

# 2016

## SERVICE MANUAL



**WILDCAT® X/4X**



# 2016 Wildcat X/4X Service Manual

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## General Information/Foreword



This Arctic Cat Service Manual contains service, maintenance, and troubleshooting information for certain 2016 Arctic Cat Wildcat models (see cover). The complete manual is designed to aid service personnel in service-oriented applications.

This manual is divided into sections. Each section covers a specific vehicle component or system and, in addition to the standard service procedures, includes disassembling, inspecting, and assembling instructions. When using this manual as a guide, the technician should use discretion as to how much disassembly is needed to correct any given condition.

This service manual is designed primarily for use by an Arctic Cat CatMaster Basic Level technician. The procedures found in this manual are of varying difficulty, and certain service procedures in this manual require one or more special tools to be completed. The technician should use sound judgement when determining which procedures can be completed based on their skill level and access to appropriate special tools.

**NOTE:** Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

When replacement of parts is necessary, use only genuine Arctic Cat parts. They are precision-made to ensure high quality and correct fit. Refer to the appropriate Illustrated Parts Manual for the correct part number, quantity, and description.

All Arctic Cat publications and decals display the words Warning, Caution, Note, and At This Point to emphasize important information. The symbol  **WARNING** identifies personal safety-related information. Be sure to follow the directive because it deals with the possibility of serious personal injury or even death. A **CAUTION** identifies unsafe practices which may result in vehicle-related damage. Follow the directive because it deals with the possibility of damaging part or parts of the vehicle. The symbol **NOTE:** identifies supplementary information worthy of particular attention. The symbol  **AT THIS POINT** directs the technician to certain and specific procedures to promote efficiency and to improve clarity.

At the time of publication, all information, photographs, and illustrations were technically correct. Some photographs used in this manual are used for clarity purposes only and are not designed to depict actual conditions. Because Arctic Cat Inc. constantly refines and improves its products, no retroactive obligation is incurred.

All materials and specifications are subject to change without notice.

Product Service and  
Warranty Department  
Arctic Cat Inc.

## Specifications

CHASSIS	
Curb Weight (approx)	658.6 kg (1452 lb) - X 681.3 kg (1502 lb) - X Limited 738.9 kg (1629 lb) - 4X
ROPS Tested Curb Weight	981 kg (2162 lb) - X 1265 kg (2789 lb) - 4X
Length (overall)	314.9 cm (124 in.) - X 378.5 cm (149 in.) - 4X
Height (overall)	167.0 cm (65.8 in.)
Width (overall)	162.6 cm (64 in.)
Tire Size (X)	27 x 9R14 (Front) 27 x 11R14 (Rear)
Tire Size (4X)	26 x 9R14 (Front) 26 x 11R14 (Rear)
Tire Inflation Pressure	0.84 kg/cm <sup>2</sup> (12 psi) - X 1.12 kg/cm <sup>2</sup> (16 psi) - 4X/Limited
MISCELLANY	
Spark Plug Type	NGK CPR8E
Spark Plug Gap	0.5-0.6 mm (0.019-0.024 in.)
Gas Tank Capacity	33.3 L (8.8 U.S. gal.)
Coolant Capacity	3.3 L (3.5 U.S. qt)
Front Differential Capacity	200 ml (6.7 fl oz)*
Rear Drive Capacity	175 ml (5.9 fl oz)*
Engine Oil Capacity	2.8 L (3.0 U.S. qt) - Overhaul 2.3 L (2.4 U.S. qt) - Change
Gasoline (recommended)	91 Octane Regular Unleaded
Engine Oil (recommended)	Arctic Cat ACX All Weather Synthetic
Front Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Belt Width	32 mm (1.25")
Brake Fluid	DOT 4
Taillight/Brakelight	High Intensity LED
Headlight	High Intensity LED
ELECTRICAL SYSTEM	
Spark Plug Cap	5000 ohms
Ignition Coil Resistance (primary) (secondary)	Less than 1 ohm N/A
Ignition Coil Primary Voltage	Battery Voltage
Stator Coil Resistance (CKP sensor) (AC generator)	104-156 ohms Less than 1 ohm
CKP Sensor AC Voltage	2.0 or more
AC Generator Output (no load)	75 AC volts @ 5000 RPM
Ignition Timing	10° BTDC @ 1500 RPM
VALVES AND GUIDES	
Valve Face Diameter (intake) (exhaust)	31.6 mm 27.9 mm
Valve/Tappet Clearance (intake) (exhaust) (cold engine) (max)	0.1016 mm 0.1524 mm
Valve Guide/Stem Clearance (max)	0.013 mm
Valve Guide Inside Diameter	5.000-5.012 mm
Valve Head Thickness (min)	2.3 mm
Valve Seat Angle	45° +15'/+30'
Valve Spring Free Length(min)	38.7 mm
Valve Spring Tension @ 31.5 mm	19.0 kg (42 lb)

\* Visible at plug threads.

CAMSHAFT AND CYLINDER HEAD		
Cam Lobe Height	(min)	34.18 mm
Camshaft Journal Oil Clearance	(max)	0.07 mm
Camshaft Journal Holder	(right & center) (left)	21.94-22.04 mm 17.44-17.48 mm
Camshaft Journal	(right & center) (left)	21.96-21.98 mm 17.48-17.53 mm
Camshaft Runout	(max)	0.05 mm
Cylinder Head/Cover Distortion	(max)	0.05 mm
CYLINDER, PISTON, AND RINGS		
Piston Skirt/Cylinder Clearance		0.05 mm
Cylinder Bore		91.992-92.008 mm
Piston Diameter 15 mm from Skirt End		91.949-91.959 mm
Piston Ring Free End Gap (min)(1st/2nd)		12.5 mm
Bore x Stroke		92 x 71.6 mm
Cylinder Trueness (max)		0.075 mm
Piston Ring End Gap - Installed		0.38 mm
Piston Ring to Groove Clearance	(1st) (max) (2nd)	0.034 mm 0.033 mm
Piston Ring Groove Width	(1st/2nd) (oil)	1.202-1.204 mm 2.501-2.503 mm
Piston Ring Thickness	(1st/2nd)	1.170-1.195 mm
Piston Pin Bore (max)		20.012 mm
Piston Pin Outside Diameter (min)		19.995 mm
CRANKSHAFT		
Connecting Rod (small end inside diameter) (max)		20.021 mm
Connecting Rod (big end side-to-side)		0.95 mm
Connecting Rod (small end deflection) (max)		0.3 mm
Crankshaft (web-to-web)		98 mm
Crankshaft Runout (max)		0.03 mm
Oil Pump Gerotor Clearance (max)		0.15 mm

Specifications subject to change without notice.

## Torque Specifications

Torque (ft-lb)	Tolerance
0-15	±20%
16-39	±15%
40+	±10%

EXHAUST COMPONENTS			
Part	Part Bolted To	Torque ft-lb	N-m
Exhaust Pipe	Cylinder Head	20	27
Heat Shield	Frame	20	27
Spark Arrester	Muffler	6	8
O2 Sensor	Exhaust Pipe	18	23
BRAKE COMPONENTS			
Brake Disc**	Hub	15	20
Brake Hose	Caliper	20	27
Brake Hose	Master Cylinder	20	27
Master Cylinder	Frame	25	34
Caliper	Knuckle	20	27
Front Brake Caliper (4X)	Knuckle	35	48
SUSPENSION COMPONENTS (Front)			
A-Arm	Frame	40	54
Knuckle****	Ball Joint	35	48
Shock Absorber	Frame/Lower A-Arm	40	54

SUSPENSION COMPONENTS (Rear)			
Sway Bar Bracket	Frame	40	54
Sway Bar Link	Sway Bar Arm	35	48
Sway Bar Link	Lower Trailing Arm	35	48
Trailing Arm	Cross Mount (min)	60	81
Trailing Arm Cross-Mounts	Frame	60	81
Shock Absorber (Lower)	Trailing Arm	35	48
Shock Absorber (Upper)	Frame	40	54
Knuckle	Lower Trailing Arm (min)	60	81
Knuckle	Upper Trailing Arm	35	48
Upper/Lower Lateral Link	Knuckle	40	54
Upper/Lower Lateral Link	Frame	40	54
CHASSIS/ROPS ASSEMBLY			
Shift Lever	Shift Axle Bracket	20	27
Shift Cable	Shift Arm	8	11
Front ROPS Tube	Frame	35	48
Top ROPS Support	Front/Rear ROPS Tubes	35	48
Rear ROPS Tube	Lower ROPS Support	35	48
Cargo Box	Cargo Box Support	6	8
Cargo Box Supports	Frame	20	27
Seat Belt Retractor	Frame	60	81
Seat Belt Flange	Frame	60	81
Seat Belt Buckle	Frame	60	81
Shoulder Anchor	ROPS Hoop	35	48
Rear Seat	Frame	15	20
Front Bumper	Frame	20	27
Upper Bumper Support	Front Bumper	20	27
STEERING COMPONENTS			
Steering Wheel**	Steering Wheel Shaft	25	34
Rack and Pinion Bracket****	Frame	20	27
Rack and Pinion Assembly	Frame	25	34
Tie Rod**	Rack	55	75
Tie Rod End**	Knuckle	55	74
Jam Nut	Tie Rod End	10	14
Flex-Shaft Hold-Down Strap	Housing	50 in.-lb	5.5
Tilt Steering Link	Frame	10	14
EPS Mounting Bracket	EPS	35	48
EPS Assembly	Frame	20	27
Steering Shaft Upper Collar	Tilt Assembly	20	27
Steering Shaft Lower U-Clamp	Frame	7	9
Input Coupler	Steering Wheel Shaft	7	9
DRIVE TRAIN COMPONENTS			
Part	Part Bolted To	Torque ft-lb	N-m
Rear Drive/Gear Case	Frame	38	52
Drive Coupler (Front)****	Drive Flange	50	68
Front Differential	Frame/Differential Bracket	38	52
Set Screw** (4X)	Carrier Bearing	75 in.-lb	8.5
Center Front Driveshaft (4X)	Front Driveshaft	50	68
Center Rear Driveshaft (4X)	Rear Driveshaft	50	68
Carrier Bearing	Bracket	35	52
Carrier Bearing Support Bracket	Frame	20	27
Input Shaft Assembly	Gear Case Housing	23	31
Secondary Drive Gear Nut	Secondary Drive Gear	200	271
Pinion Housing	Differential Housing	23	31
Thrust Button**	Gear Case Cover	8	11
Differential Housing Cover***	Differential Housing	23	31
Hub*****	Axle (min)	250	340
Oil Drain Plug	Front Differential - Rear Drive	45 in.-lb	5

DRIVE TRAIN COMPONENTS (cont)			
Part	Part Bolted To	Torque ft-lb N-m	
Oil Fill/Level Plug	Front Differential - Rear Drive	16	22
Wheel (aluminum lug nut)	Hub (20 ft-lb increments)	80	108
Wheel (black lug nut)	Hub (20 ft-lb increments)	60	81
Bead Lock (Limited)	Wheel	11	15
ENGINE/TRANSMISSION			
Oil Drain Plug	Engine	20	27
Front Engine Through-Bolt	Frame	40	54
Rear Engine Through-Bolt	Frame	40	54
Clutch Cover/Housing Assembly****	Crankcase	10	14
Crankcase Half (6 mm)	Crankcase	10	14
Crankcase Half (8 mm)	Crankcase	21	28
Cylinder Head (Cap Screw)	Crankcase (step 1) (step 2) (final)	20 30 37	27 41 50
Cylinder Head Nut (6 mm)	Cylinder	10	14
Cylinder Head Nut (8 mm)	Cylinder	19	25
Valve Cover	Cylinder Head	8.5	11.5
Driven Clutch Bolt**	Input Shaft	60	81
Driven Cam	Driven Clutch	11	15
Drive Clutch Bolt	Crankshaft	60	81
Drive Clutch Cover	Drive Clutch	10	14
Magneto Cover	Crankcase	10	14
Crankshaft Spacer	Crankshaft	28	38
Oil Pump Drive Gear**	Crank Balancer Shaft	62	84
Rotor/Flywheel Nut**	Crankshaft	107	145
Cam Sprocket**	Camshaft	10	14
V-Belt Cover	Inner Clutch Cover	9.5	13
Secondary Drive Gear Nut*	Secondary Drive Output Shaft	200	270
Oil Filter	Engine	8.5	11.5
Shift Cam Stopper Support	Crankcase	8.5	11.5
Shift Cam Stopper Spring	Shift Cam Stopper	8.5	11.5
Shift Cam Plate	Shift Cam Shaft	8.5	11.5
Speed Sensor Housing	Crankcase	9.5	13
Starter Motor	Crankcase	10	14
Oil Pump Housing	Crankcase	8	11
Oil Strainer Cap	Crankcase	11	15
Intake Boot Clamp	Intake Boot	30 in.-lb	3.4
Starter One-Way Clutch**	Rotor/Flywheel	26	35
Fuel Rail	Engine	6	8
Air Filter Housing	Engine	6	8
Ground Wire	Engine	8	11
Stator Coil	Magneto Cover (New)	15	20
Stator Coil	Magneto Cover (Original)	13	18

\*w/Red Loctite #263\*\*\*w/Green Loctite #270

\*\*w/Red Loctite #271 \*\*\*\*w/"Patch-Lock"

\*\*\*\*\*w/Primer #7649 and Loctite #277

## Torque Conversions (ft-lb/N-m)

ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m
1	1.4	26	35.4	51	69.4	76	103.4
2	2.7	27	36.7	52	70.7	77	104.7
3	4.1	28	38.1	53	72.1	78	106.1
4	5.4	29	39.4	54	73.4	79	107.4
5	6.8	30	40.8	55	74.8	80	108.8
6	8.2	31	42.2	56	76.2	81	110.2
7	9.5	32	43.5	57	77.5	82	111.5
8	10.9	33	44.9	58	78.9	83	112.9
9	12.2	34	46.2	59	80.2	84	114.2
10	13.6	35	47.6	60	81.6	85	115.6
11	15	36	49	61	83	86	117
12	16.3	37	50.3	62	84.3	87	118.3
13	17.7	38	51.7	63	85.7	88	119.7
14	19	39	53	64	87	89	121
15	20.4	40	54.4	65	88.4	90	122.4
16	21.8	41	55.8	66	89.8	91	123.8
17	23.1	42	57.1	67	91.1	92	125.1
18	24.5	43	58.5	68	92.5	93	126.5
19	25.8	44	59.8	69	93.8	94	127.8
20	27.2	45	61.2	70	95.2	95	129.2
21	28.6	46	62.6	71	96.6	96	130.6
22	29.9	47	63.9	72	97.9	97	131.9
23	31.3	48	65.3	73	99.3	98	133.3
24	32.6	49	66.6	74	100.6	99	134.6
25	34	50	68	75	102	100	136

## Drive Belt Break-In Procedure

New drive belts require a break-in period of approximately 25 miles. During this period, drive the vehicle for 25 miles at 3/4 throttle or less while varying throttle position (but not exceeding 40 mph). By varying throttle position, the exposed cord on the side of a new belt will be conditioned allowing the drive belt to gain its optimum flexibility and will extend drive belt life.

## Gasoline - Oil - Lubricant

### FILLING GAS TANK

#### WARNING

Always fill the gas tank in a well-ventilated area. Never add fuel to the gas tank near any open flames or with the engine running. DO NOT SMOKE while filling the gas tank.

Since gasoline expands as its temperature rises, the gas tank must be filled to its specified capacity only. Expansion room must be maintained in the tank particularly if the tank is filled with cold gasoline and then moved to a warm area.



### **⚠ WARNING**

Do not overflow gasoline when filling the gas tank. A fire hazard could materialize. Always allow the engine to cool before filling the gas tank.

Tighten the gas tank cap securely after filling the tank.

### **⚠ WARNING**

Do not over-fill the gas tank.

## **RECOMMENDED GASOLINE**

The recommended gasoline to use is 91 minimum octane regular unleaded. In many areas, oxygenates are added to the gasoline. Oxygenated gasolines containing up to 10% ethanol or 5% methane are acceptable gasolines.

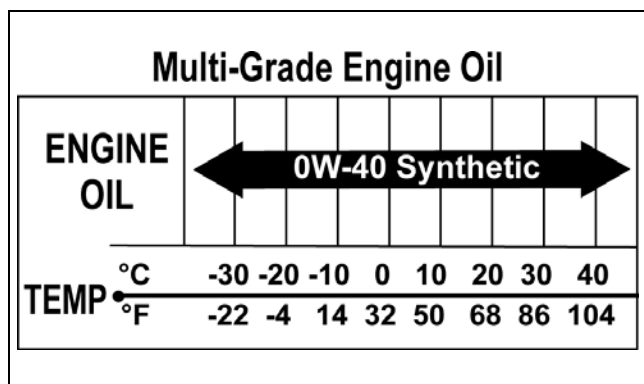
When using ethanol blended gasoline, it is not necessary to add a gasoline antifreeze since ethanol will prevent the accumulation of moisture in the fuel system.

### **CAUTION**

Do not use white gas. Only Arctic Cat approved gasoline additives should be used.

## **RECOMMENDED ENGINE/TRANSMISSION OIL**

The recommended oil to use is Arctic Cat ACX All Weather synthetic engine oil, which has been specifically formulated for use in this Arctic Cat engine. Although Arctic Cat ACX All Weather synthetic engine oil is the only oil recommended for use in this engine, use of any API certified SM 0W-40 oil is acceptable.



OILCHART.J

## **RECOMMENDED FRONT DIFFERENTIAL/REAR DRIVE LUBRICANT**

The recommended lubricant is Arctic Cat Gear Lube or an equivalent gear lube which is SAE approved 80W-90 hypoid. This lubricant meets all of the lubrication requirements of the Arctic Cat vehicle front differential and rear drive.

### **CAUTION**

Any lubricant used in place of the recommended lubricant could cause serious front differential/rear drive damage.

## **Preparation For Storage**

Arctic Cat recommends the following procedure to prepare the vehicle for storage.

### **CAUTION**

Prior to storing this vehicle, it must be properly serviced to prevent rusting and component deterioration.

1. Clean the seat cushions with a damp cloth and allow to dry.
2. Clean the vehicle thoroughly by washing dirt, oil, grass, and other foreign matter from the entire vehicle. Allow the vehicle to dry thoroughly. DO NOT get water into any part of the engine or air intake.
3. Either drain the gas tank or add a fuel stabilizer to the gas in the gas tank.
4. Change the engine oil.
5. Plug the hole in the exhaust system with a clean cloth.
6. Apply light oil to the upper steering shaft bushing and plungers of the shock absorbers.
7. Tighten all nuts, bolts, cap screws, and screws. Care must be taken that all calibrated nuts, cap screws, and bolts are tightened to specifications.
8. Fill the cooling system to the bottom of the stand pipe in the radiator neck with properly mixed coolant.
9. Disconnect the battery cables (negative cable first); then remove the battery, clean the battery posts and cables, and store in a clean, dry area.

■NOTE: For storage, use a battery maintainer or make sure the battery is fully charged (see Battery section in this manual).

10. Store the vehicle indoors in a level position.

### **CAUTION**

Avoid storing outside in direct sunlight and avoid using a plastic cover as moisture will collect on the vehicle causing rusting.

## **Preparation After Storage**

Taking this vehicle out of storage and correctly preparing it will assure many miles and hours of trouble-free riding. Arctic Cat recommends the following procedure.

1. Clean the vehicle thoroughly.
2. Clean the engine. Remove the cloth from the exhaust system.
3. Check all control wires and cables for signs of wear or fraying. Replace if necessary.
4. Change the engine/transmission oil and filter.

5. Check the coolant level and add properly mixed coolant as necessary.
6. Charge the battery; then install. Connect the battery cables making sure to connect the positive cable first.

### **CAUTION**

**Before installing the battery, make sure the ignition switch is in the OFF position.**

7. Check the entire brake systems (fluid level, pads, etc.), all controls, headlights, taillight, brakelight, and headlight aim; adjust or replace if necessary.
8. Check the tire pressure. Inflate to recommended pressure as necessary.
9. Tighten all nuts, bolts, cap screws, and screws making sure all calibrated nuts, cap screws, and bolts are tightened to specifications.
10. Make sure the steering moves freely and does not bind.
11. Check the spark plugs. Clean or replace as necessary.
12. Check the air filter and the air filter housing. Clean or replace as necessary.

## Periodic Maintenance/Tune-Up

Tighten all nuts, bolts, and cap screws. Care must be taken that all calibrated nuts, bolts, and cap screws are tightened to specifications.

It is advisable to lubricate certain components periodically to ensure free movement. Apply light oil to the components using the following list as reference.

- A. Accelerator Pedal Pivot/Cable Ends
- B. Brake Pedal Pivot
- C. Shift Cable

### SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this section. Refer to the current Special Tools Catalog for the appropriate tool description.

■NOTE: When indicated for use, each special tool will be identified by its specific name, as shown in the chart below, and capitalized.

Description	p/n
Compression Tester Kit	0444-213
Oil Filter Wrench	0644-389
Valve Clearance Adjuster	0444-255

■NOTE: Special tools are available from the Arctic Cat Service Department.

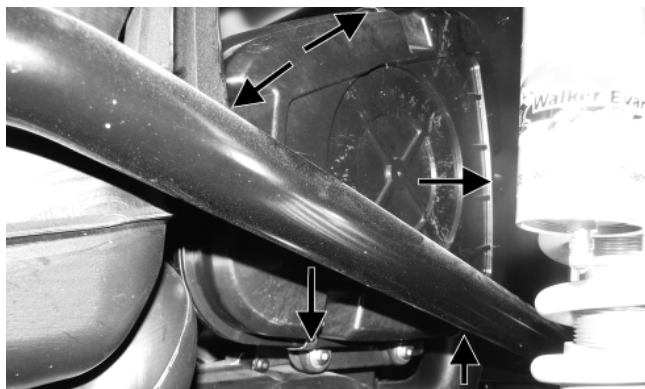
## Air Filter

### CLEANING AND INSPECTING FILTER

#### CAUTION

Failure to inspect the air filter frequently if the vehicle is used in dusty, wet, or muddy conditions can damage the engine.

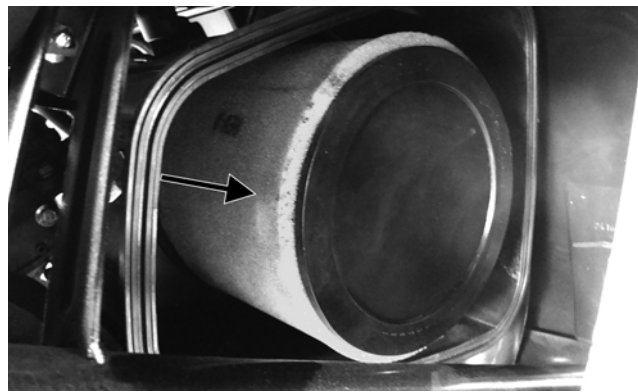
1. Unsnap the five fasteners securing the air cleaner housing cover and remove the cover.



WC023A

2. Remove the air filter from the housing; then remove the foam filter medium.

■NOTE: Do not attempt to remove the inner foam from the wire mesh. It is part of the filter frame.



WC024A

3. Fill a wash pan larger than the filter with a non-flammable cleaning solvent; then dip the inner filter and outer foam medium in the solvent and wash them.

■NOTE: Foam Filter Cleaner and Foam Filter Oil are available from Arctic Cat.

4. Dry both filter components.
5. Put the foam filter in a plastic bag; then pour in air filter oil and work the filter.

■NOTE: Apply oil to the inner filter; then carefully squeeze excessive oil from the filter element. Do not twist foam to remove oil.

6. Attach the foam filter to the inner filter screen.



WC140

#### CAUTION

A torn air filter can cause damage to the vehicle engine. Dirt and dust may get inside the engine if the element is torn. Carefully examine the element for tears before and after cleaning it. Replace the element with a new one if it is torn.

7. Clean any dirt or debris from inside the air cleaner. Be sure no dirt enters the throttle body.
8. Install the filter in the air filter housing. Position the filter frame on top.
9. Install the air filter housing cover and secure with the retaining clips.



## CHECKING AND CLEANING DRAINS

1. Inspect the drain beneath the main housing for debris or liquid. Remove and clean the drain bulb if contaminated.
2. Wipe any accumulation of oil or gas from the filter housing and drain.

---

## Valve/Tappet Clearance

---

To check and adjust valve/tappet clearance, use the following procedure.

■NOTE: The engine must be cold for this procedure.

■NOTE: On the X, the seats, left-side seat belt and anchor, left-side heat shroud and shield, cargo box, and rear body panel must be removed for this procedure.

■NOTE: On the 4X, the rear seats, left-rear seat belt retractor, left-side heat shroud and shield, cargo box, and rear body panel must be removed for this procedure.

1. Remove the spark plugs and timing inspection plug; then remove the tappet covers (for more detailed information, see Engine/Transmission - Servicing Top-Side Components).

■NOTE: Remove the crankshaft end cap and install the special cap screw (left-hand threads) to rotate the engine.

2. Rotate the crankshaft to the TDC position on the compression stroke of the front cylinder. The stamped "F" must be visible.



GZ063

■NOTE: At this point, the rocker arms and adjuster screws must not have pressure on them.

3. Align the timing mark to the magneto cover mark.

## CHECKING

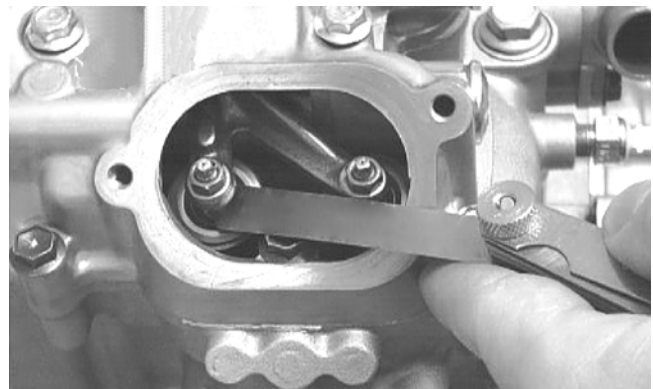
Using a feeler gauge, check each valve/tappet clearance. If clearance is not within specifications, loosen the jam nut and rotate the tappet adjuster screw until the clearance is within specifications. Tighten each jam nut securely after completing the adjustment.

### CAUTION

The feeler gauge must be positioned at the same angle as the valve and valve adjuster for an accurate measurement of clearance. Failure to measure the valve clearance accurately could cause valve component damage.

#### VALVE/TAPPET CLEARANCE

Intake	0.1016 mm (0.004 in.)
Exhaust	0.1524 mm (0.006 in.)



CC007D

## ADJUSTING

- A. Place the Valve Clearance Adjuster onto the jam nut securing the tappet adjuster screw; then rotate the valve adjuster dial clockwise until the end is seated in the tappet adjuster screw.
- B. While holding the valve adjuster dial in place, use the valve adjuster handle and loosen the jam nut; then rotate the tappet adjuster screw clockwise until friction is felt.
- C. Align the valve adjuster handle with one of the marks on the valve adjuster dial.
- D. While holding the valve adjuster handle in place, rotate the valve adjuster dial counterclockwise until proper valve/tappet clearance is attained.

■NOTE: Refer to the appropriate specifications in CHECKING for the proper valve/tappet clearance.

■NOTE: Rotating the valve adjuster dial counterclockwise will open the valve/tappet clearance by 0.05 mm (0.002 in.) per mark.

- E. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.
- F. Rotate engine 270° to the TDC position of the rear cylinder (the stamped "R" must be visible); then repeat steps A-E for the rear cylinder.



GZ059

4. Install the spark plugs and timing inspection plug; then remove the cap screw from the crankshaft and install the crankcase end cap.

■**NOTE:** Apply grease to the end cap to aid in installation.

5. Place the two tappet covers into position making sure the proper cap screws are with the proper cover. Tighten the cap screws securely.

## Testing Engine Compression

■**NOTE:** The engine should be warm (operating temperature) and the battery fully charged for an accurate compression test. In the event the engine cannot be run, cold values are included.

■**NOTE:** On the X, the seats and rear body panel must be removed and the radiator tilted rearward for this procedure.

■**NOTE:** On the 4X, the rear seats and rear body panel must be removed and the radiator tilted rearward for this procedure.

1. Remove the high tension lead from the spark plugs.
2. Using compressed air, blow any debris from around the spark plugs.

### **WARNING**

Always wear safety glasses when using compressed air.

3. Remove the spark plugs; then attach the high tension leads to the plugs and ground the plugs on the cylinder heads well away from the spark plug holes.
4. Attach the Compression Tester Kit.
5. While holding the throttle in the full-open position, crank the engine over with the electric starter until the gauge stops climbing (five to 10 compression strokes). Compression should be 190-220 psi.

■**NOTE:** If the throttle is not held in the full-open position, compression reading can be low.

6. If compression is abnormally low, verify the following:

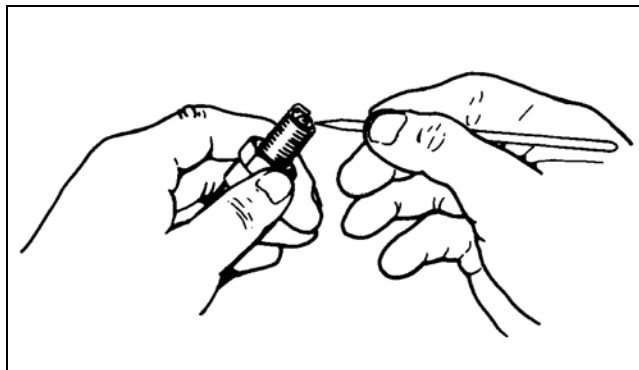
- A. Battery is fully charged and in good health.
- B. Starter cranks engine over (normal speed).
- C. Gauge is functioning properly.
- D. Throttle in the full-open position.
- E. Valve/tappet clearance correct.
- F. Engine warmed up.
- G. Intake not restricted.

■**NOTE:** To service top-side components, see Engine/Transmission.

7. Pour approximately 30 ml (1 fl oz) of oil into the spark plug holes, reattach the gauge, and retest compression.
8. If compression increases to normal, service the top end (see Engine/Transmission - Servicing Top-Side Components).

## Spark Plugs

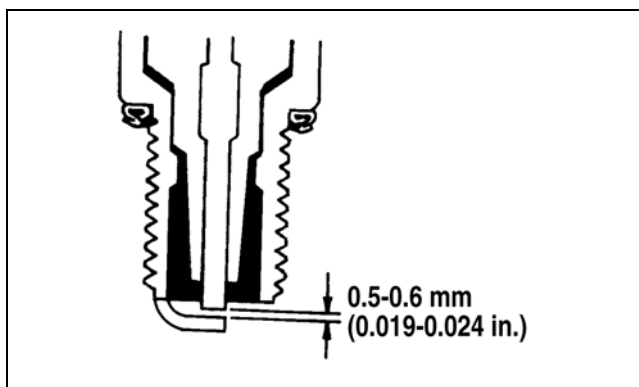
A light brown insulator indicates the plug and fuel/air ratio are correct. A white or dark insulator indicates that the engine may need to be serviced. To maintain a hot, strong spark, keep the plug free of carbon. Adjust the gap to 0.5-0.6 mm (0.019-0.024 in.).



ATV-0051

### **CAUTION**

Before removing a spark plug, be sure to clean the area around the spark plug. Dirt could enter engine when removing or installing the spark plug.



ATV0052E

A new spark plug should be tightened 1/2 turn once the washer contacts the cylinder head. A used spark plug should be tightened 1/8-1/4 turn once the washer contacts the cylinder head.

---

## Muffler/Spark Arrester

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Clean the spark arrester using the following procedure.

**⚠ WARNING**

**Wait until the muffler cools to avoid burns.**

1. Remove the machine screw securing the spark arrester to the muffler.



WC900

2. Remove the spark arrester screen; then using a suitable brush, clean the carbon deposits from the screen taking care not to damage the screen.

■NOTE: If the screen is damaged in any way, it must be replaced.

3. Install the spark arrester assembly and secure with the machine screw. Tighten the cap screw to 6 ft-lb.

---

## Engine/Transmission Oil - Filter

---

### OIL - FILTER

Change the engine oil and oil filter at the scheduled intervals. The engine should always be warm when the oil is changed so the oil will drain easily and completely.

1. Park the vehicle on level ground.
2. Remove the oil level stick/filler plug.

**⚠ WARNING**

**Use caution when removing oil level stick. Exhaust components may be extremely hot.**

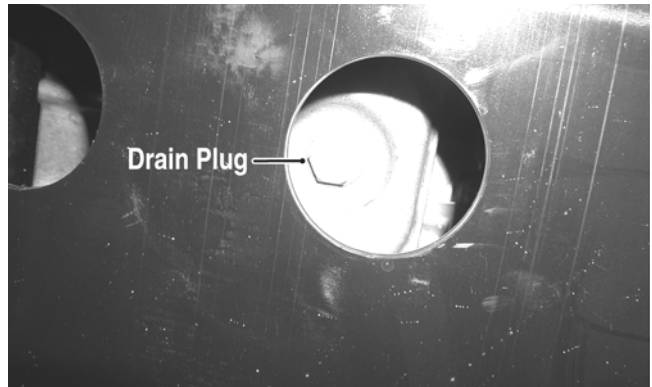


WC895A

3. Remove the drain plug from the bottom of the engine and drain the oil into a drain pan. Account for and discard the gasket.

**⚠ WARNING**

**Use extreme caution when removing the oil drain plug. Hot oil can cause severe injury and skin burns.**



PR078A

4. Using the Oil Filter Wrench and a ratchet handle (or a socket or box-end wrench), remove the old oil filter. Account for and discard the O-ring.

■NOTE: Clean up any excess oil after removing the filter.

5. Apply oil to a new filter O-ring and check to make sure it is positioned correctly; then install the new oil filter. Tighten securely.
6. Install the engine drain plug with new gasket and tighten to 20 ft-lb. Pour the specified amount of the recommended oil in the filler hole. Install the oil level stick/filler plug.
7. Start the engine (while the vehicle is outside on level ground) and allow it to idle for a few minutes.
8. Turn the engine off and wait approximately one minute.
9. Unscrew the oil level stick and wipe it with a clean cloth.
10. Install the oil level stick and thread into the engine case.

■NOTE: The oil level stick should be threaded into the case for checking the oil level.



11. Remove the oil level stick; the oil level must be within the operating range but not exceeding the upper mark.



GZ461A

### CAUTION

**Do not over-fill the engine with oil. Always make sure that the oil level is not above the upper mark.**

12. Inspect the area around the drain plug and oil filter for leaks.

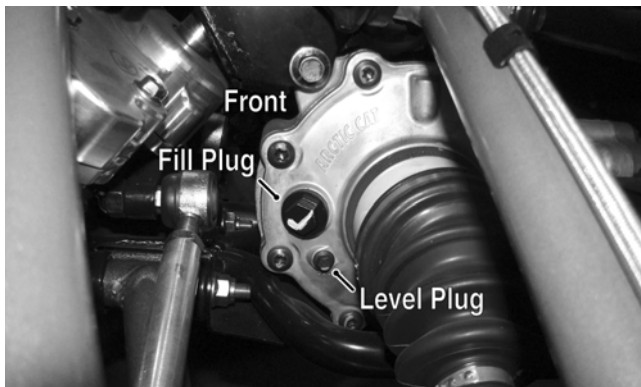
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## Front Differential - Rear Drive Lubricant

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To check front differential lubricant, use the following procedure.

1. Remove the level plug; lubricant should be level with the bottom threads.

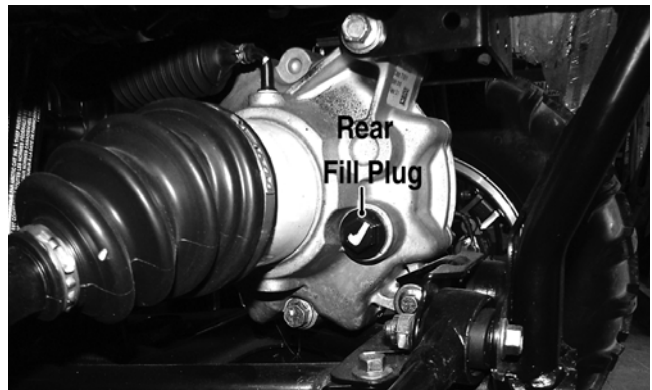


WC019A

2. If low, remove the fill plug and add SAE approved 80W-90 hypoid gear lube until it appears at the level plug threads.

To check rear drive lubricant, use the following procedure.

1. Remove the fill plug; the lubricant level should be level with the bottom of the plug threads.



WC020A

2. If low, add SAE approved 80W-90 hypoid gear lube as necessary.

To change the lubricant, use the following procedure.

1. Place the vehicle on level ground.
2. Remove each fill plug.
3. Drain the lubricant into a drain pan by removing the drain plug from the gear case.



WC020B

4. After all the lubricant has been drained, install the drain plugs and tighten to 45 in.-lb.
5. Pour the appropriate amount of recommended lubricant into the fill hole.
6. Install the fill plug and tighten to 16 ft-lb.

**NOTE: If the lubricant is contaminated with water, inspect the drain plug, fill plug, and/or bladder.**

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## Driveshaft/Coupling

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The following drive system components should be inspected periodically to ensure proper operation.

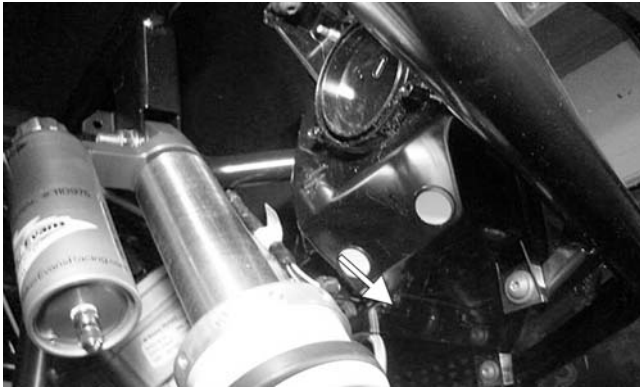
- A. Spline lateral movement (slop).
- B. Coupling cracked, damaged, or worn.
- C. Carrier bearings smooth rotation and bearing supports tight.

## Headlight - Taillight/Brakelight

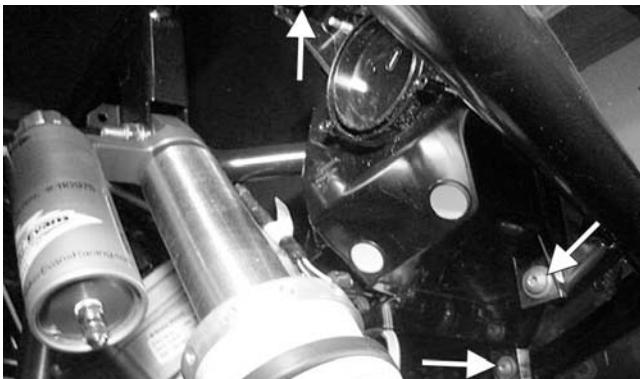
■**NOTE:** The LEDs are not replaceable. The entire assembly must be replaced as a component.

To replace the headlight assembly, use the following procedure.

1. With the hood removed, remove the wiring harness connector from the back of the headlight.



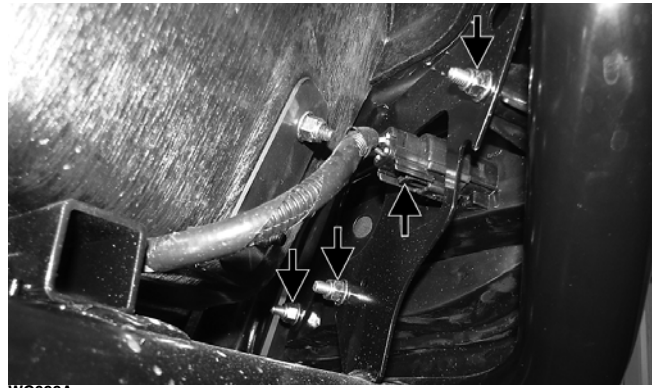
2. Remove the three mounting screws; then remove the headlight assembly.



3. Install the new headlight assembly and connect the wiring harness. Install the hood.
4. Adjust the headlight using the Checking/Adjusting Headlight Aim instructions in this sub-section.

To replace the taillight/brakelight assembly, use the following procedure.

1. Disconnect the taillight/brakelight connector; then remove the lock nuts securing the assembly to the mounting bracket.

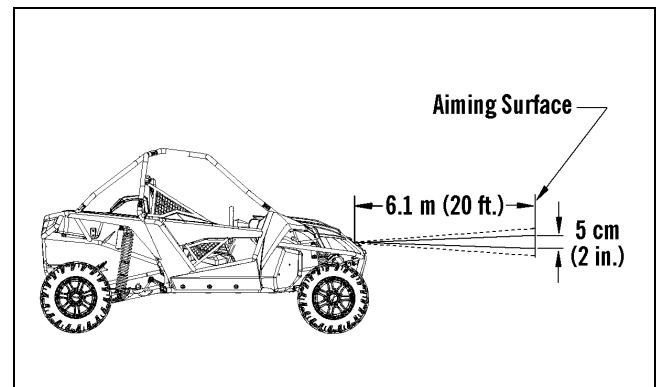


2. Remove the taillight/brakelight assembly.
3. Install the new taillight/brakelight assembly and secure with new lock nuts. Tighten securely; then connect the electrical connector.

### CHECKING/ADJUSTING HEADLIGHT AIM

The headlights can be adjusted vertically. The geometric center of the HIGH beam light zone is to be used for vertical aiming.

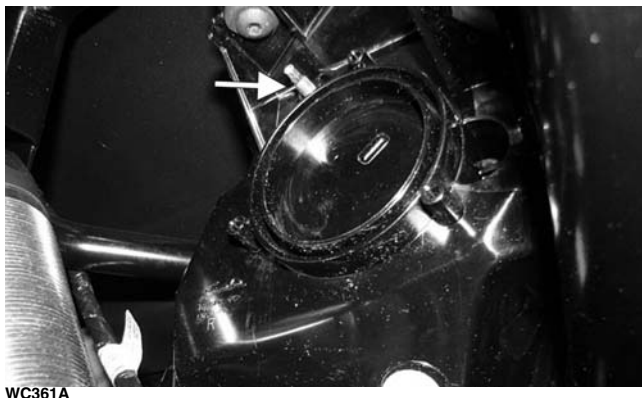
1. Position the vehicle on a level floor so the headlights are approximately 6.1 m (20 ft) from an aiming surface (wall or similar aiming surface).



0748-171

■**NOTE:** The tires must be properly inflated and there should be an average operating load on the vehicle when adjusting the headlight aim.

2. Measure the distance from the floor to the mid-point of each headlight.
3. Using the measurements obtained in step 2, make horizontal marks on the aiming surface.
4. Switch on the lights. Make sure the HIGH beam is on. DO NOT USE LOW BEAM.
5. Observe each headlight beam aim. Proper aim is when the most intense beam is 5 cm (2 in.) below the horizontal mark on the aiming surface.
6. Adjust each headlight until correct aim is obtained by turning the screw with a 4 mm wrench counter-clockwise to raise or clockwise to lower the beam.



## Shift Lever/Shift Cable

### CHECKING

Turn the ignition switch on; then shift the transmission into park. The letter P should illuminate on the LCD gauge and the park icon (P) should illuminate. The vehicle should not be able to move.



Move the shift lever all the way forward. The letter L should illuminate on the LCD gauge.



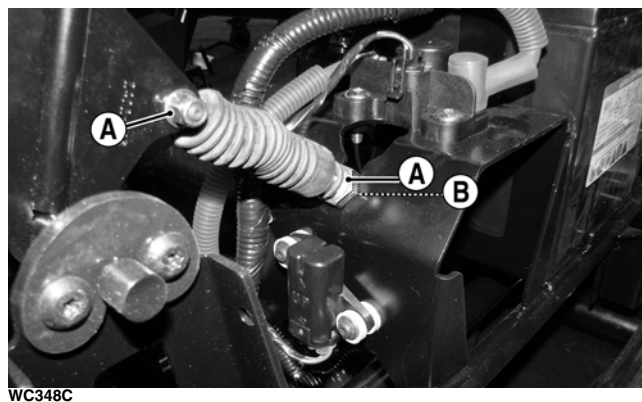
If either park or low range cannot be reached, the shift cable must be adjusted.

### ADJUSTING

■NOTE: Shift cable adjustment should not be necessary unless replacing the shift cable or shift lever.

1. Remove the seats; then remove the battery cover and center console.

2. Loosen adjuster nut (A) and jam nut (B) and adjust the cable as necessary to obtain park in the full aft position of the shift lever and low range full forward. Tighten the jam nut securely.



## Hydraulic Brake System

### CHECKING/BLEEDING

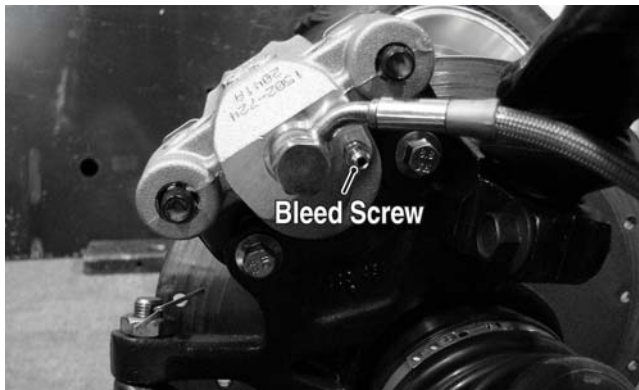
The hydraulic brake system has been filled and bled at the factory. To check and/or bleed a hydraulic brake system, use the following procedure.

1. With the master cylinder in a level position, check the fluid level in the reservoir. If the level in the reservoir is not above the MIN, add DOT 4 brake fluid.



2. Depress the brake pedal several times to check for a firm brake. If the brake is not firm, the system must be bled.
3. To bleed the brake system, use the following procedure:
  - A. Remove the cover and fill the reservoir with DOT 4 brake fluid.
  - B. Install and secure the cover; then slowly press the brake pedal several times.
  - C. Install one end of a clear hose onto the bleed screw farthest from the cylinder (right rear) and direct the other end into a container; then while holding slight pressure on the brake pedal, open the bleed screw and watch for air bubbles. Close the bleed screw before releasing the brake pedal. Repeat this procedure until no air bubbles are present.





WC268B

■NOTE: During the bleeding procedure, watch the reservoir very closely to make sure there is always a sufficient amount of brake fluid. If the fluid level gets low in the reservoir, refill the reservoir before the bleeding procedure is continued.

- D. Repeat step C until the brake pedal is firm.
- E. At this point, perform step B, C, and D on the left rear bleed screw; then move to the right front bleed screw and follow the same procedure. Finish with the left front bleed screw.
4. Carefully check the entire hydraulic brake system to ensure all hose connections are tight, the bleed screws are tight, the protective caps are installed, and no leakage is present.

### CAUTION

This hydraulic brake system is designed to use DOT 4 brake fluid only. If brake fluid must be added, care must be taken as brake fluid is very corrosive to painted surfaces.

### INSPECTING HOSES

Carefully inspect the hydraulic brake hoses for cracks or other damage. If found, the brake hoses must be replaced.

### CHECKING/REPLACING PADS

The clearance between the brake pads and brake discs is adjusted automatically as the brake pads wear. The only maintenance that is required is replacement of the brake pads when they show excessive wear. Check the thickness of each of the brake pads as follows.

1. Remove a wheel.
2. Measure the thickness of each brake pad.



PR242

3. If thickness of either brake pad is less than 1.0 mm (0.039 in.), the brake pads must be replaced.

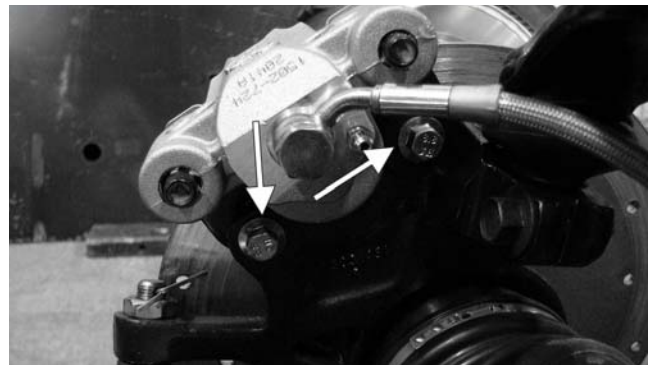
■NOTE: The brake pads should be replaced as a set.

4. To replace the rear brake pads, use the following procedure.
  - A. Remove the cap screws securing the caliper holder to the knuckle; then remove the pads from the caliper.



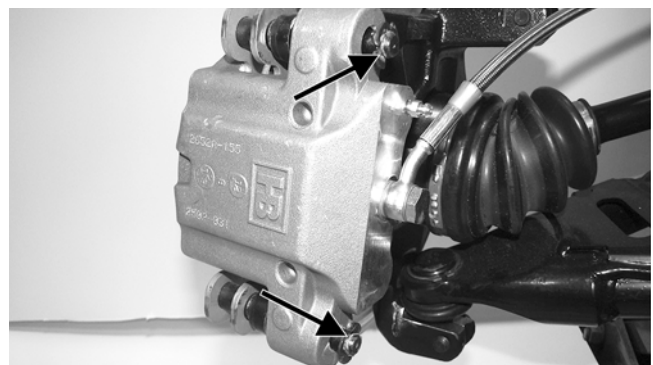
PR237

- B. Install the new brake pads.
  - C. Secure the caliper holder to the knuckle with new "patch-lock" cap screws. Tighten to 20 ft-lb.



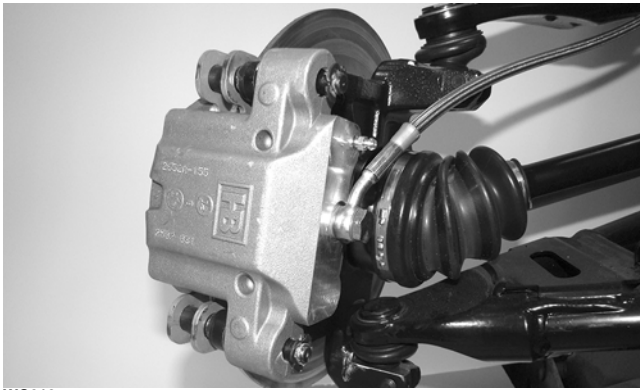
WC268A

5. To replace the front brake pads, use the following procedure.
  - A. Remove the E-clips from the inboard end of the caliper anchor bolts; then remove the anchor bolts from the knuckle.



WC611A

- B. Remove the caliper and pads from the vehicle.



WC610

■**NOTE:** It will be necessary to retract the pistons to accommodate new pads. It may be necessary to open the bleed screw slightly.

- C. Install the new brake pads; then secure the caliper and pads to the knuckle with the anchor bolts. Tighten to 35 ft-lb and install the E-clips.
6. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).
7. Burnish the brake pads (see Burnishing Brake Pads).

## **BRAKE DISC**

Using a micrometer, measure the thickness of the brake disc in multiple contact surfaces. If thickness is 0.125-in. or less, the disc must be replaced. To replace the brake disc, see Drive and Brake Systems – Hub.

## **Burnishing Brake Pads**

Brake pads must be burnished to achieve full braking effectiveness. Braking distance will be extended until brake pads are properly burnished. To properly burnish the brake pads, use the following procedure.

### **⚠ WARNING**

Failure to properly burnish the brake pads could lead to premature brake pad wear or brake loss. Brake loss can result in severe injury.

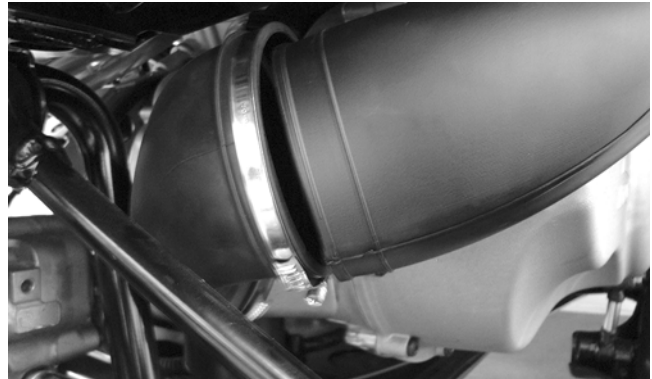
1. Choose an area large enough to safely accelerate the vehicle to 30 mph and to brake to a stop.
2. Accelerate to 30 mph; then release the accelerator pedal and depress the brake pedal to decelerate to 0-5 mph.
3. Repeat procedure 20 times until brake pads are burnished.

## **Replacing V-Belt**

### **REMOVING**

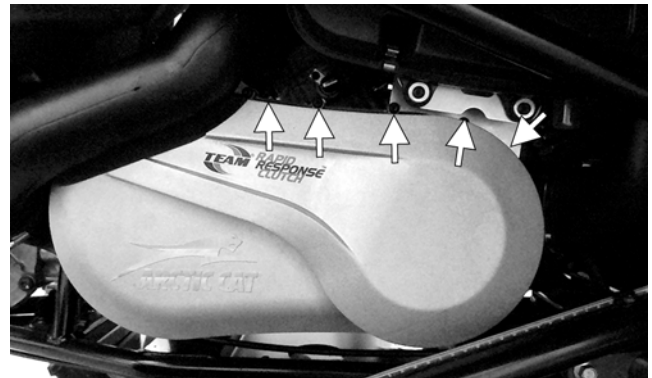
1. Raise the rear of the vehicle just enough to unload the rear suspension (weight off the shock absorbers).

2. Remove the right rear shock absorber; then loosen the clamp securing the cooling exhaust duct to the boot.



WC599

3. Remove the cap screws securing the CVT cover, CVT exhaust pipe mount, and air filter bracket. Note the longer cap screws securing the exhaust cooling duct bracket and air filter housing bracket.



WC620A

4. Remove the CVT cover. Account for two alignment pins.
5. Remove the cap screw securing the driven clutch to the transmission input shaft. Account for the washer and alignment shim(s).



WC597





WC810

6. Remove the movable sheave and V-belt and any belt threads or debris in the CVT housing or sheaves.



WC809

■**NOTE:** If threads are fouling the drive clutch, it may be necessary to remove the clutch and disassemble it to free threads from the center bearing (see Engine/Transmission - Removing Right-Side Components).

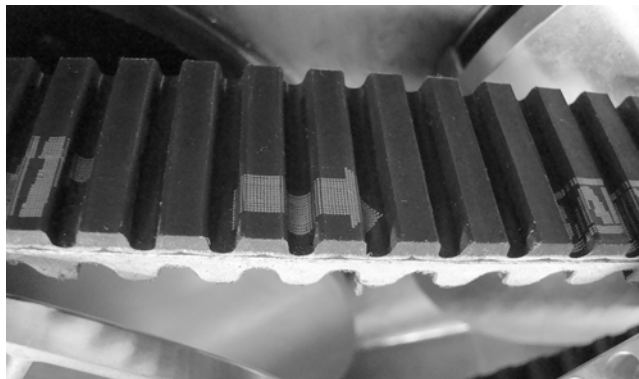
## CHECKING

Use the Drive Belt Gauge to identify any abnormal wear. Measure across the top of the V-belt (in multiple locations) using a Vernier caliper. Do not squeeze the belt as doing so may produce an inaccurate measurement. The V-belt must be at least 28.5 mm at any point.

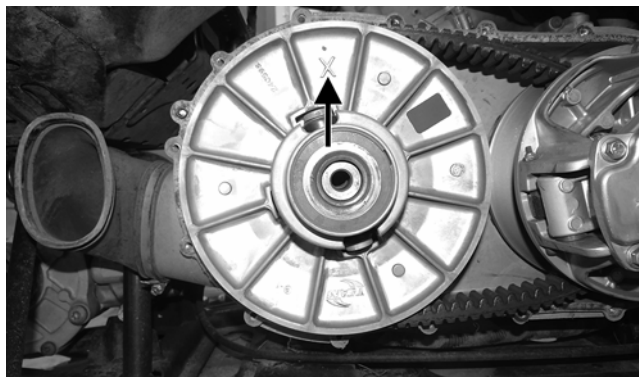
## INSTALLING

■**NOTE:** If any drive clutch or driven clutch component has been replaced or the technician is unsure of shim quantity/placement, clutch offset must be verified (see Engine/Transmission - Installing Right-Side Components steps 10-13).

1. Making sure the directional arrow on the belt is aligned with engine rotation, place the new drive belt in place on the drive clutch; then making sure the "X" marks are aligned, install the movable sheave on the driven clutch.

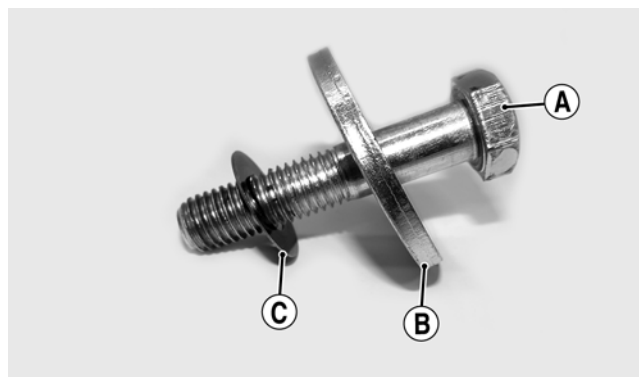


WC667



WC810A

2. Secure the driven clutch with the cap screw (A), washer (B), and alignment shim(s) (C); then tighten to 60 ft-lb.



WC741A

3. Place the alignment pins and new gasket on the clutch housing; then install the CVT cover, CVT exhaust pipe mount, and air filter bracket and secure with the cap screws. Tighten in a crisscross pattern to 8 ft-lb.
4. Connect the exhaust duct and tighten the boot clamp securely.
5. Install the rear shock absorber and secure with the cap screws. Tighten the upper cap screw to 40 ft-lb and the lower cap screw to 35 ft-lb.

■**NOTE:** Drive belts require a break-in period (see Drive Belt Break-In Procedure in the General Information Section).

## CAUTION

Failure to properly break-in a new drive belt will result in premature belt failure.

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## Steering/Body/Controls

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The following steering components should be inspected periodically to ensure safe and proper operation.

- A. Steering wheel secure.
- B. Steering has equal and complete full-left and full-right turning capability.
- C. Steering sector mounting bolts tight.
- D. Ball joints not worn, cracked, or damaged.
- E. Tie rods not bent or cracked.
- F. Knuckles not worn, cracked, or damaged.
- G. Cotter pins not damaged or missing.
- H. Steering wheel tilt locks securely.

The frame and welds should be checked periodically for damage, bends, cracks, deterioration, broken components, and missing components.

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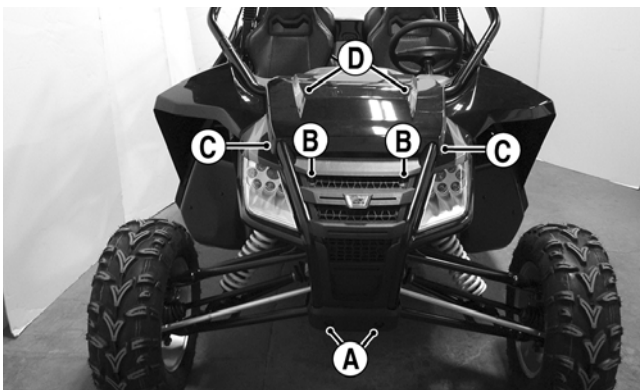
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### Hood

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WC078D



WC549B

#### REMOVING

1. Remove two fender screws (A) and two machine screws (B) with washers from the grille and remove the grille.

2. Remove two side fender screws (C), one on left and one on right located above and behind the headlight assemblies.
3. Reach up through the front fender wells and remove two fender screws (D) from the rear of the hood and remove the hood.

#### INSTALLING

1. Lay the hood in place on the frame; then install the rear fender screws (D).
  2. Install the two side fender screws (C); then place the grille on the vehicle and install the two machine screws (B) and fender screws (A). Tighten all fasteners securely.
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## Front Bumper Assembly

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#### REMOVING

1. Remove the cap screws securing the upper bumper support to the bumper.
2. Remove the bolts and lock nuts securing the bumper to the frame; then remove the bumper.

#### INSPECTING

Inspect all welds for cracking or bending.

#### INSTALLING

1. Place the front bumper assembly into position and secure using the existing cap screws. Finger-tighten only at this time.
  2. Secure the upper bumper support to the bumper using the bolts and new lock nuts. Tighten all hardware to 20 ft-lb.
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## Rear Body Panel

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#### REMOVING

1. Remove the seats (rear seats only on the 4X); then remove the machine screws securing the rear body panel to the frame and rear splash panel.



WC346A





WC347A

2. Remove the hose clamp from the gasoline filler neck and disconnect the filler hose.



WC344A

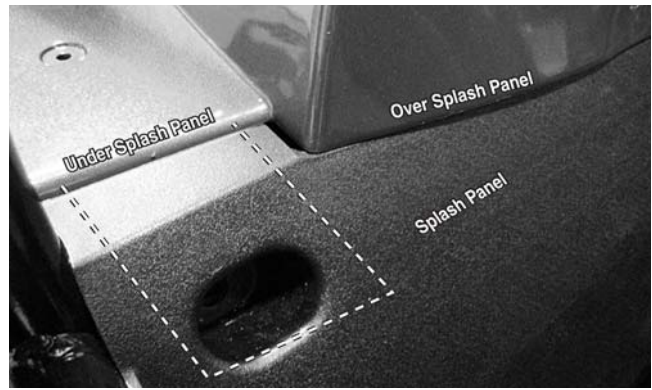
3. Lift the rear body panel off and remove forward between the ROPS uprights; then tape or plug the filler hose to prevent contamination of fuel or vapor escaping.



WC186

## INSTALLING

1. Place the rear body panel onto the vehicle making sure the outer front mounting tabs are located behind the splash panel.



WC342A

2. Secure with the machine screws and tighten securely.
3. Remove the plug or tape from the gas filler hose and connect the hose to the gasoline filler neck and secure with the hose clamp. Tighten securely.
4. Install the seats.

## Steering Wheel

### REMOVING

1. Remove the steering wheel cover; then match mark the steering shaft and steering wheel.

■NOTE: Any time steering components are disassembled, all connecting components should be marked for proper alignment during assembling.

2. Remove the hairpin clip from the steering shaft; then remove the nut securing the steering wheel and remove the steering wheel.

### INSPECTING

1. Inspect the steering wheel for cracks, missing padding, or broken spokes.
2. Inspect the splines for wear.
3. Check that the steering wheel is not bent.

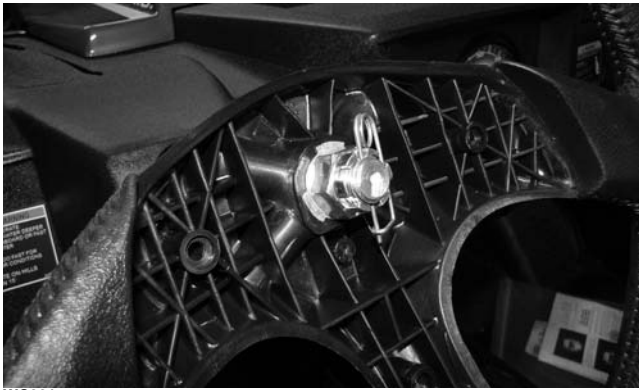
### INSTALLING

1. Install the steering wheel aligning the two match marks; then apply a drop of red Loctite #271 to the threads of the nut and secure the steering wheel. Tighten to 25 ft-lb.

■NOTE: If a new steering wheel is being installed, mark the wheel as close as possible to the old wheel mark; then check for proper positioning with the front wheels straight forward (see Checking/Adjusting Front Wheel Alignment).

2. Install the hairpin clip on the steering shaft.

■NOTE: If the hole in the steering shaft does not align with the slots in the nut, tighten the nut slightly until the next slot aligns with the hole.



WC321

## Steering Assembly

■**NOTE:** Thoroughly troubleshoot the EPS system prior to replacing the EPS assembly (see Electrical System) as there are several possible external causes for system failure.

### REMOVING EPS

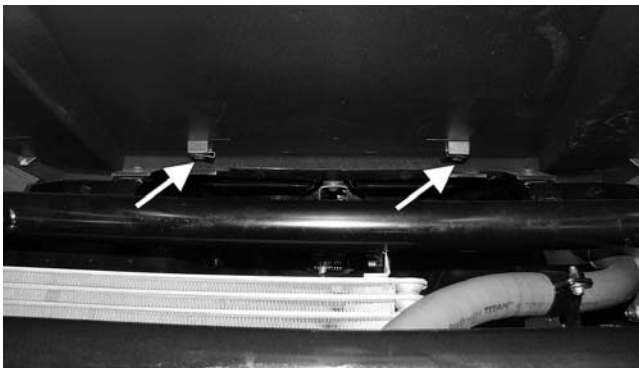
■**NOTE:** Before removing the EPS, ensure the front wheels and steering wheel are aligned to the front.

1. Remove two cap screws and two fender screws securing the grille and remove the grille.



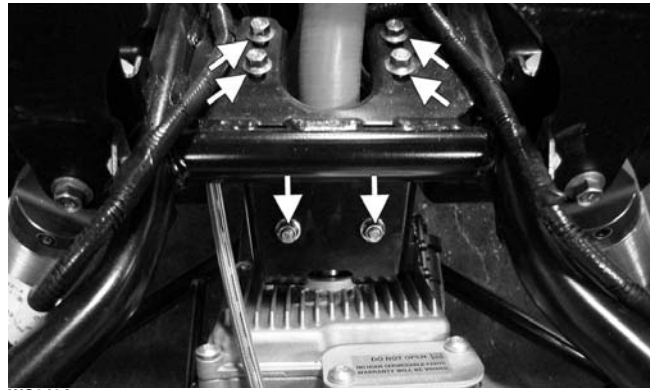
WC081C

2. Remove two fender screws behind the headlights and two fender screws at the rear of the hood; then remove the hood.



WC241A

3. Unplug the two connectors from the EPS unit; then remove four cap screws and two lock nuts from the steering flex-shaft clamp bracket and clamp.

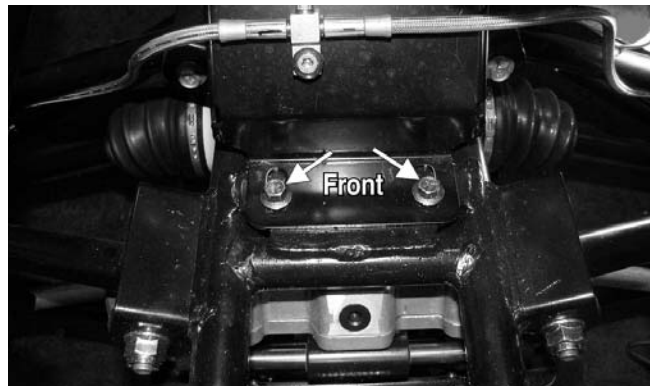


WC242A

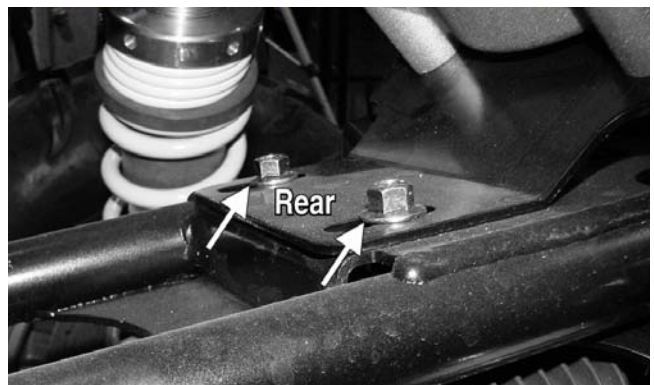
4. Remove the U-clamp; then remove the bracket.
5. Loosen the Allen-head cap screw securing the steering rack input coupler to the shaft; then remove four cap screws securing the EPS mounting bracket to the frame.



WC244A



WC245A

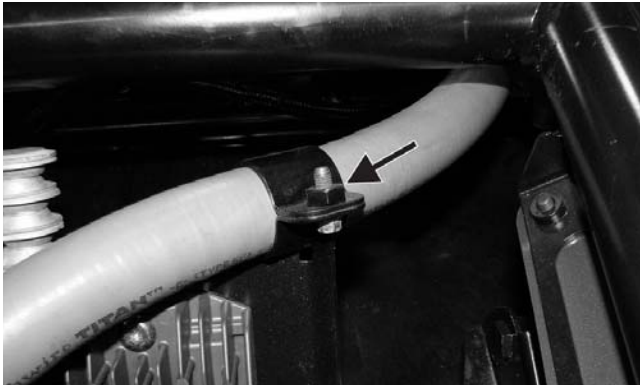


WC246A

6. Remove the mounting screw securing the brake line support bracket to the EPS mounting bracket.



7. Remove the steering flex-shaft support bracket; then slide the EPS unit upwards and to the rear until clear of the steering rack input coupler.



WC247A

8. Remove the steering flex-shaft coupler from the EPS unit; then maneuver the assembly past the brake hoses and out of the vehicle.



WC253A

9. Remove the four cap screws securing the EPS mounting bracket to the EPS unit.

■**NOTE: No repairs are authorized on the EPS assembly and it must be replaced as a complete assembly.**

### INSTALLING EPS

1. Install the EPS mounting bracket onto the EPS unit and secure with the four cap screws. Tighten to 35 ft-lb.
2. Mark the ends of the EPS input and output shafts to correspond with the flat-splined segment; then align the flat-splined segment of the output shaft with the slot in the rack input coupler and install the EPS into the vehicle.

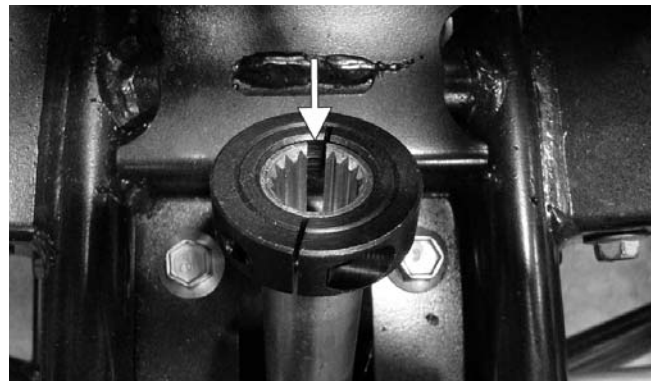


WC254A



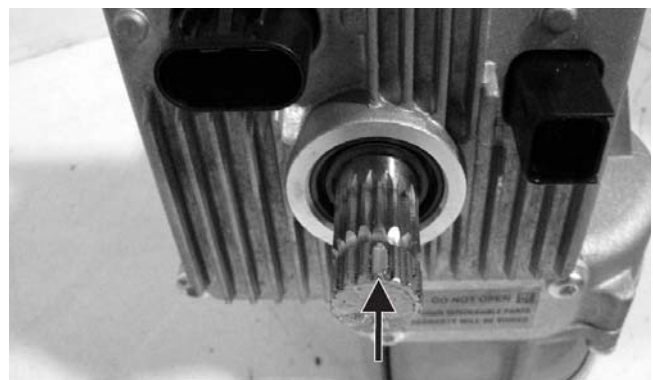
WC249A

3. Rock the EPS assembly to seat the splines and mounting bracket.

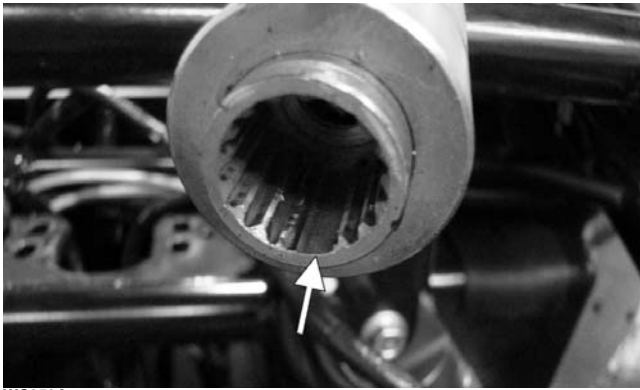


WC250A

4. Secure the mounting bracket to the frame and tighten to 20 ft-lb.
5. Install the steering flex-shaft coupler onto the EPS input shaft aligning the flat-splined segment of the shaft to the slot in the coupler.



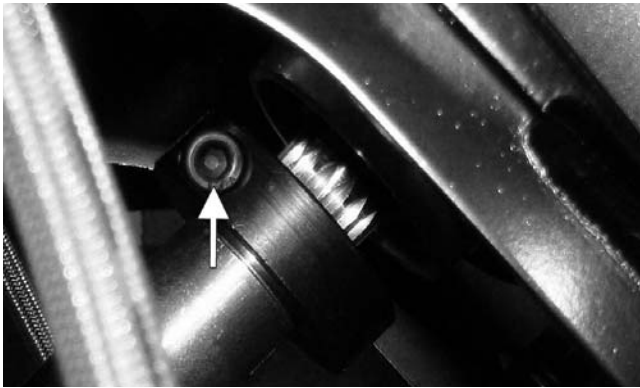
WC251A



WC252A

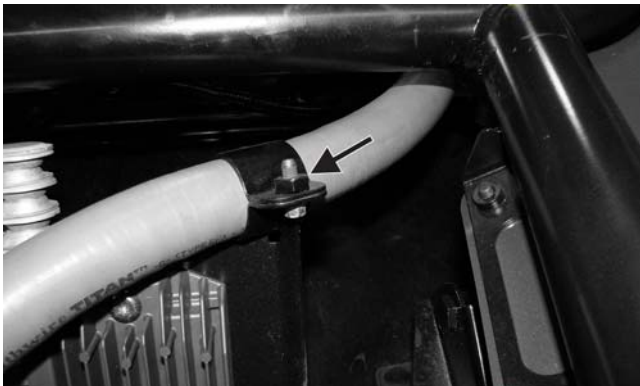
■**NOTE:** The flex-shaft coupler must engage completely covering the majority of the splines of the input shaft.

6. Attach the brake line support to the mounting bracket and tighten securely.
7. Tighten the input coupler clamp cap screw to 7 ft-lb.



WC244A

8. Install the flex-shaft clamp bracket and four cap screws loosely installed; then install the U-clamp and secure with two lock-nuts. Tighten the U-clamp lock nuts to 7 ft-lb and the lower bracket cap screws to 20 ft-lb.
9. Install the upper steering flex-shaft hold-down strap and tighten the cap screw to 50 in.-lb.



WC247A

10. Connect the two electrical connectors and check EPS operation.
11. Install the hood and grille.

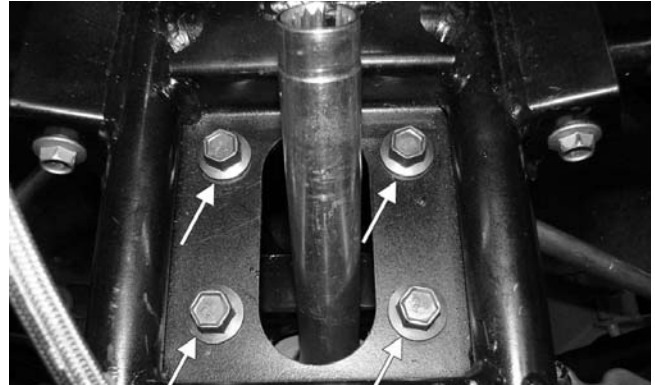
## REMOVING RACK AND PINION ASSEMBLY

1. Remove the hood and grille; then remove the EPS assembly.
2. Remove the front differential assembly (see Drive and Brake Systems).
3. Remove the cotter pins and nuts securing the tie rods to the steering rack.



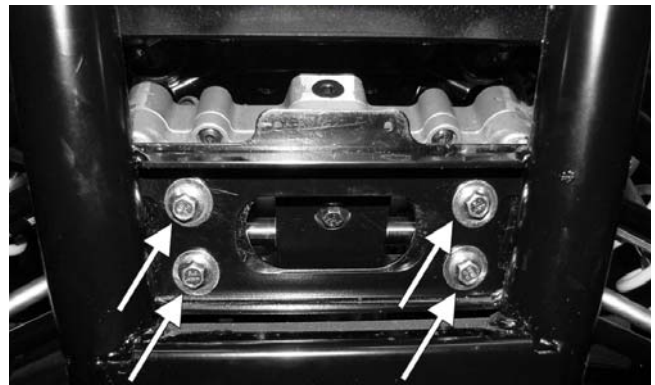
WC259

4. Remove four cap screws securing the upper mounting bracket to the frame and remove the bracket.



WC278A

5. Remove four cap screws securing the rack and pinion assembly to the frame; then rotate the rack and pinion assembly to the rear and out of the frame from either side.



WC260A





WC279

### Inspecting

1. Inspect the input shaft splines for excessive wear or signs of misalignment.
2. Inspect the slide mechanism for pitting, excessive wear, or worn bushings.
3. Rotate the input shaft from center to full left and right checking for any binding or catching.
4. Check for loose cap screws on rack and pinion housing.
5. Check for seal damage or lubricant leaks.

■**NOTE:** The steering assembly (rack and pinion) is not repairable and must be replaced as an assembly; however, the tie rods and boots are replaceable.

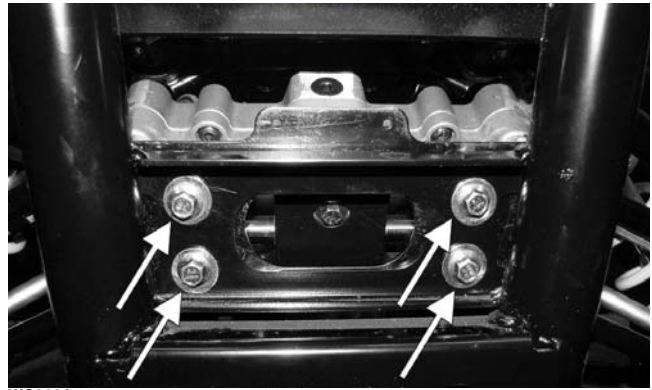
### INSTALLING RACK AND PINION ASSEMBLY

1. Place the rack and pinion assembly into the frame and guide the steering input shaft up through the shaft opening; then rotate the assembly forward and into position on the front mounting bracket.



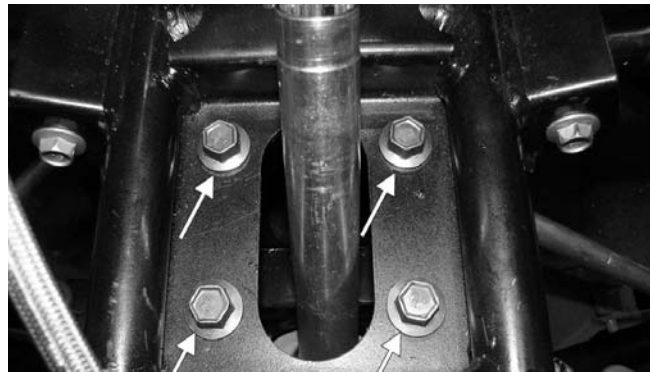
WC279A

2. Secure the assembly to the frame with four cap screws and tighten to 25 ft-lb.



WC260A

3. Install the upper mounting bracket in the frame and secure with new "patch-lock" cap screws. Tighten to 20 ft-lb.



WC278A

4. Connect the tie rods to the steering rack and secure with the nuts (threads coated with red Loctite #271). Tighten to 55 ft-lb and install new cotter pins.



WC257

5. Install the front differential assembly (see Drive and Brake Systems).
6. Install the EPS assembly.
7. Install the hood and grille.

## Steering Shaft

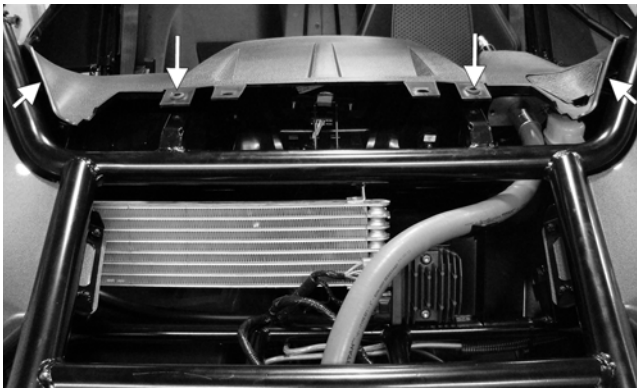
### REMOVING

1. Remove the steering wheel.
2. Remove the hood and grille.
3. Remove the upper pivot bolt on the steering tilt link and drop the tilt link down clear of the dash.



WC330

4. Remove four upper dash mounting screws and block the dash to the rear.



WC329A

5. Remove the steering shaft housing support hold-down strap; then remove the U-clamp from the lower steering shaft support.

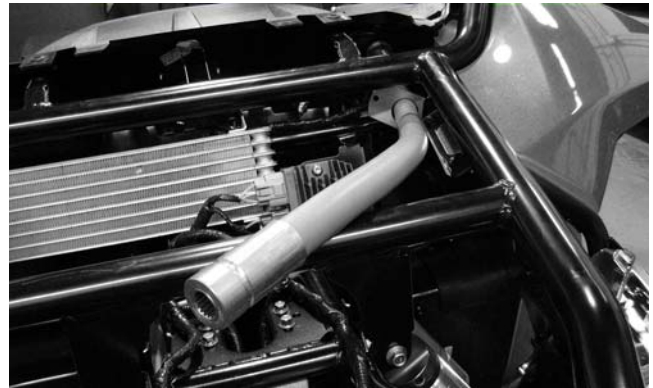


WC247A



WC328A

6. Remove the steering shaft from the EPS by pulling straight away from the input shaft.

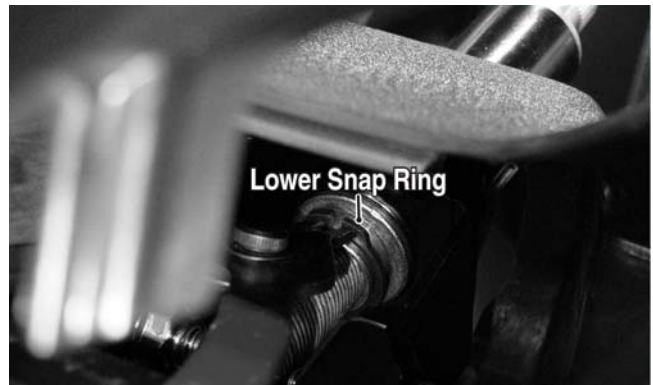


WC335

7. Remove the upper and lower snap rings from steering shaft; then work the steering shaft out of the upper steering support housing and remove from the vehicle. Account for a flat washer and a wave washer.



WC326



WC337A

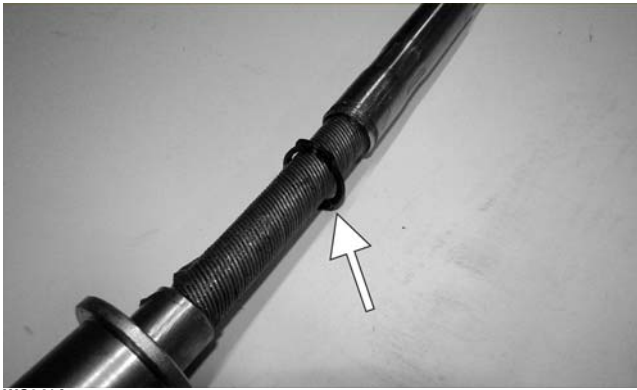
## INSPECTING

1. Check that the steering flex-shaft rotates freely in the housing with no sticking or binding.
2. Check the splines for wear or any signs of twisting.
3. Check the housing for cuts, cracks, or kinks.
4. If the assembly is serviceable, remove the flex-shaft and lubricate with the appropriate lubricant; then reinstall in the housing.

## INSTALLING

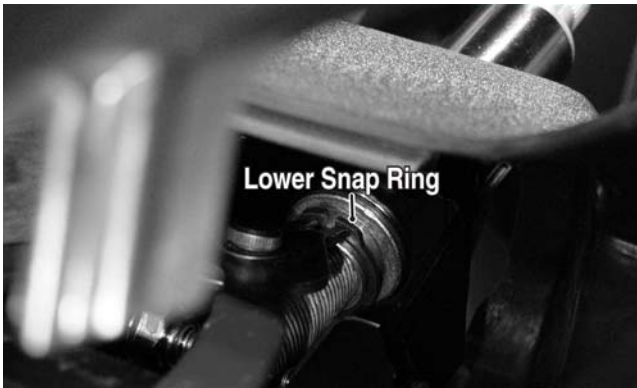
1. Making sure the lower snap ring is loosely on the steering shaft but not installed, slide the shaft into the upper steering support housing.





WC341A

2. From under the dash, install the lower snap ring onto the steering shaft.



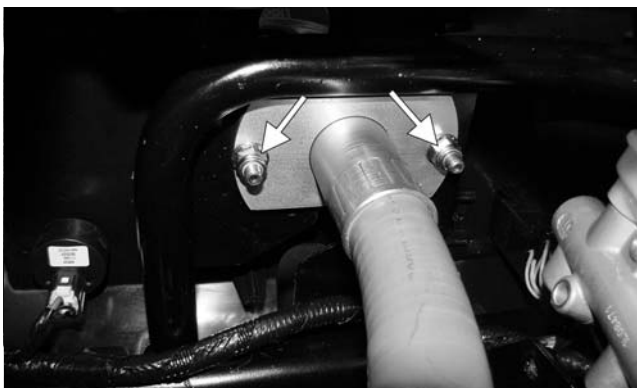
WC337A

3. Install the wave washer and flat washer onto the upper steering shaft; then install the upper snap ring.



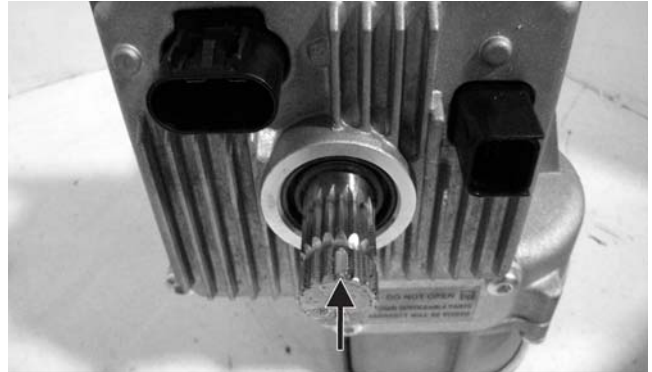
WC324A

4. Install the upper steering housing collar onto the tilt housing and tighten the nuts to 20 ft-lb.



WC339A

5. Install the steering flex-shaft coupler onto the EPS input shaft aligning the flat-splined segment of the shaft to the slot in the coupler; then install the U-clamp on the lower sheering shaft housing and secure with two nuts. Tighten to 7 ft-lb.



WC251A

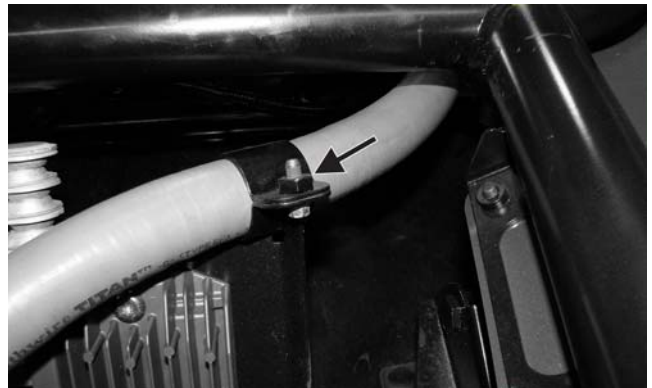


WC252A



WC242

6. Install the upper steering flex-shaft hold-down strap and secure with the cap screw. Tighten to 50 in.-lb.



WC247A

7. Install the upper tilt-steering link pivot bolt and tighten to 10 ft-lb; then install the steering wheel.
8. Remove the block and secure the upper dash screws; then install the hood and grille.

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## Steering Knuckles

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### REMOVING AND DISASSEMBLING

1. Secure the vehicle on a support stand to elevate the wheel; then remove the wheel and account for the hub plate.
2. Remove the nut and Belleville washer securing the hub.
3. Remove the brake caliper.
4. Remove the hub assembly.
5. Remove the cotter pin from the tie rod end and remove the tie rod end from the knuckle.
6. Remove the upper cap screw securing the ball joint in the knuckle.



WC271

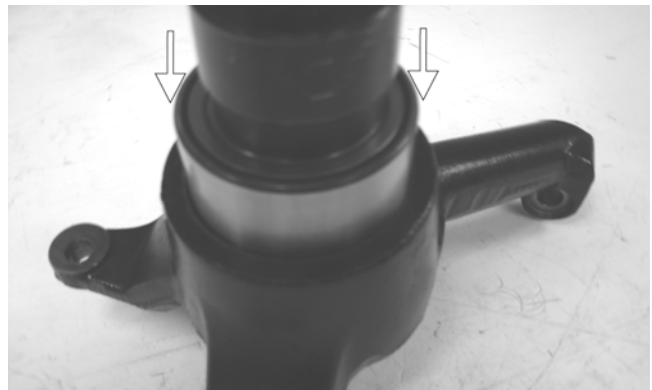
7. Tap the ball joint end out of the knuckle; then slide the axle out of the knuckle.
8. Remove the cap screw securing the lower ball joint to the knuckle and remove the knuckle.
9. Remove the snap ring securing the bearing in the knuckle; then press the bearing out of the knuckle.

### CLEANING AND INSPECTING

1. Clean all knuckle components.
2. Inspect the bearing for pits, scoring, rusting, or premature wear.
3. Inspect the knuckle for cracks, breaks, or galling of the bearing surface.

### ASSEMBLING AND INSTALLING

1. Using a suitable press and driver, press the bearing into the knuckle until firmly seated; then install the snap ring.



PR292A



PR289

2. Install the knuckle to the lower ball joint and secure with a new "patch-lock" cap screw. Tighten to 35 ft-lb.
3. Slide the axle into the knuckle; then install the upper ball joint and secure with a new "patch-lock" cap screw. Tighten to 35 ft-lb.



WC272



WC271



4. Install the tie rod end and secure with the nut (coated with red Loctite #271). Tighten to 55 ft-lb; then install a new cotter pin and spread the pin.

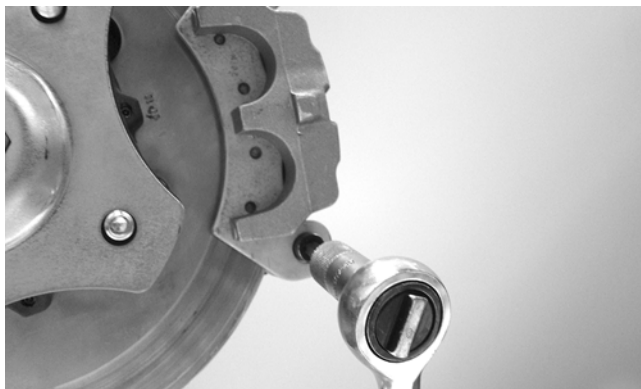
■NOTE: During assembling, new cotter pins should be installed.

5. Install the hub assembly onto the axle; then apply Loctite primer and red Loctite #277 to the axle threads.
6. Engage the hub nut into the Belleville washer on the convex side; then with the concave side of the washer directed toward the hub, install the nut and washer. Keeping the nut and washer engaged, tighten the hub nut to 250 ft-lb.



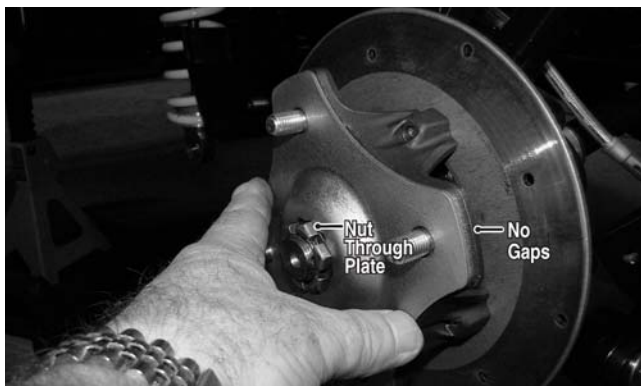
WC303A

7. Secure the brake caliper to the knuckle with the two new "patch-lock" cap screws. Tighten to 35 ft-lb.



WC606

8. Install the hub plate making sure it fits completely over the nut and lies flat against the hub.



WC317A

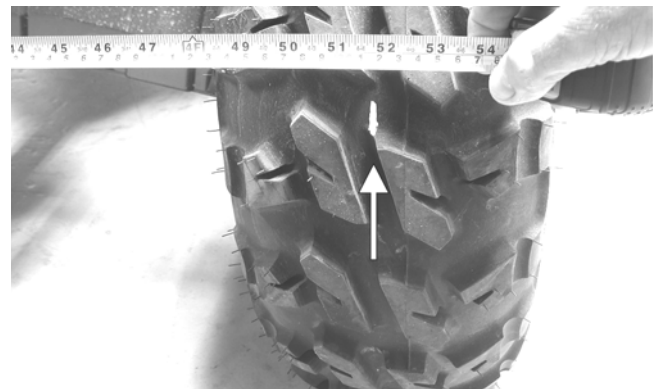
■NOTE: If the hub plate cannot be fully installed due to misalignment of the hub nut, tighten the nut until properly aligned and plate is fully installed.

9. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).
10. Remove the vehicle from the support stand.

## Checking/Adjusting Front Wheel Alignment

■NOTE: All measurements and adjustments must be made with the vehicle unloaded.

Mark the center-line of the front tires at the front and rear of the tire; then using a tape measure, measure and record the distance between the marks at the front and rear. The front measurement should be 6 mm (1/4 in.) greater than the rear measurement (toe-out).

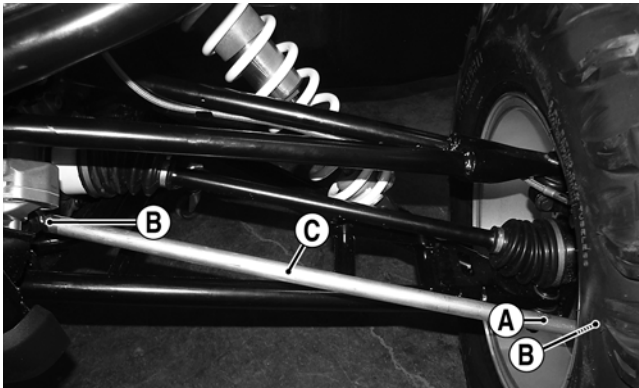


PR087A

1. Center the steering wheel; then using an open-ended wrench on the tie rod flat (A), loosen the inner and outer jam nuts (B) on both tie rods.



WC012A



WC110B

### CAUTION

Always use a wrench to hold the tie rod ends when loosening or tightening the jam nuts or damage to the boots could occur.

2. Turn the left-side and right-side tie rods in equal increments to achieve the proper toe-out; then tighten the jam nuts to 10 ft-lb.

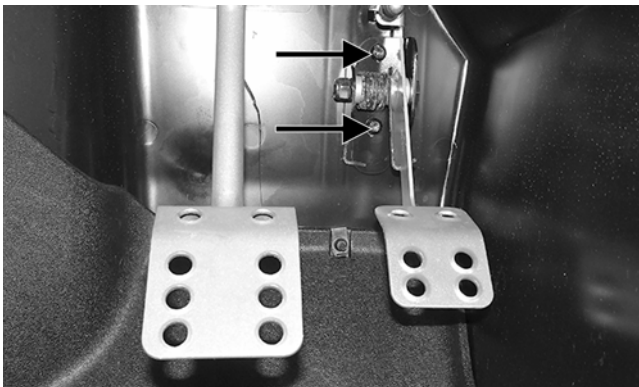
## Accelerator Pedal

### REMOVING

Dislodge the throttle cable holding grommet from the actuator arm; then remove two torx-head screws and nuts securing the accelerator pedal assembly to the splash panel and remove the accelerator pedal.



PR709



WC933A

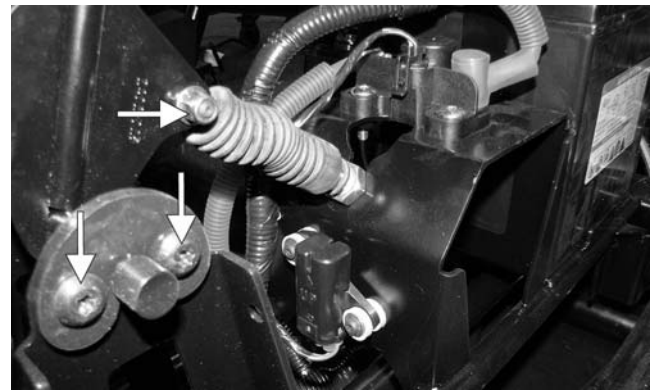
### INSTALLING

Align the mounting holes with the holes in the splash panel and secure with the two torx-head screws and nuts; then snap the throttle cable holding grommet into the actuator arm.

## Shift Lever

### REMOVING

1. Remove the seats; then remove the battery cover and shift lever handle.
2. Remove the center console leaving the shift lever boot in the console.
3. Remove the nut from the shift cable pivot bolt; then remove the four machine screws from the shift lever axle mounting and remove the shift lever.



WC348A

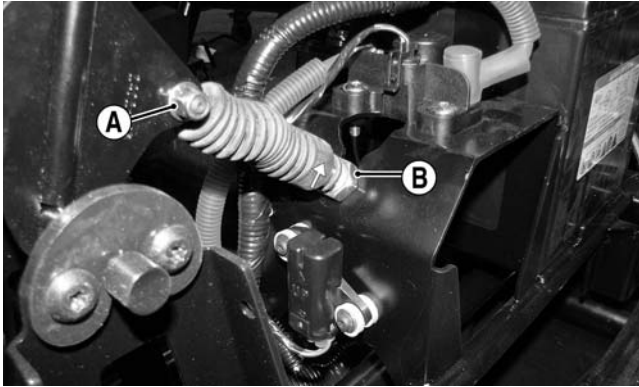
### INSTALLING

1. Place the shift lever into position and secure with the four machine screws (threads coated with blue Loc-tite #243). Tighten to 20 ft-lb.
2. Connect the shift cable to the shift arm with the pivot bolt and tighten the nut to 8 ft-lb.
3. Check shift cable adjustment (see Periodic Maintenance/Tune-Up); then install the center console. Tighten the machine screws securely.
4. Install the shift lever handle onto the shift lever and tighten the jam nut with the handle correctly aligned.
5. Install the battery cover and seats.

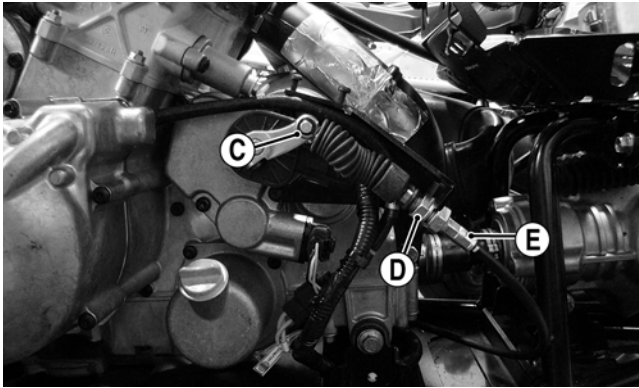
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## Shift Cable

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WC348B



WC178B

### REMOVING

1. Remove the seats, battery cover, and center console; then remove the two cap screws securing the starter relay to the frame.
2. Remove the nut (A) from the shift arm pivot bolt; then loosen the jam nut (B) and lift the cable upward out of the mounting bracket slot.
3. Remove the muffler and heat shield; then remove the E-clip (C). Loosen jam nut (D) and slide the cable (E) out of the mounting bracket.
4. Noting the cable routing, mark any cable tie locations; then remove the shift cable from the vehicle.
5. If the shift cable is to be replaced, accurately measure and record the distance between the adjuster nuts (nuts opposite the jam nuts).

### INSTALLING

1. Using the measurements from the existing cable, adjust the adjuster nuts to the same length.

**NOTE:** The shift cable will have to be adjusted, but using the existing measurements will give a close starting point.

2. As noted in removing, route the new cable into position. Do not tie cable tie points yet.
3. Set the upper cable housing end into the mounting bracket and finger tighten jam nut (B); then connect the cable to the shift arm pivot bolt and secure with the nut (A). Tighten the nut to 8 ft-lb.

4. Place the lower cable housing end into the mounting bracket on the engine and finger tighten jam nut (D); then connect cable (E) to the shift arm and install the E-clip (C).
5. Install any necessary cable ties as marked during removal; then check/adjust the shift cable (see Periodic Maintenance/Tune-Up). After cable is properly adjusted, tighten the jam nuts to 20 ft-lb.
6. Install the center console, battery cover, and seats.

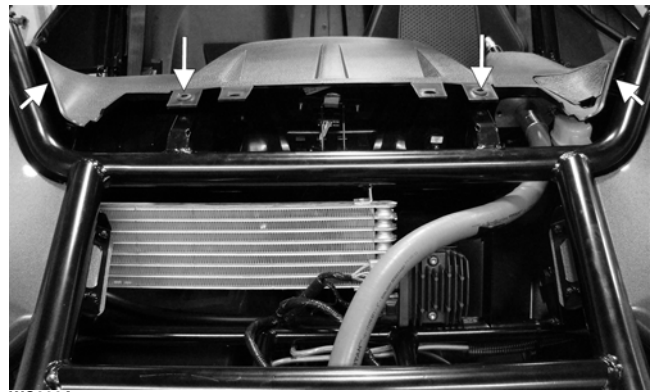
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## LCD Gauge

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### REPLACING

1. Remove the hood and grille.
2. Remove the four screws securing the upper dash to the frame.



WC329A

3. Remove the nuts securing the gauge assembly to the dash; then unplug the multi-pin connector and remove the gauge from the vehicle.
4. Place the new gauge into the dash panel opening; then place the gauge holder over the mounting screws and secure with the nuts.
5. Plug the multi-pin connector into the gauge; then turn the ignition switch to the ON position and check gauge functions.
6. Install the dash and secure with the four screws; then install the hood and grille.

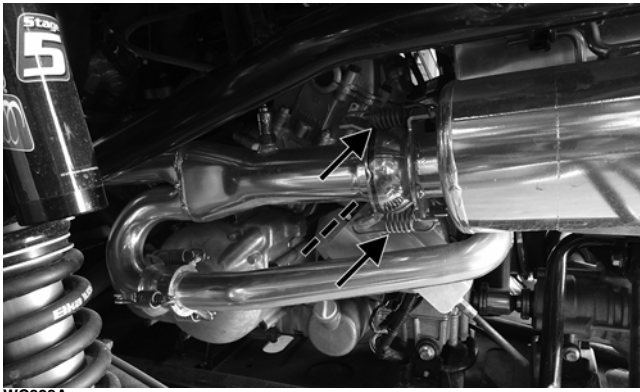
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## Muffler

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### REMOVING

1. Remove the four exhaust springs at the muffler/exhaust pipe juncture.



WC898A

2. Slide the muffler assembly clear of the holder pins. Account for the grafoil seal.

### INSPECTING

1. Inspect muffler externally for cracks, holes, and dents.
2. Inspect the muffler internally by shaking the muffler back and forth and listening for rattles or loose debris inside the muffler.

■**NOTE:** For additional details on cleaning the muffler/spark arrester, see **Periodic Maintenance/Tune-Up**.

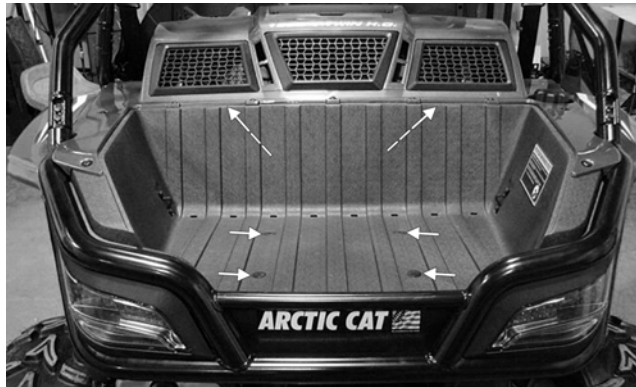
### INSTALLING MUFFLER

1. With the grafoil seal in place, place the muffler onto the holder pins and slide into position.
2. Secure the muffler to the exhaust pipe with the four exhaust springs.

## Cargo Box

### REMOVING

1. Remove the rear body panel.
2. Remove the six fender screws (two under rear body panel) securing the cargo box to the mounts and remove the cargo box.



WC346B

### INSTALLING

1. Set the cargo box into position on the cargo box mounts; then secure with the six fender screws. Tighten securely.

2. Install the rear body panel.

## Seats

### REMOVING/INSTALLING (X)

1. To remove a seat, pull the seat lock lever up. Raise the rear of the seat and tilt it forward.

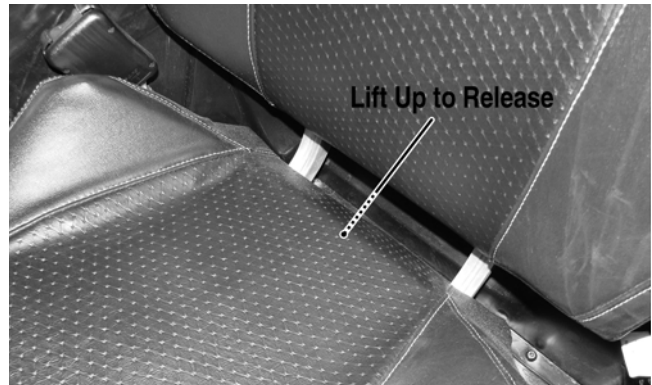


WC017A

2. To install a seat, slide the front of the seat into the seat retainers and push down firmly on the rear of seat. The seat should automatically lock into position.

### REMOVING/INSTALLING (4X)

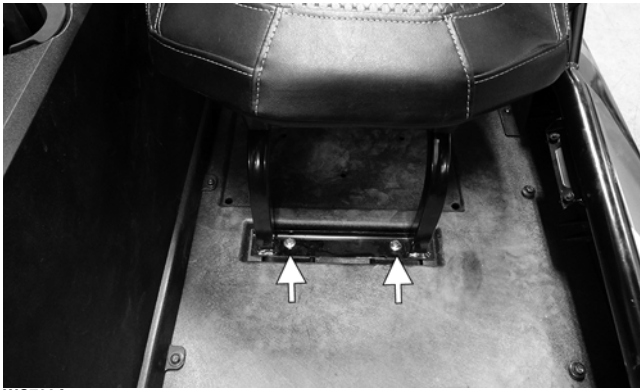
1. To remove a front seat, pull the seat lock lever up. Raise the rear of the seat and tilt it forward.



WC017A

2. To install a front seat, slide the front of the seat into the seat retainers and push down firmly on the rear of seat. The seat should automatically lock into position.
3. To remove a rear seat, remove two cap screws securing the seat support to the floor; then remove the seat.





WC722A

4. To install a rear seat, place into position with the seat support; then secure with the cap screws and tighten to 15 ft-lb.

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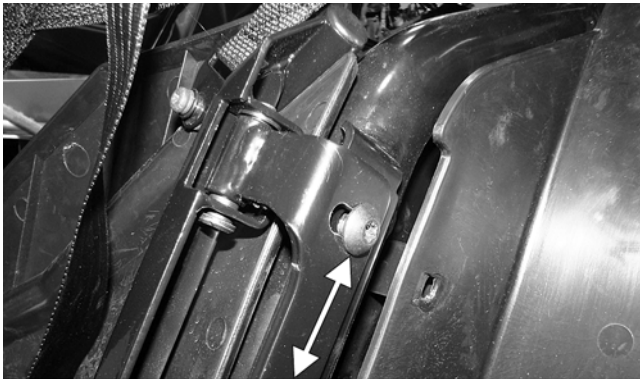
## Doors

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### CHECKING/ADJUSTING (X/4X)

The doors and latches are adjustable for proper latching/unlatching.

1. To raise or lower door-to-latch contact or to move the door forward or backward, loosen the screws on the hinge plate. After adjustment, tighten securely.



WC134A



WC109A

2. To move latch forward or aft, loosen the screws on the latch plate. After adjustment, tighten securely.



WC133A

### CHECKING/ADJUSTING (X Limited)

1. Loosen the screws on the hinge plate to raise or lower the door-to-latch contact or to move the door forward or backward. After adjustment, tighten securely.



WC801A



WC798A

2. Loosen the screws on the latch plate to move the latch forward or backward. After adjustment, tighten securely.

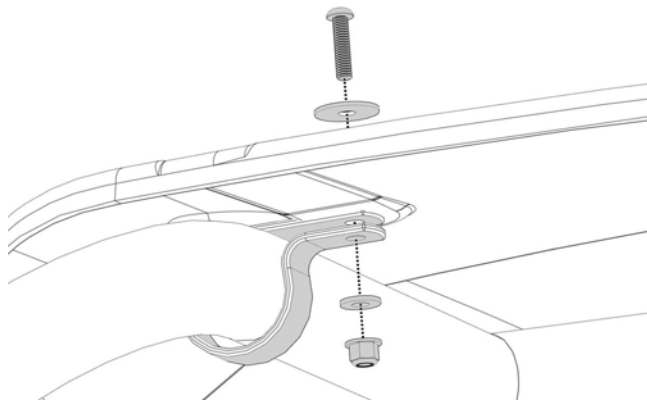
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## Roof (X Limited)

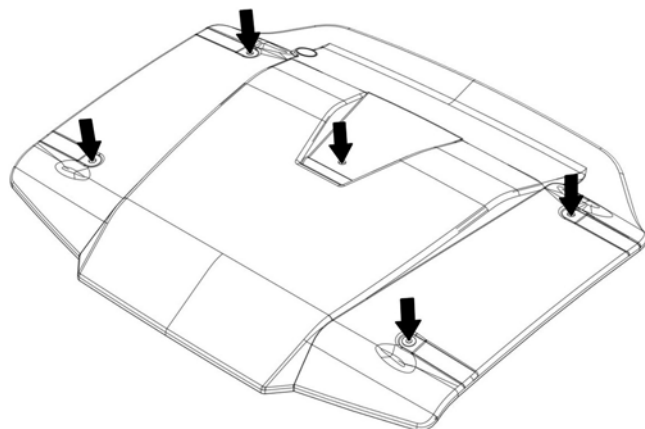
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### REMOVING/INSTALLING

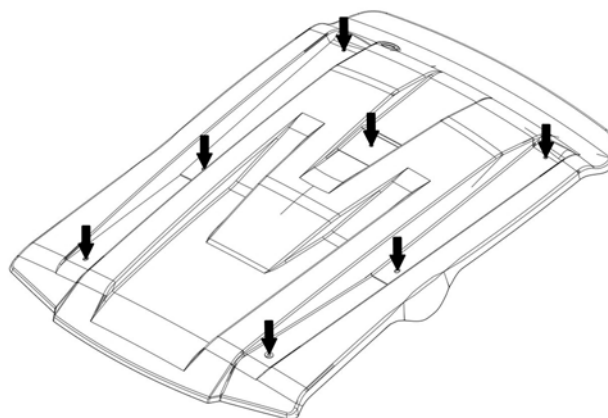
1. Remove the cap screws and lock nuts securing the P-clamps to the roof. Account for the washers and discard the lock nuts.



ROV-810



ROV-812



ROV-809

2. Align the roof over the top of the ROPS. Install the P-clamps in the proper locations onto the ROPS.
3. Secure the roof to the P-clamps using the cap screws, washers, and new lock nuts.

■ **NOTE:** The lip of the roof faces the rear of the vehicle.



WC812

# Troubleshooting

## Problem: Handling too heavy or stiff

Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Front wheel alignment</b> incorrect</li> <li>2. <b>Lubrication</b> inadequate</li> <li>3. <b>Tire inflation pressure</b> incorrect</li> <li>4. <b>Tie rod ends</b> seizing</li> <li>5. <b>Linkage connections</b> seizing</li> <li>6. <b>EPS</b> malfunction</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust alignment</li> <li>2. Lubricate appropriate components</li> <li>3. Adjust pressure</li> <li>4. Replace tie rod ends</li> <li>5. Repair - replace connections</li> <li>6. Replace EPS</li> </ol>

## Problem: Steering oscillation

Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Tires inflated</b> unequally</li> <li>2. <b>Wheel(s)</b> wobbly</li> <li>3. <b>Wheel hub cap screw(s)</b> loose - missing</li> <li>4. <b>Wheel hub bearing</b> worn - damaged</li> <li>5. <b>Tie rod ends</b> worn - loose</li> <li>6. <b>Tires defective</b> - incorrect</li> <li>7. <b>A-arm bushings</b> damaged</li> <li>8. <b>Bolts - nuts (frame)</b> loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust pressure</li> <li>2. Replace wheel(s)</li> <li>3. Tighten - replace cap screws</li> <li>4. Replace bearing</li> <li>5. Replace - tighten tie rod ends</li> <li>6. Replace tires</li> <li>7. Replace bushings</li> <li>8. Tighten bolts - nuts</li> </ol>

## Problem: Steering pulling to one side

Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Tires inflated</b> unequally</li> <li>2. <b>Front wheel alignment</b> incorrect</li> <li>3. <b>Wheel hub bearings</b> worn - broken</li> <li>4. <b>Frame</b> distorted</li> <li>5. <b>Shock absorber</b> defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust pressure</li> <li>2. Adjust alignment</li> <li>3. Replace bearings</li> <li>4. Repair - replace frame</li> <li>5. Replace shock absorber</li> </ol>

## Problem: Steering impaired

Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Tire pressure</b> too high</li> <li>2. <b>Steering linkage connections</b> worn</li> <li>3. <b>Cap screws (suspension system)</b> loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust pressure</li> <li>2. Replace connections</li> <li>3. Tighten cap screws</li> </ol>

## Problem: Tire wear rapid or uneven

Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Wheel hub bearings</b> worn - loose</li> <li>2. <b>Front wheel alignment</b> incorrect</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace bearings</li> <li>2. Adjust alignment</li> </ol>

## Problem: Steering noise

Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Caps screws - nuts</b> loose</li> <li>2. <b>Wheel hub bearings</b> broken - damaged</li> <li>3. <b>Lubrication</b> inadequate</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten cap screws - nuts</li> <li>2. Replace bearings</li> <li>3. Lubricate appropriate components</li> </ol>

## Problem: Rear wheel oscillation

Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Rear wheel hub bearings</b> worn - loose</li> <li>2. <b>Tires</b> defective - incorrect</li> <li>3. <b>Wheel rim</b> distorted</li> <li>4. <b>Wheel hub cap screws</b> loose</li> <li>5. <b>Rear suspension lateral link bushing</b> worn</li> <li>6. <b>Trailing arm bushings</b> worn</li> <li>7. <b>Rear suspension lateral link</b> loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace bearings</li> <li>2. Replace tires</li> <li>3. Replace rim</li> <li>4. Tighten cap screws</li> <li>5. Replace bushing</li> <li>6. Replace bushings or link</li> <li>7. Tighten nut or replace</li> </ol>

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## Engine/Transmission

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This section has been organized into sub-sections which show a progression for the complete servicing of the Arctic Cat Wildcat engine/transmission.

To service the center crankcase halves, the engine/transmission must be removed from the frame. To service top-side, left-side, and right-side components, the engine/transmission does not have to be removed from the frame.

■NOTE: Arctic Cat recommends the use of new gaskets, lock nuts, and seals and lubricating all internal components when servicing the engine/transmission.

■NOTE: A new ROV and an overhauled ROV engine require a “break-in” period. The first 10 hours (or 200 miles) are most critical to the life of this ROV. Proper operation during this break-in period will help assure maximum life and performance from the ROV. Instruct the customer to follow the proper break-in procedure as described in the Operators Manual.

### SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this section. Refer to the current Special Tools Catalog for the appropriate tool description.

■NOTE: When indicated for use, each special tool will be identified by its specific name, as shown in the chart below, and capitalized.

Description	p/n
Seal Protector Tool	0444-252
Crankcase Separator/Crankshaft Remover	0444-152
Magneto Rotor Remover Set	0444-254
Piston Pin Puller	0644-328
Secondary Drive Gear Holder	0444-253
Spanner Wrench	0444-240
Surface Plate	0644-016
V Blocks	0644-535
Drive Clutch Spider Removal Kit	0444-281

■NOTE: Special tools are available from the Arctic Cat Service Department.



# Troubleshooting

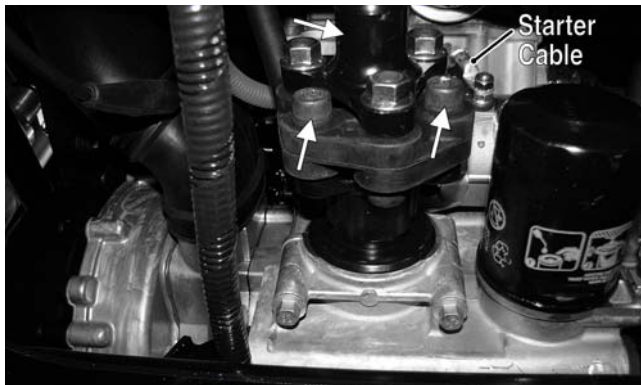
Problem: Engine will not start or is hard to start (Compression too low)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Gasoline</b> bad</li> <li>2. <b>Valve clearance</b> out of adjustment</li> <li>3. <b>Valve guides</b> worn</li> <li>4. <b>Valves</b> mistimed</li> <li>5. <b>Piston rings</b> worn - broken</li> <li>6. <b>Cylinder bore</b> worn</li> <li>7. <b>Starter motor</b> cranks too slowly - does not turn</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain gas - replace with clean gas</li> <li>2. Adjust clearance</li> <li>3. Repair - replace guides</li> <li>4. Retime engine</li> <li>5. Replace rings</li> <li>6. Replace cylinder</li> <li>7. See Electrical System</li> </ol>
Problem: Engine will not start or is hard to start (No spark)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Spark plug(s)</b> fouled</li> <li>2. <b>Spark plug(s)</b> wet</li> <li>3. <b>Magneto</b> defective</li> <li>4. <b>ECM</b> defective</li> <li>5. <b>Ignition coil</b> defective</li> <li>6. <b>High-tension lead</b> open - shorted</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean - replace plug(s)</li> <li>2. Clean - dry plug(s)</li> <li>3. Replace stator coil</li> <li>4. Replace ECM</li> <li>5. Replace ignition coil</li> <li>6. Replace high tension lead</li> </ol>
Problem: Engine will not start or is hard to start (No fuel reaching the fuel injector)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Gas tank vent hose</b> obstructed</li> <li>2. <b>Fuel hose</b> obstructed</li> <li>3. <b>Fuel screens</b> obstructed</li> <li>4. <b>Fuel pump</b> defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean vent hose</li> <li>2. Clean - replace hose</li> <li>3. Clean - replace inlet screen</li> <li>4. Replace fuel pump</li> </ol>
Problem: Engine stalls easily	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Gasoline</b> bad</li> <li>2. <b>Spark plug(s)</b> fouled</li> <li>3. <b>Magneto</b> defective</li> <li>4. <b>ECM</b> defective</li> <li>5. <b>Fuel injector</b> obstructed</li> <li>6. <b>Valve clearance</b> out of adjustment</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain gas - replace with clean gas</li> <li>2. Clean - replace plug(s)</li> <li>3. Replace stator coil</li> <li>4. Replace ECM</li> <li>5. Replace fuel injector</li> <li>6. Adjust clearance</li> </ol>
Problem: Engine noisy (Excessive valve chatter)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Valve clearance</b> excessive</li> <li>2. <b>Valve spring(s)</b> weak - broken</li> <li>3. <b>Rocker arm - rocker arm shaft</b> worn</li> <li>4. <b>Camshaft</b> worn</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust clearance</li> <li>2. Replace spring(s)</li> <li>3. Replace arm - shaft</li> <li>4. Replace camshaft</li> </ol>
Problem: Engine noisy (Noise seems to come from piston)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Piston - cylinder</b> worn</li> <li>2. <b>Combustion chamber</b> carbon buildup</li> <li>3. <b>Piston pin - piston pin bore</b> worn</li> <li>4. <b>Piston rings - ring groove(s)</b> worn</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace - service piston - cylinder</li> <li>2. Clean cylinder head and piston</li> <li>3. Replace - service pin - bore</li> <li>4. Replace rings - piston</li> </ol>
Problem: Engine noisy (Noise seems to come from timing chain)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Chain</b> stretched</li> <li>2. <b>Sprockets</b> worn</li> <li>3. <b>Tension adjuster</b> malfunctioning</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace chain</li> <li>2. Replace sprockets</li> <li>3. Repair - replace adjuster</li> </ol>
Problem: Engine noisy (Noise seems to come from crankshaft)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Main bearing</b> worn - burned</li> <li>2. <b>Lower rod-end bearing</b> worn - burned</li> <li>3. <b>Connecting rod side clearance</b> too large</li> <li>4. <b>Centrifugal clutch</b> loose</li> <li>5. <b>Rotor/flywheel</b> loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace bearing</li> <li>2. Replace crankshaft assembly</li> <li>3. Replace crankshaft assembly</li> <li>4. Tighten - replace clutch</li> <li>5. Tighten - replace flywheel - crankshaft</li> </ol>
Problem: Engine noisy (Noise seems to come from transmission)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Gears</b> worn - chipped</li> <li>2. <b>Splines</b> worn</li> <li>3. <b>Primary gears</b> worn - chipped</li> <li>4. <b>Bearings</b> worn</li> <li>5. <b>Bushing</b> worn</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace gears</li> <li>2. Replace shaft(s)</li> <li>3. Replace gears</li> <li>4. Replace bearings</li> <li>5. Replace bushing</li> </ol>

<b>Problem: Engine noisy (Noise seems to come from secondary bevel gear and final driven shaft)</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>Drive - driven bevel gears</b> damaged - worn</li> <li>2. <b>Backlash</b> excessive</li> <li>3. <b>Tooth contact</b> improper</li> <li>4. <b>Bearing</b> damaged</li> <li>5. <b>Gears</b> worn - chipped</li> <li>6. <b>Splines</b> worn</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace gears</li> <li>2. Adjust backlash</li> <li>3. Adjust contact</li> <li>4. Replace bearing</li> <li>5. Replace gears</li> <li>6. Replace shaft(s)</li> </ol>
<b>Problem: Engine idles poorly</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>Gasoline</b> bad</li> <li>2. <b>Valve clearance</b> incorrect</li> <li>3. <b>Valve seating</b> poor</li> <li>4. <b>Valve guides</b> defective</li> <li>5. <b>Rocker arms - arm shaft</b> worn</li> <li>6. <b>Magneto</b> defective</li> <li>7. <b>ECM</b> defective</li> <li>8. <b>Spark plug(s) fouled - gap</b> too wide</li> <li>9. <b>Ignition coil</b> defective</li> <li>10. <b>Fuel injector</b> obstructed</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain gas - replace with clean gas</li> <li>2. Adjust clearance</li> <li>3. Replace valves/cylinder head</li> <li>4. Replace guides</li> <li>5. Replace arms - shafts</li> <li>6. Replace stator coil</li> <li>7. Replace ECM</li> <li>8. Adjust gap - replace plug(s)</li> <li>9. Replace ignition coil</li> <li>10. Replace fuel injector</li> </ol>
<b>Problem: Engine runs poorly at high speed</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>Gasoline</b> bad</li> <li>2. <b>High RPM "cut out"</b> against RPM limiter</li> <li>3. <b>Valve springs</b> weak</li> <li>4. <b>Valve timing</b> incorrect</li> <li>5. <b>Cams - rocker arms</b> worn</li> <li>6. <b>Spark plug gap</b> too narrow</li> <li>7. <b>Ignition coil</b> defective</li> <li>8. <b>Air cleaner element</b> obstructed</li> <li>9. <b>Fuel hose</b> obstructed</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain gas - replace with clean gas</li> <li>2. Shift into higher gear - decrease speed</li> <li>3. Replace springs</li> <li>4. Retime engine</li> <li>5. Replace cams - arms</li> <li>6. Adjust gap</li> <li>7. Replace ignition oil</li> <li>8. Clean element</li> <li>9. Clean - prime hose</li> </ol>
<b>Problem: Exhaust smoke dirty or heavy</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>Gasoline</b> bad</li> <li>2. <b>Engine oil</b> overfilled - contaminated</li> <li>3. <b>Piston rings - cylinder</b> worn</li> <li>4. <b>Valve guides</b> worn</li> <li>5. <b>Cylinder wall</b> scored</li> <li>6. <b>Valve stems</b> worn</li> <li>7. <b>Stem seals</b> defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain gas - replace with clean gas</li> <li>2. Drain excess oil - change oil</li> <li>3. Replace - service rings - cylinder</li> <li>4. Replace guides</li> <li>5. Replace cylinder</li> <li>6. Replace valves</li> <li>7. Replace seals</li> </ol>
<b>Problem: Engine lacks power</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>Gasoline</b> bad</li> <li>2. <b>Valve clearance</b> incorrect</li> <li>3. <b>Valve springs</b> weak</li> <li>4. <b>Valve timing</b> incorrect</li> <li>5. <b>Piston ring(s) - cylinder</b> worn</li> <li>6. <b>Valve seating</b> poor</li> <li>7. <b>Spark plug</b> fouled</li> <li>8. <b>Rocker arms - shafts</b> worn</li> <li>9. <b>Spark plug gap</b> incorrect</li> <li>10. <b>Fuel injector</b> obstructed</li> <li>11. <b>Air cleaner element</b> obstructed</li> <li>12. <b>Engine oil</b> overfilled - contaminated</li> <li>13. <b>Intake manifold</b> leaking air</li> <li>14. <b>Cam chain</b> worn</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain gas - replace with clean gas</li> <li>2. Adjust clearance</li> <li>3. Replace springs</li> <li>4. Time camshaft</li> <li>5. Replace - service rings - cylinder</li> <li>6. Repair seats</li> <li>7. Clean - replace plug</li> <li>8. Replace arms - shafts</li> <li>9. Adjust gap - replace plug</li> <li>10. Replace fuel injector</li> <li>11. Clean element</li> <li>12. Drain excess oil - change oil</li> <li>13. Tighten - replace manifold</li> <li>14. Replace cam chain - sprockets</li> </ol>
<b>Problem: Engine overheats</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>Carbon deposit (piston crown)</b> excessive</li> <li>2. <b>Oil</b> low</li> <li>3. <b>Octane low - gasoline</b> poor</li> <li>4. <b>Oil pump</b> defective</li> <li>5. <b>Oil filter</b> obstructed</li> <li>6. <b>Intake manifold</b> leaking air</li> <li>7. <b>Coolant level</b> low</li> <li>8. <b>Fan</b> malfunctioning</li> <li>9. <b>Fan relay</b> malfunctioning</li> <li>10. <b>Thermostat</b> stuck - closed</li> <li>11. <b>Radiator hoses - cap</b> damaged - obstructed</li> <li>12. <b>Fan fuse(s)</b> blown</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean piston</li> <li>2. Add oil</li> <li>3. Drain - replace gasoline</li> <li>4. Replace pump</li> <li>5. Replace filter</li> <li>6. Tighten - replace manifold</li> <li>7. Fill - examine system for leaks</li> <li>8. Check fan fuse - replace fan</li> <li>9. Replace fan relay</li> <li>10. Replace thermostat</li> <li>11. Clear obstruction - replace hoses - cap</li> <li>12. Replace fuse(s)</li> </ol>

## Removing Engine/Transmission

Many service procedures can be performed without removing the engine/transmission from the frame. Closely observe the note introducing each sub-section for this important information.

1. Drive or lift the vehicle onto wheel ramps or other lift that supports vehicle by its wheels; then shift the transmission into park.
2. Remove the seats; then remove the battery cover and disconnect the negative battery cable. On the 4X, remove the rear center console.
3. Remove the belly panel from under the engine. On the 4X, remove the seat belt anchors; then remove the rear splash panels.
4. Remove the three Allen-head cap screws from the front output drive flange; then remove the starter cable.



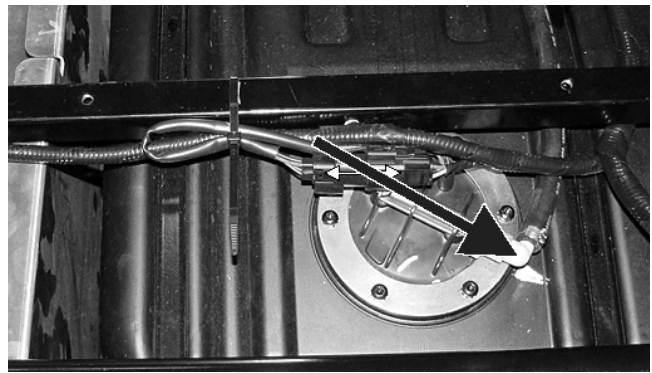
WC187C

5. Remove all nuts and screws securing the rear body panel; then loosen the gas tank fill hose clamp and remove the cover forward through the ROPS tubes. Seal the fill hose to prevent contamination of gas or vapor escaping.



WC186

6. Remove the cargo box; then disconnect the gasoline hose connector from the fuel pump and separate the fuel pump/level sensor connector.



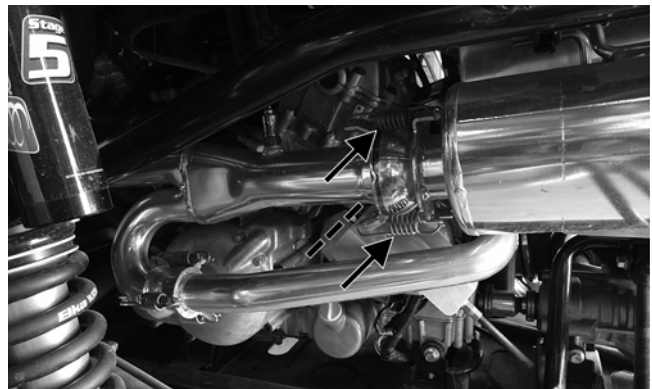
WC179A

7. Disconnect the taillight/brakelight connectors; then carefully pry the wire harness anchors from the cross members. Mark the location of and remove the nylon tie.



WC179B

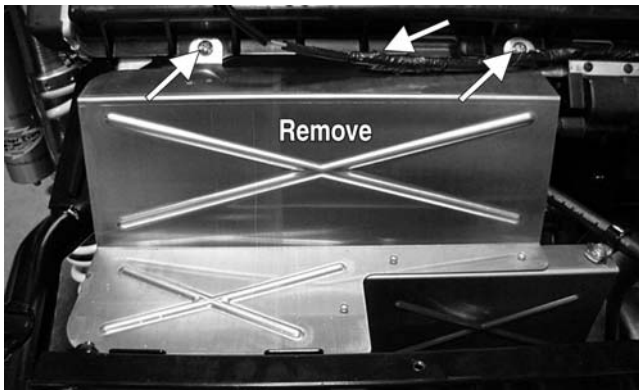
8. Remove the springs from the exhaust pipe to muffler connectors and remove the muffler. Account for the grafoil seal.



WC898A

9. Remove the two cargo box supports; then remove the heat shield leaving the rear coil attached to the radiator assembly.

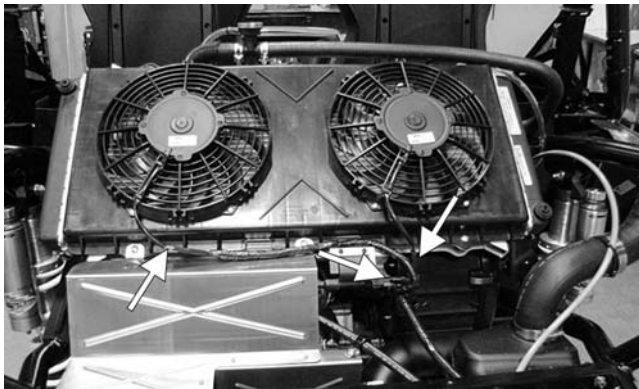




WC352A

10. Remove the gas tank hold-down and gas tank; then remove the gas tank cradle.

11. Disconnect the cooling fan connectors, spark plug wire, and coil primary connector; then clamp off the coolant hoses at the water pump and thermostat outlet. Do not remove the hoses yet.



WC350A

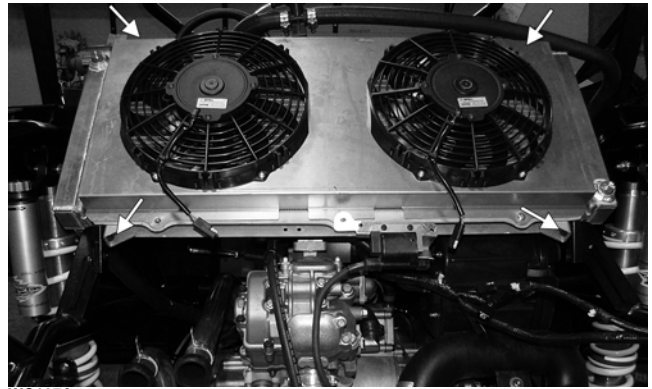


WC192



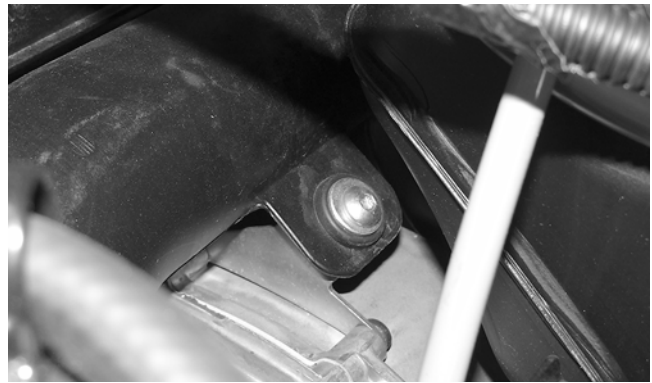
WC193

12. Remove the radiator mounting screws; then disconnect the coolant hoses from the engine and remove the radiator from the vehicle being careful not to release the clamps. Coolant can remain in the radiator.

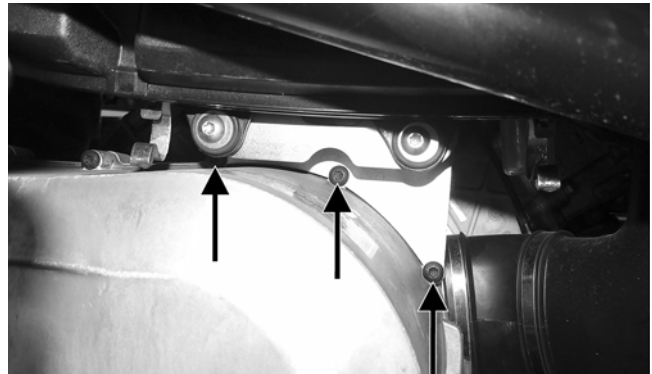


WC197A

13. Remove the CVT cooling outlet duct; then remove the screws securing the air filter mounting bracket to the CVT housing.

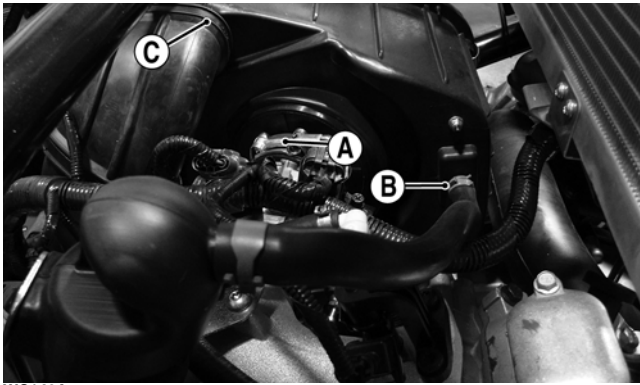


WC935



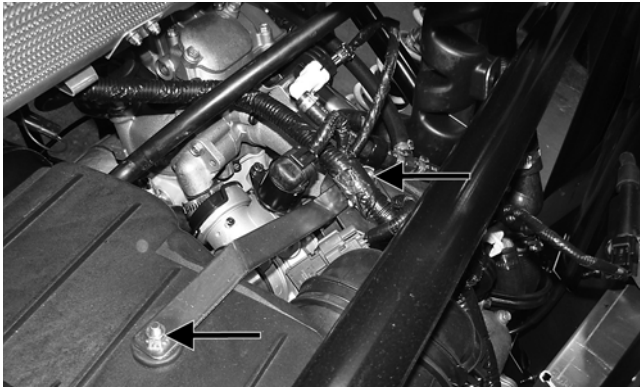
WC934A

14. Loosen the inlet boot (A); then remove the crankcase breather hose (B) and the inlet air duct (C).



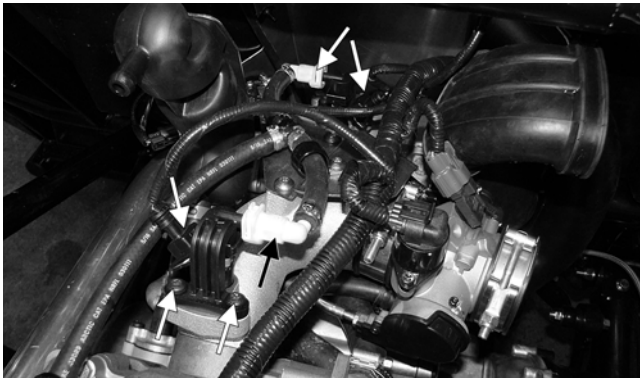
WC146A

15. Remove the air filter housing support bracket; then free the air filter housing from the inlet boot and remove from the vehicle.



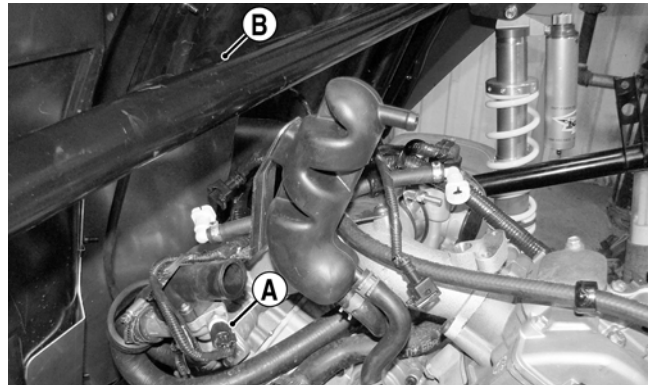
WC365A

16. Disconnect the gas line connectors from the fuel rails and electrical connectors from the injectors; then remove the mounting screws and remove the fuel rails and injectors.



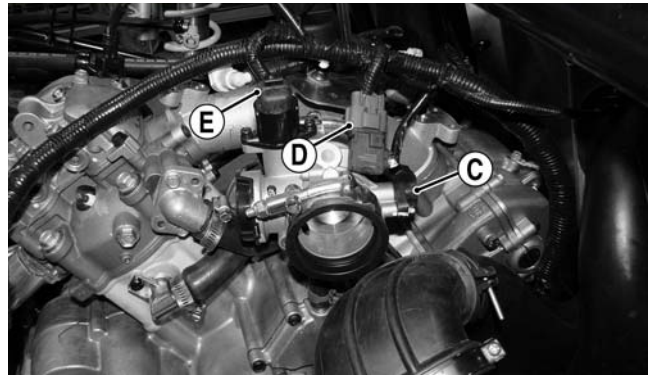
WC203A

17. Remove the ECT connector (A), front coil primary connector (B), TPS connector (C), TMAP connector (D), and ISC connector (E); then tie the engine harness out of the way.



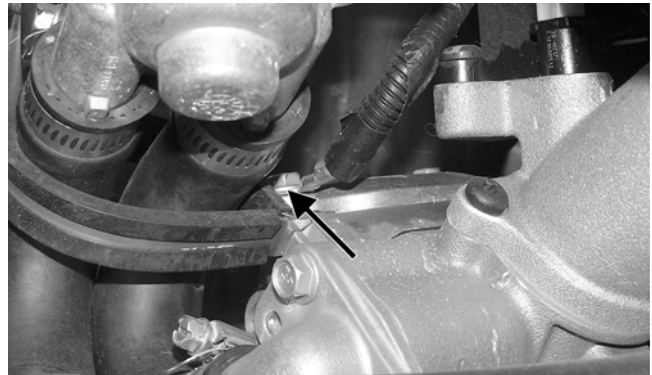
WC204A

18. Remove the engine ground cable.



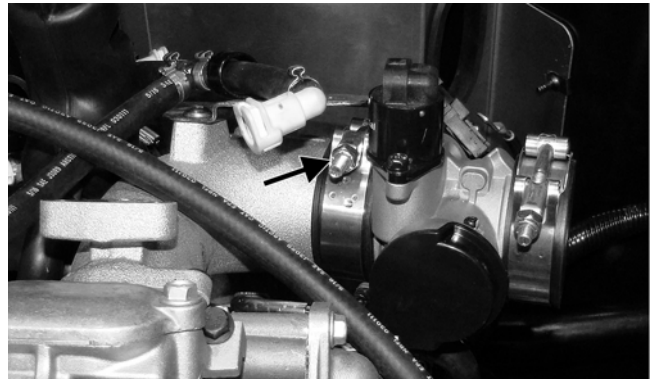
WC206A

18. Remove the engine ground cable.



WC936A

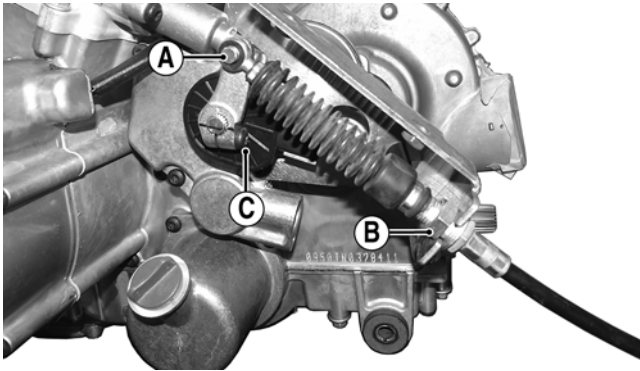
19. Loosen the throttle body boot clamp; then remove the throttle body leaving the throttle cable attached.



WC210A

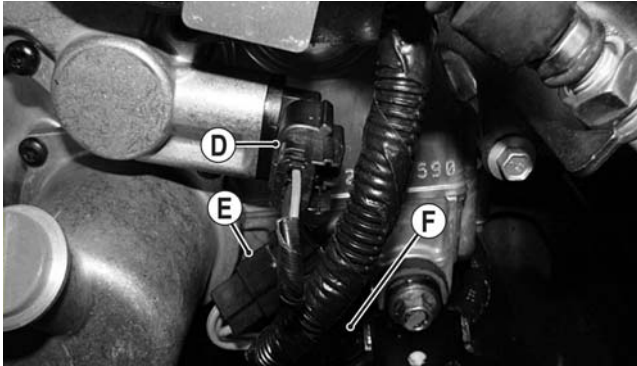
20. With the heat shield removed, remove the E-clip (A); then loosen the jam nut (B) and slide the shift cable out of the mounting bracket and off the shift arm (C).





WC925A

21. Disconnect the speed sensor connector (D), stator connector (E), and crankshaft position sensor (F) and tie the lower harness out of the work space.



WC364A

22. Disconnect the O2 sensor; then remove the exhaust pipes and account for a grafoil gasket.
23. Remove the upper rear lateral link pivot bolt; then drop the link down to allow removal of the rear drive gear case through-bolt.



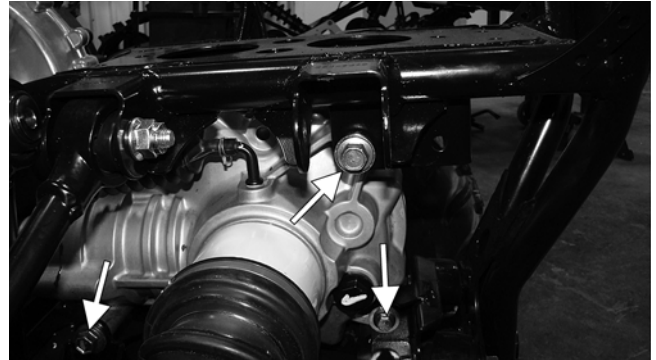
WC169A



WC170

■NOTE: It may be necessary to use a hoist to slightly raise the rear of the vehicle to free the link from the frame weldment.

24. Remove two through-bolts and one cap screw securing the rear drive gear case; then reattach the lateral link and remove the hoist if used.

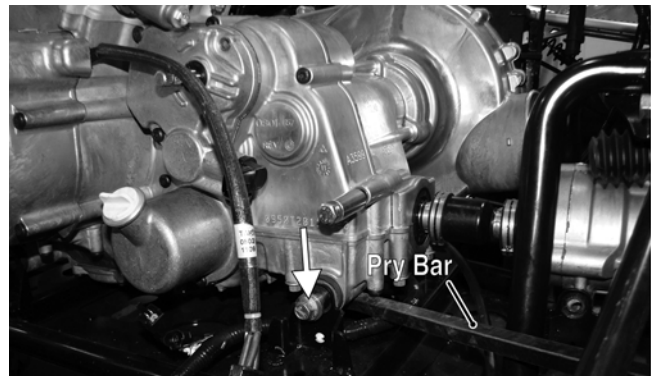


WC170A



WC169A

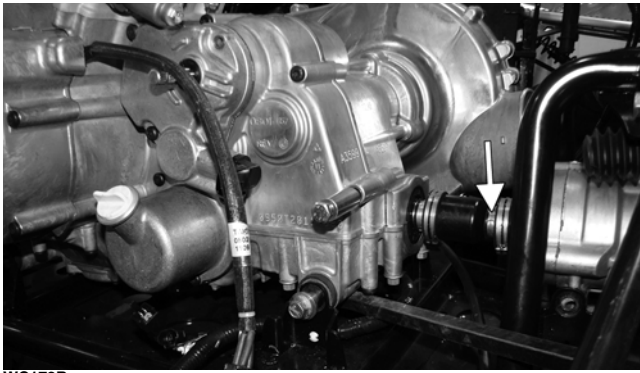
25. Using a suitable engine lift and equalizer sling, support the engine; then remove the engine through-bolts, front first followed by the rear.



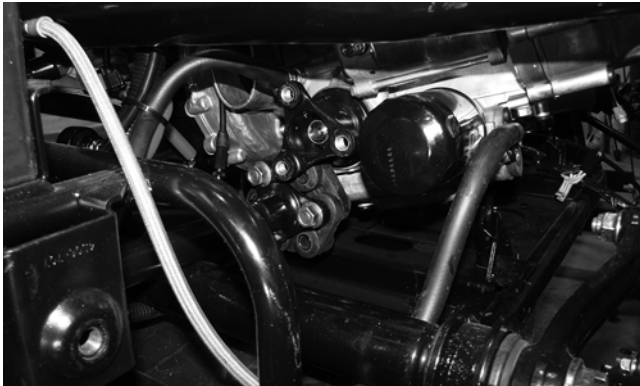
WC172A

26. Remove the rear drive coupler boot; then lift the engine slightly and work the rear drive gear case and engine rearward enough to clear the front drive coupler and drop the driveshaft down.



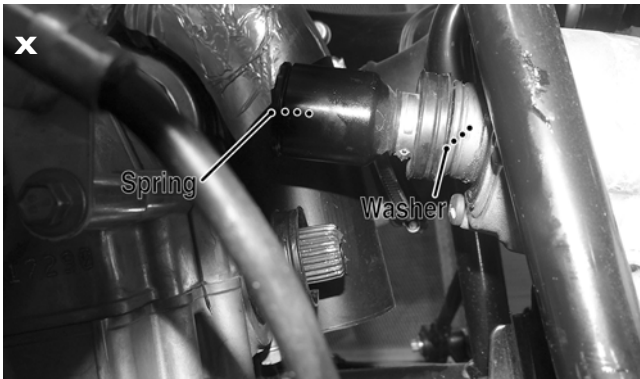


WC172B

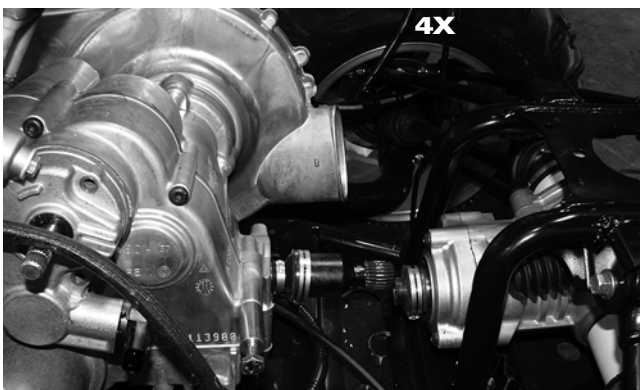


WC174

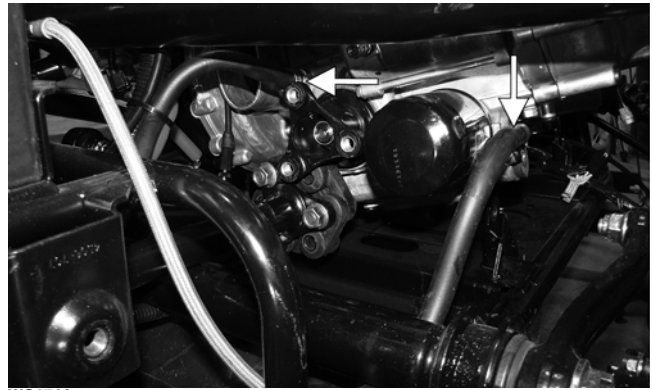
27. Move the engine forward sufficiently to disengage the spline shaft on the rear drive coupler and lift the engine just free of the mounts; then clamp off the oil cooler hoses and disconnect from the engine. Account for the spring.



WC767A



WC173



WC174A

## Top-Side Components

■NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

### AT THIS POINT

To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

■NOTE: The engine/transmission does not need to be removed for this procedure.

## Removing Top-Side Components

### A. Valve Cover/Rocker Arms

### B. Cylinder Head/Camshaft

1. Remove the timing inspection plug, spark plugs, and magneto housing cover; then install the 10 mm cap screw (left-hand threads) in the crankshaft and rotate the desired cylinder to top-dead-center of the compression stroke.



GZ027



GZ026

■NOTE: Timing marks on the rotor/flywheel are stamped with an “F” (front cylinder) and “R” (rear cylinder) adjacent to the mark.

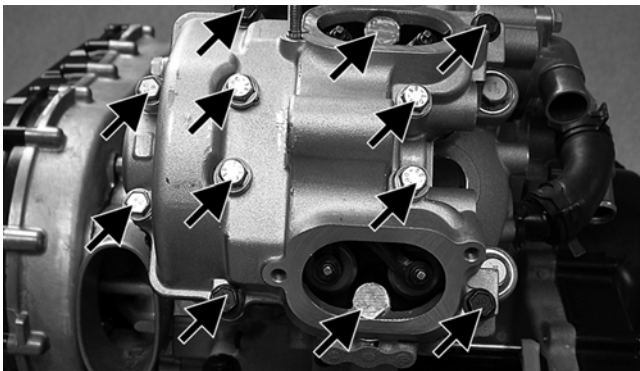


GZ063



GZ059

2. Remove the tappet covers on the cylinder being serviced. The tappets should not have pressure on them.
3. Loosen the cap screws securing the valve cover to the cylinder head.

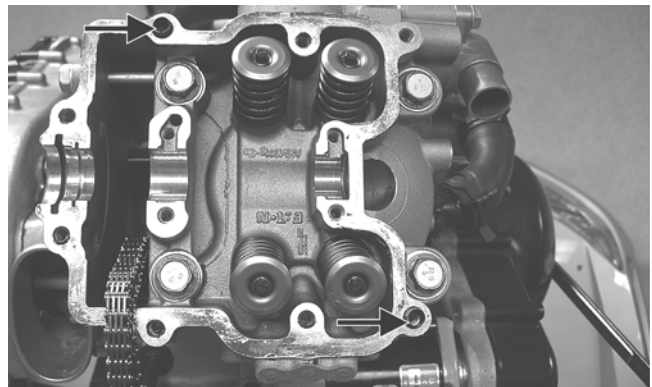


GZ126C

4. Remove all cap screws except the two top-side cap screws next to the spark plug. These will keep the alignment pins in place. Note the two rubber washers on the remaining cap screws.
5. Remove the valve cover. Account for and note the orientation of the cylinder head plug. Note the location of the two alignment pins.



GZ162



GZ132A

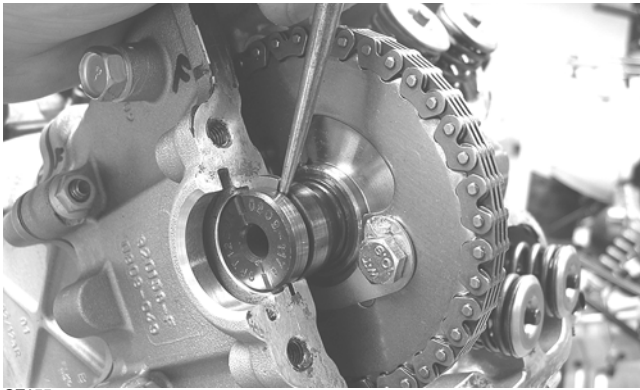
6. Remove the cap screw on the end of the tensioner; then using a flat-blade screwdriver, turn the tensioner clockwise to remove the tension. Remove the two cap screws securing the tensioner adjuster assembly and remove the assembly. Account for a gasket.



GZ405

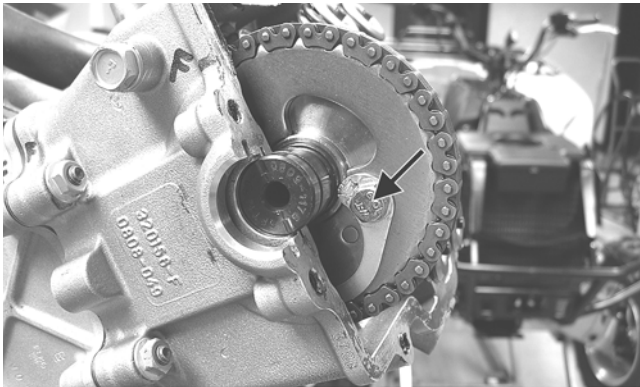
7. Using an awl, rotate the C-ring in its groove until it is out of the cylinder head; then remove the C-ring.

■NOTE: Care should be taken not to drop the C-ring into the crankcase.



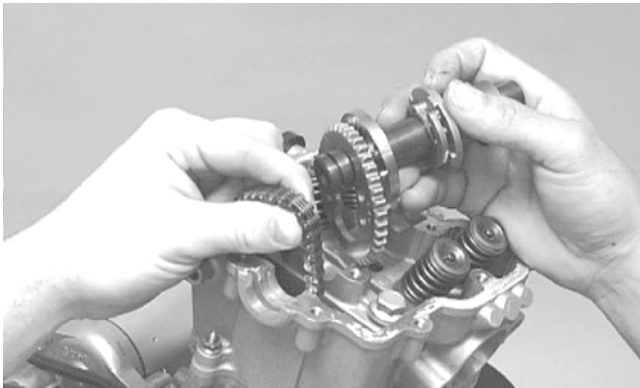
GZ155

8. Bend the washer tabs down and remove the two cap screws securing the sprocket to the camshaft; then drop the sprocket off the camshaft being careful not to drop the locating pin into the engine.



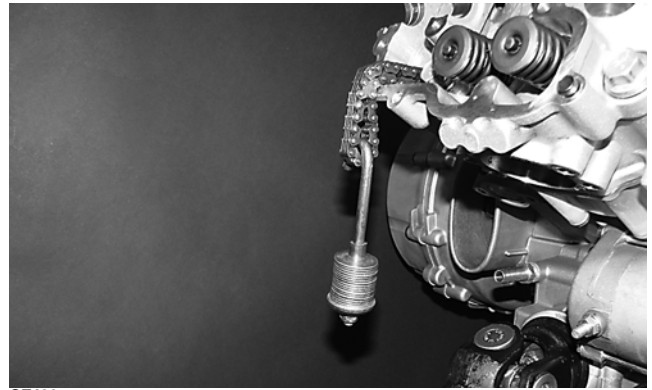
GZ154A

9. While holding the chain, slide the sprocket and camshaft out of the cylinder head.



CC266D

■NOTE: Loop the chain over the cylinder head and secure it to keep it from falling into the crankcase.



GZ408

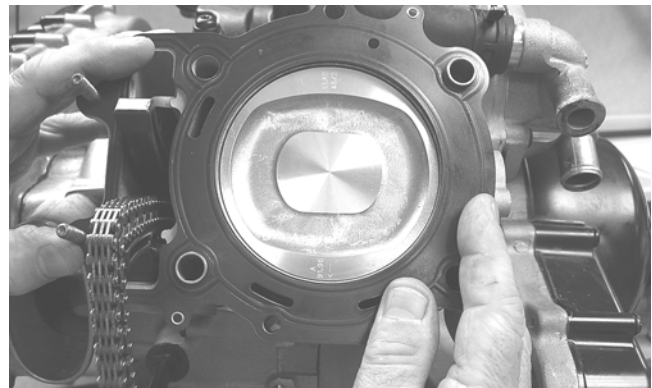
10. Remove the five nuts securing the cylinder head to the cylinder; then remove the four cylinder head cap screws and washers.

■NOTE: Removing the starter will simplify removal of the front cylinder base nuts.



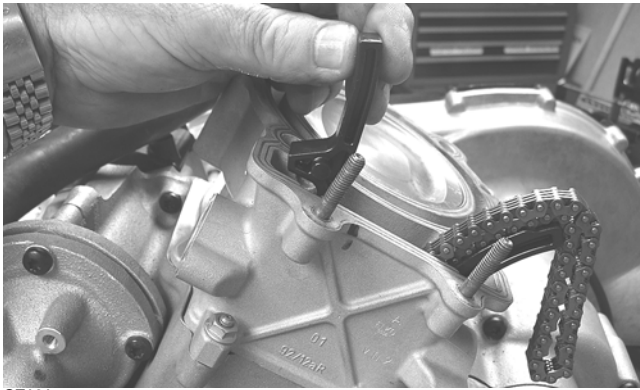
GZ209A

11. Remove the cylinder head from the cylinder, remove the gasket, and account for two alignment pins; then remove the cam chain guide.



GZ151





GZ161

12. If the remaining cylinder head is to be serviced, apply tension to the loose timing chain and rotate the second cylinder to top-dead-center of the compression stroke; then repeat steps 2-11 on the other cylinder head.

**⚠ AT THIS POINT**

To service valves and cylinder head, see Servicing Top-Side Components sub-section.

**⚠ AT THIS POINT**

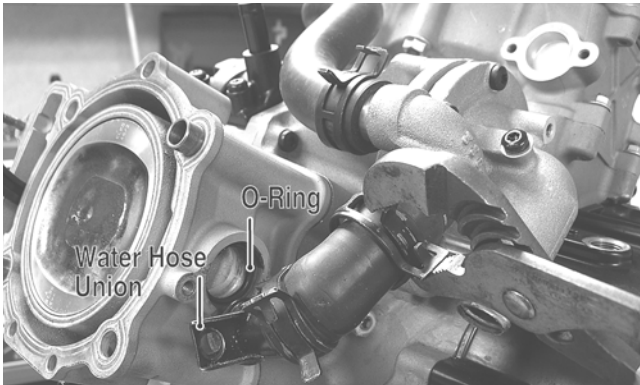
To inspect cam chain guide, see Servicing Top-Side Components sub-section.

**C. Cylinders**

**D. Pistons**

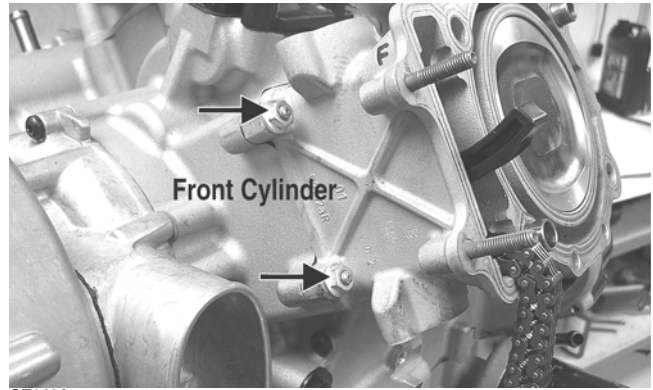
■NOTE: Steps 1-12 in the preceding sub-section must precede this procedure.

13. Remove the cap screws securing the water hose union to the cylinder; then remove the union from the cylinder. Account for an O-ring.

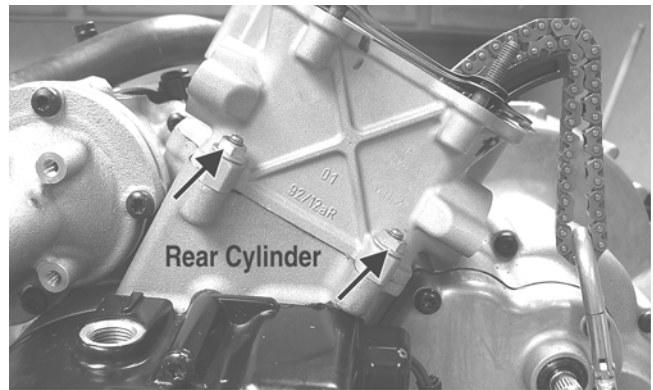


GZ140A

14. Remove the two nuts securing the cylinder to the crankcase.

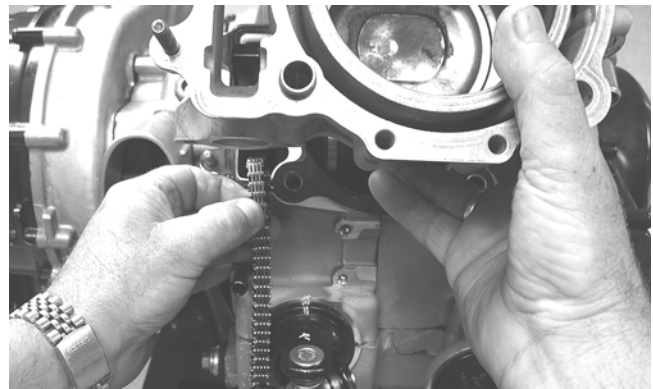


GZ141A



GZ160A

15. Lift the cylinder off the crankcase taking care not to allow the piston to drop against the crankcase. Account for the gasket and two alignment pins.



GZ142



GZ144

**⚠ AT THIS POINT**

To service cylinder, see Servicing Top-Side Components sub-section.

### CAUTION

When removing the cylinder, be sure to support the piston to prevent damage to the crankcase and piston.

16. Using an awl, remove one piston-pin circlip.

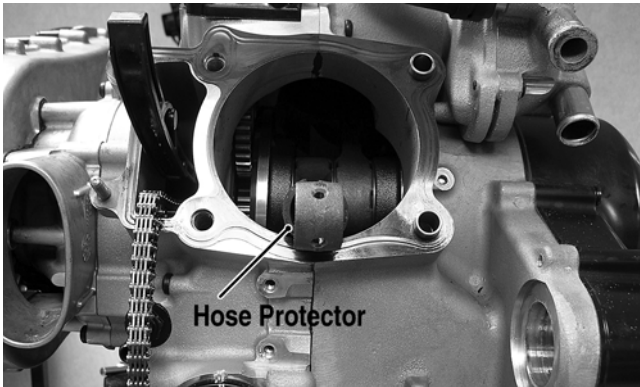


GZ145

17. Using the Piston Pin Puller, remove the piston pin. Account for the opposite-side circlip. Remove the piston.

■NOTE: It is advisable to remove the opposite-side circlip prior to using the puller.

■NOTE: Support the connecting rod with rubber bands or a piece of hose to avoid damaging the rod or install a suitable connecting rod holder.



GZ146A

### CAUTION

Do not allow the connecting rod to go down inside the crankcase. If the rod is down inside the crankcase and the crankshaft is rotated, severe damage will result.

#### AT THIS POINT

To service piston, see Servicing Top-Side Components sub-section.

#### AT THIS POINT

To service center crankcase components only, proceed to Removing Left-Side Components.

## Servicing Top-Side Components

### VALVE ASSEMBLY

When servicing valve assembly, inspect valve seats, valve stems, valve faces, and valve stem ends for pits, burn marks, or other signs of abnormal wear.

■NOTE: Whenever a valve is out of tolerance, it must be replaced.

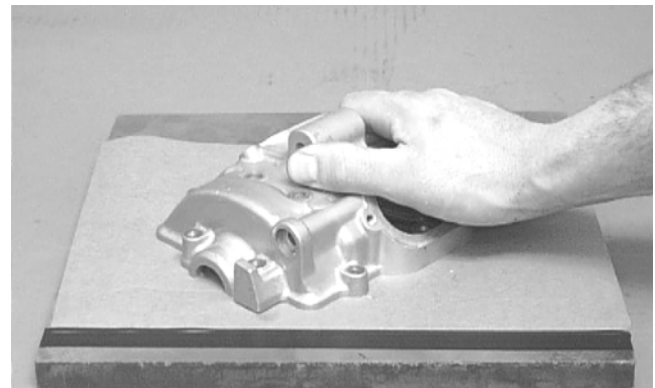
### Cleaning/Inspecting Valve Cover

■NOTE: If the valve cover cannot be trued, the cylinder head assembly must be replaced.

1. Wash the valve cover in parts-cleaning solvent.
2. Place the valve cover on the Surface Plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move the valve cover in a figure eight motion. Inspect the sealing surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the valve cover in a figure eight motion until a uniform bright metallic finish is attained.

### CAUTION

Do not remove an excessive amount of the sealing surface or damage to the camshaft will result. Always check camshaft clearance when resurfacing the valve cover.



CC130D

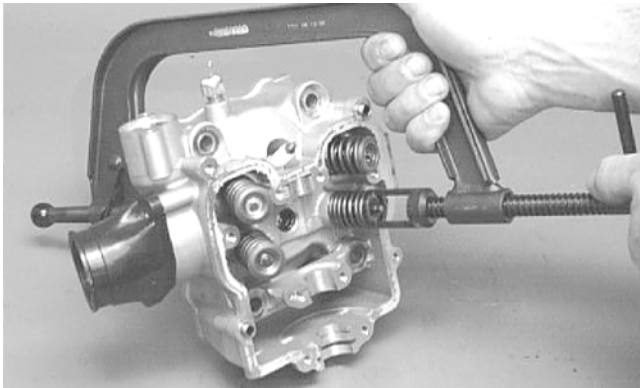
### CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

### Removing Valves

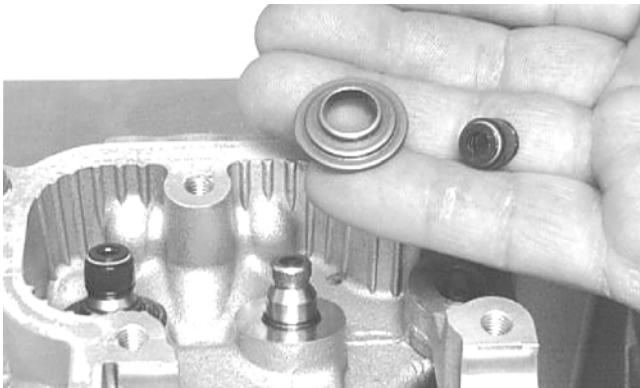
■NOTE: Index all valves, springs, and cotters to their original position when removing. When installing, all valve components should be installed in their original position.

1. Using a valve spring compressor, compress the valve springs and remove the valve cotters. Account for an upper spring retainer.



CC132D

2. Remove the valve seal and the lower remaining spring seat. Discard the valve seal.



CC136D

■NOTE: The valve seals must be replaced.

3. Remove the valve springs; then invert the cylinder head and remove the valves.

### Measuring Valve Guide (Bore)

1. Insert a suitable bore gauge 1/2 way into each valve guide bore and record the measurement.
2. Acceptable inside diameter range must be within specifications.
3. If a valve guide is out of tolerance, it must be replaced.

### Servicing Valves/Valve Guides/Valve Seats

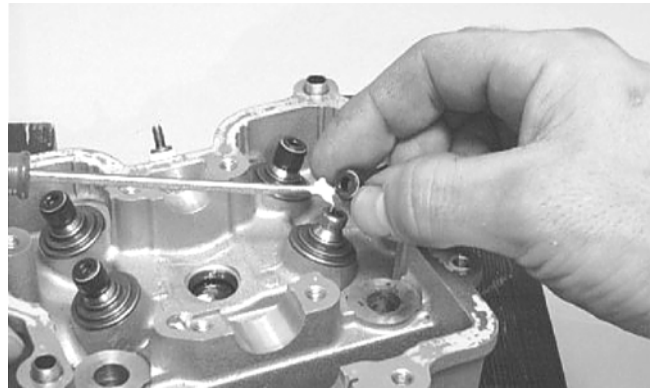
If valves, valve guides, or valve seats require servicing or replacement, Arctic Cat recommends the components be taken to a qualified machine shop for servicing.

### CAUTION

If valves are discolored or pitted or if the seating surface is worn, the valve must be replaced. Do not attempt to grind the valves or severe engine damage may occur.

### Installing Valves

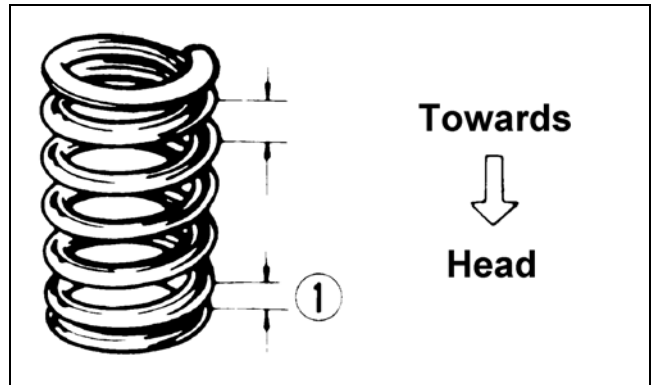
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



CC144D

2. Insert each valve into its original location.
3. Install the valve springs with the painted end of the spring facing away from the cylinder head.

■NOTE: If the paint is not visible, install the ends of the springs with the closest wound coils toward the head.



ATV-1011A

4. Place a spring retainer over the valve springs; then using the valve spring compressor, compress the valve springs and install the valve cotters.

### PISTON ASSEMBLY

■NOTE: Whenever a piston or pin is out of tolerance, it must be replaced.

### Removing Piston Rings

1. Starting with the top ring, slide one end of the ring out of the ring-groove.
2. Remove each ring by working it toward the dome of the piston while rotating it out of the groove.



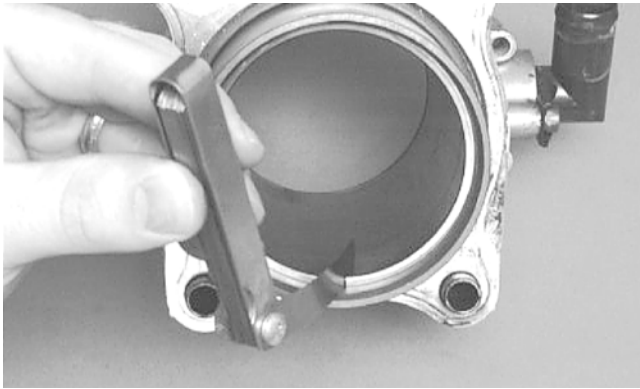
CC400D

## Inspecting Piston

1. Inspect the piston for cracks in the piston pin, dome, and skirt areas.
2. Inspect the piston for seizure marks or scuffing.
3. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

## Measuring Piston-Ring End Gap (Installed)

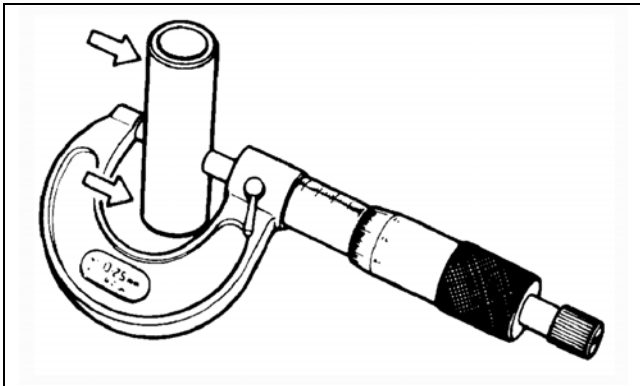
1. Place each compression ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must not exceed specifications.



CC280D

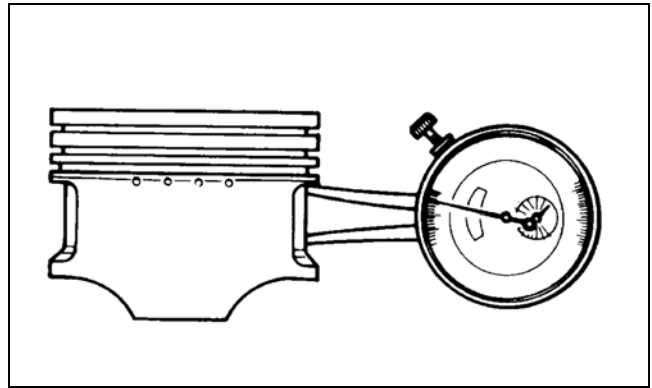
## Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement exceeds specifications, the piston pin must be replaced.



ATV-1070

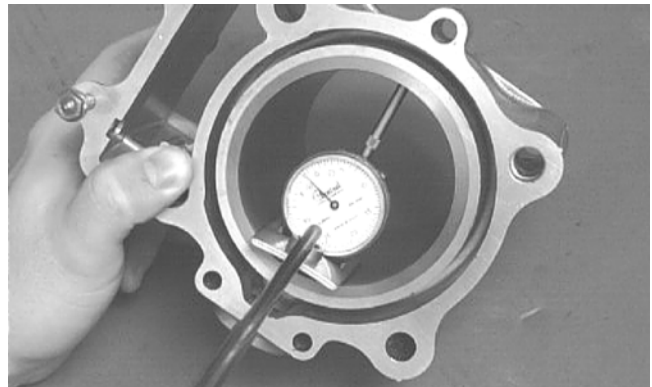
2. Insert an inside dial indicator into the piston-pin bore. The diameter must not exceed specifications. Take two measurements to ensure accuracy.



ATV-1069

## Measuring Piston Skirt/Cylinder Clearance

1. Measure the cylinder front to back in six places.

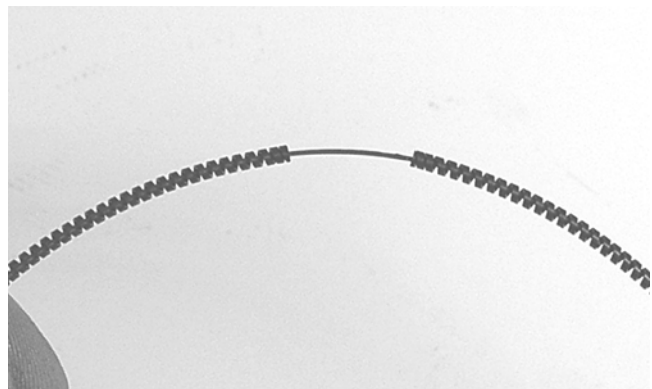


CC127D

2. Measure the corresponding piston diameter at a point 15 mm (0.6 in.) above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the largest measurement in step 1. The difference (clearance) must not exceed specifications.

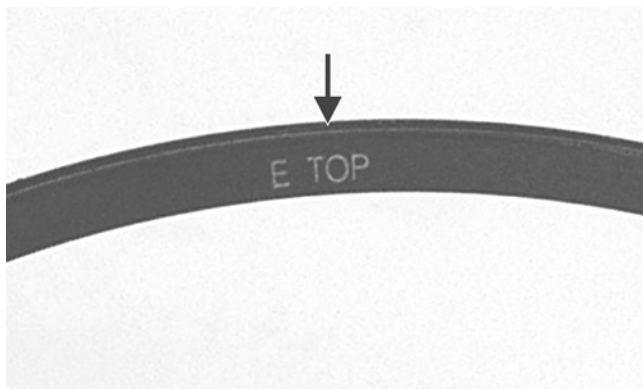
## Installing Piston Rings

1. Install the expander spring making sure the ends are aligned on the wire; then install the oil ring with the ring gap 90° from the spring gap and the marking "E TOP" directed toward the top of the piston.



GZ168





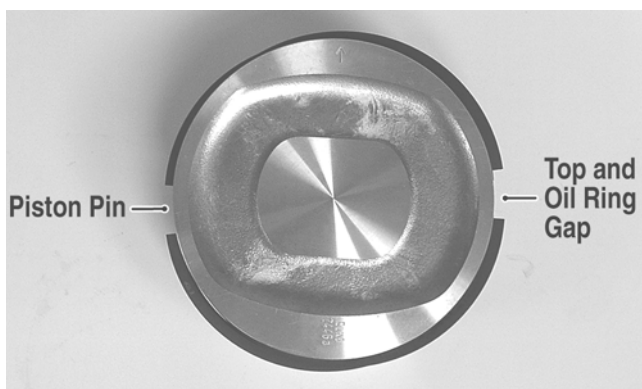
GZ169A

2. Install the second compression ring with the marking "E TOP" directed toward the top of the piston.



GZ167

3. Install the first (unmarked) compression ring; then rotate the rings so the ring gaps are approximately 180° apart and oriented to the piston pin.



GZ187A

### CAUTION

Incorrect installation of the piston rings will result in engine damage.

## CYLINDER/CYLINDER HEAD ASSEMBLY

■NOTE: If the cylinder/cylinder head cannot be trued, they must be replaced as an assembly.

## Cleaning/Inspecting Cylinder Head

### CAUTION

The cylinder head studs must be removed for this procedure.

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the combustion chamber being careful not to nick, scrape, or damage the combustion chamber or the sealing surface.
2. Inspect the spark plug hole for any damaged threads. Repair damaged threads using a "Time-Sert" insert.
3. Place the cylinder head on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move the cylinder head in a figure eight motion. Inspect the sealing surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder head in a figure eight motion until a uniform bright metallic finish is attained.

### CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

## Measuring Cylinder Head Distortion

1. Remove any carbon buildup in the combustion chamber.
2. Lay a straightedge across the cylinder head; then using a feeler gauge, check the distortion between the head and the straightedge.
3. Maximum distortion must not exceed specifications.



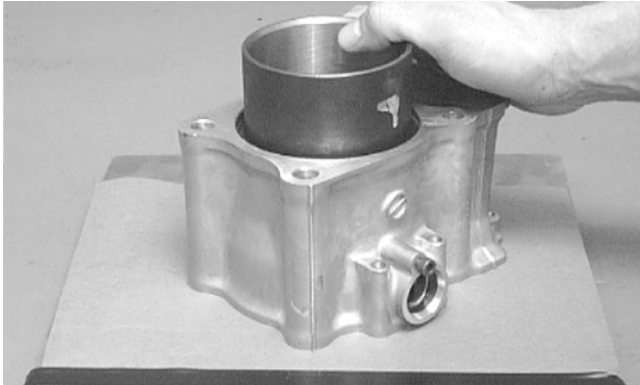
CC141D

## Cleaning/Inspecting Cylinder

1. Wash the cylinder in parts-cleaning solvent.
2. Inspect the cylinder for pitting, scoring, scuffing, warpage, and corrosion. If marks are found, repair the surface using a cylinder hone (see Cleaning/Inspecting Cylinder in this sub-section).
3. Place the cylinder on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move the cylinder in a figure eight motion. Inspect the sealing surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder in a figure eight motion until a uniform bright metallic finish is attained.

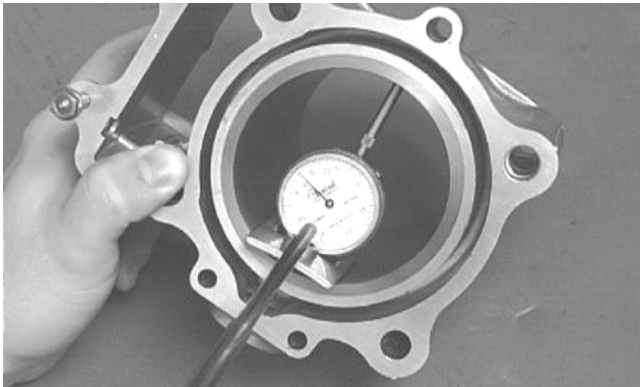
## CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.



CC129D

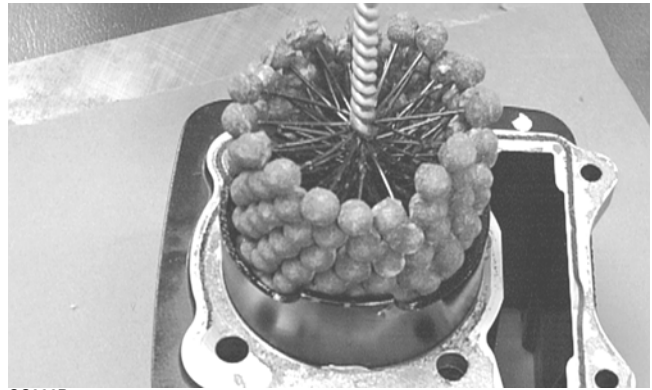
4. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must not exceed specifications.



CC127D

5. Wash the cylinder in parts-cleaning solvent.
6. Inspect the cylinder for pitting, scoring, scuffing, and corrosion. If marks are found, repair the surface using a #320 grit ball hone.

■NOTE: To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately apply oil to the cylinder bore. If the bore is severely damaged or gouged, replace the cylinder.



CC390D

7. If any measurement exceeds the limit, replace the cylinder and piston.

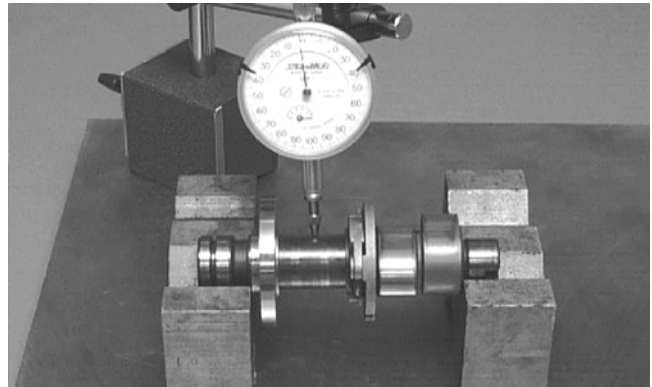
### Inspecting Cam Chain Guide

1. Inspect cam chain guide for cuts, tears, breaks, or chips.
2. If the chain guide is damaged, it must be replaced.

### Measuring Camshaft Runout

■NOTE: If the camshaft is out of tolerance, it must be replaced.

1. Place the camshaft on a set of V blocks; then position the dial indicator contact point against the shaft and zero the indicator.

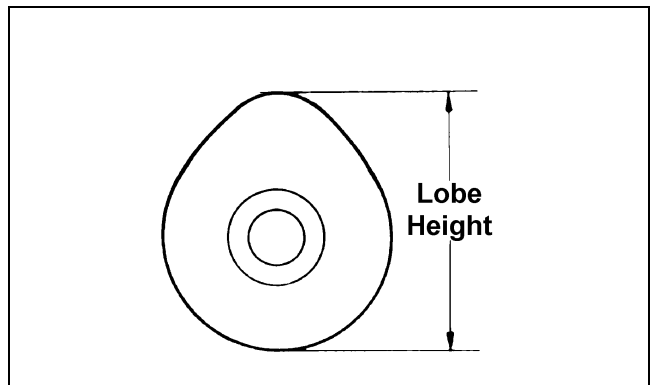


CC283D

2. Rotate the camshaft and note runout; maximum runout must not exceed specifications.

### Measuring Camshaft Lobe Height

1. Using a calipers, measure each cam lobe height.



ATV1013A

2. The lobe heights must be greater than minimum specifications.

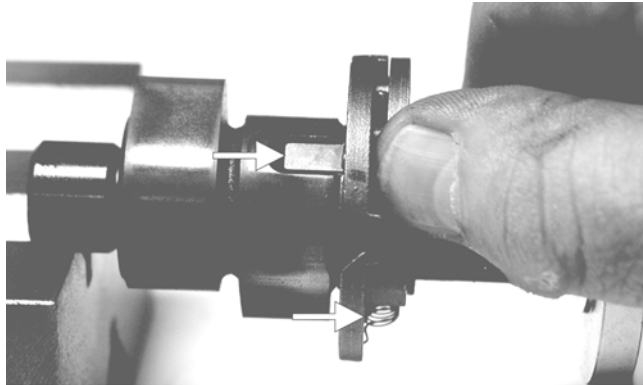
### Inspecting Camshaft Bearing Journal

1. Inspect the bearing journal for scoring, seizure marks, or pitting.
2. If excessive scoring, seizure marks, or pitting is found, the cylinder head assembly must be replaced.

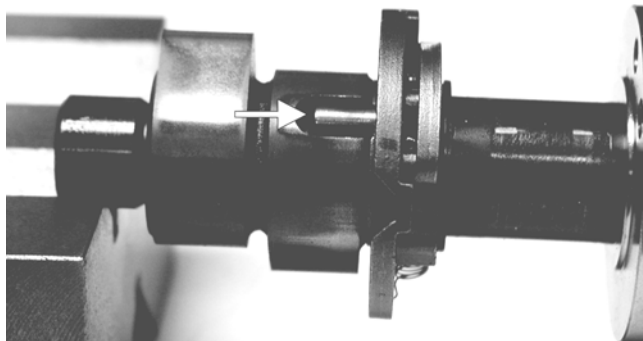
■NOTE: If the journals are worn, replace the camshaft.

### Inspecting Camshaft Spring/Drive Pin (Front Camshaft Only)

1. Inspect the spring and drive pin for damage.



CF061A



CF060A

2. If damaged, the camshaft must be replaced.

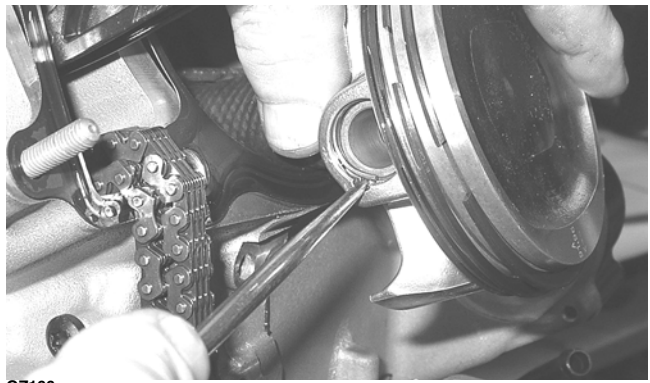
## Installing Top-Side Components

### A. Pistons

### B. Cylinders

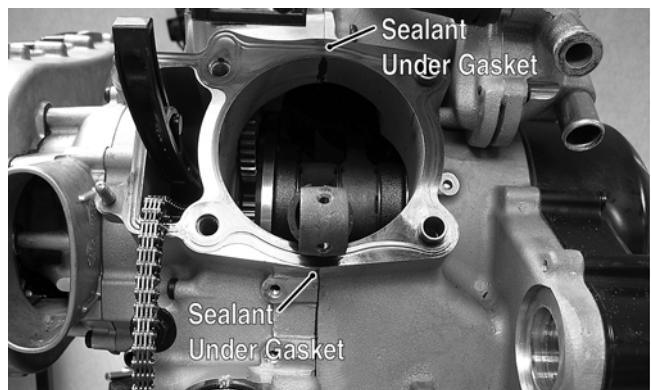
1. Install the piston on the connecting rod making sure the circlip on each side is fully seated in the piston.

■NOTE: The piston should be installed so the arrow points toward the exhaust of the respective cylinder.



GZ166

2. Place the two alignment pins into position. Place the cylinder gasket into position with a drop of silicone sealant at the front and rear crankcase junction; then place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase.



GZ146B



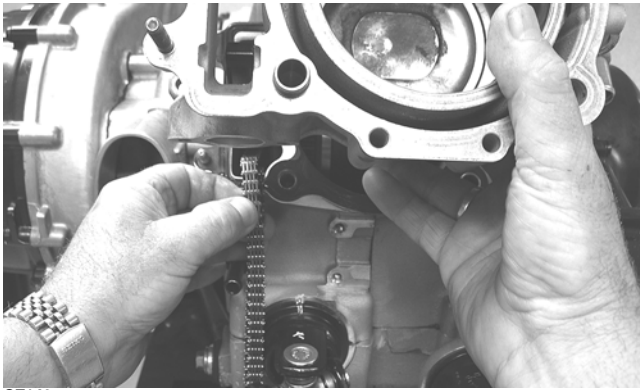
GZ159

3. Lubricate the inside wall of the cylinder; then using a ring compressor, compress the rings and slide the cylinder over the piston. Route the cam chain up through the cylinder cam chain housing; then remove the piston holder and seat the cylinder firmly on the crankcase.

### CAUTION

The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.

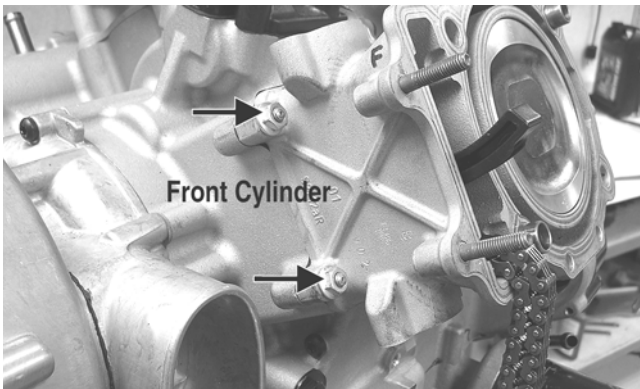




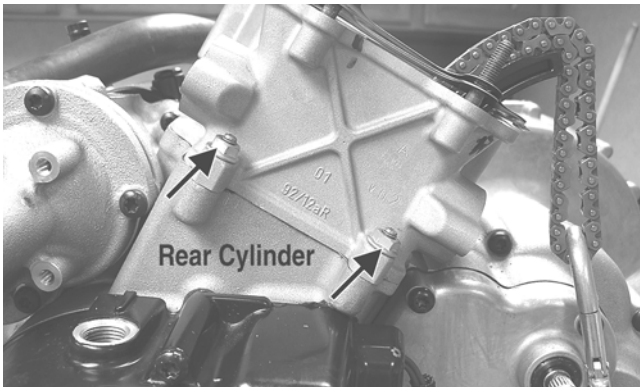
GZ142

4. Loosely install the two nuts securing the cylinder to the crankcase.

■**NOTE:** The two cylinder-to-crankcase nuts will be tightened in step 10.



GZ141A



GZ160A

5. Install the coolant hose onto the crankcase union and tighten the clamp.

### C. Cylinder Head

### D. Valve Cover

■**NOTE:** Steps 1-5 in the preceding sub-section must precede this procedure.

6. Place the chain guide into the cylinder.

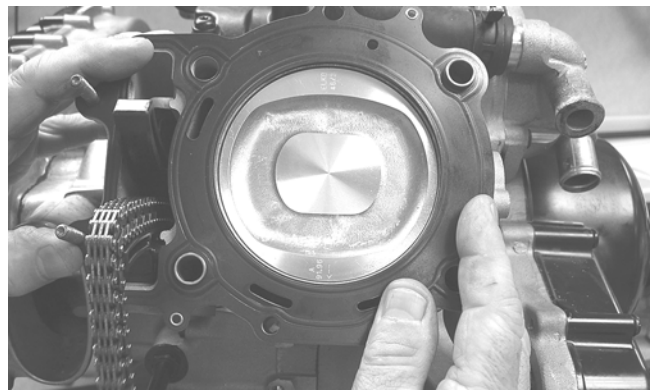
### CAUTION

Care should be taken that the bottom of the chain guide is secured in the crankcase boss.



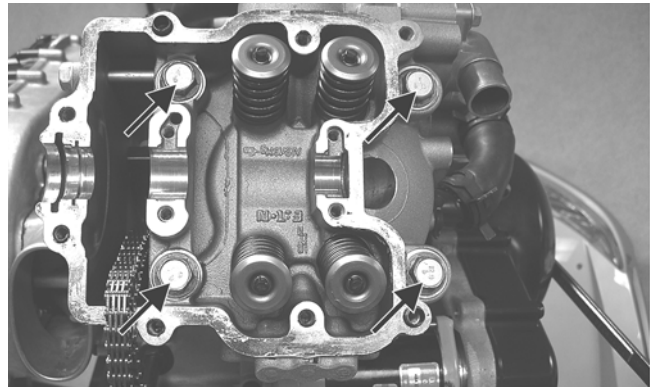
GZ161A

7. Place a new head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder while guiding the cam chain through the cylinder head.



GZ151

8. Install the cylinder head cap screws. Tighten only until snug.



GZ132B

9. Loosely install the five cylinder head nuts.
10. In a crisscross pattern, tighten the four cylinder head cap screws (from step 8) initially to 20 ft-lb; then increase to 30 ft-lb, and finally to 37 ft-lb. Tighten the 8 mm nut (from step 9) to 21 ft-lb; then using a crisscross pattern, tighten the 6 mm nuts (from step 9) to 8.5 ft-lb. Tighten the two cylinder-to-crankcase nuts (from step 4) to 21 ft-lb.

■**NOTE:** If both cylinders have been removed, repeat steps 1-10 for the remaining cylinder.

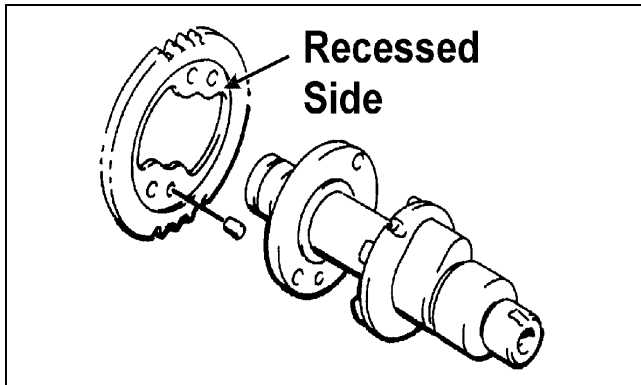


11. With the timing inspection plug removed and the front chain held tight, use a cap screw to rotate the crankshaft until the front piston is at TDC indicated by timing mark F.

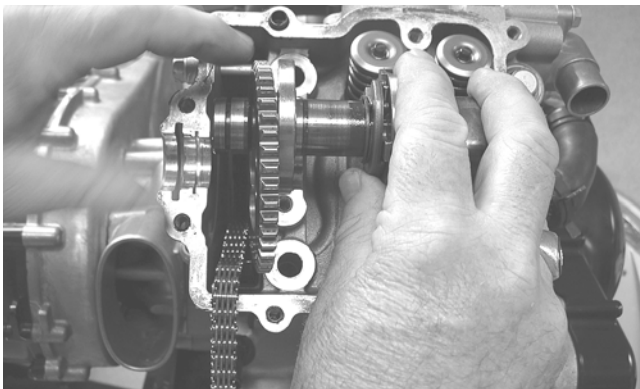


GZ063

12. With the alignment pin installed in the front camshaft, loosely place the cam sprocket (with the recessed side facing the cam shaft lobes) onto the camshaft. At this point, do not “seat” the sprocket onto the shaft.



732-307B

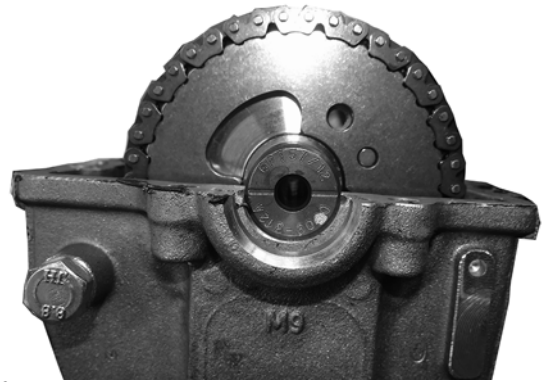


GZ130

■NOTE: At this point, oil the camshaft bearings, cam lobes, and the three seating journals on the cylinder.

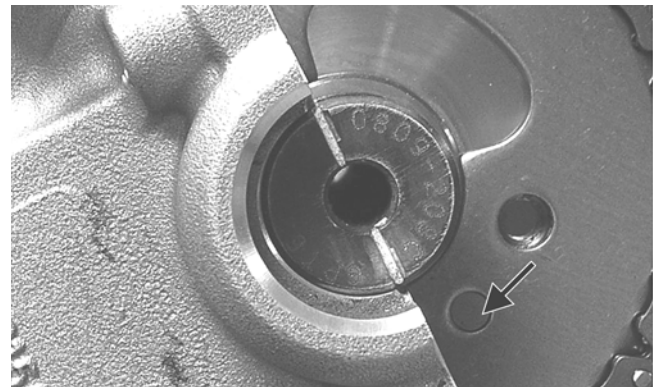
13. With the cam lobes directed down (toward the piston), maneuver the camshaft/sprocket assembly through the chain and towards its seating position; then loop the chain over the sprocket.

■NOTE: Note the position of the alignment marks on the end of the camshaft. They must be parallel to the valve cover mating surface. If rotating the camshaft is necessary for alignment, rotate the sprocket inside the chain until the alignment pin can be engaged in the sprocket with the camshaft properly aligned to the head.



GZ519

14. Seat the cam sprocket onto the camshaft making sure the alignment pin in the camshaft aligns with the smallest hole in the sprocket; then place the camshaft/sprocket assembly onto the cylinder ensuring the following.



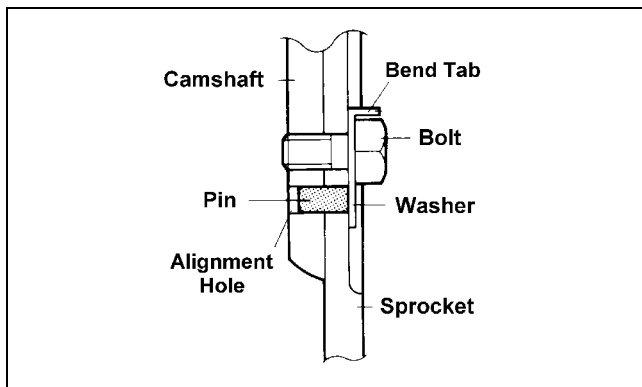
GZ190B

- A. Piston still at top-dead-center.
- B. Camshaft lobes directed down (toward the piston).
- C. Camshaft alignment marks parallel to the valve cover mating surface.
- D. Recessed side of the sprocket directed toward the cam lobes.
- E. Camshaft alignment pin and sprocket alignment hole (smallest) are aligned.

### CAUTION

If any of the above factors are not as stated, go back to step 11 and carefully proceed.

15. Place a new tab-washer onto the sprocket making sure it covers the pin in the alignment hole.

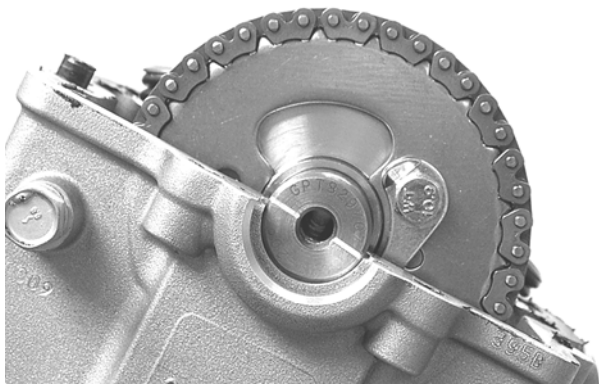


ATV1027

### CAUTION

Care must be taken that the tab-washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.

16. Install the first cap screw (threads coated with red Loctite #271) securing the sprocket and tab-washer to the camshaft. Tighten only until snug.

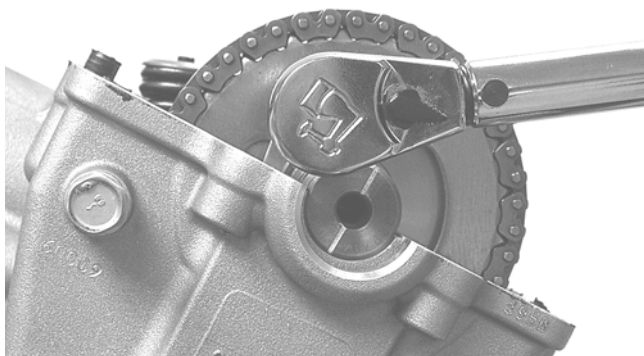


GZ195

17. Keeping tension on the opposite cam chain, rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw (threads coated with red Loctite #271) and tighten to 10 ft-lb. Bend the tab to secure the cap screw.

### CAUTION

Failure to keep tension on any loose cam chain may cause severe engine damage.



GZ193

18. Rotate the crankshaft until the first cap screw (from step 16) can be tightened; then tighten to 10 ft-lb. Bend the tab to secure the cap screw.

### AT THIS POINT

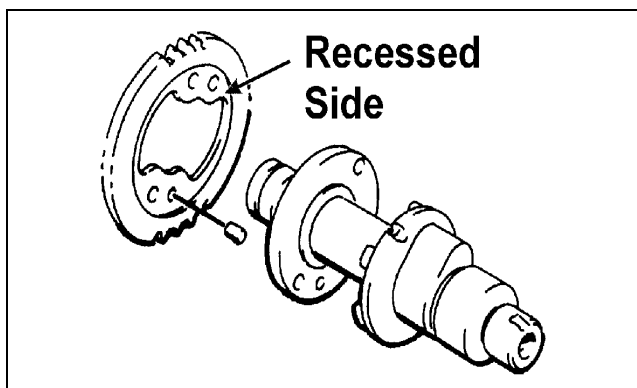
Return the engine to TDC on the front cylinder making sure the cam lobes are directed downward to ensure correct starting point for step 19.

19. Keeping tension on the rear cam chain, rotate the engine forward 270° until rear piston is at TDC indicated by timing mark R.

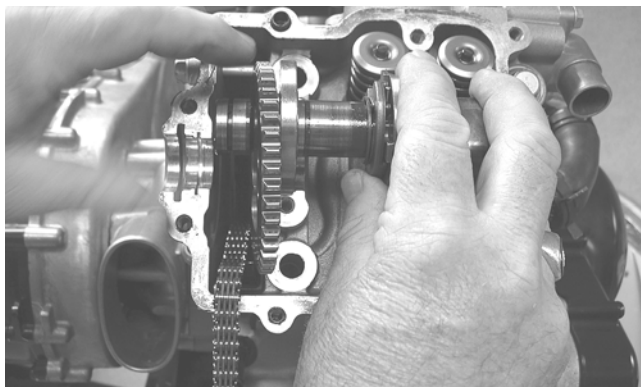


GZ059

20. With the alignment pin installed in the rear camshaft, loosely place the cam sprocket (with the recessed side facing the cam shaft lobes) onto the camshaft. At this point, do not "seat" the sprocket onto the shaft.



732-307B



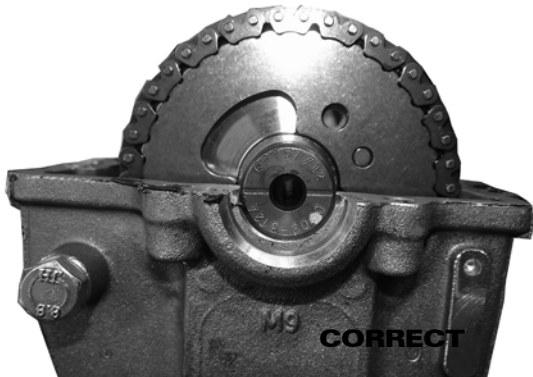
GZ130

■NOTE: At this point, oil the camshaft bearings, cam lobes, and the three seating journals on the cylinder.

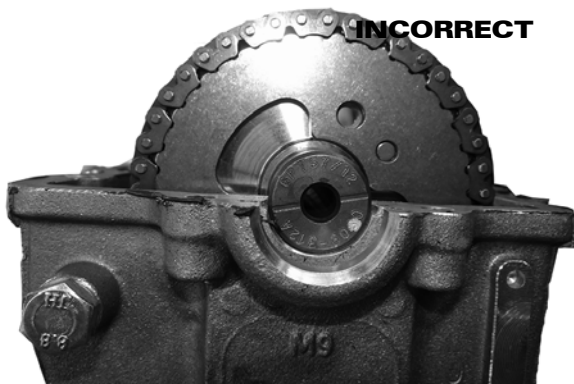


21. With the cam lobes directed down (toward the piston), maneuver the camshaft/sprocket assembly through the chain and towards its seating position; then loop the chain over the sprocket.

■**NOTE:** Note the position of the alignment marks on the end of the camshaft. They should be parallel with the plane of the cylinder head. If rotating the camshaft is necessary for alignment, rotate the sprocket inside the chain until the alignment pin can be engaged in the sprocket with the camshaft in the nearest possible position to parallel.

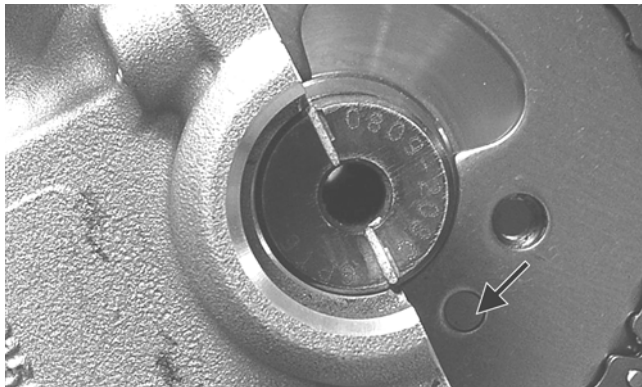


GZ519



GZ518

22. Seat the cam sprocket onto the camshaft making sure the alignment pin in the camshaft aligns with the smallest hole in the sprocket; then place the camshaft/sprocket assembly onto the cylinder ensuring the following.



GZ190B

- Piston still at top-dead-center.
- Camshaft lobes directed down (toward the piston).
- Camshaft alignment marks parallel to the valve cover mating surface.

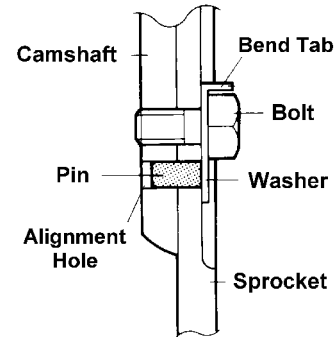
- D. Recessed side of the sprocket directed toward the cam lobes.

- E. Camshaft alignment pin and sprocket alignment hole (smallest) are aligned.

### CAUTION

If any of the above factors are not as stated go back to step 19 and carefully proceed.

23. Place tab-washer onto the sprocket making sure it covers the pin in the alignment hole.

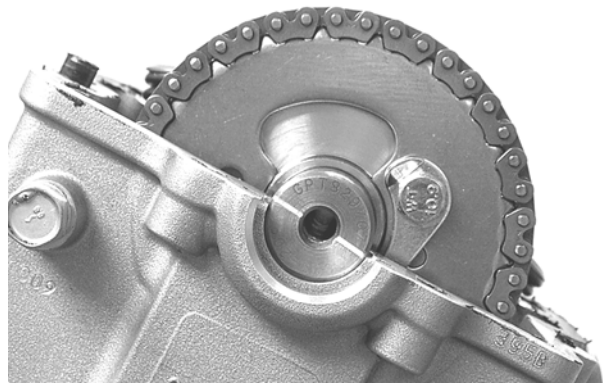


ATV-1027

### CAUTION

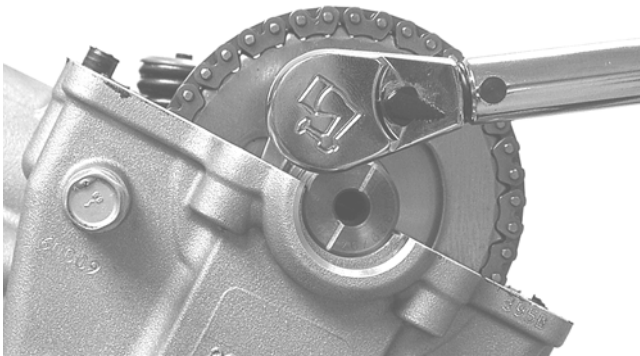
Care must be taken that the tab-washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.

24. Install the first cap screw (threads coated with red Loctite #271) securing the sprocket and tab-washer to the camshaft. Tighten only until snug.



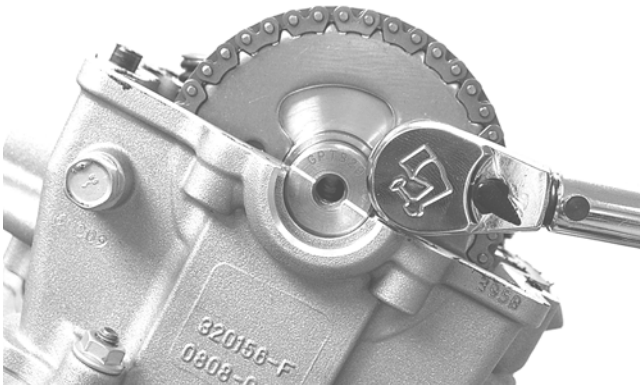
GZ195

25. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw (threads coated with red Loctite #271) and tighten to 10 ft-lb. Bend the tab to secure the cap screw.



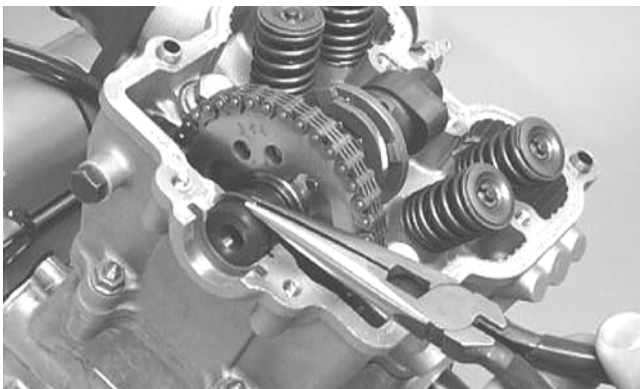
GZ193

26. Rotate the crankshaft until the first cap screw (from step 24) can be addressed; then tighten to 10 ft-lb. Bend the tab to secure the cap screw.



GZ194

27. Place the C-rings into position in their grooves in the cylinder heads.

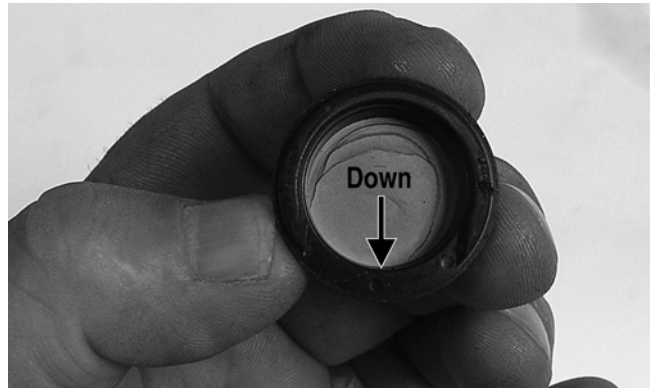


CC012D

28. Install the cylinder head plugs in the cylinder heads with the open end facing downward and toward the inside.

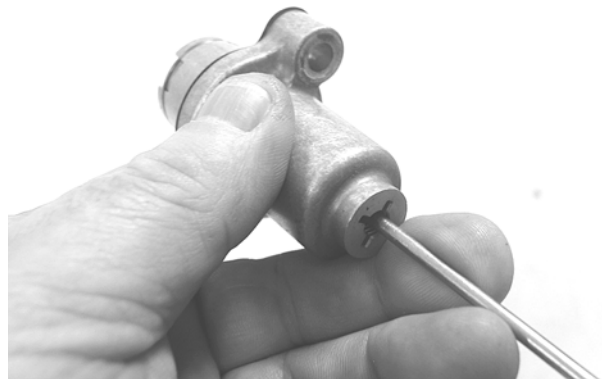
### CAUTION

The open end of the plug must be positioned downward.



GZ162A

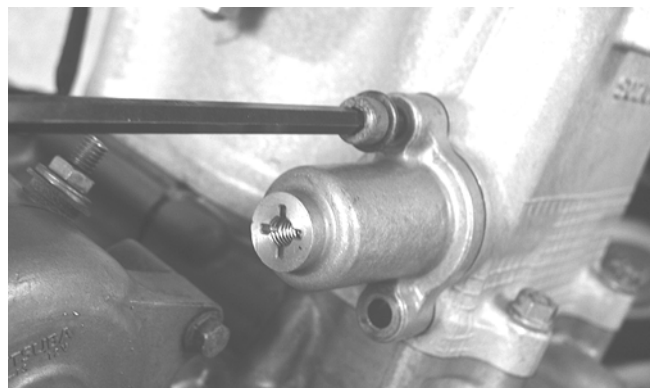
29. Remove the cap screw from the end of the chain tensioner; then using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner clockwise until the screw bottoms and the adjuster shaft is held in place.



CD501

■NOTE: The adjuster shaft will be drawn into the tensioner as the adjuster screw is rotated clockwise. The adjuster shaft tension will be released in step 31.

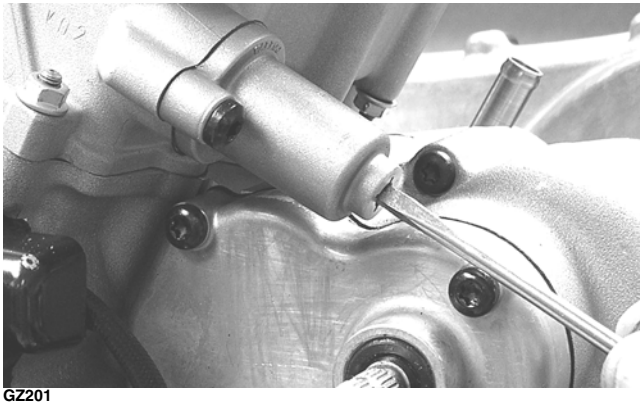
30. Place the chain tensioner adjuster assembly and gasket into position on the cylinder and secure with the two cap screws.



CD469

31. Using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner counterclockwise until the tensioner spring bears tension; then remove the screw driver to apply tension to the cam chain. Install the cap screw into the end of the chain tensioner.



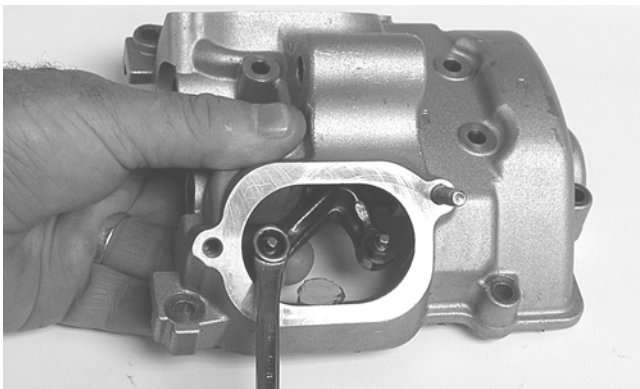


GZ201



CD471

32. Loosen the four adjuster screw jam nuts; then loosen the four adjuster screws on the rocker arms in the valve cover.



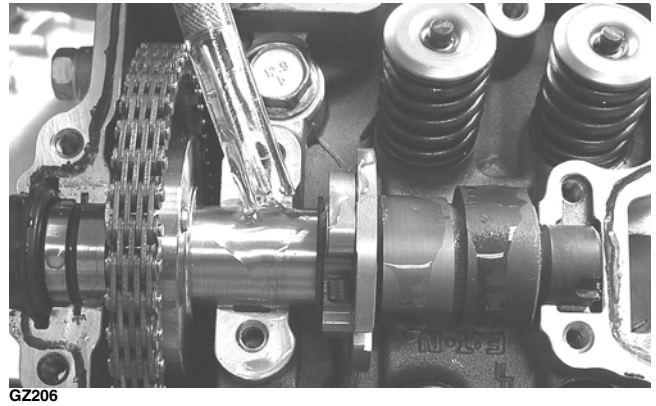
GZ199

33. Apply a thin coat of Three Bond Sealant to the mating surfaces of the cylinder heads; then smooth the sealant into an even coating on the surfaces.



GZ533

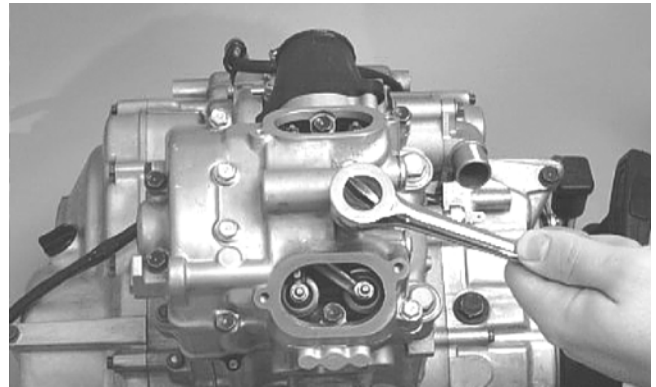
34. Lubricate the camshaft journals and lobes with engine oil; then place the valve cover into position.



GZ206

■NOTE: At this point, the rocker arms and adjuster screws must not have pressure on them.

35. Install the valve cover cap screws with rubber washers; then install the remaining cap screws. Tighten only until snug.



CC003D

36. In a crisscross pattern starting from the center and working outward, tighten the cap screws on both valve covers to 8.5 ft-lb.
37. Adjust valve/tappet clearance (see Periodic Maintenance/Tune-Up).
38. Place the tappet covers into position on the valve cover making sure the O-rings are properly installed. Tighten the cap screws to 8.5 ft-lb.



GZ208

39. Install the spark plugs and timing inspection plug; then remove the cap screw from the crankshaft and install the crankcase end cap.

■NOTE: Apply grease to the end cap to aid in installation.

## Left-Side Components

■NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

### AT THIS POINT

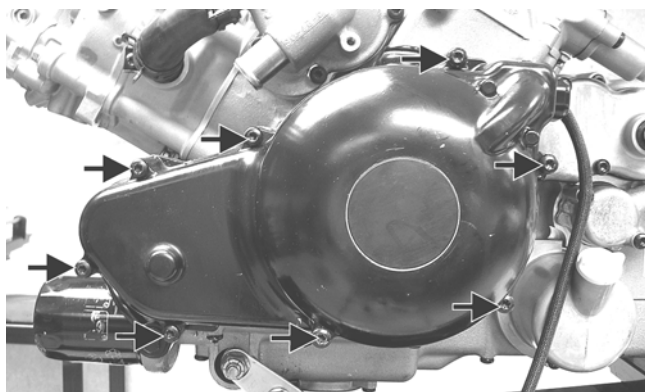
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

■NOTE: The engine/transmission does not have to be removed from the frame for this procedure.

## Removing Left-Side Components

- A. Magneto Cover/Stator Coils**
- B. Water Pump**
- C. Shifter Assembly**
- D. Rotor/Flywheel/Starter Clutch**
- E. Speed Sensor/Trigger Assembly**

1. Remove the cap screws securing the magneto cover to the crankcase; then remove the magneto cover. Account for the gasket.

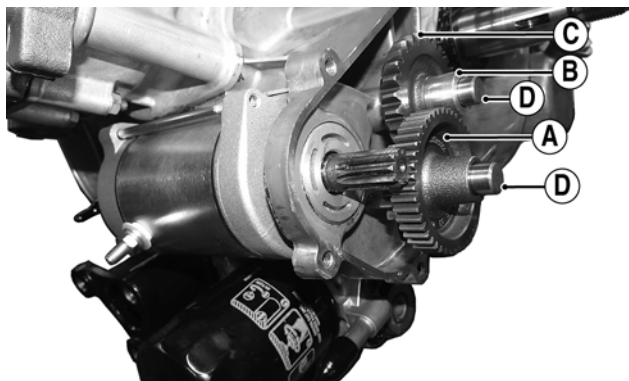


GZ212A

### AT THIS POINT

To replace stator coils/crankshaft position sensor, see Electrical System.

2. Remove the starter motor, starter driven gear (A), starter countershaft bushing (B), and starter countershaft gear (C); then remove the starter gear shafts (D) noting the longer shaft is nearest the starter.



WC917A

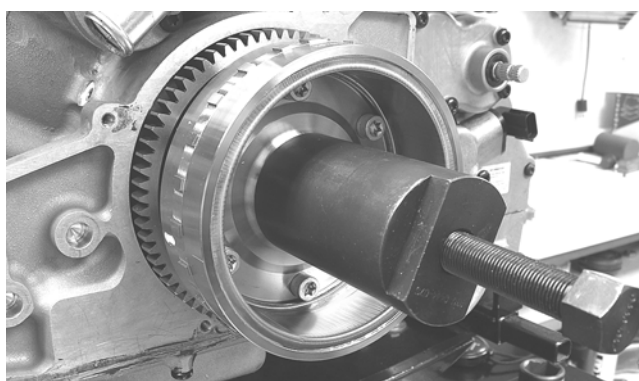
■NOTE: The starter is not serviceable and must be replaced as a complete assembly.

3. Remove the rotor/flywheel nut; then install the appropriate crankshaft protector into the crankshaft.



H2-018

4. Install Magneto Rotor Remover Set and loosen the rotor/flywheel; then remove the crankshaft protector and rotor/flywheel from the crankshaft. Account for the flywheel key.



GZ216



GZ217

5. With the flywheel key removed, remove the starter ring-gear and spacer washer.

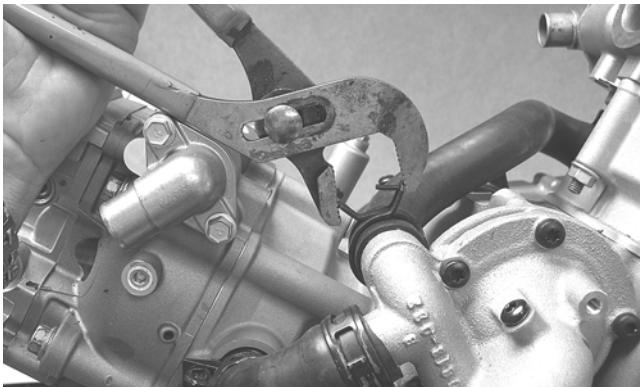


GZ226



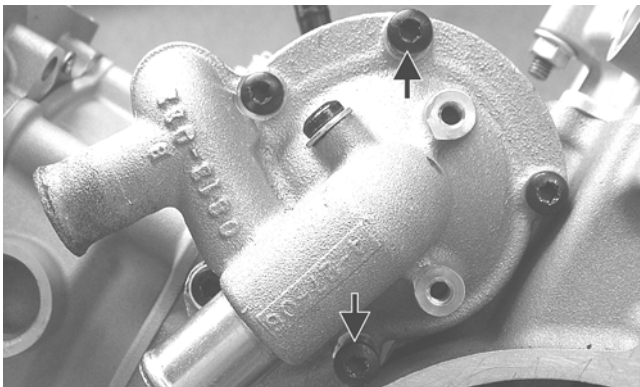
GZ249

6. Remove the hose clamps from the water pump; then remove the coolant hoses from the water pump outlets and coolant pipes.



GZ218

7. Remove the two cap screws securing the water pump to the crankcase.

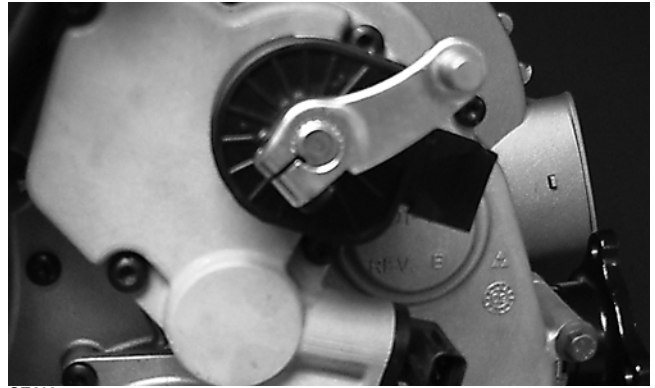


GZ230A

8. Remove the water pump. Account for an O-ring.

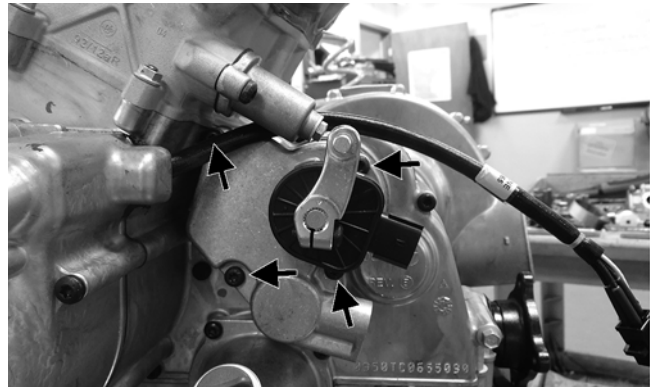
■NOTE: The water pump is a non-serviceable component and must be replaced as a complete assembly.

9. Make match marks on the shift arm and shift shaft for installing purposes; then remove the cap screw, shift select arm, and gear position switch from the shift shaft.



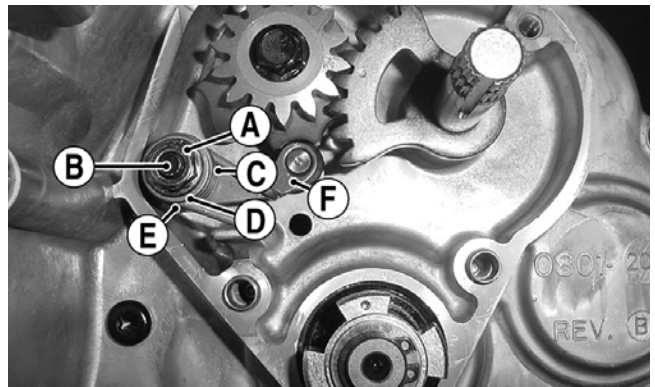
GZ416

10. With the heat shield removed, remove the cap screws securing the gear shift cover to the crankcase; then remove the gear shift cover. Account for a gasket and dowel pins.



H2-013A

11. Remove the nut (A) from the shift cam stopper support (B); then remove the cam stopper spring (C). Account for a flat washer (D), cam stopper (F), and shim (E).



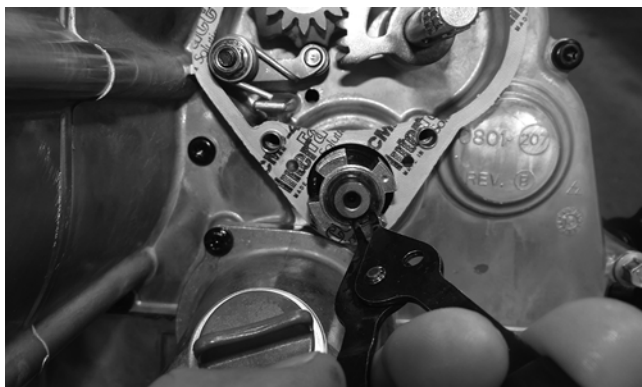
H2-019C

12. Remove the cap screw securing the shift cam plate to the shift cam shaft and remove the shift cam plate; then remove the shift shaft.



H2-022A

13. Remove the snap ring securing the speed sensor trigger to the shaft; then remove the thrust washer. Remove the trigger using a suitable "two-jawed" puller. Account for a gasket.



H2-023

14. Remove the cap screws securing the oil filler cover to the crankcase; then remove the cover. Account for an O-ring.



GZ250

## Servicing Left-Side Components

### INSPECTING STARTER CLUTCH/GEAR

1. Place the starter clutch gear onto the rotor/flywheel and attempt to rotate the starter clutch gear clockwise. It should lock up to the rotor/flywheel. Rotate the gear counterclockwise and it should turn freely. If it moves or locks up both ways, the starter clutch must be replaced.

2. Inspect the starter clutch gear for chipped or missing teeth or discoloration/scoring of the clutch surface. Inspect the bearing for loose, worn, or discolored rollers. If bearing is damaged, it must be replaced.



FI569

3. Inspect the one-way bearing for chipped surfaces, missing rollers, or discoloration. If any of the above conditions exist, replace the starter clutch assembly.



FI572

### REPLACING STARTER CLUTCH ASSEMBLY

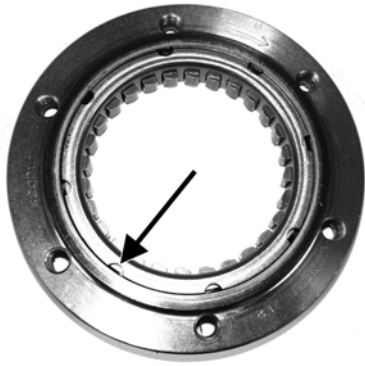
1. Remove the cap screws securing the one-way clutch assembly to the flywheel; then remove from the flywheel.



FI570

2. Thoroughly clean the rotor/flywheel; then install the new starter one-way clutch and secure with the cap screws after applying a drop of red Loctite #271 to the threads. Tighten to 26 ft-lb using a crisscross pattern. Make sure the one-way bearing is installed with the notches directed away from the rotor/flywheel.





FI576A



FI578

### REPLACING STARTER GEAR BEARING

1. Support the starter clutch gear in a press making sure to support the hub around the entire circumference; then using a suitable bearing driver, press the bearing from the gear.



FI583

2. Thoroughly clean the gear hub; then apply a drop of green Loctite #620 to the bearing outer race and press into the gear hub until even with the lower chamfer radius.



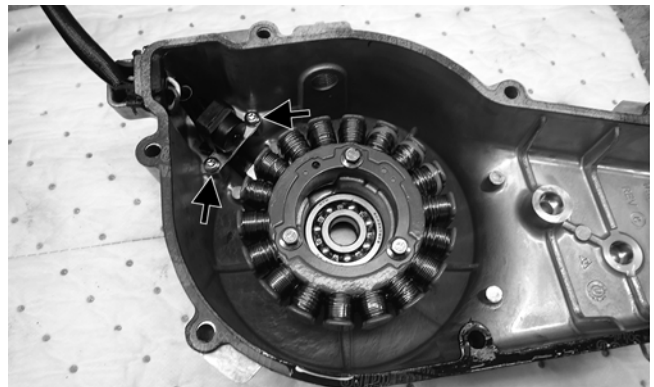
FI580

### INSPECTING STATOR COIL/ MAGNETO COVER ASSEMBLY

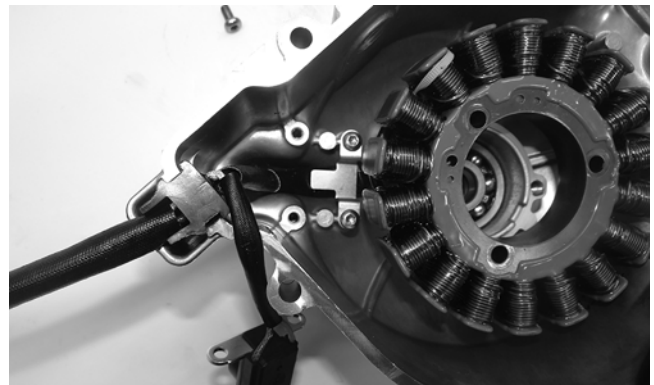
1. Inspect the stator coil for burned or discolored wiring, broken or missing hold-down clips, or loose cap screws.
2. Inspect the bearings in the magneto housing for discoloration, roughness when rotated, and secure fit in bearing bores.

### REPLACING STATOR COIL/ CRANKSHAFT POSITION SENSOR

1. Remove the three cap screws securing the stator coil, two cap screws securing the crankshaft position sensor, and two cap screws from the harness hold-down.
2. Lift the rubber grommet out of the housing; then remove the stator coil/crankshaft position sensor. Account for and note the position of the harness hold-down under the crankshaft position sensor.

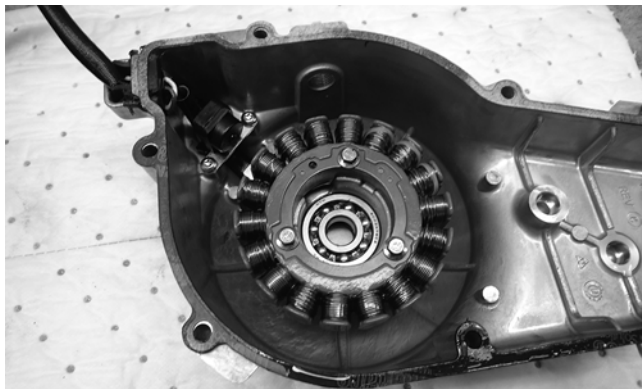


H2-017A



H2-027

3. Install the new stator coil assembly and secure with three cap screws using a drop of red Loctite #271 on each. If installing the existing magneto cover, tighten the cap screws to 13 ft-lb. If installing a new magneto cover, tighten the cap screws to 15 ft-lb.
4. Place the stator wire harness hold-down into position; then install the crankshaft position sensor and secure with two cap screws. Tighten securely.
5. Install the upper cable hold-down and secure with two cap screws. Tighten securely.



H2-017

## Installing Left-Side Components

1. Thoroughly clean all gasket material and sealant from mating surfaces.
2. Install a new O-ring on the oil filler cover and coat it with clean engine oil; then install the oil filler cover into the crankcase and secure with the cap screws. Tighten to 8 ft-lb.

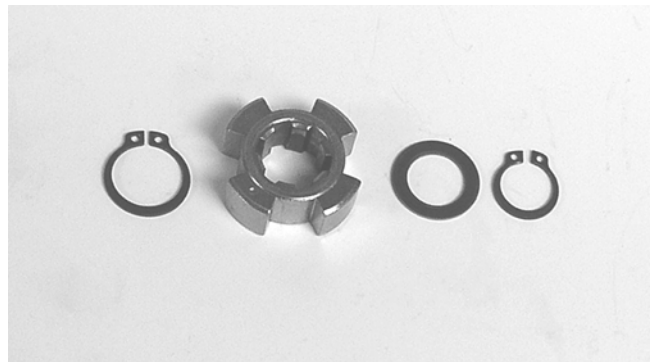


GZ250

3. Clean the countershaft and trigger splines thoroughly and install the inner snap ring onto the shaft; then apply green Loctite #620 to the trigger and countershaft splines and install the trigger. Secure with a flat washer and outer snap ring.

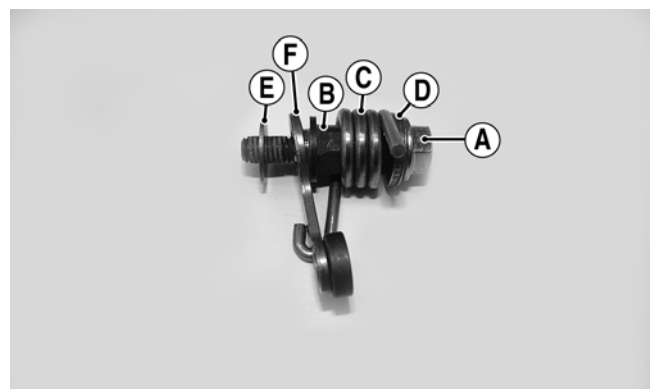


H2-023

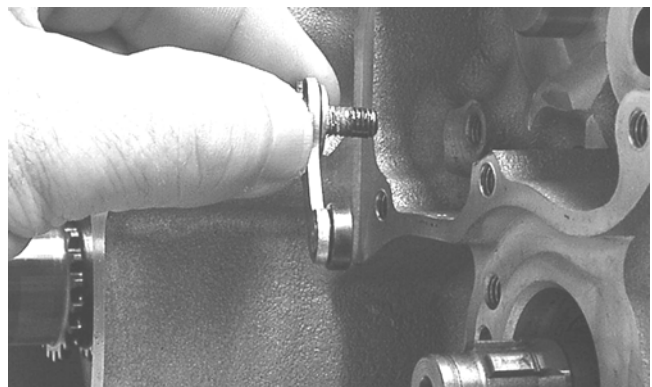


GZ254

4. If removed, install the shim (E) and cam stopper (F); then with the cam stopper support (B) in place, install the spring (C), washer (D), and nut (A). Tighten to 8 ft-lb.



FW-017B



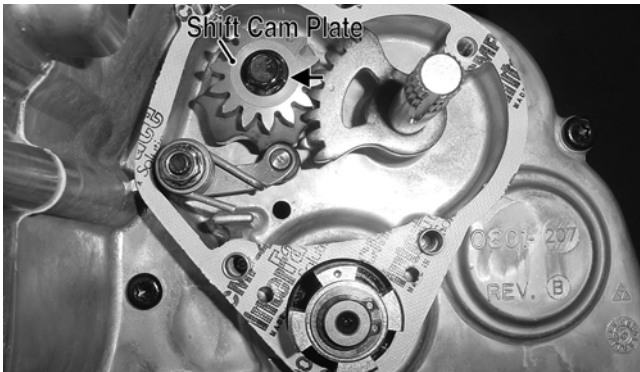
GZ256

5. Install the shift cam stopper spring onto the shift cam stopper and secure with a flat washer and flange nut. Tighten to 8 ft-lb.



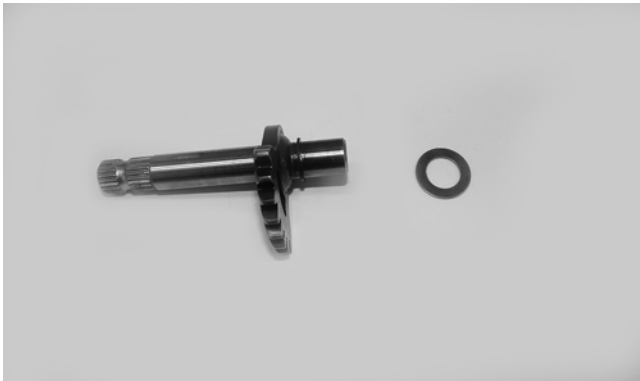
H2-019

6. Install the shift cam plate onto the shift cam shaft and secure with the cap screw. Tighten to 8 ft-lb.



H2-022A

7. Install the shift shaft into the crankcase making sure the washer is properly located; then align the timing reference marks and completely seat the shift shaft.



FW-019



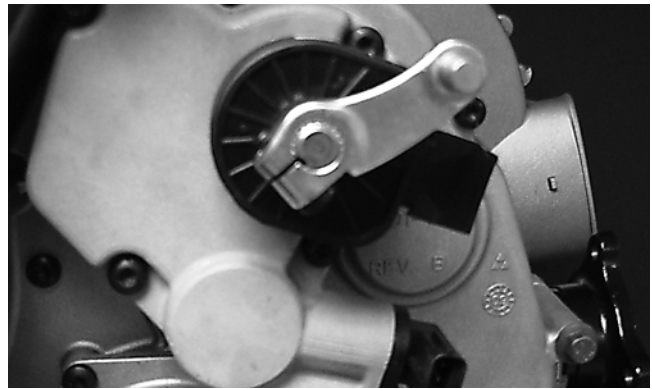
H2-026

8. Apply grease to the lips of the shift shaft seal in the shifter housing; then using a new gasket, install the dowel pins and shifter housing and secure with the cap screws. Tighten in a crisscross pattern to 8 ft-lb.



H2-020

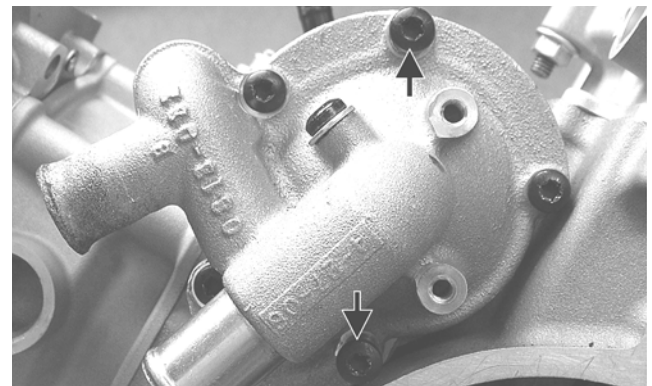
9. Install the gear position switch; then align and install the shift select arm to the shift shaft using the match marks as a guide.



GZ416

10. Install the heat shield; tighten the fasteners to 20 ft-lb.

11. With the O-ring lightly coated with grease and properly positioned, install the water pump. Secure using the two existing cap screws.



GZ230A

■NOTE: The longer cap screw goes on the top of the water pump.

12. Install the coolant hoses and secure with the hose clamps.

13. Install the spacer washer on the crankshaft; then install the starter ring gear.

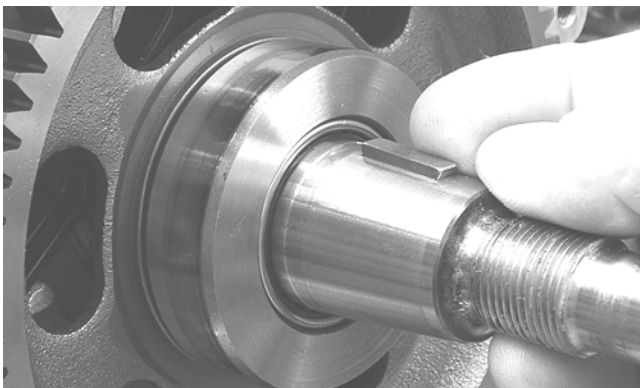


GZ249



GZ226

14. Place the key into the keyway in the crankshaft; then wipe all oil from the crankshaft surface and rotor/flywheel bore and install the rotor/flywheel onto the crankshaft aligning the keyway with the key. Secure with the nut (coated with red Loctite #271) tightened to 105 ft-lb.

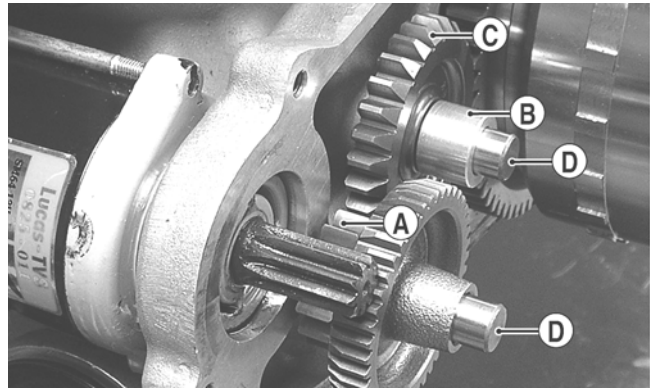


GZ225

### CAUTION

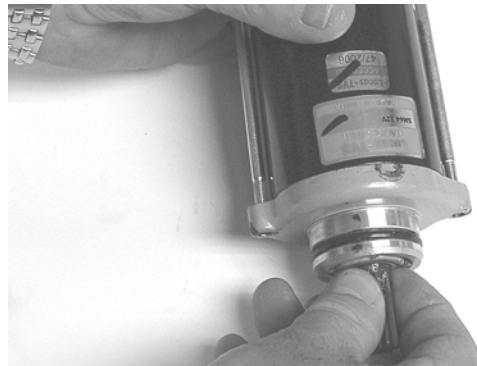
Make sure the one-way starter clutch is properly engaged with the starter ring gear before installing and tightening the rotor/flywheel nut or damage to the clutch assembly could occur.

15. Install the starter driven and counter gear shafts (D) into the crankcase (longer shaft to the front); then install the starter countershaft gear (C), starter driven gear (A), and bushing (B) making sure the chamfered gear teeth on the countershaft gear are directed outward.



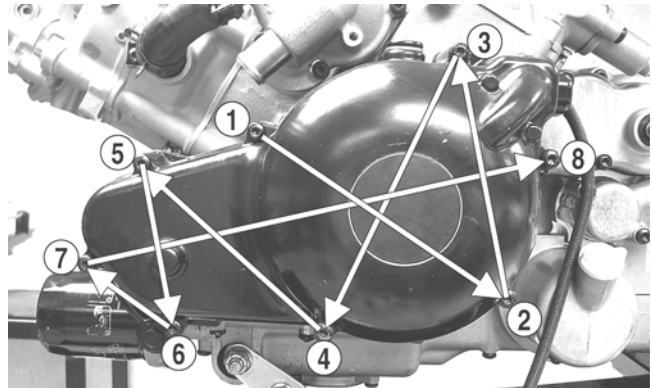
GZ224A

16. Install the starter motor with a new O-ring lightly lubricated with grease; then tighten the mounting cap screws to 8 ft-lb.



GZ251

17. Using Seal Protector Tool, install the outer magneto cover using a new gasket and secure with the cap screws. Using the pattern shown, tighten to 8 ft-lb.



GZ212B

## Right-Side Components

■NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

### AT THIS POINT

To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

■NOTE: The engine/transmission does not have to be removed from the frame for this procedure.



## Removing Right-Side Components

- A. CVT Cover**
- B. Drive Clutch**
- C. Driven Clutch**
- D. Inner Clutch Cover**

1. Remove the cap screws securing the CVT cover; then using a rubber mallet, gently tap on the cover tabs to loosen the cover. Account for a gasket and two alignment pins.
2. Remove the cap screw securing the driven clutch; then remove the outer sheave of the driven clutch. Account for a flat washer and alignment shim(s).



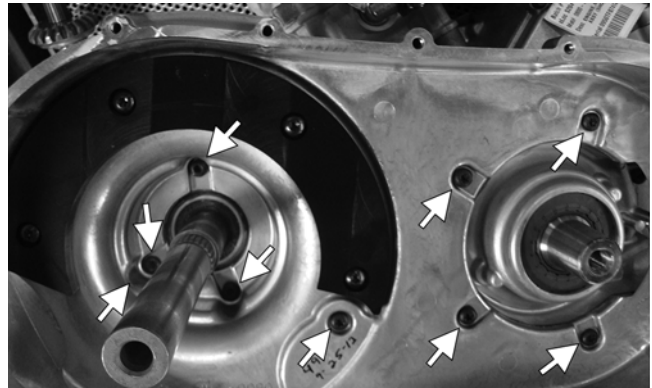
WC809

3. Remove the cap screw (left-hand threads) securing the drive clutch assembly; then using an appropriate clutch puller, remove the drive clutch.



WC666A

4. Remove the drive belt.
5. Remove the fixed driven sheave.
6. Remove and discard the cap screws securing the V-belt housing to the crankcase; then remove the V-belt housing. Account for two alignment pins.



WC664A

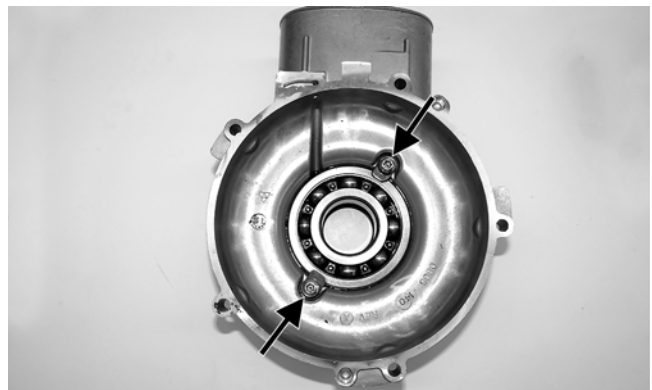
7. Remove the cap screws securing the clutch cover; then using a rubber mallet, carefully remove the cover. Account for two alignment pins.



WC662A

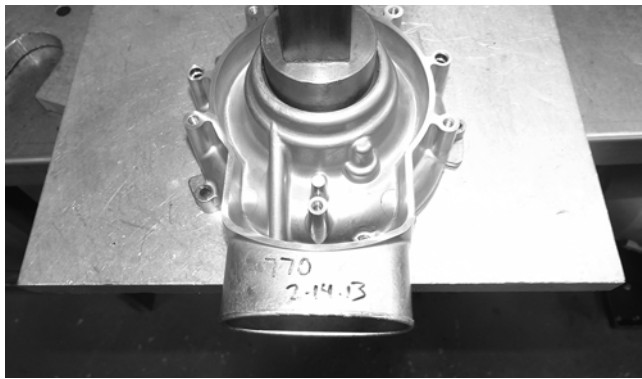
■**NOTE:** Only the clutch cover bearing and seal are serviceable. If any other component of the cover is damaged, the cover must be replaced.

8. Remove and retain the two machine screws and bearing retainers.

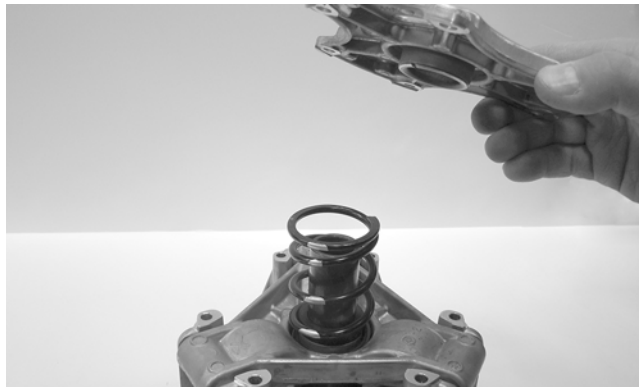


GZ500A

9. Using a suitable press, remove the seal and bearing simultaneously from the clutch cover.



GZ527



WC657

## Servicing Right-Side Components

### DRIVE CLUTCH

#### Disassembling

■NOTE: Note the timing marks (X) on the cover, spider, and movable sheave. These must be aligned when assembling the drive clutch for balance purposes.

1. Loosen the machine screws securing the cover. Remove every other cap screw from the cover; then while firmly holding the cover, remove the three remaining screws equally.

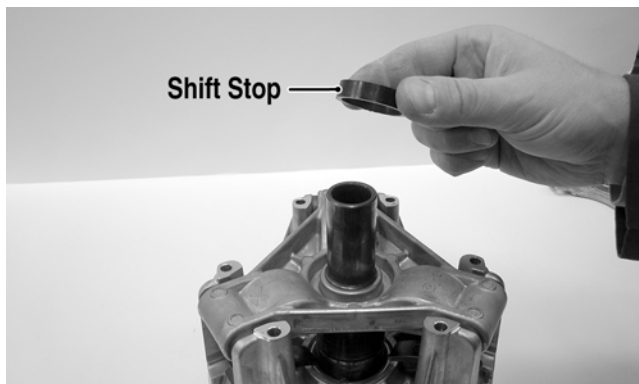


WC659



WC658

2. Remove the cover, spring, and nylon shift stop.



WC656A

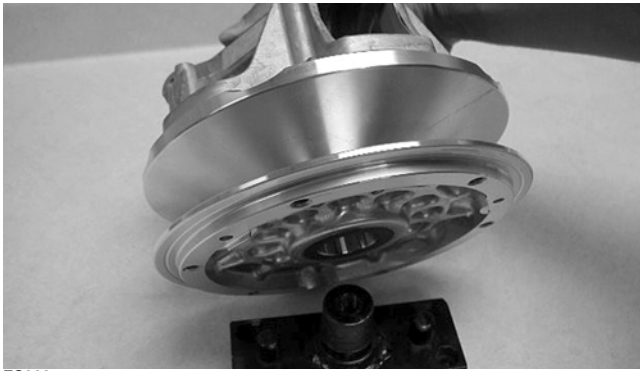
■NOTE: Some models were produced without a shift stop and instead feature a threaded nut. At this point on these models, no further disassembling should be performed. For models with a shift stop, proceed to step 3.



GZ529

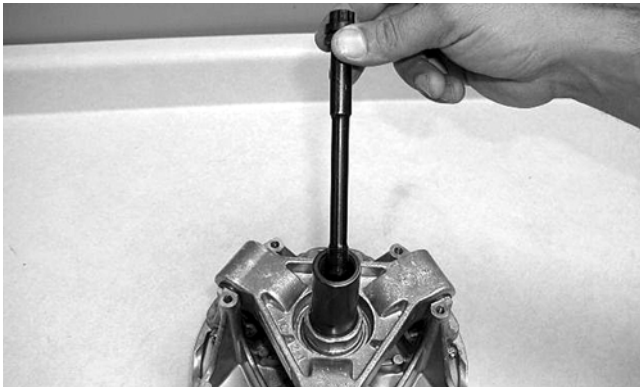
3. Remove the windage plate; then position the drive clutch over an appropriate clutch holder.

■NOTE: The holder should either be secured in a vise or bolted to a sturdy work bench.



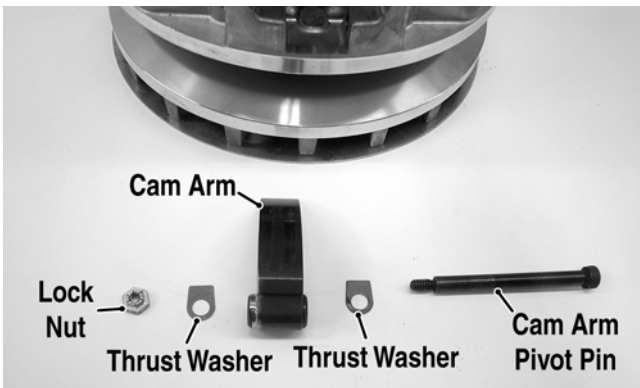
FC083

4. Secure the drive clutch to the holder using the clutch bolt and washer.



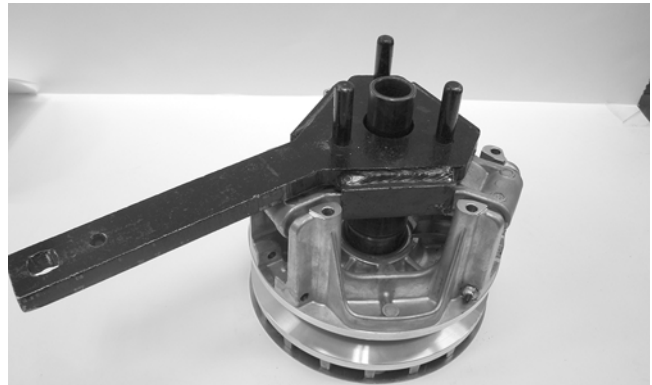
FC084

5. Remove the lock nuts from the cam arm pivot pins; then remove the pins and account for six thrust washers and three cam arms.



WC651A

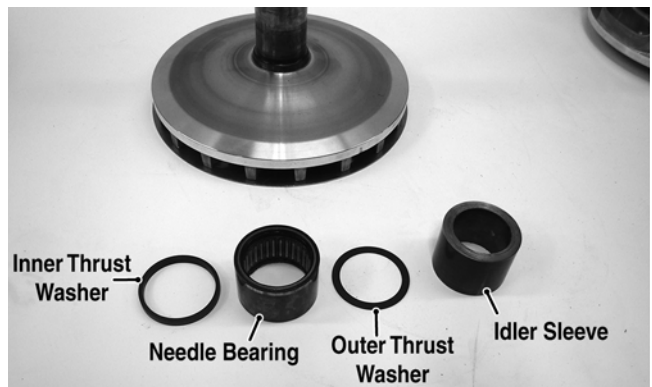
6. Using a small torch, heat the threaded area of the spider. Place an appropriate spider removal tool over the heated spider and break the spider loose by turning it clockwise (left-hand threads).



WC650

■**NOTE:** Applying heat to the spider threaded area will aid in clutch disassembly. The heat will loosen the Loctite used during assembly.

7. Remove the drive clutch from the clutch holder.
8. Remove the spider, idler sleeve, needle bearing, and thrust washers from the fixed drive sheave hub.



WC647A

■**NOTE:** The spider is a non-serviceable component. If damaged or worn parts are found, the clutch assembly must be replaced.



MS405

## Cleaning and Inspecting

■**NOTE:** If any components other than flyweights, pins, spring, needle bearings, rollers, and thrust washers are damaged or worn, clutch replacement is necessary.

1. Using parts-cleaning solvent, wash grease, dirt, and foreign matter off all components; dry with compressed air.



■**NOTE:** If the needle bearing is washed, re-pack the bearing with hi-temp molybdenum wheel bearing grease.

2. Remove any drive belt dust accumulation from the stationary sheave, movable sheave, and bushings using parts-cleaning solvent only.

### CAUTION

**Do not use steel wool or a wire brush to clean components having a bushing; damage to the bushing will result.**

3. Inspect stationary sheave, movable sheave, spider, and cover for cracks or imperfections in the casting.
4. Inspect the cam arm pins for wear or bends.
5. Inspect the bushing in the cover for wear, damage, or cracks.
6. Inspect the bushing in the movable sheave for wear, damage, or cracks.
7. Inspect the spring for cracking or twisting.
8. Inspect all threaded areas for any cracked or stripped threads.
9. Inspect the roller bushings for damage or fraying.
10. Inspect the needle bearings for missing needles or torn or missing seals.
11. Inspect the stationary sheave and shaft for damage or wear.

### Assembling

■**NOTE:** Steps 1-6 are for models with a shift stop only. For models with a nut, proceed to step 7.

### WARNING

**Never reuse the lock nuts on the cam arm pins.**

1. Place the cam arms, thrust washers, and cam arm pivot pins (pivot pin heads opposite direction of rotation) into the moveable drive sheave and secure with new lock nuts. Tighten to 48 in.-lb.

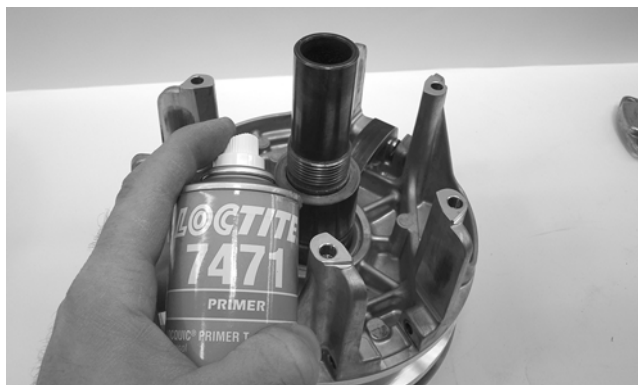
■**NOTE:** The drive clutch rotates clockwise.

2. Align the spider and movable sheave timing marks; then making sure the cam arms are properly positioned, drop the spider into position in the moveable sheave.

### CAUTION

**Failure to align the spider and movable sheave timing marks will cause drive clutch to be out of balance resulting in clutch and crankshaft damage.**

3. Place the movable sheave, spacer washers, and spider into position on the stationary sheave hub. Make sure all threads are clean and free of oily residue. Apply Loctite Primer #7649 and allow to dry per instructions; then apply red Loctite #277 to the threads of the stationary sheave and spider. Tighten the spider to 265 ft-lb.



WC641



WC642

■**NOTE:** Allow the Loctite to cure at room temperature for 24 hours.

■**NOTE:** Grasp the moveable sheave and lift it upward; then release it. It must move freely and not bind at any point.

4. With the head of each cam arm pin positioned away from the direction of the drive clutch rotation, install the cam arms.

■**NOTE:** The drive clutch rotates clockwise.

5. Secure the cam arm pins with new lock nuts and tighten to 48 in.-lb.
6. Place the shift stop into position with the relief towards the spider.



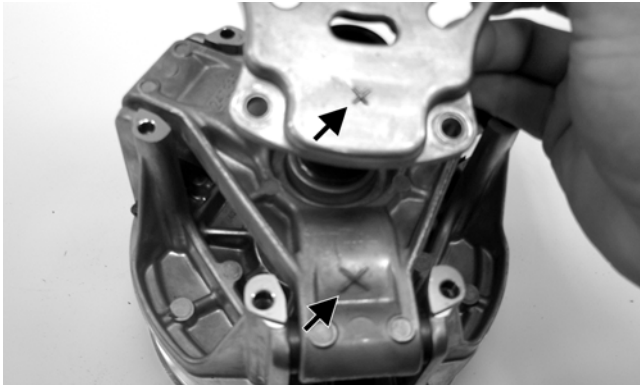
WC655

### CAUTION

**Install the shift stop cam with the relief facing down or severe engine damage could occur.**

7. Install the spring.

8. Align the match marks (X) and install the clutch cover and secure with six cap screws. Tighten using a crisscross pattern to 120 in.-lb.



WC653A

## DRIVEN CLUTCH

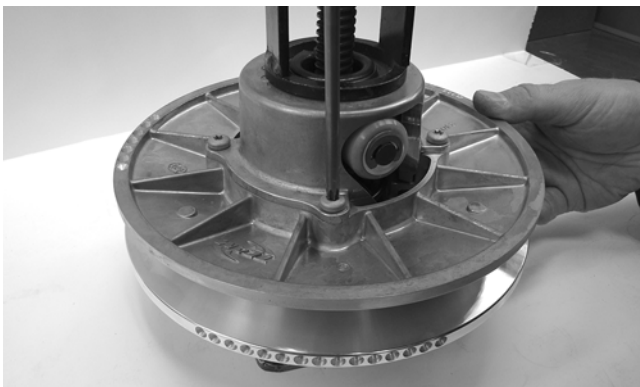
### Disassembling

1. Install the clutch into an appropriate driven clutch compressor tool. Finger-tighten the wing nut to tighten.



WC638

2. Remove the driven cam; then remove the spider assembly.



WC636



WC635

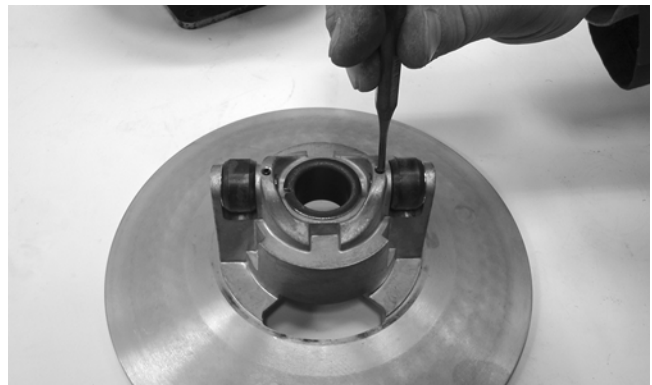
3. Remove the E-clips securing the cam rollers to the spider; then remove the thrust washer and roller.



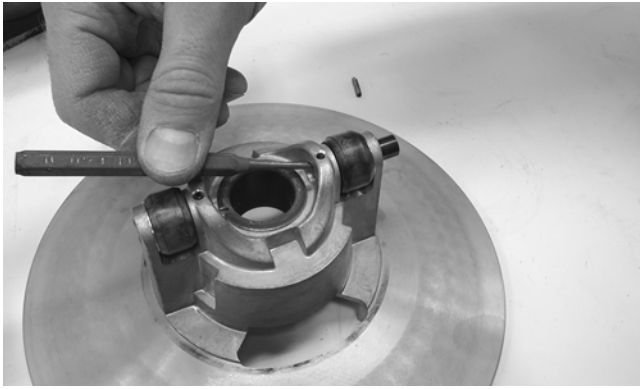
WC628

■NOTE: The relief in the roller is directed towards the spider.

4. Remove the spring and movable sheave.
5. Using a suitable punch, remove the roller pin securing the roller axle in movable sheave; then drive out the axle and account for a thrust washer.



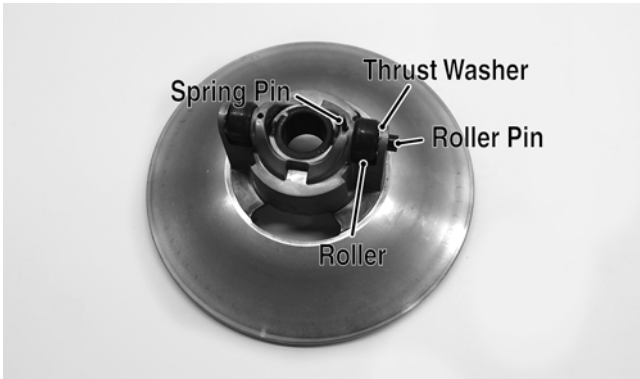
WC627



WC626

## Assembling

1. Install the roller and thrust washer in place with the washer toward the outside of sheave.



WC673A

2. Slide the roller pin into place; then using suitable punch, insert the pin spring until flush.



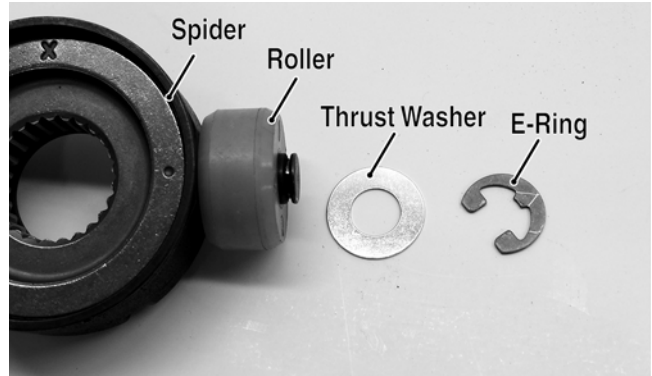
WC682

3. Place the sheaves together lining up the "X" marks.



WC811

4. Place the roller onto the spider (beveled side of roller facing in); then install the thrust washer and E-Ring.



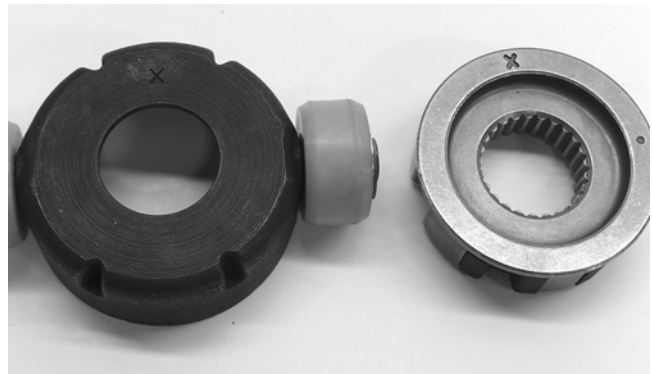
WC677A

5. Place the insert and spider onto the bearing assembly.



WC670

6. Insert the bearing assembly with spider insert into the spider making sure to line up the "X" marks.



WC672

7. Place the spring and spider into the movable sheave making sure all marks are aligned.



WC678



8. Using an appropriate driven clutch compressor tool, install the cam making sure all marks are aligned. Tighten the screws to 11 ft-lb.



WC686

## WATER PUMP DRIVE ASSEMBLY

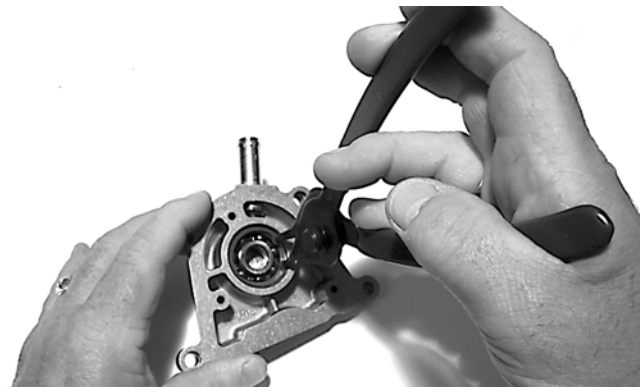
### Disassembling

1. Remove the two snap rings from the driveshaft; then remove the gear and drive pin noting the orientation of the gear for proper assembly.



GZ442

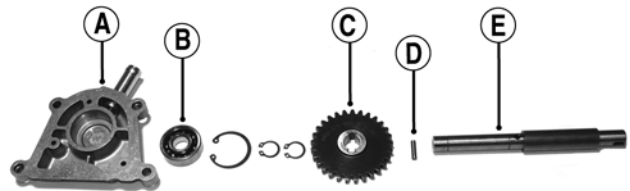
2. Remove the snap ring securing the bearing in the water pump drive cover; then remove the bearing using an appropriate blind bearing remover.



GZ441

### Inspecting

1. Inspect the water pump drive housing (A) for scoring or discoloration.

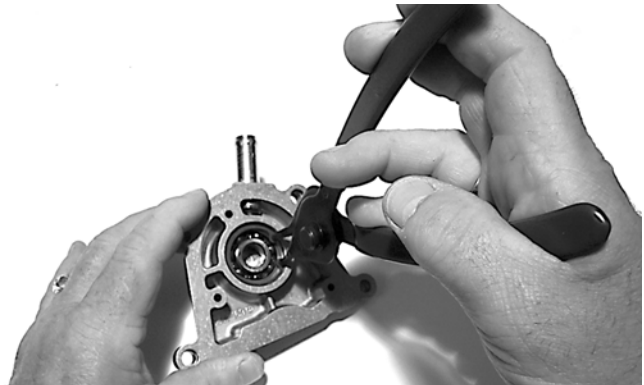


GZ440A

2. Inspect the bearing (B) for smooth rotation and no discoloration or scoring.
3. Inspect the gear (C) for chipped or missing teeth, excessive hub wear, or excessive wear in the drive pin slot.
4. Inspect the drive pin (D) and driveshaft (E) for excessive wear or looseness.

### Assembling

1. Install the bearing in the water pump drive cover and secure with the snap ring (flat side away from the bearing).



GZ441

2. Install the gear onto the driveshaft noting correct orientation (from step 1 of disassembling).



GZ442

3. Install the two snap rings on the driveshaft (flat side away from the gear).

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## Installing Right-Side Components

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1. Place a new clutch housing seal (spring side facing Clutch Housing Seal Tool) into the clutch cover and secure with a rubber mallet or press.



GZ530

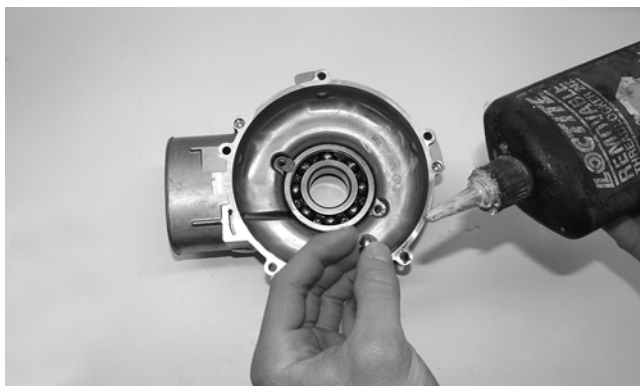
2. Using a suitable press, install the bearing into the clutch cover against the outer bearing face.



GZ501

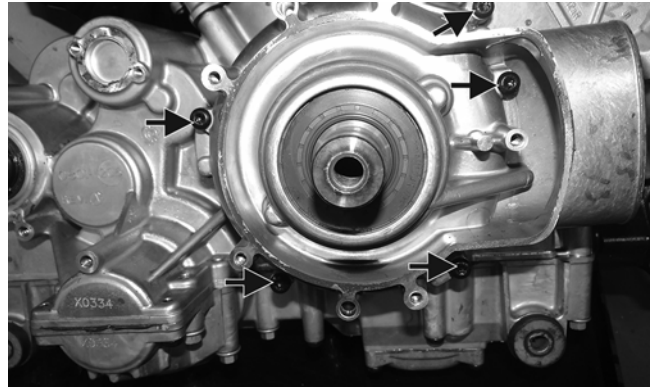
■NOTE: It is critical to verify the seal on the bearing faces the clutch cover seal before pressing in a new bearing.

3. Secure the bearing in the clutch cover using the existing bearing retainers and machine screws (threads coated with blue Loctite #242). Tighten to 8 ft-lb.



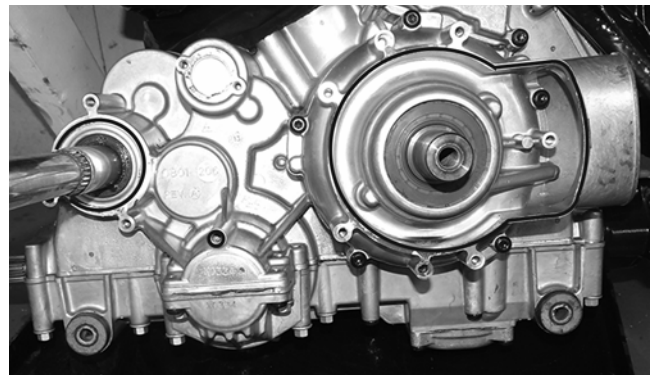
GZ508

4. With the gasket and alignment pins in position, install the clutch cover and secure with the existing cap screws. Tighten to 8 ft-lb.

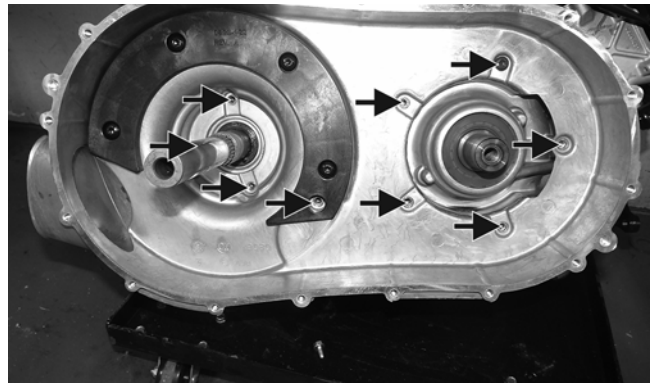


GZ528A

5. Making sure the alignment pins are correctly installed, place a bead of silicone sealant on the mating surfaces of the V-belt housing and install the housing. Using new "patch-lock" cap screws, secure the housing and tighten the screws to 8 ft-lb.



GZ532A

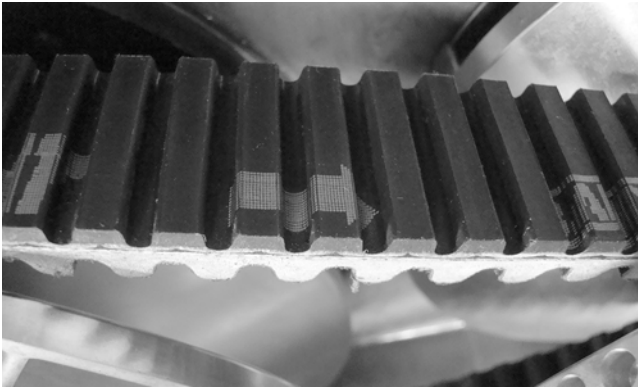


GZ531A

6. Place the fixed driven sheave onto the driveshaft; then install the V-belt making sure the directional arrow is facing the direction of engine rotation.

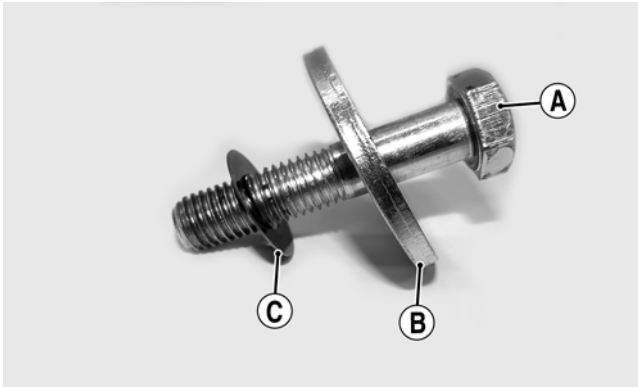


WC809



WC667

7. Making sure the "X" marks are properly aligned, install the movable drive sheave and secure with the cap screw (A), washer (B), and shim(s) (C). Tighten to 60 ft-lb.



WC741A

8. Place the transmission in neutral and rotate the driven clutch and drive belt by hand in a clockwise direction for three complete revolutions.

■NOTE: Do not rotate in a counter clockwise direction as this will produce an inaccurate reading.

9. Verify 0.8 mm (0.030") clearance between stationary sheave on drive clutch and drive belt by using a feeler gauge flat against the sheave. Check for slight resistance with gauge between sheave and belt.



WC739

10. If offset adjustment is necessary, place the transmission in park. Remove the driven clutch cap screw (A), washer (B), and any shims (C). If belt clearance is too small, add additional shims to gain the desired clearance. If belt clearance is too large, remove shims to gain the desired clearance.
11. Install the cap screw (A), washer (B), and shim(s) (C). Tighten the screw to 60 ft-lb.
12. Repeat steps 8-11 until proper clearance is achieved.
13. Place the CVT cover gasket into position; then with the two alignment pins in position, install the cover and secure with the cap screws. Tighten the cap screws to 8 ft-lb.

## Center Crankcase Components

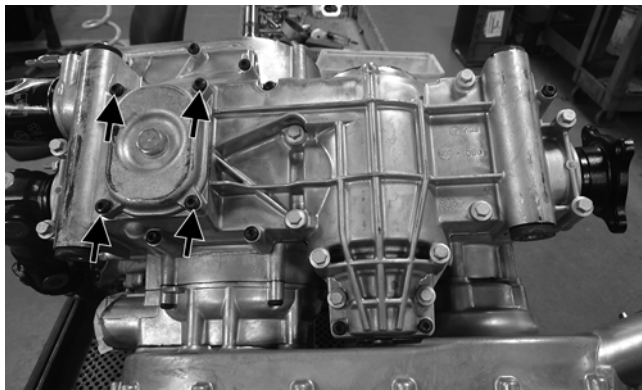
■NOTE: This procedure cannot be done with the engine/transmission in the frame. Complete Removing procedures for Top-Side, Left-Side, and Right-Side must precede this procedure.

■NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

## Separating Crankcase Halves

1. Remove the oil strainer cap; then remove the oil strainer.



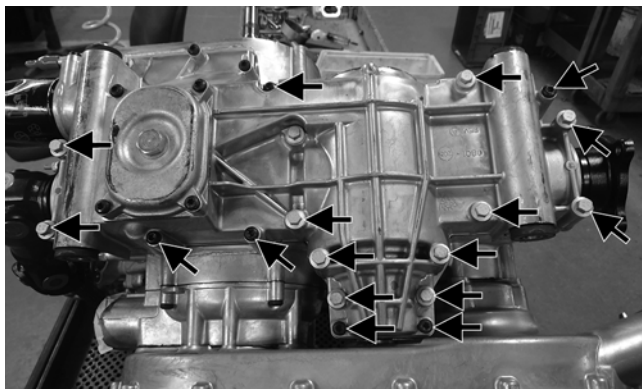


H2-012A



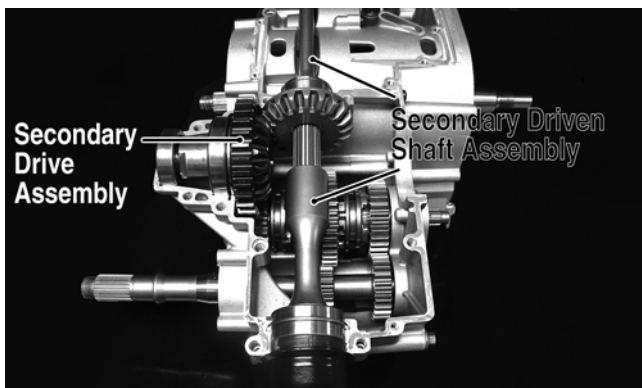
GZ446

2. Remove the cap screws securing the lower crankcase to the upper crankcase halves; then using a rubber hammer, free the lower crankcase and remove. Account for two alignment pins.

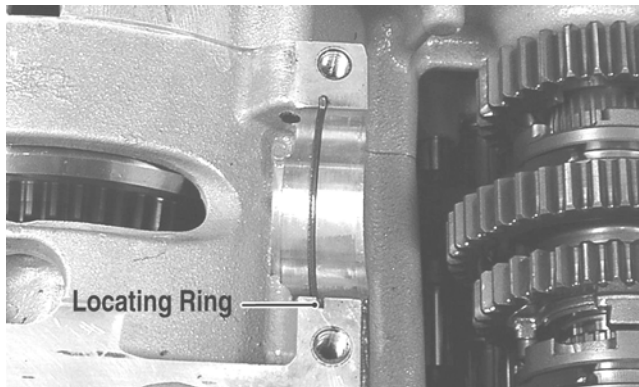


H2-012B

3. Remove the secondary drive assembly; then remove the secondary driven shaft assembly and set aside. Account for one locating ring.



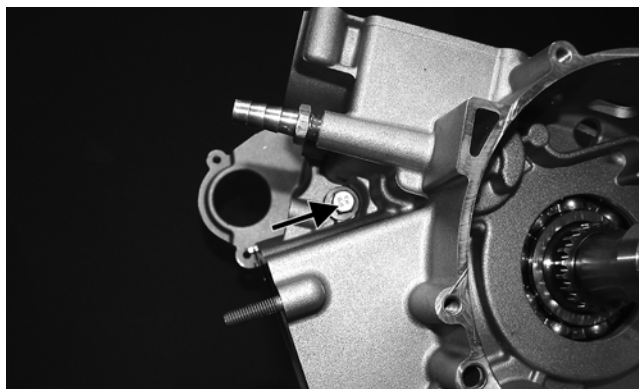
GZ448A



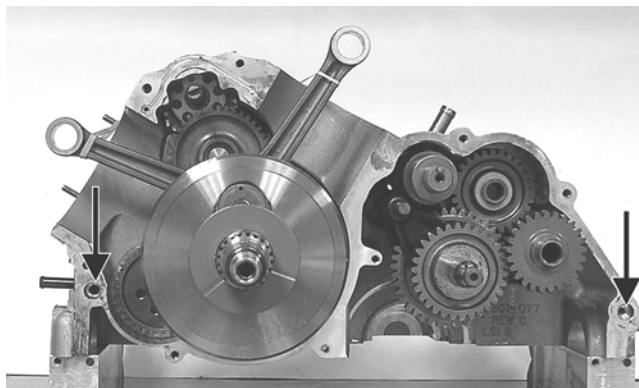
GZ269A

■NOTE: Do not disassemble these assemblies unless service is required. If disassembled, secondary gear sets will have to be reset for backlash and gear contact (see Servicing Center Crankcase Components sub-section).

4. Remove one cap screw from the right-side crankcase and eight cap screws from the left-side crankcase; then using a rubber mallet, separate the crankcase halves leaving all components in the right-side case. Account for a thrust washer on the crankshaft and flat washers on gear shift shaft, countershaft, and reverse idler. Note the location of two alignment pins.



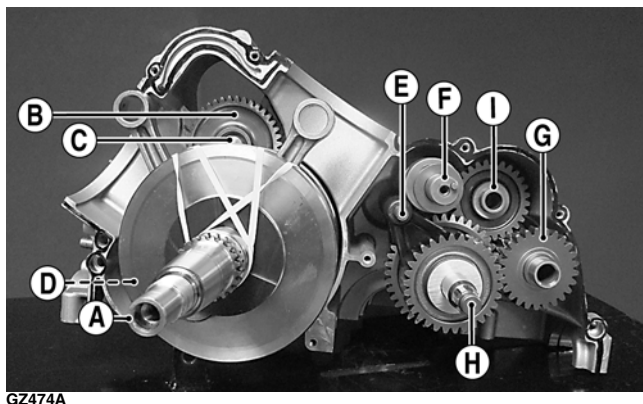
GZ454A



GZ272B

## Disassembling Crankcase Half

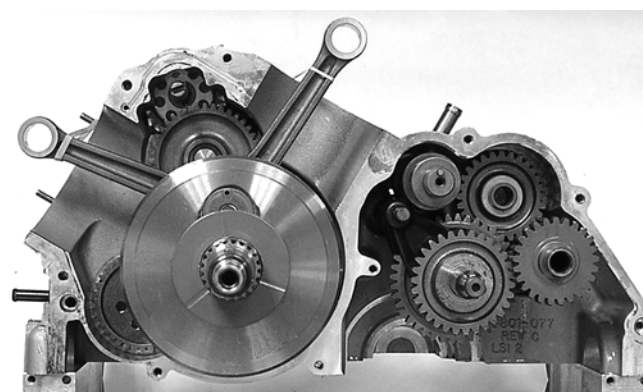
■NOTE: For steps 1-8, refer to illustration GZ474A.



GZ474A

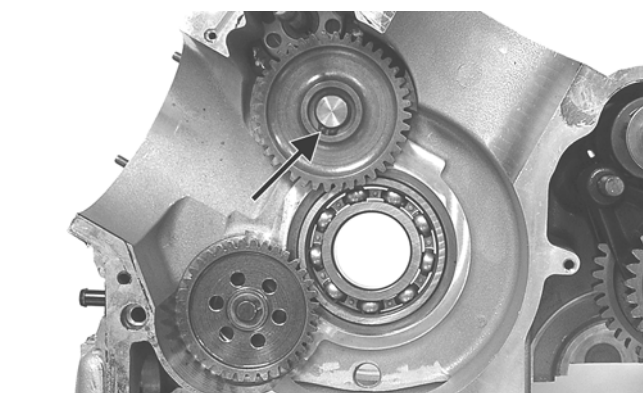
■NOTE: To aid in installing, it is recommended the assemblies are kept together and IN ORDER.

1. Support the right-side crankcase assembly on suitable support blocks; then carefully remove the crankshaft assembly (A) from the crankcase.



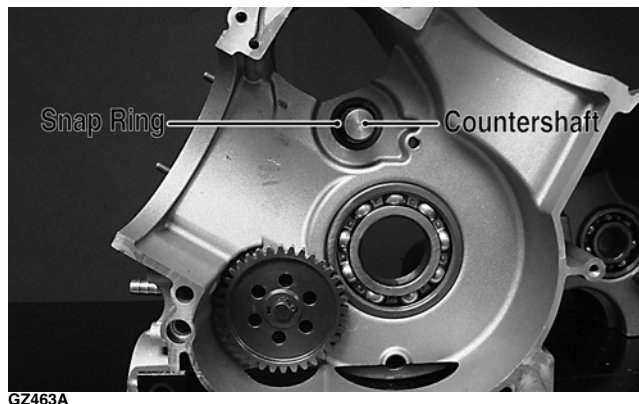
GZ298

2. Remove the snap ring securing the water pump drive idler (B) to the idler shaft; then remove the drive idler.



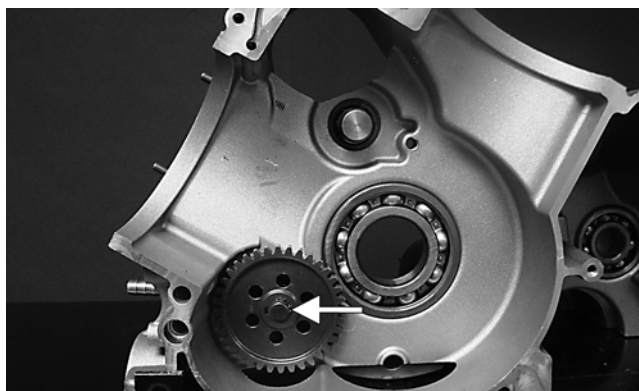
GZ299A

3. Rotate and align the water pump idler shaft flat surface towards the open end of the snap ring; then remove the snap ring securing the water pump idler shaft (C) in the crankcase. Remove the shaft and bearings.



GZ463A

4. Remove the snap ring securing the oil pump driven gear (D) to the oil pump driveshaft; then remove the gear. Account for a drive pin and washer.



GZ463B

5. Remove the shift fork shaft (E); then remove the gear shift shaft assembly (F). Account for a flat washer and a spacer.

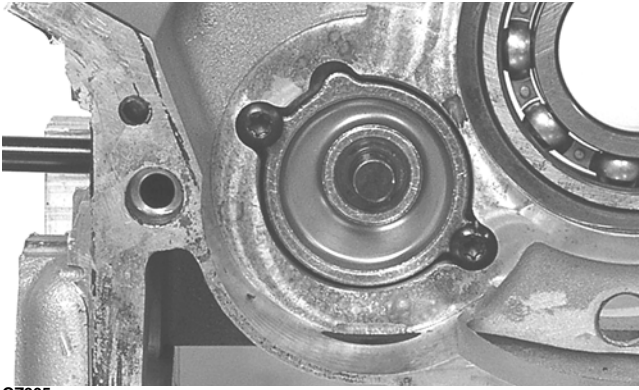


DE677A



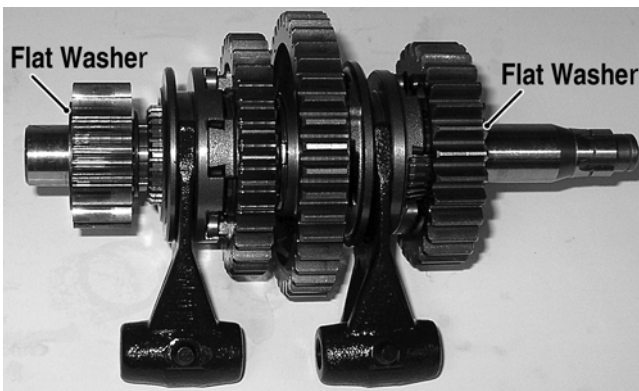
GZ276

- Remove two cap screws securing the oil pump in the crankcase and remove the oil pump.



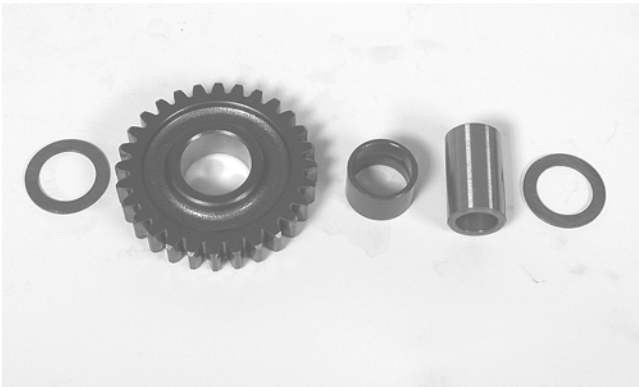
GZ305

- Remove the driveshaft (G); then remove the countershaft assembly (with shift forks) (H). Account for two flat washers on the countershaft.



GZ280B

- Remove the reverse idler gear (I), shaft bushing, and two washers.



GZ279

■NOTE: Do not disassemble the countershaft assembly unless necessary. If necessary, see Servicing Center Crankcase Components sub-section.

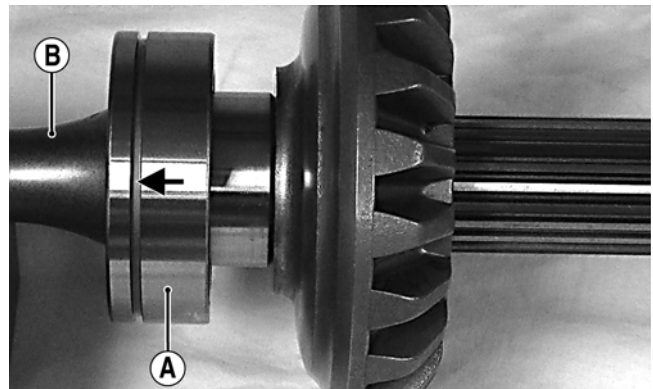
## Servicing Center Crankcase Components

### SECONDARY OUTPUT DRIVE GEARS

#### Initial Set-Up

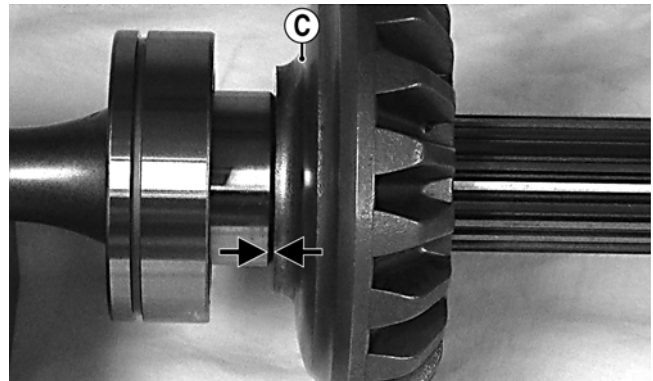
■NOTE: If the secondary output driven shaft is replaced or disassembled, the initial set-up must be performed to establish correct gear tooth contact. If only the secondary output driveshaft or secondary output driven gear are replaced, proceed to Correcting Backlash in this sub-section.

- Install a new bearing (A) onto the secondary driven shaft (B) making sure the bearing locating groove is directed away from the driven gear splines.



MT011A

- Using a suitable press, install the driven gear (C) on the shaft until the gear firmly seats on the shoulder of the shaft.

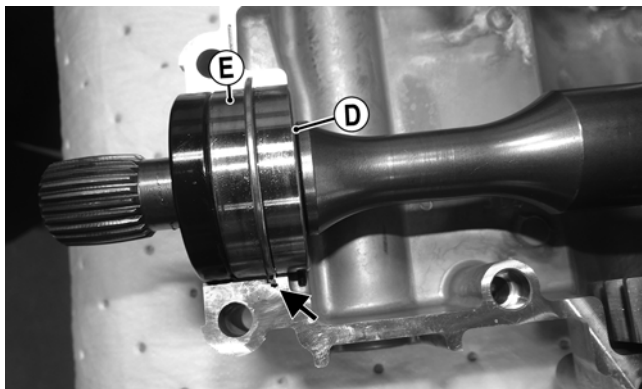


MT011B

- If installing the existing shaft, start with the shims removed during disassembly or if installing a new shaft, start with approximately 1.0 mm shims at point (D); then install the output driveshaft bearing (E) making sure the locating pin is directed toward the center of the shaft.



MT012



FW-003A

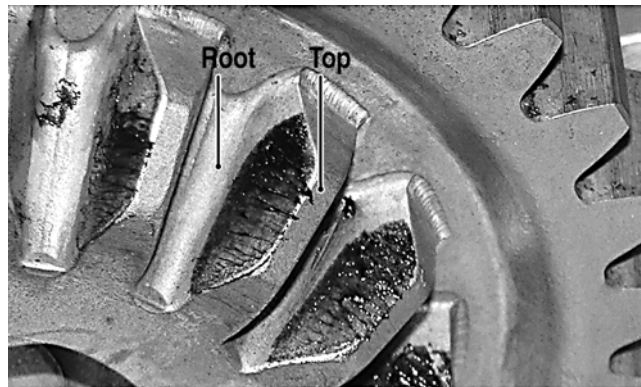
4. Install a new seal (F) and snap ring.



GZ479C

■NOTE: Do not use a new lock nut at this time as this procedure may have to be repeated.

5. Place the assembled shaft into the left crankshaft case; then lightly coat the gear teeth with machinist's lay-out dye. Rotate the shafts through several rotations in both directions. Gear contact should extend from the root to the top of the gear teeth.



MT016A

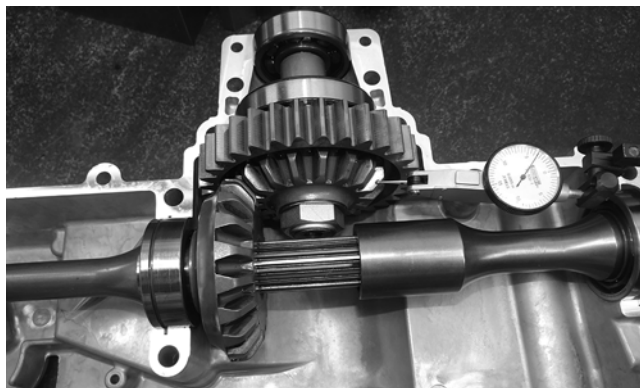
6. To adjust tooth contact, use the following chart to correctly shim the driven shaft.

Tooth Contact	Shim Correction
Contact at Top	Increase Shim Thickness
Contact at Root	Decrease Shim Thickness

7. After correct tooth contact is established, proceed to Checking Backlash in this sub-section.

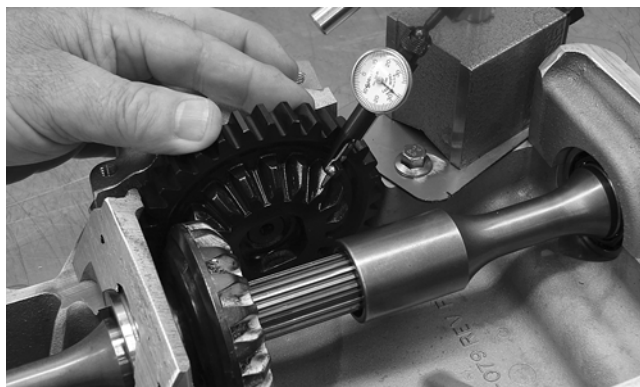
### Checking Backlash

1. Install the drive bevel gear assembly and driven bevel gear/output shaft assembly into the crankcase bottom cover.
2. Mount the dial indicator so the tip is contacting a tooth on the secondary drive bevel gear.



FW-008

3. Firmly hold the bearing down and while rocking the drive bevel gear back and forth, note the maximum backlash reading on the gauge.



GZ398

4. Acceptable backlash range is 0.127-0.381 mm (0.005-0.015 in.).



## Correcting Backlash

■NOTE: If backlash measurement is within the acceptable range, no correction is necessary.

1. If backlash measurement is less than specified, remove an existing shim, measure it, and install a new thinner shim.



2. If backlash measurement is more than specified, remove an existing shim, measure it, and install a thicker shim.

■NOTE: Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

Backlash Measurement	Shim Correction
Under 0.127 mm (0.005 in.)	Decrease Shim Thickness
At 0.127-0.381 mm (0.005-0.015 in.)	No Correction Required
Over 0.381 mm (0.015 in.)	Increase Shim Thickness

3. Once correct gear pattern and backlash are established, install a new output pinion nut (coated with red Loctite #263) on the output shaft and tighten to 150 ft-lb.
4. Using an appropriate holding fixture and wrench adapter, install the secondary drive gear nut (threads coated with red Loctite #263) and tighten to 200 ft-lb. The output drive assembly is now ready for installation.

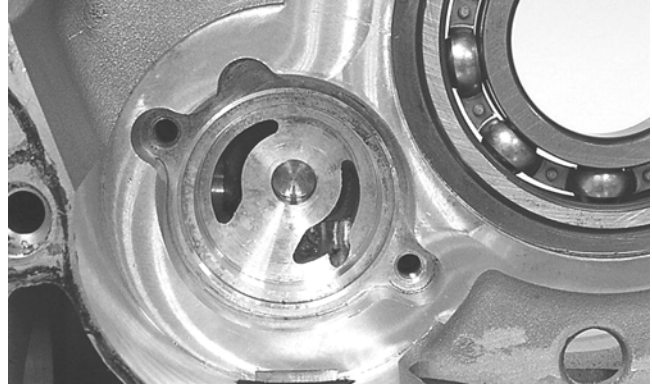


## OIL PUMP ASSEMBLY

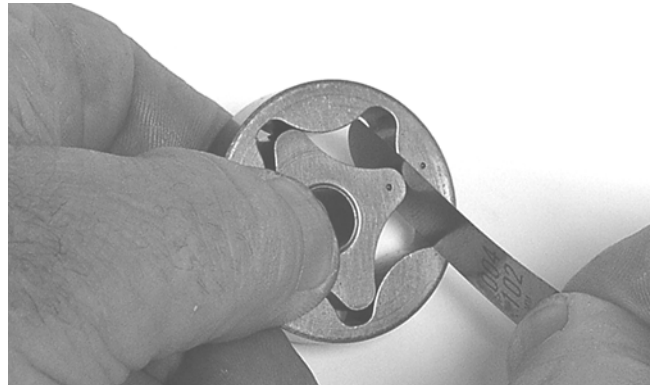
### Disassembling and Inspecting

1. Remove the oil pump cover; then remove the gerotor set, shaft, and pin (see Disassembling Crankcase Half in this sub-section).

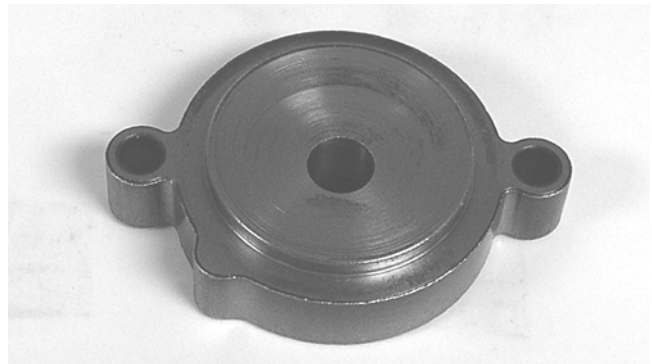
2. Inspect the crankcase for scoring, discoloration, or cracks in the gerotor bore. If scored, crankcase assembly must be replaced.



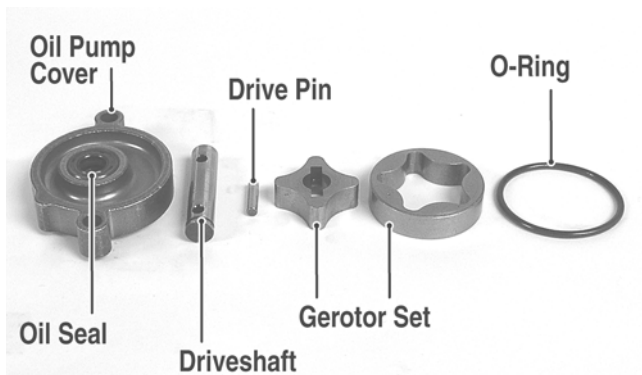
3. Inspect the gerotor set for scoring, discoloration, or cracks; then using a feeler gauge, check the inner to outer rotor clearance. If measurements exceed specifications, the gerotor set must be replaced.



4. Inspect the oil pump cover for scoring, discoloration, or cracks. Replace if damaged.

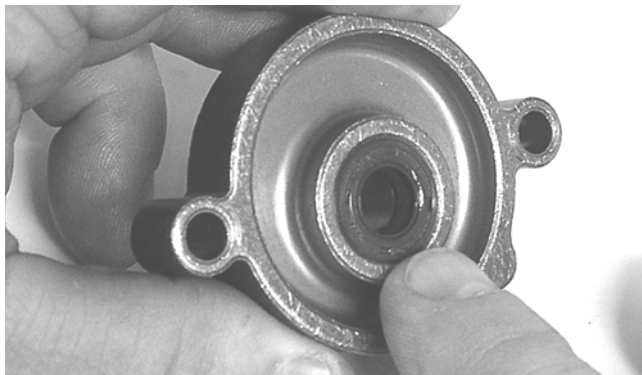


5. Inspect the oil pump driveshaft and drive pin for excessive wear or grooving. Replace as required.



GZ354A

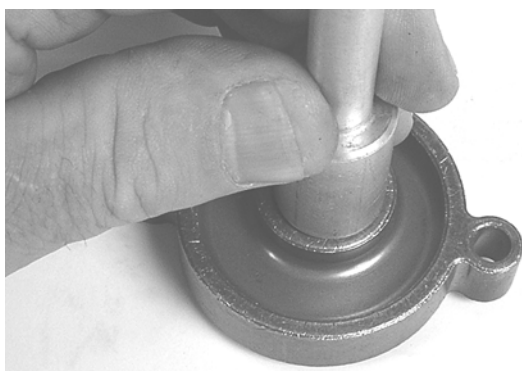
6. Remove the oil seal from the oil pump cover.



GZ365

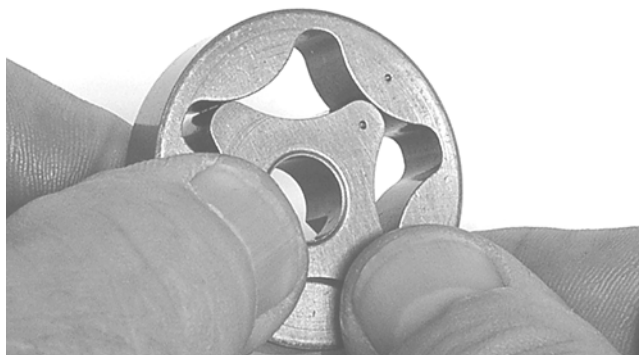
## Assembling

1. Install a new oil seal into the oil pump cover; then coat the lips of the seal with grease and install the pump driveshaft from the seal side.

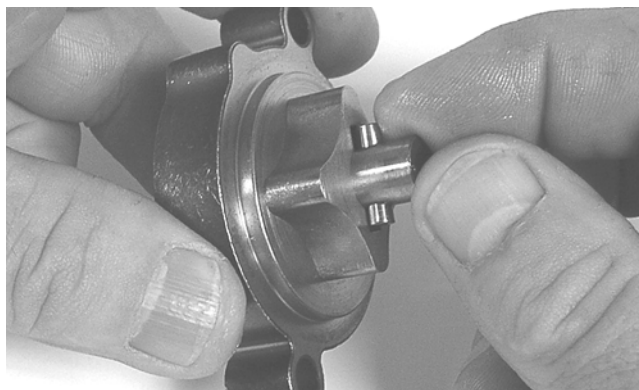


GZ359

2. Noting the reference dots on the gerotor set, separate the inner rotor from the outer rotor and with the reference dot directed toward the oil pump cover, place the rotor on the shaft; then install the drive pin and push the shaft into the rotor.



GZ356



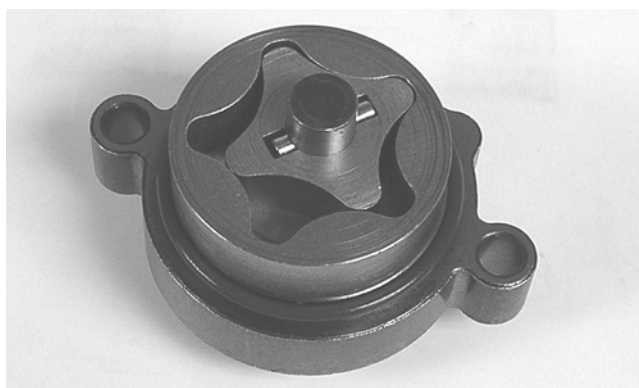
GZ363

3. With the outer rotor reference dot directed toward the oil pump cover, install the rotor onto the inner rotor.



GZ360

4. Place a new O-ring seal on the outside of the oil pump cover. The oil pump assembly is now ready for assembly into the crankcase.



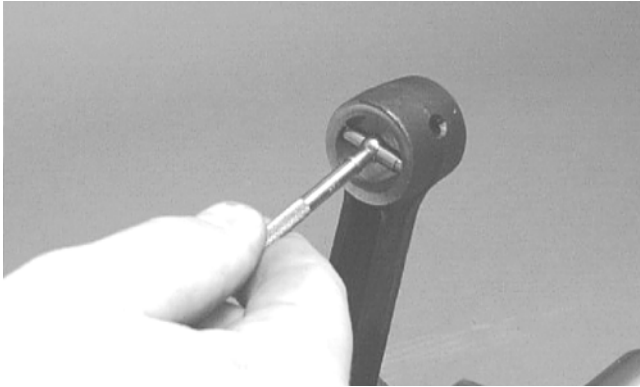
GZ362

## CRANKSHAFT ASSEMBLY

■NOTE: The crankshaft and connecting rod is a non-serviceable assembly. If any component is out of specification, the assembly must be replaced.

### Measuring Connecting Rod (Small End Inside Diameter)

1. Insert a snap gauge into the upper connecting rod small end bore; then remove the gauge and measure it with micrometer.



CC290D

2. Maximum diameter must not exceed specifications.

### Measuring Connecting Rod (Small End Deflection)

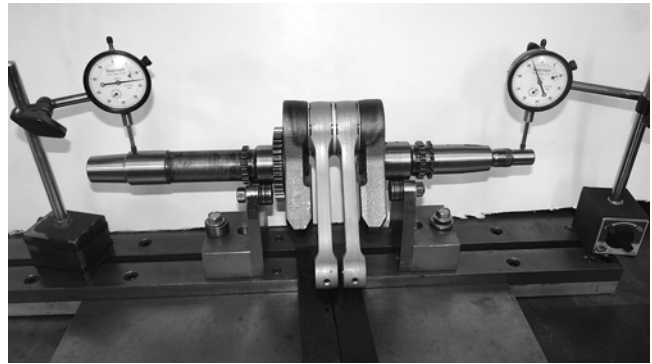
1. Place the crankshaft on a set of V blocks and mount a dial indicator and base on the surface plate. Position the indicator contact point against the center of the connecting rod small end journal.
2. Zero the indicator and push the small end of the connecting rod away from the dial indicator.
3. Maximum deflection must not exceed specifications.

### Measuring Connecting Rod (Big End Side-to-Side)

1. Push the lower end of the connecting rod to one side of the crankshaft journal.
2. Using a feeler gauge, measure the gap between the connecting rod and crankshaft journal.
3. Acceptable gap range must be within specifications.

### Measuring Crankshaft (Runout)

1. Place the crankshaft on a set of V blocks.
2. Mount a dial indicator and base on the surface plate. Position the indicator contact at point 1 of the crankshaft.



H2-006

3. Zero the indicator and rotate the crankshaft slowly.

### CAUTION

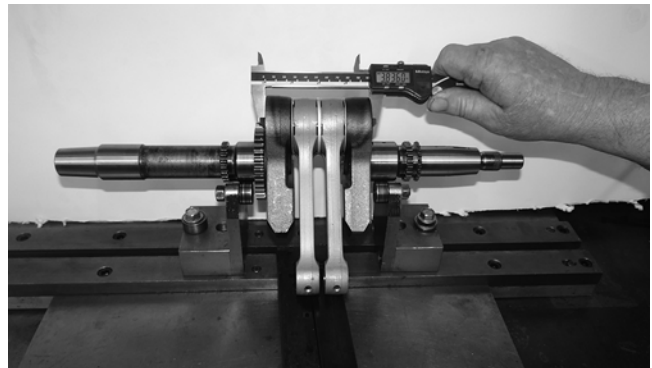
Care should be taken to support the connecting rod when rotating the crankshaft.

4. Maximum runout must not exceed specifications.

■NOTE: Proceed to check runout on the other end of the crankshaft by positioning the indicator contact at point 2 and following steps 3-4.

### Measuring Crankshaft (Web-to-Web)

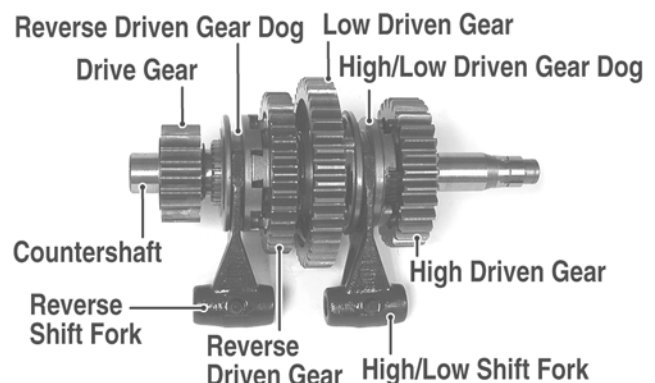
1. Using a calipers, measure the distance from the outside edge of one web to the outside edge of the other web.



H2-007

2. Acceptable width range must be within specifications.

## COUNTERSHAFT



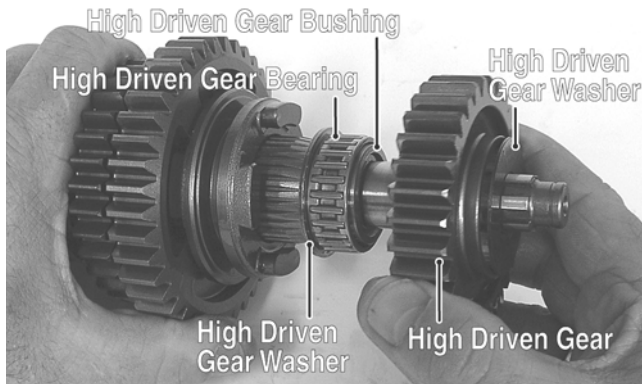
GZ281A

## CAUTION

When disassembling the countershaft, care must be taken to note the direction each major component (dog, gear) faces. If a major component is installed facing the wrong direction, transmission damage may occur and/or the transmission will malfunction. In either case, complete disassembly and assembly will be required.

### Disassembling

1. Remove the shift forks noting the positions for assembling; then remove the high driven gear outer washer, high driven gear, high driven gear bearing, high driven gear bushing, and high driven gear inner washer.

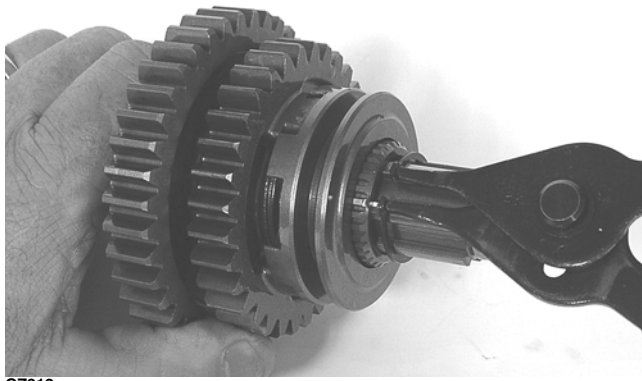


GZ283A

2. Remove the drive gear; then remove the snap ring securing the reverse driven gear dog and bushing to the countershaft.



GZ296



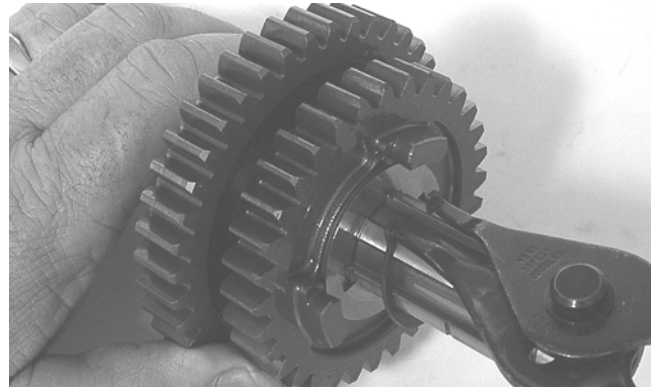
GZ312

3. Remove the reverse driven gear dog.



GZ313A

4. Remove the snap ring securing the reverse driven gear and washer; then remove the washer and gear.



GZ314

5. Remove the reverse driven washer; then remove the low driven gear locking washer.

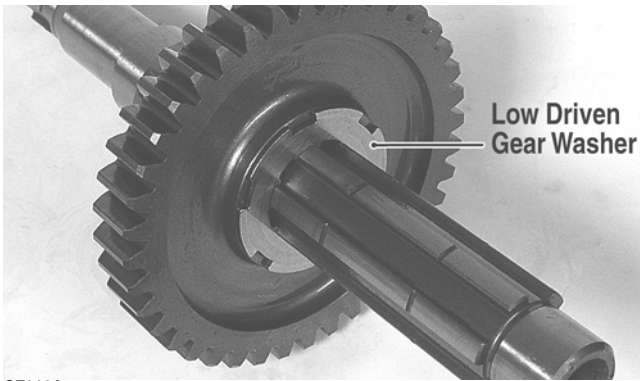


GZ320



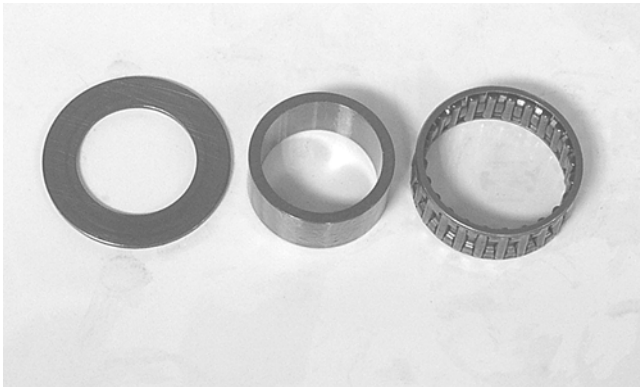
GZ319





GZ318A

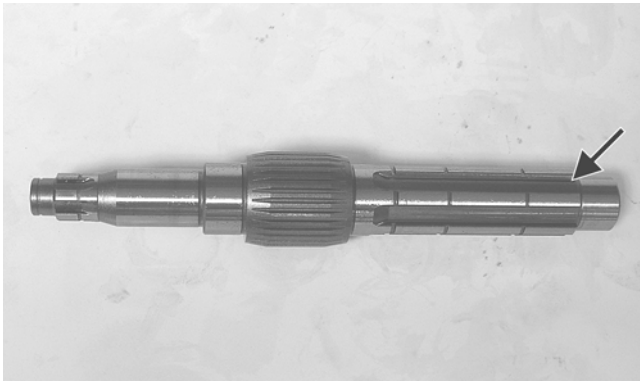
6. Remove the low driven gear. Account for a bearing, bushing, and thrust washer.



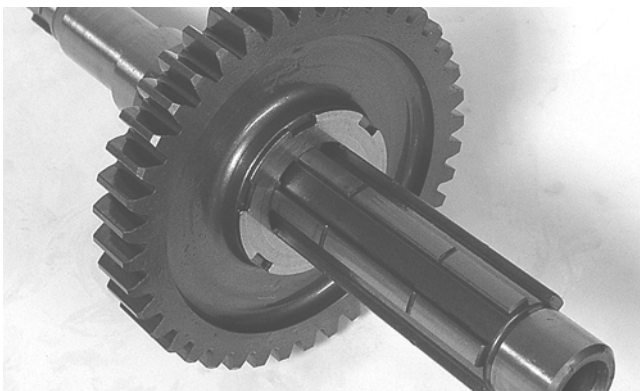
GZ316

### Assembling

1. From the drive gear end, install a thrust washer, bushing, and bearing; then install the low driven gear and washer.

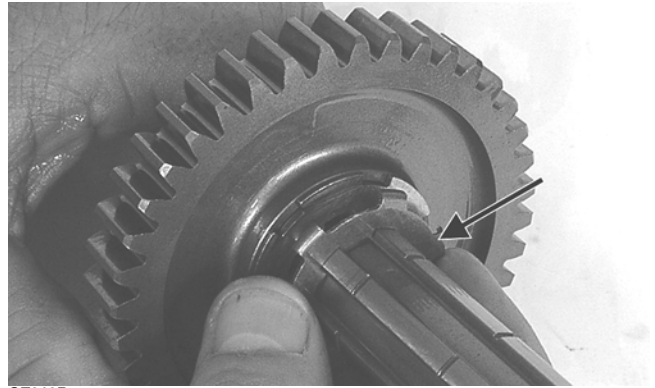


GZ317A

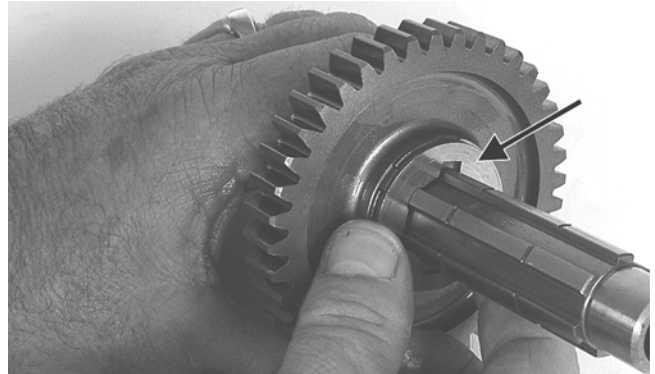


GZ318

2. Install the low driven gear locking washer; then install the inner reverse driven gear washer.

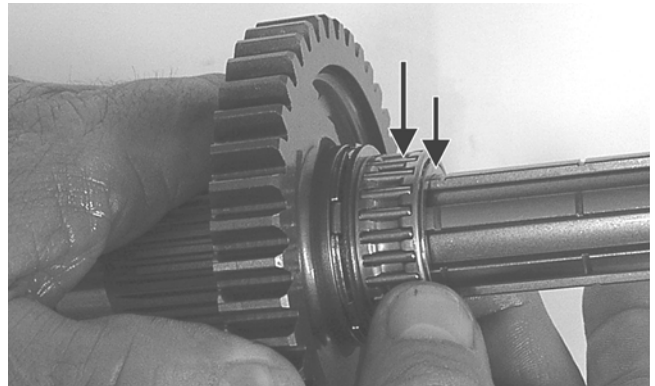


GZ319B



GZ320B

3. Install the reverse driven bushing and bearing; then install the reverse driven gear.

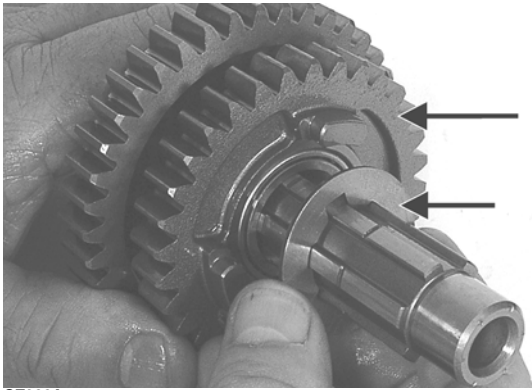


GZ286A

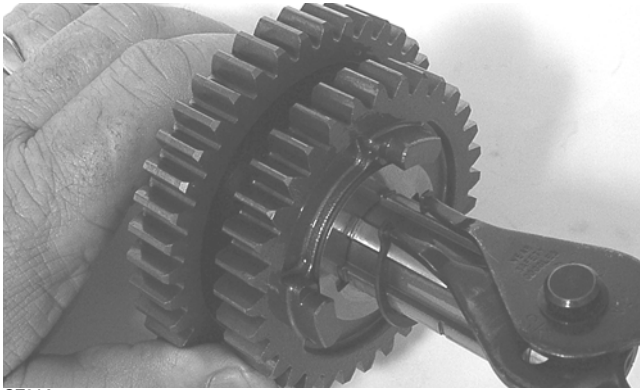


GZ287

4. Install the outer reverse driven washer; then secure the reverse driven gear assembly with a snap ring.



GZ288A

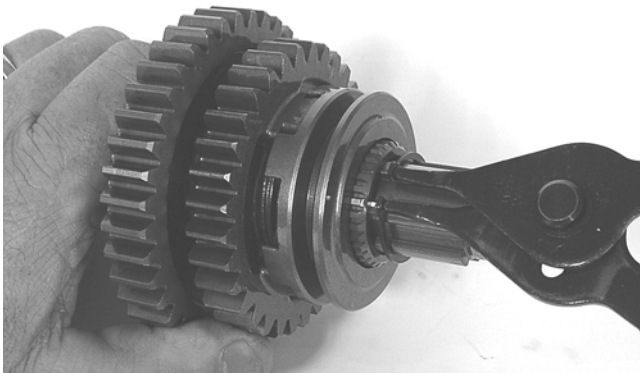


GZ314

5. Install the reverse driven gear dog onto the countershaft and secure with a snap ring.

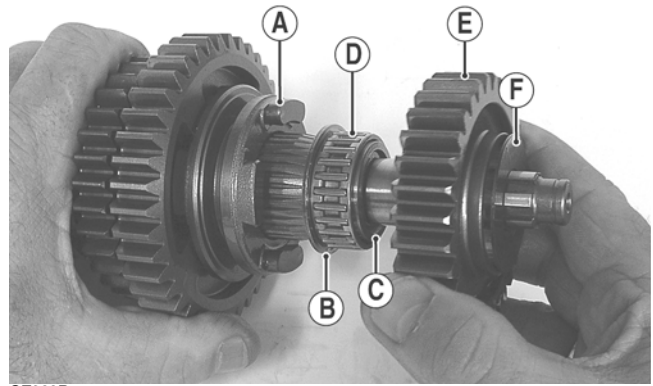


GZ313A



GZ312

6. From the opposite end of the countershaft, install the high/low driven gear dog (A), thrust washer (B), bushing (C), bearing (D), high/low driven gear (E), and spacer washer (F).

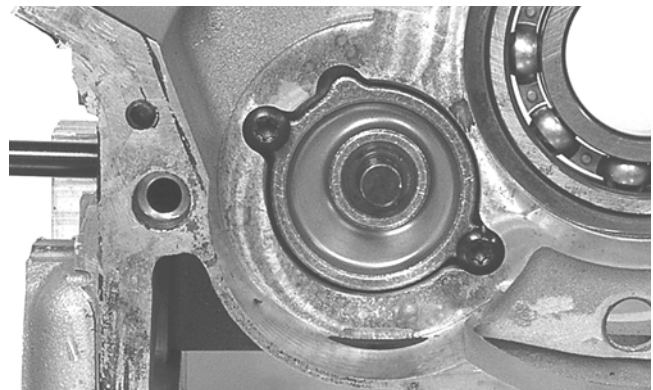


GZ283B

7. Install the drive gear washer and the shift forks. The countershaft is now ready for installation.

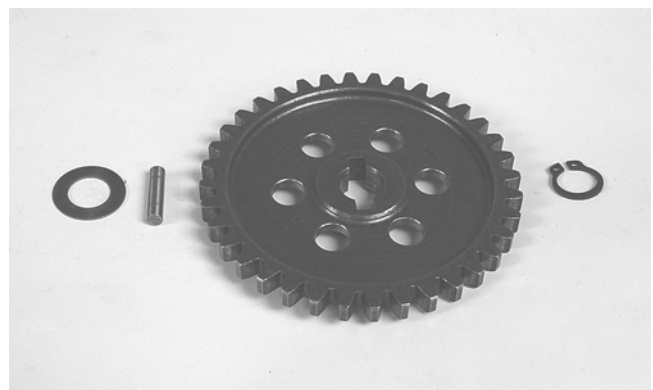
## Assembling Crankcase Half

1. Install the oil pump gerotor assembly and oil pump cover in the crankcase and secure with two cap screws. Coat the threads with red Loctite #271 and tighten securely to 8 ft-lb.



GZ305

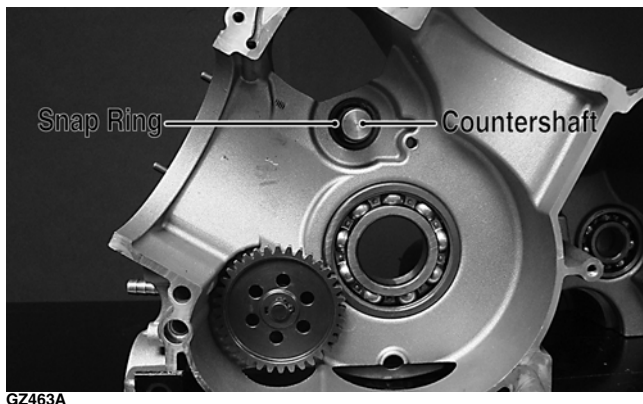
2. Install a flat washer, drive pin, and drive gear onto the oil pump shaft; then secure with a snap ring (flat-side away from the gear).



GZ347

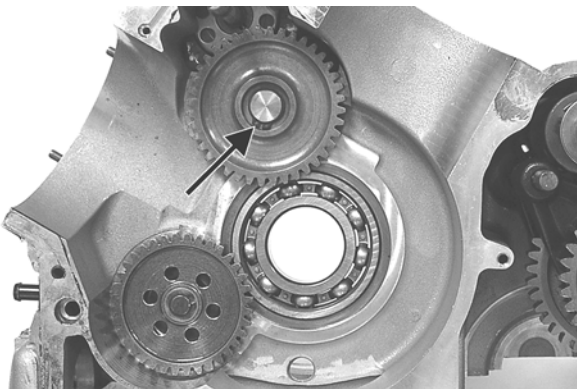
3. Install the countershaft into the crankcase and secure with the snap ring (flat side away from the bearing).

■NOTE: To aid in installing, install the open end of the snap ring over the flat surface of the water pump countershaft.



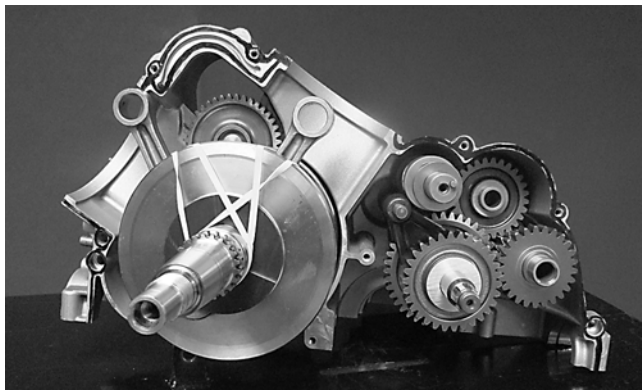
GZ463A

4. Install the countershaft gear onto the countershaft and secure with a snap ring (flat-side away from the gear).



GZ299A

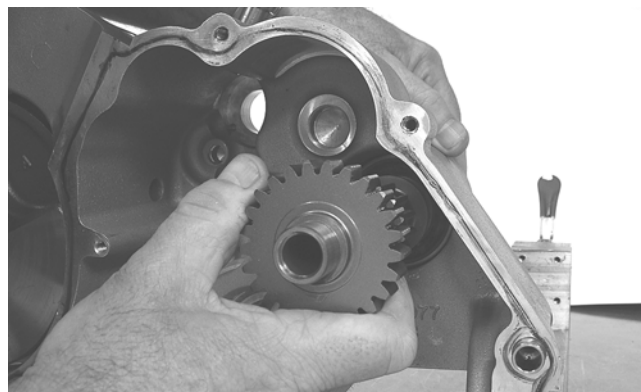
5. Using rubber bands to support the connecting rods, carefully install the crankshaft assembly into the crankcase.



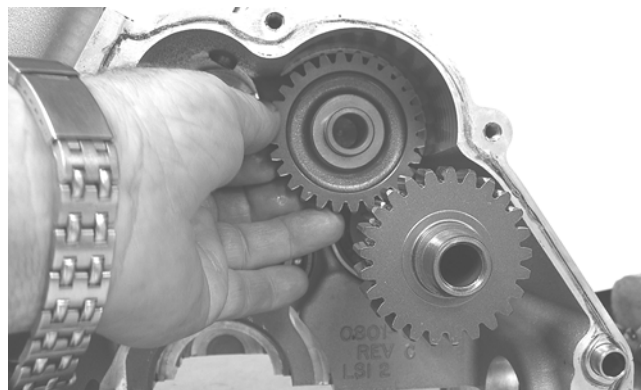
GZ474

■NOTE: It will be necessary to rotate the crankshaft back and forth to engage the teeth of the oil pump and countershaft gears.

6. Install the driveshaft; then with a flat washer on each end of the reverse idler assembly, install into the crankcase.



GZ332

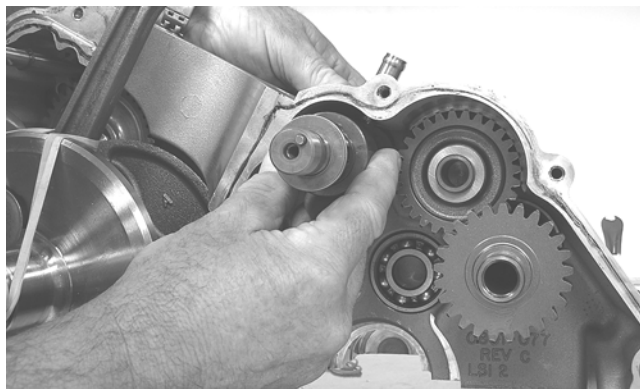


GZ333

7. Install the gear shift shaft into the crankcase making sure the flat washer is in place on the right case end and the spacer on the gear shift stop end.

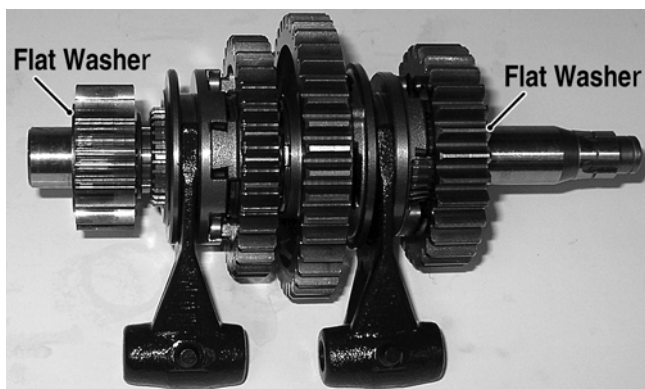


DE677A



GZ335

8. Place the larger flat washer on the drive gear end of the countershaft and the smaller flat washer on the high driven gear end; then with shift forks and shift fork shaft, install the countershaft assembly into the crankcase.

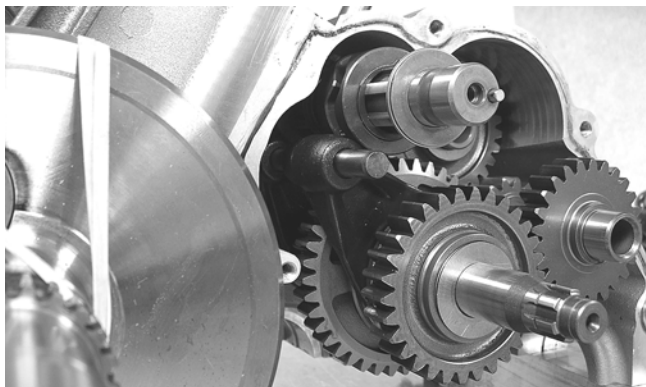


GZ280B



GZ336

9. Engage the shift forks into the gear shift shaft and push the shift fork shaft into the crankcase.



GZ339

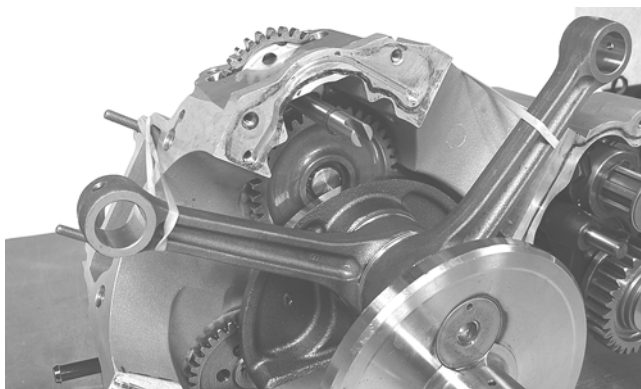
### **AT THIS POINT**

Proper transmission shifting should be verified by turning the gear shift shaft to select High, Low, Neutral, and Reverse while rotating the input shaft and observing the countershaft rotation.

The right-side crankcase is now ready for installation to the left-side crankcase.

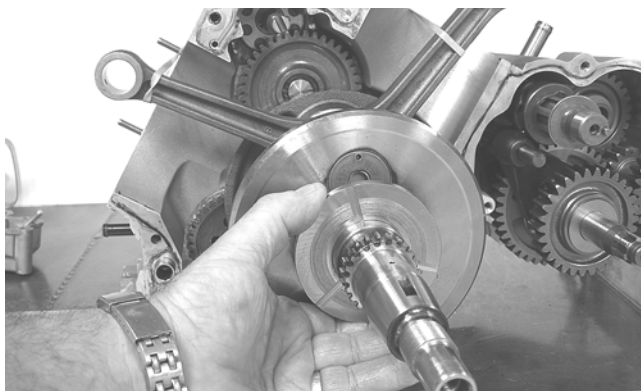
## **Joining Crankcase Halves**

1. Using rubber bands, support the connecting rods to align with the cylinder bores.



GZ340

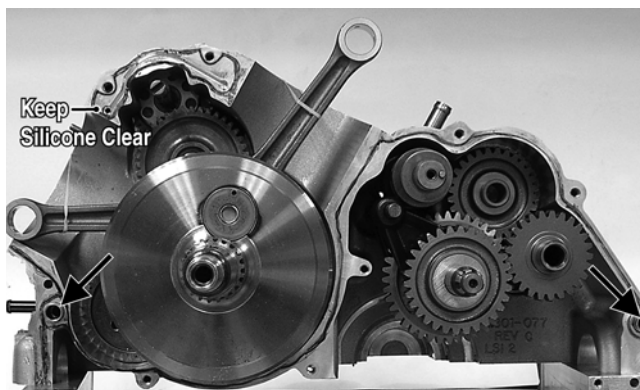
2. Coat both sides with engine oil; then install the spacer washer on the crankshaft with the radius directed toward the crankshaft.



GZ341

3. Install the two alignment pins; then apply a thin bead of silicone sealant to the crankcase mating surface.

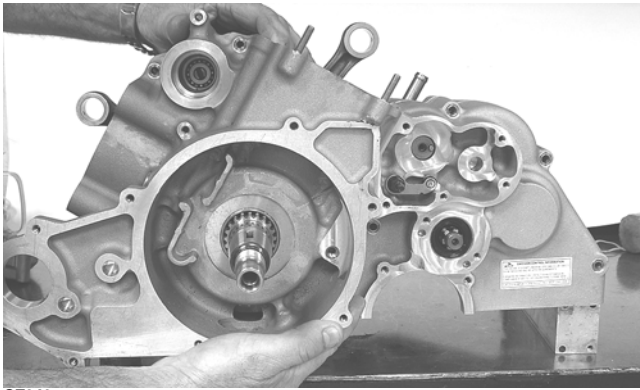
■ **NOTE:** When applying silicone, make sure to keep clear of all oil galleries and ports. Do not over-apply silicone.



GZ345C

4. Carefully join the crankcase halves by placing the left-side crankcase onto the assembled right side. Secure with the cap screws (eight left side and one right side).

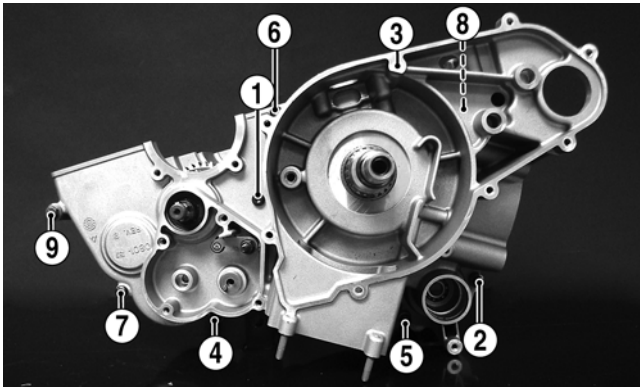




GZ342

5. Tighten the 6 mm cap screws to 8 ft-lb and the 8 mm cap screws to 21 ft-lb using the pattern shown and turning the shafts frequently to ensure there is no binding.

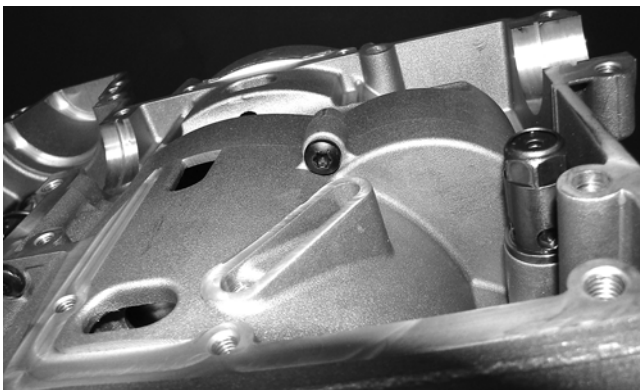
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.



GZ457A

■NOTE: Cap screw number eight (8) is installed from the right side.

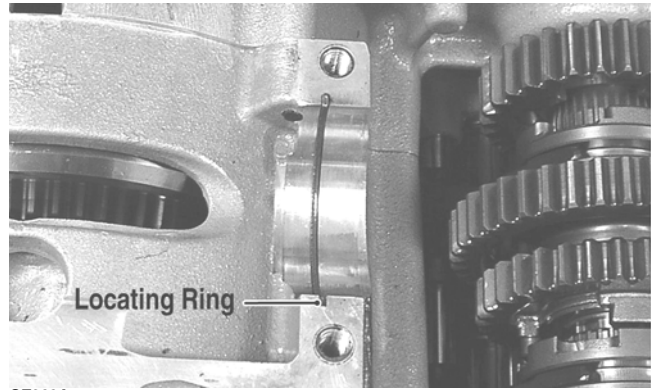
■NOTE: Cap screw number three (3) is installed from under the case halves on the magneto side.



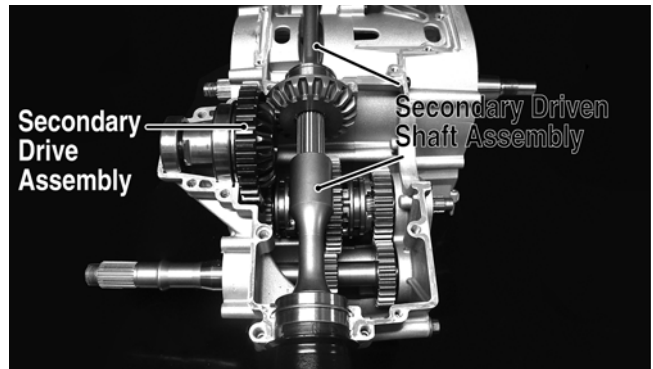
GZ455

■NOTE: If the secondary drive/driven assemblies have been disassembled, refer to Servicing Center Crankcase Components sub-section for proper gear tooth contact and backlash.

6. Install the locating ring in the crankcase assembly; then install the secondary driven shaft assembly and secondary drive assembly making sure the locating ring and bearing engage correctly.



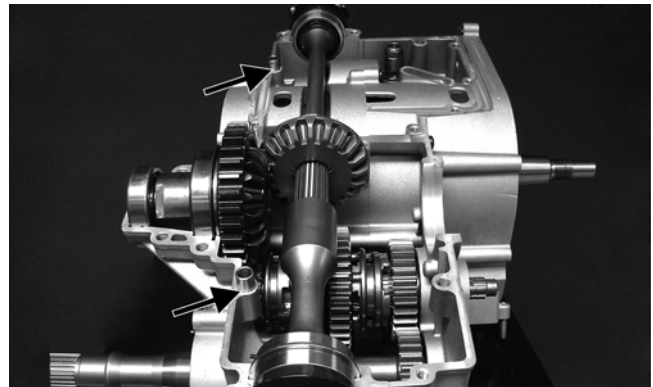
GZ269A



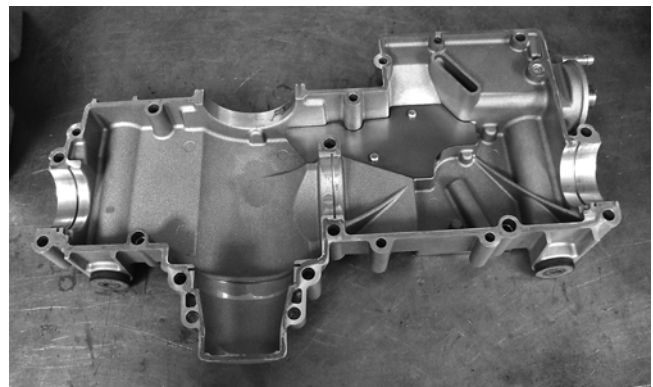
GZ448A

7. Make sure the locating pins on the front and rear bearings are correctly seated in the crankcase.

8. Install two alignment pins into the upper crankcase assembly; then apply a thin bead of silicone sealant to the lower crankcase cover.

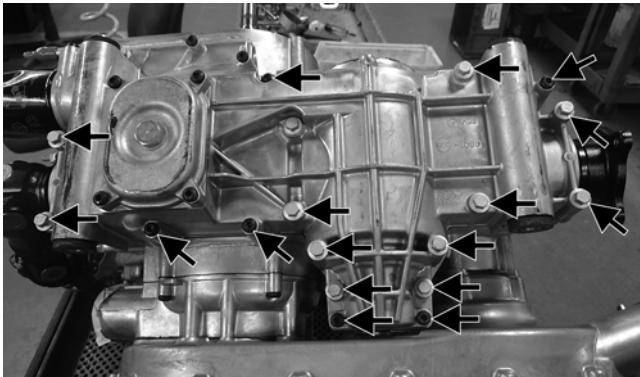


GZ452A



GZ451

9. Carefully place the lower crankcase cover onto the joined crankcase halves; then secure with the cap screws. Tighten the 6 mm cap screws to 8 ft-lb and the 8 mm cap screws to 20 ft-lb.

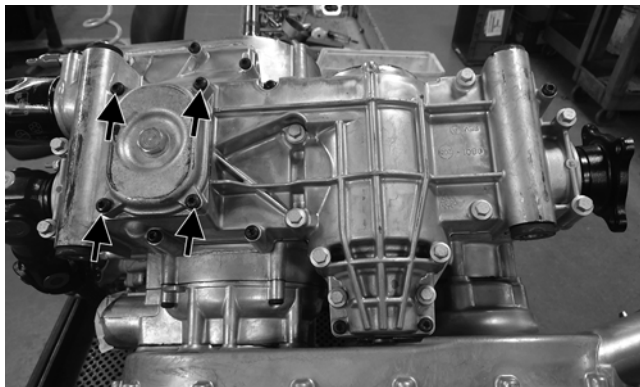


H2-012B

10. Install the oil screen; then apply a thin bead of silicone sealant to the oil strainer cap and secure with the cap screws. Tighten to 8 ft-lb.

### **AT THIS POINT**

After completing center crankcase components, proceed to Installing Right-Side Components, to Installing Left-Side Components, and to Installing Top-Side Components.



H2-012A

## **Installing Engine/Transmission**

■**NOTE:** Arctic Cat recommends new gaskets and O-rings be installed whenever servicing the vehicle.

1. Install the front exhaust pipe onto the engine with a new grafoil gasket but do not torque; then using a suitable engine hoist and equalizer sling, lower the engine into the vehicle.
2. Apply a liberal amount of molybdenum grease to the rear output splines and in the coupler boot; then align and engage the splines and coupler.



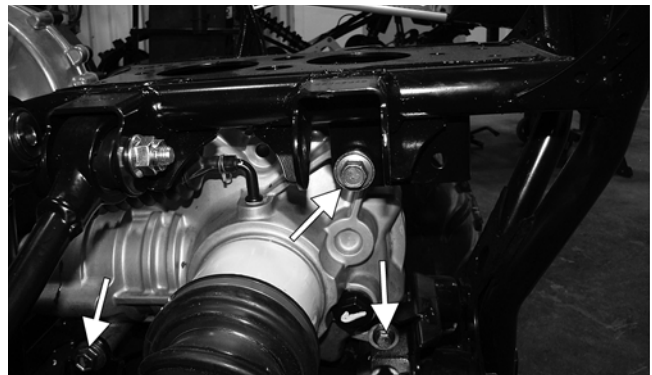
WC173A

3. Holding the engine rearward, lift the front drive shaft and loosely install at least one cap screw; then work the engine down into the mounting brackets.
4. Install the engine mounting through-bolts with flat washer, rear first; then front. Tighten new lock nuts to 40 ft-lb.
5. Support the rear of the vehicle; then remove the lateral link pivot bolt, drop the lateral link down, and install the upper through-bolt on the rear drive gear case. Reinstall the lateral link, secure with the bolt and tighten a new lock nut to 40 ft-lb.



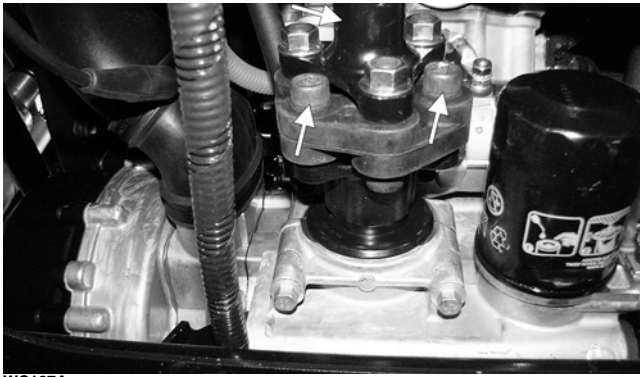
WC169A

6. Install the lower front through-bolt and the rear lower through bolt securing the rear drive gear case; then with new lock nuts, tighten the lower front through-bolt to 38 ft-lb, and the rear lower through bolt to 20 ft-lb.



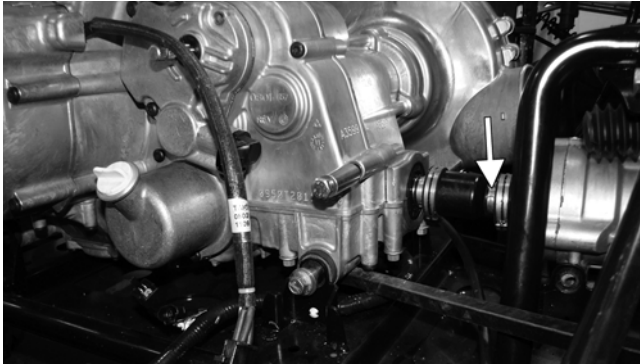
WC170A

7. Secure the front driveshaft to the front drive output flange using new "patch-lock" cap screws and tighten to 50 ft-lb; then connect the starter cable.



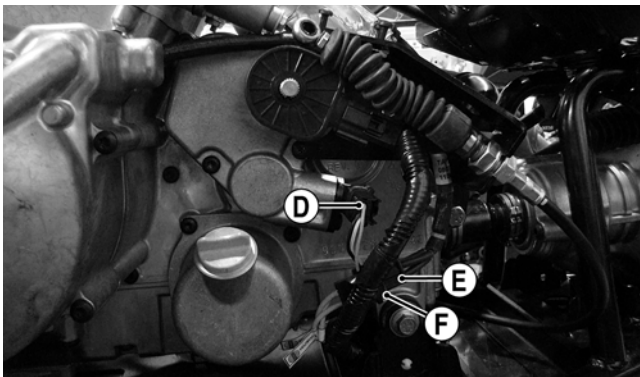
WC187A

8. Crimp the clamp onto the rear drive coupler boot.

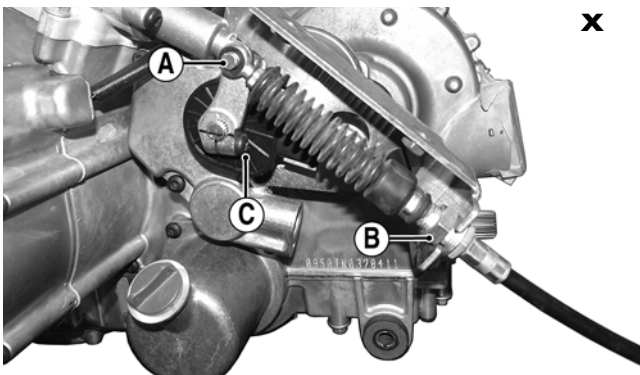


WC172B

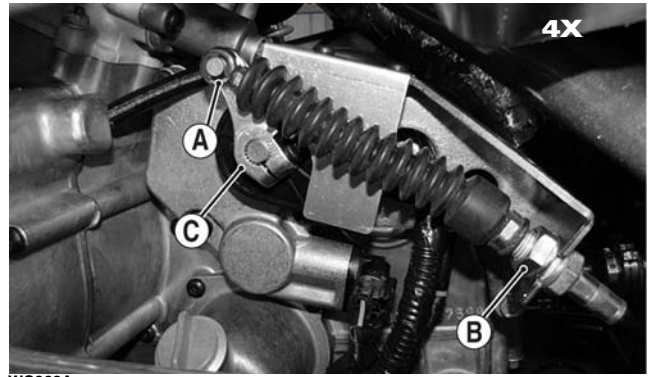
9. Connect the speed sensor (D), stator connector (E), and the CKP sensor (F); then install the gear shift cable onto the shift arm (C) and secure with the E-clip (A) and jam nut (B).



WC177A



WC925A



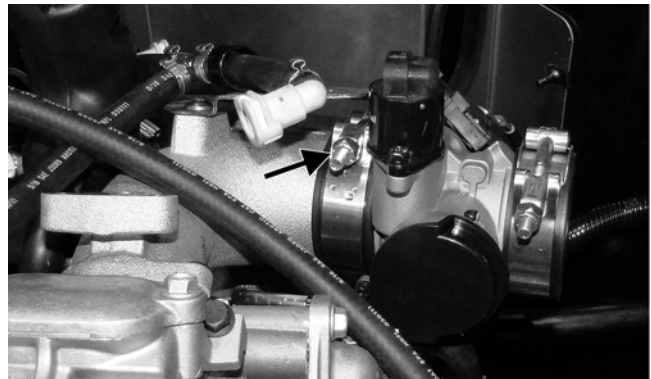
WC362A

10. Install the heat shield; tighten the fasteners to 20 ft-lb.

11. Making sure the tab on the throttle body aligns and fully engages the alignment slot on the intake boot, install the throttle body and tighten the clamp nut to 30 in.-lb; then install the engine ground cable and tighten to 8 ft-lb.



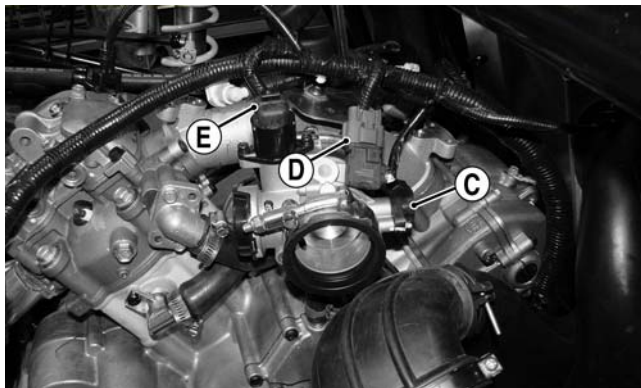
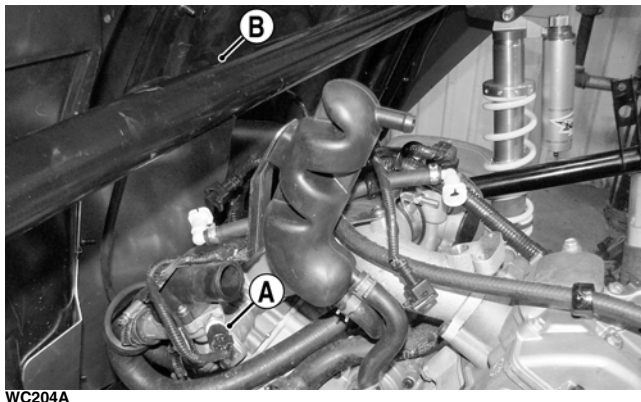
WC164A



WC210A

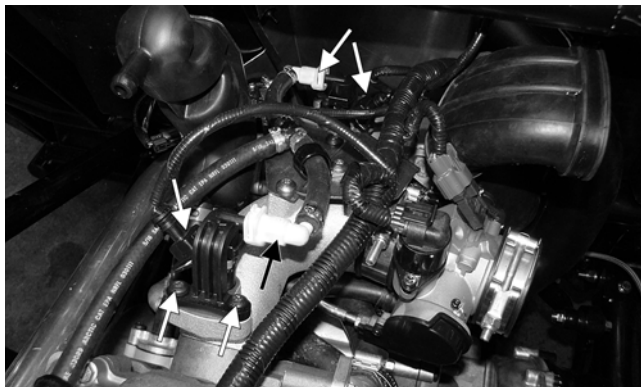
12. Connect the ECT connector (A), front coil primary connector (B), TPS connector (C), TMAP connector (D), and ISC connector (E).





13. Install the fuel rail with fuel injectors and secure with the cap screws. Tighten to 6 ft-lb.

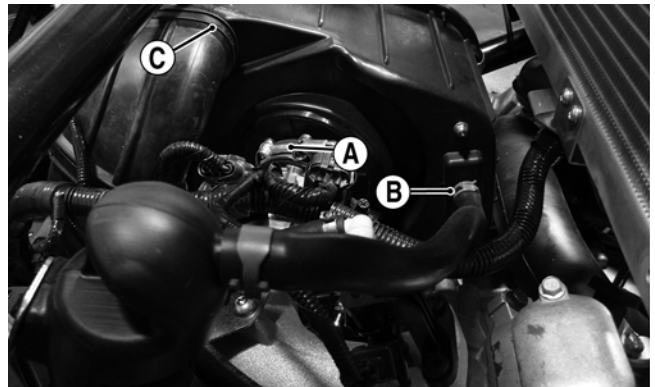
14. Connect the gas line connectors to the fuel rails and the electrical connectors to the fuel injectors.



15. Place the air inlet duct into position; then install the CVT intake cooling duct and secure with the clamp.



16. Set the air filter housing into place and secure with the three screws on the CVT housing and tighten to 6 ft-lb; then connect and secure the throttle body inlet air boot (A), crankcase breather hose (B), and inlet air duct (C). Tighten the intake boot clamp to 30 in.-lb and install the air filter housing strap.



17. Install the CVT cooling outlet duct; then with a new grafoil gasket, install the rear exhaust pipe and cap screws loosely.

18. Install the radiator/fan assembly and secure with the mounting screws; then connect and secure the coolant hoses with the clamps. Tighten securely.

19. Connect the fan connectors, rear spark plug cap, and rear coil primary connector.

20. Install the gas tank cradle and gas tank and secure with the hold down bracket; then connect the fuel hose and fuel pump/fuel level sensor connector.

21. Install the heat shield and secure with the appropriate fasteners; then install the cargo box supports and secure with the cap screws and new lock nuts. Tighten to 20 ft-lb.

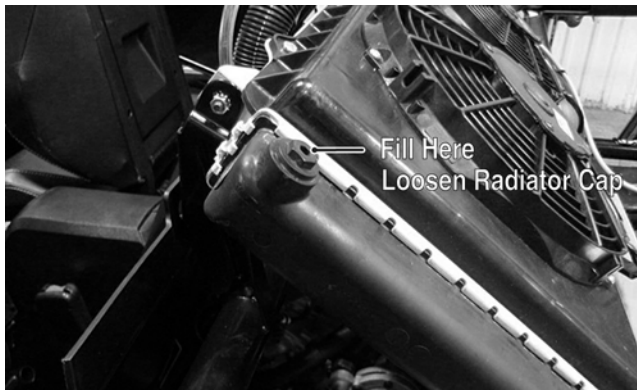
22. Install the muffler and secure with the spring; then tighten the front and rear exhaust pipe cap screws to 20 ft-lb.

23. Secure the rear wiring harness to the cargo box supports as indicated and connect the tail/brakelight connectors to the light housings.



24. Remove the plug on the radiator and fill the radiator with the recommended coolant allowing air to bleed from the loosened filler cap; then loosen the bleed screw on the water pump allowing air trapped in the engine to escape. Top off coolant and tighten all bleed points securely.

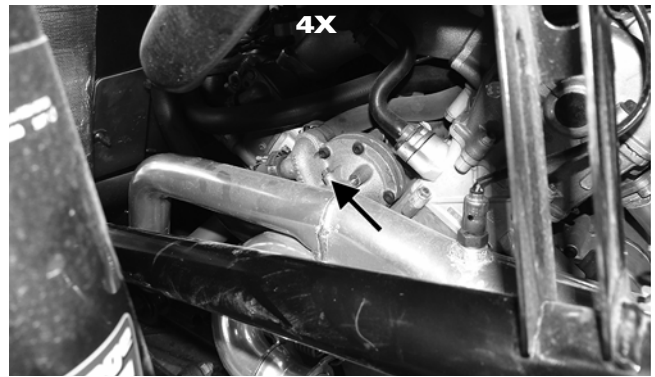




WC354A



WC205A



WC899A

25. Install the cargo box; then remove the cap from the gas fill hose and place the rear body panel into position. Secure the gas tank fill hose to the filler neck and secure with the clamp.
26. Secure the rear body panel with the appropriate fasteners; then pour in the prescribed engine oil and connect the negative battery cable. Install the battery cover and seats.
27. Start the engine allowing it to warm up for a few minutes; then shut the engine off and check for leaks. Check all fluid levels and correct as necessary.
28. On the 4X, install the rear center console; then install the seat belt anchors and rear splash panels.

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## Fuel/Lubrication/Cooling

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### WARNING

Whenever the gasoline hoses are removed (other than for pressure testing), the battery must be disconnected to prevent inadvertent activation of the electronic fuel pump.

### WARNING

Whenever any maintenance or inspection is performed on the fuel system during which there may be fuel leakage, there should be no welding, smoking, open flames, etc., in the area.

### SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this section. Refer to the current Special Tools Catalog for the appropriate tool description.

■NOTE: When indicated for use, each special tool will be identified by its specific name, as shown in the chart below, and capitalized.

Description	p/n
Oil Pressure Test Kit	0644-495
Tachometer	0644-275

■NOTE: Special tools are available from the Arctic Cat Service Department.

### TROUBLESHOOTING

1. Verify that the electric fuel pump is operating by listening for a “whirring” sound for approximately three seconds after the ignition switch is turned to the ON position. If no sound can be heard, see FUEL PUMP/FUEL LEVEL SENSOR in Electrical System.
2. Check for a diagnostic trouble code (DTC) on the LCD. If the light is flashing, see EFI Diagnostic System in Electrical System.
3. Make sure there is sufficient, clean gas in the gas tank.

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## Throttle Body

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### REMOVING

1. Turn the ignition switch to the OFF position; then remove the ignition switch key.

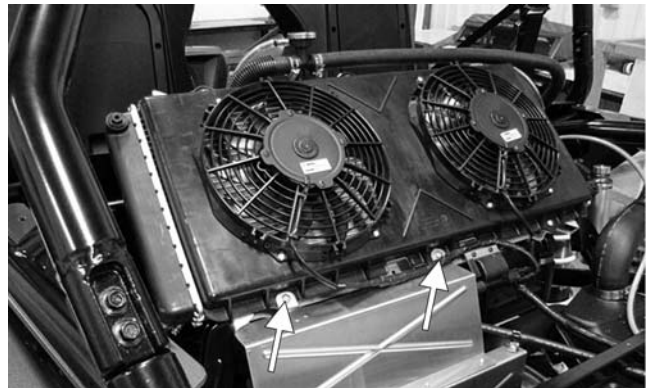
### WARNING

Do not turn the ignition switch to the ON position with the hoses removed. Gasoline will be pumped by the electric fuel pump causing a safety hazard.

2. Remove the left and right seats; then remove the battery cover and disconnect the battery.

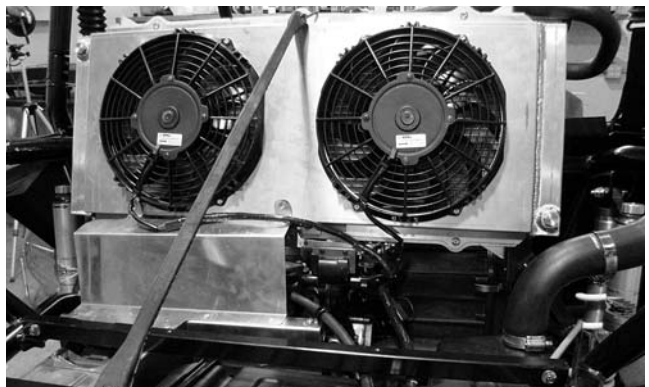
3. Remove the rear body panel; then remove the cargo box.

4. Remove the two screws securing the heat shield to the radiator/cooling fan assembly.



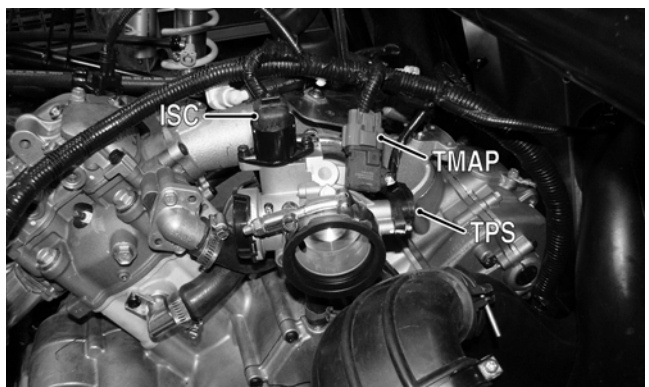
WC351B

5. Remove the two upper radiator support mounting screws; then, while holding the heat shield away from the radiator, tip the radiator back and secure with an appropriate holding strap such as a tarp strap.



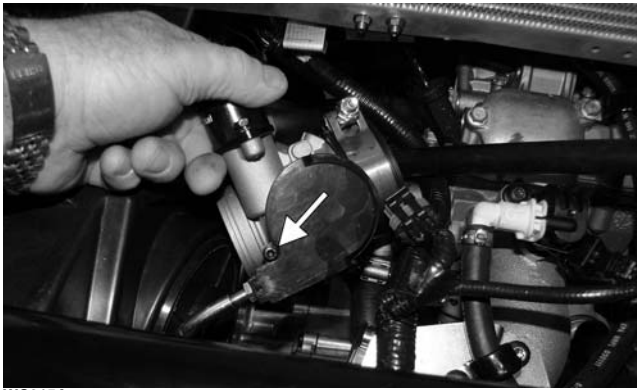
WC212

6. Remove the air filter housing strap. Loosen the air filter to throttle body clamp and pull the air filter assembly away from the throttle body; then disconnect the ISC, TMAP, and TPS connectors.



WC206B

7. Loosen the throttle body to intake clamp and remove the throttle body from the intake boot; then remove the screw from the throttle arm cover and disconnect the throttle cable from the throttle body.



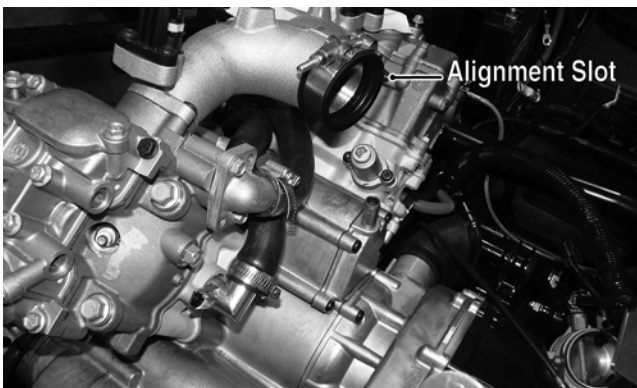
WC215A

## INSTALLING

1. Connect the throttle cable to the throttle arm; then install the throttle cable housing to the throttle body and secure the throttle arm cover with the screw.
2. Make sure the alignment tab on the throttle body aligns with the slot in the intake boot and install the throttle body fully into the boot. Tighten the clamp to 30 in.-lb.

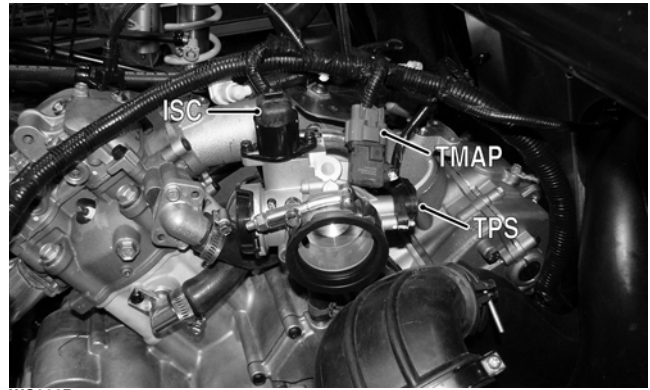


WC216A



WC164A

3. Install the wire connectors on the TPS, MAP/IAT, and TPS; then place the air filter outlet into the throttle body boot and tighten the clamp to 30 in.-lb. Install the air filter housing strap.



WC206B

4. Remove the holding strap and move the radiator back into position and secure with the mounting screws. Tighten securely.
5. Secure the heat shield and wiring harness anchors; then install the cargo box.
6. Install the rear body panel and secure with the appropriate fasteners; then connect the negative battery cable and install the battery cover and seats.

■**NOTE:** If the throttle body, ECM, TPS, or ISC are replaced, the EFI system must be synchronized. Use the following procedure.

1. With the key off, depress the accelerator pedal to Wide Open Throttle (WOT).
2. Place the ignition key in the ON position and wait for 10 seconds.
3. Release the accelerator pedal and wait an additional 10 seconds.
4. Turn the key to the OFF position and allow the gauge to shut off.

## Gas Tank

### **WARNING**

Whenever any maintenance or inspection is made on the fuel system during which there may be fuel leakage, there should be no welding, smoking, open flames, etc., in the area.

### REMOVING

1. Remove the seats and battery cover; then disconnect the negative battery cable.
2. Remove the rear body panel and cap off or tape the gas filler hose.
3. Remove the cargo box; then disconnect the tail/brakelight connectors and the fuel pump/fuel level sensor connector.
4. Remove the exhaust pipe to muffler springs and remove the muffler.
5. Pry the wiring harness anchors out of the cargo box supports and mark any wire tie locations; then set the harness out of the way.





WC179B

6. Remove the cargo box supports and the heat shield; then wrap a shop cloth around the gas line connector to catch any fuel spray and disconnect from the fuel pump.
7. Remove the gas tank hold-down bracket and remove the gas tank.

## INSTALLING

### **WARNING**

Whenever any maintenance or inspection is made on the fuel system during which there may be fuel leakage, there should be no welding, smoking, open flames, etc., in the area.

1. Place the gas tank into position on the cradle and secure with the hold-down bracket. Tighten the fasteners until the bracket is snug on the tank but not distorting it.
2. Place the heat shield into position; then install the cargo box supports and start but do not tighten all fasteners. After all fasteners are started, tighten securely.
3. Press the wiring harness anchors into the proper locations on the cargo supports and secure nylon ties where removed; then connect tail/brakelight connectors and fuel pump/fuel level connector.



WC179B

4. Install the muffler and secure with the four springs.
5. Install the cargo box; then install the rear body panel.
6. Connect the negative battery cable and install the battery cover; then set the seats in and lock into position.

## Oil Pump

■NOTE: Whenever internal engine components wear excessively or break and whenever oil is contaminated, the oil pump should be replaced.

### TESTING OIL PUMP PRESSURE

■NOTE: The engine must be warmed up to operating temperature (cooling fan cycling) for this test.

1. Remove the oil hose from the fitting nearest the oil filter base.



WC222A

2. Using a suitable "T" fitting, connect Oil Pressure Test Kit to the oil fitting and hose. Tighten all clamps securely.

■NOTE: Some oil seepage may occur when installing the oil pressure gauge. Wipe up oil residue with a cloth.

3. Place the transmission in park and start the engine. Allow the engine to warm up to operating temperature (with cooling fans cycling). Press and hold the brake pedal; then shift into neutral.
4. Set the speedometer/tachometer to RPM. With the engine running at 3000 RPM, the pressure gauge must show 1.05-1.2 kg/cm<sup>2</sup> (15-17 psi).
5. Remove the test kit from the vehicle and install the oil hose. Tighten the clamps securely.

■NOTE: If oil pressure is lower than specified, check for an oil leak, clogged oil filter, or defective oil pump.

■NOTE: If oil pressure is higher than specified, check for too heavy engine oil weight (see General Information/Foreword), clogged oil passage, or improper installation or type of the oil filter.

### REMOVING/DISASSEMBLING

1. Remove the oil pump from the engine (see Center Crankcase Components in Engine/Transmission).
2. Remove oil pump components from crankcase.

### CLEANING AND INSPECTING

1. Clean all oil-pump components.
2. Inspect the rotors for scoring and gouges.



3. Inspect the driveshaft and driven sprocket for damage.
4. Inspect the crankcase for scoring, cracks, or damage.

### ASSEMBLING/INSTALLING

1. Place the rotors into the crankcase making sure the dowel pin is in the groove of the rotor.
2. Place the cover onto the crankcase.
3. Secure the pump with the two cap screws coated with blue Loctite #243. Tighten to 8 ft-lb.

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## Oil Cooler

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### REMOVING

1. Remove the hood.
2. Loosen the clamps securing the oil hoses to the oil cooler; then place an absorbent towel under the connection and remove the hoses.
3. Remove the cap screws from the oil cooler mountings and remove the oil cooler.

### CLEANING AND INSPECTING

1. Prior to washing, inspect the oil cooler for signs of leaks such as oily dirt build-up.
2. Wash the cooling fins using a garden hose and hot, soapy water and a soft brush.
3. Inspect all mounting brackets and the oil inlet and outlet for cracks or bends.

### INSTALLING

1. Place the oil cooler into position and secure with the existing hardware. Tighten securely.
2. Connect the oil hoses and secure with the hose clamps. Tighten securely.
3. Install the hood.

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## Liquid Cooling System

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When filling the cooling system, use premixed Arctic Cat Antifreeze. While the cooling system is being filled, air pockets may develop; therefore, open the bleed screw on the upper coolant pipe or the water pump housing to allow air to bleed from the cooling system. When clear coolant (no bubbles) is present, tighten the bleed screw securely; then fill the cooling system to the bottom of the stand pipe in the radiator neck. Run the engine for five minutes after the initial fill, shut the engine off, and then "top-off" the cooling system to the bottom of the stand pipe in the radiator neck.

### CAUTION

After operating the vehicle for the initial 5-10 minutes, stop the engine, allow the engine to cool down, and check the coolant level. Add coolant as necessary.

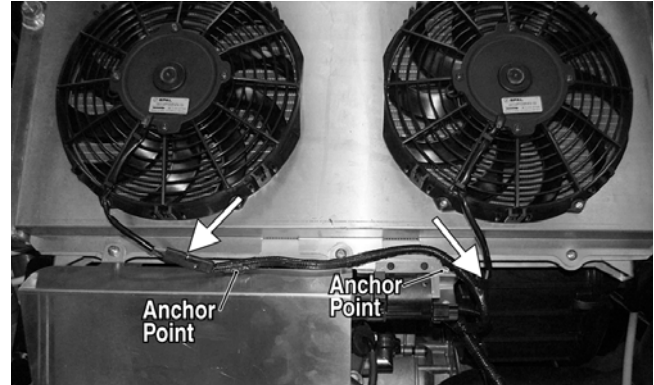
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## Radiator

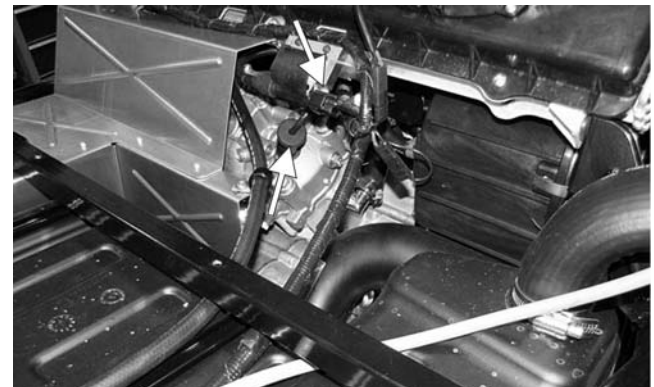
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### REMOVING

1. Remove the seats.
2. Remove the rear body panel (see Steering/Body/Controls) and cap the gas tank fill hose; then remove the cargo box (see Steering/Body/Controls).
3. Disconnect the cooling fan electrical connectors and pry the harness anchors from the radiator frame and coil bracket.



4. Remove the screws securing the heat shield to the radiator frame and disconnect the coil primary connector; then remove the spark plug wire from the spark plug.



5. Clamp the coolant hoses off; then loosen the coolant hose clamps.

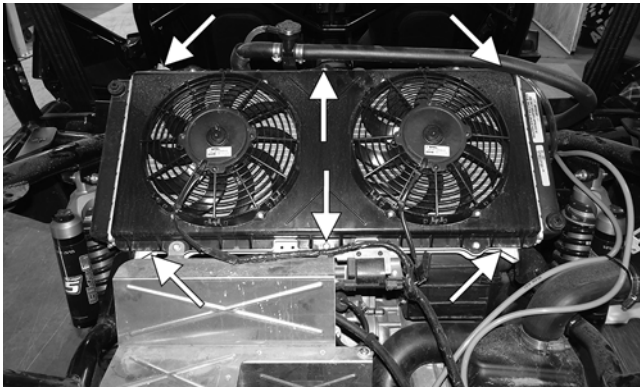




WC193

■**NOTE:** Note the routing of hoses and location of any ties used to secure hoses to frame.

6. Remove the fasteners securing the radiator to the frame weldments.



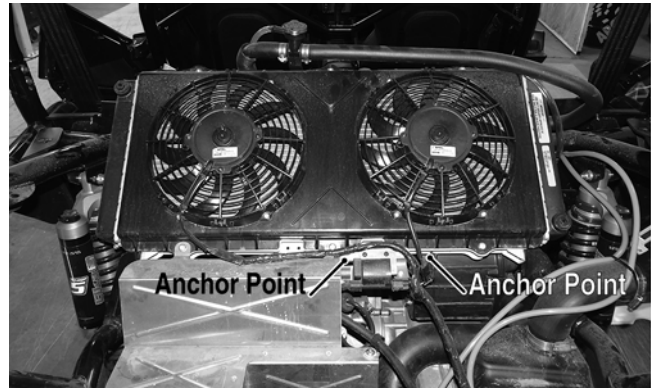
WC919A

7. Place absorbent towels under the hose connections; then remove the hoses.
8. Remove the radiator/fan assembly from the vehicle and drain remaining coolant from the radiator into a suitable container.

■**NOTE:** If the radiator is to be replaced, transfer the cooling fans, coolant hoses, coil, and attaching hardware to the replacement radiator.

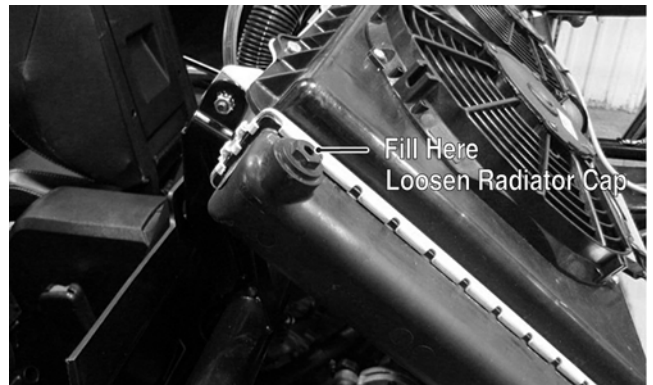
## INSTALLING

1. Place the assembled radiator/fan assembly into position in the frame weldments and loosely install the cap screws; then route the coolant hoses as noted when removing and secure with the appropriate hose clamps. Tighten the mounting cap screws securely.
2. Connect the spark plug wire and primary coil connector; then secure the heat shield to the radiator frame.
3. Connect the cooling fan connectors; then press the wiring harness anchors into the appropriate locations.



WC919B

4. Install the cargo box (see Steering/Body/Controls).
5. Pour the proper mixture and quantity of coolant into the radiator filler loosening the radiator cap to allow air to escape while filling.



WC354A

6. Start the engine and allow it to warm up while checking for leaks; then shut the engine off and check coolant level. Adjust as required.
7. Remove the cap from the gas tank fill hose and install the rear body panel and secure with the appropriate fasteners. Tighten the gas tank fill hose clamp securely.



WC186

8. Install and lock the seats into position.

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## Thermostat

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### REMOVING

■NOTE: The thermostat is located in a housing in-line with the upper radiator hoses under the radiator/fan assembly.

1. Clamp off the coolant hoses and place an absorbent towel under the thermostat.
2. Remove the four machine screws securing the thermostat housing together. Remove the thermostat and account for an O-ring.

### INSPECTING

1. Inspect the thermostat for corrosion or spring damage.
2. Using the following procedure, inspect the thermostat for proper operation.
  - A. Suspend the thermostat in a container filled with water.
  - B. Heat the water and monitor the temperature with a thermometer.
  - C. The thermostat should start to open at 71.0-86.0° C (160-187° F).
  - D. If the thermostat does not open, it must be replaced.
3. Inspect all coolant hoses, connections, and clamps for deterioration, cracks, and wear.

■NOTE: All coolant hoses and clamps should be replaced every four years or 4000 miles.

### INSTALLING

1. Place the thermostat and O-ring into the thermostat housing; then secure the thermostat housing together with the four machine screws.
2. Remove the clamp and fill the cooling system with the recommended amount of antifreeze. Check for leakage.

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## Fans

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### REMOVING

1. Remove the radiator.
2. Remove the fan assembly from the radiator.

### INSTALLING

1. Position the fan assembly on the radiator; then secure with existing hardware.

■NOTE: The fan wiring must be directed downward.

2. Install the radiator.

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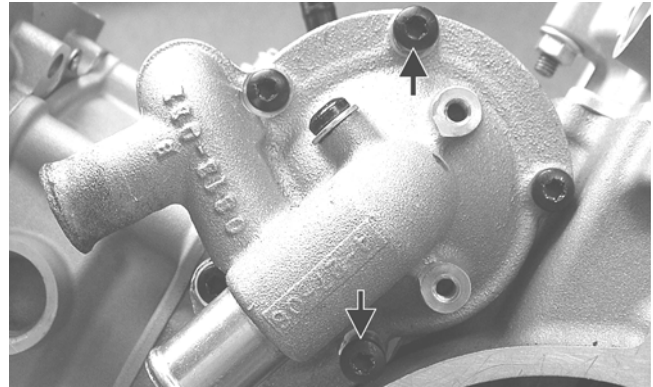
## Water Pump

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■NOTE: The water pump is a non-serviceable component. It must be replaced as an assembly.

### REMOVING

1. Clamp off and remove the coolant hoses from the water pump; then remove two cap screws securing the water pump to the crankcase.



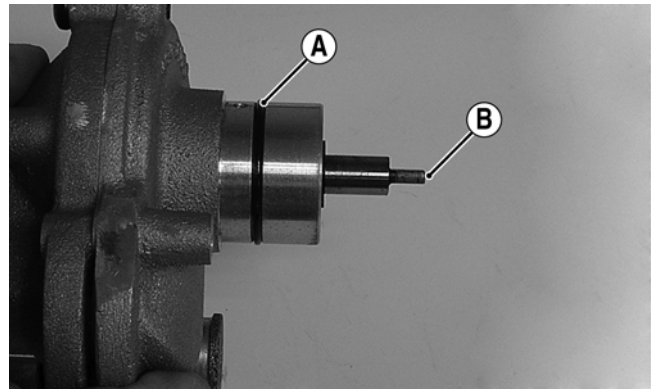
GZ230A

■NOTE: Always use a large container and have sufficient floor drying material available when draining the coolant in case of coolant spillage.

2. Remove the water pump from the engine.

### INSTALLING

1. Install a new O-ring (A) onto the water pump and lightly coat with clean engine oil.



GZ252E

2. Install the water pump assembly onto the engine aligning the flat drive on the water pump to the slot in the driven gear shaft (B).

### CAUTION

Do not force the water pump housing into the crankcase or severe engine damage may occur.

3. Secure the water pump with the two cap screws and tighten securely; then connect the coolant hoses and secure with hose clamps. Release the clamps used in removing.

■NOTE: The longer cap screw goes on top of the water pump.



4. Fill the cooling system with appropriate mixed coolant and install the radiator cap.
5. Start the engine and check for coolant leaks; then add coolant if necessary to proper level.

### CAUTION

After operating the Wildcat for the initial 5-10 minutes, stop the engine, allow the engine to cool down, and check the coolant level. Add coolant as necessary.

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## Troubleshooting

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Problem: Starting impaired	
Condition	Remedy
1. Gas contaminated	1. Drain gas tank and fill with clean gas
Problem: Idling or low speed impaired	
Condition	Remedy
1. TPS out of adjustment	1. Adjust TPS
Problem: Medium or high speed impaired	
Condition	Remedy
1. High RPM "cut out" against RPM limiter	1. Decrease RPM speed



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## Electrical System

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The electrical connections should be checked periodically for proper function.

### TESTING ELECTRICAL COMPONENTS

All electrical tests should be made using the CATT II or the Fluke Model 77 Multimeter. The CATT II can return data for certain components which are identified at the beginning of their respective sub-section. If any other type of meter is used, readings may vary due to internal circuitry. When troubleshooting a specific component, always verify first that the fuse(s) are good, that the LED(s) are good, that the connections are clean and tight, that the battery is fully charged, and that all appropriate switches are activated.

■NOTE: For absolute accuracy, all tests should be made at room temperature of 68° F.

■NOTE: Certain components and sensors can be checked by using the EFI diagnostic system and digital gauge (see EFI Diagnostic System in this section for more information).

### SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this section. Refer to the current Special Tools Catalog for the appropriate tool description.

■NOTE: When indicated for use, each special tool will be identified by its specific name, as shown in the chart below, and capitalized.

Description	p/n
Fluke Model 77 Multimeter	0644-559
Timing Light	0644-296
MaxiClips	0744-041
Diagnostic Harness	0486-219
CATT II	0544-029

■NOTE: Special tools are available from the Arctic Cat Service Department.

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## Battery

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Component data can be retrieved using the CATT II. Utilize the Sensor Data screen.

■NOTE: Preliminary checks may be performed on this component using the diagnostic mode on the LCD gauge (see EFI Diagnostic System in this section)

The battery is located in a compartment at the rear of the center console.

■NOTE: To access the battery box, the battery cover must be removed.

After being in service, batteries require regular cleaning and recharging in order to deliver peak performance and maximum service life. The following procedures are recommended for cleaning and maintaining sealed batteries. Always read and follow instructions provided with battery chargers and battery products.

■NOTE: Refer to all warnings and cautions provided with the battery or battery maintainer/charger.

Loss of battery charge may be caused by ambient temperature, ignition OFF current draw, corroded terminals, self discharge, frequent start/stops, and short engine run times. Frequent winch usage, snowplowing, accessory or light use, extended low RPM operation, short trips, and high amperage accessory usage are also reasons for battery discharge.

### Charging/Maintenance Charging

■NOTE: Arctic Cat recommends the use of the CTEK Multi US 800 for charging or the CTEK Multi US 3300 for battery maintenance charging. Maintenance charging is required on all batteries not used for more than two weeks or as required by battery drain.



800E

■NOTE: When charging a battery in the vehicle, be sure the ignition switch is in the OFF position.

1. Clean the battery terminals with a solution of baking soda and water.

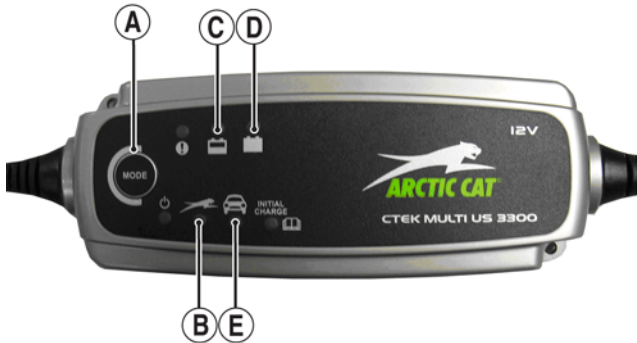
■NOTE: The sealing strip should NOT be removed and NO fluid should be added.

2. Be sure the charger and battery are in a well-ventilated area. Be sure the charger is unplugged from the 110-volt electrical outlet.
3. Connect the red terminal lead from the charger to the positive terminal of the battery; then connect the black terminal lead of the charger to the negative terminal of the battery.

■NOTE: Optional battery charging adapters are available from your authorized Arctic Cat dealer to connect directly to your vehicle from the recommended chargers to simplify the maintenance charging process. Check with your authorized Arctic Cat dealer for proper installation of these charging adapter connectors.

4. Plug the battery charger into a 110-volt electrical outlet.

5. If using the CTEK Multi US 800, there are no further buttons to push. If using the CTEK Multi US 3300, press the Mode button (A) at the left of the charger until the Maintenance Charge Icon (B) or Normal Charge Icon (E) at the bottom illuminates. the Normal Charge Indicator (C) should illuminate on the upper portion of the battery charger.



3300A

**NOTE:** For optimal charge and performance, leave the charger connected to the battery for a minimum 1 hour after the Maintenance Charge Indicator (D) illuminates. The maintainer/charger will charge the battery to 95% capacity at which time the Maintenance Charge Indicator (D) will illuminate and the maintainer/charger will change to pulse/float maintenance. If the battery falls below 12.9 DC volts, the charger will automatically start again at the first step of the charge sequence. If the battery becomes hot to the touch, stop charging. Resume after it has cooled.

**NOTE:** Not using a battery charger with the proper float maintenance will damage the battery if connected over extended periods.

6. Once the battery has reached full charge, unplug the charger from the 110-volt electrical outlet.

**NOTE:** If, after charging, the battery does not perform to operator expectations, bring the battery to an authorized Arctic Cat dealer for further troubleshooting.

## Electronic Power Steering (EPS)



Component data and system updates can be retrieved/performed using the CATT II. Navigate the screens as required.

The EPS system is an electro-mechanical device that utilizes 12 volt DC power to drive a motor linked to the steering shaft to assist the driver when rotating the steering wheel. Driver steering inputs are detected by a torque-sensing transducer assembly within the EPS housing. These inputs are converted to electronic signals by the transducer and control circuitry to tell the motor which way to drive the steering shaft. When no steering input (pressure on the steering wheel) is detected, no torque signal is generated, and no steering assist is provided by the motor.

If an electrical-related EPS system malfunction occurs, a diagnostic trouble code (DTC) will be displayed on the LCD gauge. Check for updates and verify any active DTCs using the most up-to-date CATT II software. The following is a list of DTCs, possible conditions, and causes.

**NOTE:** If no active codes are present on the LCD or verified through CATT II and the vehicle is experiencing steering-related issues, there may be a mechanical steering-related issue. In this case, the EPS is not be the cause of the issue. Components that may contribute to this type of issue could be abnormal tire wear, bad wheel bearings, ball joints, tie rod ends, tie rods, or bushings. Check the complete steering system for any sign of wear or misalignment.

**NOTE:** If any code C1306-C1315 or C1317-C1325 are active and verified with CATT II, EPS replacement is not necessary. Follow the instructions under "Fault Recovery Method" to correct the malfunction.

Code	Fault Description	Fault Condition	Possible Cause	EPS Fault Recovery Method
C1301	Over Current	EPS internal over-current condition has been detected	Internal EPS Condition	Correct EPS condition*
C1302	Excessive Current Error	EPS internal current measurement error has been detected	Internal EPS Condition	Correct EPS condition*
C1303	Torque Sensor Range Fault	EPS internal torque sensor range condition has been detected	Internal EPS Condition	Correct EPS condition*
C1304	Torque Sensor Linearity Fault	EPS internal torque sensor linearity condition has been detected	Internal EPS Condition	Correct EPS condition*
C1305	Rotor Position Encoder	EPS internal rotor position encoder condition has been detected	Internal EPS Condition	Correct EPS condition*
C1306	System Voltage Low	EPS battery power low-voltage condition has been detected	System voltage low (less than 11 VDC at the EPS). Wire harness issue, faulty voltage regulator, weak battery or loose battery terminals.	EPS will auto-recover when the battery supply returns to normal
C1307	System Voltage High	EPS battery power over-voltage condition has been detected	System voltage high (more than 16 VDC at the EPS). Wire harness issue, faulty voltage regulator or loose battery terminals.	EPS will auto-recover when the battery supply returns to normal
C1308	Temperature Above 110° C	EPS internal 110° C over-temp condition has been detected	Clean the EPS housing and cooling fins.	EPS will auto-recover when internal temperature drops below 105° C

Code	Fault Description	Fault Condition	Possible Cause	EPS Fault Recovery Method
C1309	Temperature Above 120° C	EPS internal 120° C over-temp condition has been detected	Clean the EPS housing and cooling fins.	EPS will auto-recover when internal temperature drops below 115° C
C1310	Vehicle Speed High	Vehicle speed signal received by the EPS exceeds the maximum speed specification	Intermittent main harness wires, defective speed-sensor, or intermittent speed sensor wires.	EPS will auto-recover when the vehicle speed signal drops below the maximum speed specification
C1311	Vehicle Speed Low	Vehicle speed signal received by the EPS is zero or missing	Broken main harness wires, defective speed-sensor, or broken speed sensor wires.	EPS will auto-recover when the vehicle speed signal returns to normal
C1312	Vehicle Speed Faulty	Vehicle speed CAN signal received by the EPS incorrect or missing	Broken main harness CAN wires, defective speed-sensor, or broken speed sensor wires.	EPS will auto-recover when the vehicle speed signal returns to normal
C1313	Engine RPM High	Engine RPM signal received by the EPS exceeds the maximum RPM specification	Intermittent main harness RPM wires, intermittent voltage regulator, intermittent ACG stator wires.	EPS will auto-recover when engine RPM signal drops below the maximum RPM specification
C1314	Engine RPM Low	Engine RPM signal received by the EPS suddenly dropped below 500 RPM	Handlebar switch in the "OFF" position, broken main harness RPM wires, defect voltage regulator, broken ACG stator wires.	EPS will auto-recover when engine RPM signal returns to normal
C1315	Engine RPM Faulty	Engine RPM CAN signal received by the EPS incorrect or missing	Broken main harness CAN wires or defective ECM.	EPS will auto-recover when engine RPM signal returns to normal
C1316	EEPROM Error	EPS internal memory error has been detected	Internal EPS condition	Correct EPS condition*
C1317	CAN Bus Error	The EPS has lost CAN communication with the EFI ECM	Broken CAN wires in the main harness. EFI ECM connector has been disconnected.	Correct EPS condition*
C1318	Internal CRC Error	EPS internal CRC calculation condition has been detected	EPS reflash has failed. Battery power was lost, or the key switch was turned off, during EPS reflash programming.	EPS must be reprogrammed
C1319	Boot Counter Exceeded	EPS internal application code condition has been detected	Intermittent power has prevented a successful application code launch.	Correct EPS power condition*
C1320	Incorrect Vehicle Speed-to-RPM Ratio	Vehicle speed signal received by the EPS exceeds 10 MPH, but the engine RPM signal less than 500 RPM	Intermittent or broken main harness RPM wires, intermittent voltage regulator, intermittent or broken ACG stator wires.	Correct EPS condition*
C1321	Vehicle Speed Erratic	Vehicle speed signal received by the EPS changing at an unrealistic rate	Intermittent main harness, intermittent speed sensor, dirty speed sensor or trigger wheel.	Correct EPS vehicle speed signal condition*
C1322	Engine RPM Lost	Engine RPM signal received by the EPS exceeds 500 RPM and then is zero or missing	Handlebar switch in the "OFF" position, broken main harness RPM wires, defect voltage regulator, broken ACG stator wires.	EPS will auto-recover when engine RPM signal returns to normal
C1323	"EPS OFF" Gauge Display	Battery power has been applied to the EPS for more than 5-minutes, but no engine RPM signal has been detected	The EPS has been automatically disabled, after 5-minutes of inactivity, to conserve battery power.	EPS will auto-recover when engine is started or the key switch is cycled On-Off-On
C1324	Loss of CAN communication with EPS unit	The gauge has lost CAN communication with the EPS	Broken CAN wires in the main harness or disconnected EPS. This is not an EPS generated DTC; gauge DTC display only.	Gauge DTC display will clear when the EPS-to-gauge CAN communication is restored.
C1325	Dual Loss	EPS loss of both the vehicle speed and the engine RPM signals has been detected	Handlebar switch in the "OFF" position, the engine stalled (key switch "ON"), broken harness wires, loss of CAN data signal.	EPS will auto-recover when either the vehicle speed or engine RPM signal is restored.
C1326	Rotor Position Encoder	EPS internal rotor position encoder variance condition has been detected	Internal EPS Condition	Correct EPS condition*
C1327	Voltage Converter Error (Low)	EPS internal voltage converter low-voltage condition has been detected	Internal EPS Condition	Correct EPS condition*
C1328	Voltage Converter Error (High)	EPS internal voltage converter over-voltage condition has been detected	Internal EPS Condition	Correct EPS condition*
C1329	Internal Data Error	EPS internal preloaded data condition has been detected	Internal EPS Condition	EPS must be reprogrammed

\* After correcting condition, cycle key switch On-Off-On

## TROUBLESHOOTING

■NOTE: The EPS assembly is not serviceable and must not be disassembled or EPS warranty will be voided.

1. Check 30-amp EPS fuse and EPS relay (primary coil: 150 ohms  $\pm$  10%, secondary coil <1 ohm).
2. With the ignition off, disconnect 2-pin connector on the EPS assembly and connect a volt meter set to DC voltage to the harness (black meter lead to BLK and red meter lead to ORG/BRN). With the ignition switch in the ON position, the meter must read more than 8.5 DC volts (if correct voltage is not present, check connections and wiring harness).

## CAUTION

Do not attempt to check resistance of the EPS motor (2-pin input receptacle). There are internal capacitors holding a charge that can cause internal damage to an ohmmeter.

3. With ignition switch off, disconnect the 8-pin connector on the EPS assembly and connect a volt meter set to DC voltage to the harness (red meter lead to the ORG wire and black meter lead to battery ground.) With the ignition switch in the on position, the meter must read more than 8.5 DC volts (if correct voltage is not present, check for loose fittings or connections in the wiring harness).

4. With the ignition off, disconnect the battery leads from the battery. Carefully remove the connector from the ECM. Disconnect the 8-pin connector from the EPS assembly. Check for resistance on the Grey/Yellow wire (EPS to ECM); then check for resistance on the White/Grey wire (EPS to ECM). For each wire, the meter should read less than one ohm. If readings are erratic or out of specification, check the physical condition of the pins, connectors, and wires. Repair or replace as necessary.

### CAUTION

Never disconnect the ECM connector with the battery cables installed onto the battery.

■NOTE: If after completing the preceding tests and possible solutions with normal results, an EPS issue persists with active DTCs C1301-C1305,1316, or C1326-C1329 confirmed by CATT II, the EPS assembly must be replaced (see Steering/Body/Controls).

## Ignition Switch

To access the ignition switch, dash switches, front accessory connectors, and front switched accessory connector, the dash must be unfastened and slid to the rear.

### VOLTAGE

1. Set the meter selector to the DC Voltage position.
2. Connect the red meter lead to the red wire; then connect the black meter lead to ground.
3. Meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, troubleshoot the main 30 amp fuse, the battery, or the main wiring harness.

4. Connect the red meter lead to the brown/black wire; then with the black lead grounded, turn the ignition switch to the ON position. The meter must show battery voltage.
5. Connect the red meter lead to the yellow/green wire; then with the black lead grounded, turn the ignition switch to the START position. The starter should engage and the meter must show battery voltage.

■NOTE: When the starter is engaged, battery voltage will be approximately 10.5 DC volts.

## Ignition Coil

The ignition coils are mounted to the lower radiator frame (rear cylinder) and the forward heat shield (front cylinder). Remove the rear body panel and cargo box to access the coils.

### Primary Voltage

1. Set the meter selector to the DC Voltage position; then disconnect the connector from the coil to be tested.

2. Connect the red tester lead to the orange wire and the black tester lead to ground.
3. Turn the ignition switch to the ON position. The meter must show battery voltage.

### Secondary Voltage

1. Connect the primary ignition coil connector. Remove the spark plug cap from the spark plug.
2. Connect the spark plug cap to Ignition Test Plug or other suitable tool; then ground the tool away from the spark plug hole. While turning the engine over, check for sufficient spark.

### RESISTANCE

### CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■NOTE: For this test, the meter selector should be set to the OHMS position.

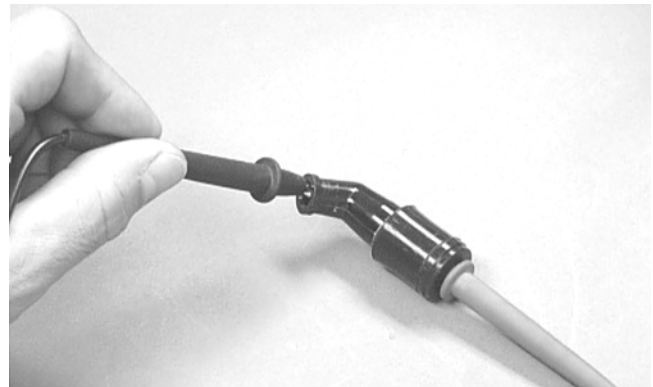
### Primary Winding

1. Disconnect the primary connector and connect the red tester lead to one terminal; then connect the black tester lead to the other terminal.
2. The meter reading must be within specification.

■NOTE: Secondary coil resistance checks are not recommended. An internal diode in the coil prevents accurate secondary resistance measurements.

### Spark Plug Cap

1. Connect the red tester lead to one end of the cap; then connect the black tester lead to the other end of the cap.



AR603D

2. The meter reading must be within specification.

■NOTE: If the meter does not show as specified, replace the spark plug cap.

## Ignition Timing

The ignition timing cannot be adjusted; however, verifying ignition timing can aid in troubleshooting other components. To verify ignition timing, use the following procedure.



■**NOTE:** To check ignition timing, the seats and center console must be removed.

1. Attach the Timing Light to the spark plug high tension lead; then remove the timing inspection plug from the left-side crankcase cover.
2. Start the engine and using the RPM function on the speedometer/tachometer, run at 1500 RPM; ignition timing should be 10° BTDC.
3. Install the timing inspection plug.

If ignition timing cannot be verified, the rotor may be damaged, the key may be sheared, the trigger coil bracket may be bent or damaged, or the ECM may be faulty.

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## Accessory Receptacle/Connector

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■**NOTE:** This test procedure is for either the receptacles or the connectors.

### VOLTAGE

1. Turn the ignition switch to the ON position; then set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the positive connector; then connect the black tester lead to the negative connector.
3. The meter must show battery voltage.

■**NOTE:** If the meter shows no battery voltage, troubleshoot the fuse, receptacle, connector, or the main wiring harness.

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## Switches

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### VOLTAGE (Brakelight)



Component data can be retrieved using the CATT II. Utilize the Sensor Data screen.

The switch connectors are spade-type connectors on the side of the master cylinder.

■**NOTE:** The ignition switch must be in the ON position.

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the orange wire; then connect the black tester lead to the red/blue wire.



WC002B

3. The meter must show battery voltage.

■**NOTE:** If the meter shows no battery voltage, troubleshoot the EFI fuse, EFI relay, switch, or the main wiring harness.

■**NOTE:** If the meter shows battery voltage, the main wiring harness is good; proceed to test the switch/component and the connector.

### RESISTANCE (Brakelight)

■**NOTE:** The brake pedal must be depressed for this test.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one terminal; then connect the black tester lead to the other terminal.
3. When the pedal is depressed, the meter must show less than 1 ohm.

■**NOTE:** If the meter shows more than 1 ohm of resistance, replace the switch.

### VOLTAGE (Headlight)

1. Connect the red meter lead to the red/black wire; then connect the black meter lead to the black wire.
2. Turn the ignition switch to the ON position. The meter must show battery voltage.

■**NOTE:** If the meter does not show battery voltage, troubleshoot the LIGHTS fuse on the power distribution module, the ignition switch, or the main harness.

3. Connect the red meter lead to the yellow wire; then select the high beam position on the headlight switch. The meter must show battery voltage.
4. Connect the red meter lead to either of the two gray wires; then select the low beam position on the headlight switch. The meter must show battery voltage.

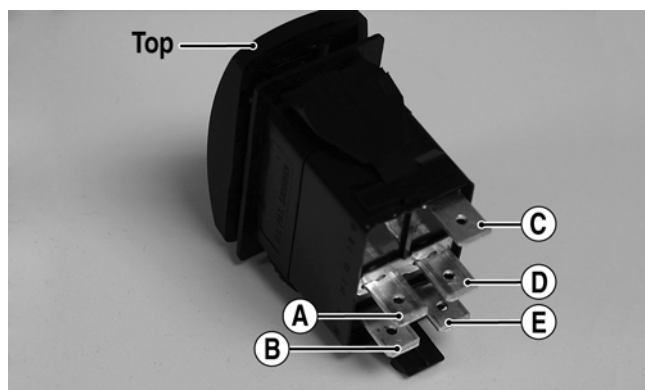
■**NOTE:** The battery voltage will show lower in steps 3 and 4 due to electrical loading of the headlights.

### RESISTANCE (Drive Select)

1. Remove the switch assembly from the dash; then disconnect the harness from the switch.

■**NOTE:** The switch can be removed from the dash using a thin, flat pry bar or suitable putty knife. It is not necessary to remove the dash to remove the switch.

- Using an ohmmeter, the following readings must be observed ( $\pm 5\%$ ).



PR566A

2WD	4WD	DIFFERENTIAL LOCK
A to D <1 ohm	A to D <1 ohm	A to D <1 ohm
C to E 48 ohms	C to E 48 ohms	C to E 48 ohms
A to B Open	A to B <1 ohm	A to B <1 ohm
A to C Open	A to C Open	A to C 48 ohms
A to E Open	A to E Open	A to C <1 ohm

### VOLTAGE (Drive Select)

■NOTE: Voltage tests must be made with the switch and the actuator connected. The meter can be connected at the actuator connector using a break-out harness or MaxiClips.

- Connect the black tester lead to the black wire; then turn the ignition switch to the ON position.
- Select the DC Volts position on the tester and observe the meter readings for each of the three switch positions.

WIRE COLOR	2WD	4WD	DIFFERENTIAL LOCK
Red to Orange	12.0 DC Volts	12.0 DC Volts	12.0 DC Volts
Red to White/Green	11.5 DC Volts	0 DC Volts	0 DC Volts
Red to White/Orange	11.5 DC Volts	11.5 DC Volts	0 DC Volts

■NOTE: If the meter does not show voltages according to the chart, make sure the front drive actuator is plugged in; then troubleshoot the switch, ignition fuses, battery connections, or wiring harness.

■NOTE: If the meter does not show 0 DC volts, rock the vehicle to help engage the differential lock; then troubleshoot the drive select switch.

### VOLTAGE (Reverse Override)

■NOTE: To perform the following tests, the ignition switch must be in the ON position and the transmission shifted into reverse gear.

- Connect the red meter lead to the red/green wire and the black meter lead to a suitable ground; then select 2WD on the drive select switch. The meter will typically show battery voltage.
- Depress the reverse override switch. The meter must show less than 1 DC volt.
- Select 4WD on the drive select switch. The meter will typically show battery voltage.

- Depress the reverse override switch. The meter must show less than 1 DC volt.

## Fan Motor



This component can be tested using the CATT II. Utilize the Test screen.

■NOTE: To determine if the fan motor is good, connect the red wire from the fan connector to a 12 volt battery; then connect the black wire from the fan connector to ground. The fan should operate.

### WARNING

Care should be taken to keep clear of the fan blades.



WT558A

■NOTE: Fan motor resistance checks are not recommended. Resistance values change with the motor commutator position.

## Lights

### VOLTAGE (Headlights)

The connectors are the two 3-prong ones secured to the headlight assemblies (one on each side).

- Set the meter selector to the DC Voltage position.
- Set the light switch to the correct position for the affected light; then connect the black tester lead to the black wire using a MaxiClip.
- Connect the red tester lead to the yellow/black wire (high beam) or white wire (low beam) using a MaxiClip. The meter must show battery voltage.

■NOTE: If battery voltage is not shown in any test, inspect the LIGHTS fuse on the power distribution module, headlight switch, ignition switch, switch connectors, or wiring harness.

## VOLTAGE (Taillight)

■NOTE: Perform this test at the socket end of the taillight-brakelight harness (pigtail). The ignition switch must be in the ON position and either high beam or low beam selected on the light switch.

1. Set the meter selector to the DC Voltage position.
2. Connect the black tester lead to the black wire; then connect the red tester lead to the white wire.
3. With the ignition key ON and the switch in the HI or LOW position, the meter must show battery voltage.

■NOTE: If battery voltage is not shown and the headlights are illuminated, inspect the three-wire connector in the left-rear canopy tube at the juncture of the canopy tube and lower frame. If battery voltage is shown on the meter, replace the LED.

## VOLTAGE (Brakelight)

■NOTE: Perform this test at the socket end of the taillight/brakelight harness (pigtail). The ignition switch must be in the ON position.

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the red/blue wire; then connect the black tester lead to the black wire.
3. With the brake applied, the meter must show battery voltage.

■NOTE: If the meter shows no voltage, inspect the 10 amp ignition (IGN) fuse, brakelight switch, wiring harness, or connectors.

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## Power Distribution Module (PDM)

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### FUSES/RELAYS

■NOTE: To access fuses and relays, compress the locking tabs on either side of the PDM cover and lift off.

The fuses are located in a power distribution module under the passenger's seat. If there is any type of electrical system failure, always check the fuses first.

The 4-pin relays are identical plug-in type located on the power distribution module. Relay function can be checked by switching relay positions. The 4-pin relays are interchangeable.

■NOTE: The module and wiring harness are not a serviceable component and must be replaced as an assembly.

1. Remove a fuse from the power distribution module.
2. Set the meter selector to the DC Voltage position.
3. Connect the black tester lead to ground.
4. Using the red tester lead, contact each end of the fuse holder connector terminals individually.

5. The meter must show battery voltage from one side of the connector terminal ends.

■NOTE: Battery voltage will be indicated from only one side of the fuse holder connector terminal; the other side will show no voltage.

■NOTE: When testing the HI fuse holder, the headlight OFF/HI/LO switch must be in the HI position; when testing the LIGHTS fuse holder, the headlight dimmer switch can be in either the HI or LO position.

■NOTE: If the meter shows no battery voltage, troubleshoot the battery, switches, power distribution module, or the main wiring harness.



2411-883

This vehicle uses automotive-style (see-through) fuses. The fuses can be visually inspected; replace fuse if link is open.

### CAUTION

Always replace a blown fuse with a fuse of the same type and rating.

■NOTE: Make sure the fuses are returned to their proper position according to amperage. Refer to the amperage listed under each fuse on the power distribution module.

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## EFI Sensor/Components

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### FUEL INJECTOR



Component data can be tested using the CATT II. Utilize the Test screen.

### Voltage

Remove the connector from the fuel injector. Place the red meter lead to the orange wire and black meter lead to ground. With the ignition switch in the on position the meter must read battery voltage.

### Resistance

With the connector still removed from the injector, place the red meter lead to either terminal; then connect the black tester lead to the other terminal. Reading is typically 12 ohms.

■NOTE: If voltage is not present, troubleshoot the battery, connector pins, wiring harness, fuses, or relay. If resistance is not present or largely out of specification, replace the injector.

## CRANKSHAFT POSITION SENSOR

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the brown wire; then connect the black tester lead to the white wire. The meter reading must be within specification.

■NOTE: The battery must be at full charge for these tests.

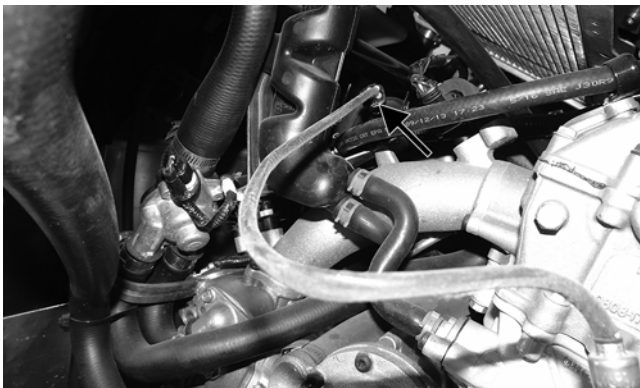
3. Set the meter selector to the AC Voltage position.
4. Connect the red tester lead to the brown wire; then connect the black tester lead to the white wire.
5. Crank the engine over using the electric starter.
6. The meter reading must be within specification.

## OXYGEN (O2) SENSOR

The sensor is located in the exhaust pipe.

■NOTE: The ambient temperature of the engine and in the intake and exhaust system must be at room temperature (approximately 68° F) when performing this test or an incorrect reading will occur.

1. On the left rear side of the vehicle, unplug the connector.



WC897A

2. On the sensor side of connector, connect the black (negative) test lead to one white wire pin; then connect the red (positive) test lead to the other white wire pin.
3. With the meter in the OHMS position, the reading should be between 6.7-10.1 ohms.

■NOTE: If the meter does not read as specified, replace sensor.

## TEMPERATURE/MANIFOLD ABSOLUTE PRESSURE (TMAP) SENSOR



Component data can be retrieved using the CATT II. Utilize the Sensor Data screen.

■NOTE: Preliminary checks may be performed on this component using the diagnostic mode on the LCD gauge (see EFI Diagnostic System in this section).

■NOTE: The ambient temperature of the engine and in the intake and exhaust system must be at room temperature (approximately 68° F) when performing this test or an incorrect reading will occur.

1. Disconnect the sensor connector from the sensor located on top of the throttle body.
2. Select DC Voltage on the tester and turn the ignition switch to the ON position.
3. Connect the black tester lead to the pink/black wire and the red tester lead to the orange/blue wire. The meter should read 4.5-5.5 DC volts. If the meter does not read as specified, check the ECM connector or wiring.
4. Connect the sensor to the harness; then using Maxi-Clips, connect the red tester lead to the brown/white wire and the black tester lead to the pink/black wire. With the engine running at idle speed, the meter should read approximately 2.5 DC volts.
5. Connect the red tester lead to the green/red wire. With the engine at idle and at room temperature (approximately 60° F), the meter should read approximately 2.9 DC volts.

■NOTE: If the meter does not read as specified, replace the sensor.

## ENGINE COOLANT TEMPERATURE (ECT) SENSOR



Component data can be retrieved using the CATT II. Utilize the Sensor Data screen.

■NOTE: Preliminary checks may be performed on this component using the diagnostic mode on the LCD gauge (see EFI Diagnostic System in this section).

1. Connect the meter leads (selector in OHMS position) to the sensor terminals.
2. Suspend the sensor and a thermometer in a container of cooking oil; then heat the oil.

■NOTE: Neither the sensor nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend the sensor and thermometer.

### ⚠ WARNING

Wear insulated gloves and safety glasses. Heated oil can cause severe burns.

3. On the ECT sensor when the temperature reaches 40° C (104° F), the meter should read approximately 1136 ohms.
4. On the ECT sensor when the temperature reaches 100° C (212° F), the meter should read approximately 155 ohms.
5. If the readings are not as indicated, the sensor must be replaced.
6. Install the sensor and tighten securely.
7. Connect the leads.



## SPEED SENSOR



Component data can be retrieved using the CATT II. Utilize the Sensor Data screen.

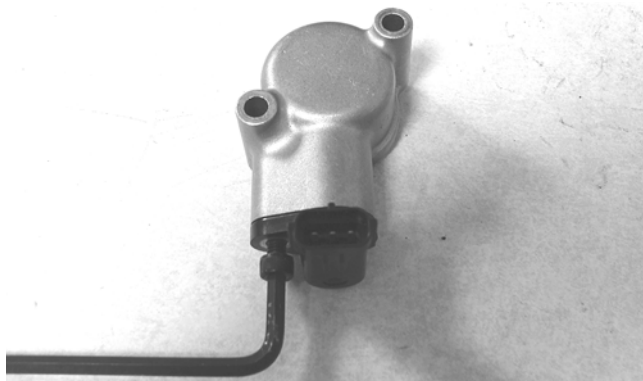
■NOTE: Preliminary checks may be performed on this component using the diagnostic mode on the LCD gauge (see EFI Diagnostic System in this section).

■NOTE: Prior to testing the speed sensor, inspect the three-wire connector on the speed sensor for contamination, broken pins, and/or corrosion.

1. Set the meter selector to the DC Voltage position.
2. With appropriate needle adapters on the meter leads, connect the red tester lead to the orange wire; then connect the black tester lead to the black wire.
3. Turn the ignition switch to the ON position.
4. The meter must show battery voltage.
5. Leave the black tester lead connected; then connect the red tester lead to the pink/white wire.
6. Slowly move the vehicle forward or backward; the meter must alternate between 0 and battery voltage.

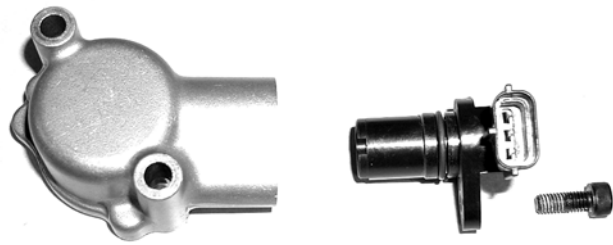
To replace a speed sensor, use the following procedure.

1. Disconnect the three-wire connector from the speed sensor harness or from the speed sensor; then remove the Allen-head cap screw securing the sensor to the sensor housing.
2. Remove the sensor from the sensor housing accounting for an O-ring.



CD070

3. Install the new speed sensor into the housing with new O-ring lightly coated with multi-purpose grease; then secure the sensor with the Allen-head cap screw (threads coated with blue Loctite #242). Tighten securely.



CD071

## FUEL PUMP/FUEL LEVEL SENSOR

■NOTE: Preliminary checks may be performed on this component using the diagnostic mode on the LCD gauge (see EFI Diagnostic System in the Electrical System section).

The fuel pump and fuel level sensor are not serviceable components. If either component fails, it must be replaced.

### Testing

#### ⚠ WARNING

Whenever any maintenance or inspection is made on the fuel system during which there may be fuel leakage, there should be no welding, smoking, open flames, etc., in the area.

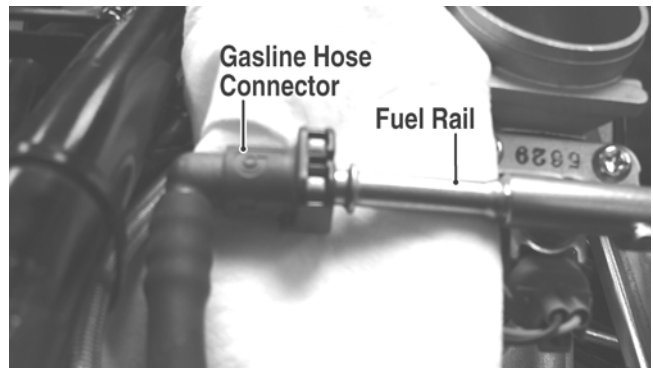
#### 👉 AT THIS POINT

Prior to removing the fuel pump, the following test should be performed to determine that removal is necessary.

1. Turn the ignition switch ON and listen for a momentary “whirring” sound of the pump building pressure. If the sound is heard (10 seconds), no electrical checks are necessary. Turn the ignition switch OFF.
2. Disconnect the gasoline hose from the fuel rail; then install a suitable pressure gauge.

#### ⚠ WARNING

Gasoline may be under pressure. Place an absorbent towel under the connector to absorb any gasoline spray when disconnecting.



FI092A

3. Turn the ignition switch to the ON position. The fuel pressure should build until the pump shuts off. Pressure should read 3.0 kg-cm<sup>2</sup> (43 psi).

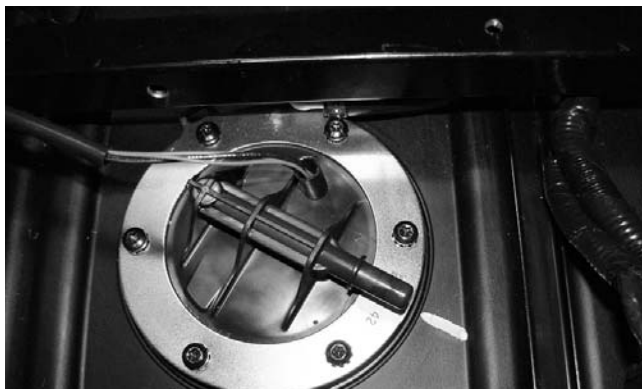
4. Check for any flashing DTC (Diagnostic Trouble Code) on the digital gauge. A disconnected or faulty tilt sensor will cause the fuel pump not to run and a code to flash.
5. If the pump is not running, check the 10 amp FUEL fuse in the PDM under the passenger seat. Replace as necessary and check for fuel pump operation.
6. If fuse is OK, check the FUEL relay by swapping with another relay. If the pump runs, replace the FUEL relay.
7. If the pump still is inoperative, replace as follows.

### Removing

1. Remove the seats and battery cover; then disconnect the negative battery cable.
2. Remove the rear body panel and cargo box (see Steering/Body/Controls); then plug or tape over the gas tank filler hose.

■**NOTE:** The power supply/wiring to the fuel pump could be checked by reconnecting the battery negative cable and using a multimeter set to DC volts; then check for battery voltage by turning the ignition to ON and checking between the black and red wires. Disconnect the negative battery cable when finished.

3. Disconnect the fuel pump/fuel level sender connector; then wrap a shop towel around the gasline connector and disconnect the gasline from the fuel pump.
4. Mark the components for assembling purposes and remove the screws securing the fuel pump to the gas tank.



WC226

5. Carefully remove the fuel pump/fuel level sender assembly from the gas tank; then tape over the opening.

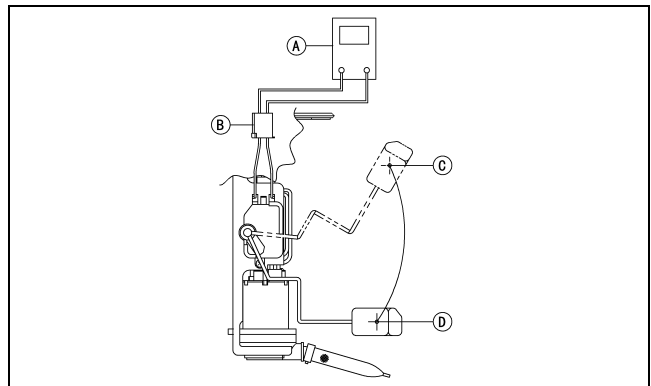
### Inspecting

#### 👉 AT THIS POINT

If the pump has failed earlier test and must be replaced, proceed to INSTALLING.

1. Inspect the fuel screen and blow clean with low pressure compressed air.
2. Move the float lever and check for free movement. The float assembly should return to the lower position without force. If not, replace the fuel level sensor assembly.

3. Test the fuel level sensor by connecting a multimeter (A) to the fuel level sensor leads (B); then select OHMS. The multimeter should show 5 ohms at full fuel position (C) and 95 ohms at empty fuel position (D).

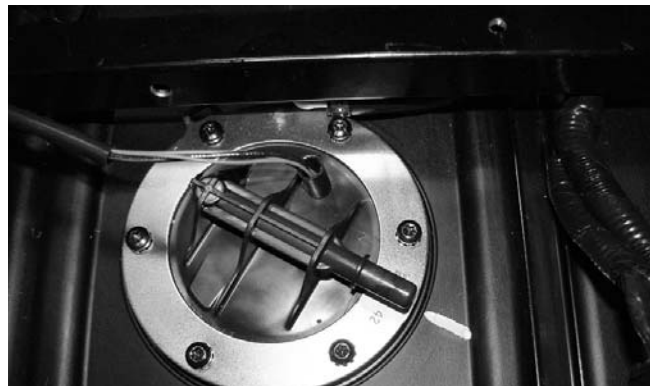


ATV2116

■**NOTE:** If readings are erratic, clean the resistor wiper and resistor with clean alcohol and retest. If still not correct, replace the fuel pump assembly.

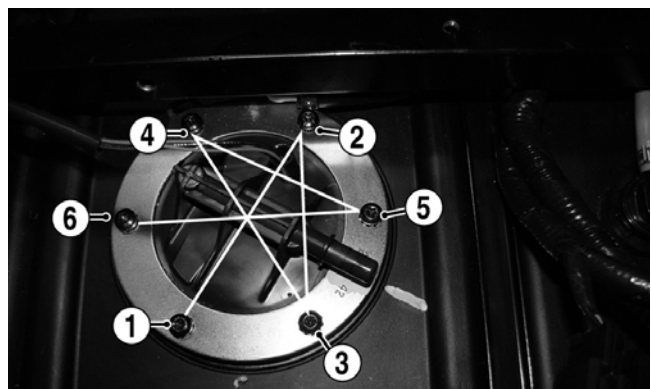
### Installing

1. Carefully place the fuel pump assembly into the gas tank referencing orientation marks made during removal.



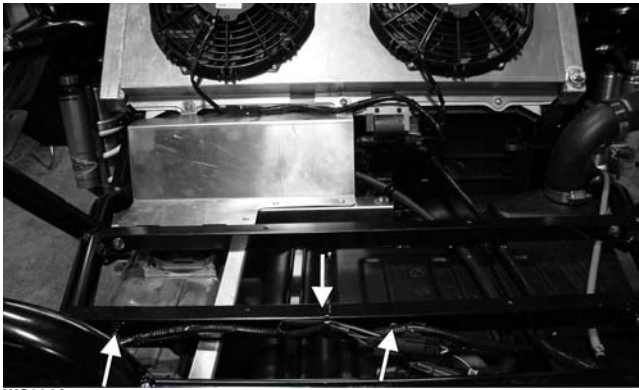
WC226

2. Secure the pump assembly with the mounting screws and tighten securely in a crisscross pattern.



WC226A

3. Connect the electrical connector and the gasline hose connector to the fuel pump; then press the wiring harness anchors into position and secure the cable ties as shown.



WC224A

4. Install the cargo box; then install the rear body panel and connect the gas tank filler hose and secure with the clamp.
5. Connect the negative battery cable and install the battery cover; then install the seats and lock in place.

### TILT SENSOR

The tilt sensor is located in the center console above the forward driveline coupler. The seats and center console must be removed to access the sensor.

#### **⚠ WARNING**

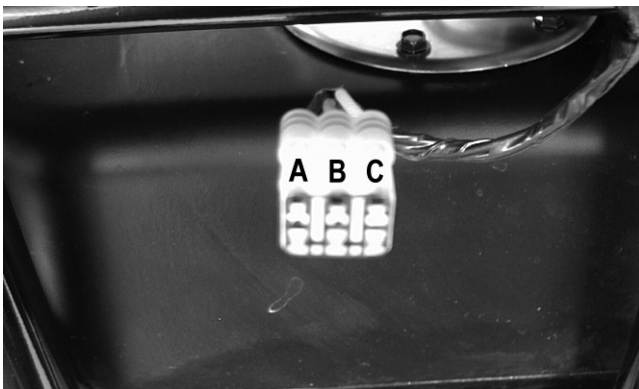
Incorrect installation of the tilt sensor could cause sudden loss of engine power which could result in loss of vehicle control resulting in injury or death.

#### **CAUTION**

Do not drop the tilt sensor as shock can damage the internal mechanism.

### Supply Voltage

1. Disconnect the three-wire connector from the sensor; then select DC Voltage on the multimeter and connect the red tester lead to the orange wire (C) and the pink tester lead to the pink wire (A).



CD706C

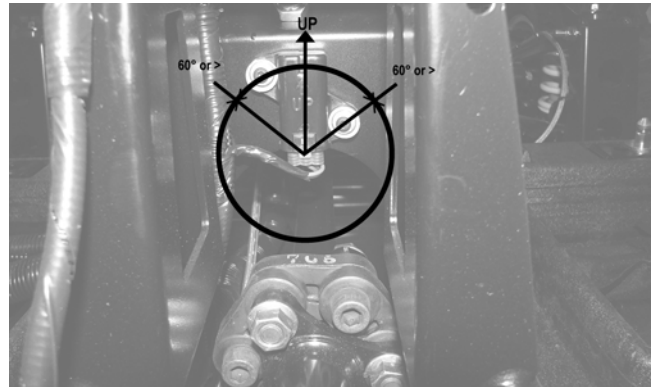
2. Turn the ignition switch to the ON position. The multimeter should read battery voltage. If battery voltage is not indicated, check the 30-amp fuse, wiring harness, or the ignition switch.
3. Remove the red tester lead and connect to the blue/brown wire (B). The multimeter should read approximately 0.2 DC volts or less. If the specified voltage is not indicated, check wire connections at the ECM or substitute another ECM to verify the test.

### Output Voltage

■NOTE: Needle adapters will be required on the multimeter leads as the following tests are made with the sensor connected.

1. Connect the three-wire plug to the sensor; then remove the right-side mounting screw securing the sensor to the frame.
2. Install the needle adapters to the multimeter leads; then select DC Voltage on the multimeter.
3. Connect the red tester lead to the blue/brown wire and the black tester lead to the pink/black wire; then turn the ignition switch ON and observe the meter. The meter should read 0.3-2.9 DC volts.
4. Tilt the sensor 60° or more to the left and right observing the meter. The meter should read 3.0-8.0 DC volts after approximately one second in the tilted position. If the meter readings are not as specified, the tilt sensor is defective.

■NOTE: When replacing the sensor after testing make sure the arrow is directed up.



WC159B

### THROTTLE POSITION SENSOR (TPS)



Component data can be retrieved using the CATT II. Utilize the Sensor Data screen.

■NOTE: Preliminary checks may be performed on this component using the diagnostic mode on the LCD gauge (see EFI Diagnostic System in this section).

### Verifying TPS Adjustment Tool

Before using the TPS adjustment tool, verify its battery condition. The battery used in the tool is a 9-volt battery. To check battery condition, use a digital volt/ohmmeter set on DC volt scale. Test between the adjustment tool black and red jacks. Insert the red lead of the digital voltmeter into the red jack of the adjustment tool and the black lead of the digital voltmeter into the black jack of the adjustment tool. The green power light of the analyzer should now be illuminated. If voltage is found below 4.9 volts, replace the battery.

■NOTE: The Test Harness must be plugged into the analyzer for testing voltage. Always verify battery voltage is at least 4.9 DC volts before testing TPS.

## Testing

1. Remove the seats and rear body panel; then remove the two top radiator mounting cap screws and tilt the radiator rearward to access the throttle body. Remove the TPS connector plug from the TPS.



■NOTE: Prior to testing the TPS, inspect the three-wire plug connector on the main harness and the three-pin plug on the TPS for contamination, broken pins, and/or corrosion.

■NOTE: If the vehicle is in warranty, removing or adjusting the TPS will void warranty. If the TPS is tested out of specification, the throttle body must be replaced. If the vehicle is out of warranty, the TPS can be adjusted.

2. Connect the TPS Multi-Analyzer Harness connector #8 to the TPS; then connect the harness to the TPS Analyzer Tool.



3. Using a multimeter, connect the black tester lead to the center socket (GND) on the analyzer and the red tester lead to the white socket (VAR); then select the DC Voltage position. With the vehicle off, the gauge should read 0.48-0.52 and at Wide-Open Throttle it should read up to approximately 3.69.



## Adjusting

1. Loosen the screw securing the TPS to the throttle body.
2. Adjust the TPS until the correct reading is obtained; then tighten the screw securely. Open and close the throttle and determine the reading at idle the correct voltage. Readjust as necessary.
3. Tighten the mounting screw securely.

■NOTE: If the throttle body, ECM, TPS, or ISC are replaced, the EFI system must be synchronized. Use the following procedure.

1. With the key off, depress the accelerator pedal to Wide Open Throttle (WOT).
2. Place the ignition key in the ON position and wait for 10 seconds.
3. Release the accelerator pedal and wait an additional 10 seconds.
4. Turn the key to the OFF position and allow the gauge to shut off.



## RPM Limiter



Component data can be retrieved using the CATT II. Utilize the Sensor Data screen.

■NOTE: The vehicle is equipped with an ECM that cuts fuel spray and spark when maximum RPM is approached. When the RPM limiter is activated, it could be misinterpreted as a high-speed misfire.

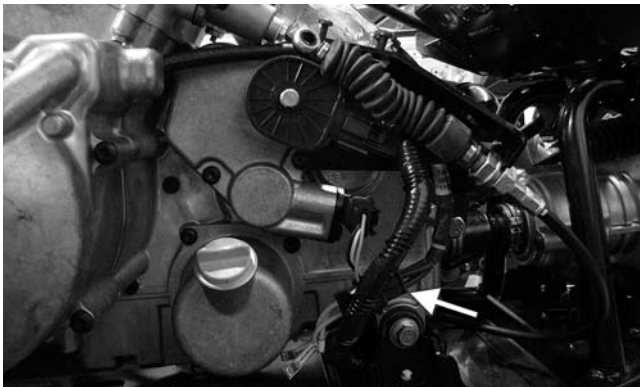
Gear	Park	Neutral	Reverse	High/Low	Fail-Safe Mode	Incorrect ECU/Gauge (P0630)	Warranty Registration (U1001)
2WD	2000	6000	4500	7750	4500	6500	4500
4WD							
4WD Lock							
2WD Override			5000				
4WD Override			7000				
Differential-Lock Override							

## Stator Coil

■NOTE: Preliminary checks may be performed on this component using the diagnostic mode on the LCD gauge (see EFI Diagnostic System in this section).

### VOLTAGE (AC Generator - No Load)

The connector is the black three-pin one on the left side below the shift arm.



WC177B

■NOTE: Test the connector coming from the engine.

1. Set the meter selector to the AC Voltage position.
2. Test between the three black wires for a total of three tests.
3. With the engine running at a constant 5000 RPM, all wire tests must be within specification.

### CAUTION

Do not run the engine at high RPM for more than 10 seconds.

■NOTE: If the voltage test fails but the resistance check is correct with no insulation break down, check the rotor. If the rotor check is good, replace the stator.

### RESISTANCE (AC Generator)

1. Set the meter selector to OHMS position.
2. Test between the three black wires for a total of three tests.
3. The meter reading must be within specification.

## Regulator/Rectifier

The regulator/rectifier is located under the hood above the differential. Verify all other charging system components before the regulator/rectifier is replaced.

### TESTING

1. Start engine and warm up to normal operating temperature; then connect a multimeter (set at the DC Voltage position) to the battery as follows.
2. Connect the red tester lead to the positive battery post and the black tester lead to the negative battery post.
3. Slowly increase RPM. The voltage should increase with the engine RPM to a maximum of 15.5 DC volts.

### CAUTION

Do not run the engine at high RPM for more than 10 seconds.

■NOTE: If voltage rises above 15.5 DC volts, the regulator is faulty or a battery connection is loose or corroded. Clean and tighten battery connections or replace the regulator/rectifier. If voltage does not rise, see EFI Sensor/Components in this section. If charging coil voltage is normal, replace the regulator/rectifier.

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## Starter Motor

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■NOTE: The starter motor is not a serviceable component. If the motor is defective, it must be replaced.

### REMOVING

1. Disconnect the battery.

#### CAUTION

Always disconnect the negative battery cable from the battery first; then disconnect the positive cable.

2. Remove the nut securing the positive cable to the starter motor; then remove the cable from the starter.
3. Remove the two cap screws securing the starter motor to the crankcase; then remove the starter motor. Account for the wiring forms and an O-ring.

### INSTALLING

1. Apply a small amount of grease to the O-ring seal on the starter motor; then install the starter into the crankcase. Secure with two machine screws and wiring forms.
2. Secure the positive cable to the starter motor with the nut.
3. Connect the battery.

### TESTING VOLTAGE

Perform this test on the starter motor positive terminal. To access the terminal, slide the boot away.

■NOTE: The ignition switch must be in the ON position, and the shift lever in the NEUTRAL position.

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the starter terminal; then connect the black tester lead to ground.



AR607D

3. With the ignition switch in the start position, the meter must show battery voltage and the starter motor should operate.

■NOTE: If the meter showed battery voltage but the starter motor did not operate or operated slowly, inspect battery voltage (at the battery), starter motor condition, and/or ground connections.

The ECM is rarely the cause of electrical problems; however, if the ECM is suspected, substitute another model-compatible ECM to verify the suspected one is

■NOTE: If the meter showed no battery voltage, inspect the main fuse, ground connections, starter motor lead, battery voltage (at the battery), or starter solenoid.

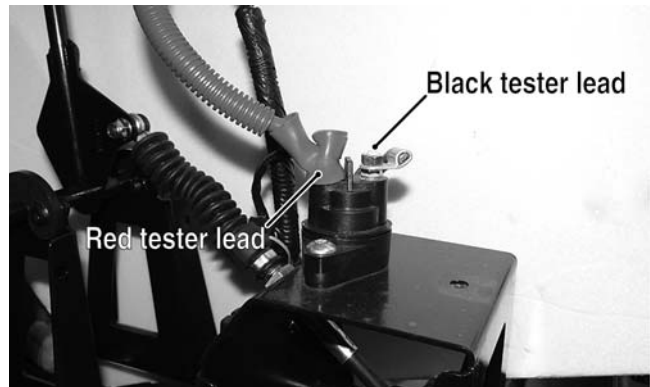
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## Starter Relay

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1. Remove the battery cover; then using the multimeter set to the DC Voltage position, check the relay as follows.
2. Connect the red tester lead to the positive battery cable; then connect the black tester lead to the starter cable connection on the starter relay. The meter must show battery voltage.



WC937A

■NOTE: Make sure the ignition switch is in the ON position and the transmission is in park.

3. With the ignition switch in the start position, the multimeter should drop to 0 volts and the starter should engage.

■NOTE: If the starter engages and more than one volt is indicated by the multimeter, replace the starter relay. If no “click” is heard and the multimeter continues to indicate battery voltage, proceed to step 4.

4. Disconnect the two-wire plug from the starter relay; then connect the red tester lead to the yellow/green wire and the black tester lead to ground.
5. Turn and hold the ignition switch in the start position. The meter must show battery voltage.

■NOTE: If battery voltage is indicated, replace the starter relay. If no voltage is indicated, proceed to Power Distribution Module (PDM) check.

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## Engine Control Module (ECM)

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The ECM is located beneath the passenger seat.

■NOTE: The ECM is not a serviceable component. If the unit is defective, it must be replaced.

defective.

This EFI system has a built-in feature that will only allow an ECM of the same part number to be used in these models. Do not attempt to substitute an ECM from a different model as the system will not allow it to start.

Error codes can be cleared by following the procedures located in the EFI Diagnostic System sub-section in this section.

■**NOTE:** If the throttle body, ECM, TPS, or ISC are replaced, the EFI system must be synchronized. Use the following procedure.

1. With the key off, depress the accelerator pedal to Wide Open Throttle (WOT).
2. Place the ignition key in the ON position and wait for 10 seconds.
3. Release the accelerator pedal and wait an additional 10 seconds.
4. Turn the key to the OFF position and allow the gauge to shut off.

## EFI Diagnostic System

### DIGITAL GAUGE

The digital gauge can be used as a diagnostic tool for many of the DTC's displayed. To place the gauge into the diagnostic mode, use the following procedure.

1. Turn the ignition switch ON.
2. Depress and hold both Mode and Set buttons together for approximately 10 seconds after which the letters "dIAG" will appear on the LCD momentarily followed by COOL.



EFI033A

■**NOTE:** The display on the gauge will display in SAE (speedometer in MPH mode) or Metric (speedometer in km/h mode), For example to read temperature in degrees Celsius, select km/h mode on the gauge or to read Fahrenheit, select MPH mode.

3. Cycle the display by depressing either the Set or Mode button to step to the desired function.



EFI025A

■**NOTE:** The gauge can be utilized dynamically (engine running/vehicle moving) or statically (engine/vehicle stopped).

Examples of Static checks: Battery voltage, fuel gauge/sensor, and TPS (0% @ closed throttle, 95-100% @ WOT).



EFI028

Examples of Dynamic checks: Battery charging, coolant temperature including fans ON/OFF, MAP/IAT, tachometer, and speedometer signal.



EFI032

### Coolant (COOL) Diagnostic Mode



EFI032

Display: Engine coolant temperature as measured by the ECT sensor.

DTC: P0116, P0117, P0118, P0119

Usage: Monitor coolant temperature to verify the following.

1. ECT sensor signal.
2. High Temperature indicator (on @ 230° F.)
3. Thermostat opening @ approximately 180° F, indicated by a momentary drop or pause in the rising temperature reading.
4. Left fan ON @ 194° F, OFF @ 185° F; right fan ON @ 203° F, OFF @ 194° F.
  - A. fan motor
  - B. fan relay
  - C. fan fuse
  - D. wiring connections
5. High Temperature Rev Limiter 5000 RPM @ 230° F.

### Fuel Sensor (FUEL) Diagnostic Mode



EFI031

Display: Fuel level signal from the fuel level sensor (measured in ohms).

DTC: C1400, C1401, C1402

Usage: Check output of the fuel level sensor.

1. Full fuel is indicated by a reading of 86-100 ohms.
2. Empty is indicated by a reading of 0-5 ohms.

\* 110-500 ohms, suspect the fuel level sensor or wiring

\* 0-100 ohms but no fuel gauge indication, suspect the fuel gauge

### Tachometer (tACH) Diagnostic Mode



EFI030

Display: Engine RPM

DTC: P0336, P0337, P0339

Usage: Verify engine speed signal from the following.

1. CKP (crankshaft position) sensor to ECM
2. ECM (CAN) signal to gauge (tachometer)
3. ECM (CAN) signal to EPS

### Speed (SPd) Diagnostic Mode



EFI029

Display: Vehicle speed signal.

DTC: P0500

Usage: Verify speedometer sensor signal from the following.

1. Speed sensor to ECM.
2. ECM (CAN) signal to gauge (speedometer/odometer).
3. ECM (CAN) signal to EPS unit.



### TPS (tPS) Diagnostic Mode



EFI028

Display: % of TPS (0% closed, 95-100% WOT).

DTC: P0121, P0122, P0123

Usage: Verify TPS signal and adjust throttle cable.

### MAP (bArO) Diagnostic Mode



EFI027

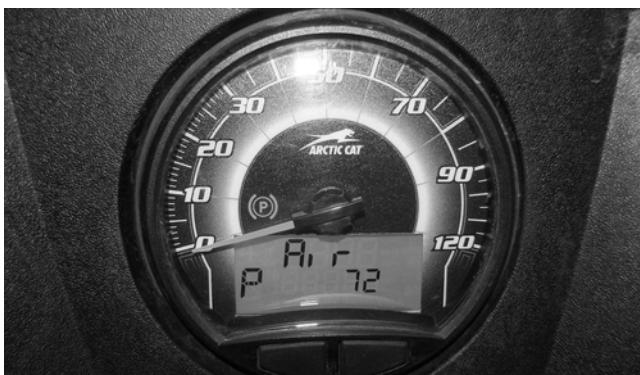
Display: MAP in millibars (1013 millibars = 29.92 in. Hg).

DTC: P0107, P0108

Usage: Verify barometric pressure signal correct.

■Note: Local barometric pressure is given in in./Hg (Inches of Mercury). 34 millibars are equal to 1 inch of mercury. Example: (Gauge reading in the BARO mode = 974 millibars, thus  $974/34 = 28.64$  in./Hg). Second example: (Local barometer reading is 29.87 in./Hg, therefore  $29.87 \times 34 = 1015$  millibars). The gauge should be reading very close to 1015.

### IAT (Alr) Diagnostic Mode



EFI026

Display: Inlet air temperature in Fahrenheit or Celsius.

DTC: P0112, P0113, P0114

Usage: Verify correct output of IAT sensor.

■NOTE: After engine has been running, IAT readings will be higher than outside air temperature due to engine and engine compartment heat as well as intake manifold heating.

### Battery (bAtt) Diagnostic Mode



EFI025

Display: System DC voltage.

DTC: P0562, P0563, P2531, P2532

Usage: Verify system voltage under following conditions.

1. Battery voltage with engine and accessories off (>12.2 VDC for fully charged).
2. Battery voltage with engine running (charging = 13.8 VDC or greater).
3. Battery voltage with electrical accessories operating, engine idling (13.5 VDC or greater).
4. Battery voltage starter cranking (10.5-11.5 VDC).

### DIAGNOSTIC TROUBLE CODES (DTC)

If an EFI or related chassis component fails or an out-of-tolerance signal is detected by the ECM, a diagnostic trouble code (DTC) will be generated in the ECM and displayed on the LCD. The DTC will continue to flash until the malfunction is corrected and the code cleared.

#### Code List

■NOTE: Each of the following numerical codes will have a one-letter prefix of C, P, or U. A "C" prefix denotes a chassis malfunction, a "P" prefix denotes a power train malfunction, and a "U" prefix denotes a loss of communication with the gauge.

■NOTE: Normal malfunction codes are cleared from the LCD when the component is replaced or the malfunction is corrected; however, intermittent codes must be cleared as noted in the code chart.

Code	Fault Description	Possible Cause	Fault Recovery
C0063	Tilt Sensor Circuit High	Sensor or interconnect harness shorted to battery power	Correct condition*
C0064	Tilt Sensor Circuit Low/SG/Open	Sensor or interconnect harness open or shorted to chassis ground	Correct condition*
C1263	Backup/Reverse-Light Circuit Open	Bulb has failed or is disconnected or interconnect harness is open	Correct condition*
C1264	Backup/Reverse-Light Circuit High	Bulb has failed or is disconnected or interconnect harness shorted to battery power	Correct condition*
C1265	Backup/Reverse-Light Circuit Low/SG	Bulb has failed or is disconnected or interconnect harness shorted to chassis ground	Correct condition*
P0030	O2 Heater Intermittent/Open	Heater or interconnect harness is intermittent or open	Correct condition*
P0031	O2 Heater Low/SG	Heater or interconnect harness shorted to chassis ground	Correct condition*
P0032	O2 Heater High/SP	Heater or interconnect harness shorted to battery power	Correct condition*
P0107	MAP Sensor Circuit Low/SG/Open	Sensor or interconnect harness shorted to chassis ground	Correct condition*
P0108	MAP Sensor Circuit High/SP	Sensor or interconnect harness shorted to battery power	Correct condition*
P0112	Intake Air Temp Sensor Circuit Low/SG	Sensor or interconnect harness shorted to chassis ground	Correct condition*
P0113	Intake Air Temp Sensor Circuit High/Open	Sensor or interconnect harness open or shorted to battery power	Correct condition*
P0114	Intake Air Temp Sensor Circuit Intermittent	Sensor or interconnect harness intermittent	Correct condition*
P0116	ECT Sensor Circuit Range/Performance	Sensor producing an out-of-range voltage	Correct condition*
P0117	ECT Sensor Circuit Low/SG	Sensor or interconnect harness shorted to chassis ground	Correct condition*
P0118	ECT Sensor Circuit High/Open/SP	Sensor or interconnect harness open or shorted to battery power	Correct condition*
P0119	ECT Sensor Circuit Intermittent	Sensor or interconnect harness intermittent	Correct condition*
P0121	TPS Range/Performance	Sensor producing an out-of-range voltage	Correct condition*
P0122	TPS Circuit Low/SG	Sensor or interconnect harness shorted to chassis ground	Correct condition*
P0123	TPS Circuit High	Sensor or interconnect harness open or shorted to battery power	Correct condition*
P0130	O2 Sensor Intermittent/Open	Sensor or interconnect harness intermittent or open	Correct condition*
P0131	O2 Sensor Low/SG or Air-Leak	Sensor or interconnect harness shorted to chassis ground or an air-leak exists	Correct condition*
P0132	O2 Sensor High/SP	Sensor or interconnect harness shorted to battery power	Correct condition*
P0171	O2 Feedback Below Minimum Correction	Low fuel rail pressure, dirty fuel filter, or dirty injectors	Correct condition*
P0172	O2 Feedback Exceeds Maximum Correction	Excessive fuel rail pressure, MAP or temp sensors out-of-spec	Correct condition*
P0219	Engine Over-Speed Condition	Engine speed (RPM) has exceeded the ECM over-speed set point/limit	Reduce engine speed
P0231	Fuel Pump Relay Circuit Low/SG/Open	Relay removed or interconnect harness shorted to chassis ground	Correct condition*
P0232	Fuel Pump Relay Circuit High	Relay or interconnect harness shorted to battery power	Correct condition*
P0233	Fuel Pump Relay Circuit	Relay circuit erratic or intermittent	Correct condition*
P0261	Cylinder #1 Fuel injector Circuit Low/SG	Injector #1 or interconnect harness shorted to chassis ground	Correct condition**
P0262	Cylinder #1 Fuel injector Circuit High	Injector #1 or interconnect harness shorted to battery power	Correct condition**
P0263	Cylinder #1 Fuel injector Balance/Open	Injector #1 disconnected or interconnect harness is open	Correct condition**
P0264	Cylinder #2 Fuel injector Circuit Low/SG	Injector #2 or interconnect harness shorted to chassis ground	Correct condition**
P0265	Cylinder #2 Fuel injector Circuit High	Injector #2 or interconnect harness shorted to battery power	Correct condition**
P0266	Cylinder #2 Fuel injector Balance/Open	Injector #2 disconnected or interconnect harness is open	Correct condition**
P0336	Crankshaft Angle Sensor Synchronization	Sensor or interconnect harness intermittent	Correct condition**
P0337	Crankshaft Angle Sensor Circuit/SG	Sensor or interconnect harness shorted to chassis ground	Correct condition**
P0339	Crankshaft Angle Sensor Intermittent/Erratic	Sensor or interconnect harness intermittent	Correct condition**
P0340	Camshaft Angle Sensor Synchronization	Sensor or interconnect harness intermittent	Correct condition**
P0341	Camshaft Angle Sensor Circuit/SG	Sensor or interconnect harness shorted to chassis ground	Correct condition**
P0342	Camshaft Angle Sensor Intermittent/Erratic	Sensor or interconnect harness intermittent	Correct condition**
P0480	Fan Relay Control Circuit	Relay erratic or intermittent	Correct condition*
P0484	Fan Relay Control Circuit High	Relay or interconnect harness shorted to battery power	Correct condition*
P0485	Fan Relay Control Circuit Low/SG/Open	Fan fuse has blown, fan relay removed, or interconnect harness shorted to chassis ground	Correct condition*
P0500	Vehicle Speed-Sensor	Sensor circuit signal intermittent or missing	Correct condition*, start and drive the vehicle*
P0508	Idle Air Control System Circuit Low/SG	IAC interconnect harness shorted to chassis ground	Correct condition*
P0509	Idle Air Control System Circuit High/Open	IAC disconnected or the interconnect harness shorted to battery power	Correct condition*
P0520	Engine Oil Sensor/Switch	Sensor or interconnect harness erratic or intermittent	Correct condition*
P0562	System Voltage Low	Battery charge condition low or the regulator/rectifier output low	Correct condition*
P0563	System Voltage High	Battery cable connections are loose or regulator/rectifier output high	Correct condition*

Code	Fault Description	Possible Cause	Fault Recovery
P0601	ECM CAN Communication Shutdown	Intermittent CAN connections or unstable CAN conditions have caused the ECM to temporarily shutdown CAN communication	Correct CAN communication issue*
P0615	Starter Relay Circuit	Start switch/button, starter relay, gear switch or interconnect harness erratic or intermittent	Correct condition*
P0616	Starter Relay Circuit Low	Start switch/button, starter relay or interconnect harness intermittent or shorted to chassis ground	Correct condition*
P0617	Starter Relay Circuit High	Start switch/button, starter relay or interconnect harness intermittent or shorted to battery power	Correct condition*
P0630	VIN Not Programmed or Incompatible	Verify the LCD gauge and ECM part numbers are correct for the vehicle model number and VIN	Correct gauge and ECM VIN compatibility issue*
P0642	Sensor Power Circuit Low	One or more of the sensors defective or shorted to chassis ground	Correct condition*
P0643	Sensor Power Circuit High	One or more of the sensors defective or shorted to battery power	Correct condition*
P2300	Ignition Coil #1 Primary Circuit Low/SG/Open	Ignition coil #1 or interconnect harness open or shorted to chassis ground	Correct condition**
P2301	Ignition Coil #1 Primary Circuit High	Ignition coil #1 or interconnect harness shorted to battery power	Correct condition**
P2303	Ignition Coil #2 Primary Circuit Low/Open	Ignition coil #2 or interconnect harness open or shorted to chassis ground	Correct condition**
P2304	Ignition Coil #2 Primary Circuit High	Ignition coil #2 or interconnect harness shorted to battery power	Correct condition**
P2531	Ignition Switch Circuit Low	Battery charge condition low or the regulator/rectifier output low	Correct condition*
P2532	Ignition Switch Circuit High	Battery cable connections are loose or regulator/rectifier output high	Correct condition*
U0155	LCD Gauge to EFI ECM CAN Communication Lost	Gauge CAN circuit or interconnect harness intermittent or has failed	Correct condition*
U1000	Vehicle Not Registered or Invalid PIN Entered	An invalid registration PIN has been entered	Enter the correct registration PIN*
U1001	Vehicle Not Registered and Vehicle Limits Enabled	An invalid registration PIN has been entered	Enter the correct registration PIN*
FUEL OFF	Tilt Sensor Activation Code	Sensor activated	Restore the vehicle chassis to an upright position*

High: High voltage condition has been detected

Low: Low voltage condition has been detected

Intermittent: Intermittent circuit condition has been detected

Open: Open circuit condition has been detected

\* After correcting condition, cycle key switch On-Off-On

\*\*After correcting condition, cycle key switch On-Off-On, start the engine, then cycle key switch Off-On.

# Troubleshooting

Problem: Spark absent or weak	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Ignition coil defective</li> <li>2. Spark plug defective</li> <li>3. Magneto defective</li> <li>4. ECM defective</li> <li>5. Pick-up coil defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace ignition coil</li> <li>2. Replace plug</li> <li>3. Replace stator coil</li> <li>4. Replace ECM</li> <li>5. Replace stator coil</li> </ol>
Problem: Spark plug fouled with carbon	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Gasoline incorrect</li> <li>2. Air cleaner element dirty</li> <li>3. Spark plug incorrect (too cold)</li> <li>4. Valve seals cracked - missing</li> <li>5. Oil rings worn - broken</li> </ol>	<ol style="list-style-type: none"> <li>1. Change to correct gasoline</li> <li>2. Clean element</li> <li>3. Replace plug</li> <li>4. Replace seals</li> <li>5. Replace rings</li> </ol>
Problem: Spark plug electrodes overheat or burn	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Spark plug incorrect (too hot)</li> <li>2. Engine overheats</li> <li>3. Spark plug loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace plug</li> <li>2. Service cooling system</li> <li>3. Tighten plug</li> </ol>
Problem: Battery does not charge	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Lead wires/connections shorted - loose - open</li> <li>2. Magneto coils shorted - grounded - open</li> <li>3. Regulator/rectifier defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair - replace - tighten lead wires</li> <li>2. Replace magneto coils</li> <li>3. Replace regulator/rectifier</li> </ol>
Problem: Battery charges, but charging rate is below the specification	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Lead wires shorted - open - loose (at terminals)</li> <li>2. Stator coil (magneto) grounded - open</li> <li>3. Regulator/rectifier defective</li> <li>4. Cell plates (battery) defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair - tighten lead wires</li> <li>2. Replace stator coil</li> <li>3. Replace regulator/rectifier</li> <li>4. Replace battery</li> </ol>
Problem: Battery overcharges	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Internal battery short circuited</li> <li>2. Regulator/rectifier resistor damaged - defective</li> <li>3. Regulator/rectifier poorly grounded</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace battery</li> <li>2. Replace resistor</li> <li>3. Clean - tighten ground connection</li> </ol>
Problem: Charging unstable	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Lead wire intermittently shorting</li> <li>2. Magneto internally shorted</li> <li>3. Regulator/rectifier defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace lead wire</li> <li>2. Replace stator coil</li> <li>3. Replace regulator/rectifier</li> </ol>
Problem: Starter button not effective	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Battery charge low</li> <li>2. Switch contacts defective</li> <li>3. Starter relay defective</li> <li>4. Emergency stop - ignition switch off</li> <li>5. Wiring connections loose - disconnected</li> </ol>	<ol style="list-style-type: none"> <li>1. Charge - replace battery</li> <li>2. Replace switch</li> <li>3. Replace relay</li> <li>4. Turn on switches</li> <li>5. Connect - tighten - repair connections</li> </ol>
Problem: Battery "sulfation" (Acidic white powdery substance or spots on surfaces of cell plates)	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Charging rate too low - too high</li> <li>2. Battery run-down - damaged</li> <li>3. Electrolyte contaminated</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace battery</li> <li>2. Replace battery</li> <li>3. Replace battery</li> </ol>
Problem: Battery discharges too rapidly	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Charging system not charging</li> <li>2. Cell plates overcharged - damaged</li> <li>3. Battery short-circuited</li> <li>4. Electrolyte contaminated</li> </ol>	<ol style="list-style-type: none"> <li>1. Check magneto - regulator/rectifier - circuit connections</li> <li>2. Replace battery - correct charging system</li> <li>3. Replace battery</li> <li>4. Replace battery</li> </ol>
Problem: Battery polarity reversed	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. Battery incorrectly connected</li> </ol>	<ol style="list-style-type: none"> <li>1. Reverse connections - replace battery - repair damage</li> </ol>



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# Drive and Brake Systems

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## GENERAL INFORMATION

The die-cast aluminum housings have been assembled with thread-rolling screws (trilobular). When assembling with these screws, start the screws carefully into the housing; then use the following torque values.

Size	New Housing	Reassembled Housing
M6 (Torx T-30 Recess)	9 ft-lb	8 ft-lb
M8 (Torx T-40 Recess)	28 ft-lb	23 ft-lb

## SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this section. Refer to the current Special Tools Catalog for the appropriate tool description.

■**NOTE:** When indicated for use, each special tool will be identified by its specific name, as shown in the chart below, and capitalized.

Description	p/n
Backlash Measuring Tool (24-Spline Axle)	0544-010
Backlash Measuring Tool (27-Spline Axle)	0544-011
CV Boot Clamp Tool	0444-120
Hose Clamp Pliers	0644-545
Hub Retaining Wrench	0444-270
Internal Hex Socket	0444-104
Pinion Gear/Shaft Removal Tool	0444-127
Gear Case Seal Installer Tool	0444-273

■**NOTE:** Special tools are available from the Arctic Cat Service Department.

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## Front Drive Actuator

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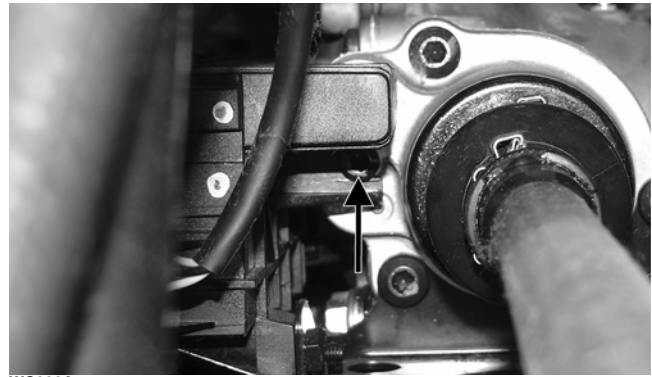
■**NOTE:** The actuator is not a serviceable component. If it is defective, it must be replaced.

■**NOTE:** The actuator will operate only when the ignition switch is in the ON position.

The front drive actuator is located on the left side of the front differential input housing. With the engine stopped and the ignition switch in the ON position, a momentary “whirring” sound can be heard each time the drive select switch is shifted. If no sound is heard, see Electrical System. If the actuator runs constantly or makes squealing or grinding sounds, the actuator must be replaced.

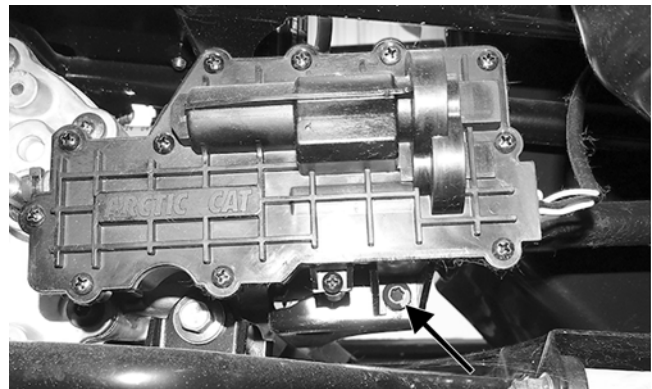
## REMOVING

1. Select LOCK on the drive select switch; then disconnect the connector on the actuator harness.
2. Using a T-30 torx wrench, remove the mounting cap screw from the driveshaft side of the actuator.



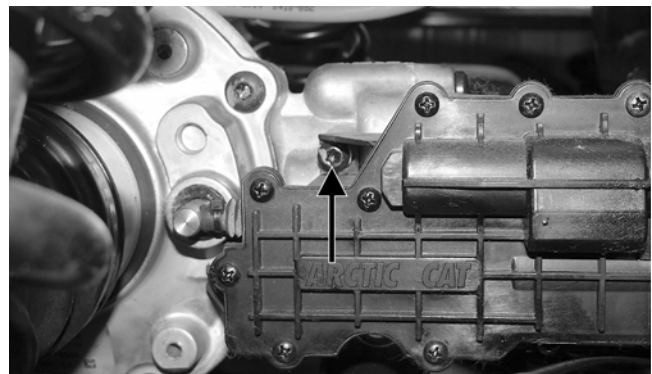
WC938A

3. Remove the mounting cap screw from below the actuator on the suspension side.



WC940A

4. Loosen but do not remove the mounting cap screw at the front of the actuator; then slide the actuator to the rear enough to clear the slotted mounting tab and the selector shaft. Remove from the right side.

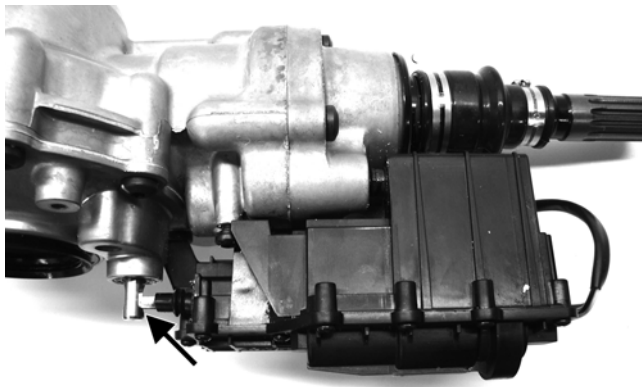


WC939A

## INSTALLING

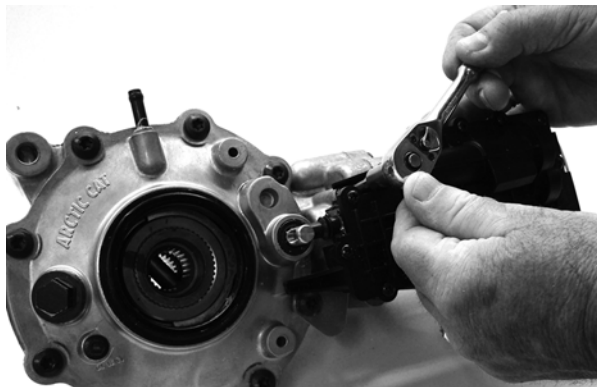
1. Lubricate the O-rings on the actuator; then ensure all mounting surfaces are clean and free of debris.
2. Align the actuator with the selector shaft and slide it forward onto the shaft taking care to engage the cap screw in the slot of the front mounting tab.

■**NOTE:** Make sure to properly align the differential lock actuator lever with the hole in the differential lock plunger.



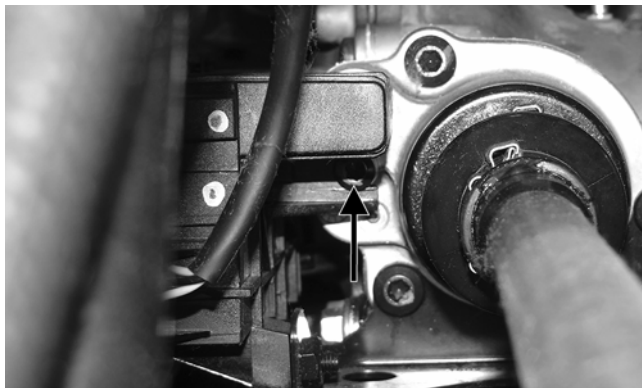
GC002A

3. While holding the actuator firmly forward, tighten the front cap screw to hold the actuator in place; then install but do not tighten the two remaining cap screws.



GC001

4. Loosen the front cap screw; then tighten the cap screw on the driveshaft side.



WC938A

■**NOTE:** It is important to tighten this cap screw while the others are loose to ensure proper seating of the actuator.

5. Tighten the remaining cap screws; then connect the electrical plug to the main harness.
6. Turn the ignition switch to the ON position and check the operation by shifting the drive select switch several times.
7. Secure the wiring harness to the frame with a nylon cable tie; then install the inner fender panel.

## Front Differential

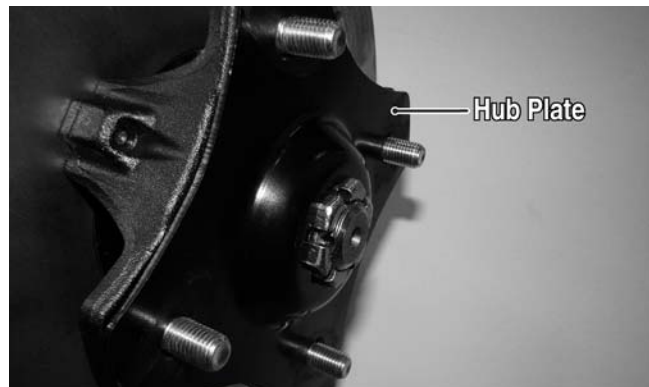
### REMOVING

1. Remove the forward belly panel (X) or seats and center console (4X); then drain the lubricant from the differential.
2. Using an appropriate jack or lift, raise the vehicle so the wheels are off the floor and support with jack-stands under the lower A-arms.



WC081D

3. Remove the front wheels and account for the hub plates; then remove the hub nuts and Belleville washers.

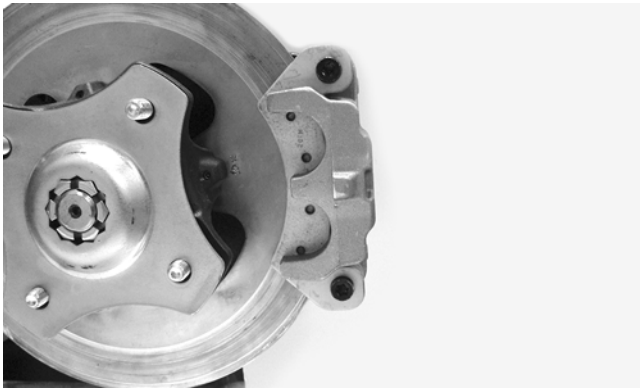


WC240B



WC304

4. Remove the left and right brake calipers; then remove the hub/brake disc assemblies.



WC608

5. Holding the upper A-arm/ball joint down into the knuckle, remove and discard the retaining cap screw.



WC271

6. Raise the upper A-arm to dislodge the ball joint from the knuckle; then tip the knuckle outward and remove the axle from the knuckle.

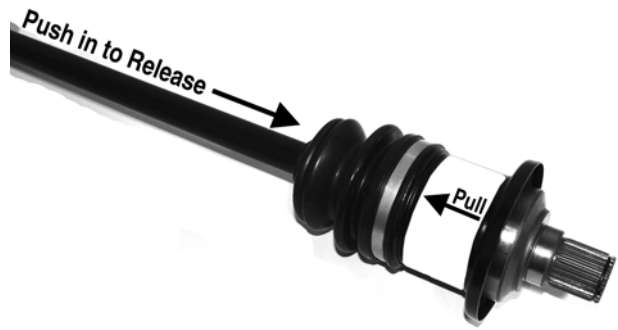


WC235



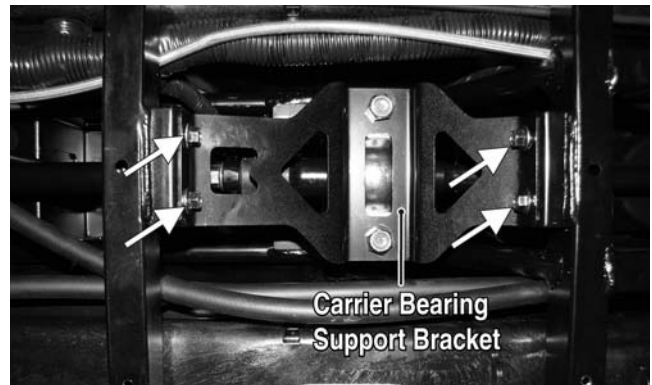
WC272

7. Push in on the axle shaft while pulling outward on the axle coupler and remove the axle assembly from the differential.

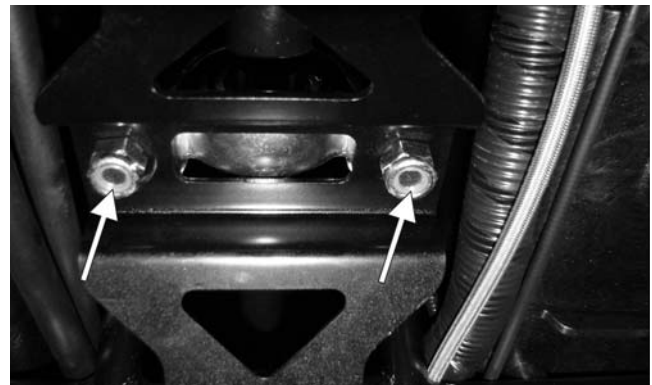


PR729C

8. On the X from underneath the vehicle, remove the carrier bearing support bracket; then remove the bolts and nuts securing the carrier bearing to the bracket and remove the bracket.



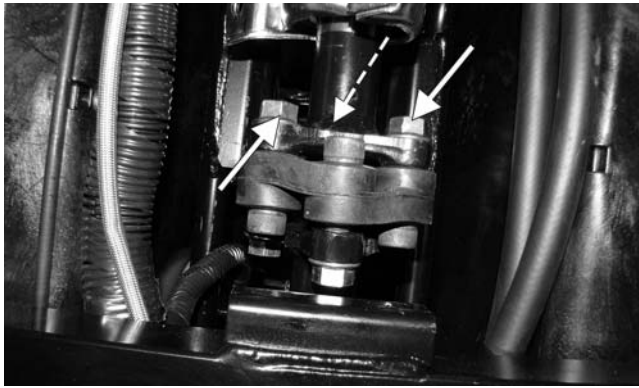
WC265A



WC266A

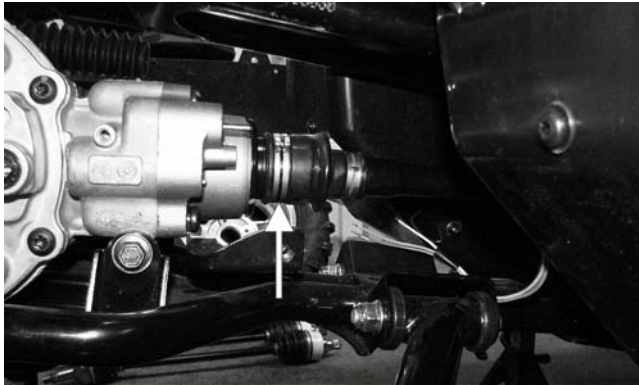
9. Disconnect the drive line coupler by removing three nuts from the Allen-head bolts; then separate the drive line to allow the front shaft to move rearward.





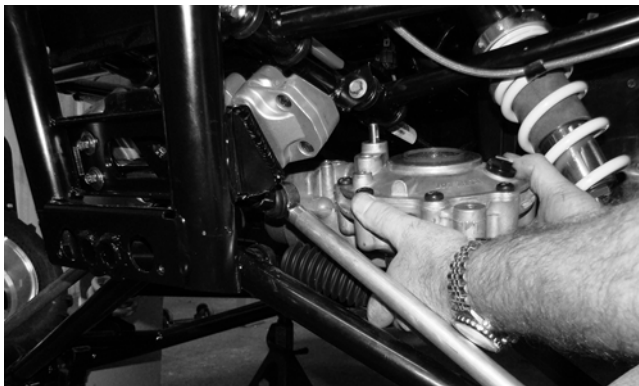
WC267A

10. Remove the front drive actuator from the differential; then remove the front boot clamp from the front drive coupler and slide the boot off.



WC275A

11. From under the vehicle (X) or inside the vehicle (4X), slide the driveshaft to the rear sufficiently to allow differential to move to the rear 6-8 inches.
12. Remove the upper and lower through-bolts; then slide the differential rearward and lay it on the right side. Remove from the vehicle from either left or right side.



WC277

### Disassembling Input Shaft

1. Using a T-40 torx wrench, remove the cap screws securing the pinion housing.

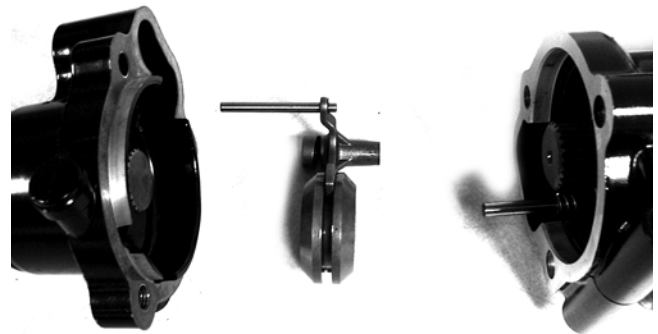


GC004A

2. Using a rubber mallet, remove the housing. Account for a gasket. Remove the fork, collar, and spring. Note the location of all the components for assembling purposes.

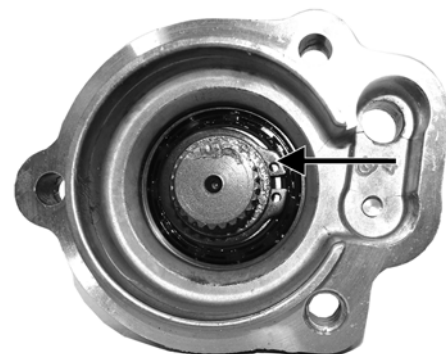


GC015



CD106

3. Remove the snap rings from the input shaft; then remove the input shaft from the pinion housing.



GC009A



- Using a seal removal tool, remove the input shaft seal. Account for a spacer.



GC010

- Remove the snap ring securing the input shaft bearing; then place the pinion housing in a press and remove the bearing.



GC011



AF984



KX219

## Assembling Input Shaft

- Place the pinion housing in a press and install the input shaft bearing. Secure the bearing with the existing snap ring making sure the sharp edge of the snap ring faces to the outside.

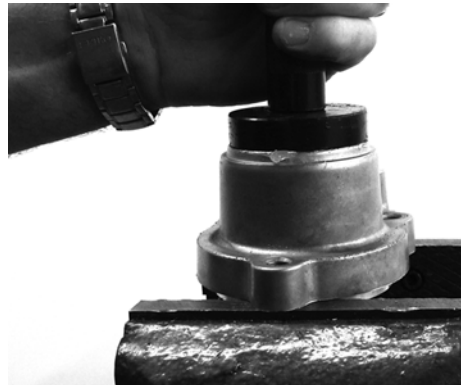


GC012



GC011

- Install the input shaft seal making sure it is fully seated in the edge of the housing.

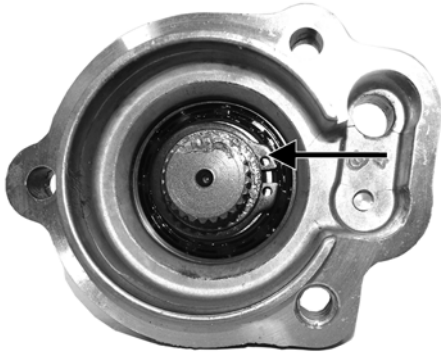


GC014

- Lubricate the input shaft with High-Performance #2 Molybdenum Disulphide Grease packing the boot ribs and splines; then assemble allowing excess grease to freely escape. Slight pressure on the boot will be present during assembly. Secure with new clamps.

**■NOTE:** Any time drive splines are separated, clean all splines with parts-cleaning solvent and dry with compressed air; then lubricate with recommended grease.

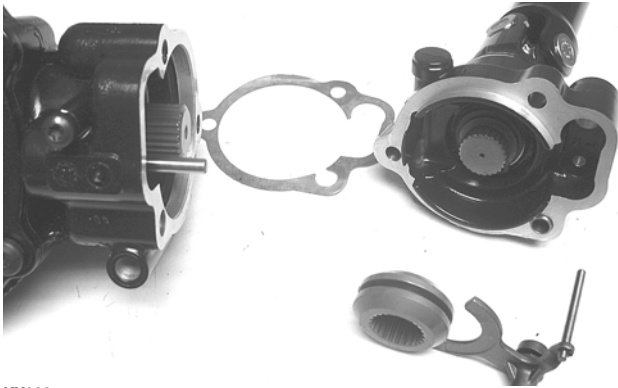
- Install the input shaft into the pinion housing; then secure in the bearing with a circlip.



GC009A

5. Place the pinion housing with new gasket onto the differential housing; then secure with existing cap screws. Tighten to 23 ft-lb.

■NOTE: If a new differential housing is being installed, tighten the cap screws to 28 ft-lb.



KX209



GC004A

### Disassembling Differential Assembly

■NOTE: This procedure can be performed on a rear gear case.

1. Using a T-40 torx wrench, remove the cap screws securing the pinion housing. Account for the coupler, fork, and spring (differential only).



GC015

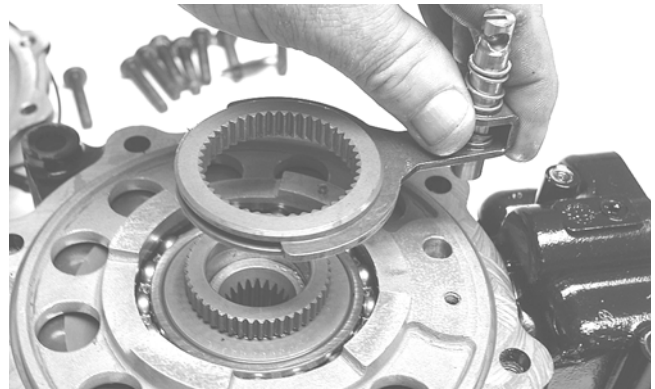
2. Using a T-40 torx wrench, remove the cap screws securing the differential cover.
3. Using a plastic mallet, tap lightly to remove the differential cover. Account for an O-ring.



KX174

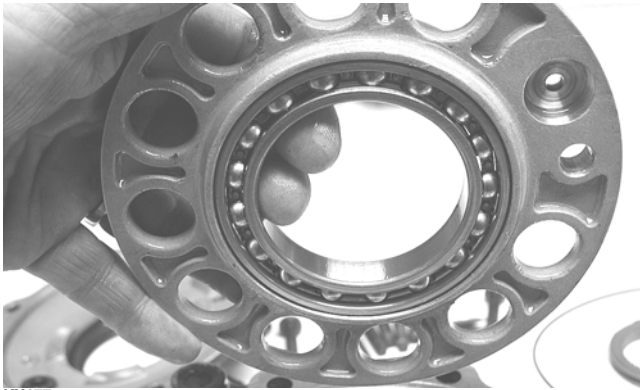
■NOTE: If the cover is difficult to remove, pry on the cover in more than one recessed location.

4. Remove the splined coupler, shifter fork, pin, and spring of the differential lock assembly and set aside. Note position of parts for assembling purposes.

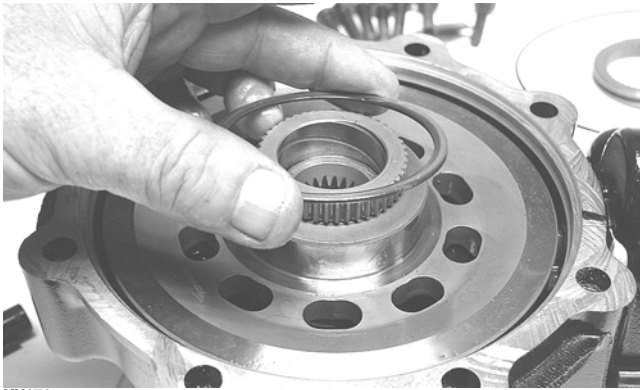


KX175

5. Remove the left differential bearing flange assembly and account for a shim. Mark the shim as left-side.



KX177

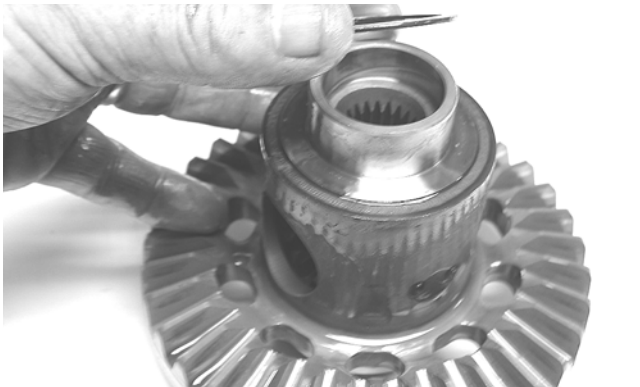


KX178

6. Place the differential with the open side down; then lift the housing off the spider assembly. Account for shim(s) and mark as right-side.



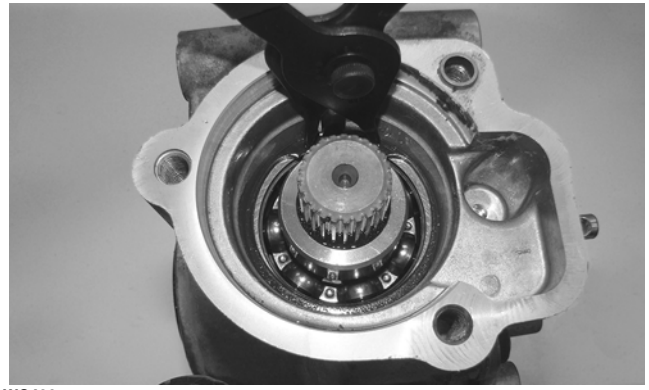
KX179



KX181

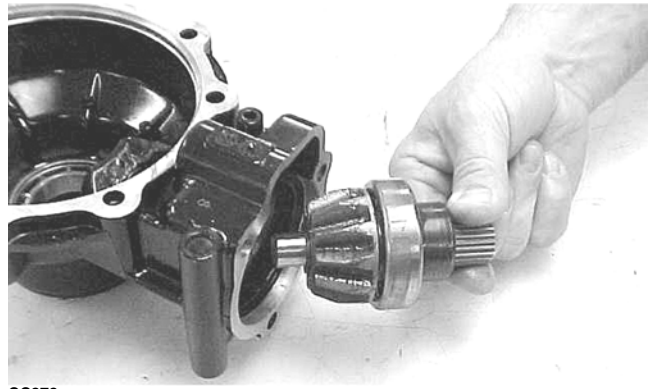
### Disassembling Pinion Gear

1. Remove the internal snap ring securing the pinion bearing in the housing.



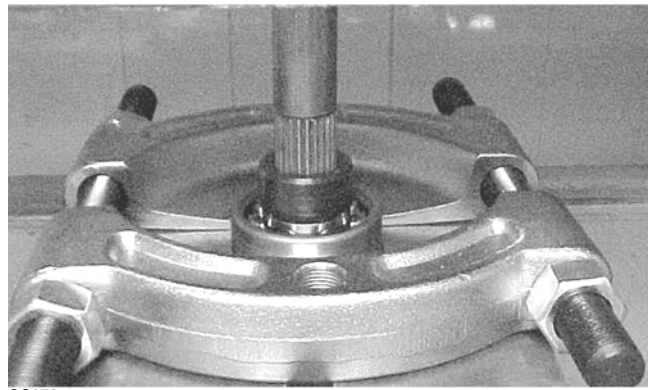
WC430

2. Using the Pinion Gear/Shaft Removal Tool and a hammer, remove the pinion gear from the gear case housing.



CC878

3. Secure the pinion gear in a bearing puller; then remove the pinion bearing using a press. Account for a collar and a bearing.

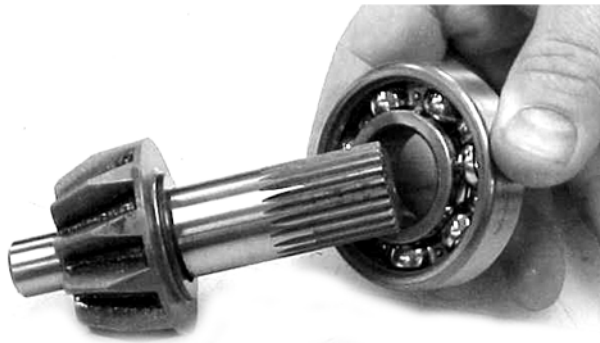


CC879

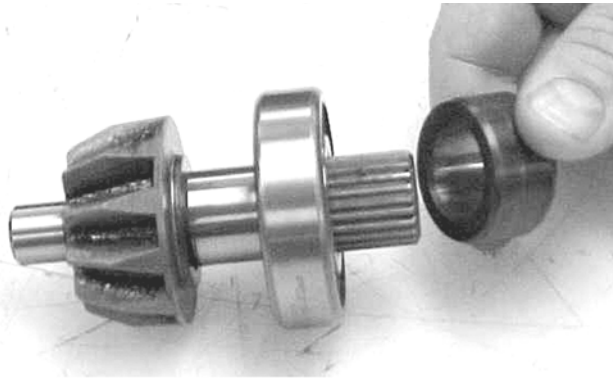
4. Remove any reusable parts from the gear case housing; then discard the housing and lock collar.

### Assembling Pinion Gear

1. Install the bearing onto the pinion shaft. Install the pinion shaft collar.

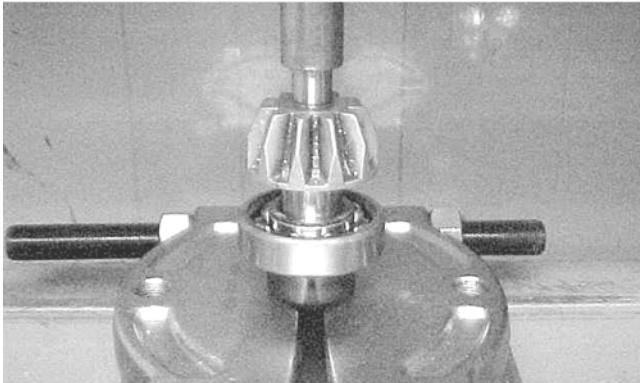


CC882



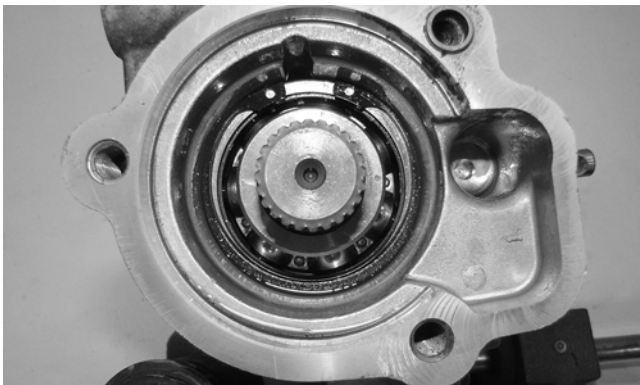
CC883

2. Place the pinion assembly in a bearing puller; then install the bearing using a press.



CC884

3. Using a propane torch, heat the gear case housing to approximately 200° F; then install the pinion assembly.
4. Install the internal snap ring with the sharp side directed away from the bearing.



WC429

## Shimming Procedure/Shim Selection

Case-Side Shims (Backlash)		
p/n	mm	in.
0402-405	1.3	0.051
0402-406	1.4	0.055
0402-407	1.5	0.059
0402-408	1.6	0.063
0402-409	1.7	0.067

Cover-Side Shims (Ring Gear End-Play)		
p/n	mm	in.
1402-074	1.3	0.051
1402-075	1.4	0.055
1402-076	1.5	0.059
1402-077	1.6	0.063
1402-078	1.7	0.067

It is very important to adjust bevel gears for the proper running tolerances. Gear life and gear noise are greatly affected by these tolerances; therefore, it is very important to properly adjust any gear set prior to final assembly.

The following procedure can be used on both front differential or rear drive gear case.

■**NOTE:** All bearings must be installed in the gear case and the pinion properly installed before proceeding.

### Backlash

■**NOTE:** Always set backlash prior to any other shimming.

1. Install the existing shim or a 0.051-0.055-in. shim on the gear case side of the ring gear assembly.



GC031A

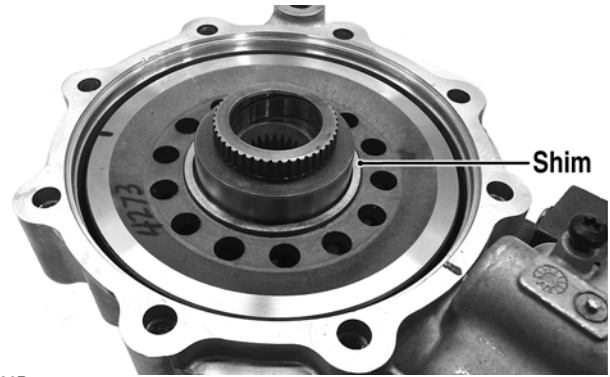
2. Install the ring gear with shim in the gear case; then while holding the pinion stationary, rock the ring gear forward and back to determine if any backlash exists. If no backlash exists, install a thicker shim and recheck.





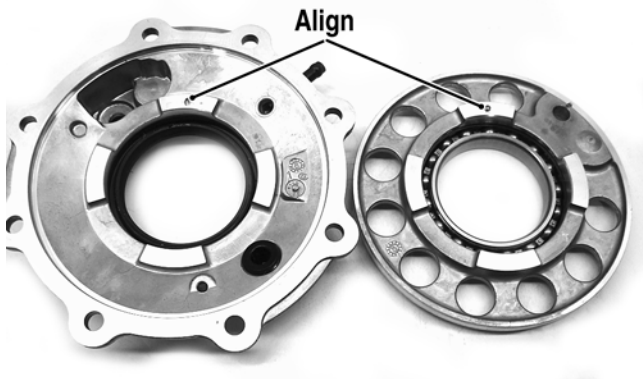
GC036A

3. Install the bearing flange onto the gear case cover making sure the alignment/locating pin engages the locating hole in the cover; then make sure the bearing flange is completely seated in the cover.



GC036B

5. Place the appropriate Backlash Measuring Tool into the splines of the ring gear and install a dial indicator making sure it contacts the gauge at a 90° angle and on the index mark.



GC032A



GC040



GC033A

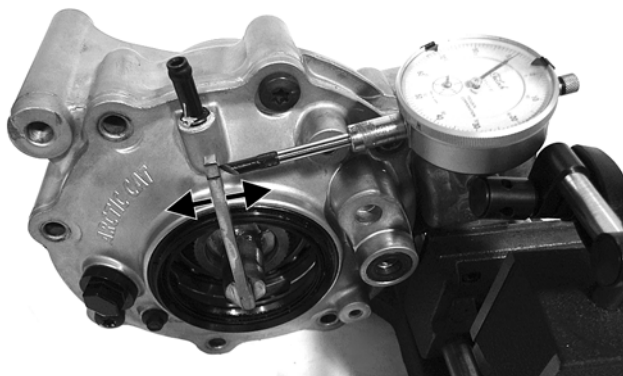
4. Install the existing shim or a 0.063 in. shim on the cover side of the ring gear; then place the assembled gear case cover onto the gear case and secure with three cap screws. Tighten evenly using a crisscross pattern.



GC039A

6. Zero the dial indicator; then while holding the pinion stationary, rock the ring gear assembly forward and back and record the backlash. Backlash must be 0.011-0.015 in. If backlash is within specifications, proceed to Ring Gear End-Play. If backlash is not within specifications, increase shim thickness to increase backlash or decrease shim thickness to decrease backlash.

■NOTE: Higher backlash settings usually result in quieter gear operation.



GC037A

### Ring Gear End-Play

After correcting backlash, ring gear end-play can be adjusted. To adjust end-play, use the following procedure.

1. Secure the gear case in a holding fixture with the cover side up; then install a dial indicator contacting the ring gear axle flange.



GC035

2. Zero the dial indicator; then push the ring gear toward the dial indicator and release. End-play should be 0.004-0.008 in.
3. To increase end-play, decrease the shim thickness. To decrease end-play, increase the shim thickness.

■NOTE: Once proper backlash and end play are established, the gear case can be assembled (see Assembling Differential Assembly in this sub-section).

### Assembling Differential Assembly

1. With the pinion gear and new bearings installed, place the selected (backlash) shim on the gear case side of the ring gear with the chamfered side toward the ring gear; then install into gear case/differential housing.



GC031A



GC020

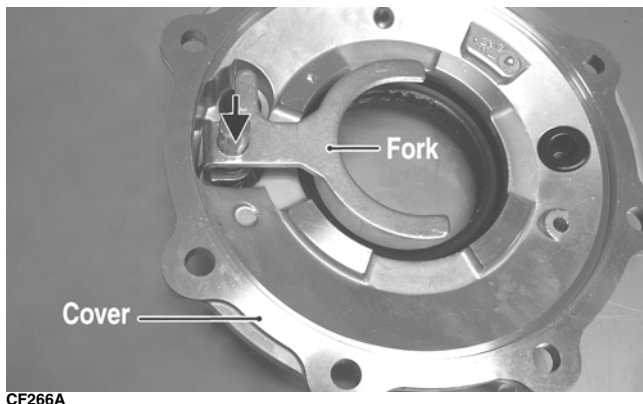
2. Place the selected (end-play) shim, chamfered side toward the gear, onto the cover side of the ring gear.



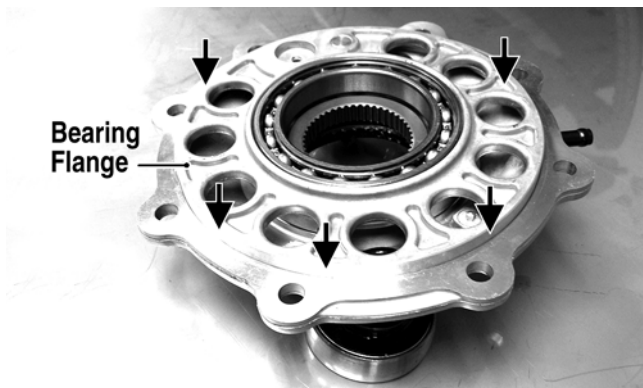
GC036B

■NOTE: The spider and ring gear assembly must be replaced as a complete unit.

3. Assemble the fork and sliding collar into the cover assembly; then install the left bearing flange/bearing assembly and seat firmly into the cover.



CF266A



CF267A

4. Apply a light coat of Loctite #598 to the O-ring; then install it on the assembled cover assembly making sure to seat the O-ring completely down around the circumference of the bearing flange.



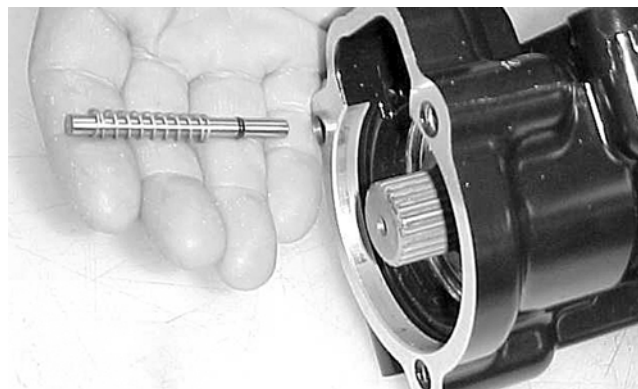
CF275A

5. Making sure the O-ring is properly positioned on the differential housing cover assembly, install the cover with existing cap screws (coated with green Loctite #270). Account for the ID tag. Tighten the cap screws evenly to 23 ft-lb.

■NOTE: Grease can be applied to the O-ring for ease of assembling.

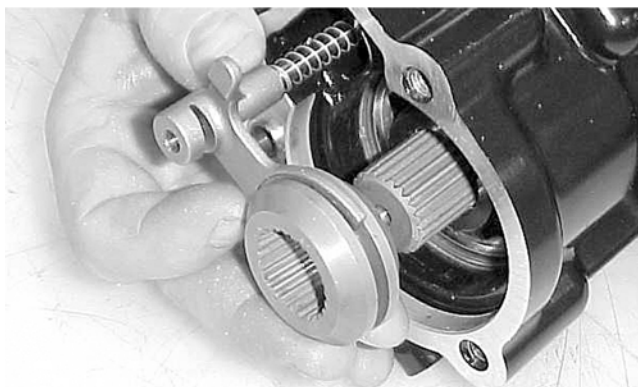
■NOTE: If a new housing is being installed, tighten the cap screws to 28 ft-lb.

6. Install the shift fork shaft w/spring into the housing making sure the shaft O-ring is positioned to the inside.



CC892

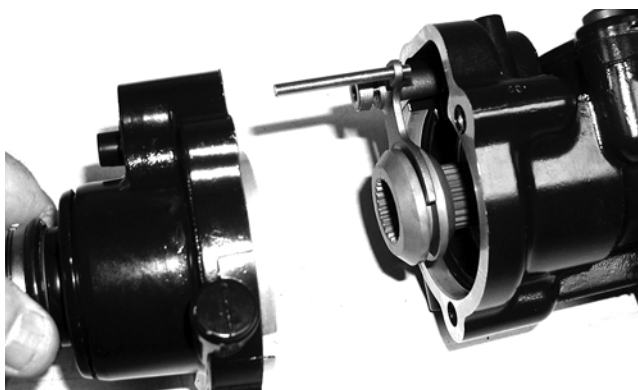
7. Install the shift fork assembly making sure the fork leg is facing upward. Apply a small amount of oil to the gasket; then install the gasket.



CC893

8. Place the input shaft assembly onto the gear case housing; then secure with the existing cap screws. Tighten to 23 ft-lb.

■NOTE: If a new housing is being installed, tighten the cap screws to 28 ft-lb.



CD103

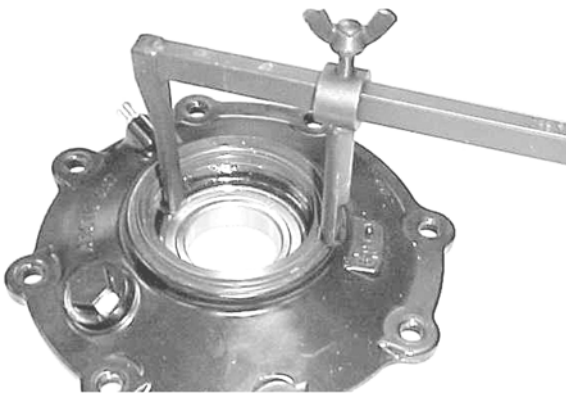


CD110

## Removing/Installing Axle Seal

■NOTE: This procedure can be performed on a rear gear case.

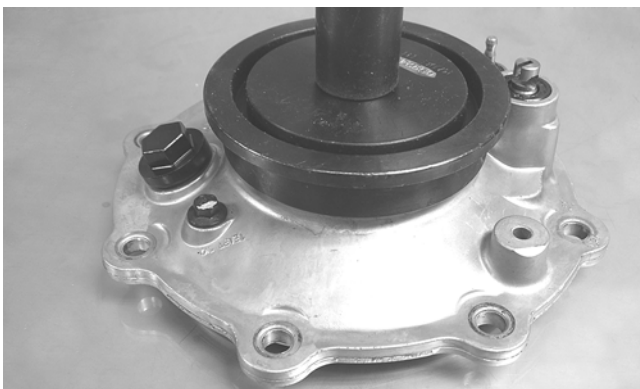
1. Remove the seal using a seal removal tool.



CC899

■NOTE: Prior to installing the seal, apply High-Performance #2 Molybdenum Disulphide grease to the seal outside diameter.

2. Using Gear Case Seal Installer Tool, evenly press the seal into the cover bore until properly seated.



CF278

## CAUTION

Make sure the tool is free of nicks or sharp edges or damage to the seal may occur.

3. Repeat steps 1-2 for the opposite side.

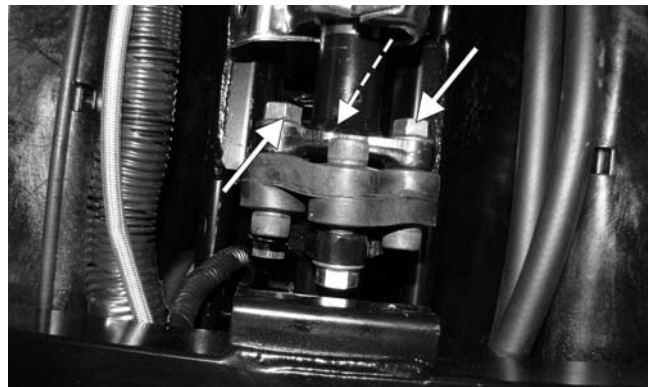
## INSTALLING

1. Lay the differential assembly on its right side and place in the frame of the vehicle; then turn it upright and maneuver into the mounting brackets.



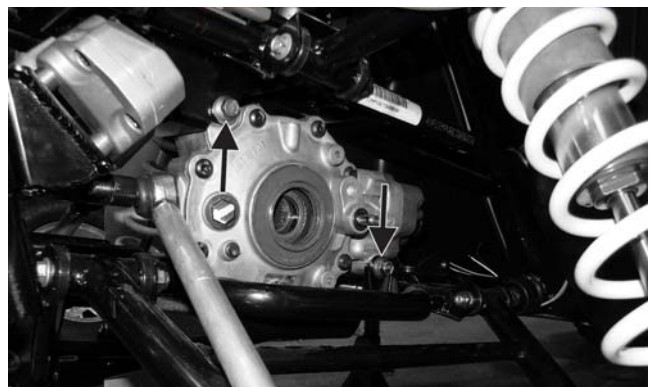
WC277

2. Apply molybdenum grease to the splines and install the forward driveshaft into the differential splined coupler; then install the three Allen-head bolts in the driveshaft coupler and tighten to 50 ft-lb.



WC267A

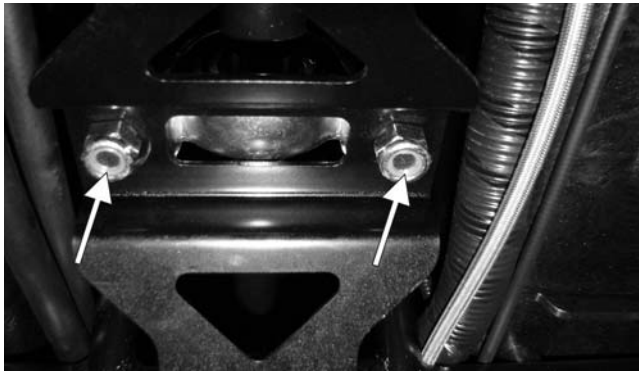
3. Install the two through-bolts and secure the differential with new lock nuts. Tighten to 38 ft-lb.



WC276A

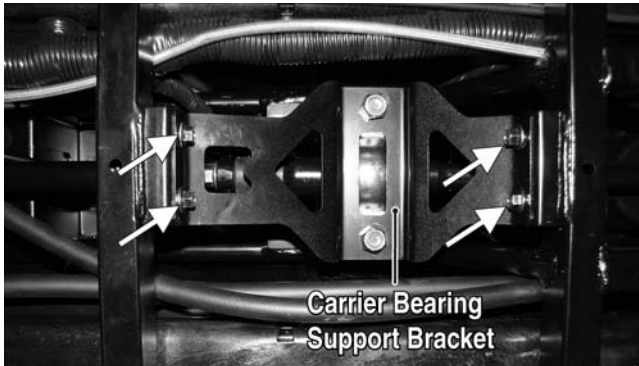
4. On the X, secure the carrier bearing to the carrier bearing support bracket with two bolts and nuts. Tighten the nuts to 35 ft-lb.





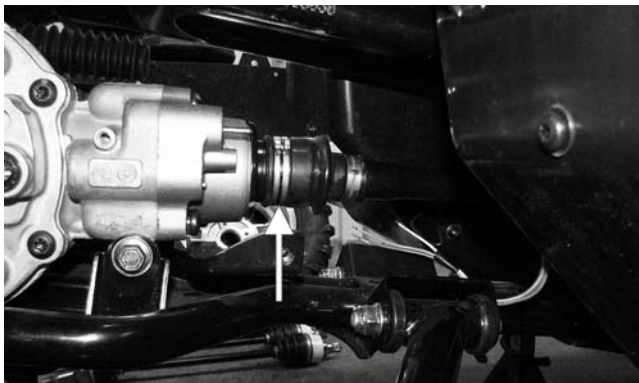
WC266A

5. On the X, secure the carrier bearing support bracket to the frame with four cap screws and tighten to 20 ft-lb.



WC265A

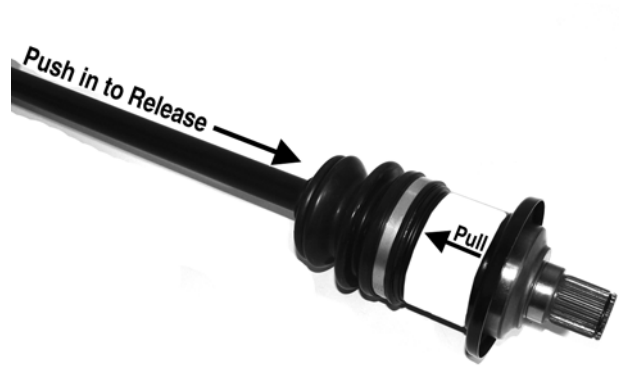
6. Make sure the drive coupler boot is fully in place on the differential drive coupler; then secure with the clamp.



WC275A

■ **NOTE:** To secure the clamp, use Hose Clamp Pliers.

7. Using new O-rings with clean grease applied, install the front drive actuator on the differential and tighten the three mounting screws securely. Connect the front drive actuator connector.
8. Apply fresh multi-purpose grease to the splines; then install the front axles into the differential pushing in on the axle shafts to seat the splines into the differential.



PR729C

9. Install the axles into the knuckles; then swing the knuckles vertical and engage the ball joint shanks into the knuckles. While holding the ball joint securely in the knuckle, secure with a new "patch-lock" cap screw. Tighten to 35 ft-lb.

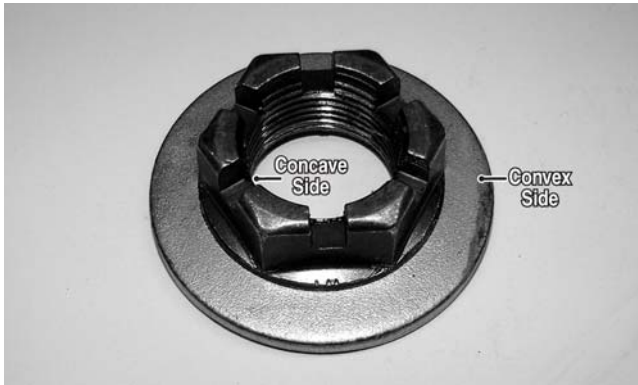


WC272



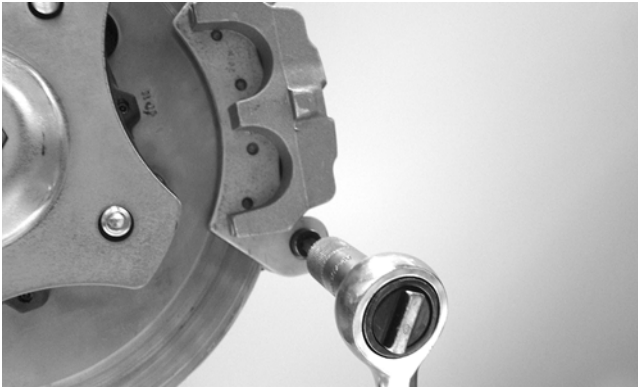
WC271

10. Install the hub assemblies onto the axles; then apply Loctite primer and red Loctite #277 to the axle threads.
11. Engage the hub nut into the Belleville washer on the convex side; then with the concave side of the washer directed toward the hub, install the nut and washer. Keeping the nut and washer engaged, tighten the hub nut to 250 ft-lb.



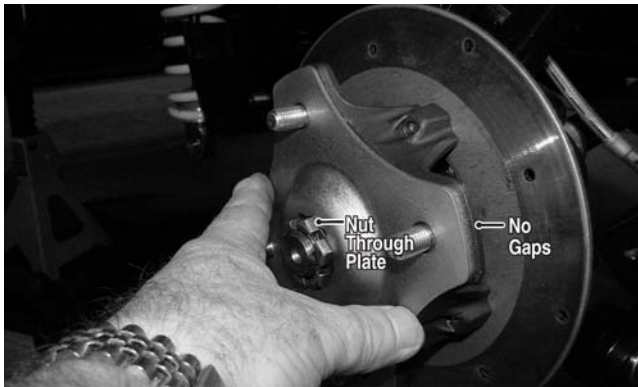
WC303A

12. Install the brake calipers/pads and secure with new “patch-lock” cap screws. Tighten to 20 ft-lb.



WC606

13. Install the hub plate and wheel onto each hub; then using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque factor of 60 ft-lb (black lug nuts) or 80 ft-lb (aluminum lug nuts).



WC317A

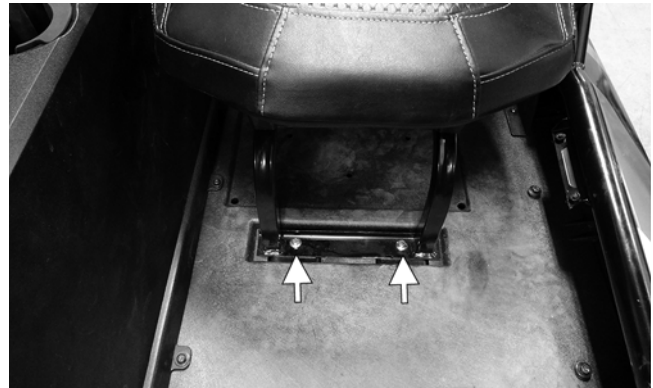
■**NOTE:** If the hub plate cannot be fully installed due to misalignment of the nut, tighten the nut until properly aligned and the plate is fully seated.

14. Tighten the differential drain plug to 45 in.-lb; then remove the fill/level plug.
15. Pour in the recommended grade and amount of lubricant until the lubricant shows on the threads of the level hole; then install the fill/level plug and tighten to 16 ft-lb.
16. Install the hub caps; then install the forward belly panel. Remove the jack stands, and lower the vehicle.

## Driveshaft (4X)

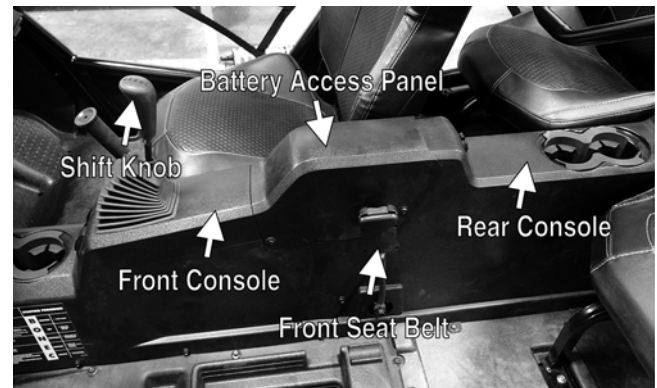
### REMOVING/DISASSEMBLING

1. Remove the front and rear seats.



WC722A

2. Remove the battery access panel, shift knob, front and rear console, and front seat belts. Make sure to disconnect the reverse override switch and the front and rear accessory plugs.



WC721A

3. On the rear driveshaft coupler near the rear differential, remove the three rearward-facing Allen-head screws.



WC716

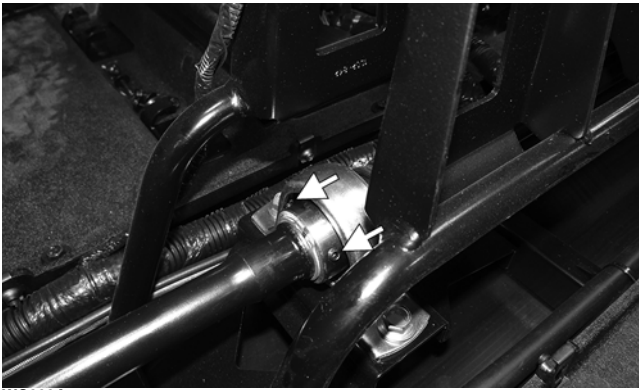
4. On the front driveshaft coupler, remove the three forward-facing Allen-head screws and nuts along with one rearward facing Allen-head screw and nut. Remove the driveshaft. Remove the remaining Allen-head screws and nuts.

■NOTE: Inspect the rubber coupler for deteriorating rubber or augured holes.



WC703

5. Loosen the set screws on the front and rear bearing assembly.



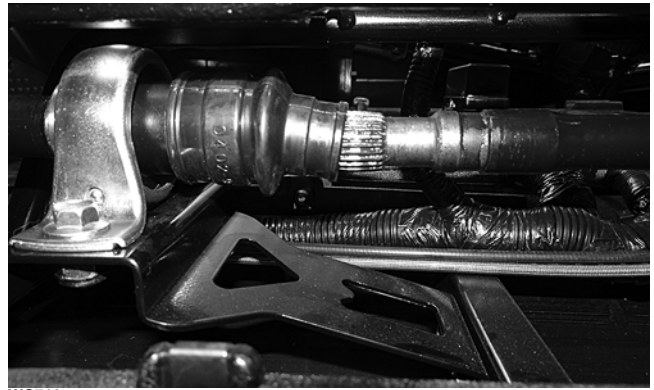
WC699A

6. Remove the boot clamps on the boot in the shift gate area.



WC696

7. Slide the center driveshaft rearward to free it from the front driveshaft.



WC713

8. Remove the screws and nuts from the rear bearing assembly. Accounting for an O-ring on the splined end of the shaft.
9. Remove the shaft; then remove the remaining Allen-head screws and nuts.

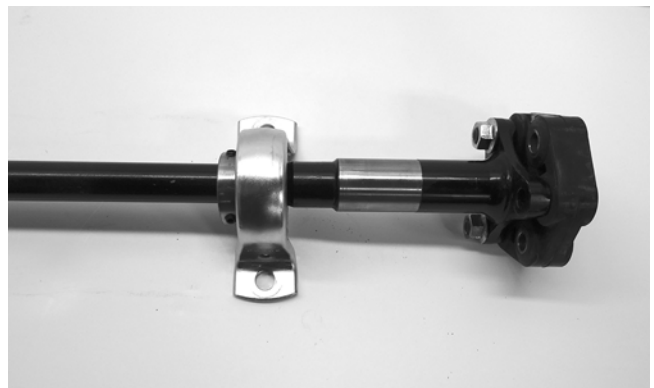
■NOTE: Inspect the rubber coupler for deteriorating rubber or augured holes.



WC697A

10. Slide the bearing housing off of the shaft.

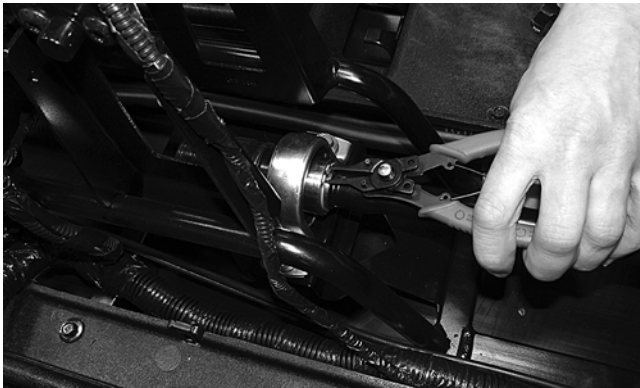
■NOTE: The set screws face the splined end of the shaft.



WC689

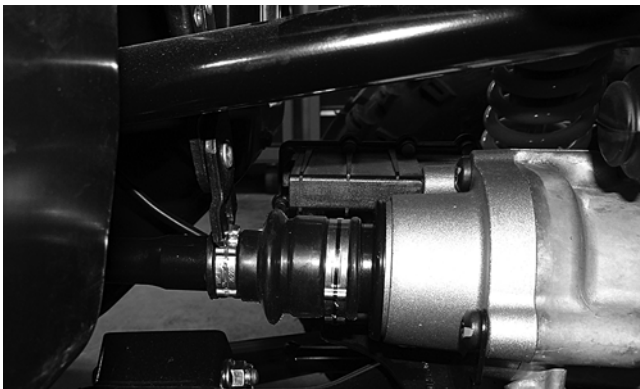
11. Check the bearing housing for any cracks. Check the bearing to see that the bearing spins freely; replace if needed.
12. On the front driveshaft in front of the front bearing assembly, remove the retaining ring.





WC710

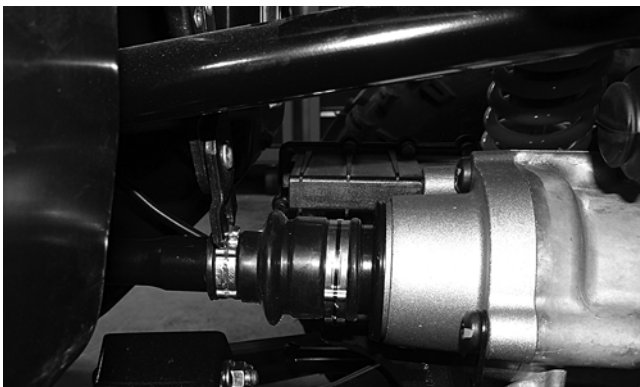
13. On the front driveshaft by the front differential, remove the rear-most boot clamp. Account for an O-ring on the splined end of the shaft.
14. Slide the shaft rearward through the bearing housing and remove the shaft.



WC712

## ASSEMBLING/INSTALLING

1. Apply a small amount of grease to the splines; then slide the front driveshaft through the front bearing housing and into the boot on the front differential. Tighten clamp securely.



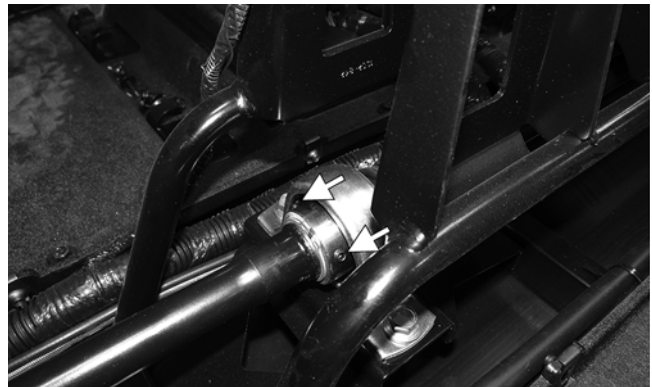
WC712

2. Apply a small amount of grease to the splines; then slide the center driveshaft into the boot connecting to the front driveshaft. Secure both clamps. Do not tighten the set screw at this time.
3. Using the existing hardware, connect the bearing housing to the bracket. Tighten to 35 ft-lb. Do not tighten set screws at this time.



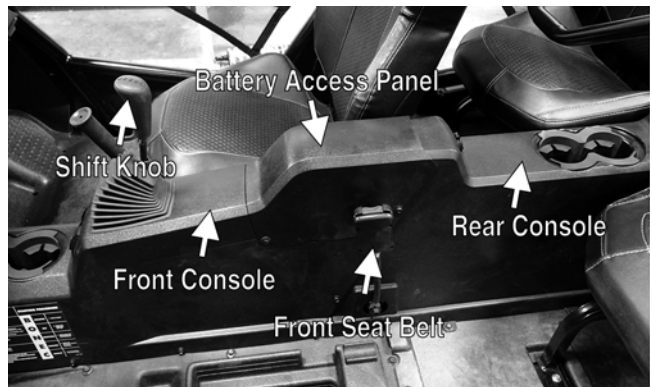
WC697A

4. Place the rear driveshaft in position; then using new Allen-head screws, connect the front and rear couplers. Starting with rear coupler, tighten to 50 ft-lb.
5. Remove the set screws on the front and rear bearing housing and apply one drop of red Loctite #271. Tighten to 75 in.-lb.



WC699A

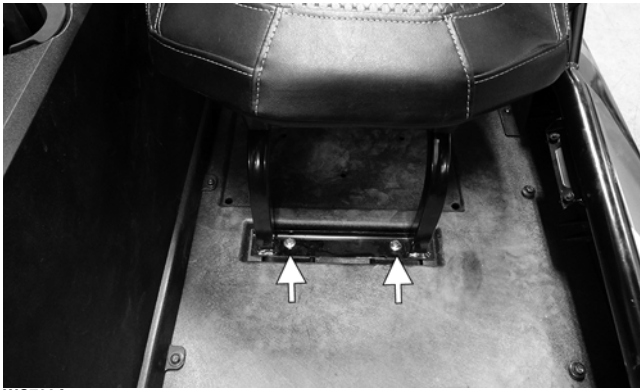
6. Install the front console making sure to connect the reverse override switch and accessory plug.
7. Install the shift knob, battery access panel, rear console, and front seat belts. Make sure to connect the rear accessory plug. Tighten the seat belt hardware to 60 ft-lb.



WC721A

8. Using new cap screws, install the rear seats. Tighten the screws to 15 ft-lb.





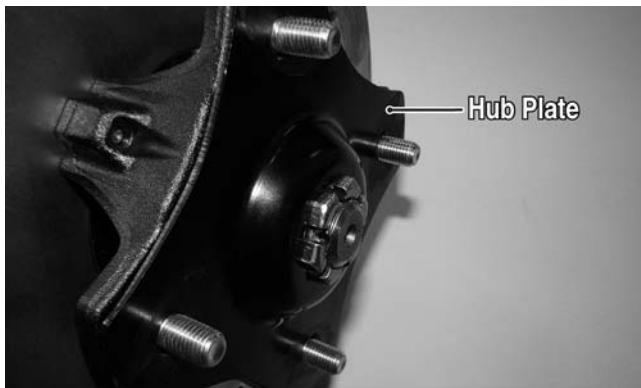
WC722A

9. Install the front seats.

## Drive Axles

### REMOVING REAR DRIVE AXLE

1. Secure the vehicle on a support stand to elevate the wheel; then remove the wheel and account for the hub plate.



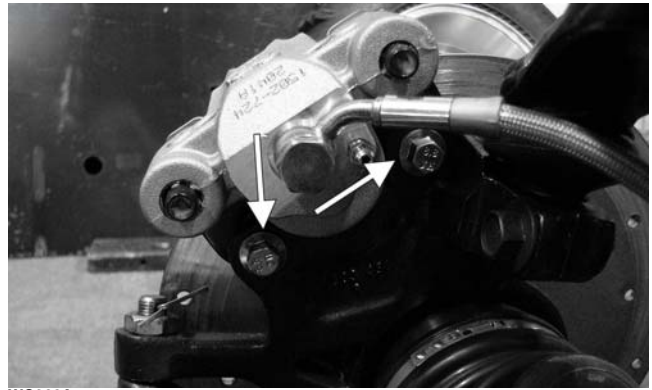
WC240B

2. Remove the Belleville washer and hub nut securing the hub.



WC304

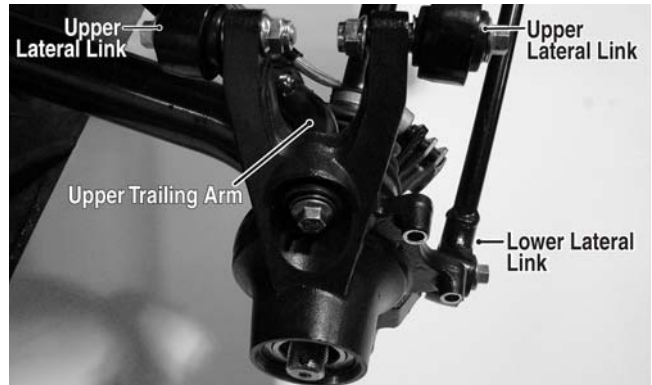
3. Remove the brake caliper.



WC268A

4. Remove the hub assembly.

5. Leaving the lower trailing arm connected to the knuckle, remove the upper trailing arm and lateral links from the knuckle; then move the top of the knuckle outward and rotate forward to disengage the axle from the axle bearing.

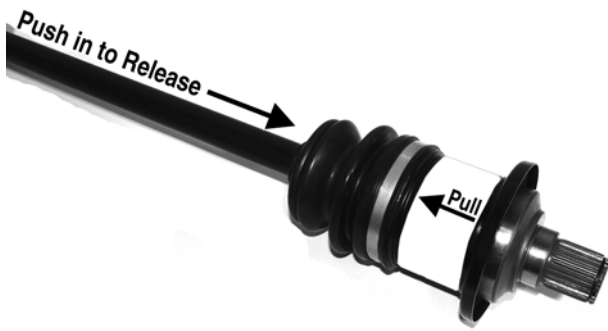


WC282B



WC286A

6. Remove the rear axles from the rear drive gear case by pushing the axle shaft toward the gear case and pulling the CV/spline shaft out. Account for one O-ring on each axle shaft.



PR729C

## REMOVING FRONT DRIVE AXLE

■NOTE: For removing a front drive axle, see Front Differential in this section.

## CLEANING AND INSPECTING AXLES

■NOTE: Always clean and inspect the drive axle components to determine if any service or replacement is necessary.

1. Using a clean towel, wipe away any oil or grease from the axle components.



CD019

2. Inspect boots for any tears, cracks, or deterioration.

■NOTE: If a boot is damaged in any way, it must be replaced with a boot kit.

## DISASSEMBLING AXLES

■NOTE: Only the boots are serviceable on the axles; if any other component is worn or damaged, the axle must be replaced.

1. Using CV Boot Clamp Tool, remove and retain both clamps for assembly purposes.



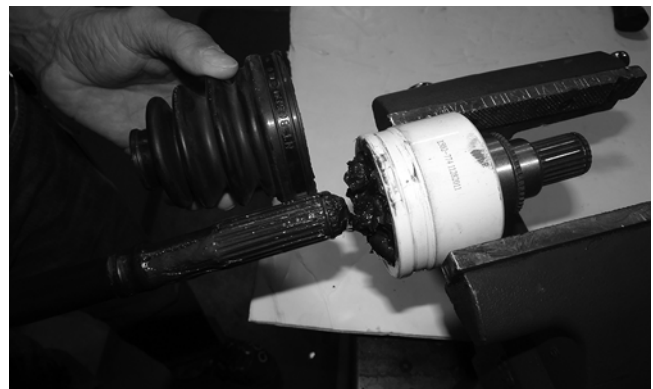
CF337

2. Place the end of the CV joint into a vise as shown.



CF335

3. To disengage the axle from the CV joint, sharply pull back on the axle; then slide the boot off of the axle.



CF334

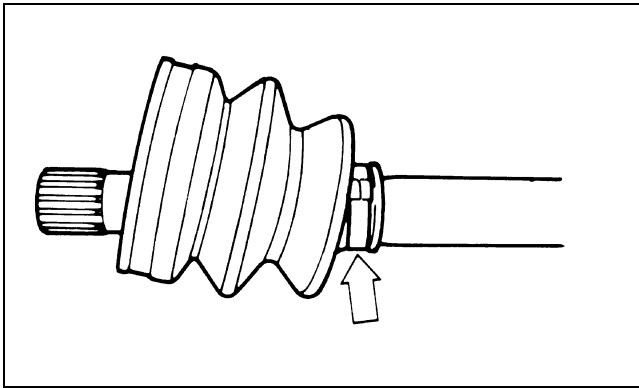
■NOTE: Steps 1-3 can be used to replace the out-board boot.

## ASSEMBLING AXLES

1. Install the inner boot with the small clamp making sure the ends of the clamp are positioned correctly.

■NOTE: The boot is positioned correctly when the small end of the boot seats down into the recessed groove.

2. Using the boot clamp tool, secure the small clamp of the inner boot.



ATV-1048

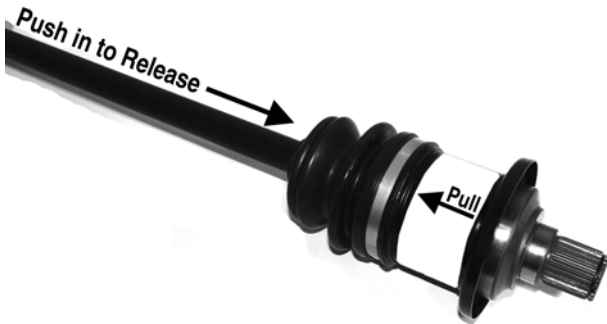
3. Apply 80 grams (2/3 of contents) of grease from the pack into the bearing housing.

■NOTE: Steps 1-3 can be used to replace the outboard boot.

■NOTE: In the outboard boot, use the final 40 grams (1/3 of contents) of grease from the pack in the bearing housing.

### INSTALLING REAR DRIVE AXLE

1. Push the axle shaft into the CV coupler to release the lock ring while pulling back on the CV coupler and slide the drive axle into place in the gear case.



PR729C

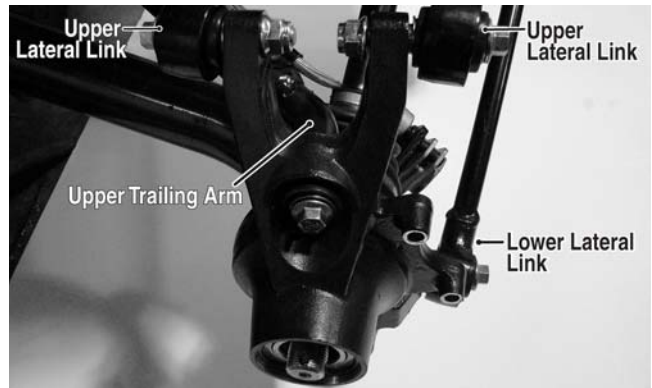
■NOTE: To ensure proper axle seating, give it a light pull; the axle should remain "clipped" in place.

2. Swing the knuckles to the rear and fit the bearing over the ends of the axles.



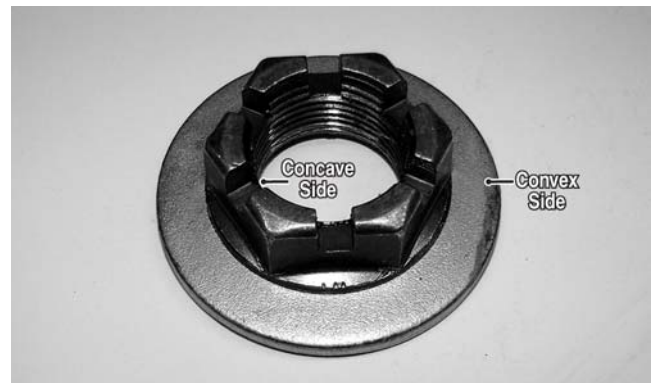
WC286

3. Connect the upper trailing arm and secure but do not tighten; then connect the lower lateral link and upper lateral links to the knuckle. Tighten the upper trailing arm cap screw and the lateral link bolts to 40 ft-lb.



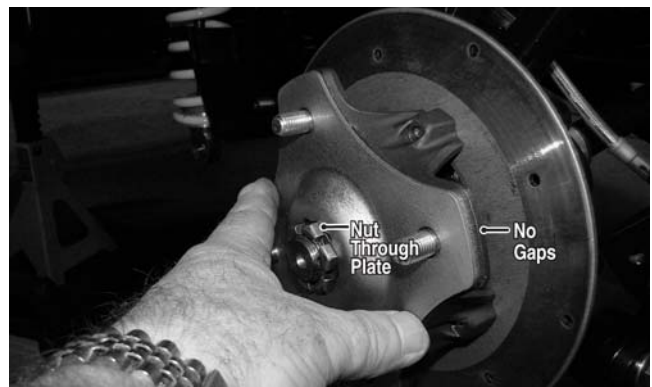
WC282B

4. Install the hub/brake disc assemblies onto the axles and apply Loctite primer and red Loctite #277 to the axle threads.
5. Engage the hub nut into the Belleville washer on the convex side; then with the concave side of the washer directed toward the hub, install the nut and washer. Keeping the nut and washer engaged, tighten the hub nut to 250 ft-lb.



WC303A

6. Install the brake calipers and secure with new "patch-lock" cap screws. Tighten to 20 ft-lb.
7. Install the hub plate making sure it fits completely over the nut and lies flat against the hub.



WC317A

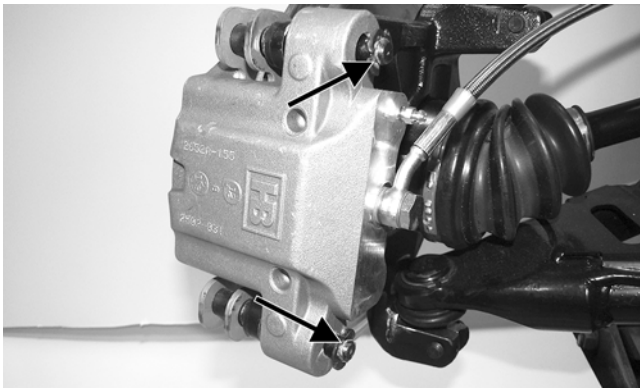
■NOTE: If the hub plate cannot be fully installed due to misalignment of the nut, tighten the nut until properly aligned and the plate is fully seated.



8. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).

## INSTALLING FRONT DRIVE AXLE

1. Push the axle shaft into the CV coupler to release the lock ring; then position the drive axle in the gear case and steering knuckle; then insert the ball joints into the steering knuckles. Secure with cap screws tightened to 35 ft-lb.
2. Secure the lower shock eyelet to the A-arm with a cap screw and a new lock nut. Tighten to 40 ft-lb.
3. Slide the hub w/brake disc into position in the steering knuckle followed by an axle nut. Finger-tighten at this time.
4. Install the caliper on the steering knuckle and secure with the original cap screws. Tighten to 35 ft-lb and install the E-clips.



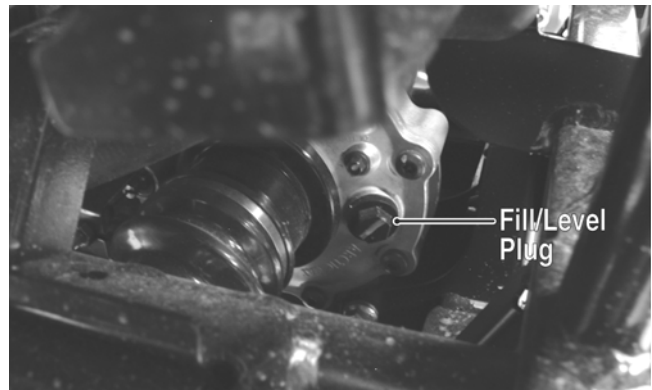
WC611A

5. Place the transmission in park; then turn the ignition switch to the ON position, select LOCK on the drive select switch. Turn the ignition switch to the OFF position.
6. Tighten the axle nut (from step 3) to 250 ft-lb; then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



WC281

7. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).
8. Check the front differential lubricant level and add lubricant as necessary.



PR065A

## Rear Gear Case

### REMOVING

1. Using a suitable lift or jack, raise and support the vehicle with the rear wheels off the floor and weight off the suspension.

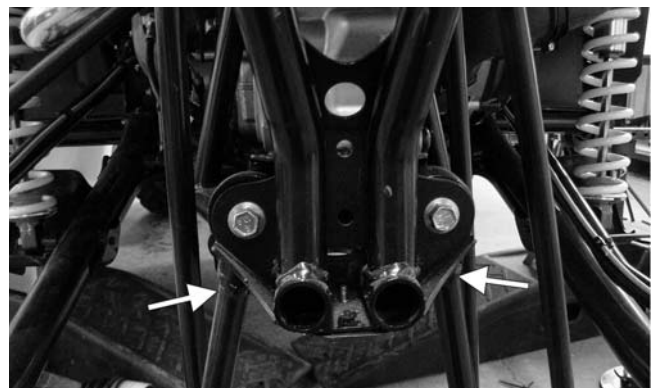
#### AT THIS POINT

On the 4X if the technician's objective is to remove the rear driveshaft, the gear case does not have to be removed from the frame. Proceed to step 6 of this procedure.

#### AT THIS POINT

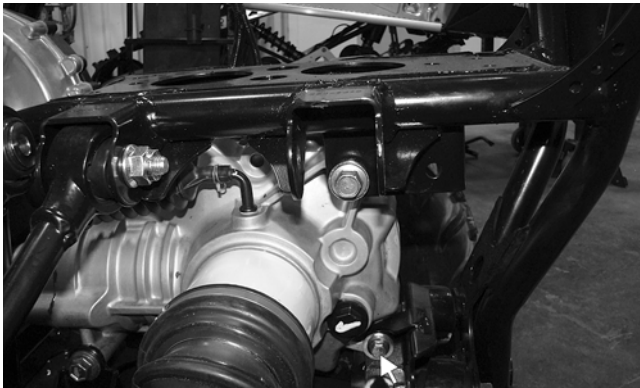
If disassembling the rear gear case, drain the lubricant.

2. Remove the rear drive axles (see Drive Axles in this section).
3. Remove the two lower lateral links from the frame; then remove the lower rear gear case mounting cap screw.



WC287A



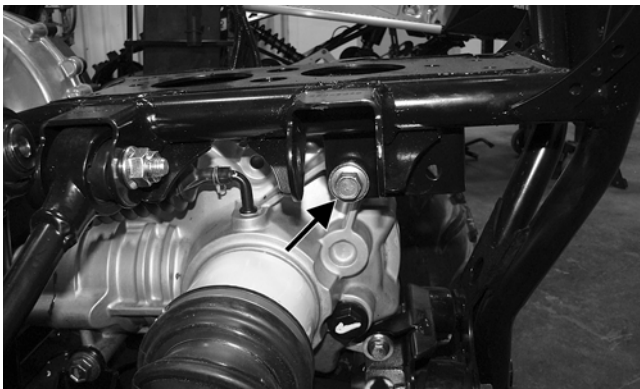


WC170B

4. Remove the lower frame gear case bracket; then remove the left upper lateral link and the upper rear gear case through-bolt.



WC169A



WC170C

5. Remove the lower front through-bolt; then remove the boot clamp on the input drive coupler and slide the gear case to the rear until drive coupler disengages.



WC288A

## AT THIS POINT

On the 4X if the technician's objective is to remove the rear driveshaft, release the clamp securing the shaft to the gear case; then slide the shaft from the gear case.



WC743

6. Lay the gear case on its left side and remove from either side of the vehicle. Account for the spring and washer with the drive coupler.



WC290

## RING GEAR/THRUST BUTTON

### Removing

1. Remove the cap screws securing the gear case cover to the gear case; then remove the ring gear.
2. Remove the thrust button from the gear case cover (left-hand threads). Account for a shim.

### Inspecting

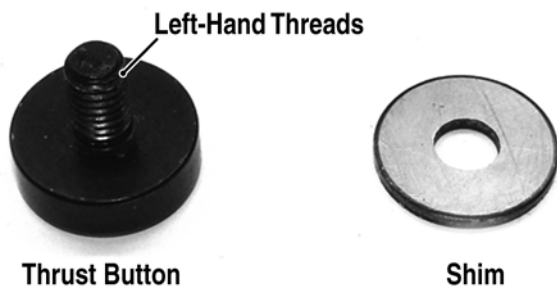
1. Inspect the ring gear for excessive wear, missing or chipped teeth, or discoloration.
2. Inspect the thrust button for excessive wear or discoloration.
3. Inspect the bearings for discoloration, roughness, or excessive wear.

■NOTE: For servicing bearings or seals, see Front Differential in this section.

### Installing/Shimming

■NOTE: Ring gear clearance must be adjusted prior to selecting shim for the thrust button.

1. Install the thrust button with shim into the gear case cover and tighten securely (left-hand threads).



GC057A

2. Place the ring gear with selected shim into the cover and measure the ring gear to thrust button clearance with a thickness gauge. Clearance should be 0.020-0.040 in.



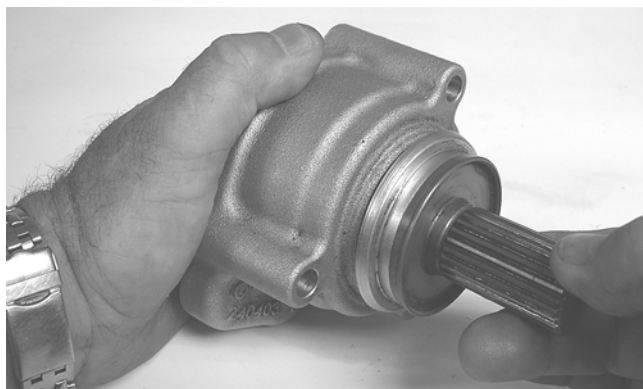
GC058A

3. If clearance is as specified, remove the ring gear and thrust button; then place a drop of red Loctite #271 on the threads and tighten to 8 ft-lb (left-hand threads).
4. If clearance is not as specified, repeat steps 1 and 2 using thicker (clearance too great) or thinner (clearance too small) until correct specification is reached.

## REAR DRIVE INPUT SHAFT/ HOUSING

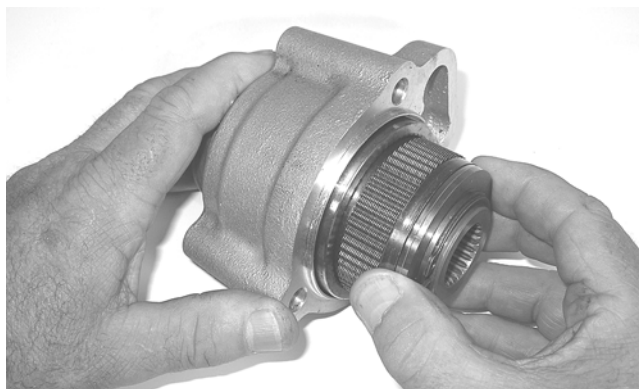
### Removing/Disassembling

1. Remove the cap screws securing the rear drive input shaft/housing to the rear gear case; then remove the input housing assembly.

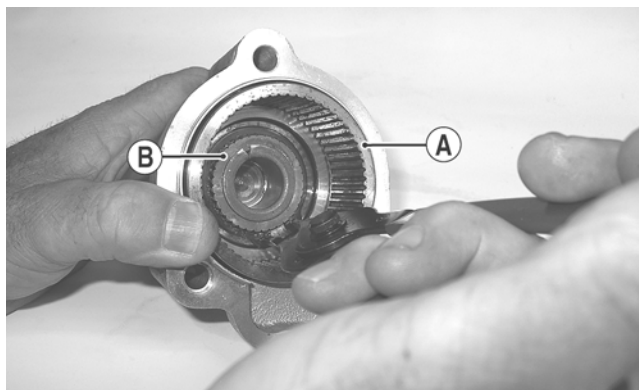


GZ183

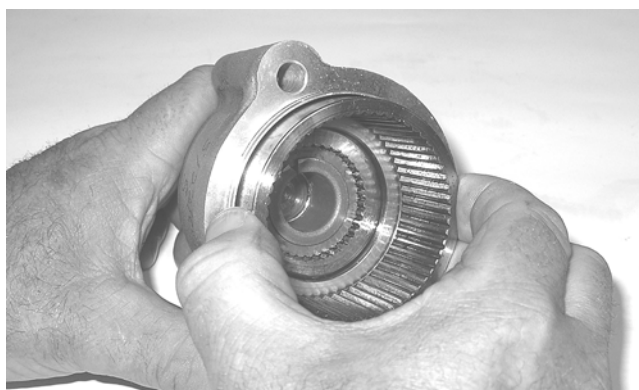
2. Remove the clutch pack from the clutch basket; then remove the snap ring securing the clutch basket (A) to the input shaft (B) and remove the clutch basket.



GZ392



GZ176A

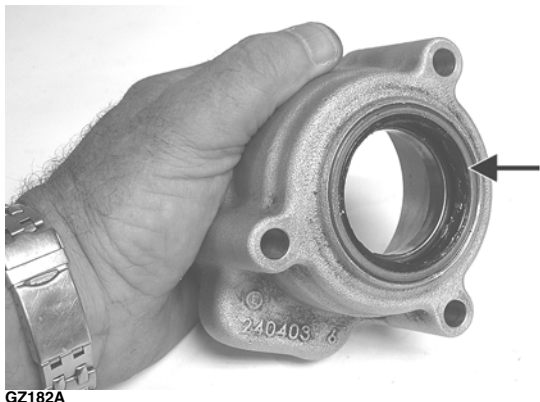


GZ177

3. Remove the input shaft from the input housing; then remove the oil seal.



GZ180



GZ182A

4. Remove the snap ring retaining the input bearing and using an appropriate bearing driver, press the bearing from the housing.



GZ184A

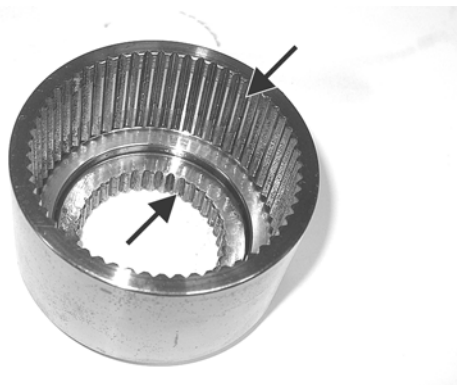
### Cleaning and Inspecting

1. Wash all parts in parts cleaning solvent and dry with compressed air.

#### **WARNING**

**Always wear safety glasses when working with compressed air.**

2. Clean all gasket material and sealant from mating surfaces.
3. Inspect bearings, shafts, and housing for excessive wear, cracks, or discoloration.
4. Inspect the clutch basket for wear in splines or cracks in the housing.



GZ178A

5. Inspect the clutch pack for signs of discoloration.

■ **NOTE:** The clutch pack is not a serviceable component. If worn, discolored, or damaged in any way, it must be replaced.

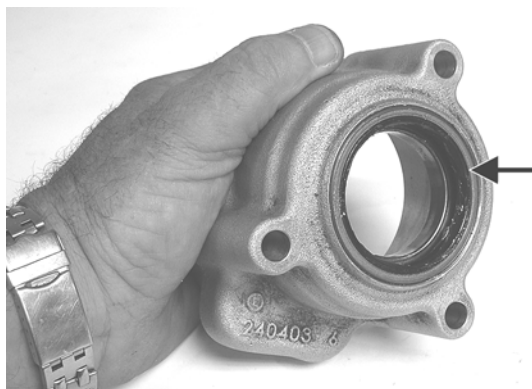
### Assembling/Installing

1. Install a new bearing into the input housing and secure with the snap ring (flat side directed away from bearing).



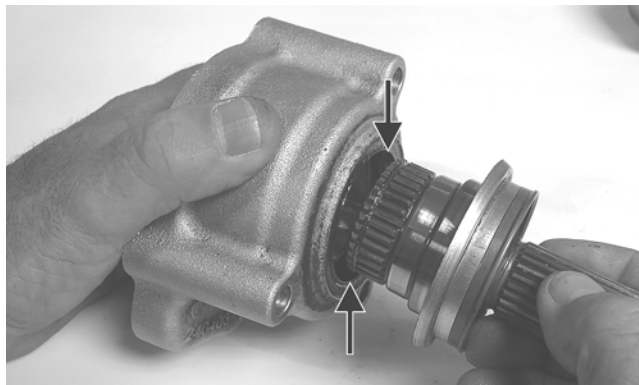
GZ184

2. Using a suitable seal driver, install a new oil seal into the front of the input housing until the seal is flush with the housing.



GZ182A

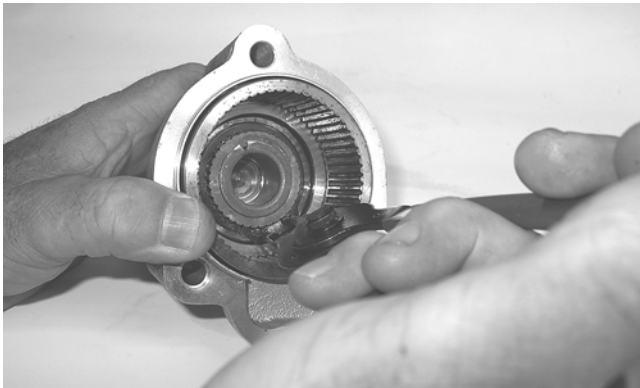
3. Apply grease to the lips of the oil seal; then install the input shaft into the input bearing and housing.



GZ179A

4. Install the clutch basket onto the input shaft and secure with the snap ring (flat side directed outward); then install the clutch pack into the basket.





GZ176

5. Using a new gasket, install the assembled rear drive input shaft/housing onto the rear drive gear case and secure with the three cap screws. Tighten to 23 ft-lb.

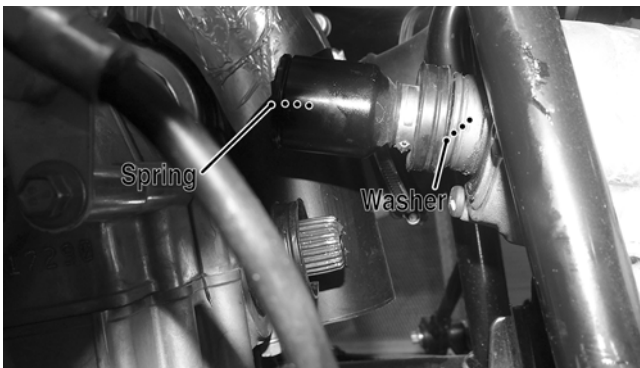
### **AT THIS POINT**

**For servicing the input shaft, pinion gear, needle bearing, and axle seal, see Front Differential in this section.**

### **INSTALLING**

1. If removed, tilt the gear case to the left side and place into the frame from either side making sure the front spacer is in place; then apply molybdenum grease to the splines of the drive coupler.
2. Making sure the washer is inside of the differential, slide the rear driveshaft into the differential.

■**NOTE:** It is critical to apply molybdenum grease to all splines of all driveshafts.

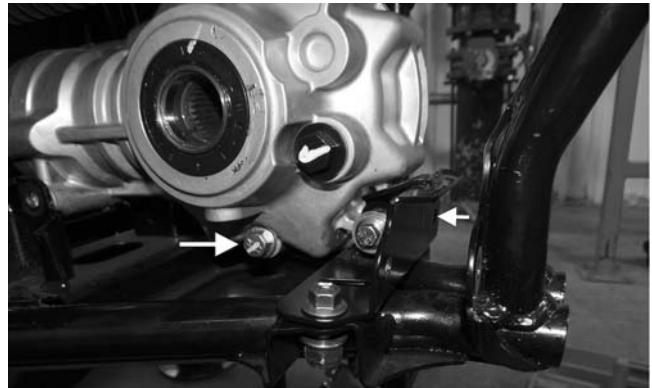


WC767A

3. With the spring in the rear driveshaft, lower the gear case and slide it onto the engine output shaft making sure the boot slips over the splined shaft; then install the lower front and upper rear through-bolts. Do not tighten at this time.

■**NOTE:** Make sure all spacers are correctly located at the gear case mounting points.

4. Install the boot clamp on the drive coupler; then install the lower frame/gear case bracket and mounting cap screw. Do not tighten at this time.



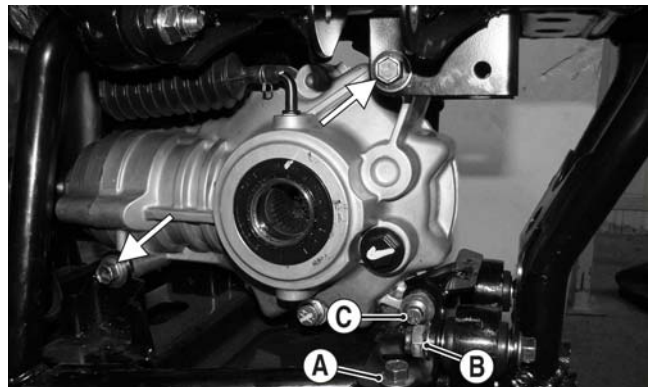
WC295A

5. Install the lower lateral links and secure with the bolts and new lock nuts. Do not tighten at this time.



WC287A

6. In order, tighten the lower frame/gear case bracket mounting nuts (A) to 35 ft-lb, lower lateral link nuts (B) to 40 ft-lb, and the gear case cap screw (C) to 20 ft-lb; then tighten the nuts on lower front and upper rear through-bolts to 38 ft-lb.



WC296A

7. Install the upper left lateral link and secure with a bolt and nut. Tighten to 40 ft-lb.





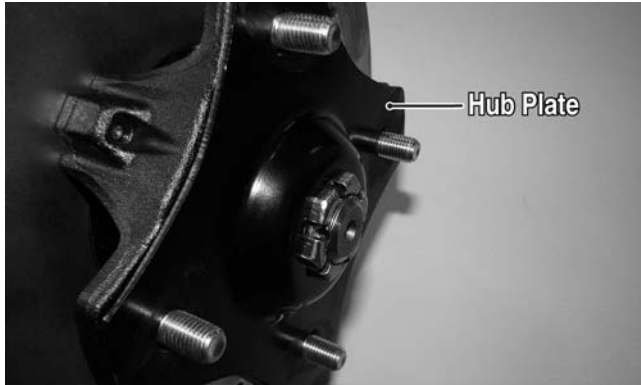
WC169A

8. Apply molybdenum grease to the splines of the axle couplers and install the axles into the gear case; then install the rear drive axles (see Drive Axles in this section).
9. Pour in the recommended gear case lubricant and check to ensure the lubricant is one inch below threads in fill/level hole. Install and tighten the fill/level plug to 16 ft-lb.

## Hub

### REMOVING

1. Secure the vehicle on a support stand to elevate the wheel; then remove the wheel and account for the hub plate.



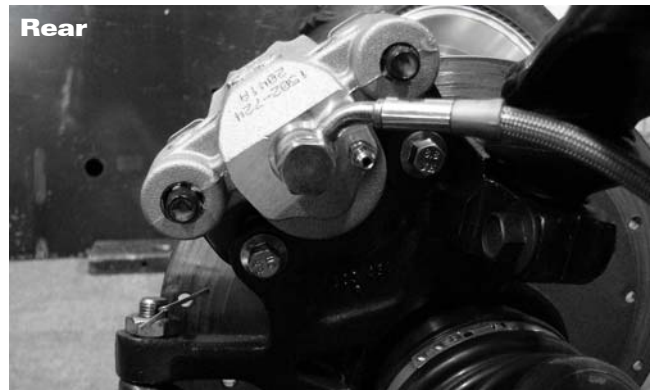
WC240B

2. Remove the Belleville washer and hub nut securing the hub.

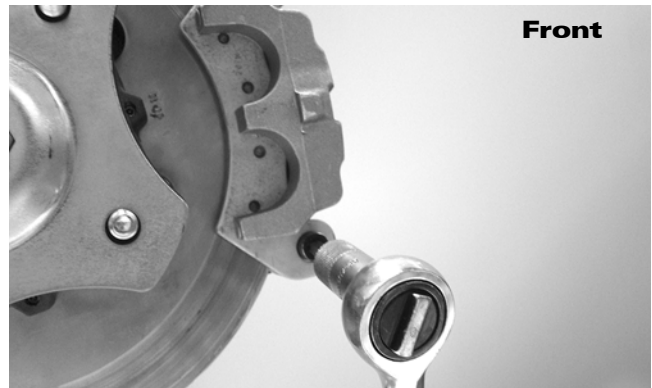


WC304

3. Remove the brake caliper.

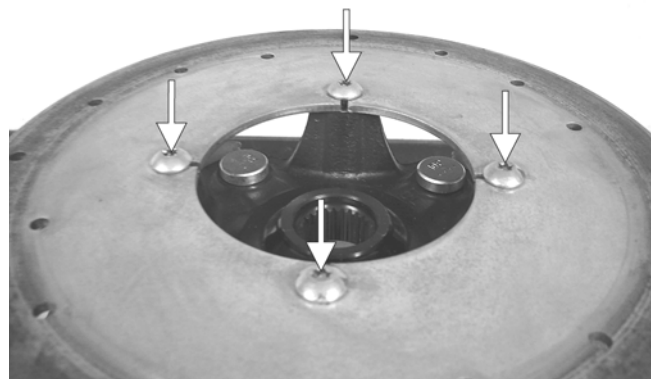


WC268



WC606

4. Remove the hub assembly.
5. Remove the four cap screws securing the brake disc.



PR254A

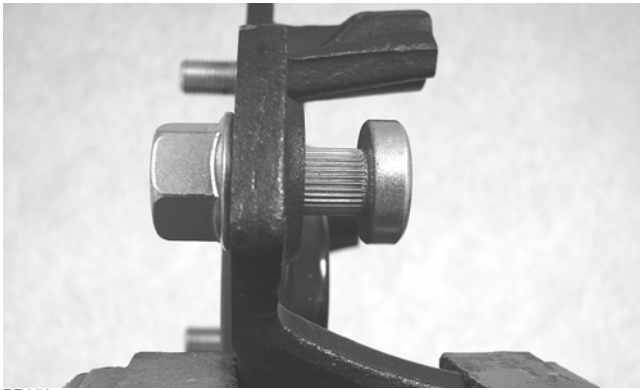
■NOTE: It may be necessary to heat the cap screws to loosen the Loctite.

### CLEANING AND INSPECTING

1. Clean all hub components.
2. Inspect all threads for stripping or damage.
3. Inspect the brake disc (if applicable) for cracks or warping.
4. Inspect the hub for pits, cracks, loose studs, or spline wear.

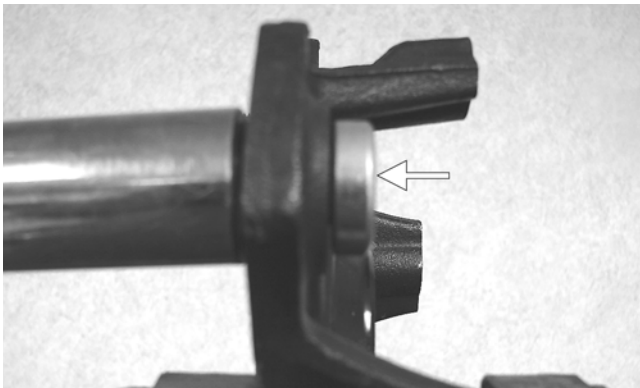
### REPLACING WHEEL STUDS

1. Secure the hub in a suitable holding fixture and remove the brake disc (if applicable).
2. Drive the damaged stud out of the hub; then place the new stud (coated with green Loctite #620) into the hub and thread on an appropriate flange nut.



PR250

3. Using a socket and ratchet handle, tighten the nut until the stud is fully drawn into the hub.



PR252A

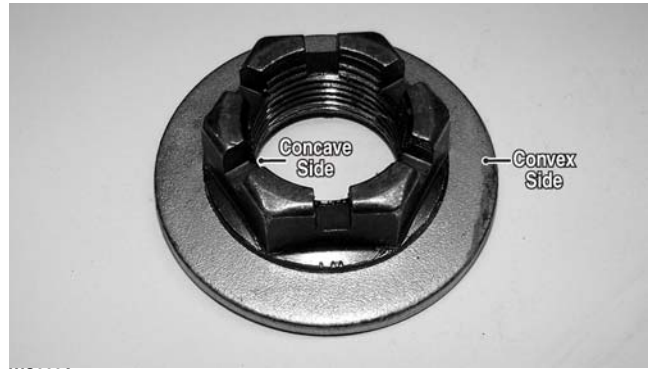
## INSTALLING

1. Secure the brake disc to the hub with the four cap screws coated with red Loctite #271. Tighten to 15 ft-lb.
2. Install the hub assembly onto the axle; then apply Loctite primer and red Loctite #277 to the axle threads. Install the brake caliper and secure with new "patch-lock" cap screws. Tighten to 20 ft-lb.

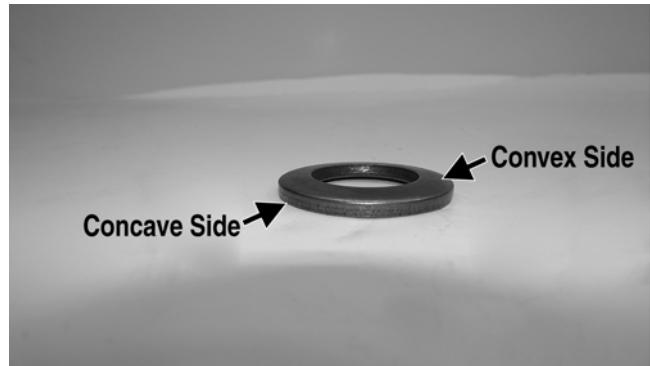


WC281

3. Engage the hub nut into the Belleville washer on the convex side; then with the concave side of the washer directed toward the hub, install the nut and washer. Keeping the nut and washer engaged, tighten the hub nut to 250 ft-lb.

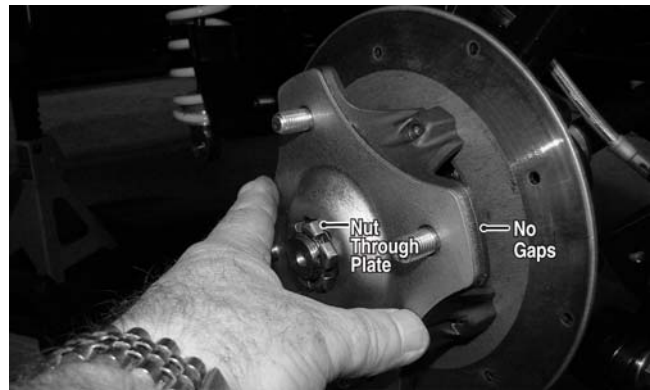


WC303A



WC769A

4. Install the hub plate making sure it fits completely over the nut and lies flat against the hub.



WC317A

■**NOTE:** If the hub plate cannot be fully installed due to misalignment of the nut, tighten the nut until properly aligned and the plate is fully seated.

5. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).
6. Remove the vehicle from the support stand.

# Hydraulic Brake Caliper

## **WARNING**

Arctic Cat recommends only authorized Arctic Cat Wild-cat dealers perform hydraulic brake service. Failure to properly repair brake systems can result in loss of control causing severe injury or death.

## **REMOVING/DISASSEMBLING (Front)**

1. Secure the vehicle on a support stand to elevate the wheel; then remove the wheels of the brake to be serviced.

## **WARNING**

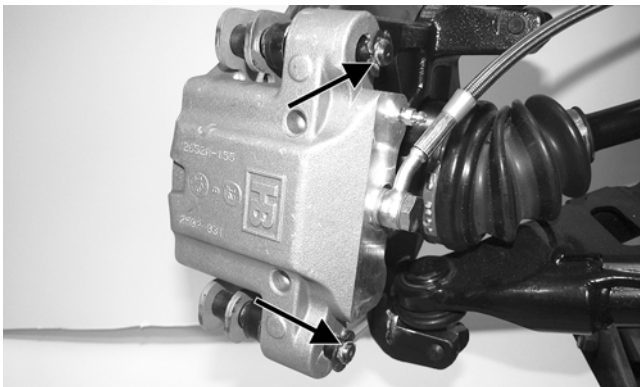
Never let brake fluid contact the eyes. Damage to the eyes will occur. Always wear appropriate protective safety goggles and latex gloves when handling brake fluid.

## **CAUTION**

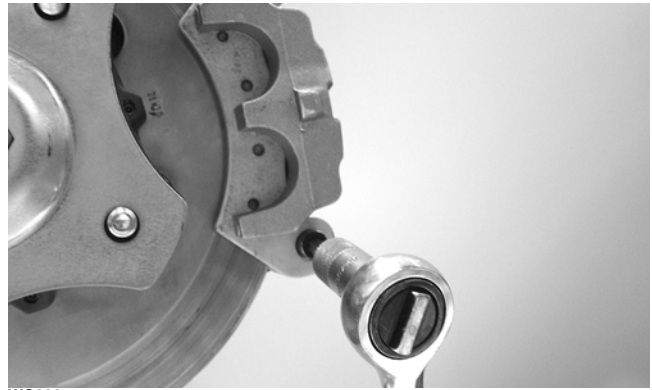
Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the vehicle and do not reuse brake fluid.

■NOTE: Whenever brake components are removed, disassembled, or repaired where brake fluid is exposed to air, drain all fluid and replace with new DOT 4 brake fluid from an unopened container. Brake fluid readily absorbs moisture from the air significantly lowering the boiling point. This increases the chance of vapor lock reducing braking power and increasing stopping distance.

2. Drain the brake fluid from the caliper, hose, and master cylinder through the bleed screw by pumping the brake pedal.
3. If the caliper is being removed, remove the E-clips on the inboard side of the caliper anchor bolts; then remove the anchor bolts from the knuckle.



WC611A



WC606

■NOTE: If brake pads are to be returned to service, do not allow brake fluid to contaminate them.

4. Remove the brake pads from the caliper.



WC694

5. Cover the piston end of the housing with cardboard or a shop towel; then keeping fingers clear of piston travel, apply compressed air to the fluid port to blow the piston free of the housing. Account for four seal rings in the housing.



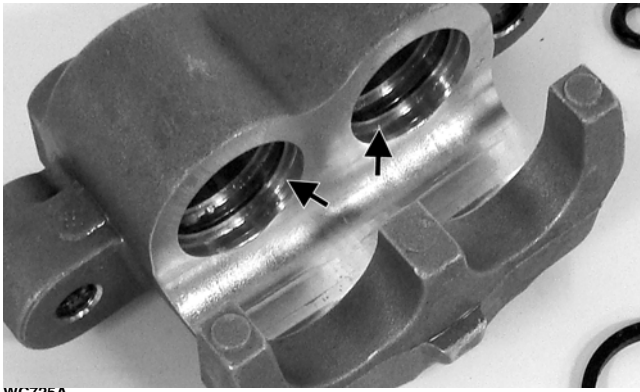
WC941

## **WARNING**

Make sure to hold the caliper firmly in place or the piston could be ejected from the housing causing injury.

6. Using an appropriate seal removal tool, carefully remove the seals from the brake caliper housing; then remove four O-rings from the brake caliper housing noting the location of the different sized O-rings. Discard all seals, O-rings, and crush washers.





WC725A

## REMOVING/DISASSEMBLING (Rear)

1. Secure the vehicle on a support stand to elevate the wheel; then remove the wheel.

### ⚠ WARNING

Never let brake fluid contact the eyes. Damage to the eyes will occur. Always wear appropriate protective safety goggles and latex gloves when handling brake fluid.

2. Drain the brake fluid from the caliper, hose, and master cylinder through the bleed screw by pumping the brake pedal.

### CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the vehicle and do not reuse brake fluid.

■NOTE: Whenever brake components are removed, disassembled, or repaired where brake fluid is exposed to air, drain all fluid and replace with new DOT 4 brake fluid from an unopened container. Brake fluid readily absorbs moisture from the air significantly lowering the boiling point. This increases the chance of vapor lock reducing braking power and increasing stopping distance.

3. Remove the brake hose from the caliper and close the bleed screw; then remove the caliper.
4. Compress the caliper holder against the caliper (opposite the O-ring side) and remove the outer brake pad; then remove the inner brake pad.



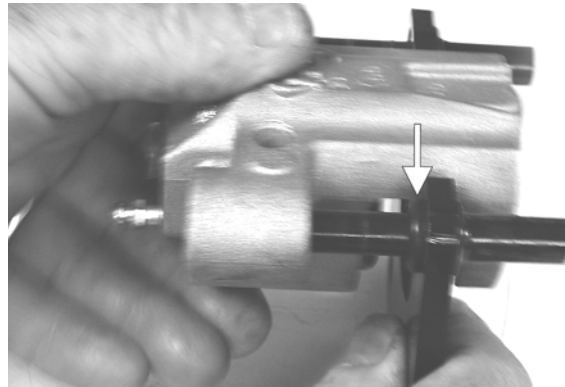
PR237A

■NOTE: If brake pads are to be returned to service, do not allow brake fluid to contaminate them.



PR238

5. Remove the caliper holder from the caliper and discard the O-ring.



PR239B

■NOTE: The O-ring is used for shipping purposes and provides no function in operation.

6. Cover the piston end of the housing with a shop towel; then keeping fingers clear of piston travel, apply compressed air to the fluid port to blow the piston free of the housing. Account for two seal rings in the housing.



PR713A





PR715

### **⚠ WARNING**

**Make sure to hold the towel firmly in place or the piston could be ejected from the housing causing injury.**

7. Using an appropriate seal removal tool, carefully remove the seals from the brake caliper housing; then remove four O-rings from the brake caliper housing noting the location of the different sized O-rings. Discard all seals, O-rings, and crush washers.

### **CLEANING AND INSPECTING**

1. Clean all caliper components (except the brake pads) with brake fluid cleaner. Do not wipe dry.
2. Inspect the brake pads for damage and excessive wear.

■**NOTE:** For measuring brake pads, see Periodic Maintenance/Tune-Up.

3. Inspect the brake caliper housings for scoring in the piston bores, chipped seal ring grooves, or signs of corrosion or discoloration.
4. Inspect the piston surface for scoring, discoloration, or evidence of binding or galling.
5. Inspect the caliper holder or anchor bolts for wear or bending.

### **ASSEMBLING/INSTALLING (Rear Brake)**

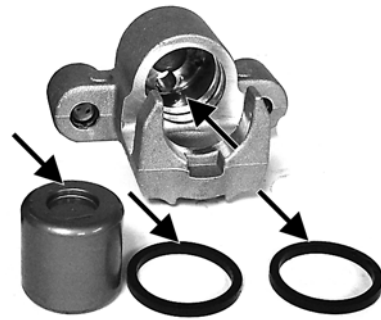
1. Install new seals into the brake caliper housing and apply a liberal amount of DOT 4 brake fluid to the cylinder bore of the housing, seals, and brake piston.

### **CAUTION**

**Make sure the seals are properly in place and did not twist or roll during installation.**



PR715



PR717A

2. Press the piston into the caliper housing using hand pressure only. Completely seat the piston; then wipe off any excessive brake fluid.

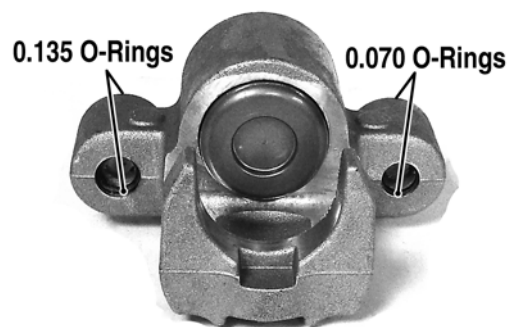


PR711A



PR712

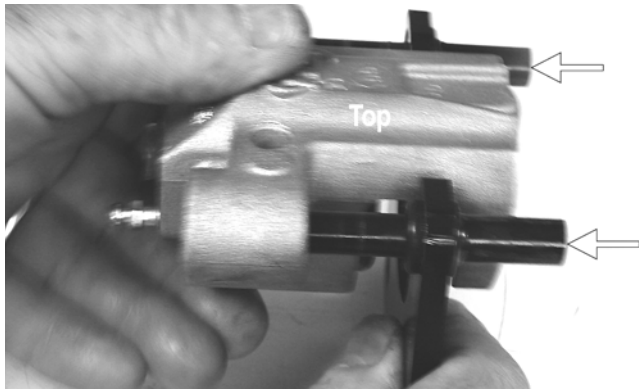
3. Apply high-temperature silicone grease (supplied with the O-ring kit) to the inside of the caliper holder bores and O-rings; then install the four O-rings into the caliper.



PR719C

4. Install the caliper onto the caliper holder making sure the caliper and holder are correctly oriented.

■**NOTE:** It is very important to apply silicone grease to the O-rings and caliper bores prior to assembly.



PR239C

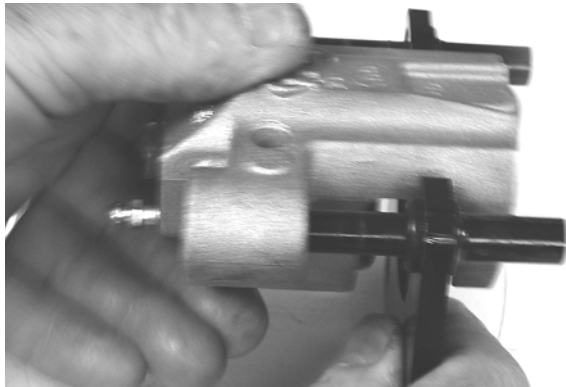
5. Making sure brake fluid does not contact the brake pads, compress the caliper holder toward the caliper and install the inner brake pad; then install the outer pad.

### CAUTION

If brake pads become contaminated with brake fluid, they must be thoroughly cleaned with brake cleaning solvent or replaced with new pads. Failure to do so will result in reduced braking and premature brake pad failure.



PR238



PR239

6. Place the brake caliper assembly into position and secure with new "patch-lock" cap screws. Tighten the caliper to 20 ft-lb.
7. Place a new crush washer on each side of the brake hose fitting and install it on the caliper. Tighten to 20 ft-lb.

8. Fill the reservoir; then bleed the brake system (see Periodic Maintenance/Tune-Up).

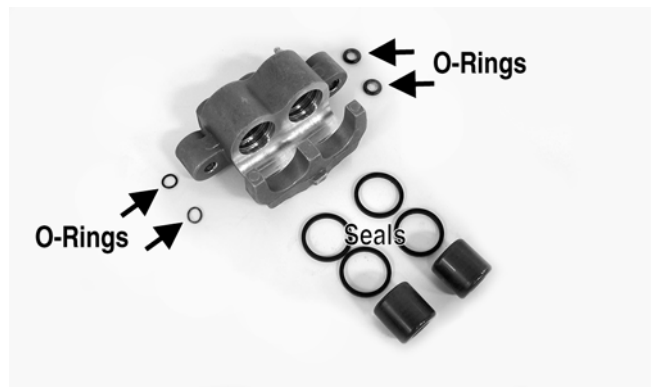
### ⚠ WARNING

Never use brake fluid from an open container or reuse brake fluid. Moisture-contaminated brake fluid could cause vapor build-up (expansion) during hard braking resulting in greatly increased stopping distance or loss of control leading to injury or death.

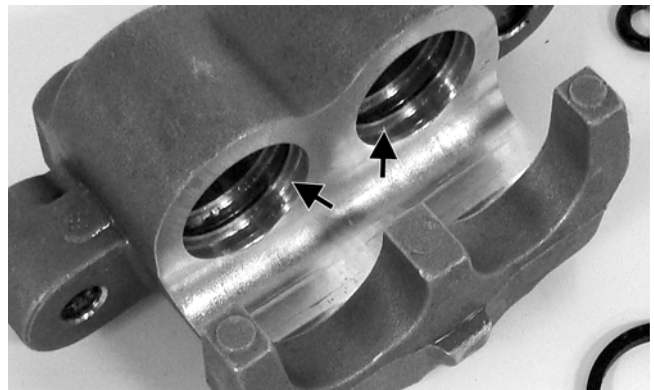
9. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).
10. Remove the vehicle from the support stand and verify brake operation.

### ASSEMBLING/INSTALLING (Front Brake)

1. Install new seals and O-rings into the brake caliper housing and apply DOT 4 brake fluid to the cylinder bores and pistons.



WC723A



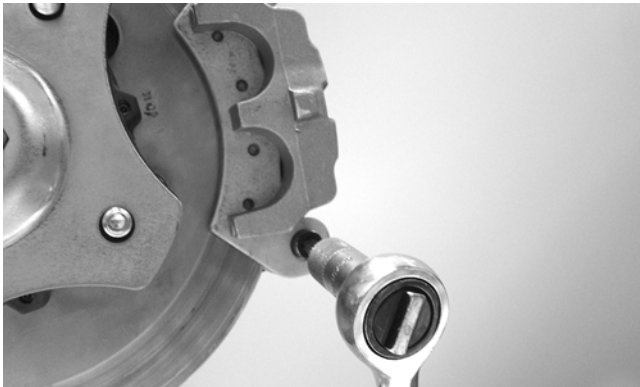
WC725A

2. Install the pistons into the caliper seating them completely into the piston bore.



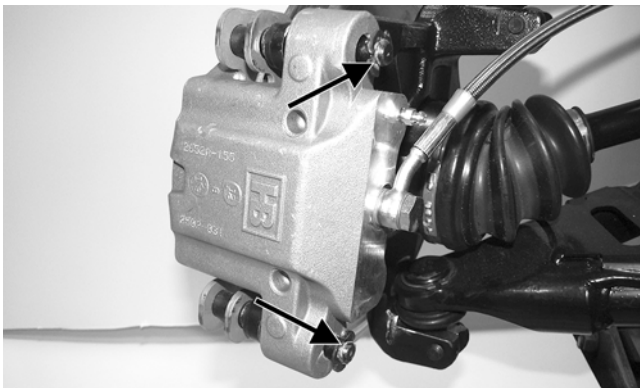
WC692

3. Using silicon grease, lubricate the O-rings and install into the anchor bolt bores making sure the correct size of O-rings are installed in the correct locations (thicker O-rings on bleed screw end of calipers).
4. Install the caliper and brake pads onto the brake disc and secure to the knuckle with the anchor bolts. Tighten to 35 ft-lb.



WC606

5. Install the E-clips; then using new crush washers, connect the brake banjo fitting to the caliper and tighten to 20 ft-lb.



WC611A



WC609

6. Fill the reservoir; then bleed the brake system (see Periodic Maintenance/Tune-Up.)
7. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).

## Master Cylinder Assembly

■NOTE: The master cylinder is a non-serviceable component; it must be replaced as an assembly.

### Removing

1. Slide a piece of flexible tubing over one of the brake caliper bleeder valves and direct the other end into a container. Remove the reservoir cover; then open the bleeder valve. Allow the brake fluid to drain until the reservoir is empty.
2. Remove the cotter pin and pivot pin from the yoke; then remove two cap screws securing the master cylinder assembly to the frame.



PR338



PR336

3. Remove the oil bolt and brakelight switch securing the banjo-fittings to the master cylinder; then remove the master cylinder. Discard the crush washers.



WC942

### **CAUTION**

**Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the vehicle.**

### **Inspecting**

1. Inspect the master cylinder push rod and clevis for wear, bending, or elongation of clevis holes.
2. Inspect the push rod boot for tears or deterioration.
3. Inspect the reservoir for cracks and leakage.
4. Inspect the brake hose for cracks and deterioration and the condition of the banjo-fittings.

### **Installing**

1. Place the master cylinder into position; then using new crush washers, secure the banjo-fitting and brakelight switch to the master cylinder. Tighten to 20 ft-lb.
2. Secure the master cylinder assembly to the frame with two cap screws. Tighten to 25 ft-lb.
3. Install the pivot pin and secure with a new cotter pin.
4. Fill the master cylinder and bleed the brake system (see Hydraulic Brake System in Periodic Maintenance/Tune-Up).



## Troubleshooting Drive System

### Problem: Power not transmitted from engine to wheels

Condition	Remedy
1. <b>Rear axle shaft serration</b> worn - broken	1. Replace shaft

### Problem: Power not transmitted from engine to either front wheel

Condition	Remedy
1. <b>Secondary drive - driven gear</b> teeth broken 2. <b>Propeller shaft serration</b> worn - broken 3. <b>Coupling</b> damaged 4. <b>Coupling joint serration</b> worn - damaged 5. <b>Front drive - driven bevel gears</b> broken - damaged 6. <b>Front differential gears/pinions</b> broken - damaged 7. <b>Front drive actuator</b> not operating	1. Replace gear(s) 2. Replace shaft 3. Replace coupling 4. Replace joint 5. Replace gear(s) 6. Replace gears - pinions 7. Replace fuse - drive select switch - front drive actuator

## Troubleshooting Brake System

### Problem: Braking poor

Condition	Remedy
1. <b>Pad</b> worn 2. <b>Brake fluid</b> leaking 3. <b>Master cylinder/brake cylinder seal</b> worn	1. Replace pads 2. Repair leak(s) 3. Replace seal(s)

### Problem: Brake pedal travel excessive

Condition	Remedy
1. <b>Brake fluid</b> low 2. <b>Piston seal - cup</b> worn	1. Add fluid to proper level 2. Replace seal - cup

### Problem: Brake fluid leaking

Condition	Remedy
1. <b>Fittings</b> loose 2. <b>Hose</b> cracked 3. <b>Piston seal</b> worn	1. Tighten fittings 2. Replace hose 3. Replace seal

### Problem: Brake pedal spongy

Condition	Remedy
1. <b>Air trapped</b> in hydraulic system 2. <b>Brake fluid</b> low	1. Bleed hydraulic system 2. Add brake fluid and bleed hydraulic brake system

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## Suspension

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The following suspension system components should be inspected periodically to ensure proper operation.

- A. Shock absorber rods bent, pitted, or damaged.
- B. Reservoirs damp or leaking.
- C. Shock absorber body damaged, punctured, or leaking.
- D. Shock absorber eyelets broken, bent, or cracked.
- E. Shock absorber eyelet bushings worn, deteriorated, cracked, or missing.
- F. Shock absorber spring broken or sagging.
- G. Sway bar mountings tight and bushings secure.
- H. Proper pre-load and damping for conditions.

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## Shock Absorbers

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### ADJUSTING SHOCK COMPRESSION

■NOTE: The JRI shock absorber comes with a 70-position Compression Adjuster for a stiffer or a softer ride. The adjuster dial is located at the bottom of the shock.

Turn the dial towards the + position for more compression (stiffer) or the - position for less compression (softer).



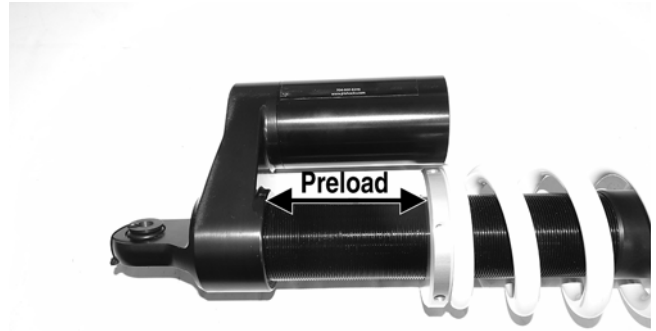
WC910

### REMOVING

1. Secure the vehicle on a support stand to elevate the wheels and release the load on the suspension.
2. Remove the two cap screws and nuts securing each front shock absorber to the frame and the lower A-arm.
3. Remove the two cap screws and nuts securing each rear shock absorber to the frame and the lower trailing arm.

### DISASSEMBLING

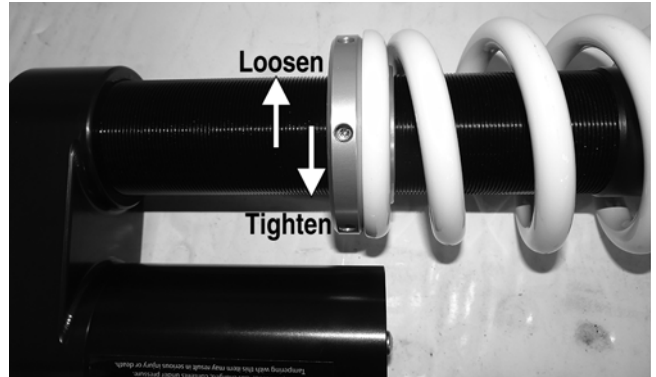
■NOTE: It is very important to measure the preload with a tape measure before disassembling in order to return the spring to the proper preload setting.



WC901A

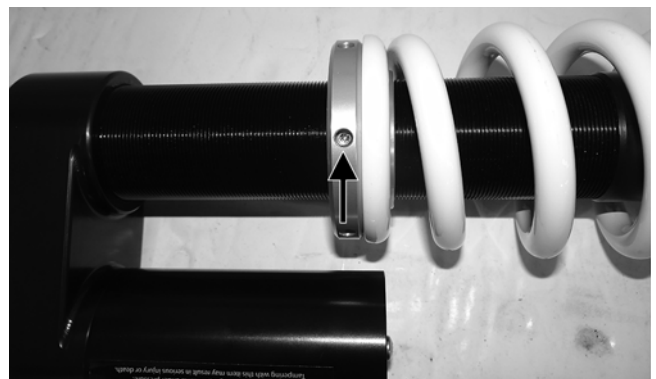
■NOTE: Only the external parts are serviceable. If the shock absorber is damaged, it must be replaced.

1. Loosen, but do not remove the lock ring screw.



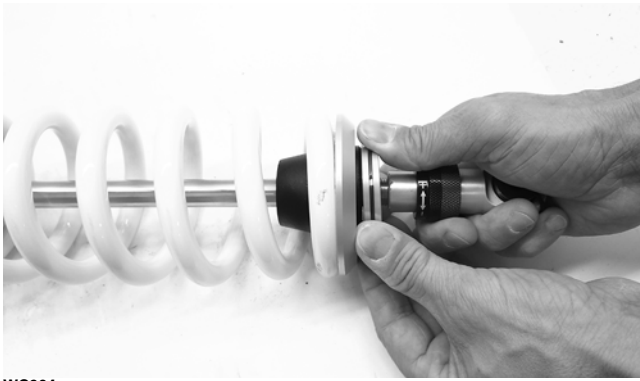
WC905A

2. Loosen the lock ring towards the top of the shock until there is no pressure on the spring.



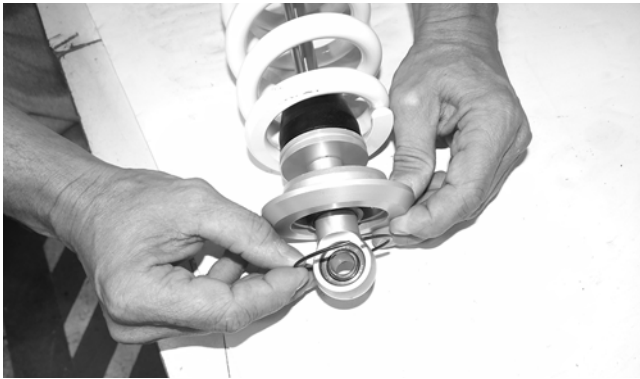
WC905B

3. Push the spring and spring retainer upward toward the lock ring.



WC904

4. Remove the snap ring from the spring retainer, and remove the spring retainer and the snap ring.



WC906

5. Remove the spring.

## ASSEMBLING

1. Slide the spring up to the lock ring.
2. Slide the spring retainer past the snap ring retainer and secure the snap ring.



WC904

3. Tighten the lock ring until preload is at the measurement noted during cleaning and inspecting; then tighten the lock ring screw securely.

■NOTE: When tightening the lock ring, the spring retainer must be past the snap ring retainer.



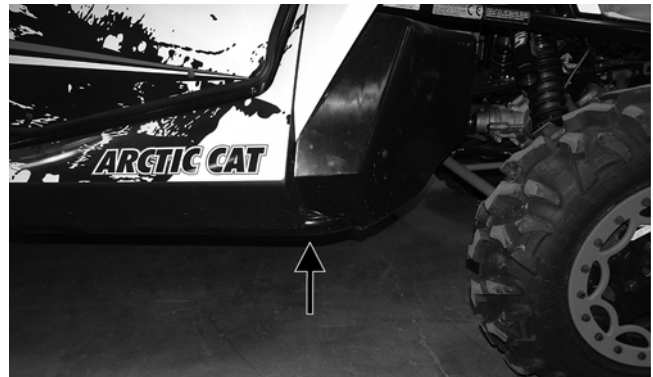
WC909

## CHECKING/ADJUSTING RIDE HEIGHT (X Limited/4X Limited)

■NOTE: Ensure the vehicle is on level ground, the tires are properly inflated, and there is an average operating load in the vehicle.

### Front

1. Measure from the ground to the bottom of the outer frame tube.



WC911A

2. If measurement is not as specified, loosen, but do not remove, the lock ring screw.

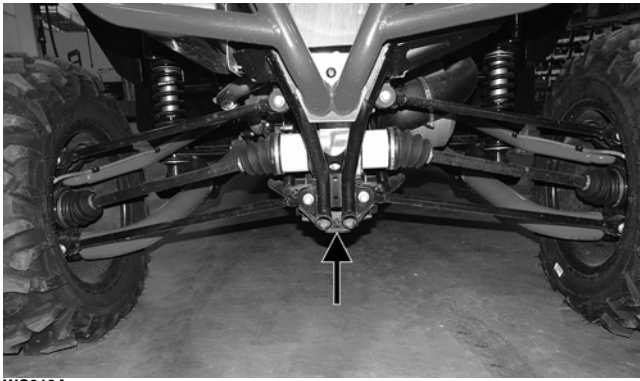


WC914A

3. Adjust the left and right spring as required.

### Rear

1. Measure from the ground to the bottom of the frame at the rear most point.



WC913A

2. If measurement is not as specified, loosen, but do not remove, the lock ring screw.



WC912A

3. Adjust left and right spring as required.

Model	Front	Rear
Wildcat X EPS	13.75"	13.5"
Wildcat 4X	13.75"	13.5"
Wildcat 4X LTD	13.75"	13.5"
Wildcat X LTD	13.75"	13.5"

### DISASSEMBLING (X Limited/4X Limited)

■NOTE: It is very important to measure the preload with a tape measure before disassembling in order to return the spring to the proper preload setting.



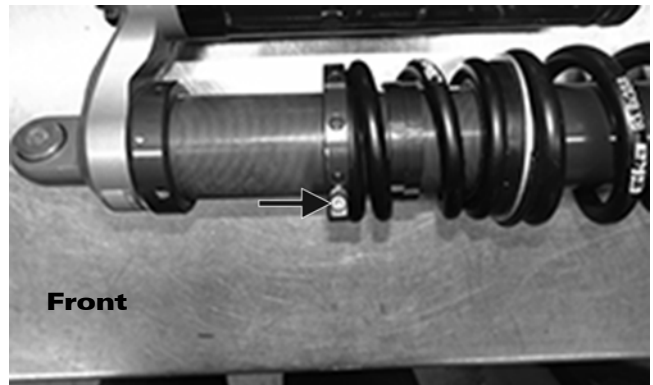
WC786A



WC789C

■NOTE: Only the external parts are serviceable. If the shock absorber is damaged, it must be replaced.

1. Loosen, but do not remove, the lock ring screw.

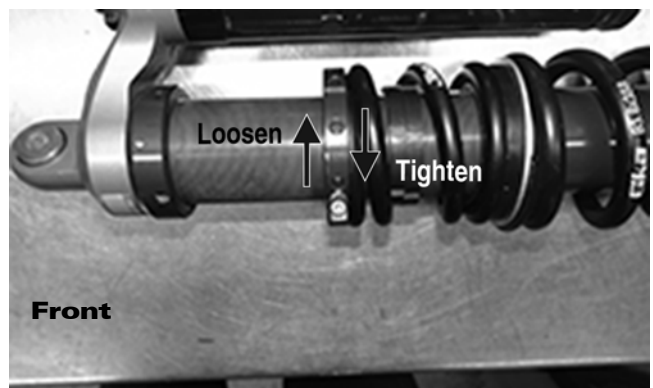


WC778A



WC789A

2. Loosen the lock ring towards the top of the shock until there is no pressure on the springs.



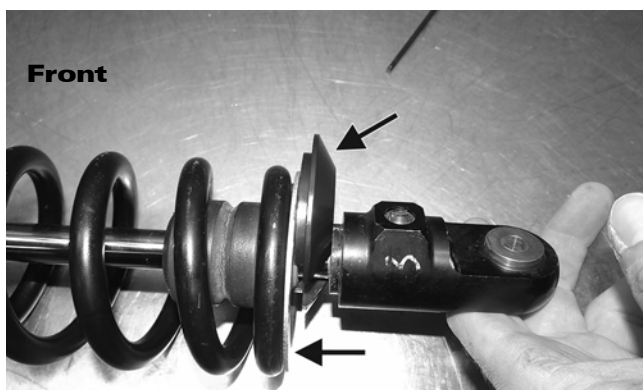
WC778B





WC789B

3. Remove the spring retainer and spring support plates.



WC781A



WC793

4. Remove the main spring, spring coupler, and retainers.



WC783

■NOTE: Note the orientation of the spring retainer for installing purposes.

5. Remove the top spring.
6. Clean all of the shock absorber components in a parts-cleaning solvent.
7. Inspect each shock rod for nicks, pits, rust, bends, and oil residue.
8. Inspect all of the spring retainers, shock rods, spring couplers, shock bodies, and eyelets for cracks, leaks, or bends.

## ASSEMBLING (X Limited/4X Limited)

### Front

1. With the proper orientation, slide the top spring, spring coupler, and spring support plate up to the lock ring.



WC786B

2. Install the main spring up to the spring support plate.
3. With the lower support plate in position, install the spring retainer.



WC795

4. Install the shocks using the two cap screws and nuts. Tighten the screws to 40 ft-lb.

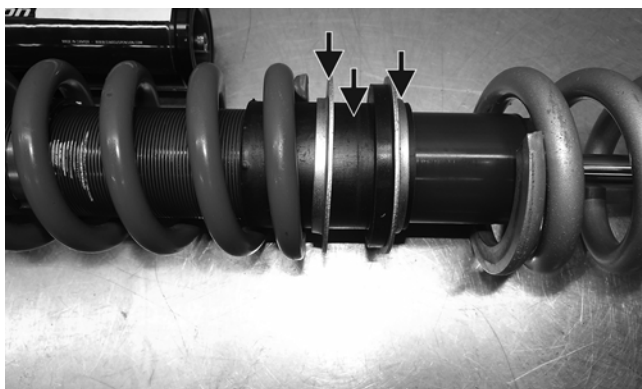
### Rear

1. With the proper orientation, slide the top spring and spring support plate up to the lock ring.



WC792

2. With the support plates facing opposite directions on the spring coupler, slide the coupler into the upper spring; then slide the lower spring into position.



WC794A

3. With the lower support plate in position, install the spring retainer.



WC 795

## INSTALLING

1. Install the shocks using the two cap screws and new lock nuts. Tighten the upper rear cap screw to 40 ft-lb and the lower rear cap screws to 35 ft-lb.
2. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts). Remove the vehicle from the stand.

## Front A-Arms

### REMOVING

1. Secure the vehicle on a support stand to elevate the front wheels; then remove the wheels and account for the hub plate.

■NOTE: The upper A-arms can be removed without removing the hub or knuckle. If the technician's objective is to remove the upper A-arms, proceed to step 6.



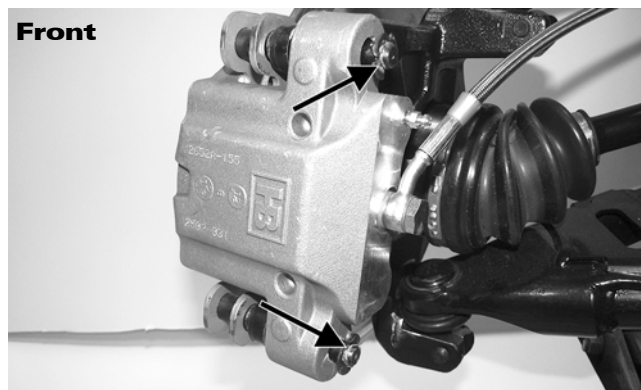
WC240B

2. Remove the hub nut and Belleville washer securing the hub.



WC304

3. Remove the brake caliper. Account for two E-clips and two anchor bolts.



WC611A



WC606

4. Remove the hub assembly. On the 4X, account for the washer.
5. Remove the cotter pin and nut securing the tie rod end to the knuckle; then remove the tie rod end from the knuckle.
6. Remove and discard the cap screws securing the ball joints to the knuckle.

### CAUTION

Support the knuckle when removing the cap screws or damage to the threads will occur.



WC271

7. Tap the ball joints out of the knuckle; then remove the knuckle from the axle.
8. Remove the lower shock absorber eyelet from the lower A-arm.
9. Remove the brakeline hose routing clips from the upper A-arm; then remove the cap screws securing the A-arms to the frame.

### CLEANING AND INSPECTING

1. Clean all A-arm components in parts-cleaning solvent.
2. Clean the ball joint mounting hole of all residual Loctite, grease, oil, or dirt for installing purposes.
3. Inspect the A-arm for bends, cracks, and worn bushings.
4. Inspect the ball joint mounting holes for cracks or damage.
5. Inspect the frame mounts for signs of damage, wear, or weldment damage.

### INSTALLING

1. Apply Loctite Primer "T" to the A-arm socket; then apply green Loctite #609 to the entire outside diameter of the ball joint. Install the ball joint into the A-arm and secure with the snap ring.



WC237



WC359

2. Install the A-arm assemblies into the frame mounts and secure with the cap screws. Only finger-tighten at this time.
3. Route the brake hose along the upper A-arm and secure with the two routing clips.
4. Secure the lower eyelet of the shock absorber to the lower A-arm. Tighten nut to 40 ft-lb (head side).
5. Secure the A-arm assemblies to the frame mounts (from step 2). Tighten the cap screws to 40 ft-lb.
6. Install the knuckle assembly onto the ball joints and secure with new "patch-lock" cap screws. Tighten to 35 ft-lb.



WC271



7. Install the tie rod end and secure with the nut (coated with red Loctite #271). Tighten to 55 ft-lb; then install a new cotter pin and spread the pin to secure the nut.

■**NOTE:** During assembly, new cotter pins should be installed.

8. Apply Loctite primer and red Loctite #277 to the threads of the axle.
9. Engage the hub nut into the Belleville washer on the convex side; then with the concave side of the washer directed toward the hub, install the nut and washer. Keeping the nut and washer engaged, tighten the hub nut to 250 ft-lb.

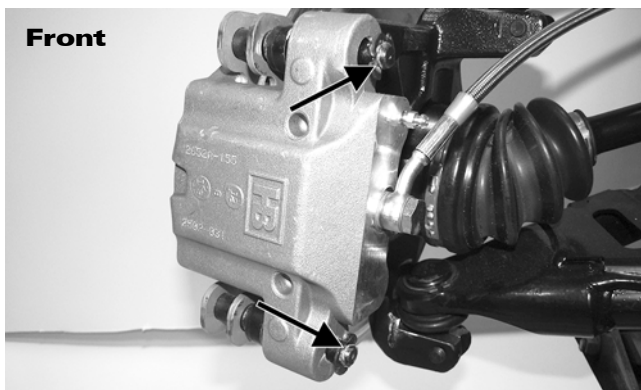


WC303A

10. Secure the brake calipers to the knuckle with two brake pad pins. Ensure the E-clips and anchor bolts are in place. Tighten to 20 ft-lb.

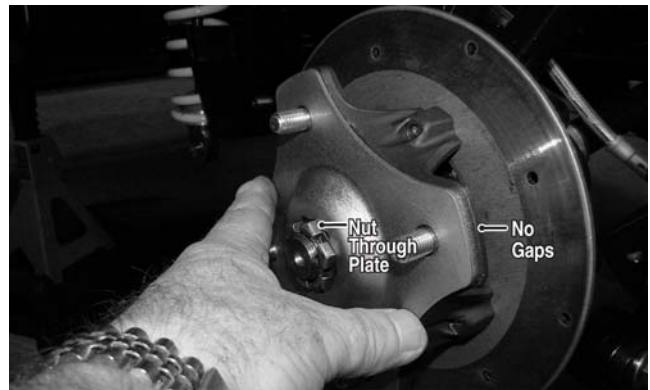


WC606



WC611A

11. Install the hub plate making sure it fits completely over the nut and lies flat against the hub.



WC317A

■**NOTE:** If the hub plate cannot be fully installed due to misalignment of the hub nut, tighten the nut until properly aligned and plate is fully installed.

12. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts). Install the hub cap.
13. Remove the vehicle from the support stand.

## Rear Trailing Arms

### REMOVING

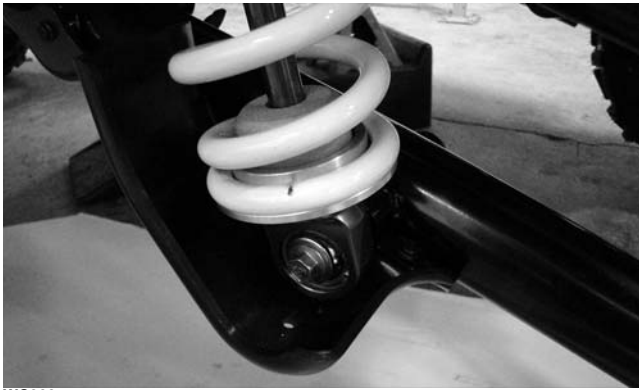
1. Lift and support the vehicle on support stands that allow access to the rear suspension with the rear tires off the floor.
2. Remove the lug nuts securing the wheel; then remove the hub plate.



WC317

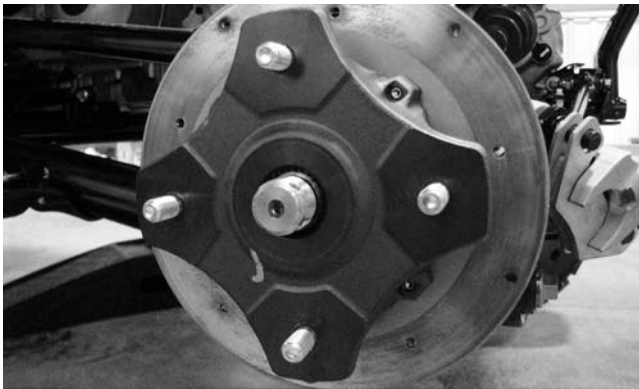
3. Place a jack stand or other support under the trailing arm; then remove the cap screw securing the lower shock eyelet to the arm. Account for a flat washer.





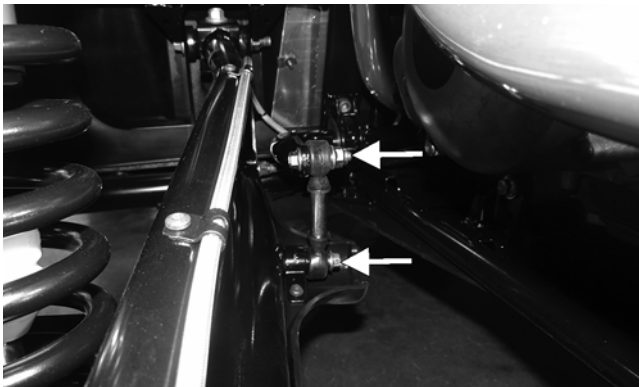
WC300

4. Remove the hub nut and Belleville washer securing the hub.
5. Remove and discard the cap screws securing the brake caliper to the knuckle and remove the caliper from the knuckle; then remove the hub/brake disc assembly.



WC314

6. Remove the sway bar link; then remove the nut from the front trailing arm cross-mount through-bolt but do not remove the bolt at this time.



WC807A

7. Using a tarp strap or nylon straps, support the suspension/axle assembly and remove the support from under the trailing arm.
8. Drive the roll-pin out and remove the nut from the trailing arm rear knuckle pivot; then remove the forward cross-mount bolt and remove the lower trailing arm.



WC305A

## INSPECTING

1. Inspect the arm for any signs of metal fatigue, cracked or broken welds, or severe dents or gouges.
2. Check the pivot seals and bushings for signs of dirt or water contamination and corrosion.
3. Check the knuckle pivot bushing for excessive wear.
4. Check the shock mount for wear or fatigue cracks where welded to the arm surface.

## INSTALLING

1. Using new seals, install the front cross-mount onto the lower trailing arm and tighten the nut to 60 ft-lb; then place the assembly into the vehicle and secure with the cross-mount through-bolt. Tighten the nut to 60 ft-lb.



WC311

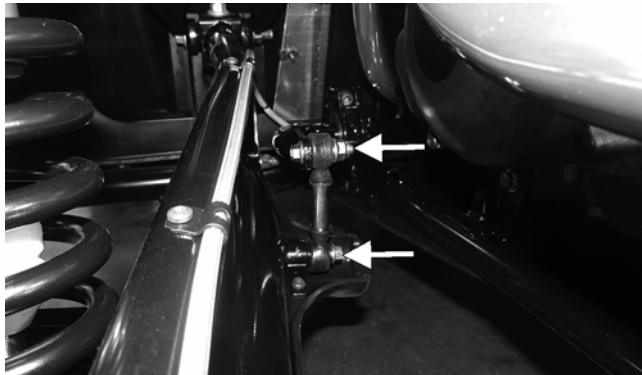
2. Slide the trailing arm into the knuckle and secure with the nut. Tighten the nut to 60 ft-lb; then install a new roll-pin.



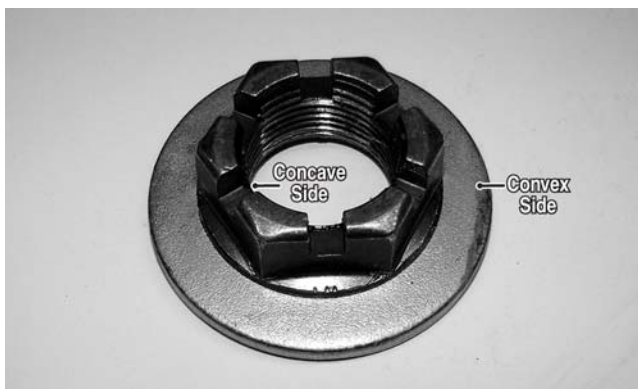
WC305A

■**NOTE:** If the slots in the nut do not align so as to allow installation of the roll-pin, **TIGHTEN** the nut until the pin can be installed. **DO NOT** loosen the nut to align.

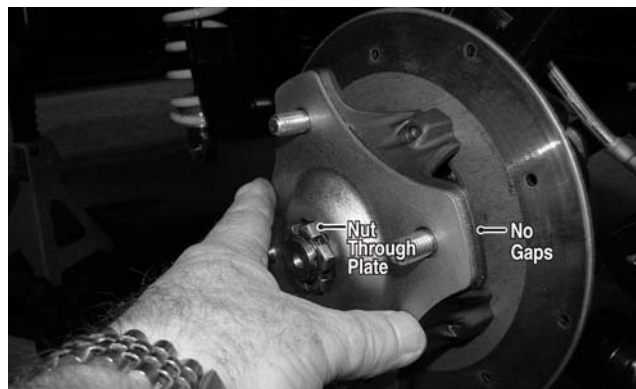
3. Place a jack stand or other suitable support under the trailing arm and install the sway bar link. Tighten the cap screw on the trailing arm and the nut on the sway bar bolt to 35 ft-lb.



4. Slide the shock eyelet bushing over the shock mounting boss and secure with the cap screw and washer. Tighten to 40 ft-lb (head side).
5. Install the hub/brake disc assembly onto the axle; then apply Loctite primer and red Loctite #277 to the axle threads.
6. Engage the hub nut into the Belleville washer on the convex side; then with the concave side of the washer directed toward the hub, install the nut and washer. Keeping the nut and washer engaged, tighten the hub nut to 250 ft-lb.



7. Install the brake caliper and secure with new "patch-lock" cap screws tightened to 20 ft-lb.
8. Install the hub plate making sure it fits completely over the nut and lies flat against the hub.



■**NOTE:** If the hub plate cannot be fully installed due to misalignment of the hub nut, tighten the nut until properly aligned and plate is fully installed.

9. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts).
10. Remove the support stands and lower to the floor.

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## Wheels and Tires

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### TIRE SIZE

#### **WARNING**

Use only Arctic Cat approved tires when replacing tires. Failure to do so could result in unstable vehicle operation.

This vehicle is equipped with low-pressure tubeless tires of the size and type listed in General Information. Do not under any circumstances substitute tires of a different type or size.

#### **WARNING**

Always use the size and type of tires specified. Always maintain proper tire inflation pressure.

#### **CAUTION**

Do not mix tire tread patterns. Use the same pattern type on front and rear. Failure to heed warning could cause poor handling qualities of the vehicle and could cause excessive drive train damage not covered by warranty.



WC774A

## TIRE INFLATION PRESSURE

Front and rear tire inflation pressure should be as specified in the General Information/Foreword section.

## REMOVING

1. Secure the vehicle on a support stand to elevate the wheels; then remove the hub cap.
2. Remove the nuts securing the wheels; then remove the wheels.

■**NOTE:** On Limited models, the bead lock must be removed before attempting to remove the tire from the rim.

## CLEANING AND INSPECTING

1. Clean the wheels and hubs with parts-cleaning solvent.
2. Clean the tires with soap and water.
3. Inspect each wheel for cracks, dents, or bends.
4. Inspect each tire for cuts, wear, missing lugs, and leaks.

## INSTALLING

■**NOTE:** On Limited models if a new tire is being installed, install the bead lock and tighten the existing screws to 11 ft-lb.

1. Install the wheels and using a crisscross pattern, tighten the wheel nuts in 20 ft-lb increments to a final torque of 40 ft-lb (steel wheel), 60 ft-lb (aluminum wheel w/black nuts), or 80 ft-lb (aluminum wheel w/chrome nuts). Install the hub cap.

## CHECKING/INFLATING

1. Using an air pressure gauge, measure the air pressure in each tire. Adjust the air pressure as necessary to meet the recommended inflation pressure.
2. Inspect the tires for damage, wear, or punctures.



## WARNING

Do not operate the vehicle if tire damage exists.

■**NOTE:** If repair is needed, follow the instructions found on the tire repair kit or replace the tire.

# Troubleshooting

Problem: Suspension too soft	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Spring preload</b> incorrect</li> <li>2. <b>Spring(s)</b> weak</li> <li>3. <b>Shock absorber</b> damaged</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust preload</li> <li>2. Replace spring(s)</li> <li>3. Replace shock absorber</li> </ol>
Problem: Suspension too stiff	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Spring preload</b> incorrect</li> <li>2. <b>A-arm-related bushings</b> worn</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust preload</li> <li>2. Replace bushing</li> </ol>
Problem: Suspension noisy	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Cap screws (suspension system)</b> loose</li> <li>2. <b>A-arm-related bushings</b> worn</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten cap screws</li> <li>2. Replace bushings</li> </ol>
Problem: Vehicle pulling or steering erratic	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Vehicle steering</b> is erratic on dry, level surface</li> <li>2. <b>Vehicle pulls</b> left or right on dry, level surface</li> </ol>	<ol style="list-style-type: none"> <li>1. Check front wheel alignment and adjust if necessary (see Steering/Body/Controls)</li> <li>2. Check air pressure in tires and adjust to specifications</li> </ol>

