CHAPTER 1
GENERAL INFORMATION

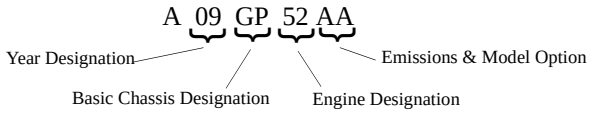
1

VEHICLE IDENTIFICATION

Model Identification

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

Machine Model Number Identification

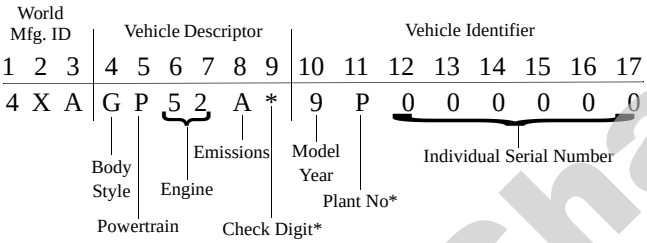


Engine Designation Numbers

ES045KLE013 - Single Cylinder, Liquid Cooled, SOHC 4-Stroke, Electric Start, 5-Speed Manual.

ES051KLE015,16 - Single Cylinder, Liquid Cooled, SOHC 4-Stroke, Electric Start, 5-Speed Manual.

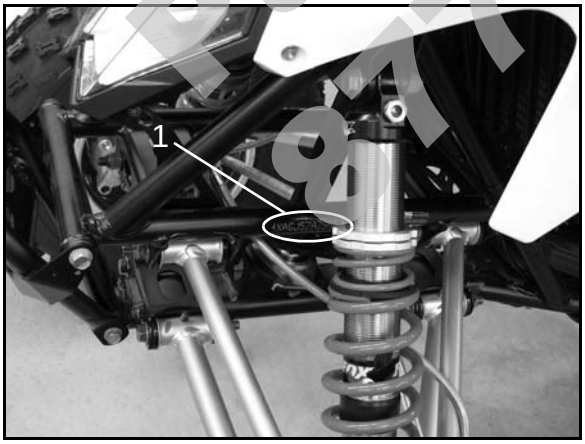
VIN Identification



* This could be either a number or a letter

Vehicle Identification Number (VIN) Location

Whenever corresponding with Polaris about a particular issue, the machine model number and serial number (VIN) are important for vehicle identification. The serial number (VIN) is stamped on the left side of the frame tube (1).



Engine Serial Number Location

The engine serial number is stamped into the casing on the lower left side of the crankcase (2).

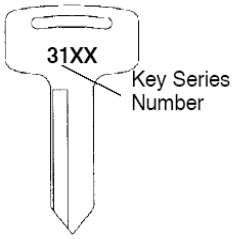
VEHICLE INFORMATION

Paint Codes

PAINTED PART	COLOR	NUMBER
Frame	Matte Black	P-458

Replacement Keys

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



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

Publication Numbers

YEAR	MODEL	MODEL NO.	OWNER'S MANUAL PN	PARTS MANUAL PN
2009	OUTLAW 450 "MXR"	A09GJ45AA	9921801	9921802
2009	OUTLAW 525 "S"	A09GJ52AA	9921801	9921804
2009	OUTLAW 525 "IRS"	A09GP52AA	9922079	9921808

NOTE: Additional Polaris factory publications can be found at www.polarisindustries.com or purchased from www.purepolaris.com.

Standard Torque Specifications

The following torque specifications are to be used as a general guideline.

FOR SPECIFIC TORQUE VALUES OF FASTENERS, refer to exploded views provided in the appropriate chapter. There are exceptions in the steering, suspension, and engine chapters.

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

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

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

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

SPECIFICATIONS

MODEL: 2009 OUTLAW 450 "MXR"

MODEL NUMBER: A09GJ45AA
ENGINE MODEL: ES045KLE013

Category	Specification
Length	71.5 in. / 182 cm
Width	47 in. / 119 cm
Height	45 in. / 114 cm
Minimum Turing Radius	67 in. / 170 cm
Wheel Base	50.5 in. / 128 cm
Ground Clearance	5 in. / 13 cm
Dry Weight	360 lbs. / 163 kg
Maximum Weight Capacity	215 lbs. / 98 kg
Oil Capacity	1.7 qts. / 1.6 ltr
Coolant Capacity	2.25 qts. / 2.1 ltr
Fuel Capacity	3.1 gal. / 11.8 ltr

MODEL: 2009 OUTLAW 525 "S"

MODEL NUMBER: A09GJ52AA
ENGINE MODEL: ES051KLE016

Category	Specification
Length	71.5 in. / 182 cm
Width	47.5 in. / 121 cm
Height	45 in. / 114 cm
Minimum Turing Radius	67 in. / 170 cm
Wheel Base	50.5 in. / 128 cm
Ground Clearance	5 in. / 13 cm
Dry Weight	370 lbs. / 168 kg
Maximum Weight Capacity	215 lbs. / 98 kg
Oil Capacity	1.7 qts. / 1.6 ltr
Coolant Capacity	2.25 qts. / 2.1 ltr
Fuel Capacity	3.1 gal. / 11.8 ltr

MODEL: 2009 OUTLAW 525 "IRS"

MODEL NUMBER: A09GP52AA
ENGINE MODEL: ES051KLE015

Category	Specification
Length	71.5 in. / 182 cm
Width	47.5 in. / 121 cm
Height	45 in. / 114 cm
Minimum Turing Radius	67 in. / 170 cm
Wheel Base	50.5 in. / 128 cm
Ground Clearance	11.5 in. / 29 cm
Dry Weight	390 lbs. / 177 kg
Maximum Weight Capacity	215 lbs. / 98 kg
Oil Capacity	1.7 qts. / 1.6 ltr
Coolant Capacity	2.25 qts. / 2.1 ltr
Fuel Capacity	3.1 gal. / 11.8 ltr

2009 OUTLAW 450 "MXR"

MODEL NUMBER: A09GJ45AA
ENGINE MODEL: ES045KLE013

Engine	
Platform / Design	KTM Liquid-cooled, single cylinder, SOHC, 4-stroke engine
Engine Model Number	ES045KLE013
Engine Displacement	448 cc
Number of Cylinders	1
Bore & Stroke (mm)	89 x 72 mm
Compression Ratio	11:1
Compression Pressure	n/a
Engine Idle Speed	1700-1800 RPM
Cooling System	Liquid 50/50
Thermostat Opening	158°F (70°C)
Overheat Warning	High Temp Light
Lubrication System	Dry Sump / Internal Reservoir
Lubrication Function	Pressure Circulation Lubrication with 2 Rotor Pumps
Oil Requirements	PS-4 Plus (2W-50 Synthetic)
Exhaust System	2 to 1 canister style
Carburetion	
Carburetor model	Keihin FCR-MX 39mm
Main Jet	138
Pilot Jet	45
Slow Air Jet	70
Jet Needle	OBDVR
Needle Clip	#3
Pilot Screw	n/a
Float Height	Parallel to Bowl Sealing Surface
Fuel Delivery	Impulse Fuel Pump
Fuel Requirement	Premium 91 Octane (minimum)
Electrical	
Alternator Output	12V / 200W @ 3000 RPM
Voltage Regulator	3-Phase
Lights : Main Headlight	Single / High-Low / 50 Watts
Tail	LED
Brake	LED
Neutral / Hot / Reverse	1 Watt (ea.)
Ignition System	DC/CDI Kokusan Ignition
RPM Limit	10000 / Reverse 6000
Ignition Timing	$25^{o} \pm 3^{o}$ BTDC @ 3500 RPM
Spark plug / Gap	NGK DCPR8E / .024 in. (0.6 mm)
Battery / Model / Amp Hr	Maintenance-Free 9 Amp Hr
Circuit Breakers (Amps)	Main-10 / Fan-10 / Ignition-5
Starting	Electric - Standard
Instrument Cluster	N/A

Drivetrain	
Transmission Type	Manual 5-Speed w/Reverse
Counter Sprocket - # Tooth	14
Rear Sprocket - # Tooth	38
Primary Ratio	2.516
Gear Ratio : 1st 2nd 3rd 4th 5th Rev	2.500 1.941 1.579 1.333 1.130 2.429
Chain Size / Deflection	520 O-ring / 1/4-3/8" (6-8mm)
Clutch Type	Wet Multi Disc
Steering / Suspension	
Front Suspension Style / Shock	Dual A-arm / FOX™ PODIUM X Compression Adjustable Shock
Front Travel	10 in. / 25 cm
Rear Suspension Style / Shock	Swing Arm / FOX™ PODIUM X Compression & Rebound Adjustable Shock
Rear Travel	11 in. / 28 cm
Shock Preload Adjustment Front and Rear	Threaded shock adjustment with Spanner Wrench
Turning Radius	67 in. / 170 cm
Toe Out	0 - 1/16 in / .0 - .159 mm
Wheels / Brakes	
Front Wheel Size / Offset / Bolt Pattern	10x5 / 28.3 mm - 4/156
Rear Wheel Size / Offset / Bolt Pattern	9x8 / 58.8 mm - 4/110
Front Tire Make / Model / Size	Maxxis / RAZR-MX / 20x6-10
Rear Tire Make / Model / Size	Maxxis / RAZR-MX / 18x10-9
Recommended Air Pressure Front / Rear	4 psi (27.6 kPa)
Brake - Front	Hydraulic Disc, Dual Bore
Brake - Rear	Hydraulic Disc
Parking Brake	Hydraulic Lock, Front Wheel

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40° F Below 5° C	+40° F + Above +5° C + Above
Meters (Feet)	0-1800 (0-6000)	Main Jet: **148** Clip Position: **#3**	Main Jet: **138** Clip Position: **#3**
	above 1800 (above 6000)	Main Jet: **138** Clip Position: **#2**	Main Jet: **125** Clip Position: **#2**

2009 OUTLAW 525 "S"

MODEL NUMBER: A09GJ52AA
ENGINE MODEL: ES051KLE016

Engine	
Platform / Design	KTM Liquid-cooled, single cylinder, SOHC, 4-stroke engine
Engine Model Number	ES051KLE016
Engine Displacement	510cc
Number of Cylinders	1
Bore & Stroke (mm)	95 x 72 mm
Compression Ratio	11:1
Compression Pressure	n/a
Engine Idle Speed	1700-1800 RPM
Cooling System	Liquid 50/50
Thermostat Opening	158°F (70°C)
Overheat Warning	High Temp Light
Lubrication System	Dry Sump / Internal Reservoir
Lubrication Function	Pressure Circulation Lubrication with 2 Rotor Pumps
Oil Requirements	PS-4 Plus (2W-50 Synthetic)
Exhaust System	2 to 1 canister style
Carburetion	
Carburetor model	Keihin FCR-MX 39mm
Main Jet	138
Pilot Jet	45
Slow Air Jet	100
Jet Needle	OBDVS
Needle Clip	#4
Pilot Screw	n/a
Float Height	Parallel to Bowl Sealing Surface
Fuel Delivery	Impulse Fuel Pump
Fuel Requirement	Premium 91 Octane (minimum)
Electrical	
Alternator Output	12V / 200W @ 3000 RPM
Voltage Regulator	3-Phase
Lights : Main Headlight	Single / High-Low / 50 Watts
Tail	LED
Brake	LED
Neutral / Hot / Reverse	1 Watt (ea.)
Ignition System	DC/CDI Kokusan Ignition
RPM Limit	10000 / Reverse 6000
Ignition Timing	$25^{o} \pm 3^{o}$ BTDC @ 3500 RPM
Spark plug / Gap	NGK DCPR8E / .024 in. (0.6 mm)
Battery / Model / Amp Hr	Maintenance-Free 9 Amp Hr
Circuit Breakers (Amps)	Main-10 / Fan-10 / Ignition-5
Starting	Electric - Standard
Instrument Cluster	N/A

Drivetrain	
Transmission Type	Manual 5-Speed w/Reverse
Counter Sprocket - # Tooth	14
Rear Sprocket - # Tooth	38
Primary Ratio	2.516
Gear Ratio : 1st 2nd 3rd 4th 5th Rev	2.500 1.941 1.579 1.333 1.130 2.429
Chain Size / Deflection	520 O-ring / 1/4-3/8" (6-8mm)
Clutch Type	Wet Multi Disc
Steering / Suspension	
Front Suspension Style / Shock	Dual A-arm / FOX™ PODIUM
Front Travel	10 in. / 25 cm
Rear Suspension Style / Shock	Swing Arm / FOX™ PODIUM X Compression & Rebound Adjustable Shock
Rear Travel	11 in. / 28 cm
Shock Preload Adjustment Front and Rear	Threaded shock adjustment with Spanner Wrench
Turning Radius	67 in. / 170 cm
Toe Out	0 - 1/16 in / .0 - .159 mm
Wheels / Brakes	
Front Wheel Size / Offset / Bolt Pattern	10x5 / 28.3 mm - 4/156
Rear Wheel Size / Offset / Bolt Pattern	9x8 / 58.8 mm - 4/110
Front Tire Make / Model / Size	Maxxis / RAZR-R / 21x7-10
Rear Tire Make / Model / Size	Maxxis / RAZR-R / 20x10-9
Recommended Air Pressure Front / Rear	4 psi (27.6 kPa)
Brake - Front	Hydraulic Disc, Dual Bore
Brake - Rear	Hydraulic Disc
Parking Brake	Hydraulic Lock, Front Wheel

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40° F Below 5° C	+40° F + Above +5° C + Above
Meters (Feet)	0-1800 (0-6000)	Main Jet: **148** Clip Position: **#4**	Main Jet: **138** Clip Position: **#4**
	above 1800 (above 6000)	Main Jet: **138** Clip Position: **#3**	Main Jet: **128** Clip Position: **#3**

2009 OUTLAW 525 "IRS"

MODEL NUMBER: A09GP52AA
ENGINE MODEL: ES051KLE015

Engine	
Platform / Design	KTM Liquid-cooled, single cylinder, SOHC, 4-stroke engine
Engine Model Number	ES051KLE015
Engine Displacement	510cc
Number of Cylinders	1
Bore & Stroke (mm)	95 x 72 mm
Compression Ratio	11:1
Compression Pressure	n/a
Engine Idle Speed	1700-1800 RPM
Cooling System	Liquid 50/50
Thermostat Opening	158°F (70°C)
Overheat Warning	High Temp Light
Lubrication System	Dry Sump / Internal Reservoir
Lubrication Function	Pressure Circulation Lubrication with 2 Rotor Pumps
Oil Requirements	PS-4 Plus (2W-50 Synthetic)
Exhaust System	2 to 1 canister style
Carburetion	
Carburetor model	Keihin FCR-MX 39mm
Main Jet	148
Pilot Jet	45
Slow Air Jet	100
Jet Needle	OBDVS
Needle Clip	#4
Pilot Screw	n/a
Float Height	Parallel to Bowl Sealing Surface
Fuel Delivery	Impulse Fuel Pump
Fuel Requirement	Premium 91 Octane (minimum)
Electrical	
Alternator Output	12V / 200W @ 3000 RPM
Voltage Regulator	3-Phase
Lights : Main Headlight	Single / High-Low / 50 Watts
Tail	LED
Brake	LED
Neutral / Hot / Reverse	1 Watt (ea.)
Ignition System	DC/CDI Kokusan Ignition
RPM Limit	10000 / Reverse 6000
Ignition Timing	$25^{o} \pm 3^{o}$ BTDC @ 3500 RPM
Spark plug / Gap	NGK DCPR8E / .024 in. (0.6 mm)
Battery / Model / Amp Hr	Maintenance-Free 9 Amp Hr
Circuit Breakers (Amps)	Main-10 / Fan-10 / Ignition-5
Starting	Electric - Standard
Instrument Cluster	N/A

Drivetrain	
Transmission Type	Manual 5-Speed w/Reverse
Counter Sprocket - # Tooth	14
Rear Sprocket - # Tooth	38
Primary Ratio	2.516
Gear Ratio : 1st 2nd 3rd 4th 5th Rev	2.500 1.941 1.579 1.333 1.130 2.429
Chain Size / Deflection	520 O-ring / 1/4-3/8" (6-8mm)
Clutch Type	Wet Multi Disc
Steering / Suspension	
Front Suspension Style / Shock	Dual A-arm / FOX™ PODIUM
Front Travel	10 in. / 25 cm
Rear Suspension Style / Shock	Independent A-Arm / FOX™ Compression Adjustable Shock
Rear Travel	10 in. / 25 cm
Shock Preload Adjustment Front and Rear	Threaded shock adjustment with Spanner Wrench
Turning Radius	67 in. / 170 cm
Toe Out	0 - 1/16 in / .0 - .159 mm
Wheels / Brakes	
Front Wheel Size / Offset / Bolt Pattern	10x5 / 28.3 mm - 4/156
Rear Wheel Size / Offset / Bolt Pattern	10x8 / 55.3 mm - 4/110
Front Tire Make / Model / Size	Maxxis / RAZR-R / 21x7-10
Rear Tire Make / Model / Size	Maxxis / RAZR-R / 20x10-10
Recommended Air Pressure Front / Rear	4 psi (27.6 kPa)
Brake - Front	Hydraulic Disc, Dual Bore
Brake - Rear	Hydraulic Disc
Parking Brake	Hydraulic Lock, Front Wheel

JETTING CHART

Altitude		AMBIENT TEMPERATURE	
		Below 40° F Below 5° C	+40° F + Above +5° C + Above
Meters (Feet)	0-1800 (0-6000)	Main Jet: **158** Clip Position: **#4**	Main Jet: **148** Clip Position: **#4**
	above 1800 (above 6000)	Main Jet: **148** Clip Position: **#3**	Main Jet: **138** Clip Position: **#3**

SPECIAL TOOLS

"Chassis" Special Tools

PART NUMBER*	TOOL DESCRIPTION	CHAPTER TOOL USED IN
PV-39951-A	Engine Tachometer	2, 7
2870975	Mity Vac™ Pressure Test Tool	4, 6
PA-48282	Rear Hub Tool	5
2200421	Gas Shock Recharging Kit (FOX™)	5
2871352	Shock Rod Holding Tool (FOX™)	5
2871351	Shock IFP Depth Tool (FOX™)	5
2871352	Shock Rod Holding Tool - 1/2"	5
2872429	Shock Rod Holding Tool - 5/8"	5
2871071	Shock Body Clamp	5
7052069-A	Charging Needle	5
2201639	Seal Bullet Tool	5
2201640	Seal Bullet Tool	5
PV-43568	Fluke™ 77 Digital Multimeter	7
2870630	Timing Light	7

*Special Tools can be ordered through a Polaris Dealer or SPX Corporation (1-800-328-6657).

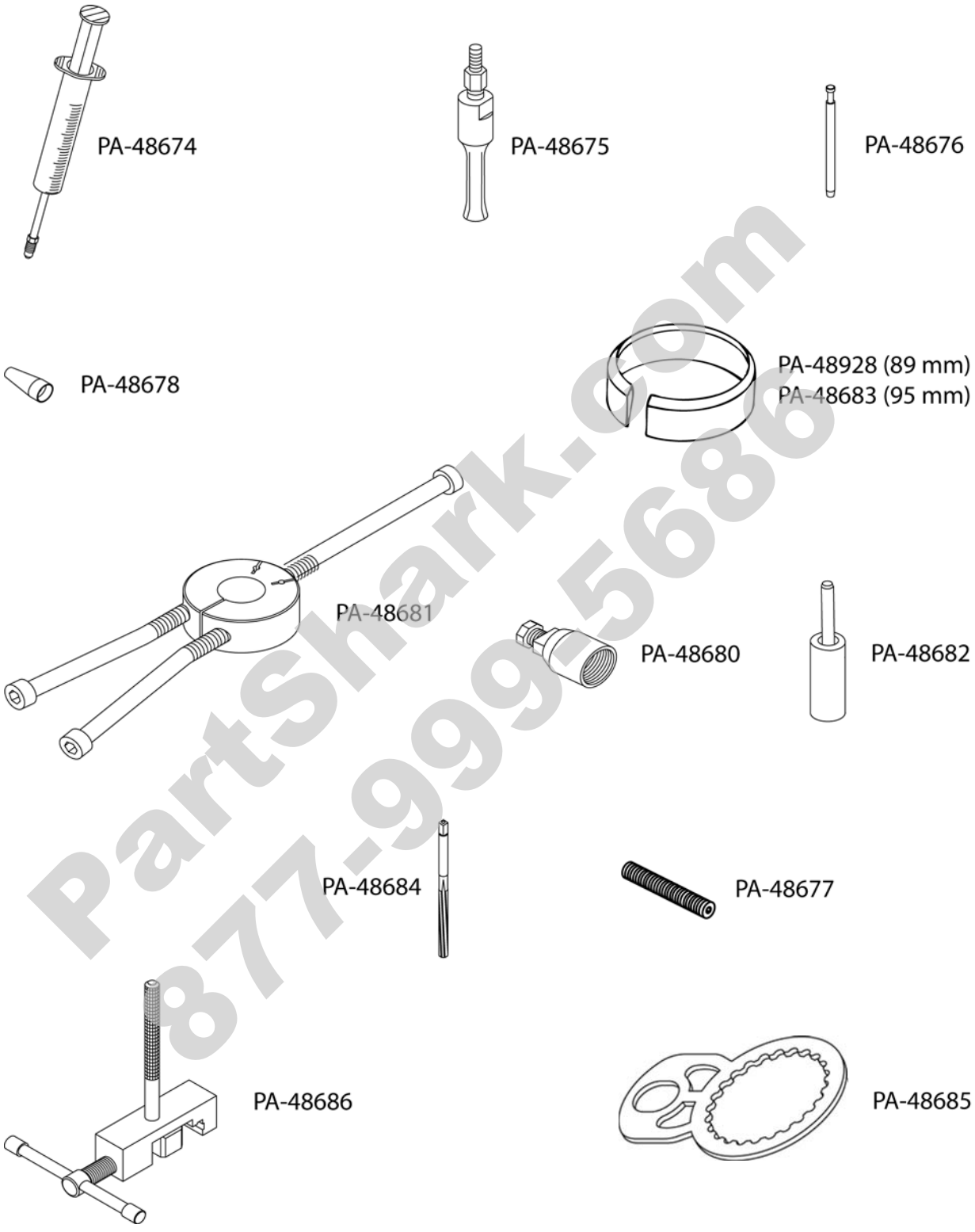
"KTM Engine" Special Tool Cross-Reference

POLARIS PART NUMBER*	KTM PART NUMBER**	TOOL DESCRIPTION
PA-46502	n/a	Valve Spring Compressor
PA-48700	n/a	Adaptor, Valve Spring Compressor
PA-48674	503.29.050.000	Hydraulic Clutch Bleeder
PA-48675	151.12.018.100	Internal Gear Puller (18-23 mm)
PA-48676	590.29.026.006	Valve Guide Limit Gauge
PA-48677	n/a	Crankshaft Locking Tool
PA-48678	590.29.005.010	Water Pump Seal Installer
PA-48680	580.12.009.000	Flywheel Puller
PA-48681	584.29.037.037	Main Bearing Removal Tool
PA-48682	590.29.018.000	Valve Guide Installation Tool
PA-48928	580.12.015.089	Piston Ring Compressor (89 mm)
PA-48683	580.12.015.095	Piston Ring Compressor (95 mm)
PA-48684	590.29.018.050	Valve Guide Reamer
PA-48685	590.29.003.100	Clutch Holder
PA-48686	590.29.020.000	Riveting Tool for Cam Chain

*Special Tools can be ordered through a Polaris Dealer or SPX Corporation (1-800-328-6657).

**KTM special tool part numbers are provided as a cross-reference for any existing KTM dealer that is already equipped with KTM special tools.

KTM Engine Special Tools



MISC. NUMBERS / CHARTS

SAE Tap / Drill Sizes

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

Metric Tap / Drill Sizes

Tap Size	Drill Size	Decimal Equivalent	Nearest Fraction
3x.50	#39	0.0995	3/32
3x.60	3/32	0.0937	3/32
4x.70	#30	0.1285	1/8
4x.75	1/8	0.125	1/8
5x.80	#19	0.166	11/64
5x.90	#20	0.161	5/32
6x1.00	#9	0.196	13/64
7x1.00	16/64	0.234	15/64
8x1.00	J	0.277	9/32
8x1.25	17/64	0.265	17/64
9x1.00	5/16	0.3125	5/16
9x1.25	5/16	0.3125	5/16
10x1.25	11/32	0.3437	11/32
10x1.50	R	0.339	11/32
11 x 1.50	3/8	0.375	3/8
12x1.50	13/32	0.406	13/32
12x1.75	13/32	0.406	13/32

Decimal Equivalents

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

Coversion 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 9.807	= 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	= Kilo pascals (kPa)
Kilo pascals (kPa)	x 0.145	= Pounds - force per square inch (psi)
Kilo pascals (kPa)	x 0.01	= Kilograms - force per square cm
Kilograms - force per square cm	x 98.1	= Kilo pascals (kPa)
ð(3.14)xR^2xH (height)		= Cylinder Volume

°C to °F: $^{9/5}$(°C + 32) = °F

°F to °C: $^{5/9}$(°F - 32) = °C

Glossary of Terms

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

CHAPTER 2
MAINTENANCE

PERIODIC MAINTENANCE CHART

Periodic Maintenance Overview

Inspection, adjustment and lubrication of important components are explained in the periodic maintenance chart.

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

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

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

Severe Use Definition

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

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

Break-In Period

Careful treatment of a new engine and transmission will result in more efficient performance and longer life for both. The break-in period consists of the first three hours of operation, or the time it takes to use 5-6 gallons (20 liters) of fuel. Do not allow engine speed to exceed 7000 RPM during the break-in period. Follow the break-in period with an additional 12 hours of cautious operation, with engine speed below 75% of capacity. See "Owner's Manual" for additional break-in information.

Maintenance Chart Key

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

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

▸ = SEVERE USE ITEM: See information provided above.

E = Emission Control System Service (California).

• = Use Polaris Premium All Season Grease.

! = Perform After the 3 Hour Break-In Period.

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

⚠ WARNING

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

Pre-Ride Maintenance Interval

Periodic Maintenance Chart

Item		Maintenance Interval (whichever comes first)			Remarks
		Hours	Calendar	Fuel Used in gallons (liters)	
■	Steering	-	Pre-Ride	-	Make adjustments as needed.
▸	Front / Rear Suspension	-	Pre-Ride	-	
	Tires	-	Pre-Ride	-	
▸	Brake Systems Fluid level / Lever travel	-	Pre-Ride	-	
	Wheels / Frame Fasteners	-	Pre-Ride	-	
▸ E	Engine Oil Level	-	Pre-Ride	-	
	Drive Chain	-	Pre-Ride	-	
	Throttle	-	Pre-Ride	-	Check operation
	Fuel Lines	-	Pre-Ride	-	Check for leaks
▸	Clutch System / Oil	-	Pre-Ride	-	Check operation, adjustment, oil level
	Engine Stop Switch	-	Pre-Ride	-	Check operation
▸ E	Air Filter Element	-	Pre-Ride	-	Inspect; clean often
▸ E	Air Box Sediment Tube	-	Pre-Ride	-	Drain deposits when visible
	Coolant	-	Pre-Ride	-	Check level daily, change coolant every 2 years
	Head Lamp / Tail Lamp	-	Pre-Ride	-	Check operation; apply dielectric grease if replacing
▸	A-arm Ball Joint	-	Pre-Ride		Check freeplay daily; have dealer replace if wheel moves excessively
	Rear Shaft Assembly	-	Pre-Ride Post-Ride	-	Check pre-ride for tears, punctures, leaking. Check post-ride for bulging / ballooning. Replace if damaged. Burp if bulging.

▸ Perform these procedures more often for vehicles subjected to severe use.

E Emission Control System Service (California)

■ Have an authorized Polaris dealer perform these services.

• Use Polaris Premium All Season Grease.

Recommended Pre-Ride Fluid Level Checks

ITEM	TYPE	NOTES	SEE PAGE
Engine / Trans Oil	Polaris PS-4 Plus (2W-50 Synthetic)	Check crankcase site glass for proper oil level.	2.15
Coolant / Level	Polaris Premium 60/40 Pre–mixed Antifreeze/Coolant or a 50/50 mixture high quality antifreeze/ coolant and distilled water	Allow engine and cooling system to cool completely and check level in radiator. Fill to top of filler neck. If reservoir was empty or extremely low, fill radiator before filling reservoir tank to full line.	2.20
Brake Fluid	Polaris DOT 4 Brake Fluid	Fill to indicated level inside reservoir. Use the sight glass to ensure the proper fluid level.	2.38

NOTE: Quick reference lubricants and maintenance product part numbers are listed on page 2.9

10 - 60 Hour Maintenance Interval

Periodic Maintenance Chart

	Item	Maintenance Interval (whichever comes first) Hours	Calendar	Fuel Used in gallons (liters)	Remarks
▸ ■	Brake Pad Wear	10 H	Monthly	-	Inspect regularly
	Battery	10 H	Monthly	-	Check terminals; clean; test
▸	Rear Sprocket Bolts	10 H	Monthly	-	Check; torque
▸ E	Air Filter Element	15 H	Weekly	-	Inspect; clean, replace as needed
▸ E !	Engine Oil and Filter Change	15 H	6 M	26 (100)	Drain and change the oil and oil filters; perform a break-in oil change after the **first 3 hours** of operation
▸ E !	Engine Oil Screens / Drain Plug	15 H	6 M	26 (100)	Remove and clean the short and long oil screens; perform during the break-in oil change after the **first 3 hours** of operation
E !	Engine Oil Lines	15 H	6 M	26 (100)	Check lines for damage or bends
!	Carb Adaptor Boot	15 H	6 M	26 (100)	Check for cracks and leaks
!	Idle Speed	15 H	6 M	26 (100)	Check; adjust as needed
!	Engine Mounting Bolts	15 H	6 M	26 (100)	Check; torque
!	Valve Clearance	15 H	6 M	26 (100)	Check; adjust
!	Shift Lever Bolt	15 H	6 M	26 (100)	Check; torque
	Wet Clutch	30 H	6 M	52 (200)	Check discs for wear
E	Spark Plug	30 H	6 M	52 (200)	Replace; inspect plug cap
▸ ●	General Lubrication	45 H	6 M	78 (300)	Lubricate all fittings, pivots, cables, etc.
	Carburetor Float Bowl	45 H	6 M	78 (300)	Drain bowl periodically and prior to storage
■ E	Throttle Cable / ETC Switch	45 H	6 M	78 (300)	Inspect; adjust; lubricate or replace if necessary
▸	Drive Chain	45 H	6 M	78 (300)	Adjust and lubricate as needed
▸ ■	Brake Pad Replacement	45 H	6 M	78 (300)	To be performed by a Polaris MSD trained technician
!	Cooling System	45 H	6 M	78 (300)	Inspect coolant strength seasonally
▸ ■	Front / Rear Suspension	45 H	6 M	78 (300)	Inspect; tighten fasteners; grease (especially after washing or driving in high water levels) **See page 2.6**
■	Steering	45 H	6 M	78 (300)	Lubricate
	Clutch Springs	60 H	12 M	104 (400)	Check spring length
	Cam Chain Tensioner	60 H	12 M	104 (400)	Check ratchet teeth for wear

! Perform after the 3 hour break-in period.

▸ Perform these procedures more often for vehicles subjected to severe use.

E Emission Control System Service (California)

■ Have an authorized Polaris dealer perform these services.

● Use Polaris Premium All Season Grease.

45 - 90 Hour Grease Lubrication Maintenance Interval

Periodic Maintenance Chart

	Item	Maintenance Interval (whichever comes first)			Remarks
		Hours	**Calendar**	**Fuel Used** in gallons (liters)	
▸ ●	Upper Steering Post (A)	45 H	6 M	-	Inspect; tighten fasteners; grease (also after washing ATV or driving in water)
▸ ●	Front A-arms (B)	45 H	6 M	-	
▸ ●	Stabilizer Bar (C)	45 H	6 M	-	
▸ ●	Rear Axle Housing (D)	45 H	6 M	-	Inspect; grease (also after washing ATV or driving in water)
▸ ●	Rear Control Arm Needle Bearings (E)	90 H	12 M	-	Disassemble, clean, inspect bearings and seals, grease, reassemble
▸ ●	Rear Bearing Carrier Needle Bearings (F)	90 H	12 M	-	

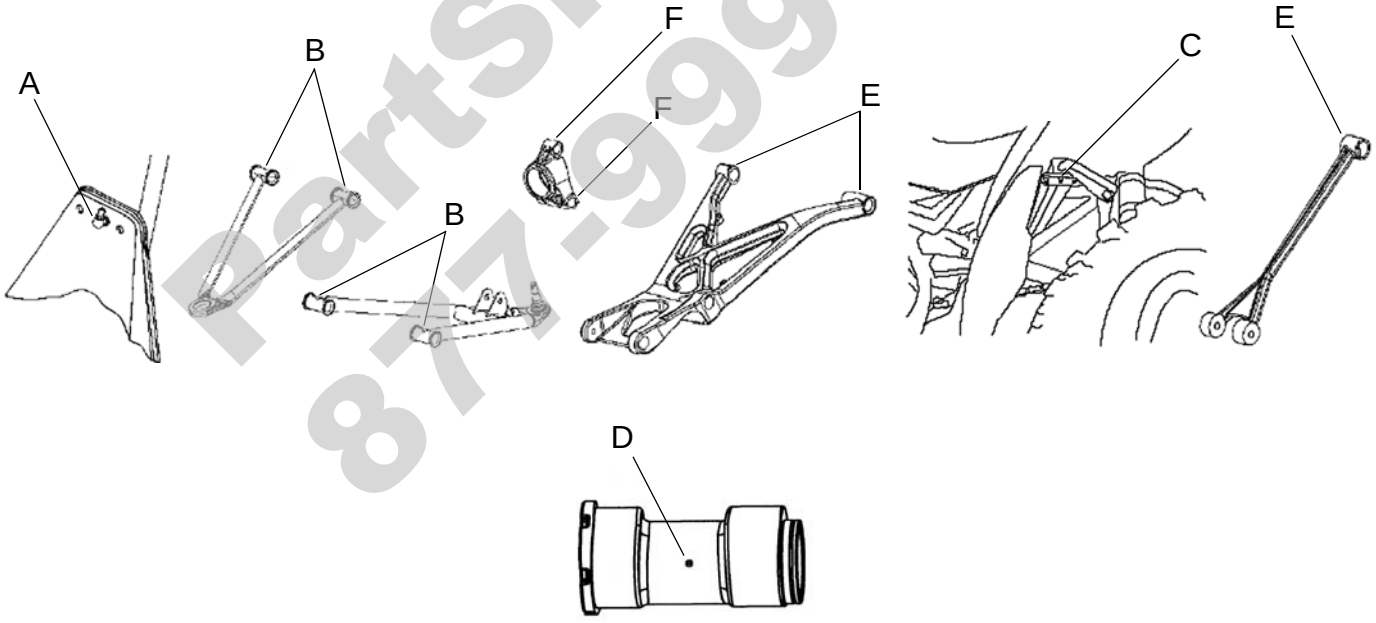
! Perform after the 3 hour break-in period.

▸ Perform these procedures more often for vehicles subjected to severe use.

E Emission Control System Service (California)

■ Have an authorized Polaris dealer perform these services.

● Use Polaris Premium All Season Grease.

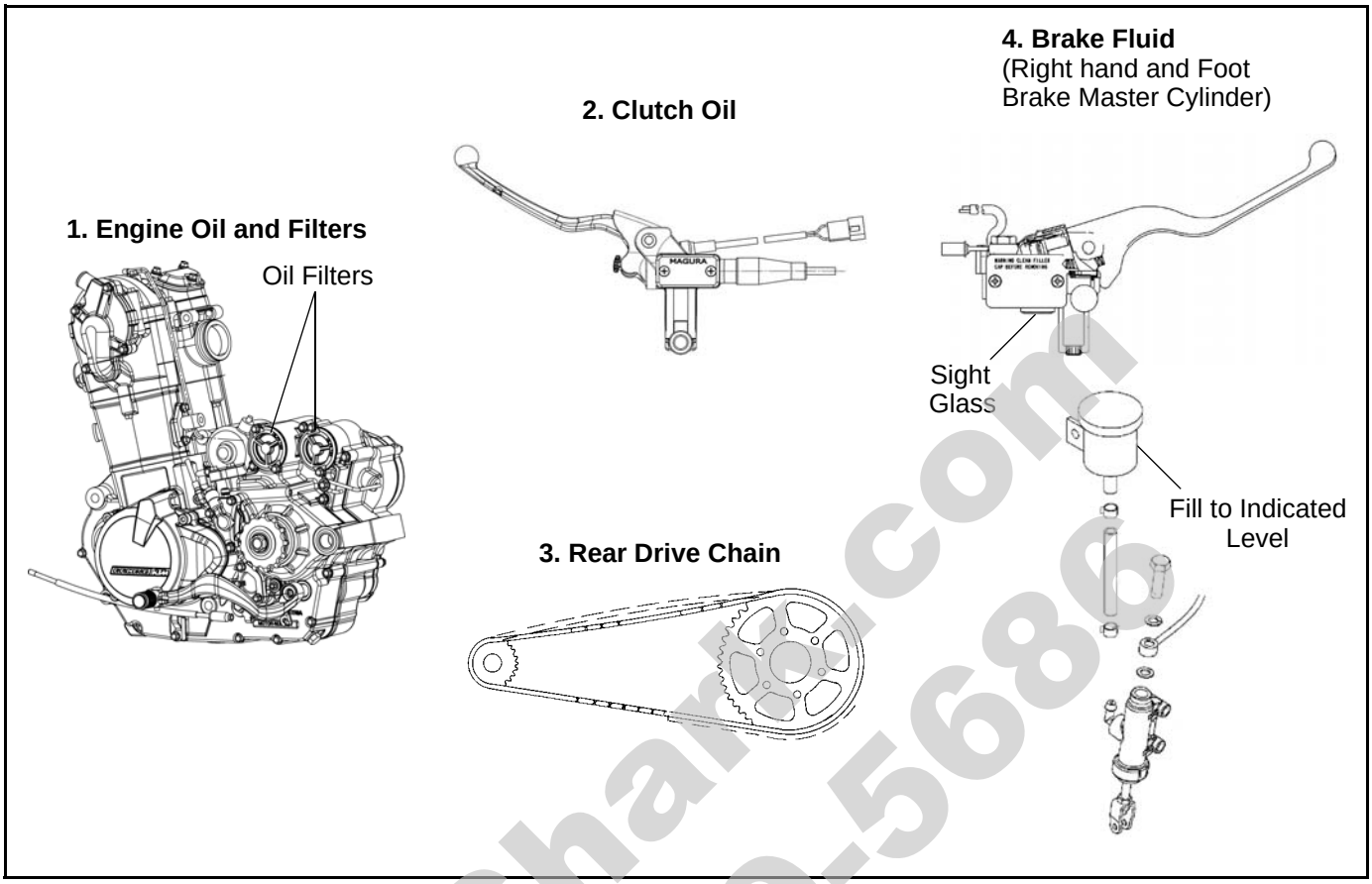


90 - 300 Hour Maintenance Interval

Periodic Maintenance Chart

Item		Maintenance Interval (whichever comes first)			Remarks
		Hours	Calendar	Fuel Used in gallons (liters)	
	Coolant System Pressure Test	90 H	12 M	156 (600)	Pressure test system annually
▶	Cooling Hoses	90 H	12 M	156 (600)	Inspect for leaks
▶	Radiator	90 H	12 M	156 (600)	Inspect; clean external surfaces; change coolant every 2 years
■ E	Fuel System	90 H	12 M	156 (600)	Check for leaks at tank cap, lines, fuel valve, filter, and carburetor. Replace lines every 2 years
	Cylinder and Piston	90 H	-	156 (600)	Inspect; measure; replace as needed
	Piston Pin Circlip Groove	90 H	-	156 (600)	Visual inspection for wear
	Compression Ring Oil Scraper Ring	90 H	-	156 (600)	Measure ring gap and replace if at or above service limit. See “Engine Manual”.
	Camshaft	90 H	-	156 (600)	Visual inspection for wear
	Camshaft Bearings	90 H	-	156 (600)	Replace
	Valve Springs	90 H	-	156 (600)	Measure free length; replace as needed
	Valve Spring Cap	90 H	-	156 (600)	Visual inspection for wear
	Valve Seats / Guides	90 H	-	156 (600)	Measure for wear; replace as needed
	Rocker Arm / Rollers	90 H	-	156 (600)	Measure radial clearance; replace as needed
	Timing Chain	90 H	-	156 (600)	Replace
	Cam Chain Tensioner	90 H	-	156 (600)	Check ratchet teeth for wear
	Bearings (Connecting Rod, Balance Shaft, Crankshaft Main)	90 H	-	156 (600)	Replace
	Crankshaft Run-Out	90 H	-	156 (600)	Measure; adjust as needed
	Oil Pressure Valve	90 H	-	156 (600)	Measure spring; replace as needed
	Transmission	90 H	-	156 (600)	Check entire transmission / bearings for wear; replace as needed
■ E	Ignition Timing	-	12 M	-	Inspect; adjust as needed
!	Hydraulic Clutch Fluid	90 H	12 M	-	Bleed as needed; change yearly
	Exhaust Pipe	100 H	12M	-	Inspect
▶	Wiring	100 H	12M	-	Inspect for wear, routing, security; apply dielectric grease to connectors subjected to water, mud, etc.
■	Carburetor	-	12 M	-	Clean and adjust
■	Jet Needle / Needle Jet	180 H	24 M	-	Replace
■	Brake Fluid	180 H	24 M	-	
	Spark Arrestor	300 H	36 M	-	Clean out
■	Wheel Bearings Front / Rear	300 H	36 M	-	Inspect; replace as needed
■	Toe Adjustment	-			Inspect periodically; adjust when parts are replaced
	Headlight Aim	-			Adjust as needed

Maintenance References



III. #	Item	Lube Rec.	Method	Frequency*
1.	Engine Oil / Transmission	Polaris PS-4 Plus 2W-50 Synthetic	View the oil level through the sight glass on the right side of the engine.	Perform break–in oil / filter change at 3 hours; change oil every 15 hours. **
2.	Clutch Oil	Hydraulic Clutch Oil	Check fluid level, fill to 4 mm below upper edge of reservoir.	Bleed as required. Change oil annually *
3.	Drive Chain	Polaris Chain Lube	Apply to chain link plates and rollers.	As required *
4.	Brake Fluid	Polaris DOT 4 Brake Fluid	Fill master cylinder reservoirs to indicated level inside reservoir.	As required. Change fluid every 2 years or 180 hours. ***

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

** Every 15 hours of operation (refer to Maintenance Schedule for additional information). Change more often in extremely dirty conditions, such as continuous operation in water, mud or sand, continuous hot, cold, or short trip cold weather operation.

NOTE: Excessive clutch plate residue will accelerate oil change intervals.

*** Every 24 months or 180 hours of operation (refer to Maintenance Schedule for additional information).
More often under severe conditions such as continuous operation in water, mud or sand.

LUBRICANTS AND SERVICE PRODUCTS

Polaris Lubricants, Maintenance and Service Products

PART NO.	DESCRIPTION
	ENGINE LUBRICANT
2876244	PS-4 Plus Engine Oil (Quart) 2W-50 Synthetic (4-Cycle)
2876245	PS-4 Plus Engine Oil (Gallon) 2W-50 Synthetic (4-Cycle)
	GREASE / SPECIALIZED LUBRICANTS
2871322	Premium All Season Grease (3 oz. cartridge)
2871423	Premium All Season Grease (14 oz. cartridge)
1350046	Rear Shaft Grease
2871460	Starter Drive Grease
2871312	Grease Gun Kit
2871329	Dielectric Grease
2876335	Hydraulic Clutch Oil (Quart)
2872348	Chain Lube, Aerosol (16 oz.)
	COOLANT
2871323	60/40 Coolant (Gallon)
2871534	60/40 Coolant (Quart)
	ADDITIVES / SEALANTS / THREAD LOCKING AGENTS / MISC.
2870791	Fogging Oil (12 oz. Aerosol)
2871326	Premium Carbon Clean (12 oz.)
2870652	Fuel Stabilizer (16 oz.)
2870585	Loctite™ Primer N, Aerosol, 25 g
2872189	DOT 4 Brake Fluid
2871956	Loctite™ Thread Sealant 565 (50 ml.)
2871949	Loctite™ Threadlock 242 (50 ml.)
2871950	Loctite™ Threadlock 242 (6 ml.)
2871951	Loctite™ Threadlock 262 (50 ml.)
2871952	Loctite™ Threadlock 262 (6 ml.)
2871953	Loctite™ Threadlock 271 (6 ml.)
2871954	Loctite™ Threadlock 271 (36 ml.)
2870584	Loctite™ RC 680–Retaining Compound (10 ml.)
2870587	Loctite™ 518 Gasket Eliminator / Flange Sealant (50 ml.)
2871957	Black RTV Silicone Sealer (3 oz. tube)
2871958	Black RTV Silicone Sealer (11 oz. cartridge)
8560054	Silicone Sealer (14 oz. cartridge)
2871557	Crankcase Sealant, 3–Bond 1215
2872893	Engine Degreaser

GENERAL VEHICLE INSPECTION AND MAINTENANCE

Pre-Ride / Daily Inspection

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

- Tires – check condition and pressures
- Chain - check tension, lubricate, adjust as needed
- Fuel Tank – fill tank to proper level; Check for leaks
- All Brakes – check operation and fluid level
- Throttle – check for free operation
- Headlight / Taillight / Brakelight – check operation of all lights, indicator lamps and switches
- Engine Stop Switch / Key Switch – check for proper function
- Wheels – check for loose wheel nuts and axle nuts; check to be sure axle nuts are secured by cotter pins
- Air Cleaner Element – check for dirt or water; clean or replace
- Steering – check for free operation, noting any unusual looseness in any area
- Loose Parts – visually inspect vehicle for any damaged or loose nuts, bolts or fasteners
- Engine Coolant – check for proper level at the recovery bottle

Frame, Nuts, Bolts, and 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.

FUEL SYSTEM AND AIR INTAKE

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. Do not fill the tank neck.
- If you get gasoline in your eyes, or if you swallow gasoline, seek medical attention immediately.
- If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.
- Never start the engine or let it run in an enclosed area. Engine exhaust fumes are poisonous and can result in loss of consciousness or death in a short period of 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

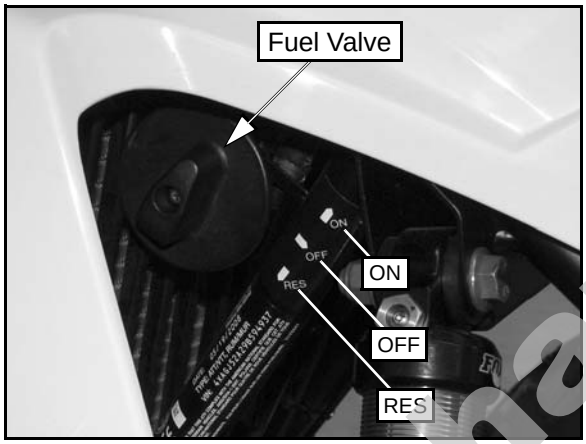
Check engine, fuel tank, and carburetor vent lines for signs of wear, deterioration, damage, or leakage. Replace every two years. Be sure vent lines are routed properly and secured with cable ties.

⚠ CAUTION

Make sure lines are not kinked or pinched

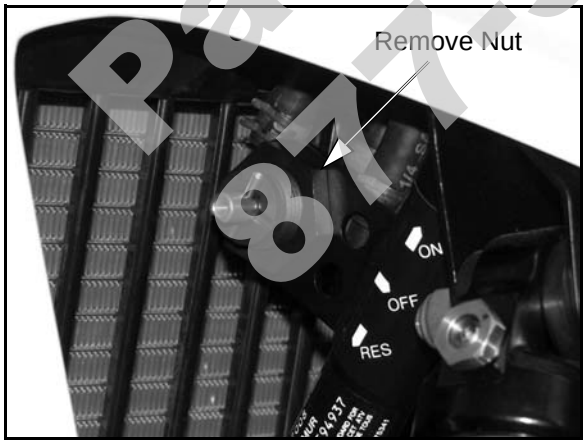
Fuel Valve

The fuel valve is located on the right side under the front fender.



Service / Replacement:

1. Turn the valve to the "OFF" position and remove the phillips head screw and adjustment knob from the valve.
2. Remove the retaining nut and pull the valve out far enough to access the fuel lines.



3. Clamp the fuel lines with an appropriate fuel line pinch tool to prevent fuel leakage and remove the line clamps and the (3) fuel lines from the valve.
4. Inspect the valve for damage or debris. Replace if needed.
5. Reverse the procedures to install the fuel valve.
6. Turn valve on, start engine and inspect for leaks.

Carburetor General Maintenance

The Keihin FCR-MX 39 mm carburetor should be cleaned and properly adjusted on an annual basis.

Refer to the "KTM Engine / Carburetion" section in the back of this service manual for carburetion maintenance details.

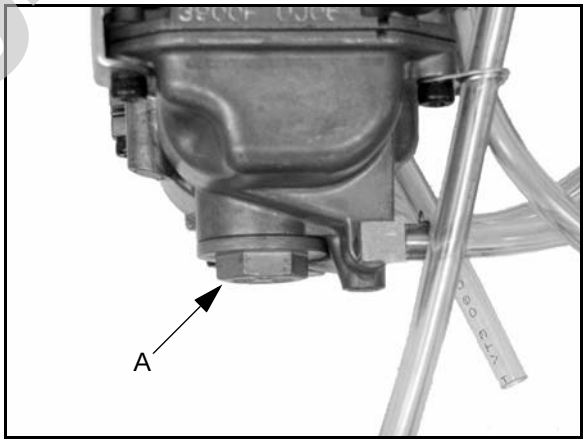
Normal wear from engine vibrations may cause the carburetor to supply an overly rich fuel mixture. Replace the jet needle and the needle jet after every 180 hours of operation.

Carburetor Draining

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

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

1. Turn fuel valve to the "OFF" position.
2. Place a suitable container under the carburetor float bowl to collect the drained fuel.
3. Remove the hex plug (A). Allow the fuel to completely drain.



4. Inspect the drained fuel for water or sediment.
5. Reinstall the hex plug securely.
6. Turn fuel valve to "ON" position.
7. Start machine and check for leaks.

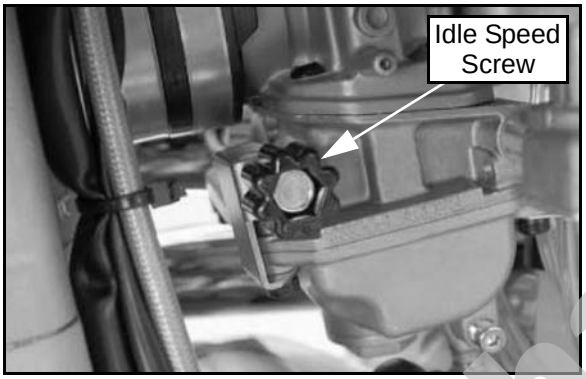
NOTE: All tubes attached to the carburetor must be checked for pinching or blockage, as this will affect engine performance.

Idle Speed Adjustment

The carburetor idle speed strongly influences the starting performance and engine responsiveness when accelerating. If idle speed does not meet specification, use the following procedure to make adjustments:

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.

1. Start engine and warm it up thoroughly.
2. Adjust idle speed by turning the idle speed adjustment screw in (clockwise) to increase or out (counterclockwise) to decrease RPM.



Idle Speed
1700-1800 RPM

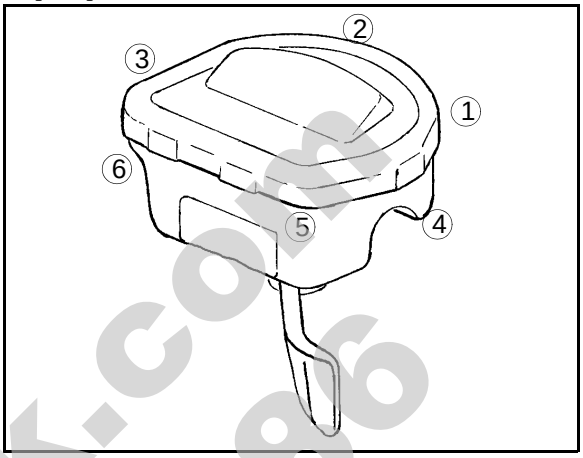
Throttle Inspection

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

1. Place the gear selector in neutral.
2. Set parking brake.
3. Start the engine and let it idle.
4. Turn handlebars from full right to full left. If idle speed increases at any point in the turning range, inspect throttle cable routing and condition. Adjust cable tension as needed until lock-to-lock turning can be accomplished with no rise in engine rpm.
5. Replace the throttle cable if worn, kinked, or damaged.
6. Inspect ETC cover seal and switch cavity by removing the cover. Verify that no dirt, water or mud is present.

To remove the ETC cover:

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



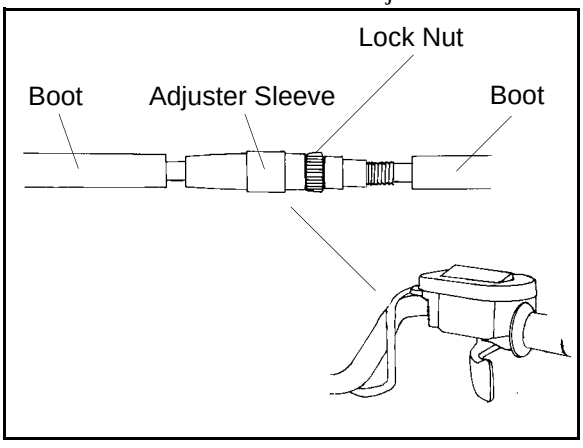
NOTE: Do not attempt to remove cover until all latch points are released.

Throttle Cable / Electronic Throttle Control (ETC) Adjustment

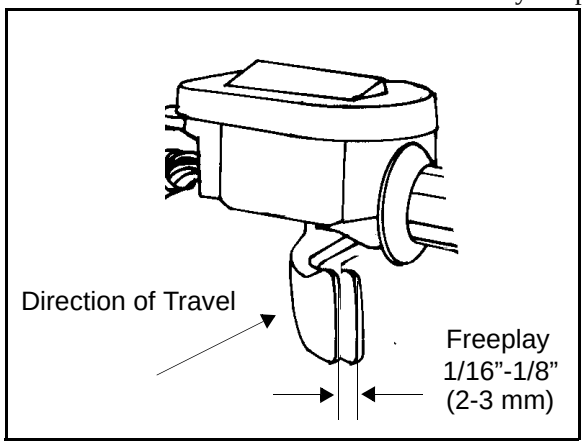
1. Slide boot off throttle cable adjuster and jam nut.
2. Place shift selector in neutral and set parking brake.
3. Start engine and set idle to 1700-1800 RPM.

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

4. Loosen lock nut on in–line cable adjuster.



5. Turn adjuster until **1/16" to 1/8" (2-3mm)** freeplay is achieved at thumb lever. After making adjustments, quickly actuate the thumb lever several times and reverify freeplay.

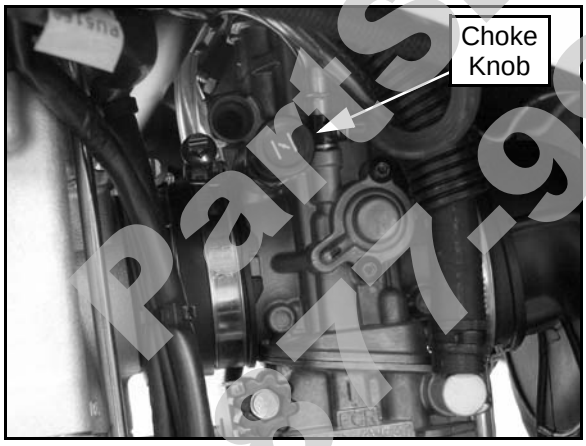


6. Tighten lock nut securely and slide boot completely in place to ensure a water–tight seal.

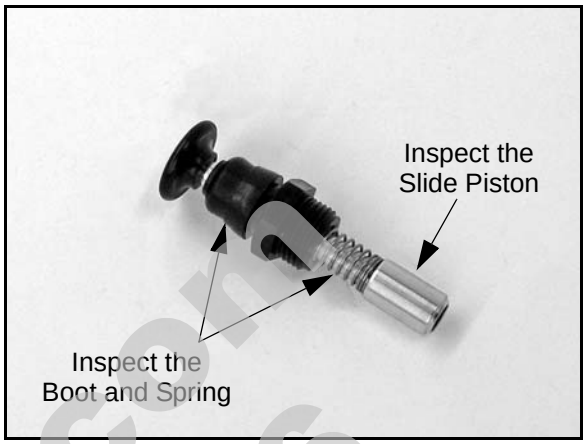
7. Turn handlebars from left to right through the entire turning range. If idle speed increases, check for proper cable routing. If cable is routed properly and in good condition, repeat adjustment procedure.

Choke Operation

The choke knob is located on the left side of the carburetor. The choke should operate smoothly.



If smooth choke operation is not obtainable, remove the choke slide piston. The slide piston should not have any deep score marks or deposits. Also check the condition of the rubber boot, spring, and the choke lock. If any damage or excessive wear is found, replace the choke slide as an assembly.

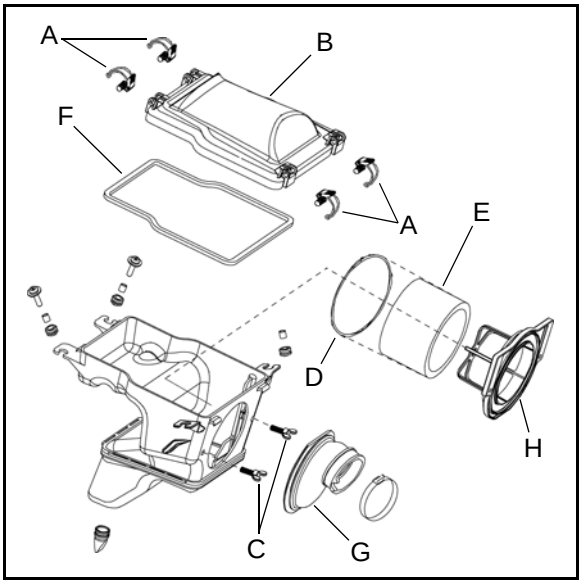


Air Filter Service ("MXR" / "S")

It is recommended that the air filter be inspected frequently. When riding in extremely dusty conditions, cleaning is required more often.

Removal:

1. Unlatch and remove the seat.
2. Release the four air box cover clips (A) and remove the cover (B).
3. Remove the wing nuts (C) securing the filter to the air box.
4. Pull the air filter assembly out of the air box.
5. Remove the spring clamp (D) and the foam filter element (E) from the internal cage (H).



Cleaning:

6. Separate the foam filter element.
7. Wash the foam filter element (E) in soapy water, then rinse and let dry (see previous illustration).
8. Apply a commercially available foam filter oil thoroughly on the foam filter element.

Installation:

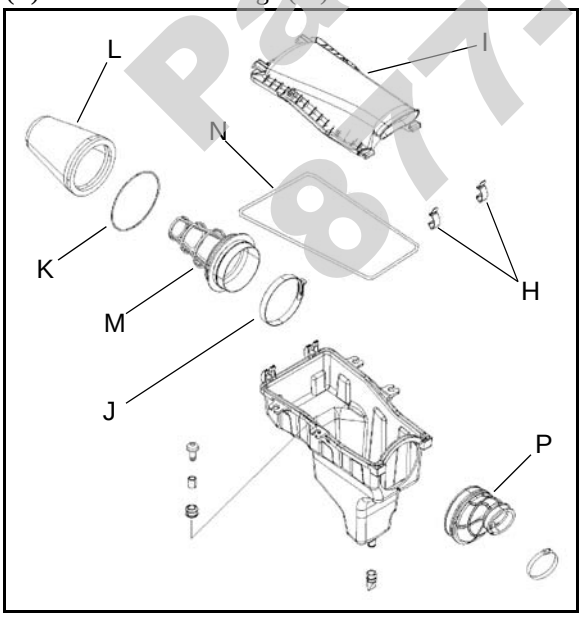
9. Inspect the air box cover seal (F) for damage (see previous illustration). Replace as needed.
10. Assemble and reinstall the air filter assembly into the air box and secure it with the wing nuts.
11. Reinstall the air box cover (B) and secure the cover with the four clips (A) as shown in the previous illustration.
12. Check the boot (G) for cracks, deterioration, abrasion, or leaks. Replace as needed.

Air Filter Service ("IRS")

It is recommended that the air filter be inspected frequently. When riding in extremely dusty conditions, cleaning is required more often.

Removal:

1. Unlatch and remove the seat.
2. Release the two air box cover clips (H) and remove the cover (I).
3. Loosen the filter clamp (J).
4. Remove the filter assembly from the air box.
5. Remove the spring clamp (K) and the foam filter element (L) from the internal cage (M).



Cleaning:

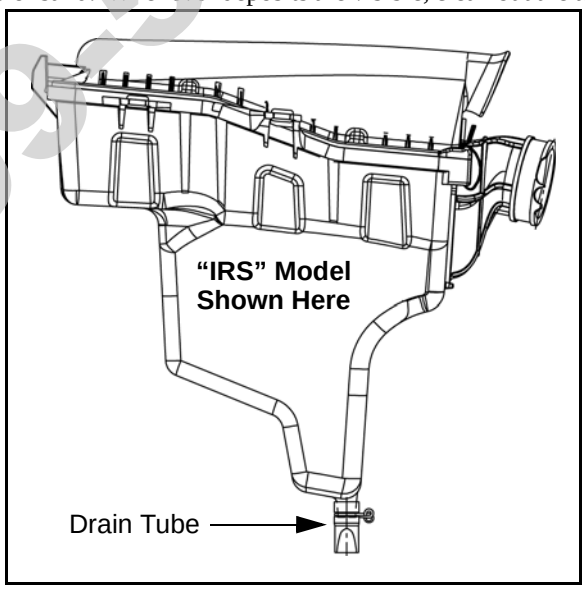
6. Separate the foam filter element.
7. Wash the foam filter element (L) in soapy water, then rinse and let dry.
8. Apply a commercially available foam filter oil thoroughly on the foam filter element.

Installation:

9. Inspect the air box cover seal (N) for damage. Replace as needed.
10. Assemble and reinstall air filter assembly into air box along with the filter clamp (J).
11. Securely tighten the filter clamp.
12. Reinstall the air box cover (I) and secure the cover with the two clips (H).
13. Check the boot (P) for cracks, deterioration, abrasion, or leaks. Replace as needed.

Air Box Drain Tube

Periodically check the air box drain tube located on the bottom side of the air box. Be sure the drain tube is not obstructed by mud or sand. Whenever deposits are visible, clean out the tube.

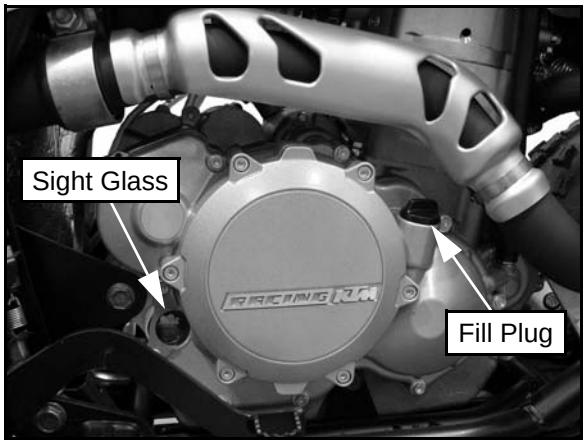


NOTE: The drain tube will require more frequent inspection if the vehicle is operated in severe conditions.

ENGINE AND TRANSMISSION

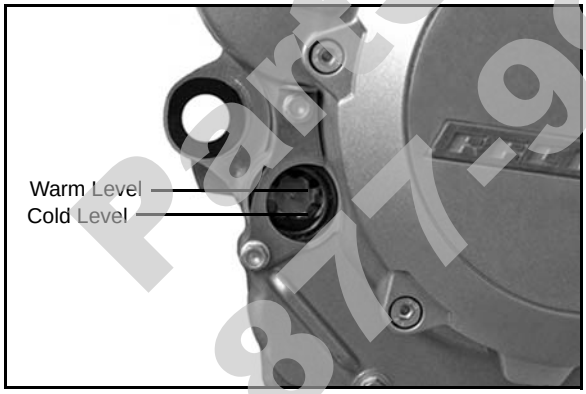
Engine Oil Level

Check the oil level before each use of the ATV. If the engine is cold, the oil level should be visible at the lower edge of the sight glass. If the engine is warm, the oil level should be visible in the middle of the sight glass.



1. Position the ATV on a level surface.
2. View the oil level through the sight glass on the right side of the ATV.

NOTE: It is very important to maintain the proper engine oil level. High oil levels can cause excessive engine operating temperatures, which may lead to engine overheating. Engine damage may result.



3. Remove the fill plug and add the recommended oil as needed.
4. Reinstall the fill plug.

Engine Oil and Filter Service

IMPORTANT: Polaris PS-4 Plus (2W-50 Synthetic) engine oil is recommended for use in the KTM engine. This engine oil was specifically designed for the KTM engine and clutching system. Other oils do not contain the needed additives to prolong engine life and provide proper lubrication to the KTM clutch and transmission components.

⚠ CAUTION

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

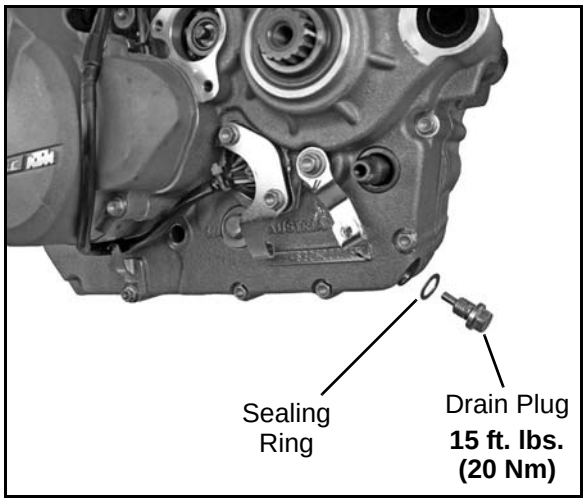
IMPORTANT: Always change both oil filters and clean both oil screens whenever changing oil.

1. Position the ATV on a level surface.
2. Start the engine. Allow it to idle for two to three minutes until warm, then stop the engine.
3. Clean the area around the crankcase drain plug with clean shop towels.

⚠ WARNING

Hot oil can cause serious burns to the skin. Do not allow hot oil to contact skin.

4. Place a drain pan beneath the crankcase and remove the drain plug.



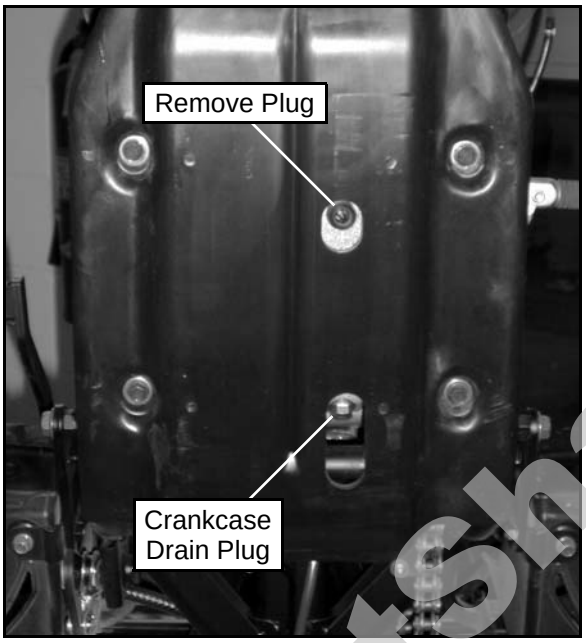
5. Allow the oil to drain completely.
6. Clean the crankcase sealing surface and the drain plug (with magnet) thoroughly.

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

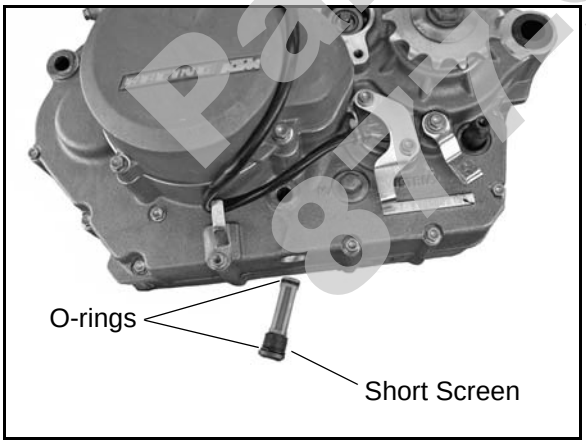
7. Replace the sealing ring and reinstall the drain plug. Torque to **15 ft. lbs. (20 Nm)**.

Cleaning the Short Oil Screen

8. Strike the head of the oil screen plug with a suitable hammer before you attempt to remove it. This "shocks" the threads of the plug and makes it easier to remove.
9. Remove the plug at the bottom of the engine. See illustration below:



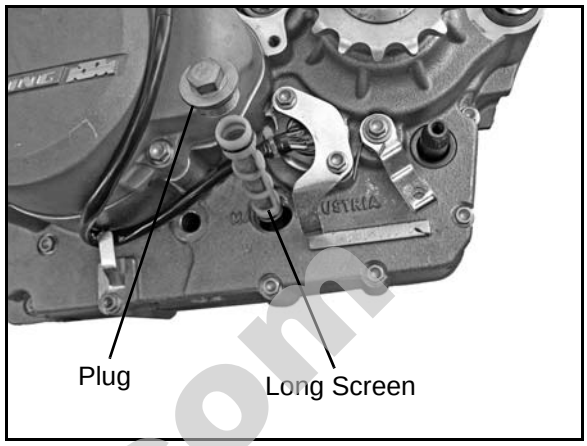
10. Remove the short oil screen. Clean the screen thoroughly and blow clean with low pressure, compressed air.



11. Check the O-rings. If damaged, install new O-rings.
12. Reinstall the screen to the plug.
13. Lubricate the threads and reinstall the plug. Torque to **7.5 ft. lbs. (10 Nm)**.

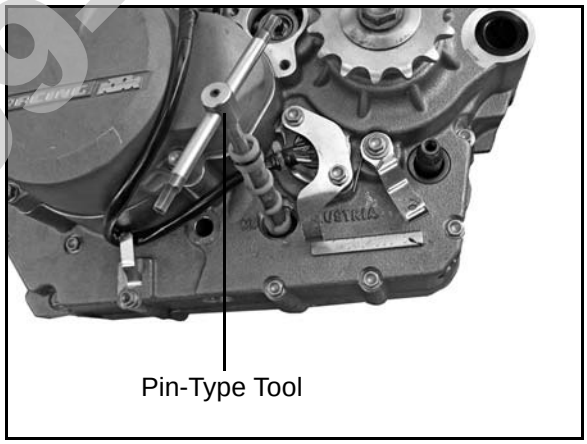
Cleaning the Long Oil Screen

14. Remove the long screen plug, located on the left side of the engine near the engine serial number.



15. Remove the oil screen. Clean the screen thoroughly and blow clean with low pressure compressed air.
16. Check the O-rings. If damaged, install new O-rings.
17. Place the long oil screen on a pin-type wrench or long screwdriver of about 12 inches (300 mm) in length.

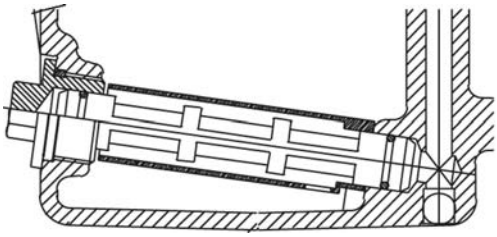
NOTE: The large opening of the oil screen should face in towards the inner case.



18. Insert the tool through the opening and into the bore of the opposite engine casing wall. Push the oil screen into the casing as far as possible. Remove the tool.

⚠ CAUTION

The oil screen is mounted slightly downward in the crankcase. If installed incorrectly, the screen will not function properly and can lead to increased engine wear.

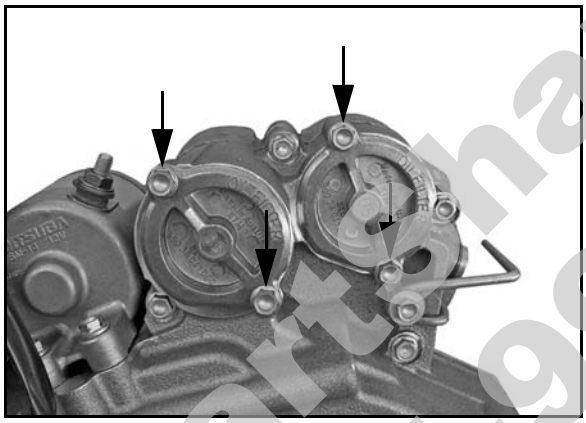


19. Reinstall the plug. Torque to **11 ft. lbs. (15 Nm)**.

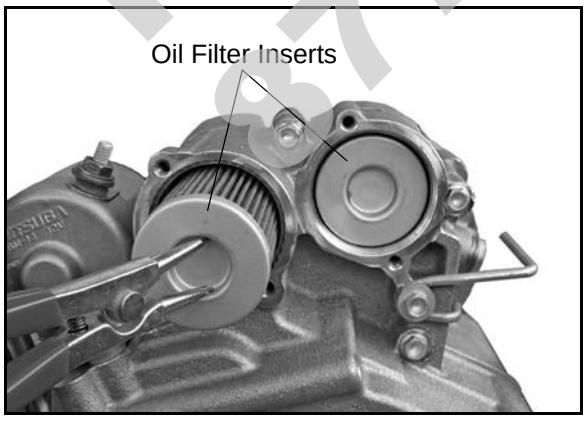
Changing Oil Filters

20. Place a drain pan under the engine.

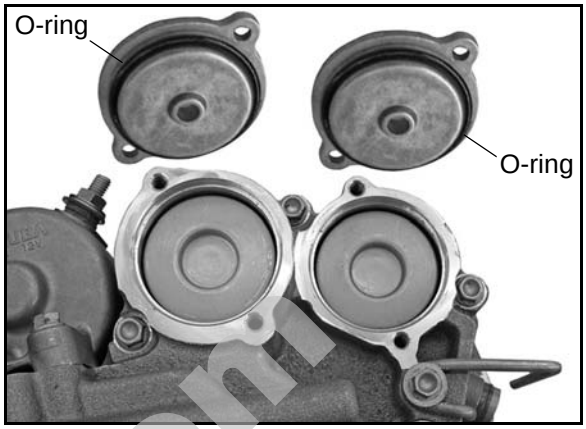
21. Remove the (4) oil filter screws and remove the covers.



22. Using a circlip or snap ring pliers, pull the oil filter inserts out of the engine case.



23. Thoroughly clean the engine casing, filter covers and O-ring sealing surfaces. Replace the filter cover O-rings.

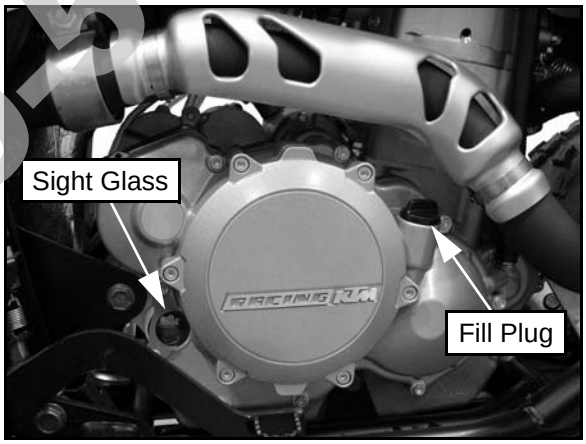


24. Soak new oil filters in fresh engine oil before installation.

25. Install new oil filters. Insert the long oil filter in the front and the short oil filter in the rear of the housing.

26. Lubricate the filter cover O-rings with engine oil and install both covers. Torque to cover screws to **54 in. lbs. (6 Nm)**.

27. Remove the fill plug and add 1.7 quarts (1.6 liters) of the recommended engine oil. Reinstall the fill plug.



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Polaris PS-4 Plus 2W-50 Synthetic Engine Oil
1.7 Qts (1.6 Liters)

28. Start the engine and allow it to idle for at least one minute to fully distribute the new oil. Stop the engine.

29. Check for leaks at all threaded connections and at the oil filter covers.

30. View the oil level in the sight glass. Correct the oil level if necessary.

Cylinder Leakdown Test

NOTE: This engine has built-in decompression components. Due to the auto-decompression mechanism, a cranking compression test is not an accurate measure of engine condition.

A cylinder leakdown test is the best indication of engine condition. Follow the manufacturer's instructions provided with the leakdown tester to perform a cylinder leakage test.

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

Valve Clearance Adjustment

Refer to page **6-13** of the **"KTM Engine / Carburetion"** section in the back of this service manual for valve clearance adjustment procedure.

Valve Clearance Specification
.005" (.127 mm)

Exhaust Pipe / Spark Arrestor

⚠ WARNING

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

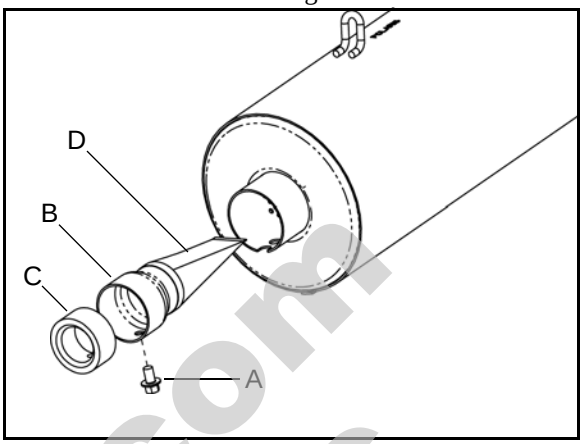
- Do not perform clean out immediately after the engine has been run, as the exhaust system becomes very hot. Serious burns could result from contact with exhaust components.
- Wear eye protection and gloves.
- Never run the engine in an enclosed area. Exhaust contains poisonous carbon monoxide gas that can cause loss of consciousness or death in a very short time.

Periodically clean the spark arrestor to remove accumulated carbon.

1. Remove the retaining screw (A) and remove the arrestor (B) and reducer (C) from the end of the muffler.
2. Use a non-synthetic brush to clean the arrestor screen (D). A synthetic brush may melt if components are warm.

NOTE: If necessary, blow debris from screen with compressed air.

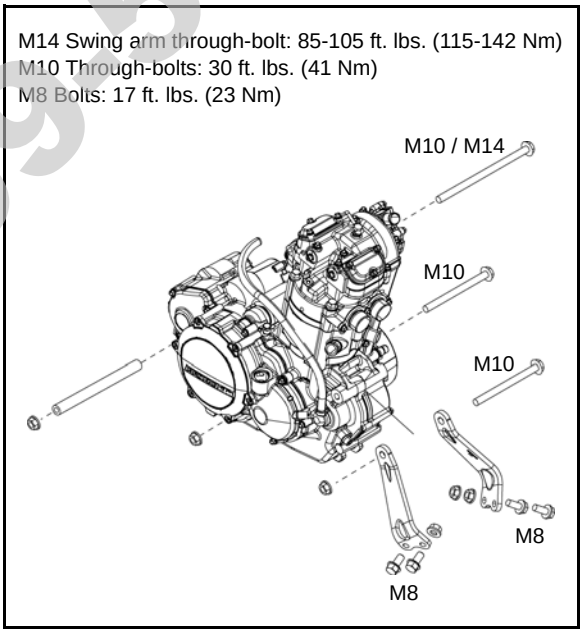
3. Inspect the screen for wear or damage. Replace the arrestor if found to be worn or damaged.



4. Torque retaining screw (A) to 25 **in. lbs. (3 Nm)**.

Engine Mount Locations

Inspect engine mounts and frame for cracks or damage. Periodically check engine fastener torque.



LIQUID COOLING SYSTEM

Cooling System Overview

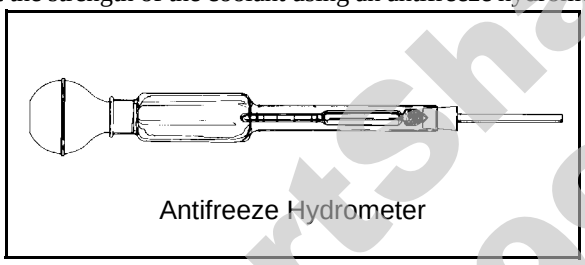
The engine coolant level is maintained by the recovery system. The recovery system consists of the recovery bottle, radiator filler neck, radiator pressure cap and connecting hose.

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

- Some coolant level drop on new machines is normal as the system is purging itself of trapped air. Observe coolant levels often during the break–in period.
- Overheating of engine could occur if air is not fully purged from system.
- Polaris Premium 60/40 anti-freeze is premixed and ready to use. Do not dilute with water.

Coolant Strength / Type

Test the strength of the coolant using an antifreeze hydrometer.



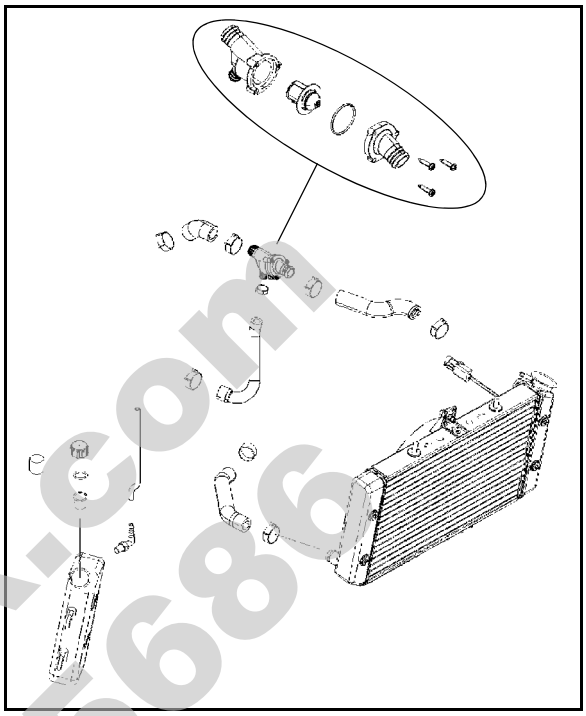
Antifreeze Hydrometer

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

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

Cooling System Hoses

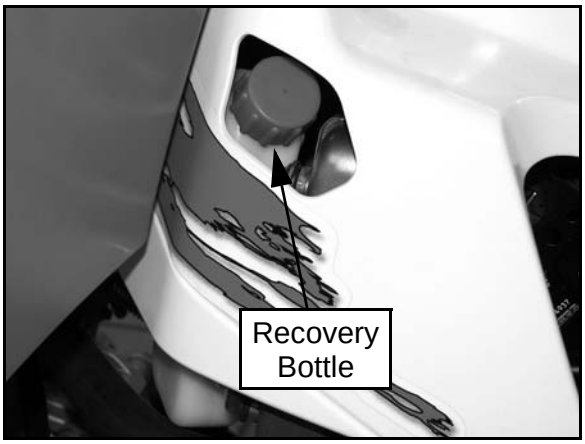
Inspect all hoses for cracks, deterioration, abrasion or leaks. Replace if necessary.



1. Check tightness of all hose clamps.
2. Do not over–tighten hose clamps at radiator or radiator fitting may distort, causing a restriction or leak. Radiator hose clamp torque is **36 in .lbs. (4 Nm).**

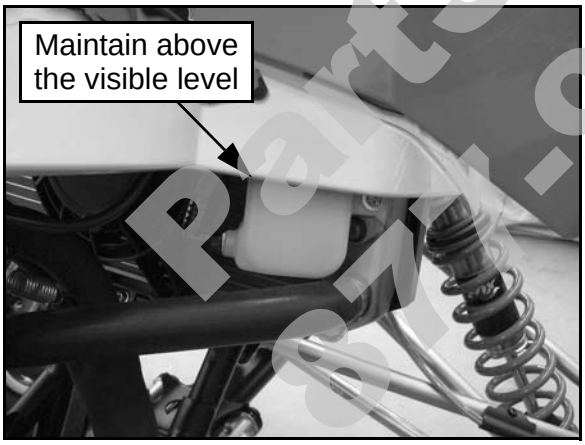
Recovery Bottle / Coolant Level Inspection

The recovery bottle is located on the right side of the vehicle under the front fender. The fluid level in the recovery bottle must be maintained.



If coolant level is low, perform the following steps:

1. Remove recovery bottle cap. Verify the breather foam is in place and the inner splash cap vent hole is clear and open.
2. Fill the recovery bottle with Polaris Premium 60/40 Anti-Freeze / Coolant (**PN 2871323**) or a mixture of anti-freeze and distilled water as required for freeze protection in your area.
3. Fill the recovery bottle up to the visible level, then add an additional 6 oz. (175 ml) of coolant.



4. Reinstall the cap.

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

Radiator / Coolant Level Inspection

⚠ WARNING

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

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

If the recovery bottle has run dry, inspect the level in the radiator and add coolant if necessary. The radiator pressure cap is located on the left side of the vehicle under the front fender.

1. Remove the pressure cap.

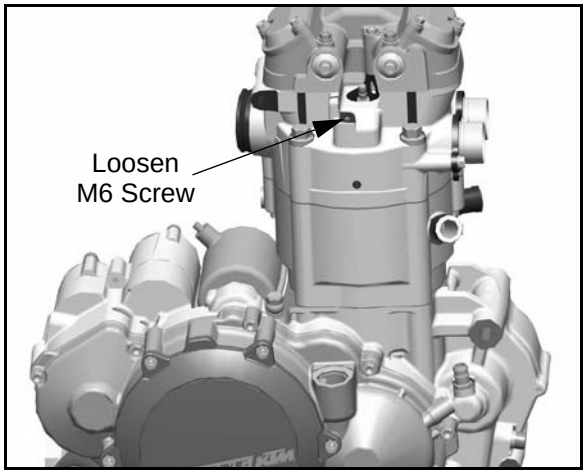
2. Using a funnel, slowly add coolant as necessary through the radiator filler neck.
3. Reinstall the pressure cap.

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

Cooling System Bleeding

Bleeding the cooling system is required only if the system has been drained for maintenance and/or repair. Always allow the engine to cool sufficiently before removing the radiator pressure cap.

1. Loosen the M6 coolant bleed screw located in the top right-hand side of the cylinder head, 2-3 turns.

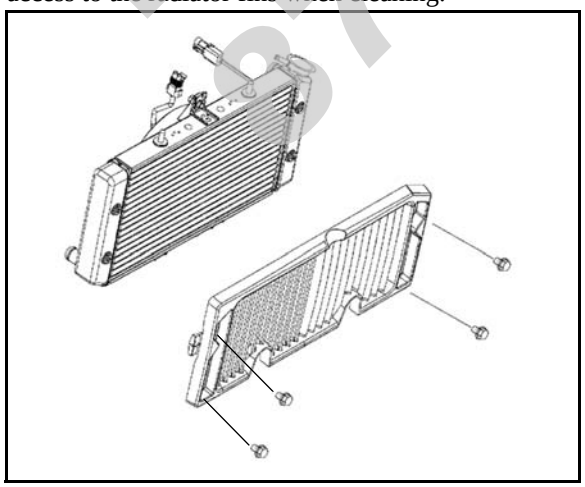


2. Remove radiator cap and slowly add coolant until the coolant escapes out of the cylinder head bleed screw.
3. Tighten the M6 bleed screw and continue filling the radiator to the bottom of filler neck.
4. Fill coolant reservoir tank to full mark.
5. Install radiator cap half-way and gently squeeze coolant hoses to force any trapped air out of system.
6. Again, remove radiator cap and slowly add coolant to the bottom of fill neck if required.
7. Start engine and observe coolant level in the radiator. Allow air to purge and top off as necessary. Reinstall radiator cap and bring engine to operating temperature. After engine is cool, check level in reservoir tank and add coolant if necessary.

NOTE: Should the reservoir tank become empty, it will be necessary to refill at the radiator and repeat the bleeding procedure.

Radiator Screen Removal

1. Remove the 4 screws retaining the radiator screen for access to the radiator fins when cleaning.

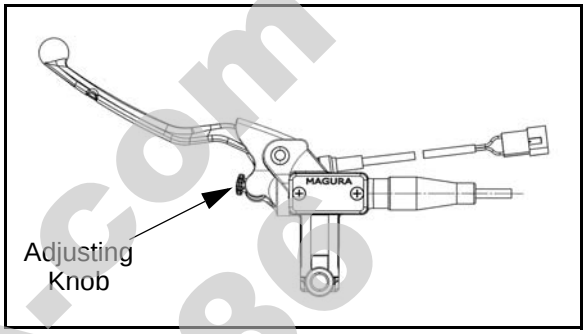


FINAL DRIVE

Hydraulic Clutch Lever Adjustment

The hydraulic clutch lever is located on the left handlebar. The clutch is self-adjusting, but the lever position can be changed to fit the operator's hand.

Turn the adjusting knob counterclockwise to move the lever closer to the handlebar. Turn the adjusting knob clockwise to move the lever away from the handlebar.



NOTE: The adjustment range is limited. Never apply excessive force to the knob. Always turn the knob by hand.

If the lever does not operate smoothly, check the fluid level at the master cylinder. See "Hydraulic Clutch Oil Level Inspection".

If the lever feels unresponsive, bleed the clutch system. See "Hydraulic Clutch System Bleeding".

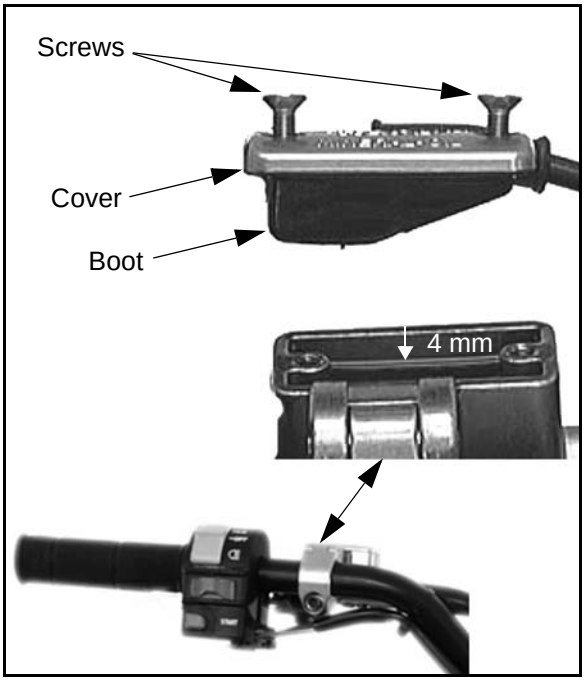
Hydraulic Clutch Oil level Inspection

The clutch oil master cylinder is located on the left handlebar. Check the fluid level in the reservoir before each ride. The level should be 4 mm below the upper edge of the reservoir. Do not overfill.

NOTE: Use only the recommended clutch oil.

1. Position the ATV on a level surface.
2. Turn the handlebar until the master cylinder is in a horizontal position.

3. Remove the two cover screws, the cover and the rubber boot.



4. Add the recommended oil as needed.

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Polaris Hydraulic Clutch Oil (Quart) PN 2876335

⚠ CAUTION
Do not use brake fluid. Do not mix clutch fluid with any other hydraulic fluids.

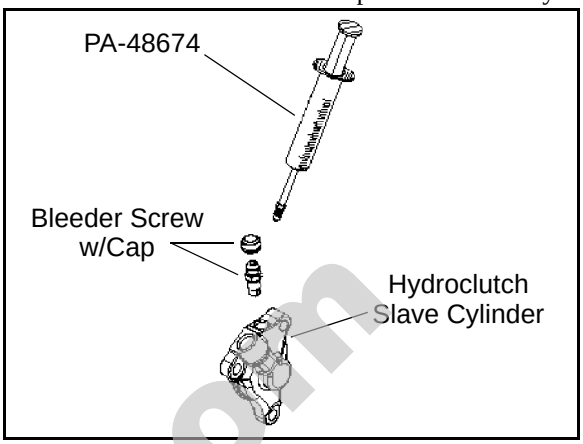
5. Reinstall the cover, boot and screws securely.

Hydraulic Clutch System Bleeding

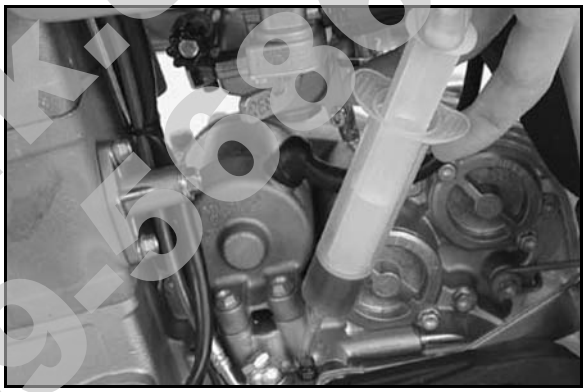
Always bleed the clutch system at the intervals outlined in the "Periodic Maintenance Chart". Always bleed the clutch system any time the clutch lever feels unresponsive.

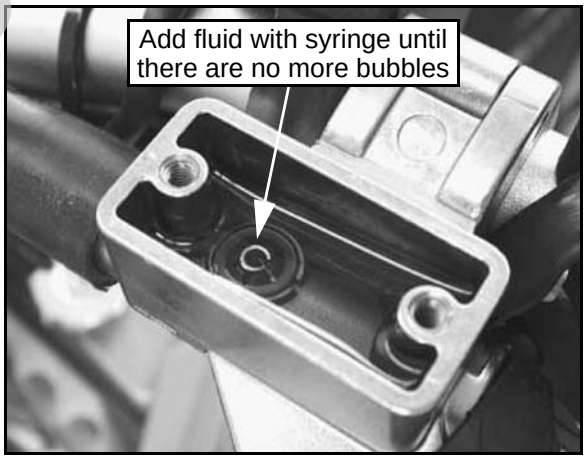
NOTE: Use only the recommended clutch oil.

1. Position the vehicle on a level surface.
2. Turn the handlebar until the master cylinder is in a horizontal position.
3. Remove the two cover screws, the cover and the rubber boot.
4. Fill the Hydraulic Clutch Bleeder Syringe (PA-48674) with the recommended hydraulic clutch oil.
5. Remove the bleeder screw and cap from the slave cylinder.



6. Press fluid into the system until the fluid runs out of the hole in the master cylinder without producing any bubbles.

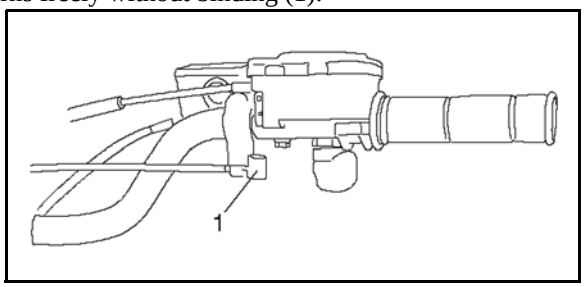




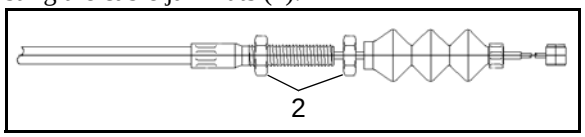
7. When finished, remove the Hydraulic Clutch Bleeder Syringe.
8. Reinstall the bleeder screw.
9. Add or remove fluid as needed to maintain the level 4 mm below the top edge of the master cylinder reservoir.
10. Reinstall the cover, boot and screws securely.

Reverse Lock-Out Lever Inspection and Cable Adjustment

Check for smooth lever operation and ensure that the lever returns freely without binding (1).



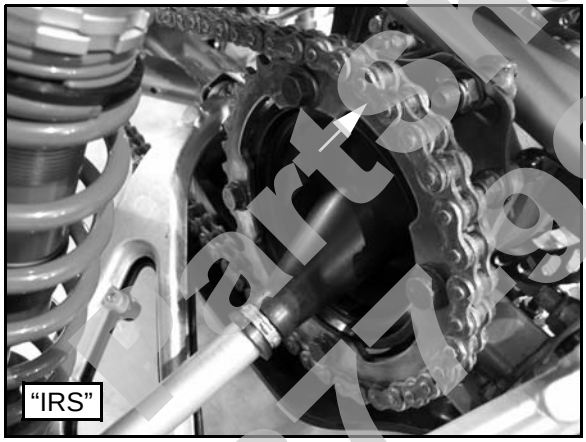
Adjust the reverse cable freeplay to 0.08 - 0.12 in. (2-3 mm) by adjusting the cable jam nuts (2).

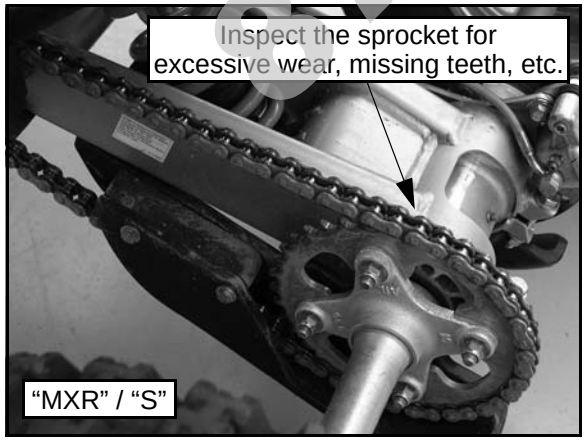


Sprocket Inspection

Inspect the sprocket for worn, broken or bent teeth.

To check for wear, pull upward on the chain at the area indicated (arrow). Replace sprocket if chain movement exceeds 1/4" (6 mm).





Drive Chain Inspection / Replacement

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

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

Never allow battery acid to contact the drive chain.

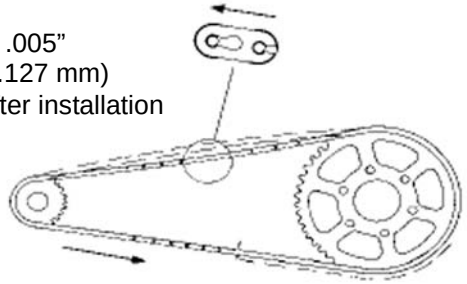
The chain must be replaced when it reaches 3% elongation.

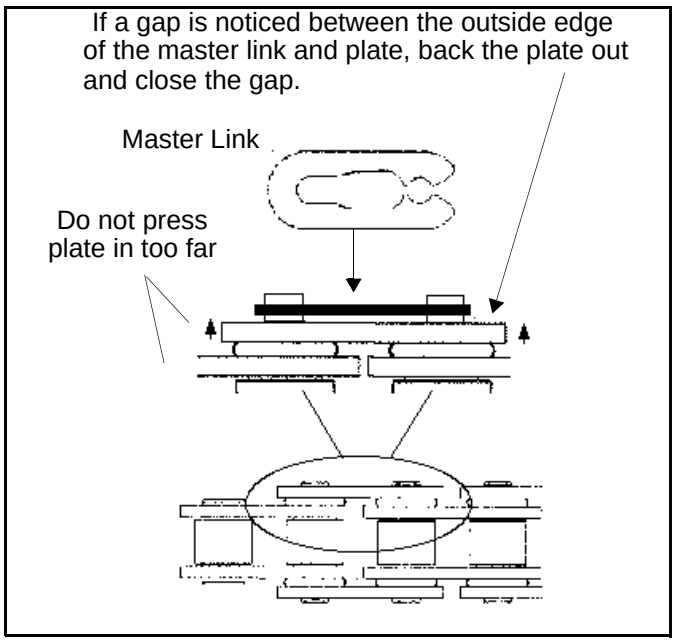
1. Stretch the chain tightly in a straight line.
2. Measure the length of 20 pitches (pins) from pin center to pin center, and compare to the specification. Replace the chain if the length exceeds the wear limit.

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

3. When replacing or reinstalling drive chain, install the closed end of the splice link clip as shown, with the closed end leading in forward operation. There should be a **.003-.005" (.076-.127 mm)** gap between the side plate of the chain and the splice link clip. See the following illustrations.

Proper Spacelink Clip Opening Position





Drive Chain Tension

⚠ CAUTION

Never adjust or operate vehicle with rear drive chain too loose or too tight. Severe damage to transmission and drive components can result.

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

CHECKING CHAIN TENSION:

Check the amount of chain slack by moving the vehicle slightly forward to remove slack at the top side of the chain.

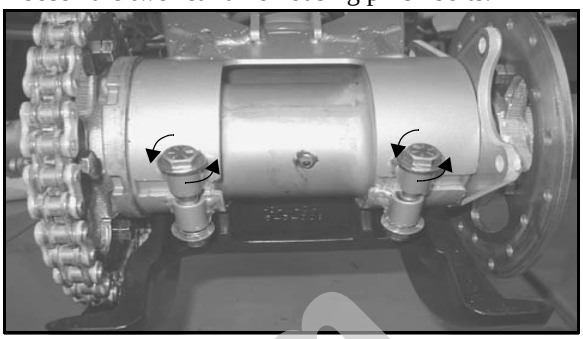
Steps 1 and 2 should be used to check chain tension on "MXR" and "S" solid rear axle models.

1. Collapse the rear suspension with a trailer tie down strap. Fasten the strap around the axle and rear grab bar.
2. Tighten the strap until the axle, swing arm pivot, and counter shaft, are centered on a single plain (this establishes the tightest chain position).
3. At the center point of the top side of the chain there should be **1/4" - 3/8" (6-9 mm)** deflection.

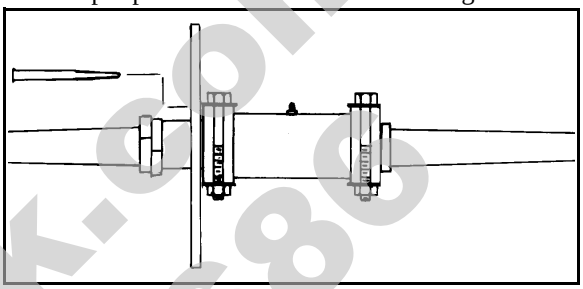
NOTE: The chain has a press-on master link. A chain tool must be used if it's necessary to remove the chain for service.

Drive Chain Adjustment ("MXR" / "S")

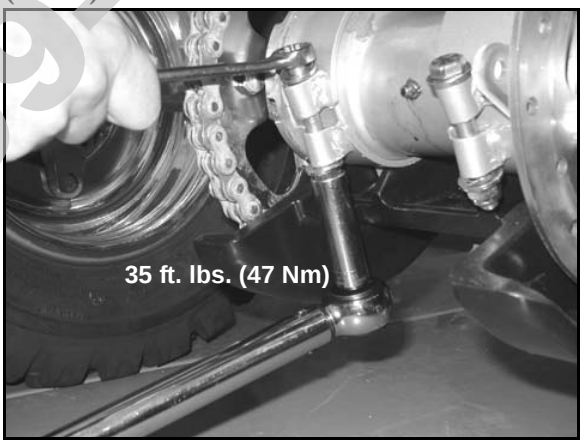
1. Loosen the two rear axle housing pinch bolts.



2. Insert a pin punch into the rear axle housing.



3. Roll the vehicle ahead or back to adjust chain slack to the proper dimension.
4. Tighten the rear axle housing pinch bolts to **35 ft. lbs. (47 Nm)**.

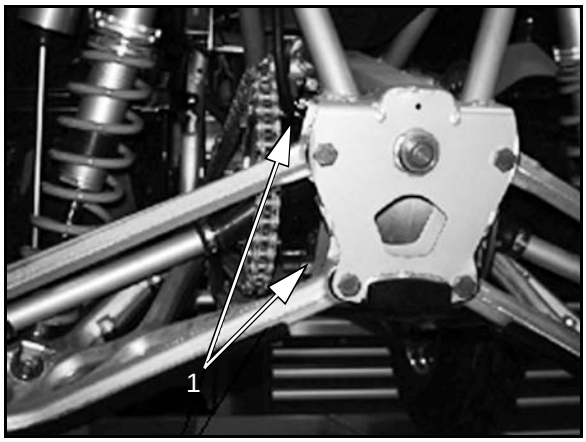


⚠ CAUTION

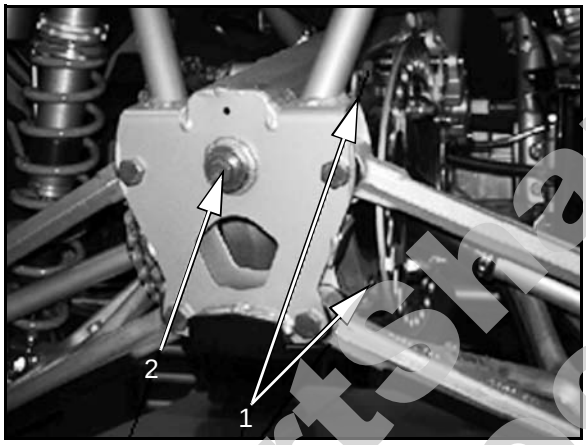
Do not over-tighten rear axle housing pinch bolts. Pre-mature bearing failure may result.

Drive Chain Adjustment ("IRS")

1. Loosen the upper and lower pivot mounting bolts (1).



2. Thread the chain adjusting bolt (2) inward or outward to adjust chain slack to the proper dimension.



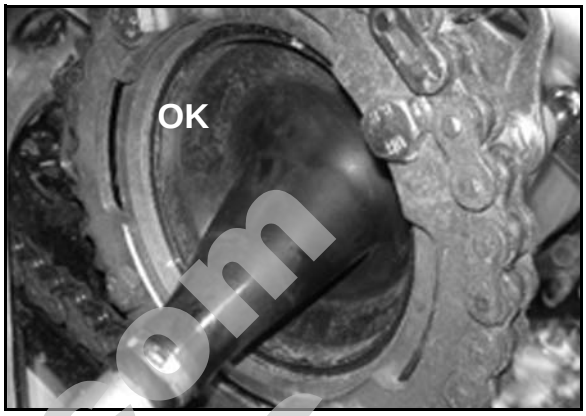
3. Torque the pivot mounting bolts to **30 ft. lbs. (41 Nm)**.

4. Torque the chain adjusting bolt to **20 ft. lbs. (27 Nm).**

Rear Driveshaft Boot Inspection ("IRS")

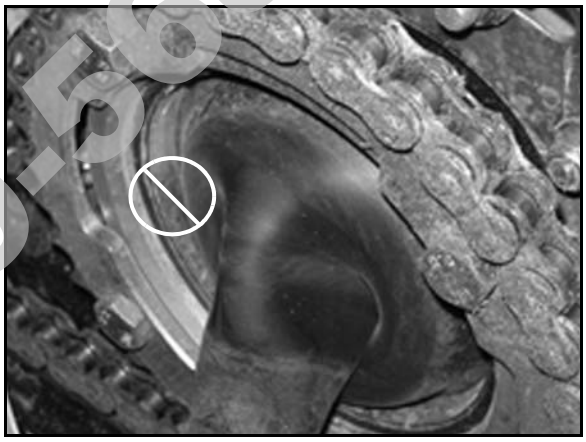
Before Operating

Inspect the boots before operating the vehicle. If a boot is torn, punctured or leaking fluid, replacement is required.



After Operating

Inspect the boots after operating the vehicle. If a boot is bulging or ballooned, perform the boot "pressure equalizing" procedure.



Driveshaft Boot Pressure Equalizing ("IRS")

1. Using a needle nose pliers or boot clamp removal tool, remove the small boot clamp (1) from the inboard boot.

NOTE: Do not use any tools that may damage the boot.

2. Slide the free end of the boot two inches toward the center of the vehicle and lift the boot away from the shaft to allow excess air to escape.

3. Wipe excess grease from the shaft before returning the boot to the boot groove. Use caution not to allow excess air back into the system when reinstalling the boot.

4. Reinstall the boot clamp.

ELECTRICAL AND IGNITION SYSTEM

Battery Maintenance

⚠ WARNING

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

External: Flush with water.

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

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

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

NOTE: The Outlaw battery is a Low Maintenance design and construction. Before placing the battery into service, check the battery condition and charge accordingly.

Use of Conventional Lead-Acid batteries is not recommended.

New Batteries: Batteries must be fully charged before use or battery life will be reduced by 10–30% of full potential. Charge battery for 3-5 hours at a current equivalent of 1/10 of the battery's rated amp/hour capacity (i.e. 9 amp hr x.10 =.9 amp charging). Do not use the alternator to charge a new battery.

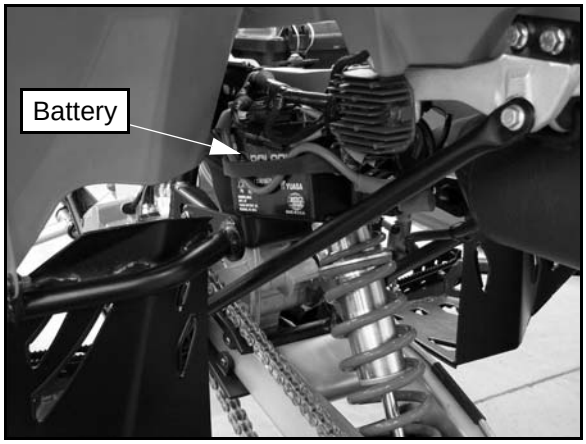
Maintenance-Free batteries are sealed at the factory. The use of lead-calcium instead of lead-antimony allows the battery acid to be fully absorbed by the plates. Therefore, a Maintenance-Free battery case is opaque and the sealing caps are not removable, since there is no need to check electrolyte level.

IMPORTANT: Never attempt to add electrolyte or water to a Maintenance-Free battery. Doing so will damage the case and shorten the life of the battery.

Battery Inspection / Removal

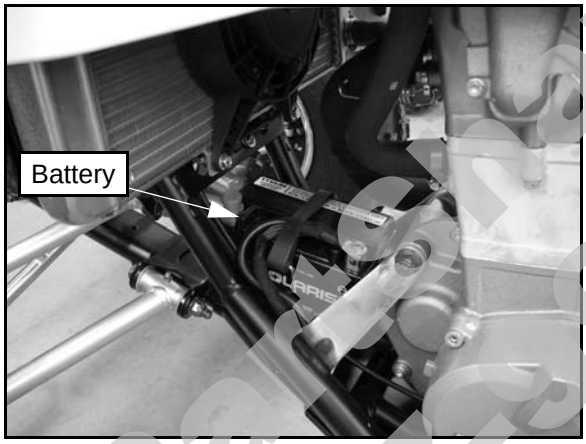
"MXR" / "S" Models

The battery is located under the LH rear fender of the ATV.



"IRS" Models

The battery is located in front of the engine on the lower portion of the main frame.



To remove the battery:

1. Disconnect battery negative (–) black cable first, followed by the positive (+) red cables.
2. Disconnect the battery holder strap.

⚠ CAUTION

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

3. Remove the battery.
4. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one cup water and one tablespoon baking soda. Rinse well with clean water and dry thoroughly. Test battery for condition and charge accordingly (refer to the "Electrical" chapter for battery testing).
5. If required, charge battery at 1/10 of its amp/hour rating. Example: 1/10 of 14 amp battery = 1.4 amp
6. Reinstall battery, attaching positive (+) red cable first and then the negative (–) black cable.
7. Coat terminals and bolt threads with Dielectric Grease (**PN 2871329**).
8. Reinstall battery holder strap and reassemble the ATV.

Battery Terminals / Bolts

Ensure battery terminals are clean of corrosion. Use Polaris corrosion resistant Dielectric Grease (**PN 2871329**) on battery bolts.

Off Season Storage

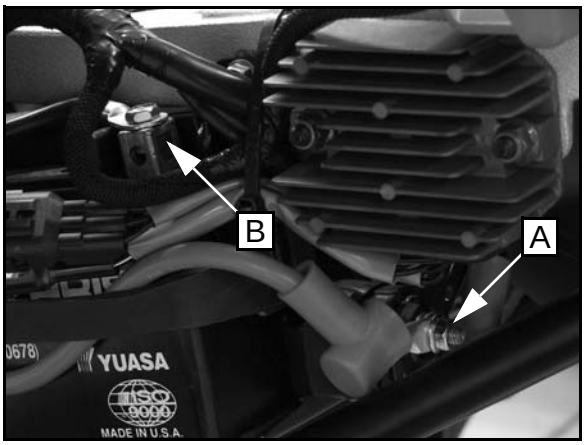
To prevent battery damage during extended periods of non–use, the following basic battery maintenance items must be performed:

- Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with fresh water after cleaning.
- Using a wire brush or knife, remove any corrosion from the cables and terminals.
- **Never add water to a sealed maintenance free battery.**
- Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the open circuit voltage is 12.9V or greater.
- Store the battery either in the machine with the cables disconnected, or store in a cool place.

Charging Procedure ("MXR" / "S")

NOTE: The battery may be charged without removing the battery from the vehicle.

1. Attach the positive (+) charging cable to the starter solenoid lead terminal (A), which is directly wired to the positive battery terminal.



2. Attach the negative (-) battery charging cable to the negative (-) battery terminal (B).

3. Charge with a charging output no greater than 1/10 of the battery's amp/hr rating. Charge as needed to raise the open circuit voltage to 12.9 V or greater.

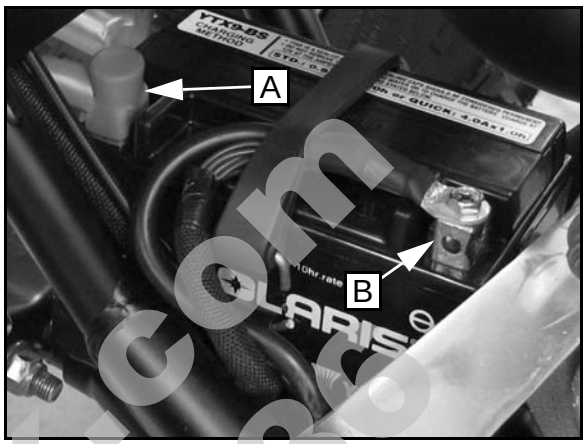
⚠ WARNING

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

Charging Procedure ("IRS")

NOTE: The battery may be charged without removing the battery from the vehicle.

1. Attach the positive (+) charging cable to the (+) battery terminal (A) and negative (-) charging cable to the (-) battery terminal (B).



IMPORTANT: When attaching to the positive (+) terminal, take care to stay clear of the frame.

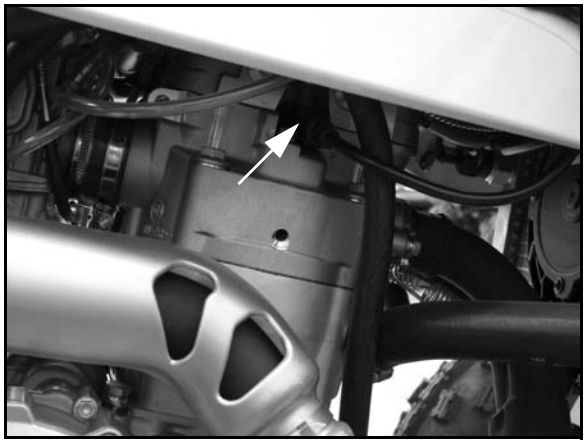
2. Charge with a charging output no greater than 1/10 of the battery's amp/hr rating. Charge as needed to raise the open circuit voltage to 12.9 V or greater.

⚠ WARNING

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

Spark Plug Removal / Inspection

1. Access the spark plug at the right side of the engine.



2. Remove spark plug high tension lead. Clean plug area so no dirt and debris can fall into engine when plug is removed.

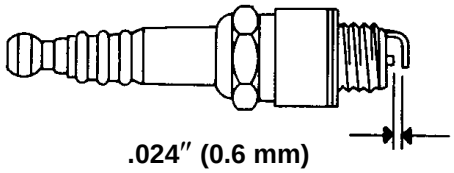
3. Remove spark plug and inspect electrode for wear and carbon buildup. The insulator tip should be a light tan color, indicating good combustion. Look for a sharp outer electrode edge with no rounding or erosion.

4. If needed, clean spark plug with electrical contact cleaner or a glass bead spark plug cleaner only.

NOTE: Wire brushes or coated abrasives should not be used.

5. Measure gap with a wire gauge. Refer to specifications for proper spark plug type and gap. Adjust gap if necessary by bending the side electrode carefully.

Spark Plug Gap



.024″ (0.6 mm)

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

Recommended Spark Plug:
NGK DCPR8E

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

CAUTION

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

7. Apply a small amount of anti–seize compound to the spark plug threads.

8. Install spark plug and torque to specification. Reverse steps as needed for reassembly.

STEERING

General Steering Information

The steering components should be checked periodically for loose fasteners, worn tie rod ends, ball joints, 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 the entire range of travel without binding. Check routing of all cables, hoses, and wiring to be sure the steering mechanism is not restricted or limited.

NOTE: Whenever steering components are replaced, check front end alignment. Use only genuine Polaris parts.

⚠ WARNING

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

Controls / Handlebar

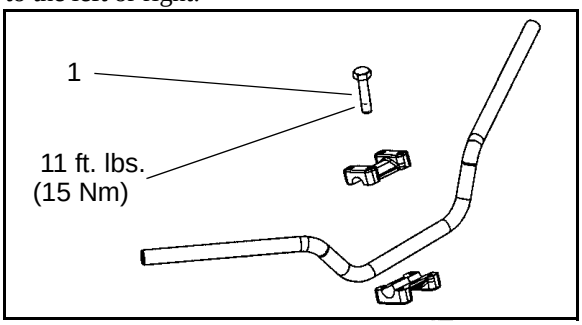
Check controls for proper operation, positioning and adjustment.

If desired, the handlebars can be adjusted for rider preference.

⚠ WARNING

Improper adjustment or incorrect tightening torque of the adjuster block bolts can cause limited steering, which could result in loss of control and serious injury or death.

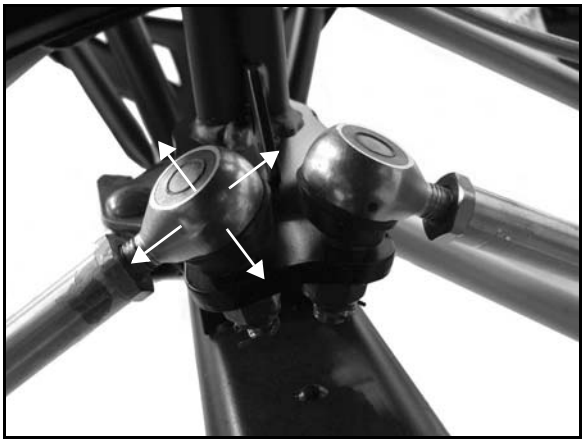
1. Loosen the four bolts and adjust the handlebar to the desired height. Be sure the handlebars do not contact the gas tank or any other part of the machine when turned fully to the left or right.



2. Torque the front two bolts to 11 ft. lbs. (15 Nm), then torque the rear two bolts. A gap of up to 1/8" will remain at the rear bolts.

Steering Inspection / Tie Rod Ends and Hubs

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



- Elevate front end of machine so front wheels are off the ground. Check for any looseness in front hub / wheel assembly by grasping the tire firmly at top and bottom first, and then at front and rear. Try to move the wheel and hub by pushing inward and pulling outward.
- If abnormal movement is detected, inspect the hub and wheel assembly to determine the cause (possible loose wheel nuts or loose front hub components).

Check for Loose Wheel or Hub

- Refer to Chapter 5 "Body / Steering / Suspension" for service procedures.

Toe Alignment Inspection

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

METHOD 1: USING A STRAIGHTEDGE OR STRING

⚠ WARNING

Severe injury or death can result from improper toe alignment and adjustment.

1. Position the vehicle on a level surface. Ensure the vehicle is at the proper ride height by placing a rider on the vehicle.
2. Place the handlebars in a straight-ahead position and secure the handlebars in this position.
3. Tie a length of string between two stands as shown in the following illustration. Position the stands so the string is flush or parallel with the side of the rear tire.

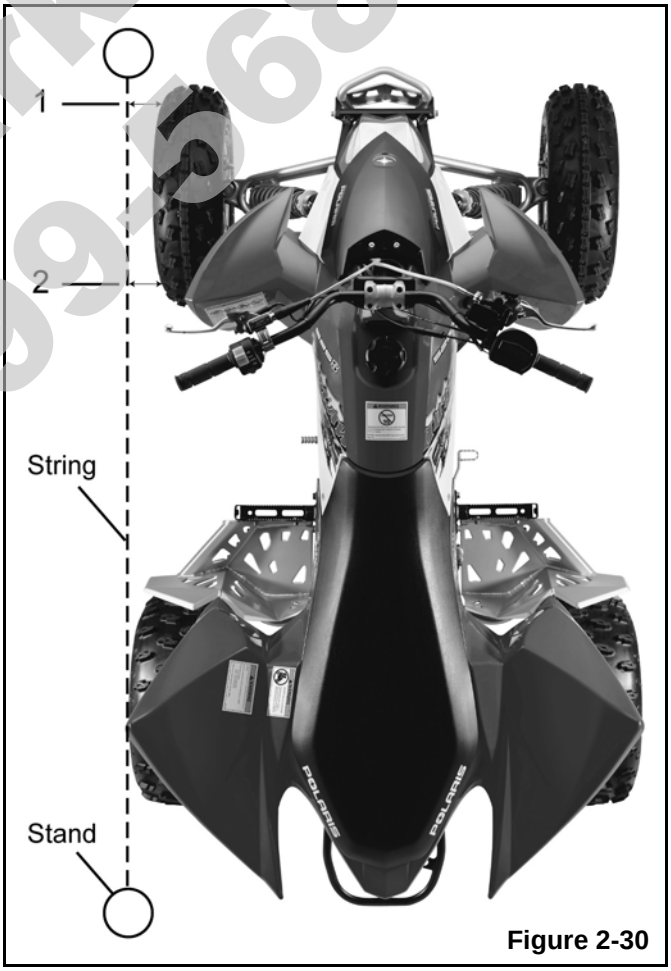


Figure 2-30

NOTE: If available, you may use a long straight-edge instead of a string.

4. Measure the distance from the string to the rim at the front (1) and rear (2) of the front rim (see **Figure 2-30).** The rear measurement should be 0-1/16'(0-1.6 mm) more than the front measurement to obtain the recommended toe out alignment.

5. Repeat the measurement procedure on the other side of the vehicle.

NOTE: If you discover improper toe out alignment, refer to "Toe Adjustment" procedure.

METHOD 2: USING A CHALK LINE

1. Position the vehicle on a level surface. Ensure the vehicle is at the proper ride height by placing a rider on the vehicle.

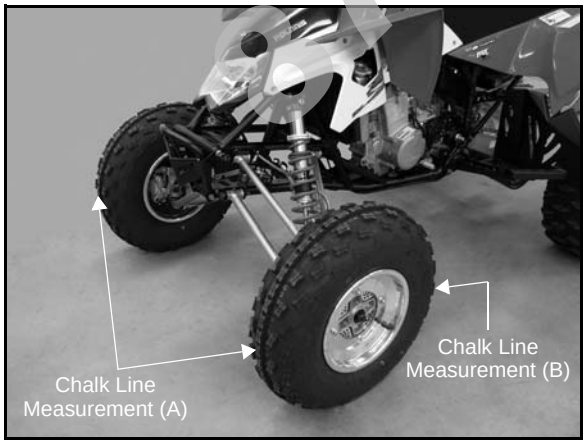
2. Set handlebars in a straight ahead position and secure handlebars in this position. **NOTE:** The steering post arm "frog" can be used as an indicator of whether the handlebars are straight. The frog should be centered with equal clearance between the steering stops.

3. Place a chalk mark on the center line of the front tires as close to the hub/axle center line as possible, or measure to a specific distance from the floor. **NOTE:** It is important that the height of both marks be equally positioned in order to get an accurate measurement.

4. Measure the distance between the marks and record the measurement. Call this measurement "A".

5. Rotate the tires 180^{o} by moving vehicle forward or backward. Position chalk marks even with the hub/axle centerline or the specified floor measurement.

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. Recommended toe alignment is: **0 to 1/16" (0 to 1.6 mm)** toe out. This means the measurement at the front of the tire (A) should be 0 to 1/16" (0 to 1.6 mm) wider than the measurement at the rear (B).



Toe Adjustment

If toe alignment is incorrect, measure the distance between vehicle center and each wheel. This will tell you which tie rod needs adjusting.

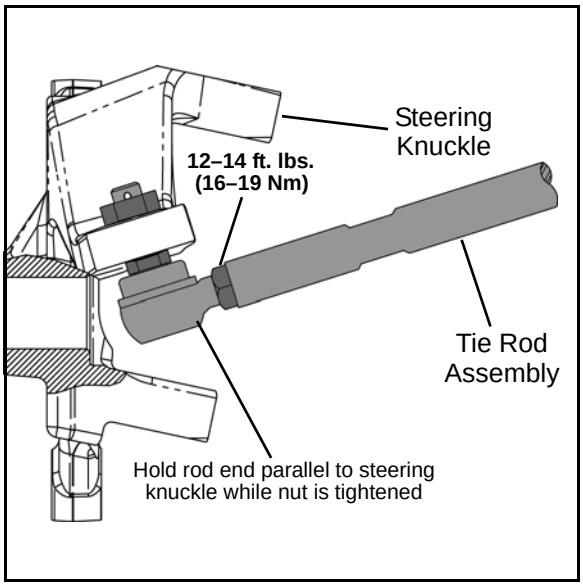
NOTE: Be sure handlebars are straight ahead before determining which tie rod(s) need adjustment.

⚠ CAUTION

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

To adjust toe alignment:

- Hold tie rod to keep it from rotating.
- Loosen jam nuts at both ends of the tie rod.
- Shorten or lengthen the tie rod until alignment is as required to achieve the proper toe setting as specified in Method 1 or Method 2 of **Toe Alignment Inspection**.
- **IMPORTANT:** When tightening the tie rod end jam nuts, the rod ends must be held parallel to prevent rod end damage and premature wear. Damage may not be immediately apparent if done incorrectly.
- After alignment is complete, torque jam nuts to specification.



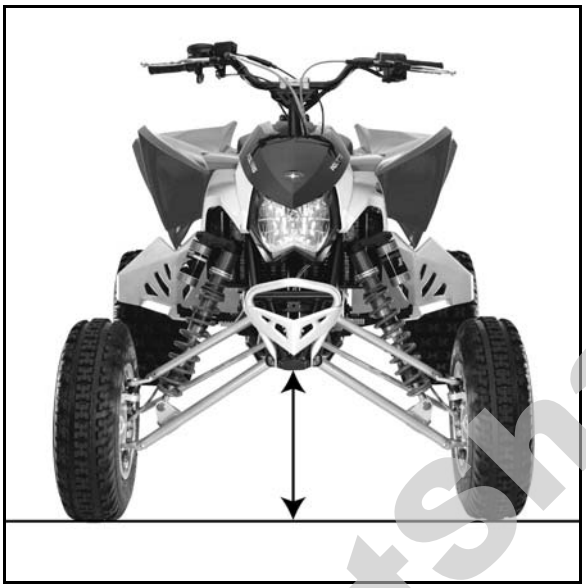
SUSPENSION (450 "MXR" / 525 "S")

Front Suspension Set-Up

1. Position the vehicle on a level surface.
2. Stop the engine.
3. Elevate the front of the vehicle by placing a suitable jack stand under the frame.

NOTE: The tires should barely touch the ground and the suspension should be at full rebound.

4. Measure the distance from the ground to the bottom of the front frame portion. Note this measurement for later use.



5. Remove the support stand and have a rider sit comfortably on the seat with hands on the handlebars.
6. Place the transmission in neutral and slowly roll the machine forward and backward at least ten feet (3 m) without lifting or pushing down on the suspension.
7. Turn the handlebars fully to the left and right.
8. With the rider still on the vehicle, repeat the measurement performed in step 4.
9. Subtract the step 8 measurement from the step 4 measurement. The difference should be between the following measurements:
   - **450 "MXR"** 3.625 - 3.875 inches (9.21 - 9.84 cm)
   - **525 "S"** 3.5 - 3.75 inches (8.89 - 9.53 cm)
10. If the number is less than 3.625" **(450)** or 3.5" **(525)**, decrease the front spring preload and repeat all steps (see "Front Spring Preload Adjustment"). If the number is higher than 3.875" **(450)** or 3.75" **(525)**, increase spring preload and repeat all steps.

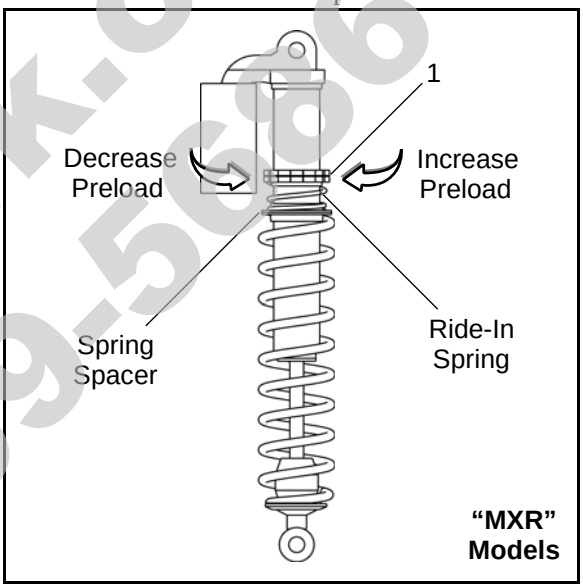
Front Spring Preload Adjustment

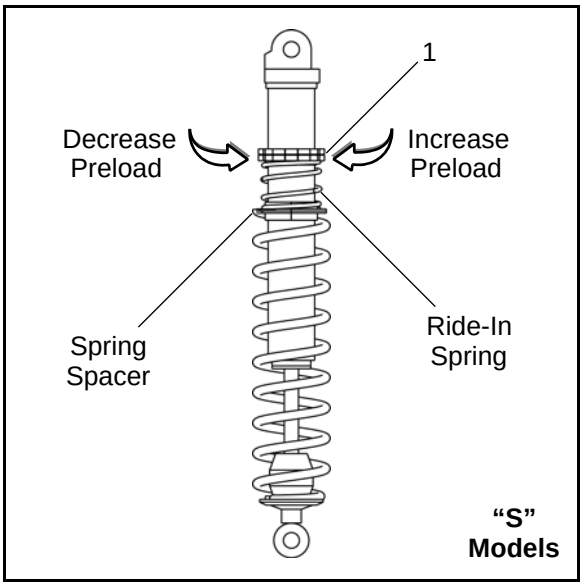
The front suspension spring preload may be adjusted to suit different conditions and operator weight.

⚠ WARNING

Uneven adjustment may cause poor handling of the ATV, which could result in an accident and serious injury or death. Always adjust both the left and right spring preloads equally or have your Polaris dealer perform the adjustments.

1. Raise and safely support the front of the ATV off the ground to allow the suspension to fully extend.
2. Loosen the upper jam nut adjustment ring. Turn the lower adjustment ring (1) clockwise to increase preload or counter-clockwise to decrease preload.





3. Once you have obtained the correct preload, hold the lower adjustment ring while tightening the upper adjustment ring to lock them in place.

4. Measure the spring preload of RH shock and LH shock to ensure they are equal. Adjust if necessary.

Front Shock Compression Adjustment ("MXR")

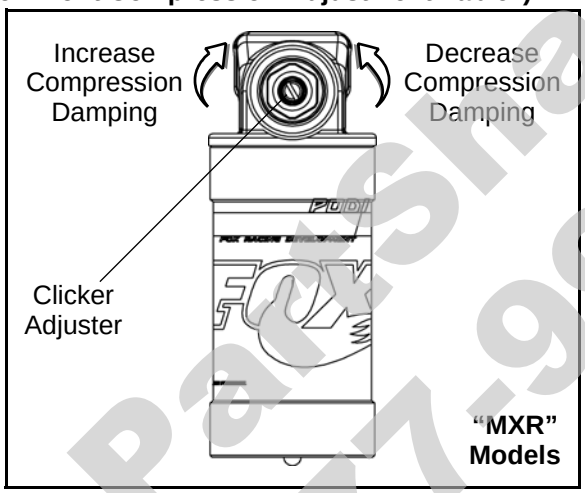
The compression damping adjustment is located on top of the shock 'Piggyback' reservoir of each front shock.

Use a flat blade screwdriver to make damping adjustments.

NOTE: When the adjuster screw is turned clockwise until it stops, the damping is in the fully closed position.

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

NOTE: The factory setting is 10 clicks from closed (see "Front Compression Adjustment Table").



Front Compression Adjustment Table

Setting	Compression Damping
Softest	20 clicks from closed
Factory	10 clicks from closed
Firmest	2 clicks from closed

Rear Suspension Set-Up

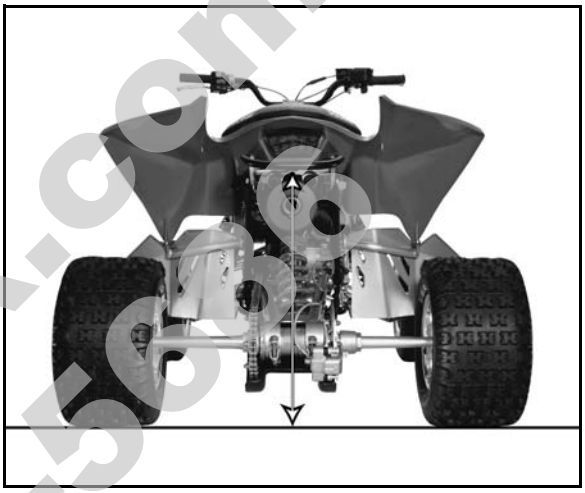
1. Position the vehicle on a level surface.

2. Stop the engine.

3. Elevate the rear of the vehicle by placing a suitable jack stand under the frame.

NOTE: The tires should barely touch the ground and the suspension should be at full rebound.

4. Measure the distance from the ground to the bottom of the rear grab bar. Note this measurement for later use.



5. Remove the support stand and have a rider sit comfortably on the seat with hands on the handlebars.

6. Place the transmission in neutral and slowly roll the machine forward and backward at least ten feet (3 m) without lifting or pushing down on the suspension.

7. Turn the handlebars fully to the left and right.

8. With the rider still on the vehicle, repeat the measurement performed in step 4.

9. Subtract the step 8 measurement from the step 4 measurement. The difference should be between the following measurements:
   - **450 "MXR"** 5.125 - 5.375 inches (13.02 - 13.65 cm)
   - **525 "S"** 5.0 - 5.25 inches (12.7 - 13.34 cm)

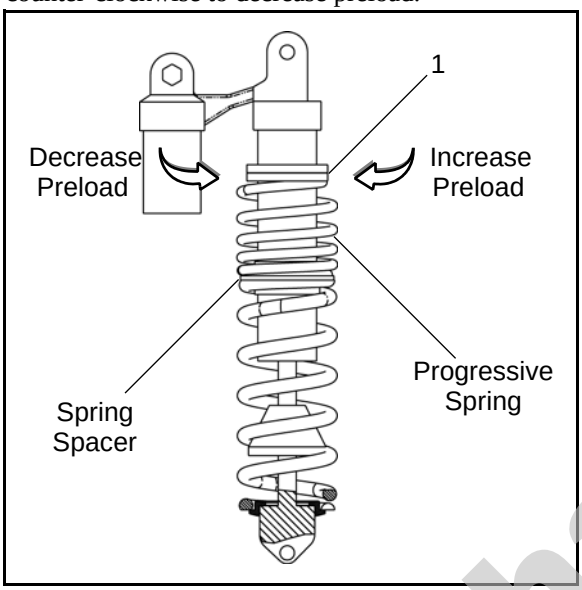
10. If the number is less than 5.125" **(450)** or 5.0" **(525)**, decrease the rear spring preload and repeat all steps (see "Rear Spring Preload adjustment"). If the number is higher than 5.375" **(450)** or 5.25" **(525)**, increase spring preload and repeat all steps.

Rear Spring Preload Adjustment

The rear suspension spring preload may be adjusted to suit different riding conditions and operator weight.

1. Raise and safely support the rear of the ATV off the ground to allow the suspension to fully extend.

2. Loosen the upper jam nut adjustment ring. Turn the lower adjustment ring (1) clockwise to increase preload or counter-clockwise to decrease preload.



3. Once you have obtained the correct preload, hold the lower adjustment ring while tightening the upper adjustment ring to lock them in place.

Rear Shock Compression Adjustment

The compression damping adjustment is located on top of the shock 'Piggyback' reservoir of the rear shock.

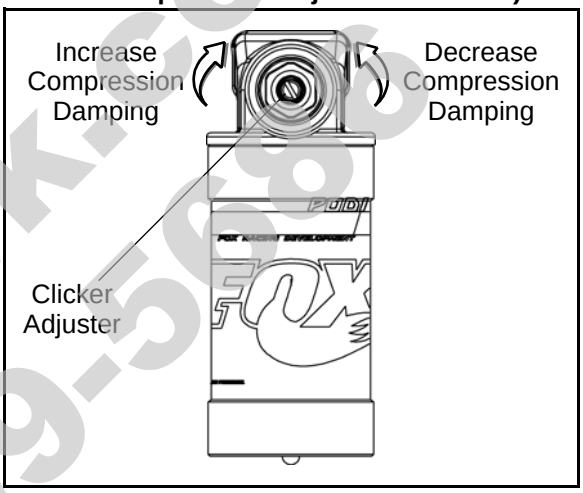
Remove the seat to access the compression adjustment screw.

Use a flat blade screwdriver to make damping adjustments.

NOTE: When the adjuster screw is turned clockwise until it stops, the damping is in the fully closed position.

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

NOTE: The factory setting is 10 clicks from closed (see "Rear Compression Adjustment Table").



Rear Compression Adjustment Table

Setting	Compression Damping
Softest	20 clicks from closed
Factory	10 clicks from closed
Firmest	2 clicks from closed

Rear Shock Rebound Adjustment

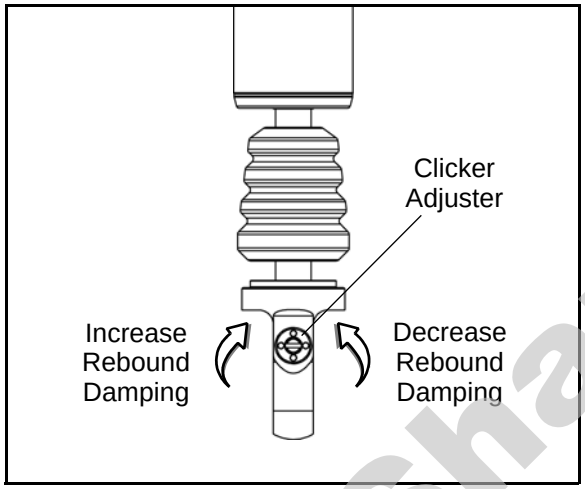
The rebound damping adjustment is located between the lower spring seat and lower shock eyelet mount of the rear shock.

Use a flat blade screwdriver to make damping adjustments.

NOTE: When the adjuster screw is turned clockwise until it stops, the damping is in the fully closed position.

Turn the clicker clockwise to increase rebound damping. Turn the clicker counter-clockwise to decrease rebound damping.

NOTE: The factory setting is 10 clicks from closed (see "Rear Rebound Adjustment Table").



Rear Rebound Adjustment Table

Setting	Rebound Damping
Softest	23 clicks from closed
Factory	10 clicks from closed
Firmest	2 clicks from closed

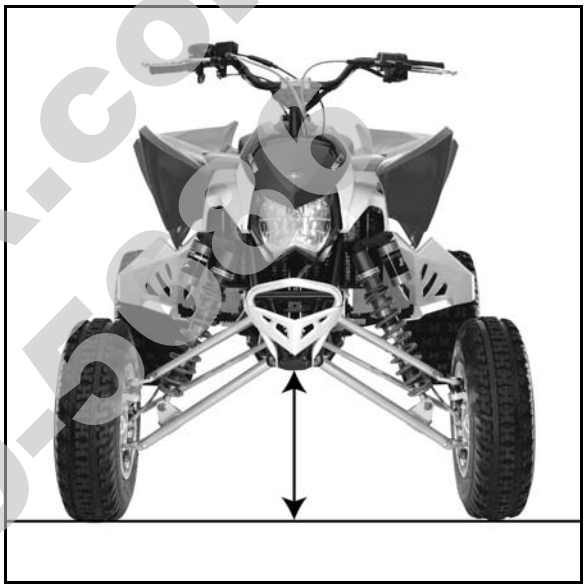
SUSPENSION (525 "IRS")

Front Suspension Set-Up

1. Position the vehicle on a level surface.
2. Stop the engine.
3. Elevate the front of the vehicle by placing a suitable jack stand under the frame.

NOTE: The tires should barely touch the ground and the suspension should be at full rebound.

4. Measure the distance from the ground to the bottom of the front frame portion. Note this measurement for later use.



5. Remove the support stand and have a rider sit comfortably on the seat with hands on the handlebars.
6. Place the transmission in neutral and slowly roll the machine forward and backward at least ten feet (3 m) without lifting or pushing down on the suspension.
7. Turn the handlebars fully to the left and right.
8. With the rider still on the vehicle, repeat the measurement performed in step 4.
9. Subtract the step 8 measurement from the step 4 measurement. The difference should be between 3.75 and 4.0 inches (9.5 - 10.2 cm).
10. If the number is less than 3.75" (9.5 cm), decrease the front spring preload and repeat all steps (see "Front Spring Preload Adjustment"). If the number is higher than 4.0" (10.2 cm), increase spring preload and repeat all steps.

Front Spring Preload Adjustment

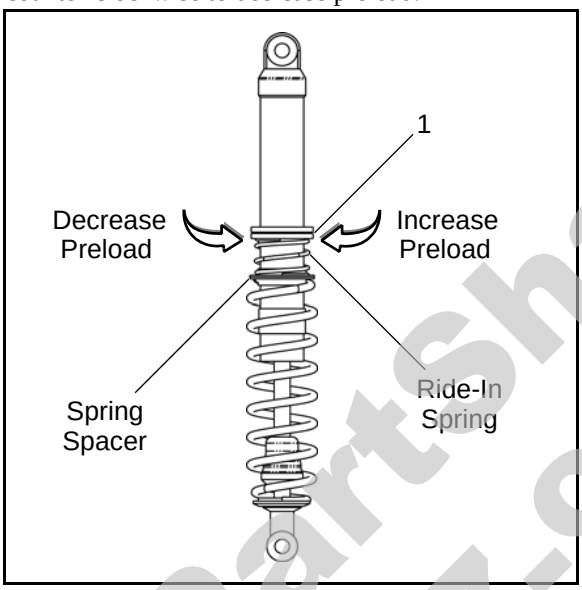
The front suspension spring preload may be adjusted to suit different conditions and operator weight.

⚠ WARNING

Uneven adjustment may cause poor handling of the ATV, which could result in an accident and serious injury or death. Always adjust both the left and right spring preloads equally or have your Polaris dealer perform the adjustments.

1. Raise and safely support the front of the ATV off the ground to allow the suspension to fully extend.

2. Loosen the upper jam nut adjustment ring. Turn the lower adjustment ring (1) clockwise to increase preload or counter-clockwise to decrease preload.



3. Once you have obtained the correct preload, hold the lower adjustment ring while tightening the upper adjustment ring to lock them in place.

4. Measure the spring preload of RH shock and LH shock to ensure they are equal. Adjust if necessary.

Rear Suspension Set-Up

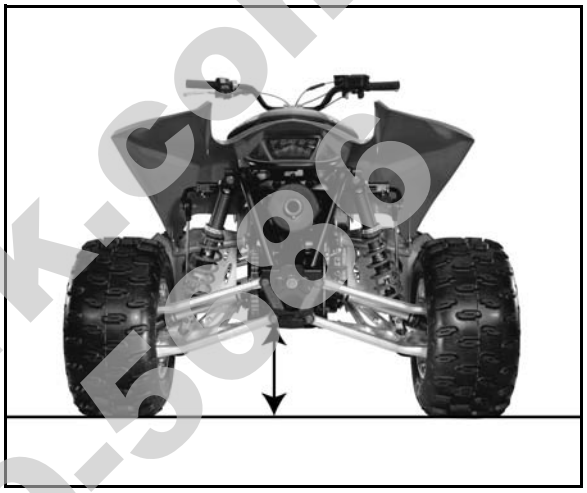
1. Position the vehicle on a level surface.

2. Stop the engine.

3. Elevate the rear of the vehicle by placing a suitable jack stand under the frame.

NOTE: The tires should barely touch the ground and the suspension should be at full rebound.

4. Measure the distance from the ground to the bottom of the rear lower control arm pivot bolt. Note this measurement for later use.



5. Remove the support stand and have a rider sit comfortably on the seat with hands on the handlebars.

6. Place the transmission in neutral and slowly roll the machine forward and backward at least ten feet (3 m) without lifting or pushing down on the suspension.

7. Turn the handlebars fully to the left and right.

8. With the rider still on the vehicle, repeat the measurement performed in step 4.

9. Subtract the step 8 measurement from the step 4 measurement. The difference should be between 4.25 and 4.5 inches (10.8 - 11.43 cm).

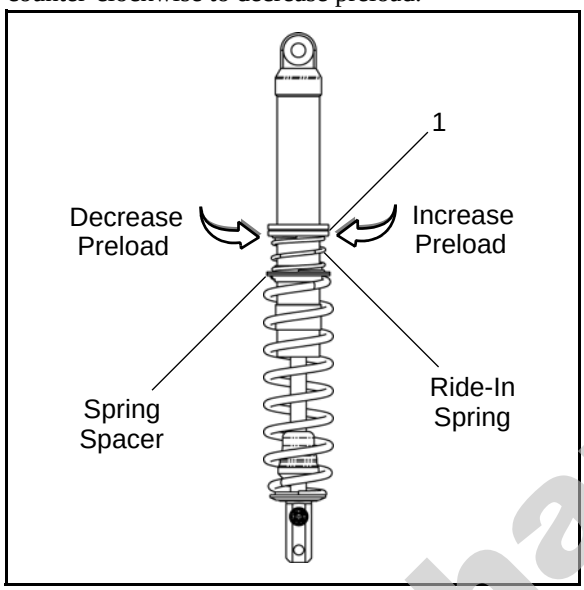
10. If the number is less than 4.25” (10.8 cm), decrease the rear spring preload on both shocks and repeat all steps (see “Rear Spring Preload adjustment”). If the number is higher than 4.5” (11.43 cm), increase spring preload and repeat all steps.

Rear Spring Preload Adjustment

The rear suspension spring preload may be adjusted to suit different conditions and operator weight.

1. Raise and safely support the rear of the ATV off the ground to allow the suspension to fully extend.

2. Loosen the upper jam nut adjustment ring. Turn the lower adjustment ring (1) clockwise to increase preload or counter-clockwise to decrease preload.



3. Measure the spring preload of RH shock and LH shock to ensure they are equal. Adjust if necessary.

4. Tighten jam nuts.

Rear Shock Compression Adjustment

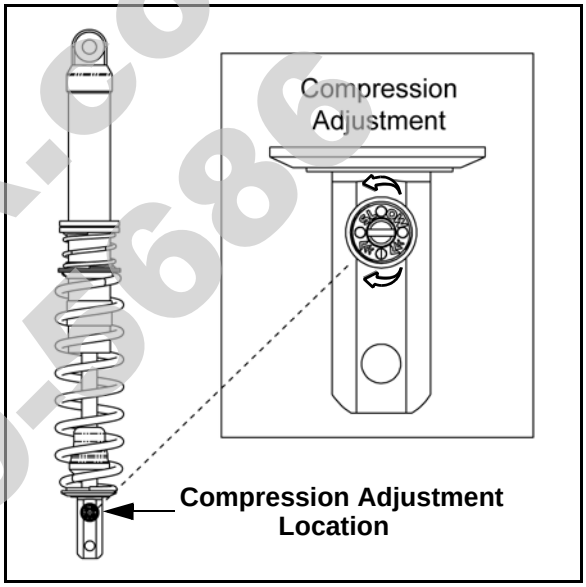
The compression damping adjustment is located on the bottom of each rear shock.

Use a flat blade screwdriver to make damping adjustments.

NOTE: When the adjuster screw is turned clockwise until it stops, the damping is in the fully closed position.

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

NOTE: The factory setting is 8 clicks from closed (see "Rear Compression Adjustment Table").



Rear Compression Adjustment Table

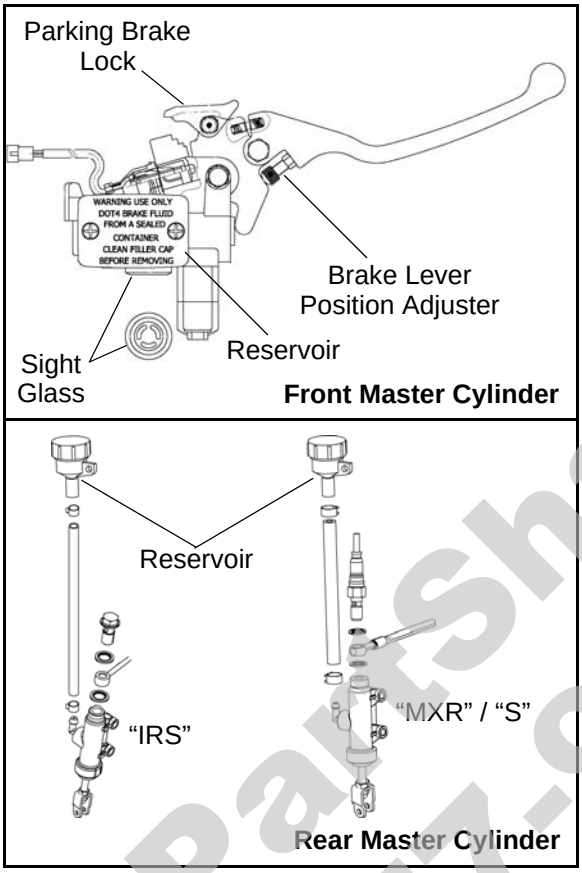
Setting	Compression Damping
Softest	24 clicks from closed
Factory	8 clicks from closed
Firmest	2 clicks from closed

BRAKE SYSTEM

Brake System Inspection

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

- Keep fluid level in the master cylinder reservoir to the indicated level on or inside the reservoir.
- Use Polaris or DOT 4 Brake Fluid.



- Check brake system hoses for cracks, deterioration, abrasion and fluid leaks. Replace worn or damaged components as needed.
- Check brake for excessive travel or spongy feel.
- Check friction pads for wear, damage or looseness.
- Check surface condition of the disc.
- Inspect thickness of brake pad friction material.

Brake Pad Inspection

Refer to Chapter 6 "Brakes" for brake pad service information.

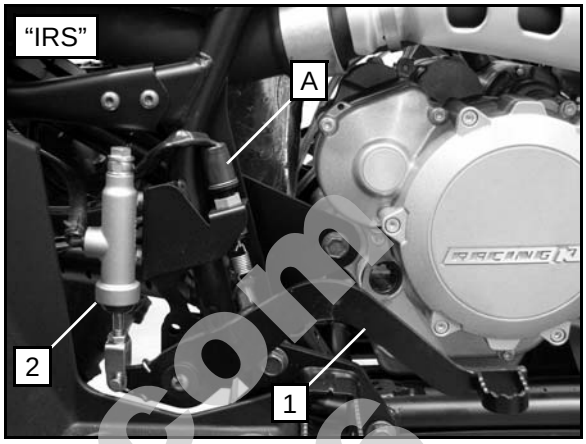
Brake Lever Position Adjustment

Refer to Chapter 6 "Brakes" for adjustment procedure.

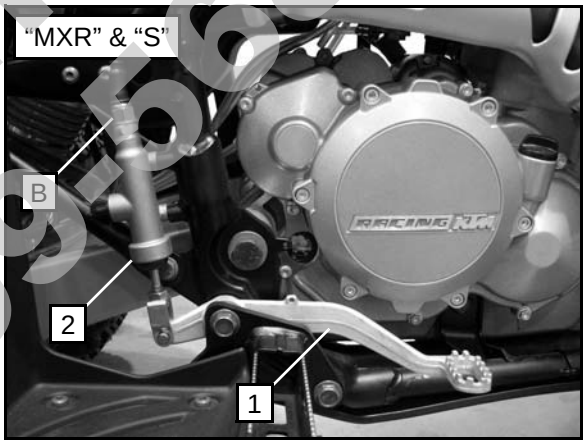
Brake Pedal Testing / Brake Light Operation

Check for proper brake light operation before each use.

- "IRS" models are equipped with a mounted brake light switch (A) that can be adjusted for proper operation.



- "MXR" and "S" models are equipped with a built-in brake light switch (B) that is part of the rear master cylinder banjo bolt. No switch adjustment is required.



The foot brake pedal (1) should be checked for proper operation. When applied, the brake power should be sufficient enough to stop the wheels under most conditions.

If brake operation is poor, two things must be examined:

Free Play:

Brake pedal free play should be 1/8" – 1/4" (3.2 – 6.35 mm).

If free play is excessive, inspect pedal (1), linkage, and master cylinder (2) for wear or damage and replace any parts as needed.

Bleeding:

If free play is correct, and brake pedal travel is still excessive, air may be trapped somewhere in the system. Bleed the hydraulic auxiliary brake system in a conventional manner, following the procedure outlined in Chapter 6 "Brakes".

WHEELS AND TIRES

Wheels

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

Wheel, Hub, and Spindle Torque Table

Item	Specification
Front Wheel Nuts	30-35 ft. lbs. (41-47 Nm)
Rear Wheel Nuts	30-35 ft. lbs. (41-47 Nm)
Front Spindle Nut	40 ft. lbs. (55 Nm)
Rear Hub Nut (“MXR” / “S”)	80 ft. lbs. (109 Nm)
Rear Hub Nut (“IRS”)	90 ft. lbs. (122 Nm)

Wheel Removal: Front or Rear

Wheel Removal

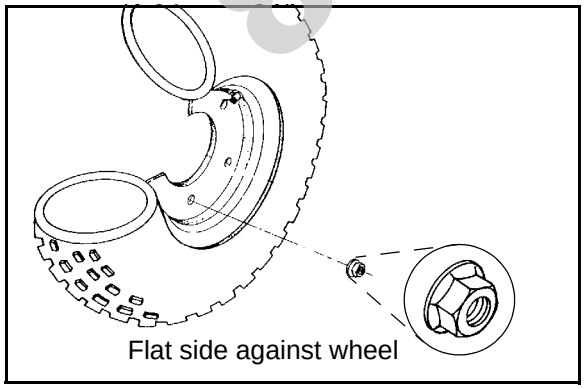
1. Stop the engine, place the transmission in gear and lock the parking brake.
2. Loosen the wheel nuts slightly.
3. Elevate the side of the vehicle by placing a suitable stand under the footrest frame.
4. Remove the wheel nuts and remove the wheel.

Wheel Installation

1. With the transmission in gear and the parking brake locked, place the wheel in the correct position on the wheel hub. Be sure the valve stem is toward the outside and rotation arrows on the tire point toward forward rotation.
2. Attach the wheel nuts and finger tighten them.
3. Lower the vehicle to the ground.
4. Tighten wheel nuts to the proper torque listed in the table.

⚠ CAUTION

Improperly installed wheels could affect vehicle handling and tire wear. Make sure the flat side of the flange nut faces the wheel.



Tire Pressure

⚠ CAUTION

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

Tire Pressure (PSI - Cold)

Front	Rear
4	4

Tire Inspection

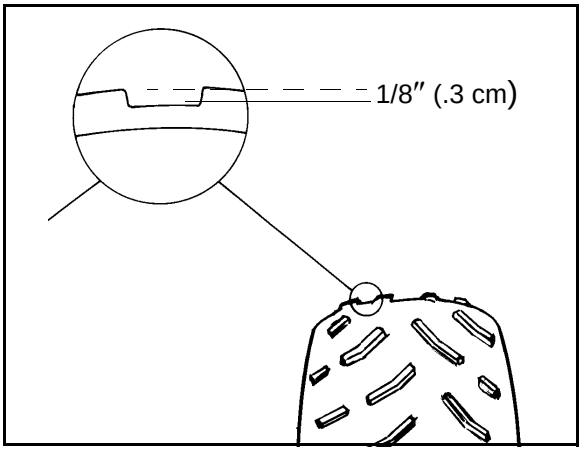
- Improper tire inflation may affect ATV maneuverability.
- When replacing a tire always use original equipment size and type.
- The use of non–standard size or type tires may affect ATV handling.

Tire Tread Depth

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

⚠ WARNING

Operating your ATV with worn tires, improperly inflated tires, non - standard tires or improperly installed tires will affect vehicle handling and could cause an accident resulting in serious injury or death. Maintain proper tire pressure as described on the ATV decal and in the owner’s manual.
Always use original equipment size and type when replacing tires.
Make sure the wheels are installed properly.



MAINTENANCE LOG

Service Date	Hours	Service Performed / Comments	Dealer / Technician
	3 Hours (Break-In)		
	15		
	30		
	45		
	60		
	75		
	90		

CHAPTER 3
ENGINE

ENGINE SERVICE

KTM 450/525 Engine

Chapter 3 covers basic engine information including engine removal / installation and the cooling system.

Chapter 9 (KTM Engine/Carburetion) details the service procedures for the KTM 450/525 engine and Keihin carburetor. Refer to Chapter 9 for any engine service specifications or service procedures.

GENERAL ENGINE INFORMATION

Special Tools

See Chapter 1 for a complete listing of special tools to service the KTM 450/525 engine.

Accessible Components

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

- Alternator / Stator
- Cam Chain and Sprockets
- Camshaft / Components
- Clutch Assembly
- Cylinder
- Cylinder Head / Valves
- Flywheel
- Oil Pump Rotors
- Piston / Rings
- Starter Motor / Starter Drive
- Water Pump Impeller / Water Pump Seal Carrier

The following components require engine removal for service:

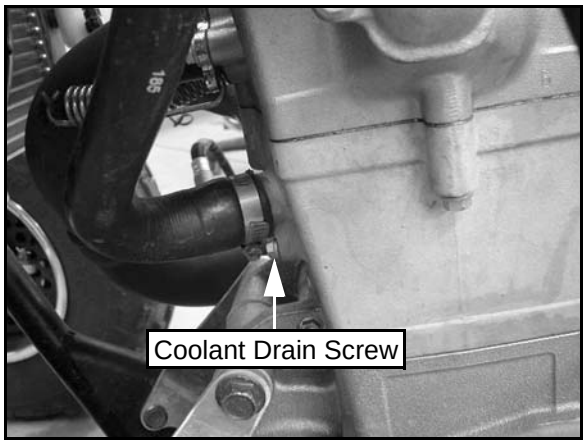
- Crankshaft
- Crankshaft Main Bearings
- Connecting Rod
- Counterbalance Shaft or Bearing(s)
- Transmission Gears and Bearings

Engine Removal

1. Thoroughly clean the ATV engine and chassis.
2. Place ATV in a clean work area.
3. Disconnect battery cables, starting with the negative (–) cable first.
4. Remove the (2) screws that retain the front cover (see Chapter 5).
5. Remove the seat and front cab assembly (see Chapter 5).
6. Remove the air box assembly.
7. Turn the fuel valve "Off" and remove the fuel lines from the fuel tank fittings (see Chapter 4).
8. Remove the fuel tank from the ATV.

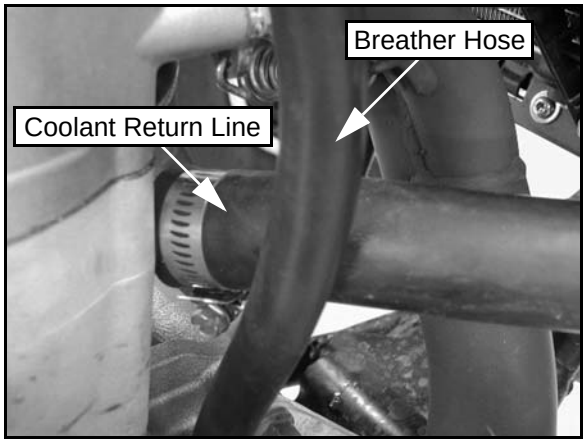
NOTE: Remove the engine skid plate to prevent excessive spills when draining the engine oil and coolant. The skid plate is attached by (4) screws on the bottom side of the plate.

9. Place a suitable catch container under the engine.
10. Remove the engine oil drain plug and allow oil to completely drain from the engine (see Chapter 2 for oil change procedure). Reinstall the drain plug when finished draining.
11. Remove the coolant drain screw from the cylinder under the coolant bypass hose. Open radiator cap to help vent the cooling system when draining.

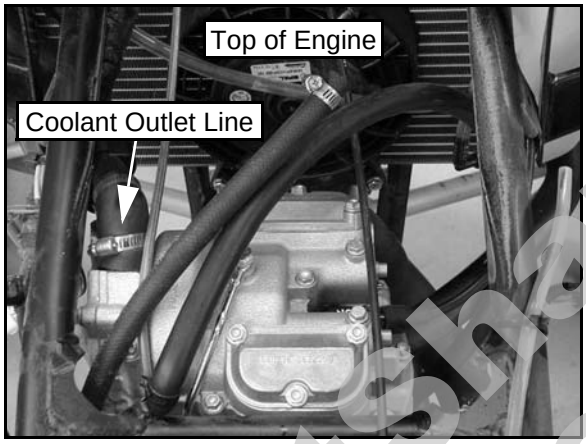


12. Allow coolant to completely drain and then remove the by-pass hose from the front of the cylinder.

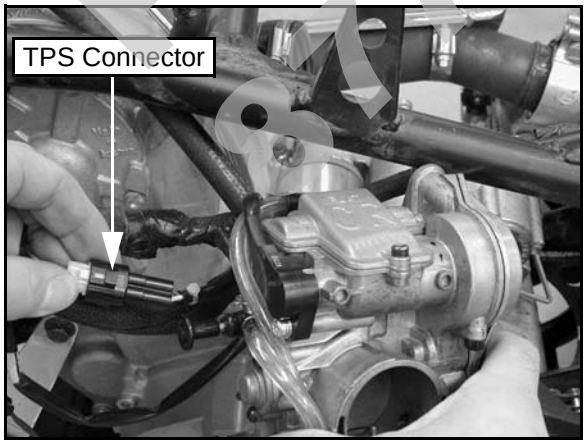
13. Remove coolant return line from right side of cylinder.



14. Remove the water pump outlet line from the top of the cylinder head at the water pump housing.



15. Disconnect the throttle position sensor (TPS) connector and remove the carburetor from the engine. In most instances, the carburetor will not have to be disconnected from the throttle cable or fuel line for engine removal. Insert a shop towel into the engine carburetor flange to prevent dirt from entering the intake of the engine.



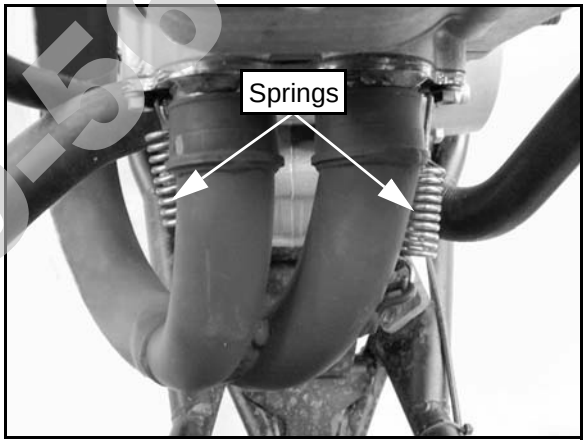
16. Unplug the (2) vent lines from the carburetor that run along the frame tubes.

⚠ CAUTION

Fuel will leak if carb is turned upside down.

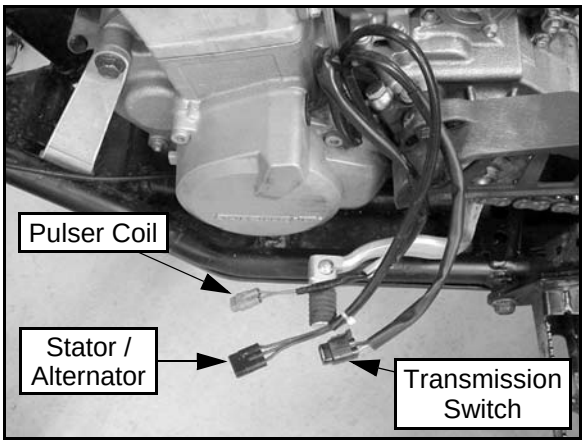
17. Remove the rear header pipe clamp.

18. Remove the exhaust springs that attach the header pipe to the cylinder head.

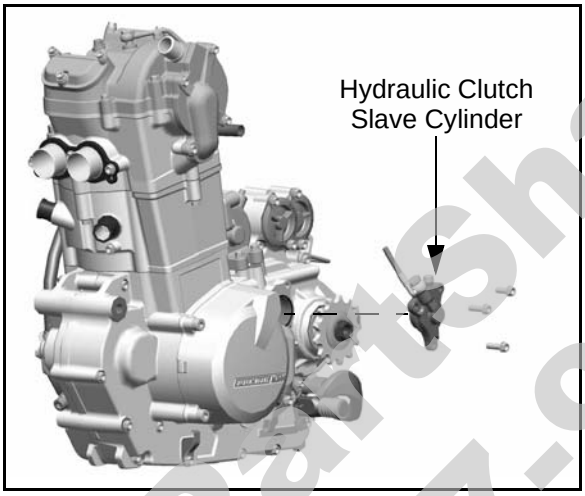


19. Slide header pipe forward and remove it from the engine.

20. Disconnect all electrical connections from the engine. Connections include: the starter motor positive (+) wire, the spark plug high tension lead, the pulser coil, stator/ alternator, and transmission switch wire connectors on the left hand side of the ATV.

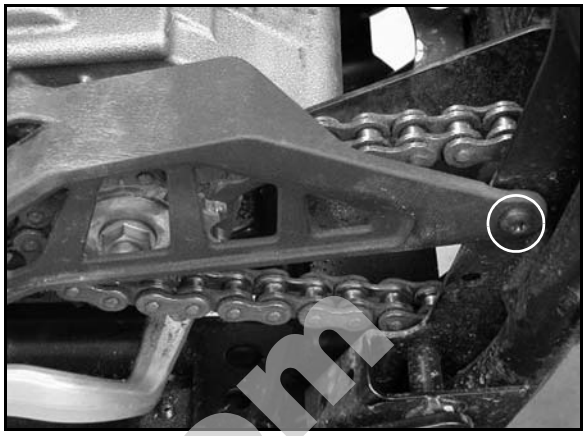


21. Remove the 3 bolts retaining the hydraulic clutch slave cylinder and remove the slave cylinder as an assembly.

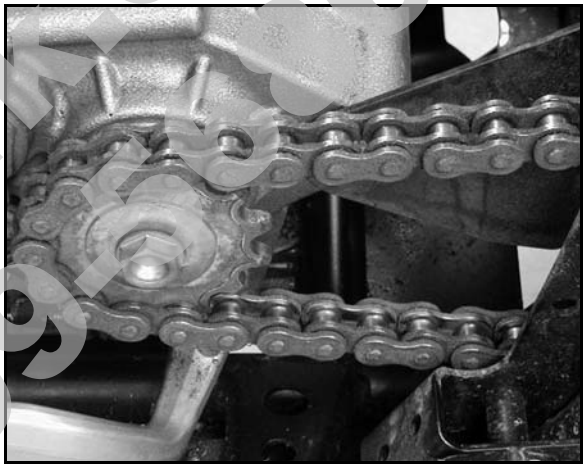


NOTE: Removing the banjo bolt from the clutch slave cylinder will require bleeding the hydraulic clutch system. Remove the slave cylinder as an assembly to prevent having to bleed the clutch system.

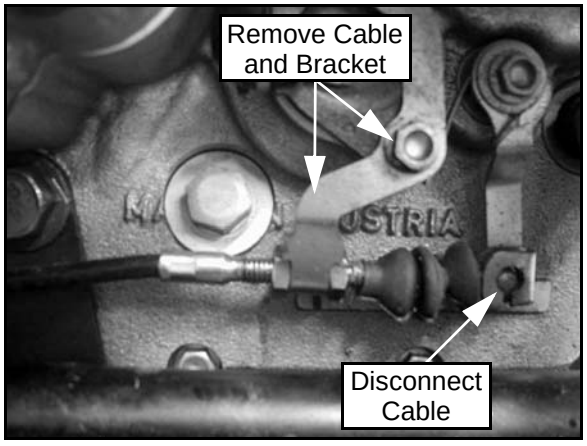
22. Remove the rear bolt from the front chain guard and remove the guard.



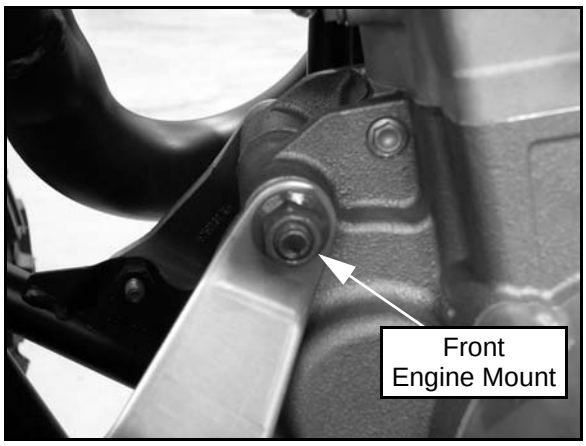
23. Loosen the drive chain tension and disconnect or remove the chain. An acceptable alternative is to remove the engine counter sprocket and chain as one.



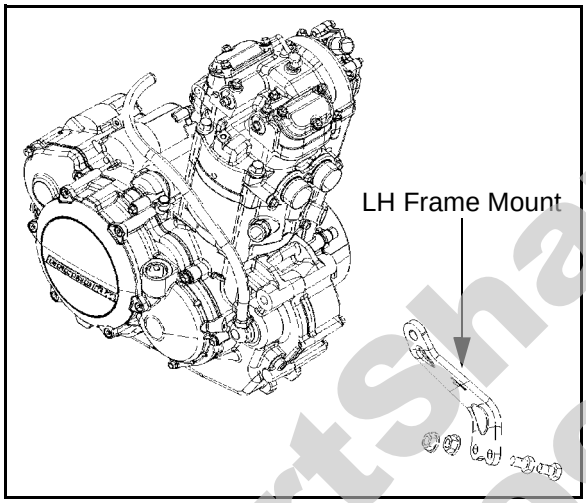
24. Disconnect and remove the reverse cable from the engine.



25. Remove the front engine mount through-bolt.

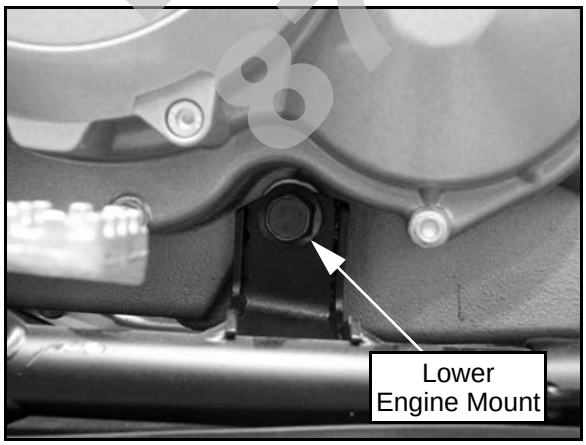


26. Remove the LH front engine mount from the frame to allow the engine to be pulled out the LH side.



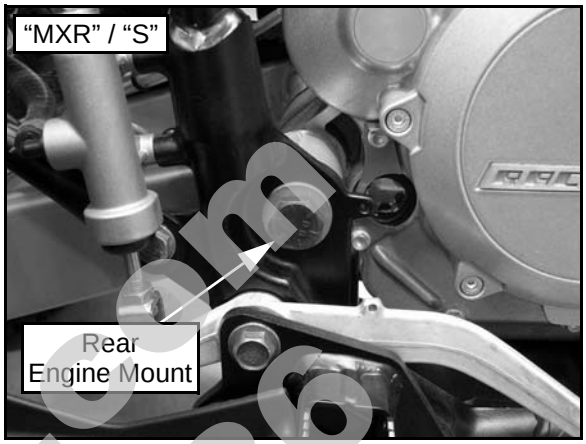
27. Loosen both the lower and rear engine mount through-bolts.

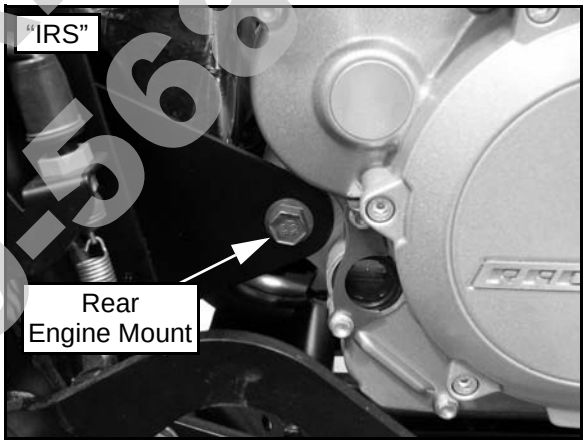
28. Remove the lower engine mount through-bolt while using the rear through-bolt as a pivot.



29. Finally, remove the rear engine mount through-bolt.

IMPORTANT: Do not completely remove the swing arm through-bolt on "MXR" / "S" models. Leave it in far enough to hold the swing arm in place. Another pin should be inserted on the opposite side to also hold the swing arm in place.





NOTE: The rear engine mount through-bolt uses a bushing. Retain the bushing in the engine so it's not lost during engine disassembly.

30. With an assistant helping you, remove the engine by tilting forward and turning to exit through the left side of frame.

31. Refer to the "KTM Engine / Carburetion" section in the back of this service manual for engine disassembly procedures.

To reinstall the engine, reverse the procedures. Refer to engine installation notes on Page 3.6.

Engine Installation Notes

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

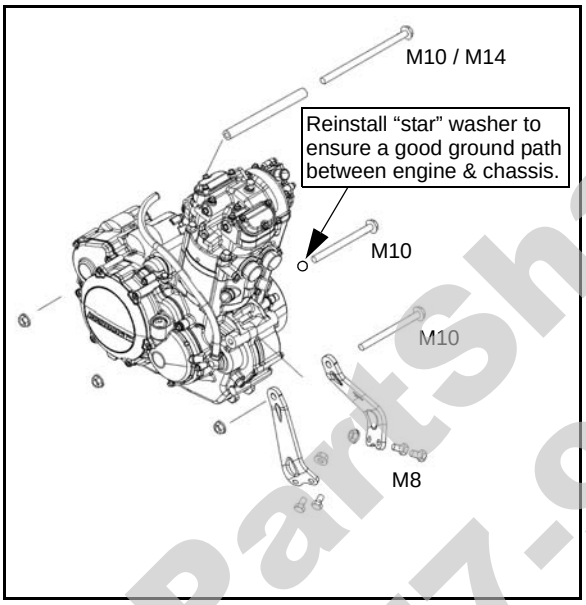
Engine Mounting Torque

"MXR" / "S" Models

- Torque the front LH frame mount M8 bolts to 17 ft. lbs. (23 Nm).
- Torque (lower / front) M10 through-bolts to 30 ft. lbs. (41 Nm).
- Torque (rear) M14 swing arm bolt to 85-105 ft. lbs. (115-142 Nm)

"IRS" Models

- Torque the front LH frame mount M8 bolts to 17 ft. lbs. (23 Nm).
- Torque (rear / lower / front) M10 through-bolts to 30 ft. lbs. (41 Nm).



General Items

- Fill engine with recommended amount of engine oil.

PS-4 Plus 2W-50 Synthetic Engine Oil
1.7 qts (1.6 L)

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

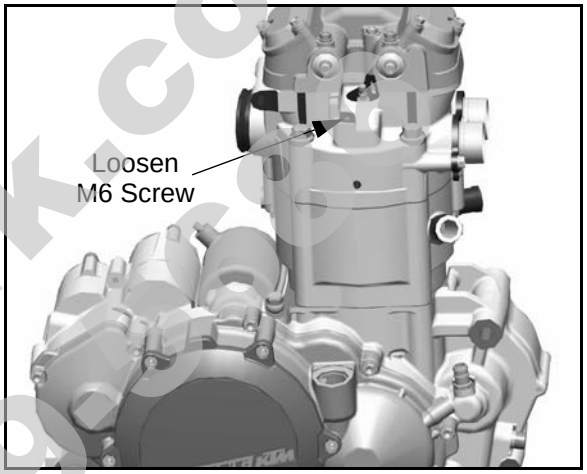
Exhaust

- Replace exhaust seal if necessary.
- Verify all fasteners are in good condition and torqued properly.

Bleed Cooling System

NOTE: Refer to Page 3.7 for hose routing. Bleeding is generally necessary after repairs to purge any air that may remain in the system during filling.

1. Loosen the M6 coolant bleed screw located in the top right-hand side of the cylinder head, 2-3 turns.



2. Remove radiator cap and slowly add coolant until the coolant escapes out of the cylinder head bleed screw.
3. Tighten the M6 coolant bleed screw and continue filling the radiator to the bottom of filler neck.
4. Fill coolant reservoir tank to full mark.
5. Install radiator cap half-way and gently squeeze coolant hoses to force any trapped air out of system.
6. Again, remove radiator cap and slowly add coolant to the bottom of fill neck if required.
7. Start engine and observe coolant level in the radiator. Allow air to purge and top off as necessary. Reinstall radiator cap and bring engine to operating temperature. After engine is cool, check level in reservoir tank and add coolant if necessary.

NOTE: Should the reservoir tank become empty, it will be necessary to refill at the radiator and repeat the bleeding procedure.

Engine Break-In Period

No single action on your part is as important as a proper break-in period. Careful treatment of a new engine and transmission will result in more efficient performance and longer life for both. Perform the following procedures carefully.

The break-in period for the KTM engine is defined as the first three hours of operation, or the time it takes to use 5-6 gallons (20 liters) of fuel. Do not allow engine speed to exceed 7000 RPM during the break-in period. Follow the break-in period with an additional 12 hours of cautious operation, with engine speed below 75% of capacity.

New and rebuilt engines require a break-in oil change after 3 hours of engine operation.

OIL RECOMMENDATION

Polaris PS-4 Plus 2W-50 synthetic oil is specially formulated for the KTM wet-clutch transmission. Never substitute or mix oil brands. Serious engine damage can result.

1. Fill fuel tank with unleaded fuel which has a minimum pump octane number of 91= (R+ M)/2.
2. Check oil level as indicated through the sight glass. Add oil if necessary.
3. Drive slowly at first to gradually bring engine up to operating temperature.
4. Vary throttle positions. Do not operate at sustained idle or sustained high speed.
5. Perform regular checks on fluid levels, controls and all important areas on the vehicle.
6. Pull only light loads during initial break in.
7. Change break-in oil and filters after 3 hours of operation.

ES45KL / ES51KL Engine Lubrication

Oil Type:
Polaris PS-4 Plus 2W-50 Synthetic (PN 2876244)

Capacity:
Approximately 1.7 qts (1.6 L)

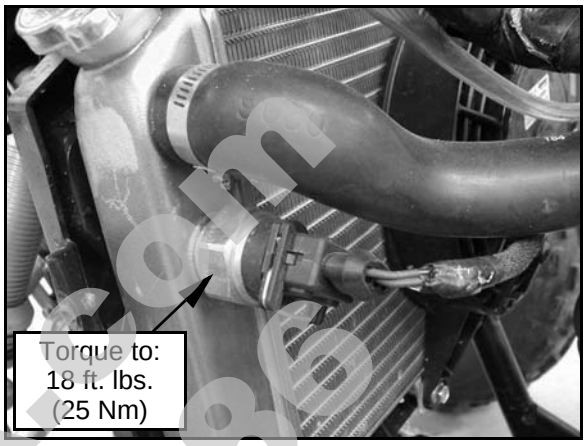
Oil Filters:
(Long PN 2520754)
(Short PN 2520755)
(Cover O-Ring PN 5413254)

Drain Plug:
15 ft. lbs. (20 Nm)

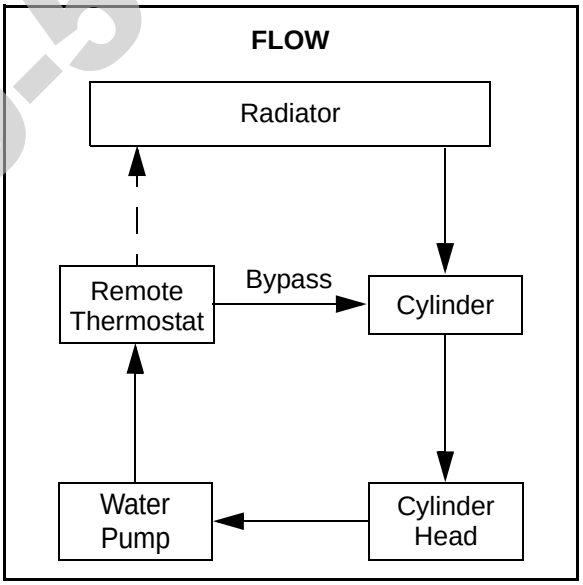
ENGINE COOLING SYSTEM

Coolant Temperature Sensor (Dual Temp Thermal Sensor)

The Dual Temp Thermal Sensor provides a ground path for the "Hot Light" and the fan motor. See Chapter 7 for further electrical information.



Cooling System Flow Chart



⚠ WARNING

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

Cooling System Pressure Test

1. Remove pressure cap and pressure test the cooling system using a commercially available pressure tester.

2. The system must retain 10 psi for five minutes or longer. If pressure is lost within five minutes, check radiator, all hoses and clamps, and water pump seal for damage.

Radiator Pressure Cap Test

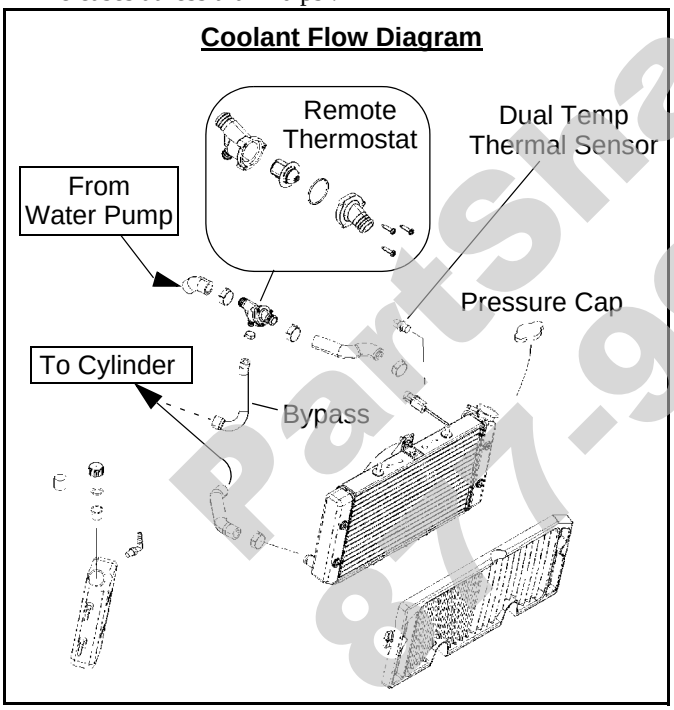
⚠ WARNING

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

1. Remove radiator pressure cap and test the cap using a cap tester (commercially available).

2. The radiator cap relief pressure is 20 psi. Replace if cap releases at less than 20 psi.

Coolant Flow Diagram



Cooling System Specifications

Description	Temperature / Spec.
Fan Switch On	185° F (85° C) ± 3°
Hot Light On	221° F (105° C) ± 3°
System Capacity	2.25 Quarts (2.1 L)
Radiator Cap Relief Pressure	20 psi

Recommended Coolant Type

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

IMPORTANT: Using tap water in the cooling system will lead to a buildup of deposits which may restrict coolant flow and reduce heat dissipation, resulting in possible engine damage.

CHAPTER 4
FUEL SYSTEM

CARBURETOR SERVICE

Keihin FCR-MX 39 mm Carburetor

Chapter 4 covers basic fuel system information including exploded views of the carburetor, a listing of optional jets and jetting guidelines.

Chapter 9 (KTM Engine/Carburetion) details the service procedures for the KTM 450/525 engine and Keihin carburetor. Refer to Chapter 9 for any carburetor service specifications or service procedures.

GENERAL INFORMATION

Jetting Guidelines

⚠ 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.

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

Polaris ATV carburetors are calibrated for an altitude of 0–6000 ft. (0–1800 meters) and ambient temperatures above +40° F (+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 may be required to suit operating conditions.

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 jet from the specification chart listed in Chapter 1.

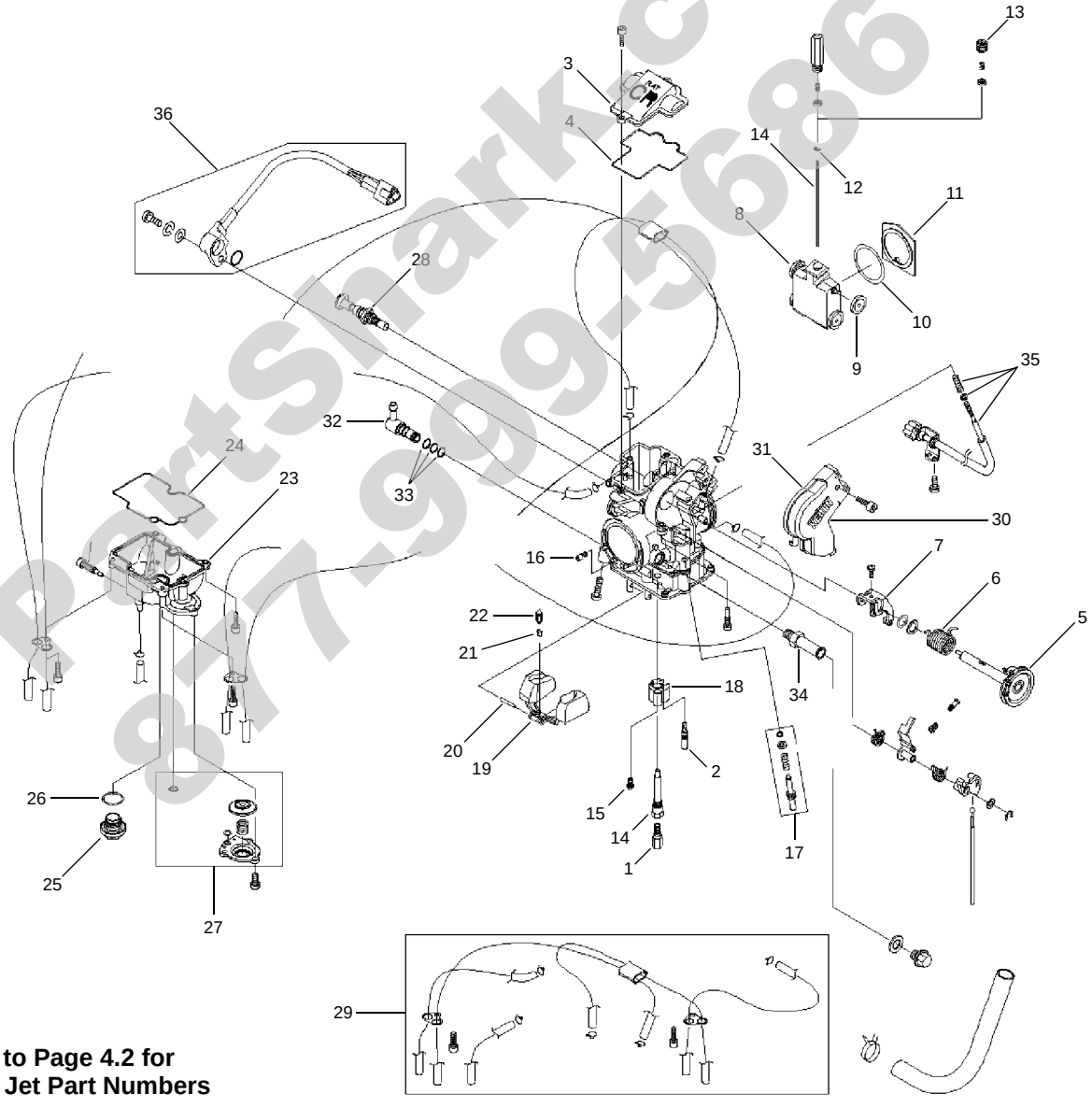
Keihin Optional Jet Part Numbers

MAIN JETS	PILOT JETS
3050235-120	3050219-35
3050235-122	3050219-38
3050235-125	3050219-40
3050235-128	3050219-42
3050235-130	3050219-45
3050235-132	3050219-48
3050235-135	3050219-50
3050235-138	3050219-52
3050235-140	3050219-55
3050235-142	3050219-58
3050235-145	3050219-60
3050235-148	3050219-62
3050235-150	3050219-65
3050235-152	
3050235-155	
3050235-158	
3050235-160	
3050235-162	

KEIHIN FCR-MX 3900 CARBURETOR

Exploded View

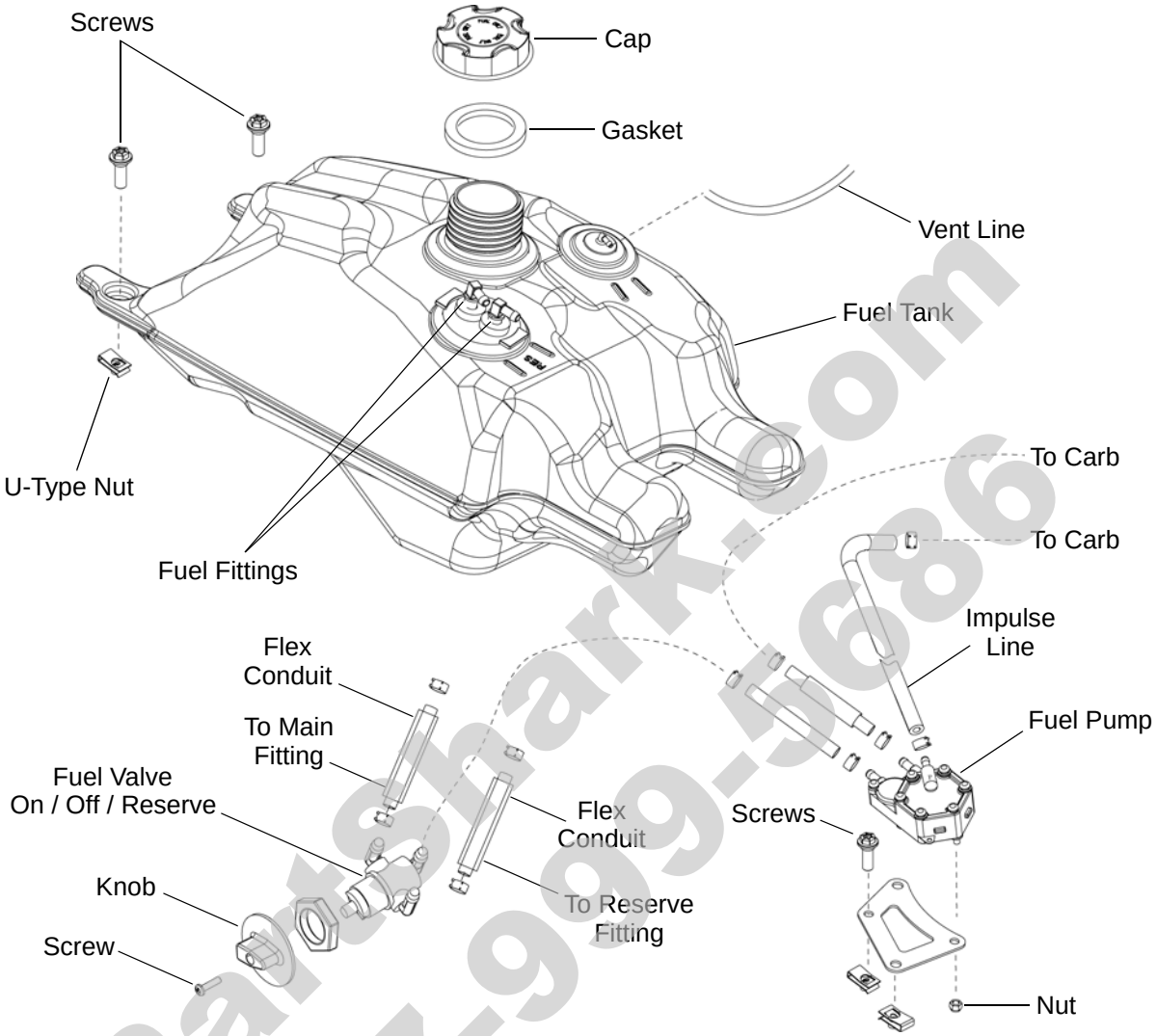
Ref	Description	Ref	Description	Ref	Description
1	Main Jet	13	Screw, Needle Seat	25	Plug, Float Bowl Drain
2	Pilot Jet	14	Carburetor Needle and Jet	26	O-Ring, Plug Screw
3	Cover, Carburetor Top	15	Starter Jet	27	Kit, Accelerator Pump Bowl
4	Seal, Carburetor Cover	16	Slow Air Jet	28	Valve, Choke
5	Shaft, Throttle	17	Kit, Pilot Screw	29	Kit, Breather Hoses
6	Spring, Throttle	18	Plate, Buffer	30	Cover, Throttle
7	Arm, Link Throttle Valve	19	Float, Carburetor	31	Seal, Throttle Cover
8	Valve, Throttle	20	Pin, Float	32	Fitting, Fuel Inlet
9	Roller, Throttle Valve	21	Clip, Float Valve	33	O-Ring, Fuel Inlet
10	Seal, Throttle Valve	22	Float Needle and Seat	34	Fitting, Breather Hose
11	Plate, Throttle Valve	23	Bowl, Float	35	Kit, Idle Speed Screw
12	Clip, Needle	24	Seal, Float Bowl	36	Kit, Throttle Position Sensor

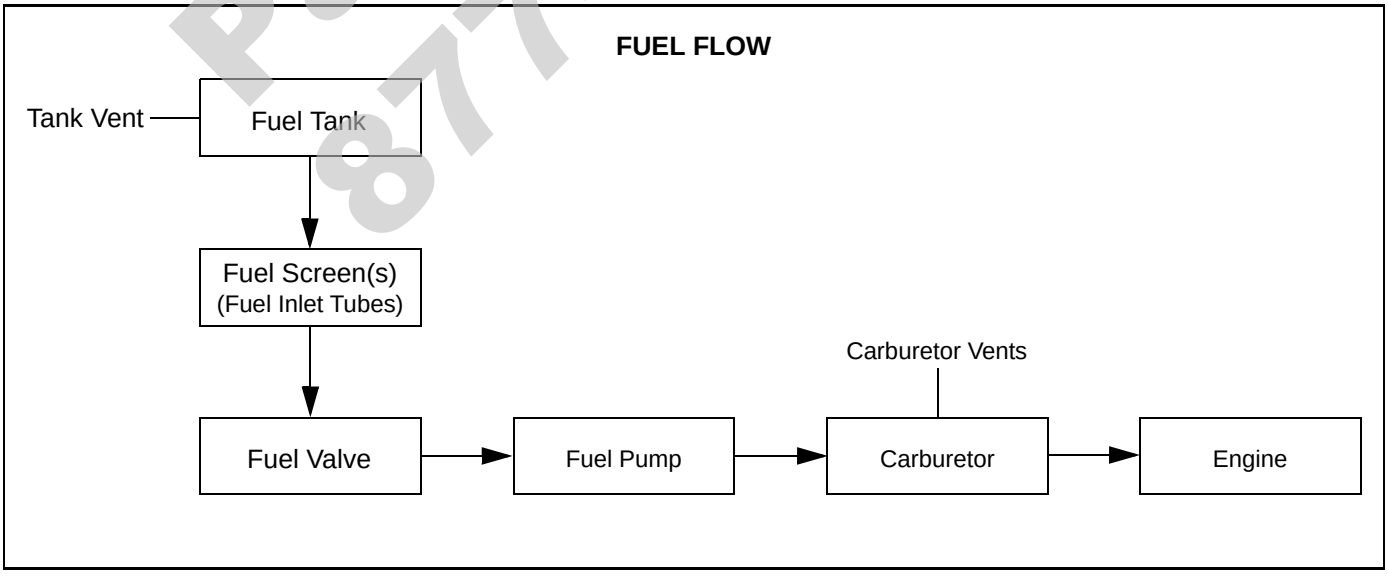


Refer to Page 4.2 for Optional Jet Part Numbers

FUEL TANK

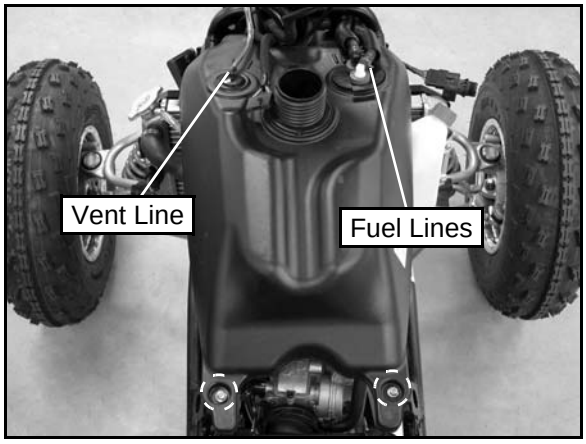
Exploded View





Fuel Tank Removal

1. Remove the seat, front cover, side panels and front cab (see Chapter 5 “Body Component Removal”).
2. Install the fuel cap.
3. Disconnect the fuel lines from the tank fittings.
4. Disconnect the vent line.

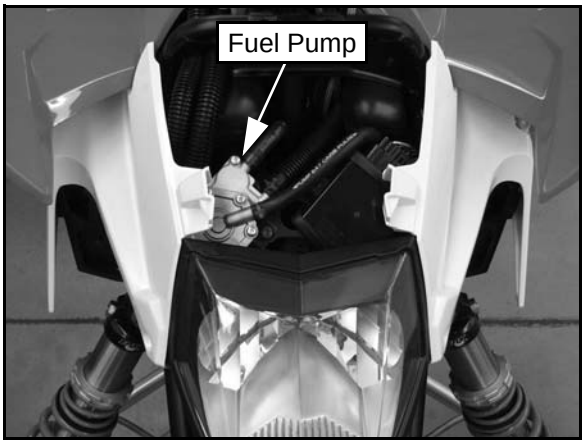


5. Remove the (2) T27/8mm Hex-head screws from the rear portion of the fuel tank.
6. Lift the fuel tank out from the frame.
7. Reverse this procedure to reinstall. Refer to Chapter 5 “Body Component Removal” during body assembly.

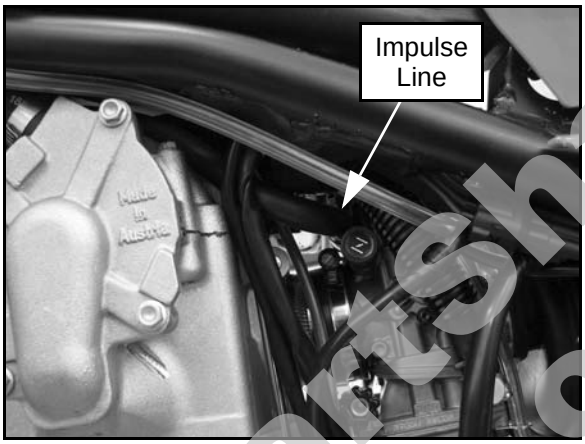
FUEL PUMP

Location / Operation

The fuel pump is located under the front cover.



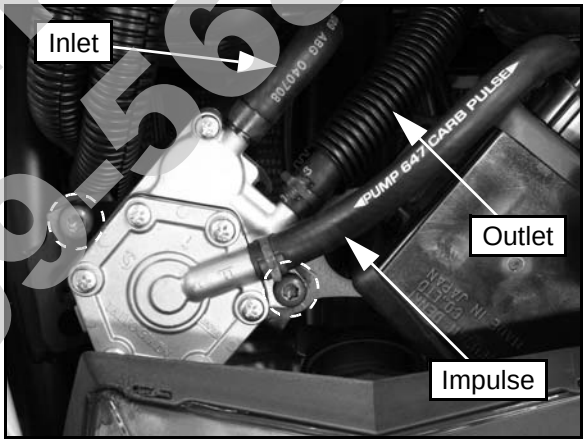
The fuel pump operates off crankcase impulses via the impulse line located on the front left side of the carburetor.



Service / Replacement

1. Remove the (2) T27/8mm Hex-head screws and front cover from the ATV.

2. Turn the fuel valve to the "OFF" position.
3. Pull the RH side panel out of the way and remove the (2) T27/8mm Hex-head screws retaining the fuel pump.



4. Pull out the fuel pump and note the fuel line orientation on the pump.
5. Remove the clamps and fuel lines from the pump.
6. Remove the fuel pump and service / replace.
7. Reverse this procedure to reinstall the fuel pump.

CHAPTER 5

BODY / STEERING / SUSPENSION

5

GENERAL INFORMATION

Torque Specifications

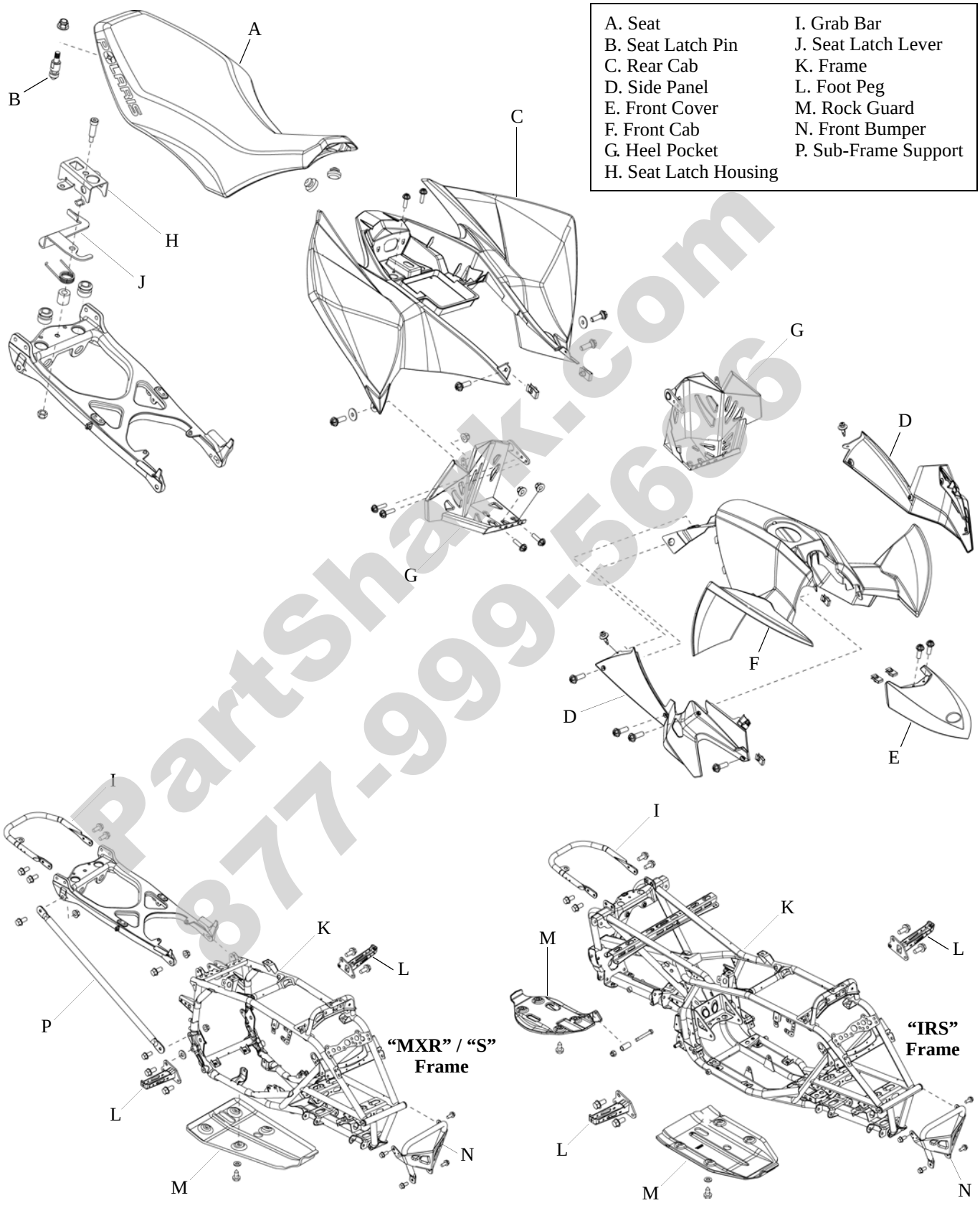
COMPONENT	TORQUE VALUE
Front Suspension	
Front A–Arm Attaching Bolts	33 ft. lbs. (45 Nm)
Front A–Arm Ball Joint Stud Nut	40 ft. lbs. (54 Nm)
Front Spindle Nut	40 ft. lbs. (54 Nm)
Tie Rod End Jam Nut	15 ft. lbs. (20 Nm)
Tie Rod End Attaching Nut	33 ft. lbs. (45 Nm)
Shock Bolts (top & bottom)	33 ft. lbs. (45 Nm)
Steering	
Master Cylinder Mount Bolts	45–55 in. lbs. (5.2–6.3 Nm)
Handlebar Adjuster Block	11 ft. lbs. (15 Nm)
Steering Post Bushing Nuts	17 ft. lbs. (23 Nm)
Steering Post Retainer Nuts	17 ft. lbs. (23 Nm)
Rear Suspension	
Rear Axle Nut (“MXR” / “S”)	8-10 ft. lbs. (11-14 Nm)
Rear Axle Nut Pinch Bolt (“MXR” / “S”)	50 in. lbs. (6 Nm)
Rear Axle Housing Pinch Bolts (“MXR” / “S”)	35 ft. lbs. (47 Nm)
Rear Hub Nut (“MXR” / “S”)	80 ft. lbs. (109 Nm)
Swing Arm Pivot Bolt / Rear Engine Mount (“MXR” / “S”)	95 ft. lbs. (129 Nm)
Rear A–Arm Attaching Bolts (“IRS”)	33 ft. lbs. (45 Nm)
Rear Hub Nut (“IRS”)	90 ft. lbs. (122 Nm)
Rear Hub Carrier Bolts (“IRS”)	30 ft. lbs. (41 Nm)
Upper Torsion Bar Bolts (“IRS”)	33 ft. lbs. (45 Nm)
Torsion Bar Pivot Plate Bolts (“IRS”)	9 ft. lbs. (12 Nm)
Shock Bolts (top & bottom) (“IRS”)	33 ft. lbs. (45 Nm)
Shock Bolts (top & bottom) (“MXR” / “S”)	36 ft. lbs. (49 Nm)
Serviceable Components	
Rear Pivot Housing Mounting Bolts (“IRS”)	30 ft. lbs. (41 Nm)
Rear Pivot Housing Mount Plate (“IRS”)	17 ft. lbs. (23 Nm)
Rear Sprocket Bolts (“MXR” / “S”)	29-35 ft. lbs. (39-47 Nm)
Rear Sprocket Bolts (“IRS”)	32 ft. lbs. (43 Nm)
Brake Disc Caliper Mounting Bolts	18 ft. lbs. (24 Nm)
Wheel Nuts	30-35 ft. lbs. (41-47 Nm)
Foot Peg	33 ft. lbs. (45 Nm)

Special Tools

PART NUMBER	TOOL DESCRIPTION
PA - 48282	Rear Drive Hub Tool (“IRS”)
2200421	Gas Shock Recharging Kit (FOX™)
2871352	Shock Rod Holding Tool (FOX™)
2201640	Shock Seal Installer .620” / 15.7 mm (FOX™)
2201639	Shock Seal Installer .498” / 12.6 mm (FOX™)
2871351	Shock IFP Depth Tool (FOX™)

BODY ASSEMBLY

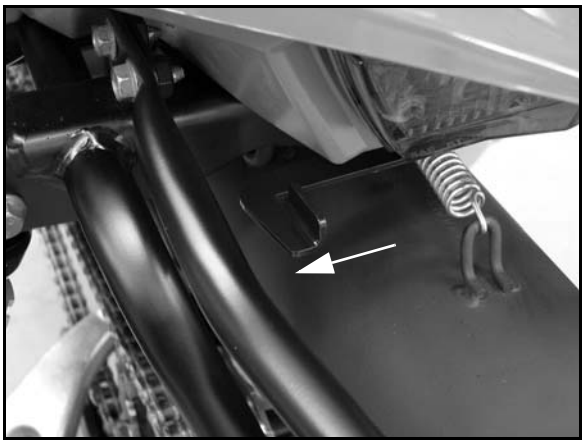
Exploded View



BODY COMPONENT REMOVAL

Seat

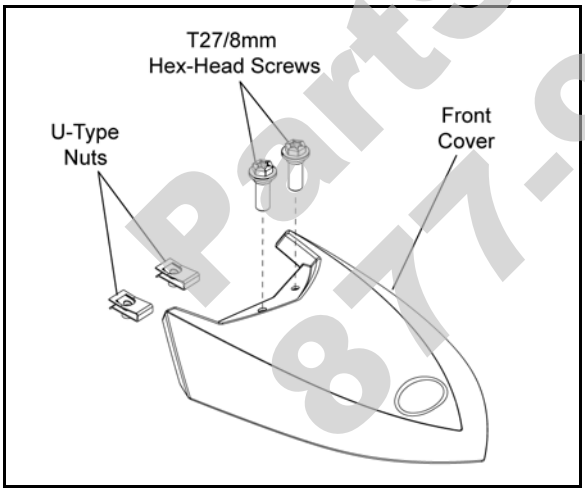
1. The seat latch is located underneath the tail light.
2. Remove the seat by pulling the seat latch outward and lifting up on the rear of the seat. Once the rear of the seat is loose, disengage the front by pulling the seat back towards the rear of the ATV.



3. Install the seat by engaging the front portion first, then pulling the seat latch out while setting the seat down and into place. Lift up on the seat to verify it is latched down.

Front Cover

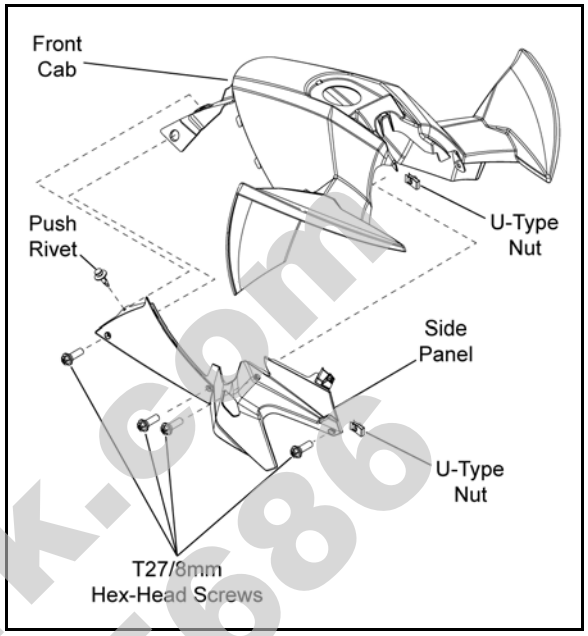
1. Remove the (2) T27/8mm Hex-head screws.



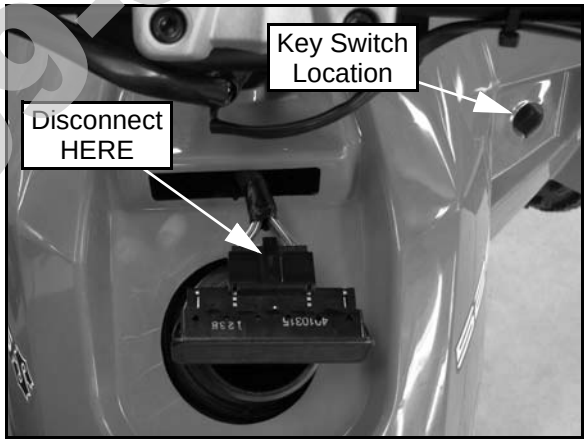
2. Pull the front cover forward to disengage the tabs and remove it from the ATV.

Front Cab

1. Remove the seat and front cover.
2. Remove the (4) T27/8mm Hex-head screws and push rivet retaining the front cab/side panels on each side.



3. Remove the retaining nut and wave washers from the key switch and remove the switch from the front cab.



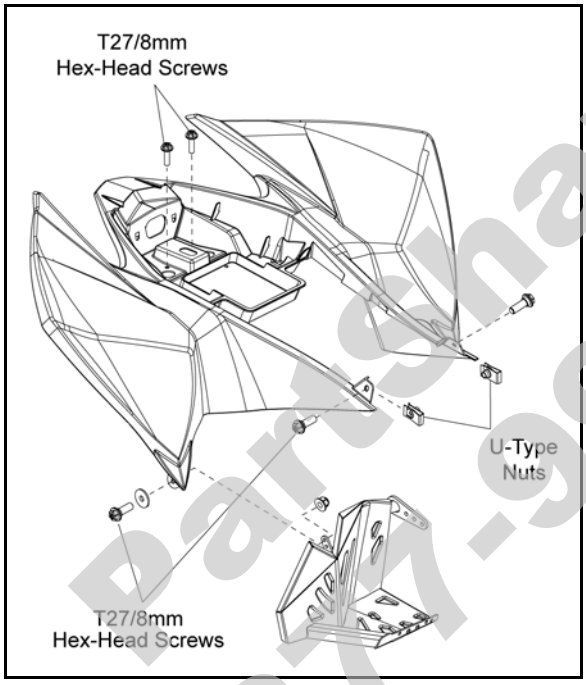
4. Remove the fuel cap and lift up on the front cab assembly to disconnect the indicator panel as shown.
5. Remove the front cab and side panels as an assembly.
6. Reinstall the fuel cap.
7. Reverse the removal steps to reinstall the front cab assembly.

Side Panels

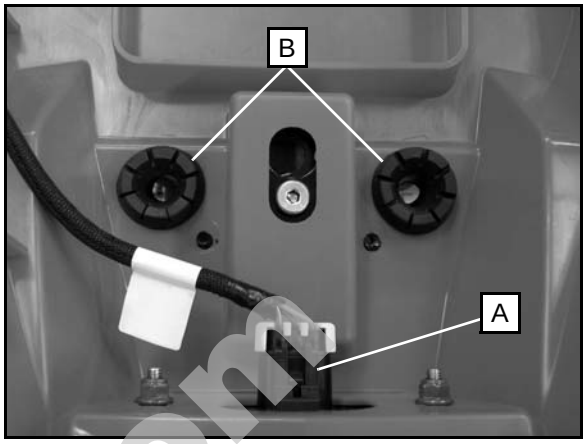
1. Refer to the “Front Cab” procedure to remove the front cab and side panels as an assembly.
2. Slide each side panel forward to disengage the tabs from the front cab and remove them.
3. Reverse the removal steps to reinstall the side panel and refer to “Front Cab” procedure to reinstall the front cab..

Rear Cab

1. Remove the seat.
2. Remove the (2) T27/8mm Hex-head screws from the rear portion of the side panels.
3. Remove the (2) T27/8mm Hex-head screws retaining the rear cab to the heel pockets.
4. Remove the (2) T27/8mm Hex-head screws retaining the rear cab to the frame.



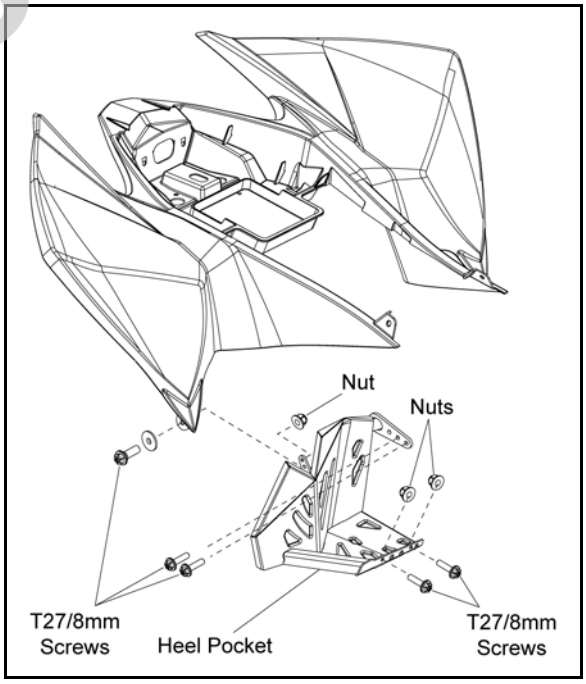
5. Disconnect the tail light (A).
6. Remove both seat grommets (B) from the rear cab and completely remove the rear cab.



7. Reverse the removal steps to reinstall the rear cab.
   - Lubricate the rubber grommets to aid assembly
   - Route tail light harness through rear cab upon assembly.

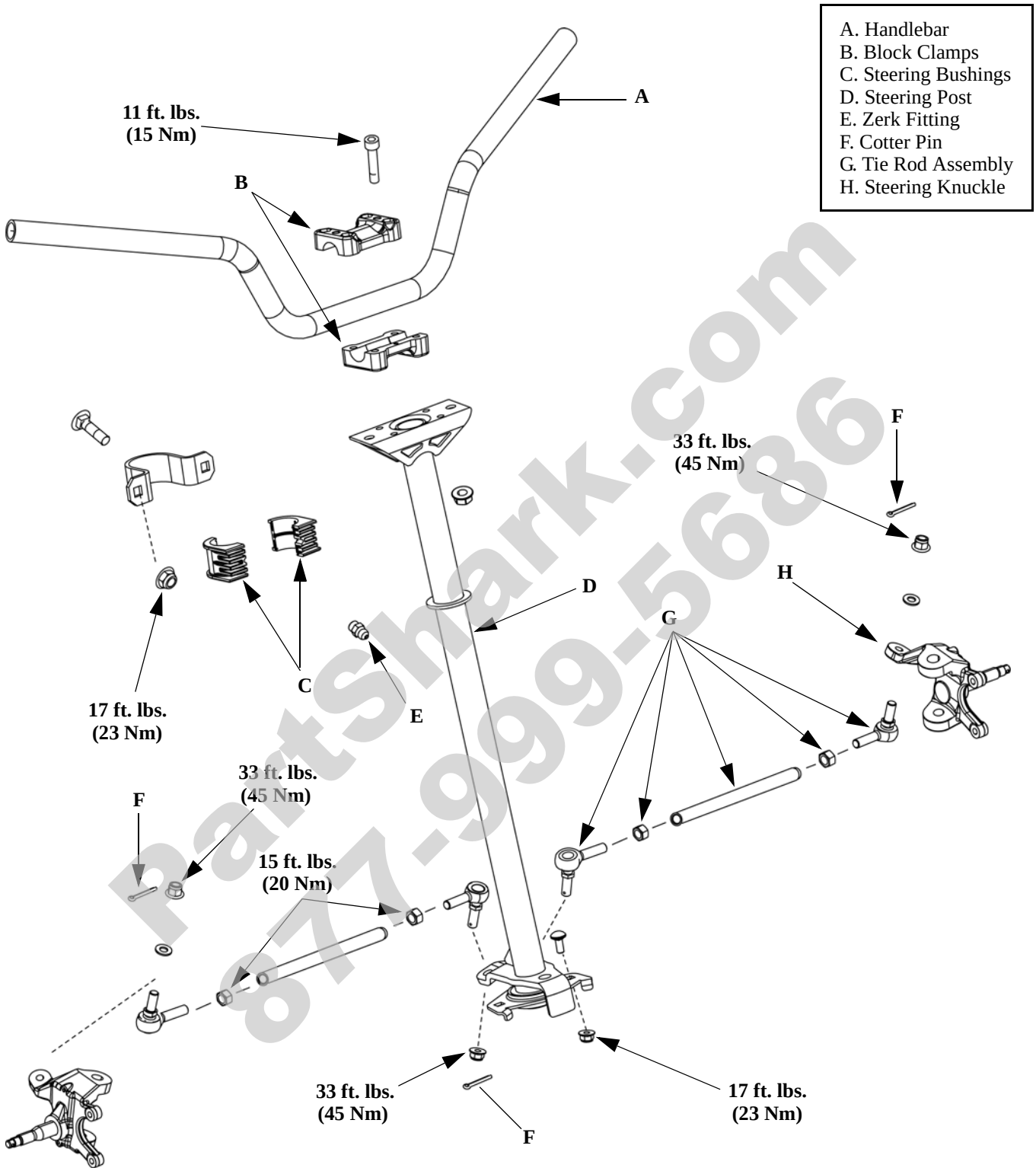
Heel Pocket

1. Remove the (2) T27/8mm Hex-head screws retaining the heel pocket to the foot peg.
2. Remove the (2) T27/8mm Hex-head screws retaining the inner portion of the heel pocket to the frame.
3. Remove the T27/8mm Hex-head screws retaining the rear cab to the heel pocket and remove them from the ATV.



4. Repeat this procedure to remove the other heel pocket.
5. Reverse the removal procedure to reinstall the heel pocket.

STEERING ASSEMBLY EXPLODED VIEW

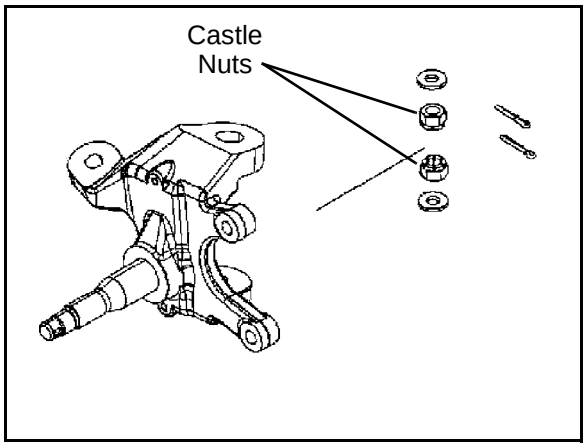


NOTE: APPLY ANTI-SEIZE COMPOUND ONTO SPINDLE BEFORE HUB INSTALLATION

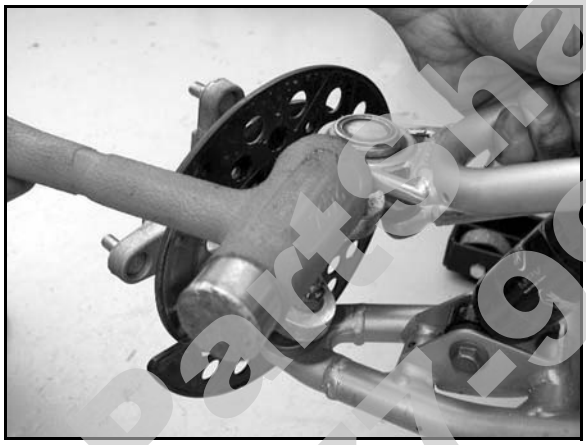
STEERING KNUCKLE

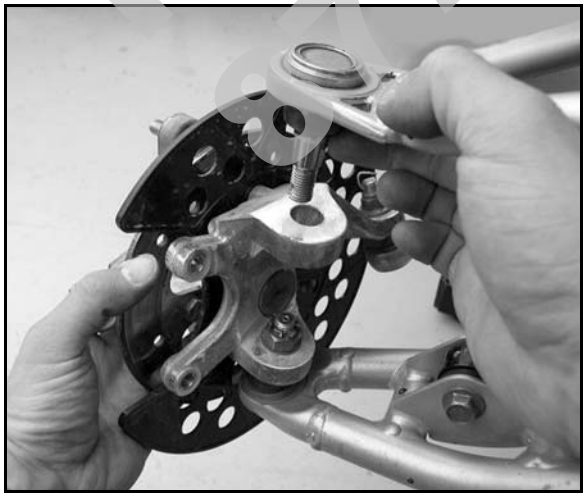
Removal

1. Follow the steps in the "FRONT HUB REMOVAL" section to remove the hub, if needed.
2. Remove the upper and lower ball joint cotter keys and castle nuts.



3. Carefully tap on the upper A-arm near the top ball joint while lifting up on the upper A-arm.





4. Tap down on the lower A-arm to move the lower ball joint from the steering knuckle.

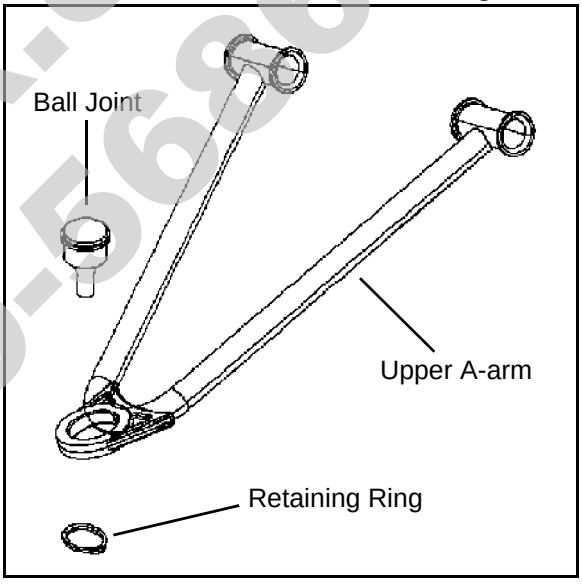
Installation

1. Before installation check the condition of the ball joints. Joints should move freely and have no axial play.
2. Place the upper and lower A-arms into the steering knuckle.
3. Install the washers and castle nuts onto the upper and lower A-arms. Torque the nuts to 35 ft. lbs. (47 Nm).
4. Install new cotter pins into the castle nuts and ball joints.

BALL JOINT SERVICE

Removal

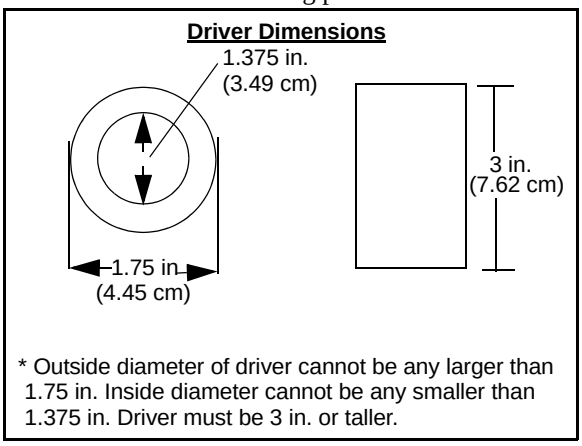
1. The A-arm must be removed to perform this procedure, Refer to "A-ARM REPLACEMENT" on Page 5.14.



2. Remove the retaining ring from the ball joint.

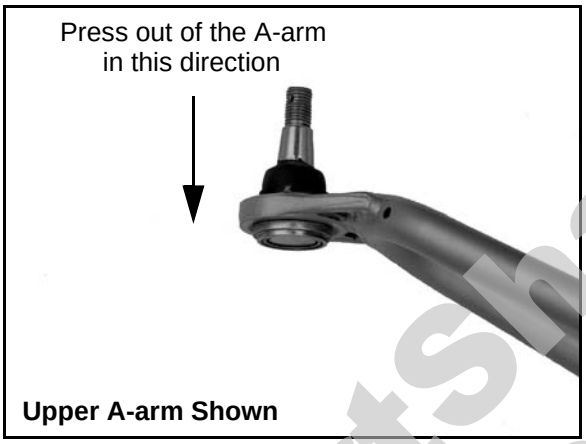

Upper A-arm Shown

3. A driver must be used for the removal of the ball joints. Use the dimensions below to fabricate or locate the correct size driver to use in the following process.

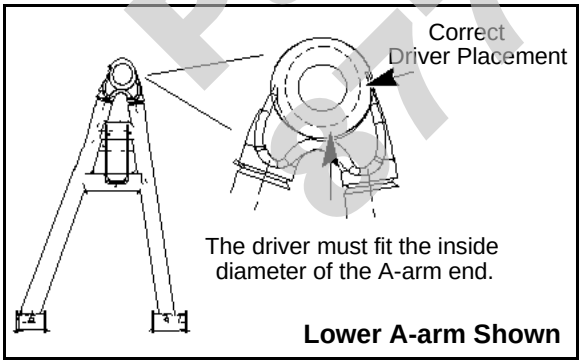


* Outside diameter of driver cannot be any larger than 1.75 in. Inside diameter cannot be any smaller than 1.375 in. Driver must be 3 in. or taller.

4. Use a press and correct size driver to remove the ball joint from the A-arm.

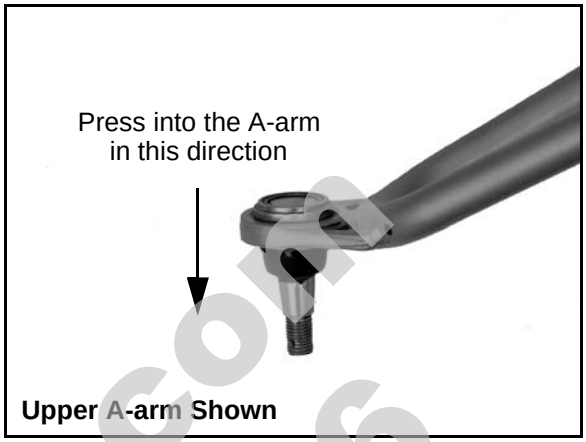


NOTE: The driver must fit the inside diameter of the A-arm. This will allow the ball joint to be properly pressed out of the A-arm without damaging the A-arm.

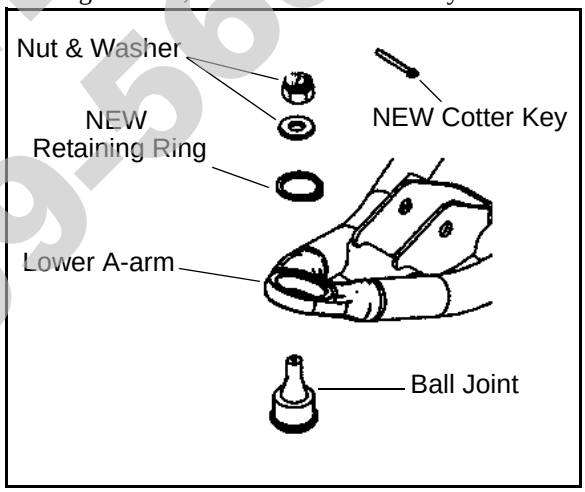


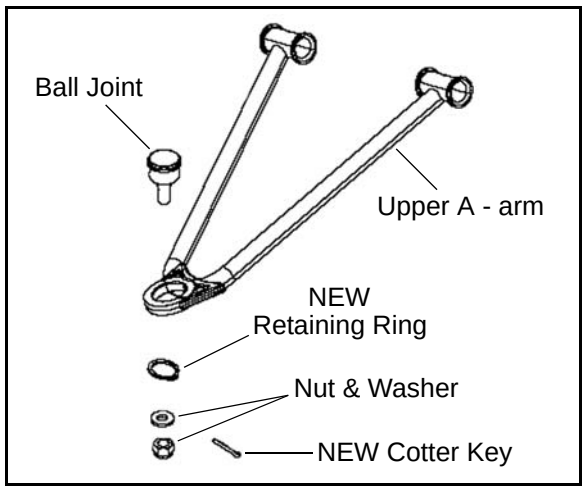
Installation

1. Place the A-arm in the correct position for ball joint installation. Face the A-arm end flat on top of the driver. Carefully drive the ball joint into place until the ball joint is properly installed.



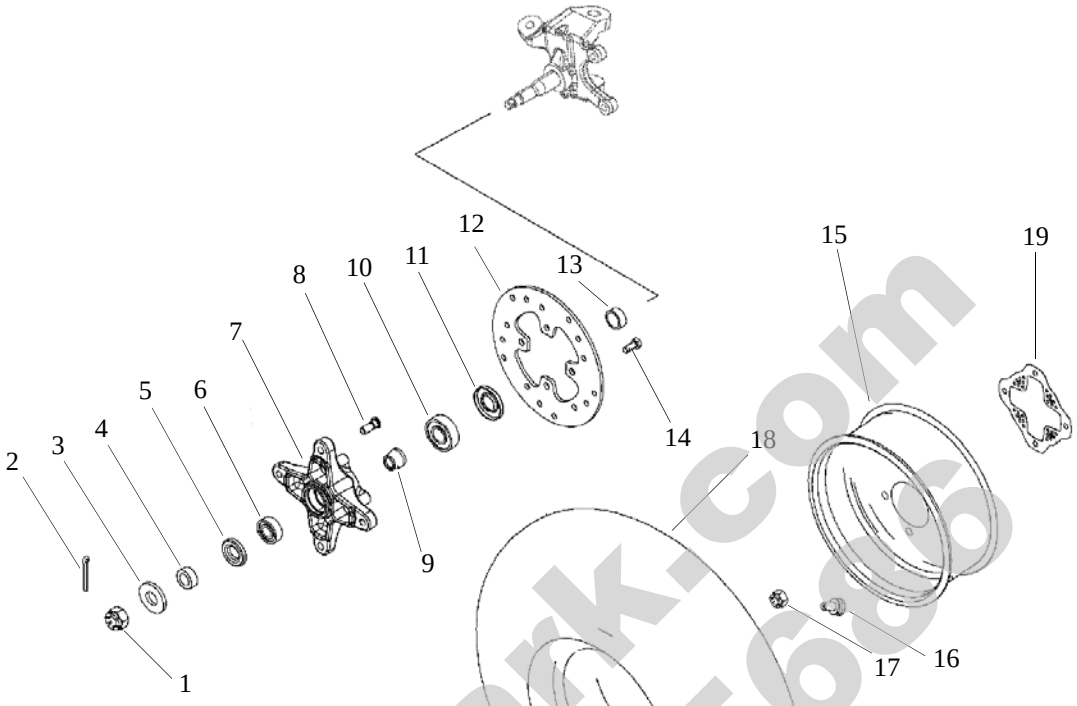
2. After the new ball joint is installed into the A-arm, install a NEW retaining ring. Upon A-arm installation onto the steering knuckle, install a NEW cotter key.





FRONT WHEEL HUB

Exploded View



REF.	QTY.	DESCRIPTION
1.	2	Nut, Castle
2.	2	Pin, Cotter
3.	2	Washer
4.	2	Spacer, Outer
5.	2	Seal
6.	2	Bearing, Ball, Sealed
7.	2	Hub, Wheel, Front, Indy Red
8.	8	Stud
9.	2	Spacer, Tapered
10.	2	Bearing, Ball
11.	2	Seal
12.	2	Disc, Brake
13.	2	Spacer, Inner
14.	8	Bolt
15.	2	Rim, Front
16.	2	Valve, Rim
17.	8	Nut, Flange
18.	2	Tire, Front, 21x7–10
19.	2	Guard, Disc, Outer

Wheel Hub Removal

1. Elevate front end of ATV and safely support machine under footrest / frame area.

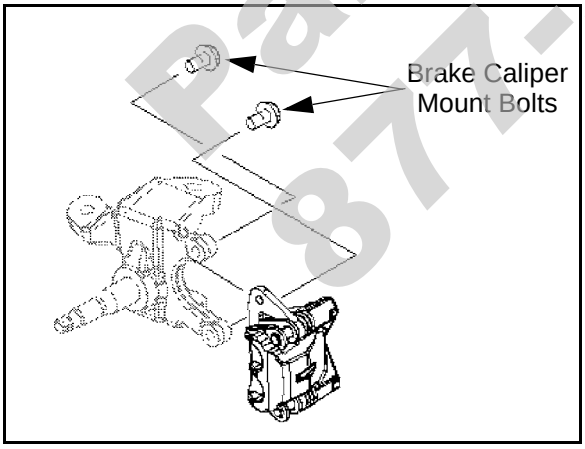
CAUTION

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

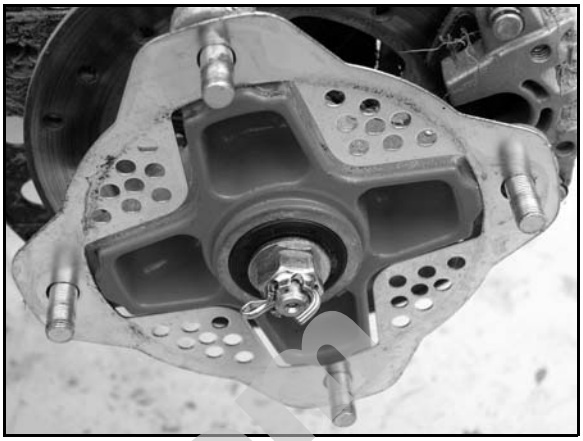
2. Check bearings for side play by grasping tire / wheel firmly (top and bottom, side to side) and checking for movement. It should rotate smoothly without binding or rough spots.

3. Remove wheel nuts and wheel.

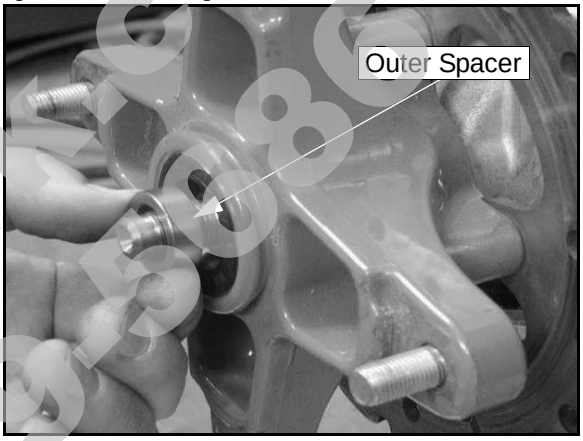
4. Remove the two brake caliper bolts and the brake caliper. Use mechanic's wire or other suitable material to support the caliper assembly. Do not allow caliper assembly to hang by the brake line!



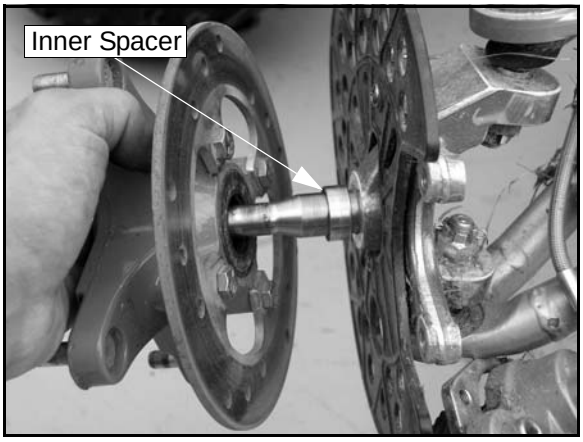
5. Remove outer brake disc guard, cotter pin, front spindle nut, and washer.



6. Remove the outer spacer from the spindle. Inspect outer spacer for wear, replace if needed.



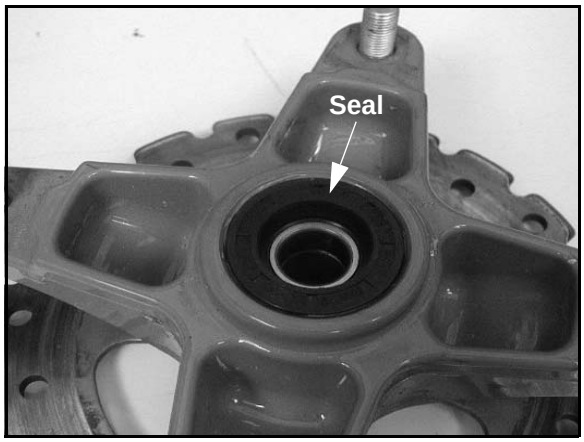
7. Remove the hub from the spindle. Remove the inner spacer from the spindle. Inspect the inner spacer for wear, replace if needed.



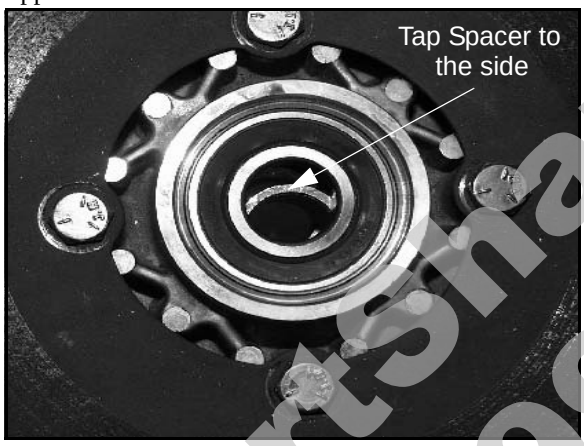
8. Rotate each bearing inside the hub by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion. Replace bearing if moisture, dirt, corrosion, or roughness is evident.

Wheel Hub Disassembly

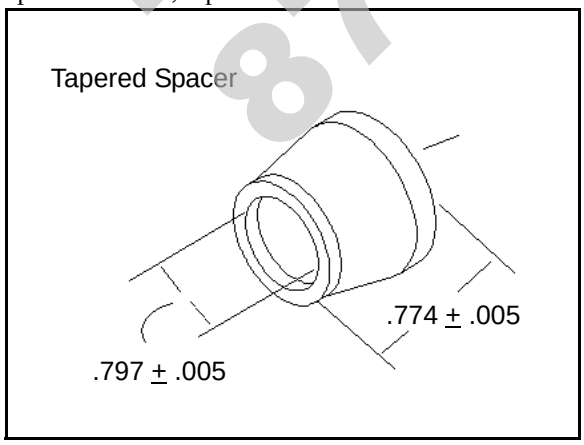
1. Place a shop towel on hub to protect surface. Carefully pry seal out of hub.



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

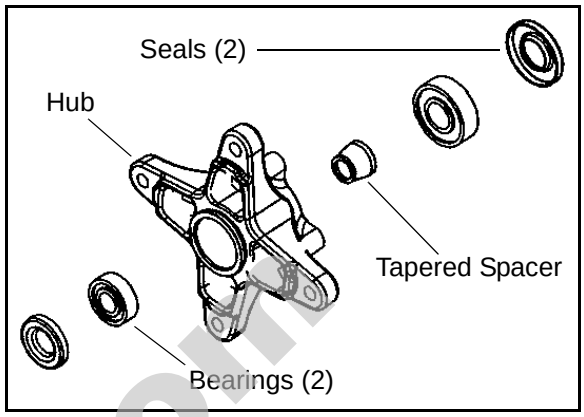


3. Remove spacer. Drive other bearing out and discard.
4. Clean hub and spacer thoroughly.
5. Inspect spacer for wear or damage. Measure the tapered spacer for wear, replace as needed.



Wheel Hub Assembly

1. Drive or press one new bearing into hub using a bearing driver.

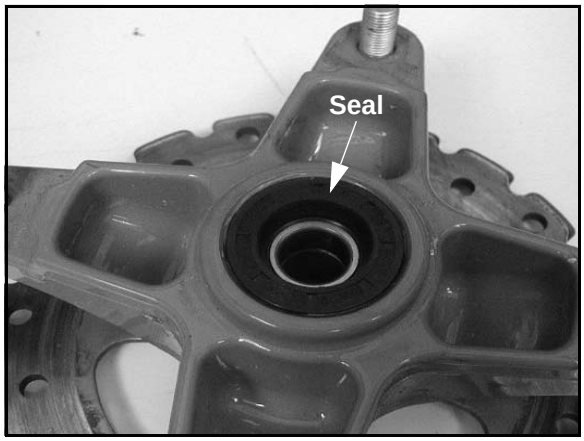


⚠ CAUTION

Do not drive on the inner race of the bearing.

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

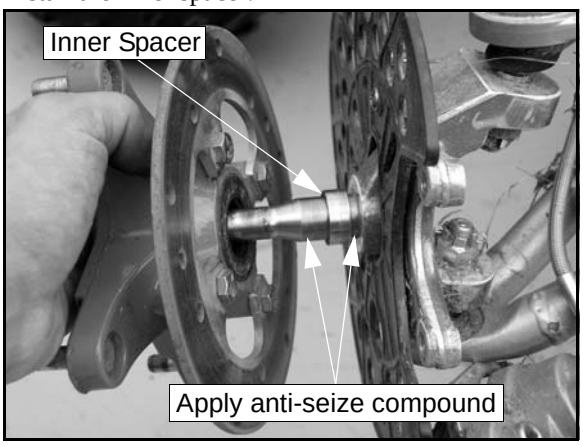
2. Coat bearing spacer with grease and install into hub. Drive or press the other bearing into hub until seated against spacer.
3. Install seal into hub (with numbers facing out) until flush with end of seal bore.



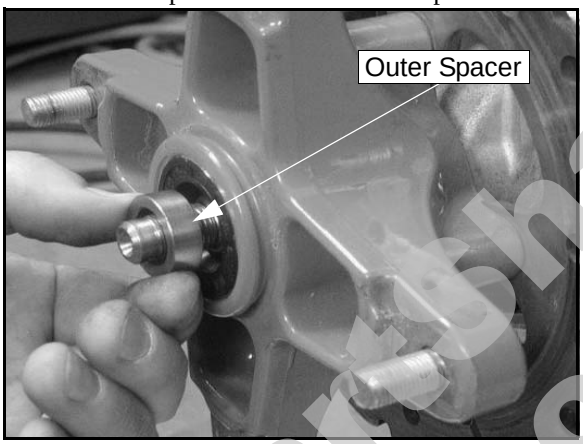
Wheel Hub Installation

1. Apply anti-seize compound to spindle area, this will aid in wheel removal in the future.

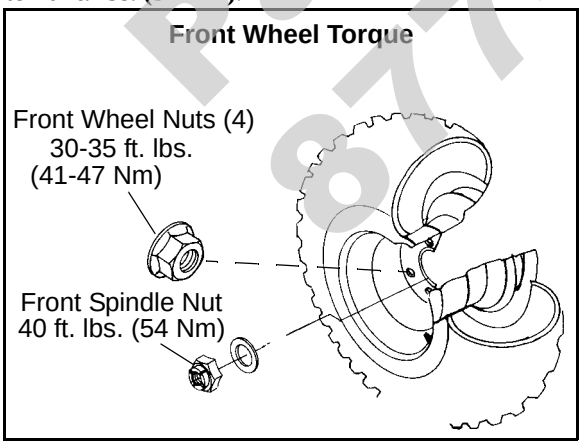
2. Inspect spindle and bearing surface for wear or damage. Install the inner spacer.



3. Install hub on spindle. Install the outer spacer.



4. Install the washer and spindle nut. Torque the spindle nut to **40 ft. lbs. (54 Nm)**.

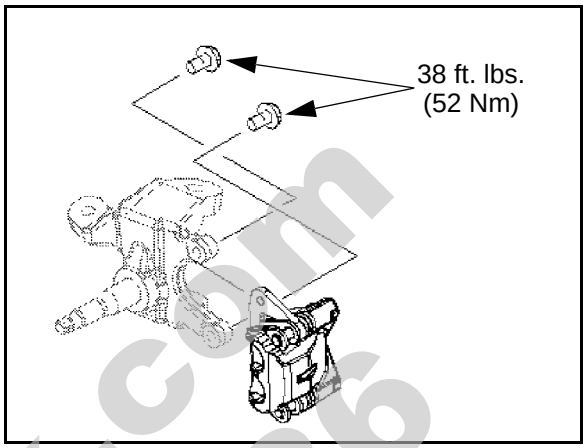


5. Install a new cotter pin. Tighten nut slightly if necessary to align cotter pin holes.

6. Bend both ends of cotter pin around end of spindle in different directions.

7. Rotate hub. It should rotate smoothly without binding, rough spots or side play.

8. Install brake caliper. Tighten bolts to **38 ft.lbs. (52 Nm)**.

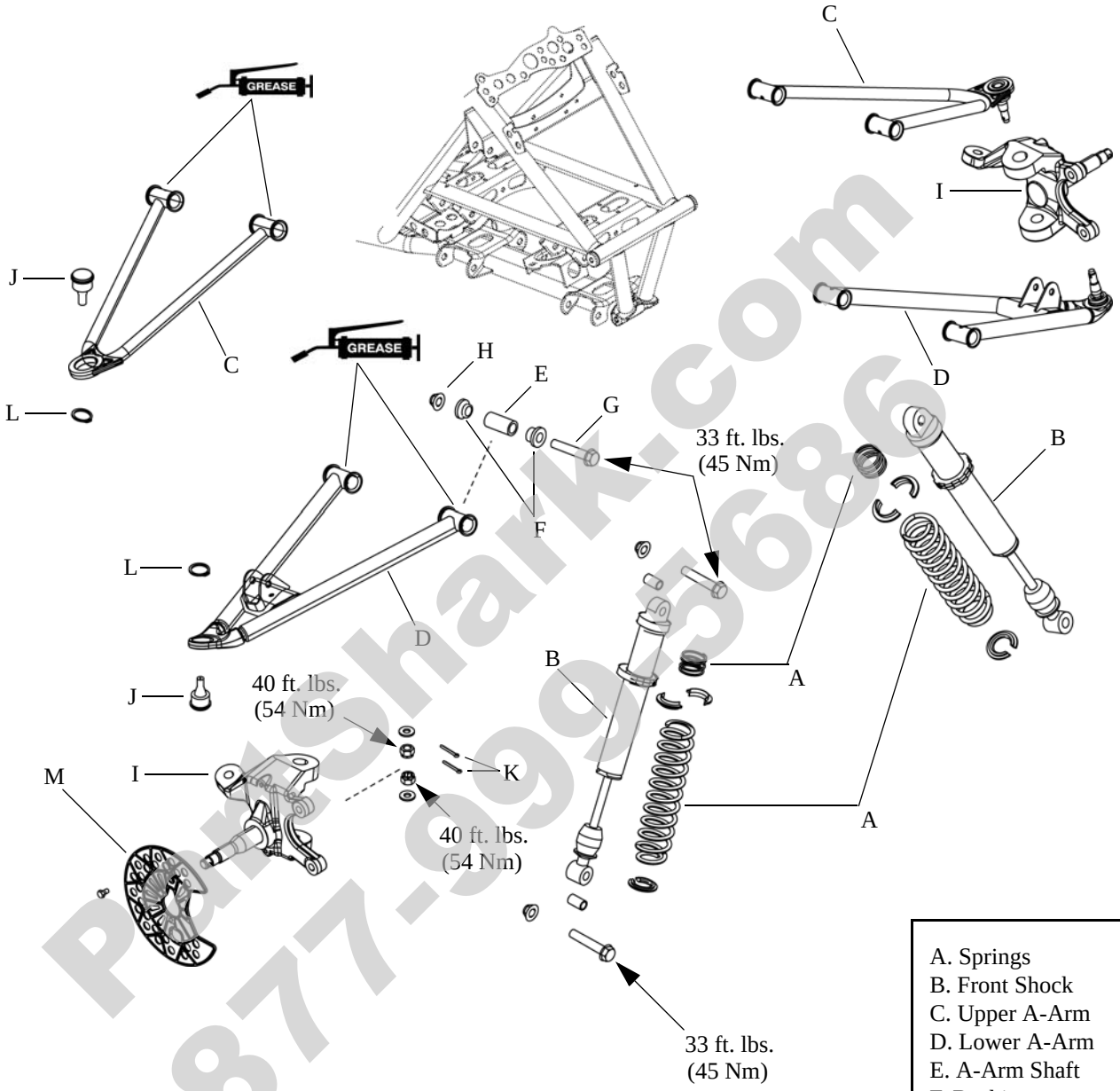


9. Install the brake disc guard.

10. Install the wheel and four wheel nuts finger tight. Lower the ATV and torque the wheel nuts to **30-35 ft. lbs. (41-47 Nm)**.

FRONT SUSPENSION EXPLODED VIEW

Use new cotter pins upon reassembly.
Install with open end toward rear of machine.

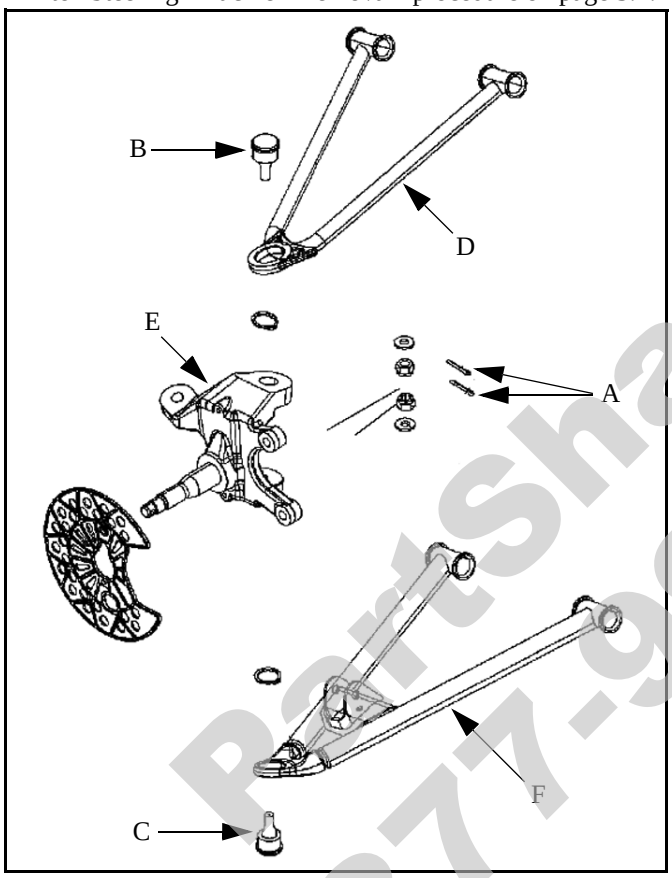


A. Springs
B. Front Shock
C. Upper A-Arm
D. Lower A-Arm
E. A-Arm Shaft
F. Bushings
G. Bolt
H. Flange Nut
I. Steering Knuckle
J. Ball Joints
K. Cotter Pins
L. Retainer Rings
M. Inner Disc Guard

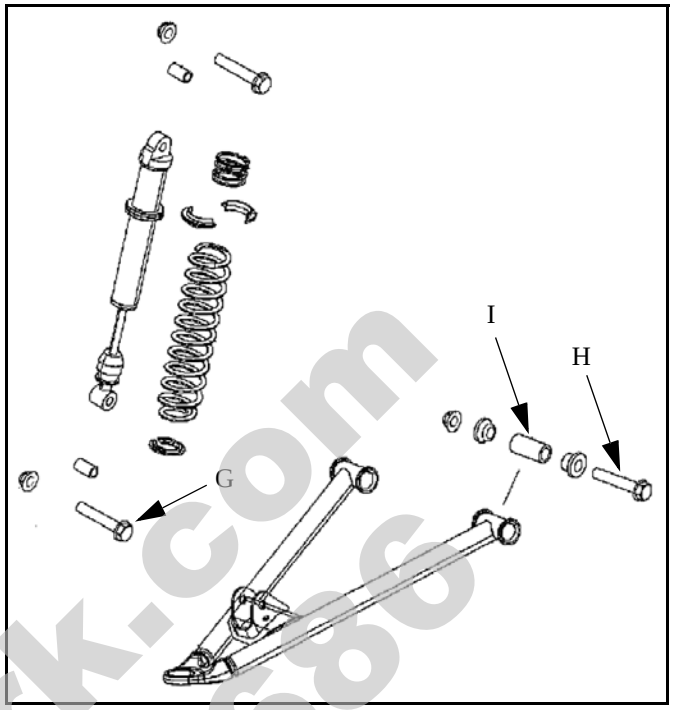
FRONT A-ARM REPLACEMENT

A-arm Removal and Inspection

1. Elevate and safely support vehicle. Remove the front wheel(s).
2. Remove the upper and lower ball joint cotter pins (A) from the ball joint studs (B & C) at wheel end of A–arm. Remove the ball joint nuts until the nuts are flush with end of the ball joint studs.
3. Push up on the upper A-arm (D) to remove the A-arm from the steering knuckle (E). Push down on the lower A-arm (F) to remove the A-arm from the steering knuckle (E). Refer to "Steering Knuckle - Removal" procedure on page 5.7.



4. Remove the lower shock bolt (G) from the lower A-arm and remove the shock from the A-arm.
5. Loosen two bolts on the A–arm tubes (H) (upper and lower A-arms) until A–arm can be removed.
6. Examine A–arm shafts (I). Replace if worn. Discard hardware.



A-arm Installation

1. Insert A–arm shaft (I) into the new A–arm (D & F).
2. Install new A–arm assembly onto vehicle frame (upper and lower). Torque bolts to **33 ft. lbs. (45 Nm)**.
3. Attach upper A-arm (D) and lower A–arm (F) to steering knuckle (E). Attach shock with bolts (G). Tighten all fasteners to **33 ft. lbs. (45 Nm)**. If ball joint cotter pin holes are not aligned, tighten nut slightly to align. Install a new cotter pin with open ends toward rear of machine (upper and lower). Bend ends in opposite directions around nut.
4. Locate grease fittings at the end of each A–arm tube and pump A–arm ends full of grease.

⚠ WARNING

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

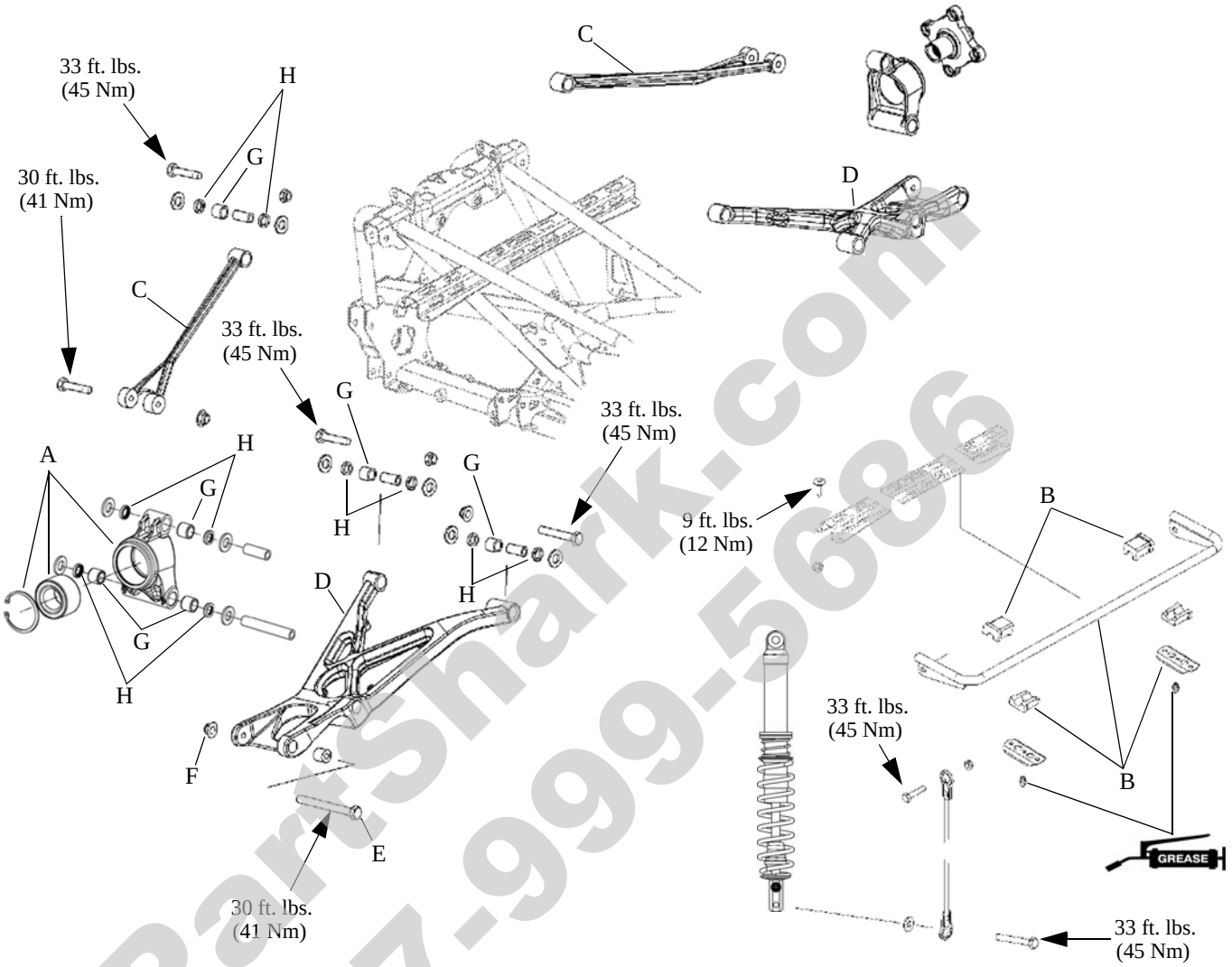
A-arm Attaching Bolt Torque:

Ball Joint Stud Nut Torque:

Front Shock Bolt Torque:

33 ft. lbs. (45 Nm)

REAR SUSPENSION EXPLODED VIEW ("IRS")



A. Hub Carrier Assembly
B. Torsion Bar Assembly
C. Upper A-Arm
D. Lower A-Arm
E. Bolt
F. Flange Nut
G. Needle Bearing
H. Bearing Seals

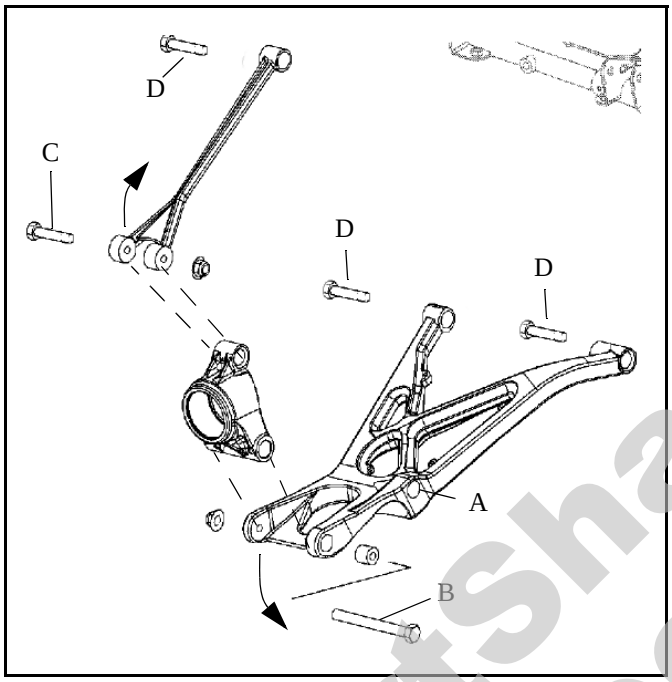
REAR A-ARM REPLACEMENT ("IRS")

A-arm Removal

1. Elevate and safely support vehicle. Remove the rear wheel(s).

2. Remove the lower shock bolt from the lower A-arm hole (A) and remove the shock from the A-arm.

3. Loosen the upper and lower bearing carrier bolts at the wheel end of A–arms.



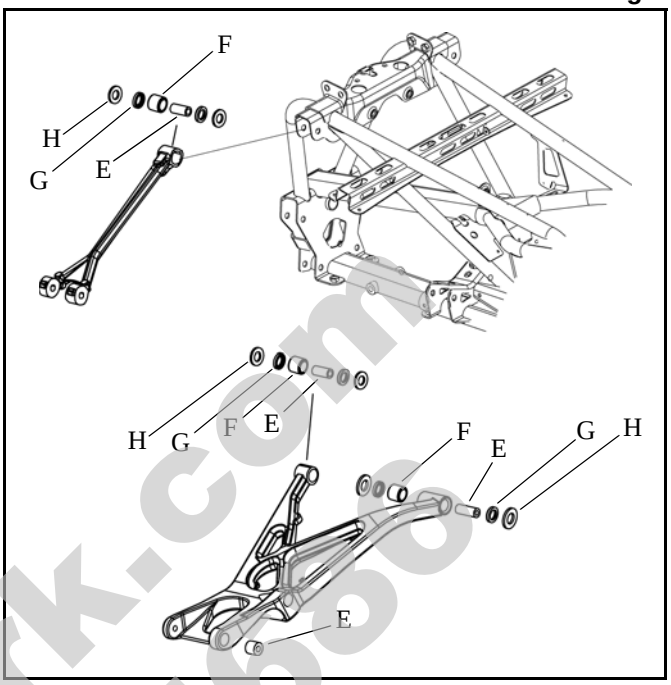
4. Remove bolt (B) on the lower A–arm tube and pry the hub carrier up and away from the A-arm.

5. Remove bolt (C) on the upper A–arm tube and pry the hub carrier down and away from the A-arm.

6. Remove remaining bolts (D) from A-arms and remove A-arms from the frame.

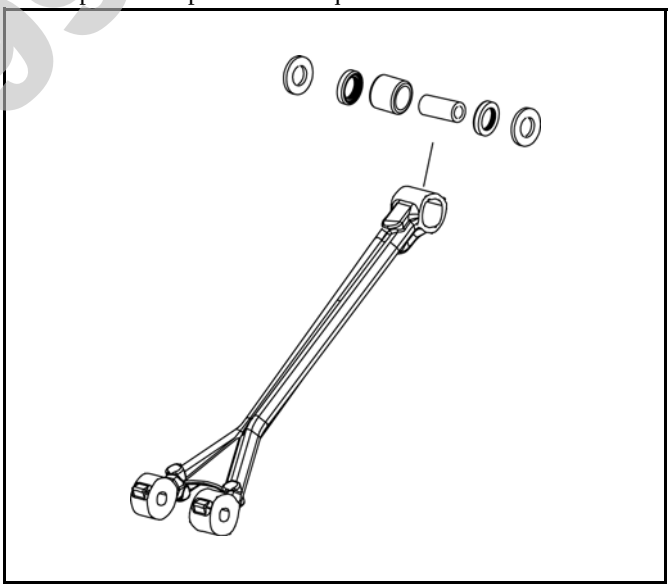
7. Examine A–arm shafts (E), needle bearings (F), seals (G), and thrust washers (H). Replace if worn or damaged.

NOTE: Rear A-arm mounts contain needle bearings

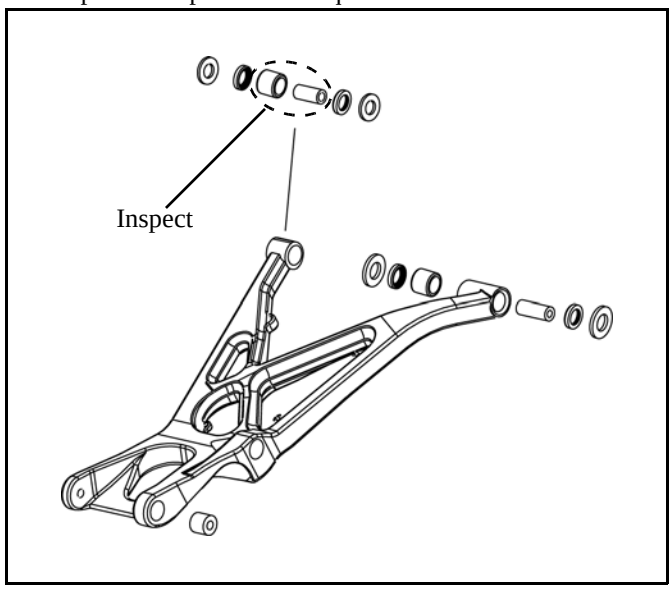


A-arm Inspection

1. Disassemble, clean and inspect the upper A-arm. Closely inspect the thrust washers, needle bearing, seals, and shaft. Replace components as required.

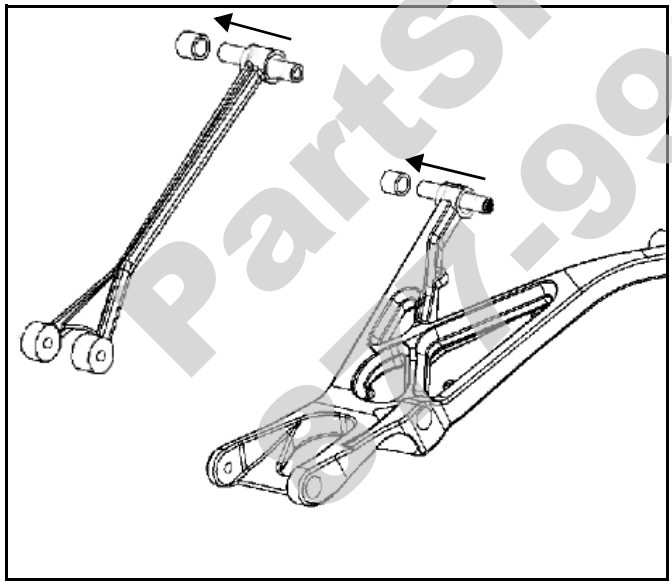


2. Disassemble, clean and inspect the lower A-arm. Closely inspect the thrust washers, needle bearings, seals and shafts. Replace components as required.



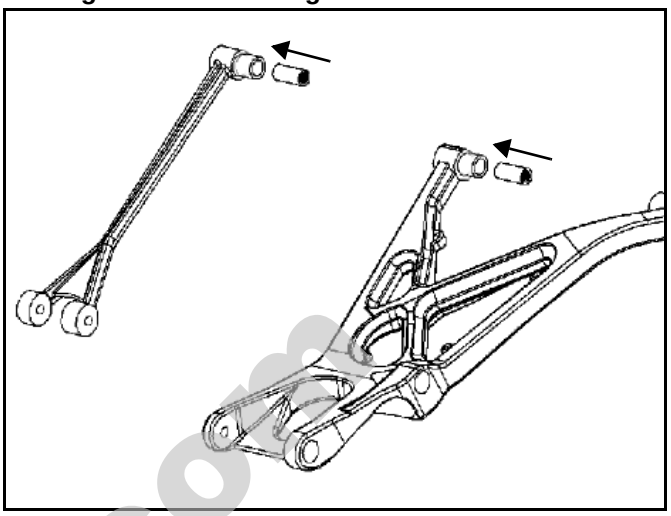
3. Inspect needle bearing performance by rotating the shaft inside the bearing (circled). If replacement is required, press the bearings out from opposite sides using a drift punch or other suitable tool.

4. Press needle bearings from the A-arms using a drift punch or other suitable tool. Do not re-use bearings once they have been removed.

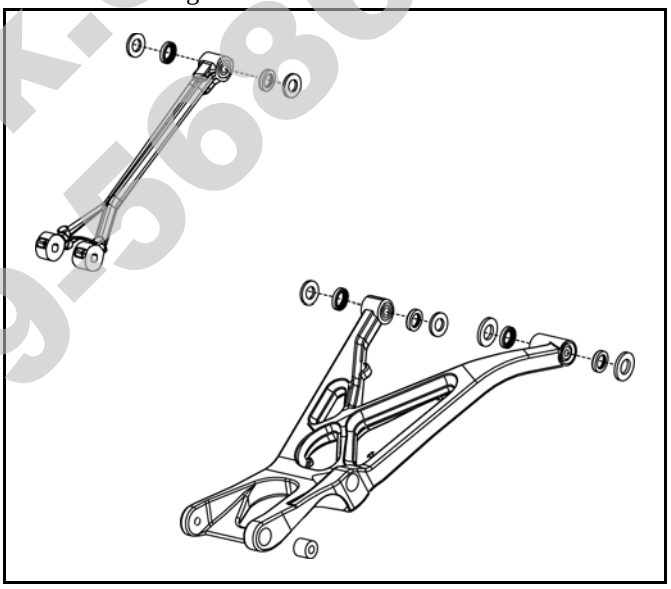


5. Press new needle bearings into the A-arms, centering bearing in the bore. Press only on the outside diameter of the bearing. Verify that an equal amount of space remains on each side to allow for seal installation.

NOTE: Apply grease to the inside of the needle bearings before inserting shaft.



6. Insert A–arm shafts, seals and thrust washers into the A–arm mounting bores.



A-arm Installation

1. Install A–arm assemblies onto vehicle frame (upper and lower). Torque mounting bolts to 33 ft. lbs. (45 Nm).

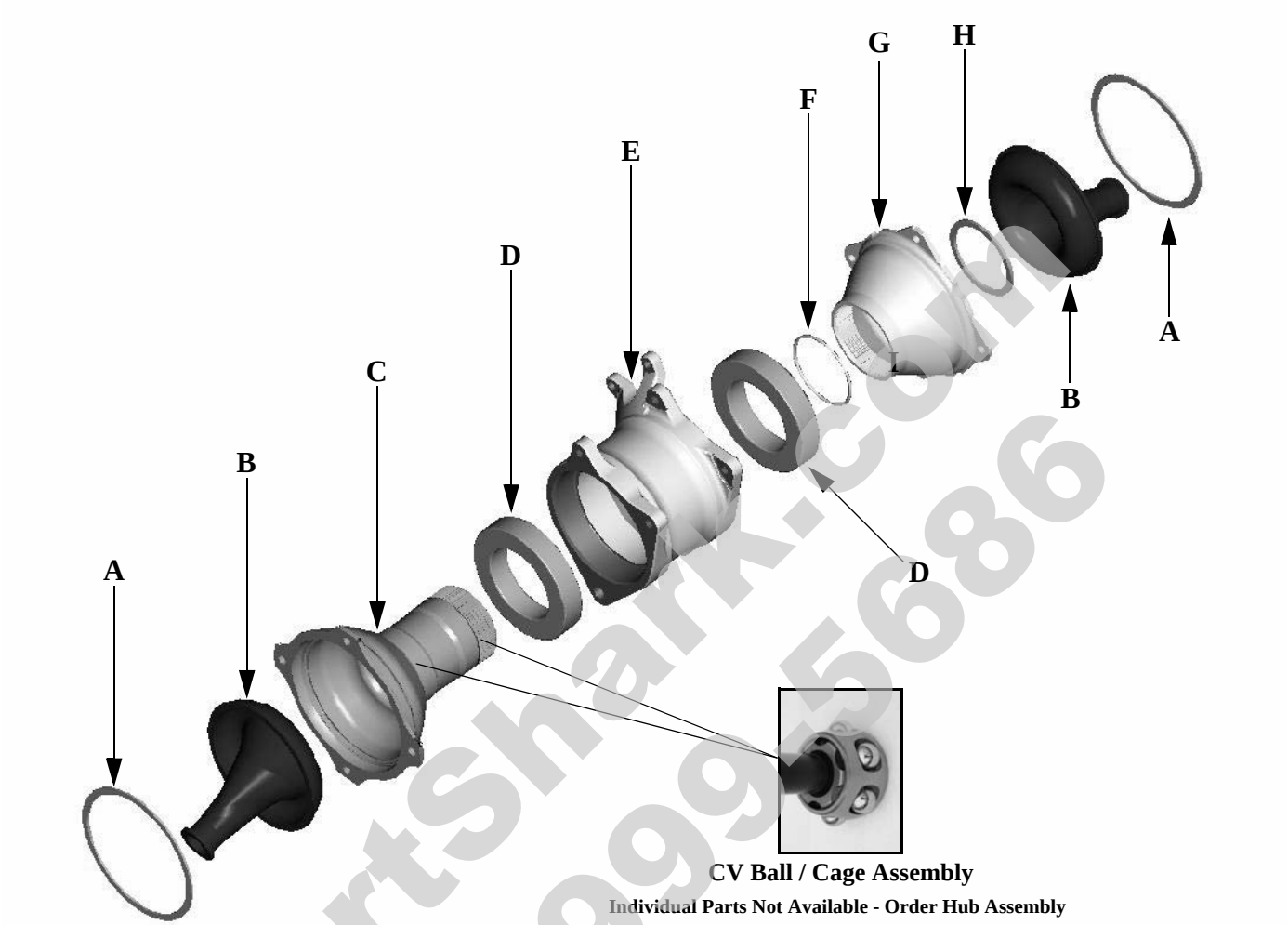
2. Attach upper A-arm and lower A–arm to the bearing carrier. Tighten both fasteners to 30 ft. lbs. (41 Nm).

⚠ WARNING

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

REAR HOUSING (“IRS”)

Exploded View



A. CV Boot Retaining Ring (2)
B. Inner CV Boot (2)
C. Sprocket Hub
D. Bearing (2)
E. Rear Axle Housing
F. O-Ring
G. Rear Brake Disc Hub
H. Brake Hub Retaining Ring

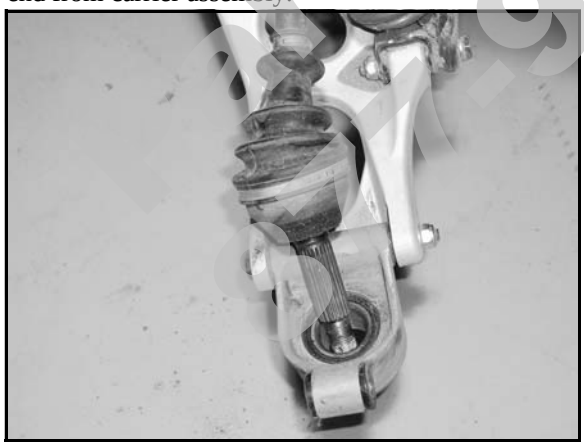
Housing Removal

1. With ATV on the ground, loosen wheel nuts and hub nuts.
2. Safely lift and support the rear of the ATV under the main frame.
3. Remove both rear wheels and hubs.
4. Loosen rear housing mounting bolts and chain adjustment.
5. Remove drive chain.
6. Remove rear caliper and secure out of the way.

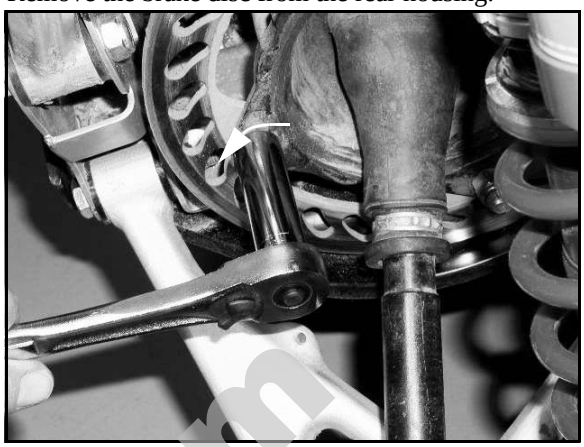
NOTE: Do not allow the caliper to hang by the brake line. Brake line damage may result.

7. Remove both upper carrier bolts and secure upper a-arms out of the way.

8. Tilt each hub carrier outward while pulling rear CV shaft end from carrier assembly.



9. Remove the brake disc from the rear housing.



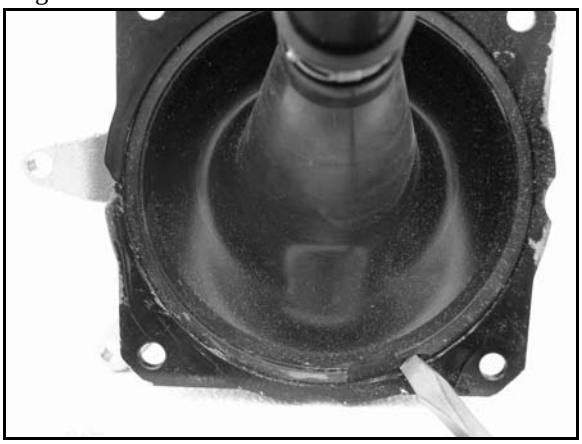
10. Bend the tabs of the bolt retainer plate away from the bolt heads.

11. Remove the bolts and rear drive sprocket from the rear housing.
12. Remove rear housing mounting bolts and chain adjustment components.
13. Lift and rotate rear housing at an angle and remove it from the ATV frame, exiting the frame from either side.

NOTE: Removal of rear shock may be necessary to gain adequate clearance for rear housing removal.

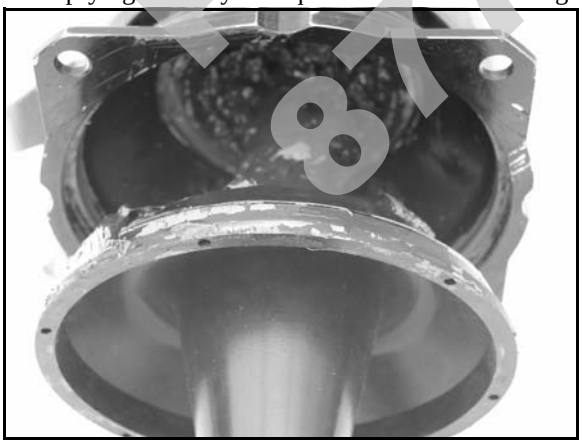
Housing Disassembly / Service

1. Place housing in a suitable holding fixture.
2. Remove both boot clamps from their locations.
3. Using a flat blade screwdriver, carefully pry the retaining ring from each boot.



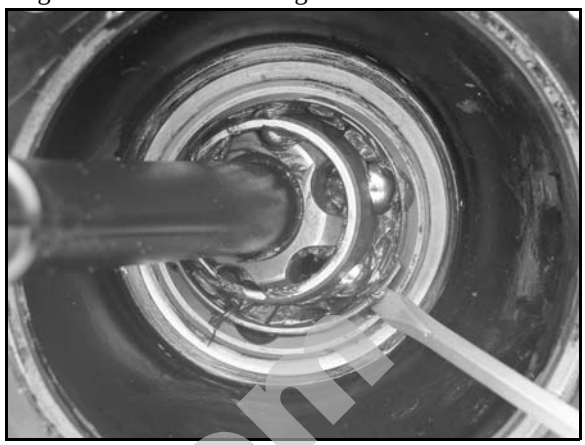
4. Remove the retaining rings from both inner boots of the rear housing.

5. Remove both inner boots by pulling outward on boot. A blunt prying tool may be required to break the sealing area.



NOTE: Inner CV boots are sealed to housing. Use caution during removal. Boot damage may result.

6. Using a flat blade screwdriver, carefully pry the retaining rings from both CV ball cages.

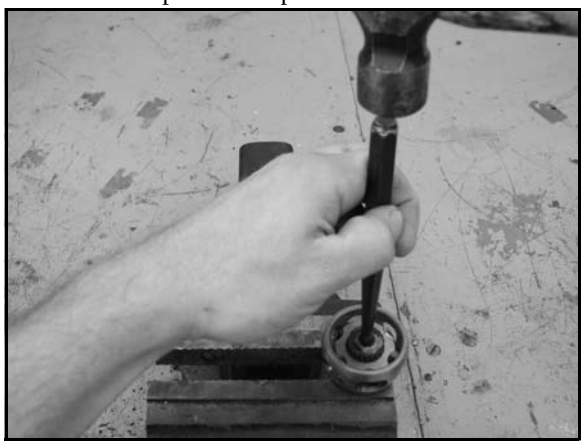


7. Remove the CV ball cage retaining rings from the housing.

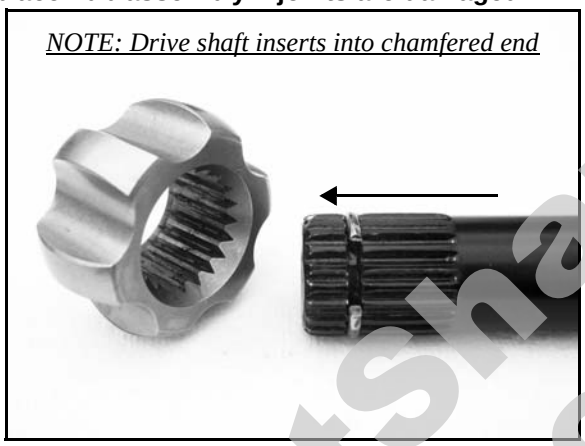
8. Remove the inner CV joints and shaft assemblies from the carrier housing.

NOTE: Inner CV joint parts are not replaceable. Order new hub assembly if damaged beyond serviceable condition.

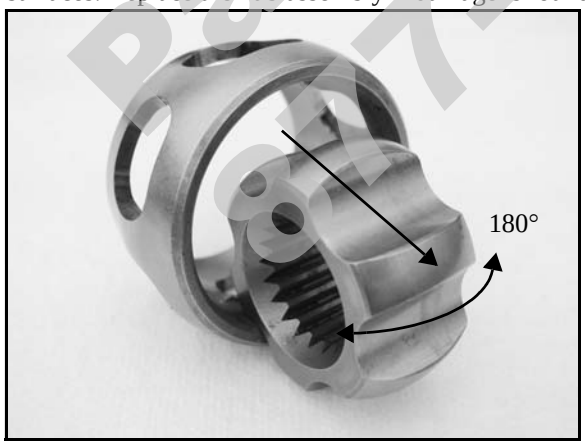
9. To disassemble the inner CV joint, place the CV end on a vise and use a punch to tap the driveshaft out.



IMPORTANT: Note the orientation of the parts for reassembly. Inner CV joint parts are not replaceable. Replace hub assembly if joints are damaged



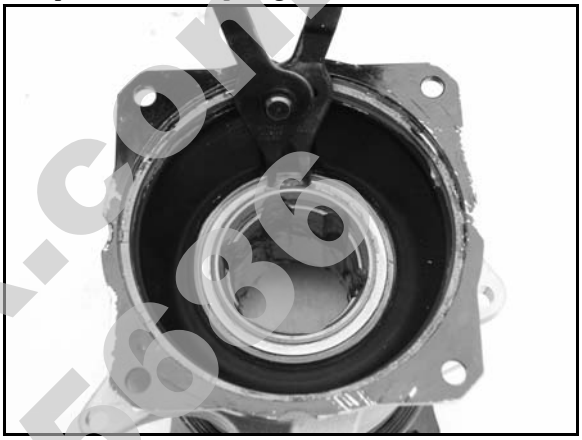
10. The inner CV joint can be disassembled by rotating the inner joint approximately 180 degrees and pulling out. Clean and inspect the joint and rollers for cracks or rough surfaces. Replace the hub assembly if damage is found.



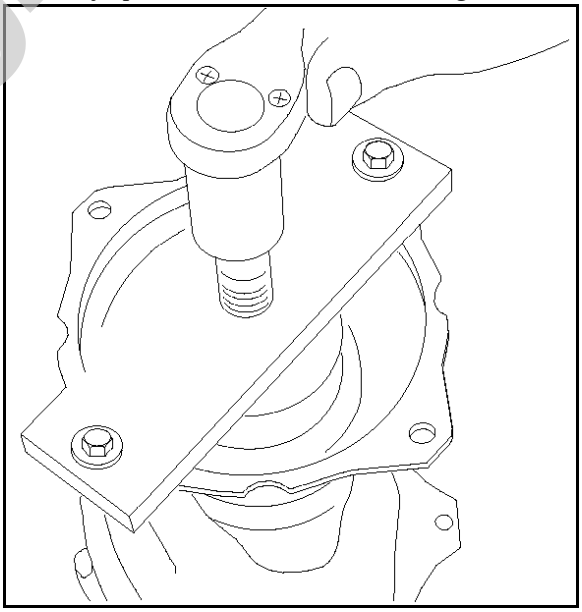
11. To reassemble the inner CV joint, use special Hi Temp CV joint grease to allow the rollers to "stick" to the cage. Insert the rollers into the outer cage, then insert the inner joint sideways 180 degrees into the cage assembly and turn the inner joint to capture the rollers. The chamfered end should be facing toward the drive shaft.

12. Using a soft faced hammer, tap the drive shaft into the chamfered end of the inner CV assembly until it locks in place. Lubricate the inner CV assembly liberally with joint grease before housing reassembly.

13. Before pressing the brake and sprocket hubs apart, remove the sprocket hub snap ring.



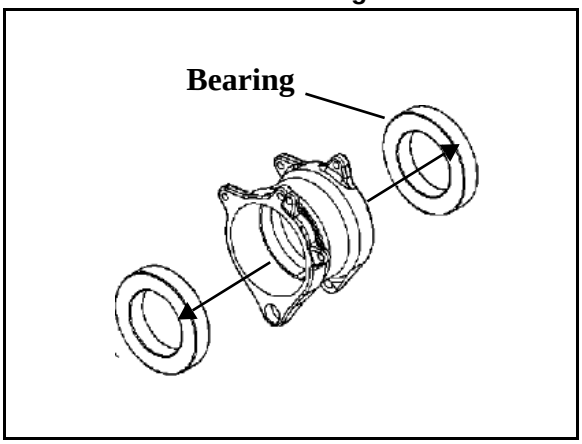
14. Using Special Tool **PN PA-48282**, press the rear hub assembly apart to access the carrier bearings.



Rear Hub Tool
PA - 48282

15. Using a suitable holding fixture, press or tap the carrier bearings out the opposite end of each housing.

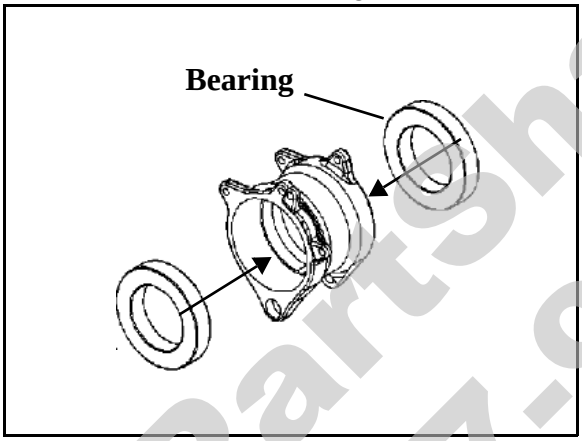
NOTE: Do not reuse the bearings if removed.



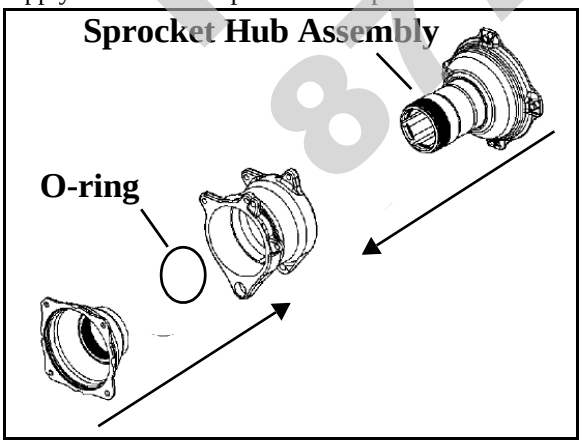
Assembly

1. Using a suitable holding fixture, press or tap the carrier bearings into the housing.

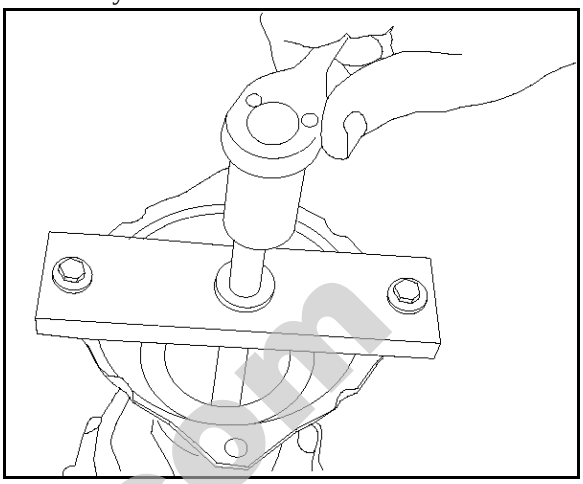
NOTE: Do not reuse the bearings if removed.



2. Apply sealant to the sprocket hub splines before assembly.

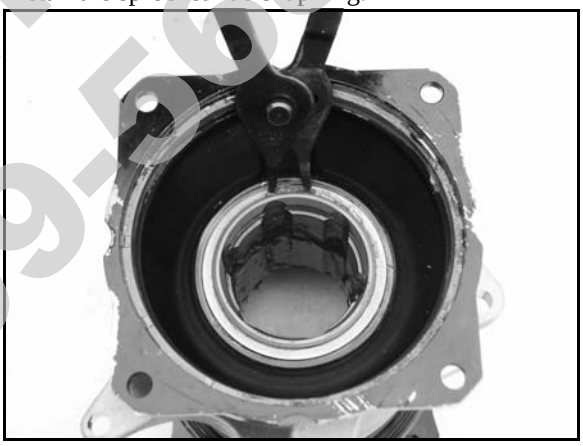


3. Using Special Tool **PN PA-48282**, press the rear hub assembly together. Verify o-ring is seated properly during reassembly.

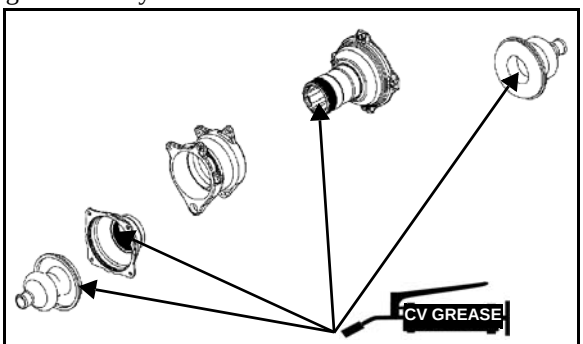


Rear Hub Tool
PA - 48282

4. Install the sprocket hub snap ring.



5. Pack the housing assembly and inner boots with a total of 8.75 oz. of Hi-Temperature CV joint grease. Distribute grease evenly.



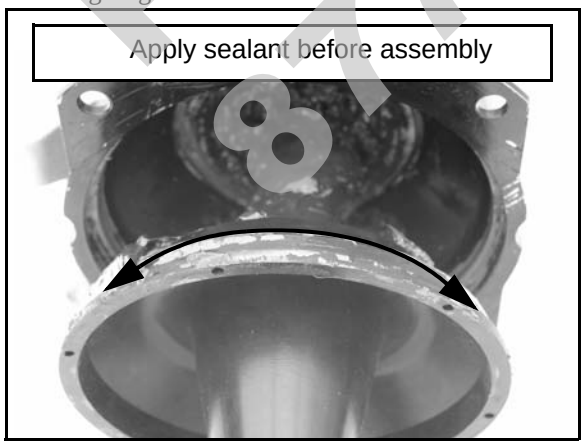
NOTE: Use Special Hi-Temp CV Grease
8.75 oz. (248.05 grams)

Rear Housing Hi-Temp CV Grease Capacity: 8.75 oz. (248.05 grams)

6. Install the inner CV ball cage and retaining rings.

7. Ensure the retaining ring is seated properly in the rear housing groove.

8. Clean and apply a thin coat of sealant to both the boot and sealing surface before installing inner boots. Install retaining rings.



9. Install boot clamps.

NOTE: Before tightening boot clamp on inboard joints, make sure any air pressure which may have built up in joint boot has been released using the boot 'burping' process. The air should be released after the plunging joint has been centered properly. Tighten boot clamps using boot clamp pliers.

5

Installation

1. Reverse the steps described in the Removal/ Disassembly procedure.

2. Attach the rear housing mounting bolts, chain adjustment components and brackets. Torque brackets to **17 ft. lbs. (23 Nm). Do not tighten chain adjustment or housing bolts until chain adjustment has been completed.**

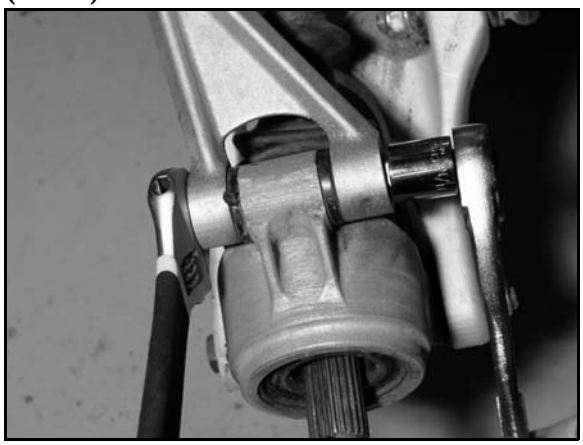
3. Attach the brake disc and drive sprocket to rear housing.

4. Install and torque the brake disc bolts to **18 ft.lbs. (24 Nm)**.

5. Install and torque the drive sprocket bolts to **32 ft. lbs. (43 Nm)**. Using a flathead screwdriver, bend up the tabs of the bolt retainer plate at each bolt head.

6. Install each rear CV shaft end into hub carrier and attach the upper a-arm to the hub carrier.

7. Insert and torque the a-arm mount bolts to **30 ft. lbs. (41 Nm)**.



Carrier Bolt Torque:

30 ft. lbs. (41 Nm)

8. Follow chain adjustment procedures.

9. Torque remaining rear housing fasteners to **30 ft. lbs. (41 Nm)** after completion of chain adjustment.

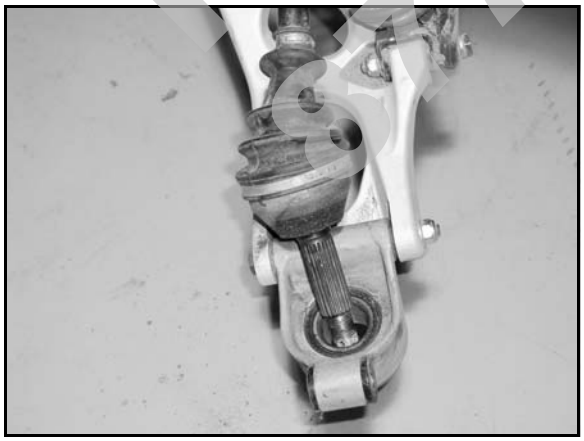
10. Install rear hubs, cone washer and nut. Verify cone washer domed side faces outward. Torque hub nut to **90 ft. lbs. (122 Nm)** and install cotter pin.

REAR BEARING CARRIER ("IRS")

Carrier Removal

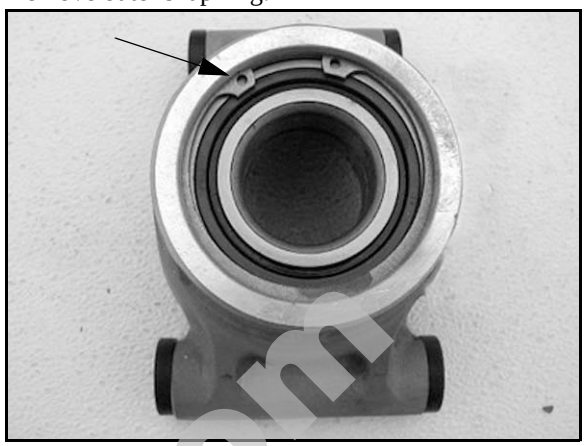
1. Remove rear wheel and hub.

2. Remove upper carrier bolt and secure upper A-arm out of the way. Tip hub carrier outward and remove shaft end from carrier. Remove lower carrier bolt.



Carrier Disassembly / Inspection

1. Remove outer snap ring.



2. From the back side, tap on the outer bearing race with a drift punch in the reliefs as shown.

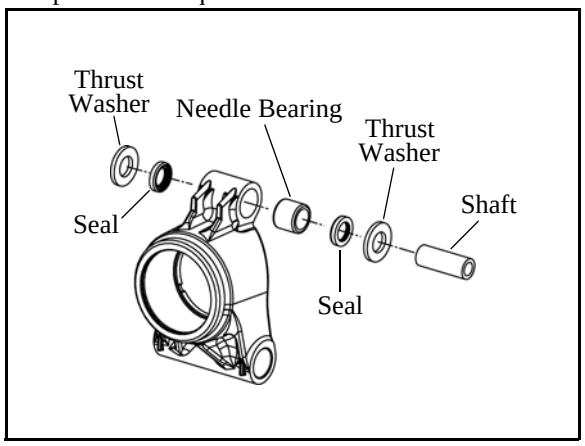
NOTE: Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.

3. Inspect bearing.

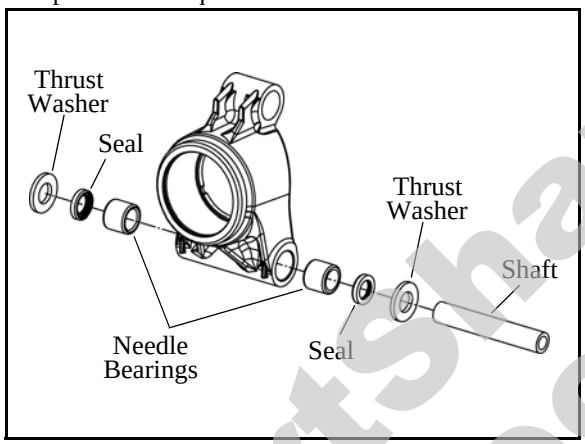
NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

4. Inspect bearing housing for scratches, wear or damage. Replace housing if damaged.

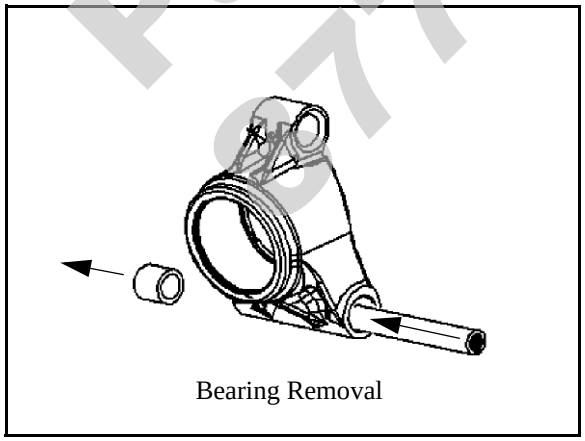
5. Disassemble, clean and inspect the upper A-arm thrust washers, needle bearing, seals and shaft. Replace components as required.



6. Disassemble, clean and inspect the lower A-arm thrust washers, needle bearings, seals and shaft. Replace components as required.

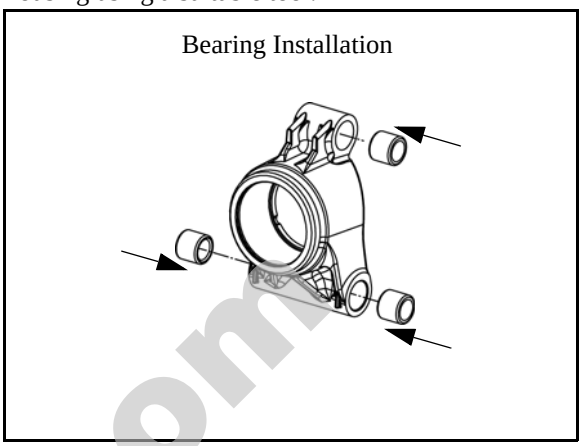


7. Inspect needle bearing performance by rotating the shaft inside the bearing. If replacement is required, press the bearings out from opposite sides using a drift punch or other suitable tool.

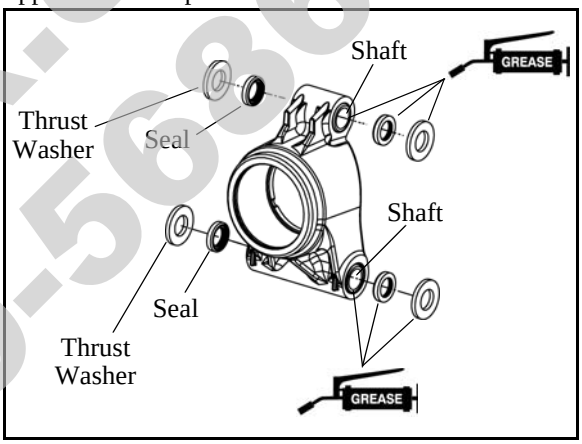


Carrier Assembly

8. Install needle bearings by pressing the bearings into the housing using a suitable tool.

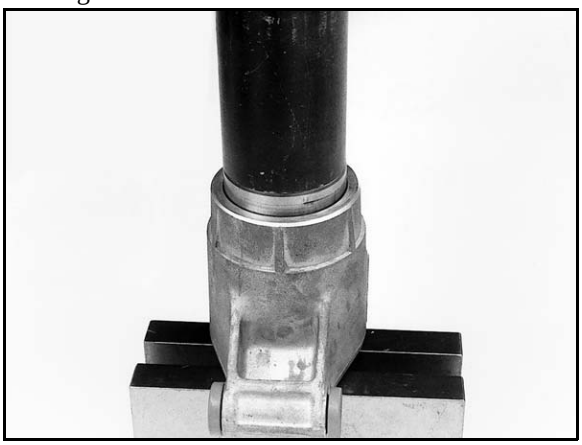


9. Apply grease and install the shafts. Install the seals in the upper and lower portion of the carrier.



10. Support bottom of bearing carrier housing and start bearing in housing.

11. Press bearing into place until outer race bottoms on housing.



⚠ CAUTION

Use an arbor press and only press on the outer race of the bearing. Failure to do so, will result in bearing damage.

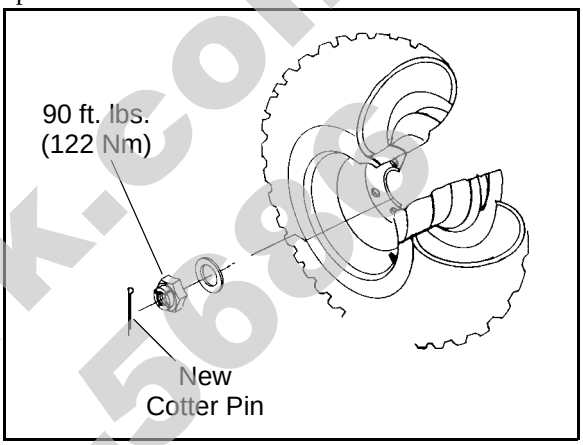
12. Install snap ring into groove.

Carrier Installation

1. Insert bearing carrier on drive shaft.
2. Align bottom of carrier housing and lower control arm. Grease and slide lower control arm bushings into place, securing corner housing.
3. Install both lower control arm bolts.
4. Lift bearing carrier until top aligns with upper control arm.
5. Install and torque upper control arm bolt and torque to specification. Torque lower control arm bolts to specification.

Upper / Lower Control Arm Bolt Torque: 33 ft. lbs. (45 Nm)

6. Pull drive shaft outward and install hub onto driveshaft splines.
7. Install cone washer domed side facing outward.
8. Install retainer nut, wheel and wheel nuts.
9. Remove jackstand and torque hub nut and wheel nuts to specification.



Hub Nut Torque:

90 ft. lbs. (122 Nm).

10. Install a new cotter pin. Tighten nut slightly to align holes if required.

Wheel Nut Torque:

30-35 ft. lbs. (41-47 Nm).

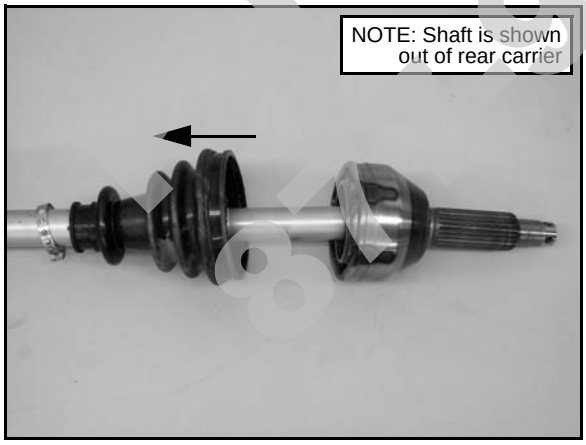
REAR DRIVE CV JOINT ("IRS")

CV Joint Removal

1. Elevate and safely support the rear of the ATV.
2. Remove the rear wheel hub nut and remove the rear wheel and hub assembly from the rear bearing carrier.
3. Remove upper carrier bolt and secure upper A-arm out of the way. Tip hub carrier outward and remove shaft end from carrier.

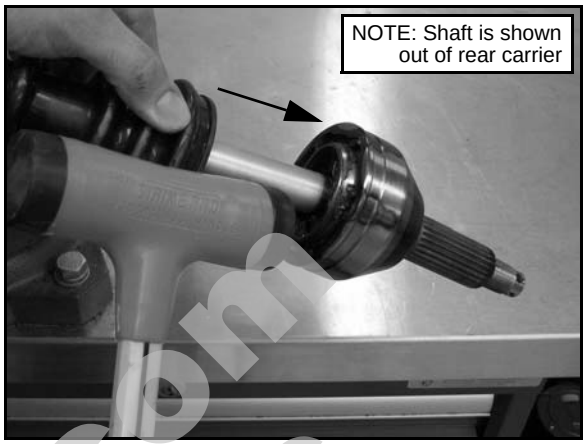
NOTE: CV joint can be serviced without removing the driveshaft from the rear carrier housing.

4. Remove the clamps from the rubber boot(s) using the proper boot clamp pliers.
5. Slide the boot down the shaft and wipe the grease away from the face of the joint.

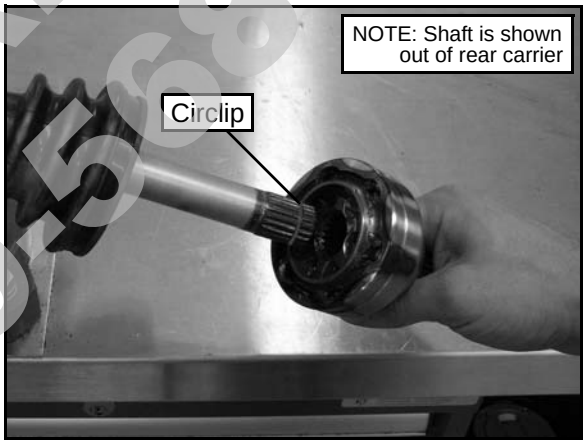


6. Support the drive shaft and strike the inner race of the CV joint using a soft-faced hammer to drive the joint off the shaft.

NOTE: If the drive shaft has been removed from the ATV, place the shaft assembly in a soft-jawed vise and remove the CV joint using the same procedure with a soft-faced hammer.



7. Pull the CV joint and boot off the end of the shaft. Make sure the circlip remains on the shaft and not left in the joint.



CV Joint Service

⚠ CAUTION

Complete disassembly of the CV joint is NOT recommended. The internal components are a precision fit and develop their own characteristic wear patterns. Intermixing the internal components could result in looseness, binding, and/or premature failure of the joint.

IMPORTANT: If the grease in the joint is obviously contaminated with water and/or dirt, the joint should be replaced.

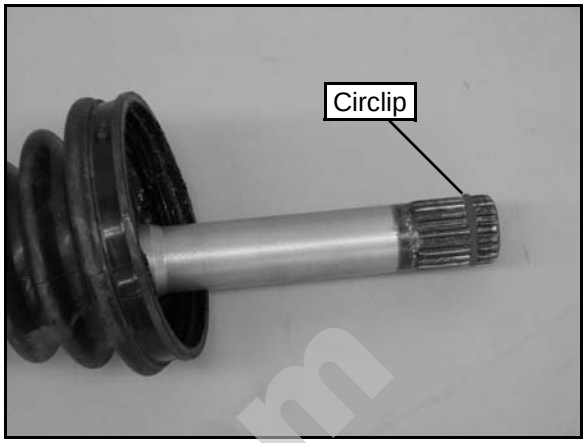
1. Thoroughly clean the joint with an appropriate solvent and dry the joint to prevent any residual solvent from being left in the joint upon reassembly.

2. Visually inspect the joint for damage. Replace if needed.

NOTE: Shiny areas in ball tracks and on the cage spheres are normal. Do not replace CV joints because parts have polished surfaces. Replace CV joint only if components are cracked, broken, worn or otherwise unserviceable.

3. Slide the small boot clamp and boot (small end first) onto the drive shaft and position the boot in its groove machined in the shaft.

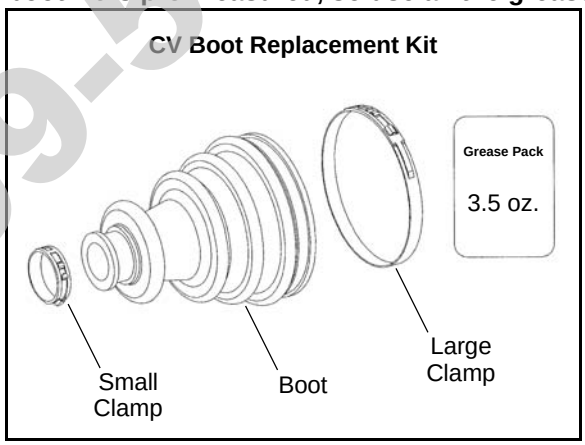
Install a NEW circlip on the end of the shaft.



⚠ CAUTION

The grease provided in the replacement kit is specially formulated for wear resistance and durability. DO NOT use substitutes or mix with other lubricants.

NOTE: The amount of grease that's provided with the boot kit is pre-measured, so use all the grease.



CV Joint Grease
Included with Boot Replacement Kit:
3.5 oz. (99 g)

4. Grease the inner and outer joint races. Fully compress the joint and push the drive shaft into the inner race of the CV joint.

5. Align the circlip with the lead-in chamfer.

6. Use a soft-faced hammer to assemble the shaft into the inner race of the CV joint. Tap on the joint until the shaft "clicks" into place.

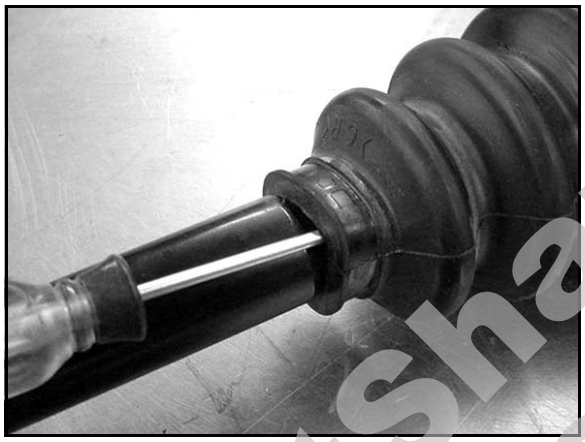
7. Pull on the joint to test that the circlip is seated and that the joint is securely fastened to the shaft.

8. Add any remaining grease to the boot and remove any excess grease from the CV joint's external surfaces.

9. Pull the boot over the joint and position the boot lips into the grooves on the joint housing and shaft. Make sure the boot is not dimpled or collapsed.

10. Tighten the large clamp using an appropriate clamp pliers.

11. Fully extend the CV joint by pulling on the shaft and slide a straight O-ring pick or small screwdriver between the small end of the boot and the shaft. This will allow the air pressure to equalize in the CV boot in the position that the joint will spend most of its life. Before you remove your instrument, be sure the small end of the boot is in its correct location on the shaft.



12. Install the small clamp on the boot and tighten using an appropriate clamp pliers.

⚠ CAUTION

Be careful not to cut through the bridge of the clamp when tightening.

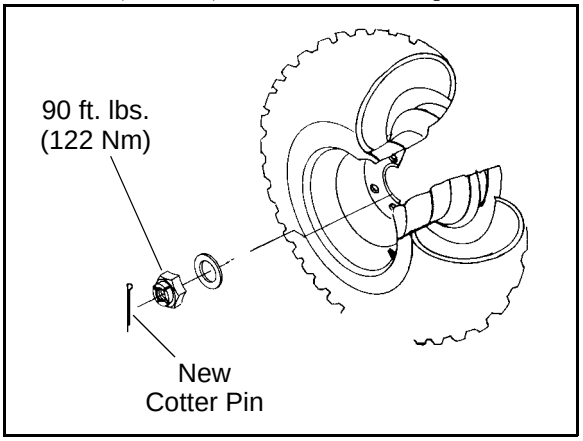
CV Joint Installation

1. Slide shaft assembly into bearing carrier hub.

2. Apply anti-seize compound to splines of shaft.

3. Lift bearing carrier into place and install bolt to upper control arm. Torque bolt to **33 ft. lbs. (45 Nm)**.

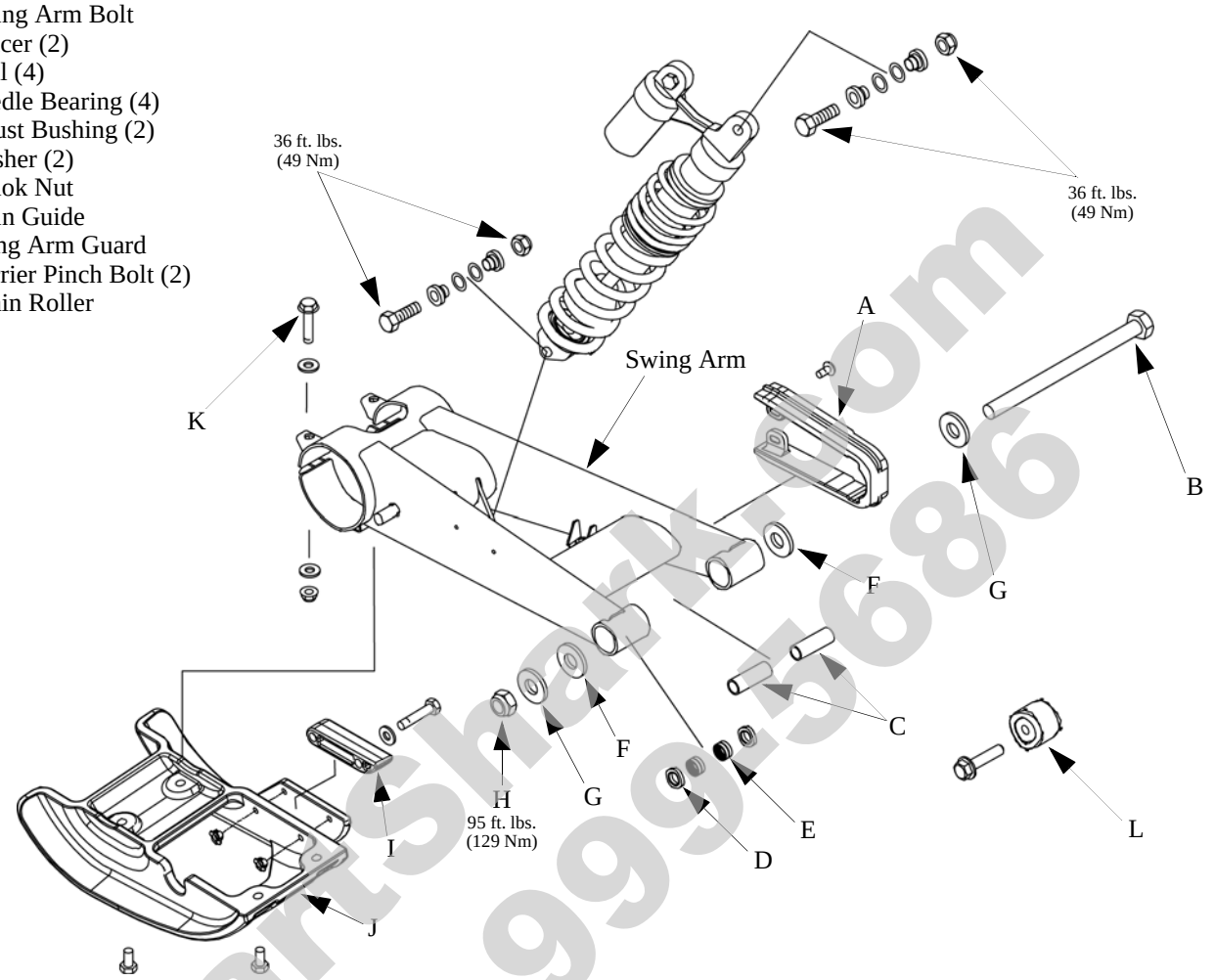
4. Install the rear wheel and hub assembly onto the rear drive shaft and bearing carrier. Torque rear hub castle nut to **90 ft. lbs. (122 Nm)**. Install new cotter pin.



REAR SUSPENSION SERVICE ("MXR" / "S")

Swing Arm Removal / Installation

A. Chain Slide
B. Swing Arm Bolt
C. Spacer (2)
D. Seal (4)
E. Needle Bearing (4)
F. Thrust Bushing (2)
G. Washer (2)
H. Nylok Nut
I. Chain Guide
J. Swing Arm Guard
K. Carrier Pinch Bolt (2)
L. Chain Roller



Removal / Disassembly

1. Safely support the rear of the machine under the main frame. Remove both rear wheels.
2. Remove drive chain.
3. Remove rear caliper.

IMPORTANT: Do not allow the caliper to hang by the brake line. Brake line damage may result.

4. Remove rear wheels and/or hubs
5. Remove lower shock bolt.
6. Remove the foot brake assembly.
7. Remove the nylok nut (H) and washers (G) from the mount bolt (B).
8. Remove the mount bolt (B) from the swing arm.

NOTE: Be careful not to damage the seals (D) and bearings (E) during swingarm removal.

9. Remove swingarm from the frame.
10. If needed, remove the thrust bushings (F) and swingarm seals (D) from swingarm.
11. If needed, remove the needle bearings from the swingarm (E).
12. Clean and inspect parts for wear. Replace worn parts.

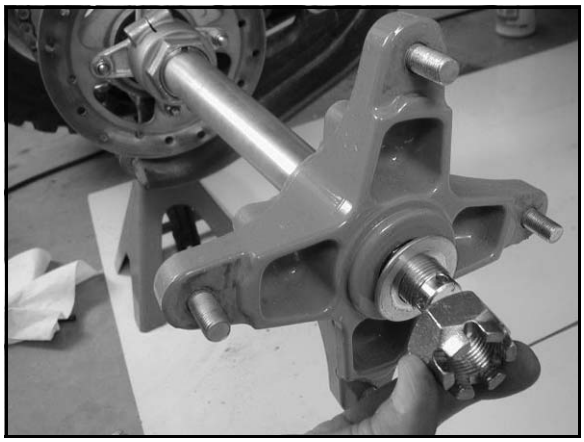
Installation

1. Reverse the steps above in the Removal / Disassembly procedure. Add grease to pivot bearings before assembly.
2. Torque mount nut (H) on bolt (B) to **95 ft. lbs. (129 Nm**).
3. Torque the top and bottom rear shock bolts to **36 ft. lbs. (49 Nm)**.

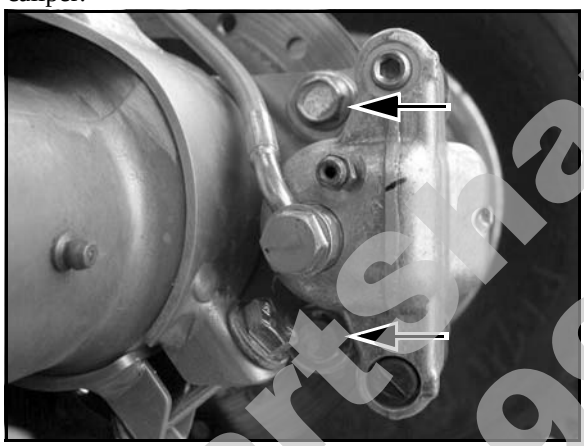
REAR AXLE SERVICE ("MXR" / "S")

Removal / Disassembly

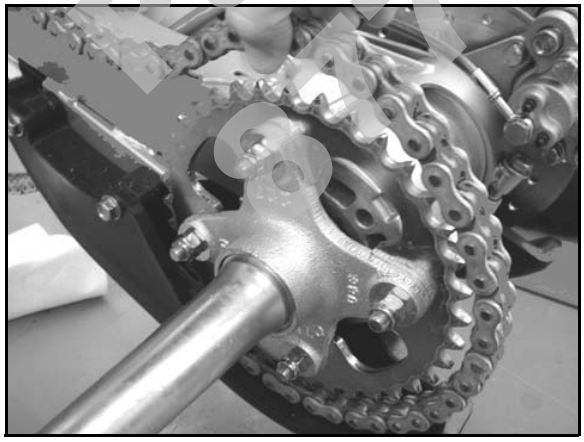
1. Securely support rear of machine with rear wheels off the floor. Remove rear wheels and hubs.



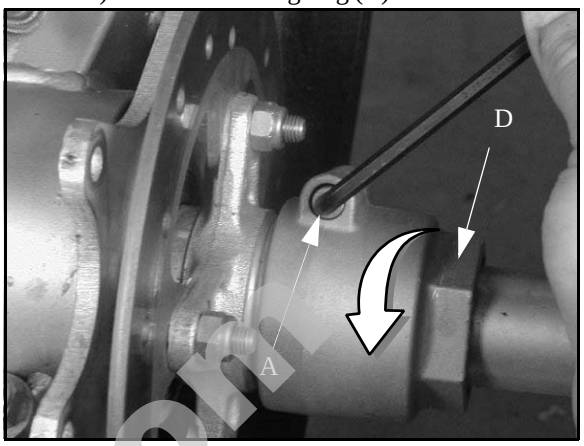
2. Remove the brake caliper bolts and remove the brake caliper.



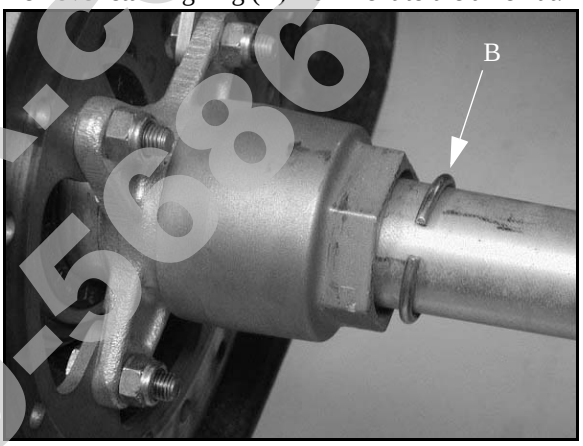
3. Remove the master link from the drive chain. Remove the drive chain.



4. Loosen the hex screw (A) to loosen the axle nut. Turn the axle nut (D) counter clockwise with a 1 3/4" wrench (PN 2870772) until the retaining ring (B) is visible for removal.

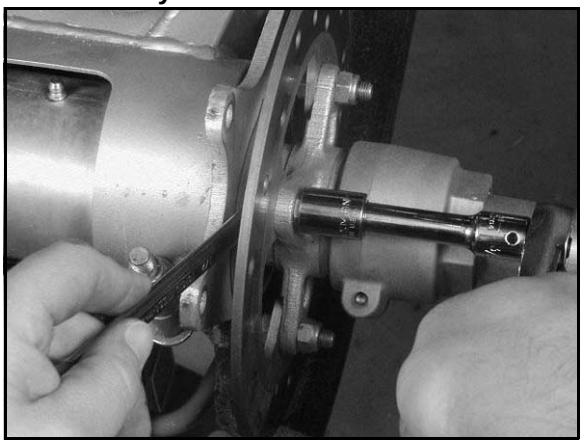


5. Remove retaining ring (B) from next to the axle nut.

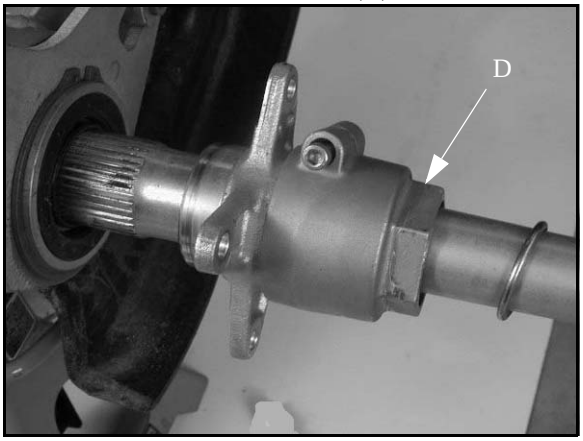


6. Remove the four bolts that secure the brake disc (C) to the rear disc hub and remove the brake disc.

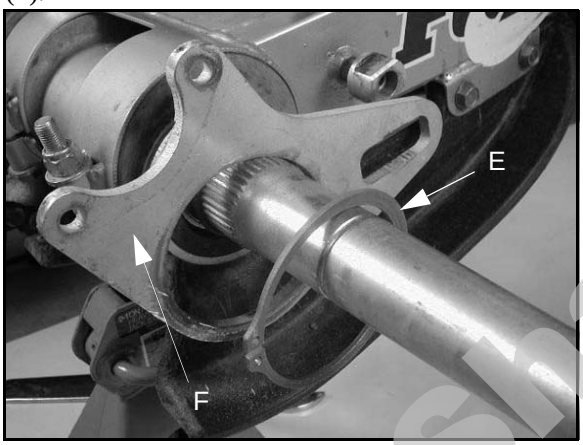
NOTE: It is not necessary to remove the brake disc at this time. Only remove if needed.



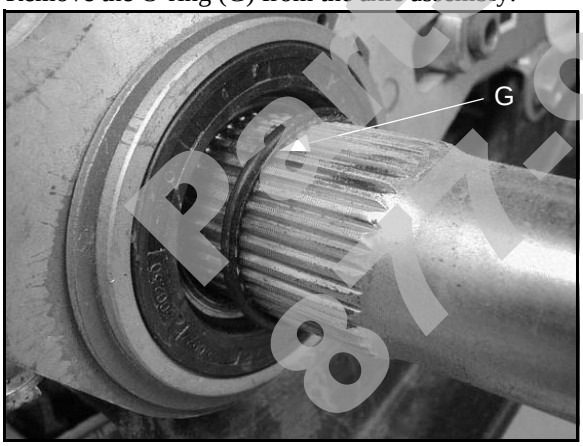
7. Loosen and remove the axle nut (D).



8. Remove the retaining ring (E) and caliper mounting bracket (F).

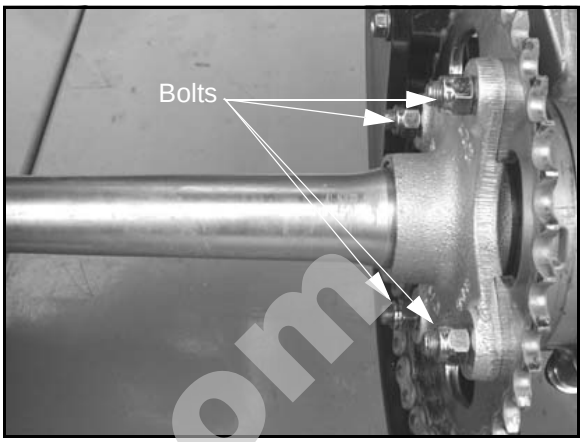


9. Remove the O-ring (G) from the axle assembly.



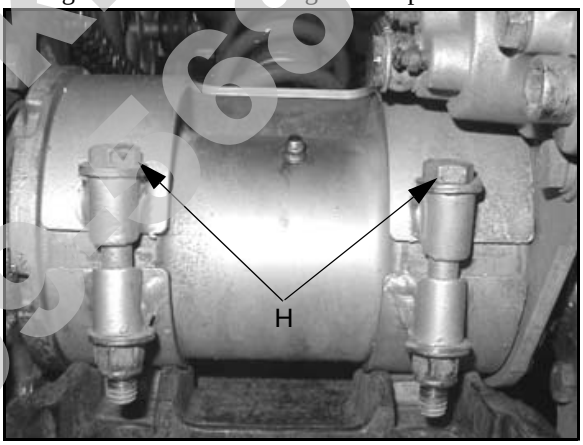
10. Remove the four bolts that secure the sprocket.

NOTE: Only remove sprocket if replacing with a new sprocket.

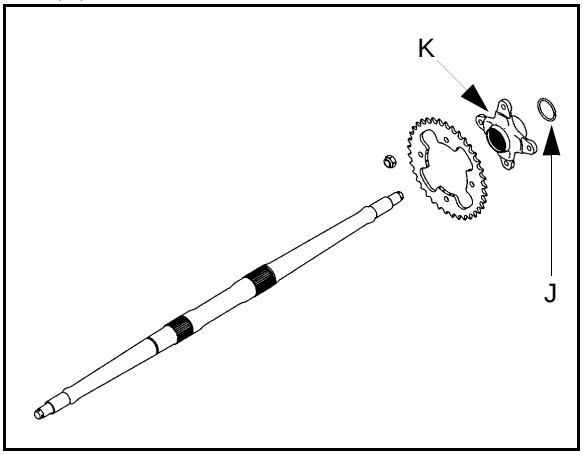


11. Slide the sprocket off the axle, if needed.

12. Loosen the concentric clamp bolts (H). Slide the axle through the rear axle housing on the sprocket side.

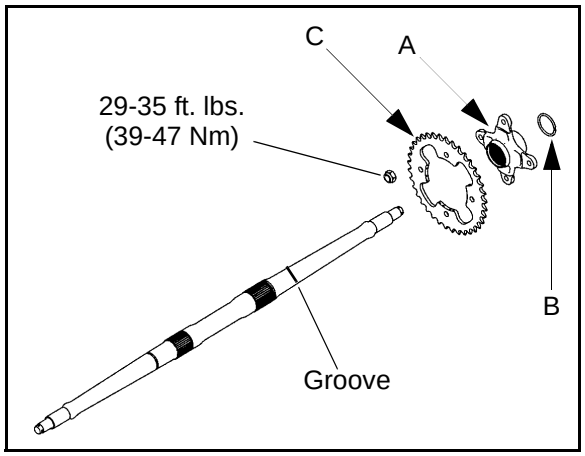


13. With the axle out, remove the retaining ring (J) and sprocket hub (K) from the axle.



Installation / Assembly

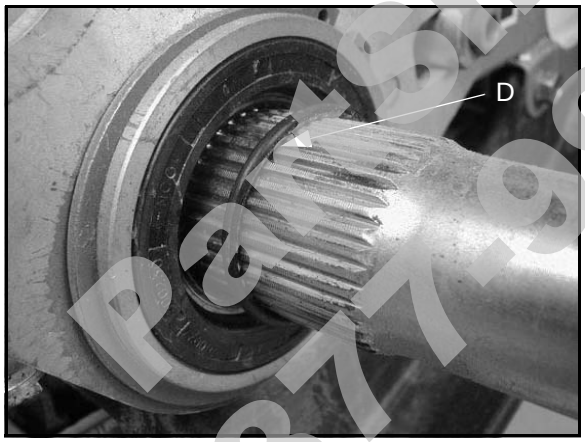
1. Slide the sprocket hub (A) onto the sprocket side of the axle. Install the retaining ring (B) onto the axle and into the groove of the axle. Apply Anti-Seize to the splines of the axle.



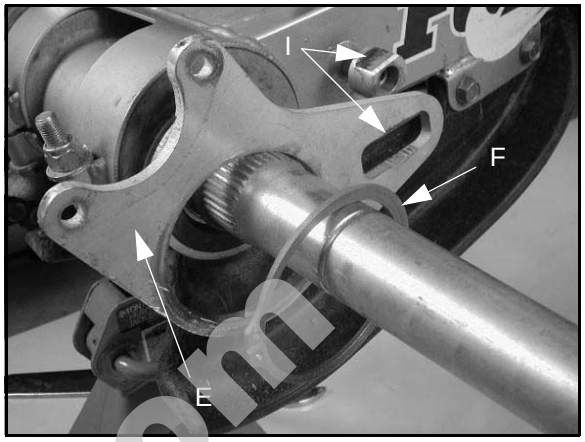
2. Slide the axle into the rear axle housing.

3. Install the sprocket (C) onto the sprocket hub (A). Torque the four sprocket nuts to **29-35 ft. lbs. (39-47 Nm)**.

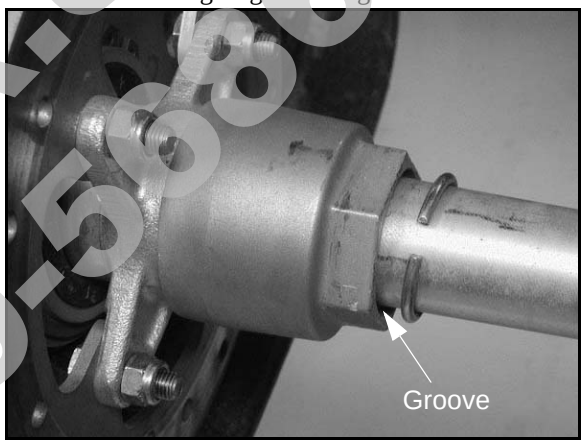
4. Apply grease to the O-ring (D) and install the O-ring on the sprocket side of the axle. Install the axle through the housing. Install the O-ring into the axle housing on the brake side.



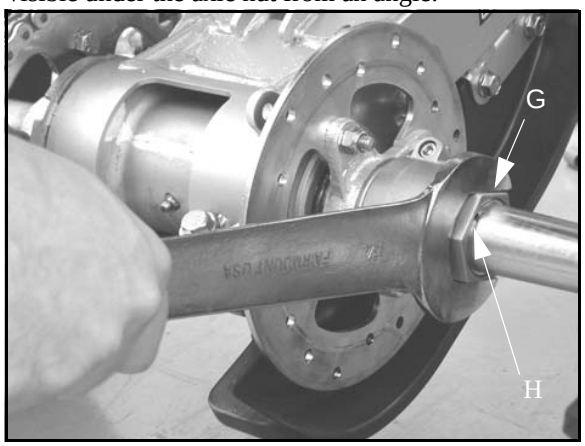
5. Install the mounting bracket (E) and retaining ring (F). Be sure to properly align the bracket (E) and bushing (I) upon installation.



6. Install the axle nut hub (G) and retaining ring (H). Thread the axle nut hub onto the axle until there is enough room to install the retaining ring into the groove in the axle.

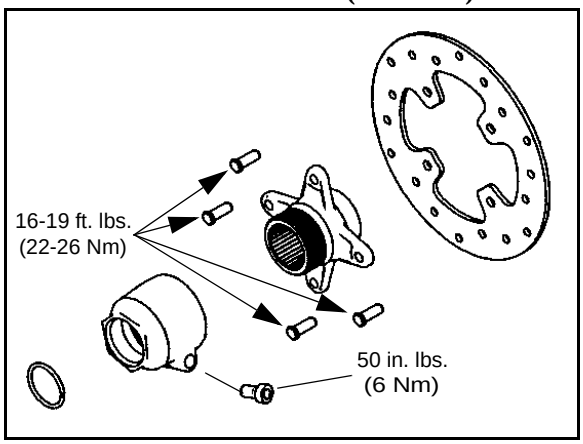


7. Turn the axle nut hub (G) outward with the 1 3/4" wrench (PN 2870772) until the end of the axle nut (G) just covers the retaining ring (H). The retaining ring should still be visible under the axle nut from an angle.

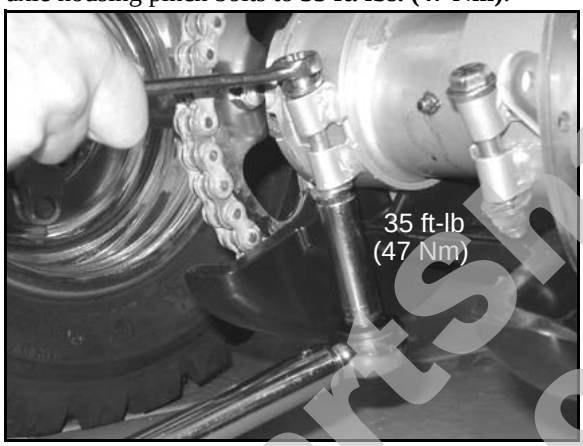


8. Torque the axle nut hex bolt to **8-10 ft. lbs. (11-14 Nm)**. Torque the hex pinch bolt to **50 in. lbs. (6 Nm)**.

9. Install the brake disc if previously removed. Torque the brake disc nuts to **16-19 ft. lbs. (22-26 Nm)**.



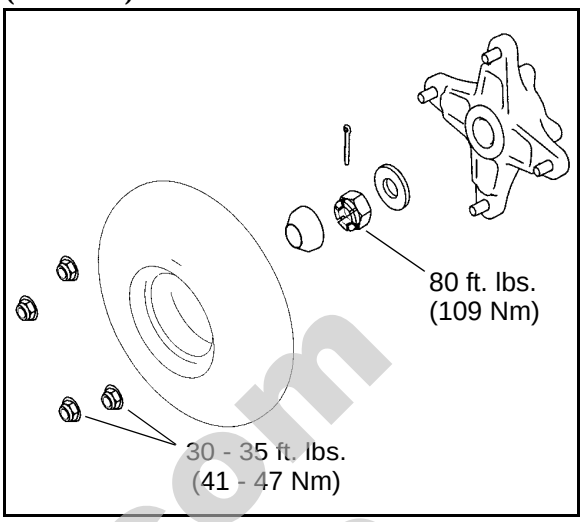
10. Reinstall the chain and masterlink. To verify proper chain tension, refer to Chapter 2 for procedure. Torque the two axle housing pinch bolts to **35 ft. lbs. (47 Nm)**.



11. Install the brake caliper and torque the mounting bolts to **18 ft. lbs. (25 Nm)**.

12. Apply Anti-Seize lubricant to the axle splines. Install the rear wheel hubs on both sides. Torque the wheel hub nuts to **80 ft. lbs. (109 Nm)**. Install a new cotter pin.

13. Install rear wheels and torque wheel nuts to **30-35 ft. lbs. (41-47 Nm)**.



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

Axle Run-Out Inspection

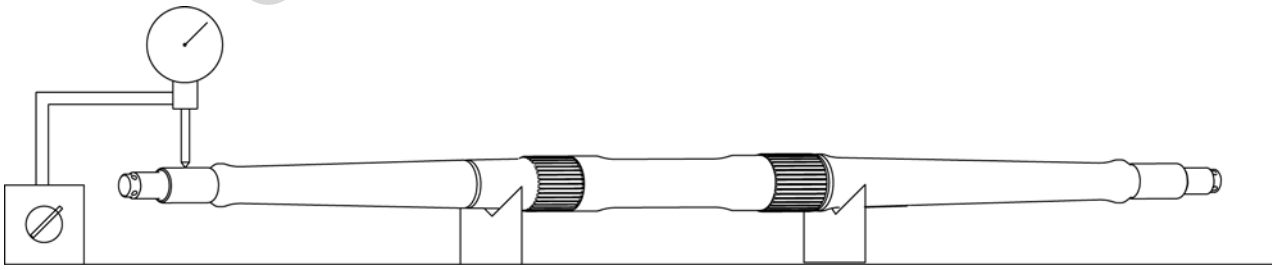
1. Park the vehicle on a flat surface and apply the parking brake.
2. Place a jack under the axle skid plate and raise until the rear wheels are off the ground.
3. Strap the vehicle securely to the ground so that the machine is held solid and will not wiggle.
4. Remove the rear wheels.
5. Remove the rear hubs (discard the used cotter pin).
6. Check that the swing arm bolt is properly torqued to 95 ft.lbs. (129 Nm).
7. Wipe the axle clean with a shop rag. Pay special attention to clean the splines at the end of the axle and the small cylindrical surface next to the splines.
8. Using a large screw driver, gently pry the brake pads apart so that the axle will spin freely.
9. Grab the end of the axle with your hand and try to move the axle up and down and side to side in the eccentric housing. The axle should not move. If the axle does not move, proceed to step 12. If movement is still detected after completing step 12, carrier bearings should be inspected and/or replaced before continuing.
10. Back the socket headed locking screw in the large cast axle nut out several turns. Using a large wrench, loosen the large axle nut by turning counter clockwise 2 turns.
11. Retighten the large nut by turning clockwise until there is no more axle play. Do not over tighten! The axle should still spin freely.
12. Torque the socket headed locking screw to 10 ft.lbs. (14 Nm).
13. Grease the eccentric using Polaris all season grease. Stop when grease starts to seep out from the eccentric seals.
14. Wipe away any excess grease. Use Polaris Brake and Clutch cleaner on the brake caliper and disc to clean any grease off the brakes.
15. Secure a dial indicator to the work surface and the measuring point on the small cylindrical surface next to the spline on the end of the axle.
16. With the vehicle in neutral, slowly spin the axle one full rotation and measure the total run out (total dial movement). Be very careful not to bump the machine or dial indicator while performing the measurement.
17. Repeat on the other end of the axle. If the measurement is over 0.040" (1.01mm) on either side, the axle needs to be replaced.

Reassembly:

18. Reinstall the hubs making sure the concave side of the conical washer is facing the hub.
19. Torque the hub nut to 80 ft.lbs. (108 Nm) and install a new cotter pin.
20. Reinstall the rear wheels and torque the wheel nuts to 30-35 ft.lbs. (41-47 Nm).
21. Unstrap the vehicle and remove the jack.

NOTE: If vibration in the rear end persists, the rims may be bent or out of balance due to wear.

Axle Run-out Inspection with V-Blocks

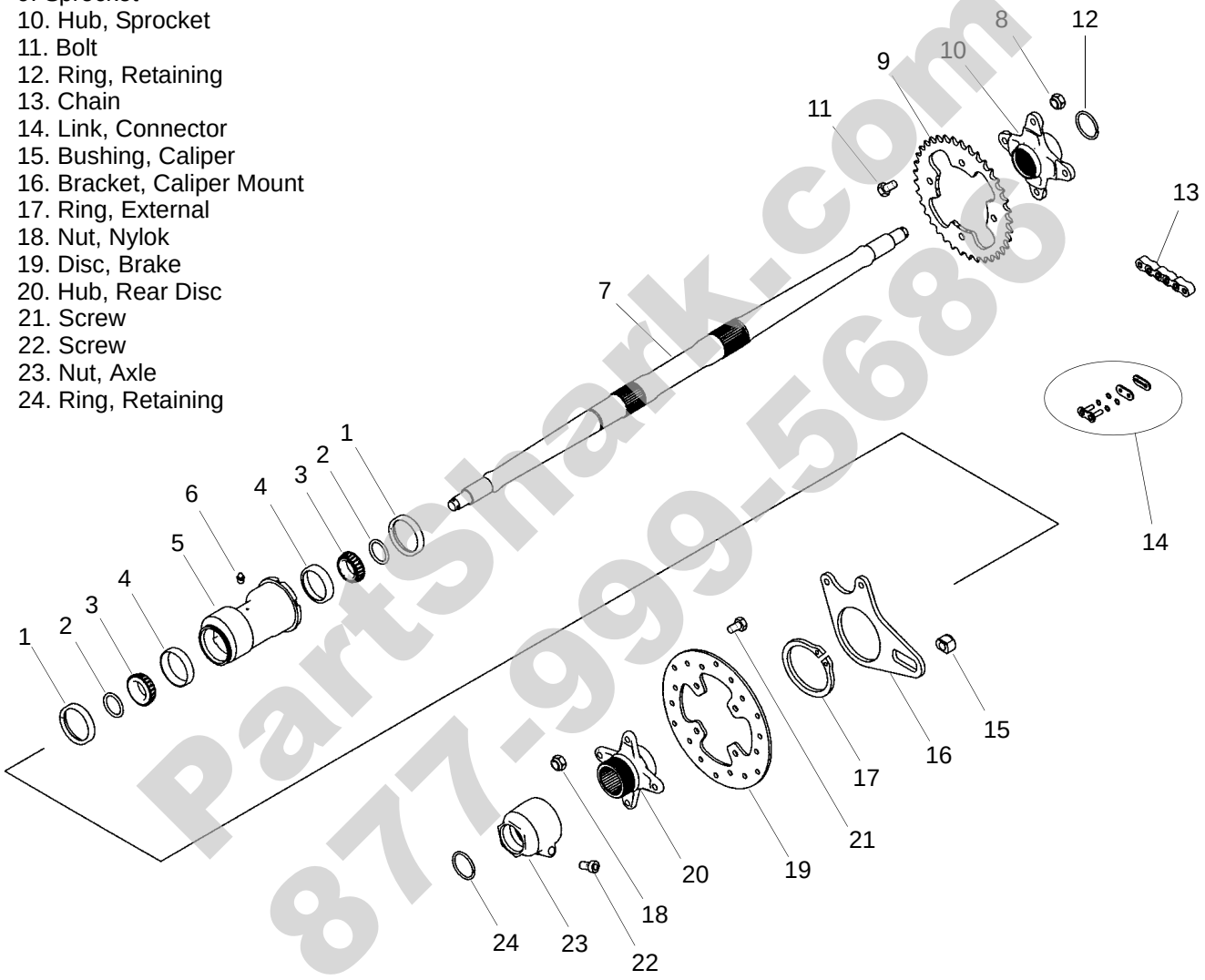


Run-out must not exceed .040" (1.01 mm) Maximum

REAR AXLE HOUSING / AXLE (“MXR” / “S”)

Exploded View

1. Seal
2. O-ring
3. Bearing, Cone, Taper
4. Bearing, Cup, Taper
5. Housing, Axle, Rear
6. Fitting, Lubrication
7. Axle, Rear
8. Nut, Nylok
9. Sprocket
10. Hub, Sprocket
11. Bolt
12. Ring, Retaining
13. Chain
14. Link, Connector
15. Bushing, Caliper
16. Bracket, Caliper Mount
17. Ring, External
18. Nut, Nylok
19. Disc, Brake
20. Hub, Rear Disc
21. Screw
22. Screw
23. Nut, Axle
24. Ring, Retaining



DECAL REPLACEMENT

⚠ WARNING

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

⚠ WARNING

Do not flame treat components that are installed on the vehicle. Remove the component from the vehicle before flame treating.

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

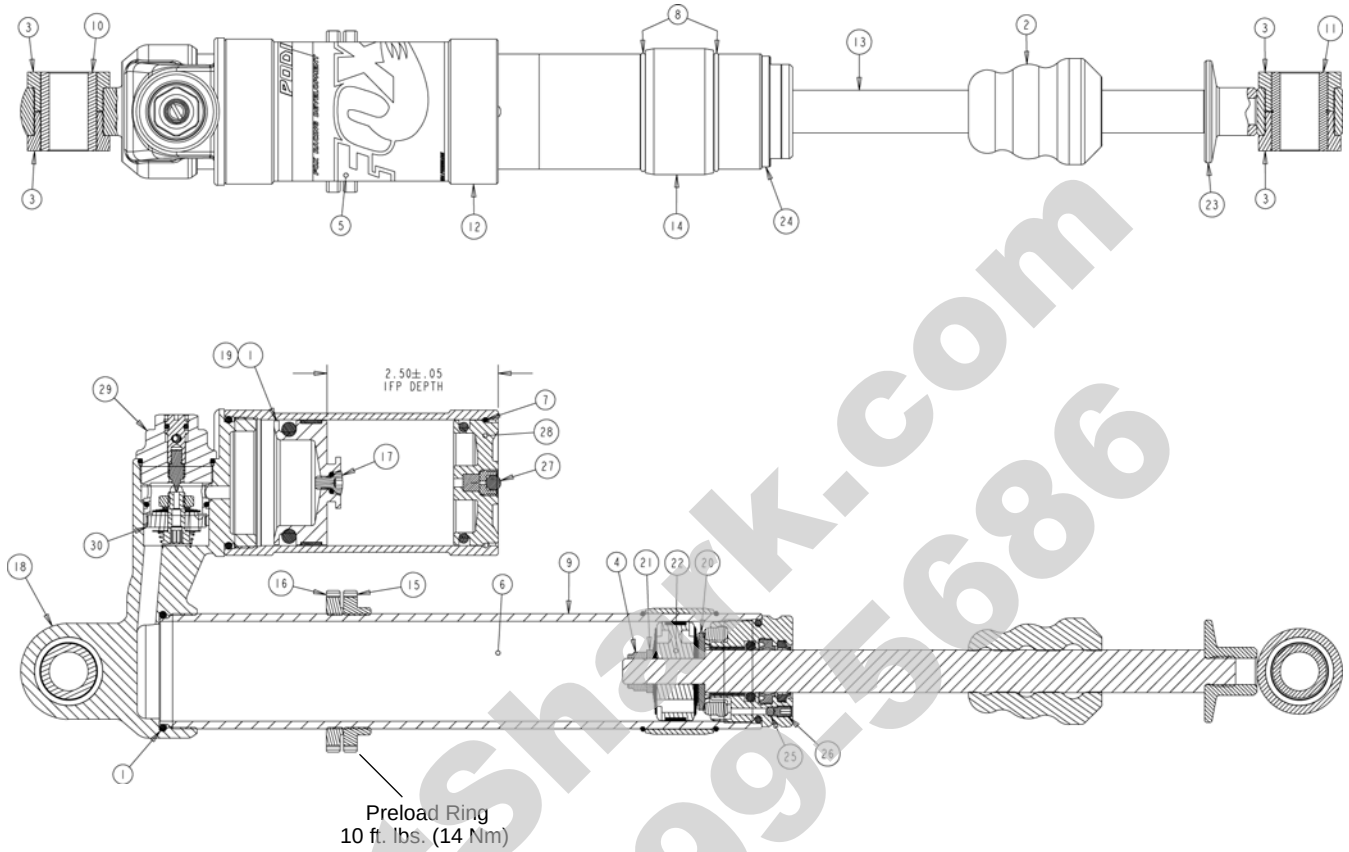
To flame treat the decal area:

1. Pass the flame of a propane torch back and forth quickly over the area where the decal is to be applied until the surface appears slightly glossy. This should occur after just a few seconds of flame treating. Do not hold the torch too close to the surface (2-3 inches from the flame tip is recommended). Keep the torch moving to prevent damage.

2. Apply the decal on one edge first. Slowly lay down remainder of the decal while rubbing lightly over the decal surface to eliminate any air bubbles during the application.

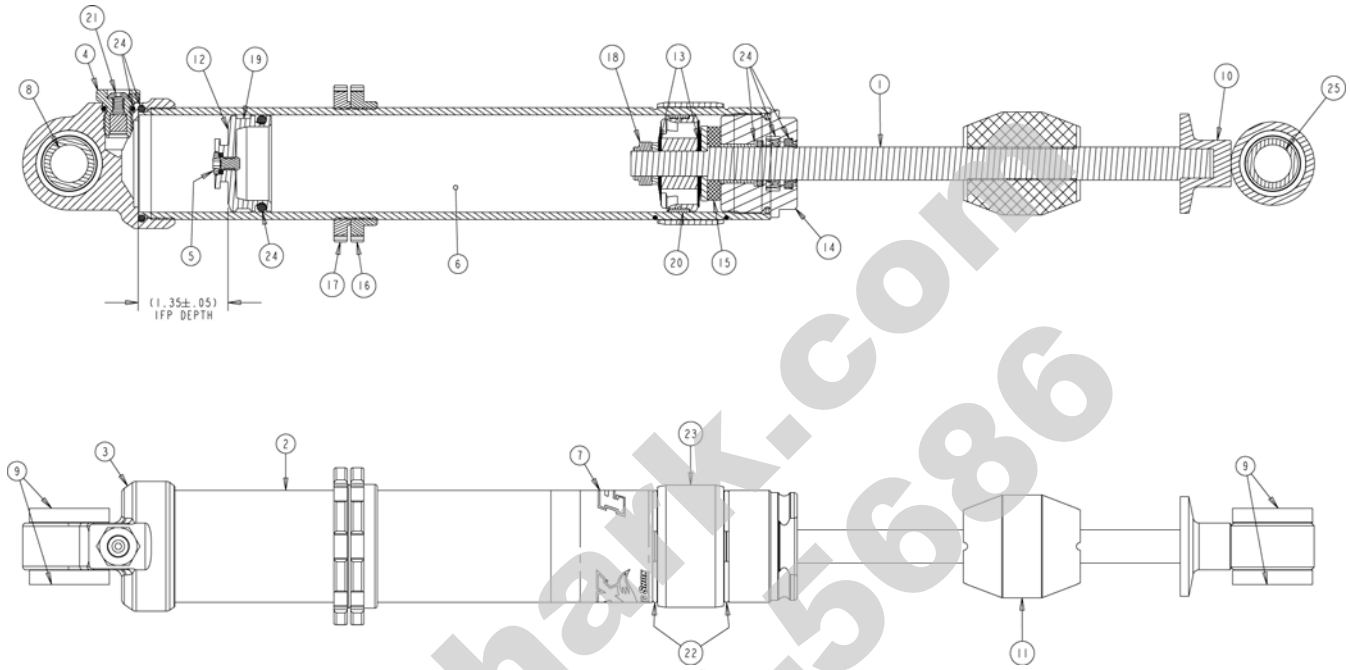
FRONT SHOCK EXPLODED VIEWS

FOX™ PODIUM X 'Piggyback' Front Shock (450 "MXR")



Ref.	Qty	Description	Ref.	Qty	Description
1.	1	Rebuild Kit	16.	1	Preload Ring
2.	1	Bumper	17.	1	Screw Asm.
3.	4	Eyelet Bushing	18.	1	Body Cap
4.	1	Nut	19.	1	Piston, Floating
5.	1	Decal	20.	1	Top-Out Plate
6.	-	Shock Oil (2870995)	21.	1	Back-Up Plate
7.	1	Wire Retaining Ring	22.	1	Piston, Damping
8.	2	Wire Retaining Ring	23.	1	Eyelet Asm.
9.	1	Body	24.	1	Bearing Asm.
10.	1	Eyelet Sleeve	25.	1	Air Valve Ball
11.	1	Eyelet Sleeve	26.	1	Screw
12.	1	Reservoir	27.	1	Air Valve Ball
13.	1	Shaft	28.	1	Reservoir End Cap
14.	1	Spring Guide	29.	1	Damping Adjustment Asm. (Cartridge)
15.	1	Preload Ring	30.	1	Damping Adjustment Asm. (Piston)

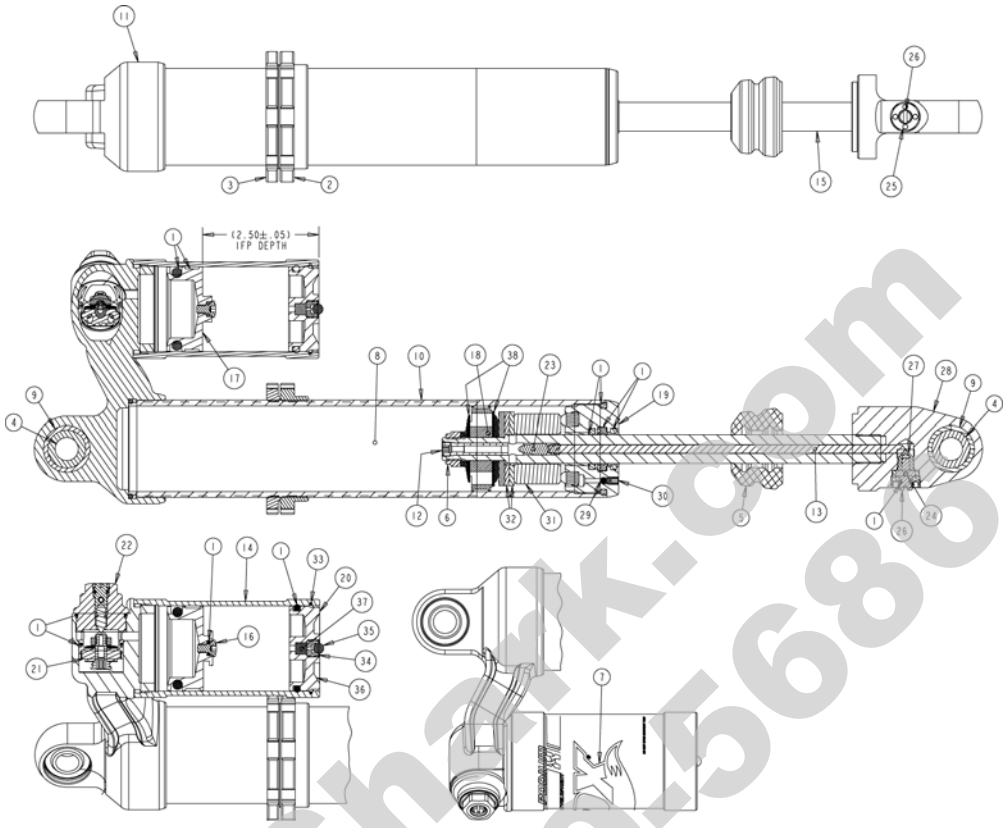
FOX™ PODIUM Front Shock (525 “S” / 525 “IRS”)



Ref.	Qty	Description	Ref.	Qty	Description
1.	1	Shaft	14.	1	Bearing Asm.
2.	1	Body	15.	1	Bumper
3.	1	Body Cap Asm.	16.	1	Preload Ring
4.	1	Air Valve Asm.	17.	1	Preload Ring
5.	1	Screw Asm.	18.	1	Nut
6.	-	Shock Oil (2870995)	19.	1	Bearing, External
7.	1	Decal	20.	1	Bearing, External
8.	1	Sleeve	21.	1	Screw
9.	4	Eyelet Bushing	22.	2	Wire Retaining Ring
10.	1	Eyelet Asm.	23.	1	Spring Guide
11.	1	Bumper	24.	1	Rebuild Kit
12.	1	Piston Asm., Floating	25.	1	Eyelet Sleeve
13.	1	Valving Asm.			

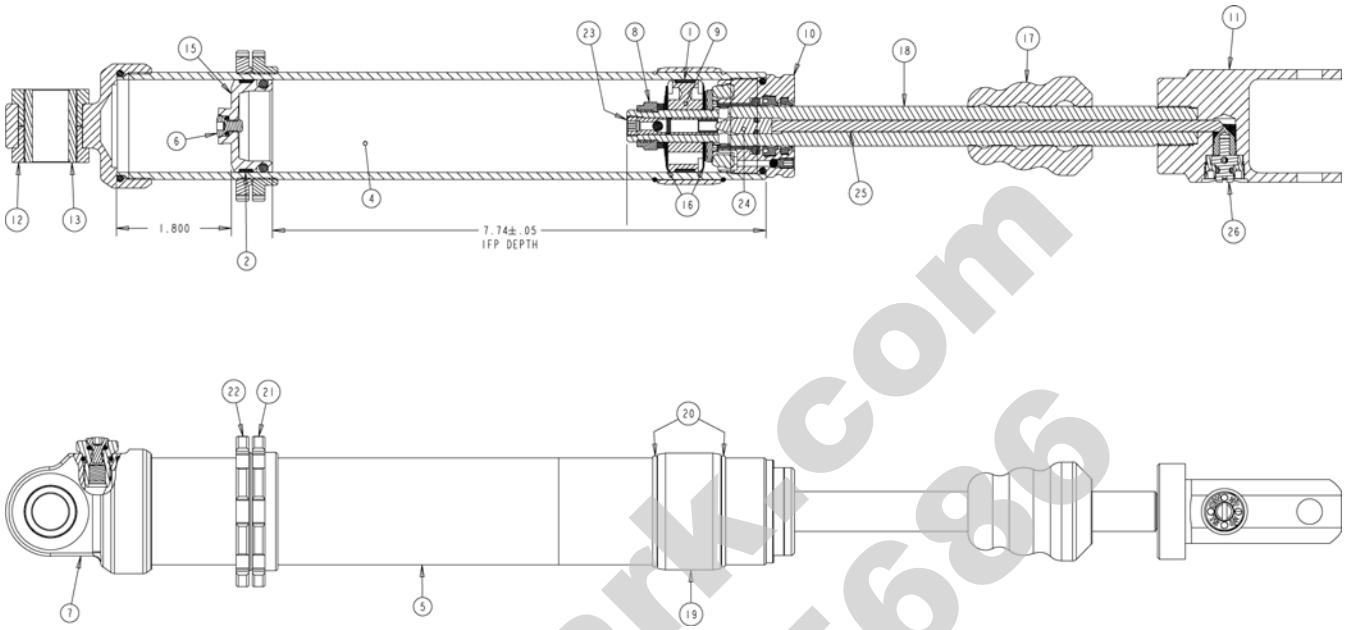
REAR SHOCK EXPLODED VIEWS

FOX™ PODIUM X 'Piggyback' Rear Shock (450 "MXR" / 525 "S")



Ref.	Qty	Description	Ref.	Qty	Description
1.	1	Rebuild Kit	20.	1	End Cap, Reservoir
2.	1	Preload Ring	21.	1	Piston, Damping Adjust Asm.
3.	1	Preload Ring	22.	1	Cartridge, Damping Adjust Asm.
4.	2	Bearing	23.	1	Needle, Parabolic w/O-Ring
5.	1	Bumper	24.	2	Air Valve Ball
6.	1	Nut	25.	1	Adjustment Retainer
7.	1	Decal	26.	1	Slotted Screw Adjustment Knob
8.	-	Shock Oil (2870995)	27.	1	Tapered Adjustment Screw
9.	4	Retaining Ring	28.	1	Eyelet
10.	1	Body	29.	1	Air Valve Ball
11.	1	Body Cap	30.	1	Screw
12.	1	Jet, Damping Adjust Port	31.	1	Shaft Spacer
13.	1	Metering Rod, Damping Adjust Port	32.	2	Shaft Spacer
14.	1	Reservoir	33.	1	Wire Retaining Ring
15.	1	Shaft	34.	1	Air Valve Set Screw
16.	1	Screw Asm.	35.	1	Air Valve Ball
17.	1	Piston, Floating	36.	1	Reservoir End Cap Asm.
18.	1	Piston, Damping	37.	1	Air Valve Pellet
19.	1	Bearing Asm.	38.	1	Valving Asm.

FOX™ PODIUM-C Rear Shock (525 “IRS”)

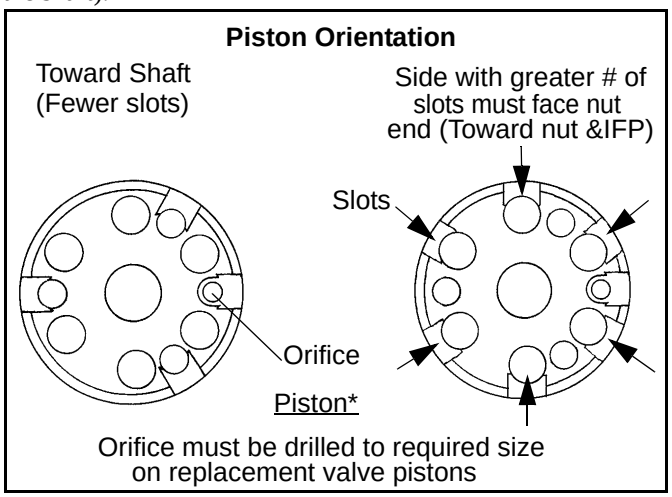


Ref.	Qty	Description	Ref.	Qty	Description
1.	1	Bearing, External	14.	1	Rebuild Kit
2.	1	Bearing, External	15.	1	Piston Asm., Floating
3.	1	Decal	16.	1	Valving Asm.
4.	-	Shock Oil (2870995)	17.	1	Bumper
5.	1	Body	18.	1	Shaft
6.	1	Screw Asm.	19.	1	Spring Guide
7.	1	Body Cap Asm.	20.	2	Wire Retaining Ring
8.	1	Nut	21.	1	Preload Ring
9.	1	Piston, Damping	22.	1	Preload Ring
10.	1	Bearing Asm.	23.	1	Jet, w/Needle Seat
11.	1	Eyelet Clevis	24.	1	Needle, Parabolic w/O-Ring
12.	2	Eyelet Bushing	25.	1	Metering Rod
13.	1	Eyelet Sleeve	26.	1	Slotted Screw Adjustment

FOX™ PODIUM SHOCK SERVICE

General Service Information

*Note direction of valve piston before disassembly. The side with the greater number of slots should face the IFP (nut end of the shaft).



FOX™ PODIUM Front Shock Standard Valving

Piston Orifice = .136"

COMPRESSION (525 "S" / "IRS")

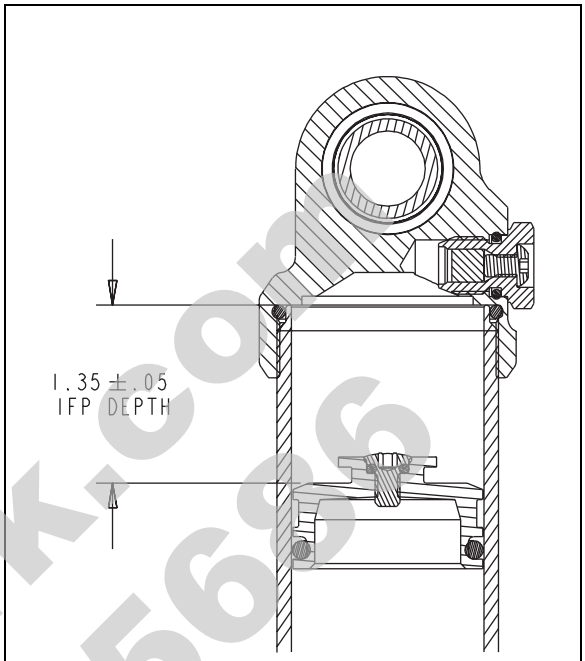
COMPRESSION VALVE STACK	FOX PART NUMBER
1.300 X .006	040-06-130-A
1.300 x .010	040-10-130-A
.700 X .008	040-08-070-A
1.250 X .008	040-08-125-A
1.100 X .008	040-08-110-A
1.000 X .010	040-10-100-A
.900 X .012	040-12-090-A
.800 X .008	040-08-080-A
1.125 X .093 TOP OUT	050-00-000-C

REBOUND (525 "S" / "IRS")

REBOUND VALVE STACK	FOX PART NUMBER
1.250 X .006	040-06-125-A
1.250 X .006	040-06-125-A
.700 X .006	040-06-070-A
1.250 X .006	040-06-125-A
1.100 X .006	040-06-110-A
.900 X .008	040-08-090-A
.800 X .008	040-08-080-A
.700 X .008	040-08-070-A
.620 X .093 BACK-UP	050-01-000-C

Changing oil on FOX™ Shocks is recommended annually and should be included when performing end of season storage preparation. For competition use, shocks should be disassembled, inspected and serviced more frequently.

FOX™ PODUIM Front Shock Details



SHOCK DETAILS	
TRAVEL:	5.75
EXTENDED LENGTH:	18.07
COMPRESSED LENGTH:	12.32
IFP LOCATION:	1.35
NITROGEN PRESSURE:	200 PSI

FOX™ Front Shock Disassembly

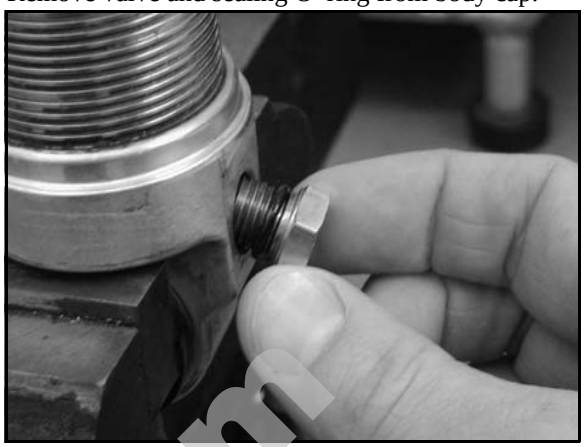
1. Remove spring and bushings from shock eyes. Thoroughly wash shocks in a parts washer or with soap and water to remove dirt and other debris. Dry thoroughly with compressed air. Position and clamp body cap of shock in soft jaws (aluminum or brass) of vise. Remove Allen screw from pressure valve.

2. With valve outlet pointed in a safe direction, insert red tip of safety needle assembly into recess in shock pressure valve. Depress safety pin on safety needle and push gauge and needle assembly slowly toward shock, inserting needle. Be sure to push needle completely into shock valve. Release nitrogen in a safe direction by turning T–handle clockwise (if equipped) or by depressing Schrader valve pin.

⚠ CAUTION

It is possible for some residual pressure to remain in the shock regardless of the gauge reading. Always completely remove valve from body cap before further disassembly of shock.

3. Remove valve and sealing O–ring from body cap.



4. Extend shock shaft by pulling up on shock eyelet. Using a 1" (25 mm) or adjustable wrench, loosen shaft bearing cap.

5. If body of shock starts to unscrew from body, tighten and try again. To keep body from turning, it may be necessary to use Body Clamp Tool clamped lightly around body in soft jaws of vise.

Shock Body Clamp Tool

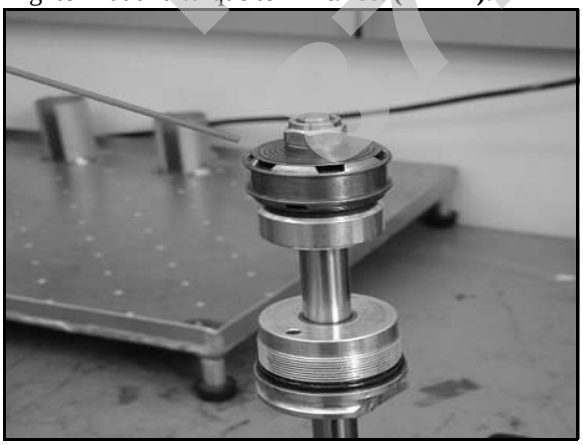
(PN 2871071)

NOTE: Position body clamp at least 1 1/2" below bearing cap.

6. Pull shock rod and piston straight out to avoid seal or valve damage. Be prepared to catch piston ring when removing the damper rod/valve piston.

7. Remove shock from vise and dispose of used oil properly. Set shock body aside.

8. Mount damper rod in soft–jawed vise. Loosen valve nut and clean the valve piston and valving washers with electrical contact cleaner. Dry thoroughly with compressed air. Tighten nut and torque to **12 ft. lbs. (17 Nm)**.



Valve Nut Torque

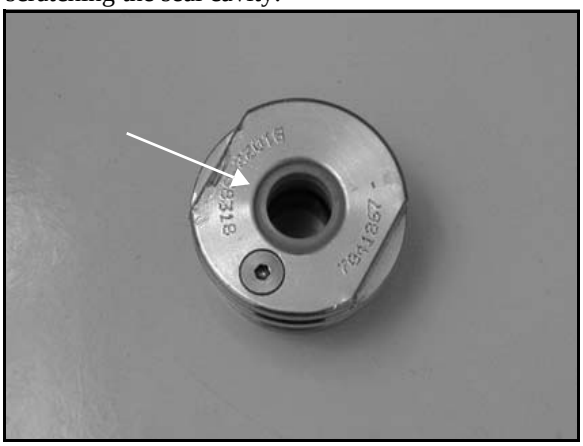
12 ft. lbs. (17 Nm)

9. If bearing cap and/or seals are to be replaced, remove nut, washer, and valve piston with valving washers and set aside. Keep washers in order and note orientation of slots in piston for proper re–installation. The side with the greater number of slots must face the damper rod nut (toward IFP).

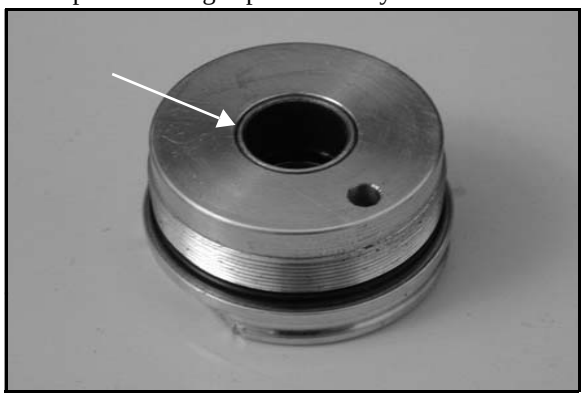
SEAL REPLACEMENT

1. Remove bearing cap from damper rod. Inspect seals, o–ring, and bushing inside cap. Inspect cap O–ring and replace if torn or damaged.

2. Using a small screwdriver or scribe, pry upper seal, main seal, and O–ring out of bearing cap. Use care to avoid scratching the seal cavity.



3. Clean seal cavity and inspect bushing for wear or damage and replace bearing cap if necessary.



4. Lubricate new seals and O–ring with Polaris shock oil and install. Be sure the seals are seated completely in the seal cavity.

5. Inspect jounce bumper (where applicable) and replace if damaged.

6. Inspect damper rod for nicks, scratches or abrasion. Install bearing cap and thick backing washer on damper rod. Install compression valve washer stack in same order as disassembly. Install valve piston with greater number of slots facing damper rod nut (toward IFP). Install rebound stack, washer, and a new nut. Torque nut to **12 ft. lbs. (17 Nm)**.

Valve Nut Torque

12 ft. lbs. (17 Nm)

7. Inspect valve piston ring for wear. The outer surface of the ring should be even in color. Set aside damper rod assembly for reinstallation.

8. Position shock in vise with Body Clamp Tool . Clean body clamp tool before installing.

Shock Body Clamp Tool
(PN 2871071)

9. Using an open end or large adjustable wrench, unscrew the body cap from the body.

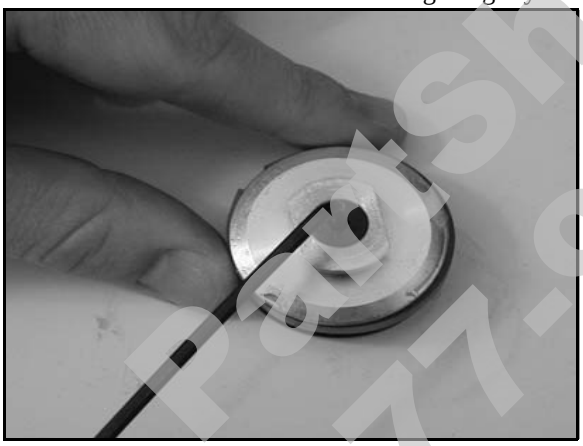
10. Inspect O–ring in body cap for damage.

11. Note location of Allen screw in internal floating piston (IFP) for reassembly in body tube. Remove IFP through bottom body cap end (external threaded end) using IFP tool. Be prepared to catch piston ring and piston as it comes out. Remove Allen screw from center of piston. Inspect bleeder screw O–ring and IFP sealing O–ring for wear or damage. Replace O–rings upon reassembly.

12. Carefully clean all parts thoroughly with electrical contact cleaner or solvent and dry with compressed air. Inspect shock body for scratches or wear.

FOX™ Front Shock Assembly

1. Install bleeder screw in IFP until O–ring is lightly seated.



NOTE: Bleeder screw must be positioned toward body cap (externally threaded) end of shock body.

2. Compress flexible piston ring around valve piston and install piston into shock body.

3. Screw in bearing cap by hand until O–ring is fully seated.

4. Invert shock and mount bearing cap flats lightly in vise. Caution: Verify damper rod is fully extended.

5. Fill with shock fluid to approximately 1" (2.54cm) from end of body.

6. Insert IFP.

7. Install body cap until O–ring is lightly seated.

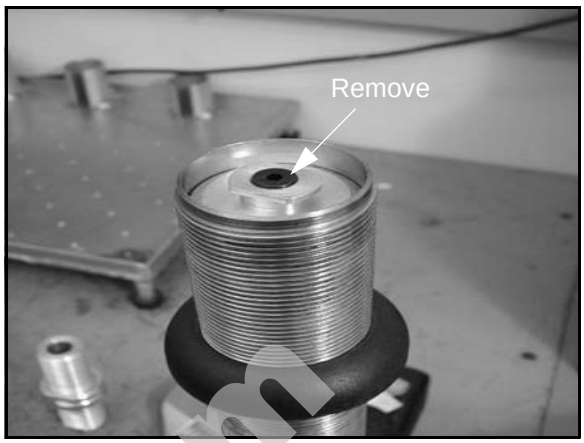
8. Mount shock in vise by top eyelet as shown. Support shock and strike body cap end 2–3 times with a soft faced hammer to remove all air trapped inside the valve piston. Allow shock to stand for 3–5 minutes.

⚠ CAUTION

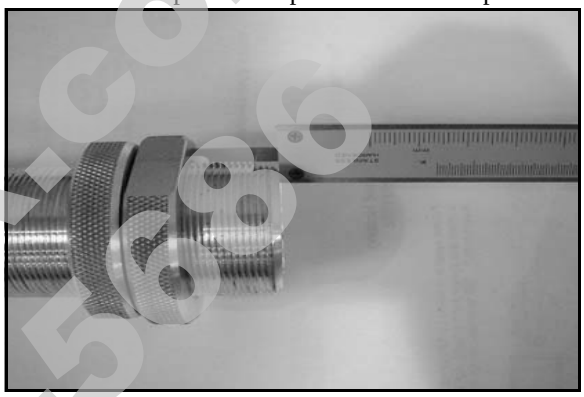
Do not over–tighten vise or bearing cap may be damaged.

9. Unscrew body cap and remove.

10. Remove IFP bleeder screw.

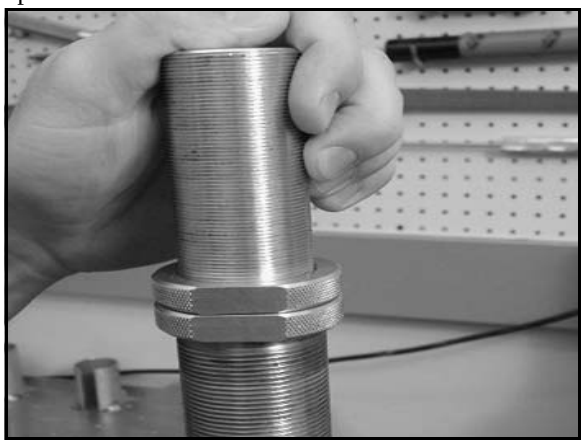


11. Set IFP tool to specified depth with a dial caliper as shown.



IFP Tool: (PN 2871351)

12. Insert IFP tool and slowly push IFP to specified depth. Place a shop towel over the end of IFP tool to catch any spilled shock oil.



13. With the IFP set and the bleeder screw removed, slowly stroke shock to force air through piston orifice. Move the shock body slowly to prevent aeration of the oil. Allow all air to purge through the bleeder screw hole.

14. Install the bleeder screw with a new O–ring and tighten securely, using the flats on the tool to prevent the IFP from turning. Pour out excess oil. It is not necessary to completely clean all oil from the nitrogen chamber, a small amount of oil will lubricate the IFP. Verify the proper IFP depth to within ± .025" (.63mm) with a dial caliper. Be sure to measure to the flat portion of the IFP, not to the tapered outer edge.

15. Reinstall body cap with a new O–ring and tighten by hand. Mount shock with body cap end down in the soft jaws of a vise. Torque bearing cap to **8–10 ft. lbs. (11–14 Nm)**. This will also tighten the body into the body cap.

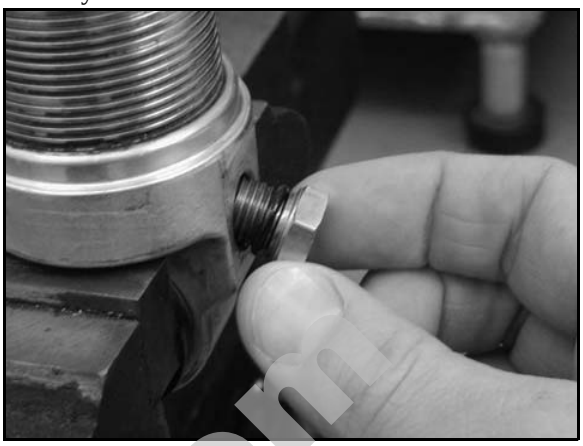
⚠ CAUTION

Do not over tighten or damage to the bearing may result.

Bearing Cap Torque

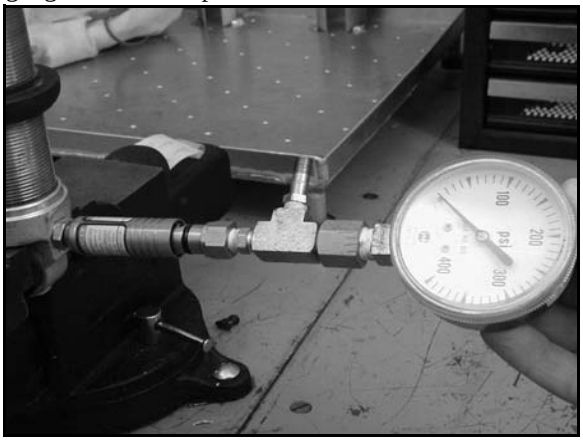
8 - 10 ft. lbs. (11- 14 Nm)

16. Install pressurizing valve with new O–ring and tighten securely.



17. Set the nitrogen tank pressure regulator to 200 – 205 PSI.

18. Insert the FOX™ Charging Needle (PN 7052069) and charge with nitrogen to 200 PSI. Pull the needle straight outward and remove from the pressurizing valve while holding the pressure hose on the fitting. Do not insert the needle again to check pressure as the volume inside the gauge will reduce pressure in the shock.



Shock Recharging Kit - PN 2200421

Gas Charge Pressure: 200 psi

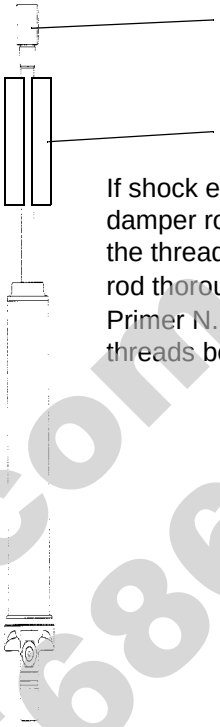
19. As a final check, push the damper rod through a full stroke. The damper rod must bottom out at full travel, and then slowly rise to full extension. Shaft movement must be smooth and consistent throughout the entire compression and rebound stroke, without binding or loss of damping.

20. To check for leaks, submerge the shock in water and look for bubbles or oil seepage around the bearing and body caps.

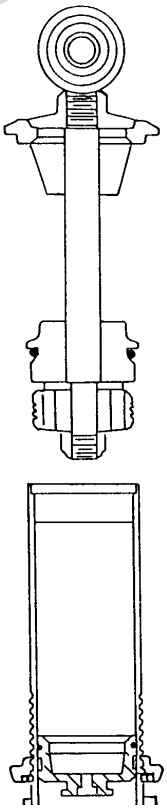
21. When reinstalling shocks on the machine, torque only to required specifications. If the shock is over tightened it will not pivot, possibly resulting in damage to shaft and seals.

22. When installing IFS shocks, tighten top mount first. Pivot shock body into lower mount and determine if spacer washers are necessary to prevent twist or side loading of shock. Suspension assemblies should always be moved through entire travel without springs to verify free movement and proper alignment of all components.

Shock Eyelet Replacement



If shock eyelet is removed for damper rod replacement, clean the threads of eyelet and damper rod thoroughly with Loctite™ Primer N. Apply Loctite™ 262 to threads before assembly.



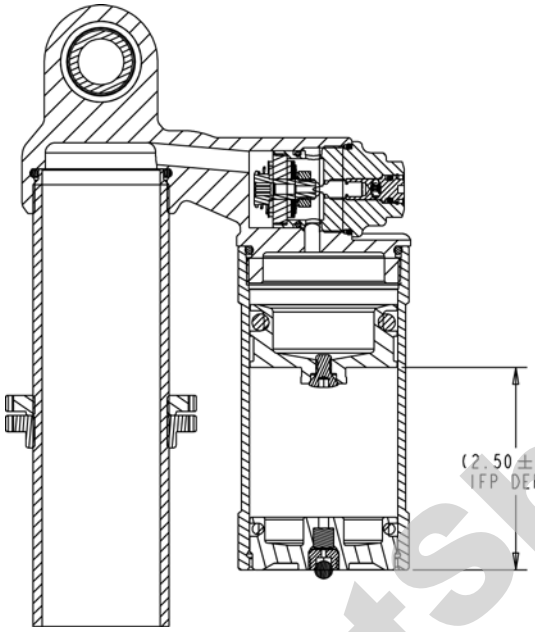
FOX™ PODIUM X SHOCK SERVICE

General Service Information

Recommended Service Intervals

FOX™ Racing Shocks will perform the best if serviced at regular intervals:

- Every ride - Wash and dry the vehicle and suspension.
- Every 100 hours - Visually inspect shock seals
- Every 500 hours or Annually - Change shock oil and seals.



Front Shock Service Information (450 "MXR")

SHOCK DETAILS	
Travel	6.02"
Extended Length	17.98"
Compression Length	11.96"
Dead Length	5.95"
IFP Location	2.50"
Nitrogen Pressure	200 psi
Gas Shock Oil	2870995 (qt.)
Body Material	Aluminum

SHOCK VALVING	
COMPRESSION	**REBOUND**
1.300 x 0.006	1.250 x 0.006
1.300 x 0.006	1.250 x 0.006
0.700 x 0.008	0.700 x 0.006
1.250 x 0.006	1.250 x 0.006
1.100 x 0.006	1.100 x 0.006
1.000 x 0.010	0.900 x 0.008
0.900 x 0.012	0.800 x 0.008
0.800 x 0.008	0.700 x 0.008
1.230 x .082 Top-Out	0.620 x .093 Back-Up
Piston Orifice:	0.078

Rear Shock Service Information (450 "MXR" / 525 "S")

SHOCK DESIGN DETAILS	
Travel	5.03"
Extended Length	450: 19.03" 525: 19.53"
IFP Location	2.50"
Nitrogen Pressure	200 psi
Gas Shock Oil	2870995 (qt.)
Body Material	Steel

SHOCK VALVING	
COMPRESSION	**REBOUND**
1.600 x 0.010	1.425 x 0.010
1.600 x 0.010	1.350 x 0.010
1.425 x 0.010	1.250 x 0.010
1.425 x 0.010	1.100 x 0.010
1.350 x 0.012	0.950 x 0.010
1.250 x 0.015	0.800 x 0.020
1.100 x 0.015	0.750 x .100 Back Up
1.100 x 0.015	
0.950 x 0.015	
1.570 x .128 Top-Out	
Piston Orifice	0.052

FOX™ PODIUM X Shock Rebuild Information

When performing maintenance on FOX™ shocks, use the Gas Shock Recharging Kit (PN 2200421), as it contains the necessary valves, pressure gauge, and fittings to deflate and pressurize shocks.

⚠ WARNING

FOX™ shocks contain high pressure nitrogen gas. Extreme caution must be used while handling and working with FOX™ shocks and related high pressure service equipment. The pressure must be released from the shock before disassembly. It is strongly recommended you wear safety glasses and ear protection during these procedures.

TIP: Extreme cleanliness is very important during all disassembly and reassembly operations. This prevents dirt or foreign particles from entering the shock, which causes premature failure.

1. Safety Glasses
2. Latex Gloves
3. Lint Free Towels
4. Assembly Lube (lithium based grease)
5. Loctite #271
6. 12” Tie Wrap (Zip Tie)
7. MAPP Gas or Propane Torch
8. 1.834 TC Seal Kit
9. 5wt. Shock Fluid

Special Tools Required:

Body Holding Tool **(PN 2871071)**
Charging Needle **(PN 7052069-A)**
Gas Shock Recharging Kit **(PN 2200421)**
FOX™ Shock IFP Tool **(PN 2871351)**
Seal Installation Bullet Tool **(PN 2201640) (PN 2201639)**

10. IFP Depth Setting Tool
11. Seal Installation Bullet (5/8”)
12. Nitrogen Safety Needle
13. 5/8” Shaft Clamps
14. Adjustable Wrench
15. Pin Spanner Wrench (3/16” Pins)
16. 3/32” Hex Key (Allen Wrench)
17. 5/32” Hex Key (Allen Wrench)
18. Scribe or Dental Pick
19. 1/4” Flat Blade Screwdriver
20. #2 Phillips Screwdriver
21. 3/4” Open End Wrench
22. Standard Pliers
23. Small Needle Nose Pliers
24. Snap Ring Pliers
25. Socket
26. Torque Wrench
27. Torque Driver
28. Soft Faced Rubber Mallet
29. Nitrogen Tank w/ Regulator
30. Cleaning Solvent
31. Vise with soft jaws
32. Tape Measure

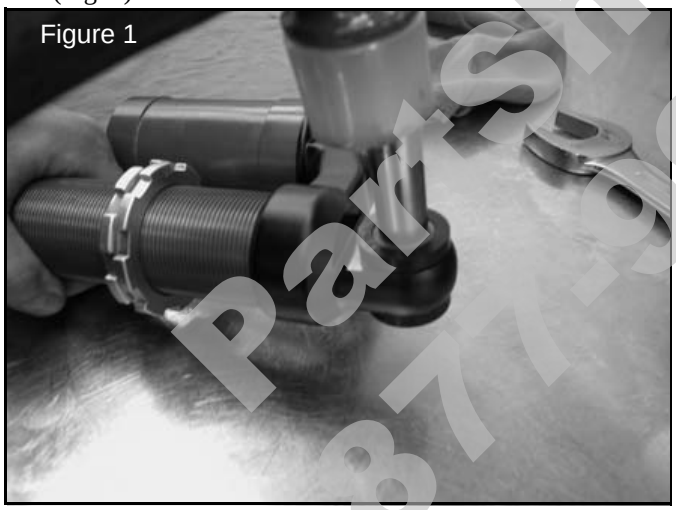
FOX™ Podium X Shock Disassembly

NOTE: Read through all of these instructions first to familiarize yourself with the rebuild procedure. Make sure you have a clean work area, and all of the necessary tools are available. Always use proper safety equipment when working on shock absorbers.

NOTE: Clean the entire shock assembly with soapy water. Try to remove as much dirt and grime as possible by scrubbing with a soft bristle brush. Never pressure wash your shock, as this can force water and debris inside which will damage the seals. Dry the shock assembly with compressed air, if available, or use clean towels.

1. If your shock DOES NOT have a spring installed, skip to Step #4.
   Measure the spring set length (Fig. 1). Record this number.
2. Back the preload adjustment ring off until spring is loose on the body. Remove the lower spring retaining clip.
3. Remove the spring.
4. If the shock has spherical bearings in the body cap or shaft eyelet, remove the reducer bushings and o-rings from both ends of the shock. If your shock has polyurethane bushings and sleeves, remove them from both ends of the shock (Fig. 1).

Figure 1



5. Note and record the setting on the Compression Adjuster Screw. Using the Flat Blade Screwdriver, count the clicks as you turn the adjuster clockwise until it stops (Fig. 2). Once you have written this number down, turn the screw all the way counterclockwise until it stops.

Figure 2

6. Clean the entire shock assembly with soapy water. Try to remove as much dirt and grime as possible by scrubbing with a soft bristle brush. Never pressure wash your shock, as this can force water and debris inside which will damage the seals. Dry the shock assembly with compressed air, if available, or use clean towels.
7. Use a 3/32" Hex Key to remove the button head screw from the FOX™ air valve in the reservoir end cap.
8. Securely clamp FOX™ Nitrogen Safety Needle in vise.

⚠ CAUTION

Point air valve away from face and body when charging or discharging any shock.

9. Insert the FOX™ Safety Needle squarely into center of gas valve (Fig. 3).

Figure 3

10. Using a blunt object, depress the air valve core to release pressure.
11. When the shock is fully discharged, pull reservoir away from the FOX™ Safety Needle in a straight, smooth motion.

12. Clamp the body cap of the shock securely in vise with shaft side up.

13. Gently tap the reservoir end cap with a rubber mallet to expose the wire retaining ring. Locate the end of the ring and push inward with fingertip. Remove the retaining ring. A scribe or dental pick can also be used for this step, but use extreme caution not to scratch the bore of the reservoir tube (Fig. 4).


Figure 4

14. Use pliers to grab flats of the gas valve of reservoir cap. Extract cap from reservoir tube using a rocking or twisting motion. Set reservoir cap aside on a clean, lint free paper towel.

15. Use the appropriate size wrench to loosen the bearing assembly (Fig. 5).
Unscrew the bearing assembly completely from the body tube. Remove the shaft assembly from the body tube, and place on a clean, lint free paper towel. Remove the shock from the vise and pour shock oil from body tube into a proper disposal container.

NOTE: DO NOT RE-USE OLD SHOCK OIL.

Figure 5

16. Clamp the body cap of the shock securely in vise with the open end of the body tube pointing up

17. Align the slot of the IFP Depth Setting Tool with the end of the IFP (Internal Floating Piston). Engage the IFP by rotating the tool 90 degrees (Fig. 6). Gently pull the IFP out of the reservoir tube using the IFP Depth Setting Tool, and place it on a clean, lint free towel. Remove the shock from the vise and pour shock oil from body and reservoir tubes into a proper disposal container. DO NOT RE-USE OLD SHOCK OIL.

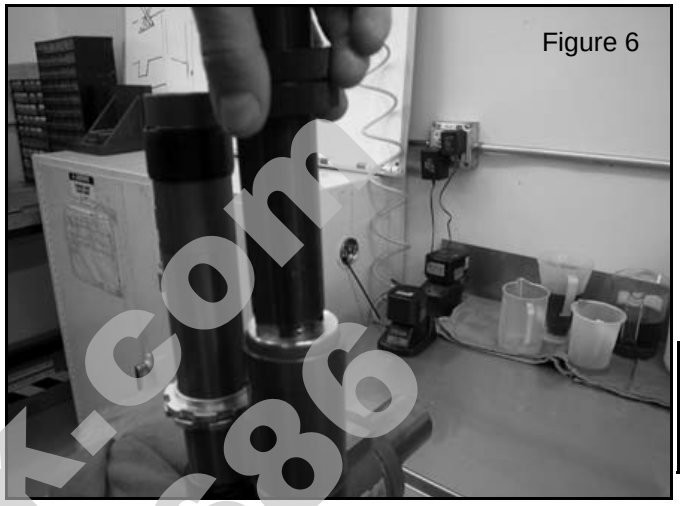


Figure 6

18. Using the 1/8" Hex Tool, remove the IFP bleed screw from the IFP.

19. Clean the body tube, reservoir tube, and the IFP using solvent. Dry with compressed air in a well ventilated area. If compressed air is not available, dry parts using clean, lint free paper towels and let sit in a well ventilated area to allow the solvents to evaporate.

20. Set body assembly aside on a clean, lint free paper towel.

21. Clamp the shaft eyelet securely in vise with the piston end up.

22. Using a 9/16" wrench, remove the piston lock nut from the end of the shaft.

23. Hold the tip of a phillips head screwdriver against the end of shaft. Hold the piston assembly under the top-out plate and lift upwards (Fig. 7). Slide the piston assembly onto the shaft of the Screwdriver. Pull the Screwdriver away from shock shaft while supporting the piston assembly. Slide a 12" tie wrap through the entire piston assembly. Secure the two ends of the zip tie together and remove the screwdriver. There are many pieces to the piston assembly, and the assembly order of these pieces is critical to the proper performance of your shock. This step ensures that the proper order is kept. Place piston assembly on a clean, lint free paper towel.

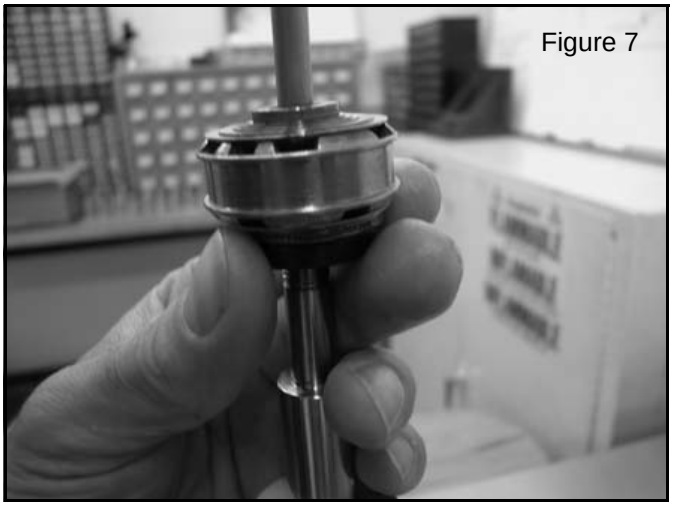


Figure 7

24. Slide bearing assembly off of shaft. Use extreme caution not to scratch inside of the bearing assembly when passing it over the threads at end of shaft.

FOX™ Podium X Shock Rebuild

1. Use a scribe or dental pick to remove the u-cup wiper (Fig. 8) and o-ring seals (Fig. 9) from the bearing housing. Be careful not to scratch the seal grooves or the DU bushing that is pressed into the bearing.


Figure 8

IMPORTANT: Use extreme caution when using a scribe to remove seals. Always "spear" the seal with the point of the scribe. Do not wedge the point of the scribe in behind the seal. This can scratch the surface of the seal groove which will compromise the performance and reliability of the shock absorber.


Figure 9

2. Thoroughly clean the bearing housing, and piston assembly with solvent. Dry with compressed air in a well ventilated area. If compressed air is not available, dry parts using clean, lint free paper towels and let sit in a well ventilated area to allow the remaining solvent to evaporate.
3. Use a scribe or dental pick to remove the o-ring seal from the IFP.
4. Use a scribe or dental pick to remove the o-ring seals from the reservoir end cap.
5. Install the new, well lubricated, o-rings into the bearing housing. Correct placement of the shaft seal o-ring is in the groove next to the DU bushing. Check to make sure the seals are properly seated, and are not twisted. If a tool is required to aid in proper seating of o-ring, use the non-writing end of a pen, or a similar soft, blunt object, to push it in.
6. Install the new U-cup seal into bearing. U-cup should be installed so the cupped end is facing the DU bushing inside of bearing. Check to make sure seal is properly seated. If a tool is required to aid in proper seating of U-cup seal, use the non-writing end of a pen, or a similar soft, blunt object, to push it in (Fig. 10).


Figure 10

7. Install the scraper in the bearing housing. Check for proper orientation of the scraper in the bearing. The stepped side of the scraper should be visible.
8. Install the new, well greased o-ring onto the IFP
9. Replace the IFP bleed screw o-ring.
10. Install the new, well greased o-rings into the reservoir end cap.

FOX™ Podium X Shock Assembly

1. Clamp shaft eyelet securely in vise, and place seal bullet tool on end of shaft.
2. Lubricate the bearing assembly seals with an ample amount of assembly lube. Slide the bearing assembly onto shaft with the scraper facing the eyelet (Fig. 11). This should be done in a single smooth motion to avoid damaging the seals.


Figure 11

3. Insert the shaft of a Phillips head screwdriver through the center of the piston assembly. The pointed end of the screwdriver should be on the same side as the top-out plate. Cut and remove the tie wrap that was holding the piston assembly together.
4. Hold the piston assembly from underneath the top-out plate and place the end of the screwdriver onto the end of the shock shaft. Slide the piston assembly onto the shaft end. Check to make sure the piston assembly is properly seated, then install the piston lock nut. Torque the nut to 22 ft. lbs. using the torque wrench and 9/16" socket. Remove shaft assembly from vise and set it aside on a clean, lint free paper towel.
5. Clamp the body cap of the shock securely in the vise, with the open end of the body facing up.
6. Using the flat blade screwdriver, turn the compression adjuster screw counter clockwise until it stops turning.
7. Lubricate the new IFP o-ring with an ample amount of assembly lube.
8. Fill the reservoir to the retaining ring groove with the recommended oil. You should see bubbles rising to oil surface. Wait until bubbling slows or stops completely. If oil level has fallen, add more oil until level is at retaining ring groove. Insert IFP into reservoir. Use a smooth motion and push straight in until o-ring seats into the retaining ring groove. Use your free hand to wrap new piston band around IFP with the rounded edge out, and push the IFP into the reservoir. Shock oil will come up through the IFP bleed hole.

Polaris Gas Shock Oil - 5 wt.
PN 2870995 - qt.
PN 2872279 - 2.5 gal.

9. Push the IFP into the reservoir until you have enough oil on top of the IFP so that the bleed hole is under the surface of the oil (Fig. 12).


Figure 12

10. Quickly install the IFP Bleed Screw before the oil level drops and tighten it with the 1/8" Hex Tool (Fig. 13).

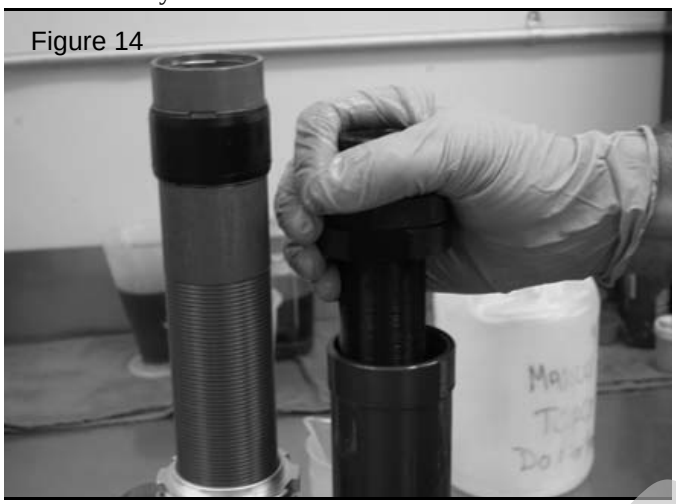
NOTE: The IFP will spin in the reservoir when the screw bottoms. This is OK.


Figure 13

11. Using the IFP Depth Setting Tool, push the IFP into the reservoir until it stops.

12. Fill shock body to the bottom of the bearing threads with oil.
13. Using the IFP Depth Setting Tool, slowly pull the IFP up to the mid point of the reservoir. Then push it down to the bottom again (Fig. 14). Be careful not to pull the IFP out completely. Also, be careful that the oil level in the shock body does not disappear below the bottom of the body and into the reservoir. If the oil does recede completely from the body, you must remove the IFP and go back to step 7 of reassembly.

Figure 14



14. As you push the IFP down, you should see bubbles rising to the surface inside the body tube. Repeat this process several times until you don't see any new bubbles inside the body tube.
15. Pull the IFP up until it's top is approximately 1" from the end of the reservoir and remove the IFP depth setting tool. Again, be sure the oil level in the shock body does not drop below the bottom of the body. If the oil does recede completely from the body, you must remove the IFP and go back to step 7 of reassembly. Add oil if necessary while pulling up on the IFP.
16. Using the flat blade screwdriver, turn the Compression Adjuster Screw clockwise until it stops turning.
17. Fill the body tube with oil approximately 1/4" below the threads. Wrap the new piston band around the piston, making sure the rounded edges face out. Insert the shaft assembly into the body tube. Slowly push shaft into body until piston assembly is approximately 1" below oil surface.
18. Stroke the shaft up and down slowly over about a 1" range until no air bubble rise from the damping piston. Be careful to keep the damping piston at least 1/4" below the surface of the oil during this process.
19. Bring the damping piston up until it is approximately 1/4" below the surface of the oil. Using the mallet, give 2 - 3 sharp blows to the eyelet, driving the damping piston down into the shock body. This opens the valves on the damping piston. You will see the released air bubbles come to the surface of the oil.
20. Add oil to the body tube until the surface of the oil is to the top of the threads inside the body tube.
21. Pull the damping piston up until it is just below the surface of the oil. Add more oil if necessary.
22. Hold the shaft eyelet with one hand. With other hand, slide the bearing assembly down the shaft until contact with the body is made. Oil will overflow from around the bearing (Figure 16).

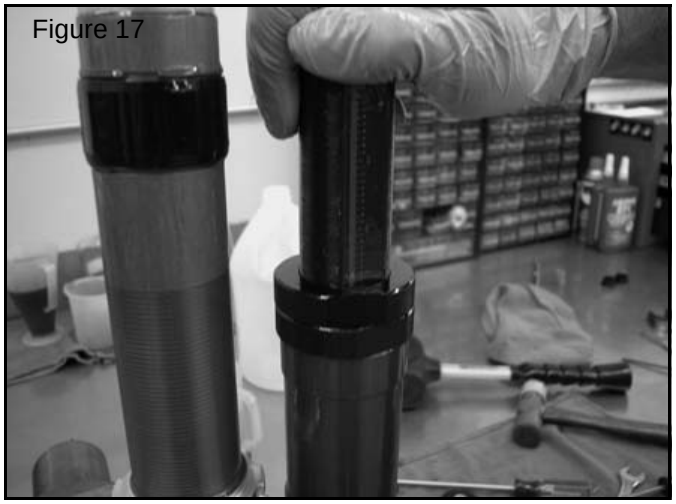
Figure 16

23. Screw the bearing assembly into the body tube by hand, holding the shaft up so that the bearing is in contact with the bottom of the damping piston assembly. Be careful not to cross-thread the bearing assembly. When the bearing will no longer thread in by hand, turn the Compression Adjuster Screw all the way counter clockwise using the flat blade screwdriver.
24. Tighten the bearing assembly using the appropriate size open end wrench.
25. Set IFP depth tool to specified length for the correct IFP depth.

Shock IFP Depth (Front & Rear):
2.50" ± .05"

26. Insert IFP depth setting tool into reservoir and engage IFP. Using a long 1/8" hex tool, remove the bleed screw from the center of the IFP. TIP: Apply grease to the end of the hex tool so that the bleed screw sticks to it. This will make it easier to remove it from the IFP.
27. Push the IFP down to the correct depth setting. As you do this, keep the open end of the IFP depth setting tool covered with your hand. Oil will stream through the bleed hole in the IFP as you push it further into the reservoir (Fig. 17).

Figure 17



28. Install IFP bleed screw and tighten using the 1/8" hex tool. Remove the IFP depth setting tool. Pour the residual oil out of the reservoir tube into a proper disposal container.
29. Install the reservoir end cap with the FOX™ air valve facing the outside of the reservoir tube. Push down on the reservoir end cap using even pressure, until the retaining ring groove is exposed. Install the wire retaining ring, and check to make sure retaining ring is seated properly.
30. Push the shaft assembly completely into the body tube (Fig. 18). It should go all the way down smoothly and without interference. If it does not, disassemble and reassemble per this procedure. Do not attempt to pull the shaft assembly back out by hand.

Figure 18

31. If reservoir cap is not properly seated against the retaining clip, tap it gently with a rubber mallet until it snaps into place. Remove shock assembly from vise.
32. Securely clamp FOX™ Nitrogen Safety Needle in the vise. Be sure to point the air valve away from your face and body.
33. Insert the safety needle squarely into center of FOX™ air valve, and pressurize the reservoir. Continue filling until the shaft has fully extended and the reservoir pressure is at 200 psi (Fig. 19).
34. Continue charging with gas as you pull the reservoir away from the FOX™ Nitrogen Safety Needle using a smooth, straight motion. Keep the reservoir as straight as possible to prevent the safety needle from bending. As the safety needle is pulled free from the FOX™ air valve, a popping sound should be heard.

Figure 19

⚠ WARNING

CHARGE THE SHOCK USING NITROGEN GAS ONLY. DO NOT FILL WITH ANY OTHER GASES. Doing so compromises the performance of the shock and may be EXTREMELY DANGEROUS!

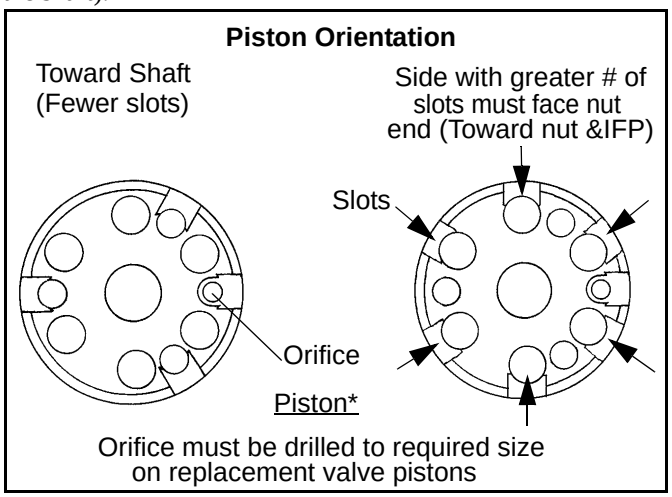
35. Install the button-head screw into the FOX™ air valve, using a 3/32" hex key.
36. Remove the shock from the vise.
37. Clean all oil residue from the shock and reservoir with solvent, and dry with compressed air in a well ventilated area. If compressed air is not available, dry the shock and reservoir using clean, lint free paper towels and let sit in a well ventilated area to allow the solvents to evaporate.
38. Reinstall the spring and the spring retainer.
39. Thread the spring preload ring down against the spring, and set the preload to the measurement you took when you removed the spring.
40. Using the flat blade screwdriver, turn the Compression Adjuster Screw all the way clockwise until it stops. Now turn it counter clockwise while counting the clicks until it matches the original setting which you wrote down during disassembly.
41. Remove the shock from the vise.
42. Reinstall spherical bearing o-rings and reducers or polyurethane bushings and sleeves.

NOTE: After installation, be sure to RIDE SLOWLY initially to ensure the shock and the vehicle's suspension is performing correctly.

FOX™ PODIUM-C SHOCK SERVICE

General Service Information

*Note direction of valve piston before disassembly. The side with the greater number of slots should face the IFP (nut end of the shaft).



FOX™ PODIUM-C Rear Shock Standard Valving

Piston Orifice = .120"

Changing oil on FOX™ Shocks is recommended annually and should be included when performing end of season storage preparation. For competition use, shocks should be disassembled, inspected and serviced more frequently.

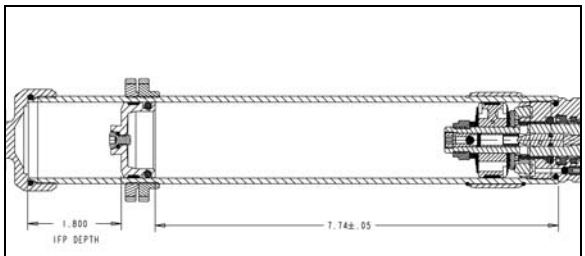
COMPRESSION (525 "IRS")

COMPRESSION VALVE STACK	FOX PART NUMBER
1.350 X .008	041-08-135-A
1.250 X .006	041-06-125-A
1.100 X .008	041-08-110-A
1.000 X .008	041-08-100-A
.950 X .008	041-08-095-A
.800 X .010	041-10-080-A
.750 X .020	041-20-750-A
1.230 X .082 TOP OUT	050-00-009-C

REBOUND (525 "IRS")

REBOUND VALVE STACK	FOX PART NUMBER
1.250 X .006	041-06-125-A
1.100 X .008	041-08-110-A
1.000 X .008	041-08-100-A
.950 X .008	041-08-095-A
.800 X .008	041-08-080-A
.700 X .010	041-10-070-A
.700 X .100 BACK-UP	050-01-001-A

FOX™ PODIUM-C Rear Shock Details (525 "IRS")



SHOCK DETAILS	
TRAVEL:	5.69
EXTENDED LENGTH:	19.75
COMPRESSED LENGTH:	14.06
IFP LOCATION:	1.80
BODY MATERIAL:	ALUMINUM
NITROGEN PRESSURE:	200 PSI

FOX™ PODIUM-C Rebuild Information

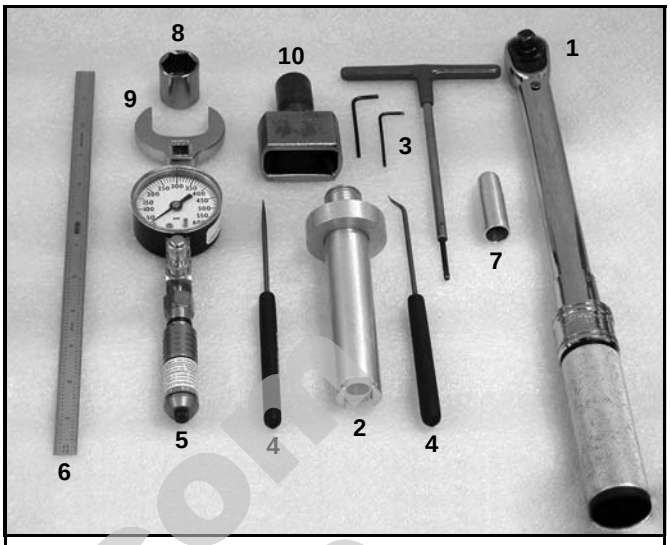
When performing maintenance on FOX™ shocks, use the Gas Shock Recharging Kit (PN 2200421), as it contains the necessary valves, pressure gauge, and fittings to deflate and pressurize shocks.

⚠ WARNING

FOX™ shocks contain high pressure nitrogen gas. Extreme caution must be used while handling and working with FOX™ shocks and related high pressure service equipment. The pressure must be released from the shock before disassembly. It is strongly recommended you wear safety glasses and ear protection during these procedures.

TIP: Extreme cleanliness is very important during all disassembly and reassembly operations. This prevents dirt or foreign particles from entering the shock which causes premature failure.

SHOCK REBUILD SERVICE TOOLS



1. **Torque Wrench**
2. **IFP Depth Set Tool** (PN 2871351) (FOX™ # 803-00-294)
3. **Hex Keys**
4. **Seal Picks**
5. **Charging Safety Needle** (PN 7052069-A) (FOX™ # 802-02-001-A)
6. **Ruler**
7. **Seal Bullet Tool** (PN 2201640), (PN 2201639) (FOX™ # 398-00-026-B)
8. **Socket**
9. **Crows Foot (1 3/8")**
10. **Body Cap Socket**

Items not shown:

Polaris Gas Shock Oil - 5 wt. (PN 2870995)
Body Clamps (PN 2871071) (FOX™ # 803-00-287)
Assembly Grease (FOX™ # 025-01-013)
Gas Shock Recharging Kit (PN 2200421)

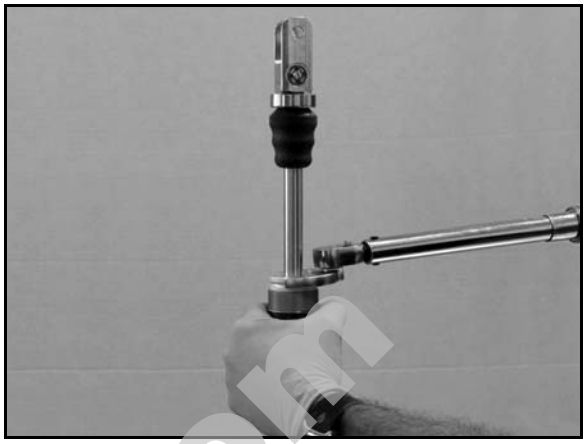
FOX™ PODIUM-C Shock Disassembly

1. Remove the bushings and steel sleeves from the eyelet.
2. Clean the entire shock and set the compression adjuster to the fully open position.
3. Use a 3/32" Hex Key to remove the button head screw from the FOX™ air valve located on the shock body.

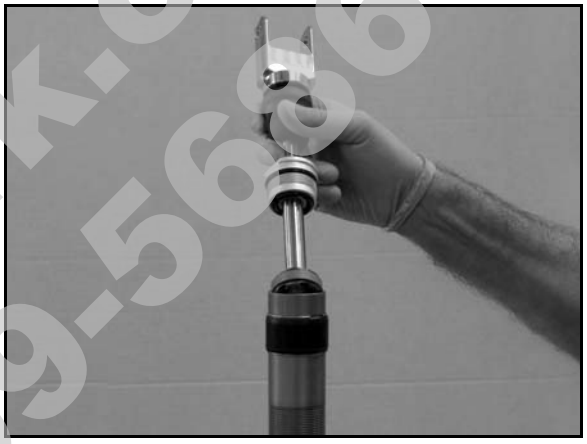
4. Securely clamp a FOX™ Nitrogen Safety Needle in the vice. Insert the safety needle squarely into the center of the gas valve discharging the nitrogen from the shock.

IMPORTANT: Ensure that all pressure has been released.

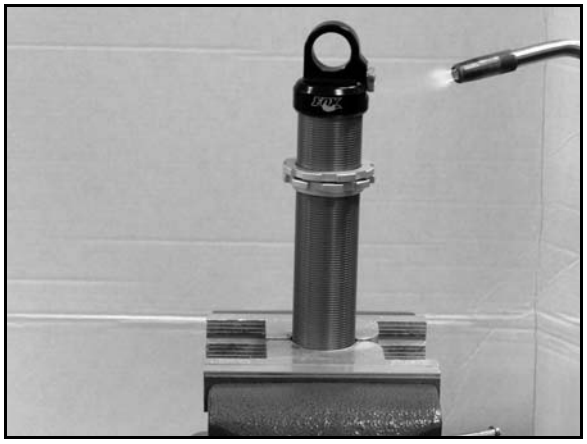
5. Inspect the FAV2 nitrogen valve for signs of wear such as holes on the face of the rubber pellet. Replace if necessary.
6. Clamp the body end eyelet of the shock securely in a soft jawed vice with the shaft side up.
7. Using a 1 3/8" wrench, loosen and unscrew the bearing assembly from the shock body.



8. Remove the shaft assembly from the body tube and place it on a clean, lint free rag or towel.

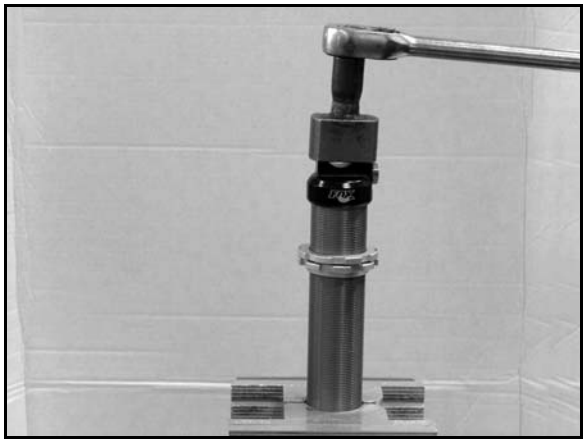


9. Dispose of the used shock oil.
10. Clamp the shock body in the vice using a set of Body Clamps making sure not to crush the shock body. Use a propane torch to lightly heat the Body Cap so that the Loctite softens.

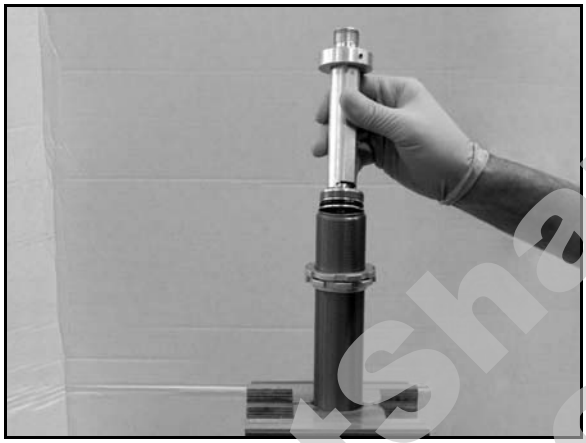


IMPORTANT: Too much heat might damage the body or body cap.

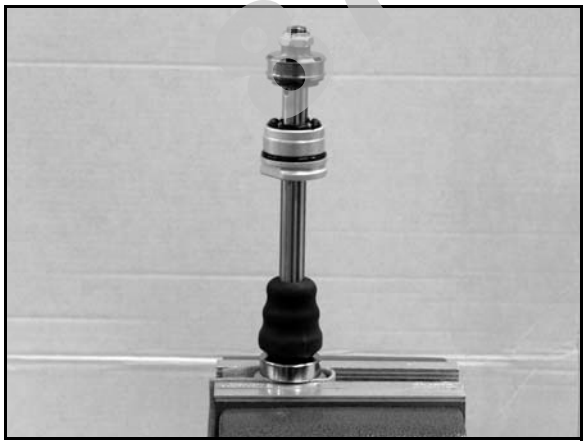
11. Use a crescent wrench or body cap socket to remove the body cap from the shock body.



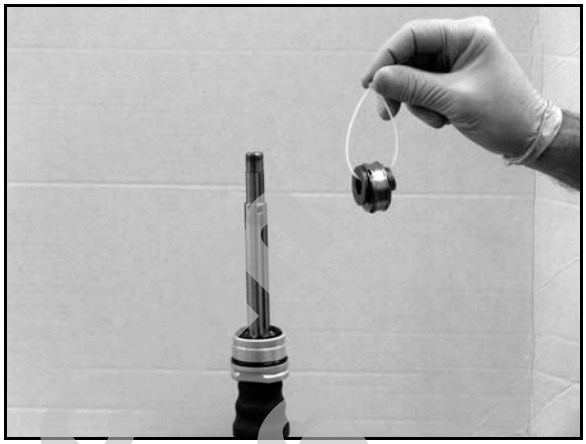
12. Pull the IFP out of the shock body using the IFP depth setting tool.



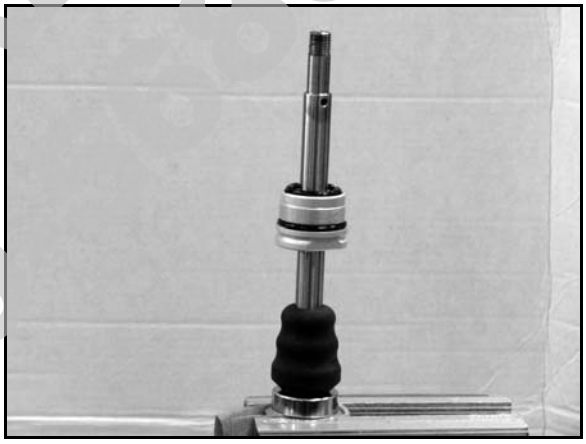
13. Remove the bleed screw from the IFP using a 1/8" T-Handle Hex Key. Discard the bleed screw O-ring, IFP O-ring and IFP band.
14. Clean and dry the IFP.
15. Remove the body assembly from the vice and clean its internals. Set aside on a clean, lint free rag.
16. Clamp the shaft clevis in the vice with the piston end up.



17. Using a 9/16" wrench, remove the piston lock nut from the end of the shaft.
18. Slide the piston assembly onto a T-Handle wrench or zip tie to preserve the shim stack / piston order. Remove and discard the step cut piston band.



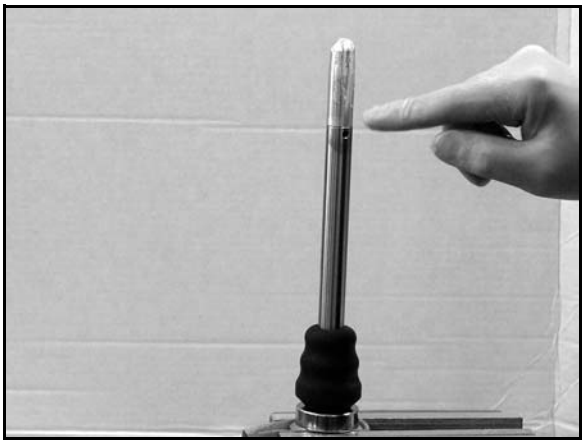
19. Slide the bearing assembly off the shaft.



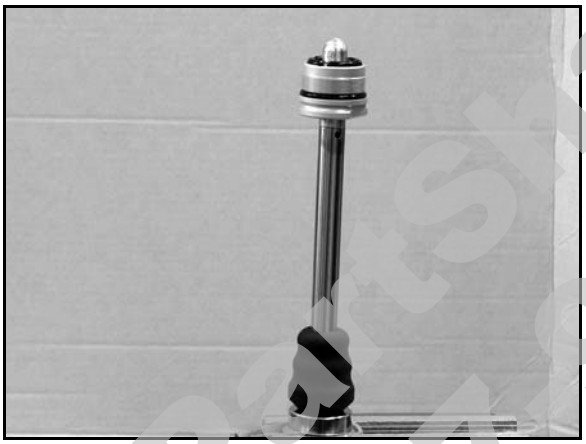
20. Remove and discard the body cap o-ring. Clean and dry the body cap.
21. Remove all seals and wipers from the bearing housing, carefully not to damage the sealing surface.
22. Check the condition of the shaft bumper, replace if necessary.
23. Proceed to "Shock Assembly" instructions.

FOX™ PODIUM-C Shock Assembly

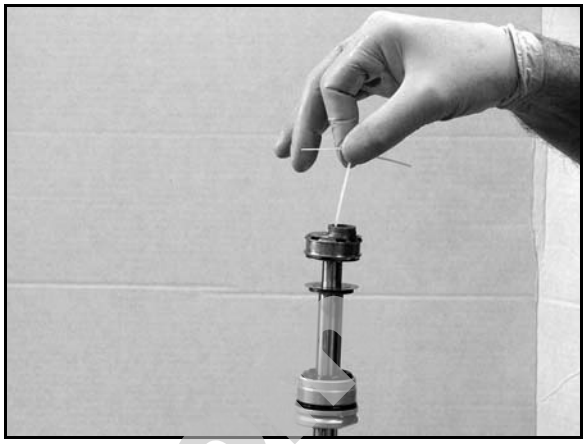
1. Install new wiper, seal and O-rings onto the bearing housing, lightly grease the new seals with FOX™ assembly grease before installing.
2. Place the shaft bullet tool onto the end of the shaft and apply FOX™ assembly grease to both the tool and shaft.



3. Slide the bearing housing over the bullet tool, onto the shaft. Once bearing is installed, remove the bullet tool.



4. Install a new piston band on the piston.
5. Install the piston and shim stack assembly onto the end of the shaft. Torque the piston lock nut to specification.



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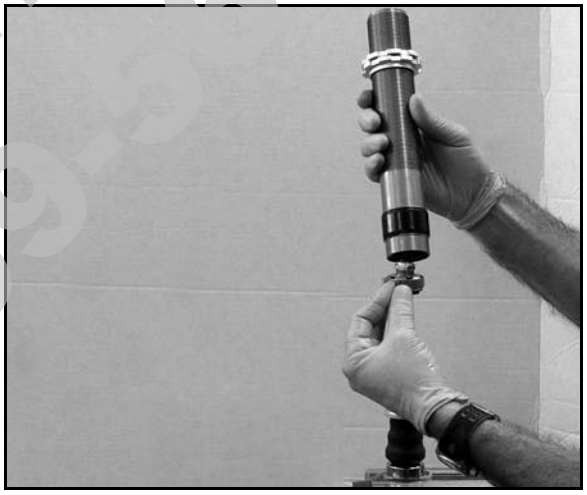
Piston Lock Nut: 22 ft. lbs. (30 Nm)

6. Slide the shock body over the piston shaft assembly, ensure that the piston band is seated correctly.



7. Thread the bearing assembly into the shock body by hand until the O-ring is seated against the body.
8. With the shaft fully extended, clamp the shock in the vice by the shaft clevis.

9. Fill the shock body with Polaris Gas Shock Oil (PN 2870995) to approximately ½ full.

=

Polaris Gas Shock Oil - 5 wt.
2870995 (Quart)
2872279 (Gallon)

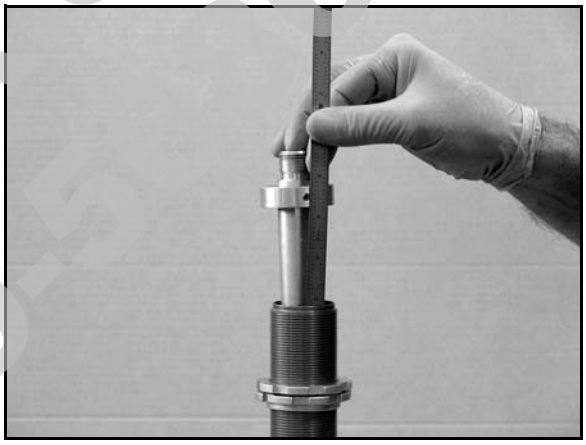
10. Slowly stroke the shock body to purge the air from the piston shim stack, allow a few minutes for the air to escape.

11. Clamp the shock by the flats of the bearing housing in the vice with the open end of the body facing up. Fully extend the shaft and add oil as needed.

12. Lube and install the IFP O-ring and piston band using the FOX™ assembly grease.

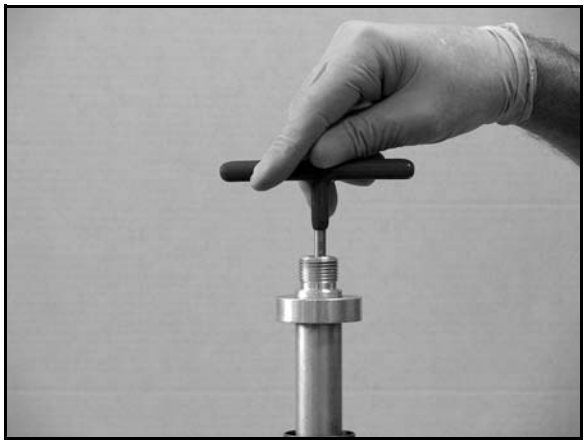
13. Insert the IFP into the shock body with the dished side facing down.

14. Using a ruler and the IFP Depth Set Tool, set the IFP depth, to 1.800" measured from the top of the body, you should feel slight resistance from the oil bleeding out from the IFP.



IFP Depth: 1.80”

15. Lube and replace the IFP bleed screw O-ring. While holding the IFP with the depth setting tool, install the IFP bleed screw using a 1/8” T-Handle Hex Wrench.



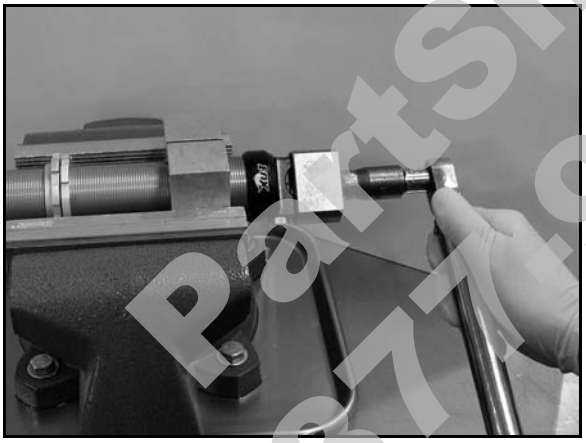
16. Discard the excess oil that remains above the IFP.

17. Lube and install the new body cap O-ring. Apply Green Loctite 638 ® to the first two threads of the shock body. Thread the body cap onto the body and hand tighten.

18. Clamp the body in the vise using the body clamps. Try to find the location on the body where the IFP is located for higher clamping resistance. Do not over tighten.

IMPORTANT: Too much clamping force could damage the body tube.

19. Using a crescent wrench or body cap socket, torque the body cap to specification.



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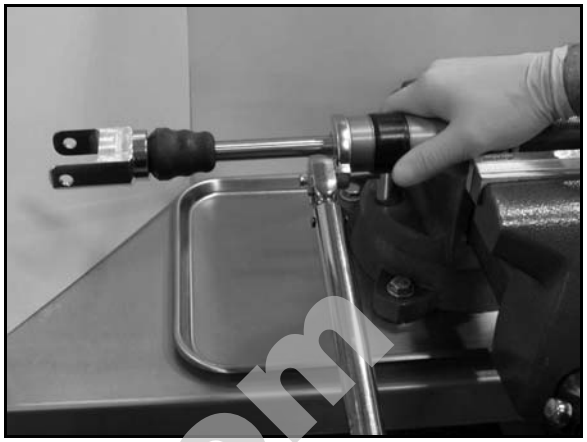
Body Cap: 75 ft. lbs. (102 Nm)

20. Using a 1 3/8" wrench, torque the bearing cap to specification.



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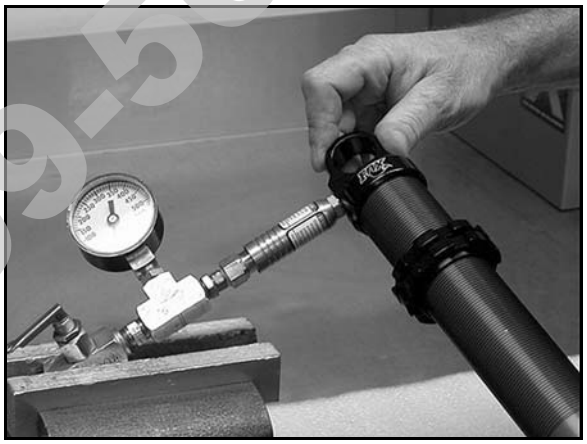
Bearing Cap: 30 ft. lbs. (41 Nm)

21. Fill the shock reservoir with nitrogen to 200 PSI by inserting the safety needle squarely into the center of the FOX™ air valve.

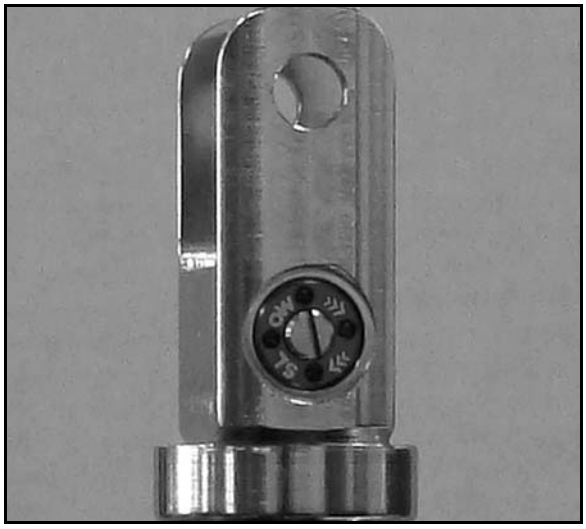


Nitrogen Pressure: 200 PSI

22. Install the button head screw into the FOX™ air valve using a 3/32” Hex Key.

23. Lube and install the bushings and steel sleeves into the clevis.

24. Set the compression adjuster to 12 clicks out from fully closed.



25. Ensure shock function before riding the vehicle.

NOTES

CHAPTER 6
BRAKES

BRAKE SPECIFICATIONS

General Specifications

FRONT BRAKE CALIPER		
Item	**Standard**	**Service Limit**
Brake Pad Thickness	.298″ / 7.6 mm	.180″ / 4.6 mm
Brake Disc Thickness	.158” / 4.013 mm	.140″ / 3.556 mm
Brake Disc Thickness Variance Between Measurements	–	.002″ / .051 mm
Brake Disc Runout	–	.010″ / .254 mm
RH Handle Bar Master Cylinder I.D.	–	.551” / 14 mm

REAR BRAKE CALIPER		
Item	**Standard**	**Service Limit**
Brake Pad Thickness	.298″ / 7.6 mm	.180″ / 4.6 mm
Brake Disc Thickness	.158” / 4.013 mm	.140″ / 3.556 mm
Brake Disc Thickness Variance Between Measurements	–	.002″ / .051 mm
Brake Disc Runout	–	.010″ / .254 mm
Master Cylinder I.D. – Aux. Rear		.500” / 12.7 mm

Torque Specifications

ITEM	TORQUE (ft. lbs. except where noted)	TORQUE (Nm)
Front Caliper Mounting Bolts	38	52
Rear Caliper Mounting Bolts	18	24
Rear Master Cylinder Mounting Bolts	8	11
Front Master Cylinder Reservoir Cover Bolts	11 (in. lbs.)	1.24
Brake Line Banjo Bolts	15	20
Brake Disc Mounting Bolts	18	24
Wheel Mounting Nuts	30-35	41-47
Front Master Cylinder Clamp Bolts	85 (in. lbs.)	9.6
Rear Caliper Bleed Screws	47 (in. lbs.)	5.3
Front Caliper Bleed Screws	47 (in. lbs.)	5.3
Front Spindle Nut	40	54
Rear Hub Nut	90	122

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

Special Tools

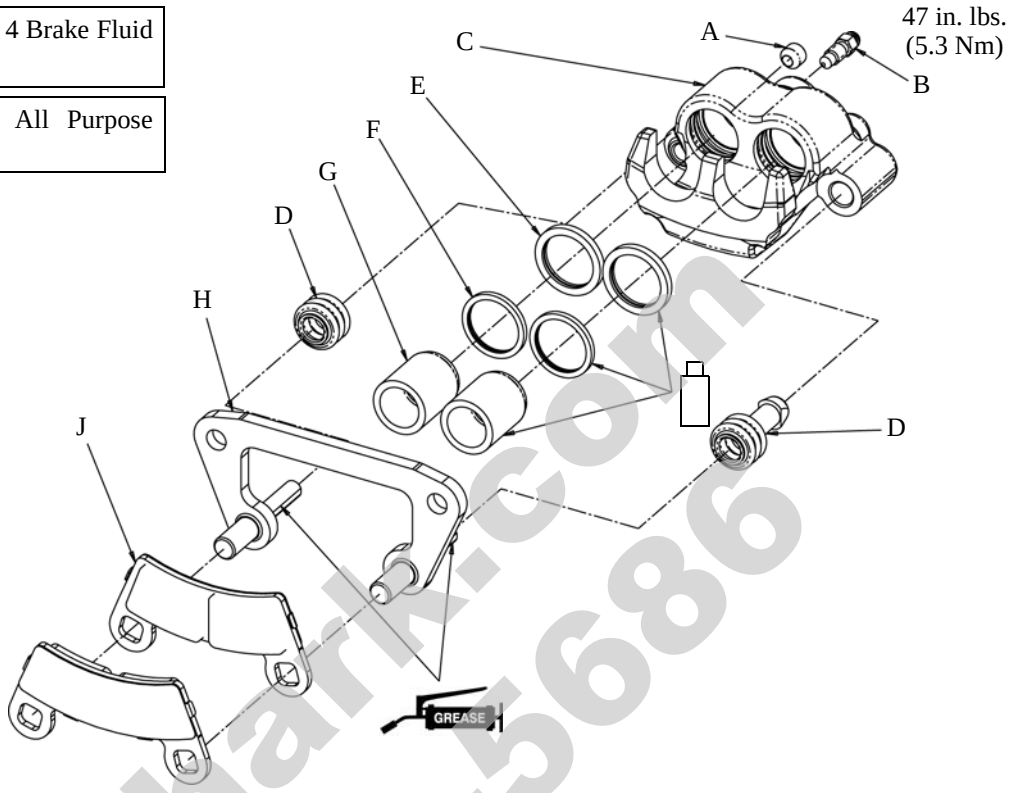
Part Number	Tool Description
2870975	Mity Vac™

BRAKE CALIPER EXPLODED VIEWS

Front Brake Caliper Assembly

Apply Polaris DOT 4 Brake Fluid to Component

Apply Polaris All Purpose Grease

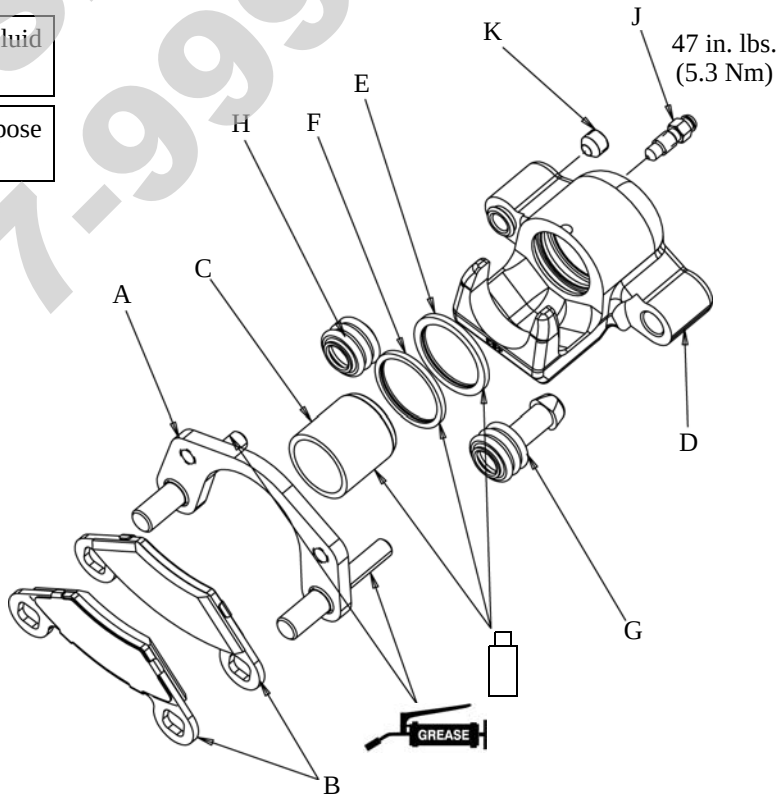


A. Adjustment Set Screw
B. Bleeder Screw
C. Caliper Assy.
D. Boot
E. Square O-ring (thick)
F. Square O-ring (thin)
G. Piston
H. Caliper Mount
J. Brake Pads

Rear Brake Caliper Assembly

Apply Polaris DOT 4 Brake Fluid to Component

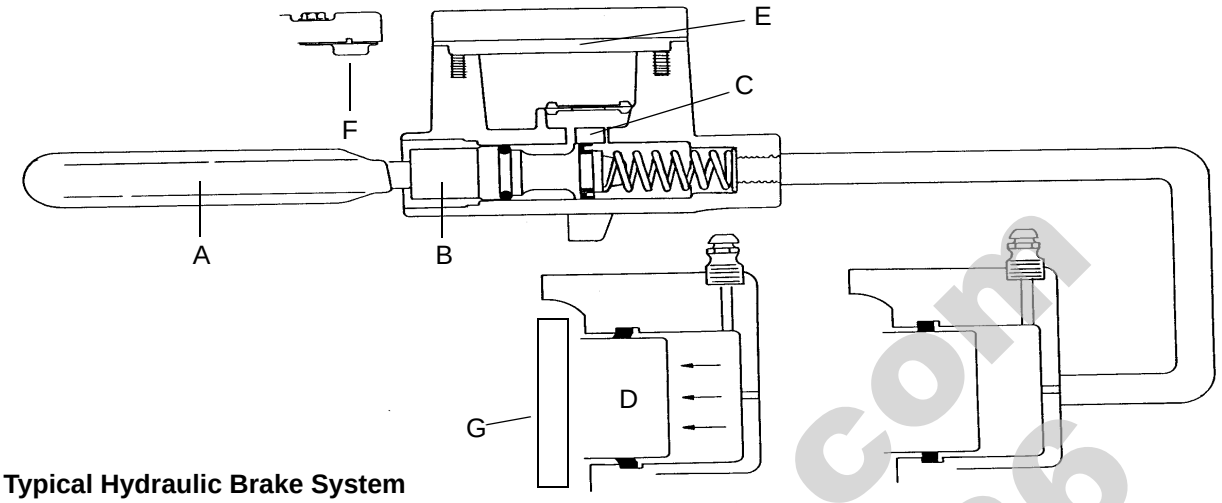
Apply Polaris All Purpose Grease



A. Caliper Mount
B. Brake Pads
C. Piston
D. Caliper Assy.
E. Square O-ring (thick)
F. Square O-ring (thin)
G. Boot, Pin Bushing
H. Boot, Pin Seal
J. Bleeder Screw
K. Adjustment Set Screw

BRAKE SYSTEM OVERVIEW

Hydraulic System Operation



Typical Hydraulic Brake System

The Polaris brake system consists of the following components or assemblies: brake lever; master cylinder; hydraulic hose; brake calipers (slave cylinder); brake pads; and brake discs, which are secured to the drive line.

When the hand activated brake lever (A) is applied it contacts a piston (B) within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port) (C) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the piston (D) located in the brake caliper moves outward and applies pressure to the moveable brake pad. This pad contacts the brake disc and moves the caliper in its floating bracket, pulling the stationary side pad into the brake disc. The resulting friction reduces brake disc and vehicle speed. As the lever pressure is increased, the braking affect is also increased.

The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper moves further outward and becomes self adjusting. Fluid from the reservoir fills the additional area created when the caliper piston moves outward.

Brake fluid level is critical to proper system operation. Too little fluid will allow air to enter the system and cause the brakes to feel spongy. Too much fluid could cause brakes to drag due to fluid expansion.

Located within the master cylinder is the compensating port (C) which is opened and closed by the master cylinder piston assembly. The port is open when the lever is released and the master cylinder piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion (heated fluid) or contraction (cooled fluid). During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for fluid expansion. Never overfill the reservoir! Fill to 1/4" – 5/16" (.64 – .80 cm) from top of the cylinder.

This system also incorporates a diaphragm (E) as part of the cover gasket; and a vent port (F) located between the gasket and the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Make sure the vent is open and allowed to function. If the reservoir is over filled or the diaphragm vent is plugged the expanding fluid may build pressure in the brake system leading to brake failure.

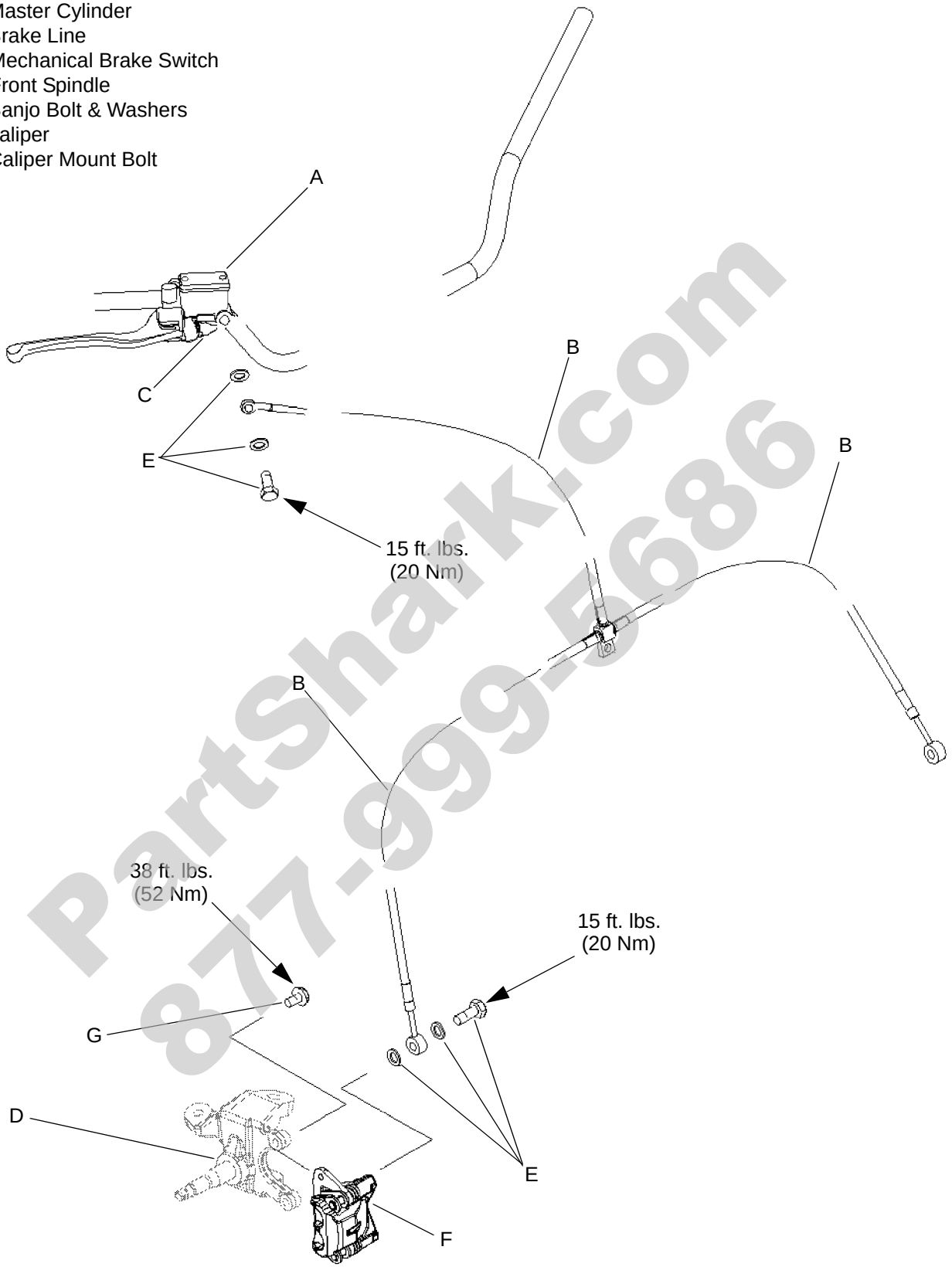
When servicing Polaris ATV brake systems use only Polaris DOT 4 Approved High Temperature Brake Fluid.

⚠ WARNING

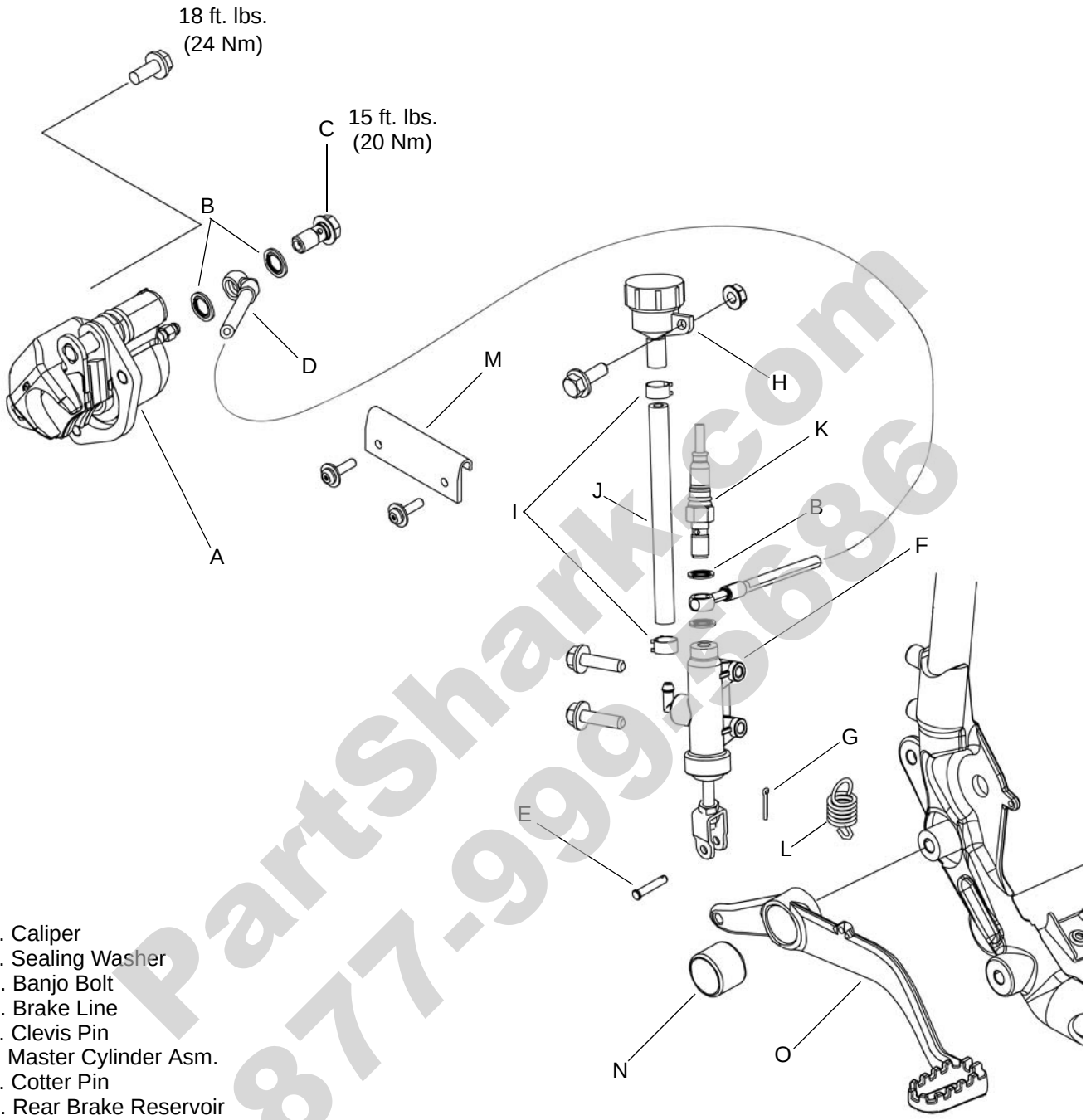
Once a bottle of brake fluid is opened, use what is necessary and discard the rest in accordance with local laws. Do not store or use a partial bottle of brake fluid. Brake fluid is hygroscopic, meaning it rapidly absorbs moisture. This causes the boiling temperature of the brake fluid to drop, which can lead to brake fade and possible loss of control.

Front Brake System - Exploded View

A. Master Cylinder
B. Brake Line
C. Mechanical Brake Switch
D. Front Spindle
E. Banjo Bolt & Washers
F. Caliper
G. Caliper Mount Bolt

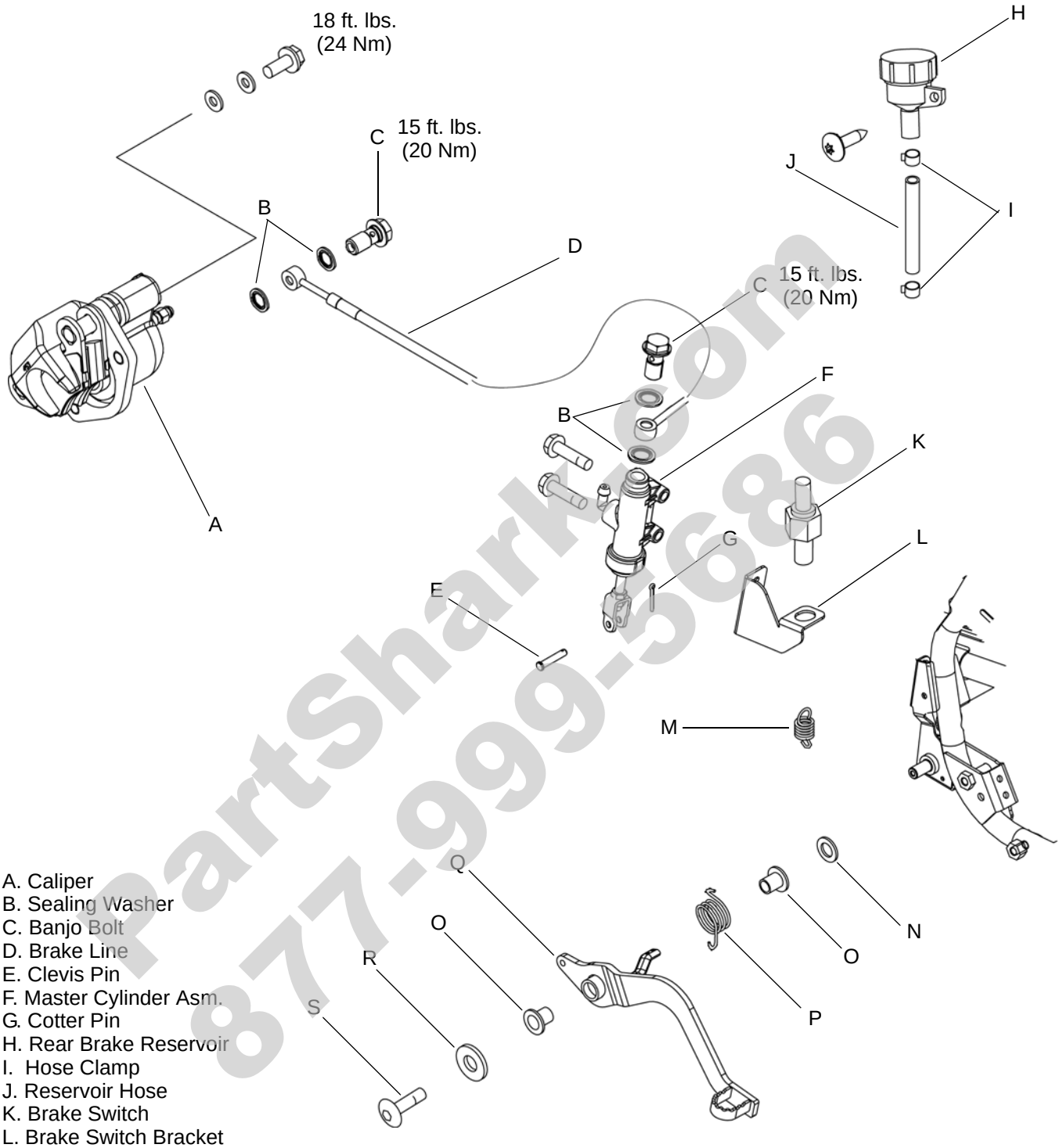


Rear Brake System ("MXR" / "S") - Exploded View



A. Caliper
B. Sealing Washer
C. Banjo Bolt
D. Brake Line
E. Clevis Pin
F. Master Cylinder Asm.
G. Cotter Pin
H. Rear Brake Reservoir
I. Hose Clamp
J. Reservoir Hose
K. Brake Pressure Switch
L. Brake Pedal Spring
M. Brake Line Retainer
N. Bushing
O. Foot Brake Pedal

Rear Brake System (“IRS”) - Exploded View



A. Caliper
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H. Rear Brake Reservoir
I. Hose Clamp
J. Reservoir Hose
K. Brake Switch
L. Brake Switch Bracket
M. Switch Spring
N. Washer
O. Bushing
P. Torsion Spring
Q. Foot Brake Pedal
R. Large Washer
S. Screw

Service Notes

Disc brake systems are light weight, low maintenance, and perform well in the conditions ATVs routinely encounter. There are a few things to remember when replacing disc brake pads or performing brake system service to ensure proper system function and maximum pad service life.

- Optional pads are available to suit conditions in your area. Select a pad to fit riding style and environment
- Do not over-fill the master cylinder fluid reservoirs.
- Make sure the brake levers return freely and completely.
- Check and adjust master cylinder reservoir fluid levels after pad service.
- Make sure atmospheric vent on reservoirs are unobstructed.
- Test for brake drag after any brake system service and investigate cause if brake drag is evident.
- Make sure caliper moves freely on guide pins.
- Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.
- Perform a brake burnishing procedure after installing new pads to maximize service life.

⚠ CAUTION

Use only DOT 4 brake fluid as an assembly aid for all procedures described in this chapter to prevent brake system contamination.
DO NOT USE LUBRICANTS OF ANY KIND FOR ASSEMBLY.

Brake Noise Troubleshooting

Dirt or dust buildup on the brake pads and disc is the most common cause of brake noise (squeal caused by vibration). If cleaning does not reduce the occurrence of brake noise, check the backing of each pad for worn spots allowing metal to metal contact. See table below:

Brake Noise Troubleshooting	
Possible Cause	**Remedy**
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with a non–flammable aerosol brake cleaner only! Remove pads and/or disc hub to clean imbedded material from disc or pads.
Pad(s) dragging on disc (noise or premature pad wear) Improper adjustment Insufficient lever or pedal clearance Master cylinder reservoir overfilled Master cylinder compensating port restricted Master cylinder piston not returning completely Caliper piston(s) not returning Operator error (riding the brake / park brake applied)	 Adjust pad stop (front calipers) Check position of controls & switches Set to proper level Clean compensating port Inspect. Repair as necessary Clean piston(s) seal Educate operator
Loose wheel hub or bearings	Check wheel and hub for abnormal movement
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary
Noise is from other source (chain, axle, hub, disc or wheel)	If noise does not change when brake is applied check other sources. Inspect and repair as necessary
Wrong pad for conditions	Change to a softer or harder pad

Brake Fluid Replacement and Bleeding Procedure

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

> **⚠ CAUTION**
>
> Always wear safety glasses during these procedures.

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

NOTE: This procedure should be used to change fluid or bleed brakes during regular maintenance.

Front Brake Caliper Bleeding

1. Clean reservoir cover thoroughly.
2. Remove screws, cover, and diaphragm from master cylinder reservoir.

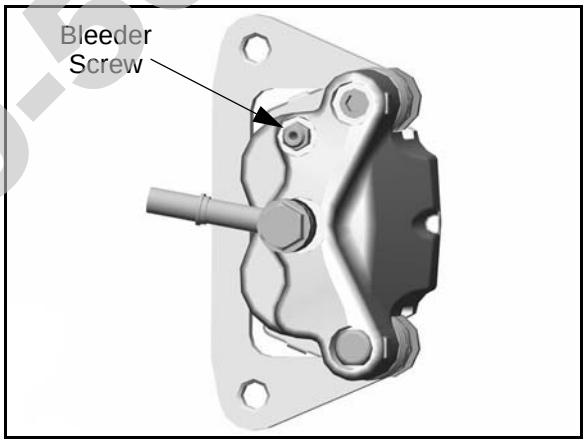
3. Inspect vent slots in the cover and remove any debris or blockage.
4. If changing fluid, remove old fluid from reservoir with a Mity Vac™ (PN 2870975) or similar tool.

NOTE: Do not move brake lever when reservoir fluid level is low.

5. Add brake fluid to the upper level mark on reservoir.

Polaris DOT 4 Brake Fluid

6. Begin bleeding procedure with either front caliper. Install a box end wrench on the caliper bleeder screw. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.



NOTE: Fluid may be forced from compensation port when brake lever is pumped. Place diaphragm in reservoir to prevent spills. Do not install cover.

7. Slowly pump brake lever until pressure builds and holds.
8. While maintaining lever pressure, open bleeder screw. Close bleeder screw and release brake lever.

NOTE: Do not release lever before bleeder screw is tight or air may be drawn into caliper.

9. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

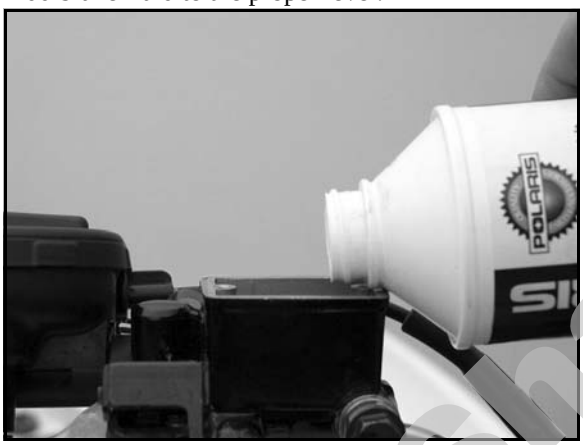
⚠ CAUTION

Maintain at least 1/2" (1.27 cm) of brake fluid in the reservoir to prevent air from entering the master cylinder.

10. Tighten bleeder screw securely and remove bleeder hose. Torque bleeder screw to 47 in. lbs. (5.3 Nm).

11. Repeat Steps 5-10 for the remaining front caliper.

12. Add brake fluid to the proper level.



Master Cylinder Fluid Level:

Add to MAX level inside reservoir. Sight glass must look dark, if sight glass is clear, fluid level is too low

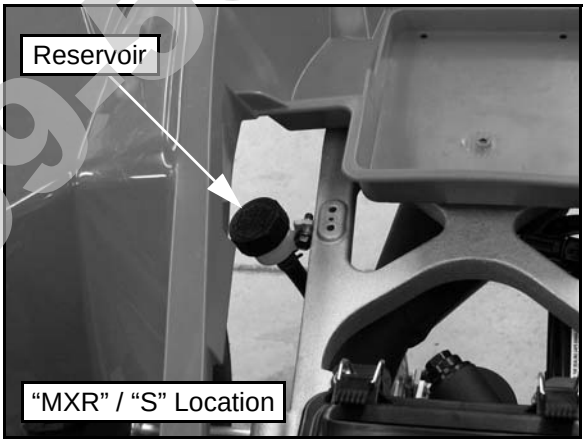
13. Install diaphragm, cover, and screws. Torque the screws to 11 in. lbs. (1.2 Nm).

Reservoir Cover Torque

11 in. lbs. (1.2 Nm)

Rear Brake Caliper Bleeding

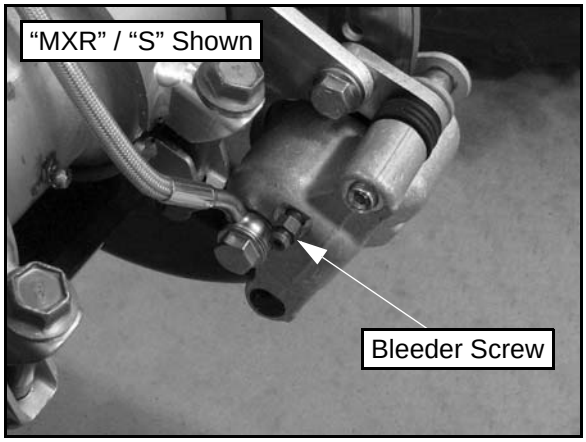
1. Remove the seat.
2. Clean rear brake fluid reservoir cover thoroughly.
3. Remove the cap and diaphragm from the reservoir.



4. If changing fluid, remove old fluid from reservoir with a Mity Vac™ (PN 2870975) or similar tool.
5. Using a funnel, add brake fluid to the MAX level mark on reservoir.

Polaris DOT 4 Brake Fluid

6. Install a box end wrench on the bleeder screw. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.



7. Slowly pump foot brake lever until pressure builds and holds.

8. While maintaining lever pressure, open bleeder screw. Close bleeder screw and release brake lever.

NOTE: Do not release lever before bleeder screw is tight or air may be drawn into caliper.

9. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

10. Tighten bleeder screw securely and remove bleeder hose. Torque bleeder screw to 47 in. lbs. (5.3 Nm).

11. Using a funnel, add brake fluid to the MAX level mark on reservoir.

Rear Reservoir Fuild Level:

Add to MAX level shown on the outside of the rear reservoir.

12. Field test machine at low speed before putting into service. Check for proper braking action and lever reserve. With lever firmly applied, lever reserve should be no less than 1/2" (1.3 cm) from handlebar.

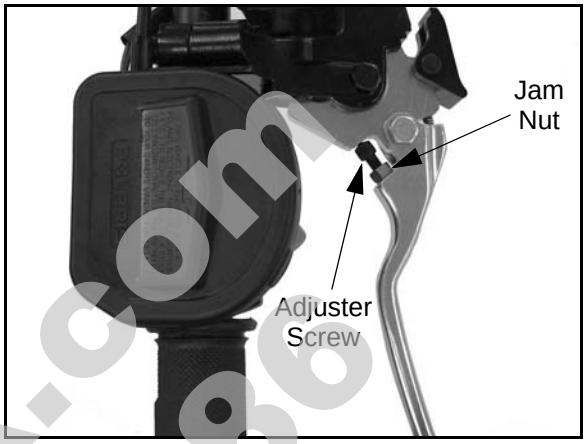
13. Check brake system for fluid leaks and inspect all hoses and lines for wear or abrasion. Replace hose if wear or abrasion is found.

FRONT MASTER CYLINDER

Brake Lever Position Adjustment

Brake lever position can be changed to fit the operator's hand.

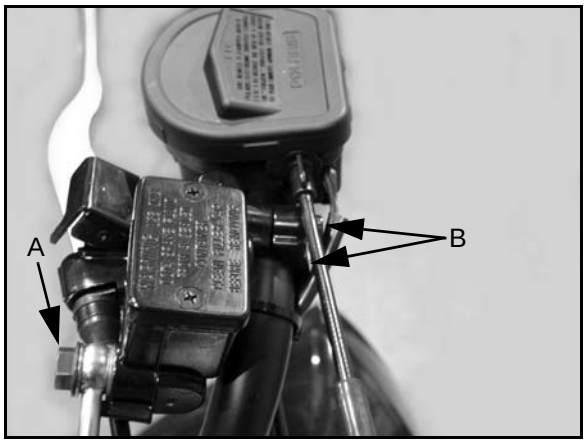
Loosen the jam nut and turn the adjuster screw in to move the lever closer to the handlebar. Turn the adjuster screw out to move the lever away from the handlebar.



Removal

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

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

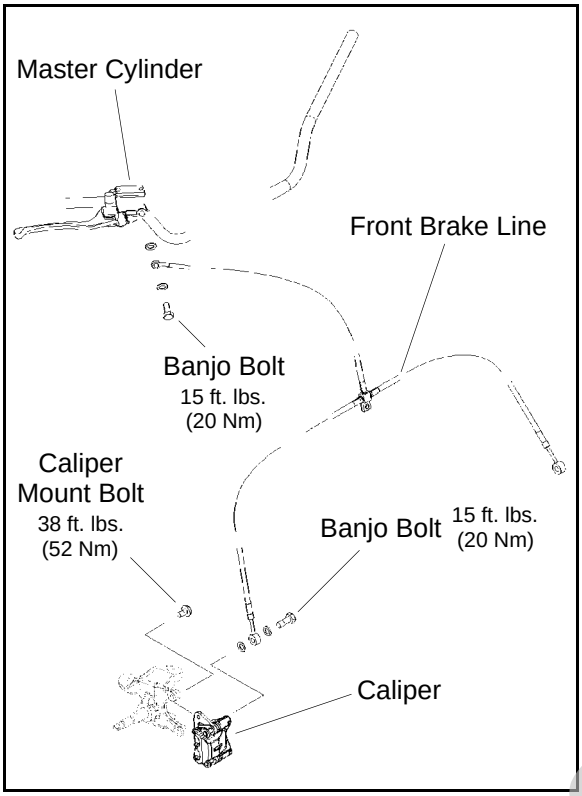


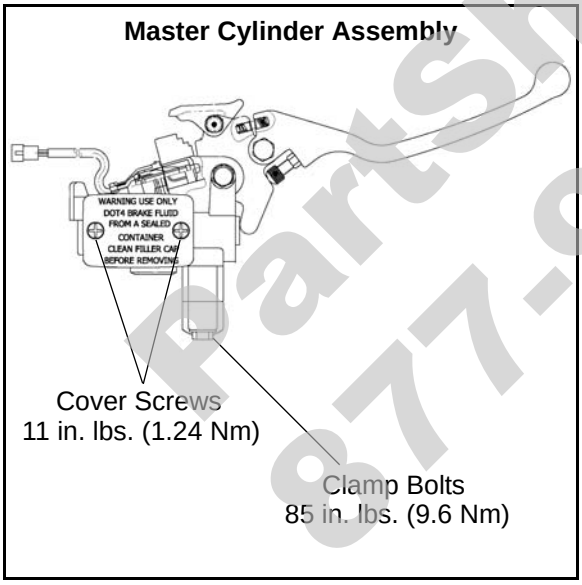
⚠ CAUTION

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

3. Loosen the master cylinder clamp bolts (B) on the handlebar side of the master cylinder.

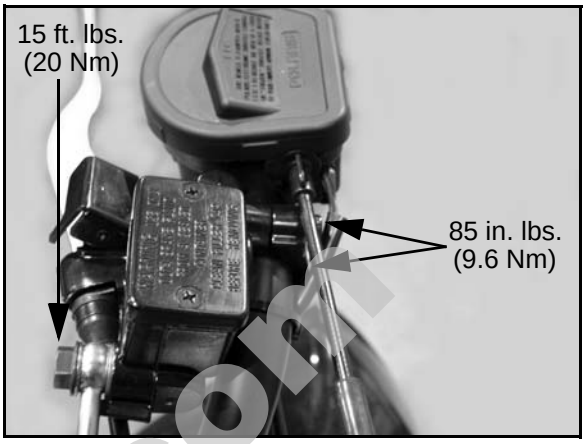
4. Remove master cylinder from handlebars.





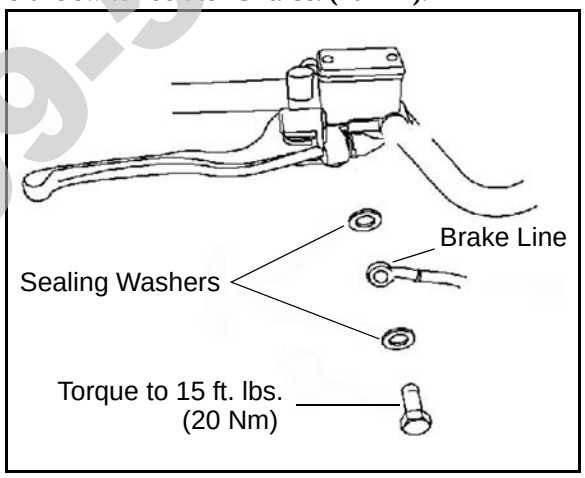
Installation

1. Install master cylinder on handlebars. Torque mounting bolts to **85 in. lbs. (9.6 Nm)**. Torque the top bolt first.



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

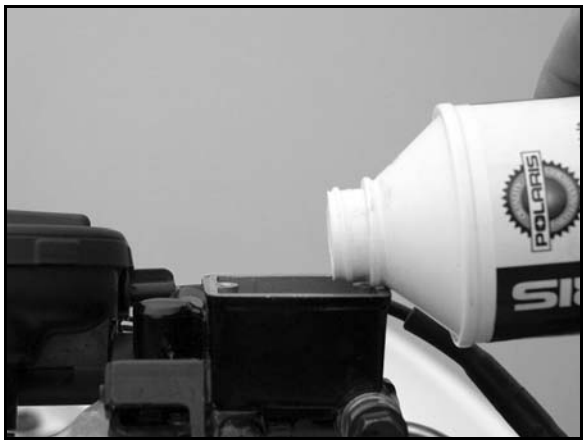
2. Place new sealing washers on each side of banjo brake line. Install the brake line into the master cylinder. Torque the brake switch bolt to **15 ft.lbs. (20 Nm)**.



Master Cylinder Mounting Clamp Bolt Torque:
85 in. lbs. (9.6 Nm)

Banjo Bolt Torque:
15 ft. lbs. (20 Nm)

3. Fill reservoir with DOT 4 Brake Fluid.



Polaris DOT 4 Brake Fluid

4. Follow bleeding procedure. Check all connections for leaks and repair if necessary.

FRONT CALIPER SERVICE

Caliper Removal and Disassembly

1. Clean caliper area before removal.

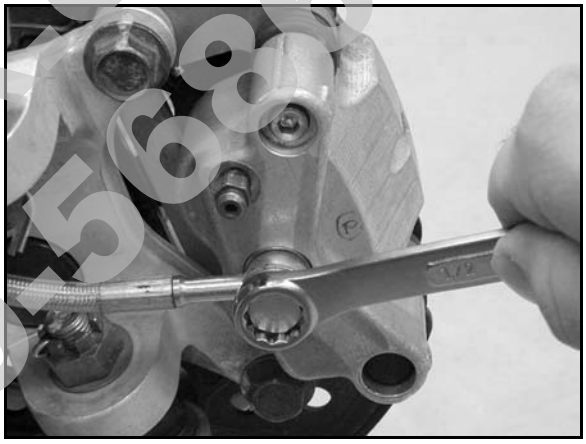
2. Elevate and support front of machine. Remove the front wheel.

⚠ CAUTION

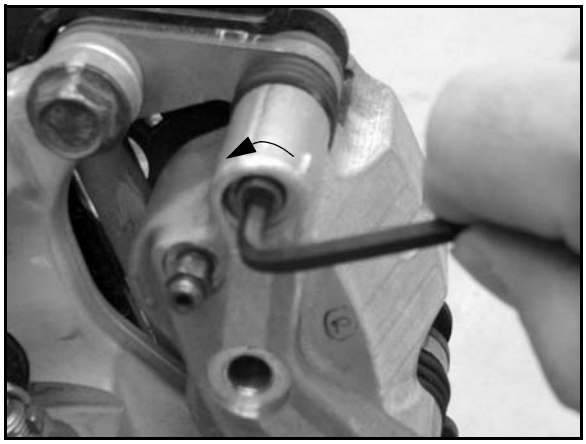
Use care when supporting vehicle so that it does not tip or fall.
Severe injury may occur if machine tips or falls.

3. Place a suitable container under caliper to catch brake fluid draining from brake line.

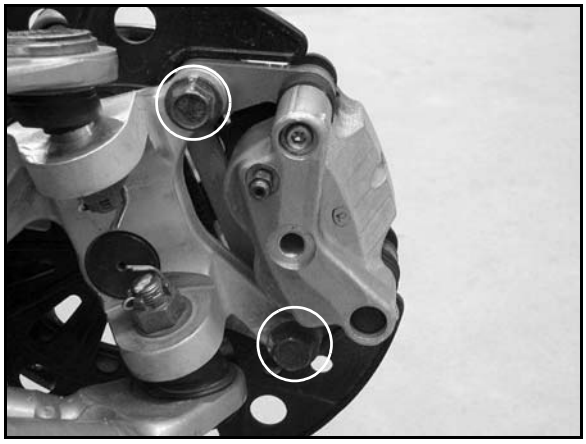
4. Using a wrench, loosen and remove brake line from caliper.



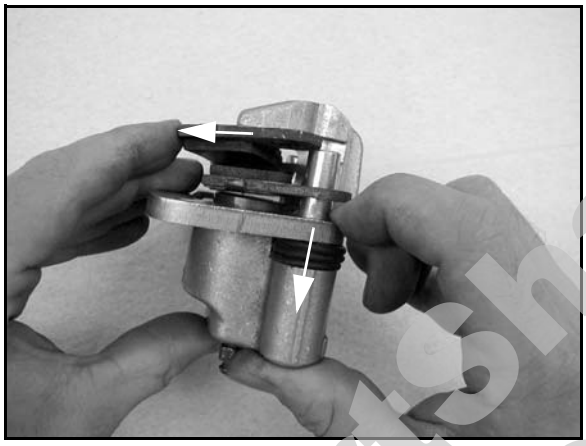
5. Loosen pad adjuster screw 2-3 turns.



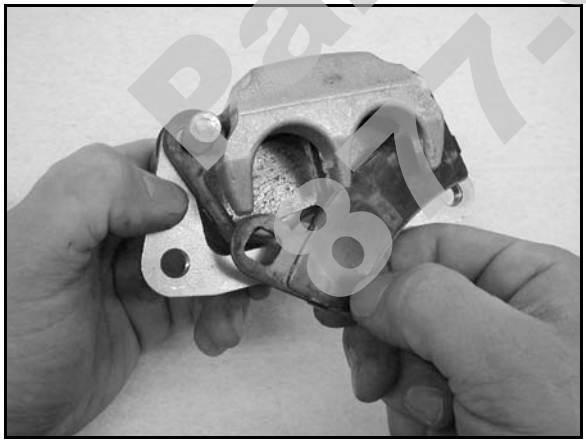
6. Remove the upper and lower caliper mounting bolts and remove the caliper assembly from the caliper mount.



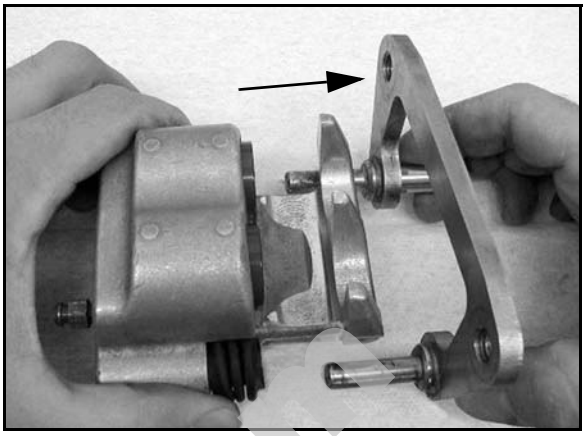
7. Push brake pad retainer pin inward and slip brake pads past the edge.



8. Remove both brake pads from the caliper.



9. Remove mounting bracket, pin assembly and dust boot.



10. Thoroughly clean the brake caliper before disassembly and prepare a clean work area to disassemble the caliper.

11. Use low pressure, compressed air to remove the pistons from the caliper.

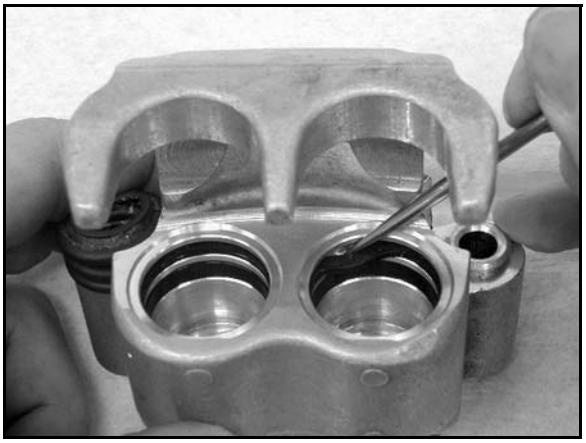
CAUTION

Use caution and always wear safety glasses when working with compressed air.

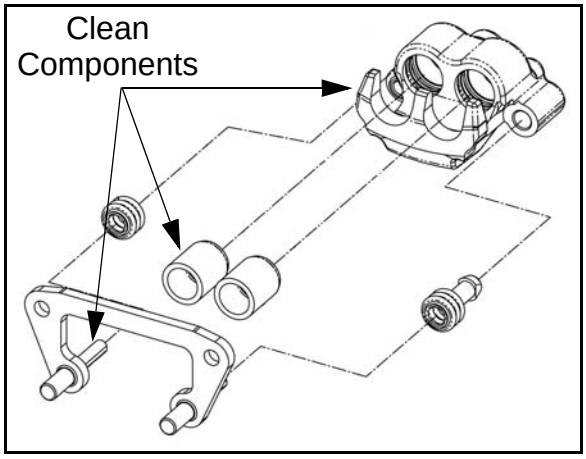
12. While holding the caliper and covering the pistons with a shop towel, carefully apply compressed air to the brake line inlet to force the pistons out from the caliper.

IMPORTANT: Do not remove the caliper pistons with a pliers. The piston sealing surfaces will become damaged if a pliers is used.

13. Once the pistons are removed, use a pick to carefully remove the square O-rings from the caliper. O-rings should be replaced during caliper service.



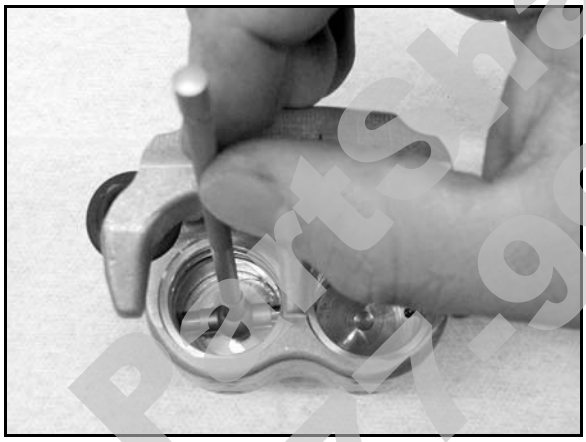
14. Clean the caliper body, piston, and retaining bracket with brake cleaner or alcohol.



NOTE: Be sure to clean seal grooves in caliper body.

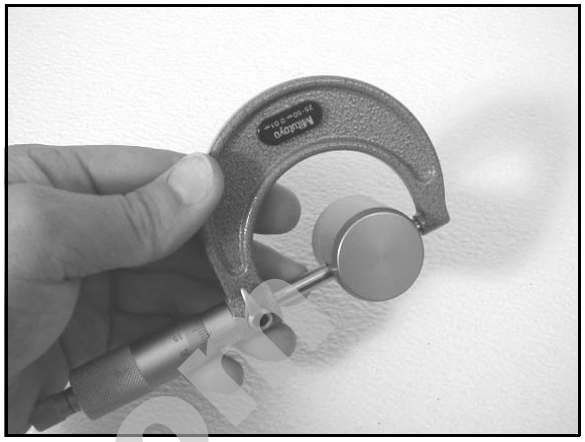
Caliper Inspection

1. Inspect caliper body for nicks, scratches, pitting or wear. Measure bore size and compare to specifications. Replace if damaged or worn beyond service limit.



= In. / mm.
Caliper Piston Bore I.D.: Std: 1.004” (25.5 mm) Service Limit: 1.006” (25.55 mm)

2. Inspect piston for nicks, scratches, pitting or wear. Measure piston diameter and replace if damaged or worn beyond service limit.

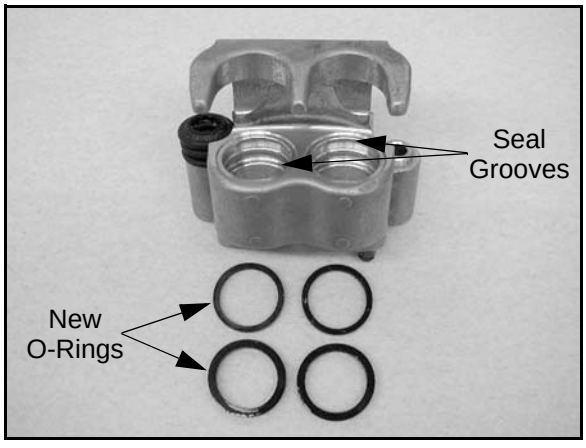


= In. / mm.
Caliper Piston O.D.: Std: 1.002” (25.45 mm) Service Limit: 1.000” (25.4 mm)

3. Inspect the brake disc and pads as outlined for brake pad replacement in this section. See “Brake Pad Inspection” earlier in this chapter.

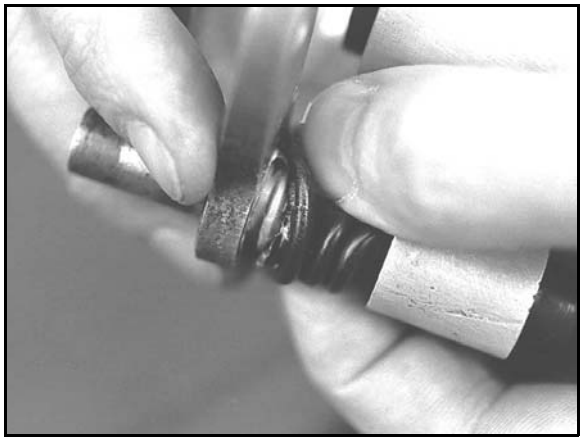
Caliper Assembly

1. Install new O-rings in the caliper body. Be sure the grooves are clean and free of residue or brakes may drag upon assembly.



2. Coat pistons with clean Polaris DOT 4 Brake Fluid. Install pistons with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly, with light resistance.

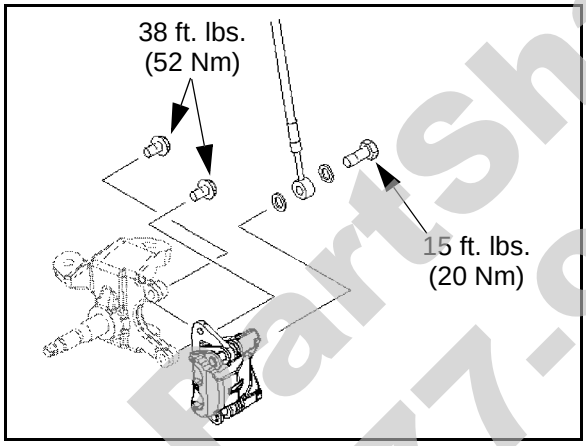
3. Lubricate the mounting bracket pins with Polaris Premium All Season Grease (**PN 2871423**), and install the rubber dust seal boots.



4. Compress the mounting bracket and make sure the dust seal boots are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.

Caliper Installation

1. Install caliper and torque mounting bolts.



2. Install brake line and tighten securely with a line wrench. Torque the banjo brake lines to the proper torque specification.

3. Install the adjuster screw and turn until stationary pad contacts disc, then back off 1/2 turn.

4. Perform brake bleeding procedure as outlined earlier in this chapter.

5. Install wheels and torque wheel nuts to specification.

FRONT BRAKE PADS

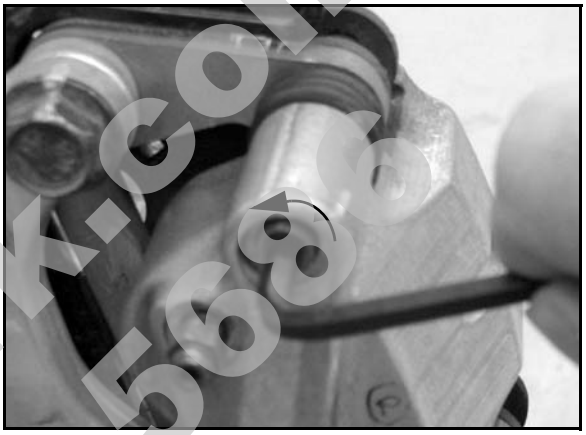
Pad Removal

1. Elevate and support front of ATV.

⚠ CAUTION

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

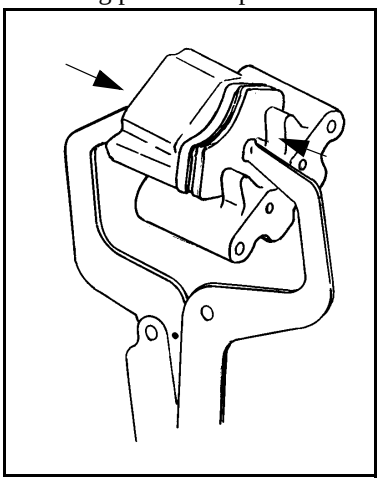
2. Remove the front wheel. Loosen pad adjuster screw 2-3 turns.



3. Remove the upper and lower caliper mounting bolts and remove the caliper from the steering knuckle.

NOTE: When removing caliper, use care not to damage brake line. Support caliper so to avoid kinking or bending brake line.

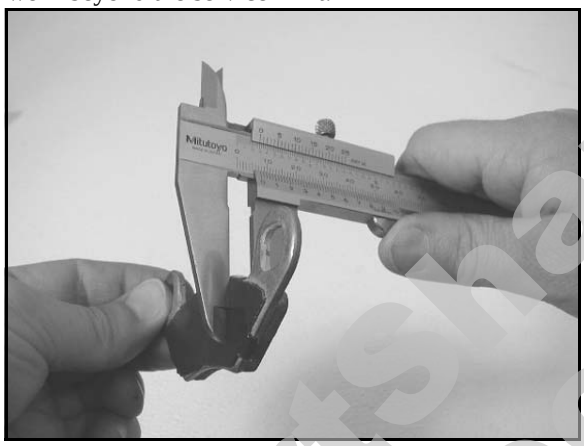
4. Push caliper piston into caliper bore slowly using a C-clamp or locking pliers with pads installed.

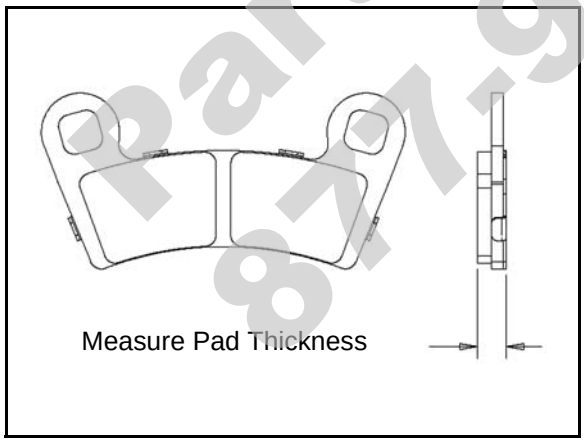


NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

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

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

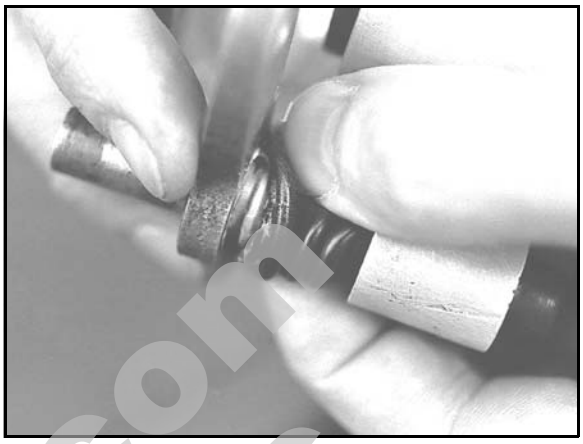




Front Brake Pad Thickness
New : .298”/ 7.6 mm
Service Limit: .180” / 4.6 mm

Pad Assembly

1. Lubricate mounting bracket pins with a light film of Polaris Premium All Season Grease (**PN 2871423**), and install rubber dust boots.

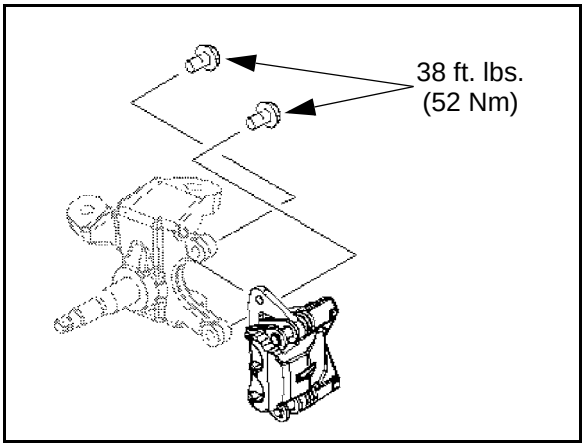


2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.

⚠ WARNING

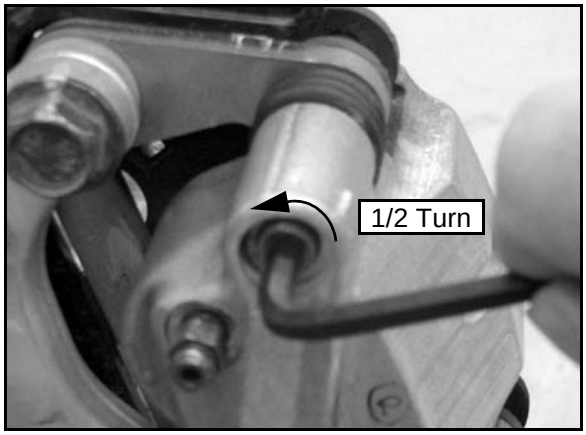
If brake pads are contaminated with grease, oil, or liquid soaked do not use the pads. Use only new, clean pads.

3. Install caliper onto steering knuckle and torque mounting bolts.



4. Slowly pump the brake lever until pressure has been built up. Maintain at least 1/2, (12.7 mm) of brake fluid in the reservoir to prevent air from entering the brake system.

5. Install the adjuster screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn (counterclockwise).



6. Verify fluid level in reservoir is up to MAX line inside reservoir and install reservoir cap.

7. Install wheels and torque wheel nuts.

NOTE: Refer to Torque Table at beginning of chapter for the front wheel nut torque.

Brake Burnishing Procedure

It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

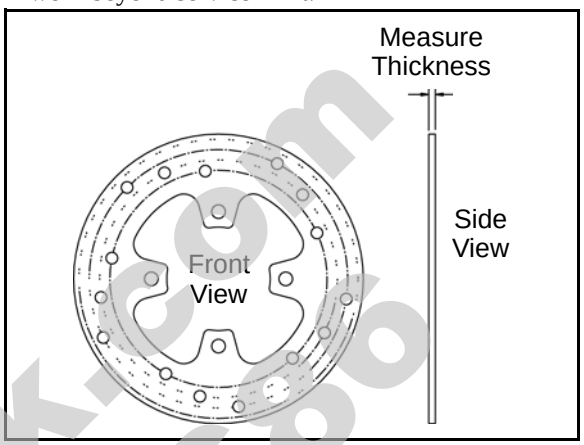
Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times.

FRONT BRAKE DISC

Disc Inspection

1. Visually inspect the brake disc for scoring, scratches, or gouges. Replace the disc if any deep gouges are evident.

2. Measure the disc thickness at 8 different points around the pad contact surface using a 0–1" micrometer. Replace disc if worn beyond service limit.



Brake Disc Thickness
New: .158" (4.013 mm)
Service Limit: .140" (3.556 mm)

Brake Disc Thickness Variance
Service Limit: .002" (.051 mm)
(difference between measurements)

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

Brake Disc Runout
Service Limit .010" (.254 mm)

Disc Removal / Replacement

1. Remove the front wheel and front brake caliper (see "FRONT BRAKE PADS - Pad Removal").

2. Remove the wheel hub cotter pin, castle nut, and washer.

3. Remove the wheel hub assembly from the spindle.

4. Apply heat to the hub in the area of the brake disc mounting bolts to soften the bolt locking agent.

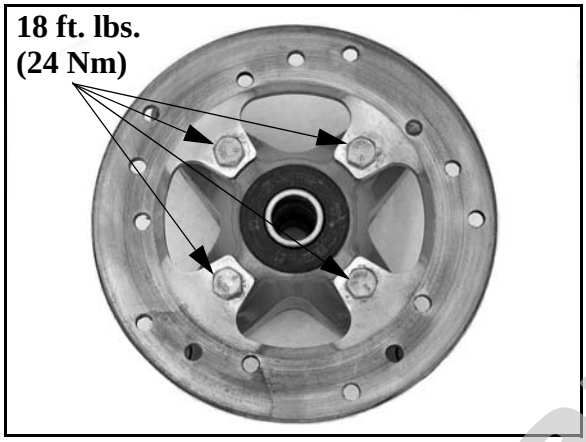
5. Remove bolts and disc.

6. Clean the wheel hub mating surface of disc and hub.

7. Install new disc on hub.

> **⚠ CAUTION**
>
> Always use new brake disc mounting bolts. The bolts have a pre–applied locking agent which is destroyed upon removal.

8. Install new bolts and tighten to specified torque.



Front Brake Disc Mounting Bolt Torque

18 ft. lbs. (24 Nm)

9. Install wheel hub assembly, washer and castle nut. Torque the front hub castle nut to 40 ft. lbs. (54 Nm) and install a new cotter pin.

10. Install the front brake caliper and front wheel (see "FRONT BRAKE PADS - Pad Assembly").

11. Field test the ATV for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever is released. If the brake drags, re-check assembly and installation.

REAR CALIPER SERVICE

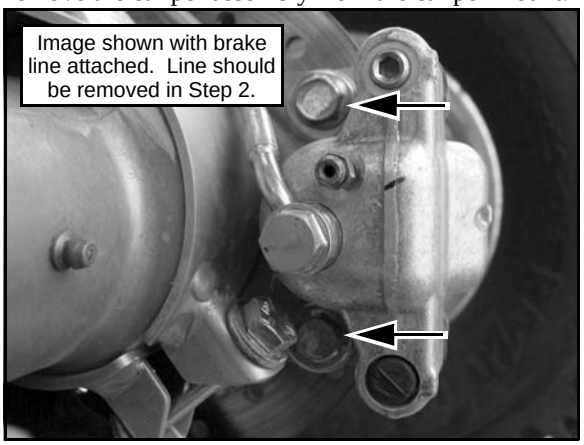
Caliper Removal ("MXR" / "S")

1. Clean caliper area before removal.

2. Using a line wrench, loosen and remove brake line to caliper. Place a container under caliper to catch fluid draining from brake line.

3. Loosen pad adjuster screw 2-3 turns.

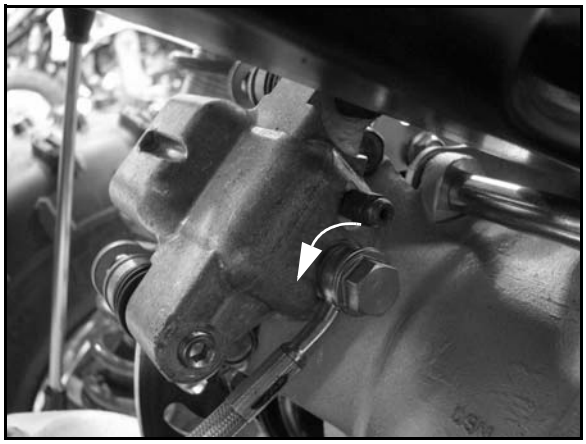
4. Remove the upper and lower caliper mounting bolts and remove the caliper assembly from the caliper mount.



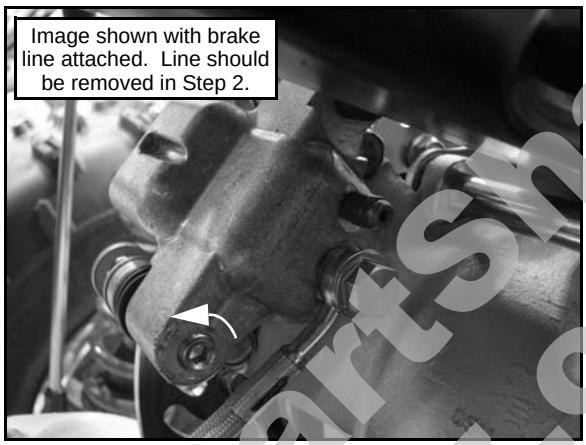
Caliper Removal ("IRS")

1. Clean caliper area before removal.

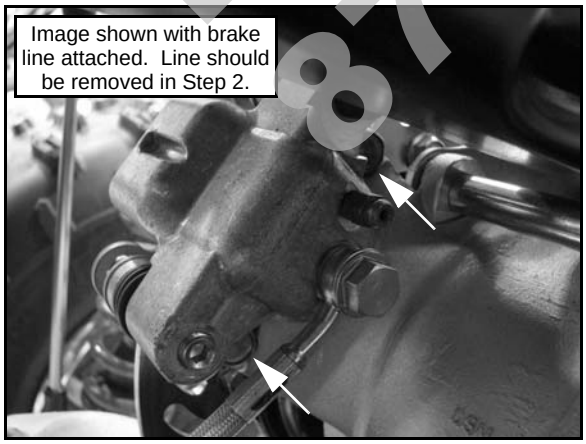
2. Using a line wrench, loosen and remove the brake line. Place a container to catch brake fluid draining from brake line.



3. Loosen pad adjuster screw 2-3 turns.

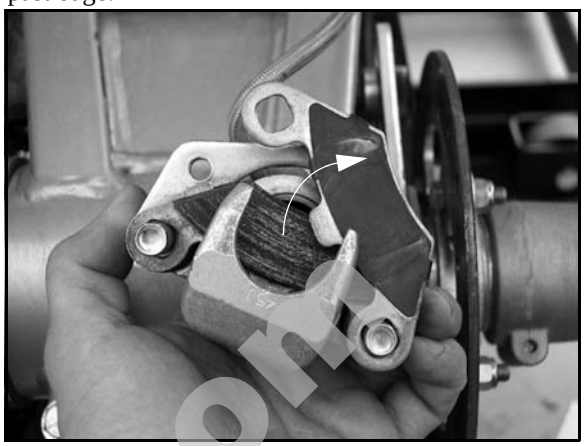


4. Remove the upper and lower caliper mounting bolts and remove the caliper assembly from the rear housing mount.

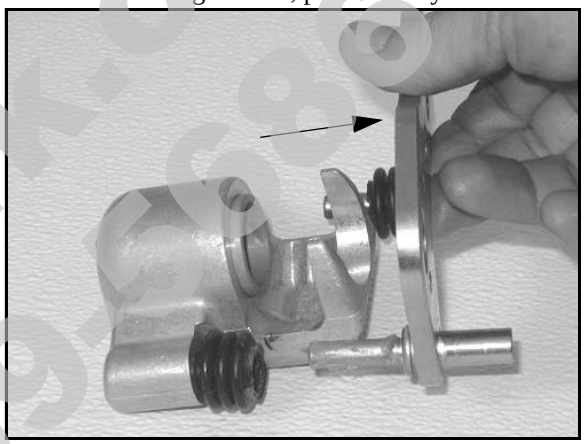


Caliper Disassembly

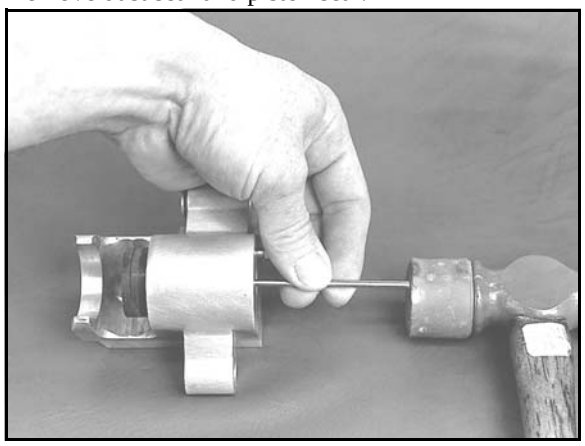
1. Push upper pad retainer pin inward and slip brake pads past edge.



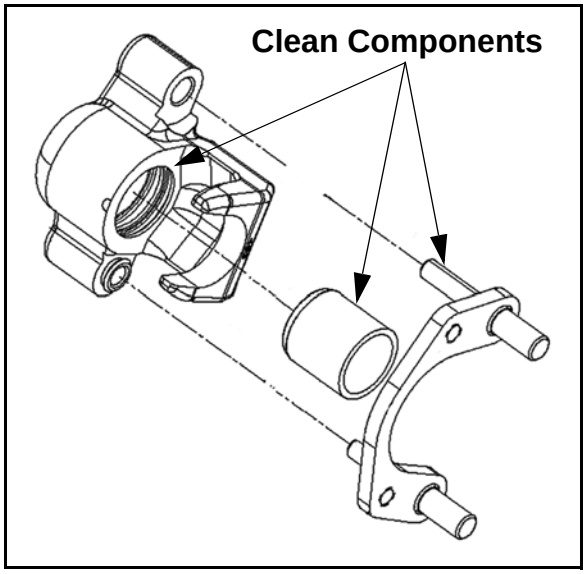
2. Remove mounting bracket, pin assembly and dust boot.



3. Remove dust seal and piston seal.



4. Clean the caliper body, piston, and retaining bracket with brake cleaner or alcohol.



NOTE: Be sure to clean seal grooves in caliper body.

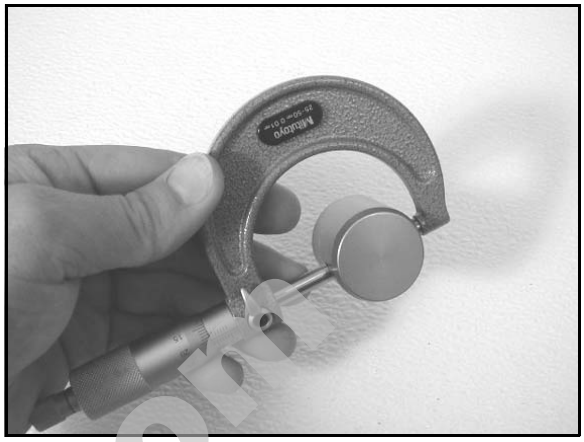
Caliper Inspection

1. Inspect caliper body for nicks, scratches or wear. Measure bore size and compare to specifications. Replace if damage is evident or if worn beyond service limit.

= In. / mm.

Caliper Piston Bore I.D.:
Std: 1.192” (30.28 mm)
Service Limit: 1.194” (30.33 mm)

2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.



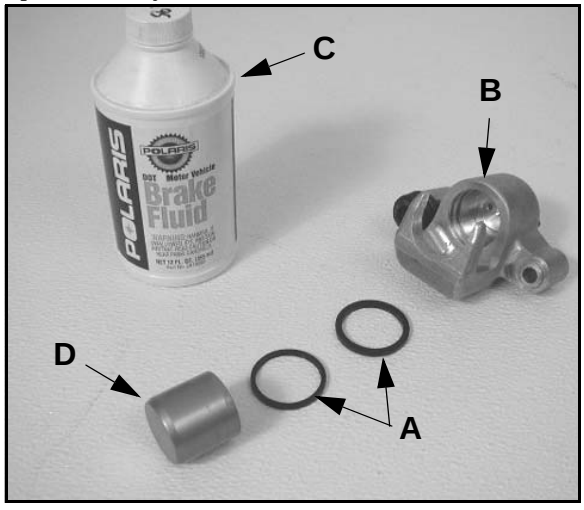
3. Inspect the brake disc and pads as outlined for brake pad replacement in this section. See “Brake Pad Inspection” in this chapter.

= In. / mm.

Caliper Piston O.D.:
Std: 1.186” (30.12 mm)
Service Limit: 1.184” (30.07 mm)

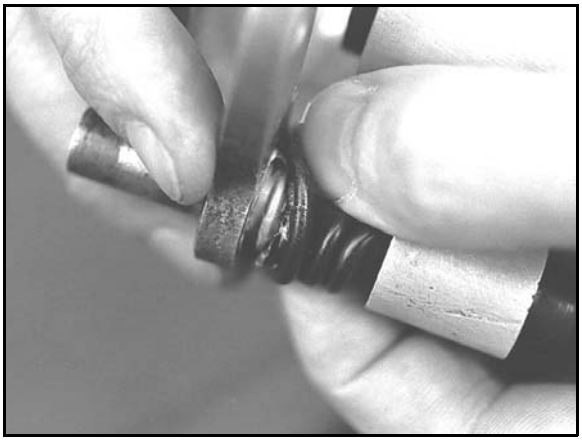
Caliper Reassembly

1. Install new O-rings (A) in the caliper body (B). Be sure groove is clean and free of residue or brakes may drag upon assembly.

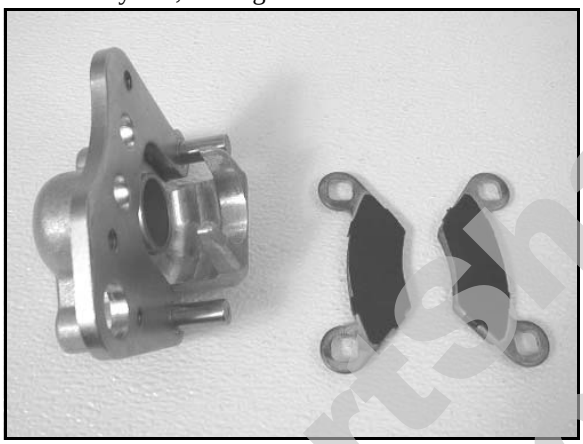


2. Coat piston with clean Polaris DOT 4 Brake Fluid (C). Install piston (D) with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly, with light resistance.

3. Lubricate the mounting bracket pins with Polaris Premium All Season Grease (**PN 2871423**), and install the rubber dust seal boots.

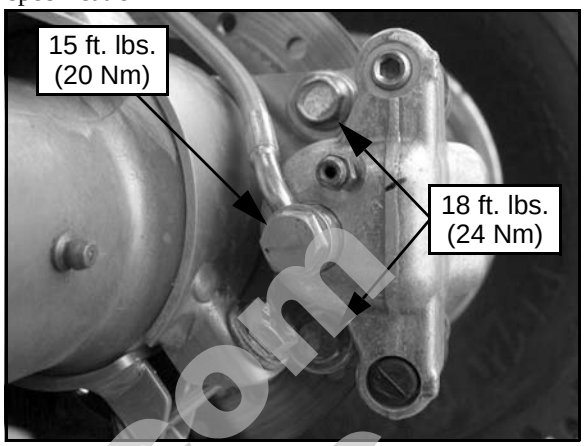


4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.



Caliper Installation ("MXR" / "S")

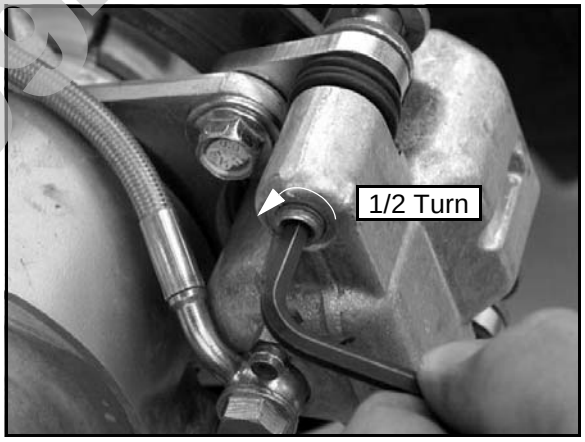
1. Install the caliper assembly over the brake disc and onto the caliper mount. Torque the mounting bolts to specification



Brake Caliper Mounting Bolt Torque:
18 ft. lbs. (24 Nm)

2. Install brake line and tighten securely with a line wrench. Torque the brake line banjo bolt to specification.

3. Install the adjuster screw and turn until stationary pad contacts disc, then back off 1/2 turn.

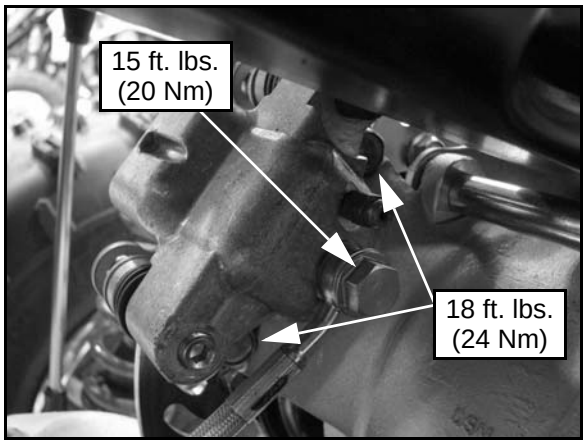


4. Perform brake bleeding procedure as outlined earlier in this chapter.

Rear Brake Master Cylinder Fluid Level
Between MIN and MAX lines

Caliper Installation ("IRS")

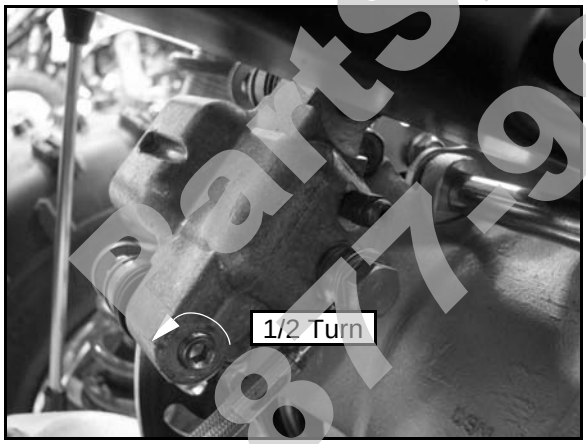
1. Install the caliper assembly over the brake disc and onto the rear housing caliper mount. Torque the mounting bolts to specification.



Brake Caliper Mounting Bolt Torque:
18 ft. lbs. (24 Nm)

2. Install brake line and tighten securely with a line wrench. Torque the brake line banjo bolt to specification.

3. Install the adjuster screw and turn until stationary pad contacts disc, then back off 1/2 turn.



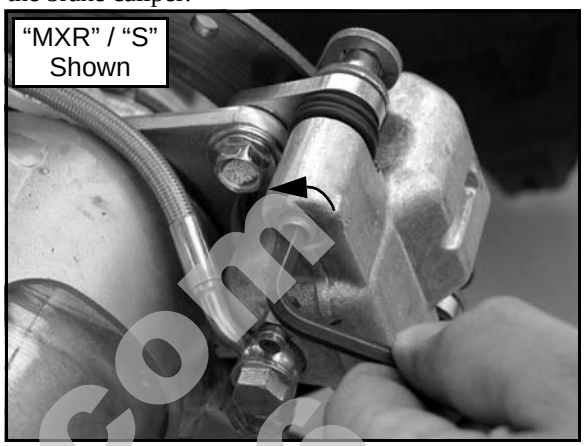
4. Perform brake bleeding procedure as outlined earlier in this chapter.

Rear Brake Master Cylinder Fluid Level
Between MIN and MAX lines

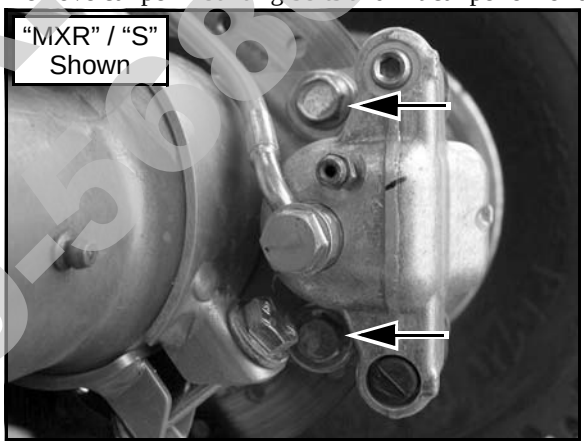
REAR BRAKE PADS

Pad Removal

1. Loosen the pad adjuster screw 2-3 turns before removing the brake caliper.

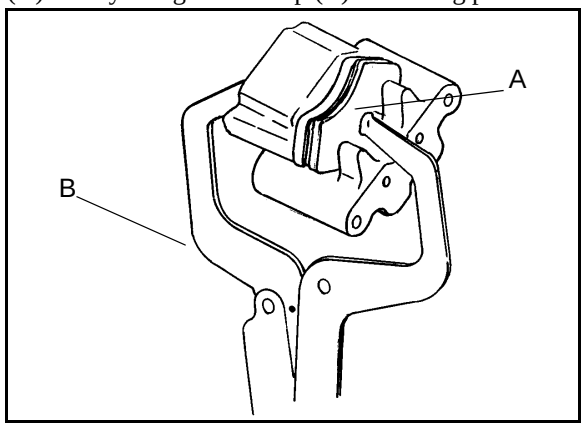


2. Remove caliper mounting bolts and lift caliper off of disc.



NOTE: When removing caliper, use care not to damage brake line. Support caliper to avoid kinking or bending brake line.

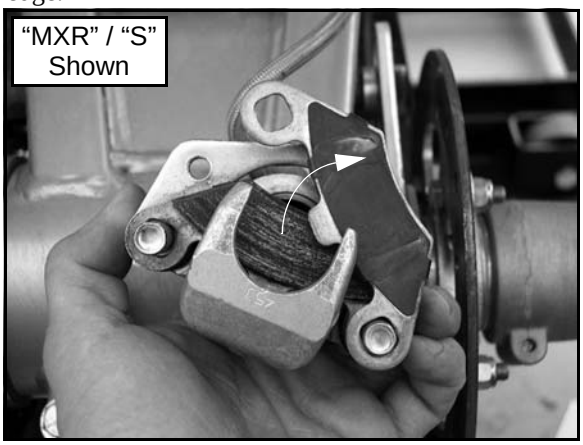
3. With pads installed, push caliper piston into caliper bore (A) slowly using a C–clamp (B) or locking pliers.



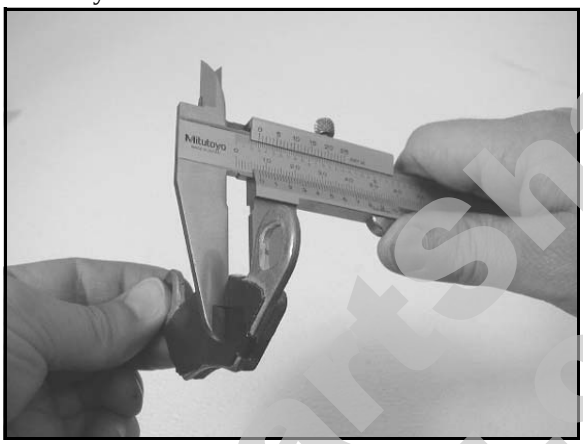
6

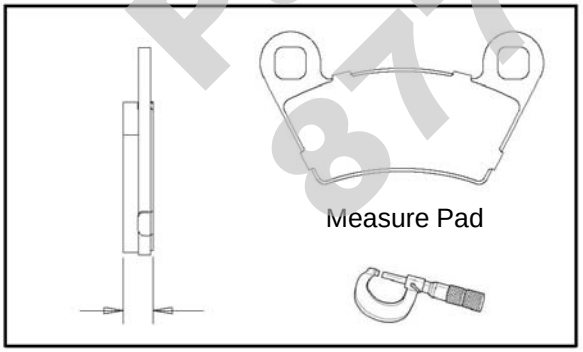
NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

4. Push upper pad retainer pin inward and slip brake pads past edge.



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

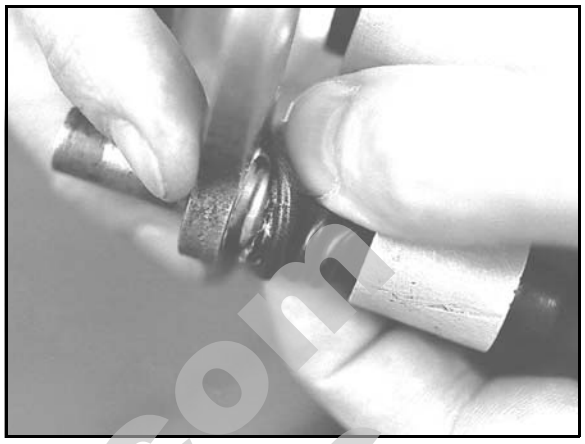




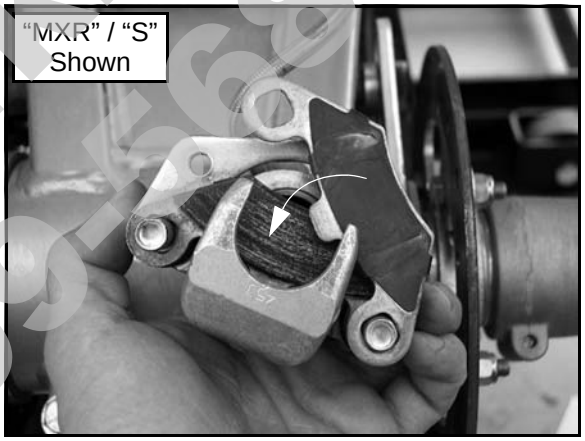
Rear Brake Pad Thickness
New: .298" / 7.6 mm
Service Limit: .180" / 4.6 mm

Pad Installation

1. Lubricate mounting bracket pins with a light film of Polaris Premium All Season Grease (**PN 2871423**), and install rubber dust boots.



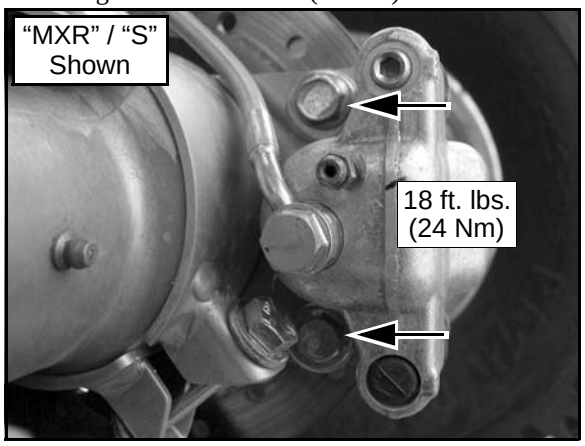
2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.



⚠ WARNING

If brake pads are contaminated with grease, oil, or liquid soaked do not use the pads.
Use only new, clean pads.

3. Install the caliper assembly over the brake disc and onto the caliper mount. Install the mounting bolts and torque mounting bolts to 18 ft. lbs. (24 Nm).



Brake Caliper Mounting Bolt Torque:
18 ft. lbs. (24 Nm)

4. Install the adjuster screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn counter-clockwise.

5. Slowly pump the foot brake lever until pressure has been built up. Maintain at least 1/2" (12.7 mm) of brake fluid in the reservoir to prevent air from entering the rear master cylinder.

Auxiliary Brake Master Cylinder
Fluid Level
Between MIN and MAX lines

Brake Burnishing Procedure

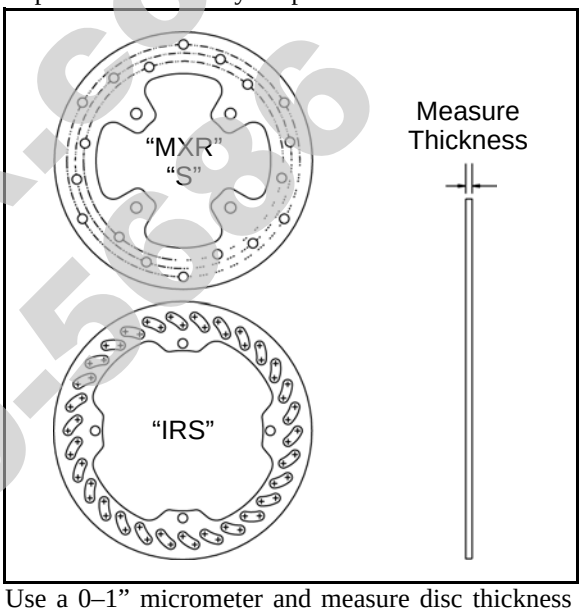
It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times.

REAR BRAKE DISC

Disc Inspection

1. Visually inspect disc for scoring, scratches, or gouges. Replace the disc if any deep scratches are evident.



2. Use a 0–1" micrometer and measure disc thickness at 8 different points around perimeter of disc. Replace disc if worn beyond service limit.

Brake Disc Thickness
New: .158" (4.013 mm)
Service Limit: .140" (3.556 mm)

Brake Disc Thickness Variance
Service Limit: .002" (.051 mm)
(difference between measurements.)

3. Mount dial indicator and measure disc runout. Replace the disc if runout exceeds specifications.

Brake Disc Runout
Service Limit: .010" (.25 mm)

Disc Removal / Replacement ("MXR" / "S")

Refer to Chapter 5 "REAR AXLE SERVICE - Removal / Disassembly" for rear brake disc removal.

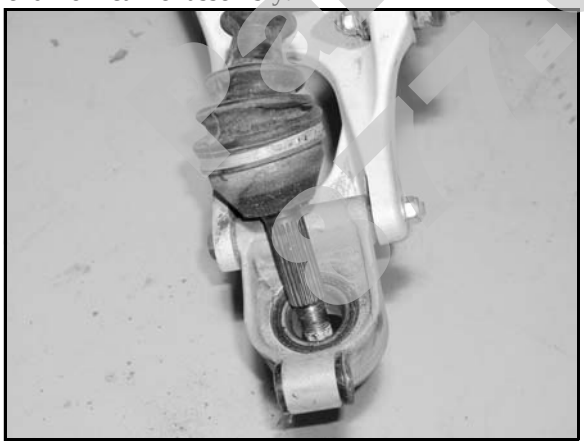
Disc Removal / Replacement ("IRS")

1. With ATV on the ground, loosen wheel nuts and hub nuts.
2. Safely lift and support the rear of the ATV under the main frame.
3. Remove right rear wheel and hub.
4. Remove rear caliper and secure out of the way.

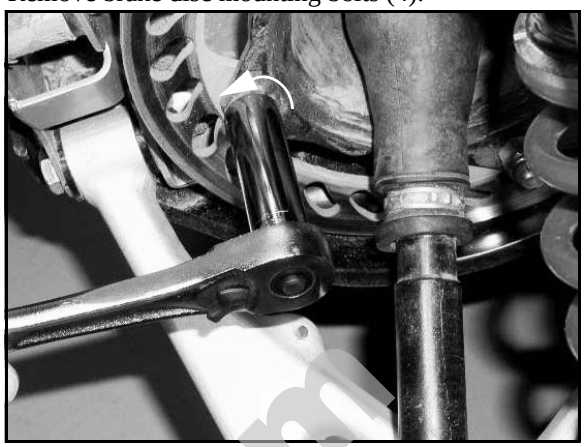
NOTE: Do not allow the caliper to hang by the brake line. Brake line damage may result.

5. Remove right upper carrier bolt and secure upper a-arm out of the way.

6. Tilt right hub carrier outward while pulling rear CV shaft end from carrier assembly.



7. Remove brake disc mounting bolts (4).



8. Lift and rotate disc, slipping it over the hub assembly and off the drive shaft, exiting the frame from the side.

Disc Installation

1. Install the disc by slipping it over the over the drive shaft and hub assembly. Disc mounting holes will be on the inside face of the hub assembly for correct installation.
2. Install brake disc mounting bolts. Torque mounting bolts to **18 ft. lbs. (24 Nm).**
3. Install CV shaft into hub carrier.
4. Install upper a-arm, bolt and nut on to hub carrier. Torque mounting bolt to **33 ft. lbs. (45 Nm).**
5. Install wheel hub, domed washer and nut (dome of washer facing out). Torque hub nut to **90 ft. lbs. (122 Nm).** Install cotter pin.

TROUBLESHOOTING

Brakes Squeal

- Dirty/contaminated friction pads
- Improper alignment
- Worn disc
- Worn disc splines
- Glazed brake pads

Poor Brake Performance

- Air in system
- Water in system (brake fluid contaminated)
- Caliper/disc misaligned
- Caliper dirty or damaged
- Brake line damaged or lining ruptured
- Worn disc and/or friction pads
- Incorrectly adjusted lever
- Incorrectly adjusted stationary pad
- Worn or damaged master cylinder or components
- Improper clearance between lever and switch

Lever Vibration

- Disc damaged
- Disc worn (runout or thickness variance exceeds service limit)
- Caliper overheats (Brakes Drag)
- Compensating port plugged
- Pad clearance set incorrectly
- Auxiliary brake pedal incorrectly adjusted
- Brake lever or pedal binding or unable to return fully
- Parking brake left on
- Residue build up under caliper seals
- Operator riding brakes

Brakes Lock

- Alignment of caliper to disc
- Fluid overfill of the reservoir
- Stuck caliper piston

NOTES

CHAPTER 7
ELECTRICAL

GENERAL INFORMATION

Special Tools

PART NUMBER	TOOL DESCRIPTION
PV-43568	Fluke™ 77 Digital Multimeter
2870836	Battery Hydrometer
PV-39951-A	Digital Tachometer

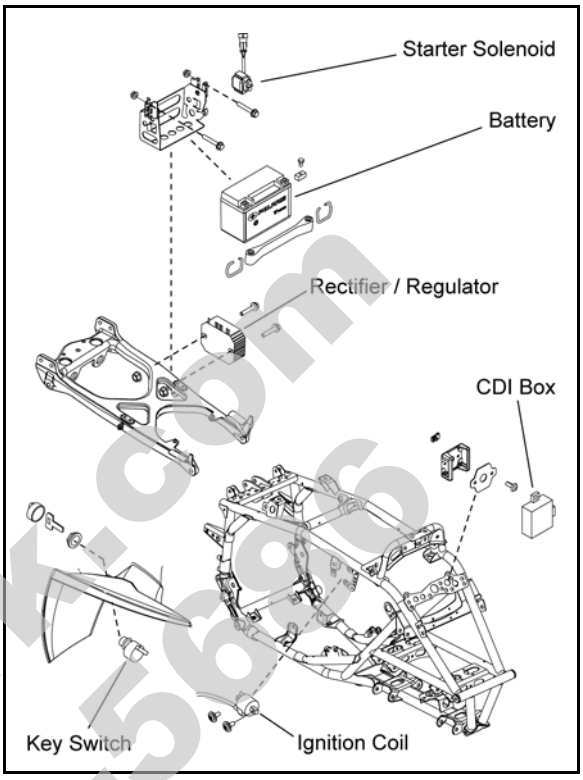
Electrical Service Notes

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

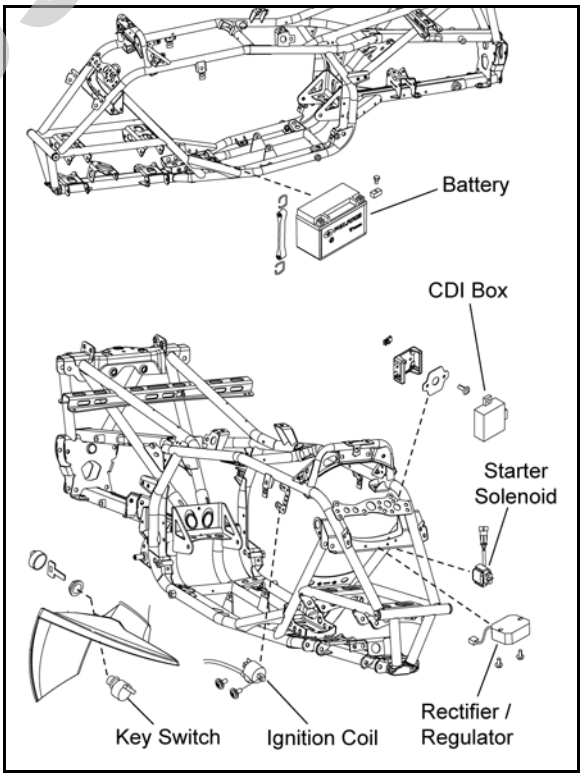
- Refer to wiring diagram for stator and electrical component resistance specifications.
- When measuring resistance of a component that has a resistance value under 10 Ohms, remember to subtract meter lead resistance from the reading. Connect the leads together and record the resistance. The resistance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

COMPONENT LOCATION (CHASSIS)

450 "MXR" / 525 "S"

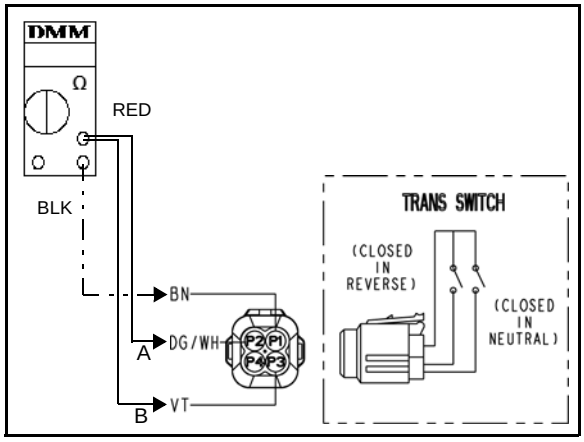


525 "IRS"



LIGHTING AND CONTROLS

Transmission Switch Test



1. Shift the transmission into 1st gear. The ohm meter should show no continuity or OL when testing at points A and B.
2. Shift the transmission into neutral and check for continuity at test point A. Continuity should be present.
3. Shift the transmission into reverse and check for continuity at test point B. Continuity should be present.

NOTE: If there is no continuity at either of the wire connections with the transmission in neutral or reverse, remove the switch and inspect the shift drum contact pin and spring for proper function. If no problems are found, replace transmission switch.

Headlight Bulb Replacement

1. Remove the front cover.
2. Disconnect the wire harness from the bulb at the back side of the headlight housing. Remove the headlight housing if having trouble gaining access to the bulb (see "Headlight Housing Replacement").

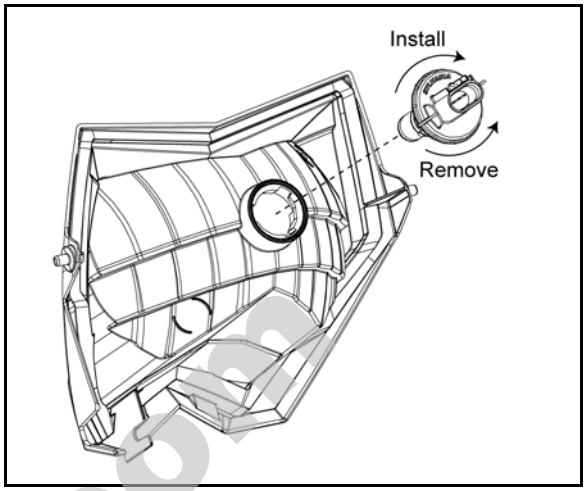
⚠ CAUTION

Do not service bulb while headlight is hot. Serious burns may result.

3. Grasp the bulb housing and turn it *counterclockwise* to remove the bulb.

IMPORTANT: When servicing a halogen bulb, avoid touching the bulb with bare fingers. Oil from your skin leaves a residue causing a hot spot that will shorten the life of the bulb. If your fingers touch the bulb, clean it with denatured alcohol.

4. Install the replacement bulb into the headlight housing and rotate firmly *clockwise* until it locks in place.



5. Reinstall the wire harness to the back side of the headlight bulb.

Headlight Housing Replacement

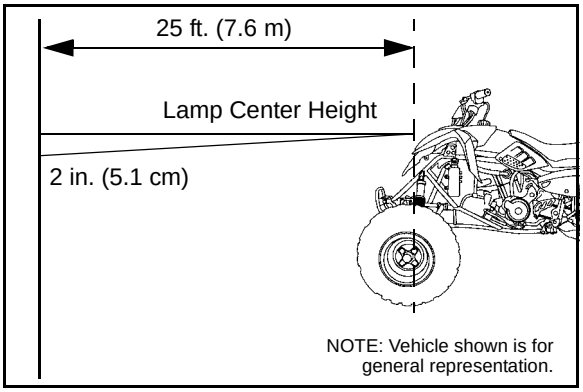
1. Remove the front cover and remove the T27/8mm Hex-head screws from the front portion of each side panel.
2. Lift up on the side panel and loosen the T27/8mm Hex-head screws retaining the headlight brackets and rotate them to free the headlight housing.
3. Remove adjuster screw and pull out the headlight housing.

4. Disconnect the wire harness from the bulb at the back side of the headlight housing. If removing the bulb, refer to "Headlight Bulb Replacement".
5. Install the new headlight housing, placing it in the slots on the frame tabs. Secure the headlight housing with the retaining brackets.
6. Install adjuster screw, leaving it loose so it can be adjusted.
7. Reinstall wire harness to the back side of the headlight bulb.
8. Reinstall the front cover and adjust headlight as needed (see "Headlight Adjustment"), then tighten the adjuster screw.

Headlight Adjustment

The headlight beam can be adjusted to varied positions by using the following procedures:

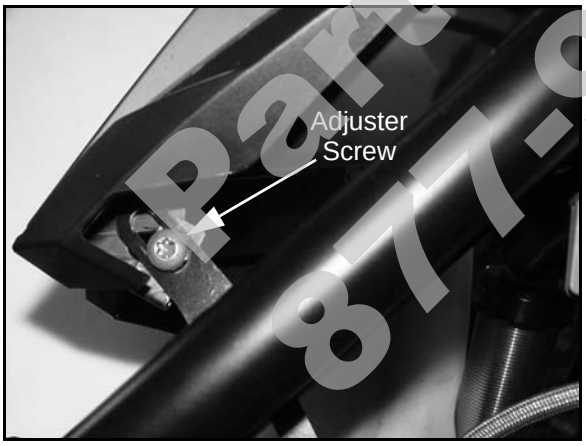
1. Place the vehicle on a level surface with the headlight approximately 25 ft. (7.6 m) from a wall.



2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height
3. Start the engine and turn the headlight switch to high beam.
4. Observe headlight aim. The most intense part of the headlight beam should be aimed 2 in. (5.1 cm) below the mark placed on the wall in Step 2.

NOTE: Rider weight must be included on the seat. On machines with separate low beam lights, the drop should be 8 in. (20.3 cm) in 25 ft. from the center of the low beam lamp.

5. Loosen the adjuster screw and adjust the beam to the desired position.



6. Tighten the screw and torque to 27 in. lbs. (3 Nm).

Headlamp Switch Test

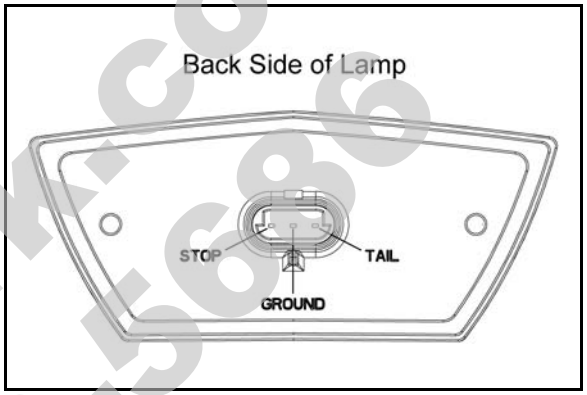
Probe the headlamp plug wires at the back of the 3-wire connector. Turn headlight on. Test for battery voltage across the connections.

- Low Beam - Brown and Green
- High Beam - Brown and Yellow

If no voltage is found, test for bad connections, switches, or broken wiring. Refer to wire diagram for harness connections.

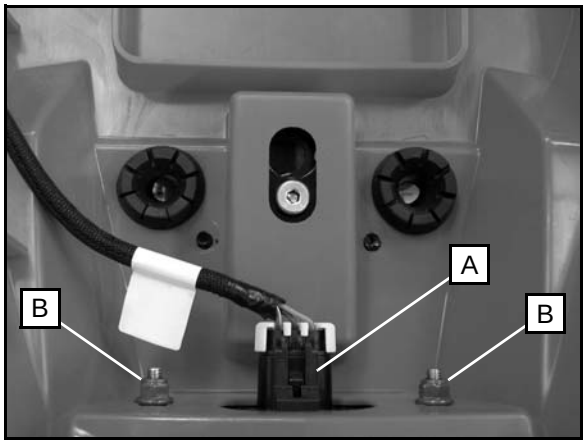
Taillight / Brakelight Lamp Replacement

If the taillight / brakelight does not work, disconnect the wire harness and try applying 12 Vdc and a known good ground directly to the LED lamp connector as shown below.



If the LED still does not work, replace the LED lamp assembly.

1. Remove the seat and disconnect the taillight / brakelight wire harness (A).
2. Remove the two fasteners (B) retaining the lamp assembly.

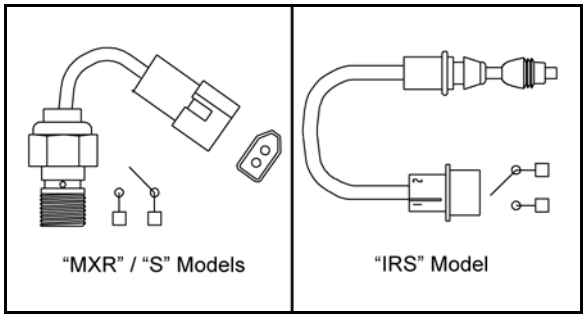


3. Remove the assembly and replace it with the recommended lamp.
4. Reinstall the assembly by reversing this procedure.
5. Test the taillight / brakelight after installation to verify proper function.

Brake Light Switch Tests

Foot Brake Switch

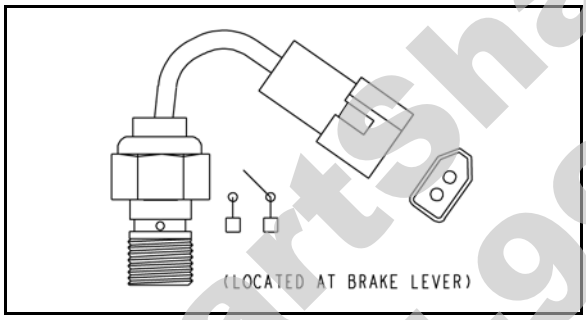
1. Disconnect wire harness from switch and connect an ohmmeter across switch contacts. The circuit should have an open line or infinity reading.



2. Apply foot brake and check for continuity between switch contacts. Replace switch if there is no continuity or if continuity is greater than .5 ohms when the brake is applied with slight pressure.

Hand Brake Switch

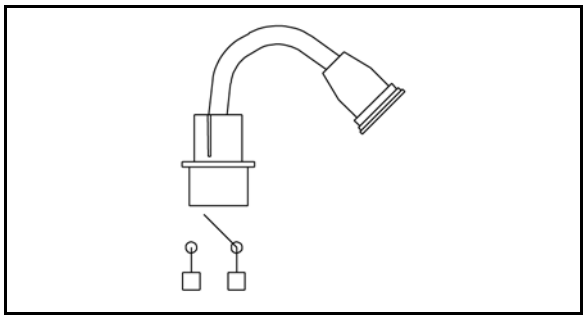
1. Disconnect wire harness from switch and connect an ohmmeter across switch contacts. The circuit should have an open line or infinity reading.



2. Apply front brake lever and check for continuity between switch contacts. Replace switch if there is no continuity or if continuity is greater than .5 ohms when the brake is applied with slight pressure.

Clutch Switch Test

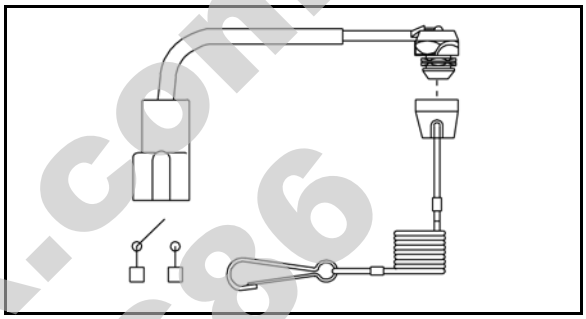
1. Disconnect wire harness from switch.



2. Connect an ohmmeter across switch contacts. The circuit should have an open line or infinity reading.
3. Apply the clutch lever and check for continuity between switch contacts. Replace switch if there is no continuity or if continuity is greater than .5 ohms when the clutch lever is applied.

Tether Switch Test (Accessory Option)

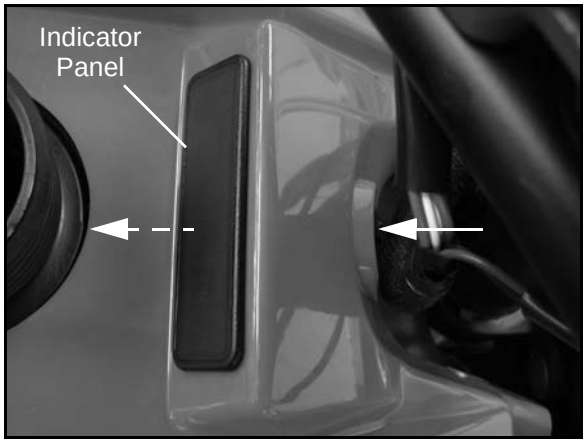
1. Disconnect wire harness from switch and connect an ohmmeter across switch contacts. The circuit should have an open line or infinity reading.



2. Pull tether boot from switch and check for continuity between switch contacts. Replace switch if there is no continuity or if continuity is greater than 0.5 ohms when tether is removed.

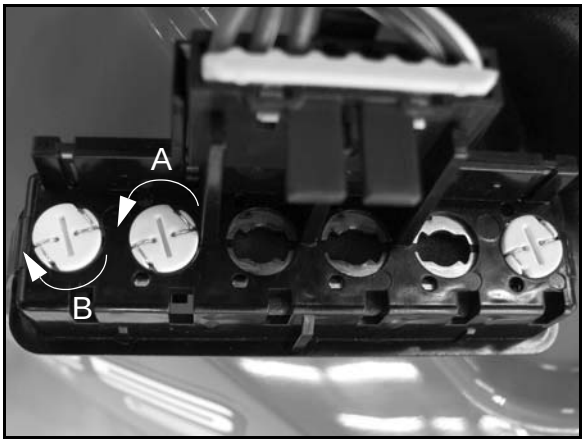
Indicator Lamp Replacement

1. Remove the fuel cap and carefully push the indicator panel through the front cab from the back side.



2. Disconnect wire harness from indicator panel.

3. Remove indicator lamp from the panel by turning the holder 1/4 turn with a screw driver (A).



4. Push a new lamp into holder assembly and insert into the indicator panel. Turn holder 1/4 turn to lock in place (B).
5. Reconnect wire harness and insert the indicator panel back into the front cab.

Electronic Throttle Control (ETC) Switch

The Electronic Throttle Control (ETC) system is designed to stop the engine of an ATV in the event of a mechanical problem with the throttle mechanism. The ETC switch is mounted independent of the throttle actuator lever inside the throttle block assembly. This is a ***normally closed*** switch, and is held in the open position (contacts are separated) by throttle cable tension (as shown in the illustration). The contacts are "open" during normal operation regardless of throttle lever position. In the event of a mechanical problem in the throttle mechanism (cable tension is lost), the switch contacts close, connecting the CDI black wire to ground, which prevents ignition spark. This is the same as turning the key or engine stop switch "OFF".

Test the ETC switch at the harness connector.

NOTE: Adjust throttle cable freeplay (ETC switch) and make sure throttle mechanism is functioning properly before testing the switch. Refer to Chapter 2 "Maintenance" for cable adjustment procedure.

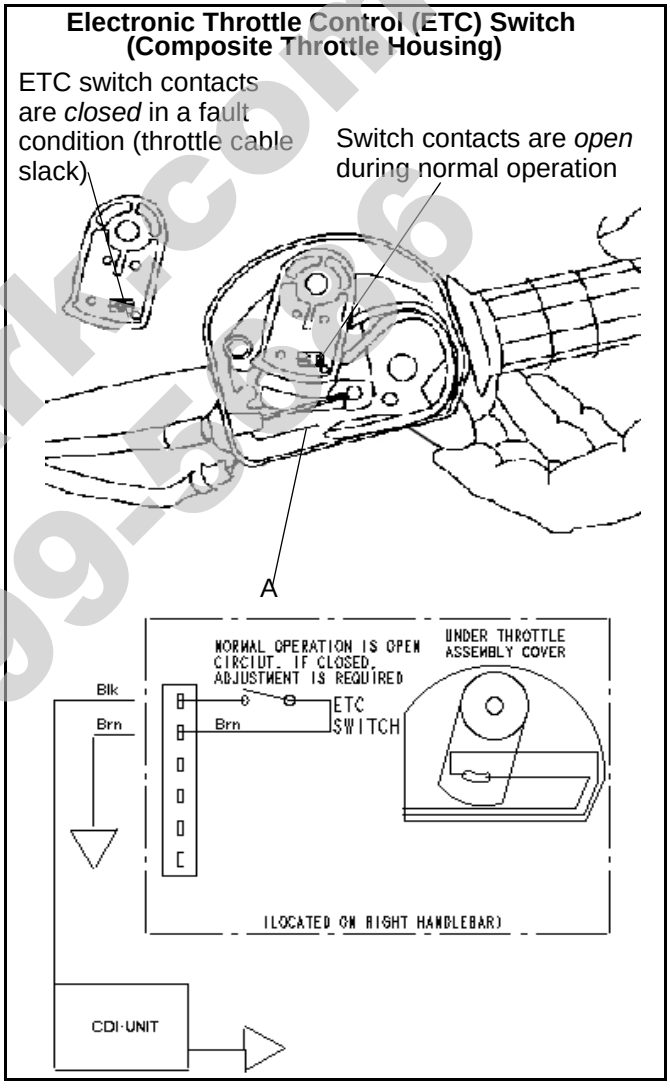
ETC Operation Test

Remove throttle block cover by carefully releasing all tabs around edge of cover.

Place transmission in neutral and apply parking brake.

Start engine and open throttle lever slightly until engine RPM is just above idle speed.

Hold throttle cable with fingers at point "A" (as shown below) and release throttle lever. If the ETC system is functioning properly, the engine will lose spark and stop.



IGNITION SYSTEM

Ignition System Troubleshooting

No Spark, Weak or Intermittent Spark

- No 12 volt power or ground to CDI
- 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
- Faulty engine stop switch, ignition switch, or tether switch
- ETC switch misadjusted or faulty
- Poor ignition coil ground (e.g. coil mount loose or corroded)
- Faulty pulse coil (measure resistance of value of pulse coil)
- Incorrect wiring (inspect color coding in connectors etc)
- Faulty ignition coil winding (measure resistance of primary and secondary)
- Sheared flywheel key
- Flywheel loose or damaged
- Excessive crankshaft runout on magneto (RH) end – should not exceed .005”
- Faulty CDI module
- Faulty 5 Amp or 10 Amp circuit breaker

DC / CDI Ignition

Some of the advantages of DC ignition are:

- Stronger, more consistent spark at low rpm for better performance
- Easier starts
- Simpler component design for ease trouble shooting and maintenance

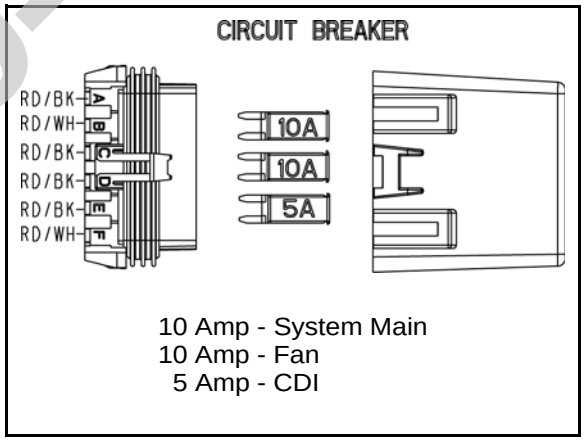
Operation Overview:

The DC/CDI system relies on battery power for ignition function. Instead of generating DC voltage via magnetic induction, a 12 volt DC current is supplied directly to the CDI unit from the battery.

At the CDI, the supplied 12 volt DC current charges an internal capacitor to build up the initial ignition charge. A small AC signal from the Pulse coil closes a thyristor (located in the CDI) at a point pre-determined in the crankshaft rotation by magnets on the flywheel’s outer diameter. This signal releases the electrical charge which saturates the coil for ignition.

Circuit Breakers

The circuit breaker panel is located underneath the front cab. Access can be gained by removing the front cover and front cab.



10 Amp - System Main
10 Amp - Fan
5 Amp - CDI

Cranking Output Tests

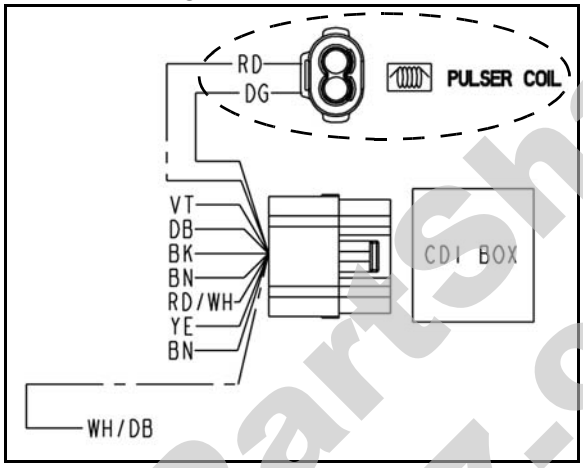
The following tests will measure the amount of output directly from each component.

Test output from the CDI box and pulser coil and compare to the specification table. The following measurements are obtained when cranking the engine with the electric starter and with the spark plug installed. The starter system must be in good condition and the battery fully charged.

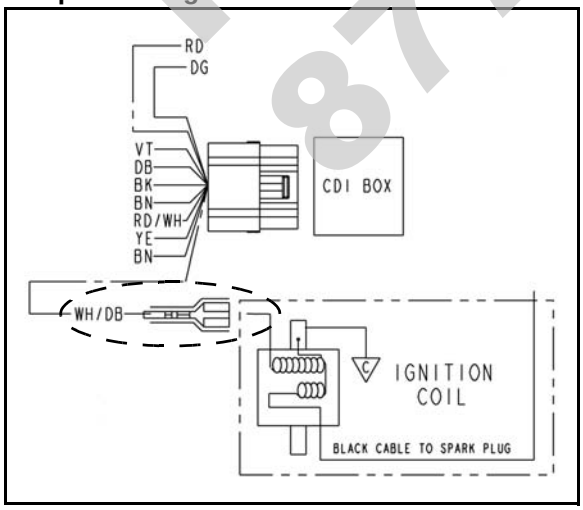
200 Watt 4 Stroke DC/CDI Ignition

Test	Connect Meter Wires To:	Taken With Standard Volt Ohm Meter
Pulser Coil Output	Red and Green	.13 - .14 VAC
CDI Output	White/Blue and Ground	200 VDC

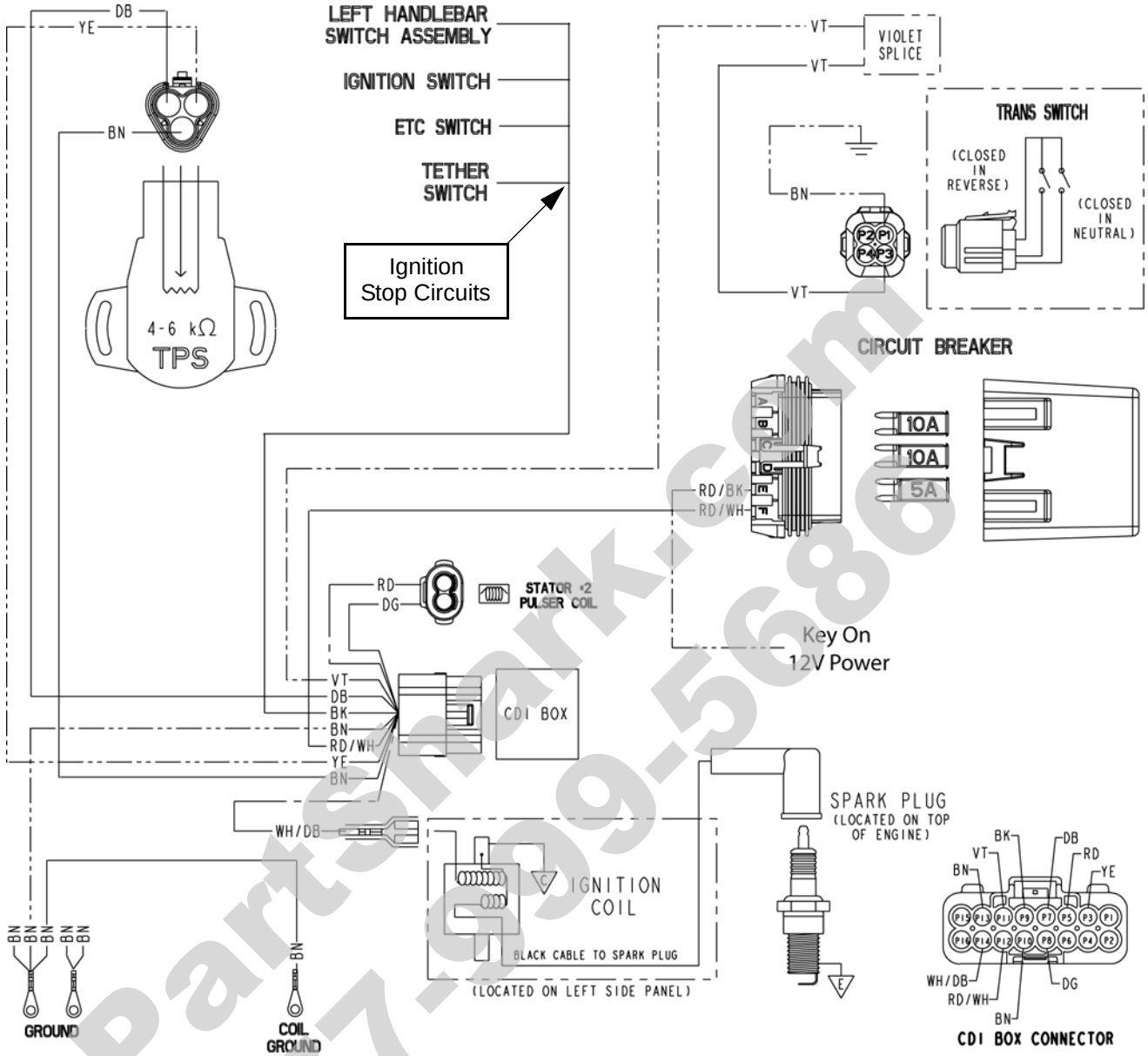
Pulser Coil Testing



CDI Output Testing



Ignition System Breakout Diagram



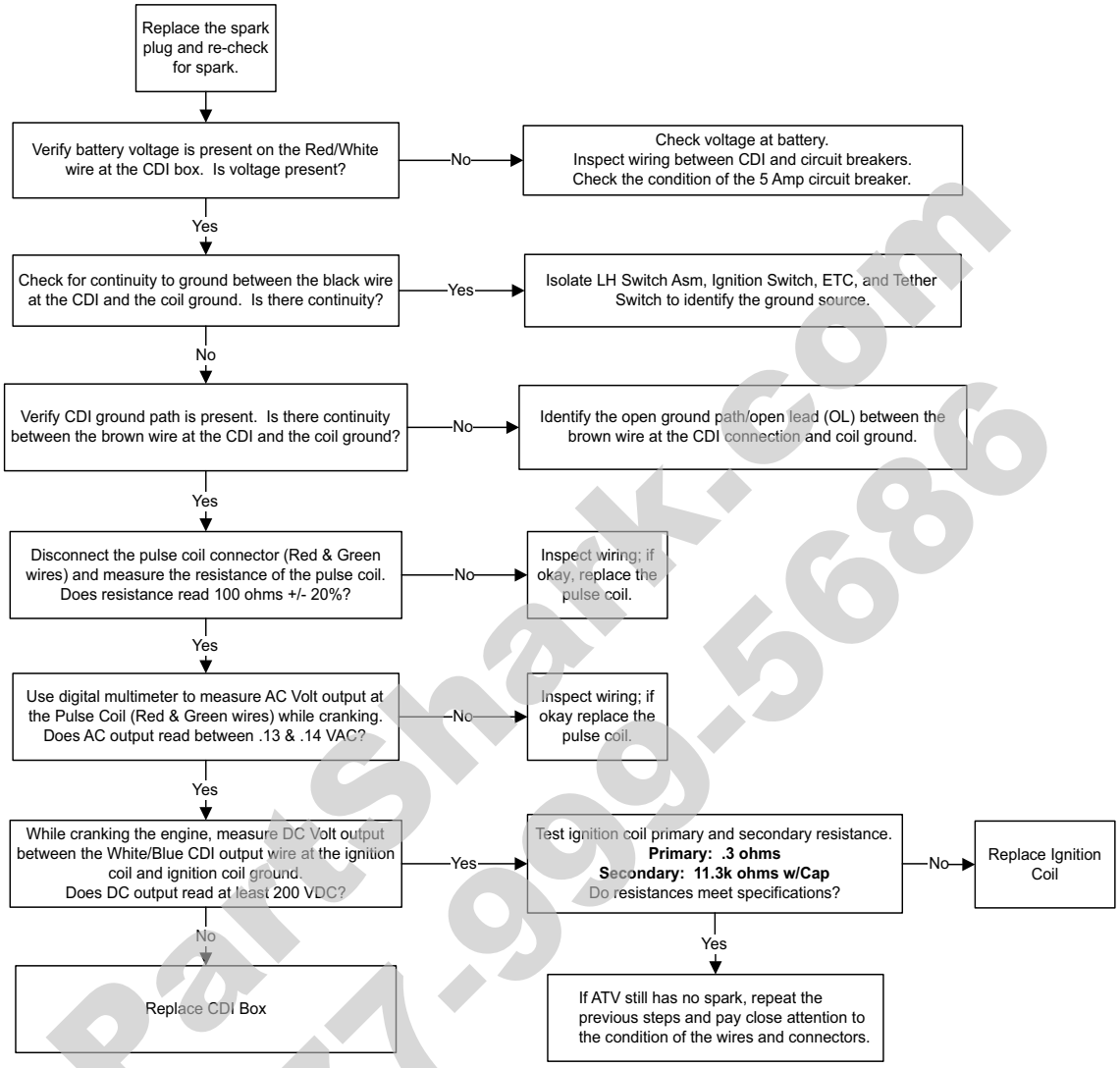
CDI Box Wire Color Description

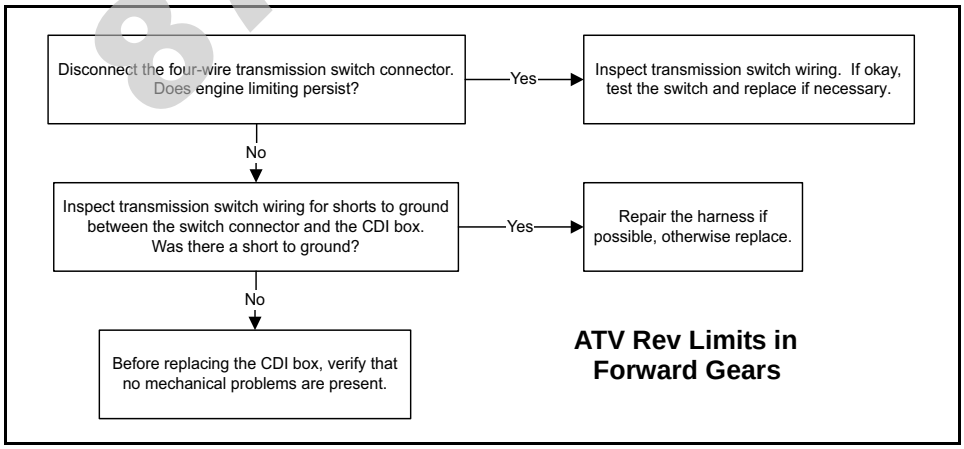
Terminal Wire Color	Terminal Description	Terminal Wire Color	Terminal Description
P1 - N/A	NOT USED	P2 - N/A	NOT USED
P3 - YELLOW	TPS SIGNAL	P4 - N/A	NOT USED
P5 - RED	PULSER COIL (+) INPUT	P6 - N/A	NOT USED
P7 - BLUE	TPS 5 VOLT REF. OUTPUT	P8 - GREEN	PULSER COIL (-) INPUT
P9 - BLACK	IGNITION STOP GROUND INPUT	P10 - BROWN	TPS GROUND OUTPUT
P11 - VIOLET	REVERSE SIGNAL INPUT	P12 - RED / WHITE	BATTERY (+) VOLTAGE
P13 - BROWN	GROUND INPUT	P14 - WHITE / BLUE	CDI OUTPUT TO IGNITION COIL
P15 - N/A	NOT USED	P16 - N/A	NOT USED

Ignition System Testing

Whenever troubleshooting an electrical problem, first check all terminal connections to be sure they are clean and tight. Use the following flow chart as a guide for troubleshooting a "No Spark" condition.

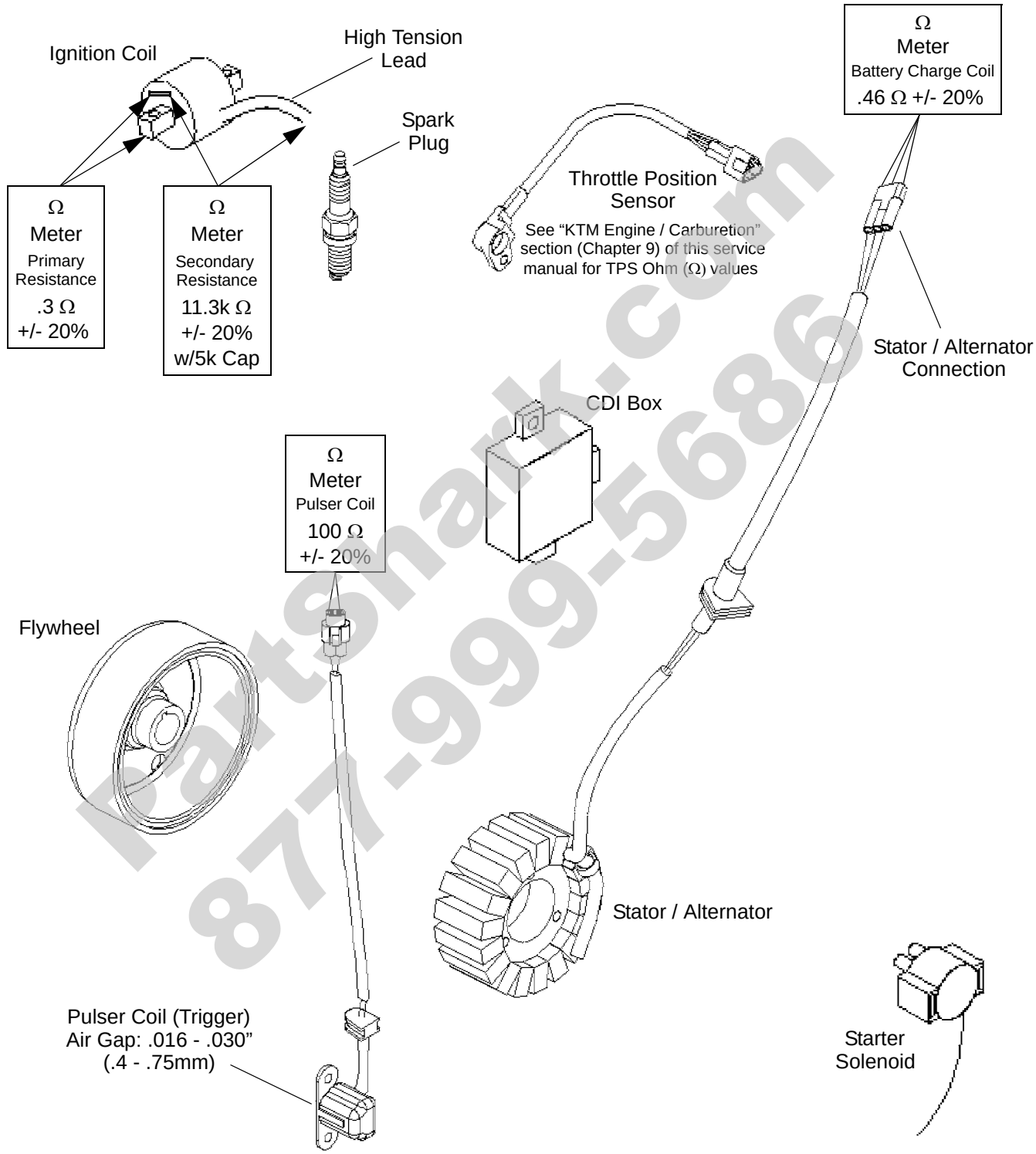
Condition: No spark or intermittent spark.





Components of DC / CDI Ignition

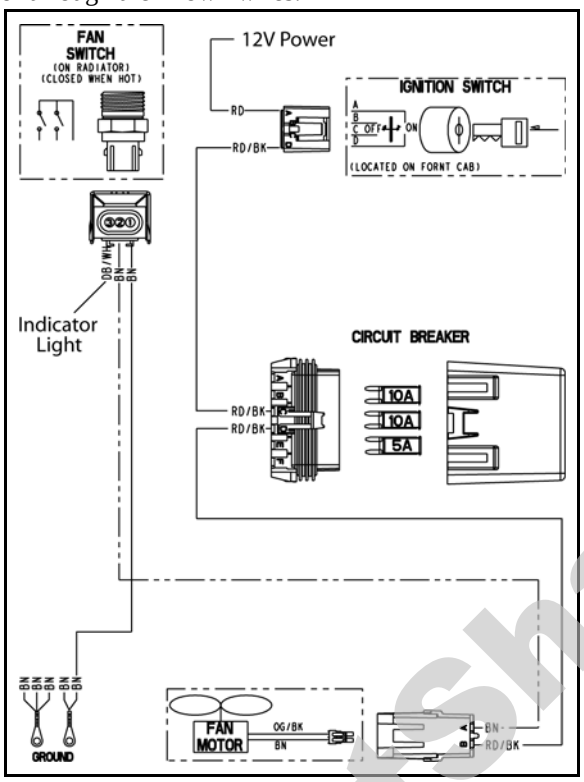
Note: DC/CDI components are not compatible with any other type of ignition system.
Refer to Wire Diagram for Specified Resistance Specifications



COOLING SYSTEM

Fan Control Circuit Operation

Power is supplied to the fan motor via the Red / Black wire when the ignition key is turned "ON". The fan switch is located on the radiator. When the fan switch reaches the specified temperature, it becomes conductive and provides a ground path for the fan motor through the Brown wires.



⚠ CAUTION

Keep hands away from fan blades during this procedure. Serious personal injury could result.

The fan switch may not function or operation may be delayed if coolant level is low or if air is trapped in the cooling system. Verify the cooling system is full and purged of air. Refer to Chapter 2 "Maintenance" for cooling system information.

Fan Switch Bypass Tests

The following tests should be performed if you find that the fan motor and/or hot light are not functioning when radiator reaches the temperature specifications. See "Fan Switch Operation" table below.

1. Disconnect harness from fan switch located on the radiator.
2. Check for continuity at the fan switch harness between the ground input from the coil mount (outer brown wire) and ground.

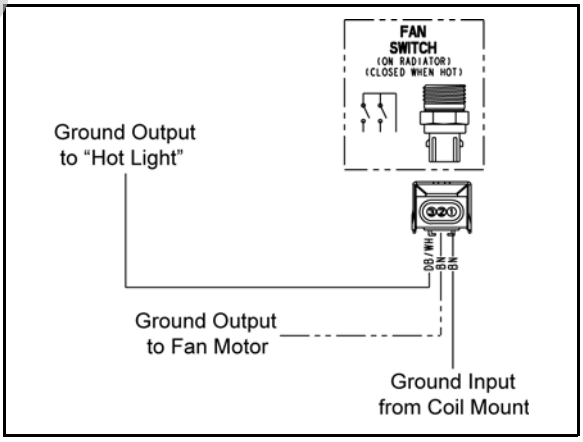
IMPORTANT: If there is no continuity present, the fan switch is not the fault. Trace harness between fan switch connector and the coil mount ground to find the open in the harness.

Switch Bypass "Fan Test"

3. Place a jumper wire between the fan motor ground output (middle brown wire) and ground.
4. Turn the ignition key on.
5. If fan operates, the fan motor is fine. Either the fan switch is faulty or the coolant is not at the proper level in the radiator.

Switch Bypass "Hot Light Test"

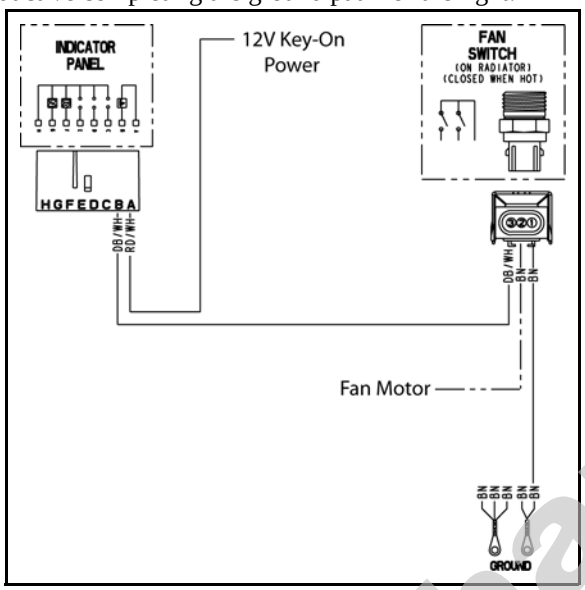
6. Place a jumper wire between the "Hot Light" ground output (blue / white wire) and ground.
7. Turn the ignition key on.
8. If the light functions, the indicator bulb is fine. Either the fan switch is faulty or the coolant is not at the proper level in the radiator.



FAN SWITCH OPERATION			
Fan Switch Type	**Continuity (Hot Light)**	**Continuity (Fan On)**	**No Continuity (Fan Off)**
2-Circuit Thermal Switch	221° F (105° C)	185° F (85° C)	150° F (65° C)

Fan Switch "Hot Light" Operation

With the ignition switch and engine stop switch in the "On" position, power is delivered to the indicator panel "Hot Light" via the Red / White wire. The Blue / White wire (ground) at the indicator panel is connected to the fan switch located on the radiator. In normal operating conditions, the "Hot Light" circuit of the fan switch is non–conductive (open). If engine coolant reaches the specified temperature, the switch becomes conductive completing the ground path for the light.



CHARGING SYSTEM

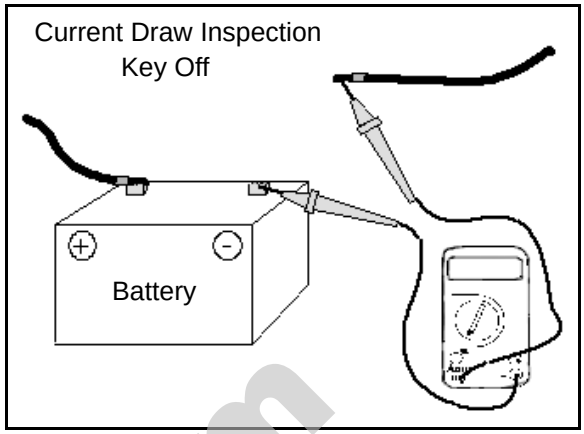
Current Draw – Key Off

⚠ CAUTION

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

Connect an ammeter in series with the negative battery cable. Check for current draw with the key off. If the draw is excessive, loads should be disconnected from the system one by one until the draw is eliminated. Check component wiring as well as the component for partial shorts to ground to eliminate the draw.

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



Charging System "Break Even" Test

The "break even" point of the charging system is the point at which the alternator overcomes all system loads (lights, etc.) and begins to charge the battery. Depending on battery condition and system load, the break even point may vary slightly. The battery should be fully charged before performing this test.

⚠ WARNING

Never start the engine with an ammeter connected in series. Damage to the meter or meter fuse will result. Do not run test for extended period of time. Do not run test with

1. Connect a tachometer to the engine.
2. Using an inductive amperage metering device, (set to DC amps) connect to the negative battery cable.
3. With engine off and the key, kill switch, and lights in the "ON" position, the ammeter should read negative amps (battery discharge). Reverse meter lead if a positive reading is indicated.
4. Shift transmission into neutral and start the engine. With the engine running at idle, observe meter readings.
5. Increase engine RPM while observing ammeter and tachometer.
6. Note RPM at which the battery starts to charge (ammeter indication is positive).
7. With lights and other electrical loads off, the "break even" point should occur at approximately 1700 RPM or lower.
8. With the engine running, turn the lights on and engage parking brake lock to keep brake light on.
9. Repeat test, observing ammeter and tachometer. With lights on, charging should occur at or below 2000 RPM.

Alternator Tests (Charging System)

Three tests can be performed using a multimeter to determine the condition of the stator (alternator).

TEST 1: Resistance Value of Each Stator Leg

1. Measure the resistance value of each of the three stator legs: Y1 to Y2, Y1 to Y3, and Y2 to Y3. Each should measure **0.46 ohms**.

NOTE: If there are any significant variations in ohms readings between the three legs; it is an indication that one of the three stator legs may be weak or failed.

TEST 2: Resistance Value of Stator Leg to Ground

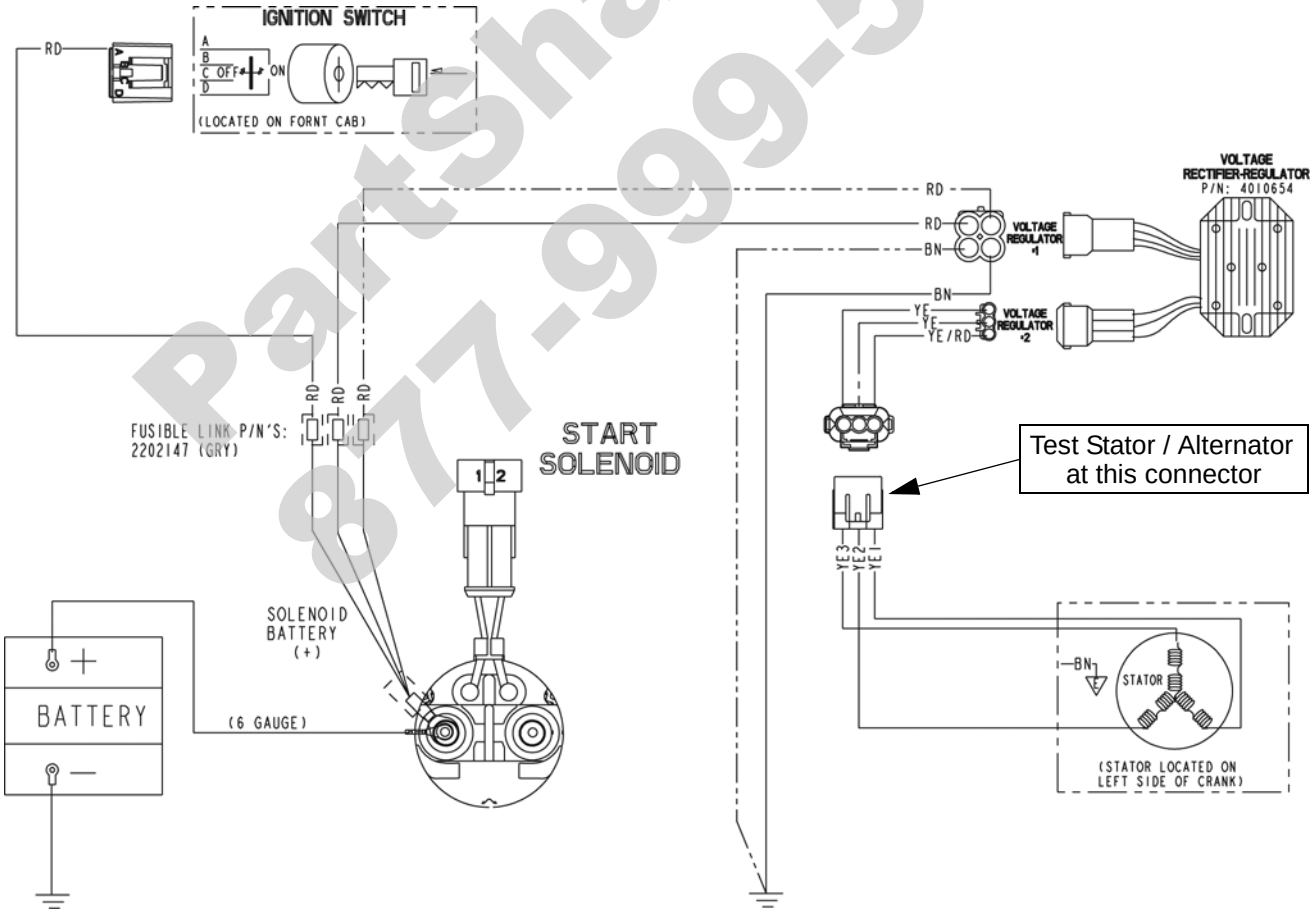
1. Measure the resistance value of each of the stator legs to ground: Y1 to Ground, Y2 to Ground, Y3 to Ground.

NOTE: Any measurement other than Infinity (open) will indicate a failed or shorted stator leg.

TEST 3: Measure AC Voltage Output of Each Stator Leg at Charging RPM with a Voltmeter set to Volts AC.

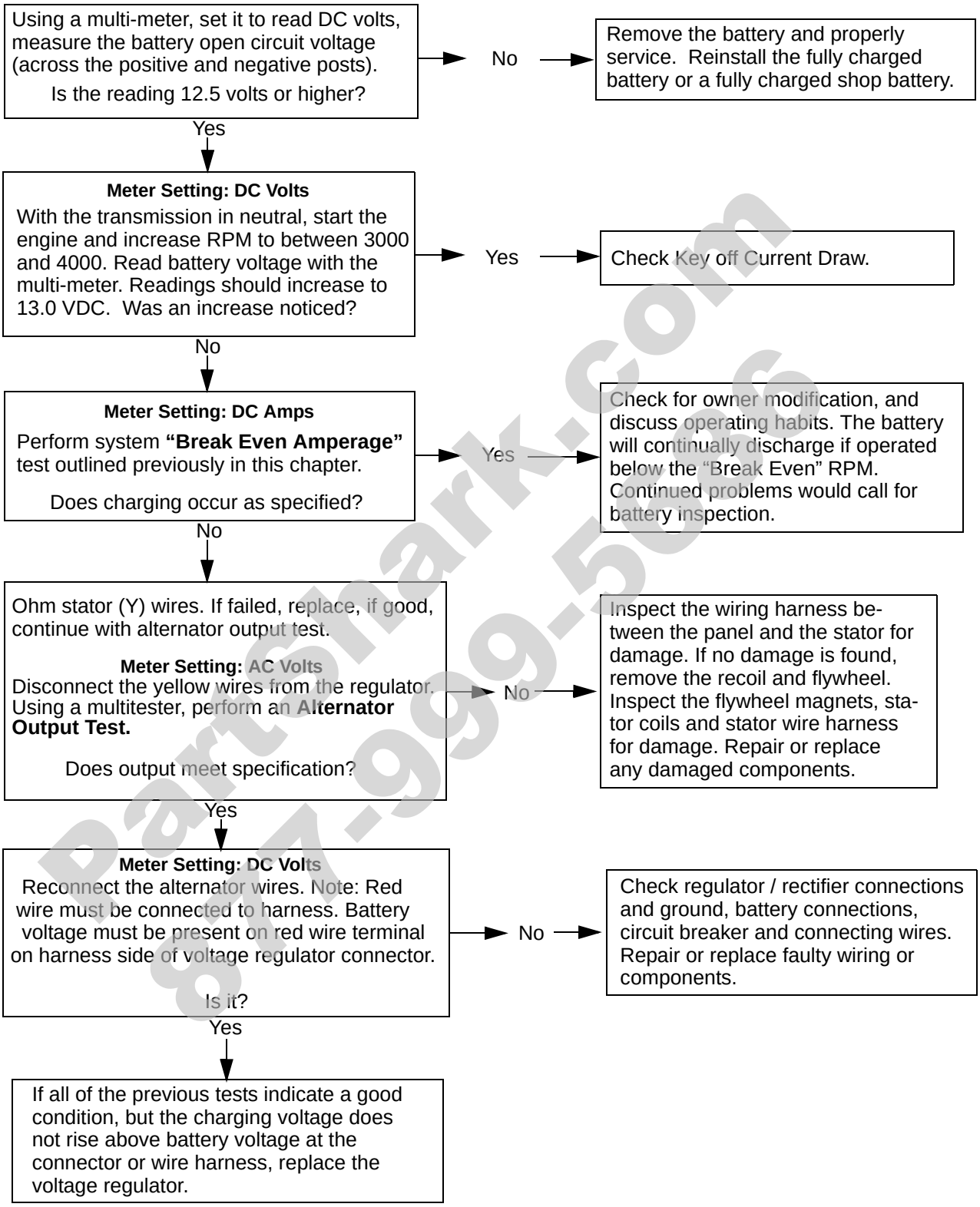
1. Set the voltmeter to read AC Voltage.
2. Place transmission in neutral.
3. Start the engine and let it idle.
4. Separately test each 'leg' of the stator by connecting the meter leads to the wires leading from the alternator (Y1 to Y2, Y1 to Y3, Y2 to Y3). Slowly apply the throttle to increase engine speed **above 2000 RPM**. Alternator Output Readings should be no less than **30-40V AC on each 'leg'**.

NOTE: If stator leg AC output varies significantly from the specified value, the stator may need to be replaced.



Charging System Testing Flow Chart

Whenever charging system problems are suspected, proceed with the following system checks.



BATTERY TESTS

Battery Testing

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

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

OCV – Open Circuit Voltage Test

Battery voltage should be checked with a digital multitester. Readings of 12.6 volts or less require further battery testing and charging. See charts and Load Test.

To perform an open circuit voltage test, set the digital meter to DC volts and place the tester leads on each battery terminal. Minimum voltage should be 12.4 to 12.7 VDC for a known good battery.

OPEN CIRCUIT VOLTAGE	
State of Charge	Maintenance Free
100% Charged	12.6 V
75% Charged	12.4 V
50% Charged	12.1 V
25% Charged	11.9 V
0% Charged	less than 11.9 V
Self Discharge vs. Temperature	
Temperature	Days to 0% Charged
104 °F	300
77 °F	600
32 °F	950

Load Test

⚠ CAUTION

To prevent shock or component damage, remove spark plug high tension leads and connect securely to engine ground before proceeding.

NOTE: This test can only be performed on machines with electric starters. This test cannot be performed with an engine or starting system that is not working properly.

A battery may indicate a full charge condition in the OCV test and the specific gravity test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered. To perform this test, hook a multi-tester to the battery in the same manner as was done in the OCV test. The reading should be 12.6 volts or greater. Engage the starter and observe the battery voltage while cranking the engine. Continue the test for 15 seconds. During cranking, the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.6 volts or higher, and the cranking voltage drops below 9.5 volts during the test, replace the battery and re-test. Continued low cranking voltage with a known good battery may indicate excess current draw from one or more of the starting components.

Battery Terminals / Bolts

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

Battery Maintenance / Inspection / Removal

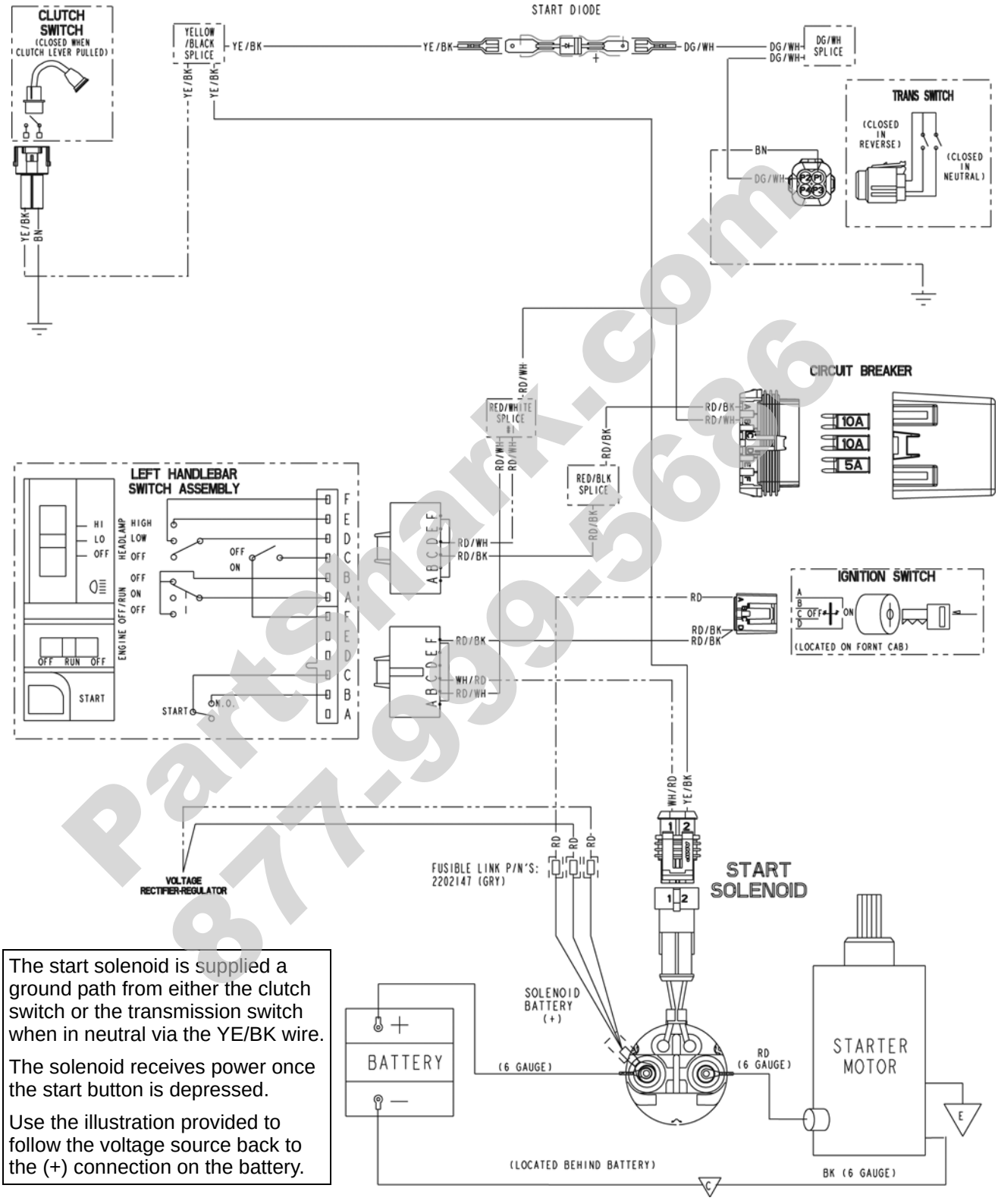
See Chapter 2 “Maintenance” for battery service procedures.

Battery Charging Procedure

See Chapter 2 “Maintenance” for battery charging procedures.

STARTING SYSTEM

Starting System Circuit



The start solenoid is supplied a ground path from either the clutch switch or the transmission switch when in neutral via the YE/BK wire.

The solenoid receives power once the start button is depressed.

Use the illustration provided to follow the voltage source back to the (+) connection on the battery.

Starter System Troubleshooting

Starter Motor Does Not Turn

- Battery discharged. Low specific gravity
- Loose or faulty battery cables or corroded connections (see Voltage Drop Tests)
- Related wiring loose, disconnected, or corroded
- Poor ground connections at battery cable, starter motor or starter solenoid (see Voltage Drop Tests)
- Faulty key switch
- Faulty kill switch
- Faulty neutral diode
- Faulty clutch switch
- Faulty starter solenoid or starter motor
- Engine problem – seized or binding (can engine be rotated easily)?

Starter Motor Turns Over Slowly

- Battery discharged
- Excessive circuit resistance – poor connections (see Voltage Drop Test)
- Engine problem – seized or binding (can engine be rotated easily)?
- Faulty or worn brushes in starter motor
- Automatic compression release inoperative

Starter Motor Turns – Engine Does Not Rotate

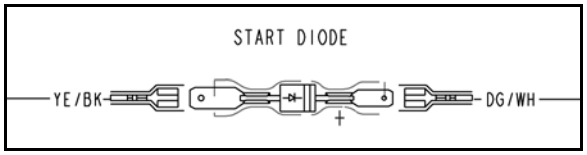
- Faulty starter drive/one way clutch
- Faulty starter drive gears or starter motor gear
- Faulty flywheel gear or loose flywheel
- Possible engine damage

Clutch Switch Test

Refer to "Clutch Switch Test" under the "Lighting and Controls" section of this chapter. Problems with the clutch switch will cause the starter circuit to not operate.

Neutral Start Diode Test

1. Disconnect diode from harness.
2. Using an ohm meter, test for continuity in each direction. The diode should only read continuity in one direction if working properly.



3. Should the diode test good and there is still a problem, check the transmission switch, clutch switch, wiring, and harness connections.

Starter Voltage Drop Testing

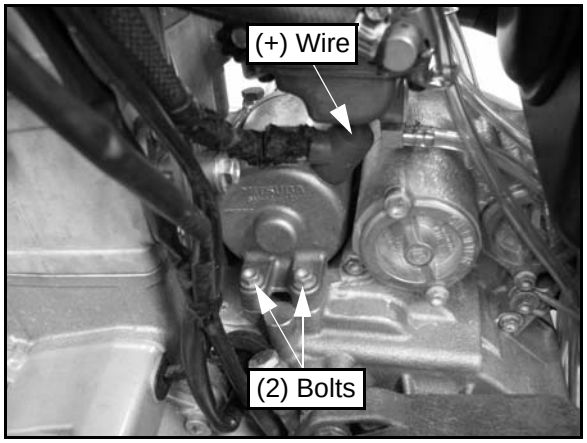
A Voltage Drop Test tests for bad connections. When performing the procedure, you are testing the amount of voltage drop through the connection. A poor or corroded connection will appear as a high voltage reading.

Voltage should not exceed .1 DC volts per connection

To perform the test, place the meter on DC volts and place the meter leads across the connection to be tested.

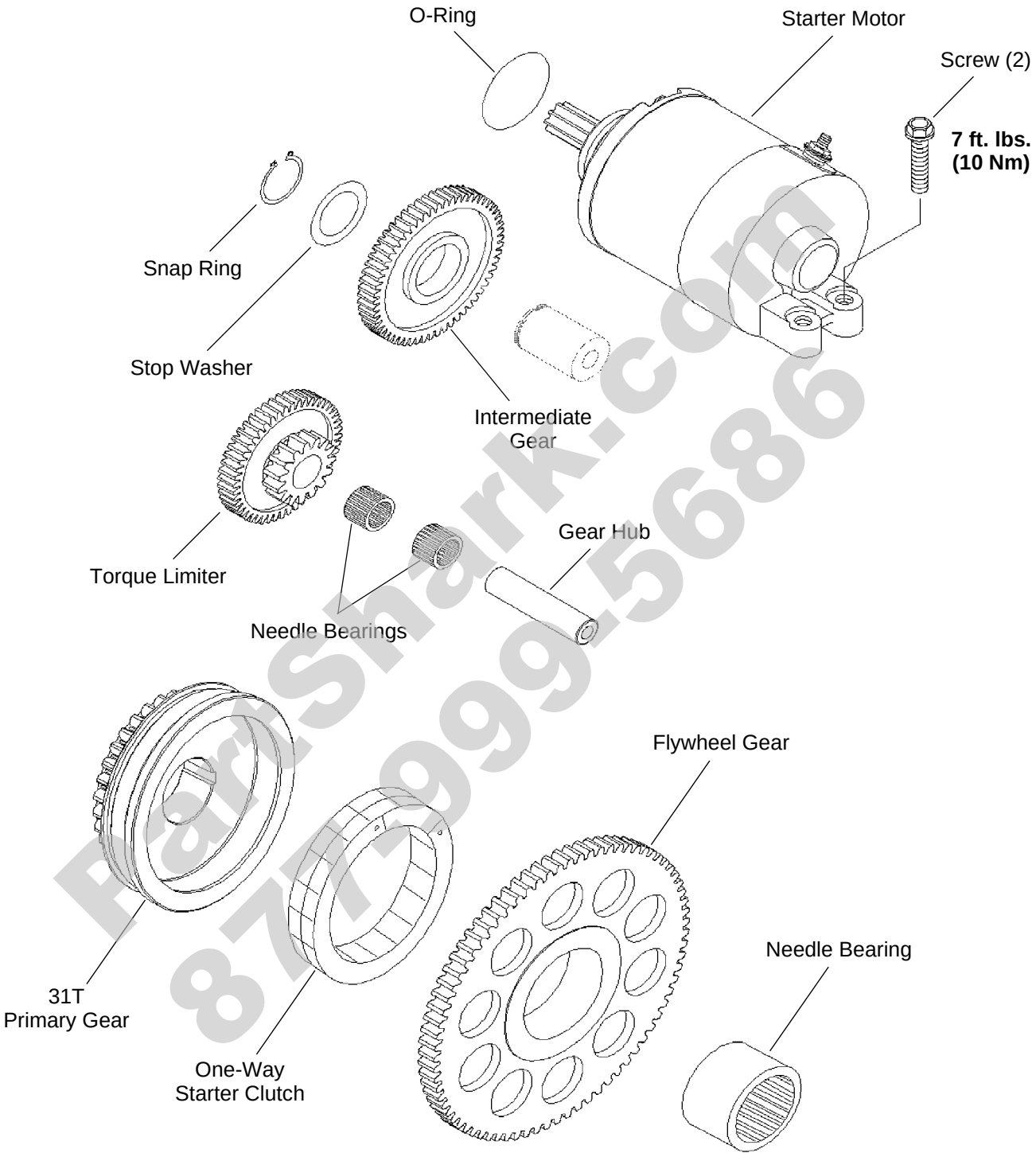
Starter Motor Removal

1. Disconnect the negative battery cable from the battery.
2. Remove the Red positive (+) wire from the starter motor terminal post.



3. Remove the (2) bolts securing the starter motor to the engine case.
4. Carefully pull the starter motor out towards the LH side of the engine to disengage it from the crankcase.

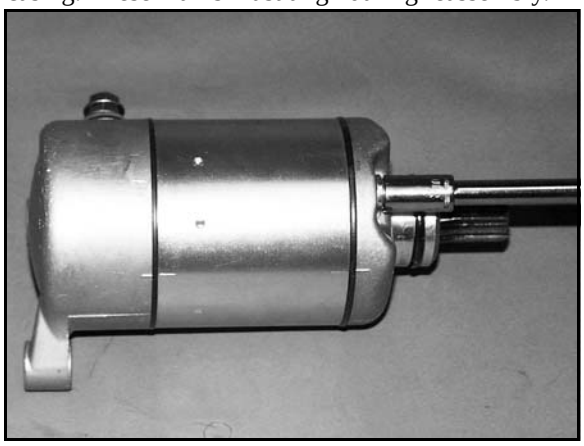
Starter Motor Exploded View



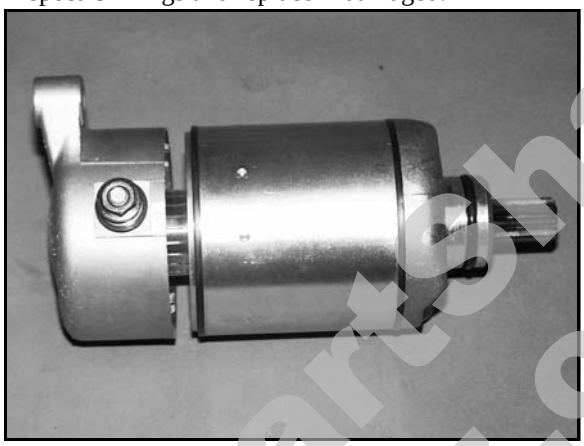
Starter Motor Disassembly

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

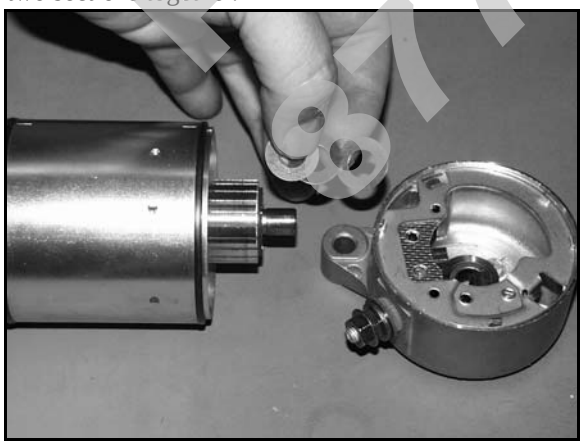
1. Note the alignment marks on both ends of the starter motor casing. These marks must align during reassembly.



2. Remove the two bolts, washers, and sealing O–Rings. Inspect O–Rings and replace if damaged.

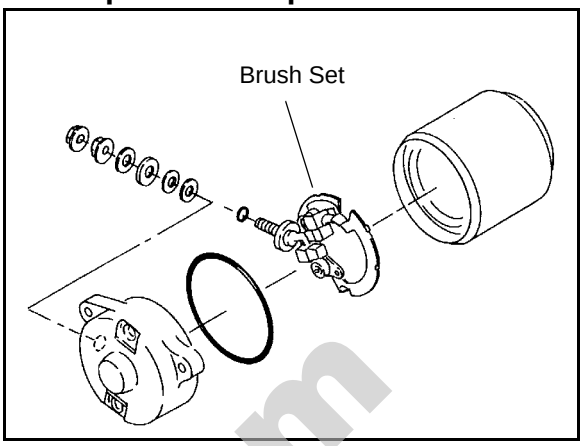


3. Remove brush terminal end of housing while holding other two sections together.

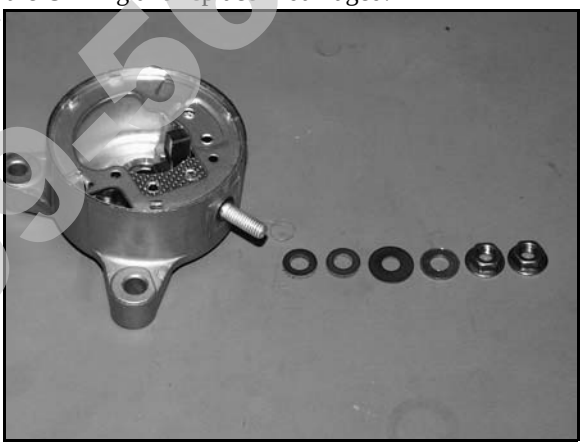


4. Remove shims from armature shaft.
   NOTE: All shims must be replaced during reassembly.

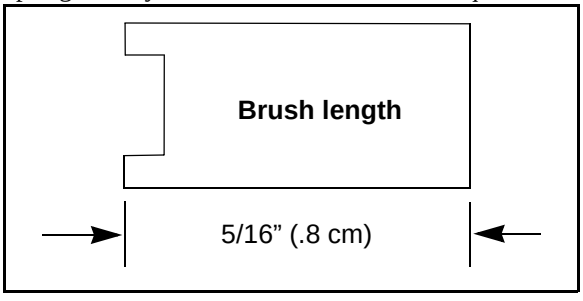
Brush Inspection / Replacement



1. Using a digital multi-tester, measure the resistance between the cable terminal and the insulated brush. The reading should be .3 ohms or less.
2. Measure the resistance between the cable terminal and brush housing. Make sure the brush is not touching the case. The reading should be infinite.
3. Remove nut, flat washer, large phenolic washer, two small phenolic washers, and O–Ring from brush terminal. Inspect the O–Ring and replace if damaged.



4. Remove brush plate and brushes. Measure length of brushes and replace if worn past the service limit. Replace springs if they are discolored or have inadequate tension.



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

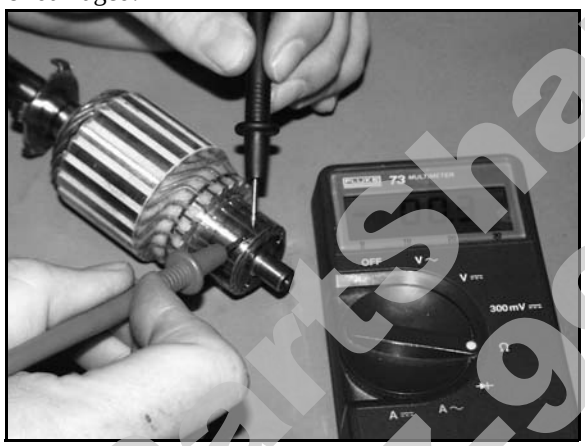
5. Inspect surface of commutator for wear or discoloration. See Steps 3–6 under **"Armature Testing"**.
6. Install a new carbon brush assembly in the brush housing.

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.

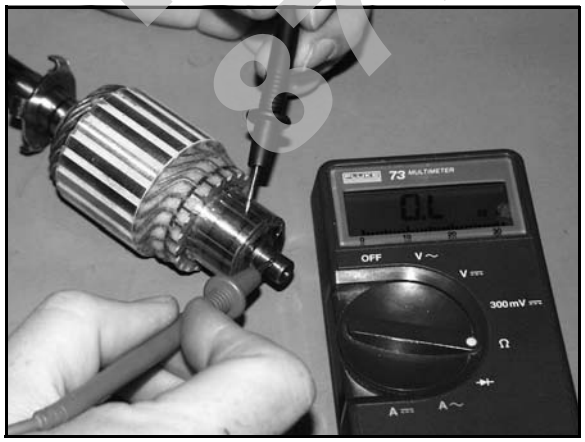
7. Place a wrap of electrical tape on the threads of the terminal bolt to prevent O–Ring damage during reinstallation.
8. Install the O–Ring over the bolt. Make sure the O–ring is fully seated.
9. Remove the electrical tape and reinstall the two small phenolic washers, the large phenolic washer, flat washer, and nut.

Armature Testing

1. Remove armature from starter casing. Note order of shims on drive end for reassembly.
2. Inspect surface of commutator. Replace if excessively worn or damaged.



3. Using a digital multitester, measure the resistance between each of the commutator segments. The reading should be .3 ohms or less.



4. Measure the resistance between each commutator segment and the armature shaft. The reading should be infinite (no continuity).
5. Check commutator bars for discoloration. Bars discolored in pairs indicate shorted coils, requiring replacement of the starter motor.
6. Place armature in a growler. Turn growler on and position a hacksaw blade or feeler gauge lengthwise 1/8" (.3 cm) above armature coil laminates. Rotate armature 360°. If hacksaw blade is drawn to armature on any pole, the armature is shorted and must be replaced.

Starter Reassembly

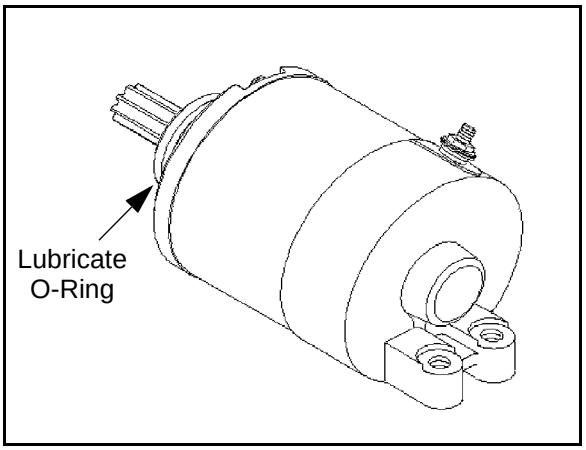
⚠ CAUTION

Use care when handling starter housing. Do not drop or strike the housing as magnet damage is possible. If magnets are damaged, starter must be replaced.

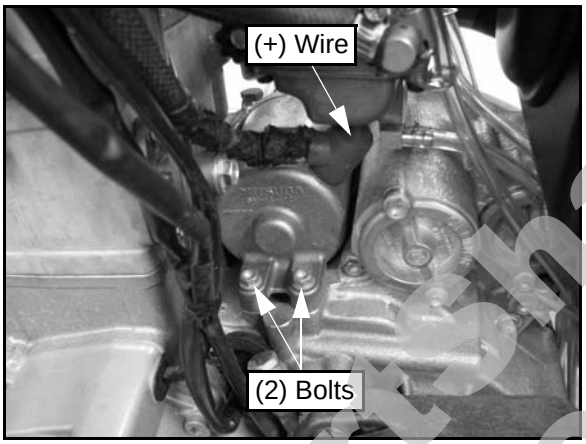
1. Inspect permanent magnets in starter housing. Make sure they are not cracked or separated from housing.
2. Reinstall starter motor housing bolts. Make sure O–Rings are in good condition and seated in groove.
3. Place armature in field magnet casing.
4. Place shims on drive end of armature shaft with phenolic washer outermost on shaft. Engage tabs of stationary washer in drive end housing, holding it in place with a light film of grease.
5. Install case sealing O–Ring. Make sure O–Ring is in good condition and not twisted on the case. Lubricate needle bearing and oil seal with a light film of grease, and install housing, aligning marks.
6. Install O–Ring on other end of field magnet casing. Make sure it is in good condition and not twisted on the case.
7. Align casing marks and install housing, pushing back brushes while installing shaft in bushing.

Starter Motor Installation

1. Lubricate the starter motor external O-ring and carefully install the starter motor into the crankcase.



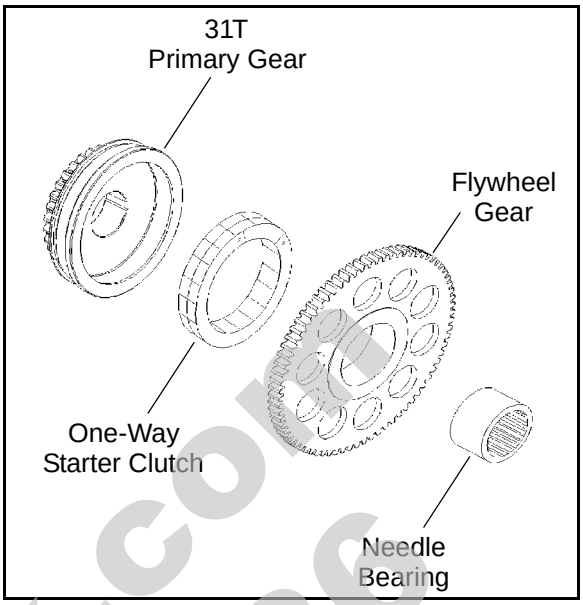
2. Install the (2) bolts and torque to 7 ft. lbs. (10 Nm).



3. Attach the Red positive (+) wire to the starter motor terminal post.

4. Reconnect the negative battery cable to the battery.

Starter One-Way Clutch Inspection



1. Inspect the primary gear teeth and thrust surfaces for excessive wear or damage.

2. Inspect the one way drive clutch rollers and springs for excessive wear or damage.

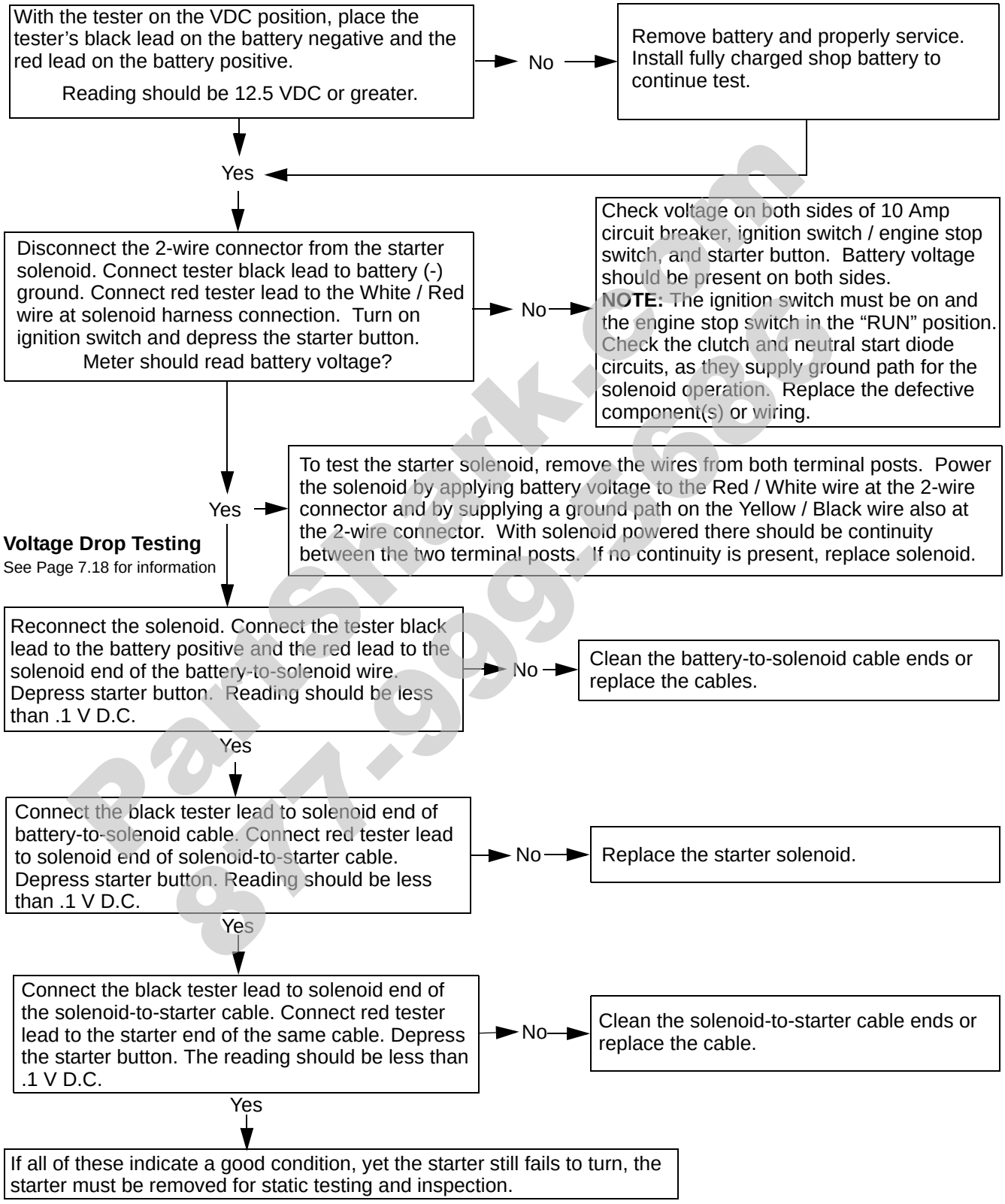
3. Inspect the flywheel gear teeth and needle bearing for excessive wear or damage.

4. Proper function can be determined by rotating the drive gear counterclockwise, which will engage the one-way clutch rollers and turn the flywheel. During engine rotation, there should be no chattering or hanging of the drive gear and one-way clutch. Should this occur, replace faulty components and retest.

Starter System Testing Flow Chart

Condition: Starter fails to turn motor.

NOTE: Make sure engine crankshaft is free to turn before proceeding with dynamic testing of starter system. A digital multi-meter must be used for this test.



NOTES

GENERAL INFORMATION 2

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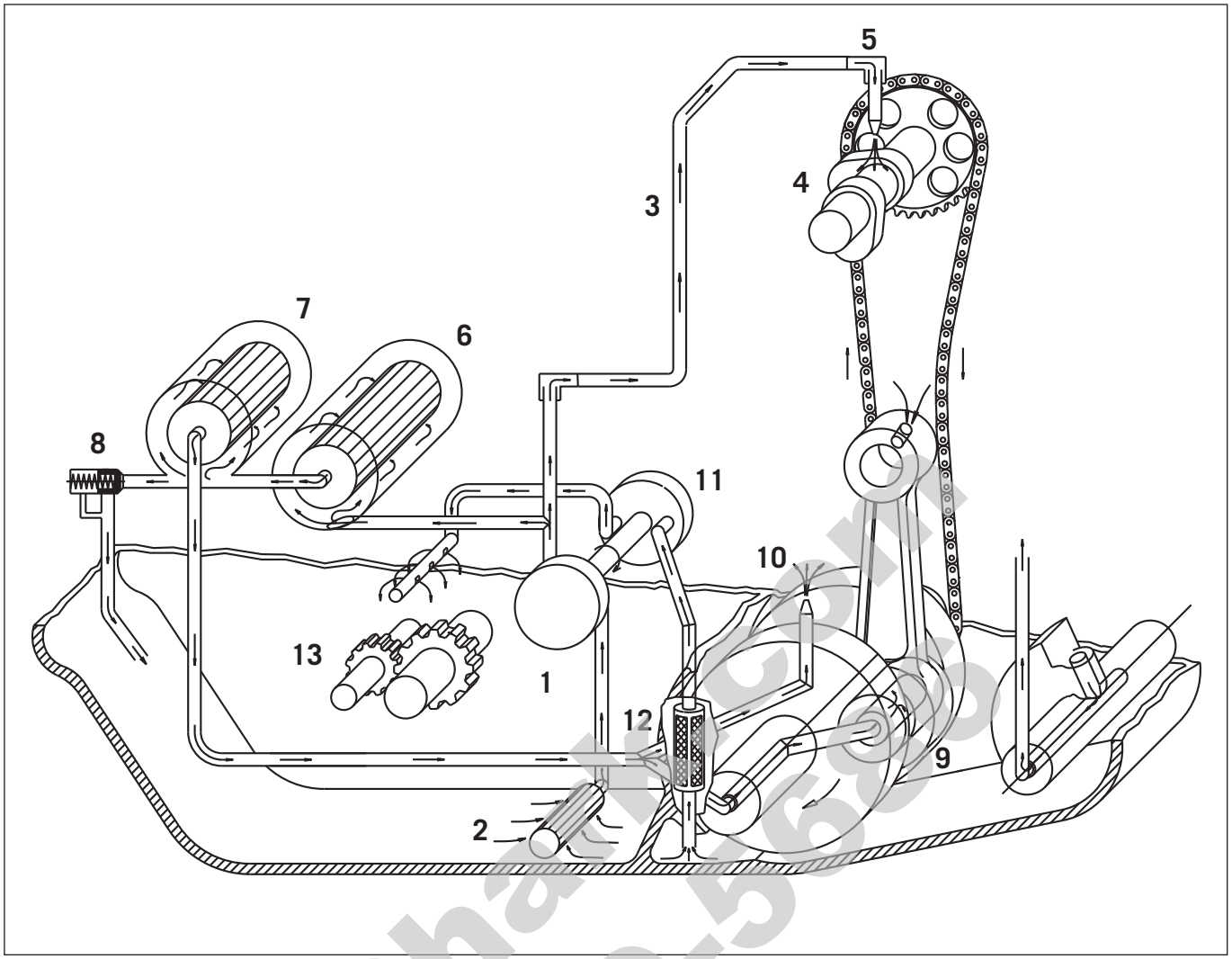


Oil Circuit

Via the long oil screen ❷, the oil pump ❶ draws engine oil from the oil sump of the transmission. This engine oil flows through an oil line ❸ into the cylinder head for camshaft lubrication ❹; the oil quantity is controlled by the jet bolt ❺. An oil duct branches off to the long oil filter ❻ where the coarser particles contained in the engine oil are filtered away. Then, the engine oil arrives at the short oil filter ❼ which also filters the fine particles.
Now, the purified engine oil is pumped past the bypass valve ❽ to the conrod bearing ❾ and sprayed from below onto the piston through a nozzle ❿.
The second oil pump ⓫ draws the engine oil via the short oil screen ⓬ out of the crankcase, thereby lubricating the transmission gears ⓭.

JASO T903 MA

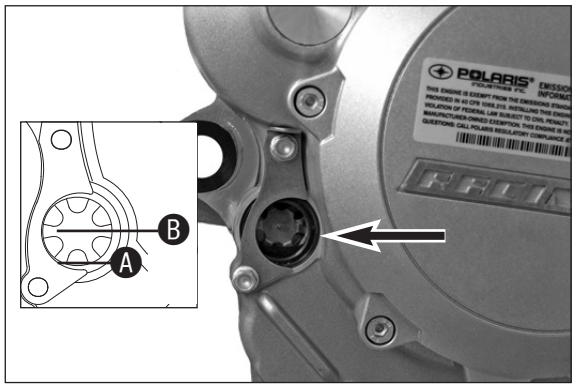
Synthetic 2W-50 Engine Oil

Engine oil

Only use fully synthetic engine oils that meet the JASO MA quality specifications (see information on the container).

Polaris recommends PS-4 Plus 2W-50 Synthetic Engine Oil

PN 2876244 (Quart)
PN 2876245 (Gallon)



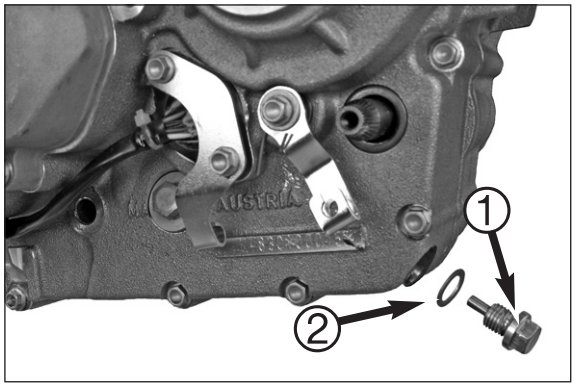
Checking the engine oil level

NOTE: You can check the engine oil level when the engine is cold or warm.

! CAUTION !

INSUFFICIENT ENGINE OIL CAN RESULT IN PREMATURE ENGINE WEAR.

- Place the vehicle on a level surface.
- You should be able to see the engine oil at the lower edge of the inspection glass ❶ when the engine is cold.
- The engine oil should reach the upper edge of the inspection glass ❷ when the engine is warm.
- Add engine oil if necessary.
- Check the engine for leaks.



Changing the engine oil

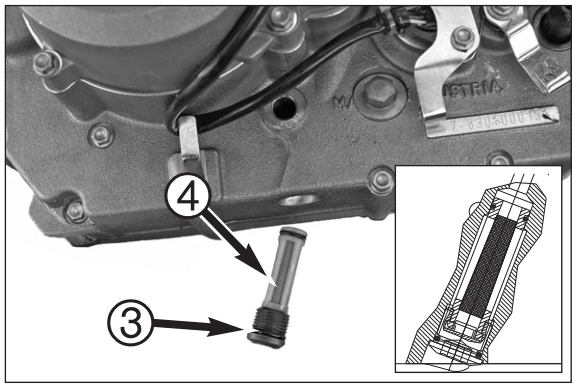
NOTE: clean the short and long oil screen and replace both oil filters when you change the engine oil.

Change the engine oil when the engine is at operating temperature.

⚠ WARNING ⚠

AN ENGINE AT OPERATING TEMPERATURE AND THE ENGINE OIL IT CONTAINS ARE VERY HOT - DO NOT BURN OR SCALD YOURSELF!

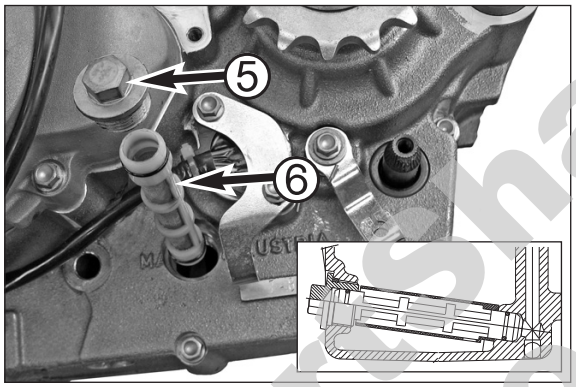
- Position the ATV on a level surface, remove plug ❶ and seal ring ❷ and drain the engine oil into a suitable pan.
- Thoroughly clean the plug (with magnet).
- Allow all of the engine oil to drain, clean the sealing area.
- Mount the plug with a new seal ring and tighten to 20 Nm.



CLEANING THE SHORT OIL SCREEN

NOTE: the short oil screen ❹ is in the AH plug ❸ on the bottom of the engine.

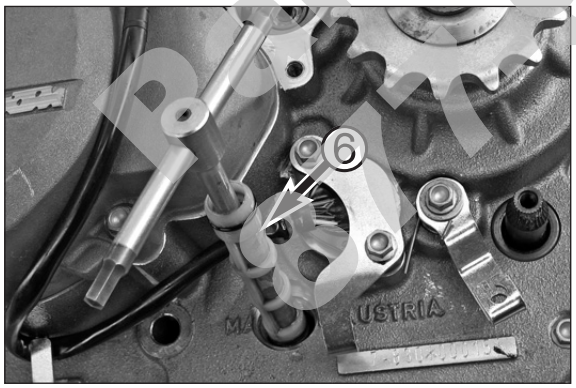
- Strike the head of the oil screen plug ❸ with a suitable hammer before you attempt to remove it. This "shocks" the threads of the plug and makes it easier to remove.
- Remove the plug at the bottom of the engine.
- Remove the oil screen, thoroughly clean the parts and dry with compressed air.
- Check the O-rings for damage and replace if necessary.
- Remount the oil screen and plug and tighten the (oiled) plug to 10 Nm.



CLEANING THE LONG OIL SCREEN

NOTE: the long oil screen ❻ is behind the plug ❺ next to the engine serial number.

- Remove the plug with the oil screen, thoroughly clean the parts with compressed air. Check the O-rings for damage and replace if necessary.



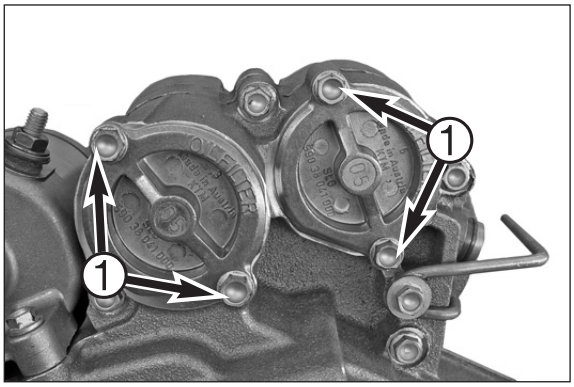
- To mount the long oil screen ❻, place it on a pin wrench or long screwdriver that is approx. 300 mm (12") in length.

NOTE: The large opening of the oil screen should face in towards the inner case.

- Insert the pin wrench through the opening in the hole of the opposite engine case.
- Push the oil screen all the way into the engine case. Remove the pin wrench, mount the plug and tighten to 15 Nm.

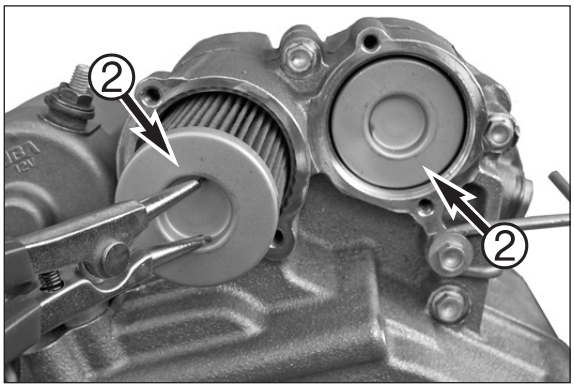
! CAUTION !

THE OIL SCREEN IS MOUNTED SLIGHTLY DOWNWARDS, IF INCORRECTLY FITTED, THE SCREEN LOSES ITS FUNCTION AND THIS CAN CAUSE INCREASED ENGINE WEAR.

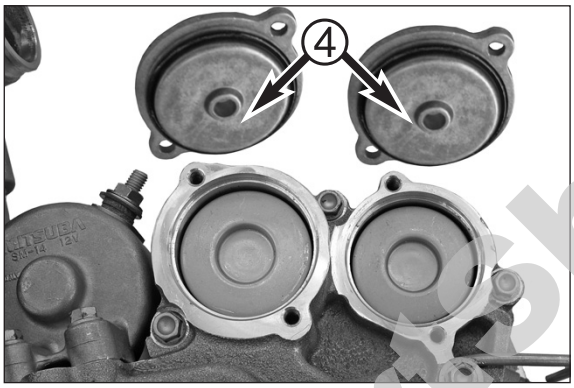


Changing the oil filter

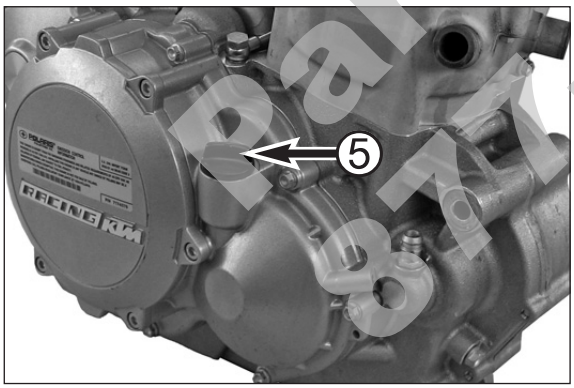
– Place a suitable pan under the engine.
– Remove the 4 screws ❶ and both oil filter covers.



– Use circlip pliers to pull the oil filter inserts ❷ out of the housing.



– Clean the oil filter cover ❹, the sealing areas on the O-rings and the engine case. Replace the O-rings in the oil filter cover.
– Soak new oil filters in fresh engine oil before installation.
– Install new oil filters. Insert the long oil filter in the front and the short oil filter in the back of the housing.
– Lightly oil the O-rings in the oil filter cover and install with cover ❹ Mount the screws and tighten to 6 Nm.



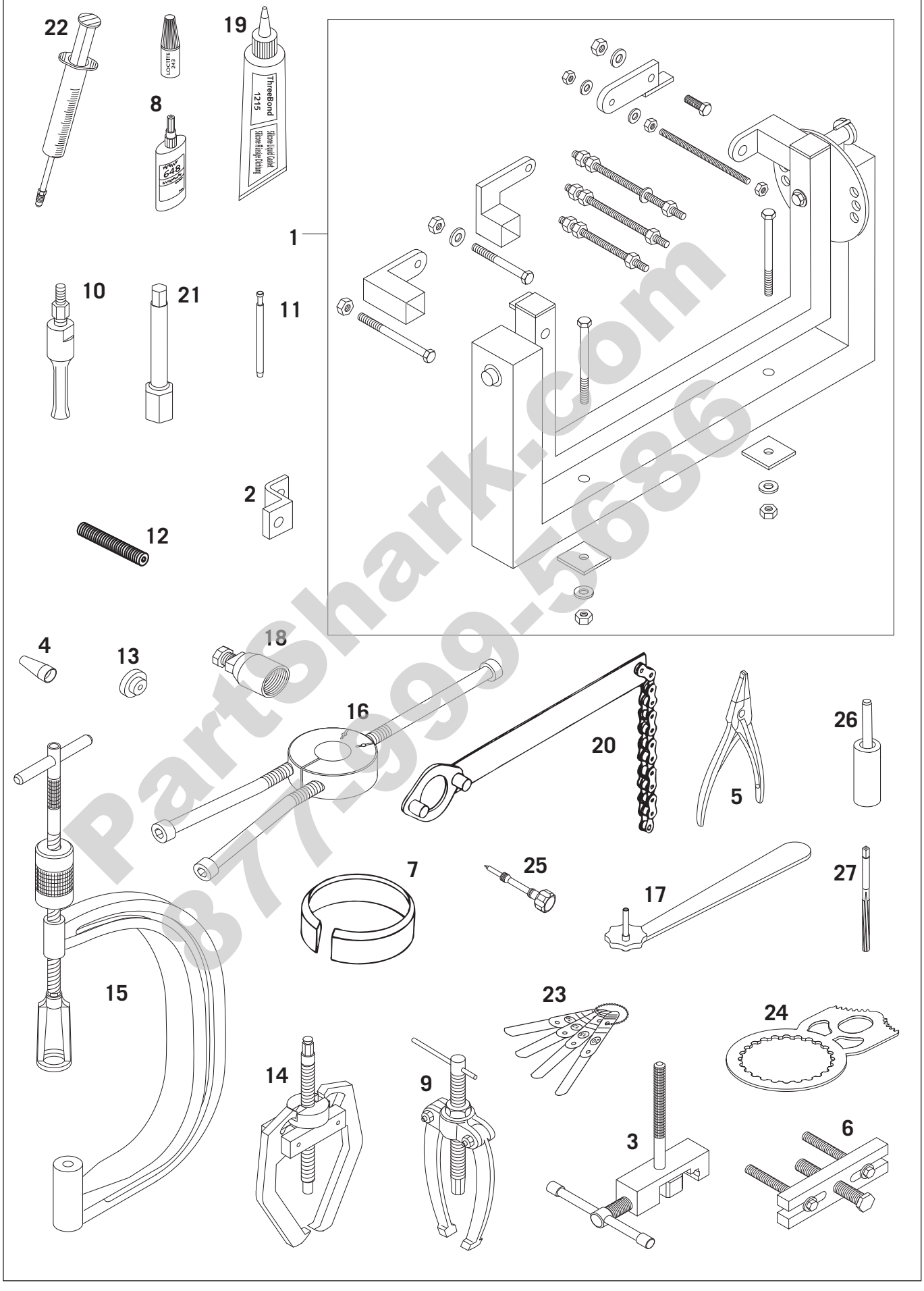
– Remove the screw cap ❺ on the clutch cover and add approx. 1.6 liters of fully-synthetic PS-4 Plus engine oil.

– Mount the screw cap ❺.

– Start the engine and check all screw caps and the oil filter cover for leaks.

– Finally, check the engine oil level and correct if necessary.

SPECIAL TOOLS - ENGINE



SPECIAL TOOLS – ENGINE

FIG	PART NO.	DESCRIPTION
1	*560.12.001.044	Universal engine work stand, complete
2	*590.29.002.000	Engine holder for engine work stand
3	**PA-48686**	Rivetting tool for cam chain
4	**PA-48678**	Water pump seal installer
5	*510.12.011.000	Circlip pliers
6	*590.29.021.044	Puller for driver
7	**PA-48928**	Piston ring compressor Ø 89 mm
7	**PA-48683**	Piston ring compressor Ø 95 mm
8	*6 899 785 *584.29.059.000	Loctite 243 blue 6 cm^3 Loctite 648 green 24 ml
9	*151.12.017.000	Bearing puller
10	**PA-48675**	Internal gear puller 18-23 mm
11	**PA-48676**	Valve guide limit gauge 6,05 mm
12	**PA-48677**	Crankshaft locking tool
14	*590.29.033.000	Puller for camshaft bearings
15	*590.29.019.000	Valve spring mounter
16	**PA-48681**	Main bearing removal tool
17	*590.29.034.000	Wrench for mixture control screw
18	**PA-48680**	Flywheel Puller
19	*309098	Seal (Three-Bond)
20	*510.12.012.000	Chain sprocket holder
21	*590.29.072.000	Spark plug wrench 16 mm
22	**PA-48674**	Hydraulic clutch bleeder
23	*590.29.041.000	Feeler gauge for valve clearance
24	**PA-48685**	Clutch holder
25	*590.31.017.200	Mixture control screw
26	**PA-48682**	Valve guide installation tool
27	**PA-48684**	Valve guide reamer (6 mm)

* These Special Tools are not considered essential to service the engine.
Tools indicated are only offered through KTM SPORTMOTORCYCLE AG, AUSTRIA.

DISASSEMBLING THE ENGINE 4

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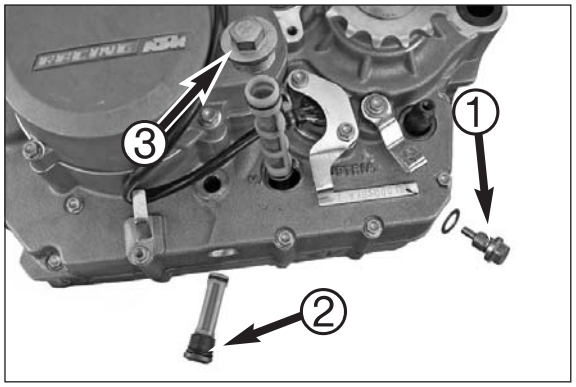
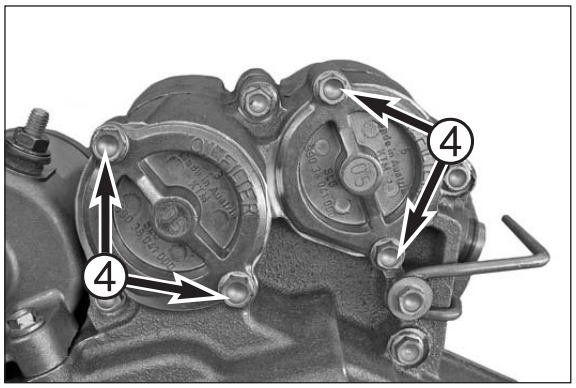


Draining the engine oil

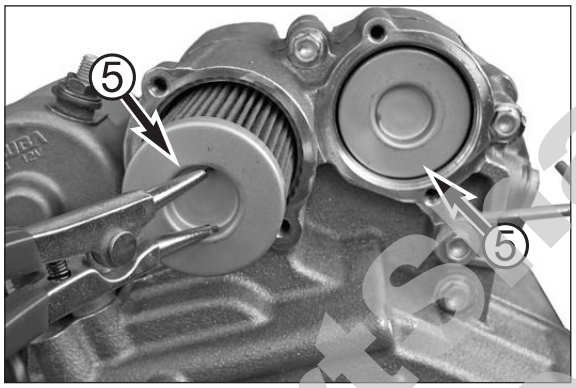
– Remove plugs:
  ❶ with seal ring
  ❷ with short oil screen
  ❸ with long oil screen

– Allow the engine oil to drain in a suitable pan.

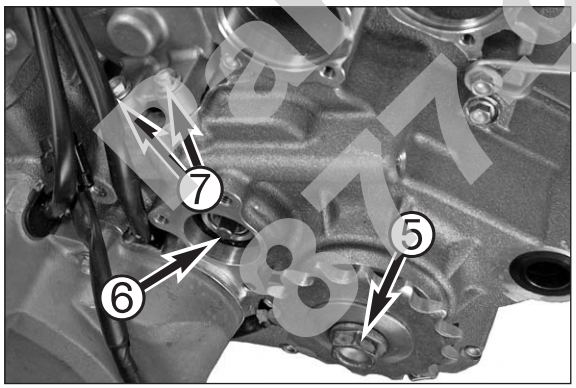


Removing the oil filter

– Remove the 4 screws ❹ and take off both oil filter covers.

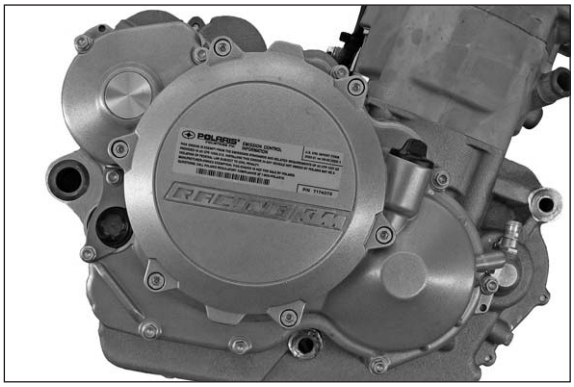


– Use circlip pliers to pull the oil filter insert ❺ out of the housing.



Removing the sprocket and starter engine

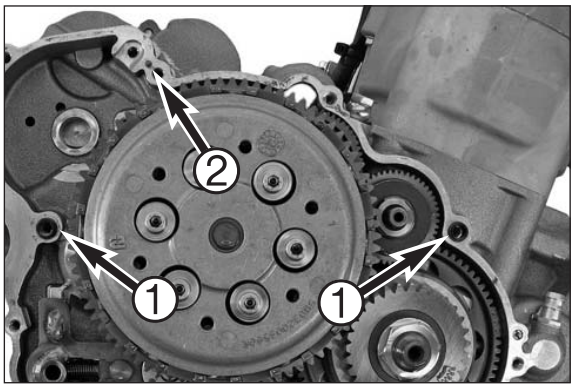
– Remove the collar screw ❺ and spring washer. Use a holding wrench to keep the sprocket 510.12.012.000 from turning.
– Remove the sprocket from the countershaft.
– Pull both distance bushings off the countershaft.
– Pull the pushrod ❻ out of the main shaft.
– Remove the 2 screws ❼ and remove the starter.



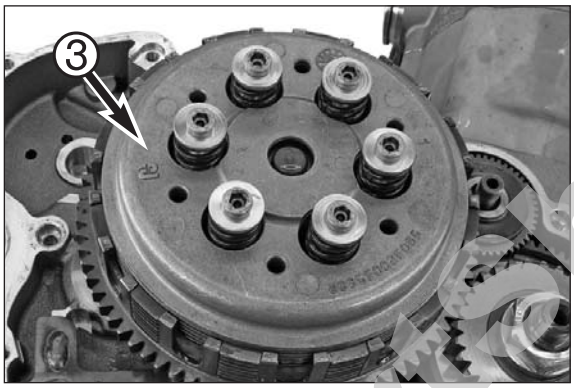
Removing the clutch

– Remove the screws on the clutch cover and take off the clutch cover including the gasket.

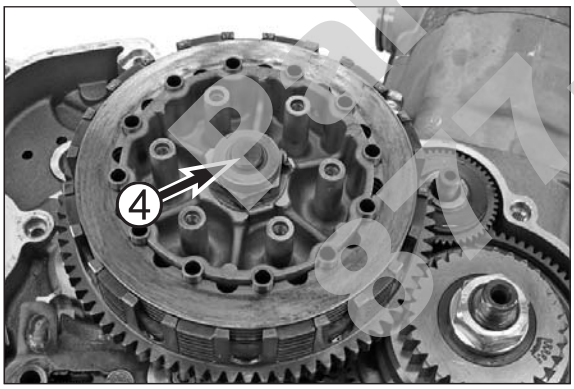
NOTE: You do not need to loosen the screws on the outer clutch cover.



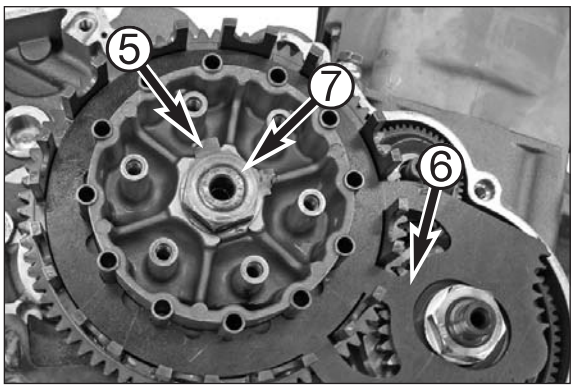
– Pull the 2 dowels ❶ and the needle roller ❷ out of the engine case.



– Loosen the screws in a crosswise direction to prevent the clutch disks from jamming when the clutch springs are relieved.
– Remove the pressure cap ❸ including screws, spring retainer and clutch springs.

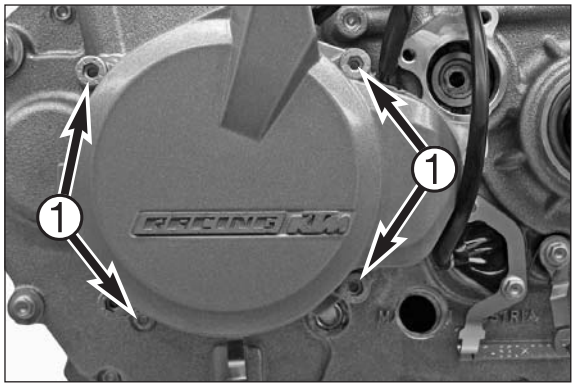


– Remove the pressure piece ❹.
– Remove all lining and clutch disks from the outer clutch hub.



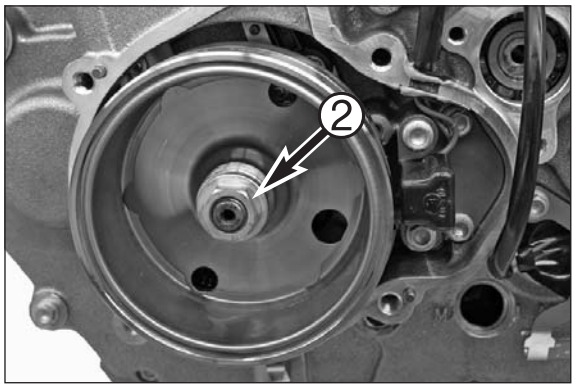
– Bend up the lock washer ❺.
– Mount the clutch holder ❻ PA-48685 together with the driving sleeve as illustrated and remove the nut ❼.

NOTE: leave the clutch holder in place since you will need it when you loosen the flywheel nut.



Removing the ignition cover and loosening the primary gear

– - Remove the 4 screws ❶ and take the ignition cover including gasket off of the engine case.



! CAUTION !

HOLD THE CLUTCH HOLDER WHEN YOU LOOSEN THE NUT ❷. DO NOT HOLD WITH THE ENGINE LOCKING SCREW.

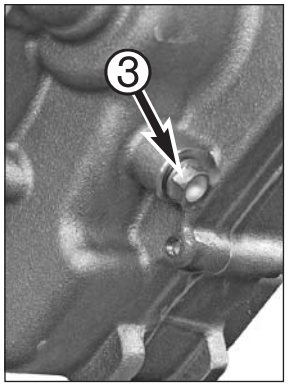
– Hold the previously mounted clutch holder PA-48685 and loosen the nut ❷.
– Remove the clutch holder and driving sleeves.
– Pull the 2 needel rollers out of the engine case.

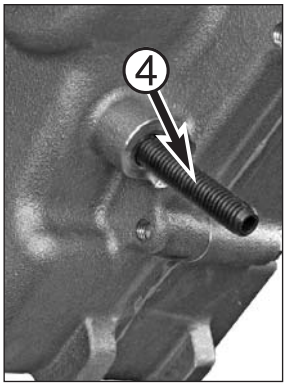
! CAUTION !

COLLAR NUTS MARKED "LEFT" HAVE A LH THREAD.

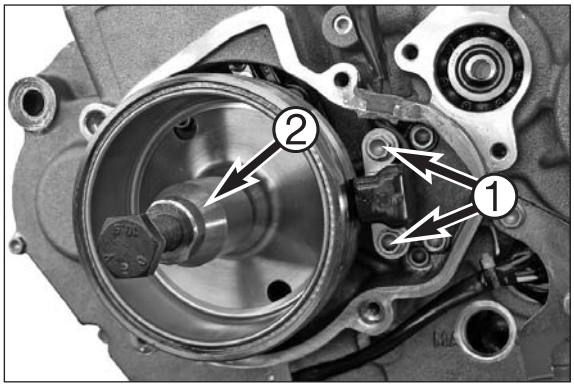
– Hold the clutch holder PA-48685 as shown and remove the collar nut from the primary gear.
– Remove the clutch holder.

– Unscrew the spark plug.
– Turn the crankshaft to the ignition TDC position.





– Unscrew the plug ❸.
– Screw in the crankshaft locking tool ❹ PA-48677 by hand.
– If you feel any resistance, gently turn the flywheel back and forth to allow the engine locking screw to engage in the recess in the crankshaft.
– Tighten the engine locking screw to 10 Nm.

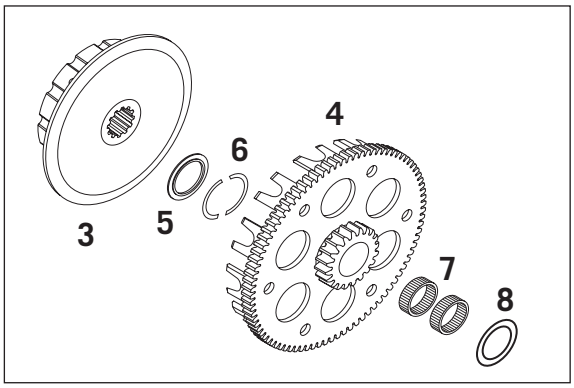


Removing the pulse generator and extracting the flywheel

! CAUTION !

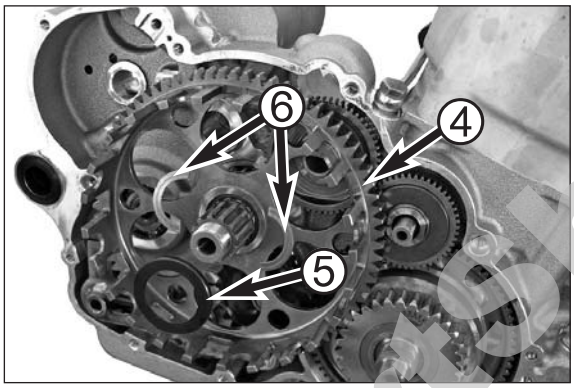
– NEVER STRIKE THE FLYWHEEL WITH A HAMMER OR OTHER TOOL. THIS COULD SEPARATE THE MAGNETS FROM THE FLYWHEEL AND DAMAGE THE CRANKSHAFT.
– HOLD WITH THE MAGNETO EXTRACTOR TO PREVENT THE ENGINE LOCKING SCREW FROM BENDING.

– Loosen the cable on the pulse generator.
– Remove the 2 screws ❶ and take off the pulse generator.
– Mount the flywheel puller ❷ PA-48680 and extract the flywheel. Use the protection cover when extracting.
– Remove the woodruff key from the crankshaft.

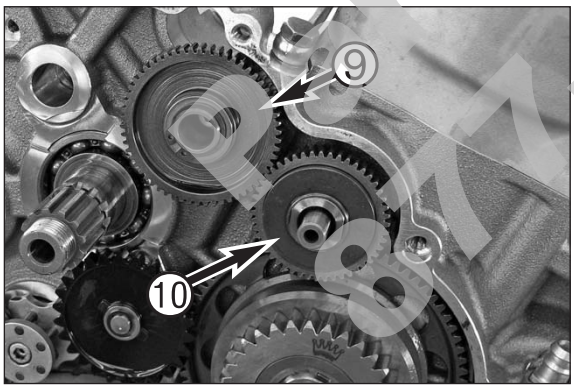


Removing the clutch drive and outer clutch hub

– Pull the driver ❸ from the main shaft. If necessary, insert the protection cover in the main shaft and use a puller.

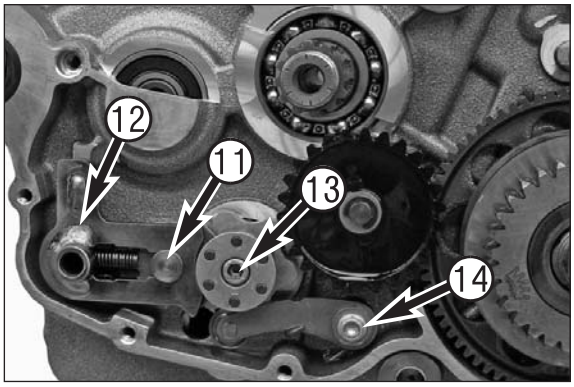


– Remove the outer clutch hub ❹ together with the stepped disk ❺ and the 2 half disks ❻ from the main shaft.
– Remove both needle bearings ❼ and the supporting plate ❽.



Removing the starter drive

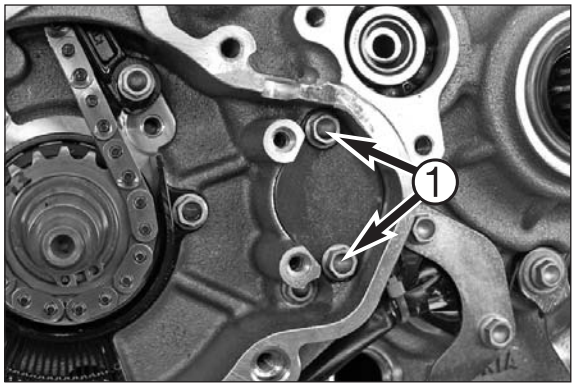
– Remove the circlip and stop disk. Remove the starter idler gear ❾.
– Pull the torque limiter ❿ and both needle bearings off the bearing bolt.



Removing the shift lock

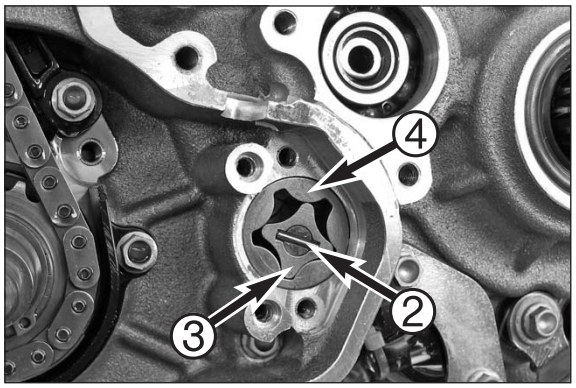
– Push back the shift rail ⓫ and pull the shift shaft ⓬ and stop disk out of the engine case.
– Remove the screw ⓭ and the shift lock.
– Remove the screw ⓮, take off the lock lever together with the bushing and spring.

NOTE: The lock lever only needs to be removed if the engine case is being replaced.

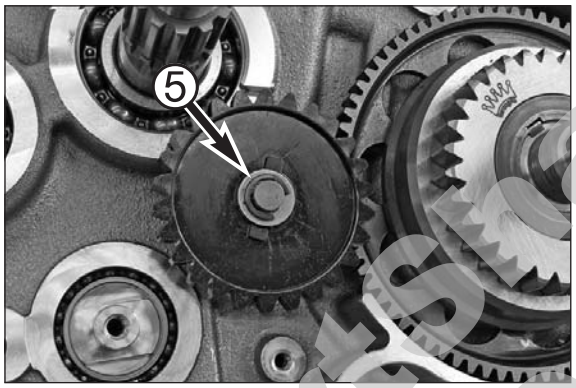


Removing the oil pump

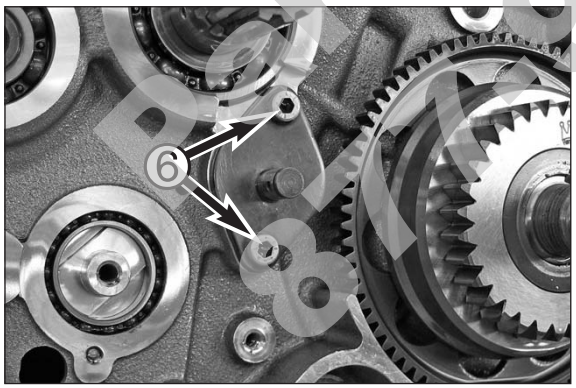
– Remove the 2 screws ❶ and take off the oil pump cover.



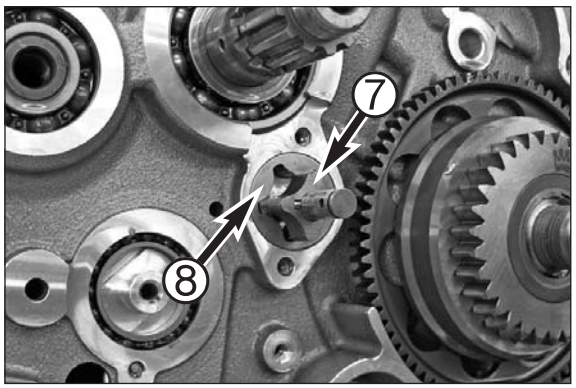
– Pull the needle roller ❷, inner rotor ❸ and outer rotor ❹ out of the oil pump housing.



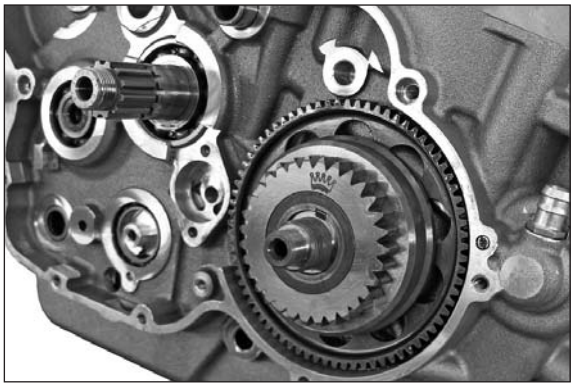
– Remove the lock washer ❺. Pull the stop disk, oil pump gear and needle roller off of the oil pump shaft.



– Remove the 2 screws ❻ and take off the oil pump cover.

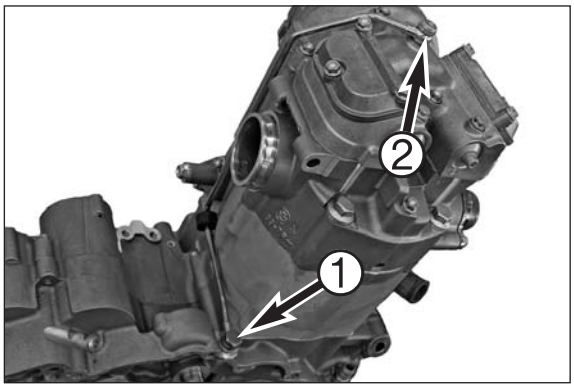


– Take the oil pump shaft together with the needle roller, inner rotor ❼ and outer rotor ❽ out of the engine case.



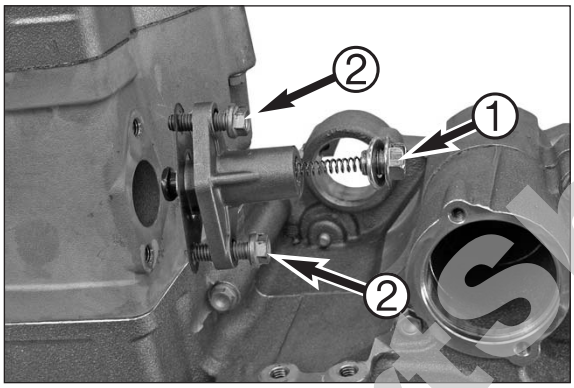
Removing the primary gear and freewheel

– Mount the puller 590.29.033.000 and pull the primary gear and freewheel off of the crankshaft.
– Make sure the woodruff key stays in place.



Removing the oil line

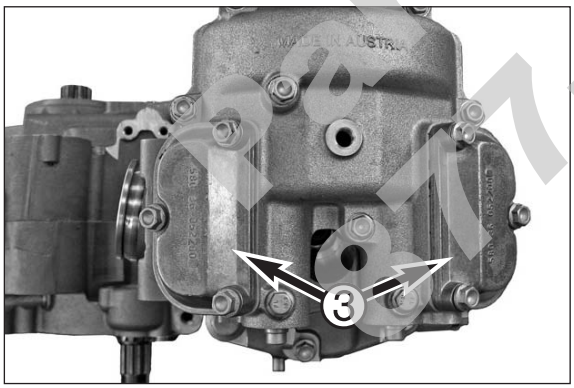
– Remove the banjo bolt ❶ and jet bolt ❷ with the seal rings and remove the oil line.



Removing the timing chain tensioner

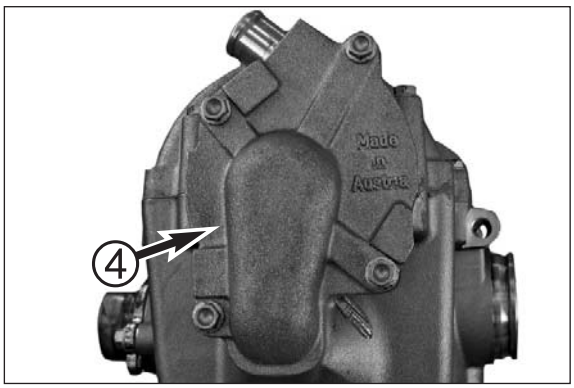
– Remove the screw ❶ together with the seal ring and pressure spring.
– Remove the 2 screws ❷ and remove the timing chain tensioner together with the gasket.

NOTE: The piston must be in the ignition TDC position and the crankshaft held in place with the engine locking screw.

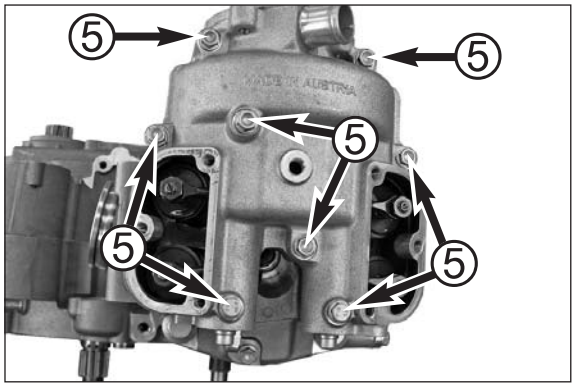


Removing the cylinder head top section

– Remove the 6 screws together with the seal rings and take off both valve covers ❸ with the gaskets.

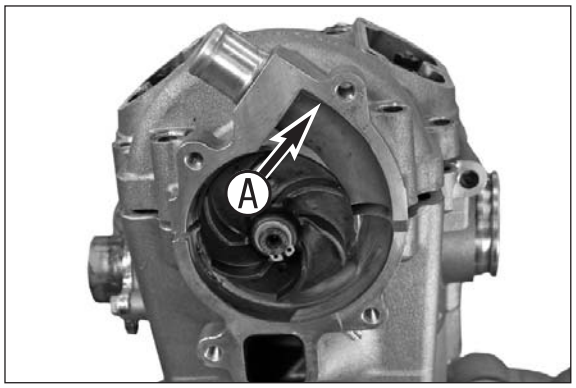


– Remove the 4 screws and take off the water pump cover ❹ with the gasket.

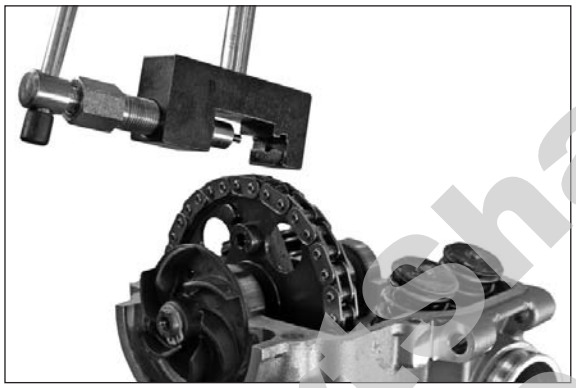


– Loosen and remove all 8 bolts ❺ of the upper cylinder head part.

NOTE: The rocker arm pin through-bolts may show signs of wear. Replace the bolts if there are any signs of wear from contact with the rocker arm pins.



– Use a plastic hammer to carefully tap upwards in area Ⓐ and lift off the upper cylinder head part.



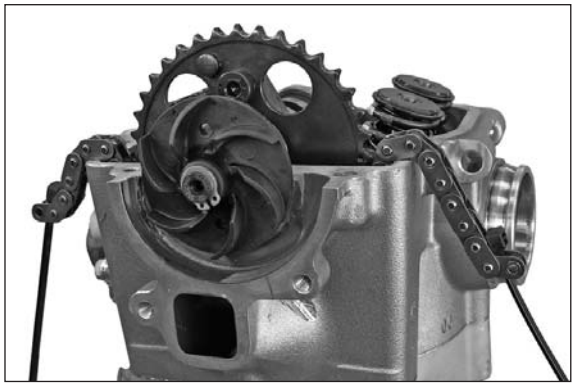
Removing the cylinder head, cylinder and piston

! CAUTION !

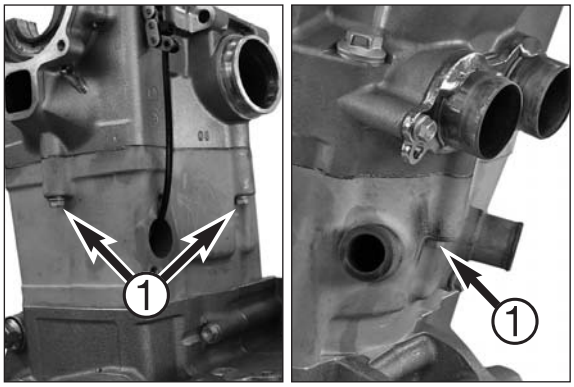
– Make sure that the pushed-out bolts do not fall into the engine.
– Prevent the timing chain from falling into the chain tunnel.
– The opened rivet link is to be discarded.

– Apply the timing chain separating tool PA-48686 and open the timing chain by turning the spindle.

NOTE: Every rivet link of the timing chain can be opened.

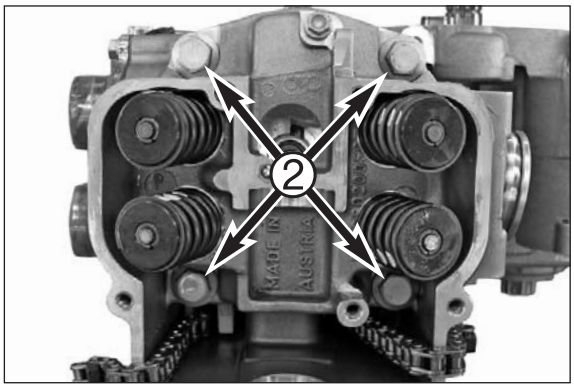


– To keep the timing chain from falling into the chain tunnel, you should insert a cable tie through the ends of the timing chain.
– Extract the camshaft from the cylinder head.

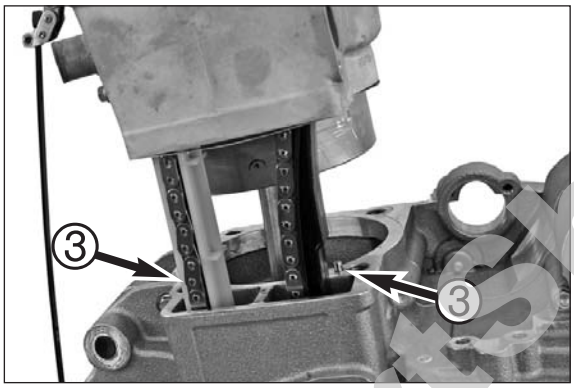


– Remove the 3 bolts ❶.

NOTE: If no repairs to the cylinder and cylinder head are necessary, the 3 bolts do not need to be removed. You can dismount the cylinder and the cylinder head as one. In this case, the cylinder head gasket does not need to be replaced.

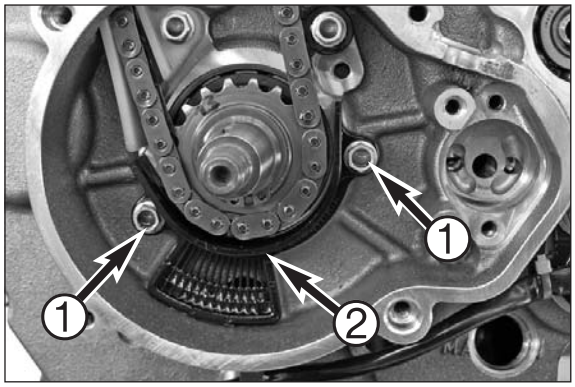


– Remove the 4 cylinder-head bolts ❷ together with the washers and dismount the cylinder head together with the cylinder head gasket.
– Do not lose the dowels.



– Pull the cylinder upward while holding the piston.
– Do not lose the two needle rollers ❸.

– Remove the wire circlip ❹ and the push piston pin from the piston. Dismount the piston.

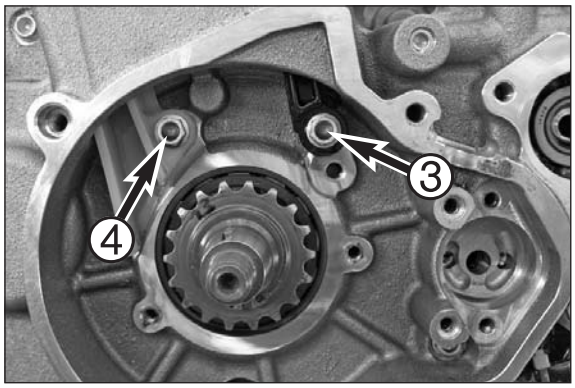


Removing the timing chain and timing gear

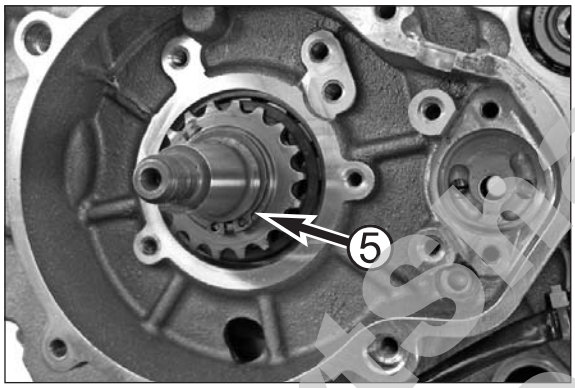
– Loosen the 2 bolts ❶ and dismount the fall-out protection element ❷.

NOTE: If the cam chain will be reused, mark the chain with an arrow so it can be installed in the same direction.

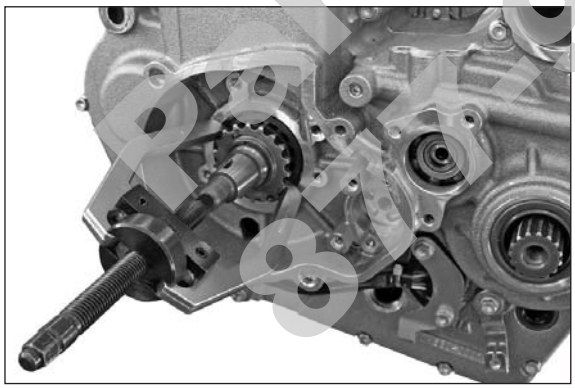
– Remove the timing chain.



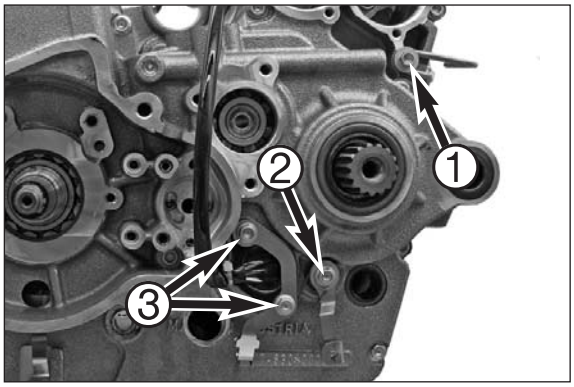
– Remove the bolts ❸ and ❹. Pull the timing chain tensioner and the timing chain guide upward out of the engine casing.



– Remove circlip ❺.

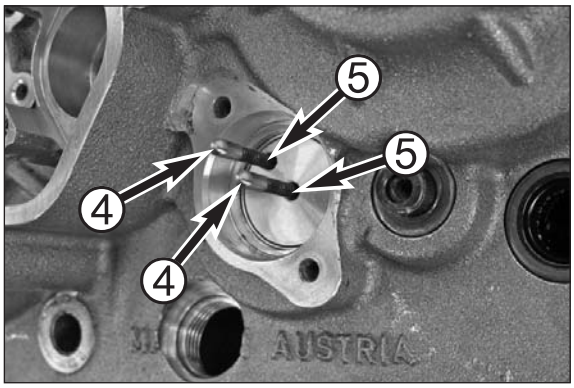


– Apply the puller tool 590.29.033.000 and pull the timing gear off the crankshaft.
– Do not lose the Woodruff key.

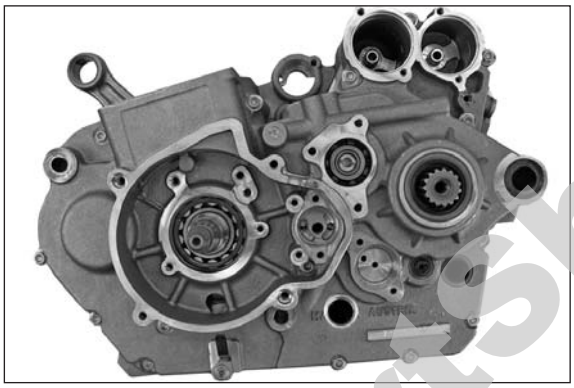


Removing the gear sensor and locking lever

– Remove the screw ❶. Remove the clip for the vent hose.
– Remove the screw ❷. Remove the locking lever including spring.
– Remove the 2 screws ❸. Remove the gear sensor including the retaining bracket.

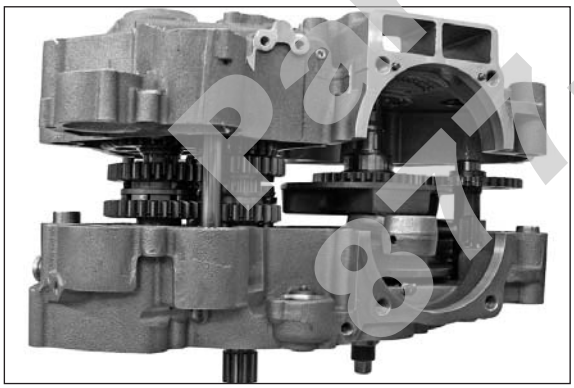


– Take the 2 contact pins ❹ including contact spring ❺ out of the shift drum.



Removing the shift mechanism and transmission

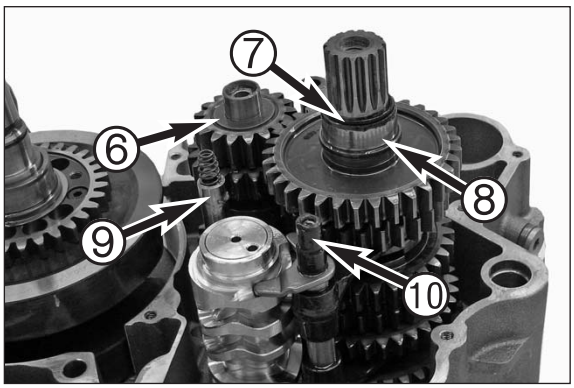
– Remove the engine locking screw.
– Remove all 16 screws from the case.



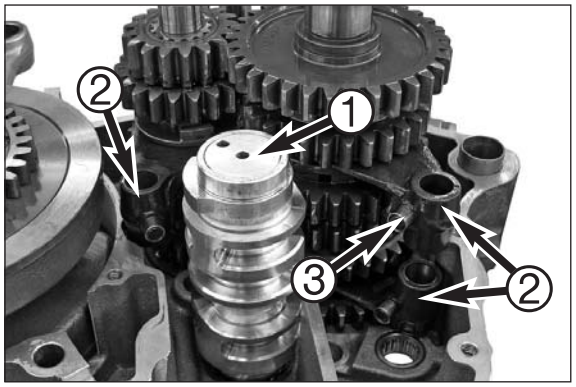
! CAUTION !

DO NOT USE A SCREWDRIVER OR OTHER TOOL TO PRY UP THE SCREWS SINCE THE SEALING AREA IS EASILY DAMAGED.

– Turn the engine on its side.
– Remove the engine holder on the engine work stand.
– Use a suitable tool to lift off the left case half at the designated runners on the case or separate by tapping lightly with a plastic hammer.
– Remove the left case half.
– Pull the 2 dowels out of the engine case and fasten the right case half to the engine work stand.

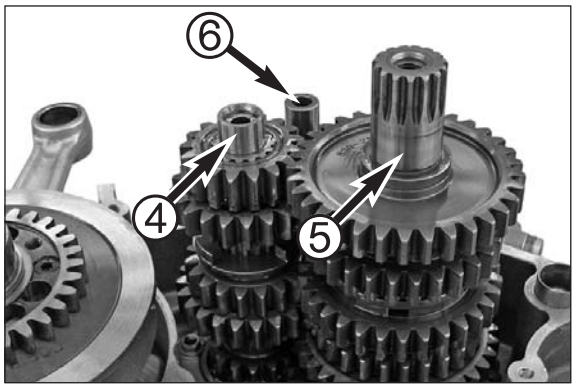


– Remove the stop disk ❻, O-ring ❼ and inner ring ❽.
– Pull the shift rail ❾ including the 2 springs out of the engine case and turn the shift fork to the side.
– Pull the shift rail and lock ❿ out of the engine case and turn the shift forks to the side.

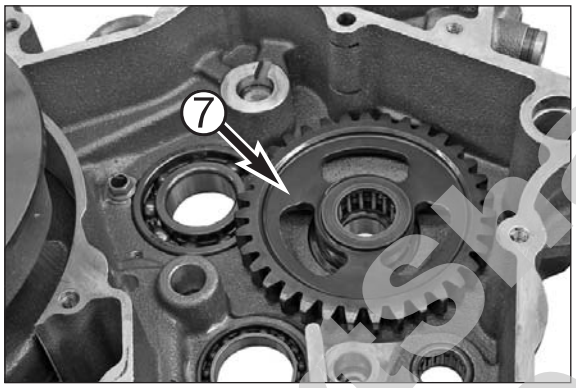


– Pull the shift drum ❶ out of the bearing seat.
– Remove the shift forks ❷.

NOTE: Pay attention to the shift rolls ❸ on the driver bolt for the shift forks during disassembly.



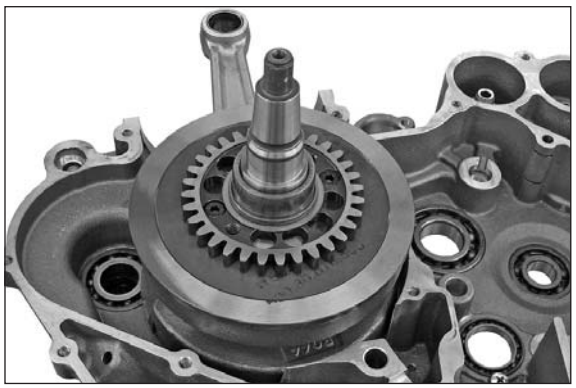
– Simultaneously pull the main shaft ❹, countershaft ❺ and reverse gear shaft ❻ out of the bearing seats.



– Remove the 1st gear idler gear ❼, needle cage and both stop disks from the engine case.

Removing the balancer shaft and crankshaft

– Turn the crankshaft until the marks on the balancer shaft and crankshaft coincide.
– Pull the balancer shaft out of the bearing seat in this position.



– Pull the crankshaft out of the bearing seat.

– Clean all parts and check for wear. Replace if necessary.

NOTE: we recommend that all seals, shaft seal rings, O-rings and bearings are replaced during a complete engine overhaul.

SERVICING INDIVIDUAL COMPONENTS 5

INDEX

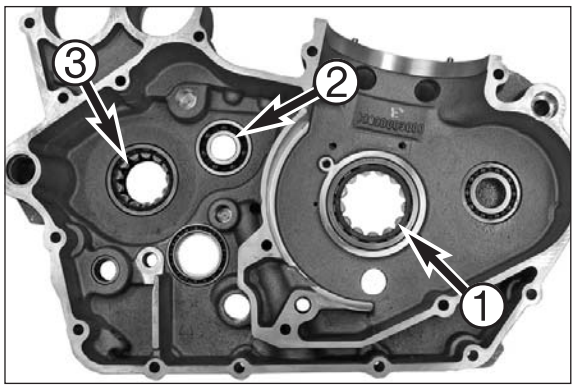
IMPORTANT NOTE TO WORKING ON THE ENGINE CASE

Read this section before you start to work on the engine case. Plan the precise order of assembly so that you can insert the bearings the first time the case halves are heated.

To press or tap out the bearings, remove the dowels and needle rollers and place the engine case half on a large, level surface (a wooden panel works fine). Make sure the entire sealing area of the engine case half rests on the surface to avoid damage.

If possible, bearings or shaft seal rings should not be hammered or tapped in at all. If you do not have a pressing tool, carefully tap them in with a suitable pin. Cold bearings usually fall into the bearing seats automatically at an engine case temperature of approximately 150°C.

If the bearings do not fit tightly in their mounts, they may turn when the engine case is heated. In this case the engine case must be replaced.



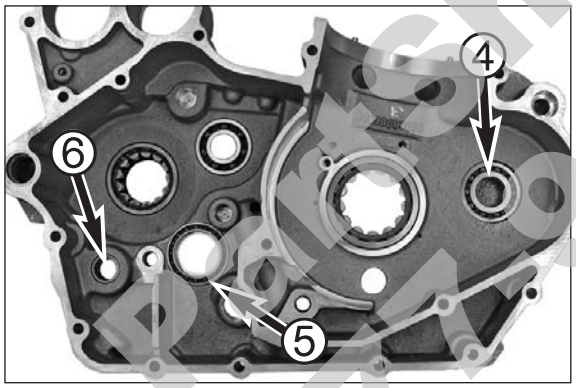
Left case half

Remove all shaft seal rings and heat the case half in the oven to approx. 150°C.

Roller bearing for the crankshaft ❶
Press in the roller bearing from the outside with a suitable drift. Press in a new roller bearing from the inside up to the stop.

Grooved ball bearing for the main shaft ❷
Press in a grooved ball bearing from the outside with a suitable drift. Press in a new grooved ball bearing from the inside up to the stop.

Grooved ball bearing for the countershaft ❸
Press in the grooved ball bearing with a suitable drift from the outside. Press in a new roller bearing from the inside up to the stop.

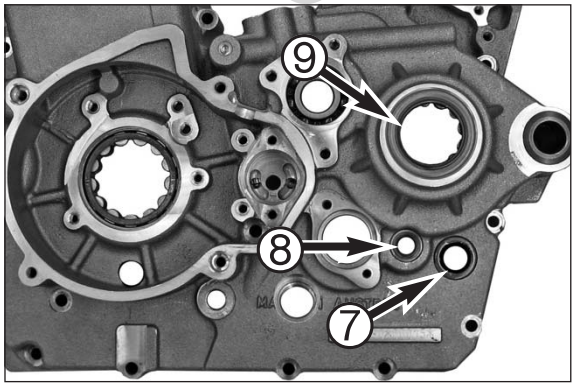


Grooved ball bearing for the balancer shaft ❹
Pull the grooved ball bearing out of the case half with a bearing puller. Press in a new grooved ball bearing up to the stop.

Grooved ball bearing for the shift drum ❺
The grooved ball bearing will almost fall out of the bearing seat automatically when the case reaches a temperature of approx. 150°C. If necessary, tap the case half on a level wood panel. Press in a new grooved ball bearing until flush.

Needle bearing for the shift shaft ❻
Press in the needle bearing from the outside.
Press in a new needle bearing from the inside until flush.

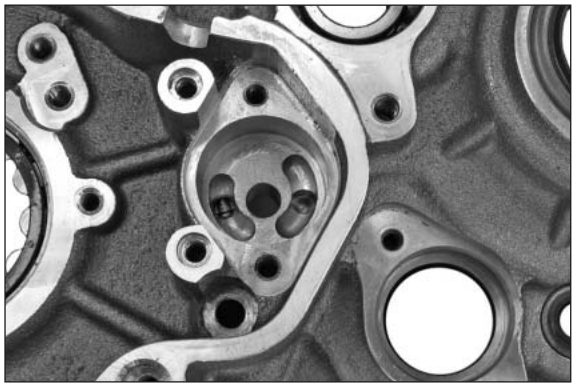
When the case half has cooled, check the bearings for a tight fit.



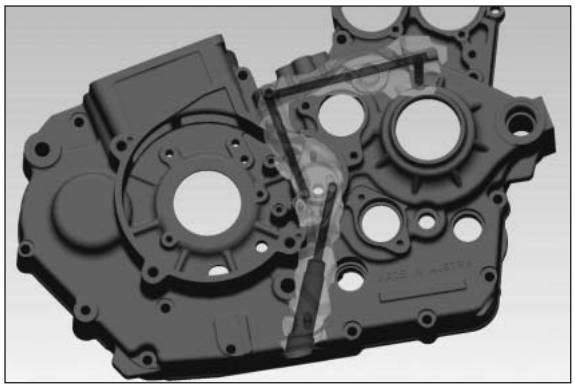
Shaft seal ring for the shift shaft ❼
Press in a new shaft seal ring from the outside.

Press in a new needle bearing from the inside until flush ❽
Press in a new shaft seal ring from the outside with the open side on the inside until flush.

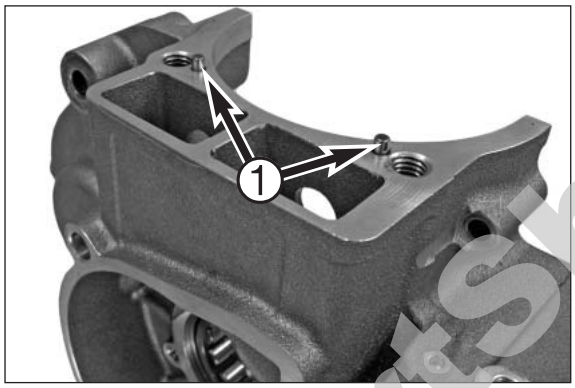
Shaft seal ring for the countershaft ❾
Press in a new shaft seal ring from the outside with the open side on the inside until flush.



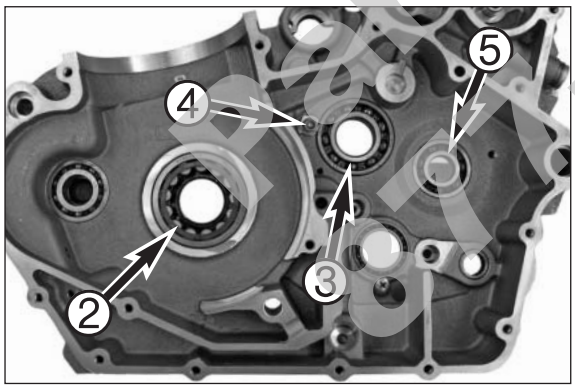
Make sure the oil pump housing has no score marks or seizing marks.



Blow compressed air through all of the oil ducts and make sure they are not clogged.



Check whether the 2 dowel pins ❶ fit tightly and lock in place with Loctite 243 if necessary.



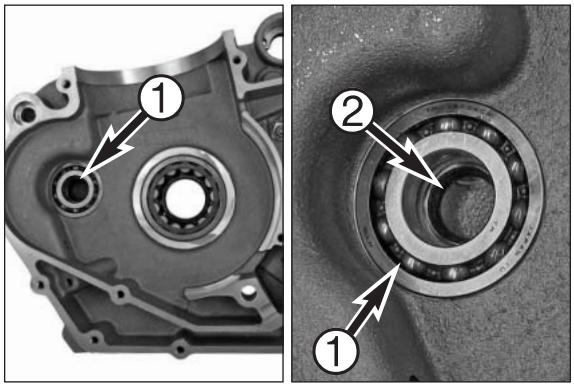
Right case half

Remove all shaft seal rings and heat the case half in the oven to approximately 150°C.

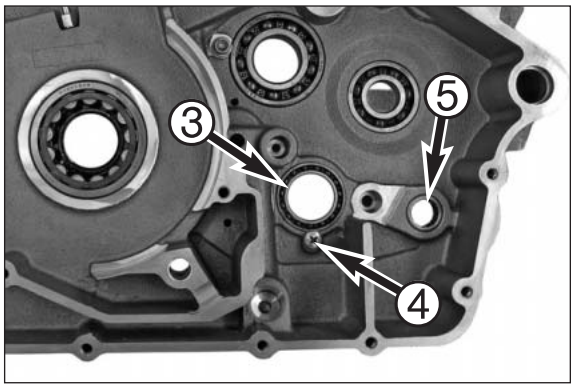
Roller bearing for the crankshaft ❷
Press in the roller bearing from the outside with a suitable drift. Press in a new roller bearing from the inside up to the stop.

Grooved ball bearing for the main shaft ❸
Remove the screw ❹.
Press in a grooved ball bearing from the outside with a suitable drift. Press in a new grooved ball bearing from the inside up to the stop. Apply Loctite 243 to the thread of the screw ❹ and tighten to 6 Nm.

Grooved ball bearing for the countershaft ❺
Pull the grooved ball bearing out of the case half with a bearing puller. Press in a new grooved ball bearing (sealed side towards the outside) from the inside to the stop.



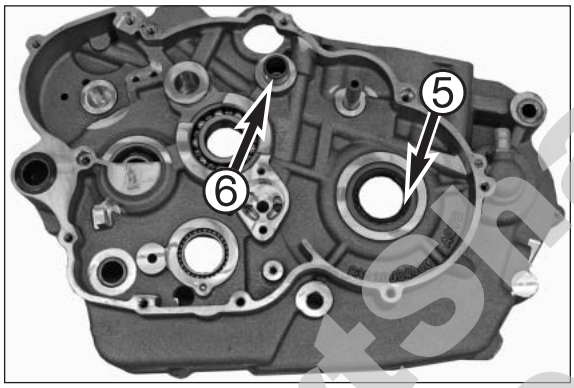
Pull the grooved ball bearing ❶ and shaft seal ring ❷ for the balancer shaft.
Pull the grooved ball bearing out of the case half with a bearing puller and pry out the shaft seal ring.
Press in a new shaft seal ring until flush with the open side facing down.
Press in a new grooved ball bearing up to the stop.



Grooved ball bearing for the shift drum ❸
Remove the screw ❹.
The grooved ball bearing will almost fall out of the bearing seat automatically when the case reaches a temperature of approx. 150°C.
If necessary, tap the case half on a level wood panel. Press in a new grooved ball bearing until flush. Apply Loctite 243 to the thread of the screw ❹ and tighten to 6 Nm.

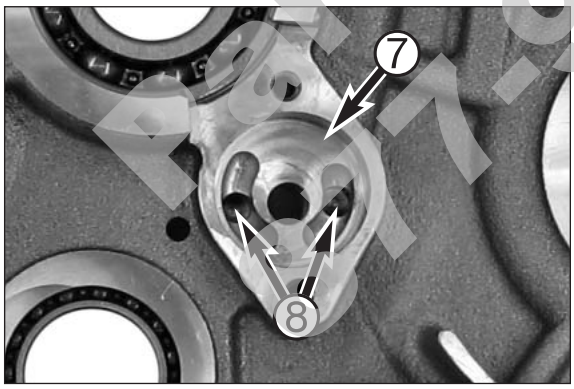
Needle bearing for the shift shaft ❺
Press in the needle bearing from the outside.
Press in a new needle bearing from the inside until flush.

– When the case half has cooled, check the bearings for a tight fit.



Shaft seal ring the crankshaft ❺
Press in a new shaft seal ring until flush with the open side towards the inside.

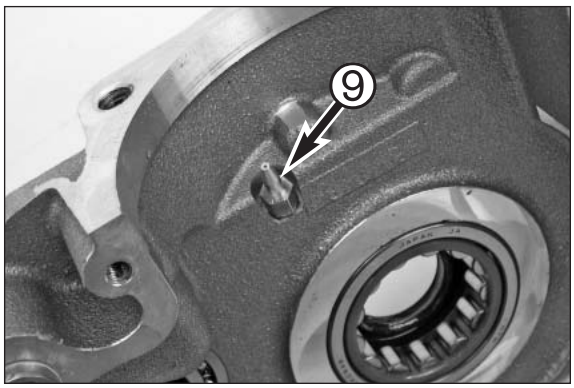
Bearing bolt for the starter idler gear ❻
The bearing bolt is usually not subjected to wear. It is difficult to replace the bearing bolt since the case is usually damaged in the process.



Make sure the oil pump housing ❼ has no score marks or seizing marks.

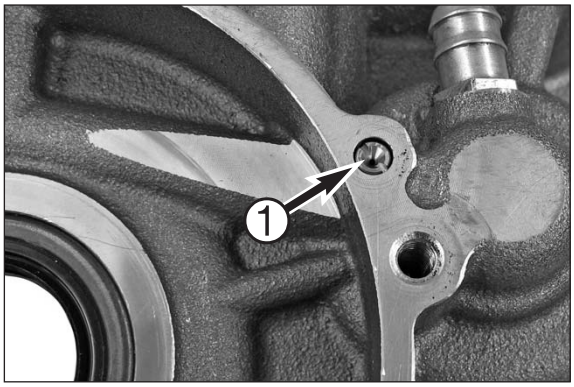
Make sure the oil ducts ❽ are not clogged.

NOTE: remove both jets and the bypass valve to clean the oil ducts and check whether they are clogged.



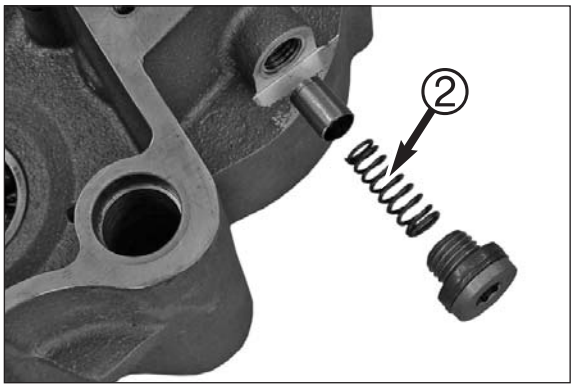
Oil jet "70" ❾
Remove the oil jet and blow compressed air through the oil duct. Degrease the thread of the oil jet, apply Loctite 243 and mount.

NOTE: this jet is used to spray engine oil on the bottom of the piston to cool it down.



Oil jet "100" ❶
Remove the oil jet and blow compressed air through the oil duct. Degrease the thread of the oil jet, apply Loctite 243 and mount.

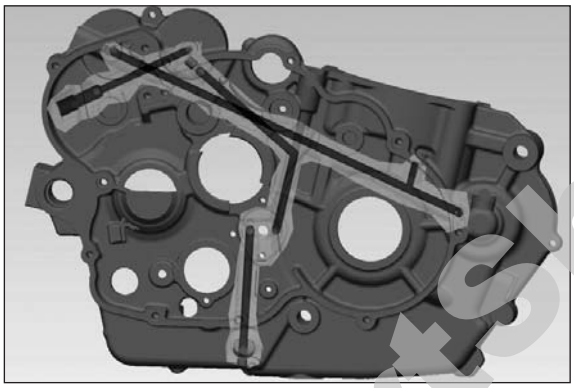
NOTE: this jet is used to regulate the quantity of oil for the conrod bearing.



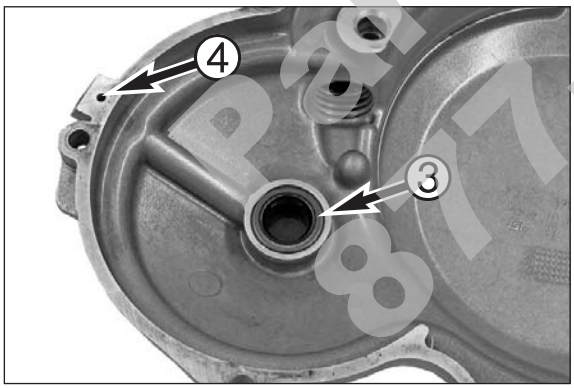
Bypass valve
Check the valve piston, sealing seat and pressure spring for wear.

Minimum length of the pressure spring ❷: 23.5 mm
Tightening torque for the plug: 20 Nm

NOTE: if the length of the pressure spring is less than 23.5 mm it will reduce the bypass valve's opening pressure. This will cause the oil pressure to drop and consequently lead to excessive wear.



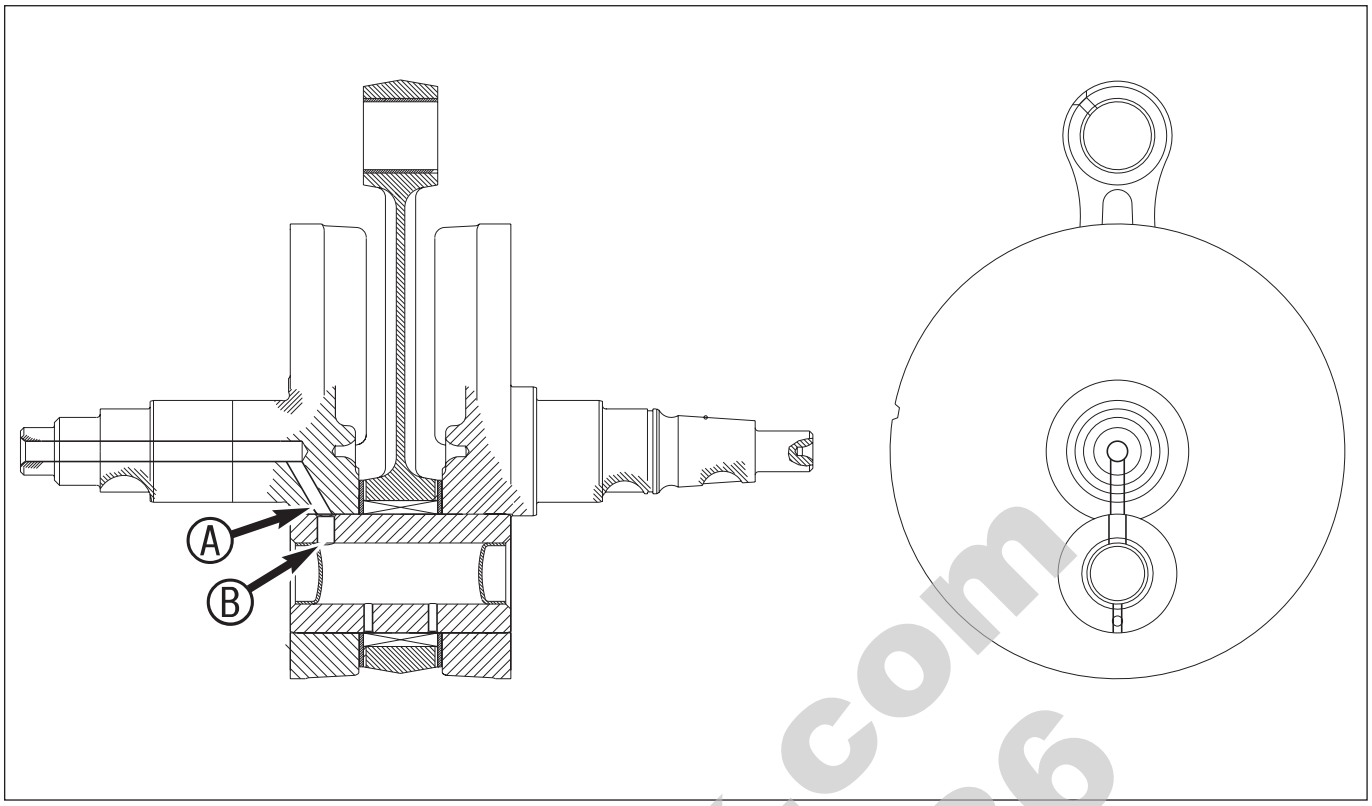
Clean all oil ducts with compressed air and make sure they are not clogged.



Clutch cover

Shaft seal ring for the crankshaft ❸
Pry out the old shaft seal ring.
Press in the new shaft seal ring (open side facing down) all the way to the stop.

Oil duct ❹
Blow compressed air through the oil duct and make sure it is not clogged.

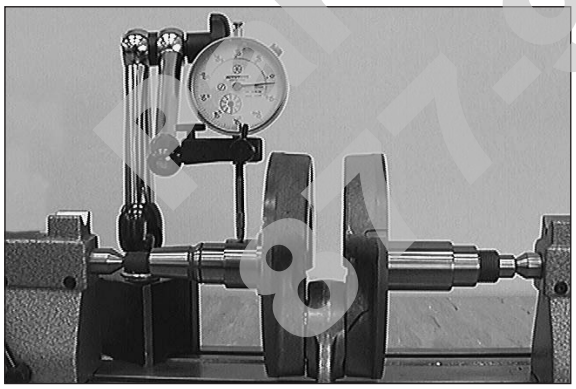


Crankshaft

! CAUTION !

IF YOU PRESS THE CRANKPIN INTO THE WRONG POSITION, THE CONROD BEARING WILL NOT BE SUPPLIED WITH ENGINE OIL AND THIS WILL RESULT IN BEARING DAMAGE.

If you are replacing the conrod bearing, make sure the crankpin is in the correct position. The holes in the crankshaft web ❹ and crankpin ❸ must be aligned with each other.

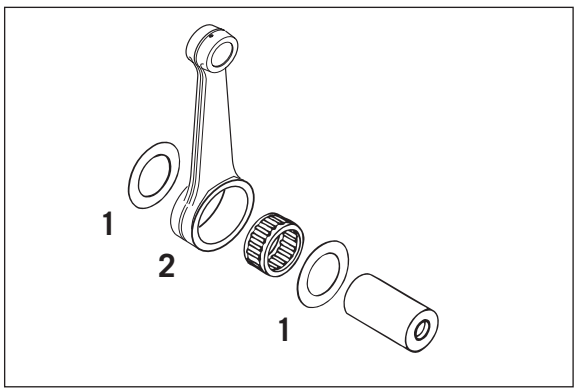


If you will continue to use the crankshaft, check the crankshaft journal for runout. Place the crankshaft on a roller stand or similar stand and measure the crankshaft journal runout with a gauge.

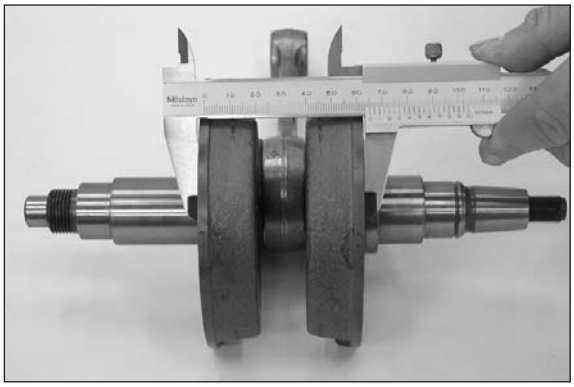
Crankshaft journal runout: max. 0.18 mm

Check the radial and axial clearance at the conrod bearing.

Radial clearance: max. 0.05 mm
Axial clearance: max. 1.10 mm



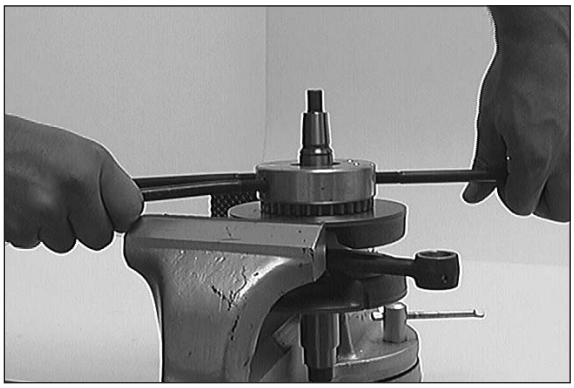
NOTE: you will not need the stop disks ❶ for the conrod ❷ included in the repair kit.



Measuring the outer dimension of the crankshaft webs

Measure the outer dimension of the crankshaft webs with a sliding caliper as illustrated.

Outer dimension of crankshaft webs = 65 mm ± 0.05 mm

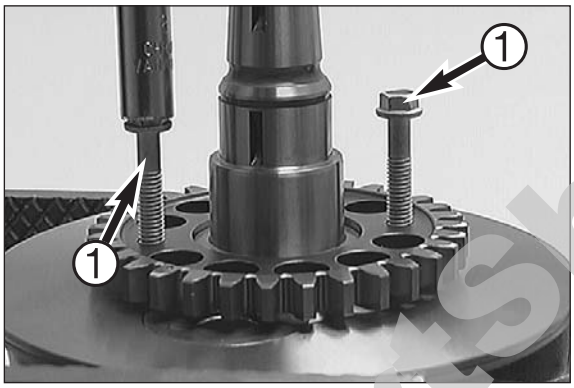


Drive wheel for the balancer shaft

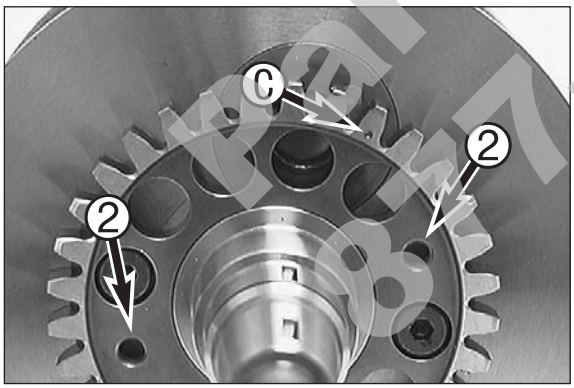
! CAUTION !

NEVER CLAMP THE CRANKSHAFT IN A VISE TOGETHER WITH THE CRANKPIN TO TRY TO EXTRACT THE INNER BEARING RING. THIS WILL ONLY COMPRESS THE CRANKSHAFT WEBS AND MAKE THE CRANKSHAFT UNUSABLE.

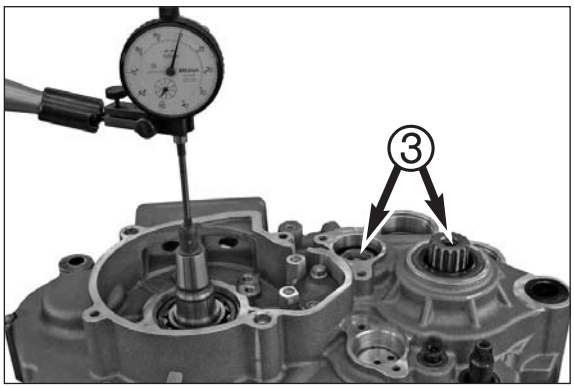
- Clamp the crankshaft with the crankshaft web holding the inner ring to be replaced in a vise.
- Heat special tool PA-48681 to approx. 150°C on a hotplate and immediately slide it onto the inner ring. Tightly press the special tool together to obtain a good heat transfer and pull the inner ring off the crankshaft.



- Remove the two screws on the drive wheel.
- Insert the 2 screws ❶ in the M6 thread ❷.
- Pull the drive wheel off the crankshaft by evenly turning in the two screws.



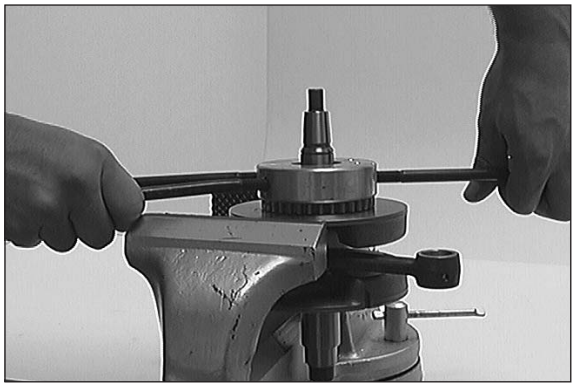
- Heat the drive wheel to approx. 100°C to mount.
- Degrease the 2 screws on the drive wheel and apply Loctite 243.
- Position the drive wheel on the crankshaft, aligning the mark ❻ with the crankpin.
- Mount the screws and tighten to 10 Nm.
- To mount the new inner ring, reheat the special tool to approx. 150°C, clamp the inner ring and immediately slide it onto the crankshaft journal.
- Allow the inner ring to cool for approx. 30 seconds and tap the inner ring with a suitable pipe to make sure it is fully seated.
- Measure the axial clearance of the crankshaft after the inner rings are replaced.



Measuring the axial clearance of the crankshaft and the transmission shafts

- Insert the crankshaft and all transmission shafts in the right case half. Mount the left case half.
- Mount and tighten the case screws.
- Mount the dial gauge support on the engine case. Measure the axial clearance of the crankshaft and the transmission shafts ❸ and write them down.

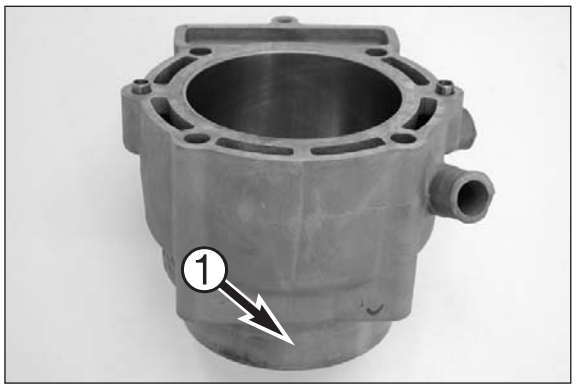
Axial clearance of the crankshaft: 0.25 - 0.35 mm
Axial clearance of the transmission shafts: 0.10 - 0.40 mm



Balancing the axial clearance the crankshaft

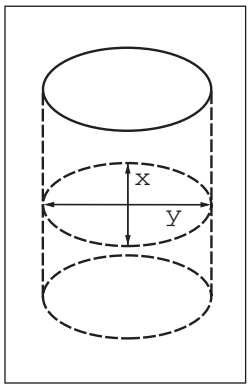
– If the measured value does not correspond to the set-point value, correct the axial clearance.
– Calculate the thickness of the compensating washers.
– Remove the crankshaft and pull the inner ring off the crankshaft on the ignition side using special tool PA-48681. Now either add or remove compensating washers.

NOTE: If the axial clearance is too large, add compensating washers; if it is too small, remove some of the washers. Compensating washers may only be added on the ignition side of the crankshaft.



Cylinder - Nikasil coating

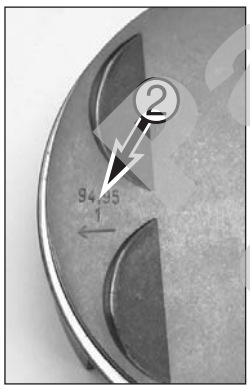
Nikasil is a trademarked cylinder coating process developed by the Mahle piston manufacturer. The name is derived from the two materials used in the process - a nickel layer in which the exceptionally hard silicon carbide is embedded. The main advantages of the Nikasil coating are its outstanding heat dissipation, the improved power output, low wear and the low weight of the cylinder.



Measuring the piston and cylinder, establishing the mounting clearance of the piston

– To establish the wear to the cylinder, use a micrometer to measure the cylinder in the middle of the bearing surface.
– Measure the diameter of the cylinder in the X and the Y axis to detect any ovality.

NOTE: The cylinder size ❶ (size I or II) is marked on the side of the cylinder, the piston size ❷ on the piston head.



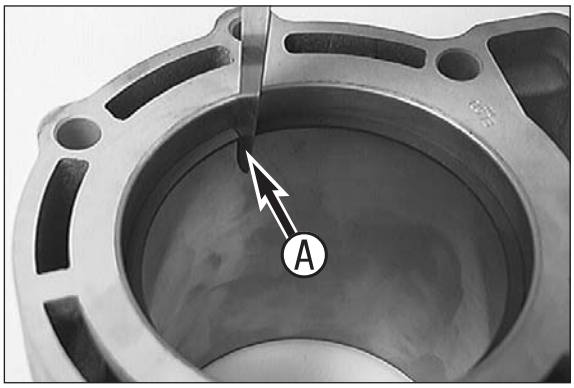
– The piston is measured at the piston skirt across the piston pin, as illustrated.
– The piston mounting clearance is the difference between the smallest cylinder diameter and the piston diameter.

See "Technical Specifications" for mounting clearances and wear limits.

Checking the piston

– Replace the piston if oil consumption is high or the piston skirt is excessively grooved.
– If the piston is to be remounted:

1. Check the piston bearing surface for damage
2. Piston ring grooves: the piston rings must move freely in the groove. You can use old piston rings to clean the piston ring grooves.
3. Check the piston rings for damage and end gap.
   Mount the oil scraper ring with the "TOP" mark facing up.
   Mount the rectangular ring with the "O" mark facing up.
4. Replace piston pins that are badly discolored or have visible running marks. Place the piston pin in the conrod and check for clearance.

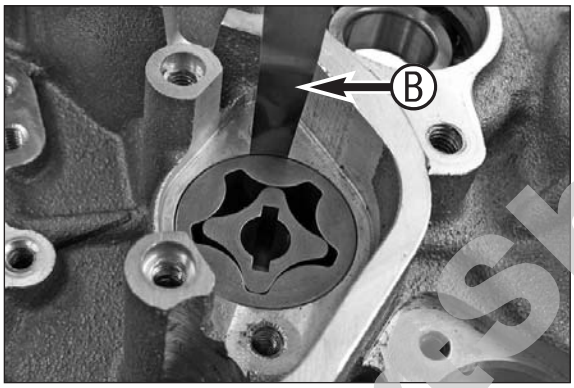


Checking the piston ring end gap

– Insert the piston ring in the cylinder and align with the piston (approx. 10 mm under the upper edge of the cylinder).
– Use a feeler gauge Ⓐ to measure the end gap.

Compression ring : max. 0.80 mm
Oil scraper ring : max. 1.00 mm

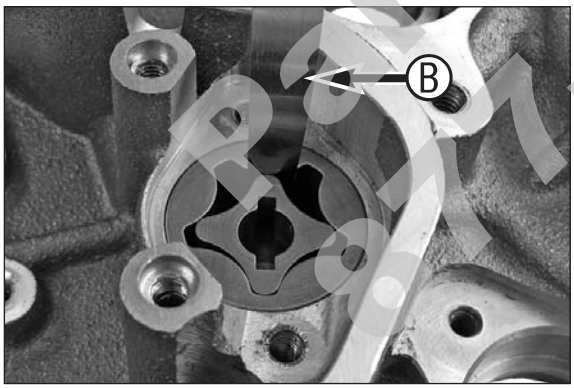
If the end gap is larger than indicated above, check the piston and cylinder for wear. If the piston and cylinder wear is within the tolerance limits, replace the piston ring.



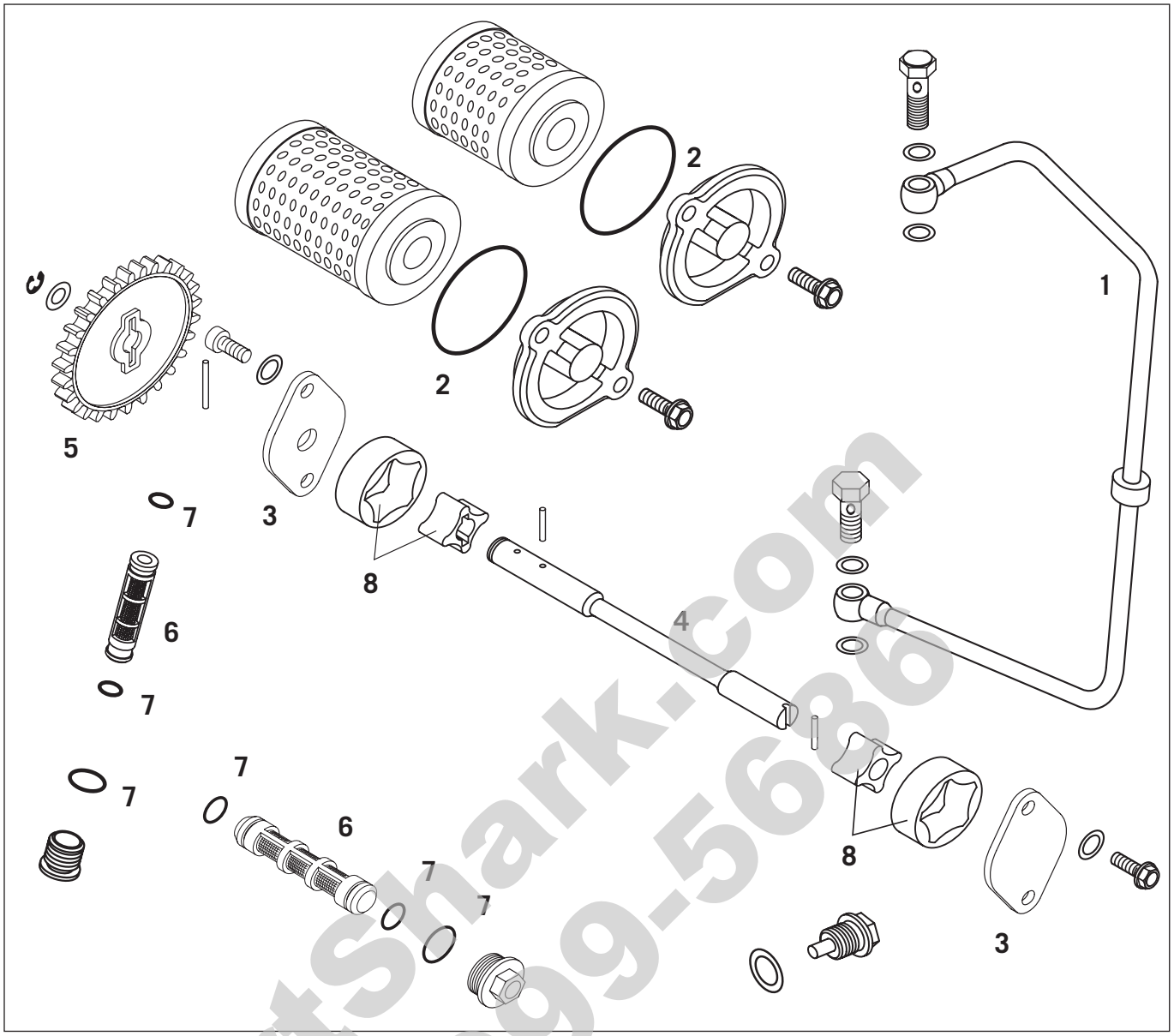
Checking the oil pumps for wear

– Lubricated inner and outer rotors with the marks facing the housing.
– Use a feeler gauge Ⓑ to measure the wear:

Outer rotor - oil pump housing: max. (0.20 mm) .008”



Outer rotor - inner rotor: max. (0.20 mm) .008”



Lubrication system

Oil line ❶
Check for hairline cracking at the soldering joints, blow compressed air through the oil line and, while doing that, check it for unobstructed passage. In addition, check the oil line for possible scuff marks and replace the copper seal rings (8x12x1).

O-rings ❷
Replace the O-rings during every oil filter change.

Oil pump cover ❸
Check for score marks caused by the oil pump rotors on its inner side and replace it if necessary.

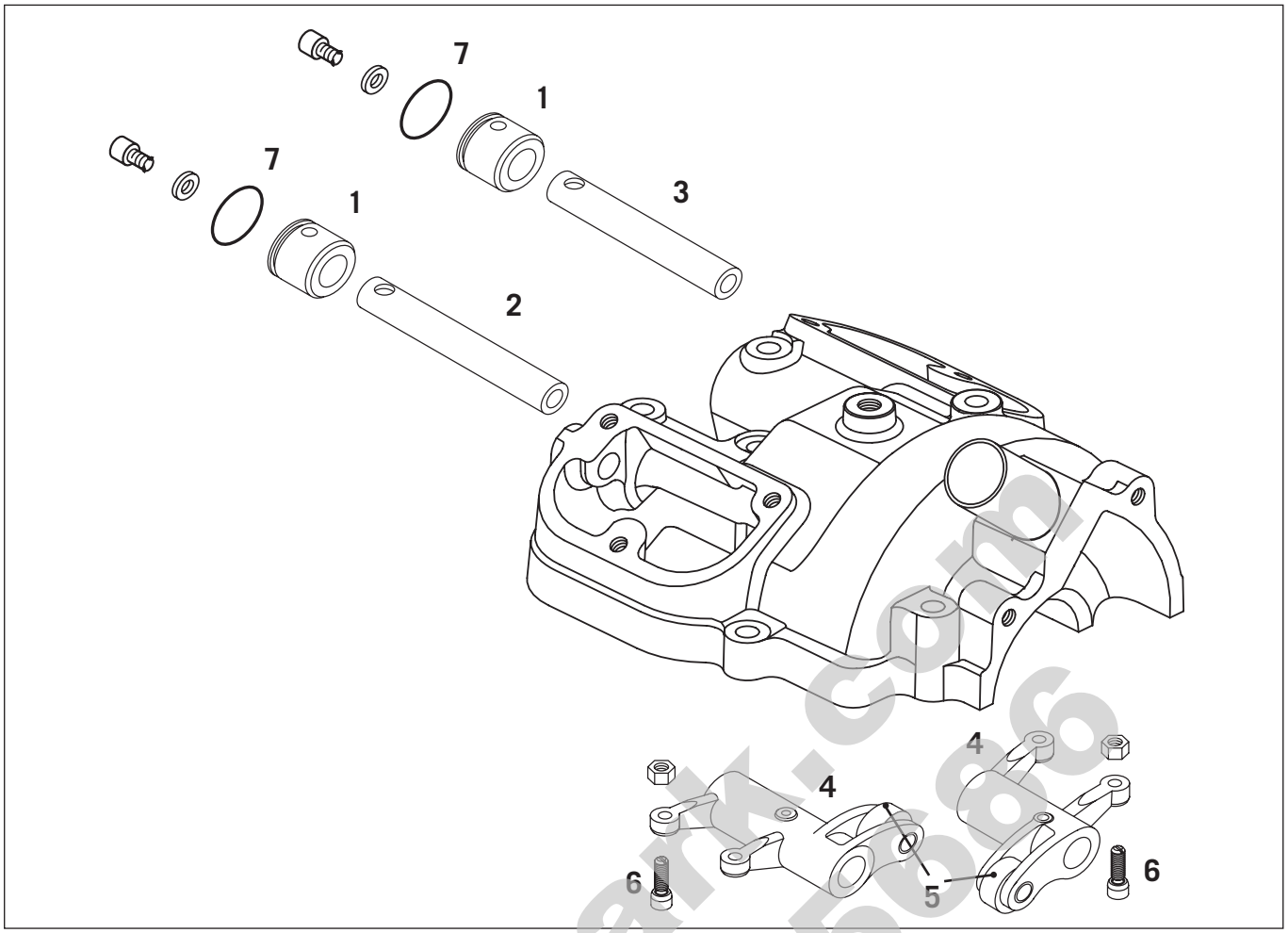
Oil pump shaft ❹
Place it on a planar surface and check it for eccentricity.

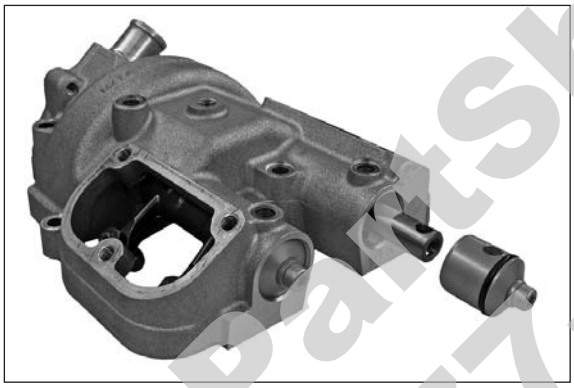
Oil pump wheel ❺
Check toothing for wear. The recess for the needle roller must not be worn out.

Oil screen ❻
Clean the two oil screens with compressed air and petroleum.

O-rings ❼
Check them for brittleness and replace them if necessary.

Oil pump rotors ❽
Place the oil pump rotors into the engine casing and check them as shown on page 5-9.
No particles must adhere to the oil pump rotors.





Upper portion of the cylinder head

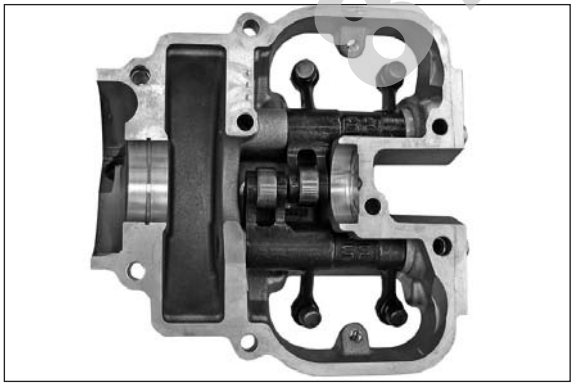
– Pull the two end pieces ❶ together with the rocker arm pins ❷ + ❸ out of the cylinder head's upper portion. Withdraw the rocker arms ❹.
– Clean all components and check them for wear.

Rocker arm pins ❷ + ❸
The rocker arm pins must not have any score marks and turning them in the rocker arms ❹ must be easy.

Rocker arm rollers ❺
Check if they move smoothly; if you detect any radial play, you have to replace the rocker arm.

Adjusting bolts ❻
The seating surfaces of the adjusting bolts must be planar.

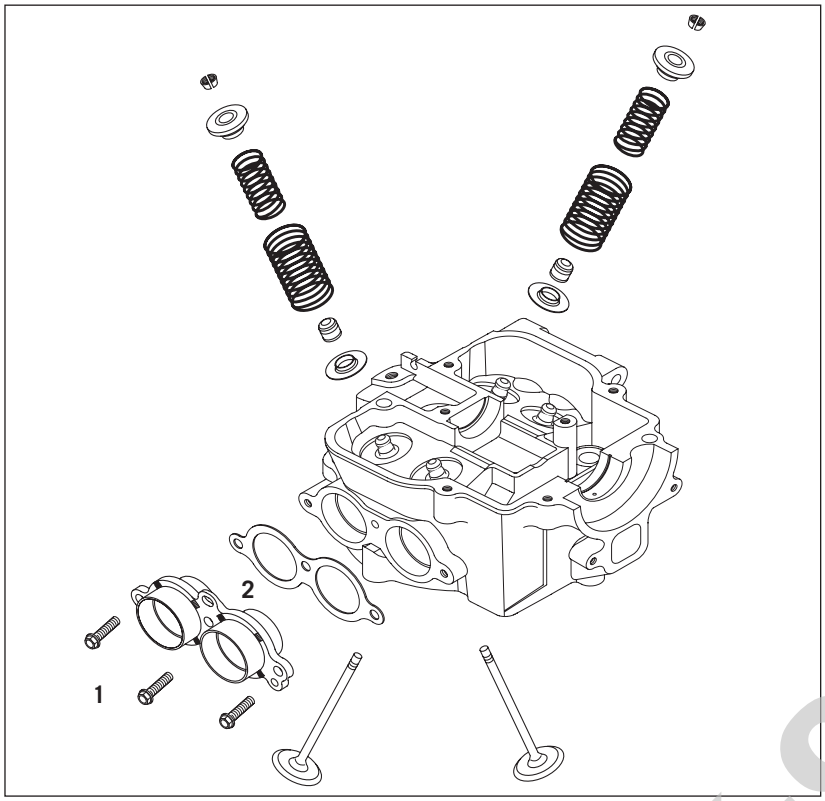
Replace the O-rings ❼.



– Prior to assembly, oil all components thoroughly.
– Position the rocker arms in the cylinder head's upper portion and mount the rocker arm pins.

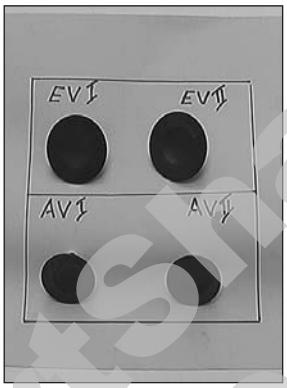
NOTE: The shorter rocker arm pin ❸ must be mounted in the back.

– Mount the end pieces ❶ and turn them such that later on the bolts of the cylinder head's upper portion can be mounted.



Cylinder head

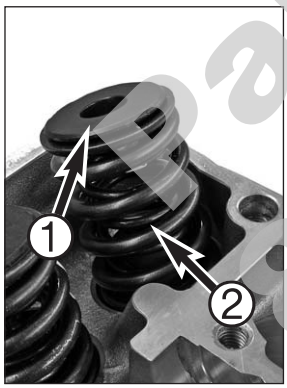
– Loosen the 3 bolts ❶ and dismount the exhaust flange ❷ together with its gasket.



– Dismount the 4 valves with the aid of the following special tools:

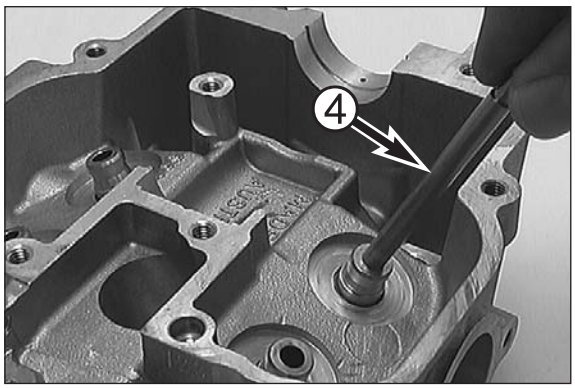
PA-46502 - Valve Spring Compressor
PA-48700 - Adaptor, Valve Spring Compressor

NOTE: When being mounted again, used valves must be mounted in the same valve guide as before. To do this, place the valves in a cardboard box in the same position they were mounted in the cylinder head (see photo).



– Take the valve spring retainer ❶ and the valve springs ❷ out of the cylinder head.
– Pull the valve stem gaskets off the valve guides and remove the spring seats ❸.

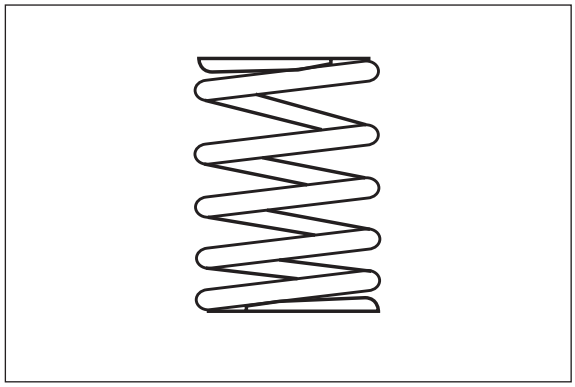
Sealing surface
Check the spark plug thread and the valve seats for damage and cracks. Use a ruler and a feeler gauge to check the sealing surface of the cylinder head for distortion. Max. distortion: 0.10 mm.



Valve guides
The valve guides are checked with a limit gauge PA-48676 ❹ (Ø 6.05 mm). If the limit plug gauge can be easily inserted into the valve guide, the guide must be replaced in a specialized workshop.

Valve seats
The valve seats must not be "battered". Sealing seat width: inlet: 1.50 mm max.; outlet: 2.00 mm max. If necessary, the valves must be reseated.

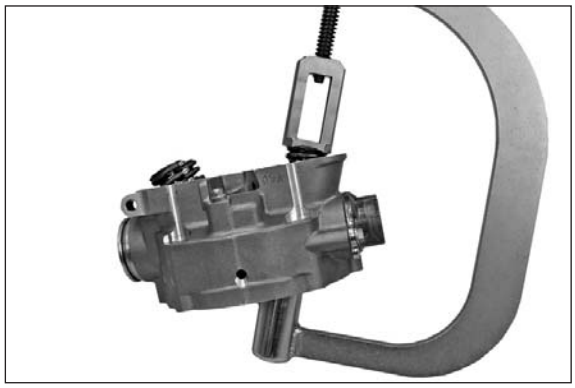
NOTE: Do not use titanium valves to reseat. Reseating will destroy the coating on the titanium valves. Use a steel valve to reseat.



Valves
Check the valve disks for wear and runout. The max. runout at the valve disk should be 0.05 mm. The valve seat should not be impacted. The sealing area should be in the center of the valve seat. The valve shaft is hard-chromium-plated, the valve guide is usually subjected to wear.

Valve springs
Check whether the valve springs are broken or worn (visual check). Also measure the length with a sliding caliper. See Technical Specifications for minimum length.

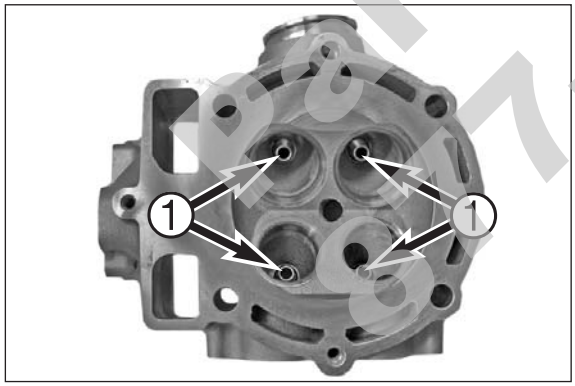
Valve shaft gaskets
If you remove the valves, always replace the valve shaft gaskets.



- Place the 4 spring washers in the cylinder head.
- Mount the valve shaft gaskets on the valve guides and lubricate.
- Generously lubricate the valve shafts and insert in the valve guides. Make sure the valves are in the right position when mounted.
- Position the valve springs, place the valve spring retainers in the valve springs.
- Pretension the valve springs with the special tools and mount the valve keys.

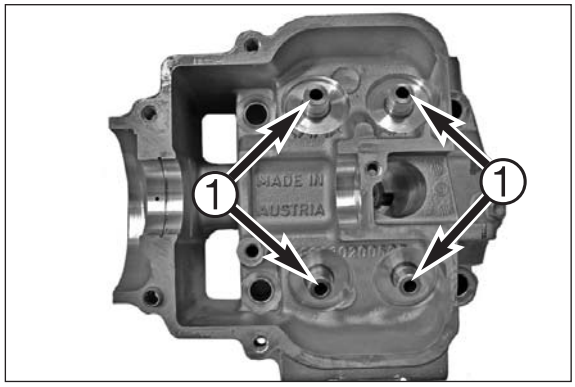
NOTE: Make sure the valve keys are in the right position when mounted. Attach the valve keys to the valve with a little grease.

- Finally, tap the valve spring retainers a few times with a plastic hammer.



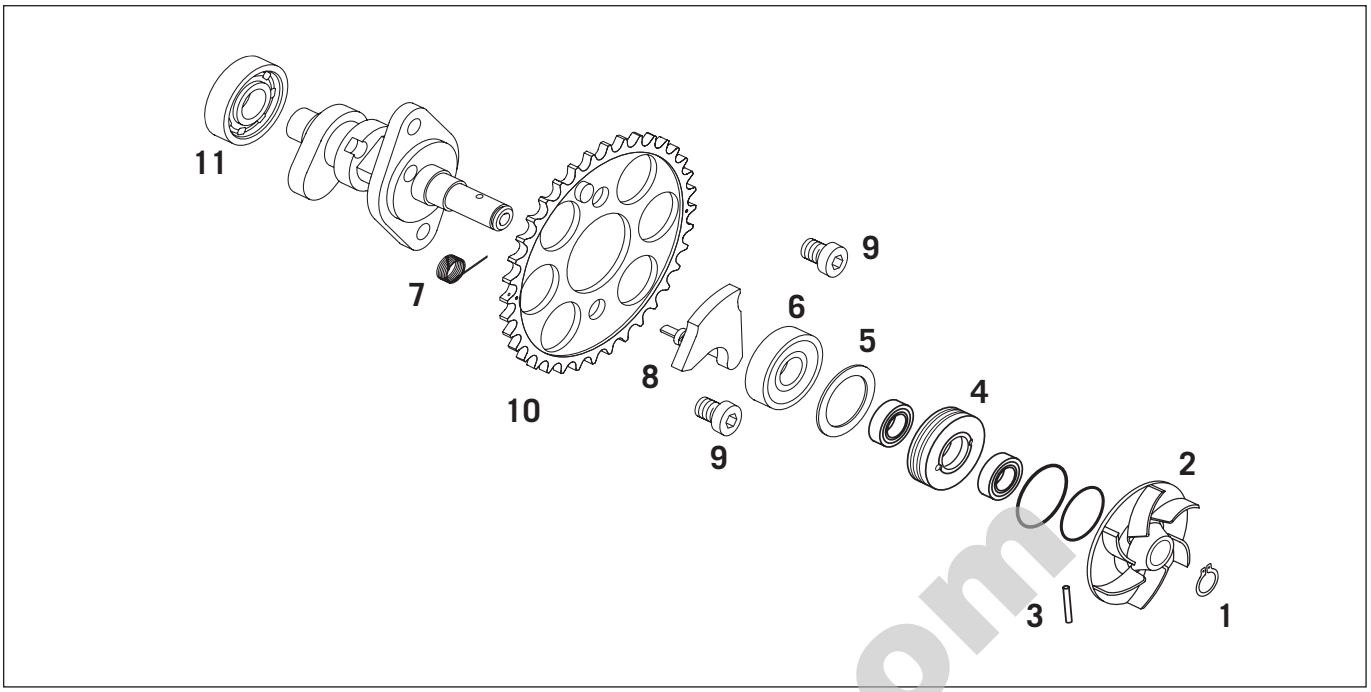
Replacing the valve guides (cylinder head disassembled)

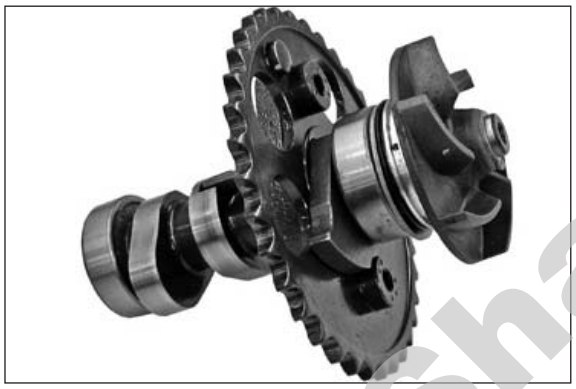
- Heat the cylinder head to 150°C.
- Tap out the valve guides ❶ with a suitable drift.
- Cool the new valve guides in a refrigerator freezer compartment for approx. 10 to 15 minutes.
- Heat the cylinder head to 150°C again.

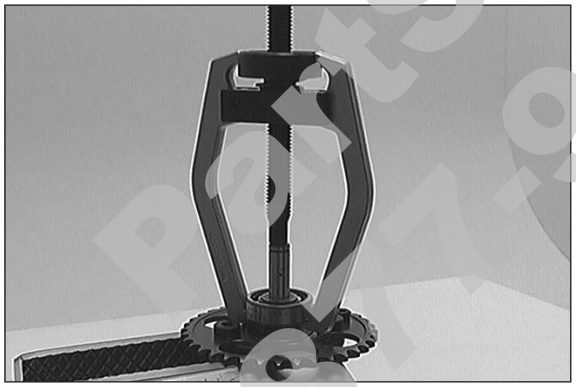


- Drive the cooled valve guides ❶ into the heated cylinder head with the installation tool PA-48682.
- Tap **lightly** with a hammer.
- Ream the cooled valve guides with reamer PA-48684.
- Check the valve seats with touch-up paint and the corresponding valve.
- If necessary, rework or grind the valve seats.

NOTE: Titanium valves may not be used to grind the valve seats. Grinding destroys the coating on the titanium valves. Use a steel valve to grind.







Camshaft

! CAUTION !

NEVER CLAMP THE CAMSHAFT IN A VISE DIRECTLY ON THE CAMS.

– Remove the circlip ❶ and water pump wheel ❷.
– Pull the needle roller ❸ out of the bore in the shaft and pull the gasket carrier ❹ off the camshaft together with the washer ❺.

– Pull the grooved ball bearing ❻ off the camshaft with the puller 590.29.033.000 (see illustration).
– Simultaneously detach the spring ❼ on the automatic decompression shaft ❽ and pull the automatic decompression shaft out of the camshaft.
– Remove the 2 screws ❾ and take off the camshaft gear ❿.

NOTE: Heat may be required to remove the cam gear screws ❾.

– Pull the grooved ball bearing ⓫ off the camshaft with the puller.

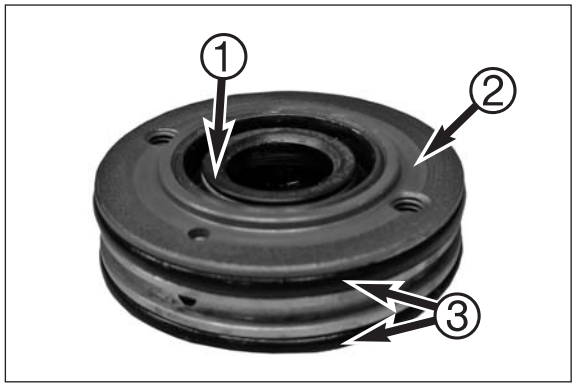
Clean all parts, check their condition and replace if necessary.

Camshaft
Check the bearing seats and cams for wear.

Replace the grooved ball bearings ❻ and ⓫.

Automatic decompression shaft ❽
Check the mounting for clearance and the contract area with the rocker arm for wear.

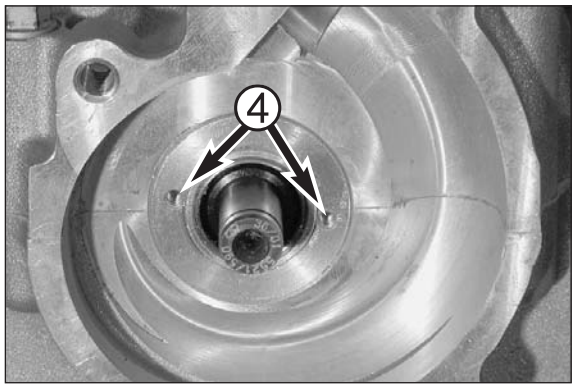
Camshaft gear ❿
Check the teeth for wear.



– Press the shaft seal rings ❶ out of the gasket carrier ❷.
– Press in the new shaft seal rings with the open side on the outside until flush. Carefully grease the sealing lips.

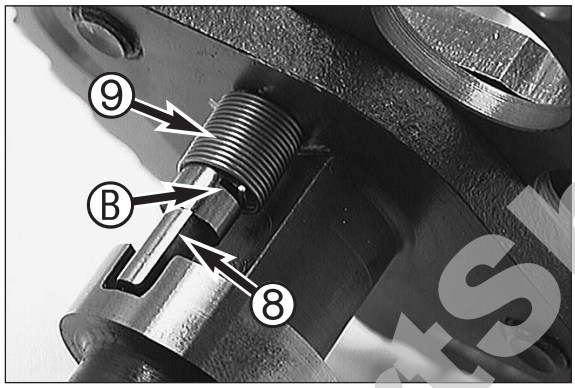
– Remove the 2 O-rings ❸ from the gasket carrier and remove any residual gasket material with a brush.
– Mount 2 new O-rings.

NOTE: The two O-rings ❸ are different sizes. The smaller one is mounted on the outside, i.e. facing the water pump wheel.



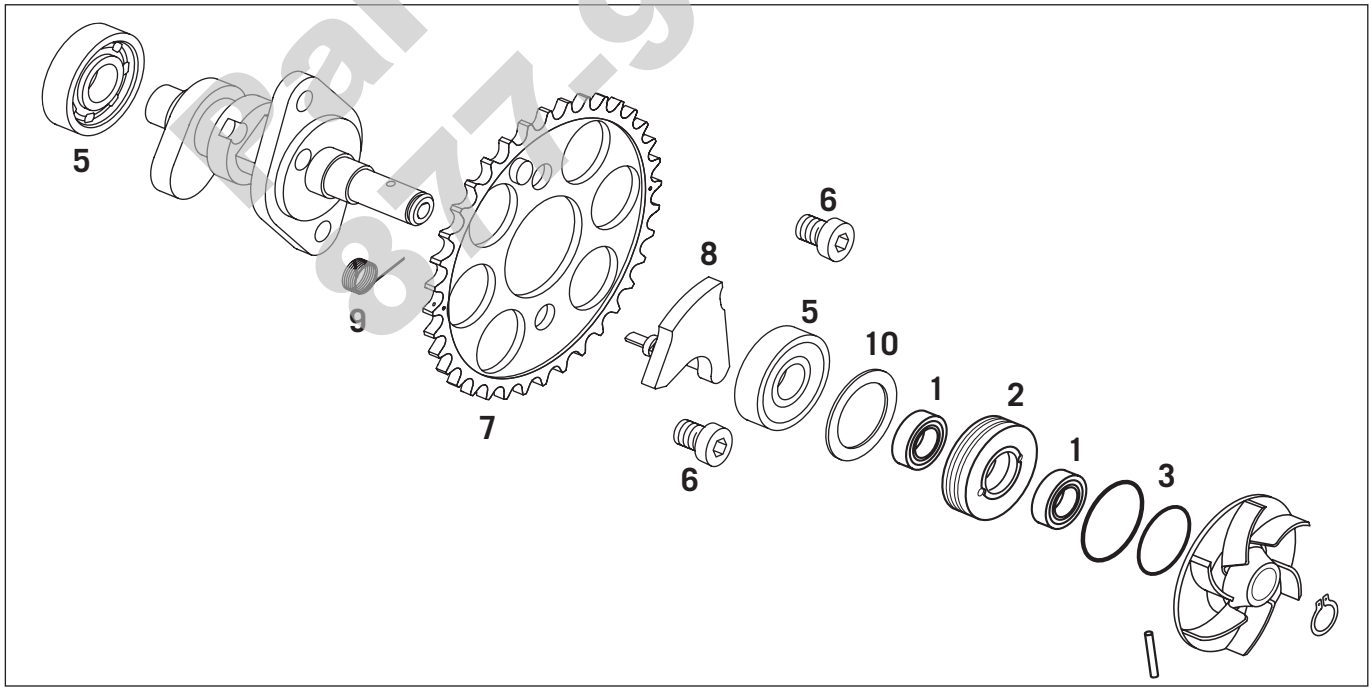
– The gasket carrier can be pulled out of the cylinder head with the two M3 threads ❹ without having to remove the cylinder head top section.

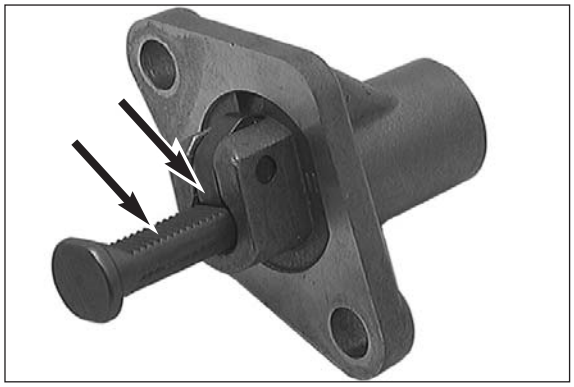
NOTE: To prevent coolant leaks, it's recommended to remove the top section of the cylinder head along with the gasket carrier. Sealant can then be added to both components upon reassembly to prevent leakage from the mating surface areas.

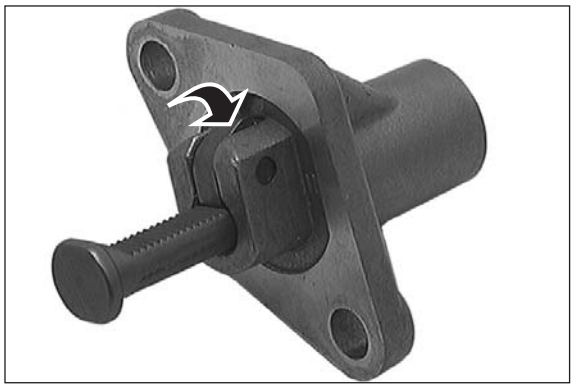


Premounting the camshaft

– Apply Loctite 243 to the thread of the 2 screws ❻ and mount the camshaft gear ❼. Tighten the screws to 28 Nm.
– Press on both grooved ball bearings ❺.
– Mount the automatic decompression shaft ❽ and the spring ❾. Pretension the spring approx. 1/2 turn and insert the end of the spring in the groove Ⓑ.
– The automatic decompression shaft must return to the starting position by itself. If not, pretension the spring a little more.
– Slide on the washer ❿.







Timing chain tensioner

NOTE: The following inspection procedure will only work if the spring was removed from the chain tensioner prior to removing the tensioner from the cylinder.

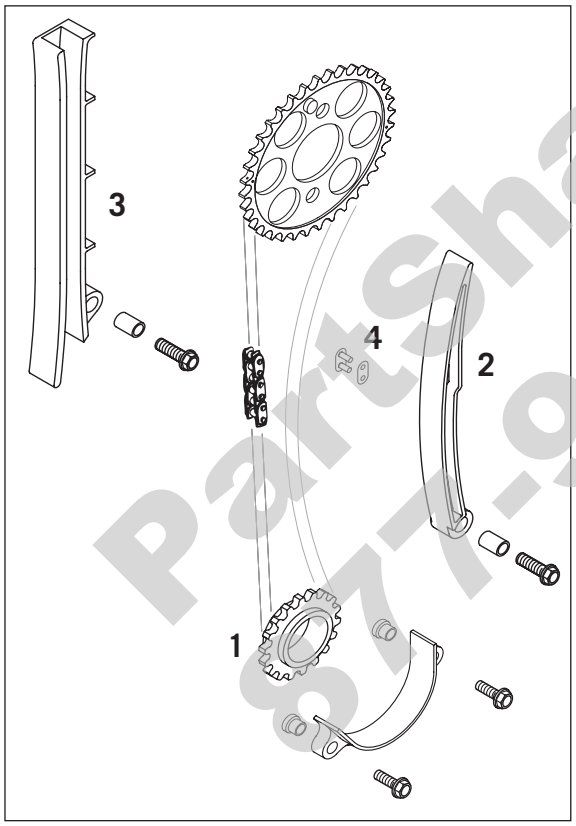
– Pull the pressure pin of the timing chain tensioner out all the way while counting the number of audible clicks.

– 6 - 8 clicks is common with a new chain. If there are less than 3 clicks, replace the cam chain and chain guides as they are worn.

– Check whether or not it moves smoothly.

– Check the toothing on the pressure pin and the ratcheting pawl for wear.

– For mounting, push the ratchet in the direction of the arrow so that the pressure pin will no longer be locked and push the pressure pin all the way into the tensioner housing.



Timing train

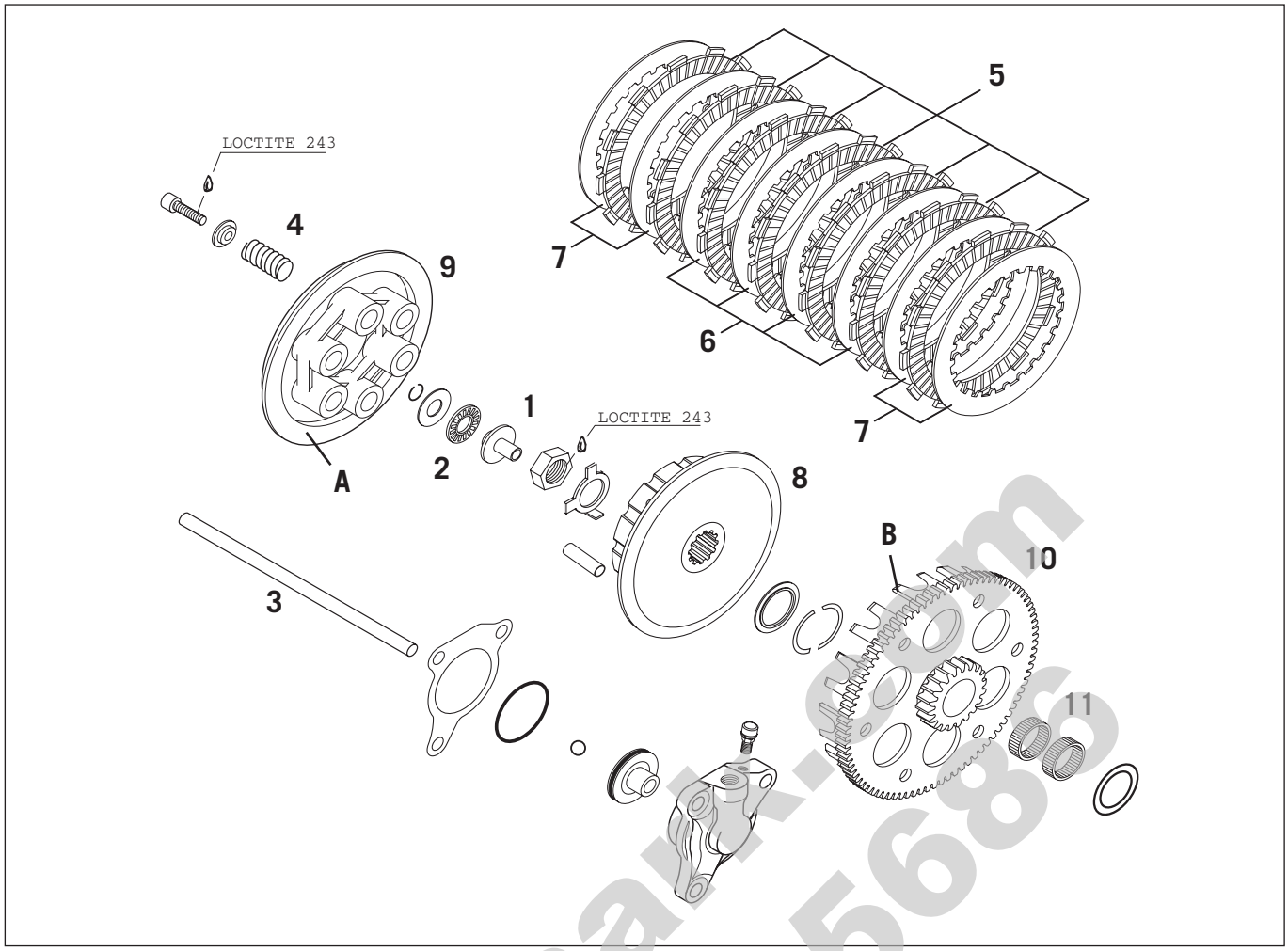
Clean all components thoroughly and check them for wear.

Timing gear ❶
Check the toothing for broken-off parts and wear.

Timing chain tensioner rail ❷
Check for seizing marks at the contact surface.

Timing chain guide ❸
Check for seizing marks at the contact surface.

Rivet link ❹
The opened rivet link of the timing chain must be replaced.



Checking the clutch for wear

NOTE: change the engine oil any time the clutch is damaged.

Pressure piece ❶
Check for seizing marks and smooth operation.

Axial needle bearing ❷
Check for damage.

Pushrod ❸
Place on a level surface and check for runout.

Clutch springs ❹
Minimum length 41.5 mm (new 43 mm). Replace all 6 springs if necessary.

7 lining disks ❺
Minimum thickness 1.9 mm (new 2 mm).
The lining disks must be flat.

4 clutch disks 1.4 mm ❻
The clutch disks must be flat. Check for mechanical damage. Replace clutch disks if you detect any roughness or chipped material.

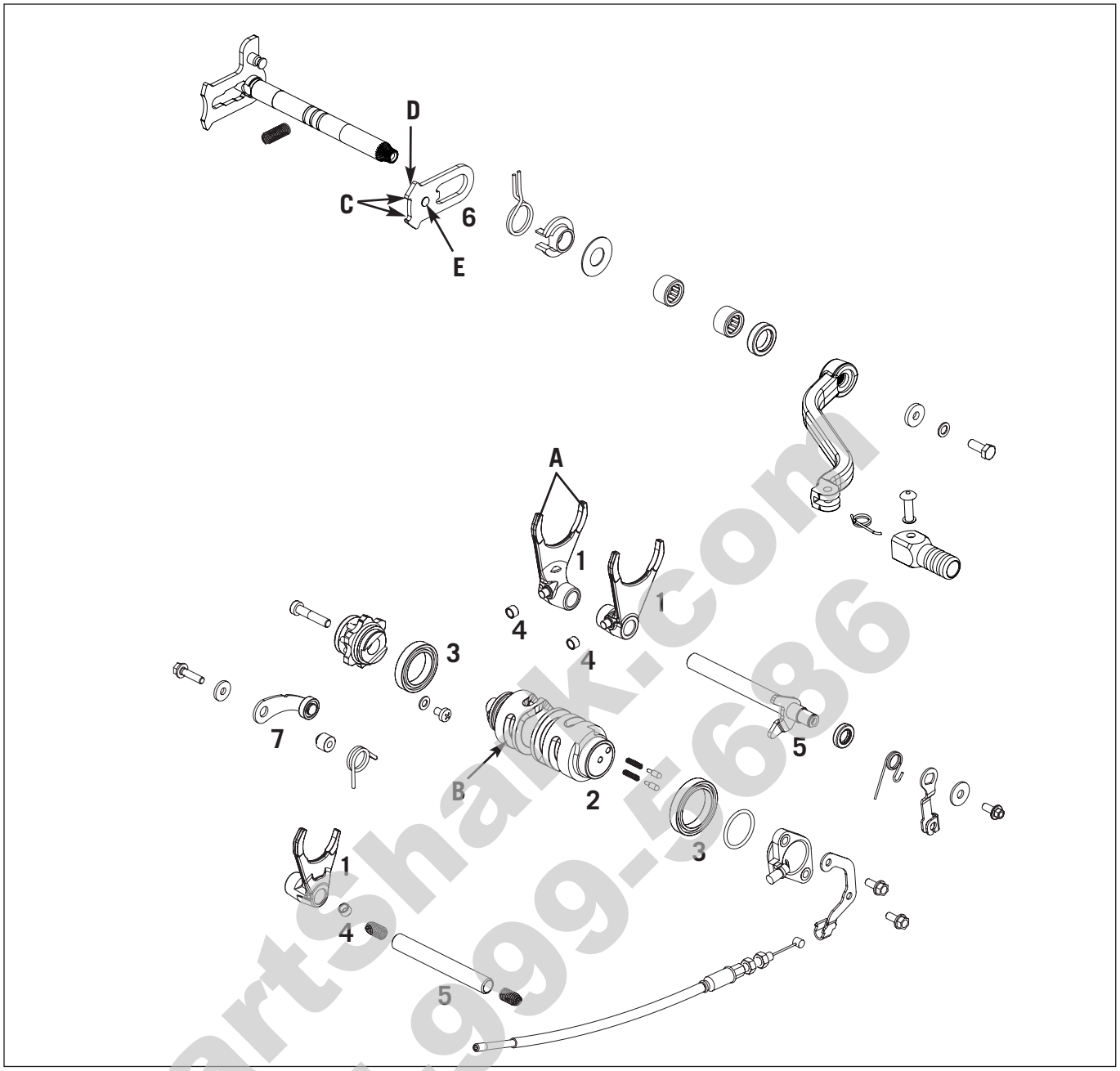
4 clutch disks 1,0 mm ❼
Must be flat. Check for mechanical damage. Replace clutch disks if you detect any roughness or chipped material.

Driver ❽
Check for seizing marks and damage.

Pressure cap ❾
Check the pressure cap mounting face Ⓐ on the steel disk for damage. Make sure the oil bores are not clogged.

Outer clutch hub ❿
Check the thrust face Ⓑ of the lining disks for wear at the outer clutch hub. If the recesses are bigger than 0.5 mm, replace the lining disks and the outer clutch hub.

Needle bearings ⓫
Check for seizing marks and damage.



Shift mechanism

Shift forks ❶
Check the blade Ⓐ for wear. New forks are 4.4 to 4.5 mm thick, the wear limit is 4.2 mm.

Shift drum ❷
Check the shift grooves Ⓑ for wear. Check the position of the shift drum in the grooved ball bearing ❸.

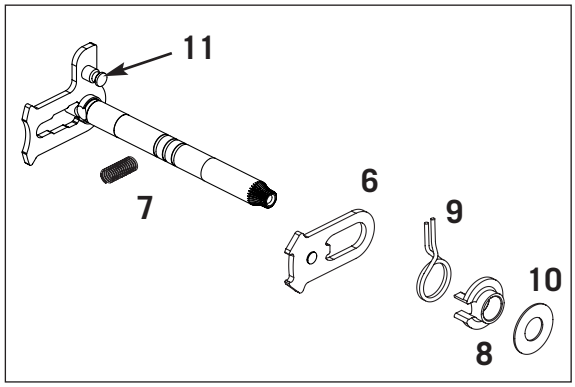
Grooved ball bearing ❸
Check for smooth operation.

Shift rolls ❹
Check the shift rolls for pressure marks or cracks.

Shift rails ❺
Place the shift rails on a level surface and check for runout, score marks and seizing marks. The shift forks must operate smoothly on the shift rails.

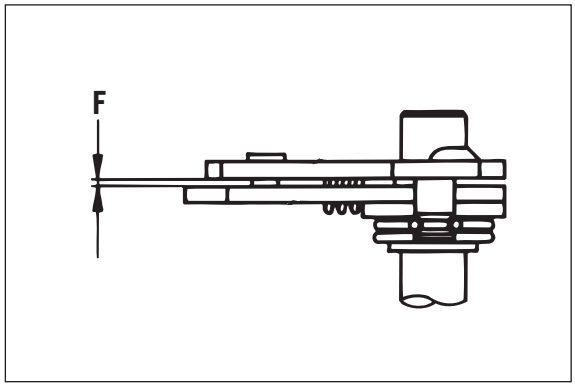
Sliding plate ❻
Check for wear at the points of contact Ⓒ. Check the return area Ⓓ on the shift rail for wear (replace if strongly indented). Check the guide bolt Ⓔ for a tight fit and wear.

Lock lever ❼
Check the roll on the lock lever for smooth operation.



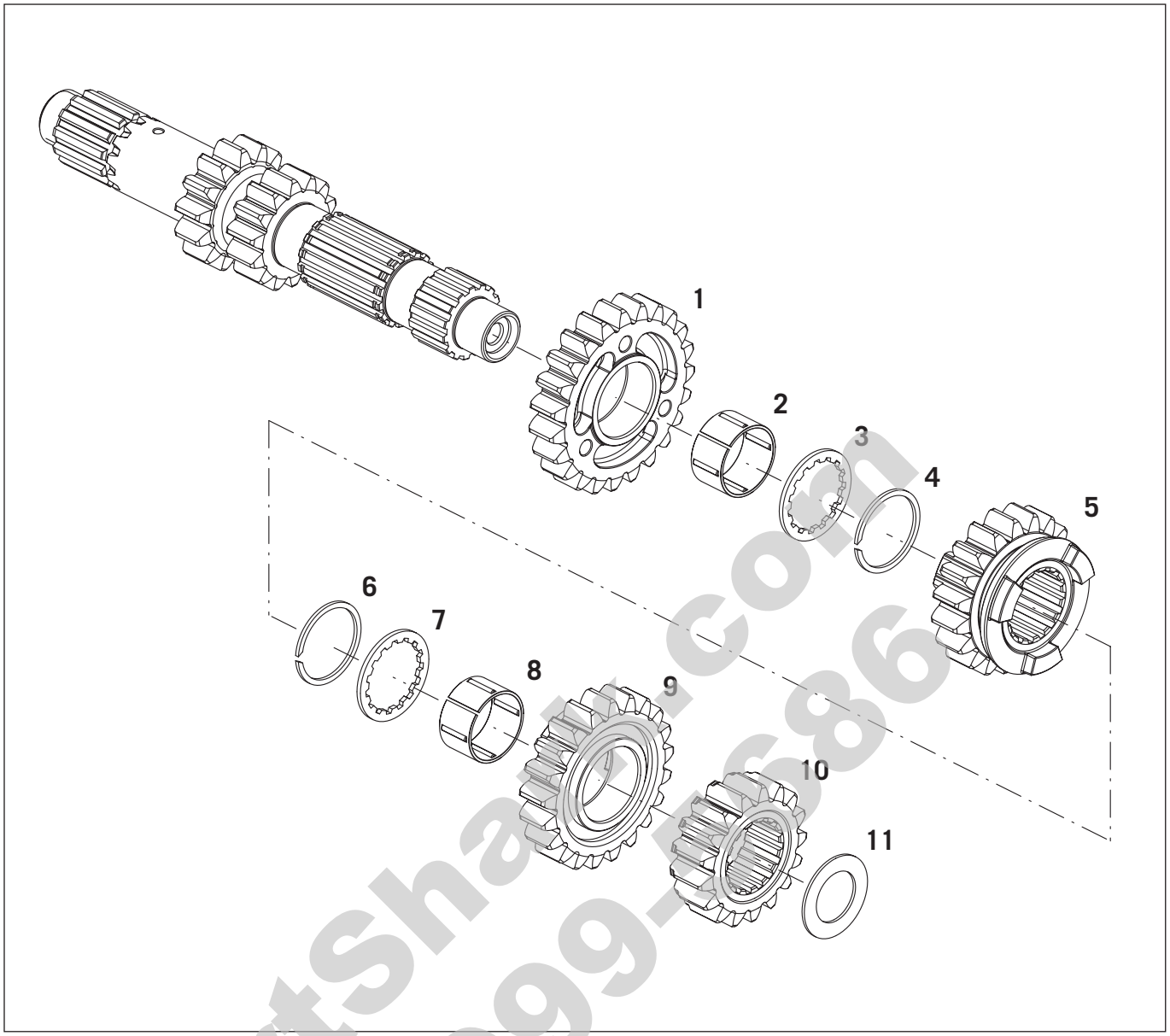
Preassembling the shift shaft

– Secure the short end of the shift shaft in a vise (use protection jaws).
– Mount the sliding plate ❻ with the guide bolt facing downward and engage the guide bolt at the shift element.
– Mount the pressure spring ❼.
– Slide on the spring guide ❽, slide the return spring ❾ with its dropped end facing upward over the spring guide and lift the dropped end over the counterbearing bolt ❿.
– Mount the stop disk ⓫.



Shift mechanism

– Check the clearance Ⓕ between the sliding plate ❻ and the shift element. The clearance must be 0.40 - 0.80 mm.

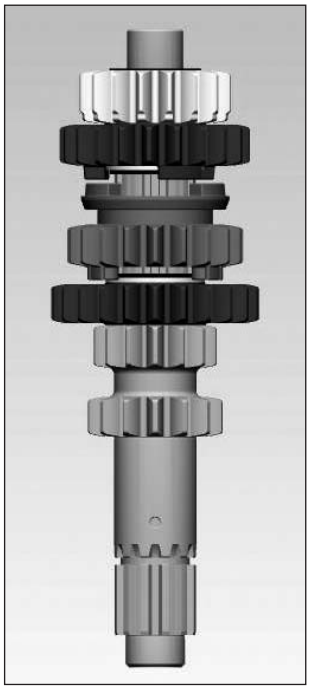


General information on servicing the transmission

Clamp the transmission shaft in a vise (use protective jaws).
If continuing to use the sliding sleeve, mark the mounted position.
Remove the gear wheels and check the following parts for wear and seizing marks:

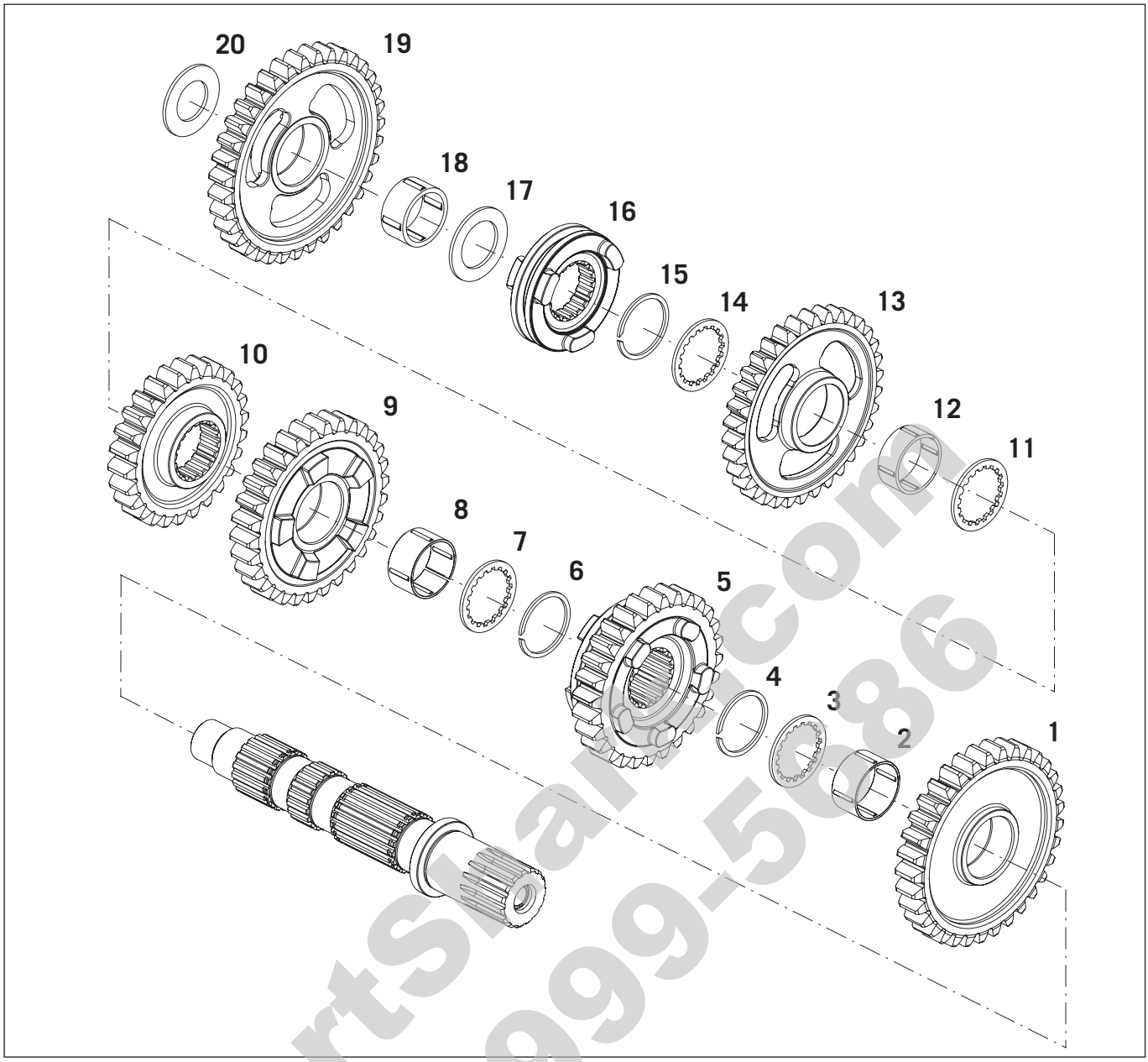
- Bearings
- Pivot points on the transmission shafts and pivot points on the idler gears
- Shift dogs
- Tooth faces on all gear wheels
- Tooth profiles on the transmission shafts as well as the corresponding gear wheels
- Profiles of all sliding gears for smooth operation

Carefully clean all parts and replace any damaged parts.
Mount new circlips whenever you repair the transmission.
Do not overstretch the lock rings when mounting.



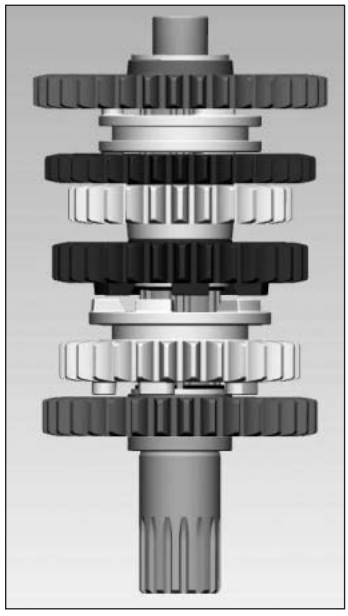
Assembling the main shaft

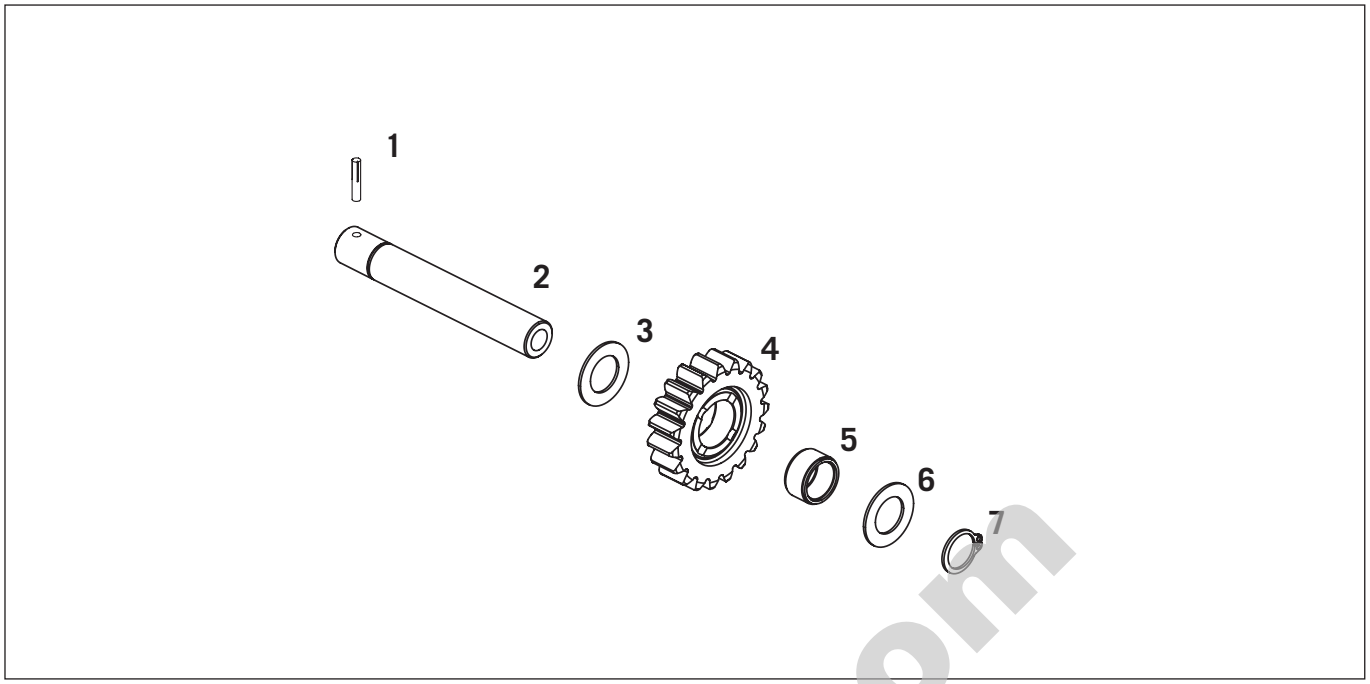
- Clamp the main shaft in the vise (use protective jaws).
- Carefully oil all parts before mounting.
- Mount the split needle bearing ❷, mount the 5-speed idler gear ❶ with the recess for the shift dogs facing up.
- Mount the stop disk ❸ (22.6x30x1.5mm) with the sharp edge facing up and mount the lock ring ❹.
- Slip on the 3rd gear sliding gear ❺ with the shift groove facing up and mount the lock ring ❻.
- Slip on the stop disk ❼ (22.6x30x1.5 mm) with the sharp edge facing down and the split needle bearing ❽.
- Slip on the 4th gear sliding gear ❾ with the shift dogs facing down.
- Slip on the 2nd gear fixed gear ❿ with the collar facing down and mount the stop disk ⓫ (17.2x27.7x1mm).
- Finally, check all of the gear wheels for smooth operation.



Assembling the countershaft

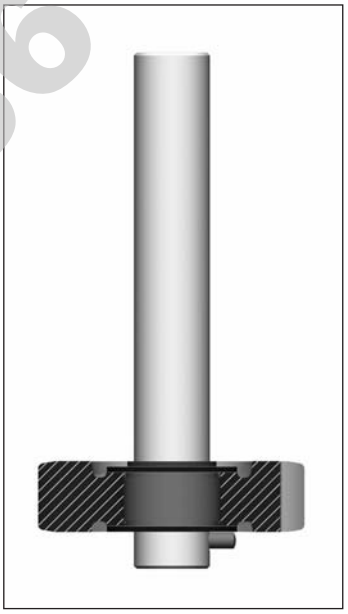
- Clamp the countershaft in the vise (use protective jaws).
- Carefully oil all parts before mounting.
- Mount the split needle bearing ❷ and 2nd gear idler gear ❶ on the countershaft with the recess for the shift dogs facing up.
- Mount the stop disk ❸ (22.6x30x1.5 mm) with the sharp edge facing up and mount the lock ring ❹.
- Mount the 4th gear sliding gear ❺ with shift groove facing up.
- Mount the lock ring ❻ and stop disk ❼ (22.6x30x1.5 mm) with the sharp edge facing down.
- Mount the split needle bearing ❽ and 3rd gear idler gear ❾ with the shift dogs facing down.
- Mount the 5th gear fixed gear ❿ with the collar facing down.
- Mount the stop disk ⓫ (22.6x30x1.5 mm) (22.6x30x1.5 mm) with the sharp edge facing down and slip on the split needle bearing ⓬.
- Mount the return gear idler gear ⓭ with the collar facing down.
- Slip on the stop disk ⓮ (22.6x30x1.5 mm) with the sharp edge facing up and mount the lock ring ⓯.
- Slip on the sliding sleeve ⓰ and stop disk ⓱ (20.2x31x1.5 mm).
- Slip on the needle bearing ⓲, 1st gear idler gear ⓳ with the collar facing up and the stop disk ⓴ (17.2x30x1.5 mm).

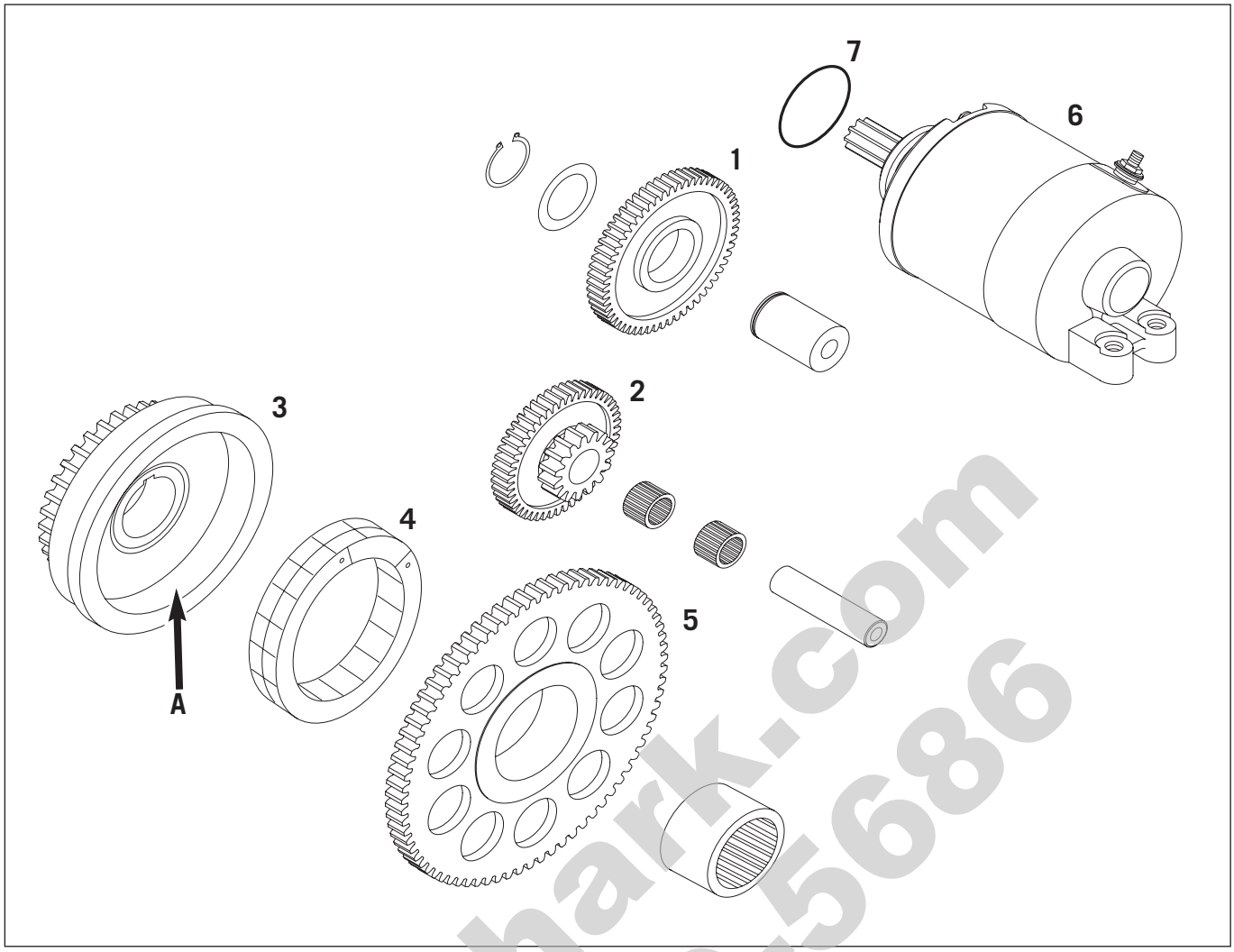




Assembling the reverse gear shaft

– Insert the grooved cylinder pin ❶ in the reverse gear shaft ❷.
– Clamp the reverse gear shaft in a vise (use protective jaws).
– Carefully oil all parts before mounting.
– Slip on the stop disk ❸ (14.1x24x1 mm) and the needle bearing ❺.
– Mount the asymmetrical reverse gear ❹ with the deeper recess facing up.
– Mount the stop disk ❻ (14.1x24x1 mm) and circlip ❼.





E-starter drive gear

Idler gear ❶
Check toothing and bearing position of the idler gear for wear. Check the bearing bolts of the idler gear for score marks, as well.

Torque limiter ❷
Check the torque limiter's toothing and pivot points for wear. Also check the bearing bolt on the torque limiter for wear marks. Mount the torque limiter and both needle bearings on the bearing bolt and check the clearance.

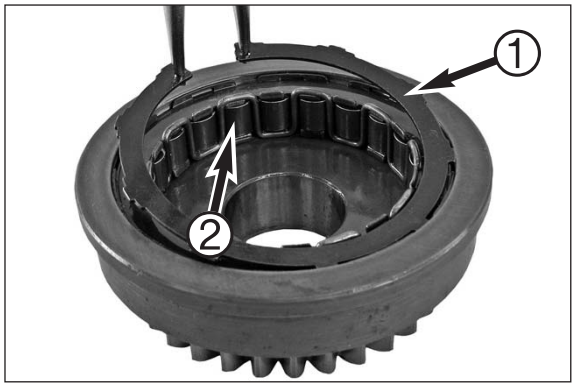
Free wheel hub ❸
Take the free wheel out of the free wheel hub and check the contact surface Ⓐ for pressure marks. Clean the free wheel hub thoroughly.

Free wheel ❹
Thoroughly clean the free wheel with petroleum and compressed air. Check the segments of the free wheel for wear. Then, oil the free wheel thoroughly.

Free wheel gear ❺
Slip the free wheel gear onto the crankshaft and check for clearance. If necessary, replace the needle bush. Check the contact surface to the free wheel for pressure marks.

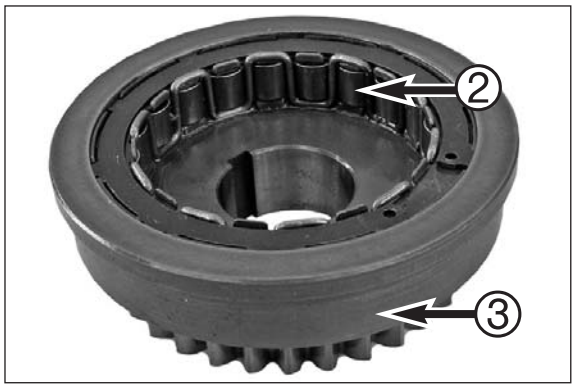
NOTE: If you detect any damage to the reduction gear, the torque limiter ❷ or the freewheel gear ❺ that makes it necessary to replace the parts, always replace both (❷ and ❺) as a set.

E-starter motor ❻
Renew the O-ring ❼ at the flange.

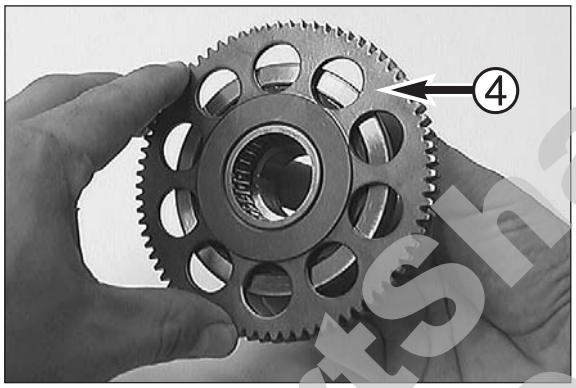


Replacing the free wheel hub

– Use the circlip pliers to compress the spreader ring ❶ and remove it together with the free wheel ❷.



– Oil the free wheel ❷ thoroughly and insert it into the free wheel hub ❸.
– Use circlip pliers to insert the spreader ring into the groove and check its proper fit.



Checking the free wheel

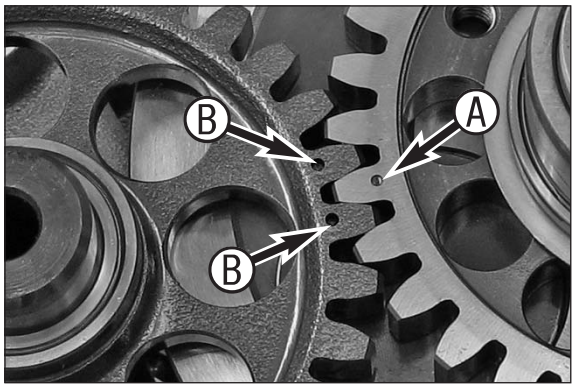
– Insert the free wheel gear ❹ into the oiled free wheel.
– It must be possible to turn the free wheel gear clockwise.
– Counterclockwise, the free wheel gear must be blocked without backlash.

ASSEMBLING THE ENGINE 6

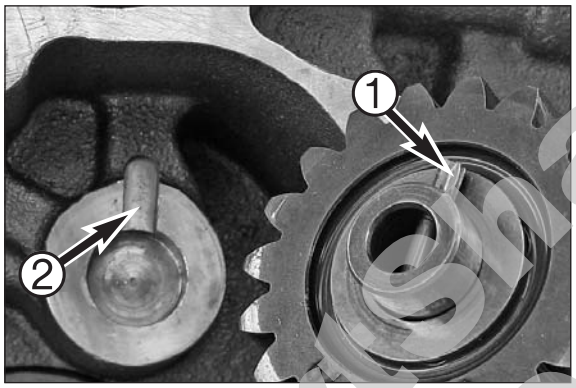
INDEX

Mounting the crankshaft and balancer shaft

– Clamp the right case half to the engine work stand.
– Generously oil the roller bearing for the crankshaft and grease the shaft seal ring for the crankshaft.
– Carefully place the crankshaft in the bearing seat.

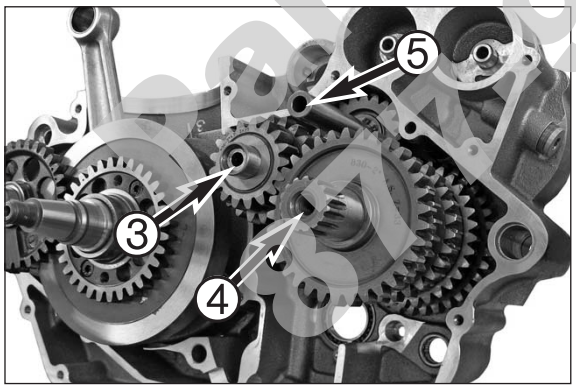


– Turn the crankshaft until the mark ❹ is in the front and place the balancer shaft in the bearing seat. Make sure the mark ❹ on the crankshaft lies between the two marks ❸ on the balancer shaft.

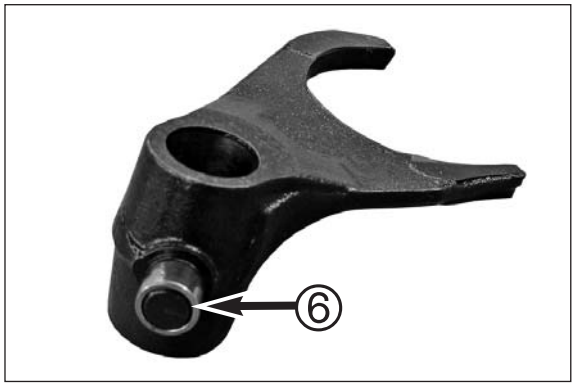


Mounting the transmission and shift mechanism

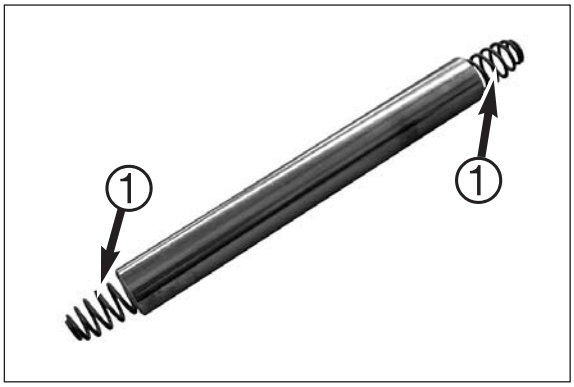
– When mounting the reverse gear shaft, make sure the grooved cylinder pin ❶ is fully seated in the groove ❷.



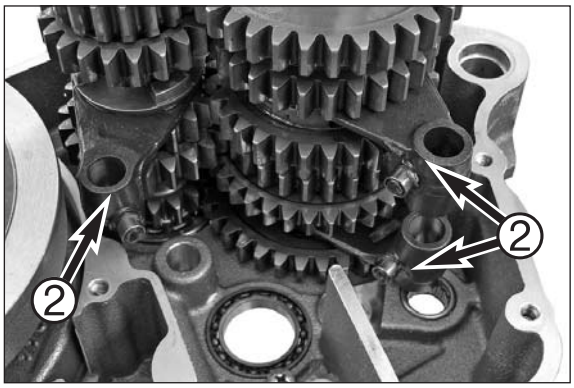
– Simultaneously insert the preassembled main shaft ❸, countershaft ❹ and reverse gear shaft ❺ in the bearing seats.



– Attach the shift rolls ❻ to the shift forks with grease.



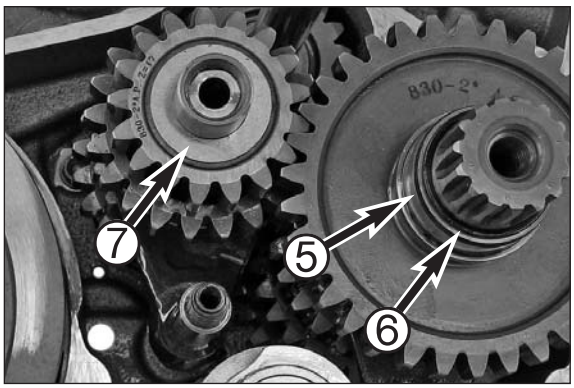
– Attach the 2 springs ❶ to the shift rail with grease.



– Oil the blades of the shift forks ❷ and attach to the sliding gears.

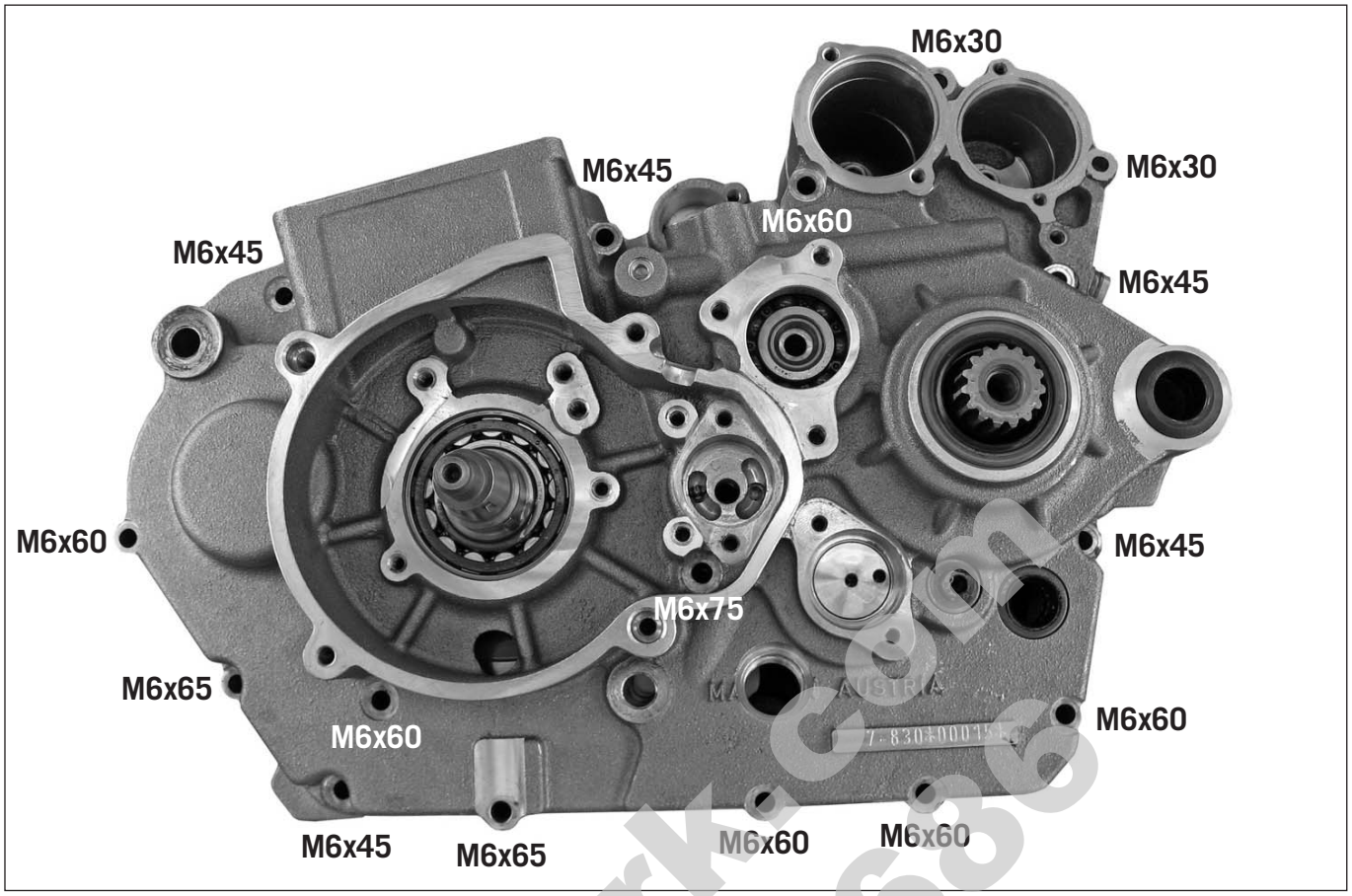
– Place the shift drum in the bearing seat.

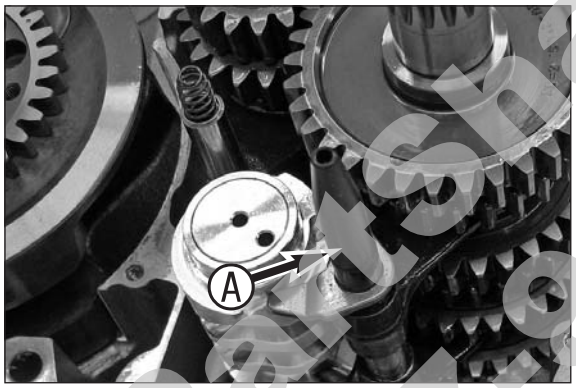
– Attach the shift forks to the shift drum.
– Mount the shift rail with lock ❸ and shift rail ❹ with springs.



– Make sure the following parts are mounted:

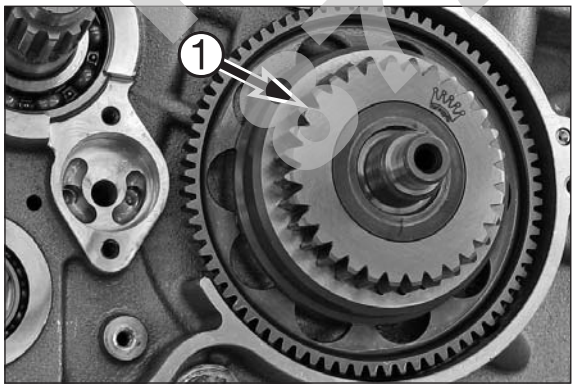
Inner bearing ring ❺
O-ring ❻
Stop disk ❼
2 dowels in the engine case





Assembling the engine case

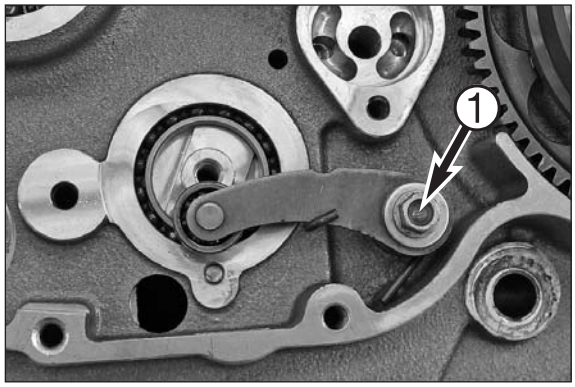
- Remove the engine mount from the engine work stand.
- Degrease the case sealing area and apply a thin layer of Three Bond silicone sealant.
- Place the seal installer Ⓐ PA-48678 on the shift rail with lock and grease the shaft seal ring.
- Mount the left case half and tap lightly on the left case half with a plastic hammer until it is fully seated.
- Grease the case screws at the thread and at the under the head. Mount the screws and tighten to 10 Nm.
- Check all shafts for smooth operation before and after you tighten the case screws.
- Clamp the engine to the engine work stand.
- Check the axial clearance of the crankshaft and the transmission shafts.



Mounting the primary gear and freewheel

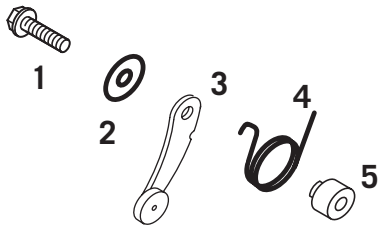
- Make sure the woodruff key is mounted in the crankshaft.
- Generously oil the freewheel and the needle cage in the freewheel gear.
- Mount the primary gear and freewheel on the crankshaft.

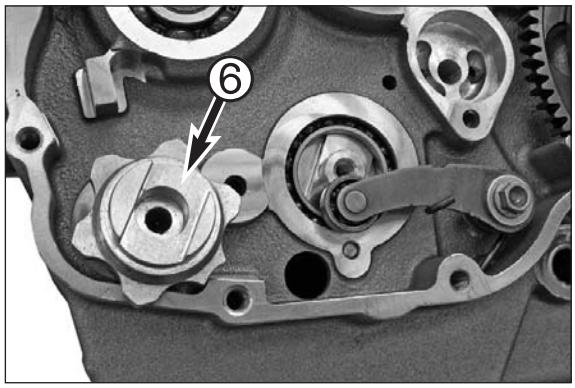
NOTE: The collar nut for the primary gear is not mounted until later.



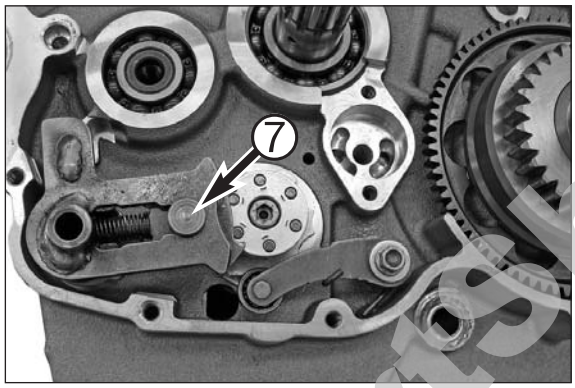
Mounting the shift lock

– Slip the washer ❷, lock lever ❸, locking lever spring ❹ and locking spring sleeve ❺ onto the screw ❶ (M5x20).
– Degrease the screw thread, apply Loctite 243 and tighten to 6 Nm.

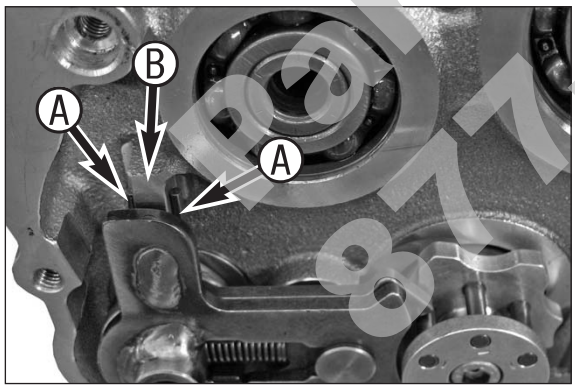




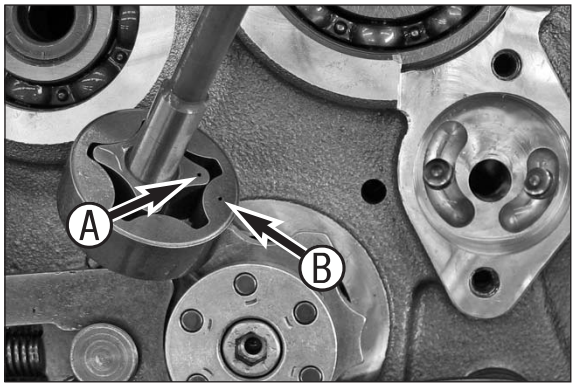
– Mount the shift lock 6 on the shift drum. Note that the flat portions are eccentric. Pull the lock lever away from the shift drum.
– Degrease the screw thread (M6x30), apply Loctite 243 and tighten to 10 Nm.



– Oil the premounted shift shaft and slide into the bearings together with the stop disk until the shift rail rests against the shift lock.
– Push back the shift rail ❼ and slide the shift shaft in all the way to the stop.



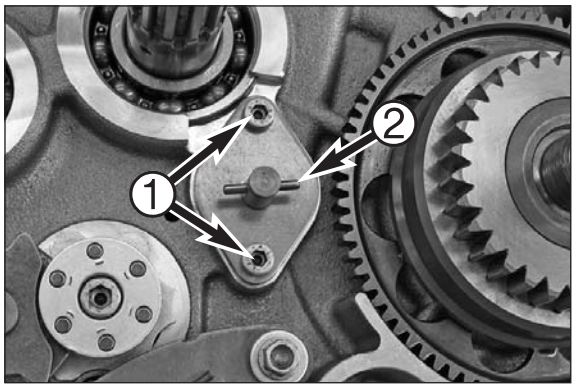
– The coils Ⓐ of the return spring must rest against the case nose Ⓑ on the left and right.



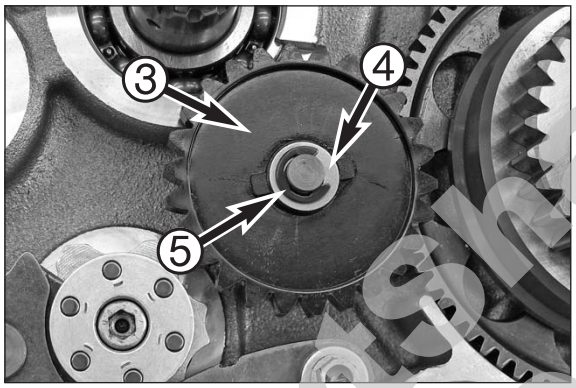
Mounting the oil pump

– Wipe the contact area on the oil pump cover clean.
– Insert the needle roller in the oil pump shaft.
– Oil the inner and outer rotors and mount them on the oil pump shaft. Insert all parts in the engine case.

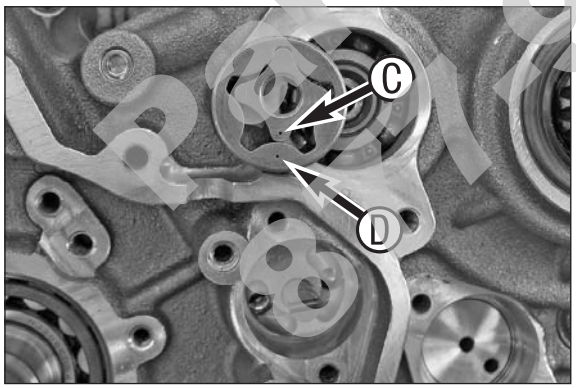
NOTE: mount the inner and outer rotor with marks ❹ and ❺ facing the case.



– Fill the oil pump housing with engine oil.
– Degrease the 2 screw threads ❶ (M5x12) and apply Loctite 222. Screw on the oil pump cover and tighten to 6 Nm.
– Insert the needle roller ❷ in the bore of the oil pump shaft.

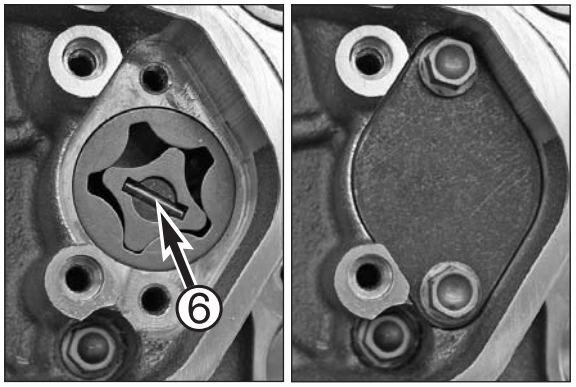


– Slip on the oil pump gear ❸, mount the stop disk ❹ and lock washer ❺.
– Check the oil pump for smooth operation by turning the oil pump gear.

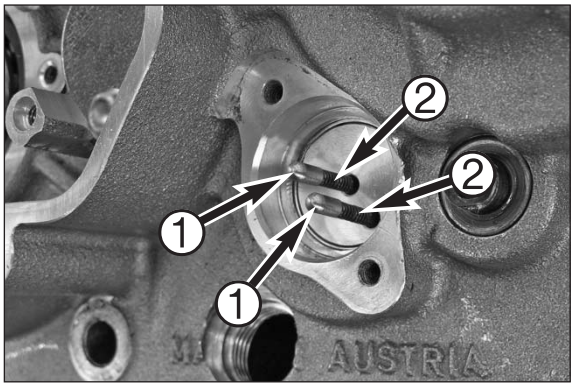


– Wipe the contact area on the oil pump cover clean.
– Insert the oiled inner and outer rotors in the engine case.

NOTE: mount the inner and outer rotors with marks ❻ and ❼ facing the case.

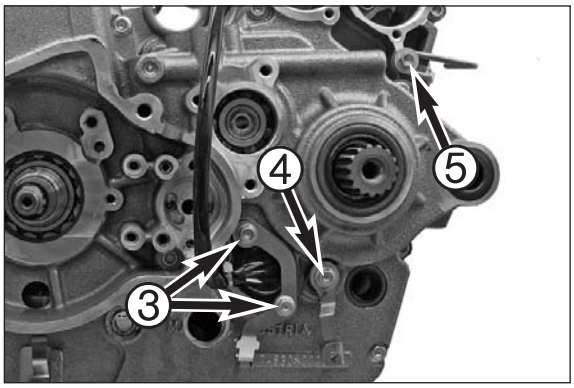


– Mount the needle roller ❻.
– Fill the oil pump housing with engine oil.
– Degrease the 2 screw threads (M5x16) and apply Loctite 222. Screw on the oil pump cover and tighten to 6 Nm.
– Check the oil pump for smooth operation by turning the oil pump gear.

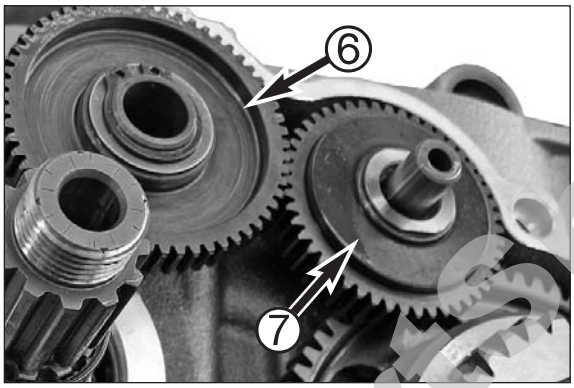


Mounting the gear sensor and locking lever

– Insert the 2 contact pins ❶ and contact spring ❷ in the shift drum.

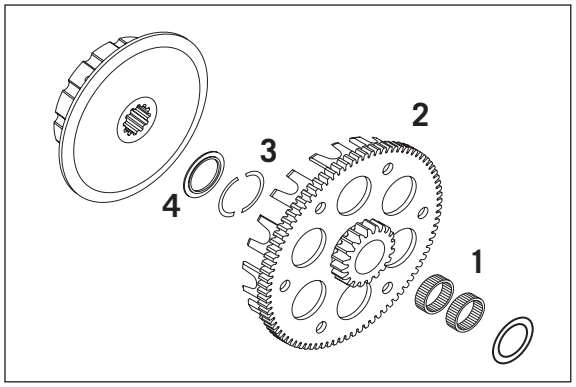


– Replace the O-ring on the gear sensor.
– Degrease the 2 screw threads ❸ (M5x16) and apply Loctite 243. Screw on the gear sensor and retaining bracket and tighten to 6 Nm.
– Run in the cable for the gear sensor.
– Degrease the screw thread ❹ and apply Loctite 243. Screw on the locking lever and spring and tighten to 6 Nm.
– Degrease the screw thread ❺ and apply Loctite 243. Screw on the bracket for the vent hose and tighten to 10 Nm.
– Mount the shift lever and turn the main shaft while you shift through the gears. Remove the shift lever again.



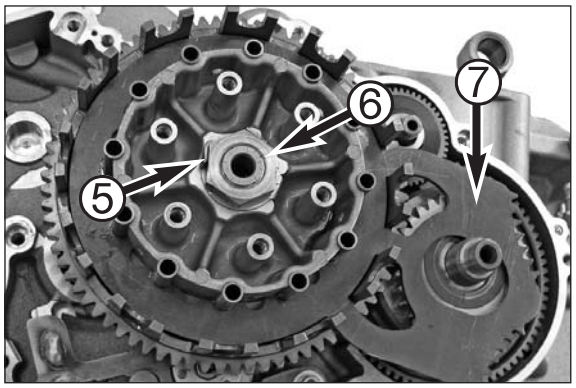
Mounting the starter drive

– Oil the starter idler gear ❻ at the pivot point and mount on the bearing bolt.
– Mount the stop disk and circlips with the sharp edge on the outside.
– Mount both needle bearings and the torque limiter ❼.



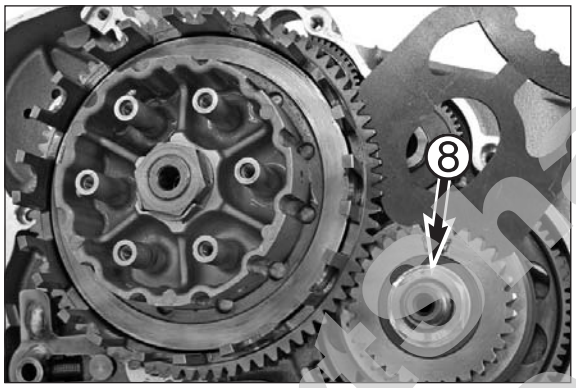
Mounting the outer clutch hub and the clutch driver

– Mount the supporting plate and the oiled needle bearings ❶.
– Slip the outer clutch hub ❷, the half disks ❸ and the stepped disk ❹ on the main shaft.



– If necessary, heat the driver to approx. 150°C and slip onto the main shaft.
– Degrease the thread on the main shaft and apply Loctite 243.
– Mount a new lock washer ❺ and nut ❻.
– Lock the outer clutch hub with special tool ❼ PA-48685 (see photo) and tighten the nut to 120 Nm.
– Lock the nut with the lock washer.

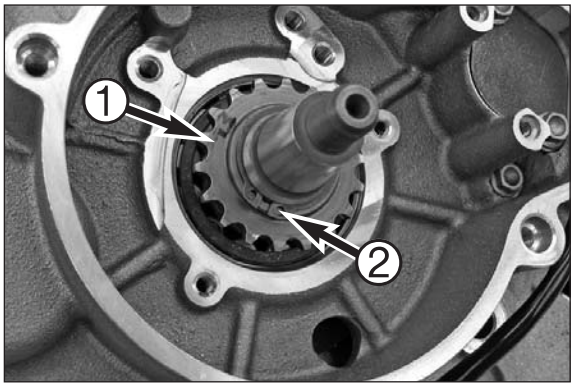
NOTE: a used driver can usually be mounted without heating.



Screwing the nut on the primary gear

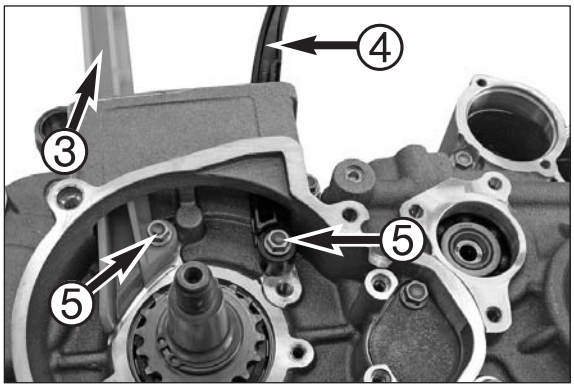
– Pull out the starter idler shaft, leaving the torque limiter in the engine case.
– Position special tool ❼ PA-48685 as illustrated.
– Degrease the thread on the crankshaft and apply Loctite 243. Mount the collar nut ❽ and tighten to 150 Nm (LH thread)!
– Mount the starter idler shaft again.

– Turn the crankshaft to the TDC position.
– Turn in the crankshaft locking tool PA-48677.



Mounting the timing gear

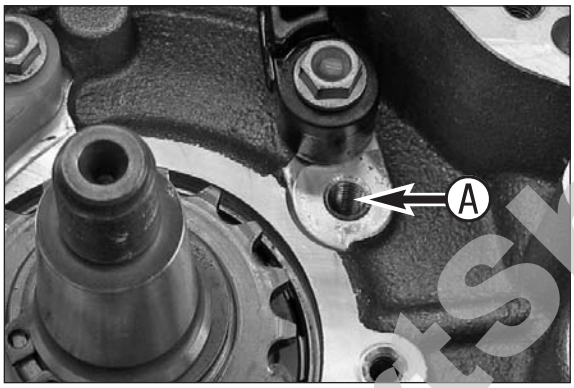
– Make sure the woodruff key is fully seated in the crankshaft.
– Heat the timing gear ❶ and slip it onto the crankshaft with the high collar on the inside. Carefully tap with a suitable pipe if necessary.
– Mount the circlip ❷ with the sharp edge on the outside.



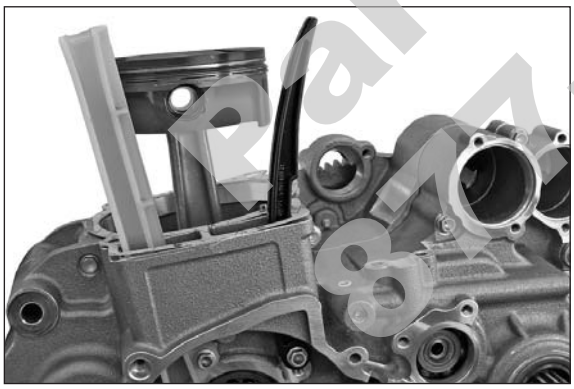
! CAUTION !

MAKE SURE THE TENSIONING RAIL OPERATES SMOOTHLY AFTER TIGHTENING.

– Degrease the 2 screw threads ❺ (M6x25) and apply Loctite 243. Screw on the timing chain guide ❸ and tensioning rail ❹ and tighten the screws to 6 Nm. Remember to mount the 2 bushings.

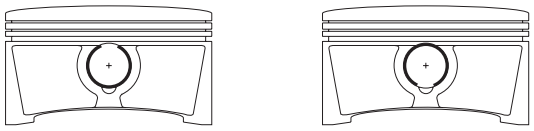


The fastening points Ⓐ are not used for this model.



Mounting the piston and cylinder

– Mount a new cylinder base gasket.
– Oil the piston pin boss in the conrod and the piston pin.



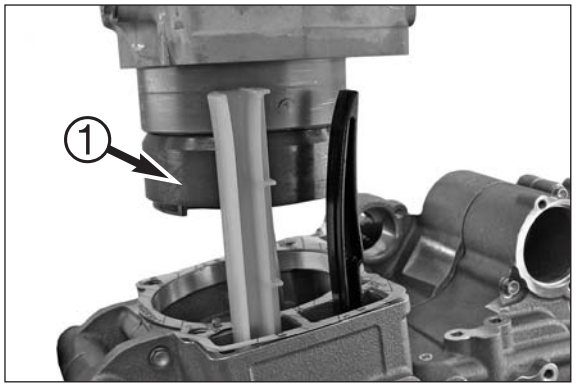
12 o'clock position

6 o'clock position

! CAUTION !

THE ARROW ON THE BOTTOM OF THE PISTON MUST POINT IN THE DIRECTION OF TRAVEL. MOUNT THE WIRE CIRCLIP IN THE "12 O'CLOCK" OR "6 O'CLOCK" POSITION.

– Mount the piston and hold the piston pin in place with 2 new wire circlips.



! CAUTION !

BE ESPECIALLY CAREFUL WHEN MOUNTING THE CYLINDER! THE OIL SCRAPER RING BREAKS EASILY.

– Oil the piston and align the piston rings.

NOTE: the joint on the oil scraper ring must be in the rear. The joint on the compression ring is positioned at a 90° angle to the joint on the oil scraper ring.

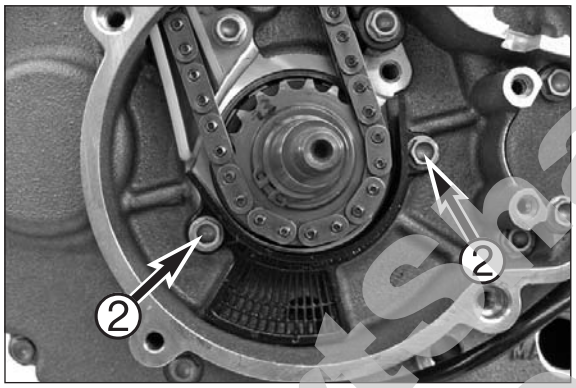
– Slide the piston ring compressor ❶ over the piston rings from above.
– Slide the cylinder over the piston and remove the ring compressor.

Mounting the cylinder head and timing chain

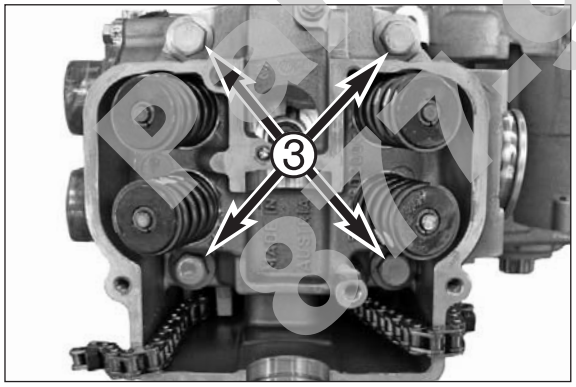
– Make sure the two dowels in the cylinder are fully seated.
– Mount a new cylinder head gasket (the "ALTO" designation up).
– Mount the cylinder head.
– Position the timing chain, making sure both ends are the same length.

NOTE: If timing chain is being reused, install in direction indicated by the arrow you placed on the chain upon disassembly.

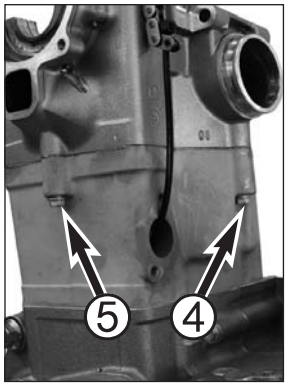
NOTE: insert in cable tie in the two ends of the timing chain to handle and position the timing chain (see illustration).

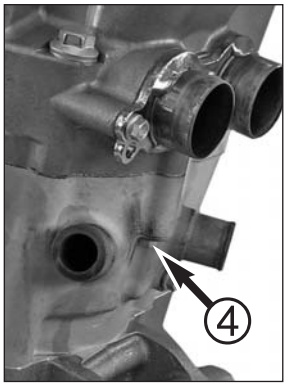


– Degrease the 2 screw threads ❷ (M5x16) and apply Loctite 243. Screw on the clip and tighten to 6 Nm.



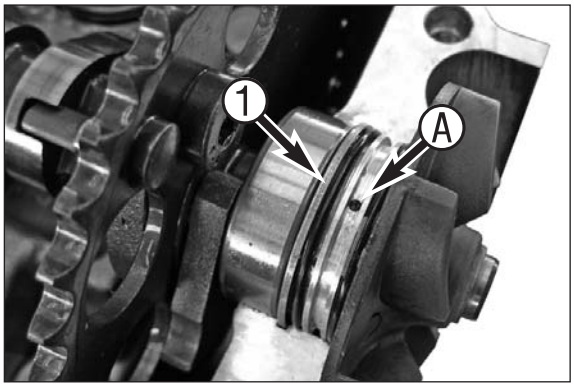
– Oil the 4 collar screws ❸ at the thread and under the head and mount with the washers.
– Tighten the collar screws in a crosswise direction as follows:
– 1st step: tighten until you start to feel resistance.
– 2nd step: tighten the screws to 40 Nm.
– 3rd step: tighten the screws to 50 Nm.





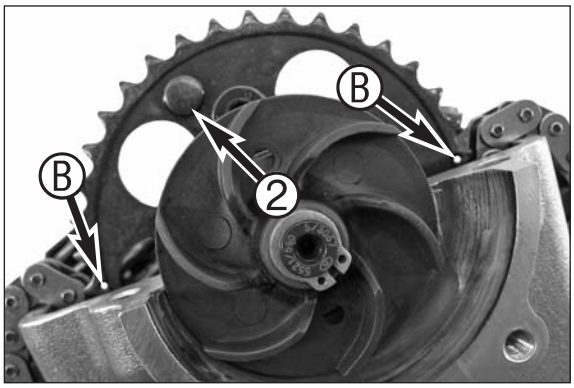
– Mount the 2 screws ❹ (M6x45) and ❺ (M6x40) and tighten to 10 Nm.

NOTE: mount the screw ❺ on the side of the timing chain case with a new copper seal ring (6x10x1).



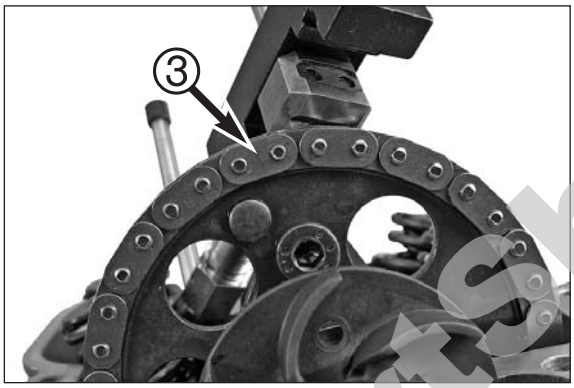
– Place the camshaft in the cylinder head.
– Make sure the washer ❶ is fully seated.
– The drain bore Ⓐ in the gasket carrier must point up.

NOTE: if the gasket carrier and the water pump wheel were removed from the camshaft, these two parts will be mounted later.



– The marks Ⓑ on the camshaft gear must be in alignment with the upper edge of the cylinder head (see photo). The automatic decompression bolt ❷ firmly attached to the camshaft gear must be on top.

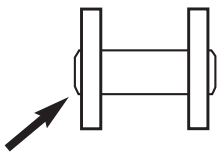
NOTE: when mounting the camshaft, lock the crankshaft in the TDC position with the engine locking screw.

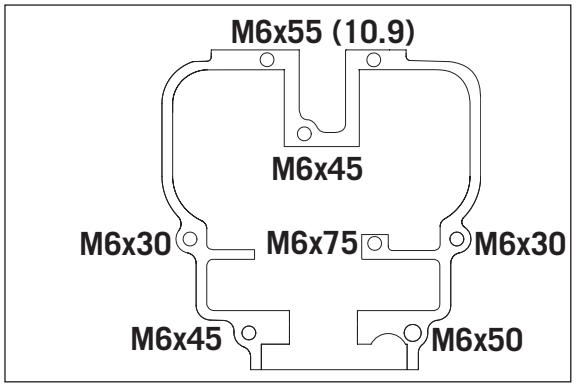


– Place the timing chain on the camshaft gear and mount a new rivet link ❸.
– First mount the bit for special tool PA-48686 as shown and lock the rivet link.

– Use a channel lock pliers to start the master link before using the special tool.
– Mount the special tool as shown and rivet the new link.

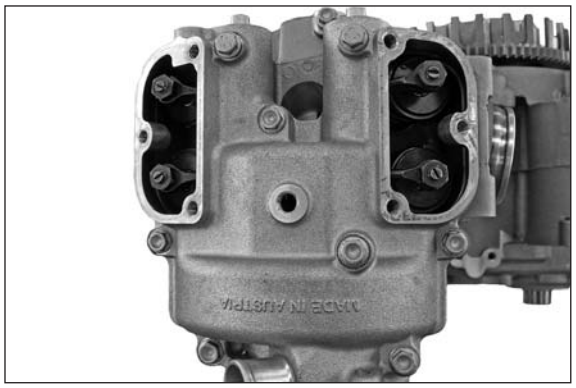
NOTE: rivet the new link tightly until the ends have a trapazoidal cross-section (see drawing).





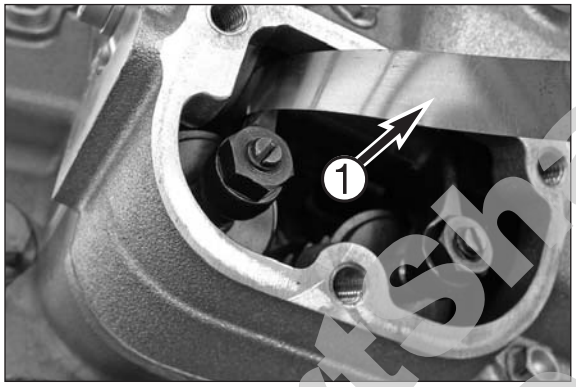
Mounting the cylinder head top section

– Insert the dowels in the cylinder head.
– Degrease the sealing area and apply a thin coat of Three Bond silicone sealant.



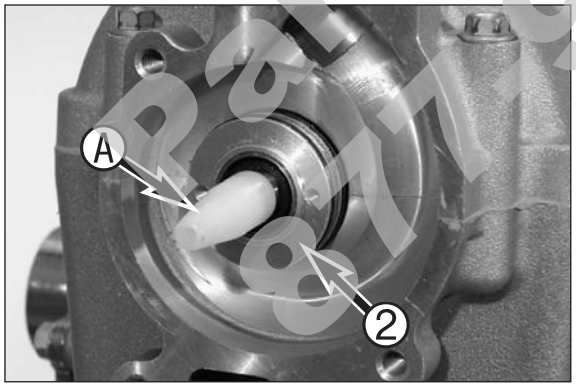
– Mount the cylinder head top section and the screws but do not tighten them yet (see drawing for screw lengths).

NOTE: mount the M6x55 and M6x75 screws with a new 6x10x1 copper seal ring.



– Check and/or adjust the axial clearance of the rocker arm before you tighten the screws.
– To adjust, insert a feeler gauge ❶ (0.05 mm) between the endpiece and the rocker arm. Press in the endpiece and tighten the screw near the endpiece.
– Tighten the remaining screws in a crosswise direction to 10 Nm.

Rocker arm axial clearance 0.02 - 0.10 mm

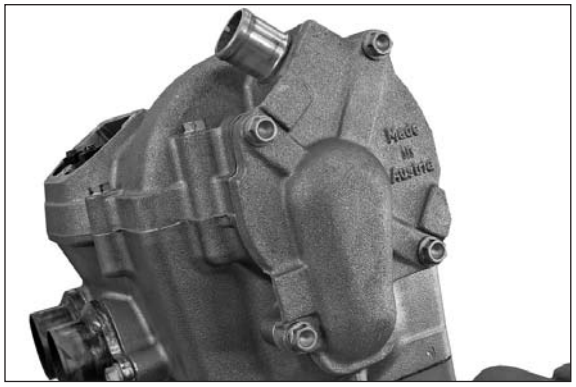


Only perform the following steps if you removed the gasket carrier ❷ from the camshaft

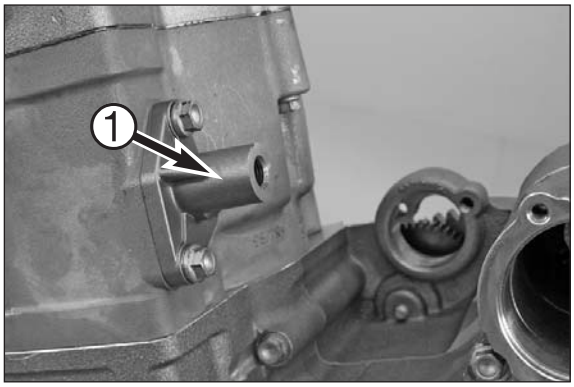
! CAUTION !

IT IS IMPORTANT TO USE A MOUNTING SLEEVE OTHERWISE THE SHAFT SEAL RINGS WILL BE DAMAGED.

– Slip on the seal installer Ⓐ PA-48678.
– Grease the O-rings and shaft seal rings.
– Mount the gasket carrier ❷ with the drain bore facing up and the collar facing the camshaft gear without cocking it sideways.
– Remove the mounting sleeve, insert the needle roller in the camshaft and mount the water pump wheel with the circlip.



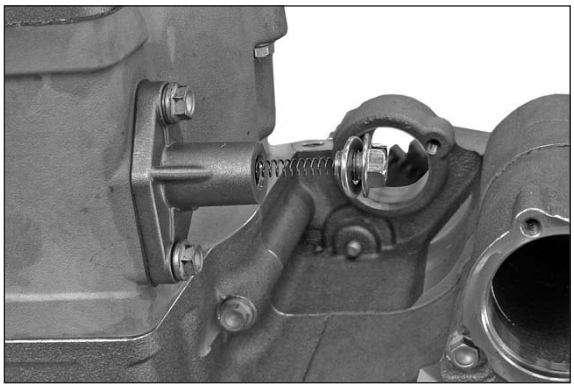
– Mount the water pump cover with a new gasket. Tighten the screws (M6x20) in a crosswise direction to 10 Nm.



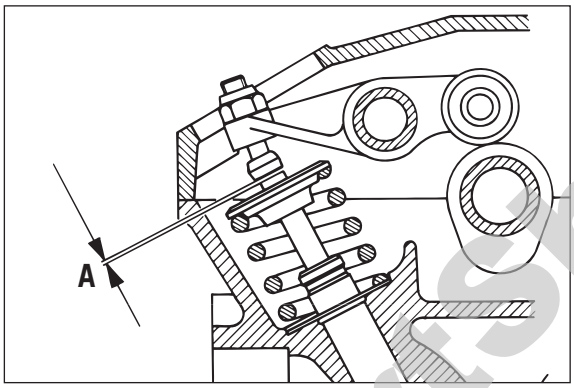
Mounting the timing chain tensioner

– Screw on the premounted timing chain tensioner ❶ with a new gasket and tighten to 10 Nm.

NOTE: mount the 2 screws (M6x20) with a new 6x10x1 copper seal ring.



– Press in the pressure bolt with a screwdriver until you start to feel resistance. Then press it in one notch further.
– Mount the pressure spring and plug with a new seal ring and tighten to 10 Nm.
– Remove the engine locking screw and crank the engine a few times. Put the engine in the ignition TDC position and lock with the engine locking screw.



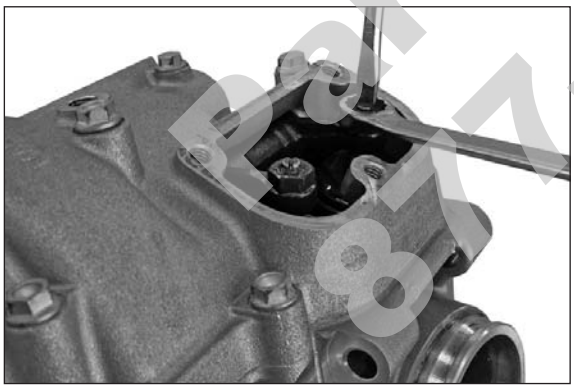
Adjusting the valve clearance

! CAUTION !

IF THE PISTON IS NOT IN THE IGNITION TDC POSITION, THE VALVES WILL BE ACTUATED BY THE ROCKER ARMS AND THE VALVE CLEARANCE CANNOT BE CORRECTLY ADJUSTED. IN THIS CASE, TURN THE ENGINE ONE REVOLUTION FURTHER AND LOCK AGAIN.

NOTE: Make sure you have set the rocker arm axial clearance before you attempt to set the valve clearance.

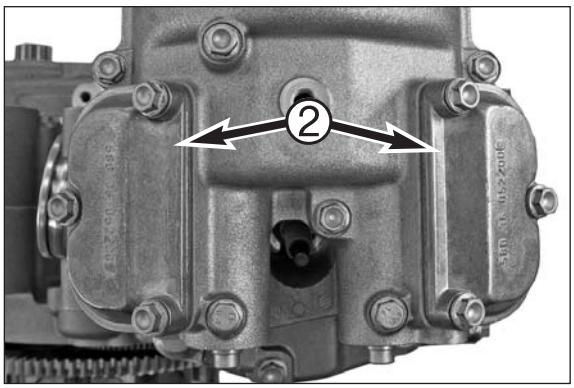
– The valve clearance Ⓐ is measured between the valve shaft and the adjusting screw when the engine is cold.



– Place the correct sized feeler gauge between the valve shaft and adjusting screw on both valves when setting the clearance. This will prevent the rocker arm rail from rocking side to side.

Valve Clearance: .005" (0.127 mm)

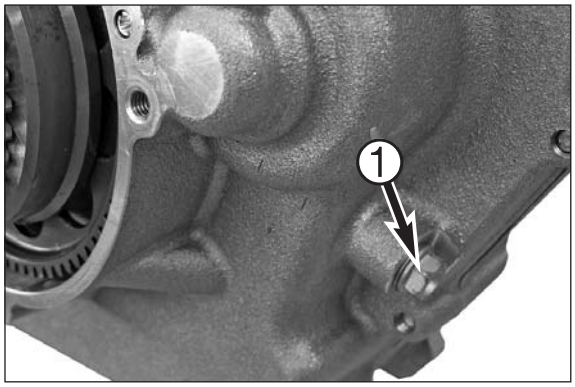
– After adjusting, check the valve clearance again and tighten the counternuts to 11 Nm.



– Screw on both valve ❷ covers with new gaskets and tighten to 10 Nm.

NOTE: mount the 2 screws (M6x20) with a new 6x10x1 copper seal ring.

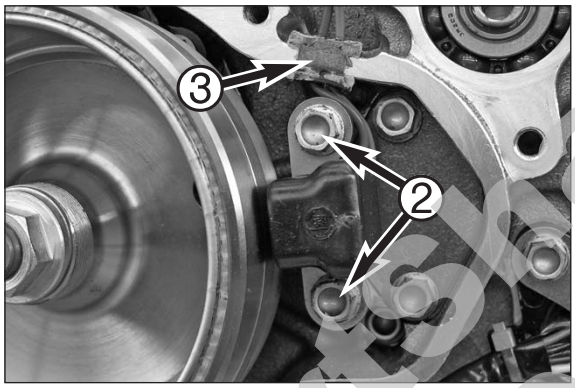
– Screw in the spark plug and tighten to 17 Nm (M12x1.25).



Mounting the flywheel

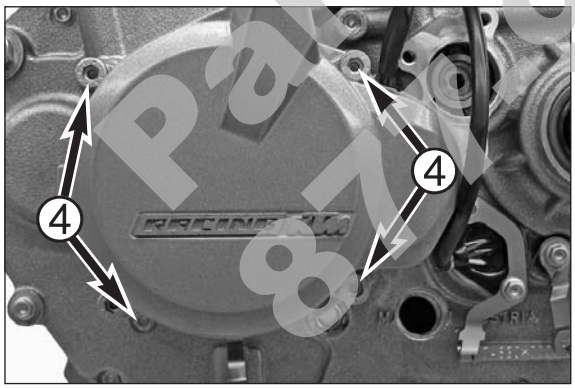
– Remove the engine locking screw. Screw in the plug ❶ with a new copper seal ring and tighten to 10 Nm.

– Make sure the woodruff key is fully seated in the crankshaft and mount the flywheel on the crankshaft.
– Mount the shaft washer and collar nut, hold with a clutch holder while you tighten the collar nut to 60 Nm.

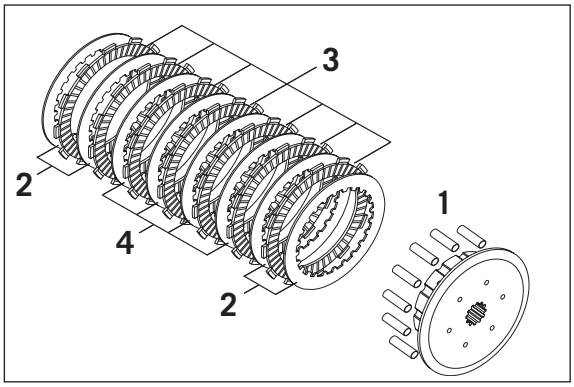


Mounting the pulse generator and ignition cover

– Degrease the 2 screw threads ❷ (M5x16) and apply Loctite 243. Screw on the pulse generator and tighten to 6 Nm.
– Degrease the cable support sleeve ❸, apply a thin coat of Three Bond silicone sealant and insert in the case opening.



– Mount both needle rollers.
– Mount a new gasket and hold the ignition cover in place with the 4 screws ❹ (M8x30), tightening torque: 10 Nm.

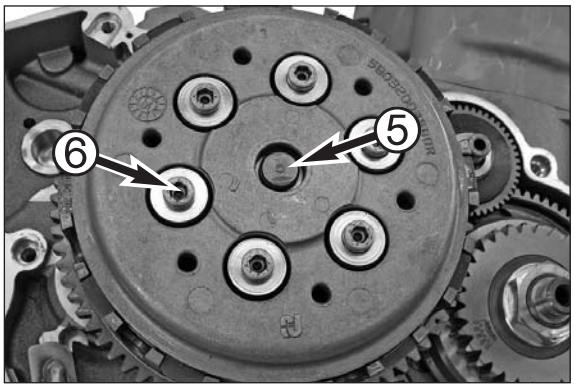


Mounting the clutch

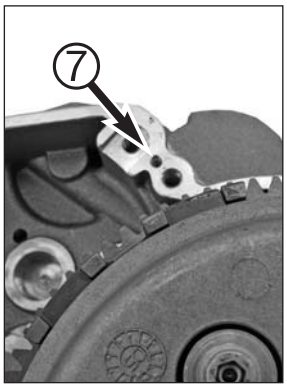
NOTE: change the engine oil any time the clutch is damaged.

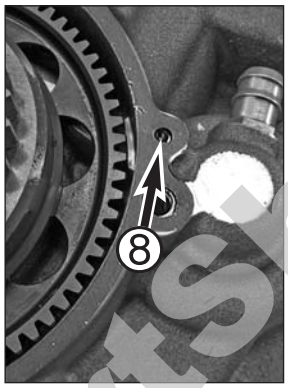
- Oil all the lining disks prior to mounting.
- Position the 12 driving sleeves ❶ on the driver and hold in place with grease if necessary.
- Starting with a thin clutch disk ❷, alternately insert 8 clutch disks and 7 lining disks ❸, finishing with a thin clutch disk ❷ on top.

NOTE: the two outer clutch disks ❷ are 1 mm thick, the thicker clutch disks ❹ (1.4 mm) are positioned on the inside (see drawing).



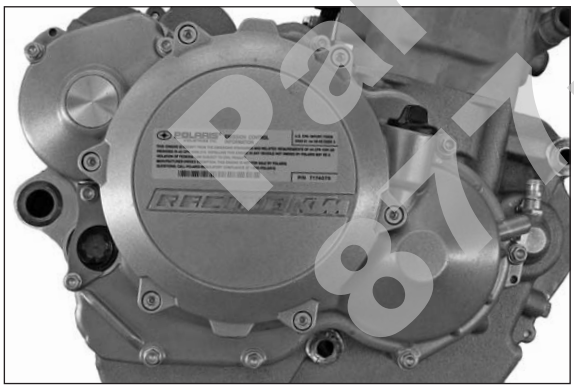
- Insert the pressure piece ❺.
- Degrease the 6 screw threads ❻ and apply Loctite 243.
- Mount the pressure cap.
- Screw on the clutch springs and spring retainers in a crosswise direction and tighten to 8 Nm.



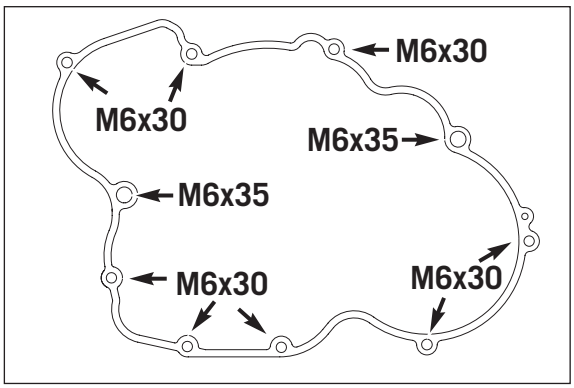


- Mount both dowels and the needle roller ❼.
- Grease all shaft seal rings in the clutch cover.
- Mount the clutch cover gasket.
- Pour approx. 30 ml engine oil into the hole in the crankshaft.

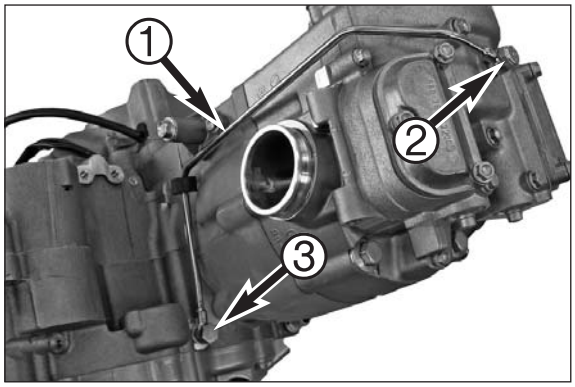
NOTE: make sure the oil jet ❽ in the engine case is not covered by the gasket.



- Mount the premounted clutch cover.



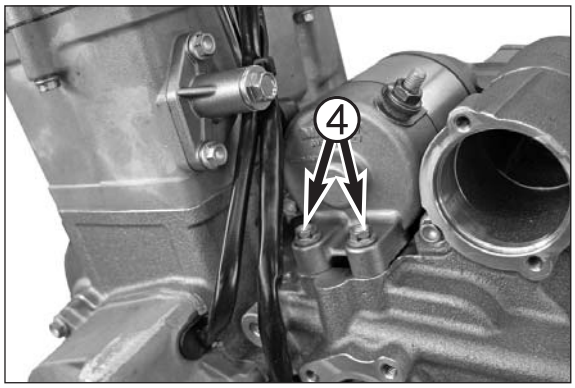
- Mount the screws (see drawing for screw lengths) and tighten to 10 Nm.



Mounting the oil line

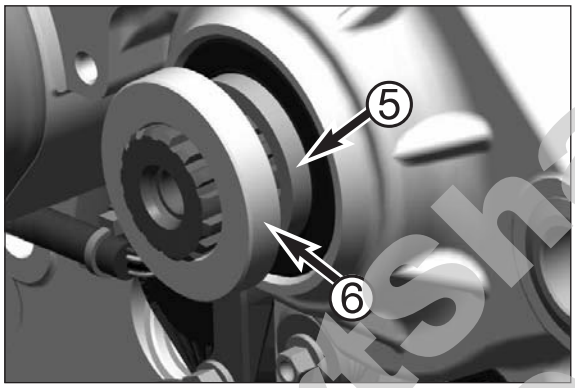
– Position the oil line ❶ and screw on with the “100” jet screw ❷ and the banjo bolt ❸.
– Use new seal rings, tightening torque: 10 Nm.

NOTE: Run the oil line so it does not touch the engine. Do not twist the oil line when tightening.



Mounting the starter and sprocket

– Oil the O-ring at the starter and insert the starter in the engine case. Mount the 2 screws ❹ (M6x20) and tighten to 10 Nm.
– Attach the cables to the oil line.

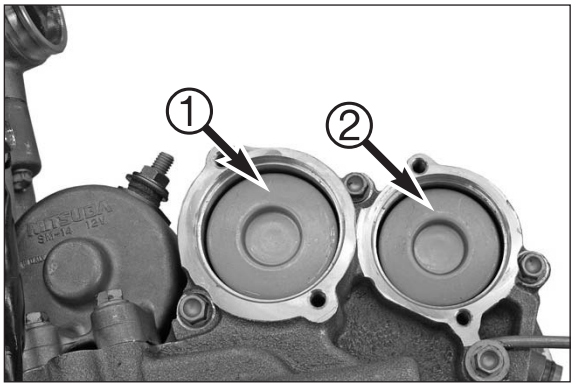


– Oil the distance bushing ❺ and mount on the countershaft with the recess for the O-ring on the inside.
– Mount the distance bushing ❻ on the countershaft.

NOTE: 525 "IRS" - Spacer placed inside of sprocket

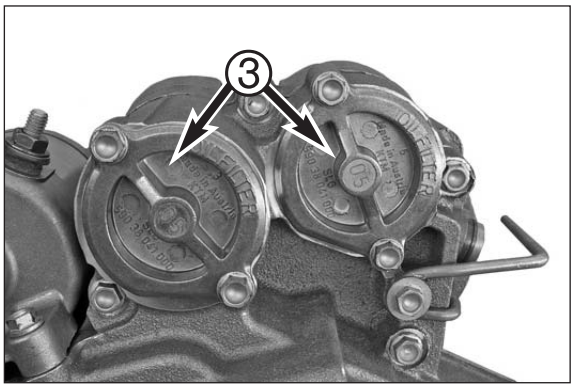
450 "MXR" / 525 "S" - Spacer placed outside of sprocket

– Place the spring washer on the collar screw, degrease the thread and apply Loctite 243. Screw on the sprocket with the high collar on the inside ("IRS") or outside ("MXR / "S") and tighten to 60 Nm. Use a holding wrench for sprocket 510.12.012.000 to keep it from turning.
– Oil and mount the clutch pushrod.

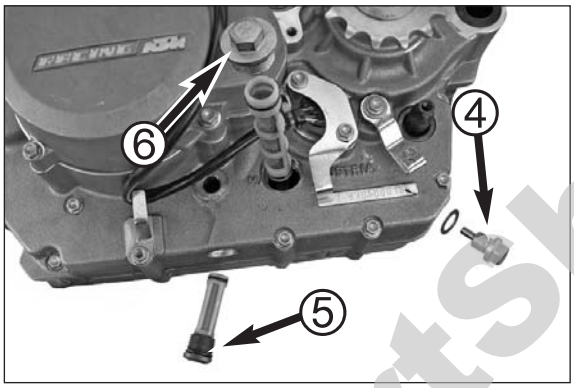


Mounting the oil filter

– Fill both oil filter housings 1/4 full with engine oil and soak new oil filters with engine oil. Insert the long oil filter ❶ in the front and the short oil filter ❷ in the back of the case.

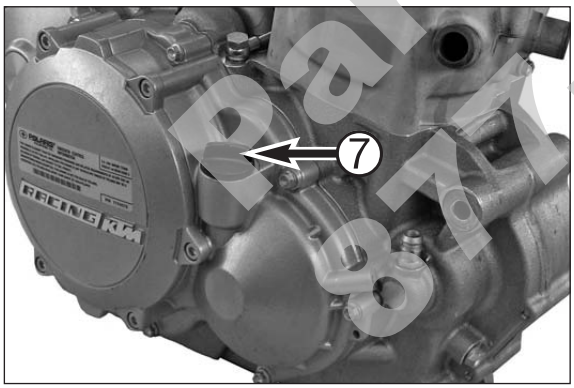


– Lightly oil the new O-rings for the oil filter cover and mount with cover ❸. Mount the screws and tighten to 6 Nm.



Adding engine oil

– Mount the plugs:
❹ with seal ring, tightening torque 20 Nm
❺ with short oil screen, tightening torque 10 Nm (oiled)
❻ with long oil screen, tightening torque 15 Nm



– Remove the screw cap ❼ from the clutch cover and add approx. 1.6 liters of fully synthetic PS-4 Plus engine oil.
– Mount the screw cap.

NOTE: check the engine oil level and leakage again when mounted.

! CAUTION !

AN INSUFFICIENT AMOUNT OR A POOR QUALITY OF ENGINE OIL WILL LEAD TO PREMATURE ENGINE WEAR.

FUEL SYSTEM / CARBURETION 8

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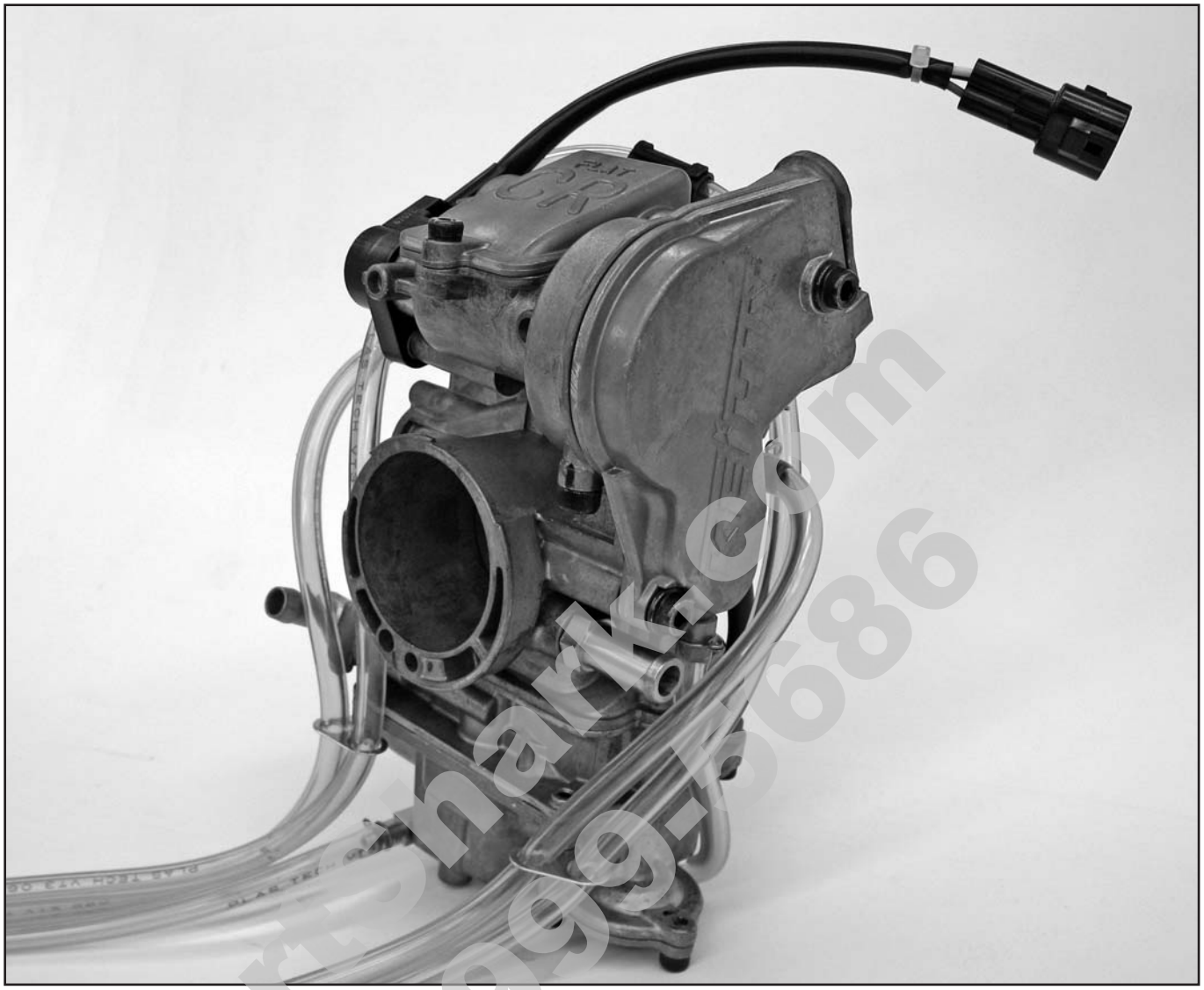
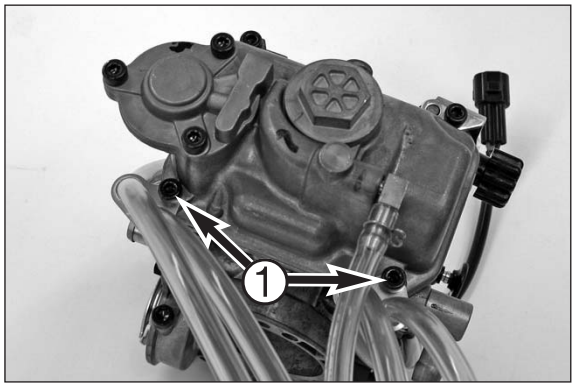
CARBURETOR - KEIHIN FCR-MX 3900



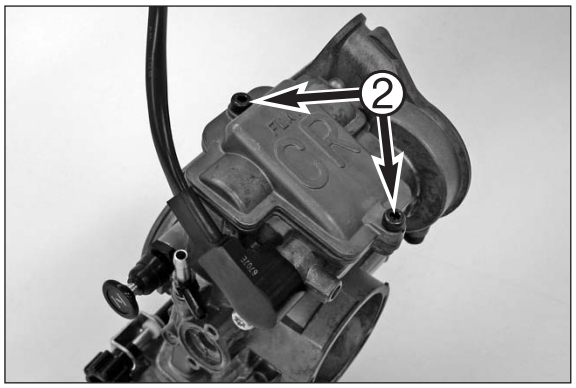


Dismounting the carburetor

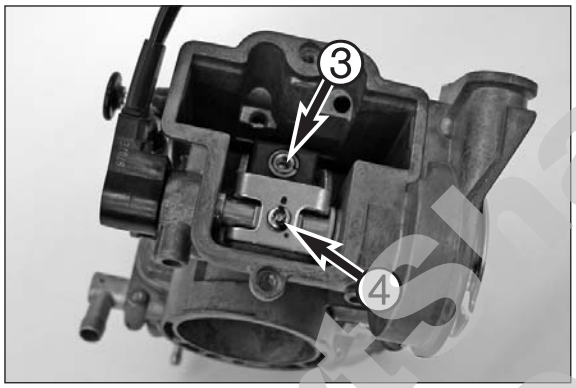
NOTE: before you start to dismount the carburetor, make sure you have a clean workplace. It should have enough room to set out all of the individual carburetor parts.

– Remove the carburetor and any coarse dirt.

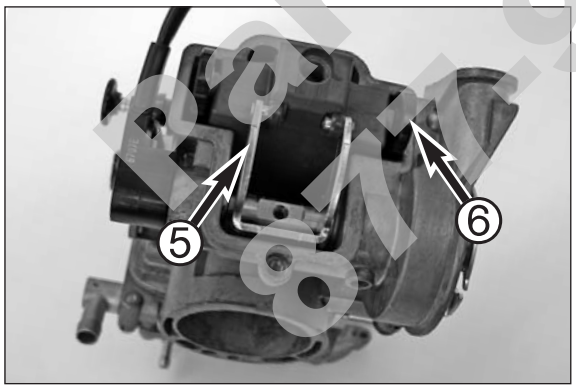
– Remove the 2 screws ❶ and disconnect all of the vent hoses from the carburetor.



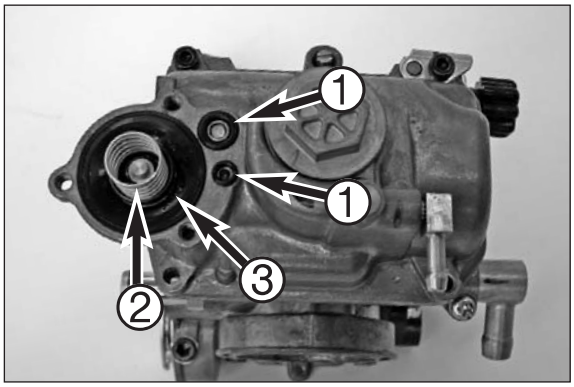
– Remove the 2 screws ❷ and take the slide cover and gasket off of the carburetor.



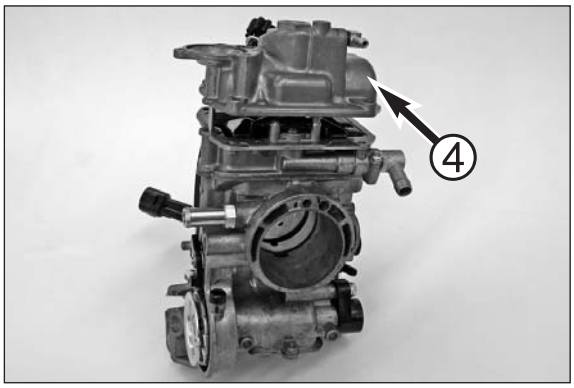
– Remove the screw ❸ with the spring and washer and pull the jet needle out of the throttle slide.
– Remove screw ❹.



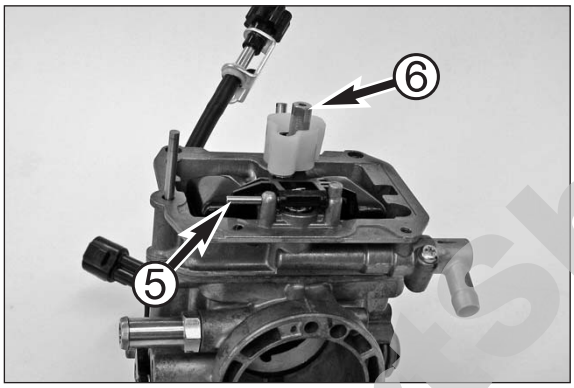
– Pull up the throttle slide arm ❺, take the throttle slide as well as the roller ❻ and the throttle slide plate out of the carburetor.



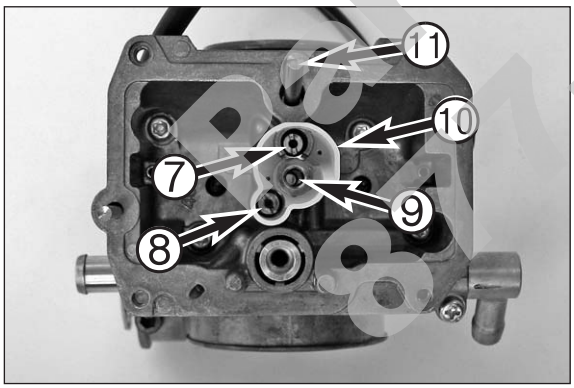
– Remove the 3 screws from the accelerator pump cover and take off the accelerator pump cover.
– Take the 2 seal rings ❶, spring ❷ and membrane ❸ out of the accelerator pump housing.



– Remove the remaining screws on the float chamber and take off the float chamber housing ❹.



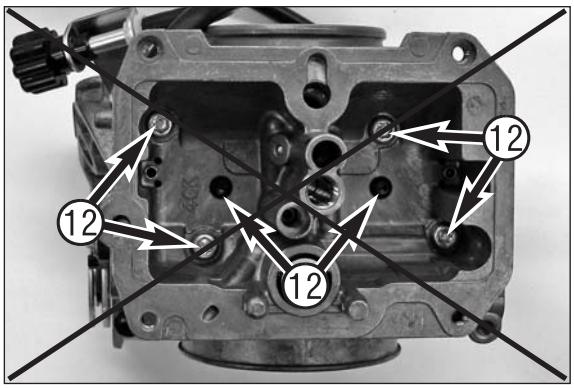
– Pull out the float hinge pin ❺ and remove the float together with the float needle valve.
– Remove the main jet ❻.



– Remove the idling jet ❼, starting jet ❽, needle jet ❾ and attenuator ❿.

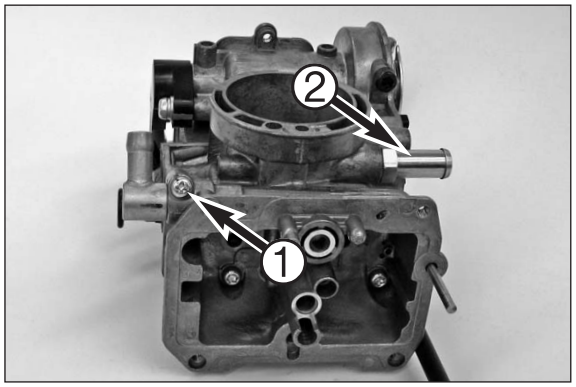
– Turn the mixture control screw ⓫ all the way in; count and write down the number of turns.
– Unscrew the mixture control screw and remove together with the spring, washer and O-ring.

NOTE: the spring, washer and O-ring usually stay in the bore. These parts can be removed with the help of compressed air. The mixture control screw ⓫ should not be open more than 2 turns. If more than two turns are required (richer mixture) you should use a larger idling jet.

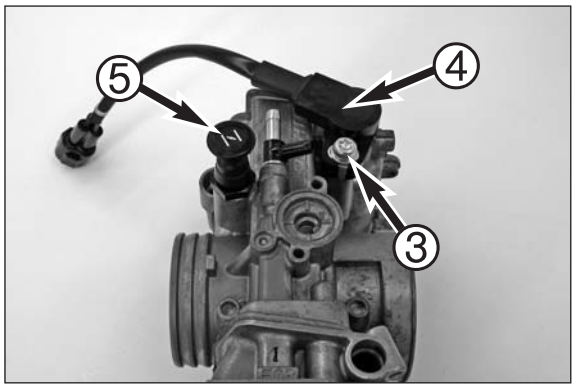


– Do **not** remove the screws ⓬.

NOTE: Removal of these screws will cause permanent malfunction of the carburetor.



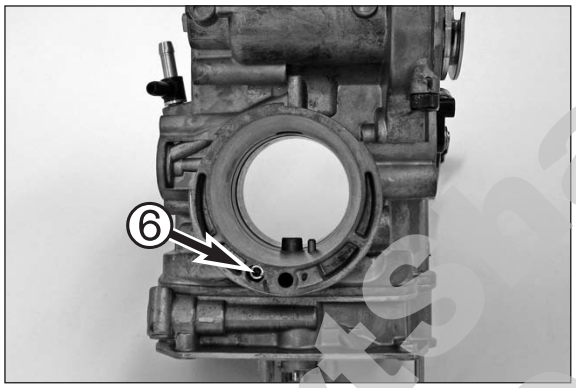
– Remove the screw ❶ and pull the hose connection out of the carburetor.
– Unscrew the threaded sleeve ❷.



NOTE: only remove the throttle sensor if it is defective. If screw ❸ is loosened, the throttle sensor must be readjusted.

– Remove screw ❸ and remove the throttle sensor ❹.

– Unscrew the choke slide ❺.

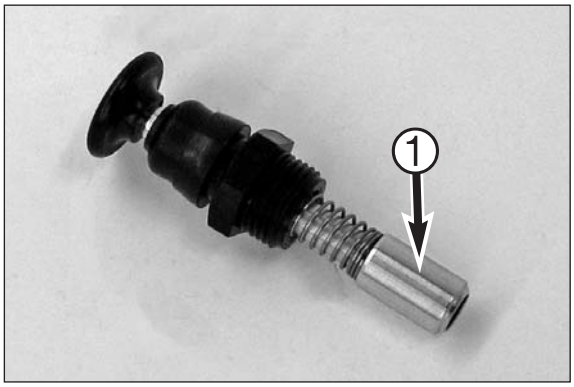


– Unscrew the idling jet ❻.

– Thoroughly clean all jets and other components and blow dry with compressed air.
– Clean the carburetor housing and blow through all carburetor orifices with compressed air.

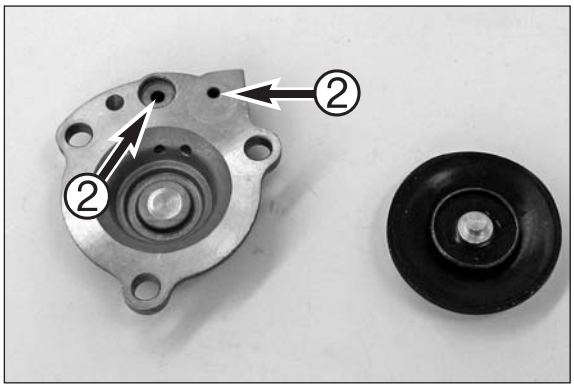
– Check all gaskets for damage and replace if necessary.

NOTE: do **not** use thinner to clean the carburetor.



Checking the choke slide

The choke slide should operate smoothly.
The choke slide piston ❶ should not have any deep score marks or deposits.
Check the condition of the rubber boot and the choke lock.

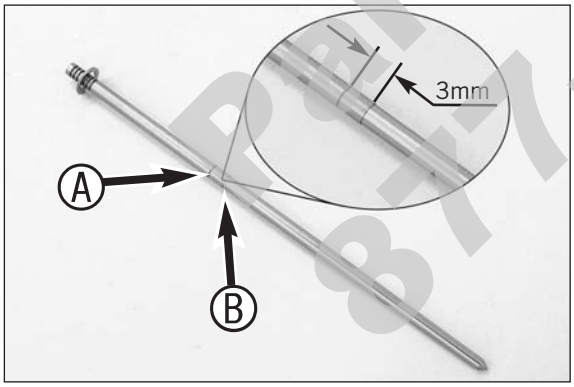


Checking the accelerator pump

Check the membrane for cracks or brittleness.
Check the gaskets for damage.
Make sure the bores ❷ are not clogged.

Checking the jet needle

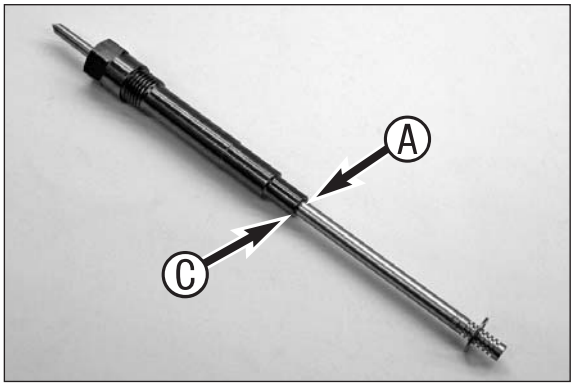
Check whether the jet needle is bent or the coating worn.
Check the needle clip for a tight fit.



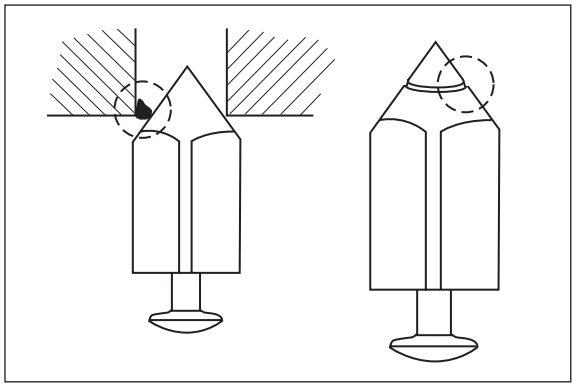
Checking the needle jet (after 30 hours of operation)

Use a flawless jet needle as a gauge.
Make a mark Ⓐ 3 mm above level Ⓑ on the jet needle.

NOTE: make sure the mark can be completely removed afterwards.

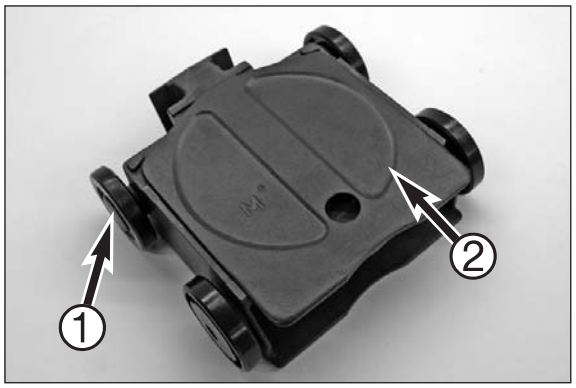


Insert the market jet needle in the needle jet to be tested. **Carefully** push the two parts together. If the mark Ⓐ on the jet needle can still be seen on the upper edge Ⓒ of the needle jet, the needle jet can still be used.
If the mark on the jet needle is no longer visible, replace the needle jet.



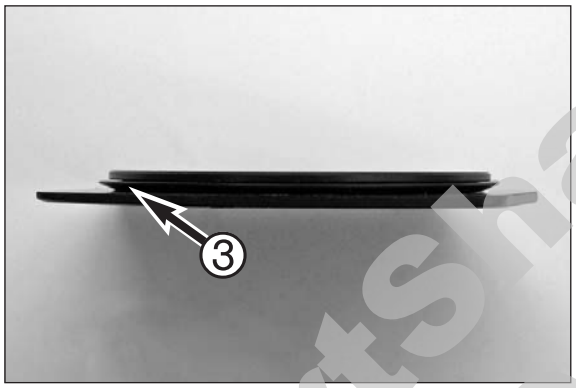
Checking the float needle valve

Check the needle valve at the sealing area for indentations. Make sure no dirt has accumulated between the valve seat and float needle.

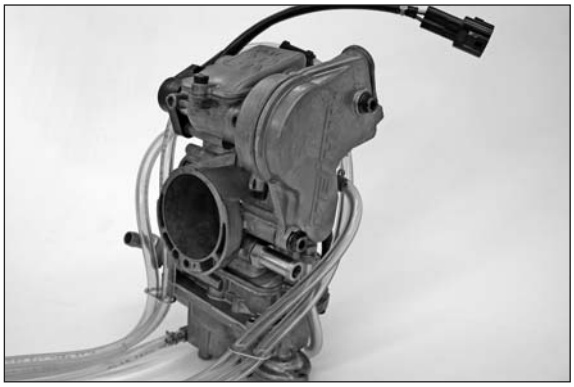


Checking the throttle slide

The rollers on the throttle slide must turn easily and should not have any flat areas. They should be seated firmly on the throttle slide (except roller ❶, which is removable). Check the condition of the coating on the throttle slide and throttle slide plate ❷. Replace if the coating is worn (if the bare aluminum is visible) or damaged.



Check the membrane ❸ on the throttle slide plate for cracks or brittleness and make sure it is correctly seated.



Assembling the carburetor

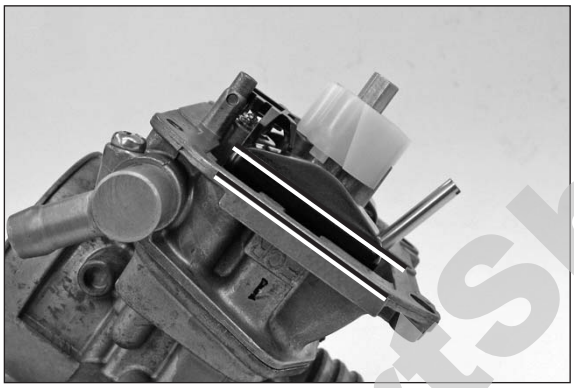
Assemble the carburetor in the reverse order, paying attention to the following points:

– Lock the screw on the throttle sensor with Loctite 243 but do not tighten yet.
– Lock the screws for the hose connection and the attachment of the throttle slide arm with Loctite 243.

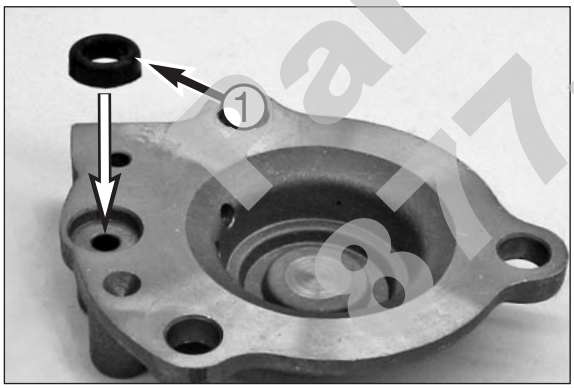
NOTE: it should be possible to turn the hose connection freely when mounted.

– Unscrew the mixture control screw the number of turns written down during disassembly. See "Technical Specifications" for the basic carburetor setting.

NOTE: the mixture control screw should not be open more than 2 turns. Use a bigger idling jet if more than two turns are necessary (richer mixture).



– Check and/or adjust the float height.

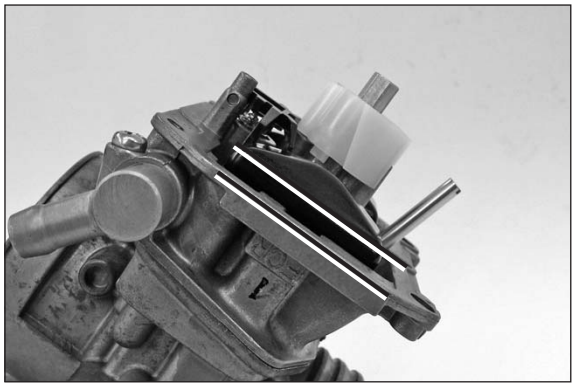


– Check and/or adjust the throttle slide opening.
– Check and/or adjust the operation of the accelerator pump.
– Fasten the seal ring ❶ with the rounded side facing up in the accelerator pump cover.

NOTE: mount the accelerator pump membrane with the writing facing the accelerator pump cover.

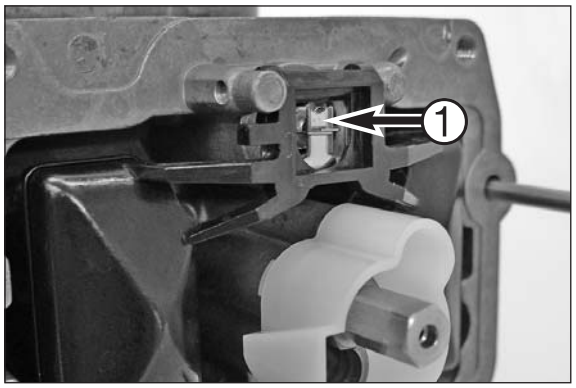
– Check and/or adjust the position of the throttle sensor.

– Check and/or adjust the idling position.

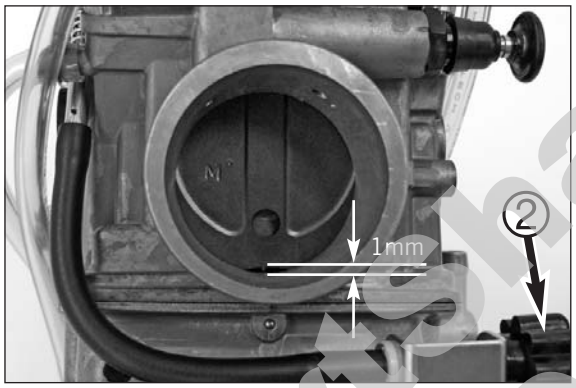


Checking/adjusting the float height

– Tilt the carburetor until the float rests against the float needle valve without compressing it.
– The edge of the float should be parallel to the sealing area of the float chamber in this position (see photo).
– If the float height does not correspond to the setpoint value, check the float needle valve and replace if necessary.



– If the float needle valve is good you can adjust the float height by bending the float tab ❶.

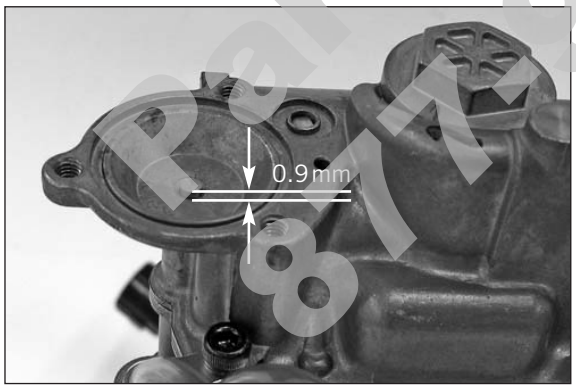


Checking/adjusting the throttle slide opening

NOTE: the basic 1 mm throttle slide setting only helps to control the beginning of injection by the accelerator pump and the basic setting of the throttle sensor.

– Use the adjusting screw ❷ to set the opening of the throttle slide to 1 mm. This test is easily performed with a 1 mm drill bit shaft or wire.

NOTE: check and/or adjust the idling position.

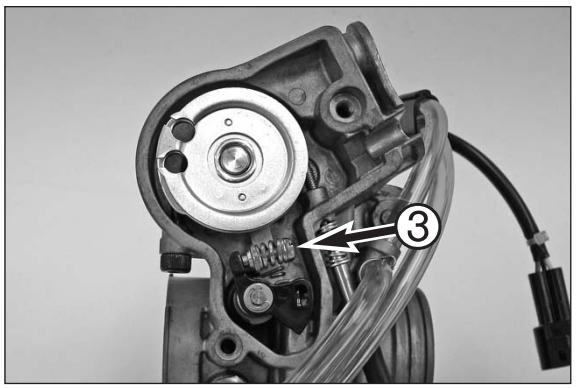


Checking/adjusting the operation of the accelerator pump

NOTE: adjusting the accelerator pump clearance will change the beginning of injection and will not affect the quantity injected or intensity of the accelerator pump.

– A 1mm opening of the throttle slide is a prerequisite for the correct adjustment of the accelerator pump operation.

– The basic setting for the accelerator pump piston rod projection is 0.9 mm.



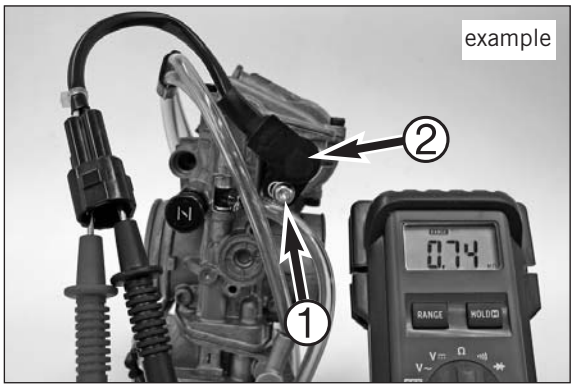
– The piston rod projection can be corrected by turning the adjusting screw ❸.

NOTE: check and/or adjust the idling position.

Adjusting the position of the throttle sensor

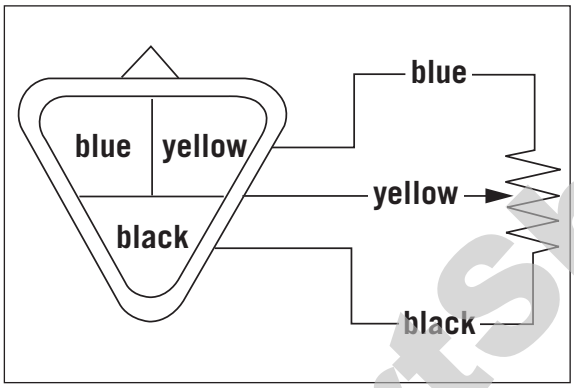
NOTE: the following measurement must be made at a component temperature of approx. 20°C. The carburetor must be dismounted to take this measurement. The throttle slide must be in the starting position (1mm open).

– Connect a multimeter (measuring range kΩ) to the blue (+) and black (-) cables on the throttle sensor and measure the total resistance of the throttle sensor (R_{ges}).
– Multiply the throttle sensor total resistance (R_{ges}) by 0.17 to obtain the variable throttle sensor resistance (R_{var}) for the throttle sensor setting.



R_{ges} (blue/black) = 4 - 6 kΩ (setpoint value)

R_{var} (yellow/black) (tolerance ± 0,05 kΩ) = R_{ges} x 0,17



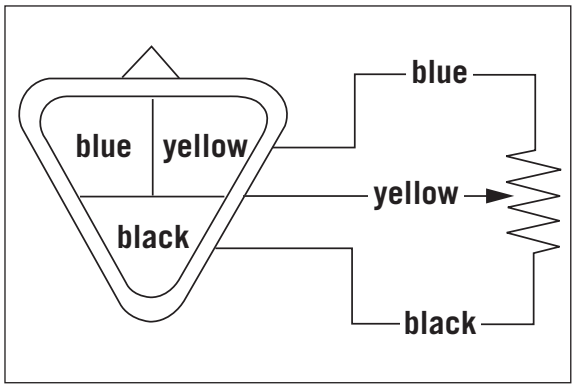
– Connect the multimeter (measuring range kΩ) to the yellow (+) and black (-) cables on the throttle sensor and measure the variable throttle sensor resistance (R_{var}).
– If the measured value does not correspond to the calculated setpoint value, loosen the screw ❶ and adjust the setpoint value by turning the throttle sensor ❷.
– Tighten the screw to set the throttle sensor in this position and check by measuring again.

Checking the throttle sensor

NOTE: the following measurement must be made at a component temperature of approx. 20°C. The carburetor must be dismounted to take this measurement. The throttle slide must be in the starting position (1mm open).

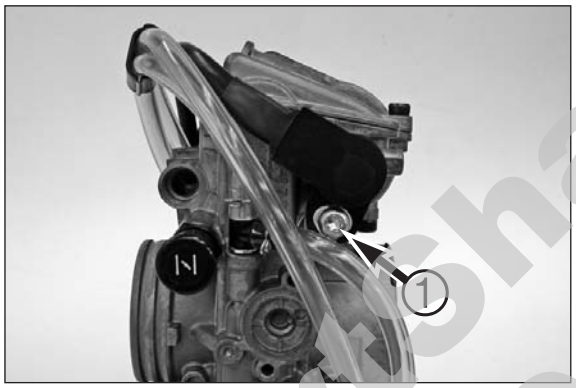
– Connect a multimeter (measuring range kΩ) to the blue (+) and black (-) cables on the throttle sensor and measure the total resistance of the throttle sensor (R_{ges}).

Throttle sensor total resistance (R_{ges})**: 4 - 6 kΩ**



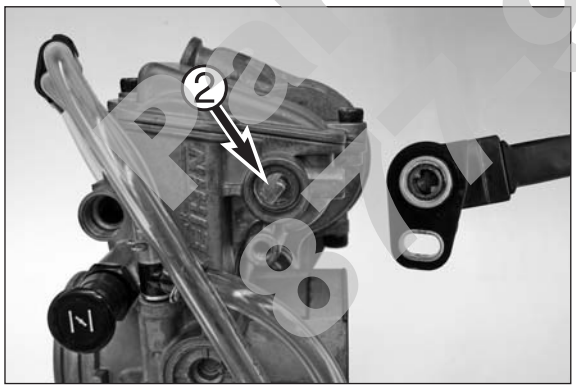
– Connect the multimeter (measuring range kΩ) to the yellow (+) and black (-) cables on the throttle sensor and measure the variable throttle sensor resistance (R_{var}).
– When the throttle slide is opened slowly, the resistance should steadily increase to:

Variable throttle sensor resistance (R_{var})**: 5 kΩ ±1 kΩ**
(throttle slide fully open)

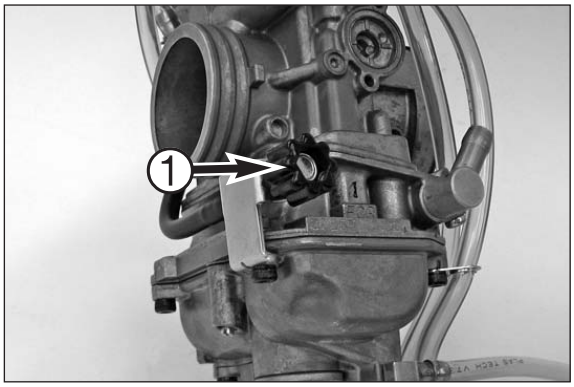


Removing and mounting the throttle sensor

– Disconnect the plug connector from the throttle sensor and remove the screw ❶.
– Remove the throttle sensor from the carburetor.



– When you mount the throttle sensor make sure the flat part of the driver ❷ engages in the recess in the throttle sensor.
– Degrease the screw thread and apply Loctite 243.
– Mount the screw but do not tighten yet. Adjust the position of the throttle sensor.



Adjusting the idle speed

The carburetor idle speed strongly influences the starting performance, a stable idle and engine responsiveness when accelerating. An engine with a correct idle speed will be easier to start than one with an incorrect idle adjustment.

The idle speed is adjusted with the adjusting screw ❶. The adjusting screw sets the basic position of the throttle slide. Turning the adjusting screw will increase or decrease engine RPM.

TO SET THE CORRECT IDLE SPEED, PROCEED AS FOLLOWS:

1. Warm up the engine (approx. 5 minutes).
2. Adjust the idle speed (1700-1800 RPM) with the adjusting screw ❶.
3. The idling speed must be readjusted for larger fluctuations in the outside temperature and at extreme altitudes.

Basic information on carburetor wear

The throttle slide, jet needle and needle jet are subjected to increased wear due to engine vibrations. This wear will cause the carburetor to malfunction (e.g. to over-enrich). These components should be checked for wear every 50 operating hours.

TROUBLE SHOOTING 9

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TROUBLESHOOTING

Defects should not occur if you have your ATV serviced as set forth in this manual. If a defect should occur, we recommend that you proceed according to the following troubleshooting chart.

ERROR	CAUSE	REMEDY
Engine does not turn over	Operating error	Switches are on and the tether is installed
	Circuit breaker is faulty	Inspect and/or replace the circuit breaker
	Battery is dead	Charge the battery and look for the cause of discharging, replace dammaged parts
Engine turns over but does not start	Operating error	Open the fuel tap, refuel, do not actuate the choke, follow start-up instructions (see driving instructions)
	ATV was not operated for a longer period of time, old fuel in the float chamber	The highly inflammable constituents in the new fuel volatilize if left standing over longer periods of time. If the ATV was not used for over 1 week, drain the old fuel from the float chamber. The engine will start immediately after the float chamber is filled with fresh ignitable fuel.
	Fuel supply is interrupted	Disconnect the fuel hose from the carburetor, place the end in a pan and open the fuel tap, – if fuel leaks out, clean the carburetor – if no fuel leaks out, check the tank ventilation and clean the fuel tap
	Engine is flooded	To "pump" the engine dry, open the throttle completely, actuate the starter 2 times for 5 seconds. Then start the engine as described above. If the engine still won't start, unscrew the spark plug and dry.
	Spark plug is sooted or wet	Clean and dry or replace the spark plug
	Electrode distance is too large	Set the electrode distance to 0.6 mm
	High tension lead or spark plug is defective	Remove the spark plug, connect the ignition wire, hold the spark plug against the ground (bright side facing the engine) and start. A strong spark should be visible at the spark plug – if there is no spark, replace the spark plug – if there is still no spark, disconnect the spark plug connector from the ignition wire, hold approx. 5 mm away from the ground and start – if there is a spark, replace the spark plug connector – if there is still no spark, test the ignition system
	Socket connector on CDI unit, pulse generator or ignition coil has oxydized	Remove the seat, clean the socket connector and treat with contact spray
	Water in the carburetor or jets clogged	Dismount and clean the carburetor

ERROR	CAUSE	REMEDY
Engine does not idle	Idling jet is clogged	Disassemble the carburetor and clean the jets
	Adjusting screws on the carburetor are turned in the wrong position	Adjust the carburetor
	Spark plug is defective	Replace the spark plug
	Ignition system is defective	Check the ignition system
Engine does not rev up	Carburetor is flooded because the float needle is soiled or worn	Disassemble the carburetor and check for wear
	Loose carburetor jets	Tighten the jets
	Defective electronic ignition advance	Check the ignition system
Engine does not have enough power	The fuel supply is partly interrupted or the carburetor soiled	Clean and check the fuel system and the carburetor
	Float leaks	Replace the float
	Air filter is heavily soiled	Clean or replace the air filter
	The exhaust system leaks or is deformed	Check the condition of the exhaust system
	Valve clearance is too small	Adjust the valve clearance
	Electronic ignition advance is defective	Check the ignition system
Engine misfires or backfires in the carburetor	Fuel shortage	Clean and check the fuel system and carburetor
	Engine takes in unmetered air	Check the rubber sleeve and carburetor for a tight fit
Engine overheats	Not enough coolant in the cooling system	Add coolant , check the cooling system for leaks
	Cooling system is not ventilated	Clean the radiator fins with a water jet
	Radiator fins are heavily soiled	Clean the radiator fins with a water jet
	Foam has formed in the cooling system	Replace the coolant; use brand-name antifreeze
	Bent radiator hose	Shorten or replace the radiator hose
	Defective thermostat	Remove and have the thermostat checked (opening temperature 70°C) or replaced
	Fan circuit breaker is faulty	Replace the circuit breaker and check fan operation
	Defective thermoswitch	Check the thermoswitch for proper functioning
	Defective fan	Check the fan for proper functioning. Start the engine and short-circuit the connections on the thermoswitch
High oil consumption	Bent engine vent hose	Run the vent hose without kinks or replace
	Engine oil level is too high	Check the oil level and correct if necessary
	Use of Incorrect engine oil (viscosity)	Replace with recommended engine oil.
Battery is dead	Battery is not being charged by the generator	Check the terminals on the voltage regulator; check the voltage regulator and generator

TECHNICAL SPECIFICATIONS 10

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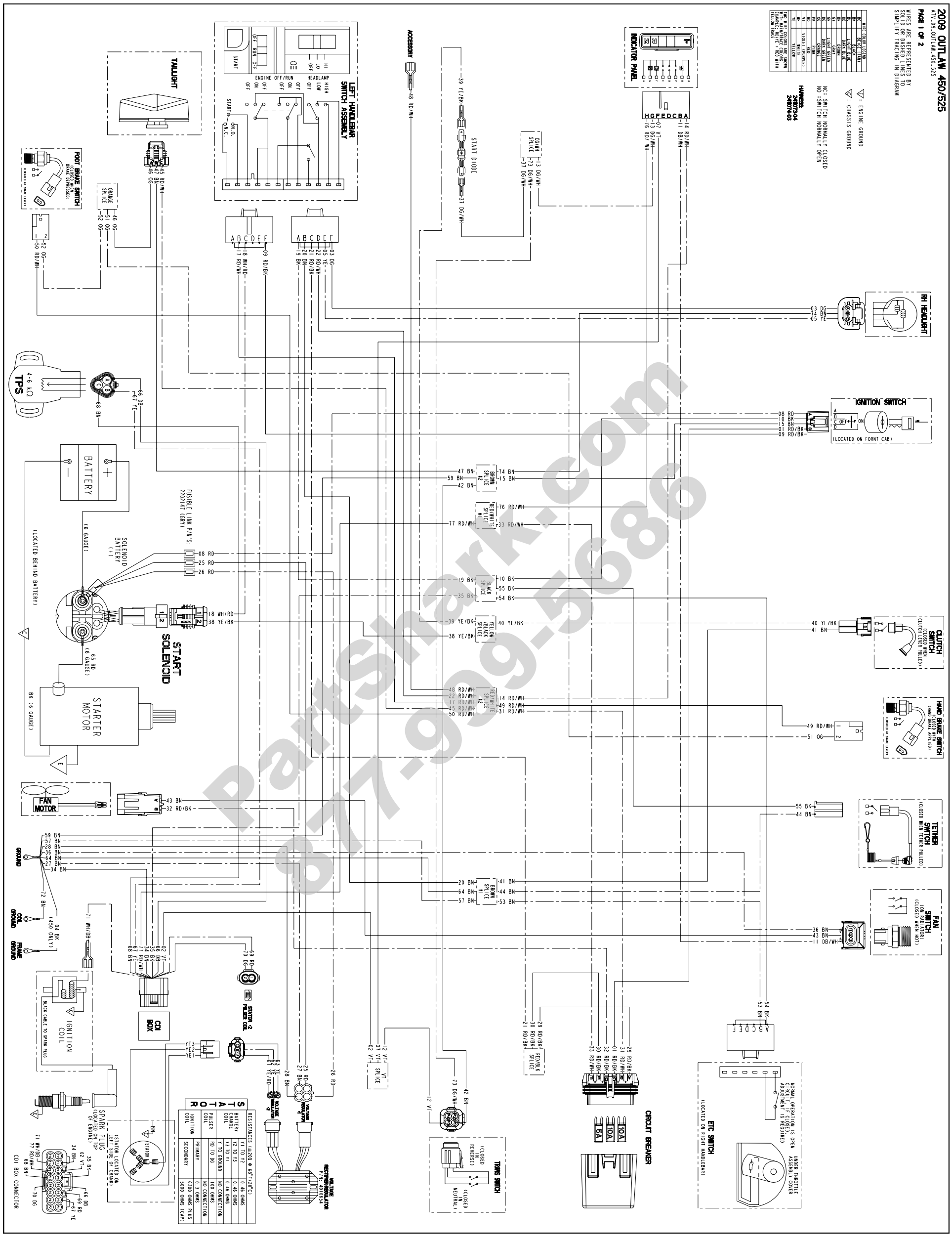
TECHNICAL DATA - ENGINE 2009

ENGINE	450 / 525
Design	Liquid-cooled single cylinder 4-stroke engine with balancer shaft
Displacement	448 ccm / 510 ccm
Bore/Stroke	89 x 72 mm / 95 x 72 mm
Ratio	11 : 1
Fuel	unleaded fuel with at least RON 95 (USA = Premium PON 91)
Valve timing	4 valves over rocker arm and 1 overhead camshaft, camshaft drive through single chain
Camshaft	590/5521
Valve diameter intake	35 mm
Valve diameter exhaust	30 mm
Valve clearence cold intake	.005" (0.127 mm)
Valve clearence cold exhaust	.005" (0.127 mm)
Crank shaft bearing	2 cylinder roller bearing
Connecting rod bearing	needle bearing
Top end bearing	bronze bushing
Piston alluminium alloy	cast / forged
Piston rings	1 compression ring, 1 oil scraper ring
Engine lubrication	pressure circulation lubrication with two rotor pumps
Engine oil	Polaris PS-4 Plus (2W-50 Synthetic Engine Oil)
Quantity of engine oil	1.6 liters
Primary ratio	straight geared spur wheels 31:78
Clutch	multi disk clutch in oil bath
Transmission claw shifted	5-speed + reverse gear
Gear ratio 1st Gear	 14:35
2nd Gear	17:33
3rd Gear	19:30
4th Gear	21:28
5th Gear	23:26
Reverse Gear	14:34
Ignition system	contactless DC-CDI ignition with digital advanced system by KOKUSAN
Generator	12V 200W
Spark plug	NGK DCPR 8 E
Spark plug gap	0.6 mm
Cooling system	liquid cooled, permanent rotation of cooling liquid through mechanically driven water pump
Cooling liquid	50% anti freeze, 50% pure water, at least -25 °C
Starting equipment	electric starter

TIGHTENING TORQUES - ENGINE		
HH collar screws for clutch cover	M6	10 Nm
HH collar screws for ignition cover	M8	10 Nm
HH collar screws for case	M6	lubricated + 10 Nm
Oil drain plug	M12x1,5	20 Nm
AH plug for short oil screen	M16x1,5	oiled + 10 Nm
HH plug for long oil screen	M20x1,5	15 Nm
HH collar screw for oil filter cover	M5	6 Nm
AH plug for bypass valve	M12x1,5	20 Nm
Jet bolt and banjo bolt for oil line	M8	10 Nm
Oil spraying jet	M6x0,75	Loctite 243
Screws for oil pump cover	M5	Loctite 222 + 6 Nm
HH collar screws for cylinder head top section	M6	10 Nm
HH collar screws for valve cover, water pump cover	M6	10 Nm
HH collar screws for exhaust flange	M6	Loctite 243 + 10 Nm
Cylinder head screws	M10	oiled + 50 Nm
HH collar screws for cylinder/cylinder head	M6	10 Nm
AH screws for camshaft gear	M8	Loctite 243 + 28 Nm
AH screws for end cap rocker arm shaft	M5	6 Nm
Couternut for valve adjusting screw	M6x0,75	11 Nm
HH nut for primary gear	M20x1,5	Loctite 243 + 150 Nm
AH screws for gear wheel balancer shaft	M6	Loctite 243 + 10 Nm
HH nut for clutch driver	M18x1,5	Loctite 243 + 120 Nm
HH collar screws for clutch springs	M6	Loctite 243 + 8 Nm
AH screw for shift drum lock	M6	Loctite 243 + 10 Nm
HH collar screw for lock lever	M5	Loctite 243 + 6 Nm
Lock screw for bearing	M5/M6	Loctite 243 + 6 Nm
HH collar screws for chain guide, tensioning rail	M6	Loctite 243 + 6 Nm
HH collar screw for clip	M5	Loctite 243 + 6 Nm
HH collar screws for chain tensioner	M6	10 Nm
HH collar screws for stator	M5	Loctite 243 + 6 Nm
HH collar screws for pulse generator	M5	Loctite 243 + 6 Nm
Cable retaining bracket for ignition	M4	Loctite 243
HH collar nut for rotor	M12x1	60 Nm
HH collar screw for vent hose clip	M6	Loctite 243 + 10 Nm
HH collar screw for shift lever	M6	Loctite 243 + 10 Nm
HH screw for sprocket	M10	Loctite 243 + 60 Nm
Spark plug	M12x1,25	17 Nm
AH bearing bolt for starter	M6	10 Nm
Threaded sleeve for cylinder head top section	M20x1,5	Loctite 577
Ventilation neck for case	M12x1,5	Loctite 243

MOUNTING CLEARANCES, WEAR LIMITS		
Crankshaft	Axial clearance	0.25 - 0.35 mm
	Crankshaft journal runout	max. 0.18 mm
	Crankshaft webs - outer measurement	65 mm ± 0.05 mm
Conrod bearing	Radial clearance	max. 0.05 mm
	Axial clearance	max. 1.10 mm
Cylinder (450 ccm)	Diameter size I	89.000 - 89.012 mm
	Diameter size II	89.013 - 89.025 mm
Cylinder (525 ccm)	Diameter size I	95.000 - 95.012 mm
	Diameter size II	95.013 - 95.025 mm
Piston (450 ccm)	Diameter size I	88.916 - 88.946 mm
	Diameter size II	88.926 - 88.958 mm
	Mounting clearance size	0.054 - 0.096 mm
	Mounting clearance size II	0.056 - 0.099 mm
	Wear limit	0.12 mm
Piston (525 ccm)	Diameter size I	94.932 - 94.960 mm
	Diameter size II	94.940 - 94.968 mm
	Mounting clearance size	0.040 - 0.080 mm
	Mounting clearance size II	0.045 - 0.085 mm
	Wear limit	0.12 mm
Piston ring end gap	Compression ring	max. 0.80 mm
	Oil scraper ring	max. 1.00 mm
Valves	Sealing seat width - intake	1.50 mm
	Sealing seat width - exhaust	2.00 mm
Valve springs	Spring washer	min. 0.4 mm (new 0.5 mm)
	Minimum length of outer spring	39.20 mm
	Minimum length of inner spring	36.45 mm
Oil pump	Outer rotor - case clearance	max. 0.20 mm
	Outer - inner rotor clearance	max. 0.20 mm
	Axial clearance	0.15 mm
Bypass valve	Minimum length of pressure spring	23.5 mm
Clutch	Length of clutch springs	min. 41.5 mm (new 43 mm)
	Minimum thickness	1.90 mm
Transmission shafts	Axial clearance	0.1 - 0.4 mm
	Runout	0.06 mm
Rocker arm	Axial clearance	0.02 - 0.10 mm
Balancer shaft	Bearing journal runout	0.06 mm
Shift forks	Minimum thickness at blade	4.2mm (new 4.4 - 4.5 mm)

2009 OUTLAW 450 / 525 (PAGE 1 OF 2)



2009 OUTLAW 450 / 525 (PAGE 2 OF 2)

WIRE TERMINATION TABLE

CCT #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	RED/BLACK	16	IGNITION SWITCH	D	CIRCUIT BREAKER	C
02	VIOLET	18	CDI	P11	VIOLET SPLICE	-
03	DK GREEN	18	HEADLIGHT	A	LH HANDLEBAR	F
04	BLACK	6	FRAME GROUND (450 ONLY)	8mm R	GROUND (450 ONLY)	6mm R
05	YELLOW	18	HEADLIGHT	C	LH HANDLEBAR	E
06	-	-	-	-	-	-
07	VIOLET	18	INDICATOR PANEL	F	VIOLET SPLICE	-
08	RED	16	IGNITION SWITCH	A	FUSIBLE LINK (SPLICE)	-
09	RED/BLACK	16	IGNITION SWITCH	D	LH HANDLEBAR	F
10	BLACK	18	IGNITION SWITCH	B	BLACK SPLICE	-
11	DK BLUE/WHITE	18	INDICATOR PANEL	B	FAN SWITCH	3
12	VIOLET	18	VIOLET SPLICE	-	TRANSMISSION SWITCH	P3
13	DK GREEN/WHITE	18	INDICATOR PANEL	G	GREEN/WHITE SPLICE	-
14	RED/WHITE	18	INDICATOR PANEL	A	RED/WHITE SPLICE #2	-
15	BROWN	18	IGNITION SWITCH	C	BROWN SPLICE #2	-
16	-	-	-	-	-	-
17	RED/WHITE	18	LH HANDLEBAR	B	RED/WHITE SPLICE #2	-
18	WHITE/RED	18	LH HANDLEBAR	C	START SOLENOID	1
19	BLACK	18	LH HANDLEBAR	A	BLACK SPLICE	-
20	BROWN	18	LH HANDLEBAR	B	BROWN SPLICE #1	-
21	RED/BLACK	16	LH HANDLEBAR	C	RED/BLACK SPLICE	-
22	RED/WHITE	18	LH HANDLEBAR	D	RED/WHITE SPLICE #2	-
23	-	-	-	-	-	-
24	-	-	-	-	-	-
25	RED	16	VOLTAGE REGULATOR #1	-	FUSIBLE LINK (SPLICE)	-
26	RED	16	VOLTAGE REGULATOR #1	-	FUSIBLE LINK (SPLICE)	-
27	BROWN	16	VOLTAGE REGULATOR #1	-	GROUND	.250R
28	BROWN	16	VOLTAGE REGULATOR #1	-	GROUND	.250R
29	RED/BLACK	16	CIRCUIT BREAKER	A	RED/BLACK SPLICE	-
30	RED/BLACK	16	CIRCUIT BREAKER	E	RED/BLACK SPLICE	-
31	RED/WHITE	16	CIRCUIT BREAKER	B	RED/WHITE SPLICE #2	-
32	RED/BLACK	16	CIRCUIT BREAKER	D	FAN MOTOR	B
33	RED/WHITE	16	CIRCUIT BREAKER	F	RED/WHITE SPLICE #1	-
34	BROWN	18	CDI	P13	GROUND	.250R
35	BLACK	18	CDI	P9	BLACK SPLICE	-
36	BROWN	16	FAN SWITCH	I	GROUND	.250R
37	DK GREEN/WHITE	18	START DIODE	+	GREEN/WHITE SPLICE	-
38	YELLOW/BLACK	18	START SOLENOID	2	YELLOW/BLACK SPLICE	-
39	YELLOW/BLACK	18	START DIODE	NO +	YELLOW/BLACK SPLICE	-
40	YELLOW/BLACK	18	CLUTCH SWITCH	2	YELLOW/BLACK SPLICE	-
41	BROWN	18	CLUTCH SWITCH	I	BROWN SPLICE #1	-
42	BROWN	18	TRANSMISSION SWITCH	P1	BROWN SPLICE #2	-
43	BROWN	16	FAN MOTOR	A	FAN SWITCH	2
44	BROWN	18	TETHER SWITCH	-	BROWN SPLICE #1	-
45	RED/WHITE	18	TAILLIGHT	C	RED/WHITE SPLICE #2	-
46	ORANGE	18	TAILLIGHT	A	ORANGE SPLICE	-
47	BROWN	18	TAILLIGHT	B	BROWN SPLICE #2	-
48	RED/WHITE	18	ACCESSORY	1/4F	RED/WHITE SPLICE #2	-
49	RED/WHITE	18	HAND BRAKE SWITCH	I	RED/WHITE SPLICE #2	-
50	RED/WHITE	18	FOOT BRAKE SWITCH	I	RED/WHITE SPLICE #2	-
51	ORANGE	18	HAND BRAKE SWITCH	2	ORANGE SPLICE	-
52	ORANGE	18	FOOT BRAKE SWITCH	2	ORANGE SPLICE	-
53	BROWN	18	ETC & AWD SWITCH	B	BROWN SPLICE #1	-
54	BLACK	18	ETC & AWD SWITCH	A	BLACK SPLICE	-
55	BLACK	18	TETHER SWITCH	-	BLACK SPLICE	-
56	-	-	-	-	-	-
57	BROWN	18	GROUND	.250R	BROWN SPLICE #1	-
58	-	-	-	-	-	-
59	BROWN	18	GROUND	.250R	BROWN SPLICE #2	-
60	-	-	-	-	-	-
61	YELLOW/RED	16	VOLTAGE REGULATOR #2	-	STATOR #1	-
62	YELLOW	16	VOLTAGE REGULATOR #2	-	STATOR #1	-
63	YELLOW	16	VOLTAGE REGULATOR #2	-	STATOR #1	-
64	-	-	-	-	-	-
65	RED	6	STARTER (+)	.250R	START SOLENOID (+)	.250R
66	DK BLUE	18	TPS	-	CDI	P7
67	YELLOW	18	TPS	-	CDI	P3
68	BROWN	18	TPS	-	CDI	P10
69	RED	18	STATOR #2	-	CDI	P5
70	DK GREEN	18	STATOR #2	-	CDI	P8
71	WHITE/DK BLUE	18	IGNITION COIL	1/4F	CDI	P14
72	BROWN	18	GROUND	.250R	IGNITION COIL GROUND	.197R
73	DK GREEN/WHITE	18	TRANSMISSION SWITCH	P2	GREEN/WHITE SPLICE	-
74	BROWN	18	HEADLIGHT	B	BROWN SPLICE #2	-
75	-	-	-	-	-	-
76	RED/WHITE	18	INDICATOR PANEL	H	RED/WHITE SPLICE #1	-
77	RED/WHITE	18	CDI	P12	RED/WHITE SPLICE #1	-

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