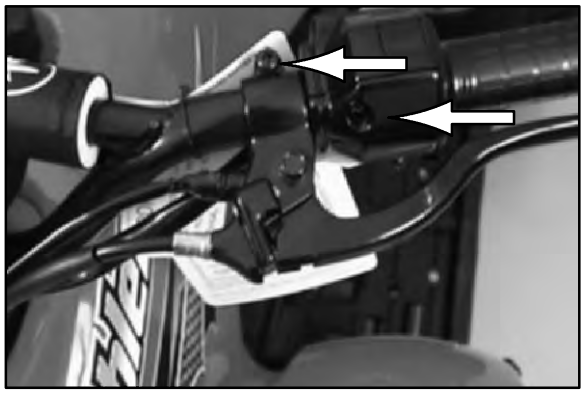


1. Install the lower pod assembly.
2. The handlebar assembly includes the right and left side brake levers, the throttle control and the left side control switch. Install these items loosely on the handle bar before mounting. Avoid pulling or bending wires and brake cable.





3. Install the handlebar. Secure the handlebar with the clamps and bolts, but do not tighten at this point.
4. Position and tighten the left and right side controls and brake lever clamps.



5. Position the handlebar on the steering post and tighten the clamp bolts to specification.

Handlebar Mounting Clamp Bolt Torque:
84 in.lbs. (10 Nm)

6. Check freeplay of the right side and left side front brake cables as shown. Adjust to specification.

Front Brake Lever Free Play:

.40-.80″ (10-20 mm)

Front Brake Lever Travel:

50 cc= 1 1/8″ (28 mm)
90 cc = 1 3/4″ (45 mm)

7. Check freeplay of the rear brake cable. Adjust to specification.

Rear Brake Lever Free Play:

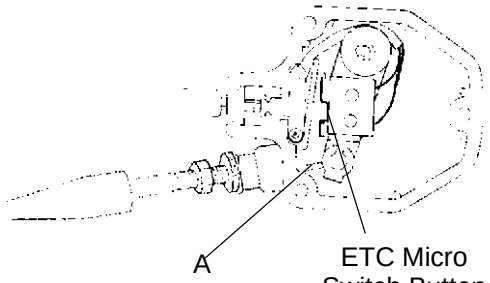
.40-.80″ (10-20 mm)

Rear Brake Lever Travel:

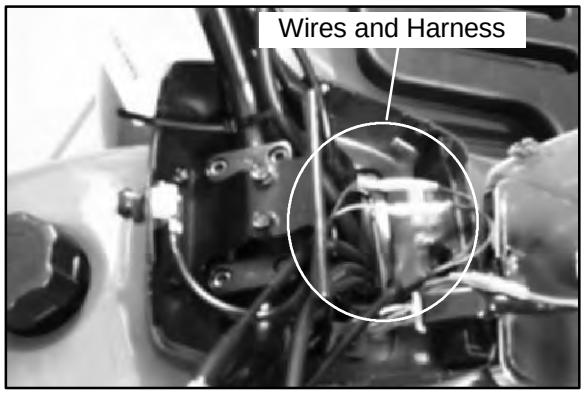
50 cc= 1 1/8″ (28 mm)
90 cc = 2 1/2″ (65 mm)

8. Open the throttle ETC switch box and lightly grease the throttle cable (A). Install the throttle cable.

Electronic Throttle Control (ETC) Switch (Cast Aluminum Throttle Housing)



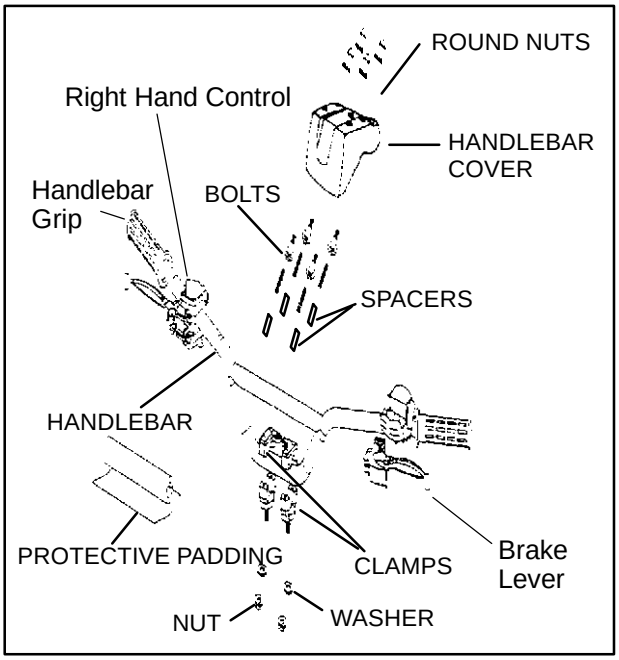
9. Connect the wiring harness to the three color coordinated wires.



10. Install the upper pod assembly with the screws. Torque the pod screws to specification.

Pod Mounting Screw Torque:
42 in. lbs. (4.7 Nm)

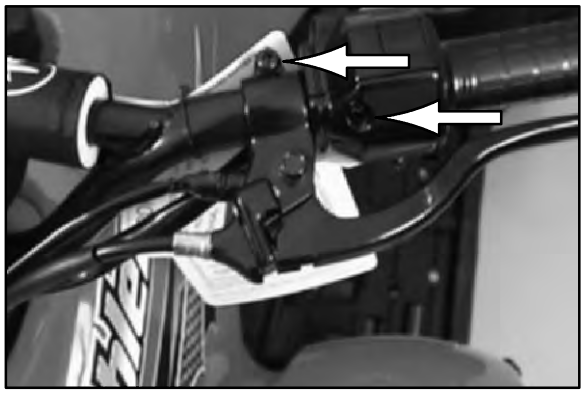
SCRAMBLER HANDLEBAR ASSEMBLY

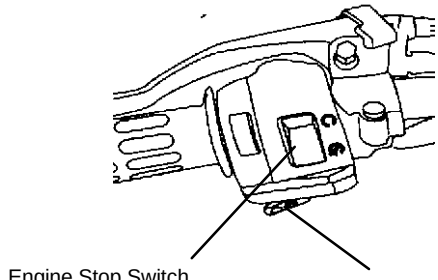


1. Install the lower clamps.
2. The handlebar assembly includes the right and left side brake levers, the throttle control and the left side control switch. Install these items loosely on the handle bar before mounting. Avoid pulling or bending wires and brake cable..

NOTE: Connect the wiring harness and wires before the handlebar cover is installed. Be sure the cables and wires are routed properly.

3. Install the handlebar. Secure the handlebar with the clamps, spacers,bolts, and nuts, but do not tighten at this point.
4. Position and tighten the left and right side controls and brake lever clamps.





5. Position the handlebar on the steering post and tighten the clamp bolts to specification.

Handlebar Mounting Clamp Bolt Torque: 84 in.lbs. (10 Nm)

6. Check freeplay of the right side and left side front brake cables as shown. Adjust to specifications.

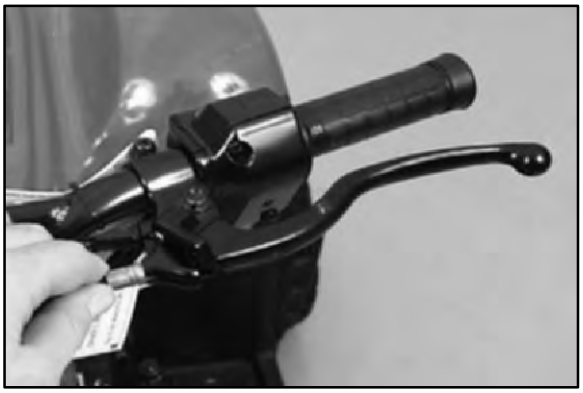
Front Brake Lever Free Play:

.40-.80″ (10-20 mm)

Front Brake Lever Travel:

50 cc= 1 1/8″ (28 mm)
90 cc = 1 3/4″ (45 mm)

7. Install the rear brake cable. Adjust to specifications



Rear Brake Lever Free Play:

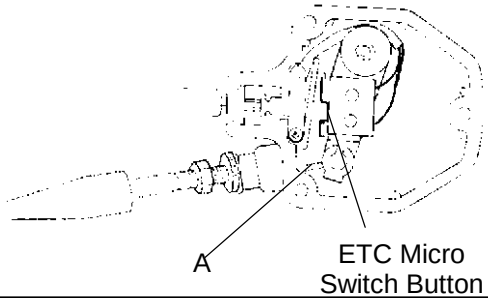
.40-.80″ (10-20 mm)

Rear Brake Lever Travel:

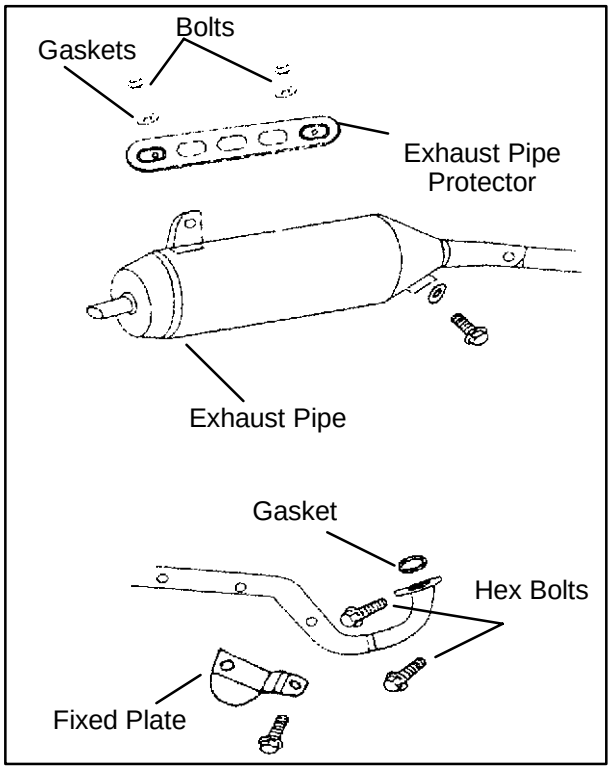
50 cc= 1 1/8″ (28 mm)
90 cc = 2 1/2″ (65 mm)

8. Open the throttle ETC switch box and lightly grease the throttle cable (A). Install the throttle cable.

Electronic Throttle Control (ETC) Switch (Cast Aluminum Throttle Housing)

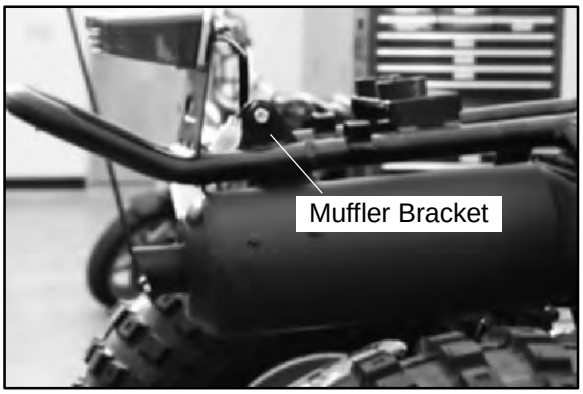


MUFFLER



1. Connect the muffler to the cylinder and install. Inspect sealing gaskets upon installation. Replace if necessary.

2. Connect the muffler to the mounting bracket on the frame. Tighten bolt to specification.



Muffler Mounting Bolt Torque: 25 ft.lbs. (34 Nm)

NOTES

CHAPTER 5
ELECTRICAL

5

SPECIAL TOOLS

Fluke™ 73 Multitester . . . . . **PN 2870659**

Strobe Timing Light . . . . . **PN 2870630**

Tachometer . . . . . **PN 8712100** or **PN 8712500**

Christie Multi-Batttery Charger **PN PV-63070**
(Available from SPX 800-328-6657)

ELECTRICAL SERVICE NOTES

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

- Refer to wiring diagram for stator and electrical component resistance specifications.
- When measuring resistance of a component that has a low resistance value (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.
- This ignition system timing is non adjustable. The specifications on page 1.3 are intended for reference only.

2003 MODEL YOUTH ATV SPEED RESTRICTION

Per ANSI / SVIA-1-2001 (sec. 6.1.3) the **AS DELIVERED TO THE CONSUMER:** The speed of youth models is restricted to under 10 MPH for the 50 cc models and under 15 MPH for the 90 cc models. The dealer **CANNOT**, under any circumstances, either prior to the sale or later, **even at the consumers request**, remove or adjust any speed limiting device. Any speed limiting device can only be removed or adjusted **by the consumer** when they determine their child is capable of the additional speed. Per ANSI / SVIA-1-2001 (sec. 6.2) the unrestricted top speed is less than 15 MPH for the 50 cc models and less than 30 MPH for the 90 cc models.

SPEED CONTROL SYSTEMS

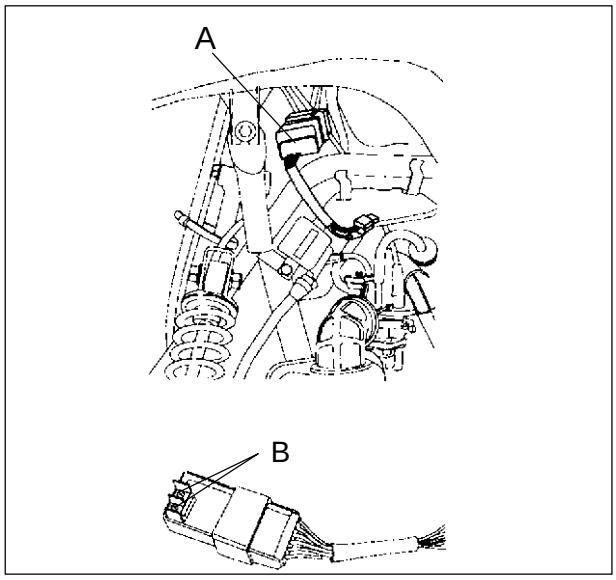
Electronic Speed Control System

2003 Polaris Youth ATVs are equipped with an electronic speed control system, which controls the engine RPM and speed of the ATV.

Speed can be adjusted by removing or installing the jumper on the CDI (A). With the jumper installed, 50cc models will travel no faster than 10 mph and 90cc models will travel no faster than 15 mph. With the jumper removed, 50cc models will travel no faster than 15 mph and 90cc models will travel no faster than 30 mph.

Jumper Removal and Installation

1. Remove the CDI and its rubber mounting strap from the mounting tab, which is located on the frame bulkhead near the steering post. It can be accessed through the left front fender.
2. Remove the two screws (B) from the jumper to remove or install the jumper. Reinstall the screws.
3. Reinstall the CDI and mounting strap onto the mounting tab.

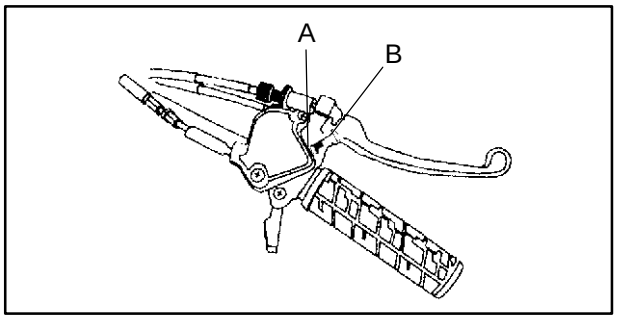


SPEED CONTROL SYSTEMS

Throttle Stop Speed Control System

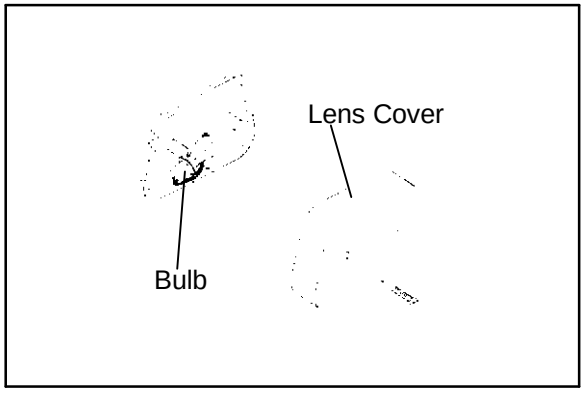
Adjusting speed at the CDI is the recommended method of speed control, but the throttle stop system may also be used. Use the following procedure to control how far the throttle opens.

1. Loosen the jam nut (A)
2. Turn the screw (B) inward to reduce speed or outward to increase speed.
3. Tighten the jam nut after adjusting.



BRAKE LIGHT BULB REPLACEMENT

If the brake light does not work the bulb 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 bulb and replace it with recommended bulb. Apply Nyogel™ grease **PN 2871329**.
3. Reinstall the lens cover removed in step 1.
4. Test the brakelight to see that it's working.

BATTERY

Youth ATV batteries have been upgraded to a maintenance-free unit with more reserve capacity. A new battery holder was designed to accommodate the battery's larger size. For charging, it is recommended to use the Christie Charger (**PA-37453**) available from SPX.

YOUTH ATV BATTERY CHARGING CHART			
State of Charge	**Voltage**	**Action**	**Charge Time***
100%	12.8-13 .0v	Fully Charged	None Required
75%	12.5-12 .8v	Slight Charge	3-6 Hours @ 0.4A
50%	12.0-12 .5v	Charge	5-11 Hours @ 0.4A
25%	11.5-12 .0v	Charge	13+Hours @ 0.4A Check State of Charge
0%	11.5v or less	Charge	20 Hours @ 0.4A Battery may be Dead

*** Charging times can vary depending on type of charger. Follow the charger instructions.**

BATTERY ACTIVATION

⚠ WARNING

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

External: Flush with water.

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

Eyes: Flush with water for 15 minutes and get prompt medical attention.

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

KEEP OUT OF REACH OF CHILDREN.

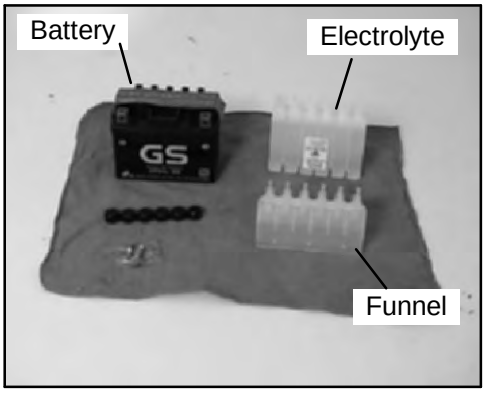
WARNING: The gases given off by a battery are explosive. Any spark or open flame near a battery can cause an explosion which will spray battery acid on anyone close to it. If battery acid gets on anyone, wash the affected area with large quantities of cool water and seek immediate medical attention.

To ensure maximum service life and performance from a new battery, perform the following steps.

NOTE: Do not activate the battery unless it will be put into regular service within 30 days. Polaris Youth ATV batteries are a maintenance-free design. Do not attempt to add water or electrolyte.

NOTE: New batteries must be fully charged before use or battery life will be significantly reduced (10-30% of the battery's full potential).

1. Remove the battery, battery acid, and accessories from the box.



NOTE: Wear safety glasses and rubber protective gloves when working with batteries.

2. Remove the protective strip from the top of the battery. Insert the battery electrolyte funnel into the battery holes.
3. Carefully press the battery electrolyte pack onto the battery electrolyte funnel. The funnel will puncture the seals on the electrolyte pack, releasing electrolyte into the battery. Allow the pack to drain for 20 minutes, periodically tapping the sides to release any air-lock that may occur.
4. Properly dispose of the battery electrolyte pack. Let battery set with the vent caps off for 30 minutes to allow full absorption of the electrolyte. After 30 minutes , install the battery seal strip onto the battery.
5. Charge the battery for 3 to 5 hours on the initial charge using a Christie Multi Battery Charger or a charger with an output 1/10th the amp rating of the battery.

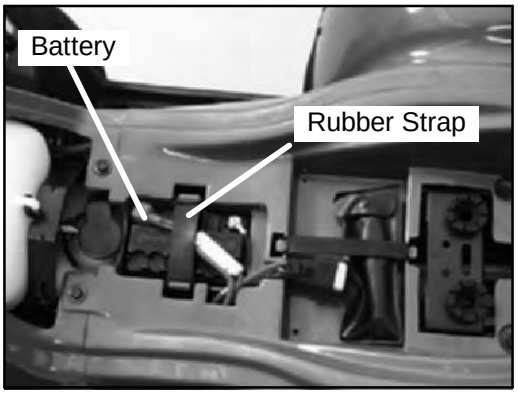
BATTERY TERMINALS/ TERMINAL BOLTS

Use corrosion resistant Dielectric Grease (**PN 2871329**) on battery bolts.

BATTERY INSPECTION/ REMOVAL

NOTE: Polaris Youth ATVs use a **maintenance free battery**. Do not remove the battery cap strip to check the acid level. Perform the proper battery tests and replace the battery as needed.

The battery is located under the seat.



1. Remove the rubber strap.
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.

BATTERY INSTALLATION

1. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one cup water mixed with 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. Route cables so they are tucked away in the battery compartment.
4. Reinstall the rubber strap.

Do not start the engine with the battery disconnected. Vehicle lamps will burn out if battery is disconnected during vehicle operation.

BATTERY TESTING

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first.

Following are two tests which can easily be made on a battery to determine its condition: OCV Test and Load Test.

OCV - OPEN CIRCUIT VOLTAGE TEST

Battery voltage should be checked with a digital multitester. Readings of 12.5 or less require further battery testing and charging. See open circuit voltage chart and Load Test.

NOTE: Batteries should be kept at or near a full charge as possible. If the battery is stored or used in a partially charged condition, crystal sulfation will form on the plates, reducing the efficiency and service life of the battery.

OPEN CIRCUIT VOLTAGE	
State of charge	Maintenence Free Batteries
100% Charged	12.8–13.0V
75% Charged	12.5–12.8V
50% Charged	12.0–12.5V
25% Charged	11.5–12.0V
0% Charged	less than 11.50V

LOAD TEST

CAUTION: Remove the spark plug high tension lead and connect securely to engine ground before proceeding.

NOTE: This test cannot be performed with an engine or starting system which 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 suspected. 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 solution of baking soda and water. Rinse with lots of fresh water after cleaning. **NOTE:** Do not allow baking soda solution into the battery or the acid will be neutralized.
- Using a wire brush or knife, remove any corrosion from the cables and terminals.
- Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the battery reaches 12.8–13.0 volts.
- 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 outside during the winter months, the electrolyte will freeze at a higher temperature as the battery discharges. The chart below indicates freezing points by specific gravity.

Electrolyte Freezing Points	
Specific Gravity of Electrolyte	Freezing Point
1.265	-75° F
1.225	-35° F
1.200	-17° F
1.150	+5° F
1.100	+18° F
1.050	+27° F

Routine Maintenance Youth ATV Batteries

Check voltage periodically using a voltmeter

- Check voltage every 3–6 months depending on temperature. Higher temperatures cause faster discharge and require checking more often.
- Maintenance Free Batteries should read 12.8–13.0v when fully charged.
- Keep the battery free of dirt and grime.
- Inspect the cables, clamps, and fittings for damage or loose connections.
- Clean terminals and connectors as needed.
- Pull battery or disconnect battery cables during storage.
- If a battery is stored, test regularly and charge it if the voltage drops below 12.5v.
- If the vehicle is going to be stored for an extended time, make sure the battery is fully charged.

CHARGING PROCEDURE

Charge the battery with a charger no larger than 1/10 of the battery's amp/hr rating. **Youth ATV batteries have an amp/hr rating of .4 volts. Do not exceed this voltage or damage to the battery will result.**

Fully charged, the battery should read **12.8–13.0 Volts**. If the battery is 12.5–12.8 volts (75% capacity), charge battery at 0.4 Amps for 3–6 hours. If the voltage reads 12.0–12.5 Volts (50% capacity) charge at 0.4 Amps for 5–11 hours. After charging is complete, let the battery stand 1–2 hours and re–test the voltage. **Do not overcharge the battery!**

After charging is complete, there is no need to remove the cell cap strip or add water for the life of the battery.

Because of the characteristics of a sealed battery, overcharging decreases the volume of electrolyte. The longer the overcharge time, the greater the drop in electrolyte, and subsequently starting power. Water cannot be added to a sealed battery. *If a sealed battery is overcharged, it will have to self–discharge before it can be used.* Overcharging can also warp plates, making future charging difficult. Watch

charging times carefully, or use a charger with limited charging time/current capabilities. Polaris recommends using the Christie Multi−Battery Charger PV−67030, available from our tool provider SPX for charging batteries. Always stop charging if the battery becomes warm to the touch. Let it cool sufficiently before resuming charging.

When the charging system is complete, install the battery in the ATV and connect the red positive (+) cable first, and the black ground (−) cable last. Coat battery bolt threads with corrosion resistant Nyogel™ grease. Secure battery with the holder strap.

Nyogel™ Grease

(PN 2871329)

⚠ WARNING

To avoid the possibility of explosion, connect positive (red) cable first and negative (black) cable last.

YOUTH ATV BATTERY CHARGING CHART

State of Charge	Voltage	Action	Charge Time*
100%	12.8−13 .0v	None Full Charge	None Required
75%	12.5−12 .8v	Slight Charge	3−6 Hours @ 0.4A
50%	12.0−12 .5v	Charge	5−11 Hours @ 0.4A
25%	11.5−12 .0v	Charge	13+Hours @ 0.4A Check State of Charge
0%	11.5v or less	Charge	20 Hours @ 0.4A Battery may be Dead

*** Charging times can vary depending on type of charger. Follow the charger's instructions.**

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 5.5). It should be 12.5 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 drive wheels securely off the ground, start the engine and increase RPM to between 3000 and 4000. Read battery voltage with the multitester. Readings should increase to between 13.0 and 14.6 V D.C. Are they?

Yes → Check Key off Current Draw Should between .1 and .2 volts

No ↓

Meter Setting: DC Amps

Perform system **"Break Even Amperage"** test outlined on Page 5.9.

Does charging occur as specified?

Yes → Check for owner modification, and discuss operating habits. The battery will continually discharge if operated below the "Break Even" RPM. Continued problems would call for battery inspection.

No ↓

Ohm stator wire (W/YR) If bad replace, if good, continue with alternator output test.

Meter Setting: AC Amps

Disconnect the Yellow/Red, White, and Red wires from the regulator/rectifier. Using a multitester, perform an **Alternator Output (AC amp) test**. See test procedure on page 5.9 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. 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.

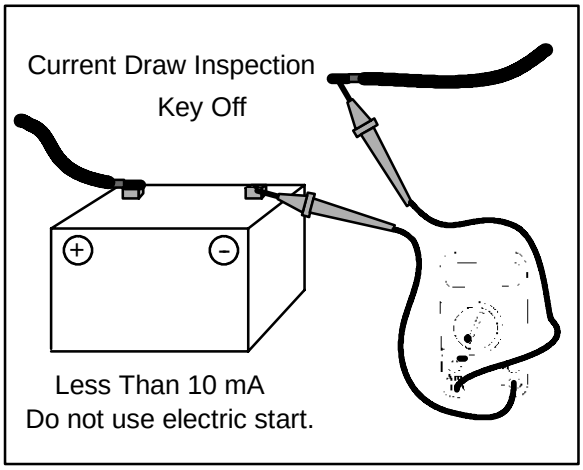
Yes ↓

If all of the previous tests indicate a good condition, but the charging voltage does not rise above battery voltage at the connector , 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 tail light bulb.***

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 .01 DCA (10 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.
- Start engine with kick start *only.*
- Increase engine RPM while observing ammeter and tachometer.
- Note RPM at which the battery starts to charge (ammeter indication is positive).
- With any electrical load off, this should occur at approximately 1500 RPM or lower.
- Lock parking brake to keep brake light on.
- Repeat test, observing ammeter and tachometer. With taillight on, charging should occur at or below 3000 RPM.

ALTERNATOR OUTPUT TEST (AC AMPERAGE TEST)

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.**

To Calculate Available Alternator Output:

$$I = \frac{P}{E} \qquad \frac{250W}{12V} = 20.8 \text{ Amps}$$

$$I = \frac{P}{E} \qquad \frac{150W}{12V} = 12.5 \text{ Amps}$$

$$I = \frac{P}{E} \qquad \frac{70W}{12V} = 5.8 \text{ Amps}$$

I = Current in Amps
P = Power in Watts
E = Electromotive Force (Volts)

- Place the red lead on the tester in the 10A jack.
- Turn the selector dial to the AC amps (A~) position.

- Connect the meter leads to the Yellow/Red and Black wires leading from the alternator.
- Start the engine using the kick staRter and let it idle. Reading should be a minimum of 3A 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. 3-5 seconds is acceptable. Do not rev the engine during the test.***

Alternator Current Output:
Minimum of 3 AC Amps

IGNITION

The ignition system has been upgraded for durability by encapsulating the stator with an epoxy coating. RPM speed limiting is now contained within the CDI Module. Exhaust restrictors have been removed.

SPARK PLUG

Spark Plug: NGK BPR7HS (PN 0450005)

Plug Gap
.024–.028"
(.6–.7mm)

STARTER SYSTEM TROUBLESHOOTING

Starter Motor Does Not Turn

- Battery discharged
- 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 with kick starter?)

Starter Motor Turns Over Slowly

- Battery discharged
- Excessive circuit resistance - poor connections (see Voltage Drop Test below)
- Engine problem - seized or binding (Can engine be rotated easily with kick starter?)
- Faulty or worn brushes in starter motor

Starter Motor Turns - Engine Does Not Rotate

- Faulty starter drive
- Faulty starter drive gear or starter motor gear
- Faulty flywheel gear or loose components

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 to perform voltage drop tests on the starter system.

Voltage should not exceed
.1 DC volts per connection

STARTER SYSTEM TROUBLESHOOTING

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 Red/White engagement coil wire from the starter solenoid. Connect tester black wire to battery ground. Connect red tester lead to Red/White 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 0Ω. Check solenoid ground path by measuring resistance between mounting plate and battery negative terminal (-).

Voltage Drop Testing

Reconnect the solenoid. Connect the tester black lead to the battery positive and the red lead to the solenoid end of the battery-to-solenoid wire. Depress starter button. Reading should be less than .1 V D.C.

→ No → Clean the battery-to-solenoid cable ends or replace the cable.

Yes

Connect the black tester lead to solenoid end of battery-to-solenoid cable. Connect red tester lead to solenoid end of solenoid-to-starter cable. Depress starter button. Reading should be less than .1 V D.C.

→ No → Replace the starter solenoid.

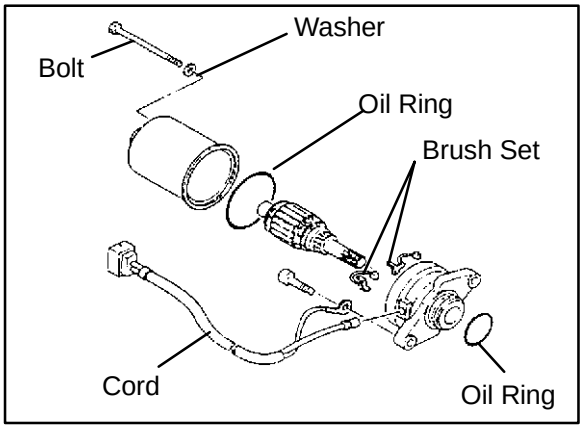
Yes

Connect the black tester lead to the solenoid end of the solenoid-to-starter cable. Connect the red tester lead to the starter end of the same cable. Depress the starter button. The reading should be less than .1 V D.C.

→ No → Clean the solenoid-to-starter cable ends or replace the cable.

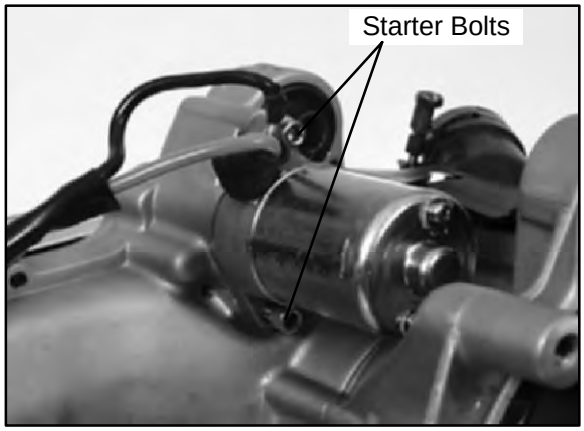
Yes → If all of these indicate a good condition, yet the starter still fails to turn, the starter must be removed for static testing and inspection.

STARTER MOTOR DISASSEMBLY



NOTE: Use only electrical contact cleaner to clean starter motor parts. Other solvents may leave a residue or damage internal parts and insulation.

1. Disconnect the negative battery cable. Remove the starter from the engine.

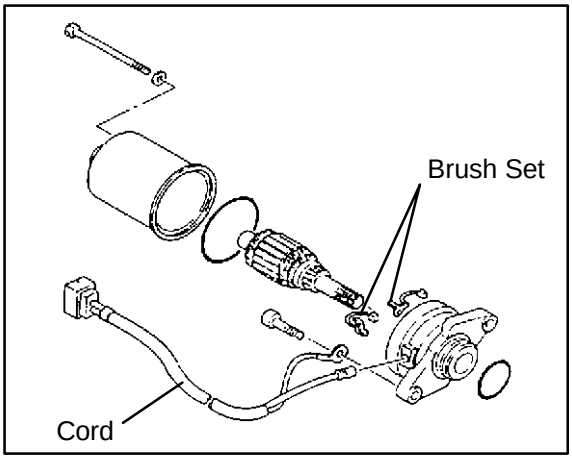


2. Remove the two bolts and washers.

3. Remove housing while holding the armature and brush holder section together.

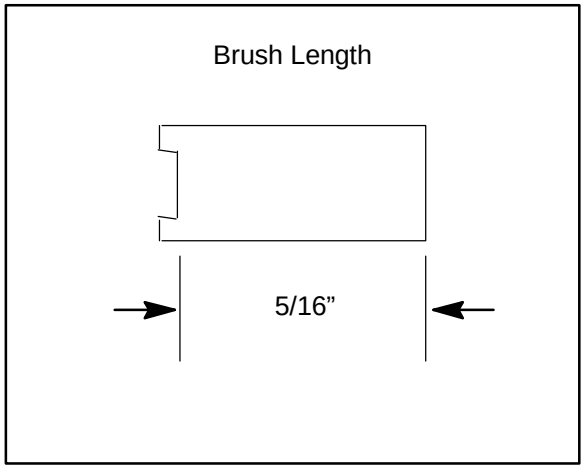
BRUSH INSPECTION/ REPLACEMENT

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 (no reading).



2. Inspect the O Rings and replace if damaged.

3. Remove brush plate and brushes. Measure length of brushes and replace if worn past the service limit.



Brush Length Service Limit: 5/16″ (.8 cm)

4. Inspect surface of commutator for wear or discoloration. See steps 3-6 of armature testing.
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.

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.
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 REASSEMBLY

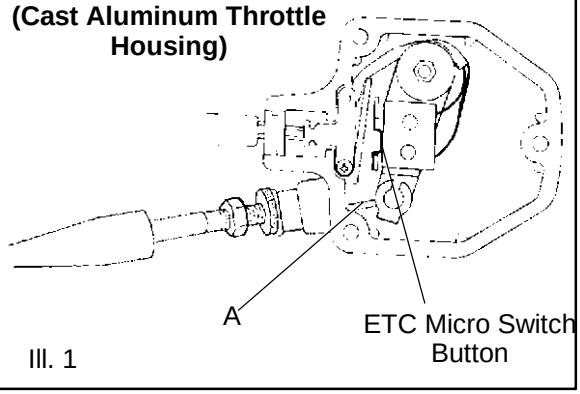
1. Place armature in field magnet casing.
2. Install case sealing O-Ring. Make sure O-Ring is in good condition and not twisted on the case. Lubricate the ends of the armature shaft and oil seal with a light film of grease, and install housing.
3. Install O-Ring on the other end of field magnet casing. Make sure it is in good condition and not twisted on the case.
4. Install housing, pushing back brushes while installing shaft in bushing.
5. Reinstall starter motor housing bolts. Make sure O-Rings are in good condition and seated in groove.

6. Reinstall the starter motor to the engine.

ELECTRONIC THROTTLE CONTROL (ETC) SWITCH

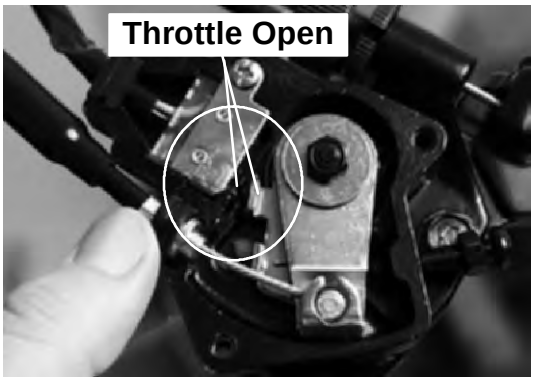
The Electronic Throttle Control (ETC) system is designed to limit the engine RPM in the event of a mechanical problem with the throttle mechanism. The ETC switch is mounted independently of the throttle actuator lever inside the throttle block assembly. This is a normally open switch, and is held in the closed position by throttle cable tension. In the event of a mechanical problem in the throttle mechanism (cable tension is lost), the switch contacts open, connecting the CDI grey wire from ground, limiting engine RPM to 1500.

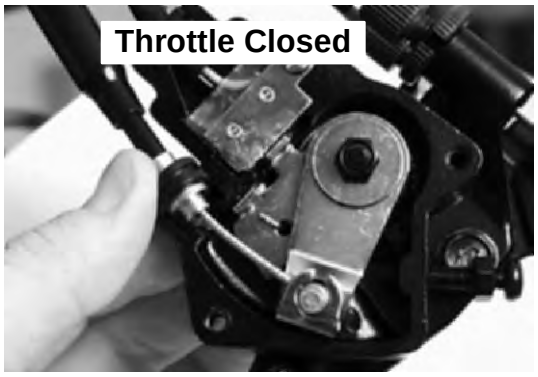
Electronic Throttle Control (ETC) Switch (Cast Aluminum Throttle Housing)



Ill. 1

Electronic Throttle Control	
Throttle is Open	ETC Switch is Closed. Connection from Grey to Black.
Throttle is Closed	ETC Switch Open. NO connection from Grey to Black.
In the Event of Cable Slack	With cable slack the ETC is open, there is NO connection from grey to black, the Engine RPM is limited to 1500 RPM.

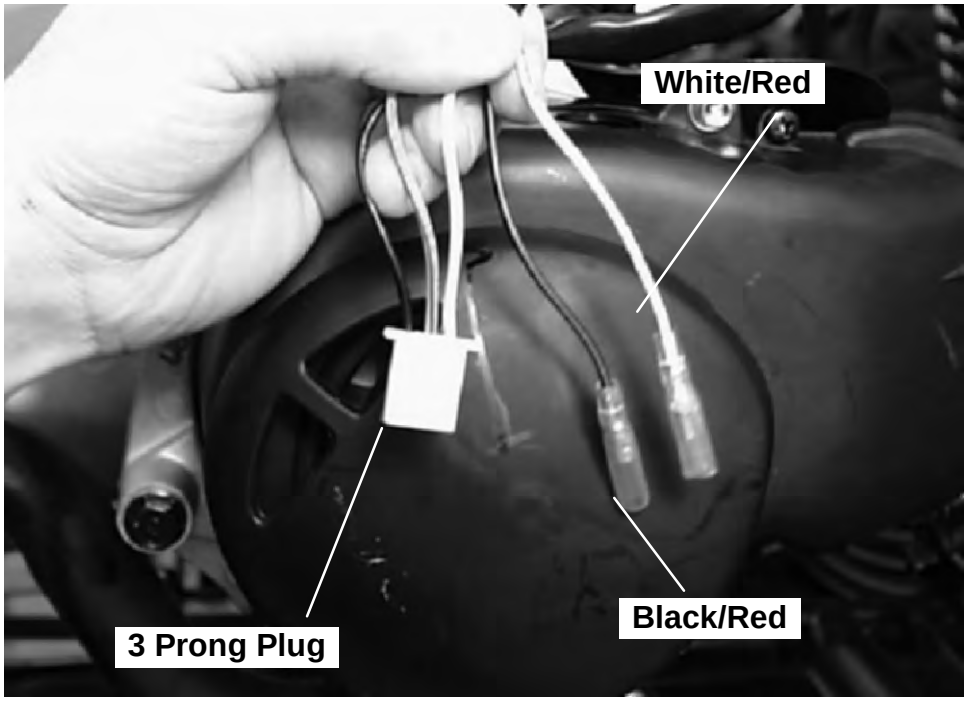




CRANKING TESTS

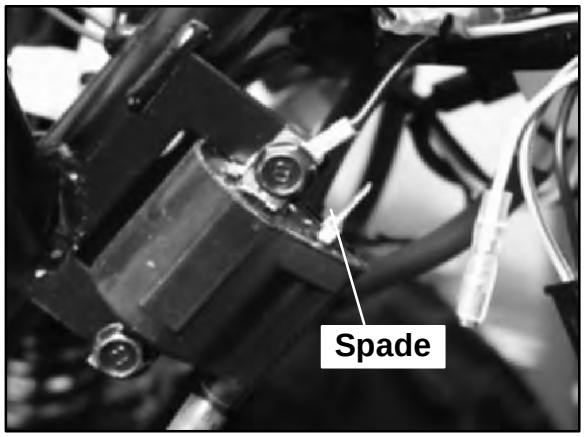
Unloaded Cranking Voltage		
Wire Color	**Wire Description**	**A/C Output**
Yellow/Red to Black	3 Prong Plug	4.5–5.9 Volts AC
White to Black	3 Prong Plug	5.3–7.0 Volts AC
White/Red to Black	Bullet Connector	0.3–0.4 Volts AC
Black/Red to Black	Bullet Connector	90–120 Volts AC

Peak Reading Cranking Voltage		
Wire Color (From Stator)	**Wire Description**	**A/C Peak Output** (With Peak Reading Adapter and meter set to DCV scale)
Yellow/Red to Black	3 Prong Plug	7.85 Volts DC
White to Black	3 Prong Plug	9.50 Volts DC
White/Red to Black	Bullet Connector	4.90 Volts DC
Black/Red to Black	Bullet Connector	203 Volts DC



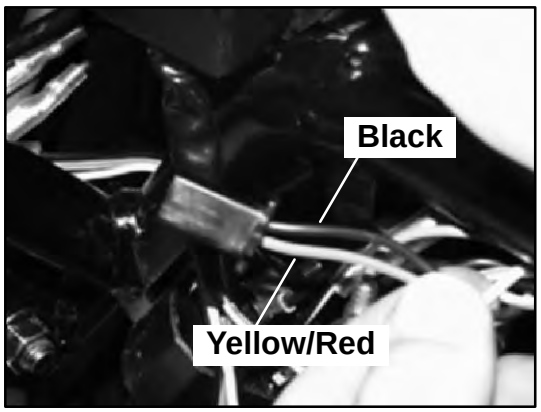
COIL TESTING

Coil Primary Winding



Wire Description	Resistance
Spade Connection to Ground	0.5 – 1.0 Ohms
Plug Cap (Cap Resistance with Cap Removed)	4–5 K Ohms
Ignition Coil Secondary Winding (Cap Removed)	5–9 K Ohms

Conntector	Meter Reading
Yellow Red to Black (Engine Cranking)	4.5–5 Volts AC
Yellow Red to Black (Engine Running)	7 to 9 Volts AC



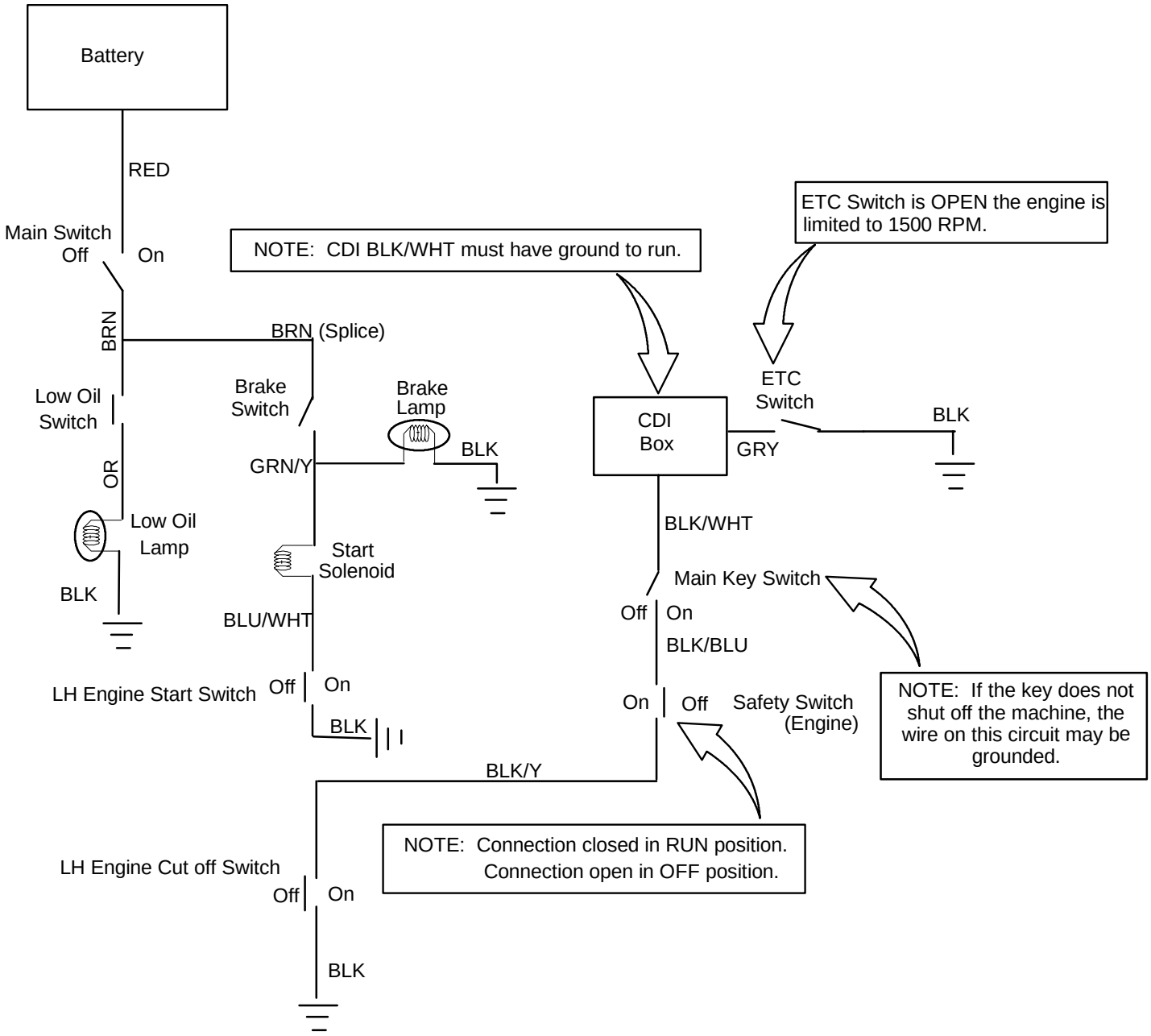
IGNITION SYSTEM TROUBLESHOOTING

No Spark, Weak or Intermittent Spark

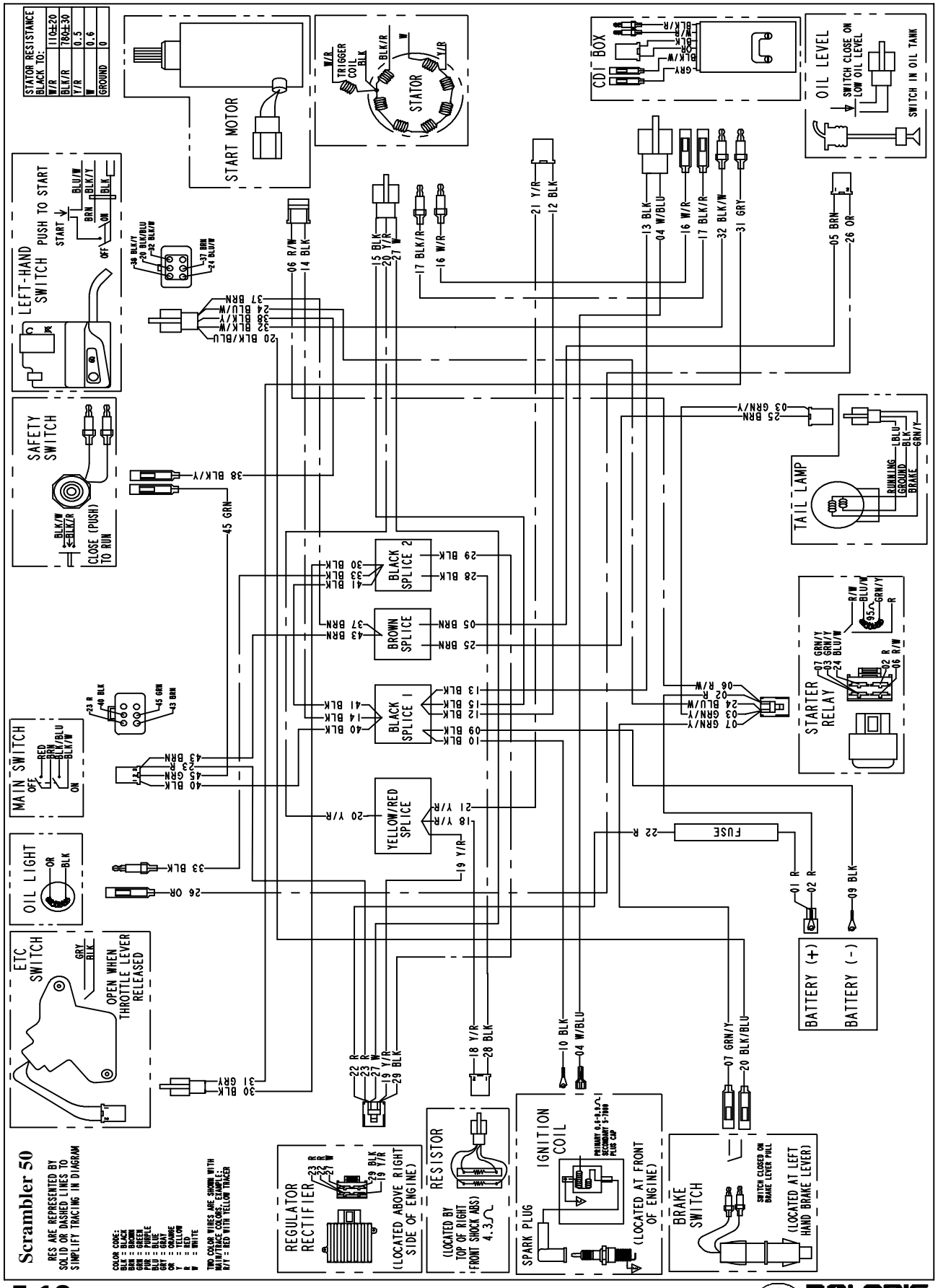
- Spark plug gap incorrect
- Fouled spark plug
- Faulty spark plug cap or poor connection to high tension lead
- Related wiring loose, disconnected, shorted, or corroded
- Engine Stop switch or ignition switch faulty
- ETC switch misadjusted or faulty
- Poor ignition coil ground (e.g. coil mount loose 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
- Excessive crankshaft runout on magneto (RH) end should not exceed .005
- Faulty CDI module

QUICK REFERENCE DIAGRAM

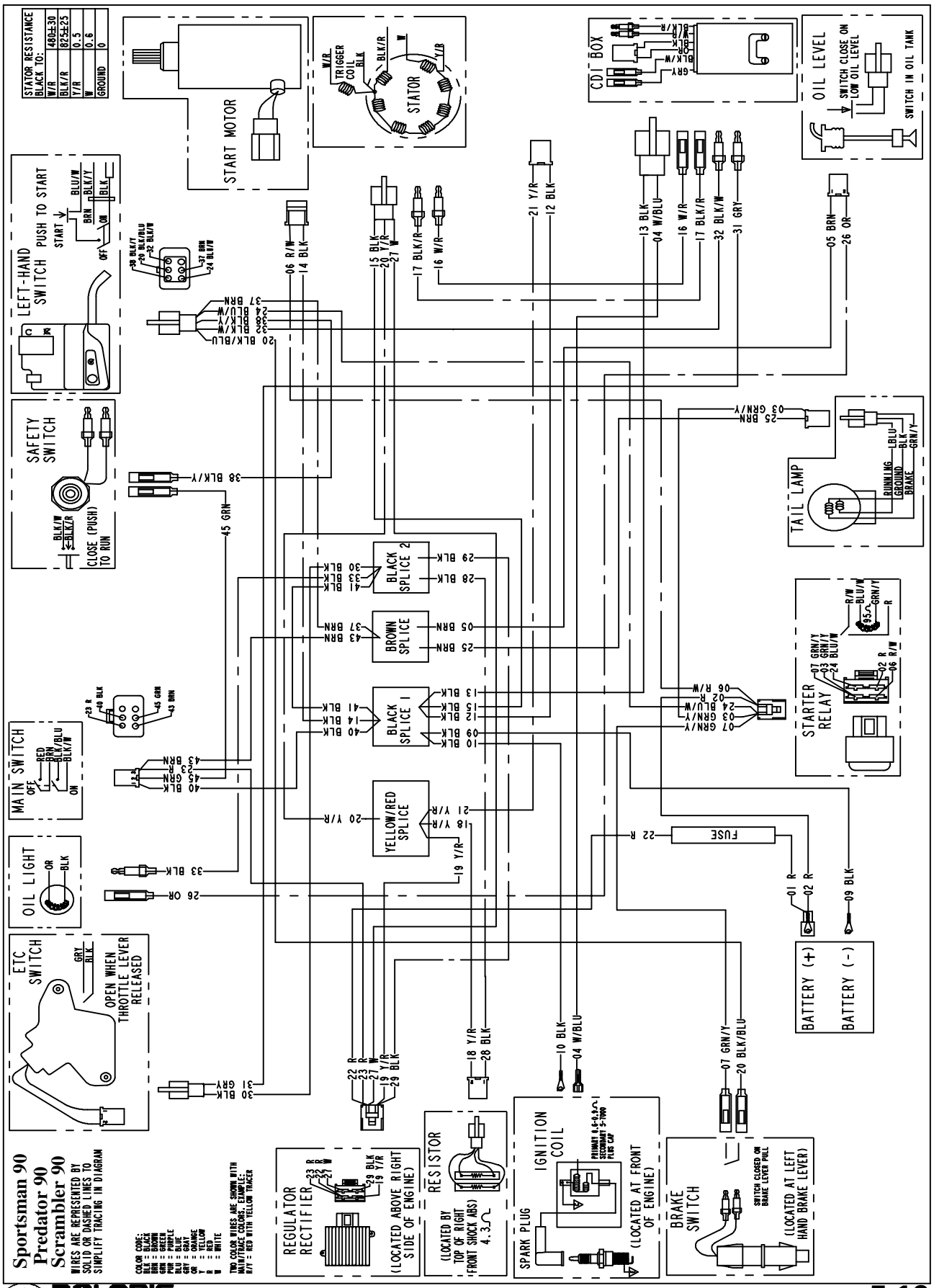
Scrambler 50/90, Predator 90 & Sportsman 90 Quick Reference Wire Diagram



SCRAMBLER 50 WIRING DIAGRAM



SCRAMBLER 90 / SPORTSMAN 90 / PREDATOR 90 WIRING DIAGRAM



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