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## FOREWORD

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This Arctic Cat Service Manual contains service, maintenance, and troubleshooting information for certain 2009 Arctic Cat ATV models (see cover). The complete manual is designed to aid service personnel in service-oriented applications.

Arctic Cat offers additional publications (when they become available) to aid in servicing other ATV models. To service models not included in this manual, please refer to the following publications:

- **2009 Y-12 Service Manual**
- **2009 T-14 Service Manual**
- **2009 DVX 300/250 Utility Service Manual**
- **2009 366 Service Manual**
- **2009 700 Mud Pro Service Manual Supplement**

This manual is divided into sections. Each section covers a specific ATV 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.

The service technician should become familiar with the operation and construction of each component or system by carefully studying the complete manual. This manual will assist the service technician in becoming more aware of and efficient with servicing procedures. Such efficiency not only helps build consumer confidence but also saves time and labor.

All Arctic Cat ATV 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 severe personal injury or even death. The symbol  **CAUTION** identifies unsafe practices which may result in ATV-related damage. Follow the directive because it deals with the possibility of damaging part or parts of the ATV. 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.

Keep this manual accessible in the shop area for reference.

**Product Service and  
Warranty Department  
Arctic Cat Inc.**

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# ATV SERVICE MANUAL



# SECTION 1 - GENERAL INFORMATION/ SPECIFICATIONS

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## General Specifications\*

400 TRV	
CHASSIS	
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Tire Size	Front - 25 x 8-12 Rear - 25 x 10-12
Tire Inflation Pressure	0.35 kg/cm <sup>2</sup> (5 psi)
MISCELLANY	
Gas Tank Capacity (rated)	20.8 L (5.5 U.S. gal.)
Rear Drive Capacity	250 ml (8.5 fl oz)**
Front Differential Capacity	275 ml (9.3 fl oz)***
Engine Oil Capacity	3.3 L (3.5 U.S. qt) - Overhaul 2.8 L (3.0 U.S. qt) - Change
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	Arctic Cat ACX All Weather (Synthetic)
Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Drive Belt Width (minimum)	28.5 mm (1.12 in.)
Brake Fluid	DOT 4
Taillight/Brakelight	12V/8W/27W
Headlight	12V/37W (2)
500	
CHASSIS	
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Tire Size	Front - 25 x 8-12 Rear - 25 x 10-12
Tire Inflation Pressure	0.35 kg/cm <sup>2</sup> (5 psi)
MISCELLANY	
Gas Tank Capacity (rated)	24.6 L (6.5 U.S. gal.)
Coolant Capacity	2.9 L (3.0 U.S. qt)
Differential Capacity	275 ml (9.3 fl oz)**
Rear Drive Capacity	250 ml (8.5 fl oz)***
Engine Oil Capacity	3.4 L (3.5 U.S. qt) - Manual 2.5 L (2.6 U.S. qt) - Automatic
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	Arctic Cat ACX All Weather (Synthetic)
Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Drive Belt Width (Automatic) (minimum)	38 mm (1.33 in.)
Brake Fluid	DOT 4
Taillight/Brakelight	12V/8W/27W
Headlight	12V/27W (2)

H1 Models	
CHASSIS	
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Tire Size	Front - 25 x 8-12 Rear - 25 x 10-12
Tire Inflation Pressure	0.35 kg/cm <sup>2</sup> (5 psi)
MISCELLANY	
Gas Tank Capacity (rated)	24.6 L (6.5 U.S. gal.) 20.8 L (5.5 U.S. gal.) - TRV/Cruiser
Coolant Capacity	2.9 L (3.0 U.S. qt)
Differential Capacity	275 ml (9.3 fl oz)**
Rear Drive Capacity	250 ml (8.5 fl oz)***
Engine Oil Capacity	2.5 L (2.6 U.S. qt) - Overhaul 1.9 L (2.0 U.S. qt) - Change
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	Arctic Cat ACX All Weather (Synthetic)
Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Drive Belt Width (minimum)	35.6 mm (1.40 in.)
Brake Fluid	DOT 4
Taillight/Brakelight	12V/8W/27W
Headlight	12V/27W (2)

H2 Models	
CHASSIS	
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Tire Size	Front - 25 x 8-12 Rear - 25 x 10-12
Tire Inflation Pressure	0.35 kg/cm <sup>2</sup> (5 psi)
MISCELLANY	
Gas Tank Capacity (rated)	24.6 L (6.5 U.S. gal.) 20.8 L (5.5 U.S. gal.) - Cruiser
Coolant Capacity	3.3 L (3.5 U.S. qt)
Differential Capacity	275 ml (9.3 fl oz)**
Rear Drive Capacity	250 ml (8.5 fl oz)***
Engine Oil Capacity	2.8 L (3.0 U.S. qt)
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	Arctic Cat ACX All Weather (Synthetic)
Front Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Drive Belt Width (minimum)	35.6 mm (1.40 in.)
Brake Fluid	DOT 4
Taillight/Brakelight	12V/8W/27W
Headlight	12V/27W (2)

\* Specifications subject to change without notice.

\*\* One inch below plug threads.

\*\*\* At the plug threads.

# Torque Specifications

EXHAUST COMPONENTS			
Part	Part Bolted To	Torque	
		ft-lb	N-m
Exhaust Pipe	Engine	20	27
Spark Arrester	Muffler	48 in.-lb	5.5
ELECTRICAL COMPONENTS			
Engine/Harness Ground Cap Screw	Crankcase	8	11
Coil (500)*	Frame	12	16
Coil (EFI Models)	Air Filter Housing	7	10
STEERING COMPONENTS			
Steering Post Bearing Housing	Frame	20	27
Steering Post Bearing Flange	Frame	20	27
Lower Steering Bearing Washer Cap Screw***	Steering Post	40	54
Tie Rod End	Knuckle/Steering Post	30	41
BRAKE COMPONENTS			
Brake Disc*	Hub	15	20
Brake Hose	Caliper	20	27
Brake Hose	Master Cylinder	20	27
Brake Hose	Auxiliary Brake Cylinder	20	27
Master Cylinder (Rear)	Frame	12	16
Hydraulic Caliper	Knuckle	20	27
Master Cylinder Clamp	Master Cylinder	6	8
Brake Pedal	Brake Pedal Axle	25	34
CHASSIS COMPONENTS			
Footrest	Frame (8 mm)	20	27
Footrest	Frame (10 mm)	40	54
SUSPENSION COMPONENTS (Front)			
A-Arm (400/500/H1 Models)	Frame	35	47
A-Arm (H2 Models)	Frame	50	68
Knuckle	Ball Joint	35	47
Shock Absorber	Frame	35	47
Shock Absorber	Upper A-Arm	35	47
Knuckle	A-Arm	35	47
SUSPENSION COMPONENTS (Rear)			
Shock Absorber (Upper)	Frame	35	47
Shock Absorber (Upper) (H2 Models)	Frame	50	68
Shock Absorber (Lower)	Lower A-Arm	20	27
A-Arm	Frame	35	47
A-Arm (H2 Models)	Frame	50	68
Knuckle	A-Arm	35	47
Knuckle (H2 Models)	A-Arm	50	68

DRIVE TRAIN COMPONENTS (400 TRV)			
Part	Part Bolted To	Torque	
		ft-lb	N-m
Engine Mounting Through-Bolt	Frame	38	52
Front Differential	Frame/Differential Bracket	38	52
Output Flange	Rear Flange Output Joint	20	27
Pinion Housing	Differential Housing	23	31
Differential Housing Cover***	Differential Housing	23	31
Drive Bevel Gear Nut**	Shaft	59	80
Driven Bevel Gear Nut**	Driven Shaft	59	80
Lock Collar	Differential Housing	125	169
Hub Nut	Shaft/Axle (max)	200	272
Oil Drain Plug	Front Differential/Rear Drive	45 in.-lb	5
Oil Fill Plug	Front Differential/Rear Drive	16	22
Oil Drain Plug	Engine	20	27
Rear Drive Input Shaft/Housing	Differential Housing	23	31
Wheel	Hub	40	54
Rear Drive Gear Case	Frame	38	52
Engine Output Shaft**	Rear Gear Case Input Flange	20	27
DRIVE TRAIN COMPONENTS (500 - Manual Transmission)			
Engine (Lower Rear/Front)	Frame	40	54
Front Differential	Frame/Differential Bracket	38	52
Pinion Housing	Differential Housing	23	31
Differential Housing Cover***	Differential Housing	23	31
Drive Bevel Gear Nut***	Shaft	72	98
Lock Collar	Differential Housing	125	169
Hub Nut	Shaft/Axle (max)	200	272
Oil Drain Plug	Front Differential/Rear Drive	45 in.-lb	5
Oil Fill Plug	Front Differential/Rear Drive	16	22
Oil Drain Plug	Engine	16	22
Inspection Plug	Front Differential/Rear Drive	48 in.-lb	5.5
Wheel	Hub	40	54
Rear Drive Input Shaft/Housing	Differential Housing	23	31
Rear Drive Gear Case	Frame	45	61
Engine Output Shaft**	Rear Gear Case Input Flange	20	27

\* w/Blue Loctite #243

\*\* w/Red Loctite #271

\*\*\* w/Green Loctite #609



DRIVE TRAIN COMPONENTS (500 - Automatic Transmission/H1 Models)			
Part	Part Bolted To	Torque	
		ft-lb	N-m
Engine Mounting Through-Bolt	Frame	40	54
Engine (TRV)	Engine Cradle	40	54
Engine Cradle (TRV)**	Rubber Mount	25	34
Rubber Mount (TRV)	Frame Bracket	35	47
Front Differential*	Frame/Differential Bracket	38	52
Output Flange	Rear Flange Output Joint	20	27
Pinion Housing	Differential Housing	23	31
Differential Housing Cover***	Differential Housing	23	31
Drive Bevel Gear Nut***	Shaft	72	98
Differential Gear Case***	Hub	19	26
Lock Collar	Differential Housing	125	169
Hub Nut	Shaft/Axle (max)	200	272
Oil Drain Plug	Front Differential/Rear Drive	45 in.-lb	5
Oil Fill Plug	Front Differential/Rear Drive	16	22
Oil Drain Plug	Engine	16	22
Rear Drive Input Shaft/Housing	Differential Housing	23	31
Wheel	Hub	40	54
Rear Drive Gear Case	Frame	38	52
Engine Output Shaft **	Rear Gear Case Input Flange	20	27
DRIVE TRAIN COMPONENTS (H2 Models)			
Engine Mount (Rear)	Frame	45	61
Front Differential	Frame/Differential Bracket	38	52
Rear Gear Case	Frame	38	52
Pinion Housing	Differential Housing	23	31
Differential Housing Cover***	Differential Housing	23	31
Lock Collar	Differential Housing	125	169
Hub Nut	Shaft/Axle (max)	200	272
Oil Drain Plug	Front Differential/Rear Drive	45 in.-lb	5
Oil Fill Plug	Front Differential/Rear Drive	16	22
Oil Drain Plug	Engine	16	22
Wheel	Hub	40	54
Rear Drive Input Shaft/Housing	Differential Housing	23	31
Rear Output Drive Flange	Rear Yoke Flange	20	27
Shift Cam Stopper	Shift Stopper	8	11
Shift Cam Plate	Shift Cam Shaft	8	11
Shifter Housing	Crankcase	8	11
Engine Output Shaft**	Rear Gear Case Input Flange	20	27

\* w/Blue Loctite #243

\*\* w/Red Loctite #271

\*\*\* w/Green Loctite #609

ENGINE/TRANSMISSION (400 TRV)			
Part	Part Bolted To	Torque	
		ft-lb	N-m
Clutch Shoe**	Crankshaft	147	199
Clutch Cover/Housing Assembly	Crankcase	8	11
Left-Side Cover	Crankcase	8	11
Crankcase Half (6 mm)	Crankcase Half	10	13.5
Crankcase Half (8 mm)	Crankcase Half	21	28
Cylinder Nut	Crankcase Half	8	11
Cylinder Head (Cap Screw)	Crankcase	28	38
Cylinder Head (6 mm)	Cylinder	8	11
Cylinder Head (8 mm)	Cylinder	20	27
Cylinder Head Cover	Cylinder Head	8	11
Oil Pump Drive Gear**	Crankshaft	63	86
Driven Pulley Nut**	Driveshaft	147	199
Ground Cable	Engine	8	11
Output Shaft Flange Nut	Output Shaft	59	80
Magneto Rotor Nut	Crankshaft	107	146
Cam Sprocket**	Camshaft	11	15
Starter Motor	Crankcase	8	11
V-Belt Cover	Crankcase	8	11
Valve Adjuster Jam Nut	Valve Adjuster	7	9.5
Oil Fitting	Engine	8	11
Oil Pump*	Crankcase	8	11
Movable Drive Face Nut**	Clutch Shaft	147	199
Oil Cooler Hose Clamps	Engine/Oil Cooler	30 in.-lb	3.4
ENGINE/TRANSMISSION (500 - Manual Transmission)			
Clutch Shoe	Crankshaft	94	127
Clutch Sleeve Hub	Countershaft	72	98
Crankcase Half (6 mm)	Crankcase Half	8	11
Crankcase Half (8 mm)	Crankcase Half	16	22
Cylinder Head (Cap Screw)	Cylinder	28	38
Cylinder Head (6 mm Nut)	Cylinder	8	11
Cylinder Head (8 mm Nut)	Cylinder	18	24
Cylinder Head Cover	Cylinder Head	7	9.5
Left-Side Cover	Crankcase Half	8	11
Oil Pump Drive Gear**	Crank Balancer Shaft	36	49
Oil Strainer Cap	Strainer	16	22
Oil Pump*	Crankcase	7	9.5
Output Shaft Gear	Output Shaft	72	98
Rear Output Shaft	Output Joint	20	27
Recoil Starter	Left-Side Cover	6	8
Starter Motor	Crankcase	8	11
Reverse Cam Stopper Housing	Crankcase	16	22
Right-Side Cover	Crankcase	8	11
Magneto Rotor Nut	Crankshaft	116	157
Shift Stop Housing	Crankcase	16	22
Cam Sprocket**	Camshaft	11	15
Starter Cup	Crankshaft	25	34
Movable Drive Face Nut**	Driveshaft	72	98
Engine Damper	Thermostat Housing	7	9.5

ENGINE/TRANSMISSION (500 - Automatic Transmission)			
Part	Part Bolted To	Torque	
		ft-lb	N-m
Clutch Shoe**	Crankshaft	94	127
Clutch Cover/Housing Assembly	Crankcase	8	11
Crankcase Half (6 mm)	Crankcase Half	8	11
Crankcase Half (8 mm)	Crankcase Half	16	22
Cylinder Head (Cap Screw)	Crankcase	28	38
Cylinder Head (6 mm)	Cylinder	8	11
Cylinder Head (8 mm)	Cylinder	18	24
Cylinder Head Cover	Cylinder Head	7	9.5
Driven Pulley Nut**	Driveshaft	80	110
Ground Wire	Engine	8	11
Magneto Cover	Crankcase	8	11
Movable Drive Face Nut**	Fixed Drive Face	72	98
Oil Pump Drive Gear**	Crank Balancer Shaft	36	49
Output Shaft Flange Nut	Output Shaft	72	98
Recoil Starter	Left-Side Cover	6	8
Magneto Rotor Nut	Crankshaft	116	157
Cam Sprocket**	Camshaft	10	13.5
Starter Cup	Crankshaft	25	34
Starter Motor	Crankcase	8	11
V-Belt Cover	Crankcase	8	11
Valve Adjuster Jam Nut	Valve Adjuster	7	9.5
Oil Pump	Crankcase	7	9.5
Drive Pulley Nut**	Clutch Shaft	80	110
ENGINE/TRANSMISSION (H1 Models)			
Clutch Shoe**	Crankshaft	221	300
Clutch Cover/Housing Assembly	Crankcase	8	11
Crankcase Half (6 mm)	Crankcase Half	8	11
Crankcase Half (8 mm)	Crankcase Half	20	27
Cylinder Head (Cap Screw)	Crankcase	40	54
Cylinder Head (6 mm)	Cylinder	8	11
Cylinder Head (8 mm)	Cylinder	18	24
Cylinder Head Cover	Cylinder Head	8.5	11.5
Driven Pulley Nut	Driveshaft	80	108
Ground Wire	Engine	8	11
Magneto Cover	Crankcase	8	11
Oil Pump Drive Gear**	Crank Balancer Shaft	63	85
Output Shaft Nut	Output Shaft	59	80
Outer Magneto Cover	Left-Side Cover	6	8
Magneto Rotor Nut	Crankshaft	107	145
Cam Sprocket**	Camshaft	10	13.5
Starter Motor	Crankcase	8	11
V-Belt Cover	Clutch Cover	8	11
Drive Pulley Nut**	Clutch Shaft	165	224
Movable Drive Face Nut**	Clutch Shaft	165	224
Output Yoke Nut	Driven Output Shaft	74	100

ENGINE/TRANSMISSION (H2 Models)			
Part	Part Bolted To	Torque	
		ft-lb	N-m
Clutch Shoe**	Crankshaft	221	300
Clutch Cover/Housing Assembly	Crankcase	8	11
Crankcase Half	Crankcase Half	8	11
Crankcase Lower Cover (6 mm)	Crankcase	8	11
Crankcase Lower Cover (8 mm)	Crankcase	20	27
Cylinder Head (Cap Screw)	Crankcase	40	54
Cylinder Head (6 mm)	Cylinder	8	11
Cylinder Head (8 mm)	Cylinder	18	24
Cylinder Head Cover	Cylinder Head	8.5	11.5
Driven Pulley Nut**	Driveshaft	80	108
Ground Wire	Engine	8	11
Magneto Cover	Crankcase	8	11
Oil Filler Cover	Crankcase	8	11
Speed Sensor Housing	Crankcase	8	11
Starter Motor	Crankcase	8	11
V-Belt Housing	Crankcase	8	11
Intake Manifold	Cylinder	8	11
Output Shaft Nut	Output Shaft	59	80
Rotor/Flywheel Nut	Crankshaft	107	145
Cam Sprocket**	Camshaft	10	13.5
V-Belt Cover	Clutch Cover	8	11
Movable Drive Face Nut**	Clutch Shaft	165	224
Oil Pump Cover*	Crankcase	8	11
Oil Strainer Cap	Crankcase	8	11
Shift Cam Stopper	Crankcase	8	11
Shift Cam Stopper Spring	Shift Cam Stopper	8	11
Shift Cam Plate	Shift Cam Shaft	8	11
Shifter Housing	Crankcase	8	11
Output Yoke Nut	Driven Output Shaft	74	100

\* w/Blue Loctite #243

\*\* w/Red Loctite #271


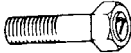
\*\*\* w/Green Loctite #609

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## 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

## Tightening Torque (General Bolts)

Type of Bolt	Thread Diameter A (mm)	Tightening Torque
(Conventional or 4 Marked Bolt) 	5	12-36 in.-lb
	6	36-60 in.-lb
	8	7-11 ft-lb
	10	16-25 ft-lb
(7 Marked Bolt) 	5	24-48 in.-lb
	6	6-8 ft-lb
	8	13-20 ft-lb
	10	29-43 ft-lb

## Break-In Procedure

A new ATV and an overhauled ATV engine require a “break-in” period. The first 10 hours (or 200 miles) are most critical to the life of this ATV. Proper operation during this break-in period will help assure maximum life and performance from the ATV.

During the first 10 hours (or 200 miles) of operation, always use less than 1/2 throttle. Varying the engine RPM during the break-in period allows the components to “load” (aiding the mating process) and then “unload” (allowing components to cool). Although it is essential to place some stress on the engine components during break-in, care should be taken not to overload the engine too often. Do not pull a trailer or carry heavy loads during the 10-hour break-in period.

When the engine starts, allow it to warm up properly. Idle the engine several minutes until the engine has reached normal operating temperature. Do not idle the engine for excessively long periods of time.

During the break-in period, a maximum of 1/2 throttle is recommended; however, brief full-throttle accelerations and variations in driving speeds contribute to good engine break-in.

After the completion of the break-in period, the engine oil and oil filter should be changed. Other maintenance after break-in should include checking of all prescribed adjustments and tightening of all fasteners.

## Gasoline - Oil - Lubricant

### RECOMMENDED GASOLINE

The recommended gasoline to use is 87 minimum octane regular unleaded. In many areas, oxygenates (either ethanol or MTBE) are added to the gasoline. Oxygenated gasolines containing up to 10% ethanol, 5% methane, or 5% MTBE 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.**

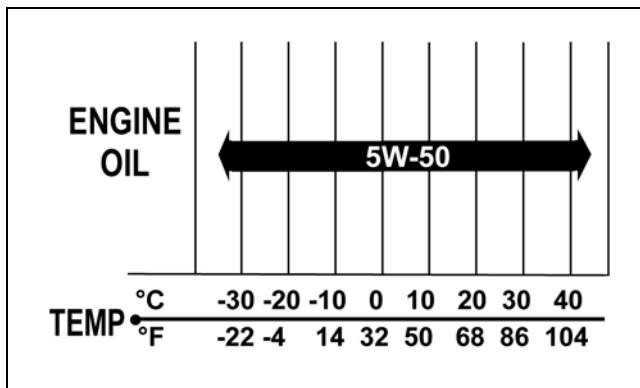


## RECOMMENDED ENGINE/ TRANSMISSION OIL

### ⚠ CAUTION

Any oil used in place of the recommended oil could cause serious engine damage. Do not use oils which contain graphite or molybdenum additives. These oils can adversely affect clutch operation. Also, not recommended are racing, vegetable, non-detergent, and castor-based oils.

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 5W-50 oil is acceptable.



OILCHART1

## 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 ATV front differentials and rear drives.

### ⚠ CAUTION

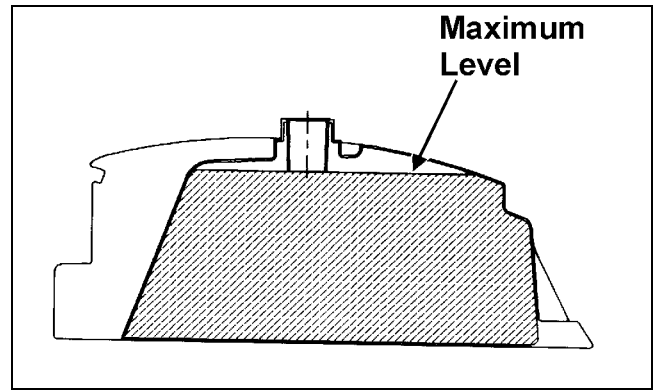
Any lubricant used in place of the recommended lubricant could cause serious front differential/rear drive damage.

## FILLING GAS TANK

### ⚠ WARNING

Always fill the gas tank in a well-ventilated area. Never add fuel to the ATV 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 rated 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.

### ⚠ WARNING

Do not over-fill the gas tank.

Tighten the gas tank cap securely after filling the tank.

## Genuine Parts

When replacement of parts is necessary, use only genuine Arctic Cat ATV 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.

## Preparation For Storage

### ⚠ CAUTION

Prior to storing the ATV, it must be properly serviced to prevent rusting and component deterioration.

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

1. Clean the seat cushion (cover and base) with a damp cloth and allow it to dry.
2. Clean the ATV thoroughly by washing dirt, oil, grass, and other foreign matter from the entire ATV. Allow the ATV to dry thoroughly. DO NOT get water into any part of the engine or air intake.
3. Either drain the gas tank or add Fuel Stabilizer to the gas in the gas tank. Remove the air filter housing cover and air filter. Start the engine and allow it to idle; then using Arctic Cat Engine Storage Preserver, rapidly inject the preserver into the air filter opening for a period of 10 to 20 seconds; then stop the engine. Install the air filter and housing cover.

**⚠ CAUTION**

**If the interior of the air filter housing is dirty, clean the area before starting the engine.**

4. On carbureted models, drain the carburetor float chamber.
5. Plug the exhaust hole in the exhaust system with a clean cloth.
6. Apply light oil to the upper steering post bushing and plungers of the shock absorbers.
7. Tighten all nuts, bolts, cap screws, and screws. Make sure rivets holding components together are tight. Replace all loose rivets. Care must be taken that all calibrated nuts, cap screws, and bolts are tightened to specifications.
8. On liquid-cooled models, fill the cooling system to the bottom of the stand pipe in the radiator neck with properly mixed coolant.
9. Disconnect the battery cables; then remove the battery, clean the battery posts and cables, and store in a clean, dry area.
10. Store the ATV indoors in a level position.

**⚠ CAUTION**

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

## Preparation After Storage

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

1. Clean the ATV 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. On liquid-cooled models, check the coolant level and add properly mixed coolant as necessary.
6. Charge the battery; then install. Connect the battery cables.

**⚠ CAUTION**

**The ignition switch must be in the OFF position prior to installing the battery or damage may occur to the ignition system.**

**⚠ CAUTION**

**Connect the positive battery cable first; then the negative.**

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

# SECTION 2 - PERIODIC MAINTENANCE

2

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## Periodic Maintenance Chart

A = Adjust    I = Inspect  
C = Clean    L = Lubricate  
D = Drain    R = Replace  
T = Tighten

Item	Initial Service After Break-In (First Mo or 100 Mi)	Every Day	Every Month or Every 100 Miles	Every 3 Months or Every 300 Miles	Every 6 Months or Every 500 Miles	Every Year or Every 1500 Miles	As Needed
Battery	I		I				C
Fuses				I			R
Air Filter/Drain Tube	I	I	C*				R
Valve/Tappet Clearance	I				I		A
Engine Compression						I	
Spark Plug(s)	I			I			R (4000 Mi or 18 Mo)
Muffler/Spark Arrester					C		R
Gas/Vent Hoses	I	I					R (2 Yrs)
Throttle Cable	I	I			C-L		A-R
Carburetor Float Chamber (Carbureted Models)				D*			
Engine Idle RPM (Carbureted Models)	I				I		A
Engine-Transmission Oil Level		I					A
Engine-Transmission Oil/Filter	R			R*/R**/R***			R
Oil Strainer	I				I		C
Front Differential/Rear Drive Lubricant	I		I				R (4 Yrs)
Clutch (Manual)	I				I		A
Tires/Air Pressure	I	I					R
Steering Components	I	I		I			R
V-Belt (Automatic)	I				I		R
Suspension (Ball joint boots, drive axle boots front and rear, tie rods, differential and rear drive bellows)	I	I					R
Nuts/Cap Screws/Screws	I		I				T
Ignition Timing						I	
Headlight/Taillight-Brakelight	I	I					R
Switches	I	I					R
Shift Lever					I		A-L
Recoil Starter (500)		I					C-R
Handlebar Grips		I					R
Handlebar	I	I					R
Gauges/Indicators	I	I					R
Frame/Welds/Racks	I				I		
Electrical Connections	I				I		C
Complete Brake System (Hydraulic & Auxiliary)	I	I		C			L-R
Brake Pads	I			I*			R
Brake Fluid	I			I			R (2 Yrs)
Brake Hoses	I			I			R (4 Yrs)
Coolant (Liquid-Cooled Models)/ Cooling System	I		I				R (2 Yrs)

\* Service/Inspect more frequently when operating in adverse conditions.

\*\* When using an API certified SM 5W-50 oil.

\*\*\* When using Arctic Cat ACX All Weather synthetic oil, oil change interval can be increased to every 1,000 miles or every year.

## Periodic Maintenance

This section has been organized into sub-sections which show common maintenance procedures for the Arctic Cat ATV.

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

■NOTE: Some photographs and illustrations used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Critical torque specifications are located in Section 1.

### SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this section.

Description	p/n
Compression Tester Kit	0444-213
Oil Filter Wrench	0644-389
Tachometer	0644-275
Timing Light	0644-296
Valve Clearance Adjuster	0444-078

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

## Lubrication Points

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

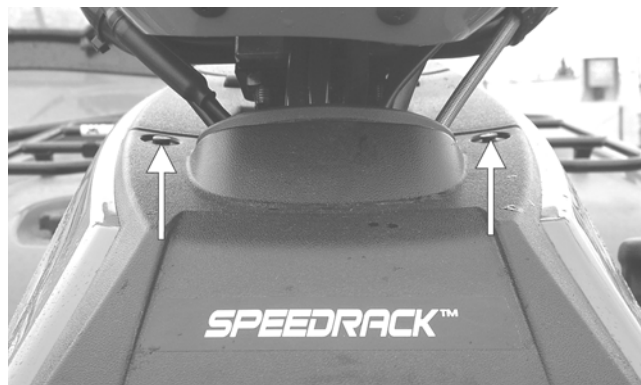
- A. Throttle Lever Pivot/Cable Ends
- B. Brake Lever Pivot/Cable Ends
- C. Auxiliary Brake Cable Ends
- D. Shift Lever Cable End
- E. Idle RPM Screw (Carburetor) (If Applicable)

## Air Filter

Use the following procedure to remove the filter and inspect and/or clean it.

### CLEANING AND INSPECTING FILTER

1. Remove the seat; then remove the appropriate reinstallable rivets securing the storage compartment.



CF260A

2. Raise the storage compartment cover; then slide the cover forward and off the compartment. Remove the storage compartment.

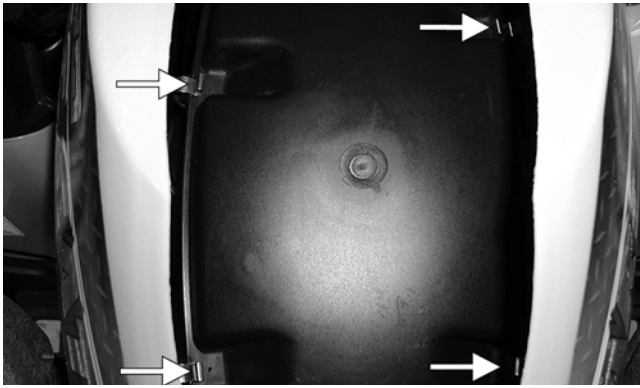


F1467



F1468

3. Unsnap the four spring-clip fasteners; then remove the air filter cover.



CD675A

4. Remove the air filter element/screen assembly and separate the element from the screen.
5. Fill a wash pan larger than the element with a non-flammable cleaning solvent; then dip the element in the solvent and wash it.

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

6. Dry the element.
7. Put the element in a plastic bag; then pour in air filter oil and work the oil into the element. Attach the element to the filter screen.

#### ⚠ CAUTION

A torn air filter element can cause damage to the ATV 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.

8. Clean any dirt or debris from inside the air cleaner. Be sure no dirt enters the carburetor (if equipped).
9. Place the filter assembly in the air filter housing making sure it is properly positioned and properly seated with the filter screen down.

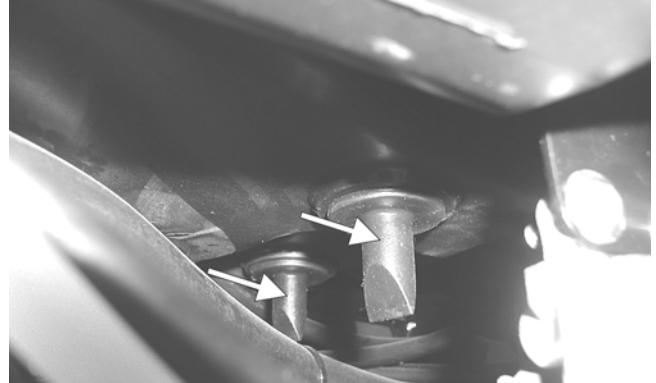


CD674

10. Install the air filter housing cover and secure with the retaining clips.
11. Install the storage compartment; then secure with the reinstallable rivets.

## CHECKING AND CLEANING DRAINS

1. Inspect the drains beneath the main housing for debris and for proper sealing.



KX045A

2. Replace any drain that is cracked or shows any signs of hardening or deterioration.

#### ⚠ CAUTION

The drain to the right is the clean air section of the filter housing. Any leak of this drain will allow dirt into the engine intake causing severe engine damage.

3. Wipe any accumulation of oil or gas from the filter housing and drains.

## Valve/Tappet Clearance (Feeler Gauge Procedure)

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

1. Remove the timing inspection plug; then remove the tappet covers (for more detailed information, see Section 3 - Servicing Top-Side Components).

■**NOTE: On the H2 models, 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 (front cylinder on the H2 models).

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

3. 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 (400)**

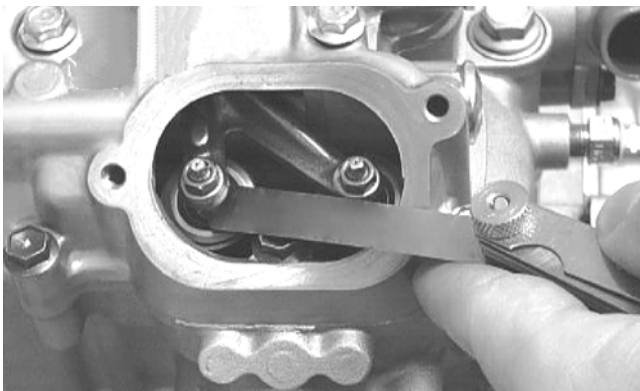
Intake	0.076-0.127 mm (0.003-0.005 in.)
Exhaust	0.152-0.203 mm (0.006-0.008 in.)

**VALVE/TAPPET CLEARANCE (500)**

Intake	0.05-0.10 mm (0.002-0.004 in.)
Exhaust	0.17-0.22 mm (0.007-0.009 in.)

**VALVE/TAPPET CLEARANCE (H1/H2 Models)**

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



CC007DC

4. On the H2 models, rotate the engine 270° to the TDC position of the rear cylinder; then repeat step 3.



GZ059

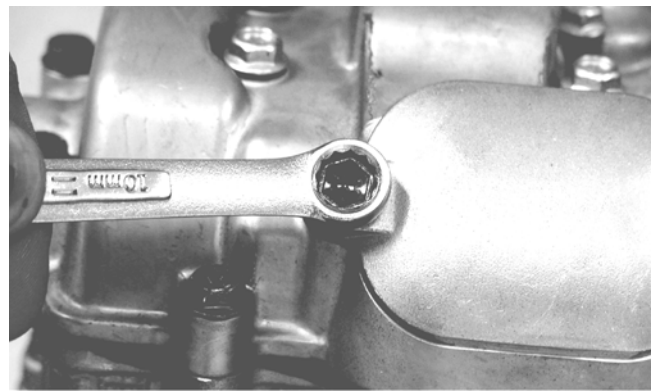
5. Install the timing inspection plug; then on the H2 models, remove the cap screw and install the crankcase end cap.
6. Place the two tappet covers into position making sure the proper cap screws are with the proper cover. Tighten the cap screws securely.

## Valve/Tappet Clearance (Valve Adjuster Procedure) (400/500/H1 Models)

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

■NOTE: The seat, storage compartment cover assembly, compartment box, air filter/filter housing, and left-side/right-side splash panels must be removed for this procedure.

1. Remove the timing inspection plug; then remove the tappet covers (for more detailed information, see Section 3 - Servicing Top-Side Components).

**2**

CF005

2. Rotate the crankshaft to the TDC position on the compression stroke.

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

■NOTE: Use Valve Clearance Adjuster for this procedure.

3. Place the valve 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.
4. 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.
5. Align the valve adjuster handle with one of the marks on the valve adjuster dial.
6. 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 Feeler Gauge Procedure sub-section 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.

7. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.
8. Place the two tappet covers with O-rings into position; then tighten the covers securely.
9. Install the spark plug; then install the timing inspection plug.

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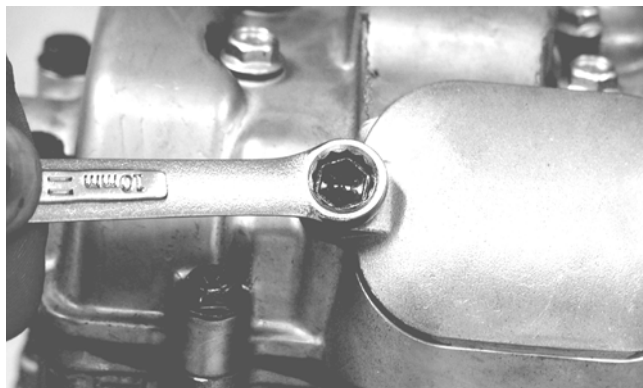
## Valve/Tappet Clearance (Valve Adjuster Procedure) (H2 Models)

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

■NOTE: The seat, storage compartment cover assembly, compartment box, air filter/filter housing, and left-side/right-side engine panels must be removed for this procedure.

1. Remove the timing inspection plug; then remove the tappet covers (for more detailed information, see Section 3 - Servicing Top-Side Components).



CF005

2. Rotate the crankshaft to the TDC position on the compression stroke of the front cylinder.



GZ063

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

■NOTE: Use Valve Clearance Adjuster for this procedure.

3. Place the valve 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.
4. 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.
5. Align the valve adjuster handle with one of the marks on the valve adjuster dial.
6. 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 Feeler Gauge Procedure sub-section 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.

7. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.
8. Rotate the engine 270° to the TDC position of the rear cylinder; then repeat steps 4-7 for the rear cylinder.
9. Place the tappet covers with O-rings into position; then tighten the covers securely.
10. Install the spark plugs; then install the timing inspection plug and crankshaft end cap.

---

## Testing Engine Compression

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To test engine compression, use the following procedure.

1. Remove the high tension lead(s) from the spark plug(s).
2. Using compressed air, blow any debris from around the spark plug(s).

### WARNING

Always wear safety glasses when using compressed air.

3. Remove the spark plug(s); then attach the high tension lead(s) to the plug(s) and ground the plug(s) on the cylinder head(s) well away from the spark plug hole(s).
4. Attach the Compression Tester Kit.

■ **NOTE:** The engine must be warm and the battery must be fully charged for this test.

5. While holding the throttle lever in the full-open position, crank the engine over with the electric starter until the gauge shows a peak reading (five to 10 compression strokes).

PEAK COMPRESSION	
MODEL	PSI
400	95-115
500	70-85
H1 Models	155-175
H2 Models	75-85 (Front) 120-130 (Rear)

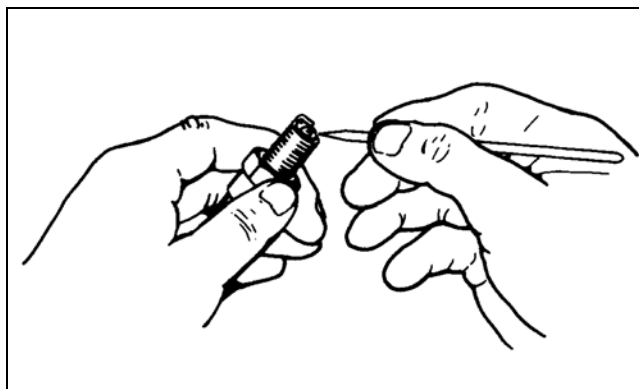
6. If compression is abnormally low, inspect the following items.
  - A. Verify starter cranks engine over at normal speed (approximately 400 RPM).
  - B. Gauge functioning properly.
  - C. Throttle lever in the full-open position.
  - D. Valve/tappet clearance correct.
  - E. Valve not bent or burned.
  - F. Valve seat not burned.

■ **NOTE:** To service valves, see Section 3.

7. Pour 29.5 ml (1 fl oz) of oil into the spark plug hole, reattach the gauge, and retest compression.
8. If compression is now evident, service the piston rings (see Section 3).

## Spark Plug(s)

A light brown insulator indicates that a plug is correct. A white or dark insulator indicates that the engine may need to be serviced or the carburetor (if equipped) may need to be adjusted. To maintain a hot, strong spark, keep the plug free of carbon.

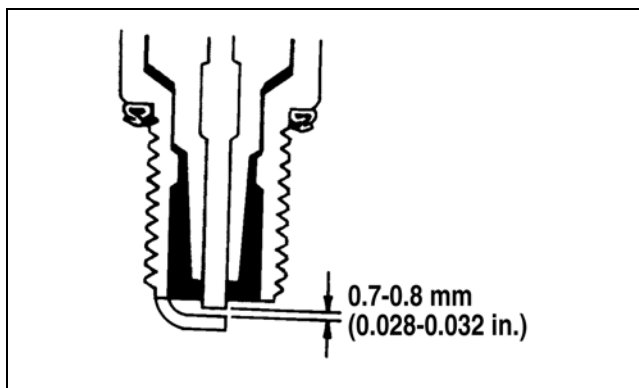


ATV-0051

### 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.

Adjust the gap to 0.7-0.8 mm (0.028-0.032 in.) for proper ignition. Use a feeler gauge to check the gap.



ATV0052C

When installing the spark plug, be sure to tighten it securely. 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.

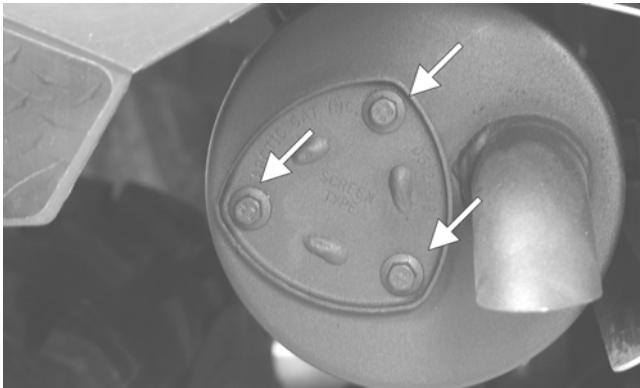
## Muffler/Spark Arrester

At the intervals shown in the Periodic Maintenance Chart, clean the spark arrester using the following procedure.

### WARNING

Wait until the muffler cools to avoid burns.

1. Remove the three cap screws securing the spark arrester assembly to the muffler; then loosen and remove the arrester.

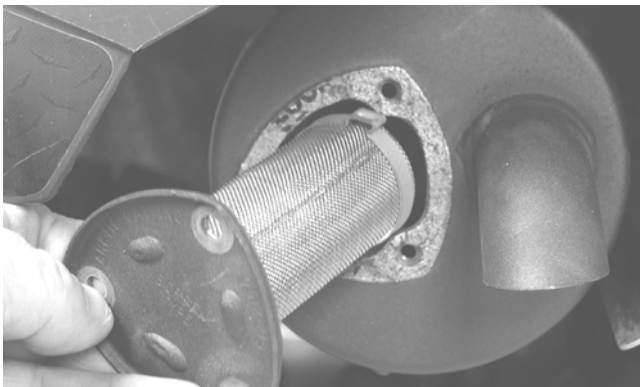


CF105A

- Using a suitable brush, clean the carbon deposits from the screen taking care not to damage the screen.

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

- Install the spark arrester assembly with gasket; then secure with the three cap screws. Tighten to 48 in.-lb.



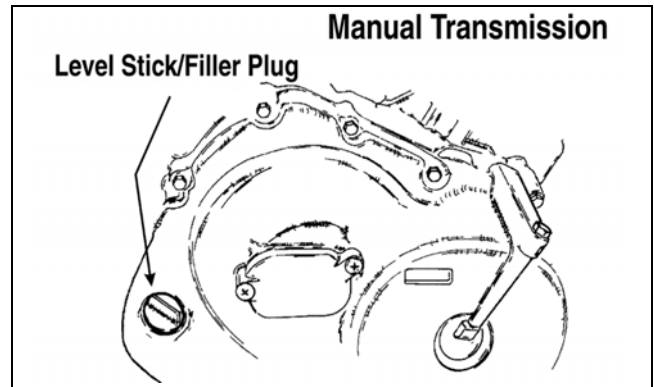
CF104

## Engine/Transmission Oil - Filter - Strainer

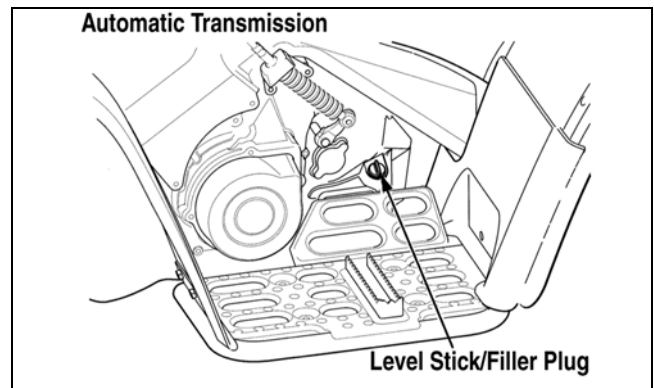
### OIL - FILTER

The engine should always be warm when the oil is changed so the oil will drain easily and completely.

- Park the ATV on level ground.
- Remove the oil level stick/filler plug.

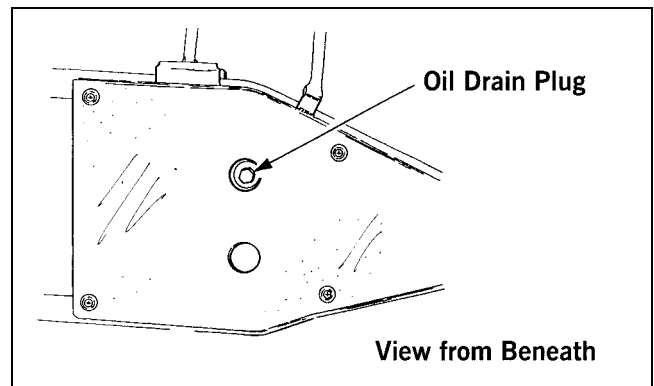


ATV-0075



0735-505

- Remove the drain plug from the bottom of the engine and drain the oil into a drain pan.



733-441A

- Remove the oil filter plug from the filter mounting boss (located on the front side of the transmission case) and allow the filter to drain completely. Install the plug and tighten securely.

- Using the adjustable Oil Filter Wrench and a suitable wrench, remove the old oil filter.

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

- 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.

■**NOTE:** Install a new O-ring each time the filter is replaced.



7. Install the engine drain plug and tighten to 16 ft-lb. Pour the specified amount of the recommended oil in the filler hole. Install the oil level stick/filler plug.

### **CAUTION**

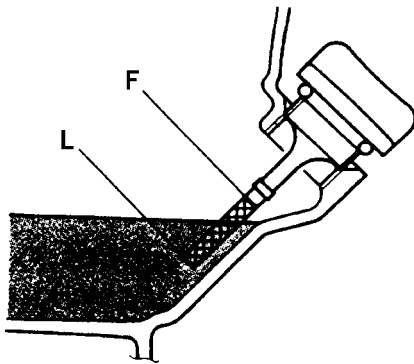
Any oil used in place of the recommended oil could cause serious engine damage. Do not use oils which contain graphite or molybdenum additives. These oils can adversely affect clutch operation. Also, not recommended are racing, vegetable, non-detergent, and castor-based oils.

8. Start the engine (while the ATV is outside on level ground) and allow it to idle for a few minutes.
  9. Turn the engine off and wait approximately one minute.
  10. Remove the oil level stick and wipe it with a clean cloth.
  11. Install the oil level stick until the threads touch the engine case.
- **NOTE:** On the 400/H1/H2 models, the oil level stick should be threaded into the case for checking purposes.
12. Remove the oil level stick; the engine oil level should be above the illustrated “L” mark but not higher than the illustrated “F” mark.

### **CAUTION**

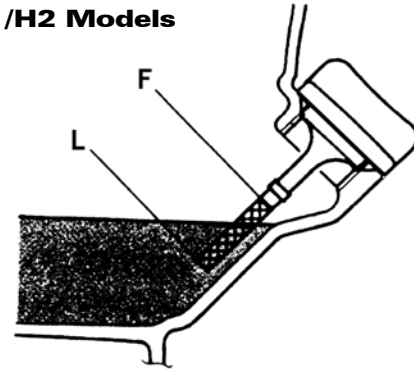
Do not over-fill the engine with oil. Always make sure that the oil level is above the “L” mark but not higher than the “F” mark.

**500**



ATV-0100

**400/H1/H2 Models**

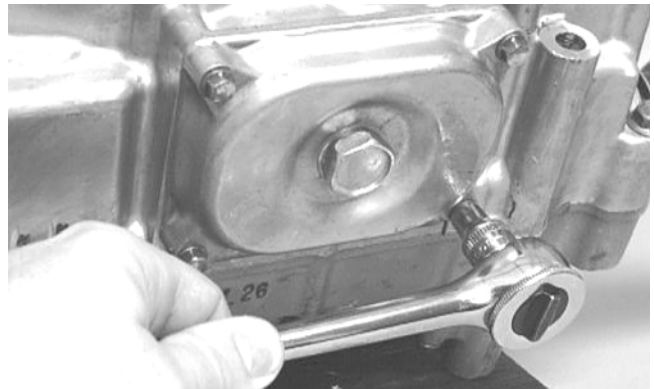


ATV-0100AA

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

## **STRAINER**

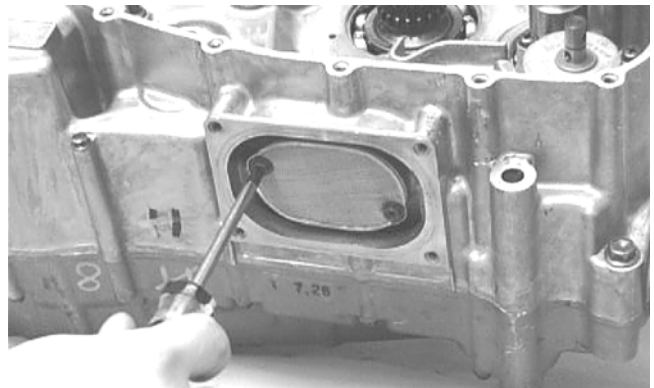
1. Remove the belly panel.
2. Remove the cap screws securing the oil strainer cap; then remove the cap. Account for the O-ring (400/500).



CC091D

3. Remove the two cap screws securing the strainer; then remove the strainer.

■ **NOTE:** On the H1/H2 models, thoroughly clean any sealant from the oil strainer cap.

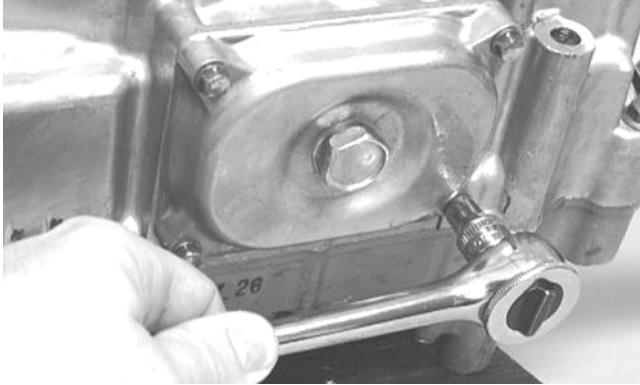


CC163D

### **AT THIS POINT**

To check/service oil strainer, see Section 3.

4. Place the oil strainer into position beneath the crankcase and secure with the cap screws. Tighten securely.
5. Place the strainer cap into position on the strainer making sure the O-ring is properly installed (400/500) or silicone sealant is applied (H1/H2 models); then secure with the cap screws. Tighten securely.



CC091D

6. Install the belly panel.

## Front Differential/Rear Drive Lubricant

■**NOTE:** On the H2 models, the rear drive incorporates a shock-limiting clutch pack in the gear case input assembly that is designed to cushion drive-line shock.

### ⚠ CAUTION

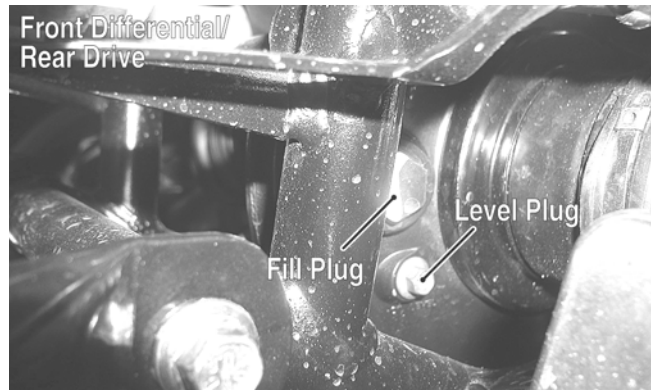
Any lubricant used in place of the recommended gear case lubricant could result in premature failure of the shock limiter. Do not use any lubricant containing graphite or molybdenum additives or other friction-modified lubricants as these may cause severe damage to shock limiter components.

When changing the lubricant, use approved SAE 80W-90 hypoid gear lube.

To check lubricant, remove the fill plug; the lubricant level should be 1 in. below the threads of the plug. If low, add SAE approved 80W-90 hypoid gear lubricant as necessary.

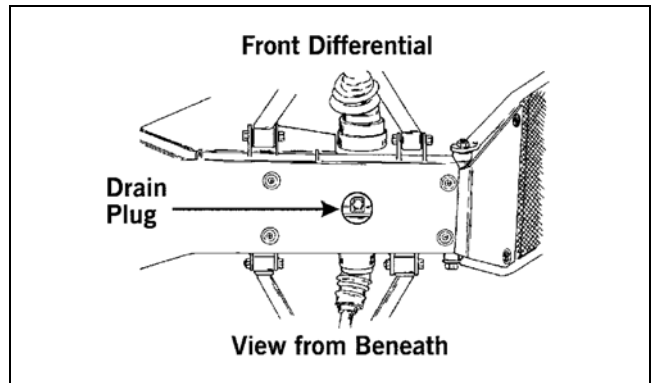
To change the lubricant, use the following procedure.

1. Place the ATV on level ground.
2. Remove each fill plug.

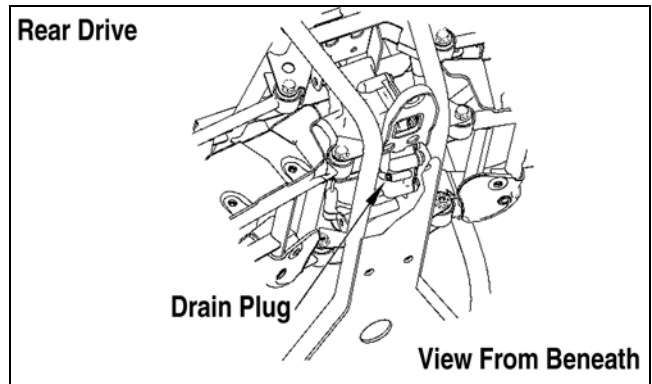


AL677C

3. Drain the lubricant into a drain pan by removing in turn the drain plug from each.



ATV0082A



737-651B

4. After all the lubricant has been drained, install the drain plugs and tighten to 45 in.-lb.
5. Pour the appropriate amount of approved SAE 80W-90 hypoid gear lubricant into the filler hole.
6. Install the fill plugs.

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

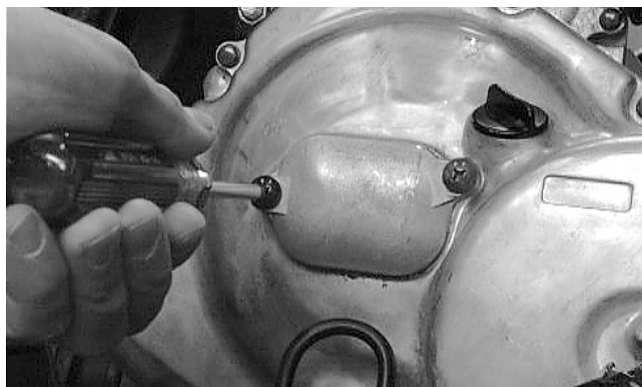
### ⚠ CAUTION

Water entering the outer end of the axle will not be able to enter the rear drive unless the seals are damaged.

## Adjusting Clutch (500 Manual Transmission)

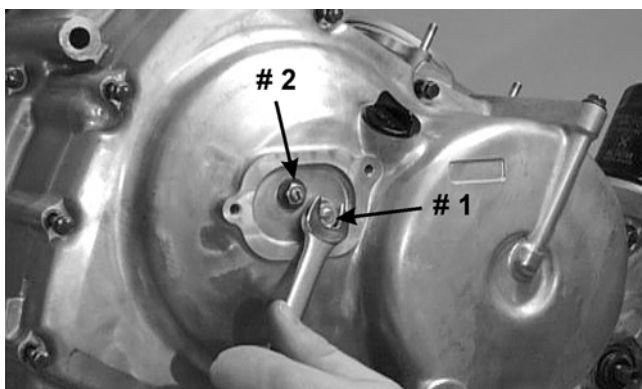
To adjust the clutch, use the following procedure.

1. Using an impact driver, remove the screws securing the cover and remove the cover. Account for the O-ring.



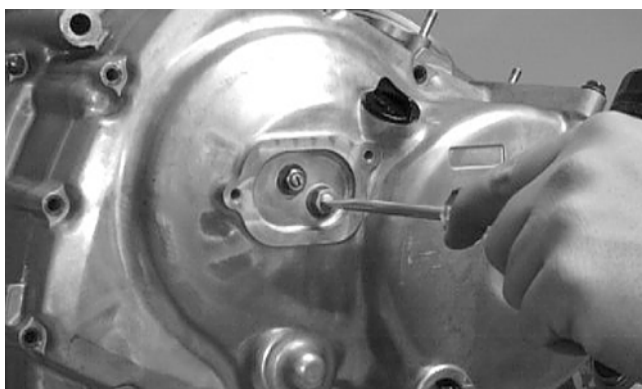
AM600D

2. Loosen the jam nuts securing adjustment screw #1 (forward) and adjustment screw #2 (rearward).



CC037D

3. Rotate adjustment screw #1 counterclockwise until it stops.



CC038D

4. Rotate adjustment screw #2 alternately clockwise and counterclockwise to ensure free movement without binding; then lock the jam nut securing adjustment screw #2.

5. Rotate adjustment screw #1 clockwise 1/8 turn; then lock the jam nut securing adjustment screw #1.

■ **NOTE:** At this point the clutch should be adjusted correctly. Test to ensure accurate adjustment.

6. Install the cover making sure the O-ring is properly positioned; then secure with the screws.

## Steering Components

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

- A. Handlebar grips not worn, broken, or loose.
- B. Handlebar not bent, cracked, and has equal and complete full-left and full-right capability.
- C. Steering post bearing assembly/bearing housing not broken, worn, or binding.
- 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.

2

## Driveshaft/Coupling

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

- A. Spline lateral movement (slop).
- B. Coupling cracked, damaged, or worn.

## Suspension/Shock Absorbers/Bushings

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

- A. Shock absorber rods not bent, pitted, or damaged.
- B. Rubber damper not cracked, broken, or missing.
- C. Shock absorber body not damaged, punctured, or leaking.



- D. Shock absorber eyelets not broken, bent, or cracked.
- E. Shock absorber eyelet bushings not worn, deteriorated, cracked, or missing.
- F. Shock absorber spring not broken or sagging.

## Nuts/Bolts/Cap Screws

Tighten all nuts, bolts, and cap screws. Make sure rivets holding components together are tight. Replace all loose rivets. Care must be taken that all calibrated nuts, bolts, and cap screws are tightened to specifications (see Section 1).

## Headlights/Taillight-Brakelight

Rotate the ignition switch to the lights position; the headlights and taillight should illuminate. Test the brakelight by compressing the brake lever. The brakelight should illuminate.

### HEADLIGHTS

■**NOTE:** The bulb portion of a headlight is fragile. **HANDLE WITH CARE.** When replacing a headlight bulb, do not touch the glass portion of the bulb. If the glass is touched, it must be cleaned with a dry cloth before installing. Skin oil residue on the bulb will shorten the life of the bulb.

#### **WARNING**

**Do not attempt to remove a bulb when it is hot. Severe burns may result.**

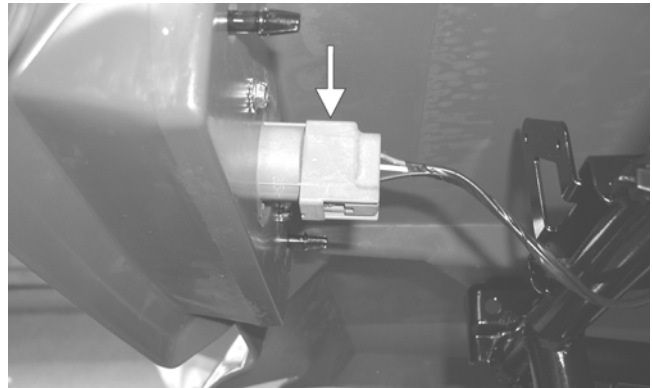
To replace a headlight bulb, use the following procedure.

1. Remove the wiring harness connector from the back of the headlight.
2. Grasp the bulb housing, turn it counterclockwise, and remove the bulb.
3. Install the new bulb into the housing and rotate it completely clockwise.
4. Install the wiring harness connector.

### TAILLIGHT-BRAKELIGHT

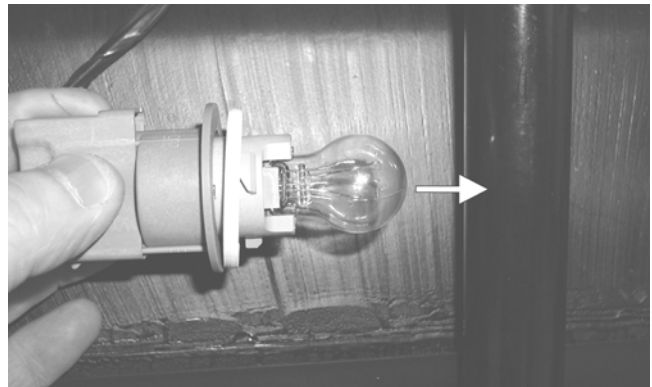
To replace the taillight-brakelight bulb, use the following procedure.

1. Turn the bulb socket assembly counterclockwise and remove from the housing.



CF135A

2. Pull the bulb straight out of the socket; then insert a new bulb.



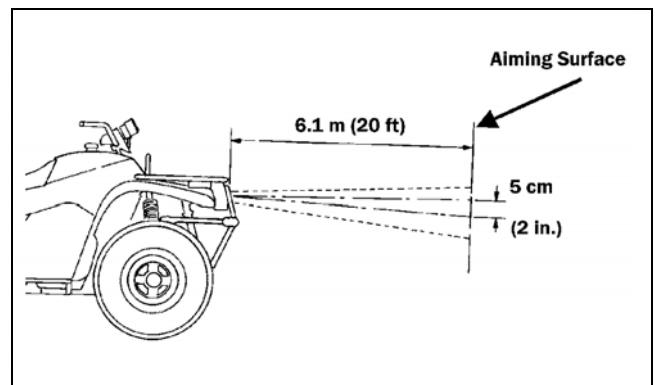
CF132A

3. Insert the bulb socket assembly into the housing and turn it clockwise to secure.

## CHECKING/ADJUSTING HEADLIGHT AIM

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

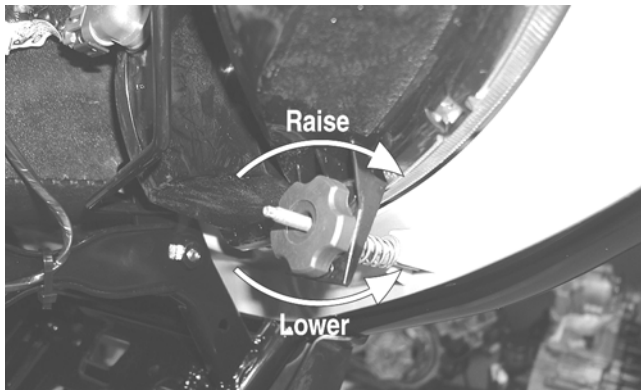
1. Position the ATV on a level floor so the headlights are approximately 6.1 m (20 ft) from an aiming surface (wall or similar aiming surface).



ATV-0070C

■**NOTE:** There should be an average operating load on the ATV when adjusting the headlight aim.

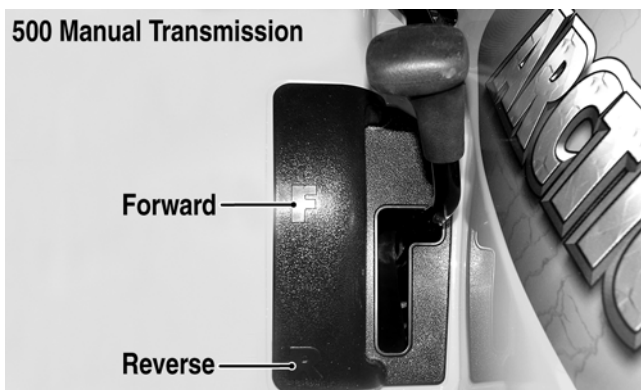
2. Measure the distance from the floor to the mid-point of each headlight.
3. Using the measurements obtained in step 2, make horizontal marks on the aiming surface.
4. Make vertical marks which intersect the horizontal marks on the aiming surface directly in front of the headlights.
5. Switch on the lights. Make sure the HIGH beam is on. DO NOT USE LOW BEAM.
6. Observe each headlight beam aim. Proper aim is when the most intense beam is centered on the vertical mark 5 cm (2 in.) below the horizontal mark on the aiming surface.
7. Adjust each headlight by turning the adjuster knob clockwise to raise the beam or counterclockwise to lower the beam.



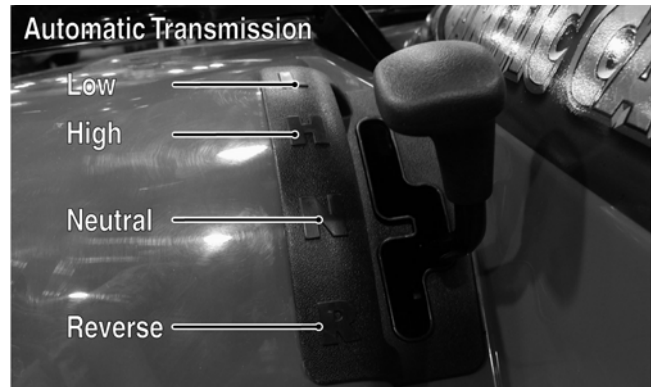
CD714A

## Shift Lever

### CHECKING ADJUSTMENT



CF238A



CF130A

Stop the ATV completely and shift the transmission into the R position. The reverse gear indicator light should be illuminated.

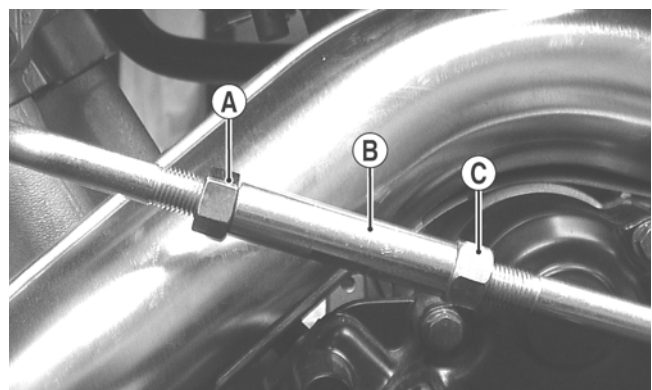
### **WARNING**

**Never shift the ATV into reverse gear when the ATV is moving as it could cause the ATV to stop suddenly throwing the operator from the ATV.**

If the reverse light does not illuminate when shifted to the reverse position, the switch may be faulty, the fuse may be blown, the bulb may be faulty, a connection may be loose or corroded, or the lever may need adjusting. To adjust, proceed to Adjusting Shift Lever.

### ADJUSTING SHIFT LEVER

1. Remove the seat; then remove the left-side engine cover.
2. With the ignition switch in the ON position, loosen jam nut (A) (left-hand threads); then loosen jam nut (C) and with the shift lever in the reverse position, adjust the coupler (B) until the transmission is in reverse and the (R) icon appears on the LCD.



CF258A

3. Tighten the jam nuts securely; then shift the transmission to each position and verify correct adjustment.
4. Install the left-side engine cover and seat making sure the seat locks securely in place.



■NOTE: An E (Error) in the gear position icon indicates no signal or a poor ground wire connection in the circuit. Troubleshoot the harness connectors, gear shift position switch connector, gear shift position switch, and LCD connector.

## Frame/Welds/Racks

The frame, welds, and racks should be checked periodically for damage, bends, cracks, deterioration, broken components, and missing components. If replacement or repair constitutes removal, see Section 8.

## Electrical Connections

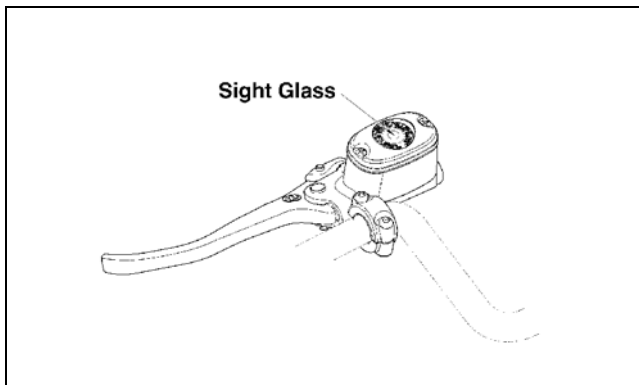
The electrical connections should be checked periodically for proper function. In case of an electrical failure, check fuses, connections (for tightness, corrosion, damage), and/or bulbs. If an electrical component needs to be tested for proper function, see Section 5.

## Hydraulic Brake Systems

### CHECKING/BLEEDING

The hydraulic brake systems have 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. On the hand brake if the level in the reservoir is adequate, the sight glass will appear dark. If the level is low, the sight glass will appear clear. On the auxiliary brake the level must be between the MIN and MAX lines on the reservoir.



738-420A

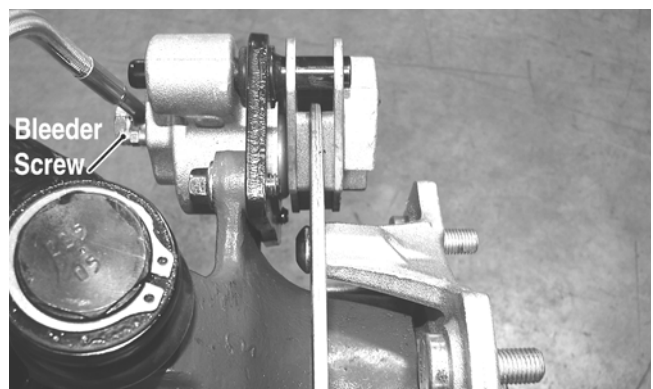


AL681

2. Compress the brake lever/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 compress the brake lever/pedal several times.
  - C. Remove the protective cap, install one end of a clear hose onto one FRONT bleeder screw, and direct the other end into a container; then while holding slight pressure on the brake lever/pedal, open the bleeder screw and watch for air bubbles. Close the bleeder screw before releasing the brake lever/pedal. Repeat this procedure until no air bubbles are present.



AF637D



PR377C

■NOTE: During the bleeding procedure, watch the reservoir/sight glass very closely to make sure there is always a sufficient amount of brake fluid. If low, refill the reservoir before the bleeding procedure is continued. Failure to maintain a sufficient amount of fluid in the reservoir will result in air in the system.

D. Repeat step C until the brake lever/pedal is firm.

E. At this point, perform step B, C, and D on the other FRONT bleeder screw; then move to the REAR bleeder screw and follow the same procedure.

4. Carefully check the entire hydraulic brake system that 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.

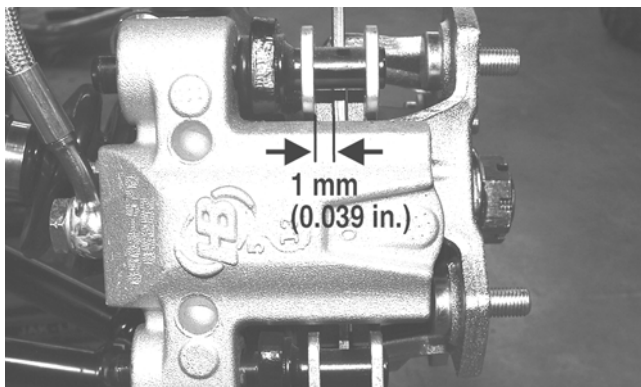
## INSPECTING HOSES

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



PR376B

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

4. To replace the brake pads, use the following procedure.

A. Remove the wheel.

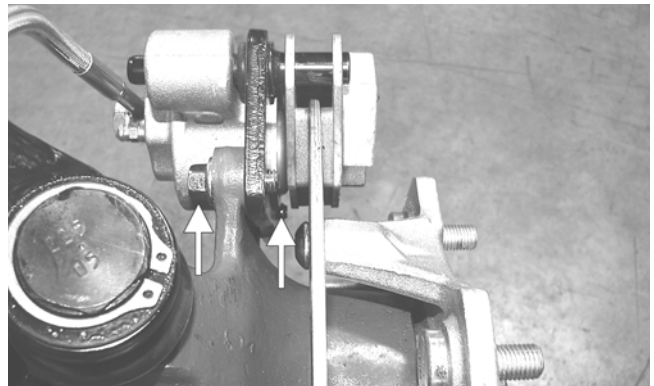
B. Remove the cap screws securing the caliper holder to the knuckle; then remove the pads.



PR237

C. Install the new brake pads.

D. Secure the caliper to the knuckle and/or axle housing with the cap screws. Tighten to 20 ft-lb.



PR377B

E. Install the wheel. Tighten to 40 ft-lb.

5. Burnish the brake pads (see Burnishing Brake Pads in this section).

## Burnishing Brake Pads

Brake pads (both hydraulic and auxiliary) 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 ATV to 30 mph and to brake to a stop.
2. Accelerate to 30 mph; then compress brake lever or apply the auxiliary brake to decelerate to 0-5 mph.
3. Repeat procedure on each brake system five times.
4. Adjust the auxiliary brake (if necessary).
5. Verify that the brakelight illuminates when the hand lever is compressed or the brake pedal is depressed.

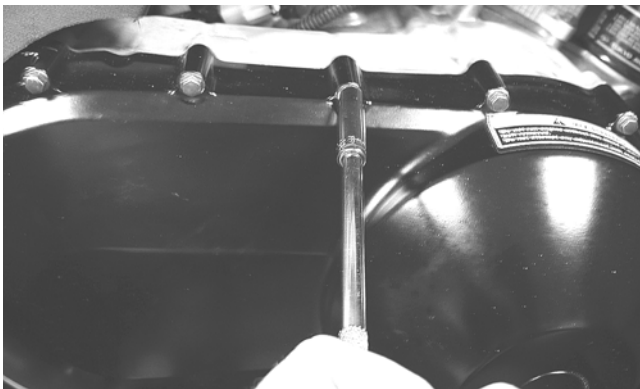
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## Checking/Replacing V-Belt (Automatic Transmission)

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### REMOVING

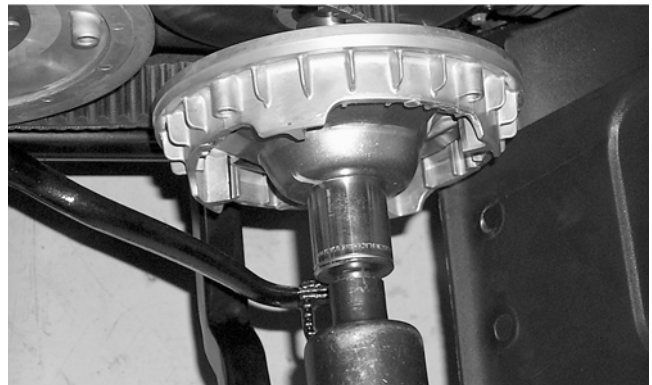
1. Remove the right-side footrest (see Section 8).
2. Remove the cap screws securing the V-belt cover noting the location of the different-lengthed cap screws for installing purposes; then using a rubber mallet, gently tap on the cover tabs to loosen the cover. Remove the cover.



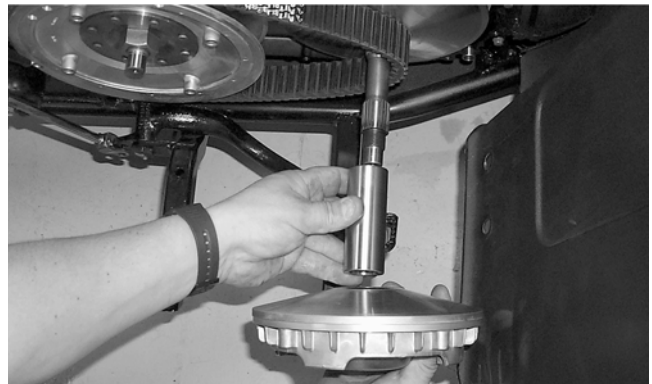
CD078

■NOTE: Note the location of the main engine ground wire for installing purposes.

3. Remove the nut securing the movable drive face; then remove the face. Account for the spacer.

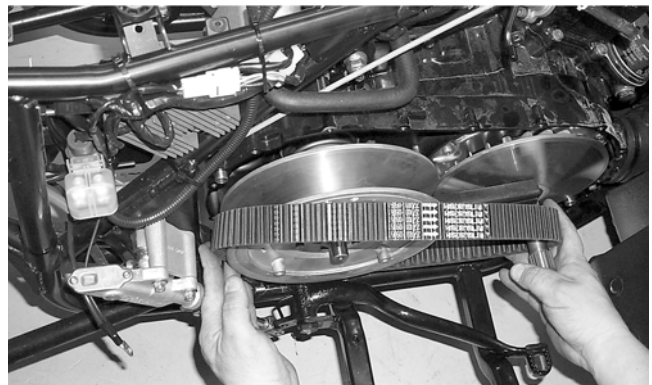


CC546



CC547

4. Remove the V-belt.

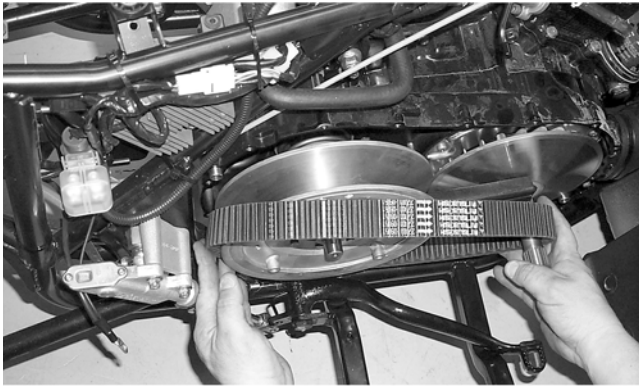


CC550

### INSTALLING

1. Spread the faces of the driven clutch by pushing the inner face toward the engine while turning it counterclockwise (500) or threading in a push-bolt (400/H1/H2 models); then when the faces are separated, insert the belt and push down between the faces.
2. Place the V-belt into position over the front shaft.

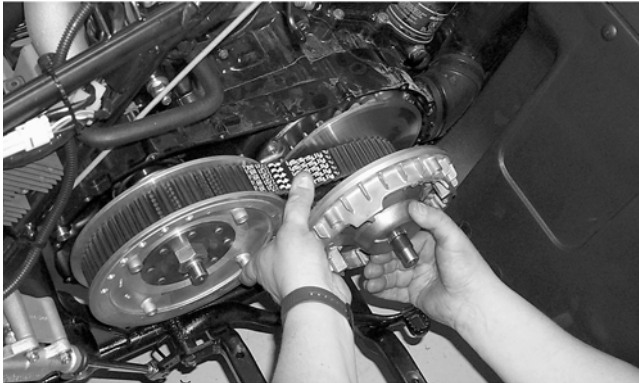




CC550

■NOTE: The arrow on the V-belt should point forward.

3. Pinch the V-belt together near its center and slide the spacer and movable drive face onto the drive-shaft. Secure the drive face with a nut (threads coated with red Loctite #271). Tighten the nut to 147 ft-lb (400), 72 ft-lb (500) or 165 ft-lb (H1/H2 models).



CC552

■NOTE: At this point, the push-bolt can be removed.

4. Rotate the V-belt and clutches until the V-belt is flush with the top of the driven clutch.
5. Place the V-belt cover gasket into position; then install the cover and secure with the cap screws making sure the different-lengthed cap screws are in their proper location. Tighten the cap screws to 8 ft-lb.



CD083

■NOTE: Make sure the main engine ground wire is installed and secured in the proper location.

6. Secure the front fender to the footrest with the two cap screws. Tighten securely.
7. Install the right-side footrest (see Section 8).

2

# SECTION 3 - ENGINE/TRANSMISSION

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## Engine/Transmission

This section has been organized into sub-sections which show a progression for the complete servicing of the Arctic Cat ATV 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:** Some photographs and illustrations used in this section are used for clarity purposes only and are not designed to depict actual conditions.

**NOTE:** Critical torque specifications are located in Section 1.

### 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.

Description	p/n
Clutch Sleeve Hub Holder	0444-007
Connecting Rod Holder	0444-006
Crankcase Separator/Crankshaft Remover	0444-009
Driven Pulley Compressor	0444-121
Driven Pulley Compressor	0444-140
Magneto Rotor Remover Set	0444-206
Oil Filter Wrench	0644-389
Piston Pin Puller	0644-328
Side Case Puller	0644-262
Side Case Puller	0644-365
Spanner Wrench	0444-153
Surface Plate	0644-016
Valve Clearance Adjuster	0444-078
V Blocks	0644-022

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

## Specifications\* (400)

VALVES AND GUIDES		
Valve Face Diameter	(intake) (exhaust)	30.6 mm 27.0 mm
Valve/Tappet Clearance (cold engine)	(intake) (exhaust)	0.076-0.127 mm 0.152-0.203 mm
Valve Guide/Stem Clearance (max)	(intake) (exhaust)	0.04 mm 0.06 mm
Valve Guide/Valve Stem Deflection (wobble method)	(max)	0.35 mm
Valve Guide Inside Diameter		5.000-5.015 mm
Valve Stem Outside Diameter	(intake) (exhaust)	4.975-4.990 mm 4.955-4.970 mm
Valve Stem Runout	(max)	0.05 mm
Valve Head Thickness	(intake) (exhaust)	2.03 mm 2.28 mm
Valve Face/Seat Width (min)	(intake) (exhaust)	2.25 mm 2.55 mm
Valve Seat Angle	(intake/exhaust)	45°
Valve Face Radial Runout	(max)	0.03 mm
Valve Spring Free Length	(min)	42.8 mm
Valve Spring Tension @ 32.5 mm	(outer)	18.6-21.4 kg (41-47 lb)
CAMSHAFT AND CYLINDER HEAD		
Cam Lobe Height (min)	(intake/exhaust)	33.53 mm
Camshaft Journal/Cylinder Head Clearance(max)		0.081 mm
Camshaft Journal Holder Inside Diameter	(right & center) (left)	22.01-22.04 mm 17.51-17.54 mm
Camshaft Journal Outside Diameter	(right & center) (left)	21.959-21.980 mm 17.466-17.480 mm
Camshaft Runout	(max)	0.03 mm
Rocker Arm Inside Diameter		12.000-12.018 mm
Rocker Arm Shaft Outside Diameter		11.975-11.987 mm
Cylinder Head/Cover Distortion	(max)	0.05 mm
CYLINDER, PISTON, AND RINGS		
Piston Skirt/Cylinder Clearance		0.060-0.073 mm
Piston Diameter 15 mm from Skirt End		80.98-81.00 mm
Piston Ring Free End Gap (min)	(1st) (2nd)	8.0 mm 8.3 mm
Bore x Stroke		81.0 x 71.2 mm
Cylinder Trueness	(max)	0.01 mm
Piston Ring End Gap - Installed	(min)	0.15 mm
Piston Ring to Groove Clearance (max)	(1st/2nd)	0.06 mm
Piston Ring Groove Width	(1st) (2nd) (oil)	1.01-1.03 mm 1.21-1.23 mm 2.01-2.03 mm
Piston Ring Thickness	(1st) (2nd)	0.97-0.99 mm 1.17-1.19 mm
Piston Pin Bore	(max)	20.008 mm
Piston Pin	(min)	19.994 mm
CRANKSHAFT		
Connecting Rod (small end)	(max)	20.021 mm
Connecting Rod (big end side-to-side)		0.10-0.55 mm
Connecting Rod (big end width)		21.95-22.00 mm
Connecting Rod (small end deflection)	(max)	0.3 mm
Crankshaft (web-to-web)		60.8-60.9 mm
Crankshaft Runout	(max)	0.03 mm

\* Specifications subject to change without notice.

## Specifications\* (500)

### VALVES AND GUIDES

Valve Face Diameter	(intake) (exhaust)	30.6 mm 27.0 mm
Valve/Tappet Clearance (cold engine)	(intake) (exhaust)	0.05-0.10 mm 0.17-0.22 mm
Valve Guide/Stem Clearance	(intake) (exhaust)	0.010-0.037 mm 0.030-0.057 mm
Valve Guide/Valve Stem Deflection (wobble deflection)	(max)	0.35 mm
Valve Guide Inside Diameter		5.000-5.012 mm
Valve Stem Outside Diameter	(intake) (exhaust)	4.975-4.990 mm 4.955-4.970 mm
Valve Stem Runout	(max)	0.05 mm
Valve Head Thickness	(min)	0.5 mm
Valve Stem End Length	(min)	2.3 mm
Valve Face/Seat Width		0.9-1.1 mm
Valve Seat Angle	(intake/exhaust)	45°
Valve Face Radial Runout	(max)	0.03 mm
Valve Spring Free Length	(min)	38.8 mm
Valve Spring Tension @ 31.5 mm	(outer)	18.6-21.4 kg (41-47 lb)

### CAMSHAFT AND CYLINDER HEAD

Cam Lobe Height (min)	(intake) (exhaust)	33.13 mm 33.20 mm
Camshaft Journal/Cylinder Head Clearance(max)		0.15 mm
Camshaft Journal Holder Inside Diameter	(right & center) (left)	22.012-22.025 mm 17.512-17.525 mm
Camshaft Journal Outside Diameter	(right & center) (left)	21.959-21.980 mm 17.466-17.484 mm
Camshaft Runout	(max)	0.10 mm
Rocker Arm Inside Diameter		12.000-12.018 mm
Rocker Arm Shaft Outside Diameter		11.973-11.984 mm
Cylinder Head Distortion	(max)	0.05 mm
Cylinder Head Cover Distortion	(max)	0.05 mm

### CYLINDER, PISTON, AND RINGS

Piston Skirt/Cylinder Clearance		0.030-0.040 mm
Piston Diameter 15 mm from Skirt End		87.465-87.480 mm
Piston Ring Free End Gap (min)	(1st) (2nd)	9.0 mm 9.5 mm
Bore x Stroke		87.5 x 82 mm
Cylinder Trueness	(max)	0.05 mm
Piston Ring End Gap - Installed	(min)	0.35 mm
Piston Ring to Groove Clearance (max)	(1st) (2nd)	0.180 mm 0.150 mm
Piston Ring Groove Width	(1st) (2nd) (oil)	1.01-1.03 mm 1.21-1.23 mm 2.51-2.53 mm
Piston Ring Thickness	(1st) (2nd)	0.97-0.99 mm 1.17-1.19 mm
Piston Pin Bore	(max)	23.03 mm
Piston Pin Outside Diameter	(min)	22.98 mm

### CRANKSHAFT

Connecting Rod (small end inside diameter)(max)		23.04 mm
Connecting Rod (big end side-to-side)		0.10-0.65 mm
Connecting Rod (big end width)		24.95-25.00 mm
Connecting Rod (small end deflection)	(max)	3 mm
Crankshaft (web-to-web)		71.02-71.22 mm
Crankshaft Runout	(max)	0.08 mm

### CLUTCH (Manual Transmission)

Clutch Release Screw		1/4-1/2 turn back
Drive Plate (fiber) Thickness	(min)	2.82 mm
Drive Plate (fiber) Tab	(min)	2.9 mm
Driven Plate (warpage)	(max)	0.1 mm
Clutch Spring Length	(min)	35.6 mm
Clutch Wheel Inside Diameter		140.0-140.2 mm
Starter Clutch Shoe		No groove at any part
Clutch Engagement RPM		1700 ± 200
Clutch Lock-Up RPM		3700 ± 300
Primary Reduction Ratio		2.032 (63/31)
Secondary Reduction Ratio		1.133 (17/15)
Final Reduction Ratio	(front/rear)	3.6 (36/10)
Secondary Transmission Reduction Ratio	(low) (high)	2.419 (22/23 x 27/17 x 43/27) 1.592 (43/27)
Gear Ratios	(1st) (2nd) (3rd) (4th) (5th) (reverse)	3.09 (34/11) 1.75 (28/16) 1.2 (24/20) 0.875 (21/24) 0.724 (21/29) 2.636 (24/11 x 29/24)
Shift Fork to Groove (side clearance)		0.1-0.3 mm
Shift Fork Groove Width	(#1 and #2) (secondary transmission) (reverse)	5.5-5.6 mm 5.5-5.6 mm 5.0-5.1 mm
Shift Fork Thickness	(#1 and #2) (secondary transmission) (reverse)	5.3-5.4 mm 5.3-5.4 mm 4.8-4.9 mm
Thermostat Valve Opening Temperature		73.5-76.5°C (164-170°F)
Thermostat Valve Lift		Over 3 mm @ 90°C (194°F)

\* Specifications subject to change without notice.

3

## Specifications\* (H1 Models)

VALVES AND GUIDES		
Valve Face Diameter	(intake) (exhaust)	31.6 mm 27.9 mm
Valve/Tappet Clearance (cold engine)	(intake) (exhaust)	0.1016 mm 0.1524 mm
Valve Guide/Stem Clearance	(intake/exhaust)	0.013 mm
Valve Guide/Valve Stem Deflection (wobble method)	(max)	0.35 mm
Valve Guide Inside Diameter		5.000-5.012 mm
Valve Stem Outside Diameter	(intake/exhaust)	4.972-4.987 mm
Valve Stem Runout	(max)	0.1 mm
Valve Head Thickness	(min)	2.3 mm
Valve Stem End Length	(min)	3.97 mm
Valve Face/Seat Width	(intake) (exhaust)	2.25 mm 2.60 mm
Valve Seat Angle	(intake/exhaust)	45° 15'-45° 30'
Valve Face Radial Runout	(max)	0.2 mm
Valve Spring Free Length	(min)	38.7 mm
Valve Spring Tension @ 31.5 mm	(outer)	19.0 kg (42 lb)
CAMSHAFT AND CYLINDER HEAD		
Cam Lobe Height (min)	(intake/exhaust)	33.53 mm
Camshaft Journal/Cylinder Head Clearance	(max)	0.04 mm
Camshaft Journal Holder Inside Diameter	(right & center) (left)	21.98-22.04 mm 17.48-17.53 mm
Camshaft Journal Outside Diameter	(right & center) (left)	21.96-21.98 mm 17.47-17.48 mm
Camshaft Runout	(max)	0.05 mm
Rocker Arm Inside Diameter		12.000-12.018 mm
Rocker Arm Shaft Outside Diameter		11.97-11.98 mm
Cylinder Head/Cover Distortion	(max)	0.05 mm
CYLINDER, PISTON, AND RINGS		
Piston Skirt/Cylinder Clearance		0.045 mm
Piston Diameter 15 mm from Skirt End (550)		97.948-97.962 mm
Piston Diameter 12 mm from Skirt End (700)		101.930-101.949 mm
Piston Ring Free End Gap	(1st/2nd)	12.5 mm
Bore x Stroke		92 x 82 mm - 550 102 x 82 mm - 700
Cylinder Trueness	(max)	0.01 mm
Piston Ring End Gap - Installed	(min)	0.36 mm
Piston Ring to Groove Clearance (max)	(1st/2nd)	0.03 mm
Piston Ring Groove Width	(1st/2nd) (oil)	1.202-1.204 mm 2.01-2.03 mm
Piston Ring Thickness	(1st/2nd)	1.970-1.990 mm
Piston Pin Bore	(max)	23.0 mm
Piston Pin Outside Diameter	(min)	22.99 mm
CRANKSHAFT		
Connecting Rod (small end inside diameter)	(max)	23.021 mm
Connecting Rod (big end side-to-side)		0.6 mm
Connecting Rod (big end width)		25 mm
Connecting Rod @ 150 mm (small end deflection)	(max)	0.3 mm
Crankshaft (web-to-web)		71 mm
Crankshaft Runout	(max)	0.03 mm

## Specifications\* (H2 Models)

VALVES AND GUIDES		
Valve Face Diameter	(intake) (exhaust)	31.6 mm 27.9 mm
Valve/Tappet Clearance (cold engine)	(intake) (exhaust)	0.1016 mm 0.1524 mm
Valve Guide/Stem Clearance	(intake/exhaust)	0.013 mm
Valve Guide/Valve Stem Deflection (wobble method)	(max)	0.35 mm
Valve Guide Inside Diameter		5.000-5.012 mm
Valve Stem Outside Diameter	(intake/exhaust)	4.972-4.987 mm
Valve Stem Runout	(max)	0.1 mm
Valve Head Thickness	(min)	2.3 mm
Valve Stem End Length	(min)	3.97 mm
Valve Face/Seat Width	(intake) (exhaust)	2.25 mm 2.60 mm
Valve Seat Angle	(intake/exhaust)	45° 15'-45° 30'
Valve Face Radial Runout	(max)	0.2 mm
Valve Spring Free Length	(min)	38.7 mm
Valve Spring Tension @ 31.5 mm	(outer)	19.0 kg (42 lb)
CAMSHAFT AND CYLINDER HEAD		
Cam Lobe Height (min)	(intake/exhaust)	33.53 mm
Camshaft Journal/Cylinder Head Clearance	(max)	0.04 mm
Camshaft Journal Holder Inside Diameter	(right & center) (left)	21.98-22.04 mm 17.48-17.53 mm
Camshaft Journal Outside Diameter	(right & center) (left)	21.96-21.98 mm 17.47-17.48 mm
Camshaft Runout	(max)	0.05 mm
Rocker Arm Inside Diameter		12.000-12.018 mm
Rocker Arm Shaft Outside Diameter		11.97-11.98 mm
Cylinder Head/Cover Distortion	(max)	0.05 mm
CYLINDER, PISTON, AND RINGS		
Piston Skirt/Cylinder Clearance		0.05 mm
Piston Diameter 15 mm from Skirt End		91.949-97.959 mm
Piston Ring End Gap (min)	(1st/2nd)	12.5 mm
Bore x Stroke		92 x 71.5 mm
Cylinder Trueness	(max)	0.0075 mm
Piston Ring End Gap - Installed		0.36 mm
Piston Ring to Groove Clearance (max)	(1st) (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 (big end width)		21.95 mm
Connecting Rod @ 150 mm (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.

\* Specifications subject to change without notice.

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# Troubleshooting

■NOTE: A Condition/Remedy marked with an asterisk (\*) is for the manual transmission model only.

## Problem: Engine will not start or is hard to start (Compression too low)

Condition	Remedy
1. <b>Valve clearance</b> out of adjustment	1. Adjust clearance
2. <b>Valve guides</b> worn - seated poorly	2. Repair - replace guides
3. <b>Valves</b> mistimed	3. Adjust valve timing
4. <b>Piston rings</b> worn excessively	4. Replace rings
5. <b>Cylinder bore</b> worn	5. Replace - rebore cylinder
6. <b>Spark plug</b> seating poorly	6. Tighten plug
7. <b>Starter motor</b> cranks too slowly - does not turn	7. See Section 5 - Troubleshooting

## Problem: Engine will not start or is hard to start (No spark)

Condition	Remedy
1. <b>Spark plug</b> fouled	1. Clean - replace plug
2. <b>Spark plug</b> wet	2. Clean - dry plug
3. <b>Magneto</b> defective	3. Replace magneto
4. <b>CDI unit/ECU</b> defective	4. Replace CDI unit/ECU
5. <b>Ignition coil</b> defective	5. Replace ignition coil
6. <b>High-tension lead</b> open - shorted	6. Replace high tension lead

## Problem: Engine will not start or is hard to start (No fuel reaching the carburetor/fuel injector)

Condition	Remedy
1. <b>Gas tank vent hose</b> obstructed	1. Clean vent hose
2. <b>Carburetor float valve</b> defective	2. Replace valve
3. <b>Fuel hose</b> obstructed	3. Clean - replace hose
4. <b>Fuel screens</b> obstructed	4. Clean - replace inlet screen - valve screen
5. <b>Fuel pump</b> defective	5. Replace fuel pump

## Problem: Engine stalls easily

Condition	Remedy
1. <b>Spark plug</b> fouled	1. Clean plug
2. <b>Magneto</b> defective	2. Replace magneto
3. <b>CDI unit/ECU</b> defective	3. Replace CDI unit/ECU
4. <b>Carburetor jets/fuel injector</b> obstructed	4. Clean jets/replace fuel injector
5. <b>Valve clearance</b> out of adjustment	5. Adjust clearance

## Problem: Engine noisy (Excessive valve chatter)

Condition	Remedy
1. <b>Valve clearance</b> too large	1. Adjust clearance
2. <b>Valve spring(s)</b> weak - broken	2. Replace spring(s)
3. <b>Rocker arm - rocker arm shaft</b> worn	3. Replace arm - shaft
4. <b>Camshaft</b> worn	4. Replace camshaft
5. <b>Valve tappets</b> worn	5. Replace tappets

## Problem: Engine noisy (Noise seems to come from piston)

Condition	Remedy
1. <b>Piston - cylinder</b> worn	1. Replace - service piston - cylinder
2. <b>Combustion chamber</b> carbon buildup	2. Clean chamber
3. <b>Piston pin - piston pin bore</b> worn	3. Replace - service pin - bore
4. <b>Piston rings - ring groove(s)</b> worn	4. Replace rings - piston

## Problem: Engine noisy (Noise seems to come from timing chain)

Condition	Remedy
1. <b>Chain</b> stretched	1. Replace chain
2. <b>Sprockets</b> worn	2. Replace sprockets
3. <b>Tension adjuster</b> malfunctioning	3. Repair - replace adjuster

<b>Problem: Engine noisy (Noise seems to come from clutch)</b>	
<b>Condition *</b>	<b>Remedy *</b>
<ol style="list-style-type: none"> <li>1. <b>Crankshaft splines - bearings</b> worn</li> <li>2. <b>Countershaft - hub splines</b> worn</li> <li>3. <b>Clutch plate teeth</b> worn</li> <li>4. <b>Driven - drive clutch plates</b> distorted - broken</li> <li>5. <b>Clutch dampers</b> weak</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace crankshaft - bearings</li> <li>2. Replace countershaft - hub</li> <li>3. Replace clutch plate(s)</li> <li>4. Replace clutch plate(s)</li> <li>5. Replace dampers</li> </ol>
<b>Problem: Engine noisy (Noise seems to come from crankshaft)</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>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> </ol>	<ol style="list-style-type: none"> <li>1. Replace bearing</li> <li>2. Replace bearing</li> <li>3. Replace thrust washer(s)</li> </ol>
<b>Problem: Engine noisy (Noise seems to come from transmission)</b>	
<b>Condition</b>	<b>Remedy</b>
<ol style="list-style-type: none"> <li>1. <b>Gears</b> worn - rubbing</li> <li>2. <b>Splines</b> worn</li> <li>3. <b>Primary gears</b> worn - rubbing</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-transmission/left-side cover)</b>	
<b>Condition *</b>	<b>Remedy *</b>
<ol style="list-style-type: none"> <li>1. <b>Gears - shaft(s)</b> worn</li> <li>2. <b>Bearing(s)/bushing(s)</b> damaged</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace gears - shafts</li> <li>2. Replace bearing(s)/bushing(s)</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 - rubbing</li> <li>6. <b>Splines</b> worn</li> <li>7. <b>Final driven shaft thrust clearance</b> too large</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> <li>7. Replace thrust washer(s)</li> </ol>
<b>Problem: Clutch slipping</b>	
<b>Condition *</b>	<b>Remedy *</b>
<ol style="list-style-type: none"> <li>1. <b>Release roller</b> out of adjustment - loss of free-play</li> <li>2. <b>Clutch springs</b> weak</li> <li>3. <b>Clutch shoes</b> worn</li> <li>4. <b>Pressure disc</b> worn - distorted</li> <li>5. <b>Clutch plates (driven - drive)</b> distorted</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust clutch bolts 1 &amp; 2</li> <li>2. Replace springs</li> <li>3. Replace shoes</li> <li>4. Replace disc</li> <li>5. Replace plates</li> </ol>
<b>Problem: Clutch dragging</b>	
<b>Condition *</b>	<b>Remedy *</b>
<ol style="list-style-type: none"> <li>1. <b>Clutch release roller</b> out of adjustment - too much free-play</li> <li>2. <b>Clutch springs</b> weak</li> <li>3. <b>Pressure disc - clutch plates</b> distorted</li> <li>4. <b>Clutch release mechanism</b> worn - damaged</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust clutch bolts 1 &amp; 2</li> <li>2. Replace springs</li> <li>3. Replace disc - plates</li> <li>4. Adjust - replace mechanism</li> </ol>
<b>Problem: Transmission will not shift</b>	
<b>Condition *</b>	<b>Remedy *</b>
<ol style="list-style-type: none"> <li>1. <b>Gearshift cam</b> broken</li> <li>2. <b>Gearshift forks</b> distorted</li> <li>3. <b>Gearshift shaft</b> worn</li> <li>4. <b>Clutch release mechanism</b> worn - damaged</li> <li>5. <b>Gearshift linkage</b> adjusted improperly</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace cam</li> <li>2. Replace forks</li> <li>3. Replace shaft</li> <li>4. Adjust - replace mechanism</li> <li>5. Adjust linkage</li> </ol>



<b>Problem: Transmission will not shift back</b>	
<b>Condition *</b>	<b>Remedy *</b>
1. <b>Reverse shift cam</b> broken 2. <b>Shift shafts</b> rubbing - sticking 3. <b>Gearshift forks</b> distorted - worn 4. <b>Gearshift lever return spring</b> broken - damaged	1. Replace cam 2. Replace shafts 3. Replace forks 4. Replace spring
<b>Problem: Transmission jumps out of gear</b>	
<b>Condition *</b>	<b>Remedy *</b>
1. <b>Shifting gears (driveshaft - countershaft)</b> worn 2. <b>Gearshift forks</b> distorted - worn 3. <b>Cam stopper spring (gearshift cam)</b> weak 4. <b>Gearshift lever stopper pin</b> worn	1. Replace gears 2. Replace forks 3. Replace spring 4. Replace pin
<b>Problem: Secondary-transmission will not shift or shift back</b>	
<b>Condition *</b>	<b>Remedy *</b>
1. <b>Sliding dog</b> broken - worn 2. <b>Gearshift fork</b> broken - worn 3. <b>Shift lever</b> out of adjustment 4. <b>Gearshift cam</b> worn 5. <b>Cam stopper spring</b> weak 6. <b>Gearshift fork shaft</b> worn	1. Replace dog 2. Replace fork 3. Adjust lever 4. Replace cam 5. Replace spring 6. Replace shaft
<b>Problem: Engine idles poorly</b>	
<b>Condition</b>	<b>Remedy</b>
1. <b>Valve clearance</b> out of adjustment 2. <b>Valve seating</b> poor 3. <b>Valve guides</b> defective 4. <b>Rocker arms - arm shaft</b> worn 5. <b>Magneto</b> defective 6. <b>CDI unit/ECU</b> defective 7. <b>Spark plug</b> fouled - gap too wide 8. <b>Ignition coil</b> defective 9. <b>Float</b> out of adjustment 10. <b>Jets</b> obstructed 11. <b>Pilot screw setting</b> improper 12. <b>Fuel injector</b> obstructed	1. Adjust clearance 2. Replace - service seats - valves 3. Replace guides 4. Replace arms - shafts 5. Replace magneto 6. Replace CDI unit/ECU 7. Adjust gap - replace plug 8. Replace ignition coil 9. Adjust float height 10. Clean jets 11. Adjust pilot screw 12. Replace fuel injector
<b>Problem: Engine runs poorly at high speed</b>	
<b>Condition</b>	<b>Remedy</b>
1. <b>High RPM "cut out"</b> against RPM limiter 2. <b>Valve springs</b> weak 3. <b>Valve timing</b> out of adjustment 4. <b>Cams - rocker arms - tappets</b> worn 5. <b>Spark plug gap</b> too narrow 6. <b>Ignition coil</b> defective 7. <b>Float level</b> too low 8. <b>Air cleaner element</b> obstructed 9. <b>Fuel hose</b> obstructed 10. <b>Fuel pump</b> defective	1. Shift into higher gear - decrease speed 2. Replace springs 3. Adjust timing 4. Replace cams - arms - tappets 5. Adjust gap 6. Replace ignition oil 7. Adjust float height 8. Clean element 9. Clean or replace hose 10. Replace fuel pump
<b>Problem: Exhaust smoke dirty or heavy</b>	
<b>Condition</b>	<b>Remedy</b>
1. <b>Oil (in the engine)</b> overfilled - contaminated 2. <b>Piston rings - cylinder</b> worn 3. <b>Valve guides</b> worn 4. <b>Cylinder wall</b> scored - scuffed 5. <b>Valve stems</b> worn 6. <b>Stem seals</b> defective	1. Drain excess oil - replace oil 2. Replace - service rings - cylinder 3. Replace guides 4. Replace - service cylinder 5. Replace valves 6. Replace seals

Problem: Engine lacks power	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Valve clearance</b> incorrect</li> <li>2. <b>Valve springs</b> weak</li> <li>3. <b>Valve timing</b> incorrect</li> <li>4. <b>Piston ring(s) - cylinder</b> worn</li> <li>5. <b>Valve seating</b> poor</li> <li>6. <b>Spark plug</b> fouled</li> <li>7. <b>Rocker arms - shafts</b> worn</li> <li>8. <b>Spark plug gap</b> incorrect</li> <li>9. <b>Carburetor jets/fuel injector</b> obstructed</li> <li>10. <b>Float level</b> out of adjustment</li> <li>11. <b>Air cleaner element</b> obstructed</li> <li>12. <b>Oil (in the engine)</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. Adjust clearance</li> <li>2. Replace springs</li> <li>3. Re-time valve gear</li> <li>4. Replace - service rings - cylinder</li> <li>5. Repair seats</li> <li>6. Clean - replace plug</li> <li>7. Replace arms - shafts</li> <li>8. Adjust gap - replace plug</li> <li>9. Clean jets - replace injector</li> <li>10. Adjust float height</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</li> </ol>
Problem: Engine overheats	
Condition	Remedy
<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</b> low - gasoline poor</li> <li>4. <b>Oil pump</b> defective</li> <li>5. <b>Oil circuit</b> obstructed</li> <li>6. <b>Gasoline level (in float chamber)</b> too low</li> <li>7. <b>Intake manifold</b> leaking air</li> <li>8. <b>Coolant level</b> low</li> <li>9. <b>Fan</b> malfunctioning</li> <li>10. <b>Fan switch</b> malfunctioning</li> <li>11. <b>Thermostat</b> stuck - closed</li> <li>12. <b>Radiator hoses - cap</b> damaged - obstructed</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. Clean circuit</li> <li>6. Adjust float height</li> <li>7. Tighten - replace manifold</li> <li>8. Fill - examine system for leaks</li> <li>9. Check fan fuse - replace fan</li> <li>10. Replace fan switch</li> <li>11. Replace thermostat</li> <li>12. Clear obstruction - replace hoses</li> </ol>

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## 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.

### AT THIS POINT

If the technician's objective is to service Top-Side Components, Left-Side Components, or Right-Side Components, the engine/transmission does not have to be removed from the frame.

### AT THIS POINT

If the technician's objective is to service/replace left-side cover oil seals or the oil strainer (from beneath the engine/transmission), the engine/transmission does not have to be removed from the frame.

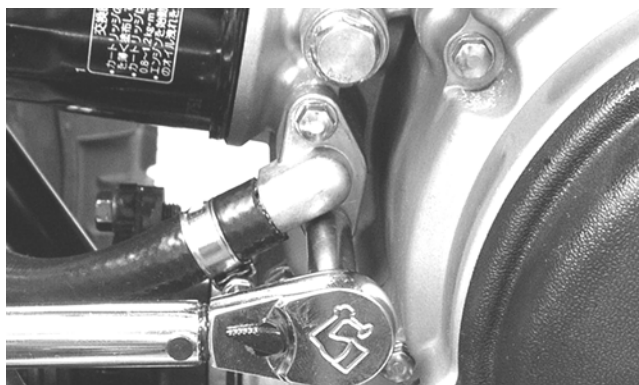
Secure the ATV on a support stand to elevate the wheels.

### **WARNING**

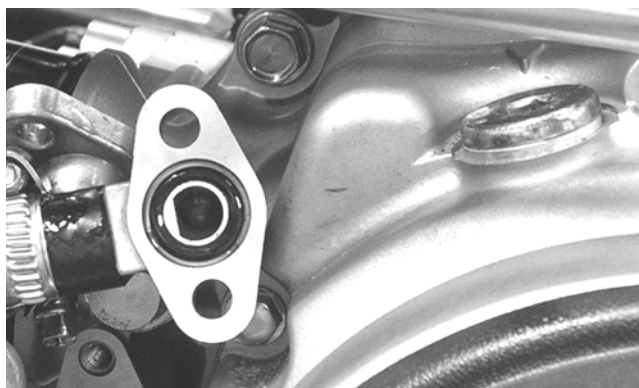
Make sure the ATV is solidly supported on the support stand to avoid injury.

1. Remove the front rack, left and right footwells, and front body panel (see Section 8); then disconnect the negative battery cable from the battery.

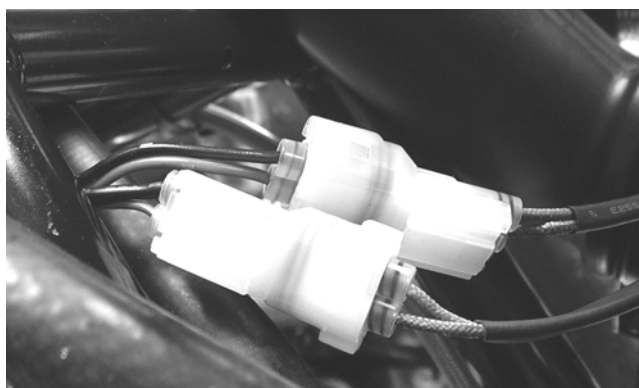
2. Remove the heat shield; then remove the gas tank (see Section 4).
3. Remove the oil fittings from the engine and account for two O-rings; then disconnect the oil temperature connector and cooling fan connector.



KC251

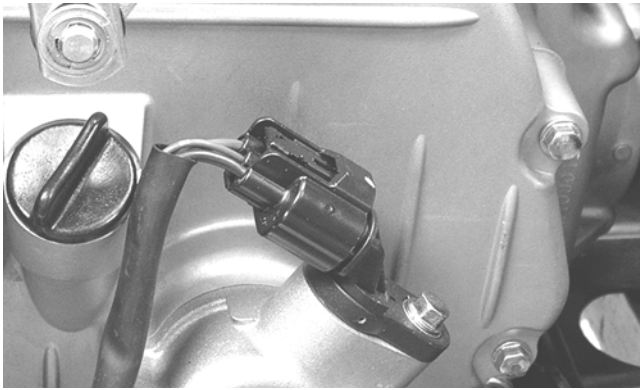


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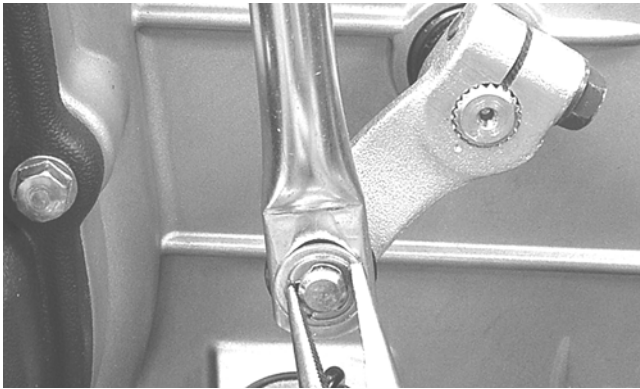


KC249

4. Disconnect the speedometer sensor; then remove the E-clip securing the shift rod to the shift arm and disconnect the shift rod. Account for a bushing and flat washer.

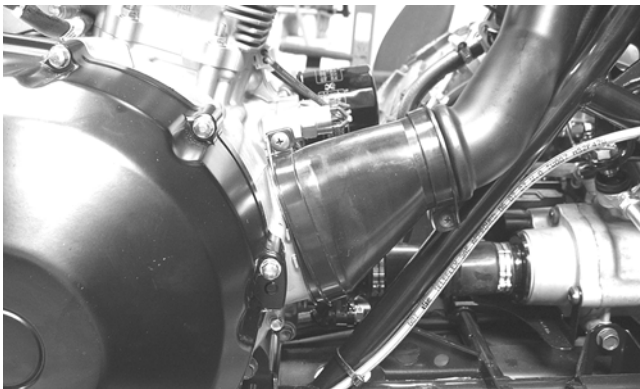


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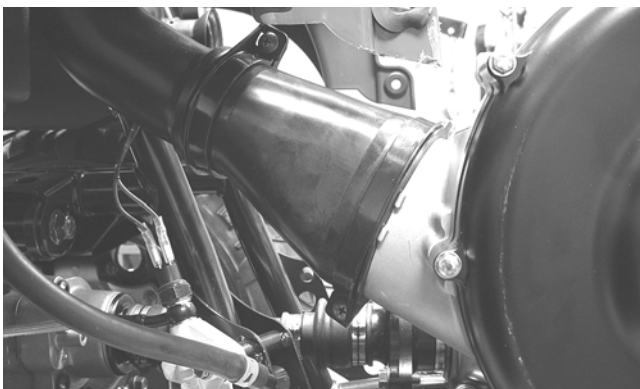


KC255

5. Remove the inlet air duct, air filter housing, and air silencer duct; then remove the carburetor and set aside leaving the throttle cable attached.

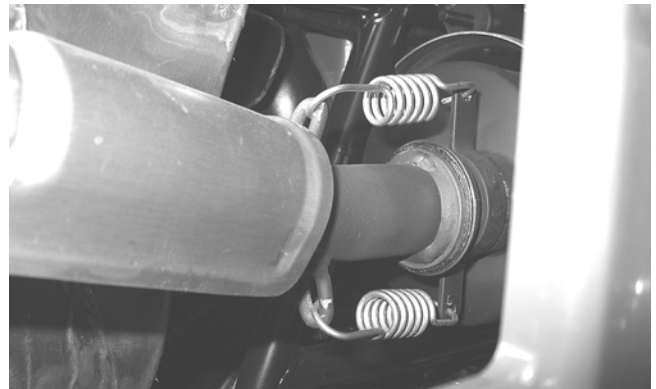


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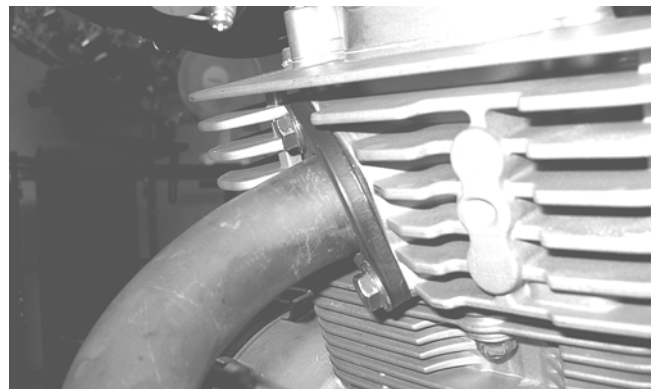


KC236

6. Remove the cap screws securing the exhaust pipe to the cylinder head; then disconnect the exhaust pipe to muffler springs and remove the exhaust pipe. Account for a grafoil seal and seal ring.

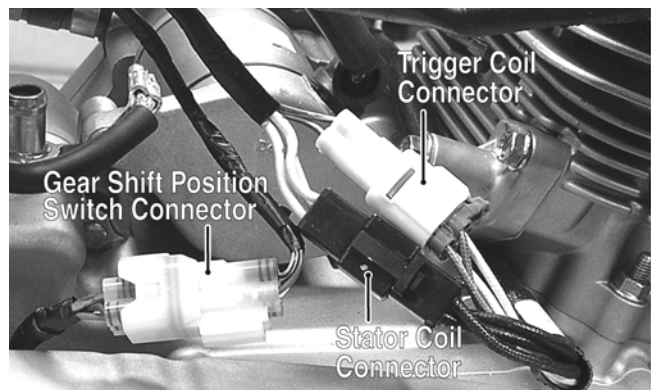


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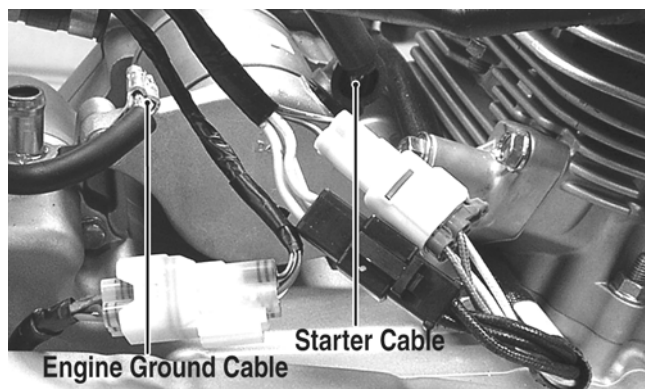
KC238

7. Disconnect the gear shift position switch, starter cable, and engine ground cable; then disconnect the trigger coil and stator coil connectors.

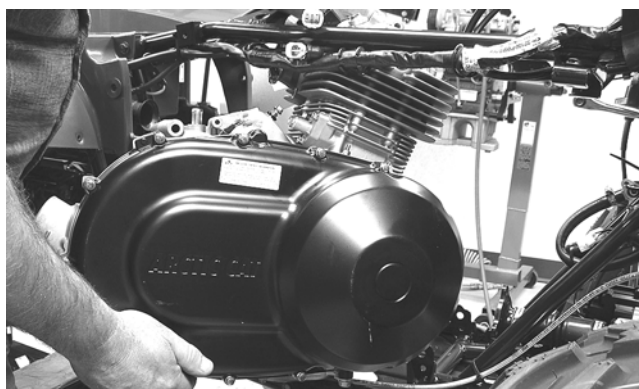


KC228A



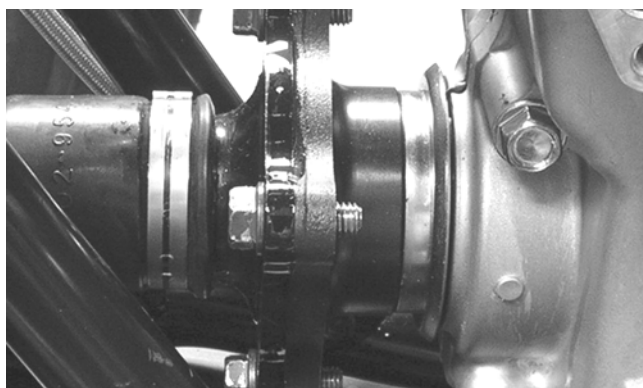


KC228B

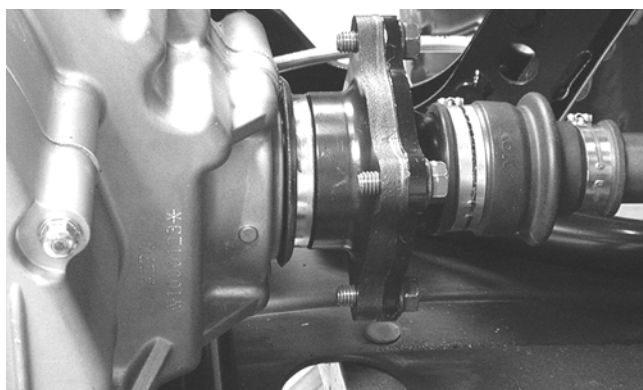


KC216

8. Remove the front and rear V-belt cooling boots from the V-belt housing.
9. Remove the cap screws from the front and rear output flanges; then remove the front and rear engine mounting through-bolts.



KC242



KC243

10. Lift the rear of the engine/transmission and swing to the right; then tilt the assembly sufficiently to remove through the right-side frame opening.

## 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 have to be removed from the frame for this procedure.

## Removing Top-Side Components

### A. Valve Cover/Rocker Arms B. Cylinder Head/Camshaft

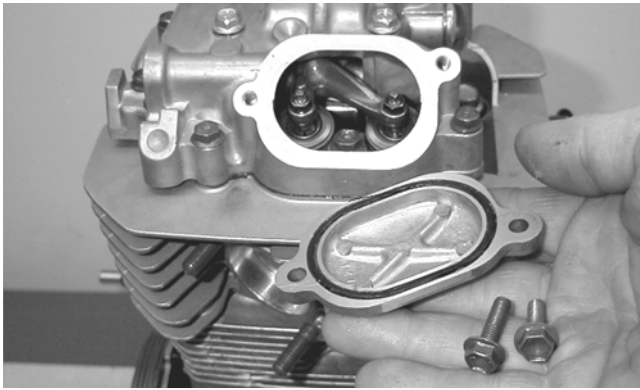
■NOTE: Remove the spark plug, timing inspection plug, and outer magneto cover; then using an appropriate wrench, rotate the crankshaft to top-dead-center of the compression stroke.

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

1. Remove the cap screws securing the two tappet covers. Remove the two tappet covers. Account for the O-rings.

3

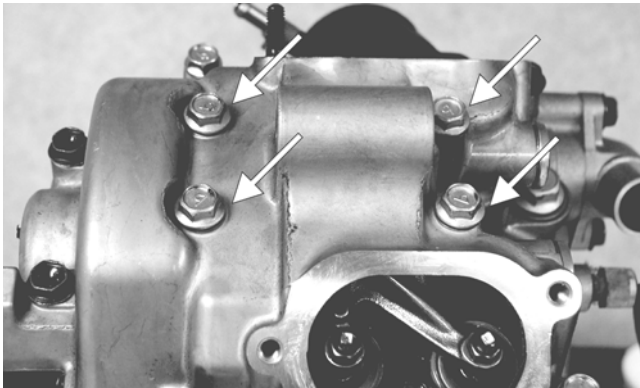




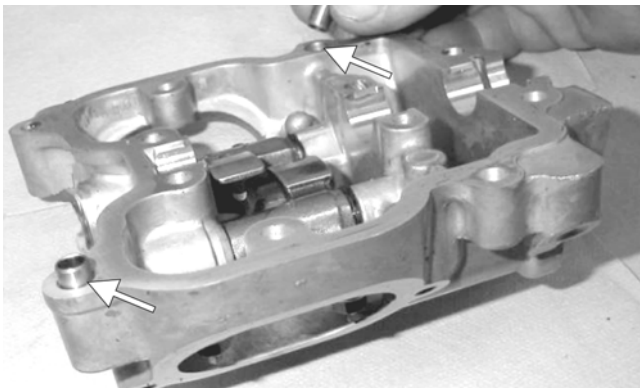
MD1264

■NOTE: Keep the mounting hardware with the covers for assembly purposes.

2. Remove the valve cover cap screws. Note the rubber washers on the four top-side cap screws; remove the valve cover. Note the orientation of the cylinder head plug and remove it. Note the location of the two alignment pins.

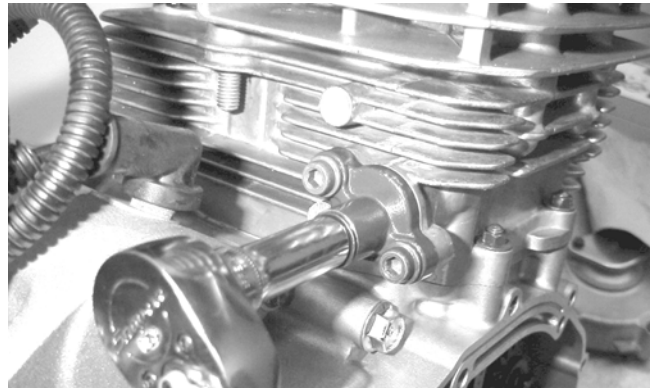


CF007A



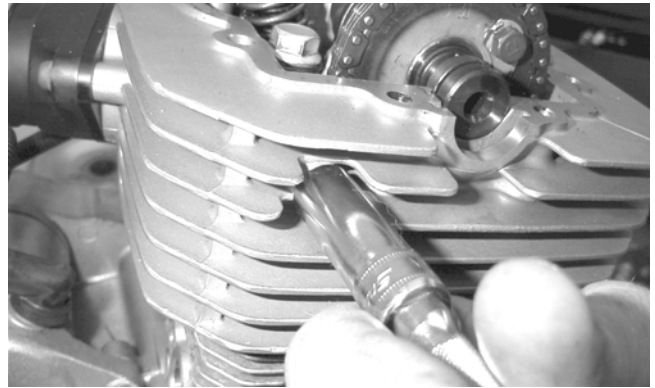
MD1354A

3. Loosen the cap screw on the end of the cam chain tensioner; then remove the two cap screws securing the cam chain tensioner assembly. Remove the tensioner assembly and gasket.



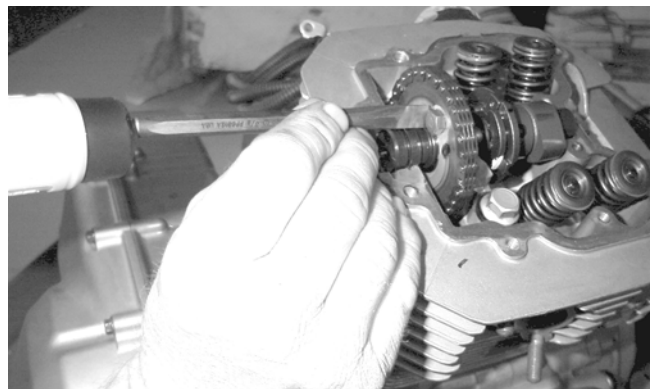
MD1245

4. Remove the cam chain tensioner pivot cap screw and washer.

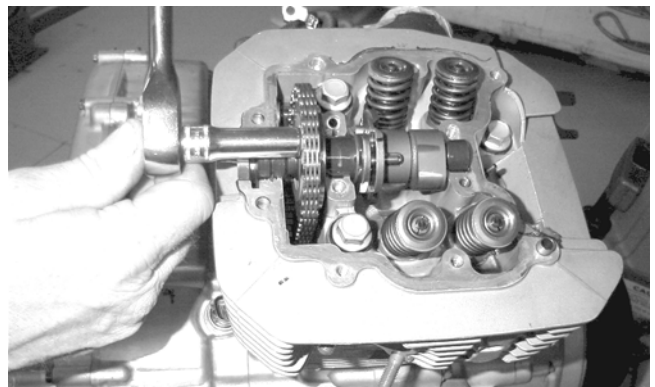


MD1251

5. Bend the washer tabs and remove the two cap screws securing the sprocket to the camshaft.



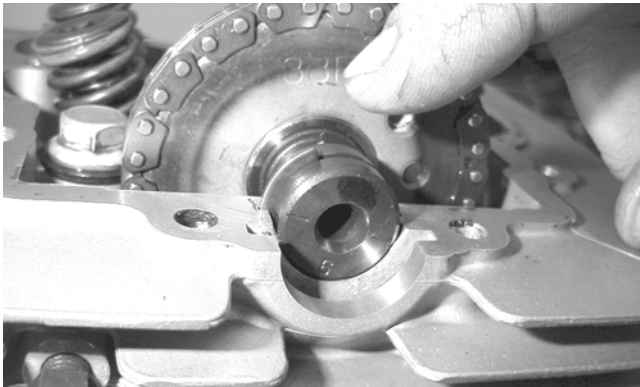
MD1136



MD1137

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

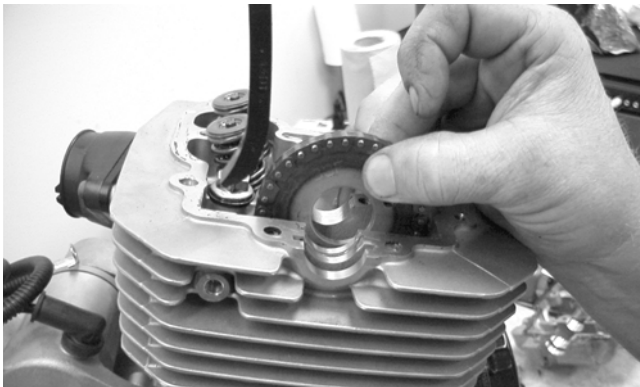
■NOTE: Care should be taken not to drop the C-ring down into the crankcase.



MD1131

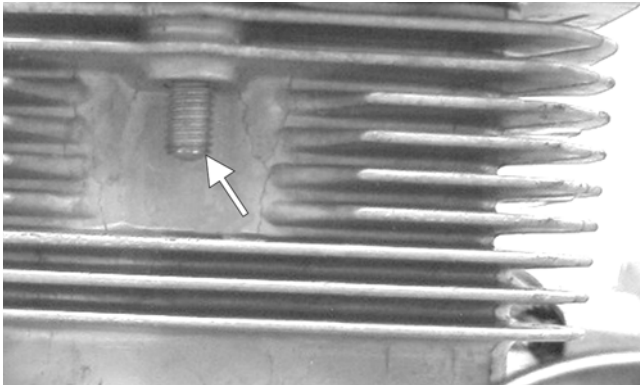
7. Noting the timing marks for installing purposes, drop the sprocket off the camshaft. While holding the cam chain, slide the sprocket and camshaft out of the cylinder head. Account for an alignment pin.

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



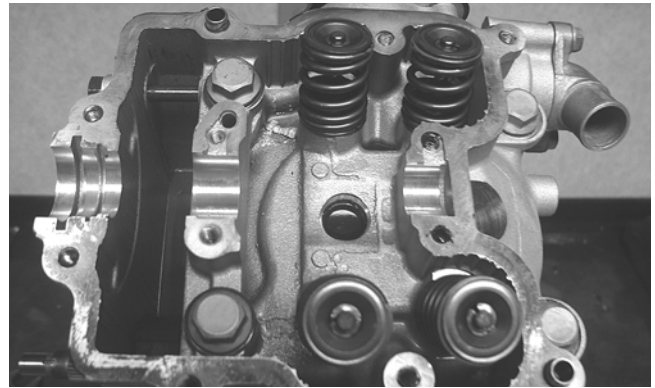
MD1132

8. Remove the cam chain tensioner by lifting it from the chain cavity; then remove the two lower nuts securing the cylinder head to the cylinder, one in front and one in rear.



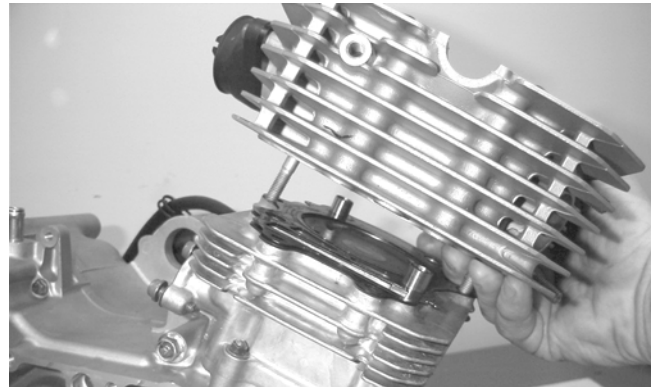
MD1192

9. Remove the four cylinder head cap screws and washers. Note that the two cap screws on the right side of the cylinder head nearest the cam sprocket are longer than the two cap screws on the left (spark plug) side.



CD211

10. Remove the cylinder head from the cylinder, remove the gasket, and account for two alignment pins.



MD1163

### ➡ AT THIS POINT

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

11. Remove the cam chain guide.

### ➡ AT THIS POINT

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



MD1173

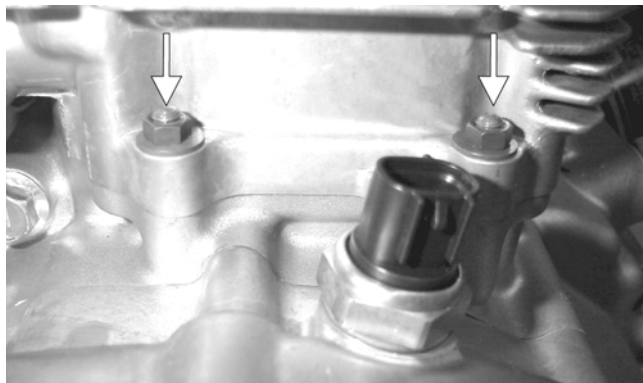


## C. Cylinder

## D. Piston

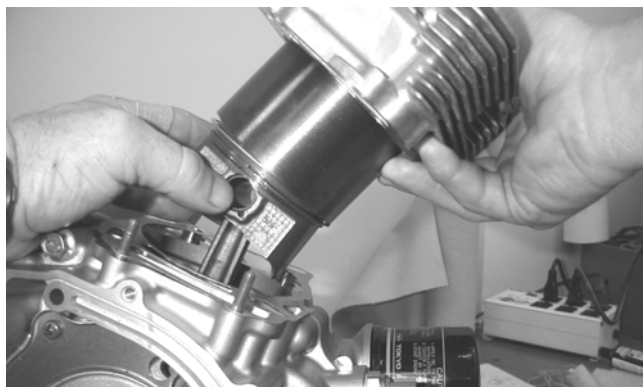
■NOTE: Steps 1-11 in the preceding sub-section must precede this procedure.

12. Remove the two nuts securing the right side of the cylinder to the right-side crankcase half.



MD1226A

13. 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.



MD1214

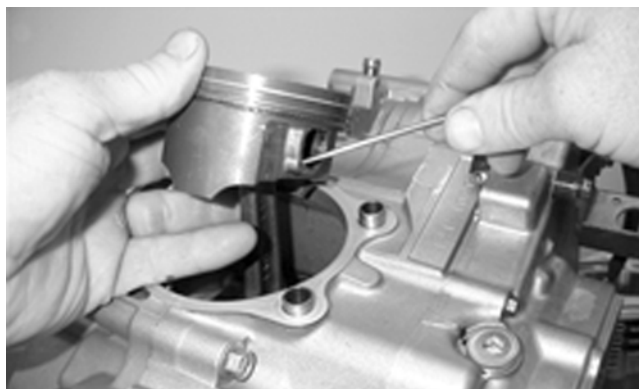
### ⚠ AT THIS POINT

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.

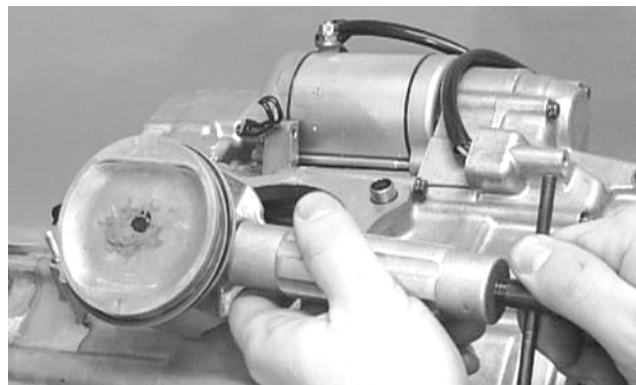
14. Using an awl, remove one piston-pin circlip. Take care not to drop it into the crankcase.



MD1213

15. Using 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.



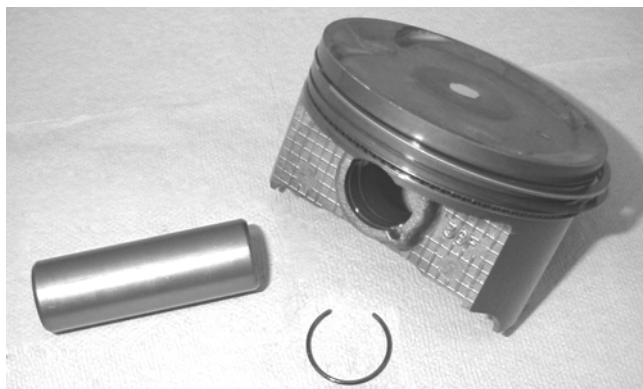
MD1219

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

### ⚠ 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.

■NOTE: If the existing rings will not be replaced with new rings, note the location of each ring for proper installation. When replacing with new rings, replace as a complete set only. If the piston rings must be removed, remove them in this sequence.



MD1211

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

#### 👉 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

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

### 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

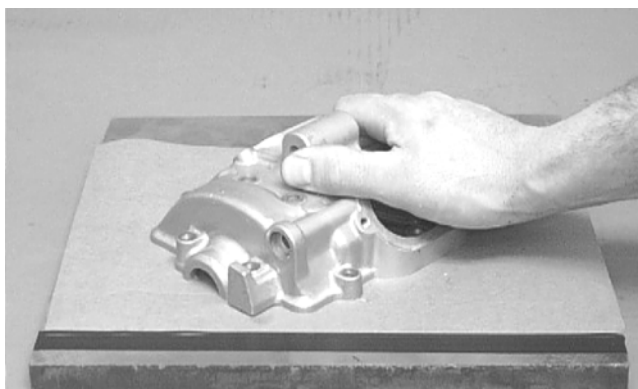
■NOTE: If the valve cover cannot be trued, the cylinder head assembly must be replaced.

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: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

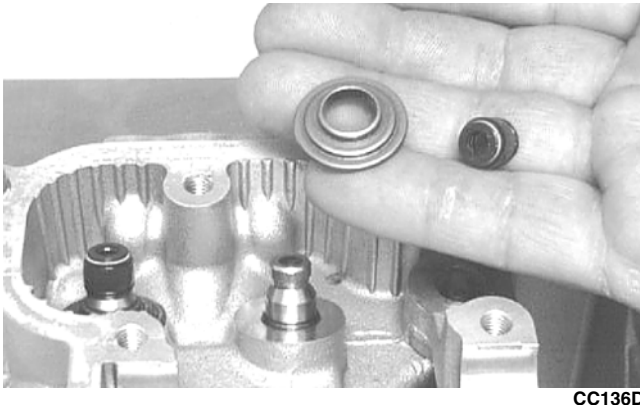
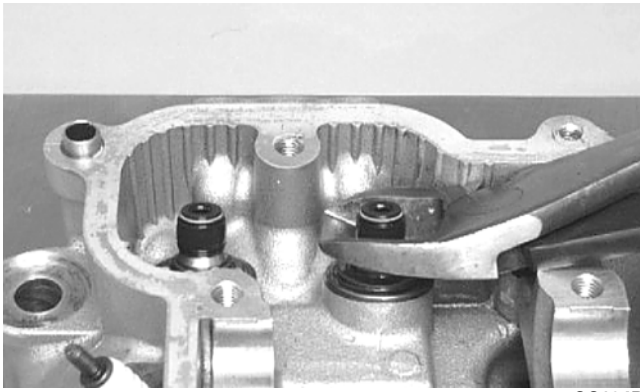
1. Using a valve spring compressor, compress the valve springs and remove the valve keepers. Account for an upper spring retainer.



CC994

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



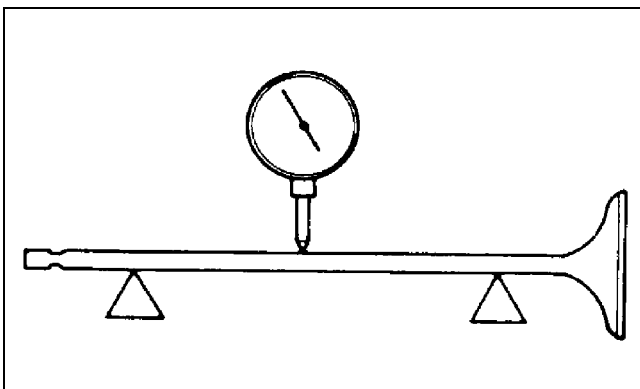


■NOTE: The valve seals must be replaced.

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

### Measuring Valve Stem Runout

1. Support each valve stem end with the V Blocks; then check the valve stem runout using a dial indicator.



2. Maximum runout must not exceed specifications.

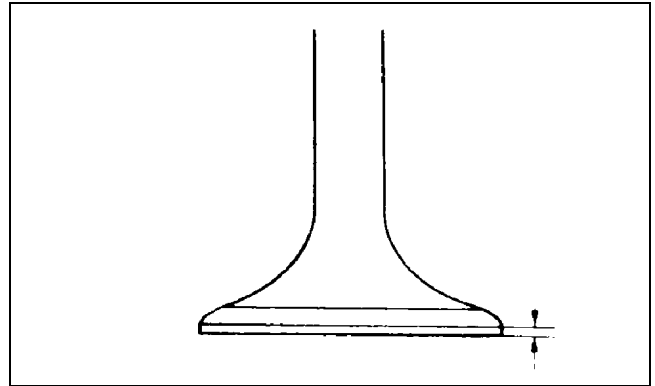
### Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) must be within specifications.

3. Acceptable diameter range (exhaust valve) must be within specifications.

### Measuring Valve Face/Seat Width

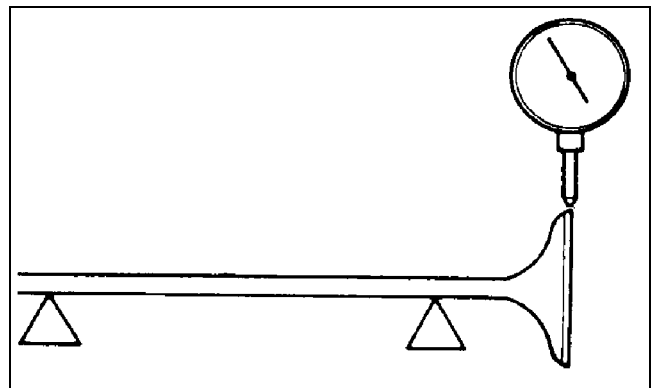
1. Using a micrometer, measure the width of the valve face.



2. Acceptable width must be at or above specifications.

### Measuring Valve Face Radial Runout

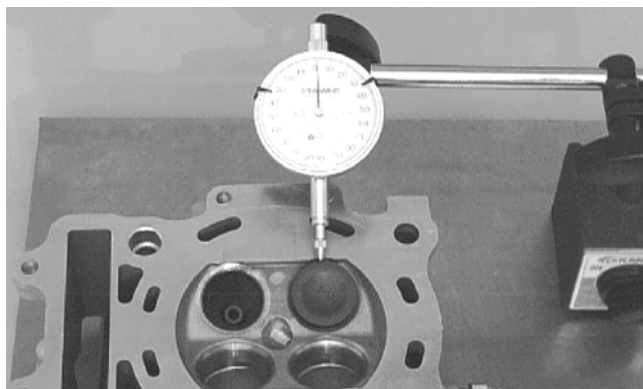
1. Mount a dial indicator on the surface plate; then place the valve stem on a set of V blocks.
2. Position the dial indicator contact point on the outside edge of the valve face; then zero the indicator.



3. Rotate the valve in the V blocks.
4. Maximum runout must not exceed specifications.

### Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

1. Mount a dial indicator and base on the surface plate; then place the cylinder head on the surface plate.
2. Install the valve into the cylinder head; then position the dial indicator contact point against the outside edge of the valve face. Zero the indicator.



CC131D

3. Push the valve from side to side; then from top to bottom.
4. Maximum “wobble” deflection must not exceed specifications.

### Measuring Valve Guide (Inside Diameter)

1. Insert a snap gauge 1/2 way down into each valve guide bore; then remove the gauge and measure it with a micrometer.
2. Acceptable inside diameter range must be within specifications.
3. If a valve guide is out of tolerance, the cylinder head must be replaced.

### Servicing Valves/Valve Guides/Valve Seats

If valves, valve guides, or valve seats require servicing or replacement, Arctic Cat recommends that 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.

### Measuring Rocker Arm (Inside Diameter)

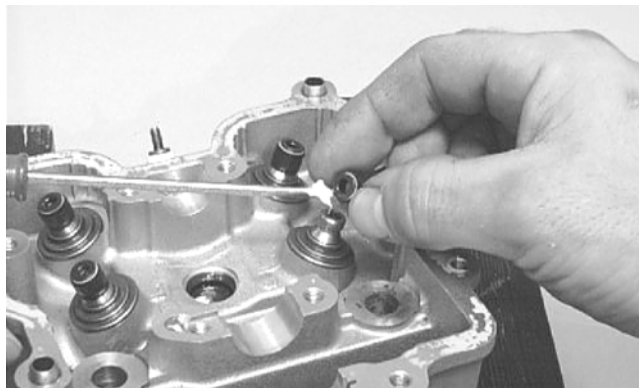
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range must be within specifications.

### Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range must be within specifications.

### 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.

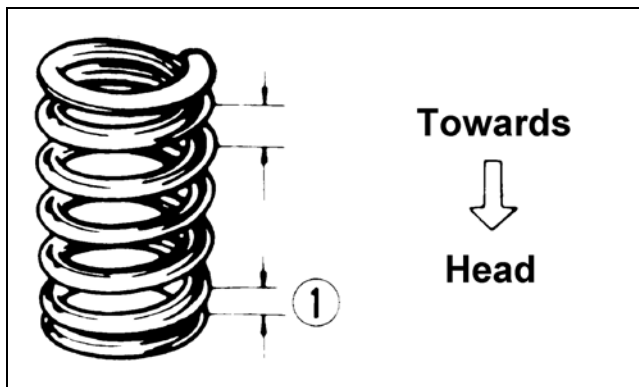


CC144D

2. Insert each valve into its original valve 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.

3



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 keepers.



CC994

## PISTON ASSEMBLY

■NOTE: Whenever a piston, rings, or pin are out of tolerance, they must be replaced.

### Cleaning/Inspecting Piston

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the top of the piston.
2. Inspect the piston for cracks in the piston pin, boss, top, and skirt areas.
3. Inspect the piston for seizure marks or scuffing. If piston is scored or galled, replace it with a new one.
4. Inspect the perimeter of each piston for signs of "blowby" indicated by dark discoloration. "Blowby" is caused by worn piston rings, excessive carbon in ring grooves, or an out-of-round cylinder.

### Removing Piston Rings

1. Starting with the top ring, slide one end of the ring out of the ring-groove.



CC400D

2. Remove each ring by working it toward the top of the piston while rotating it out of the groove.

■NOTE: If the existing rings will not be replaced with new ones, note the location of each ring for proper installation. When installing new rings, install as a complete set only.

### Cleaning/Inspecting Piston Rings

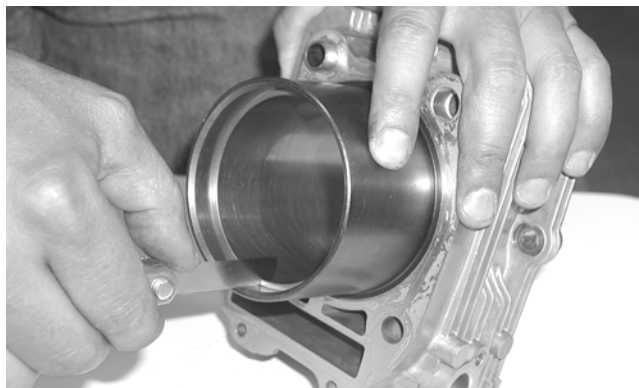
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring grooves. Be sure to position the ring with its tapered side up.

#### ⚠ CAUTION

Improper cleaning of the ring grooves by the use of the wrong type of ring groove cleaner will result in severe damage to the piston.

### Measuring Piston-Ring End Gap (Installed)

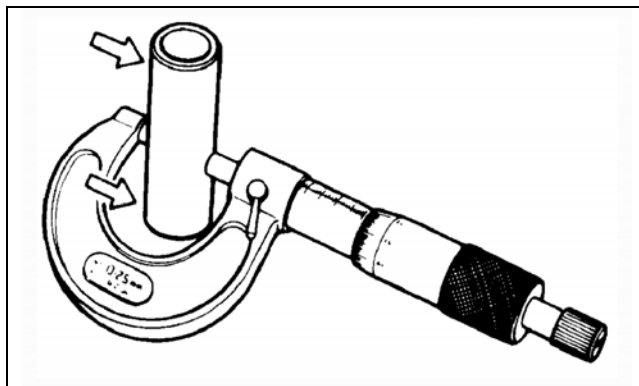
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within specifications.



CC995

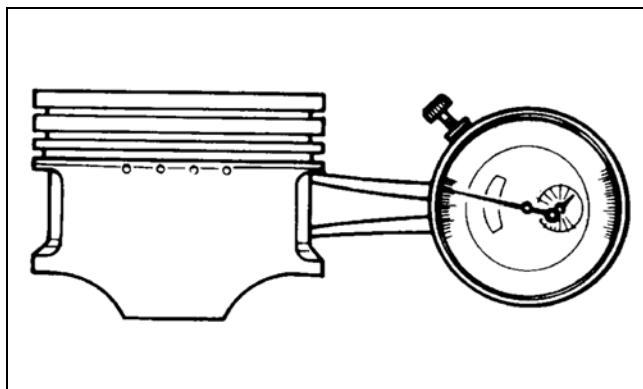
### Measuring Piston Pin, Connecting Rod Small End, and Piston-Pin Bore

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

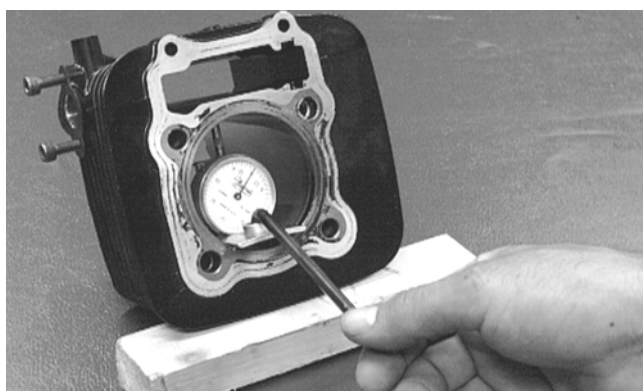
2. Inspect and measure the connecting rod small end. If the measurement exceeds specifications, the connecting rod must be replaced (see Center Crankcase Components in this section).
3. Insert an inside dial indicator into the piston-pin bore. Take two measurements to ensure accuracy. The diameter must not exceed specifications. If the diameter exceeds specifications, the piston must be replaced.



ATV-1069

## Measuring Piston Skirt/ Cylinder Clearance

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



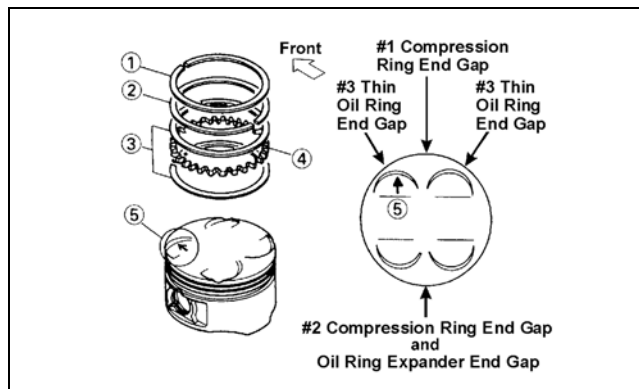
CC397D

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 measurement in step 1. The difference (clearance) must be within specifications.

## Installing Piston Rings

1. Install ring expander (4) in the bottom groove of the piston; then install the thin oil rings (3) over the expander making sure the expander ends do not overlap. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■NOTE: Note the direction of the exhaust side of the piston (5) for correct ring end gap orientation.

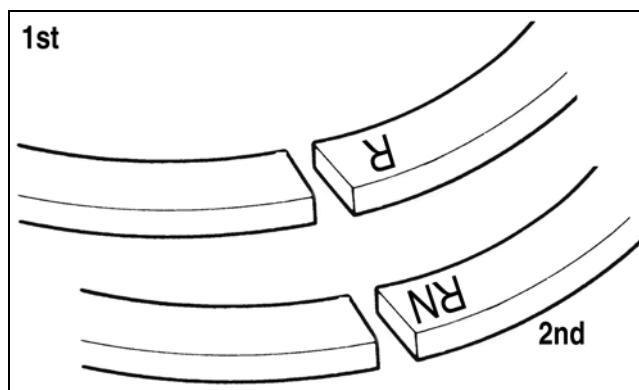


ATV-1085B

2. Install the compression rings (1 and 2) so the letter(s) on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring end gaps are on directly opposite sides of the piston according to the illustration.

■NOTE: The chrome (silver) ring should be installed in the top position.

3



MD1343A

### CAUTION

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

## CYLINDER/CYLINDER HEAD ASSEMBLY

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

## Cleaning/Inspecting Cylinder Head

### CAUTION

The cylinder head studs must be removed for this procedure.

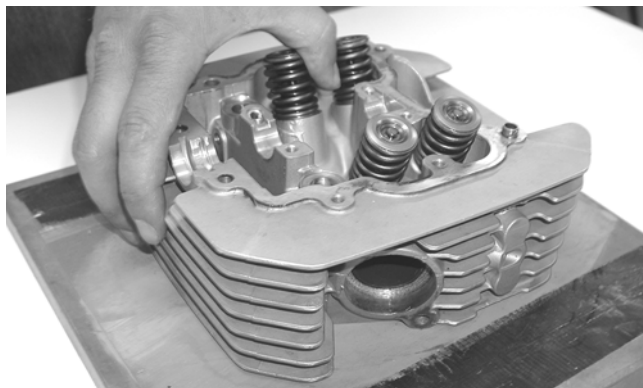
1. Using a non-metallic carbon removal tool, remove any carbon buildup from the combustion chamber being careful not to nick, scrape, or damage the combustion chamber or the sealing surface.
2. Inspect the spark plug hole for any damaged threads. Repair damaged threads using a "heli-coil" insert.



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.



CC996

## 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 factor between the head and the straightedge.
3. Maximum distortion must not exceed specifications.



CC141D

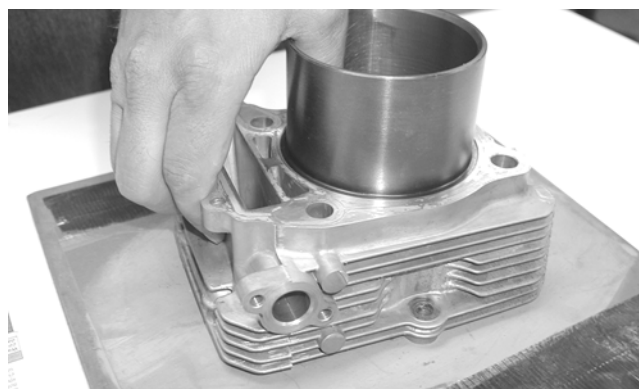
## Cleaning/Inspecting Cylinder

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 Honing 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.



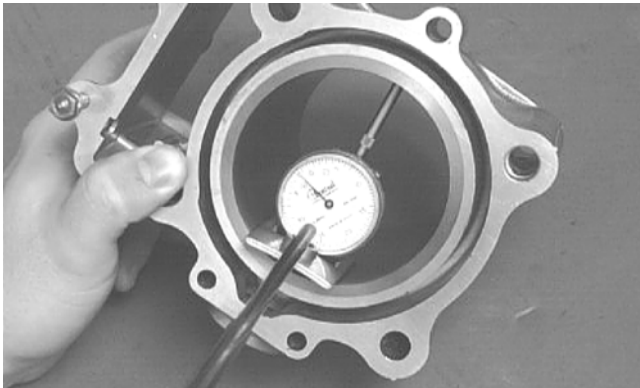
CC997

## 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.

## Honing Cylinder

1. 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

2. Wash the cylinder in parts-cleaning solvent.
3. 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.



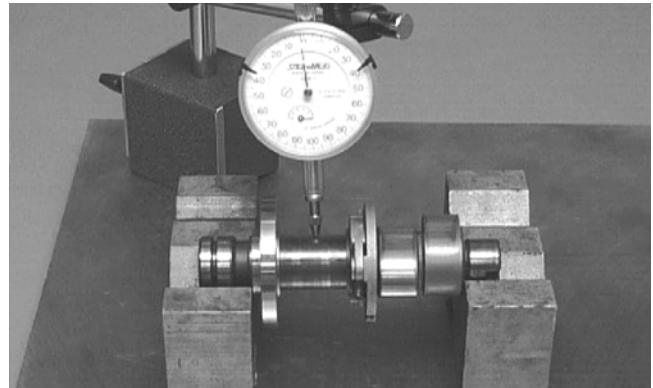
CC390D

4. If any measurement exceeds the limit, bore the cylinder and 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.

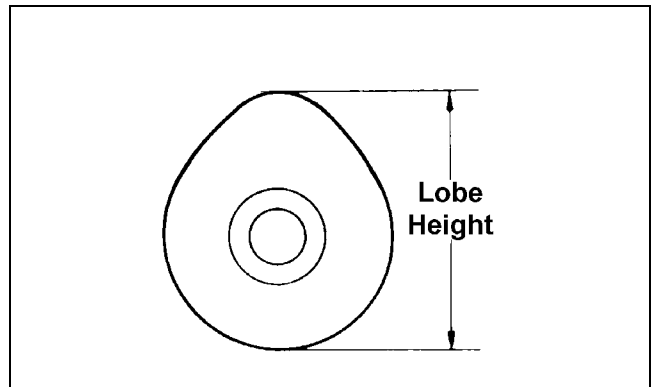


CC283D

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

### Measuring Camshaft Lobe Height

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



ATV1013A

2. The lobe heights must not exceed minimum specifications.

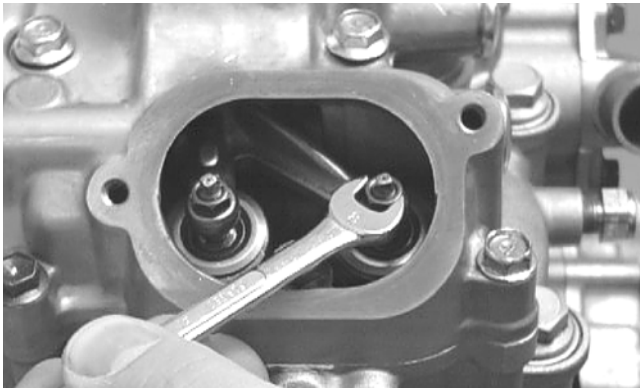
### Inspecting Camshaft Bearing Journal

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.

### Measuring Camshaft to Cylinder Head Clearance

1. Loosen the jam nuts and adjuster screws.

3

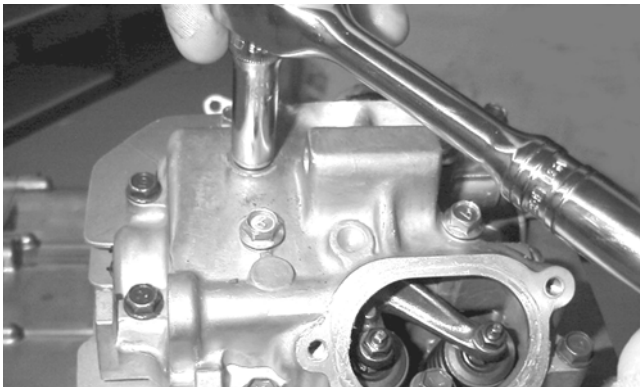


CC005D

2. Place a strip of plasti-gauge in each of the camshaft lands in the cylinder head.
3. Place the valve cover on the cylinder head and secure with the valve cover cap screws. Tighten securely.

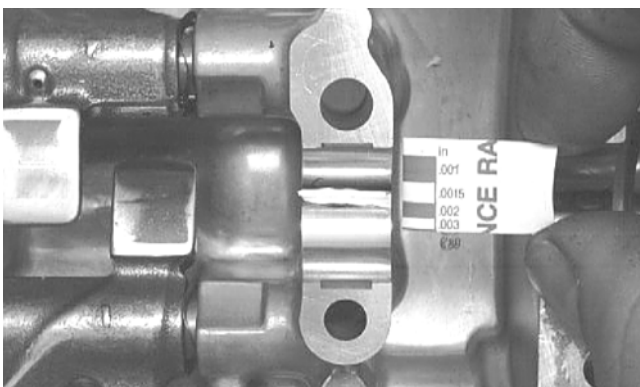
■NOTE: Do not rotate the camshaft when measuring clearance.

4. Remove the cap screws securing the valve cover to the cylinder; then remove the valve cover and camshaft.



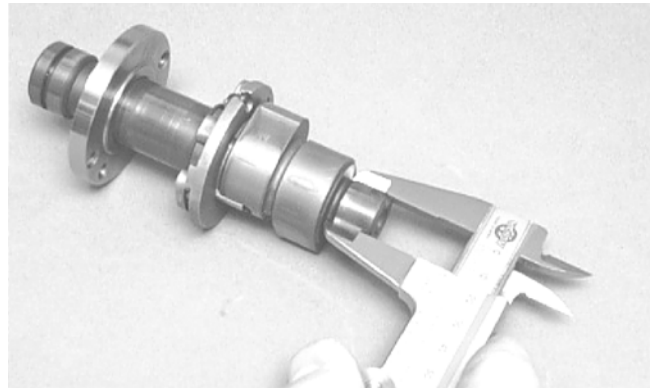
MD1261

5. Match the width of the plasti-gauge with the chart found on the plasti-gauge packaging to determine camshaft to cylinder head and valve cover clearance.



CC145D

6. If clearance is excessive, measure the journals of the camshaft.

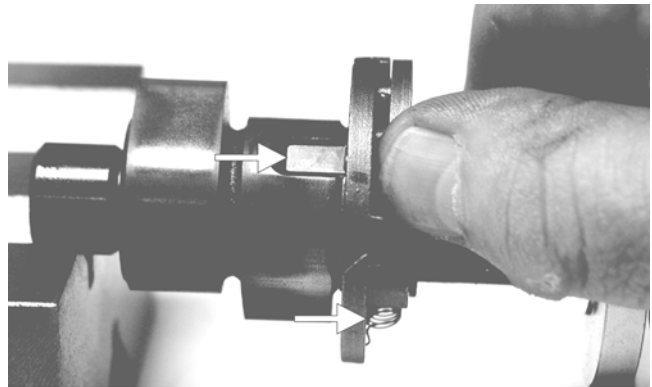


CC287D

■NOTE: If the journals are worn, replace the camshaft; then measure the clearance again. If it is still out of tolerance, replace the cylinder head.

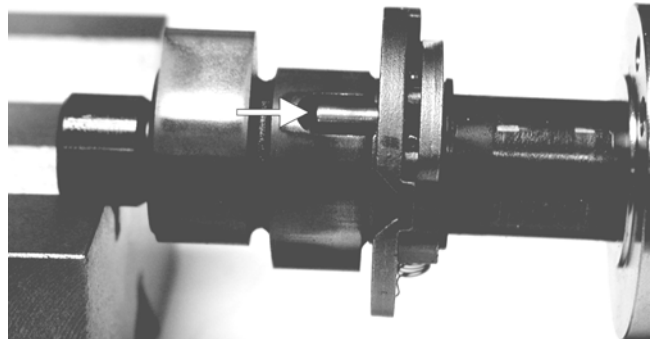
### Inspecting Camshaft Spring/Drive Pin

1. Inspect the spring and unloader pin for damage.



CF061A

■NOTE: With the weight extended, the unloader pin should be flat-side out; with the weight retracted, the unloader pin should be round-side out.



CF060A

2. If damaged, the camshaft must be replaced.



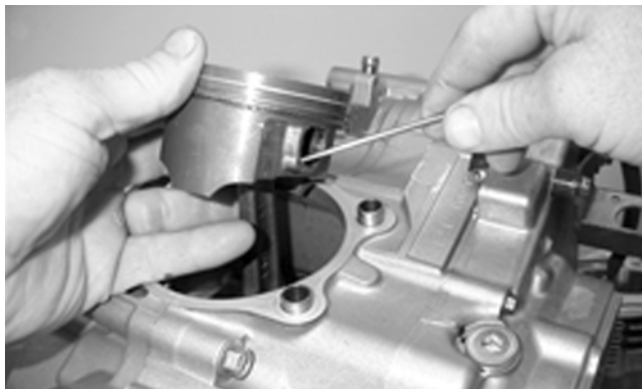
## Installing Top-Side Components

### A. Piston

### B. Cylinder

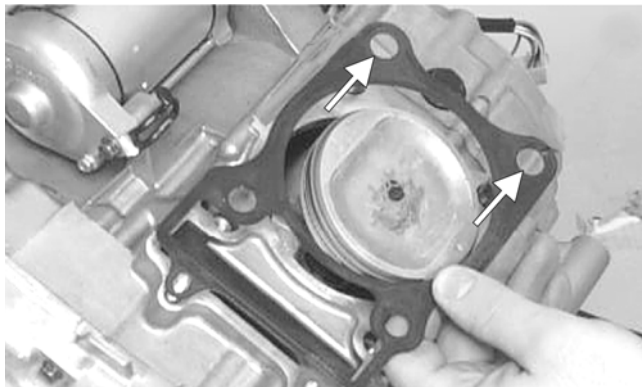
1. Lubricate the piston pin, connecting rod, and piston pin bore with motor oil; then install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip is directed upwards or downwards.

■NOTE: The piston should be installed so the arrow points towards the exhaust.



MD1213

2. Place the two alignment pins into position. Place a new cylinder gasket into position; then place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase.

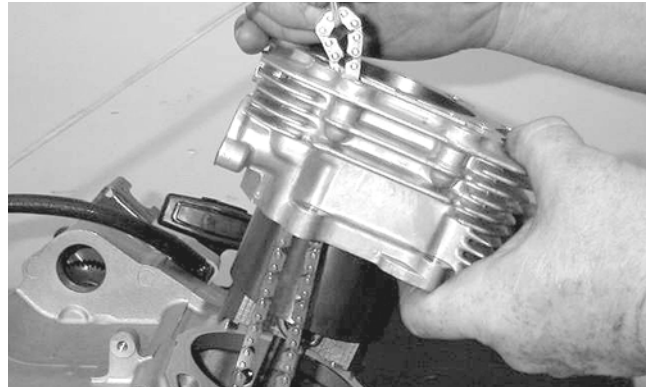


MD1344

3. Lubricate the inside wall of the cylinder; then using a ring compressor or the fingers, 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.

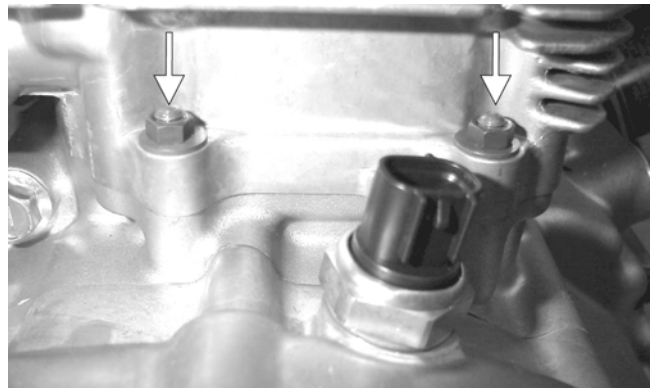


MD1345

4. Loosely install the two nuts securing the cylinder to the right-side crankcase half.

■NOTE: The two cylinder-to-crankcase nuts will be tightened in step 9.

3



MD1226A

### C. Cylinder Head/Camshaft

### D. Valve Cover/Rocker Arms

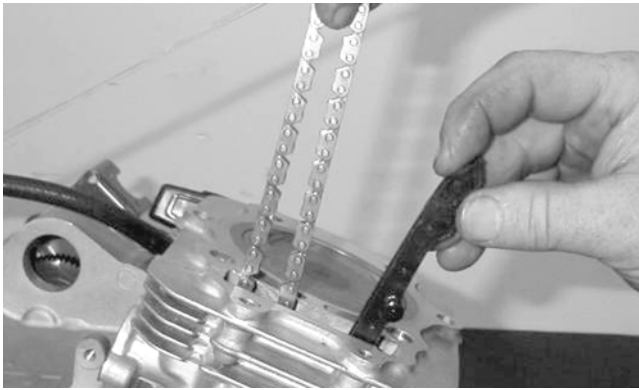
■NOTE: Steps 1-4 in the preceding sub-section must precede this procedure.

5. While keeping tension on the cam chain, place the front cam chain guide into the cylinder.

### ⚠ CAUTION

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



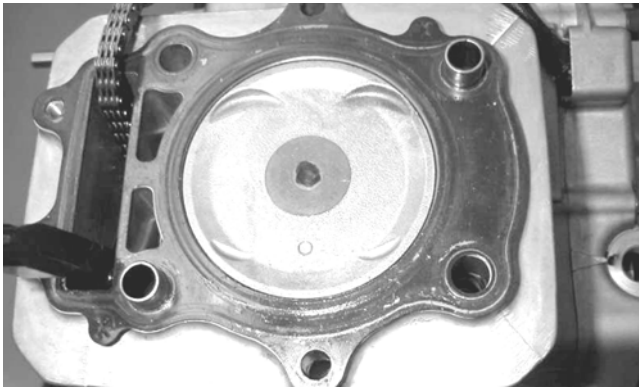


MD1349

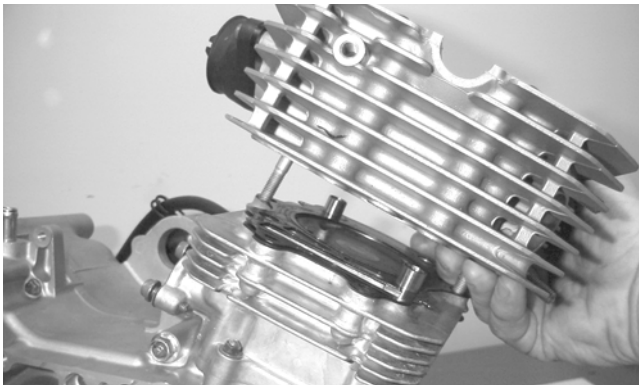
6. Place a new gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder making sure the cam chain is routed through the chain cavity.

**CAUTION**

Keep tension on the cam chain to avoid damaging the crankcase boss.

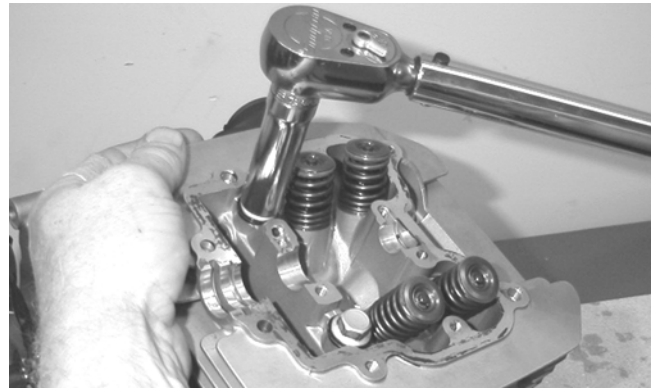


MD1347



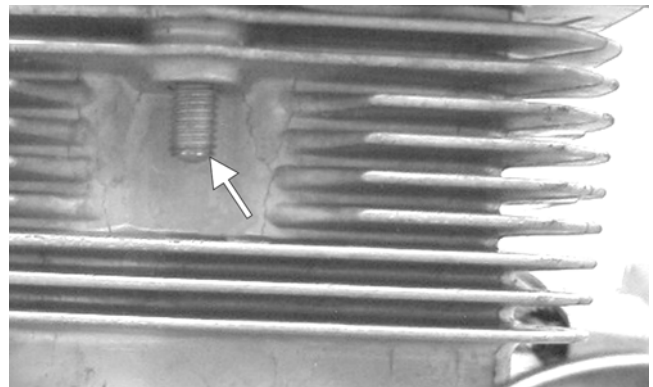
MD1163

7. Install the four cylinder head cap screws with washers. Note that the two cap screws on the right side of the cylinder head nearest the cam sprocket are longer than the two cap screws on the left (spark plug) side. Tighten only until snug.



MD1270

8. Install the two lower nuts securing the cylinder head to the cylinder, one in front and one in rear.



MD1192

9. In a crisscross pattern, tighten the four cylinder head cap screws (from step 7) to 28 ft-lb. Tighten the two lower cylinder head nuts (from step 8) to 20 ft-lb and the cylinder-to-crankcase nuts (from step 4) to 8 ft-lb.
10. With the timing inspection plug removed and the cam chain held tight, rotate the crankshaft until the piston is at top-dead-center.
11. While holding the cam chain sprocket to the side, install the rear cam chain tensioner guide into the cylinder head. Install the pivot cap screw and washer.

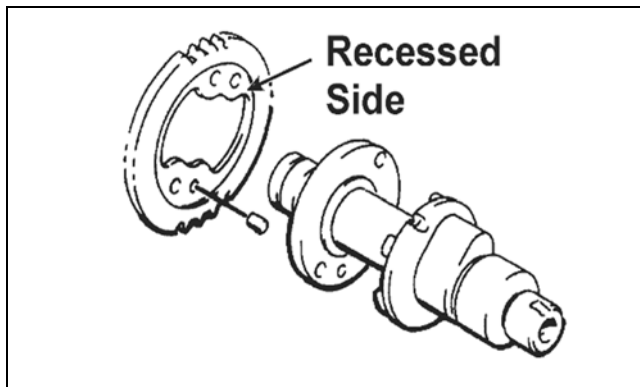


CD383

12. With the alignment pin installed in the camshaft and the cam lobes directed down (toward the piston), place the camshaft in position and verify that the timing mark on the magneto is visible through the inspection plug and that the timing marks on the camshaft sprocket are parallel with the valve cover mating surface.

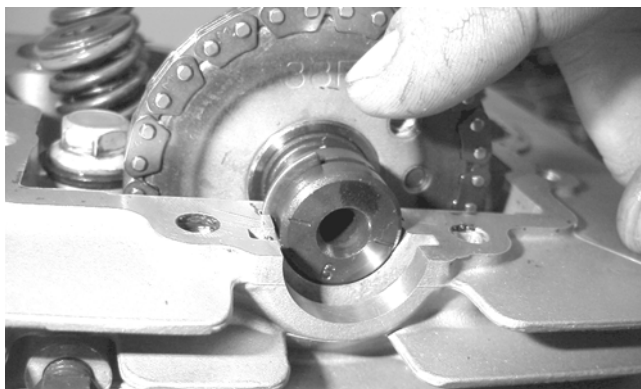
■**NOTE:** When the camshaft assembly is seated, make sure the alignment pin in the camshaft aligns with the smallest hole in the sprocket.

13. With the alignment pin installed in the camshaft, loosely place the cam sprocket (with the recessed side facing the camshaft lobes) onto the camshaft and place it into position with the cam chain over the sprocket.



MD1359

14. Place the C-ring into position in its groove in the cylinder head.



MD1131

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

■**NOTE:** Note the position of the alignment marks on the end of the camshaft. They must be parallel with the valve cover mating surface. If rotating the camshaft is necessary for alignment, do not allow the chain and sprocket to rotate and be sure the cam lobes end up in the down position.

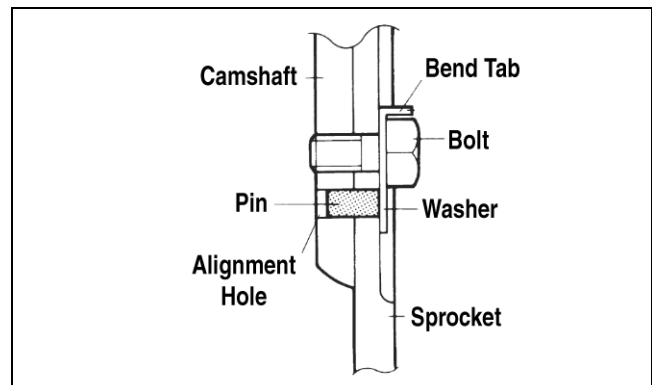
15. When the camshaft assembly is seated, ensure the following.

- 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 13 and carefully proceed.

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

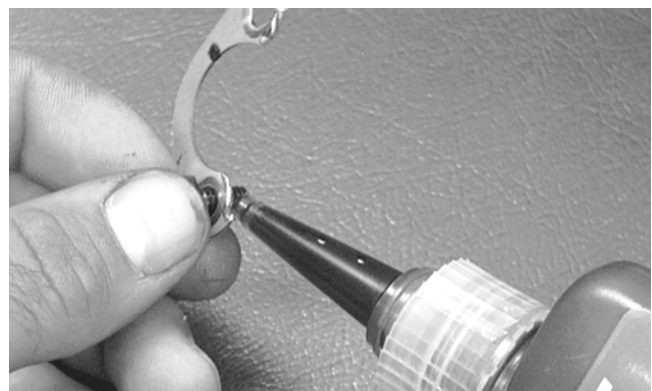


MD1363

### ⚠ CAUTION

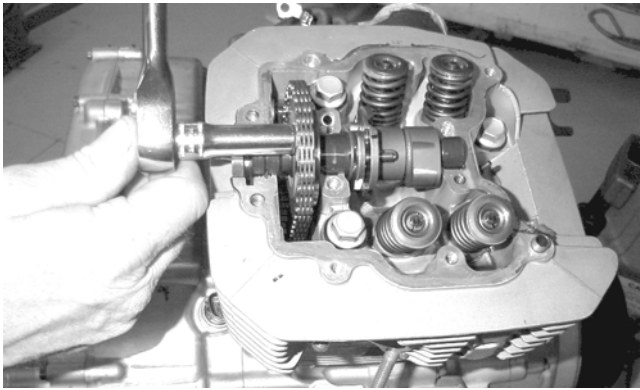
Care must be taken that the tab washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.

17. Apply red Loctite #271 to the first cap screw securing the sprocket and tab washer to the camshaft; then install the cap screw and tab washer. Tighten cap screw only until snug.



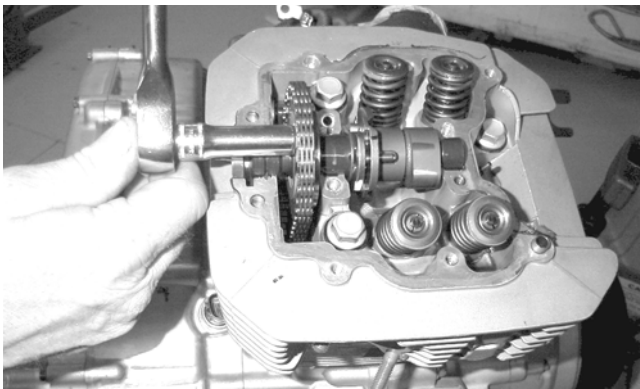
CC404D





MD1137

18. 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). Tighten to 11 ft-lb; then bend the tab to secure the cap screw.



MD1137

19. Rotate the crankshaft until the first cap screw (from step 17) securing the sprocket to the camshaft can be addressed; then tighten to 11 ft-lb. Bend the tab to secure the cap screw.
20. Install the cylinder head plug with the cupped end facing the camshaft and the opening directed downwards.
21. Remove the cap screw from the end of the chain tensioner. Account for the plunger, spring, and gasket.



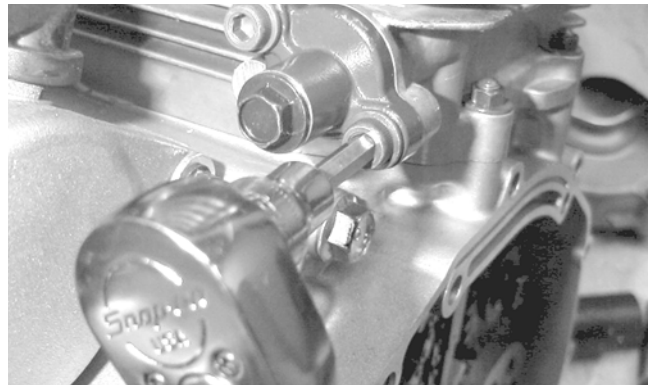
MD1248

22. Depress the spring-loaded lock and push the plunger into the tensioner.



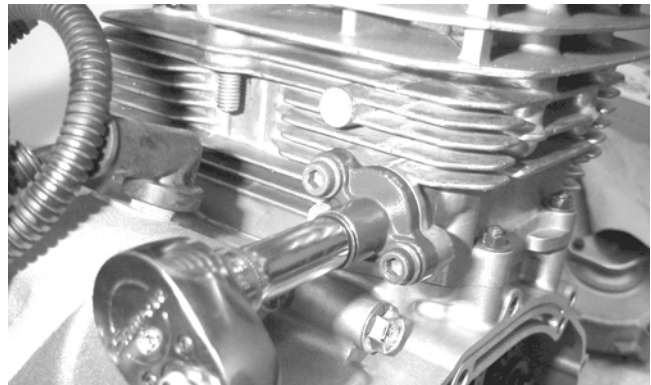
MD1146

23. Place the cam chain tensioner assembly and gasket into the cylinder making sure the ratchet side is facing toward the top of the cylinder and secure with the two cap screws.



MD1254

24. Install the cap screw and spring into the end of the cam chain tensioner. Tighten securely.

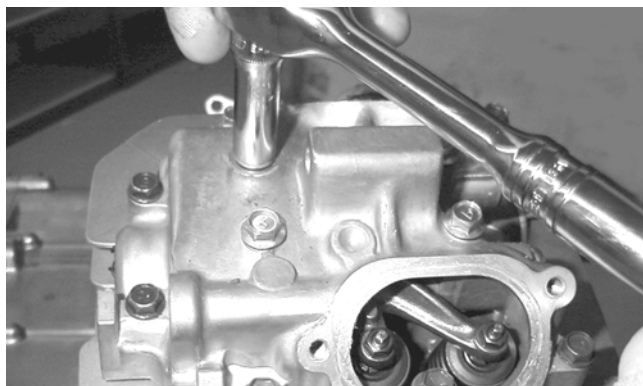


MD1245

25. Loosen the adjuster screw jam nuts; then loosen the adjuster screws on the rocker arms in the valve cover.
26. Apply a thin coat of Three Bond Sealant to the mating surface of the valve cover; then place the valve cover into position. Note that the two alignment pins are properly positioned.

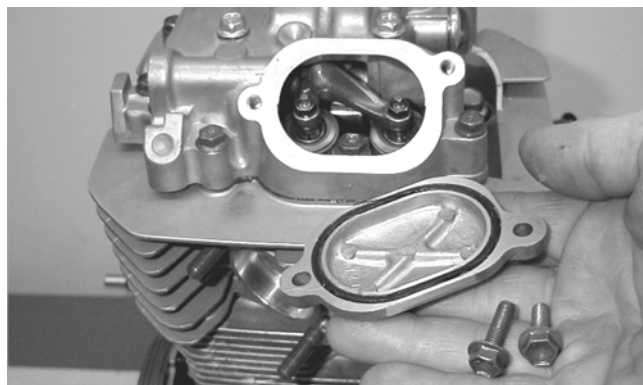
■NOTE: At this point, the rocker arms and adjuster screws must not have pressure on them.

27. Install the four top-side cap screws with rubber washers; then install the remaining cap screws. Tighten only until snug.



MD1261

28. In a crisscross pattern starting from the center and working outward, tighten the cap screws (from step 27) to 8 ft-lb.
29. Adjust valve/tappet clearance (see Section 2).
30. Place the two tappet covers with O-rings into position; then install and tighten the cap screws securely.



MD1264

31. Install the spark plug and tighten securely; then install the timing inspection plug.

## 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

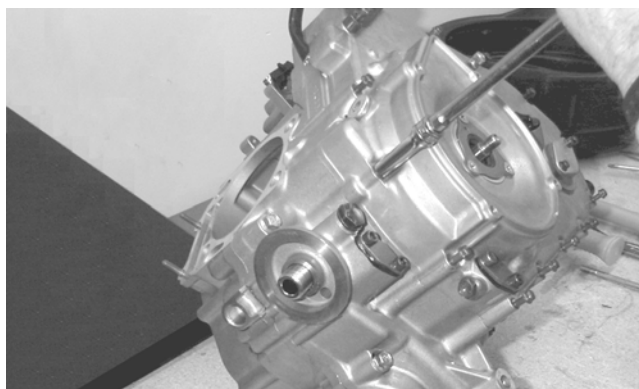
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

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

## Removing Left-Side Components

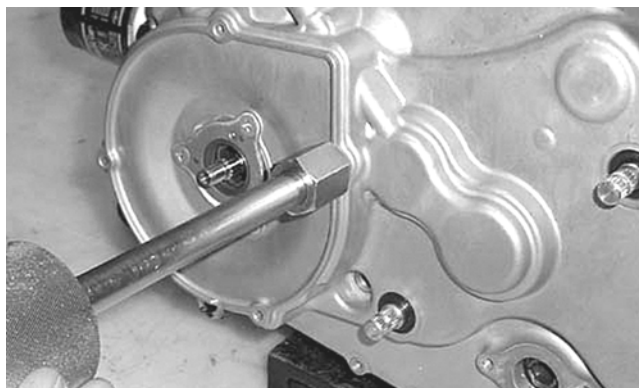
### A. Cover/Stator Assembly

1. Remove the cap screws securing the outer magneto cover and remove the cover.
2. Remove the left-side cover-to-crankcase mounting cap screws noting the location of the 8 mm cap screw with the washer near the middle of the left-side cover. Keep the different-lengthed 6 mm cap screws in order for installing purposes.



MD1186

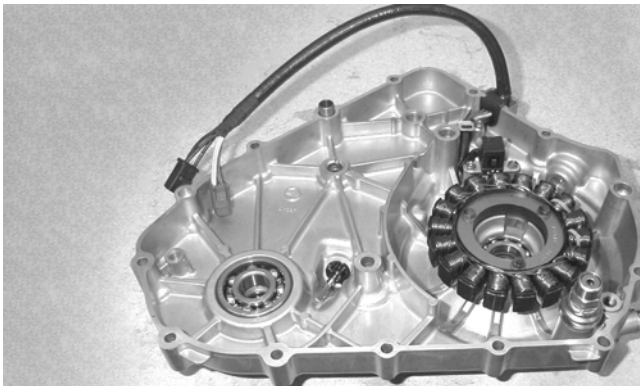
3. Using Side Case Puller and the 6 mm adapter, remove the left-side cover w/stator assembly. Account for the two alignment pins and the position of the shifter bracket for installing purposes.



CC946

3





MD1188

■NOTE: Inspect the inside of the left-side cover for any shaft washers that may have come off with the cover. Make sure they are returned to their respective shafts and that the starter idler gear spacer is on the shaft or in the cover.

## B. Rotor/Flywheel C. Starter Motor

■NOTE: Steps 1-3 in the preceding sub-section must precede this procedure.

4. Remove the rotor/flywheel nut.



MD1194

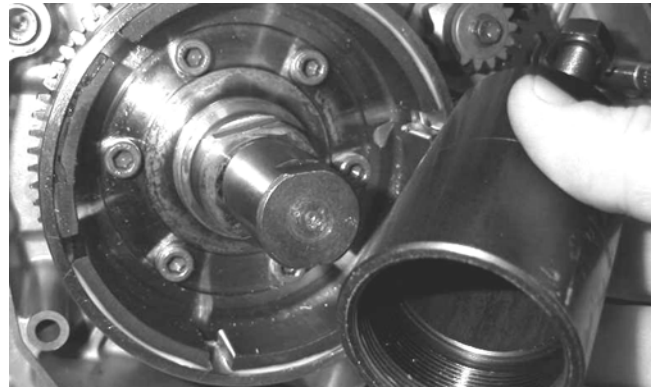
5. Install the crankshaft protector.



MD1365

6. Using Magneto Rotor Remover Set, break the rotor/flywheel assembly loose from the crankshaft. Remove the remover, the crankshaft protector, the rotor/flywheel, and the starter clutch gear. Account for the key.

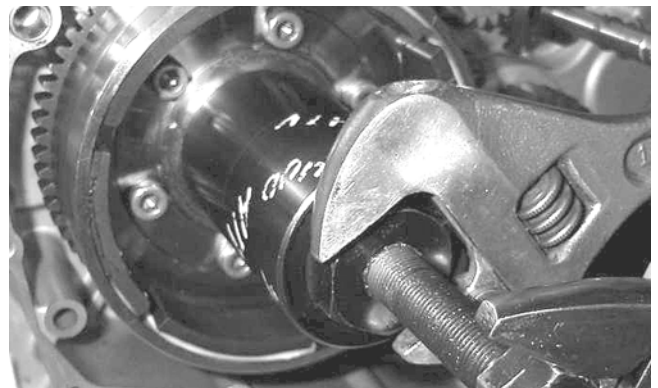
**CAUTION**  
Care must be taken that the remover is fully threaded onto the rotor/flywheel or damage may occur.



MD1368

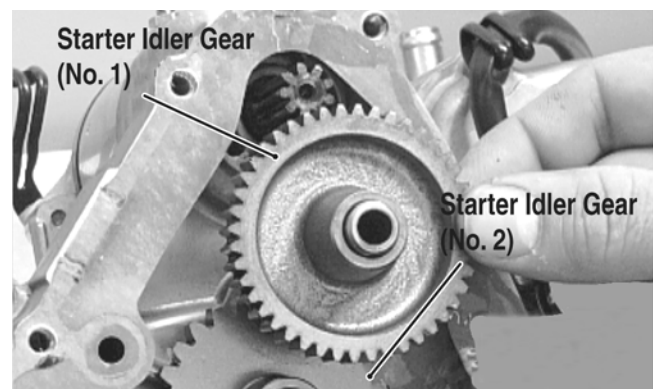


MD1369



MD1370

7. Remove the starter idler gear (No. 1) and starter idler gear (No. 2).



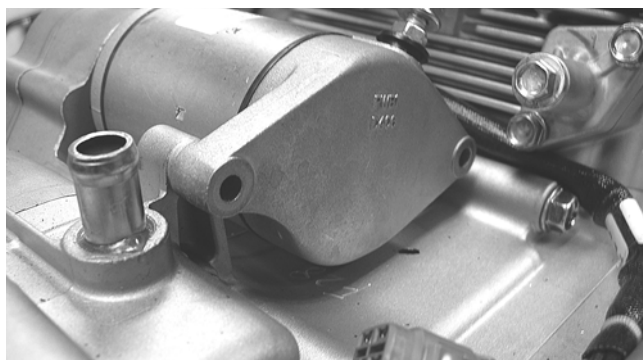
MD1305

8. Remove the gear shift shaft assembly and washer from the left-side crankcase. Note the positions of the alignment marks and washer for installing purposes; then release the cam stopper spring tension.



MD1239

9. Remove the shift detent cam.
10. Remove the cam stopper assembly.
11. Remove two starter motor cap screws.



KC217

12. Remove starter motor by tapping lightly with a mallet.

■**NOTE:** The starter motor is a non-serviceable component and must be replaced as an assembly.

13. Using an impact screwdriver, remove the three Phillips-head screws holding the crankshaft bearing retainer. Remove the crankshaft bearing retainer.



MD1122

## Installing Left-Side Components

### A. Starter Idler Gears

### B. Rotor/Flywheel

1. Place the crankshaft bearing retainer into position. Apply red Loctite #271 to the three cap screws. Install and tighten the three cap screws securely.



MD1122

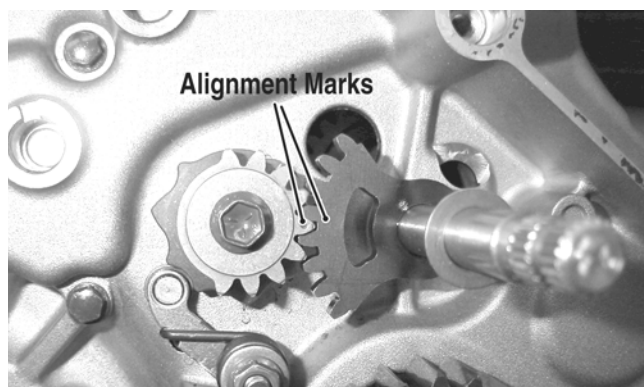
2. Install the starter motor and tighten the two cap screws securely.
3. Install the shift detent cam making sure the washer is installed.



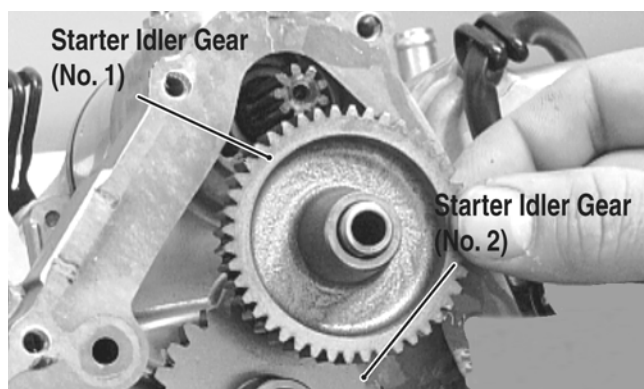
MD1086

4. Install the cam stopper assembly.
5. Install the gear shift shaft assembly and washer making sure to align the alignment marks.





6. Install starter idler gear (No. 2) and starter idler gear (No. 1).



7. Place the key into its notch; then slide the rotor/flywheel (with the ring gear in place) over the crankshaft. Tighten the nut to 107 ft-lb.

### C. Cover

■NOTE: Steps 1-7 in the preceding sub-section must precede this procedure.

8. Install two alignment pins and place the left-side cover gasket into position. Install the left-side cover. Noting the different-lengthed 6 mm cap screws, the position of the shifter bracket, and the location of the long cap screw with the washer, tighten cap screws in a crisscross pattern to 8 ft-lb.
9. Place the outer magneto cover into position on the left-side cover; then install and tighten the four cap screws securely.

## Right-Side Components

### AT THIS POINT

To service center crankcase components only, proceed to Removing 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.

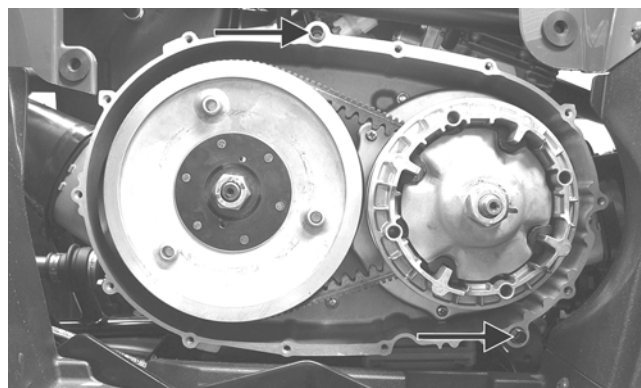
## Removing Right-Side Components

- A. V-Belt Cover
- B. Driven Pulley
- C. Clutch Cover

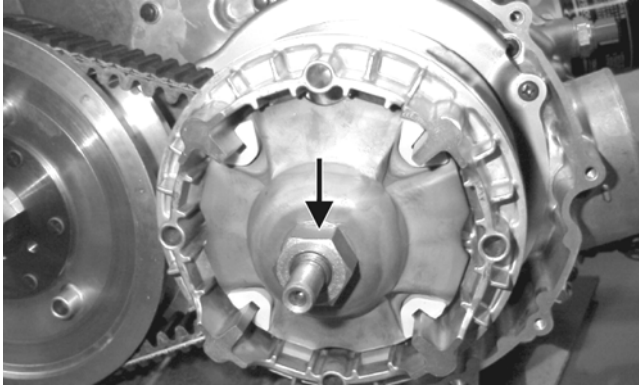
1. If the engine is still in the frame, remove the cap screw securing the brake pedal to the pivot shaft. Account for a flat washer.



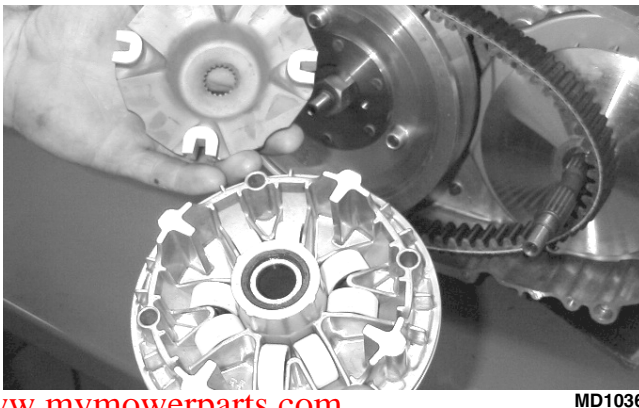
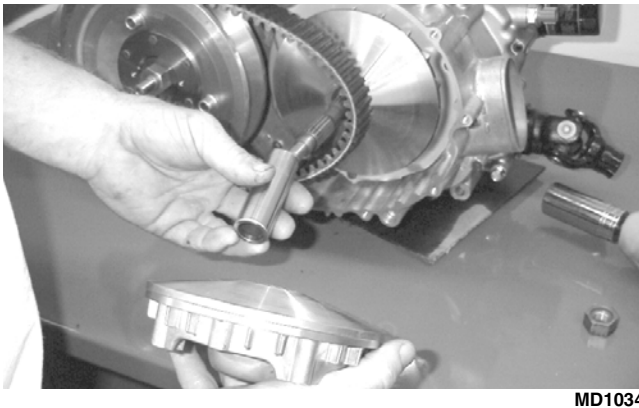
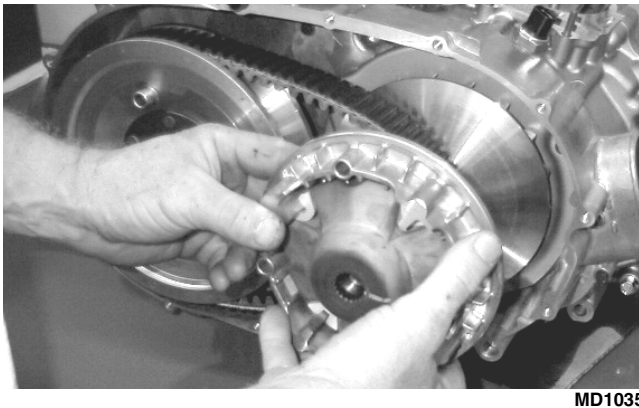
2. Remove the cap screws securing the V-belt cover to the clutch cover; then slide the brake pedal outward and remove the V-belt cover. Account for two alignment pins and a gasket.



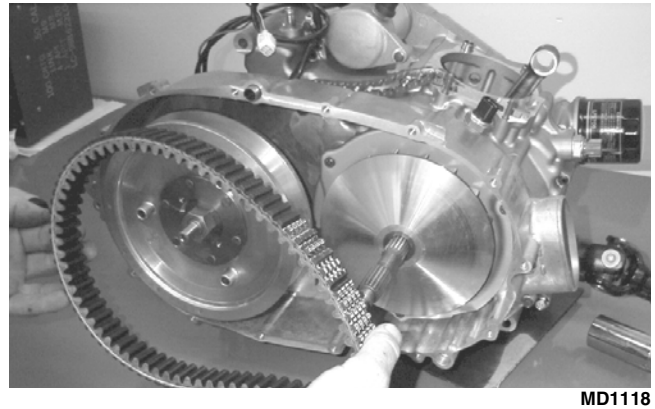
3. Mark the movable drive face and the fixed drive face for installing purposes; then remove the nut holding the movable drive face onto the crankshaft.



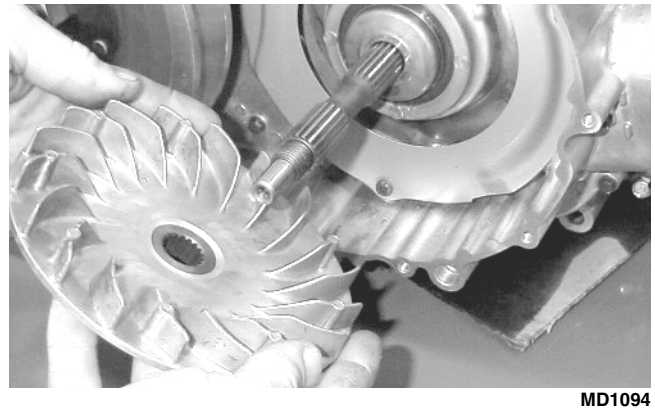
4. Remove the movable drive face and spacer. Account for the movable drive face rollers and outer drive face cover.



5. Remove the V-belt.



6. Remove the fixed drive face.

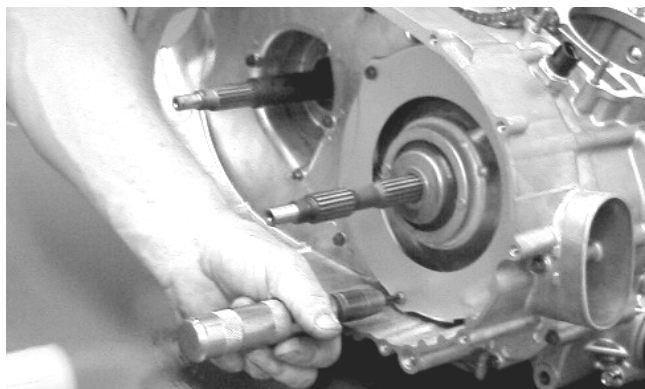


7. Remove the nut holding the driven pulley assembly; then remove the driven pulley assembly.



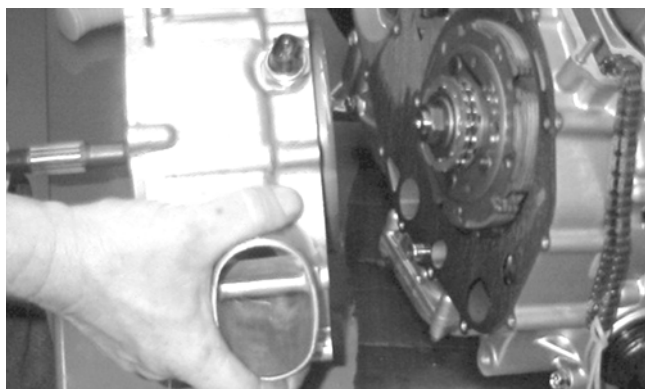
8. Using an impact screwdriver, remove the three Phillips-head cap screws holding the air intake plate. Remove the air intake plate.





MD1092

9. Remove the cap screws holding the clutch cover onto the right-side crankcase half. Note the positions of the different-lengthed cap screws for installing purposes.
10. Using a rubber mallet, loosen the clutch cover; then pull it away from the right-side crankcase half. Account for two alignment pins and gasket.

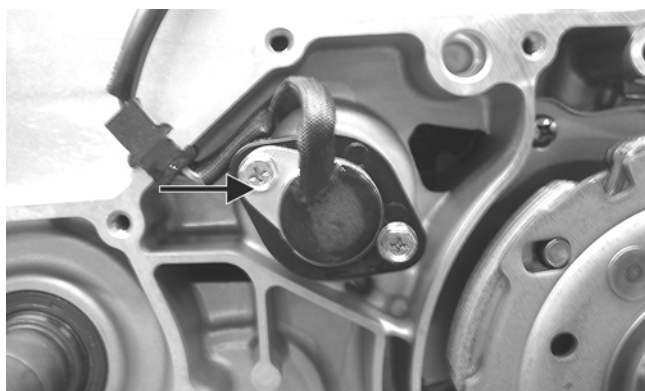


MD1115

**D. Gear Shift Position Switch**  
**E. Centrifugal Clutch Assembly**  
**F. Oil Pump Drive Gear**  
**G. Oil Pump Driven Gear**

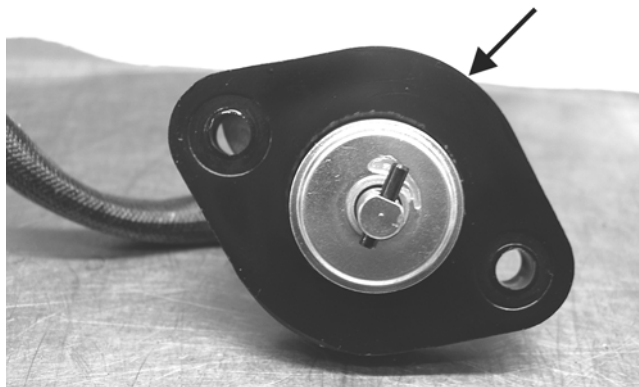
■NOTE: Steps 1-10 in the preceding sub-section must precede this procedure.

11. Remove the cap screw holding the gear shift position switch onto the right-side crankcase half.



KC324A

12. Remove the gear shift position switch. Account for a spacer.



KC326A

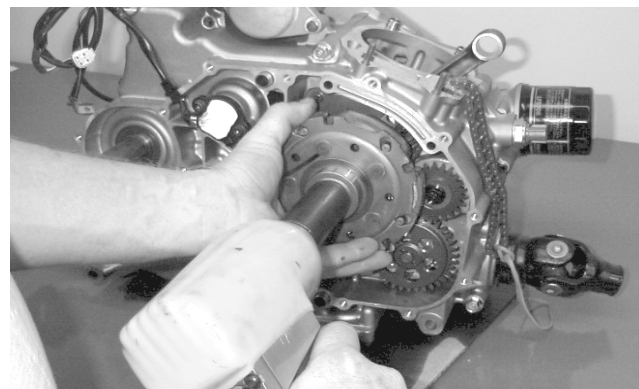
13. Remove the one-way clutch noting the direction of the green dot or the word OUTSIDE for installing purposes.



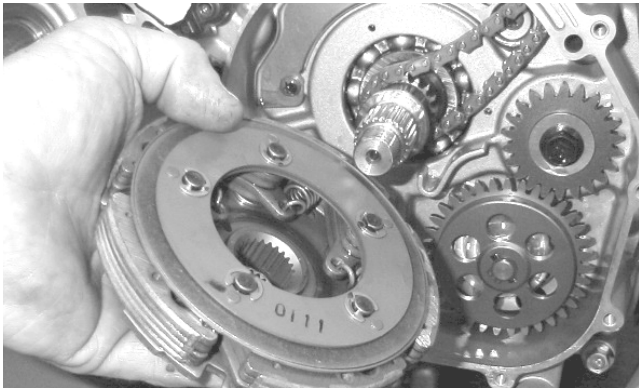
MD1286

14. Remove the left-hand threaded nut holding the centrifugal clutch assembly.

**CAUTION**  
 Care must be taken when removing the nut; it has "left-hand" threads.



MD1014



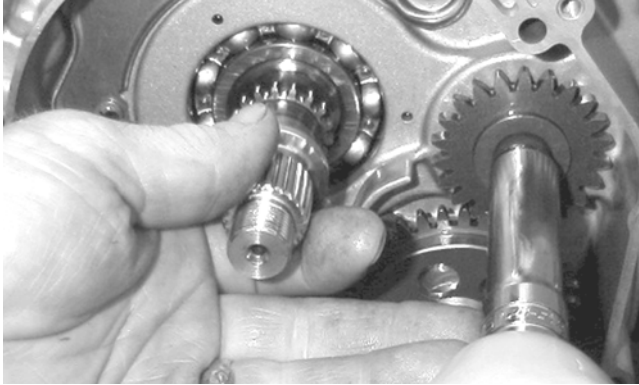
MD1016

15. Remove the cam chain.



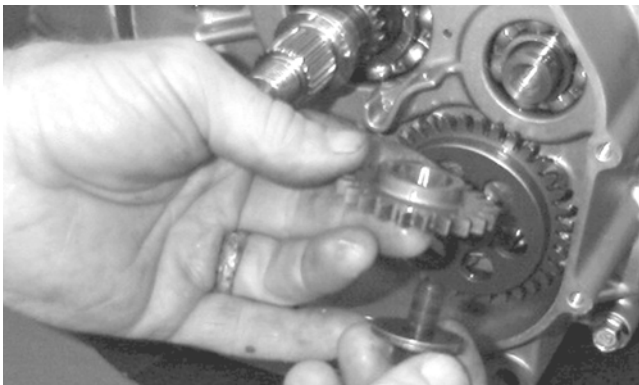
MD1335

16. Remove the oil pump drive gear cap screw.



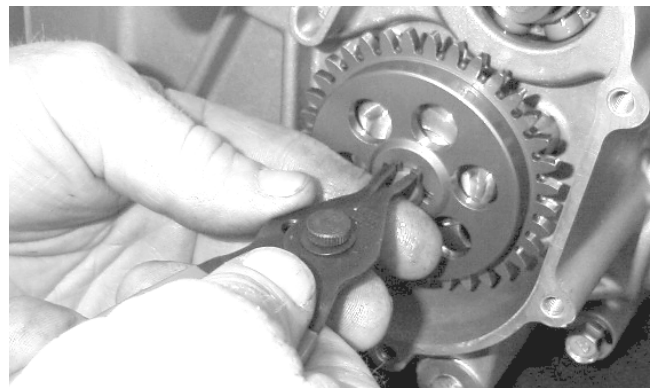
MD1018

17. Remove oil pump drive gear. Account for the pin.



MD1017

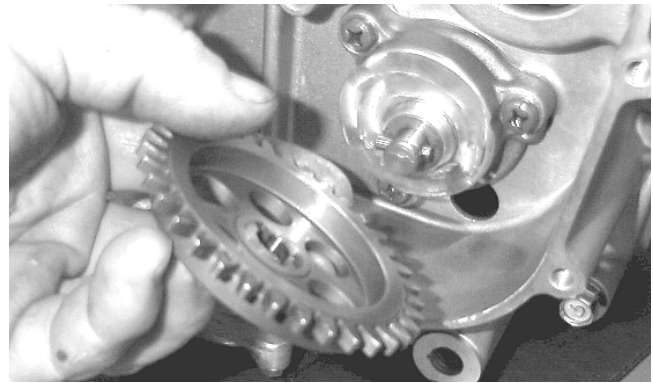
18. Remove the snap ring holding the oil pump driven gear.



MD1019

■NOTE: Always use a new snap ring when installing the oil pump driven gear.

19. Remove oil pump driven gear. Account for the drive pin and thrust washer.



MD1020

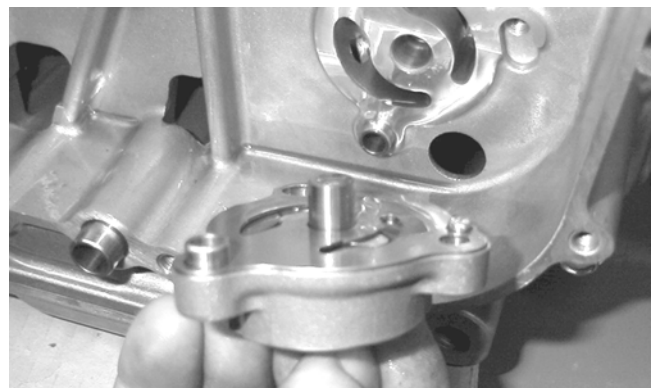
### AT THIS POINT

To service clutch components, see Servicing Right-Side Components sub-section.

## H. Oil Pump/Oil Strainer

■NOTE: Steps 1-19 in the preceding sub-sections must precede this procedure.

20. Remove three Phillips-head screws holding the oil pump and remove the oil pump. Account for two alignment pins.



MD1060

3



21. Remove the four cap screws securing the oil strainer cap; then remove the Phillips-head screws securing the oil strainer. Account for the O-ring.



MD1207

### **AT THIS POINT**

To service center crankcase components only, proceed to Separating Crankcase Halves.

## **Servicing Right-Side Components**

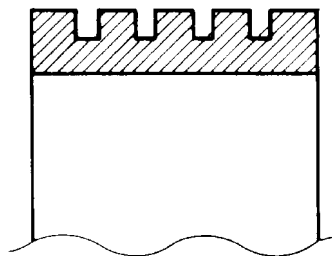
■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

### **INSPECTING CENTRIFUGAL CLUTCH SHOE**

1. Inspect the clutch shoe for uneven wear, chips, cracks, or discoloration.
2. Inspect the depth of the grooves in the clutch shoes. If any shoe is worn to the bottom of the groove, replace the complete set.

### **CAUTION**

Always replace clutch shoes as a complete set or severe imbalance could occur.



Inspecting clutch shoe groove

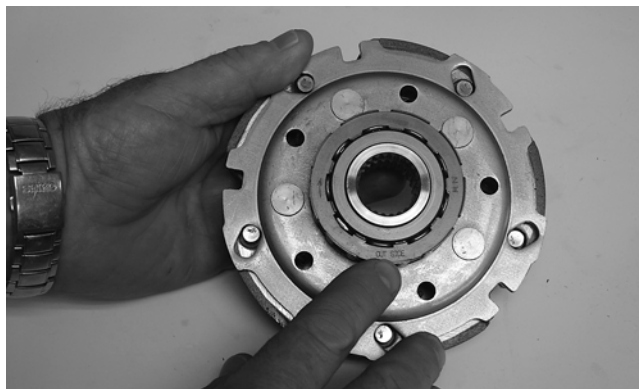
ATV1014

### **INSPECTING CENTRIFUGAL CLUTCH HOUSING**

1. Inspect the clutch housing for burns, marks, scuffs, cracks, scratches, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

### **INSPECTING PRIMARY ONE-WAY DRIVE**

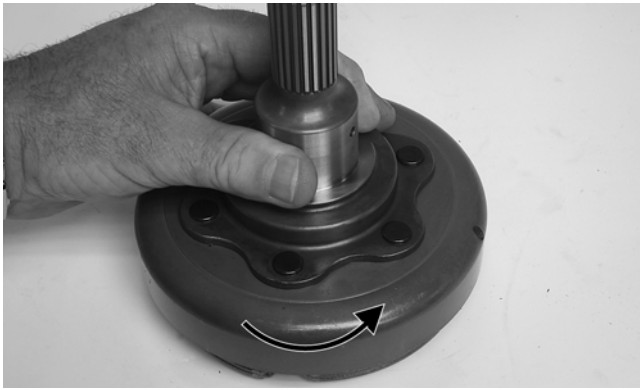
1. Place the one-way clutch onto the clutch shoe assembly with the green dot or the word "OUTSIDE" directed away from the clutch shoe.



KC330

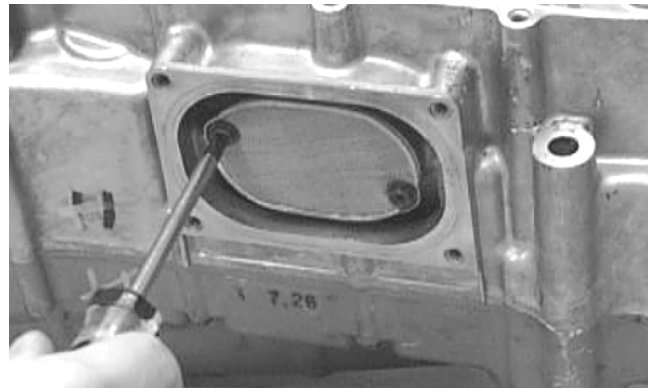
2. Place the clutch housing onto the clutch shoe/one-way clutch.

■NOTE: It will be necessary to rotate the clutch housing counterclockwise to properly seat the one-way clutch.



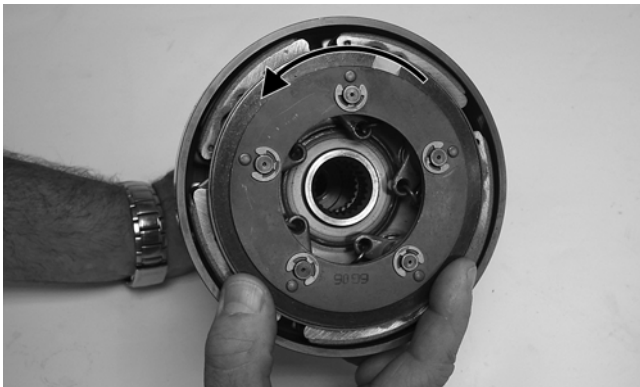
KC331A

3. Check that the clutch shoe can only be rotated counterclockwise in respect to the clutch housing. If the clutch shoe locks up or turns either direction, the one-way clutch must be replaced.



MD1337

2. Place the strainer cap into position on the crankcase making sure the O-ring is properly installed and secure with the four cap screws; then tighten the oil drain plug to 20 ft-lb.



KC332A

## INSPECTING OIL PUMP

1. Inspect the pump for damage.
2. It is inadvisable to remove the screw securing the pump halves. If the oil pump is damaged, it must be replaced.

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

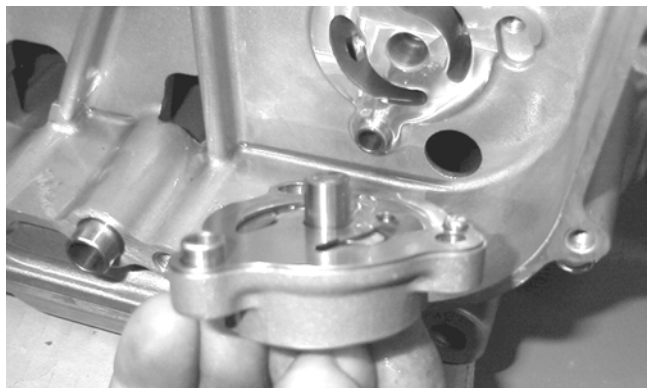
## DRIVEN PULLEY ASSEMBLY

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



MD1208

3. Place two alignment pins and the oil pump into position on the crankcase and secure with the Phillips-head screws coated with blue Loctite #243. Tighten to 8 ft-lb.



MD1060

4. Place the thrust washer and drive pin into position on the oil pump shaft, install the oil pump driven gear making sure the recessed side of the gear is directed inward, and secure with a new snap ring.

■NOTE: Always use a new snap ring when installing the oil pump driven gear.

## Installing Right-Side Components

### A. Oil Strainer/Oil Pump

1. Place the oil strainer into position beneath the crankcase. Tighten the Phillips-head screws (coated with red Loctite #271) securely.

[www.mymowerparts.com](http://www.mymowerparts.com)

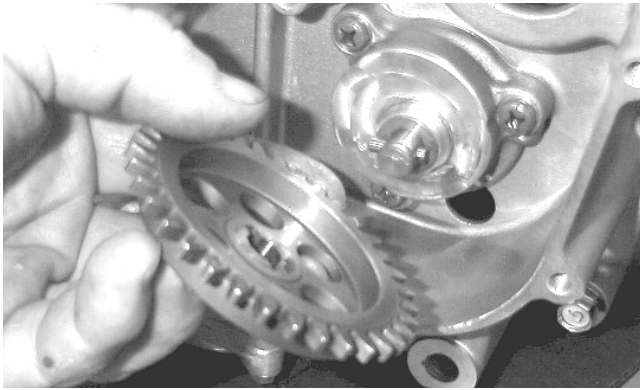


Back to TOC

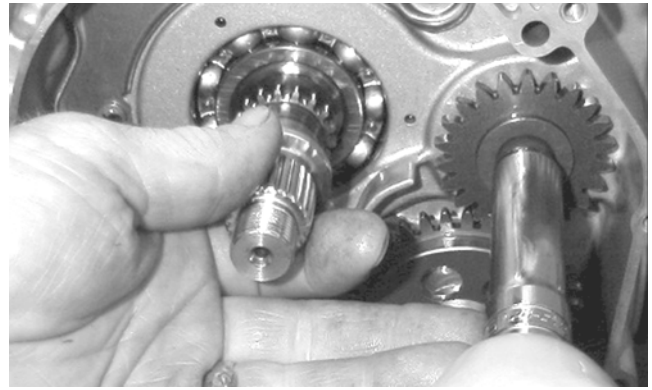
Back to Section TOC



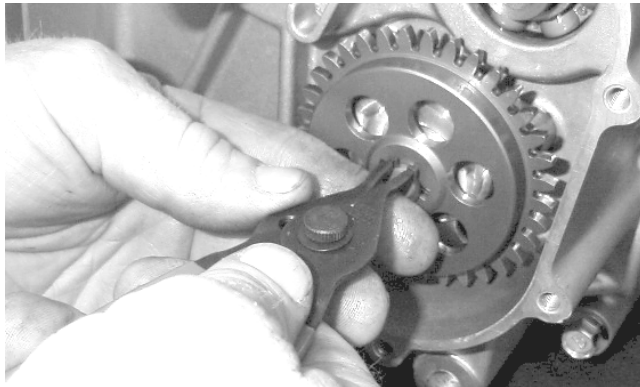




MD1020



MD1018

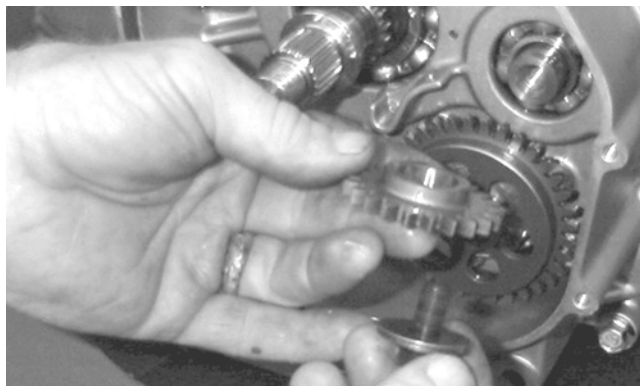


MD1019

5. Install the cam chain.

■NOTE: Keep tension on the cam chain to avoid damaging the crankcase boss.

6. Place the pin into position, install the oil pump drive gear, and tighten the cap screw (coated with red Loctite #271) to 63 ft-lb.



MD1017

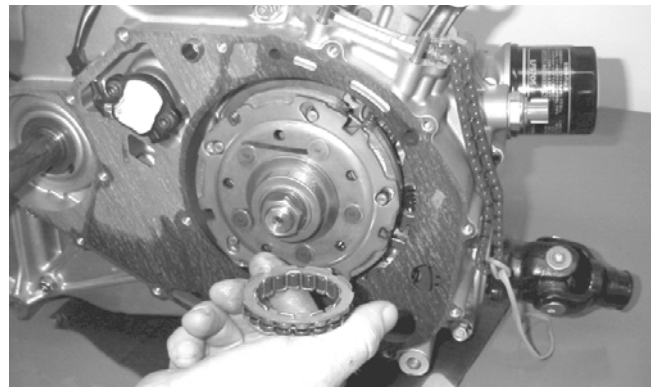
7. Install the clutch shoe assembly on the crankshaft; then install the flange nut (left-hand thread) (coated with red Loctite #271). Tighten to 147 ft-lb.

■NOTE: The flat side of the flange nut should be directed towards the clutch shoe.

### ⚠ CAUTION

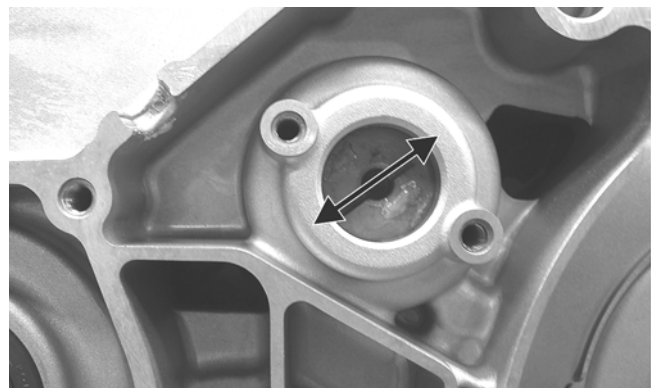
Care must be taken when installing the flange nut; it has "left-hand" threads.

8. Install the one-way clutch making sure that the green dot or the word OUTSIDE is directed away from the crankcase.



MD1286

9. Install gear shift position switch spacer and switch making sure to align the drive pin with the slot in the shift shaft.



KC325A



KC326B

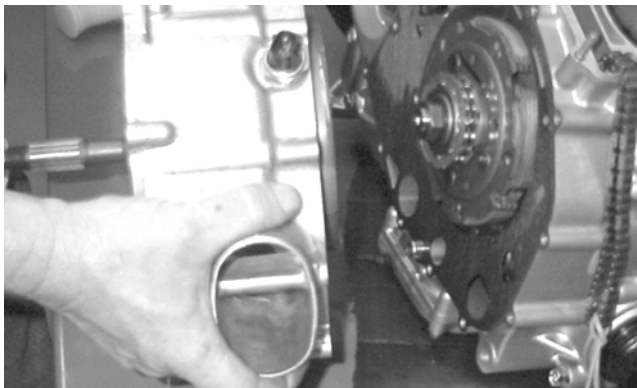
## B. Clutch Cover

## C. Fixed Drive Face

## D. Movable Drive Face

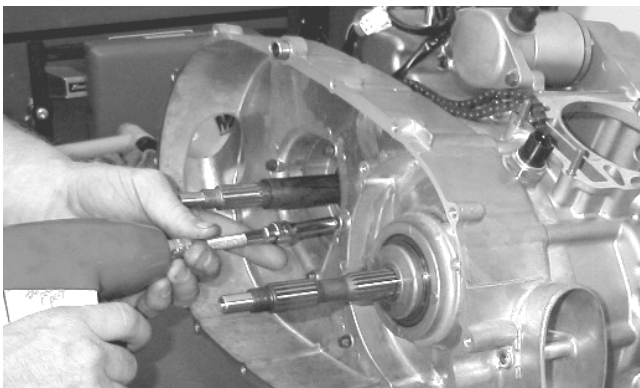
■NOTE: Steps 1-9 in the preceding sub-section must precede this procedure.

10. Install two alignment pins and place the clutch cover gasket into position. Install the clutch cover.



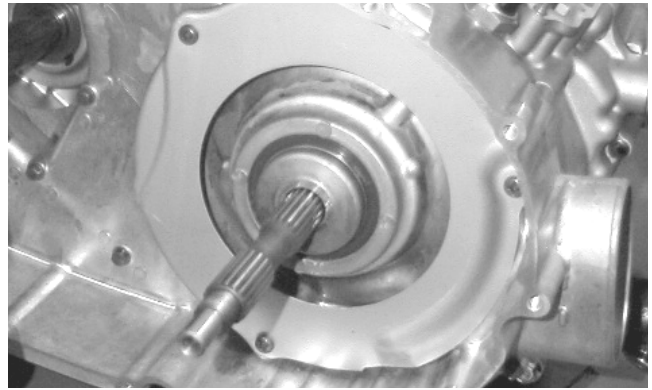
MD1115

11. Tighten the clutch cover cap screws to 8 ft-lb.



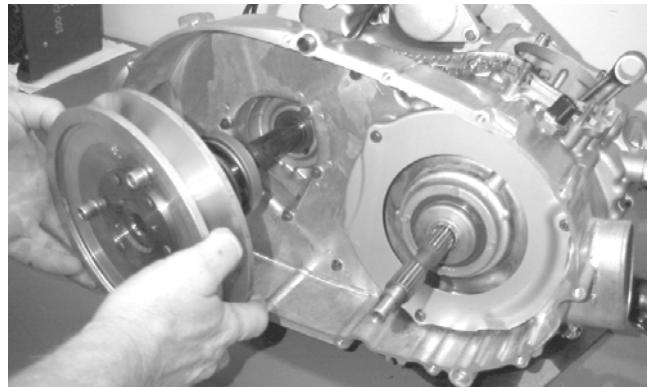
MD1117

12. Install the air intake plate. Apply red Loctite #271 to the threads of the three Phillips-head cap screws; then install and tighten securely.

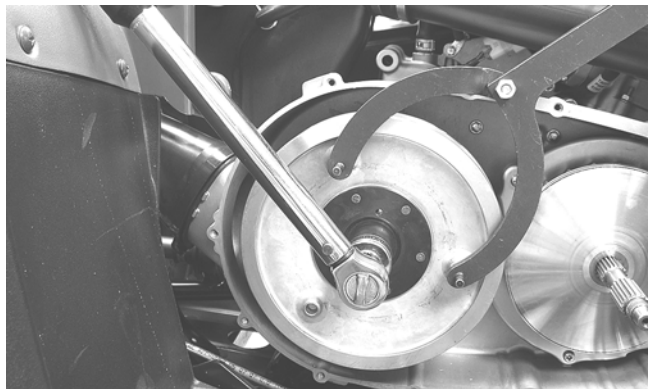


MD1342

13. Place the driven pulley assembly into position and secure with the nut (threads coated with red Loctite #271). Tighten to 147 ft-lb.



MD1068

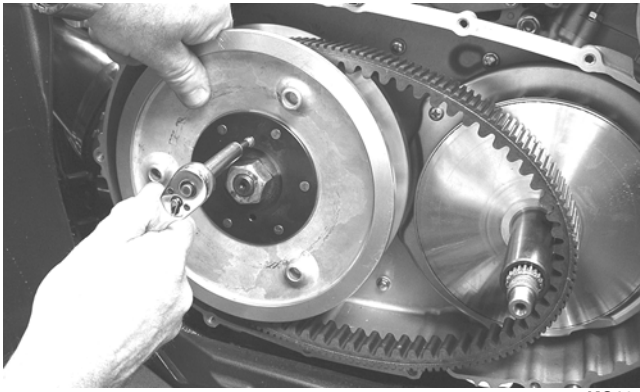


KC134

14. Slide the fixed drive face assembly onto the front shaft.
15. Spread the faces of the driven pulley by threading a V-belt cover cap screw into the fixed driven face and tightening until the faces open sufficiently to allow the V-belt to drop into the pulley approximately 3/4 in.

3

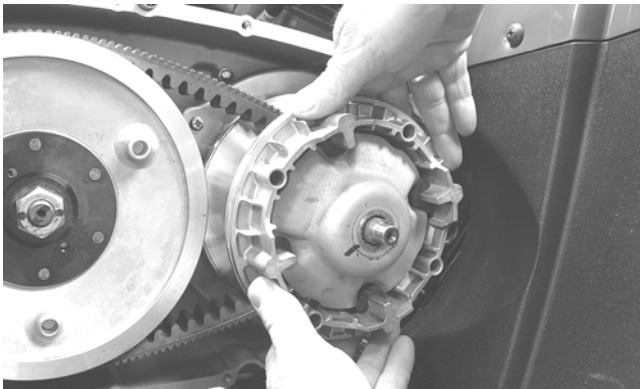




KC137

■NOTE: The arrows on the V-belt should point in direction of engine rotation.

16. Making sure the movable drive face rollers are in position, pinch the V-belt together near its center and slide the spacer and movable drive face onto the shaft.

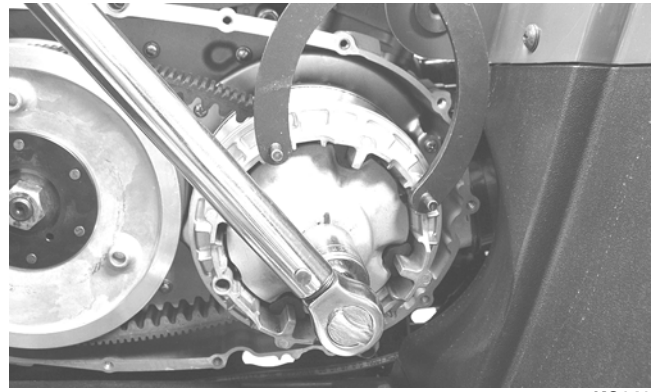


KC127

17. Coat the threads of the nut with red Loctite #271; then making sure the splines of the clutch shaft protrude through the cover plate, secure with the nut and tighten to 147 ft-lb.



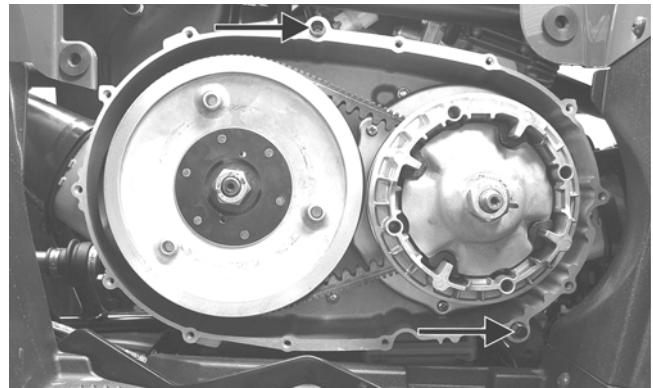
KC138



KC141

■NOTE: At this point, the cap screw can be removed from the driven pulley face.

18. Rotate the V-belt and drive/driven assemblies until the V-belt is flush with the top of the driven pulley.
19. Install two alignment pins and place a new V-belt cover gasket into position on the clutch cover. In a crisscross pattern, tighten cap screws to 8 ft-lb.



KC142A

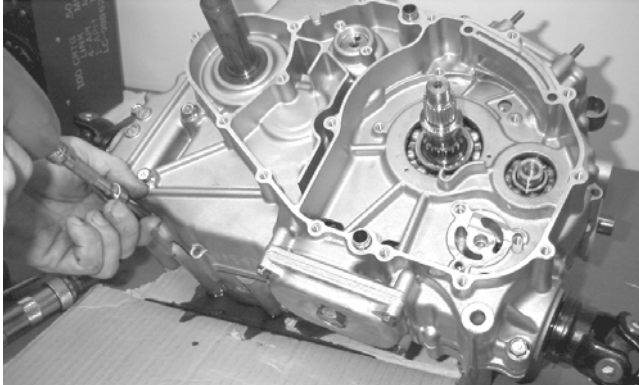
## Center Crankcase Components

■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.

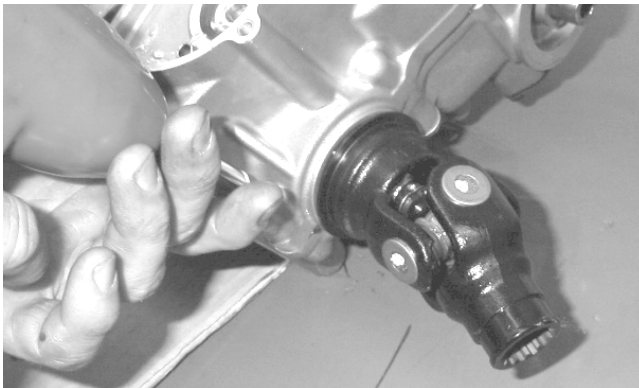
■NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

## Separating Crankcase Halves

1. Remove the left-side and right-side cap screws securing the crankcase halves noting the position of the different-sized cap screws for joining purposes.

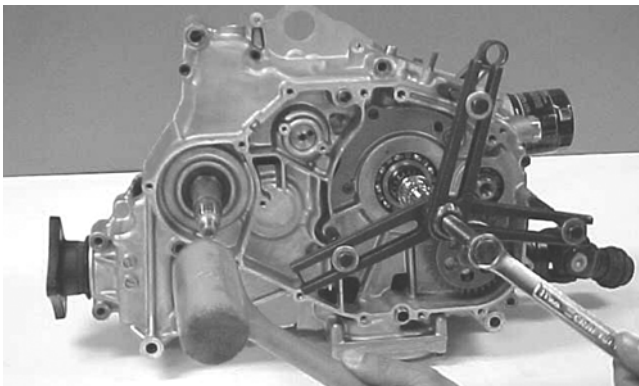


MD1006



MD1012

2. Using Crankcase Separator/Crankshaft Remover and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins.



CC869

■NOTE: To keep the shaft/gear assemblies intact for identification, tap the shafts toward the left-side crankcase half when separating the halves.

[www.mymowerparts.com](http://www.mymowerparts.com)

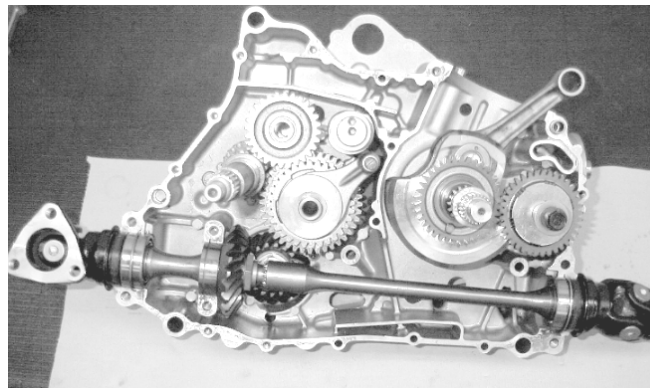


MD1313

## Disassembling Crankcase Half

1. Remove the secondary and primary driveshaft assemblies. Account for the bearing alignment C-ring on the bearing boss next to the driven gear.

3



MD1317

■NOTE: Note the location of the bearing alignment pin on the secondary output shaft.

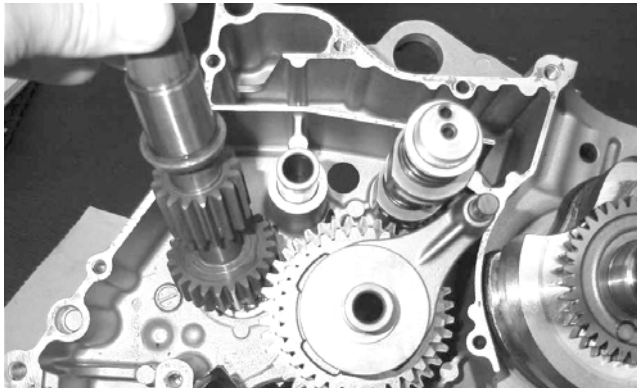
2. Remove the reverse idler gear, spacer, and sleeve. Account for the washer.



MD1325

3. Remove the driveshaft.





MD1326

4. Remove the shift fork shaft and the outer shift fork.



MD1327

5. Remove snap ring and gear from the output side of the gear cluster. Remove the gear cluster and the inner shift fork together. Account for snap ring, gear, and washer.



MD1328

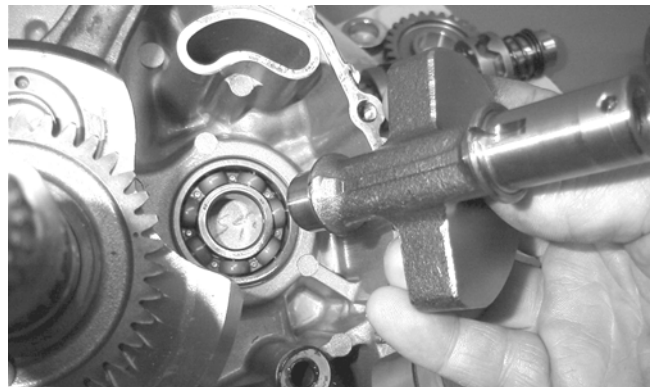
6. Noting the position of the slot on the end, remove the shift cam assembly. Account for inner and outer washers.



KC325

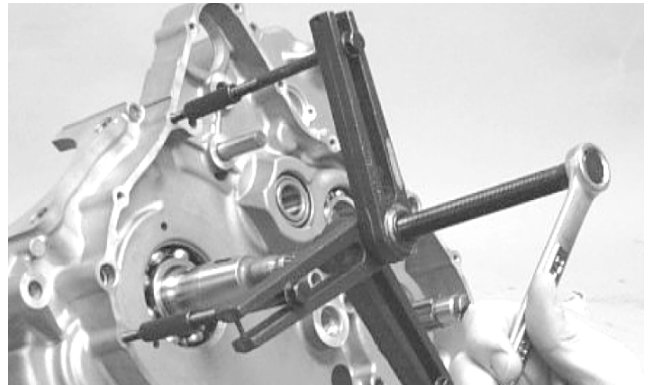
7. Remove the counterbalance gear. Account for the key.

8. Remove the counterbalance shaft.



MD1024

9. Using Crankcase Separator/Crankshaft Remover, remove the crankshaft.



MD1330

### **CAUTION**

Do not remove the remaining output shaft assembly unless absolutely necessary. If the shaft is removed, the shaft nut must be replaced with a new one and the shaft must be re-shimmed.

10. Remove the secondary drive gear/secondary driven gear retaining nut. From inside the crankcase using a rubber mallet, drive out the output shaft assembly. Account for the output shaft, a shim, a washer, and the nut.

### AT THIS POINT

To service crankshaft assembly, see Servicing Center Crankcase Components sub-section.

## Servicing Center Crankcase Components

■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

### SECONDARY GEARS

■NOTE: When checking and correcting secondary gear backlash and tooth contact, the universal joint must be secured to the front shaft or false measurements will occur.

### Checking Backlash

■NOTE: The rear shaft and bevel gear must be removed for this procedure. Also, always start with the original shims on the rear shaft.

1. Place the left-side crankcase cover onto the left-side crankcase half to prevent runout of the secondary transmission output shaft.
2. Install the secondary driven output shaft assembly onto the crankcase.
3. Mount the indicator tip of the dial indicator on the secondary driven bevel gear (centered on the gear tooth).
4. While rocking the driven bevel gear back and forth, note the maximum backlash reading on the gauge.
5. Acceptable backlash range is 0.05-0.33 mm (0.002-0.013 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 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

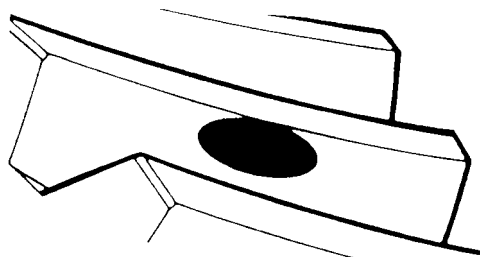
### Checking Tooth Contact

■NOTE: After correcting backlash of the secondary driven bevel gear, it is necessary to check tooth contact.

1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
5. Rotate the secondary driven bevel gear several revolutions in both directions.
6. Examine the tooth contact pattern in the dye and compare the pattern to the illustrations.

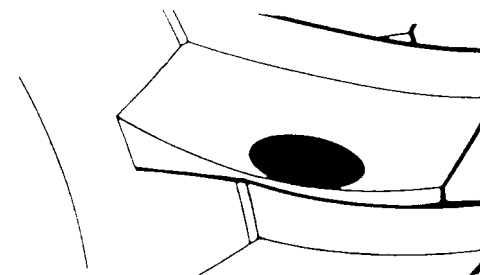
3

Incorrect (contact at tooth top)

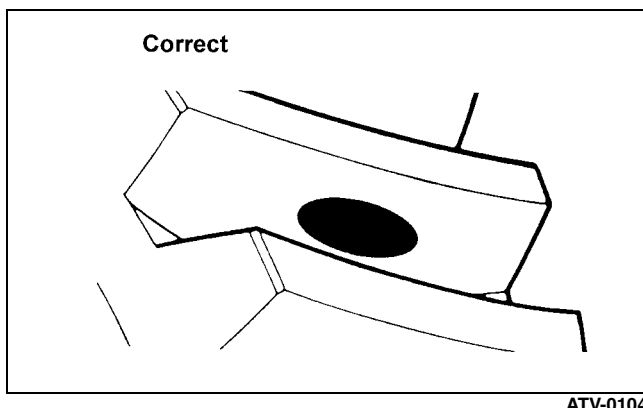


ATV-0103

Incorrect (contact at tooth root)



ATV-0105



ATV-0104

## Correcting Tooth Contact

■NOTE: If tooth contact pattern is comparable to the correct pattern illustration, no correction is necessary.

If tooth contact pattern is comparable to an incorrect pattern, correct tooth contact according to the following chart.

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

■NOTE: To correct tooth contact, steps 1 and 2 (with NOTE) of “Correcting Backlash” must be followed and the above “Tooth Contact/Shim Correction” chart must be consulted.

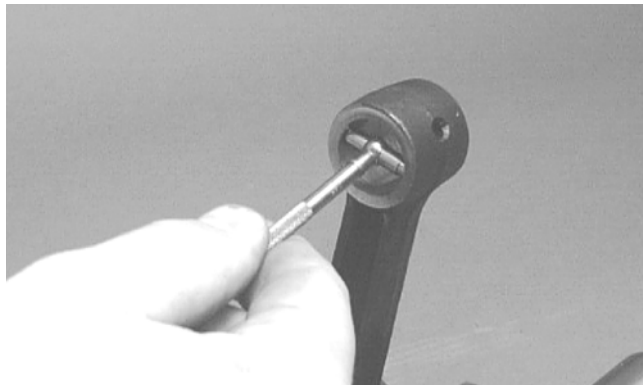
### CAUTION

After correcting tooth contact, backlash must again be checked and corrected (if necessary). Continue the correcting backlash/correcting tooth contact procedures until they are both within tolerance values.

## CRANKSHAFT ASSEMBLY

### 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

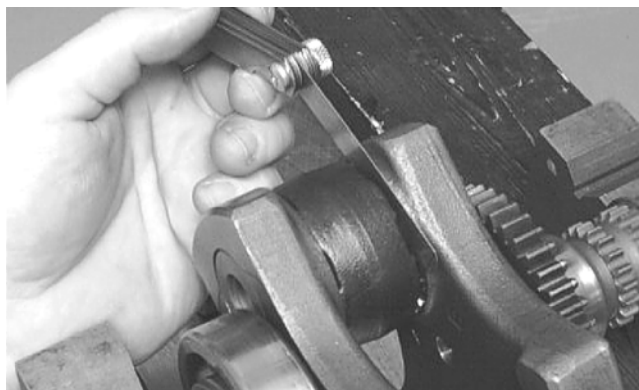
2. Maximum diameter must not exceed specifications.

### 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.



CC289D

3. Acceptable gap range must be within specifications.

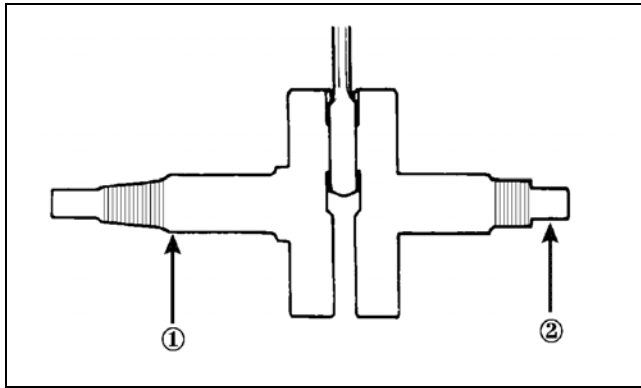
### Measuring Connecting Rod (Big End Width)

1. Using a calipers, measure the width of the connecting rod at the big-end bearing.
2. Acceptable width 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.





ATV-1074

3. Zero the indicator and rotate the crankshaft slowly.

### ⚠ CAUTION

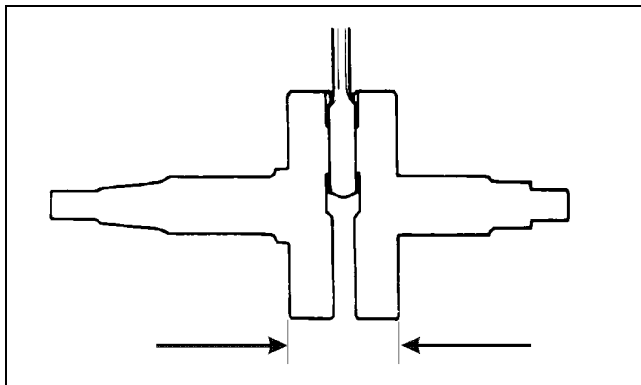
Care should be taken to support the connecting rod when rotating the crankshaft.

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.



ATV-1017

2. Acceptable width range must be within specifications.

### COUNTERSHAFT

### ⚠ 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 reverse driven gear dog; then remove the circlip securing the reverse driven gear.
2. Remove the reverse driven gear and account for the washer, bushing, and bearing.
3. Remove the low driven gear washer; then remove the low driven gear. Account for the bushing and bearing.
4. Remove the washer; then remove the circlip securing the sliding dog. Remove the sliding dog.
5. Remove the high driven gear circlip; then remove the high driven gear. Account for the washer, bushing, and bearing.

### Assembling

1. Place the high driven gear onto the countershaft making sure the bearing, bushing, and washer are properly positioned. Secure with the circlip.
2. Place the sliding dog onto the countershaft; then secure with the circlip. Place the washer next to the circlip.
3. Place the low driven gear onto the countershaft making sure the bearing and bushing are properly positioned; then place the washer onto the shaft.
4. Place the reverse driven gear onto the countershaft making sure the bearing, bushing, and washer are properly positioned; then secure with the circlip.
5. Place the reverse driven gear dog onto the countershaft.

■NOTE: The countershaft is now completely assembled for installation.

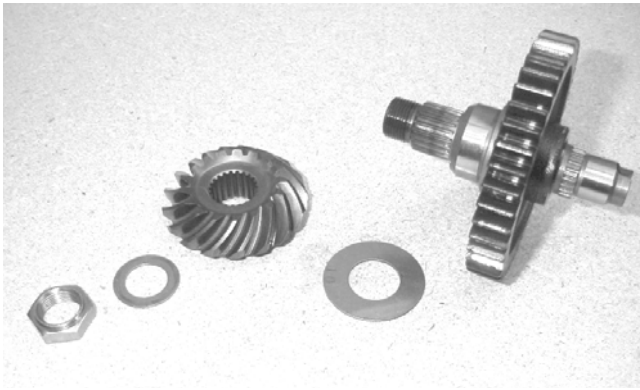
## Assembling Crankcase Half

■NOTE: For ease of assembly, install components on the right-side crankcase half.

■NOTE: If the output shaft was removed, make sure that the proper shim is installed.

1. Install the output shaft into the crankcase making sure the two gears, shim, washer, and nut are in the correct order.

3



MD1199

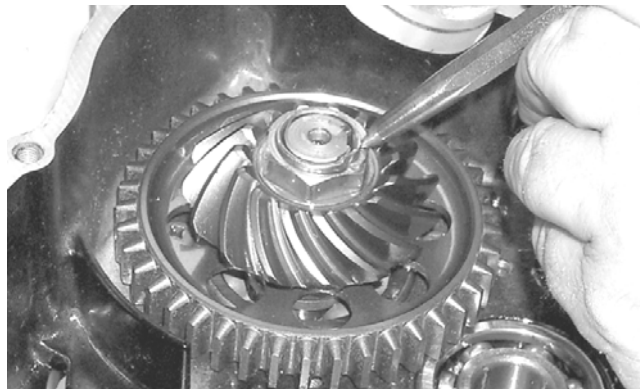


MD1334



MD1079

2. Apply red Loctite #271 to the threads of the output shaft. Install and tighten the nut 59 ft-lb. Using a punch, peen the nut.

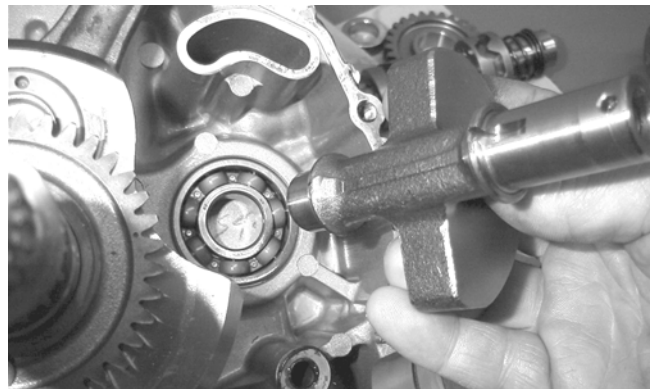


MD1333

3. Apply a liberal amount of oil to the crankshaft bearing. Using a propane torch, heat the bearing until the oil begins to smoke; then slide the crankshaft assembly into place.

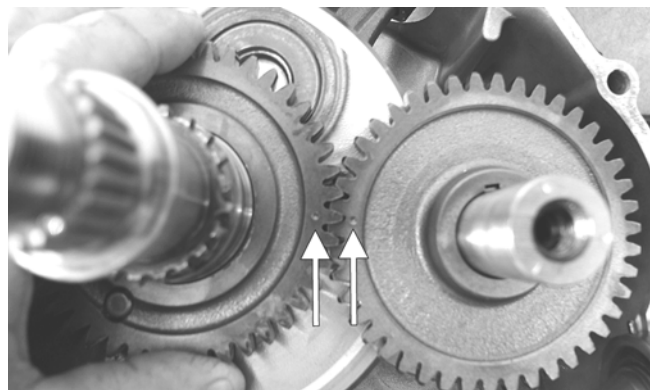
■NOTE: If heating the bearing is not possible, the crankshaft can be installed using a crankshaft installer.

4. Rotate the crankshaft so the counterweight is toward the rear of the engine. Install the counterbalance shaft.



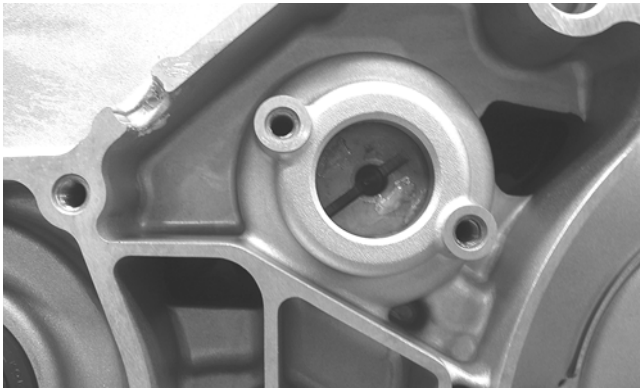
MD1024

5. Keeping the counterbalance gear timing mark aligned with the one on the crankshaft gear, install the key and the counterbalance gear.



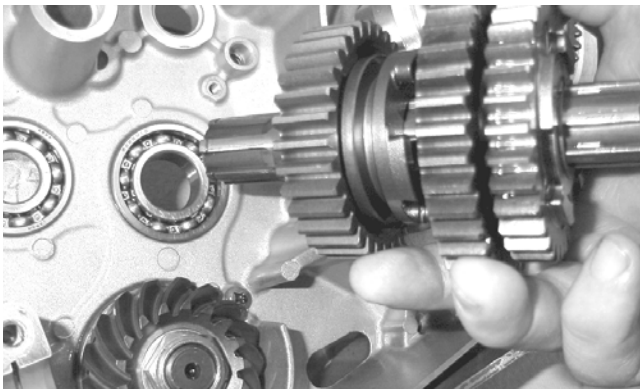
CD826A

6. Keeping the slot directed as shown, install the shift cam and inner and outer washers.

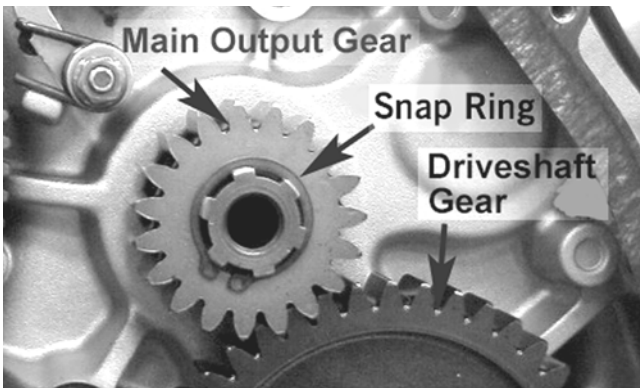


KC325

7. Align the inner shift fork with the gear cluster and with the inner washer in place, install the gear cluster and inner shift fork. While holding the gear cluster in place, install the washer, gear, and snap ring.



MD1032



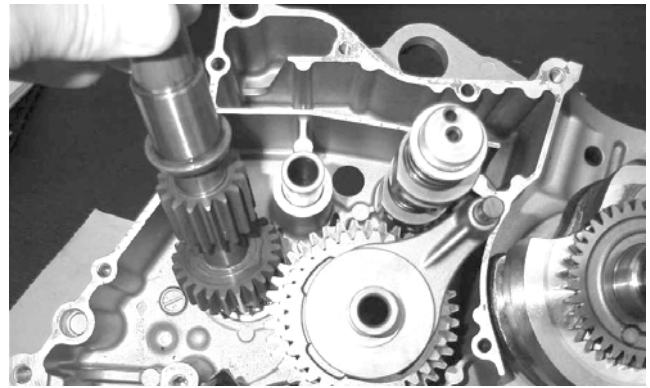
MD1198

8. Install the outer shift fork and the shift fork shaft.



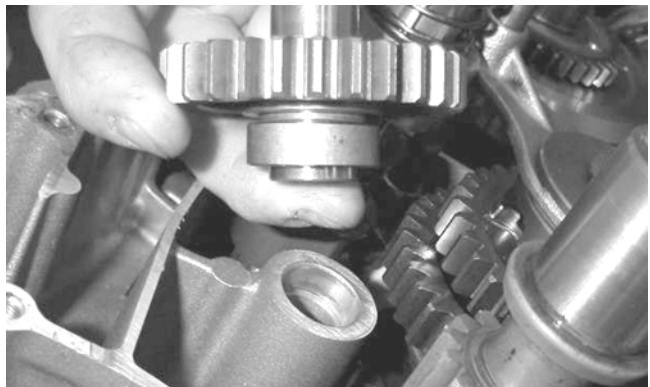
MD1327

9. Install the input driveshaft.



MD1326

10. Install the washer, spacer, sleeve, and reverse idler gear.



MD1357

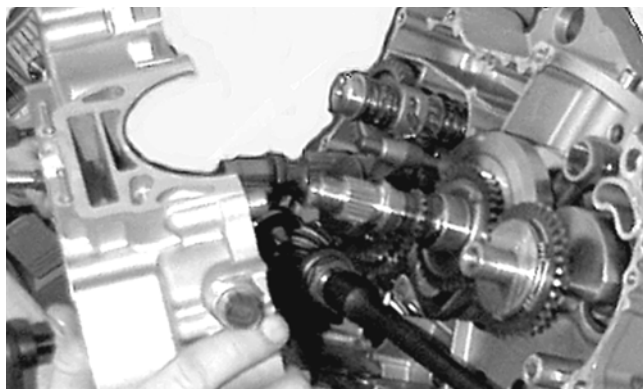
11. Install the secondary and primary driveshaft assemblies. Account for the bearing alignment C-ring on the bearing boss next to the driven gear.

■NOTE: Align the bearing alignment pin on the secondary output shaft.

## Joining Crankcase Halves

1. Verify that the two alignment pins are in place and that both case halves are clean and grease free. Apply Three Bond Sealant to the mating surfaces. Place the right-side half onto the left-side half.

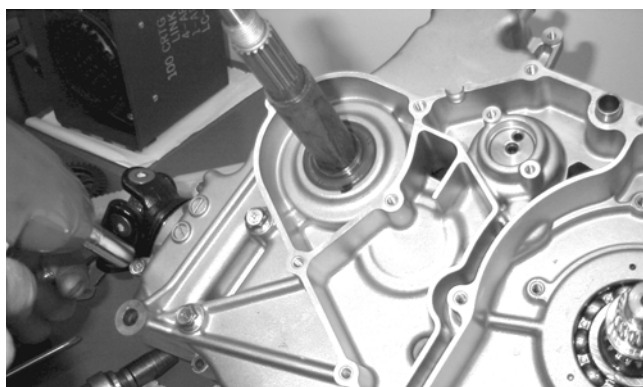




MD1336

2. Using a plastic mallet, lightly tap the case halves together until cap screws can be installed.
3. From the right side, install the crankcase cap screws noting the location of the different-sized cap screws; then tighten only until snug.

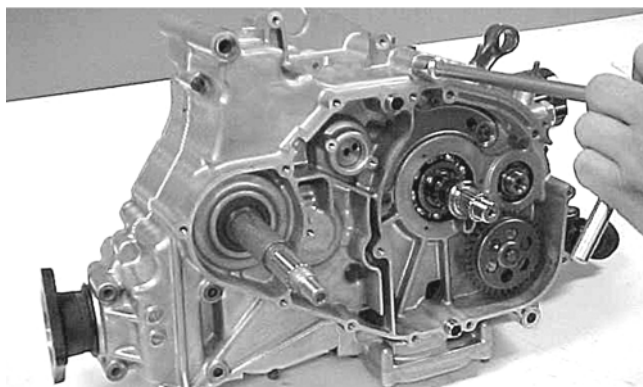
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs while tightening the cap screws.



MD1008

4. From the left side, install the remaining crankcase cap screws; then tighten only until snug.

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



CC871

5. In a crisscross/case-to-case pattern, tighten the 8 mm cap screws until the halves are correctly joined; then tighten to 21 ft-lb.

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

6. In a crisscross/case-to-case pattern, tighten the 6 mm cap screws to 10 ft-lb.

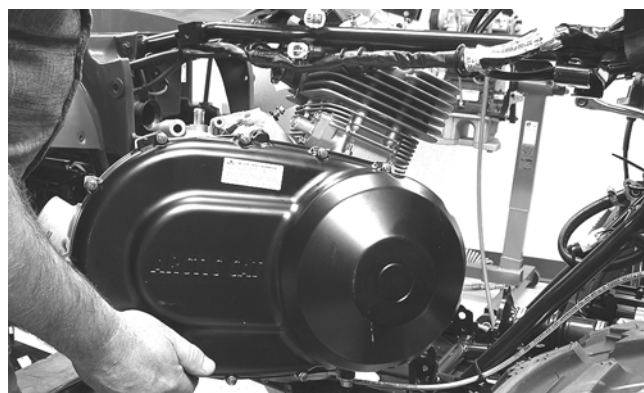
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.

#### ➡ 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.

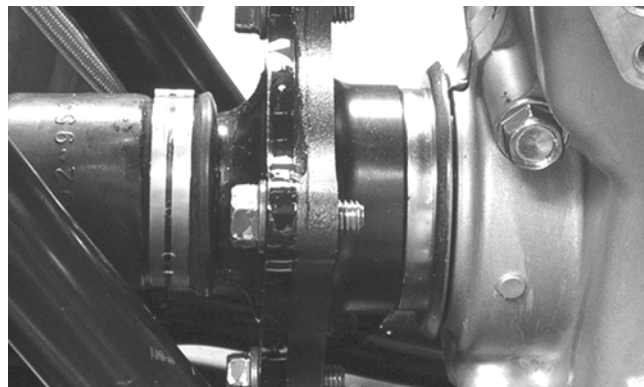
## Installing Engine/Transmission

1. From the right side, place the engine/transmission into the frame tilting the top-side forward to clear the frame member.

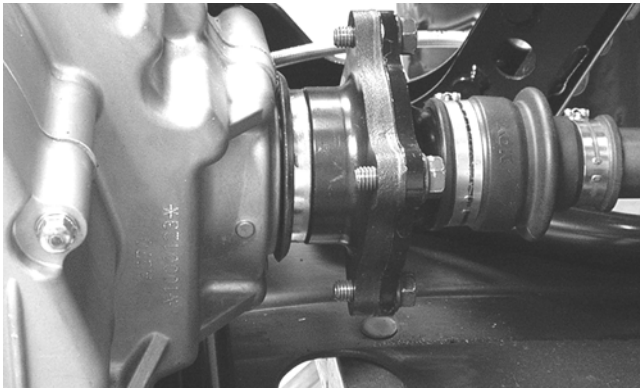


KC216

2. Install the front and rear engine mounting through-bolts and secure with the flange nuts. Tighten to 38 ft-lb.
3. Align the front and rear output flanges with the drive couplers; then secure with the screws and tighten to 20 ft-lb.

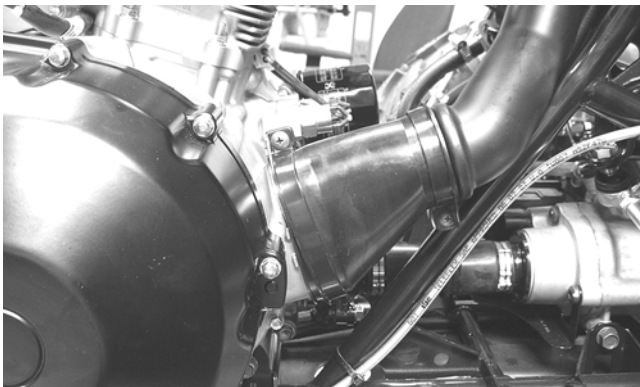


KC242

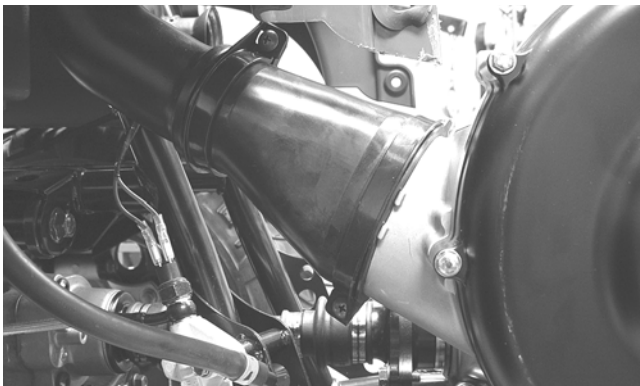


KC243

4. Install the front and rear V-belt cooling boots and secure with the existing hardware.

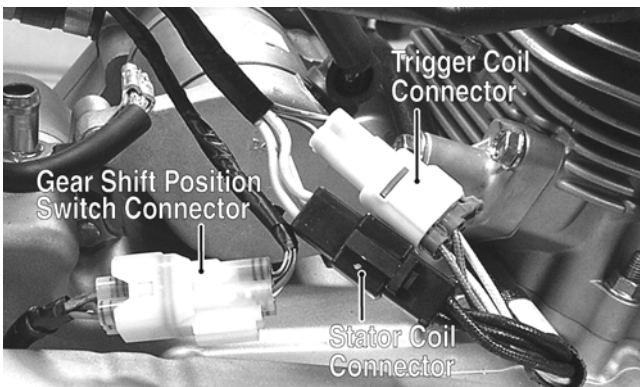


KC235

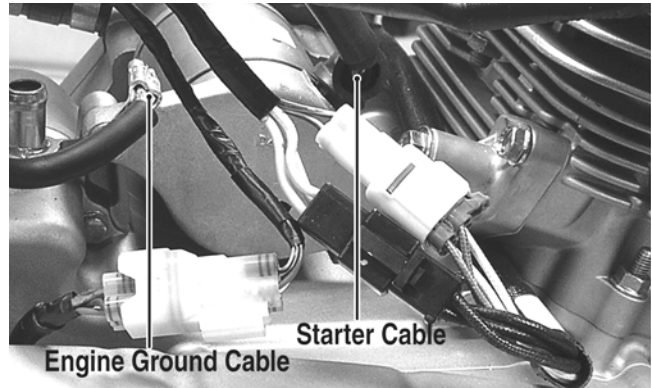


KC236

5. Connect the stator coil, trigger coil, and gear shift position switch connectors; then attach the engine ground cable and starter cable and secure with cap screws and nuts. Tighten to 8 ft-lb.



KC228A

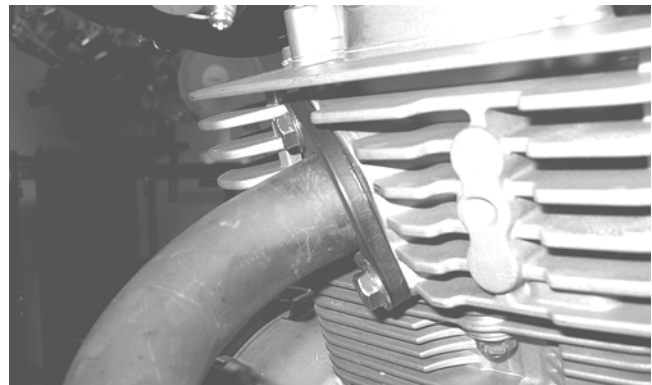


KC228B

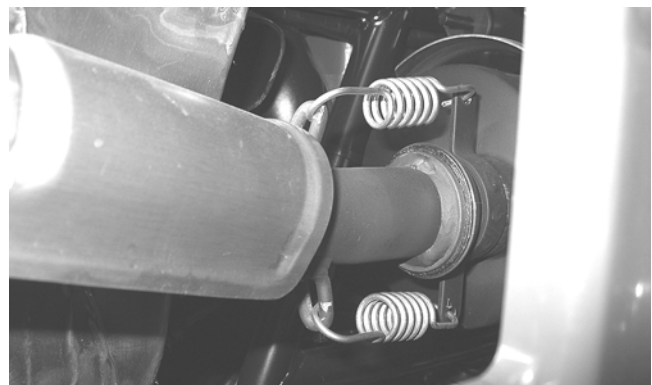
6. Set the inlet air silencer into the frame; then install the exhaust pipe using a new exhaust pipe seal and grafoil seal. Tighten the cap screws evenly to 20 ft-lb and install the muffler retainer springs.



KC237



KC238

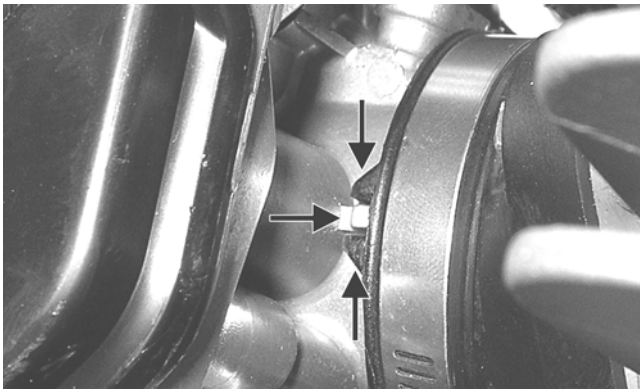


KC170

3

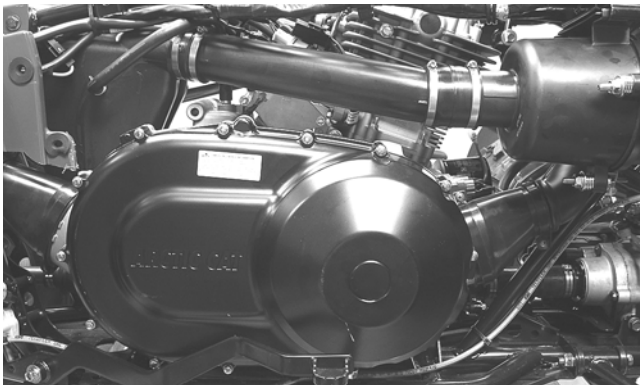


7. Place the carburetor into the intake pipe being careful to align the lug on the carburetor with the alignment tabs on the air intake pipe; then tighten the clamp securely.



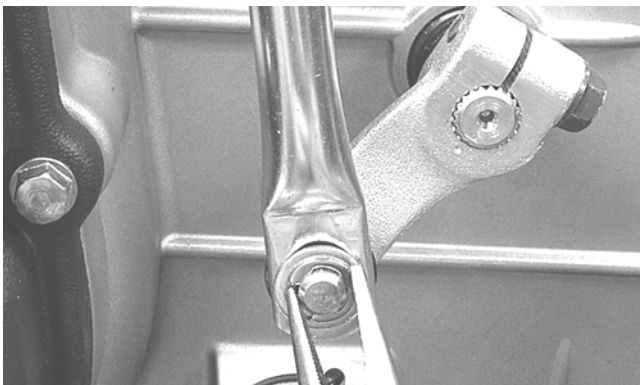
KC245A

8. Install the air filter housing onto the frame; then connect the inlet air duct, air silencer duct, and intake housing to carburetor boot and tighten all hose clamps securely.



KC254

9. Install the shift rod onto the shift arm with bushing and flat washer and secure with an E-clip; then connect the speedometer sensor plug.

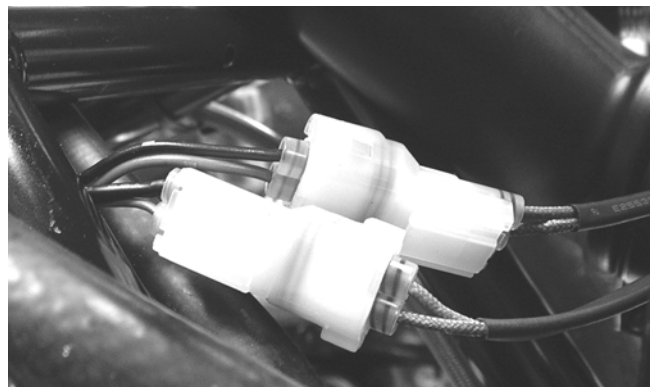


KC255

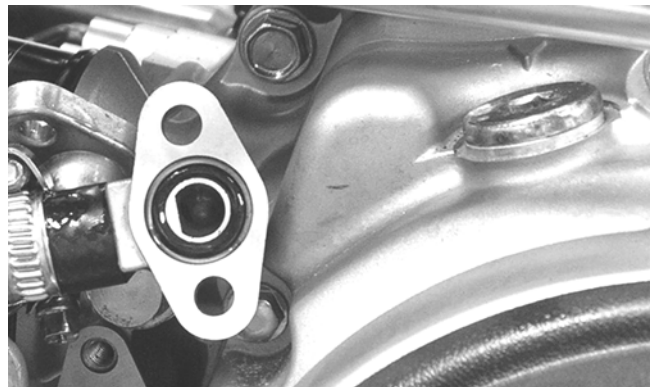


KC248

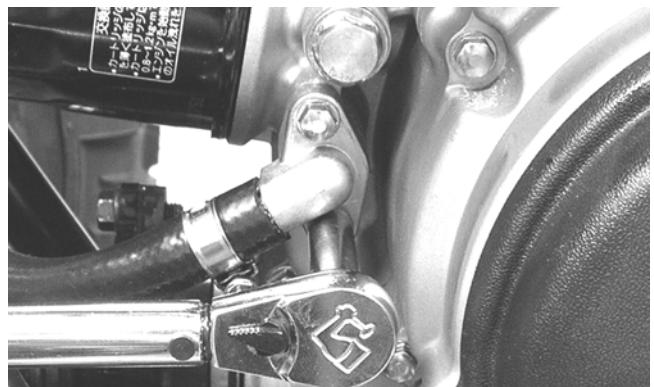
10. Connect the oil temperature connector and cooling fan connector; then using new O-rings, install the oil fittings onto the crankcase and secure with the cap screws. Tighten to 8 ft-lb.



KC249



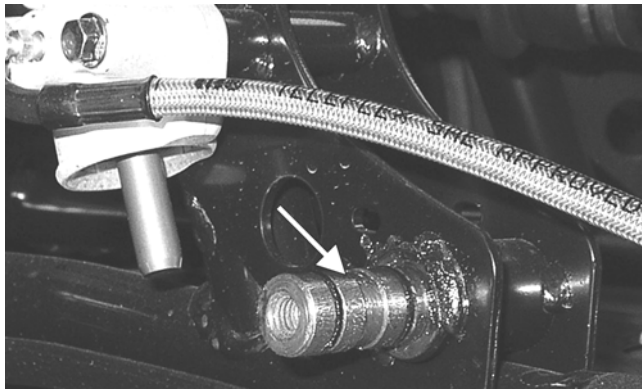
KC250



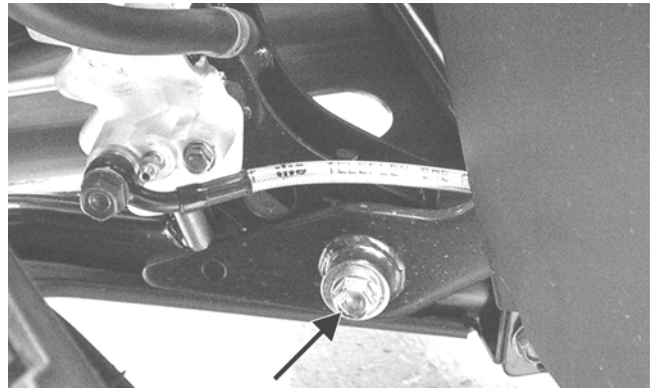
KC251



11. If the brake pedal was removed during disassembling, apply grease to the brake pedal pivot stud; then install the brake pedal and secure with a flat washer and cap screw. Tighten to 20 ft-lb.



KC232A



KC149A

12. Install the heat shield; then install the gas tank (see Section 4).
13. Install the front body panel, front rack, and footwells (see Section 8).
14. Pour the appropriate quantity and grade oil into the crankcase; then connect the negative battery cable and move the ATV outside to a well ventilated area.
15. Start the engine and allow the engine to warm up while checking for oil leaks; then shut the engine off and check the oil level. Add oil as required.

3

## Table of Contents (500 - Automatic Transmission/ H1 Models)

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## 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.

### AT THIS POINT

If the technician's objective is to service Top-Side Components, Left-Side Components, or Right-Side Components, the engine/transmission does not have to be removed from the frame.

### AT THIS POINT

If the technician's objective is to service/replace left-side cover oil seals, front output joint oil seal, rear output joint oil seal, and/or the oil strainer (from beneath the engine/transmission), the engine/transmission does not have to be removed from the frame.

Secure the ATV on a support stand to elevate the wheels.

### WARNING

Make sure the ATV is solidly supported on the support stand to avoid injury.

1. Remove the seat.

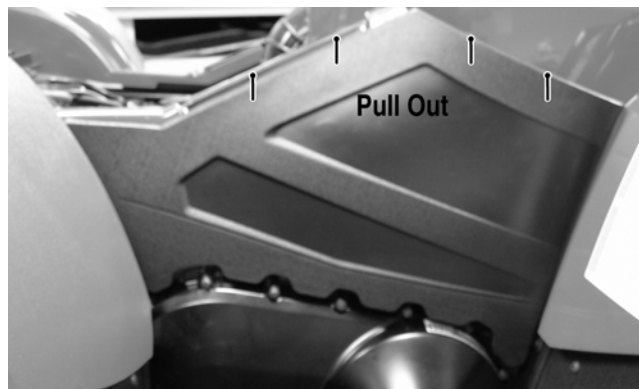
2. Remove the negative cable from the battery; then remove the positive cable. Remove the battery and the battery vent hose; then remove the battery.

### CAUTION

Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

3. Remove the radiator access cover, steering post cover, and storage compartment cover assembly; then remove the storage compartment box.

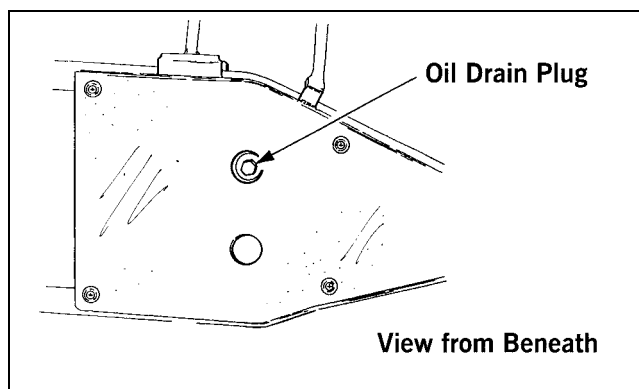
4. Remove the side panels.



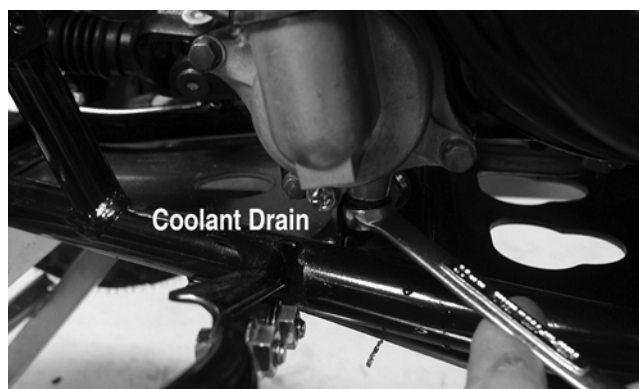
CF242A

5. Remove the instrument pod; then remove the front rack and front body panel (see Section 8).

6. Drain the oil from beneath the engine/transmission; then drain the coolant.



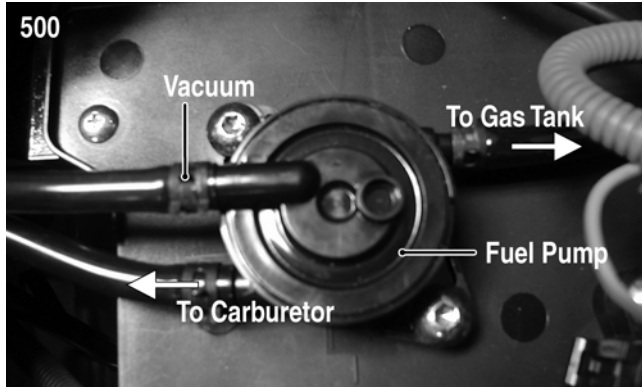
733-441A



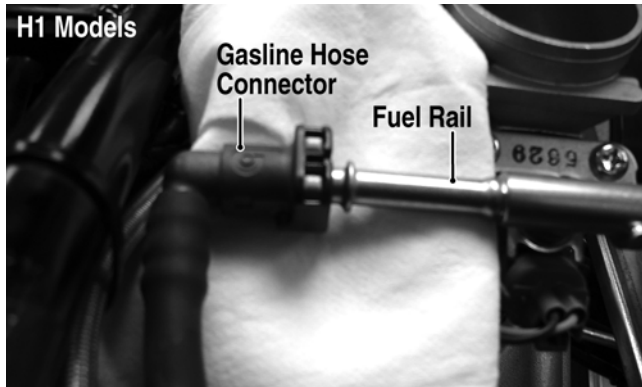
CD799A

7. Remove the air filter (see Section 2).

8. Remove the vacuum hose and the fuel-pump-to-carburetor hose (500) or gasline hose connector from the fuel rail (H1 models).



CD766C



F1092D

9. Loosen the clamp securing the air intake duct to the air filter housing.



CD785

10. Disconnect the crankcase vent hose from the air filter housing. Remove the clamp securing the carburetor intake duct to the air filter housing; then remove the air filter housing.

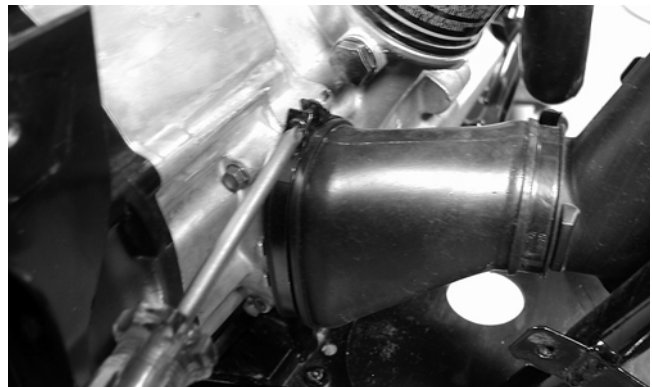


CD787

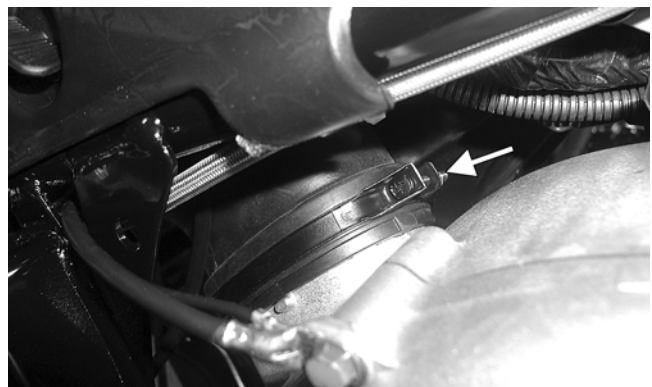


CD786

11. Remove the clamp securing the cooling duct boot to the V-belt housing; then remove the cooling duct boot from the V-belt housing outlet.



CD793



CD515A

12. Remove the left-side foot peg and footwell (see Section 8).

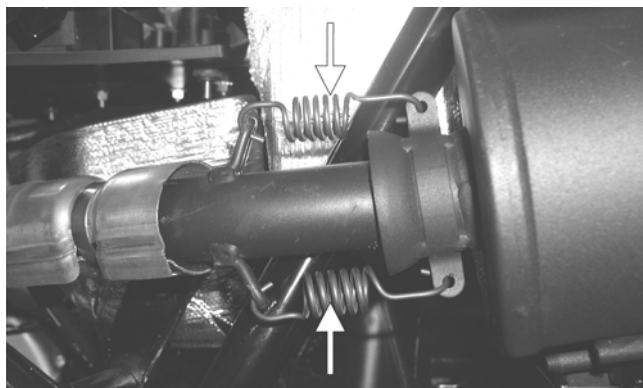


13. Secure the carburetor/throttle body assembly up and away from the engine.
14. Remove the E-clip securing the shift rod to the engine shift arm; then allow the shift rod to swing forward and hang straight down from the shift lever.



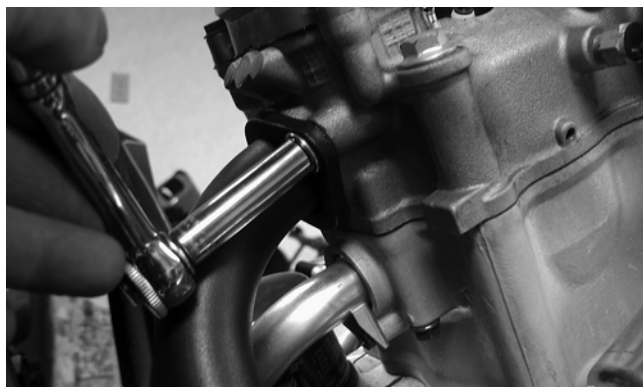
CD774

15. Remove the springs securing the muffler to the exhaust pipe; then remove the muffler. Account for the two exhaust springs.



CF138A

16. Remove the two cap screws securing the exhaust pipe to the cylinder head; then remove the pipe.



CD803

17. Remove the two coolant hoses from the engine; then route the hoses out of the way.
18. Remove the cap screws securing the rear drive-shaft/output flange to the rear output joint flange.



CD805

■NOTE: It is advisable to lock the brake when loosening the cap screws securing the rear drive-shaft.

19. Remove the positive cable from the starter motor and route it out of the way.



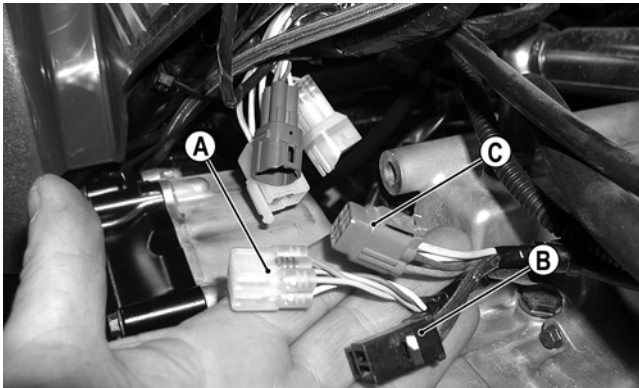
CD796

20. Disconnect the speed sensor connector from the sensor housing.



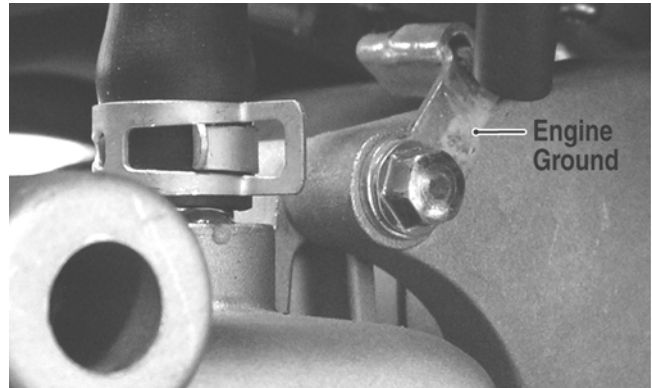
CD794

21. On the right-side, disconnect the gear shift position switch (A), stator connector (B), and the CDI connector (C).



CD797A

22. Disconnect the temperature sensor lead from the wiring harness.



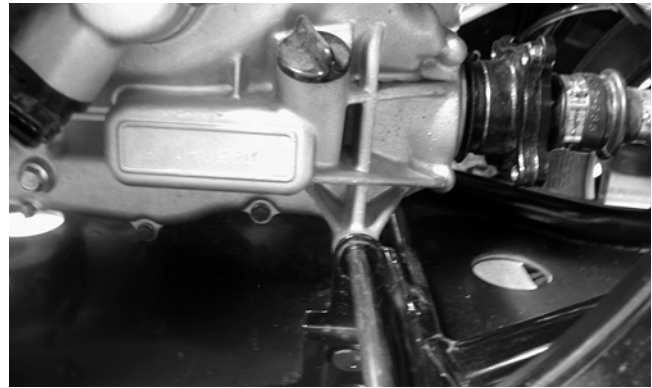
KC201A

25. Remove the engine mounting through-bolts. Account for all mounting hardware.



CD788

23. Remove the spark plug wire from the spark plug; then remove the coil from the frame.



CD809

26. Raise the rear of the engine enough to allow the rear output flange to clear the output flange joint. Block the engine up in this position.



CD814

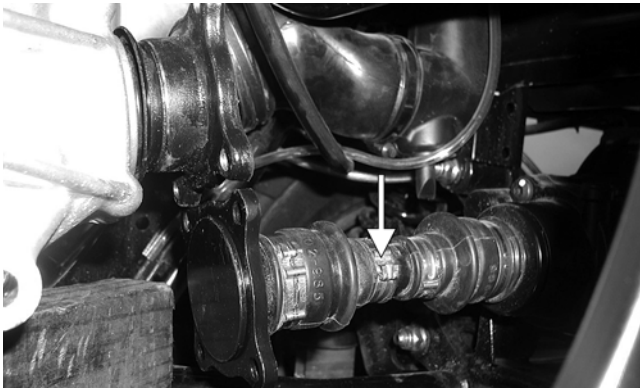
24. Remove the cap screw securing the engine ground wire to the engine.



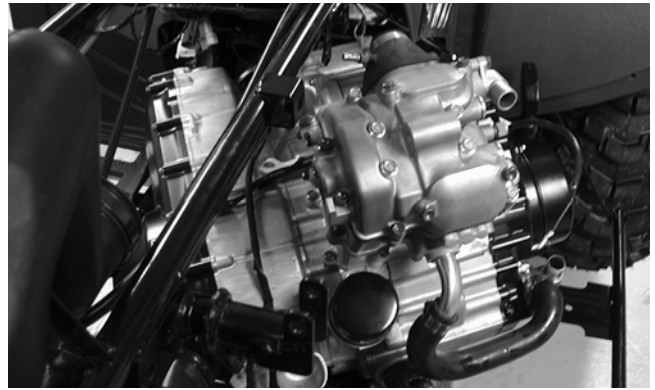
CD811

27. Remove the first small boot clamp; then remove the output flange and driveshaft from the rear drive coupler.





CD812A



CD773



CD813

28. Remove the block from under the engine and lower the engine; then remove the boot clamp from the front output drive yoke.
29. Move the engine to the rear enough to allow the front driveshaft to clear the front output yoke; then move the engine forward and to the left. The engine will come out the left side of the frame.



CD818

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## Top-Side Components

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■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 Top-Side Components

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- A. Valve Cover/Rocker Arms
- B. Cylinder Head/Camshaft

■NOTE: Remove the spark plug and timing inspection plug; then using the recoil starter, rotate the crankshaft to top-dead-center of the compression stroke.

1. Remove the two tappet covers.

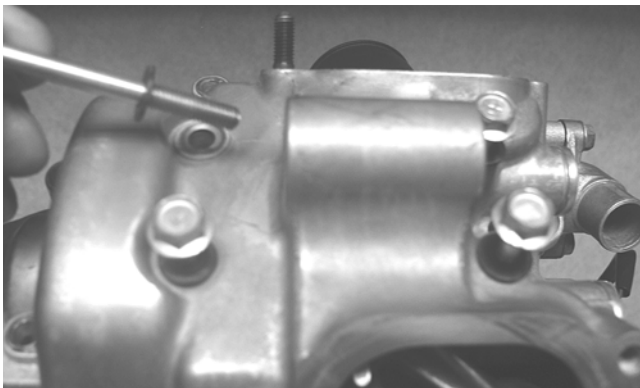




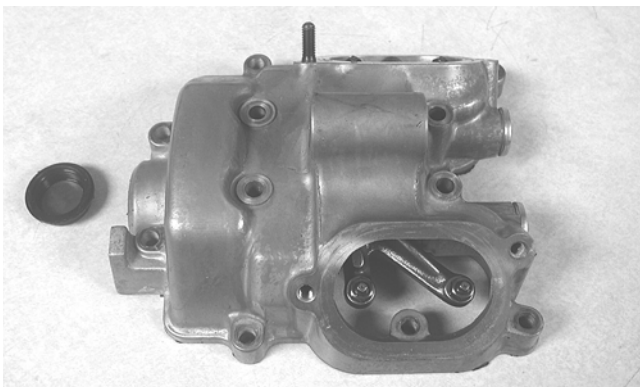
CC001D

■NOTE: Keep the mounting hardware with the covers for assembly purposes or thread them back into the head to keep them separated.

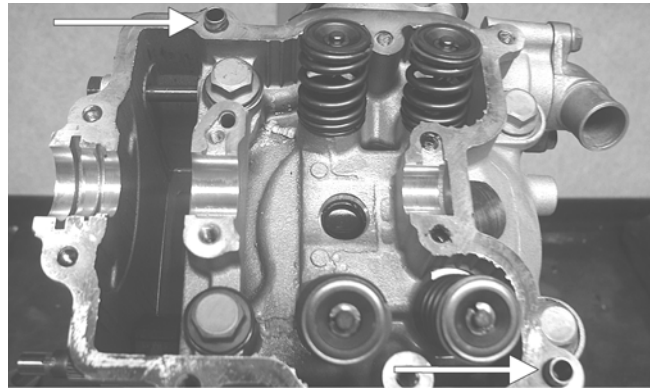
2. Remove the 12 cap screws securing the valve cover to the head; account for the four rubber washers on the top side cap screws. Remove the valve cover. Account for and note the orientation of the cylinder head plug. Note the location of two alignment pins.



CD205

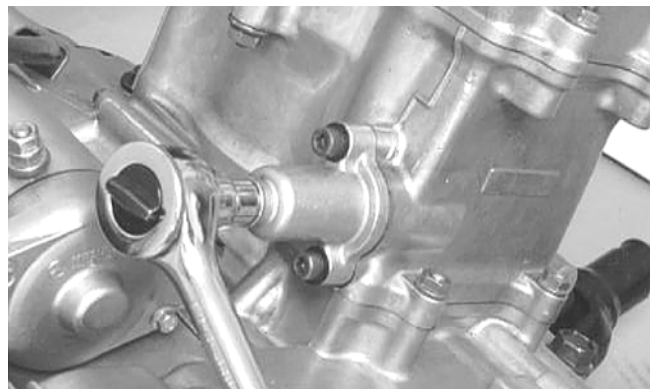


CD206



CD211A

3. Loosen the cap screw on the end of the tensioner; then remove the two cap screws securing the tensioner adjuster assembly and remove the assembly. Account for a gasket.



CC009D

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

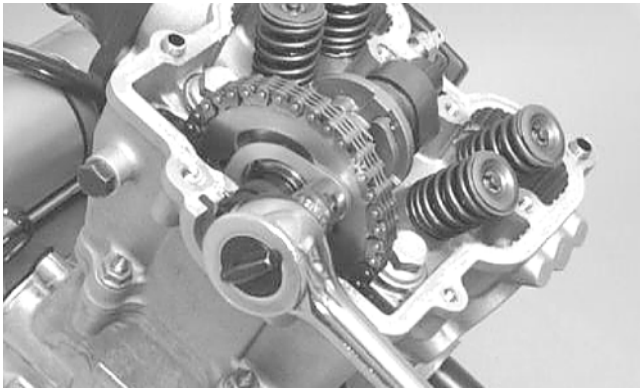
■NOTE: Care should be taken not to drop the C-ring down into the crankcase.



CC012D

5. Bend the washer tabs down and remove the two cap screws securing the sprocket to the camshaft; then drop the sprocket off the camshaft.

3



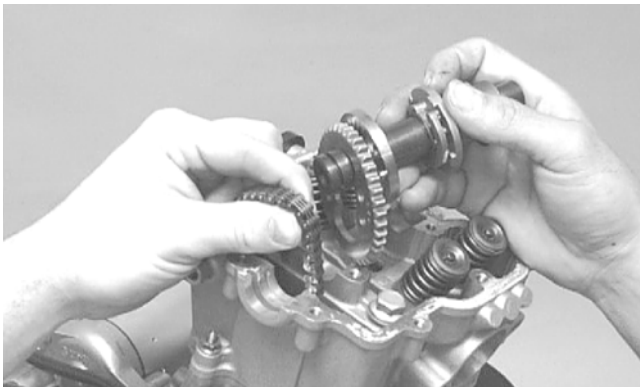
CC013D

6. Remove the cap screw securing the chain tensioner (account for a washer); then remove the tensioner.



CC014D

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

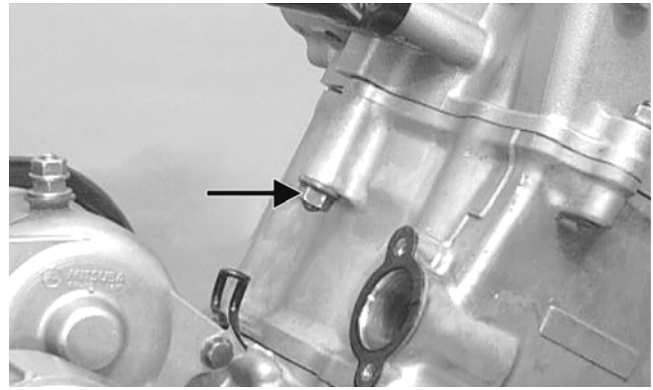


CC266D

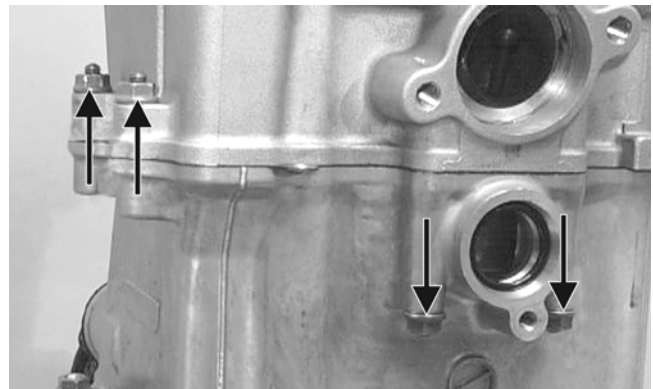
■ **NOTE:** Loop the chain over the cylinder and secure it to keep it from falling into the crankcase.

8. Remove the five nuts securing the cylinder head to the cylinder; then remove the four cylinder head cap screws (500).

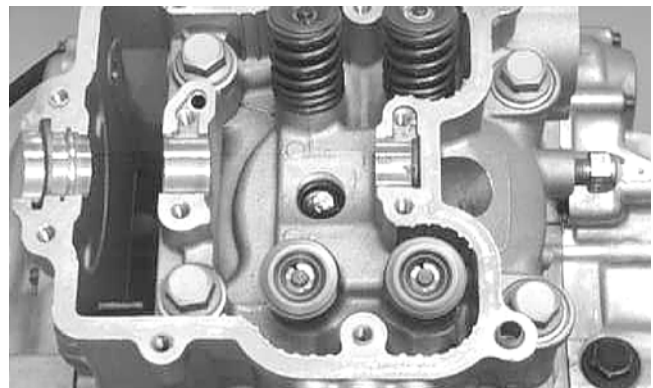
■ **NOTE:** On the 500, the cylinder head cap screws are different lengths.



CC017D

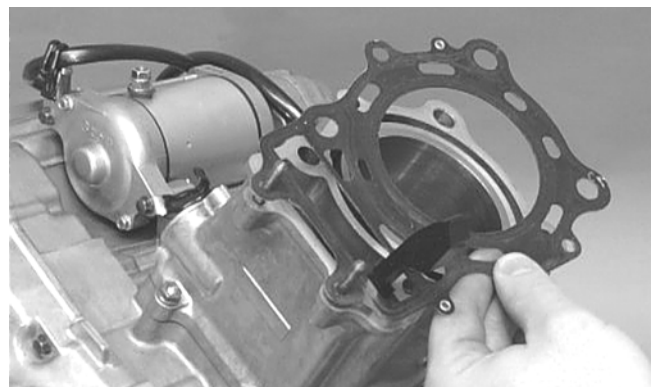


CC018D



CC016D

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



CC020D

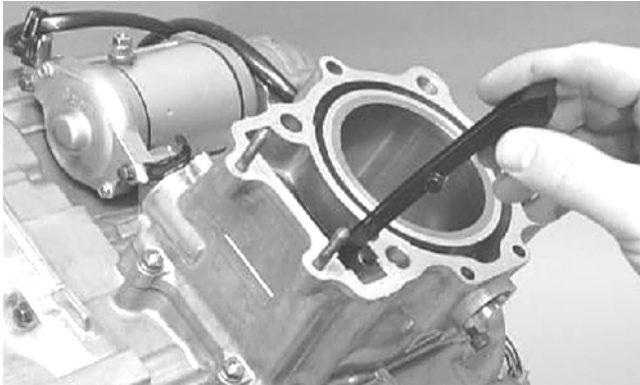
#### 👉 AT THIS POINT

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.



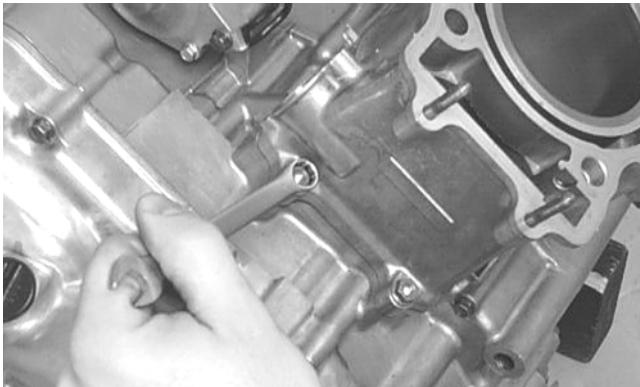
CC022D

## C. Cylinder

### D. Piston

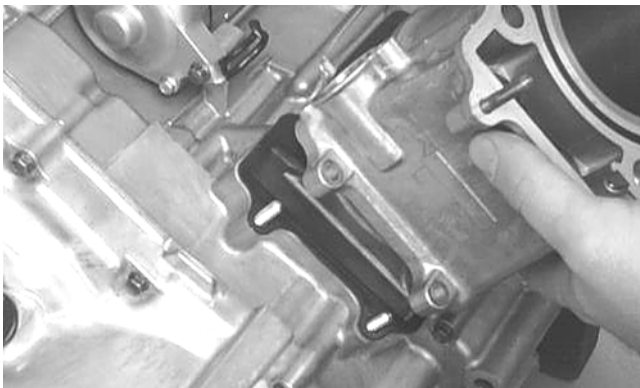
■NOTE: Steps 1-9 in the preceding sub-section must precede this procedure.

10. Loosen the clamp securing the coolant hose to the union; then detach the hose.
11. Remove the two nuts securing the cylinder to the crankcase.

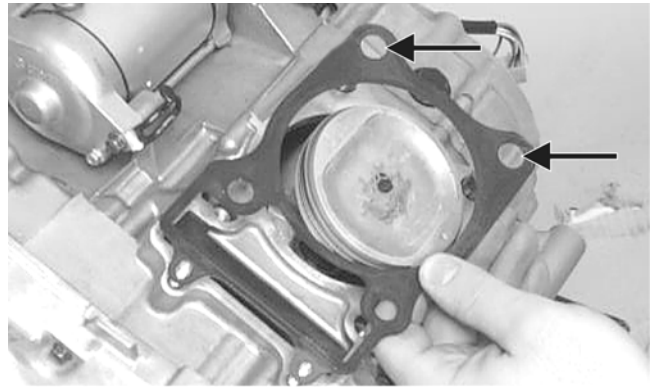


CC023D

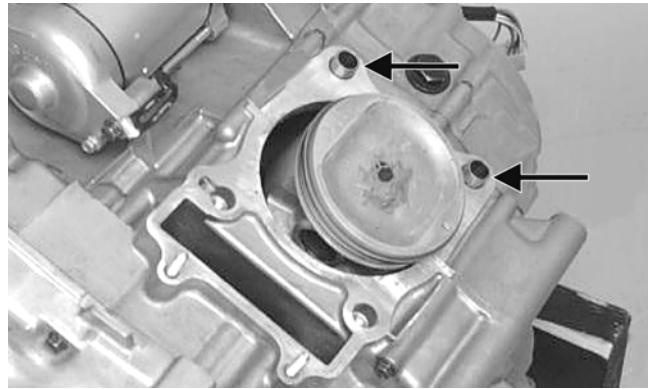
12. Lift the cylinder off the crankcase taking care not to allow the piston to drop against the crankcase. Account for the gasket and two alignment pins.



CC024D



CC025D



CC026D

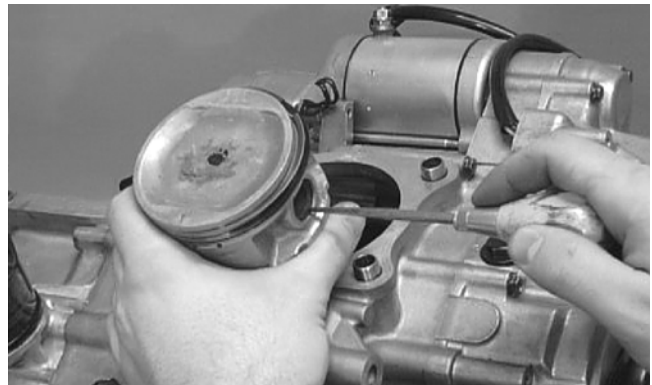
### AT THIS POINT

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.

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

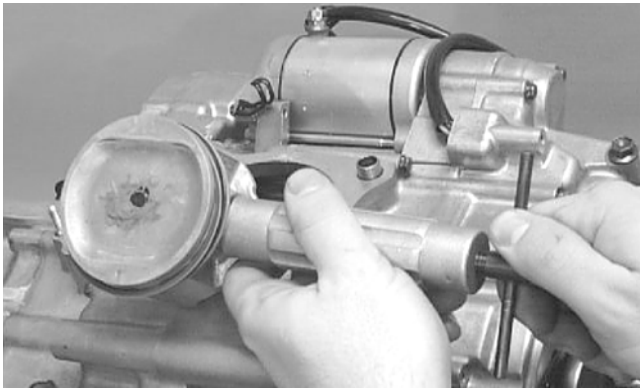


CC032D

14. 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.





CC033D

■NOTE: Support the connecting rod with rubber bands to avoid damaging the rod or install the Connecting Rod Holder.

### ⚠ 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.

■NOTE: If the existing rings will not be replaced with new rings, note the location of each ring for proper installation. When replacing with new rings, replace as a complete set only. If the piston rings must be removed, remove them in this sequence.

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

### 👉 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

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

### 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.

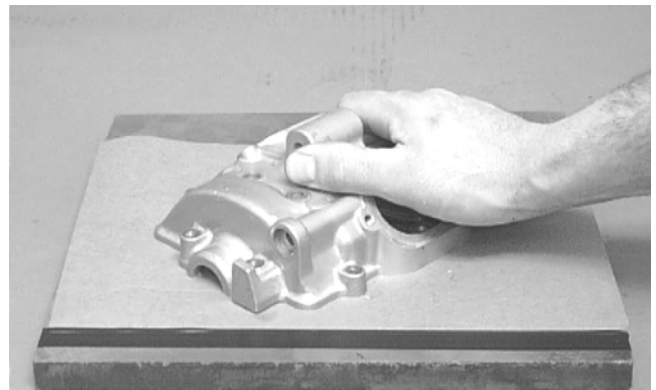
### Cleaning/Inspecting Valve Cover

■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

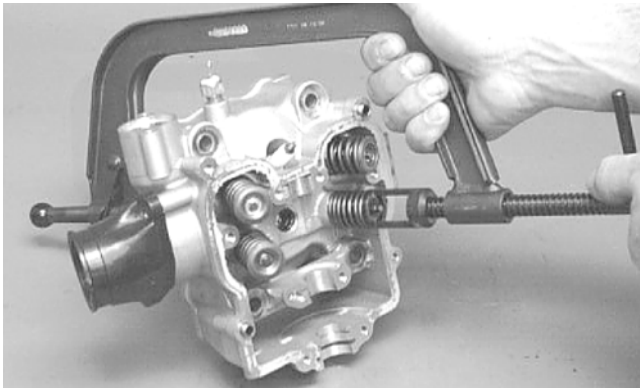
### ⚠ CAUTION

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

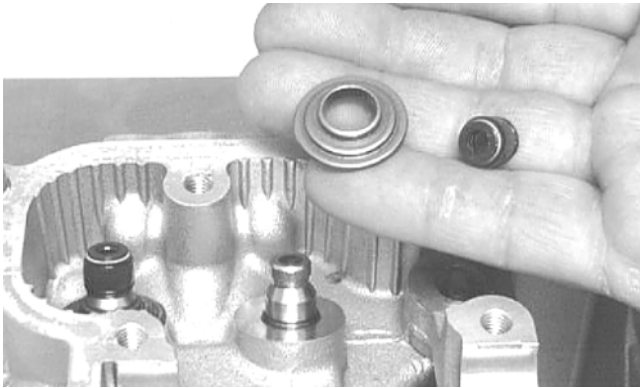
■NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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.



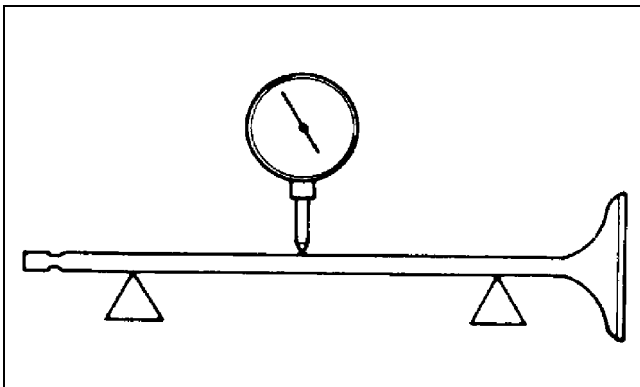
CC136D

■NOTE: The valve seals must be replaced.

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

### Measuring Valve Stem Runout

1. Support each valve stem end with the V Blocks; then check the valve stem runout using a dial indicator.



ATV-1082

2. Maximum runout must not exceed specifications.

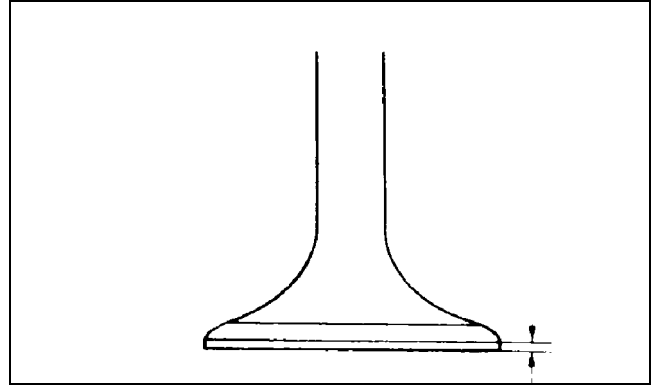
### Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.

2. Acceptable diameter range (intake valve) must be within specifications.
3. Acceptable diameter range (exhaust valve) must be within specifications.

### Measuring Valve Face/Seat Width

1. Using a micrometer, measure the width of the valve face.

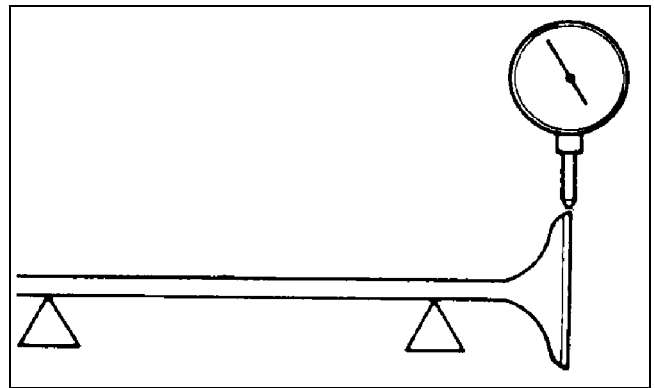


ATV-1004

2. Acceptable width range must be within specifications.

### Measuring Valve Face Radial Runout

1. Mount a dial indicator on the surface plate; then place the valve stem on a set of V blocks.
2. Position the dial indicator contact point on the outside edge of the valve face; then zero the indicator.

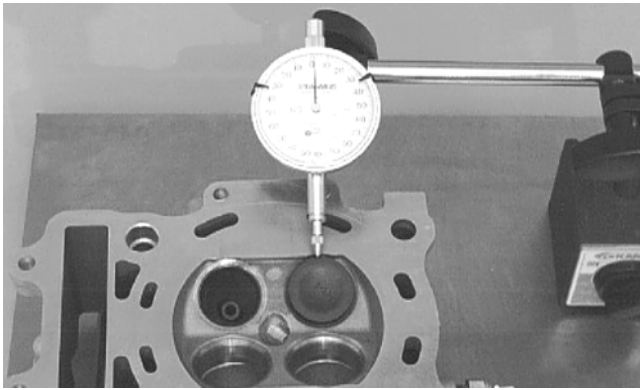


ATV1082A

3. Rotate the valve in the V blocks.
4. Maximum runout must not exceed specifications.

### Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

1. Mount a dial indicator and base on the surface plate; then place the cylinder head on the surface plate.
2. Install the valve into the cylinder head; then position the dial indicator contact point against the outside edge of the valve face. Zero the indicator.



CC131D

3. Push the valve from side to side; then from top to bottom.
4. Maximum "wobble" deflection must not exceed specifications.

### Measuring Valve Guide (Inside Diameter)

1. Insert a snap gauge 1/2 way down into each valve guide bore; then remove the gauge and measure it with a micrometer.
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 that 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.

### Measuring Rocker Arm (Inside Diameter)

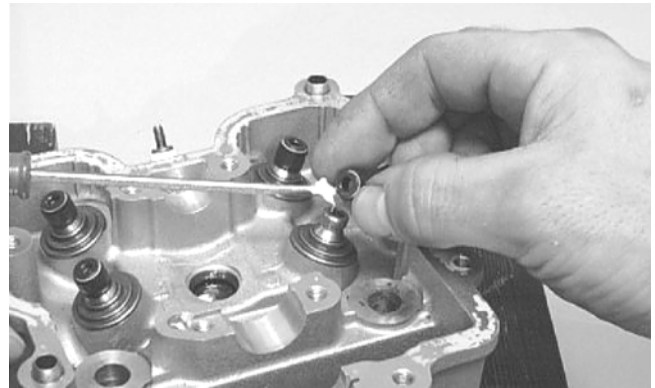
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range must be within specifications.

### Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range must be within specifications.

### Installing Valves

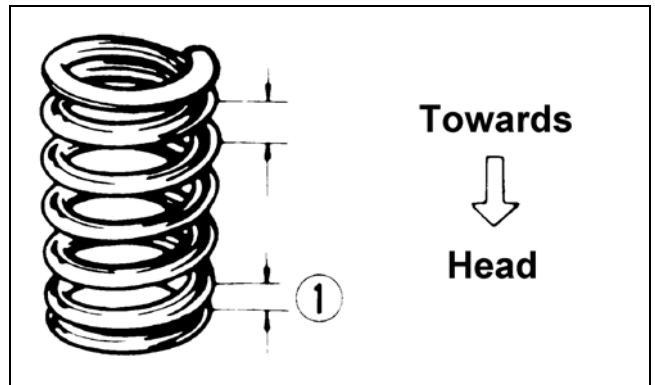
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



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.



CC132D



## PISTON ASSEMBLY

■NOTE: Whenever a piston, rings, or pin are out of tolerance, they must be replaced.

### Cleaning/Inspecting Piston

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the dome of the piston.
2. Inspect the piston for cracks in the piston pin, dome, and skirt areas.
3. Inspect the piston for seizure marks or scuffing. Repair with #400 grit wet-or-dry sandpaper and water or honing oil.

■NOTE: If scuffing or seizure marks are too deep to correct with the sandpaper, replace the piston.

4. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

### Removing Piston Rings

1. Starting with the top ring, slide one end of the ring out of the ring-groove.



CC400D

2. Remove each ring by working it toward the dome of the piston while rotating it out of the groove.

■NOTE: If the existing rings will not be replaced with new ones, note the location of each ring for proper installation. When installing new rings, install as a complete set only.

### Cleaning/Inspecting Piston Rings

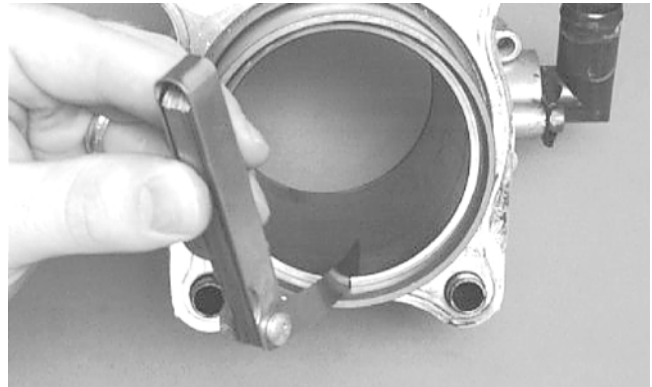
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

## CAUTION

Improper cleaning of the ring-grooves by the use of the wrong type of ring-groove cleaner will result in severe damage to the piston.

### Measuring Piston-Ring End Gap (Installed)

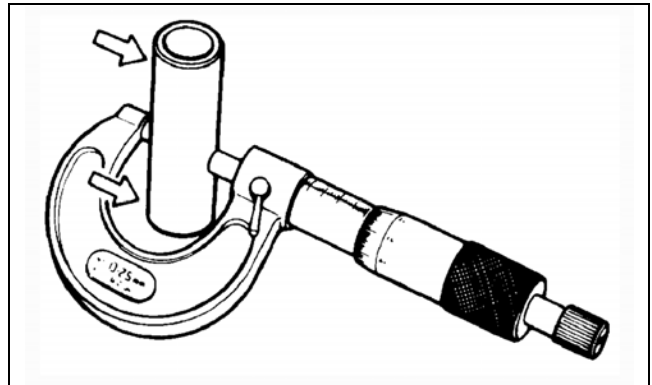
1. Place each compression ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within specifications.



CC280D

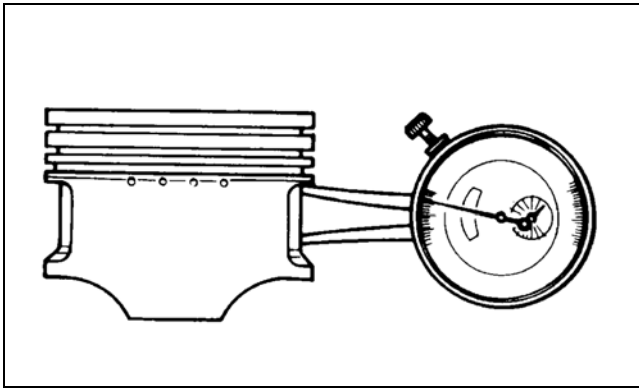
### Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is not within specifications, the piston pin must be replaced.



ATV-1070

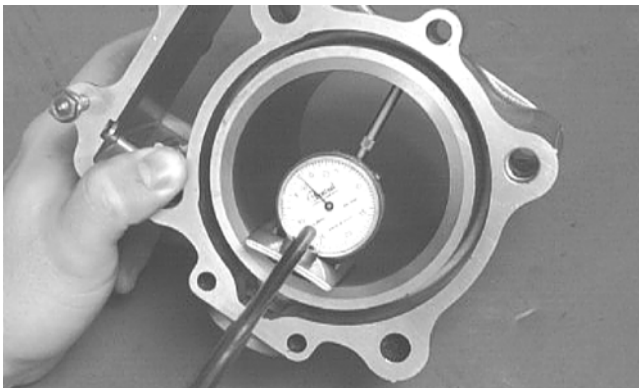
2. Insert an inside dial indicator into the piston-pin bore. The diameter must not exceed specifications. Take two measurements to ensure accuracy.



ATV-1069

## Measuring Piston Skirt/ Cylinder Clearance

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

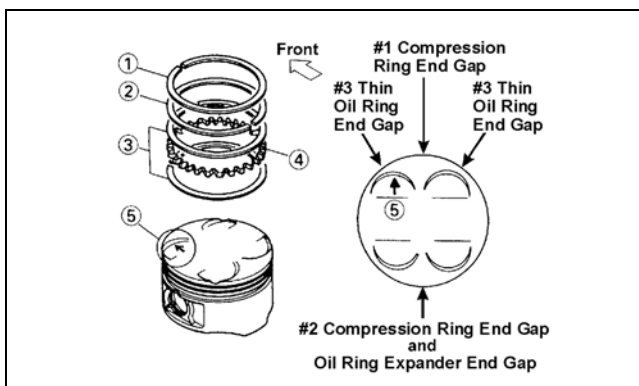


CC127D

2. Measure the corresponding piston diameter at the recommended point above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be within specifications.

## Installing Piston Rings

1. Install ring expander (4) in the bottom groove of the piston; then install the thin oil rings (3) over the expander making sure the expander ends do not overlap. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

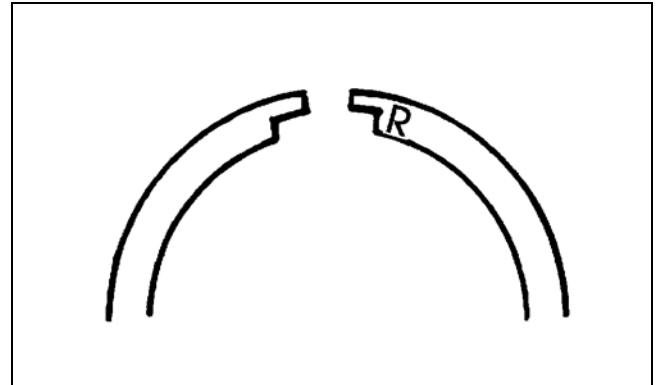


ATV-1085B

■NOTE: Note the direction of the exhaust side of the piston (5) for correct ring end gap orientation.

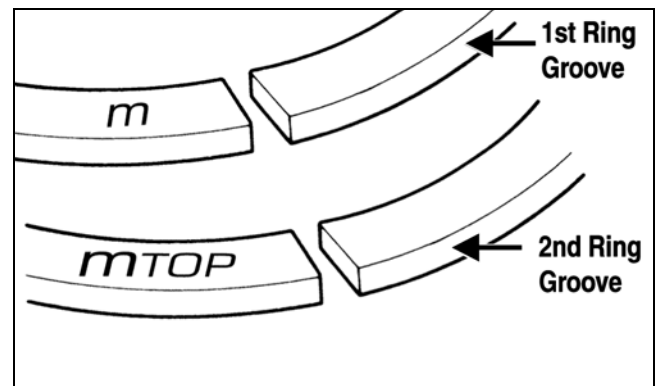
2. On the 500, install the compression rings (1 and 2) so the letter on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring end gaps are on directly opposite sides of the piston (see illustration).

■NOTE: The chrome (silver) ring should be installed in the top position.

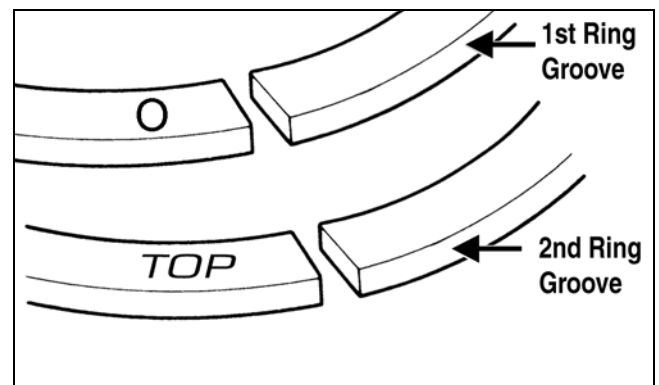


726-306A

3. On the H1 models, the ring with the orientation mark (MTOP or TOP) should be installed in the second (middle) groove and the ring with the orientation mark (M or O) should be installed in the first (top) groove.



ATV-1024A



ATV-1024B

## CAUTION

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

## CYLINDER/CYLINDER HEAD ASSEMBLY

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

### Cleaning/Inspecting Cylinder Head

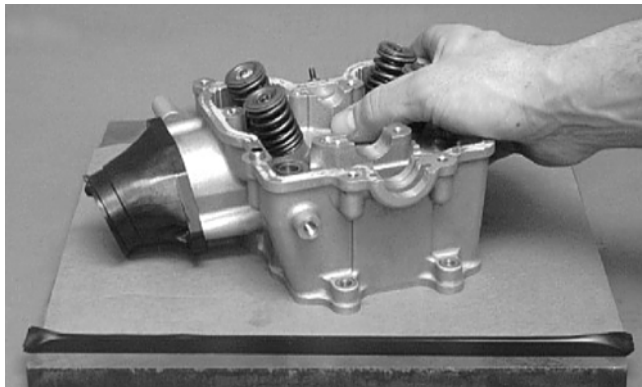
#### ⚠ CAUTION

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 "heli-coil" 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.



CC128D

### 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 factor between the head and the straightedge.
3. Maximum distortion must not exceed specifications.



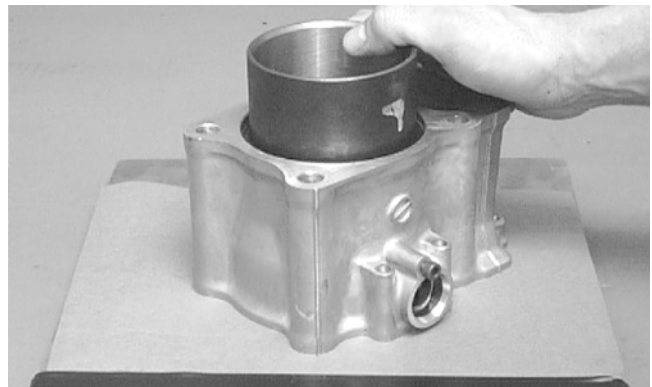
CC141D

### 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 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

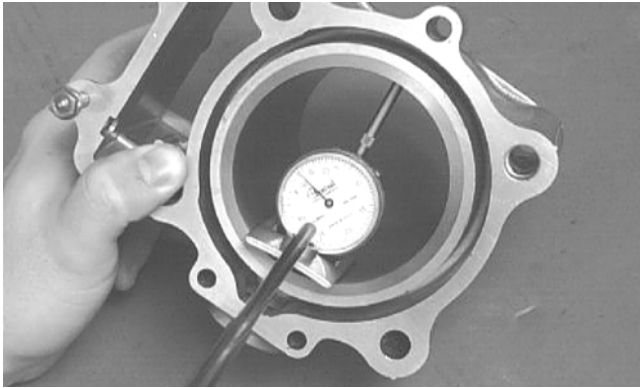
### Inspecting Cam Chain Guide

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



## Inspecting Cylinder

1. 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

2. Wash the cylinder in parts-cleaning solvent.
3. 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.



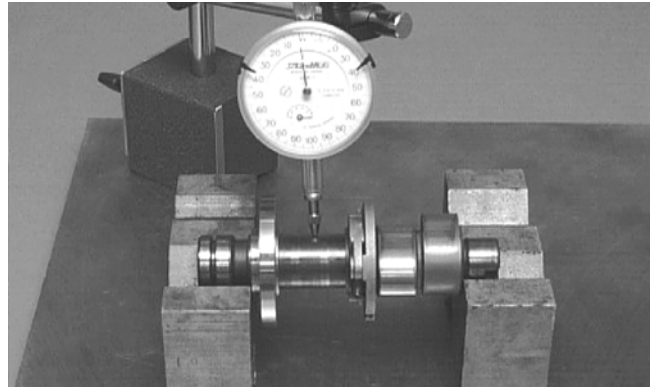
CC390D

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

## 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.

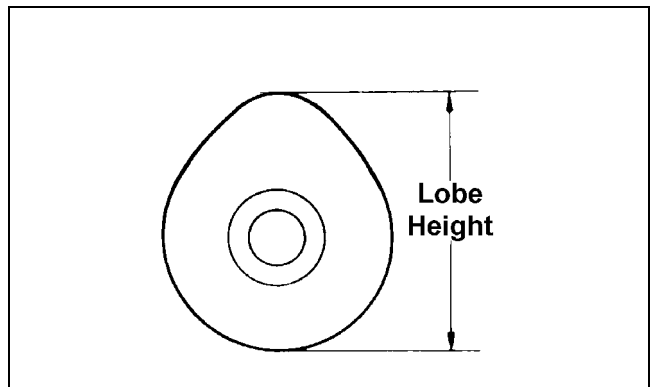


CC283D

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

## Measuring Camshaft Lobe Height

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



ATV1013A

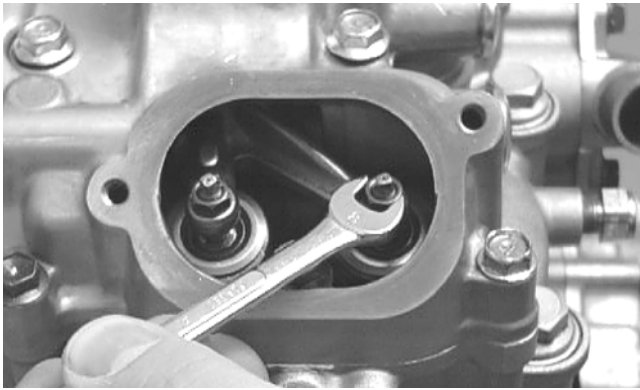
2. The lobe heights must not exceed minimum specifications.

## 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.

## Measuring Camshaft to Cylinder Head Clearance

1. Remove the adjuster screws and jam nuts.

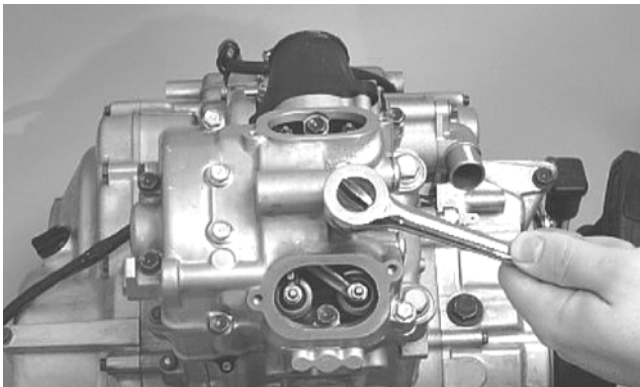


CC005D

2. Place a strip of plasti-gauge in each of the camshaft lands in the cylinder head.
3. Place the valve cover on the cylinder head and secure with the valve cover cap screws. Tighten securely.

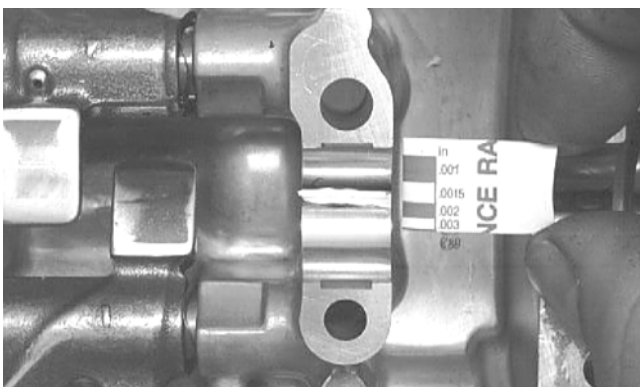
■NOTE: Do not rotate the camshaft when measuring clearance.

4. Remove the cap screws securing the valve cover to the cylinder; then remove the valve cover and camshaft.



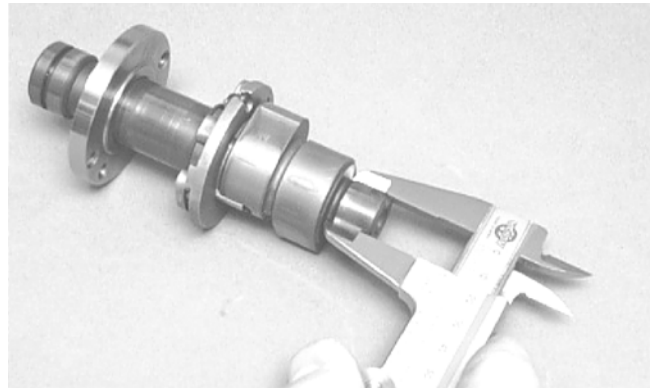
CC003D

5. Match the width of the plasti-gauge with the chart found on the plasti-gauge packaging to determine camshaft to cylinder head and valve cover clearance.



CC145D

6. If clearance is excessive, measure the journals of the camshaft.



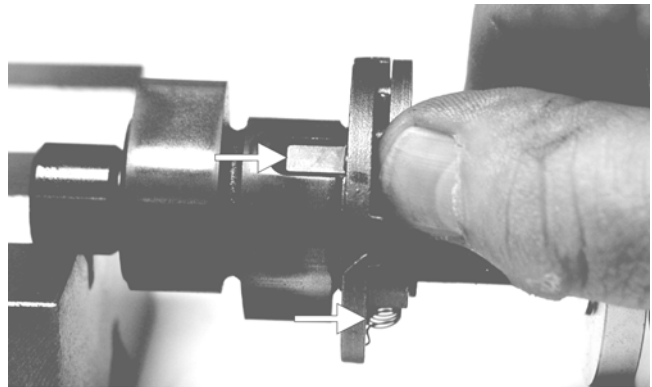
CC287D

■NOTE: If the journals are worn, replace the camshaft; then measure the clearance again. If it is still out of tolerance, replace the cylinder head.

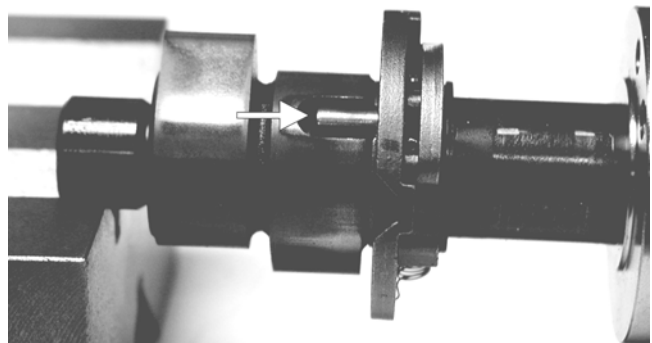
### Inspecting Camshaft Spring/Drive Pin

1. Inspect the spring and drive pin for damage.

3



CF061A



CF060A

2. If damaged, the camshaft must be replaced.

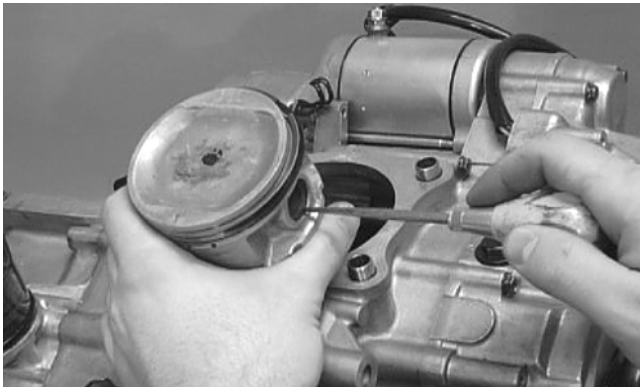
## Installing Top-Side Components

### A. Piston

### B. Cylinder

1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

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



CC032D

2. Place the two alignment pins into position. Place the cylinder gasket into position; then place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase.

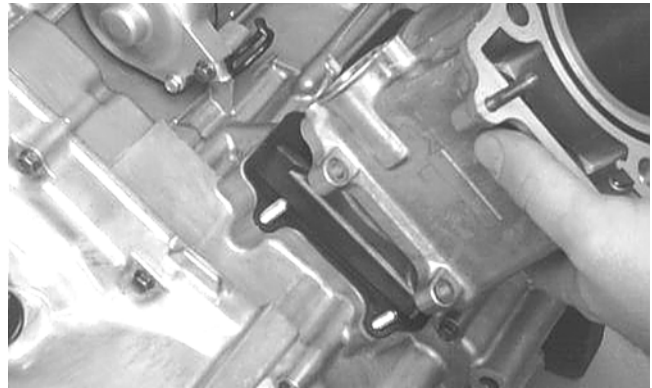


CC025D

3. Lubricate the inside wall of the cylinder; then using a ring compressor or the fingers, 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

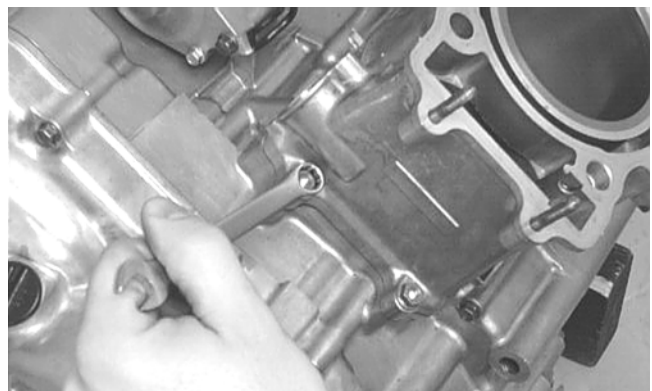
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



CC024D

4. Loosely install the two nuts which secure the cylinder to the crankcase.

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



CC023D

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

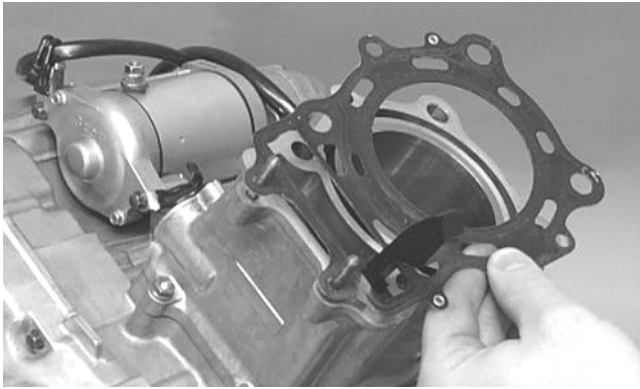
Care should be taken that the bottom of the chain guide is secured in the crankcase boss.



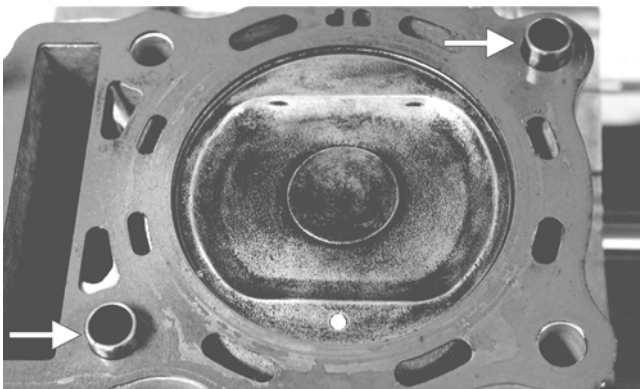
CC022D



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.

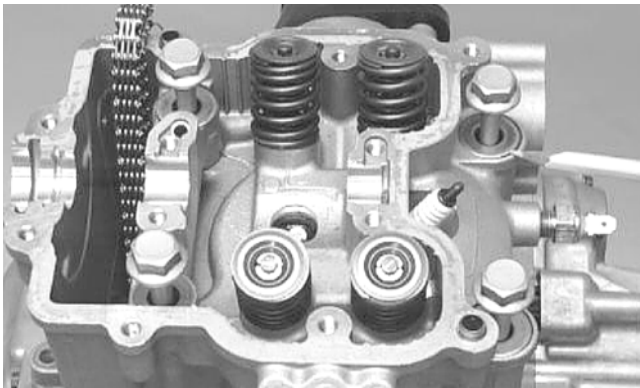


CC020D



CF057A

8. Install the four cylinder head cap screws (on the 500, note the locations of the different-lengthed cap screws and install with copper washers). Tighten only until snug.

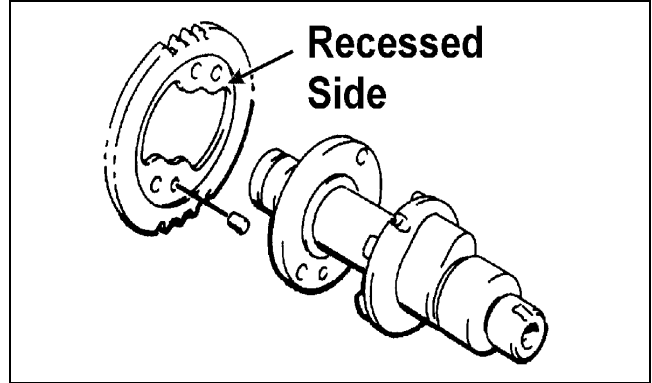


CC272D

9. Loosely install the five cylinder head nuts.

10. In a crisscross pattern, tighten the four cylinder head cap screws (from step 8) to 28 ft-lb (500) or to 40 ft-lb (H1 models); then tighten the 8 mm nut (from step 9) to 18 ft-lb. Using a crisscross pattern, tighten the 6 mm nuts (from step 9) to 8 ft-lb. Tighten the two cylinder-to-crankcase nuts (from step 4) securely.

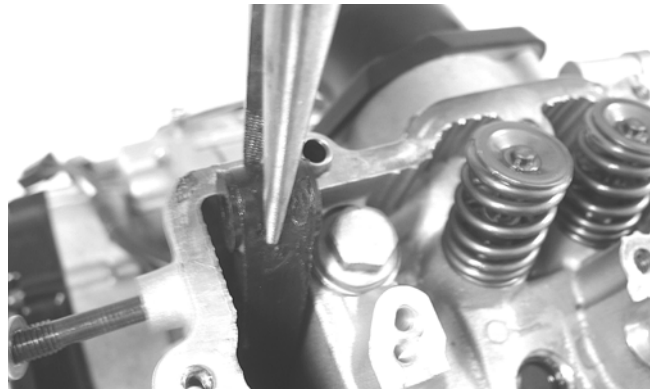
11. With the timing inspection plug removed and the chain held tight, rotate the crankshaft until the piston is at top-dead-center.
12. With the alignment pin installed in the camshaft, loosely place the cam sprocket (with the recessed side facing the cam shaft lobes) onto the camshaft. At this point, do not "seat" the sprocket onto the shaft.



732-307B

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

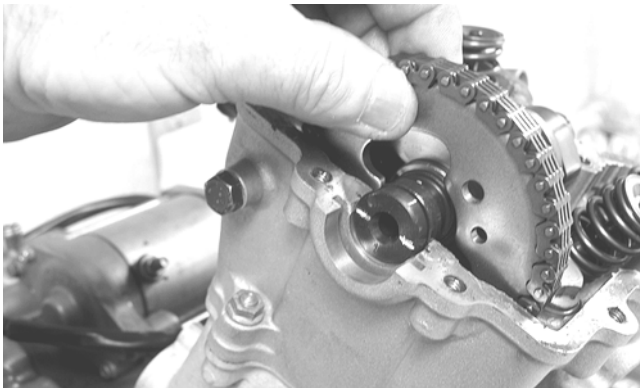
13. While holding the cam chain sprocket to the side, install the rear cam chain tensioner guide into the cylinder head. Install the pivot cap screw and washer.



CD461

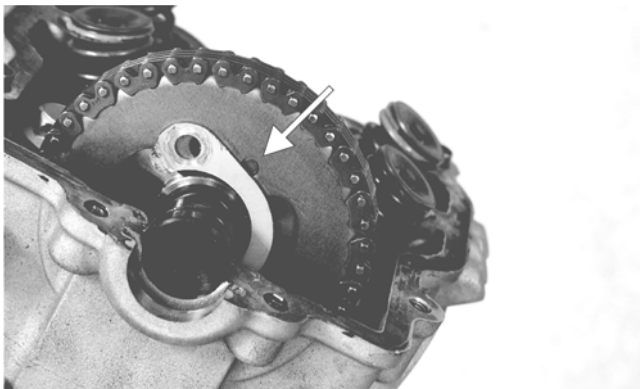
14. With the cam lobes directed down (toward the piston), maneuver the camshaft/sprocket assembly through the chain and towards its seating position; then loop the chain over the sprocket.

■ **NOTE:** Note the position of the alignment marks on the end of the camshaft. They must be parallel with the valve cover mating surface. If rotating the camshaft is necessary for alignment, do not allow the chain and sprocket to rotate and be sure the cam lobes end up in the down position.



CD463

15. 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.



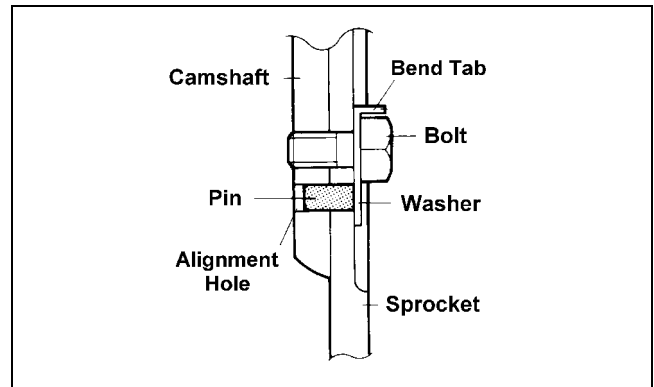
CF013A

- 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.

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

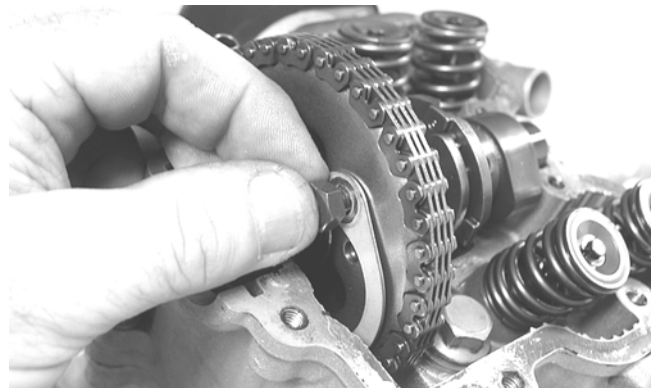


ATV1027

**⚠ CAUTION**

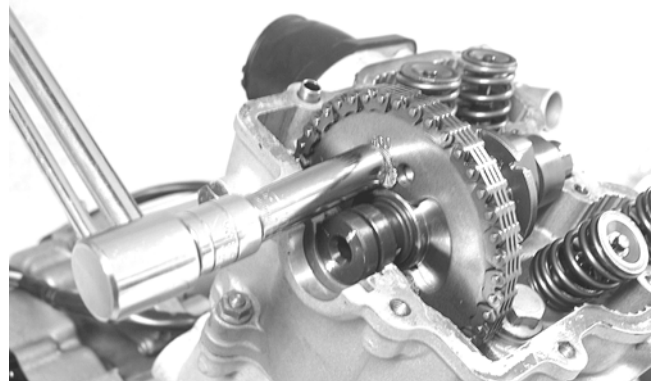
Care must be taken that the tab-washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.

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



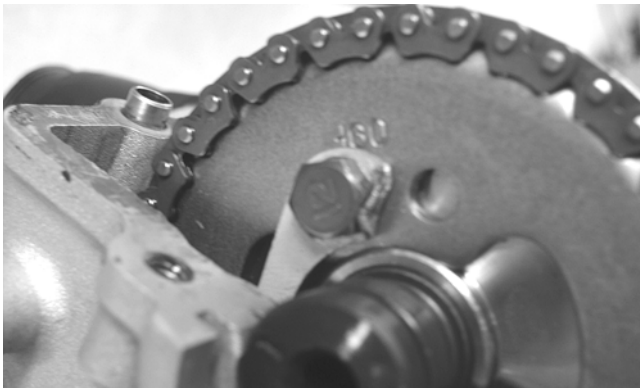
CD464

18. 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.



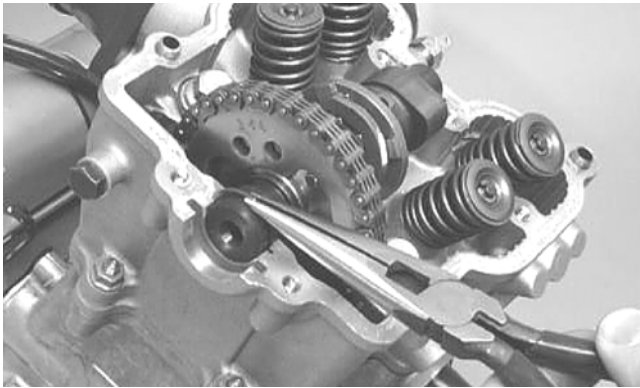
CD465

19. Rotate the crankshaft until the first cap screw (from step 17) can be addressed; then tighten to 10 ft-lb. Bend the tab to secure the cap screw.



CD466

20. Place the C-ring into position in its groove in the cylinder head.

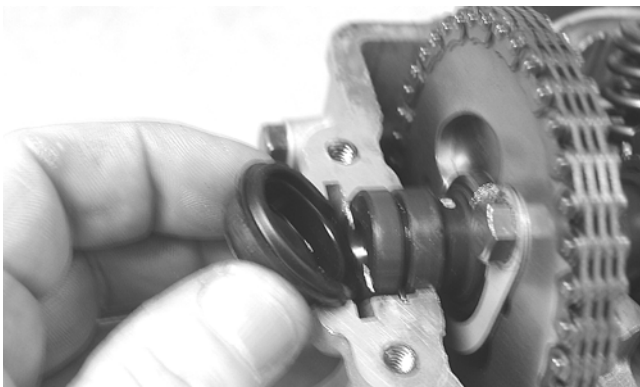


CC012D

21. Install the cylinder head plug in the cylinder head with the open end facing downward and toward the inside.

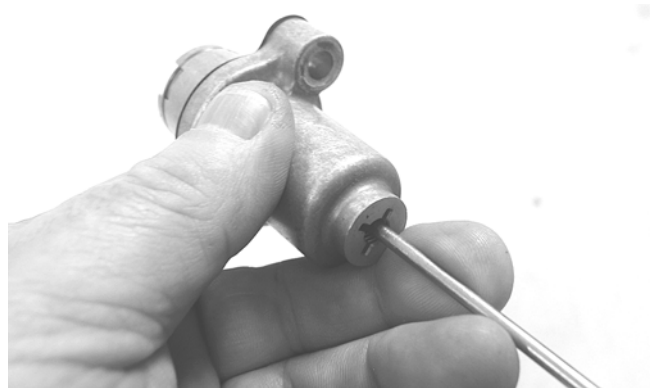
**CAUTION**

The open end of the plug must be positioned downward.



CD468

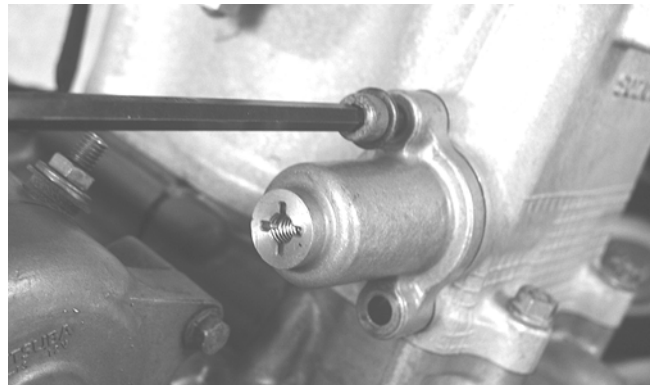
22. Remove the cap screw from the end of the chain tensioner; then using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner clockwise until the screw bottoms.



CD501

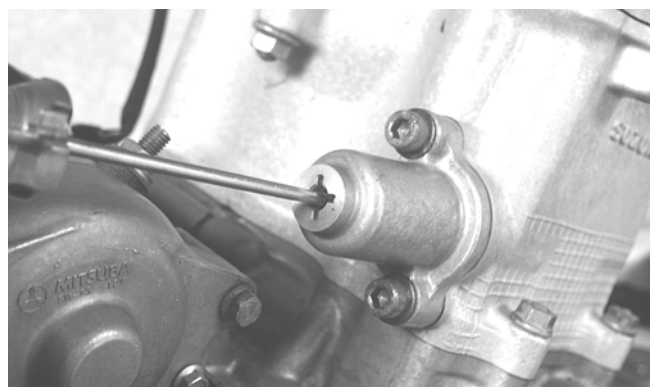
■NOTE: The adjuster shaft will be drawn into the tensioner as the adjuster screw is rotated clockwise. The adjuster shaft tension will be released in step 24.

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



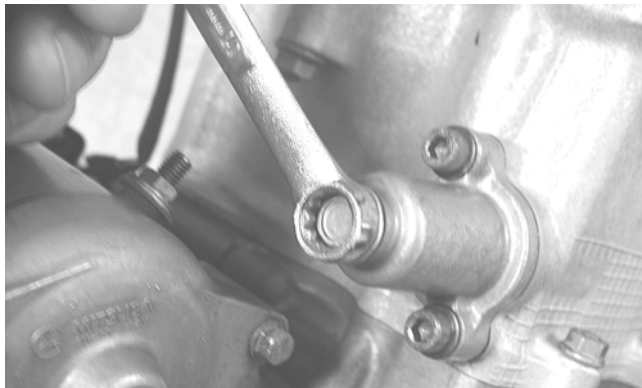
CD469

24. Using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner counterclockwise until all tension is released; then install the cap screw into the end of the chain tensioner.



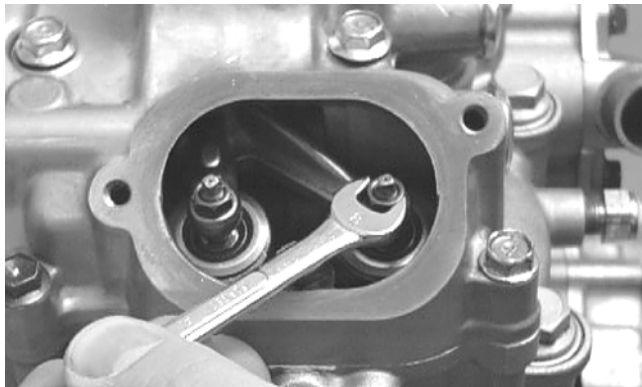
CD470





CD471

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



CC005D

26. Apply a thin coat of Three Bond Sealant to the mating surfaces of the cylinder head and valve cover.

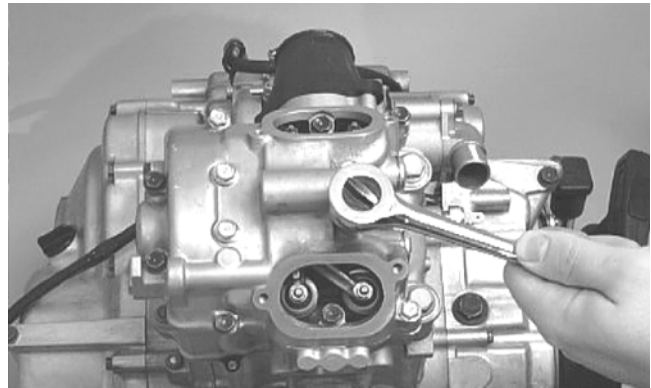


CC275D

27. Place the valve cover into position.

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

28. Install the four top side cap screws with rubber washers; then install the remaining cap screws. Tighten only until snug.



CC003D

29. In a crisscross pattern starting from the center and working outward, tighten the cap screws (from step 28) to 7 ft-lb (500) or 8.5 ft-lb (H1 models).

30. Adjust valve/tappet clearance (see Section 2).

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



CC001D

32. If removed, install the spark plug. Tighten securely.

## 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. Recoil Starter/Outer Magneto Cover**
- B. Water Pump**
- C. Cover**
- D. Rotor/Flywheel**

■NOTE: The H1 models are not equipped with a recoil starter.

1. Remove the four cap screws securing the recoil starter/outer magneto cover to the left-side cover; then remove the recoil starter/outer magneto cover. Account for the gasket.

### ⚠ AT THIS POINT

To service the recoil starter, see Servicing Left-Side Components sub-section.

2. Remove the flange nut securing the starter cup/spacer to the crankshaft; then remove the starter cup/spacer. Account for the O-ring inside the cup.



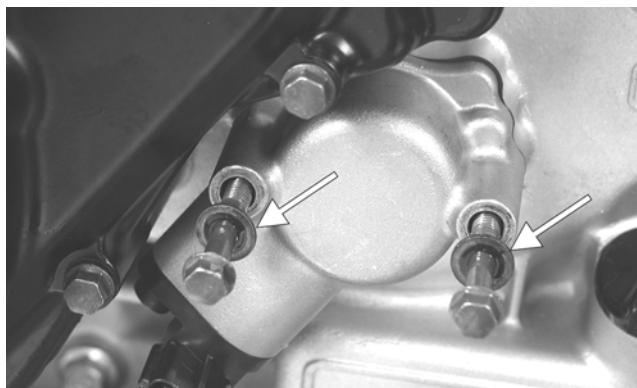
CD925A

3. Using a cold chisel, scribe a mark showing the relative position of the shift arm to the shift arm shaft to aid in installing; then remove the shift arm.



FI085A

4. Remove the two cap screws securing the speed sensor housing; then remove the housing. Account for the gasket and two seal washers.



CD920A

5. Loosen the clamps securing the coolant hose to the water pump; then remove the crossover tube from the cylinder head. Account for an O-ring.



CD214

6. Remove the two cap screws securing the water pump to the engine; then remove the water pump.

### ⚠ AT THIS POINT

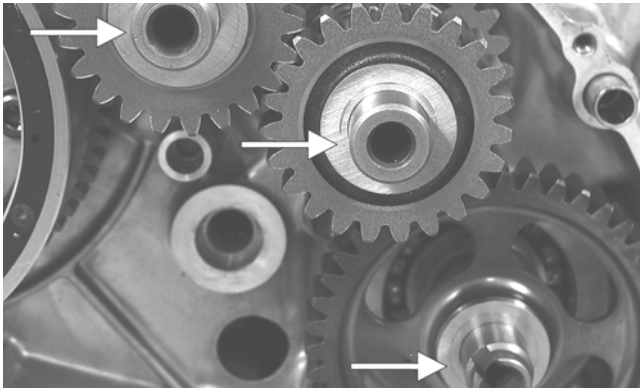
To service the water pump, see Section 4.

7. Remove the cap screws securing the left-side cover to the crankcase noting the location of the different-sized cap screws for installing purposes.
8. Using Side Case Puller, remove the side cover. Account for a gasket and two alignment pins.

■NOTE: Inspect the inside of the left-side cover for any shaft washers that may have come off with the cover. Make sure they are returned to their respective shafts and that the starter idler gear spacer is on the shaft or in the cover.

3



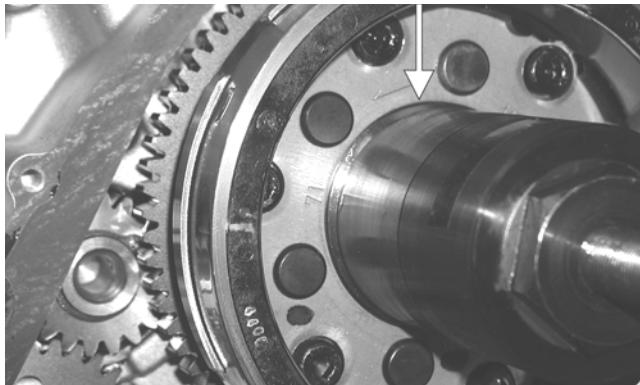


CF075A

9. Remove the nut securing the magneto rotor to the crankshaft; then install the magneto rotor puller adapter.

■ **NOTE:** The puller has left-hand threads.

10. Using Magneto Rotor Remover Set, remove the rotor/flywheel assembly from the crankshaft. Account for the key; then remove the starter clutch gear assembly and washer.



CD939A

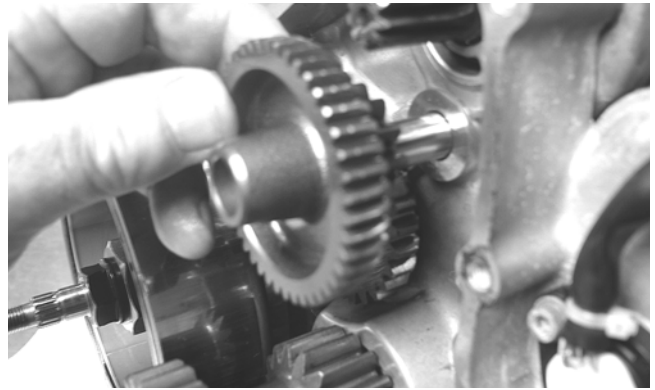


CD940A

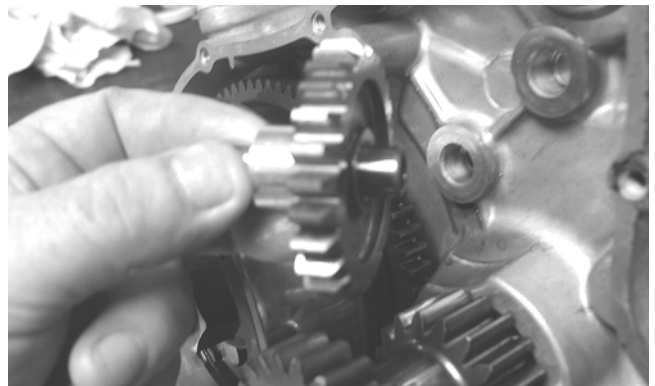
### 👉 AT THIS POINT

To service the magneto assembly, see Section 5.

11. Remove the two starter gears from the crankcase noting the direction of the beveled side of the gears for installing purposes; then remove the two starter gear shafts.



CD136



CD140

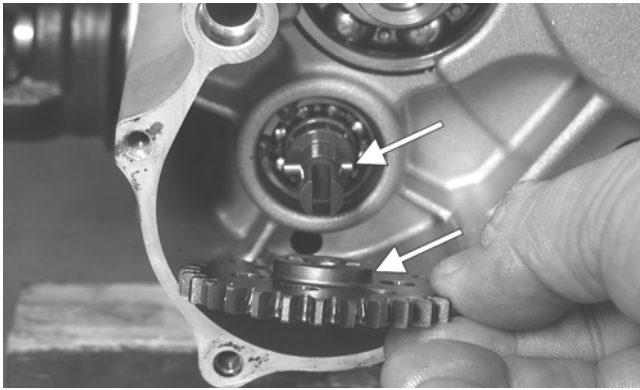
12. Remove the snap ring securing the water pump drive gear; then remove the gear noting the direction of the sides of the gear for installing purposes. Account for the drive gear alignment pin.



CD944

13. Remove the snap ring securing the water pump driven gear; then remove the gear noting the direction of the sides of the gear for installing purposes. Account for the driven gear alignment pin.

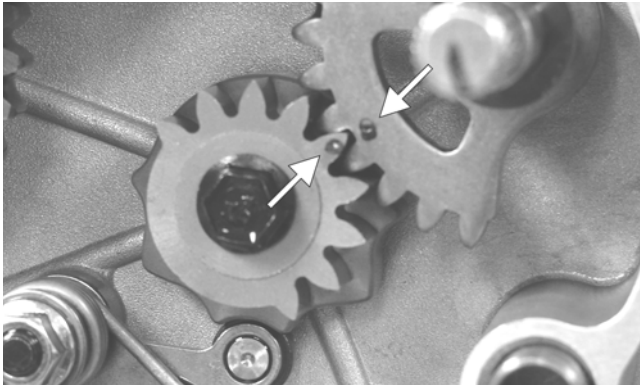




CD952A

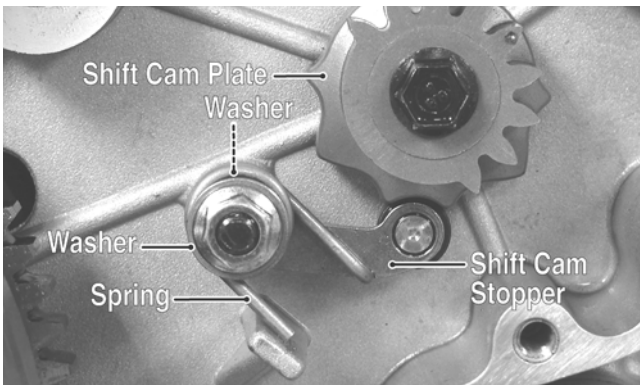
■NOTE: There is an oil passage beneath the driven gear/drive gear assembly. This passage should be plugged prior to removing the driven gear and drive gear. Failure to do so could result in the loss of an alignment pin into the crankcase.

14. Remove the shift shaft noting the timing marks for assembling purposes. Account for two washers.



PR430A

15. Remove the gear shift cam plate; then remove the cam stopper and cam stopper spring. Account for two washers.



PR434A

## Servicing Left-Side Components

### A. RECOIL STARTER (500)

#### Disassembling

#### WARNING

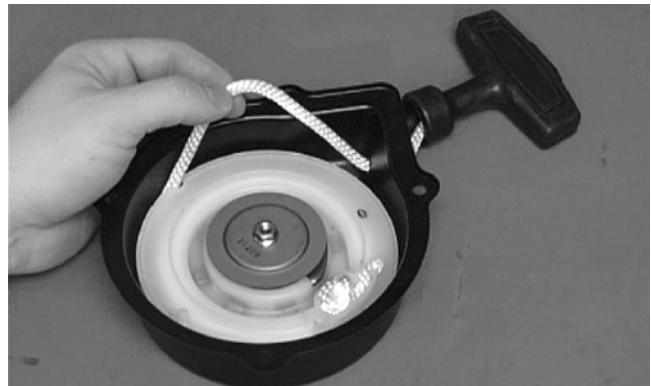
Always wear safety glasses when servicing the recoil starter.

#### WARNING

During the disassembly procedure, continuous downward pressure must be exerted on the reel so it does not accidentally disengage and cause injury.

1. Rotate the reel counterclockwise until the notch of the reel is near the rope guide in the case. Guide the rope into the notch and slowly allow the reel to retract until all spiral spring tension is released.

3



B600D

#### CAUTION

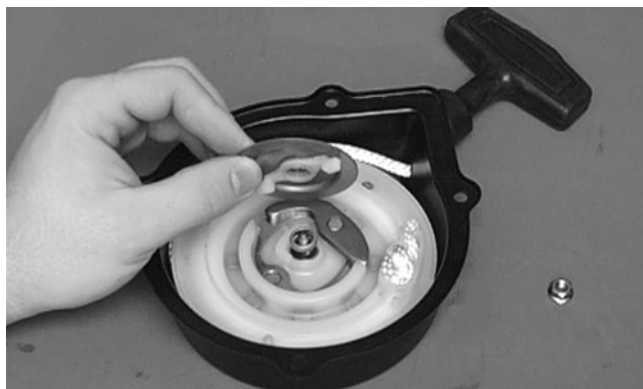
During the disassembly procedure, make sure all spring tension is released before continuing.

2. Remove the nut.



B601D

3. Slowly release the friction plate and lift the plate with ratchet guide free of the recoil case; then remove the ratchet guide from the friction plate.



B602D

4. Remove the spring, collar, and friction spring; then remove the ratchet and account for the pin.

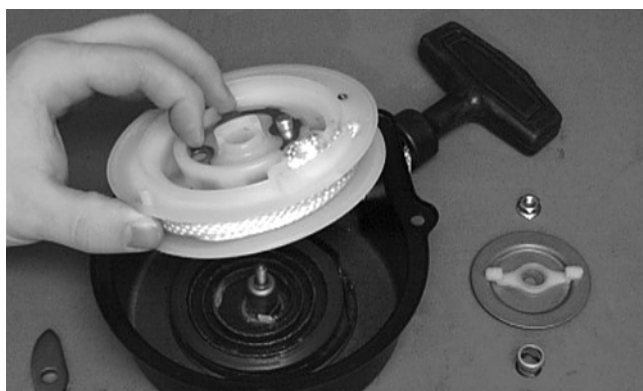


B603D



B604D

5. Carefully lift the reel from the case making sure the spiral spring does not accidentally disengage from the case.



B605D

## ⚠ WARNING

Care must be taken when lifting the reel free of the case. Wear safety glasses to avoid injury.

6. Remove the protective cover from the starter handle and pull the rope out of the handle; then untie the knot in the rope and remove the handle.

■NOTE: Do not remove the spiral spring unless replacement is necessary. If replacement is necessary, follow steps 7-8.

7. Remove the spring from the case by lifting the spring end up and out. Hold the remainder of the spring with thumbs and alternately release each thumb to allow the spring to gradually release from the case.

8. Unwind the rope from the reel and remove the rope.

## Cleaning and Inspecting

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

1. Clean all components.
2. Inspect the springs and ratchet for wear or damage.
3. Inspect the reel and case for cracks or damage.
4. Inspect the shaft for wear, cracks, or damage.
5. Inspect the rope for breaks or fraying.
6. Inspect the spiral spring for cracks, crystallization, or abnormal bends.
7. Inspect the handle for damage, cracks, or deterioration.

## Assembling

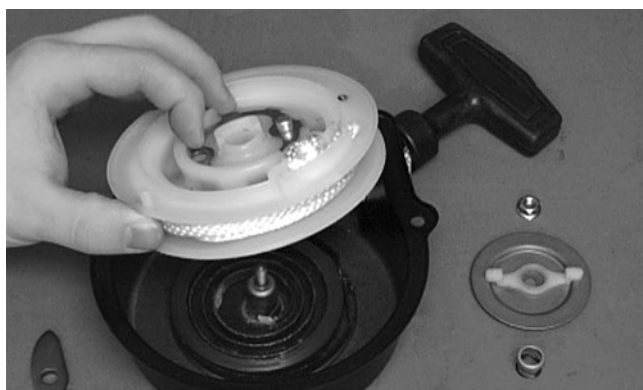
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

■NOTE: The spiral spring must seat evenly in the recoil case.



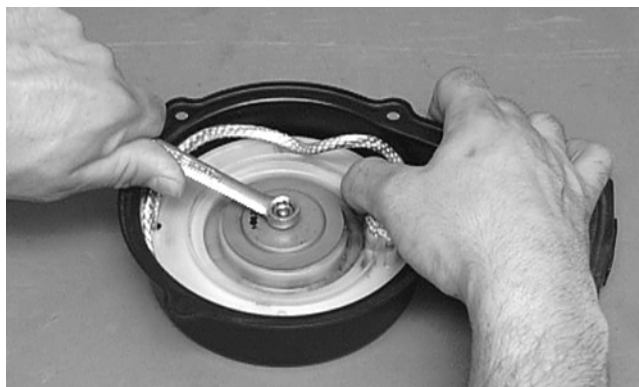
B606D

2. Insert the rope through the hole in the reel and tie a knot in the end; then wrap the rope counter-clockwise around the reel leaving approximately 50 cm (20 in.) of rope free of the reel.
3. Apply low-temperature grease to the spring and hub.
4. Thread the end of the rope through the guide hole of the case; then thread the rope through the handle and secure it with a double knot. Install the protective cover into the handle.
5. Align the inner hook of the spiral spring with the notch in the reel.



B605D

6. Install the ratchet making sure the end is properly installed on the reel.
7. Install the friction spring and the spring cover; then install the friction plate with the ratchet guide fitting into the ratchet.
8. While pushing down on the reel, install the nut. Tighten securely.



B601D

9. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.
10. Rotate the reel four turns counterclockwise; then release the rope from the notch and allow the rope to retract.
11. Pull the rope out two or three times to check for correct tension.

■NOTE: Increasing the rotations in step 10 will increase spring tension.

3

## B. STARTER MOTOR

### 👉 AT THIS POINT

To service the starter motor, see Section 5.

## C. WATER PUMP

### 👉 AT THIS POINT

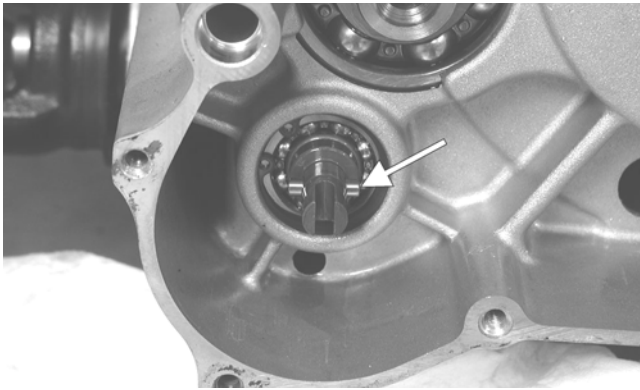
To service the water pump, see Section 4.

## Installing Left-Side Components

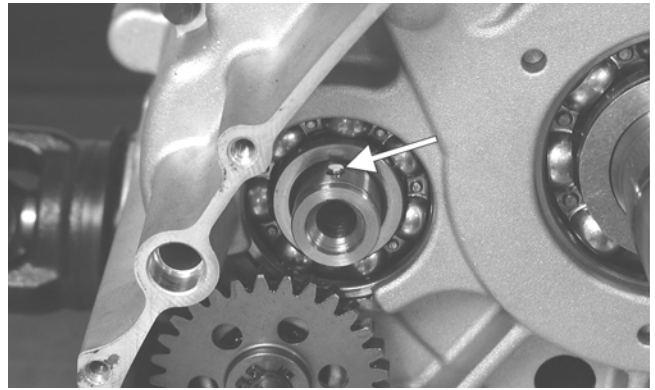
■NOTE: Plug the oil passage in the crankcase housing prior to installing the drive gear/driven gear assembly to prevent loss of an alignment pin.

1. Install the water pump driven gear alignment pin and the driven gear (with the beveled side of the gear facing outward as noted in removing); then secure with the snap ring.

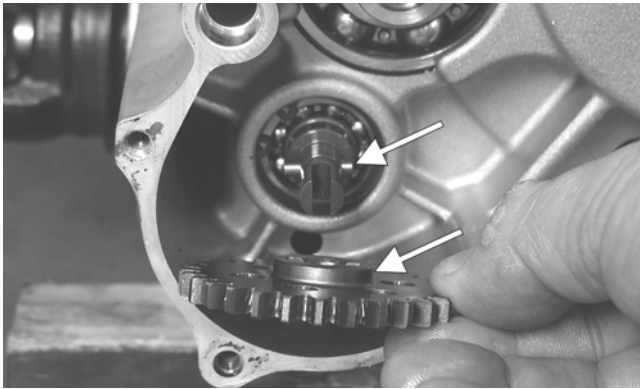




CD950A



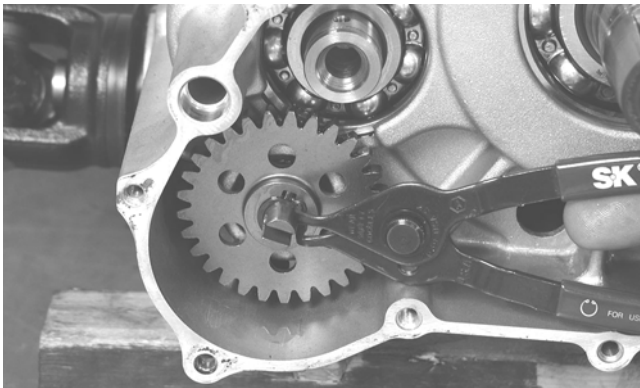
CD946A



CD952A



CD944



CD949

■NOTE: The sharp side of the snap ring should be facing outward.

2. Install the water pump drive gear drive pin and the drive gear (with the flat side of the gear facing outward as noted in removing); then secure with the snap ring.

■NOTE: The sharp side of the snap ring should be facing outward.

■NOTE: Once the gears are secured, remove the oil passage plug from the crankcase.

3. Install the two starter gear shafts; then install the two starter gears (with the beveled side of the intermediate gear facing inward as noted in removing).

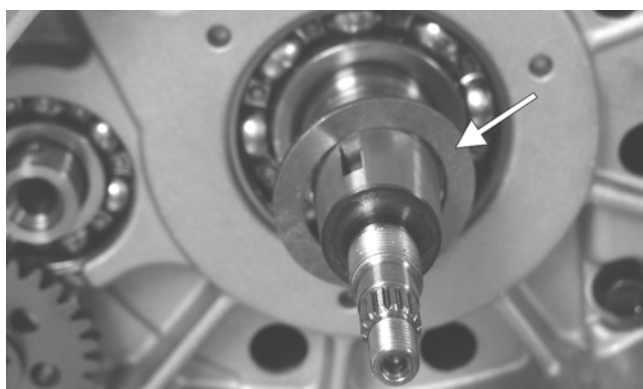


CD139

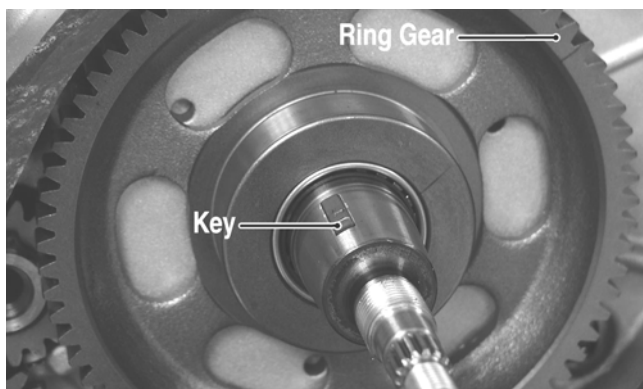


CD145

4. In order on the crankshaft, install a washer, ring gear, key, and the magneto rotor. Secure with the nut. Tighten to 116 ft-lb (500) or 107 ft-lb (H1 models).

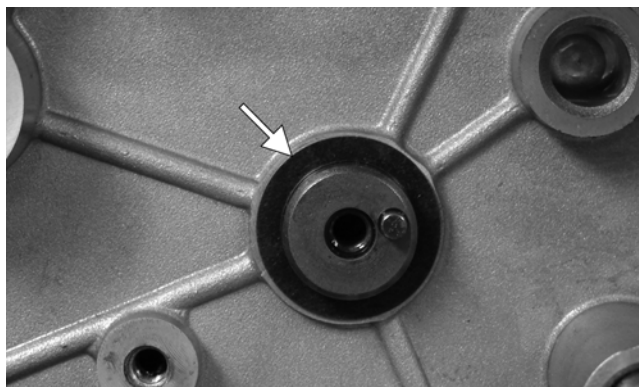


CD948A



CD940B

5. Install the thrust washer and shift cam plate onto the shift cam shaft; then coat the cap screw threads with red Loctite #271 and tighten securely.

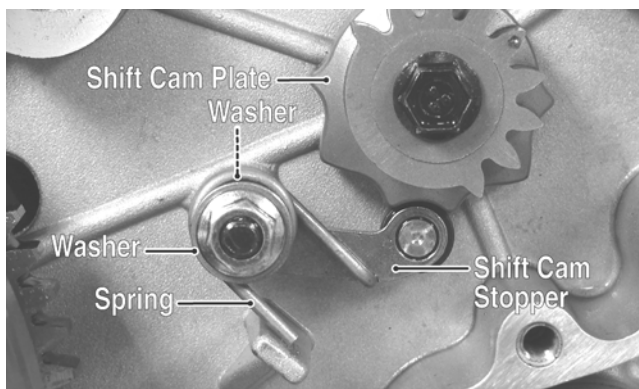


PR433A



CD934

6. Install the shift cam stopper, spring, and two washers; then coat the threads on the mounting stud with red Loctite #271 and install the nut. Tighten securely.

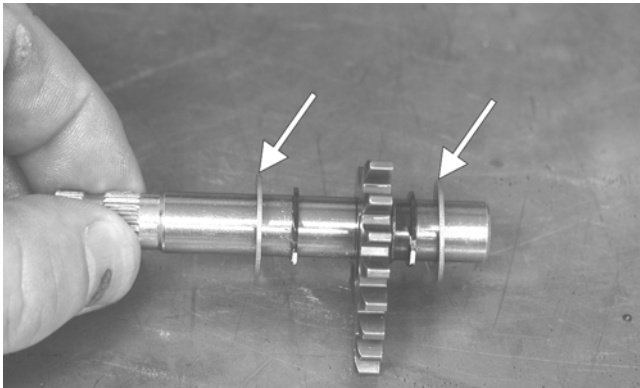


PR434A

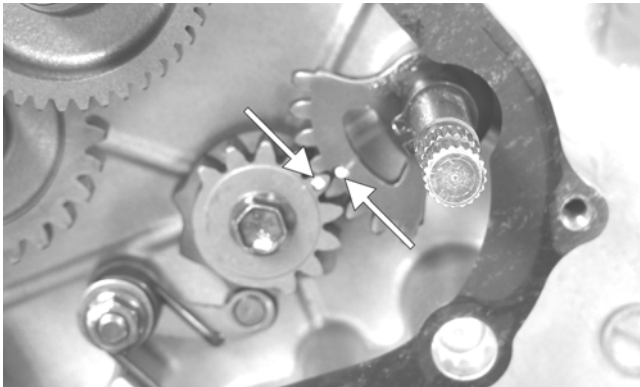
7. Install the shift shaft with two washers making sure to align the timing mark on the shift shaft with the mark on the shift cam plate.

3





CD954A



CD927A

8. Lubricate the magneto cover gasket with fresh engine oil; then place it into position on the two alignment pins. Make sure the outer shift shaft washer is in place.



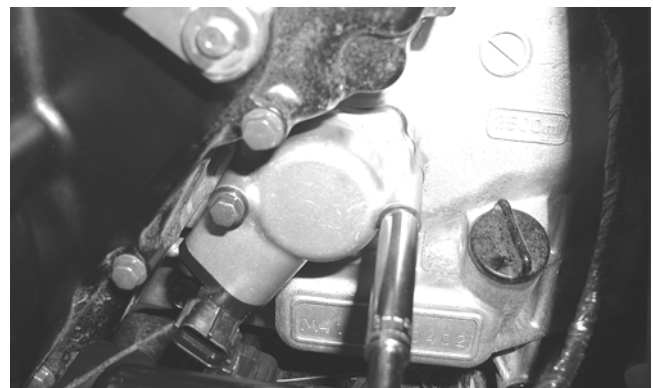
PR431A

9. Install the magneto cover and secure with the cap screws. Tighten only until snug.
10. Place the starter cup/spacer into position on the crankshaft making sure a new, lubricated O-ring is inside the cup/spacer. Tighten the flange nut to 25 ft-lb.



CD925A

11. Tighten the cap screws (from step 9) to 8 ft-lb.
12. Place the speed sensor housing and gasket into position and secure with the two cap screws. Tighten securely.



CD069

13. Place the water pump into position and secure with two cap screws. Tighten securely.
14. Install the crossover tube on the water pump and cylinder head making sure the O-ring is properly positioned.
15. Install the shift arm on the shift arm shaft making sure the scribed marks (from removing) are aligned. Tighten securely.
16. Place the gasket and recoil starter/outer magneto cover into position on the left-side cover; then tighten four cap screws to 6 ft-lb.

## 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.

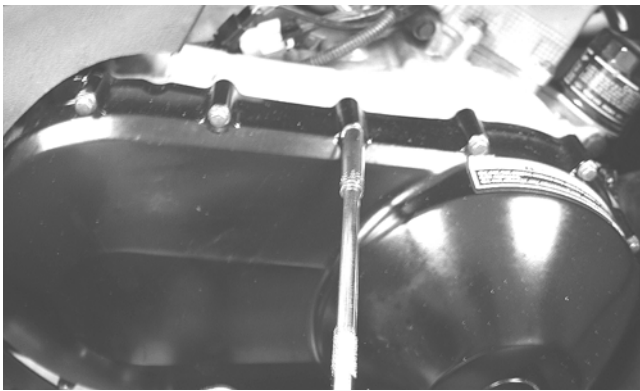


■NOTE: The engine/transmission does not have to be removed from the frame for this procedure.

## Removing Right-Side Components

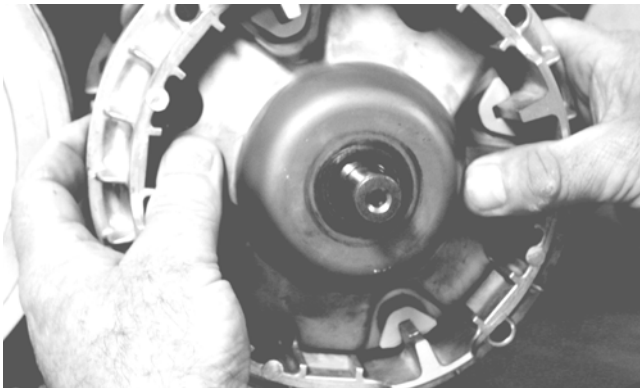
- A. V-Belt Cover
- B. Driven Pulley
- C. Clutch Cover

1. Remove the cap screws securing the V-belt cover noting the location of the different-lengthed cap screws for installing purposes; then using a rubber mallet, gently tap on the cover tabs to loosen the cover.

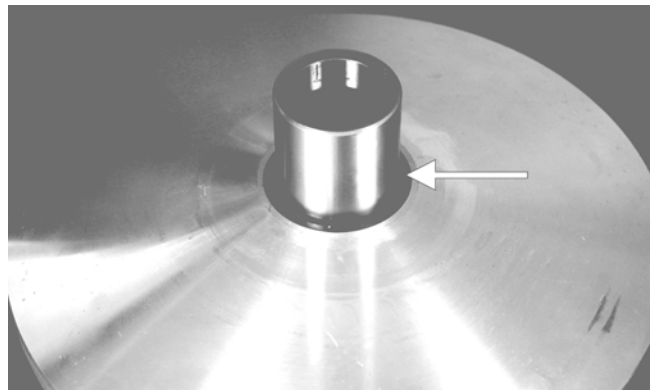


CD079

2. Remove the nut and washer (500) securing the movable drive face; then remove the face. Account for a spacer.



CD963



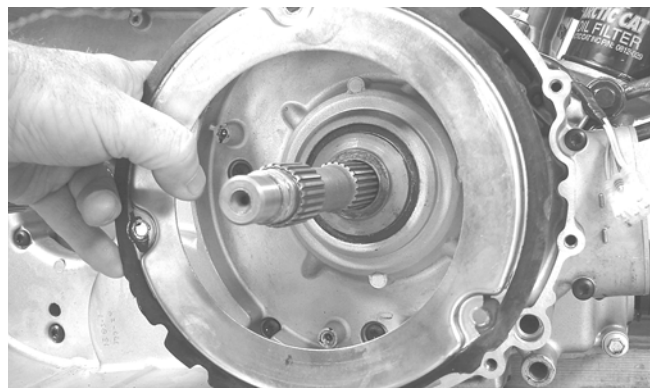
CD966A

3. Remove the V-belt.
4. Remove the nut securing the fixed driven assembly; then remove the assembly.



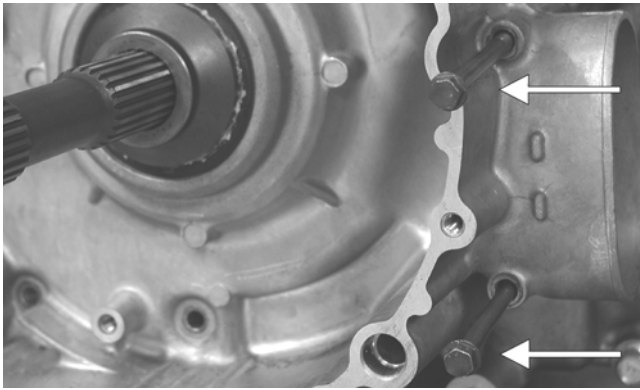
PR388

5. Remove the fixed drive face.
6. Using an impact driver, remove the cap screws securing the air intake plate; then remove the plate cushion.



PR393

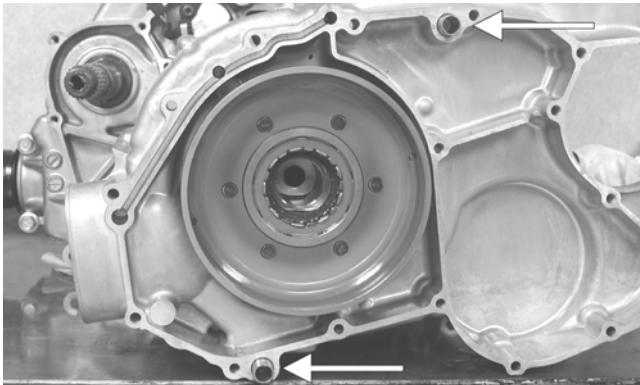
7. Remove the cap screws securing the clutch cover. Note the location of the different-lengthed cap screws for installing purposes. Using a rubber mallet, carefully remove the cover. Account for two alignment pins.



CD973A

**CAUTION**

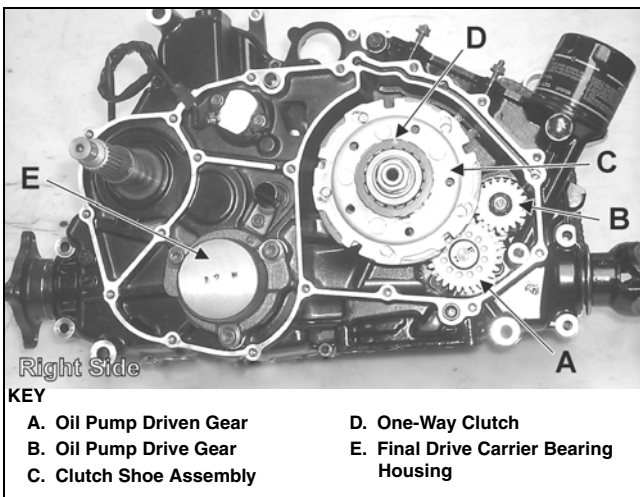
Care must be taken when removing the cover so the cover gasket is not damaged.



CD974A

■NOTE: For steps 8-14, refer to illustration CC829B.

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



CC829B

8. Remove the one-way clutch (D) from the clutch housing. Note the location of the green alignment dot (or the word OUTSIDE) for installing purposes.

9. Using a hydraulic press, remove the clutch housing assembly from the clutch cover. Account for the left fixed drive spacer and an O-ring inside the fixed drive spacer.

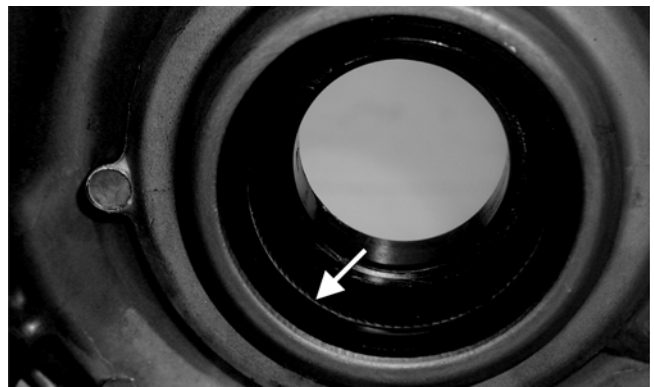


CF085



CC596

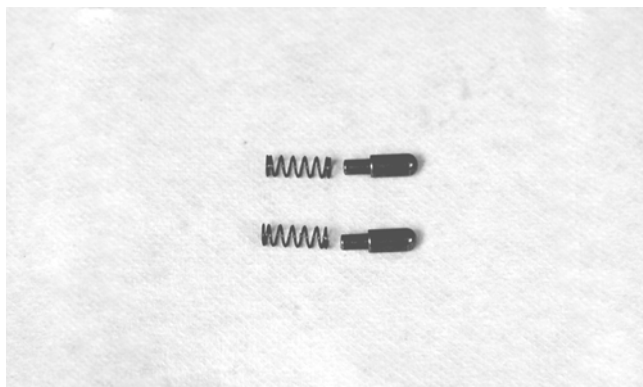
■NOTE: Account for and inspect the clutch housing seal.



CF088A

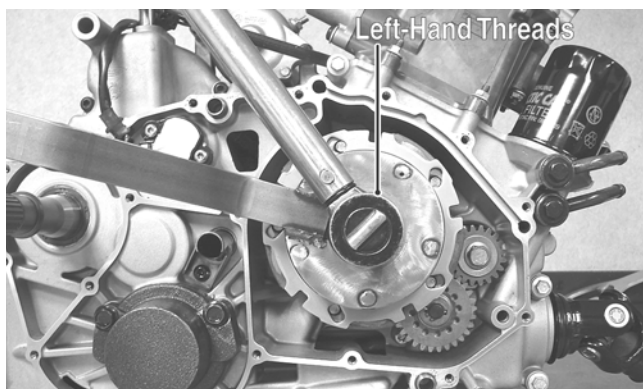
10. Remove the two cap screws securing the gear shift position switch; then remove the switch. Account for two neutral contact pins and two springs.





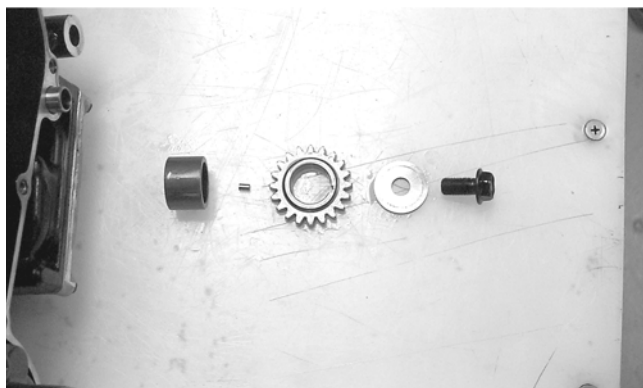
CD997

11. Remove the nut (left-hand threads) securing the clutch shoe assembly (C).

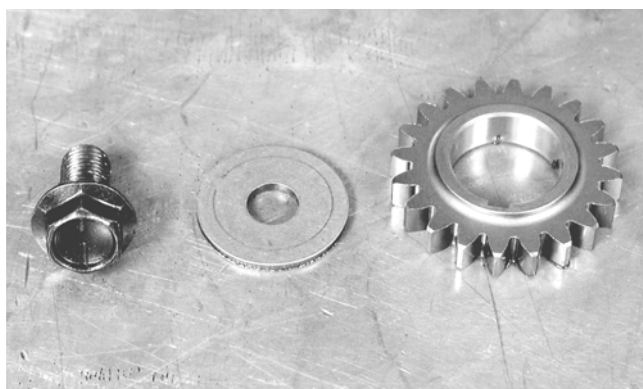


PR410A

12. Remove the cap screw securing the oil pump drive gear (B). Account for a cap screw, washer, pin, and spacer.



CC606

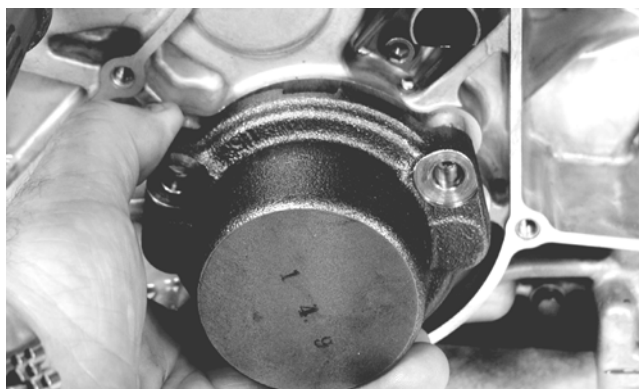


CD987



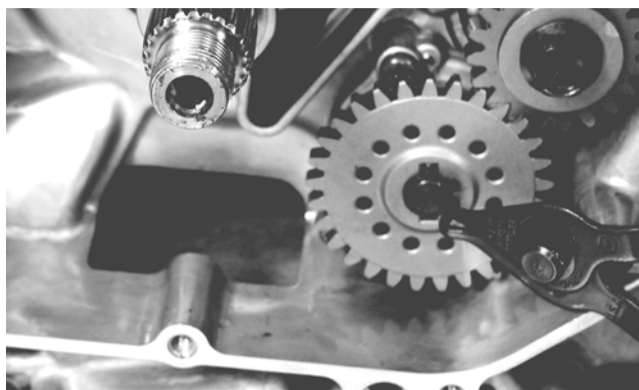
CD993

13. Using an impact wrench, remove the cap screws securing the final drive carrier bearing housing (E); then remove the housing and account for two alignment pins.



CD999

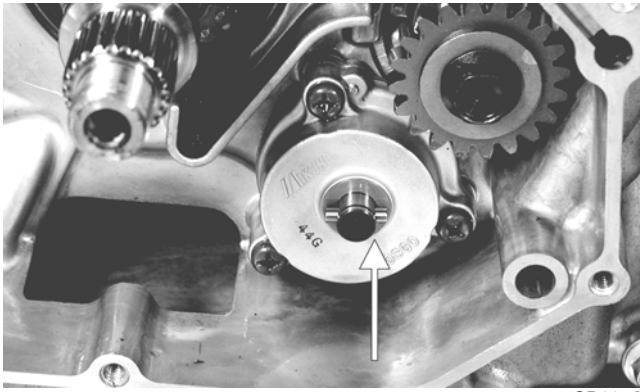
14. Remove the snap ring securing the oil pump driven gear (A); then remove the gear noting the direction of the sides of the gear for installing purposes. Account for a pin and a washer.



CD984

3





CD895A

15. Using an impact driver, remove the three Phillips-head screws securing the oil pump; then remove the pump.



CD988

## Servicing Right-Side Components

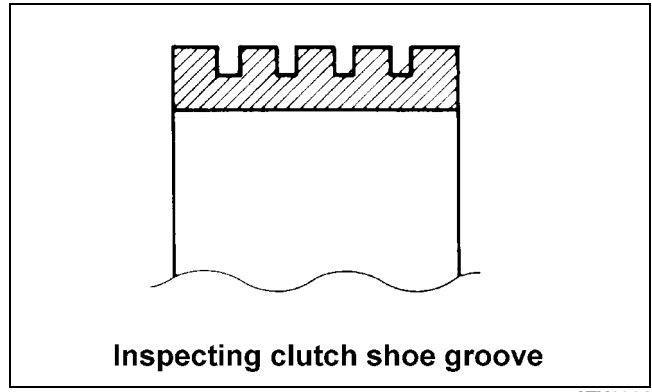
■**NOTE:** Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

### INSPECTING CENTRIFUGAL CLUTCH SHOE

1. Inspect the clutch shoes for uneven wear, chips, cracks, or discoloration. If any shoe is damaged, replace the complete set.
2. Inspect the clutch shoes for wear or damage. If any shoe is worn to the bottom of the groove, replace the complete set.

#### ⚠ CAUTION

Always replace the clutch shoes as a complete set or severe imbalance could occur.



ATV1014

Inspecting clutch shoe groove

### INSPECTING CLUTCH HOUSING

1. Inspect the clutch housing for burns, grooving, cracks, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

### INSPECTING PRIMARY ONE-WAY DRIVE

1. Insert the drive into the clutch housing.
2. Rotate the inner race by hand and verify the inner race rotates only one direction.
3. If the inner race is locked in place or rotates both directions, the drive assembly must be replaced.

### INSPECTING OIL PUMP

1. Inspect the pump for damage.
2. It is inadvisable to remove the screw securing the pump halves. If the oil pump is damaged, it must be replaced.



CC446D

## DRIVEN PULLEY ASSEMBLY

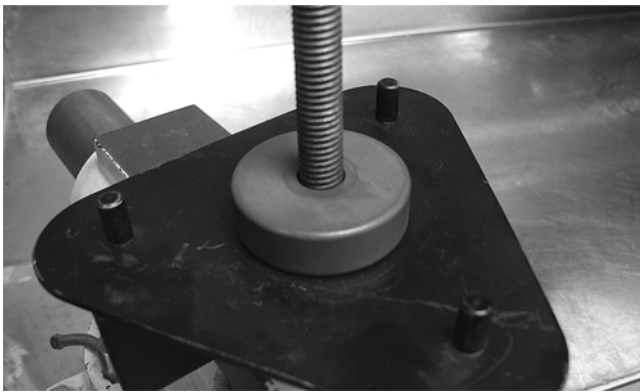
■NOTE: On the H1 models, the driven pulley is a nonserviceable component. If the pulley faces, cam ramps, or sheave bushing are worn or loose, the pulley must be replaced as an assembly. Do not disassemble the driven pulley on the H1 models.

### Disassembling

#### ⚠ WARNING

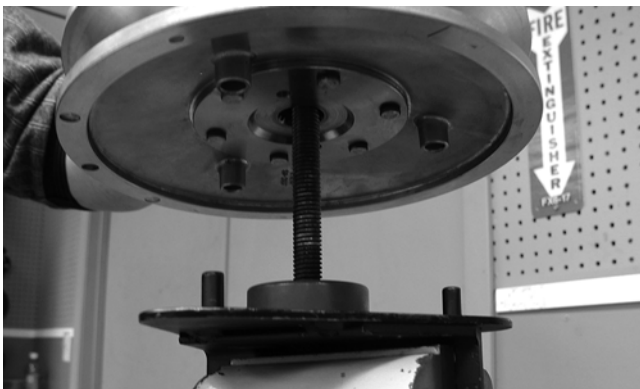
This procedure involves relaxing a compressed spring assembly. DO NOT attempt disassembling without the proper tools.

1. Secure Driven Pulley Compressor in a suitable holding fixture such as a bench vise; then remove the wing nut, holding handle, flat washer, and pilot bushing leaving the large spacer on the compressor tool base.



CD047

2. Place the driven pulley assembly onto the compressor tool base engaging the dowel pins into appropriate holes in the fixed face of the assembly.



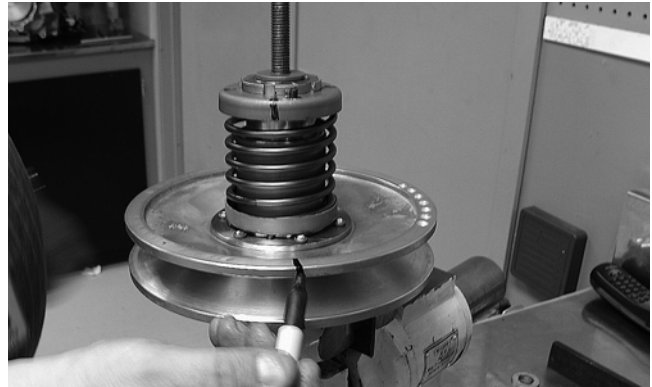
CD048

3. Install the pilot bushing with the machined end directed down; then fit the bushing into the pulley hub.



CD067

4. Using a suitable marking pen, make alignment marks on the fixed face spring holder and both pulley faces.



CD049

5. Place the holding handle on the spring holder fitting the two dowel pins into the spring holder face; then install a flat washer and the wing nut. Turn the wing nut down until resistance is felt.

■NOTE: Do not use the wing nut to compress the spring further.



CD050

#### ⚠ WARNING

The spring assembly is under pressure. Extreme care must be taken when relaxing the spring. Always wear safety glasses. Use proper tools only.

6. Using a spanner and suitable breaker bar, loosen the notched-ring nut; then spin the nut free of the hub.



CD051

7. Firmly hold the handle and slowly turn the wing nut counterclockwise to relax the spring.

■**NOTE:** There will be a tendency for the handle to rotate clockwise approximately  $\frac{1}{4}$  turn as the spring holder clears the flats or hub. This is due to a slight counterclockwise preload on the spring.



CD052

8. Release the preload slowly; then continue to relax the spring until the wing nut is flush with the end of the threads.
9. Firmly holding the spring and spring holder, remove the wing nut; then remove the spring.



CD053

10. Using a thin pry-bar or screwdriver, work the movable face sleeve upward and free of the O-rings; then remove the sleeve.

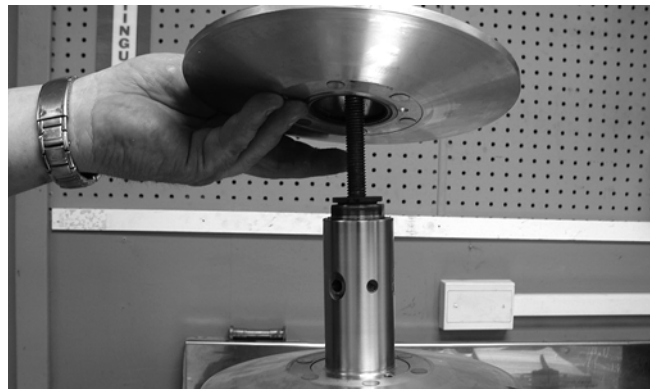


CD054

11. Remove the four pins and spacers from the cam slots in the movable face; then remove the movable face.



CF091

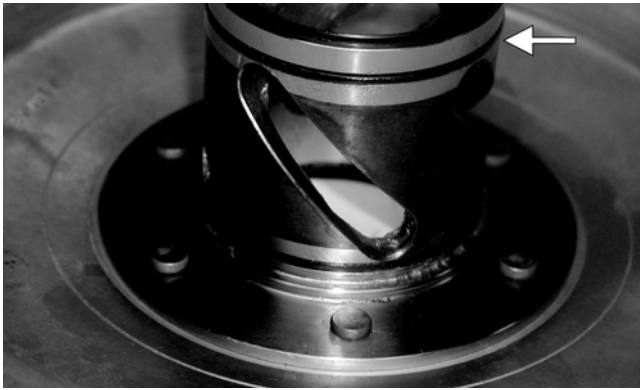


CD056

## Inspecting

1. Inspect the pulley faces for wear, galling, or grooving.
2. Inspect the O-rings on the movable face for nicks, tears, or swelling.





CF092A

3. Inspect two grease seals in the movable face for nicks, cuts, or damage.



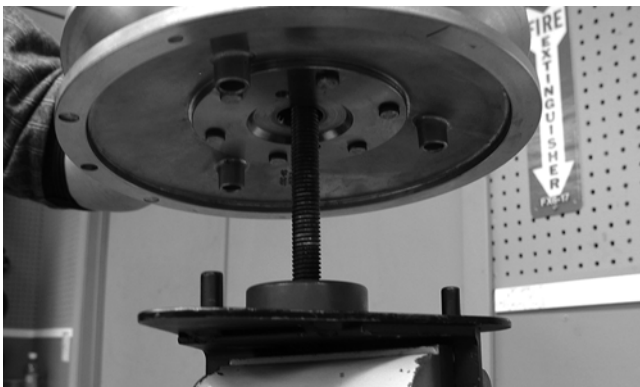
CF095A

4. Inspect the pins and bushings for wear, flat spots, looseness, or cracking.

## Assembling

1. Place the fixed face of the driven pulley on the pulley compressor base making sure the dowel pins are engaged in the appropriate holes in the pulley face.

■**NOTE:** Make sure the spacer is on the base or damage to the fixed face will occur when the spring is compressed.



CD048

2. Apply multi-purpose grease to the O-rings and grease seals on the movable face; then install on the fixed face making sure the alignment marks are properly aligned.



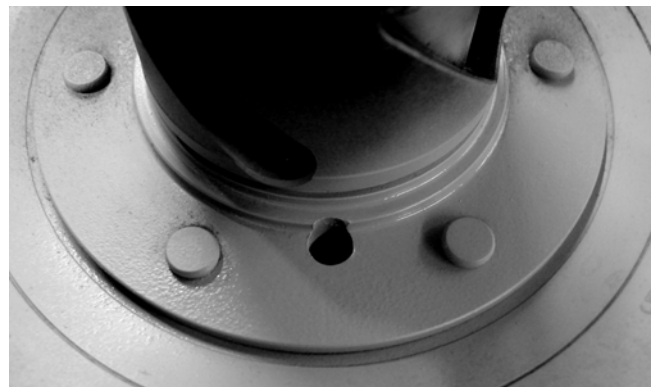
CD060

3. Install the four pins and spacers into the fixed face hub; then pack the cam slots in the movable face with multi-purpose grease.



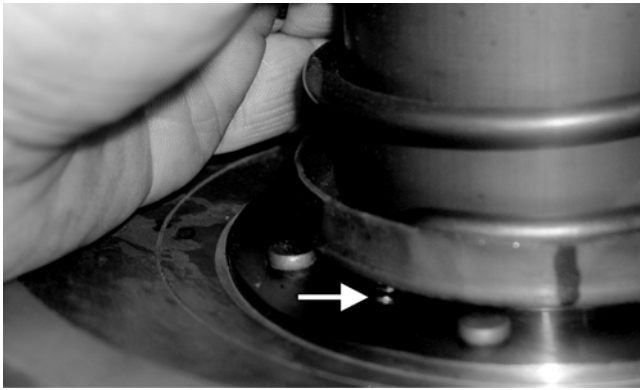
CF095A

4. Install the movable face sleeve aligning the hole in the spring seat with the spring anchor hole in the movable face.



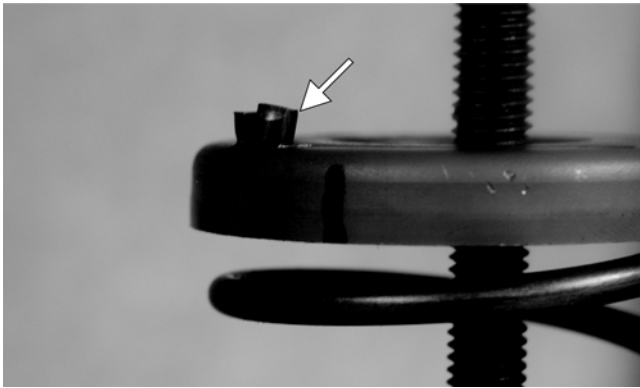
CF097

5. Install the spring over the hub and movable face sleeve; then insert the end of the spring through the sleeve and into the spring anchor hole in the movable face.



CF089A

6. Place the spring holder on the spring engaging the spring end with the appropriate anchor hole.



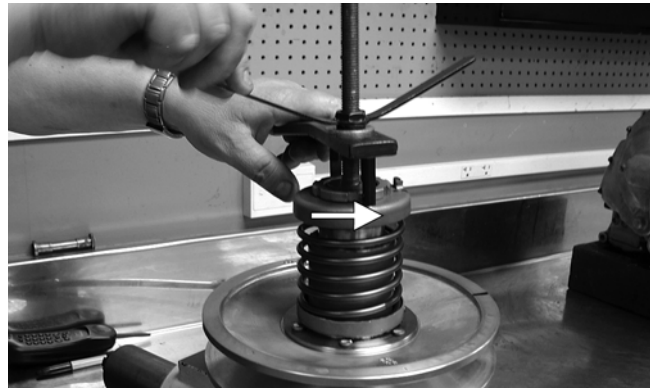
CF087A

7. Assemble the notched-ring nut, spring holding handle, one flat washer, and the wing nut in order on the pulley compressor bolt; then thread the wing nut onto the bolt.



CD052

8. Compress the spring until the spring holder nears the threads on the fixed face hub; then using the handle, wind the spring holder counterclockwise to align the flats of the spring holder and hub.



CD052A

9. Continue compressing the spring while guiding the spring holder onto the hub. When a slight resistance is felt, stop turning the wing nut.

10. Install the nut (threads coated with red Loctite #271); then tighten the nut to 74 ft-lb using the spanner and a torque wrench.



CD066

11. Remove the wing nut, washer, and holding handle; then remove the driven pulley from the pulley compressor.

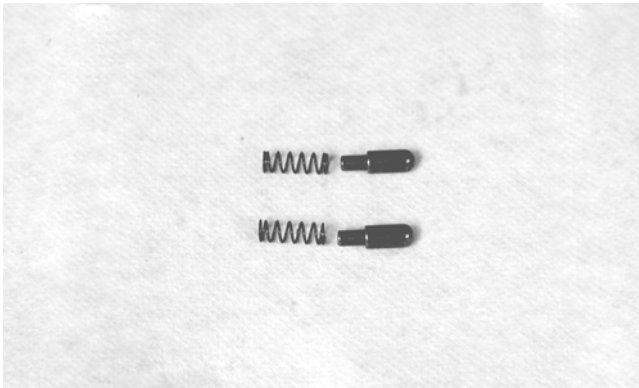
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## Installing Right-Side Components

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1. Install the gear shift position switch making sure the two neutral contact pins and the two springs are properly positioned. Tighten the Allen-head screws securely.



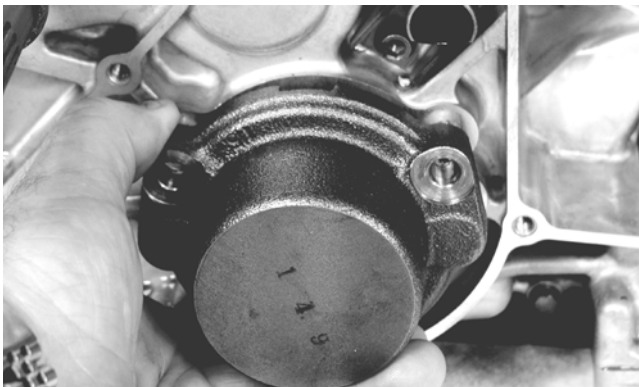


CD997



CD994

2. Install the secondary shaft bearing housing making sure the two alignment pins are properly positioned. Tighten the Allen-head screws securely.



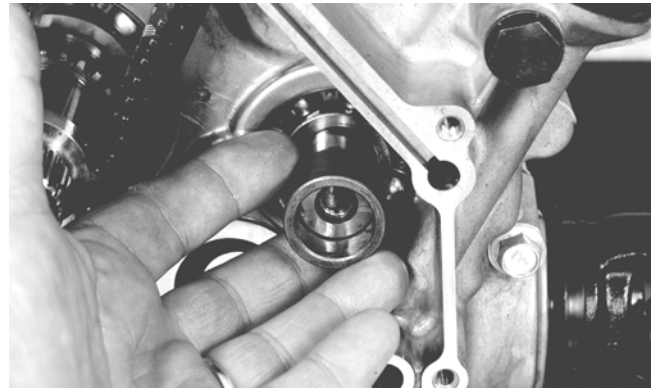
CD999

3. Install the oil pump onto the engine; then tighten the Phillips-head screws securely.

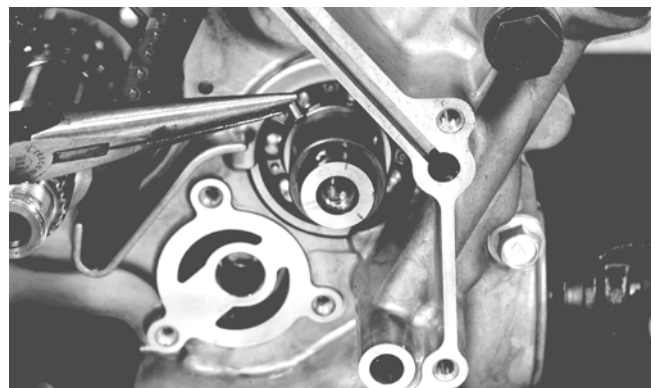


CD988

4. Install the oil pump drive gear spacer onto the crank balancer shaft. Grease the pin and insert it into the shaft; then install the drive gear making sure the raised side of the gear is facing toward the inside. Secure the gear with the cap screw (threads coated with red Loctite #271) and the washer. Tighten the cap screw to 36 ft-lb (500) or 63 ft-lb (H1 models).

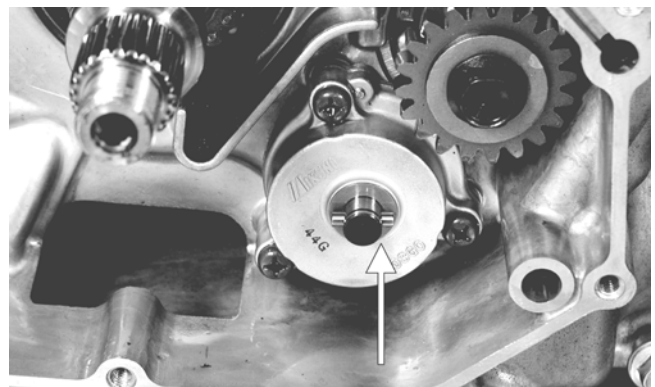


CD992



CD991

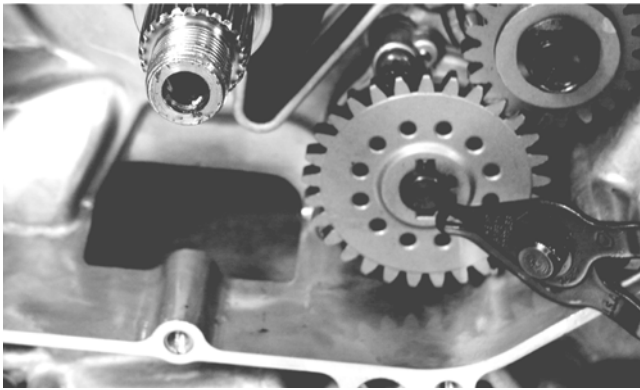
5. Grease the driven gear pin and insert it into the oil pump shaft; then install the driven gear (noting the direction of the sides of the gear from removing). Secure with a snap ring.



CD985A

3





CD984

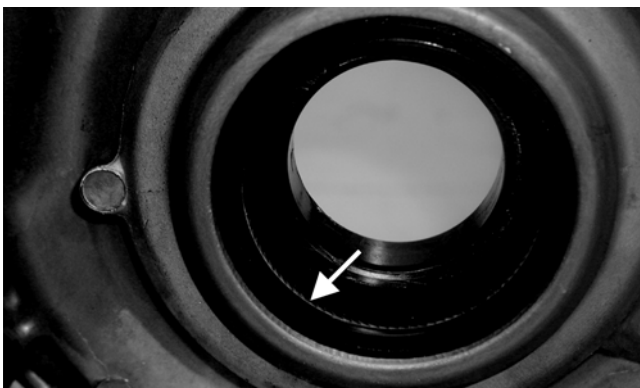
■**NOTE:** When installed correctly, the sides of the drive and driven gears will be flush with each other.

6. Install the clutch shoe assembly and secure with the flange nut (threads coated with red Loctite #271). Tighten to 94 ft-lb (500) or 221 ft-lb (H1 models).

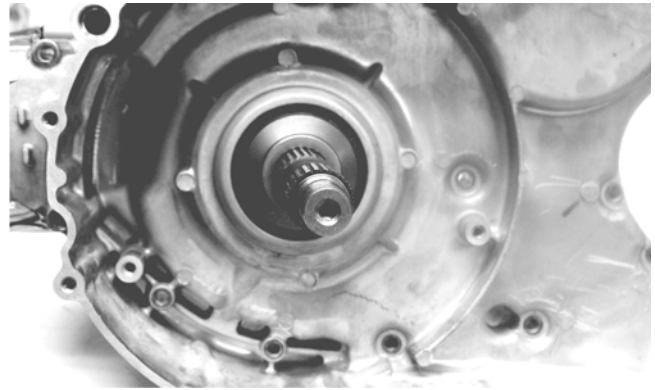


PR410A

7. Lightly grease the clutch housing seal; then insert the left fixed drive spacer.

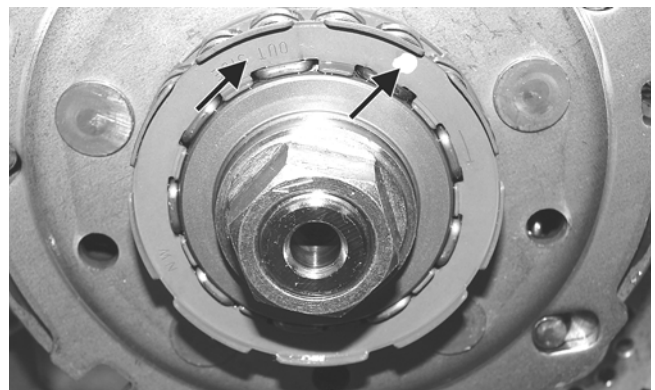


CF088A



CF086

8. Install the clutch cover alignment pins into the crankcase, apply oil to the cover gasket, and install the gasket onto the crankcase.
9. Apply grease to the outer edges of the clutch housing; then from inside the clutch cover, install the clutch housing into the cover using a rubber mallet.
10. Install the one-way clutch onto the clutch shoe assembly.

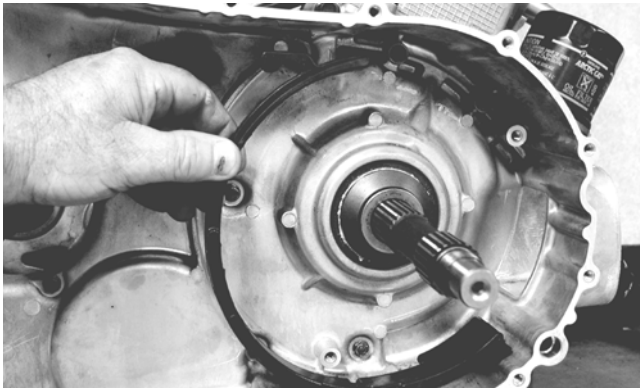


PR399A

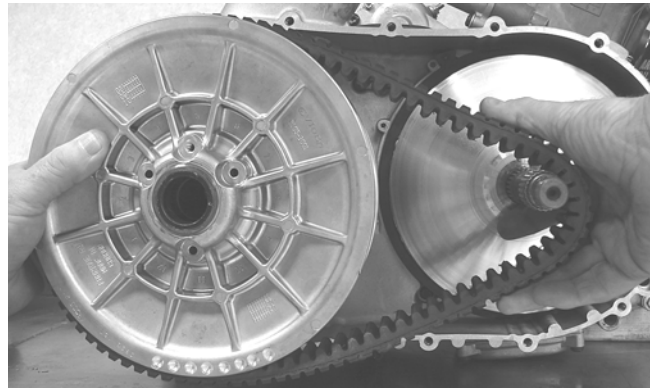
### **CAUTION**

**When installed correctly, the green alignment dot (or the word OUTSIDE) on the one-way clutch is visible.**

11. Place the clutch cover/clutch housing assembly into position on the crankcase; then secure with the cap screws making sure the different-lengthed cap screws are in their proper location. Tighten to 8 ft-lb.
12. Place the air intake plate cushion into position; then install the air intake plate. Tighten the cap screws (threads treated with a small amount of red Loctite #271) securely.



CD971



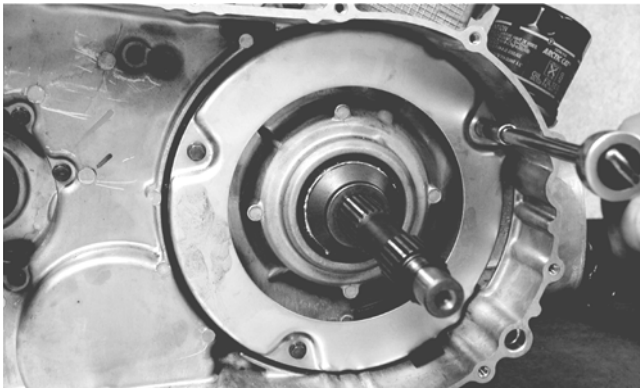
PR389

■ **NOTE:** The arrows on the V-belt should point forward.

17. Pinch the V-belt together near its center and slide the spacer and movable drive face onto the shaft. Secure the drive face with a nut and washer (500) (threads coated with red Loctite #271). Tighten the nut to 72 ft-lb (500) or 165 ft-lb (H1 models).

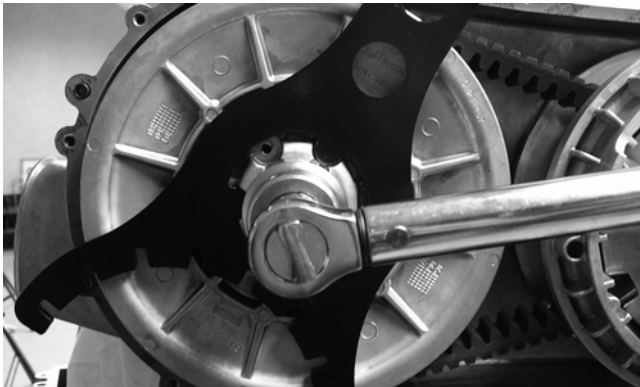
**CAUTION**

Make sure the splines extend beyond the drive face or a false torque reading and spline damage may occur.



CD970

13. Place the driven pulley assembly into position and secure with the nut (threads coated with red Loctite #271). Tighten to 80 ft-lb.



CF262

14. Slide the fixed drive face onto the shaft.
15. Spread the faces of the driven pulley by pushing the inner face toward the engine while turning it counterclockwise (500) or thread in a push-bolt (H1 models); then when the faces are separated, insert the belt and push down between the faces.
16. Place the V-belt into position on the driven pulley and over the front shaft.

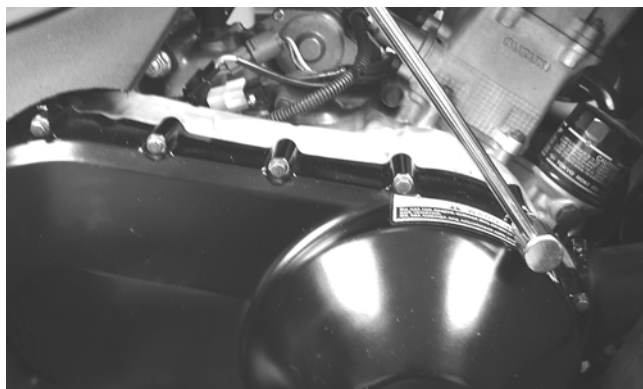


FI428A

■ **NOTE:** At this point, the push-bolt can be removed from between the driven pulley faces.

18. Rotate the V-belt and drive/driven assemblies until the V-belt is flush with the top of the driven pulley.
19. Place the V-belt cover gasket into position; then install the cover and secure with the cap screws making sure the different-lengthed cap screws are in their proper location. Tighten the cap screws to 8 ft-lb.





CD083

## Center Crankcase Components

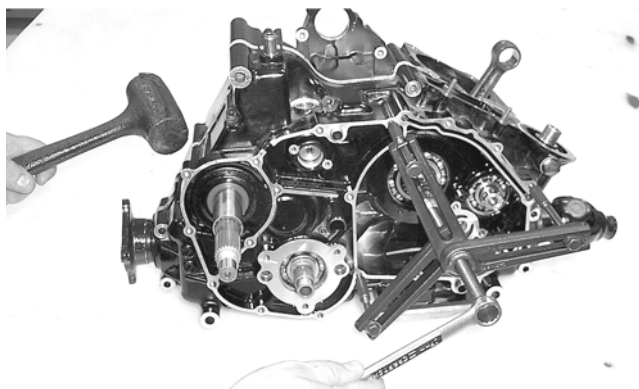
■NOTE: This procedure cannot be done with the engine/transmission in the frame. Complete Removing procedures for Top-Side, Left-Side, and Right-Side must precede this procedure.

■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 right-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws.
2. Remove the left-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws.
3. Using the Crankcase Separator/Crankshaft Remover and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins.

■NOTE: To keep the shaft/gear assemblies intact for identification, tap the shafts toward the left-side crankcase half when separating the halves.

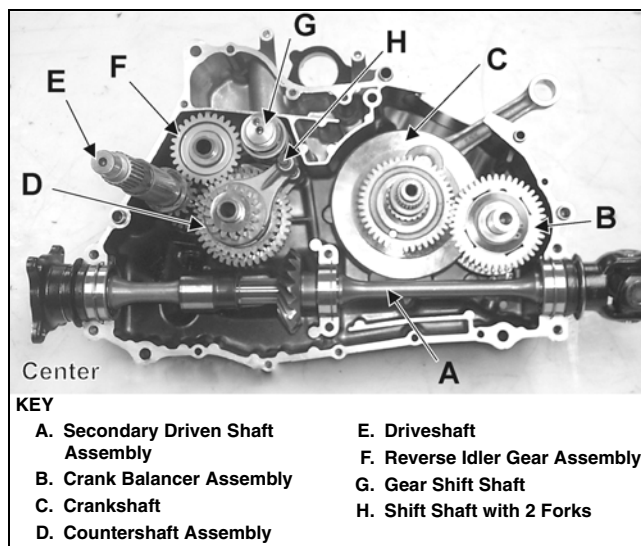


CC665

## Disassembling Crankcase Half

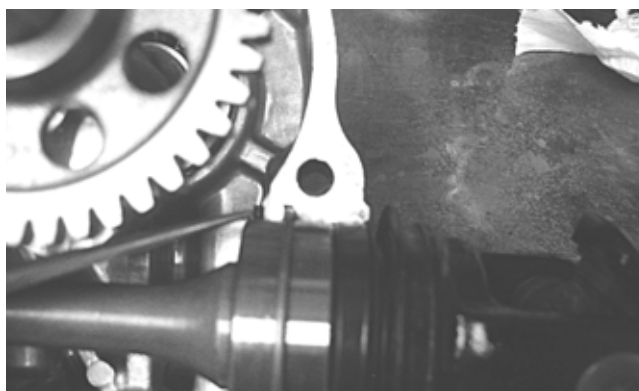
■NOTE: For steps 1-7, refer to illustration CC821B.

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



CC821B

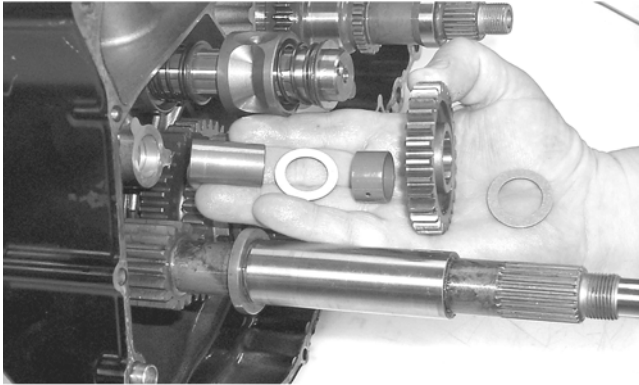
1. Remove the secondary driven shaft assembly (A) noting the location of the bearing locating pins. Account for the bearing C-ring.



CD267



2. Remove the reverse idler gear assembly (F). Account for all washers, shaft, bushing, and the gear.



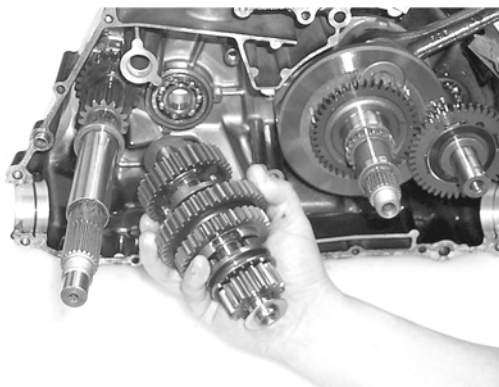
CC668

3. Remove the shift shaft (H); then remove the two forks taking note of the direction of the tabs on the forks for assembling purposes.
4. Remove the gear shift shaft (G) noting the location of the two holes on the end of the shaft. Account for two washers.



PR380A

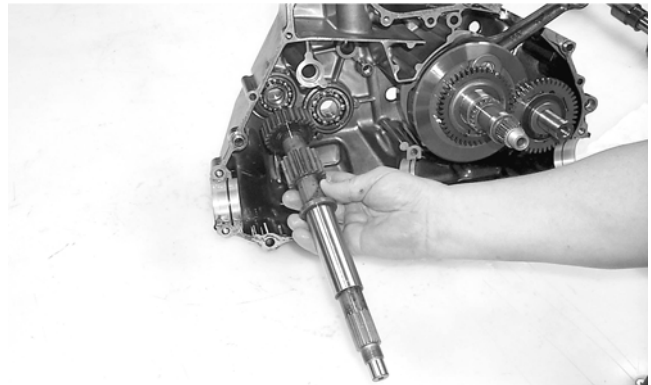
5. Remove the countershaft assembly (D). Account for a washer on each end of the countershaft.



CC674

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

6. Using a rubber mallet, tap on the crankcase to



CC675

7. Note the timing marks on the crank balancer assembly (B) gear and crankshaft (C) gear for assembling purposes; then slide the crank balancer gear off the crank balancer. Account for the key in the keyway.



CD826

8. Remove the crank balancer.

■NOTE: There is a flat spot on the crank balancer bearing flange to allow clearance past the crankshaft.



CD832B

9. Remove the snap ring securing the water pump driven gear shaft.
10. Using a hydraulic press, remove the crankshaft assembly.

■NOTE: Use a protective end cap to prevent damage to the crankshaft threads.

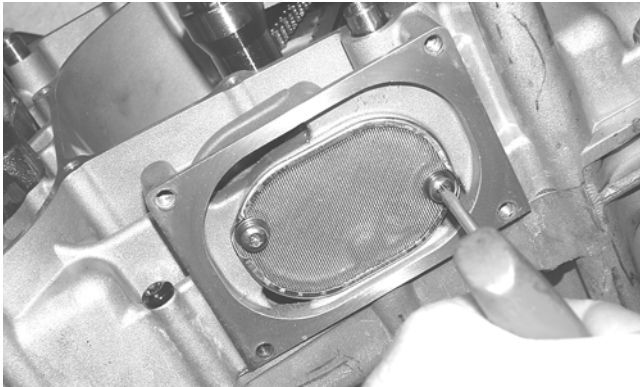
11. Remove the cap screws securing the oil strainer cap; then remove the cap. Account for the cap O-ring (500).



PR407

12. Remove the two cap screws securing the oil strainer; then remove the strainer.

■NOTE: On the H1 models, thoroughly clean any sealant from the oil strainer cap.



PR406

#### ⚠ CAUTION

Unless the secondary drive gear, bevel gear, or bearings require service, do not remove the secondary drive assembly from the case. If removed, bevel gear backlash will have to be adjusted requiring re-shimming of the drive bevel gear shaft.

13. To remove the secondary drive/bevel gear, remove the secondary drive bearing housing; then remove the nut securing the drive/bevel gear shaft in the bearing and using a plastic mallet, drive the shaft out of the bearing. Account for shim/shims.

■NOTE: Shims should be measured and kept for a starting point in adjusting backlash.

## Servicing Center Crankcase Components

■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

■NOTE: Certain models have been built using spiral gears, and certain models have been built using net-forged gears. When performing service procedures on the secondary gears, the technician should use sound judgment in determining which type of gear is being serviced.

### SECONDARY GEARS (Spiral)

■NOTE: When checking and correcting secondary gear backlash and tooth contact, the universal joint must be secured to the front shaft or false measurements will occur.

#### Checking Backlash

■NOTE: The rear shaft and bevel gear must be removed for this procedure. Also, always start with the original shims on the rear shaft.

1. Place the left-side crankcase cover onto the left-side crankcase half to prevent runout of the secondary transmission output shaft.
2. Install the secondary driven output shaft assembly onto the crankcase.
3. Mount the dial indicator so the tip is contacting a tooth on the secondary driven bevel gear.
4. While rocking the driven bevel gear back and forth, note the maximum backlash reading on the gauge.
5. Acceptable backlash range is 0.05-0.33 mm (0.002-0.013 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.

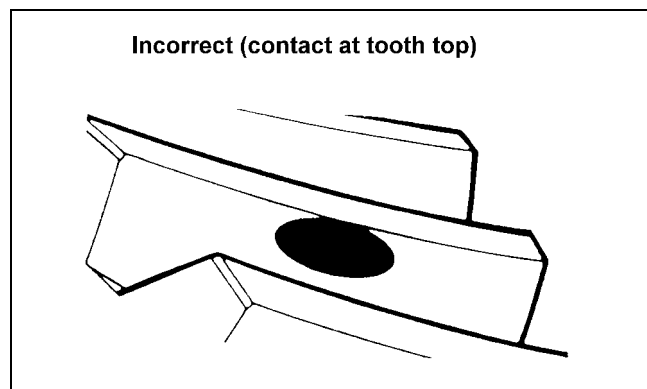
■NOTE: Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

Backlash Measurement	Shim Correction
Under 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

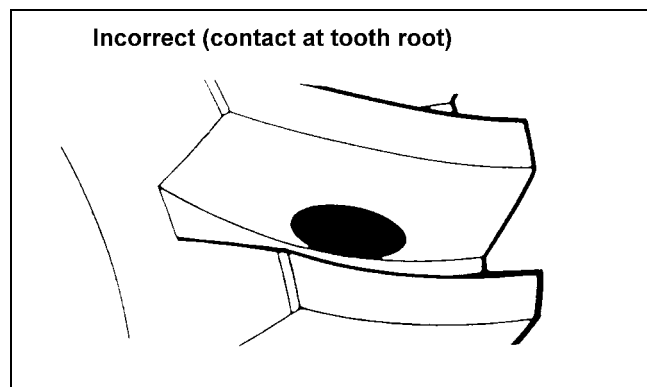
## Checking Tooth Contact

■NOTE: After correcting backlash of the secondary driven bevel gear, it is necessary to check tooth contact.

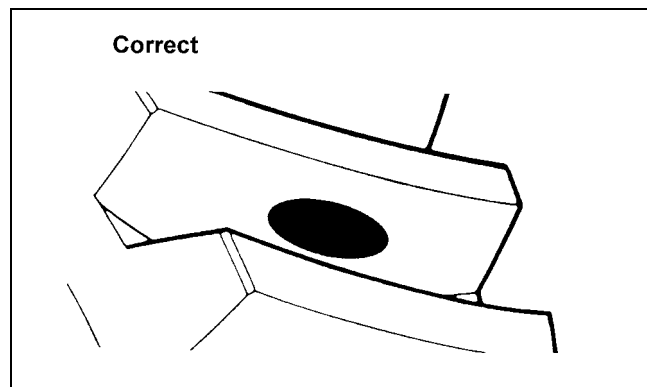
1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
5. Rotate the secondary driven bevel gear several revolutions in both directions.
6. Examine the tooth contact pattern in the dye and compare the pattern to the illustrations.



ATV-0103



ATV-0105



ATV-0104

## Correcting Tooth Contact

■NOTE: If tooth contact pattern is comparable to the correct pattern illustration, no correction is necessary.

If tooth contact pattern is comparable to an incorrect pattern, correct tooth contact according to the following chart.

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

■NOTE: To correct tooth contact, steps 1 and 2 (with NOTE) of "Correcting Backlash" must be followed and the above "Tooth Contact/Shim Correction" chart must be consulted.

### CAUTION

After correcting tooth contact, backlash must again be checked and corrected (if necessary). Continue the correcting backlash/correcting tooth contact procedures until they are both within tolerance values.

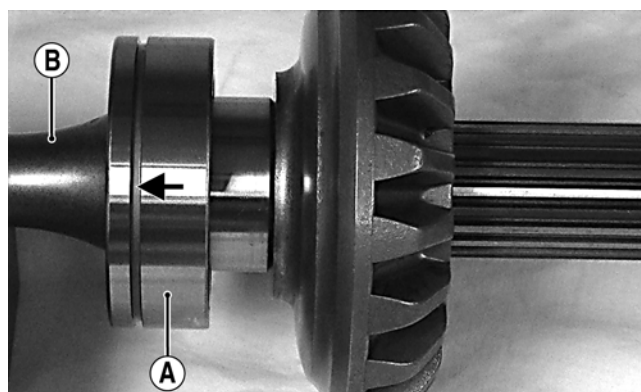
3

## SECONDARY OUTPUT DRIVE GEARS (Net-Forged)

### 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 drive shaft or secondary output driven gear are replaced, proceed to Correcting Backlash in this sub-section.

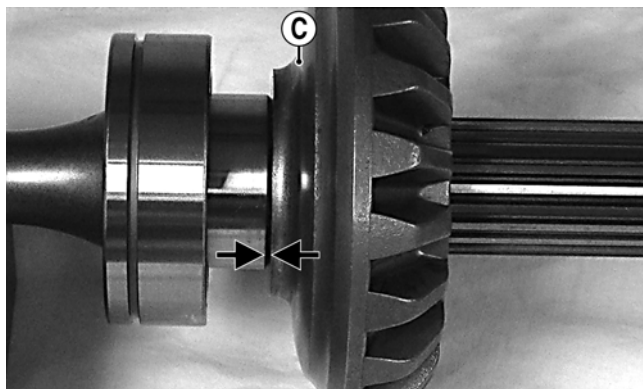
1. Install a new bearing (A) onto the secondary driven shaft (B) making sure the bearing locating groove is directed away from the driven gear splines.



MT011A

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



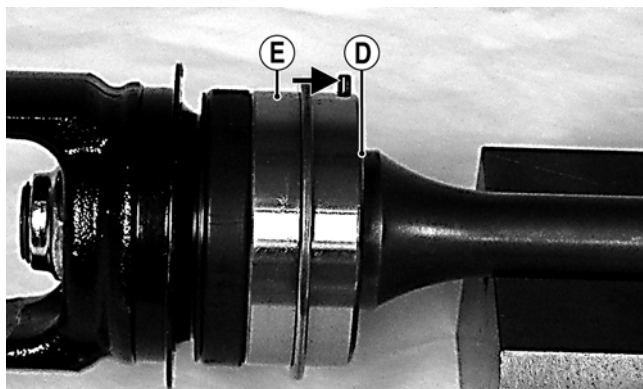


MT011B

3. 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 drive shaft bearing (E) making sure the locating pin is directed toward the center of the shaft.

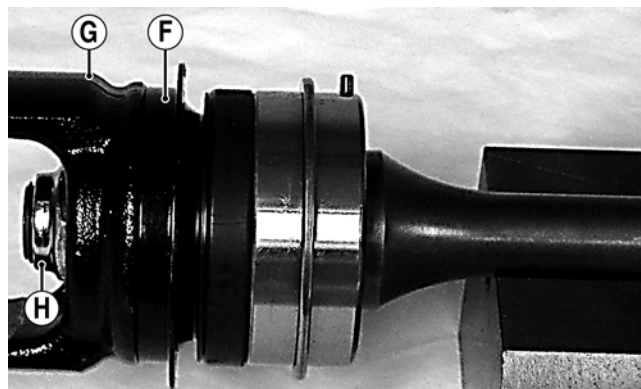


MT012



MT008A

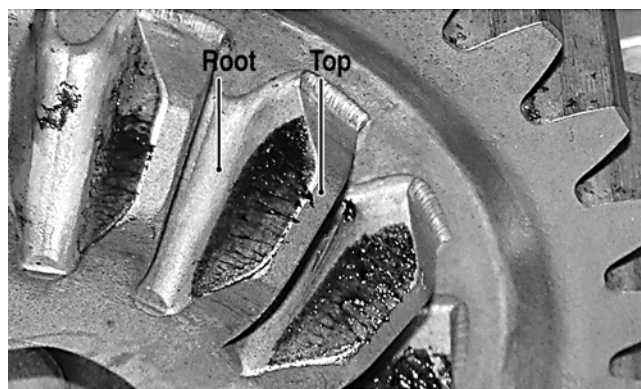
4. Install a new seal (F), output yoke (G), and nut (H) and tighten to 59 ft-lb.



MT008B

**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

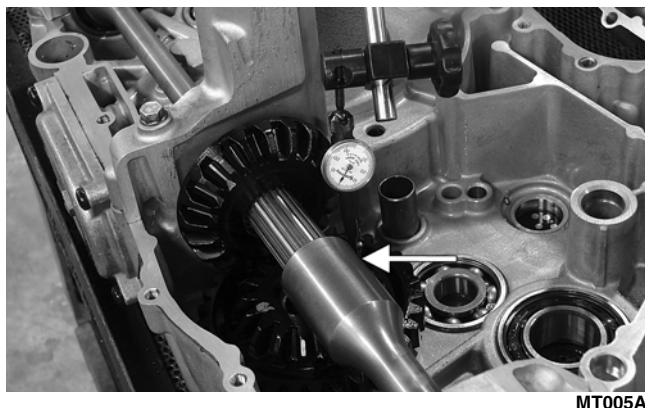
6. To adjust tooth contact, use the following chart to correctly shim the driven shaft.

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. If removed, install the secondary drive/bevel gear shaft into the crankcase; then tighten the nut to 59 ft-lb.
2. Install the secondary drive bearing support; then install the secondary driven output shaft into the crankcase.
3. Mount the dial indicator so the tip is contacting a tooth on the secondary drive bevel gear.
4. While rocking the drive bevel gear back and forth, note the maximum backlash reading on the gauge.



MT005A

5. Acceptable backlash range is 0.05-0.33 mm (0.002-0.013 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.

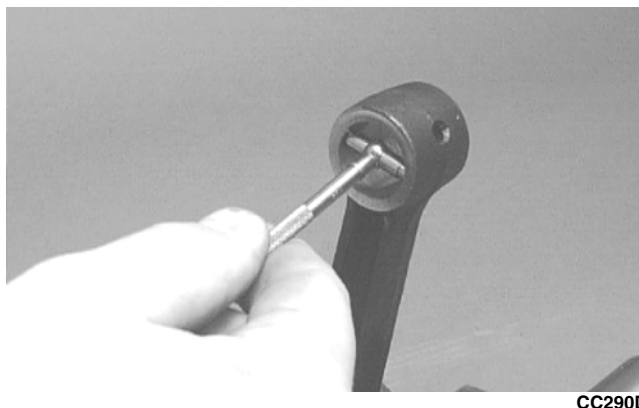
Backlash Measurement	Shim Correction
Under 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

After backlash and tooth contact are within specifications, apply red Loctite #271 to the drive shaft threads and driven output shaft threads; then using new nuts, tighten the output shaft nut to 59 ft-lb and the output yoke nut to 74 ft-lb.

## CRANKSHAFT ASSEMBLY

### 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

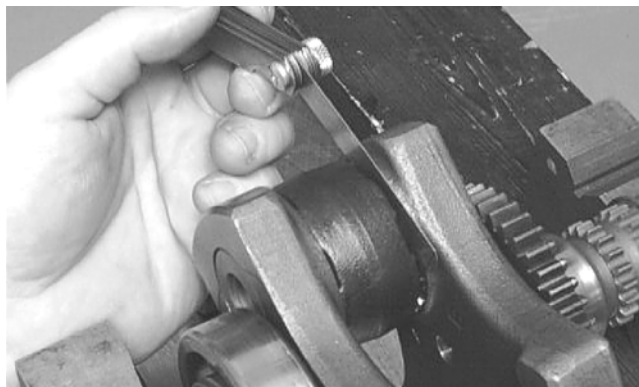
2. Maximum diameter must not exceed specifications.

### 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.



CC289D

3. Acceptable gap range must be within specifications.

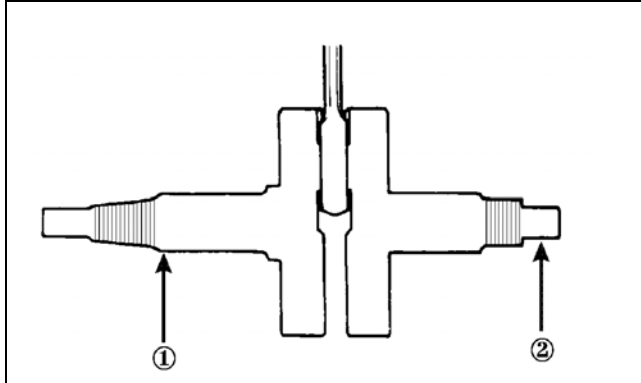
### Measuring Connecting Rod (Big End Width)

1. Using a calipers, measure the width of the connecting rod at the big-end bearing.

2. Acceptable width 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.



ATV-1074

3. Zero the indicator and rotate the crankshaft slowly.

#### CAUTION

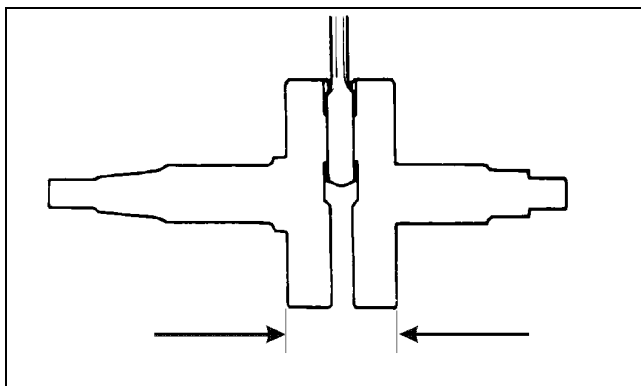
Care should be taken to support the connecting rod when rotating the crankshaft.

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.



ATV-1017

2. Acceptable width range must be within specifications.

## COUNTERSHAFT

#### 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

From the right side:

1. Remove the right drive gear washer; then remove drive gear #2.
2. Remove the reverse driven gear dog; then remove the snap ring.
3. Remove the reverse driven gear spacer; then remove the snap ring.
4. In order, remove washer, reverse driven gear, bearing, and bushing.
5. In order, remove washer, lock washer, lock washer, and low driven gear.
6. In order, remove bearing, bushing, and driven gear washer.

From the left side:

1. Remove the left drive gear washer; then remove the high driven gear and bearing.
2. In order, remove bushing, driven gear washer, and sliding dog.

### Assembling

From the left side:

1. Install the sliding dog, driven gear washer, and bushing.
2. Install bearing and high driven gear; then install the left drive gear washer.

From the right side:

1. Install driven gear washer, bushing, bearing and low driven gear.
2. Install lock washer, lock washer, washer and bushing.
3. Install bearing, reverse driven gear, washer, and the snap ring.
4. Install reverse driven gear spacer, snap ring, reverse driven gear dog, and drive gear #2; then install the right drive gear washer.



■NOTE: When installing the countershaft assembly, account for the washer on each end of the shaft.

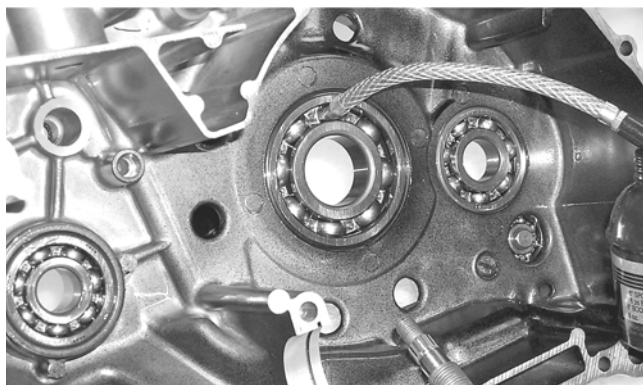
## Assembling Crankcase Half

1. Install the secondary driven output shaft assembly into the crankcase.

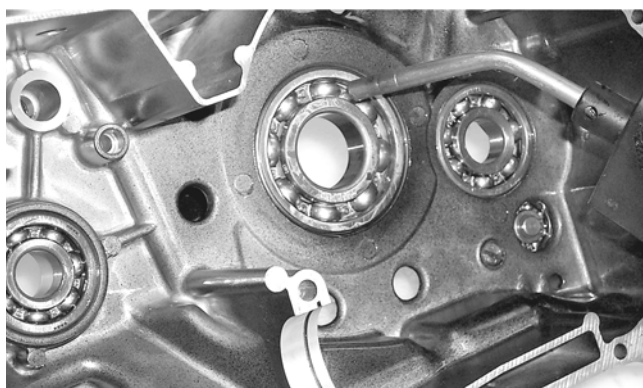


CC687

2. Apply a liberal amount of engine oil to the crankshaft bearing. Using a propane torch, heat the bearing until the oil begins to smoke; then slide the crankshaft assembly into place.



CC688



CC689

■NOTE: If heating the bearing is not possible, the crankshaft can be installed using a crankshaft installing tool.

3. Install the crank balancer.

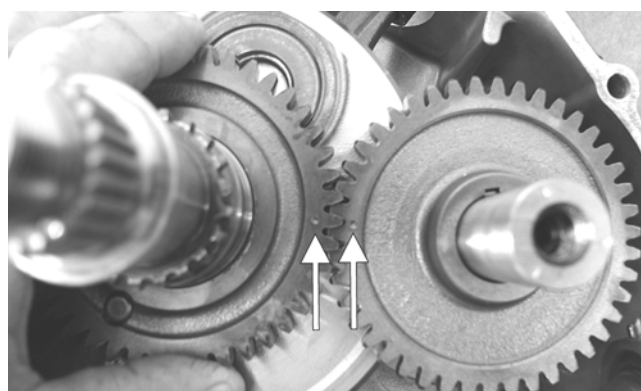


CD832B

■NOTE: It will be necessary to rotate the crank balancer until the counterweight is facing away from the crankshaft; then rotate the crankshaft clockwise into the journal area to allow the crank balancer to be fully seated.

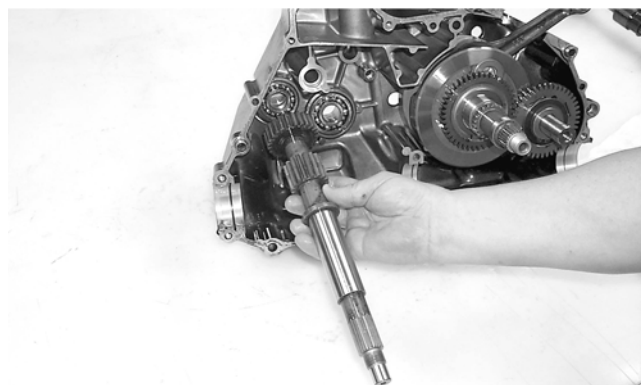
3

4. Place the key into the crank balancer keyway; then install the crank balancer gear making sure the alignment dots on the crank balancer gear and the crankshaft gear align.



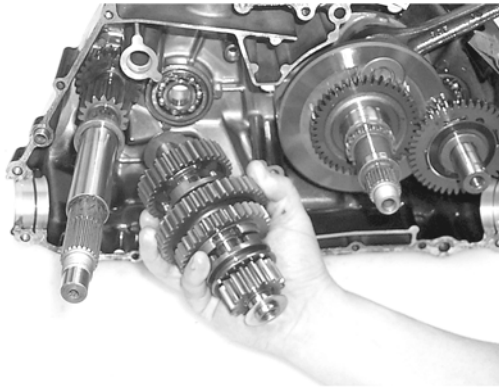
CD826A

5. Install the driveshaft.



CC675

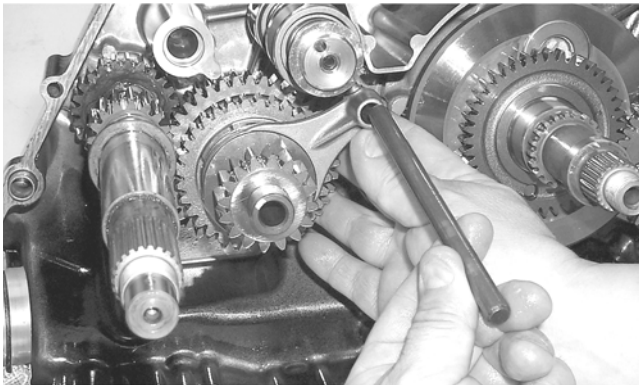
6. Place a washer on each end of the countershaft assembly; then install the assembly.



CC674

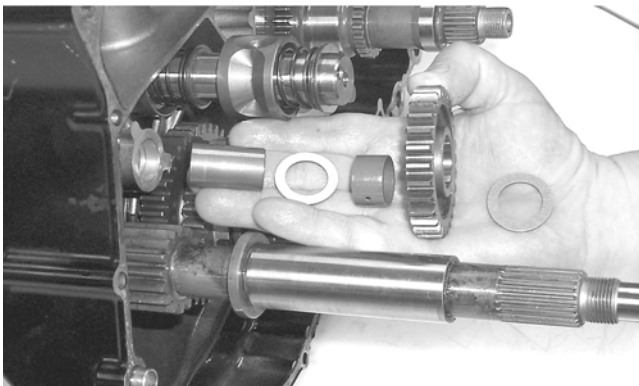
7. Place a washer on each end of the gear shift shaft; then install the shaft assembly making sure the two holes on the end of the shaft are positioned vertically.
8. Insert the two shift forks into the sliding dogs noting the direction of the tabs from disassembling; then install the shift fork shaft.

■**NOTE:** Make sure the shift fork tabs face upward and that they are properly seated into the shift cams.



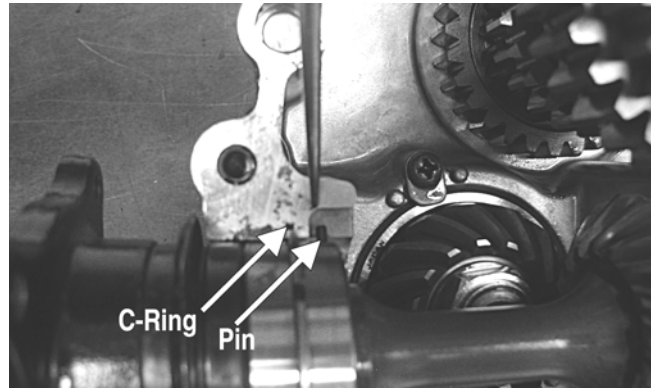
CC669

9. Install the reverse idler gear assembly noting the positioning of the two washers, gear, bushing, and shaft.



CC668

10. Install the front and rear secondary driven shaft assemblies into the left side of the crankcase making sure the bearing locating pins are facing upward and the bearing C-ring is fully seated in the crankcase.



CD268A

11. Place the oil strainer into position; then secure with the two screws.
12. Place the oil strainer cap into position making sure the O-ring is in position (500) or silicone sealant is applied (H1 models); then secure the cap with cap screws. Tighten securely.

## Joining Crankcase Halves

1. Apply High-Temp Sealant to the left-side mating surface.
2. Lightly oil all bearings and grease all shafts in the right-side crankcase.
3. Using a propane torch, heat the right-side crankshaft bearing until the oil begins to smoke; then join the two crankcase halves.



CC695

4. Using a plastic mallet, lightly tap the case halves together until cap screws can be installed.
5. From the right side, install the 8 mm cap screws; then tighten only until snug.

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

6. From the left side, install the remaining 8 mm cap screws (two inside the case); then tighten only until snug.



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

7. From the left side, install the case half 6 mm cap screws; then tighten only until snug.

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

8. From the right side, install the 6 mm cap screws; then tighten only until snug.

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

9. In a crisscross/case-to-case pattern, tighten the 8 mm cap screws (from steps 5-6) until the halves are correctly joined; then tighten to 16 ft-lb.

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

10. In a crisscross/case-to-case pattern, tighten the 6 mm cap screws (from steps 7-8) to 8 ft-lb.

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

#### 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.

## Installing Engine/Transmission

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

1. From the left side, place the engine/transmission into the frame; then slide the engine rearward as far as possible.
2. Slightly raise the rear of the engine and engage the front drive coupler into the splines of the front drive output yoke; then slide the engine forward as far as possible.



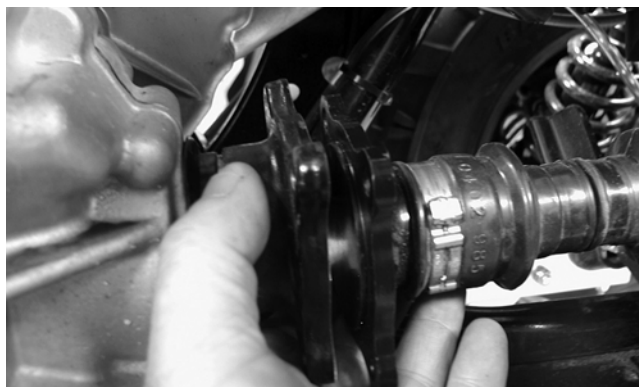
CD818

3. Raise the rear of the engine and place a block beneath it; then install the propeller shaft and output flange into the rear drive coupler.



CD821

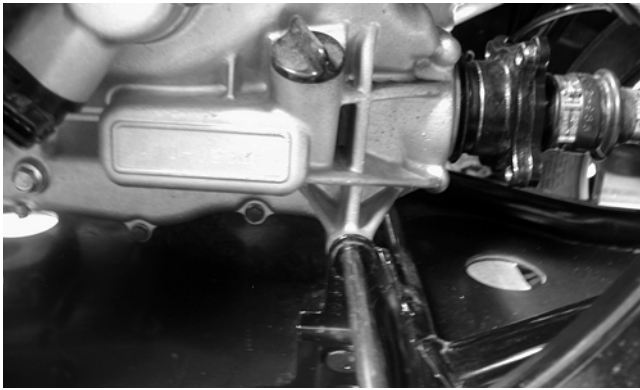
4. Remove the block from beneath the engine; then align the rear drive flanges and secure with four cap screws. Tighten to 20 ft-lb.



CD824

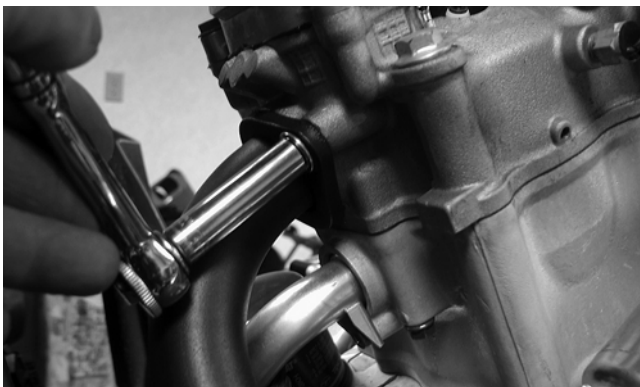
5. Install the engine mounting through-bolts and mounting hardware; then tighten to 40 ft-lb.



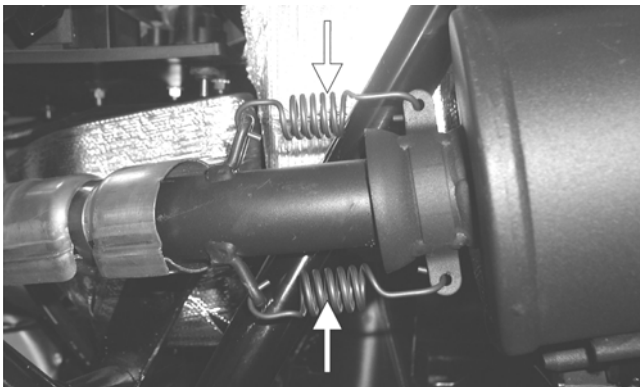


CD809

6. Secure the exhaust pipe to the engine with two cap screws making sure the mounting brackets engage the frame grommets; then install the muffler and tighten the nuts securing the exhaust pipe to 20 ft-lb.



CD803

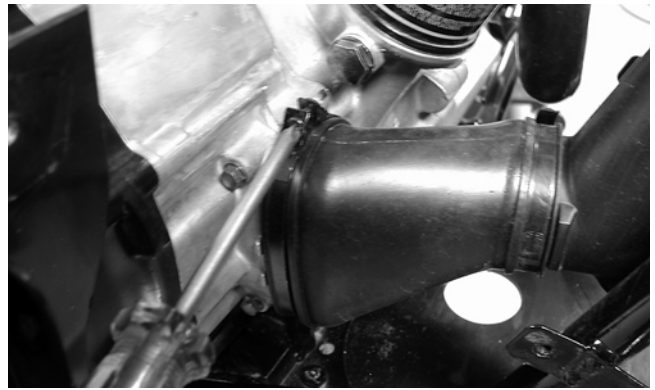


CF138A

7. Install the cooling ducts with clamps and tighten the clamps securely.

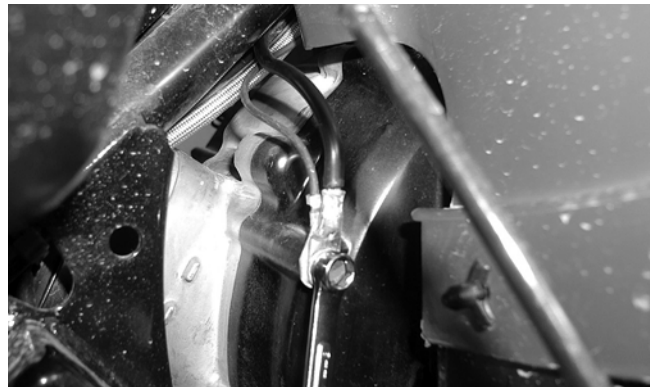


CD515



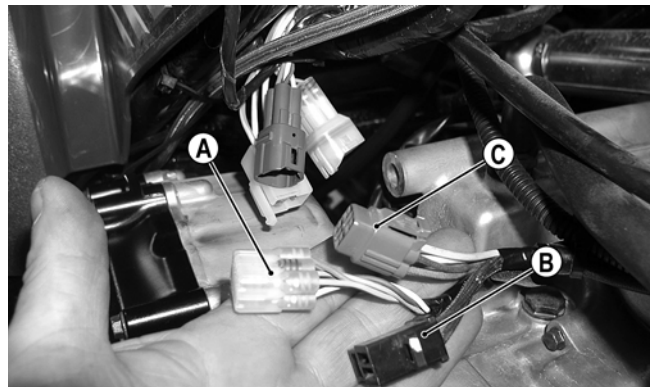
CD793

8. Secure the engine ground wire to the engine with a cap screw. Tighten to 8 ft-lb.



CD810

9. Connect the gear shift position switch (A), stator connector (B), and the CDI connector (C) to the main wiring harness.



CD797A

10. Connect the temperature sensor wire to the main wiring harness.
11. Secure the wires to the frame with nylon ties.
12. Connect the speed sensor connector to the housing.
13. Secure the positive cable to the starter motor.
14. Secure all wiring to the frame and upper engine bracket with cable ties.
15. Secure the two coolant hoses to the engine.

16. Secure the crankcase vent hose to the air cleaner housing; then secure the inlet boot and carburetor/throttle body to the air filter housing.



CD787



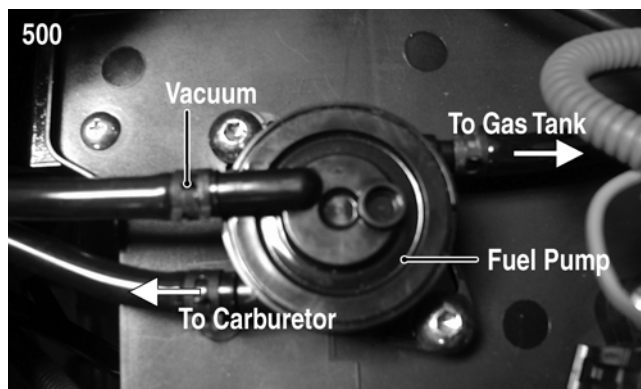
CD785

17. Secure the shift rod to the engine with a new E-clip.

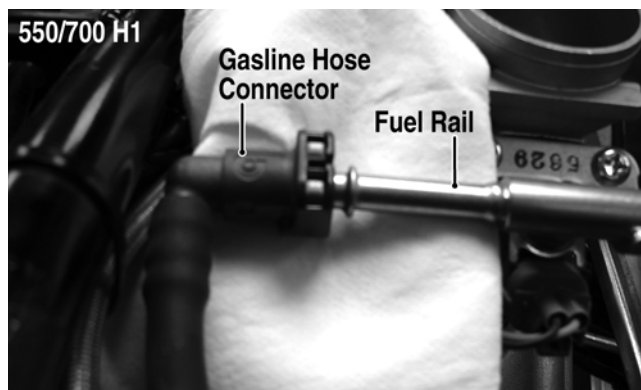


CD774

18. Place the left-side footwell and foot peg in position on the frame; then secure with existing hardware. Tighten securely.
19. Install the front body panel with existing hardware.
20. Connect the hose to the fuel pump/fuel rail; then connect the vacuum hose and secure with hose clamps (500) or connect the gasline hose connector to the fuel rail (H1 models).



CD766C



F1092C

21. Install the side panels into position.
22. Place the battery into position in the battery compartment; then install the battery cables and vent hose. Secure with the battery cover.

### ⚠ CAUTION

Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

23. Add proper amounts of engine/transmission oil and coolant.
24. Install the seat.

### ⚠ CAUTION

If the engine had a major overhaul or if any major part was replaced, proper engine break-in procedures must be followed (see Section 1). If the proper engine break-in procedures are not followed, severe engine damage may result.

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## 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.

### AT THIS POINT

If the technician's objective is to service Top-Side Components, Left-Side Components, or Right-Side Components, the engine/transmission does not have to be removed from the frame.

### AT THIS POINT

If the technician's objective is to service/replace left-side cover oil seals, front output joint oil seal, rear output joint oil seal, and/or the oil strainer (from beneath the engine/transmission), the engine/transmission does not have to be removed from the frame.

Secure the ATV on a support stand to elevate the wheels.

### WARNING

Make sure the ATV is solidly supported on the support stand to avoid injury.

1. Remove the seat.

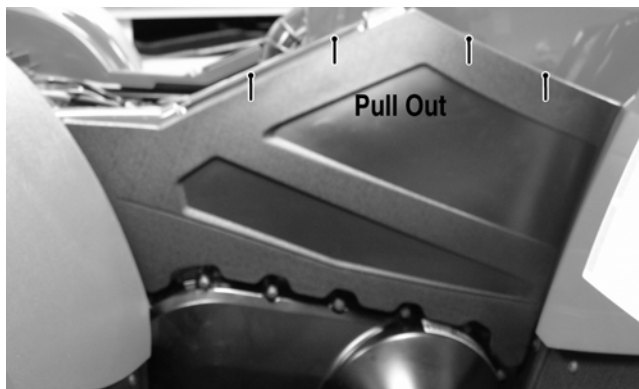
2. Remove the negative cable from the battery; then remove the positive cable. Remove the battery vent hose; then remove the battery.

### CAUTION

Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

3. Remove the radiator access cover, steering post cover, and storage compartment cover assembly; then remove the storage compartment box.

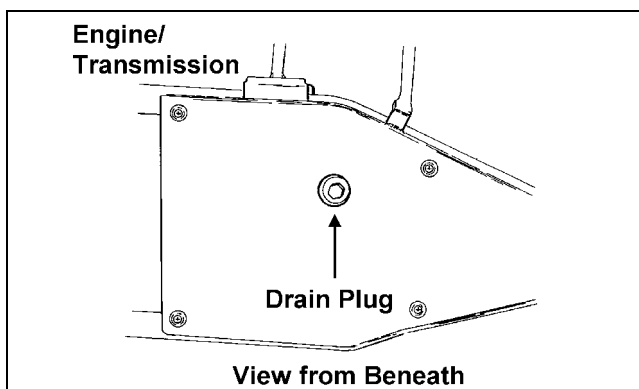
4. Remove the side panels.



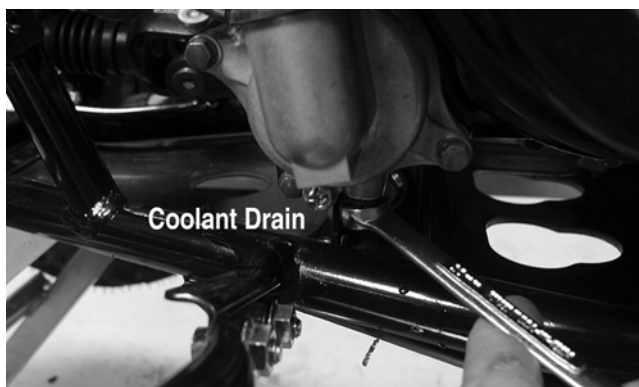
CF242A

5. Remove the instrument pod; then remove the front rack and front body panel (see Section 8).

6. Drain the oil from beneath the engine/transmission; then drain the cooling system.



ATV-0109

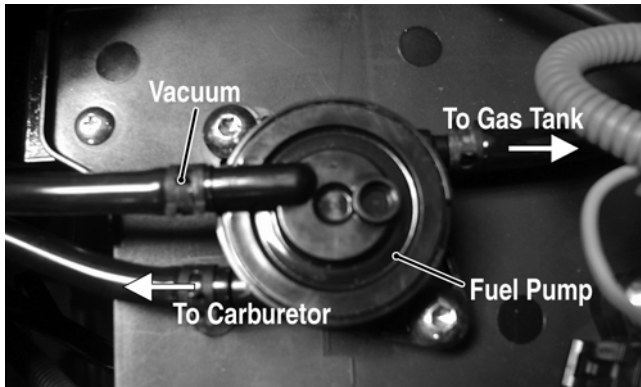


CD799A

7. Remove the air filter (see Section 2).



8. Remove the vacuum hose and the fuel-pump-to-carburetor hose.



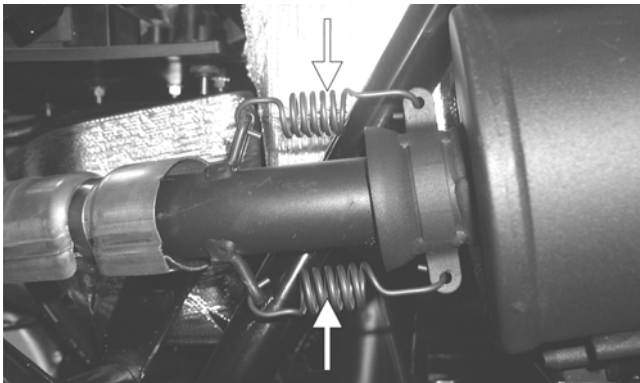
CD766A

9. Remove the cap screws securing the left-side foot peg and footwell to the footrest; then remove the footwell.



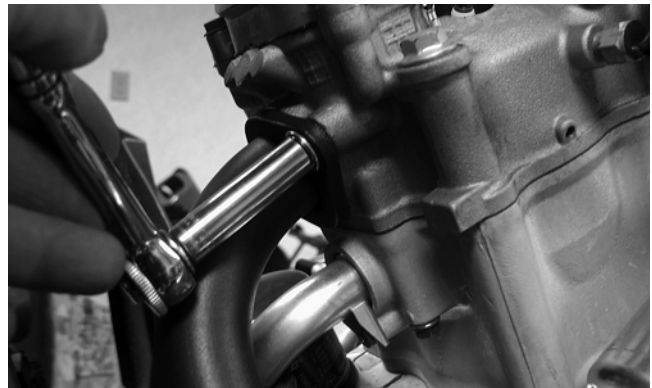
CD782

10. Remove the springs securing the muffler to the exhaust pipe; then remove the muffler. Account for two exhaust springs.



CF138A

11. Remove the cap screws securing the exhaust pipe to the head; then remove the exhaust pipe.



CD803

12. Remove the E-clip securing the shift rod to the engine shift arm; then allow the shift rod to swing forward and hang straight down from the shift lever.
13. Disconnect the speed sensor connector from the sensor housing.
14. Remove the four cap screws securing the rear output joint to the transmission and push the shaft away from the transmission.

3



CD805

15. Loosen the clamp securing the air intake duct to the air filter housing.

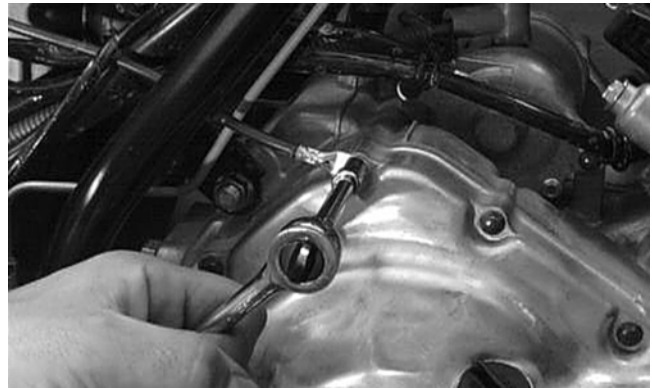


CD785

16. Disconnect the crankcase vent hose from the air filter housing. Loosen the clamp securing the carburetor intake duct to the air filter housing; then remove the housing.



CD787



AR600D



CD786



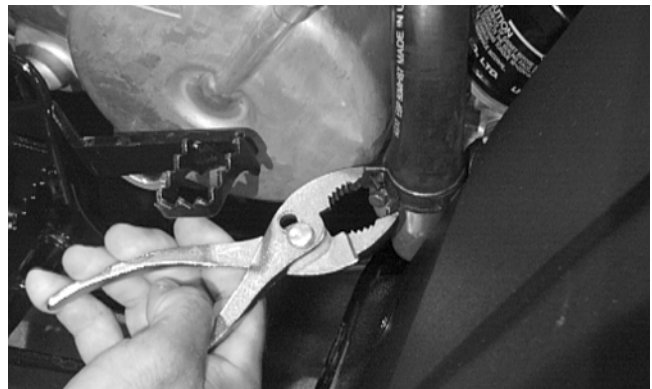
AR604D

17. Remove the clamp securing the upper coolant hose to the thermostat housing; then disconnect the hose.

20. Remove the clamp securing the lower coolant hose to the water pump housing; then disconnect the hose.



CC335D



CC334D

18. Disconnect the high tension lead from the spark plug; then remove the coil.
19. Disconnect the battery ground (negative) cable from the crankcase cover; then disconnect the positive cable from the starter motor.

21. Loosen the clamp on the crankcase breather vent hose; then remove the hose.



CC122D

22. Remove the engine/transmission mounting fasteners in the following sequence:



A. Lower front: One cap screw, nut, spacer, and washer.



CC123D

B. Lower rear: One cap screw, nut, spacer, and washer.



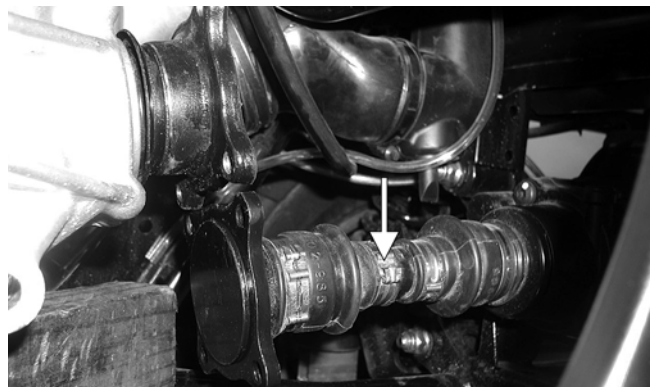
CC126D

23. Raise the rear of the engine enough to allow the rear output flange to clear the output flange joint. Place a block beneath the engine in this position.

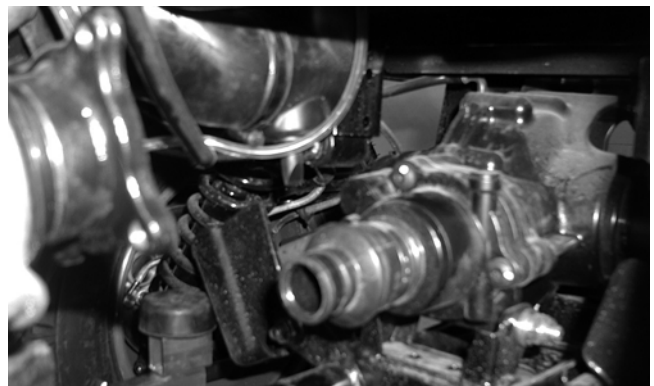


CD811

24. Remove the first small boot clamp; then slide the output flange and driveshaft out of the rear coupler.



CD812A



CD813

25. Remove the block and lower the rear of the engine; then remove the boot clamp on the front output drive yoke.



CD817

26. Move the engine to the rear enough to allow the front drive coupler to clear the front output yoke; then move the engine forward and to the left. Remove the engine from the left-side of the frame.



CD773

3



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## Top-Side Components

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■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.

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## Removing Top-Side Components

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### A. Valve Cover/Rocker Arms B. Cylinder Head/Camshaft

■NOTE: Remove the spark plug and timing inspection plug; then using the recoil starter, rotate the crankshaft to top-dead-center of the compression stroke.

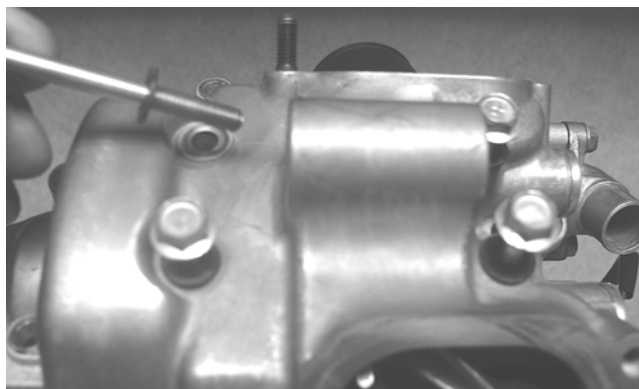
1. Remove the two tappet covers.



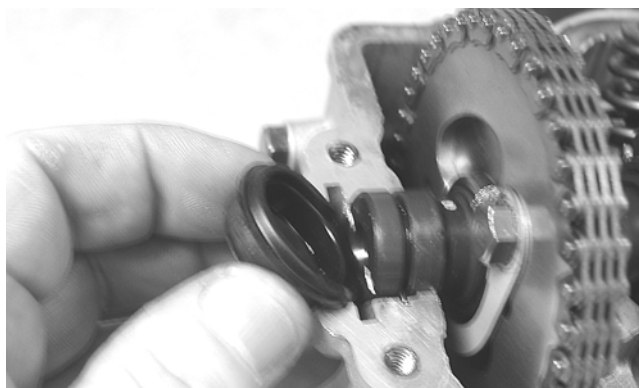
CC001D

■NOTE: Keep the mounting hardware with the covers for assembly purposes or thread them back into the head to keep them separated.

2. Remove the 12 cap screws securing the valve cover to the head; account for the four rubber washers on the top side cap screws. Remove the valve cover. Account for and note the orientation of the cylinder head plug. Note the location of two alignment pins.



CD205



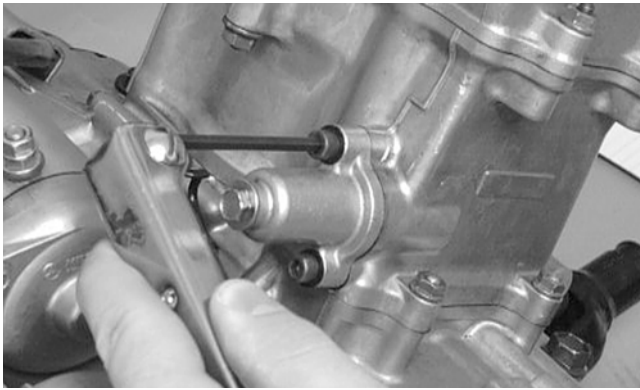
CD468

■NOTE: Note that the opening of the head plug must be directed to the 6 o'clock position.

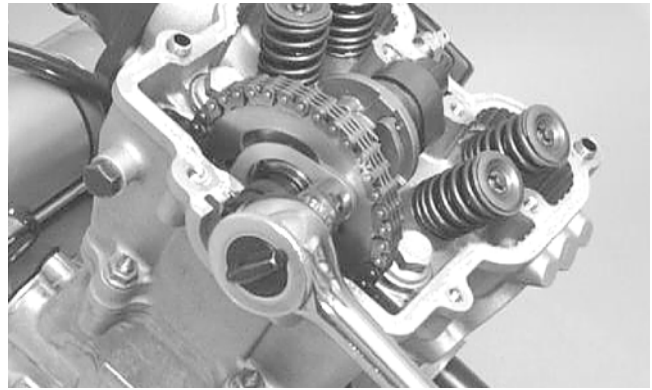
3. Loosen the cap screw on the end of the tensioner; then remove the two Allen-head cap screws securing the tensioner adjuster assembly and remove the assembly. Account for a gasket.



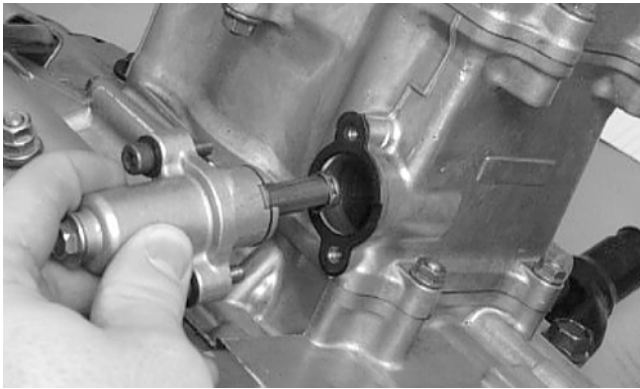
CC009D



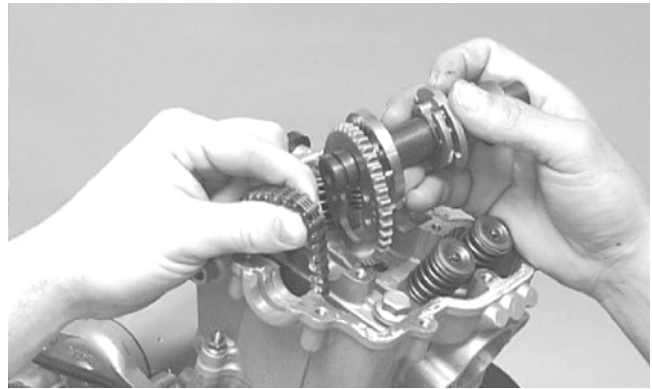
CC010D



CC013D



CC011D



CC266D

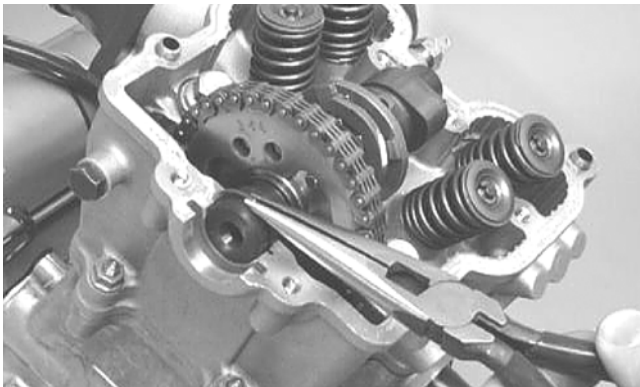
3

4. 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 down into the crankcase.

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

6. Remove the cap screw securing the chain tensioner (account for a washer); then remove the tensioner.



CC012D

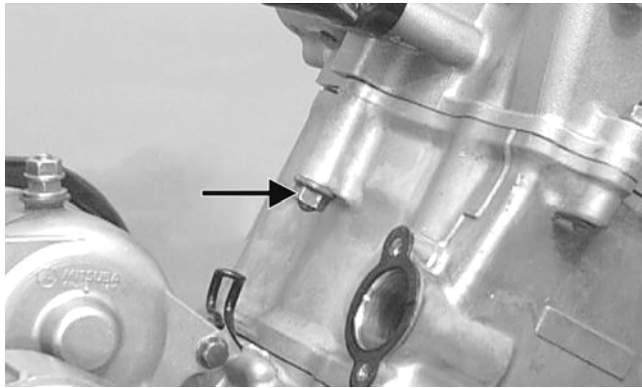


CC014D

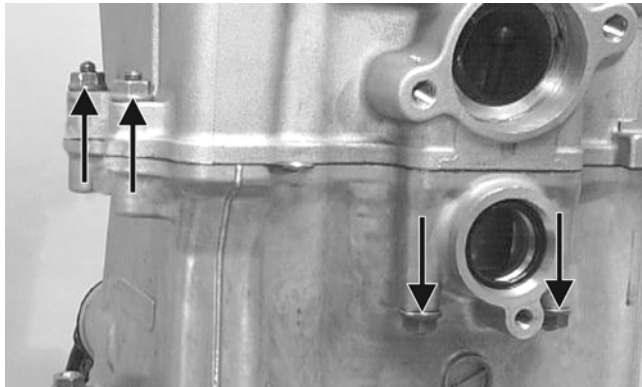
5. Bend the washer tabs and remove the two cap screws securing the sprocket to the camshaft; then drop the sprocket off the camshaft. While holding the chain, slide the sprocket and camshaft out of the cylinder head.

7. Remove the five nuts securing the cylinder head to the cylinder; then remove the four cylinder head cap screws with copper washers (note location of the different-sized cap screws and nuts).

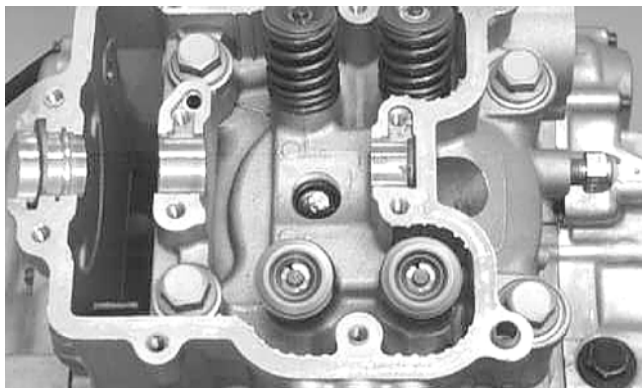




CC017D

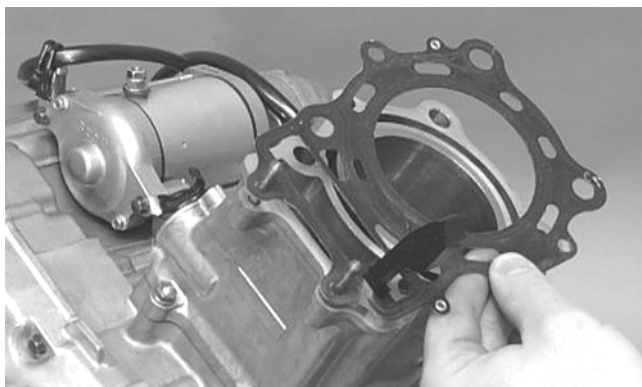


CC018D



CC016D

8. Remove the cylinder head from the cylinder, remove the gasket, and account for two alignment pins.



CC020D

### AT THIS POINT

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

9. Remove the cam chain guide.

### AT THIS POINT

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

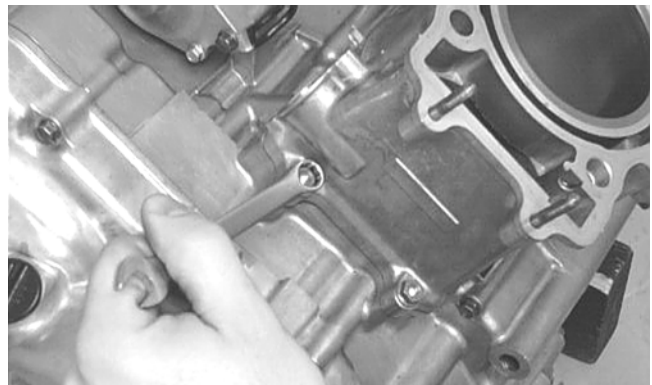


CC022D

## C. Cylinder D. Piston

■NOTE: Steps 1-9 in the preceding sub-section must precede this procedure.

10. Loosen the clamp securing the coolant hose to the union; then detach the hose.  
11. Remove the two nuts securing the cylinder to the crankcase.



CC023D

12. 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.





CC024D



CC025D



CC026D

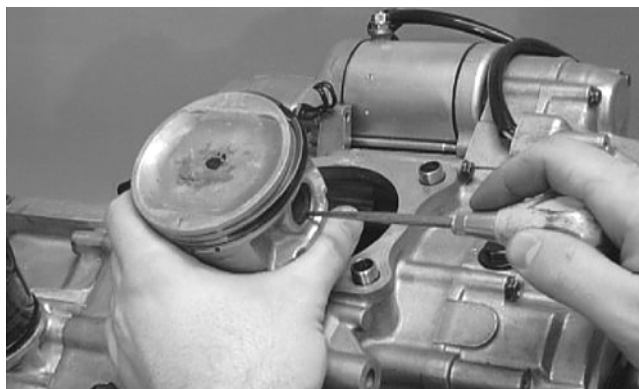
#### 👉 AT THIS POINT

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.

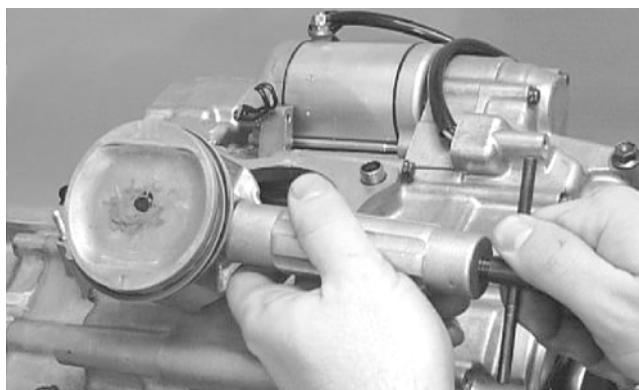
13. Using an awl, remove one piston-pin circlip.



CC032D

14. 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.



CC033D

■NOTE: Support the connecting rod with rubber bands to avoid damaging the rod or install the Connecting Rod Holder.

#### ⚠ 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.

■NOTE: If the existing rings will not be replaced with new rings, note the location of each ring for proper installation. When replacing with new rings, replace as a complete set only. If the piston rings must be removed, remove them in this sequence.

A. Starting with the top ring, slide one end of the ring out of the ring-groove.

B. Remove each ring by working it toward the dome of the piston while rotating it out of the groove.

#### 👉 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.

3

## Servicing Top-Side Components

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

### 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.

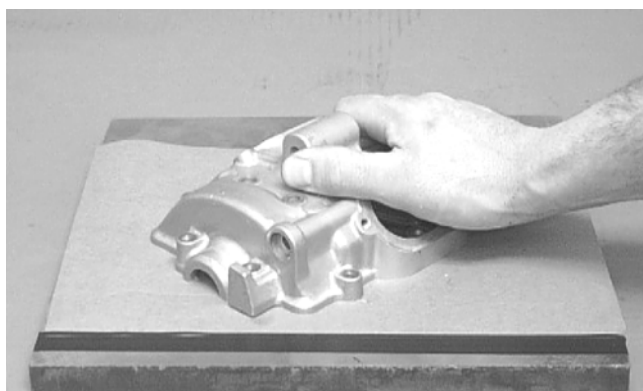
### Cleaning/Inspecting Valve Cover/Rocker Arms

■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

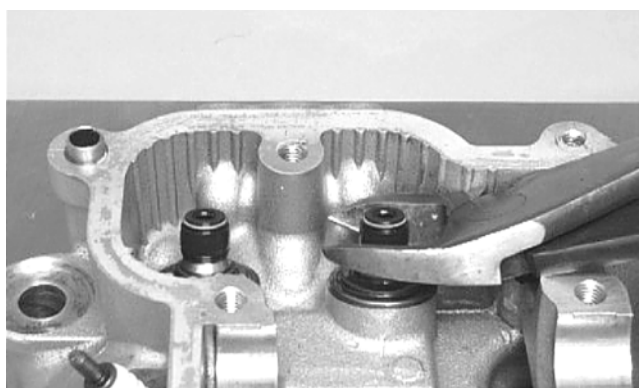
■NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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

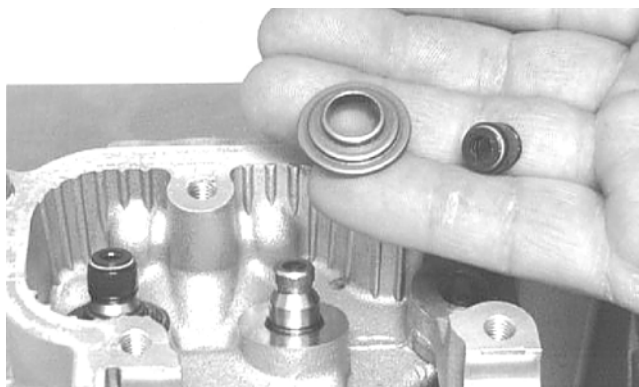


CC132D

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



CC134D



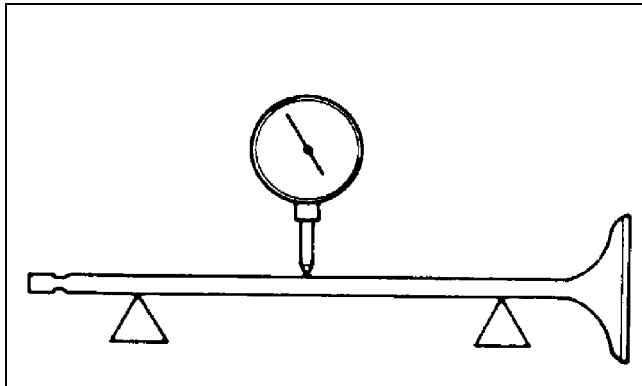
CC136D

■NOTE: The valve seals must be replaced.

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

## Measuring Valve Stem Runout

1. Support each valve stem end with the V Blocks; then check the valve stem runout using a dial indicator.



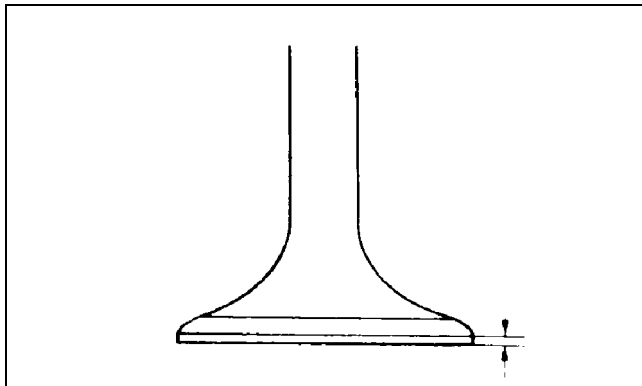
2. Maximum runout must not exceed specifications.

## Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) must be within specifications.
3. Acceptable diameter range (exhaust valve) must be within specifications.

## Measuring Valve Face/Seat Width

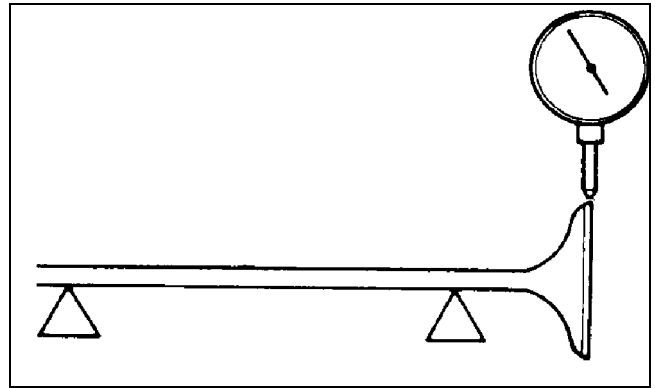
1. Using a micrometer, measure the width of the valve face.



2. Acceptable width range must be within specifications.

## Measuring Valve Face Radial Runout

1. Mount a dial indicator on the surface plate; then place the valve stem on a set of V blocks.
2. Position the dial indicator contact point on the outside edge of the valve face; then zero the indicator.

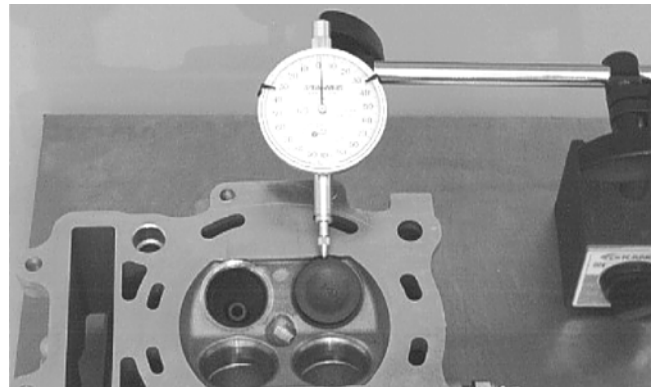


3. Rotate the valve in the V blocks.
4. Maximum runout must not exceed specifications.

## Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

1. Mount a dial indicator and base on the surface plate; then place the cylinder head on the surface plate.
2. Install the valve into the cylinder head; then position the dial indicator contact point against the outside edge of the valve face. Zero the indicator.

3



3. Push the valve from side to side; then from top to bottom.
4. Maximum "wobble" deflection must not exceed specifications.

## Measuring Valve Guide (Inside Diameter)

1. Insert a snap gauge 1/2 way down into each valve guide bore; then remove the gauge and measure it with a micrometer.
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 that 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.

## Measuring Rocker Arm (Inside Diameter)

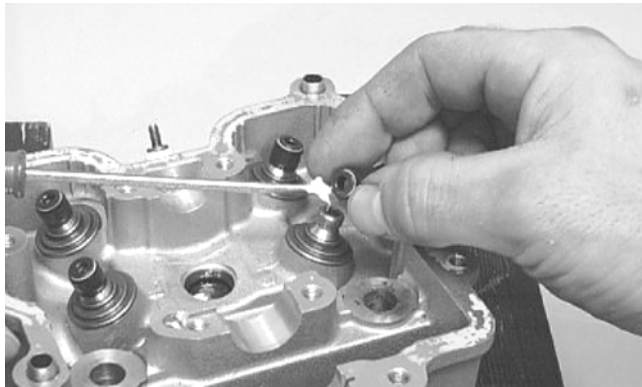
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range must be within specifications.

## Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range must be within specifications.

## Installing Valves

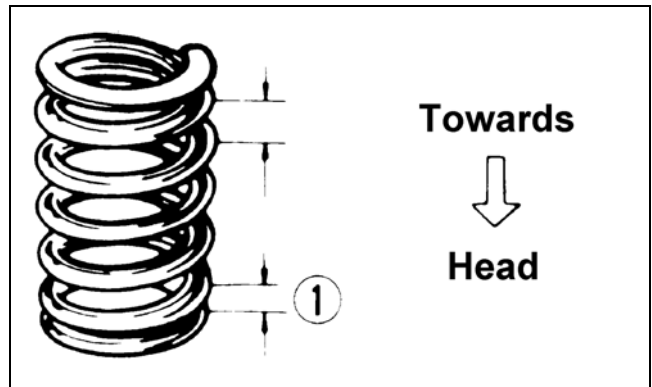
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



CC144D

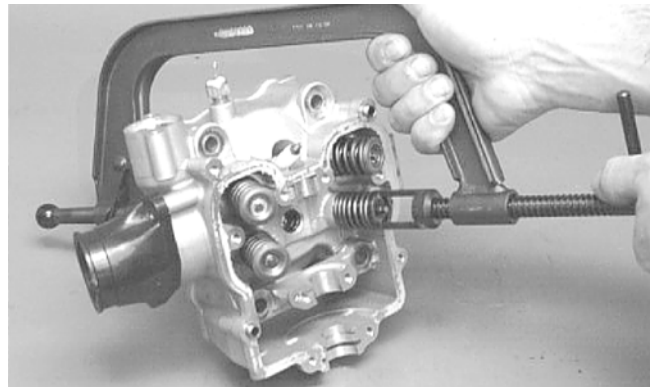
2. Insert each valve into its original valve location.
3. Install the valve springs with the painted end of the spring facing away from the cylinder head.

■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.



CC132D

## PISTON ASSEMBLY

■NOTE: Whenever a piston, rings, or pin are out of tolerance, they must be replaced.

### Cleaning/Inspecting Piston

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the dome of the piston.
2. Inspect the piston for cracks in the piston pin, dome, and skirt areas.
3. Inspect the piston for seizure marks or scuffing. Repair with #400 grit wet-or-dry sandpaper and water or honing oil.

■NOTE: If scuffing or seizure marks are too deep to correct with the sandpaper, replace the piston.

4. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

### Removing Piston Rings

1. Starting with the top ring, slide one end of the ring out of the ring-groove.



CC400D

2. Remove each ring by working it toward the dome of the piston while rotating it out of the groove.

■NOTE: If the existing rings will not be replaced with new ones, note the location of each ring for proper installation. When installing new rings, install as a complete set only.

### Cleaning/Inspecting Piston Rings

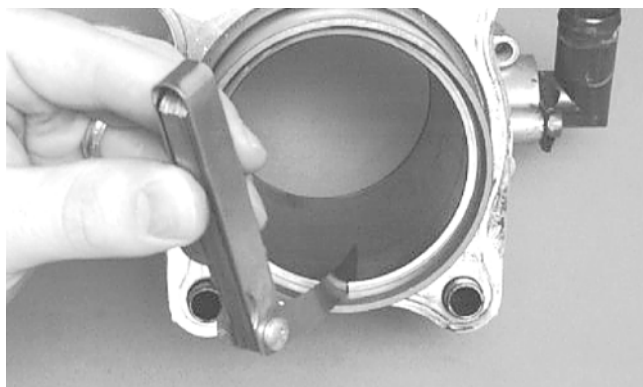
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

#### ⚠ CAUTION

Improper cleaning of the ring-grooves by the use of the wrong type of ring-groove cleaner will result in severe damage to the piston.

### Measuring Piston-Ring End Gap (Installed)

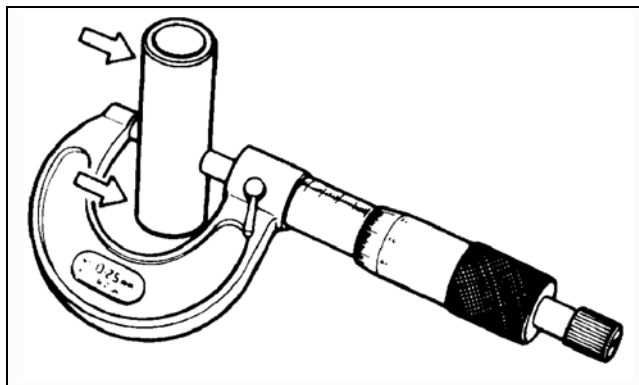
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within specifications.



CC280D

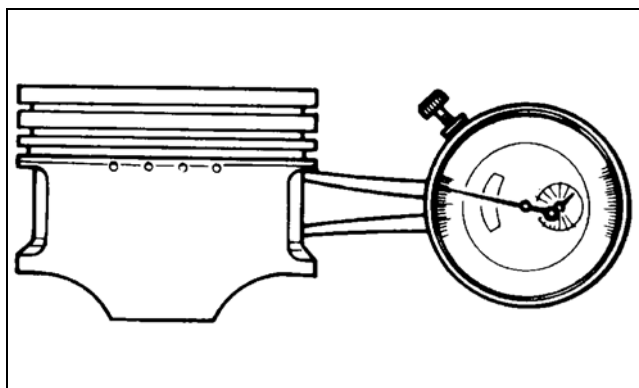
### Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is not within 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

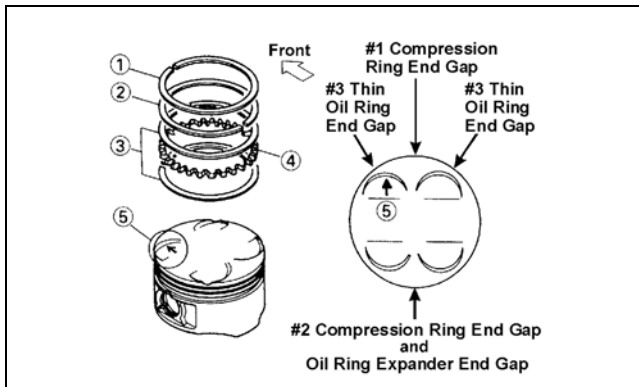
1. Measure the cylinder front to back in six places.
2. Measure the corresponding piston diameter at a point 15 mm above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be within specifications.

### Installing Piston Rings

1. Install ring expander (4) in the bottom groove of the piston; then install the thin oil rings (3) over the expander making sure the expander ends do not overlap. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■NOTE: Note the direction of the exhaust side of the piston (5) for correct ring end gap orientation.

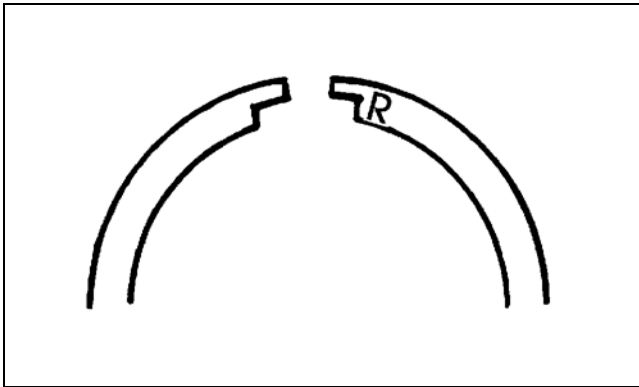
3



ATV-1085B

2. Install the compression rings (1 and 2) so the letter on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring end gaps are on directly opposite sides of the piston (see illustration).

■NOTE: The chrome (silver) ring should be installed in the top position.



726-306A

### ⚠ CAUTION

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

## CYLINDER/CYLINDER HEAD ASSEMBLY

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

### Cleaning/Inspecting Cylinder Head

### ⚠ CAUTION

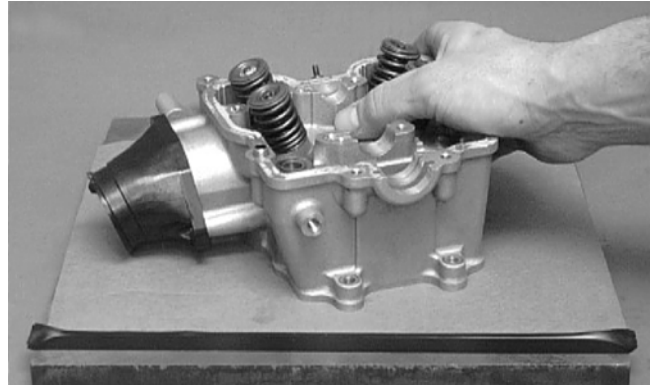
The cylinder head studs must be removed for this procedure.

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 "heli-coil" 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.



CC128D

## 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 factor between the head and the straightedge.
3. Maximum distortion must not exceed specifications.



CC141D

## Cleaning/Inspecting Cylinder

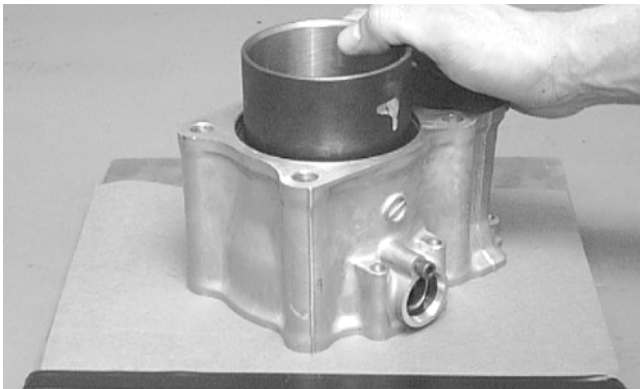
1. Wash the cylinder in parts-cleaning solvent.



2. Inspect the cylinder for pitting, scoring, scuffing, warpage, and corrosion. If marks are found, repair the surface using a cylinder hone (see Honing 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.**



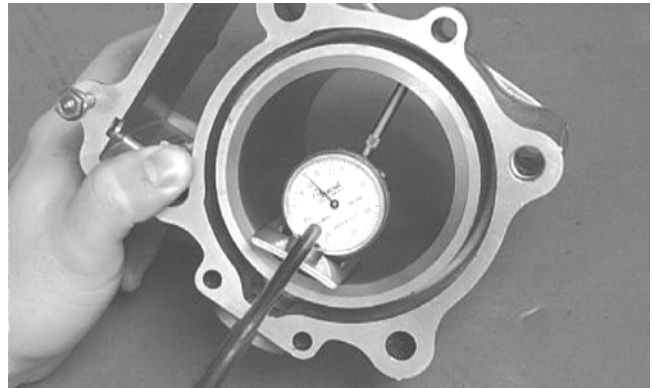
CC129D

## 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.

## Honing Cylinder

1. 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.

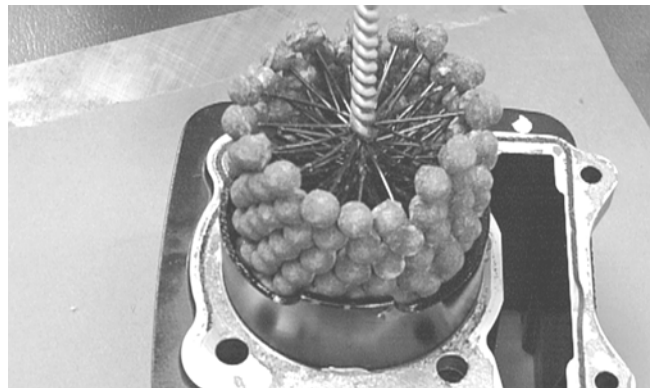


CC127D

2. Wash the cylinder in parts-cleaning solvent.
3. 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.

3



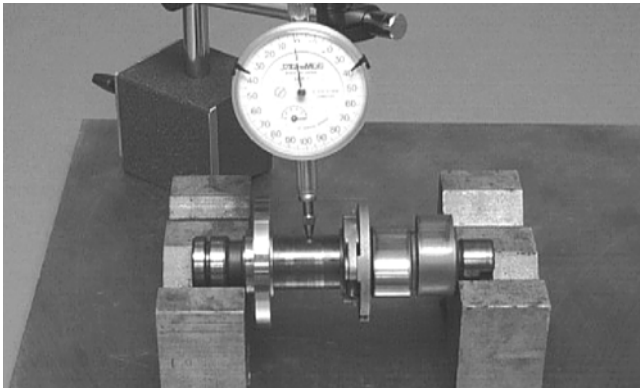
CC390D

4. If any measurement exceeds specifications, replace the cylinder.

## 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.

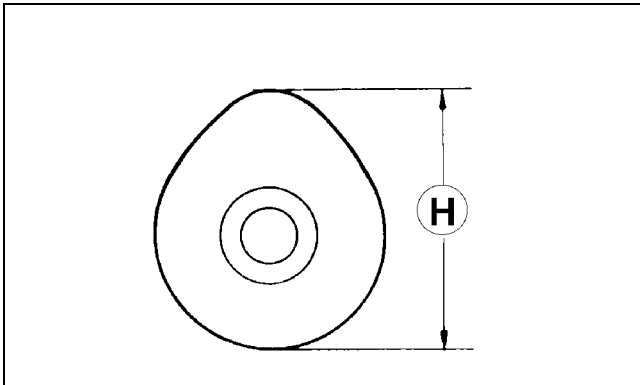


CC283D

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

### Measuring Camshaft Lobe Height

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



ATV1013A

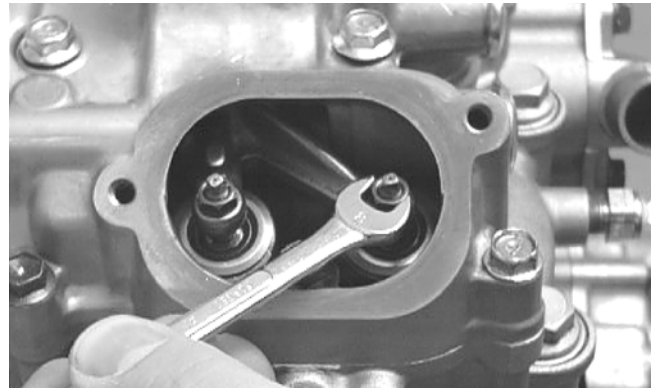
2. The lobe heights must not exceed minimum specifications.

### 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.

### Measuring Camshaft to Cylinder Head Clearance

1. Remove the adjuster screws and jam nuts.

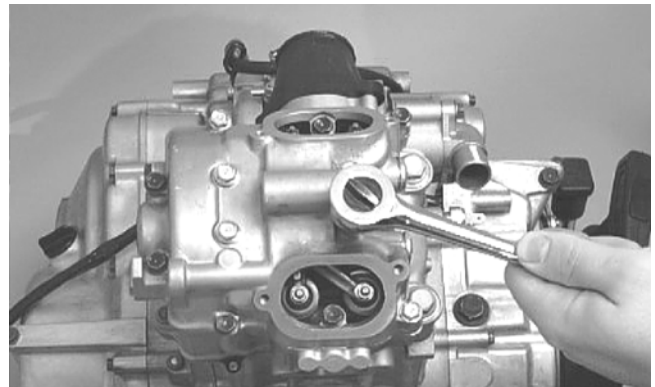


CC005D

2. Place a strip of plasti-gauge in each of the camshaft lands in the cylinder head.
3. Place the valve cover on the cylinder head and secure with the valve cover cap screws. Tighten securely.

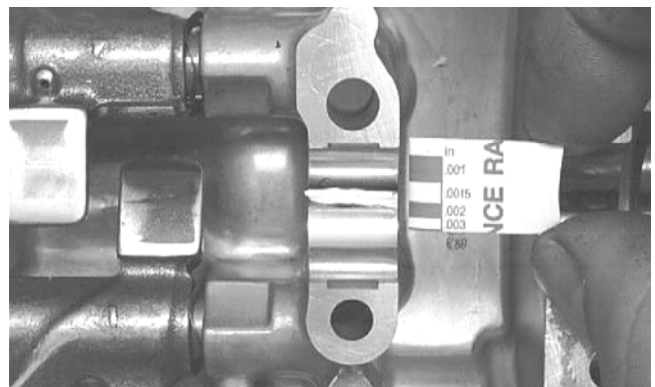
■ **NOTE:** Do not rotate the camshaft when measuring clearance.

4. Remove the cap screws securing the valve cover to the cylinder; then remove the valve cover and camshaft.



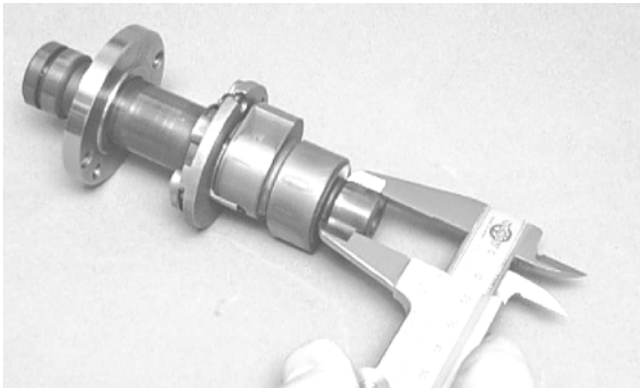
CC003D

5. Match the width of the plasti-gauge with the chart found on the plasti-gauge packaging to determine camshaft to cylinder head and valve cover clearance.



CC145D

6. If clearance is excessive, measure the journals of the camshaft.

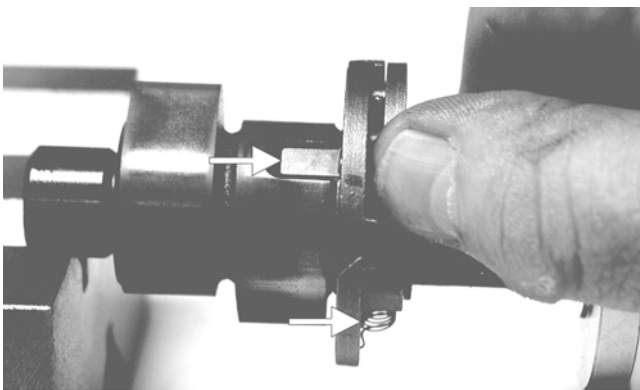


CC287D

■NOTE: If the journals are worn, replace the camshaft; then measure the clearance again. If it is still out of tolerance, replace the cylinder head.

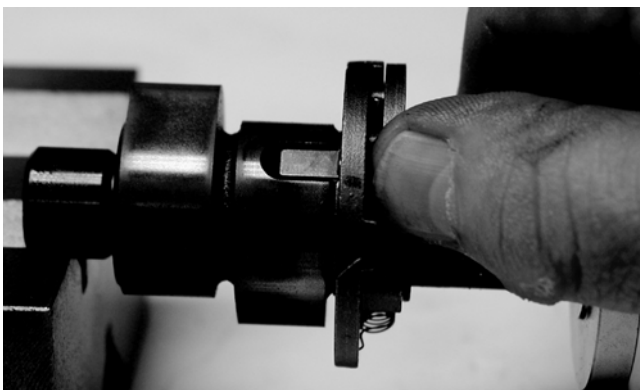
### Inspecting Camshaft Automatic Decompression Spring/Unloader Assembly

1. Inspect the spring, weights, and unloader for damage and freedom of movement.



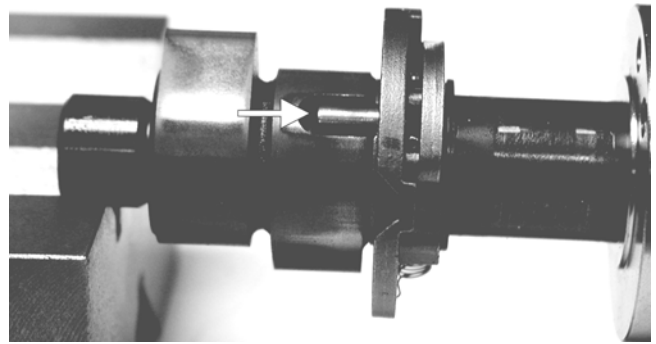
CF061A

■NOTE: With the weight extended, the unloader flat should be even with the camshaft journal.



CF061

■NOTE: When the weight is released, the spring should return the assembly to the "unload" position with the unloader extending above the camshaft journal.



CF060A

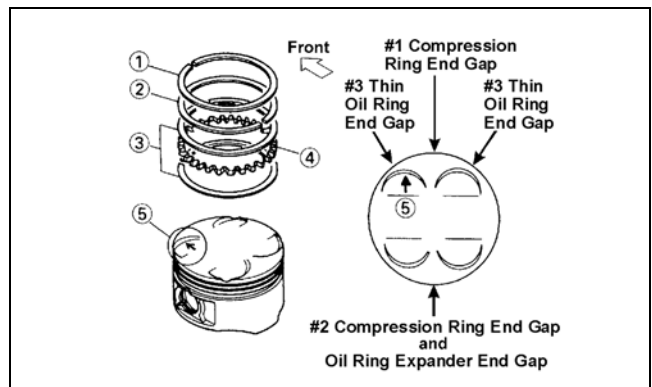
2. If damaged, the camshaft must be replaced.

## Installing Top-Side Components

### A. Piston B. Cylinder

■NOTE: If the piston rings were removed, install them in this sequence.

- A. Install ring expander (4) in the bottom groove of the piston; then install the thin oil rings (3) over the expander making sure the expander ends do not overlap.

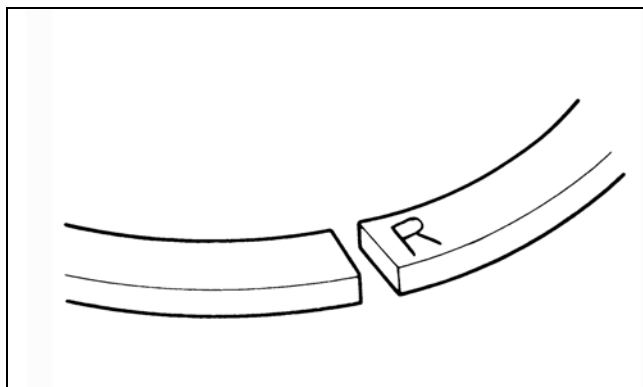


ATV-1085B

- B. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■NOTE: Note the direction of the exhaust side of the piston (5) for correct ring end gap orientation.





ATV-1024

C. Install the compression rings (1 and 2) so the letter on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring end gaps are on directly opposite sides of the piston (see illustration).

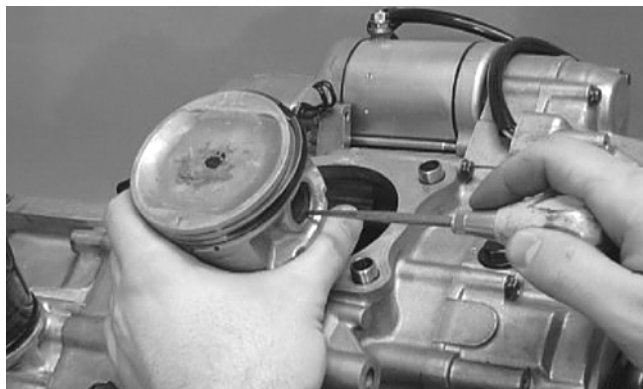
■**NOTE:** The chrome (silver) ring should be installed in the top position.

**CAUTION**

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

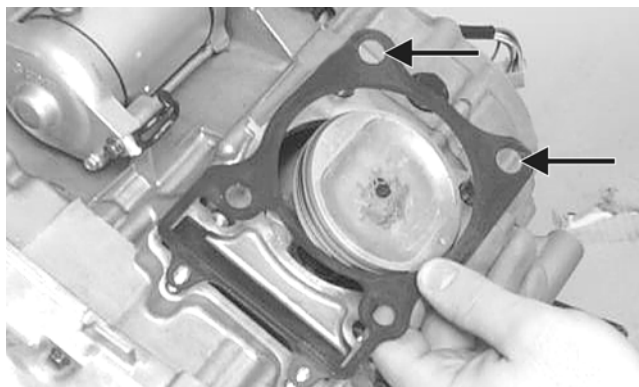
1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

■**NOTE:** The piston should be installed so the arrow points toward the exhaust.



CC032D

2. Place the two alignment pins into position. Place the cylinder gasket into position; then place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase.



CC025D

3. Lubricate the inside wall of the cylinder; then using a ring compressor or the fingers, 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**

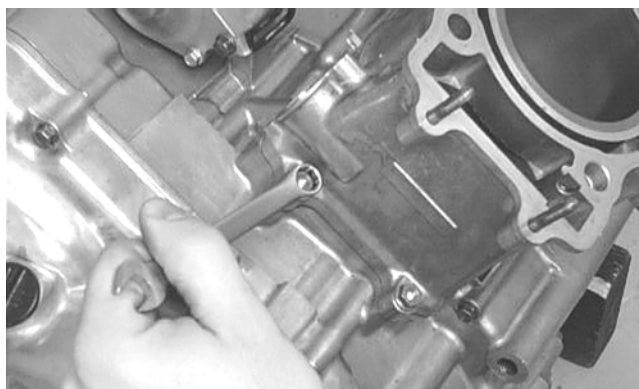
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



CC024D

4. Loosely install the two nuts which secure the cylinder to the crankcase.

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



CC023D

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

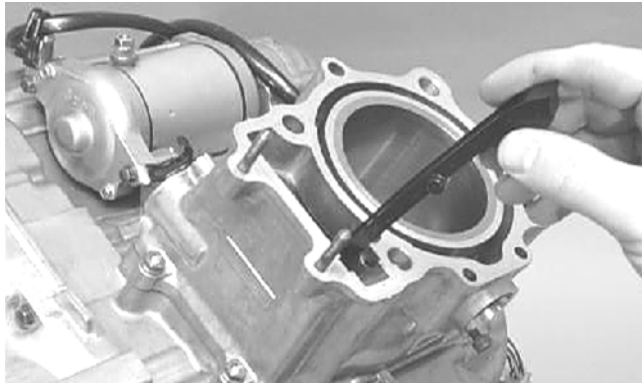
## C. Cylinder Head/Camshaft D. Valve Cover/Rocker Arms

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

6. Place the chain guide into the cylinder.

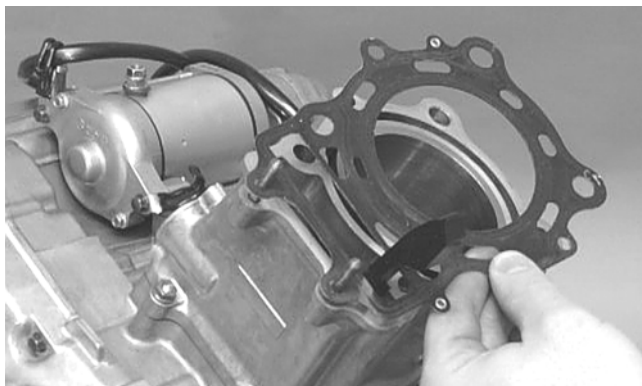
### ⚠ CAUTION

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

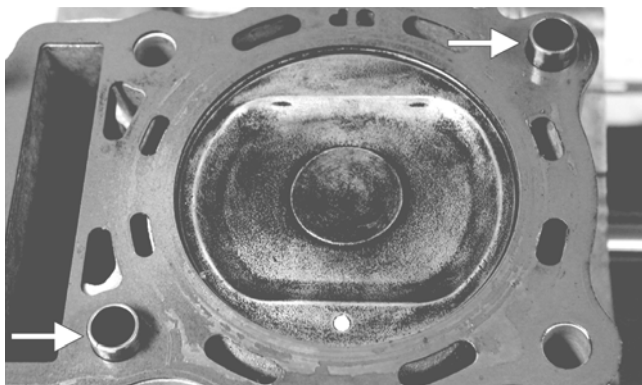


CC022D

7. Place a new head gasket into position on the cylinder. Place the alignment pins into position; then place the cylinder head into position on the cylinder.

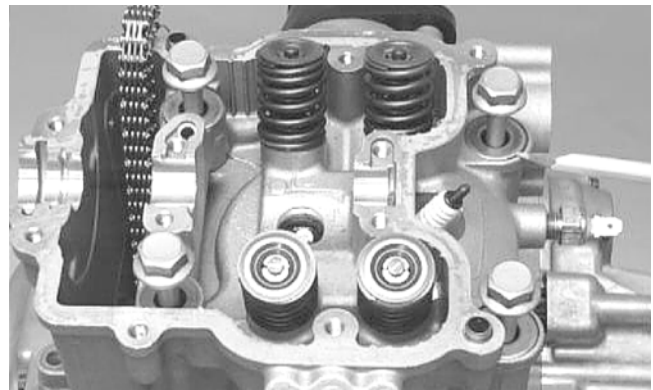


CC020D



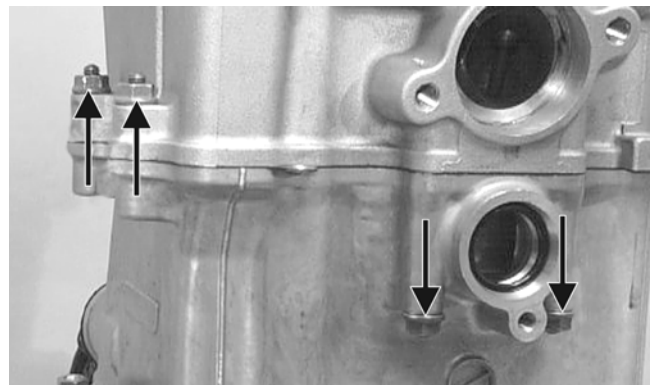
CF057A

8. Install the four cylinder head cap screws with copper washers (note the locations of the different-lengthed cap screws). Tighten only until snug.

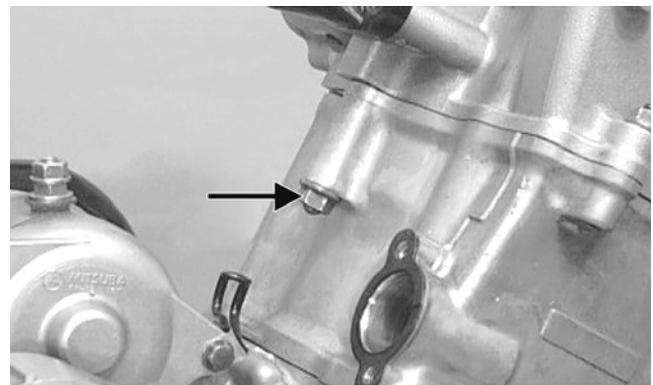


CC272D

9. Loosely install the five cylinder head nuts.



CC018D



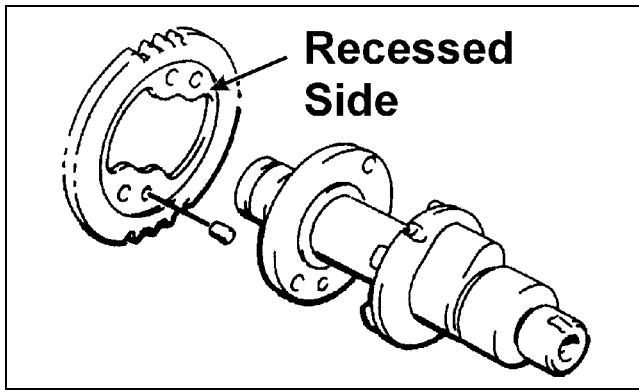
CC017D

10. In a crisscross pattern, tighten the four cylinder head cap screws (from step 8) to 28 ft-lb; then tighten the 8 mm nut (from step 9) to 18 ft-lb. Using a crisscross pattern, tighten the four 6 mm nuts (from step 9) to 8 ft-lb. Tighten the two cylinder-to- crankcase nuts (from step 4) securely.
11. With the timing inspection plug removed and the chain held tight, rotate the crankshaft until the piston is at top-dead-center.

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

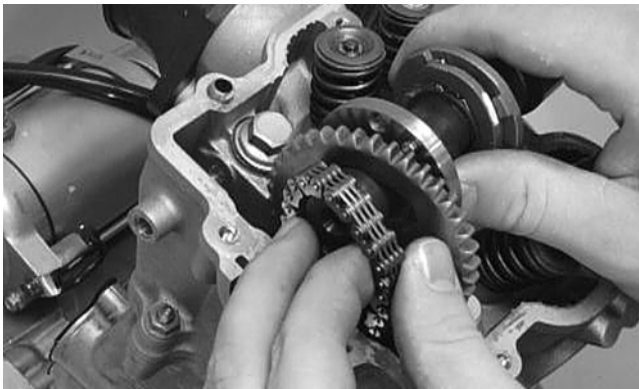
12. With the alignment pin installed in the camshaft, loosely place the cam sprocket (with the recessed side facing the cam shaft lobes) onto the camshaft. At this point, do not "seat" the sprocket onto the shaft.





732-307B

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.



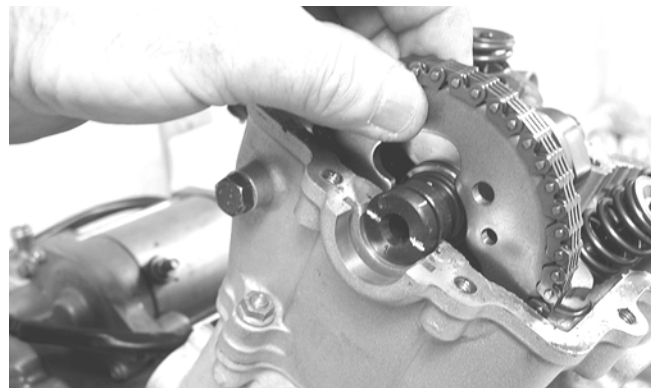
CC015D

■**NOTE:** Note the position of the alignment marks on the end of the camshaft. They must be parallel with the valve cover mating surface. If rotating the camshaft is necessary for alignment, do not allow the chain and sprocket to rotate and be sure the cam lobes are in the down position.



CF030A

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.



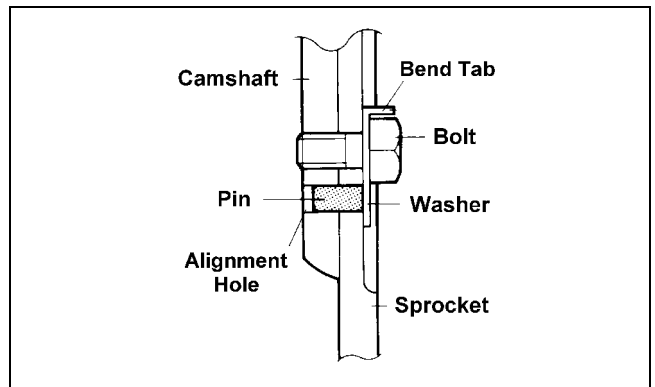
CD463

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

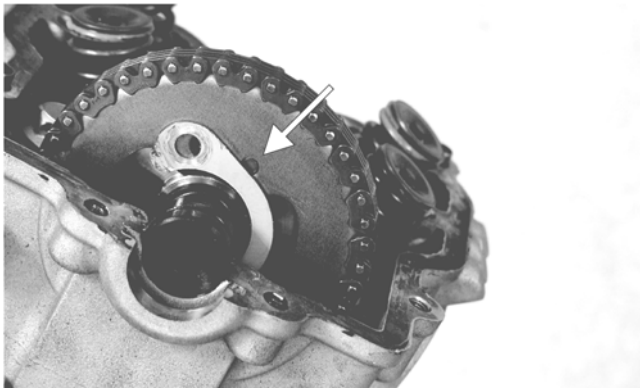


ATV-1027

### ⚠ CAUTION

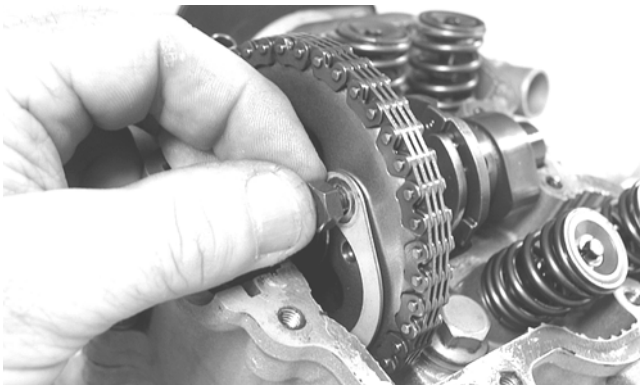
Care must be taken that the tab-washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.





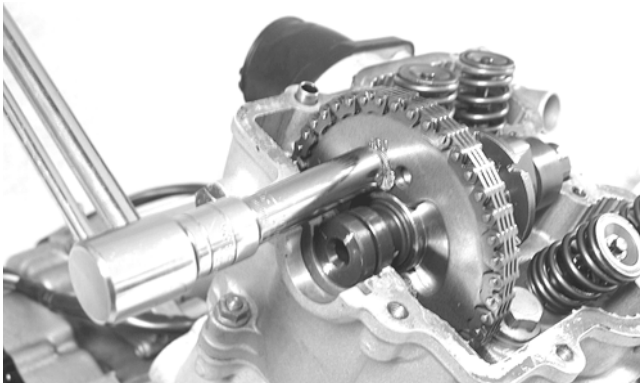
CF013A

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.



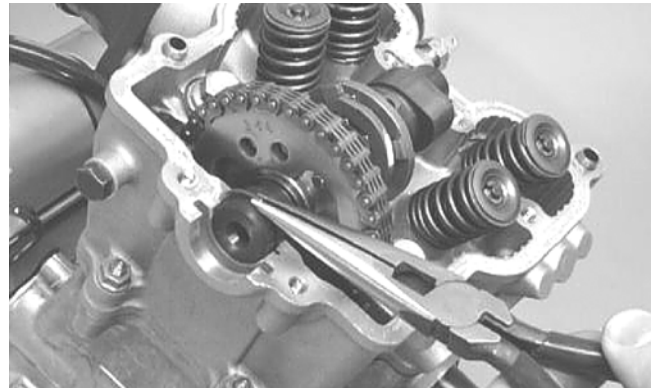
CD464

17. 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 11 ft-lb. Bend the tab to secure the cap screw.



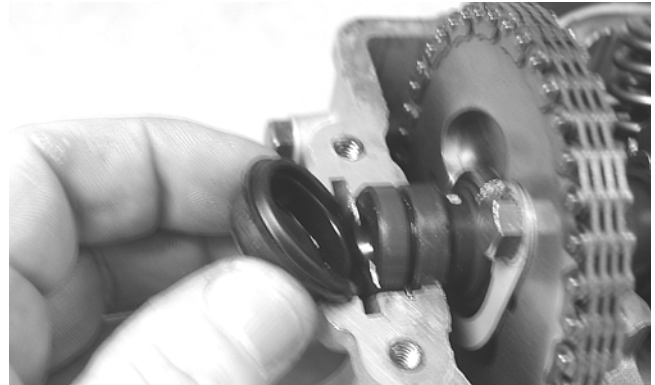
CD465

18. Rotate the crankshaft until the first cap screw (from step 16) securing the sprocket to the camshaft can be addressed; then tighten to 11 ft-lb. Bend the tab to secure the cap screw.
19. Place the C-ring into position in its groove in the cylinder.



CC012D

20. Install the cylinder head plug in the cylinder head with the opening of the plug directed downward and toward the inside.



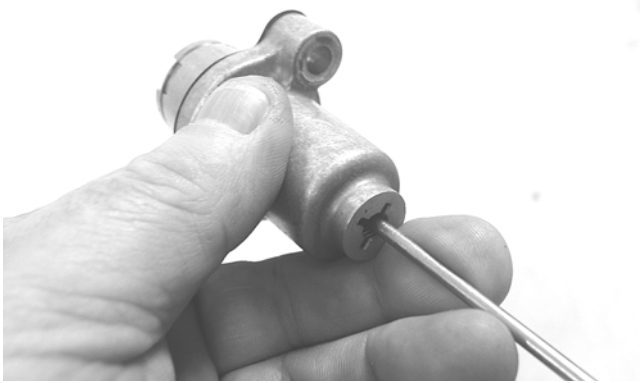
CD468

21. Place the cam chain tensioner guide into position and secure with the cap screw and washer.



CC014D

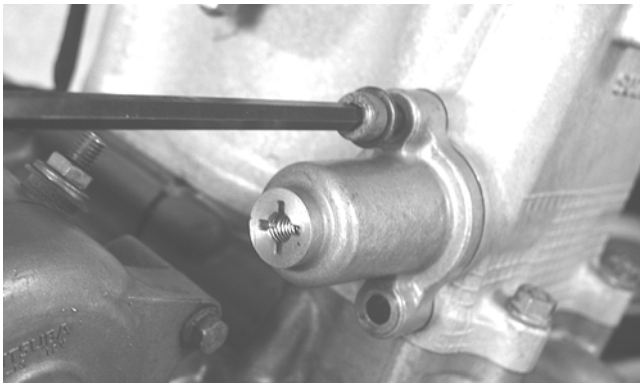
22. Remove the cap screw from the end of the chain tensioner; then using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner clockwise until the screw bottoms.



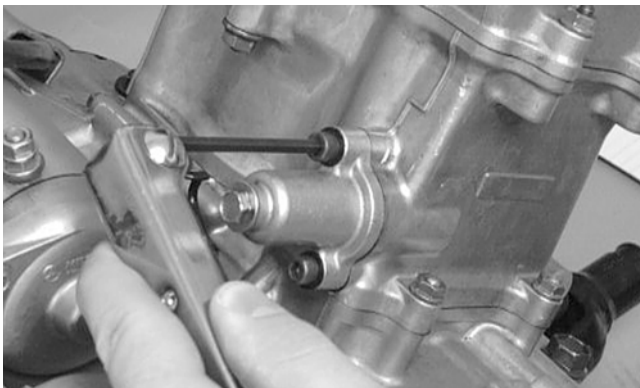
CD501

■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 24.

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

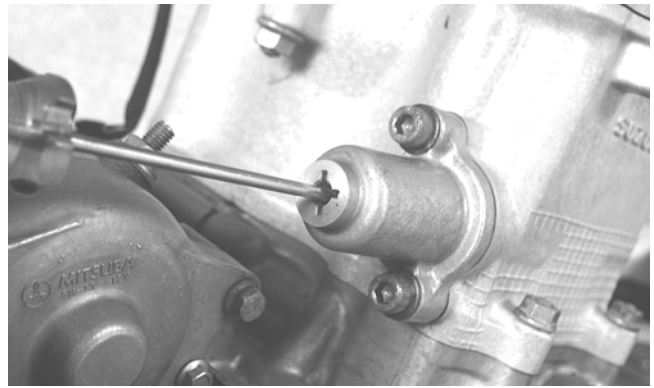


CD469

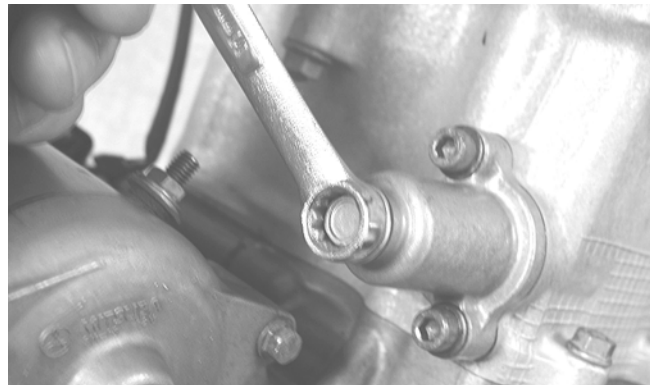


CC010D

24. Using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner counterclockwise until all tension is released; then install the cap screw into the end of the chain tensioner.



CD470



CD471

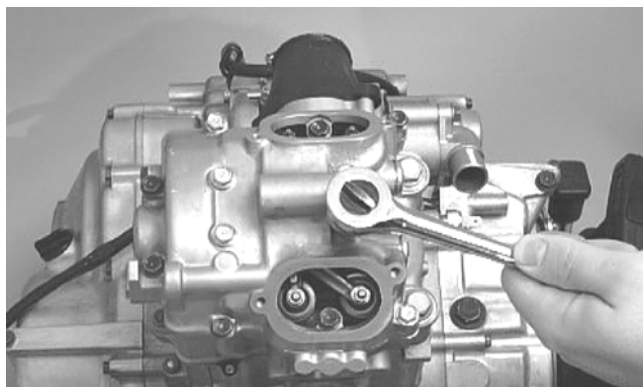
25. Loosen the four adjuster screw jam nuts; then loosen the four adjuster screws on the rocker arms in the valve cover.
26. Apply a thin coat of Three Bond Sealant to the mating surfaces of the cylinder head and valve cover.



CC275D

27. Place the valve cover into position.
- NOTE: At this point, the rocker arms and adjuster screws must not have pressure on them.
28. Install the four top side valve cover cap screws with rubber washers; then install the remaining cap screws. Tighten only until snug.





CC003D

29. In a crisscross pattern starting from the center and working outward, tighten the cap screws (from step 28) to 7 ft-lb.
30. Adjust valve/tappet clearance (see Section 2).
31. Place the two tappet covers into position making sure the proper cap screws are with the proper cover. Tighten the cap screws securely.



CC001D

32. If removed, install the spark plug and tighten securely.

## 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.

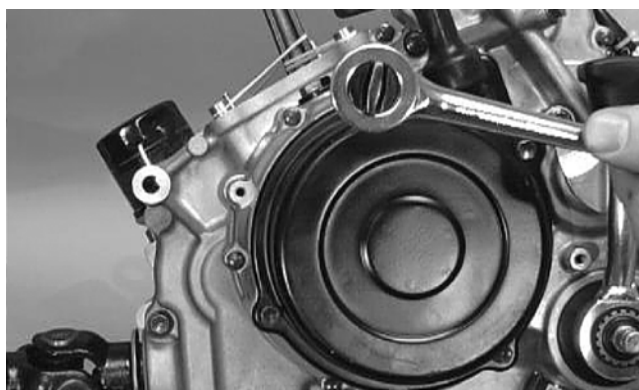
## Removing Left-Side Components

- A. Recoil Starter
- B. Hi/Low Shifter Assembly
- C. Speed Sensor Housing
- D. Cover

1. Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the recoil starter.

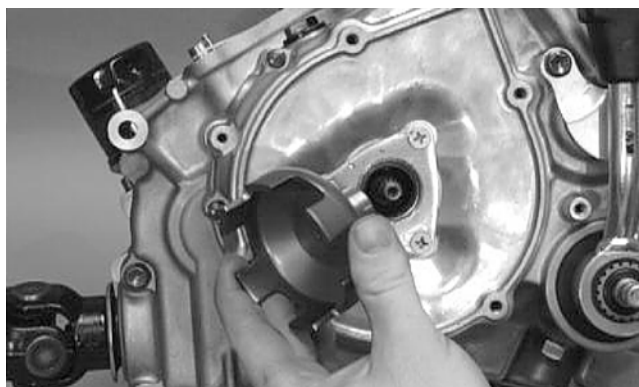
### AT THIS POINT

To service the recoil starter, see Servicing Left-Side Components sub-section.



CC039D

2. Remove the flange nut securing the starter cup to the crankshaft; then remove the starter cup. Account for the O-ring inside the cup.

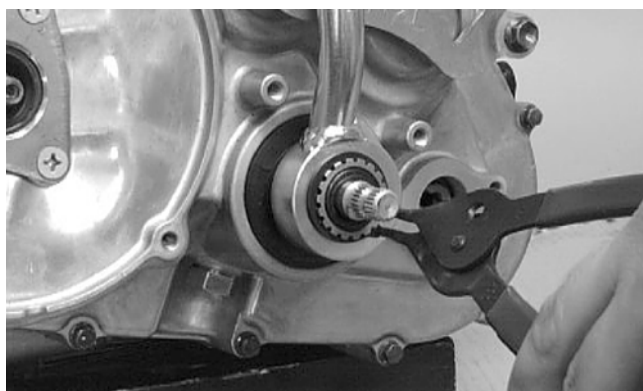


CC041D

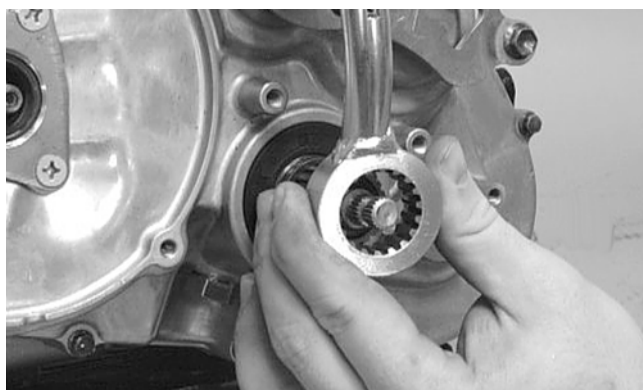
3. Put the shift lever into the hi-range position and remove the snap ring from the hi/low range shift shaft; then remove the shift lever.

■NOTE: It will be necessary to lift slightly on the shift lever to remove it from the shaft and plate.





CC044D



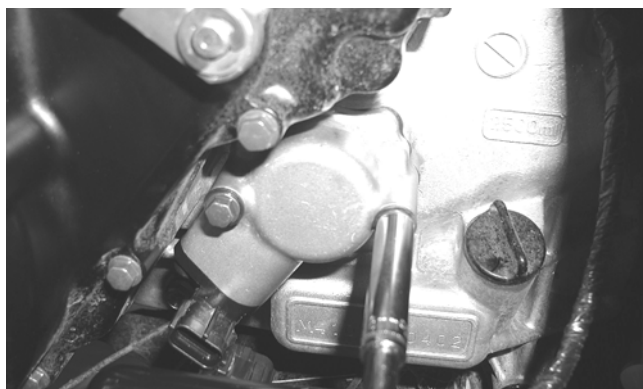
CC045D

4. Remove the inside snap ring.



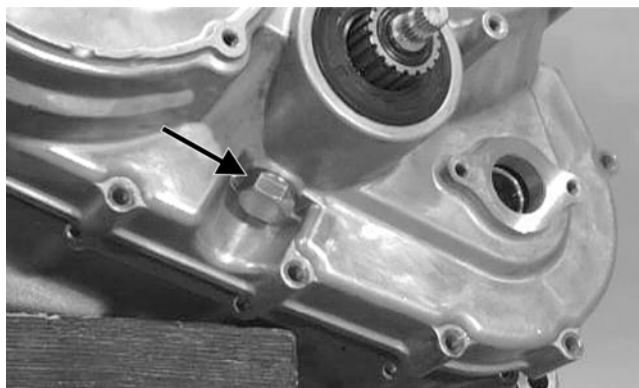
CC046D

5. Remove the two cap screws securing the speed sensor housing; then remove the housing. Account for the gasket.



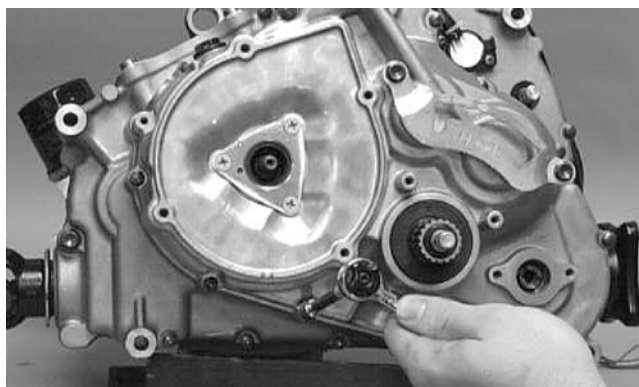
CD069

6. Remove the shift stop housing assembly from beneath the shift shaft housing. Account for the stopper and spring.



CC054D

7. Remove the cap screws securing the left-side cover to the crankcase and note the location of the long cap screw with rubber washer.



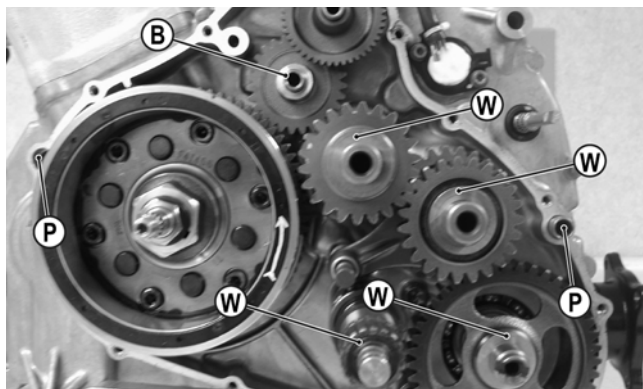
CC047D



CF037A

8. Using Side Case Puller, remove the side cover. Account for a gasket, two alignment pins, and an idle gear limiter bushing.

■ **NOTE:** Inspect the inside of the left-side cover for the four shaft washers that may have come off with the cover. The three gear shaft washers are identical and interchangeable. The shift shaft washer is a larger diameter. Keep the washers with their respective shafts for installing purposes.



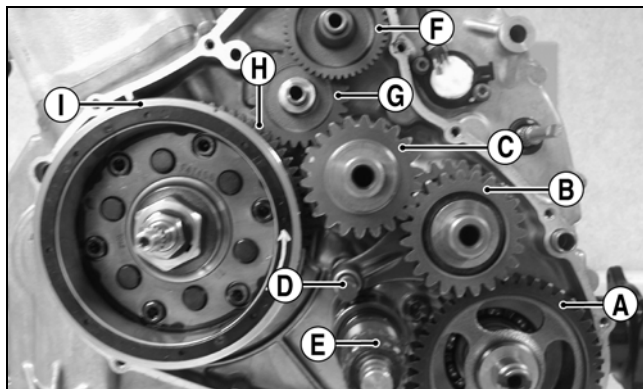
CD134A

## E. Rotor/Flywheel

## F. Idle Gear Assembly

■NOTE: Steps 1-8 in the preceding sub-section must precede this procedure.

■NOTE: For steps 9-18, refer to illustration CD134B.



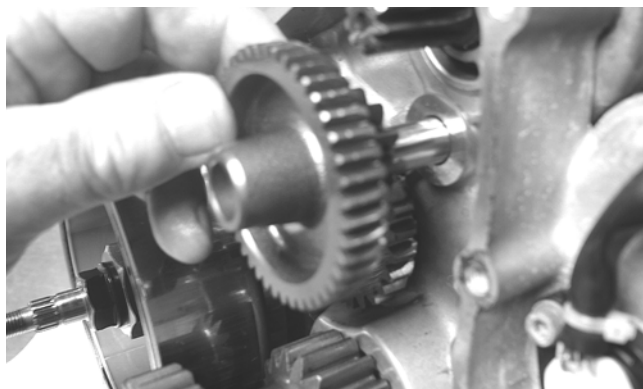
### KEY

- |                                  |                                 |
|----------------------------------|---------------------------------|
| A. Output Shaft with Driven Gear | F. Starter Gear Assembly        |
| B. Drive Gears #1 & #2           | G. Starter Idler Gear           |
| C. Idle Gear                     | H. Starter Clutch Gear Assembly |
| D. Shift Fork with Shaft         | I. Rotor/Flywheel               |
| E. Shift Shaft Assembly          |                                 |

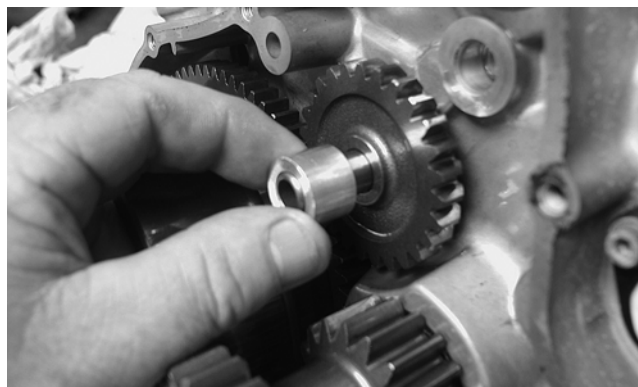
CD134B

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

- Remove the starter gear assembly (F) from the crankcase; then remove the starter idler gear (G) and spacer.

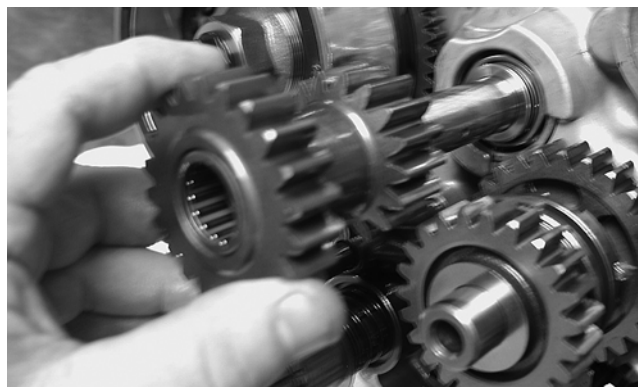


CD136



CD138

- Remove the idle gear (C), washer, and spacer from the countershaft.



CD141

- Remove the #2 drive gear (B), washer, and the select sliding dog gear from the driveshaft. Account for a bushing and a washer.

### ⚠ AT THIS POINT

To service shift fork, see Servicing Left-Side Components sub-section.

- Remove the shift fork shaft (D) from the crankcase boss; then remove the shift fork from the shaft. Remove the shift shaft assembly (E) from the fixed shaft. Account for the left shaft washer.

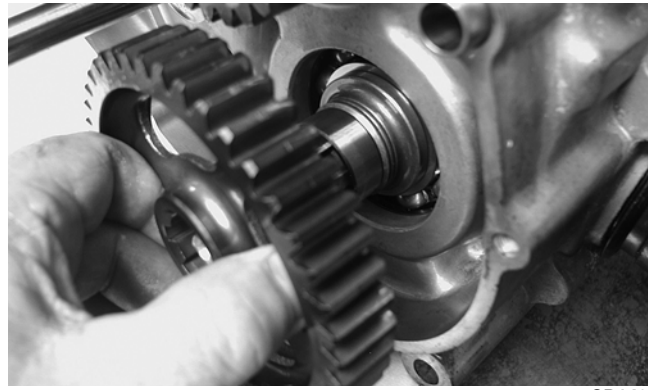


CD146





CD147



CD149



CD152

13. Remove the snap ring and washer from the drive shaft; then remove the #1 drive gear (B). Account for a splined bushing and a spacer.

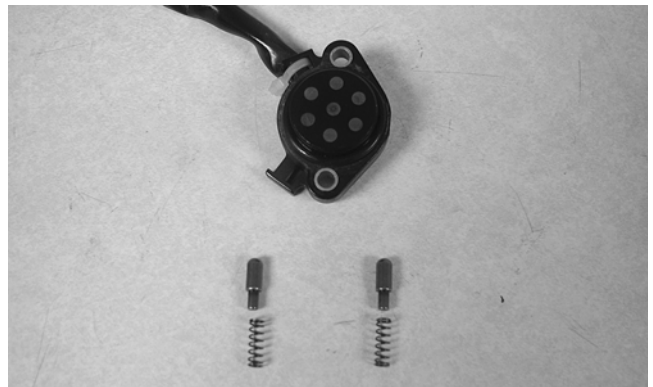


CD150

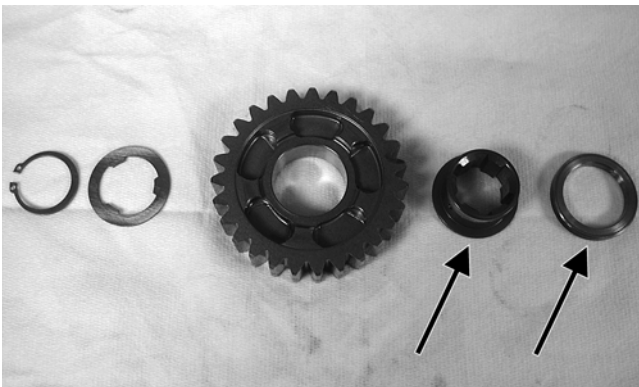
15. Remove the Allen-head screws securing the gear shift position switch; then remove the switch. Account for an O-ring, two contacts, and two springs.



CC059D



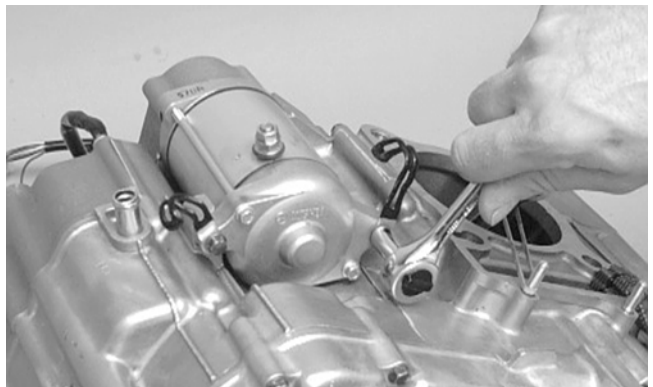
CD159



CD154A

14. Remove the washer and driven gear (A) from the output shaft; then account for the bushing.

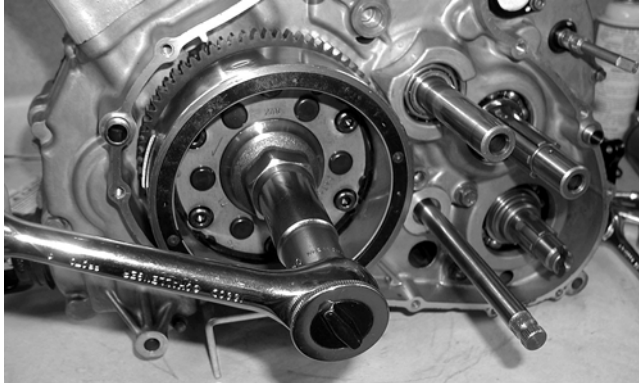
16. Remove the two cap screws securing the starter to the crankcase; then remove the starter. Account for the wiring forms.



CC065D



17. Remove the nut securing the rotor/flywheel (I) to the crankshaft; then install the magneto rotor remover adapter.

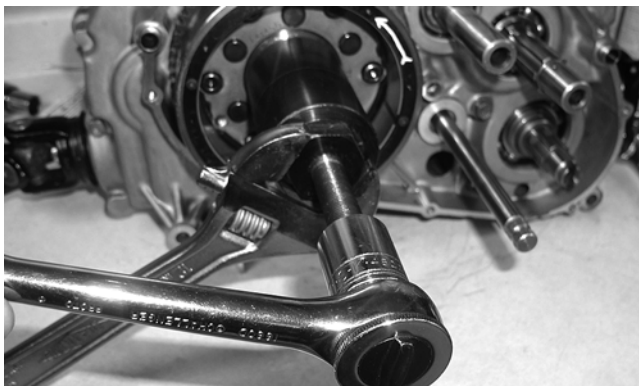


CD562



CD549

18. Using Magneto Rotor Remover Set, remove the rotor/flywheel assembly from the crankshaft. Account for the key; then remove the starter clutch gear assembly (H) and thrust washer.



CD550



CD155

### ⚠ AT THIS POINT

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

## Servicing Left-Side Components

3

### RECOIL STARTER

#### Disassembling

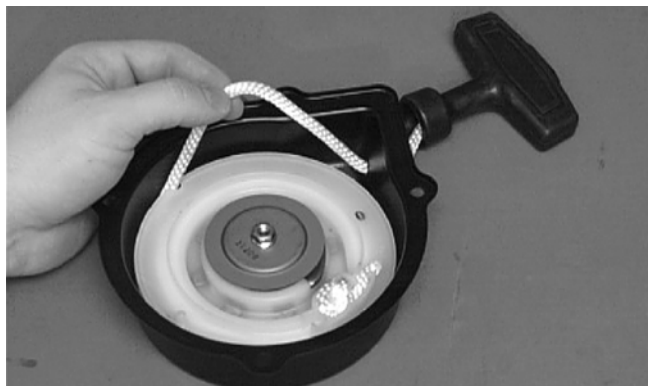
#### ⚠ WARNING

Always wear safety glasses when servicing the recoil starter.

#### ⚠ WARNING

During the disassembly procedure, continuous downward pressure must be exerted on the reel so it does not accidentally disengage and cause injury.

1. Rotate the reel counterclockwise until the notch of the reel is near the rope guide in the case. Guide the rope into the notch and slowly allow the reel to retract until all spiral spring tension is released.



B600D

#### ⚠ CAUTION

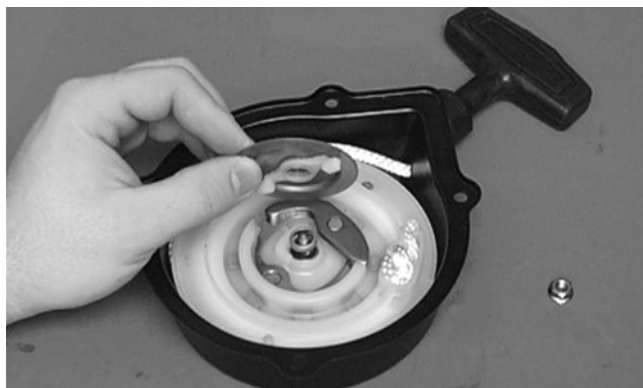
During the disassembly procedure, make sure all spring tension is released before continuing.

2. Remove the nut.



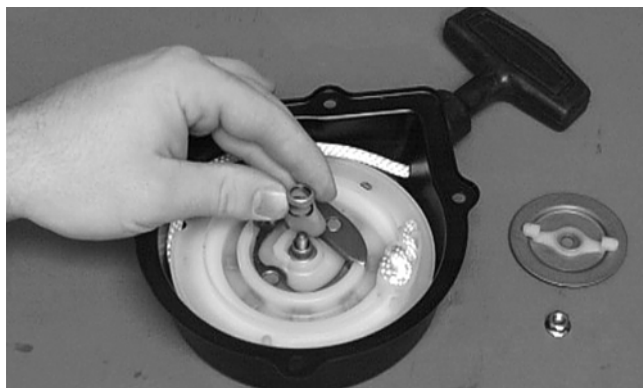
B601D

3. Slowly release the friction plate and lift the plate with ratchet guide free of the recoil case; then remove the ratchet guide from the friction plate.



B602D

4. Remove the spring cover, spring, and shaft; then remove the ratchet and account for the pin.

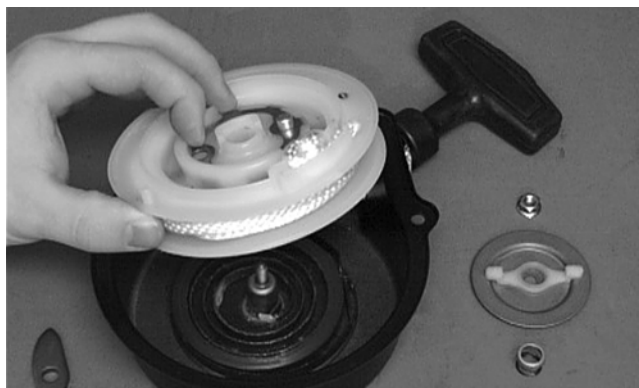


B603D



B604D

5. Carefully lift the reel from the case making sure the spring does not accidentally disengage from the case.



B605D

### **WARNING**

Care must be taken when lifting the recoil free of the case. Wear safety glasses to avoid injury.

6. Remove the protective cover from the starter handle and pull the rope out of the handle; then untie the knot in the rope and remove the handle.

■**NOTE:** Do not remove the spiral spring unless replacement is necessary. If replacement is necessary, follow steps 7-8.

7. Remove the spiral spring from the case by lifting the spring end up and out. Hold the remainder of the spring with thumbs and alternately release each thumb to allow the spring to gradually release from the case.

8. Unwind the rope from the reel and remove the rope.

### **Cleaning and Inspecting**

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

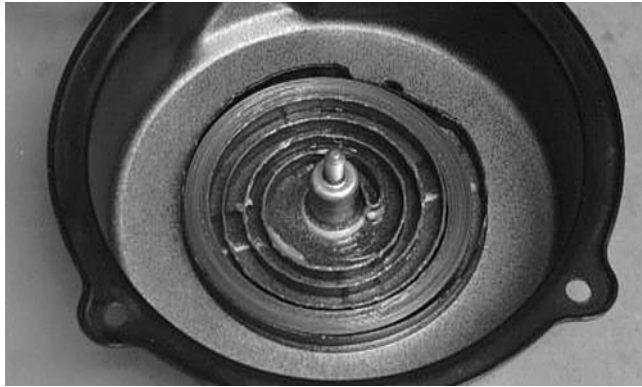
1. Clean all components.
2. Inspect the springs and ratchet for wear or damage.
3. Inspect the reel and case for cracks or damage.
4. Inspect the shaft for wear, cracks, or damage.
5. Inspect the rope for breaks or fraying.
6. Inspect the spiral spring for cracks, crystallization, or abnormal bends.
7. Inspect the handle for damage, cracks, or deterioration.



## Assembling

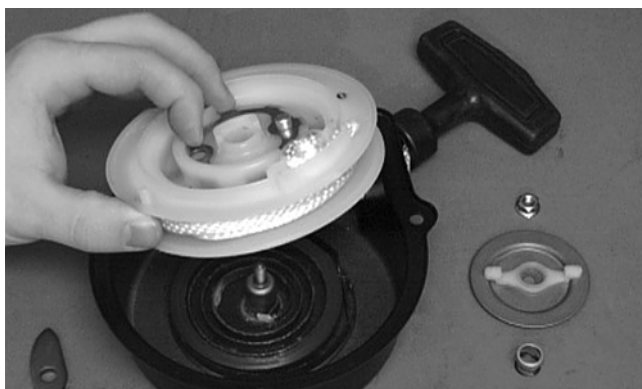
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

■**NOTE:** The spiral spring must seat evenly in the recoil case.



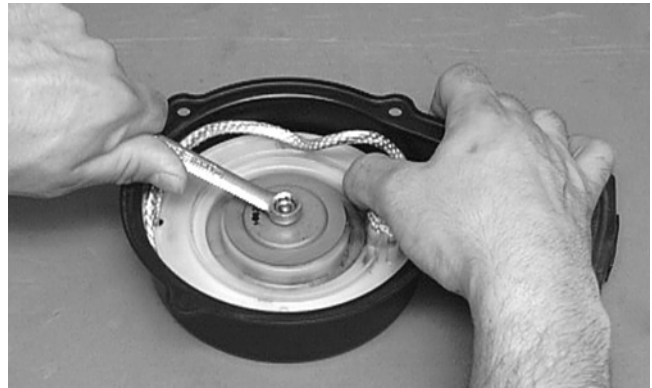
B606D

2. Insert the rope through the hole in the reel and tie a knot in the end; then wrap the rope counterclockwise around the reel leaving approximately 50 cm (20 in.) of rope free of the reel.
3. Apply low-temperature grease to the spring and hub.
4. Thread the end of the rope through the guide hole of the case; then thread the rope through the handle and secure it with a double knot. Install the protective cover into the handle.
5. Align the inner hook of the spiral spring with the notch in the reel.



B605D

6. Install the ratchet onto its spring making sure the end is properly installed on the reel.
7. Install the shaft, spring, and the spring cover; then install the friction plate with the ratchet guide fitting into the ratchet.
8. While pushing down on the reel, install the nut. Tighten securely.



B601D

9. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.
10. Rotate the reel four turns counterclockwise; then release the rope from the notch and allow the rope to retract.
11. Pull the rope out two or three times to check for correct tension.

■**NOTE:** Increasing the rotations in step 10 will increase spring tension.

## MEASURING SHIFT FORK (Thickness)

■**NOTE:** Whenever a shift fork is out of tolerance, replacement is necessary.

1. Using a calipers, in turn measure the thickness of the machined tip of each shift fork.



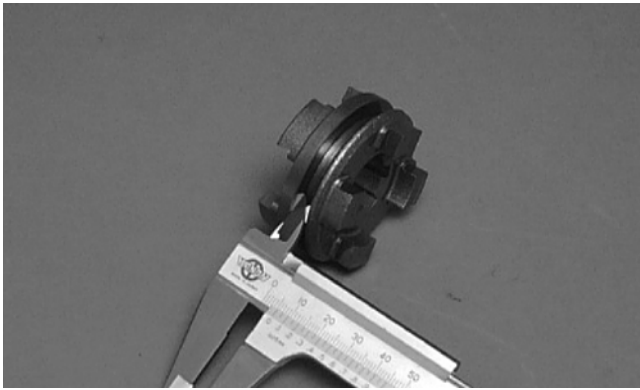
CC296D

2. Shift fork thickness must be within specifications.

## MEASURING SHIFT FORK GROOVE (Width)

1. Using a calipers, in turn measure the width of each shift fork groove.





CC288D

2. Shift fork groove width must be within specifications.

### MEASURING SHIFT FORK TO GROOVE (Side Clearance)

1. In turn, insert each shift fork into its groove.
2. Using a feeler gauge, measure the clearance between the shift fork and the groove.



CC292D

3. Shift fork to groove side clearance must be within specifications.

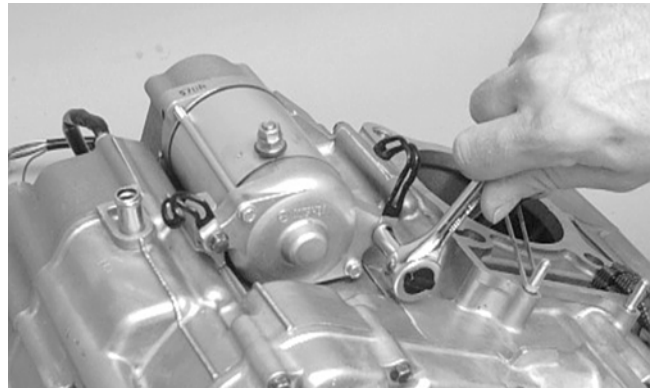
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## Installing Left-Side Components

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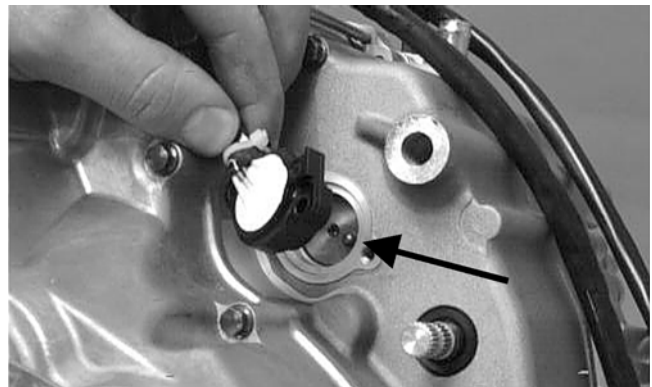
### A. Idle Gear Assembly B. Magneto Rotor

1. Place the starter into position on the crankcase and secure with the cap screws. Note the position of the wiring form.

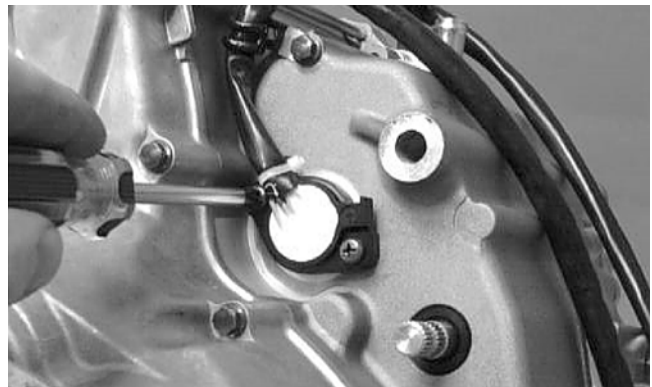


CC065D

2. Place the gear shift position switch into position making sure the contacts and springs are inside the case and a well-oiled O-ring is properly positioned. Secure with Phillips-head screws.



CC049D



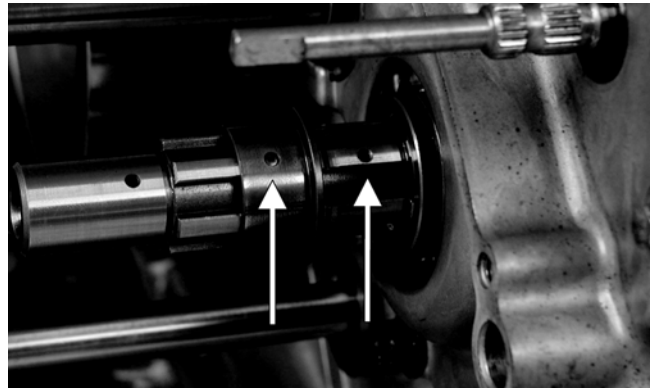
CC048D

3. Install the starter idle gear pin into the crankcase; then with the beveled side of the idle gear facing the crankcase, install the idle gear and spacer.



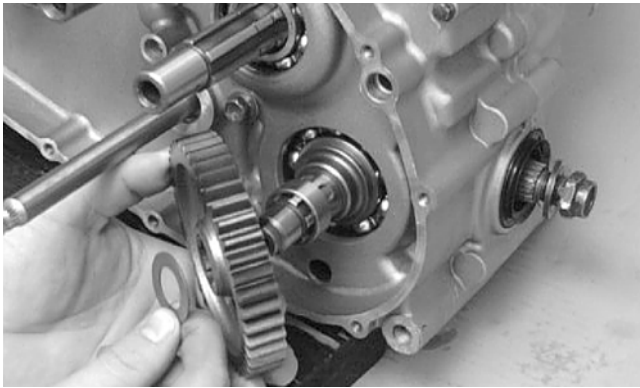
CD138

4. Place the bushing onto the output shaft; then install the driven gear and washer.



CF038A

7. In turn on the driveshaft, install the #1 drive gear and washer; then secure with the snap ring.



CC063D

5. Install the spacer onto the driveshaft.



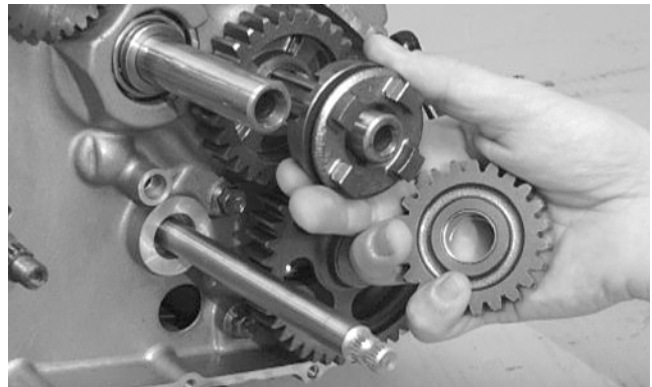
CC059D

8. Place the select sliding dog gear and washer onto the driveshaft; then place the #2 drive gear onto the driveshaft making sure the bushing and washer follow on the driveshaft.



CC258D

6. Place the splined bushing onto the driveshaft making sure the oil hole of the splined bushing aligns with the oil hole of the driveshaft.



CC061D

9. Place the idle gear spacer and idle gear onto the countershaft.

**⚠ CAUTION**

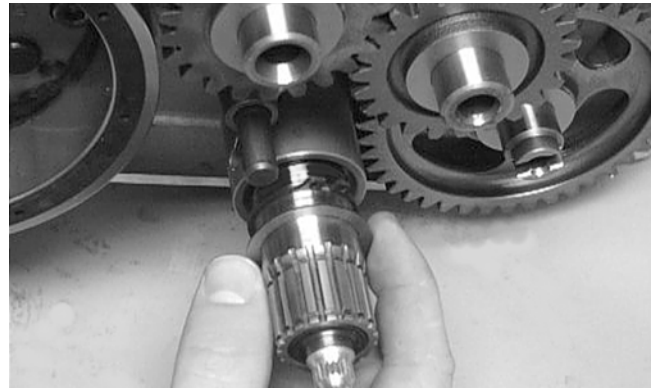
It is important that the oil holes in the splined bushing and driveshaft align. If they are not aligned, major damage will occur from lack of lubrication.

**3**

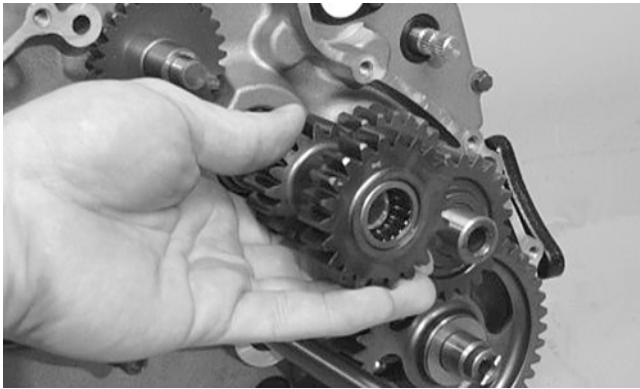




CC262D

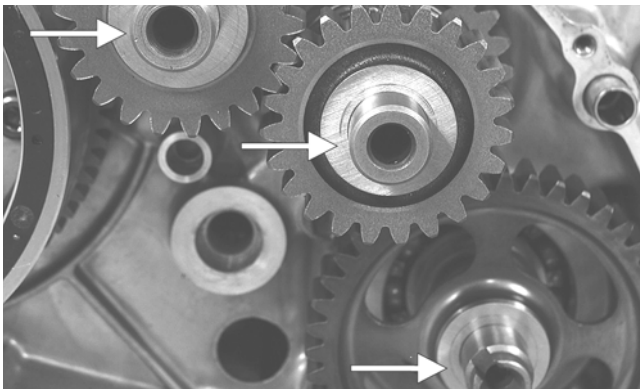


CC333D



CC060D

10. Place a washer on the driveshaft, the countershaft, and the driven shaft.



CF075A

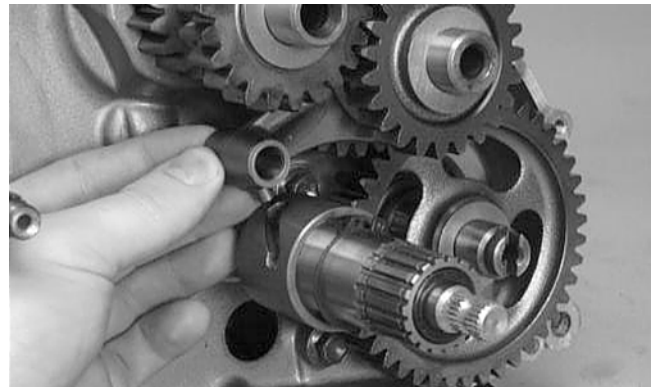
11. With the slot in the shift shaft assembly facing upward, place the assembly on the fixed shaft.



CD147

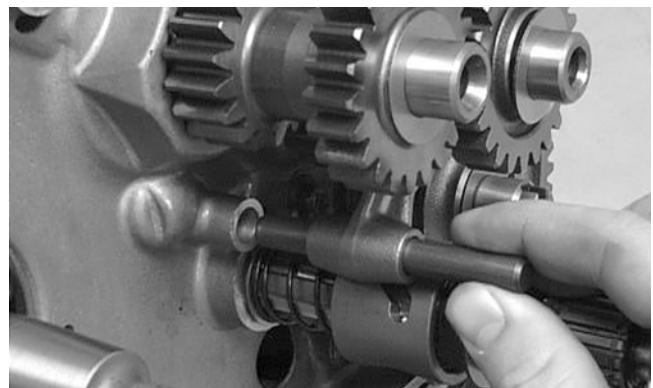
12. Place the left shaft washer on the shift shaft.

13. With the shift fork peg positioned in the shift shaft assembly slot, install the shift fork in the select sliding dog gear.



CC329D

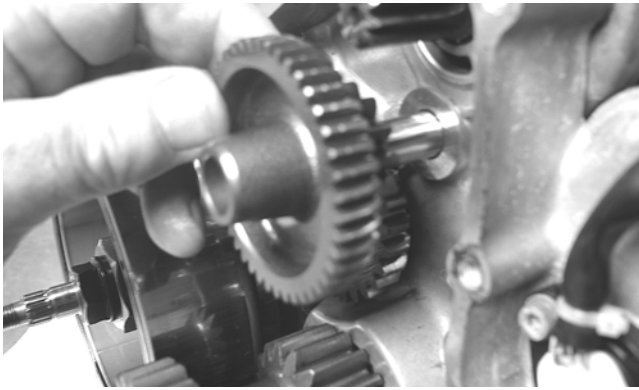
14. Slide the shift fork shaft through the shift fork and into the crankcase boss.



CC330D

15. Insert the pin into the starter gear assembly boss in the crankcase; then install starter idler gear #1.





CD136

16. Place a washer on each end of the starter gear assembly and install in the crankcase.
17. Place a thrust washer onto the crankshaft; then install the starter clutch gear assembly onto the crankshaft. Place the key into its notch.



CD155

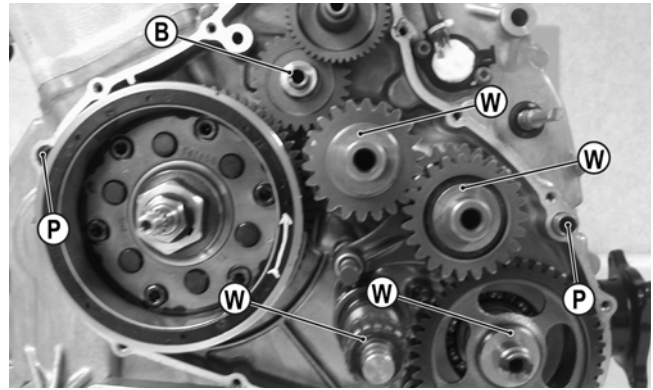
18. Place the rotor/flywheel into position on the crankshaft; then install the nut on the crankshaft and tighten until the rotor/flywheel is properly seated. Tighten to 116 ft-lb.



CD444

19. Install the two alignment pins into the left crankcase half.

■NOTE: Make sure that four washers, one bushing, and two alignment pins are in place.



CD134A

### C. Cover

### D. Speed Sensor Housing

### E. Hi/Low Shifter Assembly

### F. Recoil Starter

■NOTE: Steps 1-19 in the preceding sub-section must precede this procedure.

20. Place the gasket and left-side cover into position on the crankcase.

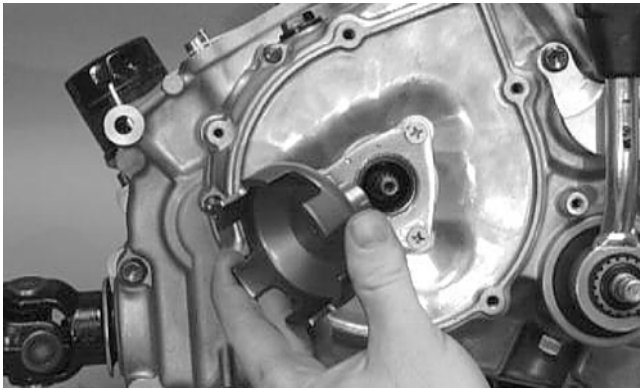
■NOTE: It may be necessary to push or pull the splined Hi/Low range shift shaft to establish cover/crankcase mating.

21. Install the cap screws to secure the left-side cover. Do not tighten at this time. Note the location of the long cap screw with rubber washer.

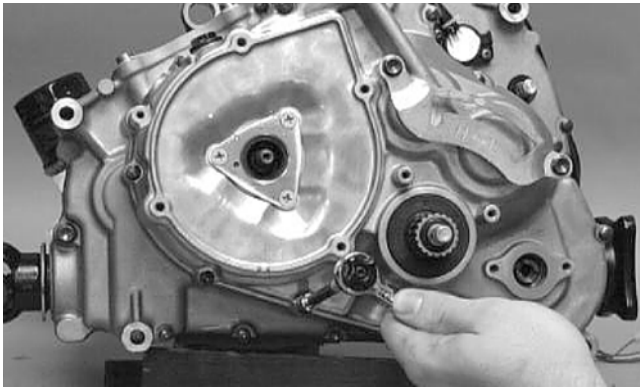


CF037A

22. Place the starter cup into position on the crankshaft making sure a new, lubricated O-ring is inside the cup. Tighten the flange nut to 25 ft-lb.



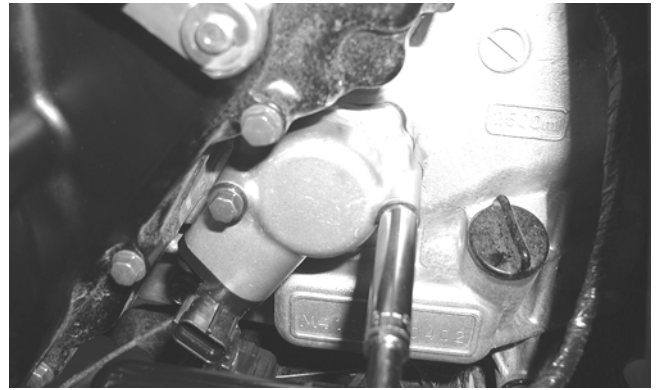
23. In a crisscross pattern, tighten the cap screws (from step 21) to 8 ft-lb.



24. Place the shift stop housing assembly into position beneath the shift shaft housing making sure the spring and stopper are correctly positioned. Tighten to securely.

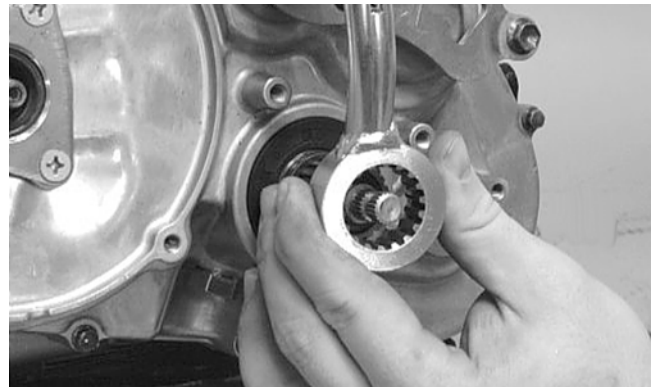


25. Place the speed sensor housing and gasket into position and secure with the two cap screws. Tighten securely.

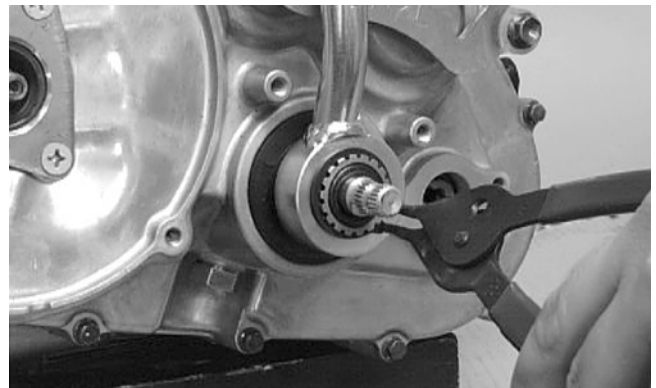


26. Install the inside snap ring onto the hi/low range shift shaft with the sharp side of the snap ring facing the engine; then place the shift lever assembly part way onto the shaft.

■NOTE: Position the shift lever part way onto the splines and verify the subtransmission is in hi range. If not, shift into hi range.

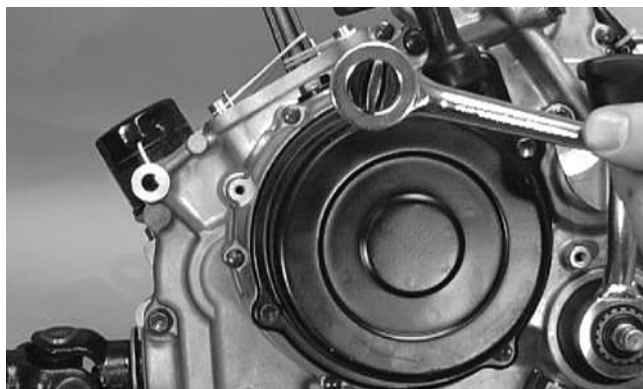


27. Pull up on the hi/low shift T-handle and guide the T-handle stop pin into the hi range lever stop plate slot; then slide the shift lever assembly the rest of the way onto the shift shaft. Secure with the outer snap ring making sure the sharp side of the snap ring faces away from the hi/low-range lever.

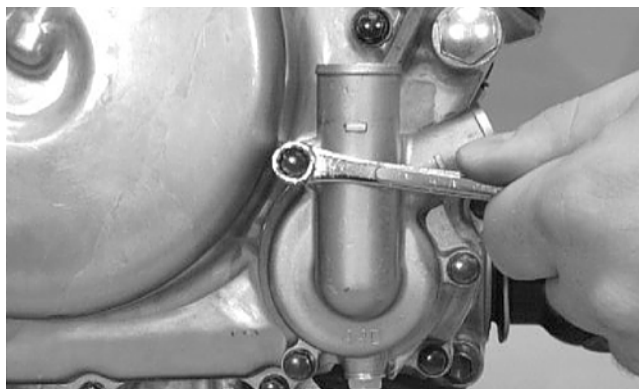


28. Place the recoil starter assembly into position on the left-side cover; then tighten four cap screws to 6 ft-lb.





CC039D



CC027D

## 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.

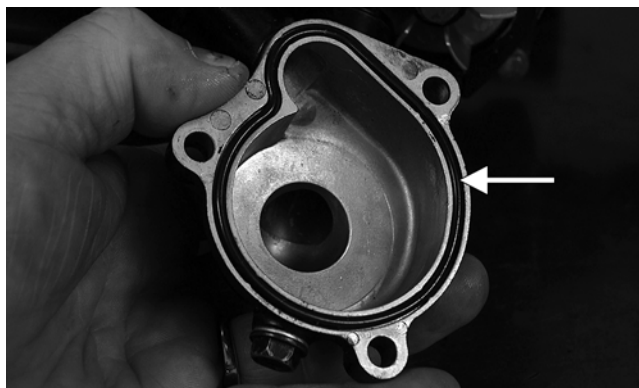
■NOTE: The engine/transmission does not have to be removed from the frame for this procedure.

## Removing Right-Side Components

### A. Oil Filter

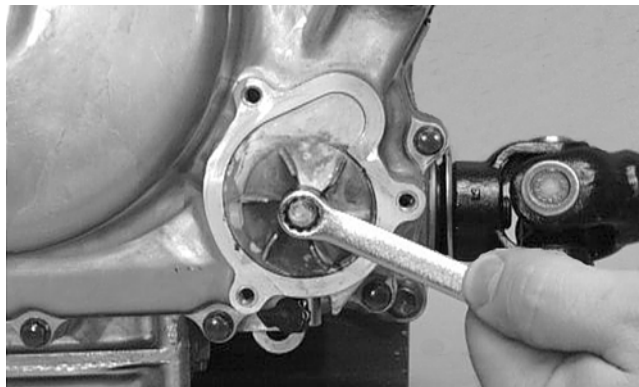
### B. Water Pump

1. Remove the clamp securing the coolant hose to the water pump; then remove the hose.
2. Using the adjustable Oil Filter Wrench, remove the oil filter.
3. Remove the three cap screws securing the water pump cover to the right-side cover; then remove the water pump cover. Account for the O-ring.

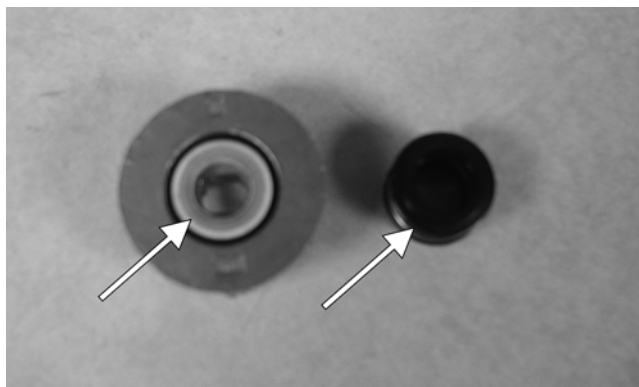


CF066A

4. Remove the cap screw securing the impeller to the impeller shaft; then remove the impeller. Account for the rubber retainer and porcelain seal.



CC029D

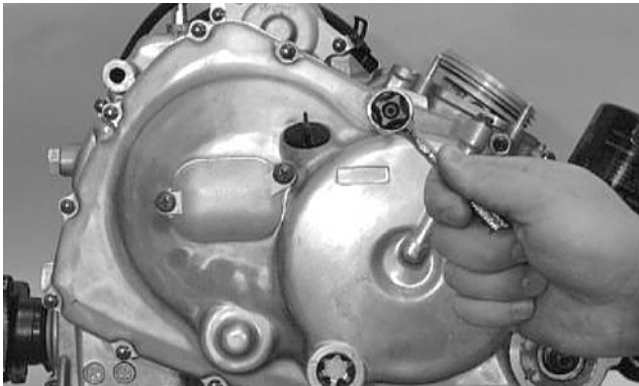


CD163A

3

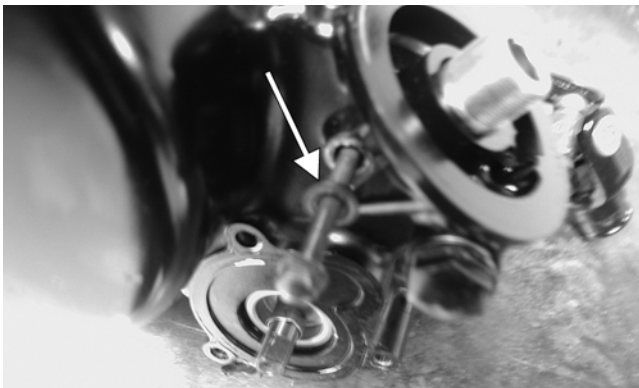


5. Remove the cap screws securing the right-side cover to the crankcase. Remove the cover. Note the location of the long cap screw and rubber washer. Account for the gasket and for two alignment pins.



CC034D

■NOTE: The water pump housing does not have to be removed when removing the right-side cover.



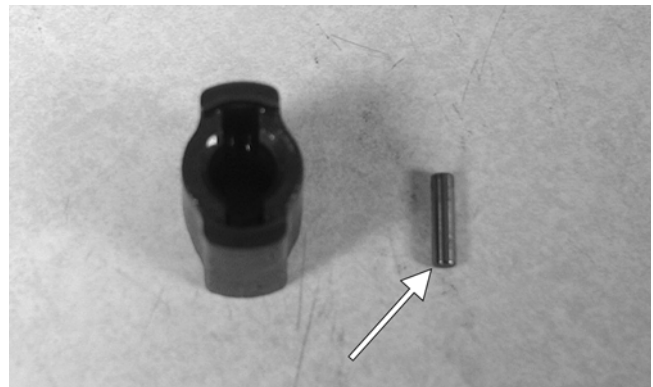
CD164A

■NOTE: When removing the right-side cover, account for the release roller guide that it does not fall and cause damage.



CC070D

6. Remove the water pump drive joint from the water pump shaft. Account for the pin.



CD168A

### C. Primary Drive Clutch Shoe D. Primary Driven Clutch E. Primary Drive Clutch Housing

■NOTE: Steps 1-6 in the preceding sub-section must precede this procedure.

7. Remove the reverse cam stopper housing and gasket and account for a stopper and spring.

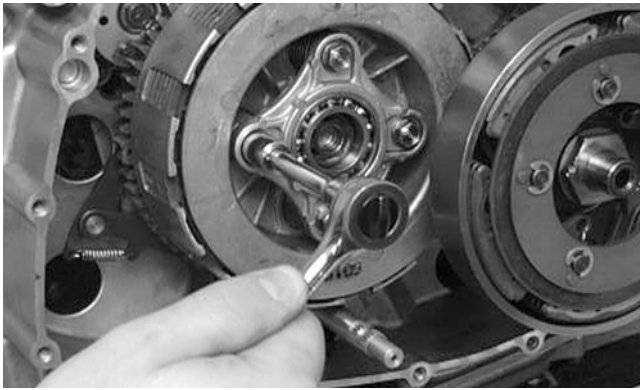


CC069D

8. Remove the clutch release arm and washer; then in a crisscross pattern, remove the four cap screws securing the clutch release roller assembly.



CD171



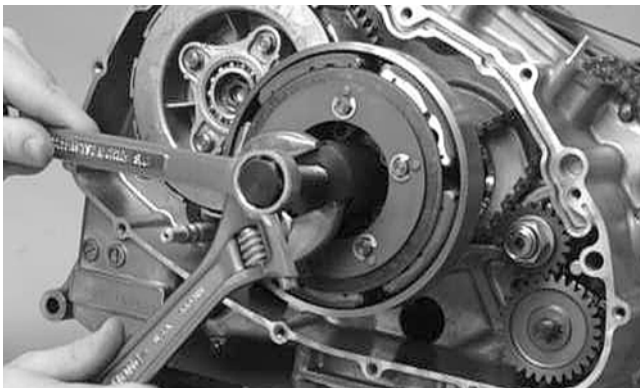
CC074D

9. Remove the release plate. Account for four springs.

10. Remove the primary drive clutch-shoe nut (left-hand threads) and washer from the driveshaft; then using a primary clutch shoe remover, remove the clutch shoe.

**CAUTION**

Care must be taken when removing the nut; it has "left-hand" threads.



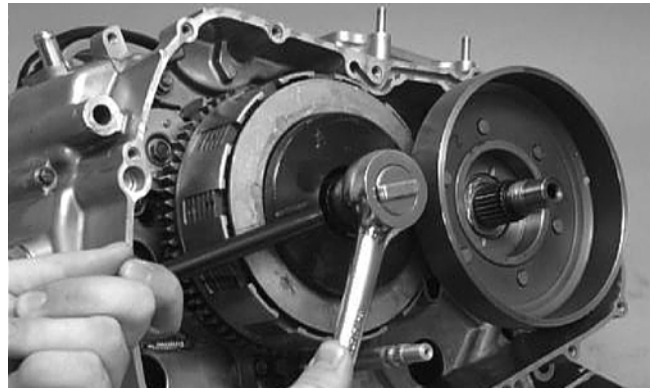
CC072D

11. Remove the primary drive one-way clutch from the primary drive clutch housing. Note the word **OUTSIDE** stamped on the clutch for installing purposes.



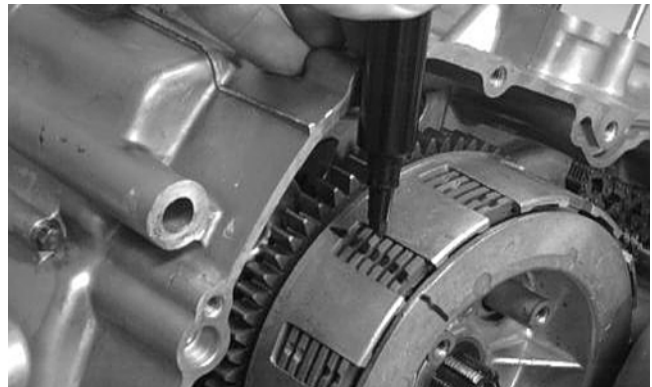
CF043

12. Using the Clutch Sleeve Hub Holder to hold the clutch sleeve hub, remove the nut and washer.



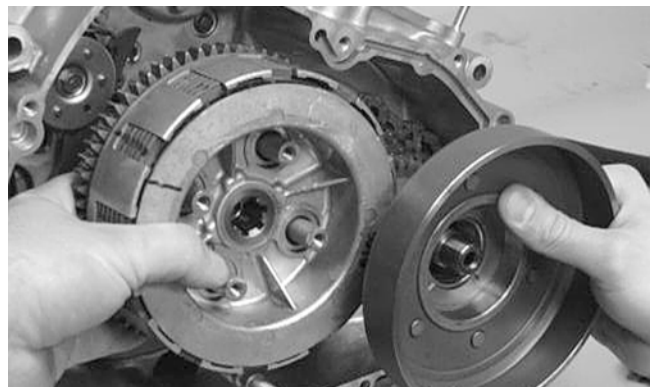
CC076D

13. Scribe a line across the primary driven clutch assembly to aid in assembling.



CC077D

14. Simultaneously, remove the primary driven clutch assembly and primary drive clutch housing from their respective shafts. Account for the sleeve and washers.



CC078D

**AT THIS POINT**

To service clutch components, see Servicing Right-Side Components sub-section.

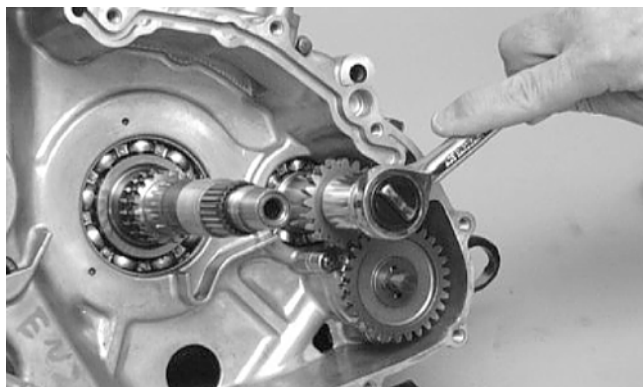
**F. Gear Shift Cam Plate/Guide  
G. Oil Pump/Oil Strainer**

■NOTE: Steps 1-14 in the preceding sub-sections must precede this procedure.

15. Remove the cam chain from the crankcase.

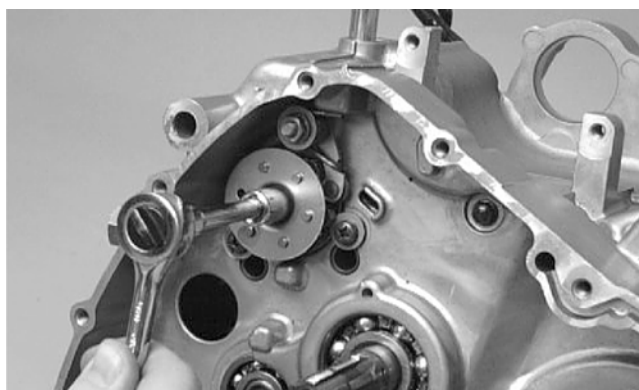


16. Remove the nut and washer securing the oil pump drive gear to the crank balancer shaft; then remove the gear and account for the pin and the spacer.

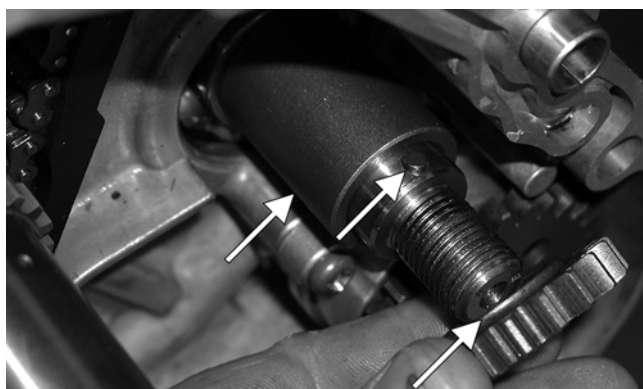


CC080D

19. Remove the cap screw securing the gear shift cam plate and guide to the gear shift cam; then remove the cam plate and guide.



CC164D



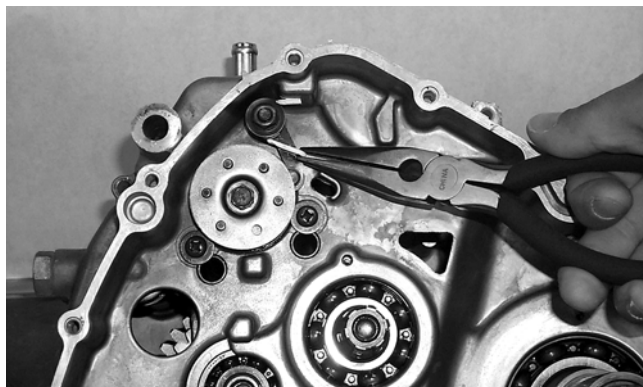
CF070A

17. Remove the gear shift shaft from the crankcase.



CC085D

18. Release the tension from the gear shift cam stopper arm spring.

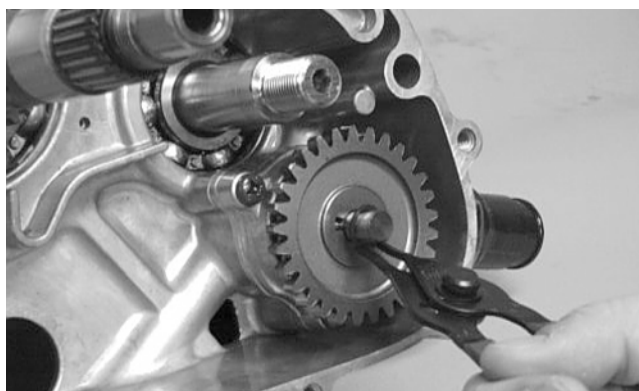


CC086D

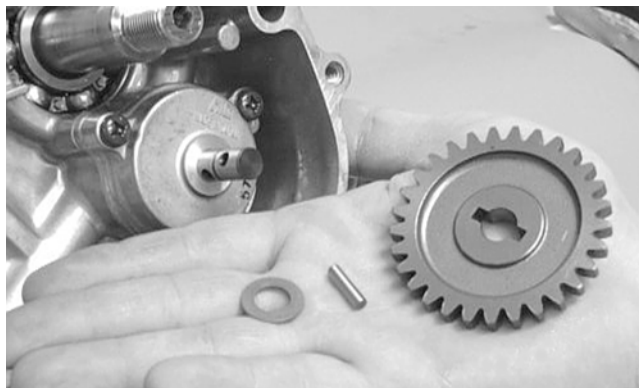
**CAUTION**  
If servicing of the engine/transmission is due to a lubrication-related problem, replace the oil pump.

■NOTE: For general servicing, it is advisable to disassemble, clean, and inspect the oil pump. If any wear or damage is suspected, replace the oil pump.

20. Remove the snap ring securing the oil pump driven gear; then remove the gear. Account for the pin and the washer.



CC088D



CC089D

21. Remove the three Phillips-head screws securing the oil pump; then remove the oil pump.



■NOTE: It may be necessary to use an impact driver to loosen the screws.



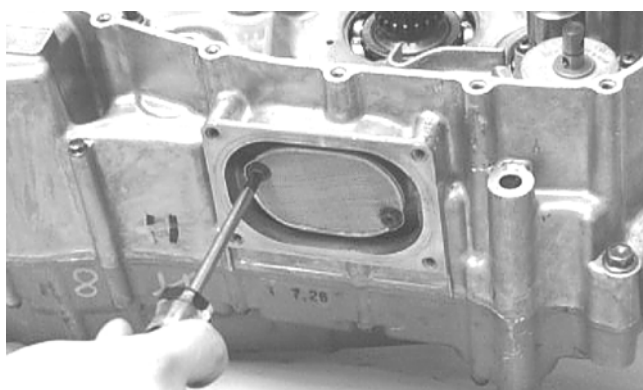
CD190

22. Remove the cap screws securing the oil strainer cap; then remove the cap. Account for the O-ring.



CC091D

23. Remove the two Phillips-head cap screws securing the strainer.



CC163D

### 👉 AT THIS POINT

To service center crankcase components only, proceed to Separating Crankcase Halves.

## Servicing Right-Side Components

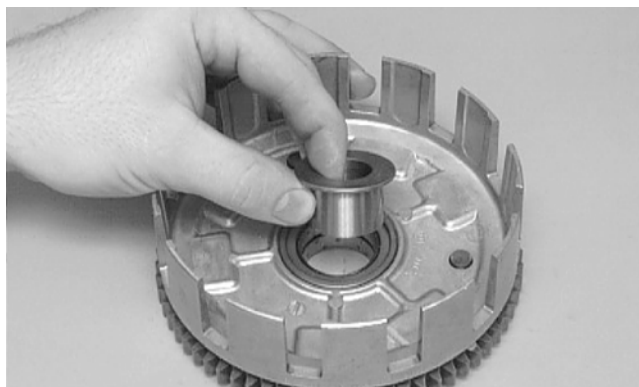
■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

### PRIMARY CLUTCH ASSEMBLY (Inspecting/Measuring/ Assembling)

■NOTE: Prior to inspecting and measuring components, it is recommended that all components be removed from the primary gear assembly and be cleaned.

■NOTE: When removing components from the primary gear assembly, account for the bushing that fits into the primary gear.

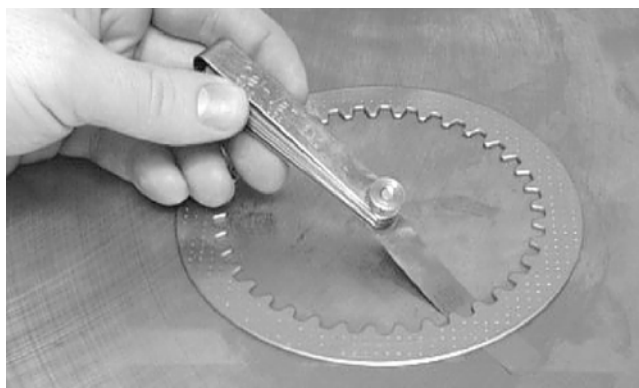
3



CC239D

### Inspecting/Measuring Clutch Driven Plate Warpage

1. Inspect each driven plate for warpage and burn marks.
2. In turn place each driven plate on the surface plate; then using a feeler gauge, measure warpage in several locations.

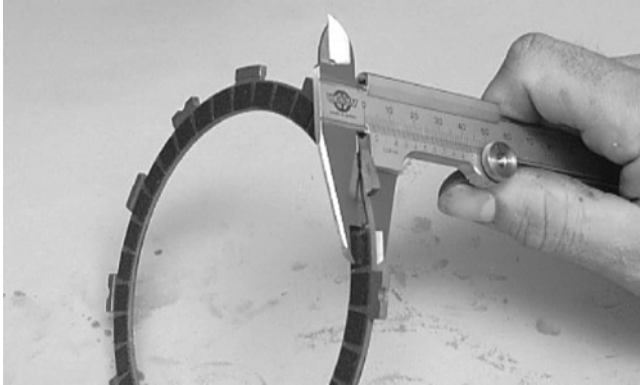


CC245D

3. Maximum driven plate warpage must not exceed specifications.

### Measuring Clutch Drive Plate (Fiber) Thickness

1. Using a calipers, in turn measure the thickness of each drive plate in several locations.



CC243D

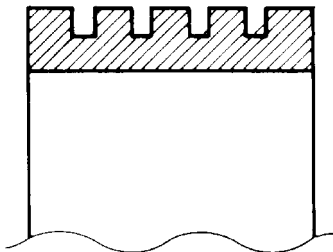
2. Drive plate thickness must be within minimum specifications.
3. If the fiber plate tabs are damaged, the plate must be replaced.
4. Inspect the clutch sleeve hub for grooves or notches. If grooves or notches are present, replace the hub.

### Inspecting Centrifugal Clutch Shoe

1. Inspect the clutch shoe for uneven wear, chips, cracks, or discoloration.
2. Inspect the depth of the grooves in the clutch shoes. If any shoe is worn to the bottom of the groove, replace the complete set.

#### CAUTION

Always replace clutch shoes as a complete set or severe imbalance could occur.



Inspecting clutch shoe groove

ATV1014

### Inspecting Centrifugal Clutch Housing

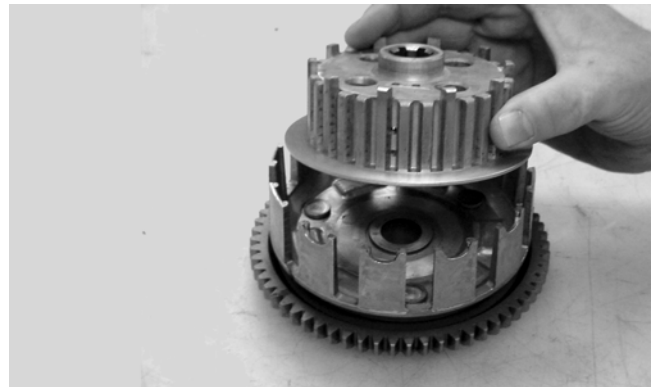
1. Inspect the clutch housing for burns, marks, scuffs, cracks, scratches, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

### Inspecting Primary One-Way Drive

1. Insert the drive into the centrifugal clutch housing.
2. Rotate the inner race by hand and verify the inner race rotates only one direction.
3. If the inner race is locked in place or rotates both directions, the drive assembly must be replaced.

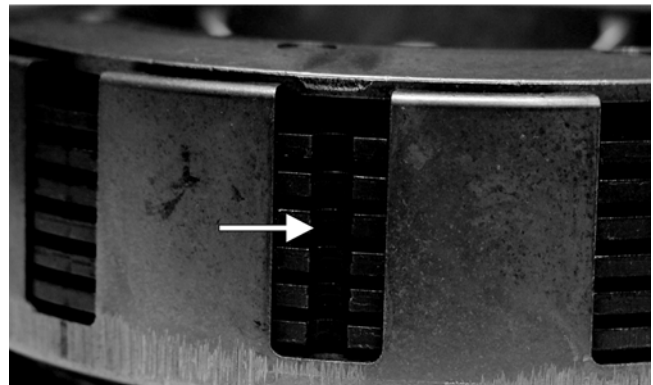
### Assembling Primary Clutch

1. Place the clutch hub upside down into the primary gear assembly.



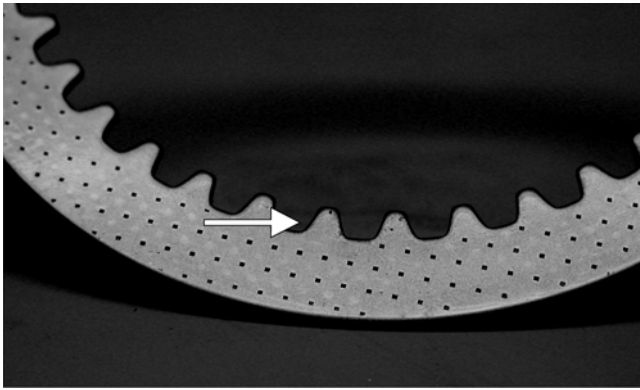
CC920

2. Alternately install the drive plates and driven plates onto the hub (starting with and ending with a drive plate) making sure the tabs with the notches are all in line with each other.



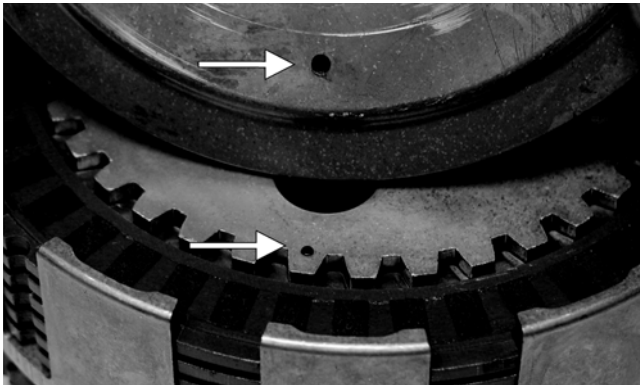
CF044A

■NOTE: When installing the driven plates for ease of installation, make sure they are placed onto the hub with the rounded side of the plates directed down.



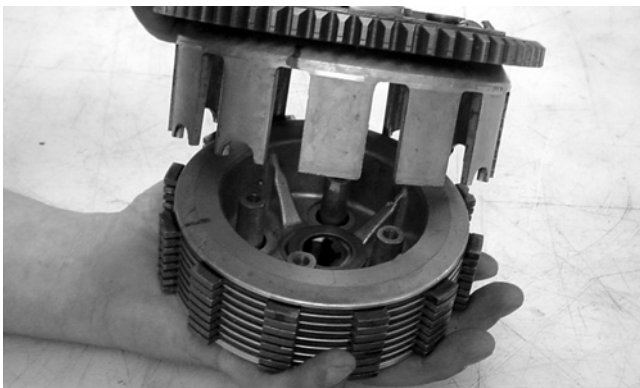
CF045A

3. Install the pressure plate onto the hub making sure the alignment dots are correctly positioned.



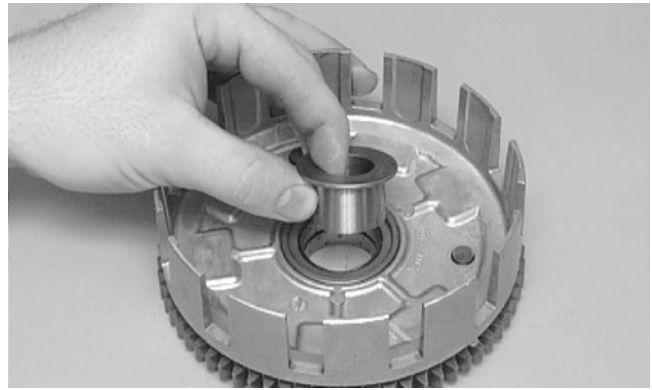
CF047A

4. Place the primary gear assembly w/clutch hub assembly in one hand, place the other hand on top of the clutch hub assembly, and flip the assembly over; then lift the primary gear assembly off the clutch hub assembly being careful not to disturb the drive plate notched tab orientation.



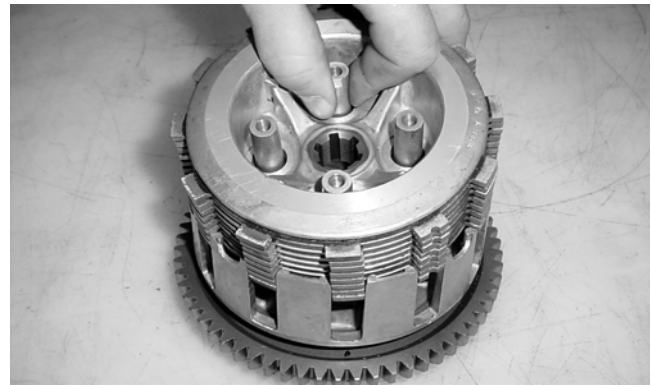
CC924

5. Place the primary gear assembly on a clean, flat surface; then install the primary washer into the assembly.



CC239D

6. Place the clutch hub assembly into the primary gear assembly.



CC926

3

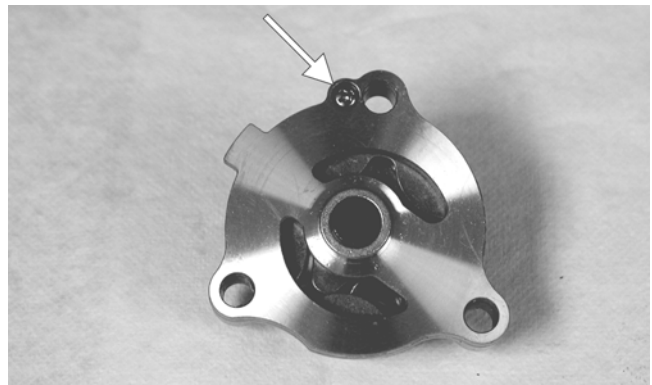
### ⚠ CAUTION

The clutch hub and the pressure plate must be seated in the proper position. If any of the incorrect positions are used, the hub and plate will have clearance between them and they will not operate properly.

■NOTE: The primary clutch assembly is now completely assembled for installation.

### INSPECTING OIL PUMP

1. Inspect the pump for damage.
2. It is inadvisable to remove the screw securing the pump halves. If the oil pump is damaged, it must be replaced.



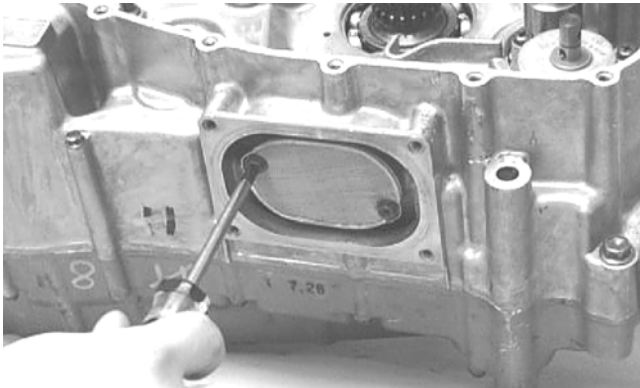
CD989A



## Installing Right-Side Components

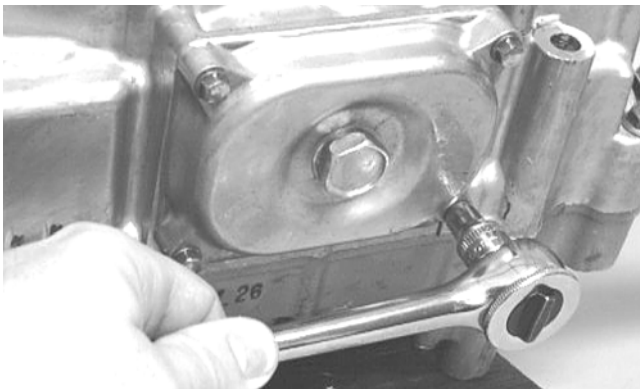
### A. Oil Strainer/Oil Pump B. Gear Shift Shaft

1. Place the oil strainer into position beneath the crankcase and tighten securely with the Phillips-head cap screws.



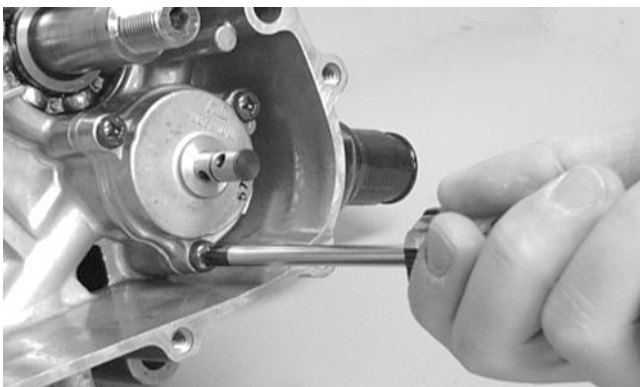
CC163D

2. Place the strainer cap into position on the strainer making sure a new O-ring is properly installed and secure with the cap screws; then install and tighten the oil drain plug to 16 ft-lb.



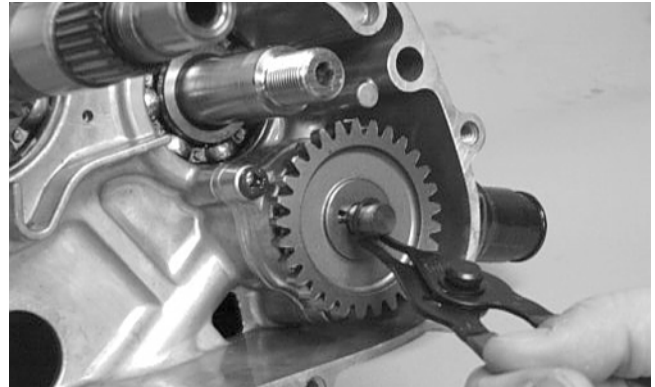
CC091D

3. Place the oil pump into position in the crankcase and secure with the three Phillips-head screws coated with blue Loctite #243. Tighten to 7 ft-lb.



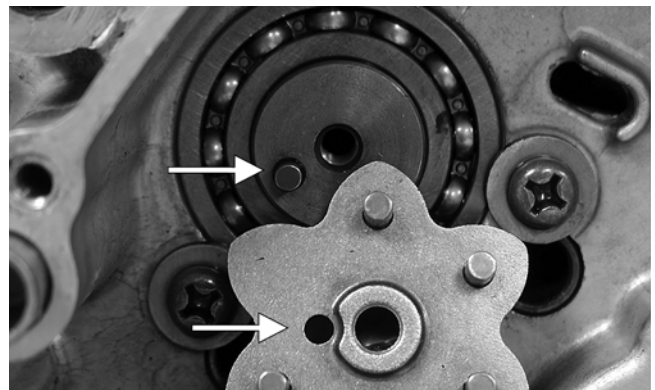
CC090D

4. Place the pin and washer into position on the oil pump shaft, install the oil pump driven gear, and secure with the snap ring.

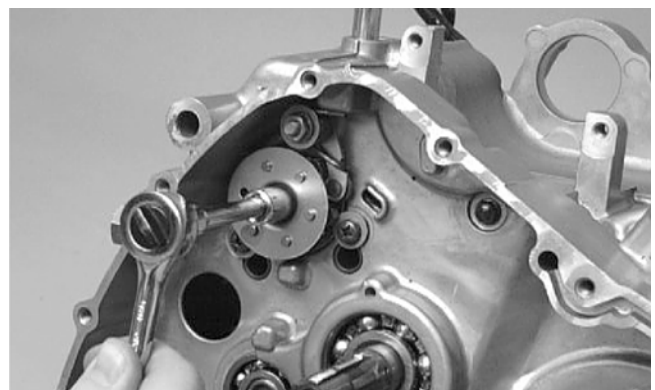


CC088D

5. Place the gear shift cam plate and guide onto the gear shift cam making sure the alignment pin was installed. Secure assembly with the cap screw coated with blue Loctite #243. Tighten securely.

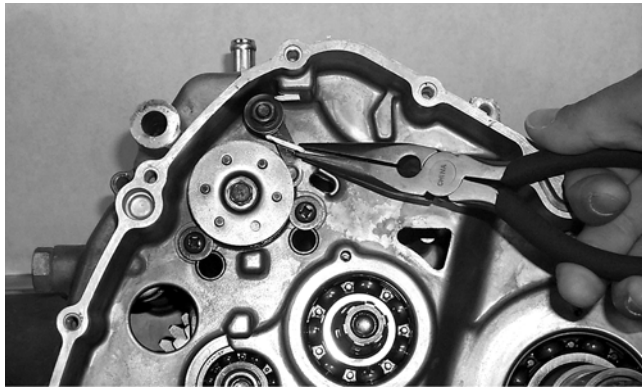


CF073A

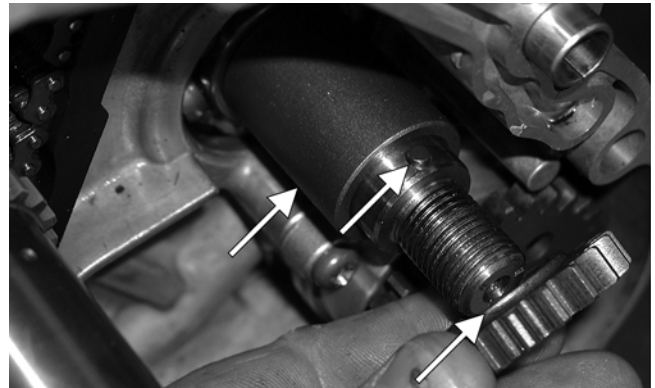


CC164D

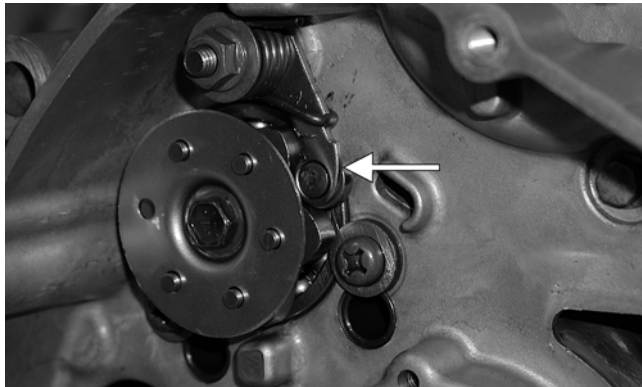
6. Attach the spring to the gear shift cam stopper arm.



CC086D



CF070A



CF072A



CD481

7. Install the gear shift shaft.

9. Place the chain into the crankcase; then secure it from the top side with a wire for ease of assembling.



CC085D



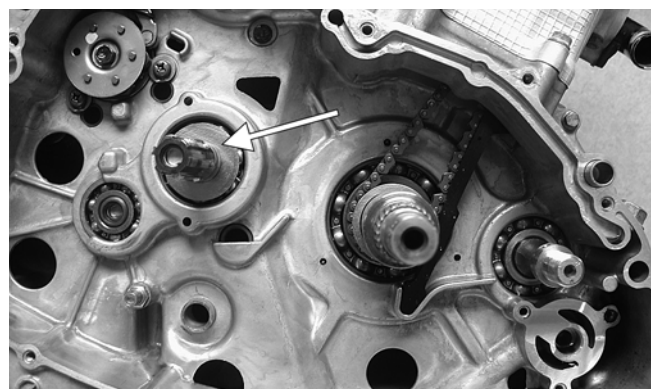
CC079D

**C. Primary Driven Gear**  
**D. Primary Driven Clutch**  
**E. Primary Drive Clutch Shoe**

■NOTE: Steps 1-7 in the preceding sub-section must precede this procedure.

8. Install the spacer, pin, and oil pump drive gear onto the crank balancer shaft making sure the shoulder of the drive gear is facing inward toward the crankcase; then secure with the washer and nut tightened to 58 ft-lb.

10. Install the primary driven washers onto the drive-shaft and crankshaft.



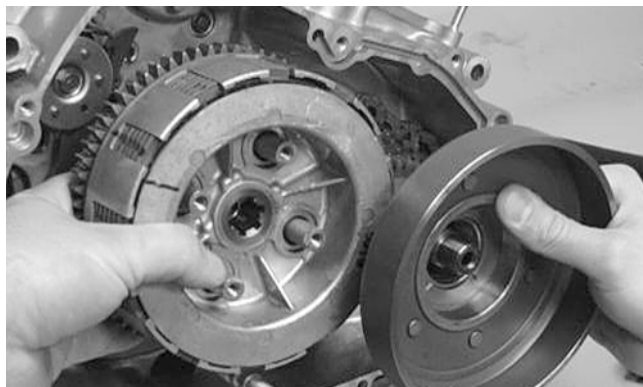
CD198B



**⚠ CAUTION**

The clutch sleeve hub and the pressure plate must be seated in the proper position. If any of the incorrect positions are used, the hub and plate will have clearance between them and they will not operate properly.

11. Simultaneously, place the primary clutch assembly and the starter clutch housing on their respective shafts making sure the sleeve is properly positioned in the primary assembly.



CC078D

■NOTE: Note the alignment mark scribed on the primary driven gear assembly during disassembly.

12. Using the Clutch Sleeve Hub Holder, install the nut and washer. Tighten to 72 ft-lb.



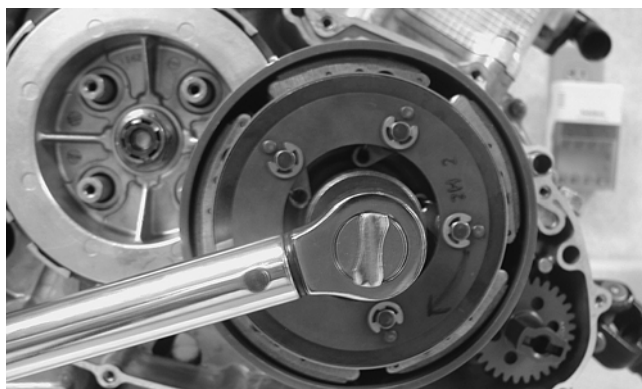
CD479

13. Place the primary drive one-way clutch into the starter clutch housing noting the word OUTSIDE for proper placement.



CF043

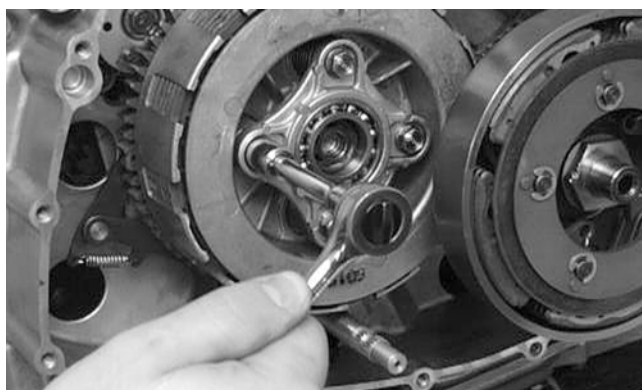
14. Install the clutch shoe and washer; then secure with the starter clutch shoe nut (left-hand threads). Tighten to 94 ft-lb; then using a center punch, stake the nut.



CD482

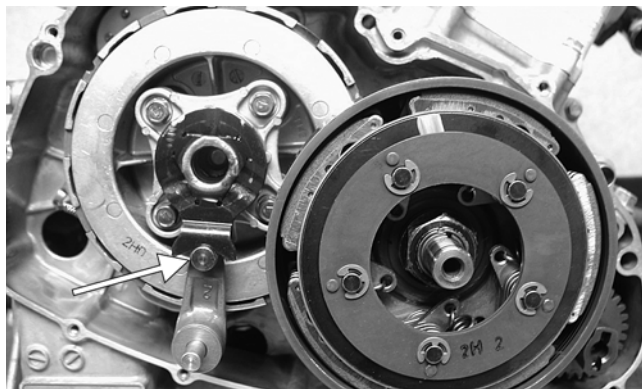
15. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, tighten the four cap screws securely.

■NOTE: Tighten the four roller assembly cap screws in a crisscross pattern making sure there is no clearance between the clutch plates when secured.



CC074D

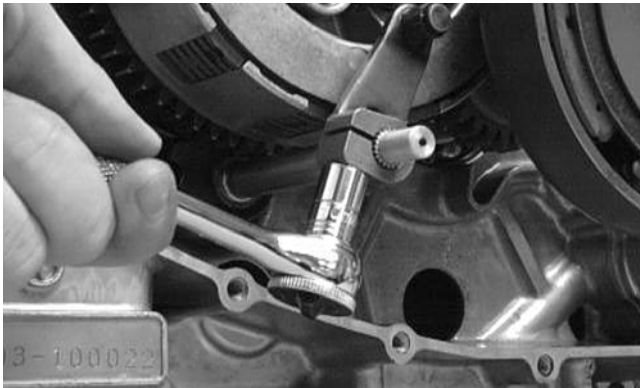
16. Install the clutch release arm and release roller guide making sure the release roller and guide are aligned.



CD166A

17. Secure the clutch release arm with the cap screw coated with blue Loctite #243. Tighten securely.





CC073D

18. Install the reverse cam stopper housing and gasket making sure the stopper and spring are correctly positioned. Tighten to 16 ft-lb.



CD494

## F. Water Pump

## G. Oil Filter

■NOTE: Steps 1-18 of the preceding sub-sections must precede this procedure.

■NOTE: Lubricate all internal components with 5W-30 oil prior to installing the right-side cover.

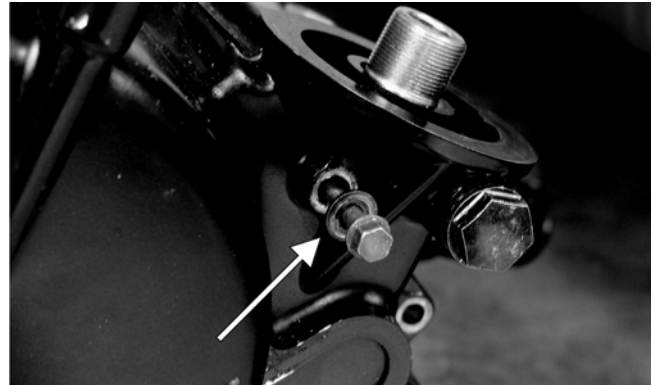
19. Place the water pump drive joint into position on the water pump shaft making sure the pin is properly positioned.



CF067

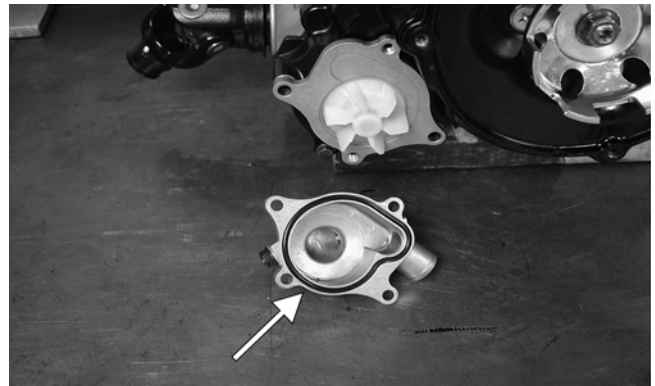
■NOTE: Care should be taken that the alignment pins are installed in the right-side cover.

20. Place the gasket and right-side cover into position making sure the release roller guide remains correctly positioned and that the water pump drive adapter aligns; then install the fifteen cap screws. Note the proper location of the long cap screw with rubber washer.

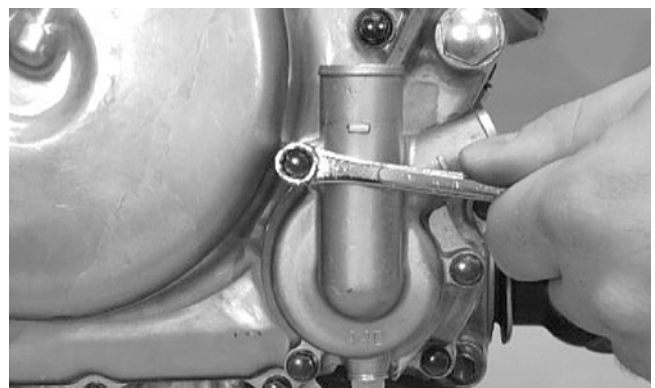


CF039A

21. Tighten the cap screws in a crisscross pattern to 8 ft-lb.
22. Place the water pump cover onto the right-side cover making sure the new O-ring is properly positioned. Tighten securely with the three cap screws.



CD910A



CC027D

23. Using the oil filter wrench, install a new oil filter.



CC067D

24. Install the coolant hose on the water pump and secure with the clamp.

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## Center Crankcase Components

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■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.

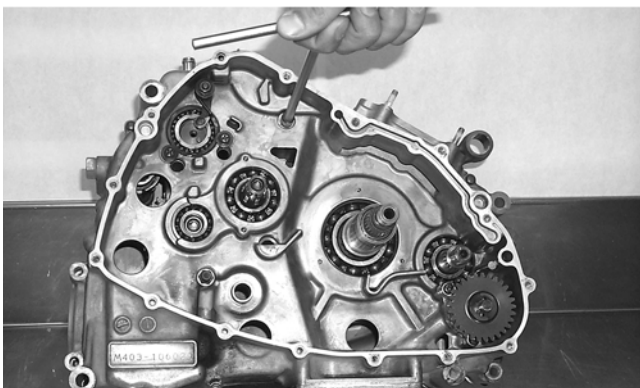
■NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

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## Separating Crankcase Halves

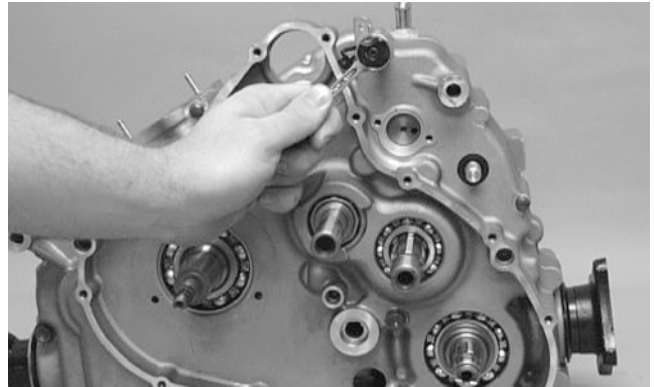
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1. Remove the right-side 6 mm cap screws (one from inside the case) securing the crankcase halves. Note the location of the different-lengthed cap screws.



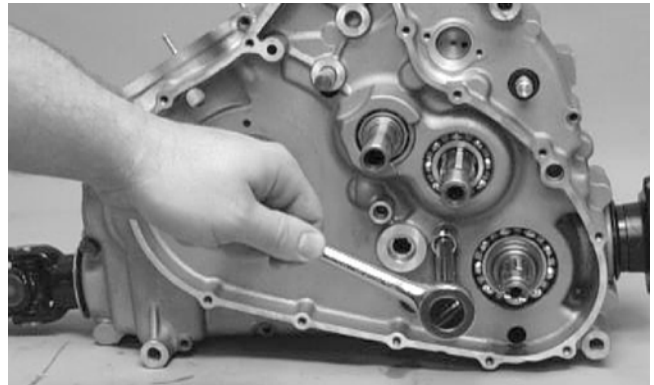
CC530D

2. Remove the left-side 6 mm cap screws securing the crankcase halves. Note the location of the wiring form. Note the location of the different-lengthed cap screws.



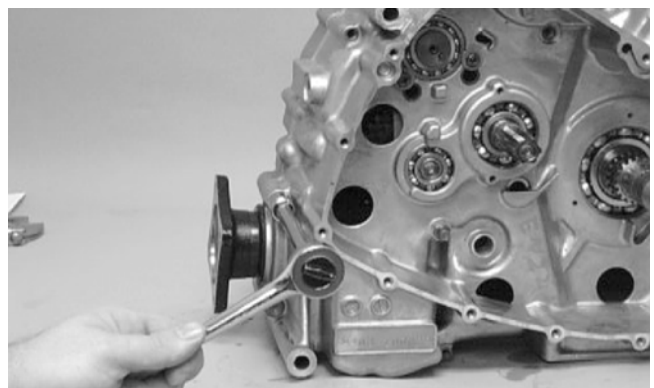
CC096D

3. Remove the left-side 8 mm cap screws (two from inside the case) securing the crankcase halves. Note the location of the different-lengthed cap screws.



CC097D

4. Remove the right-side 8 mm cap screws securing the crankcase halves.

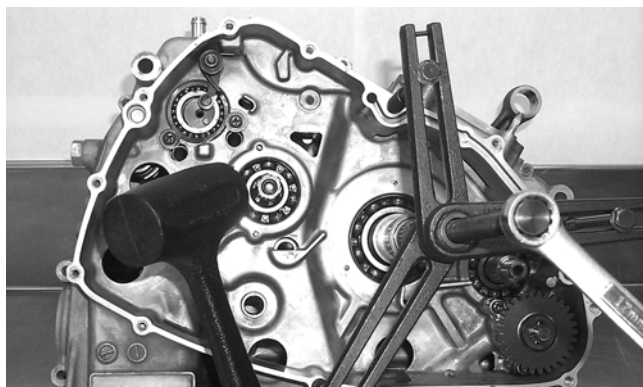


CC098D

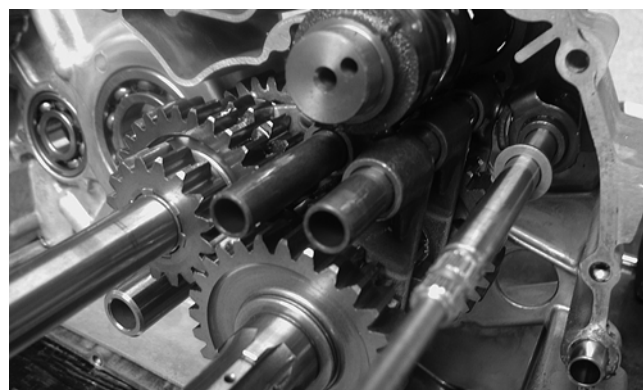
5. Using the Crankcase Separator/Crankshaft Remover and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins, an O-ring, and a washer.

■NOTE: To keep the shaft/gear assemblies intact for identification, tap the shafts toward the left-side crankcase half when separating the halves.

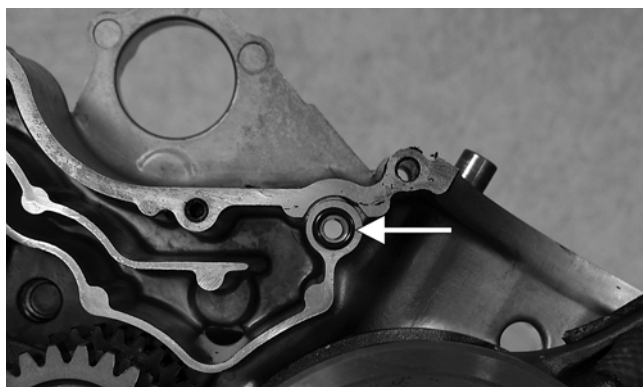




CC099D



CD227



CF078A

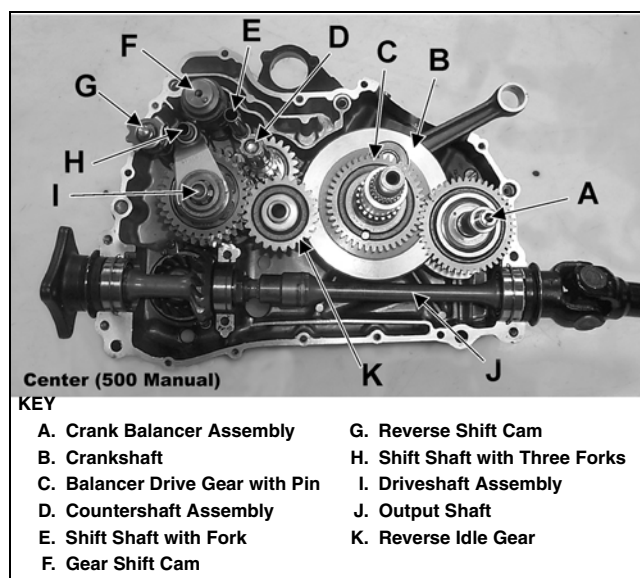


CC102D

## Disassembling Crankcase Half

■NOTE: For steps 1-10, refer to illustration CC803C.

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



CC803C

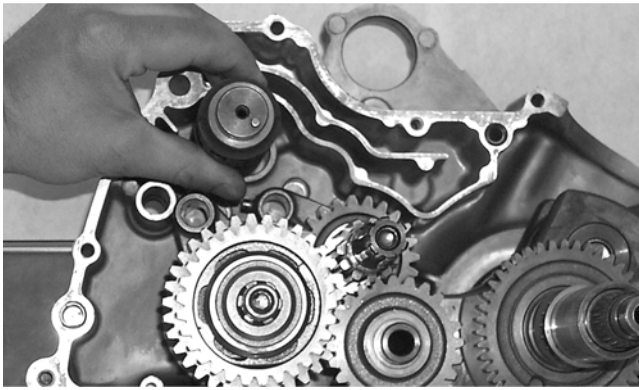
1. Remove the two shift shafts (E and H).
2. Remove the reverse shift cam (G) and spacer.
3. Disengage four forks from the gear shift cam (F); then remove the reverse shifter fork.



CC105D

4. Remove the gear shift cam (F).





CC106D

5. Remove the three remaining forks noting their positions for assembling purposes.

**AT THIS POINT**

To service gear shift forks, see Servicing Center Crankcase Components sub-section.

6. Remove the reverse idle gear (K) w/shaft. Account for the bushing, two washers, and the snap ring.
7. Simultaneously, remove the driveshaft assembly (I) and countershaft assembly (D). Account for the washer on the countershaft.

**AT THIS POINT**

To service the driveshaft and/or countershaft, see Servicing Center Crankcase Components sub-section.

■NOTE: For efficiency, if the driveshaft and/or countershaft are not being serviced, it is preferable to leave them assembled. The technician should use discretion and sound judgment.

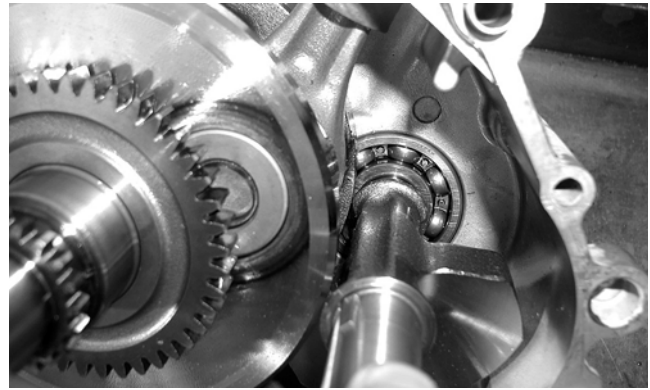
8. Remove the front output shaft (J) and rear shaft assemblies. Account for the bearing C-ring.

■NOTE: Note the alignment marks on the crank balancer driven gear and balancer drive gear to aid in assembly.



CD826

9. Remove the driven gear from the crank balancer assembly (A). Account for a key.



CD832

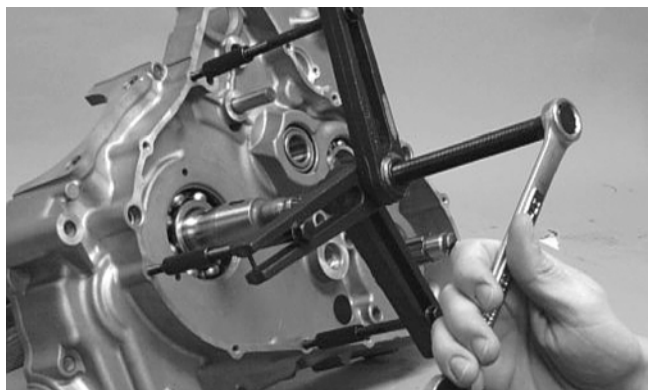
10. Remove the crank balancer assembly (A).



CD832B

■NOTE: There is a flat spot on the crank balancer to allow clearance past the crankshaft.

11. Using the Crankcase Separator/Crankshaft Remover, push the crankshaft assembly out of the crankcase.



CC115D

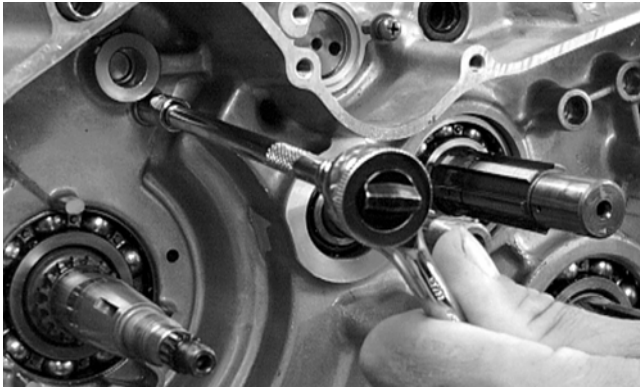
**AT THIS POINT**

To service crankshaft assembly, see Servicing Center Crankcase Components sub-section.

**CAUTION**

Do not remove the remaining output shaft assembly unless absolutely necessary. If the shaft is removed, the shaft nut must be replaced with a new one and the shaft must be re-shimmed.

12. To remove the output shaft and gear, remove the nut, slide the gear off the shaft (account for a shim or shims), and drive the shaft out with a plastic mallet (account for a shim or shims).



CC482D

## Servicing Center Crankcase Components

■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

### SECONDARY GEARS

■NOTE: When checking and correcting secondary gear backlash and tooth contact, the universal joint must be secured to the front shaft or false measurements will occur.

### Checking Backlash

■NOTE: The rear shaft and bevel gear must be removed for this procedure. Also, always start with the original shims on the rear shaft.

1. Place the left-side crankcase cover onto the left-side crankcase half to prevent runout of the secondary transmission output shaft.
2. Install the secondary driven output shaft assembly onto the crankcase.
3. Mount the indicator tip of the dial indicator on the secondary driven bevel gear.
4. While rocking the driven bevel gear back and forth, note the maximum backlash reading on the gauge.
5. Acceptable backlash range is 0.05-0.33 mm (0.002-0.013 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.

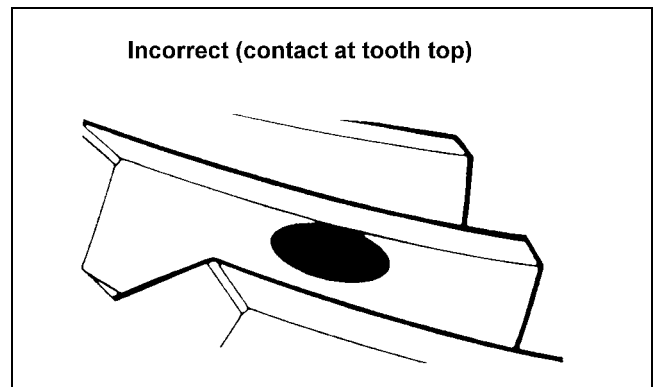
■NOTE: Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

Backlash Measurement	Shim Correction
Under 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

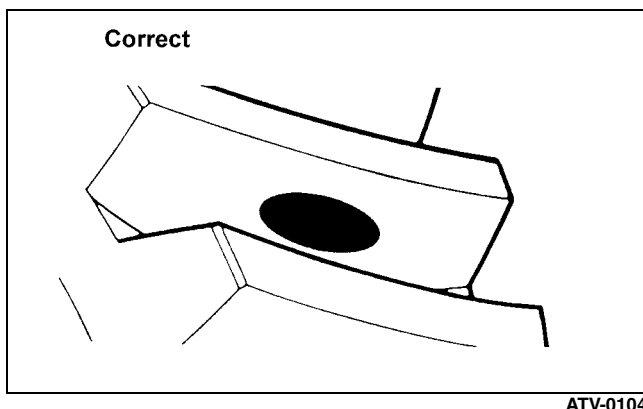
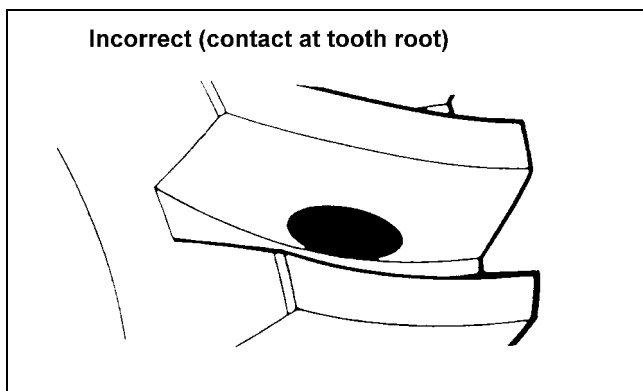
### Checking Tooth Contact

■NOTE: After correcting backlash of the secondary driven bevel gear, it is necessary to check tooth contact.

1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
5. Rotate the secondary driven bevel gear several revolutions in both directions.
6. Examine the tooth contact pattern in the dye and compare the pattern to the illustrations.



ATV-0103



### Correcting Tooth Contact

■NOTE: If tooth contact pattern is comparable to the correct pattern illustration, no correction is necessary.

If tooth contact pattern is comparable to an incorrect pattern, correct tooth contact according to the following chart.

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

■NOTE: To correct tooth contact, steps 1 and 2 (with NOTE) of "Correcting Backlash" must be followed and the above "Tooth Contact/Shim Correction" chart must be consulted.

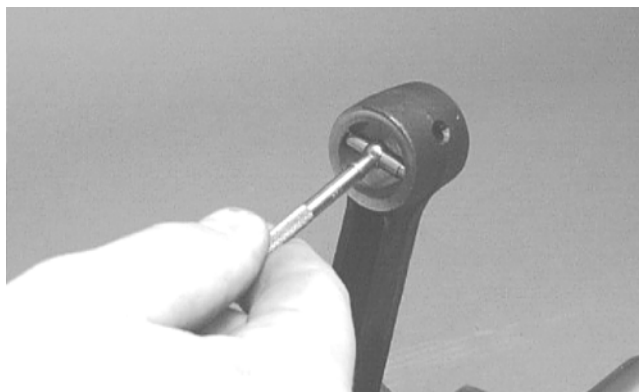
#### CAUTION

After correcting tooth contact, backlash must again be checked and corrected (if necessary). Continue the correcting backlash/correcting tooth contact procedures until they are both within tolerance values.

## CRANKSHAFT ASSEMBLY

### 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.



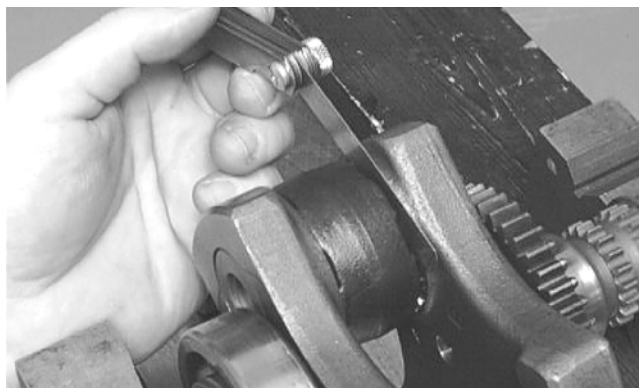
2. Maximum diameter must not exceed specifications.

### 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.

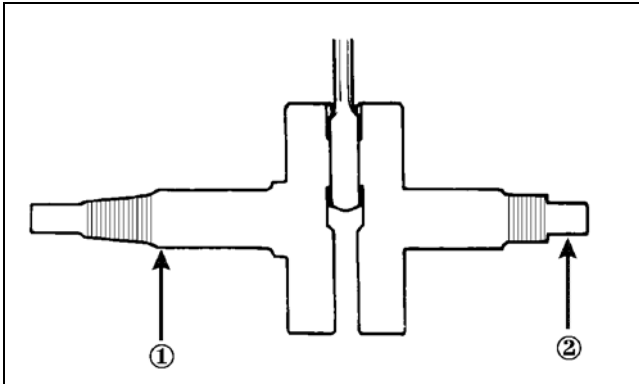
### Measuring Connecting Rod (Big End Width)

1. Using a calipers, measure the width of the connecting rod at the big-end bearing.
2. Acceptable width 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.



ATV-1074

3. Zero the indicator and rotate the crankshaft slowly.

### ⚠ CAUTION

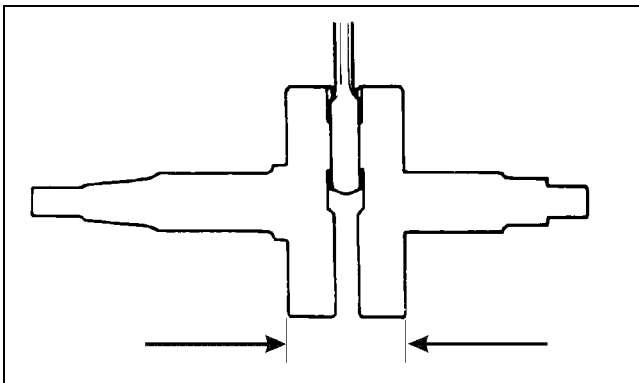
Care should be taken to support the connecting rod when rotating the crankshaft.

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.



ATV-1017

2. Acceptable width range must be within specifications.

## DRIVESHAFT

### Disassembling

1. In order, remove the reverse dog, snap ring, washer, reverse driven gear, and bushing from the driveshaft.



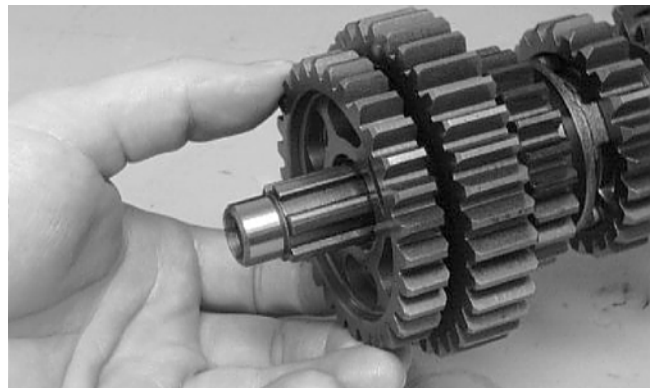
CC228D



CC227D

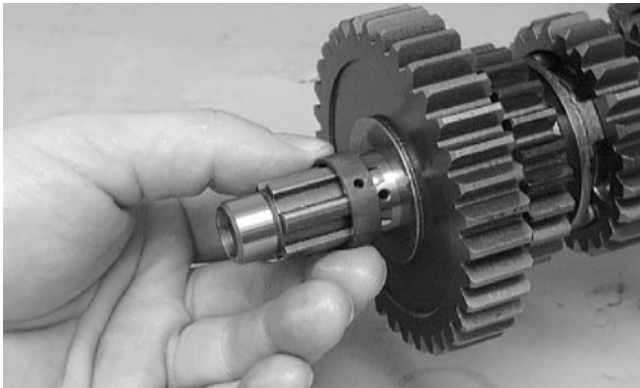


CC226D



CC225D

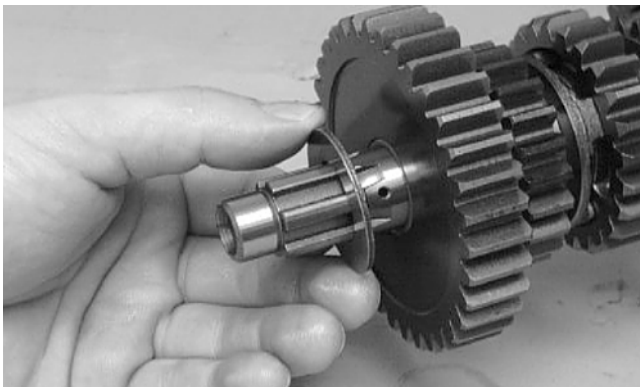
3



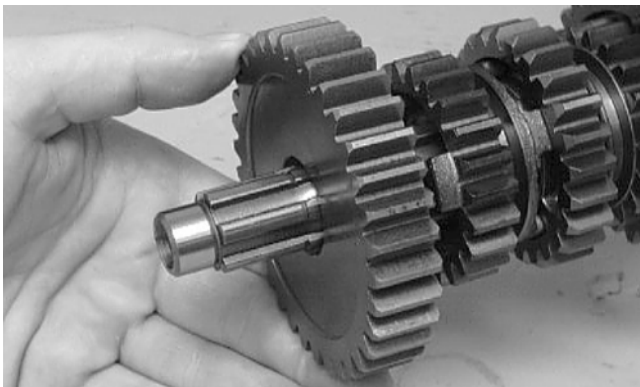
CC224D

■NOTE: The teeth on the bushing must face the 1st driven gear.

2. Remove the 1st driven washer (right side); then remove the 1st driven gear from the driveshaft.

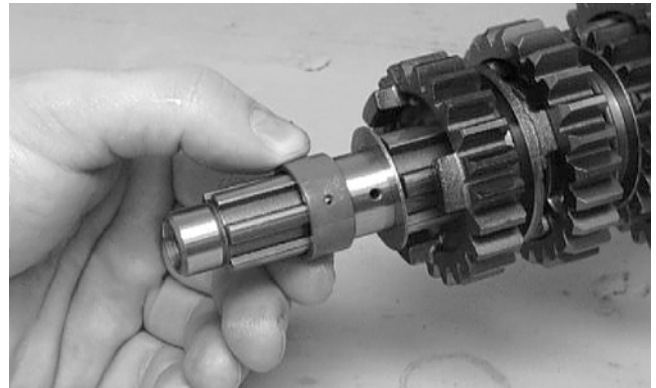


CC223D



CC222D

3. Remove the 1st driven bushing; then remove the 1st driven washer (left side) from the shoulder of the splined shaft. Remove the 4th driven snap ring.



CC221D

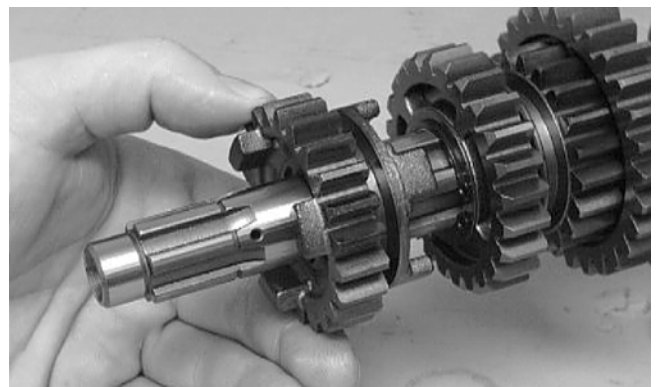


CC220D



CC508D

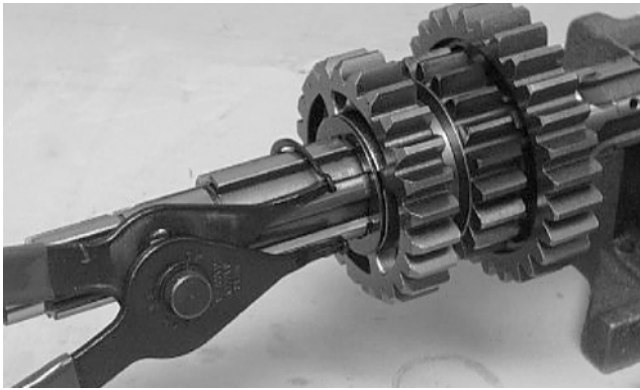
4. Remove the 4th driven gear from the driveshaft. Note the four small dogs facing toward the 3rd driven gear for assembling purposes.



CC219D

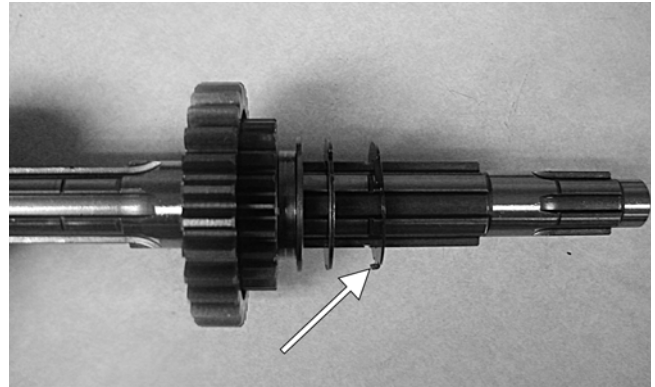
5. Remove the 3rd driven snap ring; then remove the 3rd driven lock washer (right side) from the drive-shaft.





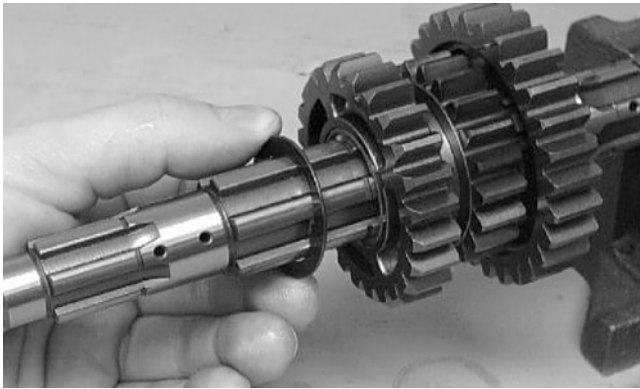
CC216D

8. Remove the 3rd driven lock washer (right side) from the driveshaft. Note the tabs facing toward the 5th driven gear for assembling purposes.



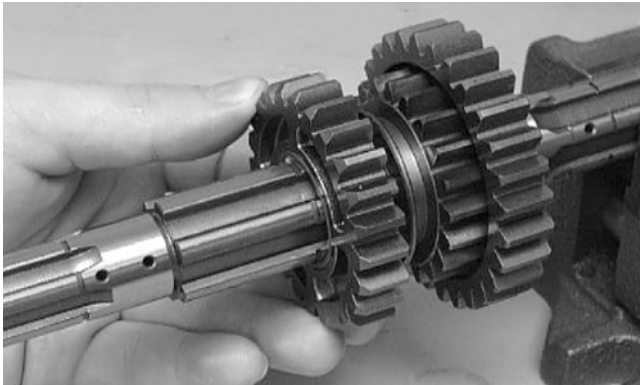
CD247A

9. Remove the next 3rd driven lock washer (left side) by rotating it out of the groove. Note the groove closest to the 5th driven gear for assembling purposes.



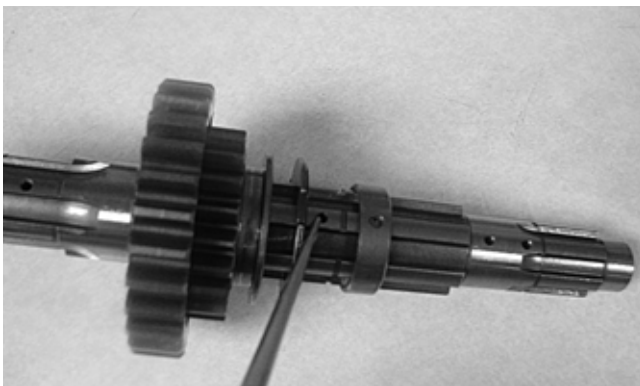
CC215D

6. Remove the 3rd driven gear from the driveshaft.

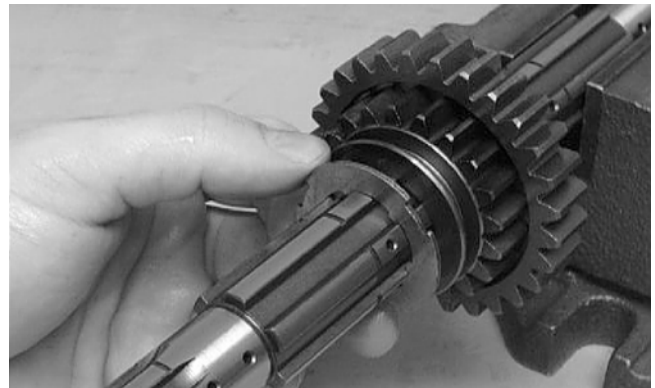


CC214D

7. Remove the 3rd driven bushing from the driveshaft. Note the location of the oil feed hole in the bushing and the matching oil supply hole in the driveshaft for assembling purposes.

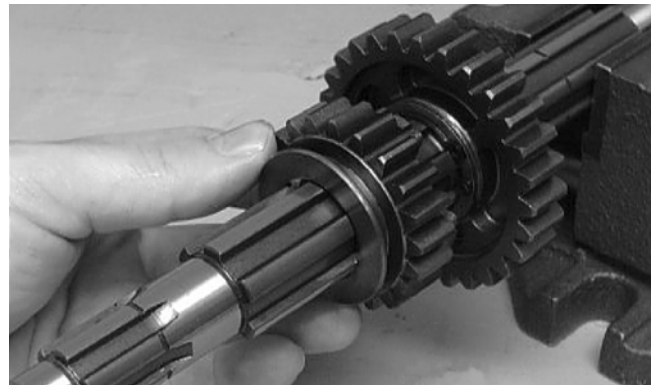


CD248



CC211D

10. Remove the 5th driven gear from the driveshaft.



CC210D

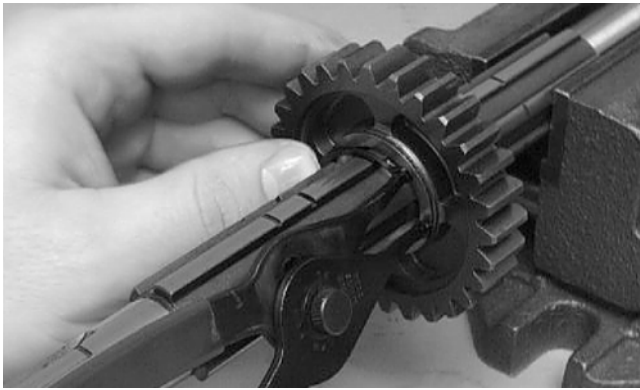
11. In order, remove the 2nd driven snap ring, washer, gear, and bushing from the driveshaft.

3

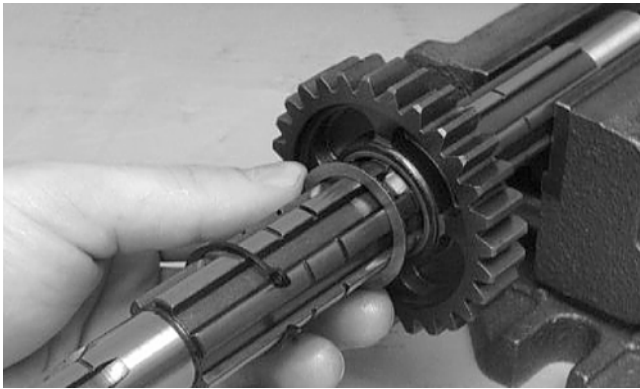


## Assembling

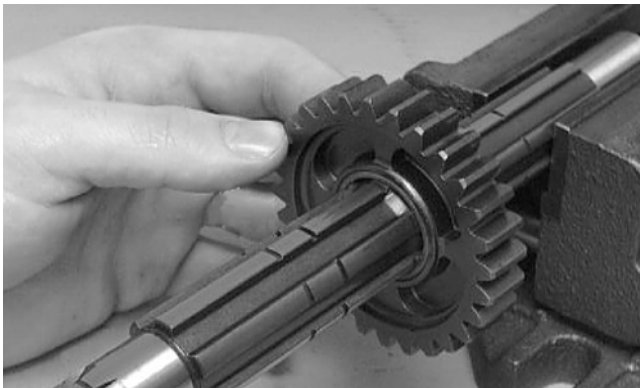
1. In order, install the 2nd driven bushing, gear, washer, and snap ring onto the driveshaft.



CC209D



CC208D



CC207D



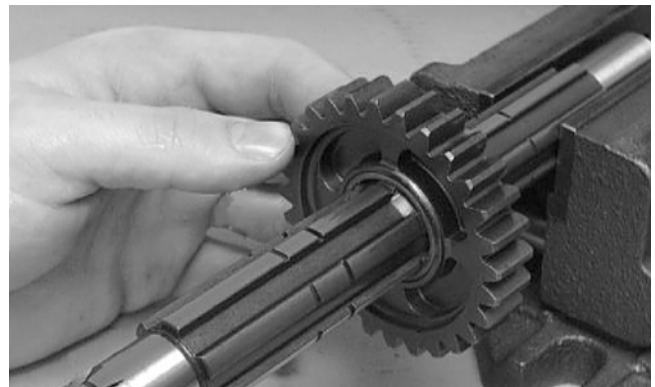
CC206D

### AT THIS POINT

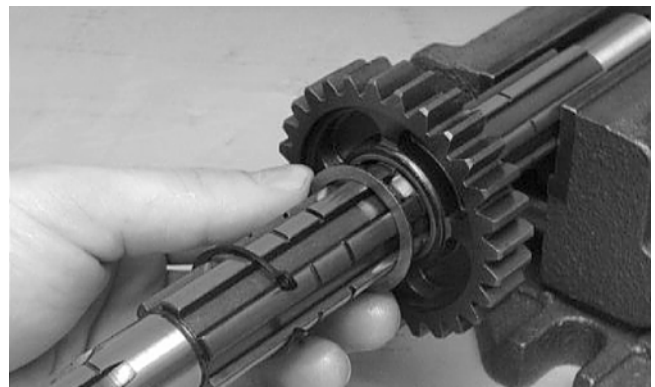
To service secondary gears, see Servicing Center Crankcase Components in this sub-section.



CC206D



CC207D

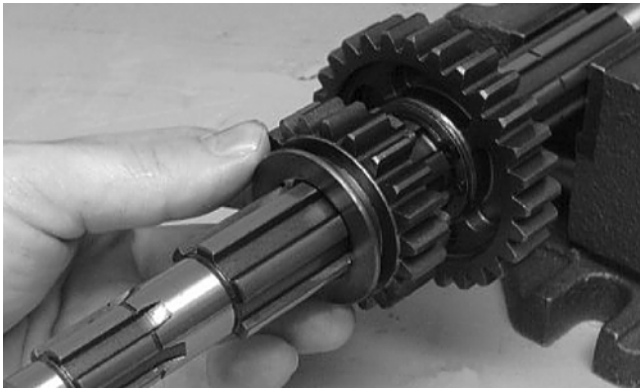


CC208D



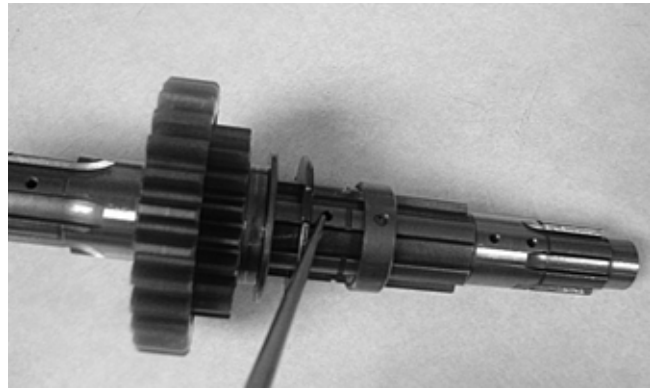
CC209D

2. Install the 5th driven gear onto the driveshaft.



CC210D

3. Install the 3rd driven lock washer (left side). Lock it into the groove closest to the 5th driven gear (as noted in disassembling) by rotating it when it is in the groove.

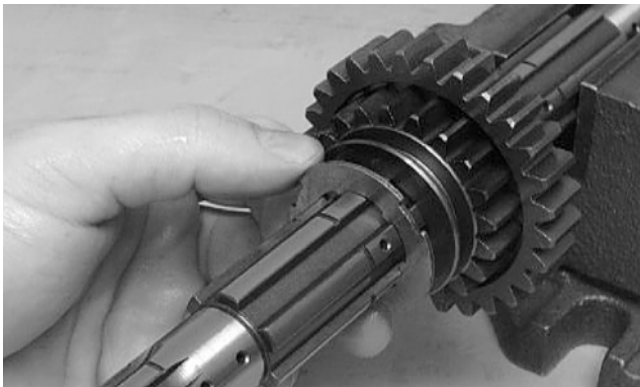


CD248

**CAUTION**

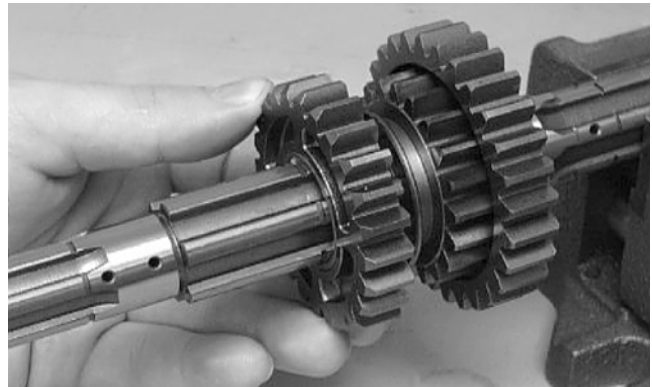
It is very important to assure the oil feed hole in the bushing and oil supply hole in the driveshaft align. If not aligned, engine damage will result.

6. In order, install the 3rd driven gear, lock washer (right side), and snap ring onto the driveshaft.

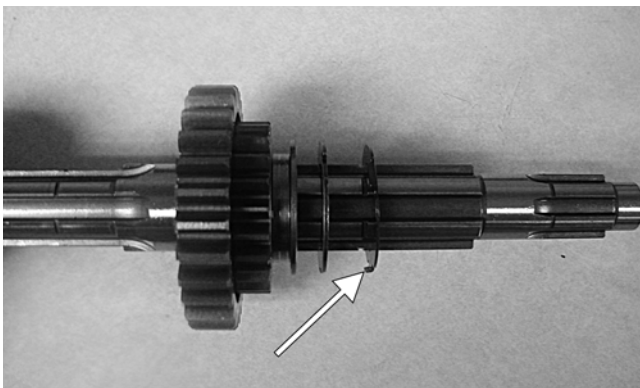


CC211D

4. Install the next 3rd driven lock washer (left side) onto the driveshaft making sure the tabs are facing toward the 5th driven gear. Make sure the tabs interlock with the 3rd driven lock washer.

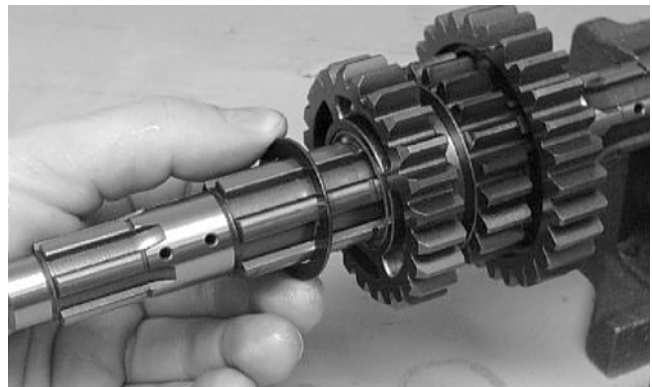


CC214D



CD247A

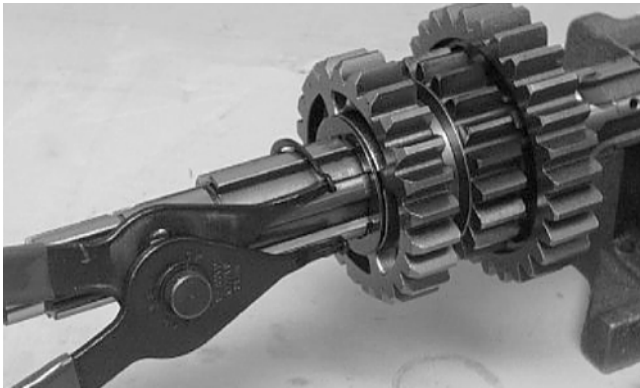
5. Install the 3rd driven bushing onto the driveshaft making sure the oil feed hole in the bushing aligns with the appropriate oil supply hole in the driveshaft (as noted in disassembling).



CC215D

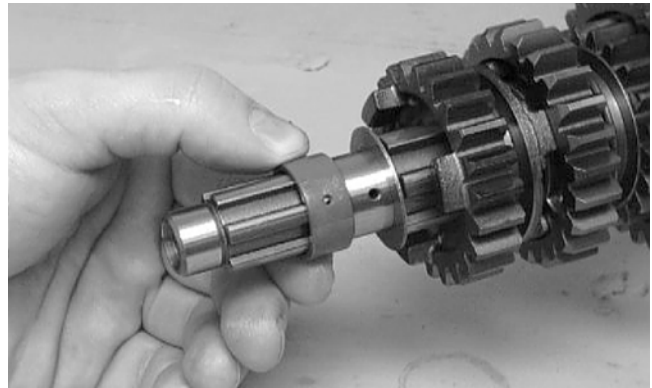
3



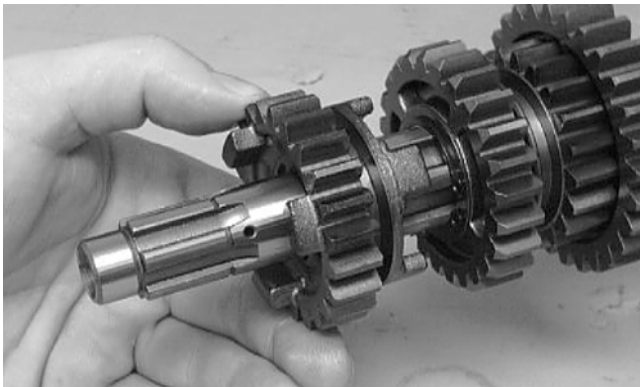


CC216D

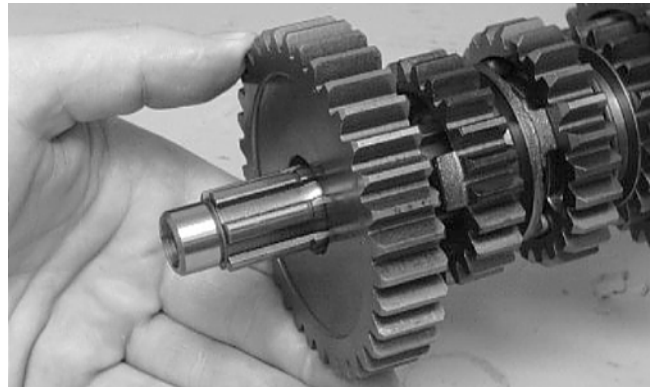
7. Install the 4th driven gear onto the driveshaft making sure the four small dogs are facing toward the 3rd driven gear as noted in disassembling; then secure with the snap ring.



CC221D



CC219D



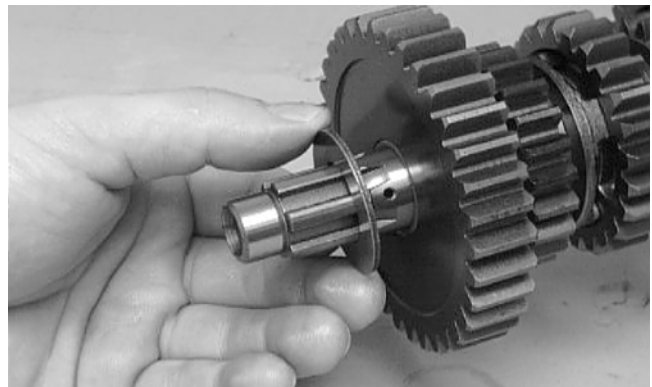
CC222D

9. Install the 1st driven washer (right side) on the shaft making sure it lines up with the groove in the shaft; then turn the washer locking it on the shaft.



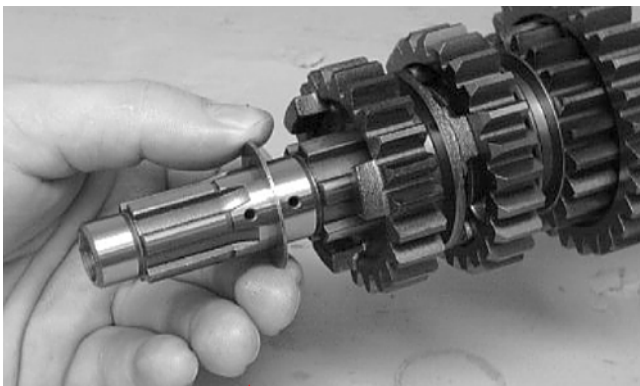
CC508D

8. Install the 1st driven washer (left side) onto the shoulder of the splined shaft; then install the 1st driven bushing and gear.



CC223D

10. Slide the reverse driven gear bushing onto the shaft making sure the oil port in the bushing aligns with the oil port on the shaft.



CC220D



CC842



**⚠ CAUTION**

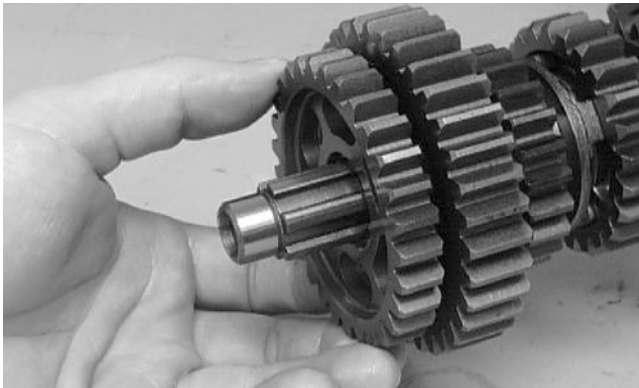
Failure to align the oil ports will result in serious engine damage.

11. Move the washer in the shaft groove until the notches in the washer align with the tabs on the bushing; then slide the bushing up tight against the washer.

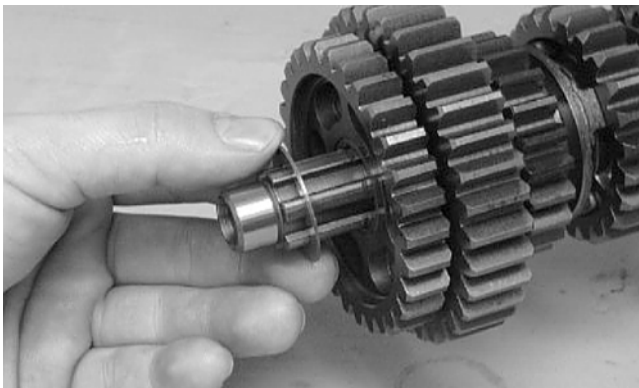


CC843

12. In order, install the reverse driven gear, washer, snap ring, and reverse dog onto the driveshaft.



CC225D



CC226D



CC227D



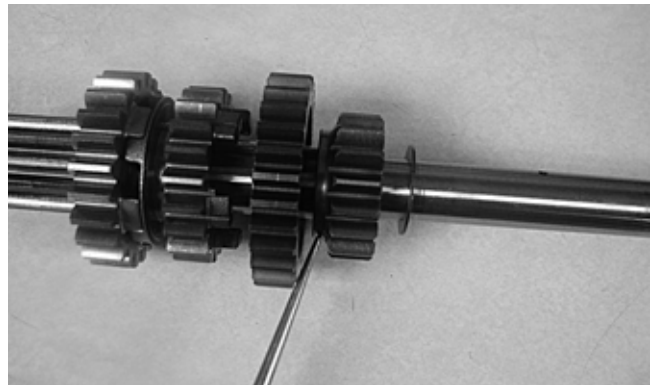
CC228D

■NOTE: The driveshaft is now completely assembled for installation.

## COUNTERSHAFT

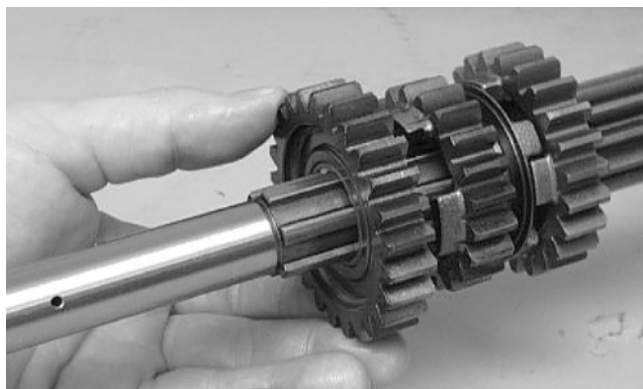
### Disassembling

1. Remove the 2nd drive gear and washer from the countershaft.



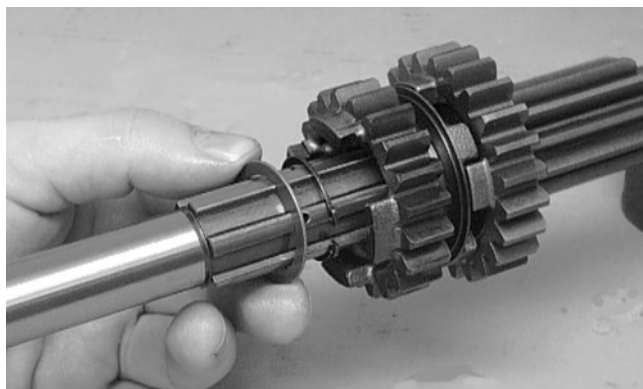
CD242

2. Remove the 5th drive gear from the countershaft.

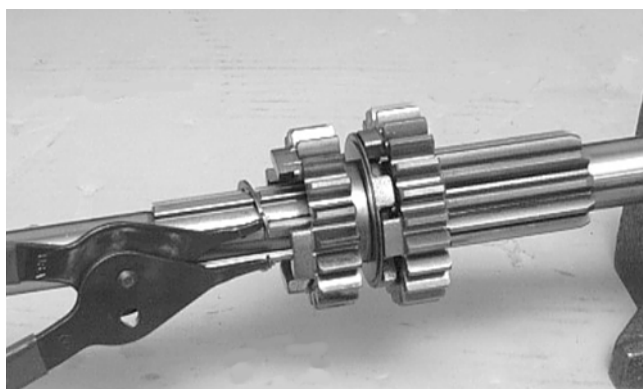


CC203D

3. Remove the 5th drive washer and 5th drive snap ring from the countershaft.



CC201D



CC200D

4. Remove the 3rd drive gear from the countershaft.
5. Remove the 4th drive snap ring securing the 4th drive gear on the countershaft; then remove the first 4th drive washer and 4th drive gear. Account for the bushing.

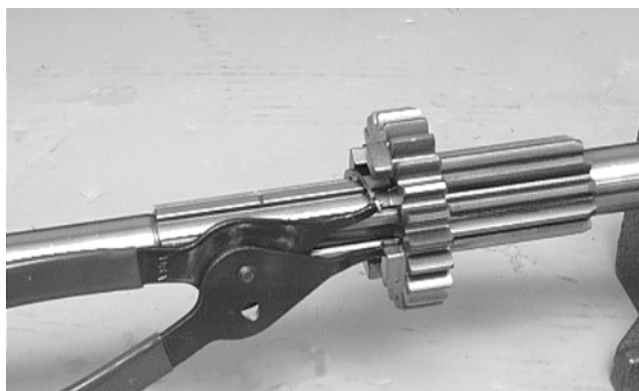


CC199D

6. Remove the other 4th drive washer from the countershaft.

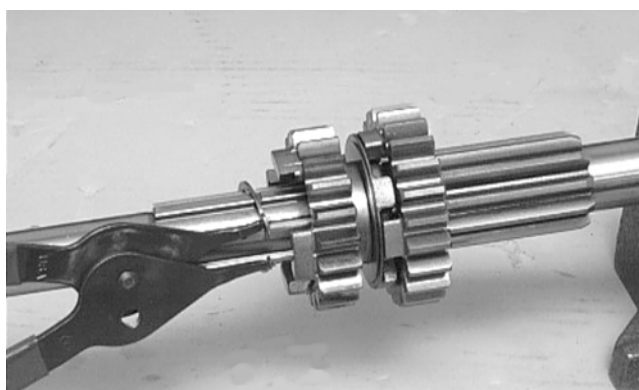
## Assembling

1. Install the 4th drive washer onto the countershaft.
2. Install the 4th drive gear making sure the bushing is in position; then install the other 4th drive washer onto the countershaft. Secure with the snap ring.



CC199D

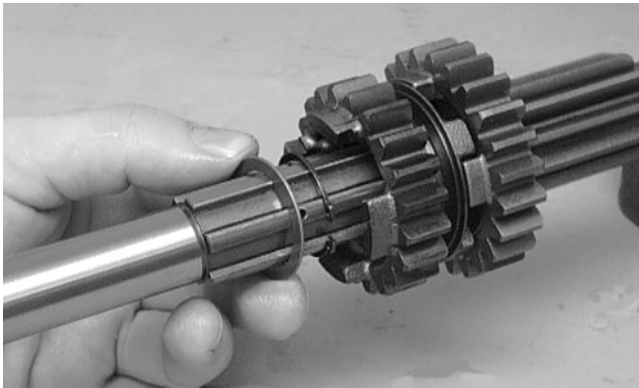
3. Install the 3rd drive gear; then install the 5th drive snap ring onto the countershaft.



CC200D

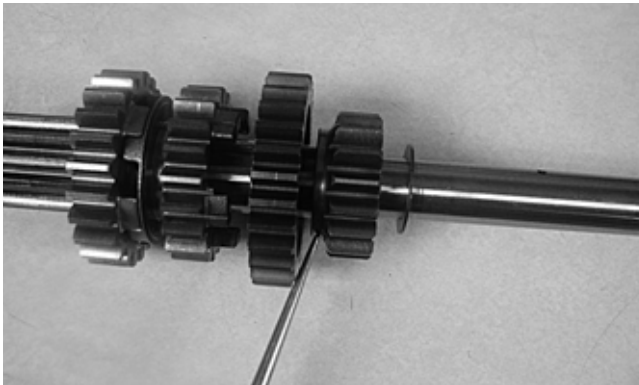
4. Install the 5th drive washer and 5th drive gear onto the countershaft.





CC201D

5. Install the 2nd drive gear and washer onto the countershaft.



CD242

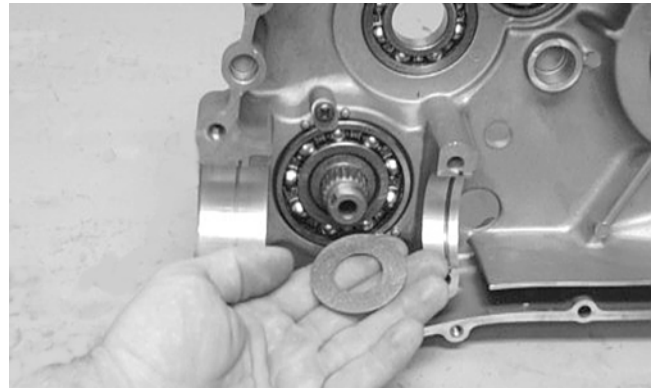
■NOTE: The countershaft is now completely assembled for installation.

## Assembling Crankcase Half

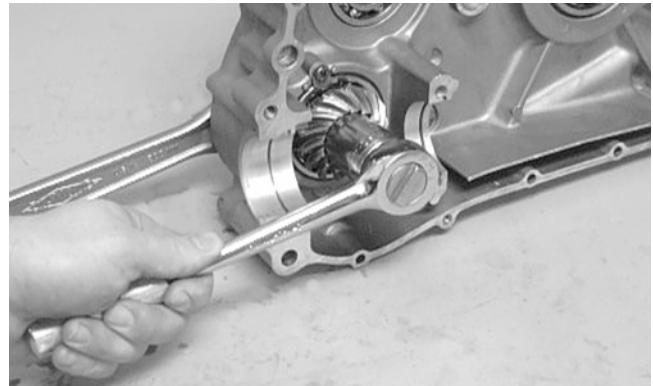
■NOTE: For ease of assembly, install components on the left-side crankcase half.

■NOTE: If the output shaft and gear were removed, make sure that the proper shim is installed.

1. To install the output shaft and gear, place the shaft into position with proper shims, slide the gear onto the shaft, and secure with a new nut tightened to 72 ft-lb.

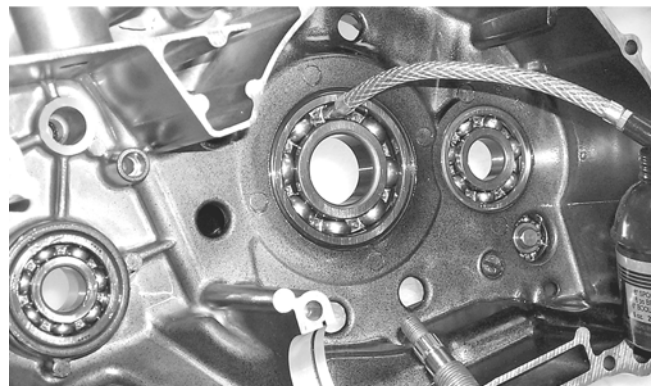


CC117D

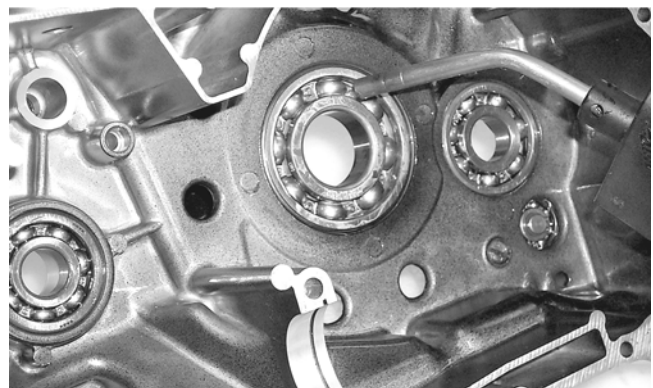


CC116D

2. Apply a liberal amount of engine oil to the crankshaft bearing. Using a propane torch, heat the bearing until the oil begins to smoke; then slide the crankshaft assembly into place.



CC688



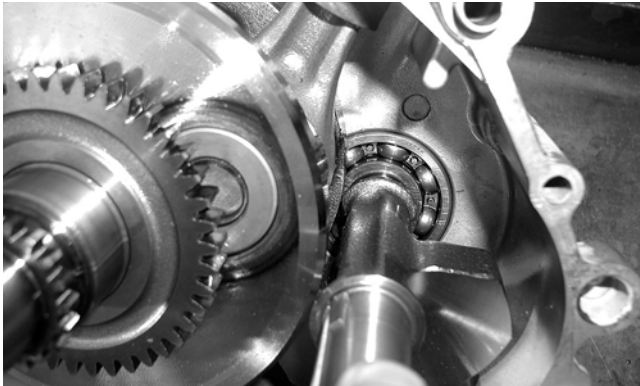
CC689

■NOTE: If heating the bearing is not possible, the crankshaft can be installed using a crankshaft installing tool.



3. Install the crank balancer.

■**NOTE:** It will be necessary to rotate the crank balancer until the counterweight is directed away from the crankshaft; then rotate the crankshaft clockwise into the journal area to allow the balancer to be fully seated.



CD832A

4. With the key in position, slide the driven gear onto the crank balancer making sure the timing marks are aligned.

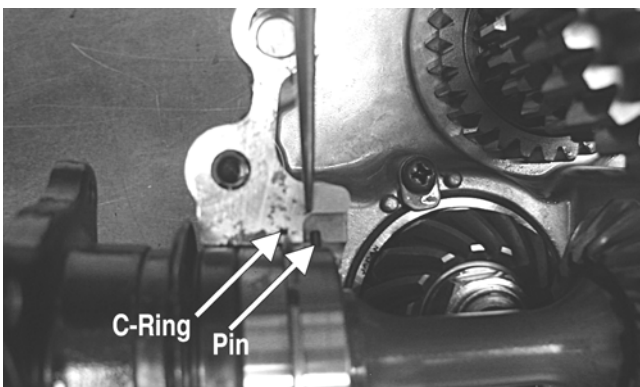


CD826

5. Place the bearing C-ring into position in the crankcase; then install the front output shaft and rear shaft assemblies.

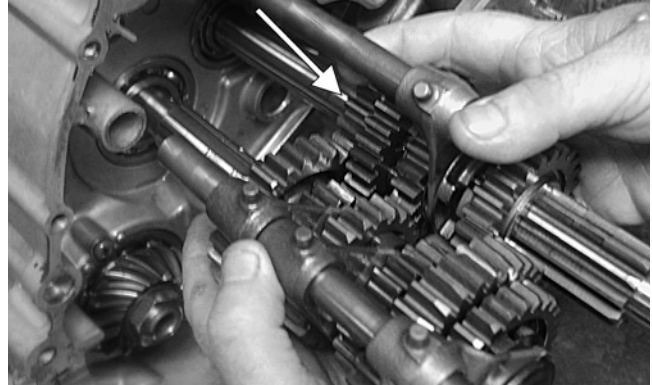
**CAUTION**

The bearing pins must be positioned into the crankcase correctly or damage to the crankcase may occur.



CD268A

6. Simultaneously, install the driveshaft and countershaft assemblies making sure the washer is on the countershaft.

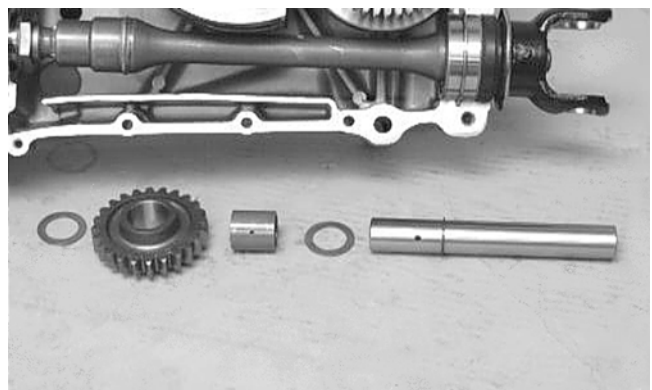


CD232A

7. Install the reverse idle shaft with snap ring making sure the oil hole in the shaft is facing downward; then install a washer, bushing, reverse idle gear, and a washer.

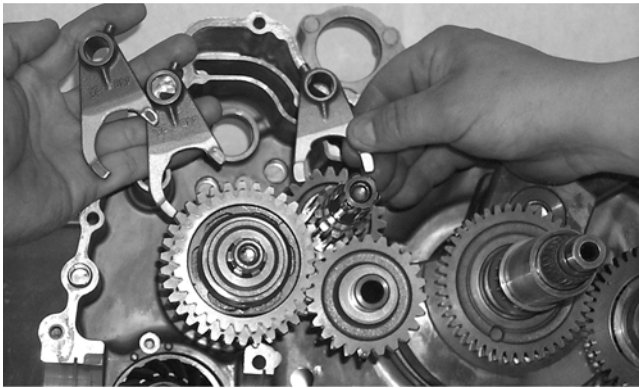


CF055

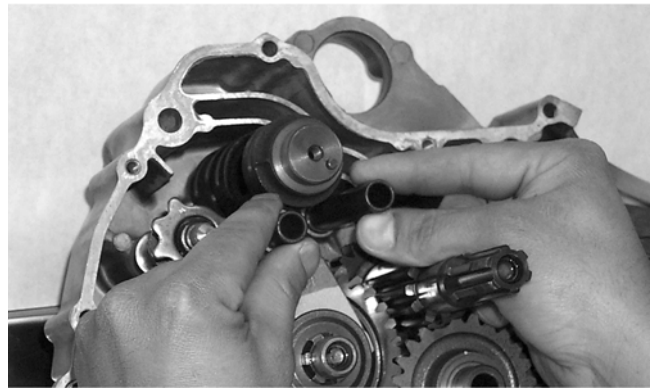


CC231D

8. Place each of the four shift forks into its respective gear or dog as noted during disassembling; then install the gear shift cam.



CC107D



CC104D

■NOTE: Prior to joining crankcase halves, turn the shift cam to ensure all gears shift properly.

## Joining Crankcase Halves

3

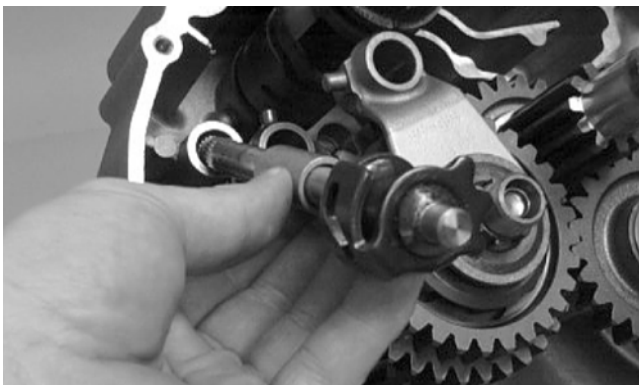


CC106D

9. Engage the four forks to the gear shift cam; then install the reverse shift cam and spacer.

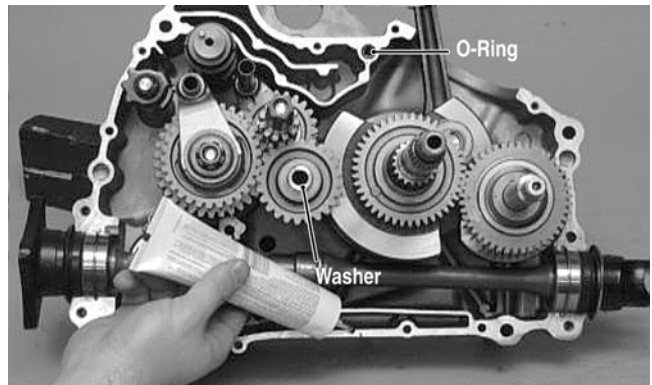


CC105D



CC103D

10. Install the two gear shift shafts; then verify that the two crankcase half alignment pins are in place.

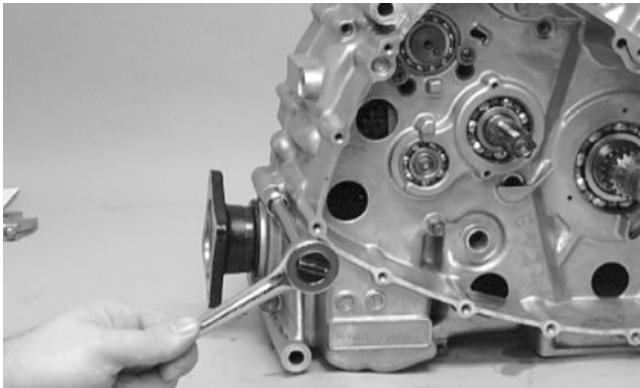


CC234DA

2. Using a plastic mallet, lightly tap the case halves together until cap screws can be installed.
3. From the left side, install the three case half 8 mm cap screws (two inside the case); then tighten only until snug.

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

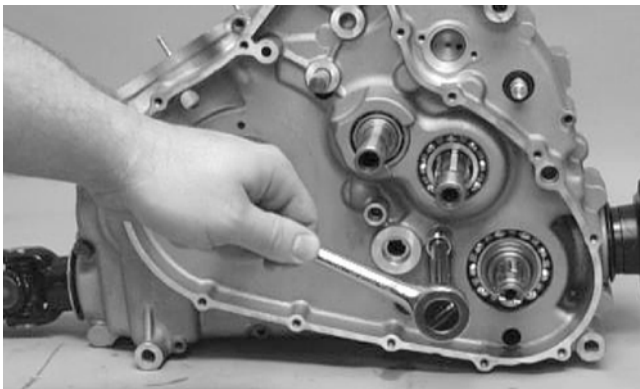




CC098D

4. From the right side, install the case half 8 mm cap screws; then tighten only until snug.

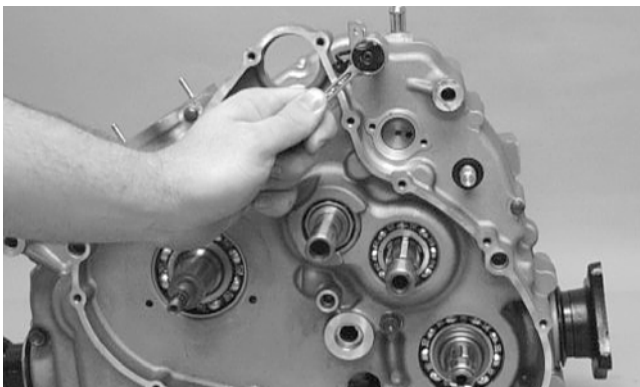
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.



CC097D

5. From the left side, install the case half 6 mm cap screws noting the location of the wiring form; then tighten only until snug.

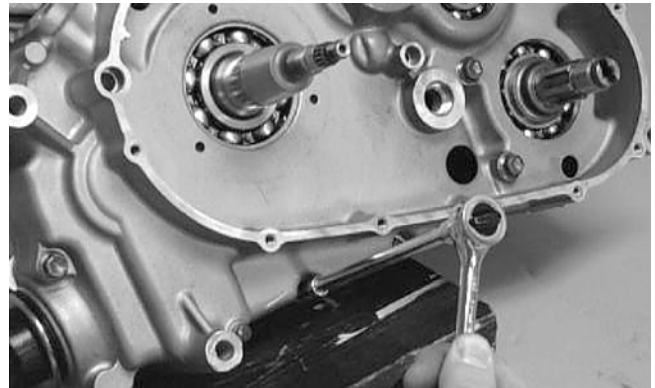
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.



CC096D

6. From the right side, install the case half 6 mm cap screws (one inside the case); then tighten only until snug.

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



CC095D

7. In a crisscross/case-to-case pattern, tighten the 8 mm cap screws (from steps 3-4) until the halves are correctly joined; then tighten to 16 ft-lb.

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

8. In a crisscross/case-to-case pattern, tighten the 6 mm cap screws (from steps 5-6) to 8 ft-lb.

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

#### CAUTION

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

## Installing Engine/Transmission

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

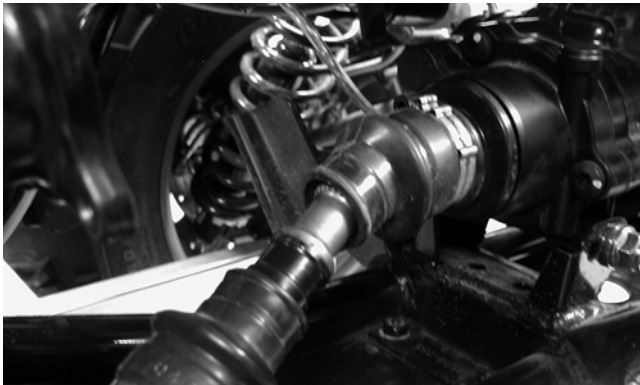
1. From the left side, place the engine/transmission into the frame; then move it rearward as far as possible.
2. Raise the rear of the engine enough to engage the front driveshaft into the splines of the front drive output yoke; then slide the engine forward as far as possible.





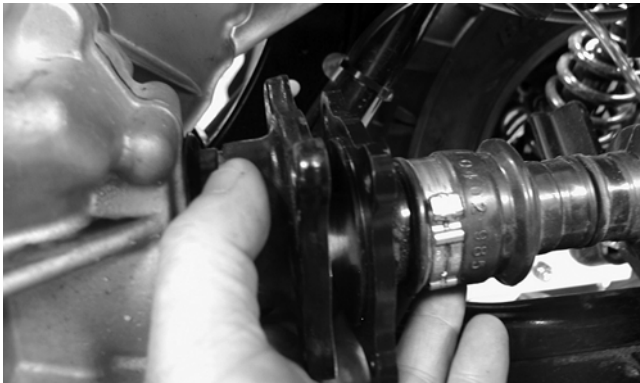
CD818

3. Raise the rear of the engine and place a block under it; then install the propeller shaft and output flange into the rear drive coupler.



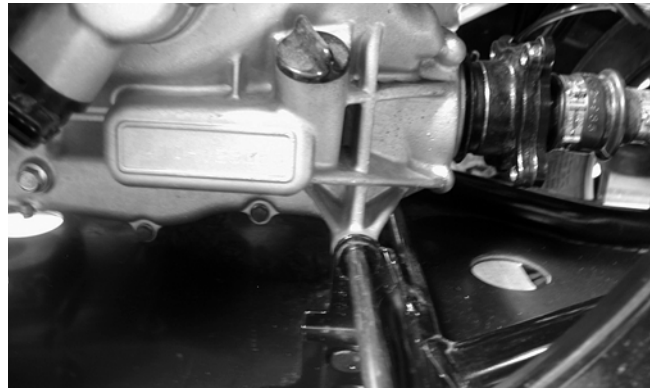
CD821

4. Remove the block from beneath the engine; then align the rear drive flanges and secure with four cap screws. Tighten to 20 ft-lb.



CD824

5. Install the lower rear engine mounting through-bolt, spacer, and washer; then install the lower front engine mounting through-bolt, spacer, and washer. Tighten to 40 ft-lb.



CD809

6. Connect the crankcase breather vent hose and secure with the clamp.

7. Connect the lower coolant hose to the water pump housing and secure with the clamp.



CC124D

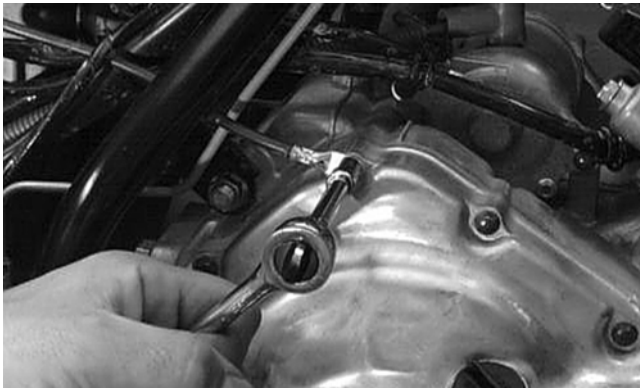
8. Connect the positive cable to the starter motor and install the protective boot.



AR604D

9. Connect the battery ground (negative) cable to the crankcase cover.

3



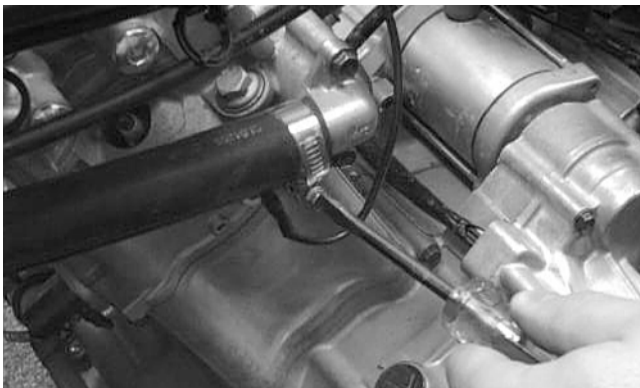
AR600D

10. Install the coil and secure with two cap screws; then install the high tension lead on the spark plug.



CD814

11. Connect the upper coolant hose to the thermostat housing and secure with the clamp.



CC121D

12. Install the air filter housing; then connect the crankcase breather and the inlet air duct. Secure with the clamps.



CD785

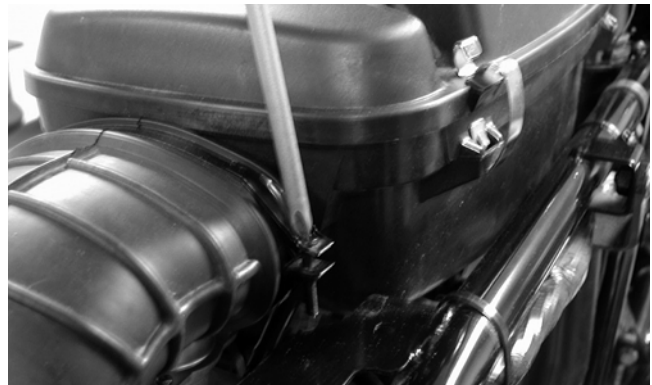


CD787

13. Position the carburetor into the intake pipe and secure with the clamp; then connect the carburetor boot to the air filter housing. Secure with the clamp.

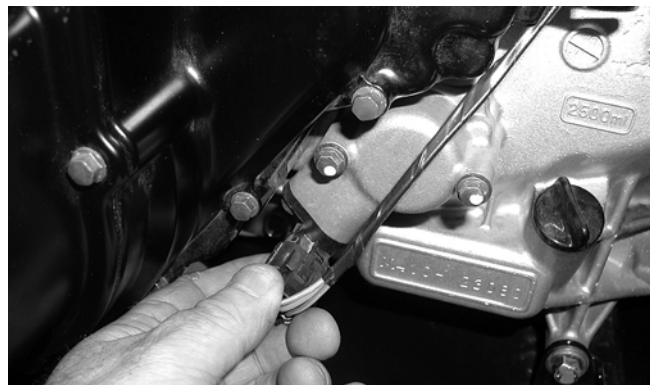


CD790



CD786

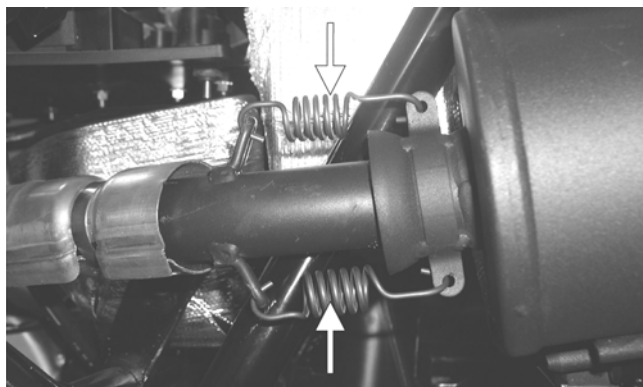
14. Connect the speed sensor connector to the sensor housing.



CD794



15. Install the exhaust pipe and secure with two cap screws making sure the mounting brackets engage the frame grommets; then install the muffler with the springs. Tighten the exhaust pipe cap screws to 20 ft-lb.

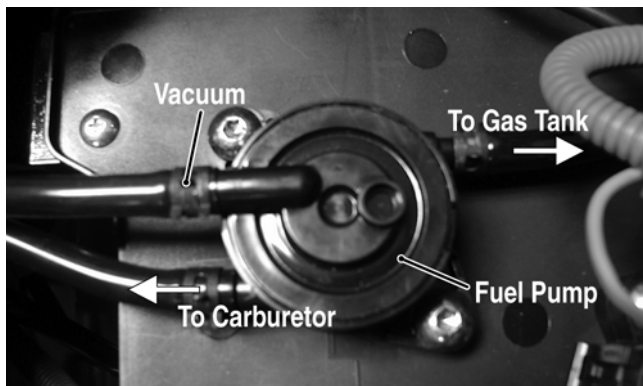


CF138A



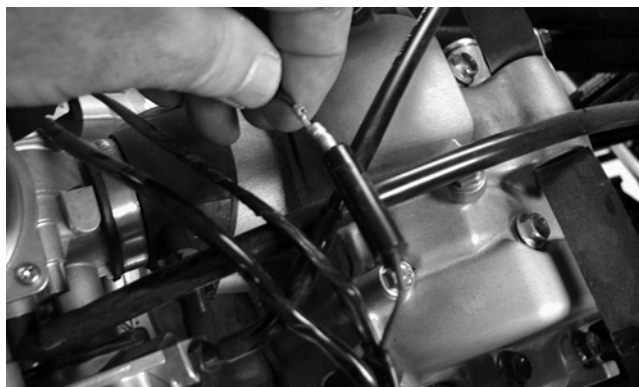
CD803

16. Swing the shift rod back into position on the engine shift arm; then secure with the E-clip.
17. Place the left-side footwell and foot peg into position on the footrest. Secure with two cap screws. Tighten to 20 ft-lb.
18. Connect the gas hose to the fuel pump; then connect the vacuum hose. Secure with hose clamps.



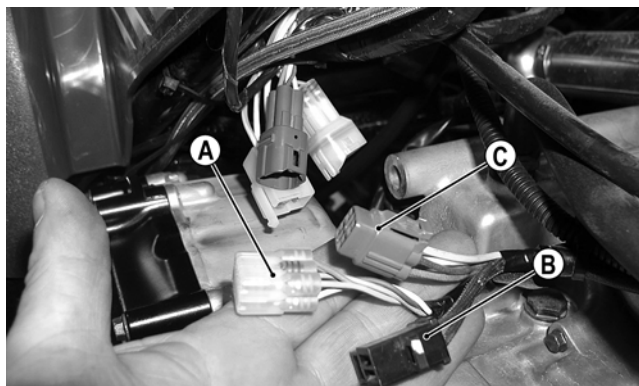
CD766A

19. Connect the temperature sensor wire to the main harness.



CD788

20. Connect the gear shift position switch (A), stator connector (B), and the CDI connector (C) to the main harness.



CD797A

21. Install the front body panel and the front rack.
22. Install the side panels.
23. Install the battery connecting the positive cable first; then the negative cable.
24. Pour the correct amount of recommended oil into the engine/transmission filler hole; install the filler plug.
25. Pour 2.9 L (3 U.S. qt) of premixed Arctic Cat Antifreeze into the cooling system. Allow coolant to settle and then fill to the bottom of the stand pipe in the radiator neck.
26. Install the seat making sure it locks into position.



### CAUTION

If the engine had a major overhaul or if any major part was replaced, proper engine break-in procedures must be followed (see Section 1). If the proper engine break-in procedures are not followed, severe engine damage may result.

3



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## 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.

### AT THIS POINT

If the technician's objective is to service front Top-Side Components, Left-Side Components, or Right-Side Components, the engine/transmission does not have to be removed from the frame.

### AT THIS POINT

If the technician's objective is to service/replace the oil strainer (from beneath the engine/transmission), the engine/transmission does not have to be removed from the frame.

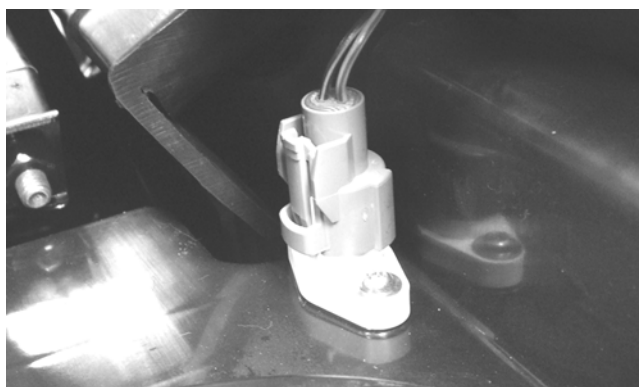
Secure the ATV on a support stand to elevate the wheels.

### **WARNING**

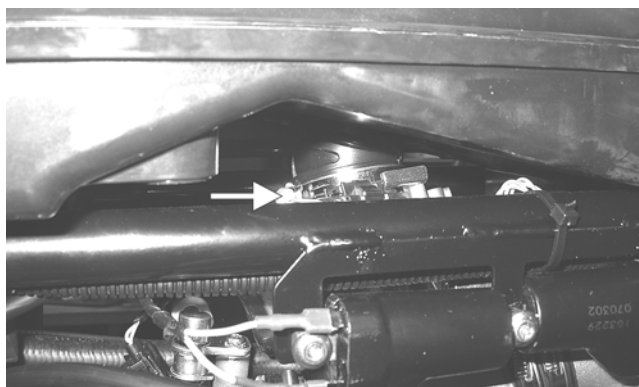
**Make sure the ATV is solidly supported on the support stand to avoid injury.**

1. Remove the seat and tool tray; then remove the negative battery cable.

2. Remove the front rack, gauge pod, footwells and footrests; then remove the front body panel (see Section 8).
3. Disconnect the IAT sensor connector; then loosen the clamp securing the inlet air boot to the throttle body and remove the air filter housing assembly.



GZ013



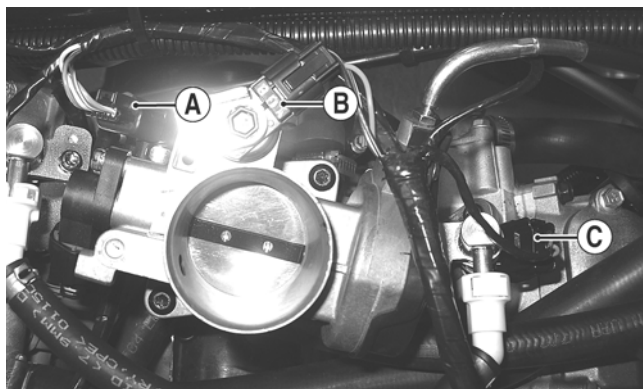
GZ091A

4. Using an absorbent towel, clean any spilled gasoline; then press the gasline hose connectors and remove from the fuel rails.



GZ124

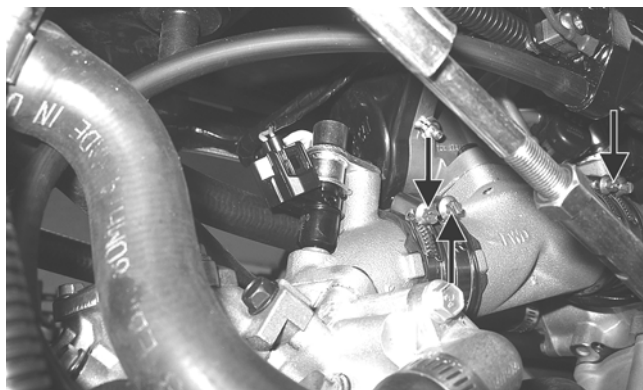
5. Disconnect the TPS connector (A), MAP sensor connector (B), and ISC valve connector (C) from the throttle body; then route the harness and connectors away from the engine.



GZ094A

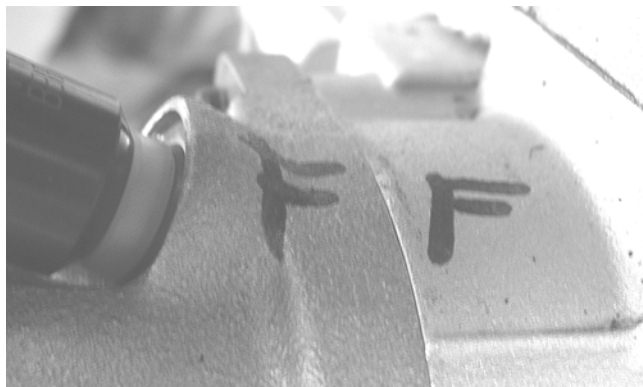
■NOTE: Using a suitable marker, mark the locations of any ties that are removed to relocate wiring out of the way.

6. Loosen the clamps securing the throttle body to the intake manifolds; then remove the throttle body and leaving the throttle cable connected, lay the assembly over the handlebar.



GZ090B

7. Disconnect the fuel injector wiring connectors; then remove the intake manifolds leaving the injectors installed.

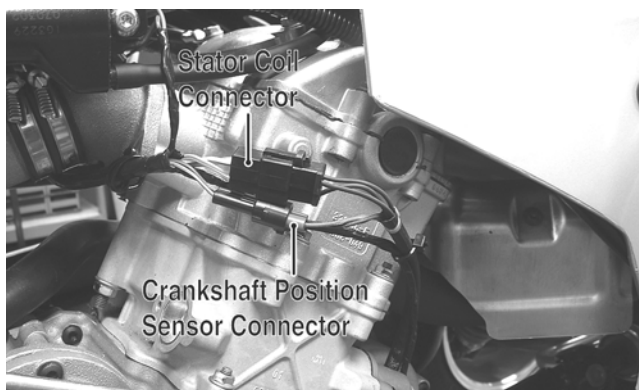


GZ106



GZ107

8. Disconnect the stator coil connector and the crankshaft position sensor connector; then disconnect the gear shift position switch connector.

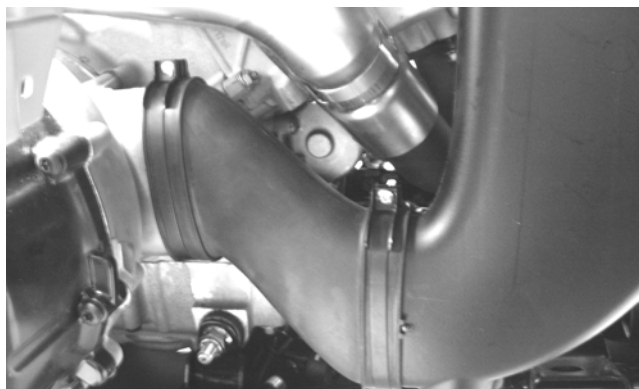


GZ069A



GZ368A

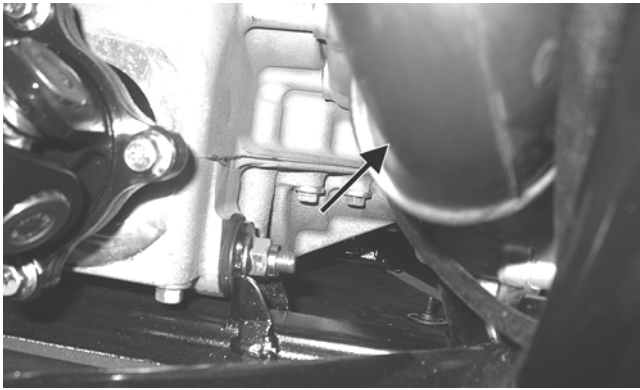
9. Loosen the clamps securing the V-belt cooling ducts to the V-belt housing; then disconnect the cooling ducts.



GZ037

3





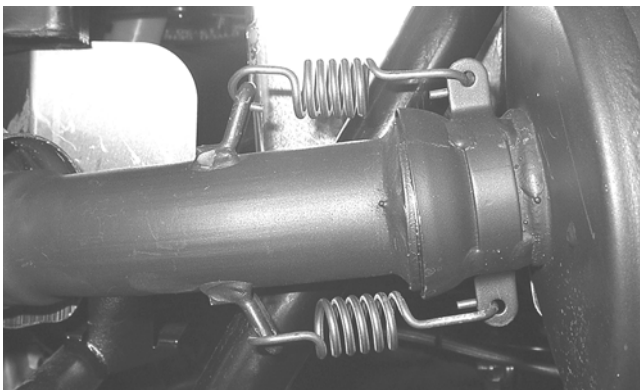
GZ103B

10. Remove the E-clips securing the shift linkage to the shift lever and shift shaft; then remove the shift linkage. Account for two bushings and two flat washers.
11. Remove the cap screws securing the rear drive-shaft yoke flange to the rear output flange.



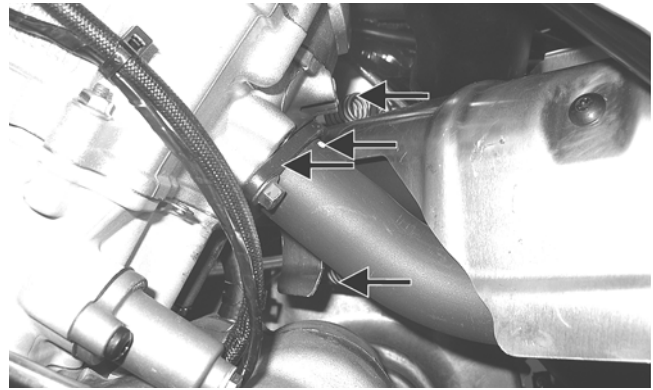
GZ374

12. Remove the exhaust pipe springs at the muffler and remove the muffler. Account for the grafoil seal.



GZ372

13. Remove the nuts securing the rear exhaust pipe to the cylinder; then remove the springs securing the rear exhaust pipe to the front exhaust pipe and remove the rear exhaust pipe. Account for a grafoil seal on the pipe juncture and a seal in the cylinder.



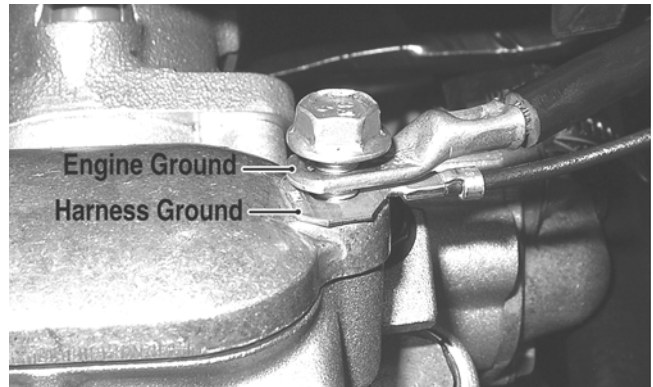
GZ099A

14. Remove the front and rear spark plug wires from the spark plugs; then disconnect the primary wire connectors from the coils and remove the coils from the left side of the frame.



GZ071A

15. Remove the cap screw securing the engine and harness grounds to the engine.



GZ064A

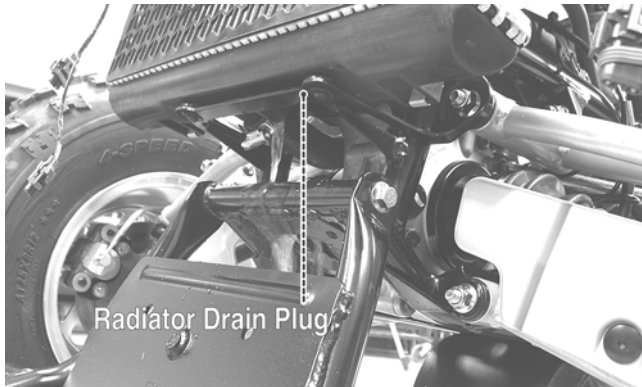
16. Remove the cap screws securing the upper bumper support to the frame and swing the bumper forward allowing access to the radiator drain plug.





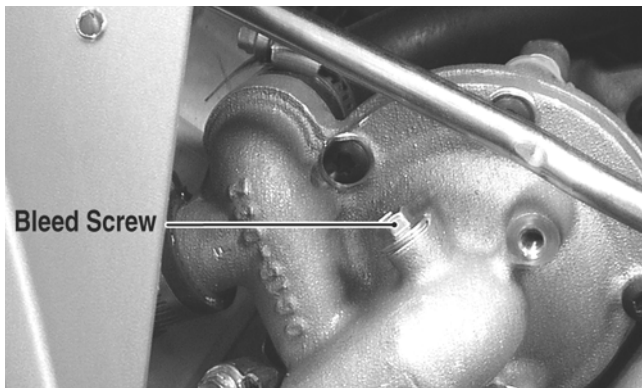
GZ068

17. Place a suitable drain pan under the radiator; then remove the radiator drain plug. Do not loosen the radiator cap at this time.



GZ086A

18. Remove the bleed screw from the water pump; then after coolant has drained, apply compressed air to the bleed opening to purge the remaining coolant from the system. Install the bleed screw and radiator drain plug and tighten securely.

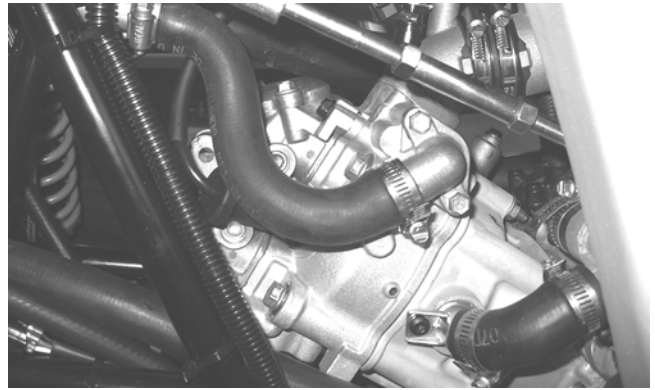


GZ009A

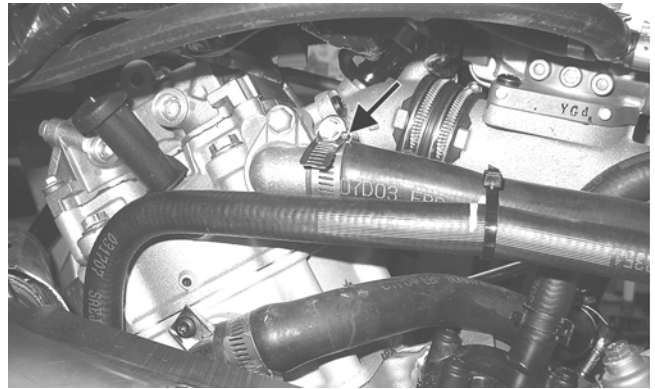
**⚠ WARNING**

Always wear safety glasses when using compressed air.

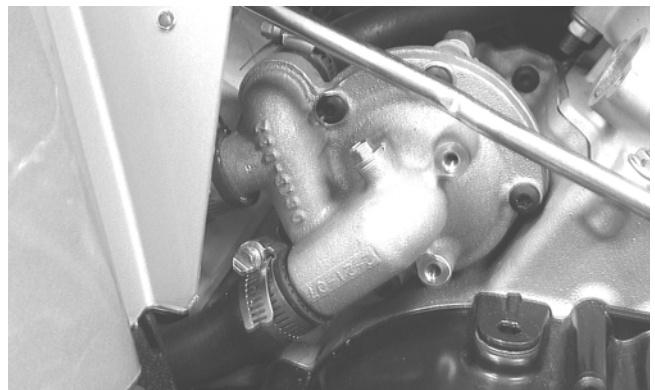
19. Remove the coolant hoses from the upper engine coolant outlet pipes; then remove the lower coolant hose from the water pump.



GZ028

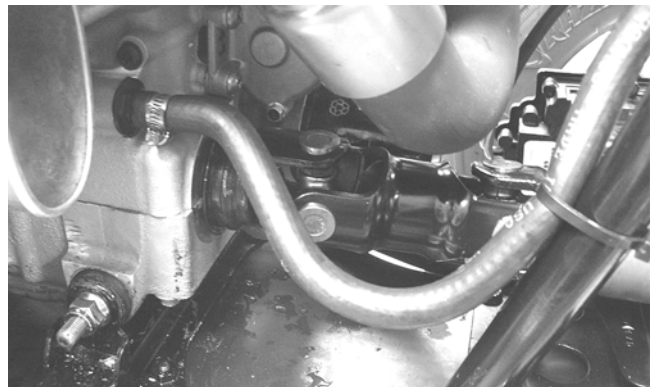


GZ369A



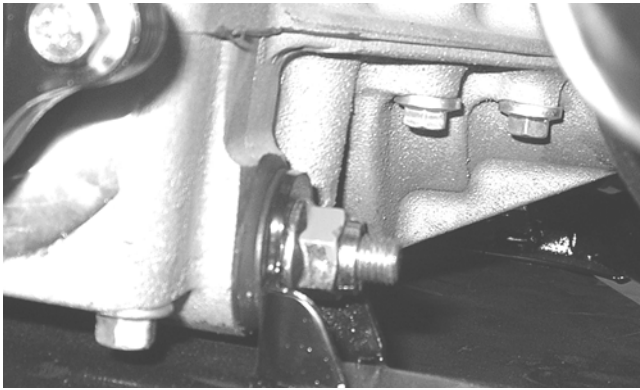
GZ008

20. Remove the flange nuts from the front and rear engine through-bolts; then rock the engine slightly to relieve motor mount pressure and remove the through-bolts.



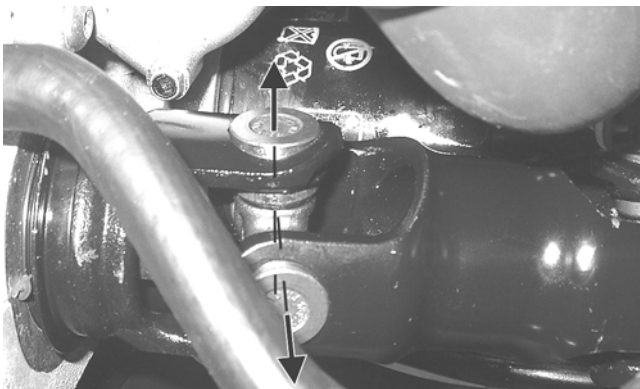
GZ118

3

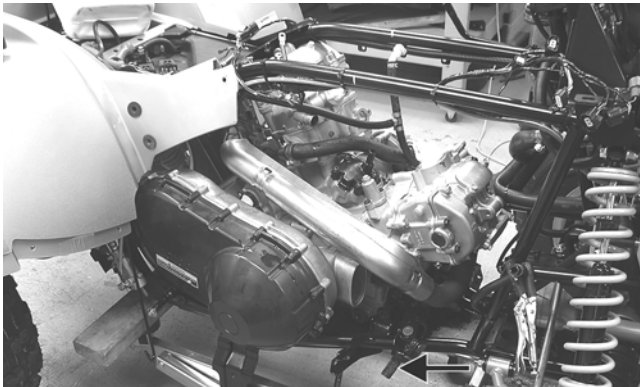


GZ104

21. Rotate the front driveshaft until the output yoke universal joint is in the vertical plane; then raise the front of the engine/transmission until the front drive splines disengage from the differential.

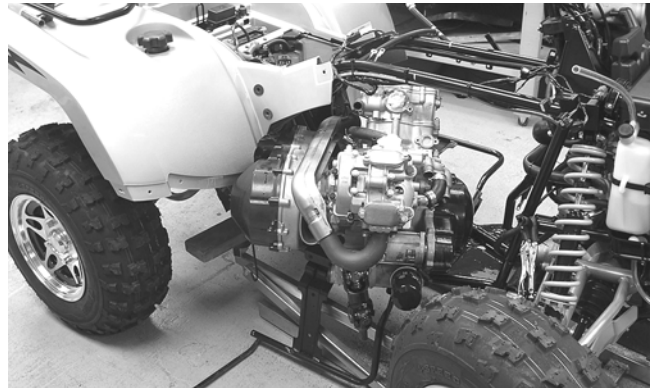


GZ 110A



GZ117A

22. Fold the front drive line up and secure against the front of the engine; then lift the engine clear of the mountings and remove from the right side of the frame.



GZ123

## 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 must be removed to service the rear cylinder head, cylinder, and piston.

## 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.



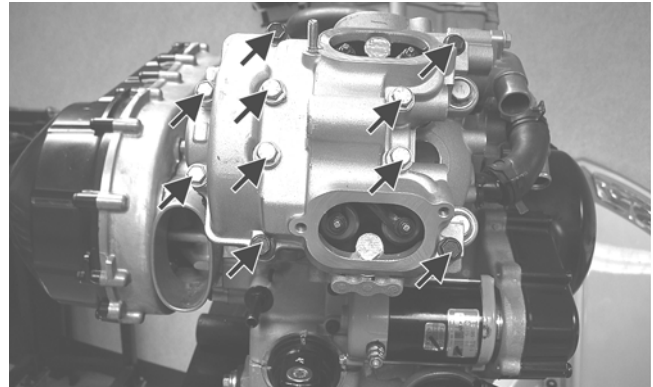
GZ063



GZ059

2. Remove the tappet covers on the cylinder being serviced. The tappets should not have pressure on

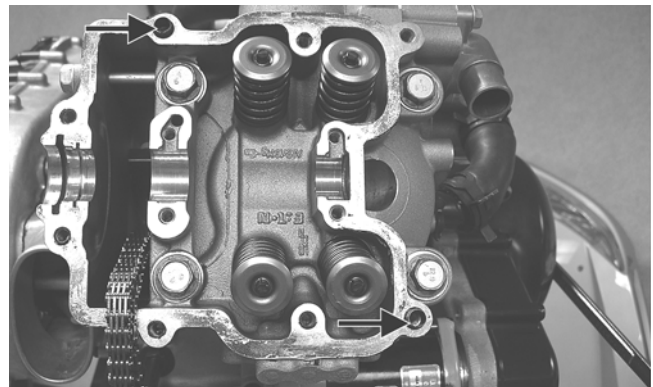
3. Remove the cap screws securing the valve cover to the head; account for the four rubber washers on the top side cap screws. Remove the valve cover. Account for and note the orientation of the camshaft plug. Note the location of two alignment pins.



GZ126A



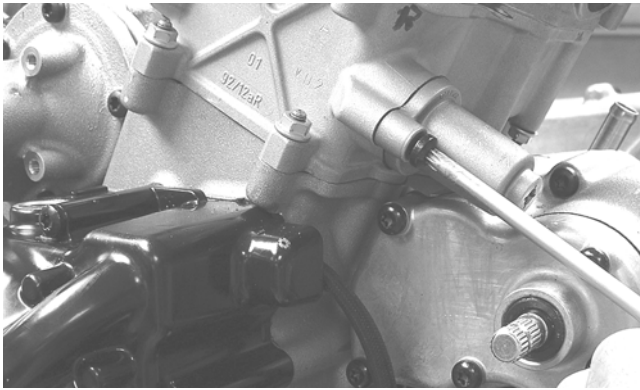
GZ162



GZ132A

4. Remove the cap screw on the end of the tensioner; then using a 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.

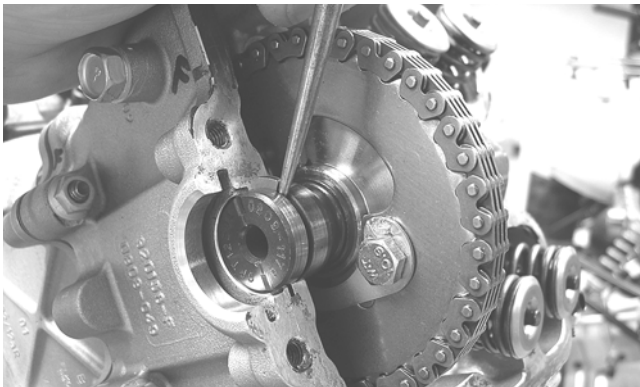




GZ200

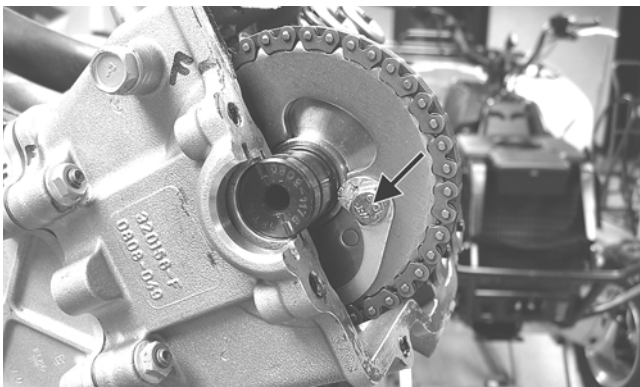
5. Using an awl, rotate the C-ring in its groove until it is out of the cylinder head; then remove the C-ring.

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



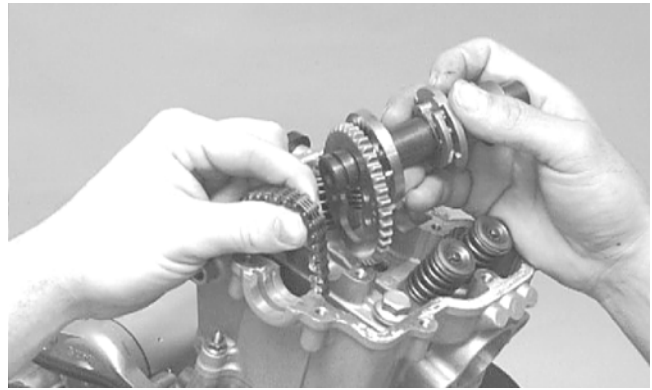
GZ155

6. Bend the washer tabs down and remove the two cap screws securing the sprocket to the camshaft; then drop the sprocket off the camshaft.



GZ154A

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

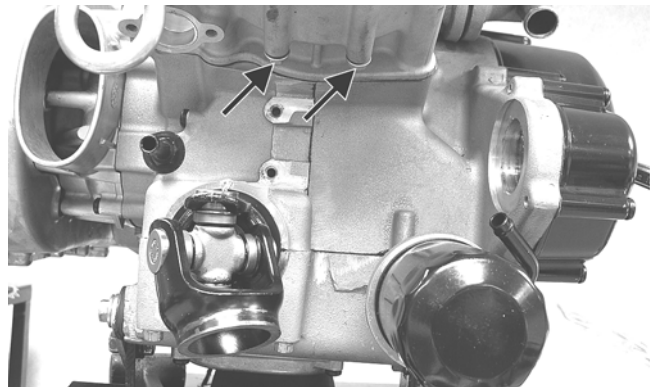


CC266D

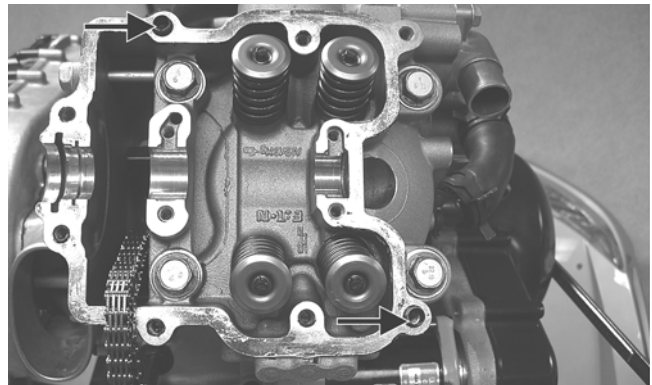
■NOTE: Loop the chain over the cylinder head and secure it to keep it from falling into the crankcase.

8. 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.

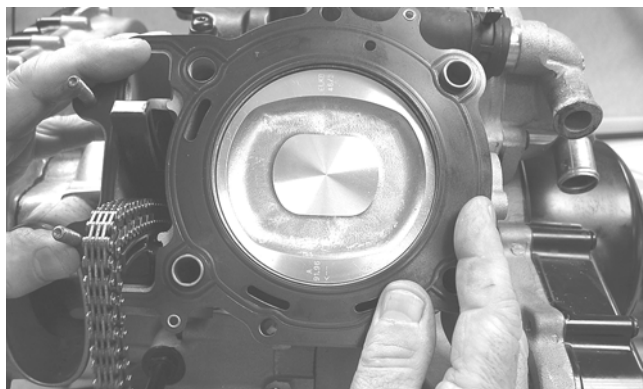


GZ136A

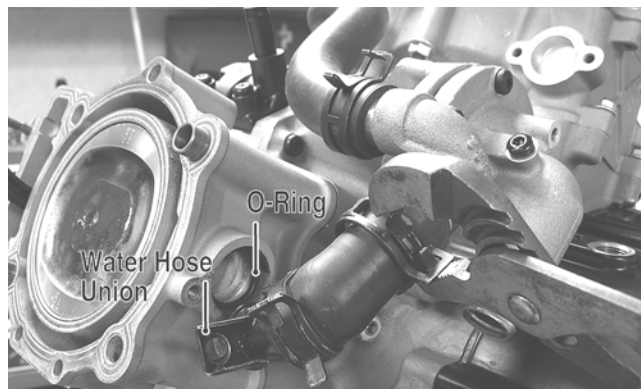


GZ132B

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



GZ151



GZ140A



GZ161

10. 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 2-10 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.

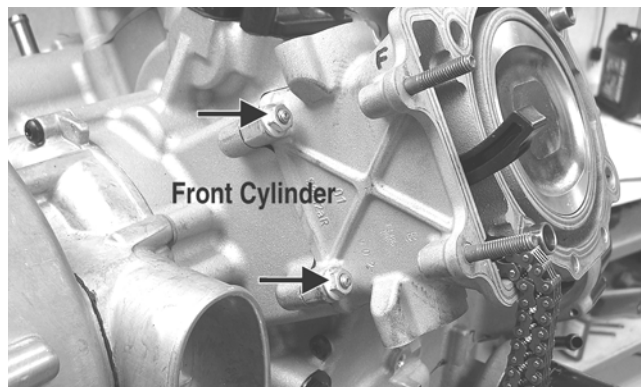
**C. Cylinders**

**D. Pistons**

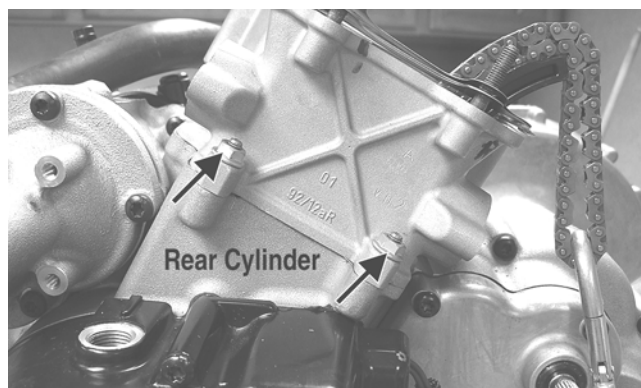
■NOTE: Steps 1-10 in the preceding sub-section must precede this procedure.

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

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

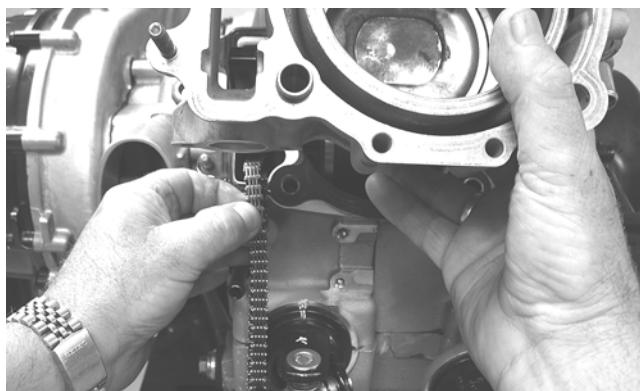


GZ141A



GZ160A

13. 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.

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

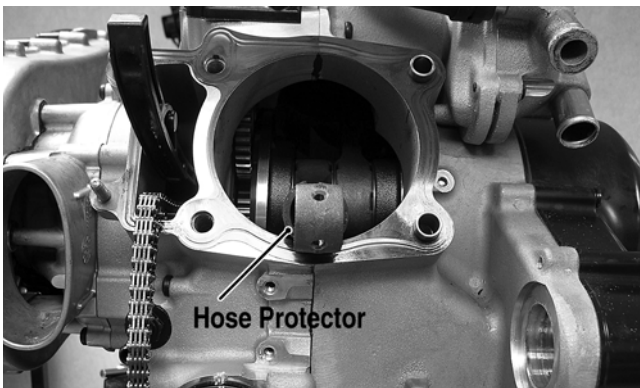


GZ145

15. 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 the 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.

■NOTE: If the existing rings will not be replaced with new rings, note the location of each ring for proper installation. When replacing with new rings, replace as a complete set only. If the piston rings must be removed, remove them in this sequence.

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

### 🔧 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

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

### 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

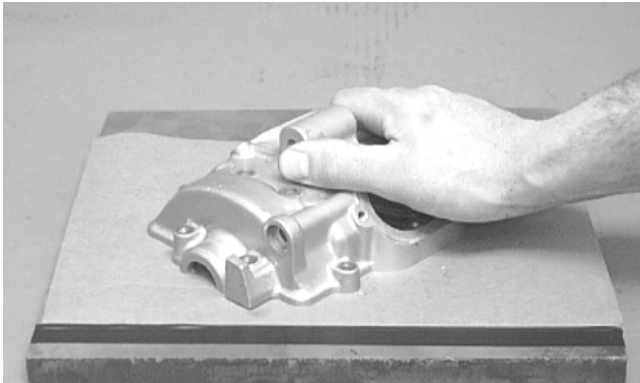
■NOTE: If the valve cover cannot be trued, the cylinder head assembly must be replaced.

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

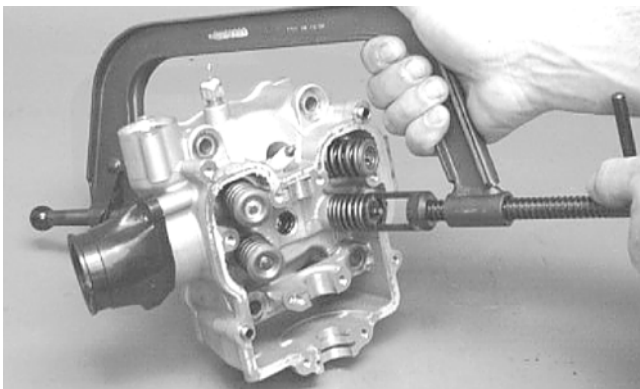
**⚠ CAUTION**

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

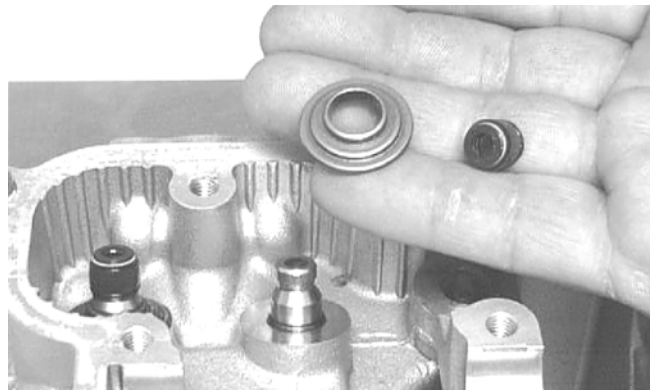
■NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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

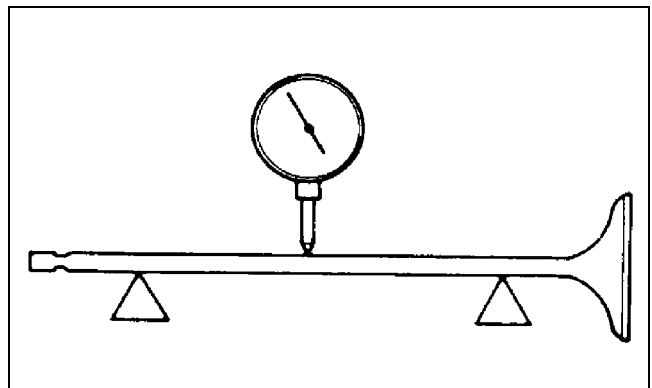
■NOTE: The valve seals must be replaced.

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

## Measuring Valve Stem Runout

1. Support each valve stem end with the V Blocks; then check the valve stem runout using a dial indicator.

**3**



ATV-1082

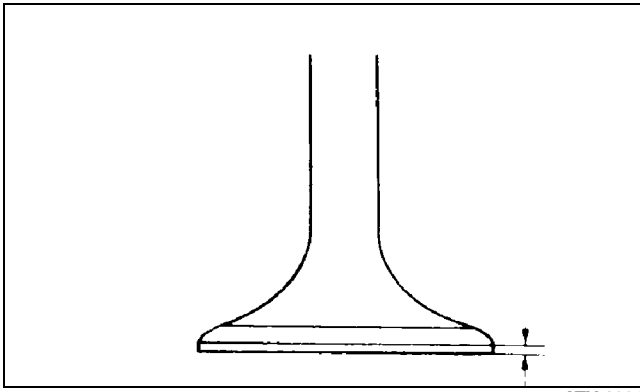
2. Maximum runout must not exceed specifications.

## Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) must be within specifications.
3. Acceptable diameter range (exhaust valve) must be within specifications.

## Measuring Valve Face/Seat Width

1. Using a micrometer, measure the width of the valve face.

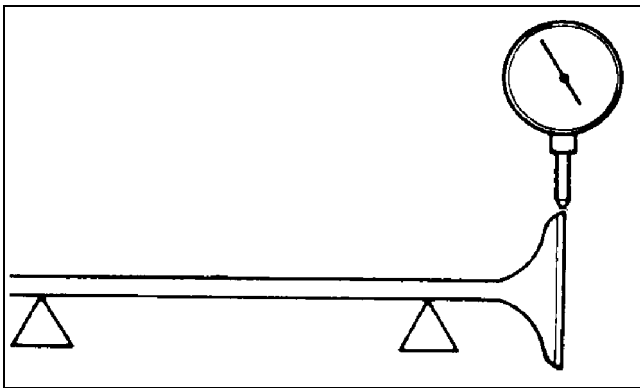


ATV-1004

2. Acceptable width range must be within specifications.

### Measuring Valve Face Radial Runout

1. Mount a dial indicator on the surface plate; then place the valve stem on a set of V blocks.
2. Position the dial indicator contact point on the outside edge of the valve face; then zero the indicator.

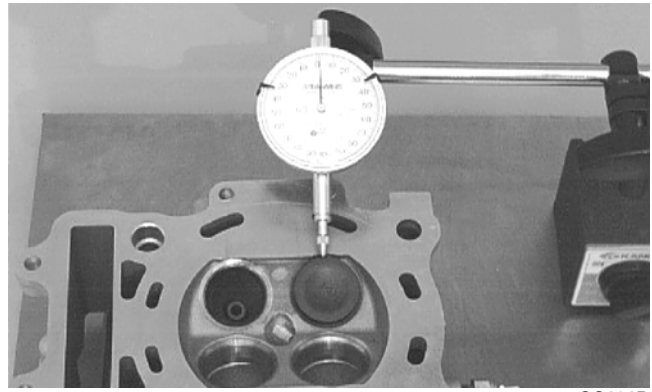


ATV1082A

3. Rotate the valve in the V blocks.
4. Maximum runout must not exceed specifications.

### Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

1. Mount a dial indicator and base on the surface plate; then place the cylinder head on the surface plate.
2. Install the valve into the cylinder head; then position the dial indicator contact point against the outside edge of the valve face. Zero the indicator.



CC131D

3. Push the valve from side to side; then from top to bottom.
4. Maximum "wobble" deflection must not exceed specifications.

### Measuring Valve Guide (Inside Diameter)

1. Insert a snap gauge 1/2 way down into each valve guide bore; then remove the gauge and measure it with a micrometer.
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 that 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.

### Measuring Rocker Arm (Inside Diameter)

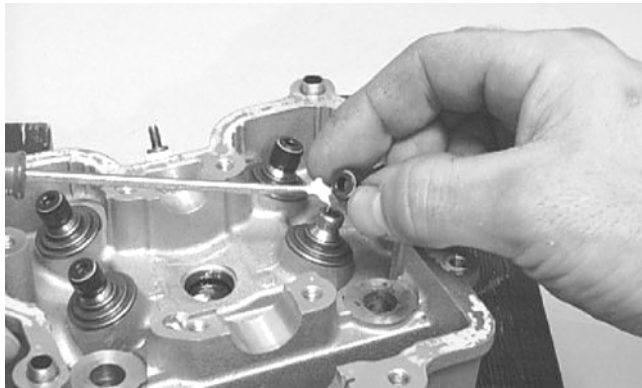
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range must be within specifications.

### Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range must be within specifications.

## Installing Valves

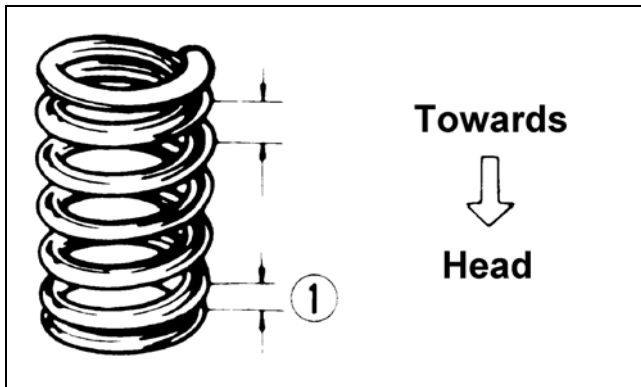
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



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, rings, or pin are out of tolerance, they must be replaced.

### Cleaning/Inspecting Piston

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the dome of the piston.
2. Inspect the piston for cracks in the piston pin, dome, and skirt areas.
3. Inspect the piston for seizure marks or scuffing. Repair with #400 grit wet-or-dry sandpaper and water or honing oil.

■NOTE: If scuffing or seizure marks are too deep to correct with the sandpaper, replace the piston.

4. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

## Removing Piston Rings

1. Starting with the top ring, slide one end of the ring out of the ring-groove.



CC400D

2. Remove each ring by working it toward the dome of the piston while rotating it out of the groove.

■NOTE: If the existing rings will not be replaced with new ones, note the location of each ring for proper installation. When installing new rings, install as a complete set only.

## Cleaning/Inspecting Piston Rings

1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

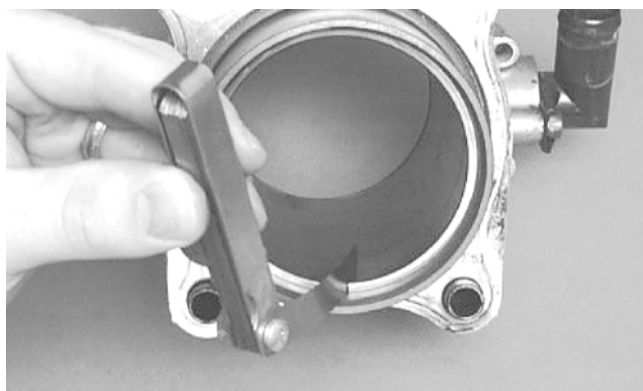
### CAUTION

Improper cleaning of the ring-grooves by the use of the wrong type of ring-groove cleaner will result in severe damage to the piston.

## 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 be within specifications.

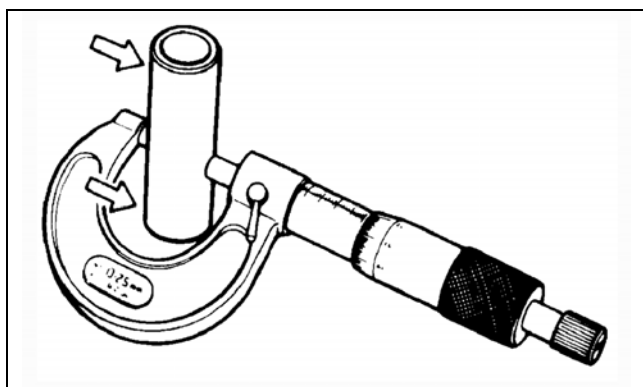




CC280D

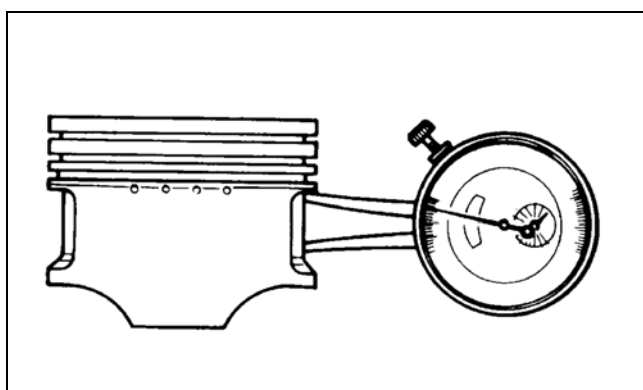
### Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is not within specifications, the piston pin must be replaced.



ATV-1070

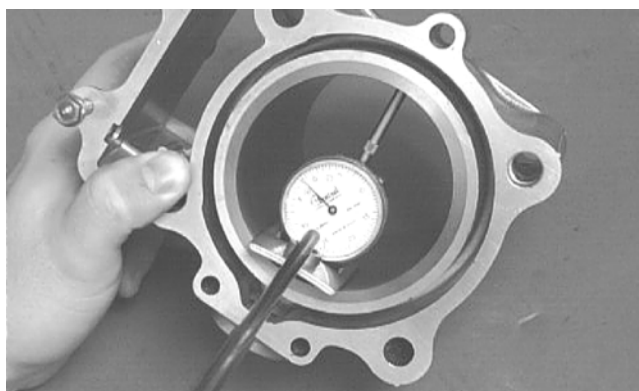
2. Insert an inside dial indicator into the piston-pin bore. The diameter must not exceed specifications. Take two measurements to ensure accuracy.



ATV-1069

### Measuring Piston Skirt/ Cylinder Clearance

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

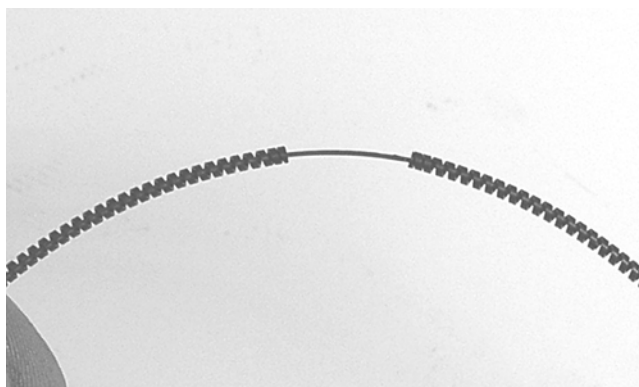


CC127D

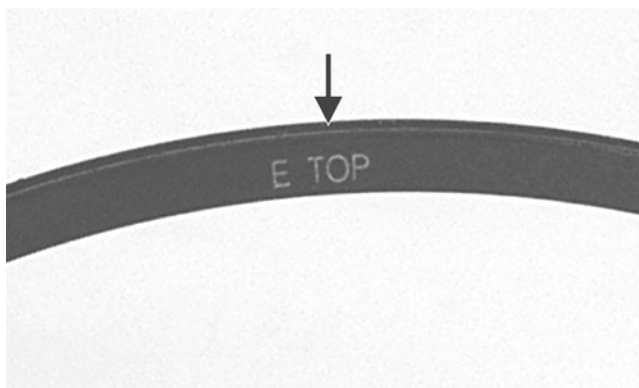
2. Measure the corresponding piston diameter at a point 15 mm (0.6 in.) above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be within specifications.

### 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



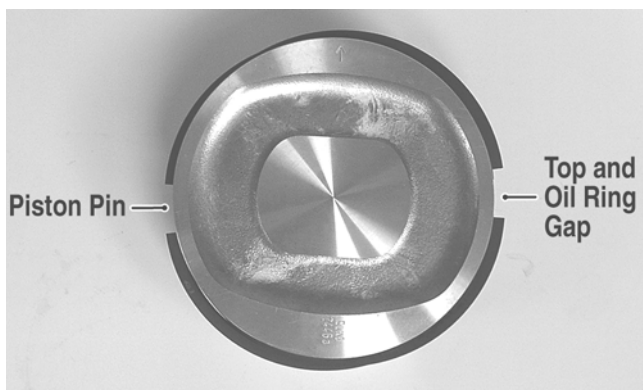
GZ169A

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 orientated 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 assembly cannot be trued, they must be replaced.

### 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 "heli-coil" 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.

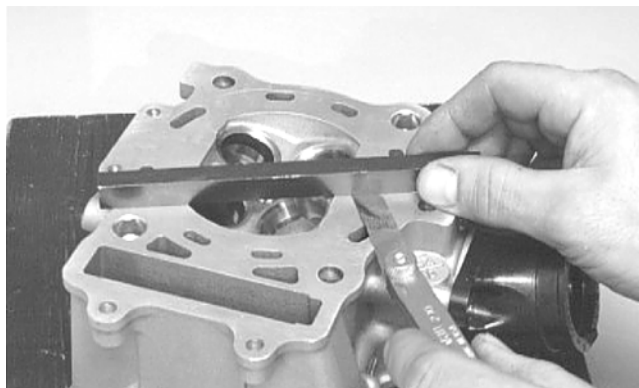
**CAUTION**

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 factor between the head and the straightedge.
3. Maximum distortion must not exceed specifications.

3



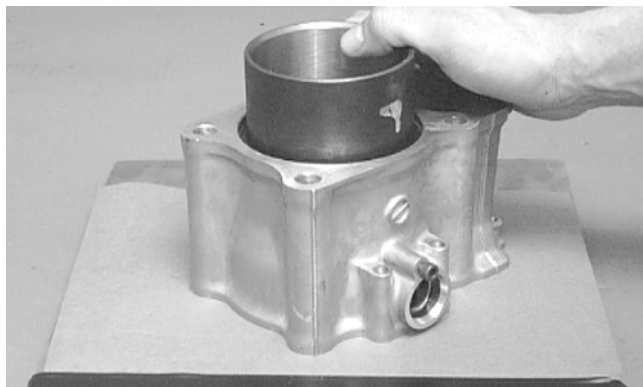
CC141D

### 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 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.



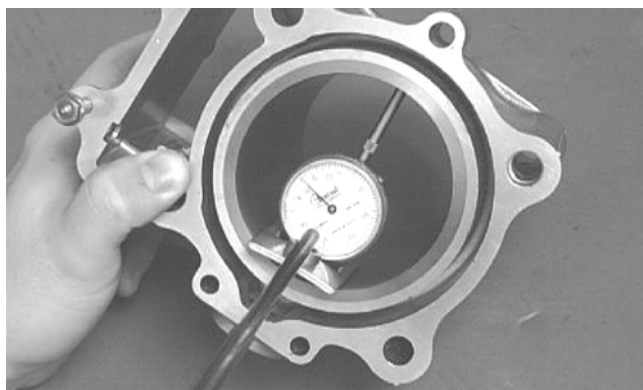
CC129D

### 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.

### Inspecting Cylinder

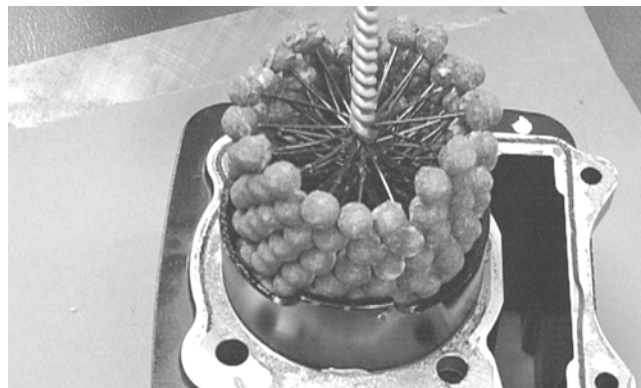
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest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



CC127D

2. Wash the cylinder in parts-cleaning solvent.
3. 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.



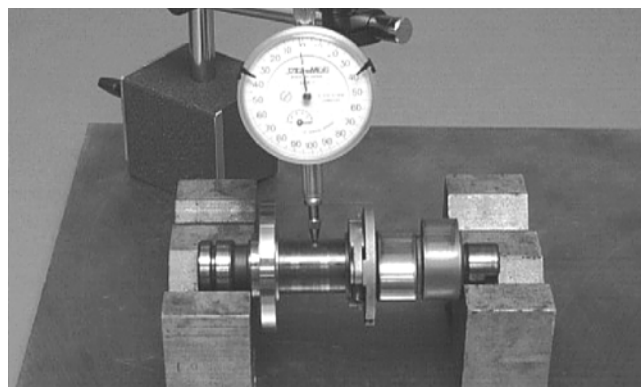
CC390D

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

### 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.



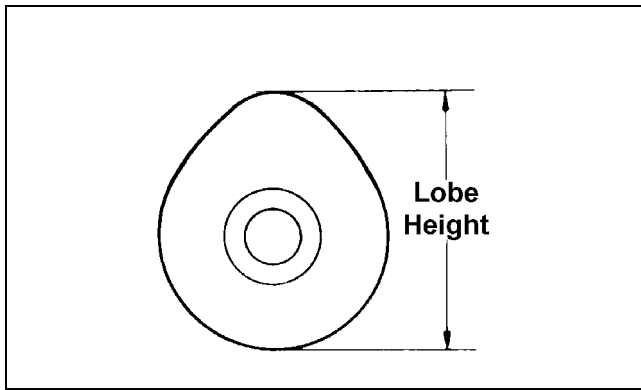
CC283D

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

### Measuring Camshaft Lobe Height

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





ATV1013A

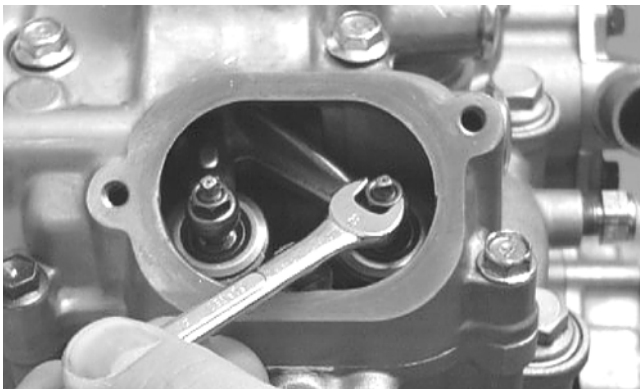
2. The lobe heights must not exceed minimum specifications.

### 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.

### Measuring Camshaft to Cylinder Head Clearance

1. Remove the adjuster screws and jam nuts.

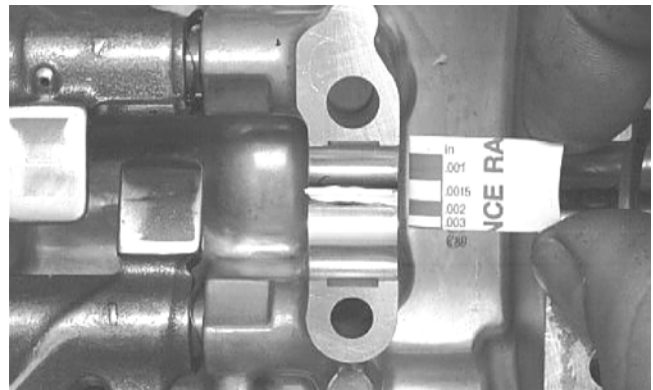


CC005D

2. Place a strip of plasti-gauge in each of the camshaft lands in the cylinder head.
3. Place the valve cover on the cylinder head and secure with the valve cover cap screws. Tighten securely.

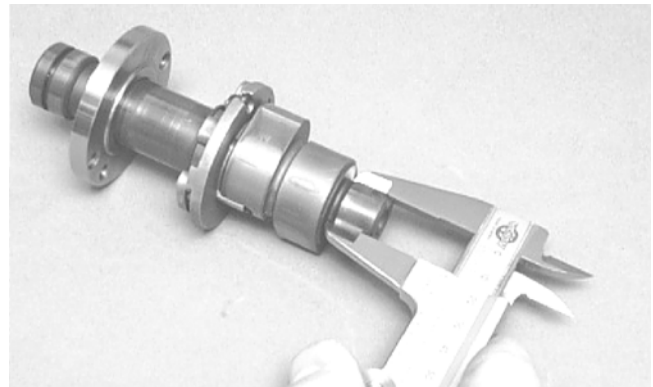
■NOTE: Do not rotate the camshaft when measuring clearance.

4. Remove the cap screws securing the valve cover to the cylinder; then remove the valve cover and camshaft.
5. Match the width of the plasti-gauge with the chart found on the plasti-gauge packaging to determine camshaft to cylinder head and valve cover clearance.



CC145D

6. If clearance is excessive, measure the journals of the camshaft.

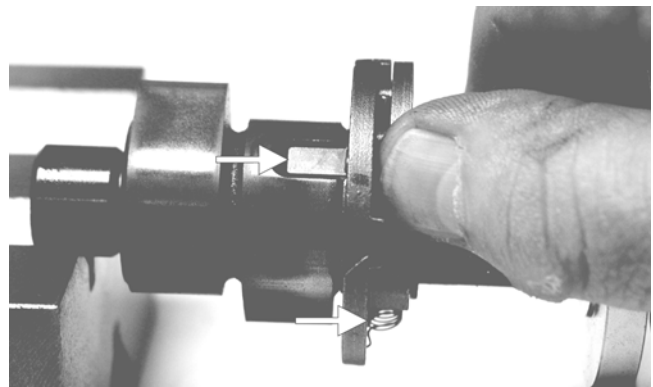


CC287D

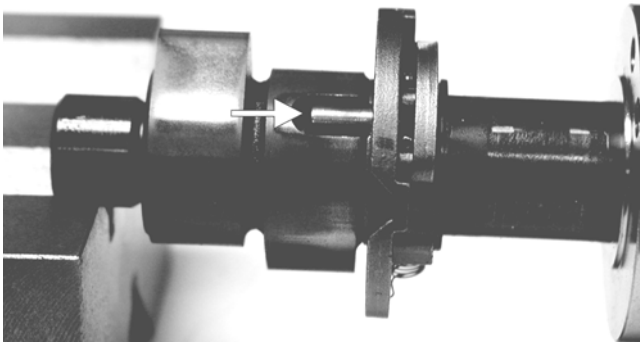
■NOTE: If the journals are worn, replace the camshaft; then measure the clearance again. If it is still out of tolerance, replace the cylinder head.

### 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.

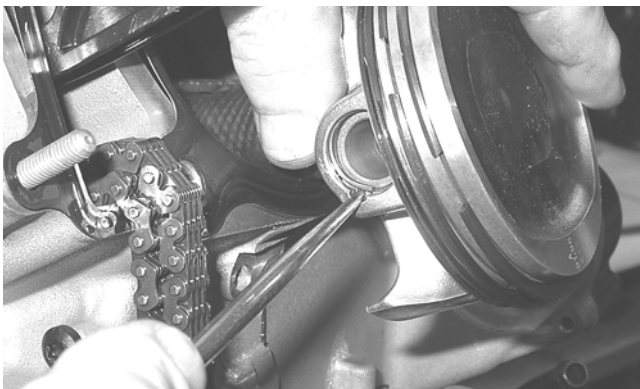
## Installing Top-Side Components

### A. Pistons

### B. Cylinders

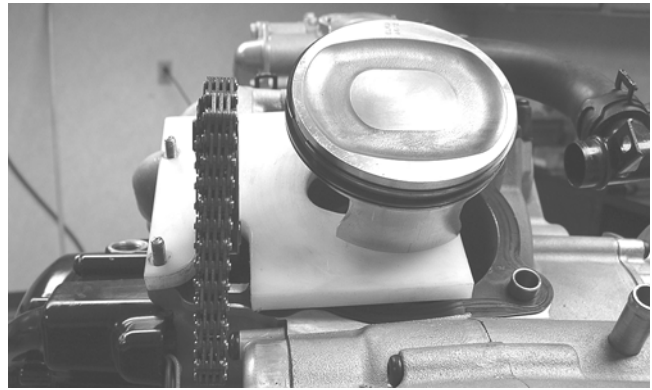
1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

■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; then place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase.

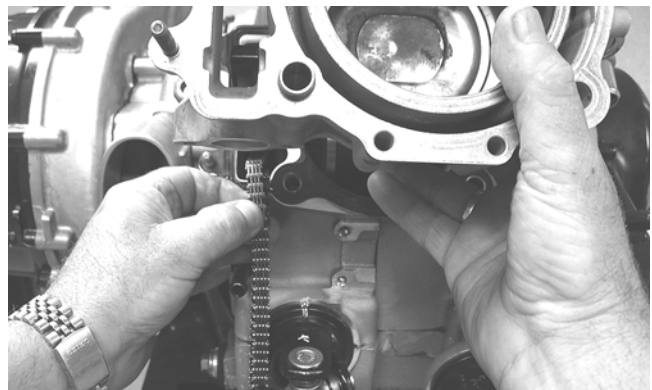


GZ159

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

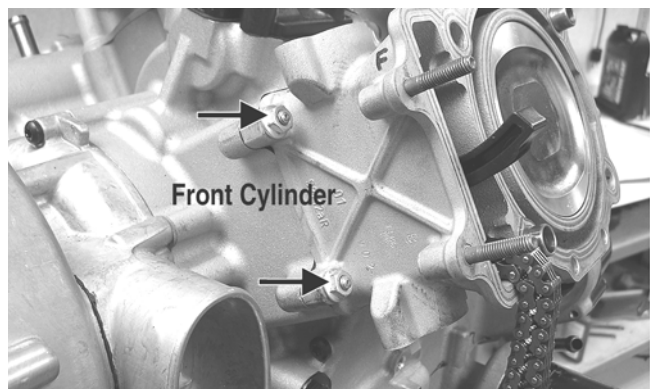
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



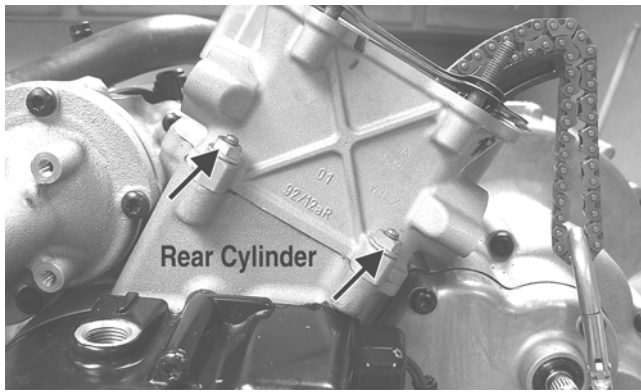
GZ142

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.

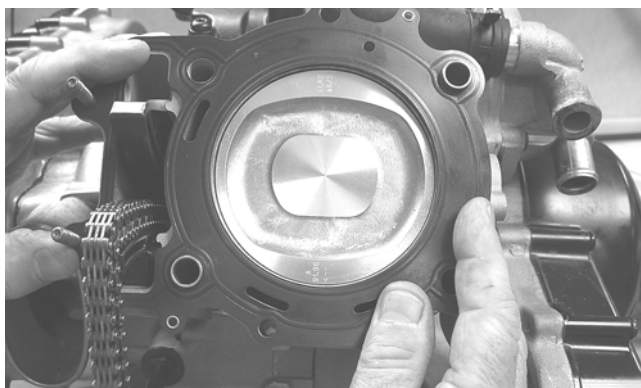
#### ⚠ CAUTION

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



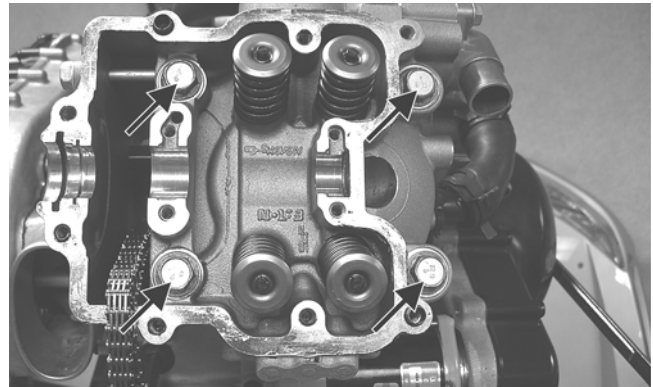
GZ161A

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 four cylinder head cap screws with washers. Tighten only until snug.



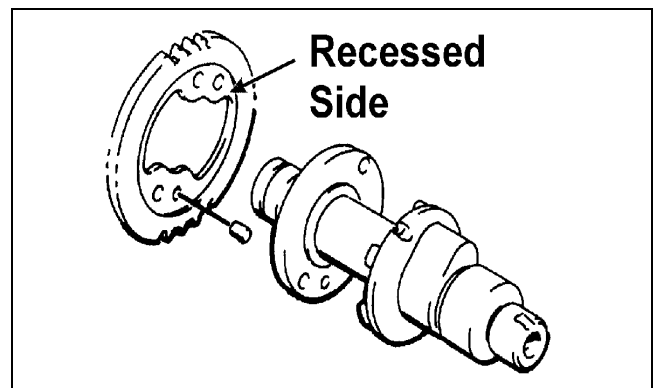
GZ132B

9. Loosely install the five cylinder head nuts.

10. In a crisscross pattern, tighten the four cylinder head cap screws (from step 8) to 40 ft-lb; then tighten the 8 mm nut (from step 9) to 18 ft-lb. Using a crisscross pattern, tighten the 6 mm nuts (from step 9) to 8 ft-lb. Tighten the two cylinder-to-crankcase nuts (from step 4) securely.

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

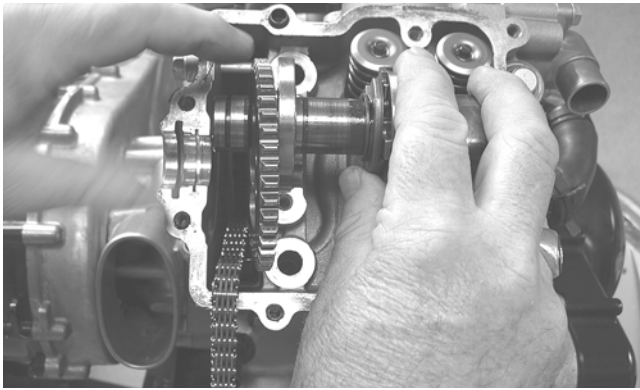
11. With the timing inspection plug removed and the chains held tight, rotate the crankshaft until the front piston is at top-dead-center.
12. With the alignment pin installed in the camshaft, loosely place the cam sprocket (with the recessed side facing the cam shaft lobes) onto the camshaft. At this point, do not "seat" the sprocket onto the shaft.



732-307B

3



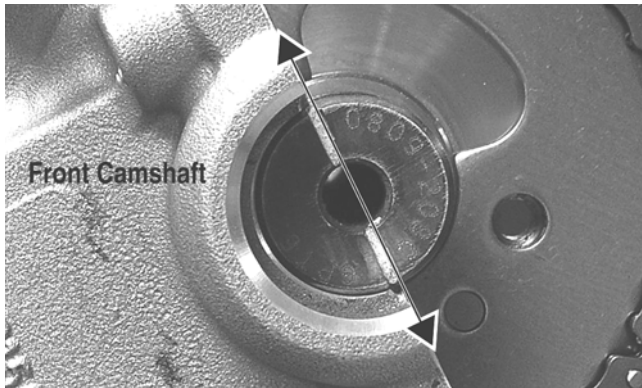


GZ130

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

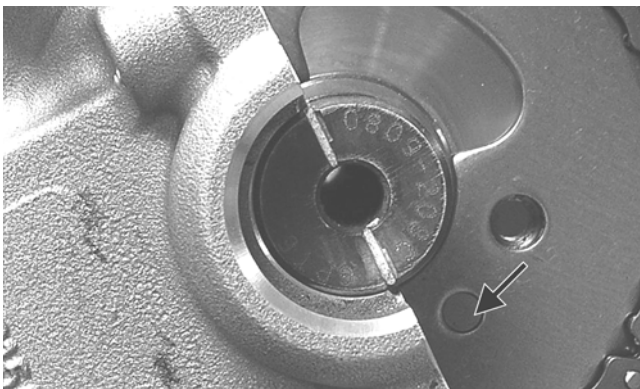
13. With the cam lobes directed down (toward the piston), maneuver the camshaft/sprocket assembly through the chain and towards its seating position; then loop the chain over the sprocket.

■NOTE: Note the position of the alignment marks on the end of the camshaft. They must be parallel with the valve cover mating surface. If rotating the camshaft is necessary for alignment, do not allow the chain and sprocket to rotate and be sure the cam lobes end up in the down position.



GZ190A

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.



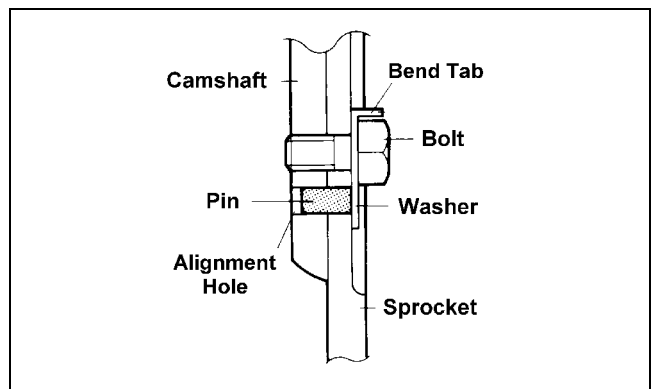
GZ190B

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

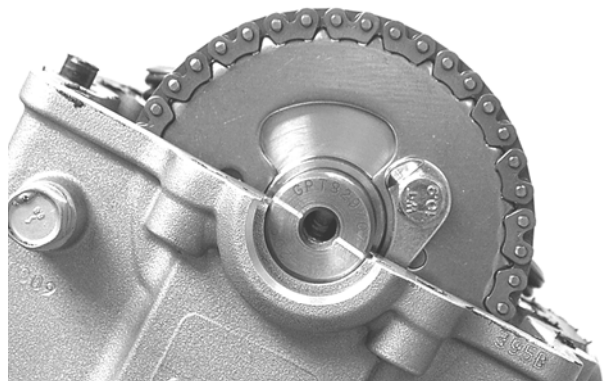


ATV1027

### ⚠ 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.

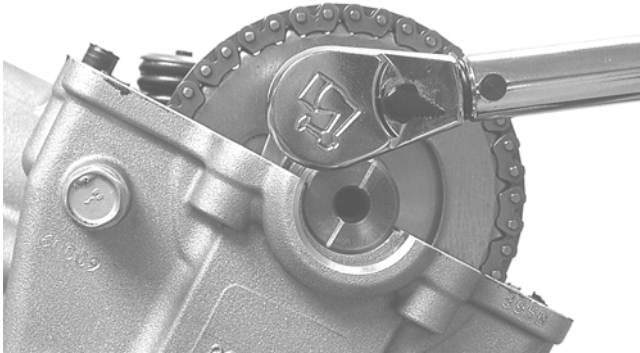


GZ195

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 Loc-tite #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.

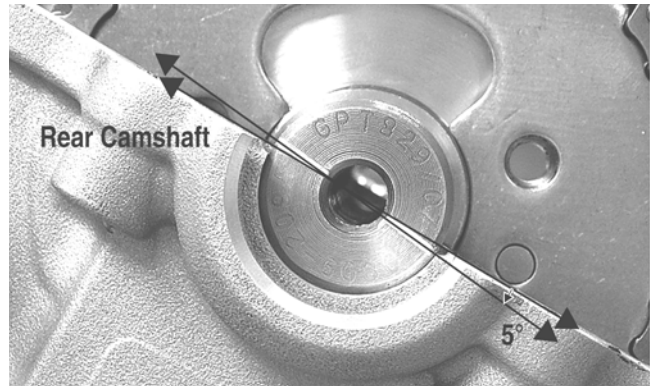
19. Keeping tension on the rear cam chain, rotate the engine forward 270° until rear piston is at TDC indicated by timing mark R.



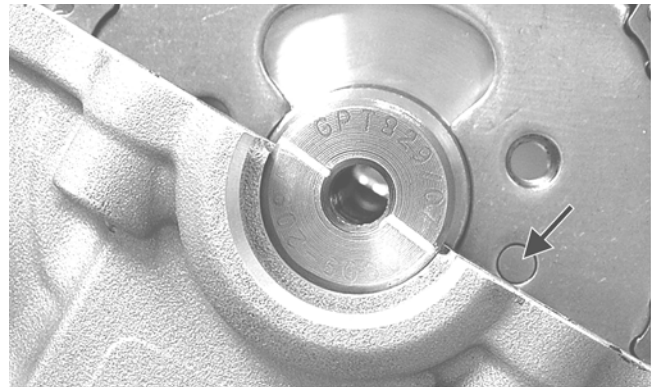
GZ060

20. 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 NOT be parallel with the valve cover but offset slightly to the rear (approximately 5°). If rotating the camshaft is necessary for alignment, do not allow the chain and sprocket to rotate and be sure the cam lobes end up in the down position.

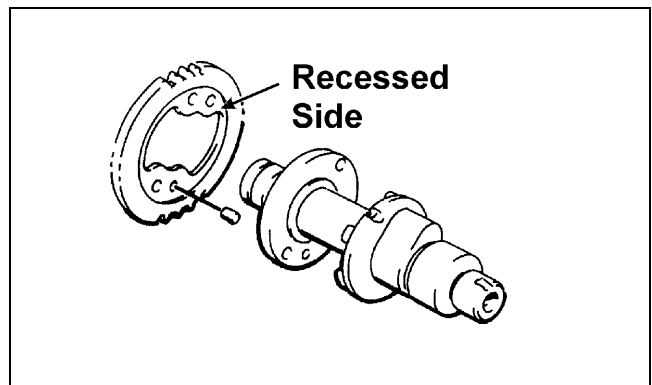


GZ189A



GZ189B

21. 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.



732-307B

- A. Piston still at top-dead-center.
- B. Camshaft lobes directed down (toward the piston).
- C. Camshaft alignment marks offset 5° from the valve cover mating surface.



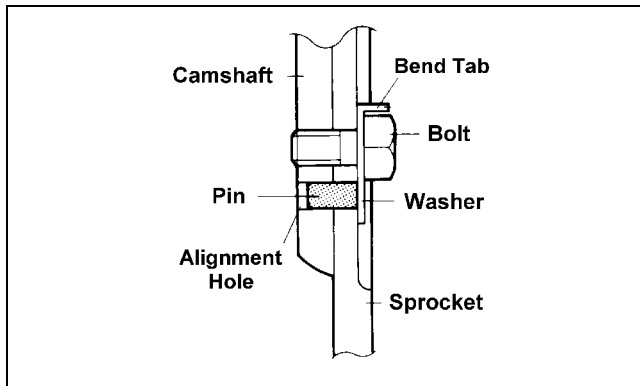
D. Recessed side of the sprocket directed toward the cam lobes.

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.

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

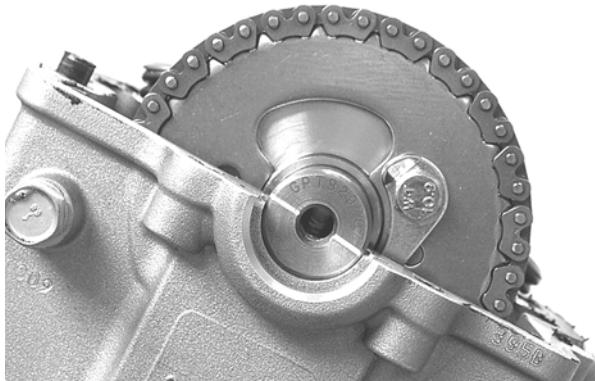


ATV-1027

**CAUTION**

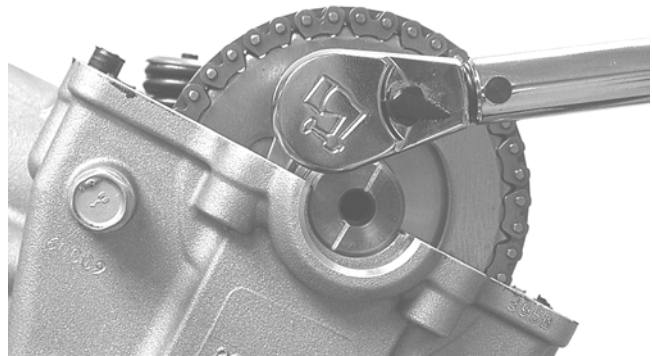
Care must be taken that the tab-washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.

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

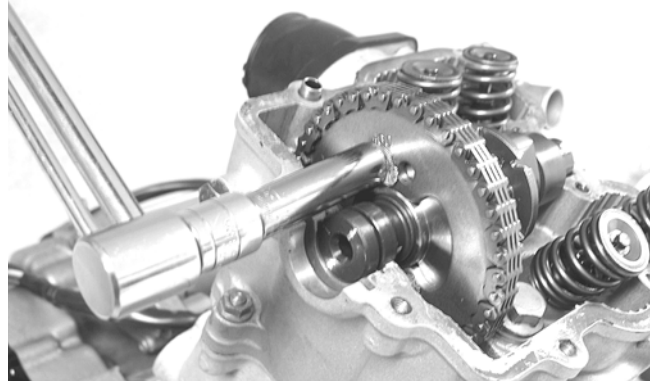


GZ195

24. 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.

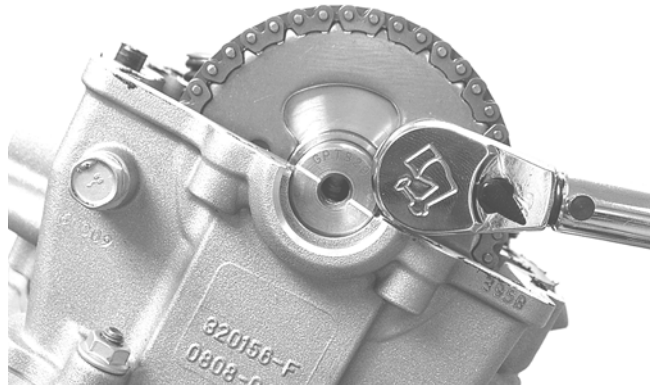


GZ193



CD465

25. Rotate the crankshaft until the first cap screw (from step 23) can be addressed; then tighten to 10 ft-lb. Bend the tab to secure the cap screw.



GZ194

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



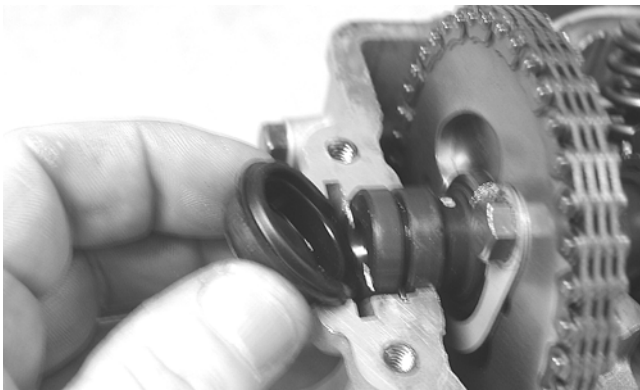
CC012D



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

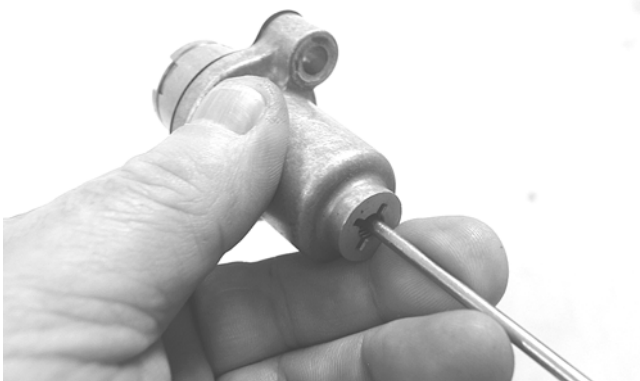
**⚠ CAUTION**

The open end of the plug must be positioned downward.



CD468

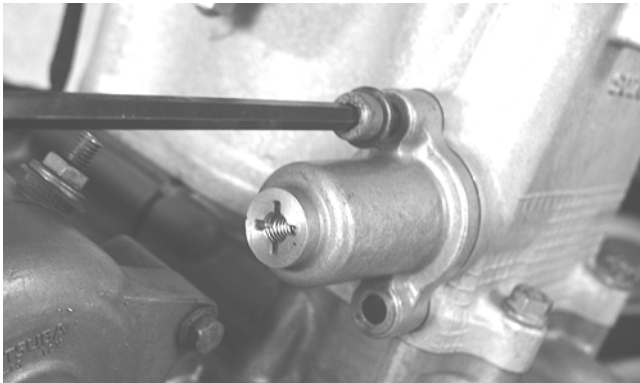
28. Remove the cap screw from the end of the chain tensioner; then using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner clockwise until the screw bottoms.



CD501

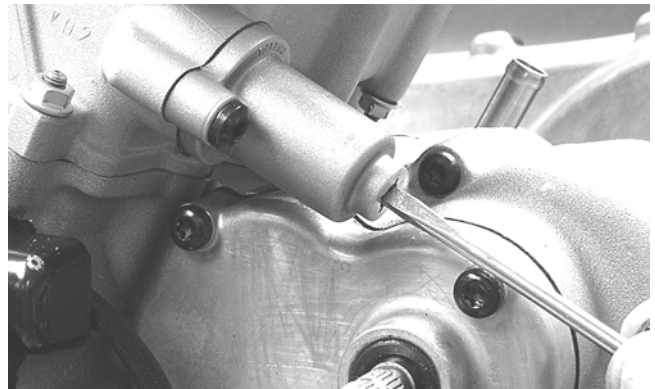
■NOTE: The adjuster shaft will be drawn into the tensioner as the adjuster screw is rotated clockwise. The adjuster shaft tension will be released in step 30.

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

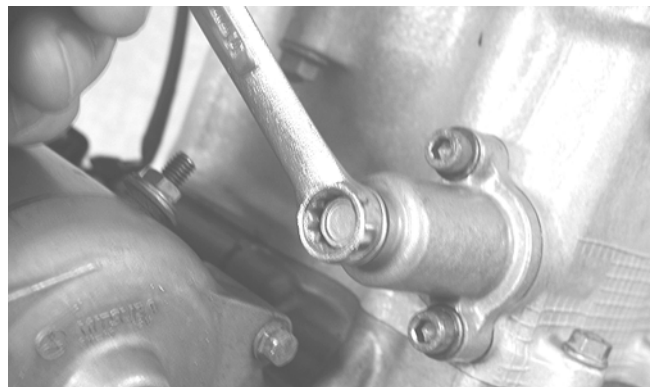


CD469

30. Using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner counterclockwise until all tension is released; then install the cap screw into the end of the chain tensioner.

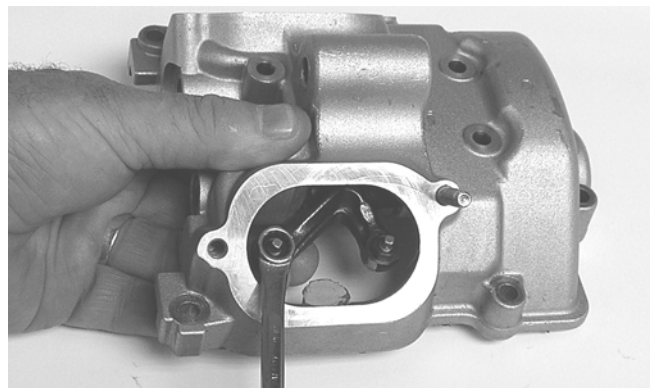


GZ201



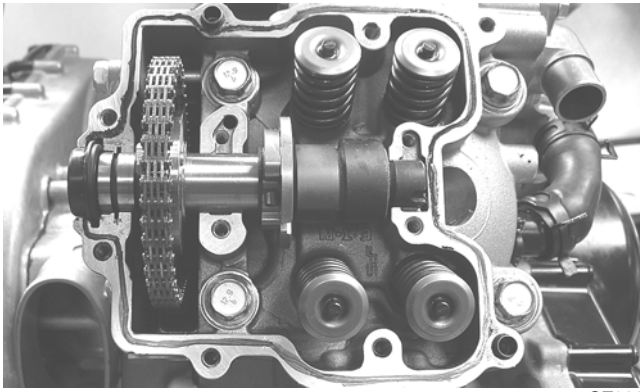
CD471

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



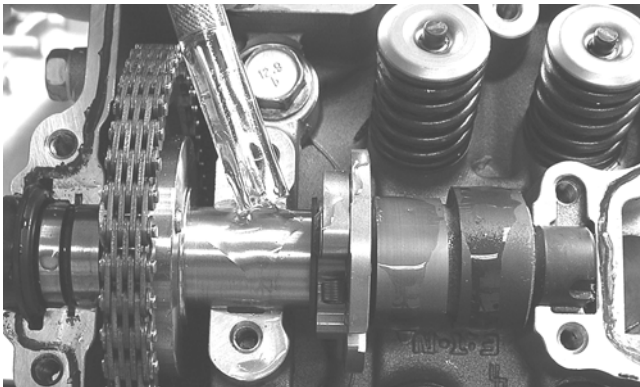
GZ199

32. Apply a thin coat of Three Bond Sealant to the mating surfaces of the cylinder heads.



GZ202

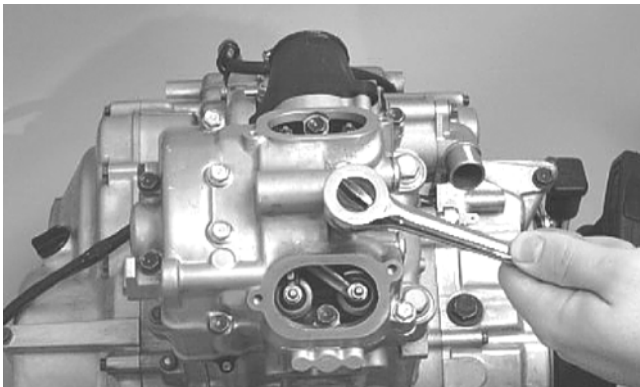
33. Lubricate the camshaft journals and lobes with engine oil; then place the valve cover into position.



GZ206

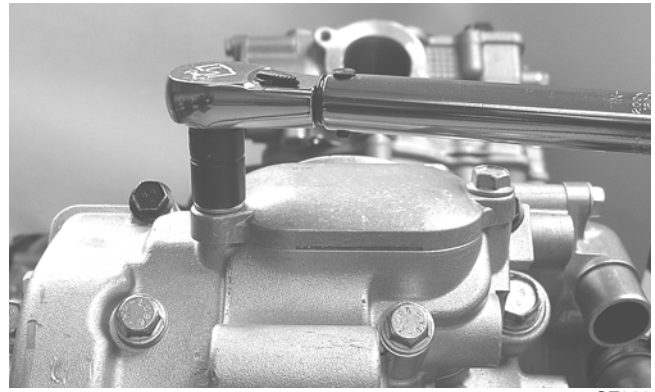
- NOTE: At this point, the rocker arms and adjuster screws must not have pressure on them.

34. Install the top side cap screws with rubber washers; then install the remaining cap screws. Tighten only until snug.



CC003D

35. In a crisscross pattern starting from the center and working outward, tighten the cap screws on both valve covers securely.
36. Adjust valve/tappet clearance (see Section 2).
37. Place the tappet covers into position making sure the O-rings are properly installed. Tighten the cap screws securely.



GZ208

38. If removed, install the spark plugs. Tighten securely.

## 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.

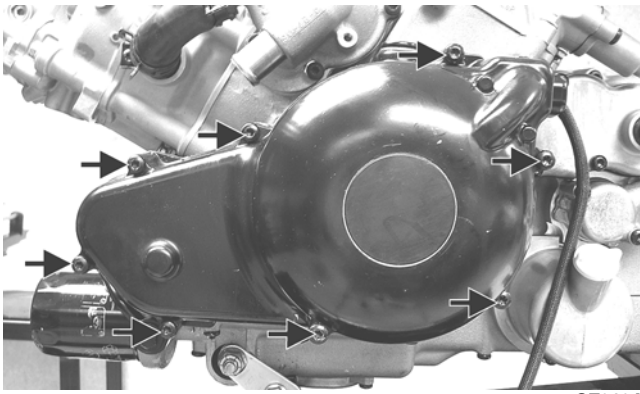
■NOTE: The engine/transmission does not have to be removed from the frame for this procedure.

## 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.



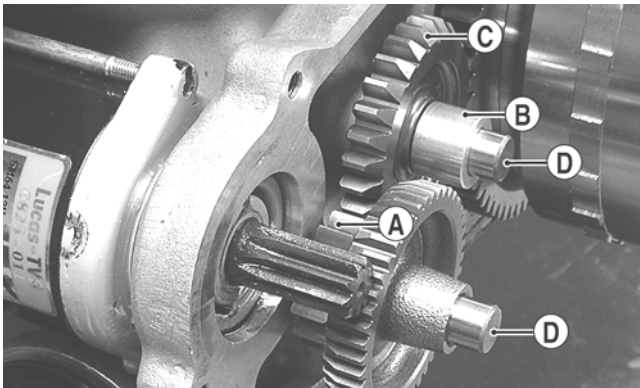


GZ212A

### AT THIS POINT

To replace stator coils/crankshaft position sensor, see Section 5.

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 that the longer shaft is nearest the starter.



GZ224A

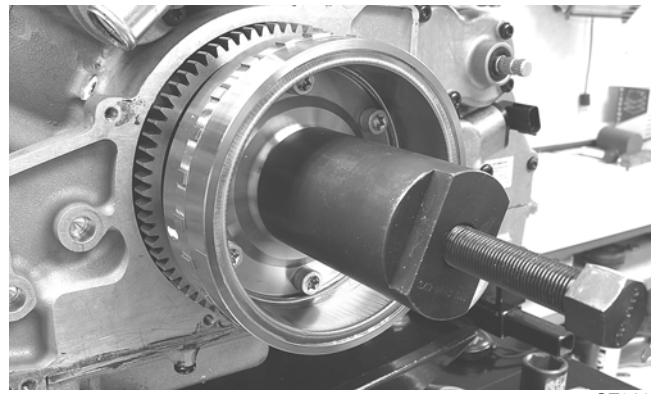
■NOTE: The starter is not serviceable and must be replaced as a complete assembly.

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



PR440

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

■NOTE: The puller has left-hand threads.



GZ217

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



GZ226

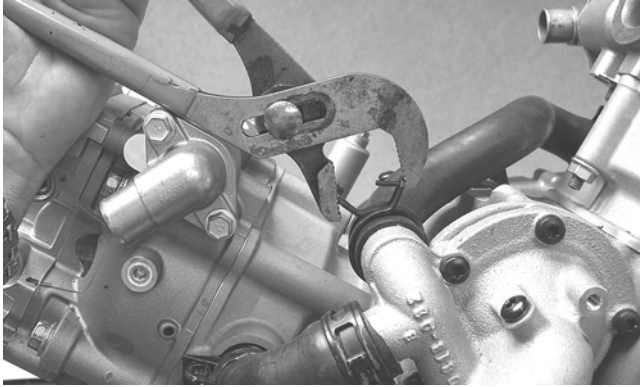


GZ249

3

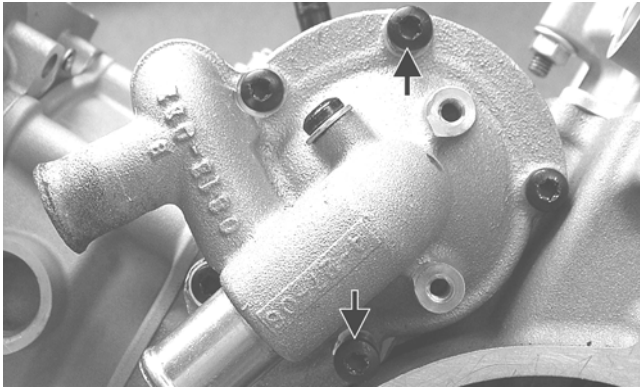


6. Remove the hose clamps from the water pump; then remove the coolant hoses from the water pump outlets and coolant pipes.



GZ218

7. Remove the two cap screws securing the water pump to the crankcase; then remove the water pump. Account for an O-ring.

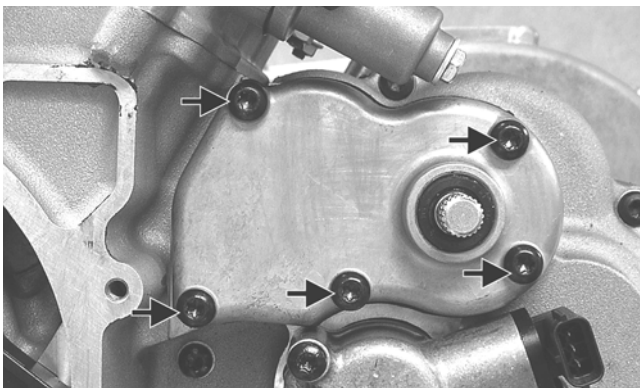


GZ230A

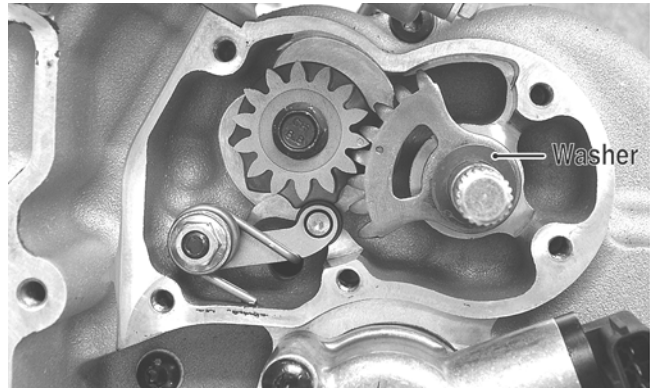
■**NOTE:** The water pump is a non-serviceable component and must be replaced as a complete assembly.

8. Remove the cap screws securing the gear shift cover to the crankcase; then remove the gear shift cover. Account for a gasket and washer.

■**NOTE:** Inspect the inside of the left-side cover for any shaft washers that may have come off with the cover. Make sure they are returned to their respective shafts.

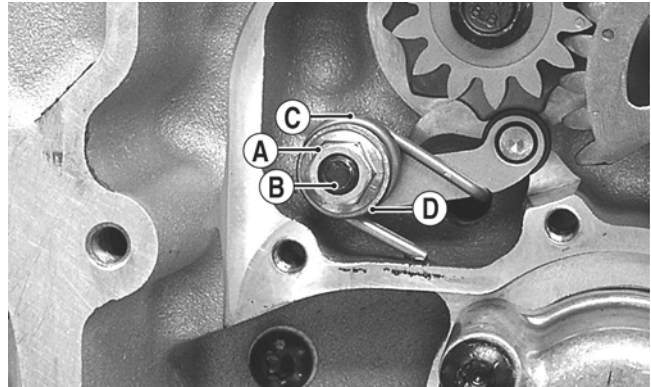


GZ231A



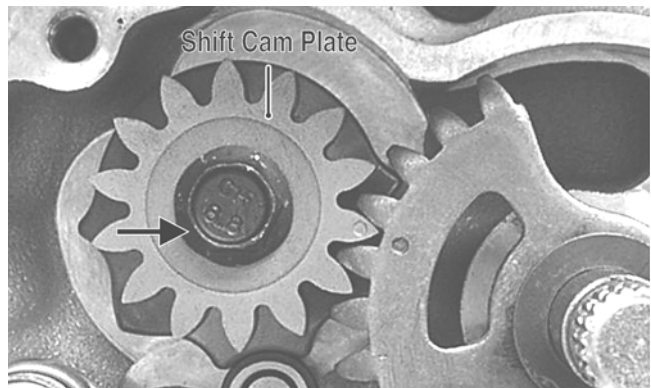
GZ233A

9. Remove the nut (A) from the shift cam stopper bolt (B); then remove the cam stopper spring (C). Account for a flat washer (D).



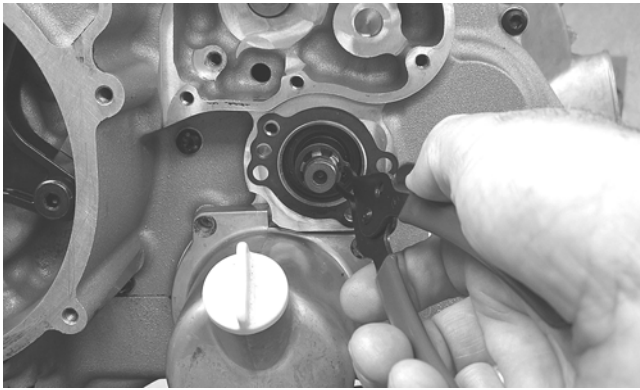
GZ236A

10. 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. Account for a washer.

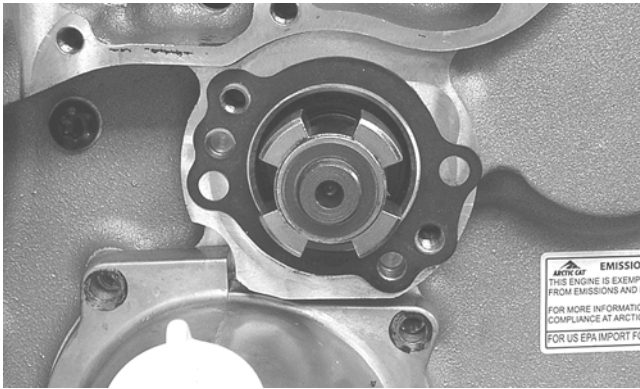


GZ234B

11. Remove the cap screws securing the speed sensor housing to the crankcase and remove the housing assembly; then remove the snap ring securing the speed sensor trigger to the shaft and remove the trigger. Account for a gasket.



GZ243



GZ235

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



GZ250

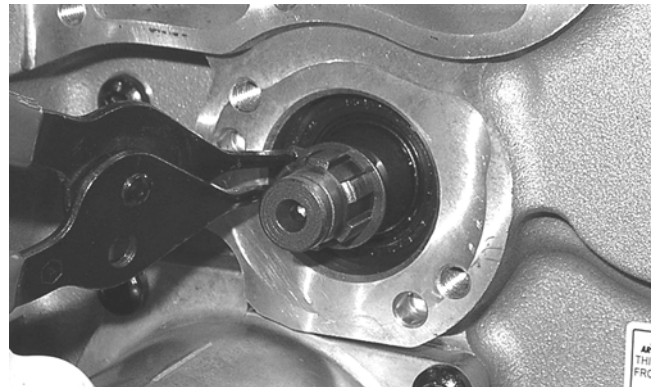
## Installing Left-Side Components

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.



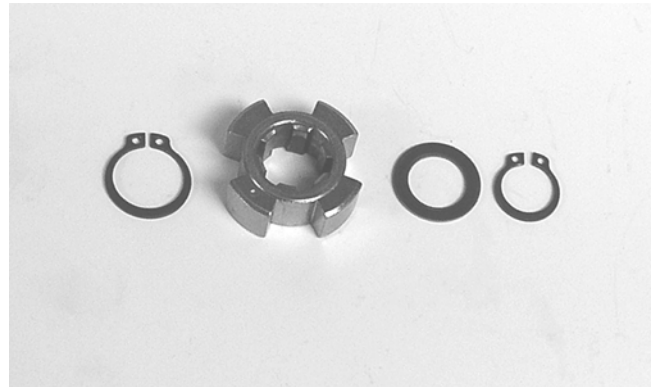
GZ250

3. Install the inner snap ring onto the countershaft; then install the speed sensor trigger, a flat washer, and the outer snap ring.



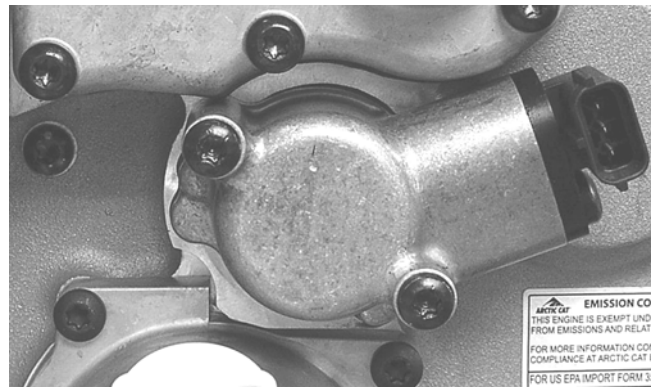
GZ253

3



GZ254

4. Using a new gasket, install the speed sensor housing onto the crankcase and secure with two cap screws. Tighten to 8 ft-lb.



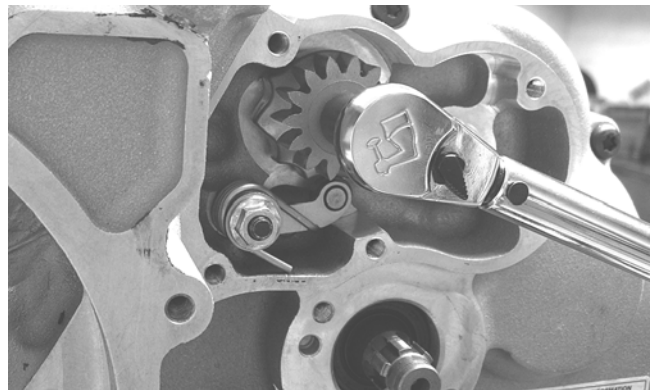
GZ232



5. If removed, install the shift cam stopper on the support; then with the flat washer in place, install the shift cam stopper assembly into the crankcase and tighten to 8 ft-lb.

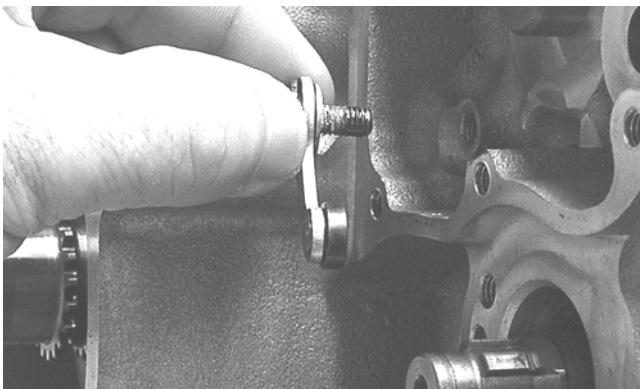


GZ255



GZ260

8. Install the shift shaft into the crankcase making sure the washers are properly located; then align the timing reference marks and completely seat the shift shaft.



GZ256

6. 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.

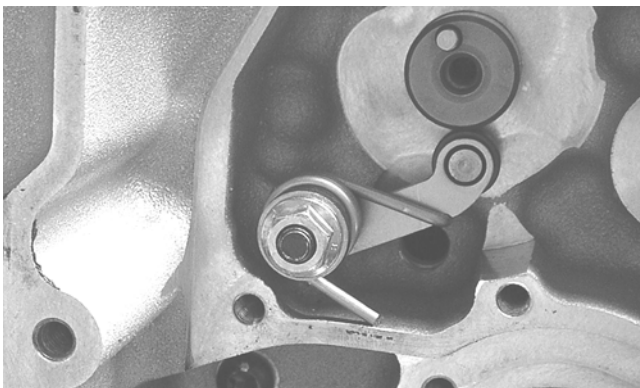


GZ258



GZ261

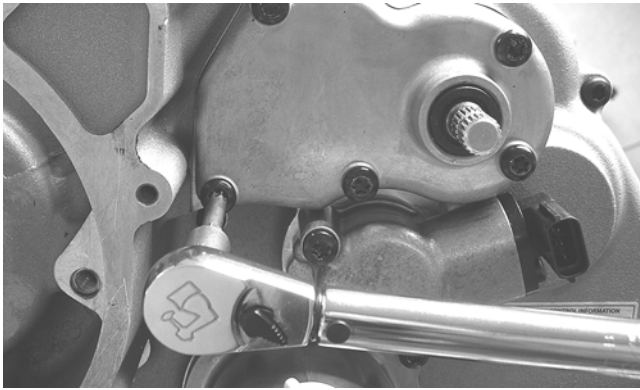
9. Apply grease to the lips of the shift shaft seal in the shifter housing; then using a new gasket, install the shifter housing and secure with the cap screws. Tighten in a crisscross pattern to 8 ft-lb.



GZ259

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





GZ262

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

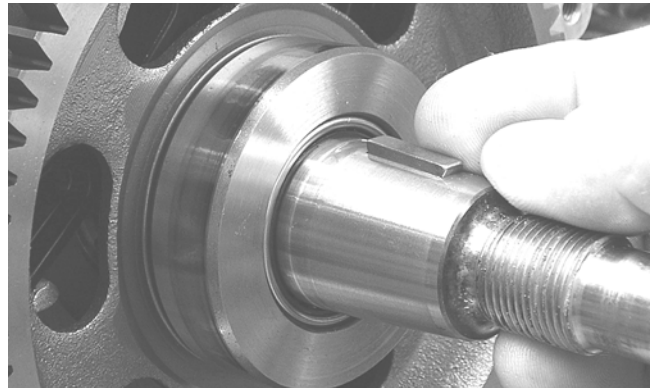


GZ249



GZ226

11. 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 and tighten to 107 ft-lb.



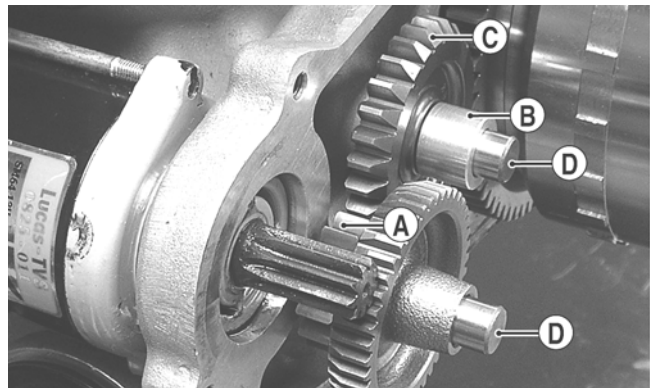
GZ225

### ⚠ 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.

12. 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.

3



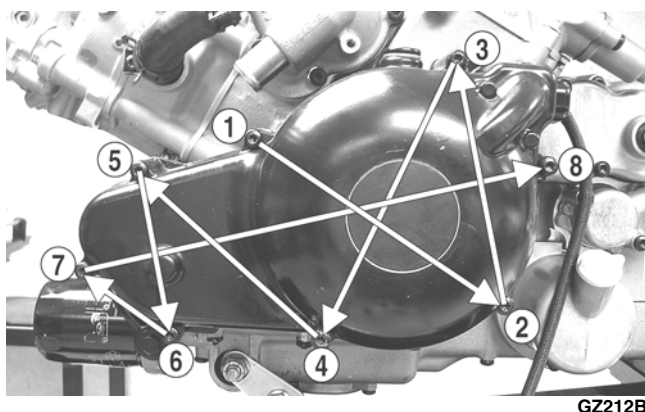
GZ224A

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



GZ251

14. Install the 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

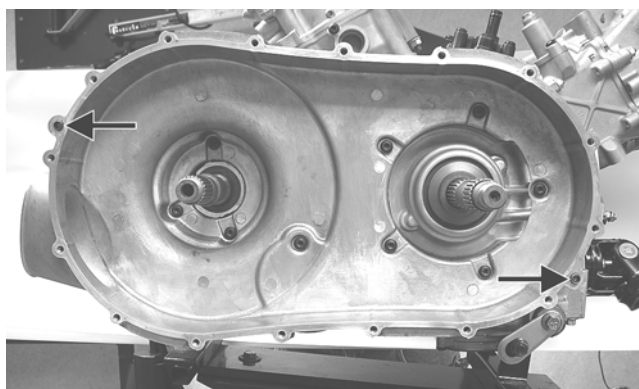
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

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

## Removing Right-Side Components

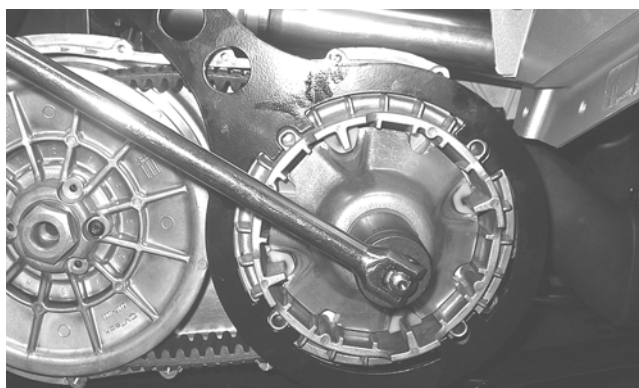
- A. V-Belt Cover
- B. Driven Pulley
- C. Clutch Cover
- D. Centrifugal Clutch

1. Remove the cap screws securing the V-belt cover; then using a rubber mallet, gently tap on the cover tabs to loosen the cover. Account for a gasket and two alignment pins.

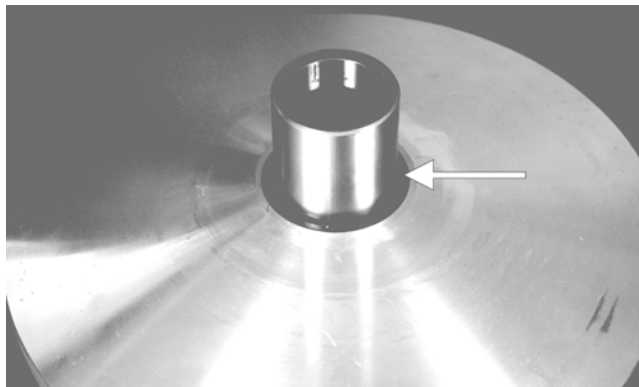


GZ244B

2. Remove the nut securing the movable drive face; then remove the face. Account for a spacer and a flat washer.



GZ074



CD966A

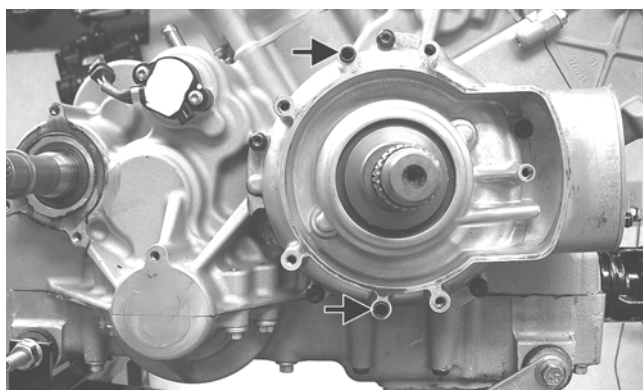
3. Remove the V-belt.
4. Remove the nut securing the fixed driven assembly; then remove the assembly.





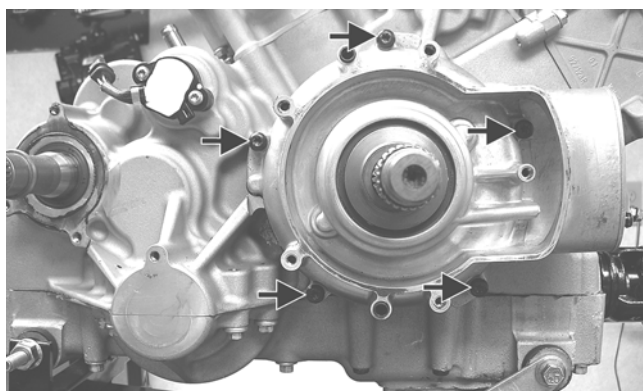
PR388

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

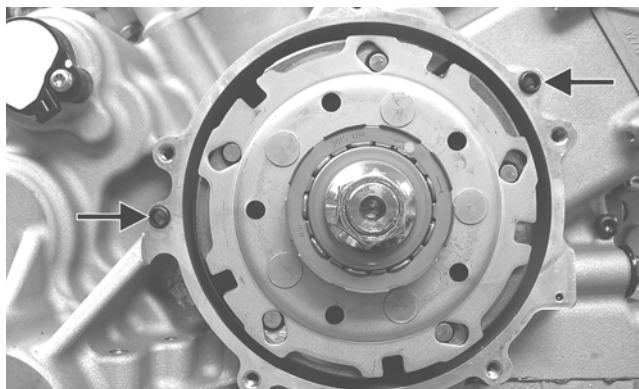


GZ246A

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



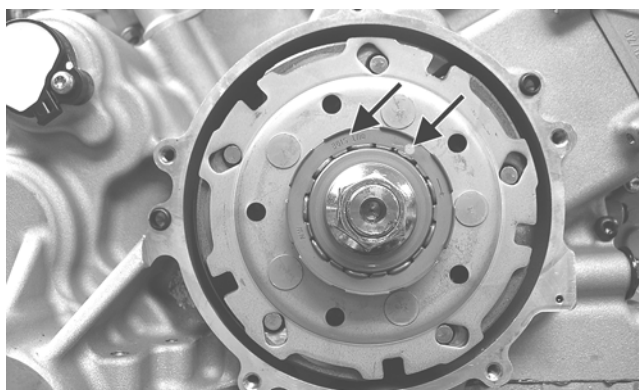
GZ246B



GZ247A

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

8. Remove the one-way clutch from the centrifugal clutch. Note the location of the green dot (or the word OUTSIDE) for installing purposes.



GZ247B

9. Using a hydraulic press, remove the clutch housing assembly from the clutch cover. Account for the left fixed drive spacer and an O-ring inside the fixed drive spacer.



CF085

3

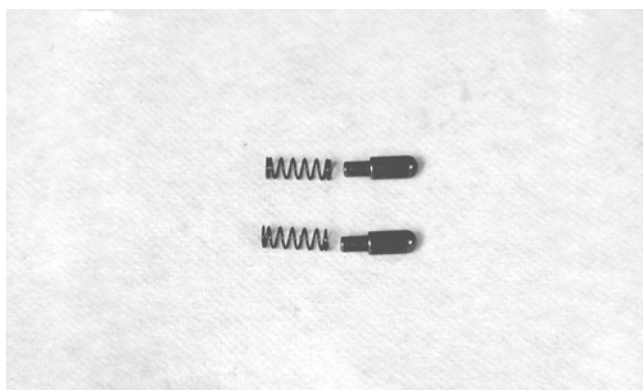




CC596

■NOTE: Account for and inspect the clutch housing seal.

10. Remove the two cap screws securing the gear shift position switch; then remove the switch. Account for two contact pins and two springs.



CD997

11. Remove the nut (left-hand threads) securing the clutch shoe assembly.



GZ248A

## Servicing Right-Side Components

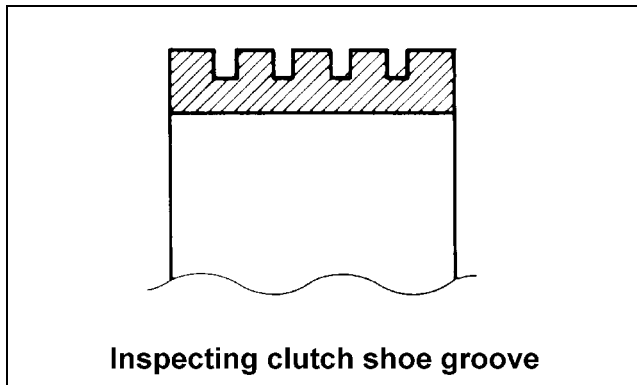
■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

## INSPECTING CENTRIFUGAL CLUTCH SHOE

1. Inspect the clutch shoes for uneven wear, chips, cracks, or discoloration. If any shoe is damaged, replace the complete set.
2. Inspect the clutch shoes for wear or damage. If any shoe is worn to the bottom of the groove, replace the complete set.

### ⚠ CAUTION

Always replace the clutch shoes as a complete set or severe imbalance could occur.



ATV1014

## INSPECTING CLUTCH HOUSING

1. Inspect the clutch housing for burns, grooving, cracks, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

## INSPECTING PRIMARY ONE-WAY DRIVE

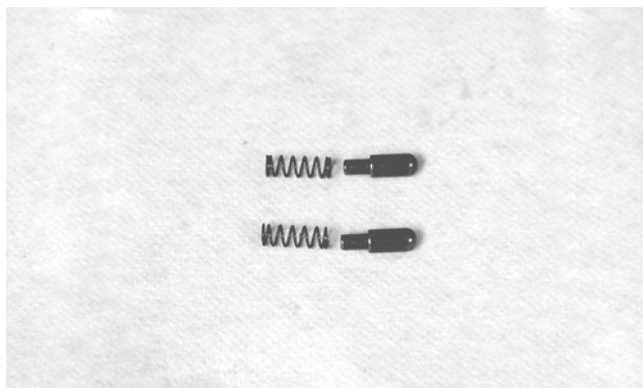
1. Insert the drive into the clutch housing.
2. Rotate the inner race by hand and verify the inner race rotates only one direction.
3. If the inner race is locked in place or rotates both directions, the drive assembly must be replaced.

## DRIVEN PULLEY ASSEMBLY

■NOTE: The driven pulley is a non-serviceable component. If the pulley faces, cam ramps, or sheave bushing are worn or loose, the pulley must be replaced as an assembly. Do not disassemble the driven pulley.

## Installing Right-Side Components

1. Apply silicone to the mating surfaces; then install the gear shift position switch making sure the two contact pins and the two springs are properly positioned. Tighten the cap screws securely.

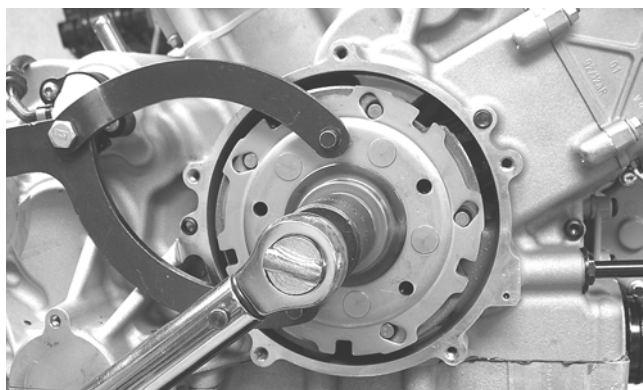


CD997



GZ240

2. Install the clutch shoe assembly and secure with the flange nut (threads coated with red Loctite #271). Tighten to 221 ft-lb.



GZ241

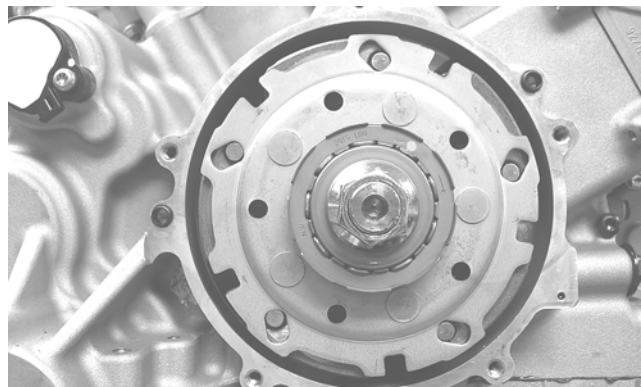
3. Lightly grease the clutch housing seal; then insert the left fixed drive spacer.



CF088A

4. Install the clutch cover alignment pins into the crankcase, apply oil to the cover gasket, and install the gasket onto the crankcase.
5. Apply grease to the outer edges of the clutch housing; then from inside the clutch cover, install the clutch housing into the cover.
6. Install the one-way clutch onto the clutch shoe assembly.

3

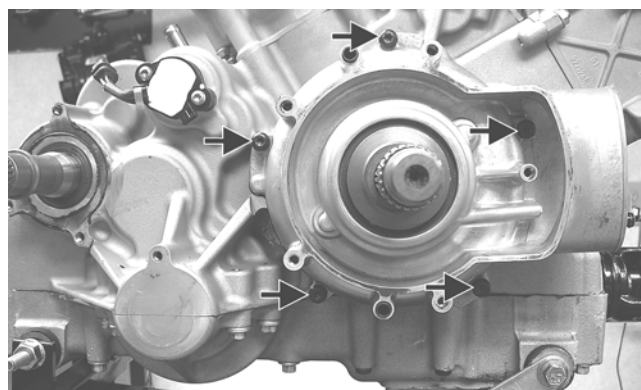


GZ247

### **CAUTION**

**When installed correctly, the green alignment dot (or the word OUTSIDE) on the one-way clutch is visible.**

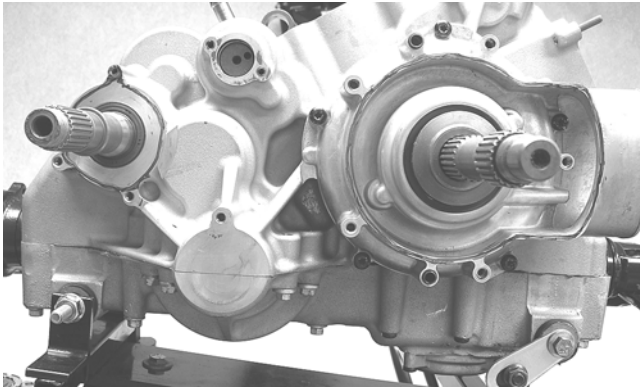
7. Place the clutch cover/clutch housing assembly into position on the crankcase; then secure with the cap screws. Tighten in a crisscross pattern to 8 ft-lb.



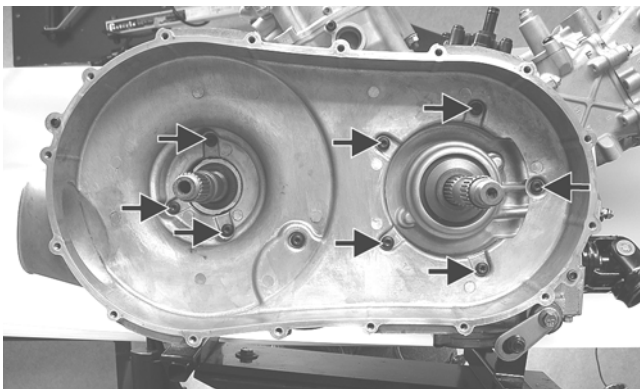
GZ246B



8. Making sure the alignment pins are correctly installed, place a bead of silicone sealant on the mating surfaces and install the V-belt housing. Secure with the cap screws tightened to 8 ft-lb.



GZ263



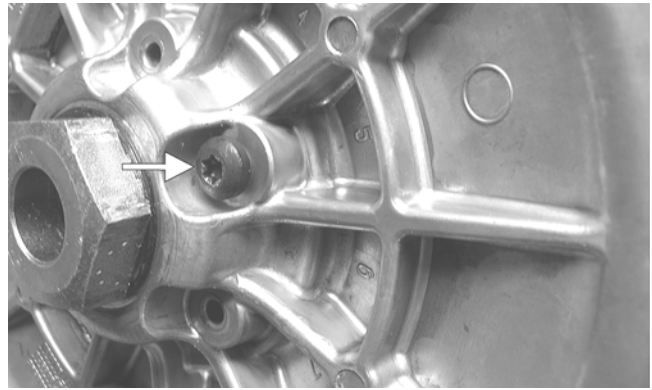
GZ244A

9. Place the driven pulley assembly into position and secure with the nut (coated with red Loctite #271). Tighten to 80 ft-lb.



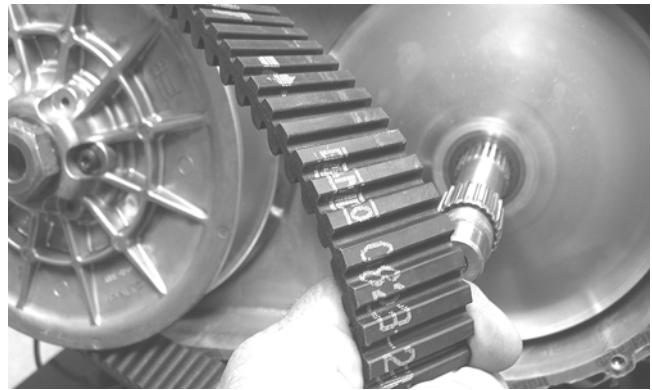
GZ066

10. Slide the fixed drive face onto the clutch shaft.
11. Spread the faces of the driven pulley by threading in a cap screw; then when the faces are separated, insert the belt and push down between the faces.



GZ065A

12. Place the V-belt into position on the driven pulley and over the front shaft.



GZ085

■ **NOTE:** The arrows on the V-belt should point forward.

13. Pinch the V-belt together near its center and slide the spacer and movable drive face onto the shaft. Secure the drive face with a flat washer and a nut (threads coated with red Loctite #271). Tighten the nut to 165 ft-lb.



GZ075

### ⚠ CAUTION

Make sure the splines extend beyond the drive face and washer or a false torque reading and spline damage may occur.





PR386

■NOTE: At this point, the cap screw can be removed from between the driven pulley faces.

14. Rotate the V-belt and drive/driven assemblies until the V-belt is flush with the top of the driven pulley.
15. Place the V-belt cover gasket into position; then install the cover and secure with the cap screws. Tighten the cap screws to 8 ft-lb.

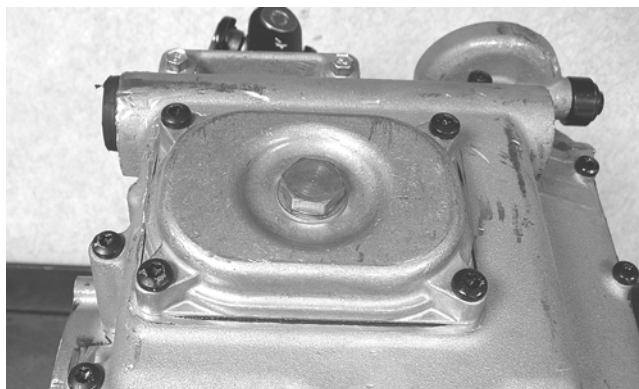
## Center Crankcase Components

■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.

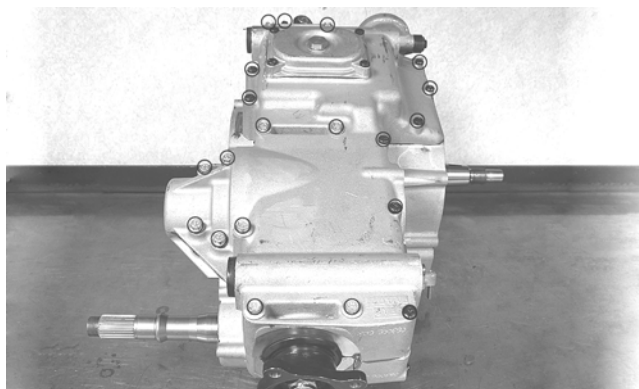


GZ264



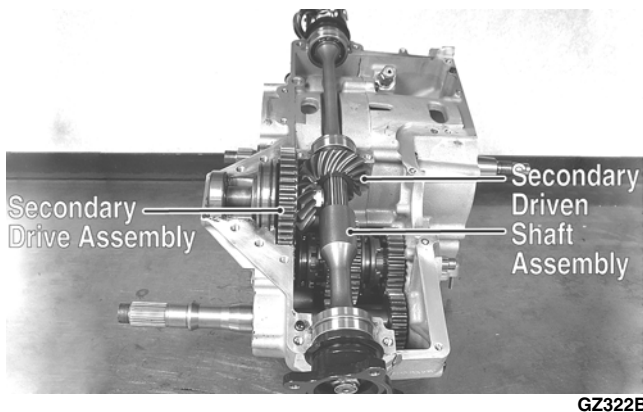
GZ268

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.



GZ321A

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



GZ322B



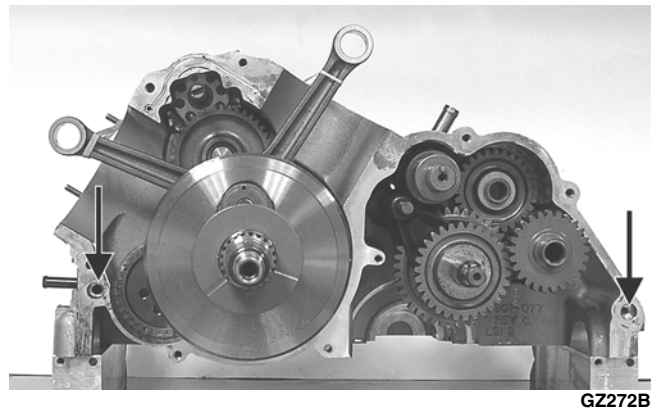
GZ269A

■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 in this 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.



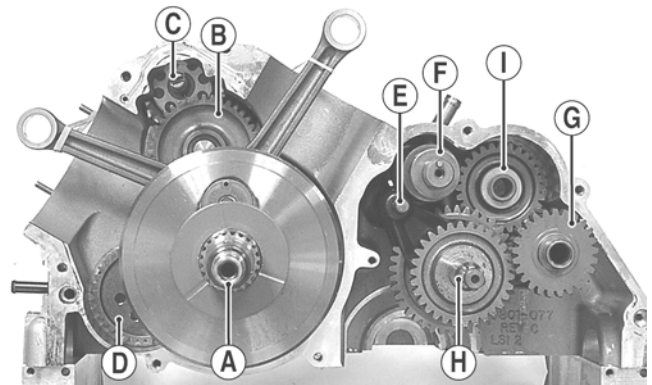
GZ271



GZ272B

## Disassembling Crankcase Half

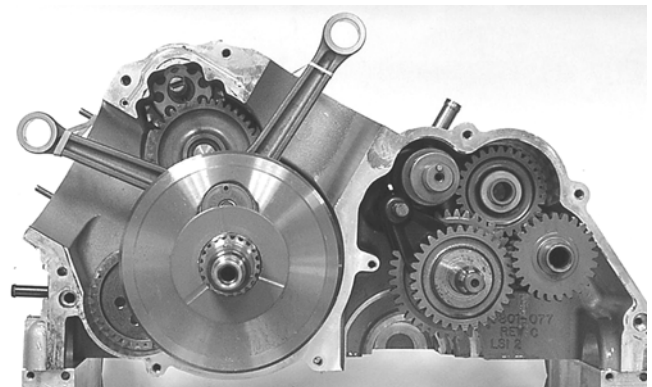
■NOTE: For steps 1-8, refer to photograph GZ298A.



GZ298A

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

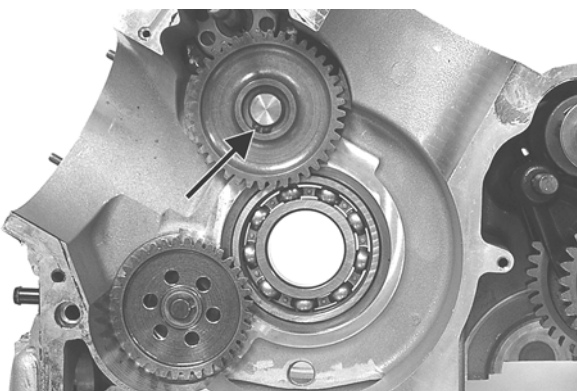
1. Support the right-side crankcase assembly on suitable support blocks; then carefully remove the crankshaft assembly (A) from the crankcase.



GZ298

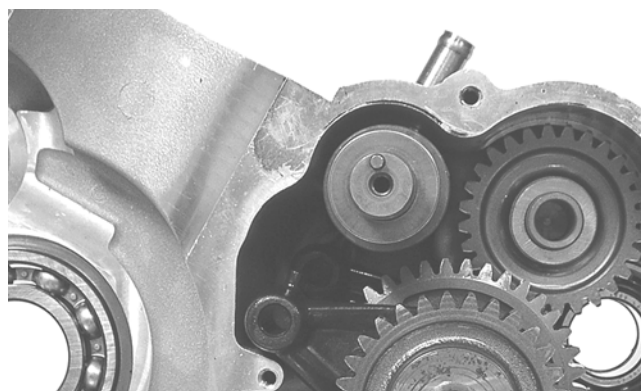
2. Remove the snap ring securing the water pump drive idler (B) to the idler shaft; then remove the drive idler.





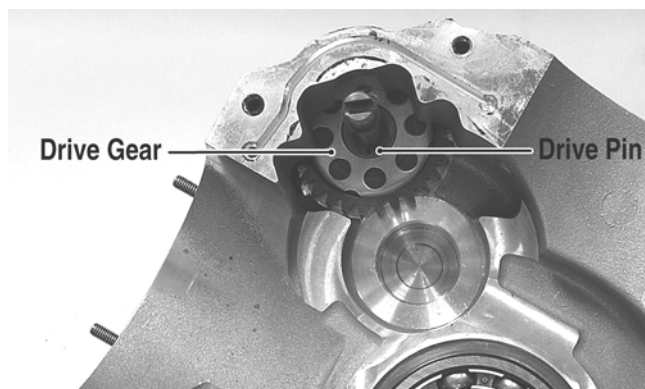
GZ299A

3. Remove the water pump driven shaft (C). Account for the driven gear and drive pin.



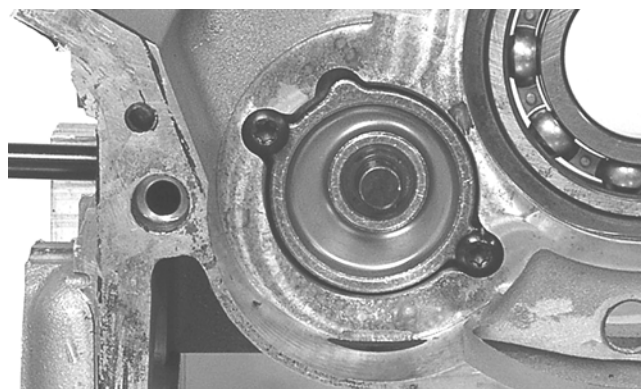
GZ276

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



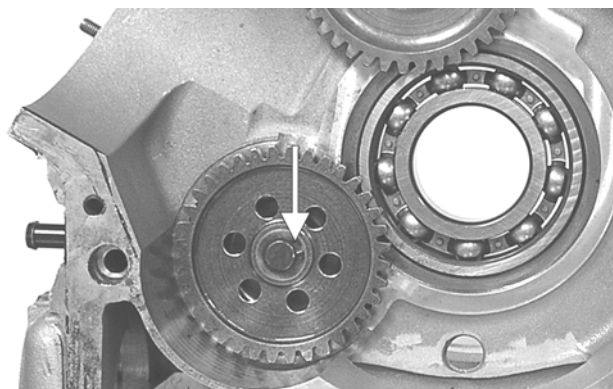
GZ304A

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.



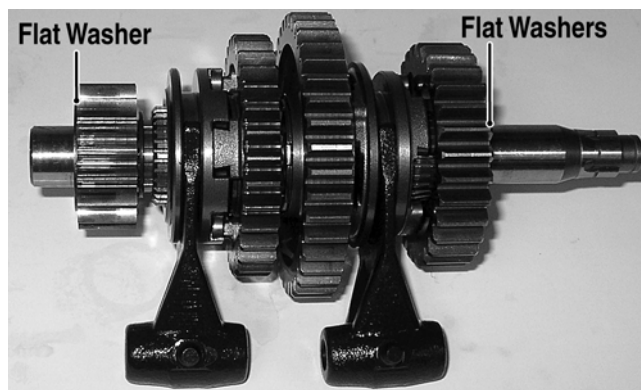
GZ305

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



GZ301A

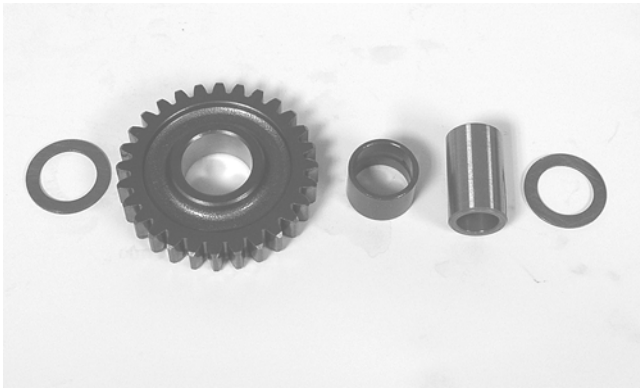
5. Remove the shift fork shaft (E); then remove the gear shift shaft assembly (F). Account for two flat washers.



GZ280A

8. 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

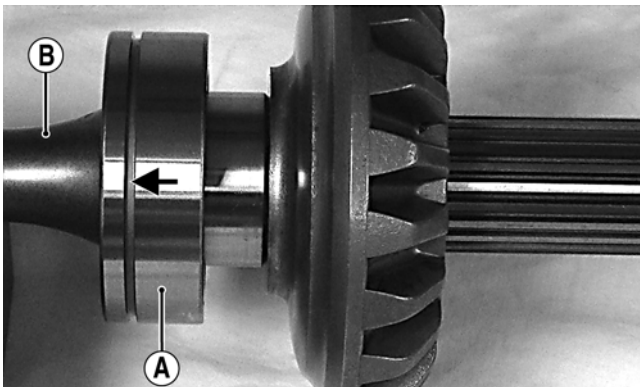
■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

### SECONDARY OUTPUT DRIVE GEARS

#### Initial Set-Up

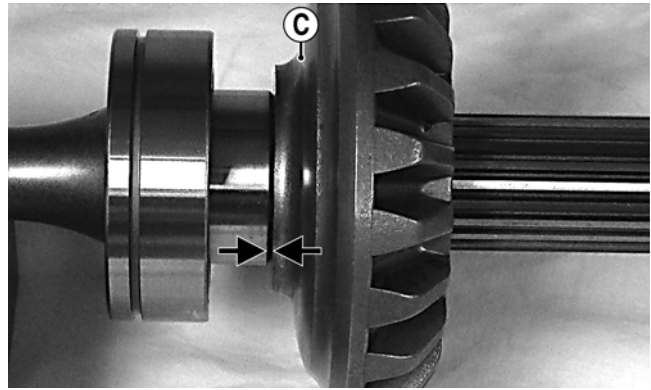
■NOTE: If the secondary output driven shaft is replaced or disassembled, the initial set-up must be performed to establish correct gear tooth contact. If only the secondary output drive shaft or secondary output driven gear are replaced, proceed to Correcting Backlash in this sub-section.

1. 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

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

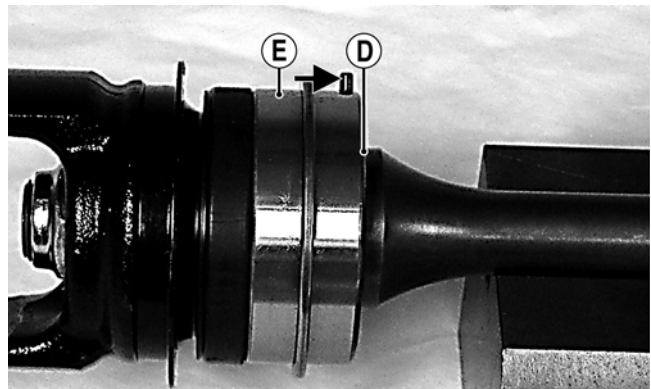


MT011B

3. 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 drive shaft bearing (E) making sure the locating pin is directed toward the center of the shaft.

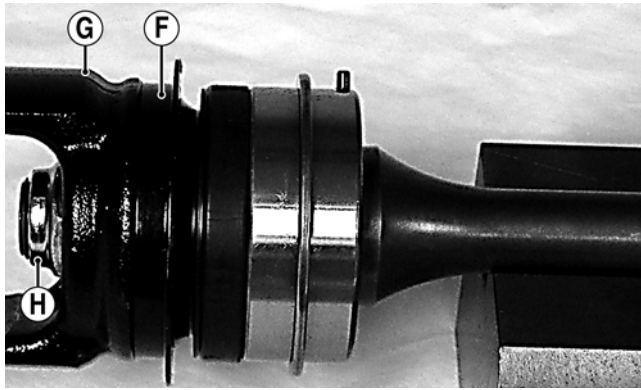


MT012



MT008A

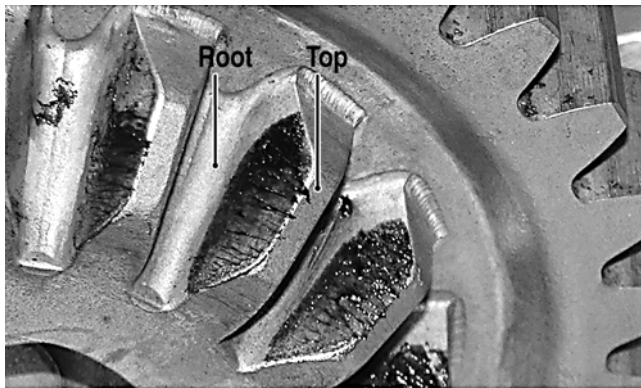
4. Install a new seal (F), output yoke (G), and nut (H) and tighten to 59 ft-lb.



MT008B

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

- 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

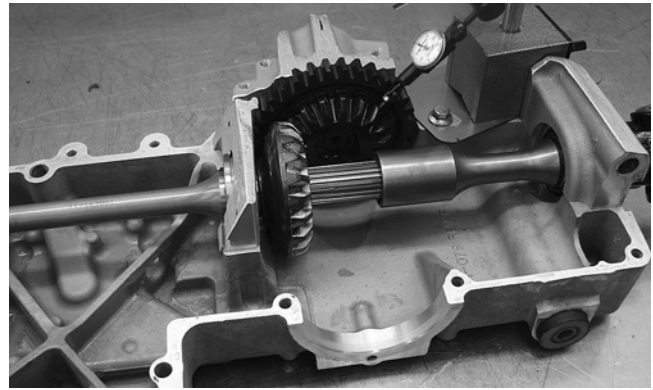
- To adjust tooth contact, use the following chart to correctly shim the driven shaft.

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

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

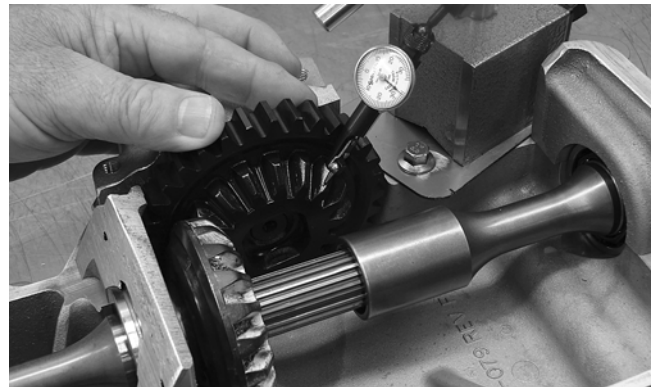
### Checking Backlash

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



GZ396

- While rocking the drive bevel gear back and forth, note the maximum backlash reading on the gauge.



GZ398

- Acceptable backlash range is 0.05-0.33 mm (0.002-0.013 in.).

### Correcting Backlash

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

- If backlash measurement is less than specified, remove an existing shim, measure it, and install a new thinner shim.
- 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 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

### OIL PUMP ASSEMBLY

#### Disassembling and Inspecting

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

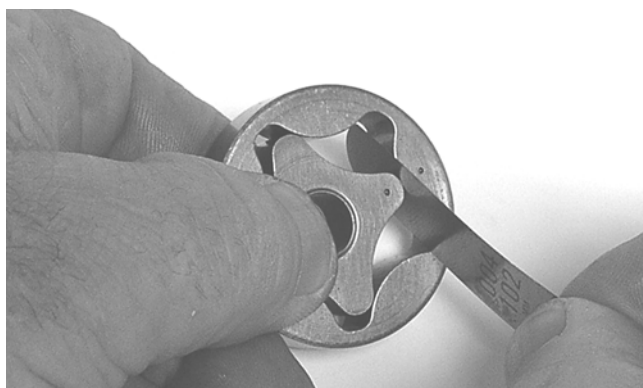


2. Inspect the crankcase for securing, discoloration, or cracks in the gerotor bore. If scored, crankcase assembly must be replaced.



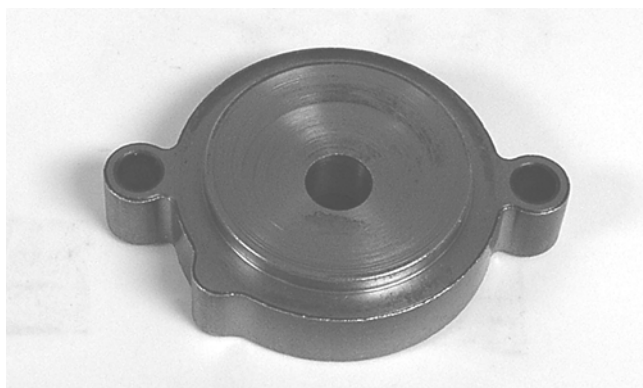
GZ357

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.



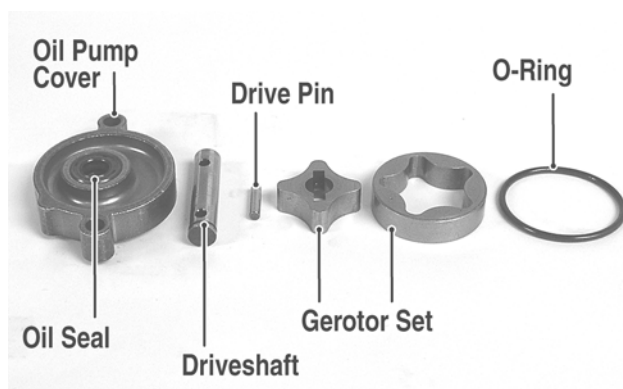
GZ355

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



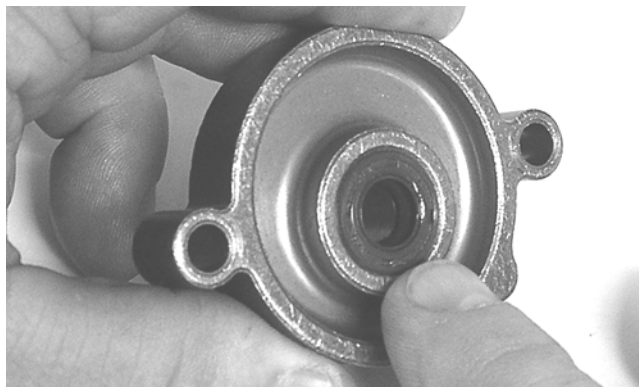
GZ358

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



GZ354A

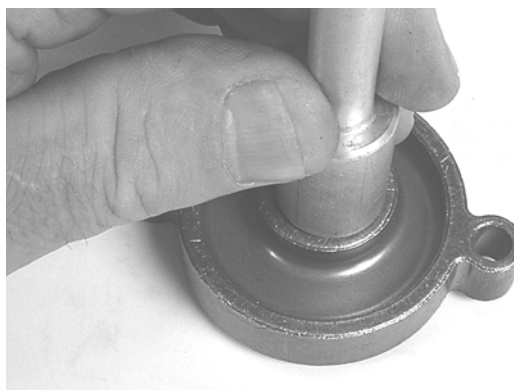
6. Remove the oil seal from the oil pump cover.



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

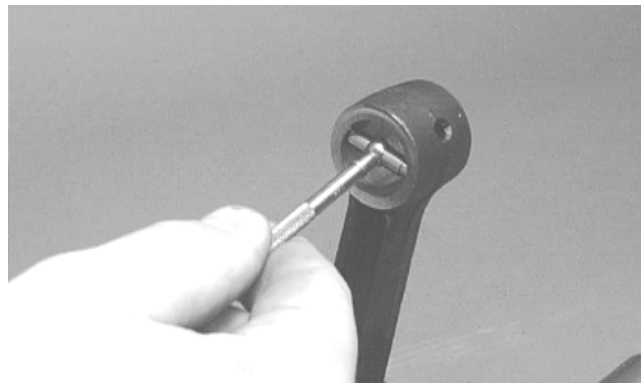
2. Noting the reference dots on the gerotor set, separate the inner rotor from the outer rotor and with the reference dot directed toward the oil pump cover, place the rotor on the shaft; then install the drive pin and push the shaft into the rotor.



## CRANKSHAFT ASSEMBLY

### 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)

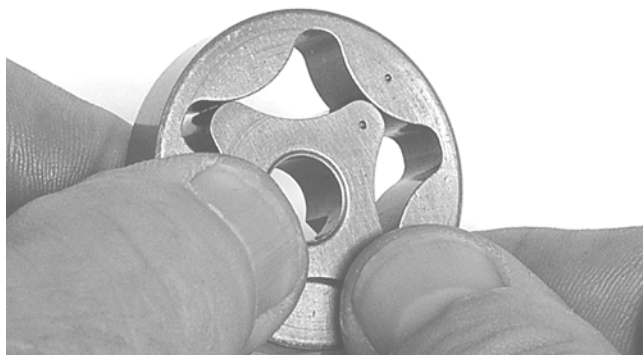
1. Place the crankshaft on a set of V blocks and mount a dial indicator and base on the surface plate. Position the indicator contact point against the center of the connecting rod small end journal.
2. Zero the indicator and push the small end of the connecting rod away from the dial indicator.
3. Maximum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

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

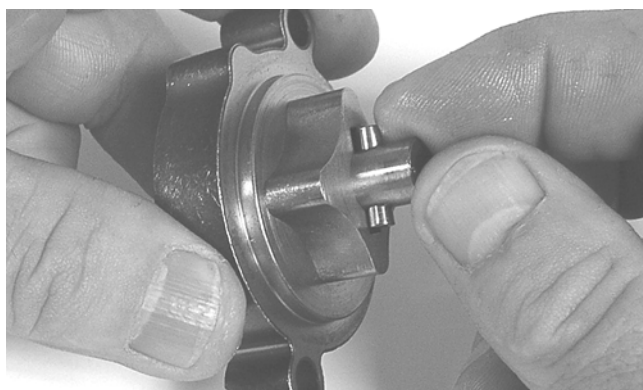
1. Push the lower end of the connecting rod to one side of the crankshaft journal.
2. Using a feeler gauge, measure the gap between the connecting rod and crankshaft journal.
3. Acceptable gap range must be within specifications.

### Measuring Connecting Rod (Big End Width)

1. Using a calipers, measure the width of the connecting rod at the big-end bearing.
2. Acceptable width range must be within specifications.



GZ356



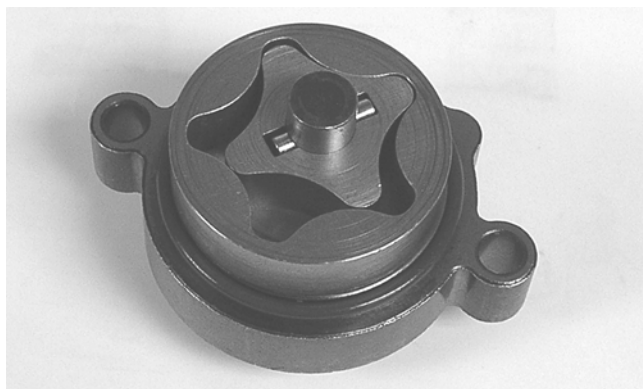
GZ363

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



GZ360

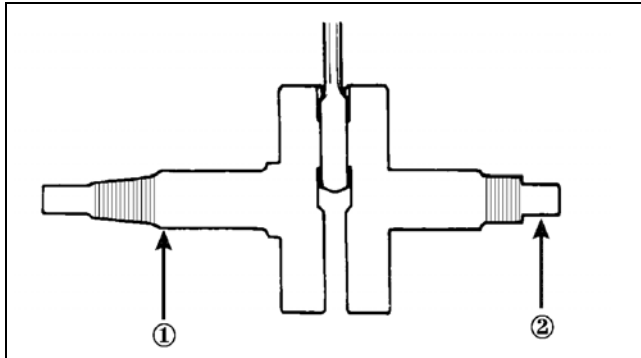
4. Place a new O-ring seal on the outside of the oil pump cover. The oil pump assembly is now ready for assembly into the crankcase.



GZ362

## 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.



ATV-1074

3. Zero the indicator and rotate the crankshaft slowly.

### CAUTION

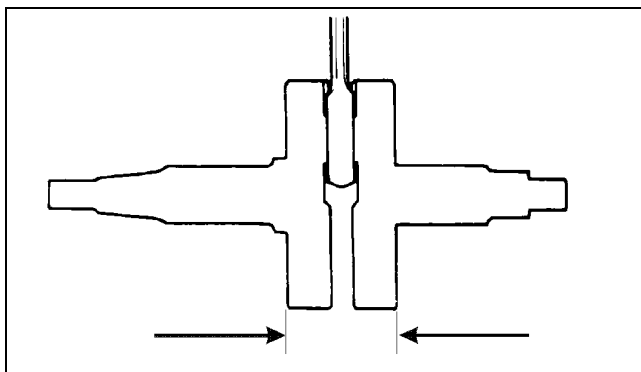
Care should be taken to support the connecting rod when rotating the crankshaft.

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)

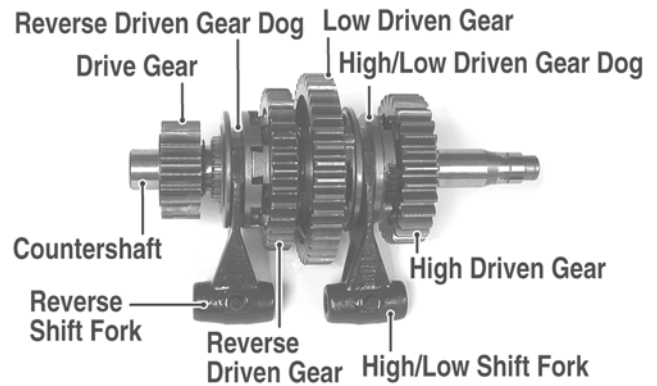
1. Using a calipers, measure the distance from the outside edge of one web to the outside edge of the other web.



ATV-1017

2. Acceptable width range must be within specifications.

## COUNTERSHAFT



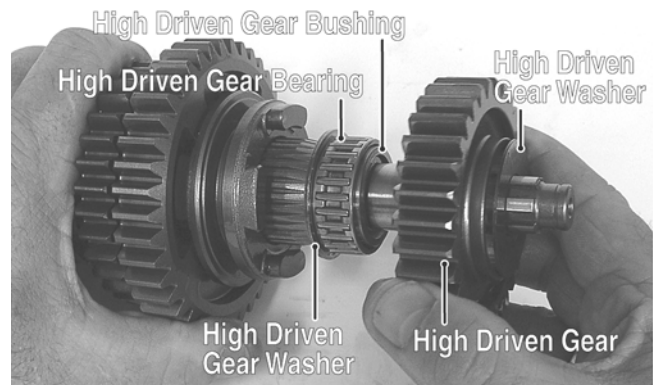
GZ281A

### 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.

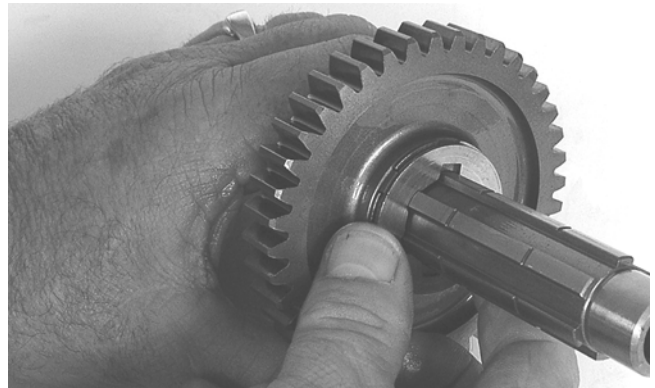


GZ283A

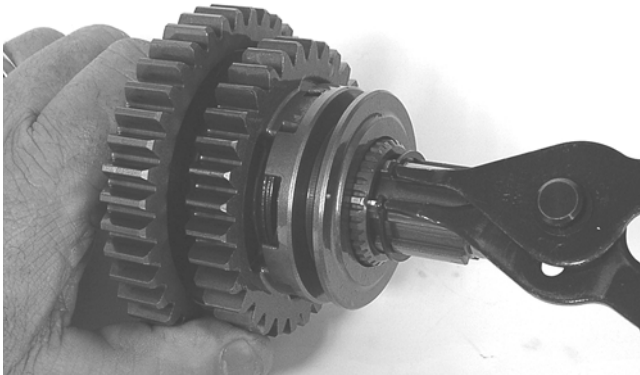
2. Remove the drive gear; then remove the snap ring securing the reverse driven gear dog and bushing to the countershaft.



GZ296



GZ320



GZ312

3. Remove the reverse driven gear dog.



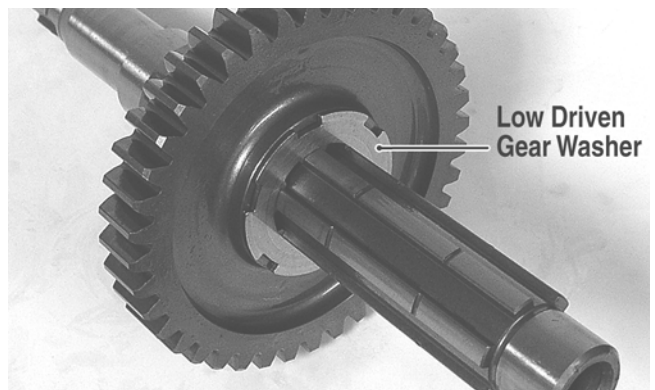
GZ319

3



GZ313A

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



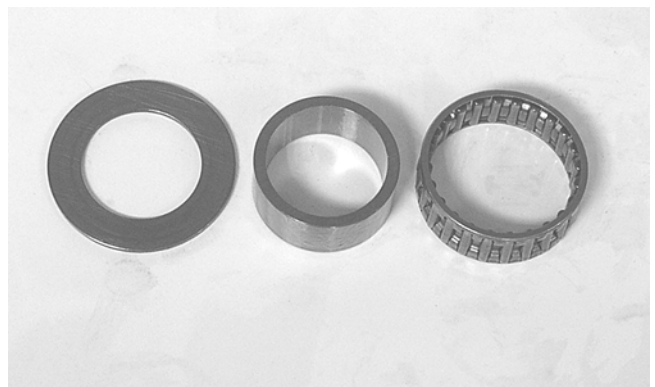
GZ318A

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



GZ314

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

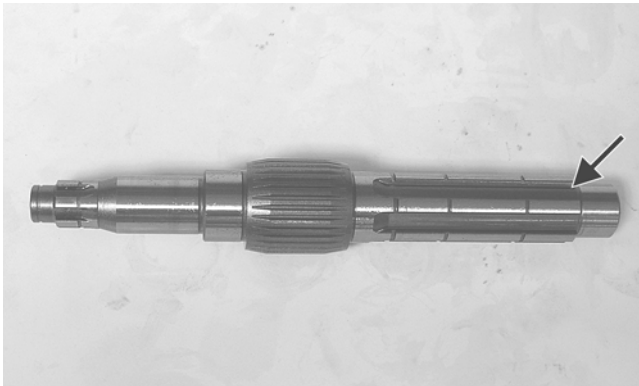


GZ316

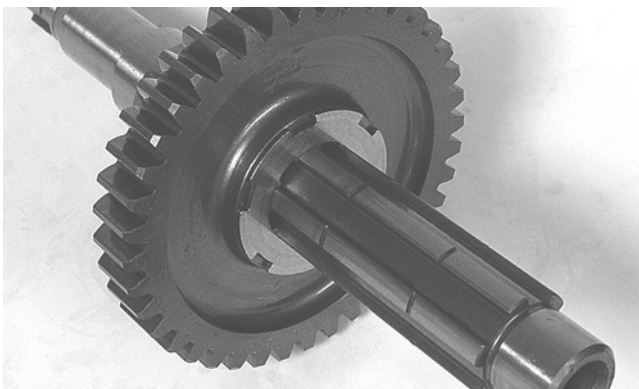


## Assembling

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

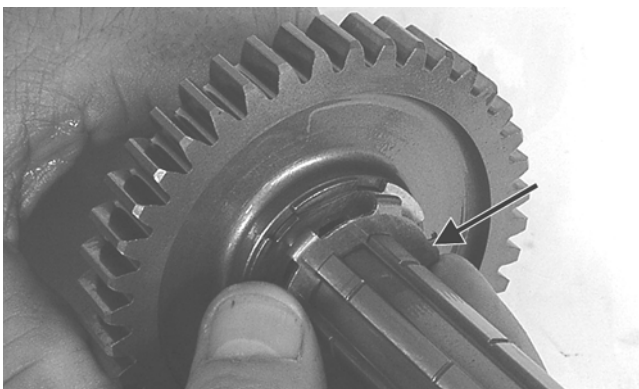


GZ317A

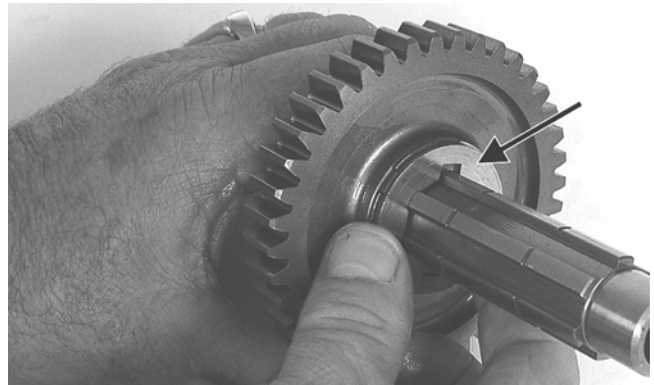


GZ318

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

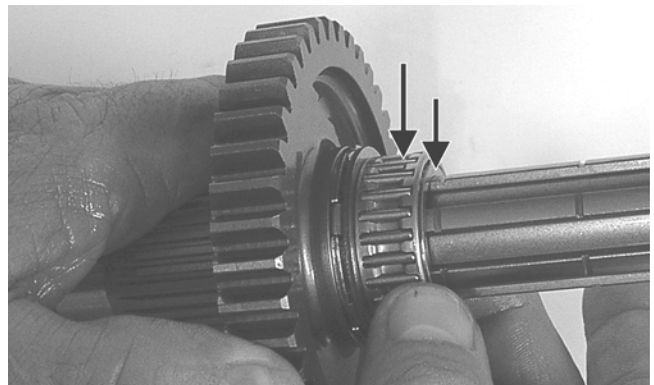


GZ319B



GZ320B

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

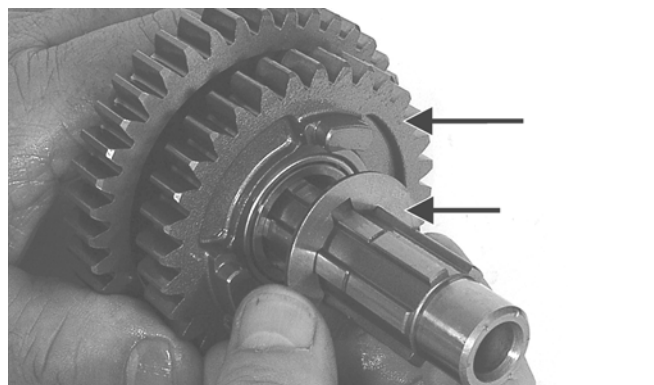


GZ286A

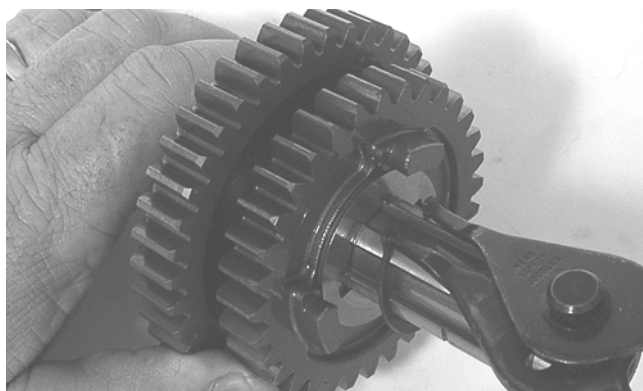


GZ287

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



GZ288A

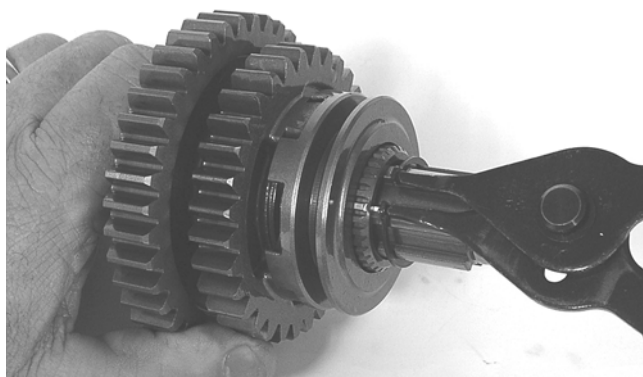


GZ314

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

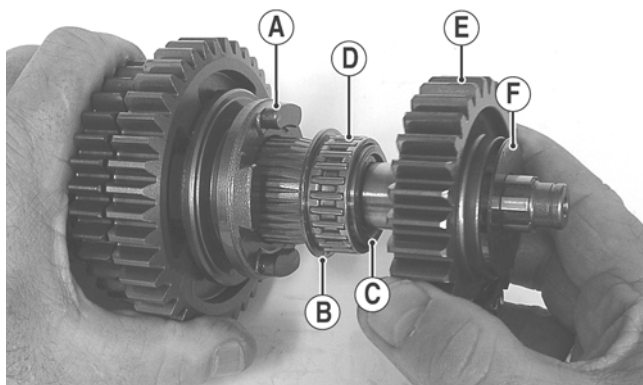


GZ313A



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).

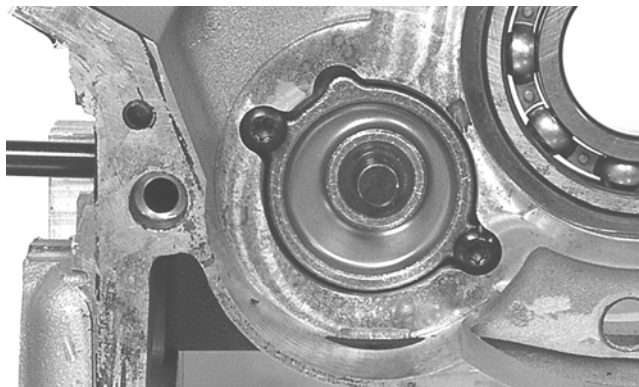


GZ283B

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

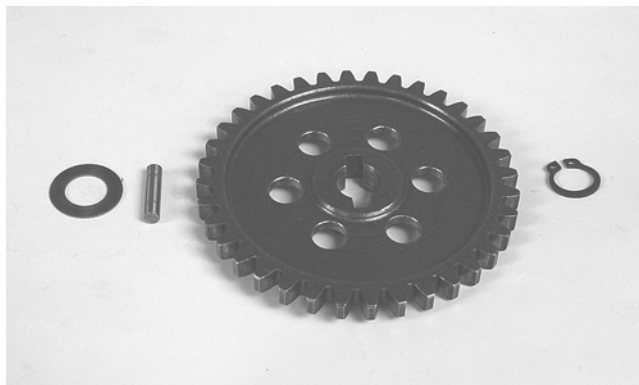
## Assembling Crankcase Half

1. Install the oil pump gerotor assembly and oil pump cover in the crankcase and secure with two cap screws. Coat the threads with blue Loctite #243 and tighten securely to 8 ft-lb.



GZ305

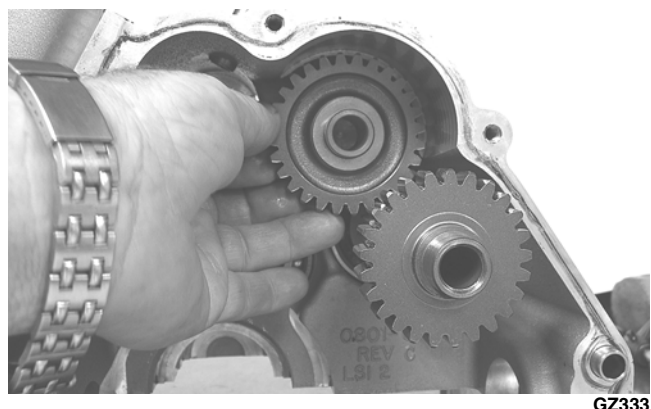
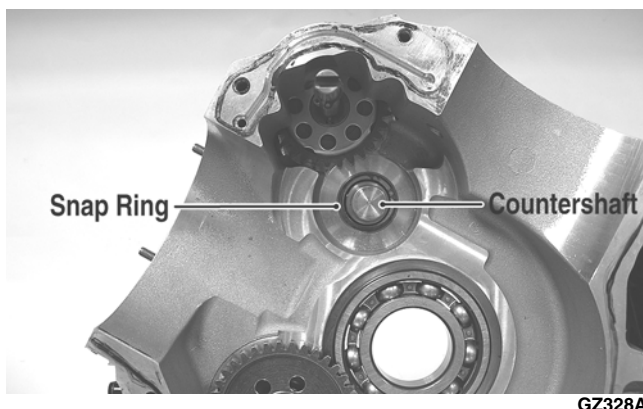
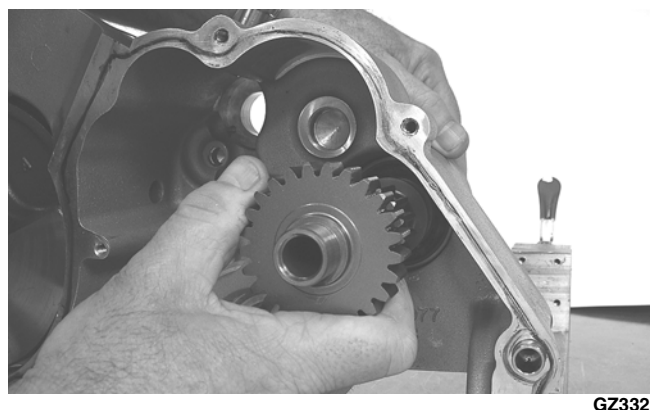
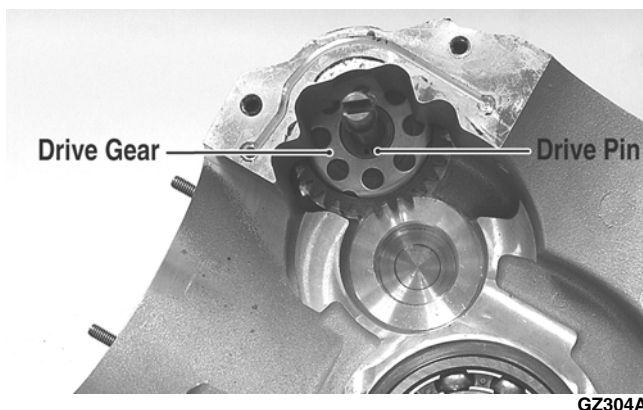
2. Install a flat washer, drive pin, and drive gear onto the oil pump shaft; then secure with a snap ring (flat-side away from the gear).



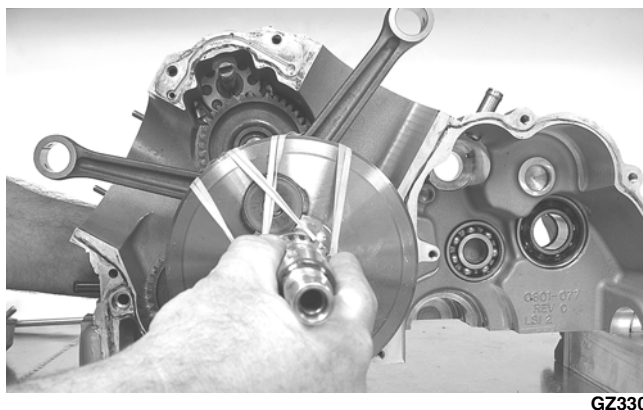
GZ347

3. Install the water pump drive gear, driveshaft, and drive pin; then install the countershaft into the crankcase and secure with a snap ring (flat-side away from the bearing).





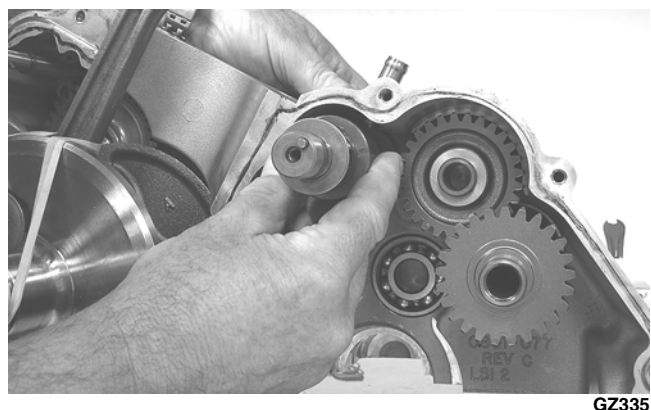
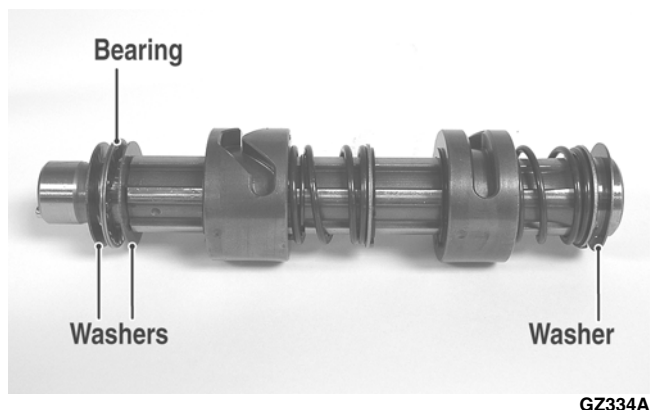
4. Install the countershaft gear onto the countershaft and secure with a snap ring (flat-side away from the gear).
5. Using rubber bands to support the connecting rods, carefully install the crankshaft assembly into the crankcase.



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

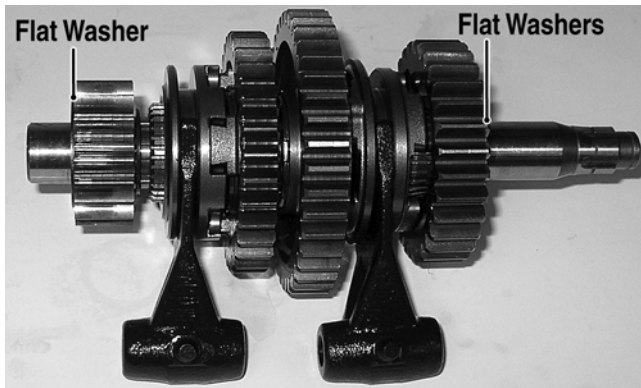
6. Install the driveshaft; then with a flat washer on each end of the reverse idler assembly, install into the crankcase.

7. Install the gear shift shaft into the crankcase making sure the flat washer is in place on the gear shift position switch end and the bearing assembly on the gear shift stop end.





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

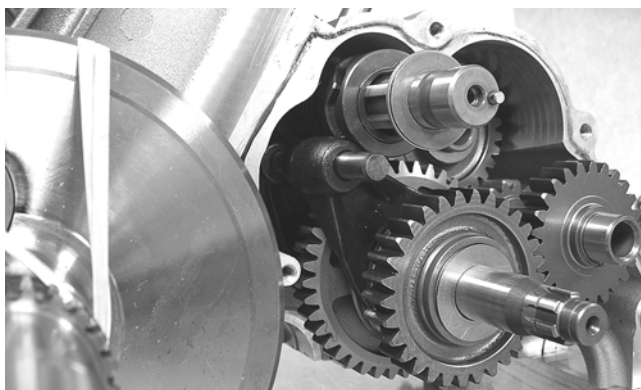


GZ280A



GZ336

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



GZ339

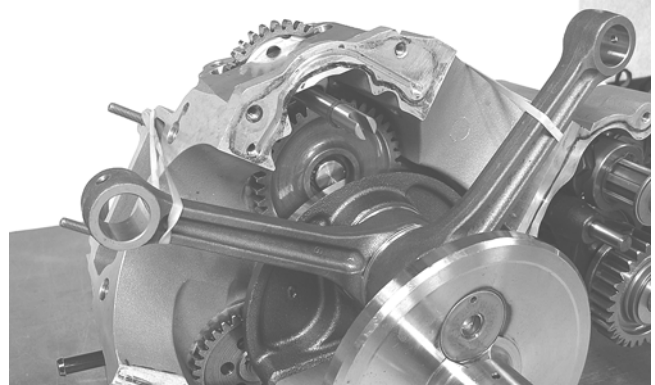
### ⚡ AT THIS POINT

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.

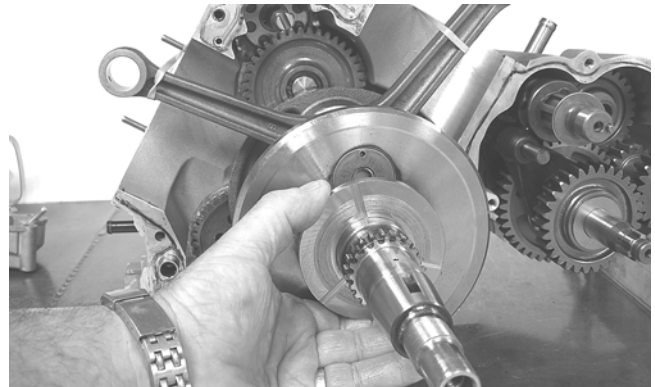
## Joining Crankcase Halves

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



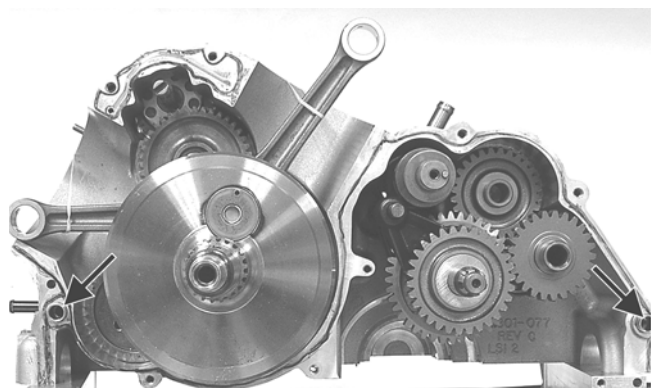
GZ340

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



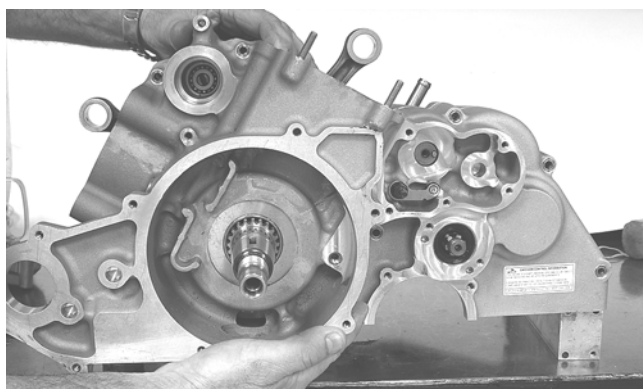
GZ341

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



GZ345A

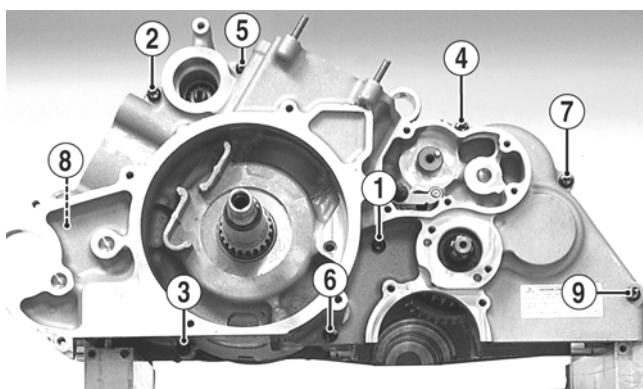
4. Carefully join the crankcase halves by placing the left-side crankcase onto the assembled right side. Secure with the cap screws (eight left side and one right side).



GZ342

5. Tighten the cap screws to 8 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.



GZ375A

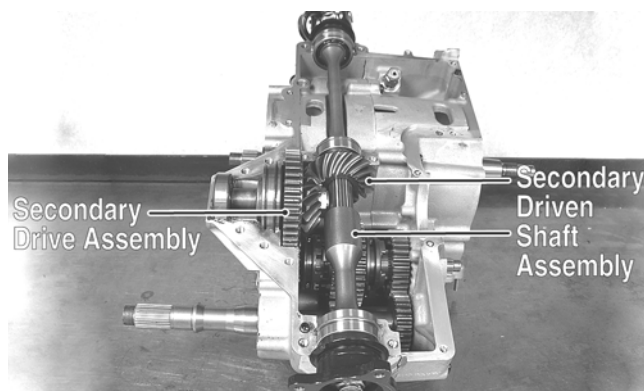
■NOTE: Cap screw number eight (8) is installed from the right side.

■NOTE: If the secondary drive/driven assemblies have been disassembled, refer to Servicing Center Crankcase Components 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.

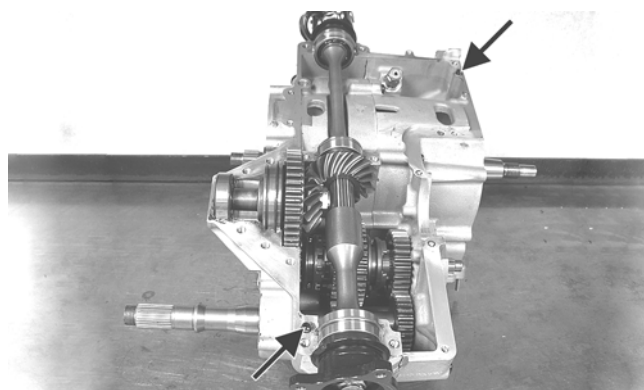


GZ269A

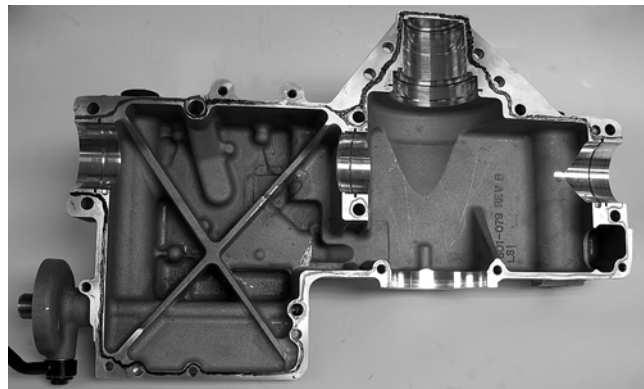


GZ322B

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



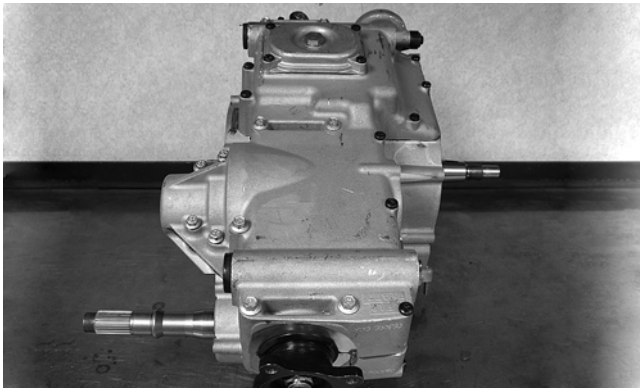
GZ322A



GZ265

8. 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.





GZ321

9. 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.

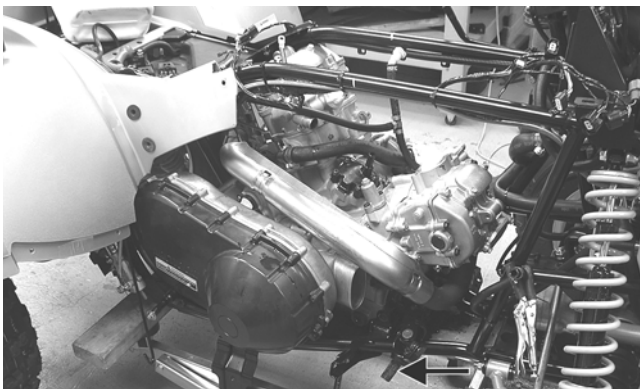
### AT THIS POINT

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

## Installing Engine/Transmission

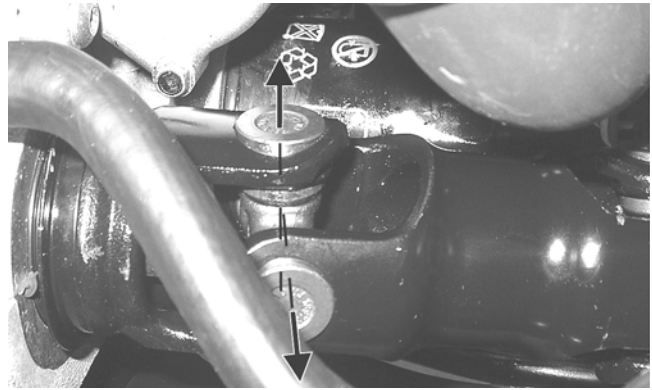
■**NOTE:** Arctic Cat recommends that new gaskets and O-rings be installed whenever servicing the ATV.

1. Turn the front driveline to place the output drive yoke universal joint in the horizontal plane; then secure the driveshaft to the right and against the engine.

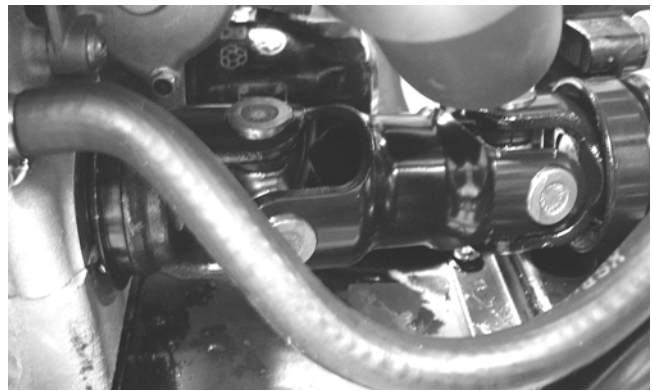


GZ117A

2. Install the engine/transmission into the frame from the right side.
3. Rotate the driveshaft 90°; then lift the front of the engine sufficiently to engage the splined shaft into the front differential. Lower the front of the engine.

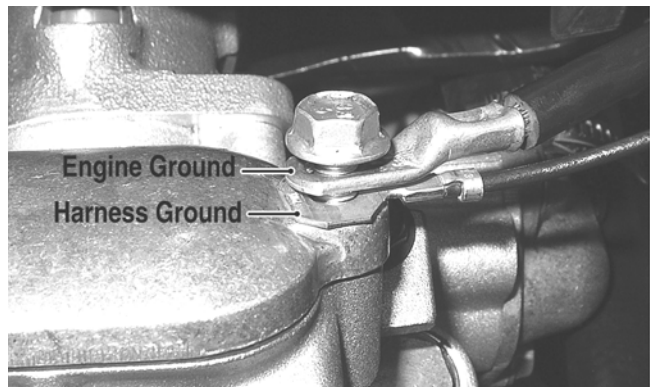


GZ110A



GZ119

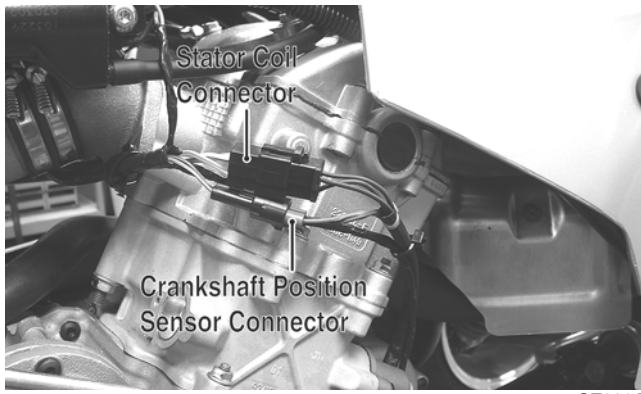
4. Align the rear output drive flange and the rear driveshaft yoke flange and install the cap screws. Tighten to 20 ft-lb.
5. Align the engine with the mounting brackets and install the through-bolts with flat washers; then install the flange nuts and tighten to 45 ft-lb.
6. Connect the coolant hose and tighten the clamps securely.
7. Secure the engine and harness grounds to the engine and tighten the cap screw to 8 ft-lb.



GZ064A

8. Install the ignition coils and tighten the cap screws to 7 ft-lb; then connect the primary wires, grounds, and spark plug caps.
9. Connect the stator coil connector and crankshaft position sensor connector; then connect the gear shift position switch connector.



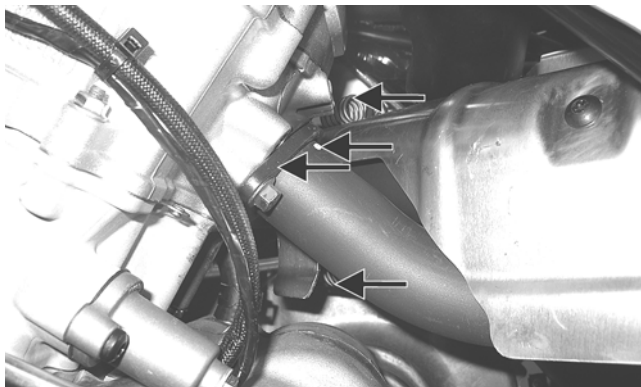


GZ069A

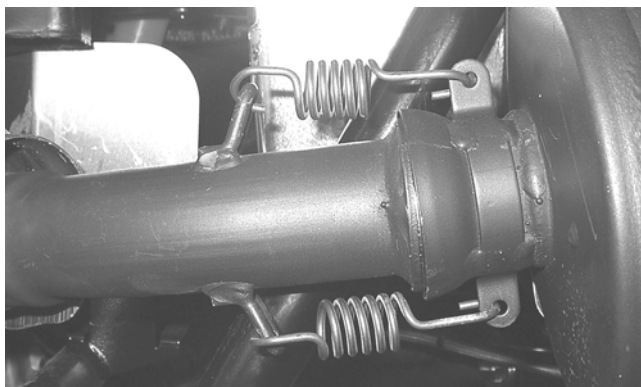


GZ368A

10. Install the front the rear exhaust pipes with new grafoil seals and tighten the retaining nuts to 20 ft-lb; then install the muffler and connect all exhaust juncture springs.



GZ099A



GZ372

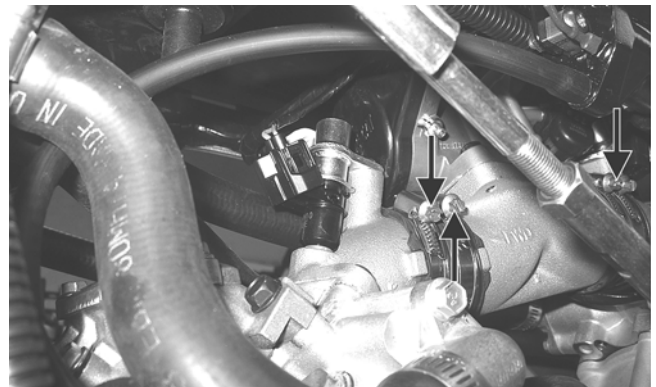
11. Install the intake manifolds and tighten to 8 ft-lb; then install the throttle body and secure with the hose clamps.



GZ106

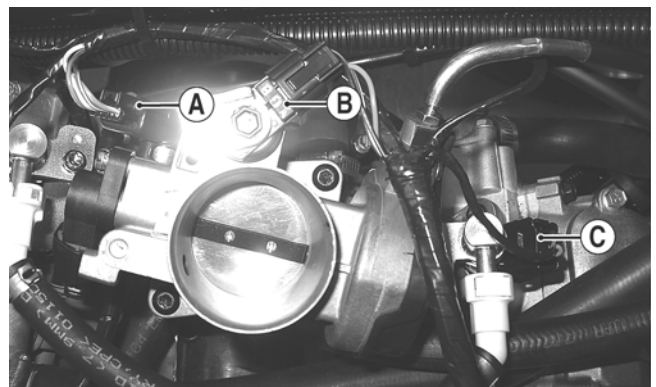


GZ107



GZ090B

12. Connect the fuel injector, TPS connector (A), MAP sensor connector (B), and ISC valve connector (C).



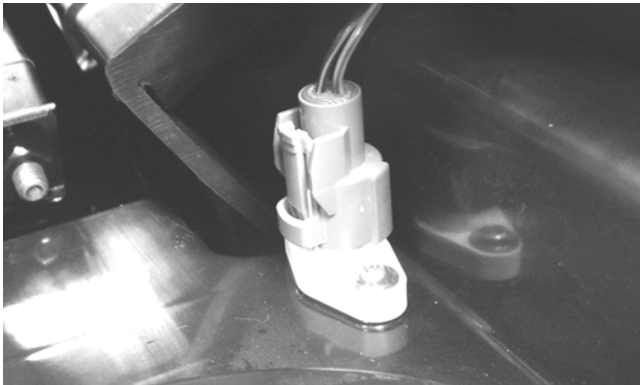
GZ094A

13. Install the shift linkage with bushings and secure with E-clips.
14. Connect the gasoline hose connectors to the fuel rails; then install any nylon ties that were removed during disassembly.



GZ124

15. Install the air filter housing and secure to the throttle body with a hose clamp; then connect the IAT sensor connector.



GZ013

16. Install the V-belt cooling duct and boots. Tighten securely.
17. Install the front body panel, footrests, foot wells, and front rack; then install the upper bumper support-to-frame cap screws (see section 8).
18. Connect the negative battery cable; then secure the battery with the tool tray and install the seat.
19. Pour in the proper quantities of engine/transmission oil and coolant; then start the engine and warm up to operating temperature.
20. Check for fluid leaks; then shut off engine and check fluid levels (see Section 2).

# SECTION 4 - FUEL/LUBRICATION/COOLING

4

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## Fuel/Lubrication/ Cooling

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

■NOTE: Some photographs and illustrations used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Critical torque specifications are located in Section 1.

### 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.

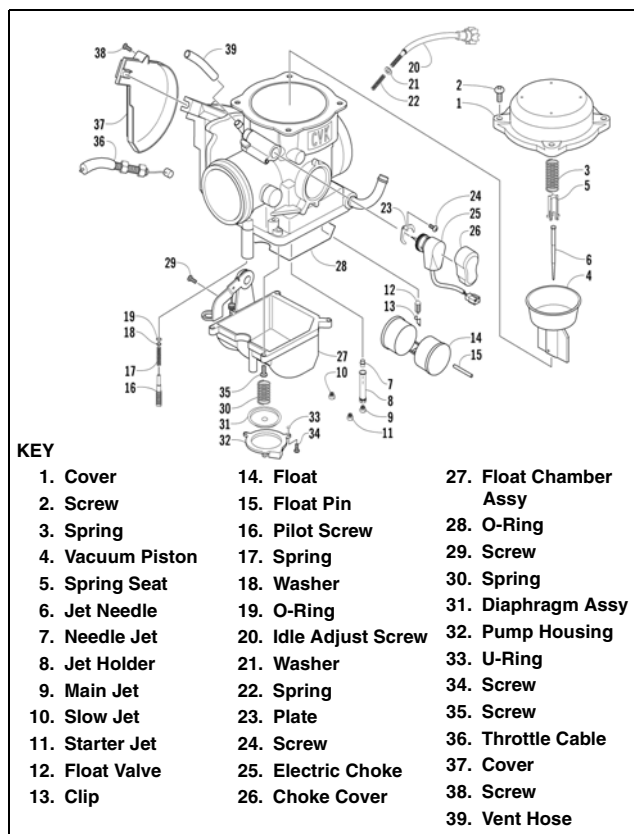
Description	p/n
Oil Pressure Test Kit	0644-495
Seal Removal Tool	0644-072
Tachometer	0644-275
Electric Choke Test Harness	0444-247

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

## Carburetor Specifications (400/500)

Item	400	500
Carburetor	Keihin CVK34	Keihin CVK36
Main Jet	138	138
Slow Jet	40	40
Pilot Screw Setting (turns)	1 3/4	1 3/4
Jet Needle	NAZG	NFKG
Idle RPM (engine warm)	1250-1350	1250-1350
Starter Jet	75	85
Float Arm Height	17 mm (0.7 in.)	17 mm (0.7 in.)
Throttle Cable Free-Play (at lever)	3-6 mm (1/8-1/4 in.)	3-6 mm (1/8-1/4 in.)

## Carburetor Schematics (400/500)



0740-600

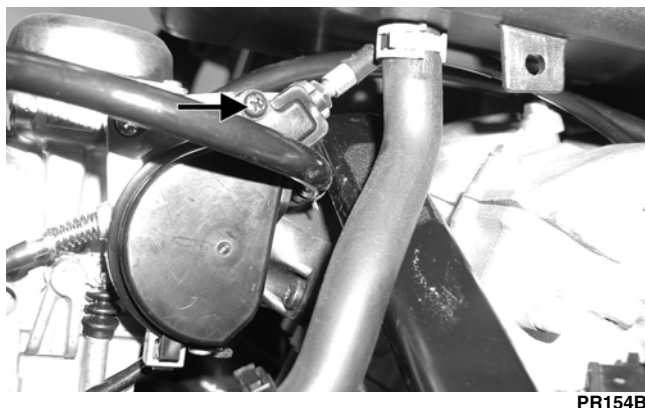
## Carburetor (400/500)

### ⚠ 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.

### REMOVING

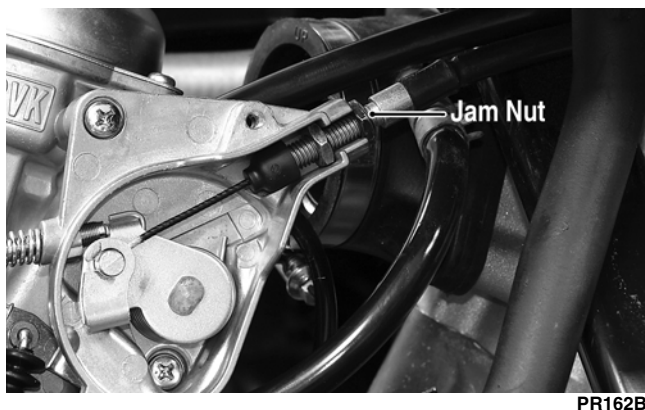
1. Remove the seat.
2. As necessary to access the carburetor, remove the air-intake snorkel, the air filter housing cover, or the air filter housing.
3. Disconnect the gasoline hose from the carburetor to the fuel pump.
4. Loosen the flange clamps; then remove the carburetor from the intake pipe.
5. Remove the screw securing the throttle actuator cover to the carburetor; then remove the cover.



6. Remove the throttle cable from the actuator arm.



7. Loosen the outer jam nut securing the throttle cable to the carburetor body; then route the cable out of the way.

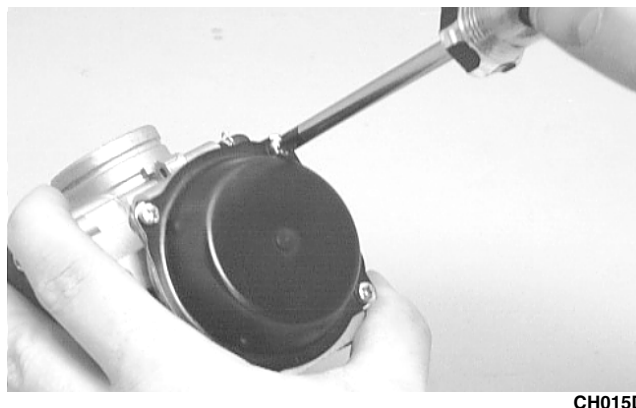


8. Disconnect the electric choke lead from the wiring harness.

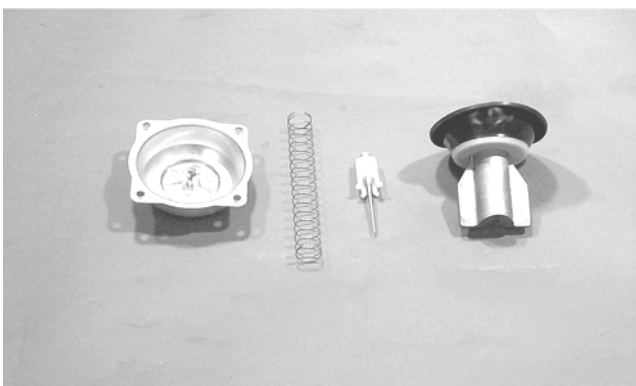
9. Disconnect the vent hose; then remove the carburetor.

## DISASSEMBLING

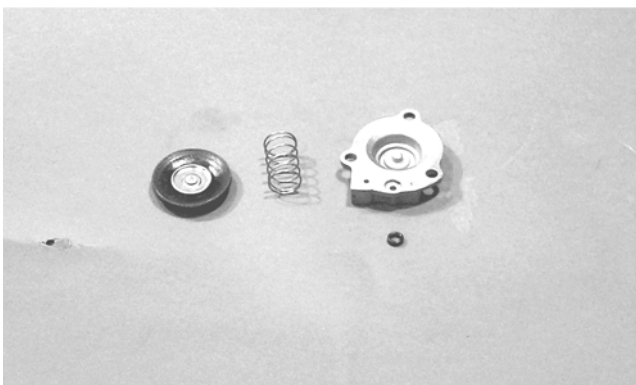
1. Remove the four Phillips-head screws securing the top cover; then remove the cover.



2. Remove the vacuum piston assembly from the carburetor body. Account for a spring, spring seat, and the jet needle.

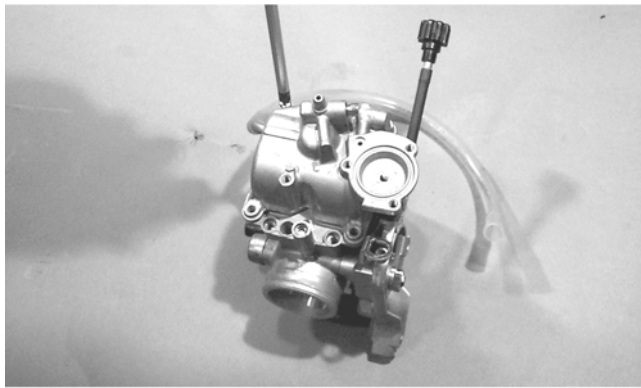


3. Remove the three screws securing the pump housing. Account for the diaphragm assembly, spring, and U-ring (in the housing).

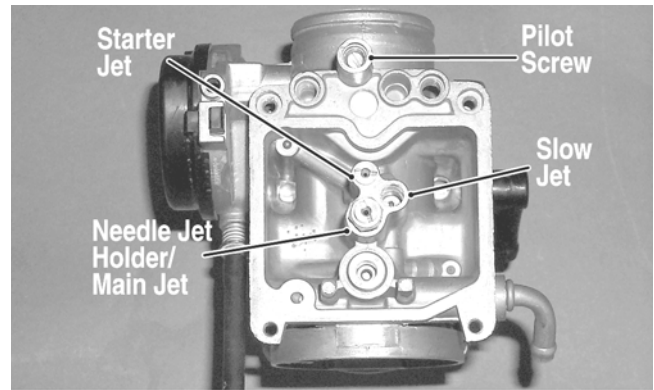


4. Remove the Phillips-head screws securing the float chamber; then remove the chamber. Account for the O-ring.

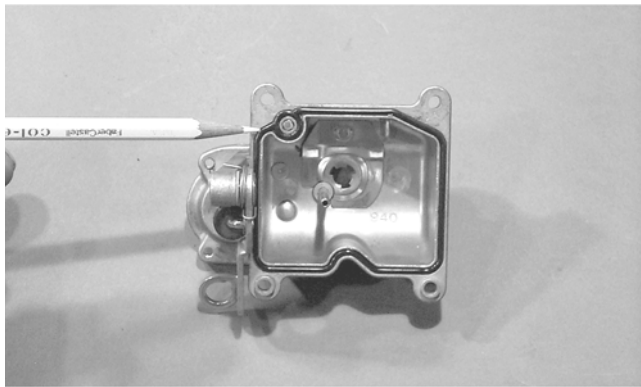
4



CC749

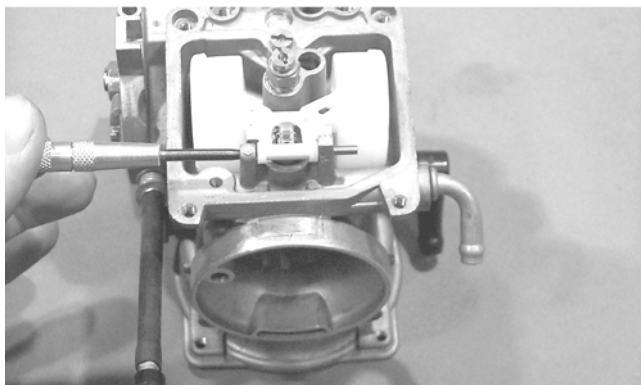


CC761A



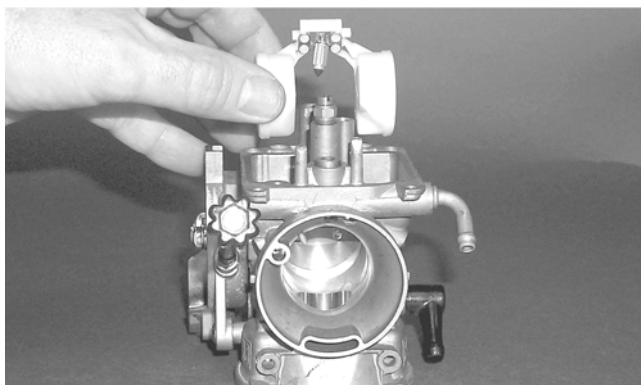
CC750

5. Remove the float pin.



CC752

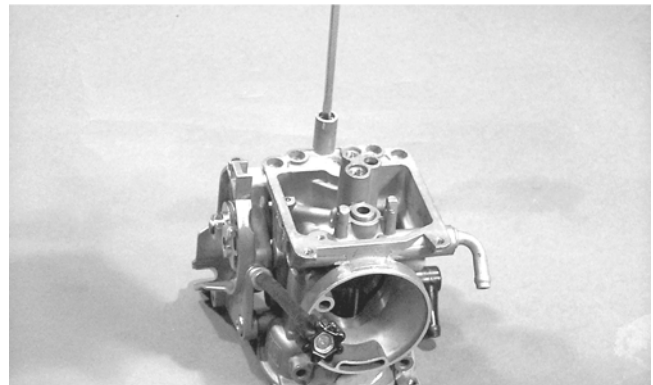
6. Lift the float assembly from the carburetor. Account for the float valve.



CC753

■NOTE: Note the locations of the jets, pilot screw, and holder for disassembling procedures.

7. Secure the needle jet holder with a wrench; then remove the main jet.
8. Remove the needle jet holder; then remove the needle jet, slow jet, and the starter jet.
9. Remove the pilot screw. Account for a spring, washer, and an O-ring.



CC758

10. Unscrew and remove the idle adjust screw. Account for the spring and washer.

## CLEANING AND INSPECTING

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

### ⚠ WARNING

When drying components with compressed air, always wear safety glasses.

### ⚠ CAUTION

DO NOT place any non-metallic components in parts-cleaning solvent because damage or deterioration will result.

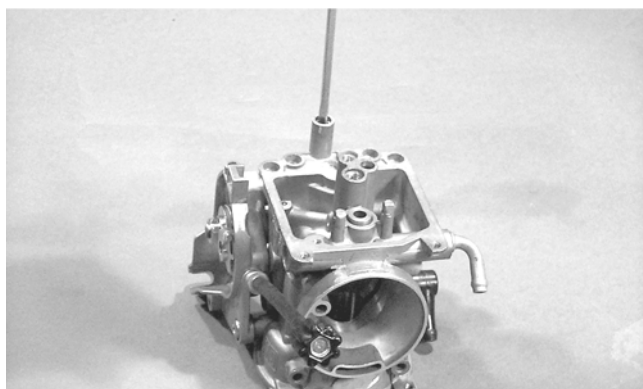
1. Place all metallic components in a wire basket and submerge in carburetor cleaner.
2. Soak for 30 minutes; then rinse with clean, hot water.
3. Wash all non-metallic components with soap and water. Rinse thoroughly.



4. Dry all components with compressed air only making sure all holes, orifices, and channels are unobstructed.
  5. Inspect the carburetor body for cracks, nicks, stripped threads, and any imperfections in the casting.
  6. Inspect the vacuum piston/diaphragm for cracks, imperfections in the casting, or cracks and tears in the rubber.
  7. Inspect float for damage.
  8. Inspect gasket and O-rings for distortion, tears, or noticeable damage.
  9. Inspect tips of the jet needle, pilot screw, and the needle jet for wear, damage, or distortion.
  10. Inspect the slow jet and main jet for obstructions or damage.
- NOTE: If the slow jet is obstructed, the mixture will be extremely lean at idle and part-throttle operation.**
11. Inspect the float valve for wear or damage.
  12. Inspect the carburetor mounting flange for damage and tightness.

## ASSEMBLING

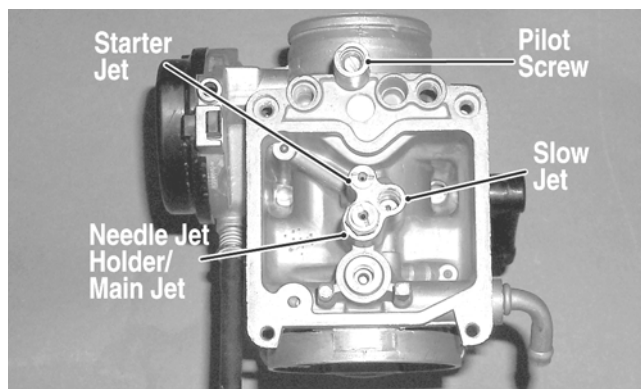
1. Thread the idle adjust screw into the carburetor making sure the washer and spring are properly positioned.
2. Install the pilot screw, spring, washer, and O-ring.



CC758

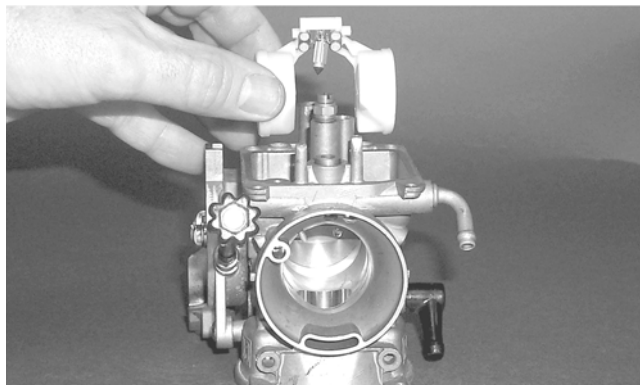
**■NOTE: Turn the pilot screw clockwise until it is lightly seated; then turn it counterclockwise the recommended number of turns as an initial setting.**

**■NOTE: Note the locations of the jets and holder during assembling procedures.**



CC761A

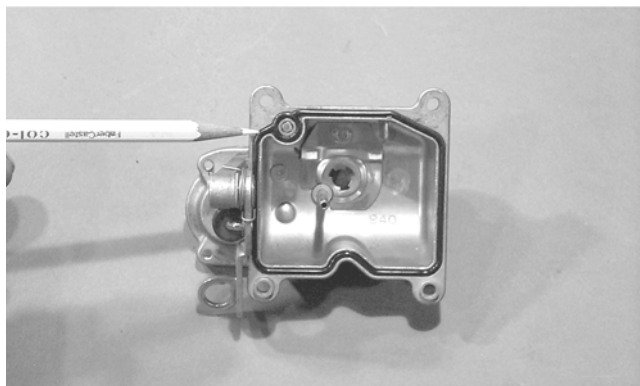
3. Install the slow jet. Tighten securely.
4. Install the main jet into the needle jet holder and tighten securely; then install the needle jet and needle jet holder assembly into the carburetor and tighten securely.
5. Place the float assembly (with float valve) into position and secure to the carburetor with the float pin.



CC753

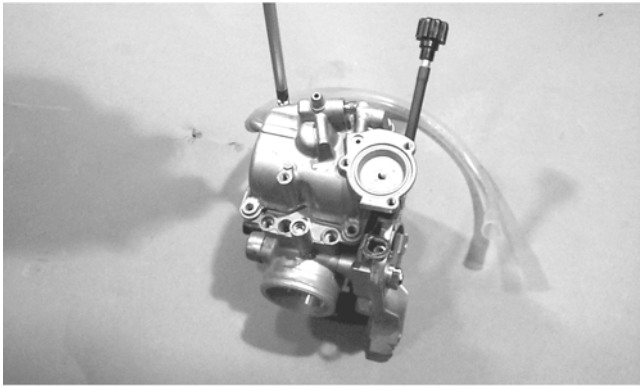
**■NOTE: Check float arm height by placing the carburetor on its side w/float contacting the needle; then measure with a caliper the height when the float arm is in contact with the needle valve. Float arm height should be 17 mm (0.7 in.).**

6. Place the float chamber into position making sure the O-ring is properly positioned; then secure with the Phillips-head screws.



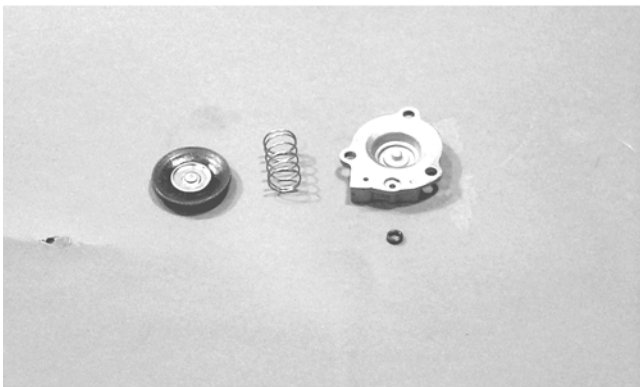
CC750

4



CC749

7. Place the U-ring into the pump housing. Position the spring and diaphragm assembly (lip toward the carburetor) onto the carburetor; then secure the assembly with the pump housing and three screws. Tighten securely.

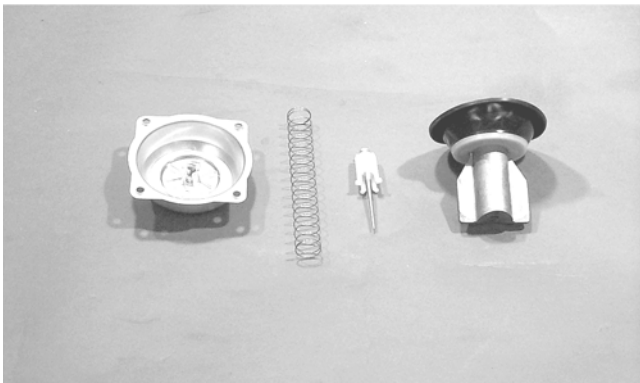


CC748

### **CAUTION**

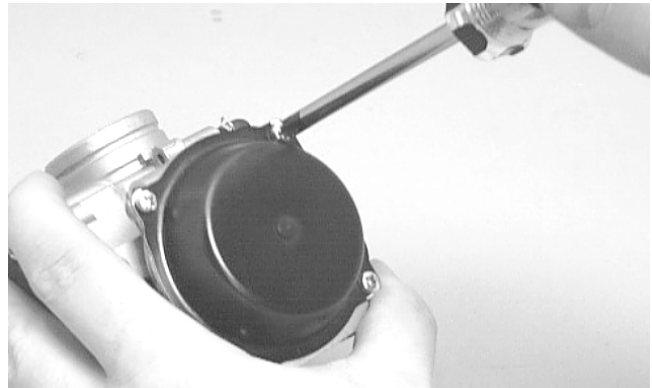
It is important to press down on the pump housing until it contacts the carburetor to make sure the diaphragm lip is properly seated in the groove in the carburetor. If the diaphragm is not properly seated, leakage will occur.

8. Place the jet needle, spring seat, and spring into the vacuum piston; then place the assembly down into the carburetor.



CC746

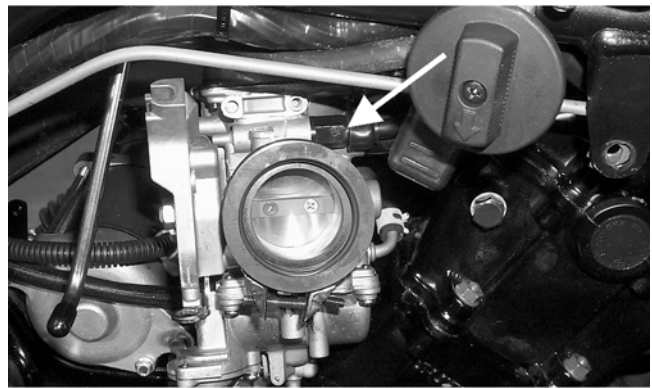
9. Place the top cover into position; then secure with the Phillips-head screws. Tighten securely.



CH015D

## **INSTALLING**

1. Connect the gas and vent hoses onto the carburetor.
2. Connect the electric choke lead to the wiring harness.



CC740A

3. Place the throttle cable into position and secure by tightening the outer jam nut.



PR162B

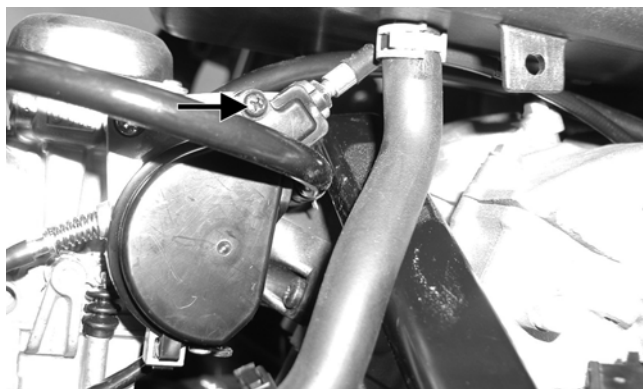
4. Connect the throttle cable to the actuator arm.





PR162C

5. Place the throttle actuator cover into position on the carburetor; then secure with the screw.



PR154B

6. Position the carburetor in the air cleaner boot and intake pipe assembly; then secure with the clamps.
7. Connect the hose from the carburetor to the gas tank.
8. As necessary, secure the air-intake snorkel, the air filter housing cover, or the air filter housing.
9. Install the seat.

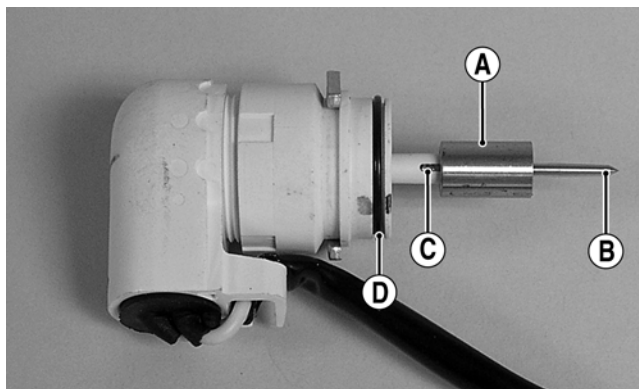
## Electric Choke (400/500)

### REMOVING

1. Disconnect the electric choke connector from the wiring harness; then remove the screw securing the choke body to the carburetor.
2. Carefully remove the choke assembly from the carburetor taking care not to force the plunger from the carburetor body.

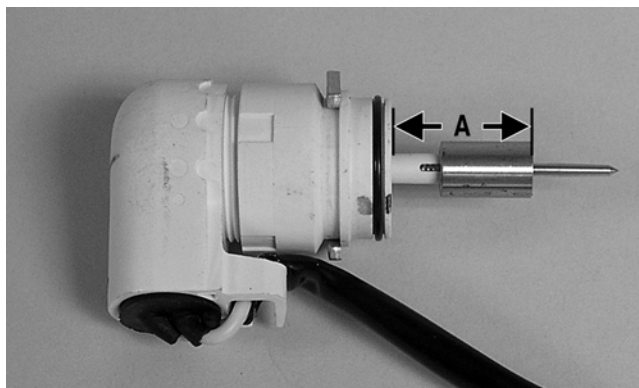
### INSPECTING/TESTING

1. Inspect the plunger (A) for scoring or scratches, the needle (B) for damage to the tip, the spring (C) for breakage, and the O-ring (D) for breaks.



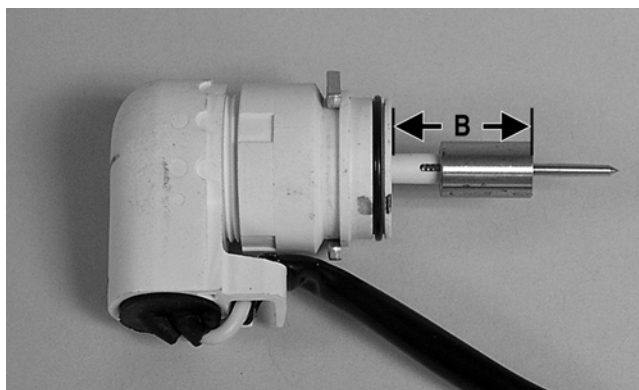
KC328A

2. With the choke at room temperature (approximately 70° F), measure plunger extension. Measurement (A) should be 18.6-19.1 mm.



KC328B

3. Connect Electric Choke Test Harness to the choke connector and a suitable 12 DC volt power supply for 2-3 minutes. Disconnect the power and measure plunger extension. Measurement (B) should be 22.1-23.4 mm.



KC328C

4. If the choke is damaged or the measurements are not within specifications, the choke must be replaced.

### INSTALLING

1. Lightly lubricate the O-ring on the choke body; then carefully insert the choke assembly into the carburetor being careful not to damage the plunger.



2. Secure the choke with the screw and tighten securely; then connect the choke connector to the wiring harness.

## Electronic Fuel Injection (EFI Models)

### **⚠ 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.

### TROUBLESHOOTING

1. Verify that the electric fuel pump is operating by listening for a “whirring” sound for several seconds after the ignition switch is turned to the ON position. If no sound can be heard, see Electric Fuel Pump/Fuel Level Sensor (EFI Models) in this section.
2. Check for a flashing EFI icon on the LCD. If EFI is flashing, see ECU Error Codes (EFI Models) in Section 5.
3. Make sure there is sufficient, clean gas in the gas tank.
4. Verify that the battery is sufficiently charged to crank the engine over at normal speed.
5. Check the air filter housing and air filter for contamination. Clean or replace as necessary (see Section 2).

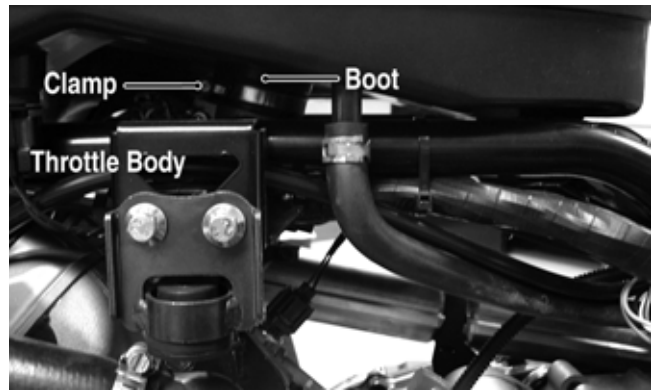
### REMOVING (H1 Models)

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. Disconnect the battery; then remove the seat.
3. Remove the storage compartment cover and air filter housing cover; then remove the air filter.
4. Loosen the clamp securing the air filter housing boot to the throttle body inlet; then remove the boot from the throttle body.

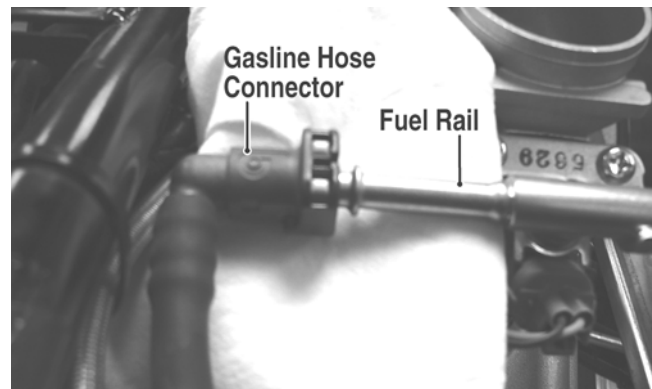


FI081B

5. Slowly disconnect the gasoline hose connector from the fuel rail.

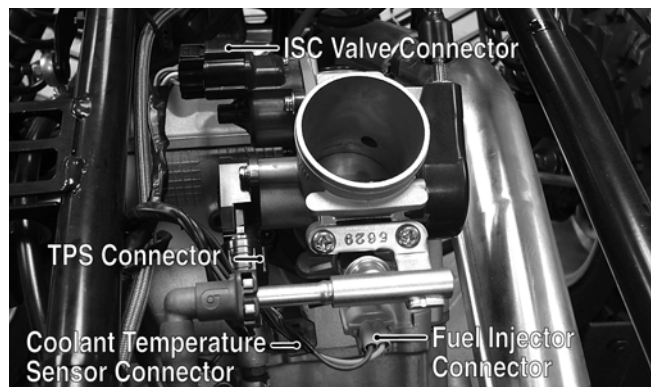
### **⚠ WARNING**

Gasoline may be under pressure. Place an absorbent towel under the connector to absorb any gasoline spray when disconnecting.



FI092A

6. Remove the screw securing the throttle actuator cover to the throttle body; then remove the cover.
7. Remove the throttle cable from the actuator arm.
8. Loosen the outer jam nut securing the throttle cable to the throttle body; then route the cable out of the way.
9. Remove the four electrical connectors from the throttle body components.



FI089A

10. Remove the cap screws securing the intake pipe to the cylinder head and remove the throttle body assembly; then remove the intake pipe from the throttle body. Account for an O-ring.



FI104A

11. Use tape to cover and seal the intake opening.

**CAUTION**

Any objects or liquid entering the intake opening will fall into the engine causing severe damage if the engine is turned over or started.

**REMOVING (H2 Models)**

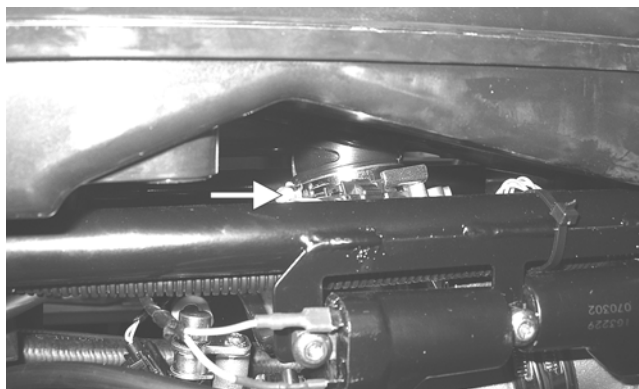
**WARNING**

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.

1. Remove the front rack and body panel (see Section 8).
2. Disconnect the wires from the IAT sensor; then loosen the clamp and remove the inlet air boot from the air filter housing.

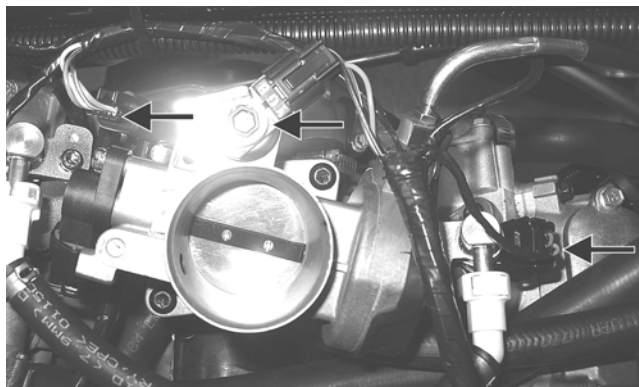


GZ379

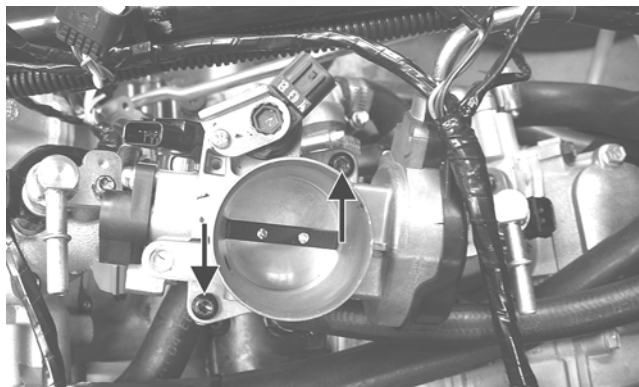


GZ091A

3. Loosen the clamp on the throttle body intake boot; then remove the air filter housing from the ATV.
4. Disconnect the three wiring connectors from the sensors on the throttle body; then remove the cap screws securing the throttle body to the intake manifold.



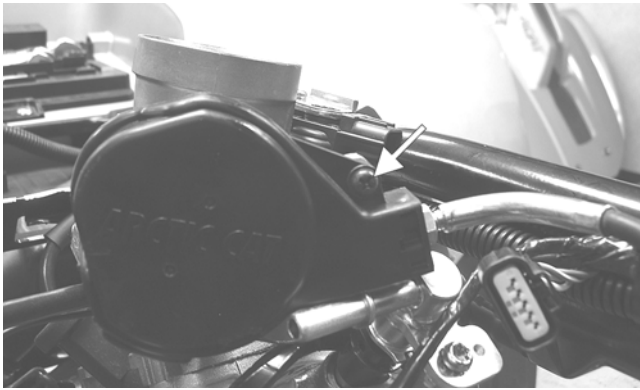
GZ094B



GZ381A

5. Remove the throttle arm cover and disconnect the throttle cable; then remove the throttle body from the ATV.

4



GZ383A

6. Use tape to cover and seal the intake opening.

### **CAUTION**

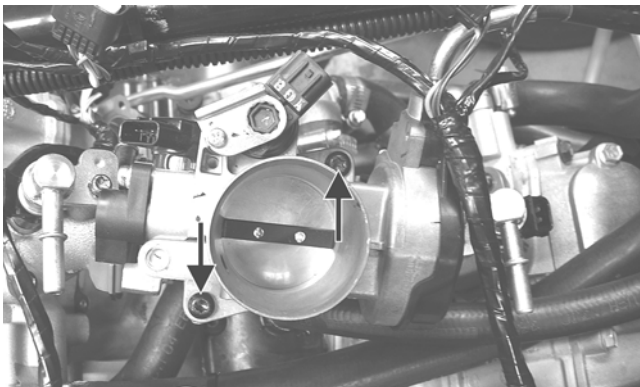
Any objects or liquid entering the intake opening will fall into the engine causing severe damage if the engine is turned over or started.

## **INSTALLING (H1 Models)**

1. Install the throttle body into the intake pipe and secure with the clamp. Tighten securely.
2. Place a new O-ring in the intake pipe; then position the pipe onto the engine and secure with two cap screws.
3. Connect the throttle cable to the throttle body and adjust throttle free-play (see Section 2); then connect the gasoline hose.
4. Connect the four electrical connectors to the throttle body components.
5. Install the air filter housing boot and secure with the clamp; then install the air filter, air filter cover, storage compartment, and storage compartment cover.
6. Install the seat making sure it locks securely in place.

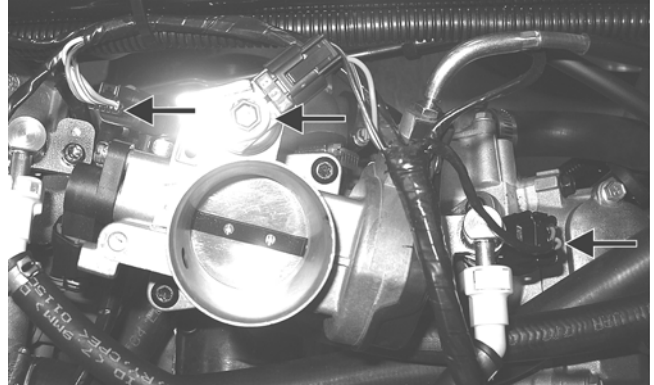
## **INSTALLING (H2 Models)**

1. Connect the throttle cable to the throttle body; then remove the tape from the intake manifold and install the throttle body using a new O-ring. Tighten the cap screws securely.

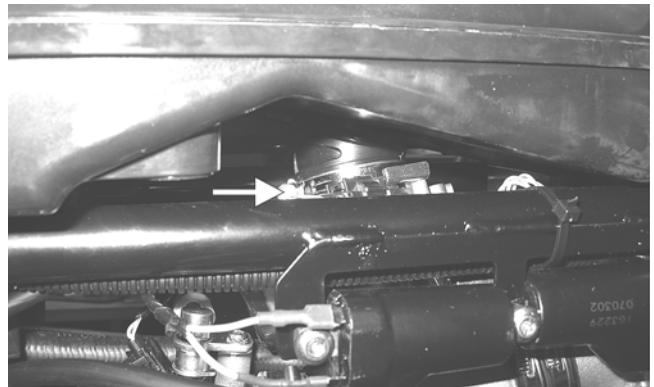


GZ381A

2. Connect the three wiring connectors to the sensors; then install the air filter housing and connect all hoses. Tighten all clamps securely.



GZ094B



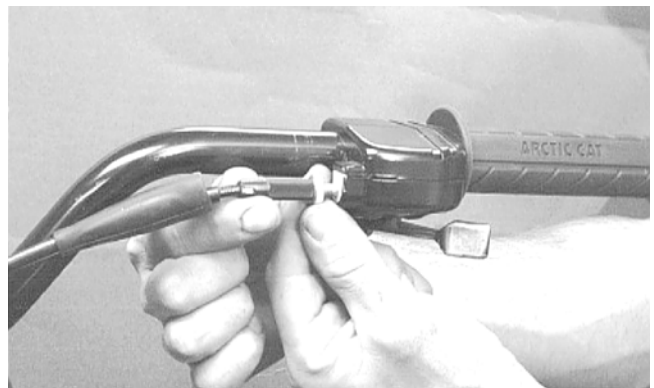
GZ091A

3. Connect the wiring connector to the IAT sensor
4. Install the front rack and body panel (see Section 8).
5. Install the seat making sure it locks securely in place.

## **Throttle Cable Free-Play**

To adjust the throttle cable free-play, follow this procedure.

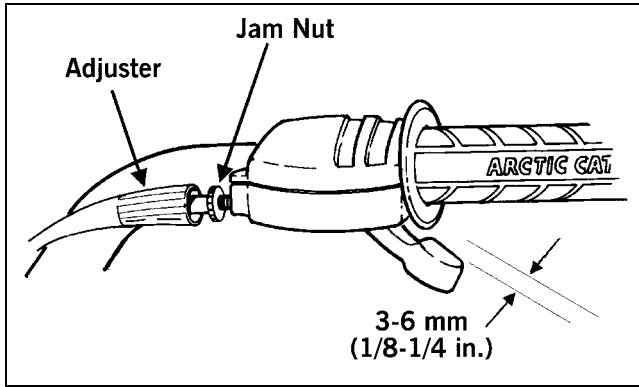
1. Slide the rubber boot away; then loosen the jam nut from the throttle cable adjuster.



AL611D



- Turn the adjuster until the throttle cable has proper free-play of 3-6 mm (1/8-1/4 in.) at the lever.



ATV-0047

- Tighten the jam nut against the throttle cable adjuster securely; then slide the rubber boot over the adjuster.

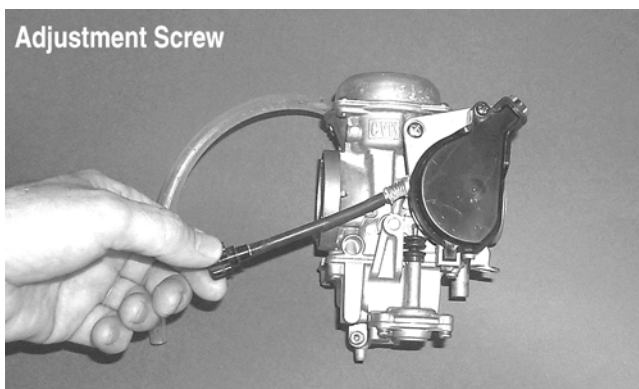
## Engine RPM (Idle)

■NOTE: The idle RPM is not adjustable on the EFI models.

To properly adjust the idle RPM, a tachometer is necessary. To adjust idle RPM, use the following procedure.

■NOTE: The idle adjustment screw is located on the right-hand side of the carburetor.

- With the transmission in neutral, start the engine and warm it up to normal operating temperature.
- Turn the idle adjustment screw clockwise one turn past the recommended RPM setting; then turn it counterclockwise to 1250-1350 RPM.



AF920D

### ⚠ WARNING

Adjust the idle to the correct RPM. Make sure the engine is at normal operating temperature before adjusting the idle RPM.

## 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

- Remove the seat.
- Remove the rear rack and fenders (see Section 8).
- Disconnect the hose from the fuel pump to the carburetor/throttle body.
- Remove the cap screws securing the gas tank to the frame.
- Disconnect the fuel gauge connector; then remove the gas tank.

### CLEANING AND INSPECTING

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

- Clean all gas tank components with parts-cleaning solvent.
- Inspect all hoses for cracks or leaks.
- Inspect tank cap and tank for leaks, holes, and damaged threads.
- Remove the fuel level sensor/fuel pick-up assembly and inspect the fuel level sensor and fuel screen.

■NOTE: If the fuel level sensor has failed or may be faulty, see Electric Fuel Pump/Fuel Level Sensor (EFI Models) in this section.

### INSTALLING

- Install the fuel level sensor/fuel pick-up assembly.
- Place the gas tank into position in the frame; then install the cap screws. Tighten securely.
- Connect the gas hose from the carburetor/throttle body; then connect the fuel gauge connector.
- Install the vent hose; then fill the gas tank with gasoline.
- Start the engine and inspect for leakage.
- Install the rear fenders and rack; then install the seat making sure it latches securely.

4

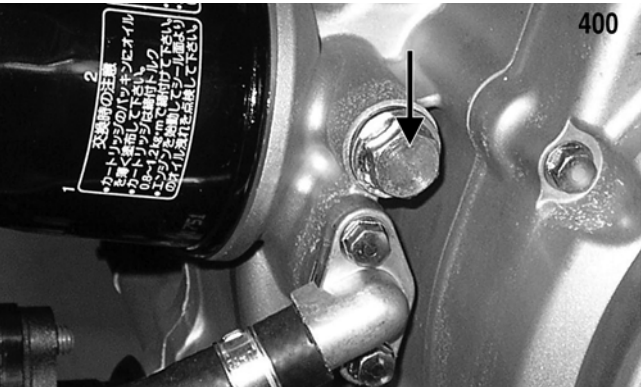
# Oil Filter/Oil Pump

■NOTE: Whenever internal engine components wear excessively or break and whenever oil is contaminated, the oil pump should be replaced. The oil pump is not a serviceable component.

## Testing Oil Pump Pressure

■NOTE: The engine must be warmed up to the specified temperature for this test.

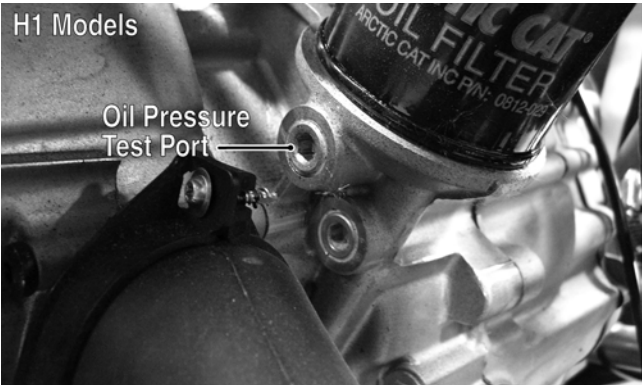
- 1. Connect the Tachometer to the engine or utilize the LCD (if equipped).
- 2. Connect the Oil Pressure Test Kit to the oil filter drain plug (400/500), the oil pressure test port (H1 models), or the oil cooler to oil filter line (H2 models).



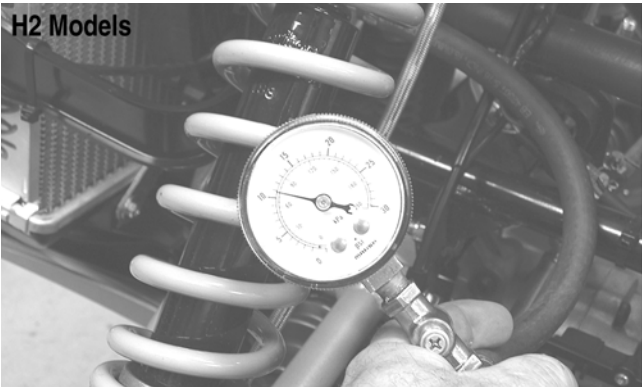
KC195B



CD457D



CF264B



GZ388A

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

- 3. Start the engine and run at 3000 RPM. With the oil temperature at 60° C (140° F), the oil pressure gauge must read as specified.

400/500/700	H2 Models
1.05-1.76 kg/cm <sup>2</sup> (15-25 psi)	0.7-1.4kg/cm <sup>2</sup> (10-20 psi)

■NOTE: If the oil pressure is lower than specified, check for low oil level, defective oil pump, or restricted oil cooler.

■NOTE: If the oil pressure is higher than specified, check for too heavy engine oil weight (see Section 2), clogged oil passage, clogged oil filter, or improper installation of the oil filter.

## Oil Cooler (400/700/H2 Models)

### REMOVING

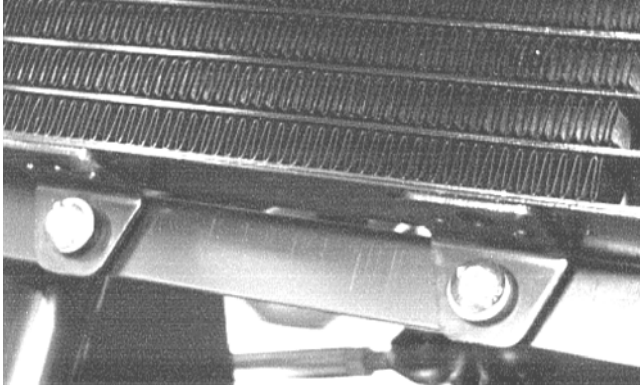
■NOTE: It is not necessary to drain the engine oil for this procedure.

1. Remove the input and output hoses from the fittings on the cooler.

**⚠ CAUTION**

**Elevate and secure the hoses to avoid oil spillage.**

2. Remove the cap screws securing the oil cooler to the frame. Account for grommets.



AL651D

3. Remove the oil cooler from the frame.

## INSTALLING

1. Place the cooler into position in the frame.
2. Secure the cooler to the frame with the cap screws and grommets.
3. Install the hoses onto their respective fittings and secure with the clamps.

## Liquid Cooling System (500/H1/H2 Models)

When filling the cooling system, use premixed Arctic Cat Antifreeze. While the cooling system is being filled, air pockets may develop; therefore, run the engine for five minutes after the initial fill, shut the engine off, and then fill the cooling system to the bottom of the stand pipe in the radiator neck.

**⚠ CAUTION**

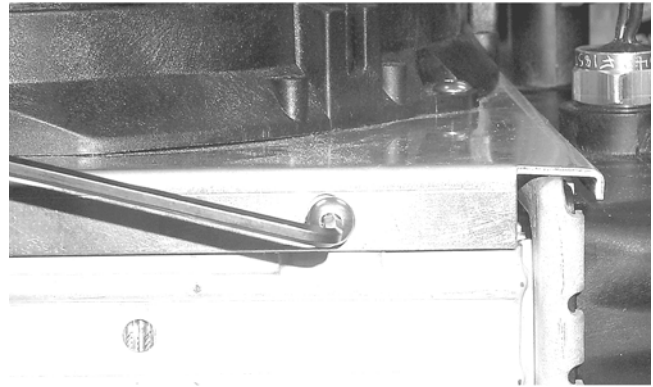
**After operating the ATV for the initial 5-10 minutes, stop the engine, allow the engine to cool down, and check the coolant level. Add coolant as necessary.**

## RADIATOR

### Removing

1. Drain the coolant at the engine.
2. Remove the front rack (see Section 8).
3. Remove the front bumper and front fender panel (see Section 8).

4. Remove the upper and lower coolant hoses.
5. Remove the cap screws and nuts securing the radiator to the frame.
6. Disconnect the fan wiring from the main wiring harness; then remove the radiator/fan assembly and account for the grommets and collars.
7. Remove the fan/fan shroud assembly from the radiator.



CC863

## Cleaning and Inspecting

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

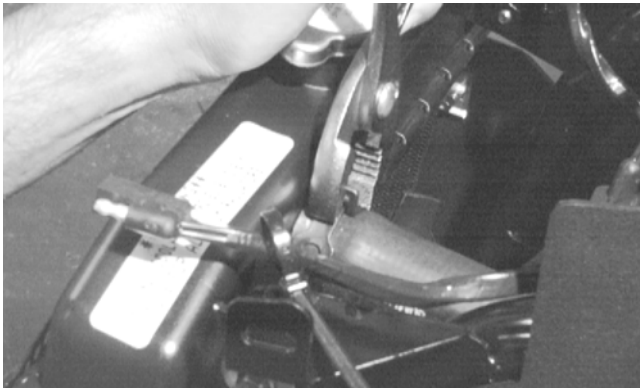
1. Flush the radiator with water to remove any contaminants.
2. Inspect the radiator for leaks and damage.
3. Inspect all hoses for cracks and deterioration.
4. Inspect all fasteners and grommets for damage or wear.

## Installing

1. Position the fan/fan shroud assembly on the radiator; then secure with existing hardware.
2. Place the radiator with grommets and collars into position on the frame; then install the cap screws and nuts. Tighten securely.
3. Install the upper and lower coolant hoses; then secure with hose clamps.

4





AF734D

4. Install the front bumper and front fender panel.
5. Install the front rack.
6. Fill the cooling system with the recommended amount of antifreeze. Check for leakage.
7. Connect the fan wiring to the main wiring harness.

## HOSES/THERMOSTAT

### Removing (500/H1 Models)

1. Drain approximately one quart of coolant from the cooling system.
2. Remove the two cap screws securing the thermostat housing to the cylinder head. Account for an O-ring and a thermostat.

### Removing (H2 Models)

■NOTE: The thermostat is located in a housing in-line with the upper radiator hoses under the air filter housing.



GZ036A

1. Drain approximately one quart of coolant from the cooling system.
2. Remove the machine screws securing the thermostat housing together. Remove the thermostat and account for an O-ring.

## Inspecting

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

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 73.5-76.5° C (164-170° 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 (500/H1 Models)

1. Place the thermostat and O-ring into the thermostat housing; then secure the thermostat housing to the cylinder head with the two cap screws.
2. Install the crossover coolant hose onto the water pump and engine water inlet. Secure with the two hose clamps.
3. Slide the upper hose onto the thermostat housing and radiator. Secure with the two hose clamps.
4. Install the lower coolant hose onto the water pump housing and radiator. Secure with the two hose clamps.
5. Fill the cooling system with the recommended amount of antifreeze. Check for leakage.

### Installing (H2 Models)

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

## COOLING FAN

### Removing

1. Remove the radiator (see Liquid Cooling System in this section).
2. Remove the fan assembly from the radiator.

## Installing

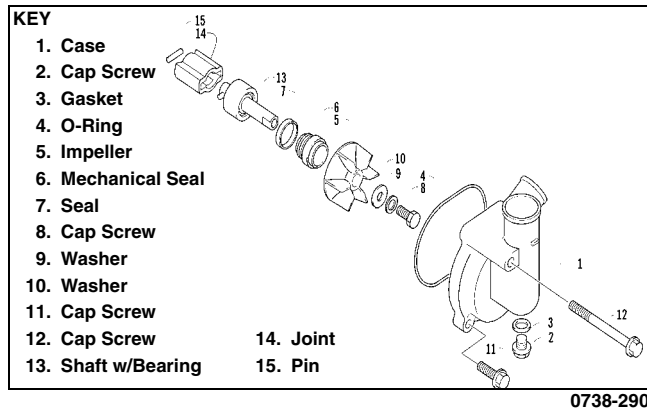
1. Position the fan assembly on the radiator; then secure with existing hardware.

■NOTE: The fan wiring must be in the upper-right position.

2. Install the radiator.

## WATER PUMP (500 - Manual Transmission)

### Removing/Disassembling



1. Drain the coolant.
2. Remove the three cap screws securing the water pump case. Note the position of the long cap screw and account for the O-ring.
3. Remove the impeller cap screw, washer, and gasket.
4. Remove the mechanical seal using this procedure.
  - A. Tap the tip of a small sheet metal screw into the inner-metal edge of the seal.
  - B. Grip the screw with a pair of vise-grip pliers and pull the seal out. Account for the pump drive seal.

### Cleaning and Inspecting

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

1. Clean all pump components in solvent.
2. Inspect the mechanical seal and pump drive seal for damage.

■NOTE: If the mechanical seal and/or pump drive seal are damaged, they must be replaced as a set.

3. Inspect the impeller for corrosion or damage.

## Assembling/Installing

■NOTE: Treat seals and O-rings with clean anti-freeze for initial lubrication.

1. Press the mechanical seal with pump drive seal into the impeller by hand.
2. Install the mechanical seal assembly onto the water pump shaft and secure with the cap screw, washer, and gasket. Tighten the cap screw securely.
3. Place the water pump case into position and secure with the three cap screws. Note the position of the long cap screw from removal.
4. Fill the cooling system with the recommended amount of antifreeze.

■NOTE: While the cooling system is being filled, air pockets may develop; therefore, run the engine for five minutes after the initial fill, shut the engine off, and then fill the cooling system.

5. Check the entire cooling system for leakage.

## WATER PUMP (500 - Automatic Transmission/H1 Models)

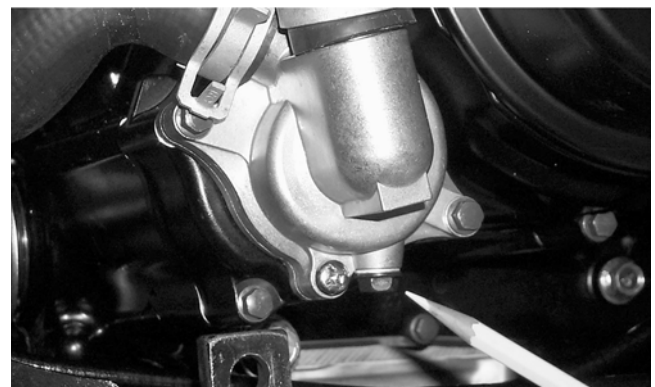
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■NOTE: On the H1 models, the water pump is a non-serviceable component. It must be replaced as an assembly.

■NOTE: On the 500 when servicing the water pump, it will be necessary to install a new oil seal and a new mechanical seal.

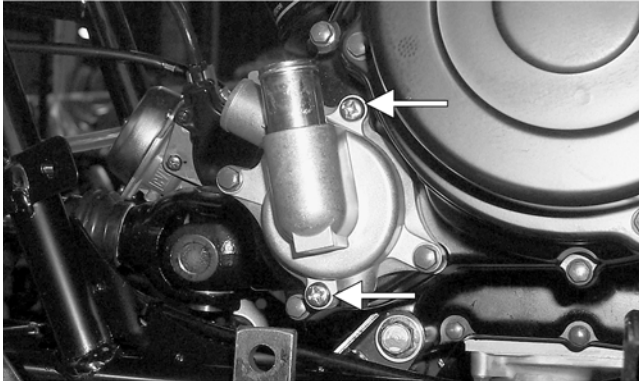
### Removing

1. Remove the radiator cap; then remove the water pump drain and drain the coolant.



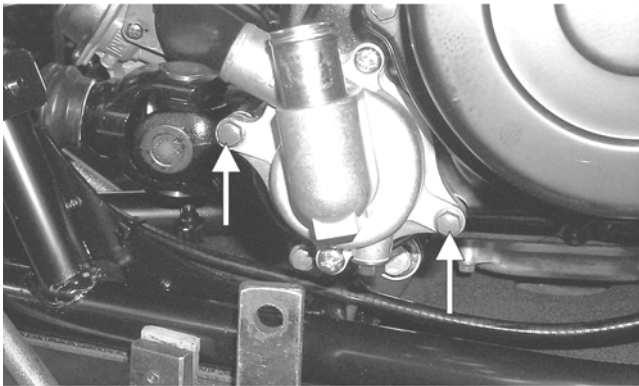
2. Drain the oil from the engine/transmission.
3. Remove the four torx-head cap screws securing the front and rear fenders to the footrest; then remove the four cap screws securing the footrest to the frame. Remove the footrest.

4. Loosen the hose clamps and slide the clamps away from the hose ends approximately 2 in.; then remove both hoses from the water pump.
5. Using an impact driver, loosen but do not remove the two Phillips-head cover screws.



CC785A

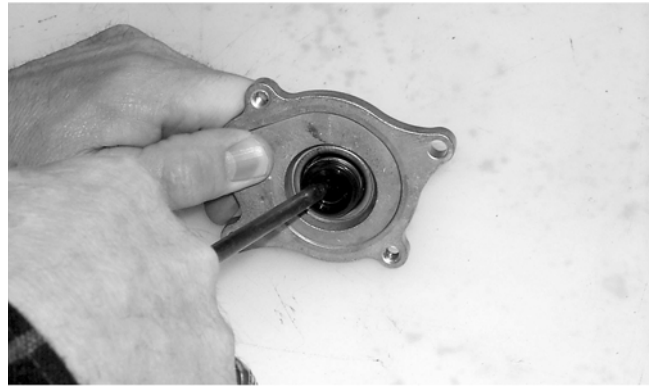
6. Remove the two cap screws securing the water pump to the engine; then remove the water pump.



CC786A

## Disassembling

1. Finish removing the two Phillips-head cap screws securing the cover to the bearing housing; then remove the cover. Account for the O-ring.
2. Remove the E-ring securing the impeller/shaft to the bearing housing; then remove the impeller/shaft.
3. Using Seal Removal Tool, remove the mechanical seal and the oil seal from the bearing housing.



CC772

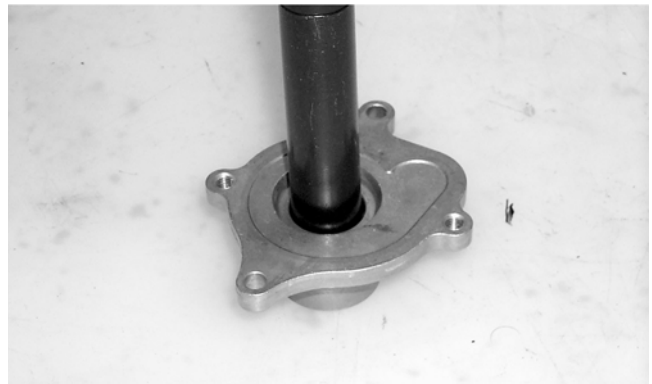
## Cleaning and Inspecting

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

1. Clean all oil-pump components in cleaning solvent.
2. Inspect the impeller/shaft for corrosion or damage.

## Assembling

1. Place the new oil seal into the bearing housing; then using a seal driver, gently tap the seal down until it is fully seated.



CC778

2. Place the new mechanical seal into the bearing housing; then tap it down until it is fully seated.

■ **NOTE:** A large deep-well socket can be used to drive the seal down evenly.

3. Install the impeller/shaft assembly into the bearing housing; then secure with the E-ring.

■ **NOTE:** Make sure the E-ring is fully seated and the impeller rotates freely.

4. While holding the bearing housing assembly in position on the engine, slowly rotate the impeller until the impeller/shaft engages properly with its slot in the driven shaft.



■NOTE: The bearing housing will be flush with the engine when the two shafts are properly engaged.

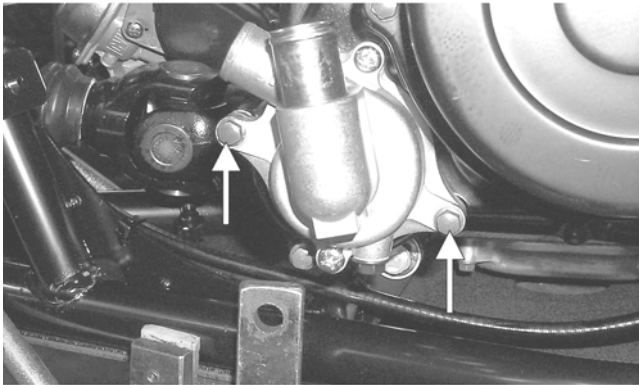
**CAUTION**

Failure to properly engage the two shafts could cause serious engine damage.

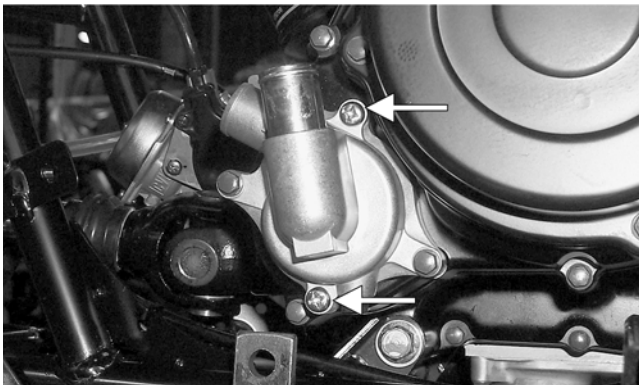
5. With the bearing housing assembly in position on the engine, place the cover (with O-ring installed) into position on the housing; then loosely secure with the two Phillips-head cap screws.

## Installing

1. Secure the water pump to the engine with the two cap screws tightened securely; then tighten the two Phillips-head cap screws securely.



CC786A



CC785A

2. Connect the two coolant hoses to the water pump and secure with the clamps. Tighten securely.
3. Place the footrest into position on the frame and loosely secure with four cap screws; then secure the front and rear fenders to the footrest with the four torx-head cap screws. Tighten the four torx-head cap screws securely; then tighten the remaining cap screws to 20 ft-lb.
4. Fill the engine/transmission with the proper amount of recommended oil.
5. Fill the cooling system with the proper amount of recommended coolant.

■NOTE: While the cooling system is being filled, air pockets may develop; therefore, run the engine for five minutes after the initial fill, shut the engine off, and then fill the cooling system.

6. Check the entire cooling system for leakage.

**CAUTION**

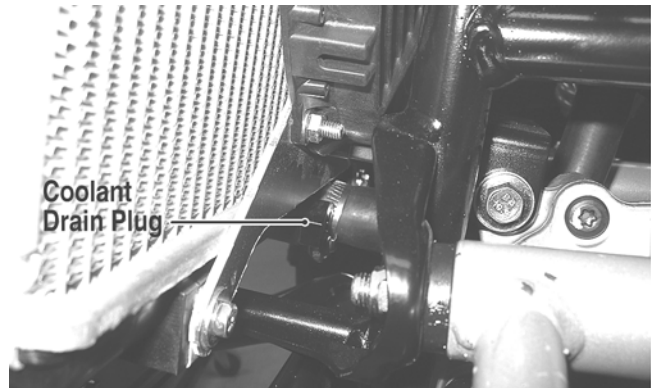
After operating the ATV for the initial 5-10 minutes, stop the engine, allow the engine to cool down, and check the coolant level. Add coolant as necessary.

## WATER PUMP (H2 Models)

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

## Removing

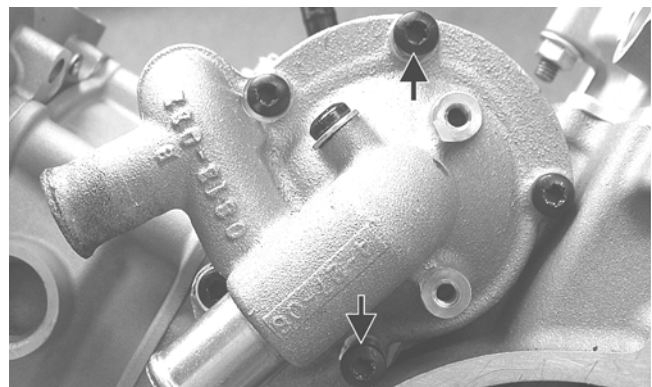
1. Remove the coolant drain plug; then remove the radiator cap and drain the coolant into a suitable container.



GZ093A

■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 coolant hoses from the water pump; then remove two cap screws securing the water pump to the crankcase.

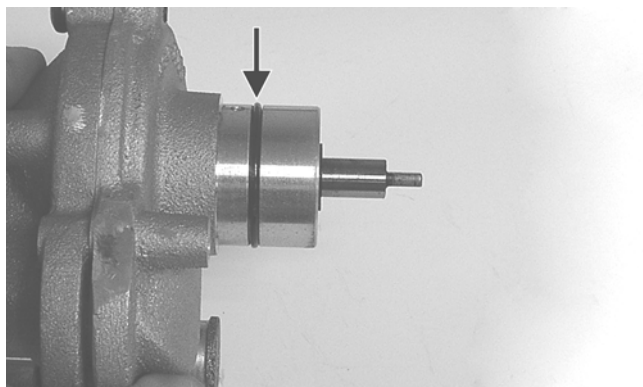


GZ230A

3. Remove the water pump from the engine.

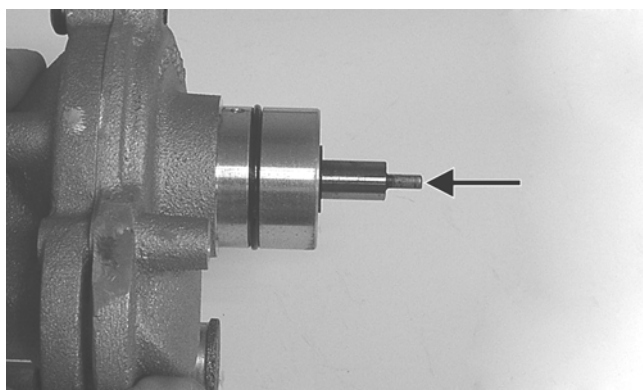
## Installing

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



GZ252C

2. Install the water pump assembly onto the engine aligning the flat drive on the water pump to the slot in the driveshaft.



GZ252D

### **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.
4. Tighten the coolant drain plug securely; then 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 ATV for the initial 5-10 minutes, stop the engine, allow the engine to cool down, and check the coolant level. Add coolant as necessary.

## Electric Fuel Pump/ Fuel Level Sensor (EFI Models)

The electric 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.

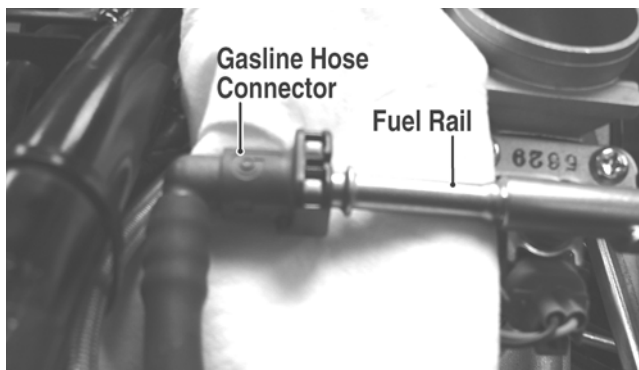
### **AT THIS POINT**

Prior to removing the electric fuel pump, the following check 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 throttle body; 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.



F1092A

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. If the pump is not running, disconnect the fuel pump/tank sensor connector by reaching under the rear rack from behind.

5. Connect a multimeter to the power supply leads with the red tester lead to the red wire and the black tester lead to the black wire; then turn the ignition switch to the ON position. The meter should read battery voltage. If battery voltage is indicated and the fuel pump does not run, replace the pump assembly. If no battery voltage is indicated, check the ECU and the vehicle tilt sensor.

## REMOVING

1. Remove the rear rack and fenders (see Section 8); then disconnect the power supply/fuel hose connector.
2. Remove the spring clamp; then remove the fuel hose.
3. Remove the screws securing the fuel pump to the gas tank; then make a reference mark on the fuel pump and tank.
4. Lift out the fuel pump assembly carefully tilting it forward to clear the voltage regulator; then guide the pump and float lever through the opening in the gas tank.

### ⚠ CAUTION

Take care not to damage the float or float arm or replacement of the entire assembly will be necessary.

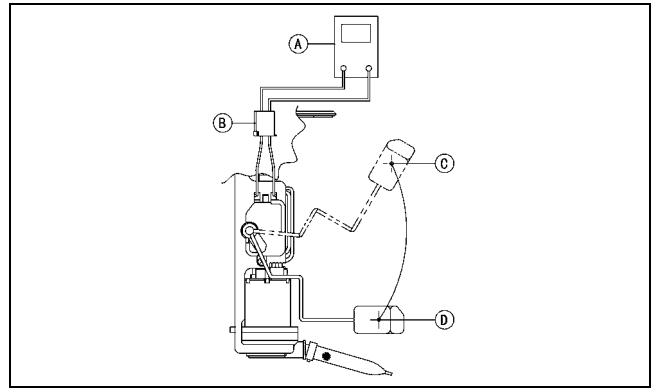
5. Using duct tape or other suitable means, cover the fuel pump opening.

## 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 pump 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).

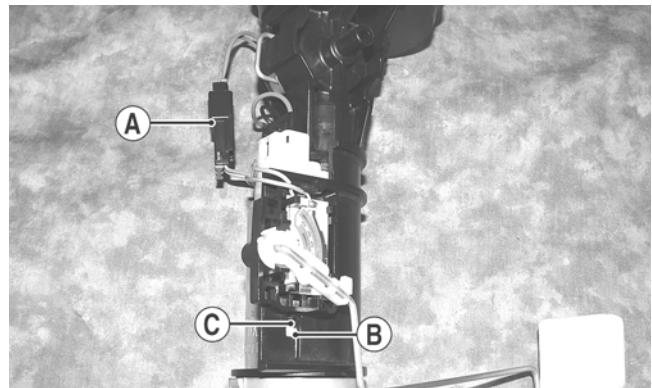


ATV2116

■NOTE: If readings are erratic, clean the resistor wiper and resistor with clean alcohol and retest. If still not correct, replace the fuel level sensor.

4. To replace the fuel level sensor, use the following procedure.

- A. Disconnect the two-wire connector (A); then press the fuel level sensor toward the top of the fuel pump to release it from the mounting slot (B).



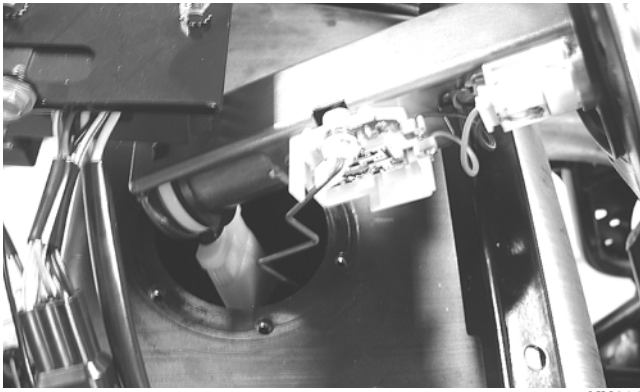
FI460A

- B. Engage the tabs (C) of the fuel level sensor into the mounting slot (B) and press toward the bottom of the fuel pump to latch in place; then connect the two-wire connector (A).

## INSTALLING

1. Mark the new fuel pump with a reference mark in the same location as the removed pump; then place the new gasket on the pump.
2. Remove the material covering the fuel pump opening; then carefully guide the fuel pump into position taking care not to damage the float or float lever.





KX190

3. Rotate the fuel pump until the match marks align; then install the mounting screws and tighten securely using a crisscross pattern.

■**NOTE:** It is important to install the fuel pump with the correct orientation to ensure adequate float lever clearance.

4. Connect the wires, fuel hose, and spring clamp; then turn the ignition switch to the ON position. Note that the fuel pump runs momentarily and the fuel gauge indicates the proper fuel level.
5. With the transmission in neutral and brake lever lock engaged, start the engine and check for normal operation. Check for any fuel leaks.
6. Install any wire ties that were removed; then install the rear fenders, rack, and seat making sure the seat locks securely.

## Vacuum Pulse Fuel Pump (500)

The vacuum pulse fuel pump is not a serviceable component. If the pump fails, it must be replaced.

### TESTING

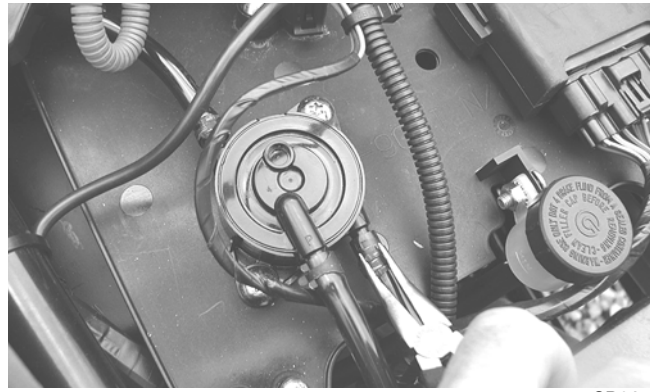
#### ⚠ WARNING

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

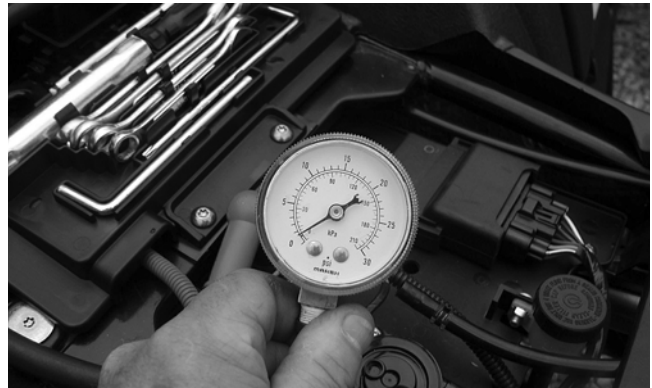
Prior to removing the vacuum pulse fuel pump, the following check should be performed to determine that removal is necessary.

1. Disconnect the fuel pump/carburetor hose at the fuel pump; then connect a hose and suitable pressure gauge to the fuel pump output fitting.



CD815

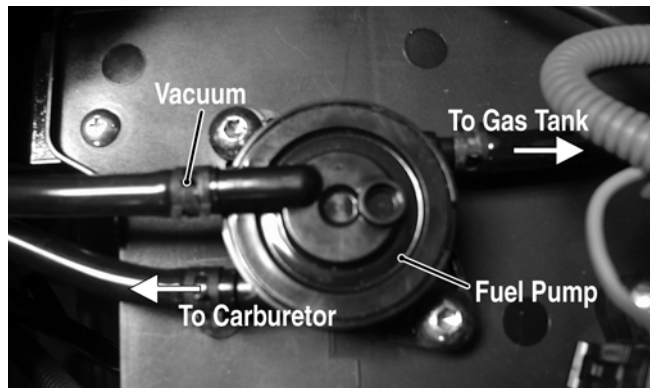
2. Start the engine. Fuel pump pressure should read 0.18-0.25 kg/cm<sup>2</sup> (2.5-3.5 psi).



CD816

### REMOVING

1. Remove the seat; then remove the three clamps securing the gas hoses and vacuum hose and disconnect the hoses.



CD766A

2. Remove the two machine screws and flange nuts securing the fuel pump to the electrical tray; then remove the pump.

### INSTALLING

1. Place the fuel pump into position on the electrical tray; then secure with the machine screws and flange nuts. Tighten securely.
2. Connect two gas hoses and one vacuum hose; then secure with the clamps.

## Troubleshooting (400/500)

Problem: Starting impaired	
Condition	Remedy
1. <b>Starter jet</b> obstructed 2. <b>Starter jet passage</b> obstructed 3. <b>Carburetor</b> leaking air 4. <b>Gas</b> contaminated	1. Clean jet 2. Clean passage 3. Replace gasket 4. Drain gas tank and fill with clean gas
Problem: Idling or low speed impaired	
Condition	Remedy
1. <b>Slow jet</b> obstructed - loose 2. <b>Slow jet outlet</b> obstructed 3. <b>Low speed fuel screw setting</b> incorrect 4. <b>Float height</b> incorrect	1. Clean - tighten jet 2. Clean outlet 3. Adjust screw 4. Adjust float height
Problem: Medium or high speed impaired	
Condition	Remedy
1. <b>High RPM "cut out"</b> against RPM limiter 2. <b>Main jet</b> obstructed 3. <b>Needle jet</b> obstructed 4. <b>Vacuum piston</b> not operating properly 5. <b>Filter</b> obstructed 6. <b>Float height</b> incorrect	1. Shift into higher gear - decrease RPM speed 2. Clean main jet 3. Clean needle jet 4. Check piston operation 5. Clean filter 6. Adjust float height
Problem: Overflow and fuel level fluctuations	
Condition	Remedy
1. <b>Float valve</b> worn - damaged 2. <b>Float valve spring</b> broken 3. <b>Float</b> not working properly 4. <b>Float valve</b> dirty 5. <b>Float height</b> too high - too low	1. Replace valve 2. Replace spring 3. Adjust float height - replace float 4. Clean valve 5. Adjust float height

4

## Troubleshooting (EFI Models)

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

# SECTION 5 - ELECTRICAL SYSTEM

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## Electrical System

This section has been organized into sub-sections which show procedures for the complete servicing of the Arctic Cat ATV electrical system.

■NOTE: Some photographs and illustrations used in this section are used for clarity purposes only and are not designed to depict actual conditions.

### 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 Tool Catalog for the appropriate tool description.

Description	p/n
Diagnostic Harness	0486-219
Fluke Model 73 Multimeter	0644-191
MaxiClips	0744-041
Peak Voltage Reading Adapter	0644-307
Tachometer	0644-275
Test Plug/Error Code List	0444-216
Timing Light	0644-296

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

## Specifications

400 TRV	
Ignition Timing	10° BTDC @ 1500 RPM
Spark Plug Type	NGK CR8E
Spark Plug Gap	0.7-0.8 mm (0.028-0.032 in.)
Spark Plug Cap	4000-6000 ohms
Ignition Coil Resistance (primary)	Less than 1 ohm (terminal to terminal)
(secondary)	2900-3400 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	250-375 DC volts (black/yellow to black)
Stator Coil Resistance (trigger) (charging)	90-110 ohms (green to blue)
	Less than 1 ohm (black to black)
Peak Voltage (trigger)	7.8-9.3 volts (green to blue)
AC Generator Output (no load)	60 AC volts @ 3000 RPM (black to black)
Generator Output (approx)	220W @ 5000 RPM

500	
Ignition Timing	10° BTDC @ 1500 RPM
Spark Plug Type	NGK CR6E
Spark Plug Gap	0.7-0.8 mm (0.028-0.032 in.)
Spark Plug Cap	8000-12,000 ohms
Ignition Coil Resistance (primary)	Less than 1 ohm (terminal to ground)
(secondary)	5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	140.0-215.0 DC volts (blue/white to ground)
Stator Coil Resistance (trigger) (charging) (signal)	160-240 ohms (green to blue)
	Less than 1 ohm (black to black)
	Less than 1 ohm (yellow to white)
Peak Voltage (trigger) (signal)	4.2-6.3 volts (green to blue)
	0.4-0.6 volts (yellow to white)
AC Generator Output (no load)	60 AC volts @ 5000 RPM (black to black)
Generator Output (approx)	325W @ 5000 RPM

H1 Models	
Ignition Timing	10° BTDC @ 1500 RPM
Spark Plug Type	NGK CPR8E
Spark Plug Gap	0.7-0.8 mm (0.028-0.032 in.)
Spark Plug Cap	5000 ohms
Ignition Coil Resistance (primary)	Less than 1 ohm (terminal (+) to terminal (-))
(secondary)	12k-19k ohms (high tension - plug cap to terminal (+))
Ignition Coil Primary Voltage	Battery Voltage (orange (+) to blue/white(-))
Stator Coil Resistance (crankshaft position sensor) (AC generator)	150-250 ohms (blue to white)
	Less than 1 ohm (yellow to yellow)
Crankshaft Position Sensor AC Voltage	5.0 volts or more (blue to green)
AC Generator Output (no load)	75 AC volts @ 5000 RPM (yellow to yellow)

H2 Models	
Ignition Timing	10° BTDC @ 1500 RPM
Spark Plug Type	NGK CPR8E (2)
Spark Plug Gap	0.7-0.8 mm (0.028-0.032 in.)
Spark Plug Cap	5000 ohms
Ignition Coil Resistance (primary)	4.8 ohms (terminal (+) to terminal (-))
(secondary)	12k-19k ohms (high tension - plug cap to terminal)
Ignition Coil Primary Voltage	Battery Voltage (orange to ground)
Stator Coil Resistance (crankshaft position sensor) (AC generator)	150-250 ohms (blue to green)
	Less than 1 ohm (gray to gray)
Crankshaft Position Sensor AC Voltage	2.0 AC volts or more (blue to green)
Generator Output (no load)	75 AC volts or more @ 5000 RPM (gray to gray)

## Battery

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

### ⚠ WARNING

Anytime service is performed on a battery, the following must be observed: keep sparks, open flame, cigarettes, or any other flame away. Always wear safety glasses. Protect skin and clothing when handling a battery. When servicing battery in enclosed space, keep the area well-ventilated. Make sure battery venting is not obstructed.

1. Remove the battery hold-down; then disconnect the battery cables (negative cable first).
2. Disconnect the vent hose (lead-acid battery).
3. Remove the battery from the battery compartment; then thoroughly wash the battery and battery compartment with soap and water.

■NOTE: If battery posts, cable ends, or the battery case has a build-up of white/green powder residue, apply water and baking soda to neutralize acid; then flush off with warm soapy water.

4. Using a wire brush, clean the battery posts and cable ends removing all corrosive buildup. Replace damaged cables or cable ends.
5. Add clean distilled water to bring fluid level to the UPPER level line (lead-acid battery).

■NOTE: The EFI models are equipped with a sealed battery. Do not attempt to add electrolyte to these batteries.

### ⚠ WARNING

Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

### ⚠ CAUTION

Never use electrolyte (sulfuric acid) to "top off" the battery. Use only distilled water or severe battery damage may occur.

6. Using a multimeter, test the battery voltage. The meter must read 12.5 or more DC Volts for a fully charged battery.

■NOTE: At this point, if the meter reads as specified, the battery may be returned to service (see step 10).

7. If the meter reads less than specified voltage, charge the battery using the following guidelines.

A. When using an automatic battery charger, always follow the charger manufacturer's instructions.

B. When using a constant-current battery charger, use the following Battery Charging Chart.

### ⚠ CAUTION

Never exceed the standard charging rate.

### ⚠ WARNING

An overheated battery could explode causing severe injury or death. Always monitor charging times and charge rates carefully. Stop charging if the battery becomes very warm to the touch. Allow it to cool before resuming charging.

#### Battery Charging Chart (Constant-Current Charger)

Battery Voltage (DC)	Charge State	Charge Time Required (at 1.5-2.0 Amps)
12.5 or more	100%	None
12.2-12.4	75%-99%	3-6 hours
12.0-12.2	50%-74%	5-11 hours
11.0-11.9	25%-49%	13 hours (minimum)
11.5 or less	0-24%	20 hours (minimum)

■NOTE: If the battery voltage is 11.5 DC Volts or less, some chargers may "cut off" and fail to charge. If this occurs, connect a fully charged booster battery in parallel (positive to positive and negative to negative) for a short period of time with the charger connected. After 10-15 minutes, disconnect the booster battery leaving the charger connected and the charger should continue to charge. If the charger "cuts off," replace the battery.

8. After charging the battery for the specified time, remove the battery charger and allow the battery to sit for 1-2 hours.
9. Connect the multimeter and test the battery voltage. The meter should read 12.5 or more DC Volts. If the voltage is as specified, the battery is ready for service.

■NOTE: If voltage in step 9 is below specifications, charge the battery an additional 1-5 hours; then retest. Recheck electrolyte level (lead-acid battery) and the battery is ready for service.

10. Place the battery in the battery compartment; then coat the battery posts and cable ends with a light coat of multi-purpose grease.

### ⚠ CAUTION

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

11. Connect the battery cables (positive cable first); then install the battery hold-down.

**⚠ CAUTION**

Connecting cables in reverse (positive to negative and negative to positive) can cause serious damage to the electrical system.

## RPM Limiter

■NOTE: The ATV is equipped with a CDI unit/ECU that retards ignition timing when maximum RPM is approached. When the RPM limiter is activated, it could be misinterpreted as a high-speed misfire.

## Testing Electrical Components

All of the electrical tests should be made using the Fluke Model 73 Multimeter and when testing peak voltage, the Peak Voltage Reading Adapter must be used. 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 bulb(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.

## Accessory Receptacle/Connector

■NOTE: This test procedure is for either the receptacle or the connector.

### 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 red/white wire or the positive connector; then connect the black tester lead to ground.
3. The meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, receptacle, connector, or the main wiring harness.

## Brakelight Switch (Auxiliary)

The switch connector is the two-prong connector on the brake switch lead above the transmission.

■NOTE: The ignition switch must be in the ON position.

### VOLTAGE (Wiring Harness Side)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester to the orange wire; then connect the black tester lead to ground.



AR627D

3. The meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, 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, the connector, and the switch wiring harness for resistance.

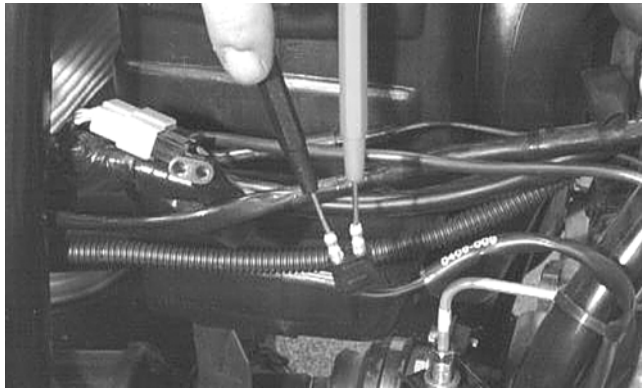
### RESISTANCE (Switch Connector)

**⚠ CAUTION**

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one black wire; then connect the black tester lead to the other black wire.





AR626D

3. When the brake 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.

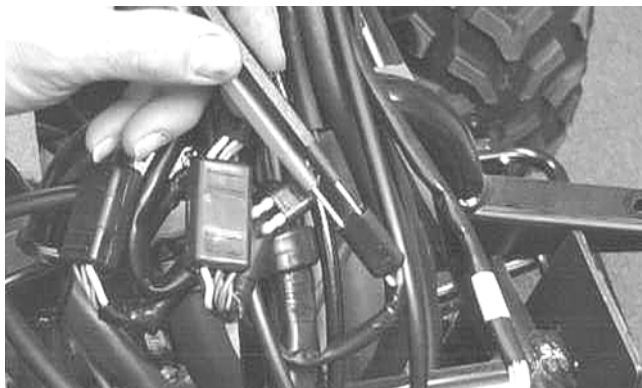
## Brakelight Switch (Handlebar Control)

To access the connector, remove the access panel.

■NOTE: The ignition switch must be in the ON position.

### VOLTAGE (Wiring Harness Connector)

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 ground.



AR622D

3. The meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, 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, the connector, and the switch wiring harness for resistance.

### RESISTANCE (Switch Connector)

#### ⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■NOTE: The brake lever must be compressed for this test. Also, the ignition switch must be in the OFF position.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one black wire; then connect the black tester lead to the other black wire.



AR621D

3. When the lever is compressed, the meter must show less than 1 ohm.

■NOTE: If the meter shows more than 1 ohm of resistance, replace the switch.

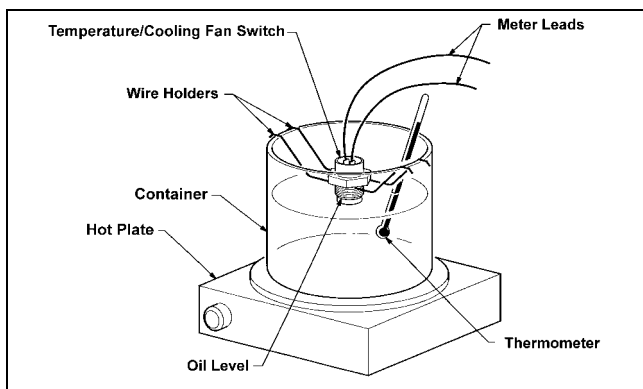
## Oil Temperature and Cooling Fan Switches (400)

1. Connect the meter leads (selector in the OHMS position) to the switch contacts.
2. Suspend the switch and a thermometer in a container of cooking oil; then heat the oil.

■NOTE: Neither the switch nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend switch and thermometer.

#### ⚠ WARNING

Wear insulated gloves and safety glasses. Heated oil can cause severe burns.



733-554C

3. On the oil temperature switch when the oil temperature reaches 160° C (320° F), the meter should read a closed circuit.
4. On the oil temperature switch, allow the oil to cool, and when the temperature is at (or just before) a temperature of 140° C (284° F), the meter should read an open circuit.
5. On the cooling fan switch when the temperature reaches 120° C (248° F), the meter should read a closed circuit.
6. On the cooling fan switch, allow the oil to cool, and when the temperature is at (or just before) a temperature of 110° C (230° F), the meter should read an open circuit.
7. If the readings are not as indicated, the switch must be replaced.
8. Apply thread tape to the threads of the switch; then install the switch and tighten securely.
9. Connect the switch leads.

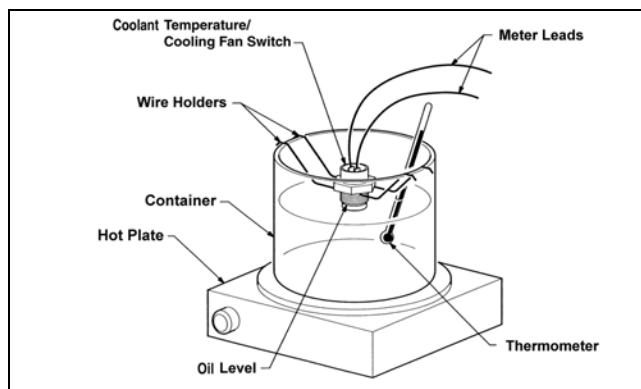
## Coolant Temperature and Cooling Fan Switches (500)

1. Connect the meter leads (selector in the OHMS position) to the switch contacts.
2. Suspend the switch and a thermometer in a container of cooking oil; then heat the oil.

■NOTE: Neither the switch nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend switch and thermometer.

### ⚠ WARNING

Wear insulated gloves and safety glasses. Heated oil can cause severe burns.



733-554E

3. On the coolant temperature switch when the oil temperature reaches 112-118° C (234-244° F), the meter should read a closed circuit.
4. On the coolant temperature switch, allow the oil to cool, and when the temperature is within a temperature range of 108-111° C (226-232° F), the meter should read an open circuit.
5. On the cooling fan switch when the temperature reaches 88° C (190° F), the meter should read a closed circuit.
6. On the cooling fan switch, allow the oil to cool, and when the temperature is within a temperature range of 66° C (150° F), the meter should read an open circuit.
7. If the readings are not as indicated, the switch must be replaced.
8. Install the switch and tighten securely.
9. Connect the switch leads.

## Engine Coolant Temperature (ECT) Sensor (EFI Models)

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 20° C (68° F), the meter should read approximately 2.45k ohms.
4. On the ECT sensor when the temperature reaches 50° C (122° F), the meter should read approximately 800 ohms.
5. On the ECT sensor when the temperature reaches 80° C (176° F), the meter should read approximately 318 ohms.
6. On the ECT sensor when the temperature reaches 110° C (230° F), the meter should read approximately 142 ohms.
7. If the readings are not as indicated, the sensor must be replaced.
8. Install the sensor and tighten securely.
9. Connect the leads.

---

## Fan Motor

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The connector is the black two-prong one located behind the fan assembly.

■NOTE: The ignition switch must be in the ON position.

### VOLTAGE (Main Harness Connector to Fan Motor)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the black/red wire; then connect the black tester lead to ground.
3. The meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, motor, or the main wiring harness.

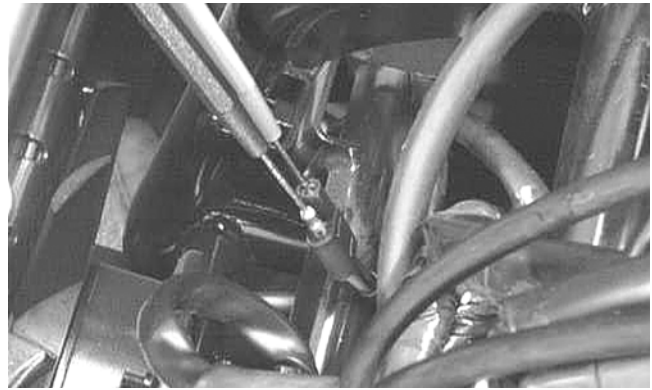
■NOTE: If the meter shows battery voltage, the main wiring harness is good. The connector should be checked for resistance.

### RESISTANCE (Fan Motor Connector)

#### ⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the blue wire; then connect the black tester lead to the black wire.



AR645D

3. The meter must show less than 1 ohm.

■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

■NOTE: To determine if the fan motor is good, connect the red wire from the fan connector to the positive side of a 12 volt DC power supply; then connect the black wire from the fan connector to the negative side. The fan should operate.

#### ⚠ WARNING

Care should be taken to keep clear of the fan blades.

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## Power Distribution Module (PDM)

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The fuses are located in a power distribution module under the seat. If there is any type of electrical system failure, always check the fuses first.

■NOTE: The ignition switch must be in the LIGHTS position.

1. Remove all fuses from the 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.

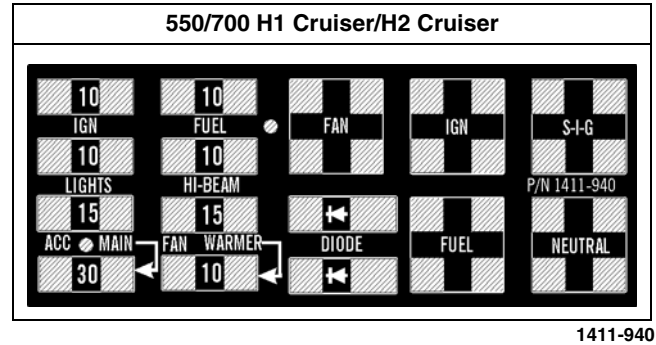
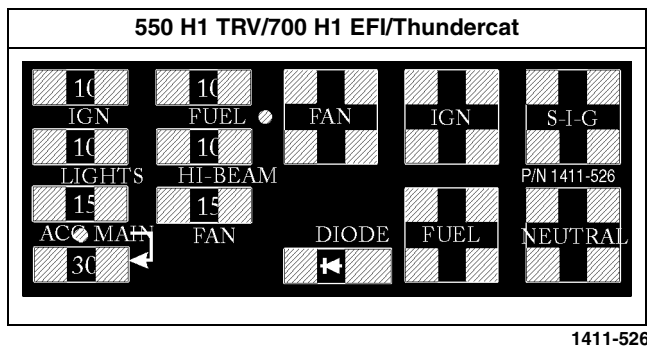
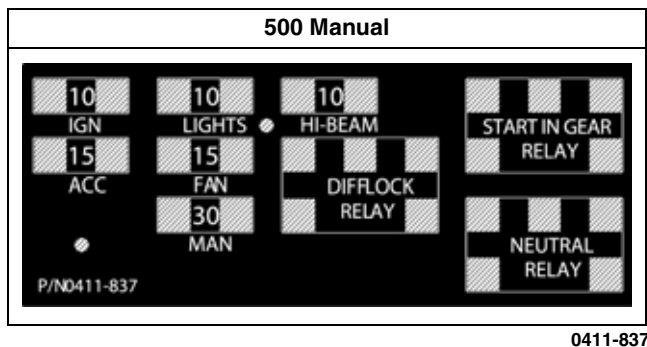
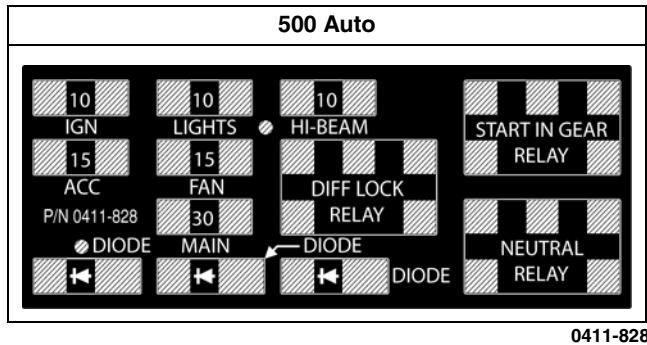
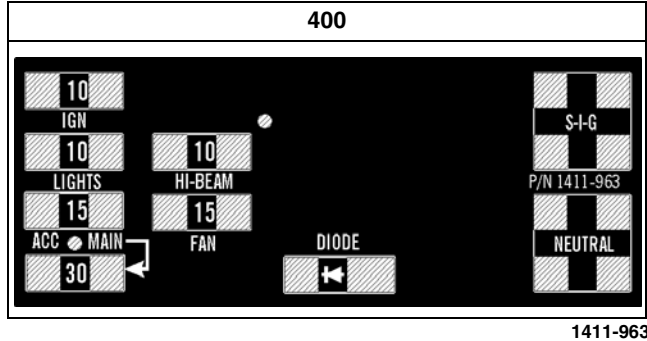
■NOTE: When testing the HI fuse holder, the headlight dimmer switch must be in the HI position; when testing the LIGHTS fuse holder, the headlight dimmer switch can be in either position.



■NOTE: If the meter shows no battery voltage, troubleshoot the battery, switches, distribution module, or the main wiring harness.

## FUSES

■NOTE: To remove a fuse, compress the locking tabs on either side of the fuse case and lift out.



### CAUTION

Always replace a blown fuse with a fuse of the same type and rating.

### CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one spade end of the fuse; then connect the black tester lead to the other spade end.
3. The meter must show less than 1 ohm resistance. If the meter reads open, replace the fuse.

■NOTE: Make sure the fuses are returned to their proper position according to amperage. Refer to the fuse block cover for fuse placement.

## RELAYS

The relays are identical plug-in type. Relay function can be checked by switching relay positions. The relays are interchangeable.

■NOTE: The module and wiring harness are not a serviceable component and must be replaced as an assembly.

## Ignition Coil

■NOTE: On the H2 models, the following procedures should be performed on both ignition coils.

The ignition coil is on the frame above the engine. To access the coil, the side panel must be removed (see Section 2).

## RESISTANCE

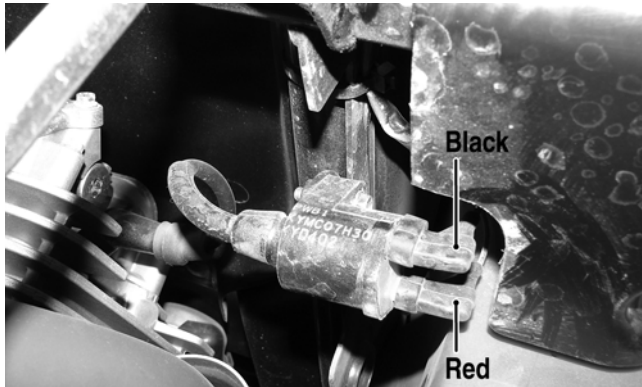
### ⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

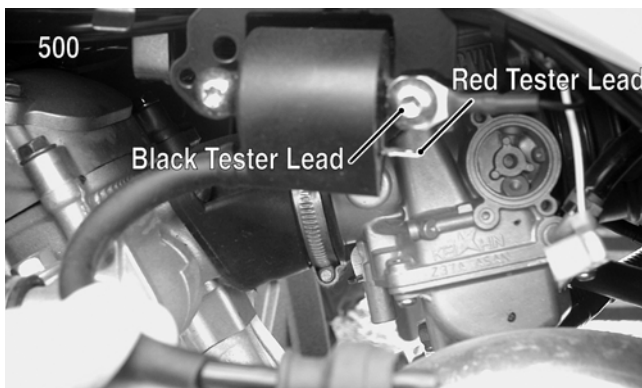
■NOTE: For these tests, the meter selector should be set to the OHMS position and the primary wire(s) should be disconnected.

### Primary Winding

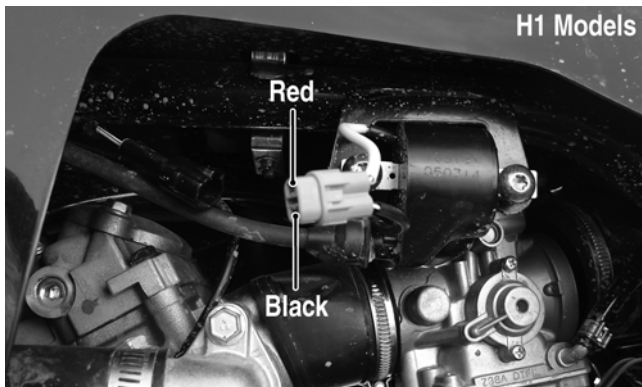
1. Connect the red tester lead to either terminal; then connect the black tester lead to the other terminal or on 500 models, to a suitable ground.



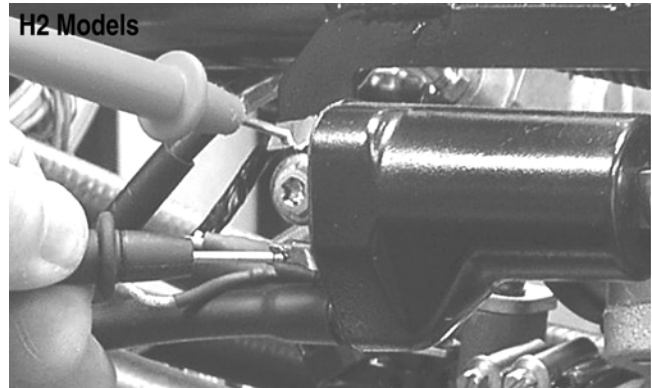
KC329A



CD882B



CF234C



GZ389A

2. The meter reading must be within specification.

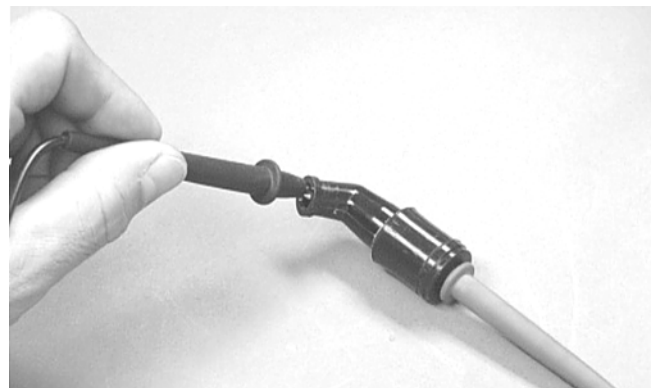
### Secondary Winding

1. Remove the plug cap from the high tension lead; then connect the red tester lead to the high tension lead.
2. On the H1/H2 models, connect the black tester lead to either primary connector; on the 400/500, connect the black tester lead to the coil frame or to the primary connector.
3. The meter reading must be within specification.

■NOTE: If the meter does not show as specified, replace ignition coil.

### 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 read as specified, replace the spark plug cap.

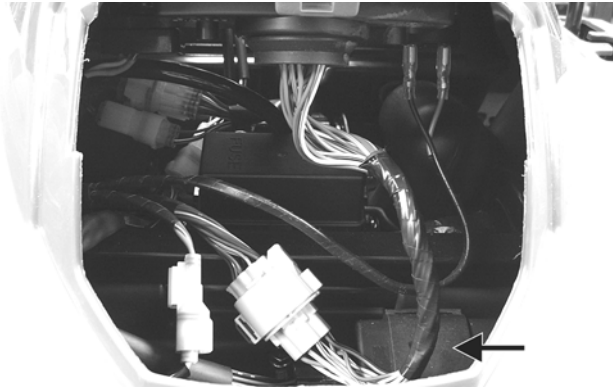
### PEAK VOLTAGE

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter with Peak Voltage Reading Adapter. If any other type of tester is used, readings may vary due to internal circuitry.

■NOTE: The battery must be at full charge for these tests.

### Primary/CDI (400)

■NOTE: The CDI is located on the electrical tray in front of the steering shaft.



KC210B

1. Set the meter selector to the DC Voltage position; then disconnect the black/yellow and black primary wires from the coil.
2. Connect the red tester lead to the black/yellow wire; then connect the black tester lead to the black wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

### Primary/CDI (500)

■NOTE: The CDI is located beneath the seat near the battery.

1. Set the meter selector to the DC Voltage position; then disconnect the blue/white primary wire from the coil.
2. Connect the red tester lead to the primary wire; then connect the black tester lead to ground.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

### Primary Voltage - ECU (H1 Models)

1. Set the meter selector to the DC Voltage position; then disconnect the two wires from the coil.
2. Connect the red tester lead to the orange wire and the black tester lead to the blue/white wire.
3. Turn the ignition switch to the ON position. The meter must show battery voltage.

### Primary Voltage - ECU (H2 Models)

■NOTE: The battery must be at full charge for this test.

■NOTE: The ECU is located beneath the rear fender near the taillight.

1. Set the meter selector to the DC Voltage position; then disconnect the orange primary wire from the coil.
2. Connect the red tester lead to the orange primary wire; then connect the black tester lead to ground.
3. Turn the ignition switch to the ON position.
4. The meter reading must be within specification.

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## EFI Sensors/ Components (EFI Models)

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### CRANKSHAFT POSITION (CKP) SENSOR

To test the CKP sensor, see Stator Coil/Crankshaft Position (CKP) Sensor (EFI Models) in this section.

### MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Disconnect the MAP connector from the pressure 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 black/green 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 ECU connector or wiring.
4. Connect the MAP to the harness; then using Maxi-Clips, connect the red tester lead to the brown/white wire and the black tester lead to the black/green wire. With the engine running at idle speed, the meter should read approximately 1.5 DC volts.

■NOTE: If the meter does not read as specified, replace the sensor.

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## Speed Sensor

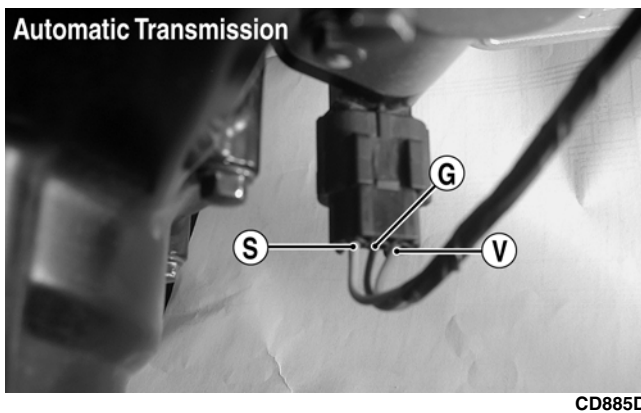
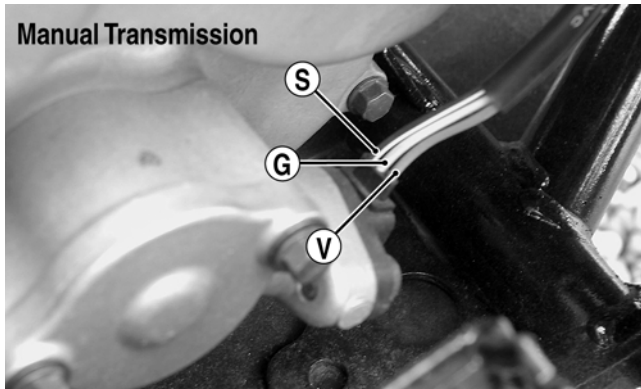
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■NOTE: Prior to testing the speed sensor, inspect the three-wire connector on the speed sensor harness (manual transmission model) or on the speed sensor (automatic transmission models) for contamination, broken pins, and/or corrosion.

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 voltage lead (V); then connect the black tester lead to the ground lead (G).

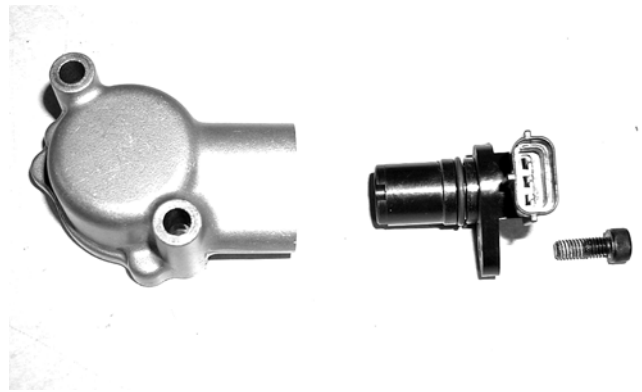


3. Turn the ignition switch to the ON position.
4. The meter must show 6-12 DC volts.
5. Leave the black tester lead connected; then connect the red tester lead to the signal lead (S) pin.
6. Slowly move the ATV forward or backward; the meter must show 0 and 6-12 DC volts alternately.

■**NOTE:** If the sensor tests are within specifications, the speedometer must be replaced (see Section 9).

To replace a speed sensor, use the following procedure.

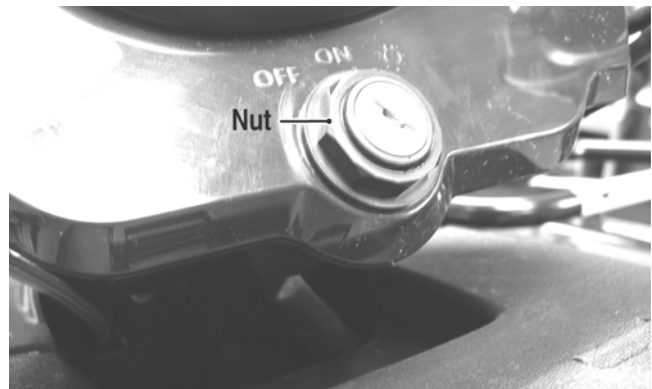
1. Disconnect the three-wire connector from the speed sensor harness or from the speed sensor; then remove the Allen-head cap screw securing the sensor to the sensor housing.
2. Remove the sensor from the sensor housing accounting for an O-ring.
3. Install the new speed sensor into the housing with new 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.



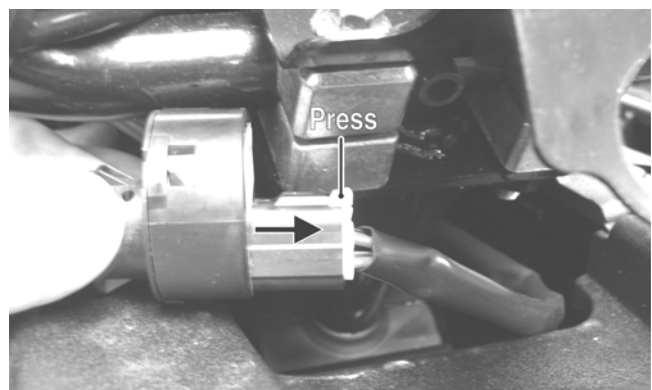
CD071

## Ignition Switch

The ignition switch harness connects to the switch with a four-pin connector. To access the connector, remove the ignition switch nut, remove the switch, and press the connector release tab. Pull the connector from the switch.



CF272A



CF273A

## VOLTAGE

■**NOTE:** Perform this test on the harness connector.

1. Set the meter selector to the DC Voltage position.
2. Connect the red meter lead to either red wire; then connect the black meter lead to ground.

3. Meter must show battery voltage.

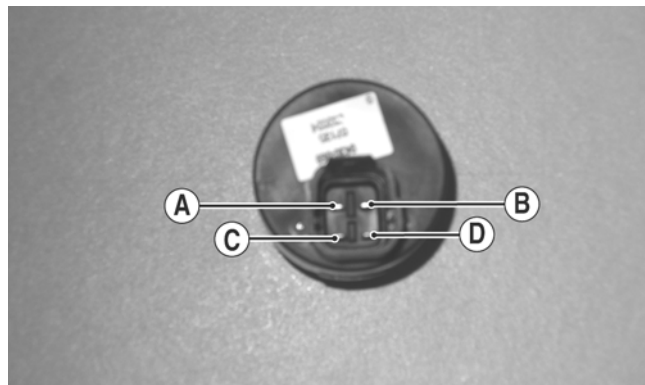
■NOTE: If the meter shows no battery voltage, troubleshoot the battery or the main wiring harness.

## RESISTANCE

### ⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■NOTE: Perform this test on the switch using the following procedure.



CF274A

1. Turn the ignition switch to the ON position.
2. Set the meter selector to the OHMS position.
3. Connect either tester lead to pin C; then connect the other tester lead to pin D.
4. The meter must show less than 1 ohm.
5. Turn the ignition switch to the LIGHTS position.
6. Connect either tester lead to pin A; then connect the other tester lead to pin B.
7. The meter must show less than 1 ohm.
8. Connect either tester lead to pin C; then connect the other tester lead to pin D.
9. The meter must show less than 1 ohm.
10. With the switch in the OFF position, connect the red tester lead and the black tester lead to each of the remaining pins. The meter must show an open circuit on all pins.

■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component or the connector.

## Handlebar Control Switches

The connector is the yellow one next to the steering post. To access the connector, the steering post cover and the right-side fender splash shield must be removed (see Section 8).

■NOTE: These tests should be made on the top side of the connector.

### ⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

## RESISTANCE (HI Beam)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the gray wire.
3. With the dimmer switch in the HI position, the meter must show less than 1 ohm.

■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

## RESISTANCE (LO Beam)

1. Connect the red tester lead to the white wire; then connect the black tester lead to the gray wire.
2. With the dimmer switch in the LO position, the meter must show an open circuit.

■NOTE: If the meter reads resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

## DIODE (Starter Button)

■NOTE: If voltage is not as specified, check the condition of the battery in the meter prior to replacing the switch. A low battery will result in a low voltage reading during a diode test.

1. Set the meter selector to the Diode position.
2. Connect the red tester lead to the orange/white wire; then connect the black tester lead to the yellow/green wire.
3. With the starter button depressed, the meter must show 0.5-0.7 DC volts.
4. With the starter button released, the meter must show 0 DC volts.

5. Connect the red tester lead to the yellow/green wire; then connect the black tester lead to the orange/white wire.
6. With the starter button depressed, the meter must show 0 DC volts.

■**NOTE:** If the meter does not show as specified, replace the switch/component, connector, or switch harness.

### RESISTANCE (Emergency Stop)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the orange wire; then connect the black tester lead to the orange/white wire.
3. With the switch in the OFF position, the meter must show an open circuit.
4. With the switch in the RUN position, the meter must show less than 1 ohm.

■**NOTE:** If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

### RESISTANCE (Reverse Override)

The connector is the four-prong white one next to the steering post. To access the connector, the front rack and front fenders must be removed (see Section 8).

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one red/yellow wire; then connect the black tester wire to the other red/yellow wire. The meter must show less than 1 ohm.
3. Depress and hold the reverse override button. The meter must show an open circuit.
4. Connect the red tester lead to the blue wire; then connect the black meter lead to the black wire. The meter must show an open circuit.
5. Depress and hold the reverse override button. The meter must show less than 1 ohm.

■**NOTE:** If the meter does not show as specified, replace the switch/component, connector, or switch harness.

## Front Drive Selector Switch

The connector is the two-wire black snap-lock one in front of the steering post. To access the connector, the cover must be removed.

■**NOTE:** Resistance tests should be made with the connector disconnected and on the selector-side of the connector.

### RESISTANCE

#### ⚠ CAUTION

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the red wire; then connect the black tester lead to the white wire.
3. With the selector switch in the 2WD position, the meter must show a closed circuit (400/500) or open circuit (H1/H2 models).
4. With the selector switch in the 4WD position, the meter must show an open circuit (400/500) or less than 1 ohm (H1/H2 models).

■**NOTE:** If the meter does not show as specified, replace the front drive selector switch.

### VOLTAGE

■**NOTE:** The battery must be connected when performing voltage tests.

1. Set the meter selector to the DC Voltage position.
2. Connect the black tester lead to the negative battery terminal.
3. Connect the red tester lead to the red (400/500) or white (H1/H2 models) wire on the harness side of the connector.
4. Turn the ignition switch to the RUN position.
5. The meter must show 12 DC volts.

■**NOTE:** If the meter shows other than specified, check the harness, connector, 30 amp fuse, and battery connections.



## Front Drive Selector Actuator (400/500)

■NOTE: With the engine stopped and the ignition switch in the ON position, a momentary “whirring” sound must be noticeable each time the selector switch is moved to 2WD and 4WD. Test the switch, 30 amp fuse, and wiring connections prior to testing the actuator.

■NOTE: The differential must be in the unlocked position for this procedure.

### VOLTAGE

1. Select the 2WD position on the front drive selector switch; then disconnect the connector on the actuator wiring harness.
2. With the ignition switch in the OFF position, connect the black tester lead to the black wire in the supply harness; then connect the red tester lead to the orange wire in the supply harness.
3. Turn the ignition switch to the ON position. The meter must show 12 DC volts.
4. Connect the red tester lead to the white/red wire in the supply harness. The meter must show 12 DC volts.
5. Select the 4WD position on the front drive selector switch; then connect the red tester lead to the white/red wire in the supply harness. The meter must show 0 DC volts.

■NOTE: The 4WD icon on the LCD should illuminate.

6. Connect the red tester lead to the orange wire in the supply harness. The meter must show 12 DC volts.

■NOTE: If the voltage readings are as specified and the actuator does not function correctly, replace the actuator (see Section 6).

## Front Drive/Differential Lock Actuator (H1/H2 Models)

■NOTE: With the engine stopped and the ignition switch in the ON position, a momentary “whirring” sound must be noticeable each time the selector switch is moved to 2WD and 4WD. Test the switch, 30 amp fuse, and wiring connections prior to testing the actuator.

■NOTE: The differential must be in the unlocked position for this procedure.

### VOLTAGE

1. Select the 2WD position on the front drive selector switch; then disconnect the connector on the actuator wiring harness.
2. With the ignition switch in the OFF position, connect the black tester lead to the black wire in the supply harness; then connect the red tester lead to the orange wire in the supply harness.
3. Turn the ignition switch to the ON position. The meter must show 12 DC volts.
4. Connect the red tester lead to the white/orange wire in the supply harness. The meter must show 12 DC volts.
5. Connect the red tester lead to the white/green wire in the supply harness. The meter must show 10.2 DC volts.
6. Select the 4WD position on the front drive selector switch; then connect the red tester lead to the white/orange wire in the supply harness. The meter must show 12 DC volts.

■NOTE: The 4WD icon on the LCD should illuminate.

7. Connect the red tester lead to the white/green wire in the supply harness. The meter must show 0 DC volts.
8. Select Differential Lock on the front drive actuator switch; then connect the red tester lead to the white/orange wire in the supply harness. The meter must show 0 DC volts.
9. Connect the tester lead to the white/green wire in the supply harness. The meter must show 0 DC volts.

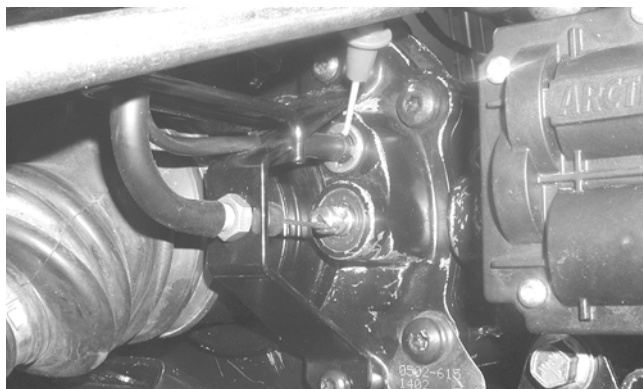
■NOTE: The 4WD and LOCK icons on the LCD should illuminate.

■NOTE: If the voltage readings are as specified and the actuator does not function correctly, replace the actuator (see Section 6).

## Differential Lock Switch (500)

### VOLTAGE

1. Select DC Voltage on the multimeter; then connect the red tester lead to the switch terminal (leaving the wire connected) and the black tester lead to ground.



CD575

2. Turn the ignition switch to the ON position. The meter must show 12 DC volts.

■NOTE: If no voltage is indicated, check the wiring harness, fuse, or battery connections.

3. Select the lock position on the differential. The meter should drop to 0 volts, and the front drive selector actuator switch should operate to engage 4-wheel drive.

■NOTE: It may be necessary to rock the ATV slightly to engage the differential lock fully.

■NOTE: The 4WD and the LOCK icons on the LCD should illuminate.



CD576



CF094C

4. If the differential lock engages (front wheels locked) and the voltage does not drop to 0, the switch is faulty and must be cleaned or replaced.

## Differential Lock Control Switch (H1/H2 Models)

### RESISTANCE

Disconnect the switch from the main harness; then with the tester set to the OHMS position, test the switch as follows.

"Unlocked" Position	A to B	<1 Ohm
	A to C	50 Ohms
	B to C	<1 Ohm
"Locked" Position	A to B	<1 Ohm
	A to C	50 Ohms
	B to C	50 Ohms

## Stator Coil (400/500)

### VOLTAGE (AC Generator - Regulated Output)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the positive battery post; then connect the black tester lead to the negative battery post.
3. With the engine running at a constant 5000 RPM (with the headlights on), the meter must show 14-15.5 DC volts.

#### ⚠ CAUTION

Do not run the engine at high RPM for more than 10 seconds.

■NOTE: If voltage is lower than specified, test charging coil - no load.

## VOLTAGE (Charging Coil - No Load)

The connector is a three-pin one in the harness coming from the AC generator.

■NOTE: Test the engine-side of the connector.

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 the specified RPM, all wire tests must show 60 AC volts.

### ⚠ CAUTION

Do not run the engine at high RPM for more than 10 seconds.

■NOTE: If both stator coil tests failed, check all connections, etc., and test again. If no voltage is present, replace the stator assembly.

## RESISTANCE (Charging Coil)

### ⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

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.

## RESISTANCE (Trigger Coil)

### ⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Disconnect the gray four-pin connector on the right side of the engine just above the starter motor.
2. Set the meter selector to the OHMS position.
3. Connect the red tester lead to the green wire; then connect the black tester lead to the blue wire. The meter reading must be within specification.

## PEAK VOLTAGE

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter with Peak Voltage Reading Adapter. If any other type of tester is used, readings may vary due to internal circuitry.

■NOTE: The battery must be at full charge for these tests.

## Trigger Coil

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the green wire; then connect the black tester lead to the blue wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

## Stator Coil/Crankshaft Position (CKP) Sensor (EFI Models)

## VOLTAGE

### (AC Generator - Regulated Output)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the positive battery post; then connect the black tester lead to the negative battery post.
3. With the engine running at a constant 5000 RPM (with the headlights on), the meter must show 14-15.5 DC volts.

### ⚠ CAUTION

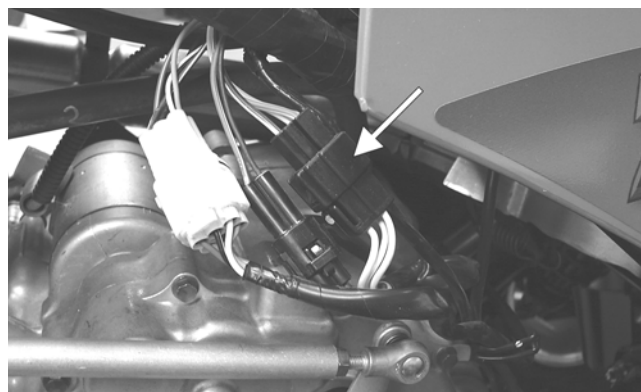
Do not run the engine at high RPM for more than 10 seconds.

■NOTE: If voltage is lower than specified, test AC Generator - No Load.

## VOLTAGE

### (AC Generator - No Load)

The connector is a three-pin one in the harness coming from the generator.



FI083B

■NOTE: Test the connector that comes from the engine.

1. Set the meter selector to the AC Voltage position.



2. Test between the three yellow wires (H1 models) or gray wires (H2 models) for a total of three tests.
3. With the engine running at a constant 5000 RPM, all wire tests must be within specifications.

**⚠ CAUTION**

**Do not run the engine at high RPM for more than 10 seconds.**

■NOTE: If both stator coil tests failed, check all connections, etc., and test again. If no voltage is present, replace the stator assembly.

## RESISTANCE (AC Generator)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to OHMS position.
2. Test between the three yellow wires (H1 models) or gray wires (H2 models) for a total of three tests.
3. The meter reading must be within specification.

## RESISTANCE (Crankshaft Position Sensor)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the blue wire; then connect the black tester lead to the white wire (H1 models) or green wire (H2 models). The meter reading must be within specification.

## AC VOLTAGE

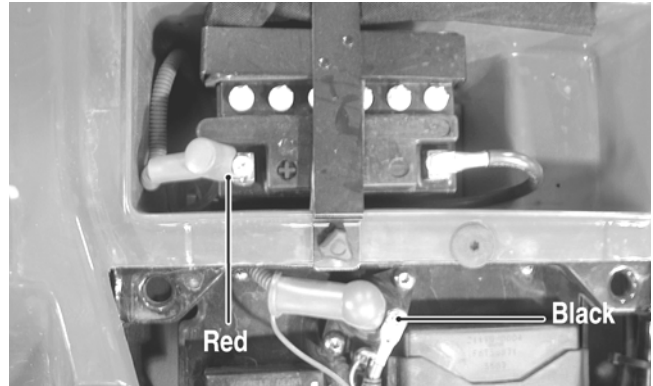
■NOTE: The battery must be at full charge for these tests.

### Crankshaft Position Sensor

1. Set the meter selector to the AC Voltage position.
2. Connect the red tester lead to the blue wire; then connect the black tester lead to the green wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

## Starter Relay

1. Remove the seat; 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 terminal; then connect the black tester lead to the starter cable connection on the starter relay. The meter must show battery voltage.



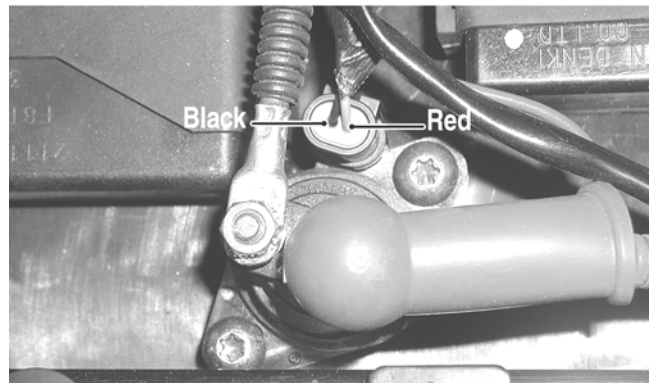
KX206A

■NOTE: Make sure that the ignition switch is in the ON position, transmission in neutral, brake lock released, and the emergency stop switch in the RUN position.

3. Depress the starter button while observing the multimeter. The multimeter should drop to 0 volts and a “click” should be heard from the relay.

■NOTE: If a “click” is heard and any voltage 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 green wire and the black tester lead to the black wire.



KX059A

5. Depress the starter button and observe the multimeter.

■NOTE: If battery voltage is indicated, replace the starter relay. If no voltage is indicated, proceed to Power Distribution Module (PDM) check.

## Starter Motor

■NOTE: On the 400/H1/H2 models, the starter is a non-serviceable component. If the following test does not result as specified, the starter must be replaced.

### 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, the emergency stop switch in the RUN position, the reverse lever (on manual transmission models) in the FORWARD position, and the shift lever (on automatic transmission models) 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.
3. With the starter button depressed, the meter must show approximately 10.0 DC volts and the starter motor should operate.



AR607D

■NOTE: If the meter showed correct voltage but the starter did not operate or operated slowly, the starter motor is defective.

■NOTE: If the meter showed no voltage, inspect the main fuse, ground connections, starter motor lead, battery voltage (at the battery), starter relay, or the neutral start relay.

### REMOVING/DISASSEMBLING

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; then remove the cable from the starter.
3. Remove the two cap screws securing the starter to the crankcase; then remove the starter. Account for the wiring forms and an O-ring.

#### 👉 AT THIS POINT

On the 400/H1/H2 models to install the starter, proceed to ASSEMBLING/INSTALLING - steps 10-12 in this sub-section.

4. For assembly purposes, scribe a line across the outside of the starter assembly.



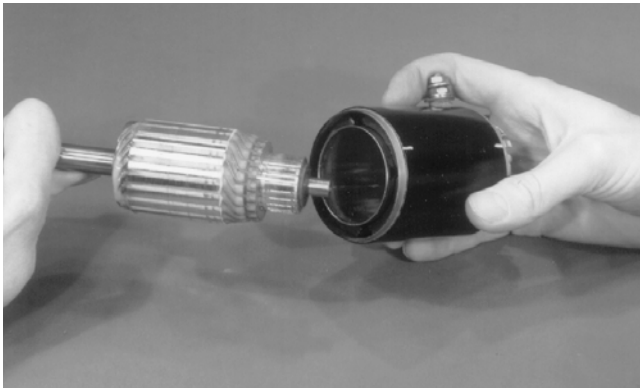
AR652D

5. Remove the two long starter cap screws securing the starter components.
6. Remove the front cover from the starter housing and armature shaft. Account for a seal protector and three washers.



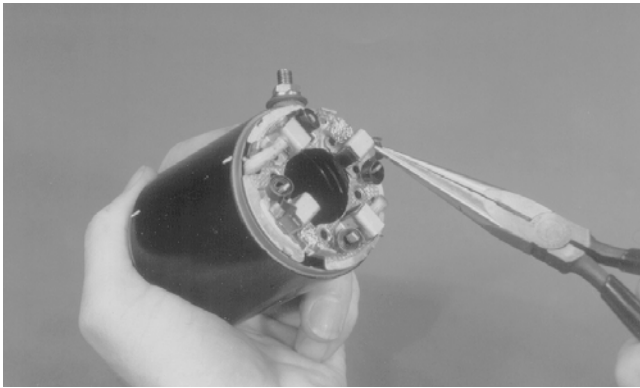
BC003

7. Remove the rear cover.
8. Slide the armature free of the starter housing.



BC006

9. Bend the two positive brushes outward; then remove the brush holder.

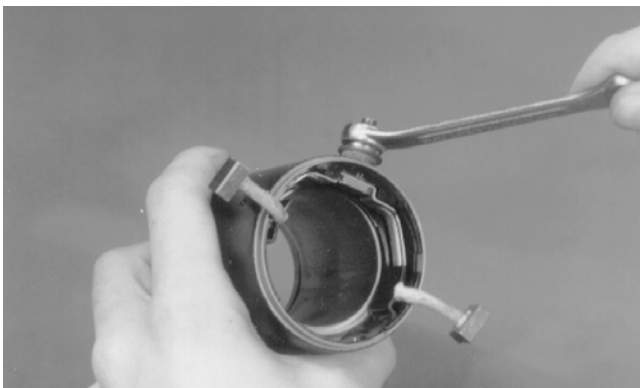


BC007



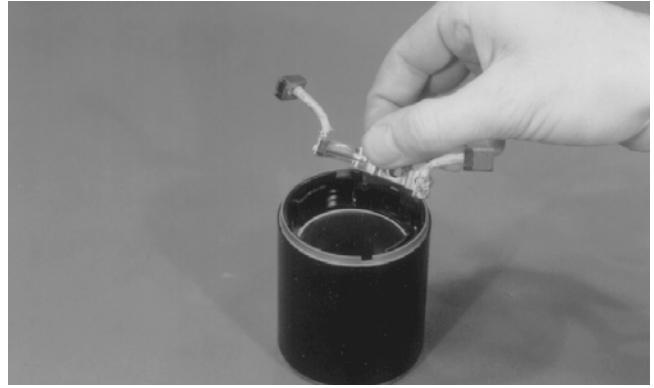
BC010

10. Remove the nut from the positive post. Account for the lock washer, flat washer, a fiber washer, and an O-ring.



BC008

11. Remove the positive brush assembly from the starter housing.



BC009

## CLEANING AND INSPECTING

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

1. Thoroughly clean all components except the armature and brushes in parts-cleaning solvent; then dry with compressed air.

### ⚠ CAUTION

Do not wash the armature and brushes in any kind of solvent. Use only compressed air and a clean dry, lint-free cloth.

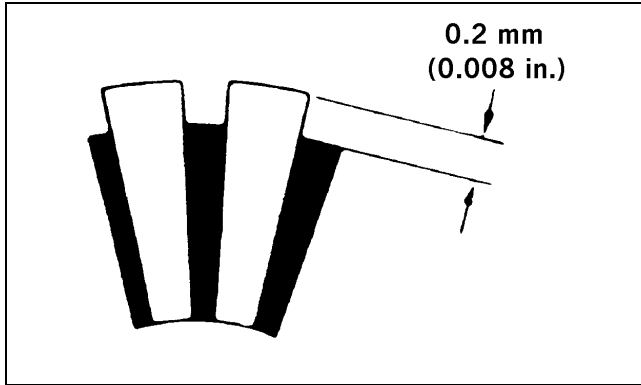
2. Inspect all threaded areas for damage or stripped threads.
3. Inspect the brush holder assembly and brushes for damage or wear. Using a caliper, measure the length of the brushes. If brush measurement is less than 10.1 mm (0.40 in.), replace with new brushes and brush springs as a set.
4. Inspect the brush leads for cracks, wear, or fraying. If any of these conditions exist, replace with new brushes and brush springs as a set.
5. Inspect the rear cover bushing for wear.
6. Inspect the front cover bearing for wear.
7. Inspect the brass commutator end of the armature for any discolored spots or damage. If the commutator is lightly discolored or damaged, the armature must be replaced. This is a molded commutator and turning it down in a lathe should not be attempted.

### ⚠ CAUTION

Do not use emery cloth to clean the commutator as emery particles will become imbedded in the brass commutator resulting in a short circuit. Use only #200 grit sandpaper.



8. Inspect the commutator end of the armature for buildup in the grooves. Carefully remove any buildup by undercutting using a thinly ground hacksaw blade. Do not undercut any deeper than the original groove which can be seen by looking at the end of the commutator.
9. Using a caliper, measure the undercut. Maximum undercut groove must be 0.2 mm (0.008 in.).

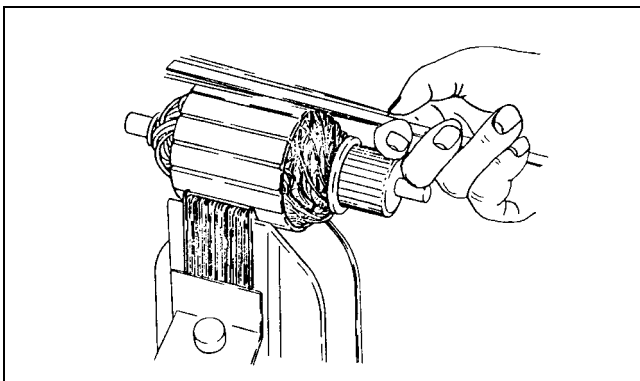


ATV-1054

### CAUTION

Buildup in the grooves must be removed to prevent any chance of an electrical arc between individual sections of the commutator.

10. Inspect the commutator for shorting using a multi-meter and the following procedure.
  - A. Set the selector to the OHMS position.
  - B. Touch the black lead to the armature shaft.
  - C. Using the red tester lead, probe the commutator end of the armature. The meter indicator should not change. If the indicator shows resistance, the armature is shorted and must be replaced.
11. Inspect the armature for shorting using a "growler" and the following procedure.
  - A. Place the armature in the "growler."
  - B. While holding a metal strip on the armature, rotate the armature an entire revolution. If the metal strip vibrates at any point on the armature, the armature is shorted and must be replaced.



0725-653

12. Inspect the ground brushes to make sure they are properly grounded. Use a multimeter and the following procedure.
  - A. Set the selector to the OHMS position.
  - B. Touch the black tester lead to a ground brush.
  - C. Touch the red tester lead to the brush holder assembly.

■NOTE: If no resistance is indicated, check the ground connection for tightness and for cleanliness. If there is still no meter indication, replace the brush assembly.

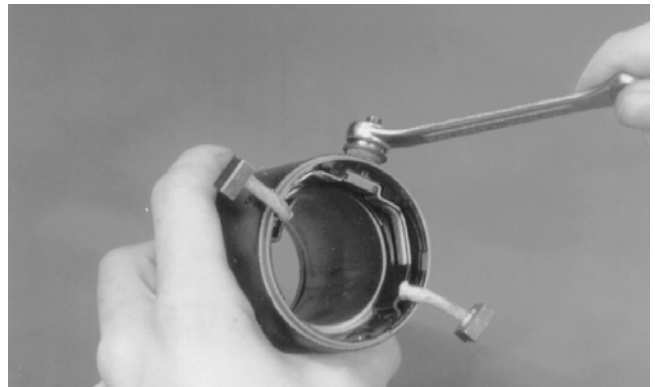
## ASSEMBLING/INSTALLING

1. Install the positive post on the positive brush assembly; then install on the starter housing.



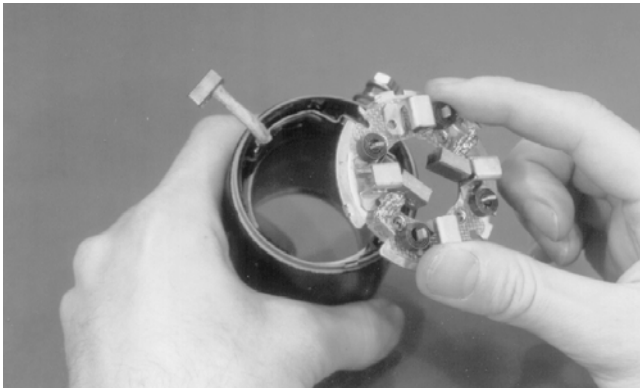
BC009

2. On the positive post, install an O-ring washer, a fiber washer, a flat washer, and a lock washer. Secure with the nut.



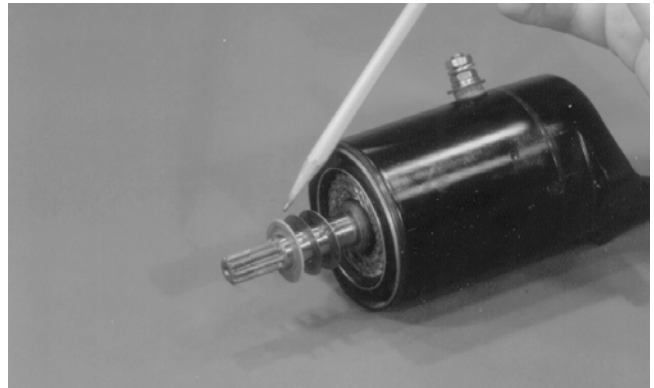
BC008

3. Align the tab on the brush holder with the notch in the starter housing; then install.



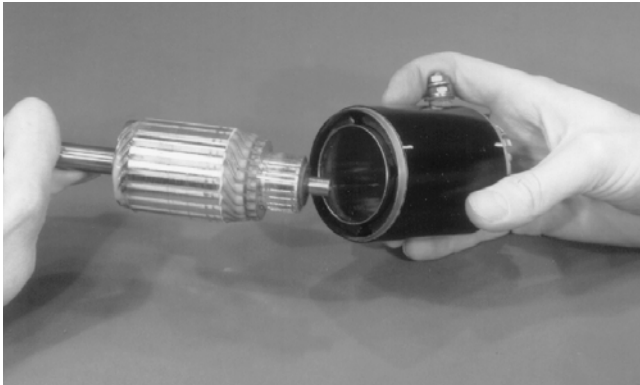
BC010

4. Install the armature into the starter housing; then while holding the brushes out, slide the commutator into the brush holder.



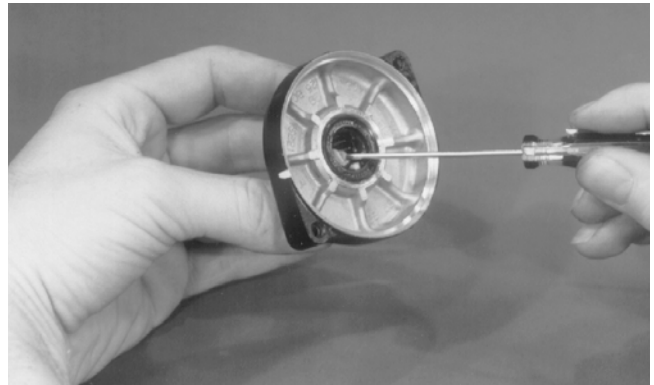
BC014

7. Apply a small amount of grease to the front cover bearing and seal; then install the seal protector.

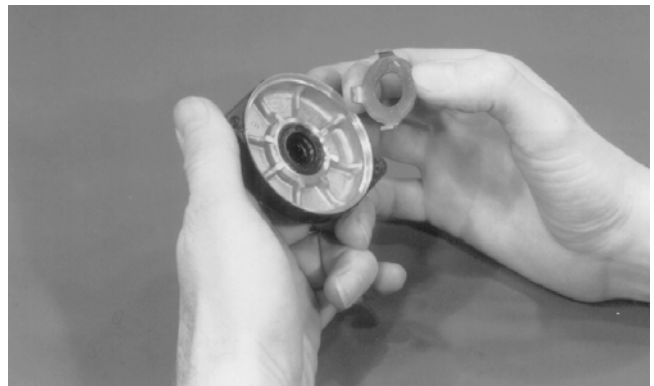


BC006

5. Apply a small amount of grease to the rear cover bushing; then install the cover on the starter housing making sure the reference marks align.

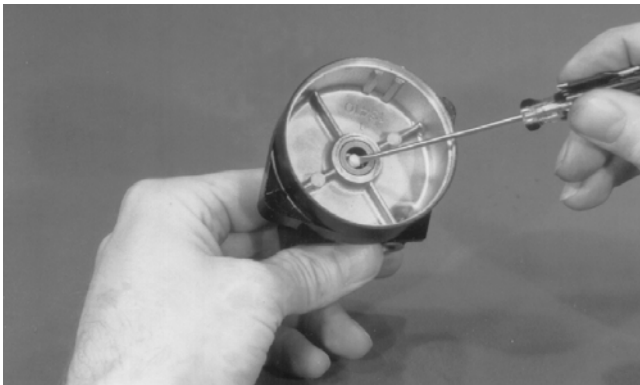


BC015



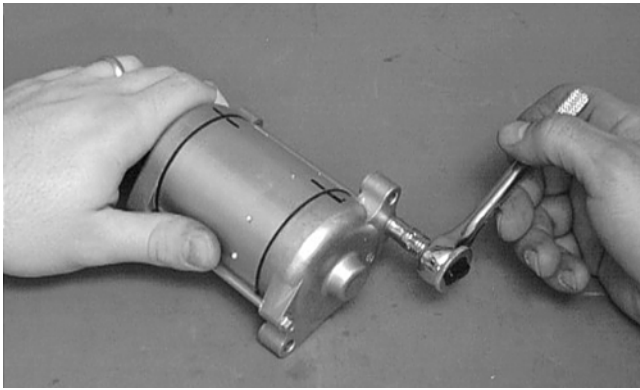
BC004

8. Place the front cover onto the starter housing making sure it seats properly.
9. Apply red Loctite #271 to the threads of the two long cap screws and install. Tighten to 8 ft-lb.



BC013

6. In order, install the thick metal washer, thin metal washer, and the fiber washer on the armature shaft; then install the housing O-ring on the starter housing.



AR653D

10. Apply a small amount of grease to the O-ring seal on the starter; then install the starter into the crankcase. Secure with two cap screws and wiring forms.
11. Secure the positive cable to the starter with the nut.
12. Connect the battery.

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## CDI Unit (400/500)

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The CDI is located beneath the seat near the battery.

**■NOTE:** The CDI unit is not a serviceable component. If the unit is defective, it must be replaced.

The CDI is rarely the cause for electrical problems; however, if the CDI is suspected, substitute another CDI unit to verify the suspected one is defective.

**■NOTE:** Prior to replacing the CDI unit to assure the CDI unit is defective, it is advisable to perform a CDI peak voltage test (see Ignition Coil in this section) and/or perform a continuity test of the wiring harness from the CDI connector to the CDI unit.

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## Electronic Control Unit (ECU) (EFI Models)

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The electronic control unit (ECU) is located beneath the seat near the battery (H1 models) or under the fender near the taillight (H2 models).

**■NOTE:** The ECU is not a serviceable component. If the unit is defective, it must be replaced.

The ECU is rarely the cause for electrical problems; however, if the ECU is suspected, substitute another ECU to verify the suspected one is defective.

Error codes can be cleared by following the procedures located in the ECU Error Codes (EFI models) sub-section in this section.

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## Regulator/Rectifier

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The regulator/rectifier is located under the rear rack and rear fenders.

### TESTING

1. Start engine and warm up to normal operating temperatures; then connect a multimeter to the battery as follows.
2. Select the DC Voltage position; then connect the red tester lead to the positive battery post and the black tester lead to the negative battery post.
3. Start the engine and slowly increase RPM. The voltage should increase with the engine RPM to a maximum of 15.5 DC volts.

**■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, check Voltage in this section. If charging coil voltage is normal, replace the regulator/rectifier.

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## Headlights

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The connectors are the four 2-prong ones secured to the front bumper supports (two on each side) with cable ties.

### VOLTAGE

**■NOTE:** Perform this test in turn on the main harness side of all four connectors. Also, the ignition switch must be in the LIGHTS position.

**■NOTE:** The LO beam is the outside bulb, and the HI beam is the inside bulb.

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to one wire; then connect the black tester lead to the other wire.
3. With the dimmer switch in the LO position, test the two outside connectors (LO beam). The meter must show battery voltage.
4. With the dimmer switch in the HI position, test the two inside connectors (HI beam). The meter must show battery voltage.



■NOTE: If battery voltage is not shown in any test, inspect the LIGHTS fuse, battery, main wiring harness, connectors, or the left handlebar switch.

## Taillight - Brakelight

The connector is the 3-prong one located under the rear fender assembly.

### VOLTAGE (Taillight)

■NOTE: Perform this test on the main harness side of the connector. Also, the ignition switch should be in the LIGHTS position.

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the white wire; then connect the black tester lead to the black wire.
3. With the ignition key in the LIGHTS position, the meter must show battery voltage.

■NOTE: If the meter shows no voltage, inspect fuses, wiring harness, connectors, and switches.

### VOLTAGE (Brakelight)

■NOTE: Perform this test on the main harness side of the connector. Also, the ignition switch should be in the ON position and the brake (either foot pedal or hand lever) must be applied.

■NOTE: Make sure the brake lever (hand) and brake pedal (auxiliary) are properly adjusted for this procedure.

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 either brake applied, the meter must show battery voltage.

■NOTE: If the meter shows no voltage, inspect bulb, fuses, wiring harness, connectors, and switches.

## 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.

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. Using the Tachometer, start the engine and run at 1500 RPM; ignition timing should be 10° BTDC.
3. Install the timing inspection plug.

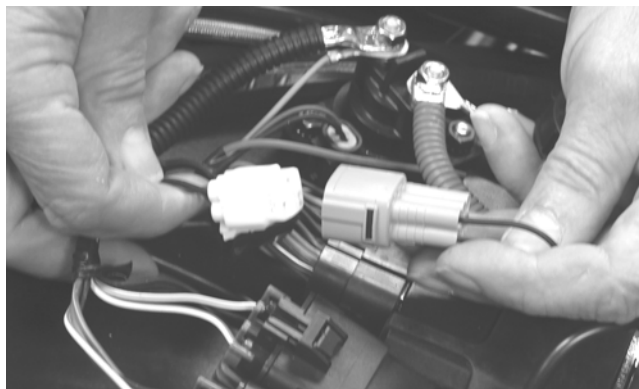
If ignition timing cannot be verified, the rotor may be damaged, the key may be sheared, the trigger coil/CKP sensor bracket may be bent or damaged, or the CDI unit/ECU may be faulty.

## ECU Error Codes (EFI Models)

If a sensor fails or an out-of-tolerance signal is sensed by the ECU, an error code will be generated by the ECU. This will result in the analog needle swinging full scale (if equipped) or the LCD gauge going blank (if equipped). The EFI icon will flash.

To read the error code(s), use the following procedure.

1. Make sure the ignition switch is in the OFF position; then remove the seat.
2. Locate the diagnostic plug next to the PDM; then remove the black rubber cap.
3. Connect the Diagnostic Harness to the diagnostic plug.



ATV-112

4. Turn the ignition switch to the ON position and read the error code on the LCD. Refer to the following ECU Error Code List to identify the specific problem area.

### ECU Error Code List

■NOTE: Each of the following numerical codes will have a two-letter prefix. A prefix of AC (Active Code) or SC (Stored Code) will be displayed. Always correct and clear Active Codes before clearing Stored Codes.

- 00 = No Fault Detected (active code only)
- 12 = CKP (Crankshaft Position) Sensor\*
- 13 = APS (Air Pressure Sensor) - H1
- 13 = MAP (Manifold Absolute Pressure) Sensor - H2
- 14 = TPS (Throttle Position Sensor)
- 15 = ECT (Engine Coolant Temperature) Sensor
- 16 = Speed Sensor
- 21 = IAT (Inlet Air Temperature) Sensor
- 23 = Tilt Sensor\*
- 24 = Ignition Coil #1\*
- 26 = Ignition Coil #2\* - H2
- 32 = Fuel Injector #1\*
- 34 = Fuel Injector #2\* - H2
- 40 = ISC (Idle Speed Control) Valve
- 41 = Fuel Pump Relay\*
- 60 = Cooling Fan Relay
- 95 = Sensor Power
- 96 = Incorrect ECU\*
- 97 = ECU Memory Power (constant battery power)
- 98 = UART Comm Link - H2
- 99 = Start/Run Not Possible (active code only)

\*Will initiate code 99.

To clear the error code(s), use the following procedure.

**NOTE:** The ignition switch should be in the OFF position.

1. With the diagnostic harness connected to the diagnostic plug and the drive select switch in the 4WD position, hold the reverse override switch down and turn the ignition switch to the ON position.
2. After ten seconds, release the reverse override switch and turn the ignition switch to the OFF position; then turn the ignition switch to the ON position. The display should read AC00 (no fault detected).

**NOTE:** If the LCD still displays an error code, continue troubleshooting the appropriate component.

3. Disconnect the diagnostic harness; then install the black rubber cap.
4. Install the seat making sure it locks securely in place.

## Tilt Sensor (EFI Models)

### **WARNING**

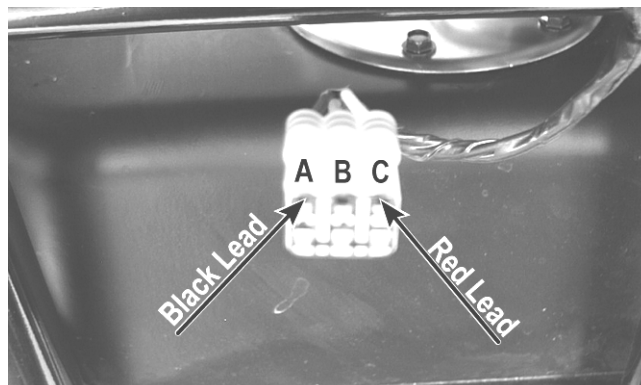
Incorrect installation of the tilt sensor could cause sudden loss of engine power which could result in loss of vehicle control resulting in injury or death.

### **CAUTION**

Do not drop the tilt sensor as shock can damage the internal mechanism.

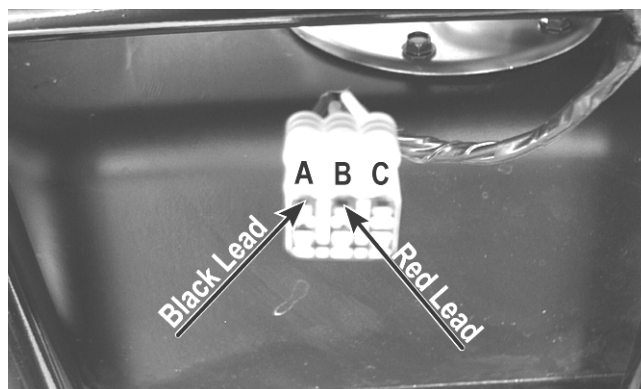
## SUPPLY VOLTAGE

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 black tester lead to the black wire (A).



CD706A

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 0 DC volts. If the specified voltage is not indicated, check wire connections at the ECU or substitute another ECU to verify the test.

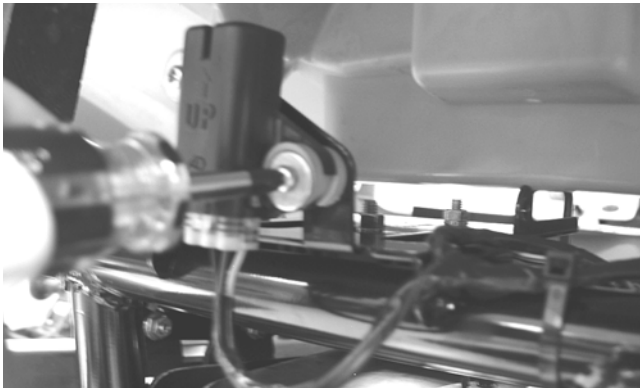


CD706B

## OUTPUT VOLTAGE

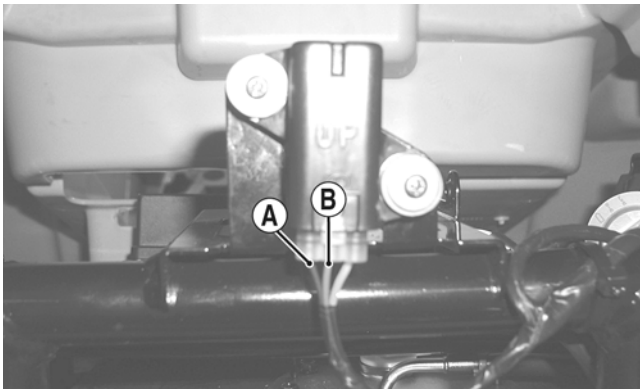
**NOTE:** Needle adapters will be required on the multimeter leads as the following tests are made with the sensor connected.

1. Connect the three-wire plug to the sensor; then remove the right-side mounting screw securing the sensor to the rear frame.



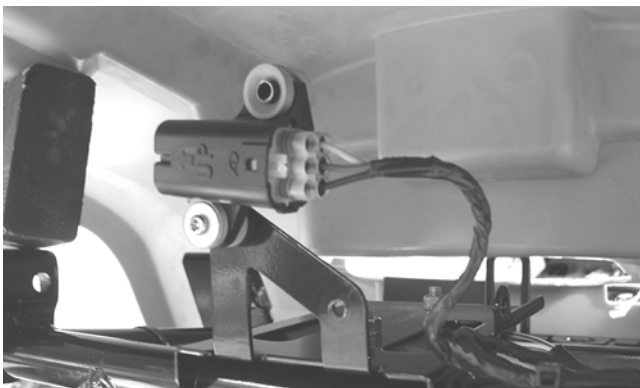
CD707

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 (B) and the black tester lead to the black/yellow wire (A); then turn the ignition switch ON and observe the meter. The meter should read 0.8-3.0 DC volts.



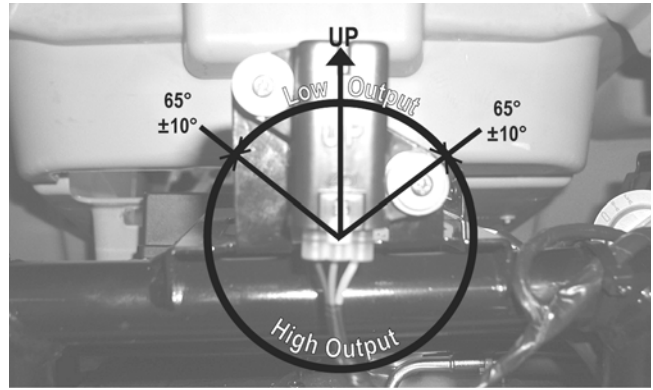
CD705B

4. Tilt the sensor 60° or more to the left and right observing the meter. The meter should read 4.0-8.0 DC volts after approximately one second in the tilted position. If the meter readings are not as specified, the tilt sensor is defective.



CD709

■NOTE: When replacing the sensor after testing, make sure the arrow marking is directed up.

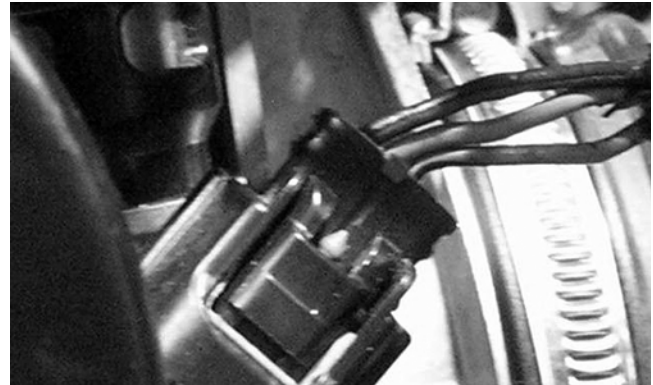


CD705A

## Throttle Position Sensor (TPS) (EFI Models)

### INSPECTING

1. Remove the left-side engine cover; then disconnect the three-wire TPS connector plug.

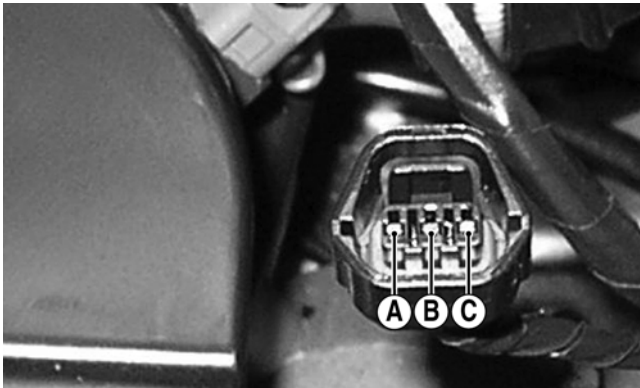


PR544

■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.

2. Make sure the ignition switch is in the OFF position; then select the DC Voltage position on the meter.
3. Connect the black tester lead to terminal C and the red tester lead to terminal B. Turn the ignition switch to the ON position. The meter should read approximately 5.0 DC volts.





PR538A

4. Remove the red tester lead from terminal B and connect it to terminal A. The meter should read 0 DC volts.

■**NOTE:** If the meter does not read as specified, check for poor connections at the ECU or open/broken wires in the wiring harness.

**CAUTION**

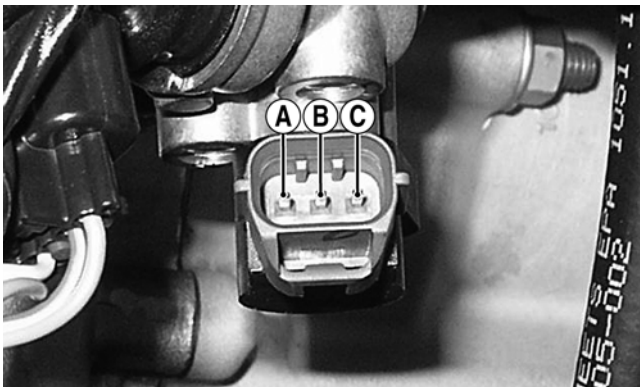
Always make sure the ignition switch is in the OFF position before disconnecting the ECU.

5. Turn the ignition switch to the OFF position; then disconnect the battery (negative cable first).

**CAUTION**

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

6. Select the OHMS position on the meter; then perform the following resistance tests on the TPS.
  - A. Pin (B) to ground - infinity (open circuit).
  - B. Pin (A) to pin (B) - approximately 1.22k ohms (throttle closed).
  - C. Pin (A) to pin (B) - approximately 4.36k ohms (throttle full-open).
  - D. Pin (A) to pin (C) - approximately 4.05k ohms.

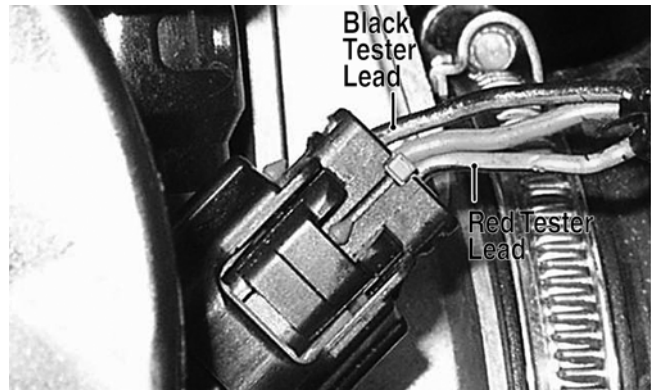


PR535A

■**NOTE:** If any meter reading is not as specified, replace or adjust the TPS (see INSTALLING/ADJUSTING in this sub-section).

[www.mymowerparts.com](http://www.mymowerparts.com)

7. Connect the positive lead to the battery; then connect the negative lead.
8. Connect the main harness TPS connector to the TPS; then using MaxiClips, connect the black tester lead to the black/green wire and the red tester lead to the green/black wire.



PR546A

9. Select the DC Voltage position on the meter and turn the ignition switch to the ON position. The meter should read approximately 0.60 DC volt with the throttle closed and approximately 4.0 DC volts with the throttle in the full-open position.

■**NOTE:** If the meter readings are as specified, check the main harness connector at the ECU main harness wiring. If the meter readings are not as specified, replace the TPS and adjust to specifications (see INSTALLING/ADJUSTING in this sub-section).

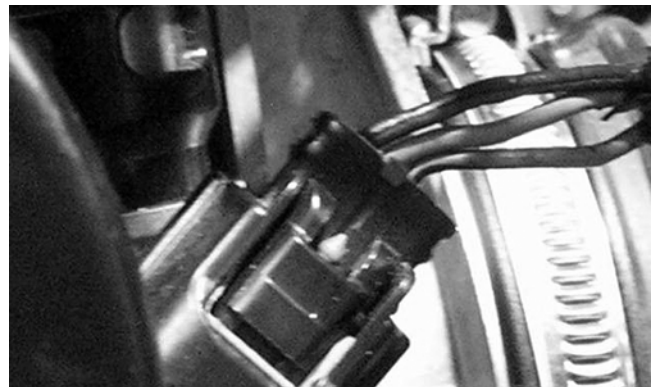
**CAUTION**

Always make sure the ignition switch is in the OFF position before disconnecting the ECU.

10. Clear all ECU error codes after servicing is complete (see ECU Error Codes (EFI Models) in this section).

## REMOVING

1. Remove the left-side engine cover; then disconnect the three-wire TPS connector plug.



PR544

2. Remove the two screws securing the TPS to the throttle body and remove the TPS.

## INSTALLING/ADJUSTING

1. Place the TPS into position on the throttle body and secure with the two screws. Do not tighten at this time.
2. Connect the main harness to the TPS.
3. Locate the diagnostic connector under the seat next to the PDM; then install the test plug from Test Plug/Error Code List kit onto the connector.
4. Turn the ignition switch to the ON position and note the position of the TPS indicator icon (A, B, or C); then adjust the TPS until the TPS icon appears in the center position (B).



5. Tighten the mounting screws securely; then verify the TPS icon appears in the center position.
6. Remove the test plug; then install the left-side engine cover.

## Troubleshooting

Problem: Spark absent or weak	
Condition	Remedy
1. <b>Ignition coil</b> defective 2. <b>Spark plug</b> defective 3. <b>Magneto</b> defective 4. <b>CDI unit/ECU</b> defective 5. <b>Pick-up coil</b> defective	1. Replace ignition coil 2. Replace plug 3. Replace magneto 4. Replace CDI unit/ECU 5. Replace pick-up coil
Problem: Spark plug fouled with carbon	
Condition	Remedy
1. <b>Mixture</b> too rich (400/500) 2. <b>Idling RPM</b> too high (400/500) 3. <b>Gasoline</b> incorrect 4. <b>Air cleaner element</b> dirty 5. <b>Spark plug</b> incorrect (too cold) 6. <b>Valve seals</b> cracked - missing 7. <b>Oil rings</b> worn - broken	1. Adjust carburetor 2. Adjust carburetor 3. Change to correct gasoline 4. Clean element 5. Replace plug 6. Replace seals 7. Replace rings
Problem: Spark plug electrodes overheat or burn	
Condition	Remedy
1. <b>Spark plug</b> incorrect (too hot) 2. <b>Engine</b> overheats 3. <b>Spark plug</b> loose 4. <b>Mixture</b> too lean (400/500)	1. Replace plug 2. Service cooling system 3. Tighten plug 4. Adjust carburetor
Problem: Magneto does not charge	
Condition	Remedy
1. <b>Lead wires/connections</b> shorted - loose - open 2. <b>Magneto coils</b> shorted - grounded - open 3. <b>Regulator/rectifier</b> defective	1. Repair - replace - tighten lead wires 2. Replace magneto coils 3. Replace regulator/rectifier
Problem: Magneto charges, but charging rate is below the specification	
Condition	Remedy
1. <b>Lead wires</b> shorted - open - loose (at terminals) 2. <b>Stator coils (magneto)</b> grounded - open 3. <b>Regulator/rectifier</b> defective 4. <b>Electrolyte</b> low 5. <b>Cell plates (battery)</b> defective	1. Repair - tighten lead wires 2. Replace stator coils 3. Replace regulator/rectifier 4. Add distilled water 5. Replace battery
Problem: Magneto overcharges	
Condition	Remedy
1. <b>Internal battery</b> short circuited 2. <b>Regulator/rectifier resistor</b> damaged - defective 3. <b>Regulator/rectifier</b> poorly grounded	1. Replace battery 2. Replace resistor 3. Clean - tighten ground connection
Problem: Charging unstable	
Condition	Remedy
1. <b>Lead wire</b> intermittently shorting 2. <b>Magneto</b> internally shorted 3. <b>Regulator/rectifier</b> defective	1. Replace lead wire 2. Replace magneto 3. Replace regulator/rectifier



Problem: Starter button not effective	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Battery charge</b> low</li> <li>2. <b>Switch contacts</b> defective</li> <li>3. <b>Starter motor brushes</b> not seating</li> <li>4. <b>Starter relay</b> defective</li> <li>5. <b>Emergency stop - ignition switch</b> off</li> <li>6. <b>Wiring connections</b> loose - disconnected</li> </ol>	<ol style="list-style-type: none"> <li>1. Charge - replace battery</li> <li>2. Replace switch</li> <li>3. Repair - replace brushes (500)</li> <li>4. Replace relay</li> <li>5. Turn on switches</li> <li>6. 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. <b>Charging rate</b> too low - too high</li> <li>2. <b>Battery electrolyte</b> insufficient</li> <li>3. <b>Specific gravity</b> too low</li> <li>4. <b>Battery</b> run-down - damaged</li> <li>5. <b>Electrolyte</b> contaminated</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace battery</li> <li>2. Keep electrolyte to prescribed level</li> <li>3. Charge battery - add distilled water</li> <li>4. Replace battery</li> <li>5. Replace battery</li> </ol>
Problem: Battery discharges too rapidly	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Electrolyte</b> contaminated</li> <li>2. <b>Specific gravity</b> too low</li> <li>3. <b>Charging system</b> not charging</li> <li>4. <b>Cell plates</b> overcharged - damaged</li> <li>5. <b>Battery</b> short-circuited</li> <li>6. <b>Specific gravity</b> too low</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace battery</li> <li>2. Charge battery - add distilled water</li> <li>3. Check magneto - regulator/rectifier - circuit connections</li> <li>4. Replace battery - correct charging system</li> <li>5. Replace battery</li> <li>6. Charge battery</li> </ol>
Problem: Battery polarity reversed	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Battery</b> incorrectly connected</li> </ol>	<ol style="list-style-type: none"> <li>1. Reverse connections - replace battery - repair damage</li> </ol>

# SECTION 6 - DRIVE SYSTEM

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## Drive System

■NOTE: Some photographs and illustrations used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Critical torque specifications are located in Section 1.

■NOTE: Specifications regarding the gear cases (capacities, lubricant type, etc.) can be found in Section 1 of this manual.

Ring Gear Backlash	0.28-0.38 mm (0.011-0.015 in.)
Ring Gear End Play	0.1-0.2 mm (0.004-0.008 in.)

### GENERAL INFORMATION

All gear cases are tagged beneath a cover bolt. This tag is marked with a production date code, sequence code, and a ratio code.

- A. A “6” or “3.6” on the lower-right corner indicates a 3.6:1 gear set ratio (10:36 teeth).
- B. A “1” or “3.1” on the lower-right corner indicates a 3.1:1 gear set ratio (11:34 teeth).
- C. A “4.0” on the lower-right corner indicates a 4.0:1 gear set ratio (9:36 teeth).

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)	8-9.5 ft-lb	6.5-9 ft-lb
M8 (Torx T-40 Recess)	25-31 ft-lb	21-25 ft-lb
M10 (Torx T-50 Recess)	37-45.5 ft-lb	31-38 ft-lb

### SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this section.

Description	p/n
CV Boot Clamp Tool	0444-120
CV Boot Clamp Tool	0444-250
Internal Hex Socket	0444-104
Pinion Gear/Shaft Removal Tool	0444-127
Slide Hammer Kit	0444-225
Seal Installation Tool	0444-224

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

## Front Drive Actuator (400/500)/Electronic Differential Lock (H1/H2 Models)

■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 side of the front drive input housing. With the engine stopped and the ignition switch in the ON position, a momentary “whirring” sound can be heard each time the front drive selector switch is shifted (400/500) or the electronic differential lock is activated (H1/H2 models). If no sound is heard, see Section 5. If the actuator runs constantly or makes squealing or grinding sounds, the actuator must be replaced.

### REMOVING

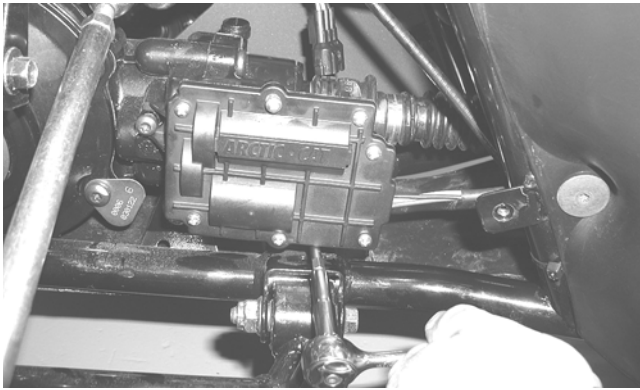
1. Disconnect the connector on the actuator harness.
2. Using a T-30 torx wrench, remove the mounting cap screw from the driveshaft side of the actuator.



AG926

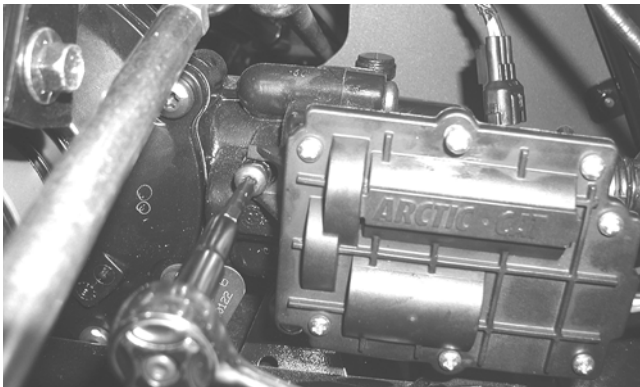
3. Remove the mounting cap screw from below the actuator on the suspension side.





AG927

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.

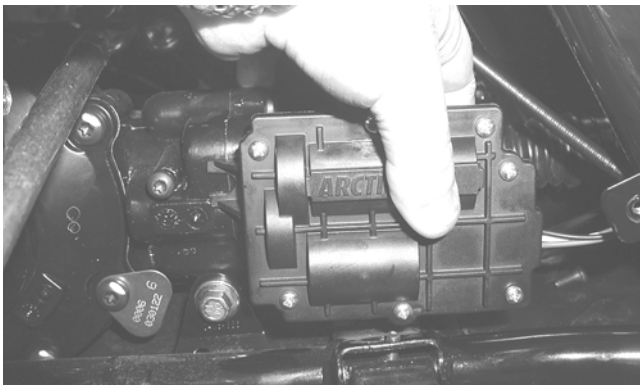


AG928

## INSTALLING

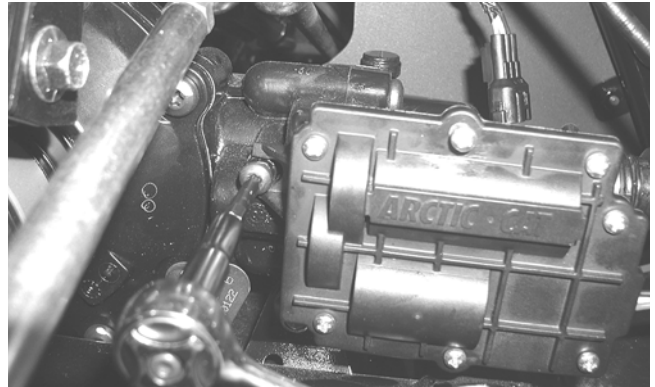
■NOTE: On the H1/H2 models, make sure to properly align the differential lock actuator lever with the hole in the differential lock plunger.

1. Lubricate the O-rings on the actuator; then ensure that 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.



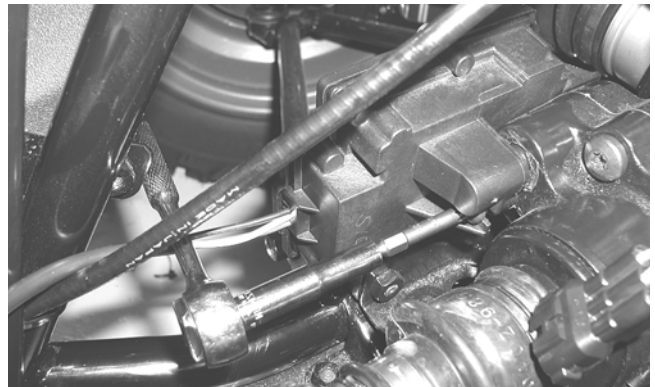
AG925

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.



AG926

4. Loosen the front cap screw; then tighten the cap screw on the driveshaft side.



AG929

■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 selector switch several times.
7. Secure the wiring harness to the frame with a nylon cable tie; then install the inner fender panel.

## Front Differential

■NOTE: To remove the rear gear case, see Rear Gear Case in this section.

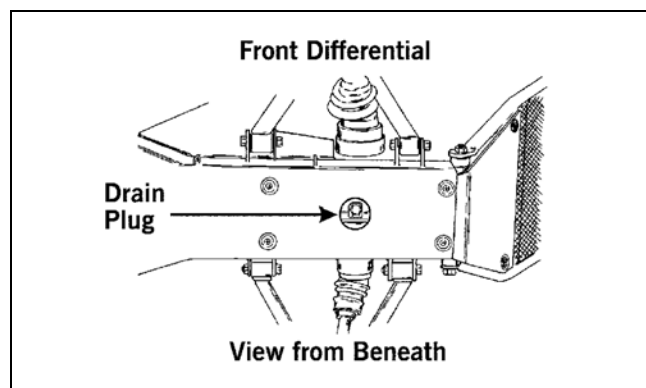
## REMOVING DIFFERENTIAL

1. Secure the ATV on a support stand to elevate the wheels.

### **WARNING**

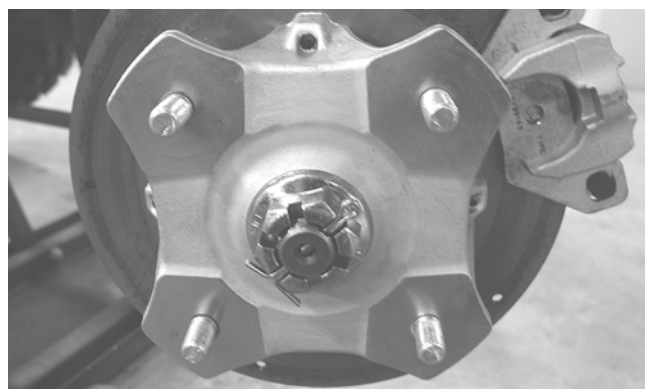
**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Remove the drain plug and drain the gear lubricant into a drain pan; then reinstall the plug and tighten to 45 in.-lb.



ATV0082A

3. Remove the front wheels.
4. Pump up the hand brake; then engage the brake lever lock.
5. Remove the cotter pin securing the hex nut; then remove the hex nut and washer.



KX041

6. Release the brake lever lock.

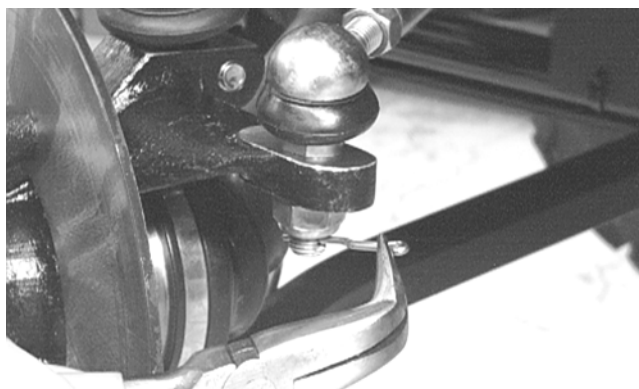
**NOTE: It is not necessary to remove the brake hoses from the calipers for this procedure.**

7. Remove the two brake calipers. Account for the four cap screws.



AF894D

8. Remove the tie rod cotter pins and discard the pins.



AF895D

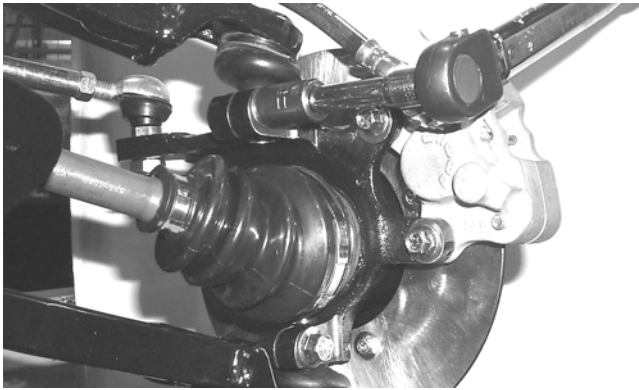
9. Remove the tie rod lock nuts.



AF896D

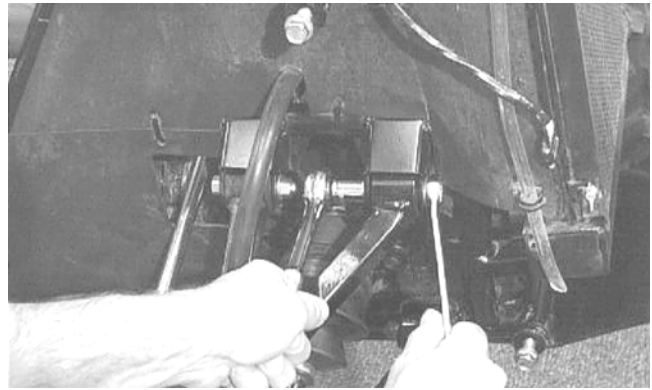
10. Remove the upper ball joint cap screws taking care not to strip the threads on the ball joint shaft; then using a rubber mallet, tap the end of the axle and free it from the knuckle assembly.





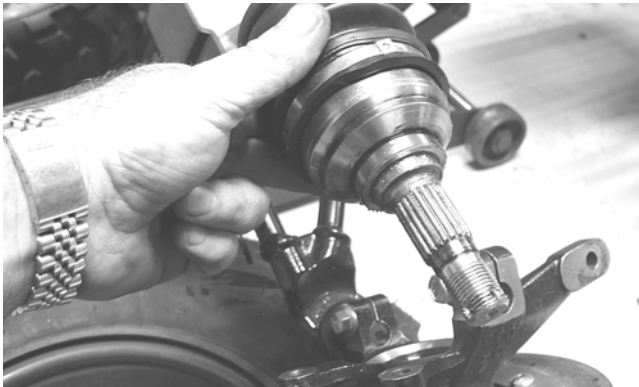
AF628D

11. Pull the steering knuckle away from the axle.



AF610D

15. Using a slide hammer, remove the front axles.

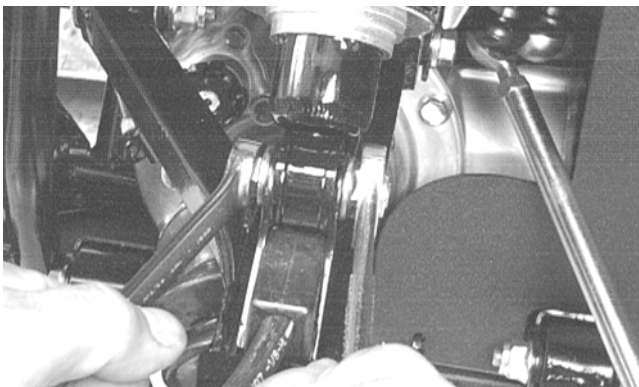


KX151

12. Support the axle to not allow it to drop or hang.

**⚠ CAUTION**  
The axle must be supported. If the axle is allowed to drop or hang, damage to the inner CV joint may occur.

13. Remove the lower shock bolts. Account for the lock nuts; then move the shocks aside and secure them with a strap.



AF897D

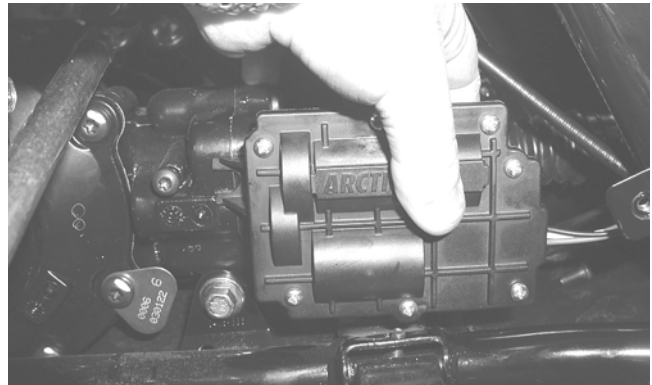
14. Remove the upper A-arm lock nuts and cap screws; then remove the A-arms.



AF899D

16. Remove the inner fender panels.

17. Using a T-30 torx wrench, remove the three screws securing the front drive actuator to the gear case; then remove the actuator.

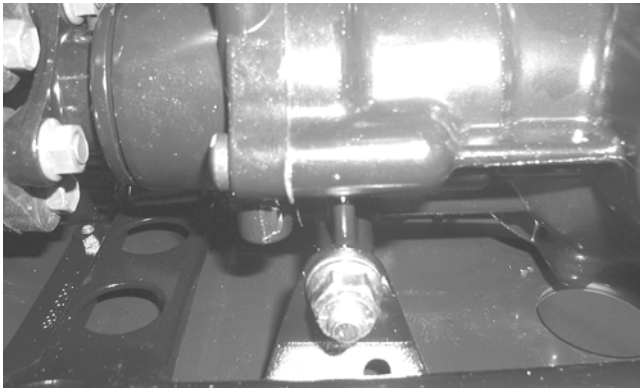


AG925

18. Remove the lower differential mounting cap screw. Account for a lock nut and washers.

6





CD026

19. Remove the upper differential mounting cap screws.



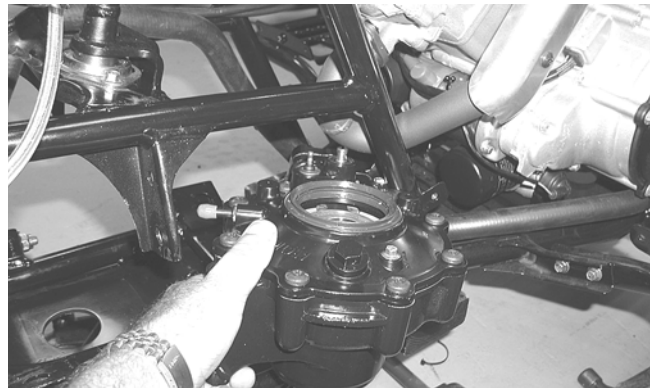
CD016

20. Free the differential assembly from the frame mountings; then shift the differential assembly forward enough to disengage the front driveshaft from the output yoke.



KX161

21. Place the differential on its right side; then remove it from the frame.



KX159

## Disassembling Input Shaft

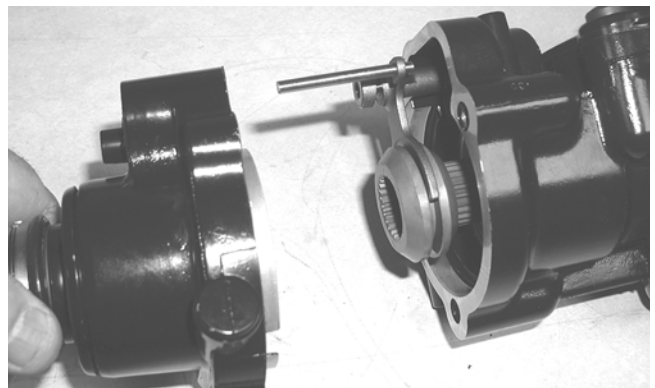
■NOTE: This procedure can be performed on a rear gear case; however, some components may vary from model to model. The technician should use discretion and sound judgment.

1. Using a T-40 torx wrench, remove the cap screws securing the pinion housing.

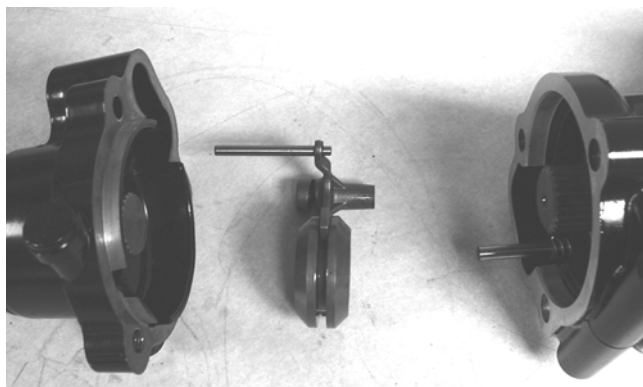


CD102

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.

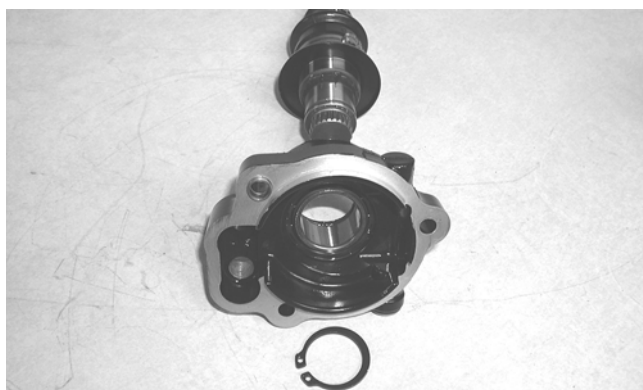


CD103



CD106

3. Using a boot-clamp pliers (or suitable substitute), remove the boot clamps; then remove the boots and splined drive from the input shaft.
4. Remove the input shaft from the pinion housing.



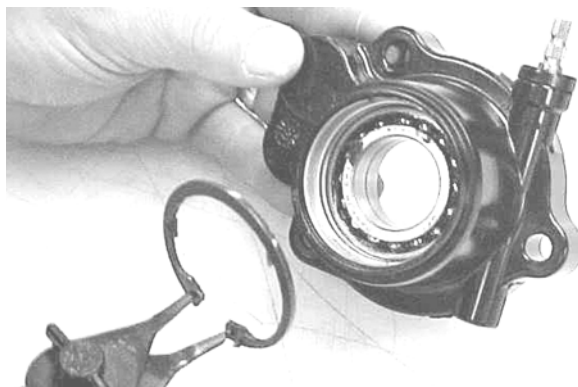
CD107

5. Using a seal removal tool, remove the input shaft seal. Account for a spacer.

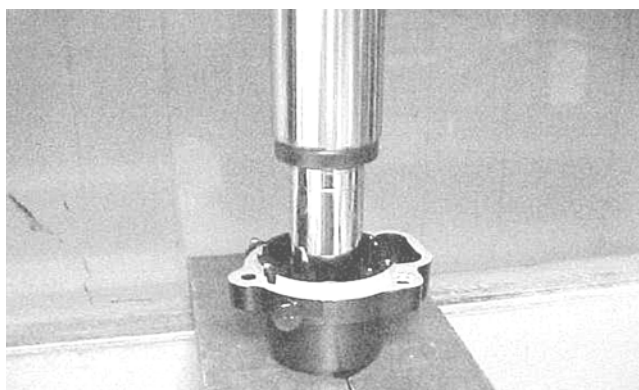


AF982

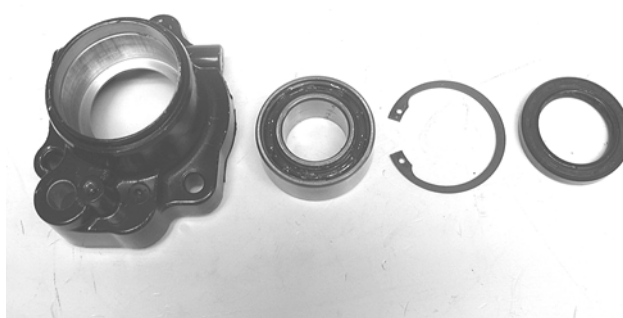
6. Remove the snap ring securing the input shaft bearing; then place the pinion housing in a press and remove the bearing.



AF983



AF984

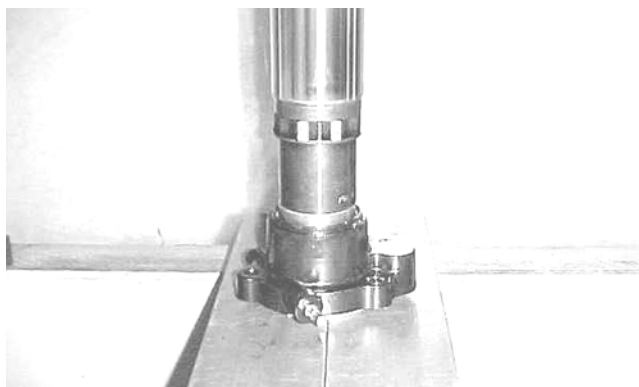


KX219

6

## Assembling Input Shaft

1. 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.



AF993



AF994

2. Install the input shaft seal making sure it is flush with the edge of the housing.
3. Lubricate the input shaft splines with High-Performance #2 Molybdenum Disulphide Grease.

■NOTE: Any time drive splines are separated, clean all splines with parts-cleaning solvent and dry with compressed air; then lubricate with recommended grease.



KX221



KX222

4. Install the input shaft into the pinion housing; then install the front boot and secure with an appropriate boot clamp and the rear boot with an appropriate boot clamp.



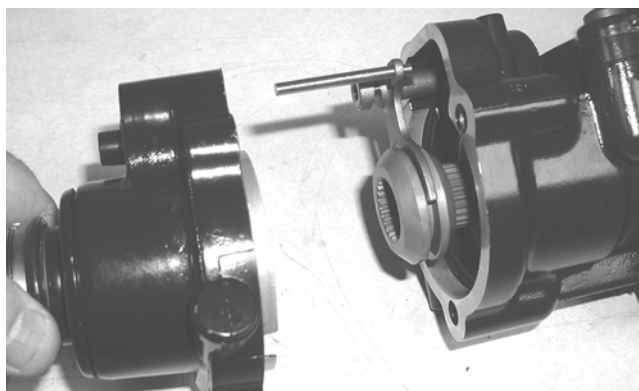
CD112



CD099

5. Place the pinion housing with new gasket onto the gear case housing; then secure with the existing cap screws. Tighten to 23 ft-lb.

■NOTE: If a new gear case housing is being installed, tighten the cap screws to 25-31 ft-lb.



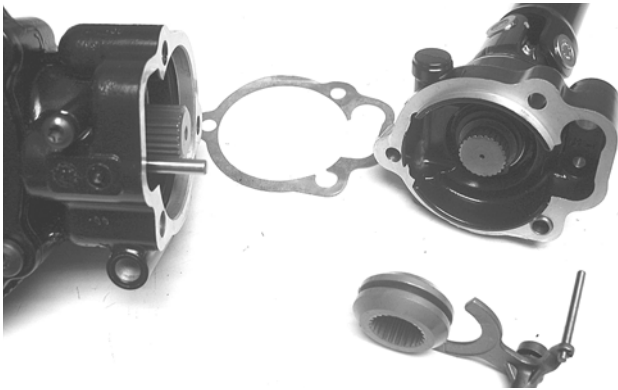
CD103

## Disassembling Pinion Gear

■NOTE: This procedure can be performed on a rear gear case.

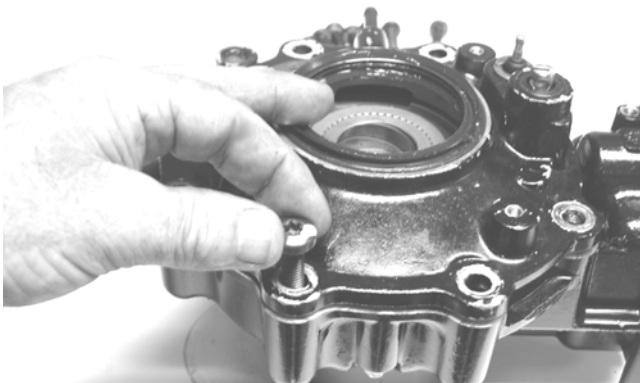
1. Using a T-40 torx wrench, remove the cap screws securing the pinion housing. Account for the coupler, fork, and spring.





KX209

2. Using a T-40 torx wrench, remove the cap screws securing the gear case cover. Account for and make note of the ID tag location for assembling purposes.



KX173

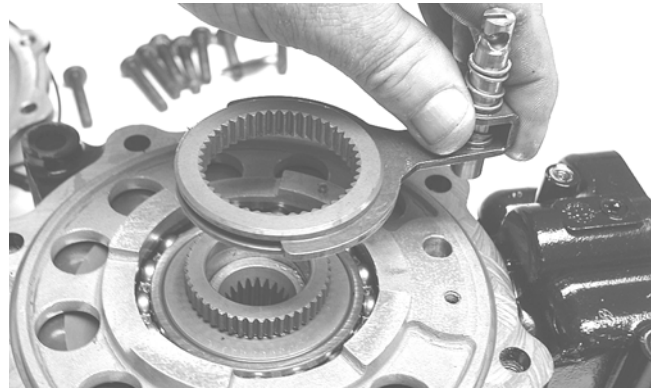
3. Using a plastic mallet, tap lightly to remove the differential cover. Account for an O-ring.



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.

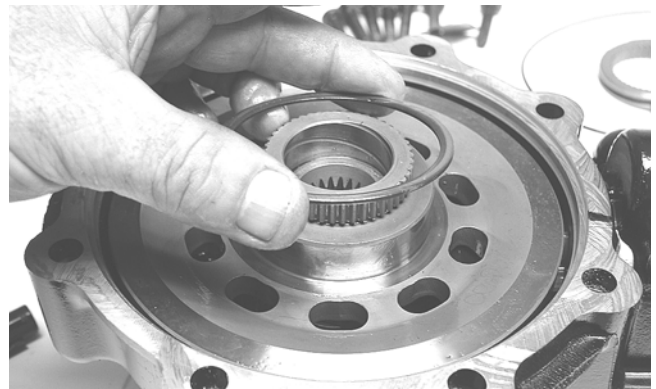


KX175

5. Remove the left gear case bearing flange assembly and account for a shim. Mark the shim as left-side.



KX177



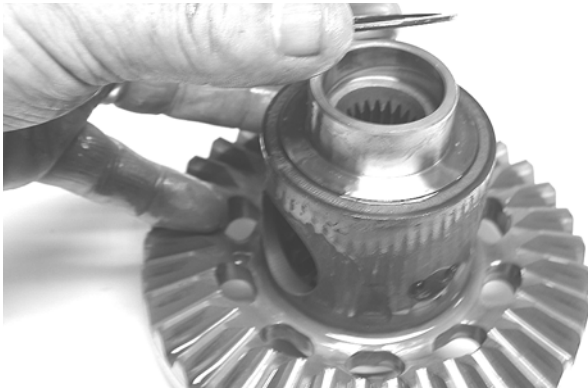
KX178

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

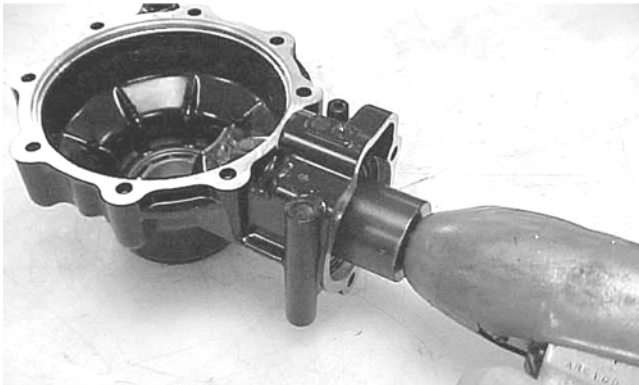
6



KX181

7. Using the 48 mm Internal Hex Socket, remove the lock collar securing the pinion gear assembly.

■NOTE: On a front differential, the lock collar has right-hand threads. On a rear gear case, the lock collar has left-hand threads.

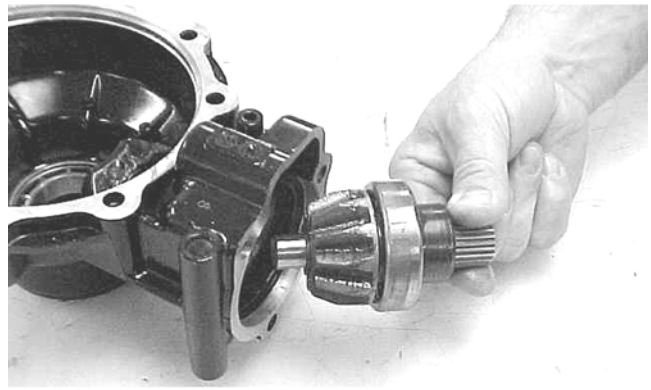


CC875



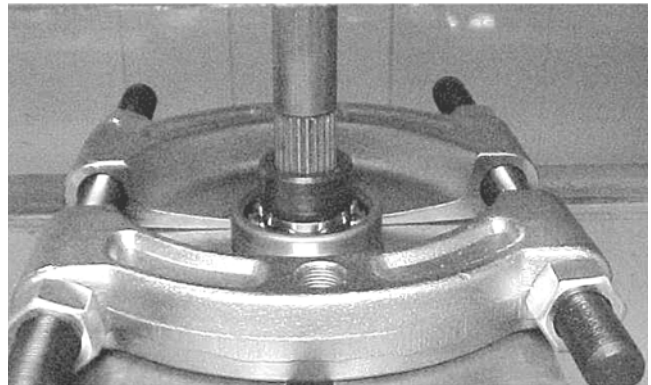
CC876

8. Using the Pinion Gear/Shaft Removal Tool and a hammer, remove the pinion gear from the gear case housing.



CC878

9. Secure the pinion gear in a bearing puller; then remove the pinion bearing using a press. Account for a collar and a bearing.



CC879

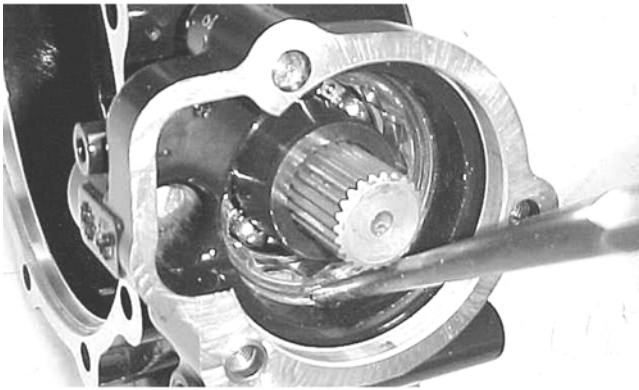
■NOTE: If gears are being replaced, use the existing shims. The numbers are scribed onto the gears: the ring gear has the number on the opposite side of the gears, and the pinion gear has the number on the end of the pinion gear shaft by the splines. If no number is present, it should be considered as being in the 0 category.

■NOTE: If the gear case housing is being replaced, proceed to the following Shimming Procedure/Shim Selection sub-section.

### Shimming Procedure/Shim Selection

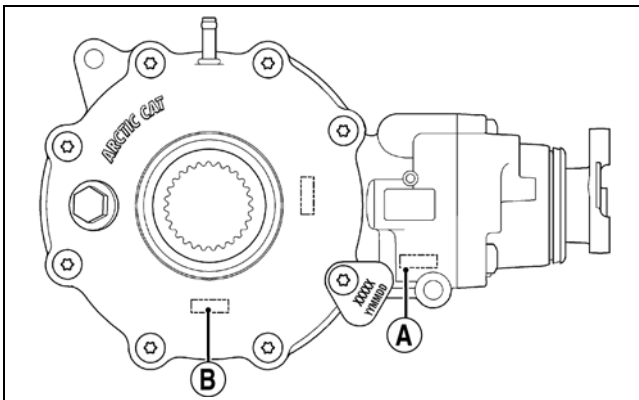
1. Press bearings into bores by outer ring to contact with seat.
2. Install the lock collar and tighten to 125 ft-lb; then on final assembling, stake the lock collar edge approximately 1.5 mm into the lower oil channel.





CC891

3. Note the following shim selections (shims are nominally 1.5 mm thick):



738-268C

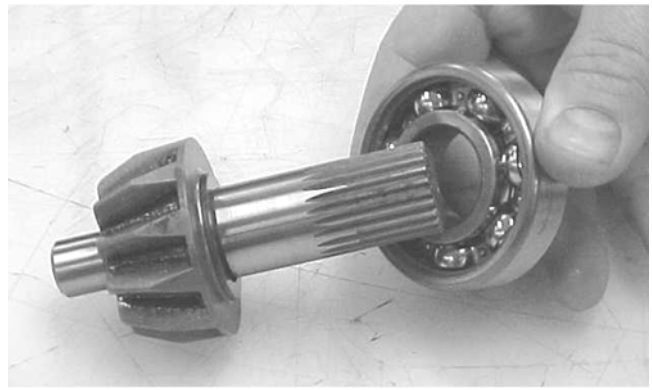
- A. Cover Side - add value A on the gear case housing to value B on the gear case cover; then add 1.5 mm. This will give you the proper shim thickness.

■NOTE: When shimming a rear gear case, add value A to value B.

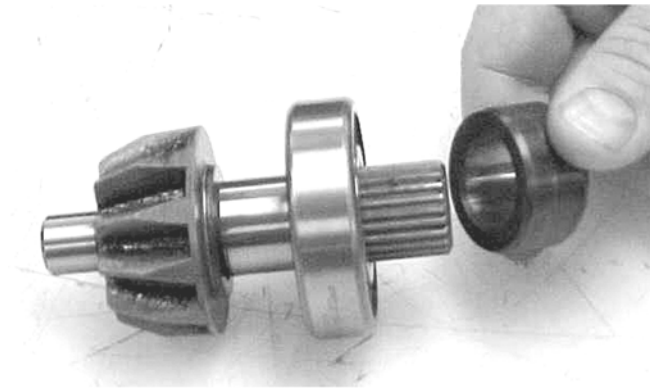
- B. Gear Case Side - install a 1.3-1.4 mm shim and tighten the bolts to 28 ft-lb. Verify backlash to be within a range of 0.28-0.38 mm (0.011-0.015 in.) and end-play to be within a range of 0.10-0.20 mm (0.004-0.008 in.). If not within specification range, reselect shim until backlash specification range can be verified.
4. Prior to final assembling, apply molybdenum disulfide grease to all oil seal lips.
5. Prior to final assembling, prelubricate journal on pinion assembly with SAE 80W-90 hypoid gear lubricant prior to pressing assembly into gear case housing.

### Assembling Pinion Gear

1. Install the bearing onto the pinion shaft. Install the pinion shaft collar.

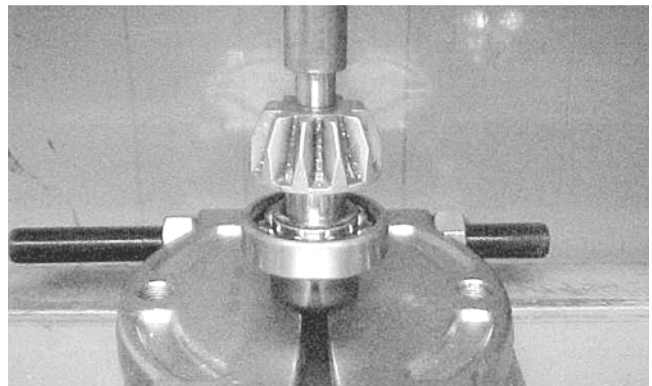


CC882



CC883

2. Place the pinion assembly in a bearing puller; then install the bearing using a press.

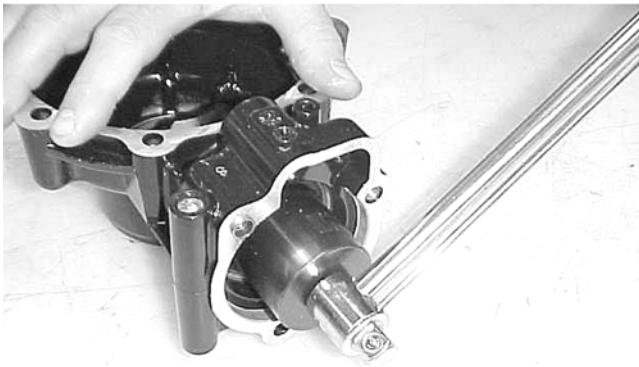


CC884

3. Install the pinion gear assembly into the housing. Using the 48 mm Internal Hex Socket, secure the pinion gear assembly with the existing lock collar. Tighten to 125 ft-lb.

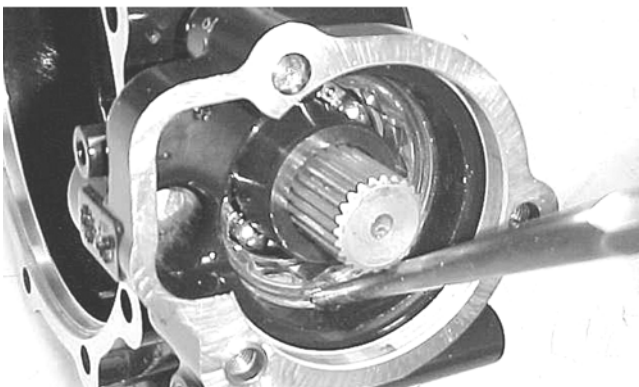
■NOTE: On a front differential, the lock collar has right-hand threads. On a rear gear case, the lock collar has left-hand threads.





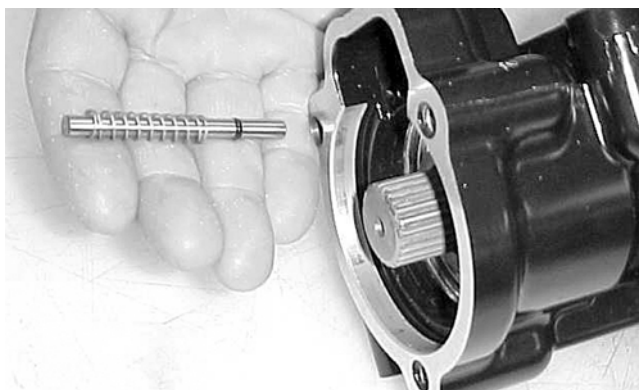
CC890

4. Place a punch on the edge of the lock collar in the oil gallery area; then using a hammer, stake the lock collar to ensure that the collar will remain securely tightened.



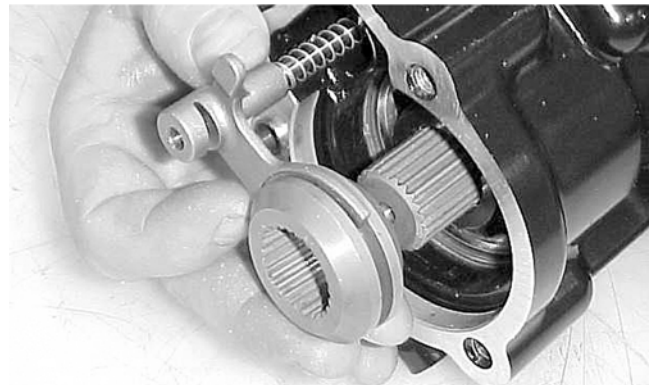
CC891

5. Install the shift fork shaft w/spring into the gear housing making sure the shaft O-ring is positioned to the inside.



CC892

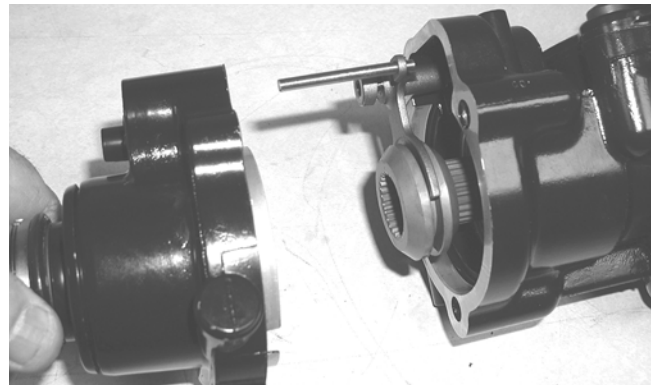
6. Install the shift fork assembly making sure the fork leg is facing upward. Apply a small amount of oil to the gasket; then install the gasket.



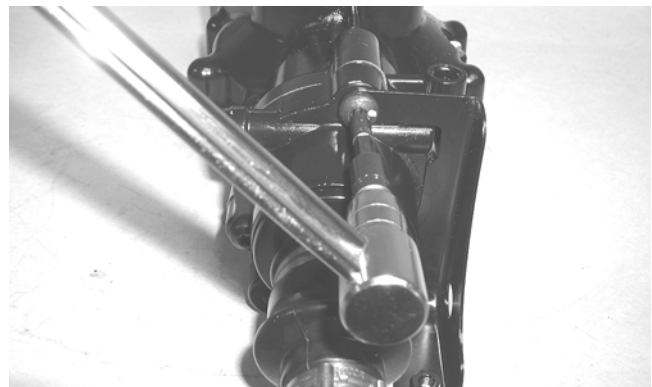
CC893

7. Place the pinion housing assembly onto the gear housing; then secure with the existing cap screws. Tighten to 23 ft-lb.

■NOTE: If a new gear housing is being installed, tighten the cap screws to 25-31 ft-lb.



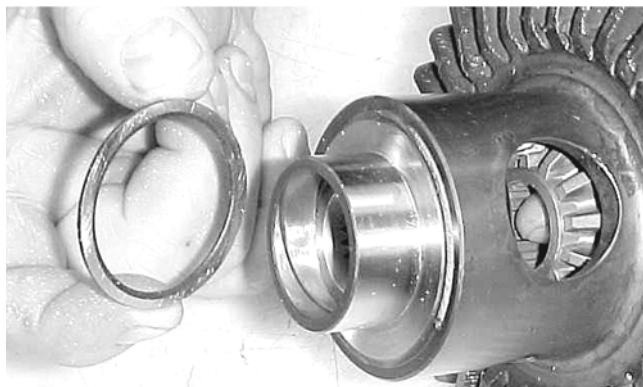
CD103



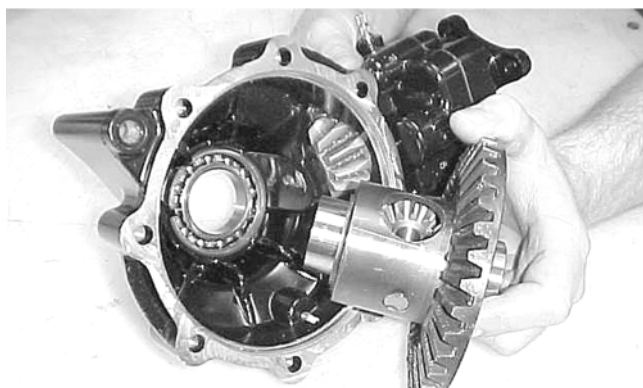
CD110

8. Install the proper shim onto the ring gear spider assembly making sure the chamfer side of the shim is facing toward the ring gear. Install the ring gear in the housing; then install the outside shim with the chamfer side of the shim toward the ring gear.

■NOTE: The spider and ring gear assembly must be replaced as a complete unit.

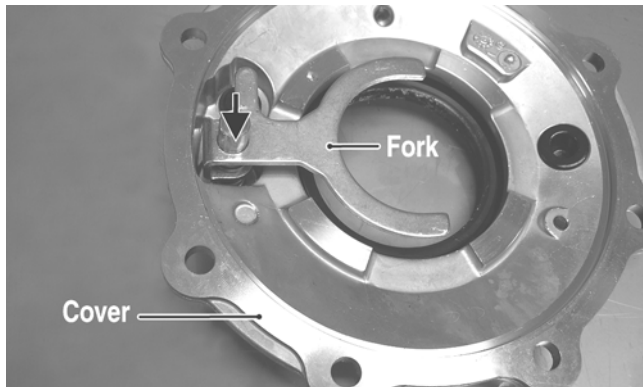


CC896

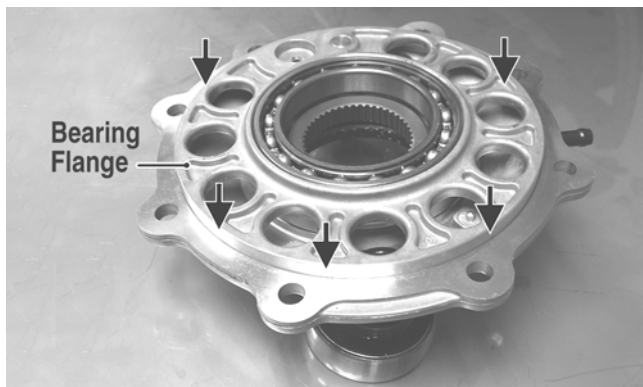


CC897

9. Assemble the fork and sliding collar into the cover assembly; then install left bearing flange/bearing assembly and seat it firmly into the cover.



CF266A



CF267A

10. Apply a liberal amount of grease to the O-ring; then install it on the assembled cover assembly making sure to seat the O-ring down around the circumference of the bearing flange.
11. Making sure the O-ring is properly positioned on the differential/gear case cover assembly, install the cover with existing hardware. Account for the ID tag. Tighten the cap screws (coated with green Loctite #609) to 23 ft-lb.

■NOTE: Grease can be applied to the O-ring for ease of assembling.

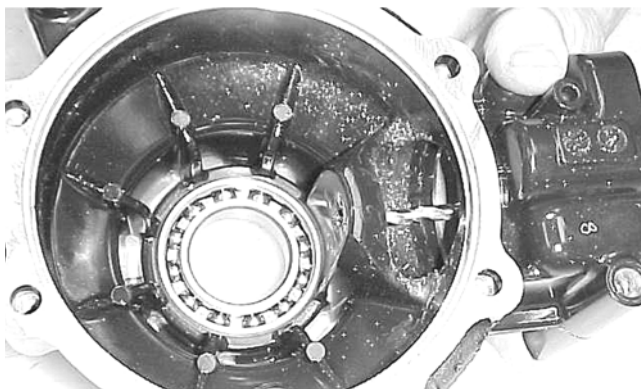
■NOTE: If a new gear case housing is being installed, tighten the cap screws to 25-31 ft-lb.

## Removing Needle Bearing

■NOTE: Removing the needle bearing is rarely necessary. Avoid removing the needle bearing unless the bearing is clearly damaged.

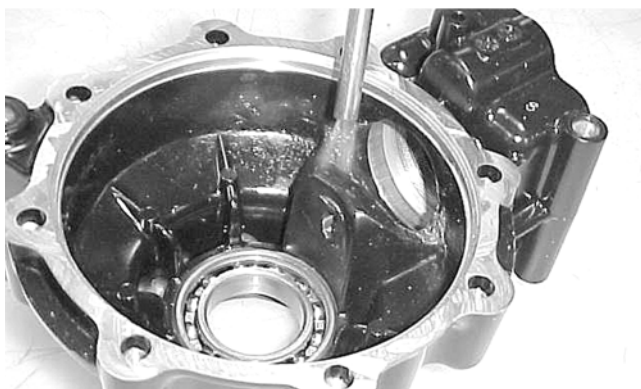
■NOTE: This procedure can be performed on a rear gear case.

1. Place a 1/4 in. drill bit on the inside surface of the needle bearing (against the bottom side); then drill through the pinion shaft needle bearing housing.



CC885

2. Using a propane torch, heat the area surrounding the needle bearing to soften the Loctite.



CC886

3. Using a flat-nosed punch, drive the bearing out of the housing.

6

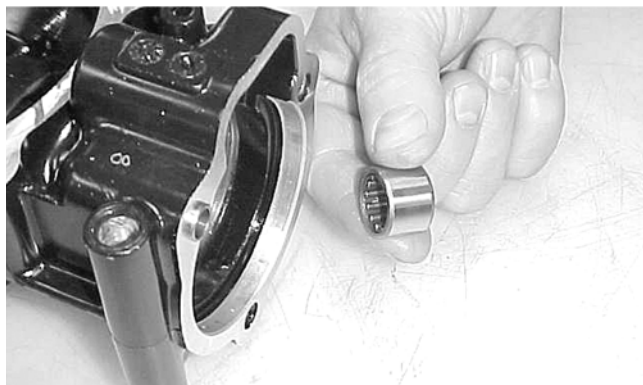




CC887

## Installing Needle Bearing

1. Apply red Loctite #271 to the outside of a new bearing; then place the new bearing into the housing.



CC888

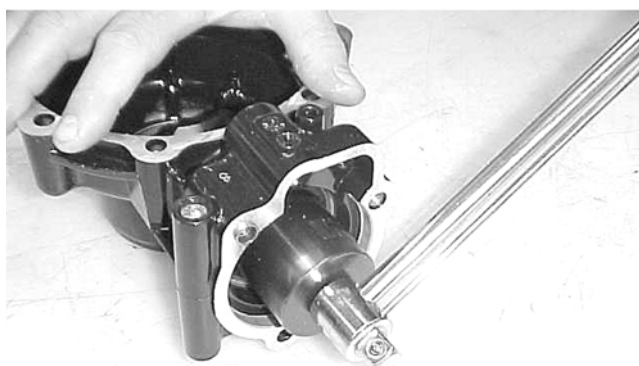
2. Using a suitable driver, install the needle bearing into the gear case housing making sure the bearing is seated.

■NOTE: Do not push the bearing too far into the housing.



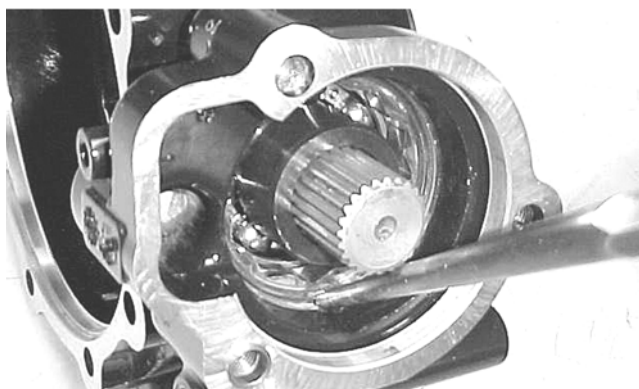
CC889

3. Install the pinion shaft and secure with the existing 48 mm lock collar. Tighten to 125 ft-lb.



CC890

4. Place a punch on the edge of the lock collar in the oil gallery area; then using a hammer, stake the lock collar to ensure that the collar will remain securely tightened.



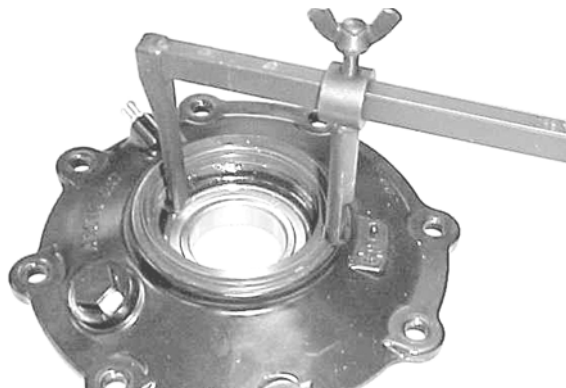
CC891

5. Install the pinion housing.

## 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

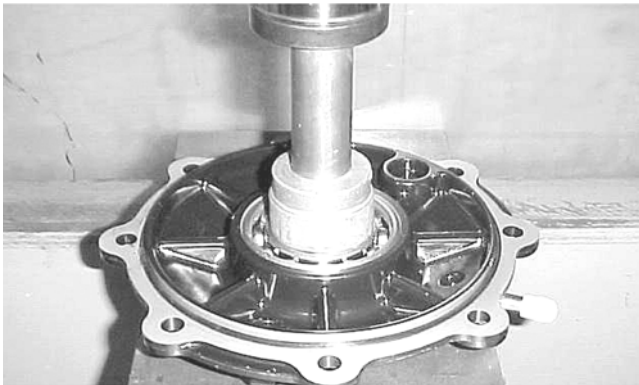
2. Using a press, remove the bearing.





CC900

3. Using a press, install the new bearing into the housing.



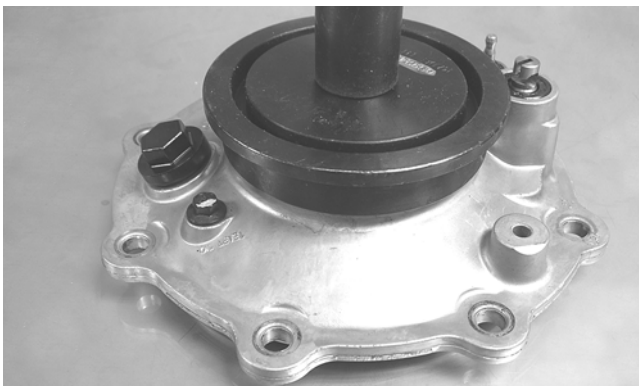
CC901

■ **NOTE:** Prior to installing the seal, apply High Performance #2 Molybdenum Disulphide Grease to the seal outside diameter.

4. Using an appropriate seal installation tool, evenly press the seal into the cover bore until seated.

**CAUTION**

Make sure the tool is free of nicks or sharp edges or the seal will be damaged.



CF278

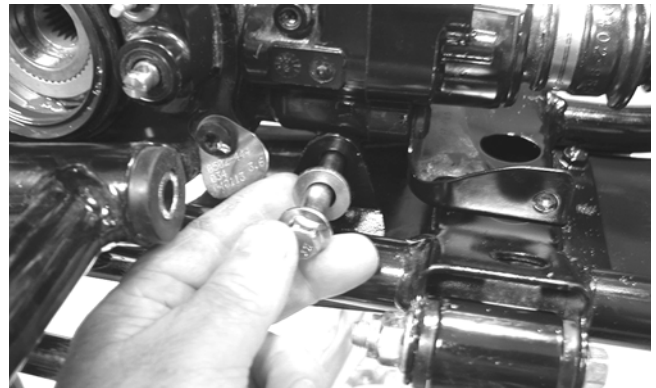
5. Repeat steps 1-4 for the opposite side.

## INSTALLING DIFFERENTIAL

1. Align the splined input yoke with the front output splines; then place the differential into position on the frame and install the cap screws, washers, and flex-lock nuts. Tighten to 38 ft-lb. Make sure the rubber boot is properly seated on the input yoke.

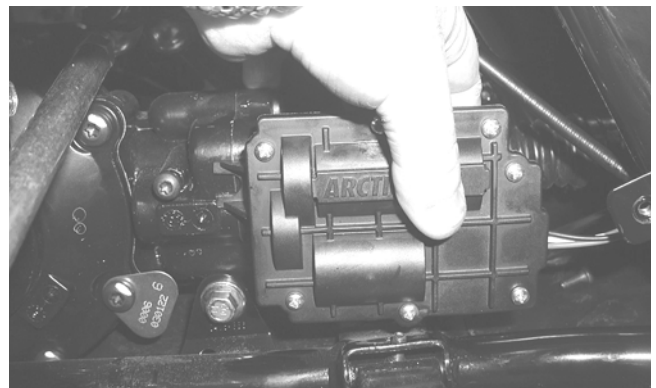


CD857



CD859

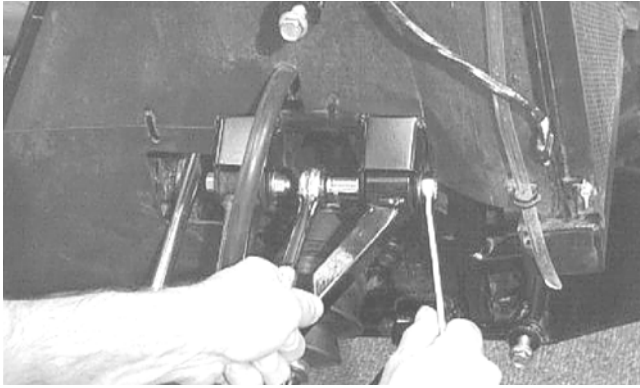
2. Pour 275 ml (9.3 fl oz) of SAE 80W-90 hypoid gear lubricant into the differential and install the filler plug. Tighten to 16 ft-lb.
3. Install the front drive actuator with the three torx-head cap screws; then connect the wire connector to the main wiring harness.



AG925

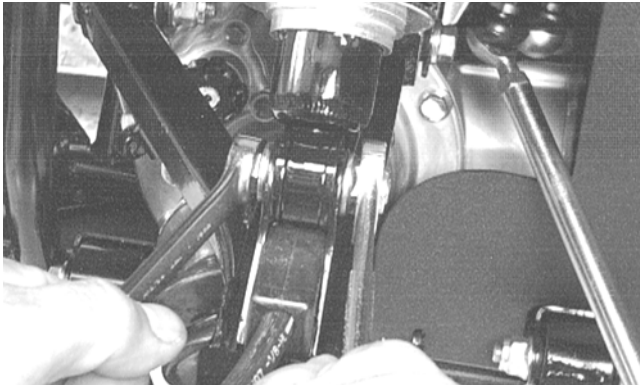
4. Install the inner fender panels.
5. Install the front axles (see Drive Axles in this section).

6. Secure the upper A-arms with cap screws and lock nuts. Tighten to 35 ft-lb.



AF610D

7. Secure the lower shock eyelets with cap screws and lock nuts. Tighten to 35 ft-lb (400/500/H1 models) or to 50 ft-lb (H2 models).

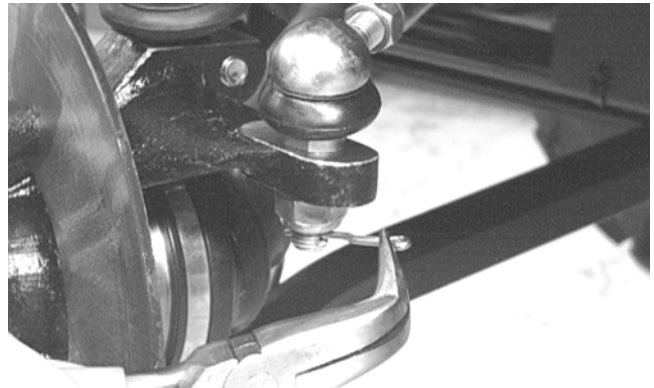


AF897D

8. Secure the tie rods with the lock nuts. Tighten to 30 ft-lb; then install and spread the cotter pins.



AF896D



AF895D

9. Install the brake calipers and secure with the patch-lock cap screws tightened to 20 ft-lb.



AF894D

10. Install the wheels and tighten to 40 ft-lb.

11. Remove the ATV from the support stand.

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## Drive Axles

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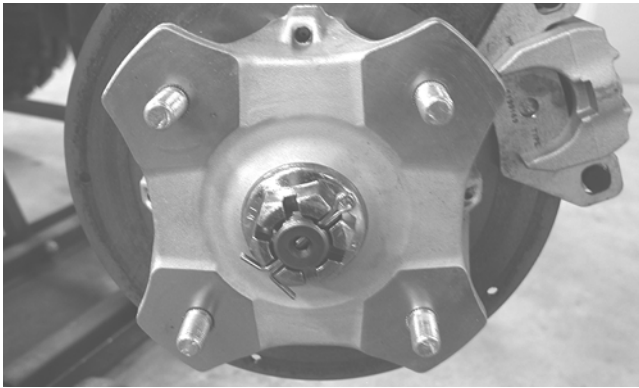
### REMOVING REAR DRIVE AXLE

1. Secure the ATV on a support stand to elevate the wheels.

#### **WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Pump up the hand brake; then engage the brake lever lock.
3. Remove the wheel.
4. Remove the cotter pin securing the hex nut; then remove the hex nut. Release the brake lever lock.



KX041

5. Remove the two brake calipers (right side only).

■NOTE: Do not allow the brake calipers to hang from their cable/hose.

**CAUTION**

The calipers should be supported. If the calipers are allowed to hang from the cable/hose, damage may occur.

6. Slide the hub out of the knuckle and set aside.
7. Remove the cap screw and lock nut securing the knuckle to the upper A-arm. Discard the lock nut.

■NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.

8. While holding the drive axle stationary, pull the top of the knuckle out and down until it is free of the drive axle.
9. Place a drain pan under the ATV to contain any oil leakage; then using a slide hammer, remove the drive axle.



AF935

## REMOVING FRONT DRIVE AXLE

■NOTE: For removing a front drive axle, see Front Differential in this section.

## CLEANING AND INSPECTING

■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

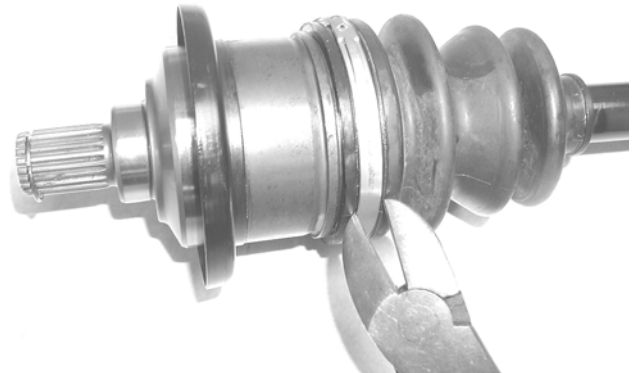
2. Inspect boots for any tears, cracks, or deterioration.

■NOTE: If a boot is damaged in any way, it must be replaced with a boot kit.

3. Inspect the gear case seals for nicks or damage.

## DISASSEMBLING AXLES

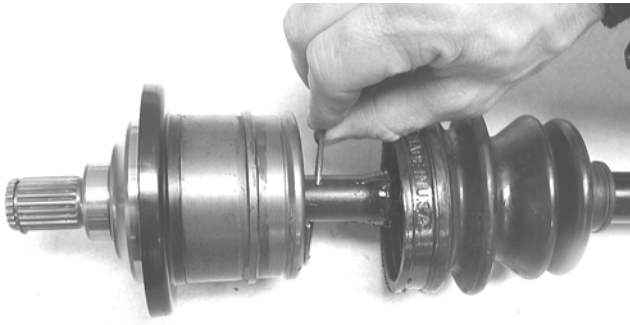
1. Using a side-cutters (or suitable substitute), remove the large clamp from the boot.



CD020

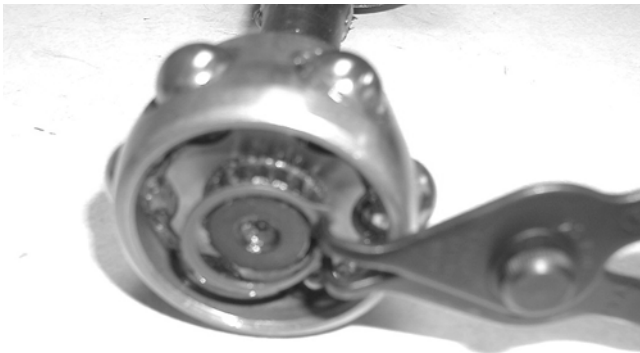
2. Wipe away excess grease to access the retaining ring. Using an awl, remove the circlip.





CD021

3. Using a snap ring pliers, remove the snap ring securing the bearing ring to the shaft. Note the direction of the bearing for assembling purposes.



CD023

4. Note the difference inside each bearing ring end for assembling purposes; then remove the bearing ring.

■NOTE: The recess of the bearing must face toward the housing.



CD022

5. Inspect the splines of the shaft, the bearing ring, and the housing for damage.

■NOTE: If any damage is apparent to the splines, the bearing ring, and/or the housing, the drive axle must be replaced as an assembly.

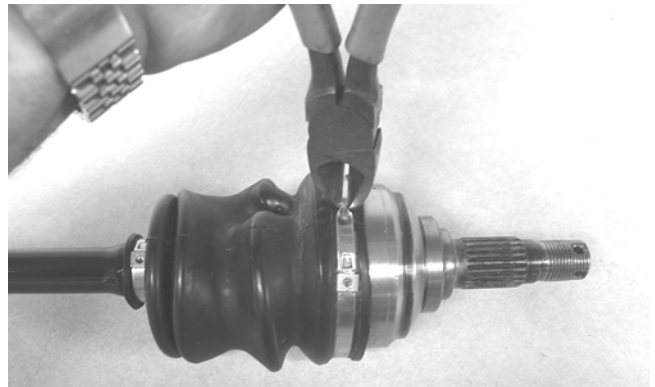
6. Using a side-cutters (or suitable substitute), remove the small clamp from the shaft.



CD752

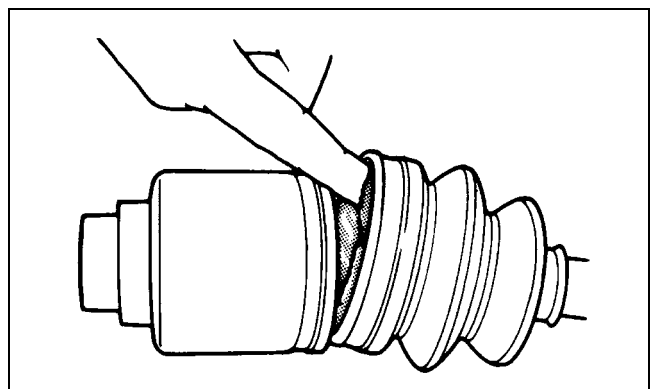
■NOTE: At this point if the outside boot is damaged, continue with step 7.

7. Using a side-cutters (or suitable substitute), remove both outside boot clamps from the shaft. Note the position of the different-sized clamps for assembling purposes.



CD751

8. Apply 40 grams (1/3 of contents) of grease from the Grease Pack into the knuckles and the new outside boot.



ATV-1052

■NOTE: Grease Pack contains 120 grams of grease. The inside joint (double-offset) requires approximately 70-90 grams of grease and the outside (bell-type) requires approximately 35-55 grams. When replacing boots, use 2/3 of the pack for inside boots and 1/3 of the pack for outside boots.

**CAUTION**

Do no over-fill the joint as boot damage may occur resulting in joint failure.

9. Slide the new outside boot onto the shaft with the new clamps positioned as shown. Note the different-sized clamps from removal.

■NOTE: The boot is positioned correctly when the small end of the boot seats down into the recessed groove.



CD754

10. Using the CV Boot Clamp Tool, secure both outside boot clamps.

**CAUTION**

It is important that the clamps are positioned correctly or they may loosen when in motion.



CD024

## ASSEMBLING AXLES

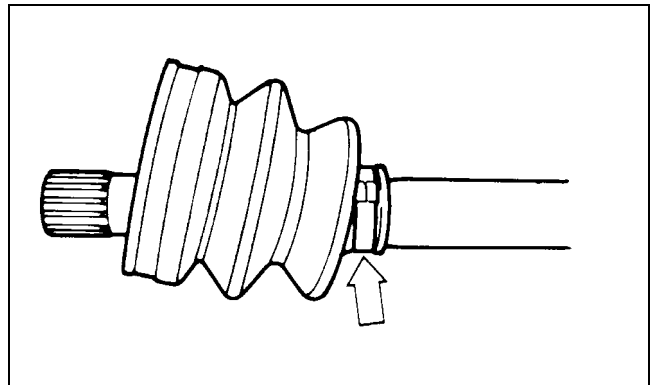
1. Install the inner boot with the small clamp making sure the ends of the clamp are positioned correctly.

■NOTE: The boot is positioned correctly when the small end of the boot seats down into the recessed groove.



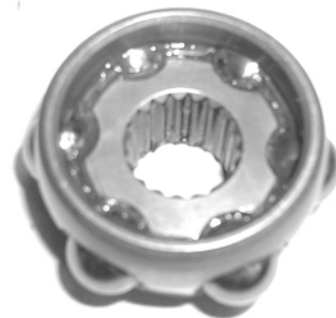
CD754

2. Using the boot clamp pliers, 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.
4. Install the bearing onto the shaft making sure the recess of the bearing is facing the housing.

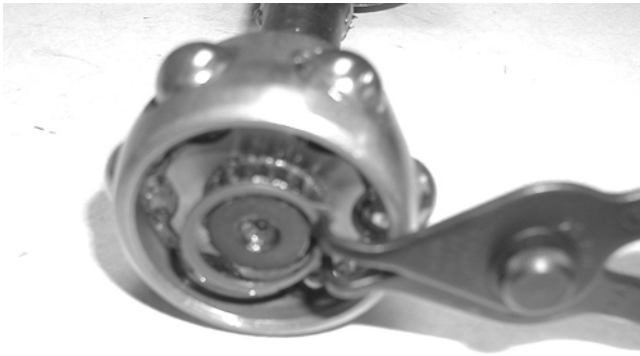


CD022

**CAUTION**

The bearing ring must go onto the shaft with the side without splines facing toward the small clamp of the inner boot or severe damage will result.

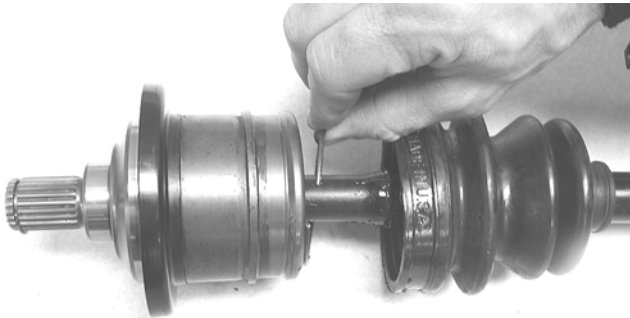
5. Secure the bearing ring with the snap ring making sure the sharp side of the snap ring faces away from the boot.



CD023

6. Making sure the marks made during disassembling align, slide the housing over the bearing ring; then completely seat the bearing ring into the housing and install the circlip.

■NOTE: Pull the bearing ring out of the housing until it contacts the circlip; then slide the ring in half way. This will purge air from the housing and ensure the bearing is packed properly.



CD021

7. Slide the boot over the housing; then using the boot clamp pliers, secure the boot with the clamp.



CD024

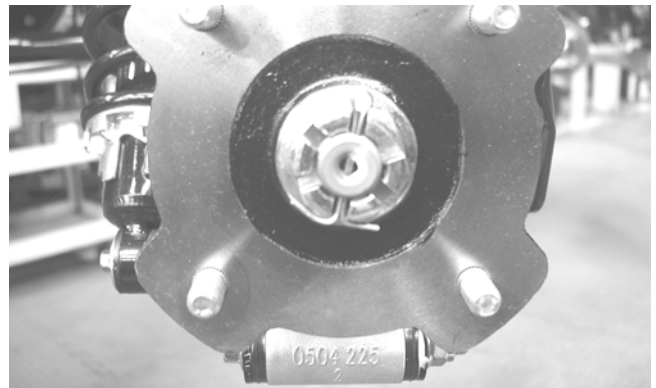
8. Inspect the axle components for correct positioning of the four clamps. Also, inspect the boots for being correctly positioned on the shaft.

### INSTALLING REAR DRIVE AXLE

1. Slide the drive axle into place in the gear case.

■NOTE: To assure proper seating of the axle, give it a light pull; the axle should remain "clipped" in place.

2. Swing the knuckle up and onto the drive axle; then place the knuckle into place in the upper A-arm. Secure the knuckle to the A-arm with a cap screw and a new lock nut. Tighten to 35 ft-lb (400/500/H1 models) or to 50 ft-lb (H2 models).
3. Place the hub into position on the axle followed by a hex nut. Tighten the hex nut finger-tight at this time.
4. If the brake calipers were removed, position them on the knuckle and secure with existing cap screws. Tighten the auxiliary brake caliper cap screws to 20 ft-lb. Tighten the hydraulic brake caliper cap screws to 20 ft-lb.
5. Pump up the hand brake lever; then engage the brake lever lock.
6. Tighten the hub hex nut (from step 3) to 200 ft-lb; then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



CD027

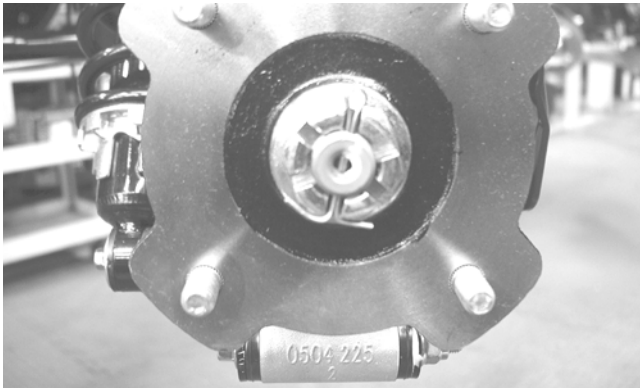
7. Install the wheel. Tighten to 40 ft-lb.
8. Remove the ATV from the support stand and release the brake lever lock.

### INSTALLING FRONT DRIVE AXLE

1. Position the drive axle in the gear case and steering knuckle; then insert the upper A-arm ball joint into the steering knuckle. Secure with a cap screw tightened to 35 ft-lb.
2. Place the brake hose into position on the upper A-arm; then secure the lower shock eyelet to the A-arm with a cap screw and a new lock nut. Tighten to 35 ft-lb.
3. Secure the tie rod to the steering knuckle with a new lock nut. Tighten securely; then install and spread a new cotter pin.
4. Slide the hub w/brake disc into position in the steering knuckle followed by a washer and hex nut. Tighten finger-tight at this time.

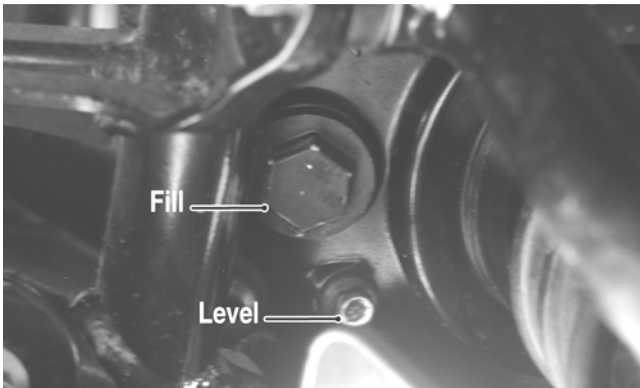


5. Install the brake caliper on the steering knuckle. Tighten to 20 ft-lb; then pump up the hand brake lever and engage the brake lever lock.
6. Tighten the hub hex nut (from step 4) to 200 ft-lb; then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



CD027

7. Install the wheel and tighten to 40 ft-lb.
8. Remove the ATV from the support stand and release the brake lever lock.
9. Check the front differential oil level and add oil as necessary.

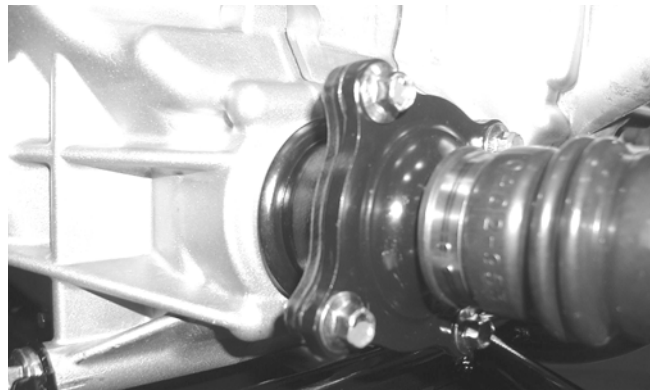


CF113A

## Rear Gear Case

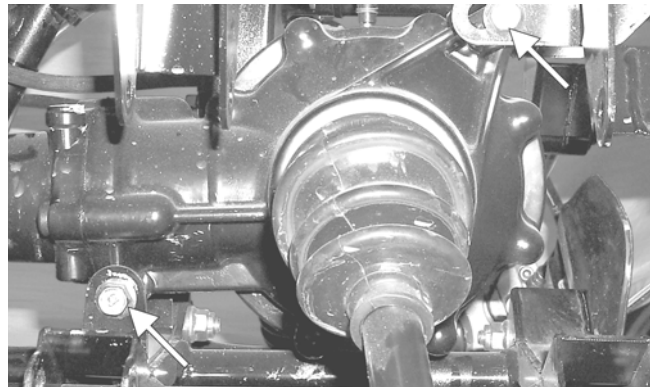
### REMOVING

1. Remove the left-side rear A-arms (see Rear A-Arms in Section 7).
2. Remove both of the rear drive axles (see Drive Axles in this section).
3. Remove the four cap screws securing the engine output shaft to the rear gear case input flange.



CD028

4. Remove the two cap screws and lock nuts securing the rear gear case to the frame; then remove the gear case through the left side.



AF960A

### AT THIS POINT

For servicing the input shaft (500/H1 models), pinion gear, needle bearing, and axle seal, see Front Differential in this section.

6

## REAR DRIVE INPUT SHAFT/ HOUSING (H2 Models)

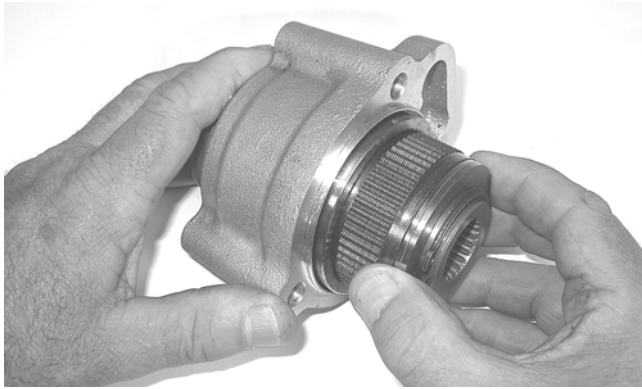
### Removing/Disassembling

1. Remove the cap screws securing the rear drive input shaft/housing to the rear gear case; then remove the input housing assembly.

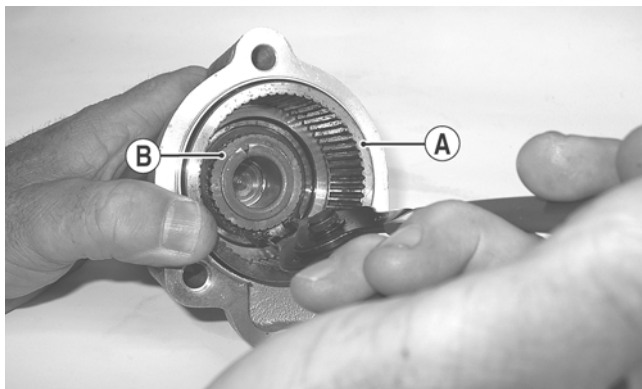


GZ183

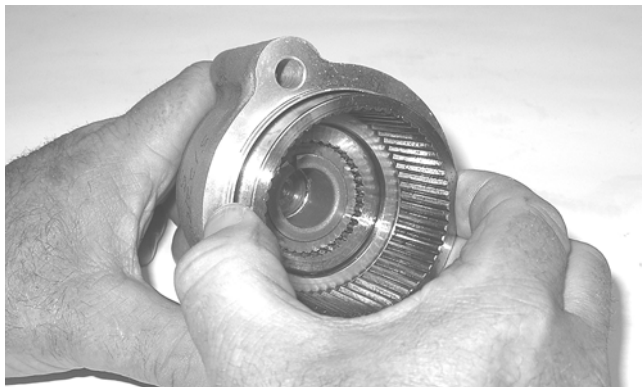
2. Remove the clutch pack from the clutch basket; then remove the snap ring securing the clutch basket (A) to the input shaft (B) and remove the clutch basket.



GZ392



GZ176A

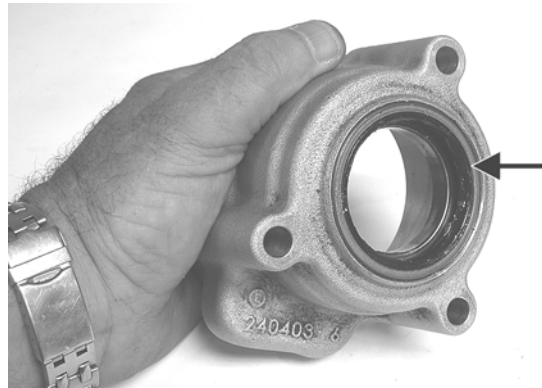


GZ177

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

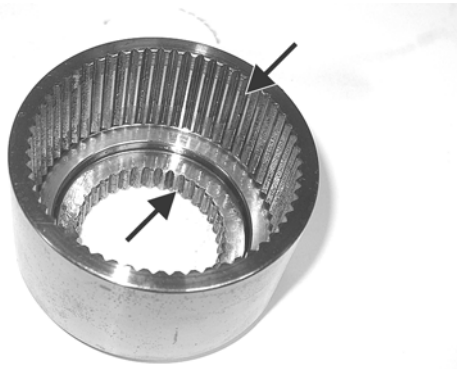
## Cleaning and Inspecting

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.

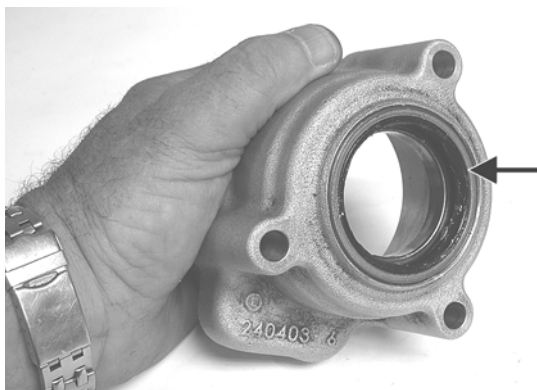
### Assembling/Installing

1. Install a new bearing into the input housing and secure with the snap ring (flat side directed away from bearing).



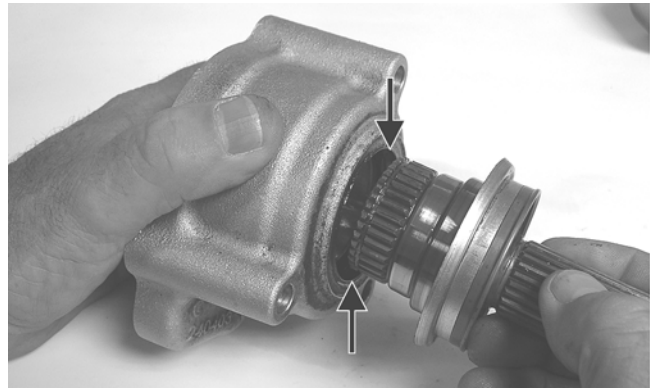
GZ184

2. Using a suitable seal driver, install a new oil seal into the front of the input housing until the seal flush with the housing.



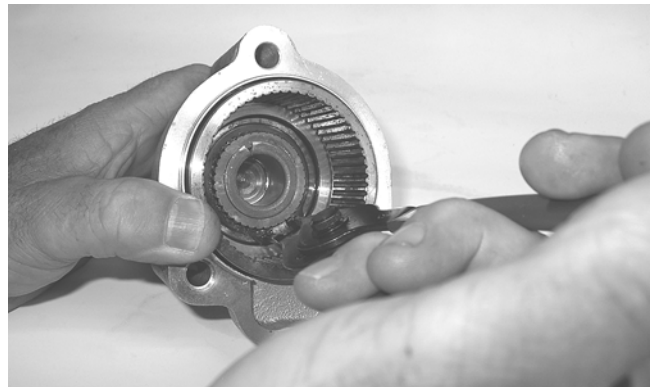
GZ182A

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.

6

### INSTALLING

1. Slide the gear case into position through the left side of the frame; then secure it to the frame with cap screws and lock nuts. Tighten to 45 ft-lb.
2. Secure the engine output shaft to the rear gear case input flange with four cap screws (coated with red Loctite #271) and lock nuts. Tighten to 20 ft-lb.
3. Install the rear drive axles (see Drive Axles in this section).
4. Install the left-side rear A-arms (see Rear A-Arms in Section 7).

## Hub

### REMOVING

1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

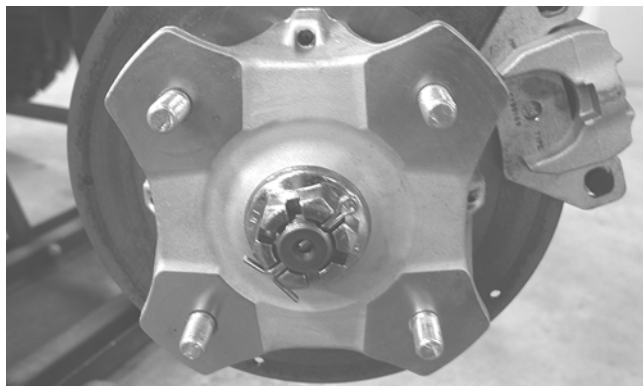


## ⚠ WARNING

Make sure the ATV is solidly supported on the support stand to avoid injury.

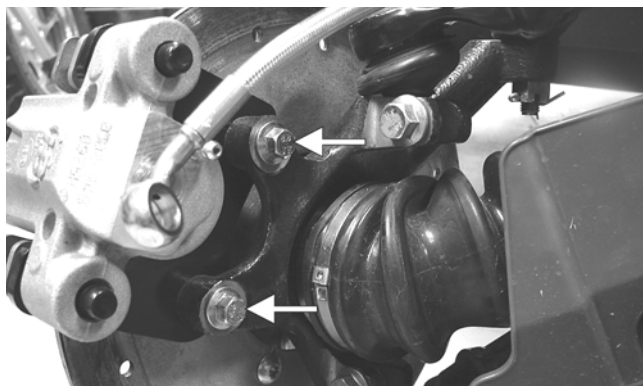
2. Remove the cotter pin from the nut.

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



KX041

3. Remove the flange nut securing the hub.
4. Remove the brake caliper.



PR243A

5. Remove the hub assembly.
6. Remove the four cap screws securing the brake disc.

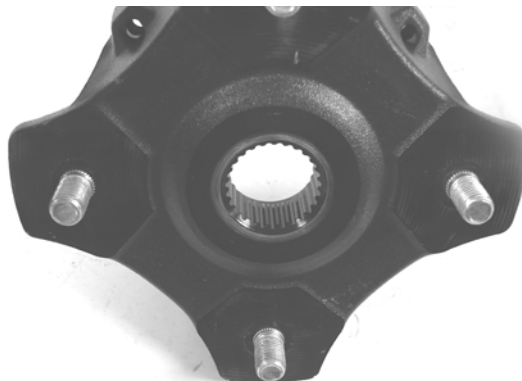
## CLEANING AND INSPECTING

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

1. Clean all hub components.
2. Inspect all threads for stripping or damage.
3. Inspect the brake disc for cracks or warping.
4. Inspect the hub for pits, cracks, loose studs, or spline wear.

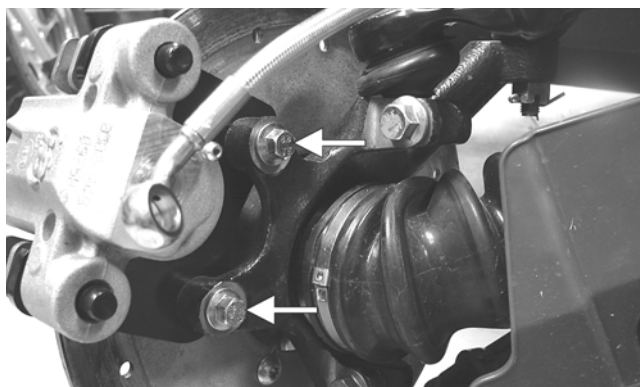
## INSTALLING

1. Secure the brake disc to the hub with the four cap screws coated with blue Loctite #243. Tighten to 15 ft-lb.
2. Apply grease to the splines in the hub.
3. Install the hub assembly onto the shaft.



PR290

4. Secure the hub assembly with the nut. Tighten only until snug.
5. Secure the brake caliper to the knuckle with the two cap screws. Tighten the auxiliary caliper to 20 ft-lb. Tighten the hydraulic caliper to 20 ft-lb.



PR243A

6. Tighten the hub nut (from step 4) to 200 ft-lb; then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



PR260

7. Install the wheel and tighten to 40 ft-lb.

8. Remove the ATV from the support stand.

## Hydraulic Brake Caliper

■NOTE: The brake calliper is a non-serviceable component; it must be replaced as an assembly.

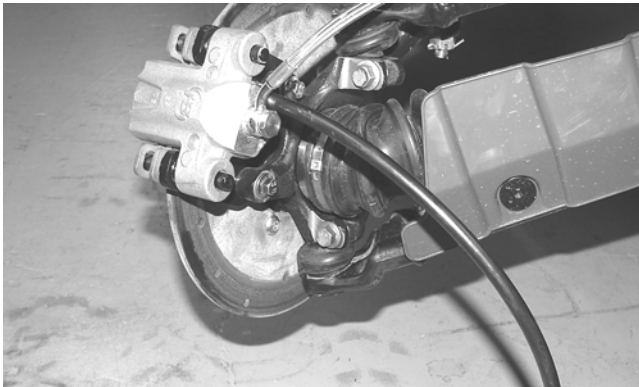
### REMOVING/DISASSEMBLING

1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

#### ⚠ WARNING

Make sure the ATV is solidly supported on the support stand to avoid injury.

2. Drain the brake fluid from the caliper, hose, and master cylinder.



PR235

#### ⚠ CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the ATV and do not reuse brake fluid.

3. Remove the brake hose from the caliper; then remove the caliper and plug the brake fluid port.
4. Compress the caliper holder against the caliper and remove the outer brake pad; then remove the inner brake pad.

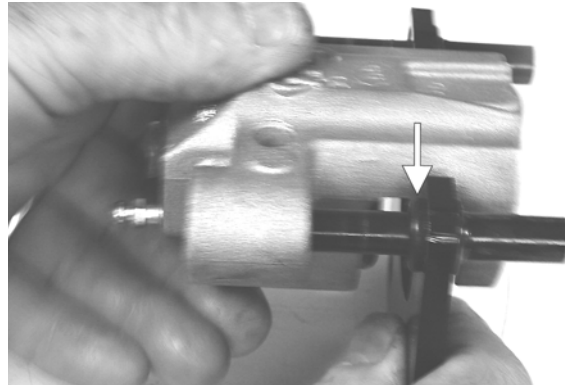


PR237



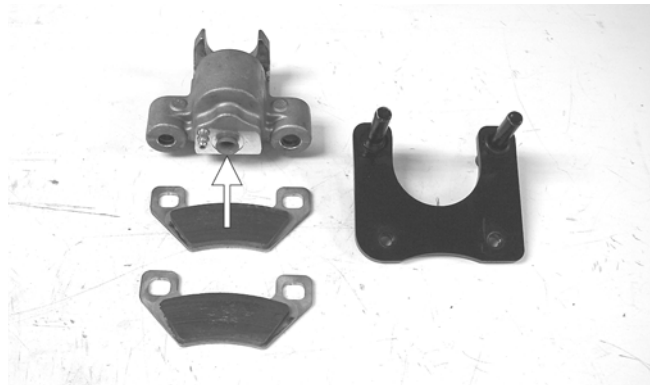
PR238

5. Remove the caliper holder from the caliper and account for the brake caliper O-ring. Do not remove the piston from the caliper.



PR239B

6. Plug the fluid port with a suitable plug to prevent contamination during cleaning.



PR240A

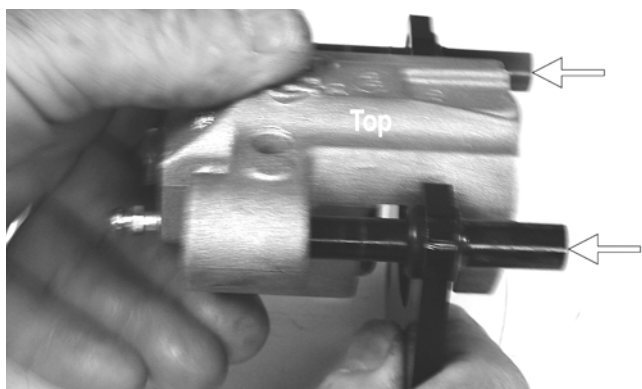
### CLEANING AND INSPECTING

1. Clean all caliper components (except the brake pads) with parts-cleaning solvent.
2. Inspect the brake pads for damage and excessive wear.

■NOTE: For measuring brake pads, see Section 2.

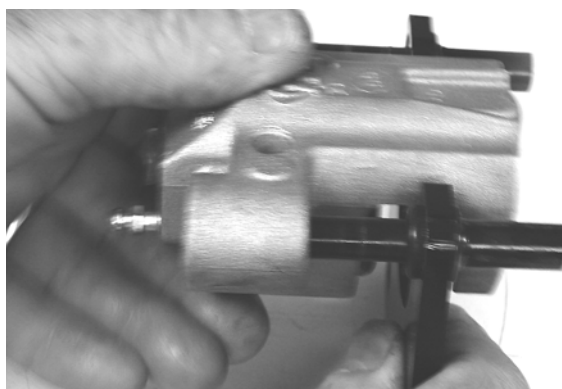
### ASSEMBLING/INSTALLING

1. Install the caliper onto the caliper holder making sure the caliper is correctly oriented on the holder.



PR239C

2. Compress the caliper holder toward the caliper and install the inner brake pad; then install the outer pad.



PR239

3. Place the brake caliper assembly into position and secure with the cap screws. Tighten the caliper to 20 ft-lb.
4. Place a new crush washer on each side of the brake hose fitting and install it on the caliper. Tighten to 20 ft-lb.
5. Fill the reservoir; then bleed the brake system (see Section 2).
6. Install the wheel. Tighten to 40 ft-lb.
7. Remove the ATV from the support stand and verify brake operation.



PR238

## Troubleshooting Drive System

### Problem: Power not transmitted from engine to wheels

Condition	Remedy
1. Rear axle shafts serration worn - broken	1. Replace shaft

### Problem: Power not transmitted from engine to either front wheel

Condition	Remedy
1. Secondary drive - driven gear teeth broken	1. Replace gear(s)
2. Propeller shaft serration worn - broken	2. Replace shaft
3. Coupling damaged	3. Replace coupling
4. Coupling joint serration worn - damaged	4. Replace joint
5. Front drive - driven bevel gears broken - damaged	5. Replace gear(s)
6. Front differential gears/pinions broken - damaged	6. Replace gears - pinions
7. Sliding dogs/shaft fork worn - damaged	7. Replace gear(s)
8. Front drive axle worn - damaged	8. Replace axle
9. Front drive axle serration worn - damaged	9. Replace axle



## Troubleshooting Brake System

Problem: Braking poor	
Condition	Remedy
1. <b>Pad</b> worn	1. Replace pads
2. <b>Pedal free-play</b> excessive	2. Replace pads
3. <b>Brake fluid</b> leaking	3. Repair - replace hydraulic system component(s)
4. <b>Hydraulic system</b> spongy	4. Bleed hydraulic system - correct or repair leaks
5. <b>Master cylinder/brake cylinder seal</b> worn	5. Replace master cylinder
Problem: Brake lever travel excessive	
Condition	Remedy
1. <b>Hydraulic system</b> entrapped air	1. Bleed hydraulic system
2. <b>Brake fluid</b> low	2. Add fluid to proper level
3. <b>Brake fluid</b> incorrect	3. Drain system - replace with correct fluid
4. <b>Piston seal - cup</b> worn	4. Replace master cylinder
Problem: Brake fluid leaking	
Condition	Remedy
1. <b>Connection joints</b> loose	1. Tighten joint
2. <b>Hose</b> cracked	2. Replace hose
3. <b>Piston seal</b> worn	3. Replace brake caliper

# SECTION 7 - SUSPENSION



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## Suspension

■NOTE: Critical torque specifications are located in Section 1.

## Shock Absorbers

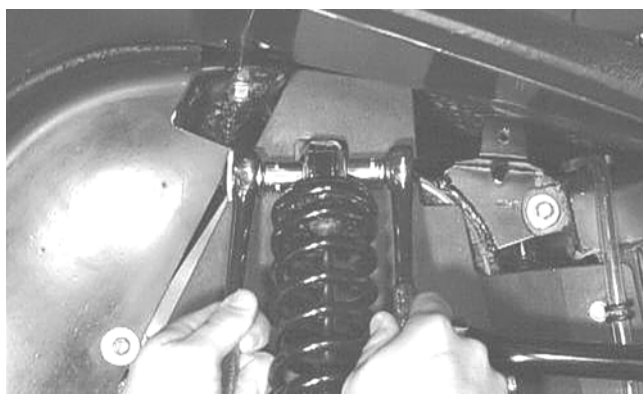
### REMOVING

1. Secure the ATV on a support stand to elevate the wheels and to release load on the suspension.

#### ⚠ WARNING

Make sure the ATV is solidly supported on the support stand to avoid injury.

2. Remove the two cap screws and nuts securing each front shock absorber to the frame and the upper A-arm. Account for bushings and sleeves from each.



AF605D

#### ⚠ CAUTION

Additional support stands are necessary to support the rear axle when the shock absorbers are removed or damage may occur.

3. Remove the two cap screws and nut securing each rear shock absorber to the frame and lower A-arm. Account for bushings and sleeves from each.



AF626D

4. Compress the shock absorber spring, remove the retainer, and remove the spring.



AF730D

### CLEANING AND INSPECTING

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

1. Clean all shock absorber components using a pressure washer.
2. Inspect each shock rod for nicks, pits, rust, bends, and oily residue.
3. Inspect all springs, spring retainers, shock rods, sleeves, bushings, shock bodies, and eyelets for cracks, leaks, and bends.

### INSTALLING

1. Place the shock absorber spring over the shock absorber, compress the spring, and install the retainer.
2. Place bushings and sleeves (where appropriate) into shock eyelet; then install shock with two cap screws and nuts. Tighten all front suspension nuts to 35 ft-lb. Tighten rear suspension nuts (upper) to 35 ft-lb (400/500/H1 models); tighten rear suspension nuts (upper) to 50 ft-lb (H2 models).



**⚠ CAUTION**

Do not tighten the nuts beyond the recommended specification or the shock eyelet or mount WILL be damaged.

■NOTE: The rear shock absorber-to-lower A-arm torque factor is 20 ft-lb.

3. Remove the ATV from the support stand.

## Front A-Arms

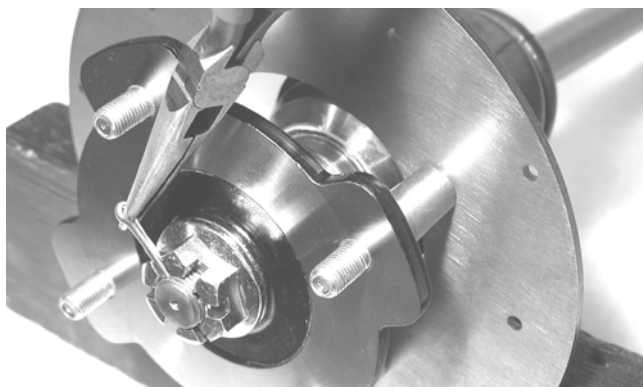
### REMOVING

1. Secure the ATV on a support stand to elevate the front wheels; then remove the wheels.

**⚠ WARNING**

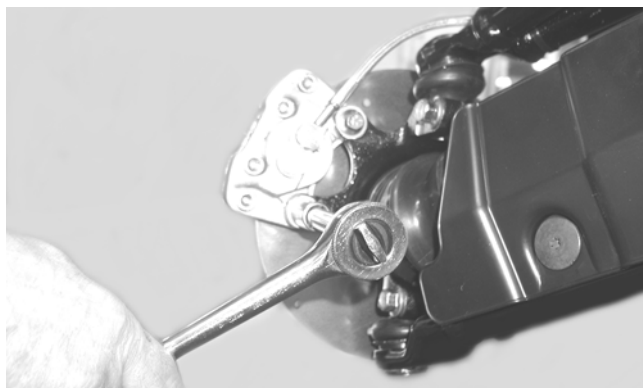
Make sure the ATV is solidly supported on the support stand to avoid injury.

2. Remove the cotter pin from the nut. Discard the cotter pin.



CD008

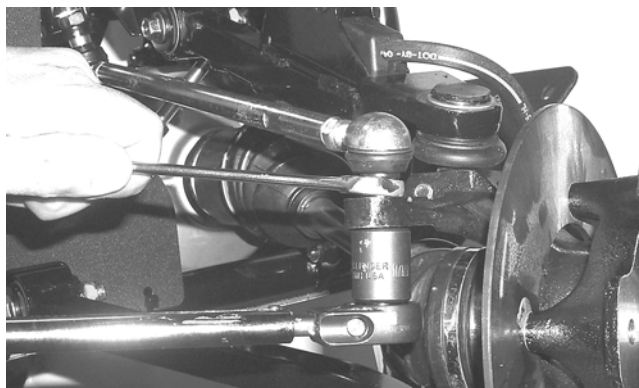
3. Remove the nut securing the hub.
4. Remove the brake caliper. Account for two cap screws.



CD007

5. Remove the hub assembly.

6. Remove the cotter pin and slotted nut securing the tie rod end to the knuckle; then remove the tie rod end from the knuckle.

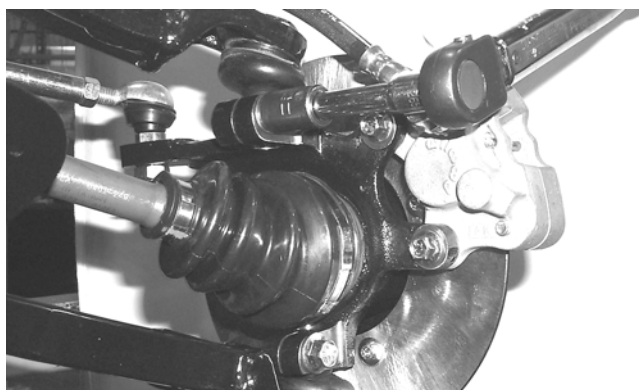


AF618D

7. Remove the cap screws securing the ball joints to the knuckle.

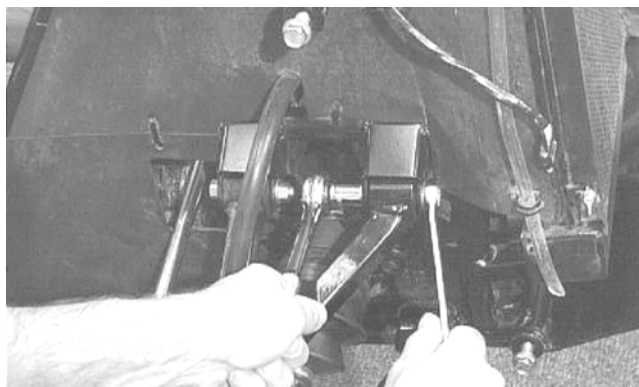
**⚠ CAUTION**

Support the knuckle when removing the cap screws or damage to the threads will occur.



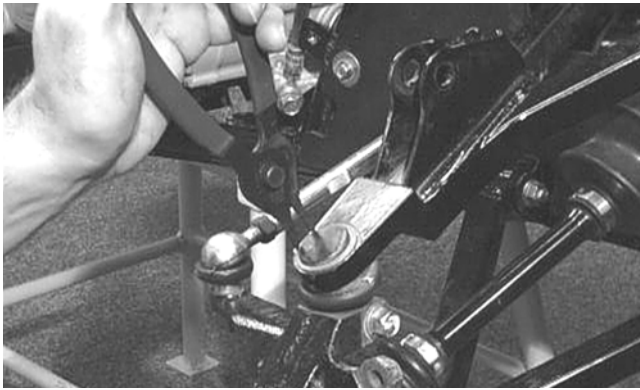
AF628D

8. Tap the ball joints out of the knuckle; then remove the knuckle.
9. Remove the lower shock absorber eyelet from the upper A-arm.
10. Remove the cap screws securing the A-arms to the frame.



AF610D

11. Remove the circlip from the ball joint; then remove the ball joint from the A-arm.



AF616D

## CLEANING AND INSPECTING

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

1. Clean all A-arm components using a pressure washer.
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.

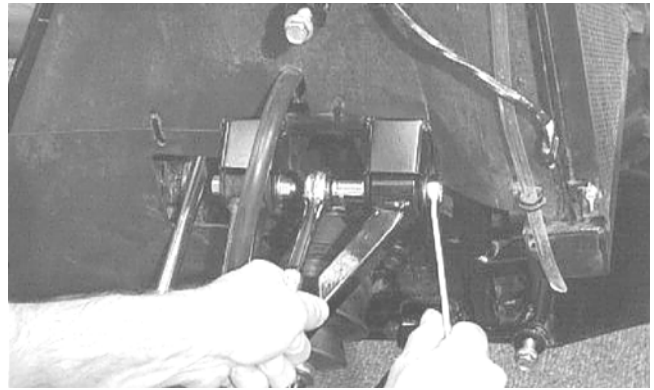
## INSTALLING

1. Apply green Loctite #609 to the entire outside diameter of the ball joint; then install the ball joint into the A-arm and secure with the snap ring.



AF616D

2. Install the A-arm assemblies into the frame mounts and secure with the cap screws. Only finger-tighten at this time.



AF610D

3. Route the brake hose through the upper A-arm shock absorber mount; then secure the hose to the A-arm with a cable tie and grommet.



DE054A

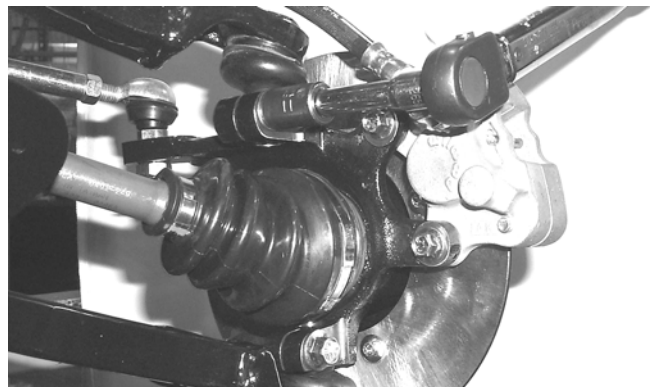
4. Secure the lower eyelet of the shock absorber to the upper A-arm. Tighten nut to 35 ft-lb.
5. Secure the A-arm assemblies to the frame mounts (from step 2). Tighten the cap screws to 35 ft-lb.



### CAUTION

Do not tighten the nut beyond the 35 ft-lb specification or the shock eyelet or mount WILL be damaged.

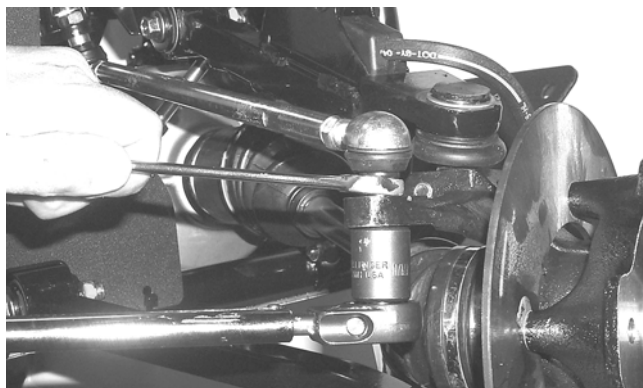
6. Install the knuckle assembly onto the ball joints and secure with cap screws. Tighten to 35 ft-lb.



AF628D

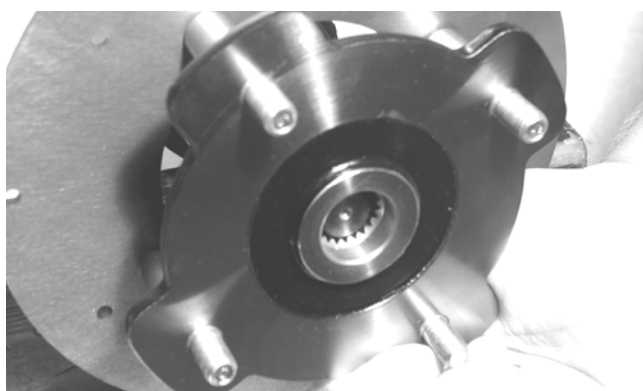
7. Install the tie rod end and secure with the nut. Tighten to 30 ft-lb; then install a new cotter pin and spread the pin to secure the nut.

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



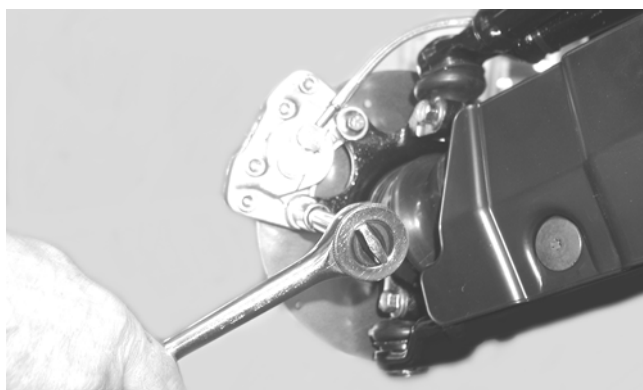
AF618D

8. Apply grease to the hub and drive axle splines; then install the hub assembly onto the drive axle.



CD009

9. Secure the hub assembly with the nut. Tighten only until snug.
10. Secure the brake caliper to the knuckle with the two Patch-lock cap screws. Tighten to 20 ft-lb.



CD007

11. Secure the hub nut (from step 9) to the shaft/axle. Tighten to 200 ft-lb.
12. Install a new cotter pin and spread the pin to secure the nut.



CD008

13. Install the wheel and tighten to 40 ft-lb.
14. Remove the ATV from the support stand.

## Rear A-Arms

### REMOVING

1. Secure the ATV on a support stand to elevate the wheels.

### WARNING

Make sure the ATV is solidly supported on the support stand to avoid injury.

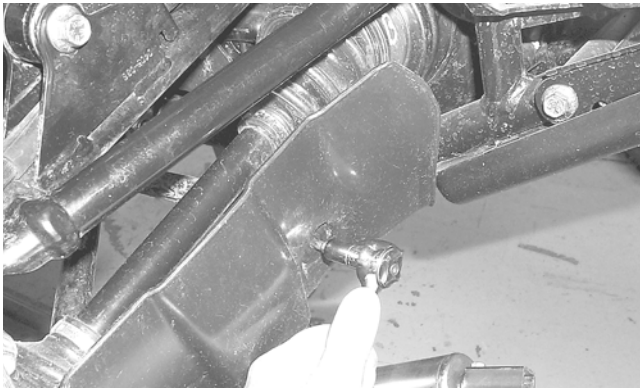
2. Pump up the hand brake; then engage the brake lever lock.
3. Remove the wheel.
4. Remove the cotter pin securing the hex nut; then remove the hex nut. Release the brake lever lock.
5. Remove the caliper (right side only).

■NOTE: Do not allow the brake calipers to hang from their cable/hose.

6. Remove the cap screws and lock nut securing the shock absorber to the frame and lower A-arm; then remove the shock absorber.
7. Remove the cap screws securing the boot guard to the lower A-arm.

7





AF934

8. Slide the hub out of the knuckle and set aside.
9. Remove the cap screws and lock nuts securing the knuckle to the A-arms. Discard the lock nuts.

■NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.

10. Remove the cap screws and lock nuts securing the A-arms to the frame; then remove the A-arms.

■NOTE: If removing the upper right A-arm, it will be necessary to disconnect the brake hose from the A-arm.

## CLEANING AND INSPECTING

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

1. Clean all A-arm components using a pressure washer.
2. Inspect the A-arm for bends, cracks, and worn bushings.
3. Inspect the frame mounts for signs of damage, wear, or weldment damage.

## INSTALLING

1. Install the A-arm assemblies into the frame mounts and secure with the cap screws and new lock nuts. Only finger-tighten at this time.
2. Slide the knuckle onto the drive axle and into position on the A-arms; then secure the knuckle to the A-arms with cap screws and new lock nuts. Tighten to 35 ft-lb (400/500/H1 models) or to 50 ft-lb (H2 models).
3. Tighten the hardware securing the A-arms to the frame mounts (from step 1) to 35 ft-lb (400/500/H1 models) or to 50 ft-lb (H2 models).
4. Apply grease on the drive axle splines; then install the hub assembly onto the drive axle.



PR290

5. Secure the hub assembly with the nut. Tighten only until snug.
6. Secure the brake caliper to the knuckle with the two cap screws (right side only). Tighten the caliper to 20 ft-lb.

■NOTE: Ensure that the brake hose is properly routed and secured to the upper A-arm.



DE054A

7. Compress the hand brake lever and engage the brake lever lock; then secure the hub nut (from step 5) to the drive axle. Tighten to 200 ft-lb.
8. Install a new cotter pin and spread the pin to secure the nut.

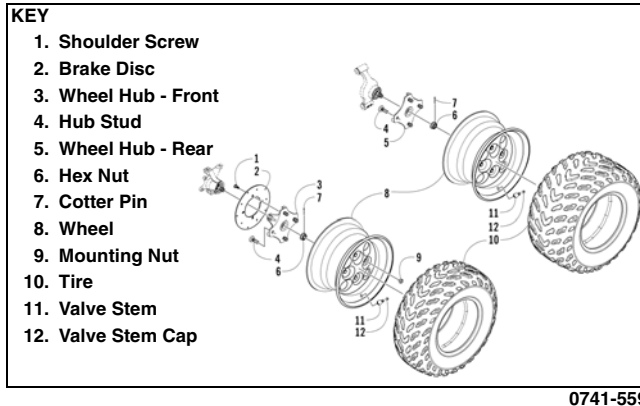


PR260

9. Secure the shock absorber to the frame with a cap screw and new lock nut. Tighten to 35 ft-lb (400/500/H1 models) or to 50 ft-lb (H2 models).

10. Secure the shock absorber to the lower A-arm with a cap screw and new lock nut. Tighten to 20 ft-lb.
11. Secure the boot guard to the lower A-arm with the two cap screws. Tighten securely.
12. Install the wheel and tighten to 40 ft-lb.
13. Remove the ATV from the support stand.

## Wheels and Tires



### TIRE SIZE

#### **⚠ WARNING**

Use only Arctic Cat approved tires when replacing tires. Failure to do so could result in unstable ATV operation.

The ATV is equipped with low-pressure tubeless tires of the size and type listed in Section 1. Do not under any circumstances substitute tires of a different type or size.

#### **⚠ WARNING**

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 ATV and could cause excessive drive train damage not covered by warranty.

### TIRE INFLATION PRESSURE

Front and rear tire inflation pressure should be 0.35 kg/cm<sup>2</sup> (5.0 psi).

### REMOVING

1. Secure the ATV on a support stand to elevate the wheels.

#### **⚠ WARNING**

Make sure the ATV is solidly supported on the support stand to avoid injury.

2. Remove the wheels.

■NOTE: Keep left-side and right-side wheels separated for installing them on their proper sides.

### CLEANING AND INSPECTING

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

1. Clean the wheels and hubs using a pressure washer.
2. Inspect each wheel for cracks, dents, or bends.
3. Inspect each tire for cuts, wear, missing lugs, and leaks.

### INSTALLING

Install each wheel on its hub. Tighten to 40 ft-lb.

■NOTE: Make sure each wheel is installed on its proper hub as noted in removing (the "rotation arrow" (if applicable) must indicate forward direction of rotation).



AF612D

### 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 ATV if tire damage exists.

■NOTE: Be sure all tires are the specified size and have identical tread pattern.

3. Check the front wheel toe-in and toe-out and adjust as necessary (see Section 8).
4. Test drive the ATV on a dry, level surface and note any pulling to the left or right during acceleration, deceleration, and braking.

■NOTE: If pulling is noted, measure the circumference of the front and rear tires on the pulling side. Compare the measurements with the tires on the opposite side. If pulling is noted during braking only, check and adjust the brakes as necessary and recheck operation (see Section 2).

5. Increase the air pressure in the tires with the smallest circumference measurement until all tires are equal in circumference.
6. Repeat steps 4-5 as necessary to ensure proper handling.

## Troubleshooting

Problem: Suspension too soft	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>Spring(s)</b> weak</li> <li>2. <b>Shock absorber</b> damaged</li> <li>3. <b>Shock absorber preload</b> too low</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace spring(s)</li> <li>2. Replace shock absorber</li> <li>3. Adjust shock absorber preload</li> </ol>
Problem: Suspension too stiff	
Condition	Remedy
<ol style="list-style-type: none"> <li>1. <b>A-arm-related bushings</b> worn</li> <li>2. <b>Shock absorber preload</b> too high</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace bushing</li> <li>2. Adjust shock absorber preload</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: 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>Axle shaft nut</b> loose (manual transmission)</li> <li>6. <b>Auxiliary brake</b> adjusted incorrectly</li> <li>7. <b>Rear suspension arm-related bushing</b> worn</li> <li>8. <b>Rear shock absorber</b> damaged</li> <li>9. <b>Rear suspension arm nut</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. Tighten nut (manual transmission)</li> <li>6. Adjust brake</li> <li>7. Replace bushing</li> <li>8. Replace shock absorber</li> <li>9. Tighten nut</li> </ol>



# SECTION 8 - STEERING/FRAME

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## Steering/Frame

■NOTE: Critical torque specifications are located in Section 1.

## Steering Post/Tie Rods

### REMOVING

1. Remove the ignition switch retaining ring; then remove the reinstallable rivets securing the instrument pod to the mounting bracket and remove the pod and LCD gauge.



FI463A



FI464A

2. Remove the reinstallable rivets securing the radiator access cover and remove the cover.



FI465A

3. Remove four reinstallable rivets securing the steering post cover and remove the cover.



FI466A

4. Unlatch the storage compartment lid; then slide the storage compartment cover assembly forward and lift off.



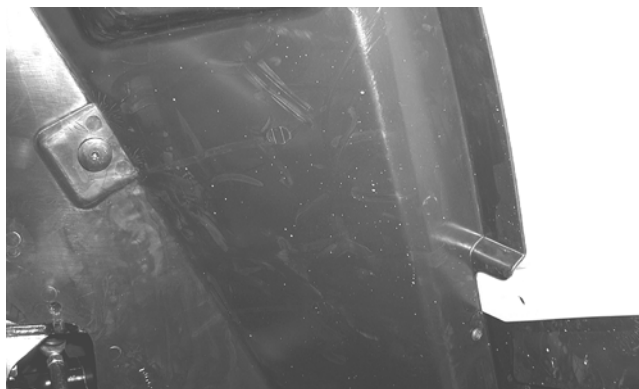
FI467A

5. Remove the storage compartment.



FI468

6. Remove the four cap screws securing the handlebar caps and speedometer bracket to the steering post; then move the handlebar and speedometer out of the way. Account for four handlebar caps.



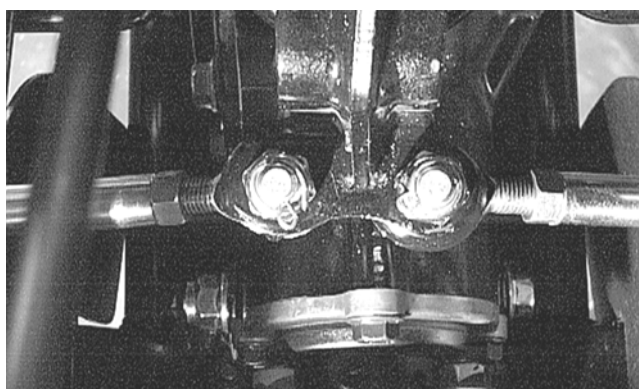
CD685

9. Remove the cotter pins and slotted nuts from the inner and outer tie rod ends; then remove the tie rods from the steering post arm and the left-side and right-side steering knuckles.



CD762

7. Remove two cap screws securing the upper steering post bearing to the frame. Account for two bearings and two housings.



AF778D



CD760

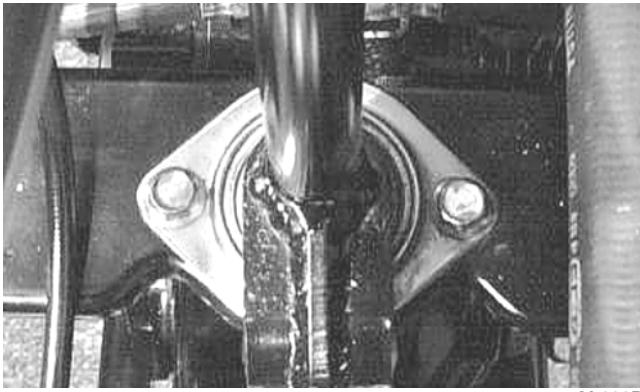
8. Using a suitable lift stand, raise the ATV enough to remove the front wheels.



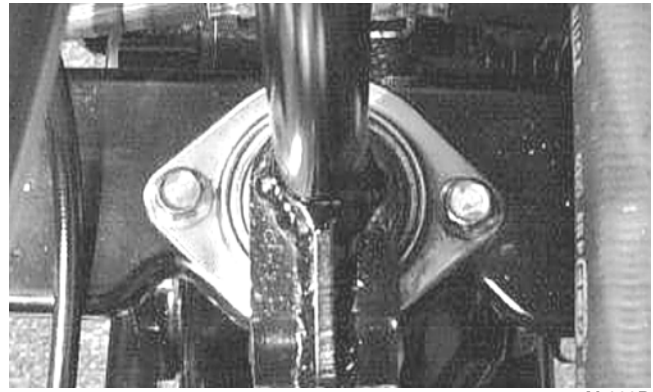
KX039

10. Remove two cap screws securing the lower steering post bearing flange to the frame; then remove the steering post.





AL600D



AL600D

## CLEANING AND INSPECTING

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

1. Wash the tie rod ends in parts-cleaning solvent. Dry with compressed air. Inspect the pivot area for wear. Apply a low-temperature grease to the ends.

### **WARNING**

Always wear safety glasses when using compressed air.

2. Inspect the tie rods for damaged threads or wear.
3. Inspect the tie rods for cracks or unusual bends.
4. Inspect all welded areas for cracks or deterioration.
5. Inspect the steering post and steering-post brackets for cracks, bends, or wear.
6. Inspect the bearing halves, bearing caps, and bearing housings for cracks or wear.
7. Inspect the handlebar tube for cracks, wear, or unusual bends.
8. Inspect the handlebar grips for damage or wear.

## INSTALLING

1. Place the steering post into position; then secure the lower bearing flange to the frame with two cap screws. Tighten to 20 ft-lb.

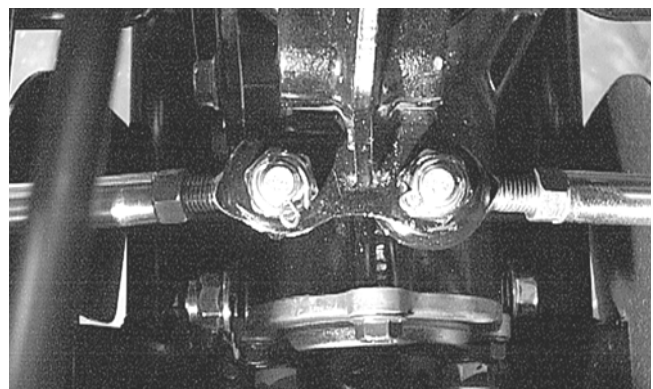
2. Place the upper steering post bearings into the housings; then position on the steering post and secure the housings to the frame with two cap screws. Tighten to 20 ft-lb.



CD760

3. Install the tie rods and secure with the slotted nuts. Tighten to 30 ft-lb; then install new cotter pins.

■ **NOTE:** If the slots do not align with the holes in the tie rod ends, tighten the nuts just enough to allow installation of the cotter pins.



AF778D

4. Install the front wheels and tighten to 40 ft-lb using a crisscross pattern.
5. Lower the ATV and place the handlebar and caps into position on the steering post; then position the speedometer on top of the caps and secure with the four cap screws. Tighten securely.

6. Install the storage compartment box; then attach the storage compartment cover assembly by engaging the tabs into the slots and sliding rearward. Lock the storage compartment lid to hold the assembly in place.
7. Place the instrument pod into position; then secure with two reinstallable rivets and the ignition switch retaining ring.



FI464A

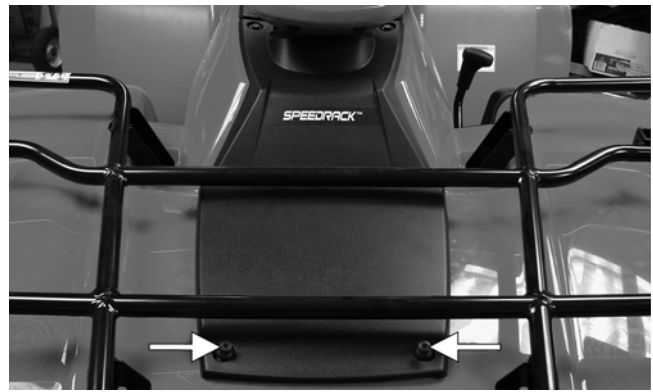


FI463A

8. Install the steering post access cover and secure with four reinstallable rivets; then install and secure the radiator access cover.



FI466A

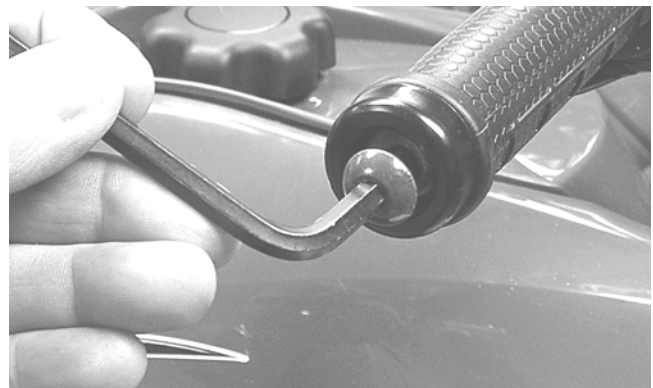


FI465A

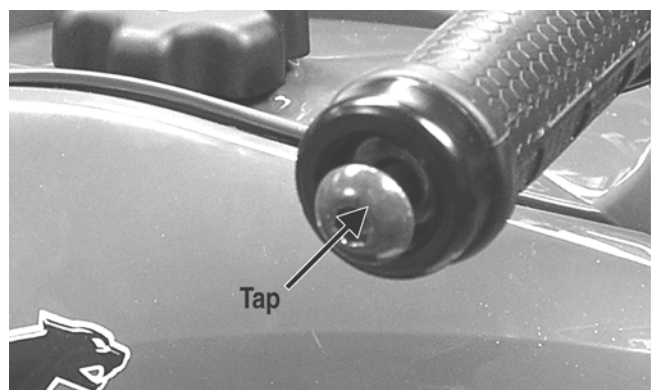
## Handlebar Grip

### REMOVING

1. Loosen but do not remove the cap screws in the end of the handlebar; then tap lightly on the head to dislodge the handlebar plug.



KC310



KC309A

2. Grasp the end and remove the cap screw, plug, and end cap.

### INSPECTING

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

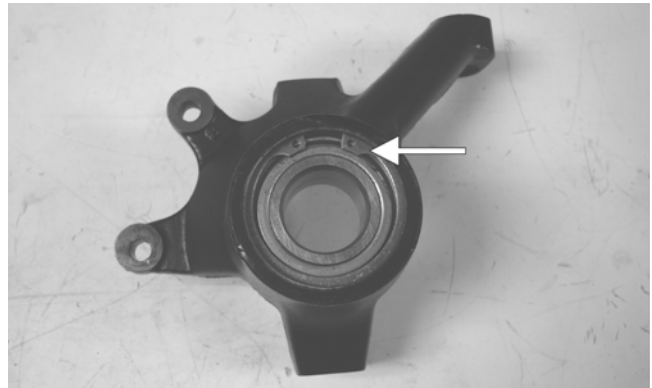
1. Inspect the grip for wear, cuts, or cracks.

2. Inspect the grip for deterioration.
3. If a grip is damaged, cut the grip lengthwise using a sharp knife or box cutter; then peel off the grip.

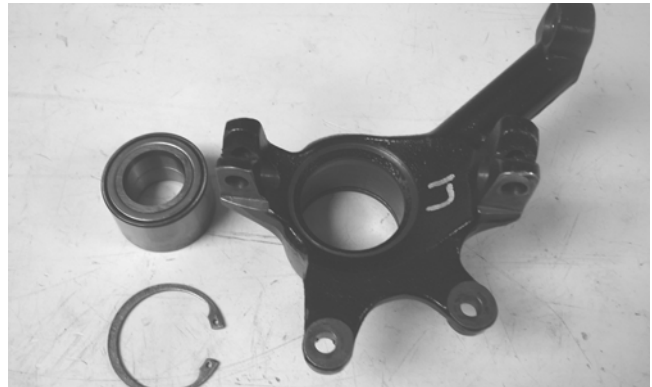
## INSTALLING

■**NOTE:** Before installing a grip, use contact spray or alcohol to clean the handlebar of glue residue, oil, or any other contaminant.

1. Apply a liberal amount of Handlebar Grip Adhesive to the inside of a new grip.
2. Slide the grip onto the handlebar until it is fully seated with the smooth part of the grip facing up.
3. Wipe off any excess glue; then secure the grip with the handlebar end-cap.



PR287A



PR288

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## Steering Knuckles

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### REMOVING AND DISASSEMBLING

1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

#### **WARNING**

Make sure the ATV is solidly supported on the support stand to avoid injury.

2. Remove the wheel cap from the hub; then remove the cotter pin from the nut.
3. Remove the nut securing the hub.
4. Remove the brake caliper.
5. Remove the hub assembly.
6. Remove the cotter pin from the tie rod end and remove the tie rod end from the knuckle.
7. Remove the two cap screws securing the ball joints in the knuckle.
8. Tap the ball joint end out of the knuckle; then remove the knuckle.
9. Remove the snap ring from the knuckle; then remove the bearing.

#### **CAUTION**

Use extreme care when removing the bearing. If the bearing is allowed to fall, it will be damaged and will have to be replaced.

### CLEANING AND INSPECTING

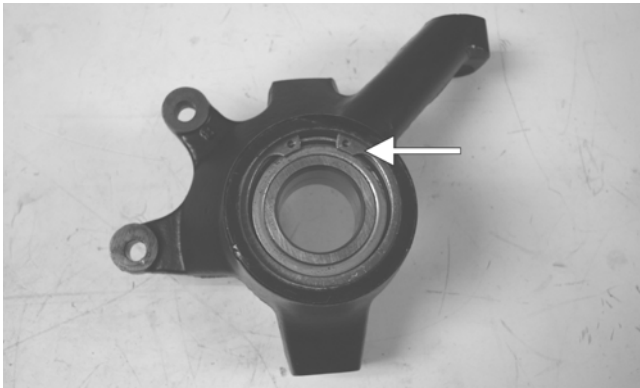
■**NOTE:** Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Clean all knuckle components.
2. Inspect the bearing for pits, gouges, rusting, or premature wear.
3. Inspect the knuckle for cracks, breaks, or porosity.
4. Inspect threads for stripping or damage.

### ASSEMBLING AND INSTALLING

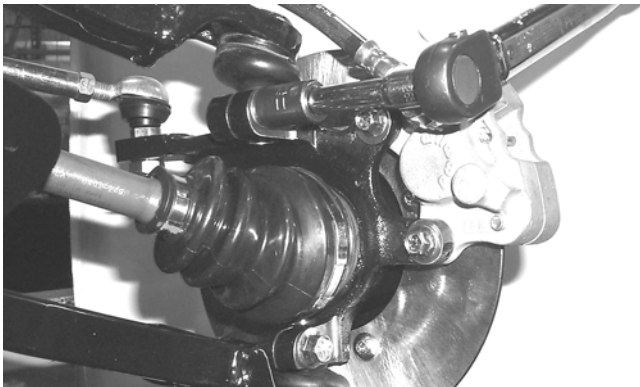
1. Install the bearing; then install the snap ring making sure it seats into the knuckle.





PR287A

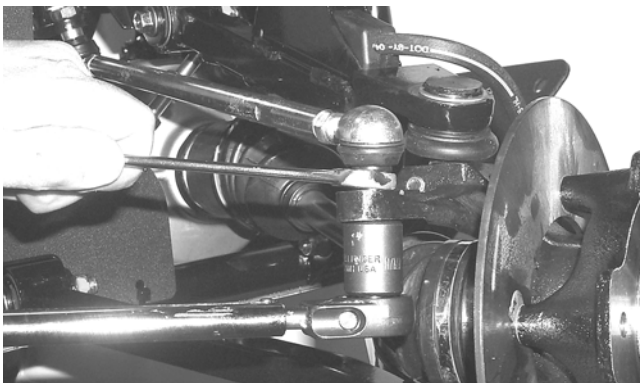
2. Install the knuckle to the upper and lower ball joints and secure with the two cap screws. Tighten to 35 ft-lb.



AF628D

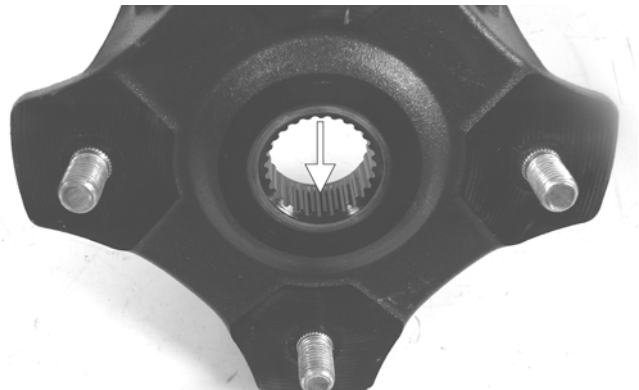
3. Install the tie rod end and secure with the nut. Tighten to 30 ft-lb; then install a new cotter pin and spread the pin.

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



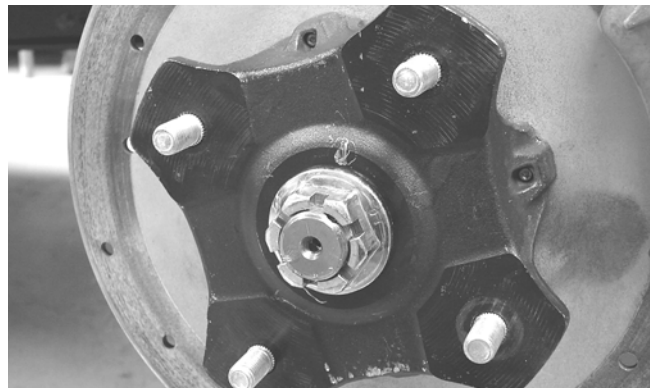
AF618D

4. Apply a small amount of grease to the hub splines.



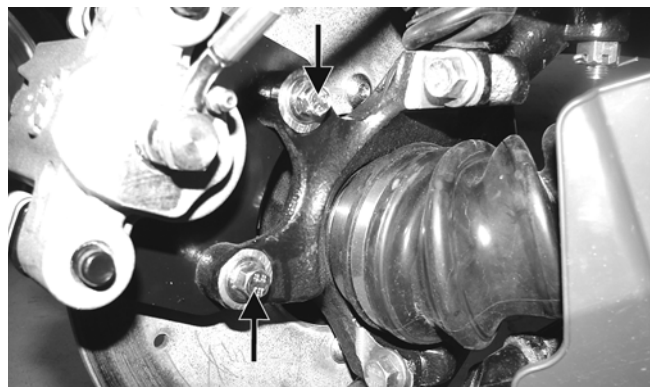
PR290A

5. Install the hub assembly onto the splines of the shaft.
6. Secure the hub assembly with the nut. Tighten only until snug.



PR257

7. Secure the brake caliper to the knuckle with the two cap screws. Tighten to 20 ft-lb.



PR264A

8. Pump the hand brake lever; then engage the brake lever lock.
9. Secure the hub nut (from step 6) to the shaft. Tighten to 200 ft-lb.
10. Install a new cotter pin and spread the pin to secure the nut.
11. Install the wheel; then using a crisscross pattern, tighten to 40 ft-lb.
12. Remove the ATV from the support stand.

## Measuring/ Adjusting Toe-In

1. Thoroughly wash the ATV to remove excess weight (mud, etc.).
2. Refer to the specifications and ensure the tires are properly inflated to the recommended pressure.

■NOTE: Ensure the inflation pressure is correct in the tires or inaccurate measurements can occur.

3. Place the ATV in a level position taking care not to push down or lift up on the front end; then turn the handlebar to the straight ahead position.

■NOTE: When measuring and adjusting, there should be a normal operating load on the ATV (without an operator but with Arctic Cat approved accessories).

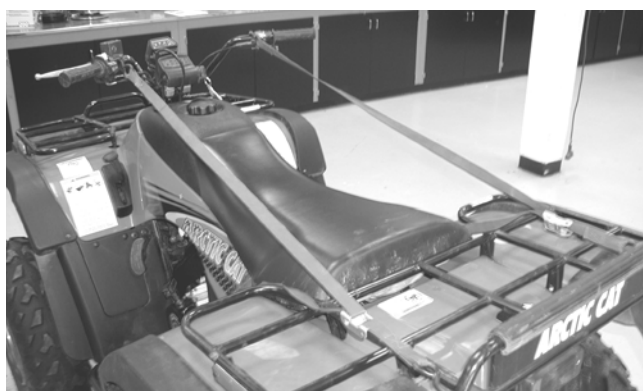
4. Measure the distance from the outside edge of each handlebar grip to equal reference points on each.



DE047A

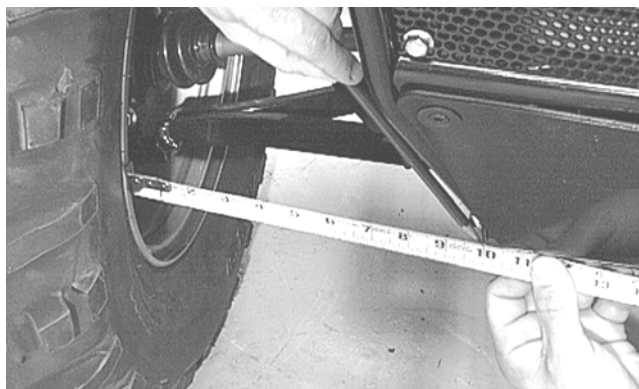
5. Adjust the handlebar direction until the two measurements are equal; then secure the handlebar to the rear rack using tie-down straps.

■NOTE: Care must be taken not to allow the handlebar to turn while securing it.

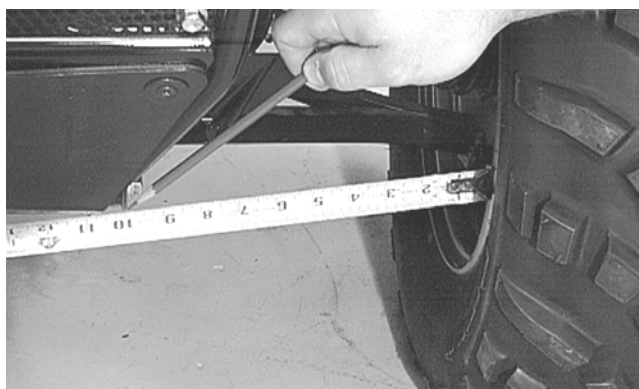


CD014

6. Measure the distance from the inside of each front rim to the lower frame tube.



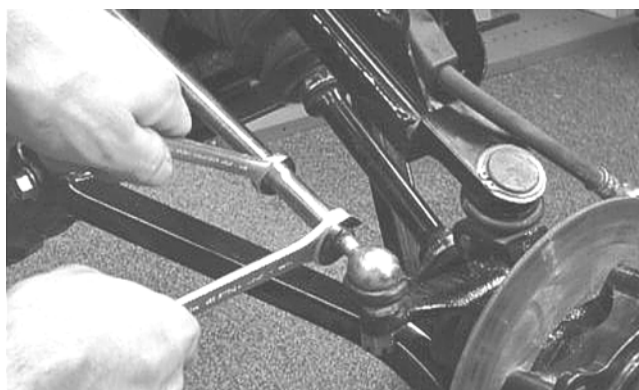
AF785D



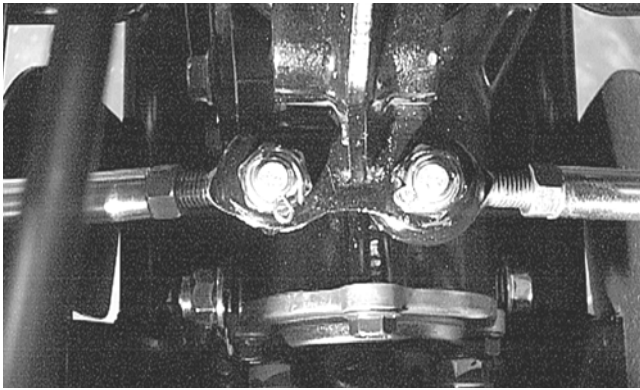
AF786D

■NOTE: The distances from the inside rims to the frame tubes should be equal. If the measurements are equal, proceed to step 8; if the measurements are not equal, proceed to step 7.

7. To make the measurements equal, loosen the appropriate tie rod jam nuts and adjust accordingly; then proceed to step 8.



AF617D



AF778D

■**NOTE:** The front wheels do not have to be removed to adjust the tie rod. Also, care should be taken not to disturb the handlebar position.

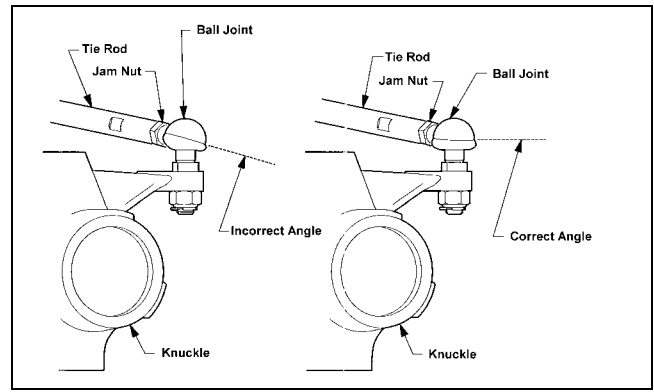
8. Using a permanent marker of some type, mark the center of each front tire (at a height parallel to the belly panel).



AF789D

9. Measure the distance between the marks (at a height parallel to the belly panel) at the front side; then record the measurement.
10. Push the ATV forward until the marks are parallel to the belly panel on the back side; then measure the distance between the marks.
11. The difference in the measurements must show 1/8-1/4 in. toe-in (the front measurement 1/8-1/4 in. less than the rear measurement).
12. If the difference in the measurements is not within specifications, adjust both tie rods equally until within specifications.

■**NOTE:** Prior to locking the jam nuts, make sure the ball joints are at the center of their normal range of motion and at the correct angle.



733-559A

## Front Rack

### REMOVING

1. Remove the cap screws and lock nuts securing the rack to the frame and front fender panel.
2. Remove the front rack from the ATV.

### CLEANING AND INSPECTING

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

1. Clean all rack components using a pressure washer.
2. Inspect all welds for cracking or bending.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect for missing decals and/or reflectors.

### INSTALLING

1. Place the rack into position on the frame and front fender panel. Install the cap screws and lock nuts and finger-tighten only.
2. Install the two cap screws and lock nuts securing the rack to the fenders. Tighten all hardware securely.

8

## Front Bumper Assembly

### REMOVING

1. Remove the two flange bolts and lock nuts securing the upper bumper supports to the bumper.
2. Remove the through-bolt and lock nut securing the bumper to the frame; then remove the bumper.



## CLEANING AND INSPECTING

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

1. Clean all bumper components with parts-cleaning solvent.
2. Inspect all welds for cracking or bending.

## INSTALLING

1. Place the front bumper assembly into position and install the through-bolt. Start the lock nut and finger-tighten only.
2. Install the two flange bolts and lock nuts on the upper supports. Tighten all hardware securely.

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## Front Body Panel/ Side Panels

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## REMOVING

1. Remove the reinstallable rivets securing the radiator access cover and remove the cover; then remove four reinstallable rivets securing the steering post cover and remove the cover.



FI465A



FI466A

2. Unlock the storage compartment lid; then slide the storage compartment cover assembly forward and lift off the storage compartment.



FI467

3. Remove the storage compartment box; then remove the seat.



FI468

4. Remove the ignition switch retaining ring and two reinstallable rivets securing the instrument pod; then remove the instrument pod.

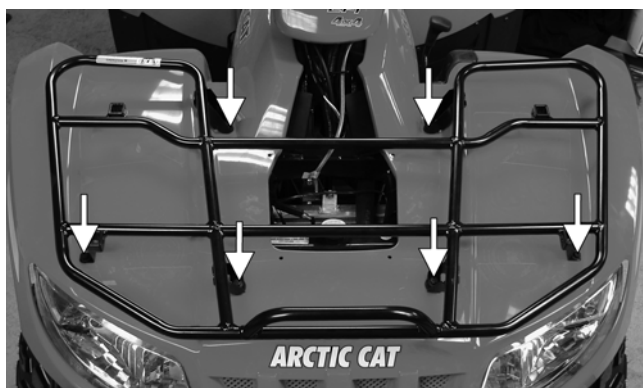


FI463A



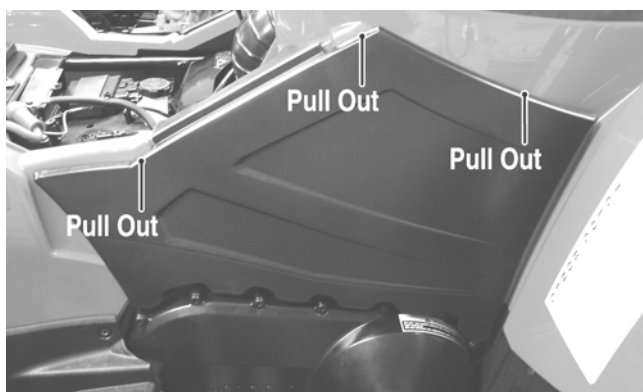
F1464A

5. Remove the cap screws and lock nuts securing the front rack to the frame; then remove the front rack. Account for the grommets and bushings.

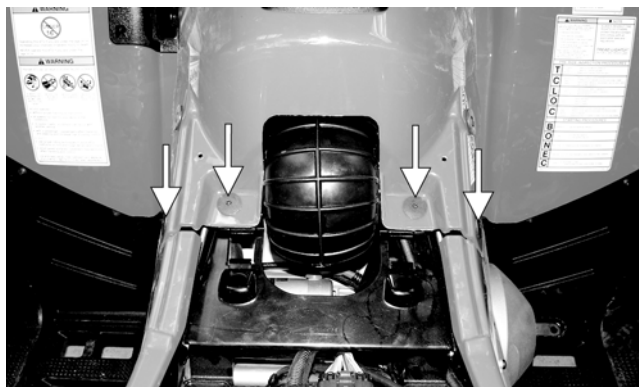


F1469A

6. Remove the side panels by pulling on them to release the tabs from the body; then remove the screws securing the rear of the front panel to the frame.

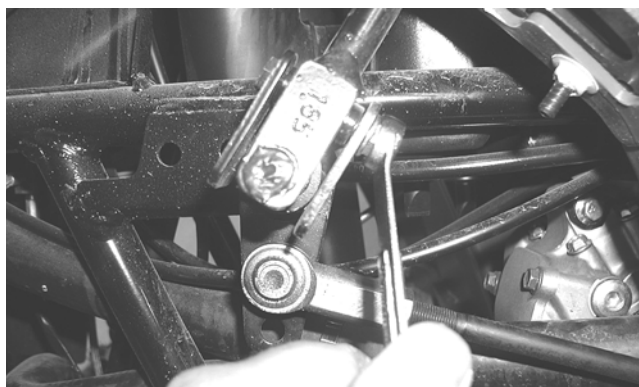


CF237A

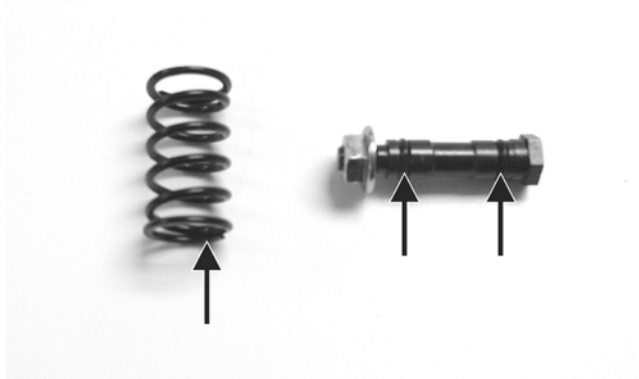


F1470A

7. Remove the left and right footwells; then remove the shift knob. Remove the shift lever pivot axle nut and remove the axle and shift lever. Account for a spring and two O-rings.



CD779



CD780A

8. Disconnect four headlight connectors and secure the wires out of the way; then disconnect the wires to the front accessory plug.

8



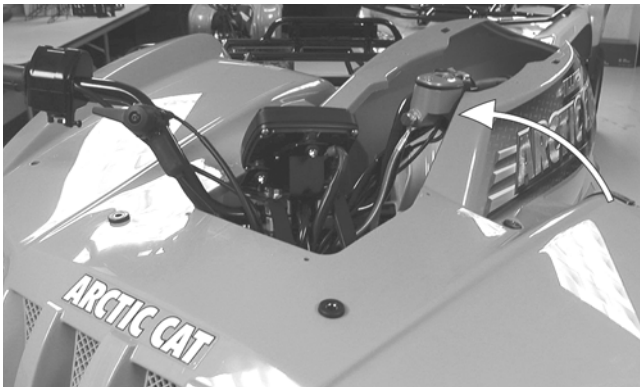
CD681

9. Rotate the handlebar to the full-left position; then lift and slide the panel to the rear and lift the rear up to clear the handlebar.



CD765

2. Connect the headlight connectors to the appropriate headlights and the front accessory plug wires to the accessory plug.



CD765A

■NOTE: It may be necessary to rotate the body panel to the right to align the opening with the handlebar.

## CLEANING AND INSPECTING

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

1. Clean all fender components with warm soap and water.
2. Inspect fenders for cracks and/or loose rivets.
3. Inspect for any missing decals.

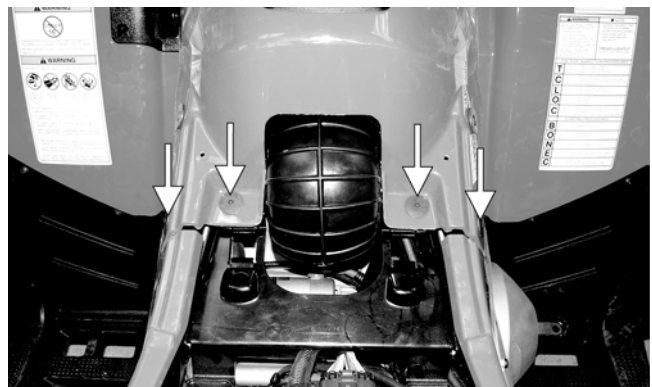
## INSTALLING

1. Rotate the handlebar to the full-left position; then place the front body panel over the handlebar and rotate and lower into position.



CD681

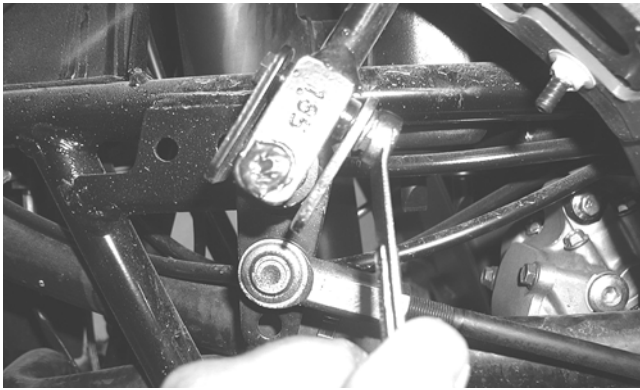
3. Make sure the rubber grommets and bushings are in place; then place the front rack into position and secure with the cap screws and lock nuts. Tighten securely.
4. Install the footwells and foot rests. Tighten securely.
5. Install the cap screws securing the front body panel to the frame and rear panel.



F1470A

6. Install the shift lever spring, shift lever, and pivot axle; then tighten the axle nut securely.





CD779

7. Install the instrument pod and ignition switch; then secure with two reinstallable rivets and the ignition switch retaining ring.
8. Set the storage compartment box into position; then install the storage compartment cover making sure the mounting tabs engage the slots. Slide rearward to secure and lock by engaging the lid lock.



FI468

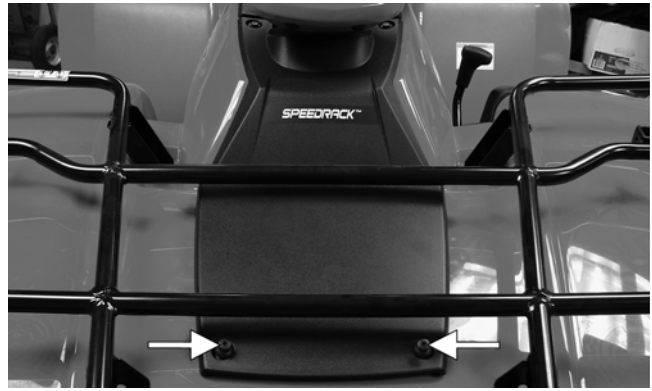


FI467

9. Install the steering post cover and secure with the reinstallable rivets; then install and secure the radiator access panel.



FI466A



FI465A

10. Install the side panels.

## Footrests

### REMOVING

1. Remove the machine screws and flange nuts securing the front and rear fenders to the footwells.



CD691A

2. Remove the screws securing the foot pegs to the footrests; then remove the foot pegs and footwells.
3. Remove the cap screws and flange nuts securing the footrests to the frame; then remove the footrests.

## CLEANING AND INSPECTING

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

1. Clean the footrest in parts-cleaning solvent.
2. Inspect the footrest weldments for cracks or unusual bends.
3. Inspect all tubing for cracks or unusual bends.

## INSTALLING

1. Secure the footrests to the frame with four cap screws and two flange nuts; then tighten the 8 mm hardware to 20 ft-lb and the 10 mm hardware to 40 ft-lb.
2. Place the footwells onto the footrests; then put the foot pegs in position and secure with two cap screws.
3. Install the machine screws and flange nuts securing the front and rear fenders to the footwells.

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## Belly Panel

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### REMOVING/INSTALLING

1. Remove the machine screws and shoulder washers securing the belly panel to the underside of the frame; then remove the belly panel.
2. Place the belly panel into position on the underside of the frame; then install the machine screws and shoulder washers. Tighten securely.

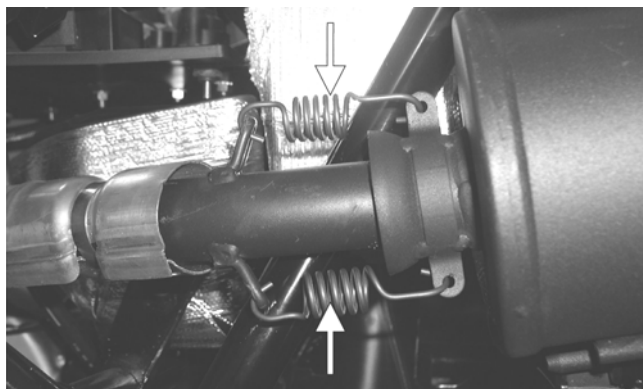
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## Exhaust System

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### REMOVING MUFFLER

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



CF138A

2. Slide the muffler rearward to clear the mounting lugs and remove the muffler.

### INSPECTING MUFFLER

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

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 Section 2.

### INSTALLING MUFFLER

1. Place the muffler into position engaging the mounting lugs into the grommets; then slide the muffler forward.
2. Install the two exhaust springs.

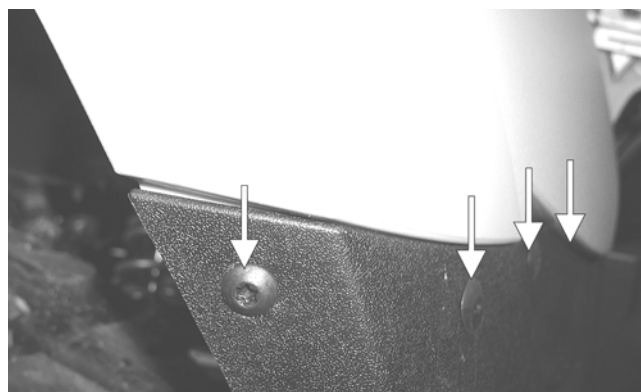
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## Rear Body Panel/Rack

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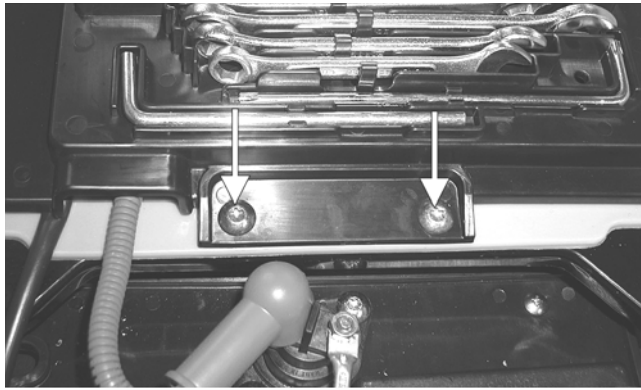
### REMOVING

1. Remove the cap screws and lock nuts securing the rear rack; then remove the rear rack. Account for the bushings.
2. Remove one shoulder screw and lock nut and three plastic rivets (on each side) securing the rear body panel to the footwells.



CD691A

3. Remove two machine screws securing the battery cover and remove the cover.



CD687A

4. Disconnect the battery (negative cable first); then remove the battery.
5. Disconnect the taillight/brakelight; then remove the gas tank cap and lift off the rear body panel. Install the gas tank cap.

■**NOTE:** If the front body panel has not been removed, the left-side and right-side panels and the two machine screws must be removed (see Front Body Panel/Side Panels in this section).

## CLEANING AND INSPECTING

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

1. Clean all rear body panel components with warm soap and water.
2. Inspect side panels and rear body panel for cracks and loose rivets.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect for missing decals.

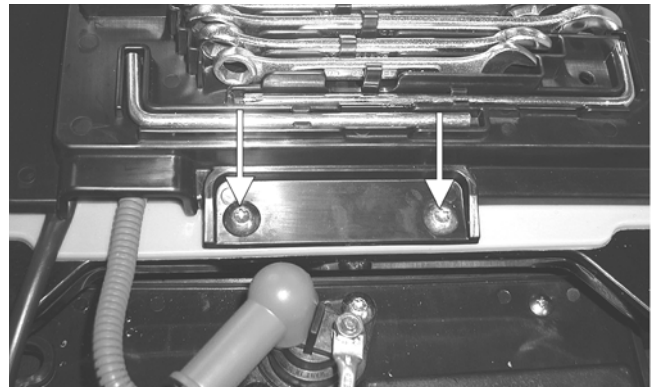
## INSTALLING

1. Remove the gas tank cap and set the rear body panel in position; then install the cap and connect the taillight/brakelight connector.
2. Place the rear rack in position with the bushings and secure with the cap screws and lock nuts. Tighten securely.
3. Install one shoulder screw and three plastic rivets (on each side) to secure the front of the rear body panel to the footwells.



CD691

4. Place the battery into the battery box; then connect the battery (positive cable first) and secure with the battery cover.



CD687A

5. Secure the front and rear panels with two machine screws; then install the left and right side panels.

■**NOTE:** If the front body panel has not been installed, see Front Body Panel/Side Panels in this section.

6. Place the seat into position making sure it locks securely.

## Taillight Assembly

8

## REMOVING

1. Unplug the three-prong connector and free the taillight wiring harness from the frame.
2. Remove the torx-head cap screws securing the taillight assembly to the frame. Account for any washers.
3. Remove the taillight assembly.

## INSPECTING

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



1. Inspect wiring harness, three-prong connector, lens, base, cap screws, and socket for damage.
2. Inspect all wires for corroding, pinching, and cracking.
3. Inspect the bulb for wattage, voltage, and proper operation.

## INSTALLING

1. Place the assembly into position on the frame and secure with torx-head cap screws and any washers.
2. Tighten the cap screws securely.
3. Route the wiring harness over the rear frame; then connect the three-prong connector.

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## Seat

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### REMOVING/INSTALLING

1. To remove the seat, lift up on the latch release (located at the rear of the seat). Raise the rear of the seat and slide it rearward.
2. To lock the seat into position, 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.

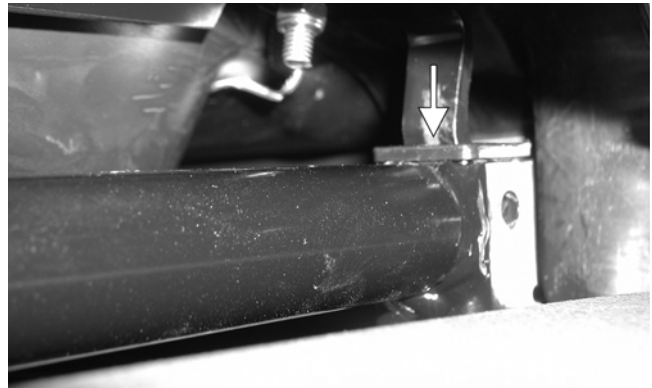
### REMOVING/INSTALLING (TRV)

1. To remove the rear seat, pull the two latch handles to the rear and rotate them to the vertical position.



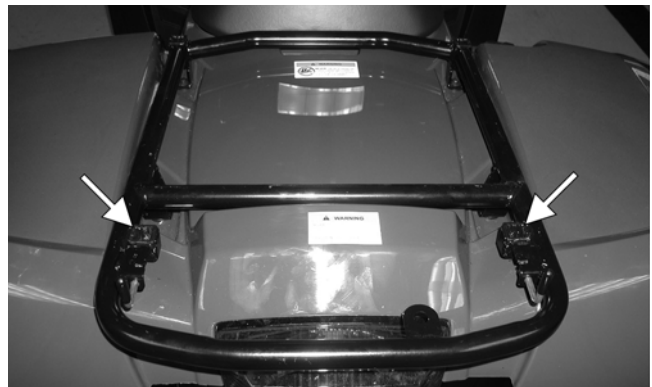
CF226

2. Lift the rear of the seat up; then pull slightly to the rear and lift the seat off the mountings.



CF227A

3. To lock the seat into position, engage the two front mounting lugs into the mounting rack; then holding down firmly on the front of the seat, push the seat forward until the rear tabs engage the rear mounting latches.



CF229A

4. Lock the seat into position by pulling the two latch handles to the rear and rotating them to the horizontal position.



CF226A

**NOTE:** The rear seat must be removed prior to removing the front seat.

5. To remove the front seat, pull the seat lock lever up (located at the rear of the seat). Raise the rear end of the seat and slide it rearward.
6. To lock the seat into position, slide the front of the seat into the seat retainers and push down firmly on rear of seat. The seat should automatically lock into position.

## Troubleshooting

Problem: Handling too heavy or stiff	
Condition	Remedy
1. <b>Front wheel alignment</b> incorrect 2. <b>Lubrication</b> inadequate 3. <b>Tire inflation pressure</b> low 4. <b>Tie rod ends</b> seizing 5. <b>Linkage connections</b> seizing	1. Adjust alignment 2. Lubricate appropriate components 3. Adjust pressure 4. Replace tie rod ends 5. Repair - replace connections
Problem: Steering oscillation	
Condition	Remedy
1. <b>Tires</b> inflated unequally 2. <b>Wheel(s)</b> wobbly 3. <b>Wheel hub cap screw(s)</b> loose - missing 4. <b>Wheel hub bearing</b> worn - damaged 5. <b>Tie rod ends</b> worn - loose 6. <b>Tires</b> defective - incorrect 7. <b>A-arm bushings</b> damaged 8. <b>Bolts - nuts (frame)</b> loose	1. Adjust pressure 2. Replace wheel(s) 3. Tighten - replace cap screws 4. Replace bearing 5. Replace - tighten tie rod ends 6. Replace tires 7. Replace bushings 8. Tighten bolts - nuts
Problem: Steering pulling to one side	
Condition	Remedy
1. <b>Tires</b> inflated unequally 2. <b>Front wheel alignment</b> incorrect 3. <b>Wheel hub bearings</b> worn - broken 4. <b>Frame</b> distorted 5. <b>Shock absorber</b> defective	1. Adjust pressure 2. Adjust alignment 3. Replace bearings 4. Repair - replace frame 5. Replace shock absorber
Problem: Tire wear rapid or uneven	
Condition	Remedy
1. <b>Wheel hub bearings</b> worn - loose 2. <b>Front wheel alignment</b> incorrect 3. <b>Tire inflation pressure</b> incorrect	1. Replace bearings 2. Adjust alignment 3. Adjust pressure
Problem: Steering noise	
Condition	Remedy
1. <b>Cap screws - nuts</b> loose 2. <b>Wheel hub bearings</b> broken - damaged 3. <b>Lubrication</b> inadequate	1. Tighten cap screws - nuts 2. Replace bearings 3. Lubricate appropriate components

# SECTION 9 - CONTROLS/INDICATORS

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## Hand Brake Lever/ 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 wheel 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 completely.

■NOTE: Compressing the brake lever several times will quicken the draining process.



AF637D

2. Place an absorbent towel around the connection to absorb brake fluid. Remove the banjo-fitting from the master cylinder. Account for two crush washers and a banjo-fitting bolt.



DE059A

### ⚠ CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the ATV.

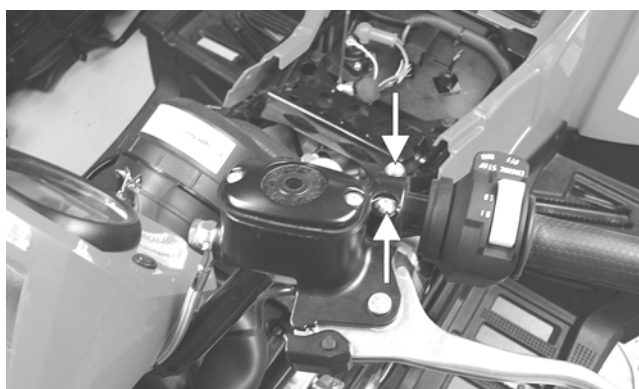
3. Remove the snap ring and pivot pin securing the brake lever to the master cylinder housing; then remove the brake lever and set aside.

4. Dislodge the brakelight switch from the master cylinder housing by gently pressing it toward the pivot pin hole in the housing; then lay it aside leaving the switch and wiring harness connected.



BC205

5. Remove the clamp screws securing the brake housing to the handlebar; then remove the assembly from the handlebar.



DE058A

### INSPECTING

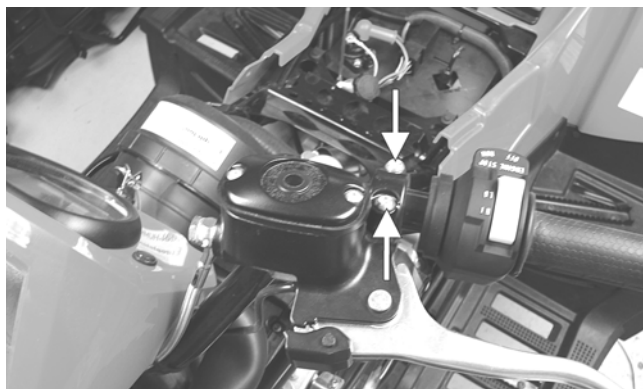
■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Inspect the pin securing the brake lever for wear.
2. Inspect the brake lever for elongation of the pivot hole.
3. Inspect the reservoir for cracks and leakage.
4. Inspect the banjo-fitting for cracks and deterioration and the condition of the fittings (threaded and compression).
5. Inspect the brakelight switch for corrosion, cracks, missing or broken mounting tabs, or broken and frayed wiring.

■NOTE: If the brakelight switch is determined to be not serviceable, see Section 5.

## INSTALLING

1. Position the brake housing on the handlebar. Secure with clamp screws; then tighten securely.



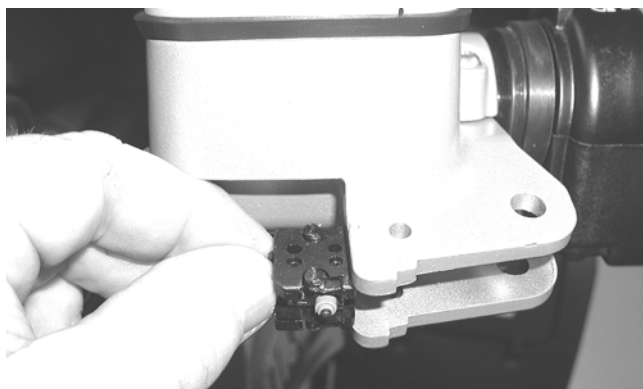
DE058A

2. Using two new crush washers, connect the banjo-fitting to the master cylinder; then secure with the banjo-fitting bolt. Tighten to 20 ft-lb.



DE059A

3. Gently press the brakelight switch into the housing (left to right) until the mounting tabs snap into the four locating holes; then install the brake lever, pivot pin, and snap ring.



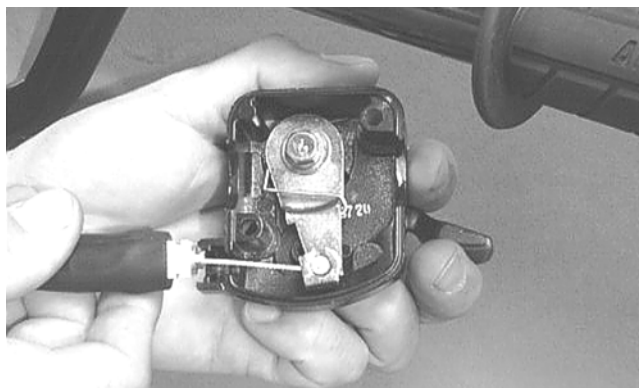
BC206

4. Bleed the brake system (see Section 2).

## Throttle Control

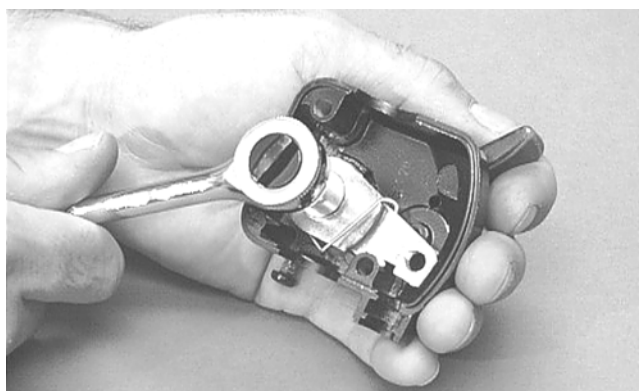
### REMOVING

1. Remove the two machine screws securing the throttle control to the handlebar.
2. Slide the grommet out of the lower half of the throttle control; then remove the cable from the actuator arm.



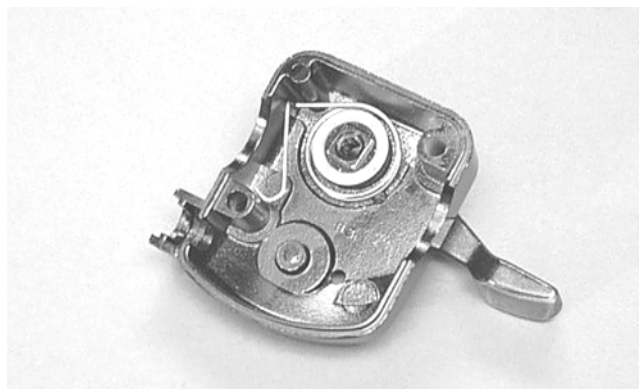
AF676D

3. Remove the cap screw, lock washer, and washer securing the actuator arm to the throttle control lever.



AF677D

4. Remove the actuator arm and account for a bushing. Note the position of the return spring for installing purposes.

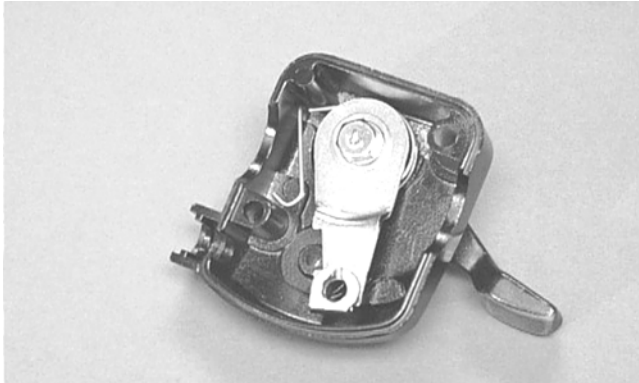


AF678D

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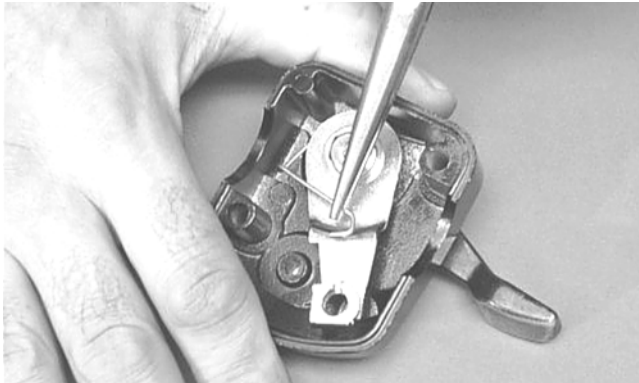
## INSTALLING

1. Place the return spring into the throttle control; then place the bushing and actuator arm into position. Secure with the cap screw, lock washer, and washer.



AF679D

2. Using a pair of needle-nose pliers, place the spring into position on the actuator arm.



AF680D

3. Place the two halves of the throttle control onto the handlebar and secure with the two machine screws.

## ADJUSTING

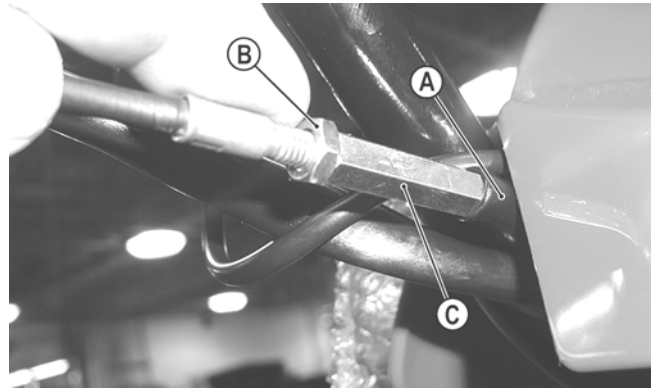
To adjust throttle cable free-play, see Section 4.

## Front Differential Lock Cable (500)

If the differential or differential lock system has been serviced, the differential lock cable should be checked and/or adjusted for proper free-play.

To adjust the cable, use the following procedure.

1. With the differential lock selector in the UNLOCK position, slide the rubber boot (A) off the adjuster; then loosen the jam nut (B). Turn the adjuster (C) to achieve 1/4 in. of free-play measured at the end of the differential lock lever.



CD560A

2. Select the 2WD position on the front drive selector switch; then turn the ignition switch to the ON position and select the LOCK position on the differential lock selector. The front drive actuator should operate engaging four-wheel drive.

■NOTE: It may be necessary to turn the handlebar or rock the ATV forward and backward to align the differential lock splines and allow engagement.

3. Return the differential lock selector to the UNLOCK position and listen for the front drive actuator to operate.
4. Turn the ignition switch to the OFF position. Tighten the jam nut securely; then install the boot on the adjuster.

## Shift Lever

### REMOVING

1. Remove the E-clip securing the shift rod to the shift lever.
2. Remove two cap screws, two self-tapping screws, and three nylon ties securing the left-side splash panel and remove the panel.
3. Remove the axle and nut securing the shift lever to the upper shift arm; then remove the shift lever. Account for a spring and two O-rings.

### INSTALLING

1. Place the spring into position between the upper shift arm and shift lever; then making sure the O-rings are in place on the axle, secure the shift lever to the arm with the existing axle and nut.
2. Place the shift rod into position on the shift lever and secure with the existing E-clip.
3. Check shift lever adjustment (see Section 2); then tighten jam nut(s) securely.
4. Install the left-side splash panel.



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## **Speedometer/ Tachometer/LCD**

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### **REPLACING**

To replace the speedometer, use the following procedure.

1. Remove the two reinstallable rivets securing the instrument pod; then remove the ignition switch retaining ring.
2. Remove the two nuts securing the mounting studs; then remove the speedometer and disconnect the multi-pin connector.
3. Mount the speedometer and secure with the two nuts; then connect the multi-pin connector.
4. Install the instrument pod and secure with the reinstallable rivets.
5. Secure the ignition switch with the retaining ring.