

2004



ARCTIC CAT®

ATV Service Manual

Foreword

This manual contains service, maintenance, and troubleshooting information for the 2004 Arctic Cat ATV models. The manual is designed to aid service personnel in service-oriented applications and may be used as a textbook for service training.

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. A troubleshooting section is also included in this manual.

The service technician should become familiar with the operation and construction of each component or system by carefully studying this 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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SECTION 1 - GENERAL INFORMATION

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General Specifications* (250)

CARBURETOR	
Type	Keihin CVK32
Main Jet	138
Slow Jet	38
Low Speed Fuel Screw Setting (turns)	1 3/4
Jet Needle	N8TT
Needle Jet	4.0/3.4
Idle RPM	1300-1400
Starter Jet	60
Float Arm Height	17 mm (0.7 in.)
Throttle Cable Free-Play (at lever)	3-6 mm (1/8-1/4 in.)
ELECTRICAL	
Ignition Timing	5° BTDC below 1800 RPM 35° BTDC above 3800 RPM
Spark Plug Type	NGK DR7EA
Spark Plug Gap	0.6-0.7 mm (0.024-0.028 in.)
Spark Plug Cap	8000-12,000 ohms
Ignition Coil Resistance (primary)	0.4-0.6 ohm (terminal to ground)
(secondary)	5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	98.3-147.5 volts (terminal to ground)
Magneto Coil Resistance (trigger)	84-126 ohms (black/yellow to green/white)
(charging)	0.44-0.66 ohm (yellow to yellow)
Magneto Coil Peak Voltage (trigger)	3.12-4.68 volts (black/yellow to green/white)
(charging)	30-45 volts (yellow to yellow)
Magneto Output (approx)	220W @ 5000 RPM
CHASSIS	
Dry Weight (approx)	2x4 - 245 kg (540 lb) 4x4 - 261 kg (575 lb)
Length (overall)	202 cm (79.5 in.)
Height (overall)	114 cm (45 in.)
Width (overall)	114 cm (45 in.)
Suspension Travel	16.5 cm (6.5 in.)
Ground Clearance	20.3 cm (8.0 in.)
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Wheelbase	127 cm (50 in.)
Tracking	89 cm (35 in.)
Tire Size	Front - AT23 x 8-12 Rear - AT24 x 9-12
Tire Inflation Pressure	0.35 kg/cm ² (5 psi)
Turning Radius	3.0 m (9.85 ft)
MISCELLANY	
Gas Tank Capacity (rated)	17.98 L (4.75 U.S. gal.)
Reserve Capacity	2.46 L (0.65 U.S. gal.)
Engine Oil Capacity	3.5 L (3.7 U.S. qt)
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	SAE 10W-40
Differential Capacity (front - 4x4)	275 ml (9.3 fl oz)**
Differential Lubricant (front - 4x4)	SAE Approved 80W-90 Hypoid
Brake Fluid	DOT 4
Taillight/Brakelight	12V/5W/27W
Headlight	12V/27W (2)
Starting System	Electric w/Manual Recoil (Emergency)

* Specifications subject to change without notice.

** One inch below plug threads

General Specifications* (300)

CARBURETOR	
Type	Keihin CVK32
Main Jet	135
Slow Jet	38
Low Speed Fuel Screw Setting (turns)	2 1/4
Jet Needle	N8TT
Needle Jet	4.0/3.4
Idle RPM	1300-1400
Starter Jet	65
Float Arm Height	17 mm (0.7 in.)
Throttle Cable Free-Play (at lever)	3-6 mm (1/8-1/4 in.)
ELECTRICAL	
Ignition Timing	5° BTDC @ 1800 RPM 30° BTDC @ 3800 RPM
Spark Plug Type	NGK DR7EA
Spark Plug Gap	0.6-0.7 mm (0.024-0.028 in.)
Spark Plug Cap	8000-12,000 ohms
Ignition Coil Resistance (primary)	0.4-0.6 ohm (terminal to ground)
(secondary)	5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	98.3-147.5 volts (terminal to ground)
Magneto Coil Resistance (trigger)	84-126 ohms (black/yellow to green/white)
(charging)	0.44-0.66 ohm (yellow to yellow)
Magneto Coil Peak Voltage (trigger)	3.12-4.68 volts (black/yellow to green/white)
(charging)	30-45 volts (yellow to yellow)
Magneto Output (approx)	220W @ 5000 RPM
CHASSIS	
Dry Weight (approx)	263 kg (580 lb)
Length (overall)	202 cm (79.5 in.)
Height (overall)	114 cm (45 in.)
Width (overall)	114 cm (45 in.)
Suspension Travel	16.5 cm (6.5 in.)
Ground Clearance	20.3 cm (8.0 in.)
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Wheelbase	127 cm (50 in.)
Tracking	89 cm (35 in.)
Tire Size	Front - AT24 x 9-12 Rear - AT25 x 10-12
Tire Inflation Pressure	0.35 kg/cm ² (5 psi)
Turning Radius	2.7 m (8.9 ft)
MISCELLANY	
Gas Tank Capacity (rated)	17.98 L (4.75 U.S. gal.)
Reserve Capacity	2.46 L (0.65 U.S. gal.)
Differential Capacity (front)	275 ml (9.3 fl oz)**
Engine Oil Capacity	3.5 L (3.7 U.S. qt)
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	SAE 10W-40
Differential Lubricant (front)	SAE Approved 80W-90 Hypoid
Brake Fluid	DOT 4
Taillight/Brakelight	12V/5W/27W
Headlight	12V/27W (2)
Starting System	Electric w/Manual Recoil (Emergency)

* Specifications subject to change without notice.

** One inch below plug threads

General Specifications* (400/400 TBX - Automatic Transmission)

CARBURETOR

Type	Keihin CVK34
Main Jet	150
Slow Jet	38
Low Speed Fuel Screw Setting (turns)	2 1/8
Jet Needle	N8TV
Needle Jet	4.0/3.4
Idle RPM	1250-1350
Starter Jet	60
Float Arm Height	17 mm (0.7 in.)
Throttle Cable Free-Play (at lever)	3-6 mm (1/8-1/4 in.)

ELECTRICAL

Ignition Timing	10° BTDC @ 1500 RPM
Spark Plug Type	NGK CR7E
Spark Plug Gap	0.7-0.8 mm (0.028-0.032 in.)
Spark Plug Cap	8000-12,000 ohms
Ignition Coil Resistance (primary)	0.4-0.6 ohm (terminal to ground)
(secondary)	5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	160.8-241.2 volts (terminal to ground)
Magneto Coil Resistance (trigger source) (charging)	160-240 ohms (green to blue) 0.08-0.12 ohm (yellow to white) 0.32-0.48 ohm (black to black)
Magneto Coil Peak Voltage (trigger source) (charging)	5.04-7.56 volts (green to blue) 0.7-1.05 volts (yellow to white) 12.5-18.6 volts (black to black #1) (black to black #2)
Magneto Output (approx)	220W @ 5000 RPM

CHASSIS

Dry Weight (approx)	2x4 - 268 kg (590 lb) 4x4 - 282 kg (622 lb) - ACT 4x4 - 286 kg (630 lb) - FIS 4x4 - 323.5 kg (713 lb) - TBX
Length (overall)	2x4 - 202 cm (79.5 in.) 4x4 - 205 cm (81 in.) 4x4 - 244.5 cm (96 in.) - TBX
Height (overall)	122 cm (48 in.) - ACT 125 cm (49.3 in.) - FIS
Width (overall)	112 cm (44.25 in.) - ACT 121 cm (47.5 in.) - FIS
Suspension Travel (front)	21.5 cm (8.45 in.) - ACT 25 cm (10 in.) - FIS
Suspension Travel (rear)	18.2 cm (7.2 in.) - ACT 25 cm (10 in.) - FIS
Ground Clearance	20.3 cm (8 in.)
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Wheelbase	127 cm (50 in.)
Wheel Stance	89 cm (35 in.)
Tire Size	Front - 25 x 8-12 Rear - 25 x 10-12 - ACT Rear - 25 x 10-12 - FIS
Tire Inflation Pressure	0.35 kg/cm ² (5 psi)
Turning Radius	2.7 m (8.9 ft)

MISCELLANY

Gas Tank Capacity (rated)	17.98 L (4.75 U.S. gal.)
Reserve Capacity	2.46 L (0.65 U.S. gal.)
Rear Drive Capacity	275 ml (9.3 fl oz) - ACT*** 250 ml (8.5 fl oz) - FIS**
Differential Capacity (front - 4x4)	275 ml (9.3 fl oz)**
Engine Oil Capacity	3.08 L (3.25 U.S. qt)
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	SAE 10W-40
Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Drive Belt Width	30.3 mm (1.19 in.)
Brake Fluid	DOT 4
Taillight/Brakelight	12V/5W/27W
Headlight	12V/27W (2)
Starting System	Electric w/Manual Recoil (Emergency)

* Specifications subject to change without notice.

** One inch below plug threads.

*** At the plug threads

General Specifications* (400 - Manual Transmission)

CARBURETOR	
Type	Keihin CVK34
Main Jet	150
Slow Jet	38
Low Speed Fuel Screw Setting (turns)	2 1/8
Jet Needle	N8TV
Needle Jet	4.0/3.4
Idle RPM	1250-1350
Starter Jet	60
Float Arm Height	17 mm (0.7 in.)
Throttle Cable Free-Play (at lever)	3-6 mm (1/8-1/4 in.)
ELECTRICAL	
Ignition Timing	10° BTDC @ 1500 RPM
Spark Plug Type	NGK CR7E
Spark Plug Gap	0.7-0.8 mm (0.028-0.032 in.)
Spark Plug Cap	8000-12,000 ohms
Ignition Coil Resistance (primary)	0.4-0.6 ohm (terminal to ground)
(secondary)	5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	160.8-241.2 volts (terminal to ground)
Magneto Coil Resistance (trigger)	160-240 ohms (green to blue)
(source)	0.08-0.12 ohm (yellow to white)
(charging)	0.32-0.48 ohm (black to black)
Magneto Coil Peak Voltage (trigger)	5.04-7.56 volts (green to blue)
(source)	0.7-1.05 volts (yellow to white)
(charging)	12.5-18.6 volts (black to black)
Magneto Output (approx)	220 W @ 5000 RPM
CHASSIS	
Dry Weight (approx)	2x4 - 261 kg (577 lb) 4x4 - 276 kg (609 lb) - ACT 4x4 - 280 kg (617 lb) - FIS
Length (overall)	2x4 - 202 cm (79.5 in.) 4x4 - 205 cm (81 in.)
Height (overall)	122 cm (48 in.) - ACT 125 cm (49.3 in.) - FIS
Width (overall)	112 cm (44.25 in.) - ACT 121 cm (47.5 in.) - FIS
Suspension Travel (front)	21.5 cm (8.45 in.) - ACT 25 cm (10 in.) - FIS
Suspension Travel (rear)	18.2 cm (7.2 in.) - ACT 25 cm (10 in.) - FIS
Ground Clearance	20.3 cm (8 in.)
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Wheelbase	127 cm (50 in.)
Wheel Stance	89 cm (35 in.)
Tire Size	Front - 25 x 8-12 Rear - 25 x 10-12 - ACT Rear - 25 x 10-12 - FIS
Tire Inflation Pressure	0.35 kg/cm ² (5 psi)
Turning Radius	2.7 m (8.9 ft)

MISCELLANY	
Gas Tank Capacity (rated)	17.98 L (4.75 U.S. gal.)
Reserve Capacity	2.46 L (0.65 U.S. gal.)
Rear Drive Capacity	275 ml (9.3 fl oz) - ACT*** 250 ml (8.5 fl oz) - FIS**
Differential Capacity (front - 4x4)	275 ml (9.3 fl oz)**
Engine Oil Capacity	3.08 L (3.25 U.S. qt)
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	SAE 10W-40
Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Brake Fluid	DOT 4
Taillight/Brakelight	12V/5W/27W
Headlight	12V/27W (2)
Starting System	Electric w/Manual Recoil (Emergency)

* Specifications subject to change without notice.

** One inch below plug threads. *** At the plug threads

General Specifications* (500 - Manual Transmission)

CARBURETOR	
Type	Keihin CVK36
Main Jet	148
Slow Jet	75
Low Speed Fuel Screw Setting (turns)	1 7/8
Jet Needle	N3RS
Needle Jet	6.0/4.0
Idle RPM	1250-1350
Starter Jet	90
Float Arm Height	17 mm (0.7 in.)
Throttle Cable Free-Play (at lever)	3-6 mm (1/8-1/4 in.)
ELECTRICAL	
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)	0.4-0.6 ohm (terminal to ground)
(secondary)	5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	142.4-213.6 volts (terminal to ground)
Magneto Coil Resistance (trigger)	160-240 ohms (green to blue)
(source)	0.08-0.12 ohm (yellow to white)
(charging)	0.32-0.48 ohm (black to black)
Magneto Coil Peak Voltage (trigger)	4.2-6.3 volts (green to blue)
(source)	0.40-0.62 volt (yellow to white)
(charging)	9.44-14.2 volts (black to black)
Magneto Output (approx)	325W @ 5000 RPM
CHASSIS	
Dry Weight (approx)	288.5 kg (636 lb)
Length (overall)	205 cm (81 in.)
Height (overall)	125 cm (49.3 in.)
Width (overall)	120.7 cm (47.5 in.)
Suspension Travel (front)	25 cm (10 in.)
Suspension Travel (rear)	25 cm (10 in.)
Ground Clearance	20.3 cm (8 in.)
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Wheelbase	127 cm (50 in.)
Tracking	89 cm (35 in.)
Tire Size	Front - 25 x 8-12 Rear - 25 x 11-12
Tire Inflation Pressure	0.35 kg/cm ² (5 psi)
Turning Radius	2.7 m (8.9 ft)
MISCELLANY	
Gas Tank Capacity (rated)	17.98 L (4.75 U.S. gal.)
Reserve Capacity	2.46 L (0.65 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)
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	SAE 10W-40
Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Brake Fluid	DOT 4
Taillight/Brakelight	12V/5W/27W
Headlight	12V/27W (2)
Starting System	Electric w/Manual Recoil (Emergency)

* Specifications subject to change without notice.

** One inch below plug threads. *** At the plug threads

General Specifications* (500/500 TBX/TRV - Automatic Transmission)

CARBURETOR	
Type	Keihin CVK36
Main Jet	148
Slow Jet	75
Low Speed Fuel Screw Setting (turns)	1 7/8
Jet Needle	N3RS
Needle Jet	6.0/4.0
Idle RPM	1250-1350
Starter Jet	90
Float Arm Height	17 mm (0.7 in.)
Throttle Cable Free-Play (at lever)	3 - 6 mm (1/8-1/4 in.)
ELECTRICAL	
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)	0.4-0.6 ohm (terminal to ground)
(secondary)	5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	142.4-213.6 volts (terminal to ground)
Magneto Coil Resistance (trigger)	160-240 ohms (green to blue)
(source)	0.08-0.12 ohm (yellow to white)
(charging)	0.32-0.48 ohm (black to black)
Magneto Coil Peak Voltage (trigger)	4.2-6.3 volts (green to blue)
(source)	0.40-0.62 volt (yellow to white)
(charging)	9.44-14.2 volts (black to black)
Magneto Output (approx)	325W @ 5000 RPM
CHASSIS	
Dry Weight (approx)	293 kg (646 lb) 331.5 kg (731 lb) - TBX 339 kg (748 lb) - TRV
Length (overall)	205 cm (81 in.) 244.5 cm (96 in.) - TBX/TRV
Height (overall)	125 cm (49.3 in.) 128 cm (50.5 in.) - TRV
Width (overall)	120.7 cm (47.5 in.)
Suspension Travel (front)	25 cm (10 in.)
Suspension Travel (rear)	25 cm (10 in.)
Ground Clearance	20.3 cm (8 in.)
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Wheelbase	127 cm (50 in.) 147 cm (58 in.) - TRV
Tracking	89 cm (35 in.)
Tire Size	Front - 25 x 8-12 Rear - 25 x 11-12
Tire Inflation Pressure	0.35 kg/cm ² (5 psi)
Turning Radius	2.7 m (8.9 ft)

MISCELLANY	
Gas Tank Capacity (rated)	17.98 L (4.75 U.S. gal.)
Reserve Capacity	2.46 L (0.65 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	2.5 L (2.6 U.S. qt)
Gasoline (recommended)	87 Octane Regular Unleaded
Engine Oil (recommended)	SAE 10W-40
Differential/Rear Drive Lubricant	SAE Approved 80W-90 Hypoid
Drive Belt Width	36.7 mm (1.44 in.)
Brake Fluid	DOT 4
Taillight/Brakelight	12V/5W/27W
Headlight	12V/27W (2)
Starting System	Electric w/Manual Recoil (Emergency)

* Specifications subject to change without notice.

** One inch below plug threads.

*** At the plug threads.

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.

During the break-in period (or whenever the brake pads are replaced), the hydraulic brake pads must be burnished. Slow disc-speed hydraulic brakes must be properly burnished in order to achieve maximum stopping power.

CAUTION

BRAKE PADS MUST BE BURNISHED TO ACHIEVE FULL BRAKING EFFECTIVENESS. Braking distance will be extended until brake pads are properly burnished.

TO PROPERLY BURNISH THE BRAKES, USE FOLLOWING PROCEDURE:

- Choose an area sufficiently large to safely accelerate ATV to 30 mph and to brake to a stop.
- Accelerate to 30 mph; then compress brake lever to decelerate to 0-5 mph.
- Repeat procedure five times until brakes are burnished.
- This procedure burnishes the brake pads, stabilizes the pad material, and extends the life of the brake pads.

WARNING

Do not attempt sudden stops or put the ATV into a situation where a sudden stop will be required until the brake pads are properly burnished.

■ **NOTE: Do not be reluctant to heat up the brake pads during the burnishing procedure.**

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

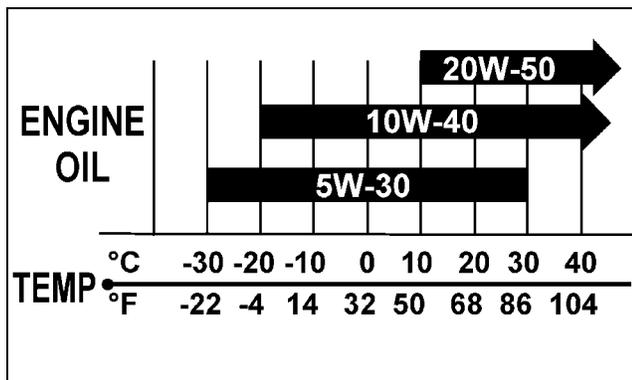
Do not use white gas. Only Arctic Cat approved gasoline additives should be used.

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 4-Cycle Engine Oil (p/n 0436-005) or an equivalent oil which is rated SE, SF, or SG under API service classification. These oils meet all of the lubrication requirements of the Arctic Cat ATV engine. The recommended engine oil viscosity is SAE 10W-40. Ambient temperature should determine the correct weight of oil. See the following viscosity chart for details.



OILCHART

RECOMMENDED FRONT DIFFERENTIAL/REAR DRIVE LUBRICANT

The recommended lubricant is Arctic Cat Gear Lube (p/n 0436-007) 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.

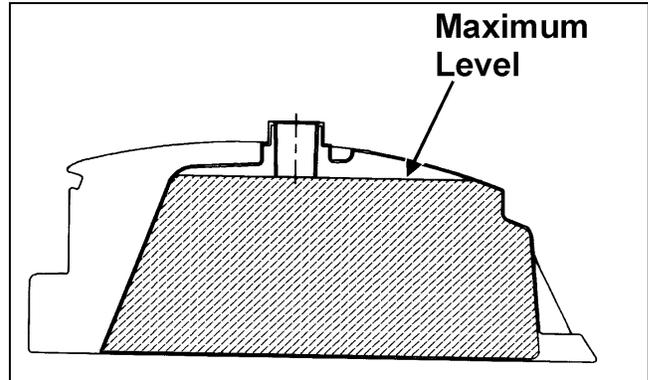
⚠ CAUTION

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.



ATV0049B

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.

Tighten the gas tank cap securely after filling the tank.

⚠ WARNING

Do not over-fill the gas 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 (p/n 0638-165) 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 (p/n 0636-177), 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. 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.
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. Clean or replace as necessary.
12. Follow the recommendations found in the pre-start inspection.

SECTION 2 - PERIODIC MAINTENANCE/TUNE-UP

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Periodic Maintenance Chart

A = Adjust
C = Clean
D = Drain

I = Inspect
L = Lubricate
R = Replace

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	I			I			R (4000 Mi or 18 Mo)
Muffler/Spark Arrester					C		R
Gas/Vent Hoses	I	I					R (2 Yrs)
Gas Tank Valve						I	C
Throttle Cable	I	I			C-L		A-R
Carb Float Chamber				D*			
Engine RPM (Idle)	I				I		A
Engine-Transmission Oil Level		I					A
Engine-Transmission Oil/Filter	R			R*			R
Oil Strainer	I				I		C
Front Differential/Rear Drive Lubricant	I						R (4 Yrs)
Clutch	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	I		A
Ignition Timing						I	
Headlight/Taillight-Brakelight	I	I					R
Switches	I	I					R
Reverse Shift Lever					I		A-L
Choke Cable (250/300/400)	I			I	C-L		R
Recoil Starter		I					C-R
Handlebar Grips		I					R
Handlebars	I	I					R
Gauges/Indicators	I	I					R
Frame/Welds/Racks	I		I		I		
Electrical Connections					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/Cooling System	I		I				R (2 Yrs)

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

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. Choke Cable Upper End (250/300/400)
- E. Reverse Lever Cable End (If applicable)
- F. Idle RPM Screw (Carburetor)

Battery



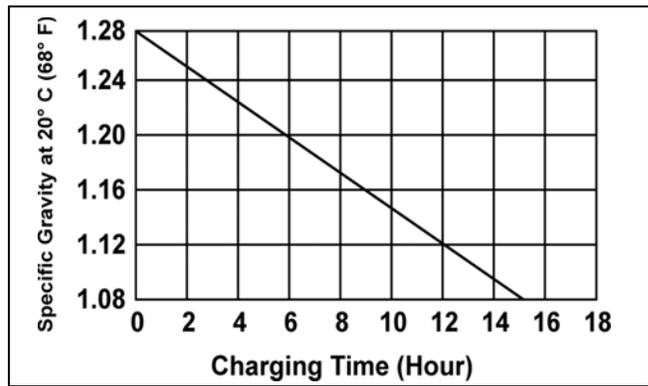
AF879D

The level of the battery fluid must be kept between the upper and lower level lines at all times. If the level drops below the lower level line, add only **distilled water** until it reaches upper level line.

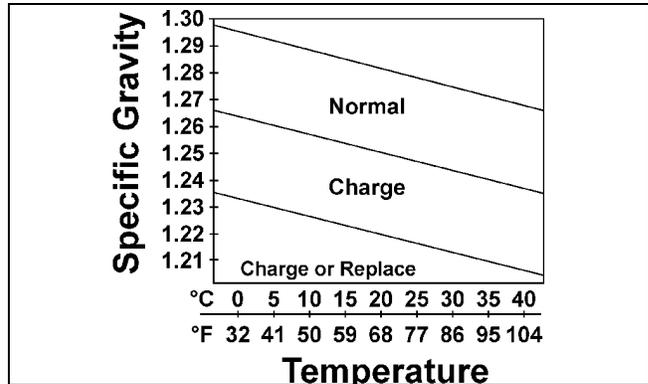
⚠ WARNING

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

If the battery is discharged, remove the battery from the ATV and charge the battery at the standard charging rate of 1.4A x 10 hr.



ChargTim



Charge

To remove and charge the battery, use the following procedure.

⚠ 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 bracket.
2. Remove the negative battery cable; then remove the positive cable and the battery vent tube. Remove the battery from the ATV. Care should be taken not to damage the vent tube.

⚠ WARNING

Avoid spillage and contact with skin, eyes, and clothing.

⚠ CAUTION

Do not charge the battery while it is in the ATV with the battery terminals connected.

3. Remove the vent plugs; then (if necessary) fill the battery with **distilled water** to the upper level indicated on the battery.
4. Trickle charge the battery at 1.4 amps for 10 hours.

⚠ CAUTION

Never exceed the standard charging rate.

- After charging, check fluid level and fill with distilled water as necessary; then install vent plugs.

⚠ CAUTION

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

- Place the battery into position in the ATV and secure with the hold-down bracket.
- Attach the vent tube and check the vent tube to make sure it is not crimped or obstructed in any way and that it is properly routed through and secured to the frame.
- Connect cables to the proper terminals: positive cable to the positive terminal (+) and negative cable to the negative terminal (-). Connect the negative cable last.



AF733D

⚠ CAUTION

Connecting cables in reverse (positive to negative and negative to positive) can cause serious damage to the electrical system.

Fuses

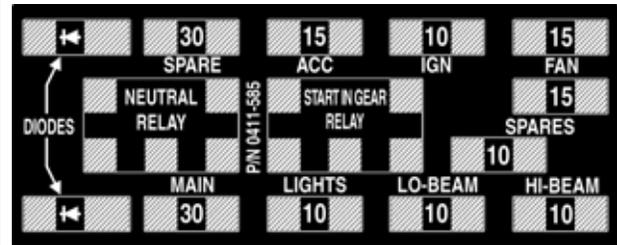
The main fuse (on the 400 ACT) is located in a fuse block on the frame near the right rear tire and protected by a snap-on cover. The main fuses are located in a fuse block under the center cover in the front fender assembly (on the 250/300), under the seat (on the 400 TBX/500 TBX/TRV), or under a cover above the right rear tire (on the 400 FIS/500).

If there is any type of electrical system failure, always check the fuses first.

NOTE: To remove the fuse, compress the locking tabs on either side of the fuse case and lift out.

250/300	400 ACT
10 A IGN	10 A LIGHTS
15 A LIGHTS	10 A HIGH
10 A ACC	10 A LO
10 A SPARE	10 A IGN
	15 A FAN
	15 A ACC

400 TBX/FIS/500



411-585A

⚠ CAUTION

Always replace a blown fuse with a fuse of the same type and rating.

Air Cleaner (250/300)

The air filter inside the air cleaner must be kept clean to provide good engine power and gas mileage. If the ATV is used under normal conditions, service the filter at the intervals specified. If operated in dusty, wet, or muddy conditions, inspect and service the filter more frequently.

CLEANING AND INSPECTING FILTER

⚠ CAUTION

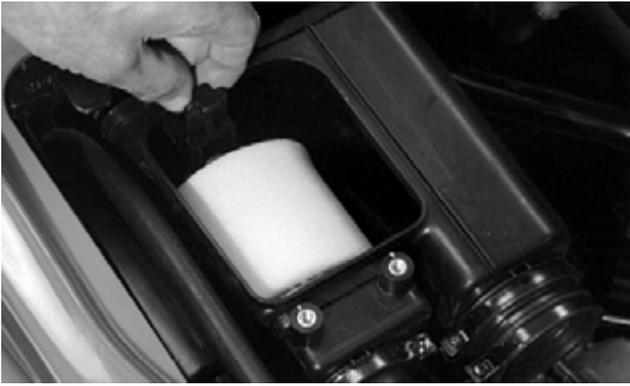
Failure to inspect the air filter frequently if the ATV is used in dusty, wet, or muddy conditions can damage the ATV engine.

- Remove the seat.
- Remove the two machine screws securing the air cleaner housing cover.



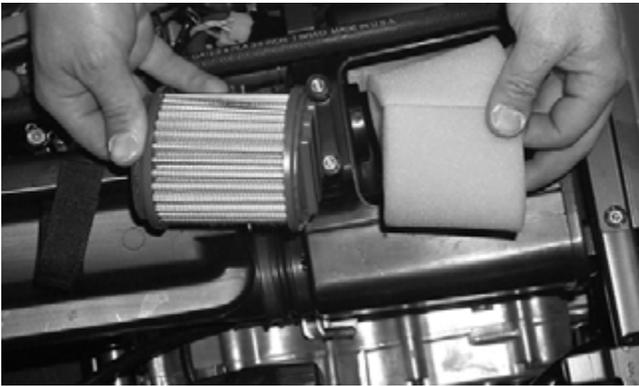
CH044D

- Pull the retainer out and remove the filter with foam wrap.



CH045D

4. Remove the foam wrap from the filter.



AL642D

5. Wash the polyester filter and the foam wrap with warm soapy water and rinse.

6. Allow the foam wrap to air dry thoroughly.

NOTE: Either allow the polyester filter to air dry or blow dry using low-pressure compressed air. Direct the compressed air through the filter from the opposite direction as normal operation air flow.

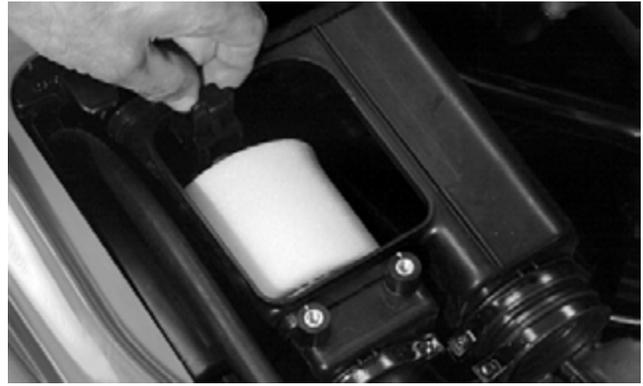
CAUTION

Do not put oil on either the filter or the foam wrap.

7. Place the foam wrap around the air filter; then install the filter with wrap into the air cleaner making sure it is properly in position and properly seated and secure with the retainer.



CH046D



CH045D

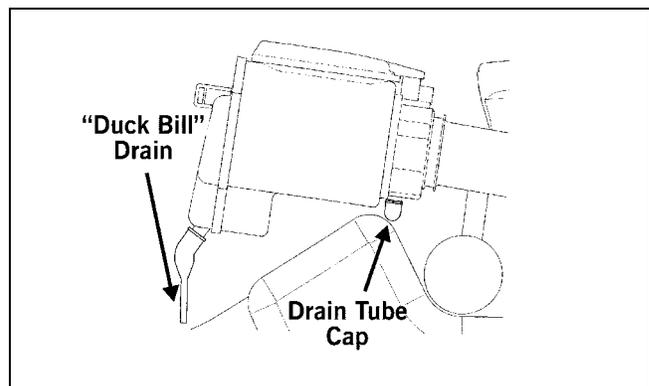
8. Install the air cleaner housing cover and secure with the machine screws; then install the seat making sure the seat is properly secured.



CH044D

9. Check the drain tube for gasoline or oil accumulation. If noticed, remove the drain tube cap from beneath the cleaner, drain the gasoline or oil into a suitable container, and install and secure the tube cap.

10. Inspect one-way drain beneath the air cleaner for debris and sealing.



733-715B

REMOVING AIR CLEANER

1. Remove the seat; then remove the air-intake snorkel.



CH040D



CH041D

2. Remove the two machine screws securing the air cleaner housing cover.



CH044D

3. Pull the retainer out and remove the filter with foam wrap.



CH045D

4. Remove the machine screws securing the air cleaner to the frame.



CH047D



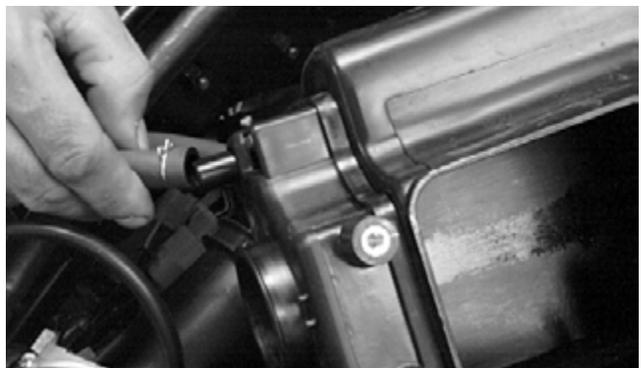
CH048D

5. Loosen the clamp securing the air cleaner to the carburetor boot.



CH049D

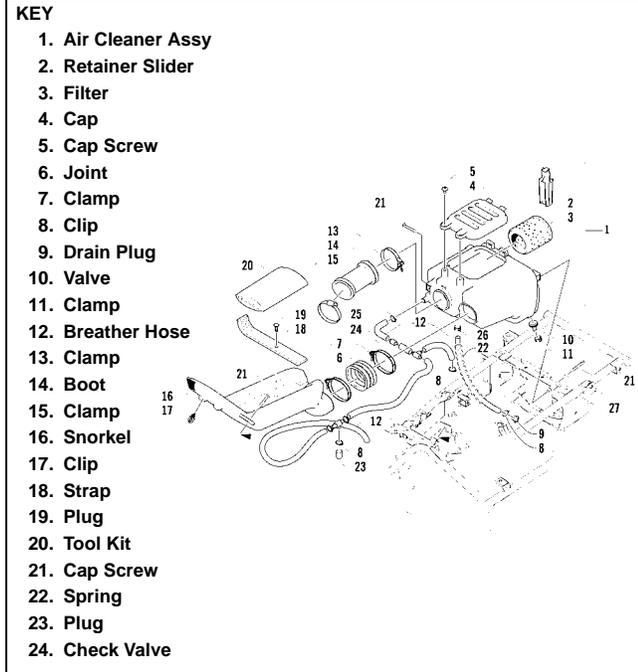
6. Remove the crankcase breather hose from the air cleaner.



CH050D

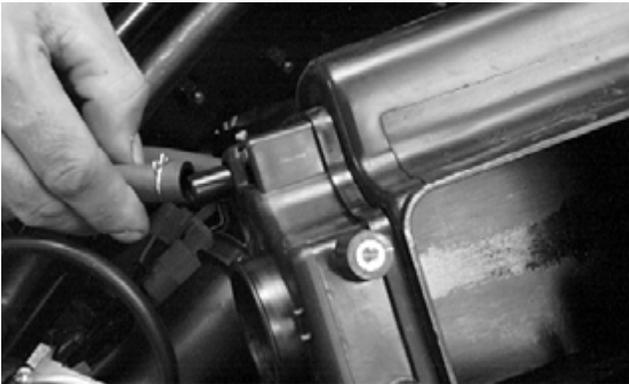
7. Remove the air cleaner from the frame.

INSTALLING AIR CLEANER



0738-682

1. Place the air cleaner into the frame; then connect the crankcase breather hose.



CH050D

2. Secure the carburetor boot to the air cleaner.



CH049D

3. Install the machine screws securing the air cleaner to the frame.



CH048D



CH047D

4. Install the filter with foam wrap into the air cleaner; then secure with the retainer.



CH045D

5. Install the air cleaner housing cover and secure with the machine screws.

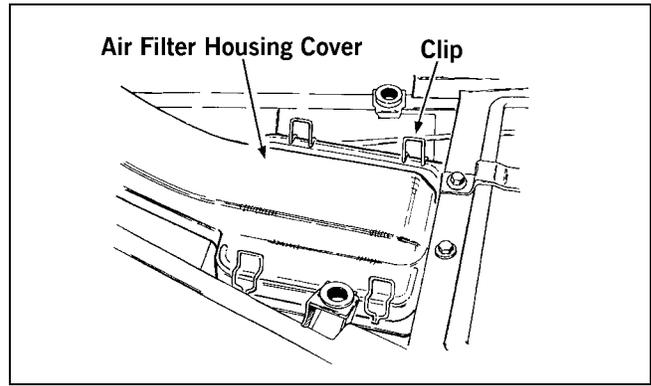


CH044D

6. Install the air-intake snorkel.



CH041D



733-444A

3. Loosen the clamp; then remove the filter.



CH040D

7. Install the seat making sure it is properly secured.



AF640DA

Air Cleaner/Filter (400/500)

The air filter inside the air filter housing must be kept clean to provide good engine power and gas mileage. If the ATV is used under normal conditions, service the filter at the intervals specified. If operated in dusty, wet, or muddy conditions, inspect and service the filter more frequently. Use the following procedure to remove the filter and inspect and/or clean it.

CLEANING AND INSPECTING FILTER

CAUTION

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

1. Remove the seat.
2. Remove the air filter housing cover from the retaining clips.



CD087

4. Fill a wash pan larger than the filter with a non-flammable cleaning solvent; then dip the filter in the solvent and wash it.

■NOTE: Foam Filter Cleaner (p/n 0436-194) and Foam Filter Oil (p/n 0436-195) are available from Arctic Cat.

5. Dry the filter.
6. Put the filter in a plastic bag; then pour in air filter oil and work the filter.

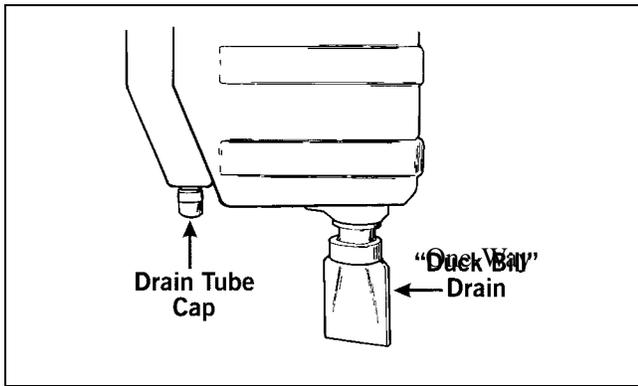
CAUTION

A torn air filter 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.

- Clean any dirt or debris from inside the air cleaner. Be sure no dirt enters the carburetor.
- Place the filter in the air filter housing making sure it is properly in position and properly seated and secure with the clamp.
- Install the air filter housing cover and secure with the retaining clips; then install the seat making sure the seat is properly secured.

CHECKING/DRAINING DRAIN TUBE

- Periodically check the drain tube for gasoline or oil accumulation. If noticed, remove the drain tube cap from beneath the front housing, drain the gasoline or oil into a suitable container, and install and secure the tube cap.
- Inspect one-way drain beneath the main housing for debris and for proper sealing.



ATV-0087

REMOVING AIR CLEANER

- Remove the seat.
- Remove the air cleaner cover from the retaining clips.



AL645D

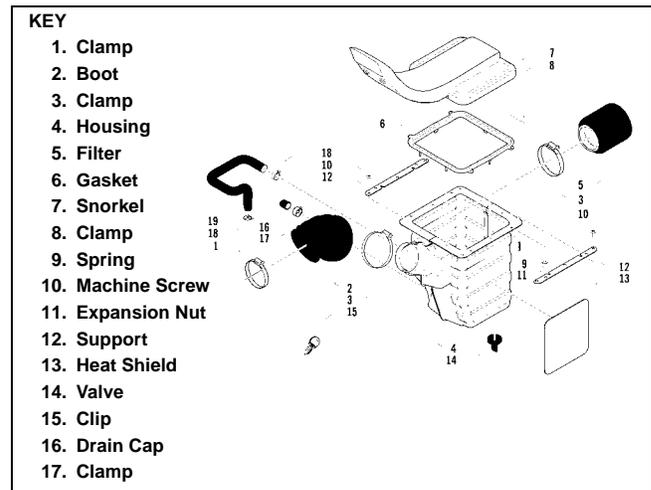
- Loosen the clamp and remove the filter.



AF640DA

- Loosen the clamp securing the air cleaner to the front boot; then loosen the clamp securing the air cleaner to the rear filter sleeve.
- Remove the machine screws securing the air cleaner to the flange support and frame.
- Remove the air cleaner from the frame.

INSTALLING



0738-385

- Place the air cleaner into the frame.
- Install the machine screws securing the air cleaner to the flange support and frame.
- Install the rear filter sleeve onto the air cleaner; then tighten the clamp securely.
- Install the front boot onto the air cleaner; then tighten the clamp securely.
- Install the filter with foam wrap into the air cleaner; then tighten the clamp securely.



AF640DA

- Place the air cleaner cover into position and secure with the retaining clips.



AL645D

- Install the seat making sure the seat is properly secured.

Valve/Tappet Clearance (Feeler Gauge Procedure)

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

■NOTE: On the 250/300, the seat and air-intake snorkel must be removed for this procedure.

■NOTE: On the 400/500, the seat assembly, side panels, and gas tank must be removed for this procedure.

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

- 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 (250)

Intake	0.03-0.08 mm (0.001-0.003 in.)
Exhaust	0.08-0.13 mm (0.003-0.005 in.)

VALVE/TAPPET CLEARANCE (300)

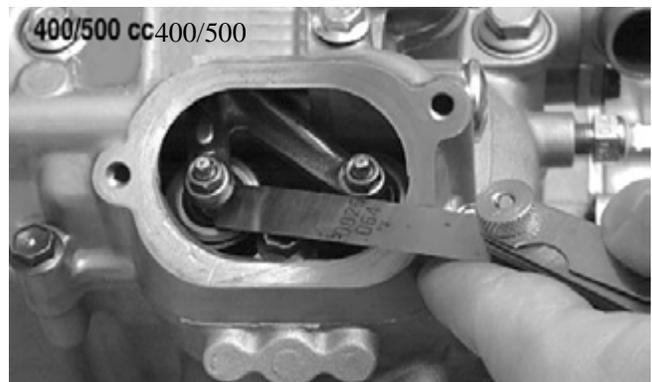
Intake	0.03-0.08 mm (0.001-0.003 in.)
Exhaust	0.17-0.22 mm (0.007-0.009 in.)

VALVE/TAPPET CLEARANCE (400/500)

Intake	0.05-0.10 mm (0.002-0.004 in.)
Exhaust (400)	0.22-0.27 mm (0.009-0.011 in.)
Exhaust (500)	0.17-0.22 mm (0.007-0.009 in.)



CC409DA



CC007DA

- Install the timing inspection plug.
- 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)

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

■NOTE: On the 250/300, the seat and air-intake snorkel must be removed for this procedure.

■NOTE: On the 400/500, the seat assembly, side panels, and gas tank 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. 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 Gap Adjuster (p/n 0444-092) for the 250/300 or Valve Clearance Adjuster (p/n 0444-078) for the 400/500 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.



CC366D

9. Install the spark plug; then install the timing inspection plug.



CC411D

Testing Engine Compression

To test engine compression, use the following procedure.

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

WARNING

Always wear safety glasses when using compressed air.

3. Remove the spark plug; then attach the high tension lead to the plug and ground the plug on the cylinder head well away from the spark plug hole.
4. Attach the Compression Gauge (p/n 0444-096).

■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).

■NOTE: For the 250/300, the compression should be within a range of 157.5-192.5 psi in the full-open throttle position. For the 400/500, the compression should be within a range of 63-77 psi in the full-open throttle position.

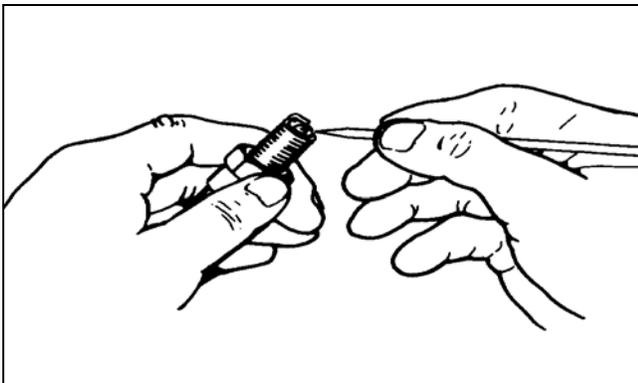
6. If compression is abnormally low, inspect the following items.
 - A. Verify starter cranks engine over.
 - B. Gauge is functioning properly.
 - C. Throttle lever in the full-open position.
 - D. Valve/tappet clearance correct.
 - E. Valve bent or burned.
 - F. Valve seat burned.

■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

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

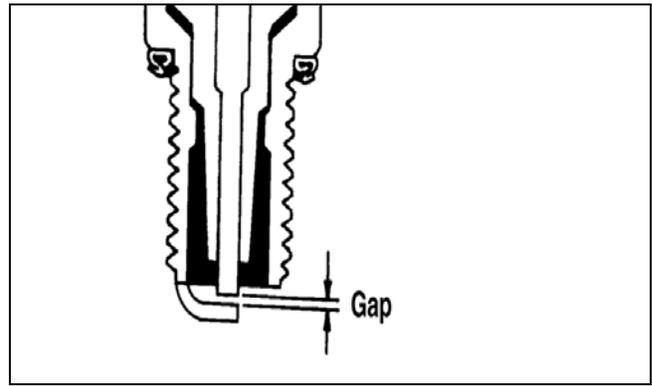


ATV-0051

CAUTION

Before removing the 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 0.6 - 0.7 mm (0.024 - 0.028 in.) on the 250/300 or to 0.7 - 0.8 mm (0.028 - 0.032 in.) on the 400/500 for proper ignition. Use a feeler gauge to check the gap.



ATV0052B

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

The muffler has a spark arrester which must be periodically cleaned. 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. Shift the transmission into neutral and set the brake lever lock.
2. Elevate the front of the ATV on a safety stand until the muffler is horizontal.
3. Remove the plug from the bottom of the muffler.



AN600

4. Start the engine and increase RPM to "blow out" the accumulated carbon particles.
5. Stop the engine. Wait until the muffler cools; then install the plug and tighten securely.

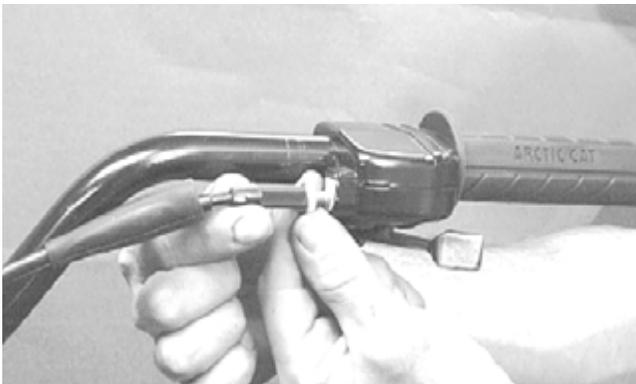
Gas/Vent Hoses

Replace the gas hose every two years. Damage from aging may not always be visible. Do not bend or obstruct the routing of the carburetor vent hose. Make certain that the vent hose is securely connected to the carburetor and the opposite end is always open.

Adjusting Throttle Cable

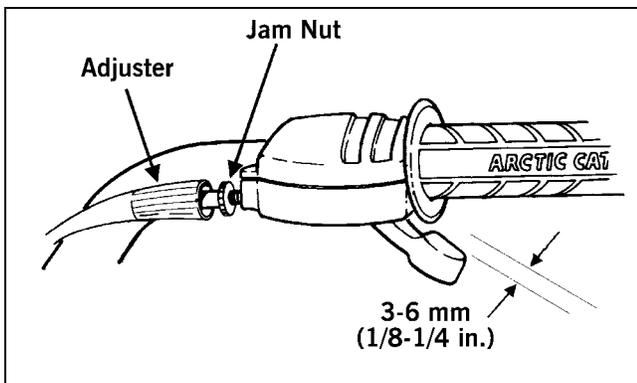
To adjust the throttle cable free-play, follow this procedure.

1. Slide the rubber boot away; then loosen the jam nut from the throttle cable adjuster.



AL611D

2. Slide the rubber boot away and 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

3. Tighten the jam nut against the throttle cable adjuster securely; then slide the rubber boot over the adjuster.

Adjusting Engine RPM (Idle)

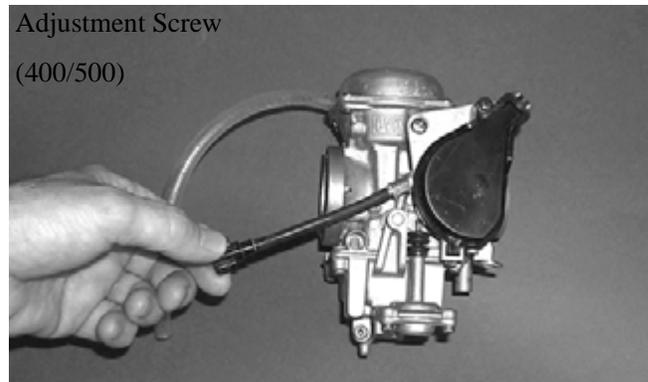
To properly adjust the idle RPM, a tachometer is necessary. To adjust idle RPM, use the following procedure.

■NOTE: To access the idle adjustment screw, it will be necessary to remove the seat on the 250/300 models. The idle adjustment screw is located on the right-hand side of the carburetor on the 400/500 models.

1. With the transmission in neutral, start the engine and warm it up to normal operating temperature.
2. Turn the idle adjustment screw clockwise one turn past the recommended RPM setting; then turn it counterclockwise to the correct RPM setting.



CC795B



AF920C

IDLE RPM	
MODEL	RPM
250/300	1300-1400
400/500	1250-1350

⚠ WARNING

Adjust the idle to the correct RPM. Make sure the engine is at normal operating temperature before adjusting the idle RPM.

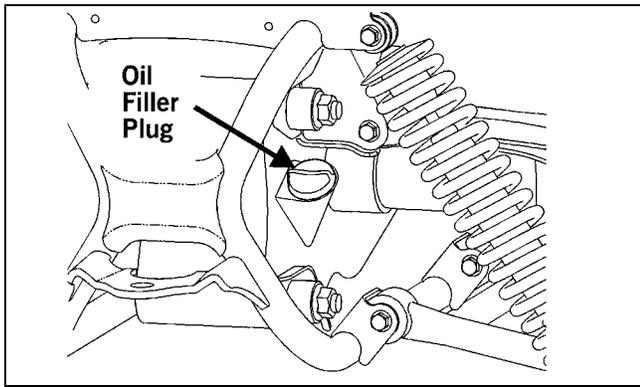
Engine/Transmission Oil - Filter - Strainer (250/300)

OIL - FILTER

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

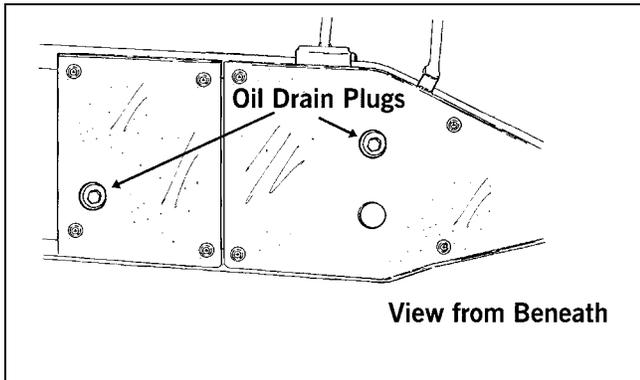
1. Park the ATV on level ground.

2. Remove the oil filler plug.



733-714A

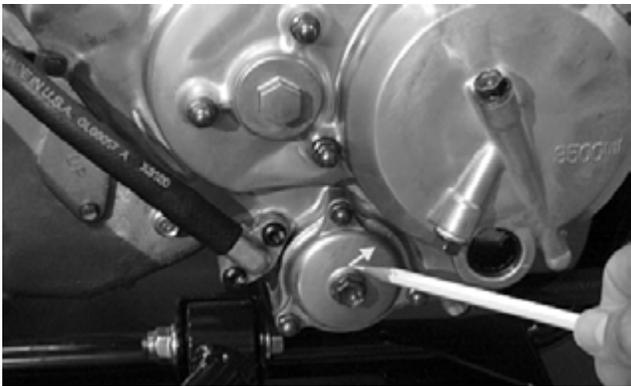
3. Remove both drain plugs from the bottom of the engine and drain the oil into a drain pan.



733-441C

4. Remove the nuts securing the filter cover.

5. Remove the filter cover; then pull out the oil filter element and properly discard. Remove and properly discard the O-ring from the filter cover.



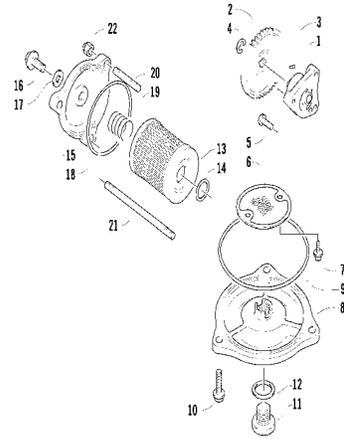
CH080DA

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

6. Apply oil to a new cover O-ring and check to make sure it is positioned correctly in the cover. With the open end of the filter element directed toward the center of the engine, slide the element into position.

KEY

1. Engine Oil Pump
2. Driven Gear
3. Pin
4. Circlip
5. Cap Screw
6. Strainer
7. Cap Screw
8. Cap
9. O-Ring
10. Cap Screw
11. Drain Plug
12. Gasket
13. Filter
14. Filter O-Ring
15. Cap
16. Check Plug
17. Gasket
18. Cap O-Ring
19. Spring
20. Stud Bolt



0733-752

CAUTION

If the oil filter element is inserted backwards, engine damage will occur due to lack of oil flow.

7. Place the filter cover in position and secure with the nuts. Tighten securely.

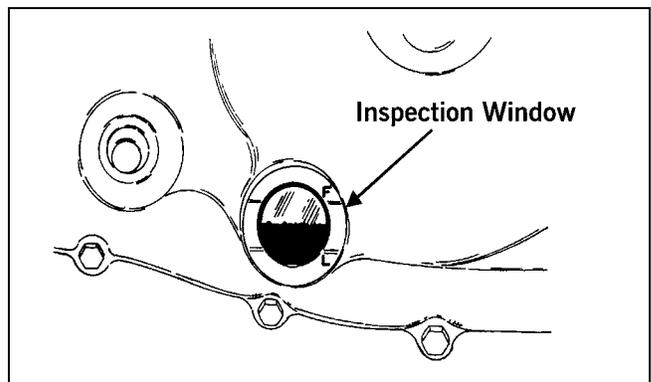
8. Install the engine drain plugs and tighten to 2.2 kg-m (16 ft-lb). Pour 3.5 L (3.7 U.S. qt) of the recommended oil in the filler hole; then install the filler plug.

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.

9. Start the engine (while the ATV is outside on level ground) and allow it to idle for a few minutes.

10. Turn the engine off and wait approximately one minute. Recheck the oil level in the engine oil inspection window. The oil level should be visible through the window. If oil is not visible, add recommended oil until the oil level is visible between the lines of the window.



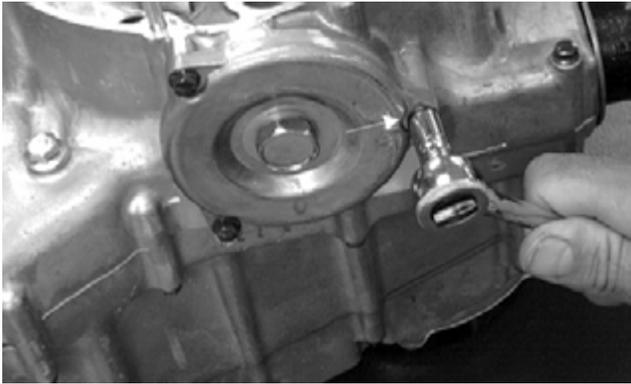
ATV-0074

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

STRAINER

To check the oil strainer, use the following procedure.

- Remove the skid plate.
- Remove the Phillips-head cap screws securing the oil strainer cap; then remove the cap. Note the directional arrow on the cap for assembly purposes.



CC442DA

- Remove the Phillips-head screws securing the strainer; then remove the strainer.



CC443D

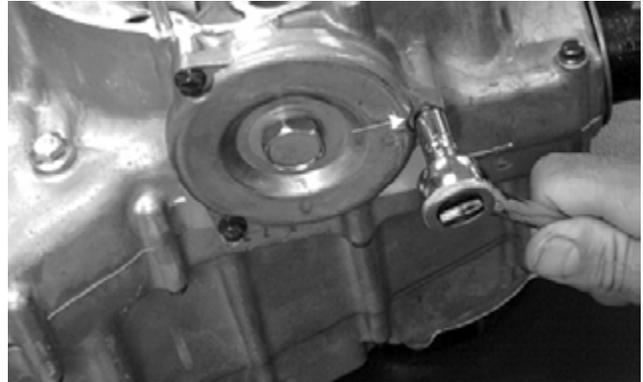
■ **NOTE:** To service the oil strainer, see Section 3.

- Place the oil strainer into position and secure with the Phillips-head screws.



CC443D

- Place the strainer cap into position on the crankcase; then secure with the Phillips-head cap screws (coated with red Loctite #271). Tighten securely.



CC442DA

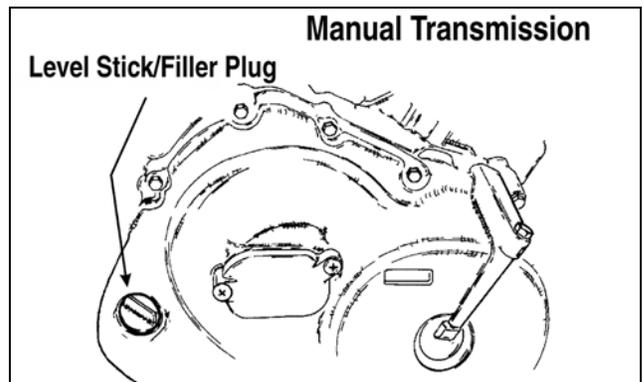
- Install the skid plate.

Engine/Transmission Oil - Filter - Strainer (400/500)

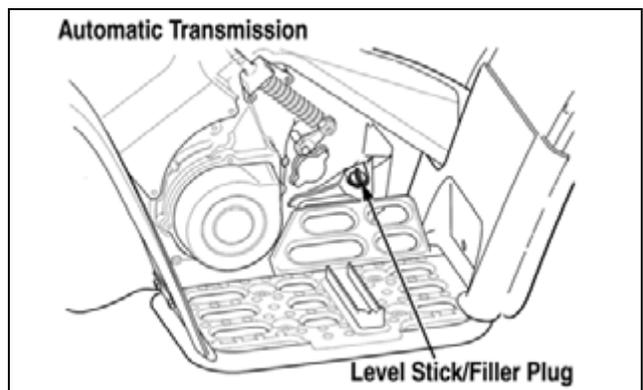
OIL - FILTER

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

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

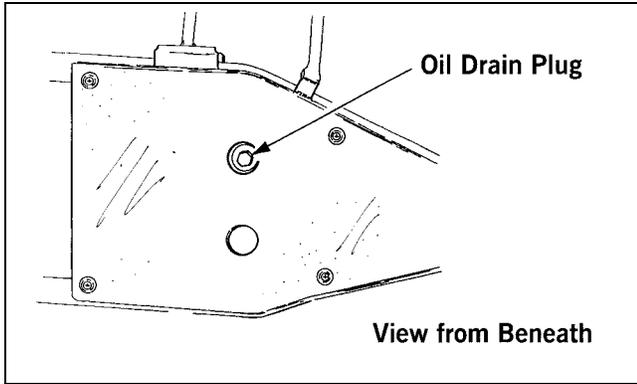


ATV-0075



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-right side of the transmission case) and allow the filter to drain completely.
- Using the Oil Filter Wrench (p/n 0444-042) and a ratchet handle (or a socket or box-end 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.

- Install the oil filter drain plug and tighten securely.
- Install the engine drain plug and tighten to 2.2 kg-m (16 ft-lb). Pour 3.08 L (3.25 U.S. qt) - 400, 3.4 L (3.5 U.S. qt) - 500 manual, or 2.5 L (2.6 U.S. qt) - 500 automatic 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.

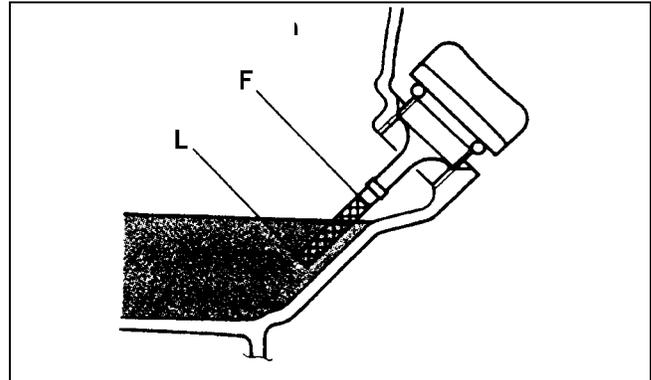
- Start the engine (while the ATV is outside on level ground) and allow it to idle for a few minutes.
- Turn the engine off and wait approximately one minute.
- Unscrew the oil level stick and wipe it with a clean cloth.
- Install the oil level stick until the threads touch engine case.

NOTE: The oil level stick should not be threaded into the case for checking the oil level.

- 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.



ATV-0100

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

STRAINER

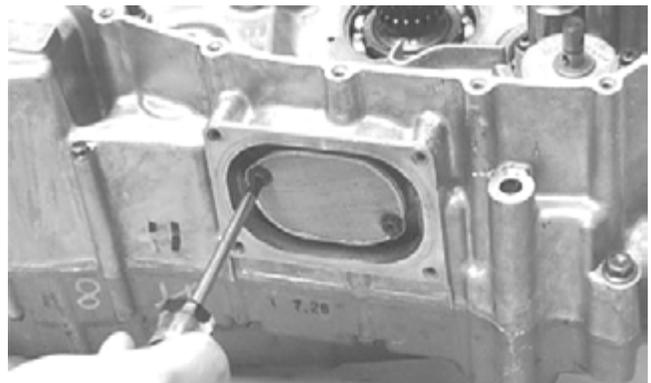
To check the oil strainer, use the following procedure.

- Remove the skid plate.
- Remove the cap screws securing the oil strainer cap; then remove the cap. Account for the O-ring.



CC091D

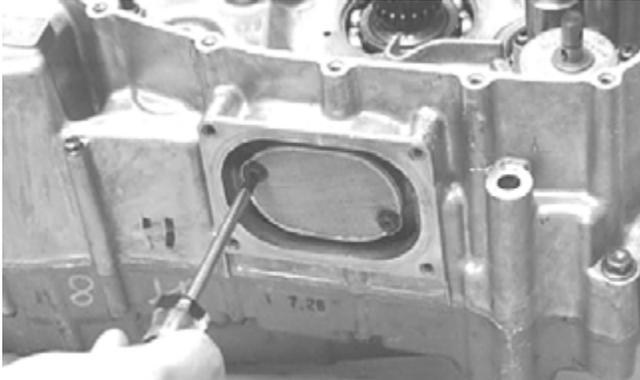
- Remove the two Phillips-head cap screws securing the strainer.



CC163D

NOTE: To service oil strainer, see Section 3.

- Place the oil strainer into position beneath the crankcase and secure with the Phillips-head cap screws. Tighten securely.



CC163D

- Place the strainer cap into position on the strainer making sure the O-ring is properly installed; then secure with the cap screws. Tighten securely.



CC091D

- Install the skid plate.

Front Differential/Rear Drive Lubricant

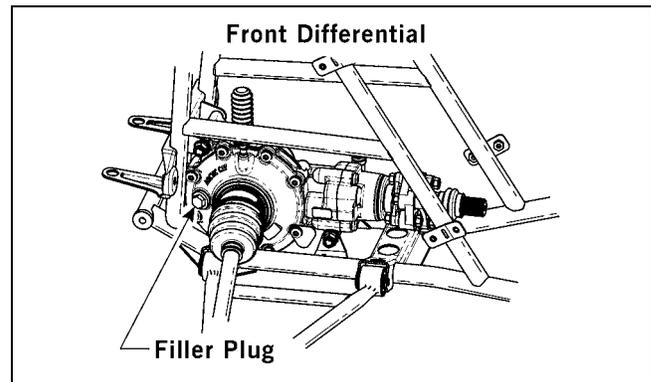
Check and change the lubricant according to the Periodic Maintenance Chart. When changing the lubricant, use approved SAE 80W-90 hypoid gear lube. To check lubricant, use the following procedure.

- On FIS models, remove the rear drive filler plug; the lubricant level should be 1 in. below the threads of the plug. If low, add SAE approved 80W-90 hypoid gear lube as necessary.
- On ACT models, remove the rear drive inspection plug; the lubricant level should be at the threads of the plug. If low, add SAE approved 80W-90 hypoid gear lube as necessary.

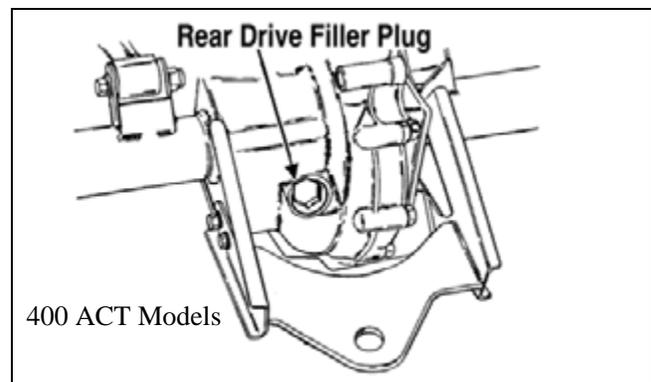


To change the lubricant, use the following procedure.

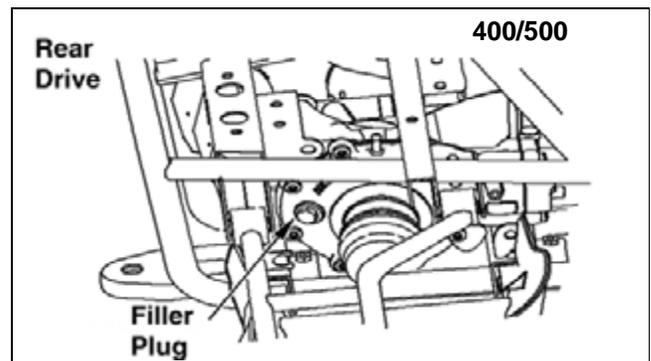
- Place the ATV on level ground.
- Remove each oil filler plug.



0736-568

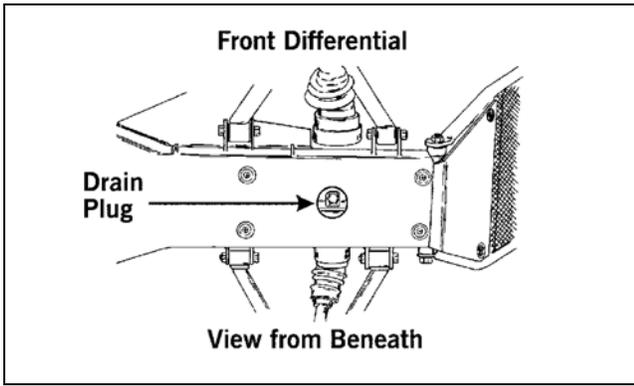


ATV-0077

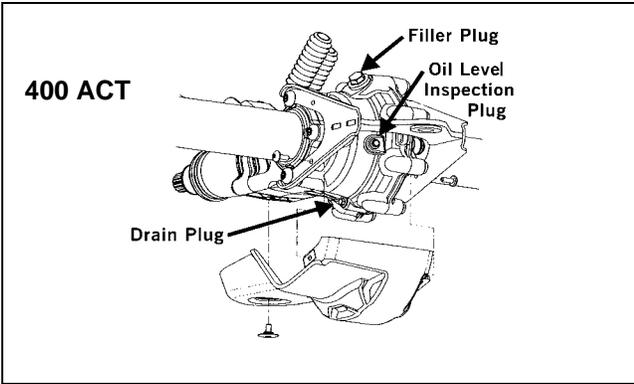


737-686A

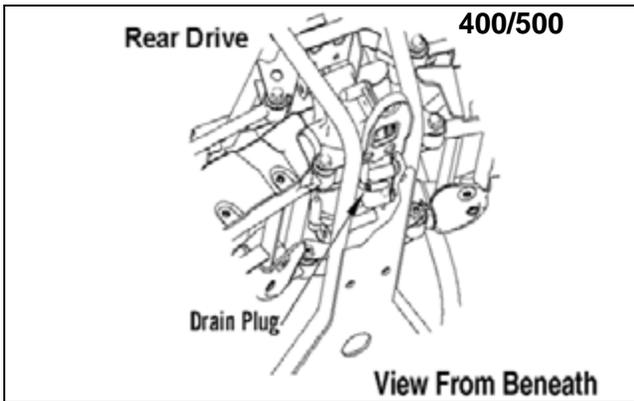
- Drain the oil into a drain pan by removing in turn the drain plug from each.



ATV0082A



ATV-1096



737-651A

4. After all the oil has been drained, install the drain plugs and tighten to 0.5 kg-m (3.5 ft-lb).
5. Pour the appropriate amount of recommended oil into the filler hole.
6. Install the filler plugs.

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

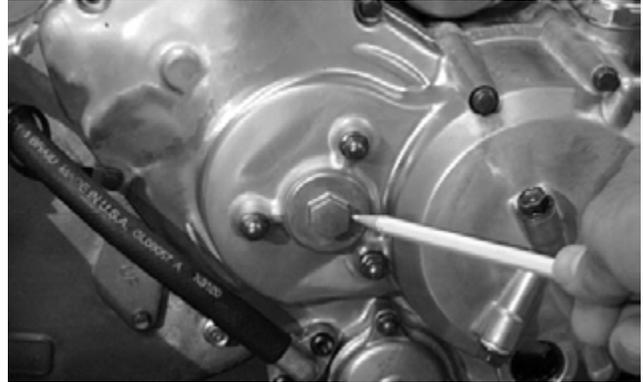
⚠ CAUTION

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

Adjusting Clutch (250/300)

To adjust the clutch, use the following procedure.

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



CH081D

2. Loosen the jam nut securing the adjustment screw.

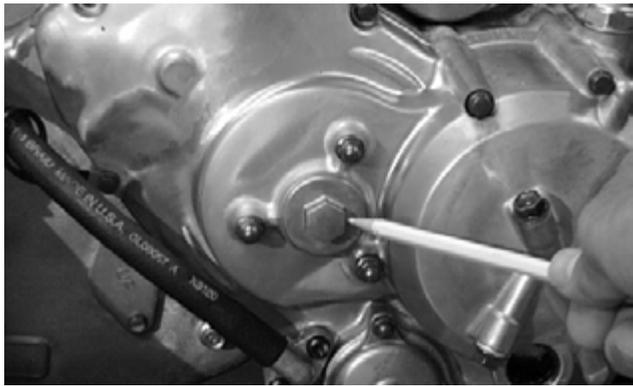


CH086D

3. Rotate the adjustment screw clockwise until it stops.
4. Rotate the adjustment screw counterclockwise 1/8 turn; then lock the jam nut securing the adjustment screw.

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

5. Secure the cover making sure the O-ring is properly positioned.

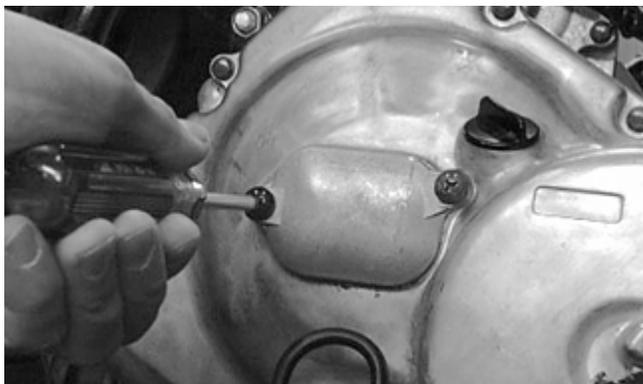


CH081D

Adjusting Clutch (400/ 500 Manual Transmission)

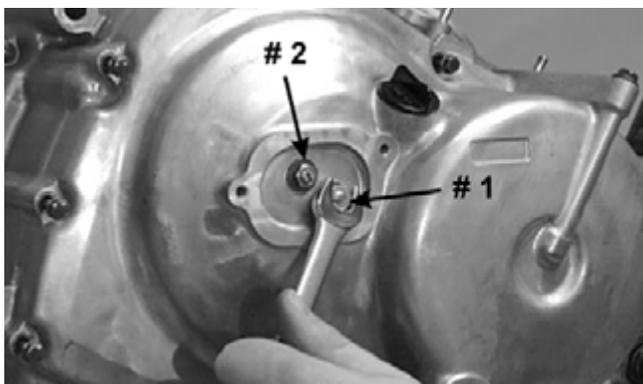
To adjust the clutch, use the following procedure.

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



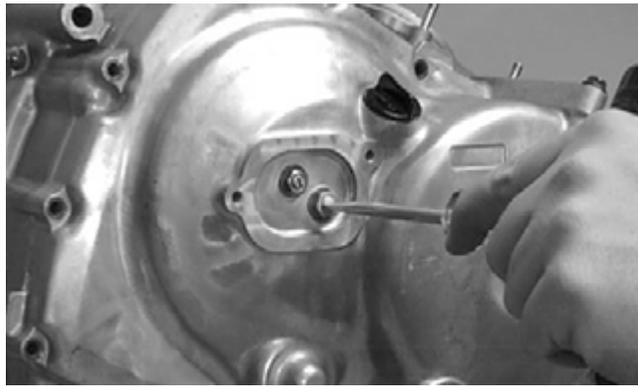
AM600D

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.

Tires

TIRE SIZES

The ATV is equipped with low-pressure tubeless tires of the size and type listed. Do not under any circumstances substitute tires of a different type or size.

⚠ WARNING

Always use the size and type of tires specified. Always maintain proper tire inflation pressure.

TIRE INFLATION PRESSURE

Front and rear tire inflation pressure should be 0.35 kg-cm² (5.0 psi).

A low-pressure gauge is provided in the tool kit to measure the air pressure in the tires. Check the air pressure in all tires before each use of the ATV.

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.

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 bent, pitted, or damaged.
- B. Rubber damper cracked, broken, or missing.
- C. Shock absorber body damaged, punctured, or leaking.
- D. Shock absorber eyelets broken, bent, or cracked.
- E. Shock absorber eyelet bushings worn, deteriorated, cracked, or missing.
- F. Shock absorber spring broken or sagging.

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. For proper torque values, see Section 10.

Ignition Timing

The ignition timing cannot be adjusted; however, verifying ignition timing can aid in troubleshooting other components. To verify engine timing, use the following procedure.

1. Attach the engine Timing Light (p/n 0644-197) to the spark plug high tension lead; then remove the timing inspection plug from the left-side crankcase cover.

2. Using the Arctic Cat Engine Tachometer (p/n 0644-275), start the engine and run at the recommended RPM; ignition timing should be the recommended degrees BTDC.

IGNITION TIMING	
MODEL	TIMING/RPM
250	5° BTDC below 1800
	35° BTDC above 3800
300	5° BTDC @ 1800 30° BTDC @ 3800
400	10° BTDC @ 1500
500	10° BTDC @ 1500

3. Install the timing inspection plug.

If ignition timing cannot be verified, the rotor may be damaged, the key may be sheared, the trigger coil bracket may be bent or damaged, or the CDI unit may be faulty.

Headlight/Taillight-Brakelight

Each time the ATV is used, lights should be checked for proper function. 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.

HEADLIGHT

■ **NOTE:** The bulb portion of the headlight is fragile. **HANDLE WITH CARE.** When replacing the 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 the bulb when it is hot. Severe burns may result.

To replace the 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. Remove the two screws and remove the lens cover.
2. Push the bulb in and turn it counterclockwise.

3. Install the new bulb by turning it clockwise while pushing in.
4. Install the lens cover.

⚠ CAUTION

Tighten the lens cover screws only until they are snug.

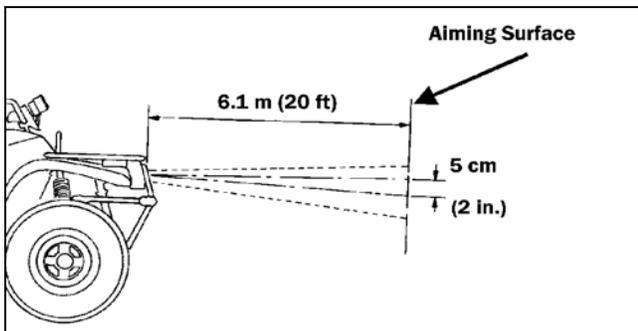
CHECKING/ADJUSTING HEADLIGHT AIM

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.

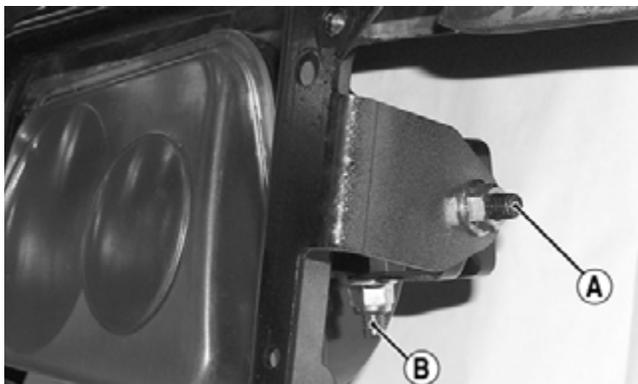
1. Position the ATV on a level floor so the headlights are approximately 6.1 m (20 ft) from an aiming surface (wall or similar aiming surface).

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.



ATV-0070C



AF926A

7. Adjust each headlight until correct aim is obtained.
 - A. Horizontal — Loosen nut (A) and adjust for proper aiming. Tighten the nut securely.
 - B. Vertical— Loosen nut (B) and adjust for proper aiming. Tighten the nut securely.

Switches

Each time the ATV is used, switches should be checked for proper operation. Use the following list for reference.

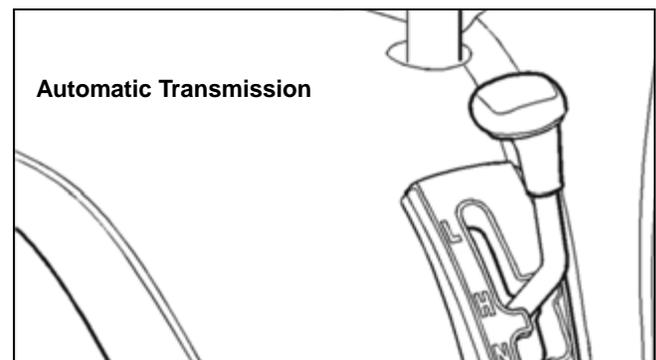
- A. Ignition switch — engine will start.
- B. Emergency stop switch — engine will stop.
- C. Reverse switch — reverse indicator light illuminates.
- D. Hi/Lo switch — headlight beam bright and dim.
- E. Brake switches — rear brakelight illuminates.

Reverse Shift Lever

CHECKING ADJUSTMENT



0736-566



0736-565

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

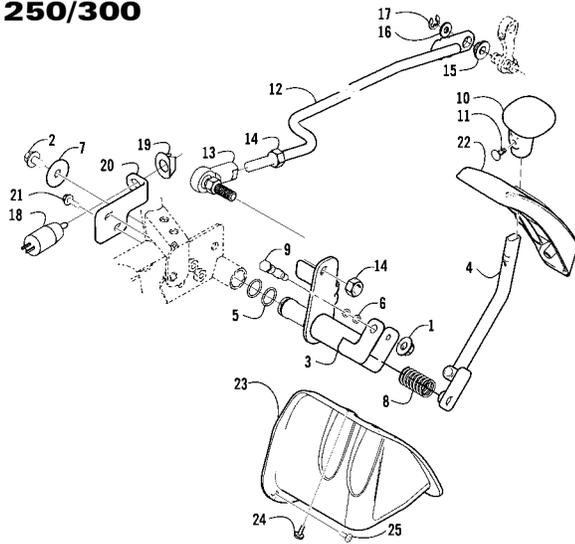
⚠ WARNING

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 lever 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

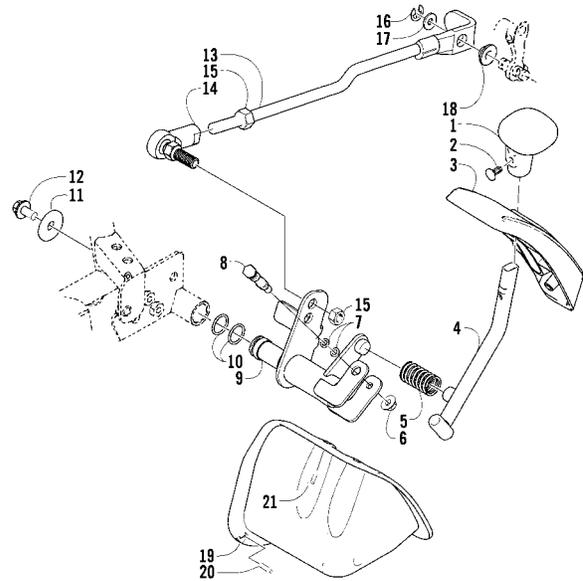
250/300



- | | |
|----------------|------------------------|
| KEY | 13. Rod End |
| 1. Nut | 14. Nut |
| 2. Cap Screw | 15. Bushing |
| 3. Axle | 16. Washer |
| 4. Shift Lever | 17. E-Ring |
| 5. O-Ring | 18. Reverse Switch |
| 6. O-Ring | 19. Retainer |
| 7. Washer | 20. Bracket |
| 8. Spring | 21. Cap Screw |
| 9. Axle | 22. Shift Plate |
| 10. Handle | 23. Shield |
| 11. Push Clip | 24. Machine Screw |
| 12. Linkage | 25. Self-Tapping Screw |

0736-908

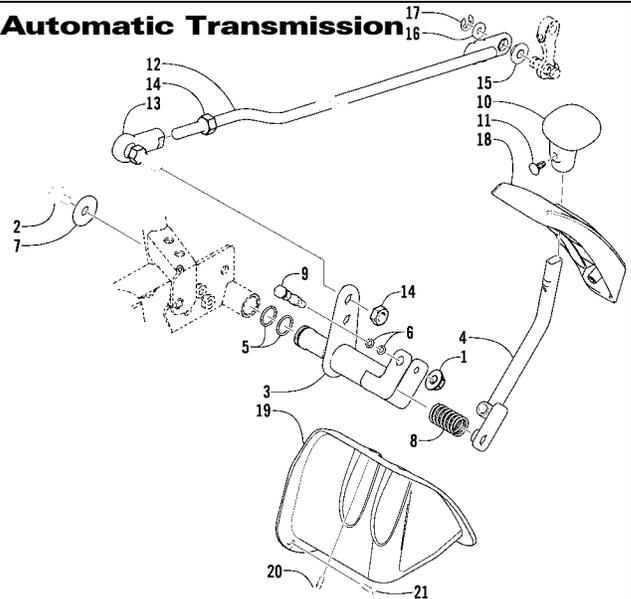
400/500 Manual Transmission



- | | |
|------------|---------------|
| KEY | 11. Washer |
| 1. Handle | 12. Cap Screw |
| 2. Clip | 13. Linkage |
| 3. Plate | 14. Rod End |
| 4. Lever | 15. Nut |
| 5. Spring | 16. E-Ring |
| 6. Nut | 17. Washer |
| 7. O-Ring | 18. Bushing |
| 8. Axle | 19. Shield |
| 9. Axle | 20. Screw |
| 10. O-Ring | 21. Screw |

0738-827

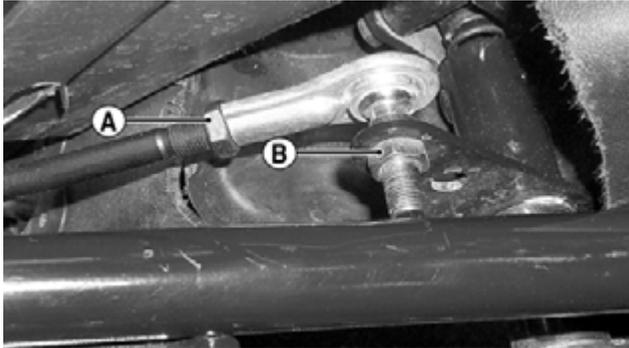
Automatic Transmission



- | | |
|--------------|------------------------|
| KEY | 11. Push Clip |
| 1. Nut | 12. Linkage |
| 2. Cap Screw | 13. Rod End |
| 3. Axle | 14. Nut |
| 4. Lever | 15. Bushing |
| 5. O-Ring | 16. Washer |
| 6. O-Ring | 17. E-Ring |
| 7. Washer | 18. Plate |
| 8. Spring | 19. Shield |
| 9. Axle | 20. Machine Screw |
| 10. Handle | 21. Self-Tapping Screw |

0737-070

1. Place the shift lever in the R position.
2. Remove the seat.
3. Remove the gas tank (see Section 4).
4. Loosen shift rod end jam nut (A).

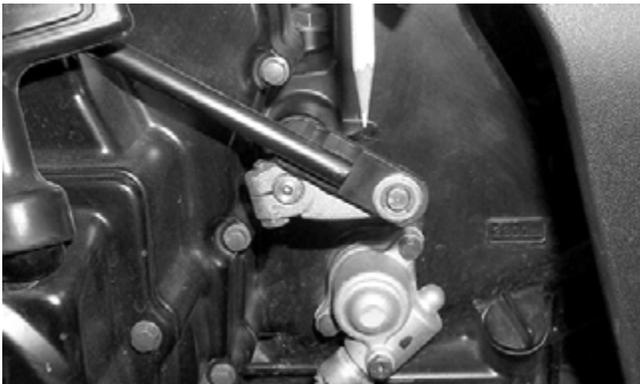


AF941A

5. Using two open-end wrenches, remove lock nut (B) securing the shift rod to the upper shift axle. 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.

6. Push the upper shift axle down completely.



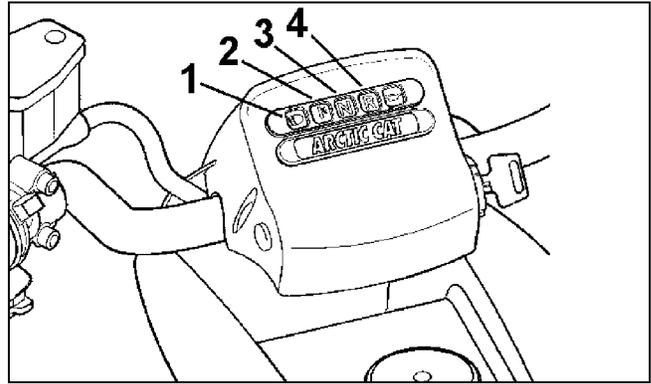
AF942

7. Rotate the shift rod end as necessary to align its threaded shaft with the hole in the upper shift axle. Secure with a new lock nut (B). Tighten securely.
8. Tighten jam nut (A) to secure the adjustment.
9. Install the gas tank (see Section 4); then install the seat.

Indicator Lights

Each time the ATV is used, the lights should be checked for proper function. Use the following for reference.

■**NOTE:** The number and functions of the indicator lights will vary from model to model.



733-707B

1. **High Beam Indicator** — A blue light will illuminate when the lights are on high beam. The light will not be illuminated when the lights are switched to low beam.
2. **Temperature Indicator** — A red light will illuminate if the engine overheats. The light should be off during normal operation.

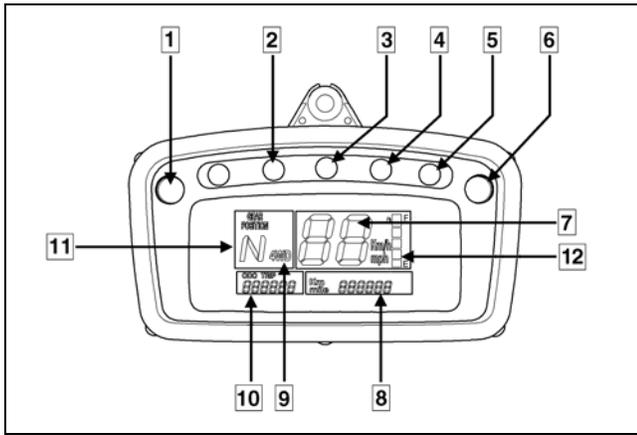
CAUTION

Continued operation of the ATV with high engine temperature may result in engine damage or premature wear.

■**NOTE:** High engine RPM, low vehicle speed, or heavy load can raise engine temperature. Decreasing engine RPM, reducing load, and selecting an appropriate transmission gear can lower the temperature.

■**NOTE:** Debris in front of the engine (or packed between the cooling fins of the radiator on the 500 or packed between the oil cooler cooling fins on the 250/300/400) can reduce cooling capability. Using a hose, pressure-wash the radiator (on the 500) or engine and oil cooler (on the 250/300/400) to remove any debris preventing air flow.

3. **Neutral Indicator** — A green light will illuminate when the transmission is in neutral and the ignition switch is on. The light will go out when shifted into any gear other than neutral.
4. **Reverse Indicator** — An orange light will illuminate when the transmission is shifted into reverse gear. The light will go off when shifted out of reverse.



738-504A

■NOTE: The indicator lights will illuminate for approximately two seconds when the ignition switch is rotated to the ON position.

1. **Odometer/Trip Meter Display Button** - Press the display button to display the Odometer (10), the A & B Trip Meters (10), and in conjunction with the Clock/Hour Display Button (6), the speedometer km/h and mph displays.
2. **Reverse Indicator** - A red light will illuminate when the transmission is shifted into reverse gear. The light will go off when shifted out of reverse.
3. **Neutral Indicator** - A green light will illuminate when the transmission is in neutral and the ignition switch is on. The light will go out when shifted into any gear other than neutral.
4. **High Beam Indicator** - A blue light will illuminate when the lights are on high beam. The light will not be illuminated when the lights are switched to low beam.
5. **Temperature Indicator** - A red light will illuminate if the engine overheats. The light should be off during normal operation.

CAUTION

Continued operation of the ATV with high engine temperature may result in engine damage or premature wear.

■NOTE: High Engine RPM, low vehicle speed, or heavy load can raise engine temperature. Decreasing engine RPM, reducing load, and selecting an appropriate transmission gear can lower the temperature.

■NOTE: Debris in front of the engine (or packed between the cooling fins of the radiator) can reduce cooling capability. Using a hose, pressure-wash the radiator and the engine to remove any debris preventing air flow.

6. **Clock/Hour Meter Display Button** - Press the display button to switch to either the clock or hour meter and in conjunction with the Odometer/Trip Meter Display Button (1), the speedometer km/h and mph displays.

■NOTE: The clock icon indicates a 12-hour mode; the hour meter icon indicates total time the ATV is used.

- A. Press and hold the display button until the minute display blinks; then adjust the minute display by pressing the button. Press the Odometer/Trip Meter Display Button (1) to set minute display.

■NOTE: If the display button is pressed in and held, the minute display will advance continuously.

- B. After the minute display is set, the hour display will blink. Press the Clock/Hour Meter Display Button (6) to set hour display.

7. **Speedometer** - Shows approximate ATV speed in km/h and mph.

■NOTE: To display km/h or mph, press Display Button (1) to odometer; then press and hold Display Button (1) while pressing Clock/Hour Meter Display Button (6) for two seconds. Speedometer will display between km/h and mph.

8. **Clock/Hour Meter** - Clock indicates 12-hour mode; the hour meter indicates total time the ATV is used.
9. **4WD Indicator** - Displays 4WD when the front drive selector switch is moved to the 4WD position. Display will go off when 2WD is selected.
10. **Odometer/Trip Meters (A & B)** - Odometer registers the total distance the ATV has traveled. Trip meters can register two different types of distances (for instance, A could register trip distance and B could register distance between stops). Trip meters can be reset.
11. **Gear Position Indicator** - Displays which position the shift lever is in: R (reverse gear) and the Reverse Indicator (2) will illuminate, N (neutral) and the Neutral Indicator (3) will illuminate, and on the automatic transmission model H (high gear), and L (low gear).

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

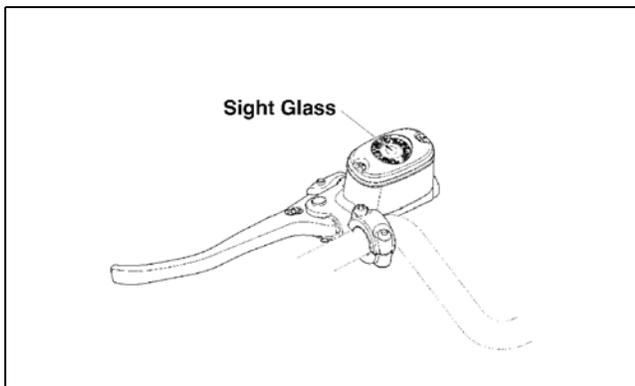
The electrical connections should be checked periodically for proper function. In case of an electrical failure, check fuses, connections (for tightness, corrosion, damage), and/or bulbs. If an electrical component needs to be tested for proper function, see Section 5.

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. If the level in the reservoir is not visible in the sight glass, add DOT 4 brake fluid.

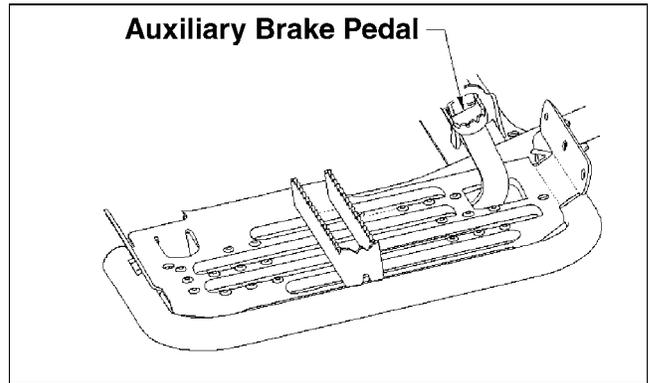


738-420A



CD091

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.

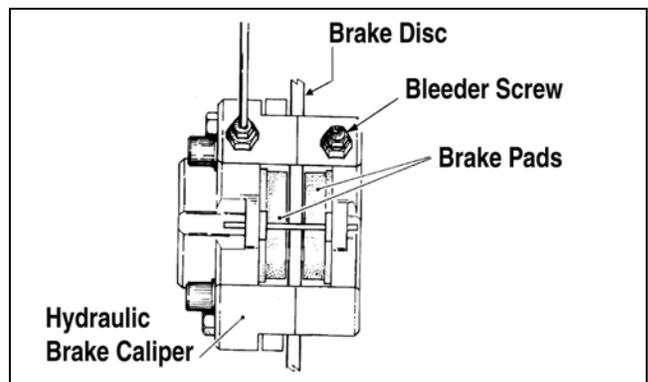


738-437C

3. To bleed the brake system, use the following procedure.
 - A. Remove the cover and fill the reservoir with DOT 4 Hi-Temp Brake Fluid (p/n 1639-799).
 - B. Install and secure the cover; then slowly compress the brake lever 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, open the bleeder screw and watch for air bubbles. Close the bleeder screw before releasing the brake lever. Repeat this procedure until no air bubbles are present.



AF637D



730-434B

■NOTE: During the bleeding procedure, watch the reservoir sight glass very closely to make sure there is always a sufficient amount of brake fluid. When the sight glass changes from dark to light, 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 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 high-temperature DOT 4 brake fluid only. If brake fluid must be added, care must be taken as brake fluid is very corrosive to painted surfaces.

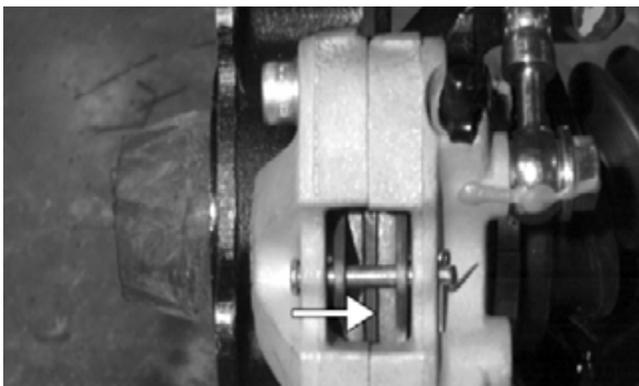
INSPECTING HOSES

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.



AF739DB

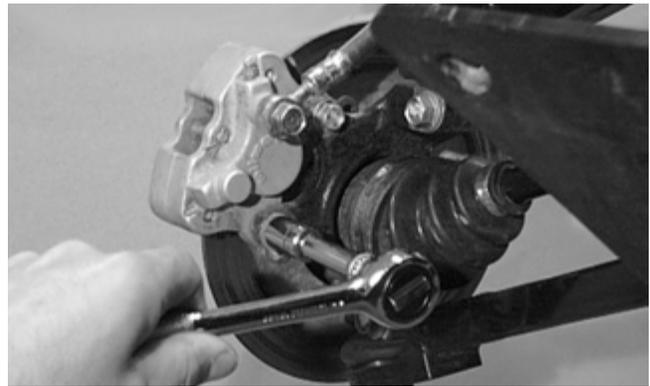
3. If thickness of either brake pad is less than 3.2 mm (0.125 in.), the brake pads must be replaced.

■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 to the bracket; then remove the cotter pin securing the pads and remove the pads.



AF615D

C. Install the new brake pads; then secure with the pin and cotter pin. Spread the cotter pin.

D. Secure the caliper to the knuckle and/or axle housing with the cap screws. Tighten to 2.8 kg-m (20 ft-lb).



AF615D

E. Install the wheel. Tighten to 5.5 kg-m (40 ft-lb).

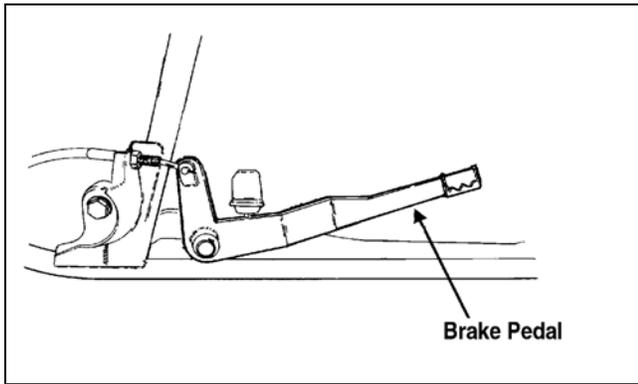
5. Burnish the brake pads (see Burnishing Brake Pads in this section).

Auxiliary Brake

CHECKING

Although the auxiliary brake has been adjusted at the factory, the brake should be checked for proper operation. The brake must be maintained to be fully functional.

1. With the engine off, transmission in neutral, and the reverse lever in the forward position, press the brake pedal and attempt to move the ATV.



ATV0088D

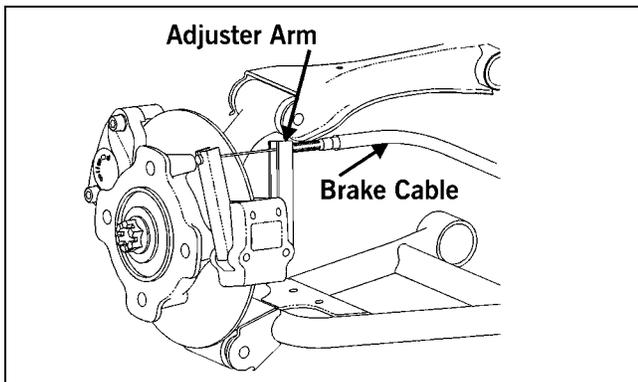
2. If the rear wheels are locked, it is adjusted properly.
3. If the rear wheels are not locked, it must be adjusted (set up).

ADJUSTING

To adjust (set up) the auxiliary brake, use the following procedure.

■NOTE: Removal of the right, rear wheel enhances access to the brake components.

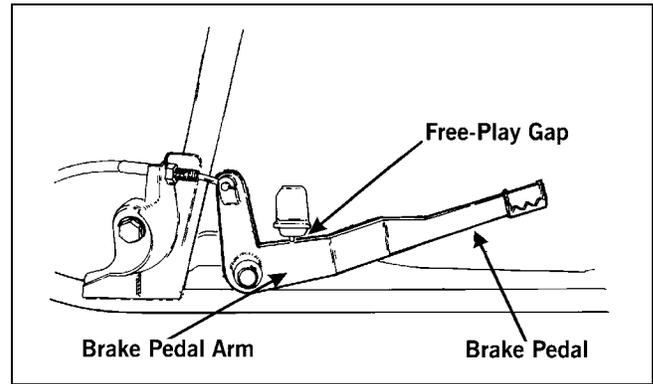
1. Loosen the right-hand jam nut (wheel-side when viewing from behind) of the adjuster arm.



733-730B

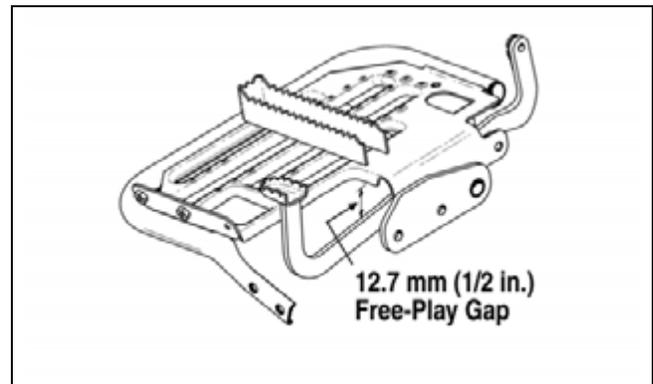
2. Pull the brake cable to the left and push the adjuster arm to the right.
3. While holding the cable and adjuster arm in this position, finger-tighten the left-hand jam nut until it contacts the adjuster arm; then loosen it one turn.
4. Tighten the right-hand jam nut securely against the adjuster arm.

■NOTE: On the 250/300, there should be 3.2 mm (1/8 in.) free-play gap between the brake pedal arm and the brake pedal bracket.



ATV0088E

■NOTE: On the 400/500, there should be 12.7 mm (1/2 in.) free-play gap between the pedal and the footrest.



736-569A

5. If the free-play gap is not within tolerance, readjust the jam nuts of the adjuster arm in 1/4 turn increments until the correct free-play gap is attained.

■NOTE: Apply the brake a number of times to ensure the wheels lock and the brakelight illuminates properly.

6. If the rear cable adjustment is inadequate to attain the proper brake pedal arm free-play gap, make adjustment at the front cable adjuster jam nuts.

⚠ CAUTION

If adjusting the rear cable at both ends does not attain proper brake pedal arm free-play, the brake pads must be replaced.

MEASURING/REPLACING BRAKE PADS

Removing

1. Support the ATV on a suitable stand.
2. Remove the right rear wheel and account for the cap screws.
3. Loosen the rear cable adjuster jam nuts; then remove the cap screws securing the auxiliary brake to the axle housing.
4. Remove the brake pads from the caliper.

Inspecting and Measuring

1. Inspect the pads for gouges, chips, or wear.
2. Inspect the disc for gouges, grooves, cracks, and warpage.
3. Using a calipers, measure the thickness of each brake pad.
4. If the thickness of either brake pad is less than 3.2 mm (0.125 in.), the brake pads must be replaced.

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

Installing

1. Place the brake pads into the caliper.

■**NOTE:** The metal backing of the pad will be facing the adjuster arms when installed properly.

2. Slide brake caliper assembly over the brake disc and into position on the knuckle; then secure the caliper with the cap screws tightened to 2.1 kg-m (15 ft-lb).
3. Install the wheel and secure. Tighten to 5.5 kg-m (40 ft-lb).
4. Adjust the brake (see Adjusting in this sub-section).
5. Remove the ATV from the support stand.

■**NOTE:** Whenever installing new pads, the new pads must be burnished (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 until brake pads are burnished.
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.

Coolant (500)

The cooling system capacity is approximately 2.9 L (3 U.S. qt). The cooling system should be inspected daily for leakage and damage. Also, the coolant level should be checked periodically.

When filling the cooling system, use premixed Arctic Cat Antifreeze (p/n 0638-395). 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.



AN604D

CAUTION

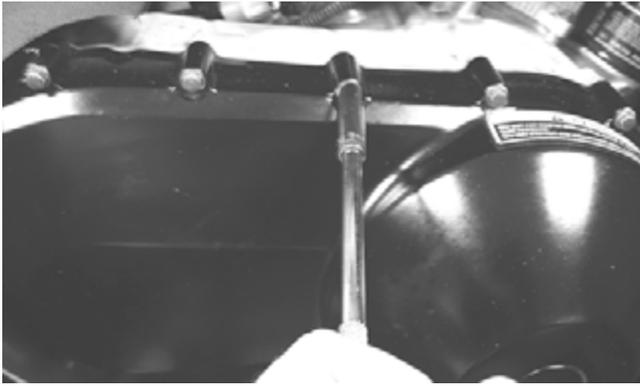
After operating the ATV for the initial 5-10 minutes, stop the engine, allow the engine to cool down, and check the coolant level. Add coolant as necessary.

Checking/Replacing V-Belt (Automatic Transmission)

REMOVING

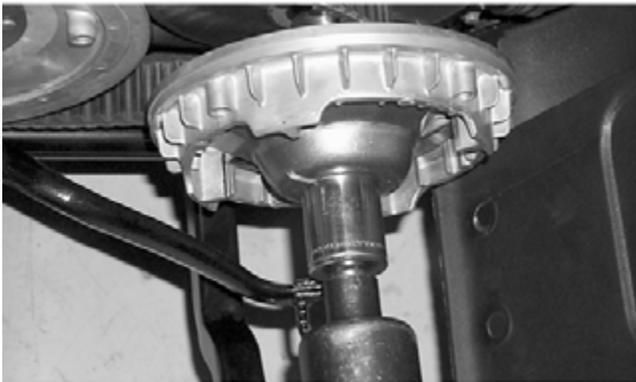
1. Remove the right-side footrest (see Section 8).
2. Remove the cap screws securing the V-belt cover noting the location of the different-lengthed cap screws for installing purposes; then using a rubber mallet, gently tap on the cover tabs to loosen the cover. Remove the cover.

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



CD078

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 counter-clockwise; then when the faces are separated, insert a wedge (approximately 3/8 in. thick) between the faces. Release the inner face.



CC549

2. Place the V-belt into position on the driven clutch and over the front shaft.



CC550

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

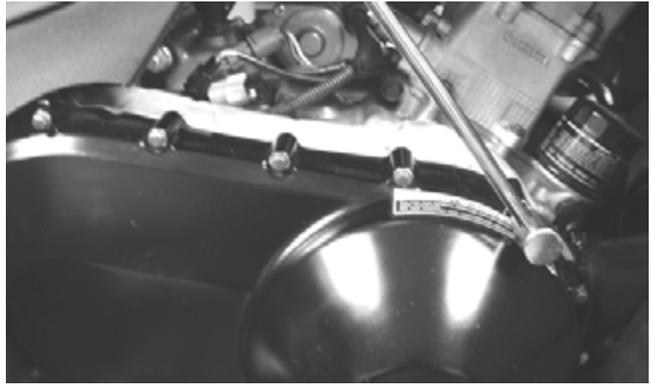
3. Pinch the V-belt together near its center and slide the spacer and movable drive face onto the driveshaft. Secure the drive face with a nut. Tighten the nut to 10.4-11.8 kg-m (75-85 ft-lb).



CC552

■NOTE: At this point, the wedge can be removed from between the driven clutch faces.

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 1.1 kg-m (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).

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.

Specifications* (250/300)

VALVES AND GUIDES		
Valve Face Diameter	(intake)	33 mm (1.3 in.)
	(exhaust)	28 mm (1.1 in.)
Valve/Tappet Clearance (cold engine)	(intake)	0.03-0.08 mm (0.001-0.003 in.)
	(exhaust)	0.08-0.13 mm (0.003-0.005 in.)**
	(exhaust)	0.17-0.22 mm (0.007-0.009 in.)
Valve Guide/Stem Clearance	(intake)	0.010-0.037 mm (0.0004-0.0015 in.)
	(exhaust)	0.030-0.057 mm (0.0012-0.0024 in.)
Valve Guide/Valve Stem Deflection (wobble method)	(max)	0.35 mm (0.014 in.)
Valve Guide Inside Diameter		5.500-5.512 mm (0.2165-0.2170 in.)
Valve Stem Outside Diameter	(intake)	5.475-5.490 mm (0.2156-0.2161 in.)
	(exhaust)	5.455-5.470 mm (0.2148-0.2154 in.)
Valve Stem Runout	(max)	0.05 mm (0.002 in.)
Valve Head Thickness	(min)	0.5 mm (0.02 in.)
Valve Stem End Length	(min)	2.5 mm (0.10 in.)
Valve Face/Seat Width		0.9-1.1 mm (0.035-0.043 in.)
Valve Seat Angle	(intake)	45°
	(exhaust)	45°
Valve Face Radial Runout	(max)	0.03 mm (0.001 in.)
Valve Spring Free Length (min)	(inner)	35.1 mm (1.38 in.)
	(outer)	41.0 mm (1.63 in.)**
		39.9 mm (1.57 in.)
Valve Spring Tension @ 32.5 mm (1.28 in.)	(inner)	7.1-9.2 kg (15.7-20.3 lb)
		7.4-9.3 kg (16.3-20.5 lb)**
Valve Spring Tension @ 36.0 mm (1.42 in.)	(outer)	17.3-21.3 kg (38.1-47.0 lb)
CAMSHAFT AND CYLINDER HEAD		
Cam Lobe Height (min)	(intake)	33.820 mm (1.331 in.)
		33.480 mm (1.318 in.)**
	(exhaust)	33.490 mm (1.319 in.)
		32.690 mm (1.2870 in.)**
Camshaft Journal Oil Clearance	(max)	0.15 mm (0.0059 in.)
Camshaft Journal Holder Inside Diameter		22.012-22.025 mm (0.8666-0.8671 in.)
Camshaft Journal Outside Diameter		21.959-21.980 mm (0.8645-0.8654 in.)
Camshaft Runout	(max)	0.10 mm (0.004 in.)
Rocker Arm Inside Diameter		12.000-12.018 mm (0.472-0.473 in.)

CAMSHAFT AND CYLINDER HEAD (cont)	
Rocker Arm Shaft Outside Diameter	11.977-11.995 mm (0.4715-0.4722 in.)
Cylinder Head Distortion (max)	0.05 mm (0.002 in.)
Cylinder Head Cover Distortion (max)	0.05 mm (0.002 in.)
CYLINDER, PISTON, AND RINGS	
Piston Skirt/Cylinder Clearance (max)	0.12 mm (0.0047 in.)
Cylinder Bore (max)	68.580 mm 66.09 mm** (2.700 in.) (2.602 in.)**
Piston Diameter 18 mm (0.71 in.) from Skirt End	68.380 mm 65.880 mm** (2.6921 in.) (2.5936 in.)**
Piston Ring Free End Gap (min)	(1st ring) 6.6 mm 6.0 mm** (0.26 in.) (0.24 in.)**
	(2nd ring) 6.8 mm 7.2 mm** (0.22 in.) (0.28 in.)**
Bore x Stroke	68.5 x 76 mm 66 x 72 mm** (2.69 x 2.99 in.) (2.60 x 2.84 in.)**
Cylinder Trueness (max)	0.05 mm (0.002 in.)
Piston Ring End Gap - Installed	0.28-0.56 mm 0.25-0.50 mm** (0.011-0.022 in.) (0.010-0.020 in.)**
Piston Ring to Groove Clearance (max)	(1st) 0.180 mm (0.0071 in.)
	(2nd) 0.150 mm (0.0059 in.)
Piston Ring Groove Width	(1st) 1.01-1.04 mm (0.040-0.041 in.)
	(2nd) 1.22-1.24 mm (0.048-0.049 in.)
	(oil) 2.01-2.03 mm (0.079-0.080 in.)
Piston Ring Thickness	(1st) 0.97-0.99 mm (0.038-0.039 in.)
	(2nd) 1.17-1.19 mm (0.046-0.047 in.)
Piston Pin Bore (max)	17.03 mm (0.6705 in.)
	16.05 mm (0.6318 in.)**
Piston Pin Outside Diameter (min)	16.98 mm (0.6685 in.)
	15.98 mm (0.6291 in.)**
CRANKSHAFT	
Connecting Rod (small end inside diameter) (max)	17.040 mm (0.6709 in.)
	16.040 mm (0.6315 in.)**
Connecting Rod (big end side-to-side)	0.10-0.45 mm (0.004-0.018 in.)
Connecting Rod (big end width)	17.95-18.00 mm (0.707-0.709 in.)
Connecting Rod (small end deflection) (max)	3 mm (0.12 in.)
Crankshaft (web-to-web)	54.9-55.1 mm 52.9-53.1 mm** (2.161- 2.169 in.) (2.08-2.09 in.)**
Crankshaft Runout (max)	0.08 mm (0.003 in.)
Oil Pump Reduction Ratio	1.566 (47/30)
Oil Pressure at 60°C (140°F) @ 3000 RPM	(above) 0.3 kg/cm ²
	(below) 2.7 kg/cm ² (10 psi)
CLUTCH	
Clutch Release Screw	1/8 turn back
Drive Plate (fiber) Thickness (min)	2.4 mm (0.094 in.)
Drive Plate (fiber) Tab (min)	11 mm (0.43 in.)
Driven Plate (warpage) (max)	0.1 mm (0.004 in.)
Clutch Spring Length (min)	27.5 mm (1.08 in.)
Clutch Wheel Inside Diameter (max)	Scuffing of contact surface
Starter Clutch Shoe	No groove at any part
Clutch Engagement RPM	2000 ± 200
Clutch Lock-Up RPM	3400 ± 300
Primary Reduction Ratio	3.250 (65/20)
Secondary Reduction Ratio	1.125 (18/16)
Final Reduction Ratio	(front) 3.090 (34/11)
	(rear) 3.647 (62/17)
Secondary-Transmission Reduction Ratio	(super low) 3.176 (17/18 x 25/11 x 37/25)
	(low) 1.480 (37/25)
	(high) 1.112 (11/25 x 18/17 x 43/18)
Gear Ratios	(1st) 3.083 (37/12)
	(2nd) 1.933 (29/15)
	(3rd) 1.388 (25/18)
	(4th) 1.095 (23/21)
	(5th) 0.913 (21/23)
	(reverse) 2.833 (29/12 x 34/29)

CLUTCH (cont)	
Engine Fork To Groove (side clearance)	0.10-0.50 mm (0.004-0.020 in.)
Secondary Transmission Fork to Groove (side clearance)	0.05-0.50 mm (0.002-0.020 in.)
Reverse Fork to Groove (side clearance)	0.10-0.50 mm (0.004-0.020 in.)
Shift Fork Groove (#1, #2, & #3) Width (secondary transmission - #1 & #2) (reverse)	4.5-4.6 mm (0.177-0.181 in.) 5.45-5.55 mm (0.215-0.219 in.) 4.0-4.1 mm (0.157-0.161 in.)
Shift Fork (#1, #2, & #3) Thickness (secondary transmission - #1 & #2) (reverse)	4.3-4.4 mm (0.169-0.173 in.) 5.3-5.4 mm (0.209-0.213 in.) 3.8-3.9 mm (0.150-0.154 in.)
Engine Oil (off→on)	160°C (320°F)
Thermo-Switch (on→off)	140°C (284°F)
Operating Temperature	

* Specifications subject to change without notice.

**250

Specifications* (400 - Automatic Transmission)

VALVES AND GUIDES	
Valve Face Diameter (intake)	30.6 mm (1.20 in.)
(exhaust)	27.0 mm (1.06 in.)
Valve/Tappet Clearance (intake) (cold engine)	0.05-0.10 mm (0.002-0.004 in.)
(exhaust)	0.22-0.27 mm (0.009-0.011 in.)
Valve Guide/Stem Clearance (intake)	0.010-0.037 mm (0.0004-0.0015 in.)
(exhaust)	0.030-0.057 mm (0.0012-0.0022 in.)
Valve Guide/Valve Stem Deflection (wobble method) (max)	0.35 mm (0.014 in.)
Valve Guide Inside Diameter	5.000-5.012 mm (0.1969-0.1973 in.)
Valve Stem Outside Diameter (intake)	4.975-4.990 mm (0.1959-0.1965 in.)
(exhaust)	4.955-4.970 mm (0.1951-0.1957 in.)
Valve Stem Runout (max)	0.05 mm (0.002 in.)
Valve Head Thickness (min)	0.5 mm (0.02 in.)
Valve Stem End Length (min)	2.3 mm (0.09 in.)
Valve Face/Seat Width	0.9-1.1 mm (0.035-0.043 in.)
Valve Seat Angle (intake)	45°
(exhaust)	45°
Valve Face Radial Runout(max)	0.03 mm (0.001 in.)
Valve Spring Free Length (min)	38.8 mm (1.53 in.)
Valve Spring Tension (outer) @ 31.5 mm (1.24 in.)	18.6-21.4 kg (41-47 lb)
CAMSHAFT AND CYLINDER HEAD	
Cam Lobe Height (min) (intake)	32.830 mm (1.293 in.)
(exhaust)	32.830 mm (1.293 in.)
Camshaft Journal Oil Clearance (max)	0.15 mm (0.0059 in.)
Camshaft Journal (right & center) Holder Inside Diameter (left)	22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal (right & center) Outside Diameter (left)	21.959-21.980 mm (0.8645-0.8654 in.) 17.466-17.484 mm (0.6876-0.6883 in.)
Camshaft Runout (max)	0.10 mm (0.004 in.)
Rocker Arm Inside Diameter	12.000-12.018 mm (0.472-0.473 in.)
Rocker Arm Shaft Outside Diameter	11.973-11.984 mm (0.4714-0.4718 in.)
Cylinder Head Distortion (max)	0.05 mm (0.002 in.)
Cylinder Head Cover (max) Distortion	0.05 mm (0.002 in.)
CYLINDER, PISTON, AND RINGS	
Piston Skirt/Cylinder Clearance	0.060-0.073 mm (0.0024-0.0029 in.)
Cylinder Bore	82.000-82.015 mm (3.2283-3.2289 in.)
Piston Diameter 15 mm (0.6 in.) from Skirt End	81.930-81.945 mm (3.2256-3.2262 in.)
Piston Ring Free End Gap (max) (1st ring)	8.9 mm (0.3504 in.)
(2nd ring)	8.3 mm (0.3268 in.)
Bore x Stroke	82 x 71.2 mm (3.29 x 2.80 in.)
Cylinder Trueness (max)	0.05 mm (0.002 in.)
Piston Ring End Gap-Installed	0.33-0.61 mm (0.013-0.024 in.)
Piston Ring to Groove Clearance (max) (1st)	0.180 mm (0.0071 in.)
(2nd)	0.150 mm (0.0059 in.)
Piston Ring Groove Width (1st)	1.01-1.03 mm (0.0398-0.0406 in.)
(2nd)	1.01-1.03 mm (0.0398-0.0406 in.)
(oil)	2.01-2.03 mm (0.0791-0.0799 in.)
Piston Ring Thickness (1st)	0.97-0.99 mm (0.0381-0.0389 in.)
(2nd)	0.97-0.99 mm (0.0381-0.0389 in.)
Piston Pin Bore (max)	20.03 mm (0.789 in.)
Piston Pin Outside Diameter (min)	19.98 mm (0.787 in.)

CRANKSHAFT	
Connecting Rod (max) (small end inside diameter)	20.04 mm (0.7889 in.)
Connecting Rod (big end side-to-side)	0.10-0.55 mm (0.004-0.022 in.)
Connecting Rod (big end width)	21.95-22.00 mm (0.8642-0.8661 in.)
Connecting Rod (max) (small end deflection)	3 mm (0.12 in.)
Crankshaft (web-to-web)	59.9-60.1 mm (2.358-2.366 in.)
Crankshaft Runout (max)	0.08 mm (0.003 in.)
Oil Pressure at 60°C (above) (140°F) @3000 RPM (below)	1.1 kg/cm ² (16 psi) 1.5 kg/cm ² (21 psi)
Cooling Fan Thermo-Switch Operating Temperature (off→on) (on→off)	120°C (248°F) 110°C (230°F)
Engine Oil (off→on) Thermo-Switch (on→off) Operating Temperature	160°C (320°F) 140°C (284°F)

* Specifications subject to change without notice.

Specifications* (400 - Manual Transmission)

VALVES AND GUIDES	
Valve Face Diameter (intake) (exhaust)	30.6 mm (1.20 in.) 27.0 mm (1.06 in.)
Valve/Tappet Clearance (intake) (cold engine) (exhaust)	0.05-0.10 mm (0.002-0.004 in.) 0.22-0.27 mm (0.009-0.011 in.)
Valve Guide/Stem Clearance (intake) (exhaust)	0.010-0.037 mm (0.0004-0.0015 in.) 0.030-0.057 mm (0.0012-0.0022 in.)
Valve Guide/Valve Stem Deflection (wobble method) (max)	0.35 mm (0.014 in.)
Valve Guide Inside Diameter	5.000-5.012 mm (0.1969-0.1973 in.)
Valve Stem Outside Diameter (intake) (exhaust)	4.975-4.990 mm (0.1959-0.1965 in.) 4.955-4.970 mm (0.1951-0.1957 in.)
Valve Stem Runout (max)	0.05 mm (0.002 in.)
Valve Head Thickness (min)	0.5 mm (0.02 in.)
Valve Stem End Length (min)	2.3 mm (0.09 in.)
Valve Face/Seat Width	0.9-1.1 mm (0.035-0.043 in.)
Valve Seat Angle (intake) (exhaust)	45° 45°
Valve Face Radial Runout (max)	0.03 mm (0.001 in.)
Valve Spring Free Length (min)	38.8 mm (1.53 in.)
Valve Spring Tension (outer) @ 31.5 mm (1.24 in.)	18.6-21.4 kg (41-47 lb)

CAMSHAFT AND CYLINDER HEAD	
Cam Lobe Height (min) (intake) (exhaust)	32.830 mm (1.293 in.) 32.830 mm (1.293 in.)
Camshaft Journal Oil Clearance (max)	0.15 mm (0.0059 in.)
Camshaft Journal (right & center) Holder Inside Diameter (left)	22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal (right & center) Outside Diameter (left)	21.959-21.980 mm (0.8645-0.8654 in.) 17.466-17.484 mm (0.6876-0.6883 in.)
Camshaft Runout (max)	0.10 mm (0.004 in.)
Rocker Arm Inside Diameter	12.000-12.018 mm (0.472-0.473 in.)
Rocker Arm Shaft Outside Diameter	11.973-11.984 mm (0.4714-0.4718 in.)
Cylinder Head Distortion (max)	0.05 mm (0.002 in.)
Cylinder Head Cover (max) Distortion	0.05 mm (0.002 in.)

CYLINDER, PISTON, AND RINGS	
Piston Skirt/Cylinder Clearance	0.060-0.073 mm (0.0024-0.0029 in.)
Cylinder Bore	82.000-82.015 mm (3.2283-3.2289 in.)
Piston Diameter 15 mm (0.6 in.) from Skirt End	81.930-81.945 mm (3.2256-3.2262 in.)
Piston Ring (1st ring) Free End Gap (max) (2nd ring)	8.9 mm (0.3504 in.) 8.3 mm (0.3268 in.)
Bore x Stroke	82 x 71.2 mm (3.29 x 2.80 in.)
Cylinder Trueness (max)	0.05 mm (0.002 in.)
Piston Ring End Gap-Installed	0.33-0.61 mm (0.013-0.024 in.)
Piston Ring to Groove Clearance (max) (1st) (2nd)	0.180 mm (0.0071 in.) 0.150 mm (0.0059 in.)
Piston Ring Groove Width (1st) (2nd) (oil)	1.01-1.03 mm (0.0398-0.0406 in.) 1.01-1.03 mm (0.0398-0.0406 in.) 2.01-2.03 mm (0.0791-0.0799 in.)
Piston Ring Thickness (1st) (2nd)	0.97-0.99 mm (0.0381-0.0389 in.) 0.97-0.99 mm (0.0381-0.0389 in.)
Piston Pin Bore (max)	20.03 mm (0.789 in.)
Piston Pin Outside Diameter (min)	19.98 mm (0.787 in.)

CRANKSHAFT	
Connecting Rod (max) (small end inside diameter)	20.04 mm (0.7889 in.)
Connecting Rod (big end side-to-side)	0.10-0.55 mm (0.004-0.022 in.)
Connecting Rod (big end width)	21.95-22.00 mm (0.8642-0.8661 in.)
Connecting Rod (max) (small end deflection)	3 mm (0.12 in.)
Crankshaft (web-to-web)	59.9-60.1 mm (2.358-2.366 in.)
Crankshaft Runout (max)	0.08 mm (0.003 in.)
Oil Pressure at 60°C (above) (140°F) @3000 RPM (below)	0.6 kg/cm ² (9 psi) 1.0 kg/cm ² (14 psi)
Cooling Fan Thermo-Switch Operating Temperature (off→on) (on→off)	120°C (248°F) 110°C (230°F)
Engine Oil (off→on) Thermo-Switch (on→off) Operating Temperature	160°C (320°F) 140°C (284°F)

CLUTCH	
Clutch Release Screw	1/16 - 1/8 turn back
Drive Plate (fiber) Thickness (min)	2.62 mm (0.103 in.)
Drive Plate (fiber) Tab	13.25-13.95 mm (0.52-0.55 in.)
Driven Plate (warp) (max)	0.1 mm (0.004 in.)
Clutch Spring Length (min)	33.7 mm (1.33 in.)
Clutch Wheel Inside Diameter	140.0-140.2 mm (5.511-5.520 in.)
Starter Clutch Shoe	No groove at any part
Clutch Engagement RPM	1700 ± 200
Clutch Lock-Up RPM	3400 - 4000
Primary Reduction Ratio	2.392 (67/28)
Secondary Reduction Ratio	1.133 (17/15)
Final Reduction Ratio (front) (rear)	3.6 (36/10) 3.6 (36/10)
Secondary-Transmission Reduction Ratio (low) (high)	2.435 (35/13 x 19/21) 1.296 (35/27)
Gear Ratios (1st) (2nd) (3rd) (4th) (5th) (reverse)	3.083 (37/12) 1.933 (29/15) 1.388 (25/18) 1.095 (23/21) 0.913 (21/23) 2.833 (34/12)
Engine Fork To Groove (side clearance)	0.1-0.3 mm (0.004-0.012 in.)
Secondary Transmission Fork to Groove (side clearance)	0.1-0.3 mm (0.004-0.012 in.)
Reverse Fork to Groove (side clearance)	0.1-0.3 mm (0.004-0.012 in.)
Shift Fork Groove Width (secondary transmission) (#1 and #2) (reverse)	4.5-4.6 mm (0.177-0.181 in.) 5.4-5.5 mm (0.213-0.217 in.) 4.0-4.1 mm (0.157-0.161 in.)
Shift Fork Thickness (#1 and #2) (secondary transmission) (reverse)	4.3-4.4 mm (0.169-0.173 in.) 5.3-5.4 mm (0.209-0.213 in.) 3.8-3.9 mm (0.150-0.192 in.)

* Specifications subject to change without notice.

Specifications* (500 - Automatic Transmission)

VALVES AND GUIDES		
Valve Face Diameter	(intake) (exhaust)	30.6 mm (1.20 in.) 27.0 mm (1.06 in.)
Valve/Tappet Clearance (cold engine)	(intake) (exhaust)	0.05-0.10 mm (0.002-0.004 in.) 0.17-0.22 mm (0.007-0.009 in.)
Valve Guide/Stem Clearance	(intake) (exhaust)	0.010-0.037 mm (0.0004-0.0015 in.) 0.030-0.057 mm (0.0012-0.0022 in.)
Valve Guide/Valve Stem Deflection (wobble method)	(max)	0.35 mm (0.014 in.)
Valve Guide Inside Diameter		5.000-5.012 mm (0.1969-0.1973 in.)
Valve Stem Outside Diameter	(intake) (exhaust)	4.975-4.990 mm (0.1959-0.1965 in.) 4.955-4.970 mm (0.1951-0.1957 in.)
Valve Stem Runout	(max)	0.05 mm (0.002 in.)
Valve Head Thickness	(min)	0.5 mm (0.02 in.)
Valve Stem End Length	(min)	2.3 mm (0.091 in.)
Valve Face/Seat Width		0.9-1.1 mm (0.035-0.043 in.)
Valve Seat Angle	(intake) (exhaust)	45° 45°
Valve Face Radial Runout(max)		0.03 mm (0.001 in.)
Valve Spring Free Length (min)		38.8 mm (1.53 in.)
Valve Spring Tension	(outer) @ 31.5 mm (1.24 in.)	18.6-21.4 kg (41-47 lb)
CAMSHAFT AND CYLINDER HEAD		
Cam Lobe Height (min)	(intake) (exhaust)	33.13 mm (1.304 in.) 33.20 mm (1.307 in.)
Camshaft Journal Oil Clearance	(max)	0.15 mm (0.0059 in.)
Camshaft Journal (right & center) Holder Inside Diameter	(right) (left)	22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal (right & center) Outside Diameter	(right) (left)	21.959-21.980 mm (0.8645-0.8654 in.) 17.466-17.484 mm (0.6876-0.6883 in.)
Camshaft Runout	(max)	0.10 mm (0.004 in.)
Rocker Arm Inside Diameter		12.000-12.018 mm (0.472-0.473 in.)
Rocker Arm Shaft Outside Diameter		11.973-11.984 mm (0.4714- 0.4718 in.)
Cylinder Head Distortion (max)		0.05 mm (0.002 in.)
Cylinder Head Cover Distortion	(max)	0.05 mm (0.002 in.)

CYLINDER, PISTON, AND RINGS		
Piston Skirt/Cylinder Clearance		0.030-0.040 mm (0.0011-0.0015 in.)
Cylinder Bore		87.500-87.515 mm (3.4448-3.4454 in.)
Piston Diameter 15 mm (0.6 in.) from Skirt End		87.465-87.480 mm (3.4435-3.4440 in.)
Piston Ring Free End Gap	(1st ring) (2nd ring)	9.0 mm (min) (0.35 in.) 9.5 mm (min) (0.37 in.)
Bore x Stroke		87.5 x 82 mm (3.40 x 3.22 in.)
Cylinder Trueness	(max)	0.05 mm (0.002 in.)
Piston Ring End Gap - Installed		0.35-0.63 mm (0.014-0.025 in.)
Piston Ring to Groove Clearance (max)	(1st) (2nd)	0.180 mm (0.0071 in.) 0.150 mm (0.0059 in.)
Piston Ring Groove Width	(1st) (2nd) (oil)	1.01-1.03 mm (0.0397-0.0405 in.) 1.21-1.23 mm (0.0476-0.0484 in.) 2.51-2.53 mm (0.0988-0.0996 in.)
Piston Ring Thickness	(1st) (2nd)	0.97-0.99 mm (0.0382-0.0389 in.) 1.17-1.19 mm (0.046-0.047 in.)
Piston Pin Bore	(max)	23.03 mm (0.907 in.)
Piston Pin Outside Diameter	(min)	22.98 mm (0.905 in.)
CRANKSHAFT		
Connecting Rod (small end inside diameter) (max)		23.04 mm (0.9070 in.)
Connecting Rod (big end side-to-side)		0.10-0.65 mm (0.0039-0.0256 in.)
Connecting Rod (big end width)		24.95-25.00 mm (0.9822-0.9842 in.)
Connecting Rod (small end deflection)	(max)	3 mm (0.12 in.)
Crankshaft (web-to-web)		70.9-71.1 mm (2.796-2.804 in.)
Crankshaft Runout	(max)	0.08 mm (0.003 in.)
Oil Pressure at 60°C (140°F) @3000 RPM	(above) (below)	1.3 kg/cm ² (18 psi) 1.7 kg/cm ² (24 psi)
Cooling Fan (off→on) Thermo-Switch (on→off) Operating Temperature		88°C (190°F) 82°C (180°F) (min)
Engine Coolant (off→on) Thermo-Switch (on→off) Operating Temperature (Approx)		115°C (239°F) 108°C (226°F)

* Specifications subject to change without notice.

Specifications* (500 - Manual Transmission)

VALVES AND GUIDES

Valve Face Diameter (intake)	30.6 mm (1.20 in.)
(exhaust)	27.0 mm (1.06 in.)
Valve/Tappet Clearance (cold engine)	0.05-0.10 mm (0.002-0.004 in.)
(intake)	0.17-0.22 mm (0.007-0.009 in.)
(exhaust)	
Valve Guide/Stem Clearance (intake)	0.010-0.037 mm (0.0004-0.0015 in.)
(exhaust)	0.030-0.057 mm (0.0012-0.0022 in.)
Valve Guide/Valve Stem Deflection (wobble method)	(max) 0.35 mm (0.014 in.)
Valve Guide Inside Diameter	5.000-5.012 mm (0.1969-0.1973 in.)
Valve Stem Outside Diameter (intake)	4.975-4.990 mm (0.1959-0.1965 in.)
(exhaust)	4.955-4.970 mm (0.1951-0.1957 in.)
Valve Stem Runout	(max) 0.05 mm (0.002 in.)
Valve Head Thickness	(min) 0.5 mm (0.02 in.)
Valve Stem End Length	(min) 1.7 mm (0.067 in.)
Valve Face/Seat Width	0.9-1.1 mm (0.035-0.043 in.)
Valve Seat Angle (intake)	45°
(exhaust)	45°
Valve Face Radial Runout(max)	0.03 mm (0.001 in.)
Valve Spring Free Length (min)	38.8 mm (1.53 in.)
Valve Spring Tension @ 31.5 mm (1.24 in.)	18.2-21.0 kg (40.1-46.3 lb)

CAMSHAFT AND CYLINDER HEAD

Cam Lobe Height (min) (intake)	33.13 mm (1.304 in.)
(exhaust)	33.20 mm (1.307 in.)
Camshaft Journal Oil Clearance	(max) 0.15 mm (0.0059 in.)
Camshaft Journal (right & center)	22.012-22.025 mm (0.8666-0.8671 in.)
Holder Inside Diameter (left)	17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal (right & center)	21.959-21.980 mm (0.8645-0.8654 in.)
Outside Diameter (left)	17.466-17.484 mm (0.6876-0.6883 in.)
Camshaft Runout	(max) 0.10 mm (0.004 in.)
Rocker Arm Inside Diameter	12.000-12.018 mm (0.472-0.473 in.)
Rocker Arm Shaft Outside Diameter	11.973-11.984 mm (0.4714-0.4718 in.)
Cylinder Head Distortion (max)	0.05 mm (0.002 in.)
Cylinder Head Cover Distortion	(max) 0.05 mm (0.002 in.)

CYLINDER, PISTON, AND RINGS

Piston Skirt/Cylinder Clearance	0.030-0.040 mm (0.0011-0.0015 in.)
Cylinder Bore	87.500-87.515 mm (3.4448-3.4454 in.)
Piston Diameter 15 mm (0.6 in.) from Skirt End	87.465-87.480 mm (3.4435-3.4440 in.)
Piston Ring Free End Gap (1st ring)	9.0 mm (min) (0.35 in.)
(2nd ring)	9.5 mm (min) (0.37 in.)
Bore x Stroke	87.5 x 82 mm (3.40 x 3.22 in.)
Cylinder Trueness	(max) 0.05 mm (0.002 in.)
Piston Ring End Gap - Installed	0.35-0.63 mm (0.014-0.025 in.)
Piston Ring to Groove Clearance (max) (1st)	0.180 mm (0.0071 in.)
(2nd)	0.150 mm (0.0059 in.)
Piston Ring Groove Width (1st)	1.01-1.03 mm (0.0397-0.0405 in.)
(2nd)	1.21-1.23 mm (0.0476-0.0484 in.)
(oil)	2.51-2.53 mm (0.0988-0.0996 in.)
Piston Ring Thickness (1st)	0.97-0.99 mm (0.0382-0.0389 in.)
(2nd)	1.17-1.19 mm (0.046-0.047 in.)
Piston Pin Bore	(max) 23.03 mm (0.907 in.)
Piston Pin Outside Diameter	(min) 22.98 mm (0.905 in.)

CRANKSHAFT

Connecting Rod (small end inside diameter) (max)	23.04 mm (0.9070 in.)
Connecting Rod (big end side-to-side)	0.10-0.65 mm (0.0039-0.0256 in.)
Connecting Rod (big end width)	24.95-25.00 mm (0.9822-0.9842 in.)
Connecting Rod (small end deflection) (max)	3 mm (0.12 in.)
Crankshaft (web-to-web)	70.9-71.1 mm (2.796-2.804 in.)
Crankshaft Runout (max)	0.08 mm (0.003 in.)
Oil Pressure at 60°C (140°F) @3000 RPM (above)	1.2 kg/cm ² (17 psi)
(below)	1.6 kg/cm ² (23 psi)

CLUTCH

Clutch Release Screw	1/4-1/2 turn back
Drive Plate (fiber) Thickness (min)	2.82 mm (0.1110 in.)
Drive Plate (fiber) Tab (min)	2.9 mm (0.507 in.)
Driven Plate (warpage) (max)	0.1 mm (0.004 in.)
Clutch Spring Length (min)	35.6 mm (1.40 in.)
Clutch Wheel Inside Diameter	140.0-140.2 mm (5.511-5.520 in.)
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)	3.6 (36/10)
(rear)	3.6 (36/10)
Secondary-Transmission Reduction Ratio (low)	2.419 (22/23 x 27/17 x 43/27)
(high)	1.592 (43/27)
Gear Ratios (1st)	3.09 (34/11)
(2nd)	1.75 (28/16)
(3rd)	1.2 (24/20)
(4th)	0.875 (21/24)
(5th)	0.724 (21/29)
(reverse)	2.636 (24/11 x 29/24)
Engine Fork To Groove (side clearance)	0.1-0.3 mm (0.004-0.012 in.)
Secondary Transmission Fork to Groove (side clearance)	0.1-0.3 mm (0.004-0.012 in.)
Reverse Fork to Groove (side clearance)	0.1-0.3 mm (0.004-0.012 in.)
Shift Fork Groove Width (#1 and #2)	5.5-5.6 mm (0.217-0.220 in.)
(secondary transmission)	5.5-5.6 mm (0.217-0.220 in.)
(reverse)	5.0-5.1 mm (0.197-0.201 in.)
Shift Fork Thickness (#1 and #2)	5.3-5.4 mm (0.209-0.213 in.)
(secondary transmission)	5.3-5.4 mm (0.209-0.213 in.)
(reverse)	4.8-4.9 mm (0.189-0.193 in.)
Thermostat Valve Opening Temperature	73.5-76.5°C (164-170°F)
Thermostat Valve Lift	Over 3 mm (0.12 in.) @ 90°C (194°F)
Cooling Fan Thermo-Switch Operating Temperature (off→on)	88°C (190°F)
(on→off)	82°C (180°F) (min)
Engine Coolant Thermo-Switch Operating Temperature (Approx) (off→on)	115°C (239°F)
(on→off)	108°C (226°F)

* Specifications subject to change without notice.

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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/replace left-side cover oil seals (3), front output joint oil seal (1), rear output joint oil seal (1), 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. Disconnect the battery by removing the negative cable first and then the positive cable.
3. Remove the battery hold-down bracket; then remove the battery.

CAUTION

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

4. Drain the oil from the engine/transmission.

NOTE: To drain the oil completely, both the engine and transmission plugs must be removed.

5. Turn the gas tank valve to the OFF position.
6. Remove the springs securing the exhaust header pipe to the engine.
7. Loosen the exhaust pipe from the muffler and the frame; then remove the exhaust pipe. Account for grafoil gaskets.
8. Mark the position of the hi/low range shifter arm; then remove the hi/low range shifter arm.



CH057D

9. Mark the gear shifter arm; then remove the cap screw securing the gear shifter arm.



CH059D

10. Mark the reverse gear shaft arm to the reverse shift shaft to aid in installing; then remove the cap screw securing the reverse gear shaft arm to the reverse shift shaft.



AF942

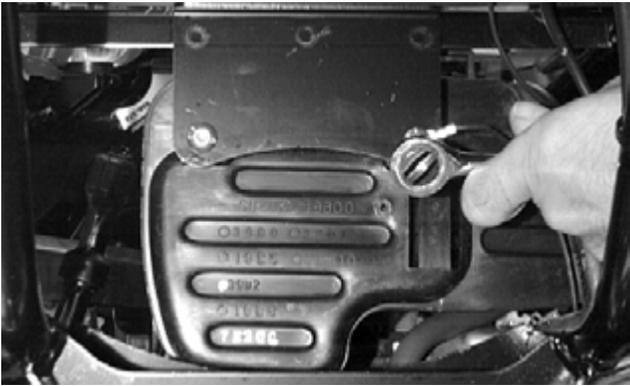
11. Remove the cap screws securing the air-intake snorkel to the frame; then loosen the hose clamp at the air-cleaner assembly.

12. Loosen the clamps securing the carburetor boots to the air intake and the engine.



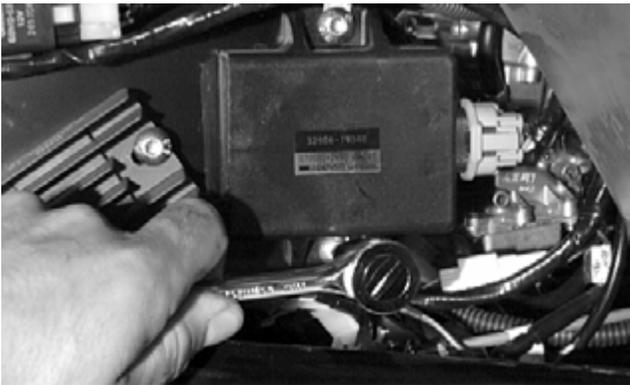
CH041D

13. Remove the cap screws securing the air-cleaner assembly to the rear of the ATV.



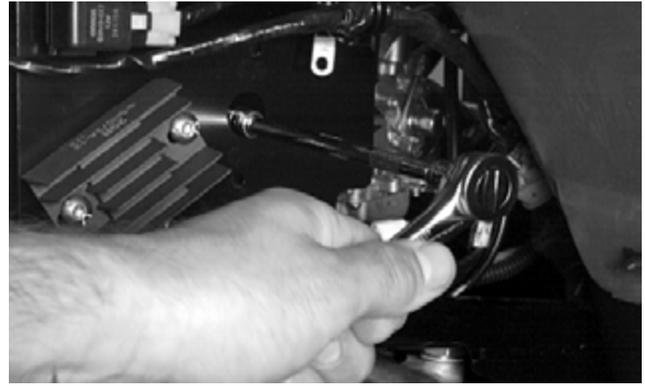
CH047D

14. Remove the cap screws securing the CDI unit.



AF882D

15. Remove the remaining cap screw securing the air-cleaner assembly to the frame; then remove the crankcase breather hoses from the air-cleaner assembly and remove the assembly.



CH048D

16. Route the carburetor assembly up and away from the engine.

■NOTE: It will not be necessary to disconnect the choke cable. Also, use cable ties or tape to secure the carburetor assembly to keep it from interfering with the removal procedure.

17. Disconnect the positive cable from the starter motor.

18. Disconnect the battery ground (negative) cable from the crankcase cover.



CH064D

19. Disconnect the high tension lead from the spark plug.

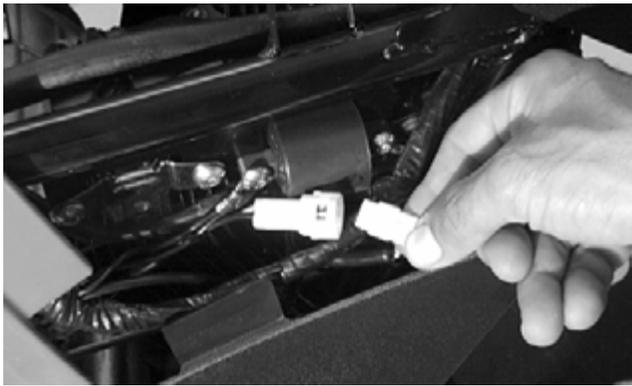
20. Disconnect the main wiring harness connectors.



CH065D

21. Remove the right-hand side panel.

22. Disconnect the oil light switch.



CH067D

23. Remove the rear hydraulic brake caliper.
24. Remove the auxiliary brake.
25. Remove the torx-head screw securing the brake hose to the upper suspension arm.
26. Remove the two oil cooler hoses from the engine.
27. Remove the skid plate from the rear end assembly.
28. Remove the two lower cap screws securing the sub-frame/engine assembly to the frame.

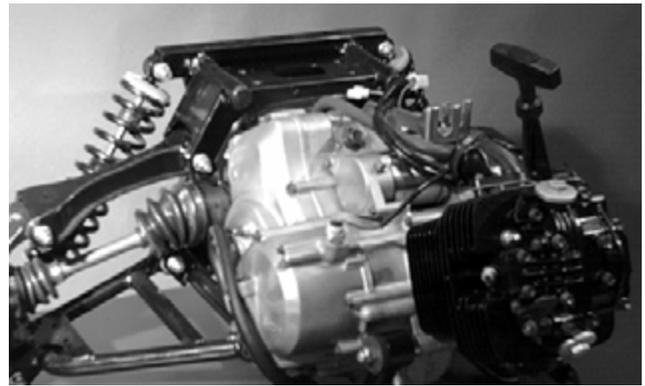


CH071D

29. Secure the upper rear of the ATV to the support stand using tie-down straps to help prevent the ATV from falling forward when the engine/sub-frame assembly is removed.

⚠ WARNING
 Support the ATV so it doesn't fall off the support stand when the engine/sub-frame assembly is removed from the frame or severe damage, injury, or death may result.

30. Place a large floor/transmission jack under the engine assembly; then remove the upper four cap screws securing the sub-frame to the frame. Place the engine assembly on a suitable work stand and remove the rear wheels.



CH073D

31. Remove the cap screw securing the front engine mount to the sub-frame. Account for spacers.
32. Remove the upper shock mount cap screw to allow access for removal of the two rear engine mount cap screws.
33. Remove the two rear cap screws and flat washers securing the engine to the sub-frame.
34. Remove the rear upper A-arm cap screws.
35. Using Side Case Puller (p/n 0644-262) with an adapter, remove each drive axle assembly.



CH078D

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 B. Cylinder Head

■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.



CC411D

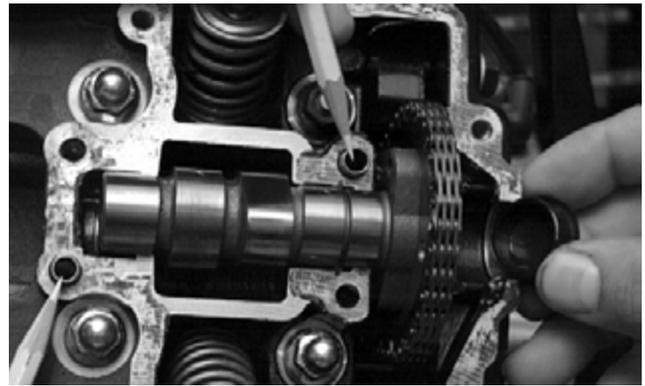
1. Remove the cap screws securing the two tappet covers; then remove the covers. Account for the O-rings.



CC366D

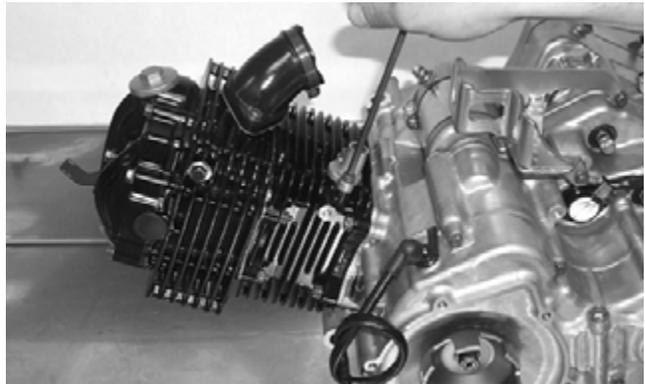
2. Remove the cap screws securing the valve cover to the head; account for the locations of any rubber washers on top side cap screws. Remove the valve cover. Account for the cylinder head plug. Note the location of two alignment pins.

■NOTE: If removing the valve cover only, the two cap screws w/rubber washers next to the compression release lever do not have to be removed.



CC368D

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



CC524D

4. Remove the cap screw securing the chain tensioner pad (account for a washer).

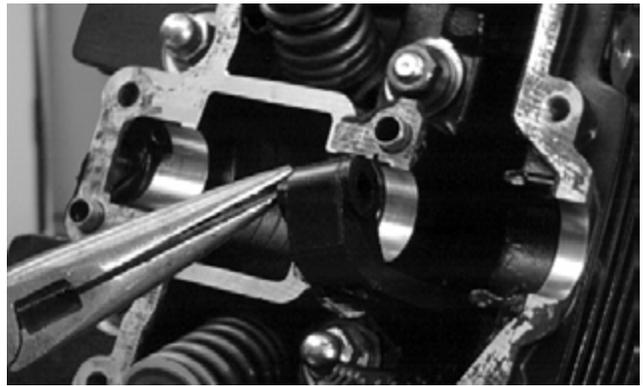


CC371D

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. Account for an alignment pin.



CC372D



CC375D

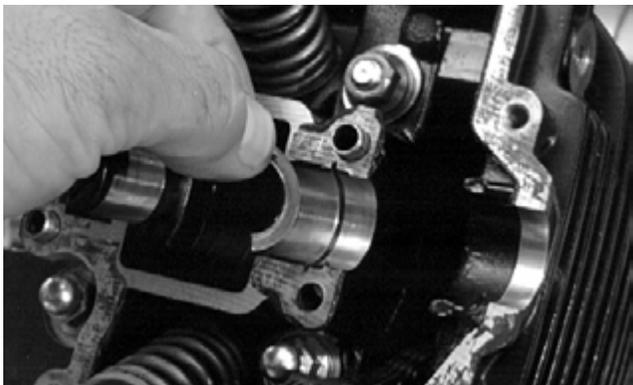


CC373D

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

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.

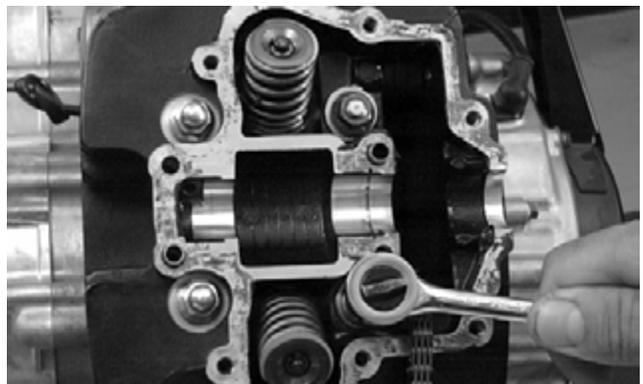


CC374D

7. Using a pair of needle-nose pliers, remove the chain tensioner pad.

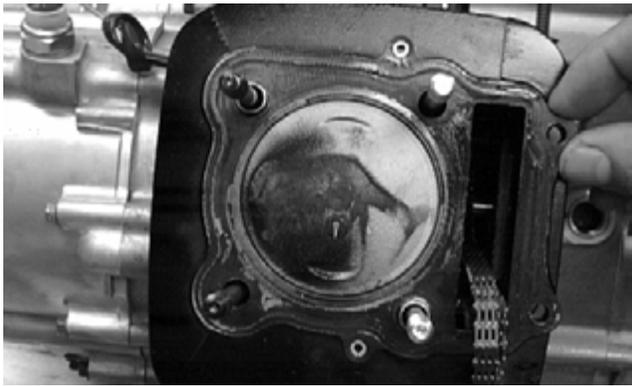


CC376D



CC377D

8. Remove the nuts securing the cylinder head to the cylinder; then remove the three cylinder head cap nuts and one nut with copper washers (note location of the cap nuts and nuts).
9. Remove the cylinder head from the cylinder, remove the gasket, and account for two alignment pins.



CC378D

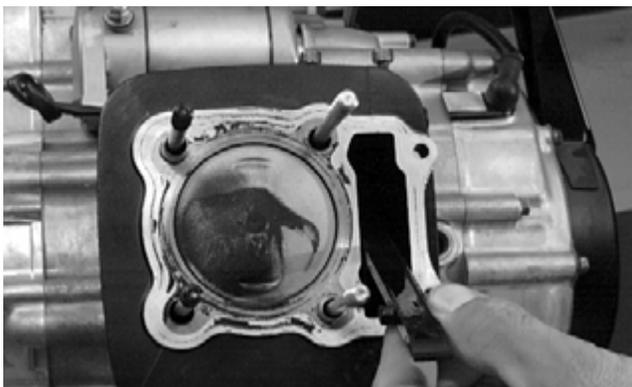
AT THIS POINT

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

10. Remove the cam chain guide.

AT THIS POINT

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



CC379D

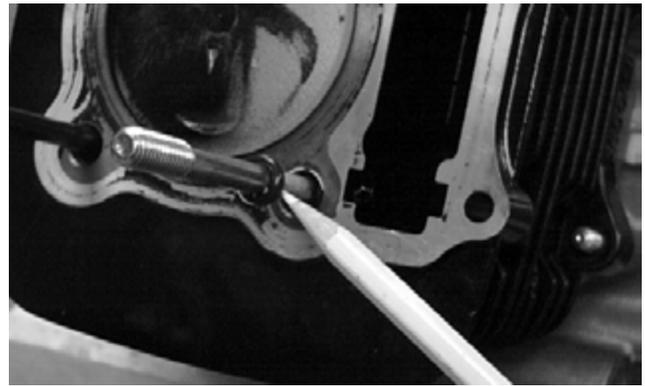
C. Cylinder
D. Piston

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

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

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.

■NOTE: It may be necessary to remove the stud w/ O-ring to aid in removing the cylinder; however, there is no stud O-ring on the 250.



CC384D



CC381D

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.

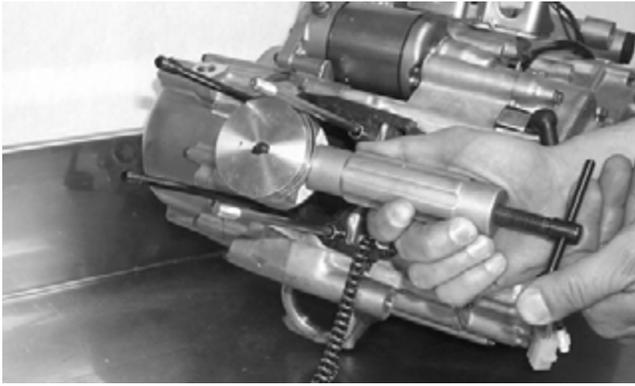
13. Using an awl, remove one piston-pin circlip.



CC382D

14. Using a 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.



CC526D

■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.

- 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.

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. Starter Cup**
- C. Cover/Stator Assembly**

1. Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the starter noting the location of the single washer. Account for the gasket.

👉 AT THIS POINT

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

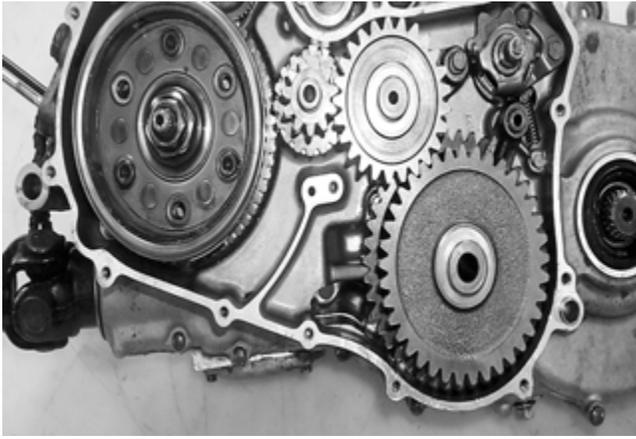
2. Remove the nut and lock washer securing the starter cup to the crankshaft; then remove the starter cup. Account for the O-ring inside the cup.
3. Lay the ATV on its right side; then remove the cap screws securing the left-side cover to the crankcase and note the location of the different-sized cap screws.
4. Remove the left-side cover w/stator assembly. Account for a gasket, two alignment pins, and a starter idler gear spacer.

■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.

■NOTE: For steps 5-21, refer to illustration CC846A (4x4) or to illustration CC873A (2x4).

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

5. Remove the nut securing the magneto rotor to the crankshaft (D).
6. Remove the starter idler gear assembly (E); then account for the spacer, the starter idler gear, and shaft.



CC846A

D. Magneto Rotor
E. Idle Gear Assembly

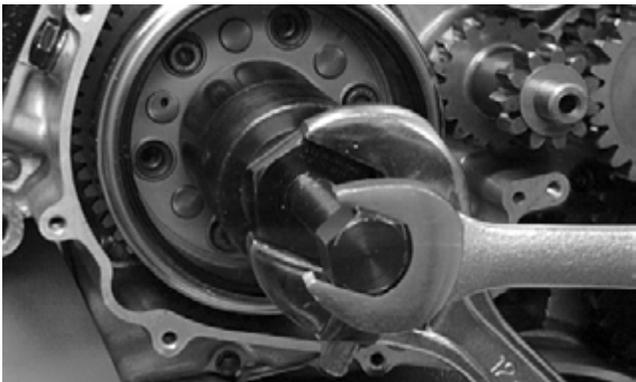
■NOTE: Steps 1-6 in the preceding sub-section must precede this procedure.

7. Install the magneto rotor puller adapter.



CC417D

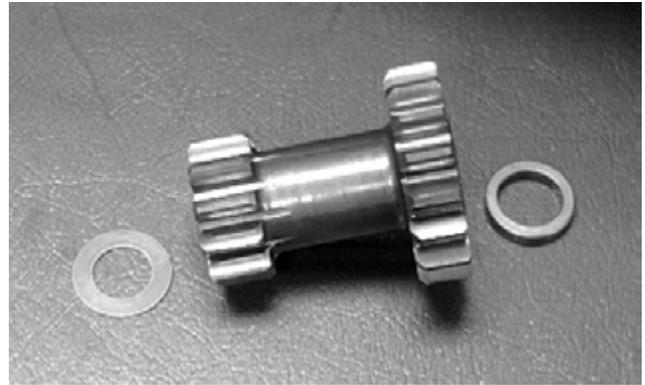
8. Using a magneto rotor remover; remove the magneto rotor assembly (F) from the crankshaft. Account for the key.



CC456D

9. Remove the starter clutch gear assembly (G) from the crankcase.
10. Remove the driven gear/driven gear assembly (H) w/washer (4x4) from the crankcase.
11. Remove the outer drive gear assembly (I) w/washer from the driveshaft.

12. Remove the short shift shaft (J) from the crankcase.
13. Remove the short shift fork.
14. Remove the long shift shaft (K) from the crankcase (4x4).
15. Remove the long shift fork (4x4).
16. Remove the driven gear dog (4x4) from the sub-transmission shaft (A).
17. Remove the drive gear dog from the driveshaft (B).
18. Remove the idler gear and washers from the countershaft (C). Account for the thick spacer on the inside.



CC477D

19. Remove the sub-transmission gear cam (M) from the crankcase.
20. Remove the circlip and washer from the sub-transmission shaft (A); then remove the driven gear/driven gear assembly (H) from the shaft. Account for a washer (4x4).
21. Remove the inner drive gear circlip from the driveshaft (B); then remove the inner drive gear and washer from the driveshaft. Account for a bushing and a spacer. Note the location of the oil hole in the bushing for installing purposes.



CC476D

22. Remove the Phillips-head screws securing the shift-indicator sending unit; then remove the sending unit. Account for an O-ring, neutral contact, and spring.



CC478D



CC479D

AT THIS POINT

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

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

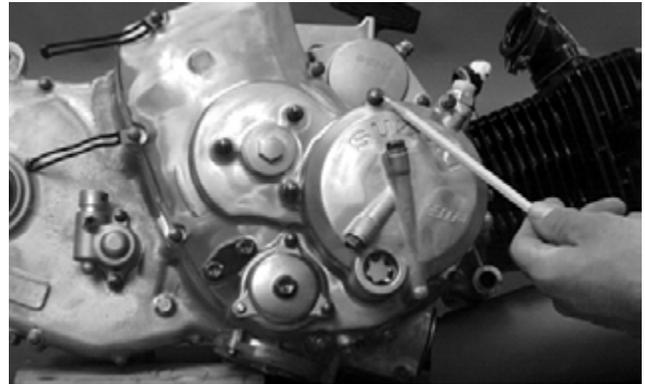
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

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

Removing Right-Side Components

A. Cover

1. Turn the gas tank valve to the OFF position and lay the ATV on its side; then remove the cap screws securing the right-side cover to the crankcase. Remove the cover. Note the locations of the long cap screw and rubber washer and the two wire forms. Account for the gasket and for two alignment pins.



CC421D



CC423D

■NOTE: It will be necessary to remove the lower rear oil filter cover stud and the upper arm cap screws to provide clearance for removing the cover.

B. Release Roller Assembly

C. Starter Clutch Shoe

D. Starter Clutch Housing

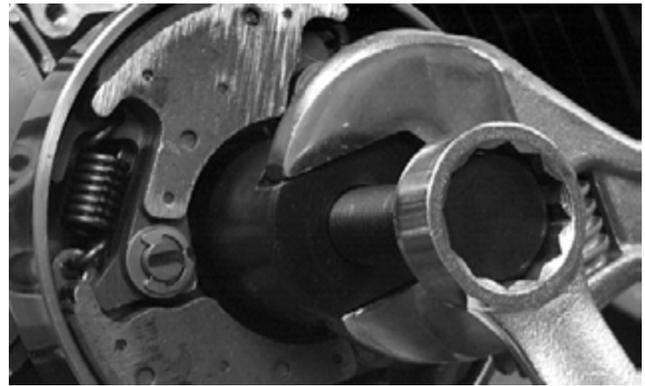
E. Primary Clutch

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

2. Slide the clutch release arm and gear shift shaft out of the crankcase; then in a crisscross pattern, remove the four cap screws securing the clutch release roller assembly.



CC424D



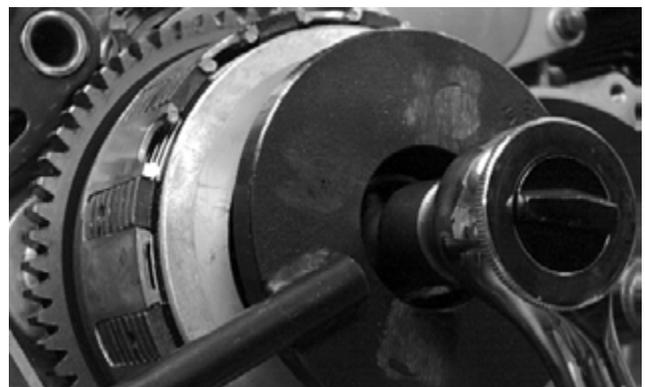
CC427D



CC425D

3. Remove the release roller assembly. Account for four springs.
4. Remove the starter clutch-shoe nut (left-hand threads) and washer from the driveshaft; then using a clutch shoe remover, remove the clutch shoe.

5. Remove the primary drive one-way clutch; then remove the starter clutch housing.
6. Using a clutch sleeve hub holder to hold the clutch hub, remove the nut and washer.



CC428D

⚠ CAUTION

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

■ **NOTE:** Note the location of the alignment notches in the clutch plates to aid in installing.



CC426D



CC914

7. Remove the primary clutch assembly from the countershaft. Account for the spacer and washer.

👉 AT THIS POINT

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

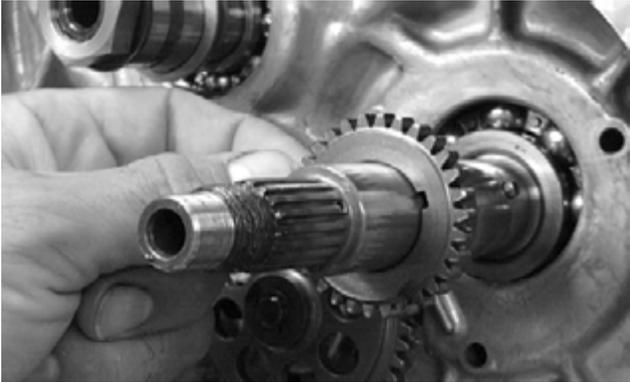
- F. Gear Shifting Arm**
- G. Oil Pump/Oil Strainer**

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

8. Remove the oil pump drive gear from the crankshaft; then account for the pin.

⚠ CAUTION

Care should be taken to not allow the pin to drop into the crankcase.



CC432D

9. Remove the cap screw securing the gear shift stopper plate pin retainer; then remove the retainer.

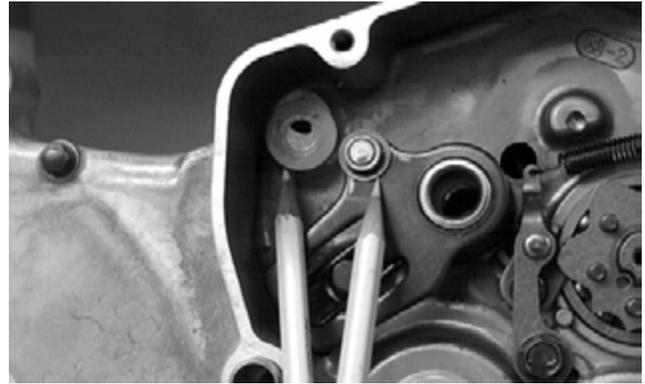


CC433D

10. Remove the cap screw securing the gear shifting arm assembly; remove the assembly and account for a washer and a roller.

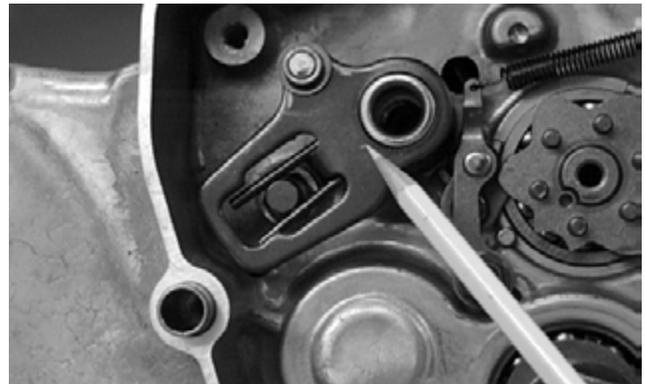


CC434D



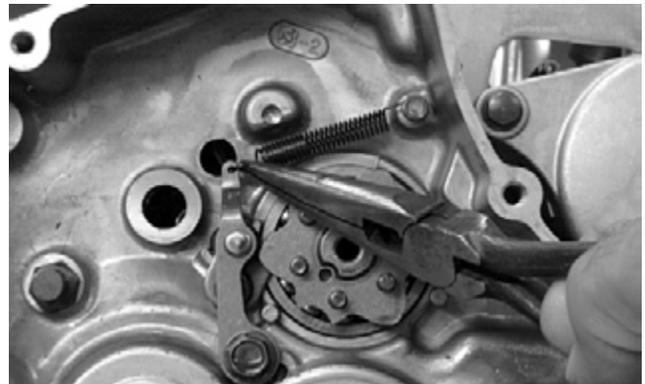
CC435D

11. Remove the link arm and account for the spring and the roller.



CC436D

12. Remove the spring from the cam stopper.



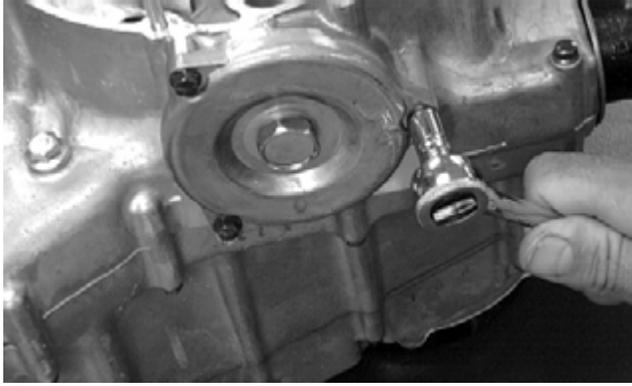
CC437D

13. Remove the stopper plate and account for six pins. Note the location of the alignment pin.



CC438D

14. Remove the cap screws securing the oil strainer cap. Note the arrow on the cap for assembly purposes.



CC442D

15. Remove the screws securing the strainer; then remove the strainer.



CC443D

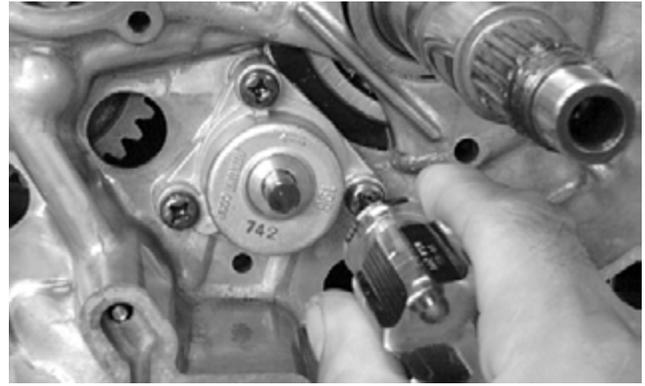
■NOTE: If service on the oil pump is necessary, follow steps 16-17.

16. Remove the circlip securing the oil pump driven gear; then remove the gear. Account for the pin.



CC439D

17. Remove the screws securing the oil pump; then remove the pump.



CC440D

👉 AT THIS POINT

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

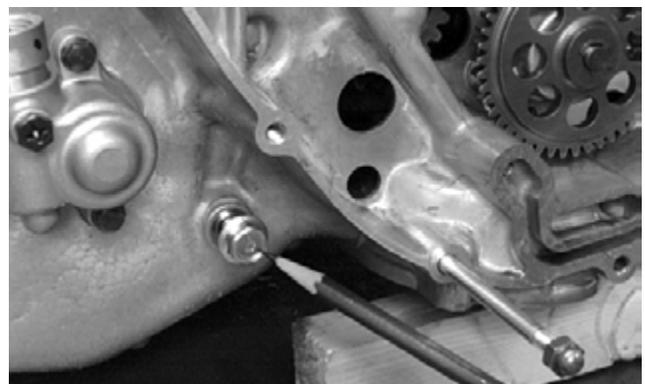
Center Crankcase Components

■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 two cap screws securing the starter to the crankcase; then remove the starter. Account for the wiring forms and an O-ring.
2. Remove the right-side cap screws securing the crankcase halves. Note the location of the cap screw with the copper washer.



CC481D

3. Remove the left-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws.
4. Using a crankcase separator and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins and an O-ring and remove a washer from the reverse shifting cam.

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



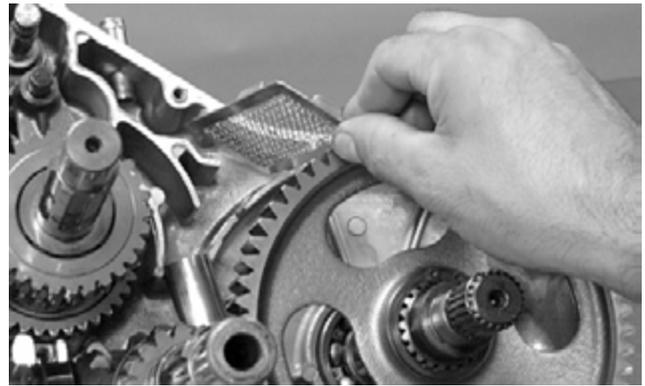
CC484D



CC486D

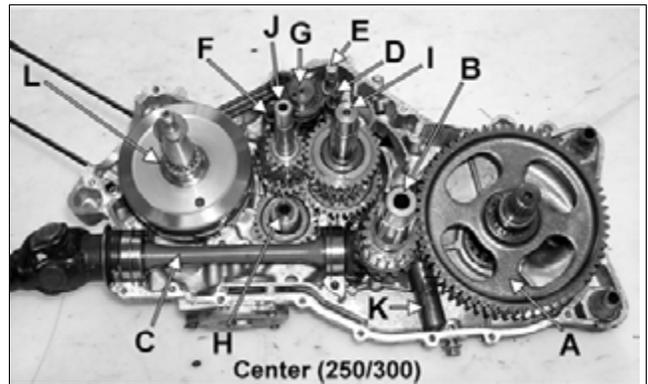
Disassembling Crankcase Half

1. On the 300, remove the oil breather screen from the crankcase. Note the direction of the tabs for assembling purposes.



CC487D

■NOTE: For steps 2-17, refer to illustration CC836A (4x4) or to illustration CC872A (2x4).



CC836A

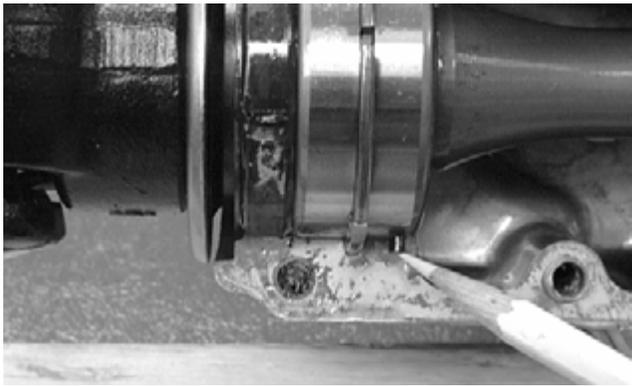


CC872A

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

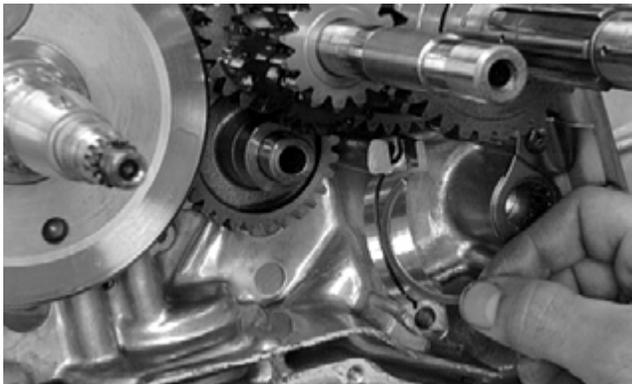
2. Remove the rear final driven gear w/ shaft (A).
3. Remove the sub-transmission shaft assembly (B).

■NOTE: On the 4x4, note the location of the bearing alignment pin on the secondary output shaft (C).



CC490D

4. On the 4x4, remove the secondary output shaft (C); then account for the C-ring.



CC492D

5. Remove the cam stopper detent and gasket from the crankcase.

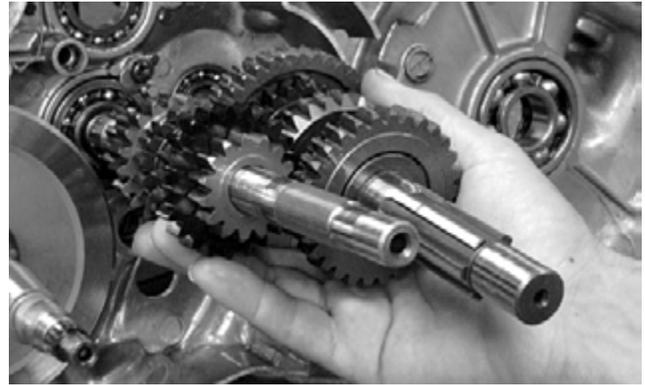


CC493D

6. Remove the long shift shaft (D).
7. Remove the outer fork and center fork noting the difference in the forks for assembling purposes.
8. Remove the reverse shifting cam (E).
9. Remove the inner fork (from the same shaft as in step 7).
10. Remove the short shift shaft (F).
11. Remove the fork.
12. Remove the gear shifting cam (G).
13. Remove the spacer from the reverse idle shaft assembly (H).

14. Remove the reverse idle shaft assembly (H). Account for the gear, bushing, and washer.

15. Simultaneously, remove the driveshaft assembly (I) and countershaft assembly (J) from the crankcase.



CC505D

16. Using a crankshaft remover, push the crankshaft assembly (L) out of the crankcase.



CC507D

AT THIS POINT

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

17. Remove the Phillips-head screws securing the oil pipe (K) to the crankcase.

Table of Contents (Servicing Components)

■NOTE: Critical engine/transmission specifications are located at the beginning of this section.

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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 (p/n 0644-016) 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.



CC385D

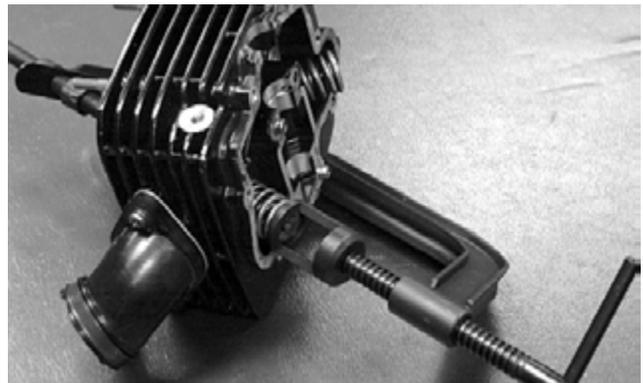
⚠ CAUTION

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

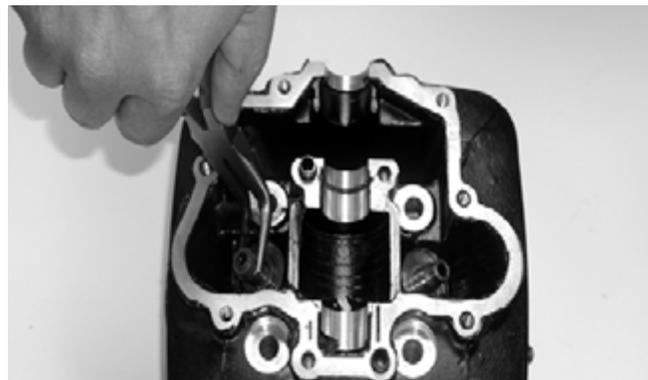
■NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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

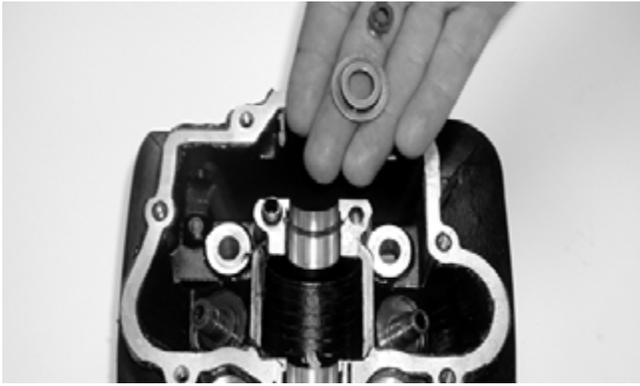


CC391D

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



CC928



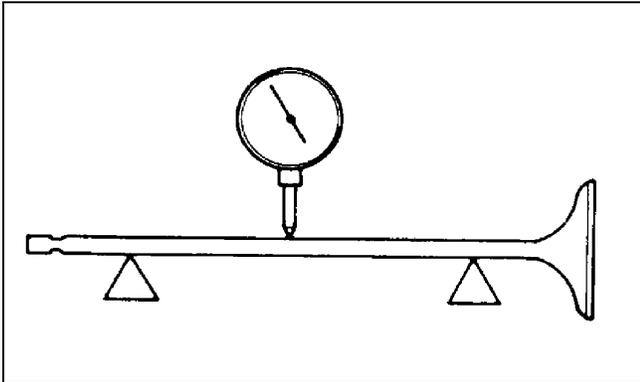
CC929

■NOTE: The valve seals must be replaced.

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

Measuring Valve Stem Runout

- Support each valve stem end with the V Blocks (p/n 0644-022); then check the valve stem runout using a dial indicator.



ATV-1082

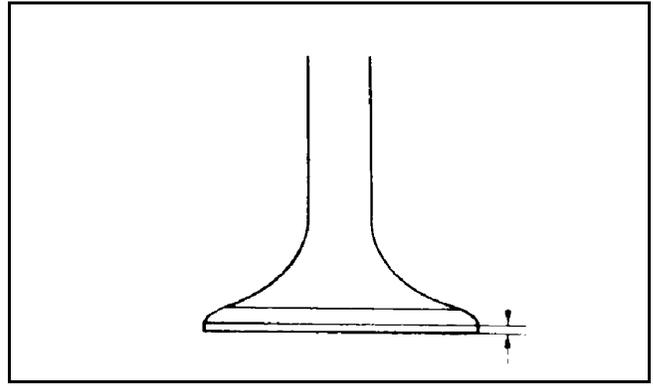
- Maximum runout must not exceed specifications.

Measuring Valve Stem Outside Diameter

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

Measuring Valve Face/Seat Width

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

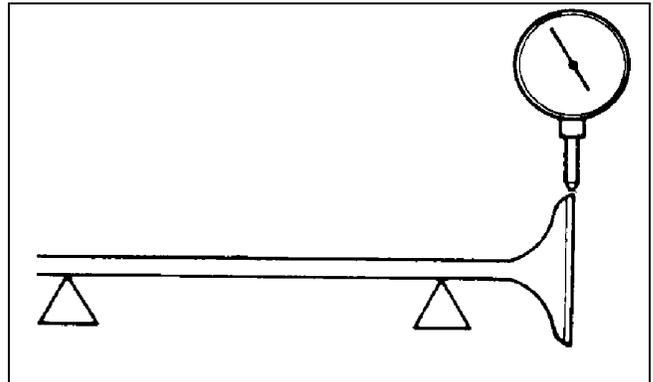


ATV-1004

- Acceptable width range must be within specifications.

Measuring Valve Face Radial Runout

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

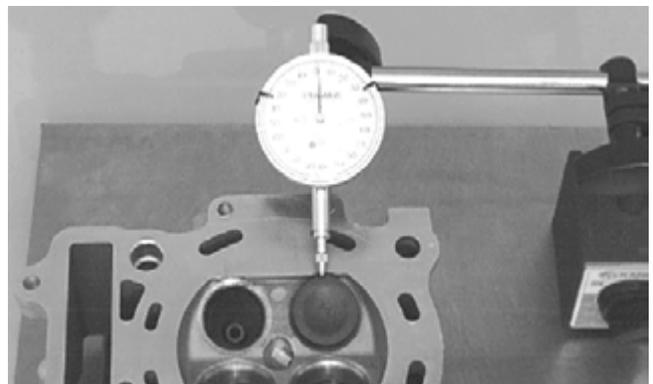


ATV1082A

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

Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

- Mount a dial indicator and base on the surface plate; then place the cylinder head on the surface plate.
- 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.

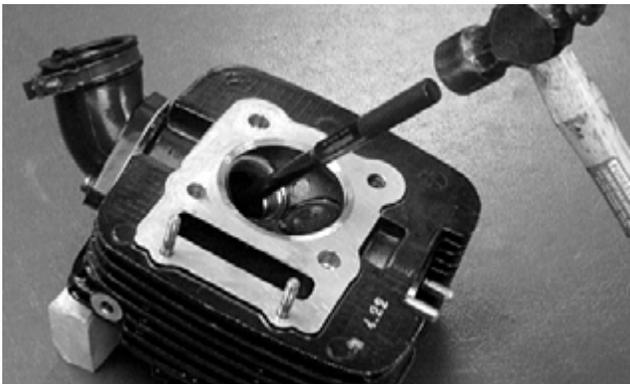
Measuring Valve Guide (Inside Diameter)

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.

Replacing Valve Guide

■NOTE: If a valve guide is worn or damaged, it must be replaced.

1. If a valve guide needs replacing, insert a valve guide remover into the valve seat side of the valve guide. Using a hammer, gently drive the valve guide out of the cylinder head.



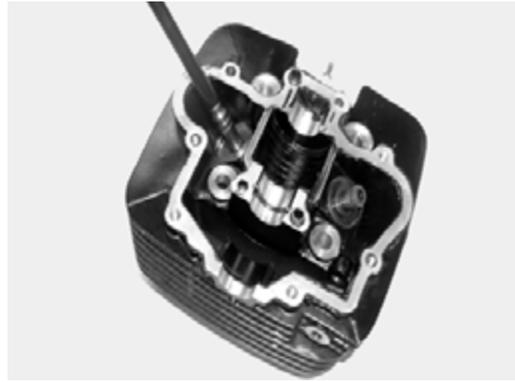
CC393D

2. Using an appropriate reamer, remove any burrs or tight areas from the valve guide journals.



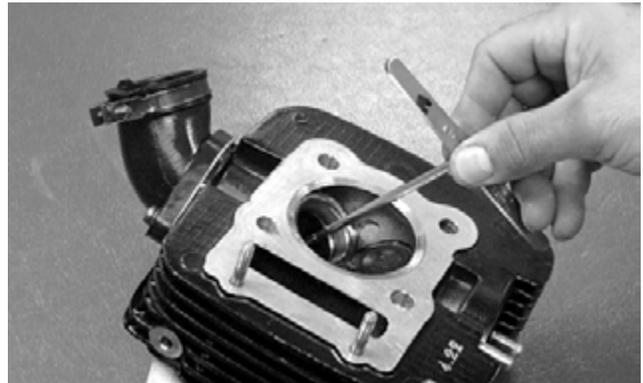
CC931

3. To install a valve guide, use a valve guide installer and gently drive a valve guide with a retaining clip into the bore from the valve spring side until the retaining clip just contacts the cylinder head.



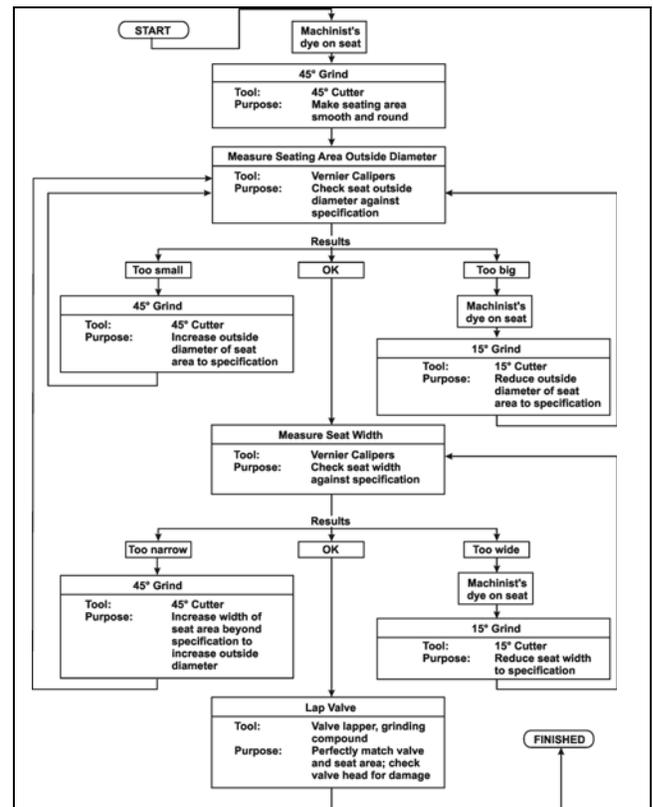
CC932

4. After installing the guide, use the standard valve guide reamer to remove all burrs and tight areas that may remain in each valve guide.



CC394D

Valve Seat/Guide Servicing Flow Chart



ATV-0107

Grinding Valve Seats

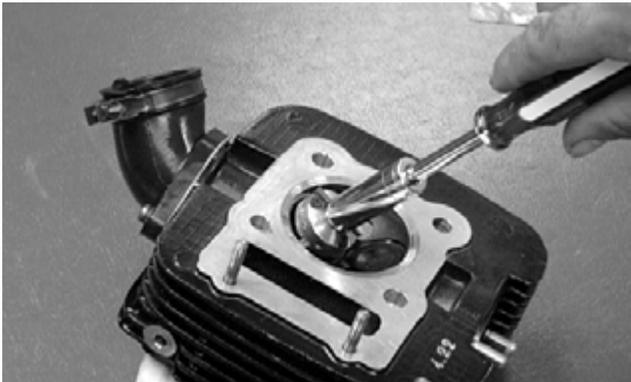
■NOTE: If the valve seat is beyond servicing, the cylinder head must be replaced.

1. Insert an exhaust valve seat pilot shaft into the exhaust valve guide. Slide the exhaust valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the exhaust valve seat until within specifications.



CC396D

2. Insert an intake valve seat pilot shaft into the intake valve guide. Slide the intake valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the intake valve seat until within specifications.



CC395D

Lapping Valves

■NOTE: Do not grind the valves. If a valve is damaged, it must be replaced.

1. Remove all carbon from the valves.
2. Lubricate each valve stem with light oil; then apply a small amount of valve lapping compound to the entire seating face of each valve.
3. Attach the suction cup of a valve lapping tool to the head of the valve.
4. Rotate the valve until the valve and seat are evenly polished.
5. Clean all compound residue from the valve and seat.

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.

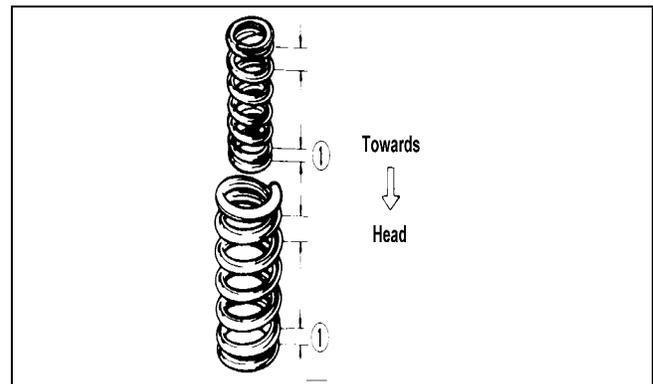
Measuring Rocker Arm Shaft (Outside Diameter)

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.
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.

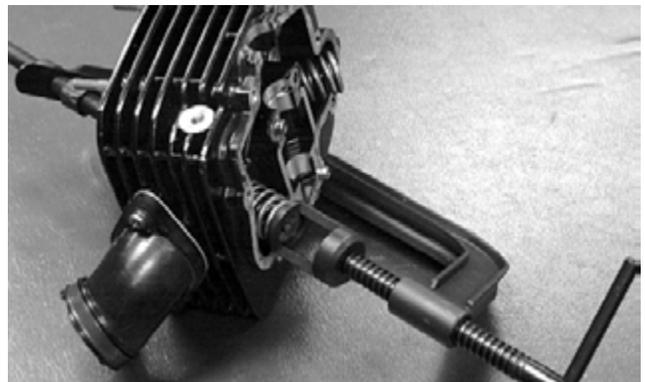
■NOTE: If the painted end is not visible, install the ends of the springs with the closest coils toward the head.



ATV-1011

■NOTE: The 250 has only the larger spring.

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



CC391D

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.



AN135

■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

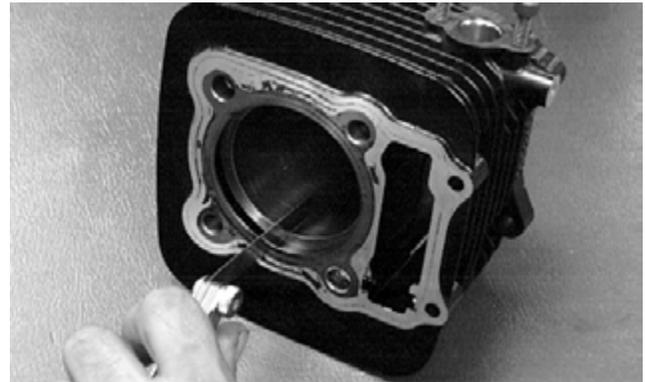
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

⚠ 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)

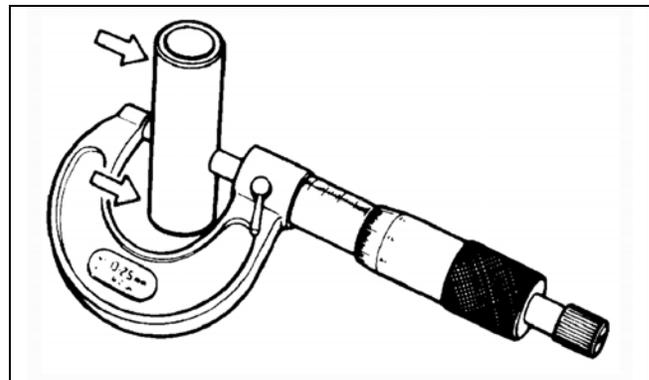
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within specifications.



CC386D

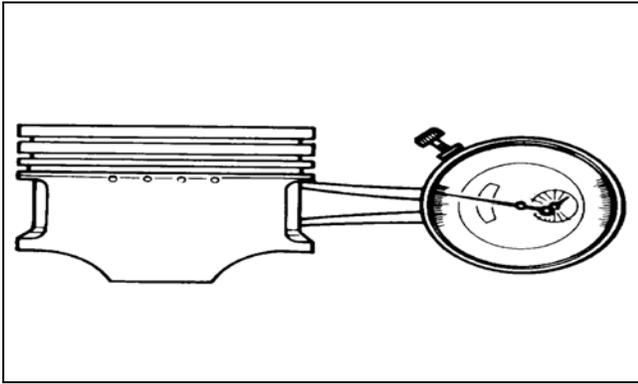
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

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

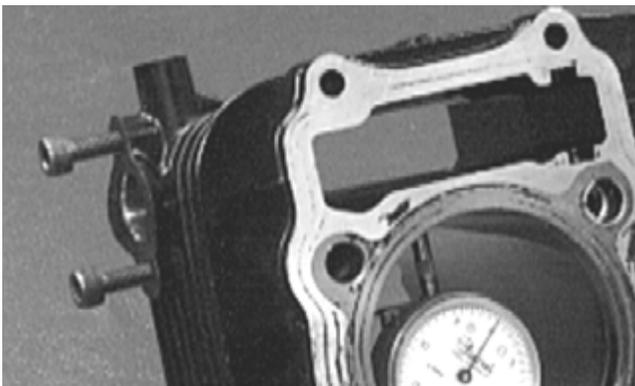
2. Insert an inside dial indicator into the piston-pin bore. The diameter must not exceed specifications. Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/ Cylinder Clearance

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



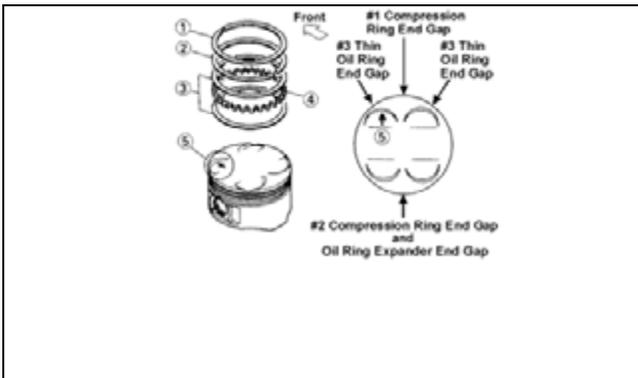
CC397D

2. Measure the corresponding piston diameter at a point 18 mm (0.71 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 not exceed specifications.

Installing Piston Rings

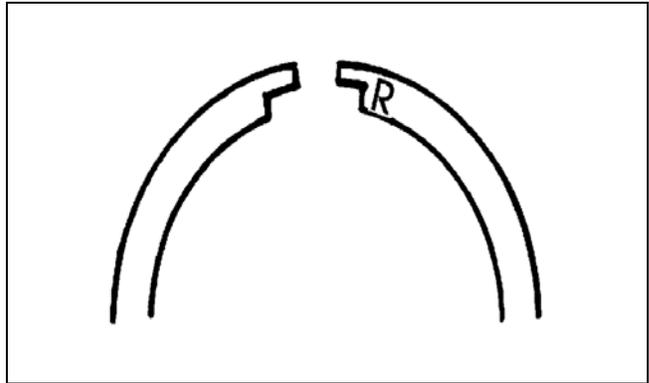
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■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 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).



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

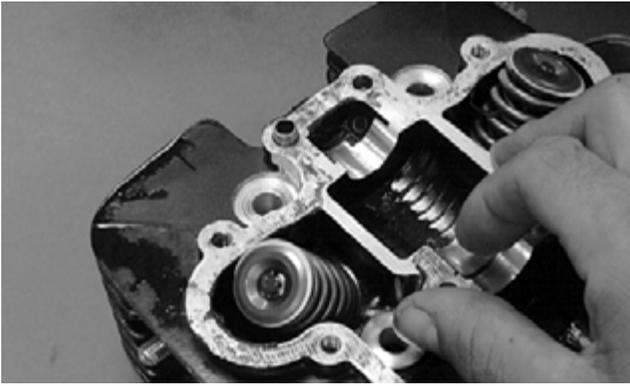
⚠ CAUTION

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

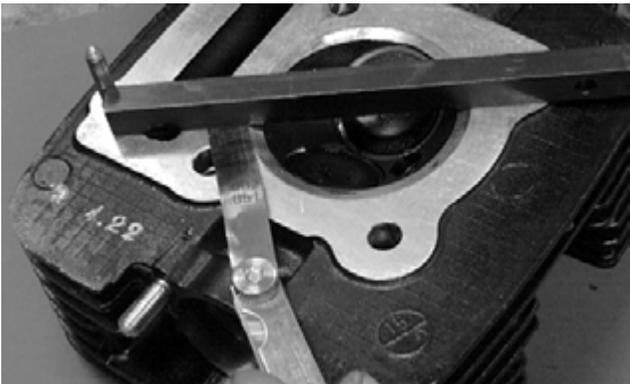
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.



CC387D

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.



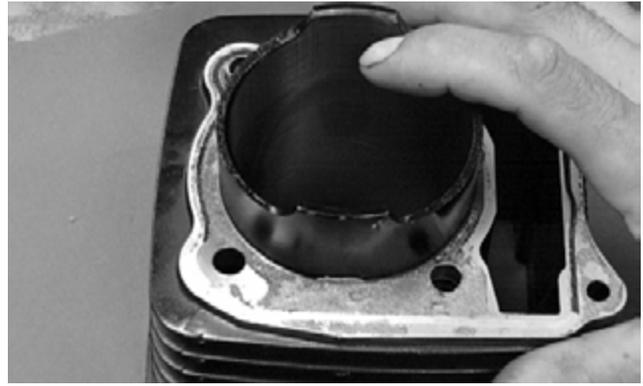
CC388D

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.



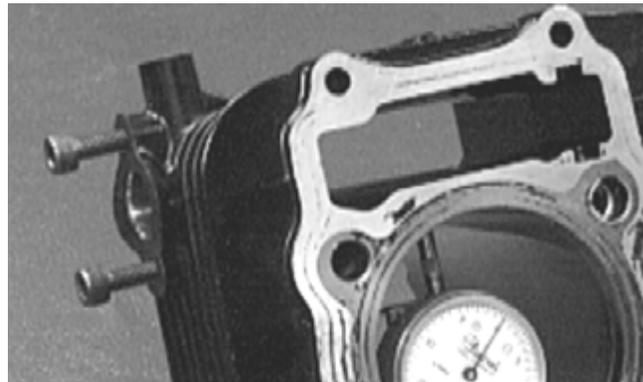
CC389D

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

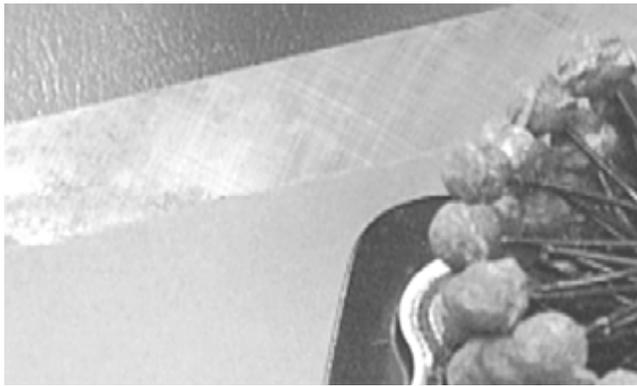
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest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



CC397D

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 ball hone.

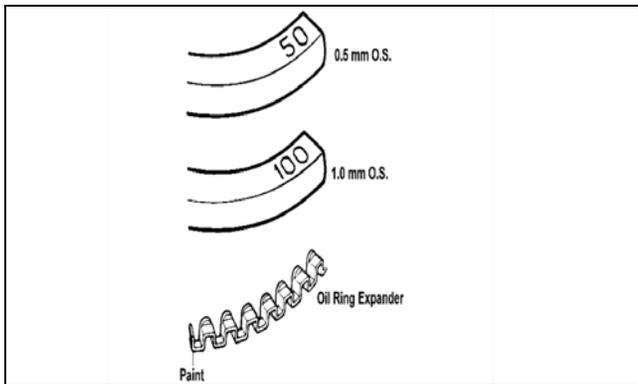
■NOTE: To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately apply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



CC390D

4. If any measurement exceeds the limit, hone the cylinder and install an oversized piston or replace the cylinder.

■**NOTE:** Oversized piston and rings are available. The oversized piston and rings are marked for identification.

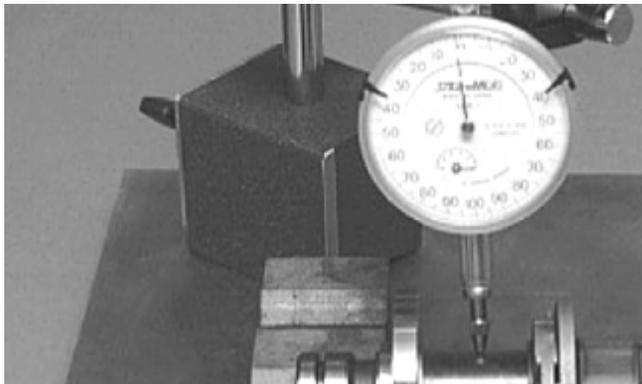


ATV-1068

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.

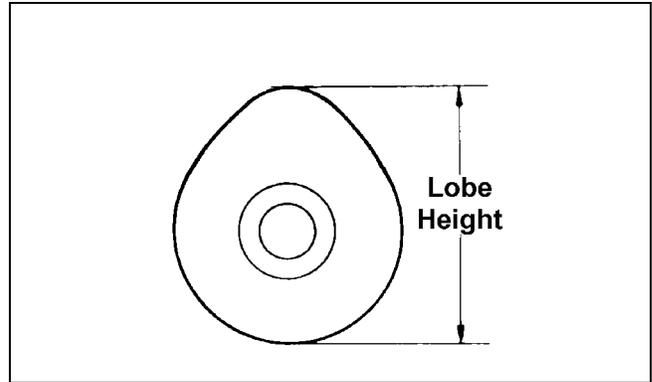


CC283D

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

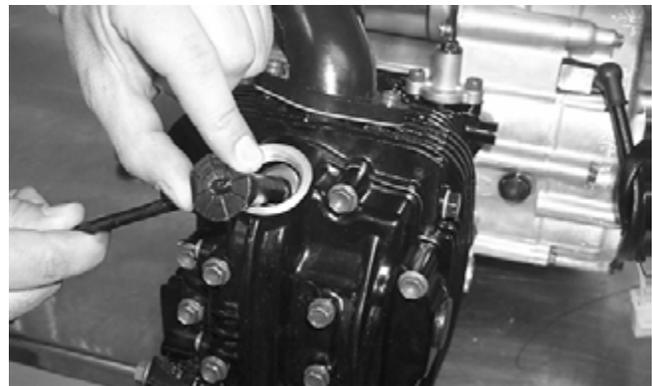
2. The lobe heights must not exceed minimum specifications.

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.



CC522D

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.

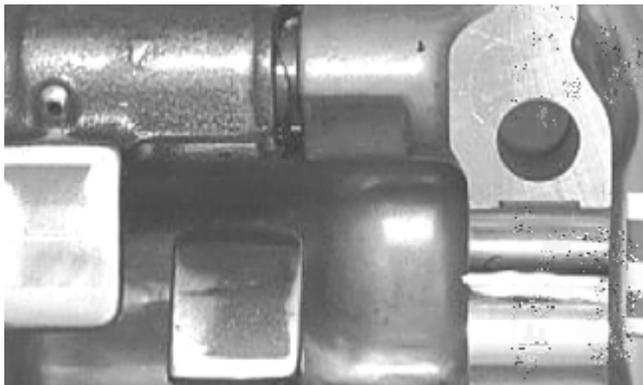
■**NOTE:** Do not rotate the camshaft when measuring clearance.

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



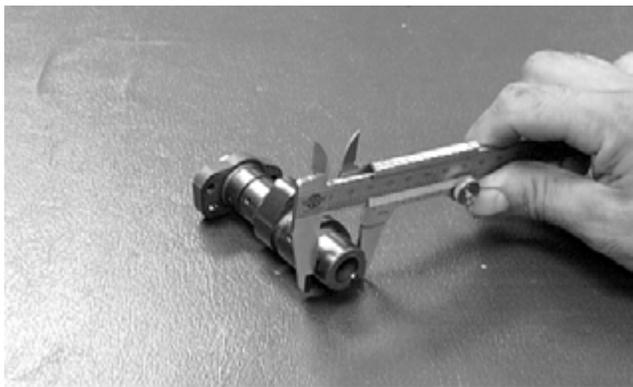
CC367D

- 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

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



CC399D

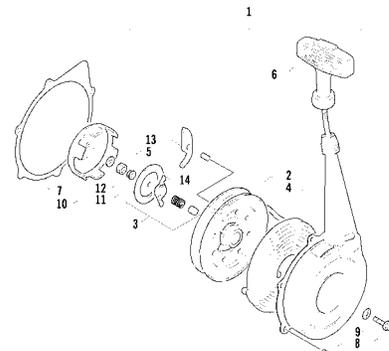
■NOTE: If the journals are worn, replace the camshaft; then measure the clearance again. If it is still out of tolerance, replace the cylinder head.

Servicing Left-Side Components

RECOIL STARTER

KEY

- Recoil Starter Assy
- Reel
- Ratchet Assy
- Spiral Spring
- Nut
- Rope Assy
- Gasket
- Cap Screw
- Gasket
- Starter Cup
- Nut
- Lock Washer
- Ratchet
- Guide



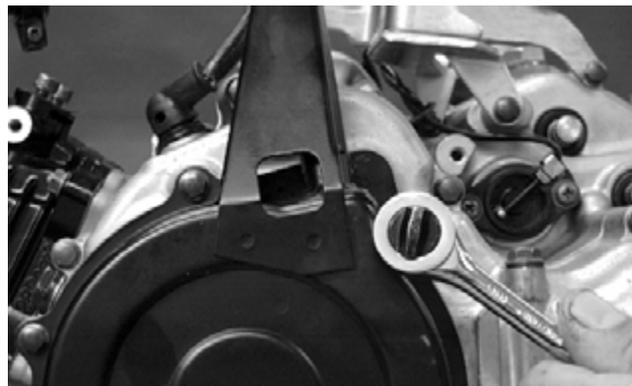
0736-194

⚠ WARNING

Always wear safety glasses when servicing the recoil starter.

Removing/Disassembling

- Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the starter noting the location of the single washer closest to the center of the crankcase. Account for a gasket.

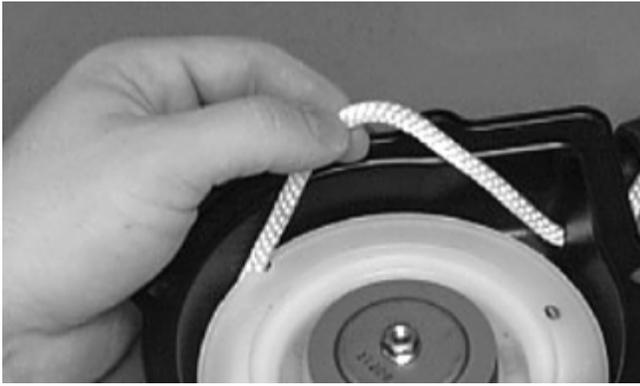


CC412D

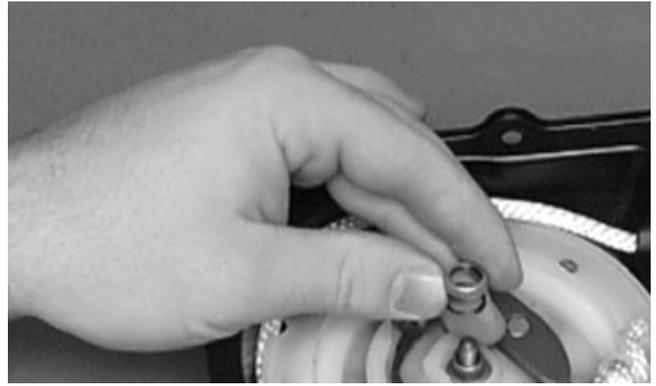
⚠ WARNING

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

- 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.



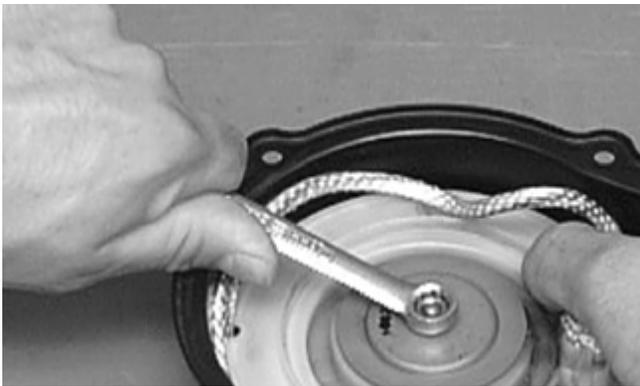
B600D



B603D

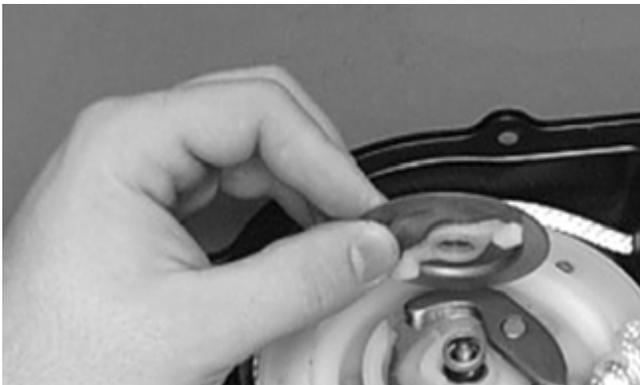
⚠ CAUTION
During the disassembly procedure, make sure all spring tension is released before continuing.

3. Remove the nut.



B601D

4. 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

5. Remove the spring cover, spring, and shaft.

6. Remove the ratchet and account for the spring.



B604D

7. Carefully lift the reel free of 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.

8. 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. It should be visually inspected in place to save time. If replacement is necessary, follow steps 9-10.

9. 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.
10. 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/Installing

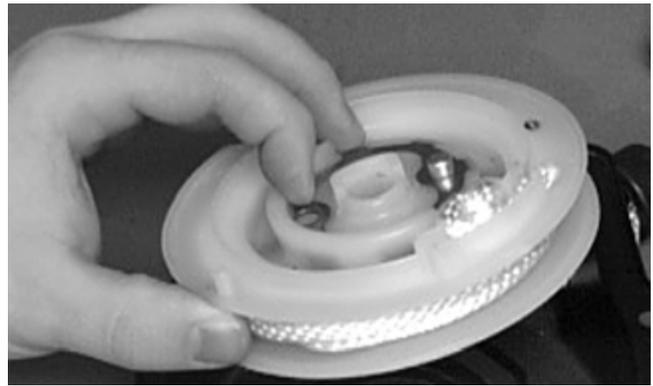
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

■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.



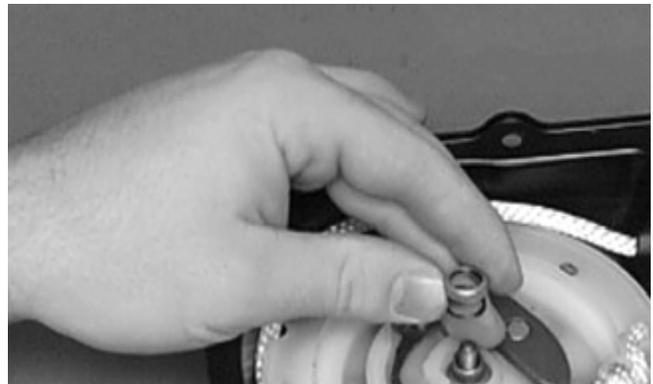
B605D

6. Install the ratchet onto its pin making sure the end is properly installed on the reel.



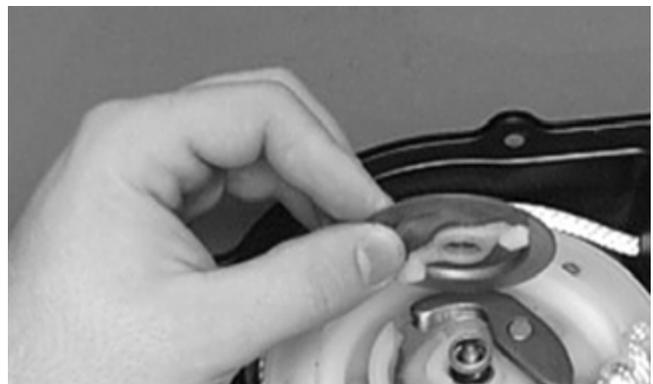
B604D

7. Install the shaft, spring, and the spring cover.



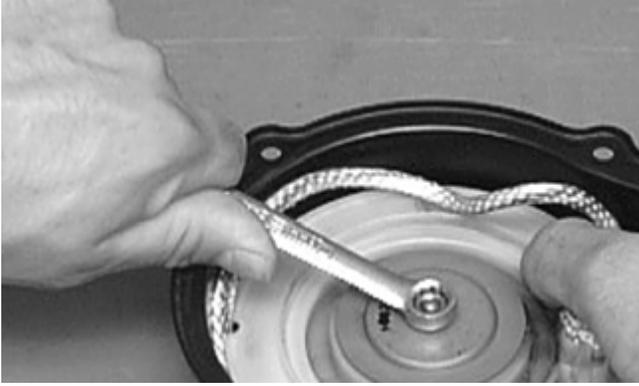
B603D

8. Install the friction plate with the ratchet guide fitting into the ratchet.



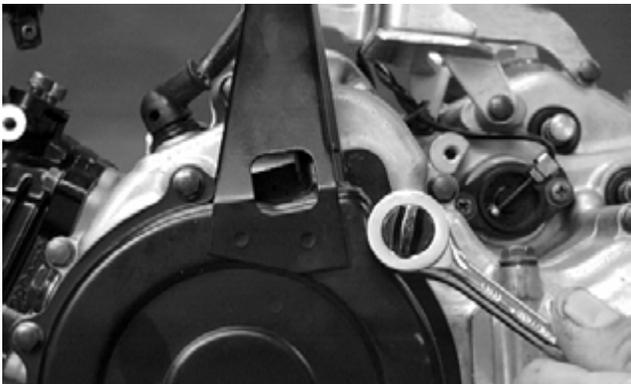
B602D

9. While pushing down on the reel, install the nut. Tighten securely.



B601D

10. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.
 11. Rotate the reel four turns counterclockwise; then release the rope from the notch and allow the rope to retract.
 12. Pull the rope out two or three times to check for correct tension.
- NOTE: Increasing the rotations in step 11 will increase spring tension.
13. Place the gasket and recoil starter assembly into position on the left-side cover noting the location of the single washer; then tighten the cap screws to 0.8 kg-m (6 ft-lb).

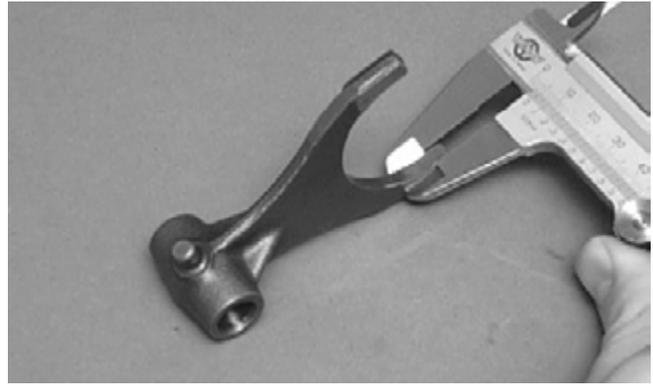


CC412D

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.

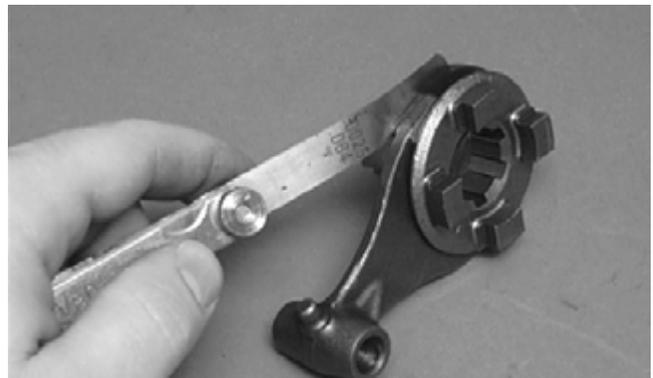


CC288D

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.

Servicing Right-Side Components

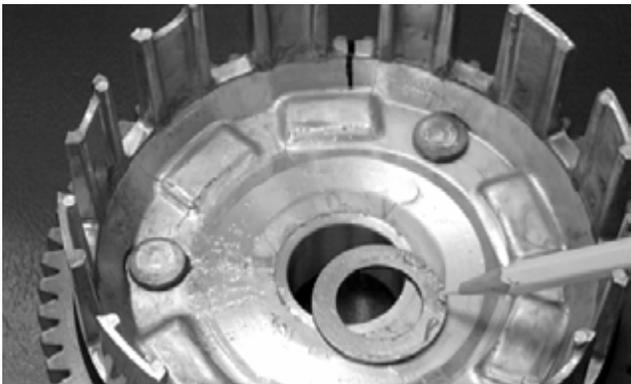
■NOTE: Whenever a part is worn excessively, cracked, damaged in any way, or out of tolerance, replacement is necessary.

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.

Inspecting/Measuring Clutch Driven Plate Warpage

■NOTE: After removing the clutch hub and clutch plates, account for the washer beneath the clutch hub.



CC444D

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.

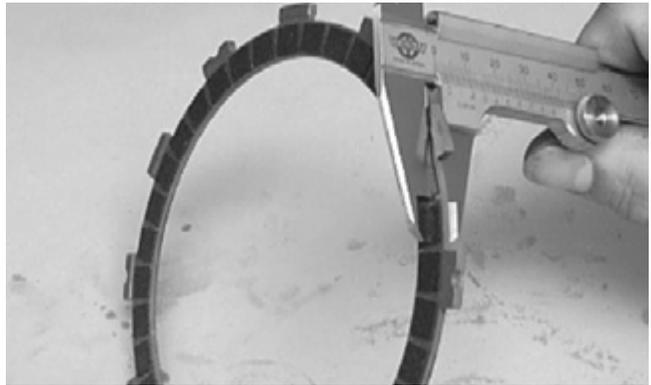


CC245D

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 not exceed minimum specifications.
3. If the fiber plate tabs are damaged, the plate must be replaced.
4. Inspect the clutch hub for grooves or notches. If grooves or notches are present, replace the hub.

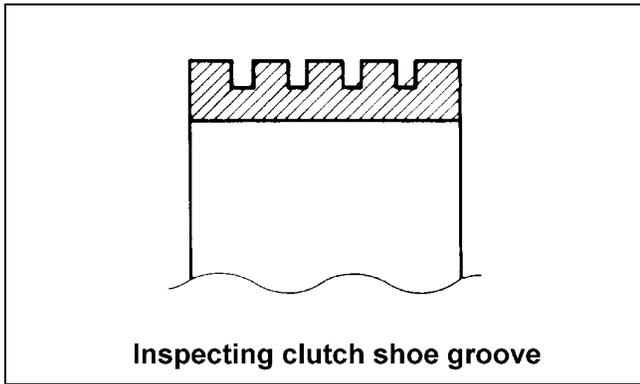
■NOTE: Note the location of the timing mark on the hub for assembly purposes.



CC448D

Inspecting Starter Clutch Shoe

1. Inspect the starter clutch shoe for uneven wear, chips, cracks, or burns.
2. Inspect the groove on the shoe for wear or damage.
3. If any damage to the shoe or any groove wear is noted, the shoe must be replaced.



ATV1014

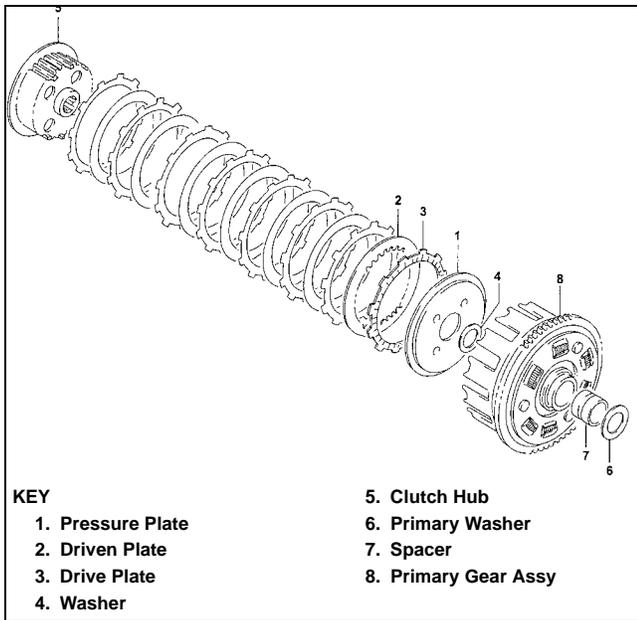
Inspecting Starter Clutch Housing

1. Inspect the starter 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.

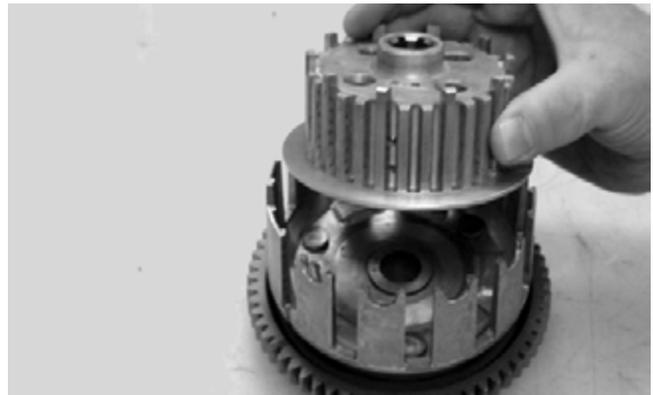
Inspecting Primary One-Way Drive

1. Insert the drive into the 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.



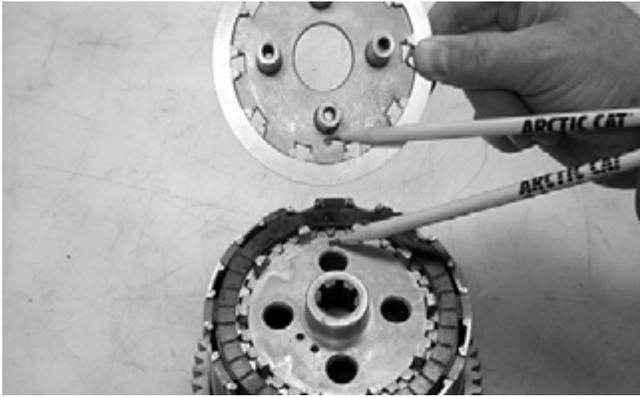
CC921

■ **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.



CC922

3. Install the pressure plate onto the hub making sure the alignment dots are correctly positioned.



CC923

- 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.



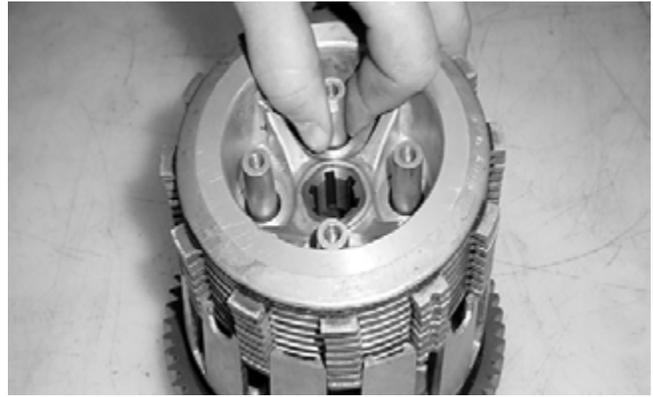
CC924

- Place the primary gear assembly on a clean, flat surface; then install the primary washer into the assembly.



CC925

- Place the clutch hub assembly into the primary gear assembly.



CC926

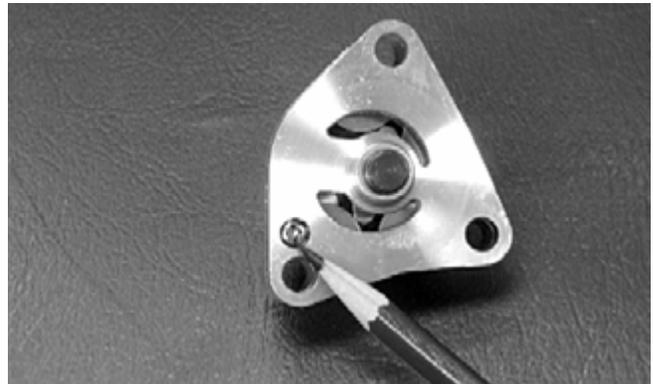
⚠ CAUTION

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

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



CC446D

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.

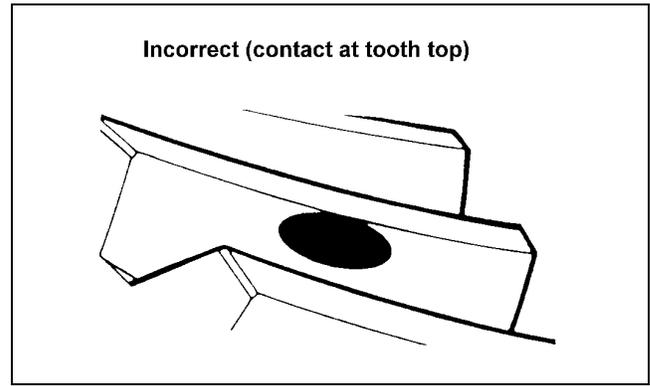
■NOTE: Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

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

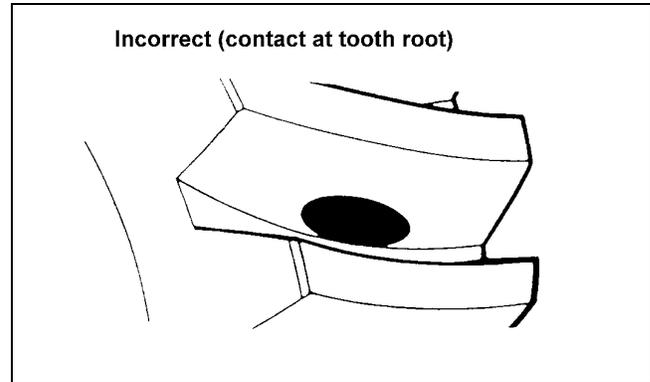
Checking Tooth Contact

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

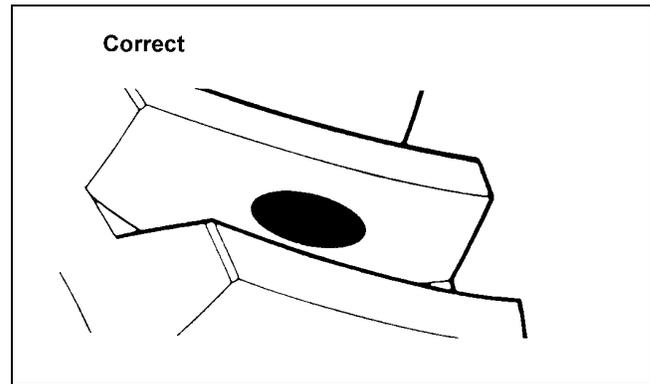
1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
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



ATV-0105



ATV-0104

Correcting Tooth Contact

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

1. 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.

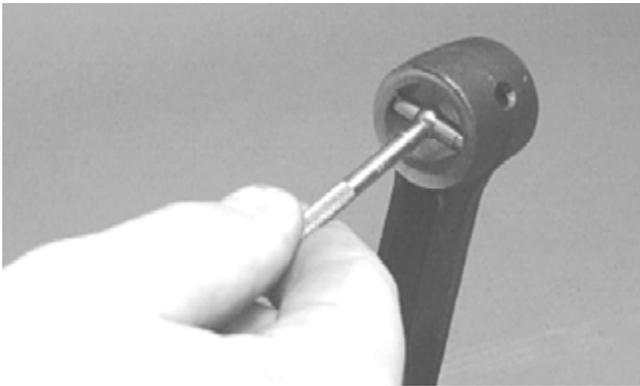
⚠ CAUTION

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

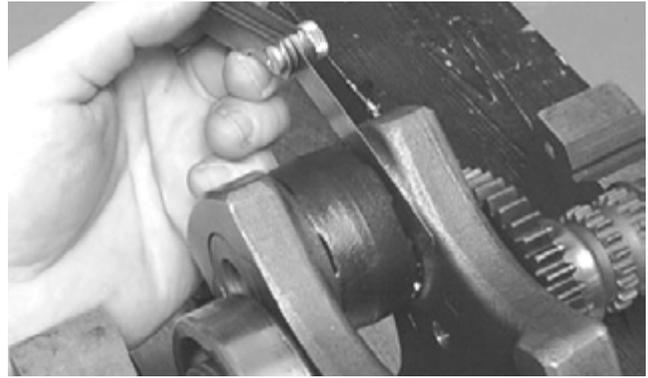
2. Maximum diameter must not exceed specifications.

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

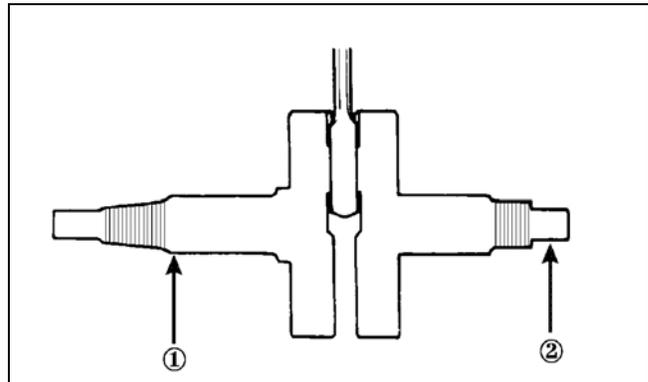
3. Acceptable gap range must be within specifications.

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

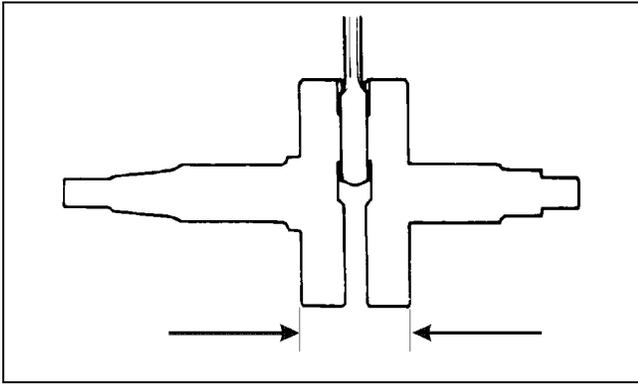
Care should be taken to support the connecting rod when rotating the crankshaft.

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 2-4.

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.



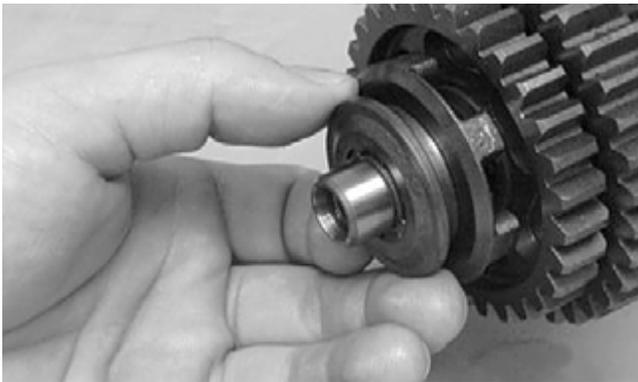
ATV-1017

2. Acceptable width range must be within specifications.

DRIVESHAFT

Disassembling

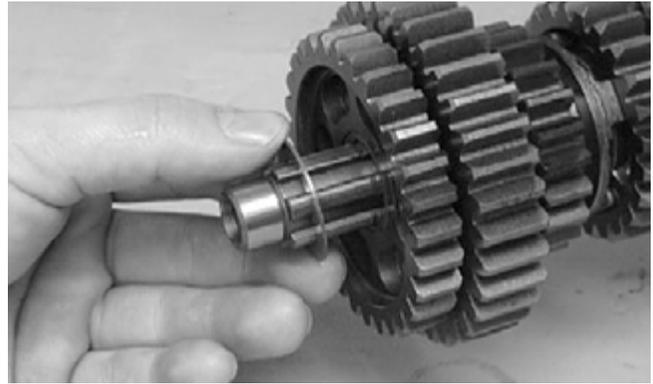
1. In order, remove the reverse dog, circlip, washer, reverse driven gear, and bushing from the driveshaft.



CC228D



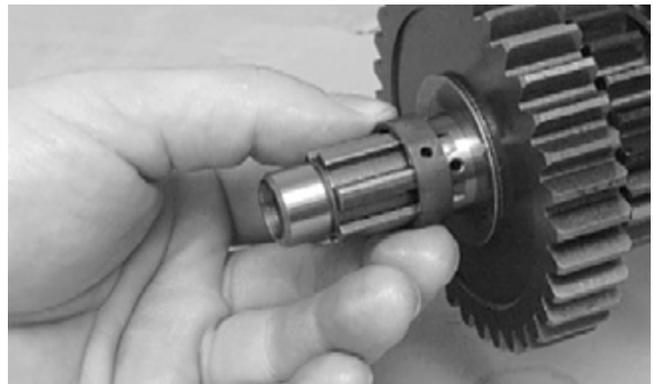
CC227D



CC226D



CC225D



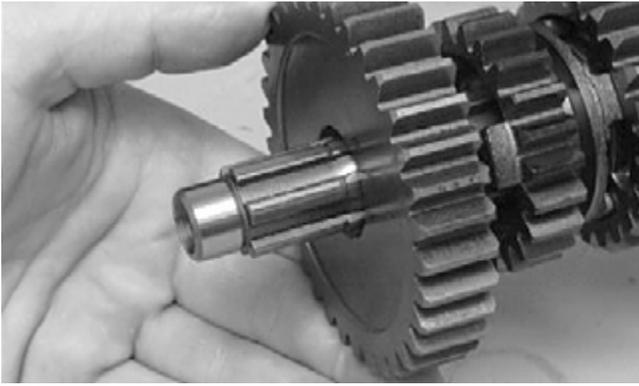
CC224D

■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.

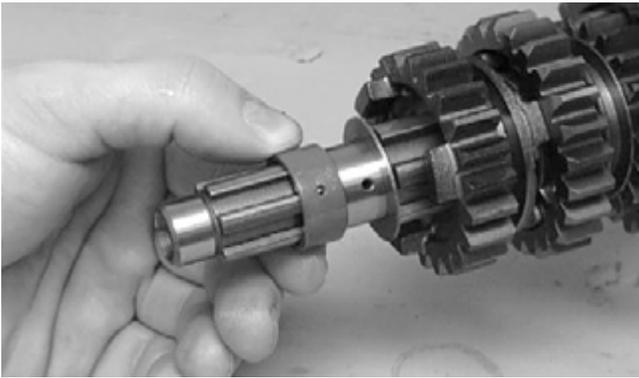


CC223D

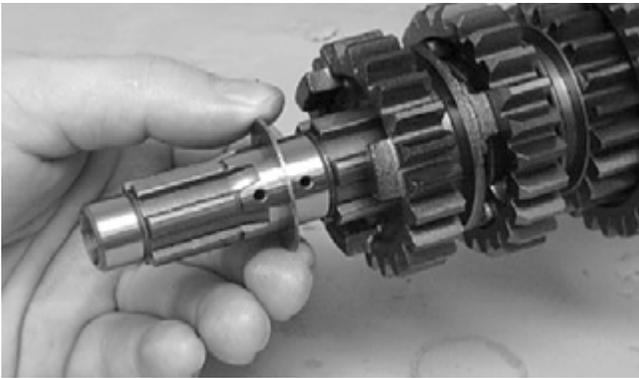


CC222D

3. Remove the 1st driven bushing; then remove the 1st driven washer (left side) from the shoulder of the splined shaft.



CC221D



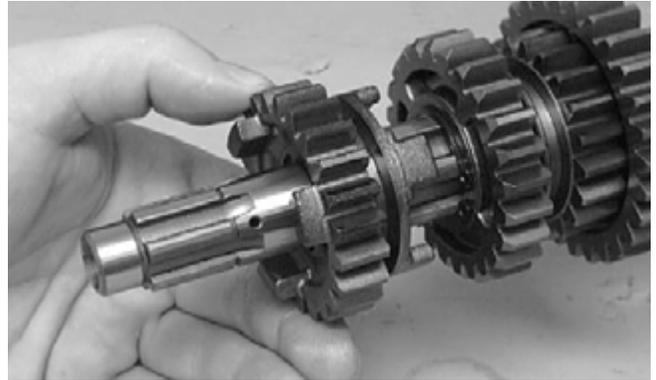
CC220D

■NOTE: Remove the 4th driven circlip.



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 circlip; then remove the 3rd driven washer (right side) from the driveshaft.

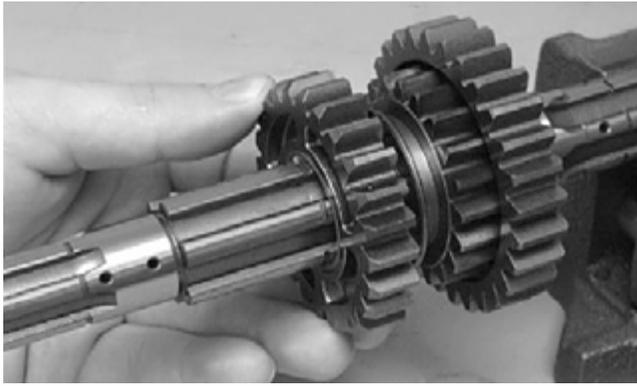


CC216D



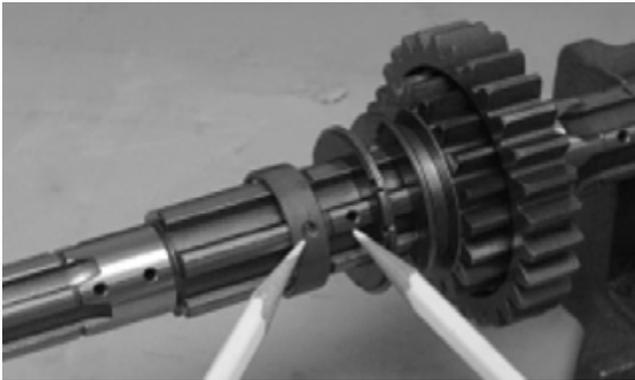
CC215D

6. Remove the 3rd driven gear from the driveshaft.



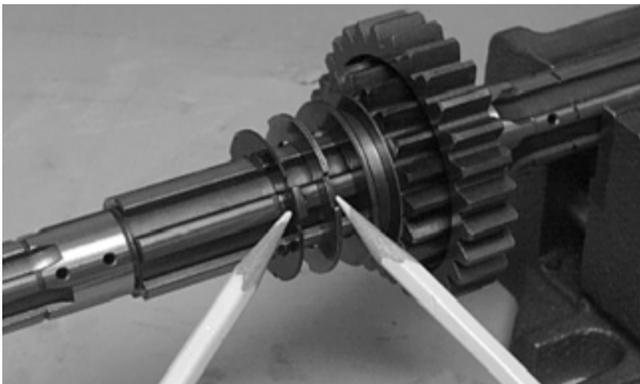
CC214D

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.



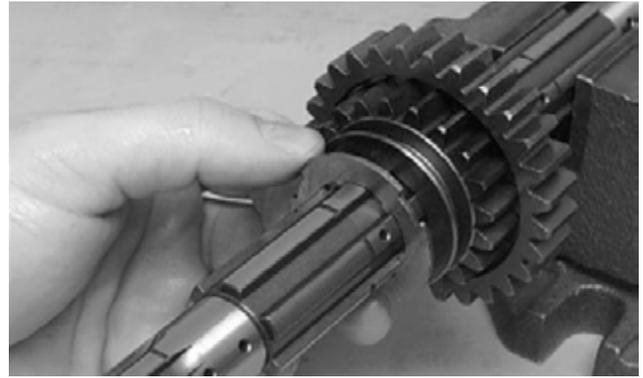
CC213D

8. Remove the first 3rd driven lock washer from the driveshaft. Note the tabs facing toward the 5th driven gear for assembling purposes.



CC212D

9. Remove the second 3rd driven lock washer by rotating it out of the groove. Note the groove closest to the 5th driven gear for assembling purposes.



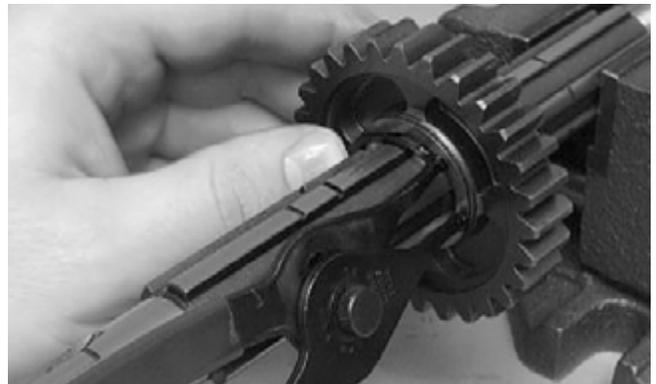
CC211D

10. Remove the 5th driven gear from the driveshaft.



CC210D

11. In order, remove the 2nd driven circlip, washer, gear, and bushing from the driveshaft.



CC209D



CC208D



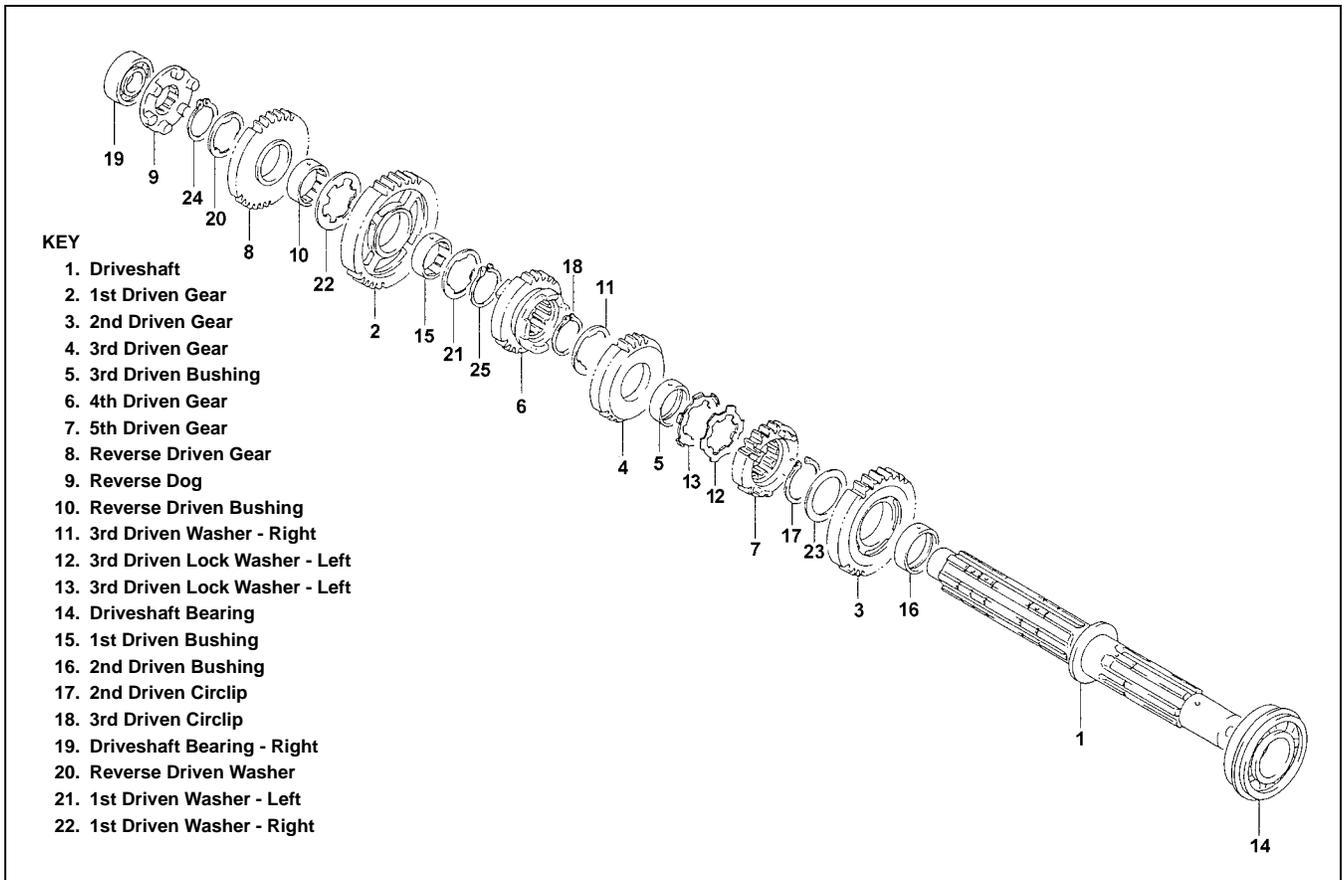
CC207D



CC206D

AT THIS POINT
 To service secondary gears, see Servicing Center Crankcase Components in this sub-section.

Assembling

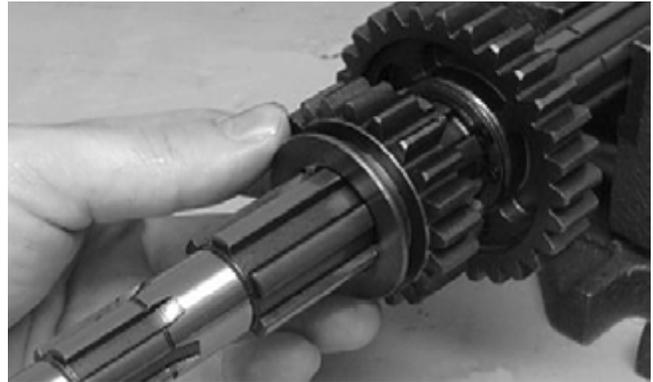


733-754B

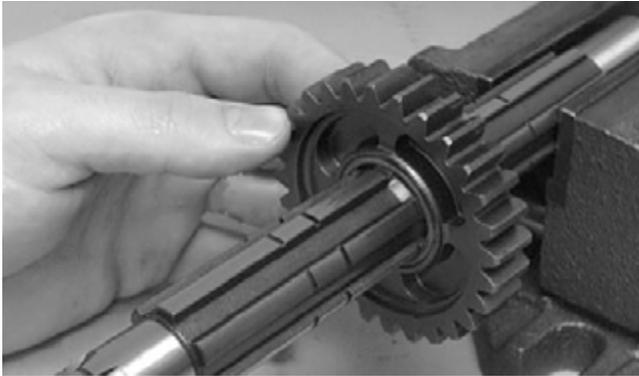
1. In order, install the 2nd driven bushing, gear, washer, and circlip onto the driveshaft.



CC206D

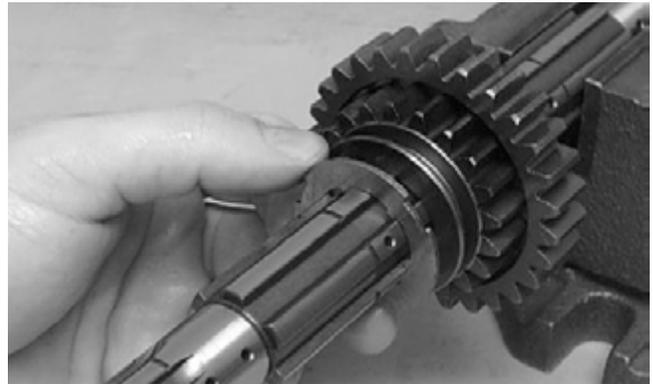


CC210D

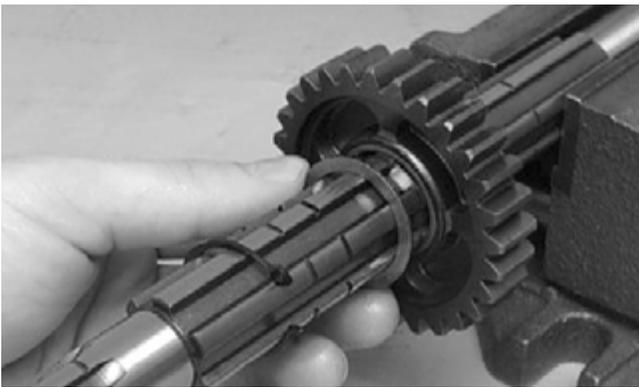


CC207D

3. Install the second 3rd driven lock washer. Lock it into the groove closest to the 5th driven gear (as noted in disassembling) by rotating it when it is in the groove.

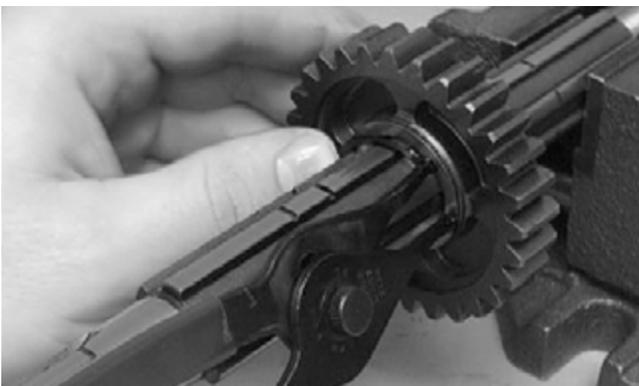


CC211D



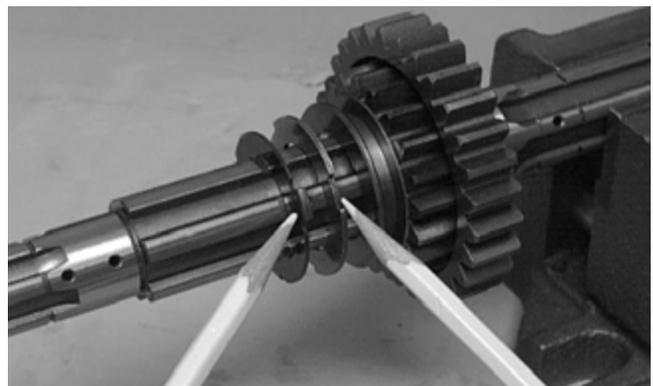
CC208D

4. Install the first 3rd driven lock washer onto the drive-shaft making sure the tabs are facing toward the 5th driven gear.



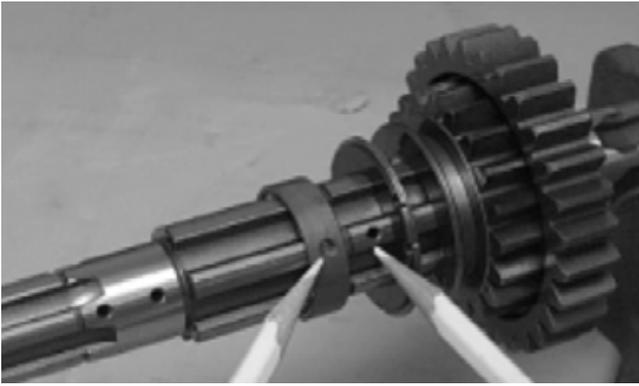
CC209D

2. Install the 5th driven gear onto the driveshaft.



CC212D

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).



CC213D

⚠ 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.

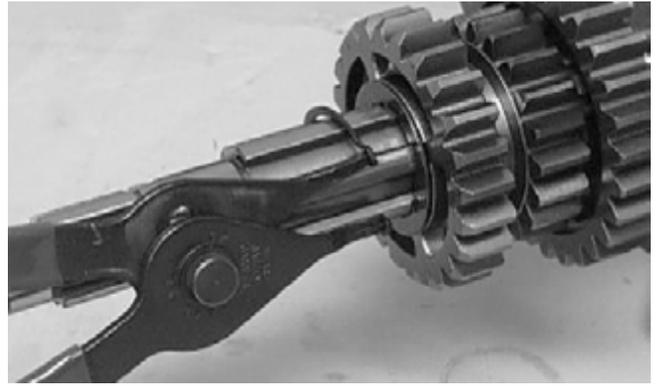
6. In order, install the 3rd driven gear, washer (right side), and circlip onto the driveshaft.



CC214D



CC215D



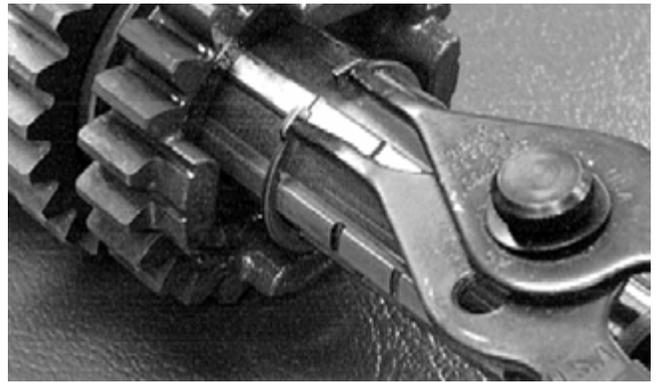
CC216D

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.



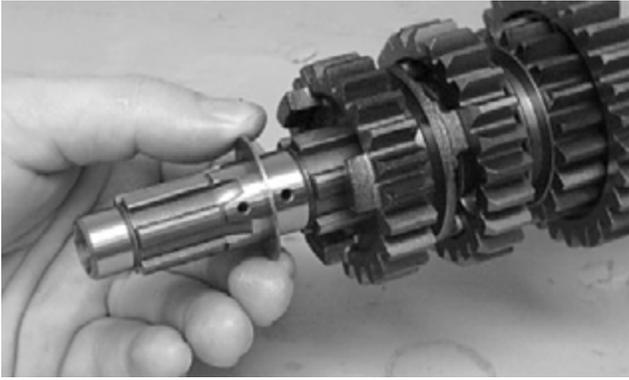
CC219D

■ **NOTE: Secure with the circlip.**

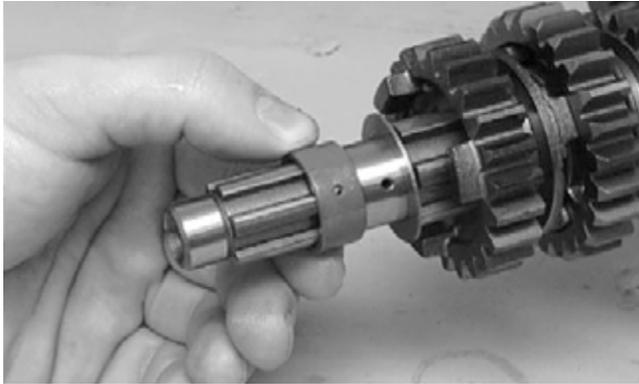


CC508D

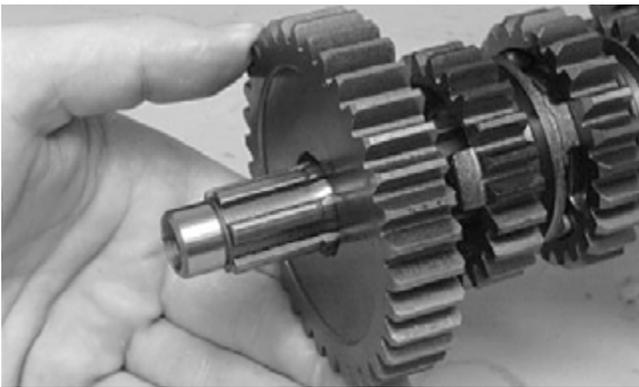
8. Install the 1st driven washer (left side) onto the shoulder of the splined shaft; then install the 1st driven bushing and gear.



CC220D



CC221D



CC222D

9. Install the washer on the shaft making sure it lines up with the groove in the shaft; then turn the washer locking it on the shaft.



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.



CC842

CAUTION

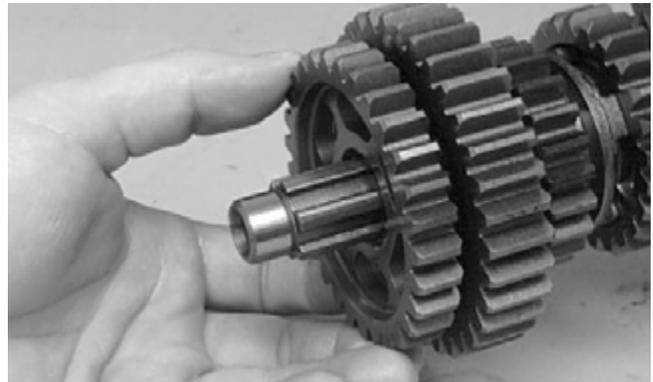
Failure to align the oil ports will result in serious engine damage.

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.

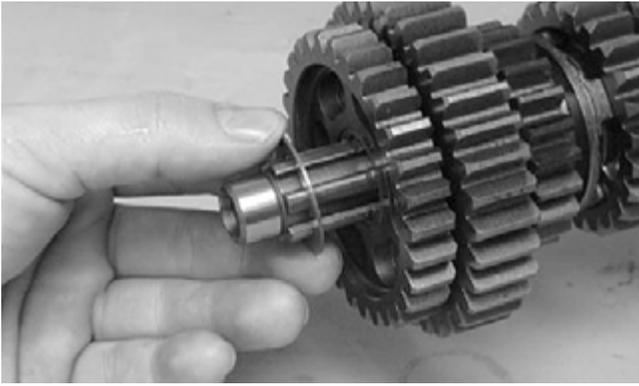


CC843

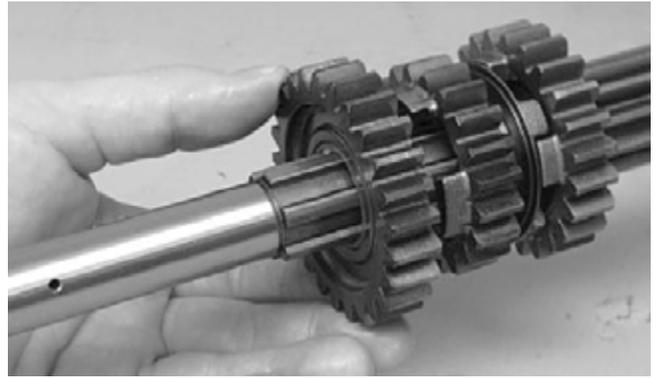
12. In order, install the reverse driven gear, washer, cir-clip, and reverse dog onto the driveshaft.



CC225D



CC226D

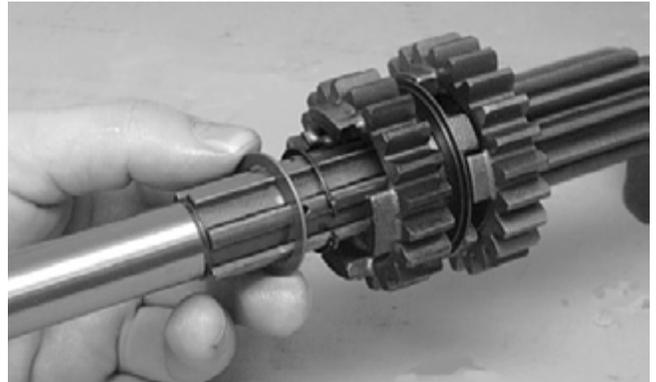


CC203D

3. Remove the 5th drive washer and 5th drive circlip from the countershaft.



CC227D



CC201D



CC228D

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

COUNTERSHAFT

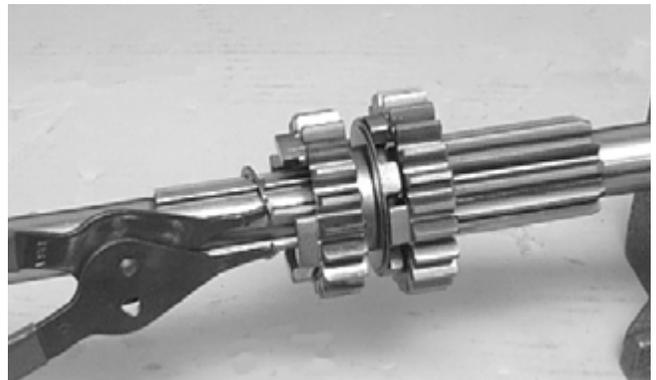
Disassembling

1. Remove the 2nd drive gear from the countershaft using a bearing separator and hydraulic press.

⚠ CAUTION

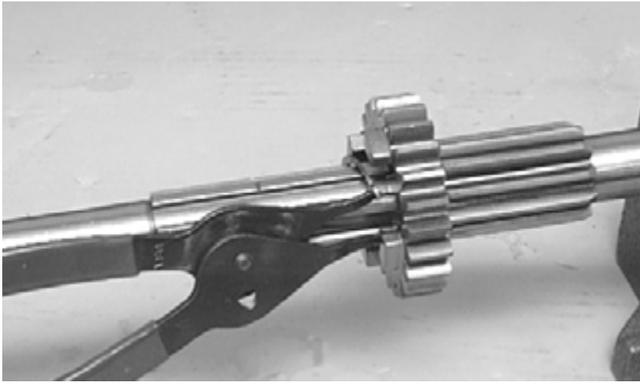
Pressing the 2nd drive gear off may be done twice before shaft replacement is necessary.

2. Remove the 5th drive gear from the countershaft.



CC200D

4. Remove the 3rd drive gear from the countershaft.
5. Remove the circlip securing the 4th drive gear on the countershaft; then remove the washer and 4th drive gear.



CC199D

■NOTE: Account for the bushing in front of the gear.

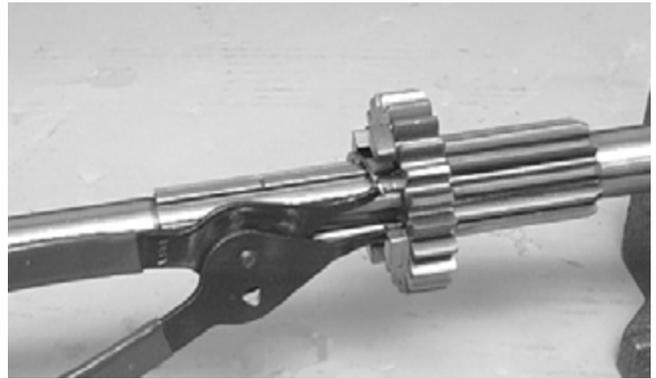
2. Install the 4th drive gear making sure the bushing is in front of the gear; then install the 4th drive washer onto the countershaft. Secure with the circlip.



CC198D



CC198D

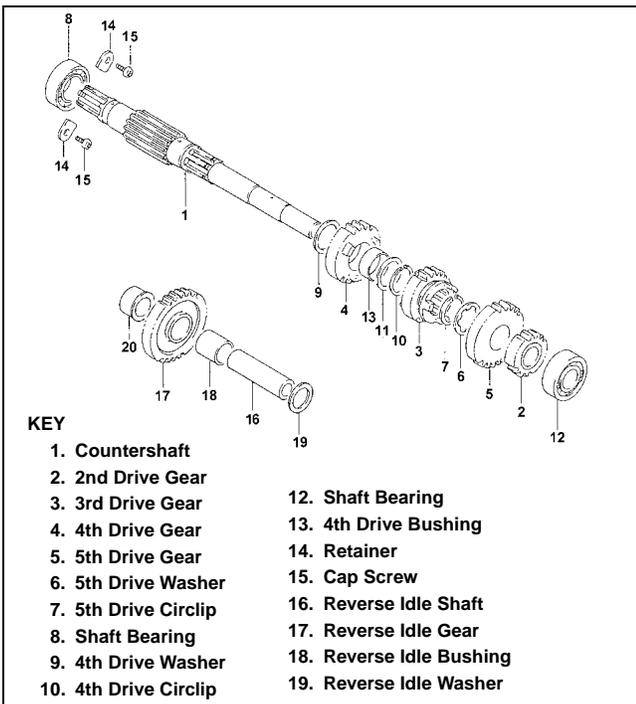


CC199D

6. Remove the 4th drive washer from the countershaft.

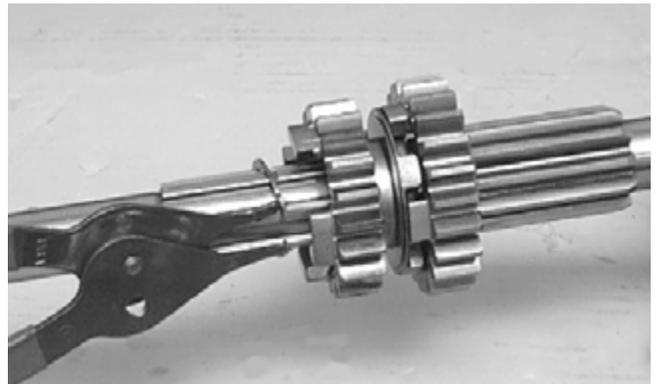
3. Install the 3rd drive gear; then install the 5th drive circlip onto the countershaft.

Assembling



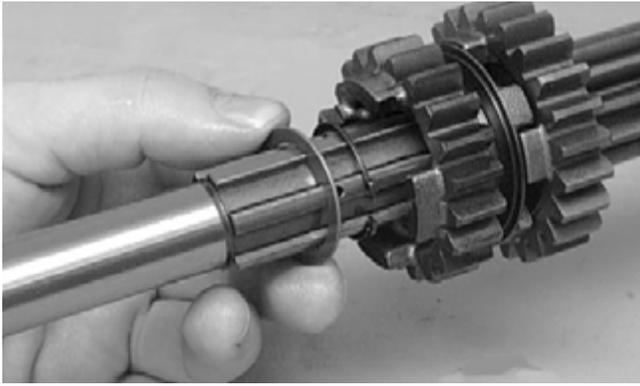
733-754C

1. Install the 4th drive washer onto the countershaft.

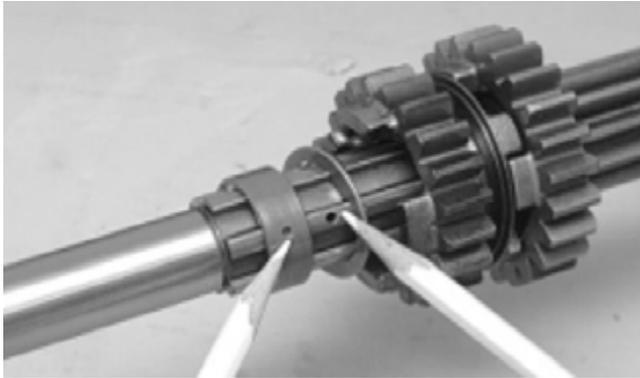


CC200D

4. Install the 5th drive washer and 5th drive gear onto the countershaft making sure the oil holes align.



CC201D



CC202D



CC203D

5. Press the 2nd drive gear onto the countershaft leaving an 0.25 mm (0.010 in.) gap between the 2nd and 5th drive gears.

■NOTE: When pressing the 2nd drive gear onto the countershaft, the inside of the gear must be oil free; then apply a thin, even coat of green Loctite #620 being careful not to get Loctite on the other gears.

CAUTION

Pressing the 2nd drive gear off may be done twice before shaft replacement is necessary.

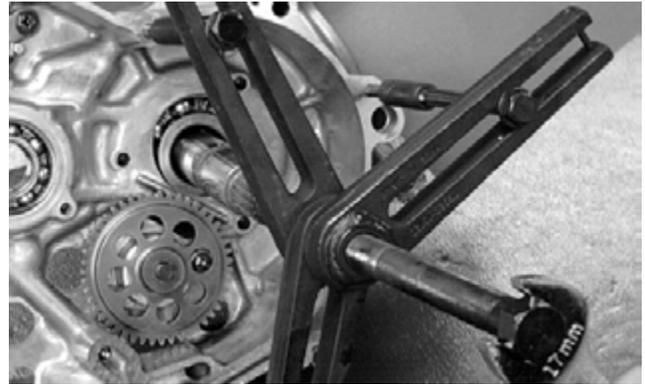
■NOTE: The countershaft is now completely assembled for installation.

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. Place the oil pipe in position and secure to the crankcase with the Phillips-head screws coated with red Loctite #271.
2. Using a crankshaft installer, install the crankshaft assembly.



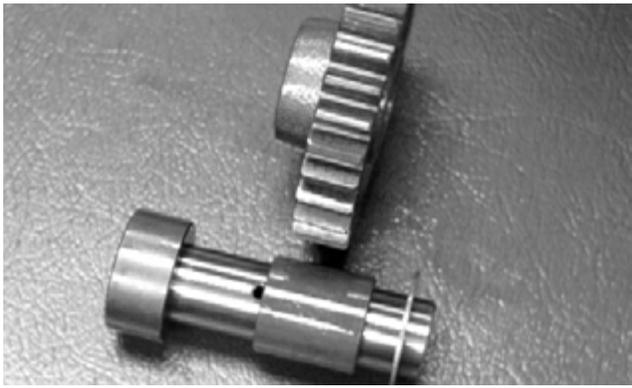
CC507D

3. Simultaneously, install the driveshaft and countershaft assemblies into the crankcase.



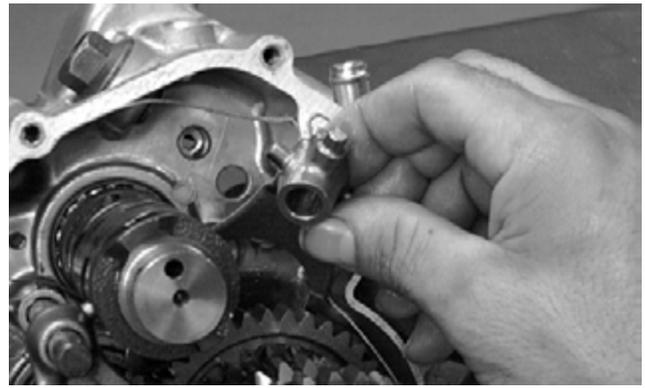
CC505D

4. Install the reverse idle shaft; then install a washer, bushing, reverse idle gear, and a spacer.



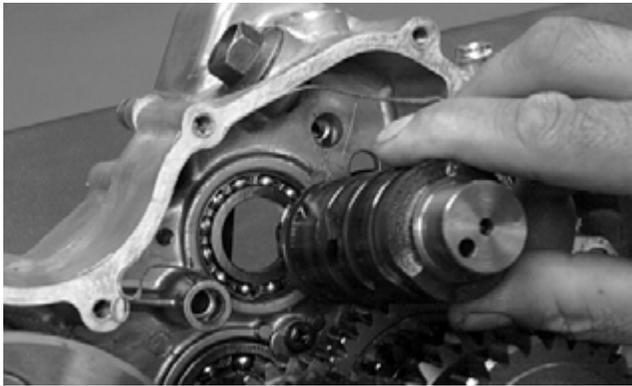
CC504D

5. Install the gear shifting cam.



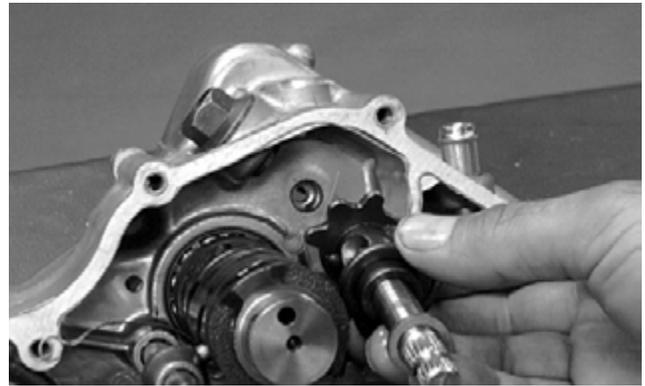
CC498D

9. Install the reverse shifting cam and washer.



CC501D

6. Install the front gear shifting fork.



CC497D

10. Install the center and outer shifting forks.



CC500D

7. Install the short gear shifting fork shaft.



CC486D



CC499D

8. Install the inner shifting fork.

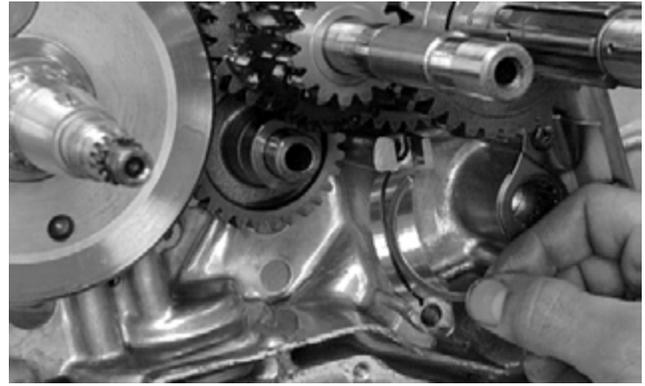


CC496D



CC495D

11. Install the long gear shifting fork shaft.

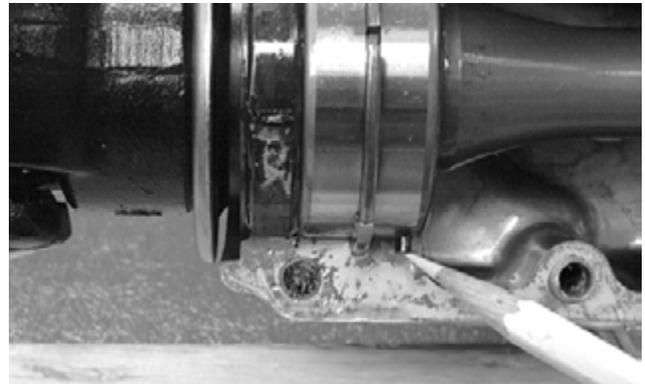


CC492D



CC494D

12. Install the cam stopper detent with gasket onto the crankcase.



CC490D

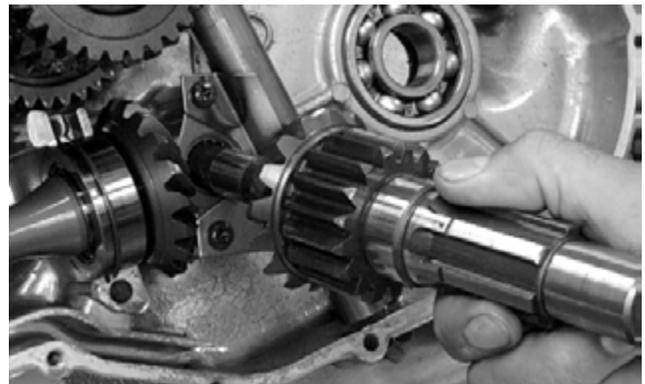
14. Install the sub-transmission shaft assembly.



CC493D

13. On the 4x4, place the C-ring into position; then install the secondary output shaft noting the location of the bearing alignment pin from disassembly.

⚠ CAUTION
Make sure the speedometer drive slot lines up with the groove in the sub-transmission shaft.



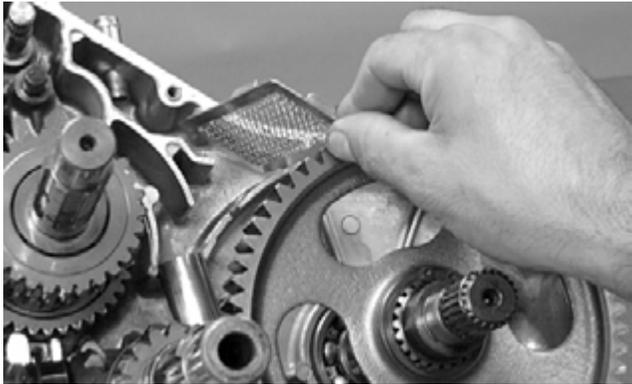
CC489D

15. Install the final driven shaft and gear.



CC488D

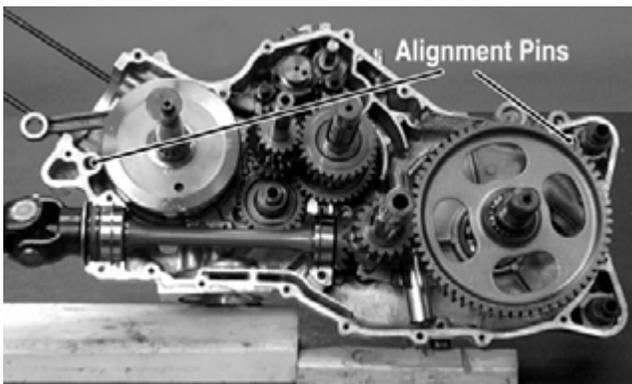
16. On the 300, install the oil breather screen noting the direction of the tabs from disassembly.



CC487D

Joining Crankcase Halves

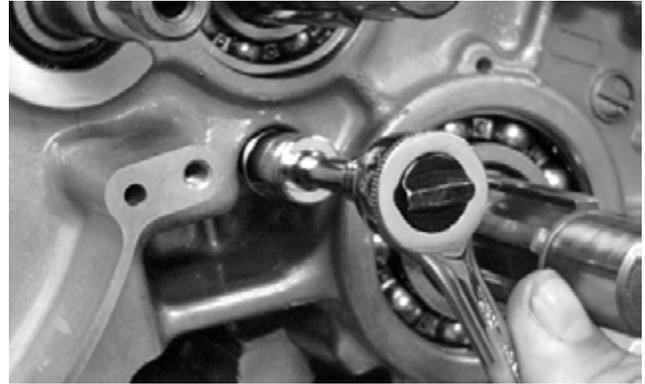
1. Verify that the alignment pins are in place and that both case halves are clean and grease free. Apply Three Bond Sealant (p/n 0636-070) to the mating surfaces. Place the right-side half onto the left-side half.



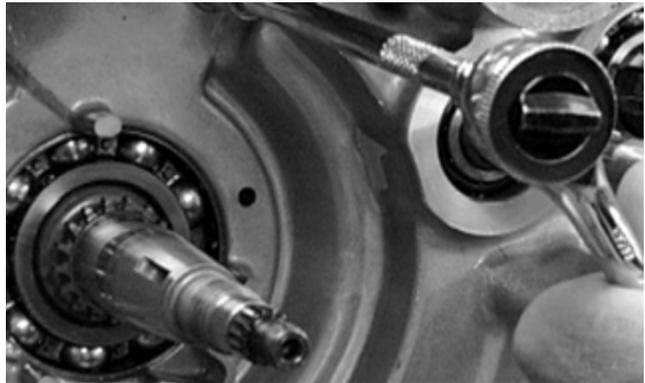
CC485DA

2. Using a plastic mallet, lightly tap the case halves together until cap screws can be installed.
3. From the left side, install the shift cable bracket and the crankcase cap screws noting the location of the different-lengthed 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.



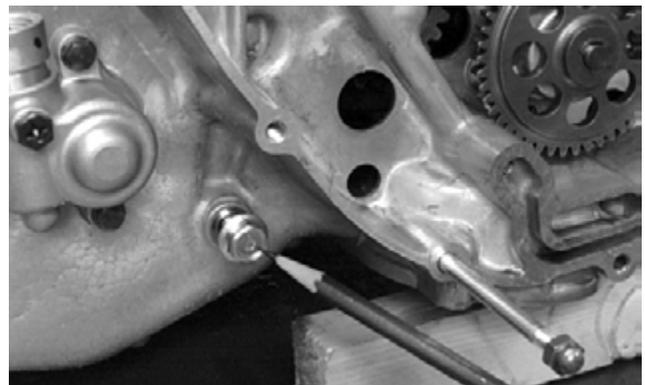
CC483D



CC482D

4. From the right side, install the cap screws noting the location of the cap screw with the copper washer; then tighten only until snug.

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



CC481D



CC480D

- In a crisscross/case-to-case pattern, tighten the 8 mm cap screws until the halves are correctly joined; then tighten to 2-2.4 kg-m (14.5-17 ft-lb).

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

- In a crisscross/case-to-case pattern, tighten the 6 mm cap screws to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

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

- 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.

AT THIS POINT

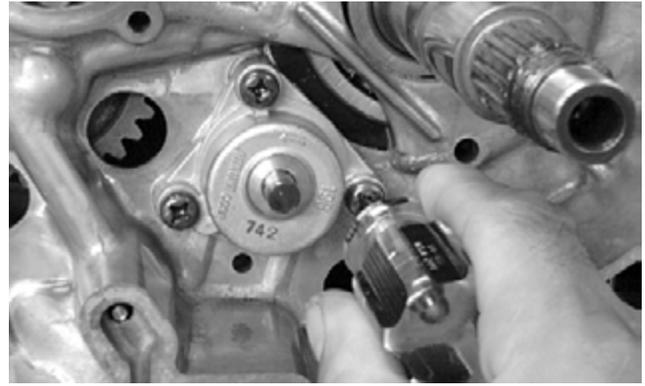
After completing center crankcase components, proceed to Installing Right-Side Components, to Installing Left-Side Components, and to Installing Top-Side Components.

Installing Right-Side Components

- A. Oil Strainer/Oil Pump
- B. Gear Shifting Arm

■NOTE: If the oil pump was serviced, follow steps 1-2.

- Place the oil pump into position on the crankcase and secure with the Phillips-head screws coated with blue Loctite #243. Tighten to 1 kg-m (7 ft-lb).



CC440D

- Place the 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 circlip.



CC439D

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

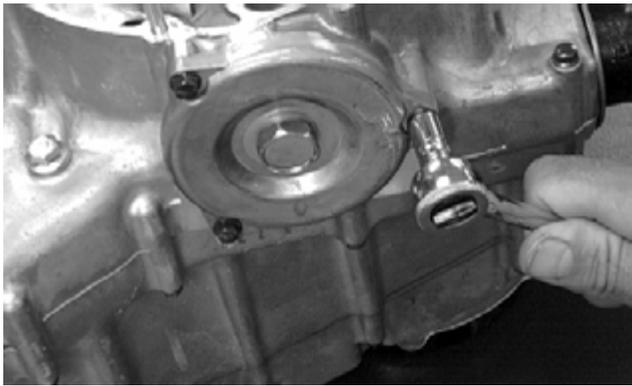
CAUTION

The legs of the strainer must be directed out.



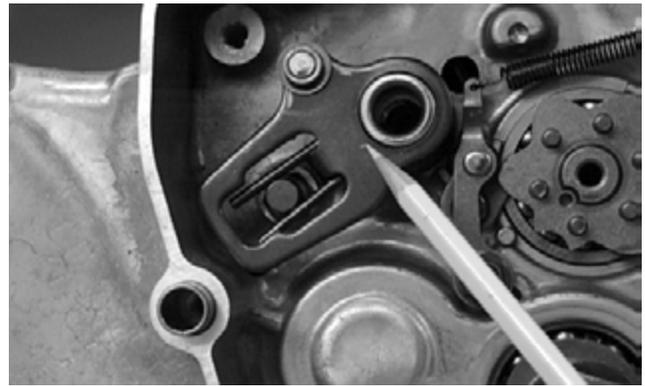
CC443D

- Noting the arrow from disassembly, place the strainer cap into position on the crankcase making sure the O-ring is properly installed and secure with the cap screws; then tighten the oil drain plug to 2.2 kg-m (16 ft-lb).



CC442D

5. Place the stopper plate pins and the pin retainer into position noting the alignment pin. Secure assembly with the cap screw coated with red Loctite #271. Tighten securely.



CC436D

8. Install the gear shifting arm assembly making sure the washer and roller are properly positioned. Secure with the cap screw coated with red Loctite #271.

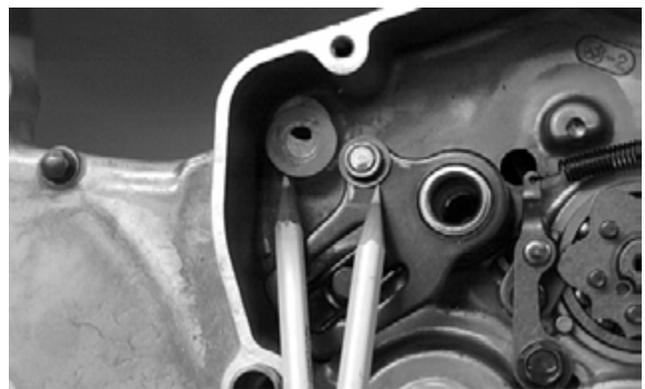
■NOTE: When installing the arm assembly, make sure to lift the spring loaded portion to install between the pin retainer and stopper plate. Also, make sure the link arm roller is in its hole.



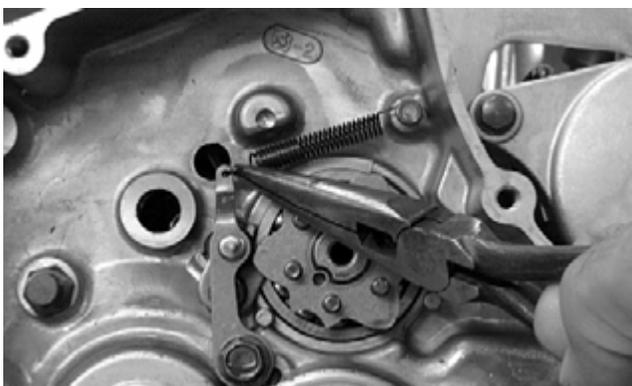
CC438D

■NOTE: The detent in the pin retainer must be straddling a pin.

6. Install the spring onto the cam stopper.



CC435D



CC437D

7. Install the link arm making sure the spring and roller are in position.



CC449D



CC451D

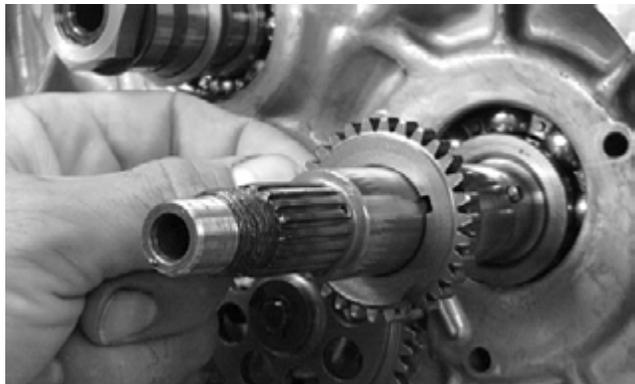
C. Primary Clutch

D. Starter Clutch Shoe

■NOTE: Steps 1-8 in the preceding sub-section must precede this procedure.

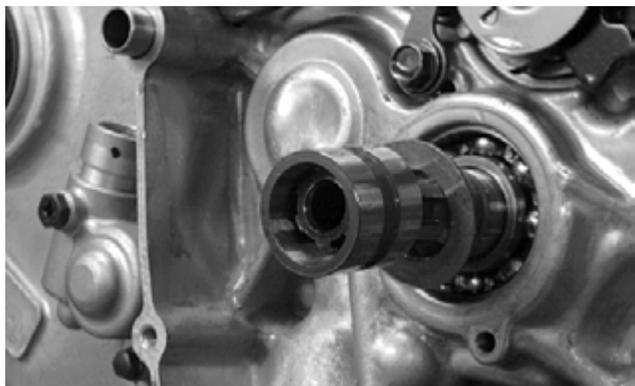
9. Install the oil pump drive gear onto the crankshaft making sure the pin is properly positioned.

■NOTE: The shoulder of the gear must be directed inward.



CC432D

10. Install the primary driven washer and sleeve onto the countershaft.



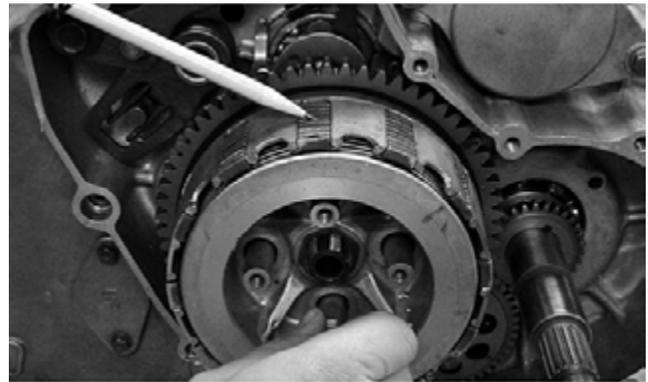
CC431D

⚠ 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.

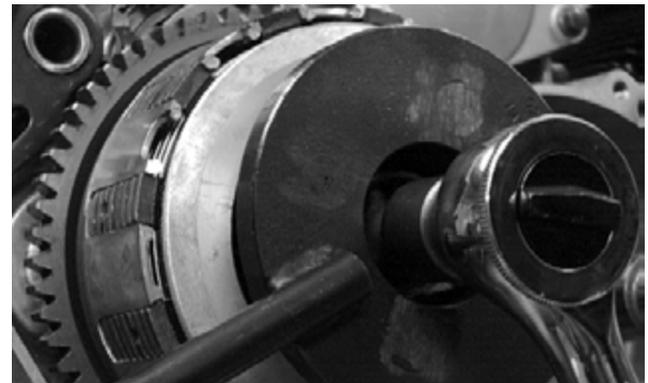
11. Place the primary clutch assembly onto the countershaft.

■NOTE: After placing the primary clutch assembly onto the countershaft, pull out on the pressure plate tower to ensure the pressure plate has engaged the clutch hub properly and make sure the plates (drive and driven) are brought together tightly prior to tightening the nut securing the primary clutch assembly.



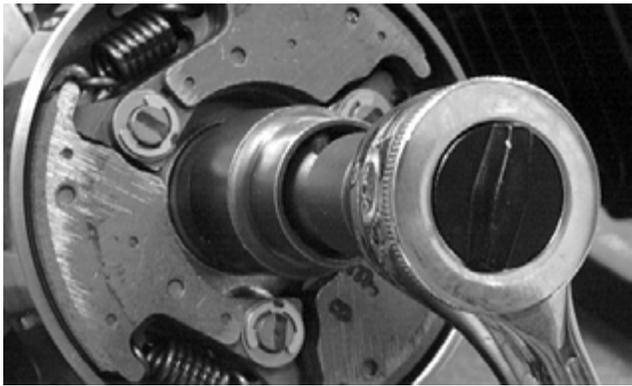
CC914

12. Using a clutch sleeve hub holder, install the nut and washer. Tighten to 8 kg-m (58 ft-lb).



CC428D

13. Place the primary drive one-way clutch housing onto the crankshaft.
14. Install the starter clutch shoe and washer; then secure with the starter clutch-shoe nut (left-hand threads). Tighten to 11 kg-m (79.5 ft-lb).



CC426D

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.



CC425D

16. Slide the clutch release arm and gear shift shaft into the crankcase.



CC424D

E. Release Roller Guide

F. Cover

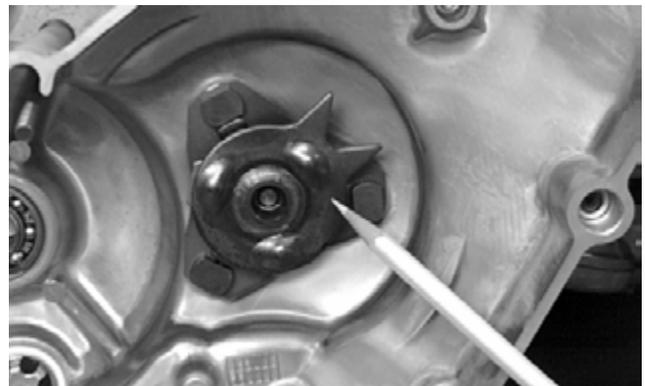
■NOTE: Steps 1-16 of the preceding sub-sections must precede this procedure.

■NOTE: At this time, care should be taken that the alignment pins are installed in the crankcase and the gasket is in position.

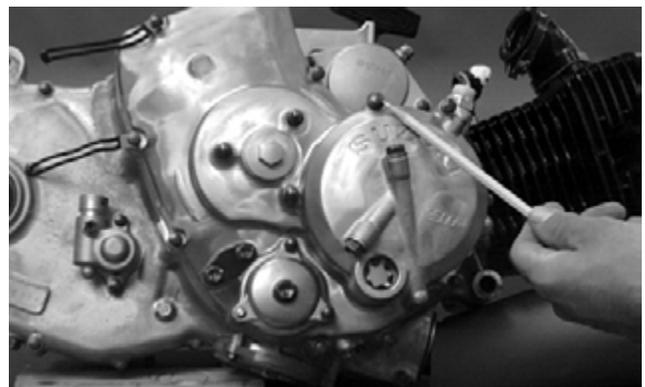


CC423D

17. Install the right-side cover onto the right side crankcase half making sure the release roller guide remains correctly positioned; then install the cap screws. Note the proper locations of the long cap screw with rubber washer and the two wire forms.



CC422D



CC421D

18. Tighten the cap screws in a crisscross pattern to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

Installing Left-Side Components

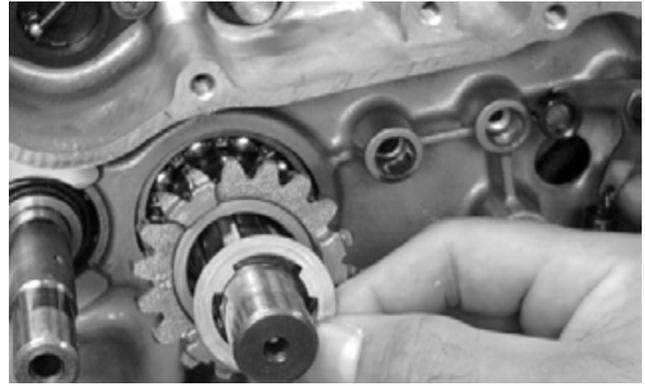
A. Idle Gear Assembly

B. Magneto Rotor

1. Place the shift-indicator sending unit into position making sure the neutral contact and spring are inside the case and a well-oiled O-ring is properly positioned. Secure with Phillips-head screws.



CC479D



CC474D



CC478D



CC473D

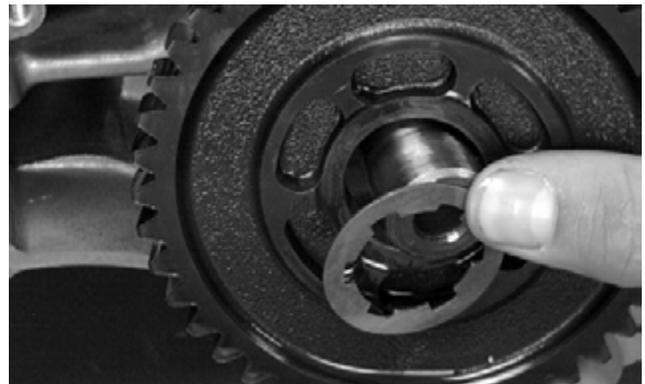
2. Place the spacer and bushing (noting the location of the oil hole) onto the driveshaft and place the gear and washer onto the driveshaft; then secure with the circlip.

3. Place a round washer (4x4) onto the sub-transmission shaft; then install the driven gear and notched washer. Secure with a circlip.

■NOTE: On the 4x4, the slots in the gear must face towards the left-side cover when installed.



CC476D



CC471D

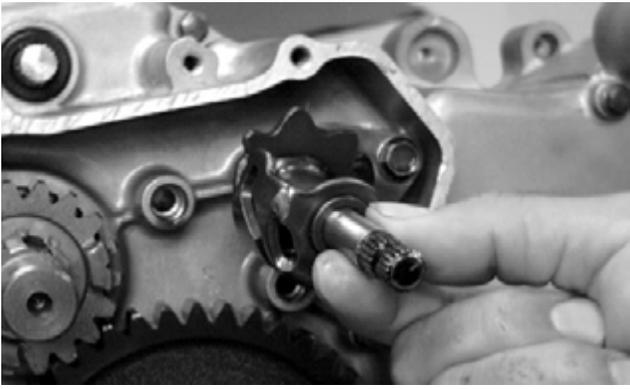


CC475D



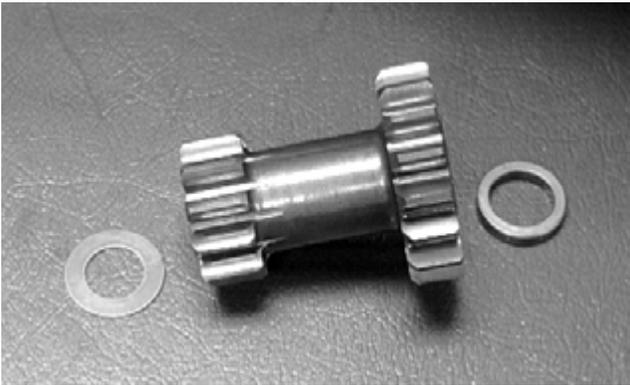
CC470D

4. Install the sub-transmission gear cam.



CC469D

5. Install the idler gear and washers noting the thick washer on the inside from disassembly.



CC477D



CC468D

6. Install the drive gear dog onto the driveshaft.



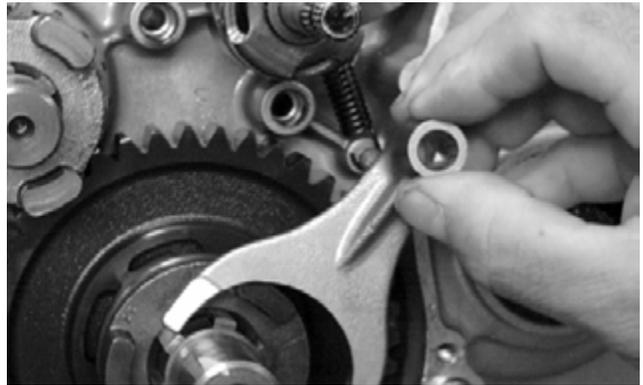
CC467D

7. Place the driven gear dog onto the sub-transmission shaft (4x4).



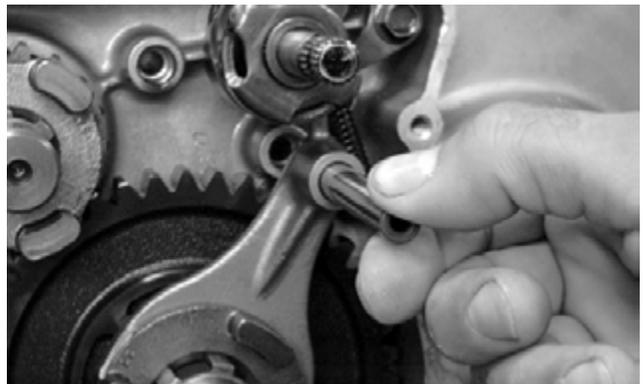
CC466D

8. Install the long shift fork (4x4).



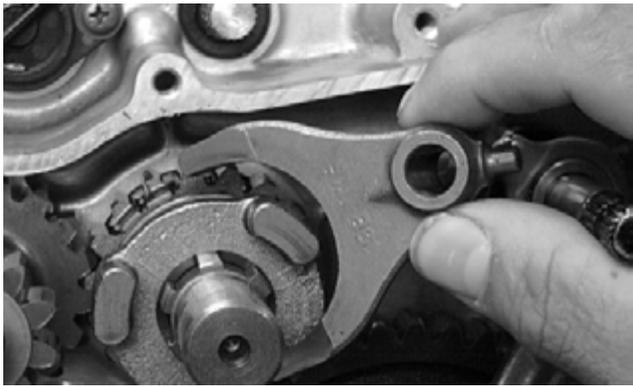
CC465D

9. Install the long shift fork shaft (4x4).



CC464D

10. Install the short shift fork.



CC463D

11. Install the short shift fork shaft.



CC462D

12. Place the drive gear and washer on the driveshaft.

13. Install the driven gear and washer (4x4).



CC460D

14. Install the cam chain; then install the starter clutch gear assembly.



CC459D

15. Place the magneto rotor into position on the crankshaft making sure the key is in place.



CC458D

16. Install the starter idler gear and shaft; then install the spacer.



CC455D



CC454D

C. Stator Assembly/Cover

D. Starter Cup

E. Recoil Starter

■NOTE: Steps 1-16 in the preceding sub-section must precede this procedure.

17. Install the magneto rotor nut on the crankshaft and tighten until the rotor is properly seated; then tighten to 16 kg-m (116 ft-lb).



CC416D

18. Place the gasket and left-side cover into position on the crankcase making sure the alignment pins are in place.
19. Install the cap screws to secure the left-side cover noting the location of the different-sized cap screws; then only finger-tighten at this time.
20. Place the starter cup into position on the crankshaft making sure a new, lubricated O-ring is inside the cup. Tighten the nut with lock washer to 3.5 kg-m (25 ft-lb).



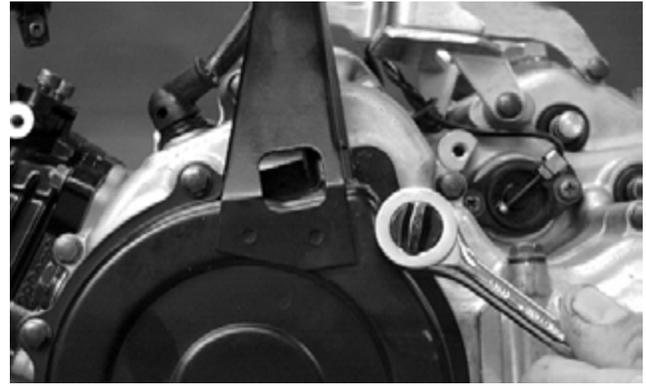
CC413D

21. Tighten the left-side cover caps screws (from step 19) to 0.9-1.3 kg-m (6.5-9.5 ft-lb).



CC414D

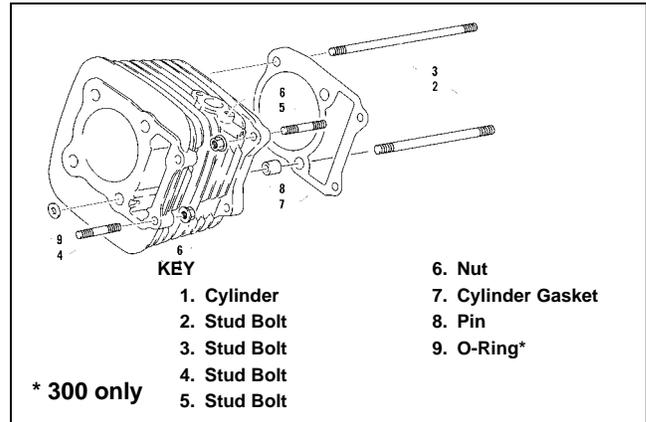
22. Place the gasket and recoil starter assembly into position on the left-side cover noting the location of the single washer; then tighten the cap screws to 0.8 kg-m (6 ft-lb).



CC412D

Installing Top-Side Components

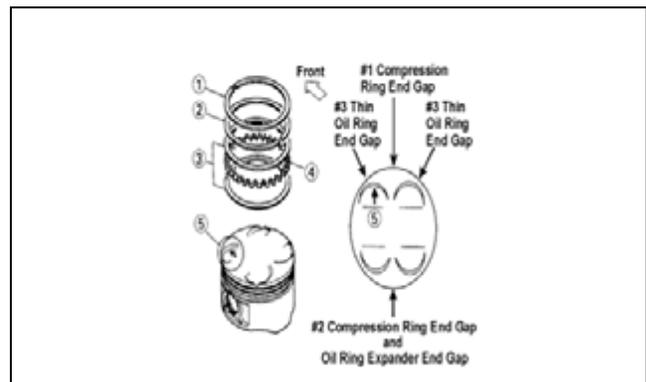
- A. Piston
- B. Cylinder



0733-744

■ **NOTE:** If the piston rings were removed, install them in this sequence.

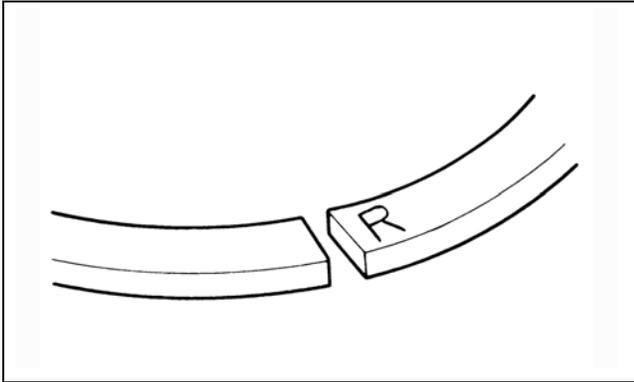
- A. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



ATV-1085B

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

B. 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).



ATV-1024

⚠ 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 towards the front.



CC383D



CC382D

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.

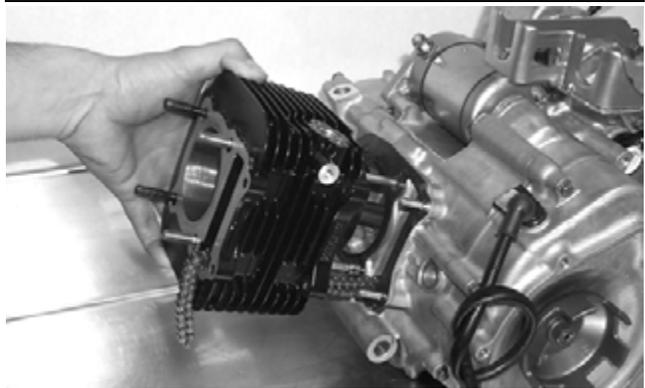


CC381D

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.



CC525D

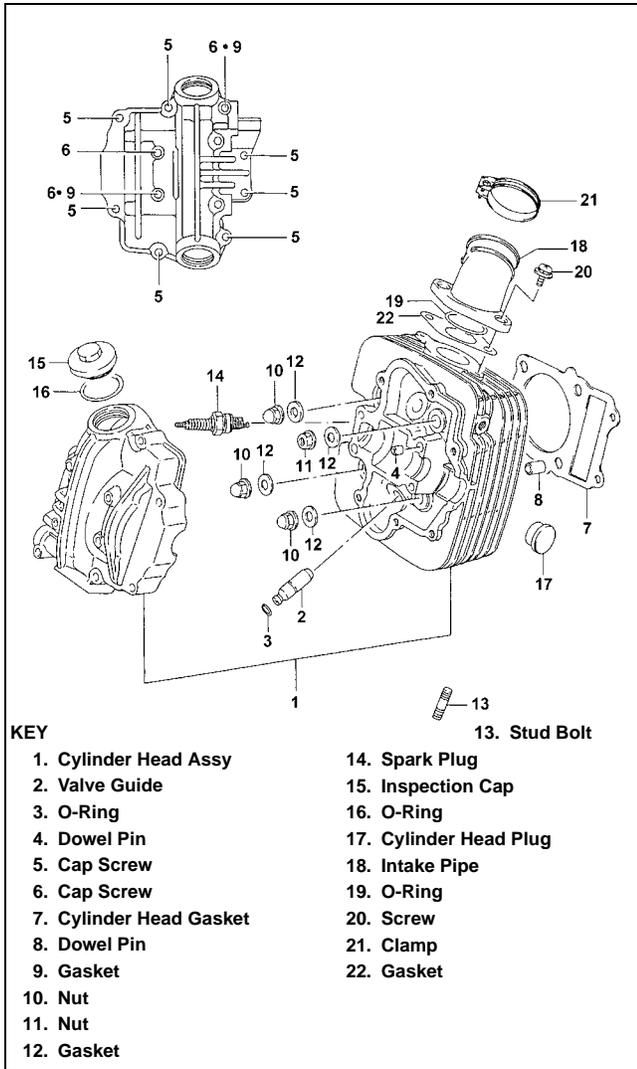
4. Loosely install the two nuts which secure the cylinder to the crankcase.

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



CC380D

C. Cylinder Head
D. Valve Cover



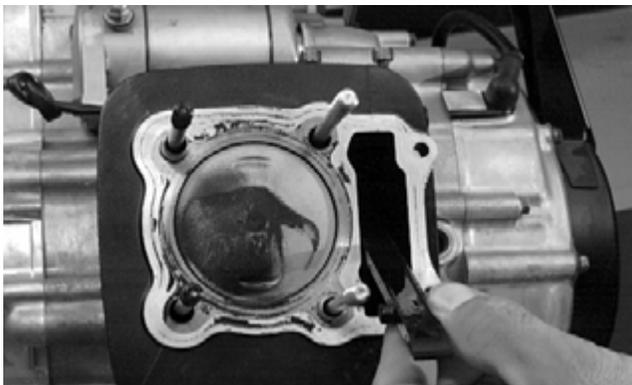
0733-743

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

5. Place the chain guide into the cylinder.

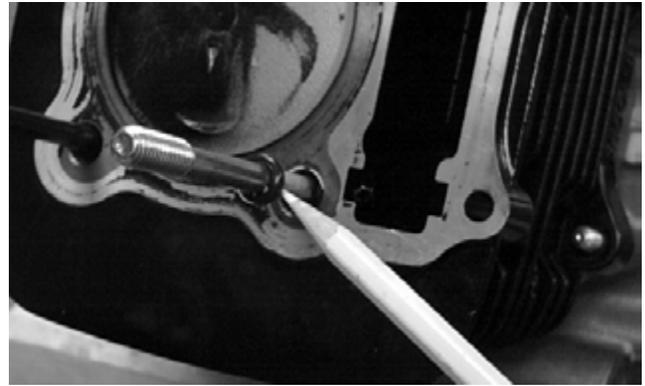
CAUTION

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



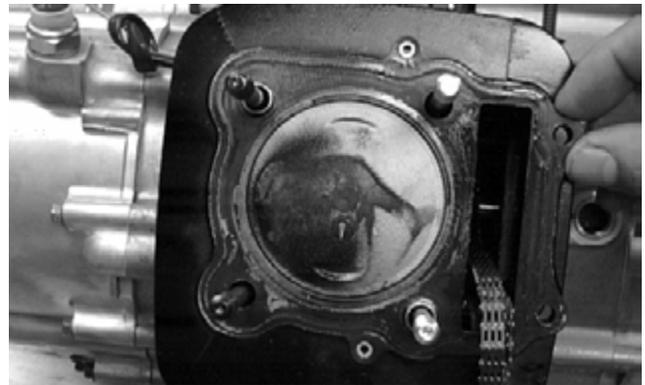
CC379D

6. On the 300, install the O-ring onto the front left-side stud.



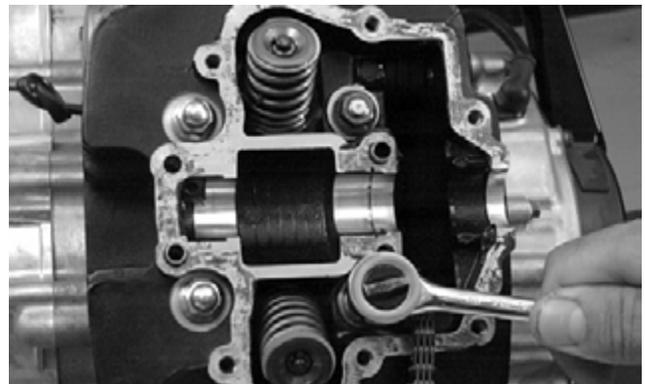
CC384D

7. Place the head 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 chain is routed through the chain cavity.



CC378D

8. Install the three cylinder head cap nuts and one nut with copper washers (note the locations of the cap nuts and nut). Tighten only until snug.



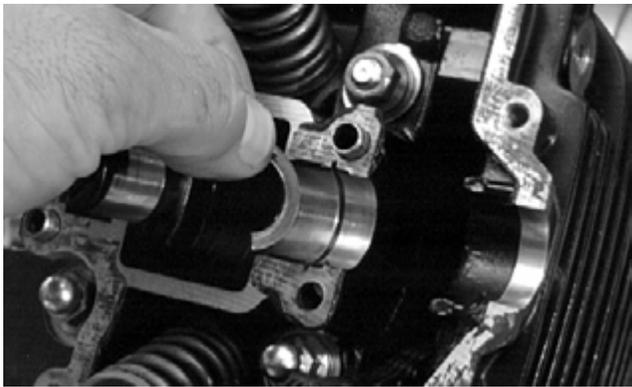
CC377D

9. Loosely install the remaining cylinder head nuts.



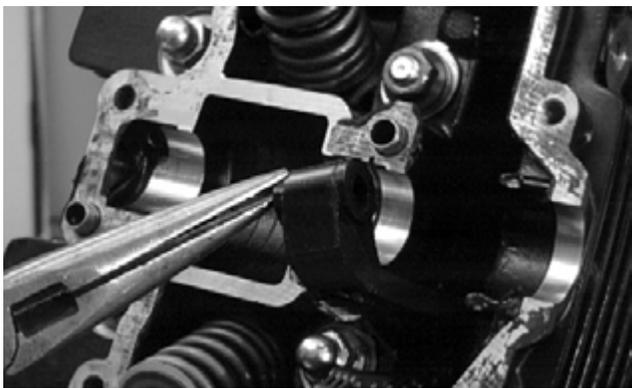
CC376D

10. In a crisscross pattern, tighten the three cylinder head cap nuts and one nut to 2.5 kg-m (18 ft-lb). Tighten the remaining head nuts and the cylinder-to-crank-case nuts to 1.1 kg-m (8 ft-lb).
11. Place the C-ring into position in its groove in the cylinder head.



CC374D

12. Install the chain tensioner pad into the cylinder head.



CC375D

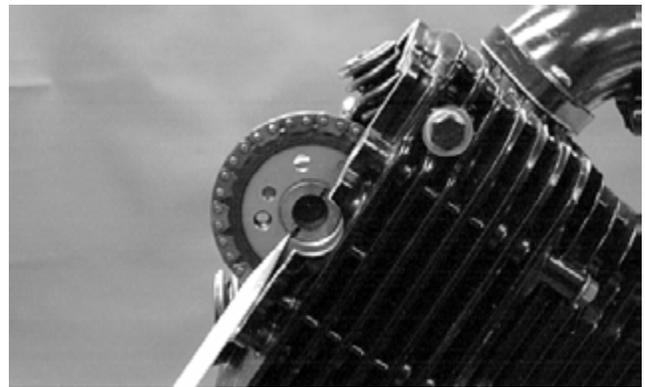
■NOTE: At this point, oil the camshaft bearings, cam lobes, and the three seating journals on the cylinder.

13. With the alignment pin installed in the camshaft and the cam lobes directed down (toward the piston), place the camshaft in its seating position; then loop the chain over the sprocket and install the sprocket onto the camshaft.



CC373D

■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.



CC401D

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



CC402D

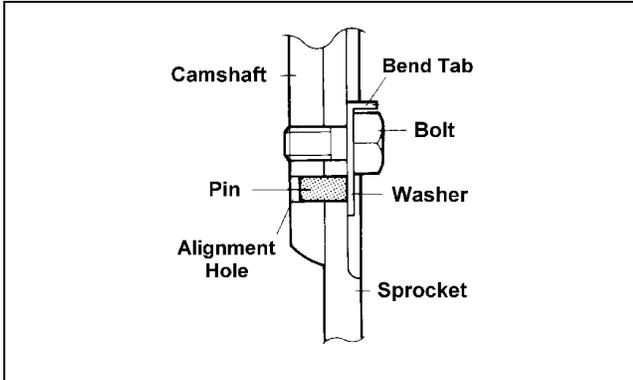
14. When the camshaft assembly is seated, ensure the following.
 - A. Piston still at top-dead-center.
 - B. Camshaft lobes directed down (toward the piston).

- 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 13 and carefully proceed.

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



ATV-1027

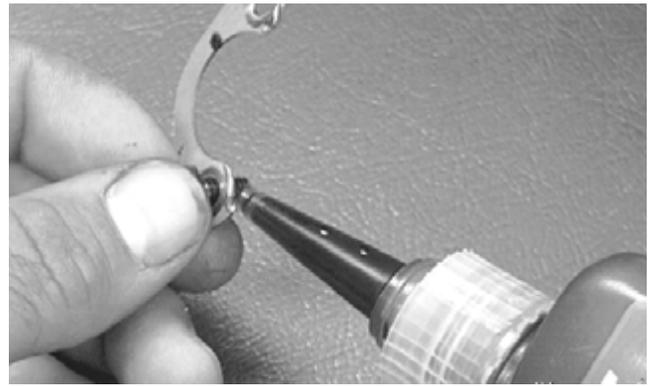
⚠ CAUTION

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.



CC403D

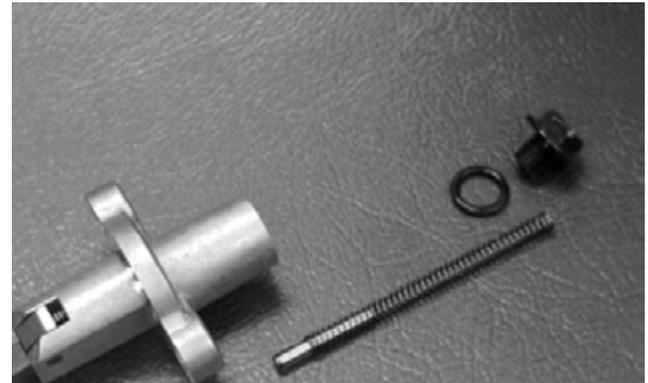
16. Install the first cap screw securing the sprocket and tab washer to the camshaft. Tighten only until snug.



CC404D

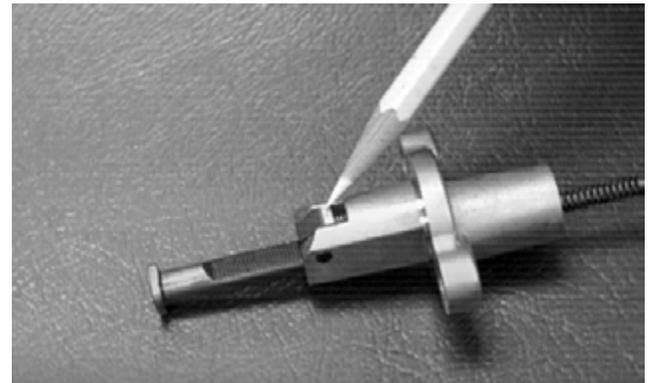
17. Install the cylinder head plug in the cylinder head.

18. Remove the cap screw from the end of the chain tensioner. Account for the plunger, spring, and O-ring.



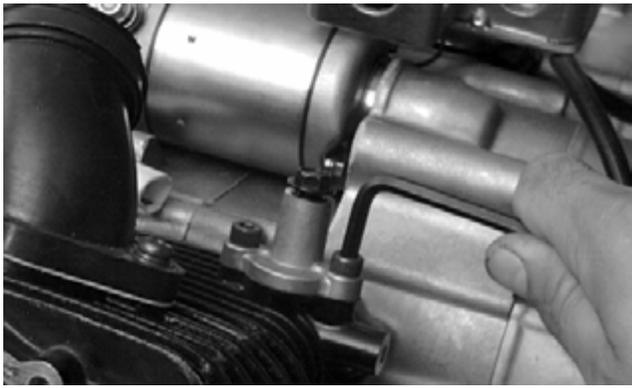
CC405D

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



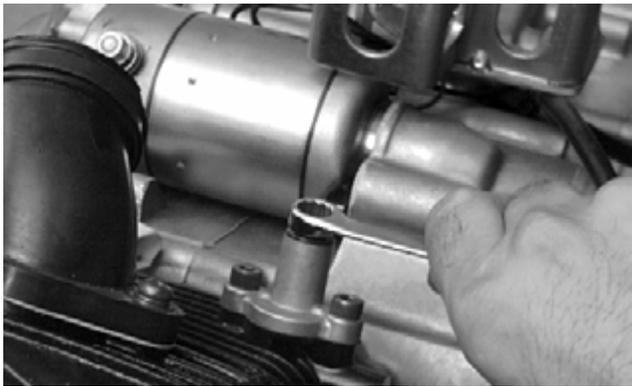
CC406D

20. Place the 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 Allen-head cap screws.



CC370D

21. Install the cap screw into the end of the chain tensioner.



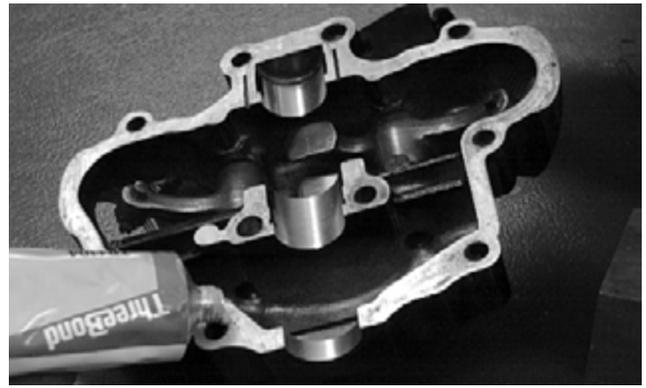
CC369D

22. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw and tighten to 1.15 kg-m (8.5 ft-lb). Bend the tab to secure the cap screw.
23. Rotate the crankshaft until the first cap screw securing the sprocket to the camshaft can be addressed; then tighten to 1.15 kg-m (8.5 ft-lb). Bend the tab to secure the cap screw.
24. Loosen the adjuster screw jam nuts; then loosen the adjuster screws on the rocker arms in the valve cover.



CC407D

25. Apply a thin coat of Three Bond Sealant (p/n 0636-070) to the mating surface of the valve cover.



CC408D

26. Place the valve cover into position.

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

27. Install the top side valve cover cap screws into the head noting the locations of any with rubber washers; then install the remaining cap screws. Tighten only until snug.

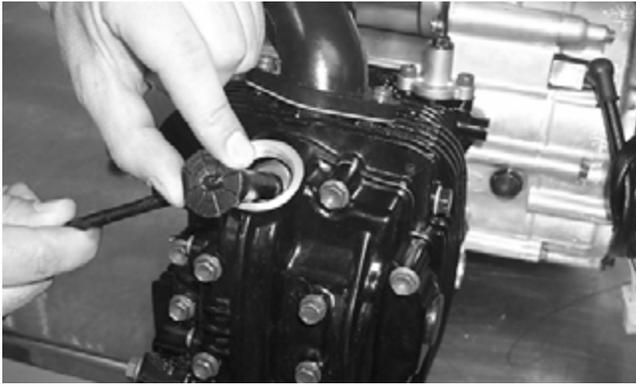


CC367D

28. In a crisscross pattern starting from the center and working outward, tighten the cap screws to 1 kg-m (7 ft-lb).
29. Adjust valve/tappet clearance using the following procedure.

■NOTE: Use Valve Gap Adjuster (p/n 0444-092) for this procedure.

- A. Turn the engine over until the piston reaches top dead center on the compression stroke.
- B. 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.
- C. 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.



CC522D

D. Align the valve adjuster handle with one of the marks on the valve adjuster dial.

E. While holding the valve adjuster handle in place, rotate the valve adjuster dial counter-clockwise until specified valve/tappet clearance is attained.

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

F. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.

30. Place the two tappet covers with O-rings into position; then tighten the covers securely.



CC366D

31. Install the spark plug and tighten to 1.7 kg-m (12 ft-lb); then install the timing inspection plug.



CC411D

Installing Engine/ Transmission

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

1. Install the engine into the sub-frame assembly.
2. Connect each drive axle to the engine output shafts.
3. Secure the upper A-arms with cap screws. Tighten to 4.8 kg-m (35 ft-lb).



CH077D

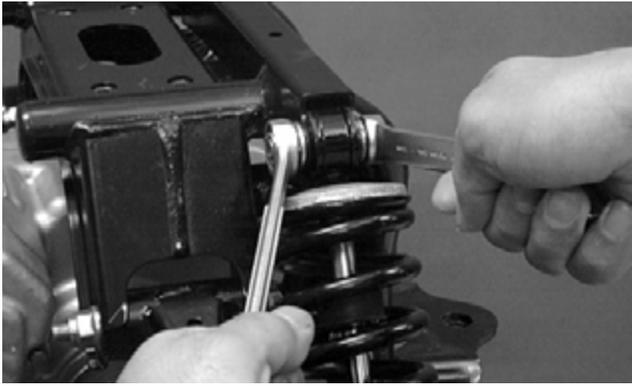
4. Secure the rear of the engine to the sub-frame with cap screws and flat washers. Tighten to 5.5 kg-m (40 ft-lb).

■NOTE: The washers must be located next to the head of the cap screw.



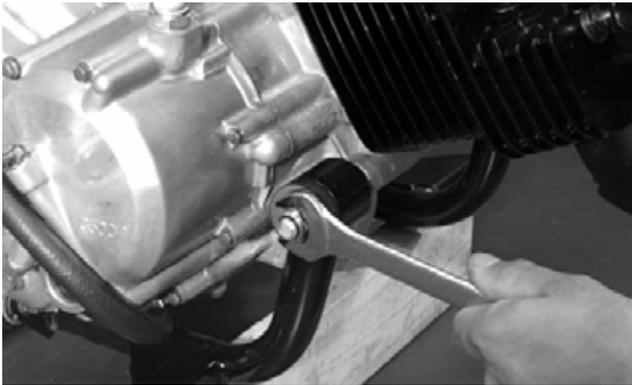
CH075D

5. Secure the upper shock mount to the sub-frame. Tighten to 4.8 kg-m (35 ft-lb).



CH076D

6. Secure the front of the engine to the sub-frame using a cap screw and spacers. Tighten to 5.5 kg-m (40 ft-lb).



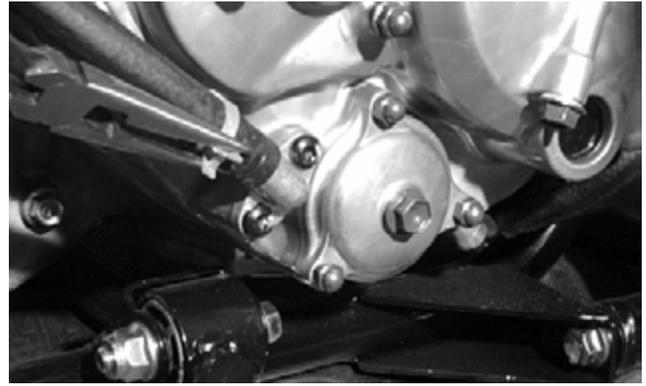
CH074D

7. Secure the rear wheels to the hubs. Tighten to 5.5 kg-m (40 ft-lb).
8. Place the engine/sub-frame assembly onto a large floor/transmission jack and place the sub-frame assembly up and into position; then loosely start all six mounting cap screws.

⚠ WARNING

Support the ATV so it doesn't fall off the support stand when the engine/sub-frame assembly is installed into the frame or severe damage, injury, or death may result.

9. Tighten the four upper sub-frame mounting cap screws in a crisscross pattern to 5.5 kg-m (40 ft-lb).
10. Tighten the two lower sub-frame mounting cap screws to 5.5 kg-m (40 ft-lb).
11. Secure the skid plate to the rear end assembly. Tighten securely.
12. Secure the two oil cooler hoses to the engine.



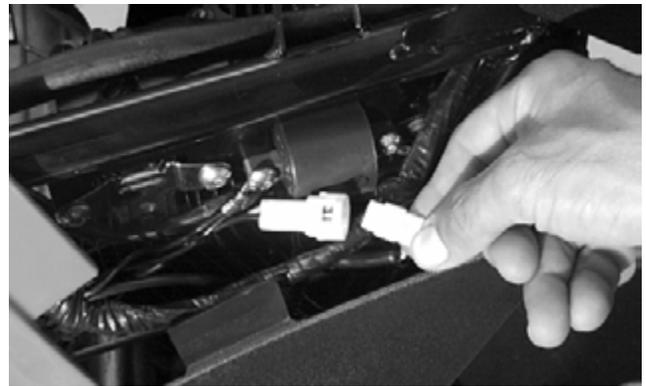
CH070D

13. Secure the brake hose holder to the upper suspension arm with a torx-head screw. Tighten securely.
14. Tighten the rear hydraulic brake caliper to 2.8 kg-m (20 ft-lb).



CH068D

15. Tighten the auxiliary brake caliper to 2.1 kg-m (15 ft-lb).
16. Secure the oil light switch to its connector.



CH067D

17. Secure the right-hand side panel.



CH066D

18. Secure the remaining connectors to the main wiring harness.



CH065D

19. Install the air-cleaner assembly into the frame and connect the crankcase breather hoses; then secure the air-cleaner assembly to the frame. Tighten securely.

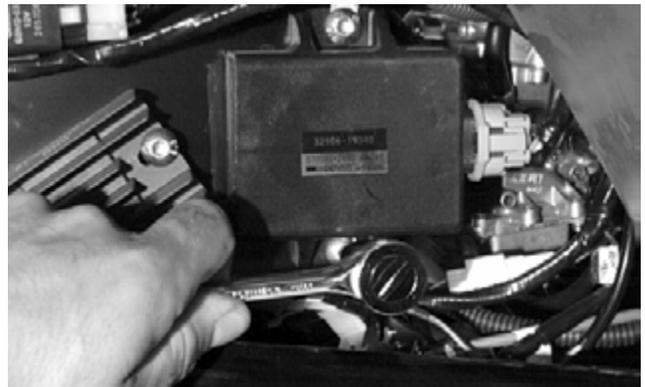


CH048D



CH047D

20. Secure the CDI unit to the frame. Tighten securely.



AF882D

21. Install the carburetor into the air-intake boots; then tighten the clamps. Route the vent hoses in the seat stop holes.



CH043D

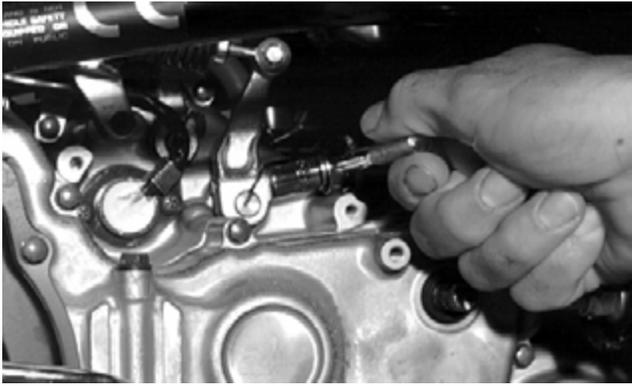
22. Secure the air-intake snorkel to the air-cleaner assembly and frame.

23. Secure the reverse gear shaft arm to the reverse shift shaft making sure that the alignment marks made during removing align. Tighten securely.



AF942

24. Secure the gear shifter arm to the shifter arm shaft making sure that the alignment marks made during removing align. Tighten securely.



CH060D

25. Secure the hi/lo range shifter arm to the shifter arm shaft making sure that the alignment marks made during removing align. Tighten securely.



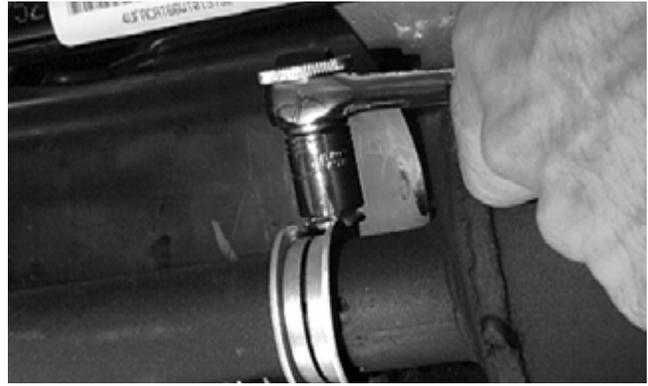
CH058D

26. Place the exhaust header pipe up to the engine with the existing grafoil gaskets and springs.



CH055D

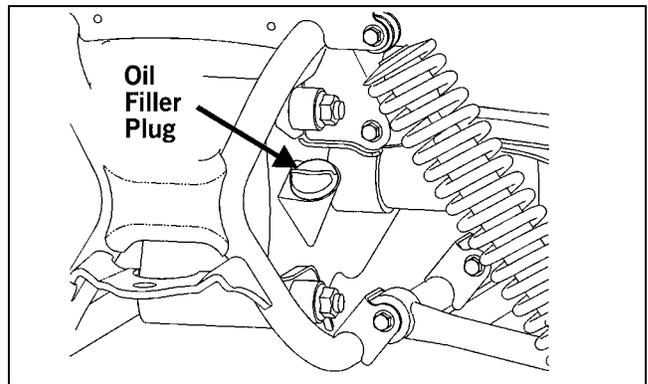
27. Secure the muffler and exhaust pipe. Tighten securely.



CH056D

28. Connect the positive cable to the starter motor; then connect the ground (negative) cable to the crankcase.

29. Fill the engine with the correct engine oil (viscosity and quantity).



733-714A

30. Install the battery and the battery hold-down bracket.

31. Connect the positive cable to the battery first; then the negative cable. Connect the high tension lead to the spark plug.

32. Install the seat.

33. Adjust the auxiliary brake to within specifications.

34. Remove the tie-down straps; then remove the ATV from the support stand.

35. Turn the gas tank valve to the ON 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.

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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/replace left-side cover oil seals (3), front output joint oil seal (1), rear output joint oil seal (1), 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 hold-down strap and the battery vent hose; then remove the battery.

CAUTION

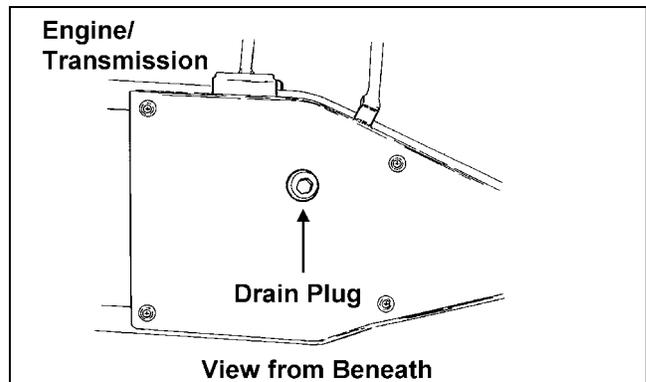
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

3. Near the battery tray, remove the two screws securing the fuse block; then carefully remove all the wiring from the block.

CAUTION

It is critical that all wiring be marked when removing from the fuse block. This will aid in installing correctly.

4. Carefully guide the battery cables and fuse block wiring down through the access hole into the engine compartment for future removing.
5. Drain the oil from beneath the engine/ transmission.



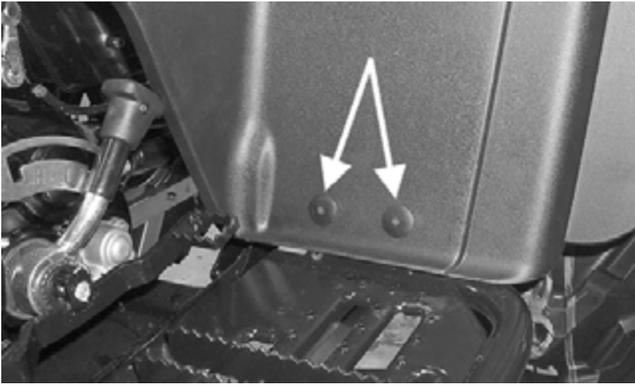
ATV-0109

6. Remove the hardware securing the right-side and left-side panels; then remove the panels.
7. Turn the gas tank valve to the OFF position; then remove the fuel hose and vent hose.
8. Remove the gas tank.



CC933

9. Remove the rear fenders and the rear rack (see Section 8).
10. Remove the hardware securing both footrests to the frame and front fender.



CC861A

11. Remove the two cap screws securing the exhaust pipe to the engine; then loosen the exhaust pipe from the muffler at the juncture in front of the muffler.



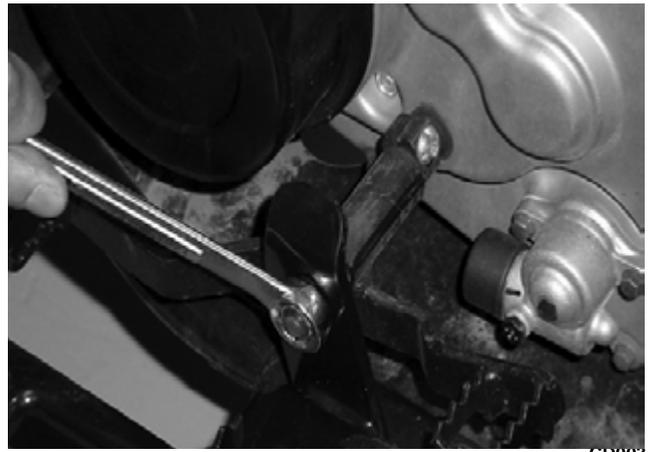
AF775D

12. Remove the exhaust pipe and account for the grafoil gasket.

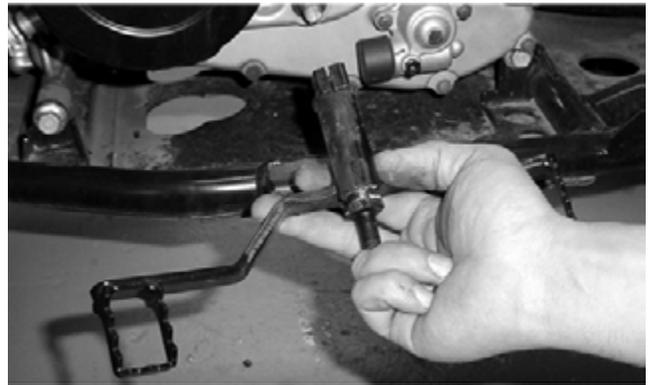


CC941

13. Remove the pinch screw and lock nut securing the gear shift lever; then remove the gear shift lever from the shaft on the engine.



CD003



CC934

14. Remove the E-clip securing the reverse shift linkage; then remove the linkage. Account for the bushing and washer.



CC935

15. On the 4x4, detach the speedometer cable by loosening the knurled nut and routing the cable away from the engine/transmission.



AF667D

16. Remove the four cap screws securing the rear output joint to the transmission and push the shaft away from the transmission.



CC119D

17. On the 4x4, remove the cap screws and nuts securing the propeller shaft to the front differential coupler.
18. Detach the carburetor using the following procedure.

- A. Disconnect the crankcase vent hose from the air cleaner housing. Remove the clamps securing the air intake hose to the carburetor; then remove the air cleaner housing.



CC536

- B. Loosen the clamps securing the carburetor boot and the air inlet boot.



CC120D

- **NOTE:** It will not be necessary to disconnect the choke cable.

- C. Route the carburetor assembly up and away from the engine.



CC936

- **NOTE:** Use cable ties or tape to secure the carburetor assembly above the handlebars to keep it from interfering with the removal procedure.

19. Remove the clamps securing the two oil cooler hoses to the engine; then disconnect the hoses.

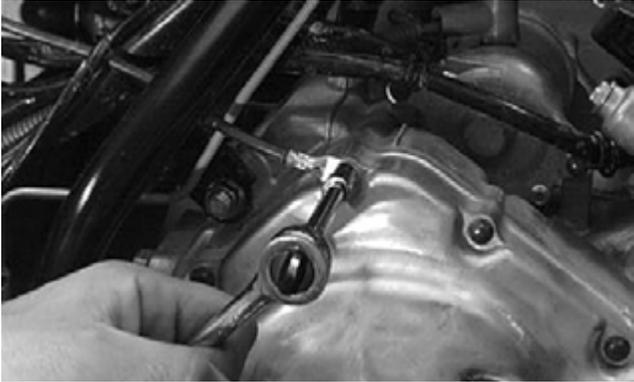


CC937

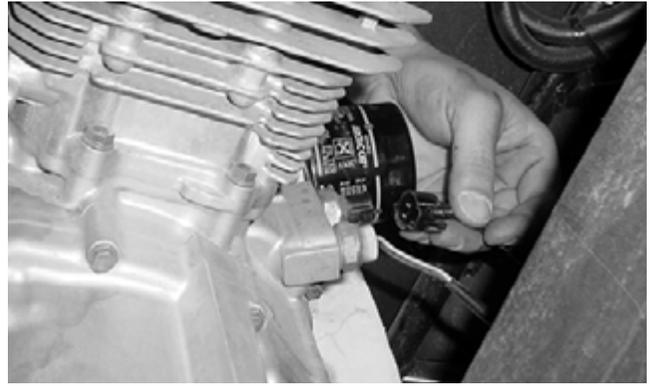
- **NOTE:** After disconnecting the oil cooler hoses, plug them to prevent leakage from the cooler.

20. Disconnect the high tension lead from the spark plug. At the ignition coil, remove the cap screw, nut, and the two wire leads; then remove the coil.

21. Disconnect the battery ground (negative) cable from the crankcase cover; then disconnect the positive cable from the starter motor.

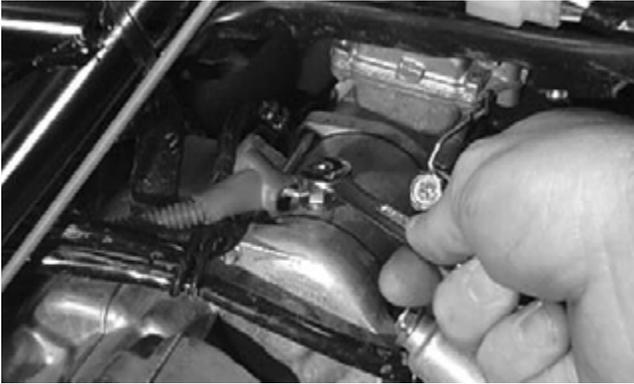


AR600D



CC939

23. Loosen the clamp on the crankcase breather vent hose; then disconnect the hose and route it away from the engine.



AR604D



CC122DA

22. Disconnect the following electrical components: voltage regulator, CDI, indicator lights, and the two wire leads for the oil pressure and oil temperature sensors.

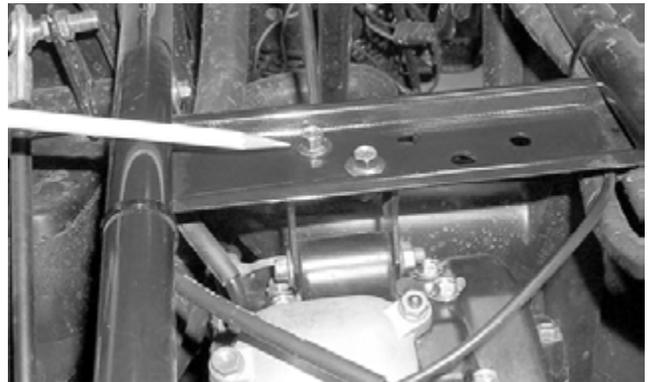


CC938

24. Remove the engine/transmission mounting fasteners in the following sequence:

- A. Upper front: Two cap screws (inside the bracket) and one cap screw and nut (topside of the engine).

■ **NOTE:** It will be necessary to remove the upper front bracket to remove the engine.



AF939

- B. Lower front: One cap screw, nut, spacer, and washer.



CC123D

C. Upper rear: One cap screw and nut with flat washer; then two left-side engine mount-to-frame cap screws.



CC125D

D. Lower rear: One cap screw and nut with flat washer.



CC126D

25. By sliding the rear of the engine out first, remove the engine/transmission from the left side of the frame.



CC940

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

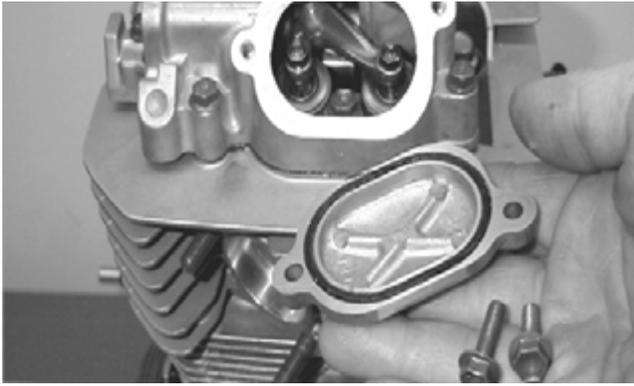
A. Valve Cover

B. Cylinder Head

■ **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.

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

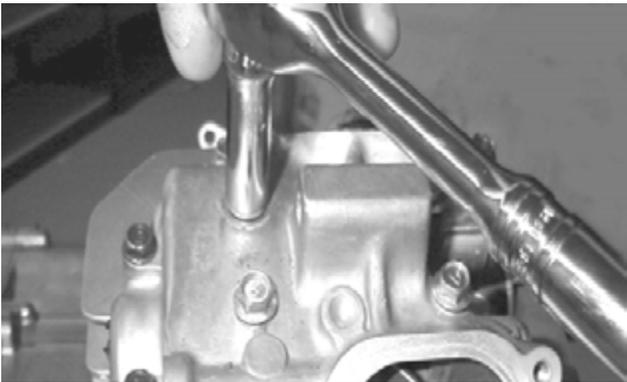
1. Remove the cap screws securing the two tappet covers. Remove the two tappet covers. Account for the O-rings.



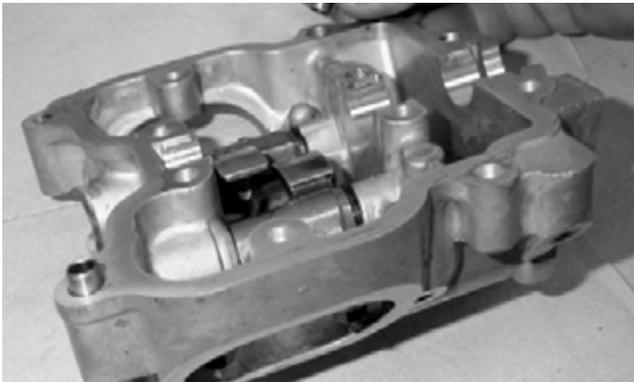
MD1264

■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; then remove the plug. Note the location of two alignment pins.

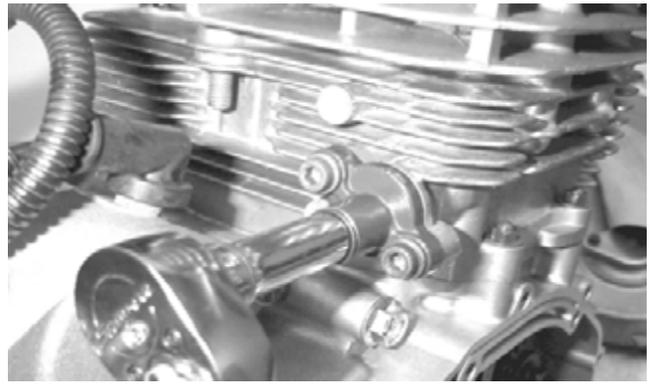


MD1261



MD1354

3. Loosen the cap screw on the end of the cam chain tensioner; then remove the two Allen-head cap screws securing the tensioner assembly and remove the assembly. Account for a gasket.

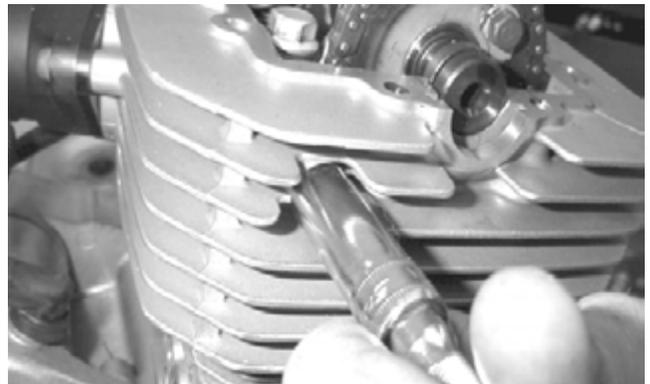


MD1245



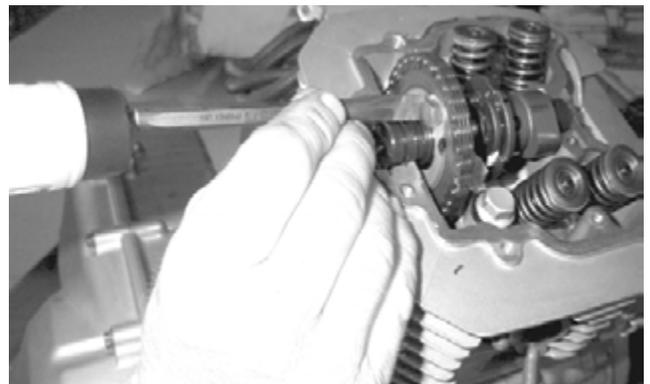
MD1254

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

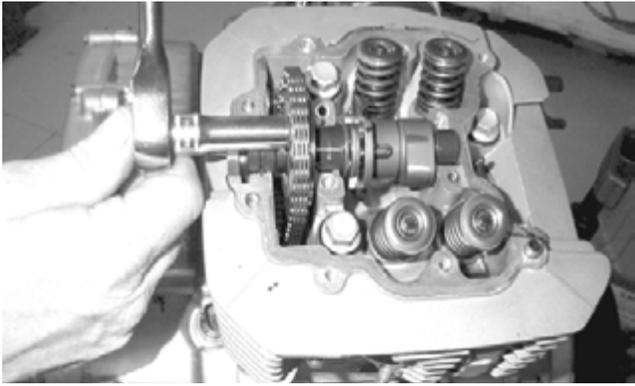


MD1251

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



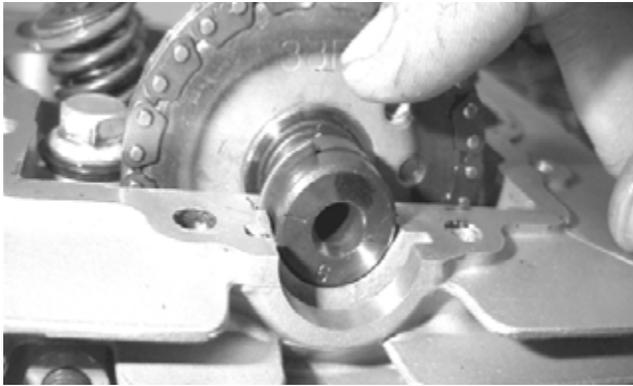
MD1136



MD1137

- 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

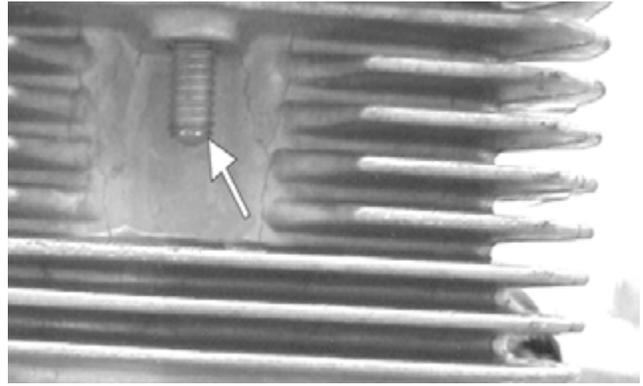
- Note the timing marks for installing purposes; then drop the sprocket off the camshaft. While holding the chain, slide the sprocket and camshaft out of the cylinder head. Account for an alignment pin.



MD1132

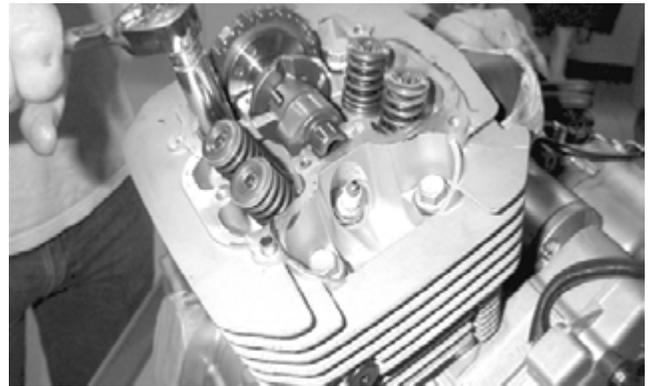
■ **NOTE:** Loop the chain over the cylinder and secure it with a wire to keep it from falling into the crankcase.

- 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.



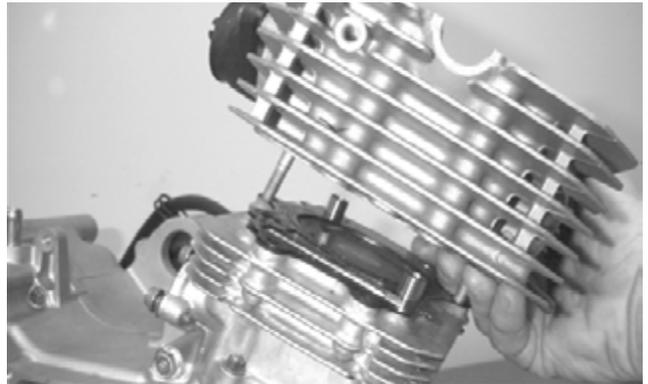
MC1192

- 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.



MD1167

- 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.

- 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

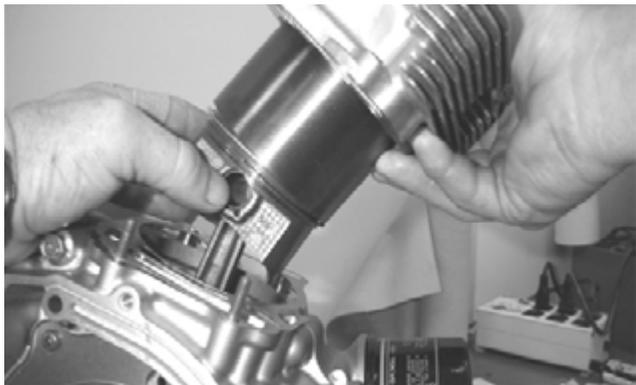
■ **NOTE:** Steps 1-11 in the preceding sub-section must precede this procedure.

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



MD1226

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 the Piston-Pin Puller (p/n 0644-328), 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 the Connecting Rod Holder (p/n 0444-006).

⚠ 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.

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 two cap screws securing the starter to the crankcase; then remove the starter.
2. Remove the four cap screws securing the recoil cover to the left-side cover; then remove recoil cover.



CC942

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



CC943

4. Remove the gear shift stopper (located above the hi/low shift shaft). Account for the washer, spring, and stopper.



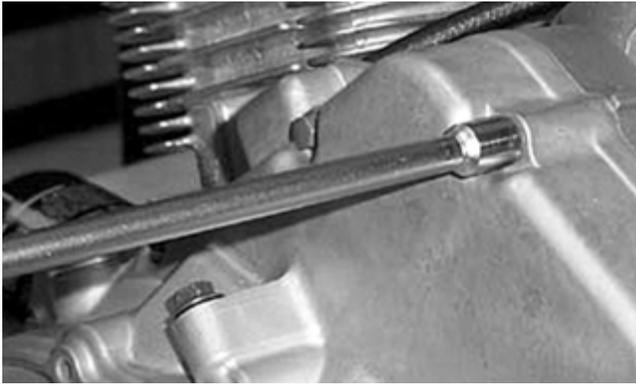
CC944

■ **NOTE:** On the 4x4, remove the cap screws securing the speedometer drive housing; then remove the housing.

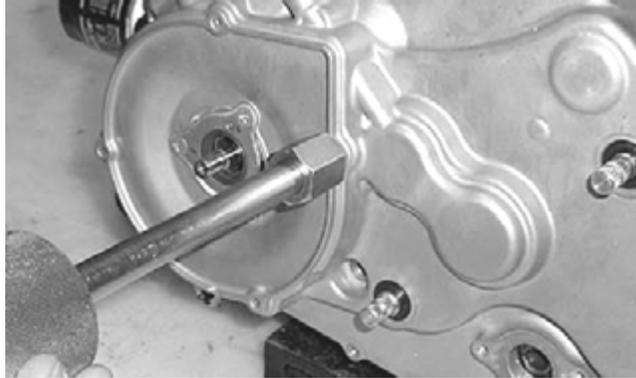


CC947

5. Remove the cap screws securing the left-side cover to the crankcase (fifteen 6 mm and one 8 mm); then using a slide hammer w/6 mm adapter (p/n 0644-310), remove the left-side cover.



CC945



CC946

■ **NOTE:** Inspect the inside of the left-side cover for any shaft washers and spacers that may have come off with the cover. Make sure they are returned to their respective shafts. Also, make sure the alignment pins are in place.

B. Rotor/Flywheel

C. Idle Gear Assembly

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

■ **NOTE:** For steps 6-14, refer to illustration CC948A.



CC948A

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

6. Remove the nut securing the rotor/flywheel (I) to the crankshaft; then install the crankshaft protector.



CC514D

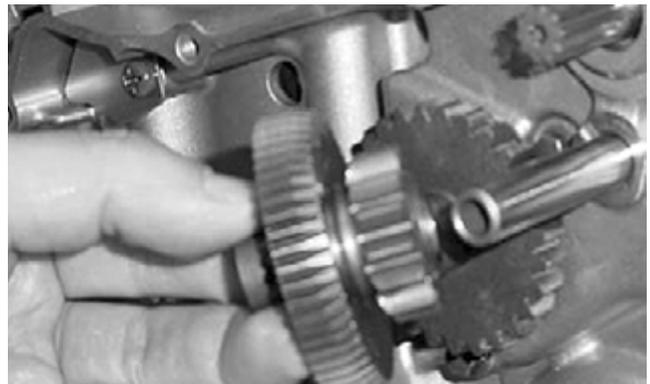
7. Using the Magneto Rotor Remover (p/n 0444-075), remove the rotor/flywheel assembly from the crankshaft. Account for the key; then remove the starter clutch gear assembly (H) w/washer.

■ **NOTE:** Care must be taken that the remover is threaded all the way onto the rotor/flywheel.

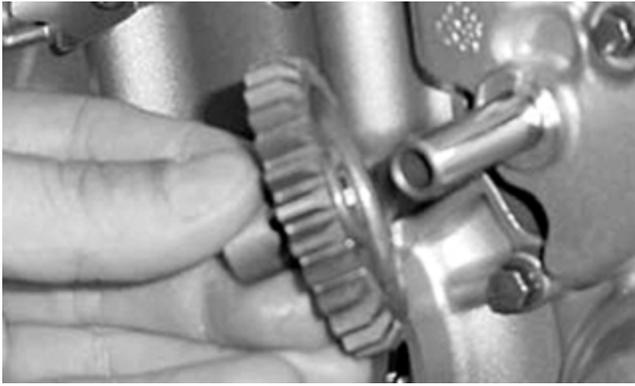


CC949

8. Remove the starter idler gears (F & G) from the crankcase; then remove the pin.

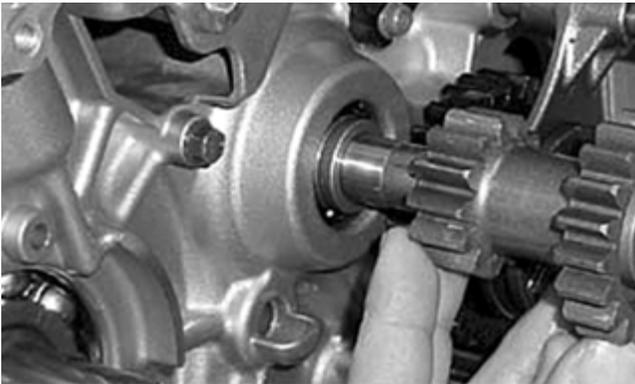


CC950



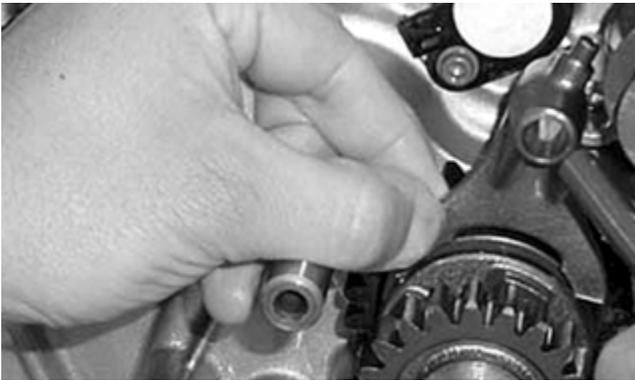
CC951

9. Remove the idler gear (C). Account for a washer and a spacer.



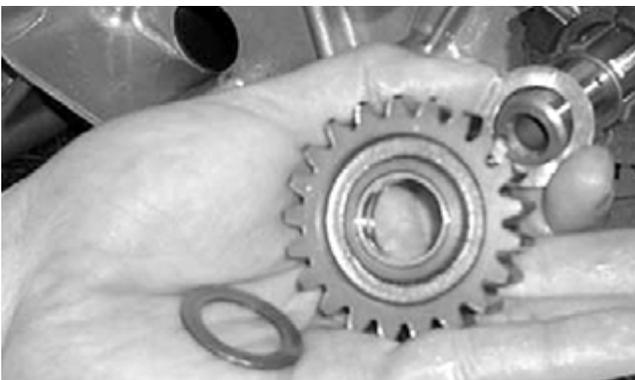
CC952

10. Remove the shift fork and pin (D).



CC953

11. Remove drive gear #2 (B). Account for washers on both sides of the gear.



CC954

12. Remove the sliding dog from the driveshaft.



CC966

13. Remove the circlip, washer, and drive gear #1 (B) from the driveshaft; then account for the bushing and the spacer.

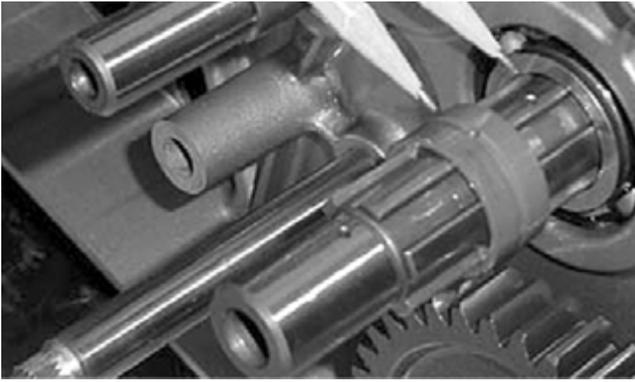


CC955

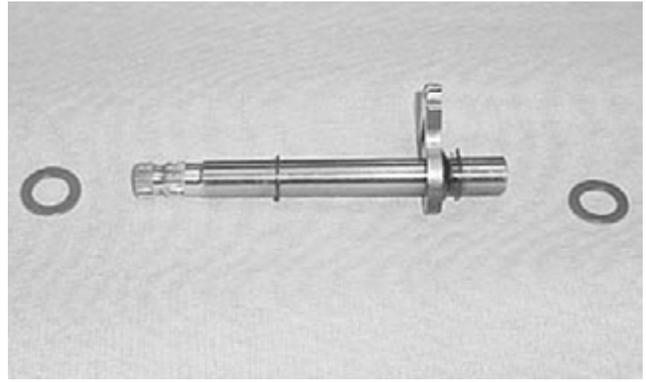


CC956

■ **NOTE:** Note the orientation of the oil holes on the driveshaft and bushing for installing purposes.



CC957



CC961



CC958

14. Remove driven gear (A) from the output shaft.



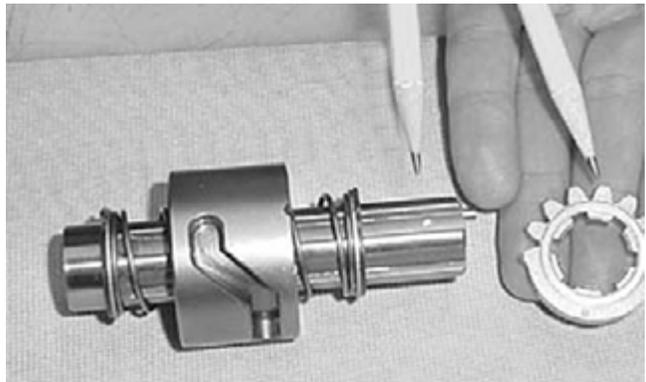
CC962

■ **NOTE:** Note the alignment dots on the cam plate and camshaft for installing purposes.



CC959

15. Remove the gear shift shaft. Account for two shims.



CC963

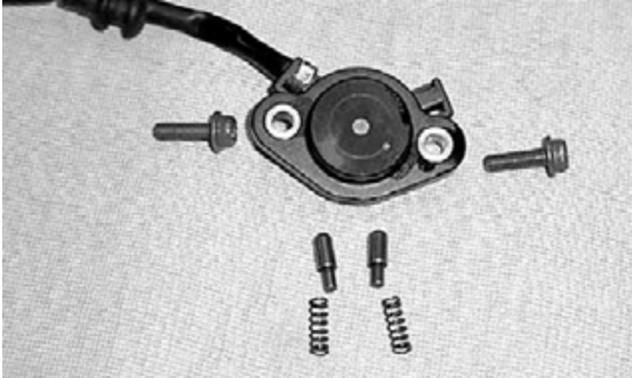
17. Remove the Allen-head cap screws from the neutral switch base; then remove the switch. Account for the two contacts and springs.



CC960



CC964



CC965

👉 AT THIS POINT

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

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

1. Using Oil Filter Wrench (p/n 0644-389), remove the oil filter.



CC967

2. If the engine has not been removed, lay the ATV on its left side; then remove the cap screws securing the right-side cover to the crankcase. Remove the cover. Account for the gasket and for two alignment pins.



CC968

■ **NOTE:** When removing the right-side cover, account for the release roller guide that it does not fall and cause damage.



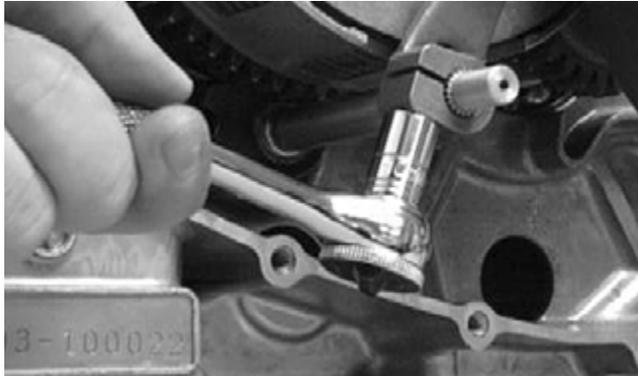
CC070D

B. Primary Clutch Shoe
C. Primary Clutch
D. Starter Clutch Housing

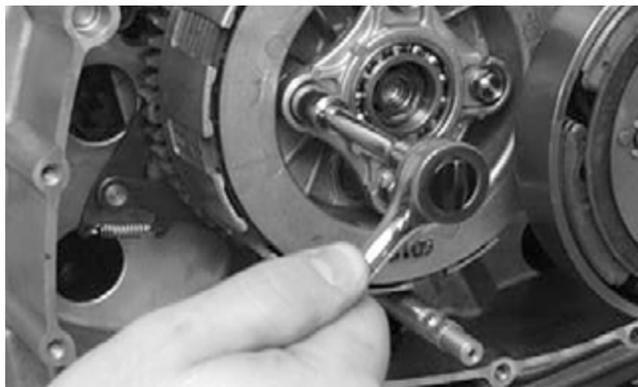
■ **NOTE:** Steps 1-2 in the preceding sub-section must precede this procedure.

3. Remove the cap screw securing the clutch release arm and remove the arm; then in a crisscross pattern, remove the four cap screws securing the clutch release roller assembly.

■ **NOTE:** Scribe a reference mark with a marker on the arm and shaft to aid in installing.



CC073D



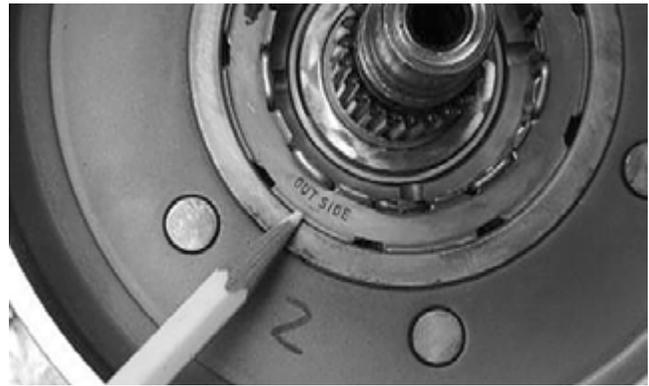
CC074D

4. Remove the release roller assembly. Account for four springs.
5. Remove the starter clutch-shoe nut (left-hand threads) and washer from the driveshaft; then using a primary clutch shoe remover, remove the clutch shoe.

⚠ CAUTION

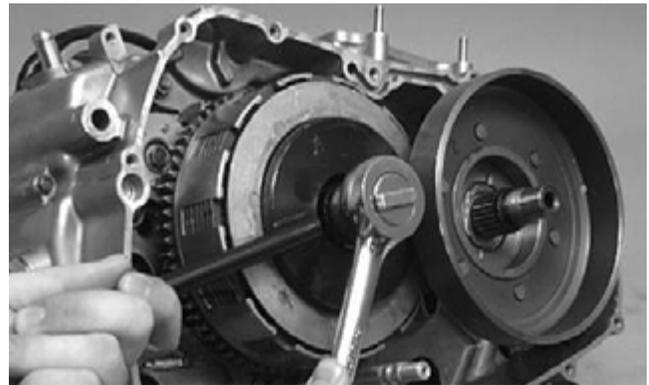
Care must be taken when removing the nut; it has "left-hand" threads.

6. Remove the primary drive one-way clutch from the starter clutch housing. Note the word OUTSIDE stamped on the clutch for assembly purposes.



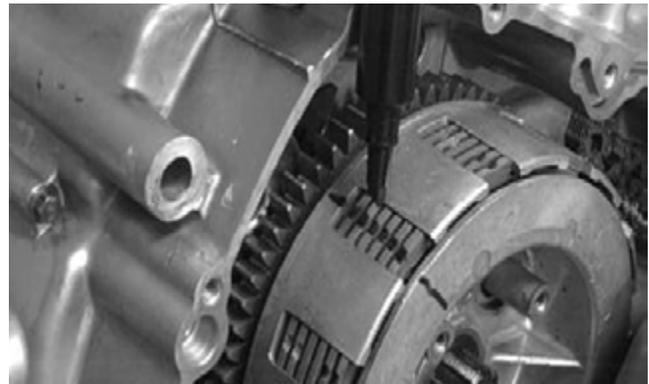
CC075D

7. Using the Clutch Sleeve Hub Holder (p/n 0444-007) to hold the clutch sleeve hub, remove the nut and washer.



CC076D

8. Scribe a line across the primary clutch assembly to aid in installing.



CC077D

9. Simultaneously, remove the primary clutch assembly and starter clutch housing from their respective shafts. Account for the shims and washers.



CC078D



CC969

👉 AT THIS POINT

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

**E. Gear Shift Cam Plate/Guide
F. Oil Pump/Oil Strainer**

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

■ **NOTE:** Note that the bushings on the crankshaft are directional and that the oil holes align for installing purposes.



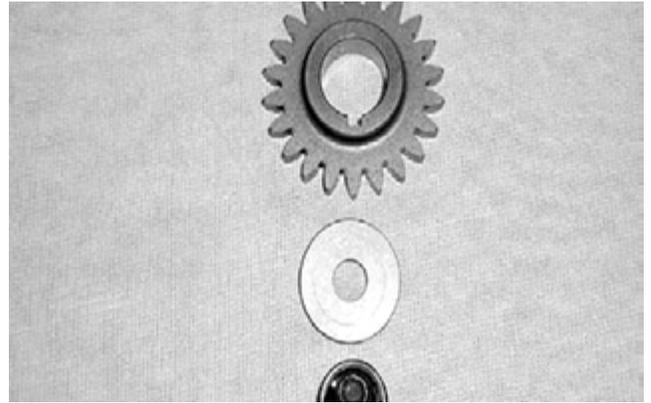
CC970

10. 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, gear, washer, and nut.

■ **NOTE:** Note that the raised hub of the gear is directed inward for installing purposes.

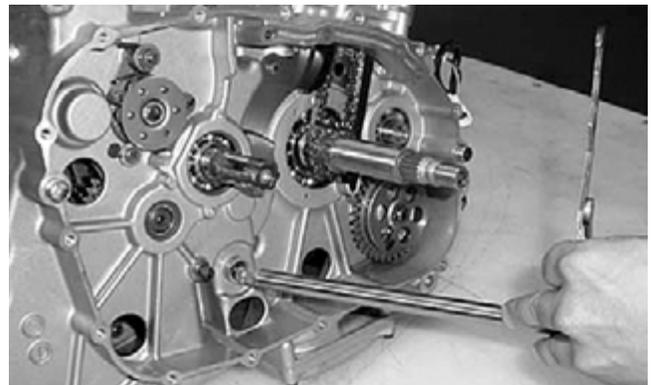


CC971



CC972

11. Remove the gear shift shaft from the crankcase.



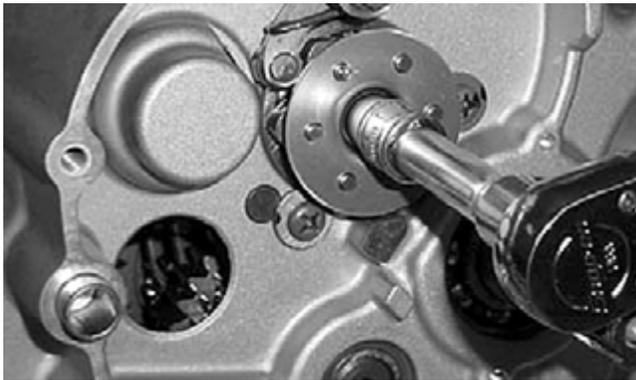
CC973

12. Release the tension from the gear shift cam stopper arm spring.



CC974

13. Remove the cap screw securing the gear shift cam plate and guide to the gear shift cam; then remove the cam plate and guide. Account for the guide and five pins.



CC975

⚠ CAUTION

If servicing of the engine/transmission is due to a lubrication-related problem, replace the oil pump.

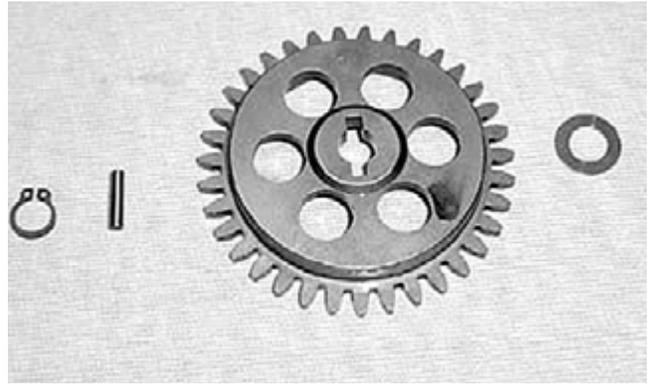
■ **NOTE:** For general servicing, it is advisable to disassemble, clean, and inspect the oil pump. If any wear or damage is suspected, replace the oil pump.

14. Remove the circlip securing the oil pump driven gear; then remove the gear. Account for the pin and the washer.

■ **NOTE:** Always use a new circlip when installing the oil pump driven gear.



CC976



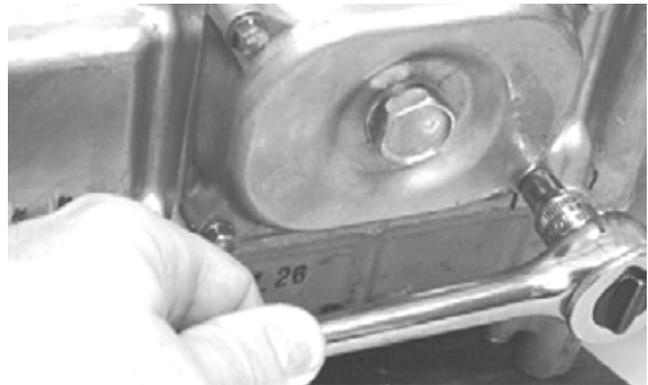
CC977

15. Remove the three Phillips-head screws securing the oil pump; then remove the oil pump.



CC978

16. Remove the cap screws securing the oil strainer cap; then remove the cap. Account for the O-ring.



CC091D

17. 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.

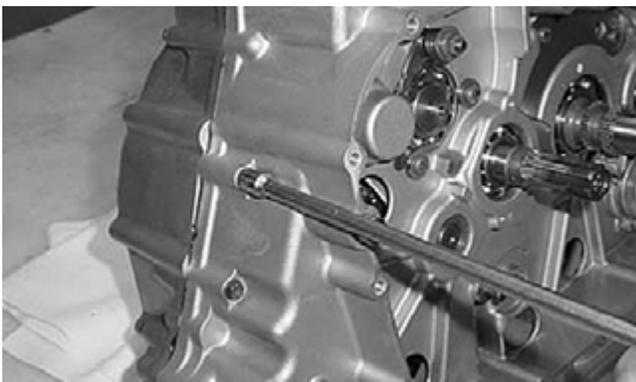
Center Crankcase Components

■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 five right-side 6 mm cap screws (one from inside the case) securing the crankcase halves; then remove the seven left-side 6 mm cap screws. Note the location of the different-lengthed cap screws and a wiring form.

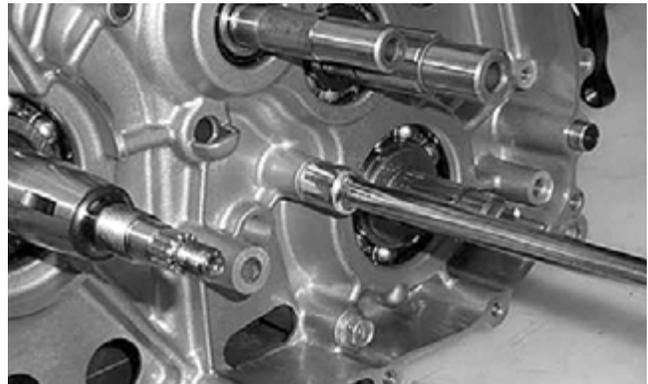


CC979



CC980

2. Remove the four left-side 8 mm cap screws (two from inside the case) securing the crankcase halves. Note the location of the different-lengthed cap screws.



CC981

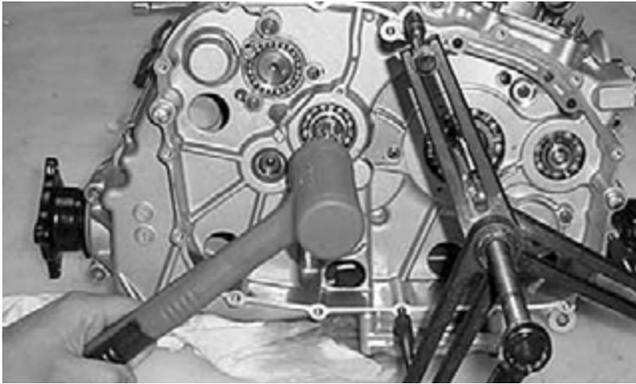
3. Remove the four right-side 8 mm cap screws securing the crankcase halves.



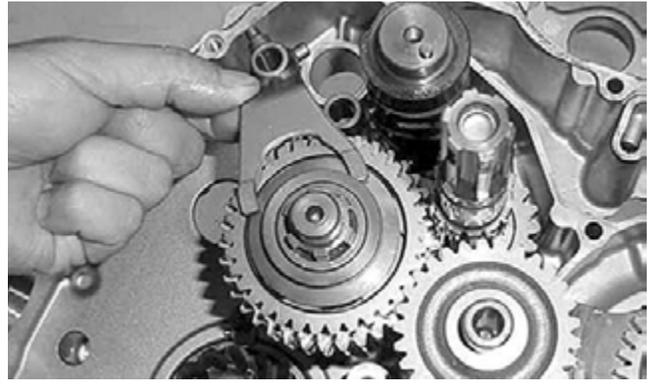
CC982

4. Using an appropriate crankcase separator and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins, a C-ring, and two washers.

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



CC983



5. Remove the gear shift cam (F).



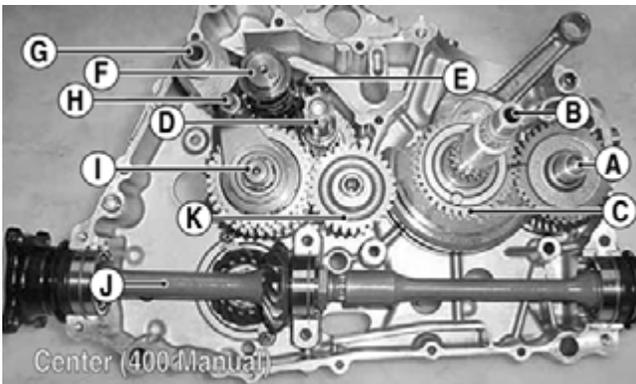
CC984



6. Remove the three remaining forks noting their positions for assembling purposes.

Disassembling Crankcase Half

■NOTE: For steps 1-10, refer to illustration CC985A.



CC985B

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

1. Remove the output shaft assembly (J).
2. Remove the two shift shafts (E and H).
3. Remove the reverse shift cam (G) and spacer.
4. Disengage four forks from the gear shift cam (F); then remove the reverse shifter fork.

👉 AT THIS POINT

To service gear shift forks, see **Servicing Center Crankcase Components** sub-section.

7. Remove the reverse idle gear (K) w/shaft. Account for the bushing, two washers, and the circlip.
8. Simultaneously, remove the driveshaft assembly (I) and countershaft assembly (D).

👉 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.

■NOTE: Note the alignment marks on the crank balancer driven gear and balancer drive gear to aid in assembly.



CC166D

9. Remove the driven gear from the crank balancer assembly (A). Account for a key.



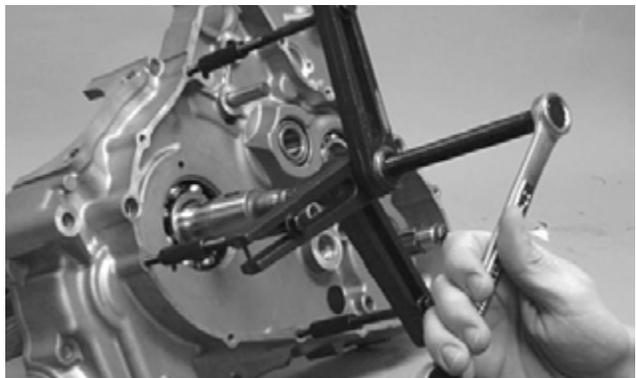
CC165D

■ **NOTE:** Note that the shoulder of the gear is directed to the outside for assembling purposes.

10. Remove the crank balancer assembly (A).

■ **NOTE:** When removing the crank balancer assembly, rotate the crankshaft counterweight away from the crank balancer assembly counterweight.

11. Using an appropriate 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

**Table of Contents
(Servicing Components)**

■ **NOTE:** Critical engine/transmission specifications are located at the beginning of this section.

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**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.

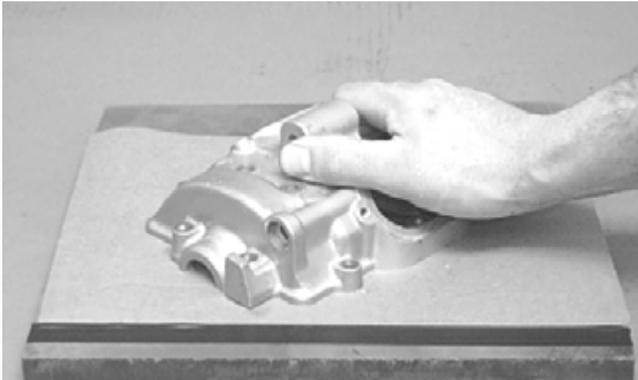
Cleaning/Inspecting Valve Cover

■ **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 (p/n 0644-016) 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

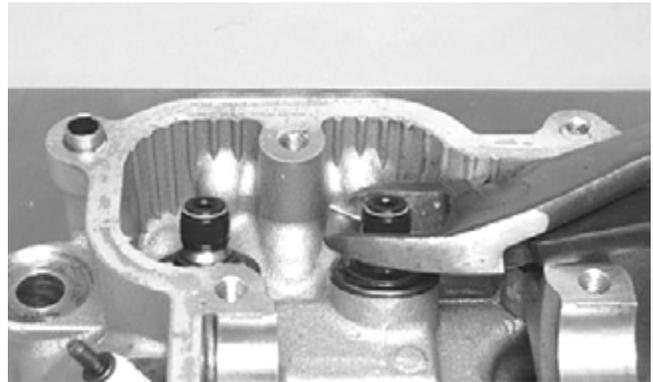
■ **NOTE:** Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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

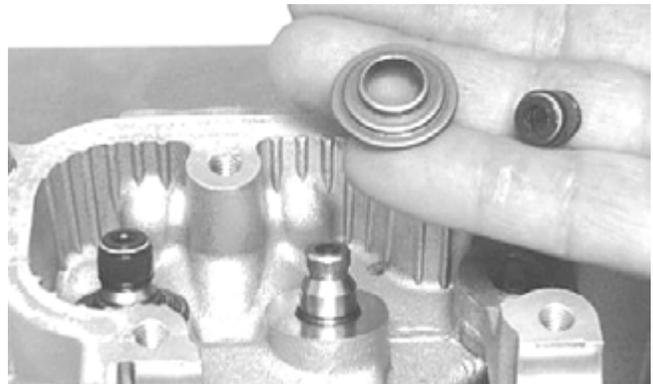


CC994

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



CC134D



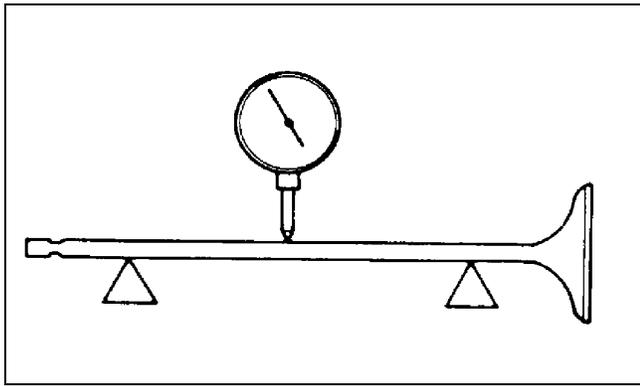
CC136D

■ **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 (p/n 0644-022); then check the valve stem runout using a dial indicator.



ATV-1082

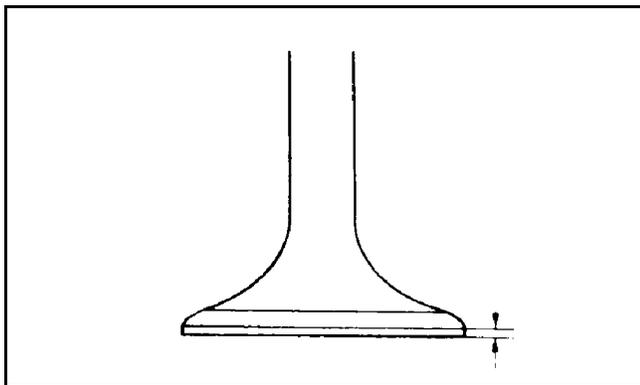
2. Maximum runout must not exceed specifications.

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.

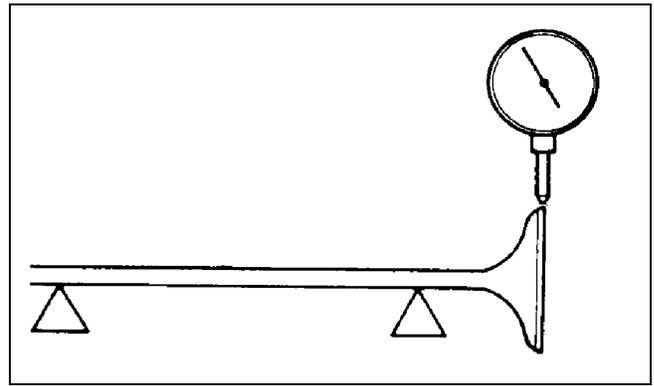


ATV-1004

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.

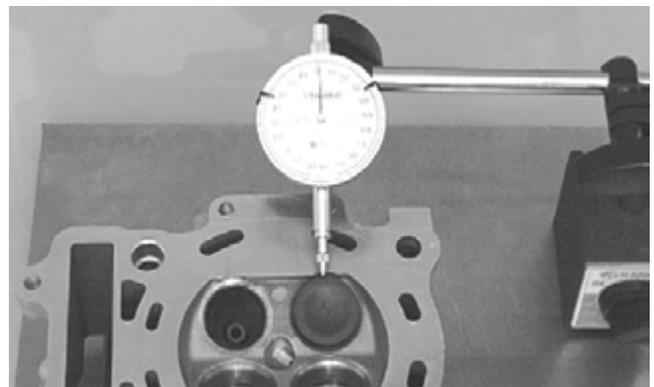


ATV1082A

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.

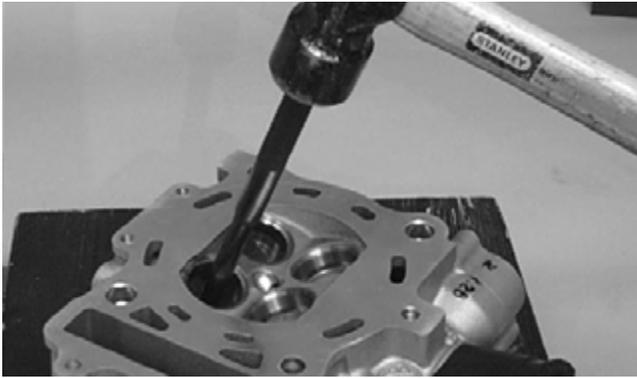
Measuring Valve Guide (Inside Diameter)

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.

Replacing Valve Guide

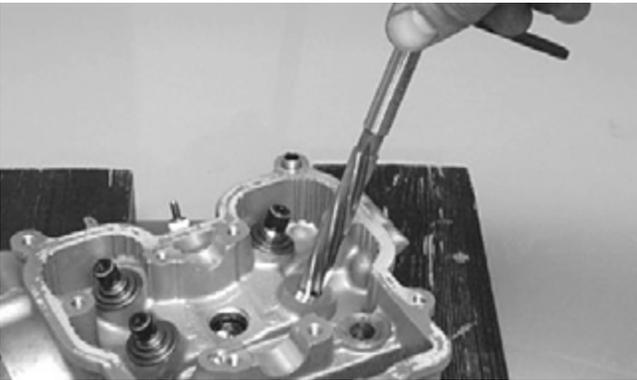
■ **NOTE:** If a valve guide is worn or damaged, it must be replaced.

1. If a valve guide needs replacing, insert a valve guide remover into the valve seat side of the valve guide. Using a hammer, gently drive the valve guide out of the cylinder head.



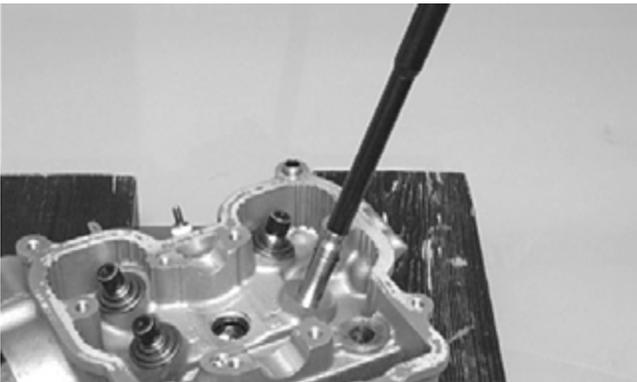
CC137D

2. Using the Standard Valve Guide Reamer (p/n 0444-017), remove any burrs or tight areas from the valve guide journals.



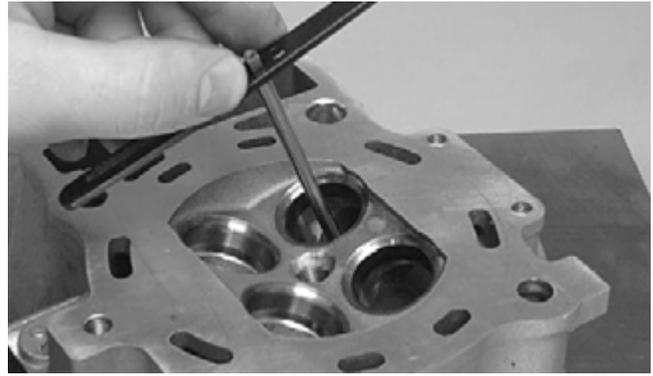
CC142D

3. To install a valve guide, use a valve guide installer and gently drive a valve guide with a retaining clip into the bore from the valve spring side until the retaining clip just contacts the cylinder head.



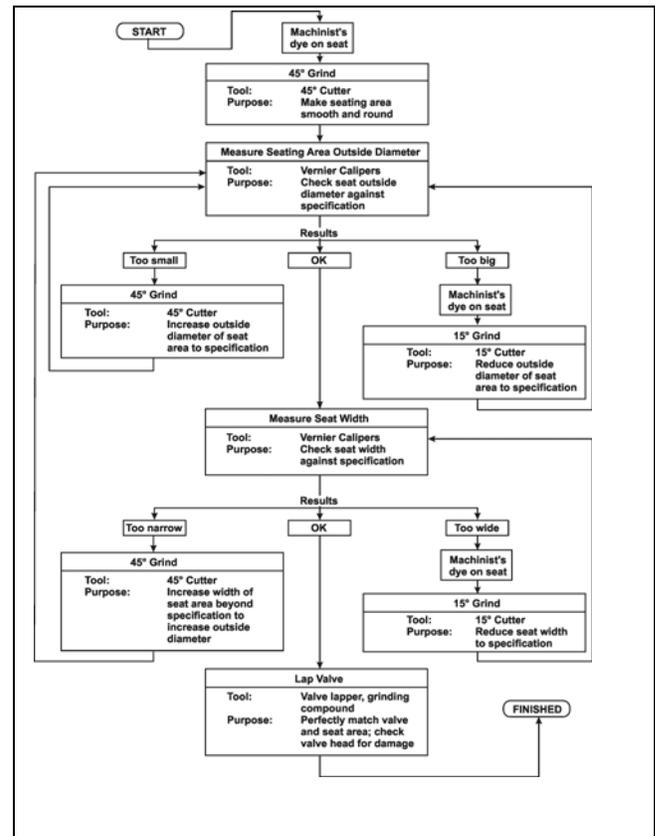
CC143D

4. After installing the guide, use the standard valve guide reamer to remove all burrs and tight areas that may remain in each valve guide.



CC138D

Valve Seat/Guide Servicing Flow Chart



ATV-0107

Grinding Valve Seats

■ **NOTE:** If the valve seat is beyond servicing, the cylinder head must be replaced.

1. Insert an exhaust valve seat pilot shaft into an exhaust valve guide. Slide an exhaust valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the exhaust valve seat until within specifications.

■ **NOTE:** Repeat procedure on the remaining exhaust valve.



CC139D

Measuring Rocker Arm Shaft (Outside Diameter)

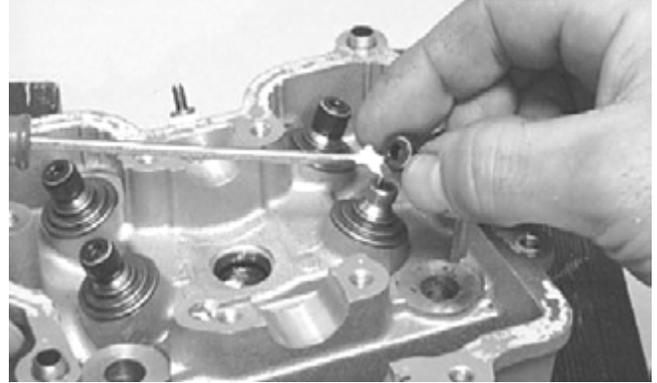
1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range must be within specifications.

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.

2. Insert an intake valve seat pilot shaft into one of the intake valve guides. Slide the intake valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the intake valve seat until within specifications.

■ **NOTE:** Repeat procedure on the remaining intake valve.



CC144D



CC140D

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 painted end is not visible, install the ends of the springs with the closest coils toward the head.

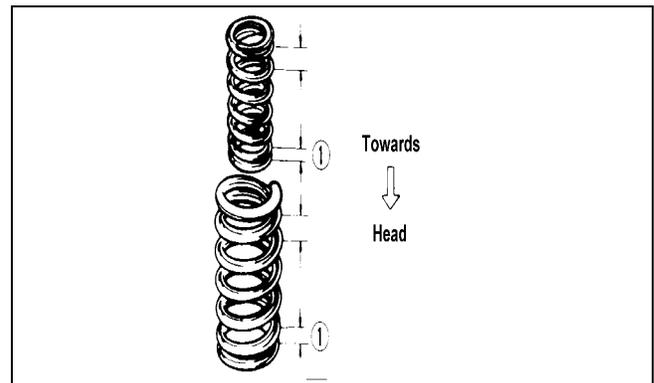
Lapping Valves

■ **NOTE:** Do not grind the valves. If a valve is damaged, it must be replaced.

1. Remove all carbon from the valves.
2. Lubricate each valve stem with light oil; then apply a small amount of valve lapping compound to the entire seating face of each valve.
3. Attach the suction cup of a valve lapping tool to the head of the valve.
4. Rotate the valve until the valve and seat are evenly polished.
5. Clean all compound residue from the valve and seat.

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.



ATV-1011

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



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 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.



AN135

■ **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

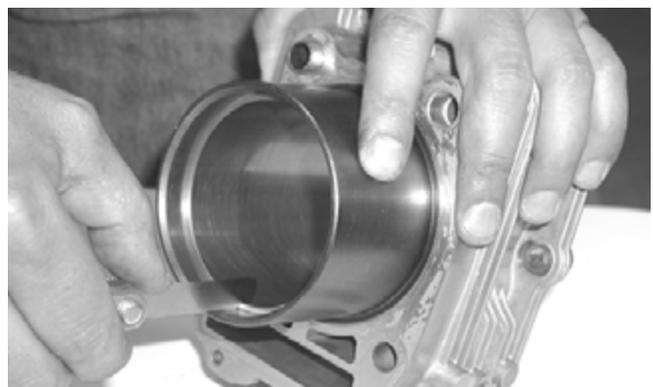
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

⚠ 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)

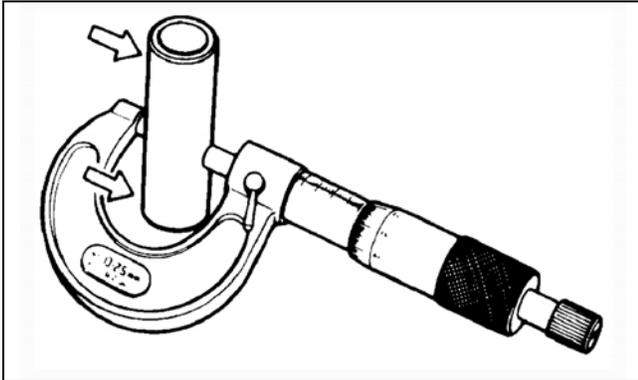
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within specifications.



CC995

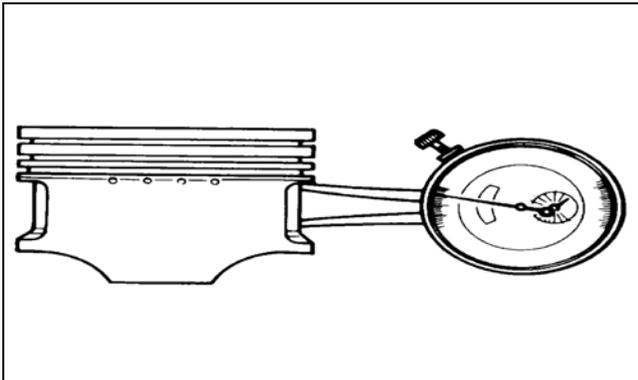
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

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

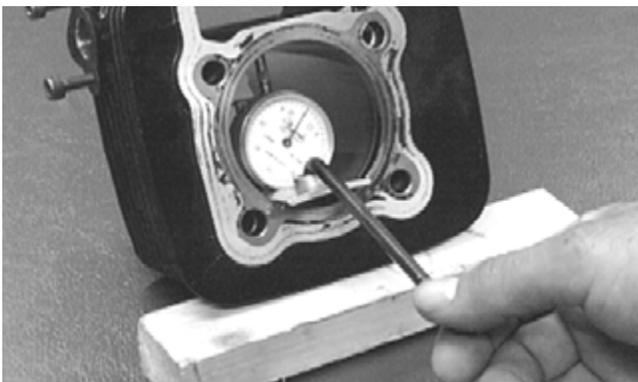
2. Insert an inside dial indicator into the piston-pin bore. The diameter must not exceed specifications. Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/Cylinder Clearance

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



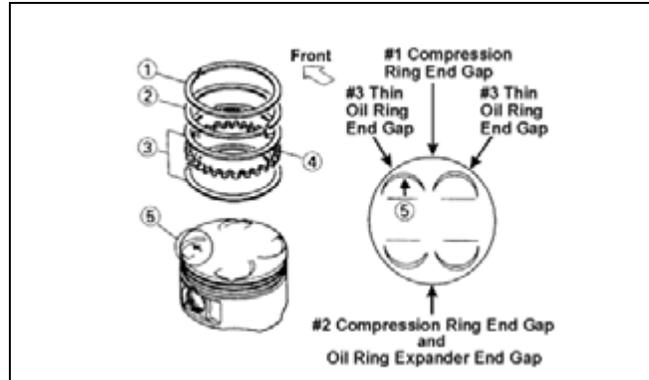
CC397D

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

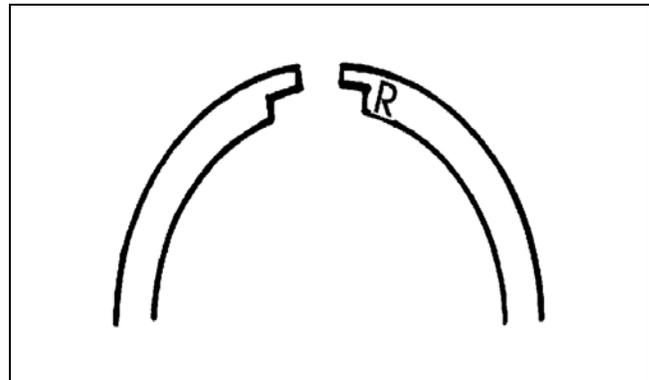
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■ **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 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).



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

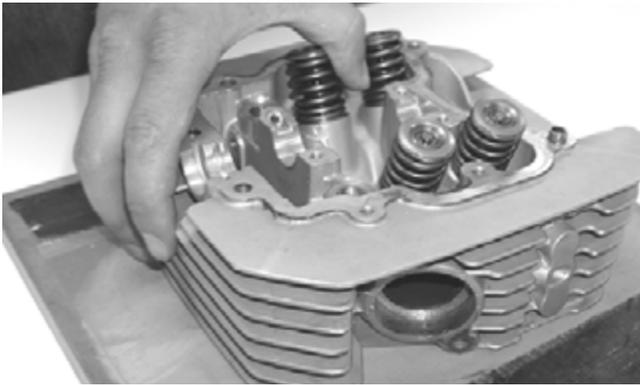
The cylinder head studs must be removed for this procedure.

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

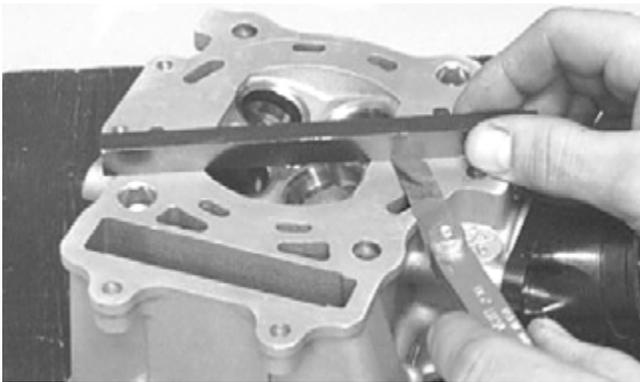
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.



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

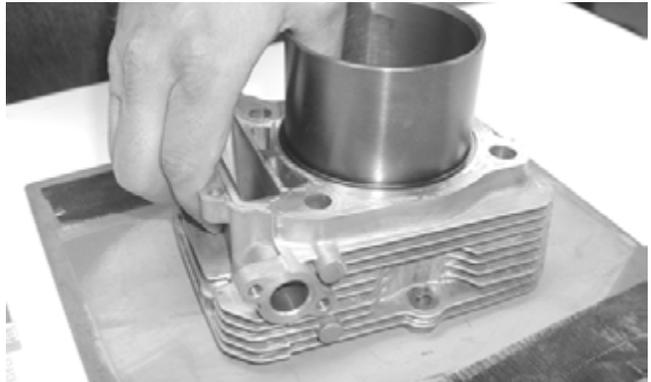
Cleaning/Inspecting Cylinder

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.



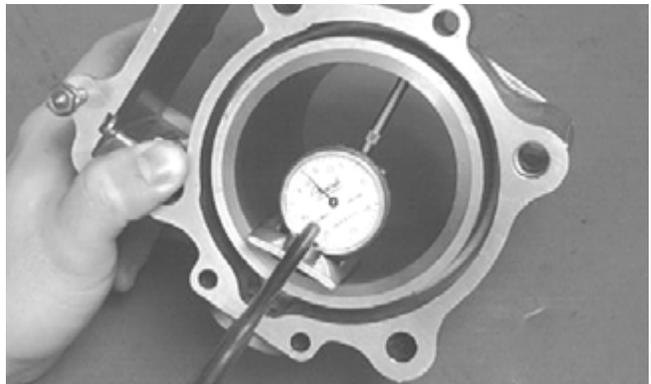
CC997

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 ball hone.

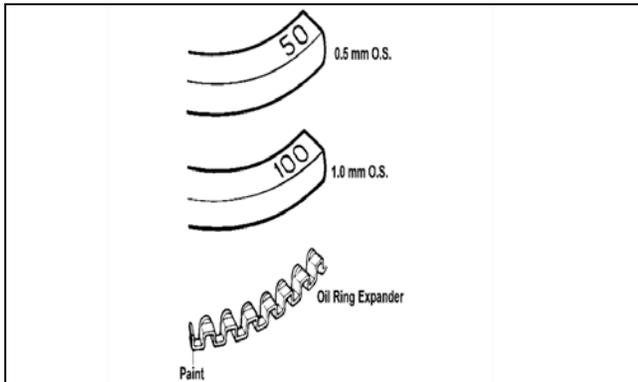
■ **NOTE:** To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately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



CC998

4. If any measurement exceeds the limit, hone the cylinder and install an oversized piston or replace the cylinder.

■ **NOTE:** Oversized piston and rings are available. The oversized piston and rings are marked for identification.

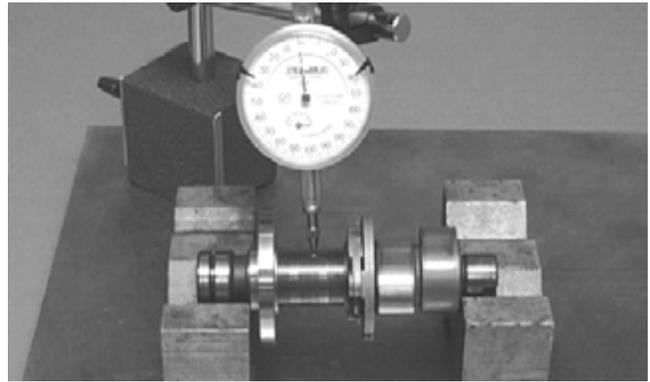


ATV-1068

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.

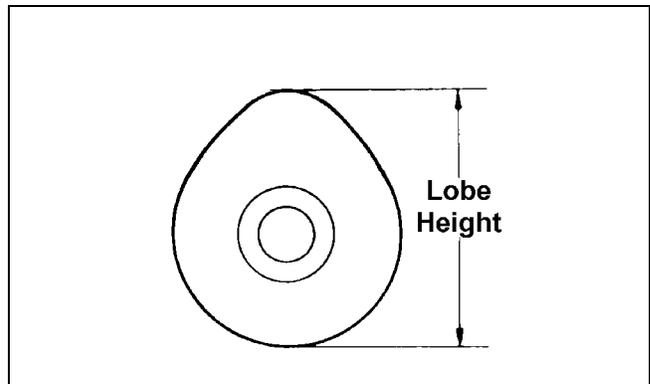


CC283D

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

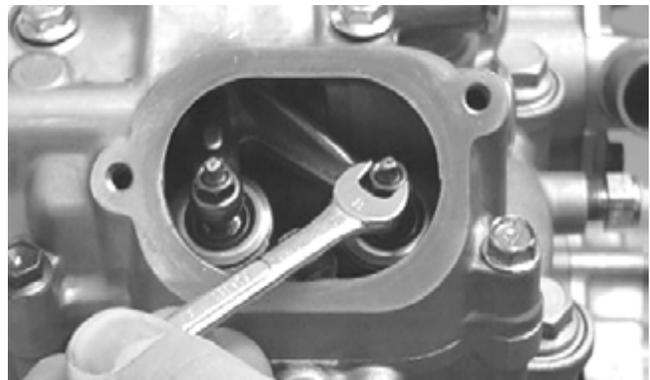
2. The lobe heights must not exceed minimum specifications.

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.

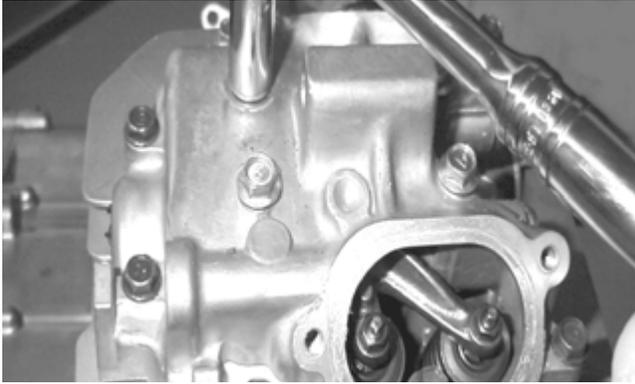


CC005D

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

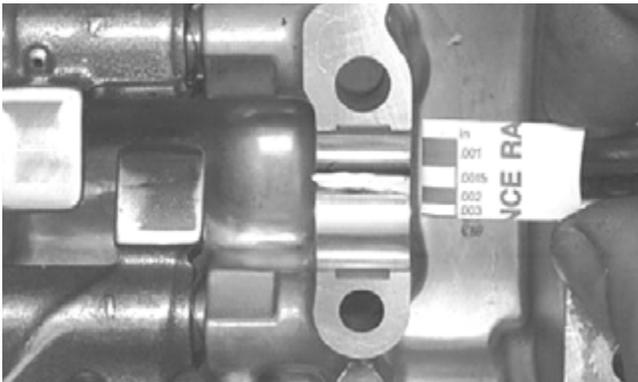
■ **NOTE:** Do not rotate the camshaft when measuring clearance.

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



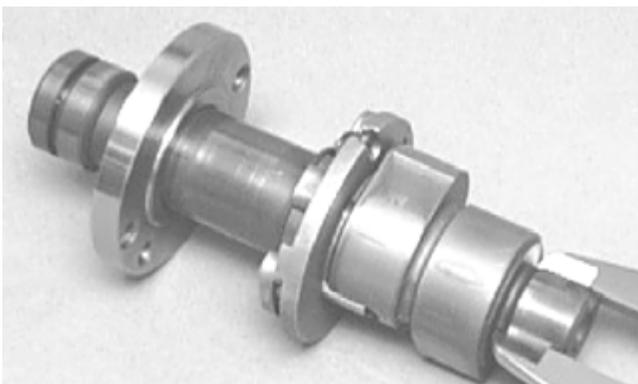
MD1261

- 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

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

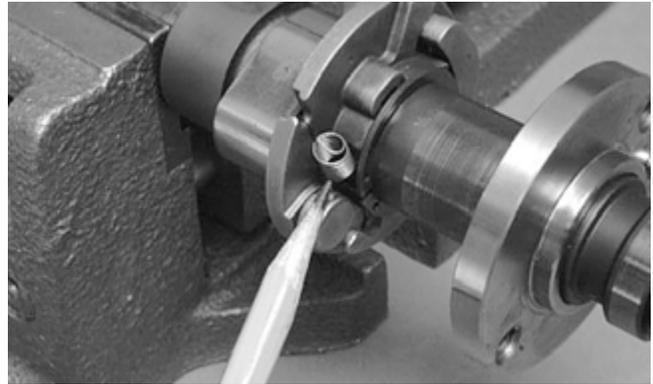


CC287D

■ **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

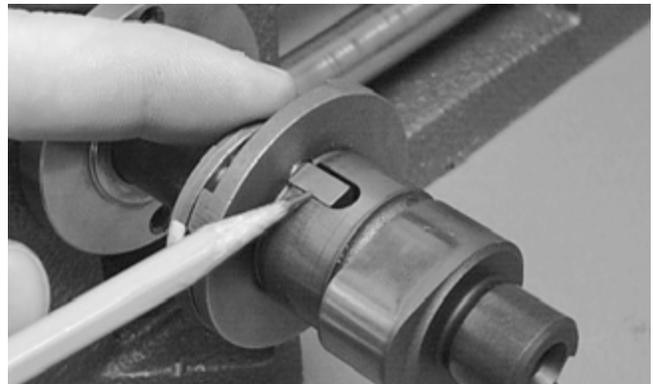
- Inspect the spring and drive pin for damage.



CC304D



CC306D

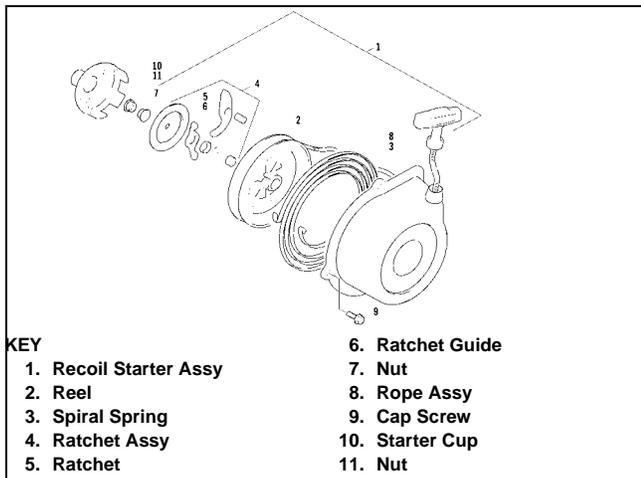


CC308D

- If damaged, the camshaft must be replaced.

Servicing Left-Side Components

RECOIL STARTER



0737-034

⚠ WARNING

Always wear safety glasses when servicing the recoil starter.

Removing/Disassembling

1. Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the starter.



CC039D

⚠ WARNING

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

2. 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.

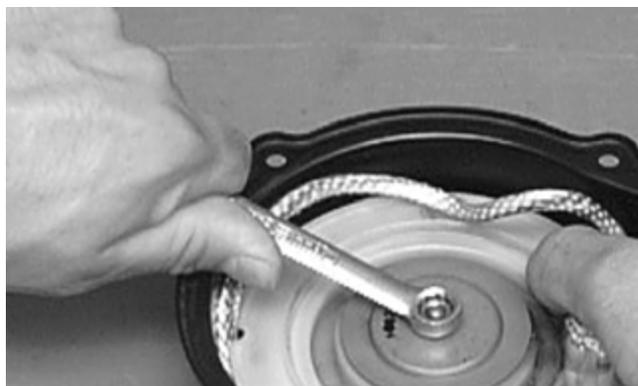


B600D

⚠ CAUTION

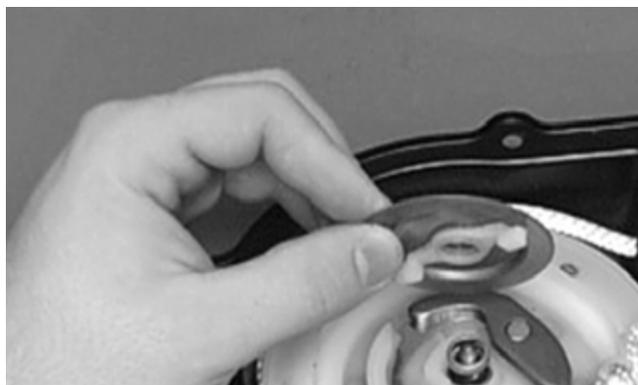
During the disassembly procedure, make sure all spring tension is released before continuing.

3. Remove the nut.



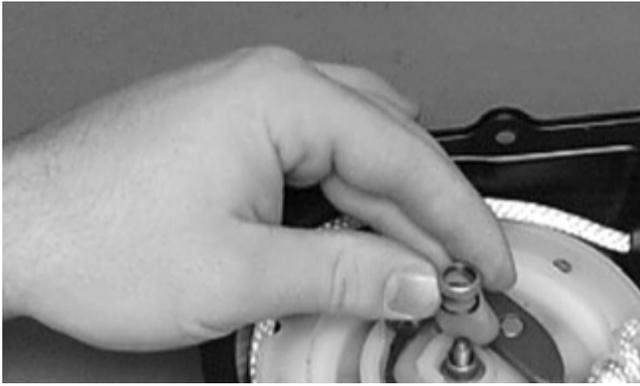
B601D

4. 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

5. Remove the spring cover, spring, and shaft.



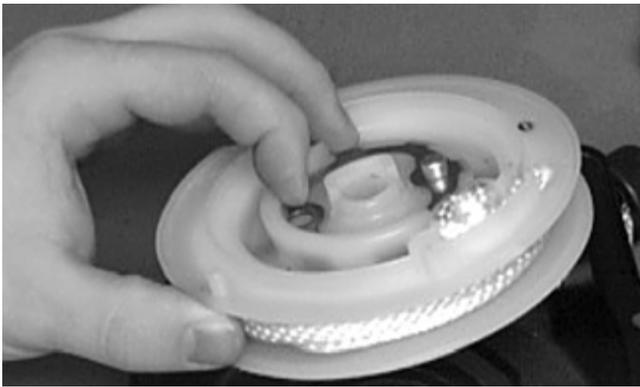
B603D

6. Remove the ratchet and account for the pin.



B604D

7. Carefully lift the reel free of 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.

8. 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. It should be visually inspected in place to save time. If replacement is necessary, follow steps 9-10.

9. 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.

10. 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/Installing

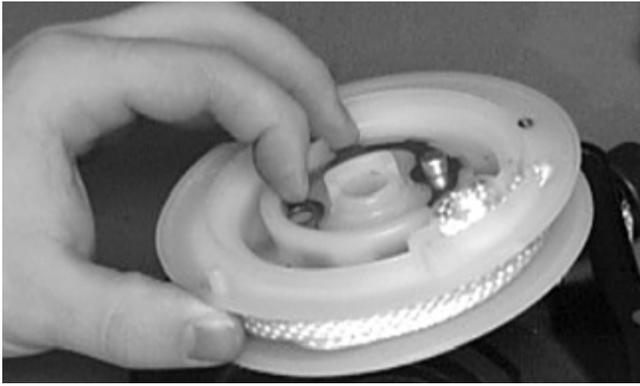
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

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.



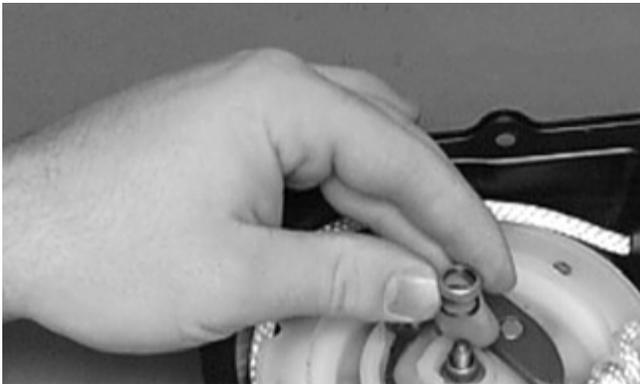
B605D

6. Install the ratchet onto its pin making sure the end is properly installed on the reel.



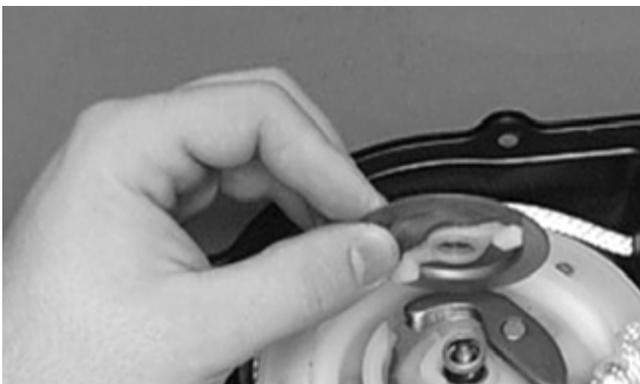
B604D

7. Install the shaft, spring, and the spring cover.



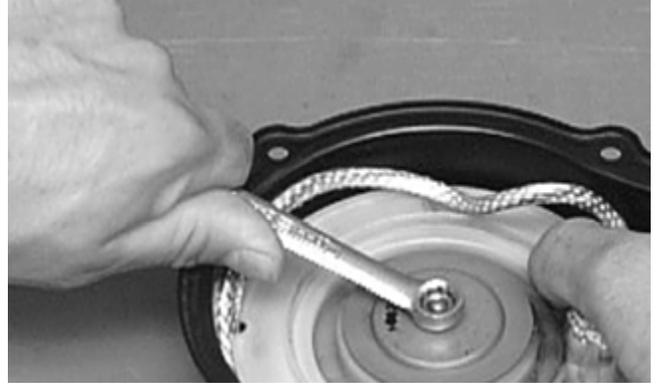
B603D

8. Install the friction plate with the ratchet guide fitting into the ratchet.



B602D

9. While pushing down on the reel, install the nut. Tighten securely.



B601D

10. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.

11. Rotate the reel four turns counterclockwise; then release the rope from the notch and allow the rope to retract.

12. Pull the rope out two or three times to check for correct tension.

■ **NOTE:** Increasing the rotations in step 11 will increase spring tension.

13. Place the recoil starter assembly into position on the left-side cover; then tighten the cap screws to 0.8 kg-m (6 ft-lb).



CC039D

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.

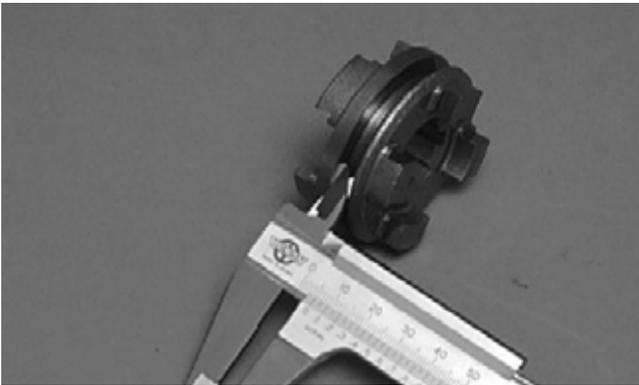


CC296D

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.

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.

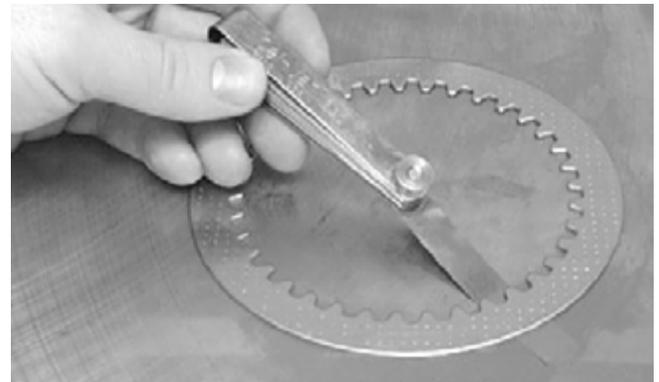
■ **NOTE:** When removing components from the primary gear assembly, account for the bushing that fits into the primary gear.



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.

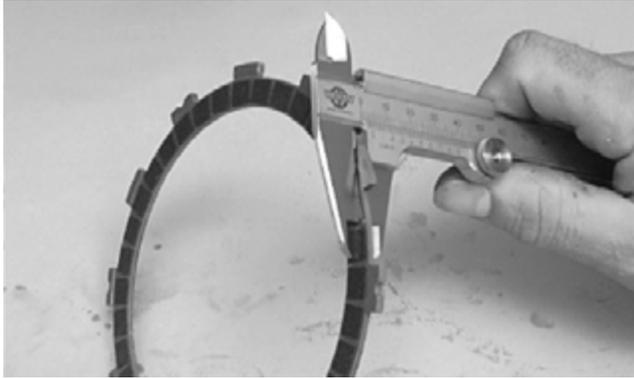


CC245D

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.

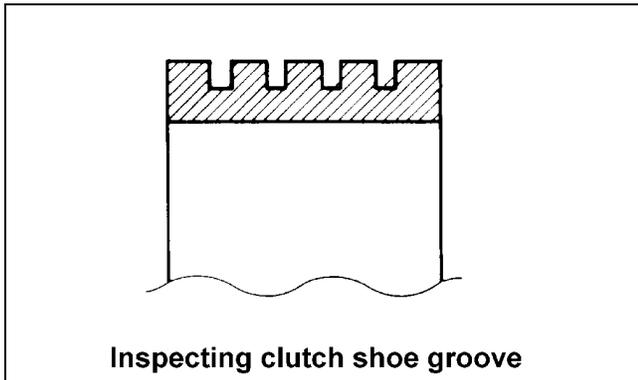


CC243D

2. Drive plate thickness must not exceed 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 Starter Clutch Shoe

1. Inspect the starter clutch shoe for uneven wear, chips, cracks, or burns.
2. Inspect the groove on the shoe for wear or damage.
3. If any damage to the shoe or any groove wear is noted, the shoe must be replaced.



Inspecting clutch shoe groove

ATV1014

Inspecting Starter Clutch Housing

1. Inspect the starter 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.

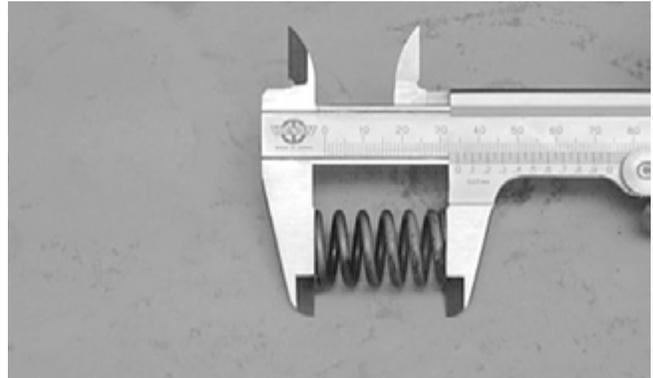
Inspecting Primary One-Way Drive

1. Insert the drive into the 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.

Measuring Clutch Spring Length

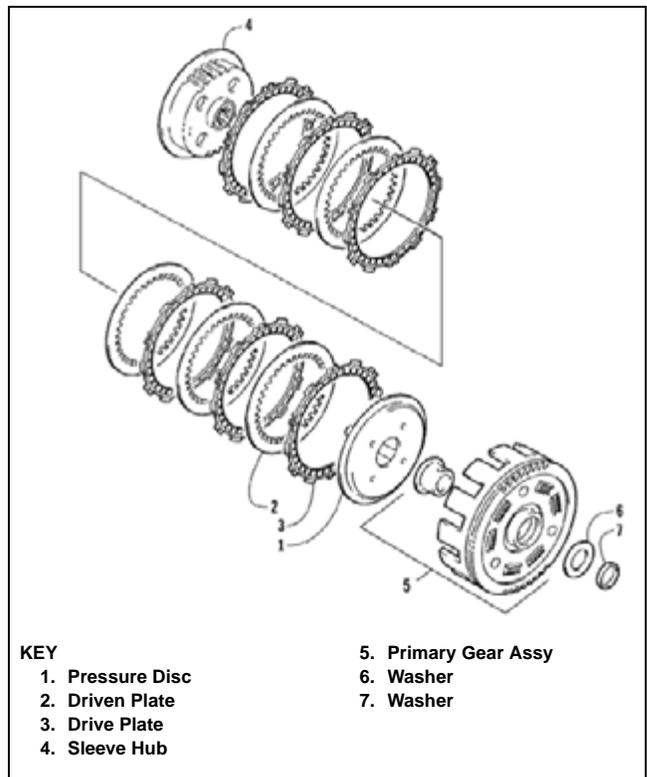
1. Using a calipers, measure the overall free length of the clutch spring.



CC247D

2. Overall length must not exceed minimum specifications.

Assembling Primary Clutch

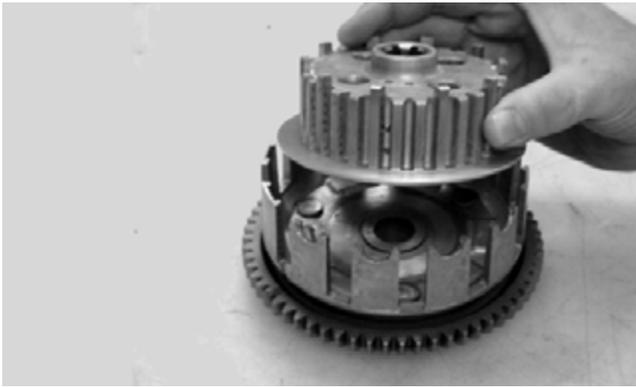


KEY

- | | |
|------------------|----------------------|
| 1. Pressure Disc | 5. Primary Gear Assy |
| 2. Driven Plate | 6. Washer |
| 3. Drive Plate | 7. Washer |
| 4. Sleeve Hub | |

737-731A

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 and ending with a drive plate) making sure the tabs with the notches are all in line with each other.



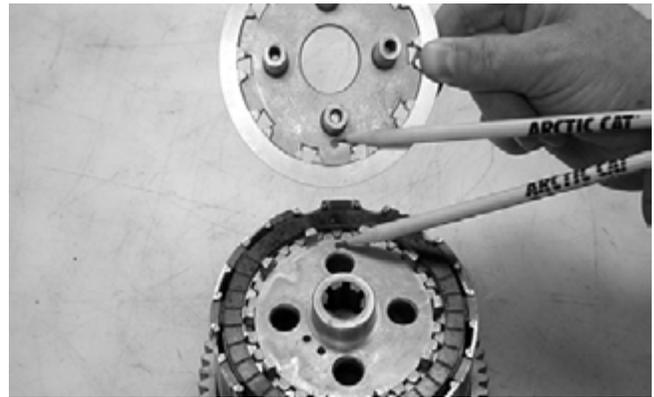
CC921

■ **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.



CC922

3. Install the pressure plate onto the hub making sure the alignment dots are correctly positioned.



CC923

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.



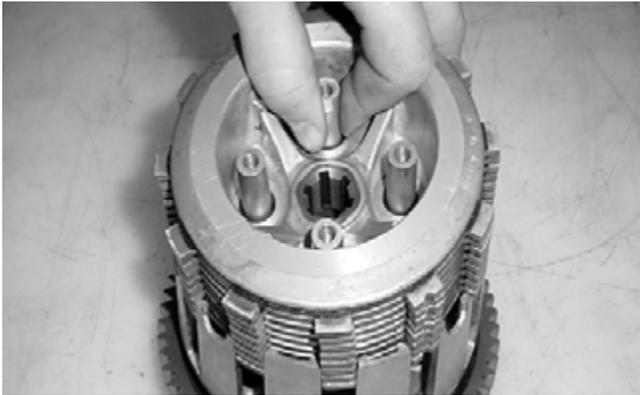
CC924

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

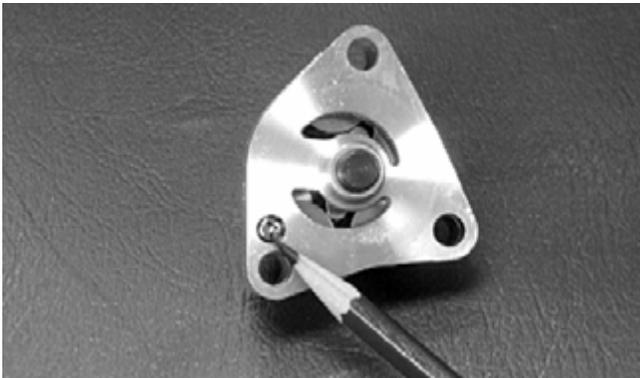
⚠ CAUTION

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.



CC446D

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.

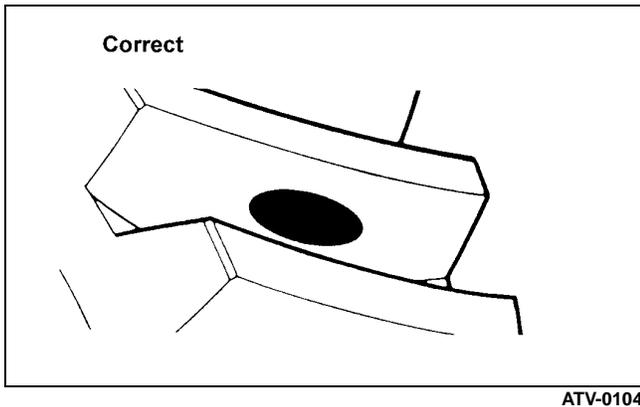
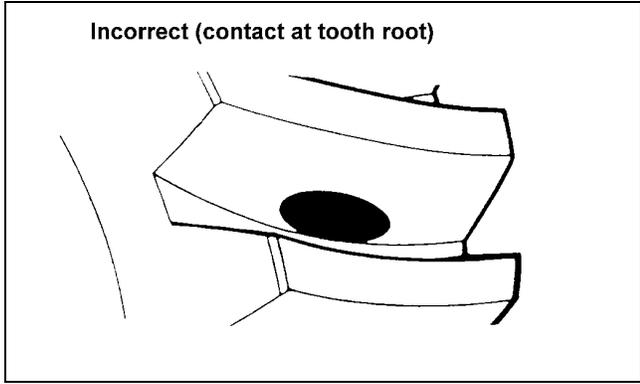
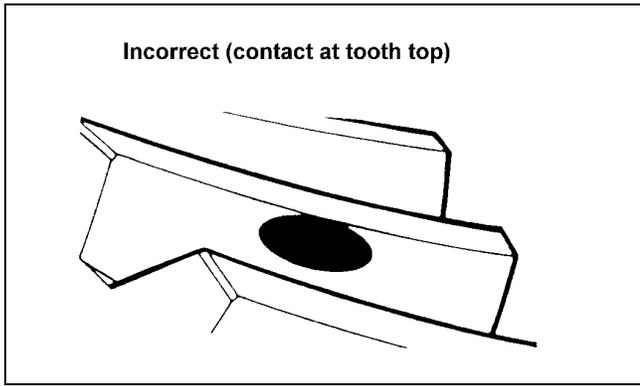
■ **NOTE:** Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

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.



Correcting Tooth Contact

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

1. 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.

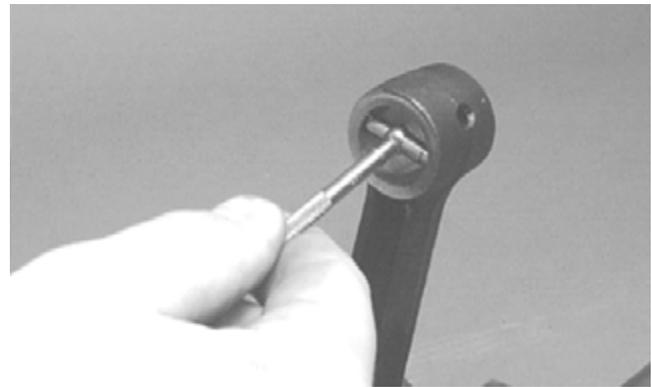
⚠ CAUTION

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.



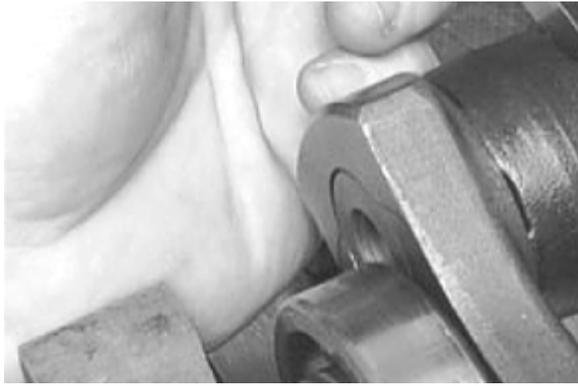
2. Maximum diameter must not exceed specifications.

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.



CC289D

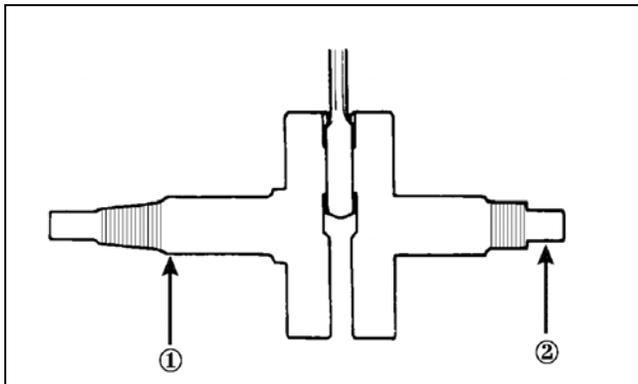
3. Acceptable gap range must be within specifications.

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

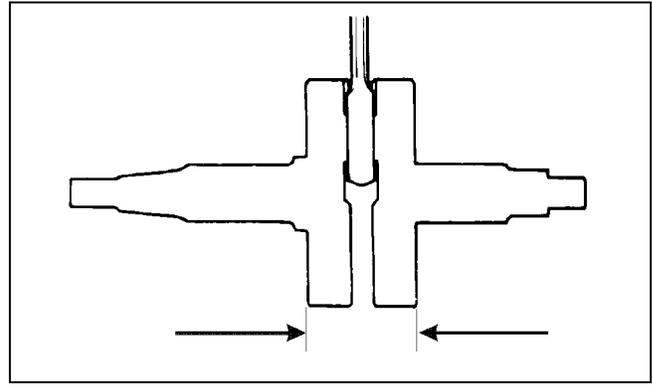
Care should be taken to support the connecting rod when rotating the crankshaft.

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 2-4.

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

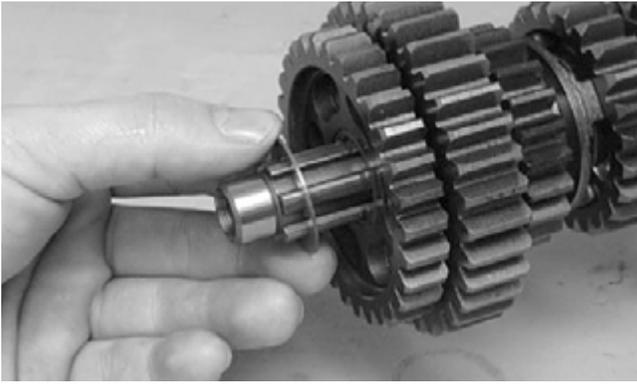
1. In order, remove the reverse dog, circlip, washer, reverse driven gear, and bushing from the driveshaft.



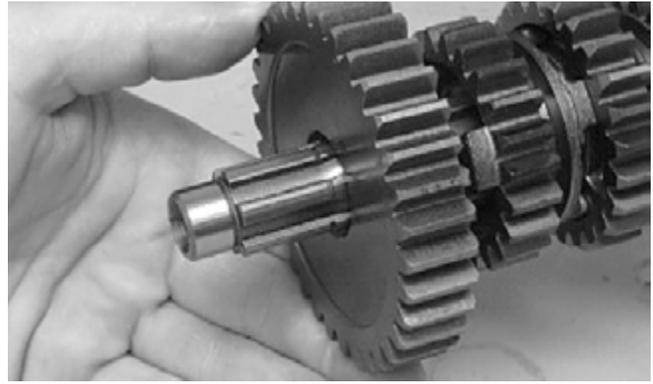
CC228D



CC227D

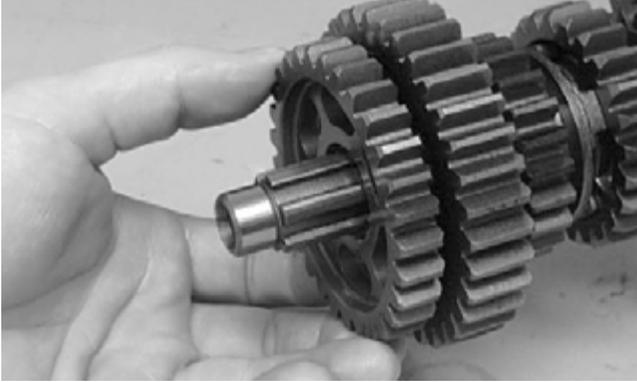


CC226D



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 circlip.



CC225D



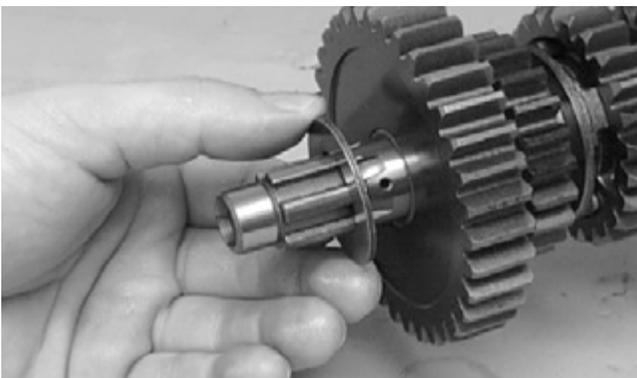
CC221D



CC224D

■ **NOTE:** The teeth on the bushing must face the 1st driven gear.

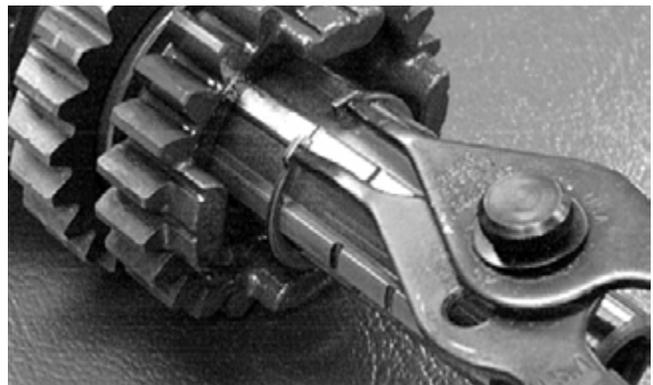
2. Remove the 1st driven washer (right side); then remove the 1st driven gear from the driveshaft.



CC223D

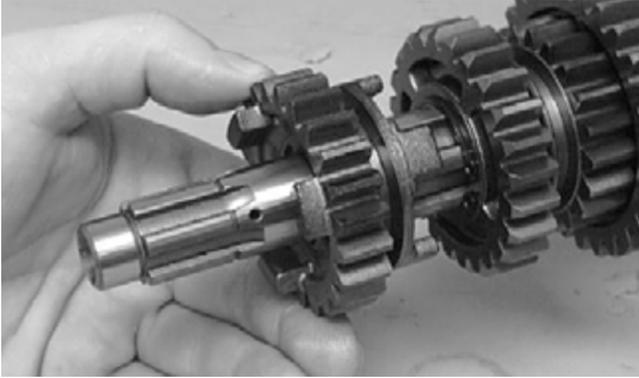


CC220D



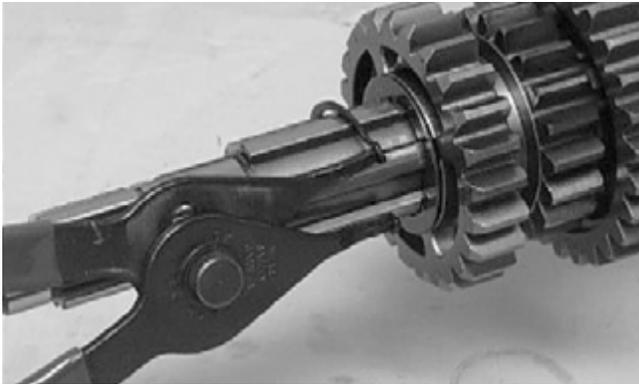
CC508D

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 circlip; then remove the 3rd driven lock washer (right side) from the driveshaft.

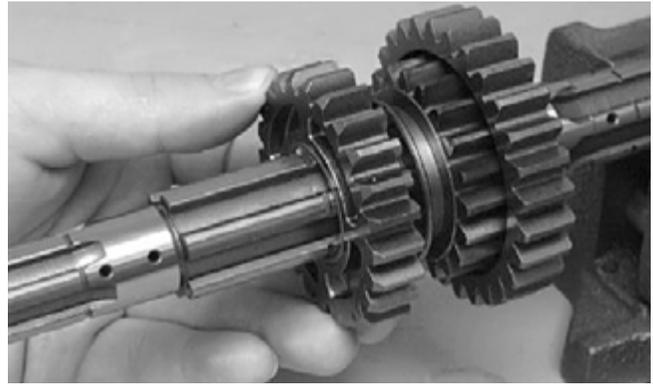


CC216D



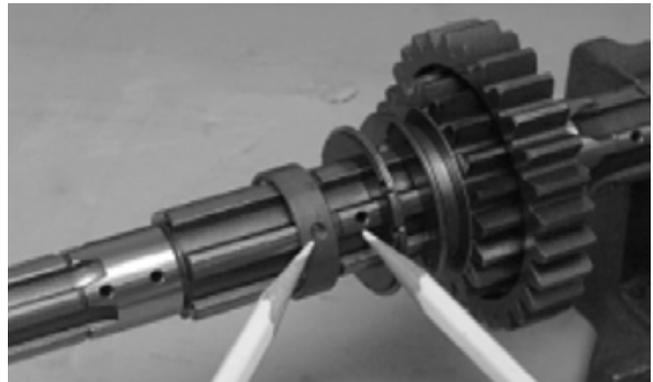
CC215D

6. Remove the 3rd driven gear from the driveshaft.



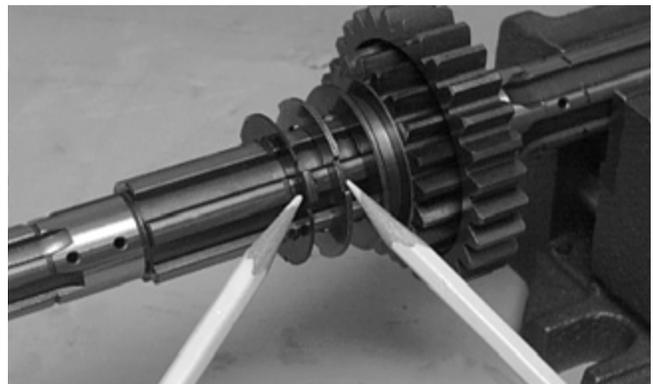
CC214D

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.



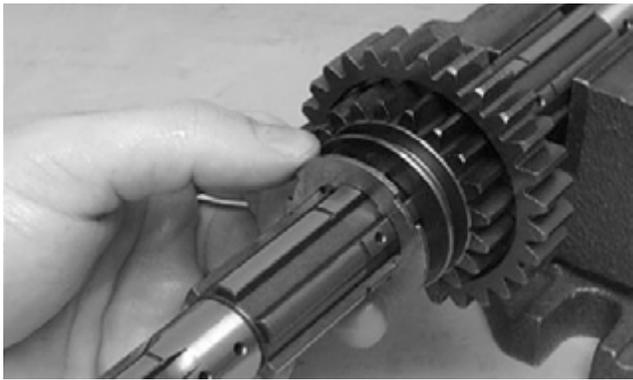
CC213D

8. Remove the 3rd driven lock washer (left side) from the driveshaft. Note the tabs facing toward the 5th driven gear for assembling purposes.



CC212D

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.

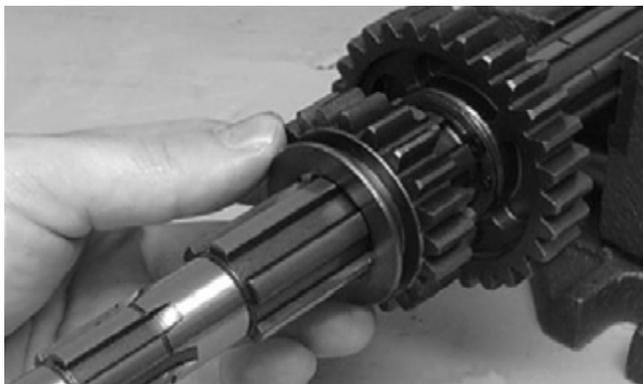


CC211D

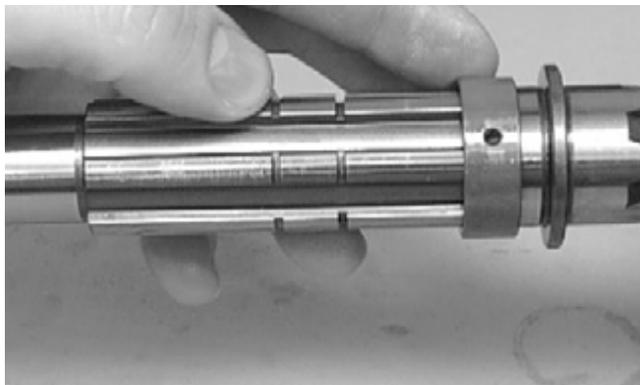


CC207D

10. Remove the 5th driven gear from the driveshaft.



CC210D



CC206D

11. In order, remove the 2nd driven circlip, washer, gear, and bushing from the driveshaft.

👉 AT THIS POINT
To service secondary gears, see Servicing Center Crankcase Components in this sub-section.

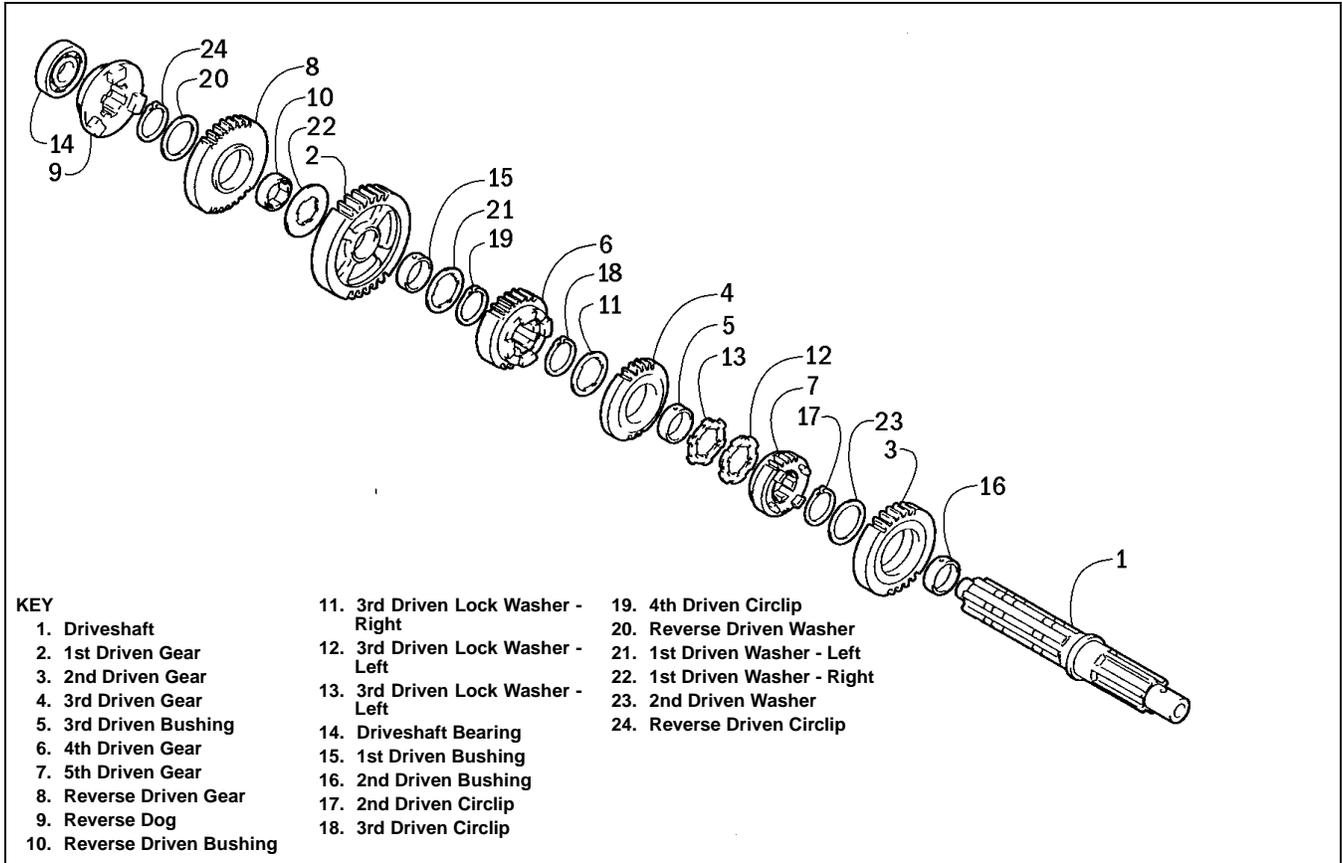


CC209D



CC208D

Assembling

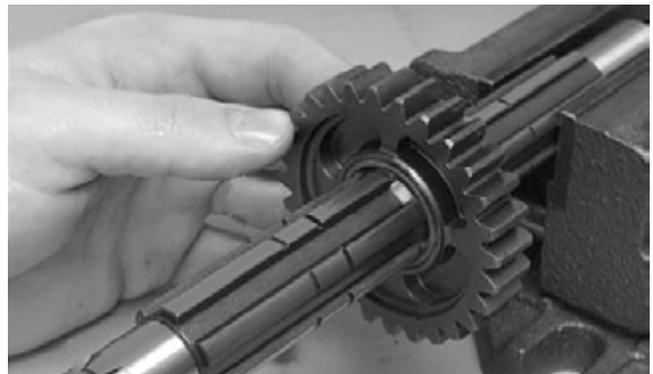


737-733A

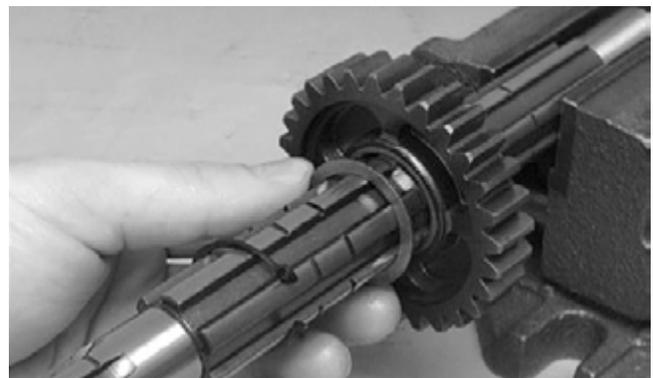
1. In order, install the 2nd driven bushing, gear, washer, and circlip onto the driveshaft.



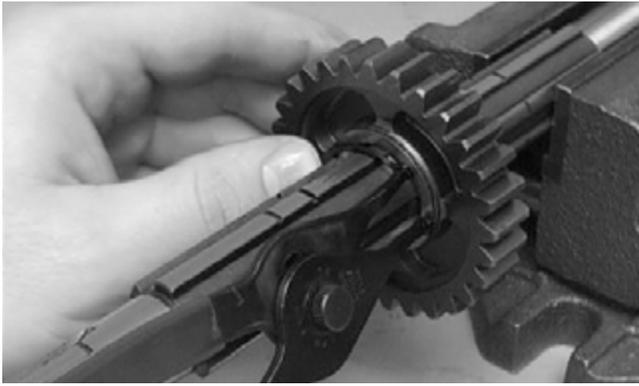
CC206D



CC207D



CC208D



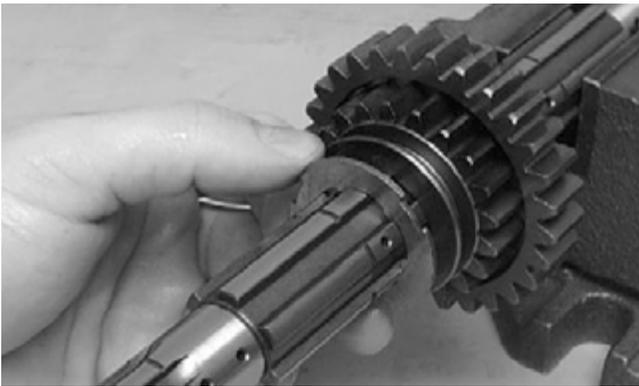
CC209D

2. Install the 5th driven gear onto the driveshaft.



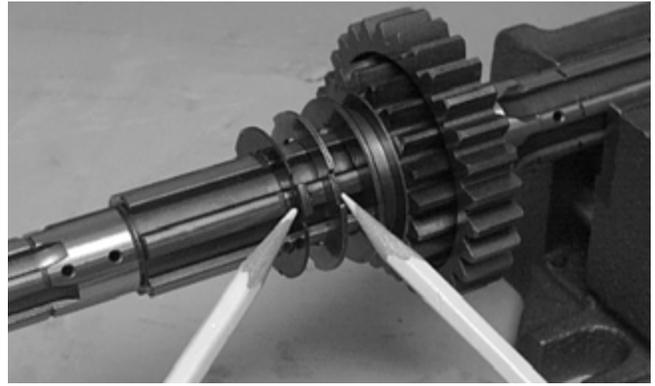
CC210D

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.



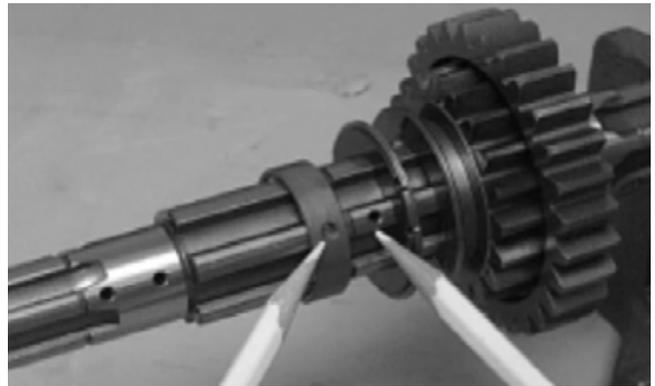
CC211D

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 intertwine with the first 3rd driven lock washer.



CC212D

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).

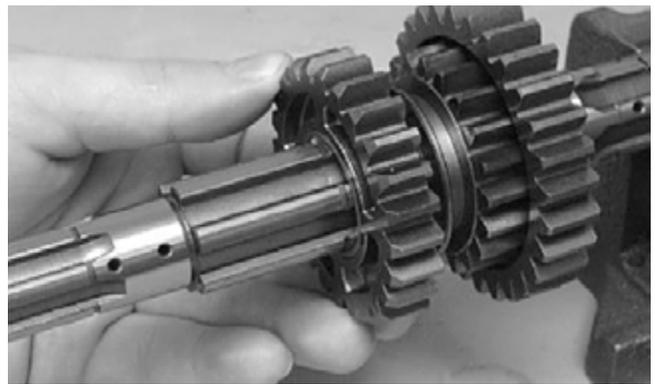


CC213D

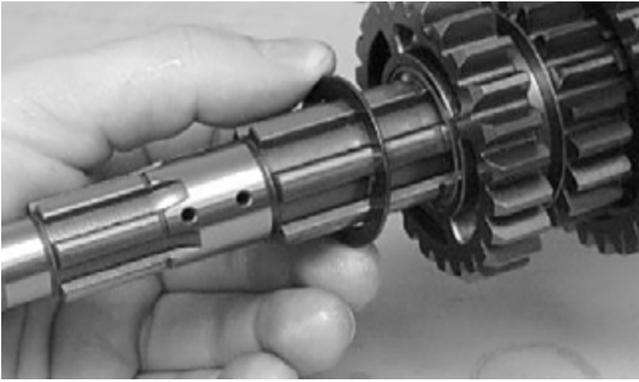
⚠ CAUTION

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 circlip onto the driveshaft.



CC214D

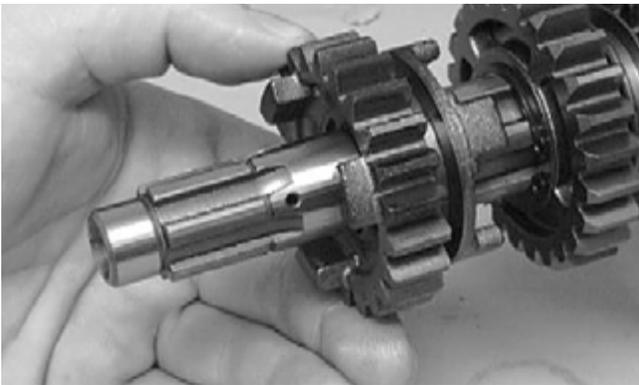


CC215D

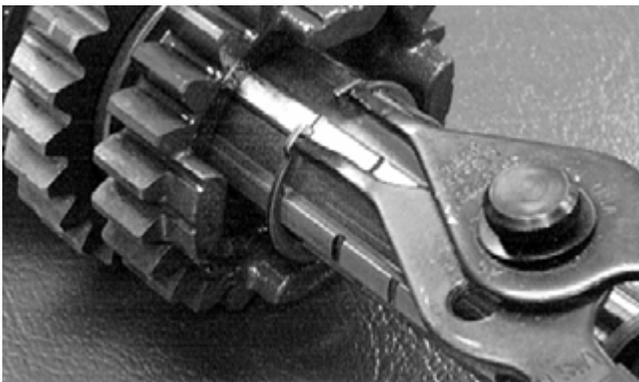


CC216D

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 circlip.



CC219D

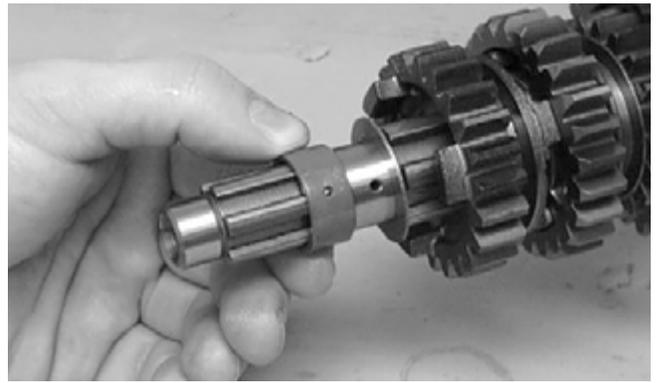


CC508D

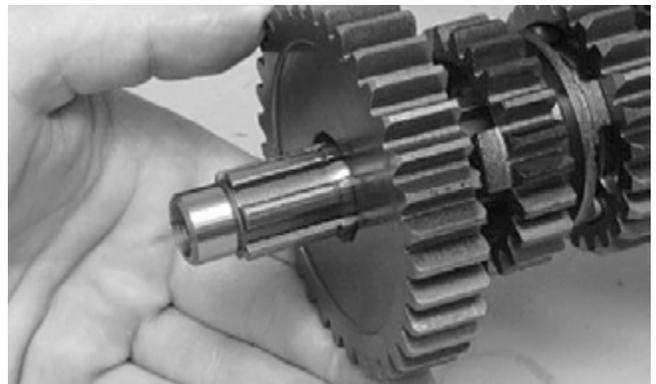
8. Install the 1st driven washer (left side) onto the shoulder of the splined shaft; then install the 1st driven bushing and gear.



CC220D

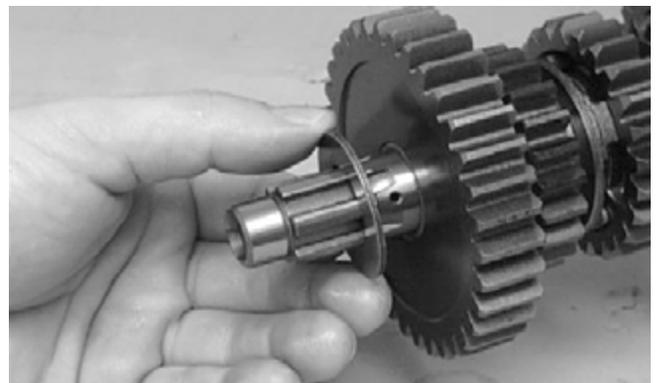


CC221D



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.



CC223D

10. Slide the reverse driven bushing onto the shaft making sure the oil port in the bushing aligns with the oil port on the shaft.



CC842

⚠ CAUTION

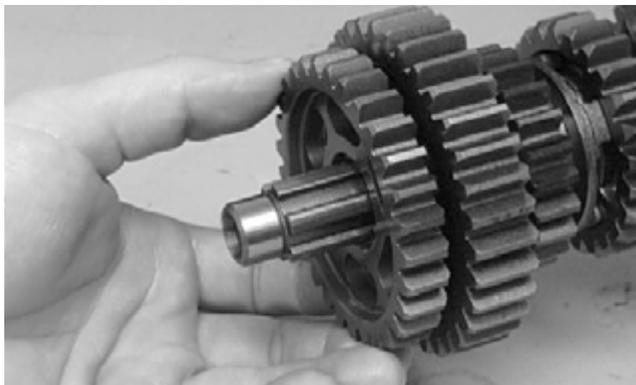
Failure to align the oil ports will result in serious engine damage.

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.

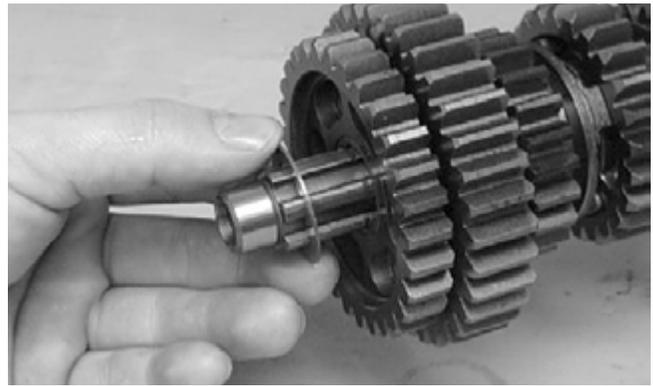


CC843

12. In order, install the reverse driven gear, washer, cir-clip, and reverse dog onto the driveshaft.



CC225D



CC226D



CC227D



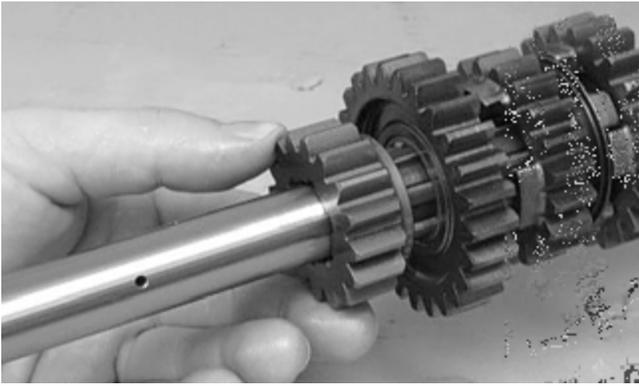
CC228D

■ **NOTE:** The driveshaft is now completely assembled for installation.

COUNTERSHAFT

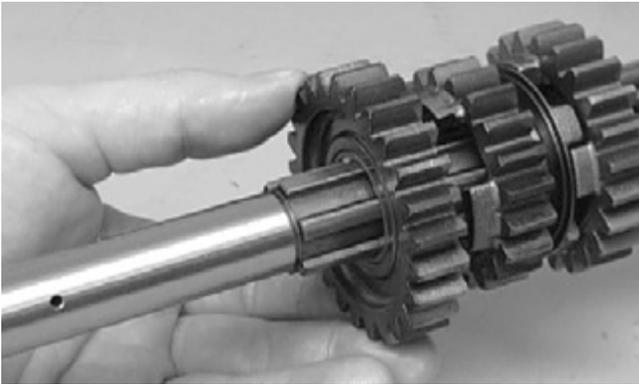
Disassembling

1. Remove the 2nd drive gear from the countershaft.



CC204D

2. Remove the 5th drive gear from the countershaft.



CC203D

3. Remove the 5th drive washer and 5th drive circlip from the countershaft.



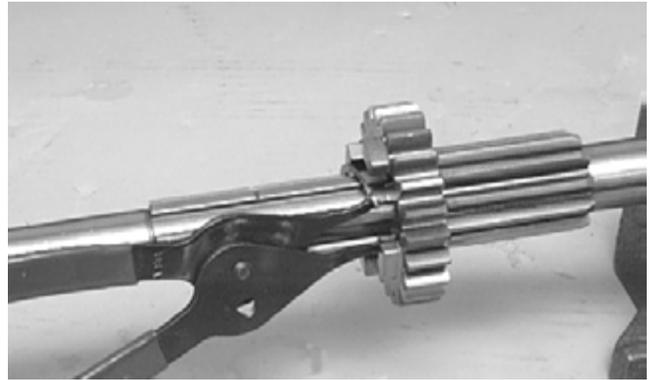
CC201D



CC200D

4. Remove the 3rd drive gear from the countershaft.

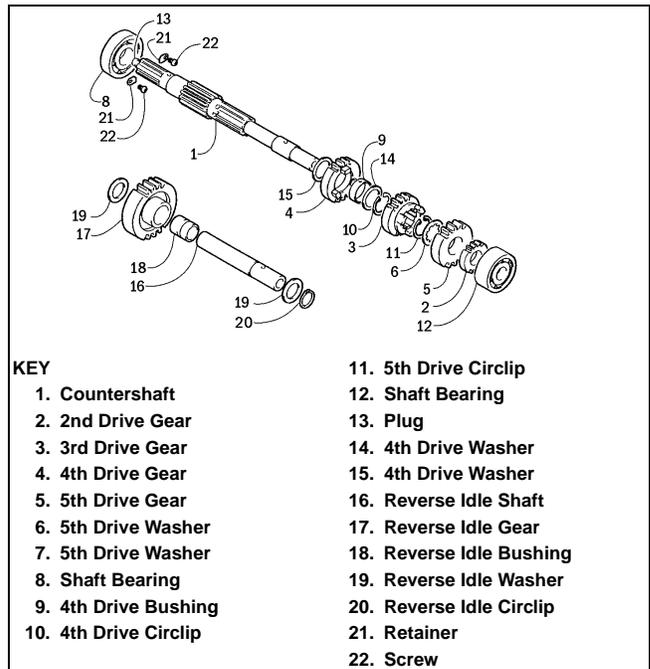
5. Remove the 4th drive circlip securing the 4th drive gear on the countershaft; then remove the first 4th drive washer and 4th drive gear. Account for the bushing.



CC199D

6. Remove the other 4th drive washer from the countershaft.

Assembling



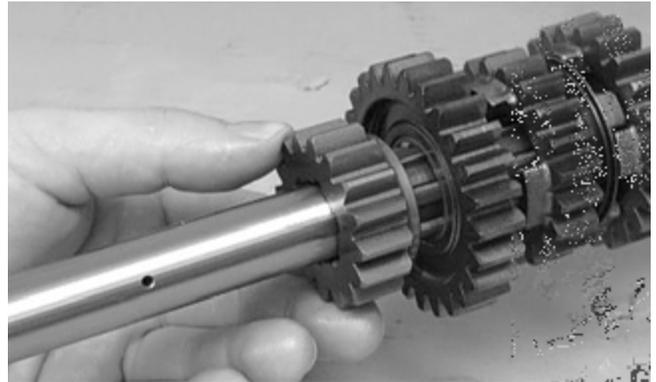
737-733B

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 circlip.



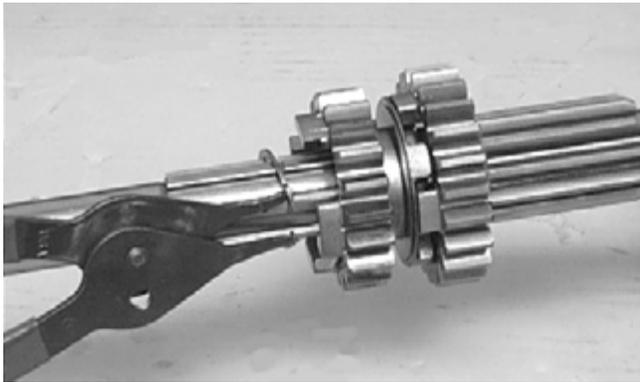
CC199D

3. Install the 3rd drive gear; then install the 5th drive circlip onto the countershaft.



CC204D

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



CC200D

4. Install the 5th drive washer and 5th drive gear onto the countershaft.

Assembling Crankcase Half

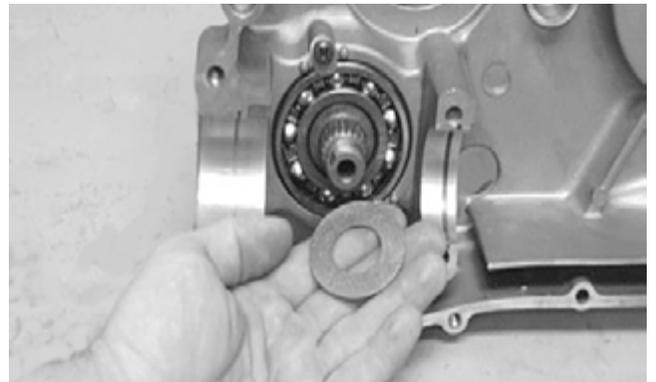
■ **NOTE:** For ease of assembly, install components on the left-side crankcase half.

■ **NOTE:** If the output shaft and gear were removed, make sure that the proper shim is installed.

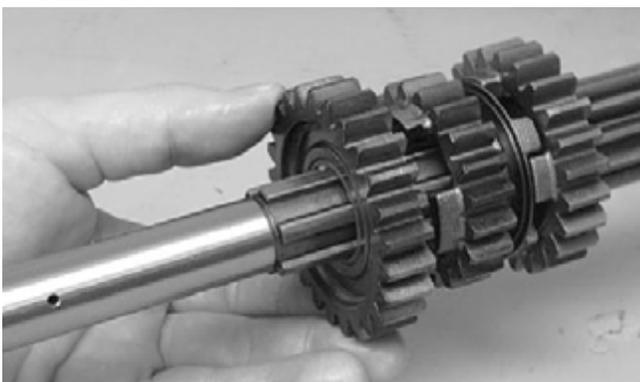
1. To install the output shaft and gear, place the shaft into position with proper shims, slide the gear onto the shaft, and secure with a new nut tightened to 10 kg-m (72 ft-lb).



CC201D

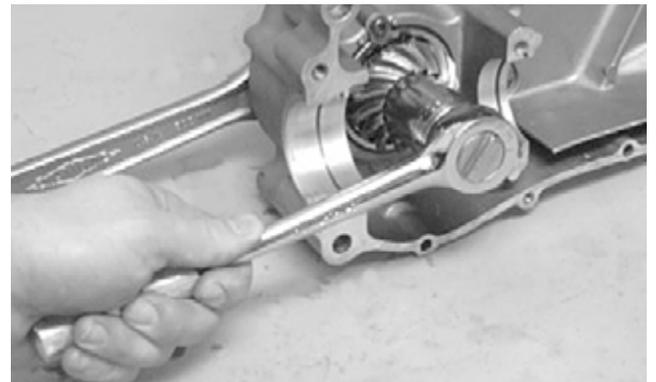


CC117D



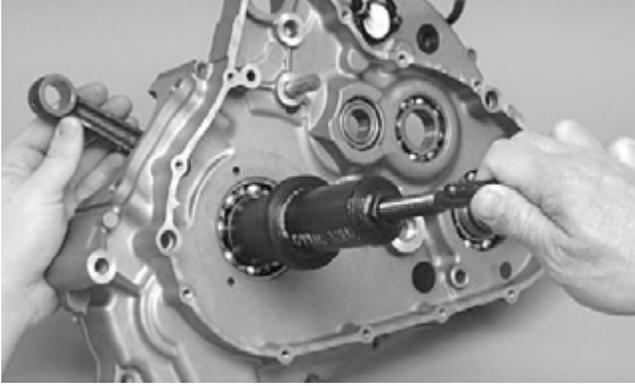
CC203D

5. Install the 2nd drive gear onto the countershaft.



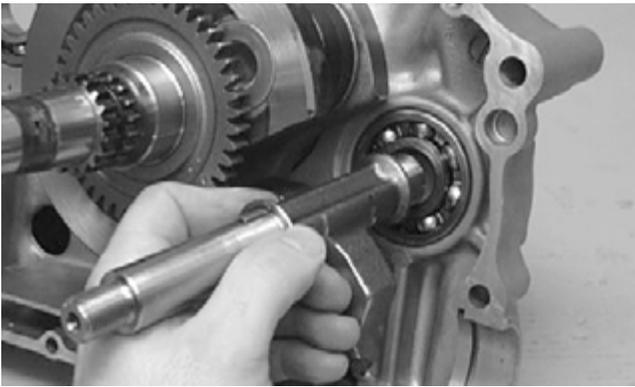
CC116D

- Using the Crankshaft Installer (p/n 0444-018), install the crankshaft.



CC151D

- Install the crank balancer.



CC168D

- With the key in position, slide the driven gear onto the crank balancer making sure the timing marks are aligned.



CC165D



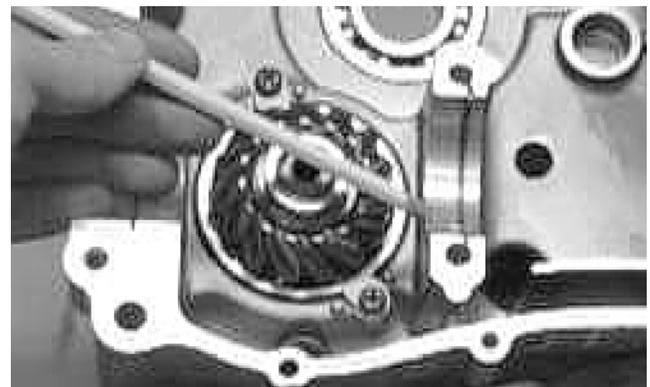
CC167D



CC166D

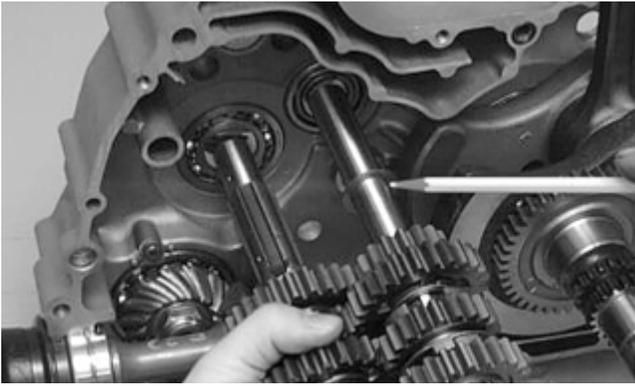
- Place the bearing C-ring into position in the crankcase; then install the front shaft (4x4) and rear shaft assemblies.

CAUTION
The bearing pins must be positioned into the crankcase.



CC110D

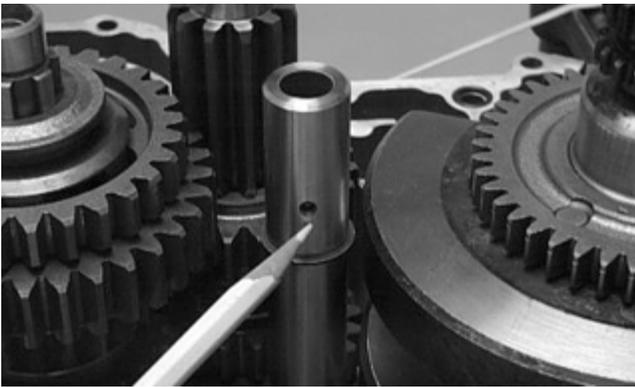
- Simultaneously, install the driveshaft and countershaft assemblies making sure the washer is on the countershaft.



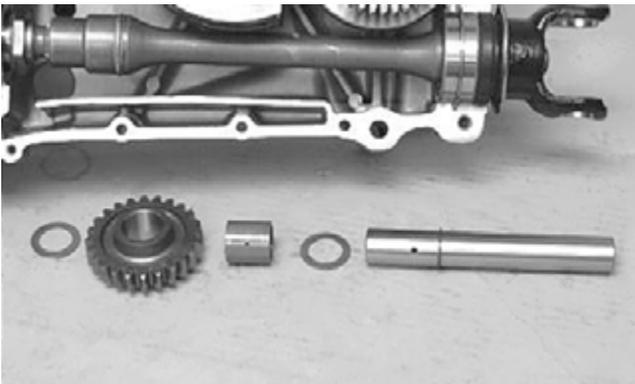
CC197D

7. Install the reverse idle shaft with circlip making sure the oil hole in the shaft is facing downward; then install a washer, bushing, reverse idle gear, and a washer.

■ **NOTE:** The reverse idle gear is directional. Care must be taken that it is installed correctly.



CC229D



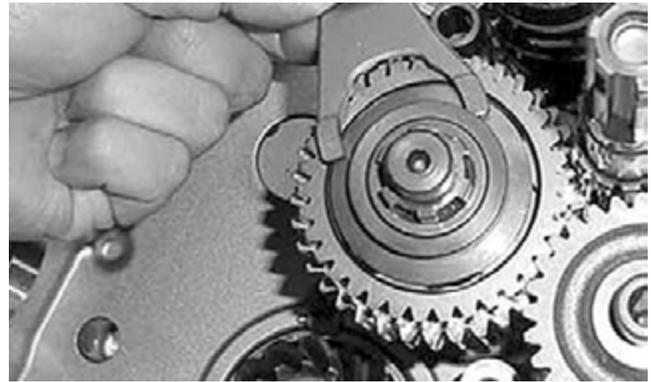
CC231D

8. Place each of the four shift forks into its respective gear or dog as noted during disassembling; then install the gear shift cam.



CC987

9. Engage the four forks to the gear shift cam; then install the reverse shift cam and spacer.



CC986

■ **NOTE:** For proper assembling, the cam lock plate must engage the shift cam cutaway.



CC988

10. Install the two gear shift fork shafts; then verify that the two crankcase half alignment pins are in place.

■ **NOTE:** Prior to joining crankcase halves, turn the shift cam to ensure all gears shift properly.

Joining Crankcase Halves

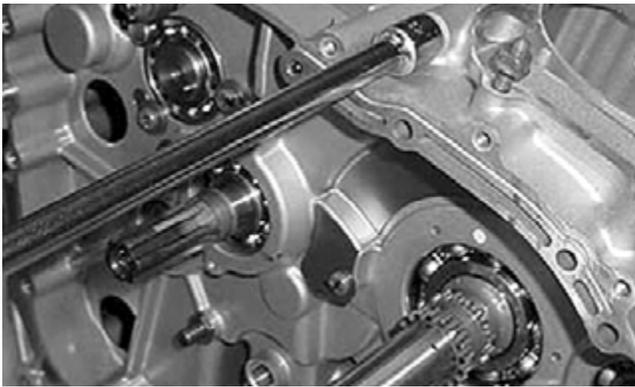
1. Verify that the shim washer is on the idler shaft; then apply Three Bond Sealant (p/n 0636-070) to the mating surfaces. Place the right-side half onto the left-side half.



CC102D

2. Using a plastic mallet, lightly tap the case halves together until cap screws can be installed.
3. From the right side, install the four 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.



CC982

4. From the left side, install the three case half 8 mm cap screws (two inside the case); then tighten only until snug.

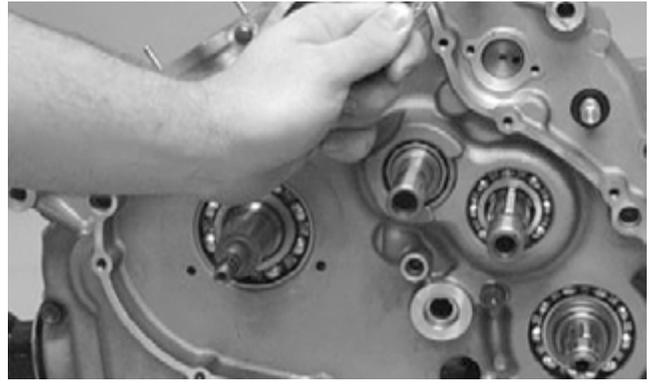
■ **NOTE:** Rotate the shafts back and forth to ensure no binding or sticking occurs.



CC981

5. From the left side, install the seven 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.



CC096D

6. From the right side, install the five 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.



CC980

7. In a crisscross/case-to-case pattern, tighten the 8 mm cap screws (from step 4) until the halves are correctly joined; then tighten to 2-2.4 kg-m (14.5-17 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 0.9-1.3 kg-m (6.5-9.5 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 Right-Side Components

A. Oil Strainer/Oil Pump

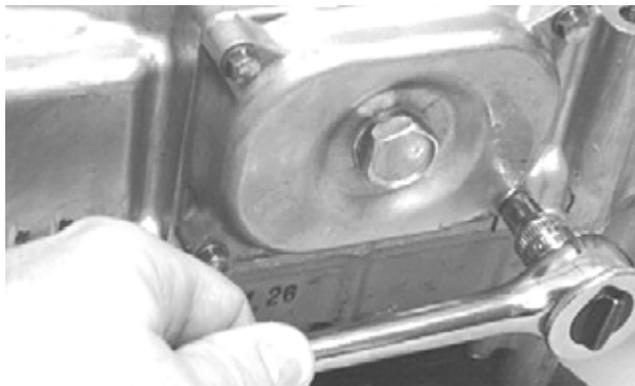
B. Gear Shift Shaft

1. Place the oil strainer with a new O-ring 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 the O-ring is properly installed and secure with the cap screws; then install and tighten the oil drain plug to 2.2 kg-m (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 1 kg-m (7 ft-lb).



CC978

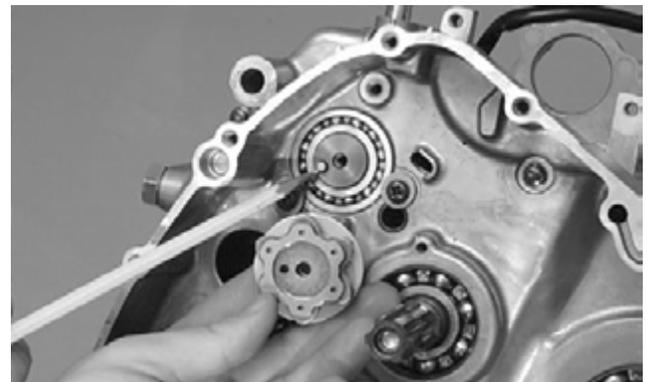
4. Place the pin and washer into position on the oil pump shaft, install the oil pump driven gear, and secure with the circlip.

■ **NOTE:** Always use a new circlip when installing the driven gear.

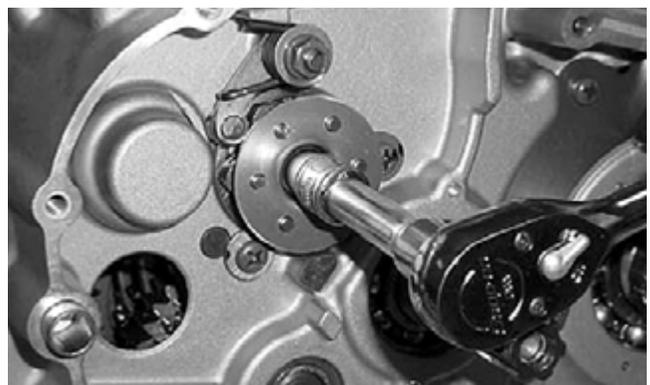


CC976

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.



CC087D



CC975

6. Attach the spring to the gear shift cam stopper arm.



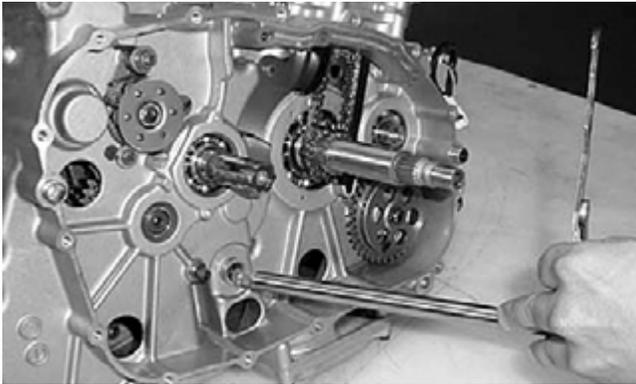
CC974

7. Install the gear shift shaft.



CC971

9. Place the chain into the crankcase; then secure it from the top side with a wire for ease of installing.



CC973

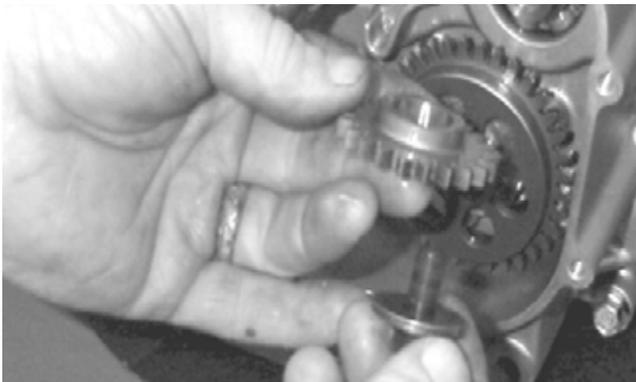


CC079D

C. Primary Driven Gear
D. Primary Clutch
E. Starter 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 (threads coated with red Loctite #271) tightened to 8 kg-m (58 ft-lb).

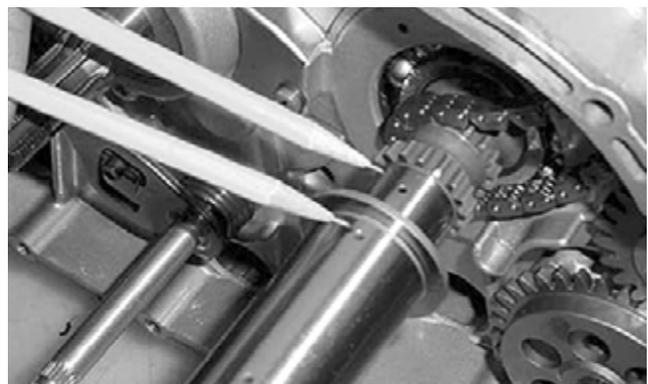


MD1017

10. Install the primary driven washers and shims onto the driveshaft and crankshaft.



CC969

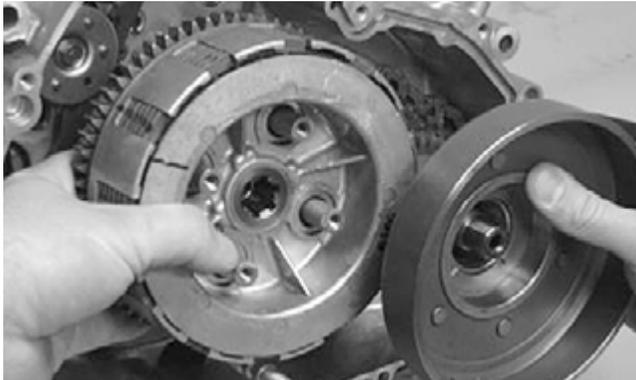


CC970

⚠ CAUTION

The clutch sleeve hub and the clutch 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.

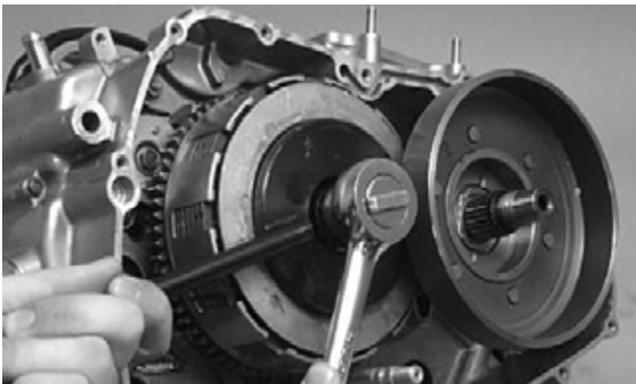


CC078D

■ **NOTE:** After placing the primary clutch assembly onto the shaft, pull out on the pressure plate tower to ensure the pressure plate has engaged the clutch hub properly and make sure the plates (drive and driven) are brought together tightly prior to tightening the nut securing the clutch assembly.

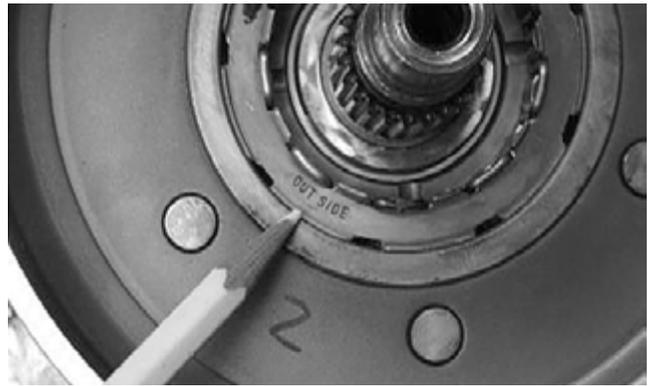
12. Using a clutch sleeve hub holder, install the nut and washer. Tighten to 10 kg-m (72 ft-lb).

■ **NOTE:** The washer is directional. Care must be taken to install it correctly.



CC076D

13. Place the primary drive one-way clutch into the starter clutch housing noting the word OUTSIDE for proper placement.



CC075D

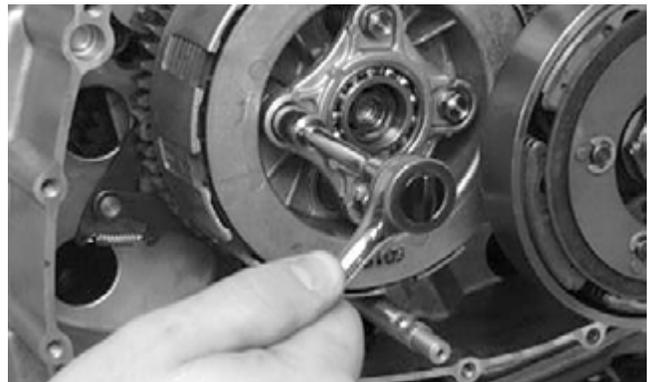
14. Install the starter clutch shoe and washer; then secure with the starter clutch-shoe nut (left-hand threads). Tighten to 13 kg-m (94 ft-lb); then using a center punch, stake the nut.



CC990

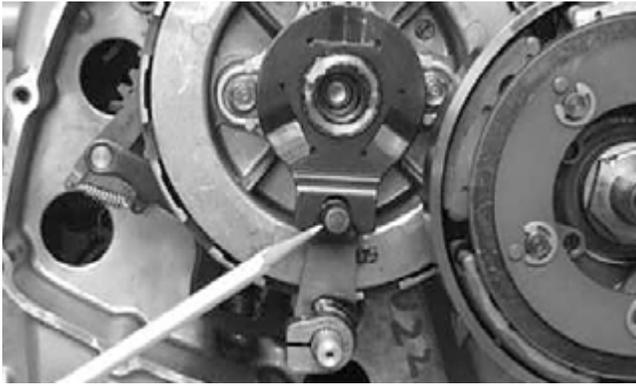
15. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, tighten the four cap screws securely.

■ **NOTE:** Tighten the four roller assembly cap screws in a crisscross pattern making sure there is no clearance between the clutch plates when secured.



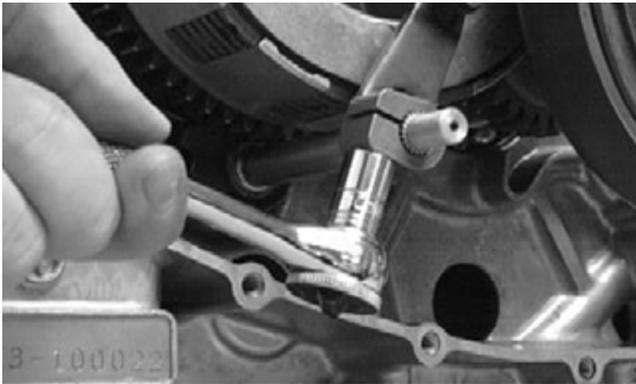
CC074D

16. Install the clutch release arm and release roller guide making sure the release roller and guide are aligned.



CC162D

17. Secure the clutch release arm with the cap screw coated with blue Loctite #243. Tighten securely.



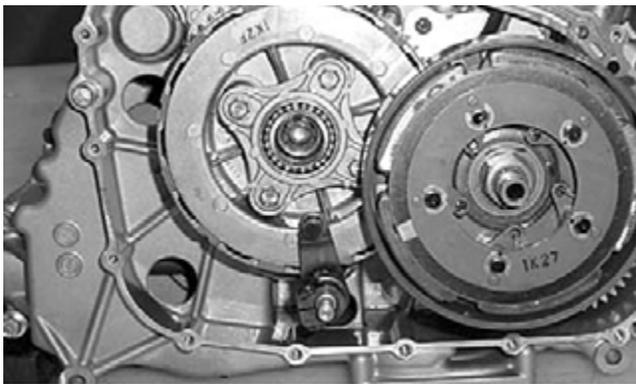
CC073D

F. Oil Filter

■ **NOTE:** Steps 1-17 of the preceding sub-sections must precede this procedure.

■ **NOTE:** Lubricate all internal components with 10W-40 oil prior to installing the right-side cover.

■ **NOTE:** Care should be taken that the alignment pins are installed in the right-side cover.



CC989

18. Place the gasket and right-side cover into position making sure the release roller guide remains correctly positioned; then install the fifteen cap screws.



CC968

19. Tighten the cap screws in a crisscross pattern to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

20. Using the oil filter wrench, install a new oil filter.



CC967

Installing Left-Side Components

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.



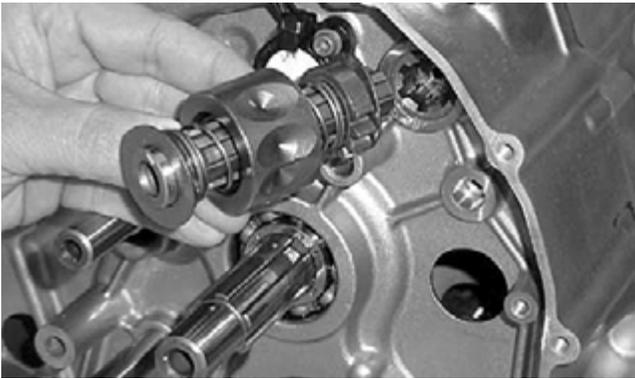
CC065D

2. Place the neutral switch base assembly into position making sure the two neutral contacts and springs are inside the case and properly positioned. Secure with Allen-head screws.



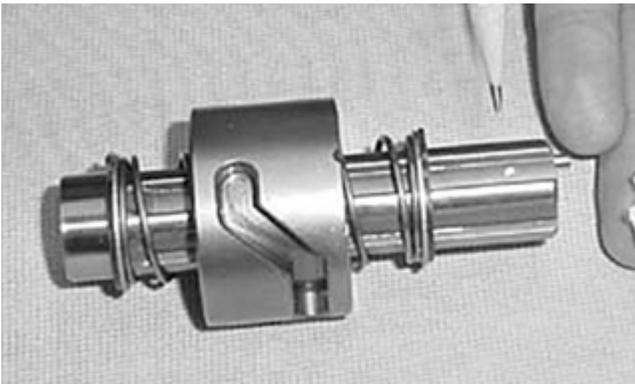
CC964

3. Install the secondary stopper camshaft w/one inner shim and one outer shim.



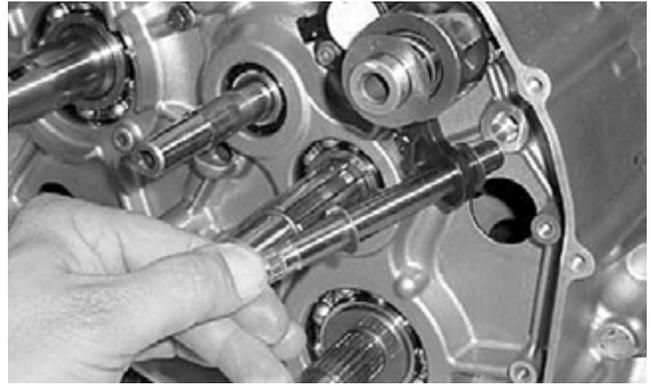
CC962

■ **NOTE:** Care must be taken that the alignment dots on the camshaft plate and the camshaft are properly aligned.



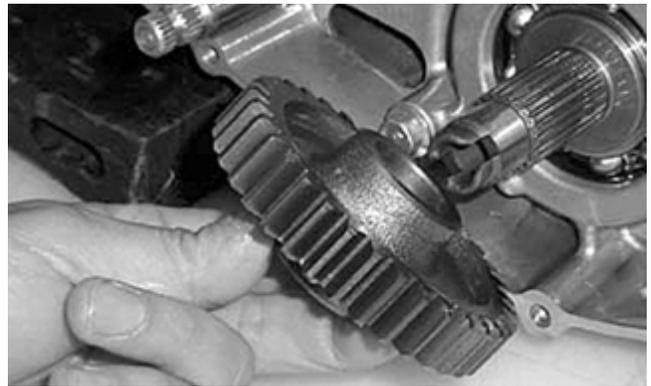
CC963

4. Install the gear shift shaft w/one inner washer and one outer washer.



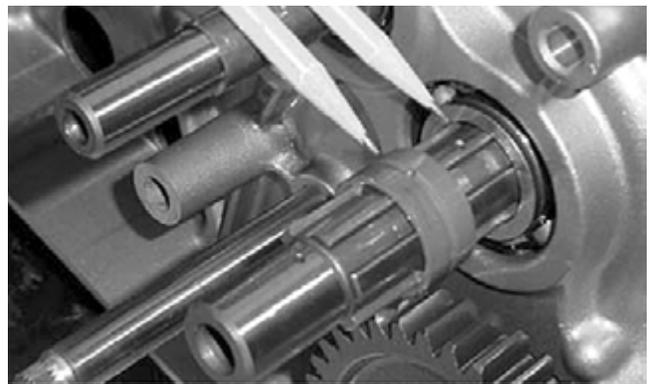
CC960

5. Install the driven gear onto the output shaft.



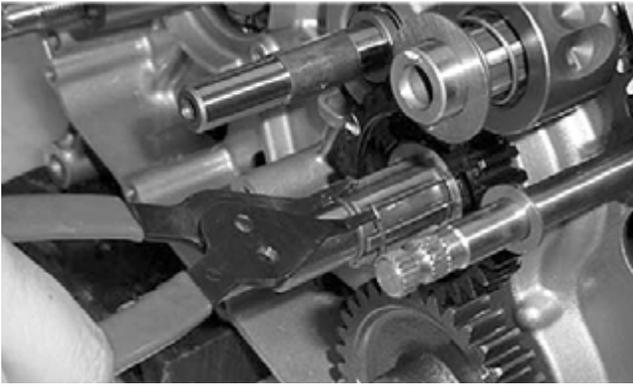
CC959

6. Place the bushing and washer onto the driveshaft making sure the oil hole of the bushing aligns with the oil hole of the driveshaft.



CC957

7. In turn on the driveshaft, install drive gear #1 and a washer; then secure with the circlip.

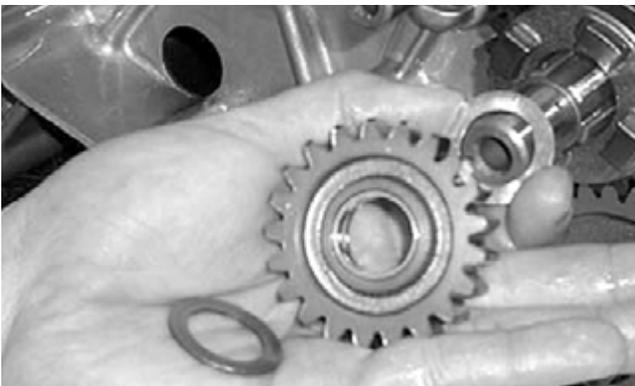


CC955

8. Place the select sliding dog gear and washer onto the driveshaft; then place drive gear #2 and another washer onto the driveshaft.

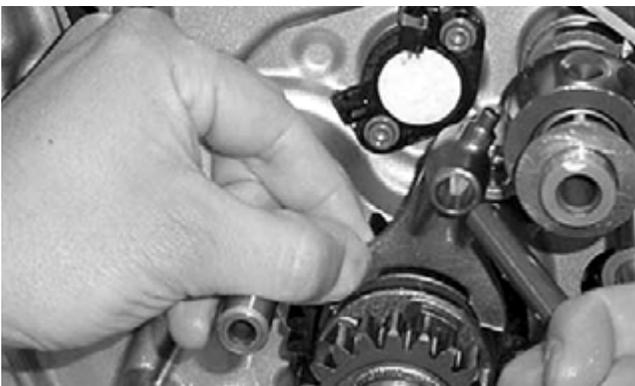


CC966



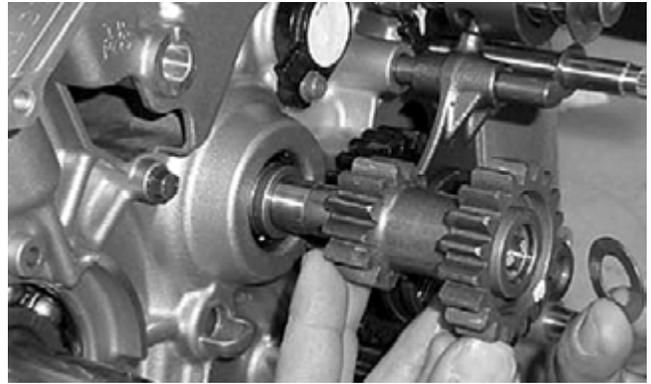
CC954

9. Place the gear shift fork into the sliding dog; then install the gear shift fork shaft.



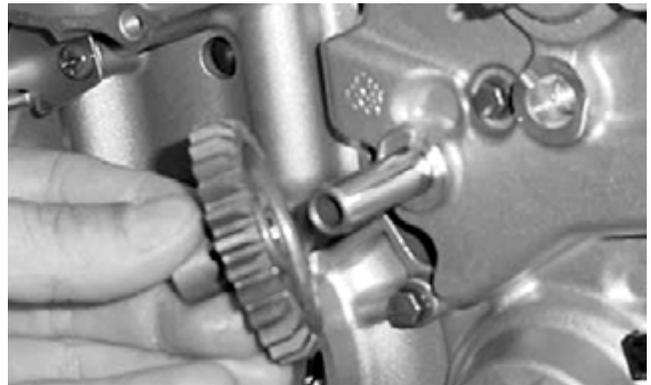
CC953

10. Install the drive idler gear with one spacer and one washer.



CC952

11. Install starter idler gear #2 and pin.



CC951

12. Install the starter clutch gear assembly onto the crankshaft. Place the key into its notch. Place the magneto rotor into position on the crankshaft; then install the magneto rotor nut on the crankshaft and tighten until the rotor is properly seated. Tighten to 16 kg-m (116 ft-lb).



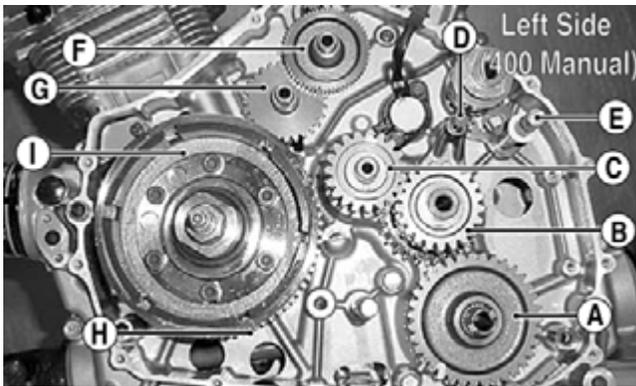
CC991



CC990

13. Install the two alignment pins into the left crankcase half.

■ **NOTE:** Make sure that three washers and two alignment pins are in place.



CC948B

- C. Cover**
- D. Speedometer Drive**
- E. Hi/Low Shifter Assembly**
- F. Recoil Starter**

■ **NOTE:** Steps 1-13 in the preceding sub-section must precede this procedure.

14. 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.

15. Install the fifteen 6 mm cap screws and one 8 mm cap screw to secure the left-side cover.



CC945

16. In a crisscross pattern, tighten the cap screws to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

17. Place the gear shift stopper w/spring and washer into position above the hi/low shift shaft making sure the spring and stopper are correctly positioned. Tighten to 2.3 kg-m (16.5 ft-lb).



CC993

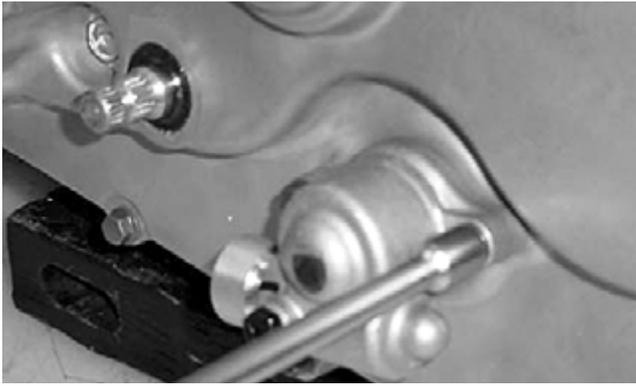
18. Place the speedometer drive adapter and gasket into position and secure with the two cap screws. Tighten securely.

CAUTION

Make sure the speedometer gear and output shaft gear match up during assembly.



CC947



CC992

19. 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 3.5 kg-m (25 ft-lb).



CC943

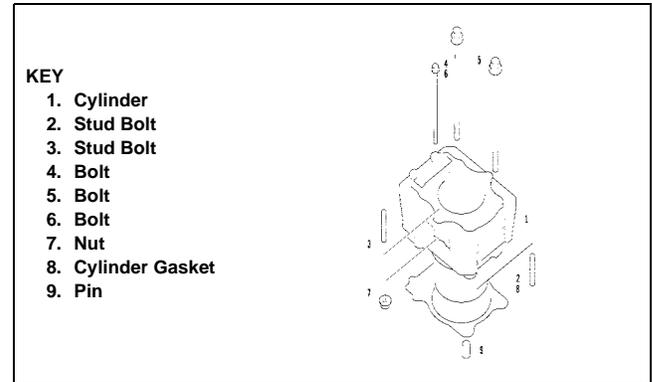
20. Place the recoil starter assembly into position on the left-side cover; then tighten four cap screws to 0.8 kg-m (6 ft-lb).



CC942

Installing Top-Side Components

A. Piston B. Cylinder

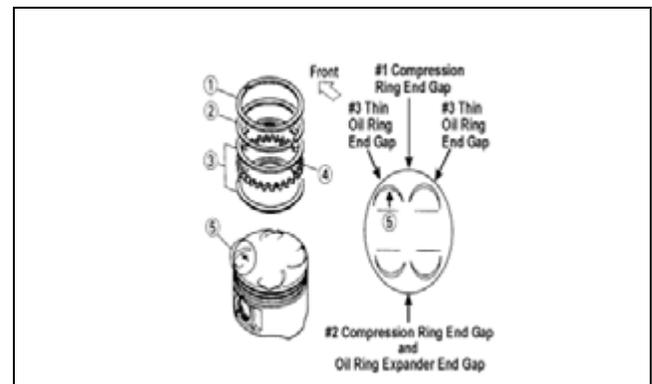


0737-039

■ **NOTE:** If the piston rings were removed, install them in this sequence.

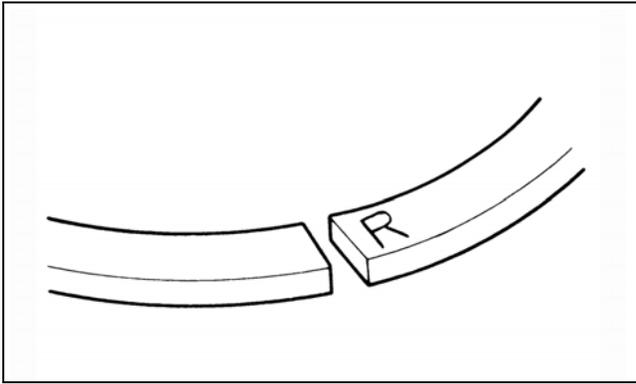
A. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

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



ATV-1085B

B. 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).



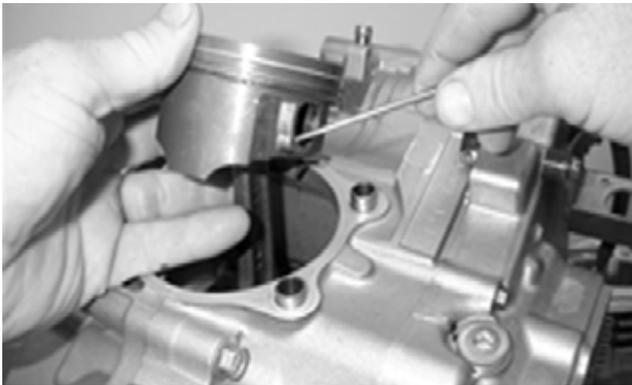
ATV-1024

⚠ CAUTION

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

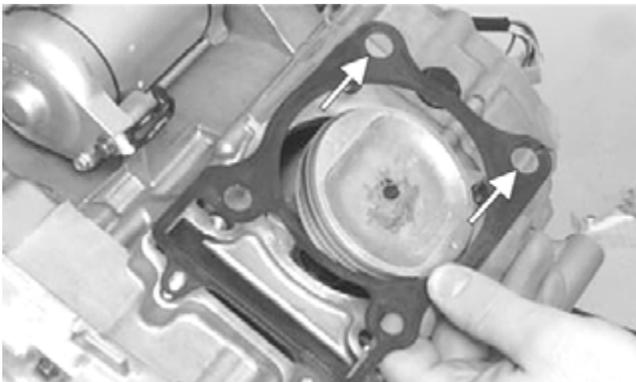
1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

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



MD1213

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.



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 with washers which secure the right-side of the cylinder to the right-side crankcase half.

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



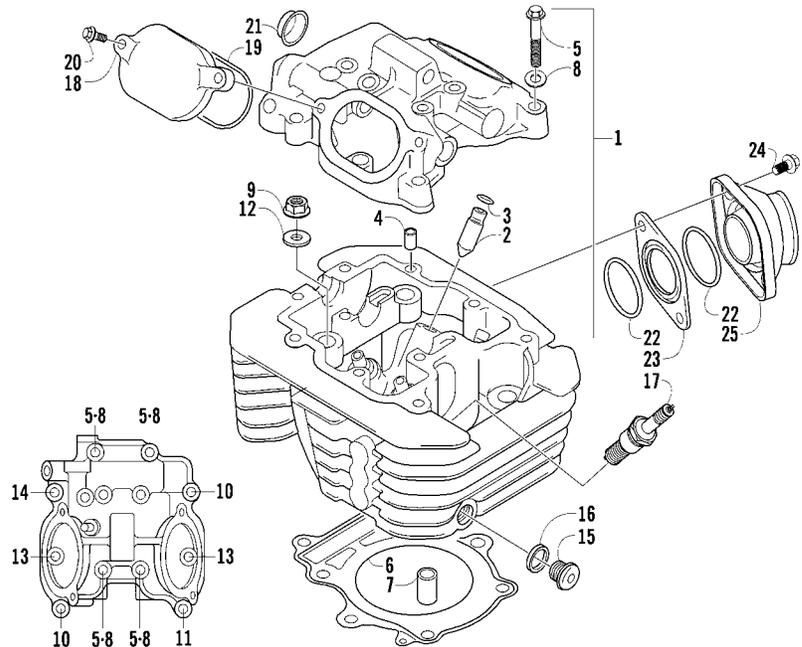
MD1226

C. Cylinder Head

D. Valve Cover

KEY

1. Cylinder Head Assy
2. Valve Guide
3. Ring
4. Pin
5. Cap Screw
6. Cylinder Head Gasket
7. Pin
8. Gasket
9. Nut
10. Cap Screw
11. Cap Screw
12. Washer
13. Cap Screw
14. Cap Screw
15. Plug
16. Gasket
17. Spark Plug
18. Inspection Cap
19. O-Ring
20. Cap Screw
21. Plug
22. O-Ring
23. Insulator
24. Screw
25. Intake Manifold



0737-038

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

5. While keeping tension on the cam chain, 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.

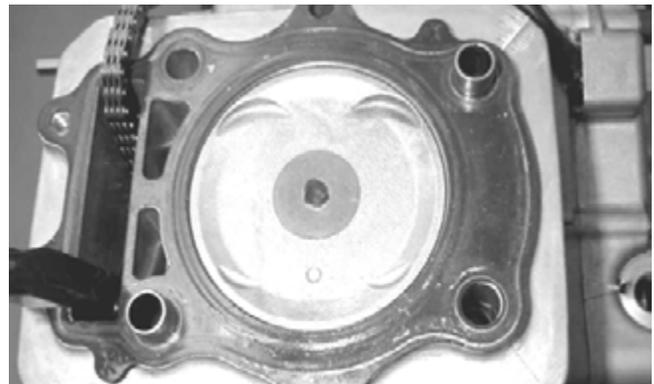


MD1349

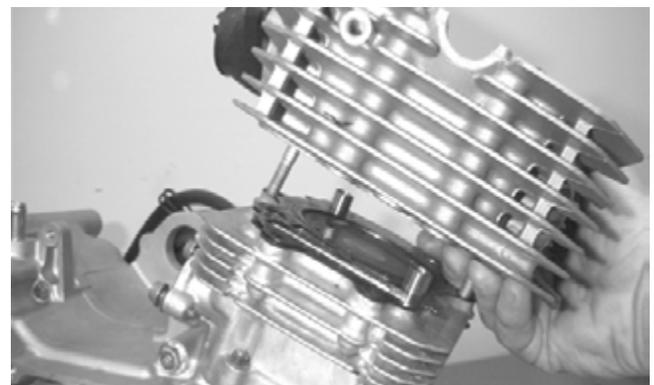
6. Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder making sure the cam chain is routed through the chain cavity.

CAUTION

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

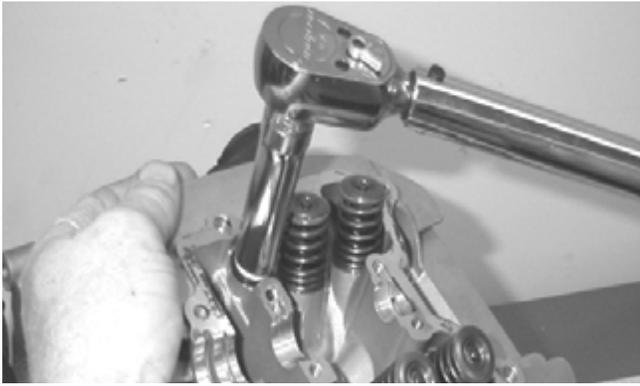


MD1347



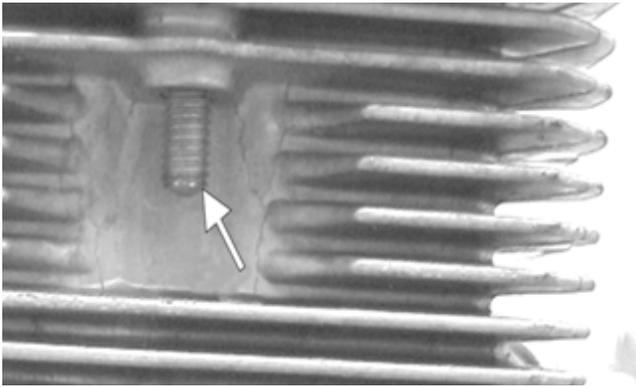
MD1163

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.



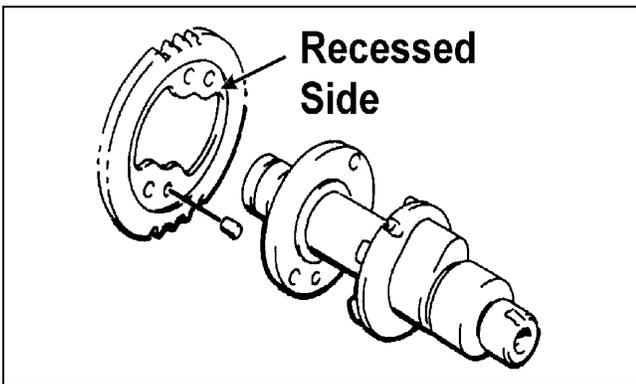
MD1270

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



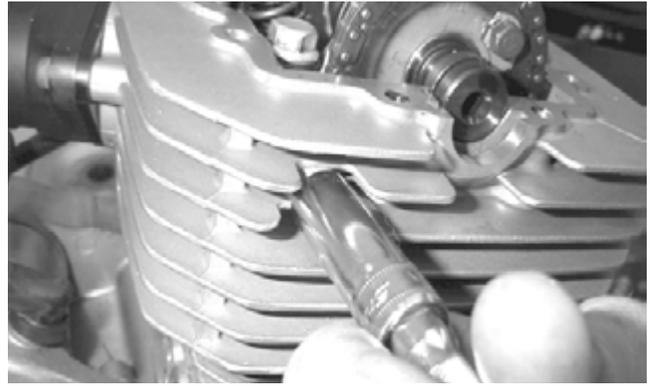
MD1192

9. In a crisscross pattern, tighten the four cylinder head cap screws (from step 7) to 3.8 kg-m (27.5 ft-lb); then tighten the nuts (from step 8) to 2.5 kg-m (18 ft-lb). Tighten the cylinder-to-crankcase nuts to 1.1 kg-m (8 ft-lb).
10. With the timing inspection plug removed and the chain held tight, rotate the crankshaft until the piston is at top-dead-center.
11. 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 over the sprocket.



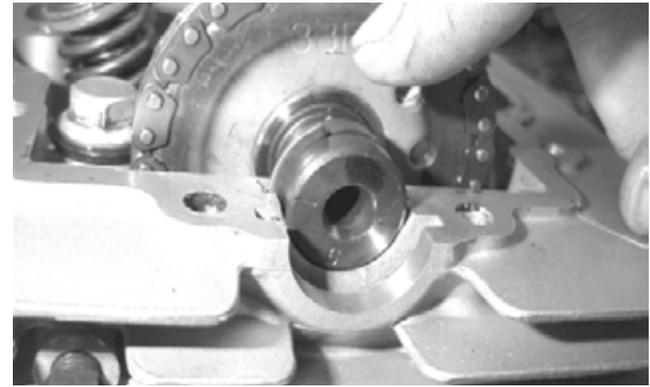
732-307B

12. 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.



MD1251

13. 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.

14. 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.

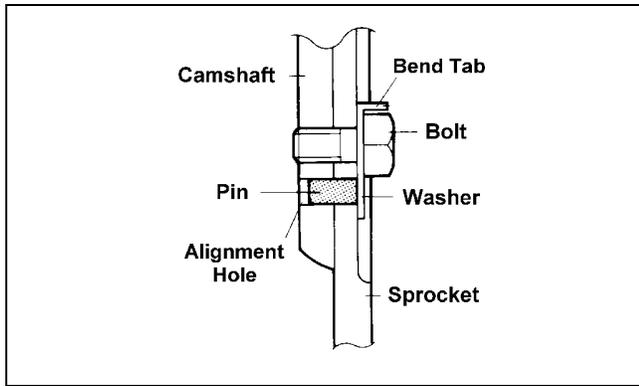
■ **NOTE:** When the camshaft assembly is seated, make sure the alignment pin in the camshaft aligns with the smallest hole in the sprocket.



MD1362

15. Apply red Loctite #271 to the cap screws; then install the cap screws and tab washer to the camshaft sprocket. Tighten cap screws to 1.5 kg-m (11 ft-lb).

16. 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.

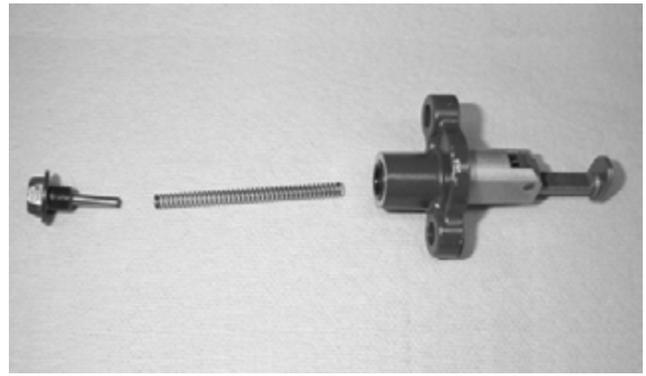
■ **NOTE:** Note the position of the alignment marks on the end of the camshaft. They must be parallel with the valve cover mating surface. If rotating the camshaft is necessary for alignment, do not allow the chain and sprocket to rotate and be sure the cam lobes end up in the down position.

17. When the camshaft assembly is seated, ensure the following.
- 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 10 and carefully proceed.

18. Install the cylinder head plug in the cylinder head with the open end facing the camshaft.
19. Remove the cap screw from the end of the chain tensioner; then account for the plunger, spring, and O-ring.



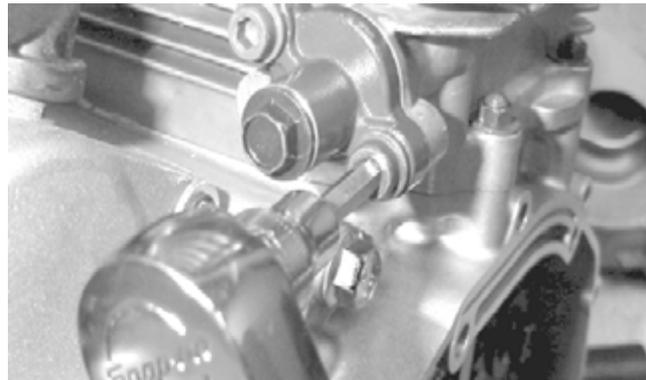
MD1248

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

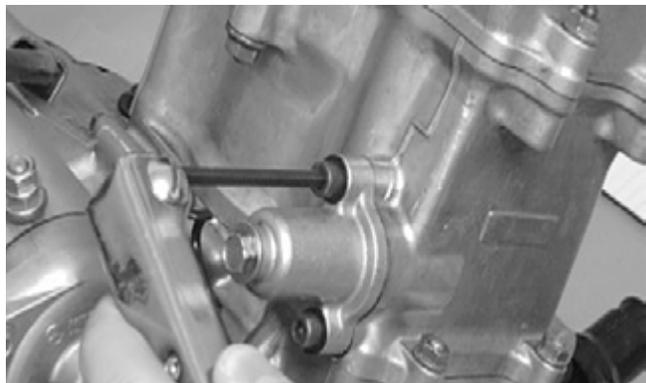


MD1146

21. Place the chain tensioner adjuster assembly and gasket into position on the cylinder making sure the ratchet side is facing toward the top of the cylinder and secure with the two Allen-head screws.

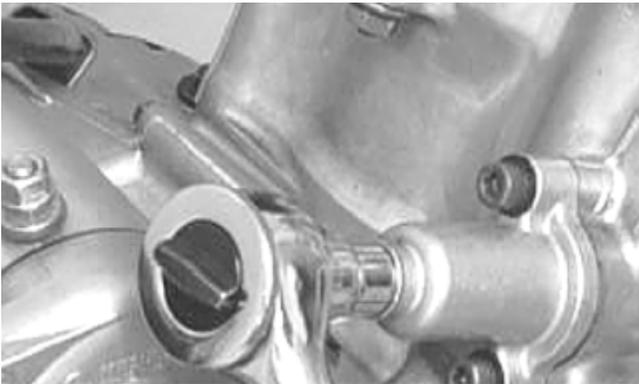
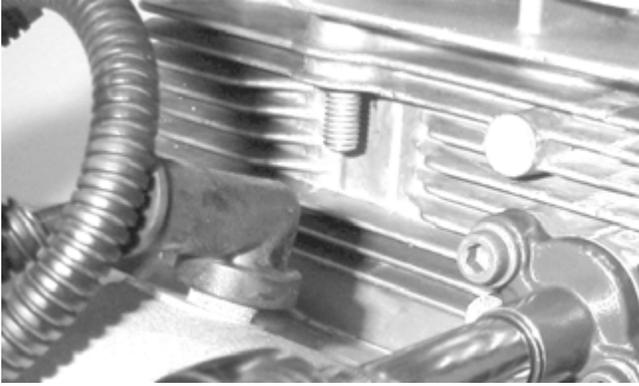


MD1254



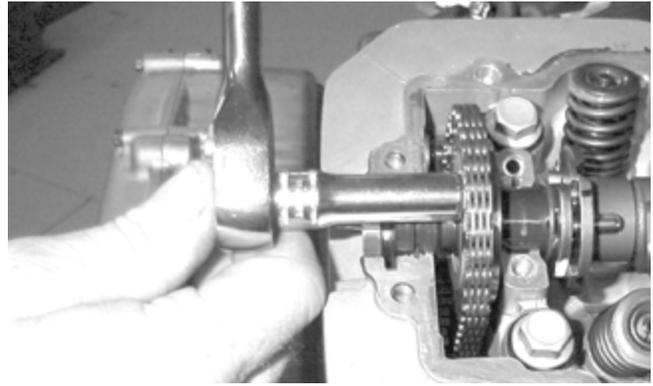
CC010D

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



23. Rotate the crankshaft until the first cap screw securing the sprocket to the camshaft can be installed; then install the cap screw. Do not tighten at this time.

24. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw. Do not tighten at this time.



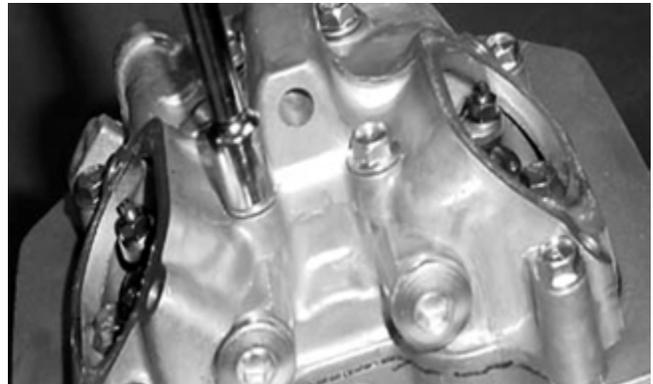
25. Tighten the cap screws (from steps 23 and 24) to 1.15 kg-m (8.5 ft-lb). Bend the washer tabs to secure the cap screws.

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

27. Apply a thin coat of Three Bond Sealant (p/n 0636-070) to the mating surface of the valve cover. Place the valve cover into position making sure the two alignment pins are properly positioned.

■ **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.



29. In a crisscross pattern starting from the center and working outward, tighten the cap screws (from step 28) to 1 kg-m (7 ft-lb).

30. Adjust valve/tappet clearance using the following procedure.

■ **NOTE:** Use Valve Clearance Adjuster (p/n 0444-078) for this procedure.

A. Turn the engine over until the piston reaches top dead center on the compression stroke.

B. 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.



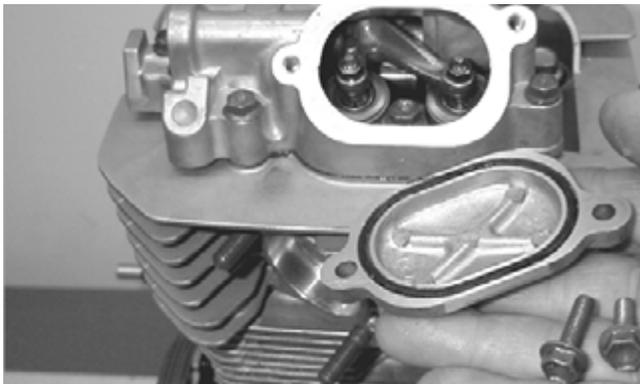
CD001

- C. 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.
- D. Align the valve adjuster handle with one of the marks on the valve adjuster dial.
- E. While holding the valve adjuster handle in place, rotate the valve adjuster dial counterclockwise until specified valve/tappet clearance is attained.

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

- F. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.

- 31. Place the two tappet covers into position; then install and tighten the cap screws securely.



MD1264

- 32. If removed, install the spark plug and tighten to 1.7 kg-m (12 ft-lb).

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.
- 2. Install the mounting fasteners securing the engine/transmission in the following sequence.

- A. Lower rear: One cap screw and nut with flat washer. Tighten only until snug.



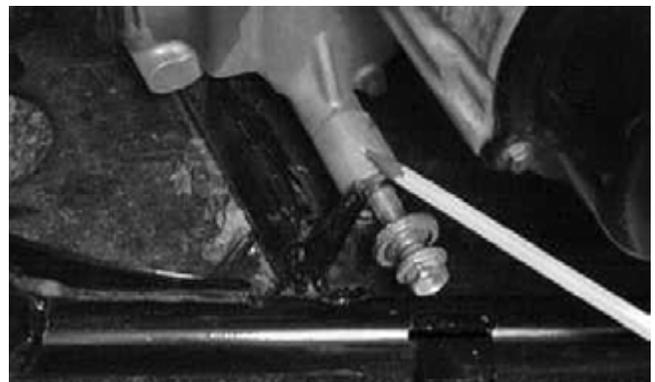
CD002

- B. Upper rear: Loosely fasten the left-side engine mount-to-frame cap screws; then install the cap screw w/nut and flat washer. Tighten only until snug.



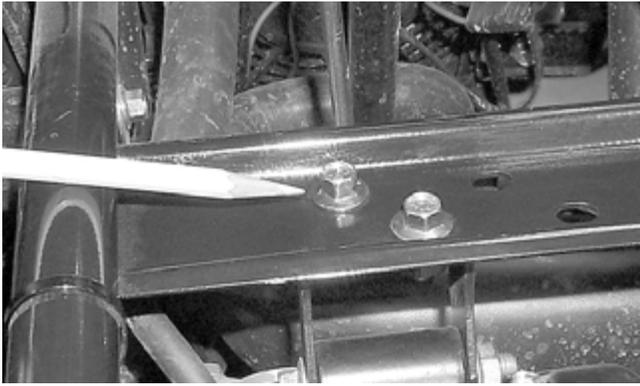
CC125D

- C. Lower front: One cap screw, nut, spacer, and washer. Tighten only until snug.



CC123D

- D. Upper front: Two cap screws (inside the bracket) and one cap screw and nut (topside of engine). Tighten only until snug.



AF939

3. Tighten the engine mounting fasteners to the following specifications.
 - A. Lower rear and Lower front to 5.5 kg-m (40 ft-lb).
 - B. Upper front (inside the bracket) and Upper front (topside of engine) to 2.8 kg-m (20 ft-lb).
 - C. Upper rear left-side engine mount-to-frame cap screws to 1.7 kg-m (12 ft-lb) and engine to engine mount cap screw with nut and flat washer to 5.5 kg-m (40 ft-lb).
4. Connect the crankcase breather vent hose and secure with the clamp.



CC122D

5. Connect the oil cooler hoses to the engine and secure with the clamps.



CC937

6. Connect the following electrical components: two wire leads for the oil temperature and oil pressure sensors, indicator lights, CDI, and voltage regulator.



CC939



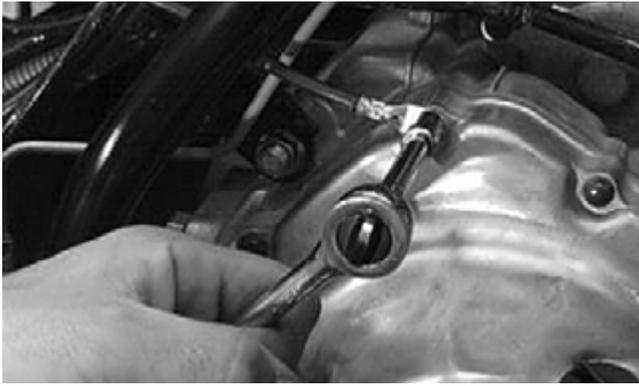
CC938

7. Connect the positive cable to the starter motor and install the protective boot.



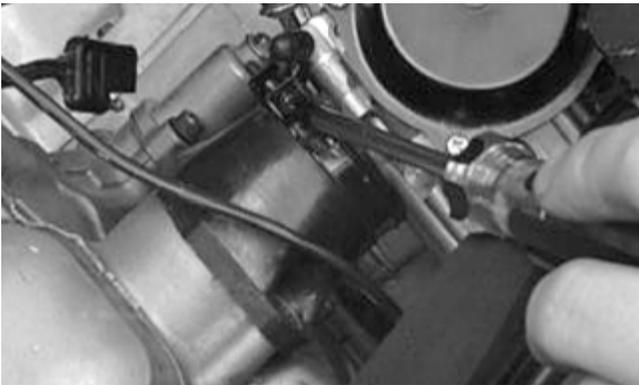
AR604D

8. Connect the battery ground (negative) cable to the crankcase cover.



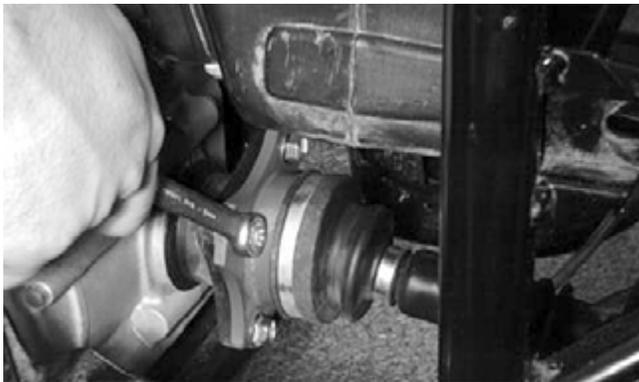
AR600D

9. Install the high tension lead on the spark plug.
10. Install the carburetor assembly and secure the intake manifold and air inlet boot.



CC120D

11. Route the two vent hoses through the slots in the frame.
12. Place the rear output shaft into position on the rear output joint; then install the four cap screws and tighten to 2.8 kg-m (20 ft-lb).



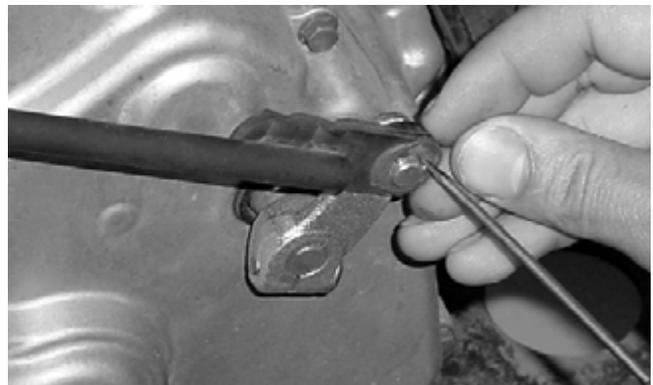
CC119D

13. On the 4x4, place the speedometer cable into position and tighten the knurled nut.



AF667D

14. On the 4x4, install the propeller shaft onto the front differential coupler. Tighten the hardware securely.
15. Place the reverse shift linkage w/bushing and washer onto the engine reverse shift shaft and secure with the E-clip.

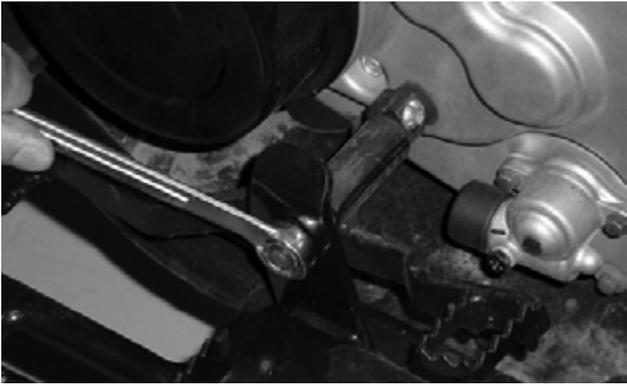


CC935

16. Place the gear shift lever into position on the shaft on the engine; then secure with the pinch screw and lock nut.



CC934



CD003

17. Place the footrests into position on the frame. Tighten the 10 mm cap screws to 5.5 kg-m (40 ft-lb) and the 8 mm cap screws to 2.8 kg-m (20 ft-lb); then secure the fender extensions to the footrests with existing hardware.

18. Place the exhaust pipe into position inside the frame and connect to the muffler at the juncture.

■ **NOTE:** If the muffler was removed, see Section 8.

19. Place the exhaust pipe with new grafoil gasket into position on the engine; install and tighten the cap screws to 2.8 kg-m (20 ft-lb).

20. Install the rear fenders and the rear rack (see Section 8).

21. Install the gas tank (see Section 4).

22. Place the right-side and left-side panels into position; then install the existing hardware and tighten securely.

23. Carefully guide the battery cables and fuse block wiring up through the access hole into the battery tray.

24. Connect all fuse block wiring according to the marking made in removing; then place the fuse block into position and secure with two screws.

⚠ CAUTION

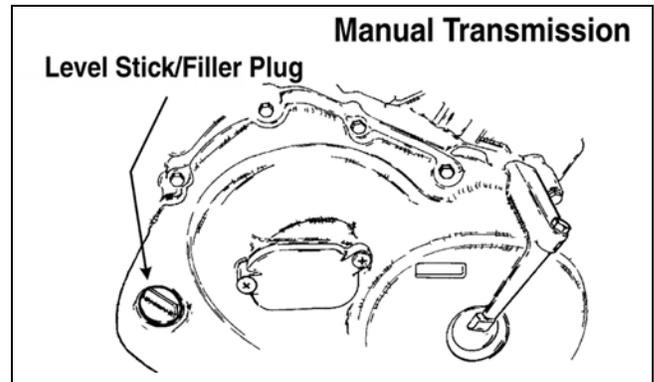
It is critical that all wiring be installed correctly to ensure electrical components will function properly.

■ **NOTE:** If the mounting screw holes have elongated, it will be necessary to install larger diameter screws.

25. Install the battery in the tray, install the vent hose, and secure the battery with the hold-down strap. Connect the positive battery cable; then connect the negative cable.

26. Install the seat.

27. Pour the correct amount of recommended oil into the engine/transmission filler hole; install the filler plug.



ATV-0075

⚠ 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/replace left-side cover oil seals (3), front output joint oil seal (1), rear output joint oil seal (1), 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 hold-down strap and the battery vent hose; then remove the battery.

CAUTION

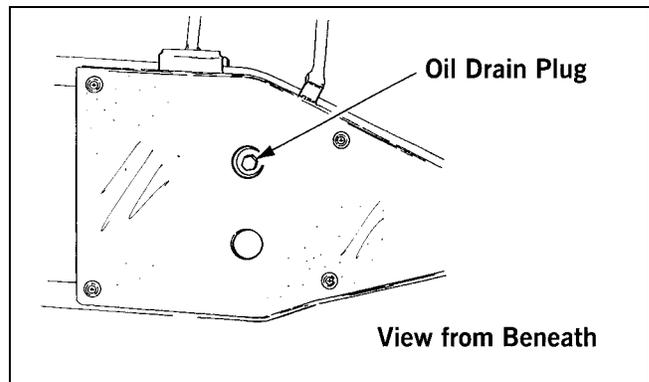
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

3. Near the battery tray, remove the two screws securing the fuse block; then carefully remove all the wiring from the block.

CAUTION

It is critical that all wiring be marked when removing from the fuse block. This will aid in installing correctly.

4. Carefully guide the battery cables and fuse block wiring down through the access hole into the engine compartment for future removing.
5. Drain the oil from beneath the engine/transmission.



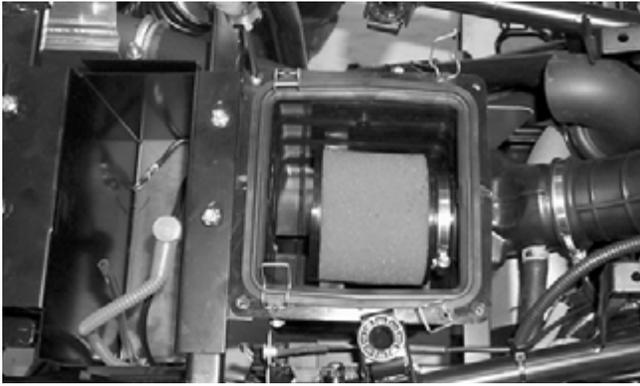
733-441A

6. Remove the hardware securing the right-side and left-side panels; then remove the panels.
7. Turn the gas tank valve to the OFF position; then remove the fuel hose and vent hose.



CC533

8. Remove the gas tank.
9. Remove the rear fenders and the rear rack assembly (see Section 8).
10. Remove the hardware securing the air cleaner housing to the frame.



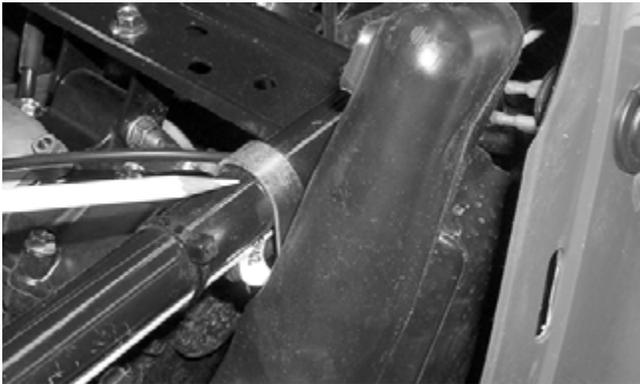
CC535

11. Disconnect the crankcase vent hose from the air cleaner housing. Remove the clamps securing the air intake hose to the carburetor; then remove the air cleaner housing.



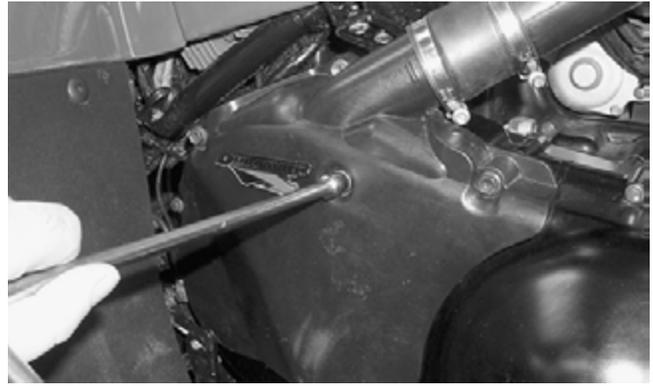
CC536

12. Remove the hardware securing the cooling duct assembly to the frame.



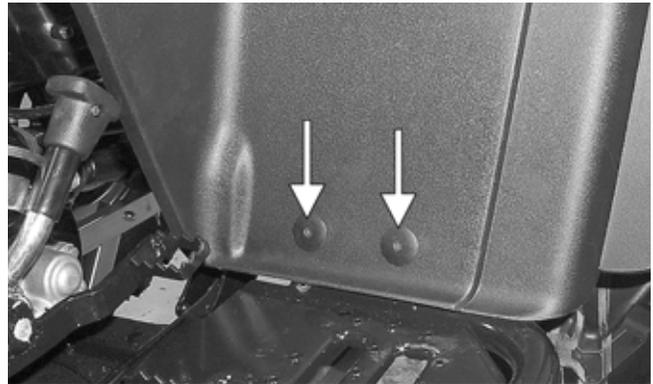
AF938

13. Remove the cooling duct shroud from the V-belt cover.



AF932

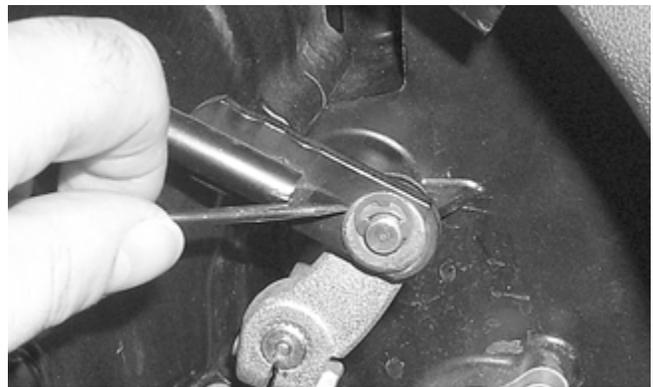
14. Remove the hardware securing both footrests to the frame and front fender.



CC861A

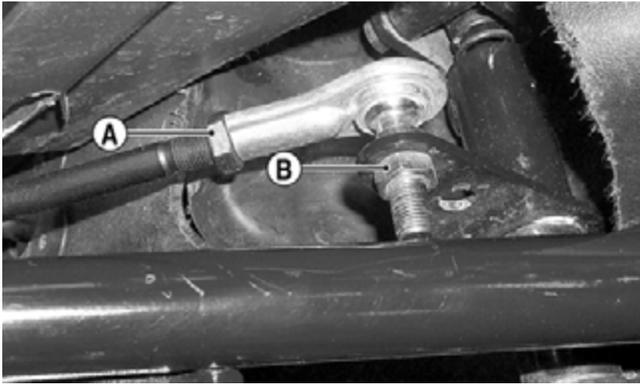
15. Loosen the clamp securing the carburetor to the intake; then route the carburetor assembly up and away from the engine.

16. Remove the E-clip securing the shift rod to the engine shift arm.



AF962

17. Remove the lock nut (B) securing the shift rod to the shift lever arm; then remove the shift rod.



AF941A

18. Remove the torx-head screws securing the exhaust pipe shroud; then remove the shroud.



CC560

19. Remove the four (two on each side) torx-head screws securing the inner front fenders to the frame and footrests.

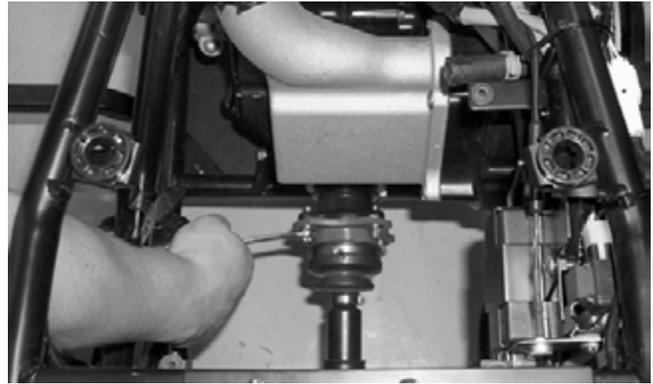
■ **NOTE:** It is not necessary to remove the front fender to remove the engine; however, removing the screws securing the inner front fenders will allow the fender to be moved to accommodate the removing of the exhaust pipe and engine.

20. Remove the hardware securing the exhaust pipe to the muffler, frame, and engine; then remove the exhaust pipe.

21. Remove the two oil hoses from the engine. Route the hoses out of the way.

■ **NOTE:** There will be a substantial amount of oil draining from the oil hoses when removing. Place a drain pan beneath the hoses prior to removing the oil hoses.

22. Remove the hardware securing the front and rear driveshafts.



CC565



CC566

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

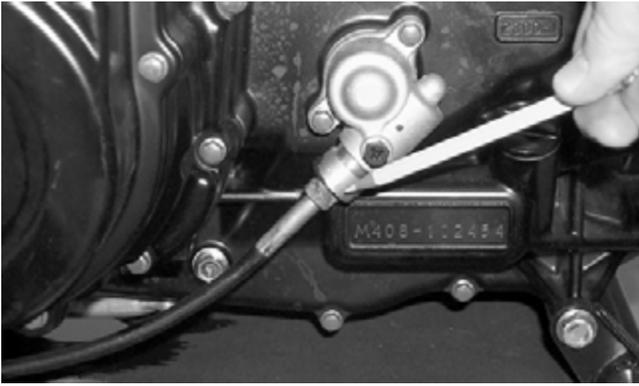
23. On the right side, cut the cable ties securing the wiring harness to the frame.



CC567

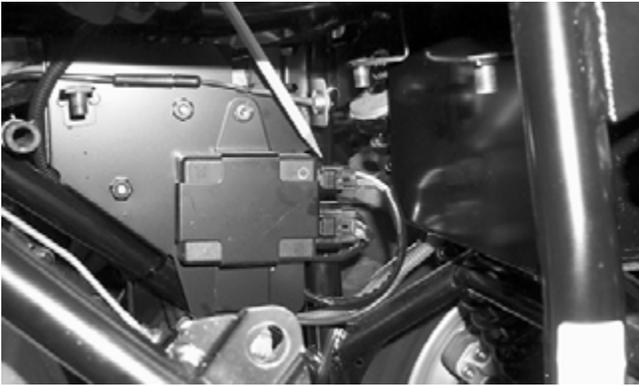
24. Remove the positive cable from the starter motor and route it out of the way.

25. Remove the speedometer cable from the speedometer gear housing.



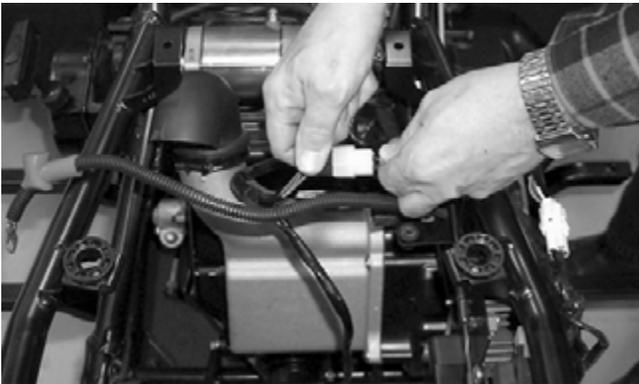
CC568

26. Disconnect the top connector at the CDI unit.



CC569

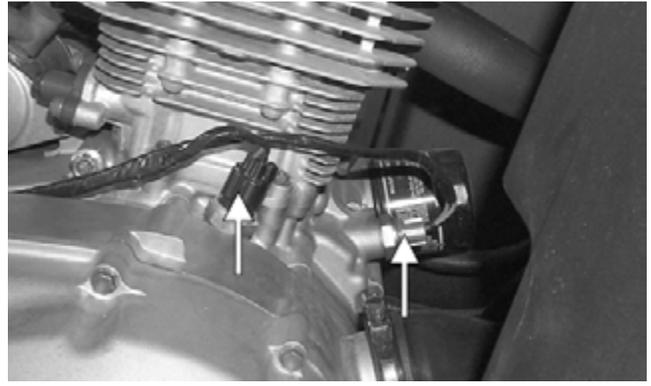
27. Disconnect the stator-to-rectifier/regulator connector.



CC570

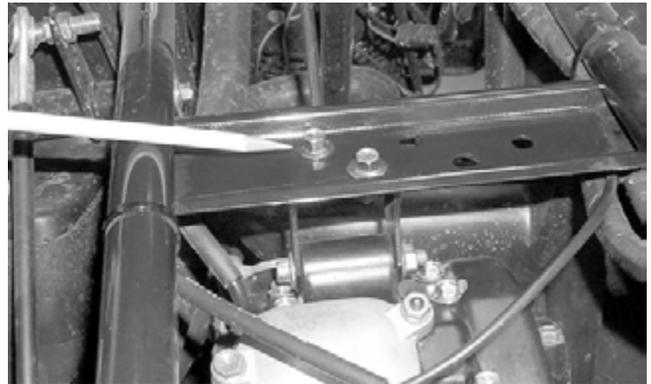
28. Remove the temperature sensor wires from the engine.

■ **NOTE:** There are two temperature sensors.



AF964B

29. Remove the two cap screws securing the front upper engine mount to the frame.



AF939

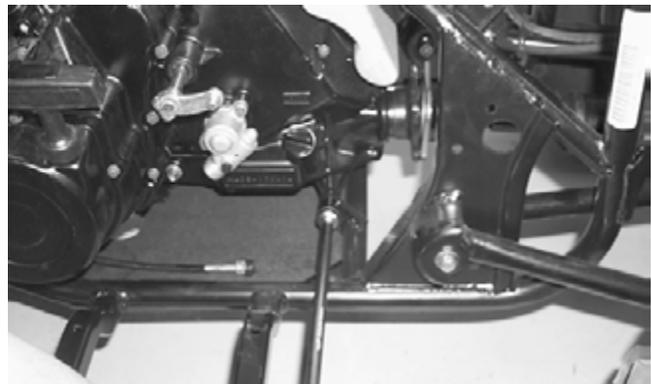
30. Remove the cap screw and flange nut securing the upper engine bracket to the engine; then remove the bracket.

31. Remove the spark plug wire from the spark plug.

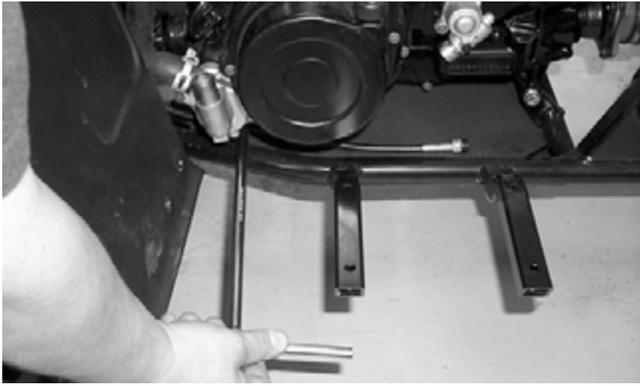
32. Remove the shift indicator connector from the main wiring harness.

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

34. Remove the three engine mounting through-bolts. Account for a washer on the upper bolt and a spacer on the lower front bolt.



CC576



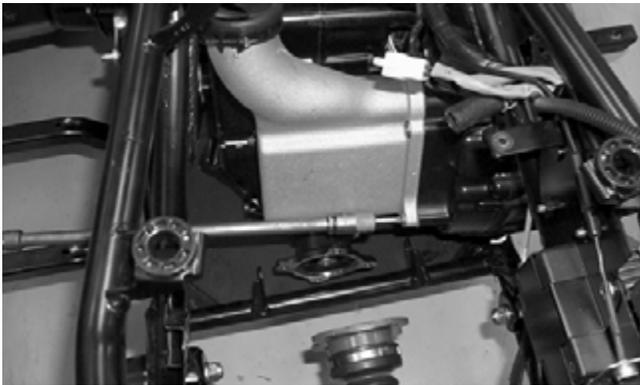
CC577

35. Remove the caps screws securing the two upper rear engine mounts to the frame.
36. Slightly raise the front of the engine; then remove the front driveshaft coupler from the engine.



CC578

37. Remove the torx-head screws securing the left-side clutch plenum to the engine; then remove the plenum and account for a gasket.



CC579

38. Remove the engine from the right side by moving the engine forward while raising the engine in the rear and rotating the engine counterclockwise. The engine will come out the right side of the frame.

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

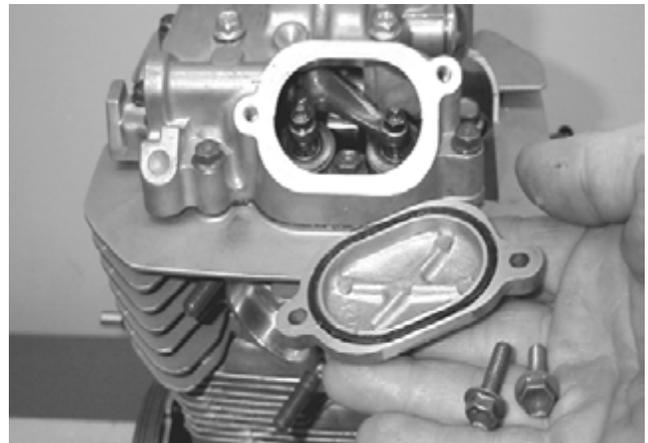
A. Valve Cover

B. Cylinder Head

■ **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.

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

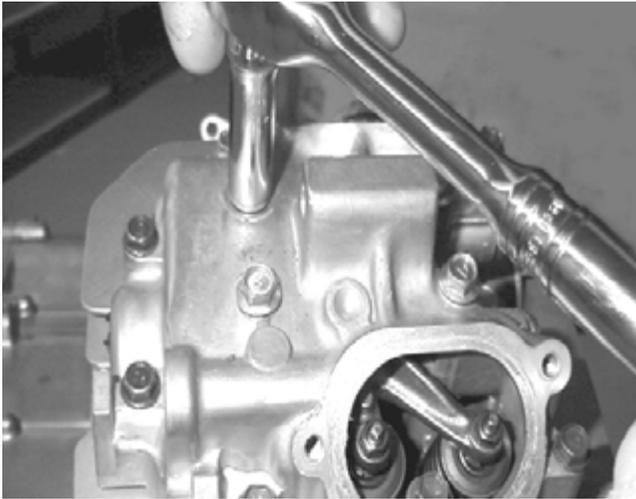
1. Remove the cap screws securing the two tappet covers. Remove the two tappet covers. Account for the O-rings.



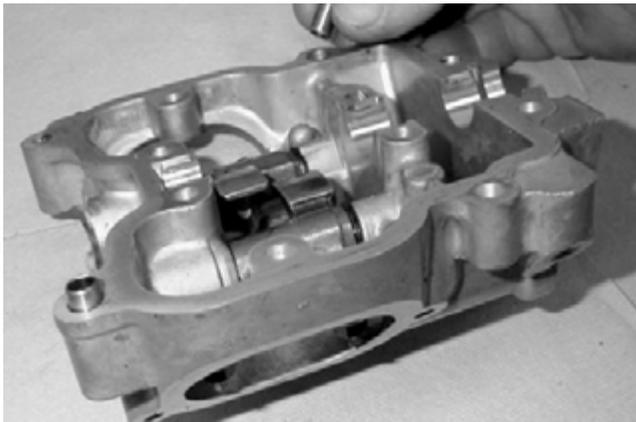
MD1264

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

2. Remove the 12 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.

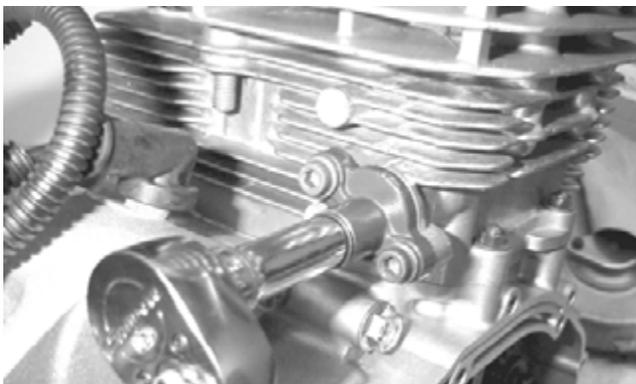


MD1261

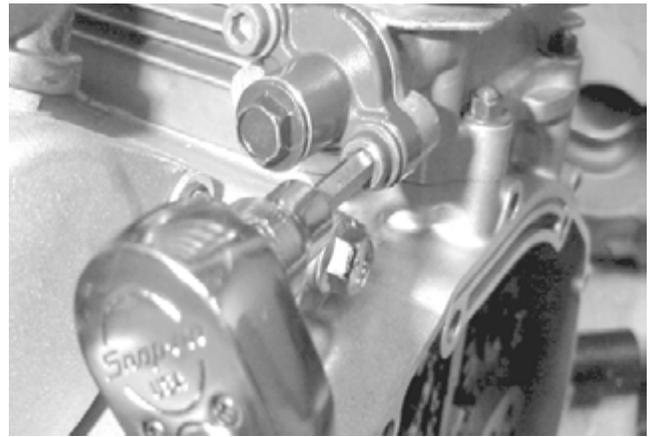


MD1354

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

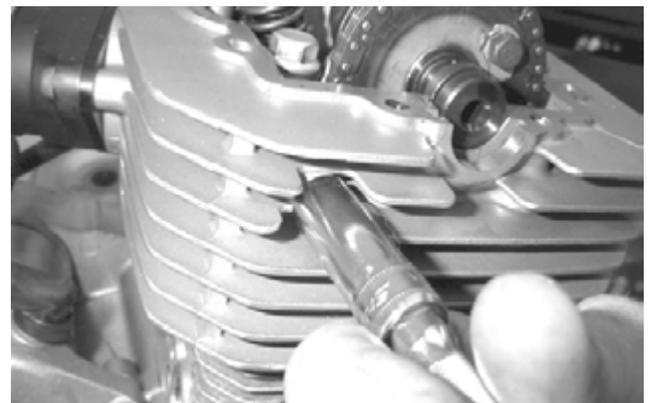


MD1245



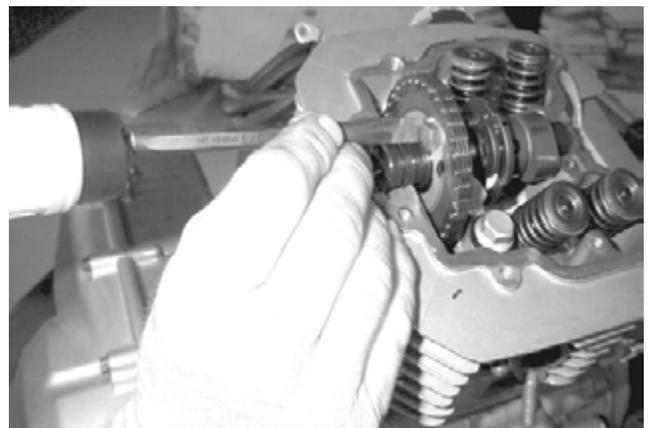
MD1254

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

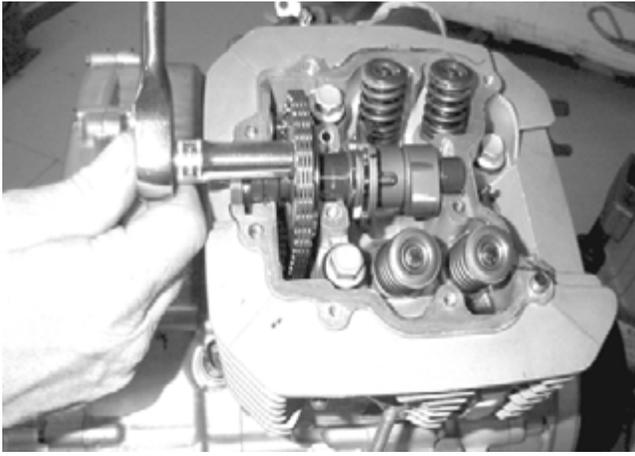


MD1251

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



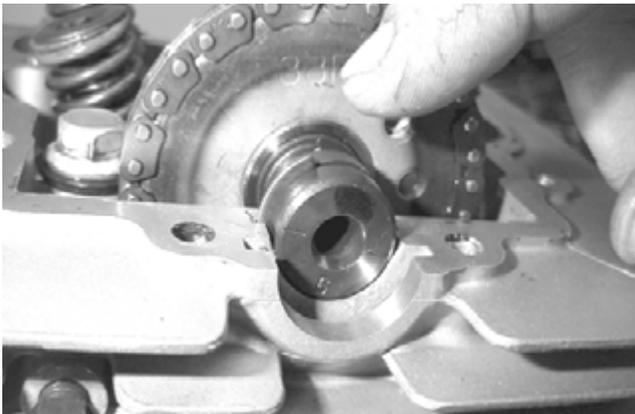
MD1136



MD1137

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

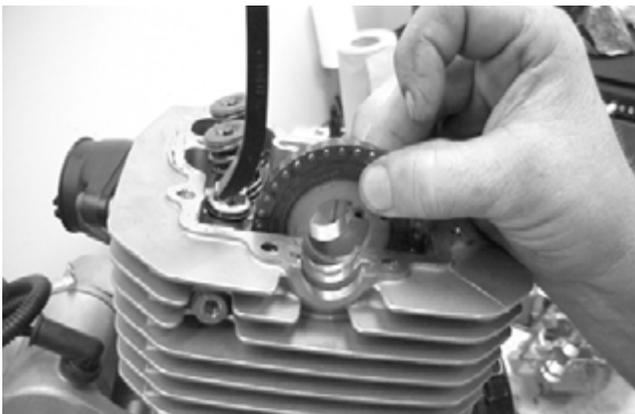
■ **NOTE:** Care should be taken not to drop the C-ring down into the crankcase.



MD1131

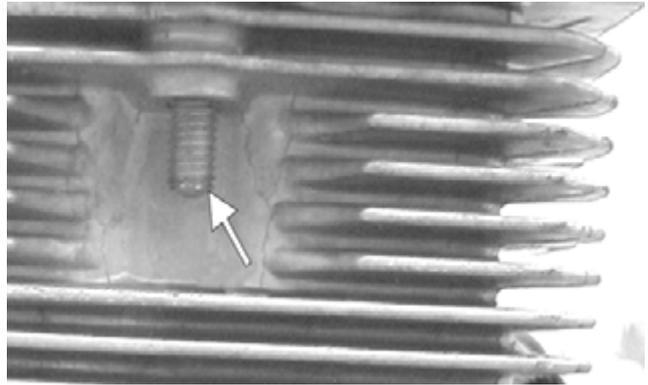
- Noting the timing marks for installing purposes, drop the sprocket off the camshaft. While holding the cam chain, slide the sprocket and camshaft out of the cylinder head. Account for an alignment pin.

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



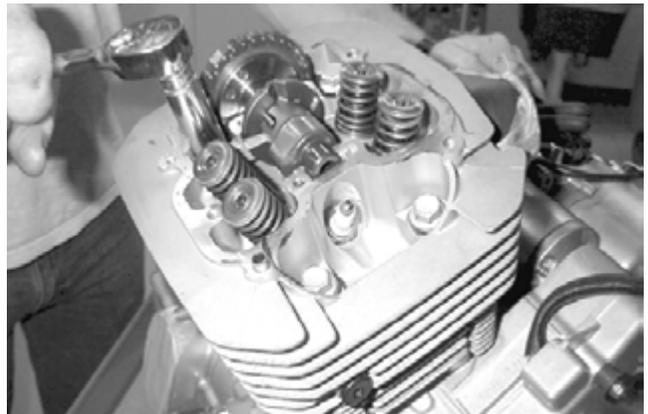
MD1132

- 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.



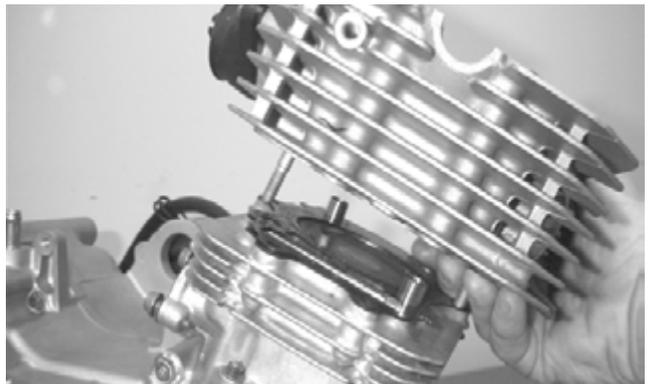
MD1192

- 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.



MD1167

- 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.

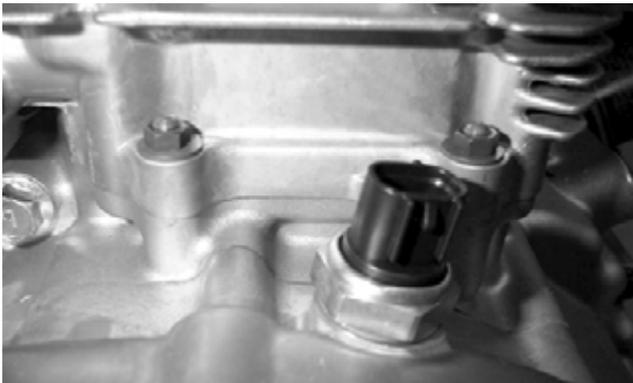


MD1173

C. Cylinder
D. Piston

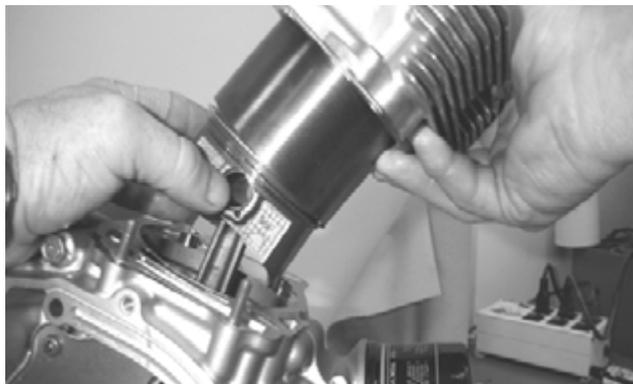
■ **NOTE:** Steps 1-11 in the preceding sub-section must precede this procedure.

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



MD1226

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

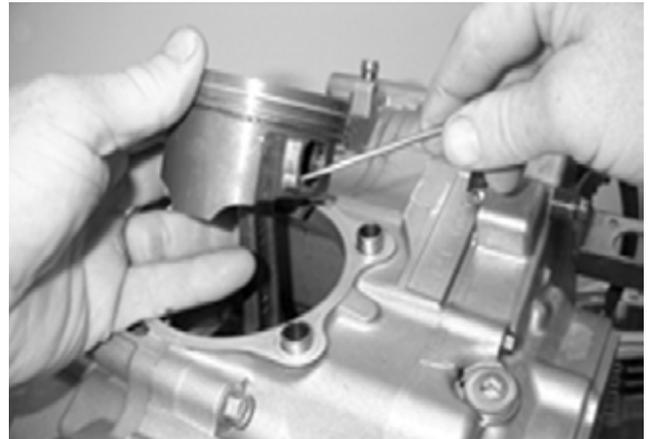
👉 AT THIS POINT

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 (p/n 0644-328), 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.



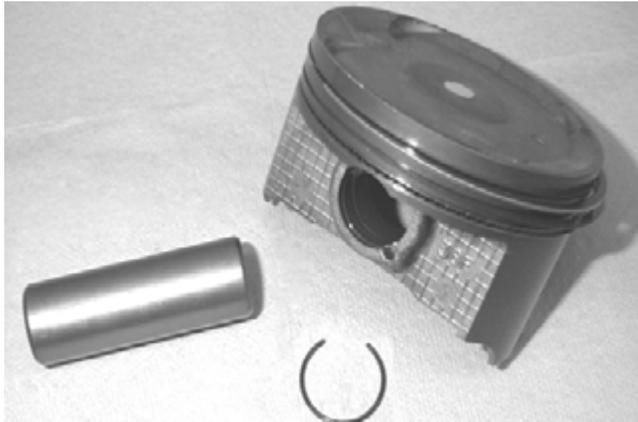
MD1219

■ **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.



- 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.

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.

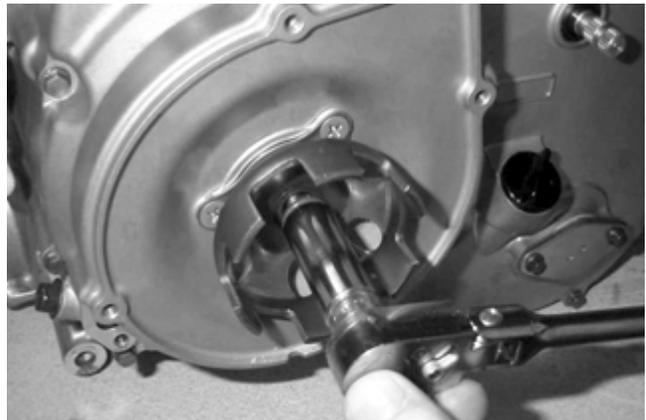
Removing Left-Side Components

- A. Recoil Starter**
- B. Starter Cup**
- C. Cover/Stator Assembly**

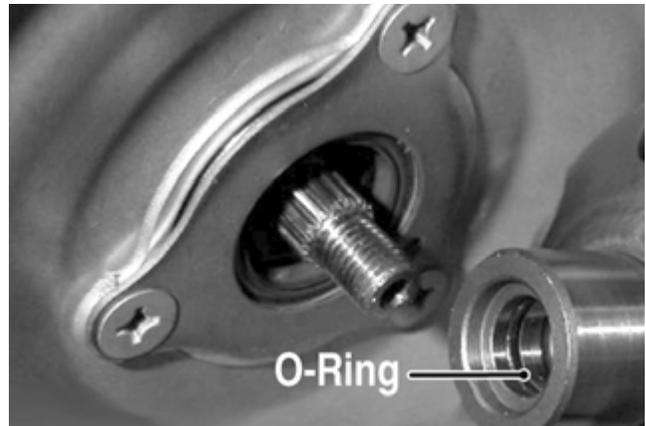
1. Remove the four recoil starter cover cap screws. Remove the recoil starter assembly noting the location of the single washer. Note the condition of the recoil cover gasket. Replace if damaged.

👉 AT THIS POINT
To service the recoil starter, see Servicing Left-Side Components sub-section.

2. Remove the nut and lock washer securing the starter cup to the crankshaft; then remove the starter cup. Account for the O-ring inside the cup.

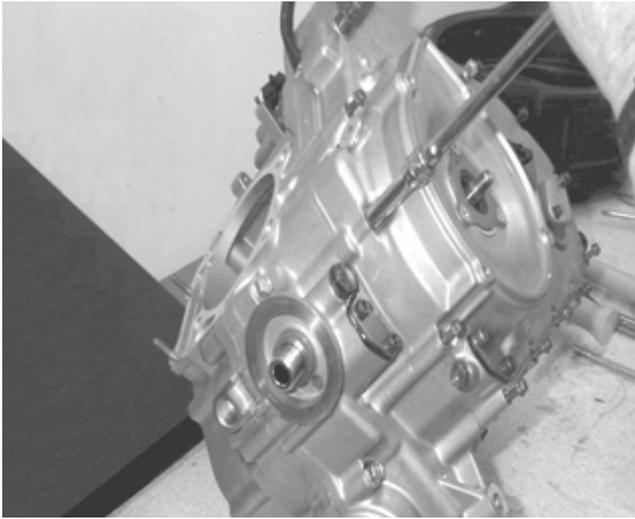


MD1303



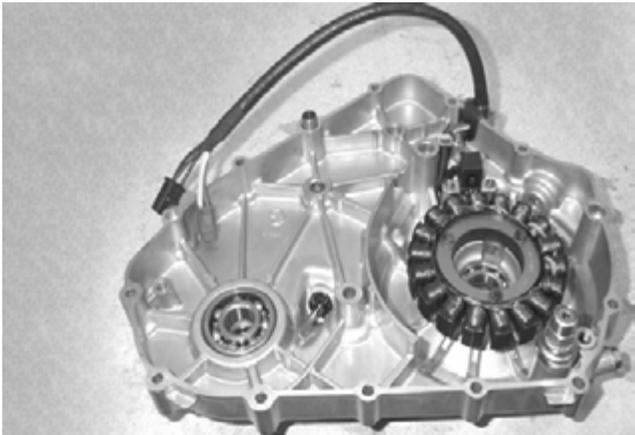
MD1304

3. Lay the engine/transmission on its right side. Remove the 14 left-side cover-to-crankcase mounting cap screws noting the location of the long 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

4. Using Side Case Puller (p/n 0644-262) and the 6 mm adapter, remove the left-side cover w/stator assembly. Note the condition of the gasket. Replace if necessary. Account for the two alignment pins and the position of the shifter bracket for installing purposes.



MD1188

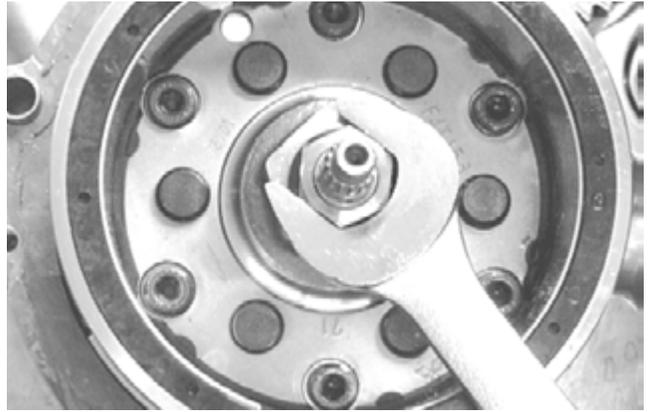
■NOTE: Inspect the inside of the left-side cover for any shaft washers that may have come off with the cover. Make sure they are returned to their respective shafts and that the starter idler gear spacer is on the shaft or in the cover.

D. Rotor/Flywheel

E. Starter Motor

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

5. Remove the rotor/flywheel nut.



MD1194

6. Install Magneto Rotor Remover Adapter (p/n 0444-075).



MD1365

⚠ CAUTION

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

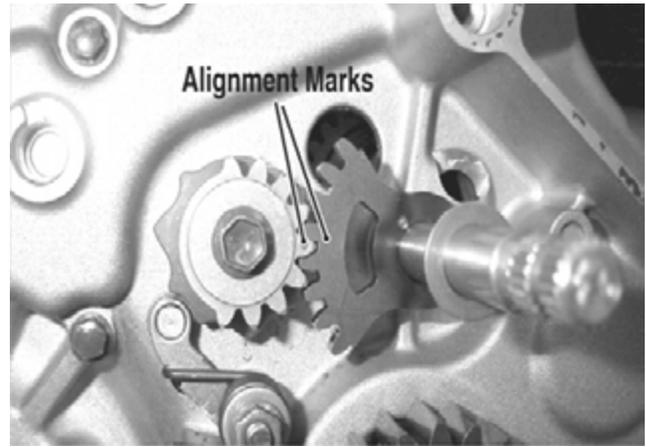
7. Using Magneto Rotor Remover (p/n 0444-075), break the rotor/flywheel assembly loose from the crankshaft. Remove the remover, the adapter, the rotor/flywheel, and the ring gear. Account for the key.



MD1368



MD1369



MD1239

10. Remove the shift detent cam. Note position of spacer for installing purposes.



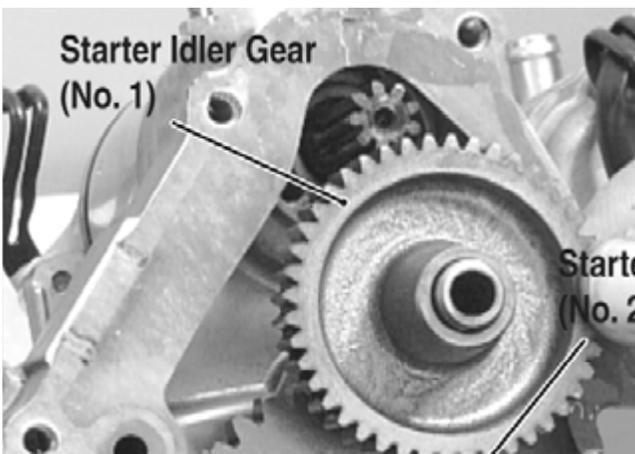
MD1370

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



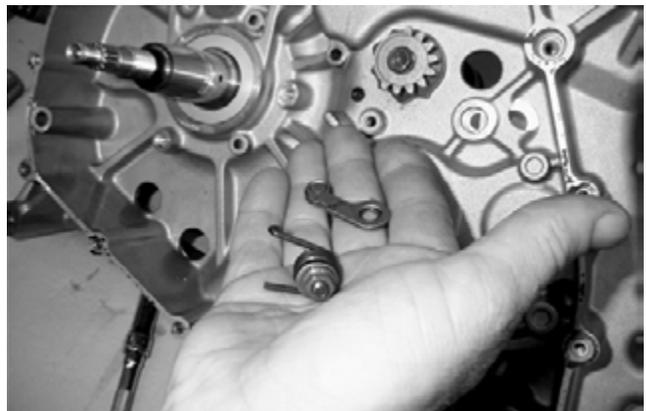
MD1086

11. Remove the cam follower assembly.



MD1305

9. 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.



MD1076



MD1231

12. Remove the spacer from the driveshaft noting the direction of the stepped side for installing purposes.



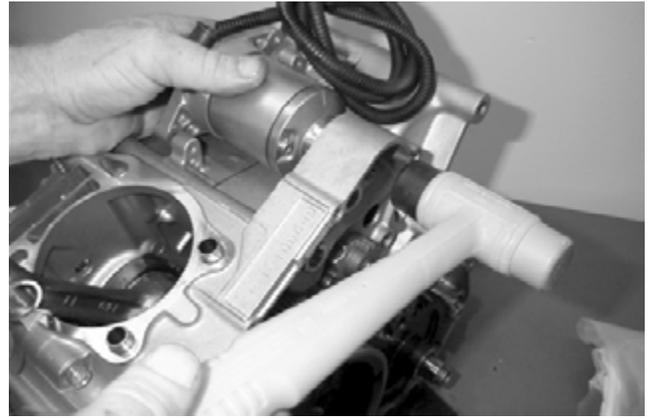
MD1224

13. Remove two starter motor cap screws.



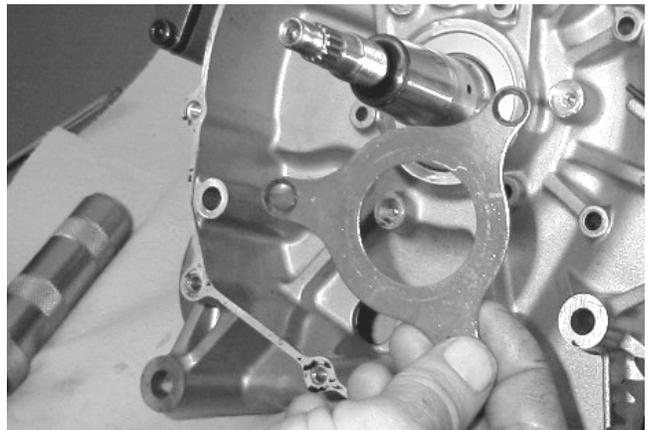
MD1078

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



MD1077

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



MD1122

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.

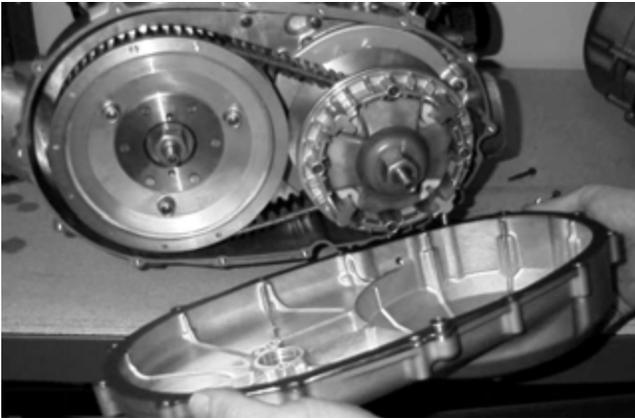
Removing Right-Side Components

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

1. If the engine is still in the frame, turn the gas tank valve to the OFF position. Remove the cap screws securing the right-side V-belt cover to the clutch cover. Remove the cover. Note the locations of the long cap screws and rubber washer and the two wire forms. Account for the gasket and for two alignment pins.

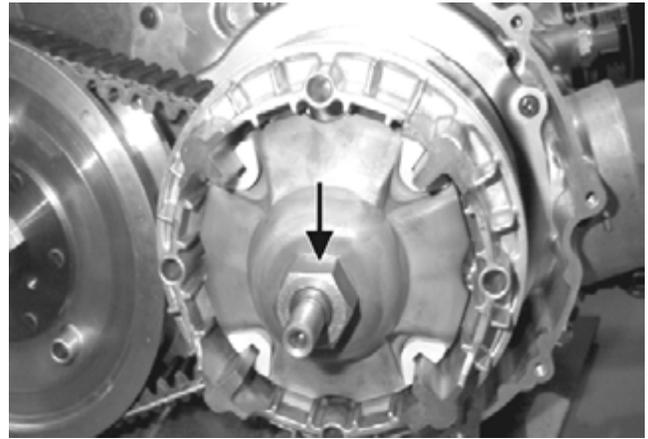


MD1306



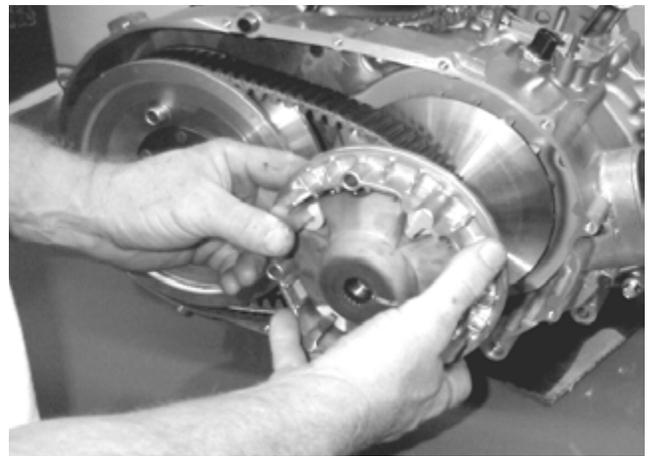
MD1307

2. Remove the nut holding the movable drive face onto the crankshaft.

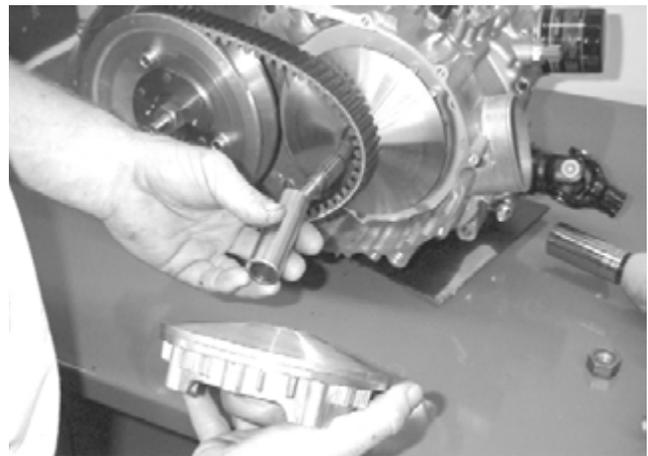


MD1033

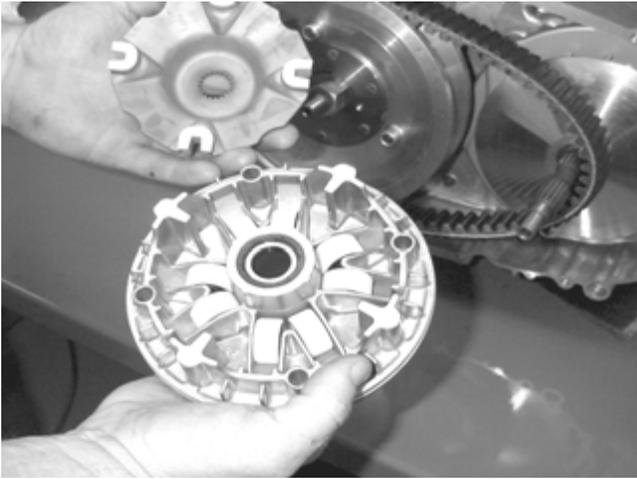
3. Remove the movable drive face and spacer. Account for the eight movable drive face rollers and outer drive face cover.



MD1035

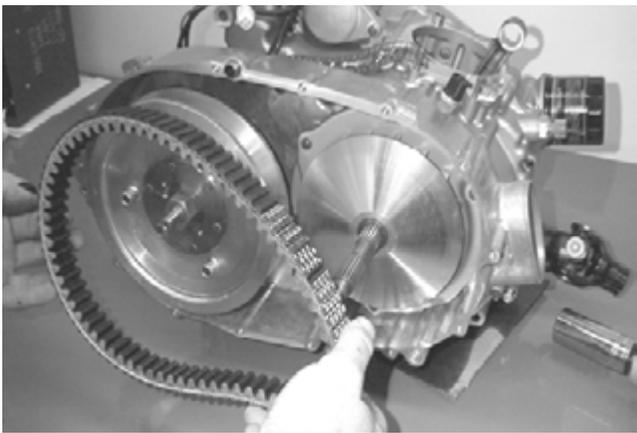


MD1034



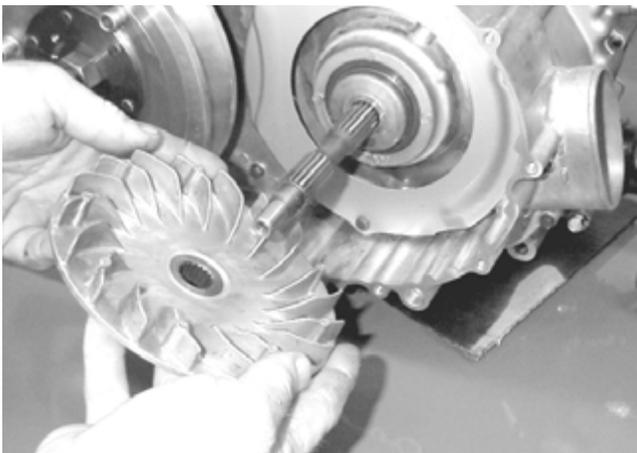
MD1036

4. Remove the V-belt.



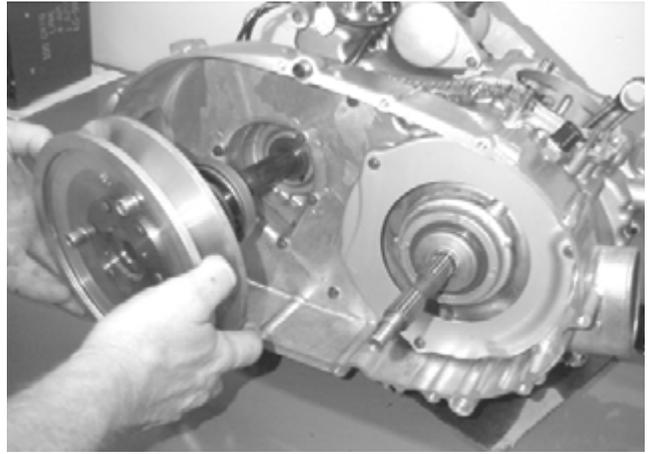
MD1118

5. Remove the fixed drive face.



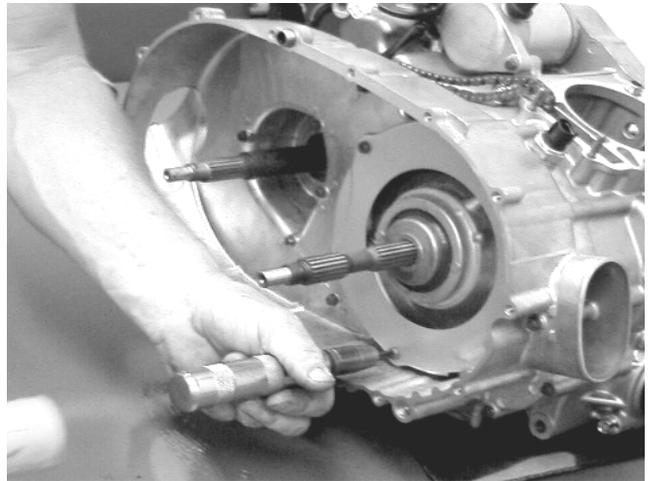
MD1094

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



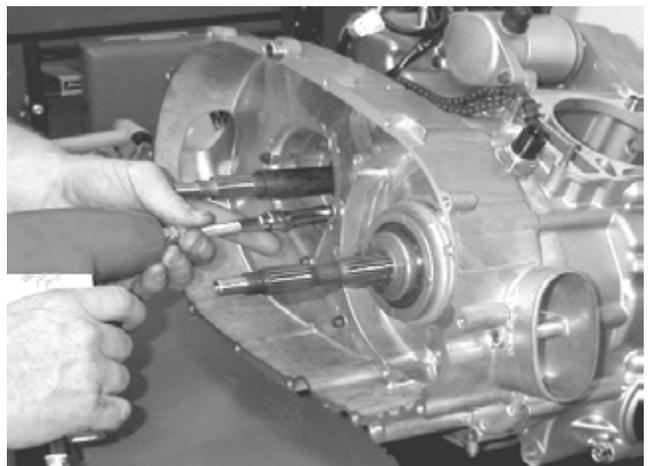
MD1068

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



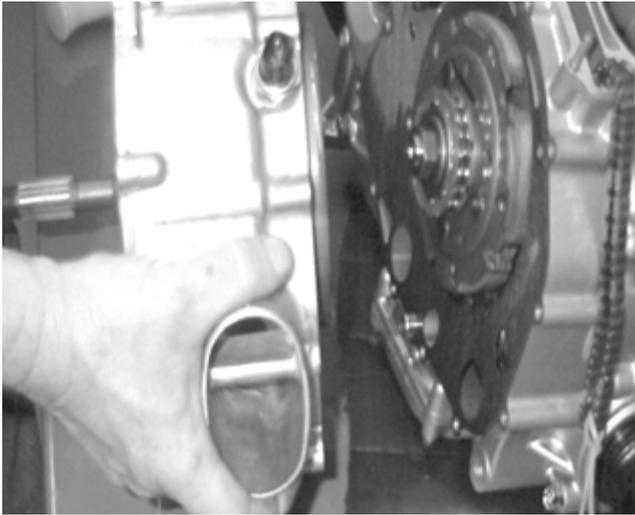
MD1092

8. 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.



MD1117

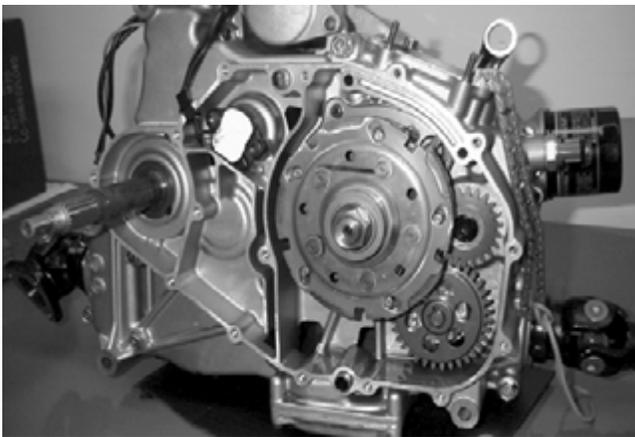
9. Using a rubber mallet, loosen the clutch cover; then pull it away from the right-side crankcase half. Account for two alignment pins and gasket.



MD1115

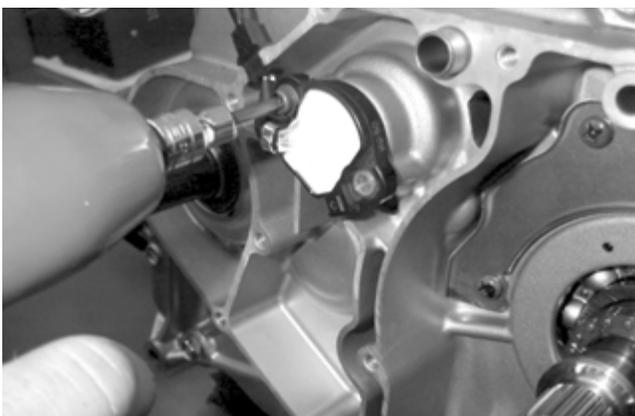
- D. Gear Position Switch**
- E. Centrifugal Clutch Assembly**
- F. Oil Pump Drive Gear**
- G. Oil Pump Driven Gear**

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



MD1072

10. Remove the cap screws holding the gear position indicator switch onto the right-side crankcase half.

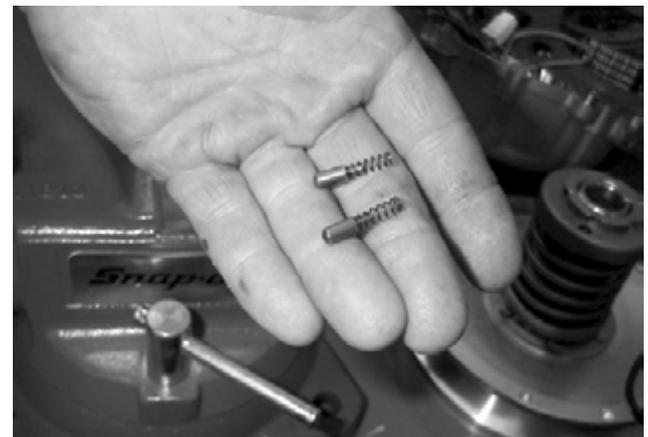


MD1041

11. Remove the gear position indicator switch. Account for two contact pins and two springs.



MD1040



MD1043

12. Remove the one-way sprag clutch noting the direction of the green dot or the stamp tag **OUTSIDE** for installing purposes.

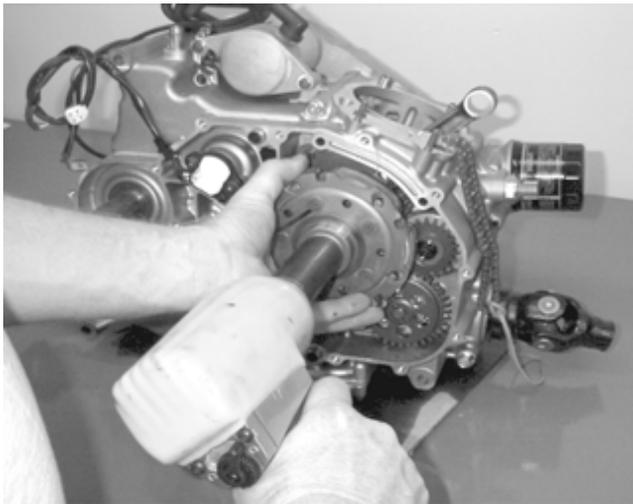


MD1286

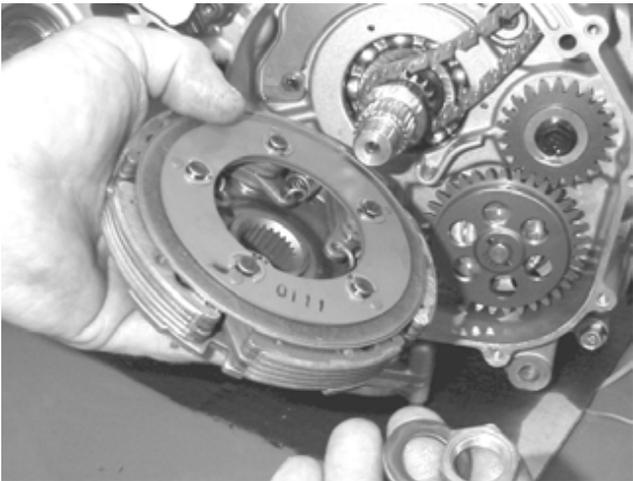
13. Remove the left-hand threaded nut holding the centrifugal clutch assembly.

⚠ CAUTION

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

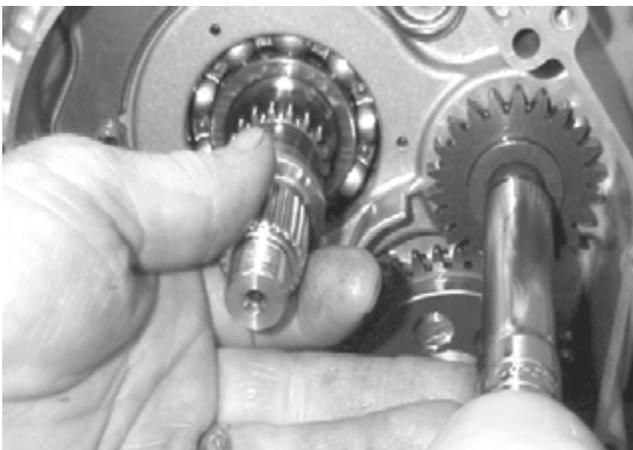


MD1014



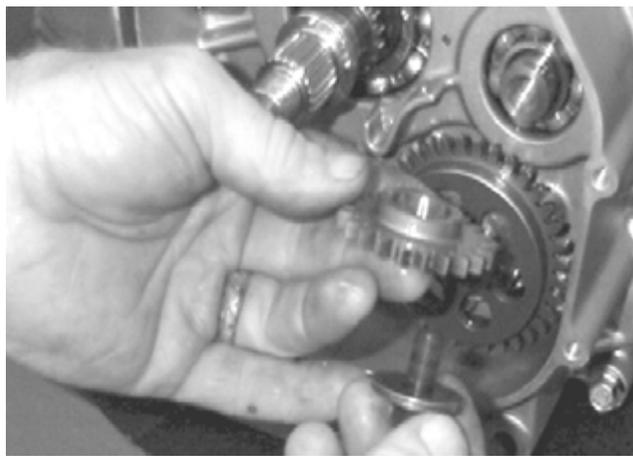
MD1016

14. Remove the oil pump drive gear cap screw.



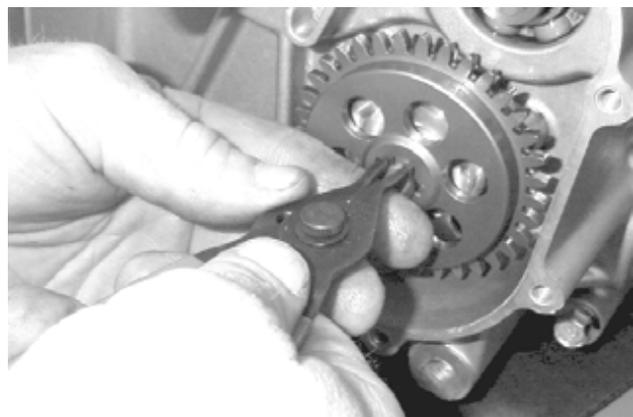
MD1018

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



MD1017

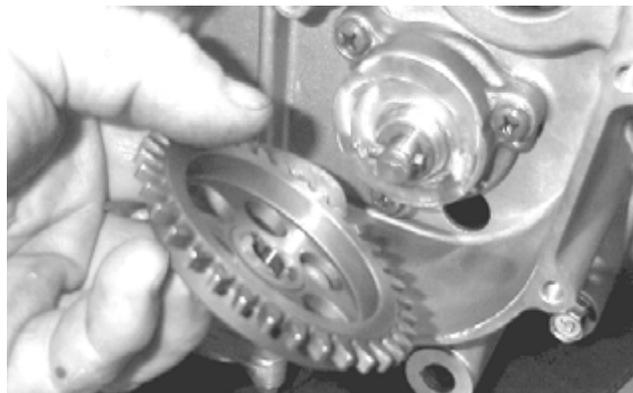
16. Remove the snap ring holding the oil pump driven gear.



MD1019

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

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



MD1020

18. Remove the cam chain.



MD1335

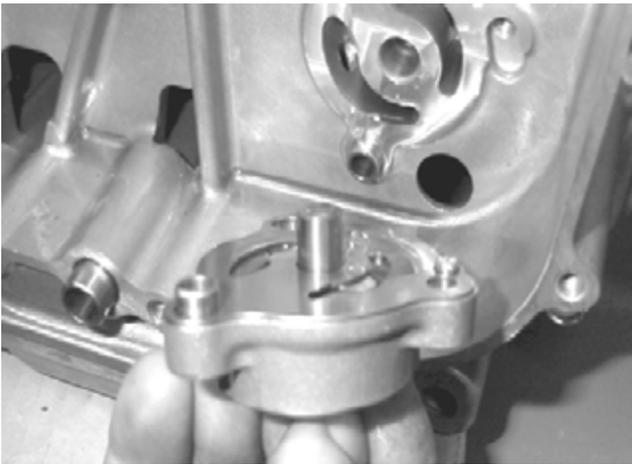
⚠ AT THIS POINT

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

H. Oil Pump/Oil Strainer

■NOTE: Steps 1-18 in the preceding sub-sections must precede this procedure.

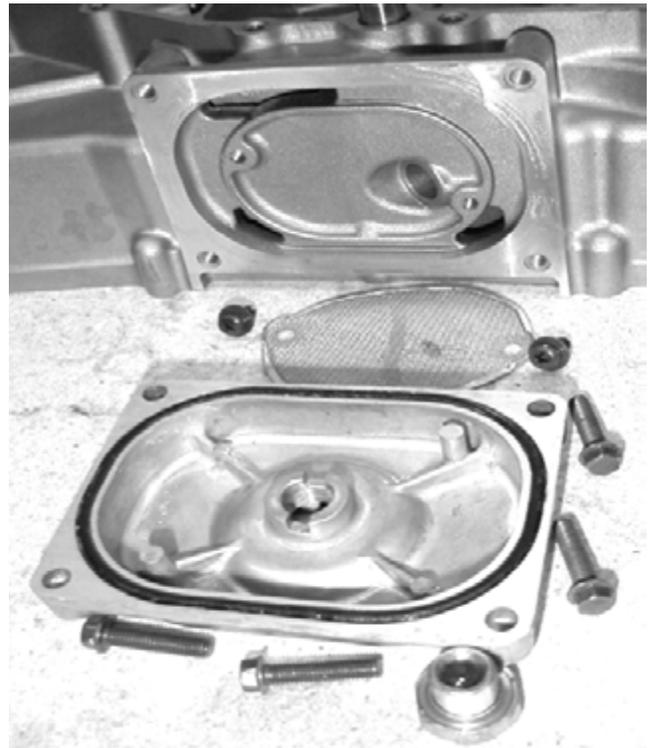
19. Remove three Phillips-head screws holding the oil pump and remove the oil pump. Account for two alignment pins.



MD1060

20. Remove the four cap screws securing the oil strainer cover; then remove the Phillips-head screws securing the oil strainer. Account for O-rings.

■NOTE: Note the directional arrow for installing purposes.



MD1207

⚠ AT THIS POINT

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

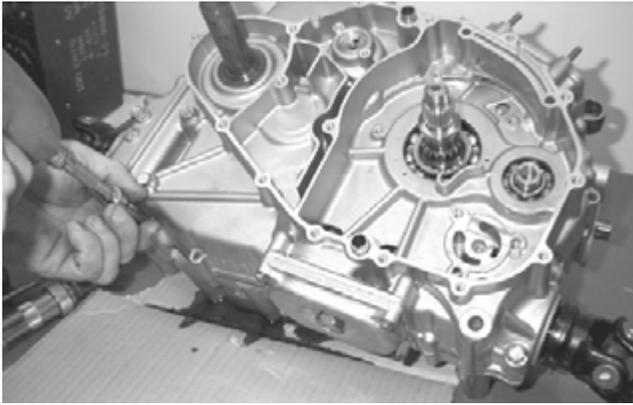
Center Crankcase Components

■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.

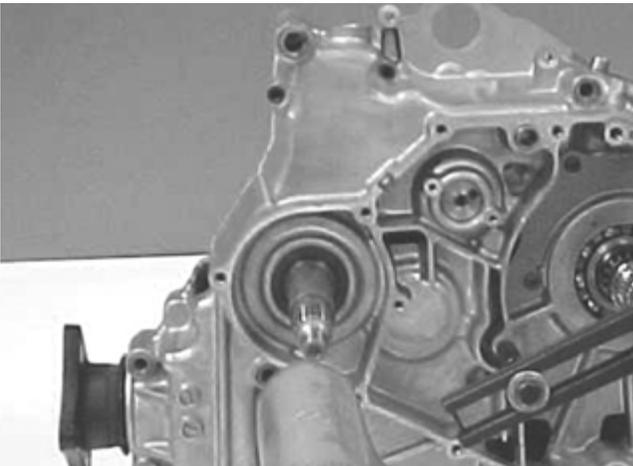


MD1006



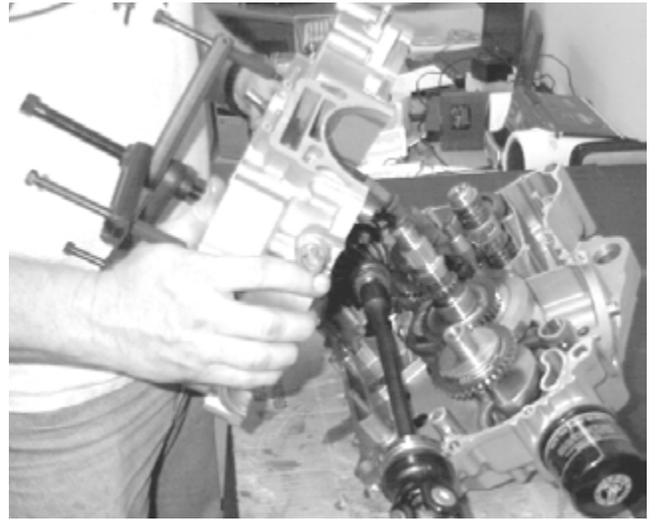
MD1012

- Using Crankcase Separator/Crankshaft Remover (p/n 0444-009) and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins.



CC869

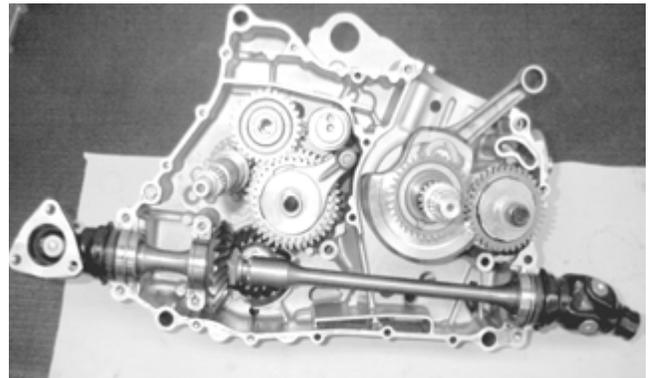
■NOTE: To keep the shaft/gear assemblies intact for identification, tap the shafts toward the left-side crankcase half when separating the halves.



MD1313

Disassembling Crankcase Half

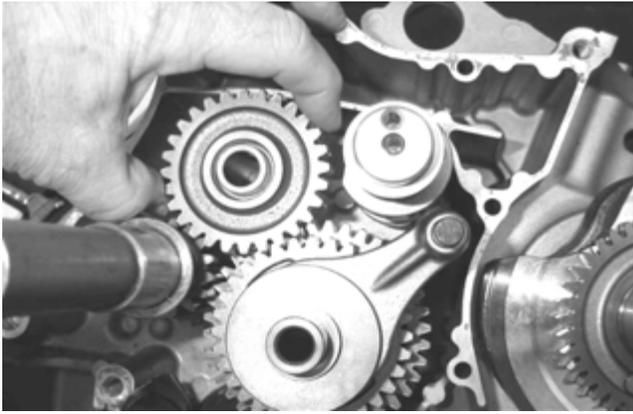
- Remove the secondary (4x4 models) and primary driveshaft assemblies. Account for the bearing alignment C-ring on the bearing boss next to the pinion gear.



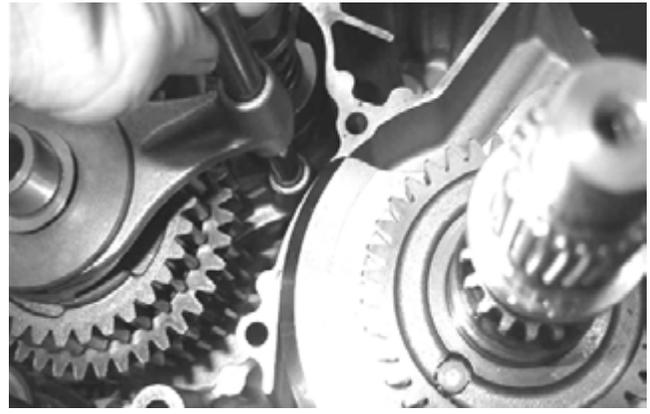
MD1317

■NOTE: On the 4x4, note the location of the bearing alignment pin on the secondary output shaft.

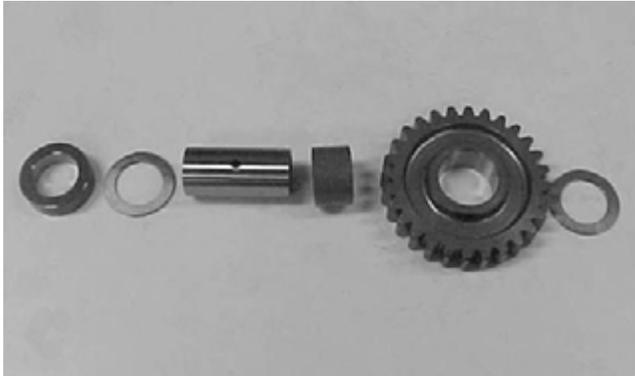
- Remove the reverse idler gear, spacer, and sleeve. Account for the washers.



MD1325



MD1327



CC870

3. Remove the driveshaft.

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 two holes on the end, remove the shift cam assembly. Account for inner and outer washers.



MD1326

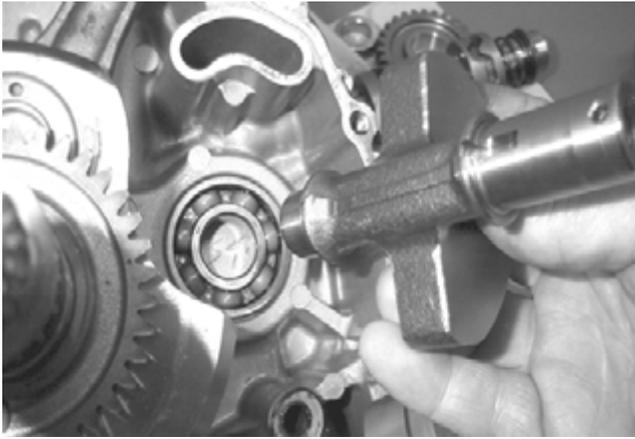
4. Remove the shift fork shaft and the outer shift fork.



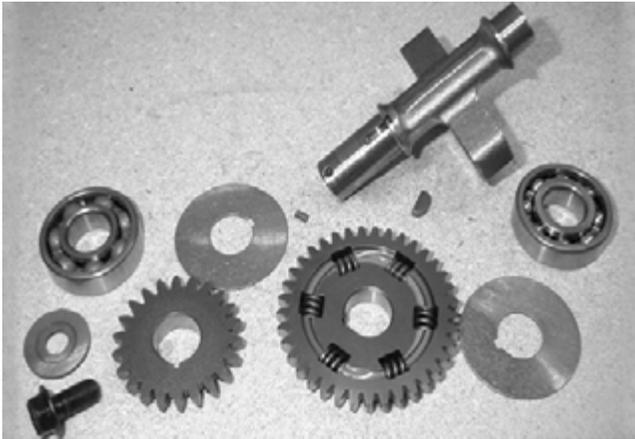
MD1329

7. Remove the counterbalance gear. Account for the key and inner and outer thrust washers.

8. Remove the counterbalance shaft.

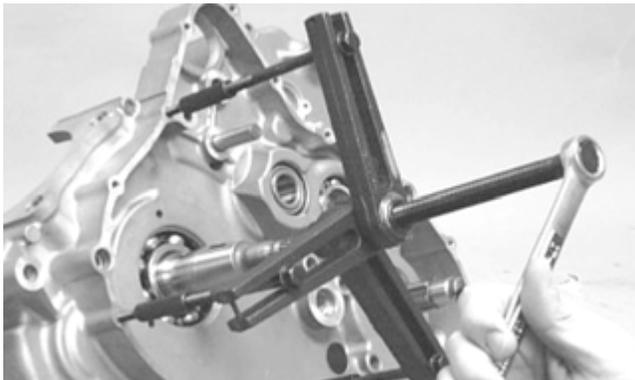


MD1024



MD1100

9. Using Crankcase Separator/Crankshaft Remover (p/n 0444-009), 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.



MD1331

👉 AT THIS POINT

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

**Table of Contents
(Servicing Components)**

■NOTE: Critical engine/transmission specifications are located at the beginning of this section.

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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.

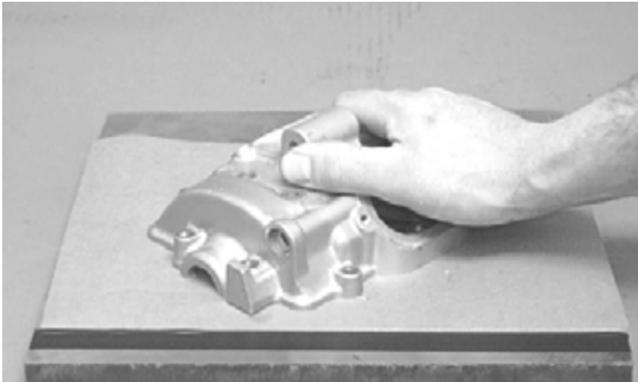
Cleaning/Inspecting Valve Cover

■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 (p/n 0644-016) 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

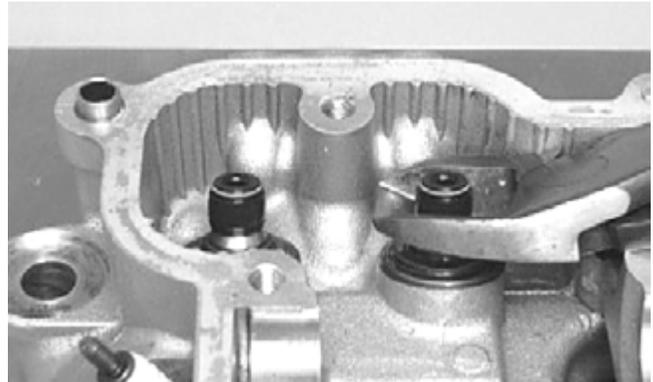
■NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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

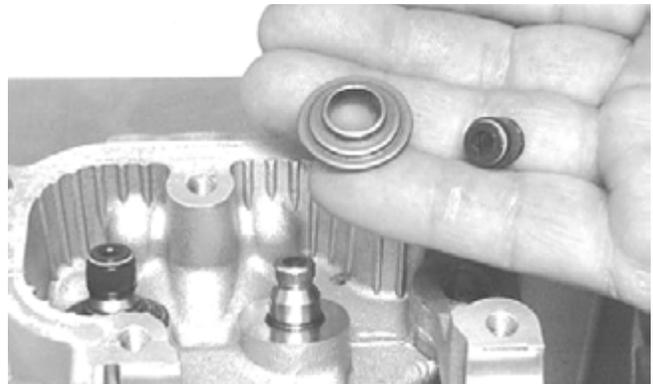


CC994

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



CC134D



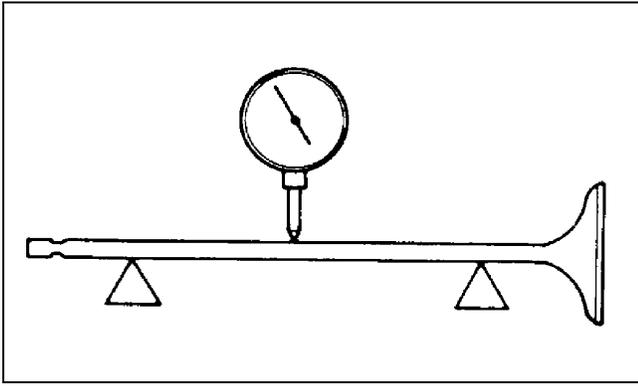
CC136D

■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 (p/n 0644-022); then check the valve stem runout using a dial indicator.



ATV-1082

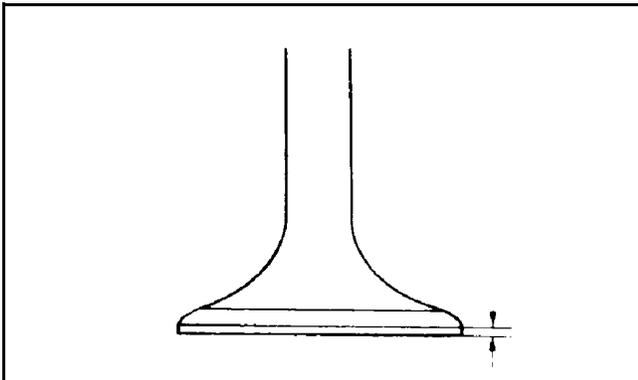
2. Maximum runout must not exceed specifications.

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.

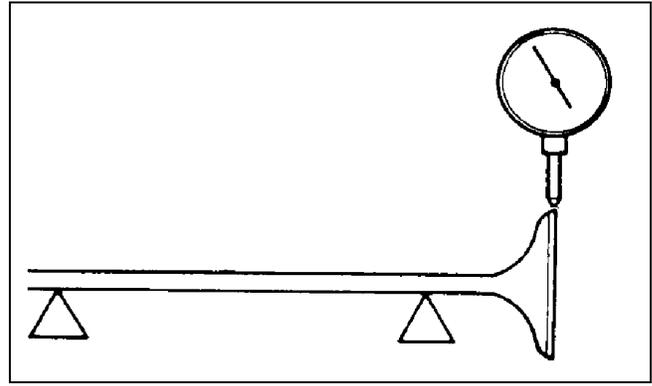


ATV-1004

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.

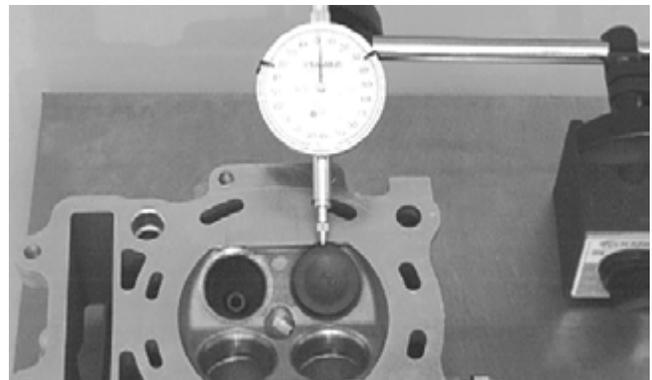


ATV1082A

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.

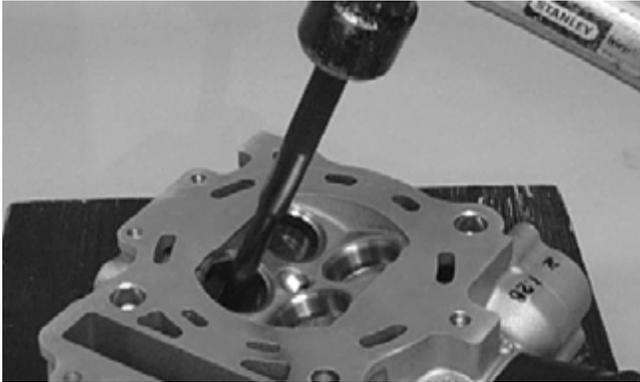
Measuring Valve Guide (Inside Diameter)

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.

Replacing Valve Guide

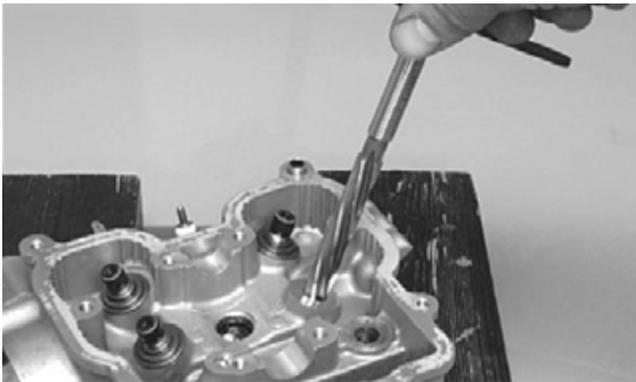
■NOTE: If a valve guide is worn or damaged, it must be replaced.

1. If a valve guide needs replacing, insert a valve guide remover into the valve seat side of the valve guide. Using a hammer, gently drive the valve guide out of the cylinder head.



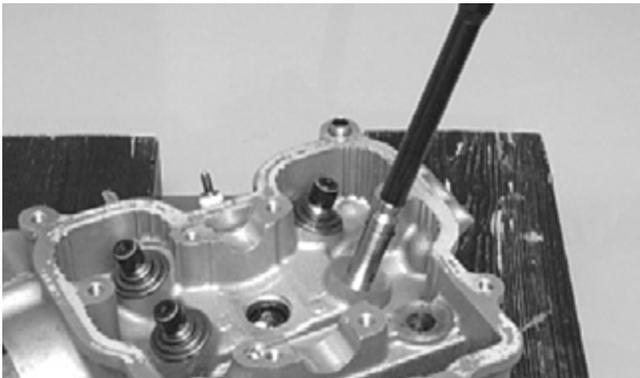
CC137D

2. Using the Standard Valve Guide Reamer (p/n 0444-017), remove any burrs or tight areas from the valve guide journals.



CC142D

3. To install a valve guide, use a valve guide installer and gently drive a valve guide with a retaining clip into the bore from the valve spring side until the retaining clip just contacts the cylinder head.



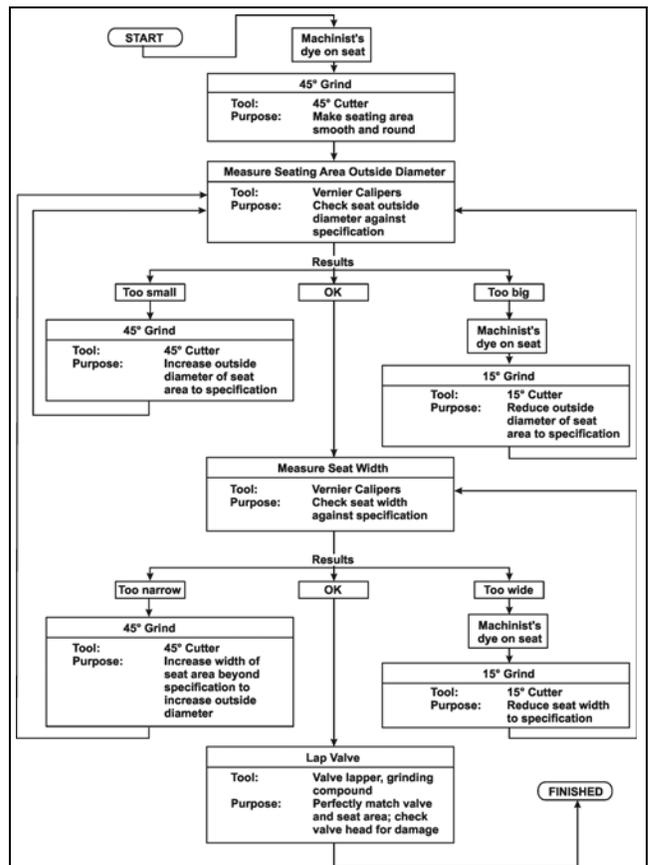
CC143D

4. After installing the guide, use the standard valve guide reamer to remove all burrs and tight areas that may remain in each valve guide.



CC138D

Valve Seat/Guide Servicing Flow Chart



ATV-0107

Grinding Valve Seats

■NOTE: If the valve seat is beyond servicing, the cylinder head must be replaced.

1. Insert an exhaust valve seat pilot shaft into an exhaust valve guide. Slide an exhaust valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the exhaust valve seat until within specifications.

■NOTE: Repeat procedure on the remaining exhaust valve.



CC139D

2. Insert an intake valve seat pilot shaft into one of the intake valve guides. Slide the intake valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the intake valve seat until within specifications.

■NOTE: Repeat procedure on the remaining intake valve.



CC140D

Lapping Valves

■NOTE: Do not grind the valves. If a valve is damaged, it must be replaced.

1. Remove all carbon from the valves.
2. Lubricate each valve stem with light oil; then apply a small amount of valve lapping compound to the entire seating face of each valve.
3. Attach the suction cup of a valve lapping tool to the head of the valve.
4. Rotate the valve until the valve and seat are evenly polished.
5. Clean all compound residue from the valve and seat.

Measuring Rocker Arm (Inside Diameter)

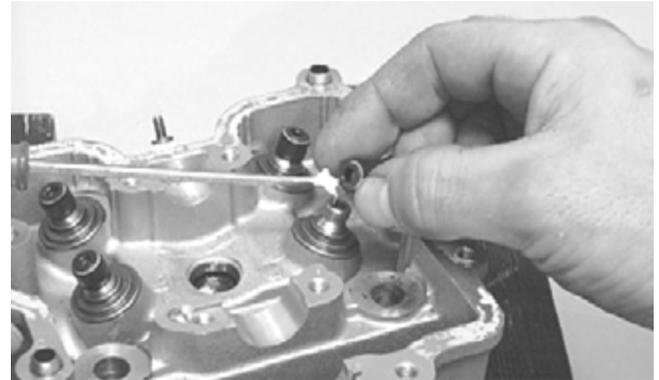
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range must be within specifications.

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

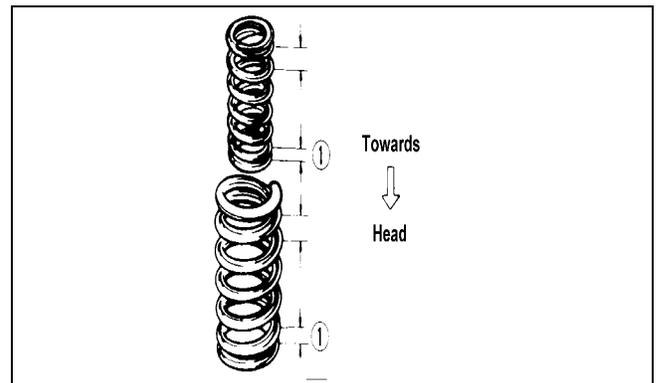
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



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 painted end is not visible, install the ends of the springs with the closest coils toward the head.



ATV-1011

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



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 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.



AN135

■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

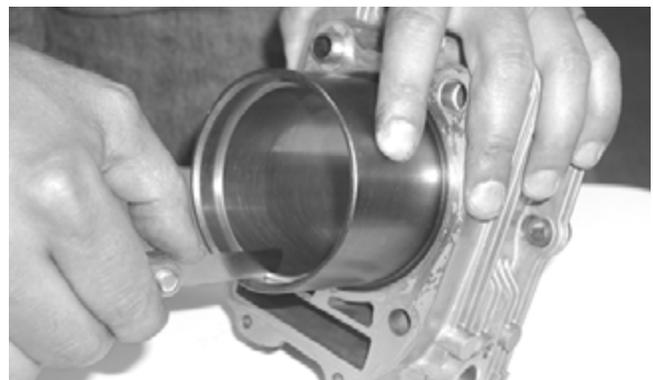
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

⚠ 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)

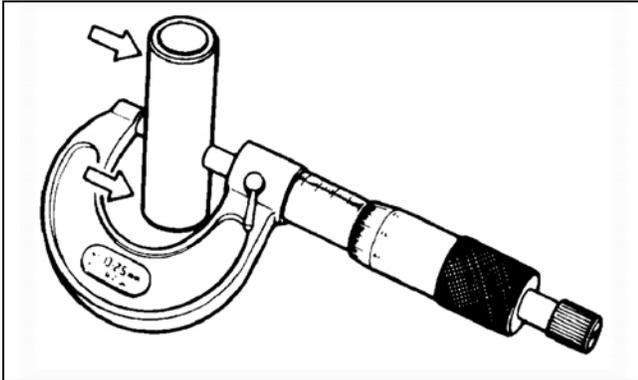
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must not exceed specifications.



CC995

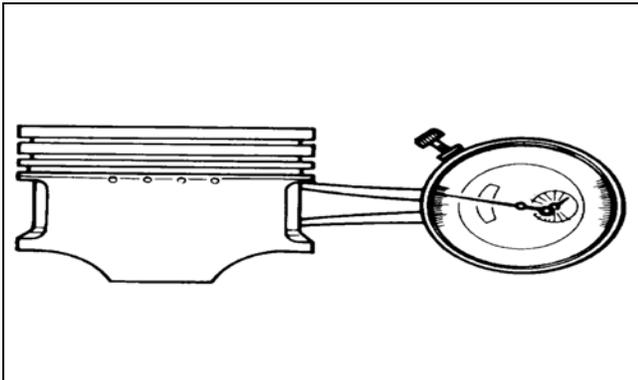
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

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

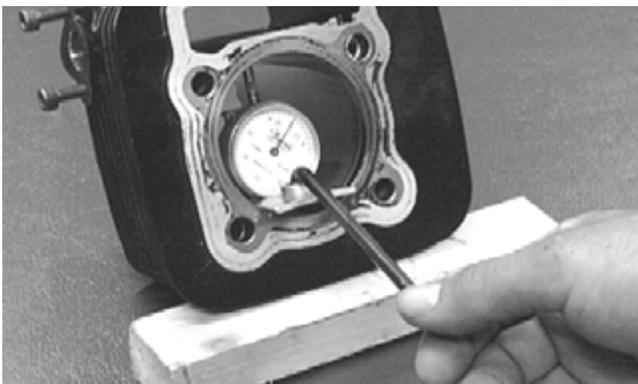
2. Insert an inside dial indicator into the piston-pin bore. The diameter must not exceed specifications. Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/Cylinder Clearance

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



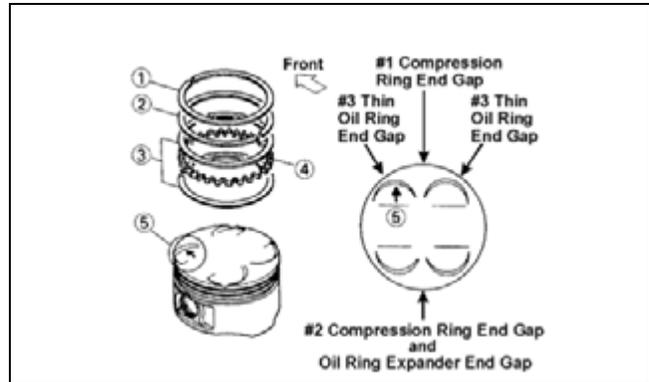
CC397D

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

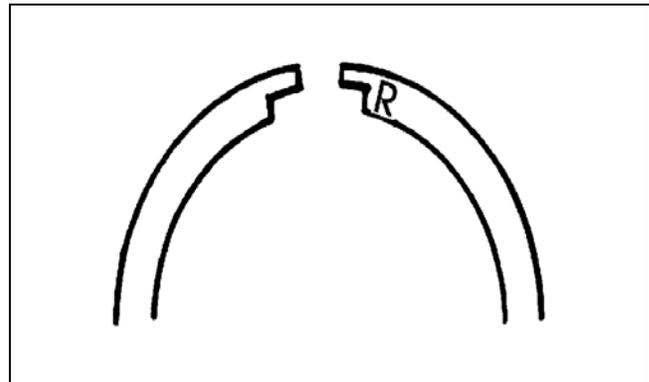
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■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 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.



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

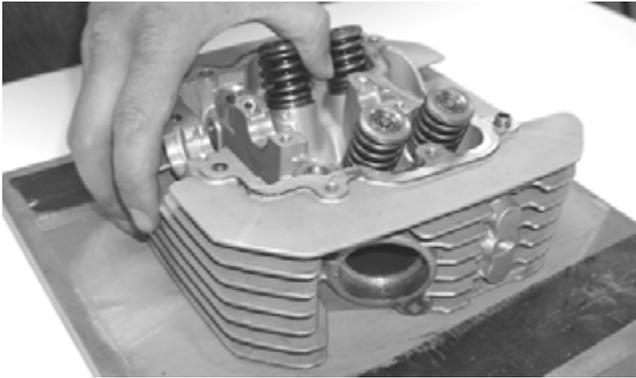
The cylinder head studs must be removed for this procedure.

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.



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

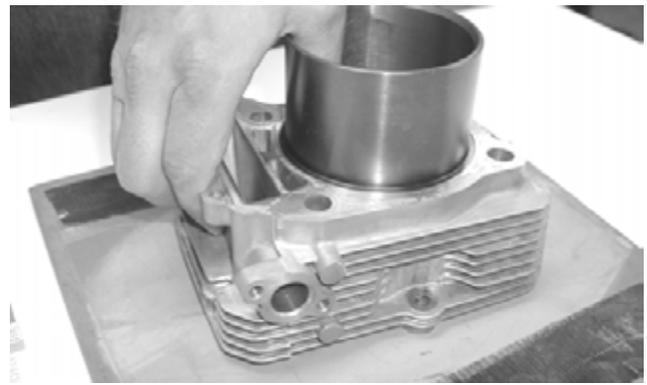
Cleaning/Inspecting Cylinder

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.



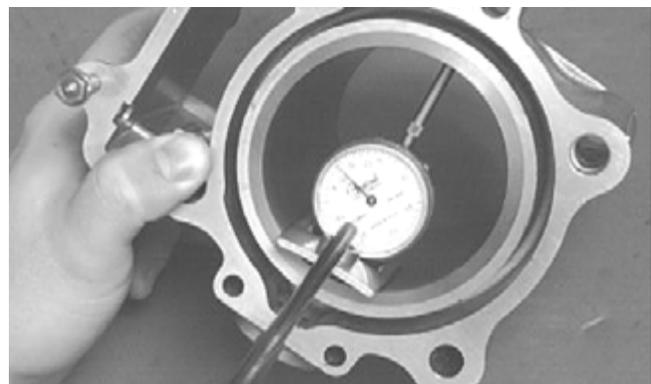
CC997

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

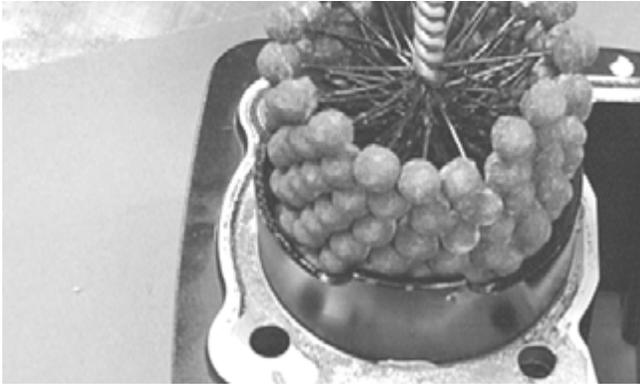
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest 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 ball hone.

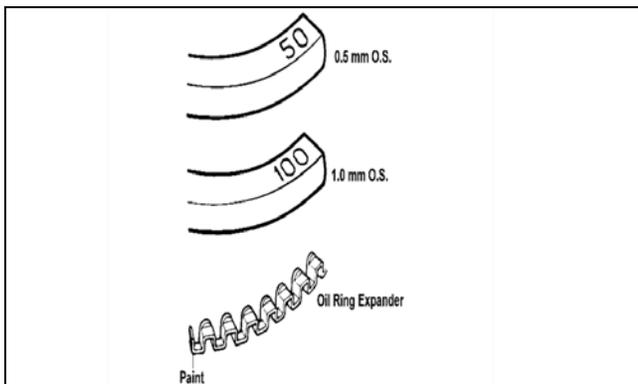
■NOTE: To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately apply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



CC390D

4. If any measurement exceeds the limit, hone the cylinder and install an oversized piston or replace the cylinder.

■NOTE: Oversized piston and rings are available. The oversized piston and rings are marked for identification.

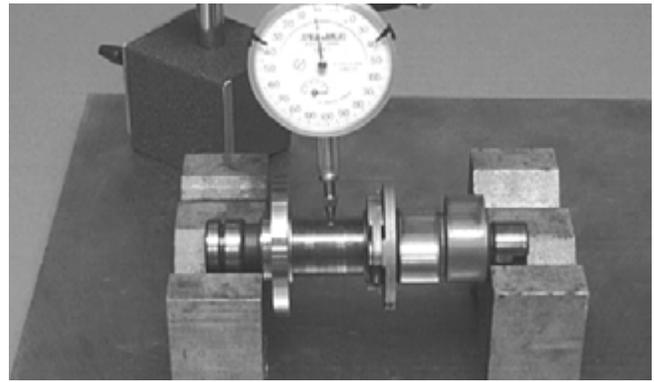


ATV-1068

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.

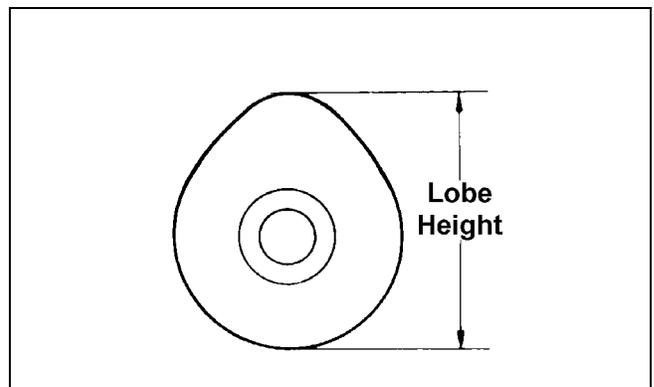


CC283D

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

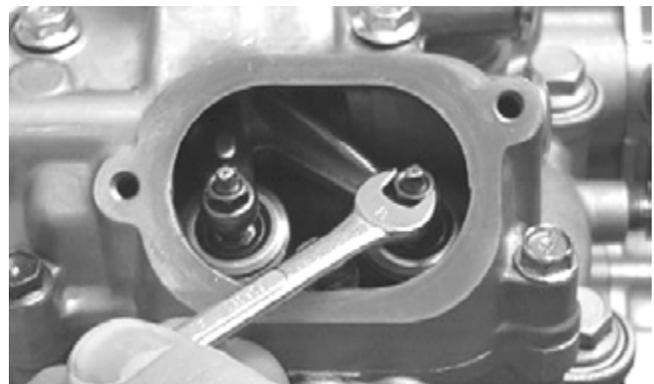
2. The lobe heights must not exceed minimum specifications.

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.

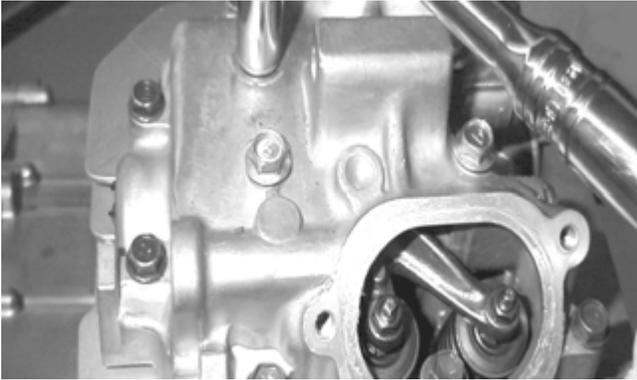


CC005D

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.

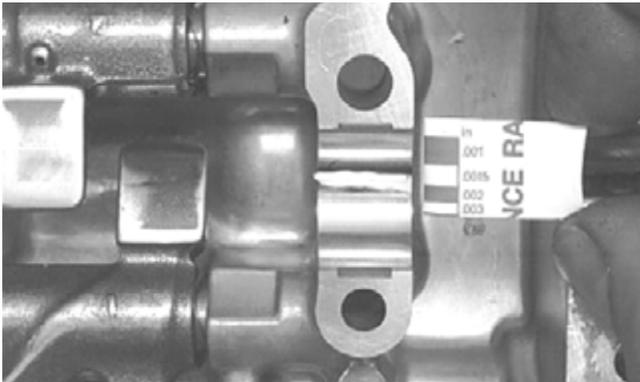
■NOTE: Do not rotate the camshaft when measuring clearance.

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



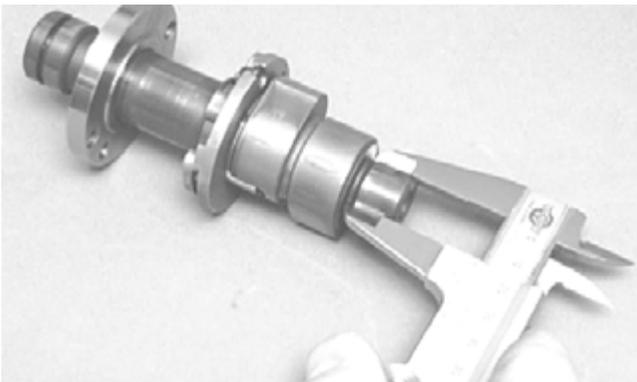
MD1261

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.

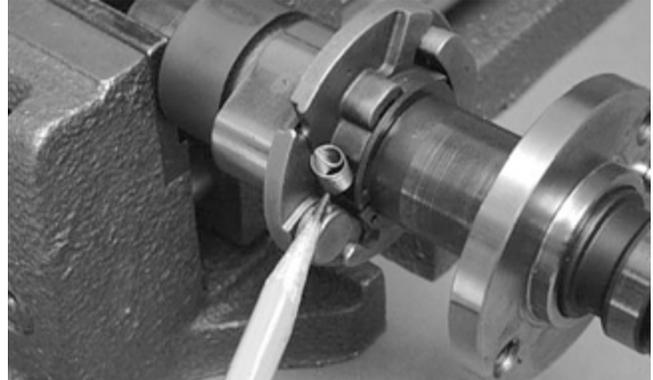


CC287D

■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

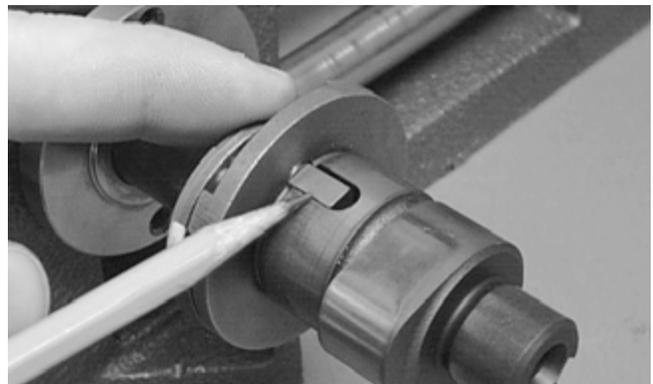
1. Inspect the spring and drive pin for damage.



CC304D



CC306D



CC308D

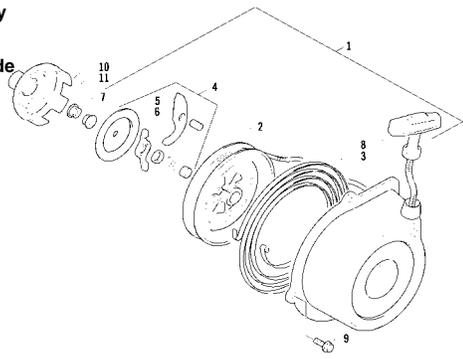
2. If damaged, the camshaft must be replaced.

Servicing Left-Side Components

RECOIL STARTER

KEY

1. Recoil Starter Assy
2. Reel
3. Spiral Spring
4. Ratchet Assy
5. Ratchet
6. Ratchet Guide
7. Nut
8. Rope Assy
9. Cap Screw
10. Starter Cup
11. Nut



0737-034

WARNING

Always wear safety glasses when servicing the recoil starter.

Removing/Disassembling

1. Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the starter.



CC039D

WARNING

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

2. 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.

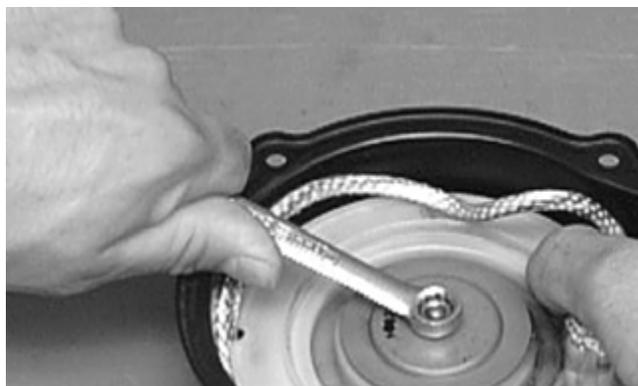


B600D

CAUTION

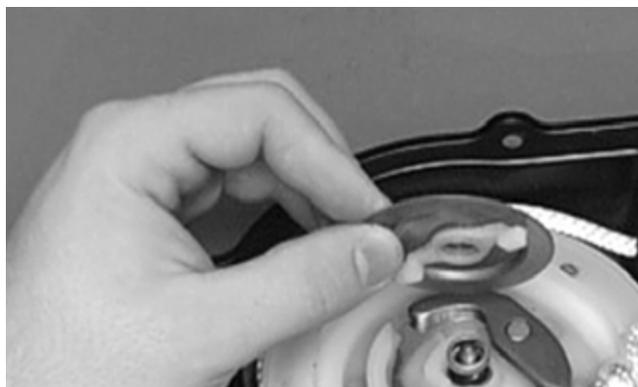
During the disassembly procedure, make sure all spring tension is released before continuing.

3. Remove the nut.



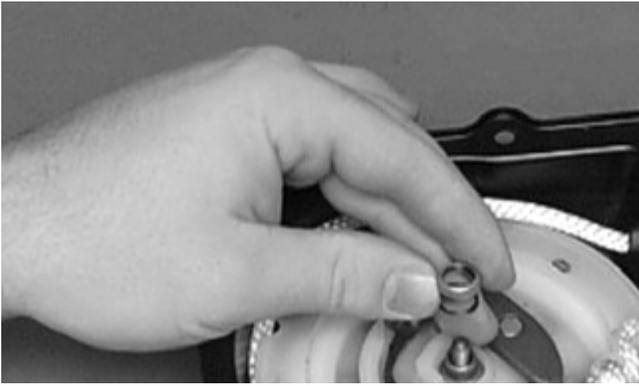
B601D

4. 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

5. Remove the spring cover, spring, and shaft.



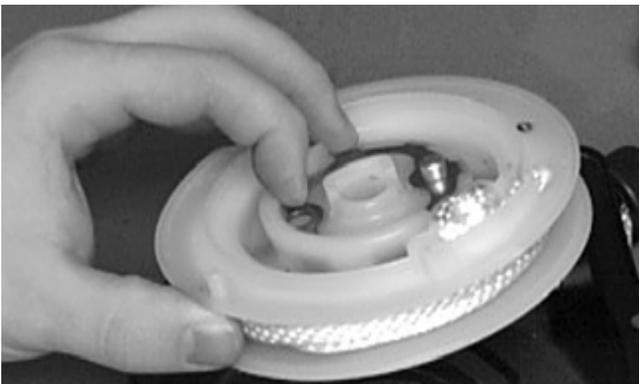
B603D

6. Remove the ratchet and account for the pin.



B604D

7. Carefully lift the reel free of 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.

8. 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. It should be visually inspected in place to save time. If replacement is necessary, follow steps 9-10.

9. 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.

10. 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/Installing

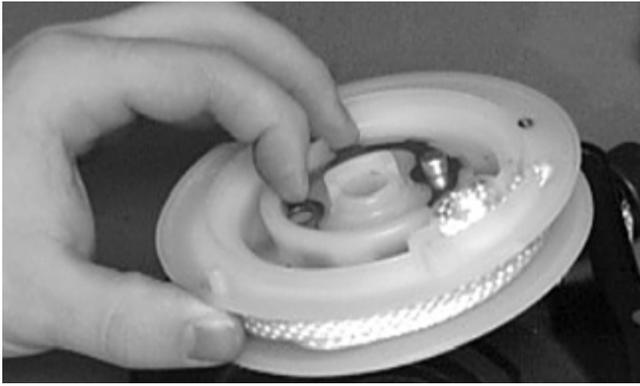
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

■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.



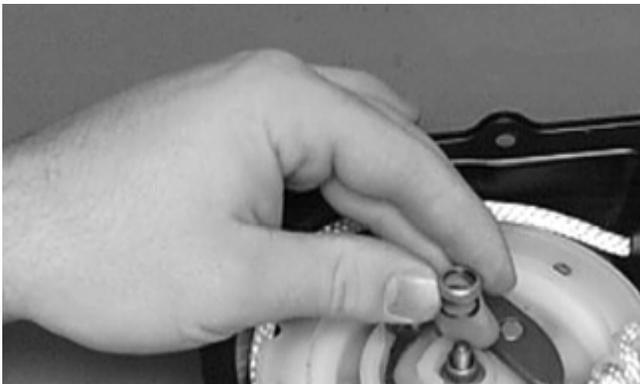
B605D

6. Install the ratchet onto its pin making sure the end is properly installed on the reel.



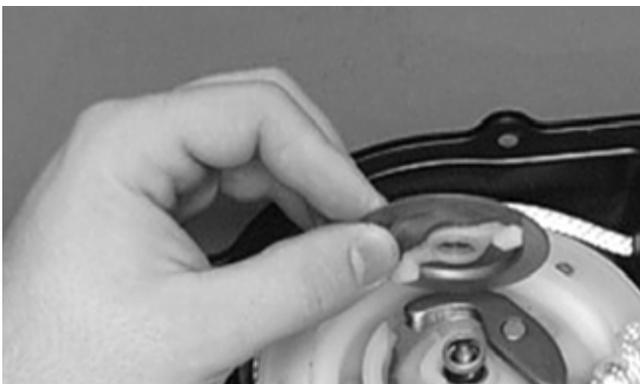
B604D

7. Install the shaft, spring, and the spring cover.



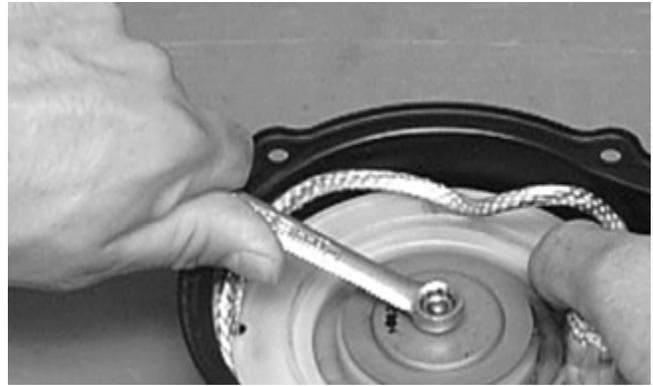
B603D

8. Install the friction plate with the ratchet guide fitting into the ratchet.



B602D

9. While pushing down on the reel, install the nut. Tighten securely.



B601D

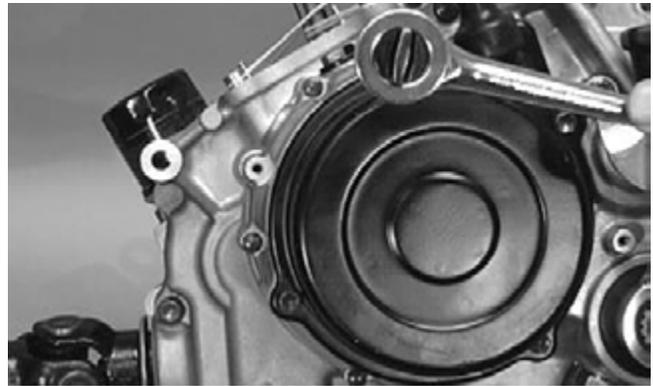
10. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.

11. Rotate the reel four turns counterclockwise; then release the rope from the notch and allow the rope to retract.

12. Pull the rope out two or three times to check for correct tension.

■ **NOTE:** Increasing the rotations in step 11 will increase spring tension.

13. Place the recoil starter assembly into position on the left-side cover; then tighten the cap screws to 0.8 kg-m (6 ft-lb).



CC039D

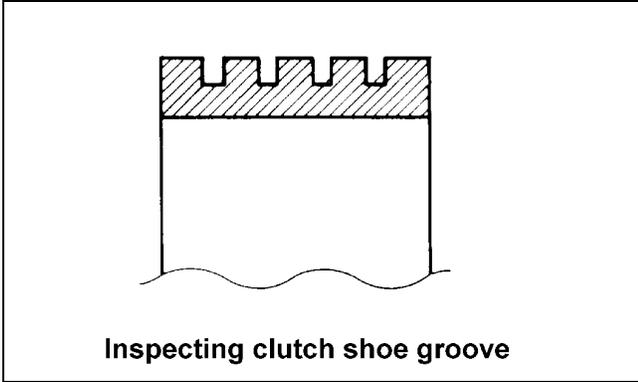
Servicing Right-Side Components

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

INSPECTING STARTER CLUTCH SHOE

1. Inspect the starter clutch shoe for uneven wear, chips, cracks, or burns.
2. Inspect the groove on the shoe for wear or damage.

3. If any damage to the shoe or any groove wear is noted, the shoe must be replaced.



ATV1014

INSPECTING STARTER CLUTCH HOUSING

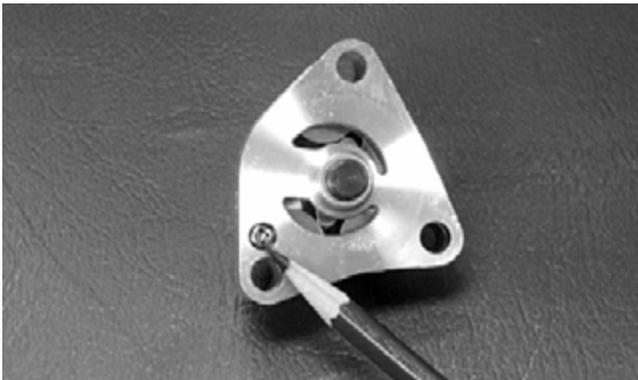
1. Inspect the starter clutch housing for burns, marks, scuffs, cracks, scratches, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

INSPECTING PRIMARY ONE-WAY DRIVE

1. Insert the drive into the 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

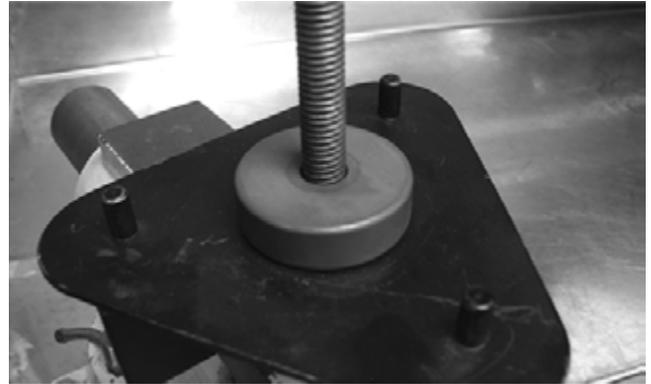
DRIVEN PULLEY ASSEMBLY

Disassembling

WARNING

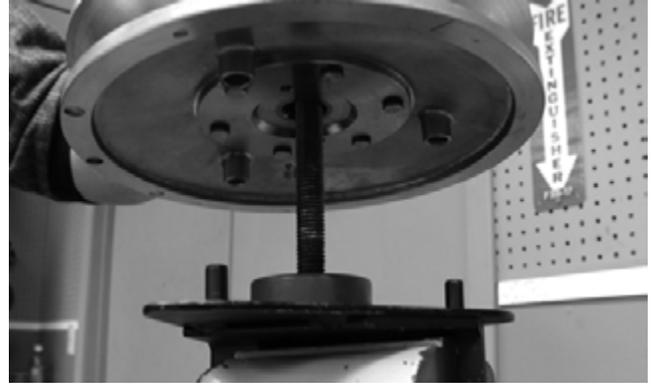
This procedure involves relaxing a compressed spring assembly. **DO NOT** attempt disassembling without the proper tools.

1. Secure Driven Pulley Compressor (p/n 0444-140) 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.



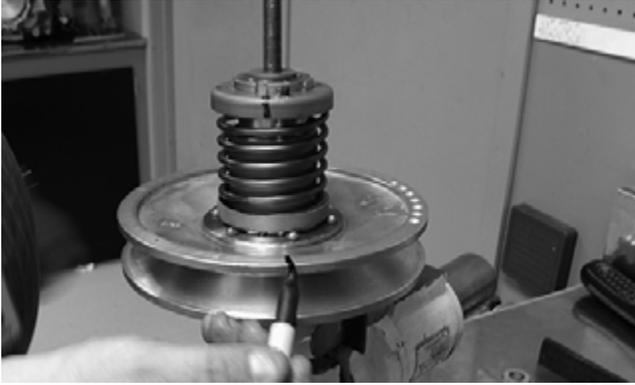
CD048

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



CD067

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



CD049

- 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.

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



CD051

- 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 ¼ turn as the spring holder clears the flats or hub. This is due to a slight counterclockwise preload on the spring.



CD052

- Release the preload slowly; then continue to relax the spring until the wing nut is flush with the end of the threads.

- Firmly holding the spring and spring holder, remove the wing nut; then remove the spring.



CD053

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

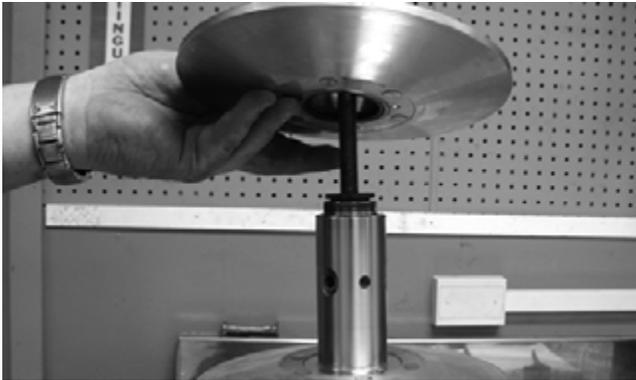


CD054

- Remove the three pins and spacers from the cam slots in the movable face; then remove the movable face.



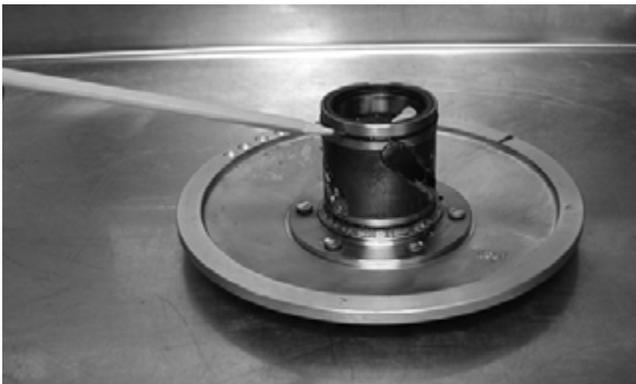
CD055



CD056

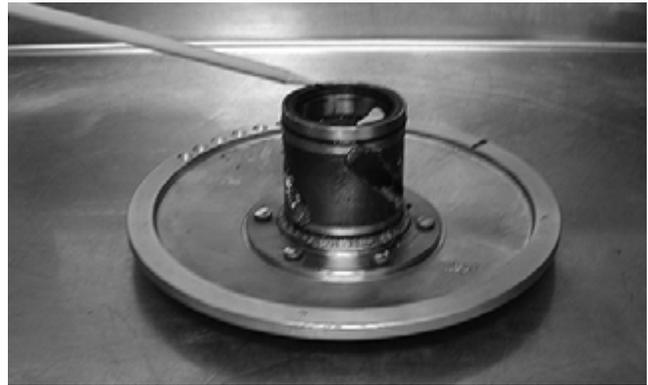
Inspecting

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



CD057

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



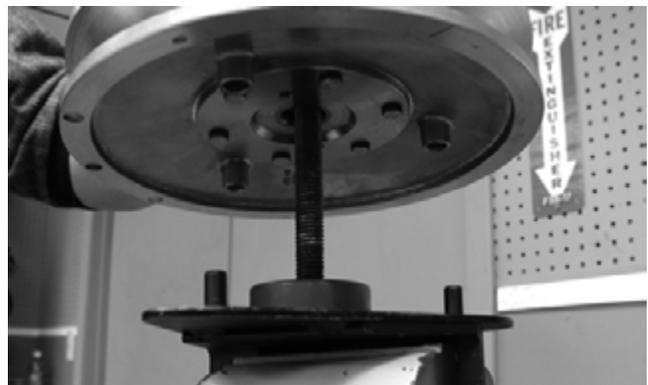
CD058

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.



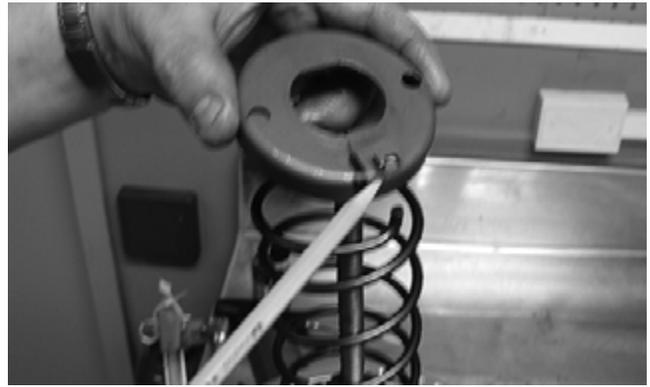
CD060

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



CD061

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



CD064

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.



CD062

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.



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.



CD063

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



CD065

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 specification 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.

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.

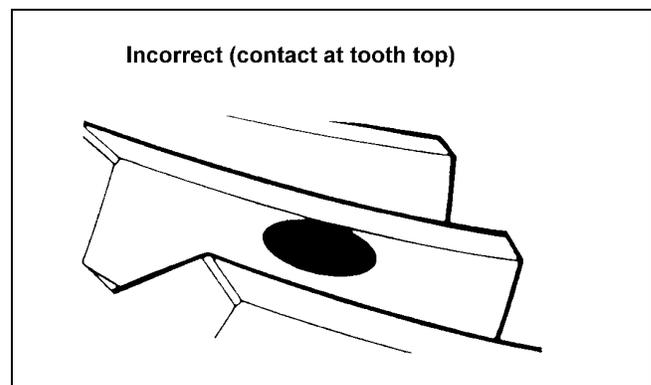
■NOTE: Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

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

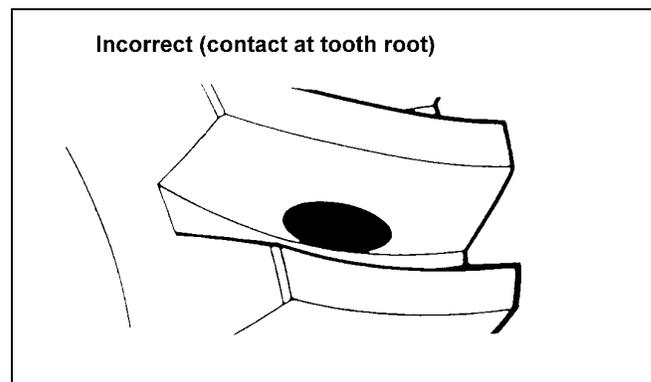
Checking Tooth Contact

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

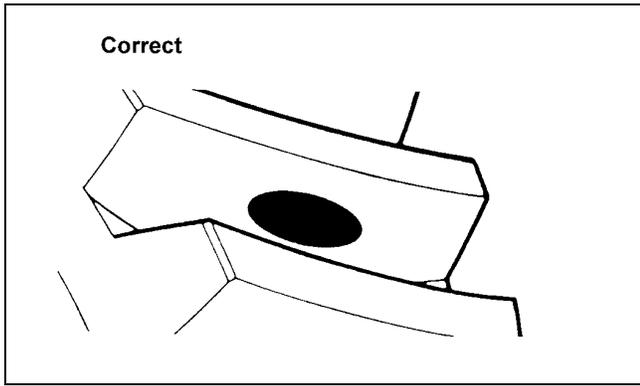
1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
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



ATV-0105



ATV-0104

Correcting Tooth Contact

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

1. 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.

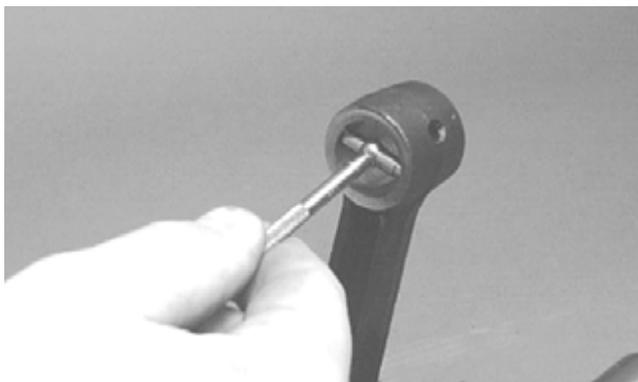
⚠ CAUTION

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

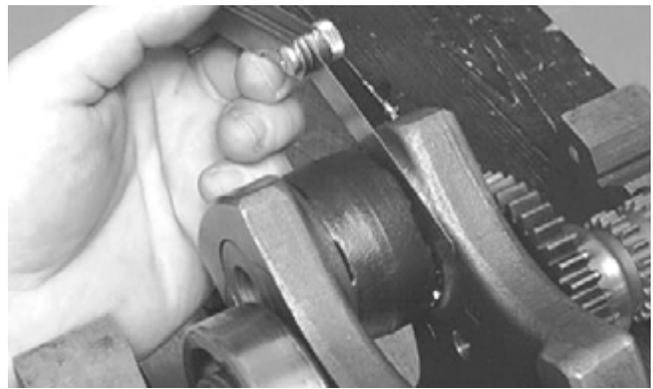
2. Maximum diameter must not exceed specifications.

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

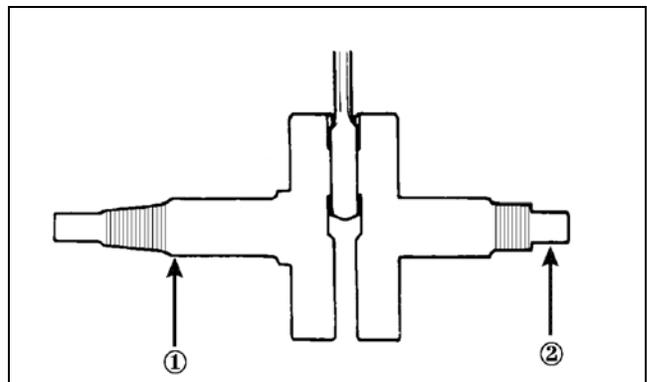
3. Acceptable gap range must be within specifications.

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

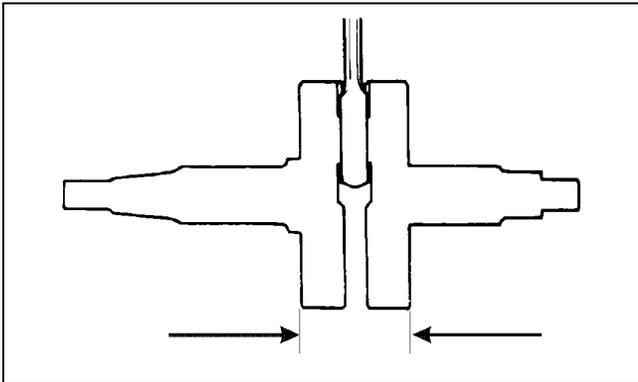
Care should be taken to support the connecting rod when rotating the crankshaft.

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 2-4.

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

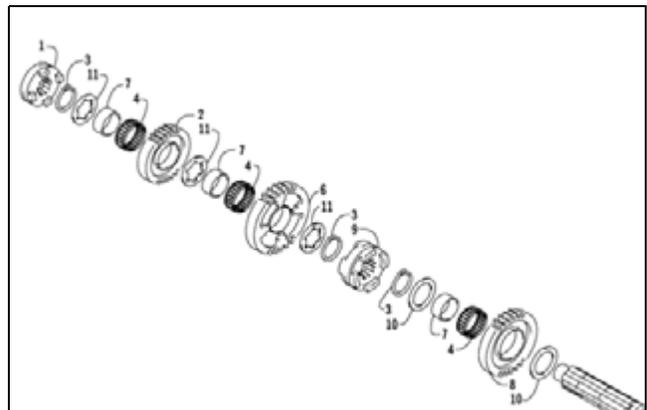
CAUTION

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



KEY

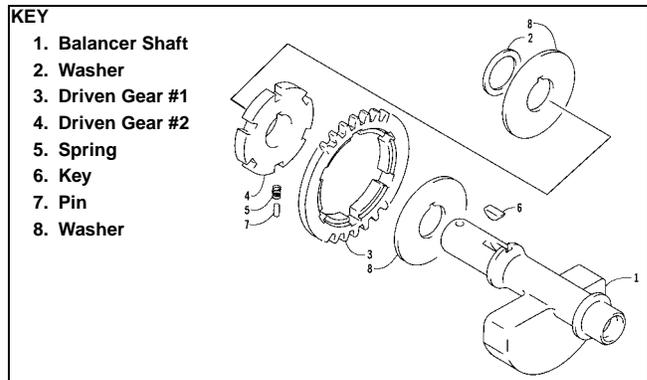
- | | |
|----------------------------|---------------------|
| 1. Reverse Driven Gear Dog | 7. Bushing |
| 2. Reverse Driven Gear | 8. High Driven Gear |
| 3. Circlip | 9. Sliding Dog |
| 4. Bearing | 10. Lock Washer |
| 5. Countershaft | 11. Lock Washer |
| 6. Low Driven Gear | |

737-053A

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; then secure with the circlip.

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

CRANK BALANCER DRIVEN GEAR



KEY

1. Balancer Shaft
2. Washer
3. Driven Gear #1
4. Driven Gear #2
5. Spring
6. Key
7. Pin
8. Washer

737-050A

Disassembling

1. Remove the small and large washers from the balancer shaft.

- Note the position of the alignment marks for assembling purposes; then remove driven gear #1 with driven gear #2. Account for pins and springs.
- Remove driven gear #2 from gear #1; then account for a large washer and a key.

Inspecting

- Inspect the gear, pins, and keyway for wear.
- Inspect the springs for damage or fatigue.

Assembling

- Place driven gear #2 into driven gear #1; then align the alignment marks of driven gear #1 and driven gear #2.
- Using a pair of needle-nose pliers, insert each spring part way into the slot; then install a pin and push the spring/pin assembly into the slot.
- Place the key and the large washer into position on the balancer shaft.
- Place the driven gear #1 assembly onto the balancer shaft; then place the large and small washers onto the shaft.

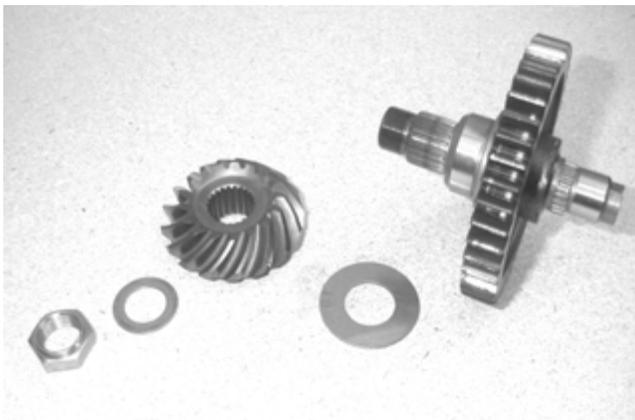
■NOTE: The crank balancer/driven gear assembly is now completely assembled for installation.

Assembling Crankcase Half

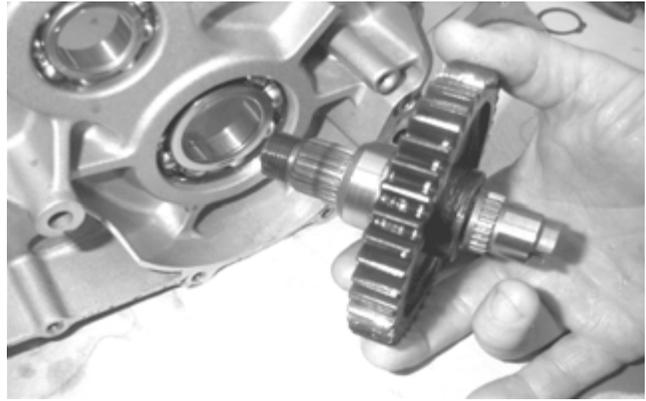
■NOTE: For ease of assembly, install components on the right-side crankcase half.

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

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



MD1199



MD1079

- Apply red Loctite #271 to the threads of the output shaft. Install and tighten the nut to 10 kg-m (72 ft-lb). Using a punch, peen the nut.



MD1333

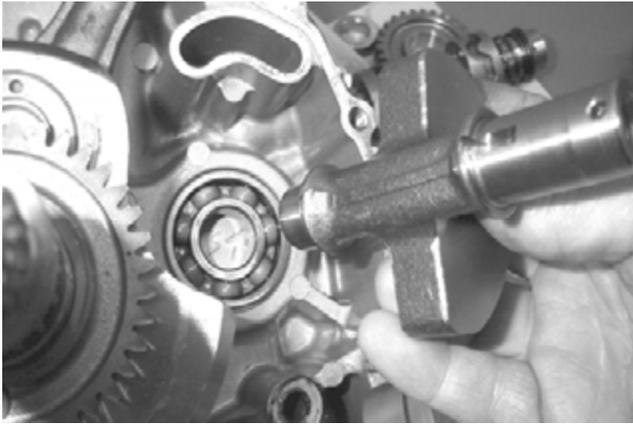
- Apply a liberal amount of oil to the crankshaft bearing. Using a propane torch, heat the bearing until the oil begins to smoke; then slide the crankshaft assembly into place.



MD1334

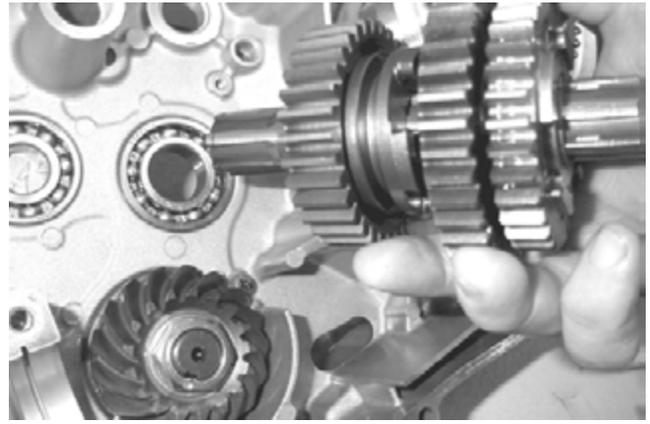
■NOTE: If heating the bearing is not possible, the crankshaft can be installed using a crankshaft installer.

- 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 the one on the crankshaft gear, install the large thrust washer, key, counterbalance gear, and second large thrust washer.

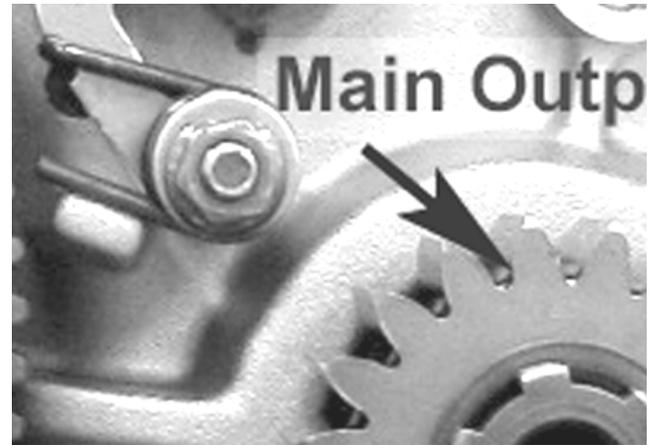


MD1032



MD1102

6. Keeping the two holes facing up, install the shift cam and inner and outer washers.



MD1198

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



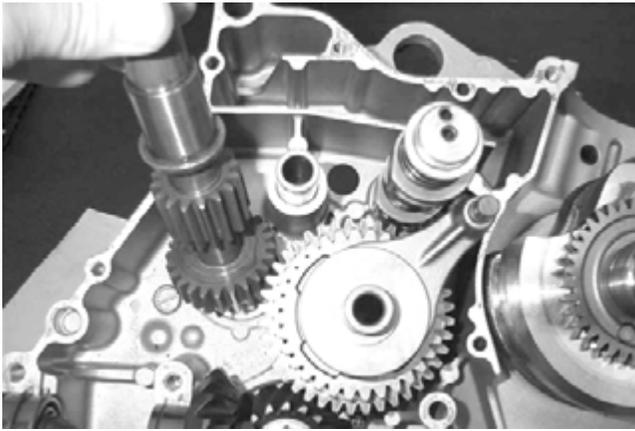
MD1329

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.

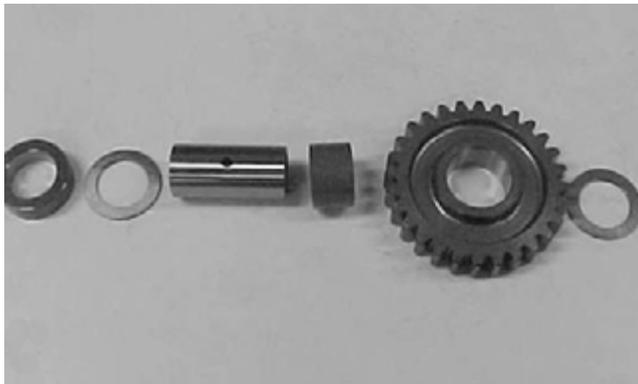


MD1327

9. Install the input driveshaft.

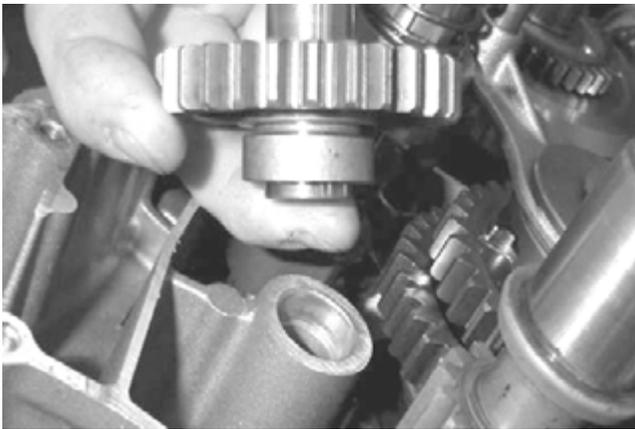


MD1326



CC870

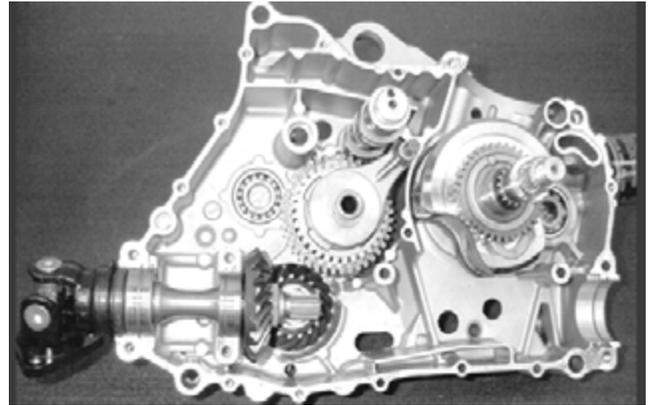
10. Install the washer, spacer, sleeve, reverse idler gear, and washer.



MD1357

11. Install the secondary (4x4 models) and primary drive-shaft assemblies. Account for the bearing alignment C-ring on the bearing boss next to the pinion gear.

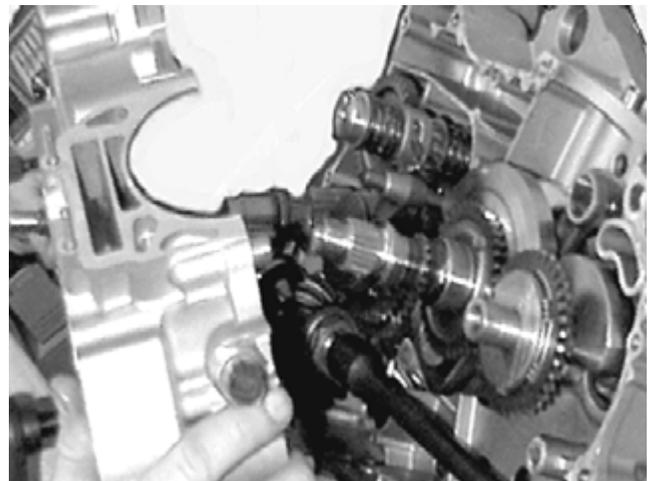
■NOTE: On the 4x4, align the bearing alignment pin on the secondary output shaft.



MD1316

Joining Crankcase Halves

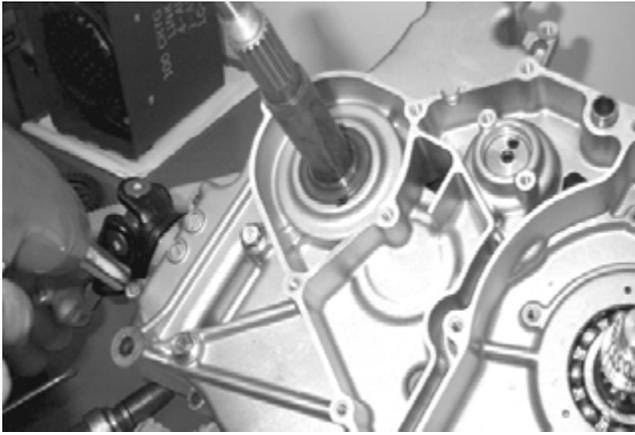
1. Verify that the two alignment pins are in place and that both case halves are clean and grease free. Apply Three Bond Sealant (p/n 0636-070) to the mating surfaces. Place the right-side half onto the left-side half.



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.

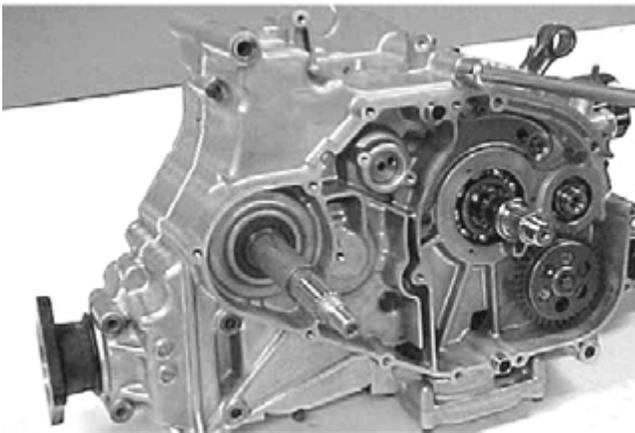
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs while tightening the cap screws.



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 2-2.4 kg-m (14.5-17 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 0.9-1.3 kg-m (6.5-9.5 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.

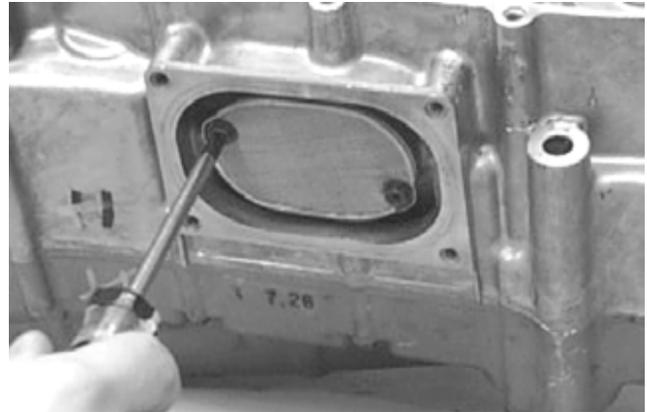
Installing Right-Side Components

A. Oil Strainer/Oil Pump

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

⚠ CAUTION

The legs of the strainer must be directed out.



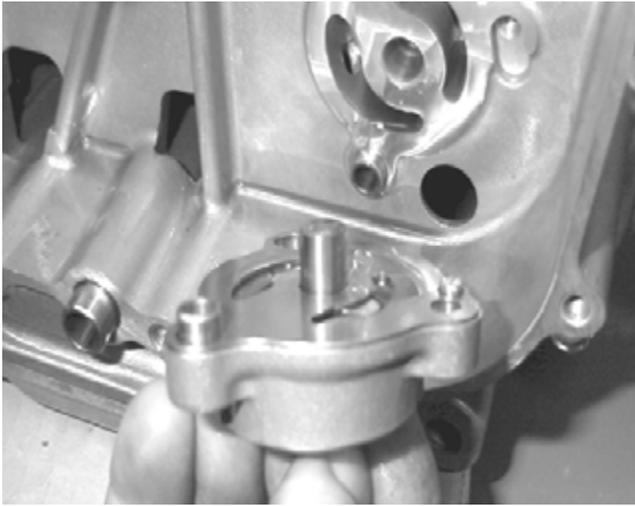
MD1337

2. Noting the directional arrow from removing, place the strainer cover 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 2.2 kg-m (16 ft-lb).



MD1208

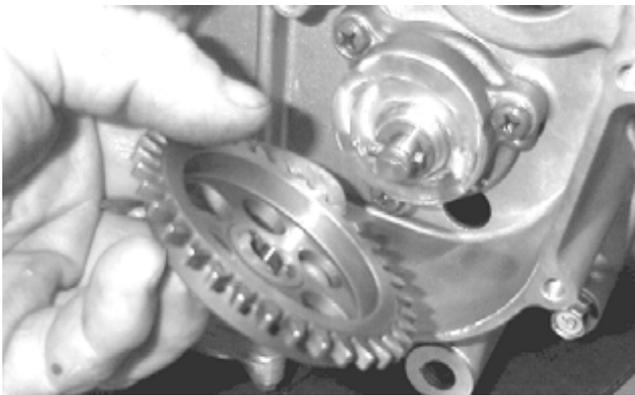
3. Place two alignment pins and the oil pump into position on the crankcase and secure with the Phillips-head screws coated with blue Loctite #243. Tighten to 1 kg-m (7 ft-lb).



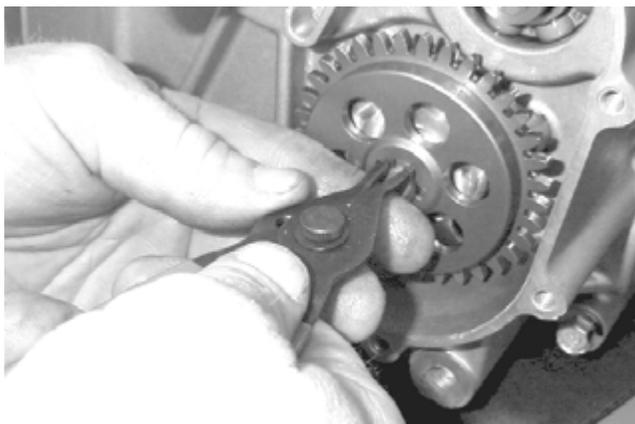
MD1060

- Place the 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.



MD1020



MD1019

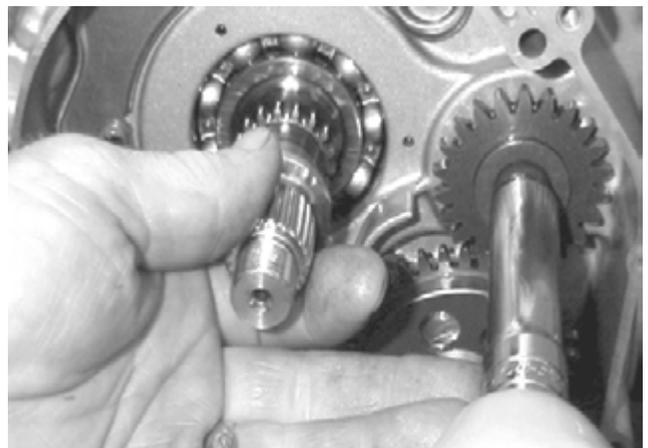
- Install the cam chain.

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

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



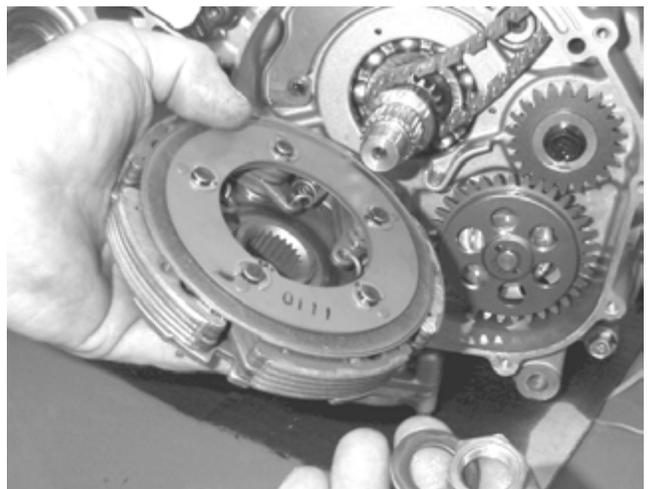
MD1017



MD1018

- Install the centrifugal clutch assembly and left-hand threaded nut. Tighten securely.

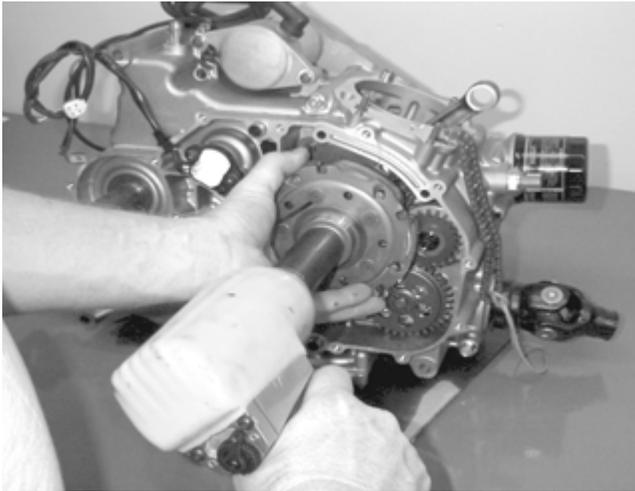
■NOTE: The flat side of the left-hand threaded nut should be towards the clutch.



MD1016

CAUTION

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



MD1014

8. Install the one-way sprag clutch making sure that the green dot or the stamp tag OUTSIDE is facing out.



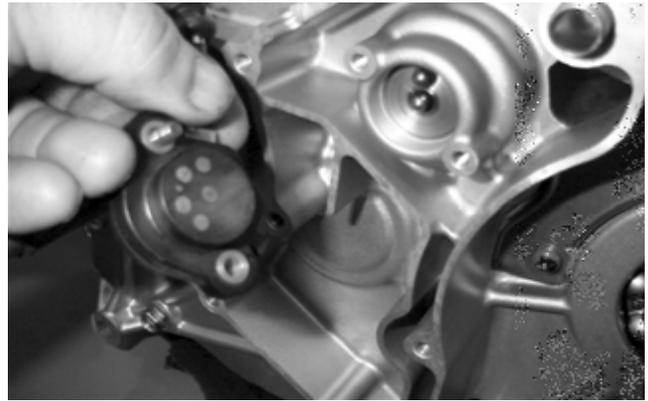
MD1286

9. Install gear position indicator switch contact pins and springs into the end of the shift cam.



MD1043

10. Install gear position indicator switch making sure the O-ring is well-oiled and properly positioned. Tighten cap screws securely.

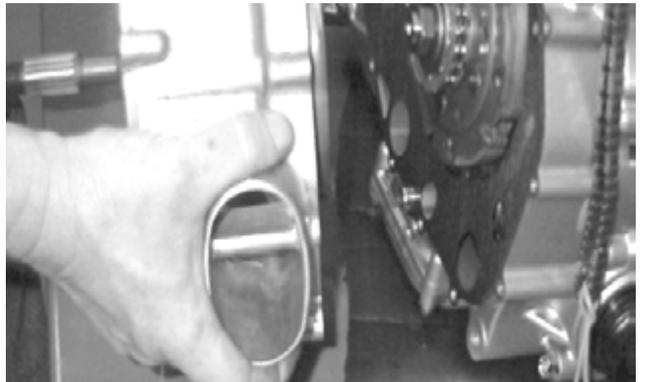


MD1040

B. Clutch Cover
C. Fixed Drive Face
D. Movable Drive Face

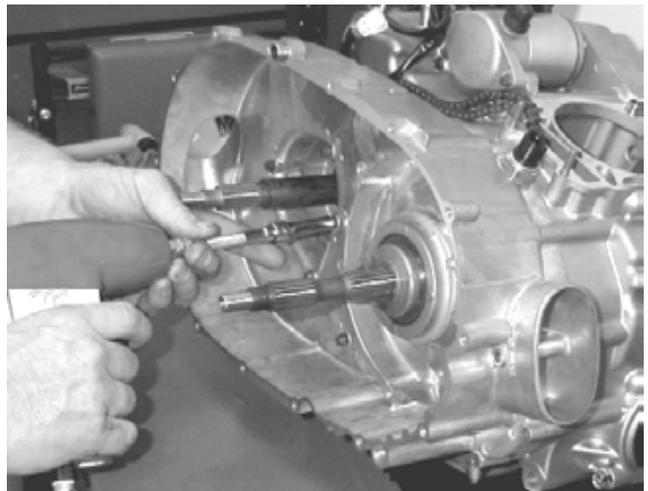
■NOTE: Steps 1-10 in the preceding sub-section must precede this procedure.

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



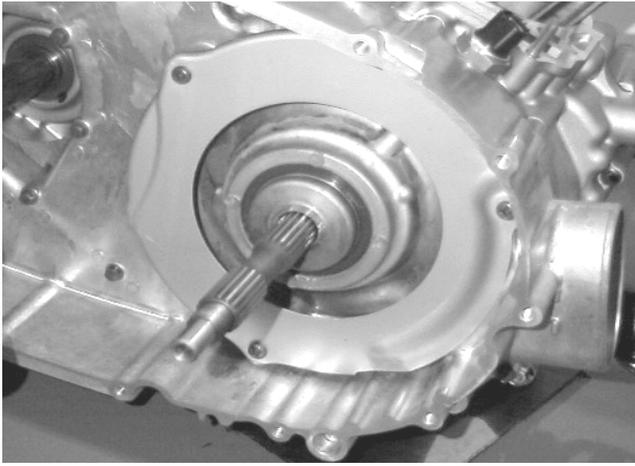
MD1115

12. Tighten the clutch cover cap screws securely.



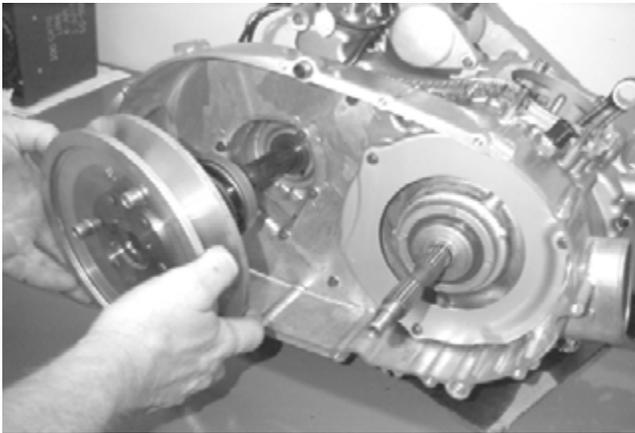
MD1117

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

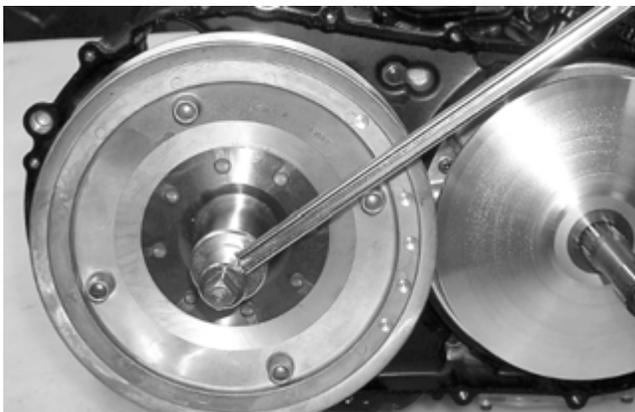


MD1342

14. Place the driven pulley assembly into position and secure with the nut (threads coated with red Loctite #271). Tighten to 10.4-11.8 kg-m (75-85 ft-lb).

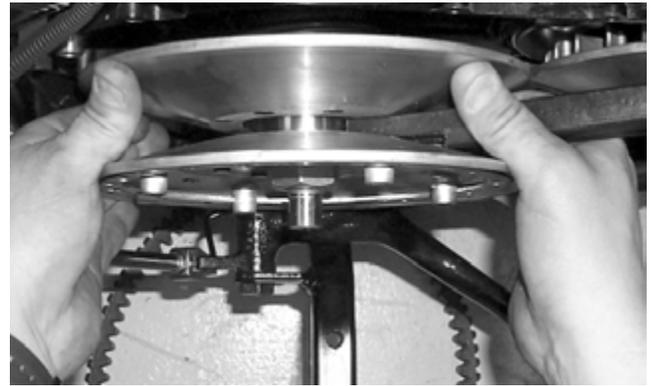


MD1068



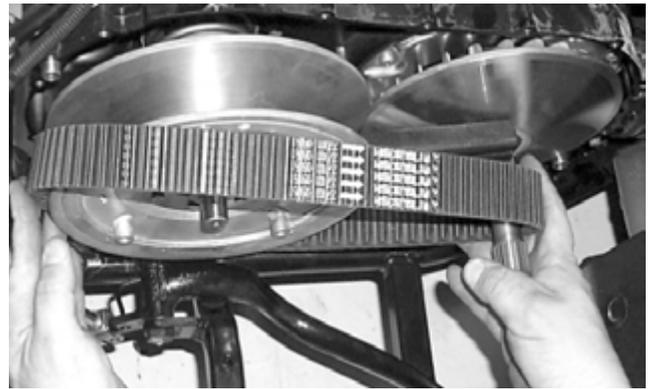
MD1339

15. Slide the fixed drive face assembly onto the front shaft.
16. Spread the faces of the driven pulley by pushing the inner face toward the engine while turning it counter-clockwise; then when the faces are separated, insert a wedge (approximately 3/8 in. thick) between the faces. Release the inner face.



MD1340

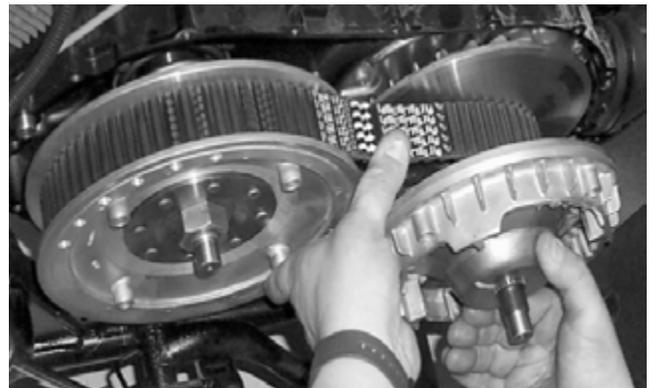
17. Place the V-belt into position on the driven pulley and over the front shaft.



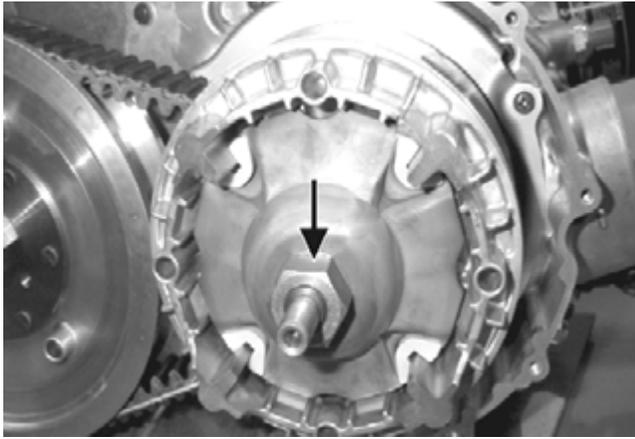
MD1341

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

18. Making sure the eight 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. Coat the threads of the nut with red Loctite #271 and secure the movable drive face. Tighten the nut to 10.4-11.8 kg-m (75-85 ft-lb).



MD1338



MD1033

■NOTE: At this point, the wedge can be removed from between the driven pulley faces.

19. Rotate the V-belt and drive/driven assemblies until the V-belt is flush with the top of the driven pulley.
20. Install two alignment pins and place the V-belt cover gasket into position on the clutch cover. Install the V-belt cover noting the position of the long cap screws and rubber washer and two wire forms. In a criss-cross pattern, tighten cap screws to 1.1 kg-m (8 ft-lb).

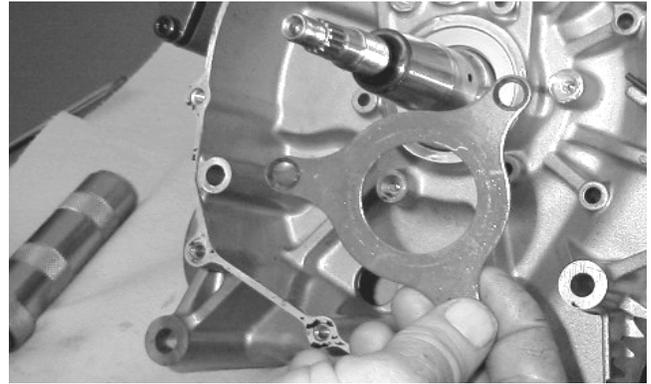


MD1306

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 Phillips-head screws. Install and tighten the three Phillips-head screws securely.



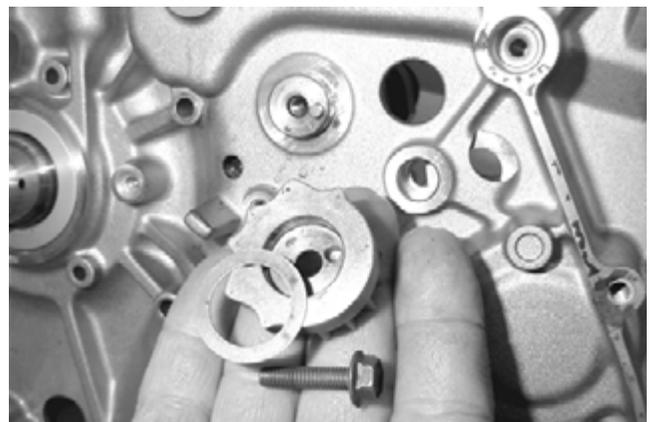
MD1122

2. Install the starter motor and tighten the two cap screws securely.
3. Install the driveshaft spacer making sure the stepped side is to the inside.



MD1224

4. Install the shift detent cam making sure the spacer is properly positioned.



MD1086

5. Install the cam follower assembly.



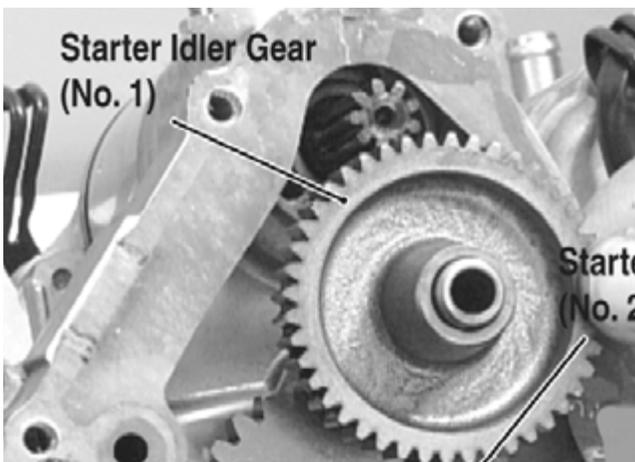
MD1231

6. Install the gear shift shaft assembly and washer making sure to align the alignment marks.



MD1239

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



MD1305

8. Place the key into its notch; then slide the rotor/ fly-wheel (with the ring gear in place) over the crankshaft. Tighten the nut to 16 kg-m (116 ft-lb).

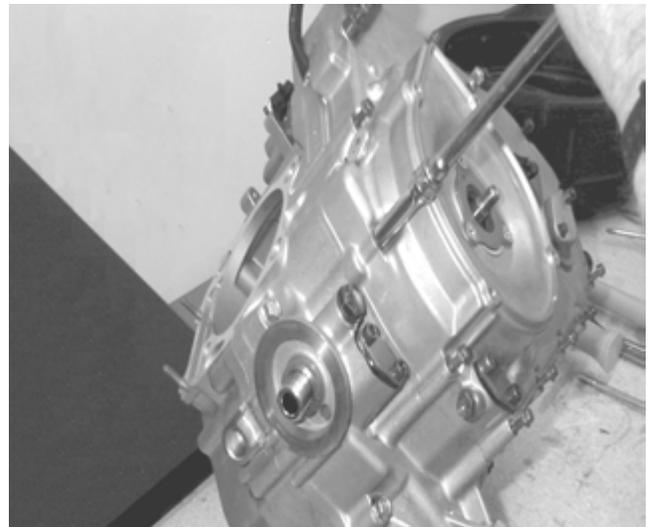


MD1194

C. Cover D. Recoil Starter

■NOTE: Steps 1-8 in the preceding sub-section must precede this procedure.

9. 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 0.9-1.3 kg-m (6.5-9.5 ft-lb).

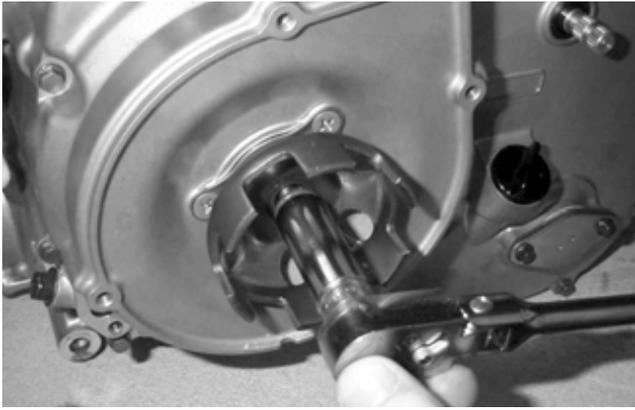


MD1186

10. Install the starter cup making sure that the O-ring is in place inside the starter cup. Tighten the nut w/lock washer to 3.5 kg-m (25 ft-lb).



MD1304



MD1303

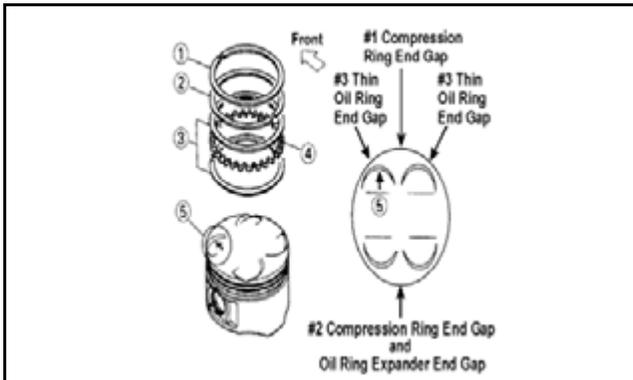
- Place the gasket, recoil starter assembly, and cover into position on the left-side cover making sure the single washer is properly positioned; then install and tighten the four cap screws to 0.8 kg-m (6 ft-lb).

Installing Top-Side Components

- A. Piston**
- B. Cylinder**

■NOTE: If the piston rings were removed, install them in this sequence.

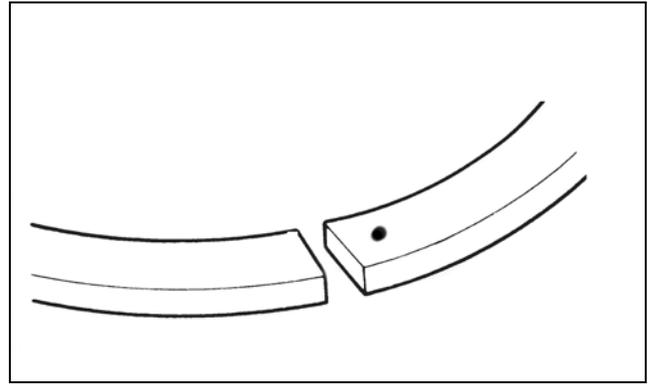
- Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



ATV-1085B

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

- 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 according to the illustration.



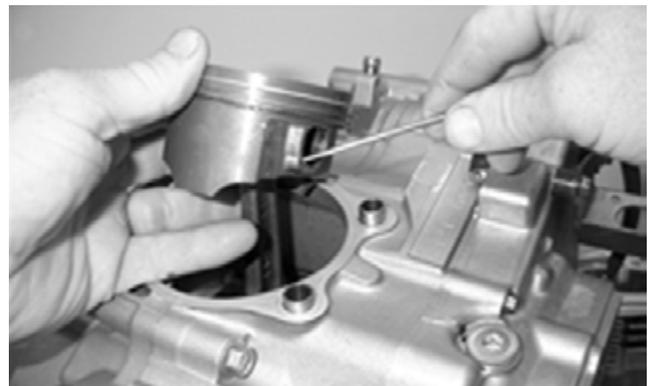
MD1343

⚠ CAUTION

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

- 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 towards the front.



MD1213

- 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.

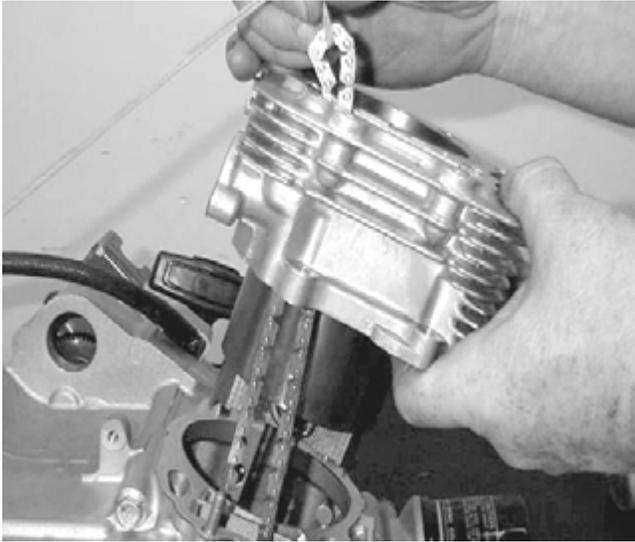


MD1344

- 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

- Loosely install the two nuts with washers which secure the cylinder to the right-side crankcase half.

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



MD1226

C. Cylinder Head

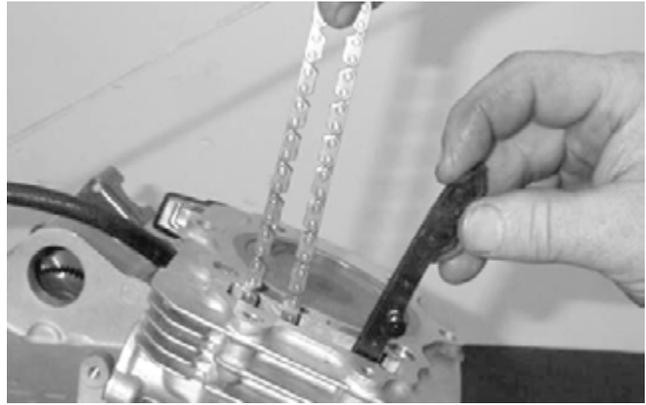
D. Valve Cover

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

- 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.

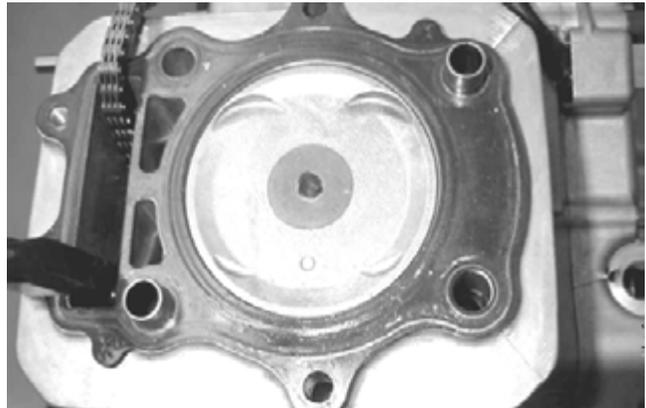


MD1349

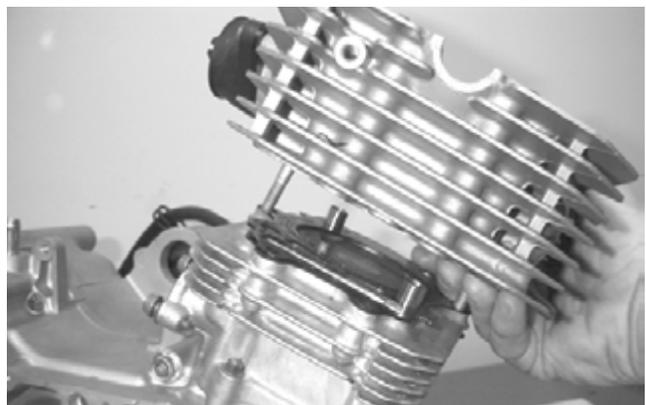
- Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder making sure the cam chain is routed through the chain cavity.

⚠ CAUTION

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

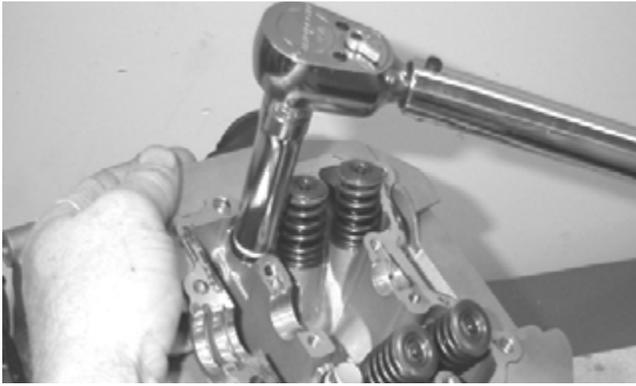


MD1347



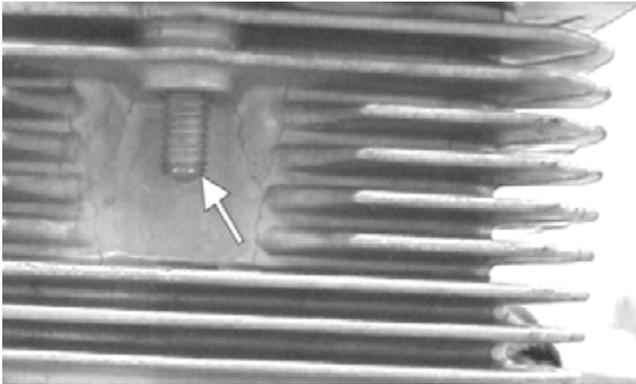
MD1163

- 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.



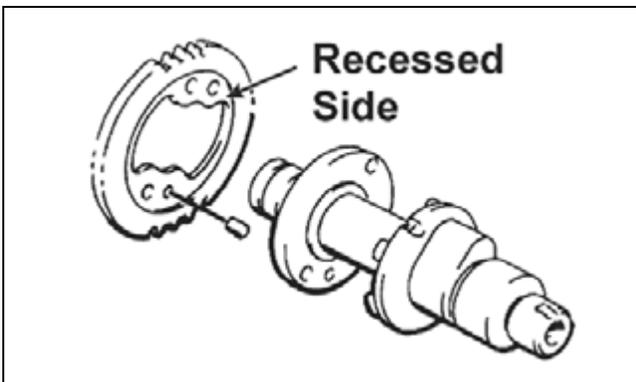
MD1270

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



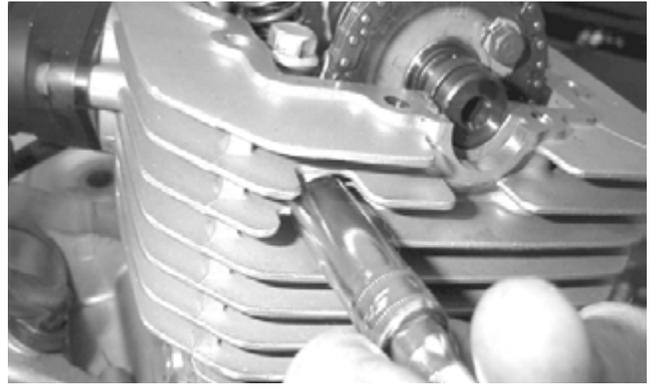
MD1192

9. In a crisscross pattern, tighten the four cylinder head cap screws to 3.8 kg-m (27.5 ft-lb). Tighten the two lower cylinder head nuts to 2.5 kg-m (18 ft-lb) and the cylinder-to-crankcase nuts to 1.1 kg-m (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. 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

12. 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.



MD1251

13. 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.

14. 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.

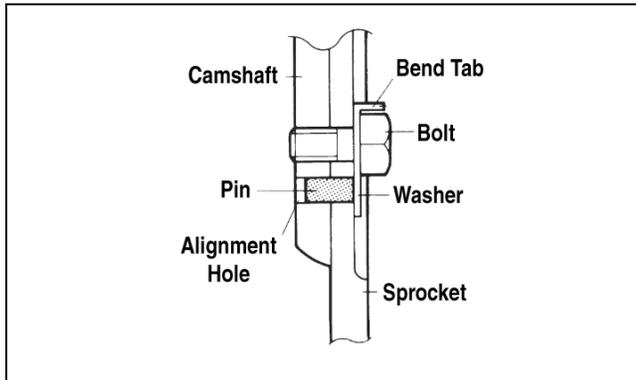
■ **NOTE:** When the camshaft assembly is seated, make sure the alignment pin in the camshaft aligns with the smallest hole in the sprocket.



MD1362

15. Apply red Loctite #271 to the cap screws; then install the cap screws and tab washer to the camshaft sprocket. Tighten cap screws to 1.5 kg-m (11 ft-lb).

■NOTE: Place the tab washer on the sprocket making sure it covers the pin in the alignment hole.



MD1363

■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.

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

- 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

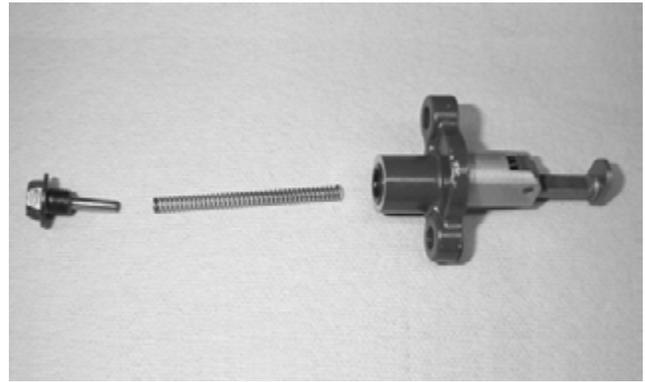
If any of the above factors are not as stated, go back to step 13 and carefully proceed.

⚠ 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 cylinder head plug with the open end facing the camshaft.

18. Remove the cap screw from the end of the chain tensioner. Account for the plunger, spring, and O-ring.



MD1248

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



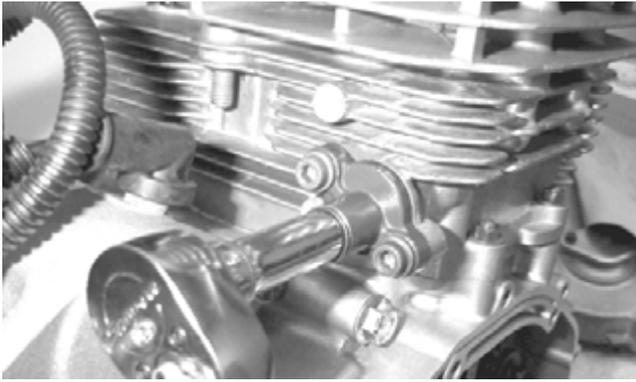
MD1146

20. 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 Allen-head screws.



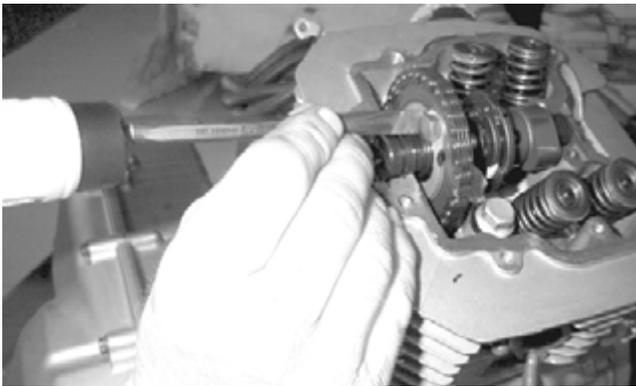
MD1254

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

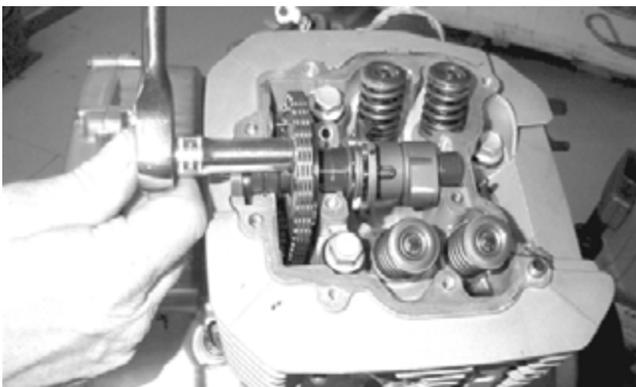


MD1245

22. Rotate the crankshaft until the first cap screw securing the sprocket to the camshaft can be installed; then install the cap screw. Do not tighten at this time.
23. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw. Do not tighten at this time.



MD1136

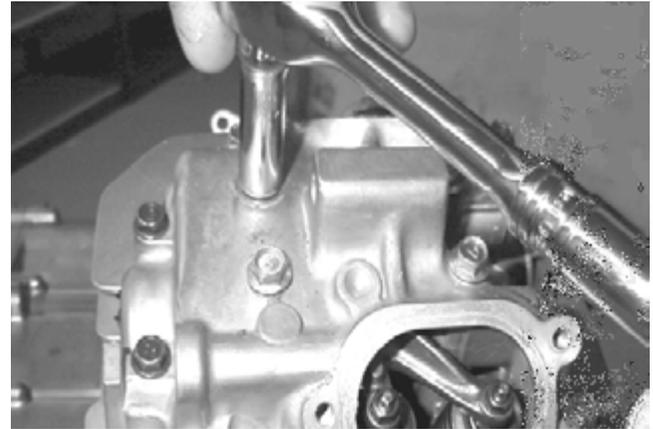


MD1137

24. Tighten the cap screws (from steps 22 and 23) to 1.15 kg-m (8.5 ft-lb). Bend the washer tabs to secure the cap screws.
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 (p/n 0636-070) 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.



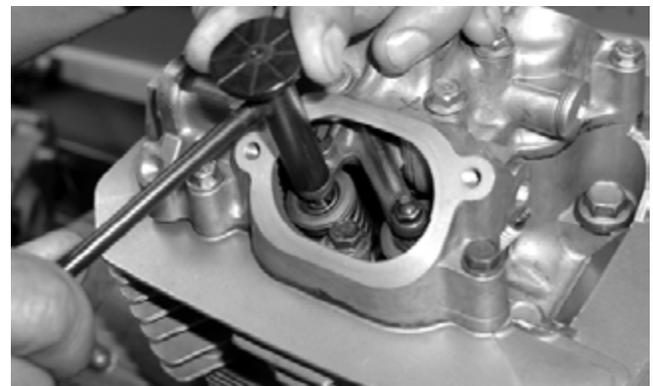
MD1261

28. In a crisscross pattern starting from the center and working outward, tighten the cap screws (from step 27) to 1 kg-m (7 ft-lb).

29. Adjust valve/tappet clearance using the following procedure.

■ **NOTE:** Use Valve Clearance Adjuster (p/n 0444-078) for this procedure.

- A. Turn the engine over until the piston reaches top-dead-center on the compression stroke.
- B. 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.
- C. 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.



CD001

- D. Align the valve adjuster handle with one of the marks on the valve adjuster dial.

E. While holding the valve adjuster handle in place, rotate the valve adjuster dial counter-clockwise until specified valve/tappet clearance is attained.

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

F. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.

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 to 1.7 kg-m (12 ft-lb); then install the timing inspection plug.

Installing Engine/ Transmission

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

1. From the right side, place the engine/transmission into the frame making sure it is properly positioned in the frame with the front and rear driveshafts properly aligned.
2. Slightly raise the front of the engine and insert the front driveshaft coupler.



CC578

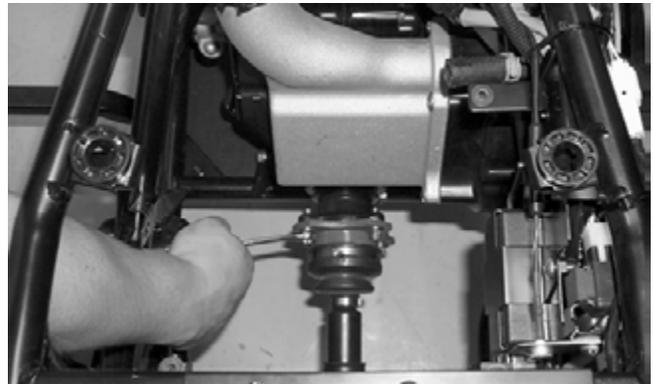
3. Position the two upper rear engine mounts in place on the frame and loosely secure with existing hardware; then install the three engine mounting through-bolts making sure to account for a washer on the upper bolt and a spacer on the lower front bolt. Tighten only until snug.

4. Align the front and rear driveshafts and secure with existing hardware. Tighten only until snug.

5. Secure the front upper engine mount to the frame with the cap screws. Tighten to 2.8 kg-m (20 ft-lb).

6. Secure the upper engine bracket to the engine with the existing cap screw and flange nut. Tighten to 2.8 kg-m (20 ft-lb).

7. Tighten all engine mounting through-bolts to 5.5 kg-m (40 ft-lb); then tighten the cap screws securing the rear CV joint to 2.8 kg-m (20 ft-lb). Tighten the front driveshaft to 5.5 kg-m (40 ft-lb); then tighten the two upper rear engine mounts to 1.7 kg-m (12 ft-lb).



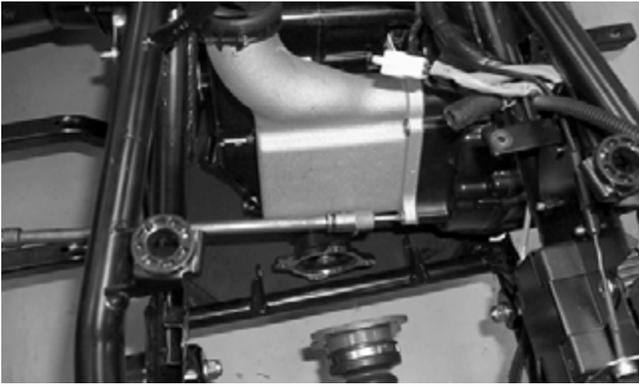
CC565



CC566

8. Secure the exhaust pipe to the engine, frame, and muffler using existing hardware. The cap screws securing the exhaust pipe to the engine and to the frame should be tightened to 2.8 kg-m (20 ft-lb).

9. Install the left-side clutch plenum with existing hardware making sure the gasket is properly positioned. Tighten securely.



CC579

10. Secure the engine ground wire to the engine with a cap screw. Tighten to 1.1 kg-m (8 ft-lb).

11. Install the shift indicator connector to the main wiring harness.



CC573

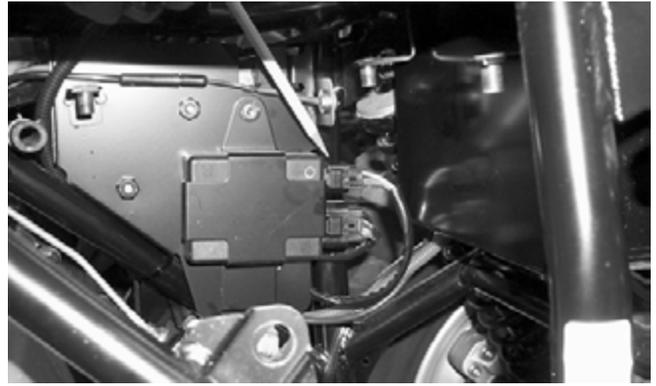
12. Connect the temperature sensor wires to the engine.

■NOTE: There are two temperature sensors.



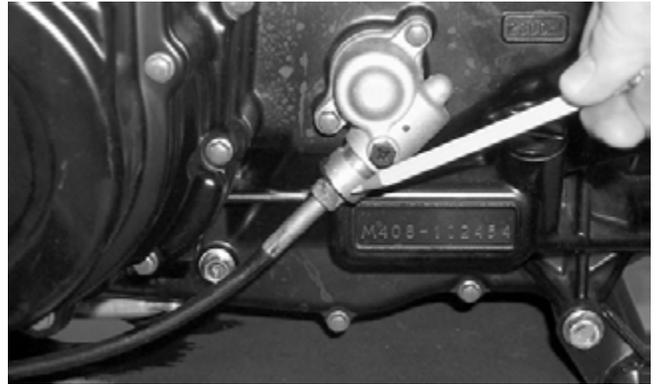
AF964B

13. Secure the stator wires to the CDI unit.



CC569

14. Secure the speedometer cable to the speedometer gear housing.



CC568

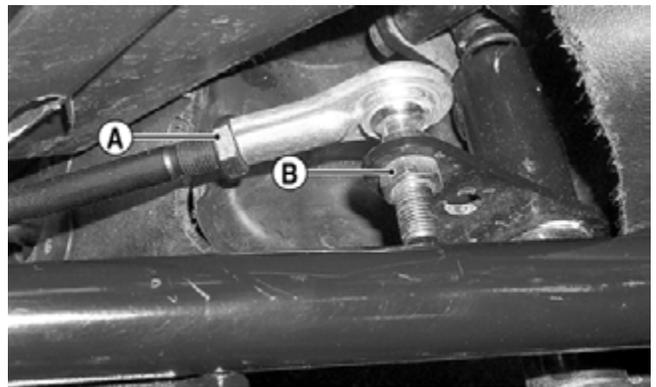
15. Secure the positive cable to the starter motor.

16. Secure all wiring to the frame and upper engine bracket with cable ties.

17. Secure the two oil hoses to the engine.

18. Secure the crankcase vent hose to the air cleaner housing.

19. Secure the shift rod to the engine with a new E-clip; then secure the shift rod to the shift lever arm with a new lock nut. Tighten securely.



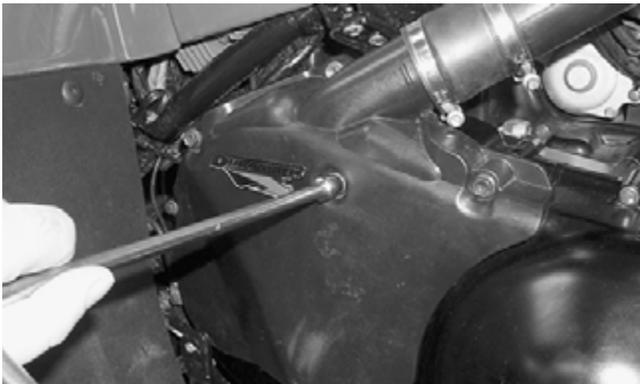
AF941A

20. Install the exhaust pipe shroud and secure with the existing torx-head screws. Tighten securely.

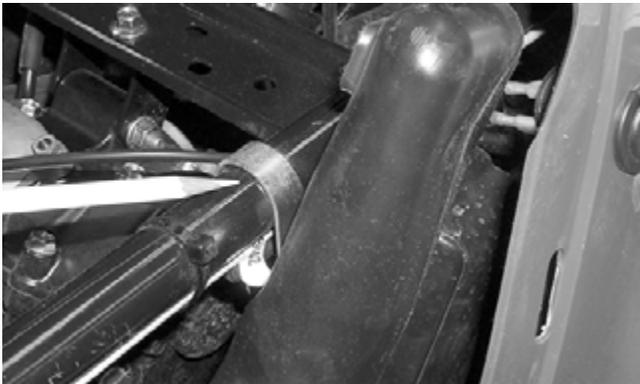


CC560

21. Install the carburetor into the intake hose. Tighten the hose clamp.
22. Place the footrests in position on the frame; then secure with existing hardware. Tighten the 10 mm cap screws to 5.5 kg-m (40 ft-lb) and the 8 mm cap screws to 2.8 kg-m (20 ft-lb).
23. Install the cooling duct shroud; then secure the cooling duct assembly to the frame.

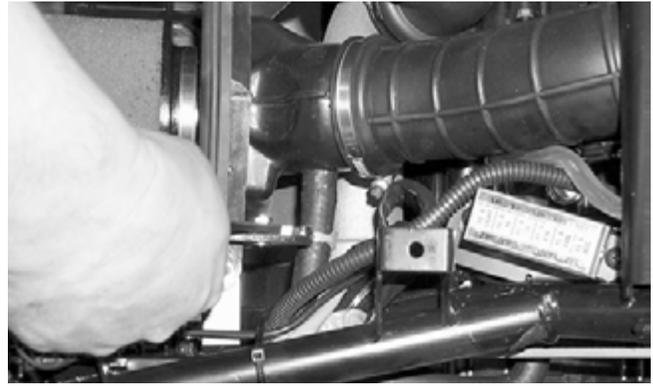


AF932



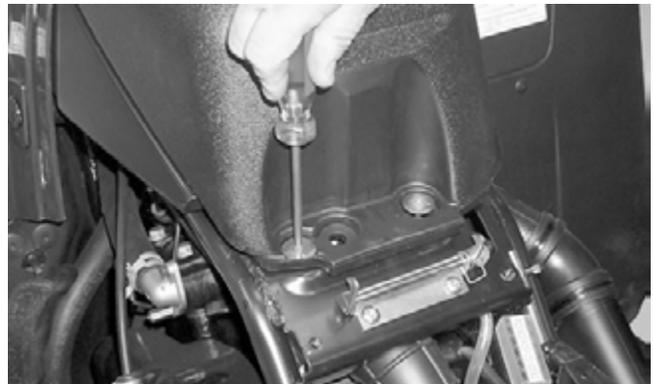
AF938

24. Install the air cleaner housing and secure the air intake hose to the carburetor; then secure the crankcase vent hose to the air cleaner housing.



CC536

25. Install the rear rack and rear fenders with existing hardware. Tighten securely.
26. Secure the wiring harness to the frame with cable ties.
27. Install the gas tank; then connect the vent hose.



CC534

28. Connect the fuel hose to the gas tank valve.



CC533

29. Install the left-side and right-side panels. Secure with existing hardware.
30. Carefully guide the battery cables and fuse block wiring up through the access hole near the battery tray.
31. Carefully connect all fuse block wiring correctly according to the marking made during removing.

⚠ CAUTION

It is critical that all wiring be connected correctly to ensure all components function properly.

32. Place the fuse block into position and secure with existing screws.

■NOTE: If the mounting screw holes have elongated, it will be necessary to install larger diameter screws.

33. Place the battery into position in the battery compartment; then install the battery cables and vent hose. Secure with the hold-down strap.

 **CAUTION**

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

34. Connect the spark plug wire to the spark plug.

35. Add proper amount of engine/transmission oil.

36. Install the seat.

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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/replace left-side cover oil seals (3), front output joint oil seal (1), rear output joint oil seal (1), 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 hold-down strap and the battery vent hose; then remove the battery.

CAUTION

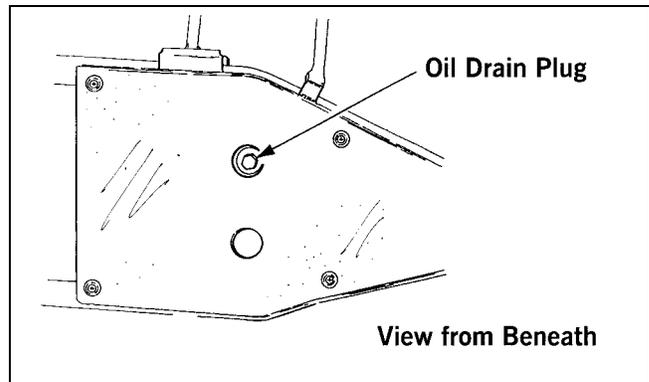
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

3. Near the battery tray, remove the two screws securing the fuse block; then carefully remove all the wiring from the block.

CAUTION

It is critical that all wiring be marked when removing from the fuse block. This will aid in installing correctly.

4. Carefully guide the battery cables and fuse block wiring down through the access hole into the engine compartment for future removing.
5. Drain the oil from beneath the engine/transmission.



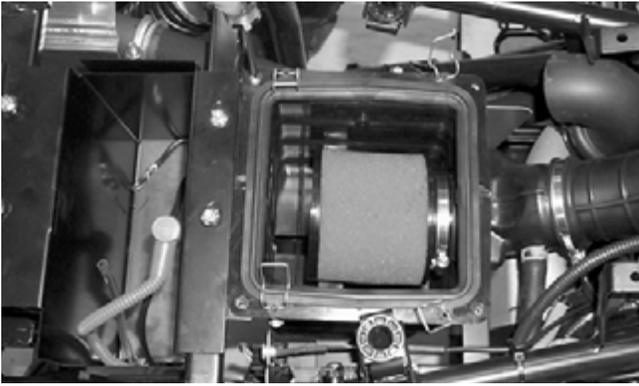
733-441A

6. Remove the hardware securing the right-side and left-side panels; then remove the panels.
7. Turn the gas tank valve to the OFF position; then remove the fuel hose and vent hose.



CC533

8. Remove the gas tank.
9. Remove the rear fenders and rear rack assembly (see Section 8).
10. Remove the hardware securing the air cleaner housing to the frame.



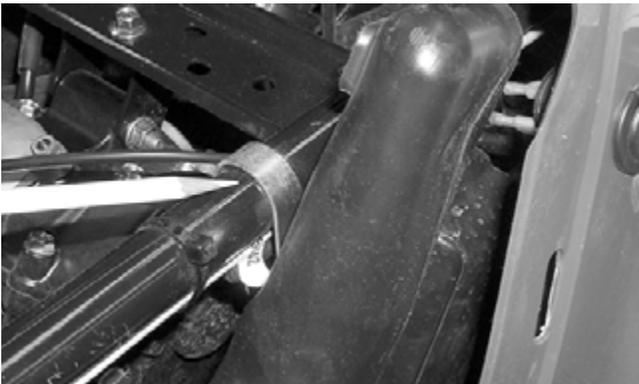
CC535

11. Disconnect the crankcase vent hose from the air cleaner housing. Remove the clamps securing the air intake hose to the carburetor; then remove the air cleaner housing.



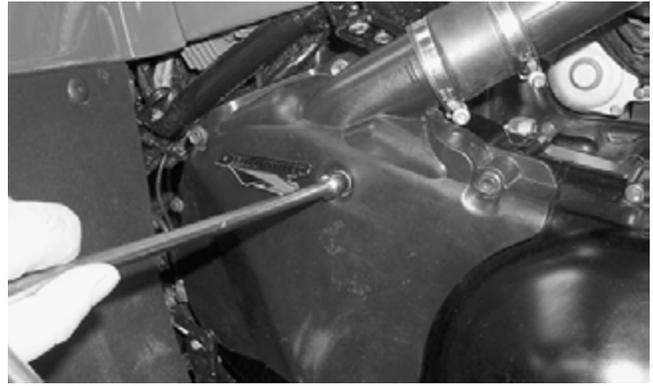
CC536

12. Remove the hardware securing the cooling duct assembly to the frame.



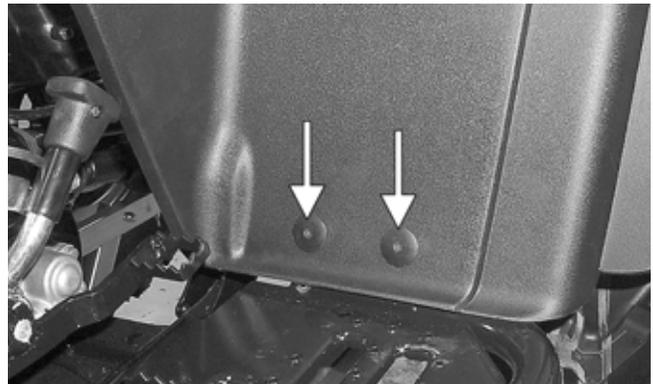
AF938

13. Remove the cooling duct shroud from the V-belt cover.



AF932

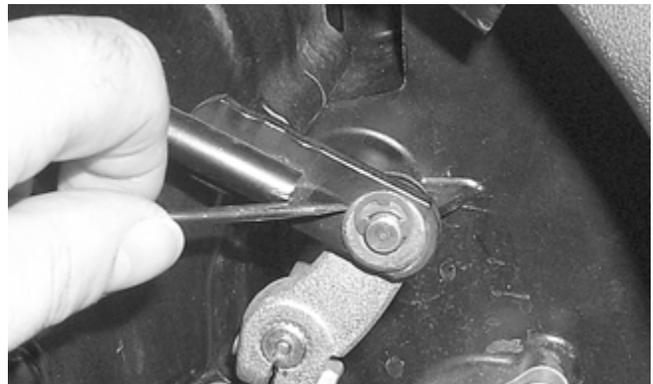
14. Remove the hardware securing both footrests to the frame and front fender.



CC861A

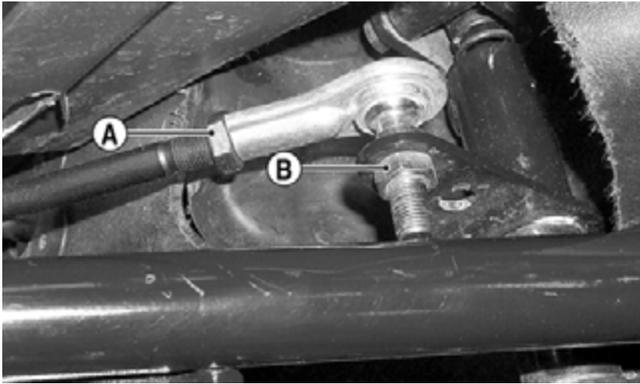
15. Loosen the clamp securing the carburetor to the intake; then route the carburetor assembly up and away from the engine.

16. Remove the E-clip securing the shift rod to the engine shift arm.



AF962

17. Remove the lock nut (B) securing the shift rod to the shift lever arm; then remove the shift rod.



AF941A

18. Remove the torx-head screws securing the exhaust pipe shroud; then remove the shroud.

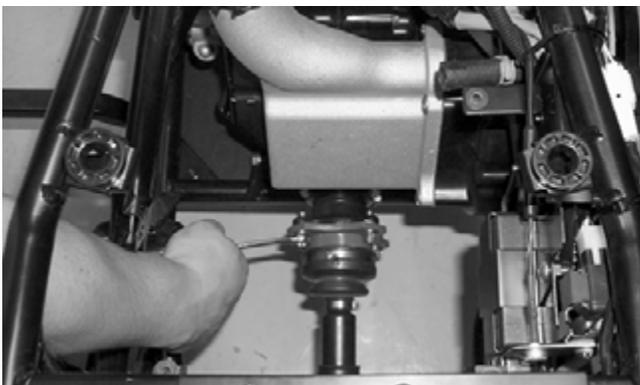


CC560

19. Remove the four (two on each side) torx-head screws securing the inner front fenders to the frame and footrests.

NOTE: It is not necessary to remove the front fender to remove the engine; however, removing the screws securing the inner front fenders will allow the fender to be moved to accommodate the removing of the exhaust pipe and engine.

20. Remove the hardware securing the exhaust pipe to the muffler, frame, and engine; then remove the exhaust pipe.
21. Remove the two coolant hoses from the engine. Route the hoses out of the way.
22. Remove the hardware securing the front and rear driveshafts.



CC565



CC566

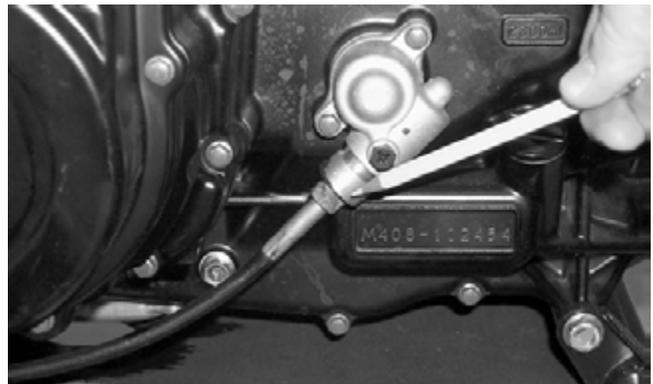
NOTE: It is advisable to lock the brake when loosening the cap screws securing the front drive shaft.

23. On the right side, cut the cable ties securing the wiring harness to the frame.



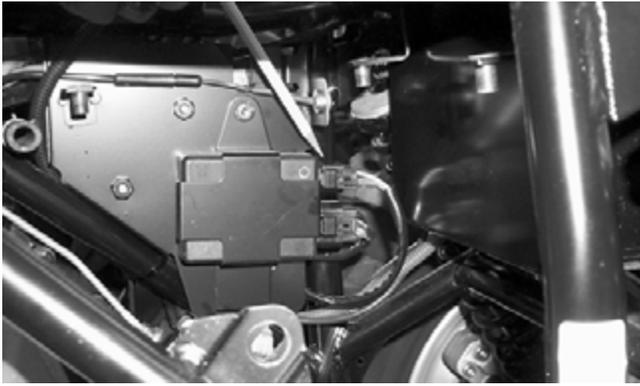
CC567

24. Remove the positive cable from the starter motor and route it out of the way.
25. Remove the speedometer cable from the speedometer gear housing.



CC568

26. Disconnect the top connector at the CDI unit.



CC569

27. Disconnect the stator-to-rectifier/regulator connector.



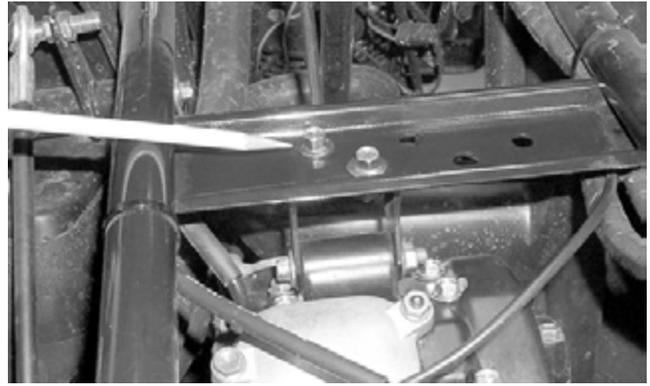
CC570

28. Remove the temperature sensor wire from the engine.



CC571

29. Remove the two cap screws securing the front upper engine mount to the frame.



AF939

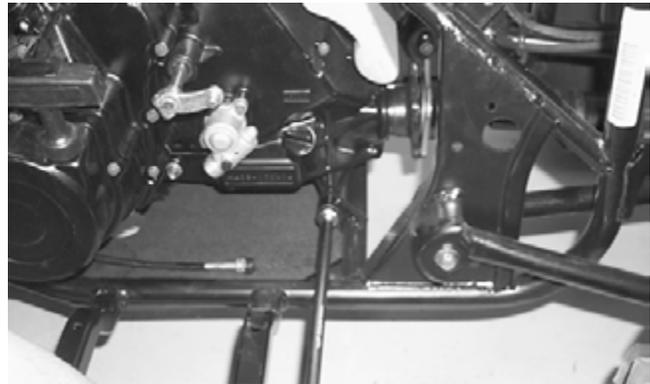
30. Remove the cap screw and flange nut securing the upper engine bracket to the engine; then remove the bracket.

31. Remove the spark plug wire from the spark plug.

32. Remove the shift indicator connector from the main wiring harness.

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

34. Remove the three engine mounting through-bolts. Account for a washer on the upper bolt and a spacer on the lower front bolt.



CC576



CC577

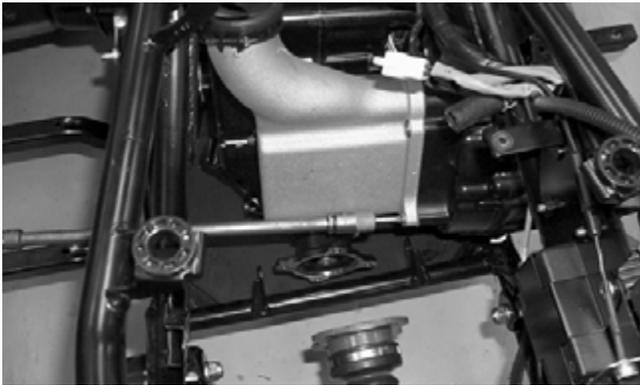
35. Remove the caps screws securing the two upper rear engine mounts to the frame.

36. Slightly raise the front of the engine; then remove the front driveshaft coupler from the engine.



CC578

37. Remove the torx-head screws securing the left-side clutch plenum to the engine; then remove the plenum and account for a gasket.



CC579

38. Remove the engine from the right side by moving the engine forward while raising the engine in the rear and rotating the engine counterclockwise. The engine will come out the right side of the frame.

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**
B. Cylinder Head

■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.

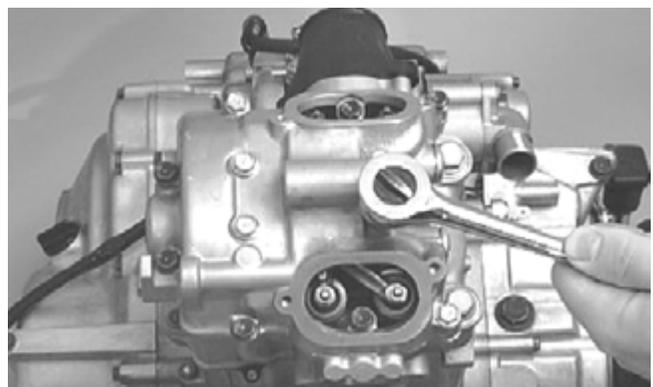
1. Remove the two tappet covers.



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.



CC003D



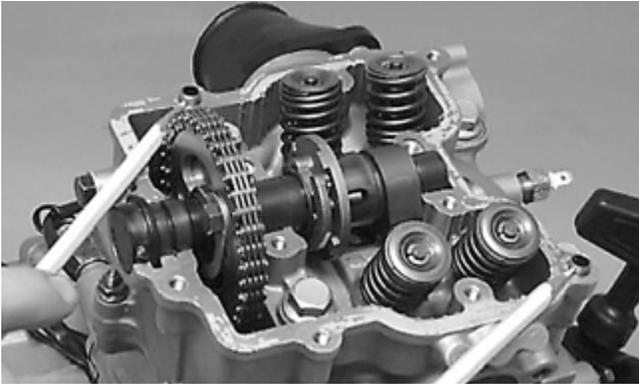
CC274D



CC011D

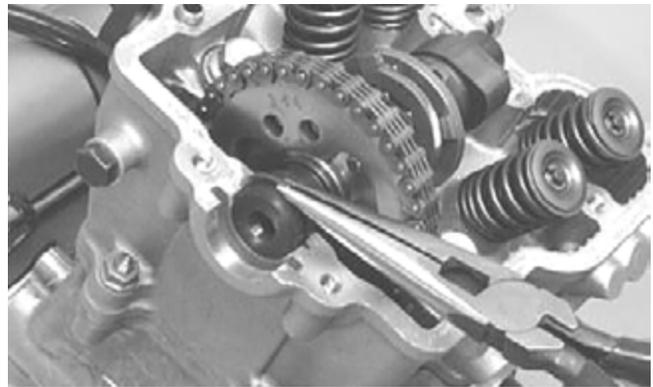
4. Using an awl, rotate the C-ring in its groove until it is out of the cylinder head; then remove the C-ring.

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



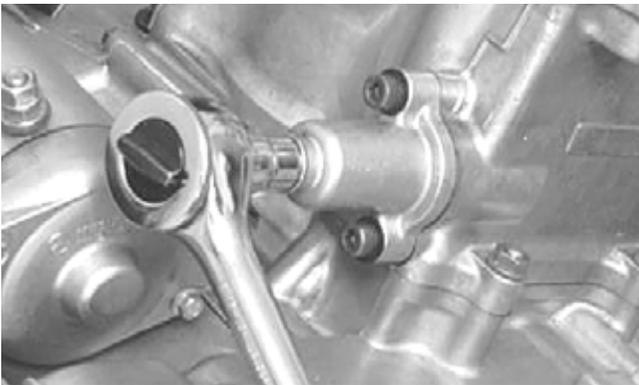
CC273D

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.



CC012D

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

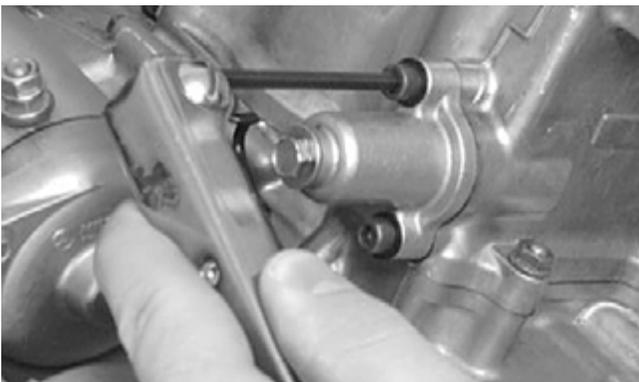


CC009D

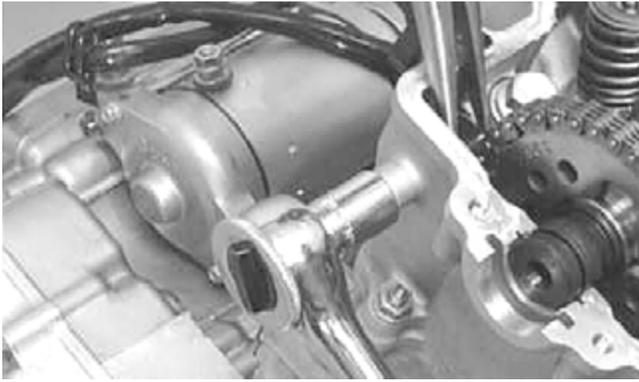


CC013D

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

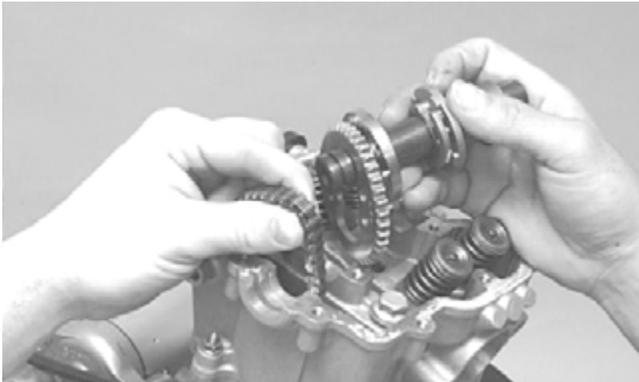


CC010D



CC014D

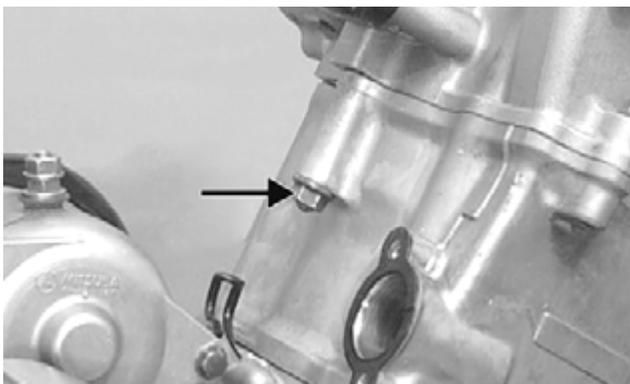
7. While holding the chain, slide the sprocket and camshaft out of the cylinder head.



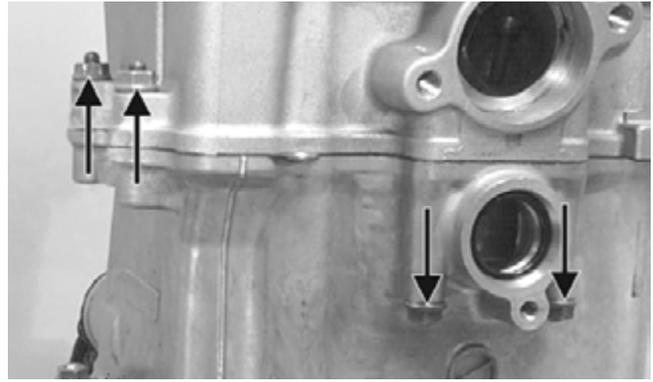
CC266D

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

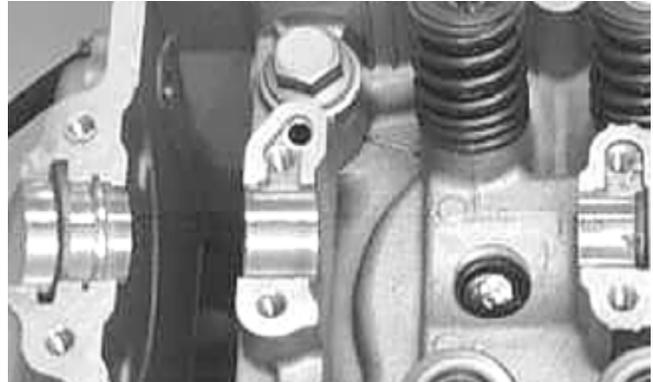
8. Remove the five nuts securing the cylinder head to the cylinder; then remove the four cylinder head cap screws with copper washers (note location of the different-sized cap screws and nuts).



CC017D

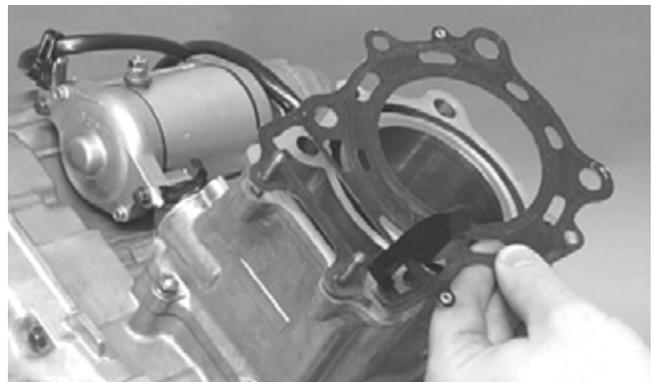


CC018D



CC016D

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



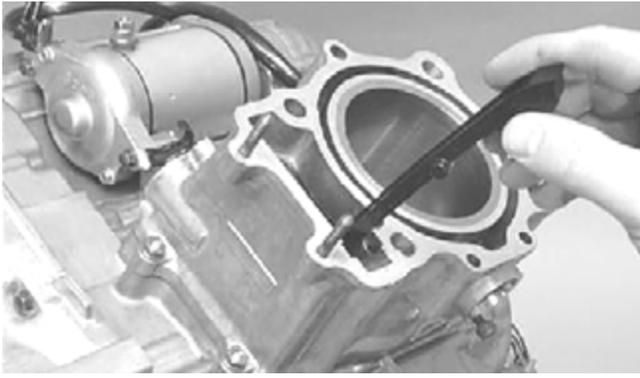
CC020D

AT THIS POINT

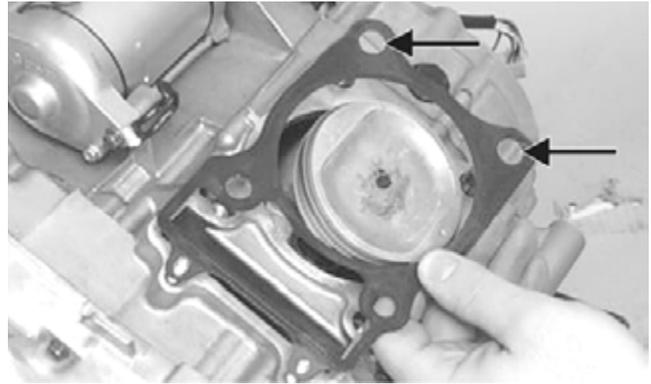
To service valves and cylinder head, see Servicing Top-Side Components sub-section.

AT THIS POINT

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



CC022D

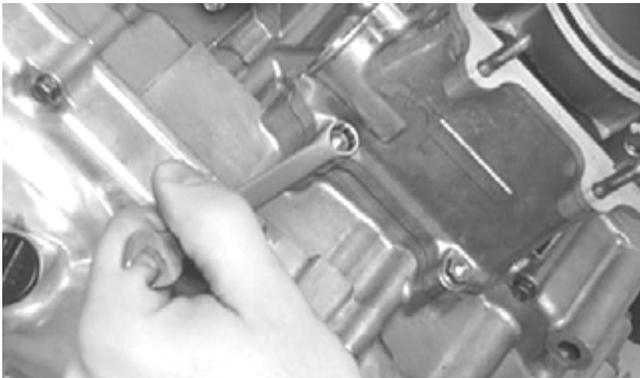


CC025D

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.



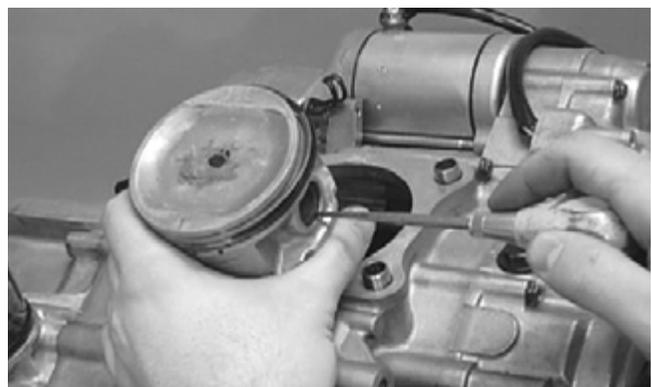
CC024D



CC026D

<p>👉 AT THIS POINT</p> <p>To service cylinder, see Servicing Top-Side Components sub-section.</p>
<p>⚠️ CAUTION</p> <p>When removing the cylinder, be sure to support the piston to prevent damage to the crankcase and piston.</p>

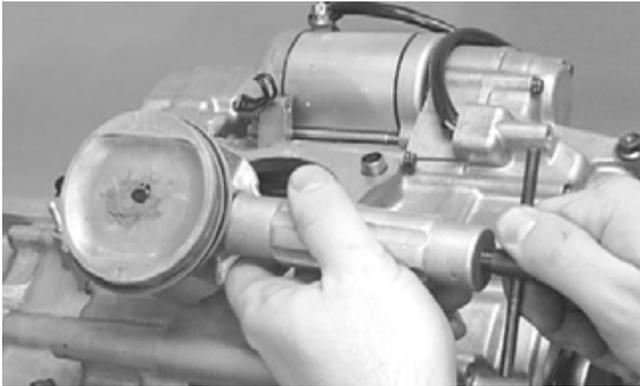
13. Using an awl, remove one piston-pin circlip.



CC032D

14. Using the Piston-Pin Puller (p/n 0644-328), 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 (p/n 0444-006).

⚠ 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.

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. Water Pump
- C. Cover
- D. Rotor/Flywheel

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

👉 AT THIS POINT

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



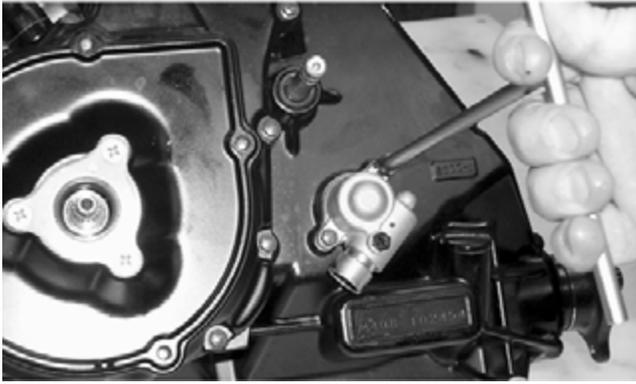
CC615

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.
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.



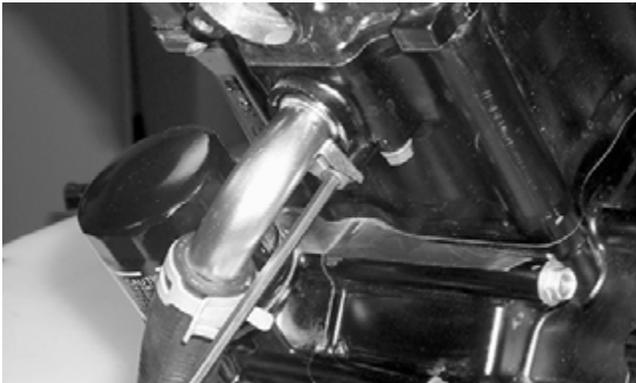
CC621

4. Remove the two cap screws securing the speedometer gear housing; then remove the housing. Account for the gasket.



CC625

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.



CC620

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



CC623

AT THIS POINT

To service the water pump, see Section 4.

7. Remove the 13 cap screws securing the left-side cover to the crankcase noting the location of the different-sized cap screws for installing purposes.



CC626

8. Using Side Case Puller (p/n 0644-262), 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.



CC629A

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.

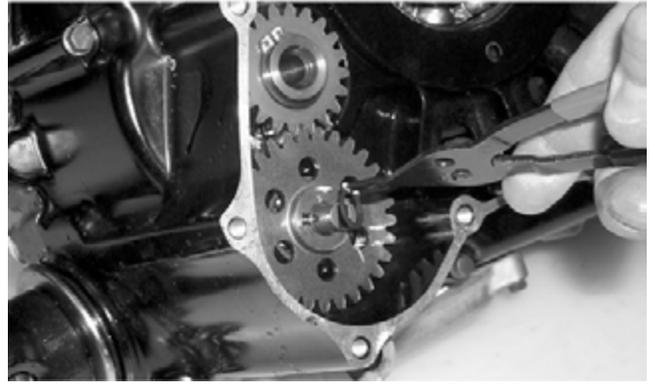
10. Using Magneto Rotor Remover Set (p/n 0444-075), remove the rotor/flywheel assembly from the crankshaft. Account for the key; then remove the starter clutch gear assembly and washer.



CC632



CC634

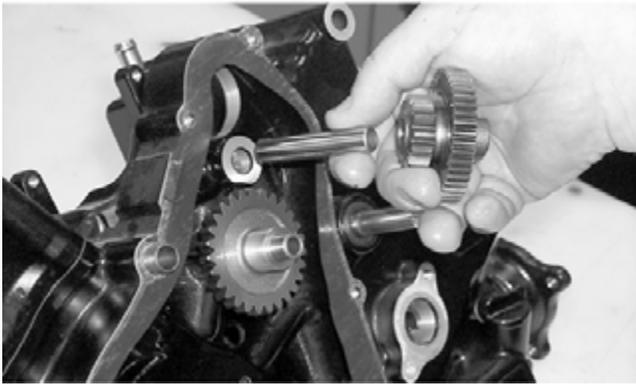


CC638

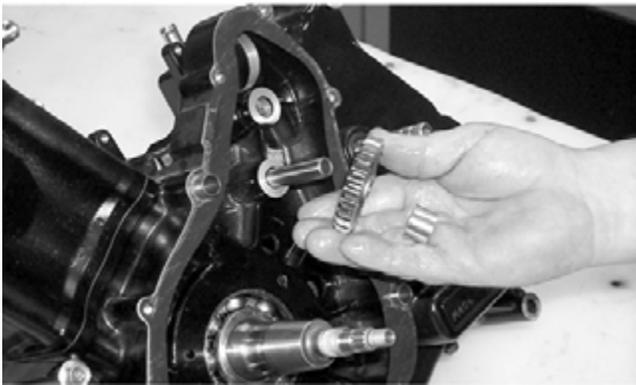
AT THIS POINT

To service the magneto assembly, see Section 5.

- 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.



CC636

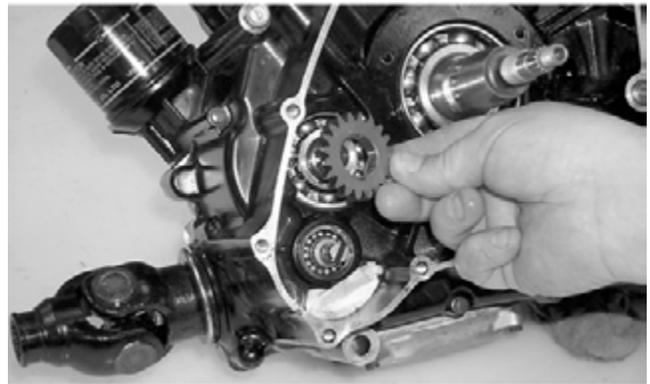


CC637

- 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.

■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.

- 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.



CC641

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

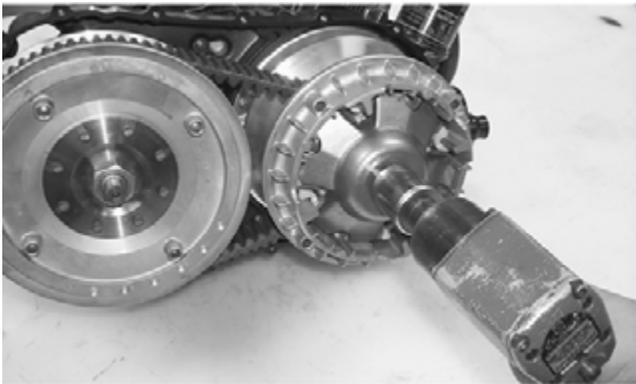
- A. V-Belt Cover**
- B. Driven Pulley**
- C. Clutch Cover**

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.

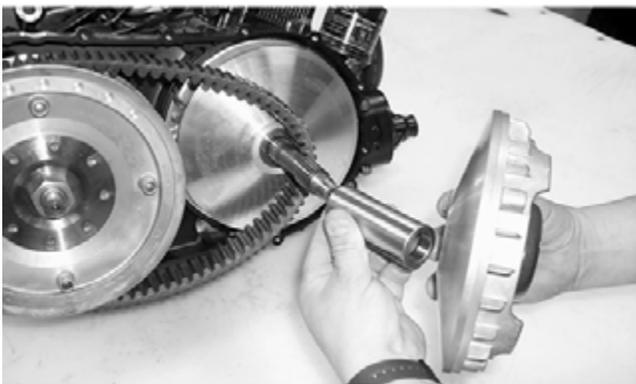


CC580

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



CC581



CC582

3. Remove the V-belt.

4. Remove the nut securing the fixed driven assembly; then remove the assembly.



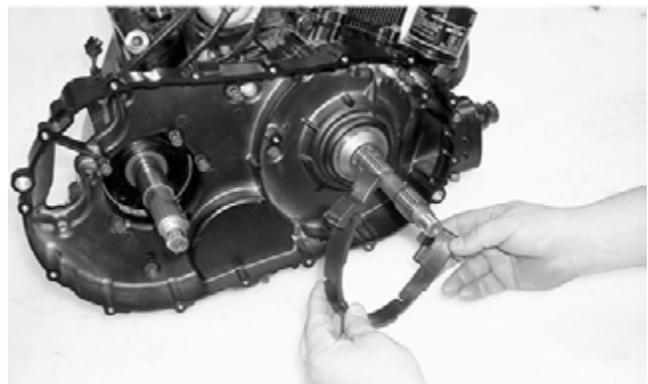
CC585

5. Remove the fixed drive face.

6. Using an impact driver, remove the Phillips-head screws securing the air intake plate; then remove the plate cushion.



CC587

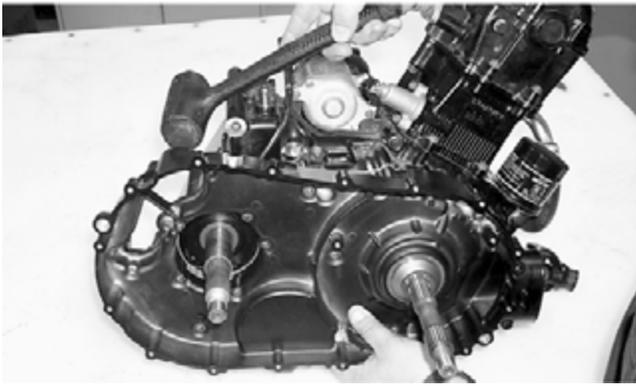


CC590

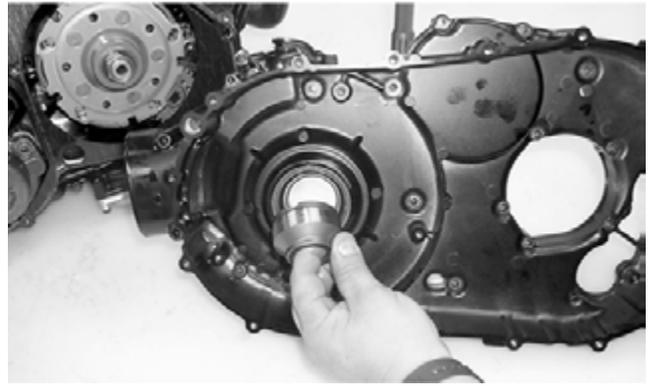
7. Remove the cap screws securing the clutch cover. Note the location of the different-lengthed cap screws for installing purposes. Using a rubber mallet, carefully remove the cover. Account for two alignment pins.

CAUTION

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



CC591



CC595



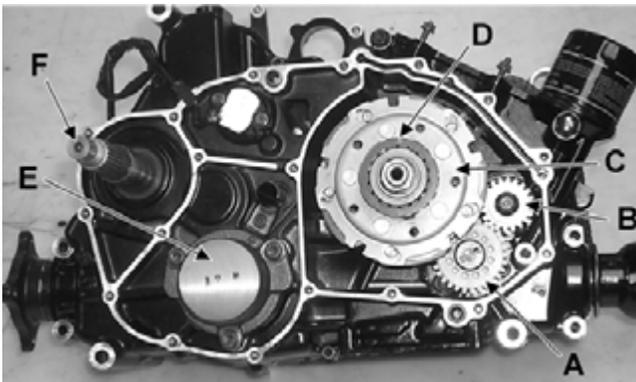
CC600A

■NOTE: For steps 8-14, refer to illustration CC829A.



CC596

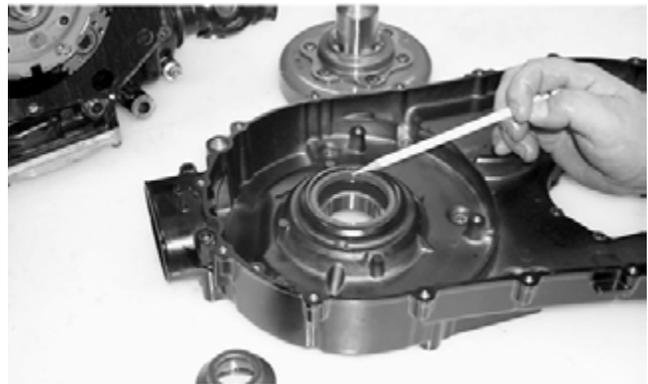
■NOTE: Account for and inspect the clutch housing seal.



CC829A

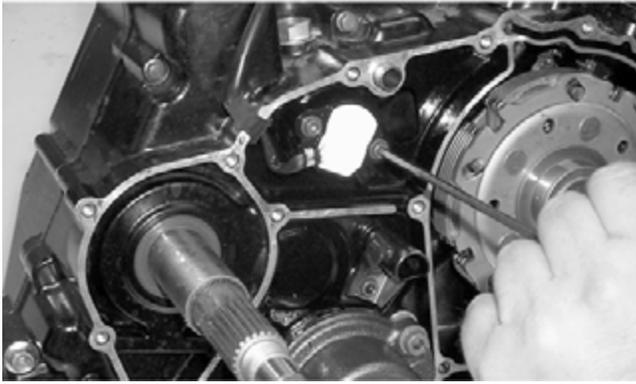
■NOTE: To aid in installing, it is recommended that the assemblies are kept together and IN ORDER.

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.

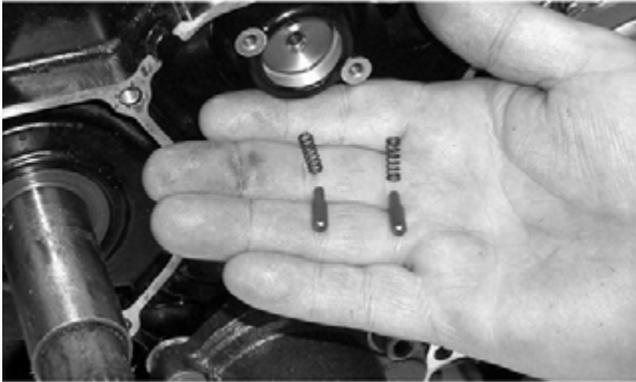


CC597

10. Remove the two Allen-head screws securing the shift indicator sending unit; then remove the unit. Account for two neutral contact pins and two springs.



CC602

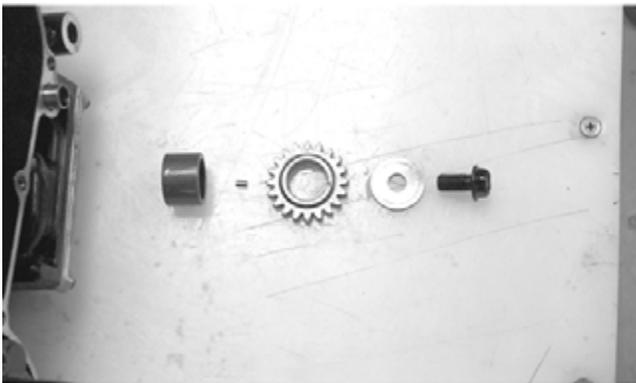


CC603

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

■NOTE: The washer is also directional. The flat side of the washer must face toward the clutch assembly when installing.

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

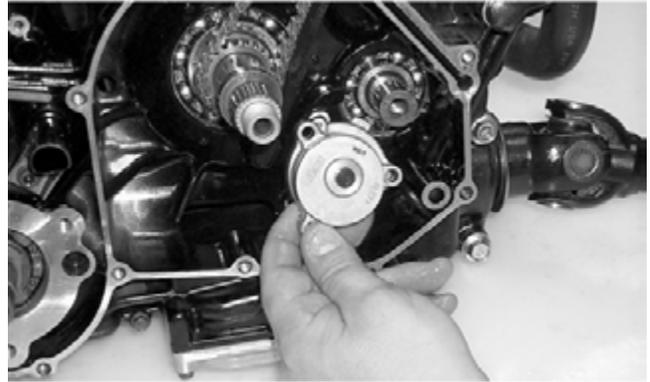


CC606

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

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.

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



CC613

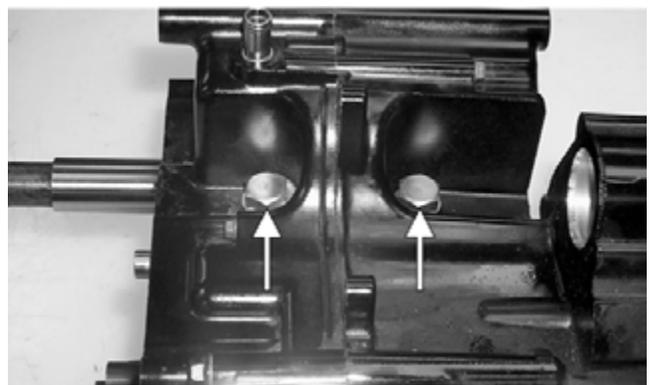
Center Crankcase Components

■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.

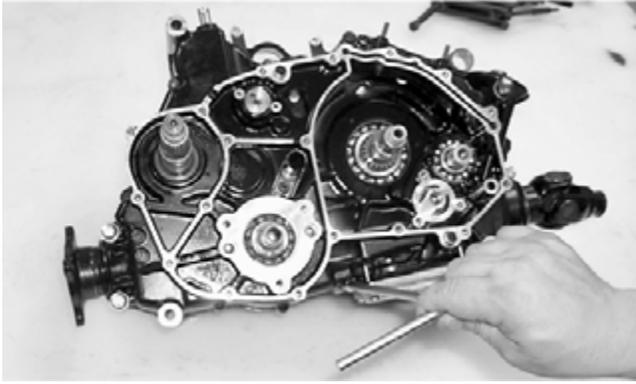
Separating Crankcase Halves

1. Remove the two shift cam stoppers from the top of the crankcase.



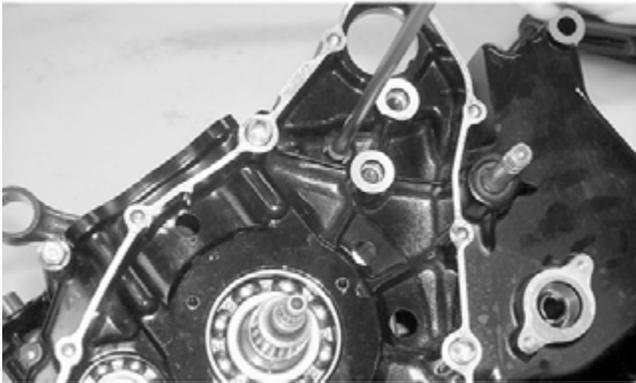
CC661A

2. Remove the right-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws.



CC664

3. Remove the left-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws.



CC663

4. Using the Crankcase Separator/Crankshaft Remover (p/n 0444-009) and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins.

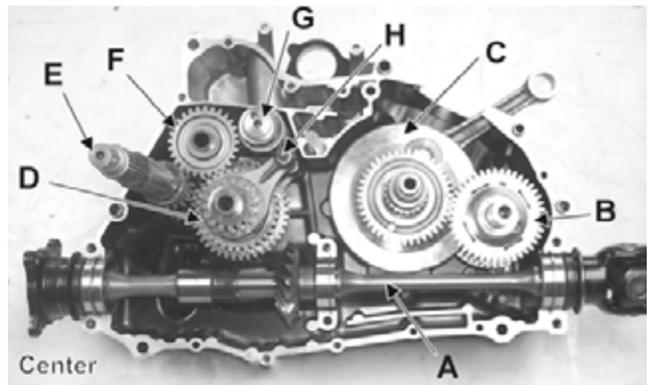
■NOTE: To keep the shaft/gear assemblies intact for identification, tap the shafts toward the left-side crankcase half when separating the halves.



CC665

Disassembling Crankcase Half

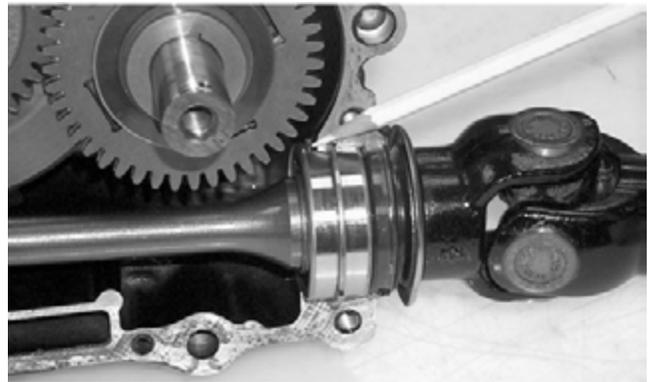
■NOTE: For steps 1-7, refer to illustration CC821A.



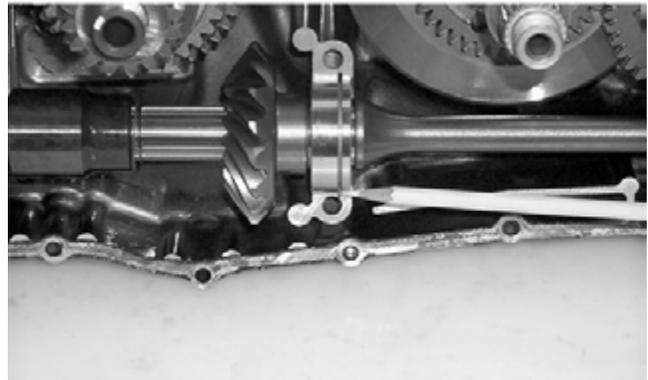
CC821A

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

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

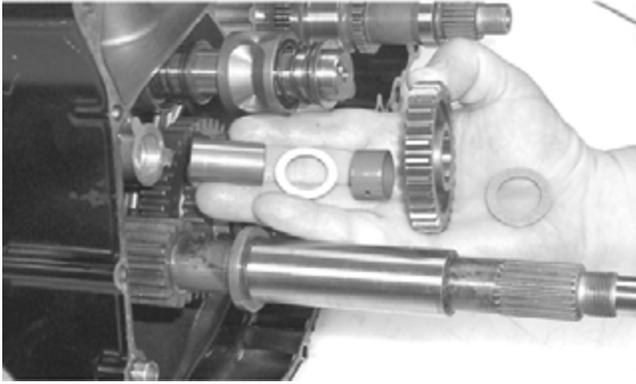


CC666



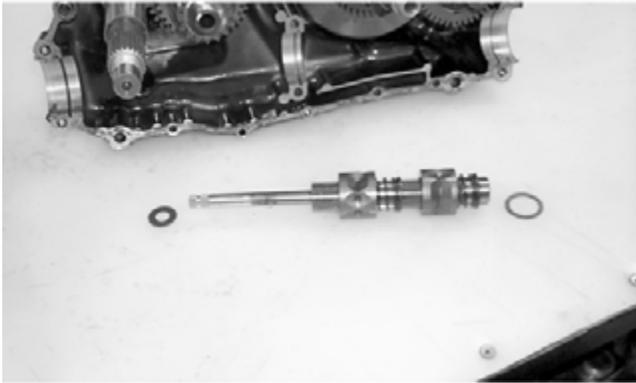
CC667

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.



CC672

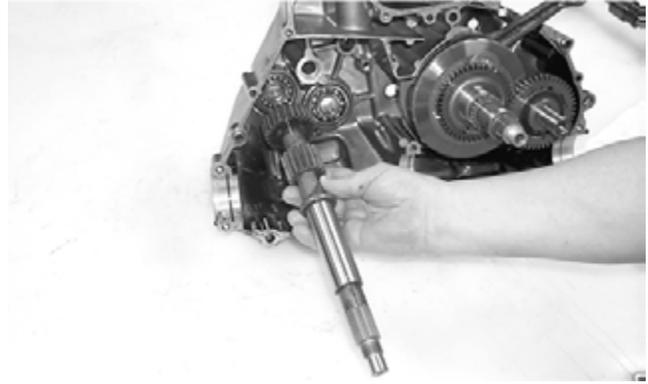
5. Remove the countershaft assembly (D). Account for a washer on each end of the countershaft.



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 remove the driveshaft.



CC675

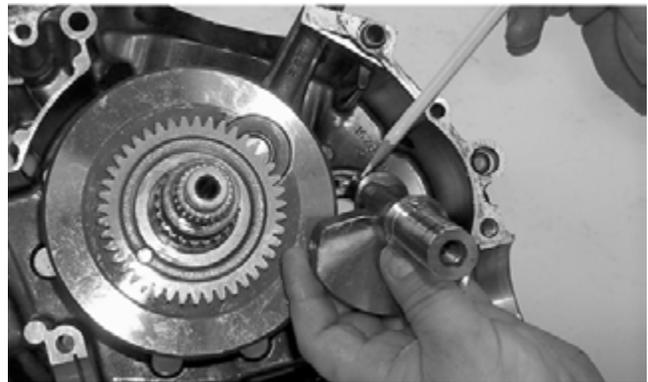
7. Note the alignment dots on the crank balancer assembly (B) gear and crankshaft (C) gear for assembling purposes; then slide the crank balancer gear off the crank balancer. Account for the key in the keyway.



CC676

8. Remove the crank balancer.

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



CC678

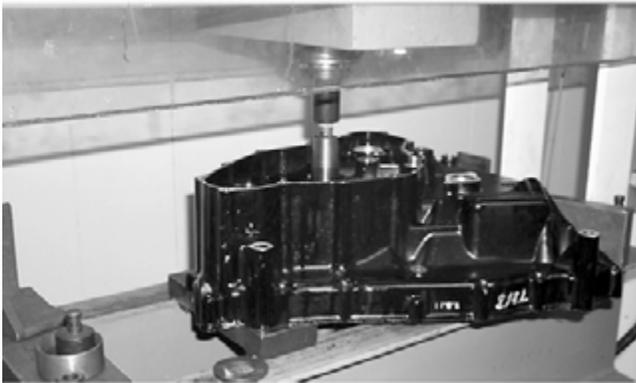
9. Remove the snap ring securing the water pump driven gear shaft.



CC679

10. Using a hydraulic press, remove the crankshaft assembly.

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



CC680

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



CC681

12. Using an impact driver, remove the two screws securing the oil strainer; then remove the strainer.



CC682

⚠ 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.

13. To remove the assembly, remove the nut securing the secondary drive gear and secondary driven gear; then from the inside of the crankcase using a rubber mallet, remove the output shaft assembly. Account for the output shaft, two gears, a shim, a washer, and the nut.



CC683



CC686

Table of Contents (Servicing Components)

■NOTE: Critical engine/transmission specifications are located at the beginning of this section.

Servicing Top-Side Components	3-225
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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.

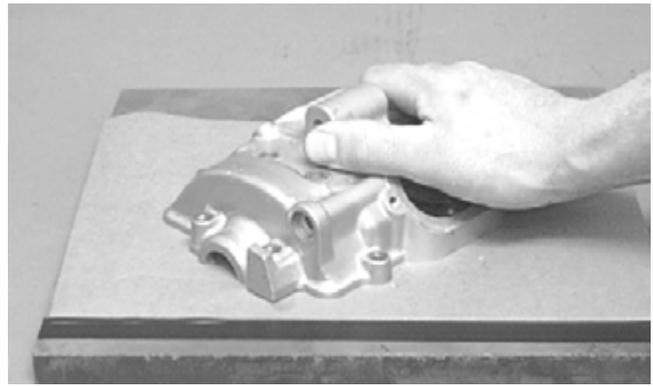
Cleaning/Inspecting Valve Cover

■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 (p/n 0644-016) 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

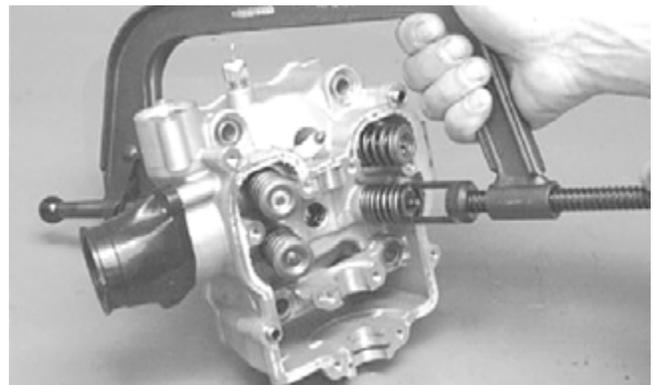
⚠ CAUTION

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

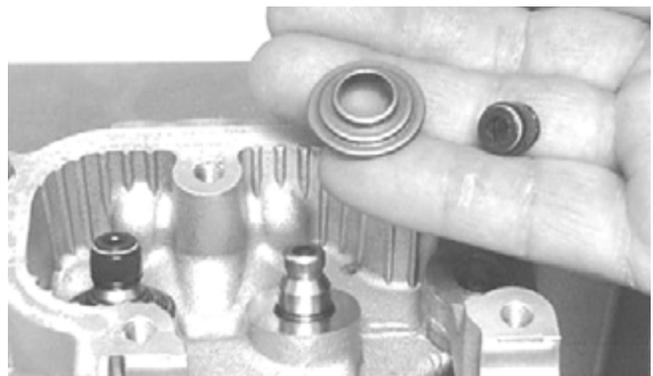
■NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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.



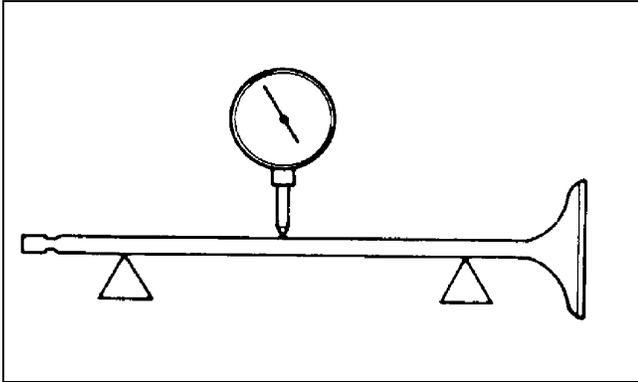
CC136D

■NOTE: The valve seals must be replaced.

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

Measuring Valve Stem Runout

- Support each valve stem end with the V Blocks (p/n 0644-022); then check the valve stem runout using a dial indicator.



ATV-1082

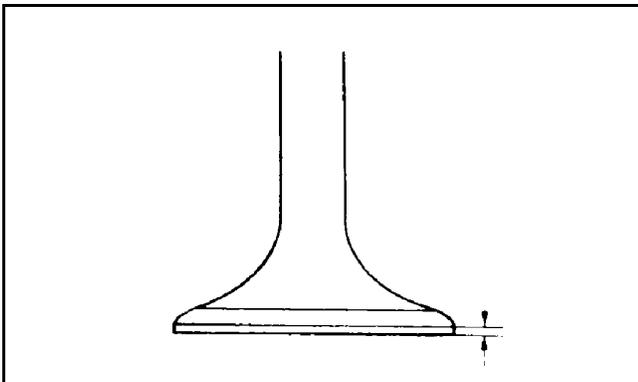
- Maximum runout must not exceed specifications.

Measuring Valve Stem Outside Diameter

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

Measuring Valve Face/Seat Width

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

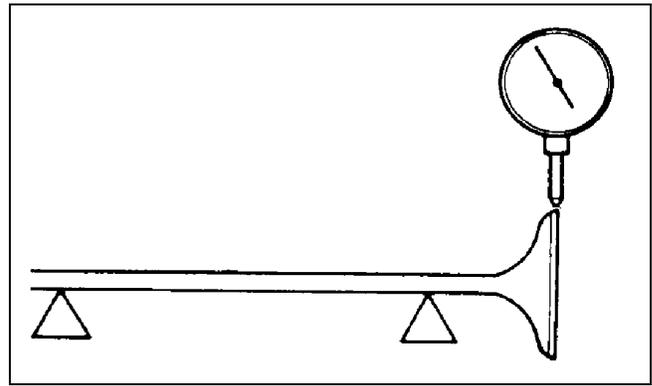


ATV-1004

- Acceptable width range must be within specifications.

Measuring Valve Face Radial Runout

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

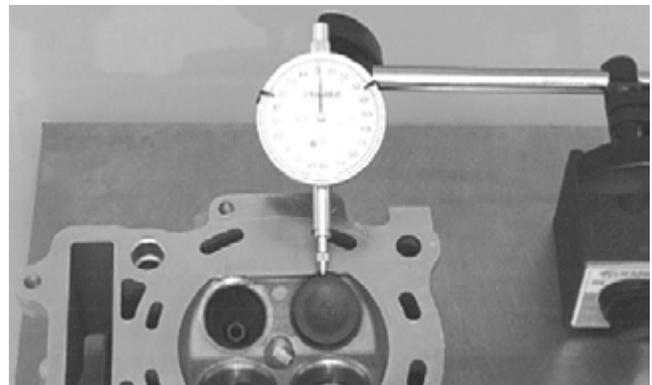


ATV1082A

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

Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

- Mount a dial indicator and base on the surface plate; then place the cylinder head on the surface plate.
- 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

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

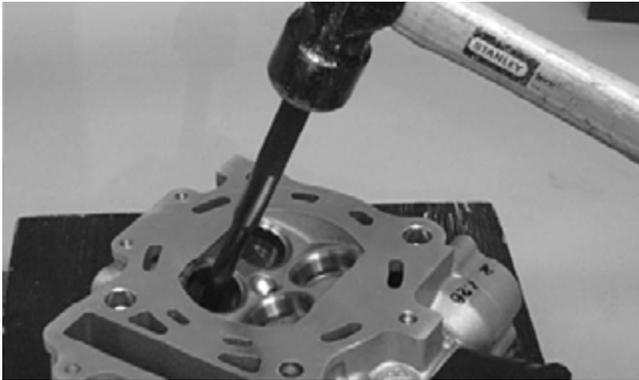
Measuring Valve Guide (Inside Diameter)

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

Replacing Valve Guide

■NOTE: If a valve guide is worn or damaged, it must be replaced.

1. If a valve guide needs replacing, insert a valve guide remover into the valve seat side of the valve guide. Using a hammer, gently drive the valve guide out of the cylinder head.



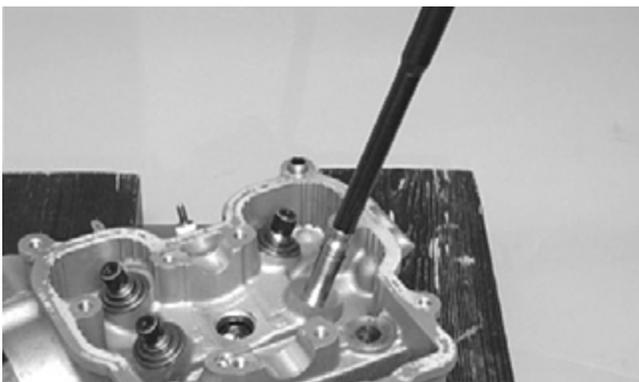
CC137D

2. Using the Standard Valve Guide Reamer (p/n 0444-017), remove any burrs or tight areas from the valve guide journals.



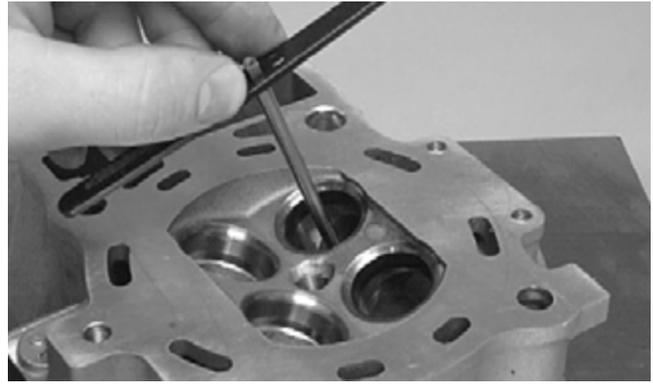
CC142D

3. To install a valve guide, use a valve guide installer and gently drive a valve guide with a retaining clip into the bore from the valve spring side until the retaining clip just contacts the cylinder head.



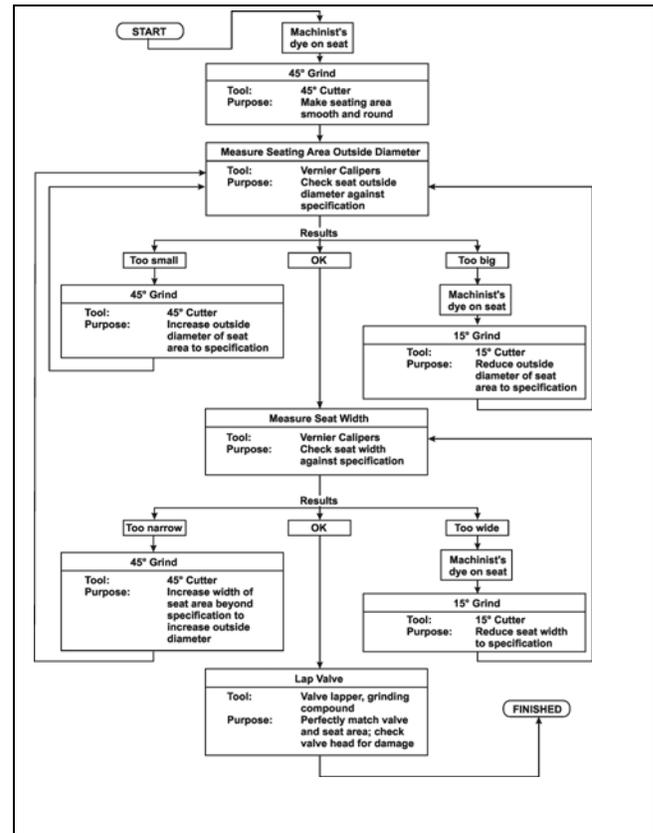
CC143D

4. After installing the guide, use the standard valve guide reamer to remove all burrs and tight areas that may remain in each valve guide.



CC138D

Valve Seat/Guide Servicing Flow Chart



ATV-0107

Grinding Valve Seats

■NOTE: If the valve seat is beyond servicing, the cylinder head must be replaced.

1. Insert an exhaust valve seat pilot shaft into an exhaust valve guide. Slide an exhaust valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the exhaust valve seat until within specifications.

■NOTE: Repeat procedure on the remaining exhaust valve.



CC139D

2. Insert an intake valve seat pilot shaft into one of the intake valve guides. Slide the intake valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the intake valve seat until within specifications.

■NOTE: Repeat procedure on the remaining intake valve.



CC140D

Lapping Valves

■NOTE: Do not grind the valves. If a valve is damaged, it must be replaced.

1. Remove all carbon from the valves.
2. Lubricate each valve stem with light oil; then apply a small amount of valve lapping compound to the entire seating face of each valve.
3. Attach the suction cup of a valve lapping tool to the head of the valve.
4. Rotate the valve until the valve and seat are evenly polished.
5. Clean all compound residue from the valve and seat.

Measuring Rocker Arm (Inside Diameter)

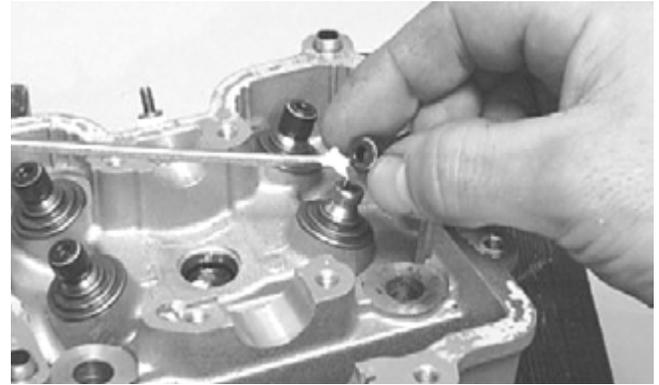
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range must be within specifications.

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

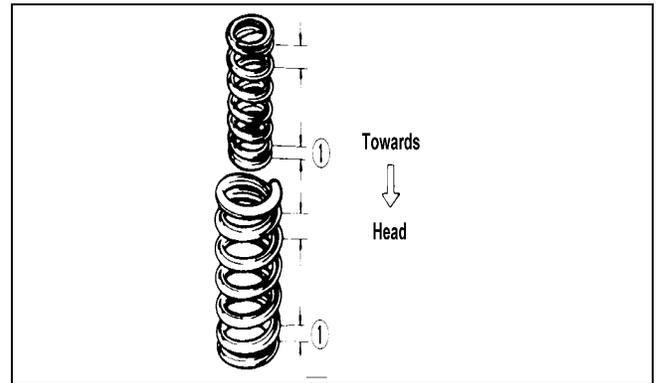
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



CC144D

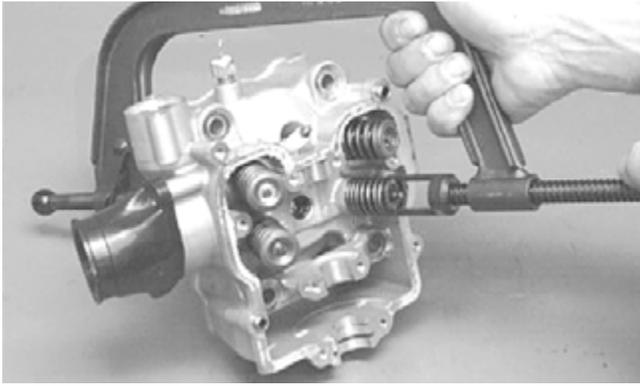
2. Insert each valve into its original valve location.
3. Install the valve springs with the painted end of the spring facing away from the cylinder head.

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



ATV-1011

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.



AN135

■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)

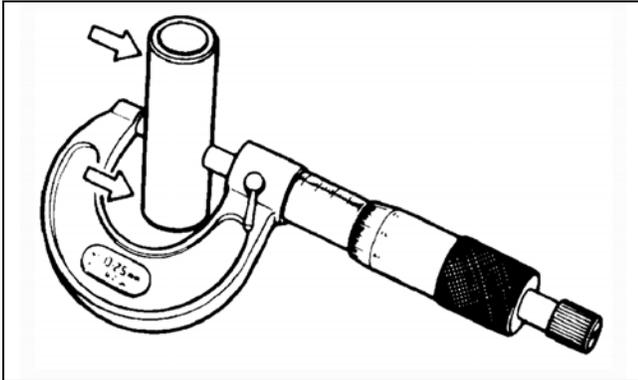
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within specifications.



CC280D

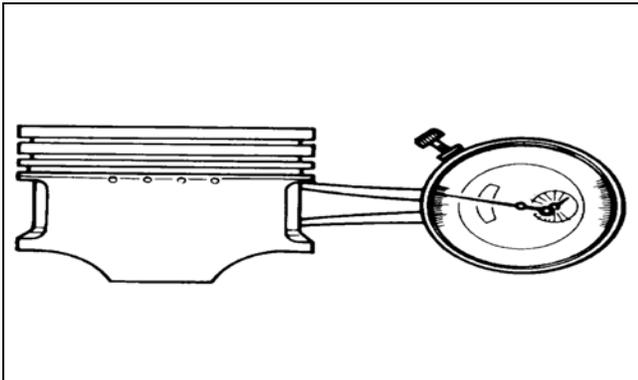
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

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

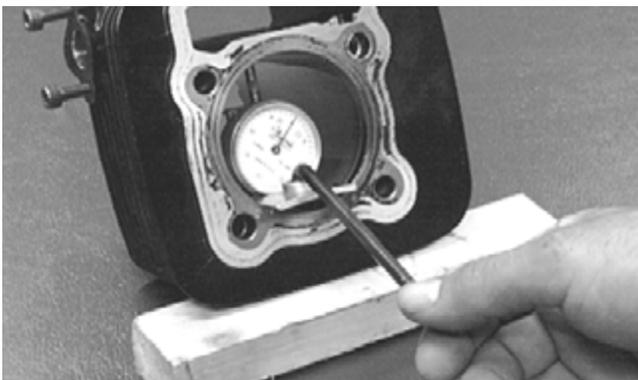
2. Insert an inside dial indicator into the piston-pin bore. The diameter must not exceed specifications. Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/Cylinder Clearance

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

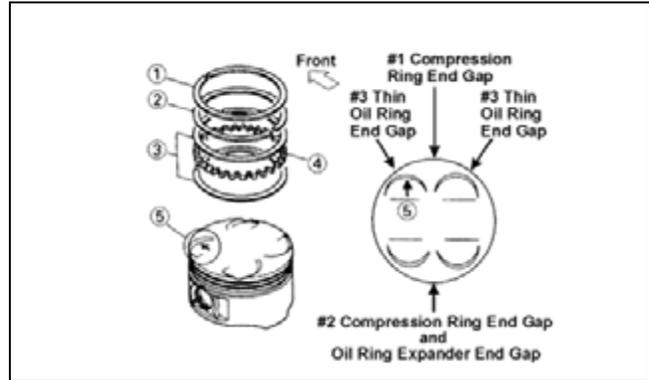


CC397D

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

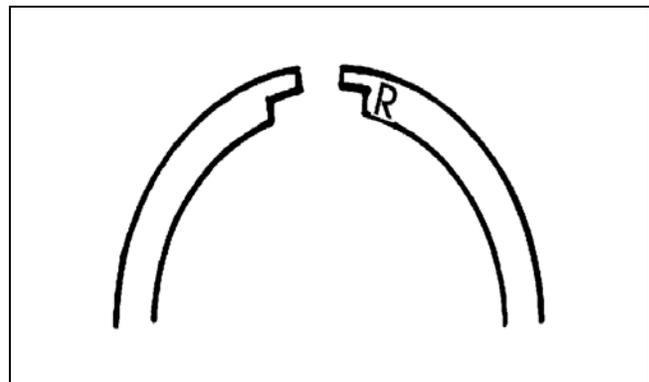
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



ATV-1085B

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

2. 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).



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

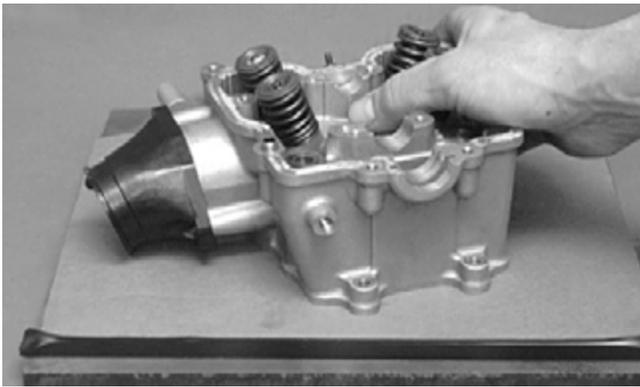
The cylinder head studs must be removed for this procedure.

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

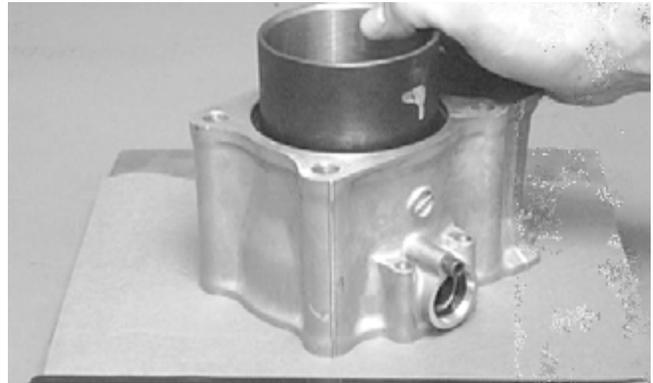
Cleaning/Inspecting Cylinder

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.



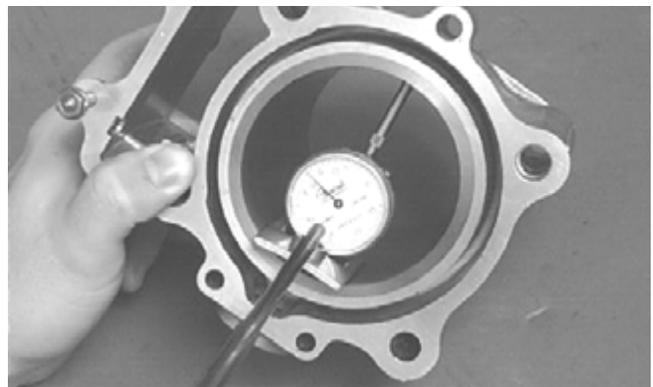
CC129D

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

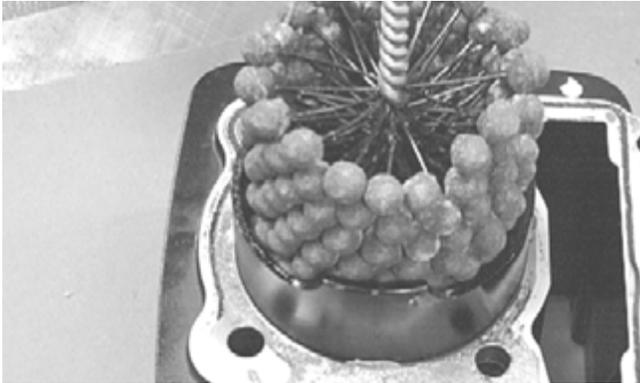
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest 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 ball hone.

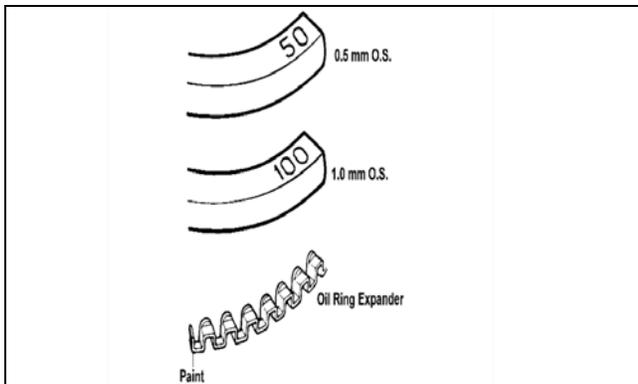
■NOTE: To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately apply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



CC390D

4. If any measurement exceeds the limit, hone the cylinder and install an oversized piston or replace the cylinder.

■NOTE: Oversized piston and rings are available. The oversized piston and rings are marked for identification.

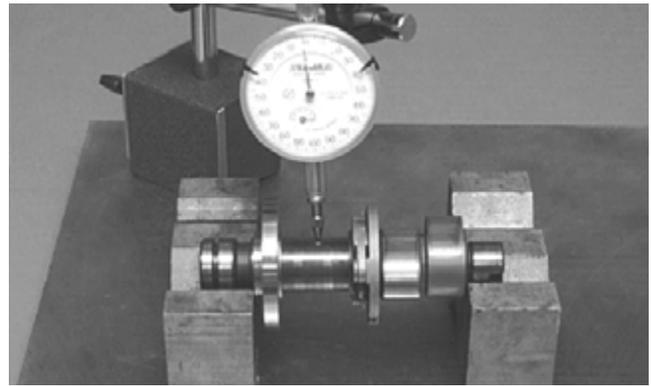


ATV-1068

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.

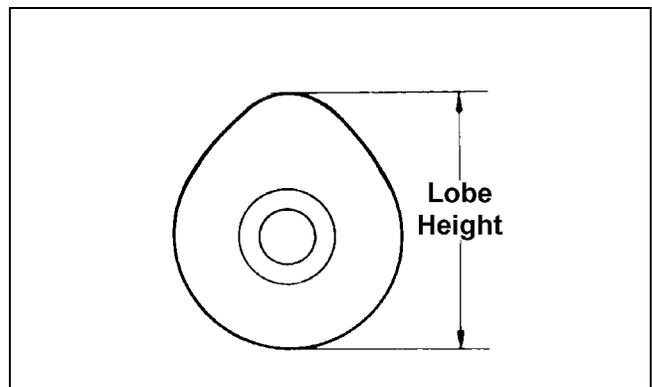


CC283D

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.

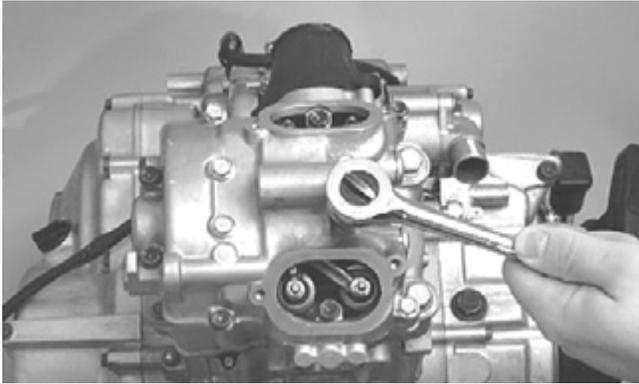


CC005D

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

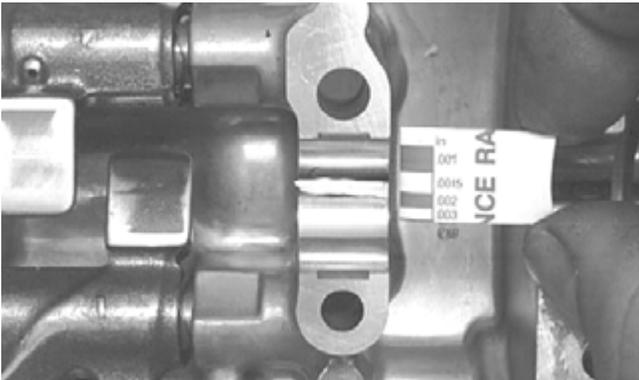
■NOTE: Do not rotate the camshaft when measuring clearance.

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



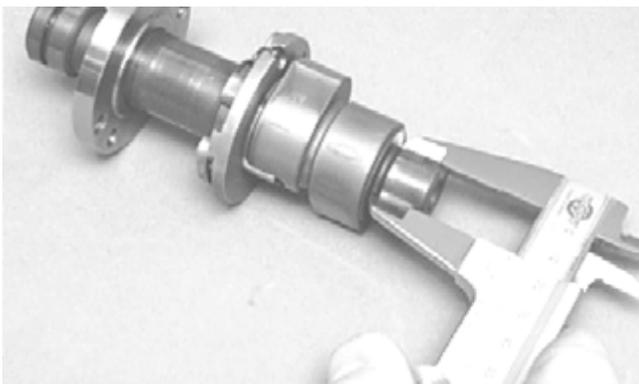
CC003D

- 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

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

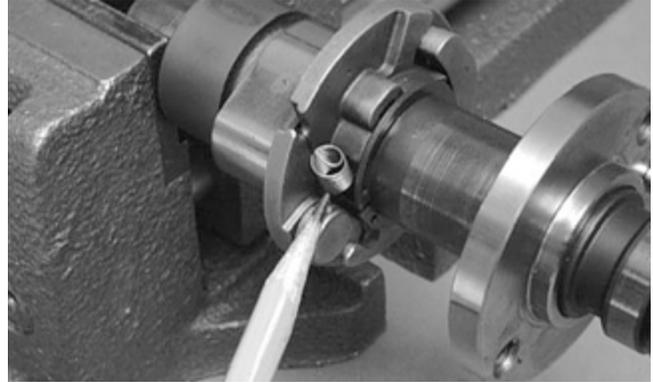


CC287D

■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

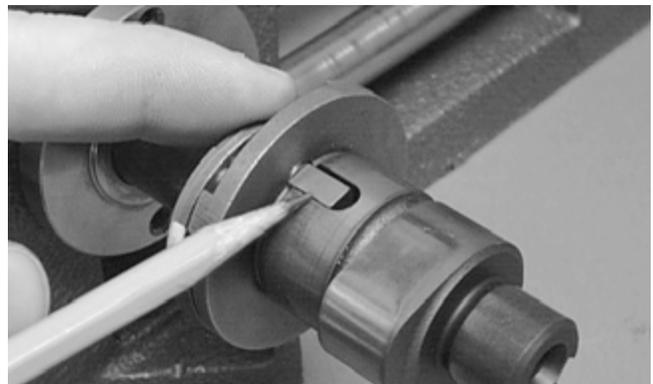
- Inspect the spring and drive pin for damage.



CC304D



CC306D

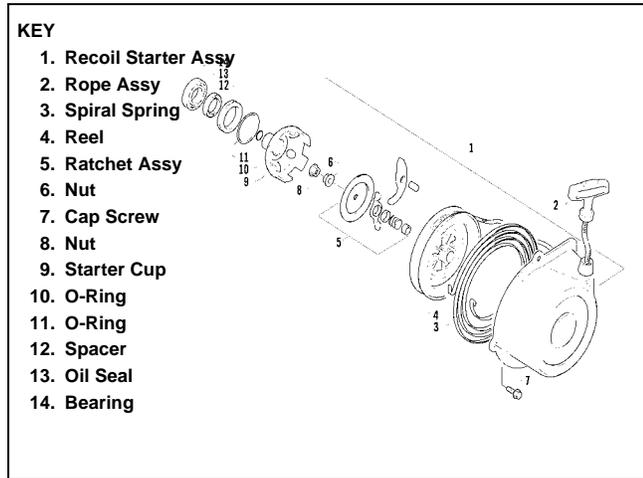


CC308D

- If damaged, the camshaft must be replaced.

Servicing Left-Side Components

RECOIL STARTER



0737-764

Removing/Disassembling

1. Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the starter.

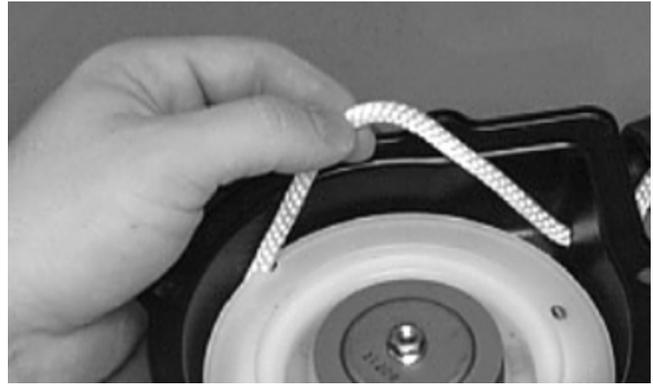


CC039D

⚠ **WARNING**

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

2. 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.

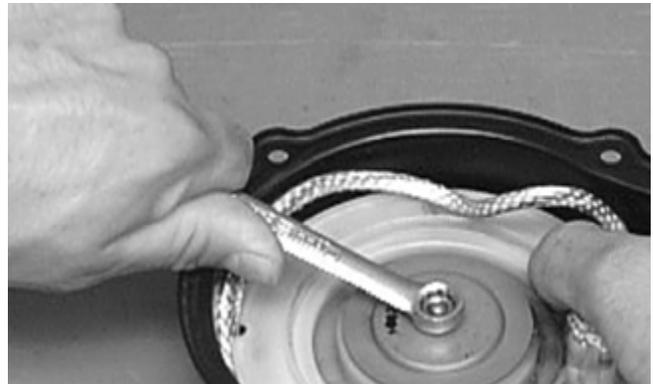


B600D

⚠ **CAUTION**

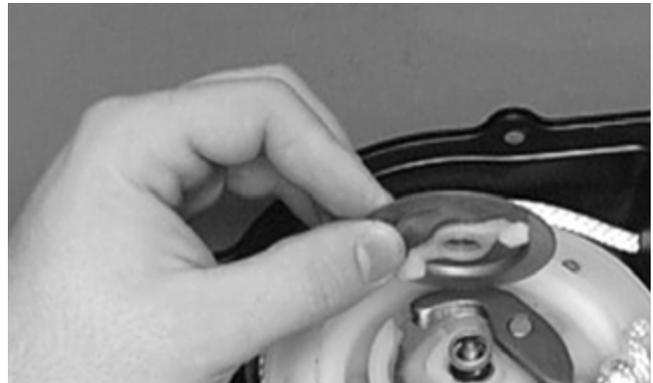
During the disassembly procedure, make sure all spring tension is released before continuing.

3. Remove the nut.



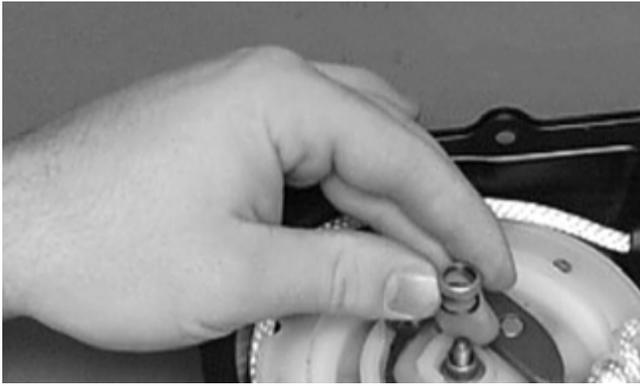
B601D

4. 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

5. Remove the spring, collar, and friction spring.



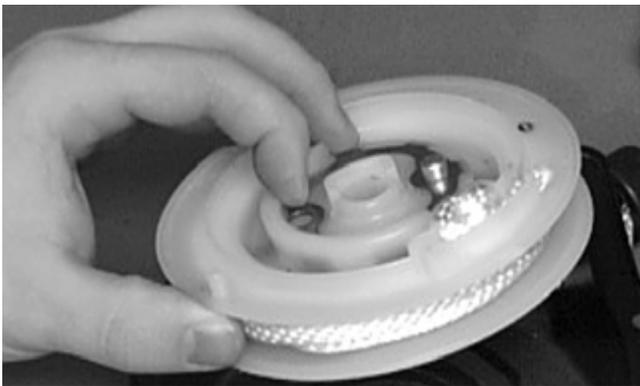
B603D

6. Remove the ratchet and account for the pin.



B604D

7. 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.

8. 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. It should be visually inspected in place to save time. If replacement is necessary, follow steps 9-10.

9. 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.
10. 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/Installing

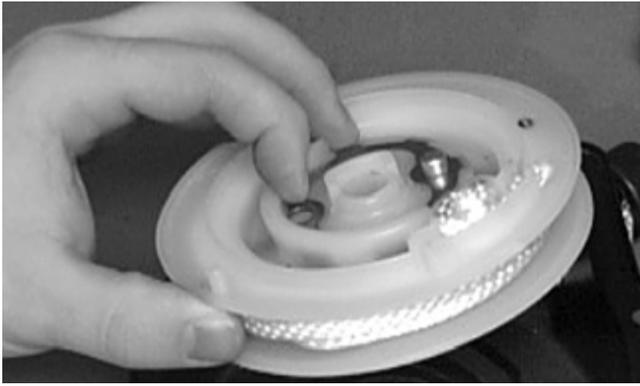
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

■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.



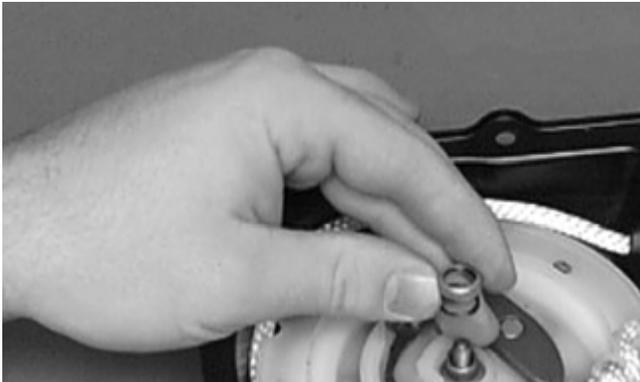
B605D

6. Install the ratchet making sure the end is properly installed on the reel.



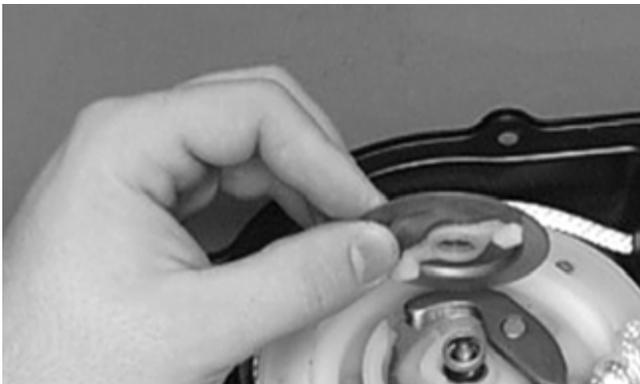
B604D

7. Install the friction spring and the spring cover.



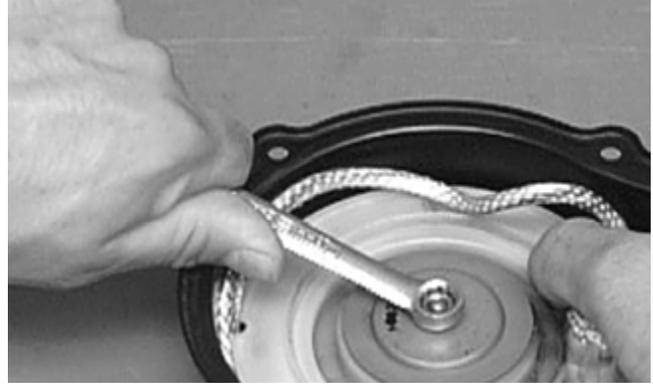
B603D

8. Install the friction plate with the ratchet guide fitting into the ratchet.



B602D

9. While pushing down on the reel, install the nut. Tighten securely.



B601D

10. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.

11. Rotate the reel four turns counterclockwise; then release the rope from the notch and allow the rope to retract.

12. Pull the rope out two or three times to check for correct tension.

■ **NOTE:** Increasing the rotations in step 11 will increase spring tension.

13. Place the recoil starter assembly into position on the left-side cover; then tighten the cap screws to 0.8 kg-m (6 ft-lb).



CC039D

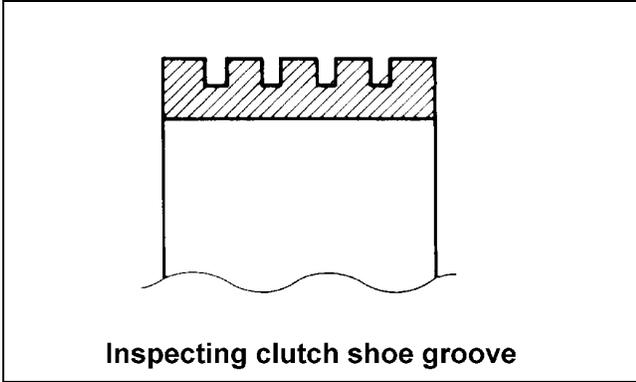
Servicing Right-Side Components

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

INSPECTING STARTER CLUTCH SHOE

1. Inspect the starter clutch shoe for uneven wear, chips, cracks, or burns.
2. Inspect the groove on the shoe for wear or damage.

3. If any damage to the shoe or any groove wear is noted, the shoe must be replaced.



ATV1014

INSPECTING STARTER CLUTCH HOUSING

1. Inspect the starter 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 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

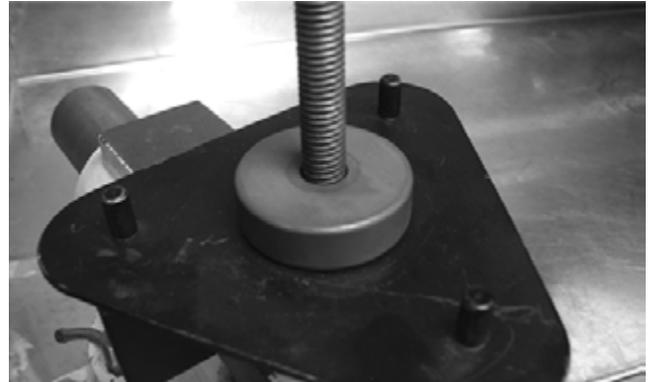
DRIVEN PULLEY ASSEMBLY

Disassembling

WARNING

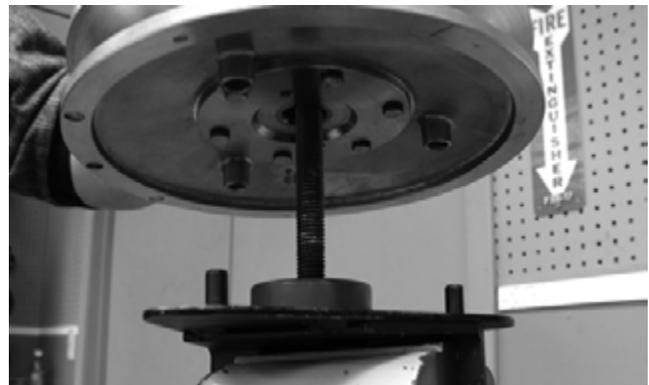
This procedure involves relaxing a compressed spring assembly. **DO NOT** attempt disassembling without the proper tools.

1. Secure Driven Pulley Compressor (p/n 0444-121) 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.



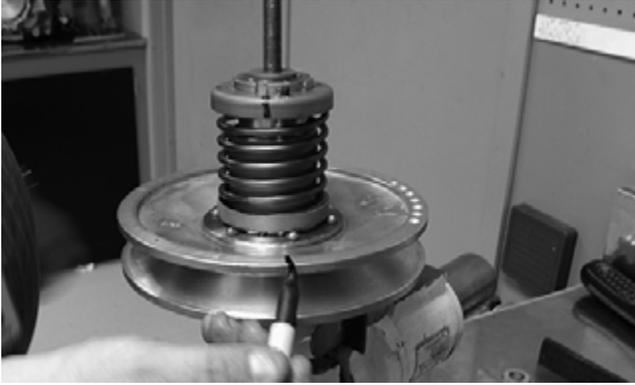
CD048

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



CD067

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



CD049

- 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.

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



CD051

- 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 ¼ turn as the spring holder clears the flats or hub. This is due to a slight counterclockwise preload on the spring.



CD052

- Release the preload slowly; then continue to relax the spring until the wing nut is flush with the end of the threads.

- Firmly holding the spring and spring holder, remove the wing nut; then remove the spring.



CD053

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

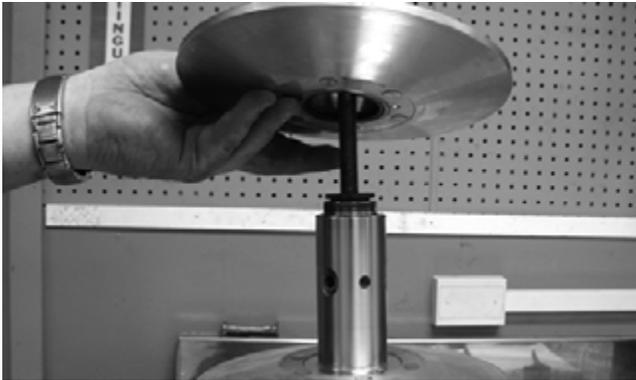


CD054

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



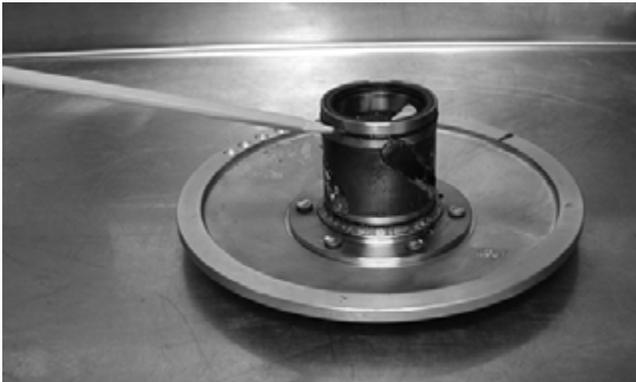
CD055



CD056

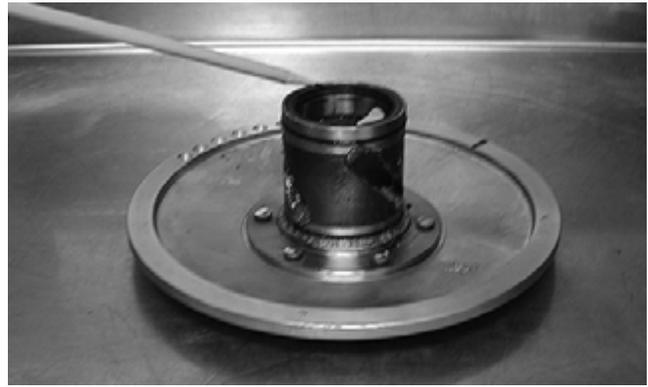
Inspecting

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



CD057

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



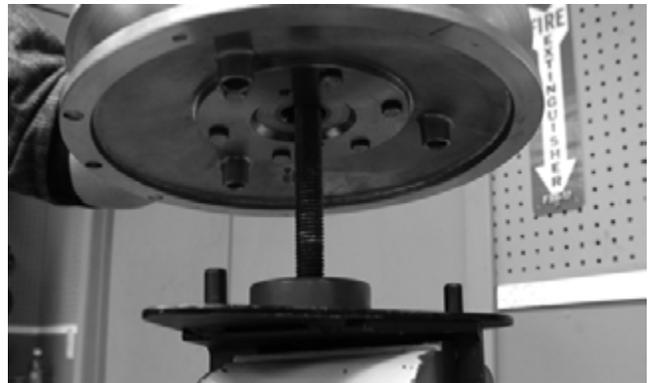
CD058

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.



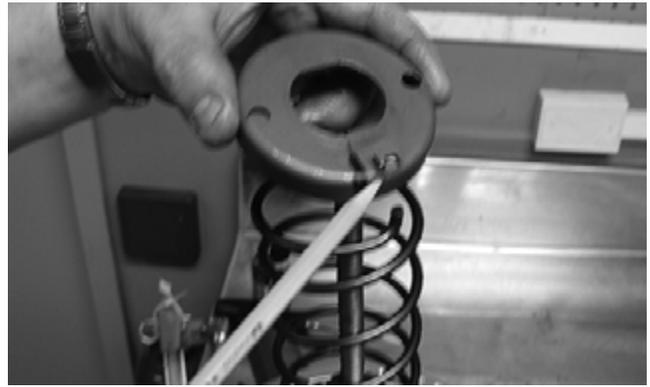
CD060

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.



CD061

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



CD064

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.



CD062

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.



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.



CD063

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



CD065

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 specification 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.

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.

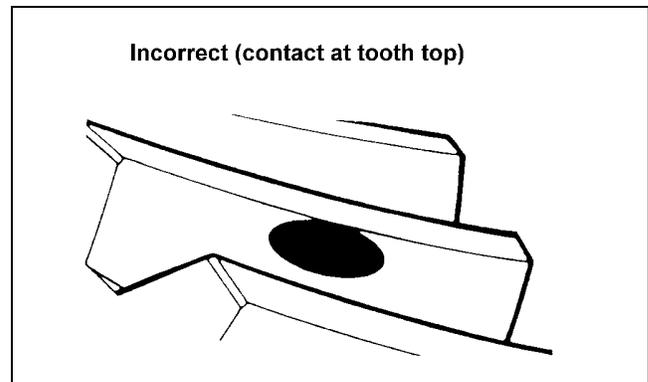
■NOTE: Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

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

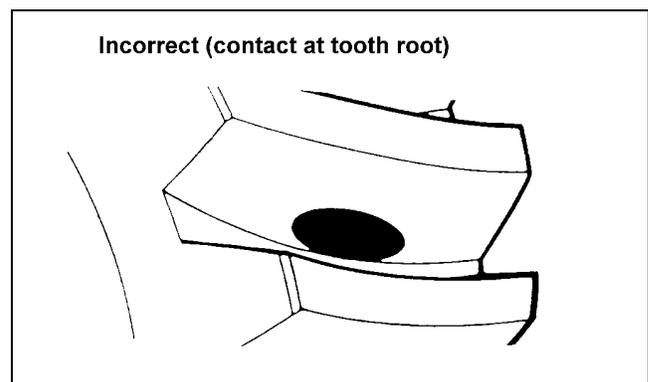
Checking Tooth Contact

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

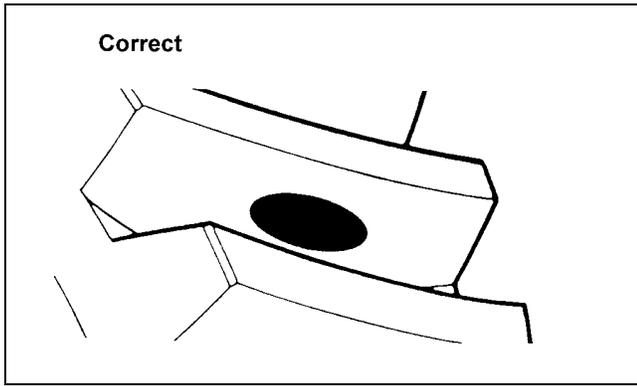
1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
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



ATV-0105



ATV-0104

Correcting Tooth Contact

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

1. 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

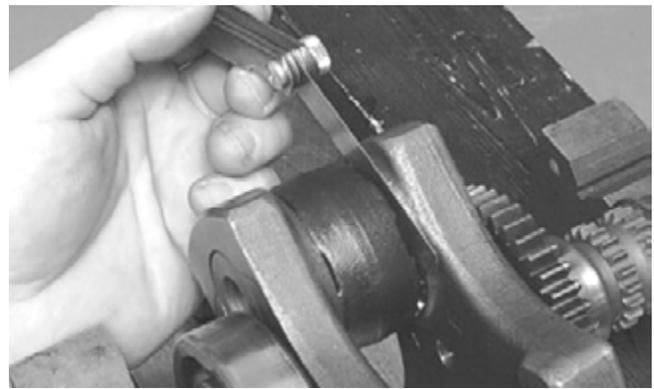
2. Maximum diameter must not exceed specifications.

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

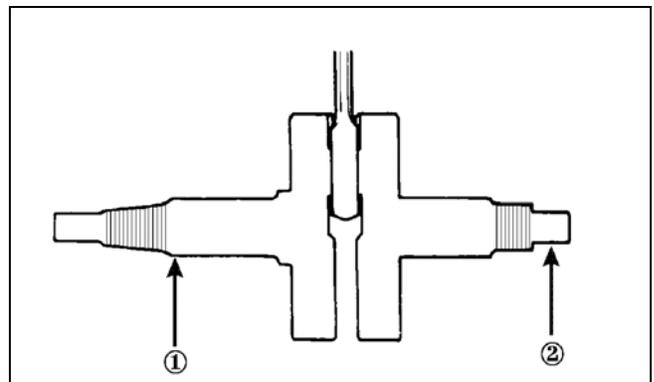
3. Acceptable gap range must be within specifications.

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

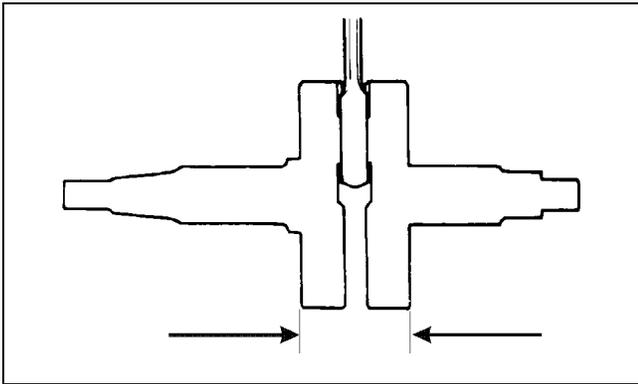
Care should be taken to support the connecting rod when rotating the crankshaft.

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 2-4.

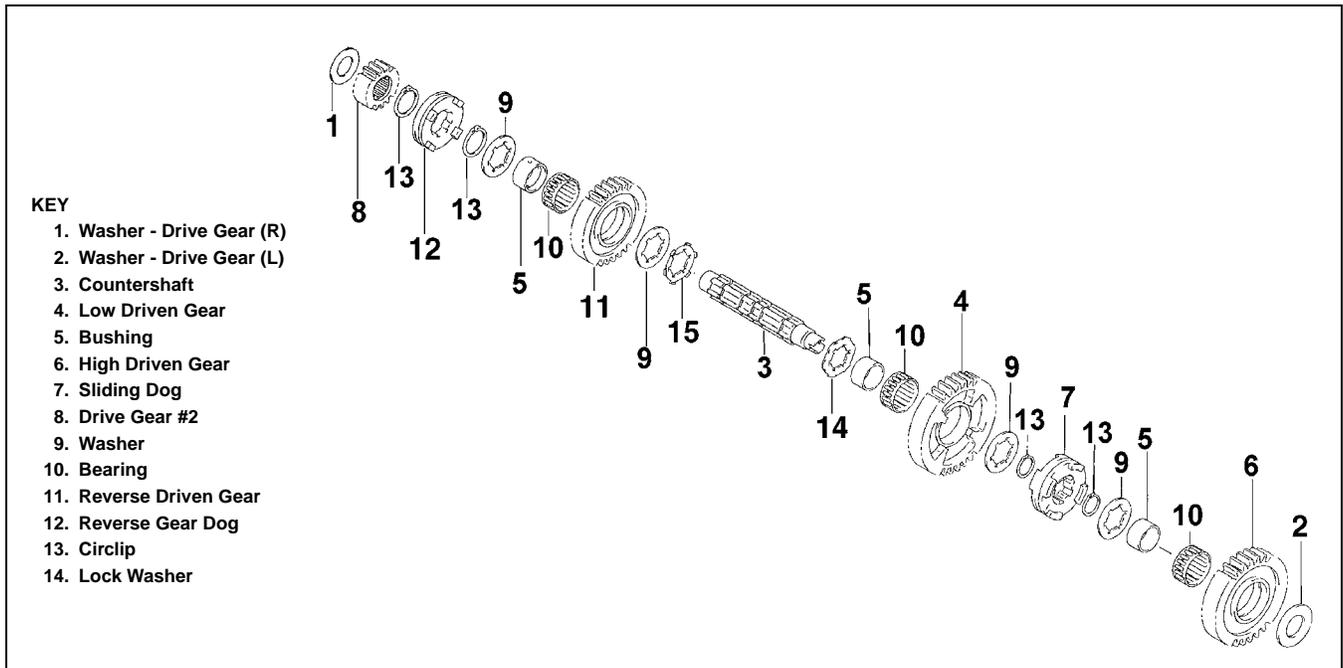
Measuring Crankshaft (Web-to-Web)

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



ATV-1017

Assembling



735-618A

1. Place the high driven gear onto the countershaft making sure the bearing, bushing, and washer are properly positioned. Secure with the circlip.

2. Acceptable width range must be within specifications.

COUNTERSHAFT

CAUTION

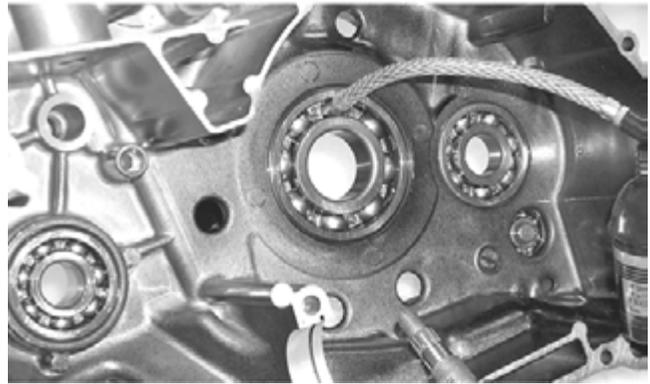
When disassembling the countershaft, care must be taken to note the direction each major component (dog, gear) faces. If a major component is installed facing the wrong direction, transmission damage may occur and/or the transmission will malfunction. In either case, complete disassembly and assembly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

Disassembling

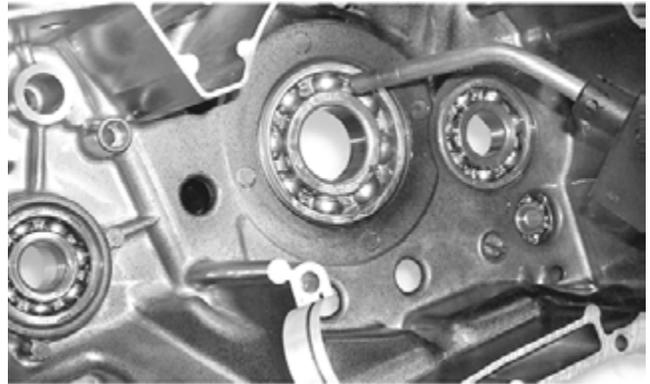
1. Remove drive gear #2; then remove the circlip securing the reverse gear dog.
2. Remove the reverse gear dog; then remove the circlip securing the reverse driven gear.
3. Remove the reverse driven gear and account for the washer, bushing, and bearing.
4. Remove the low driven gear washer and lock washers;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

3. Place the low driven gear onto the countershaft making sure the bearing and bushing are properly positioned; then place the lock washers and 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 gear dog onto the countershaft; then secure with the circlip.
6. Place drive gear #2 onto the countershaft.

■NOTE: When installing the countershaft assembly, account for the washer on each end of the shaft.



CC688



CC689

Assembling Crankcase Half

1. Install the output shaft assembly into the crankcase making sure the two gears, shim, washer, and nut are properly sequenced.



CC686

■NOTE: The beveled side of the secondary drive gear must face upward.

2. Apply red Loctite #271 to the threads of the output shaft; then secure with the nut. Tighten nut to 10 kg-m (72 ft-lb); then using a punch, peen the nut.



CC687

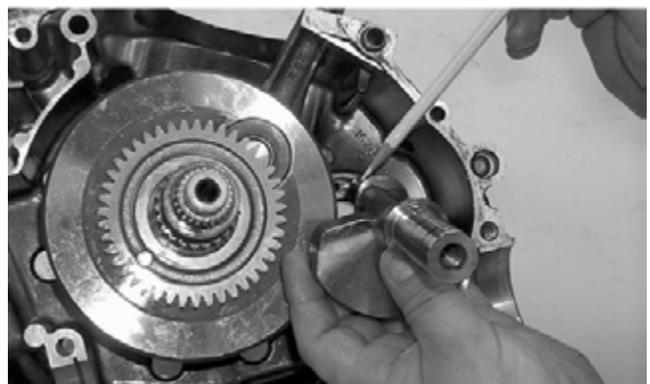
3. Apply a liberal amount of engine oil to the crankshaft bearing. Using a propane torch, heat the bearing until the oil begins to smoke; then slide the crankshaft assembly into place.

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



CC690

4. Install the crank balancer.



CC678

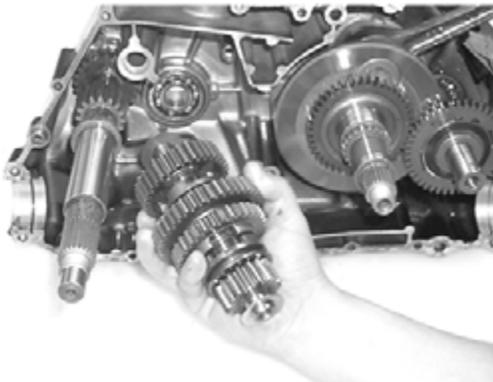
■NOTE: It will be necessary to rotate the crank balancer until the counterweight is facing away from the crankshaft; then rotate the crankshaft clockwise into the journal area to allow the crank balancer to be fully seated.

5. 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.



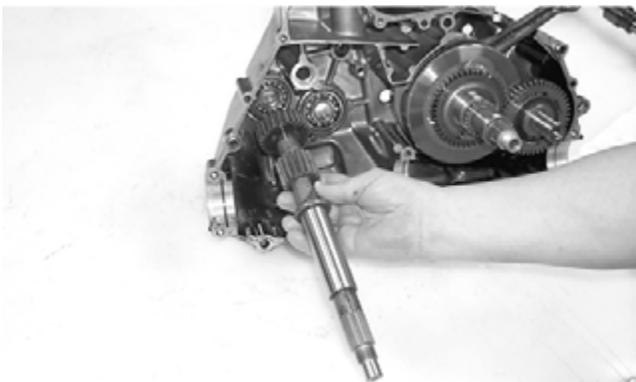
CC676

6. Place a washer on each end of the countershaft assembly; then install the assembly.



CC674

7. Install the driveshaft.



CC675

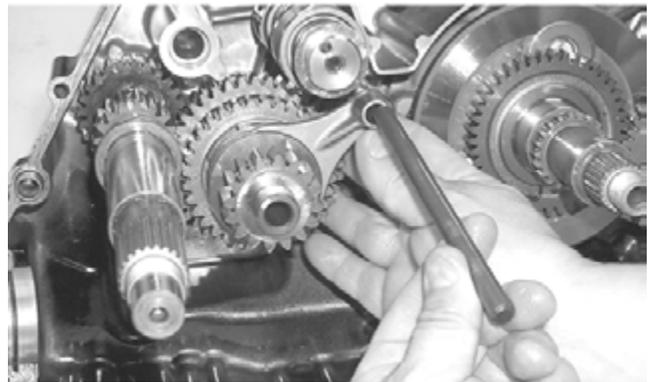
8. Place a washer on each end of the gear shift shaft; then install the shaft assembly making sure the two holes on the end of the shaft are positioned vertically.



CC671

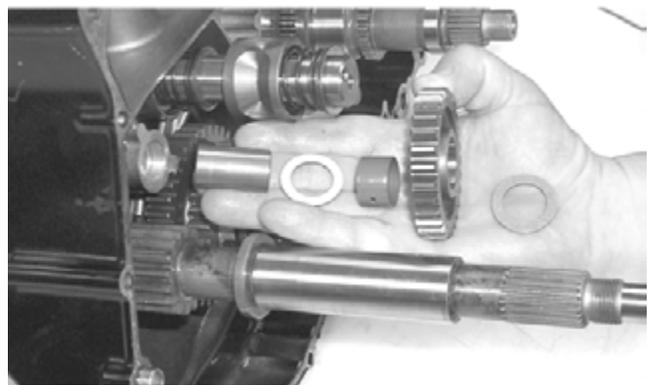
9. Insert the two shift forks into the sliding dogs noting the direction of the tabs from disassembling; then install the shift fork shaft.

■NOTE: Make sure the shift fork tabs face upward and that they are properly seated into the shift cams.



CC669

10. Install the reverse idler gear assembly noting the positioning of the two washers, gear, bushing, and shaft.

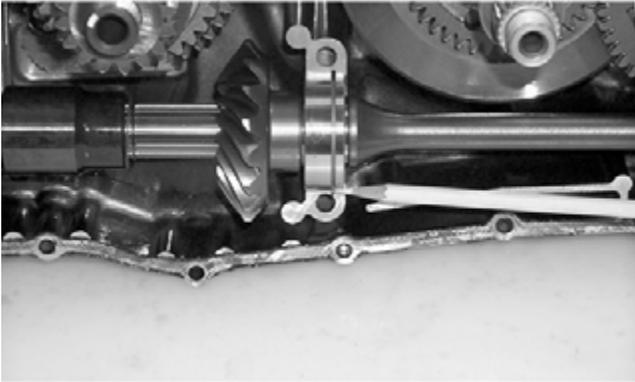


CC668

11. 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.



CC666



CC667

12. Place the oil strainer into position; then secure with the two screws.



CC682

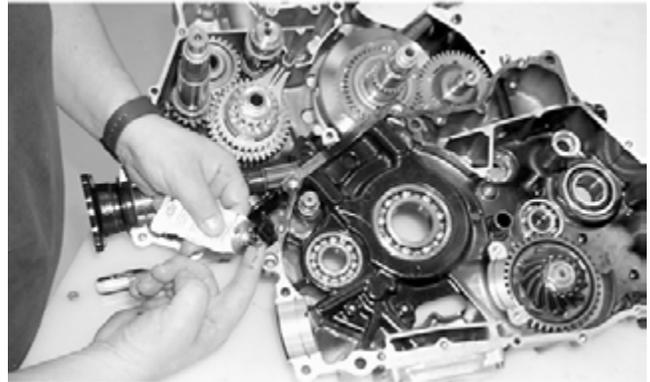
13. Place the oil strainer cap into position making sure the O-ring is in position; then secure the cap with cap screws. Tighten securely.



CC681

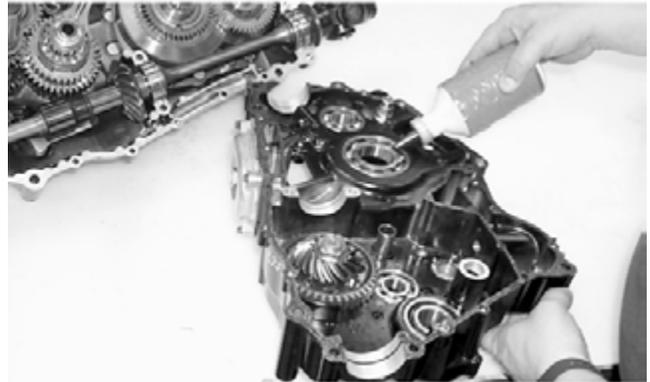
Joining Crankcase Halves

1. Apply High-Temp Sealant (p/n 0636-069) to the left-side mating surface.



CC693

2. Lightly oil all bearings and grease all shafts in the right-side crankcase.

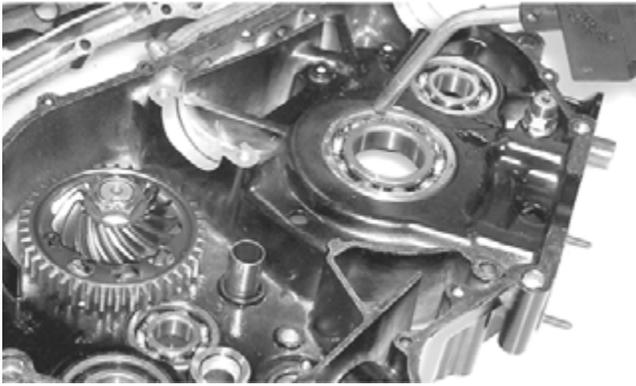


CC694



CC696

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.

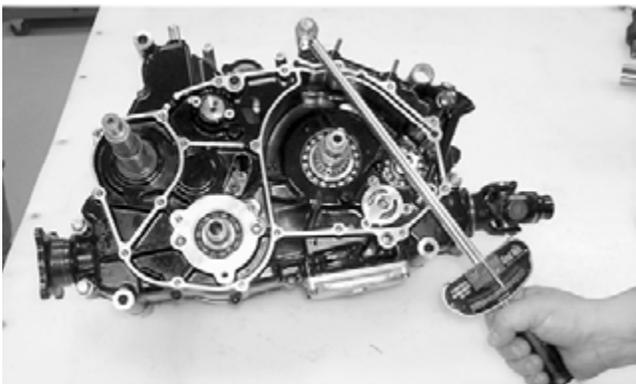
7. From the left side, install the eight case half 6 mm cap screws; then tighten only until snug.

■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 until the halves are correctly joined; then tighten to 2-2.4 kg-m (14.5-17 ft-lb).



CC697

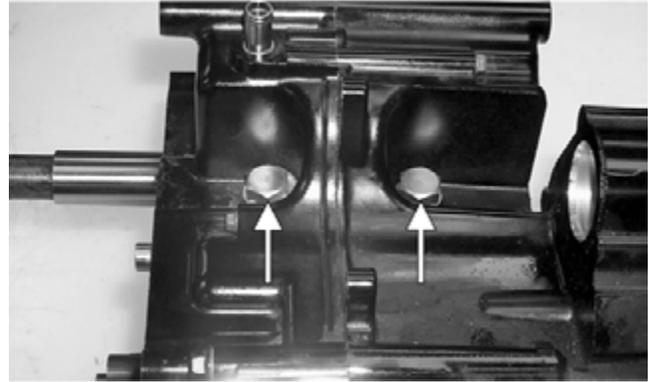
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.

10. In a crisscross/case-to-case pattern, tighten the 6 mm cap screws to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

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

11. Using a liberal amount of grease, assemble the shift cam stoppers; then install them into the top of the engine.

■NOTE: The grease will hold the springs and cam stoppers in position while installing the assemblies into the engine.



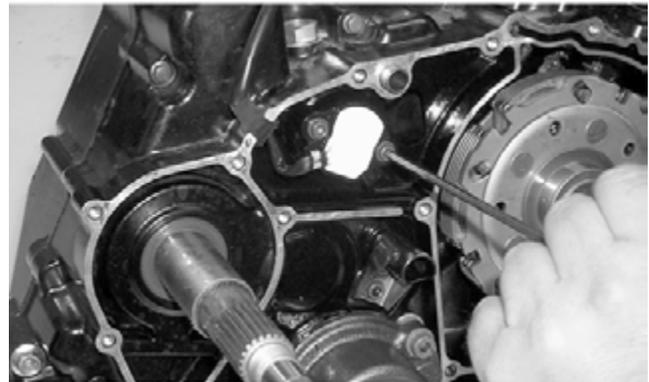
CC661A

⚠ 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.

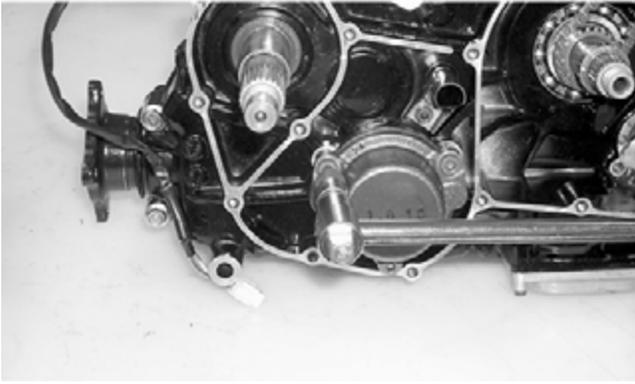
Installing Right-Side Components

1. Install the shift indicator sending unit making sure the two neutral contact pins and the two springs are properly positioned. Tighten the Allen-head screws securely.



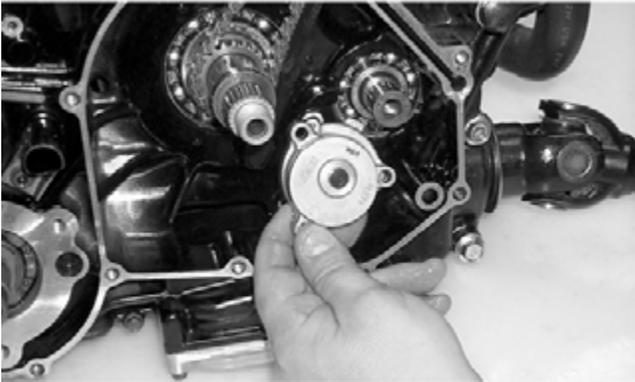
CC602

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



CC711

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



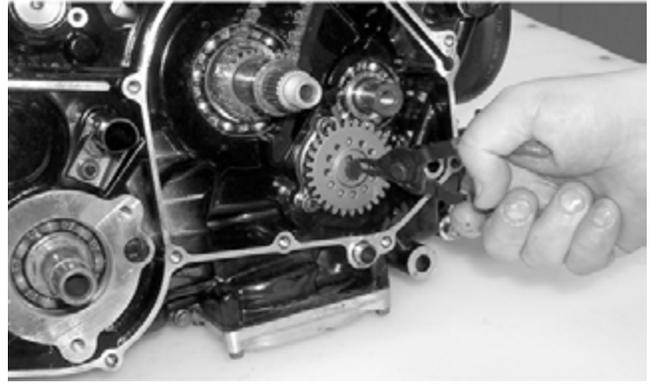
CC613

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 5 kg-m (36 ft-lb).



CC712

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.



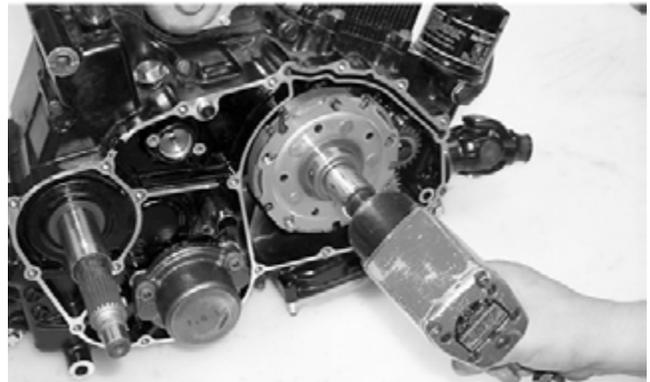
CC609

■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 washer (with the flat side facing the assembly as noted in removing) and the nut (threads coated with red Loctite #271). Tighten to 13 kg-m (94 ft-lb).

⚠ CAUTION

Care must be taken that the directional washer be installed correctly and note that the nut has left-hand threads.

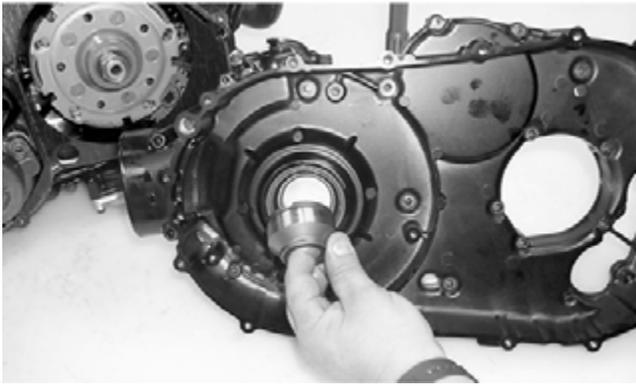


CC604

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

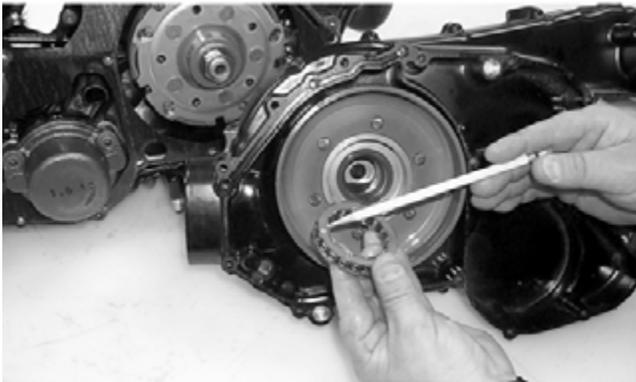


CC597



CC595

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.

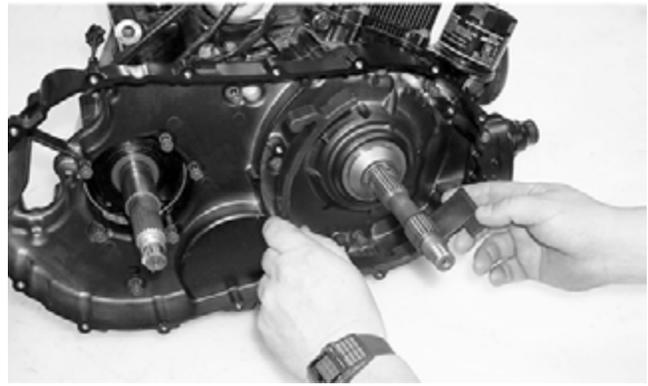


CC592

⚠ CAUTION

When installed correctly, the green alignment dot (or the word OUTSIDE) on the one-way clutch DOES NOT SHOW.

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 1.1 kg-m (8 ft-lb).
12. Place the air intake plate cushion into position; then install the air intake plate. Tighten the Phillips-head screws (threads treated with a small amount of red Loctite #271) securely.

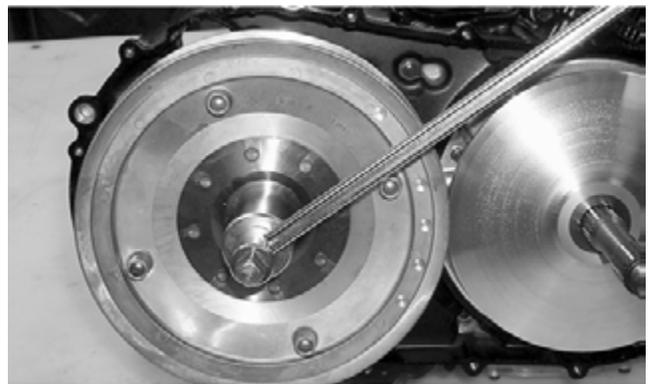


CC589



CC586

13. Place the driven pulley assembly into position and secure with the nut. Tighten to 10.4-11.8 kg-m (75-85 ft-lb).



CC726

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 counter-clockwise; then when the faces are separated, insert a wedge (approximately 3/8 in. thick) between the faces. Release the inner face.



CC549

16. Place the V-belt into position on the driven pulley and over the front shaft.



CC550

■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 (threads coated with red Loctite #271). Tighten the nut to 10.4-11.8 kg-m (75-85 ft-lb).

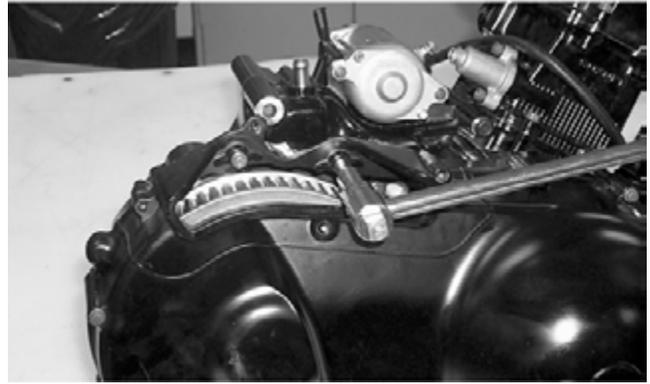


CC552

■NOTE: At this point, the wedge 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 1.1 kg-m (8 ft-lb).

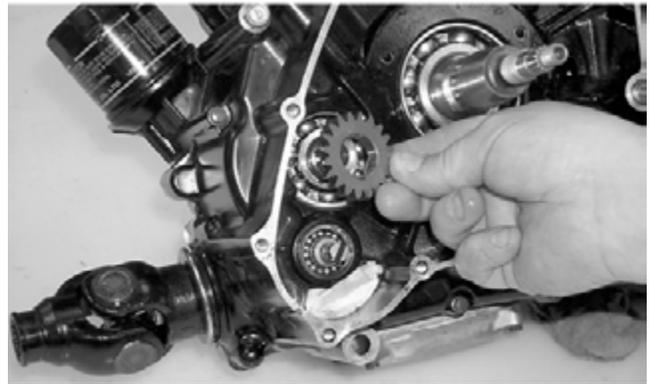


CC736

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.

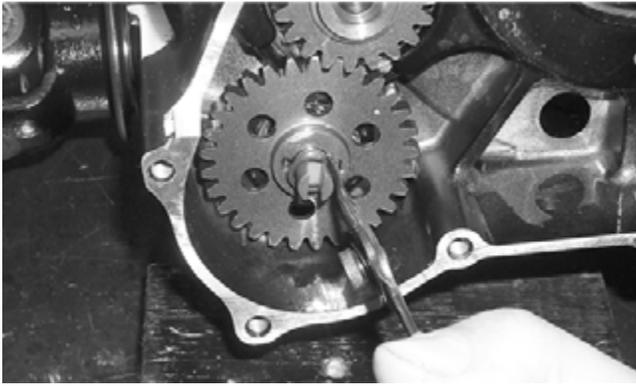
1. Install the water pump drive gear alignment pin and the drive gear (with the flat side of the gear facing outward as noted in removing); then secure with the snap ring.



CC641

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

2. 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.

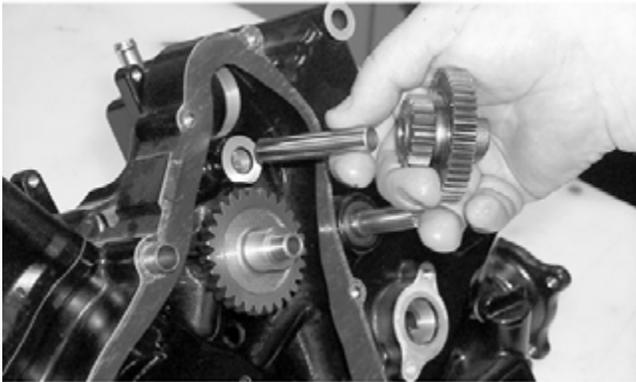


CC845

■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).



CC636

4. In order on the crankshaft, install a washer, ring gear, key, and the magneto rotor. Secure with the nut (threads coated with red Loctite #271). Tighten to 16 kg-m (116 ft-lb).
5. Lubricate the magneto cover gasket with fresh engine oil; then place it into position on the two dowel pins.



CC629

6. Install the magneto cover and secure with existing hardware. Tighten to 1.1 kg-m (8 ft-lb).

7. Place the speedometer gear housing and gasket into position and secure with the two cap screws. Tighten securely.



CC709

CAUTION

Make sure the speedometer gear and output shaft gear match up during assembly.

8. Place the water pump into position and secure with two cap screws. Tighten securely.

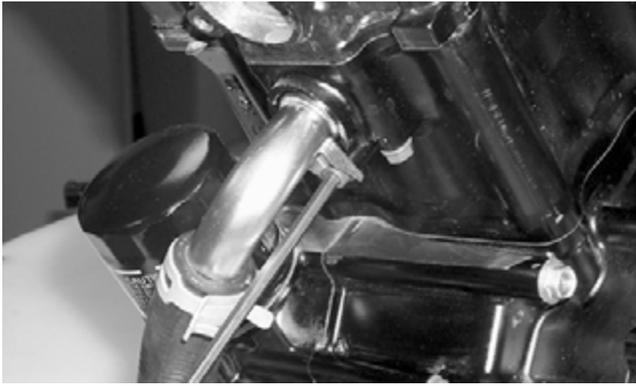


CC623

9. Install the crossover tube on the water pump and cylinder head making sure the O-ring is properly positioned.



CC619



CC620

10. Install the shift arm on the shift arm shaft making sure the scribed marks (from removing) are aligned. Tighten securely.
11. 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 3.5 kg-m (25 ft-lb).



CC710

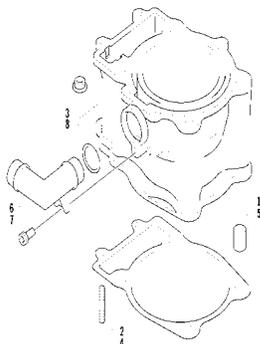
12. Place the gasket and recoil starter assembly into position on the left-side cover; then tighten four cap screws to 0.8 kg-m (6 ft-lb).

Installing Top-Side Components

- A. Piston
- B. Cylinder

KEY

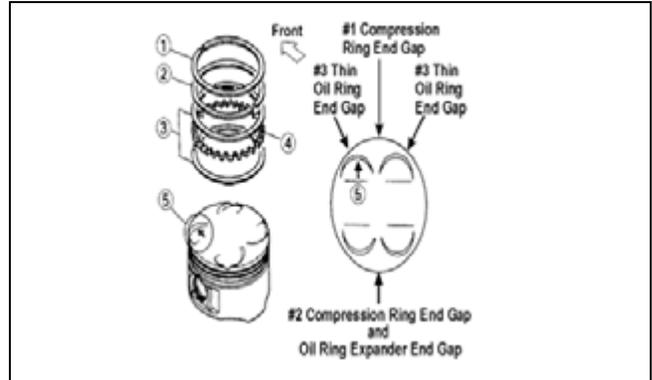
1. Cylinder
2. Stud Bolt
3. Nut
4. Cylinder Gasket
5. Pin
6. Water Hose Union
7. Cap Screw
8. O-Ring



0732-301

■ **NOTE:** If the piston rings were removed, install them in this sequence.

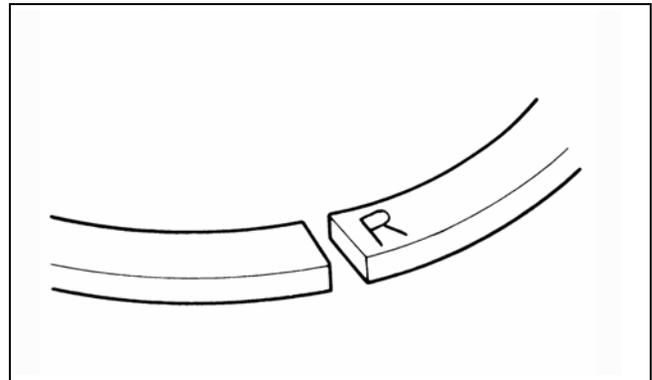
- A. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



ATV-1085B

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

- B. 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).



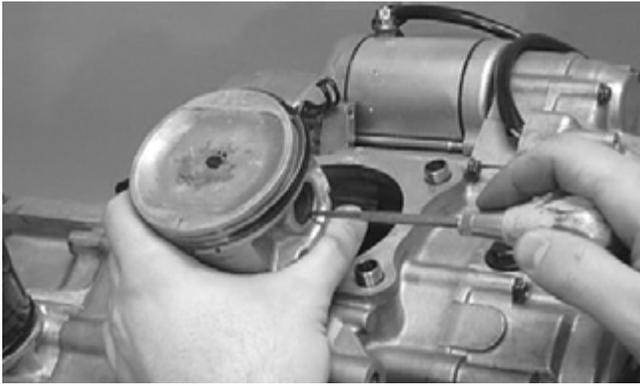
ATV-1024

CAUTION

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

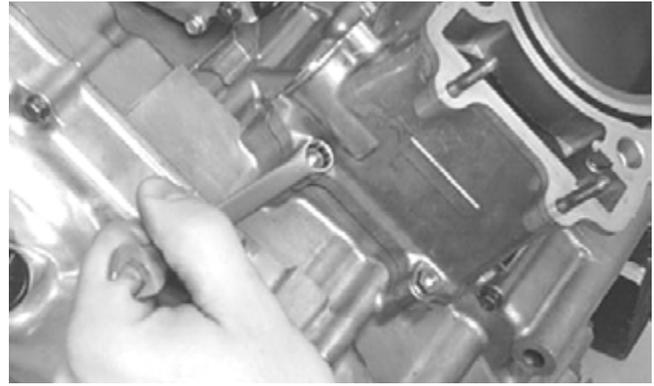
1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

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



CC032D

- 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.



CC023D

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

C. Cylinder Head D. Valve Cover



CC025D

- 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

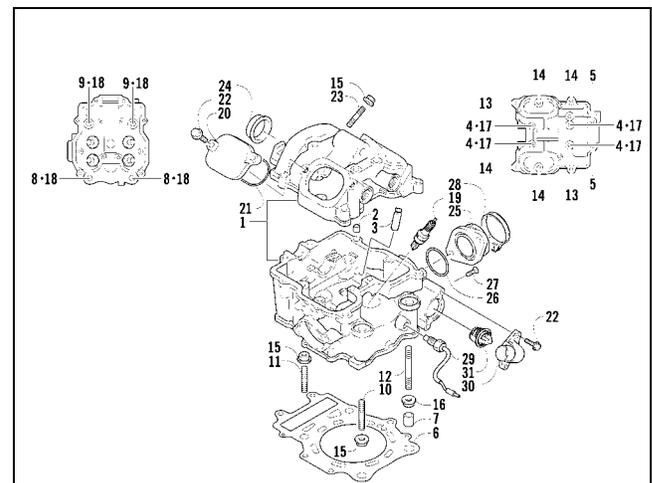
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



CC024D

- 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.



KEY

- | | |
|-------------------------|-----------------------------|
| 1. Cylinder Head Assy | 17. Gasket |
| 2. Valve Guide | 18. Gasket |
| 3. Pin | 18. Gasket |
| 4. Cap Screw | 19. Spark Plug |
| 5. Cap Screw | 20. Inspection Cap |
| 6. Cylinder Head Gasket | 21. O-Ring |
| 7. Pin | 22. Cap Screw |
| 8. Cap Screw | 23. Stud Bolt |
| 9. Cap Screw | 24. Cylinder Head Plug |
| 10. Stud Bolt | 25. Intake Pipe Assy |
| 11. Stud Bolt | 26. O-Ring |
| 12. Stud Bolt | 27. Cap Screw |
| 13. Cap Screw | 28. Clamp |
| 14. Cap Screw | 29. Temperature Switch Assy |
| 15. Nut | 30. Thermostat Cover |
| 16. Nut | 31. Thermostat |
| | 32. Intake Tube |

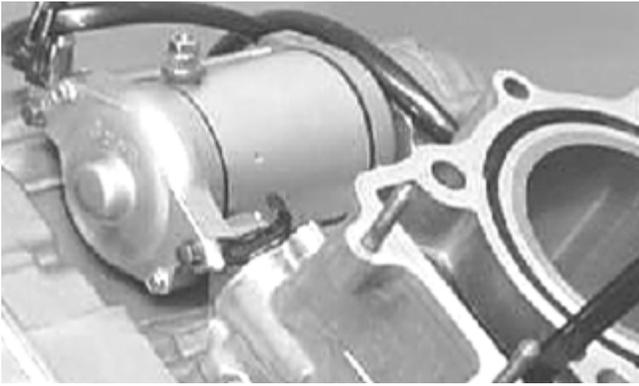
0737-755

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

- Place the chain guide into the cylinder.

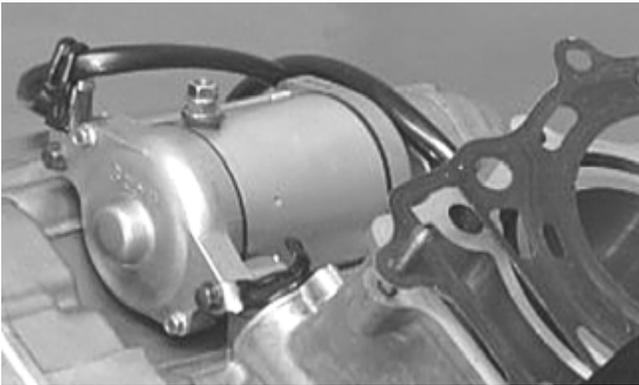
⚠ CAUTION

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

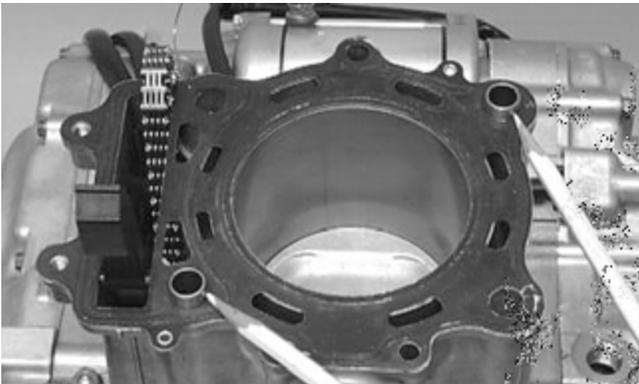


CC022D

7. Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder.

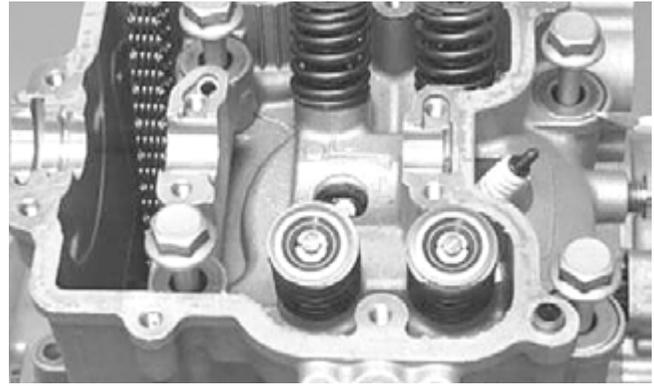


CC020D



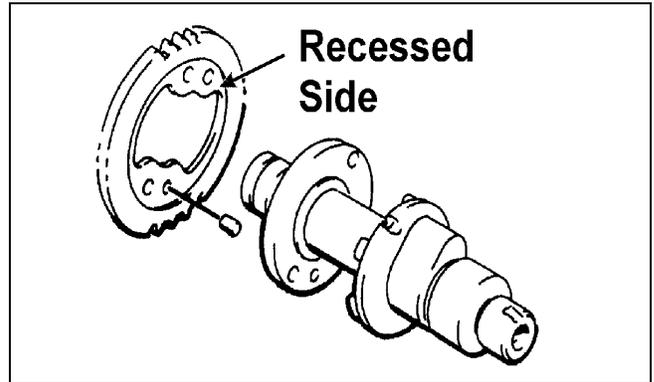
CC265D

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

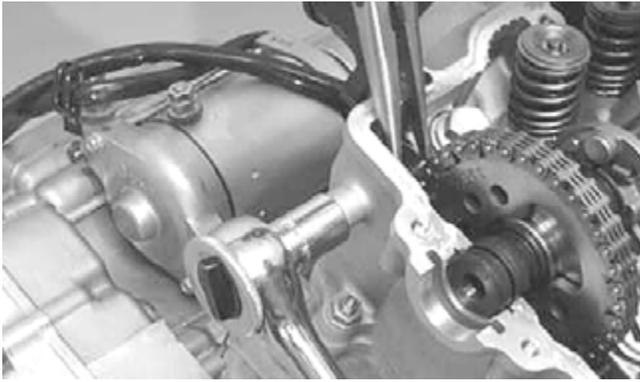
9. Loosely install the five cylinder head nuts.
10. In a crisscross pattern, tighten the four cylinder head cap screws to 3.8 kg-m (27.5 ft-lb); then tighten the 8 mm nut to 2.5 kg-m (18 ft-lb). Using a crisscross pattern, tighten the 6 mm nuts to 1.1 kg-m (8 ft-lb). Tighten the two cylinder-to- crankcase nuts 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 bearings, cam lobes, and the three seating journals 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.



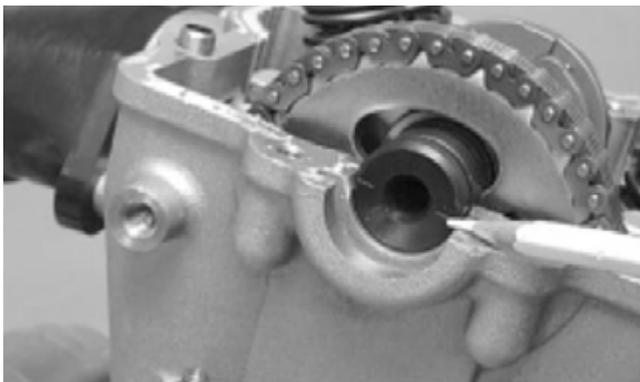
CC014D

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.



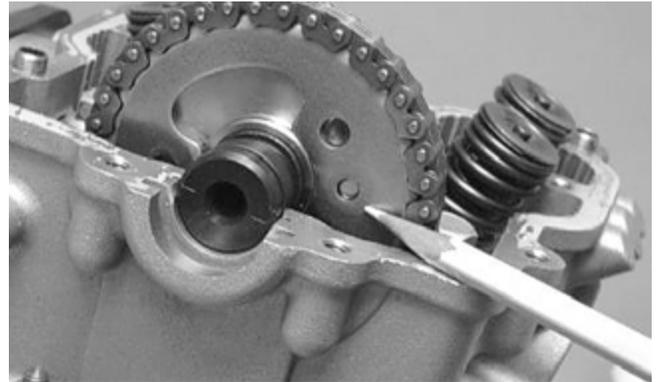
CC015D

■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 end up in the down position.



CC267D

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.



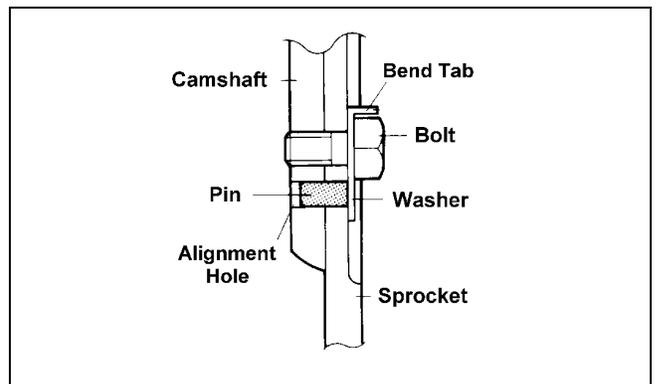
CC268D

- 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.

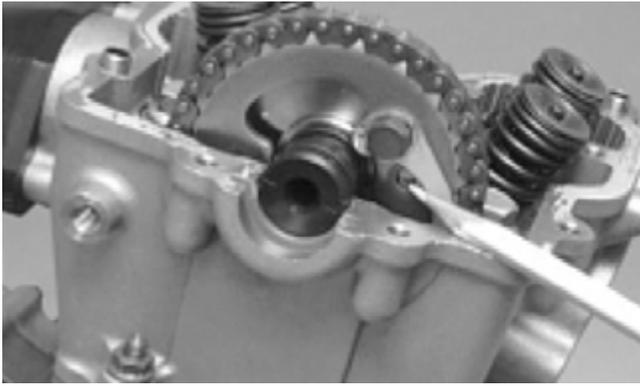
16. Place the tab-washer onto the sprocket making sure it covers the pin in the alignment hole.



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.



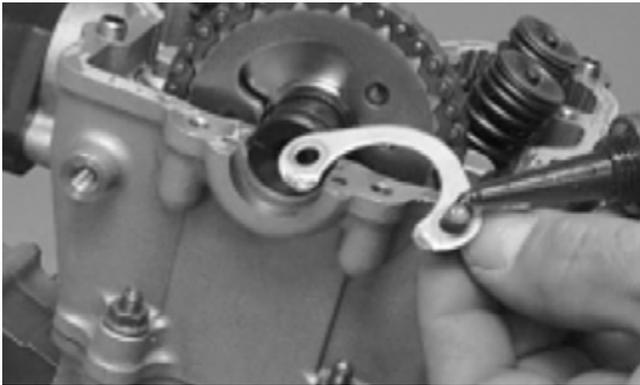
CC270D

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



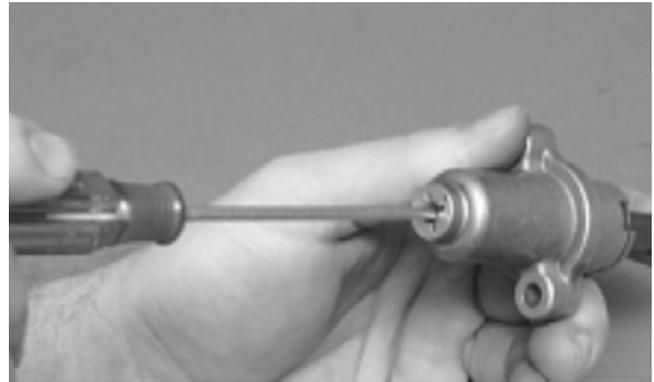
CC274D

20. 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.



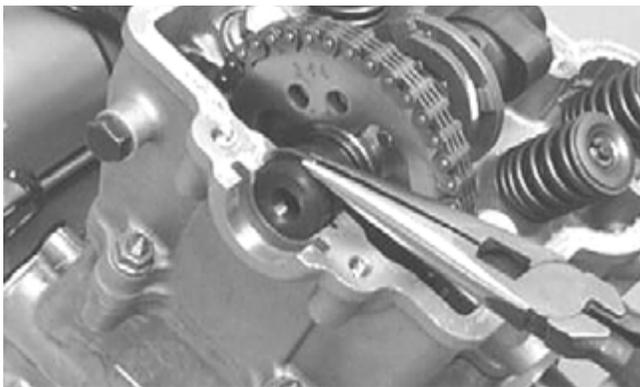
CC269D

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



CC309D

■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 22.



CC012D

19. Install the cylinder head plug in the cylinder head with the open end facing upward and toward the inside.

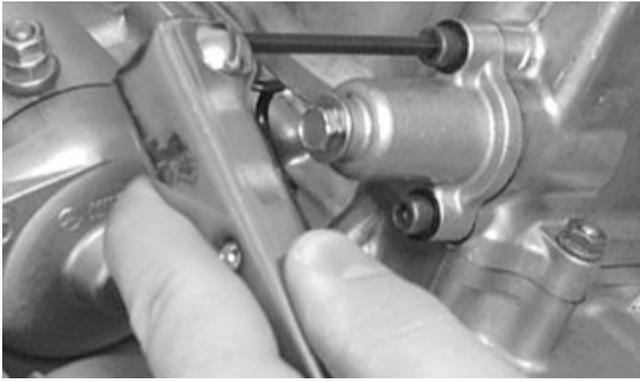


CC011D

21. Place the chain tensioner adjuster assembly and gasket into position on the cylinder and secure with the two Allen-head cap screws.

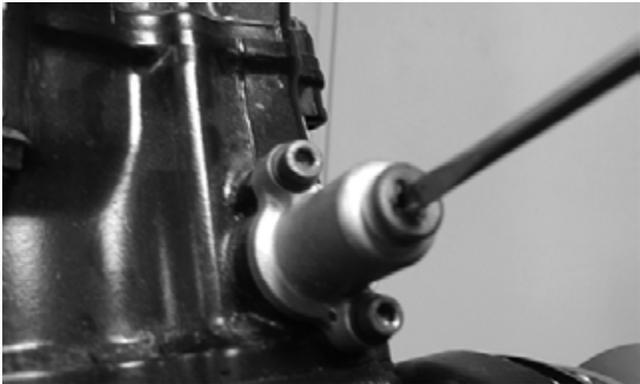
CAUTION

The open end of the plug must be positioned upward.



CC010D

22. 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.

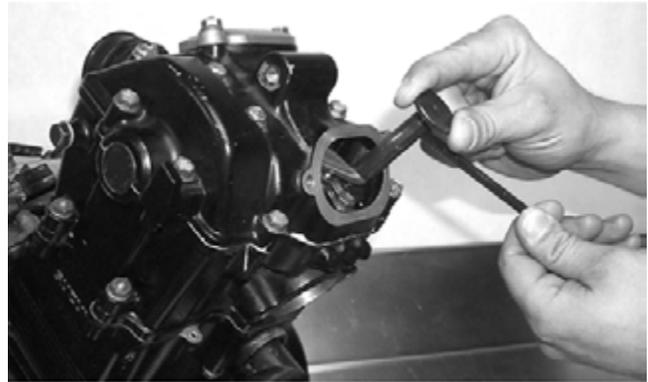


SP046



CC009D

23. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw (coated with red Loctite #271) and tighten to 1.5 kg-m (11 ft-lb). Bend the tab to secure the cap screw.
24. Rotate the crankshaft until the first cap screw securing the sprocket to the camshaft can be addressed; then tighten to 1.5 kg-m (11 ft-lb). Bend the tab to secure the cap screw.
25. Loosen the four adjuster screw jam nuts; then loosen the four adjuster screws on the rocker arms in the valve cover.



CC528D

26. Apply a thin coat of Three Bond Sealant (p/n 0636-070) to the mating surfaces of the cylinder head and valve cover.

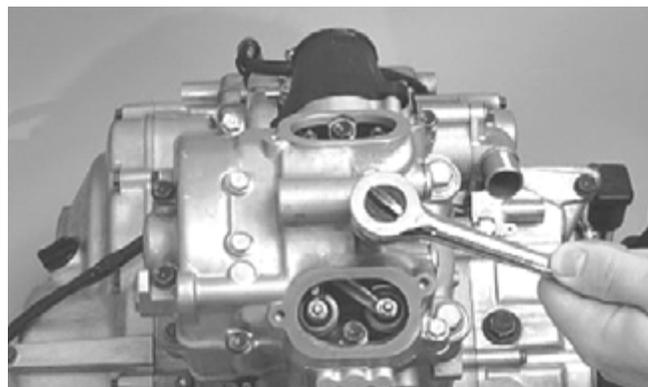


CC275D

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 securely.

30. Adjust valve/tappet clearance using the following procedure.

■NOTE: Use Valve Clearance Adjuster (p/n 0444-078) for this procedure.

- A. Turn the engine over until the piston reaches top dead center on the compression stroke.
- B. 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.
- C. 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.
- D. Align the valve adjuster handle with one of the marks on the valve adjuster dial.
- E. While holding the valve adjuster handle in place, rotate the valve adjuster dial counter-clockwise until specified valve/tappet clearance is attained.

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

- F. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.

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 to 1.7 kg-m (12 ft-lb).

Installing Engine/ Transmission

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

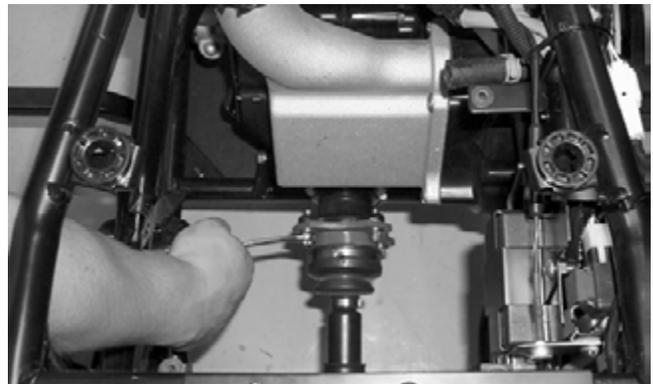
1. From the right side, place the engine/transmission into the frame making sure it is properly positioned in the frame with the front and rear driveshafts properly aligned.

2. Slightly raise the front of the engine and insert the front driveshaft coupler.



CC578

3. Position the two upper rear engine mounts in place on the frame and loosely secure with existing hardware; then install the three engine mounting through-bolts making sure to account for a washer on the upper bolt and a spacer on the lower front bolt. Tighten only until snug.
4. Align the front and rear driveshafts and secure with existing hardware. Tighten only until snug.
5. Secure the front upper engine mount to the frame with the cap screws. Tighten to 2.8 kg-m (20 ft-lb).
6. Secure the upper engine bracket to the engine with the existing cap screw and flange nut. Tighten to 2.8 kg-m (20 ft-lb).
7. Tighten all engine mounting through-bolts to 5.5 kg-m (40 ft-lb); then tighten the cap screws securing the rear CV joint to 2.8 kg-m (20 ft-lb). Tighten the front driveshaft to 5.5 kg-m (40 ft-lb); then tighten the two upper rear engine mounts to 1.7 kg-m (12 ft-lb).

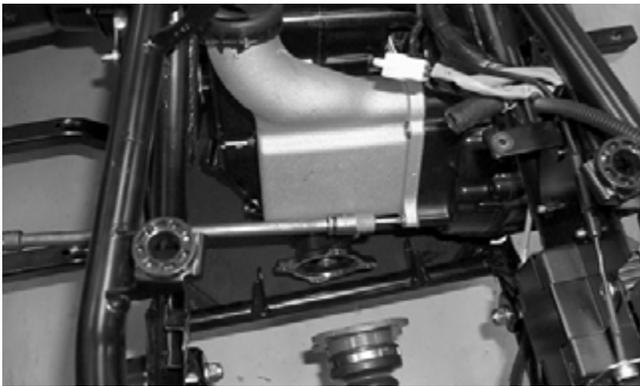


CC565



CC566

8. Secure the exhaust pipe to the engine, frame, and muffler using existing hardware. The cap screws securing the exhaust pipe to the engine and to the frame should be tightened to 2.8 kg-m (20 ft-lb).
9. Install the left-side clutch plenum with existing hardware making sure the gasket is properly positioned. Tighten securely.



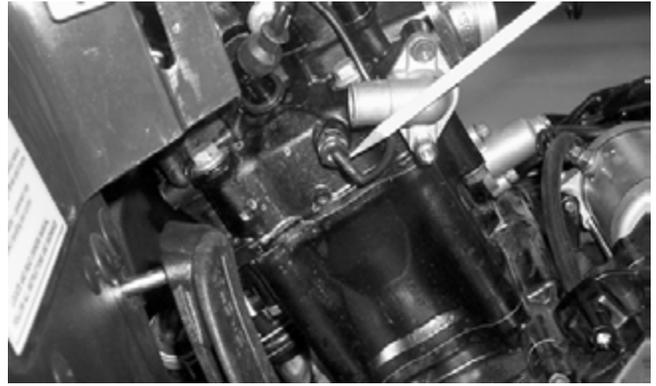
CC579

10. Secure the engine ground wire to the engine with a cap screw. Tighten to 1.1 kg-m (8 ft-lb).
11. Install the shift indicator connector to the main wiring harness.



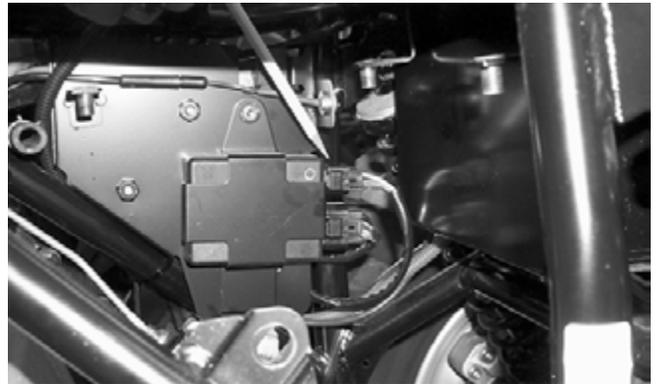
CC573

12. Connect the temperature sensor wire to the engine.



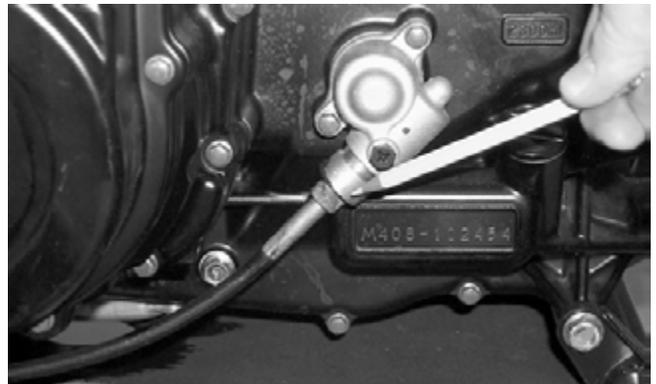
CC571

13. Secure the stator wires to the CDI unit.



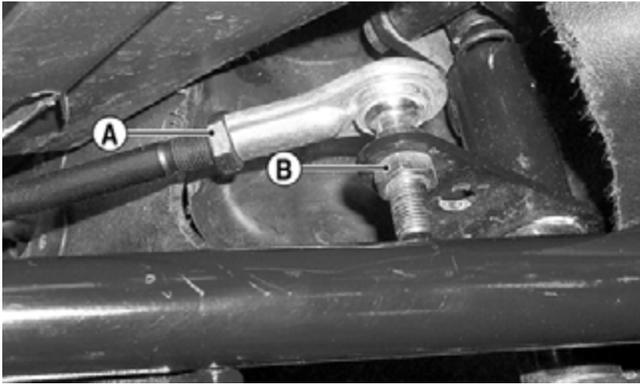
CC569

14. Secure the speedometer cable to the speedometer gear housing.



CC568

15. Secure the positive cable to the starter motor.
16. Secure all wiring to the frame and upper engine bracket with cable ties.
17. Secure the two coolant/oil hoses to the engine.
18. Secure the crankcase vent hose to the air cleaner housing.
19. Secure the shift rod to the engine with a new E-clip; then secure the shift rod to the shift lever arm with a new lock nut. Tighten securely.



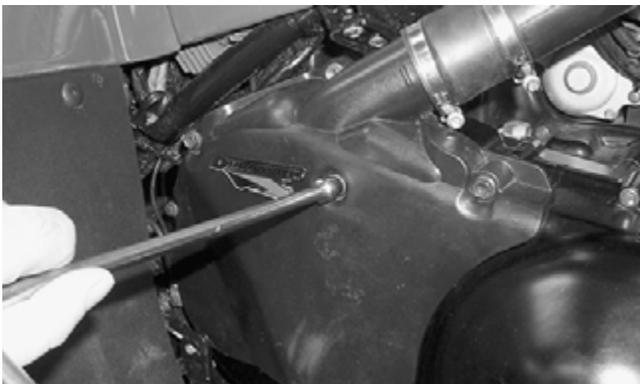
AF941A

20. Install the exhaust pipe shroud and secure with the existing torx-head screws. Tighten securely.

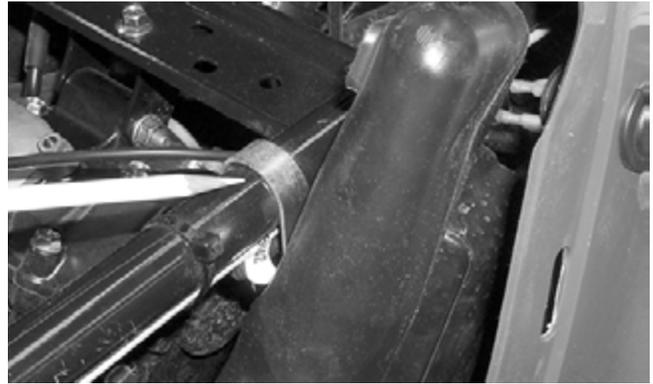


CC560

21. Install the carburetor into the intake hose. Tighten the hose clamp.
22. Place the footrests in position on the frame; then secure with existing hardware. Tighten the 10 mm cap screws to 5.5 kg-m (40 ft-lb) and the 8 mm cap screws to 2.8 kg-m (20 ft-lb).
23. Secure the fender extensions to the footrest using existing hardware.
24. Install the cooling duct shroud; then secure the cooling duct assembly to the frame.



AF932



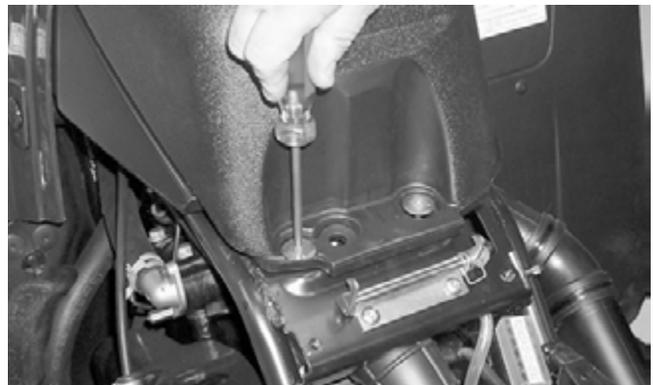
AF938

25. Install the air cleaner housing and secure the air intake hose to the carburetor; then secure the crank-case vent hose to the air cleaner housing.



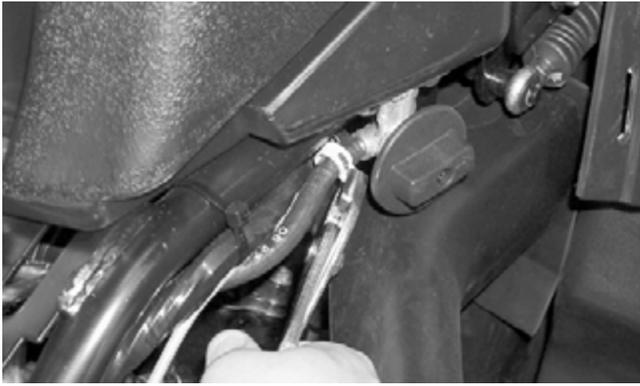
CC536

26. Install the rear rack/fender assembly with existing hardware. Tighten securely.
27. Secure the wiring harness to the frame with cable ties.
28. Install the gas tank; then connect the vent hose.



CC534

29. Connect the fuel hose to the gas tank valve.



CC533

30. Place the right-side and left-side panels into position; then install the existing hardware and tighten securely.
31. Carefully guide the battery cables and fuse block wiring up through the access hole into the battery tray.
32. Connect all fuse block wiring according to the marking made in removing; then place the fuse block into position and secure with two screws.

■NOTE: If the mounting screw holes have elongated, it will be necessary to install larger diameter screws.

 **CAUTION**

It is critical that all wiring be installed correctly to ensure electrical components will function properly.

33. Place the battery into position in the battery compartment; then install the battery cables and vent hose. Secure with the hold-down strap.

 **CAUTION**

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

34. Add proper amounts of engine/transmission oil and coolant.
35. Install the seat.

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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/replace left-side cover oil seals (3), front output joint oil seal (1), rear output joint oil seal (1), 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

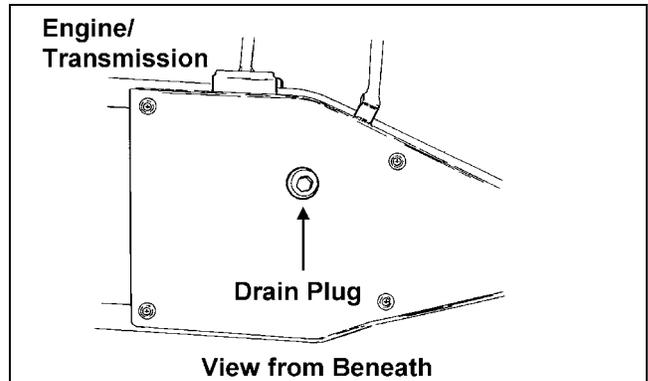
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

3. Near the battery tray, remove the two screws securing the fuse block; then carefully remove all the wiring from the block.

CAUTION

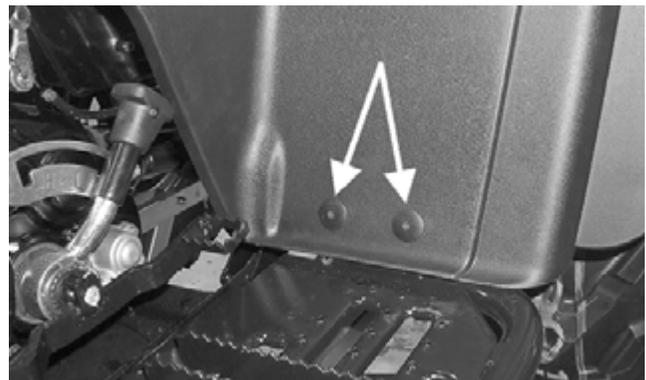
It is critical that all wiring be marked when removing from the fuse block. This will aid in installing correctly.

4. Carefully guide the battery cables and fuse block wiring down through the access hole into the engine compartment for future removing.
5. Drain the oil from beneath the engine/ transmission; then drain the cooling system.



ATV-0109

6. Remove the hardware securing the right-side and left-side panels; then remove the panels.
7. Turn the gas tank valve to the OFF position; then remove the fuel hose and vent hose.
8. Remove the gas tank.
9. Remove the rear fenders and the rear rack (see Section 8).
10. Remove the hardware securing both footrests to the frame and front fender.



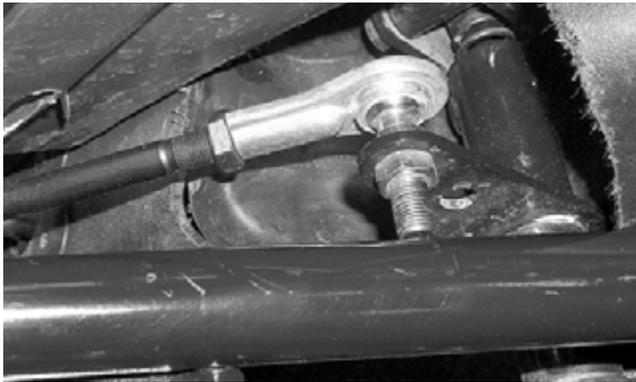
CC861A

11. Remove the two cap screws securing the exhaust pipe to the engine; then loosen the exhaust pipe from the muffler at the juncture in front of the muffler.



AF775D

12. Remove the exhaust pipe and account for the grafoil gasket.
13. Mark the reverse gear shaft arm to the reverse shift shaft to aid in installing and remove the cap screw securing the reverse gear shaft arm to the reverse shift shaft; then remove the lock nut securing the upper shift rod end to the shift lever arm. Remove the shift rod.



AF941

14. Detach the speedometer cable by loosening the knurled nut and routing the cable away from the engine/transmission.



AF667D

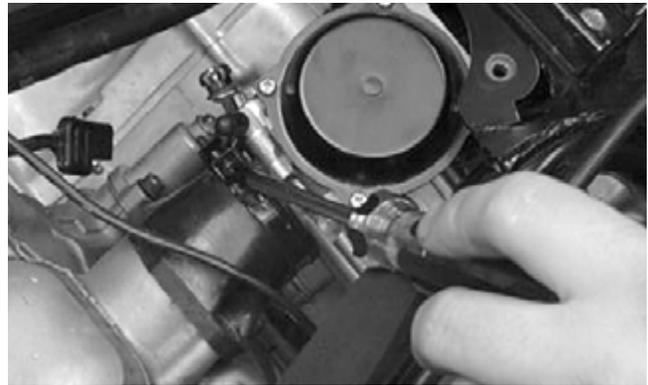
15. Remove the four cap screws securing the rear output joint to the transmission and push the shaft away from the transmission.



CC119D

16. Remove the cap screws and nuts securing the propeller shaft to the front differential coupler.

17. Detach the carburetor using the following procedure.
 - A. Loosen the clamps securing the carburetor boot and the air inlet boot.



CC120D

■NOTE: It will not be necessary to disconnect the choke cable.

- B. Route the carburetor assembly up and away from the engine.

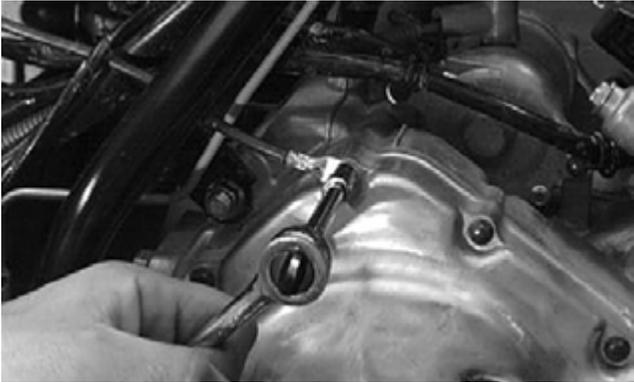
■NOTE: Use cable ties or tape to secure the carburetor assembly above the handlebars to keep it from interfering with the removal procedure.

18. Remove the clamp securing the upper coolant hose to the thermostat housing; then disconnect the hose.



CC335D

19. Disconnect the high tension lead from the spark plug.
20. Disconnect the battery ground (negative) cable from the crankcase cover; then disconnect the positive cable from the starter motor.

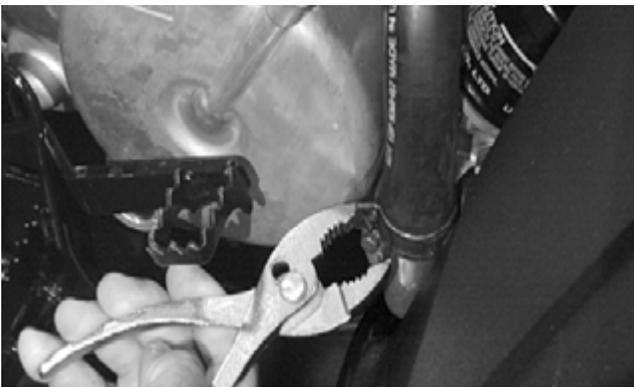


AR600D



AR604D

21. Remove the clamp securing the lower coolant hose to the water pump housing; then disconnect the hose.



CC334D

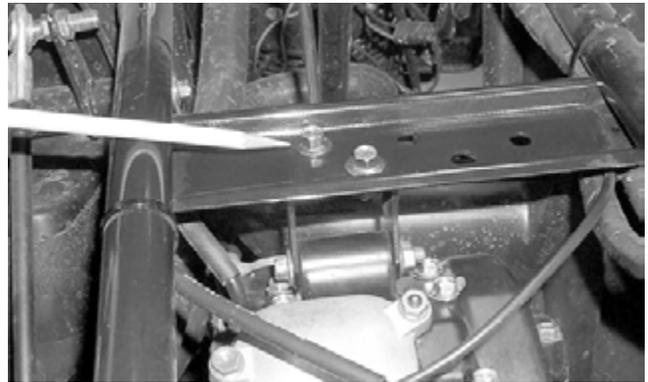
22. Loosen the clamp on the crankcase breather vent hose; then disconnect the hose and route it away from the engine.



CC122D

23. Remove the engine/transmission mounting fasteners in the following sequence:

- A. Upper front: Two cap screws (inside the bracket) and one cap screw and nut (topside of the engine).



AF939

- B. Lower front: One cap screw, nut, spacer, and washer.



CC123D

- C. Upper rear: One cap screw and nut with flat washer; then two left-side engine mount-to-frame cap screws.



CC125D

D. Lower rear: One cap screw and nut with flat washer.



CC126D

24. By sliding the rear of the engine out first, remove the engine/transmission from the left side of the frame.

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

B. Cylinder Head

■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.

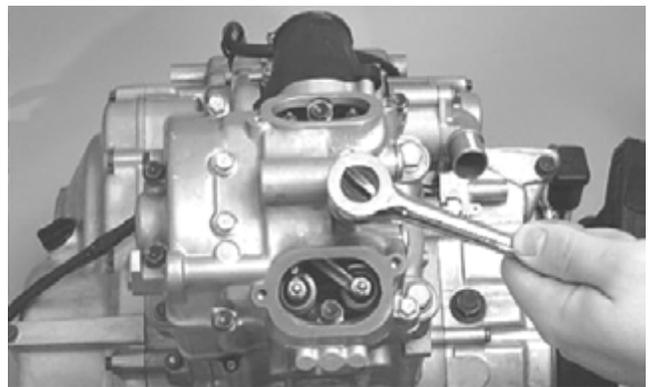
1. Remove the two tappet covers.



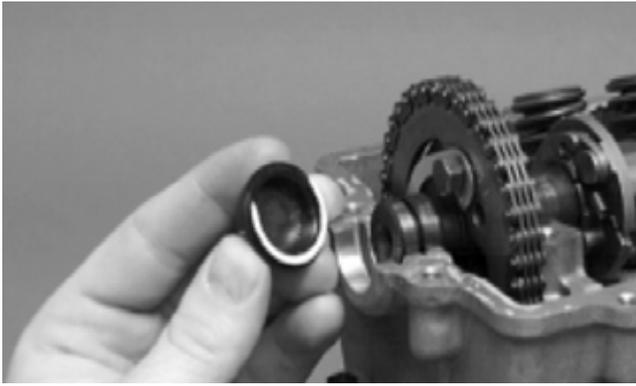
CC001D

■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.

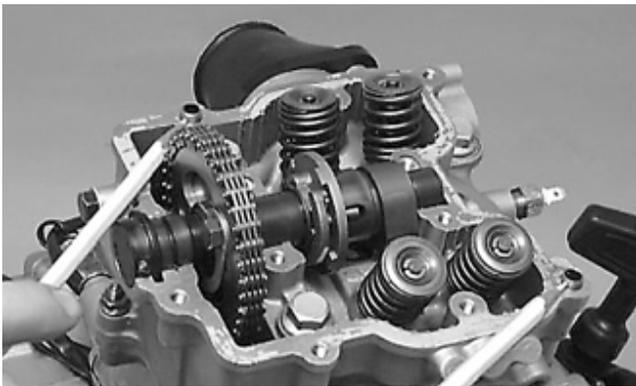


CC003D



CC274D

■NOTE: Note that the opening of the head plug can be directed to the 12 o'clock position or to the 6 o'clock position.

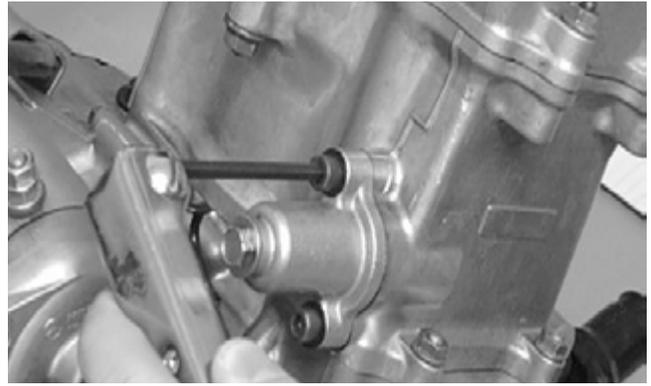


CC273D

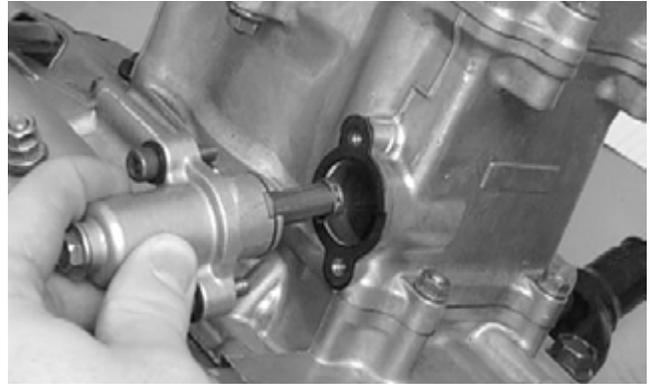
3. Loosen the cap screw on the end of the tensioner; then remove the two Allen-head cap screws securing the tensioner adjuster assembly and remove the assembly. Account for a gasket.



CC009D



CC010D



CC011D

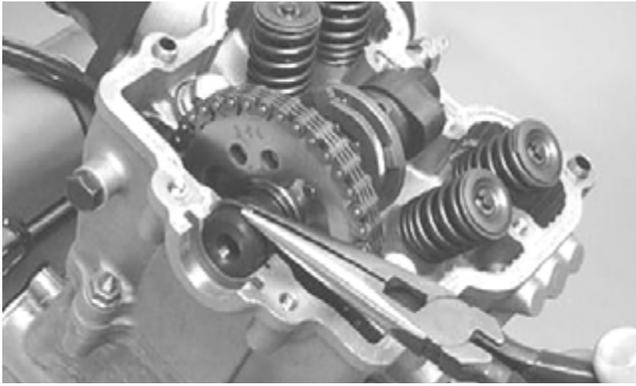
4. Remove the cap screw securing the chain tensioner (account for a washer); then remove the tensioner.



CC014D

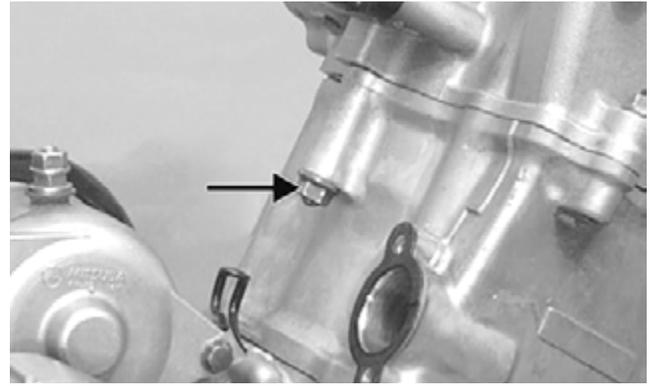
5. Using an awl, rotate the C-ring in its groove until it is out of the cylinder head; then remove the C-ring.

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

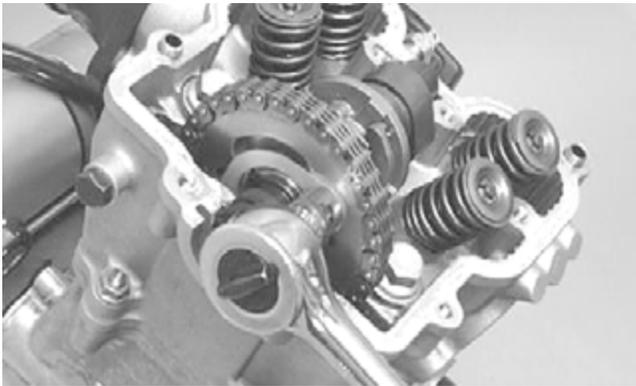


CC012D

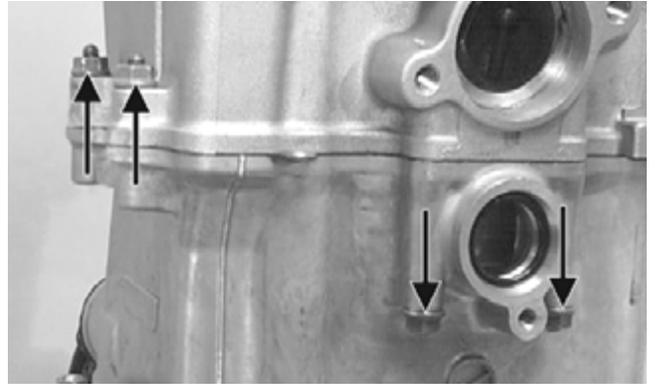
6. Bend the washer tabs and remove the two cap screws securing the sprocket to the camshaft; then drop the sprocket off the camshaft. While holding the chain, slide the sprocket and camshaft out of the cylinder head.



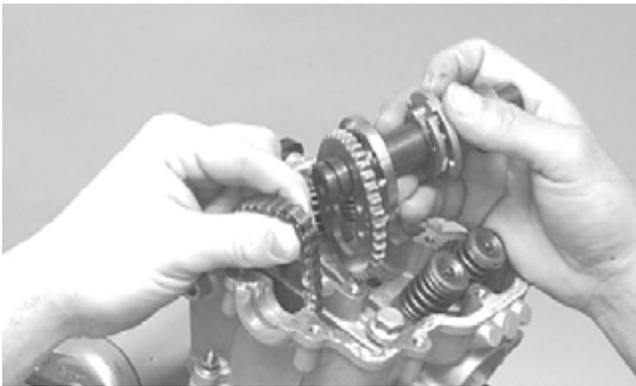
CC017D



CC013D



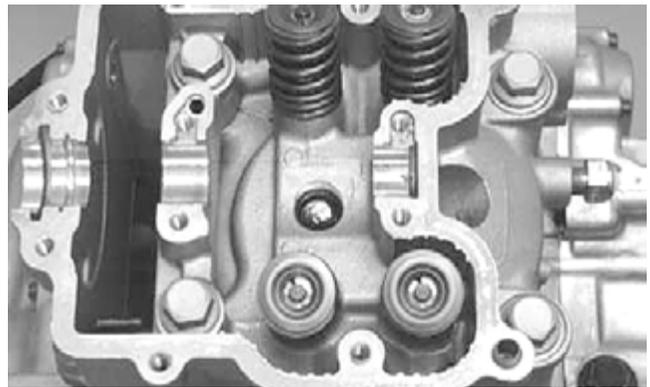
CC018D



CC266D

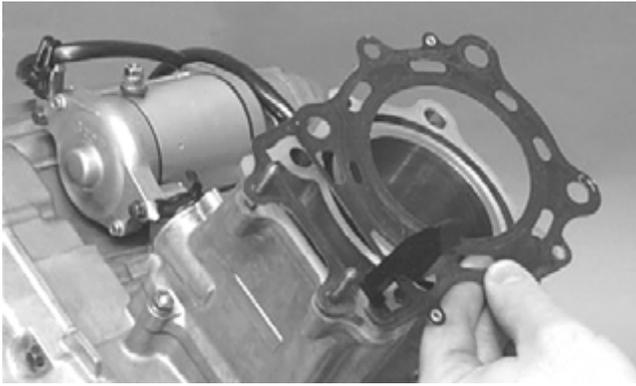
■NOTE: Loop the chain over the cylinder and secure it with a wire to keep it from falling into the crankcase.

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).



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.

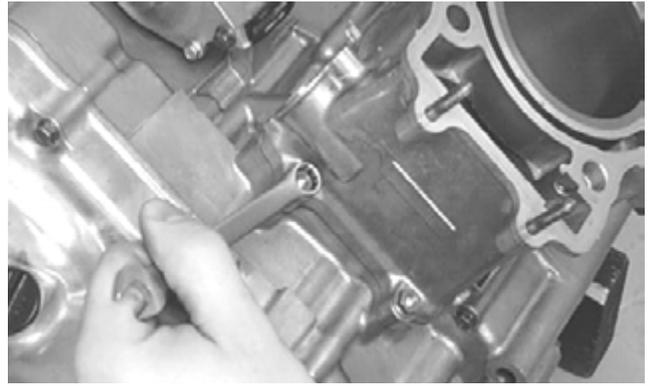


CC022D

C. Cylinder
D. Piston

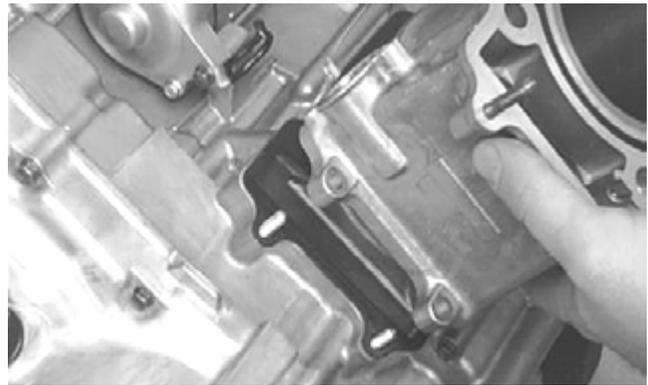
■NOTE: Steps 1-9 in the preceding sub-section must precede this procedure.

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.

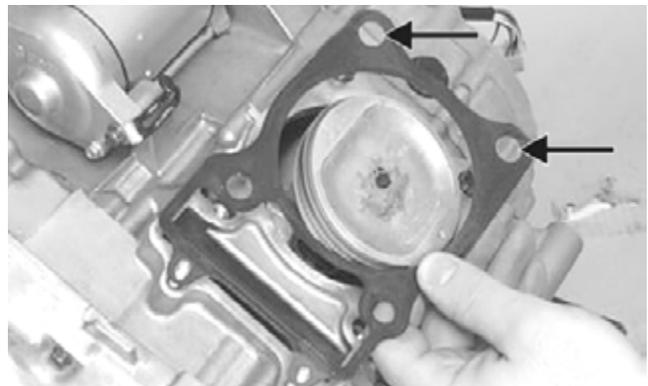


CC023D

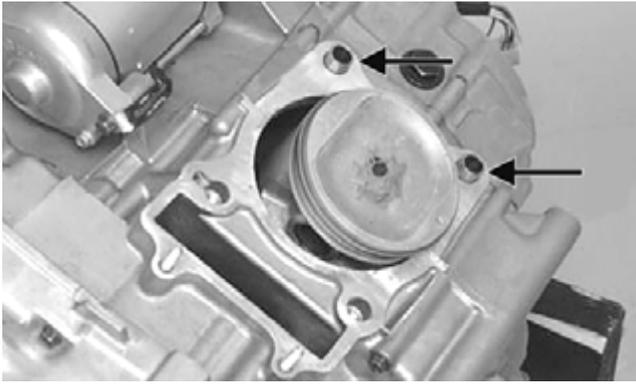
12. Lift the cylinder off the crankcase taking care not to allow the piston to drop against the crankcase. Account for the gasket and two alignment pins.



CC024D



CC025D



CC026D

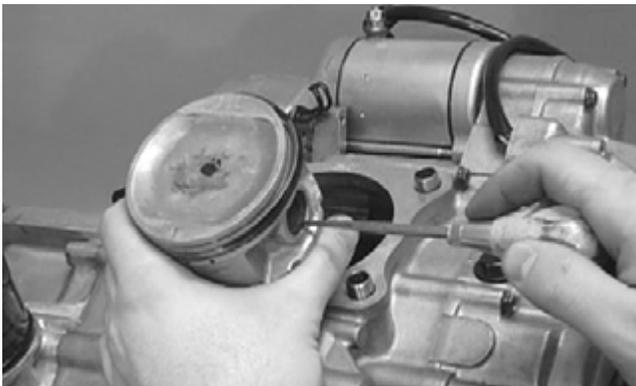
👉 AT THIS POINT

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.

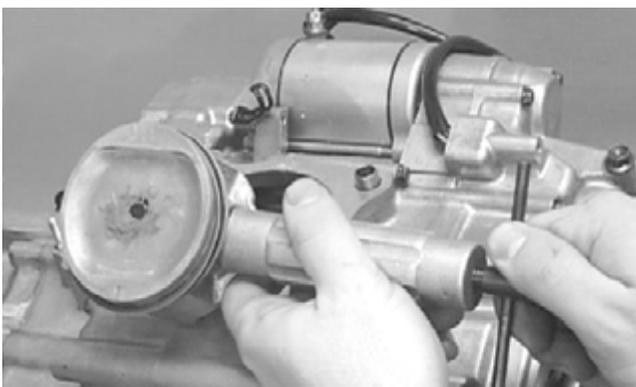
13. Using an awl, remove one piston-pin circlip.



CC032D

14. Using the Piston-Pin Puller (p/n 0644-328), 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 (p/n 0444-006).

⚠ 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.

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.

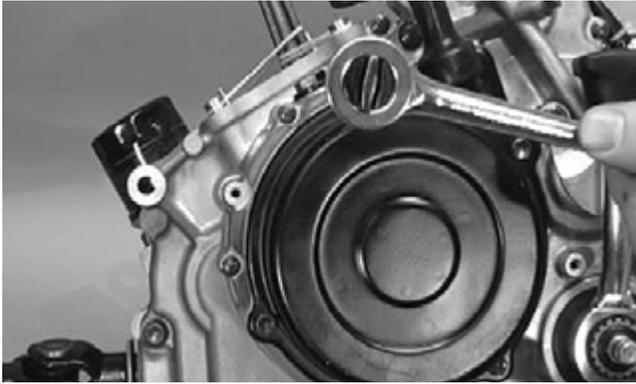
Removing Left-Side Components

- A. Recoil Starter**
- B. Hi/Low Shifter Assembly**
- C. Speedometer Drive**
- D. Cover**

1. Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the recoil starter.

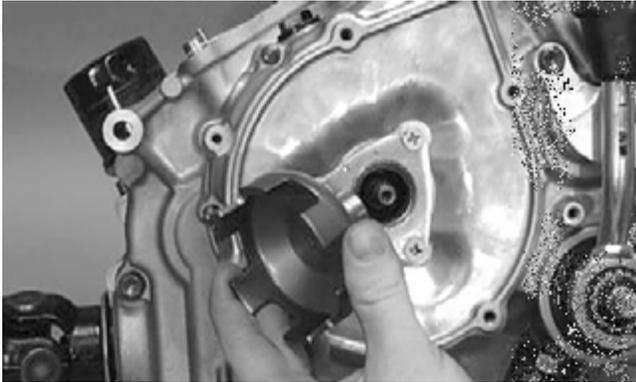
AT THIS POINT

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.



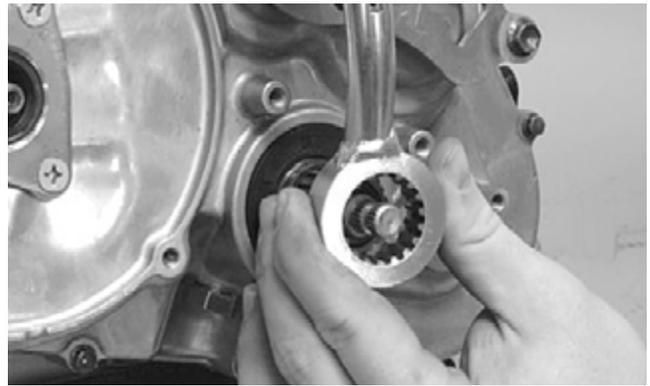
CC041D

3. Put the shift lever into the hi-range position and remove the circlip 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



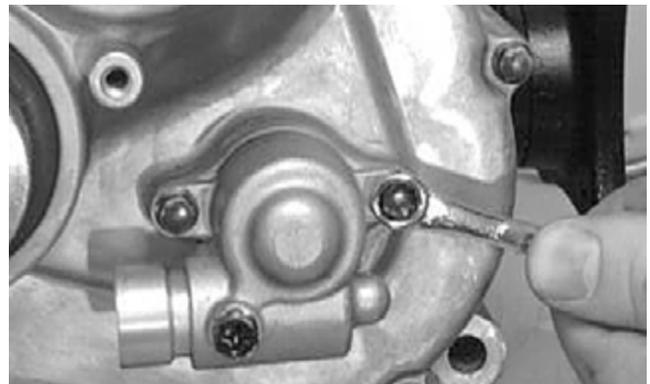
CC045D

4. Remove the inside circlip.



CC046D

5. Remove the two cap screws securing the speedometer drive adapter; then remove the adapter. Account for the gasket.

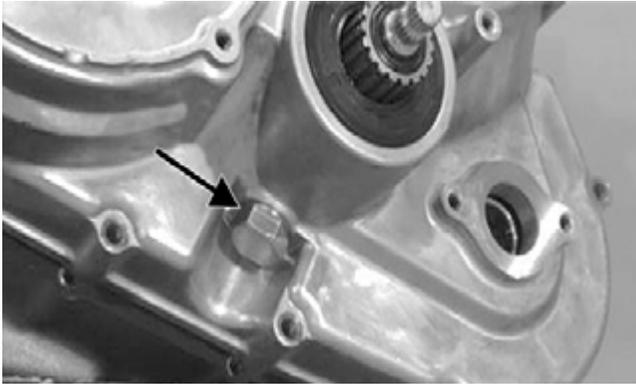


CC042D



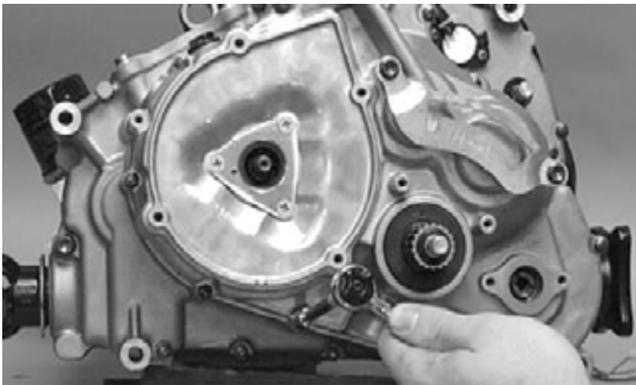
CC043D

- Remove the shift stop housing assembly from beneath the shift shaft housing. Account for the stopper and spring.

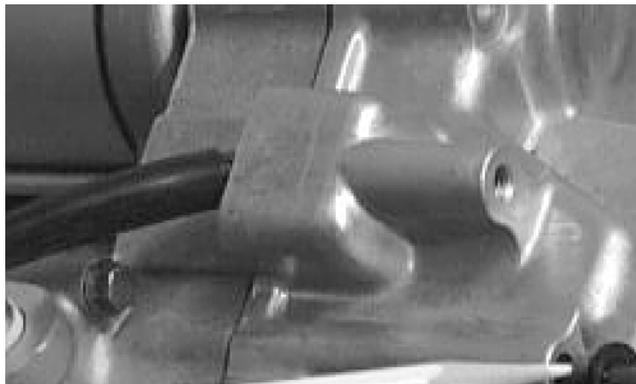


CC054D

- Remove the fourteen cap screws securing the left-side cover to the crankcase and note the location of the long cap screw with rubber washer.



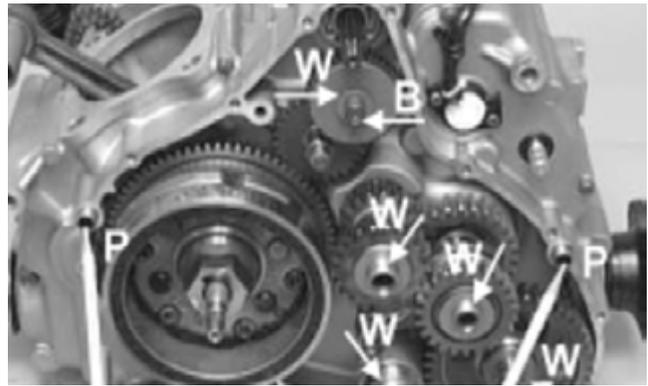
CC047D



CC055D

- Using Side Case Puller (p/n 0644-262), 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 any shaft washers that may have come off with the cover. Make sure they are returned to their respective shafts and that the idle gear bushing is on the shaft or in the cover.



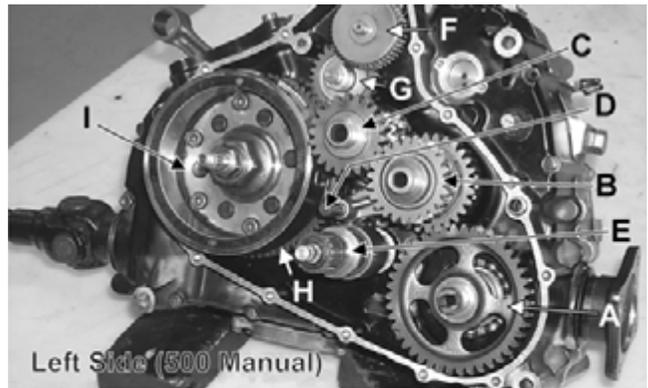
CC326D

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 CC820B.

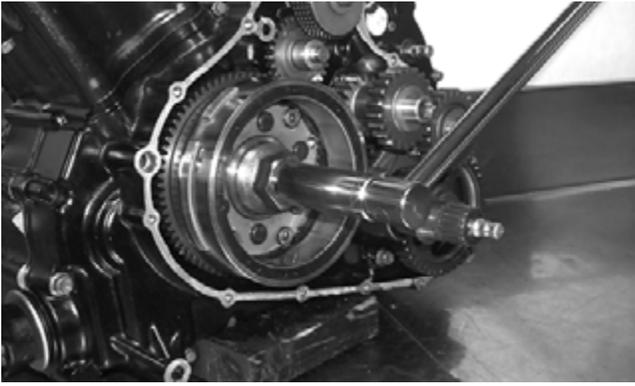


KEY CC820B	
A. Output Shaft with Driven Gear	F. Starter Gear Assembly
B. Drive Gears #1 & #2	G. Starter Idle Gear
C. Idle Gear	H. Starter Clutch Gear Assembly
D. Shift Fork with Shaft	I. Rotor/Flywheel
E. Shift Shaft Assembly	

CC820B

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

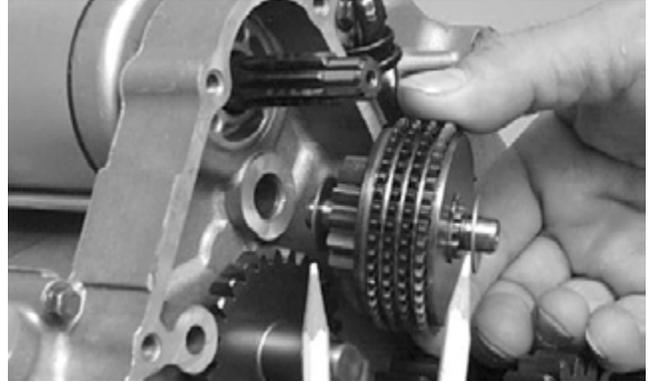
- Remove the nut securing the rotor/flywheel (I) to the crankshaft; then install the magneto rotor remover adapter.



CC147D

11. Remove the starter gear assembly (F) from the crankcase; then account for a washer on each end of the assembly.

■NOTE: There are bushings on each end of the assembly. The bushings may stay with the assembly or in the case halves.

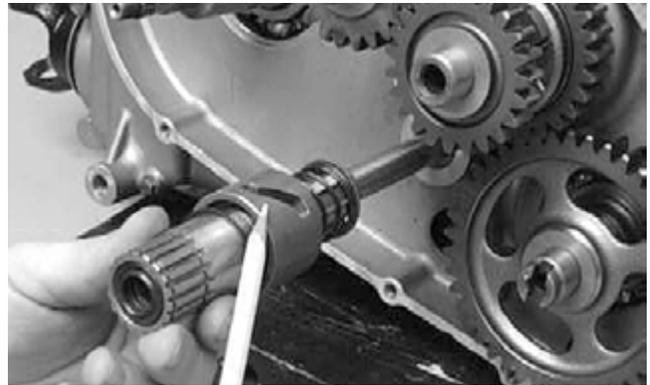


CC157D



CC327D

10. Using Magneto Rotor Remover (p/n 0444-075), remove the rotor/flywheel assembly from the crankshaft. Account for the key; then remove the starter clutch gear assembly (H) and thrust washer.



CC057D



CC149D

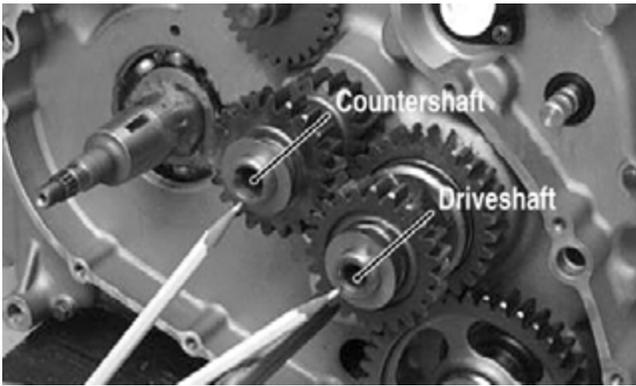


CC333D

13. Remove a washer from the countershaft and from the driveshaft.



CC150D



CC058DA

14. Remove the idle gear (C) and spacer from the countershaft.



CC059D



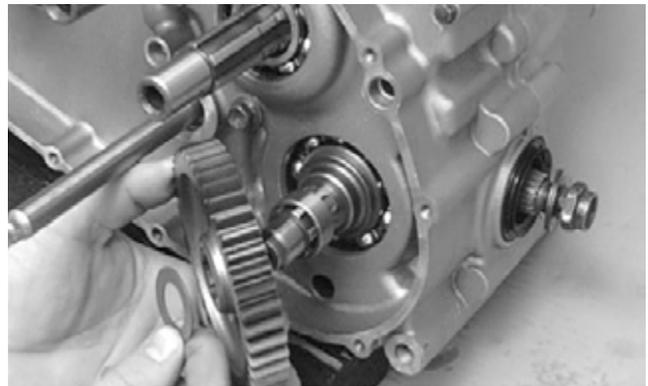
CC062D

17. Remove the washer and driven gear (A) from the output shaft; then account for the bushing.



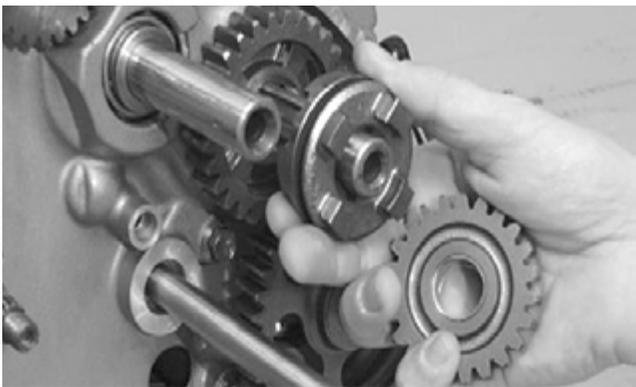
CC060D

15. Remove the #2 drive gear (B) and the select sliding dog gear from the driveshaft. Account for a bushing and a washer.



CC063D

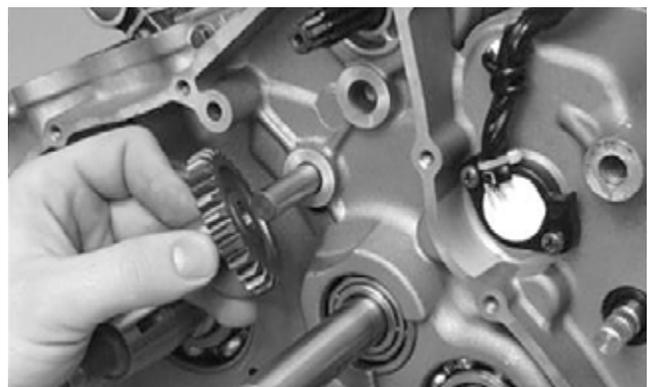
18. Remove the starter idle gear (G) from the pin; then remove the pin.



CC061D

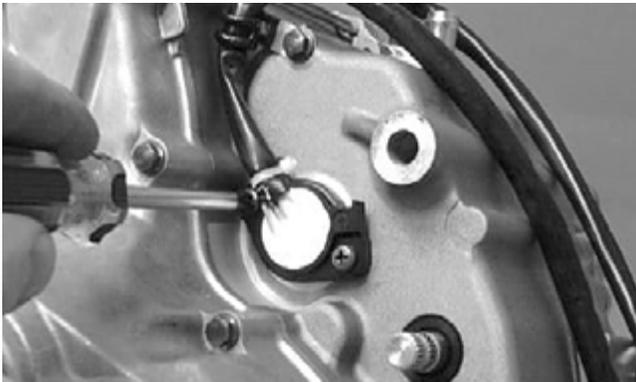
16. Remove the circlip and washer from the driveshaft; then remove the #1 drive gear (B). Account for a splined bushing and a spacer.

⚠ AT THIS POINT
To service shift fork, see Servicing Left-Side Components sub-section.

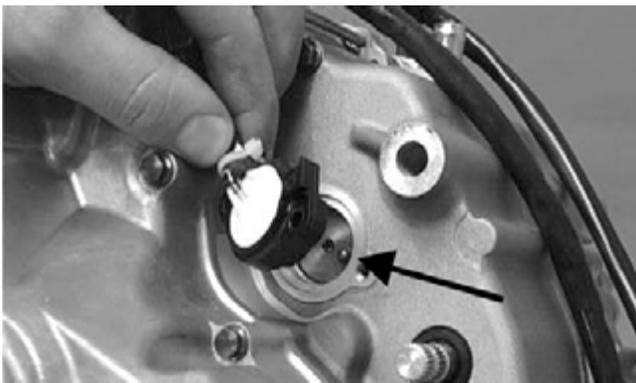


CC064D

19. Remove the Phillips-head screws securing the shift-indicator sending unit; then remove the sending unit. Account for an O-ring, neutral contact, and spring.



CC048D



CC049D

20. Remove the two cap screws securing the starter to the crankcase; then remove the starter. Account for the wiring forms.



CC065D

⚠ AT THIS POINT

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

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

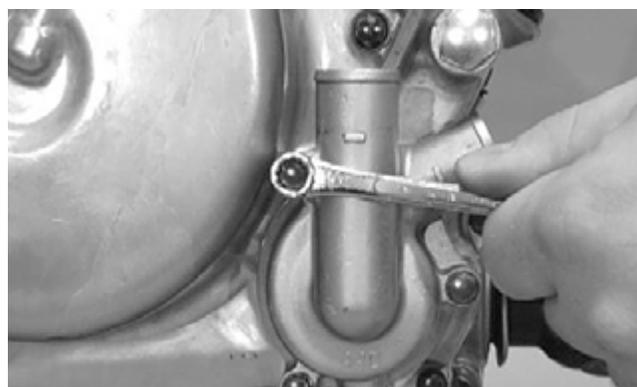
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

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

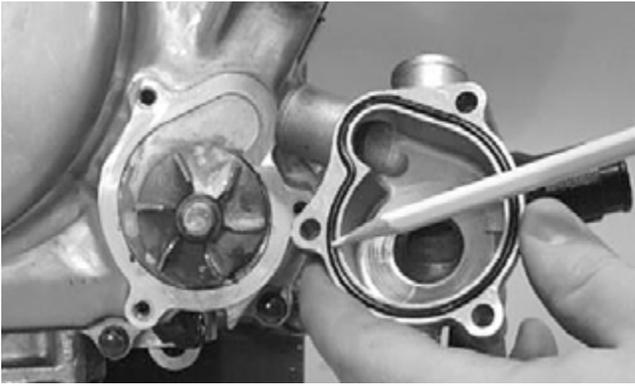
Removing Right-Side Components

- 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 Oil Filter Wrench (p/n 0644-389), 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.



CC027D



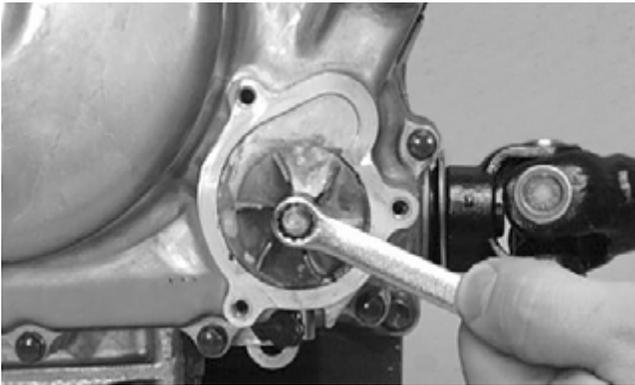
CC028D

4. Remove the cap screw securing the impeller to the impeller shaft; then remove the impeller. Account for the rubber retainer and porcelain seal.

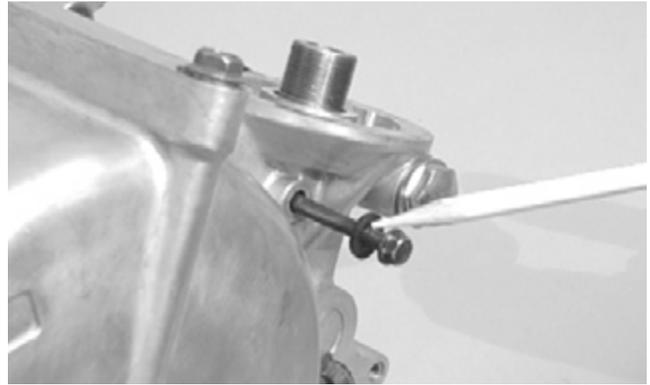


CC034D

■NOTE: The water pump housing does not have to be removed when removing the right-side cover.

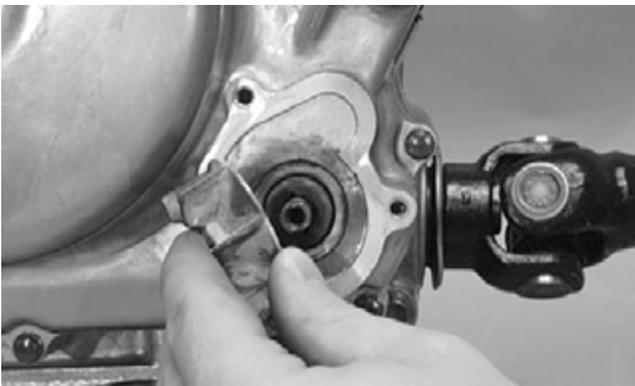


CC029D



CC068D

■NOTE: When removing the right-side cover, account for the release roller guide that it does not fall and cause damage.



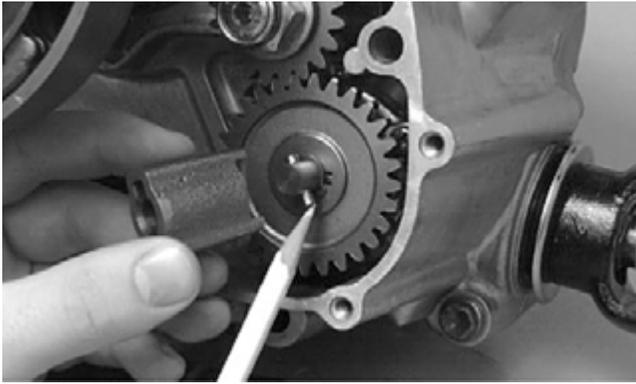
CC030D

5. Remove the fifteen 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.



CC070D

6. Remove the water pump drive joint from the water pump shaft. Account for the pin.



CC082D

C. Primary Clutch Shoe
D. Primary Clutch
E. Starter 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.



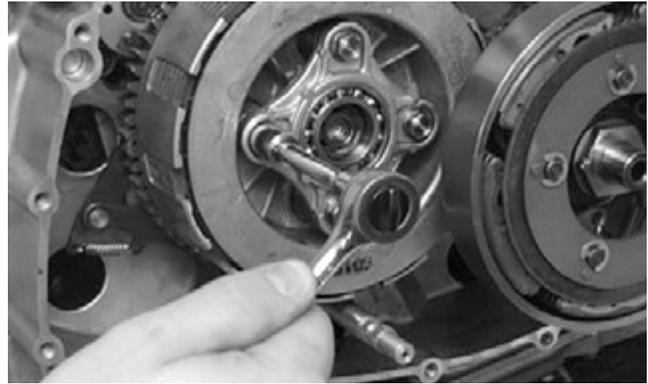
CC069D

8. Remove the cap screw securing the clutch release arm and remove the arm; then in a crisscross pattern, remove the four cap screws securing the clutch release roller assembly.

■NOTE: Scribe a reference mark with a marker on the arm and shaft to aid in assembly.



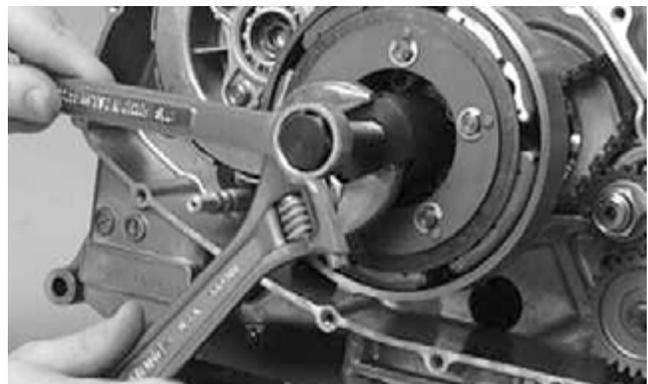
CC073D



CC074D

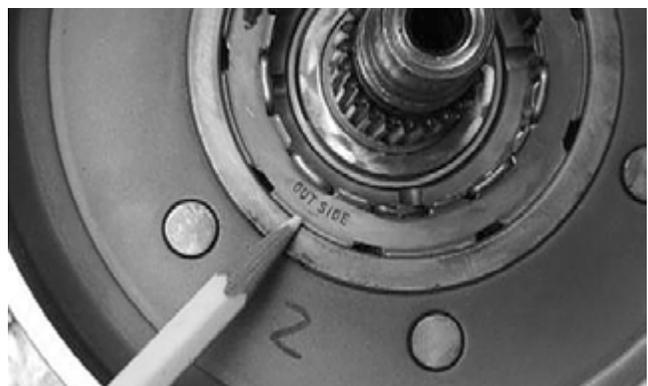
9. Remove the release roller assembly. Account for four springs.
10. Remove the starter clutch-shoe nut (left-hand threads) and washer from the driveshaft; then using a primary clutch shoe remover, remove the clutch shoe.

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



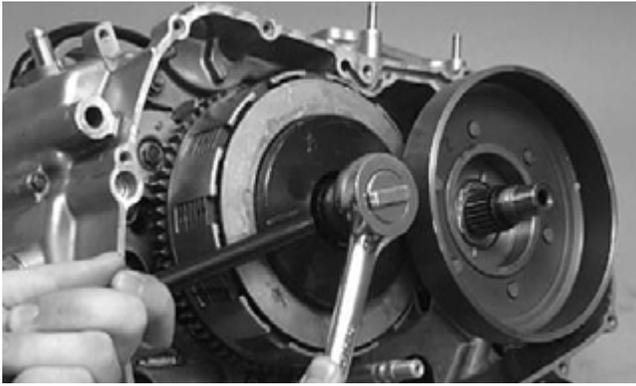
CC072D

11. Remove the primary drive one-way clutch from the starter clutch housing. Note the word OUTSIDE stamped on the clutch for installing purposes.



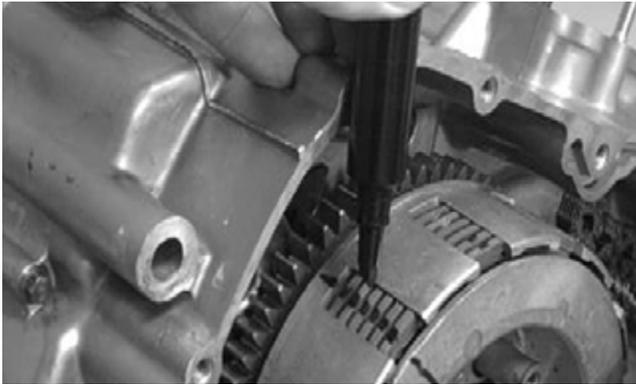
CC075D

12. Using the Clutch Sleeve Hub Holder (p/n 0444-007) to hold the clutch sleeve hub, remove the nut and washer.



CC076D

13. Scribe a line across the primary clutch assembly to aid in assembling.



CC077D

14. Simultaneously, remove the primary clutch assembly and starter clutch housing from their respective shafts. Account for the sleeve and washers.



CC078D

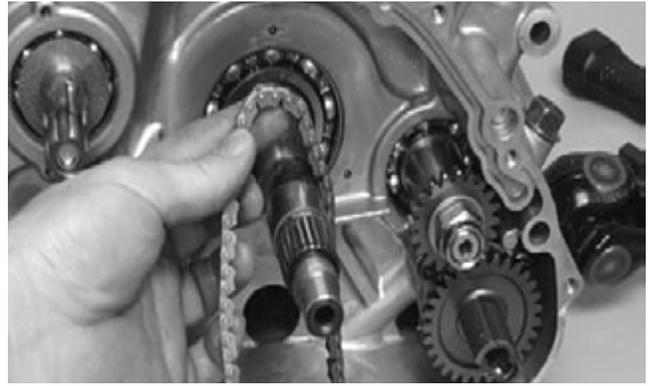
👉 AT THIS POINT

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

F. Gear Shift Cam Plate/Guide G. Oil Pump/Oil Strainer

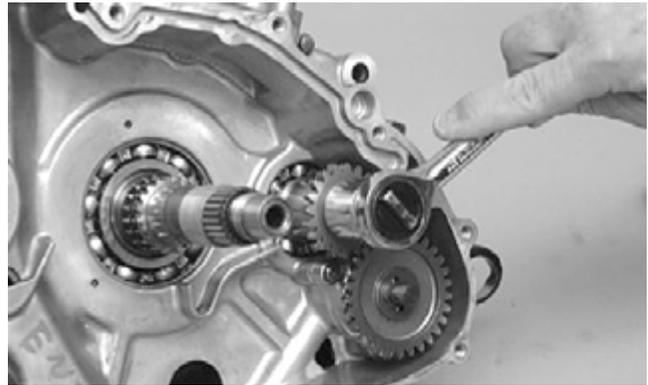
■NOTE: Steps 1-14 in the preceding sub-sections must precede this procedure.

15. Remove the chain from the crankcase.



CC079D

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



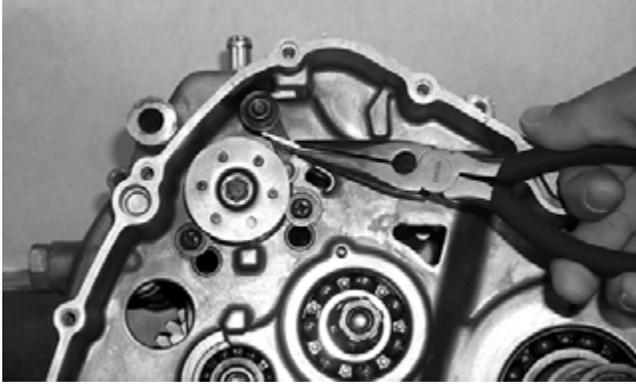
CC081D

17. Remove the gear shift shaft from the crankcase.



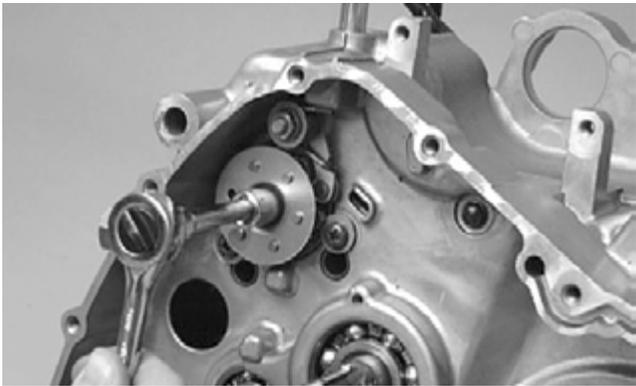
CC085D

18. Release the tension from the gear shift cam stopper arm spring.



CC086D

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

⚠ CAUTION

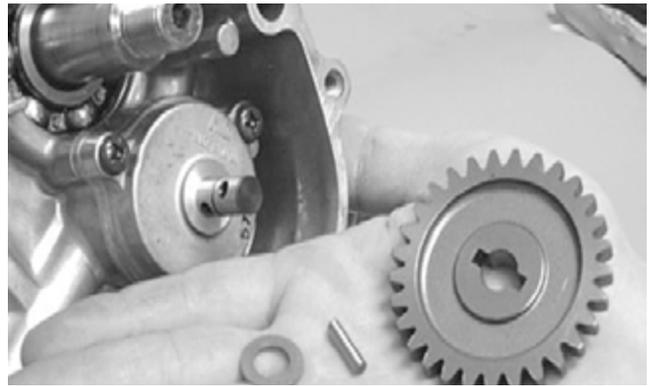
If servicing of the engine/transmission is due to a lubrication-related problem, replace the oil pump.

■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 circlip securing the oil pump driven gear; then remove the gear. Account for the pin and the washer.

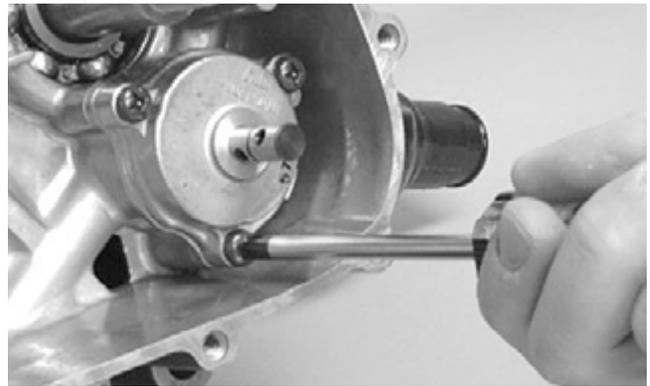


CC088D



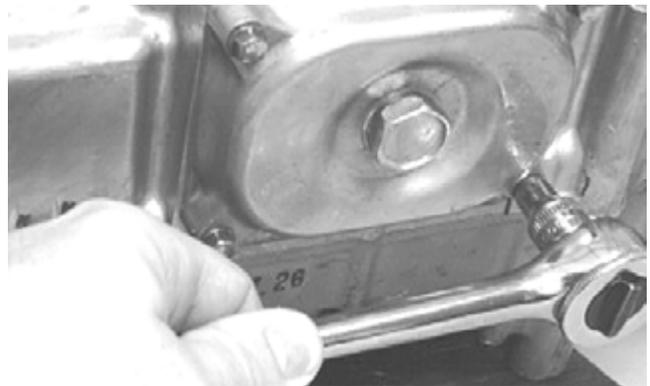
CC089D

21. Remove the three Phillips-head screws securing the oil pump; then remove the oil pump.



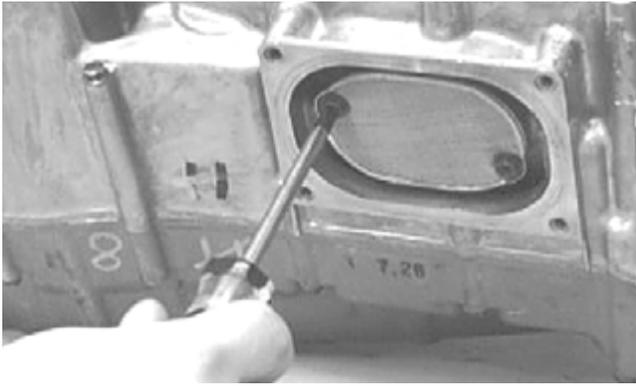
CC090D

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.

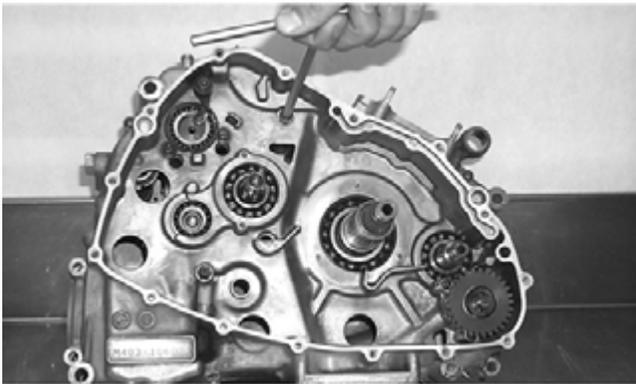
Center Crankcase Components

■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.

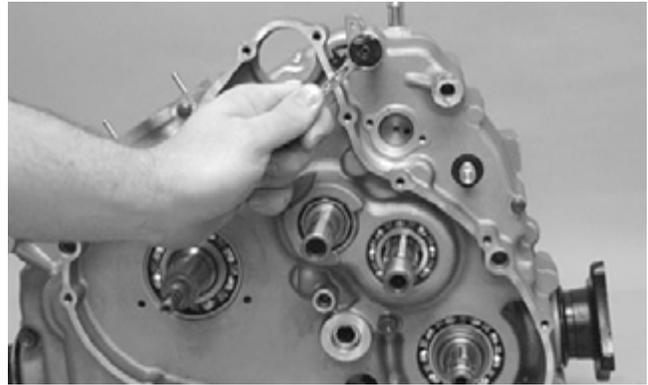
Separating Crankcase Halves

1. Remove the five 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 seven 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.



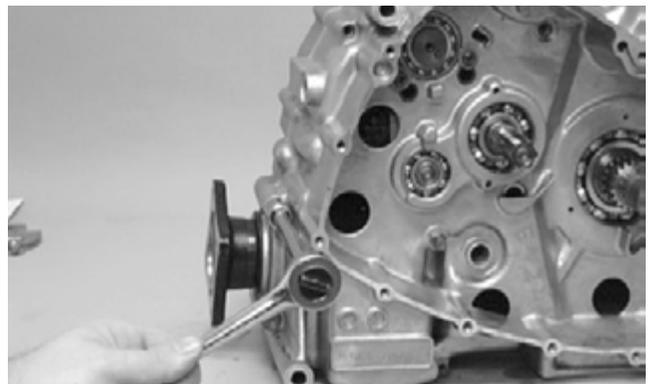
CC096D

3. Remove the three 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 three right-side 8 mm cap screws securing the crankcase halves.



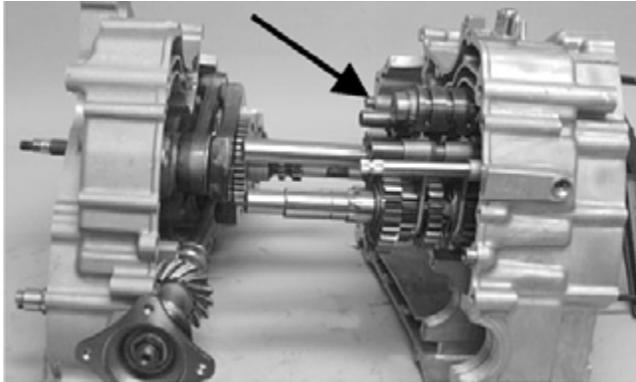
CC098D

5. Using the Crankcase Separator/Crankshaft Remover (p/n 0444-009) 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



CC100D



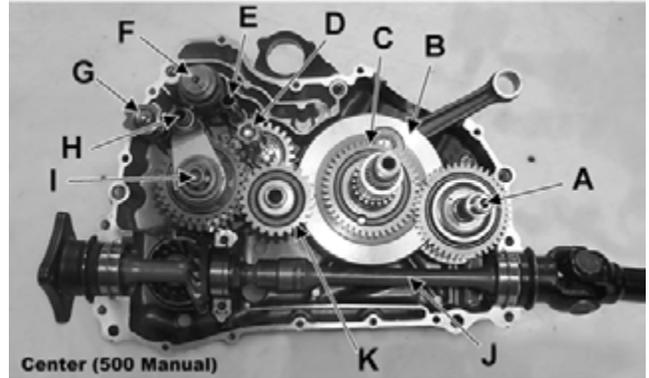
CC101D



CC102D

Disassembling Crankcase Half

■NOTE: For steps 1-10, refer to illustration CC803A.



CC803A

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

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

- 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.

- Remove the reverse idle gear (K) w/shaft. Account for the bushing, two washers, and the circlip.
- 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.

- 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.



CC166D

- Remove the driven gear from the crank balancer assembly (A). Account for a key.



CC165D

AT THIS POINT

To service the driven gear, see Servicing Center Crankcase Components sub-section.

■NOTE: For efficiency, if the driven gear is not being serviced, it is preferable to leave it assembled. The technician should use discretion and sound judgment.

- Remove the crank balancer assembly (A).

■NOTE: When removing the crank balancer assembly, rotate the crankshaft counterweight away from the crank balancer assembly counterweight.

- Using the Crankcase Separator/Crankshaft Remover (p/n 0444-009), push the crankshaft assembly out of the crankcase.



CC115D

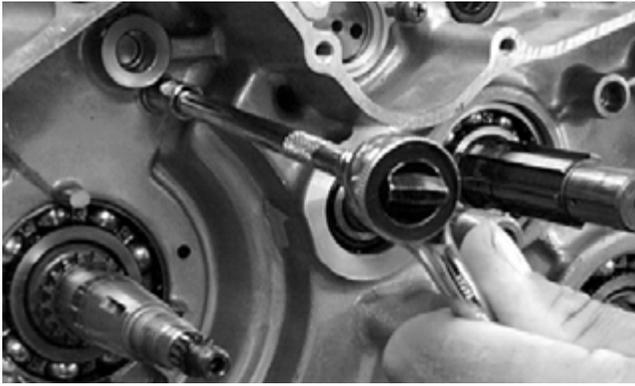
AT THIS POINT

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.

- 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

Table of Contents (Servicing Components)

■NOTE: Critical engine/transmission specifications are located at the beginning of this section.

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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

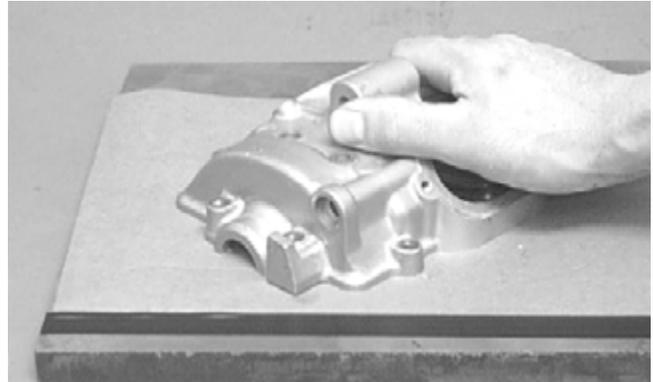
■NOTE: If the valve cover cannot be trued, the cylinder head assembly must be replaced.

1. Wash the valve cover in parts-cleaning solvent.

2. Place the valve cover on the Surface Plate (p/n 0644-016) 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

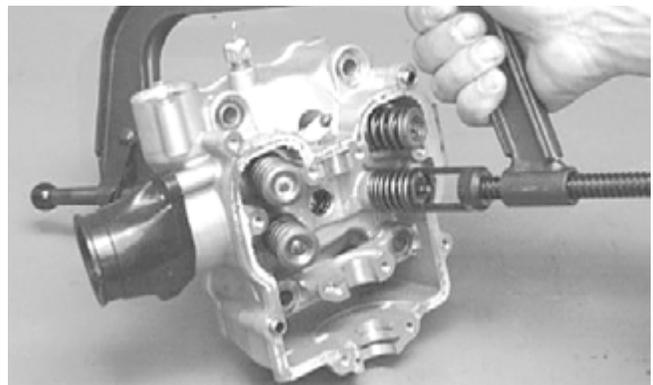
⚠ CAUTION

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

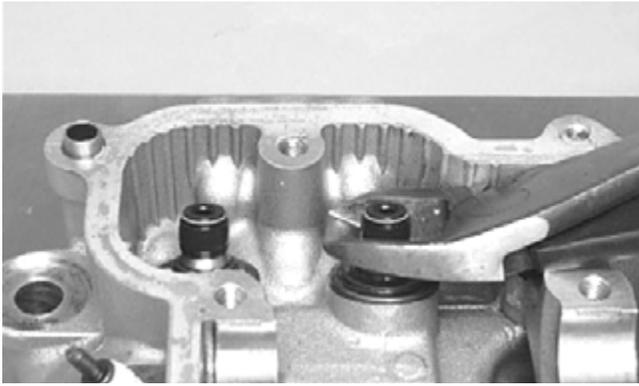
■NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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

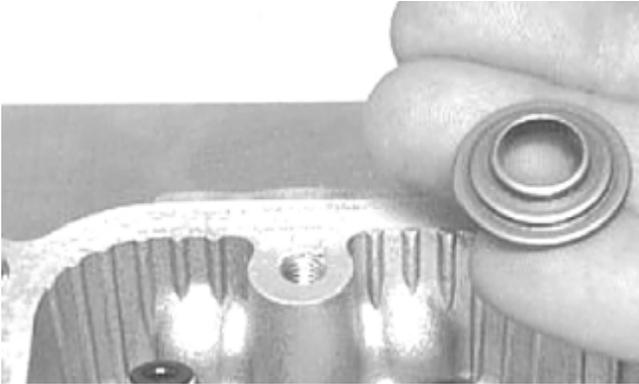


CC132D

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



CC134D



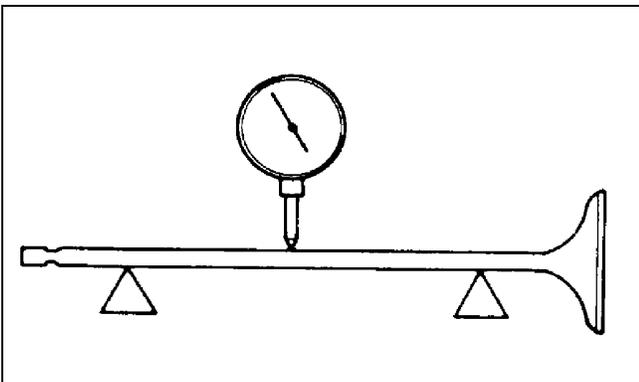
CC136D

■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 (p/n 0644-022); then check the valve stem runout using a dial indicator.



ATV-1082

2. Maximum runout must not exceed specifications.

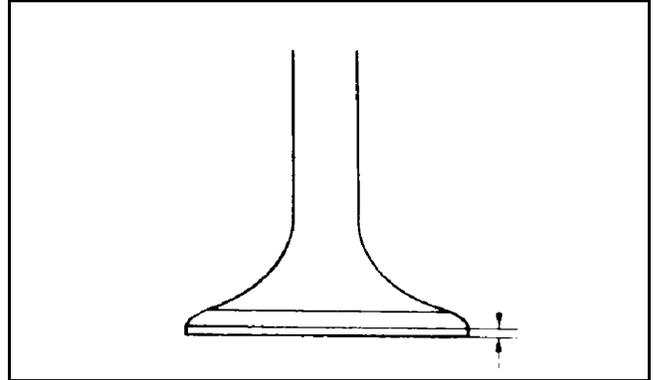
Measuring Valve Stem Outside Diameter

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.

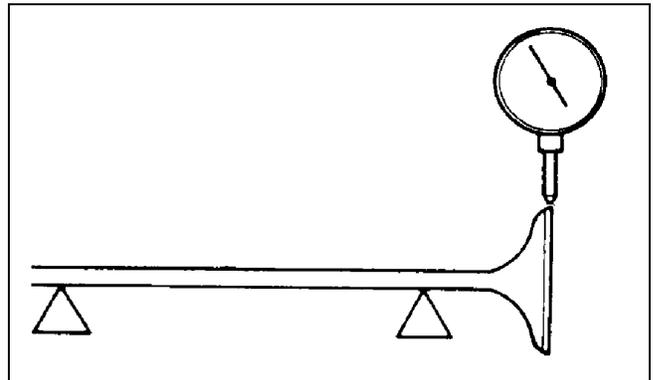


ATV-1004

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.

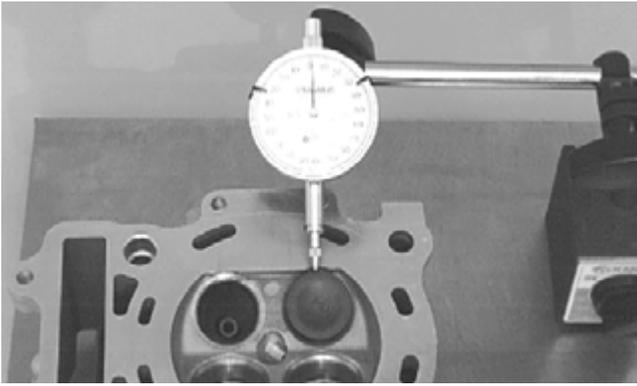


ATV1082A

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.

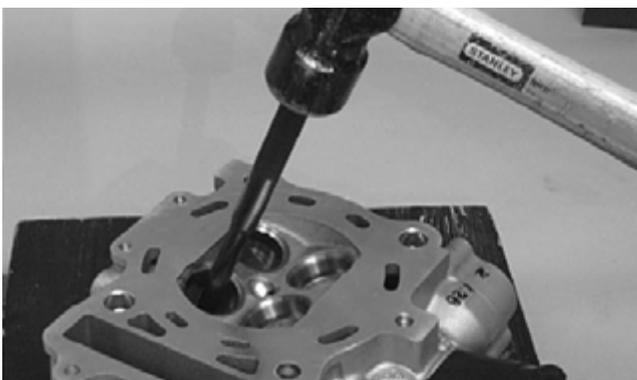
Measuring Valve Guide (Inside Diameter)

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.

Replacing Valve Guide

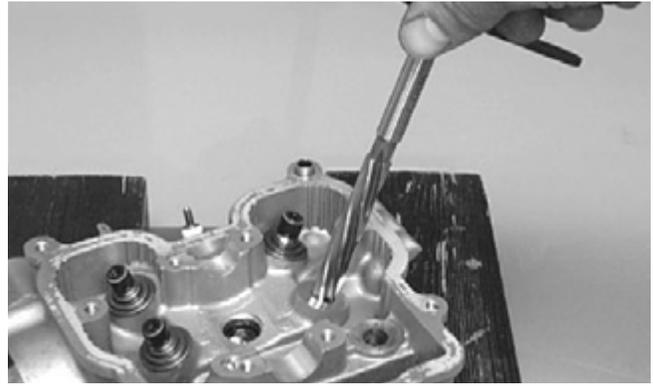
■NOTE: If a valve guide is worn or damaged, it must be replaced.

1. If a valve guide needs replacing, insert a valve guide remover into the valve seat side of the valve guide. Using a hammer, gently drive the valve guide out of the cylinder head.



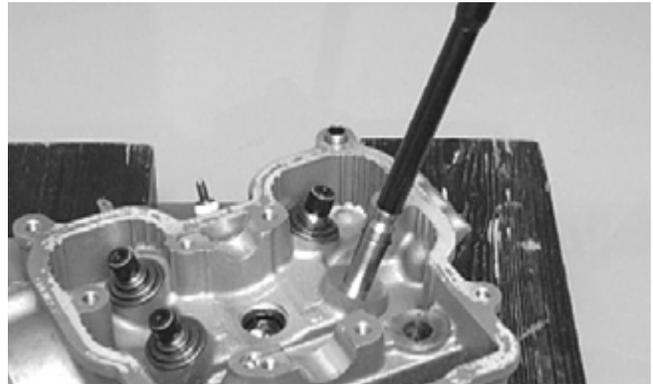
CC137D

2. Using the Standard Valve Guide Reamer (p/n 0444-017), remove any burrs or tight areas from the valve guide journals.



CC142D

3. To install a valve guide, use a valve guide installer and gently drive a valve guide with a retaining clip into the bore from the valve spring side until the retaining clip just contacts the cylinder head.



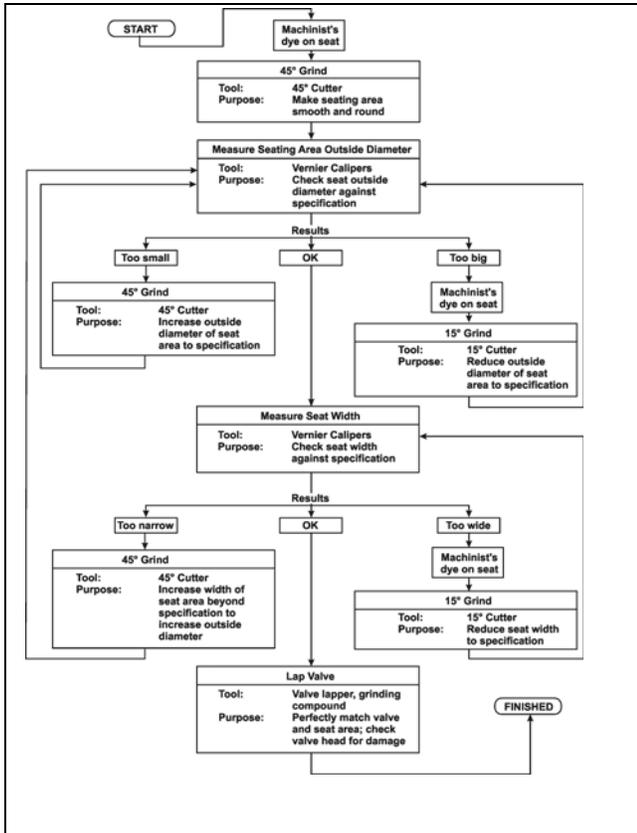
CC143D

4. After installing the guide, use the standard valve guide reamer to remove all burrs and tight areas that may remain in each valve guide.



CC138D

Valve Seat/Guide Servicing Flow Chart



ATV-0107

Grinding Valve Seats

■NOTE: If the valve seat is beyond servicing, the cylinder head must be replaced.

1. Insert an exhaust valve seat pilot shaft into an exhaust valve guide. Slide an exhaust valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the exhaust valve seat until within specifications.

■NOTE: Repeat procedure on the remaining exhaust valve.



CC139D

2. Insert an intake valve seat pilot shaft into one of the intake valve guides. Slide the intake valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the intake valve seat until within specifications.

■NOTE: Repeat procedure on the remaining intake valve.



CC140D

Lapping Valves

■NOTE: Do not grind the valves. If a valve is damaged, it must be replaced.

1. Remove all carbon from the valves.
2. Lubricate each valve stem with light oil; then apply a small amount of valve lapping compound to the entire seating face of each valve.
3. Attach the suction cup of a valve lapping tool to the head of the valve.
4. Rotate the valve until the valve and seat are evenly polished.
5. Clean all compound residue from the valve and seat.

Measuring Rocker Arm (Inside Diameter)

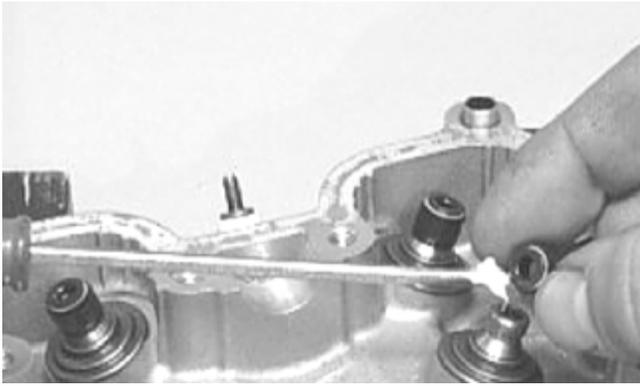
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range must be within specifications.

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

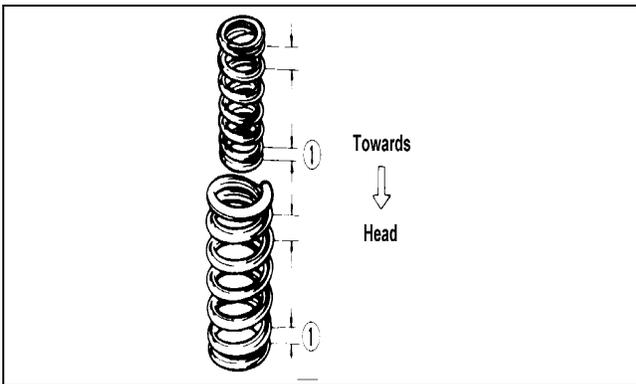
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



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 painted end is not visible, install the ends of the springs with the closest coils toward the head.



ATV-1011

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.



AN135

■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.

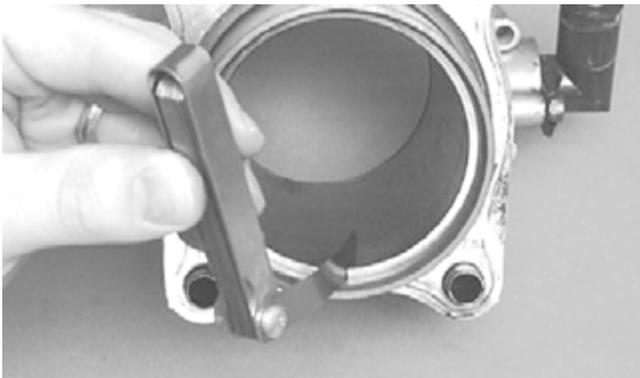
- Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

⚠ 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)

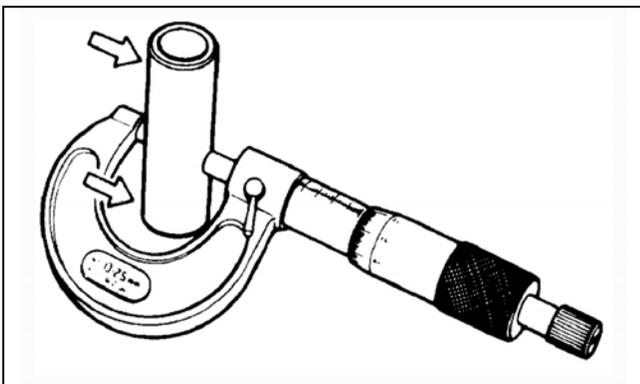
- Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
- Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within specifications.



CC280D

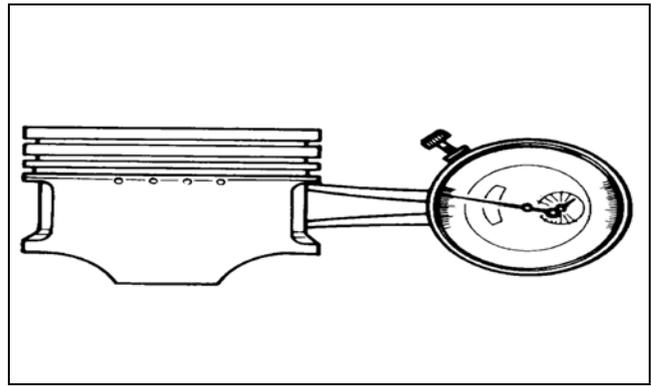
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

- 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

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



ATV-1069

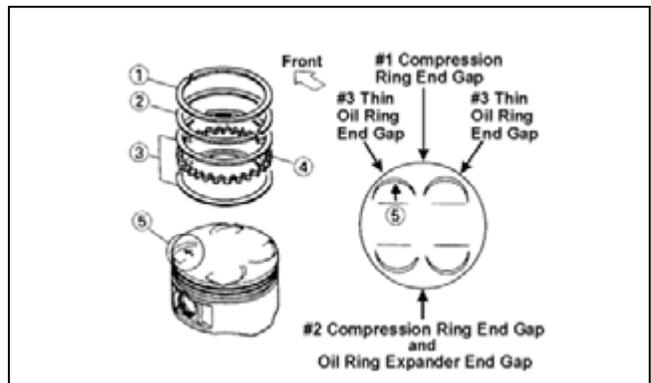
Measuring Piston Skirt/ Cylinder Clearance

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

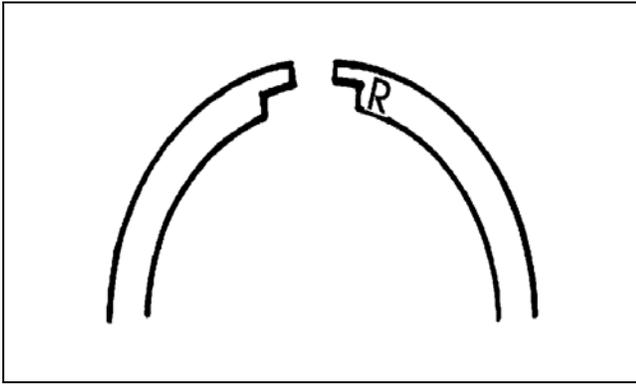
- Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

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



ATV-1085B

- 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).



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

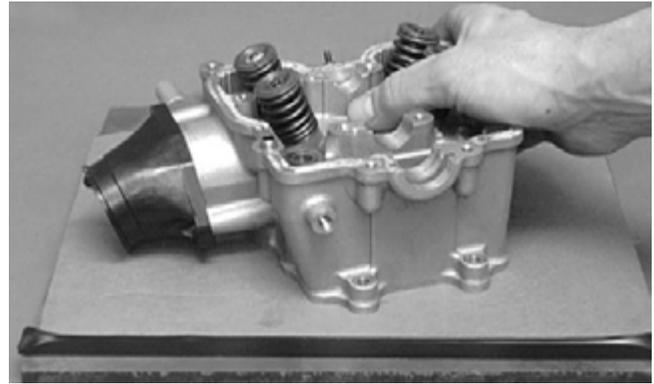
⚠ CAUTION

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

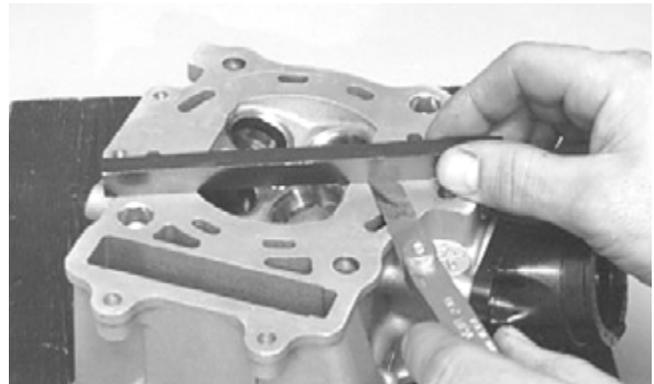
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.



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.



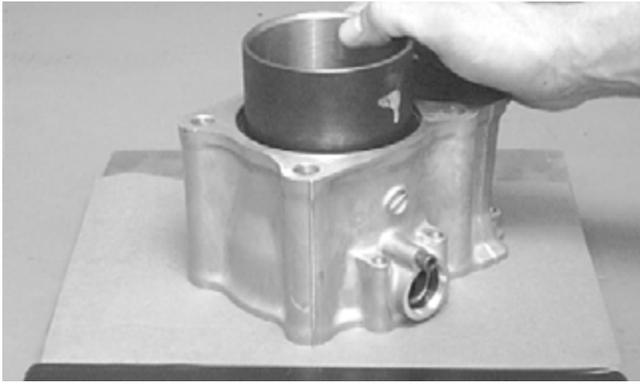
CC141D

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.



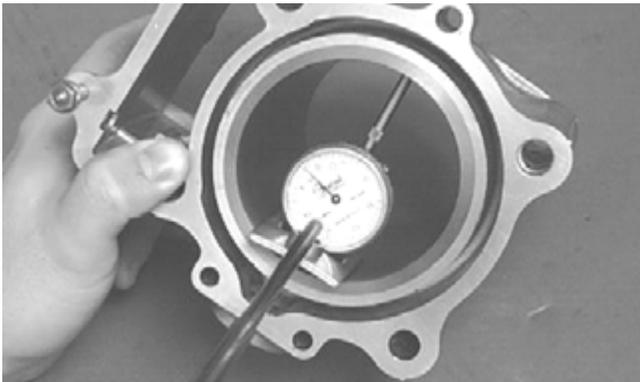
CC129D

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

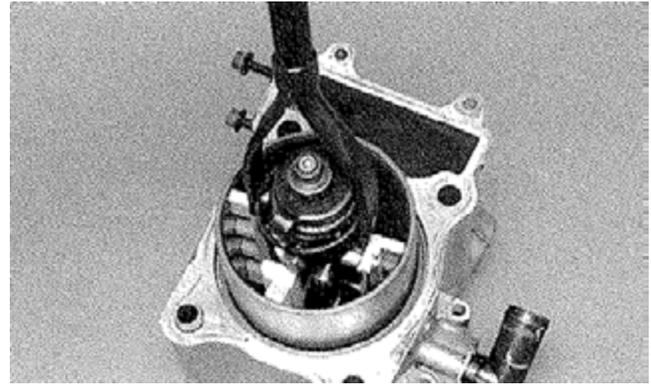
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest 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 rigid cylinder 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.

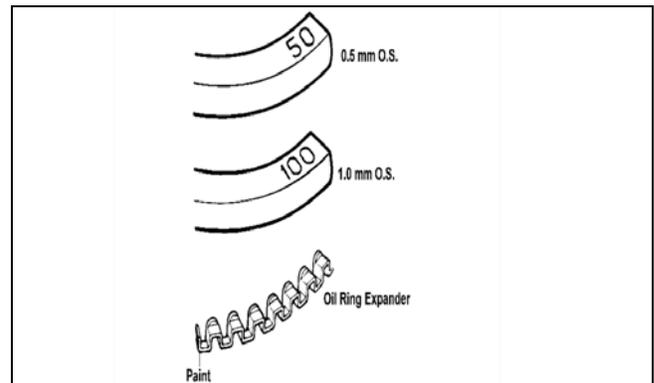


CC321D

■NOTE: Nickasil-plated cylinder cannot be honed.

4. If any measurement exceeds the limit, hone the cylinder and install an oversized piston or replace the cylinder.

■NOTE: Oversized piston and rings are available. The oversized piston and rings are marked for identification.

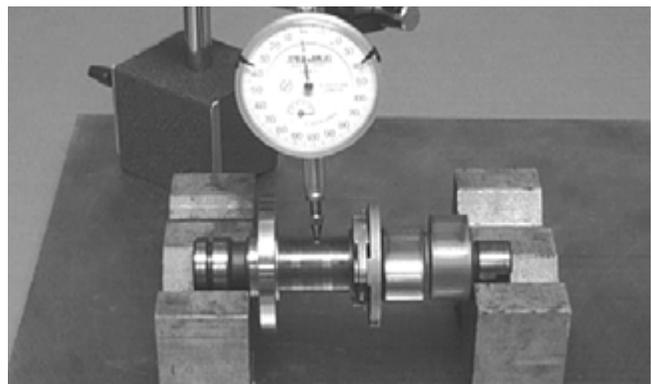


ATV-1068

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.

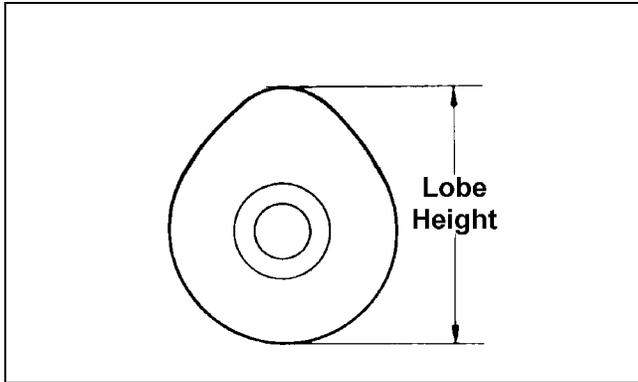


CC283D

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

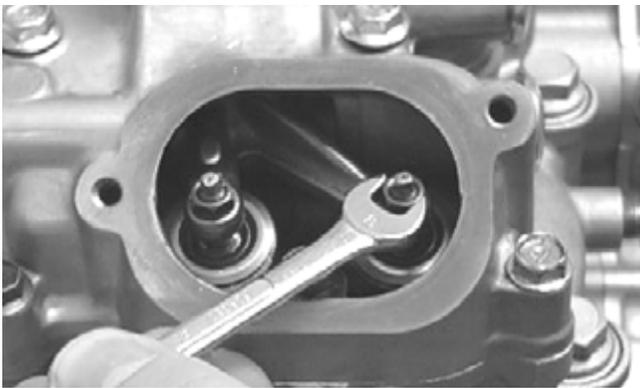
2. The lobe heights must not exceed minimum specifications.

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.

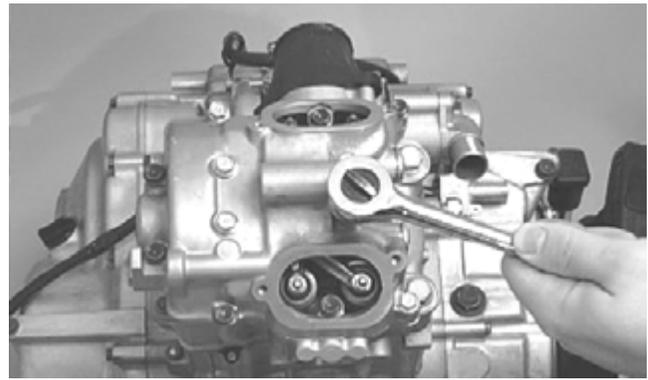


CC005D

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.

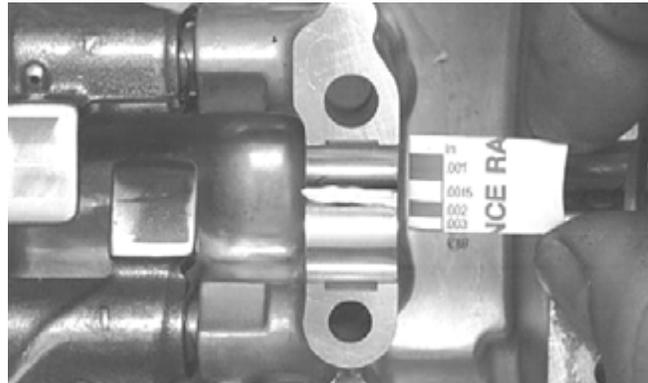
■NOTE: Do not rotate the camshaft when measuring clearance.

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



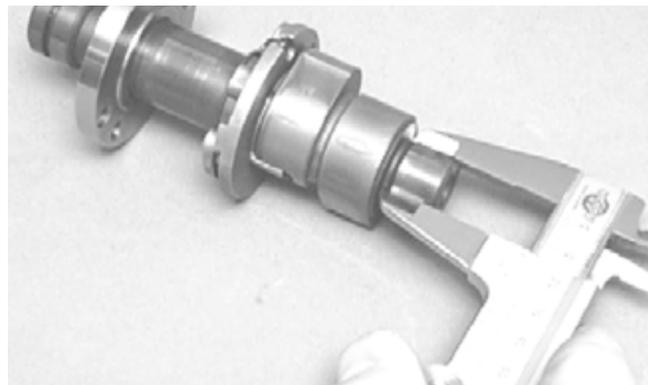
CC003D

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.

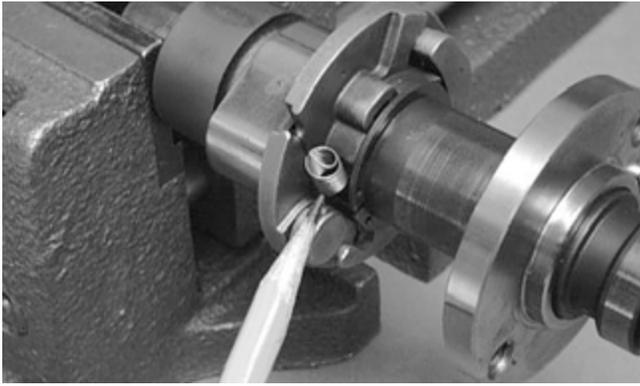


CC287D

■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.



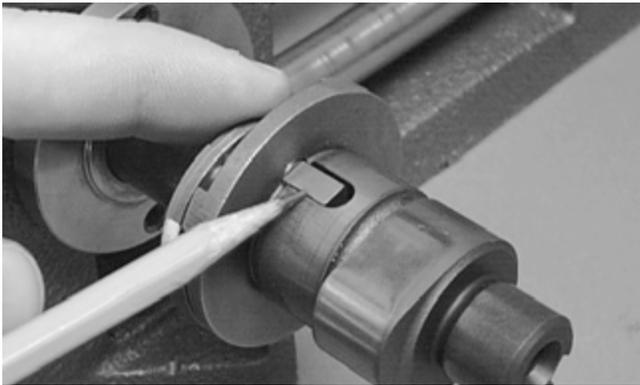
CC304D



CC039D



CC306D



CC308D

2. If damaged, the camshaft must be replaced.

Servicing Left-Side Components

RECOIL STARTER

⚠ WARNING

Always wear safety glasses when servicing the recoil starter.

Removing/Disassembling

1. Remove the cap screws securing the recoil starter assembly to the left-side cover; then remove the starter.

⚠ WARNING

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

2. 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.

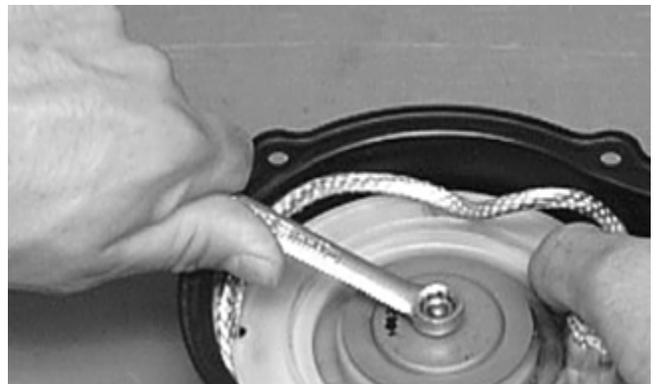


B600D

⚠ CAUTION

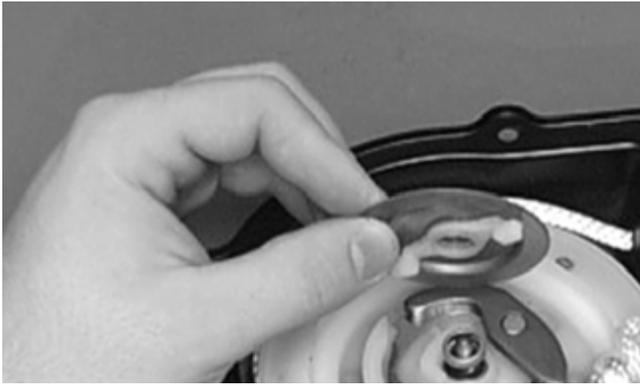
During the disassembly procedure, make sure all spring tension is released before continuing.

3. Remove the nut.



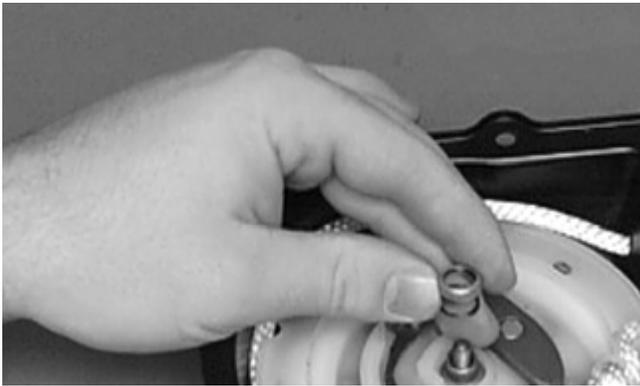
B601D

4. 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

5. Remove the spring cover, spring, and shaft.



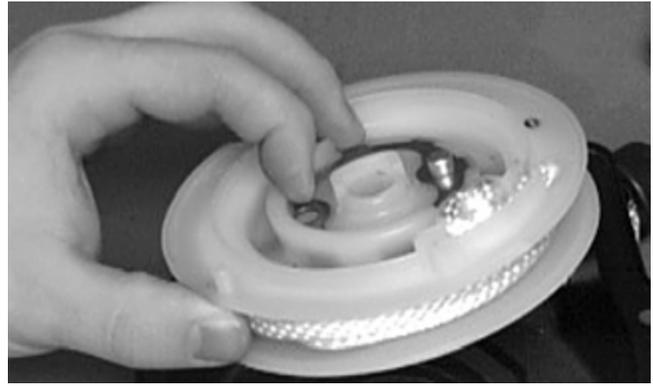
B603D

6. Remove the ratchet and account for the pin.



B604D

7. 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.

8. 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. It should be visually inspected in place to save time. If replacement is necessary, follow steps 9-10.**

9. 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.

10. 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/Installing

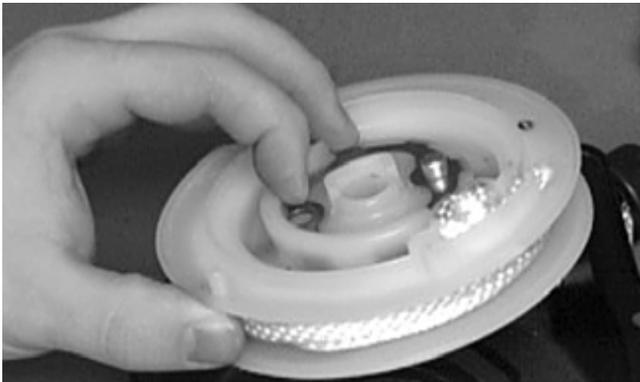
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

■ **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.



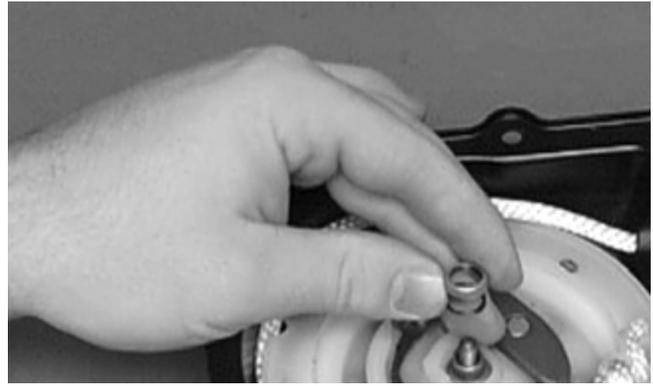
B605D

6. Install the ratchet onto its spring making sure the end is properly installed on the reel.



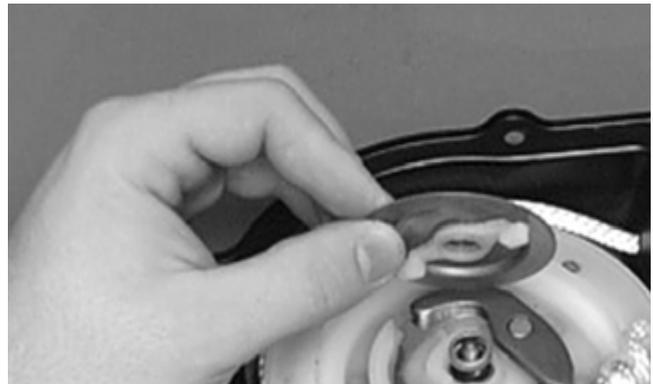
B604D

7. Install the shaft, spring, and the spring cover.



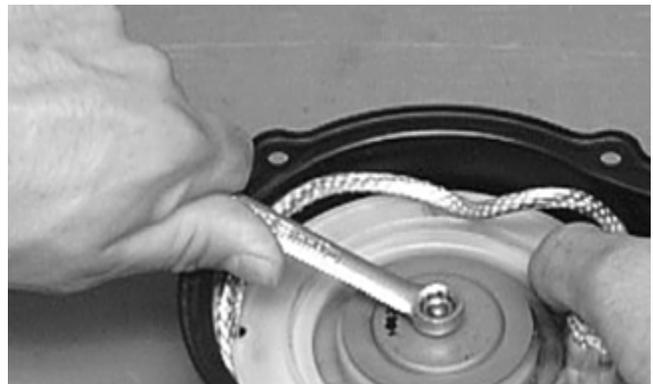
B603D

8. Install the friction plate with the ratchet guide fitting into the ratchet.



B602D

9. While pushing down on the reel, install the nut. Tighten securely.

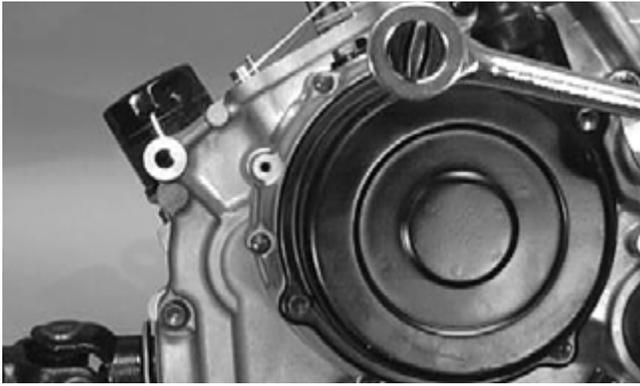


B601D

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

■NOTE: Increasing the rotations in step 11 will increase spring tension.

13. Place the recoil starter assembly into position on the left-side cover; then tighten the cap screws to 0.8 kg-m (6 ft-lb).



CC039D

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.

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.

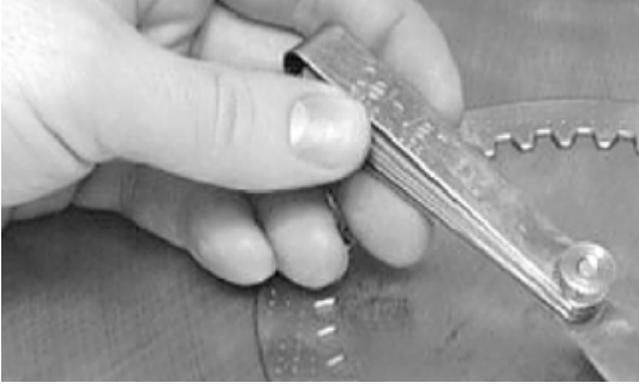
■NOTE: When removing components from the primary gear assembly, account for the bushing that fits into the primary gear.



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.

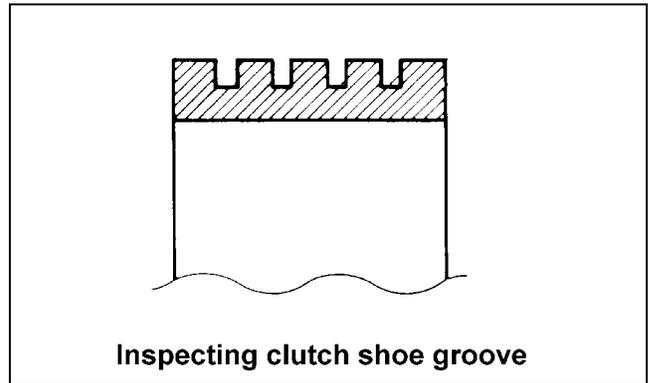


CC243D

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 Starter Clutch Shoe

1. Inspect the starter clutch shoe for uneven wear, chips, cracks, or burns.
2. Inspect the groove on the shoe for wear or damage.
3. If any damage to the shoe or any groove wear is noted, the shoe must be replaced.



ATV1014

Inspecting Starter Clutch Housing

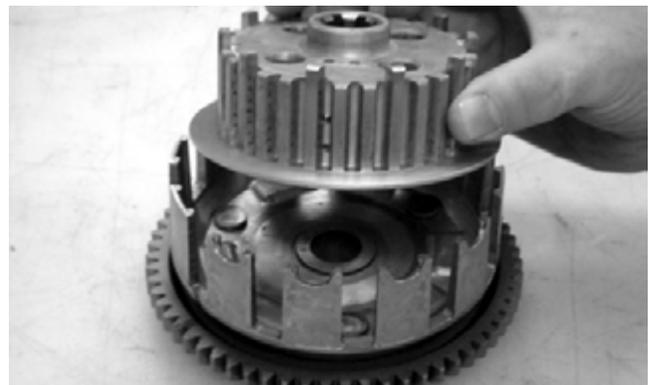
1. Inspect the starter clutch housing for burns, marks, scuffs, cracks, scratches, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

Inspecting Primary One-Way Drive

1. Insert the drive into the 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.



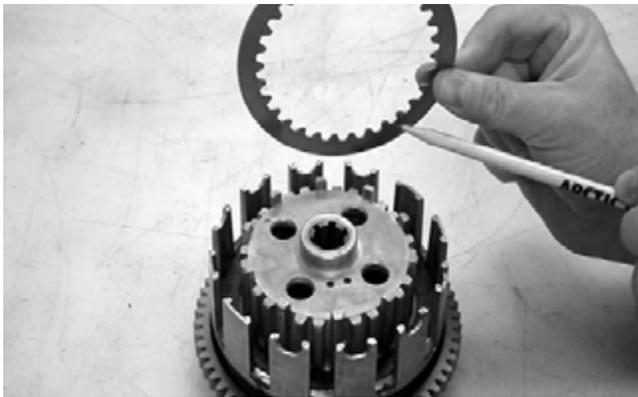
CC920

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.



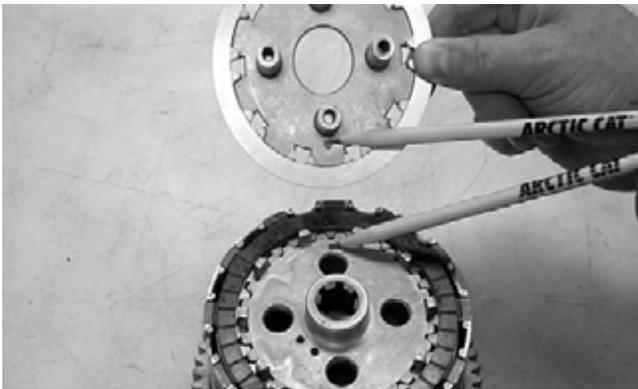
CC921

■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.



CC922

3. Install the pressure plate onto the hub making sure the alignment dots are correctly positioned.



CC923

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.



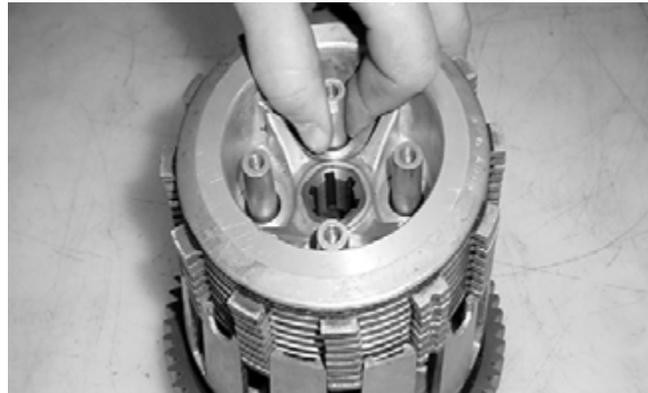
CC924

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

⚠ CAUTION

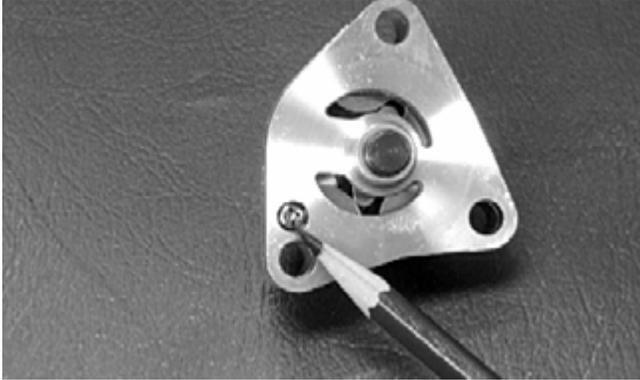
The clutch hub and the pressure plate must be seated in the proper position. If any of the incorrect positions are used, the hub and plate will have clearance between them and they will not operate properly.

■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.



CC446D

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.

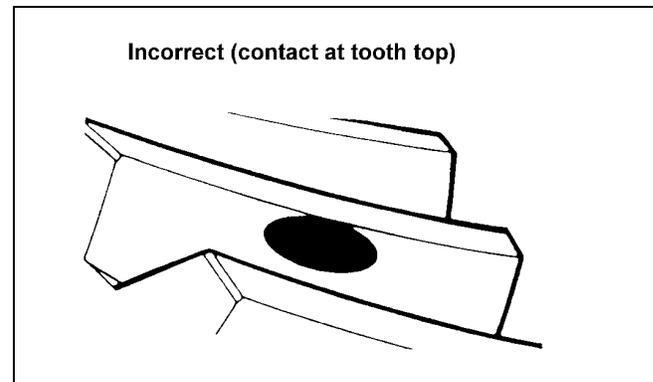
■NOTE: Continue to remove, measure, and install until backlash measurement is within tolerance. Note the following chart.

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

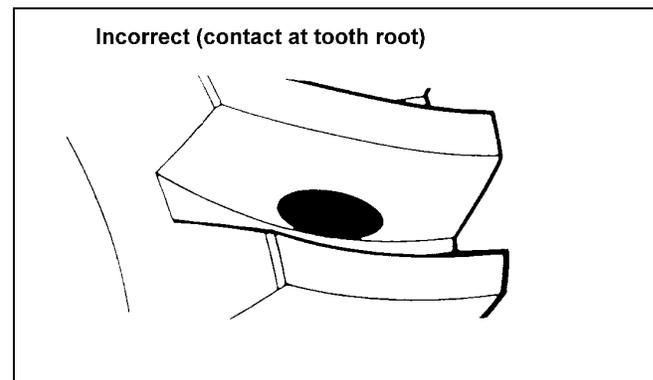
Checking Tooth Contact

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

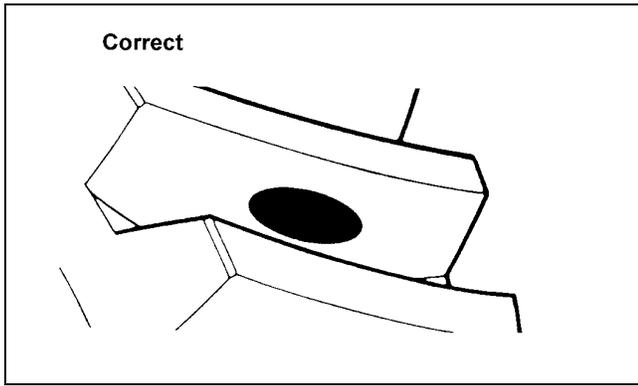
1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
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



ATV-0105



ATV-0104

Correcting Tooth Contact

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

1. 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.

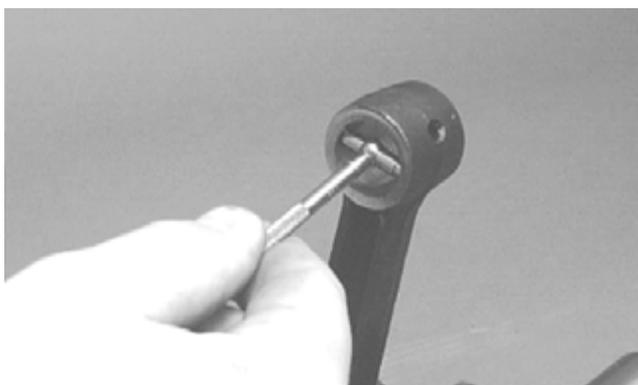
⚠ CAUTION

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

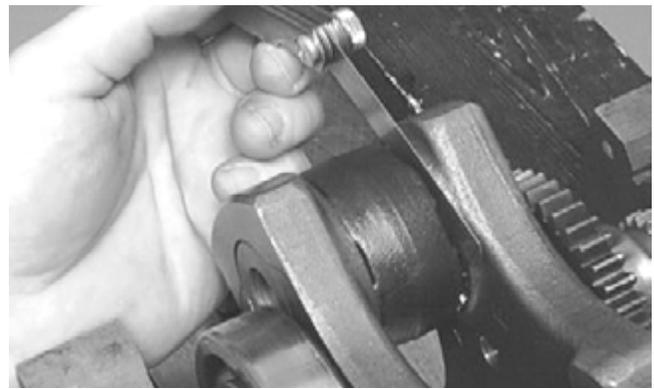
2. Maximum diameter must not exceed specifications.

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

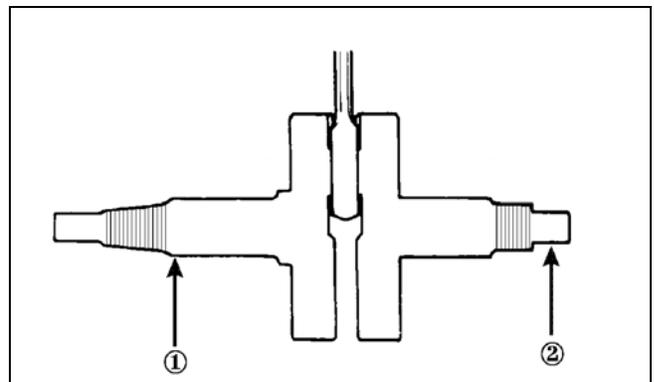
3. Acceptable gap range must be within specifications.

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

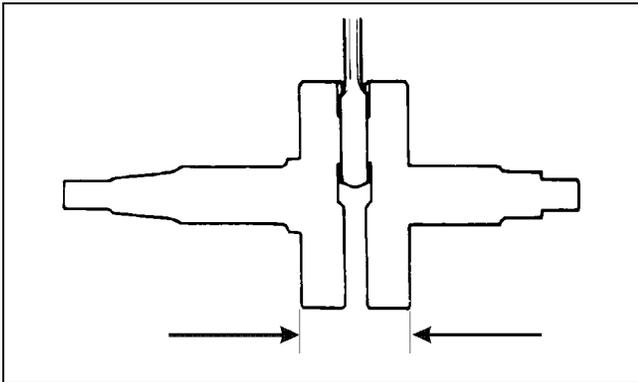
Care should be taken to support the connecting rod when rotating the crankshaft.

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 2-4.

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

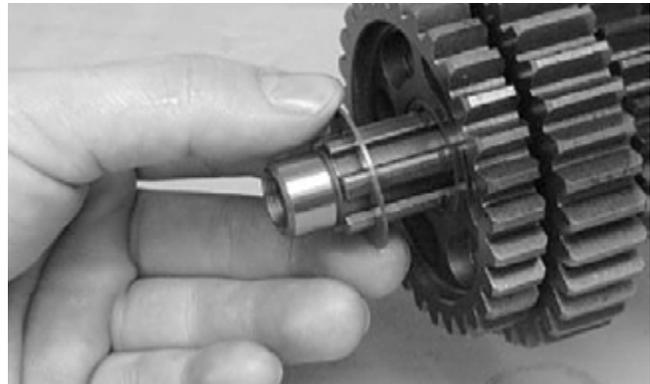
1. In order, remove the reverse dog, circlip, washer, reverse driven gear, and bushing from the driveshaft.



CC228D



CC227D



CC226D



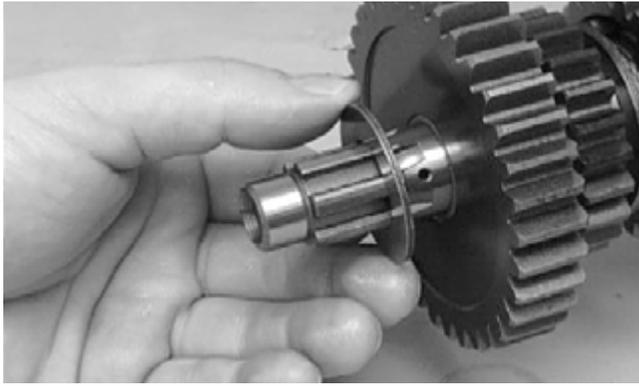
CC225D



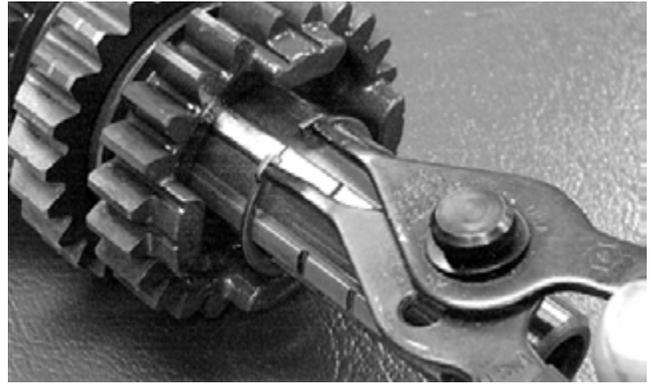
CC224D

■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



CC508D

4. Remove the 4th driven gear from the driveshaft. Note the four small dogs facing toward the 3rd driven gear for assembling purposes.



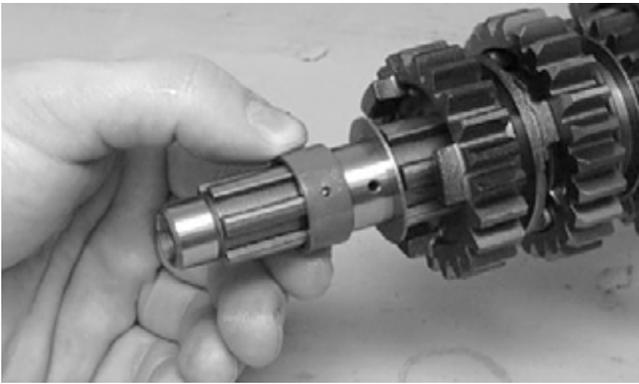
CC222D

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 circlip.

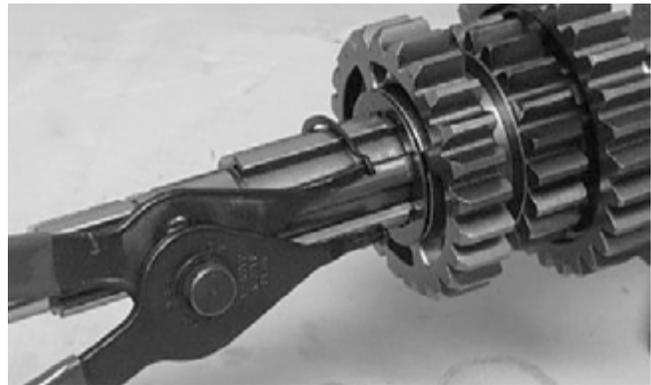


CC219D

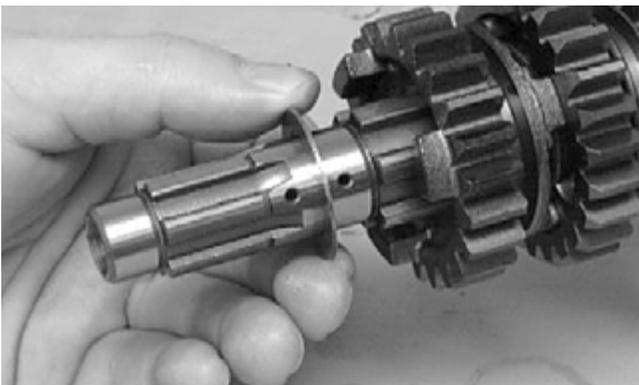
5. Remove the 3rd driven circlip; then remove the 3rd driven lock washer (right side) from the driveshaft.



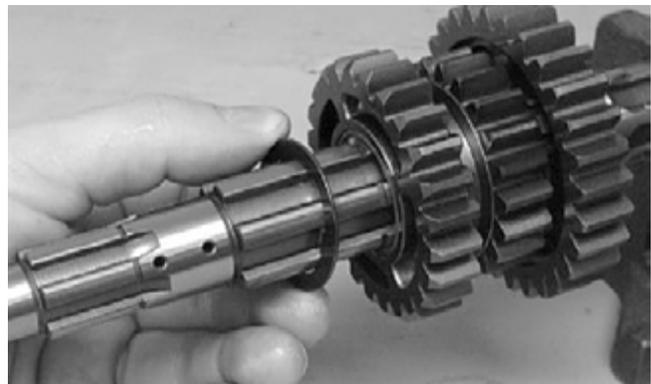
CC221D



CC216D

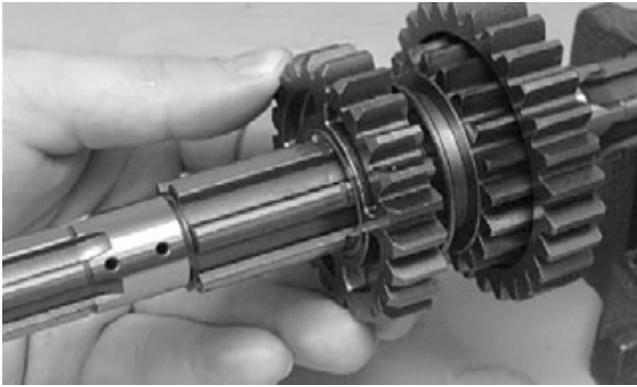


CC220D



CC215D

6. Remove the 3rd driven gear from the driveshaft.



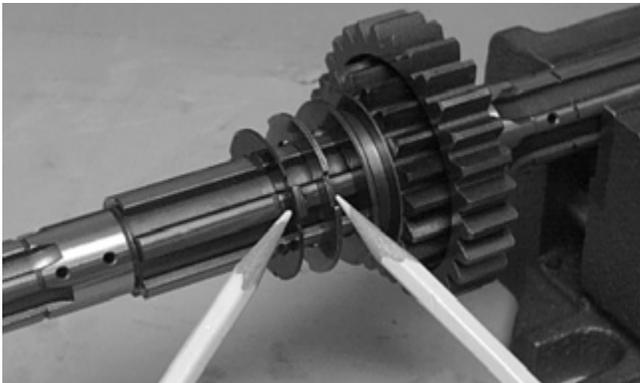
CC214D

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.



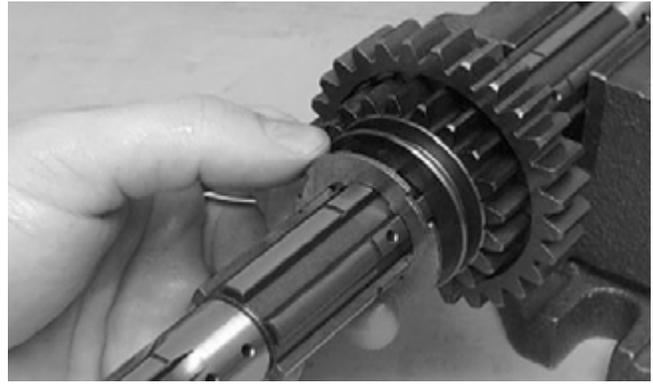
CC213D

8. Remove the 3rd driven lock washer (left side) from the driveshaft. Note the tabs facing toward the 5th driven gear for assembling purposes.



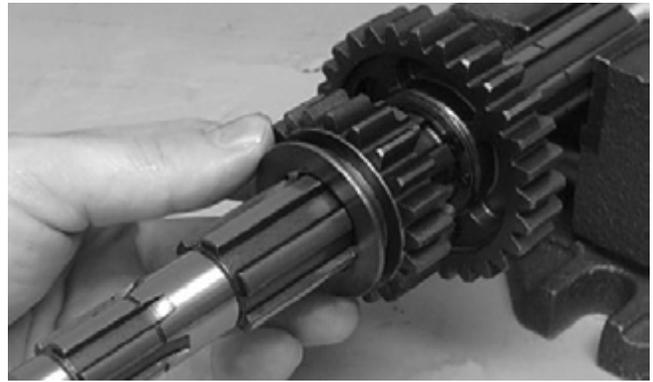
CC212D

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.



CC211D

10. Remove the 5th driven gear from the driveshaft.

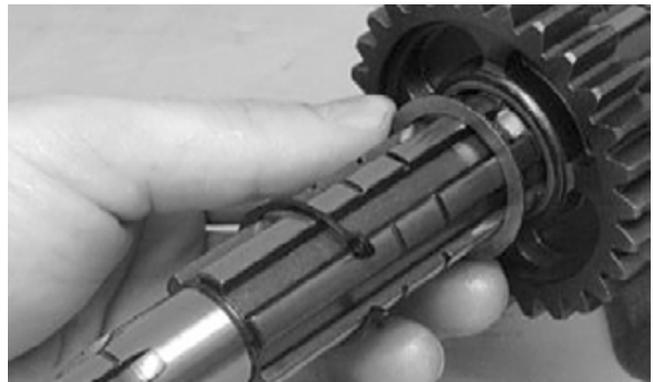


CC210D

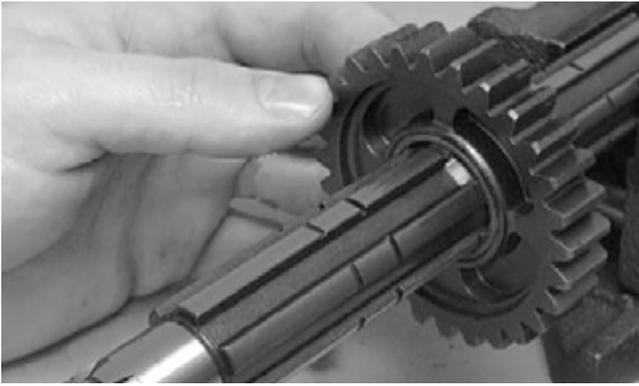
11. In order, remove the 2nd driven circlip, washer, gear, and bushing from the driveshaft.



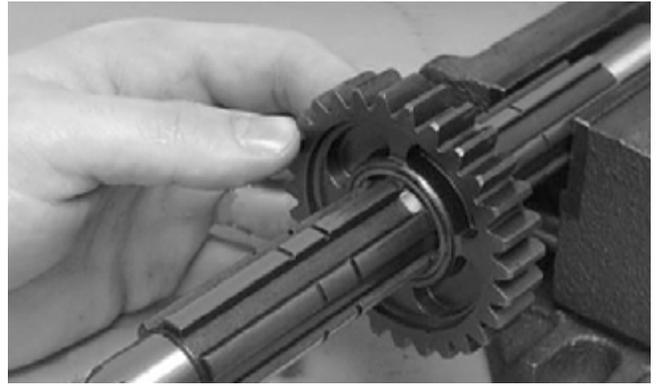
CC209D



CC208D



CC207D



CC207D



CC206D



CC208D

AT THIS POINT
 To service secondary gears, see Servicing Center Crankcase Components in this sub-section.

Assembling

1. In order, install the 2nd driven bushing, gear, washer, and circlip onto the driveshaft.

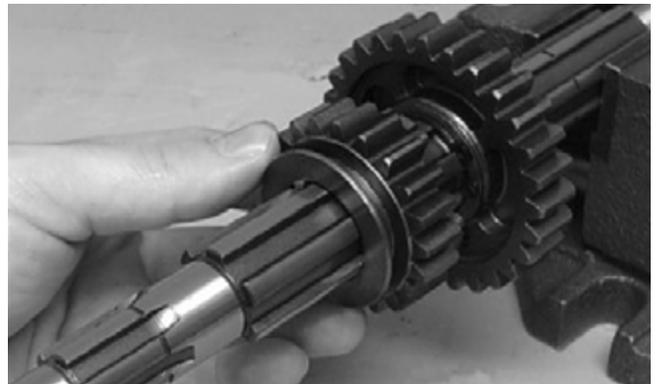


CC206D



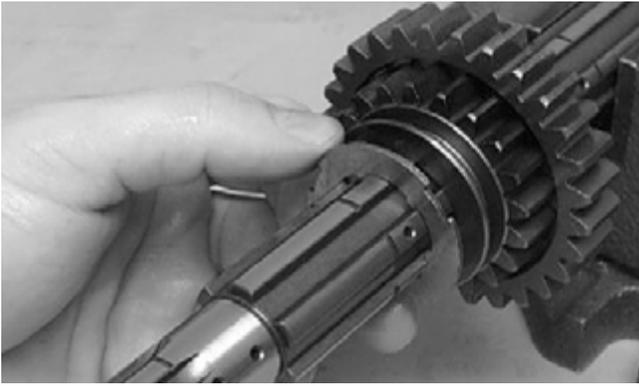
CC209D

2. Install the 5th driven gear onto the driveshaft.



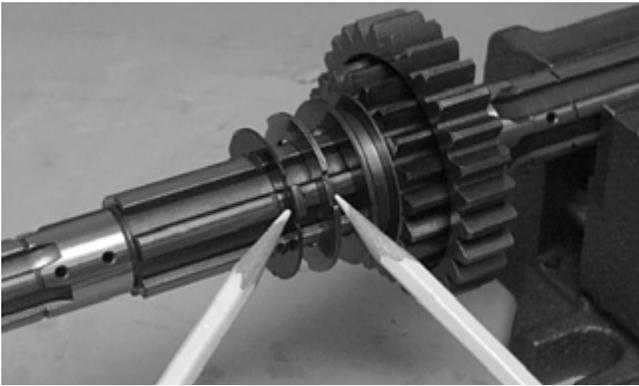
CC210D

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.



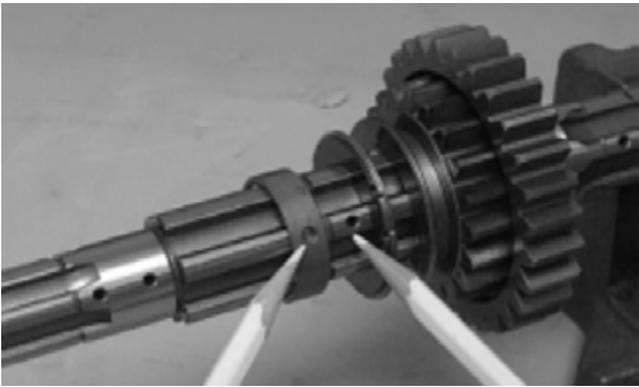
CC211D

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 intertwine with the 3rd driven lock washer.



CC212D

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).

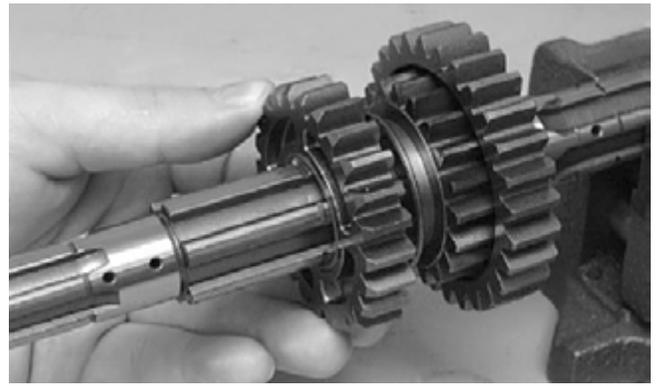


CC213D

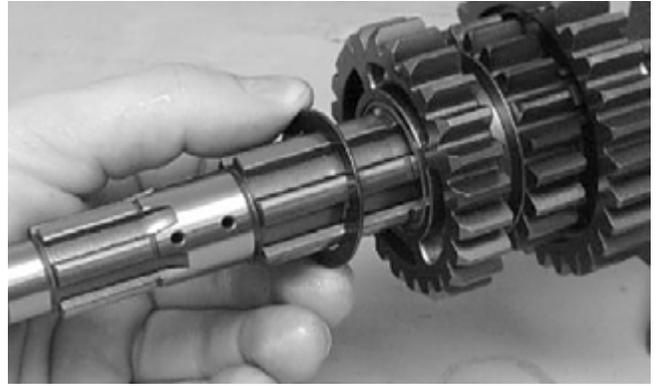
⚠ CAUTION

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 circlip onto the driveshaft.



CC214D

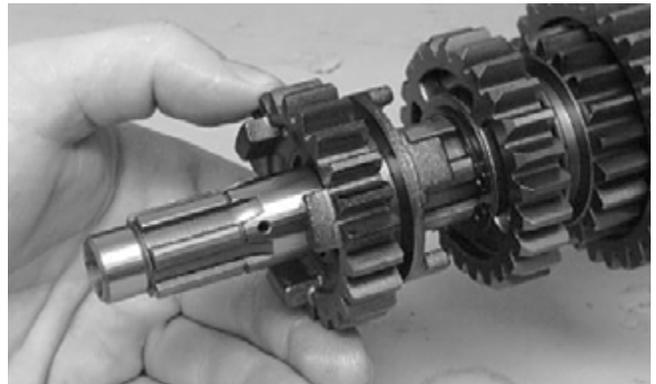


CC215D

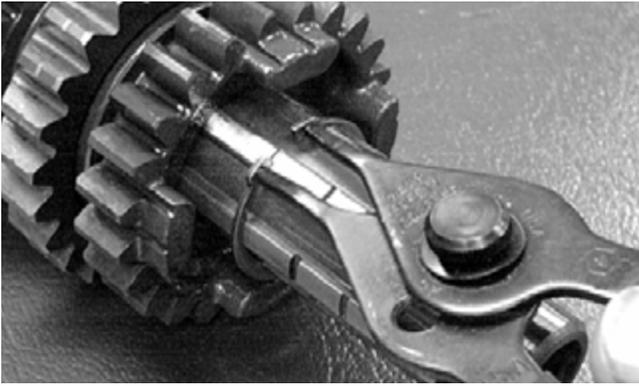


CC216D

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 circlip.



CC219D

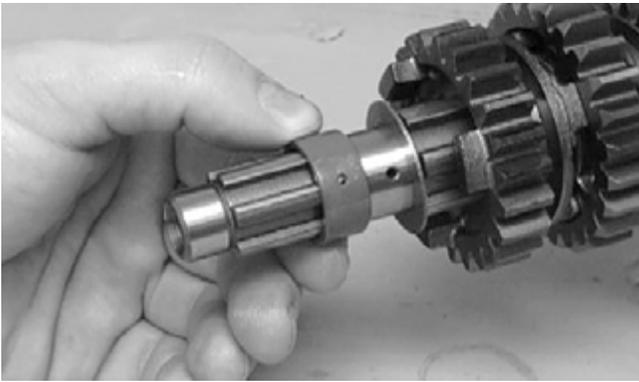


CC508D

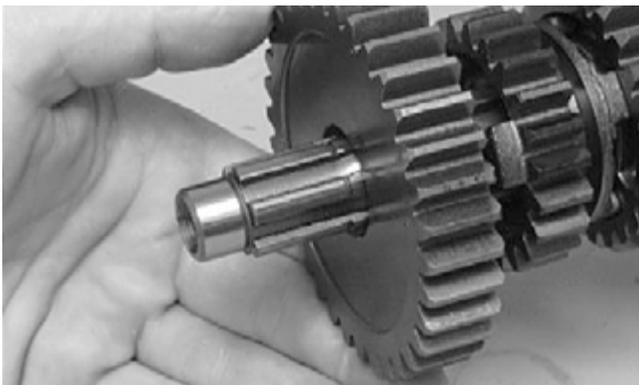
8. Install the 1st driven washer (left side) onto the shoulder of the splined shaft; then install the 1st driven bushing and gear.



CC220D

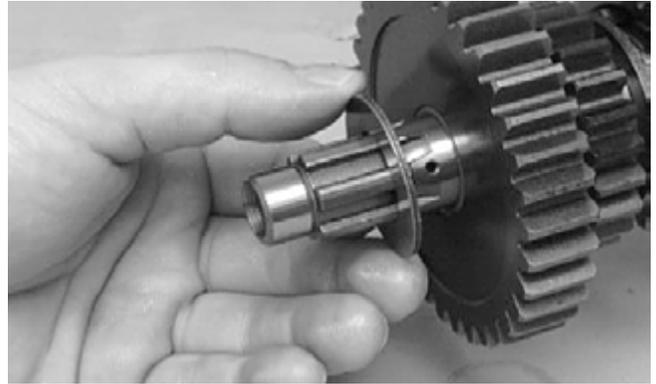


CC221D



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.



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.



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, circlip, and reverse dog onto the driveshaft.



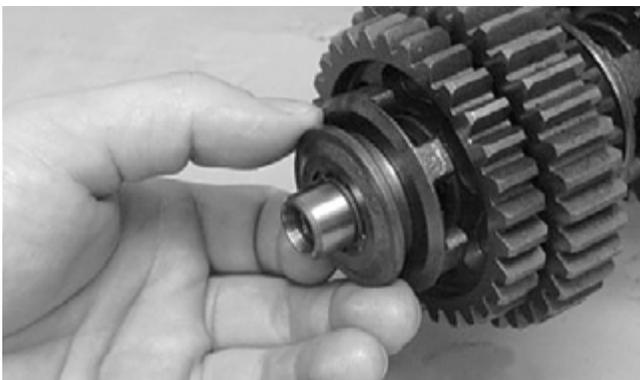
CC225D



CC226D



CC227D



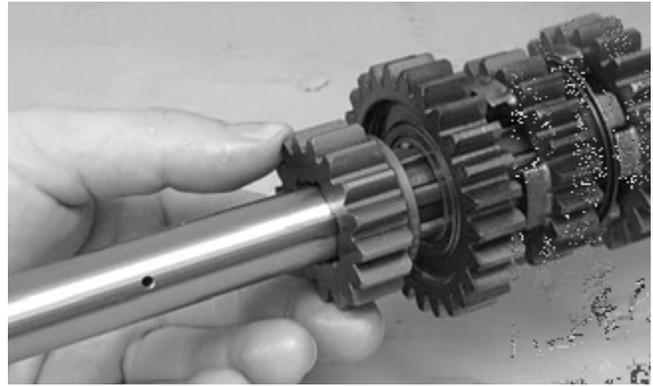
CC228D

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

COUNTERSHAFT

Disassembling

1. Remove the 2nd drive gear from the countershaft.



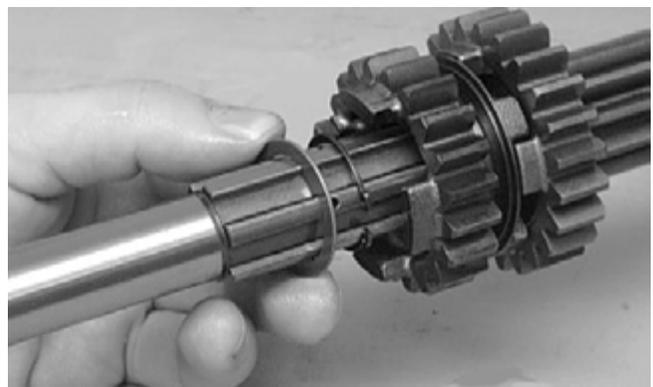
CC204D

2. Remove the 5th drive gear from the countershaft.

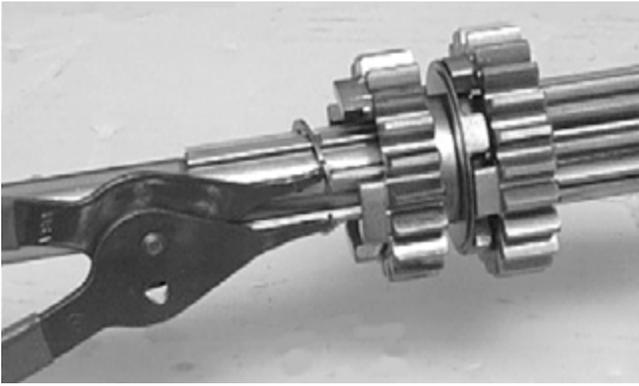


CC203D

3. Remove the 5th drive washer and 5th drive circlip from the countershaft.

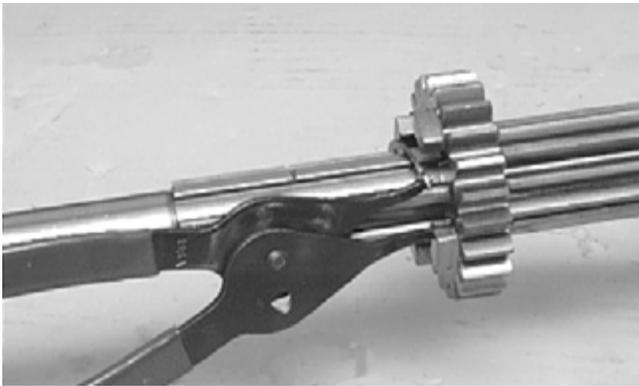


CC201D



CC200D

4. Remove the 3rd drive gear from the countershaft.
5. Remove the 4th drive circlip 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.

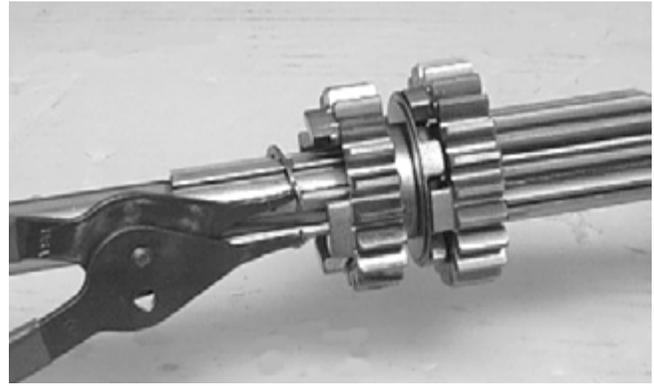
Assembling

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 circlip.



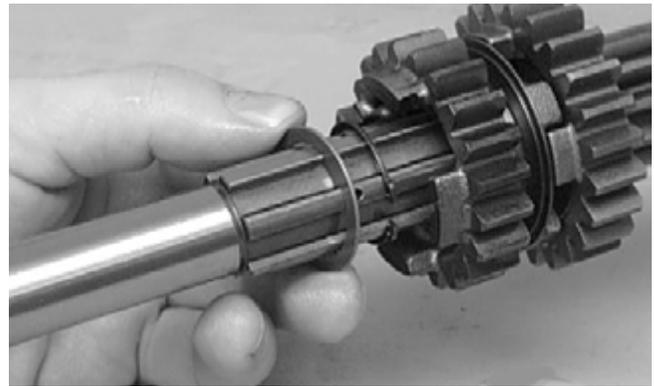
CC199D

3. Install the 3rd drive gear; then install the 5th drive circlip onto the countershaft.



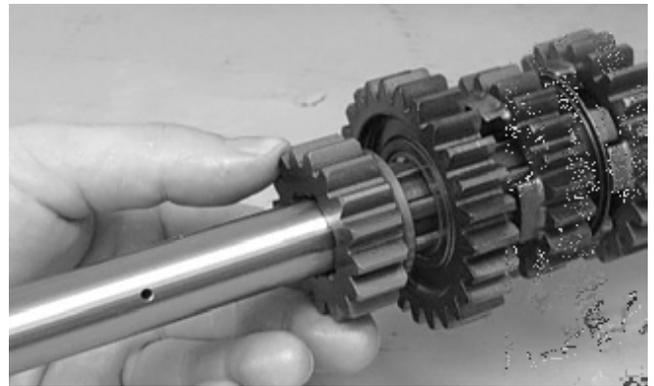
CC200D

4. Install the 5th drive washer and 5th drive gear onto the countershaft.



CC201D

5. Install the 2nd drive gear onto the countershaft.



CC204D

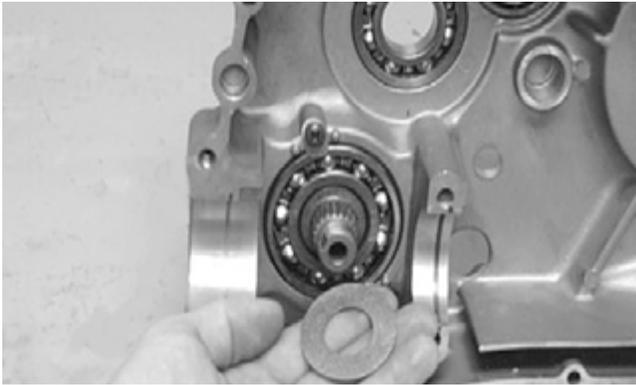
■NOTE: The countershaft is now completely assembled for installation.

Assembling Crankcase Half

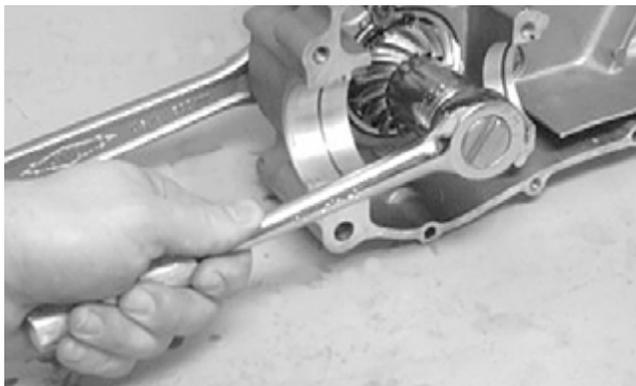
■NOTE: For ease of assembly, install components on the left-side crankcase half.

■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 10 kg-m (72 ft-lb).



CC117D



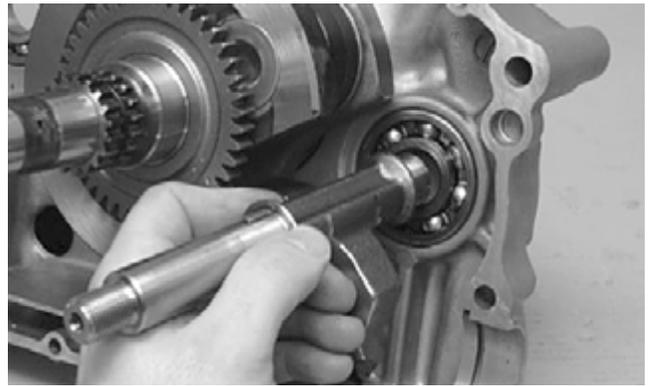
CC116D

2. Using the Crankshaft Installer (p/n 0444-018), install the crankshaft.



CC151D

3. Install the crank balancer.



CC168D

4. With the key in position, slide the driven gear onto the crank balancer making sure the timing marks are aligned.



CC165D



CC167D

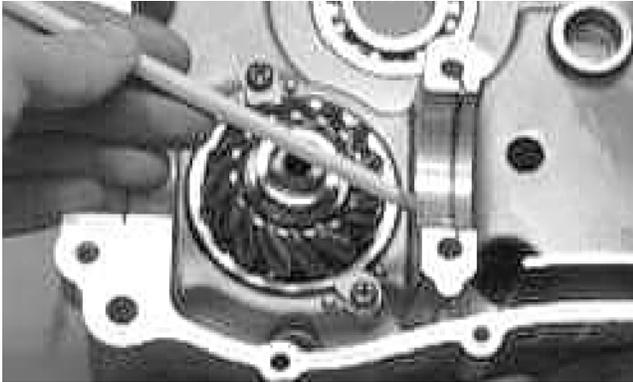


CC166D

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.



CC110D

6. Simultaneously, install the driveshaft and countershaft assemblies making sure the washer is on the countershaft.

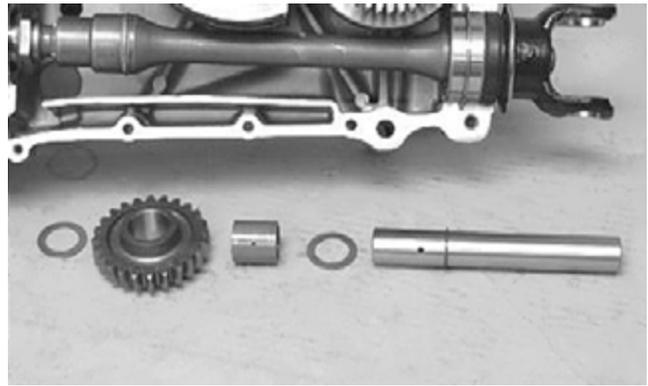


CC197D

7. Install the reverse idle shaft with circlip making sure the oil hole in the shaft is facing downward; then install a washer, bushing, reverse idle gear, and a washer.



CC229D



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

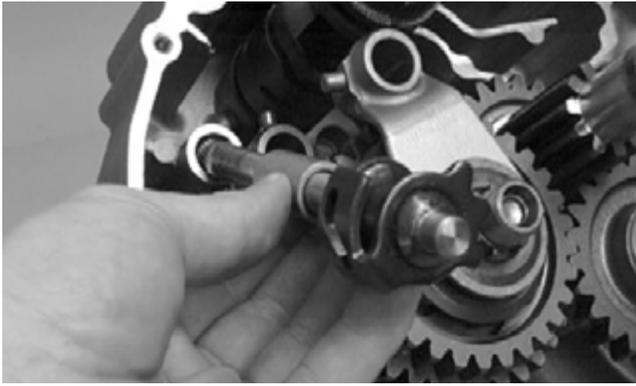


CC106D

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.

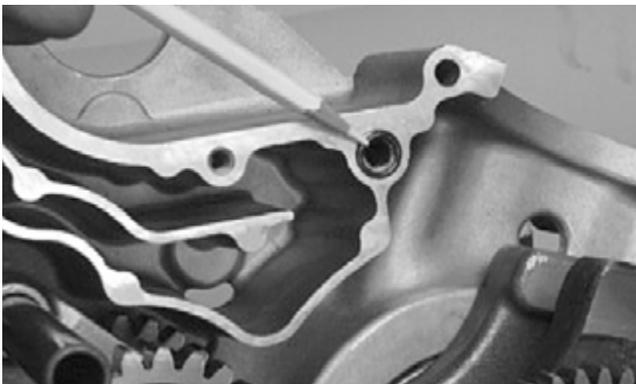


CC104D

■NOTE: Prior to joining crankcase halves, turn the shift cam to ensure all gears shift properly.

Joining Crankcase Halves

1. Place the O-ring in the left-side crankcase half and verify that the washer is on the idler shaft; then apply Three Bond Sealant (p/n 0636-070) to the mating surfaces. Place the right-side half onto the left-side half.



CC101D



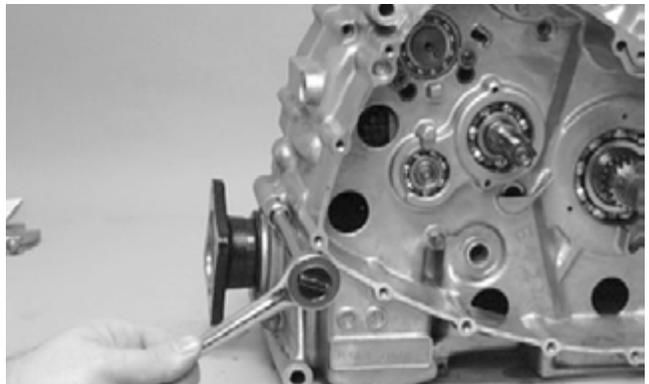
CC102D



CC234D

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 three case half 8 mm cap screws; then tighten only until snug.

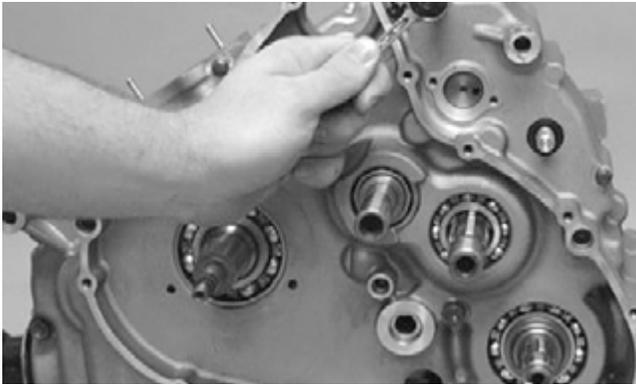
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.



CC097D

- From the left side, install the seven 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

- From the right side, install the five 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

- 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 2-2.4 kg-m (14.5-17 ft-lb).

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

- In a crisscross/case-to-case pattern, tighten the 6 mm cap screws (from steps 5-6) to 0.9-1.3 kg-m (6.5-9.5 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 Right-Side Components

A. Oil Strainer/Oil Pump B. Gear Shift Shaft

- Place the oil strainer with a new O-ring into position beneath the crankcase and tighten securely with the Phillips-head cap screws.



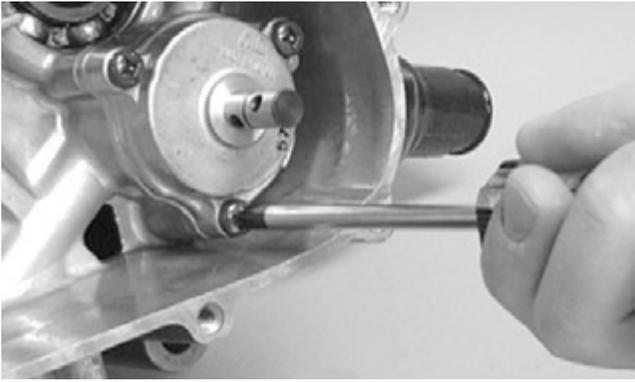
CC163D

- Place the strainer cap into position on the strainer making sure the O-ring is properly installed and secure with the cap screws; then install and tighten the oil drain plug to 2.2 kg-m (16 ft-lb).



CC091D

- Place the oil pump into position in the crankcase and secure with the three Phillips-head screws coated with blue Loctite #243. Tighten to 1 kg-m (7 ft-lb).



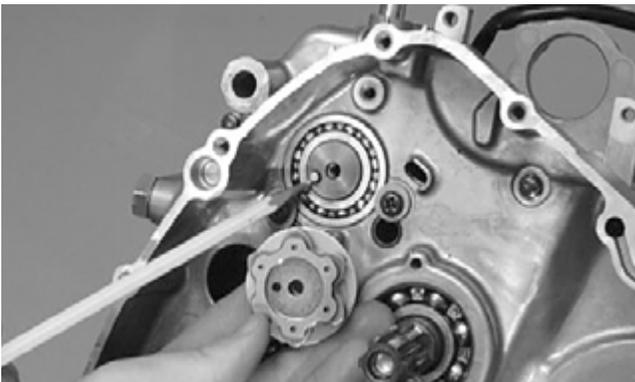
CC090D

4. Place the pin and washer into position on the oil pump shaft, install the oil pump driven gear, and secure with the circlip.

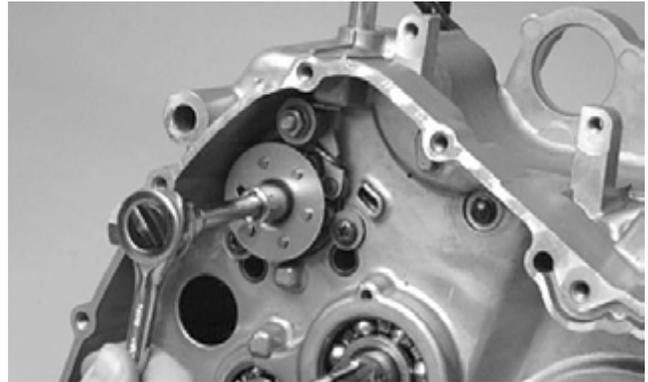


CC088D

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.



CC087D

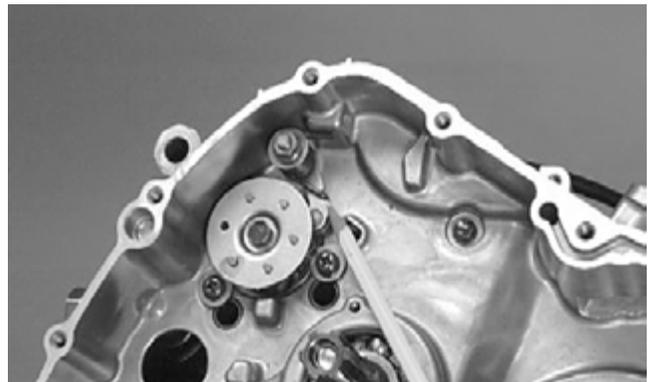


CC164D

6. Attach the spring to the gear shift cam stopper arm.

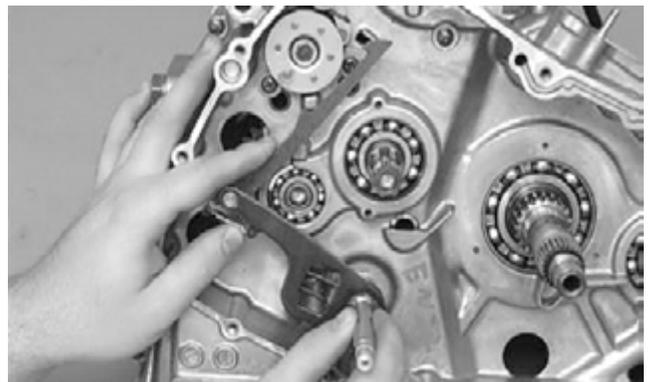


CC086D



CC153D

7. Install the gear shift shaft.



CC085D

C. Primary Driven Gear

D. Primary Clutch

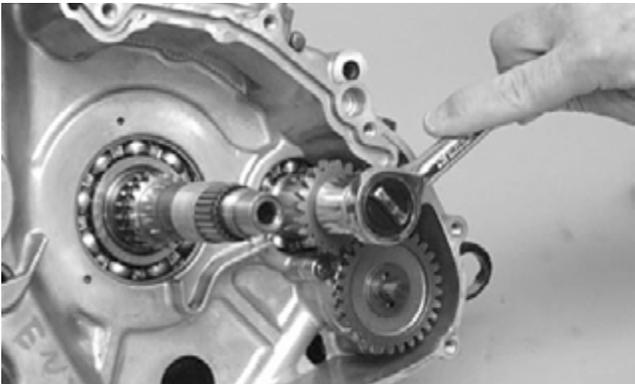
E. Starter Clutch Shoe

■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 8 kg-m (58 ft-lb).

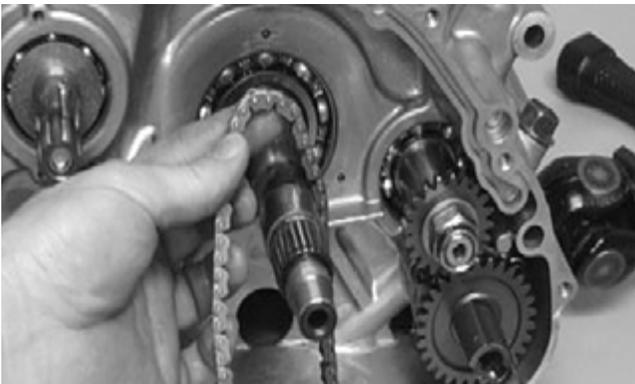


CC081D



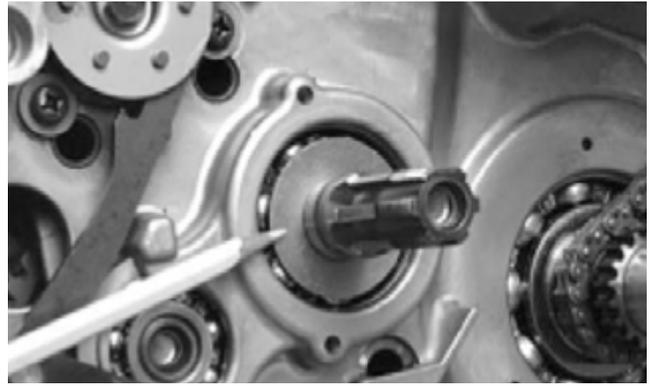
CC080D

9. Place the chain into the crankcase; then secure it from the top side with a wire for ease of assembling.



CC079D

10. Install the primary driven washers onto the driveshaft and crankshaft.



CC232D

⚠ 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.

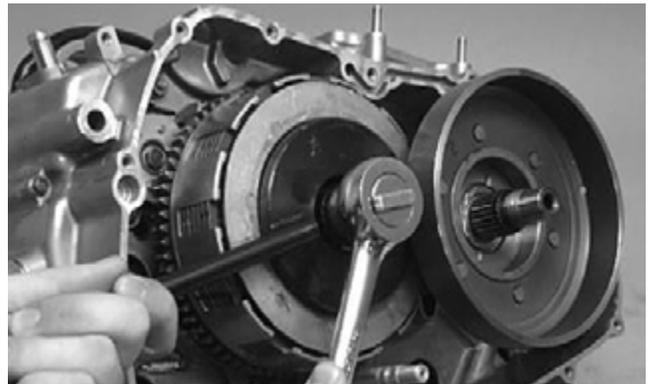
11. Simultaneously, place the primary clutch assembly and the starter clutch housing on their respective shafts making sure the sleeve is properly positioned in the primary assembly.



CC078D

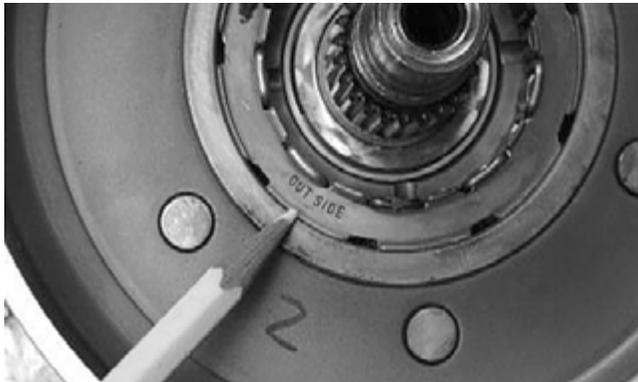
■NOTE: Note the alignment mark scribed on the primary driven gear assembly during disassembly.

12. Using the Clutch Sleeve Hub Holder (p/n 0444-007), install the nut and washer. Tighten to 10 kg-m (72 ft-lb).



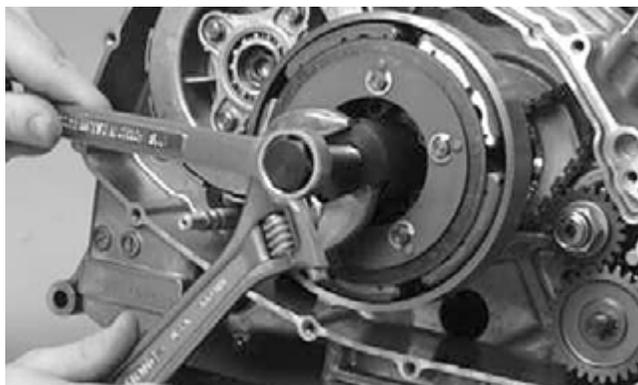
CC076D

13. Place the primary drive one-way clutch into the starter clutch housing noting the word OUTSIDE for proper placement.



CC075D

14. Install the clutch shoe and washer; then secure with the starter clutch shoe nut (left-hand threads). Tighten to 13 kg-m (94 ft-lb); then using a center punch, stake the nut.



CC072D

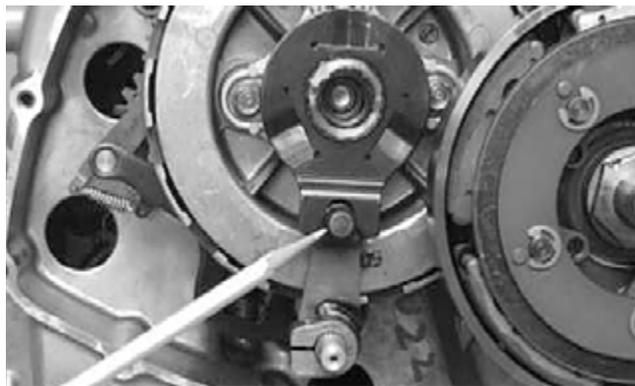
15. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, tighten the four cap screws securely.

■NOTE: Tighten the four roller assembly cap screws in a crisscross pattern making sure there is no clearance between the clutch plates when secured.



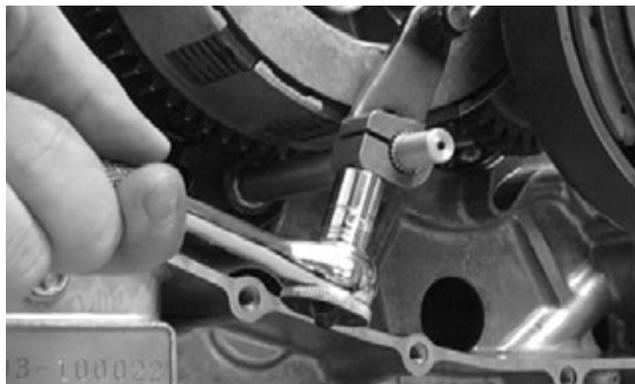
CC074D

16. Install the clutch release arm and release roller guide making sure the release roller and guide are aligned.



CC162D

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 2.3 kg-m (16.5 ft-lb).



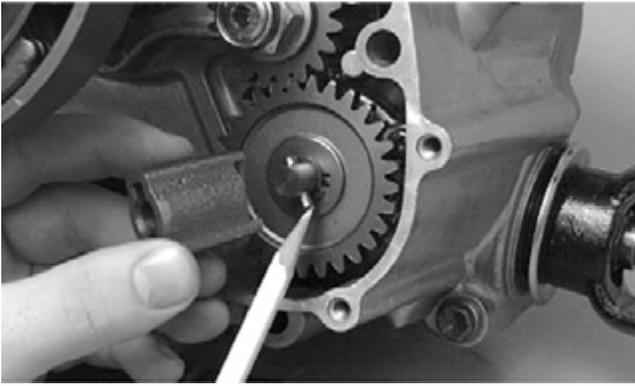
CC069D

F. Water Pump G. Oil Filter

■NOTE: Steps 1-18 of the preceding sub-sections must precede this procedure.

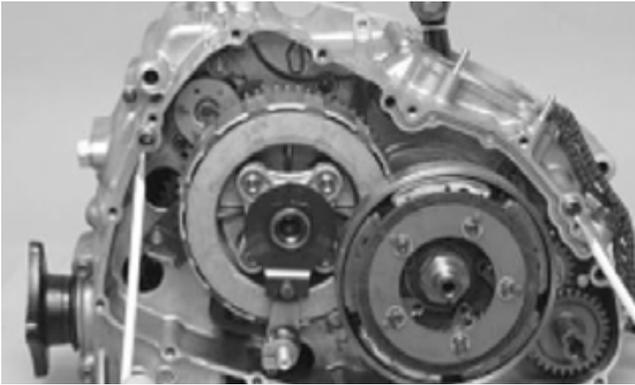
■NOTE: Lubricate all internal components with 10W-40 oil prior to installing the right-side cover.

19. Place the water pump drive joint into position on the water pump shaft making sure the pin is properly positioned.



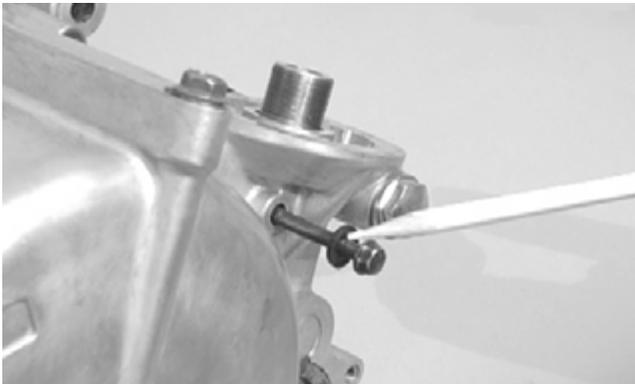
CC082D

■NOTE: Care should be taken that the alignment pins are installed in the right-side cover.



CC256D

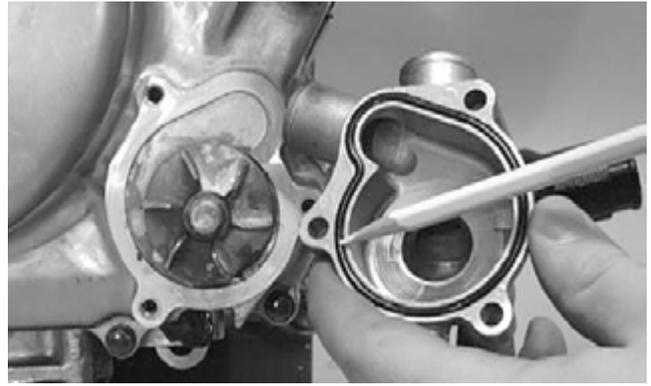
20. Place the gasket and right-side cover into position making sure the release roller guide remains correctly positioned and that the water pump drive adapter aligns; then install the fifteen cap screws. Note the proper location of the long cap screw with rubber washer.



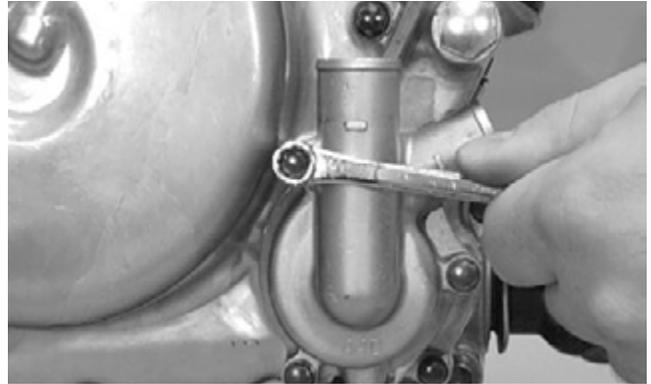
CC068D

21. Tighten the cap screws in a crisscross pattern to 0.9-1.3 kg-m (6.5-9.5 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.



CC028D



CC027D

23. Using the oil filter wrench, install a new oil filter.



CC067D

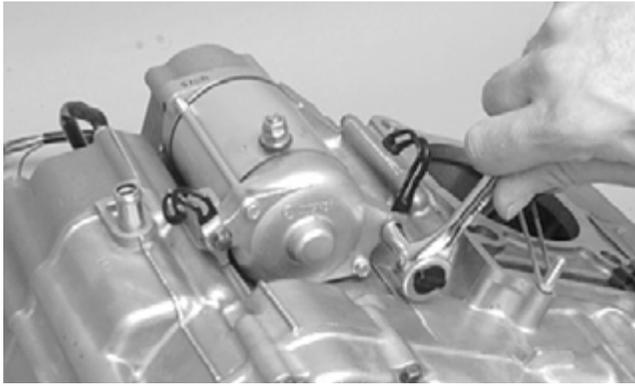
24. Install the coolant hose on the water pump and secure with the clamp.

Installing Left-Side Components

A. Idle Gear Assembly

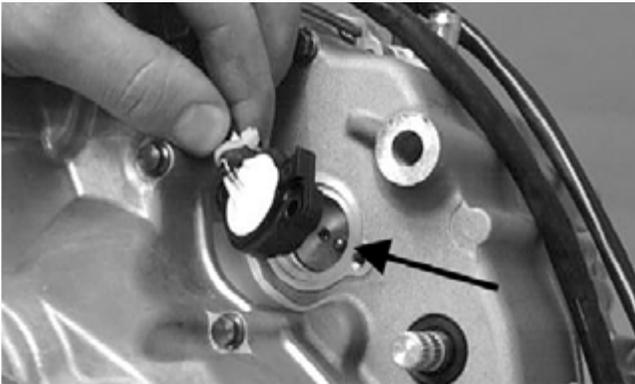
B. Magneto Rotor

1. Place the starter into position on the crankcase and secure with the cap screws. Note the position of the wiring form.



CC065D

- Place the shift-indicator sending unit into position making sure the neutral contact and spring are inside the case and a well-oiled O-ring is properly positioned. Secure with Phillips-head screws.

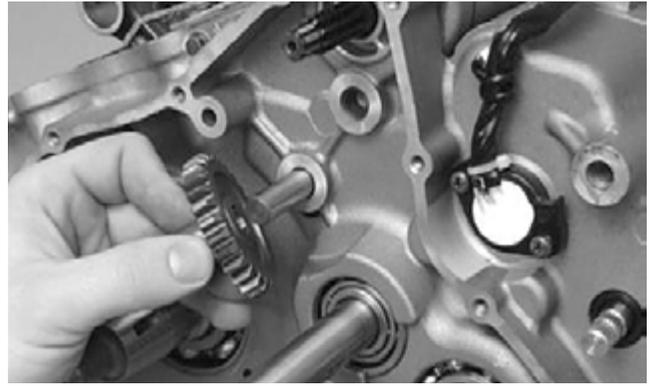


CC049D



CC048D

- 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.



CC064D

- Place the bushing onto the output shaft; then install the driven gear and washer.



CC063D

- Install the spacer onto the driveshaft.

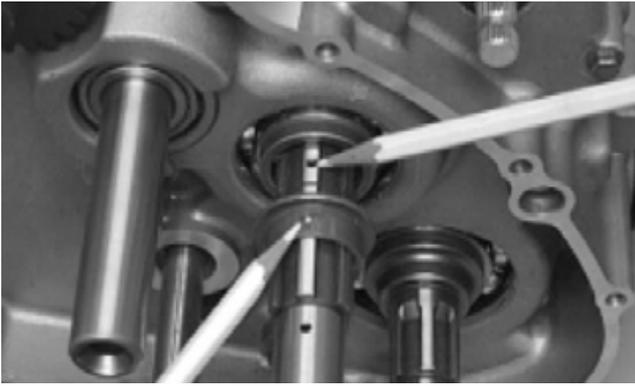


CC258D

- Place the splined bushing onto the driveshaft making sure the oil hole of the splined bushing aligns with the oil hole of the driveshaft.

⚠ 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.



CC259D

7. In turn on the driveshaft, install the #1 drive gear and washer; then secure with the circlip.



CC262D



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.



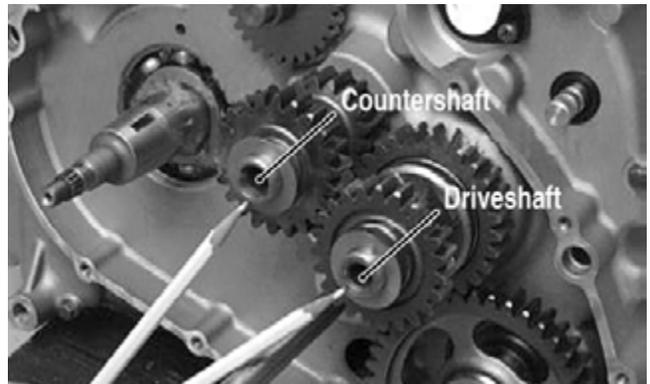
CC060D

10. Place a washer on both the driveshaft and the countershaft.



CC061D

9. Place the idle gear spacer and idle gear onto the countershaft.



CC058DA

11. With the slot in the shift shaft assembly facing upward, place the assembly on the fixed shaft.



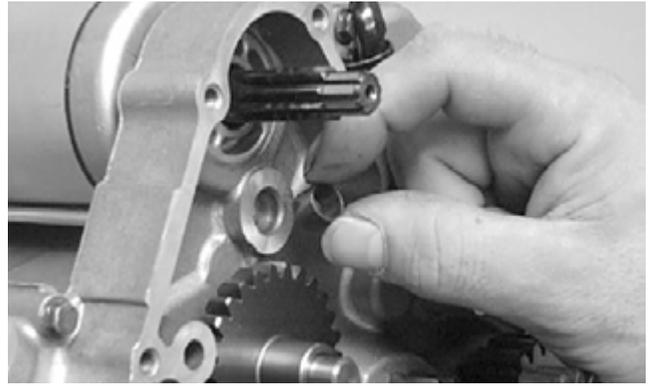
CC328D

12. Place the left shaft washer on the shift shaft.



CC333D

13. With the shift fork peg positioned in the shift shaft assembly slot, install the shift fork in the select sliding dog gear.



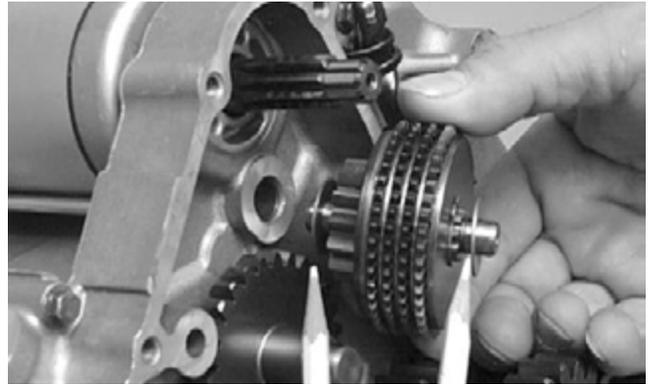
CC156D

16. Place a washer on each end of the starter gear assembly and install in the crankcase.



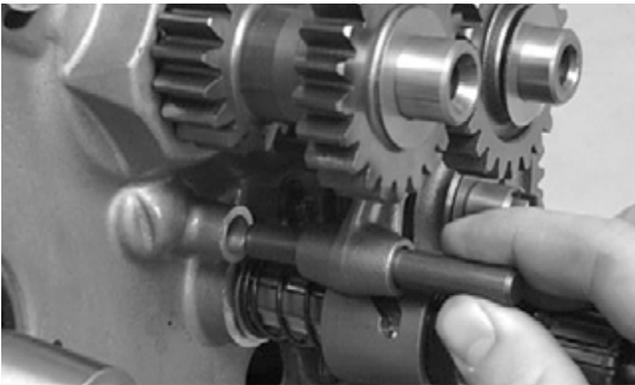
CC329D

14. Slide the shift fork shaft through the shift fork and into the crankcase boss.



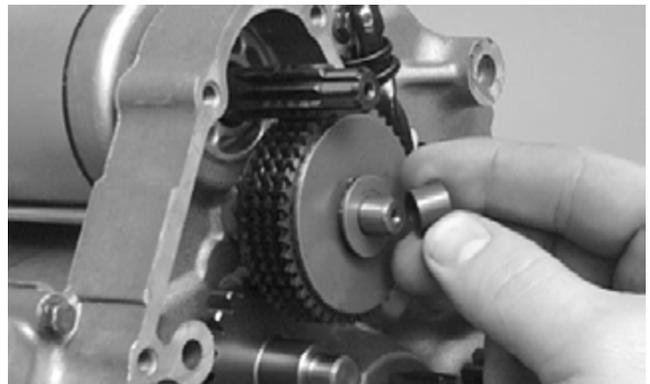
CC157D

17. Place the remaining bushing on the starter gear assembly.



CC330D

15. Insert a bushing into the starter gear assembly boss in the crankcase.



CC158D

18. Place a thrust washer onto the crankshaft; then install the starter clutch gear assembly onto the crankshaft. Place the key into its notch.

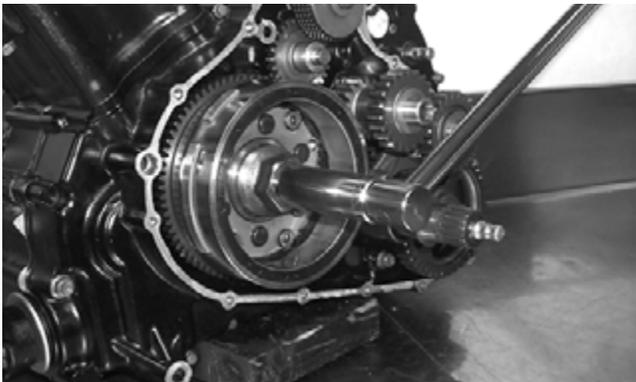


CC331D



CC332D

19. 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 16 kg-m (116 ft-lb).



CC147D

20. Install the two alignment pins into the left crankcase half.

■NOTE: Make sure that five washers, one bushing, and two alignment pins are in place.



CC326D

C. Cover
D. Speedometer Drive
E. Hi/Low Shifter Assembly
F. Recoil Starter

■NOTE: Steps 1-20 in the preceding sub-section must precede this procedure.

21. Place the gasket and left-side cover into position on the crankcase.

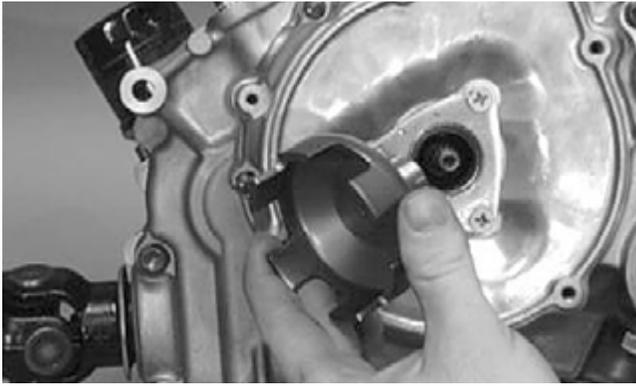
■NOTE: It may be necessary to push or pull the splined Hi/Low range shift shaft to establish cover/crankcase mating.

22. Install the fourteen 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.



CC055D

23. 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 3.5 kg-m (25 ft-lb).

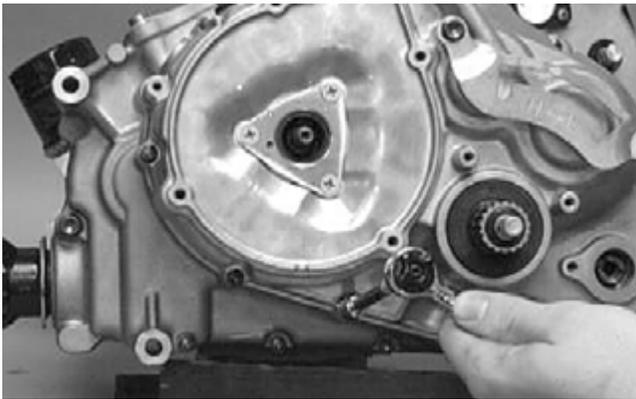


CC041D

24. In a crisscross pattern, tighten the cap screws (from step 22) to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

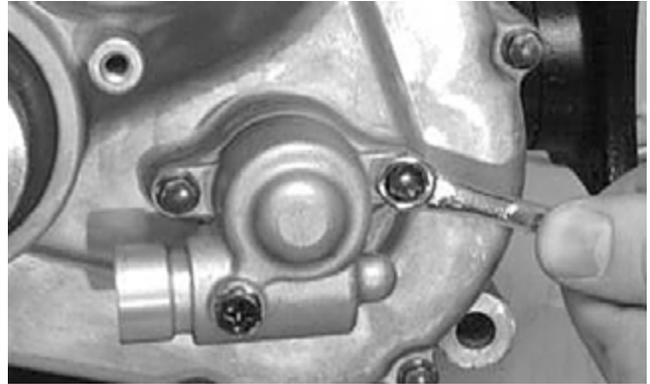


CC043D



CC047D

25. Place the shift stop housing assembly into position beneath the shift shaft housing making sure the spring and stopper are correctly positioned. Tighten to 2.3 kg-m (16.5 ft-lb).



CC042D

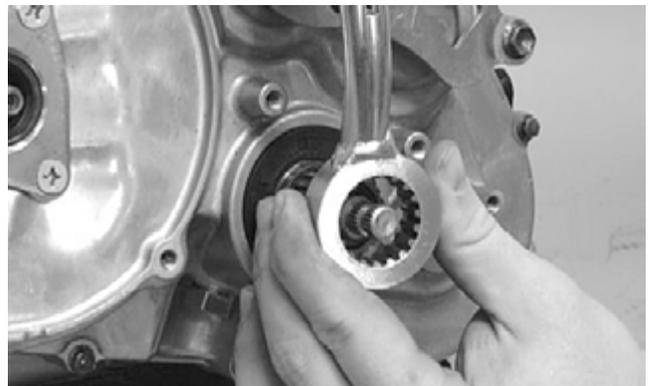
27. Install the inside circlip onto the hi/low range shift shaft with the sharp side of the circlip facing the engine; then place the shift lever assembly part way onto the shaft.

■ **NOTE:** Position the shift lever part way onto the splines and verify the subtransmission is in hi range. If not, shift into hi range.



CC054D

26. Place the speedometer drive adapter and gasket into position and secure with the two cap screws. Tighten securely.

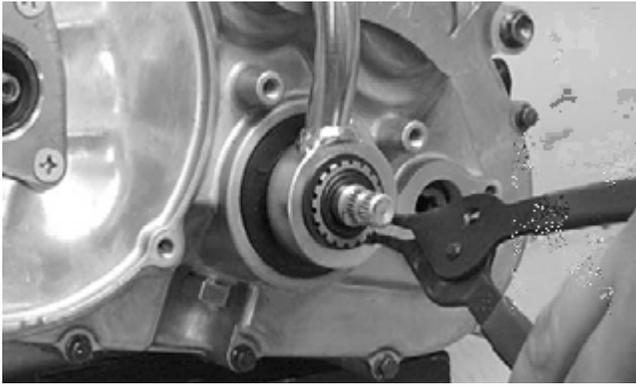


CC045D

28. 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 circlip making sure the sharp side of the circlip faces away from the hi/low-range lever.

⚠ CAUTION

Make sure the speedometer gear and output shaft gear match up during assembly.



CC044D

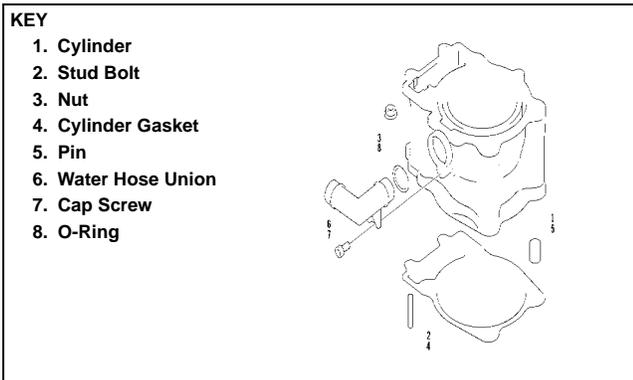
29. Place the recoil starter assembly into position on the left-side cover; then tighten four cap screws to 0.8 kg-m (6 ft-lb).



CC039D

Installing Top-Side Components

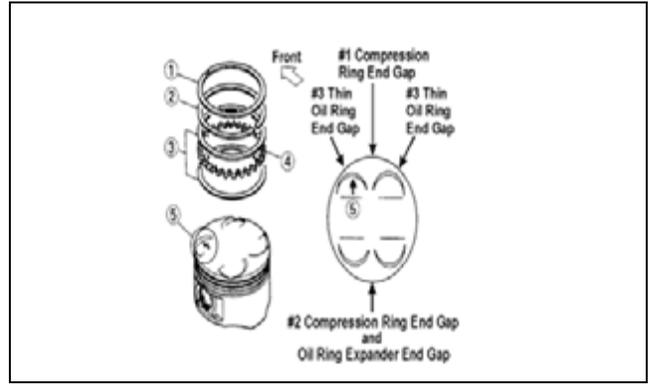
A. Piston B. Cylinder



0732-301

■NOTE: If the piston rings were removed, install them in this sequence.

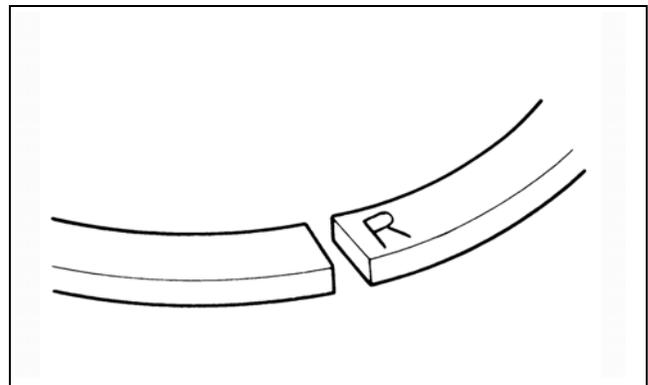
A. Install a thin oil ring (3), oil ring expander (4), and thin oil ring (3) in the bottom groove of the piston.



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

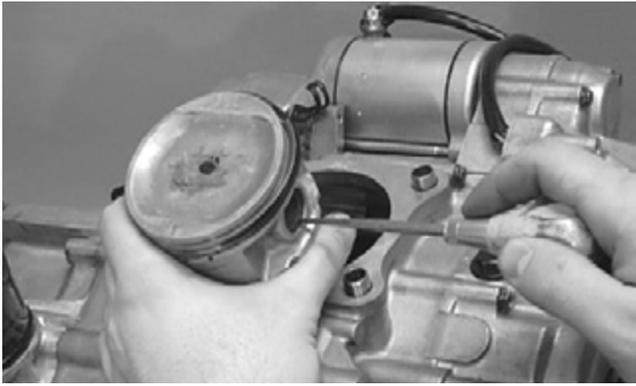
C. Install the compression rings (1 and 2) so the letter on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring end gaps are on directly opposite sides of the piston (see illustration).

⚠ CAUTION

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

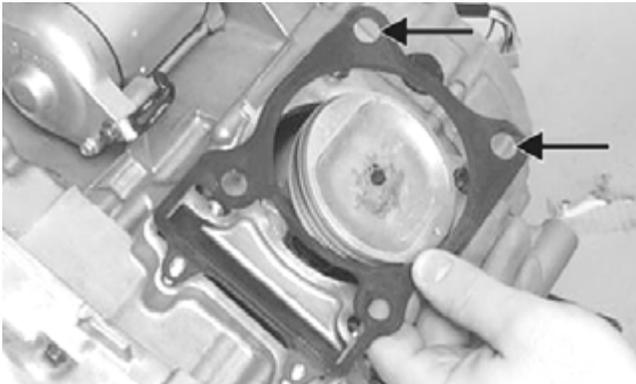
1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

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



CC032D

- 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.

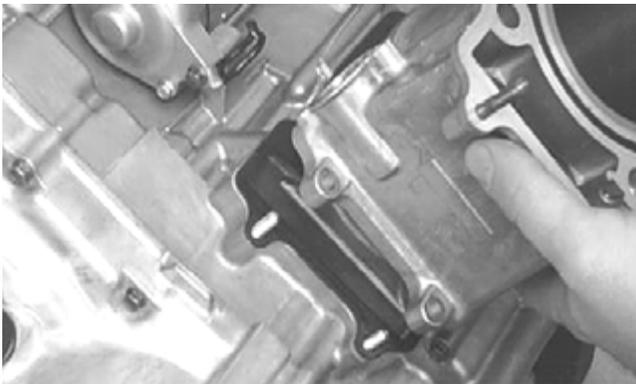


CC025D

- 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

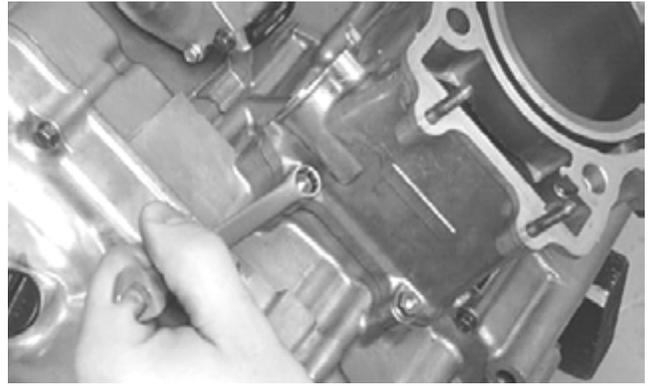
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



CC024D

- 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

- 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.

- 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.

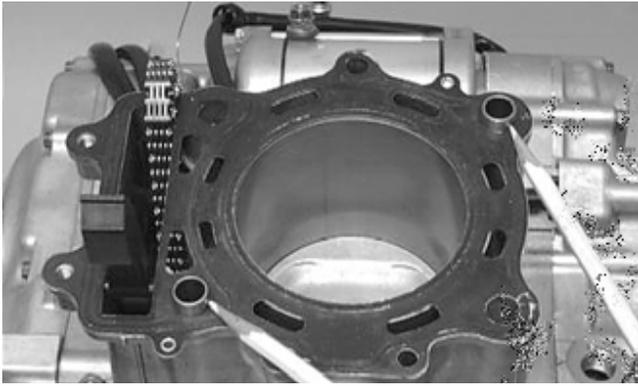


CC022D

- Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder.

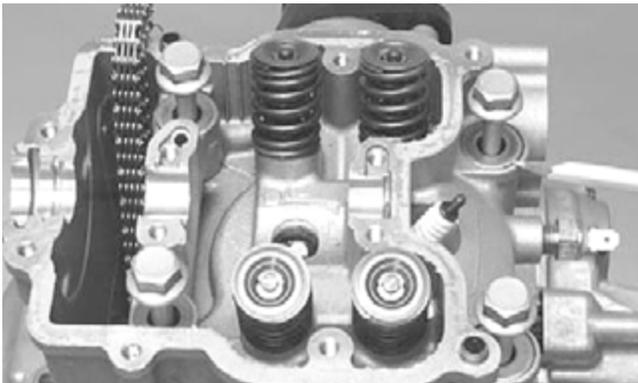


CC020D



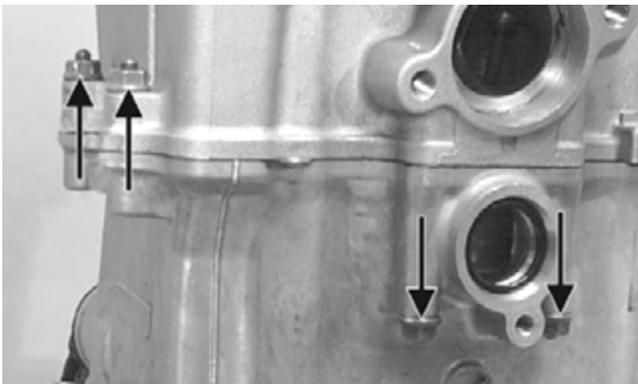
CC265D

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

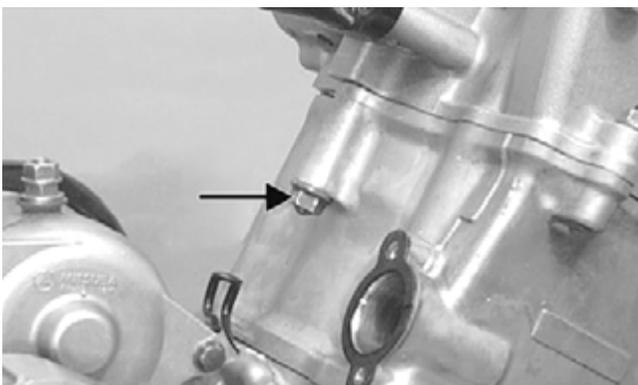


CC272D

9. Loosely install the five cylinder head nuts.



CC018D

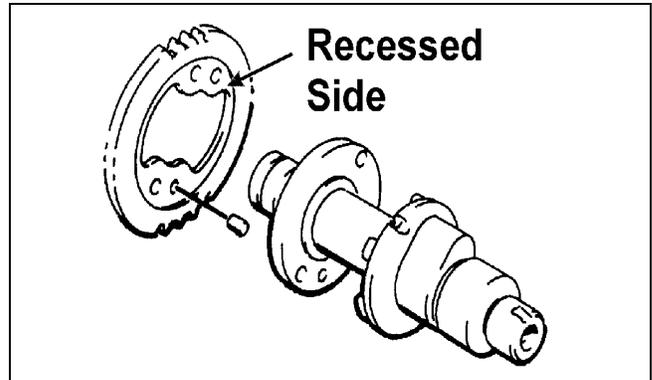


CC017D

10. In a crisscross pattern, tighten the four cylinder head cap screws (from step 8) to 3.8 kg-m (27.5 ft-lb); then tighten the 8 mm nut (from step 9) to 2.5 kg-m (18 ft-lb). Using a crisscross pattern, tighten the four 6 mm nuts (from step 9) to 1.1 kg-m (8 ft-lb). Tighten the two cylinder-to- crankcase nuts securely.

11. With the timing inspection plug removed and the chain held tight, rotate the crankshaft until the piston is at top-dead-center.

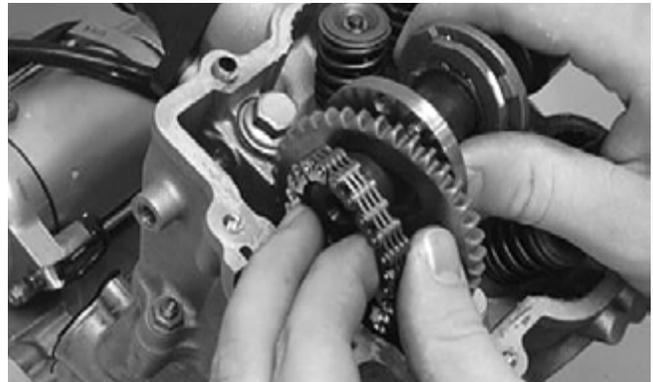
12. With the alignment pin installed in the camshaft, loosely place the cam sprocket (with the recessed side facing the cam shaft lobes) onto the camshaft. At this point, do not “seat” the sprocket onto the shaft.



732-307B

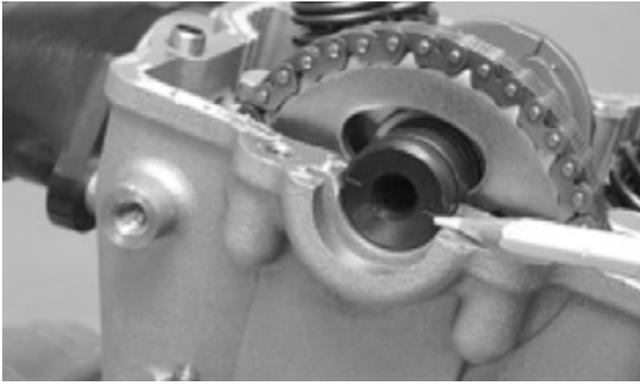
- NOTE: At this point, oil the camshaft bearings, cam lobes, and the three seating journals on the cylinder.

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.



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 end up in the down position.



CC267D

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.



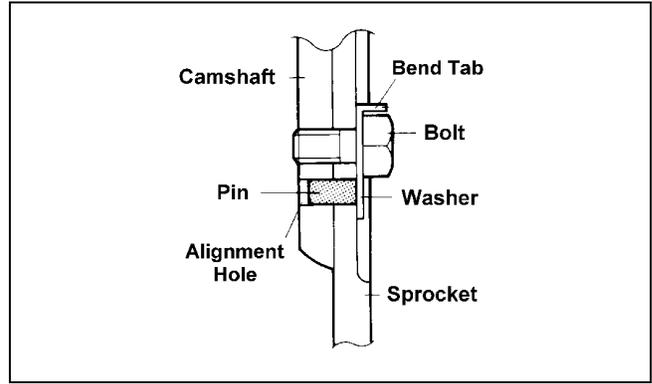
CC268D

- 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

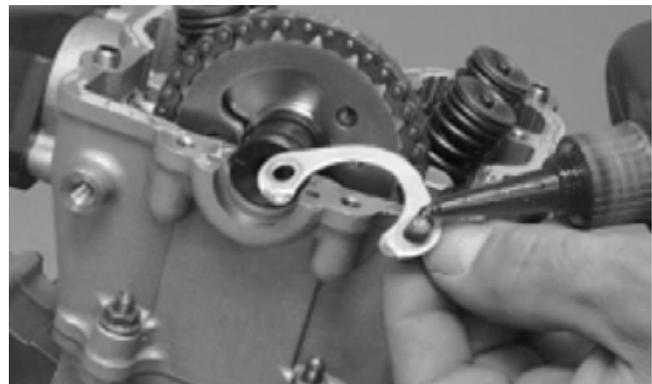
⚠ CAUTION

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.



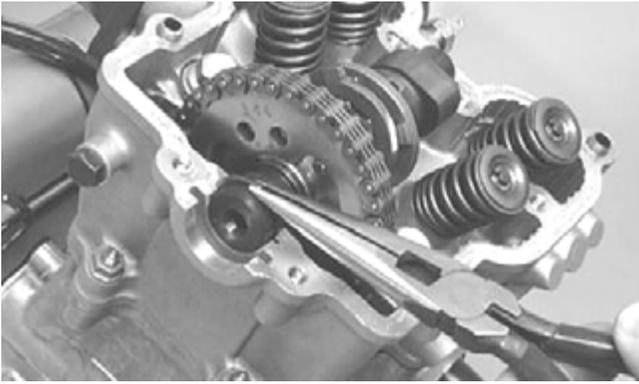
CC270D

16. Install the first cap screw securing the sprocket and tab-washer to the cam shaft. Tighten only until snug.



CC269D

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



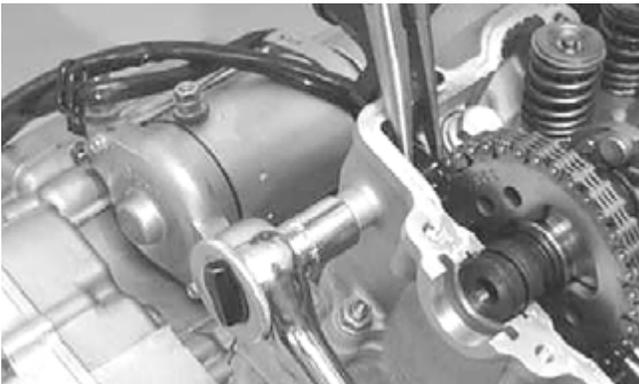
CC012D

18. Install the cylinder head plug in the cylinder head with the opening of the plug directed to the 12 o'clock position or to the 6 o'clock position and toward the inside.



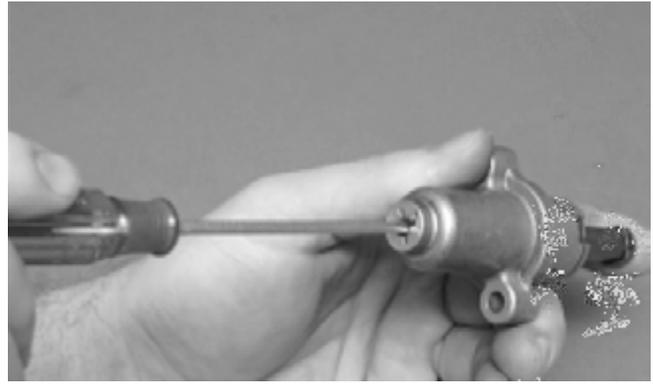
CC274D

19. Place the chain tensioner into position and secure with the cap screw and washer.



CC014D

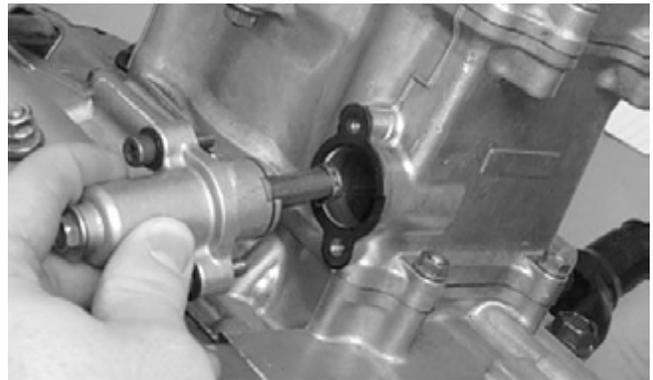
20. Remove the cap screw from the end of the chain tensioner; then using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner clockwise until the screw bottoms.



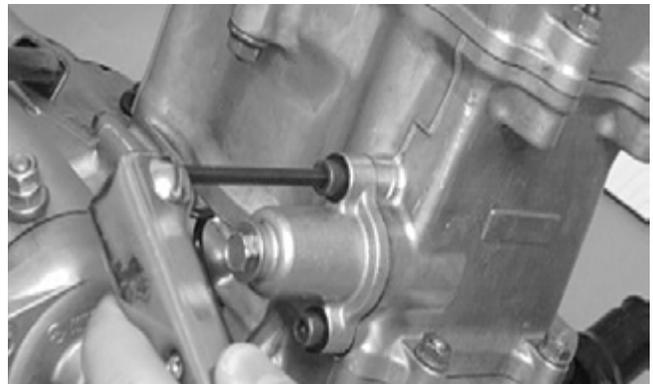
CC309D

- 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 22.

21. Place the chain tensioner adjuster assembly and gasket into position on the cylinder and secure with the two Allen-head cap screws.

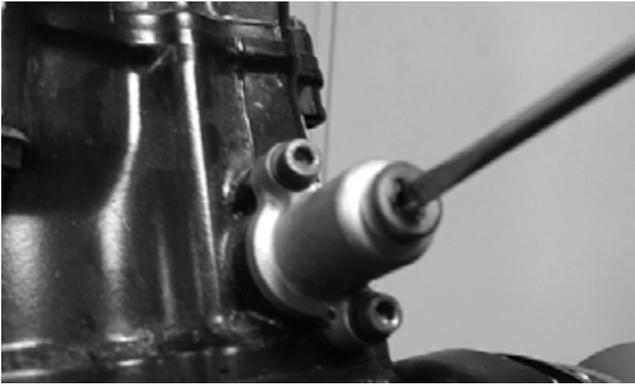


CC011D



CC010D

22. 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.



SP046



CC009D

23. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw and tighten to 1.5 kg-m (11 ft-lb). Bend the tab to secure the cap screw.
24. Rotate the crankshaft until the first cap screw (from step 16) securing the sprocket to the camshaft can be addressed; then tighten to 1.5 kg-m (11 ft-lb). Bend the tab to secure the cap screw.
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 (p/n 0636-070) to the mating surfaces of the cylinder head and valve cover.

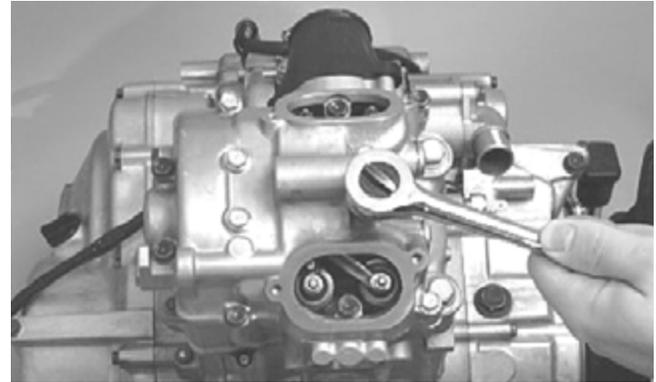


CC275D

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.

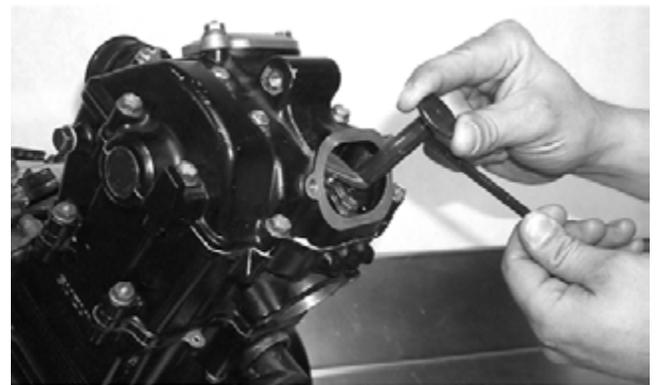


CC003D

29. In a crisscross pattern starting from the center and working outward, tighten the cap screws securely.
30. Adjust valve/tappet clearance using the following procedure.

■NOTE: Use Valve Clearance Adjuster (p/n 0444-078) for this procedure.

- A. Turn the engine over until the piston reaches top dead center on the compression stroke.
- B. 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.



CC528D

- C. 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.
- D. Align the valve adjuster handle with one of the marks on the valve adjuster dial.
- E. While holding the valve adjuster handle in place, rotate the valve adjuster dial counter-clockwise until specified valve/tappet clearance is attained.

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

F. While holding the adjuster dial at the proper clearance setting, tighten the jam nut securely with the valve adjuster handle.

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 to 1.7 kg-m (12 ft-lb).

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.
2. Install the mounting fasteners securing the engine/transmission in the following sequence.

A. Lower rear: One cap screw and nut with flat washer. Tighten only until snug.



CC126D

B. Upper rear: Loosely fasten the left-side engine mount-to-frame cap screws; then install the cap screw w/nut and flat washer. Tighten only until snug.



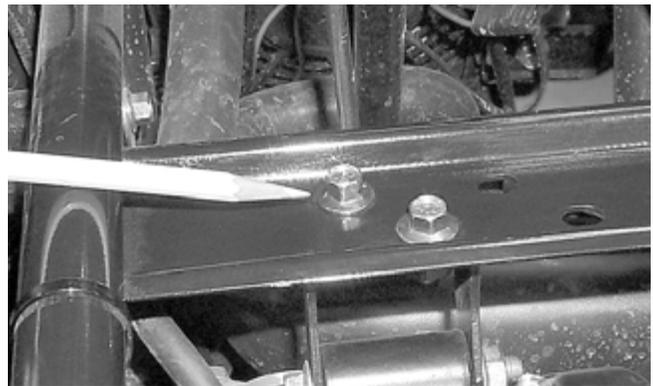
CC125D

C. Lower front: One cap screw, nut, spacer, and washer. Tighten only until snug.



CC123D

D. Upper front: Two cap screws (inside the bracket) and one cap screw and nut (topside of engine). Tighten only until snug.



AF939

3. Tighten the engine mounting fasteners to the following specifications.

A. Lower rear and Lower front to 5.5 kg-m (40 ft-lb).

B. Upper front (inside the bracket) and Upper front (topside of engine) to 2.8 kg-m (20 ft-lb).

C. Upper rear left-side engine mount-to-frame cap screws to 1.7 kg-m (12 ft-lb) and engine to engine mount cap screw with nut and flat washer to 5.5 kg-m (40 ft-lb).

4. Connect the crankcase breather vent hose and secure with the clamp.



CC122D

5. Connect the lower coolant hose to the water pump housing and secure with the clamp.



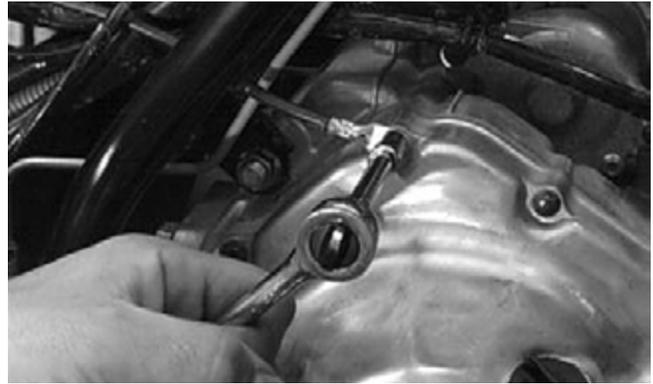
CC124D

6. Connect the positive cable to the starter motor and install the protective boot.



AR604D

7. Connect the battery ground (negative) cable to the crankcase cover.



AR600D

8. Install the high tension lead on the spark plug.

9. Connect the upper coolant hose to the thermostat housing and secure with the clamp.



CC121D

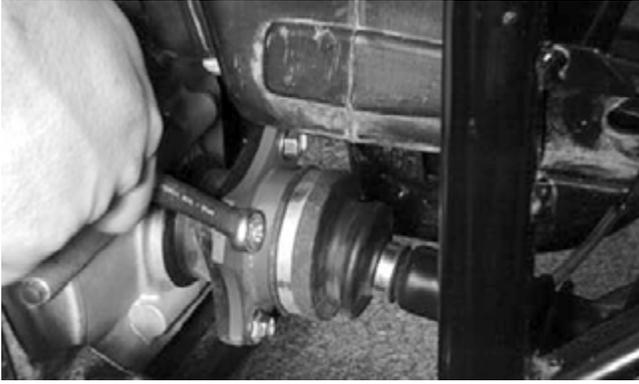
10. Install the carburetor assembly and secure the intake manifold and air inlet boot.



CC120D

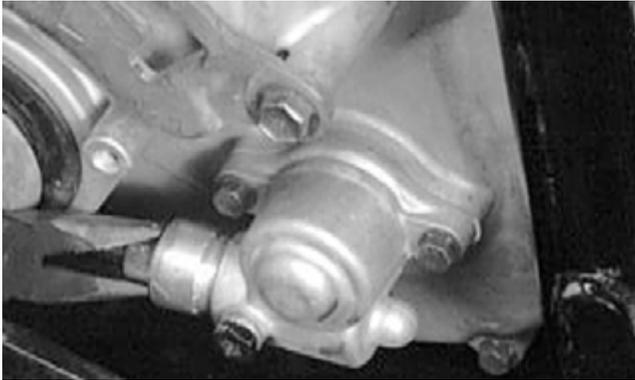
11. Route the two vent hoses through the slots in the frame.

12. Place the rear output shaft into position on the rear output joint; then install the four cap screws and tighten to 2.8 kg-m (20 ft-lb).



CC119D

13. Place the speedometer cable into position and tighten the knurled nut.



AF667D

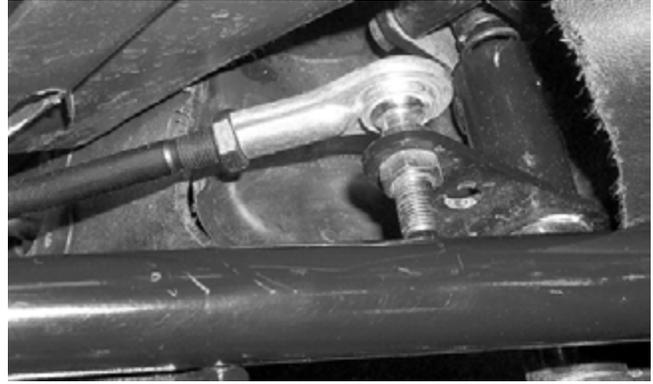
14. To install the reverse shift rod, use the following procedure:

- A. Place the reverse shift arm onto the engine reverse shift shaft (with the marks made during disassembly aligned) and secure with the cap screw.



CC118D

- B. Secure the upper end of the reverse shift rod to the shift lever arm with a new lock nut. Tighten securely.



AF941

15. Place the footrests into position on the frame. Tighten the 10 mm cap screws to 5.5 kg-m (40 ft-lb) and the 8 mm cap screws to 2.8 kg-m (20 ft-lb); then secure the fender extensions to the footrests with existing hardware.

16. Place the exhaust pipe into position inside the frame and connect to the muffler at the juncture.

■NOTE: If the muffler was removed, see Section 8.

17. Place the exhaust pipe with new grafoil gasket into position on the engine; install and tighten the cap screws to 2.8 kg-m (20 ft-lb).

18. Install the rear fenders and the rear rack (see Section 8).

19. Install the gas tank (see Section 4).

20. Place the right-side and left-side panels into position; then install the existing hardware and tighten securely.

21. Carefully guide the battery cables and fuse block wiring up through the access hole into the battery tray.

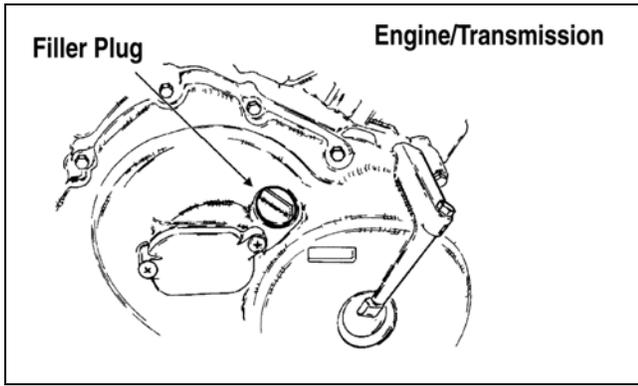
22. Connect all fuse block wiring according to the marking made in removing; then place the fuse block into position and secure with two screws.

■NOTE: If the mounting screw holes have elongated, it will be necessary to install larger diameter screws.

⚠ CAUTION

It is critical that all wiring be installed correctly to ensure electrical components will function properly.

23. Pour the correct amount of recommended oil into the engine/transmission filler hole; install the filler plug.



ATV-0108

24. Pour 2.9 L (3 U.S. qt) of premixed Arctic Cat Antifreeze (p/n 0638-395) into the cooling system. Allow coolant to settle and then fill to the bottom of the stand pipe in the radiator neck.



AN604D

25. Connect all remaining electrical connections; then install the battery making sure to connect the positive battery cable first and the negative cable last.
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.

SECTION 4 - FUEL/LUBRICATION/COOLING

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Carburetor Specifications

ITEM	250	300	400	500
	Keihin CVK32	Keihin CVK32	Keihin CVK34	Keihin CVK36
Main Jet	138	135	150	148
Slow Jet	38	38	38	75
Low Speed Fuel Screw Setting (turns)	1 3/4	2 1/4	2 1/8	1 7/8
Needle Jet	4.0/3.4	4.0/3.4	4.0/3.4	6.0/4.0
Jet Needle	N8TT	N8TT	N8TV	N3RS
Idle RPM	1300-1400	1300-1400	1250-1350	1250-1350
Starter Jet	60	65	60	90
Float Arm Height	17 mm (0.7 in.)			
Throttle Cable Free-Play (at lever)	3-6 mm (1/8-1/4 in.)			

Carburetor

⚠ 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.

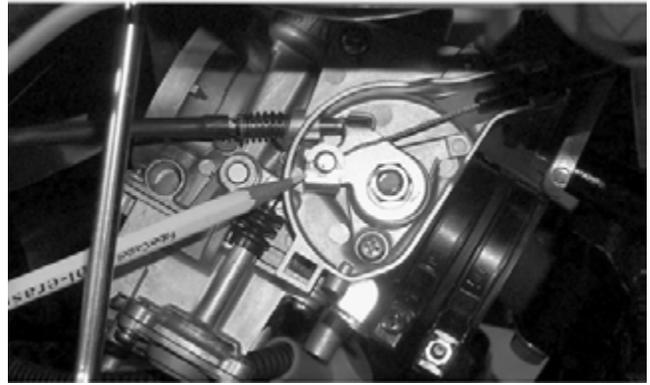
REMOVING

1. Turn the gas tank valve to the OFF position.
2. Remove the seat.
3. Remove the air-intake snorkel (250/300) or the air cleaner housing cover (400/500).
4. Disconnect the hose from the carburetor to the gas tank at the gas tank valve connection.
5. Loosen the flange clamps; then remove the carburetor from the two carburetor boots.
6. Remove the screw securing the throttle actuator cover to the carburetor; then remove the cover.



CC743

7. Remove the throttle cable from the actuator arm.



CC742

8. Loosen the outer jam nut securing the throttle cable to the carburetor body; then route the cable out of the way.



CC741

9. By unscrewing the plastic choke cable end, disconnect the choke cable from the carburetor.

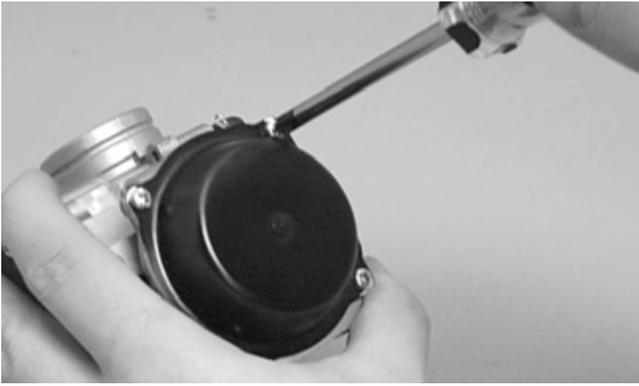


CC740A

10. Disconnect the gas and vent hoses; then remove the carburetor.

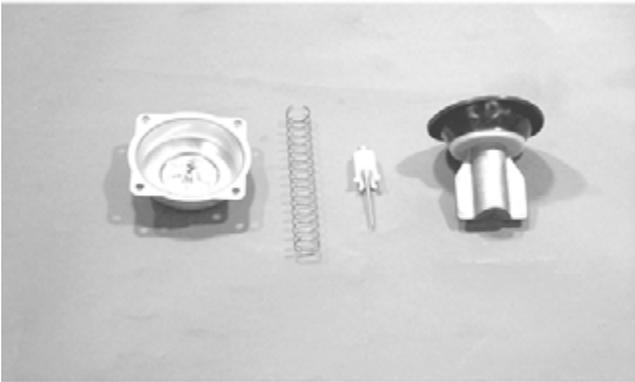
DISASSEMBLING

1. Remove the four Phillips-head screws securing the top cover; then remove the cover.



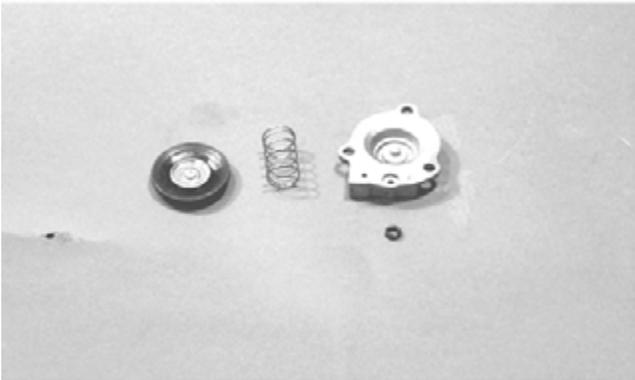
CH015D

2. Remove the vacuum piston assembly from the carburetor body. Account for a spring, spring seat, and the jet needle.



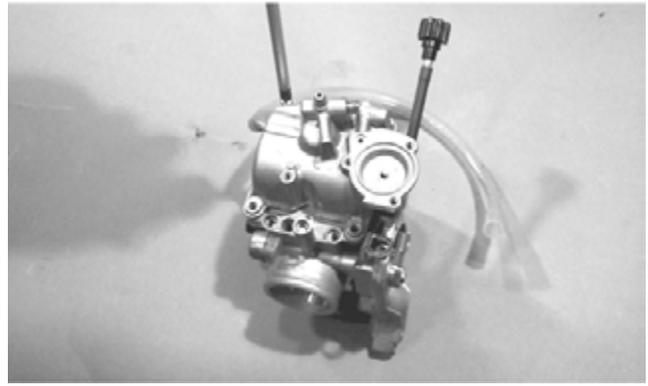
CC746

3. Remove the three screws securing the primer housing. Account for the diaphragm assembly, spring, and U-ring (in the housing).

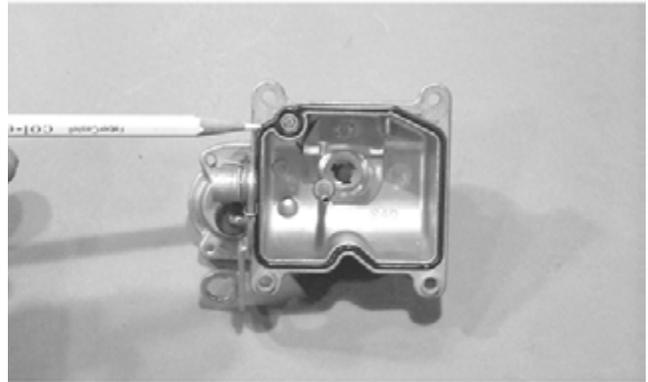


CC748

4. Remove the Phillips-head screws securing the float chamber; then remove the chamber. Account for the O-ring.

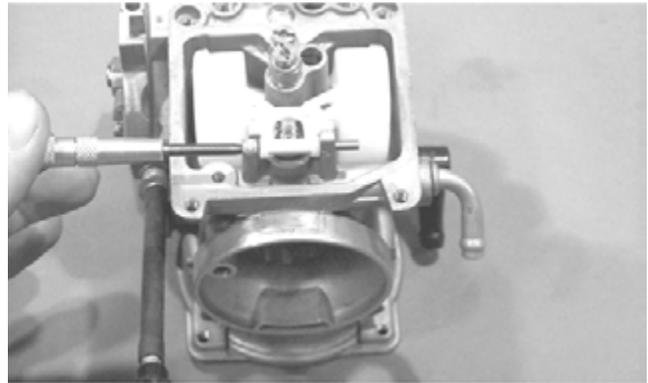


CC749



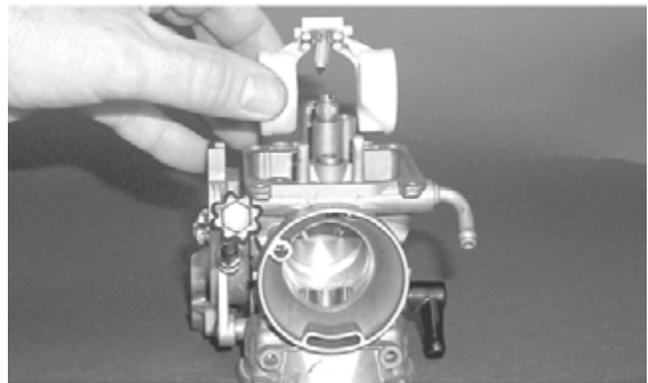
CC750

5. Remove the float pin.



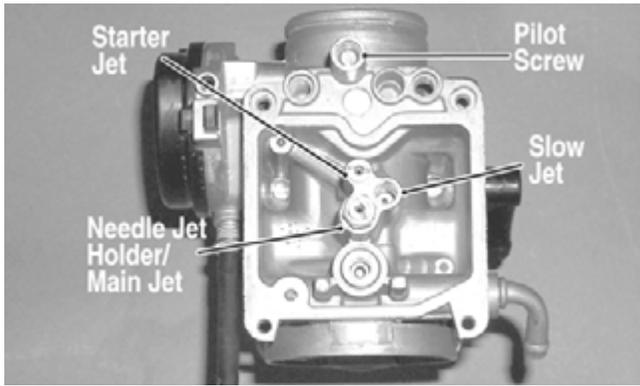
CC752

6. Lift the float assembly from the carburetor. Account for the float needle valve.



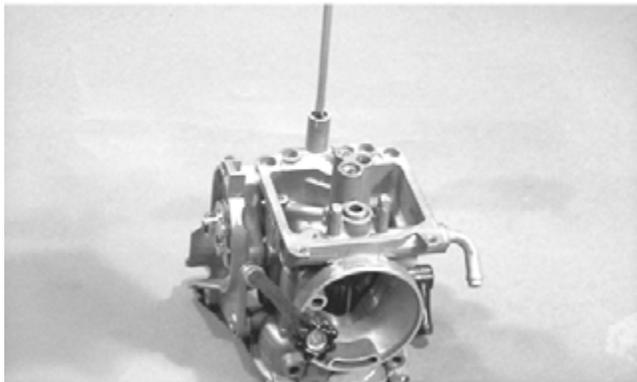
CC753

■NOTE: Note the locations of the jets, air screw, and holder for disassembling procedures.



CC761A

7. Secure the needle jet holder with a wrench; then remove the main jet.
8. Remove the needle jet holder; then remove the slow jet and the starter jet.
9. Remove the low speed fuel screw.

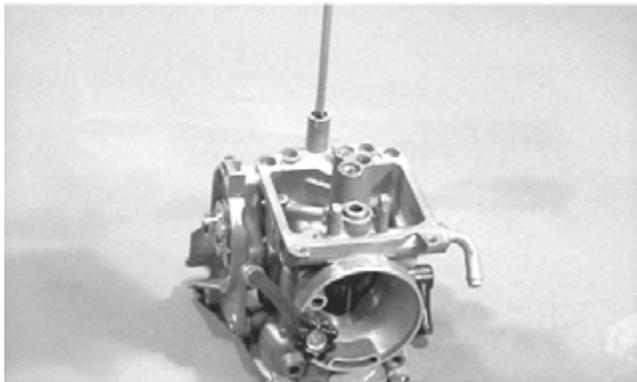


CC758

10. Unscrew and remove the idle speed adjuster assembly. Account for the spring and washer.

ASSEMBLING

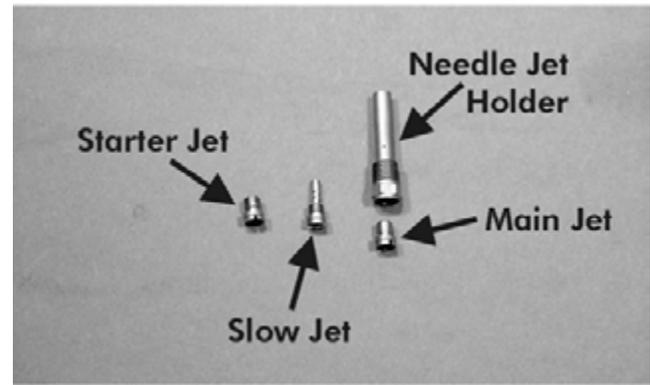
1. Screw the idle speed adjuster into the carburetor making sure the washer and spring are properly positioned.
2. Install the low speed fuel screw.



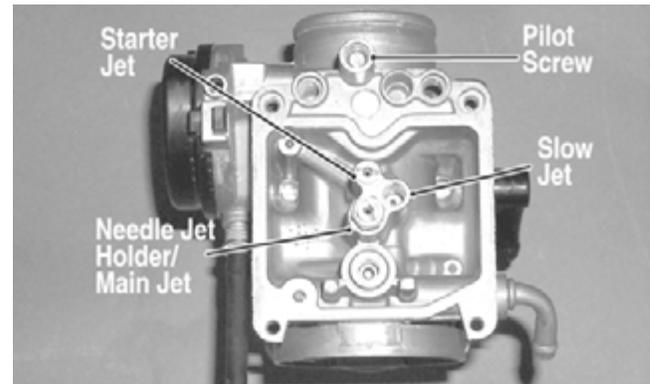
CC758

■NOTE: Turn the low speed fuel 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.

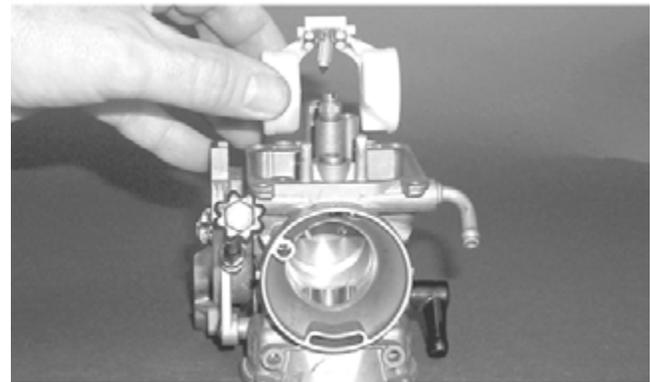


CC759A



CC761A

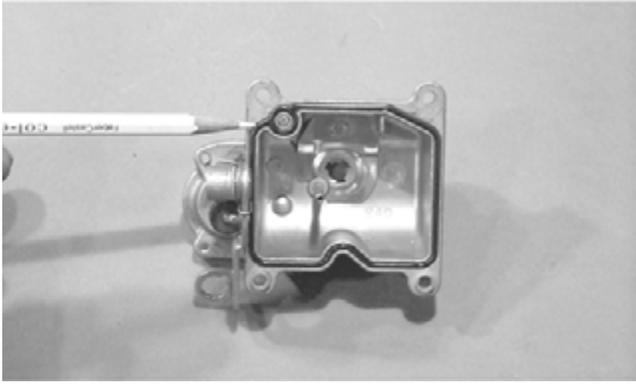
3. Install the slow jet. Tighten securely.
4. Install the main jet into the needle jet holder and tighten securely; then install the needle jet holder assembly into the carburetor and tighten securely.
5. Place the float assembly (with float needle valve) into position and secure to the carburetor with the float pin.



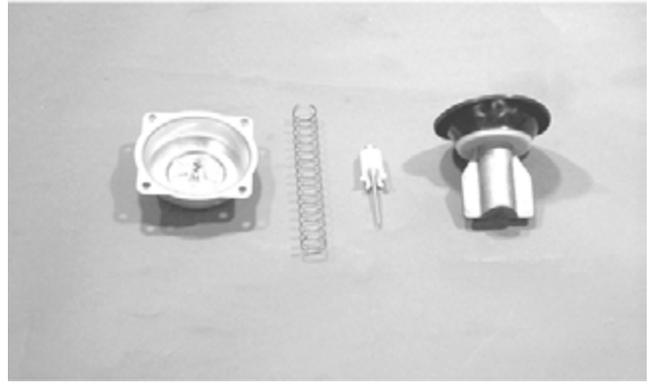
CC753

■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.).

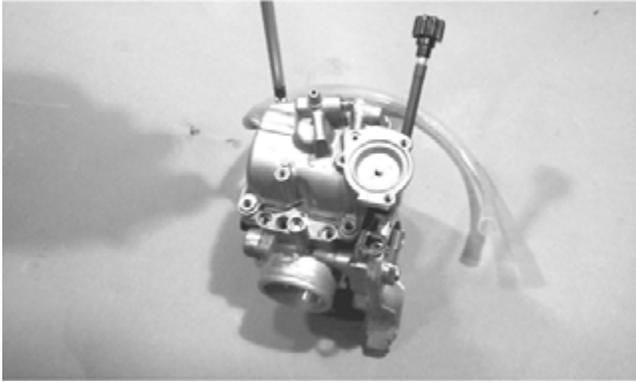
6. Place the float chamber into position making sure the O-ring is properly positioned; then secure with the Phillips-head screws.



CC750

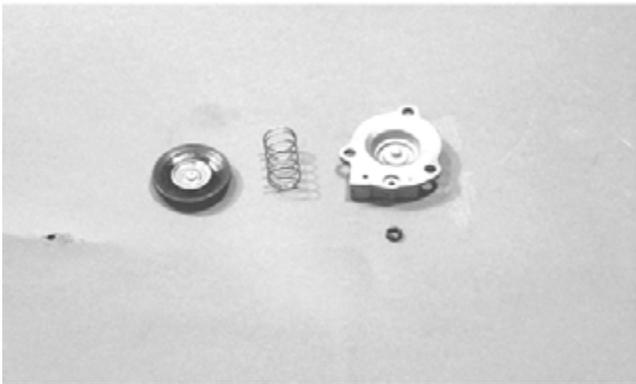


CC746



CC749

- Place the U-ring into the primer housing. Position the spring and diaphragm assembly (lip toward the carburetor) onto the carburetor; then secure the assembly with the primer housing and three screws. Tighten securely.



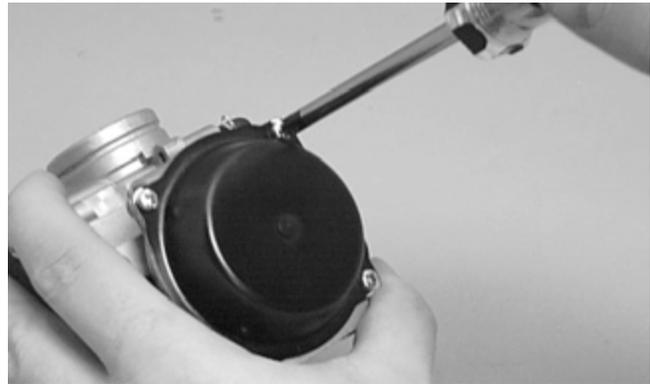
CC748

⚠ CAUTION

It is important to press down on the primer 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.

- Place the jet needle, spring seat, and spring into the vacuum piston; then place the assembly down into the carburetor.

- Place the top cover into position; then secure with the Phillips-head screws. Tighten securely.



CH015D

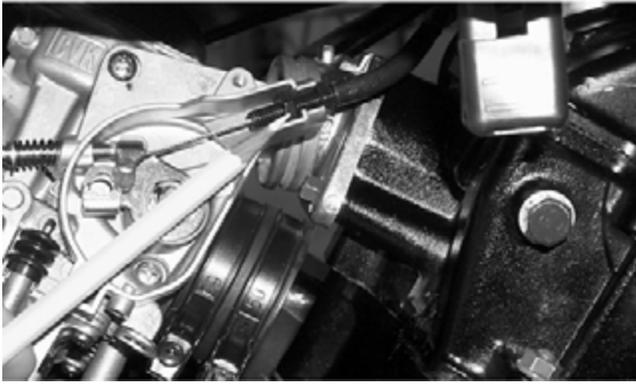
INSTALLING

- Connect the gas and vent hoses onto the carburetor.
- Connect the choke cable by screwing the plastic choke cable end onto the carburetor.



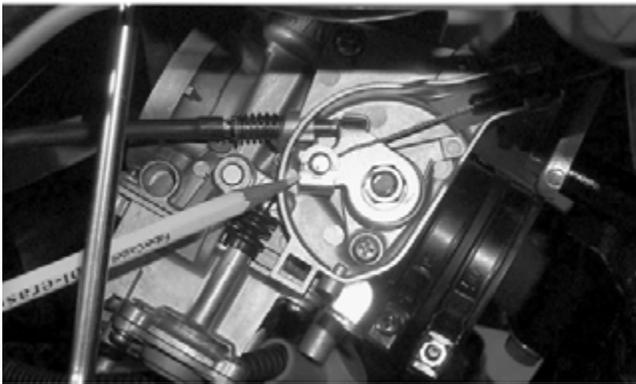
CC740A

- Place the throttle cable into position and secure by tightening the outer jam nut.



CC741

4. Connect the throttle cable to the actuator arm.



CC742

5. Place the throttle actuator cover into position on the carburetor; then secure with the screw.



CC743

6. Position the carburetor in the air cleaner boot and intake pipe assembly; then secure with the clamps.
7. Connect the hose at the gas tank valve connection.
8. Secure the air-intake snorkel (250/300) or the air cleaner housing cover (400/500).
9. Install the seat; then turn the gas tank valve to the ON position.

Cleaning and Inspecting Carburetor

■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.

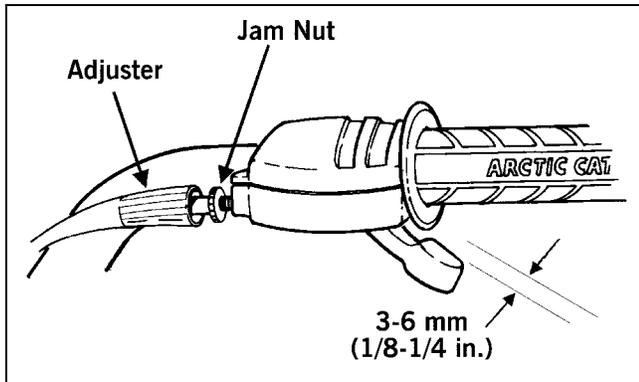
⚠ CAUTION

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 fresh parts-cleaning solvent.
 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 other 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, low speed fuel screw, and the inlet needle valve 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 plunger assembly/starter valve and seat for wear or damage.
 12. Inspect the carburetor mounting flange for damage and tightness.

Throttle Cable Free-Play

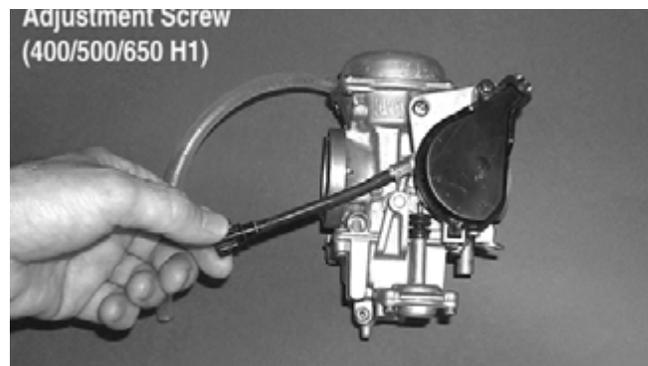
1. Check throttle cable free-play at the lever; free-play should be 3-6 mm (1/8 - 1/4 in.).
2. To adjust, slide the rubber boot away from the adjuster located near the throttle lever. Loosen the jam nut and rotate the adjuster in the appropriate direction until proper free-play is attained. Tighten the jam nut against the adjuster; then slide the rubber boot over the adjuster.



ATV-0047



CC795B



AF920C

Engine RPM (Idle)

To properly adjust the idle RPM, a tachometer is necessary.

To adjust idle RPM, use the following procedure.

■**NOTE:** To access the idle adjustment screw, it will be necessary to remove the seat on the 250/300 models. The idle adjustment screw is located on the right-hand side of the carburetor on the 400/500 models.

1. Start the engine and warm it up to operating temperature.
2. Turn the idle adjustment screw clockwise or counter-clockwise until the engine idles at recommended RPM.

⚠ WARNING

Adjust the idle to the correct RPM. Make sure the engine is fully warm before adjusting the idle RPM.

Engine Idle RPM	
250/300	1300-1400
400/500	1250-1350

Gas Tank

⚠ WARNING

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

REMOVING

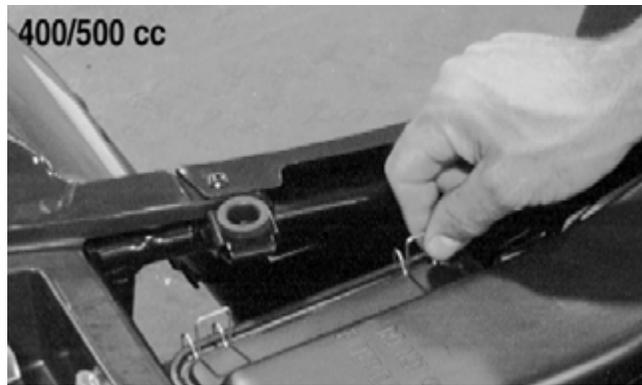
1. Turn the gas tank valve to the OFF position.
2. Remove the seat.
3. Remove the air-intake snorkel (250/300) or the air cleaner housing cover (400/500).



CH040DA

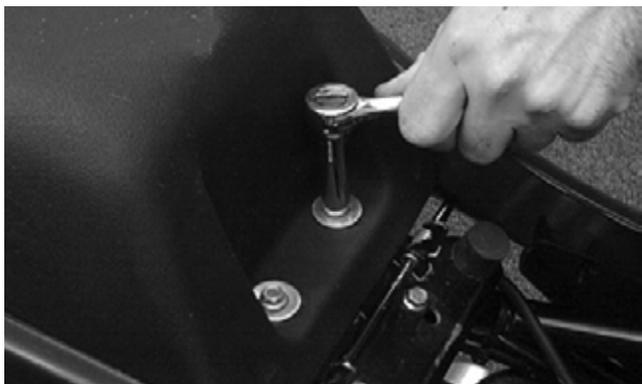


CH041DA



AL645DA

4. Disconnect the hose from the carburetor to the gas tank at the tank connection.
5. Cut the tie-down securing the fuel hose to the cables and hoses.
6. Remove the torx-head screws securing the gas tank to the frame.



AL617D

7. Remove the vent hose; then remove the gas tank.

CLEANING AND INSPECTING

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

1. Clean all gas tank components with parts-cleaning solvent.
2. Inspect all hoses for cracks or leaks.

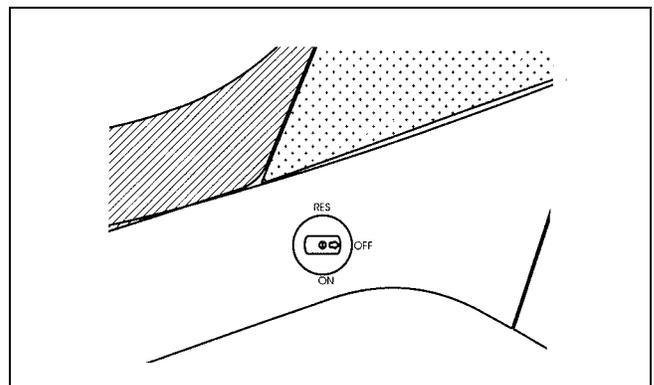
3. Inspect gas tank valve, tank cap, and tank for leaks, holes, and damaged threads.
4. Inspect the gas gauge for proper operation.

INSTALLING

1. Place the gas tank into position on the frame; then install the torx-head screws. Tighten securely.
2. Connect the fuel hose from the carburetor; then secure hose to cables and hoses with a cable tie.
3. Install the air-intake snorkel (250/300) or the air cleaner housing cover (400/500).
4. Install the vent hose; then fill the gas tank with gasoline.
5. Turn the gas tank valve to the ON position and inspect for leakage.
6. Install the seat.

Gas Tank Valve

The ATV has a valve incorporated into the gas tank. There are three positions: ON, RES, and OFF.



ATV-1098

In the OFF position, the valve will not allow gasoline to flow to the carburetor. In the ON position (the normal operating position), gasoline will flow from the tank to the carburetor. In this position 2.46 l (0.65 U.S. gal.) will remain in the tank as a reserve quantity. Moving the valve to the RES position will allow the operator to use the remaining gasoline in the tank. When turning the valve to any of the three positions, be sure the indicator is pointed directly at the position desired.

REMOVING/INSPECTING

⚠ WARNING

Drain the gas tank prior to this procedure.

1. Remove the gas hose from the valve by releasing the spring clamp.
2. Remove the two nuts securing the valve; then remove the valve. Account for the gasket.
3. Inspect the gasket and valve/tank mating surfaces for damage or deterioration.

4. Inspect for and remove any obstructions in the valve.

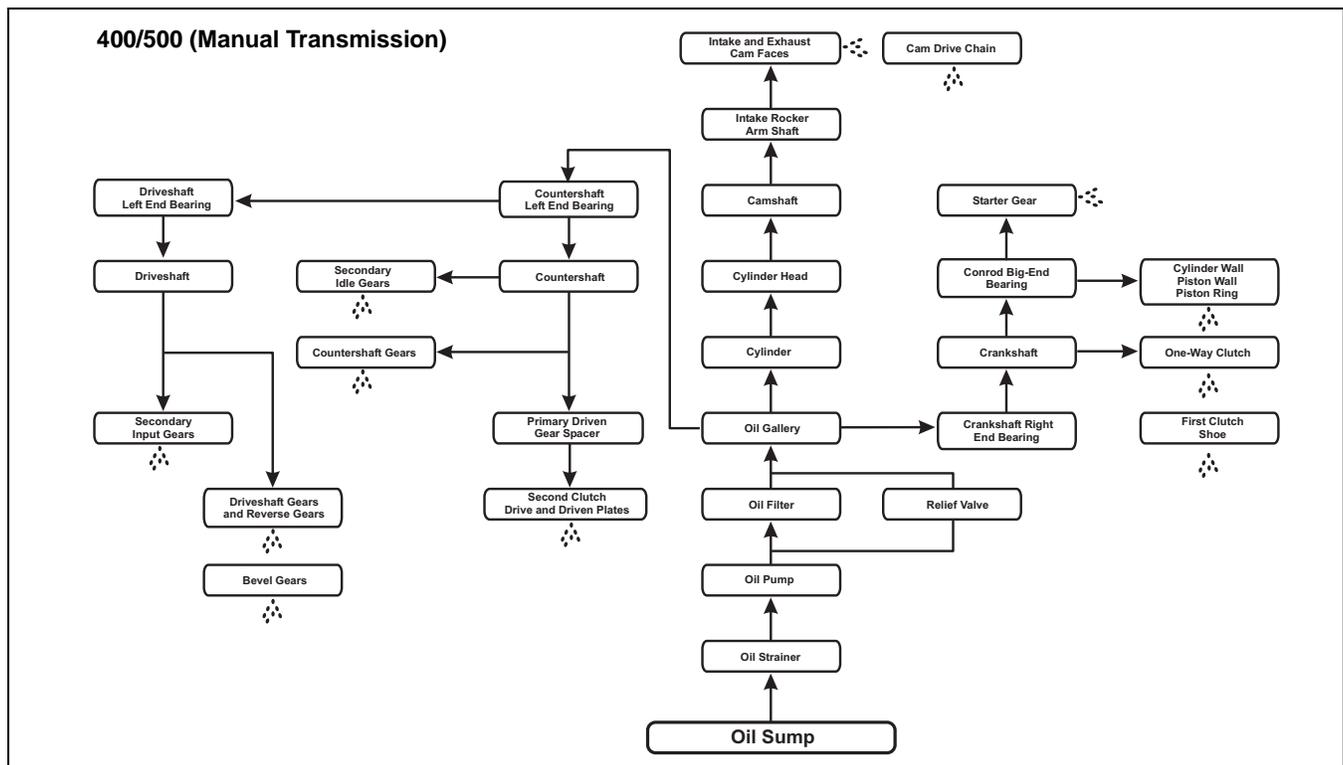
INSTALLING

1. Place the valve and gasket into position on the tank and secure with the nuts. Tighten to 0.1 kg-m (1 ft-lb).
2. Install the gas hose onto the valve with the spring clamp.

Gas/Vent Hoses

Replace the gas hose every two years. Damage from aging may not always be visible. Do not bend or obstruct the routing of the carburetor vent hose. Make certain that the vent hose is securely connected to the carburetor and the opposite end is always open.

Oil Flow Charts



ATV-0111

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.
2. Inspect the rotors for scoring and gouges.
3. Inspect the alignment pin for damage.
4. Inspect the pump housing and cover for cracks or damage.

ASSEMBLING/INSTALLING

1. Place the rotors into the pump housing making sure the alignment pin is in the groove of the rotor.
2. Place the cover onto the pump housing.
3. Secure the pump with the Phillips-head screw coated with red Loctite #271.
4. Install the oil pump into the engine (see Right-Side Components in Section 3).

Testing Oil Pump Pressure

■NOTE: The engine must be warmed up to operating temperature for this test.

1. Connect the Arctic Cat Engine Tachometer (p/n 0644-275) to the engine.
2. Connect the Oil Pressure Gauge (p/n 0444-039) to the oil filter drain plug.

■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 the specified RPM.
4. The oil pressure gauge must read as specified.

250/300
OIL PRESSURE @ 3000 RPM
0.3-0.7 kg/cm ² (4.3-10 psi)
Oil Temperature - 60°C (140°F)
400 (Manual Transmission)
OIL PRESSURE @ 3000 RPM
0.6-1.0 kg/cm ² (9-14 psi)
Oil Temperature - 60°C (140°F)
400 (Automatic Transmission)
OIL PRESSURE @ 3000 RPM
1.1-1.5 kg/cm ² (16-21 psi)
Oil Temperature - 60°C (140°F)

500 (Manual Transmission)
OIL PRESSURE @ 3000 RPM
1.2-1.6 kg/cm ² (17-23 psi)
Oil Temperature - 60°C (140°F)
500 (Automatic Transmission)
OIL PRESSURE @ 3000 RPM
1.3-1.7 kg/cm ² (18-24 psi)
Oil Temperature - 60°C (140°F)

■NOTE: If the oil pressure is lower than specified, check for an oil leak, damaged oil seal, or a defective oil pump.

■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 (250/300/400)

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, collars, and washers.



AL651D

3. Remove the oil cooler from the frame.

INSTALLING

1. Place the collar into position in the frame.
2. Secure the cooler to the frame with the cap screws, washers, collars, and grommets.
3. Install the hoses onto their respective fittings and secure with the clamps.

Liquid Cooling System (500)

The cooling system capacity is approximately 2.9 L (3 U.S. qt). The cooling system should be inspected daily for leakage and damage. Also, the coolant level should be checked periodically.

When filling the cooling system, use premixed Arctic Cat Antifreeze (p/n 0638-395). 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.

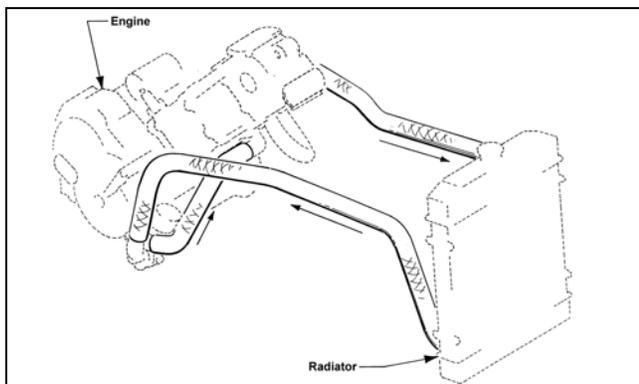


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CAUTION

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

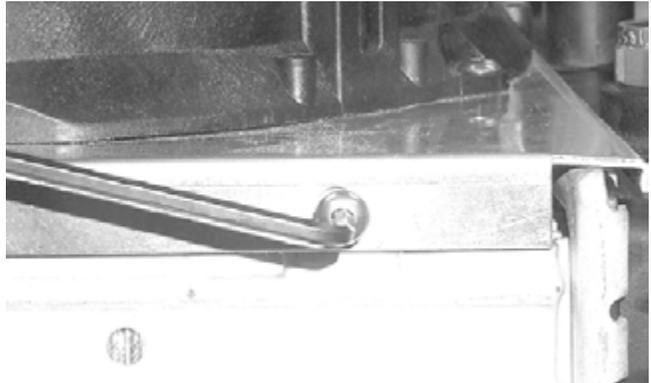


0732-411

REMOVING

1. Drain the coolant at the engine.
2. Remove the front rack (see Section 8).

3. Remove the front bumper and grille assembly (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.



AF734D

4. Install the front bumper and grille assembly (see Section 8).
5. Install the front rack (see Section 8).
6. Fill the cooling system (2.9 L or 3 U.S. qt) with anti-freeze. Check for leakage.
7. Connect the fan wiring to the main wiring harness.

Hoses/Thermostat

REMOVING

1. Drain the coolant from the cooling system.
2. Remove the hose clamps securing the lower coolant hose to the water pump housing and to the radiator; then remove the lower hose.



CC334D

3. Remove the clamps securing the upper coolant hose to the thermostat housing and to the radiator; then remove the upper hose.



CC335D

4. Remove the clamps securing the crossover coolant hose to the water pump and to the engine water inlet.
5. Remove the two cap screws securing the thermostat housing to the cylinder head. Account for an O-ring and a thermostat.

INSPECTING

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

1. Inspect the thermostat for corrosion, wear, 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 48.5-51.5°C (119.3-124°F).
 - D. If the thermostat does not open, it must be replaced.
3. Inspect all coolant hoses, connections, and clamps for deterioration, cracks, and wear.

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

INSTALLING

1. Place the thermostat and O-ring into the thermostat housing; then secure the thermostat housing 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 (2.9 L or 3 U.S. qt) with anti-freeze. Check for leakage.

Fan

REMOVING

1. Remove the radiator (see Radiator in this section).
2. Remove the fan assembly from the radiator.



CC862

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 (see Radiator in this section).

Servicing 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 (2.9 l or 3 U.S. qt) with anti-freeze.

■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.

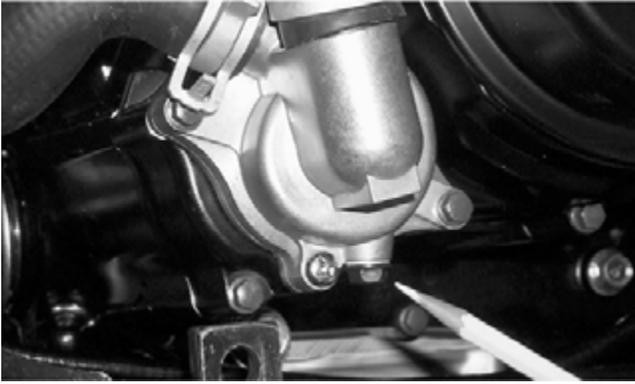
5. Check the entire cooling system for leakage.

Servicing Water Pump (500 - Automatic Transmission)

■NOTE: When servicing the water pump, it will be necessary to install a new Oil Seal (p/n 3402-465) and a new Mechanical Seal (p/n 3005-909).

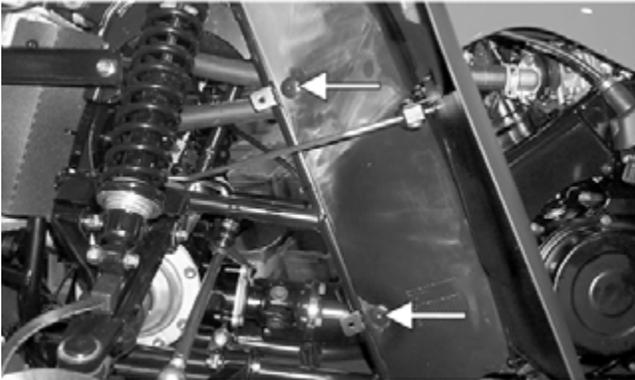
REMOVING

1. Remove the radiator cap; then remove the water pump drain and drain the coolant.



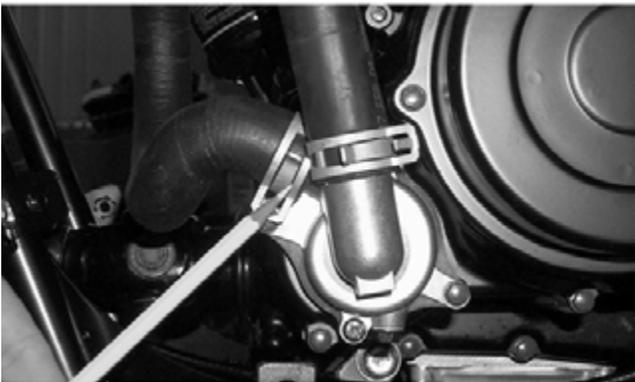
CC789

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. From inside the left-front wheel-well, remove the two torx-head cap screws securing the fender to the frame.



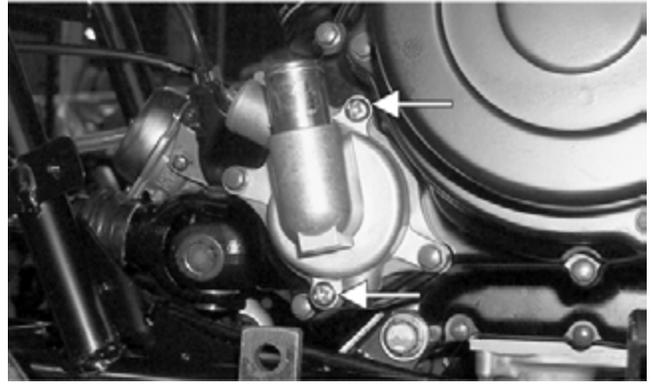
CC788A

5. Compress the tabs on the coolant hose clamps and slide the clamps away from the hose ends approximately 51 mm (2 in.); then remove both hoses from the water pump.



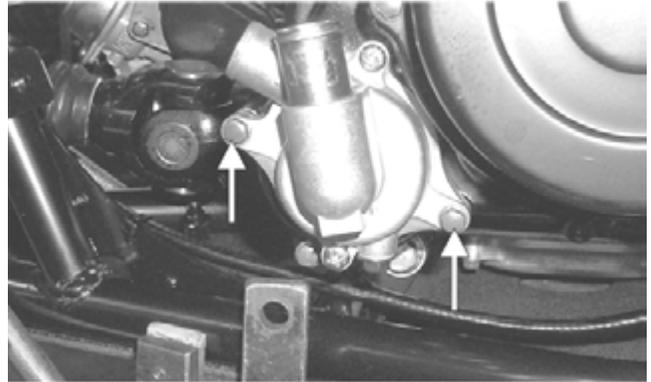
CC784

6. Using an impact driver, loosen but do not remove the two Phillips-head cover screws.



CC785A

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



CC786A

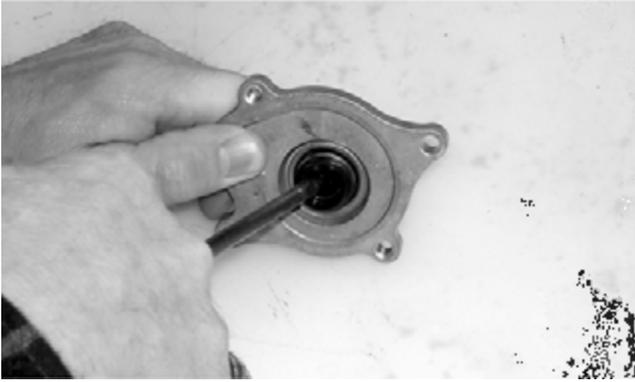
DISASSEMBLING

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.



CC781

3. Using Seal Removal Tool (p/n 0644-072), 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.



CC781

■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.

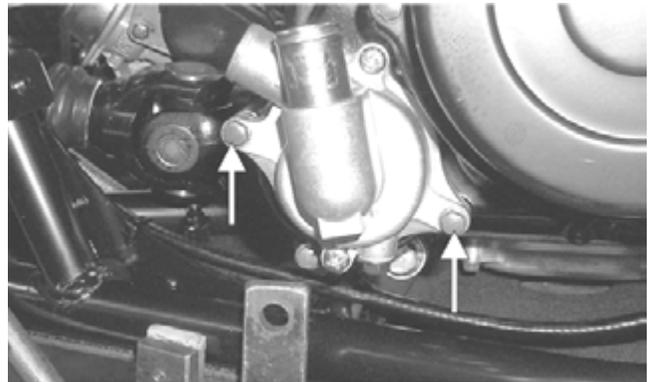
CAUTION

Failure to properly engage the two shafts could cause serious engine damage.

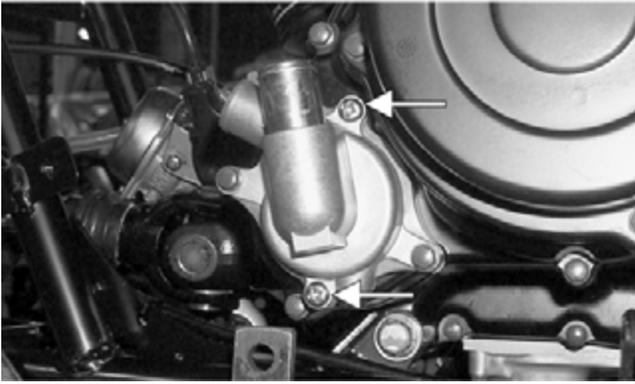
5. With the bearing housing assembly in position on the engine, place the cover (with O-ring installed) into position on the housing; then loosely secure with the two Phillips-head cap screws.

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.

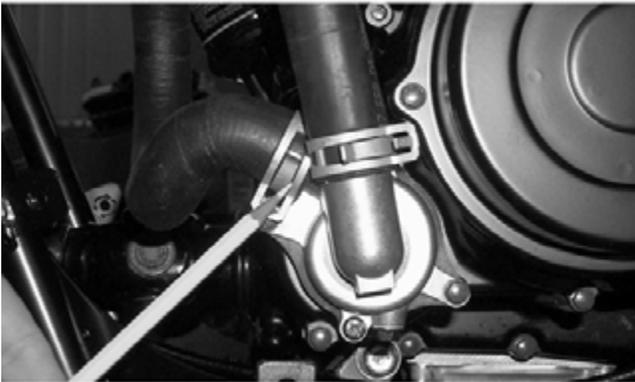


CC786A



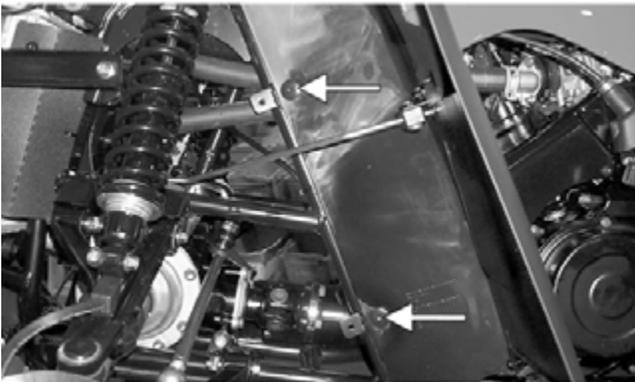
CC785A

2. Connect the two coolant hoses to the water pump and secure with the clamps.



CC784

3. From inside the left-front wheel-well, secure the fender to the frame with the two torx-head cap screws. Tighten securely.



CC788A

4. 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 two 8 mm cap screws to 2.8 kg-m (20 ft-lb) and the two 10 mm cap screws to 5.5 kg-m (40 ft-lb).

5. Fill the engine/transmission with the proper amount of recommended oil.

6. Fill the cooling system with the proper amount of recommended coolant.



AN604D

■ **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.

7. 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.

NOTES

SECTION 5 - ELECTRICAL SYSTEM

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Specifications

250/300	
IGNITION	
Ignition Timing (250)	5° BTDC below 1800 RPM 35° BTDC above 3800 RPM
Ignition Timing (300)	5° BTDC @ 1800 RPM 30° BTDC @ 3800 RPM
Spark Plug Type	NGK DR7EA
Spark Plug Gap	0.6-0.7 mm (0.024-0.028 in.)
Spark Plug Cap	8000-12,000 ohms
Ignition Coil Resistance (primary) (secondary)	0.4-0.6 ohm (terminal to ground) 5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	98.3-147.5 volts (terminal to ground)
MAGNETO	
Magneto Coil Resistance (trigger) (charging)	84-126 ohms (black/yellow to green/white) 0.44-0.66 ohm (yellow to yellow)
Magneto Coil Peak Voltage (trigger) (charging)	3.12-4.68 volts (black/yellow to green/white) 30-45 volts (yellow to yellow)
Magneto Output (approx)	220W @ 5000 RPM
400	
IGNITION	
Ignition Timing	10° BTDC @ 1500 RPM
Spark Plug Type	NGK CR7E
Spark Plug Gap	0.7-0.8 mm (0.028-0.032 in.)
Spark Plug Cap	8000-12,000 ohms
Ignition Coil Resistance (primary) (secondary)	0.4-0.6 ohm (terminal to ground) 5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	160.8-241.2 volts (terminal to ground)
MAGNETO	
Magneto Coil Resistance (trigger) (source) (charging)	160-240 ohms (green to blue) 0.08-0.12 ohm (yellow to white) 0.32-0.48 ohm (black to black)
Magneto Coil Peak Voltage (trigger) (source) (charging)	5.04-7.56 volts (green to blue) 0.7-1.05 volts (yellow to white) 12.5-18.6 volts (black to black)
Magneto Output (approx)	220W @ 5000 RPM
500	
IGNITION	
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) (secondary)	0.4-0.6 ohm (terminal to ground) 5200-7800 ohms (high tension - plug cap removed - to ground)
Ignition Coil Peak Voltage (primary/CDI)	142.4-213.6 volts (terminal to ground)
MAGNETO	
Magneto Coil Resistance (trigger) (source) (charging)	160-240 ohms (green to blue) 0.08-0.12 ohm (yellow to white) 0.32-0.48 ohm (black to black)
Magneto Coil Peak Voltage (trigger) (source) (charging)	4.2-6.3 volts (green to blue) 0.40-0.62 volt (yellow to white) 9.44-14.2 volts (black to black)
Magneto Output (approx)	325W @ 5000 RPM

Battery

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 venting tube of battery is always open once battery is filled with electrolyte.

1. Remove the battery from the ATV.

WARNING

Remove the negative cable first; then remove the positive cable.

CAUTION

Do not charge the battery while it is in the ATV with the battery terminals connected.

2. Remove the vent plugs; then fill the battery with electrolyte to the UPPER level indicated on the battery.

■NOTE: Electrolyte should be at room temperature before filling. Do not use water or any other liquid to activate a battery.

WARNING

Electrolyte is a sulfuric acid solution. Avoid spillage and contact with skin, eyes, and clothing.

3. Allow the battery to stand for 15-30 minutes after filling. Electrolyte level may fall during this time. Refill with electrolyte to UPPER level line.
4. Trickle-charge the battery at 1.4 amps for 8-10 hours.
5. After charging, check electrolyte level and fill with DISTILLED WATER as necessary; then install the vent plugs. Wash off acid spillage with water and dry the battery.

CAUTION

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

6. Place the battery into position in the ATV and secure; then connect the vent hose to the battery.
7. Connect cables to the proper terminals: positive cable to the positive terminal (+) and negative cable to the negative terminal (-). Connect the negative cable last.

CAUTION

Connecting cables in reverse (positive to negative and negative to positive) can cause serious damage to the electrical system.

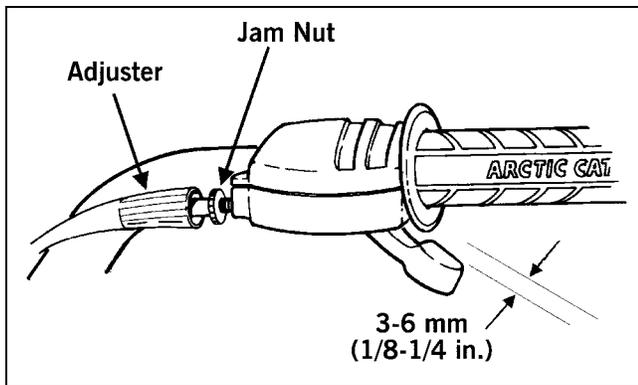
8. Check the vent tube to make sure it is not pinched or obstructed in any way and that it is properly routed down through the frame.

RPM Limiter

The ATV has an RPM limiter system to limit the engine RPM. One way to eliminate the activation of the RPM limiter is to utilize the throttle limiter screw at the throttle lever.

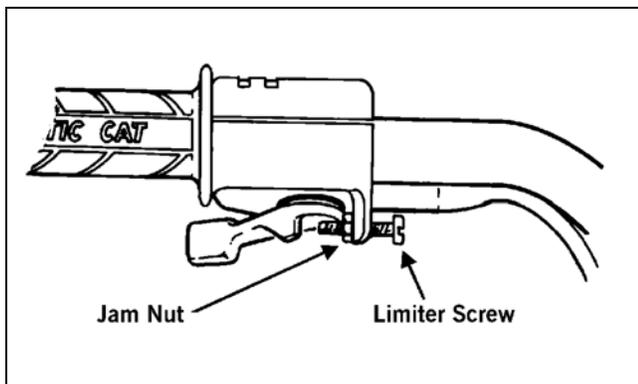
■ **NOTE:** The ATV is equipped with a CDI unit that retards ignition timing when maximum RPM is approached. When the RPM limiter is activated, it could be misinterpreted as a high-speed misfire.

1. Ensure that the throttle cable is adjusted correctly at 3-6 mm (1/8-1/4 in.) free-play at the lever.



ATV-0047

2. Loosen the jam nut of the limiter screw and rotate the screw clockwise until RPM is limited to under 9000 RPM (250/300) or under 8300 RPM (400/500); then tighten the jam nut.



ATV-0053

Testing Electrical Components

All of the electrical tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) and when testing peak voltage, the Peak Voltage Reading Adapter (p/n 0644-307) 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 (400/500)

■ **NOTE:** This test procedure is for either the receptacle or the connector.

VOLTAGE

1. Set the meter selector to the D.C. 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.



AR606D

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 right side of the engine directly above the brake cable adjuster.

■NOTE: The ignition switch must be in the ON position.

VOLTAGE (Wiring Harness Side)

1. Set the meter selector to the D.C. 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.

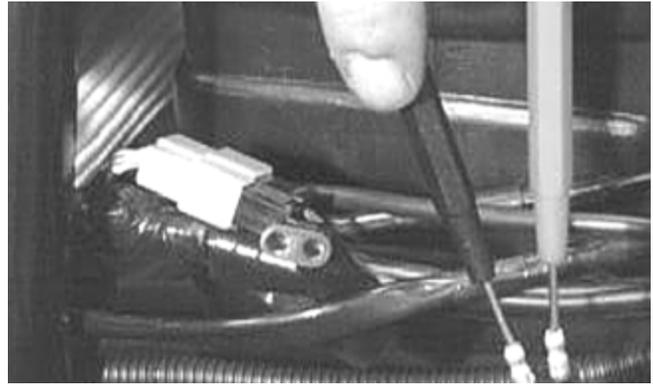
■NOTE: If the meter shows battery voltage, the main wiring harness is good; proceed to test the switch/component, the connector, and the switch wiring harness for resistance.

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, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Brakelight Switch (Handlebar Control)

The switch connector is the two-prong black connector in front of the steering post. To access the connector, the front rack and front fenders must be removed (see Section 8).

■NOTE: The ignition switch must be in the ON position.

VOLTAGE (Wiring Harness Connector)

1. Set the meter selector to the D.C. 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.

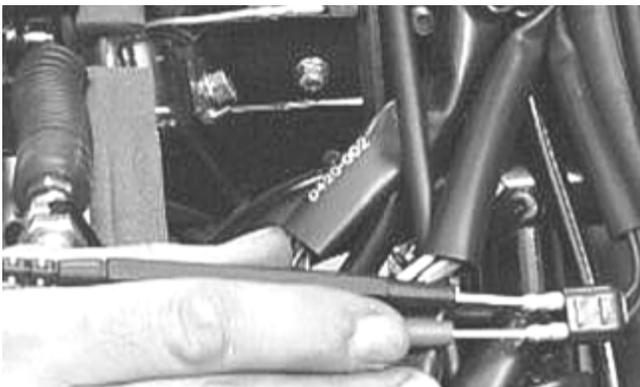
RESISTANCE (Switch Connector)

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.

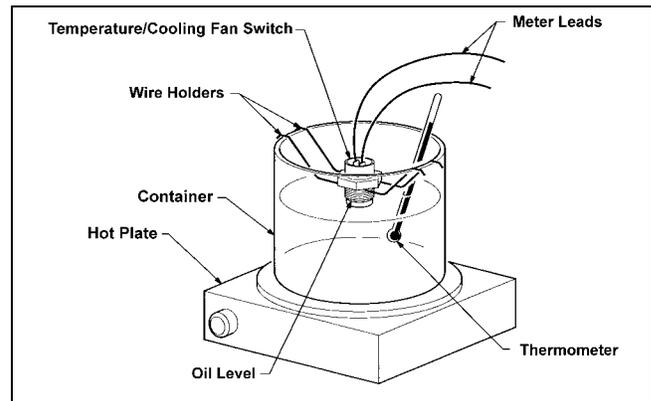
■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Oil Temperature and Cooling Fan Switches (250/300/400)

■NOTE: The 250/300 models have an oil temperature switch; the 400 models have an oil temperature switch and a cooling fan switch.

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 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.



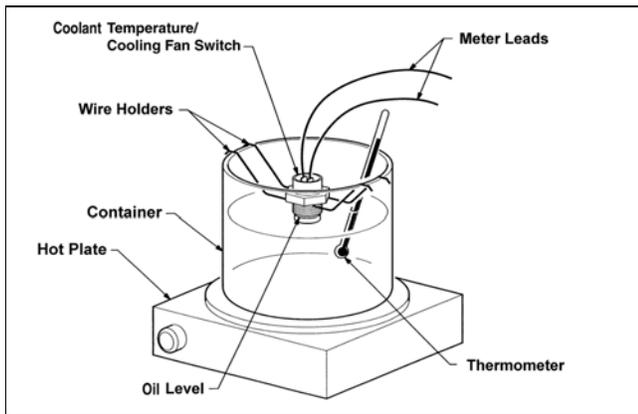
733-554C

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 teflon 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 water; then heat the water.

■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.



733-554E

3. On the coolant temperature switch when the water temperature reaches 115° C (239° F), the meter should read a closed circuit.
4. On the coolant temperature switch, allow the water to cool, and when the temperature is at (or just before) a temperature of 108° C (226° 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 at (or just before) a temperature of 82° C (180° 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.

Fan Motor (400/500)

To access the connector (located directly behind the fan), the front rack and front fenders must be removed (see Section 8).

■NOTE: The ignition switch must be in the ON position.

VOLTAGE (Main Harness Connector to Fan Motor)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the black/red wire (the black 2-prong at the fan motor); 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 blue wire from the fan connector to a 12 volt D.C. power supply; then connect the black wire from the fan connector to ground. The fan should operate.

⚠ CAUTION

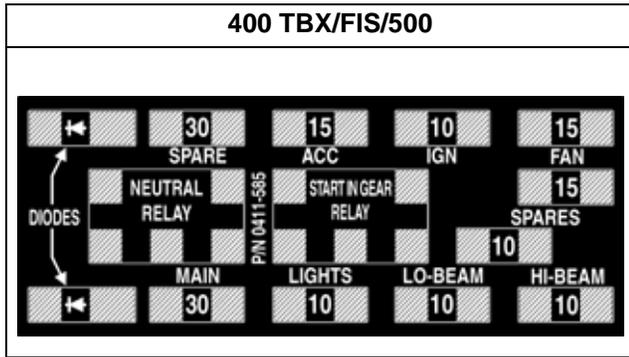
Care should be taken to keep clear of the fan blades.

Fuse Block

The main fuse (on the 400 ACT) is located in a fuse block on the frame near the right rear tire and protected by a snap-on cover. The main fuses are located in a fuse block under the center cover in the front fender assembly (on the 250/300), under the seat (on the 400 TBX/500 TBX/TRV), or under a cover above the right rear tire (on the 400 FIS/500).

If there is any type of electrical system failure, always check the fuses first.

250/300	400 ACT
10 A IGN	10 A LIGHTS
15 A LIGHTS	10 A HI
10 A ACC	10 A LO
10 A SPARE	10 A IGN
	15 A FAN
	15 A ACC



411-585A

■NOTE: The ignition switch must be in the LIGHTS position.

1. Remove all fuses from the fuse block.
2. Set the meter selector to the D.C. 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.



CH095D

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 an open circuit.

■NOTE: When testing the HI fuse holder, the headlight dimmer switch must be in the HI position; when testing the LO fuse holder, the headlight dimmer switch must be in the LO position.

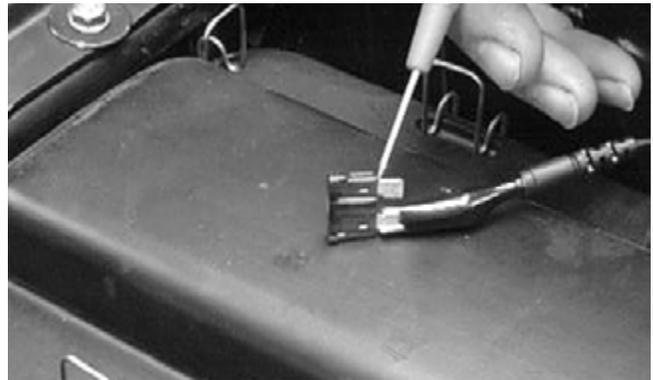
■NOTE: If the meter shows no battery voltage, troubleshoot the battery, switches, fuse block, or the main wiring harness.

Fuses

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.



AR610D

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.

Ignition Coil

On the 250/300, the ignition coil is attached to the upper frame behind the right-hand side panel. To access the coil, the seat and right-hand side panel must be removed (see Section 8).

On the 400/500, the ignition coil is on top of the engine. To access the coil, the seat and gas tank (see Section 4) must be removed.

VOLTAGE (Primary Side)

■NOTE: The ignition switch must be in the ON position; the emergency stop switch must be in the RUN position. Also, the white/blue wire must be disconnected from the coil.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the black tester lead to the white/blue wire; then connect the red tester lead to ground.

- The meter must show $31V \pm 20\%$.
- With the tester leads connected, depress the starter button.
- The meter must show $130V \pm 20\%$.

■NOTE: If the voltage is not as specified in one or both of the above tests, inspect the main wiring harness, connectors, source/charge coil, magneto rotor and magnets, magneto rotor key, or the CDI unit.

RESISTANCE

⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

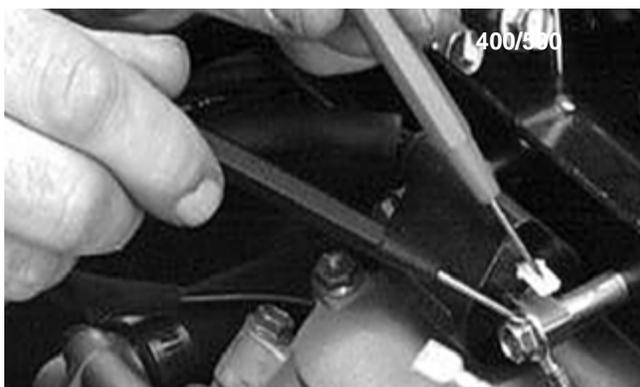
■NOTE: For these tests, the meter selector should be set to the OHMS position.

Primary Winding

- Connect the red tester lead to the terminal (with the wire removed); then connect the black tester lead to ground.



CH097D

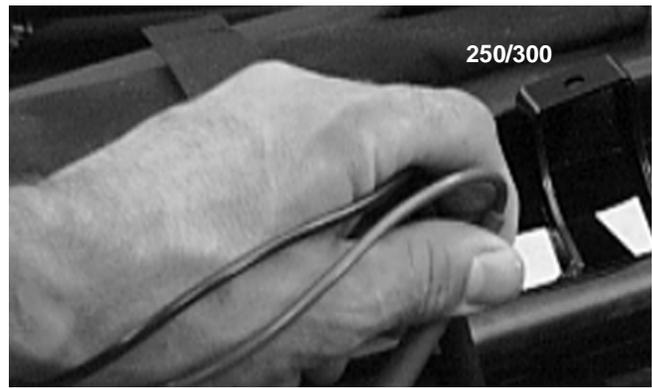


AR615D

- The meter reading must be within specification.

Secondary Winding

- Connect the red tester lead to the high tension lead (plug cap removed); then connect the black tester lead to ground.



CH098D



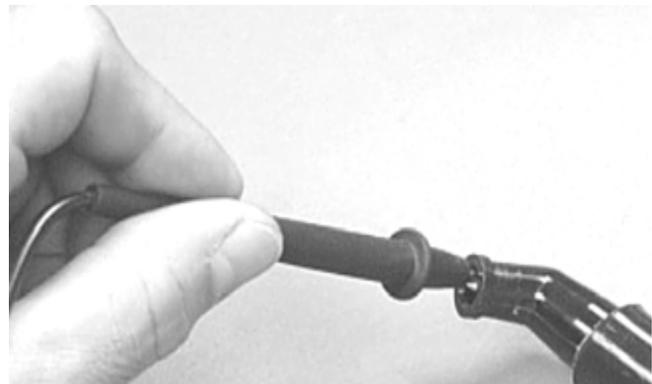
AR601D

- The meter reading must be within specification.

■NOTE: If the meter does not show as specified, replace ignition coil.

Spark Plug Cap

- 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

- The meter reading must be within specification.

■NOTE: If the meter does not read as specified, replace the spark plug cap.

PEAK VOLTAGE (250/300)

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). 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

■NOTE: The CDI is located beneath the right rear fender panel near the battery.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the primary coil terminal; 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.

PEAK VOLTAGE (400)

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). 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

■NOTE: The CDI is located beneath the seat and fender panel near the battery.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the primary coil terminal; 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.

PEAK VOLTAGE (500)

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). 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

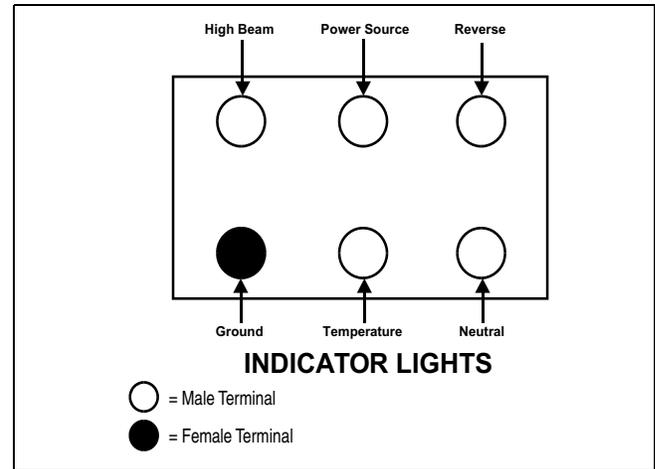
■NOTE: The CDI is located beneath the seat and fender panel near the battery.

1. Set the meter selector to the D.C. Voltage position.

2. Connect the red tester lead to the primary coil terminal; 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.

Indicator Lights

The Indicator Lights connector being tested is the black six-terminal connector (1 female and 5 male) coming from the indicator light wiring harness.



ATV-IL

To access the indicator light connector for testing purposes, use the following procedure.

1. Remove the three machine screws and key cover securing the instrument pod.
2. Remove the light bar from the instrument pod; then cut the cable tie securing the instrument pod wiring to the steering post.
3. Push the instrument pod wiring with light bar downward to access the indicator light connector; then disconnect the connector from the main wiring harness.

■NOTE: For these tests, a 12-volt power supply "jumper" should be used to supply power.

TEMPERATURE LIGHT

1. Connect the jumper positive wire to the power source terminal on the indicator light connector.
2. Connect the jumper ground wire to the temperature terminal on the indicator light connector.
3. The temperature warning indicator light should illuminate.

NEUTRAL POSITION LIGHT

1. Connect the jumper positive wire to the power source terminal on the indicator light connector.
2. Connect the jumper ground wire to the neutral terminal on the indicator light connector.

3. The neutral position indicator light should illuminate.

REVERSE POSITION LIGHT

1. Connect the jumper positive wire to the power source terminal on the indicator light connector.
2. Connect the jumper ground wire to the reverse terminal on the indicator light connector.
3. The reverse position indicator light should illuminate.

HI BEAM LIGHT

1. Connect the jumper positive wire to the high beam terminal on the indicator light connector.
2. Connect the jumper ground wire to the female terminal on the indicator light connector.
3. The HI beam indicator light should illuminate.

■NOTE: If a light fails to illuminate in any one of the indicator light tests, the connector, wiring harness, or a bulb must be replaced.

After testing procedures are completed, use the following procedure.

1. Connect the indicator light connector to the main wiring harness.
2. Pull the instrument pod wiring with light bar upward and install the light bar into the instrument pod.
3. Secure the instrument pod with existing hardware; then secure the instrument pod wiring to the steering post using a cable tie.

HI BEAM INDICATOR VOLTAGE

■NOTE: The ignition switch must be in the LIGHTS position. Also, the dimmer switch must be in the HI position, and the test must be performed on the lower side of the connector.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the black wire.
3. The meter must show battery voltage.

■NOTE: The meter may show less than 12 volts due to the draw from the headlights.

OIL TEMPERATURE LIGHT VOLTAGE (250/300/400)

■NOTE: The ignition switch must be in the ON position, and the test must be performed on the lower side of the switch.

1. Set the meter selector to the D.C. Voltage position.
2. Disconnect the white oil temperature switch connector from the switch (on the top right side of the engine) and ground the violet wire to the engine. The temperature light should illuminate.

3. Connect the red tester lead to the violet wire (main harness side); then connect the black tester lead to a ground.

4. The meter must show battery voltage.

WATER TEMPERATURE LIGHT VOLTAGE (500)

■NOTE: The ignition switch must be in the ON position, and the test must be performed on the lower side of the switch.

1. Set the meter selector to the D.C. Voltage position.
2. Remove the violet water temperature switch wire connector from the switch (on the left side of the engine below the water hose) and ground it to the engine.
3. Connect the red tester lead to the red/black wire from the fan temperature switch; then connect the black tester lead to the violet wire from the water temperature switch.
4. The meter must show battery voltage.

NEUTRAL POSITION VOLTAGE

■NOTE: The ignition switch must be in the ON position. Also, the shifter must be in the NEUTRAL position, and the test must be performed on the lower side of the connection.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the red/black wire; then connect the black tester lead to the blue/white wire.
3. The meter must show battery voltage.

REVERSE POSITION VOLTAGE

■NOTE: The ignition switch must be in the ON position. Also, the reverse lever must be in the REVERSE position, and the test must be performed on the lower side of the connector.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the red/black wire; then connect the black tester lead to the blue wire.
3. The meter must show battery voltage.

■NOTE: If the meter fails to show voltage in any of the above tests, the connector, fuse, switch, or wiring harness must be replaced.

Electronic Speedometer

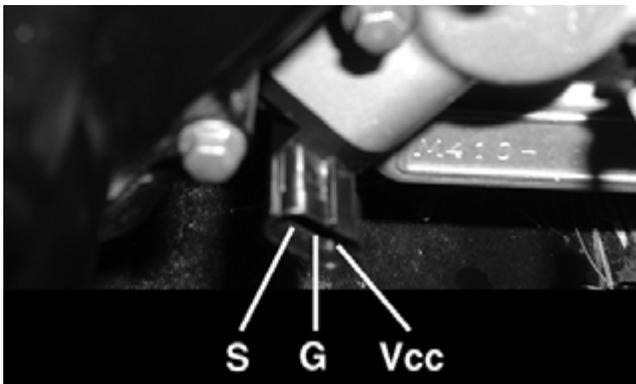
■NOTE: Prior to testing the speed sensor, inspect the three-wire connector on the sensor for contamination, broken pins, and/or corrosion.

1. Disconnect the three-wire connector from the speed sensor.



CD068

2. Connect the red tester lead to the Vcc pin; then connect the black tester lead to the G pin.



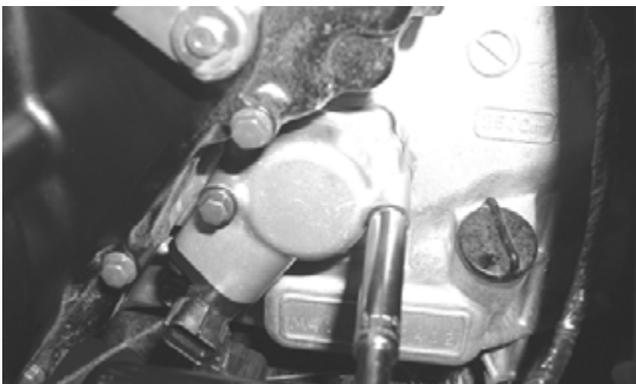
CD095A

3. The meter must show 37-38 k-ohms.
4. With the black tester lead connected to the G pin, connect the red tester lead to the S pin.
5. The meter must show 0 ohms.

■NOTE: If the sensor tests are within specifications, the speedometer must be replaced. See Section 9.

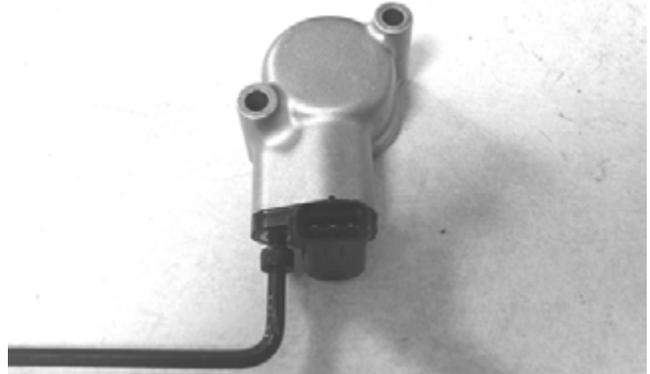
To replace a speed sensor, use the following procedure.

1. Disconnect the three-wire connector from the speed sensor; then remove the two cap screws securing the sensor housing to the crankcase.



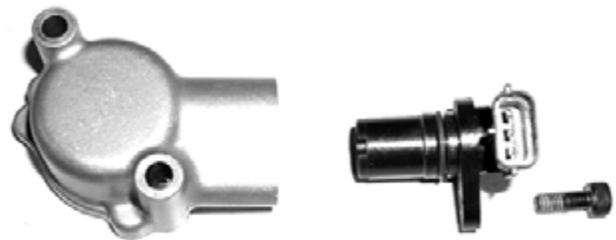
CD069

2. Remove the sensor housing accounting for the gasket; then remove the Allen-head mounting screw and separate the sensor from the housing.



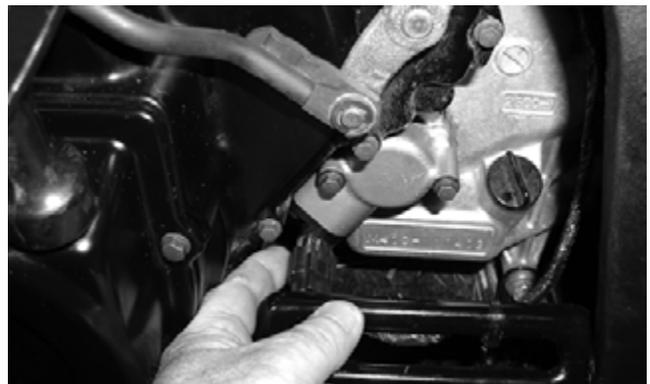
CD070

3. Install the new speed sensor into the housing with new O-ring lightly coated with multi-purpose grease; then secure the sensor with the Allen-head mounting screw (threads coated with blue Loctite #242). Tighten securely.



CD071

4. Place the sensor housing in position on the crankcase making sure the gasket is properly positioned and secure with the two cap screws; then connect the three-wire connector.



CD068

Ignition Switch

The connector is the green one beneath the console. To access the connector, the speedometer and instrument pod must be removed.

VOLTAGE

■NOTE: Perform this test on the lower side of the connector.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red meter lead to the red wire; then connect the black meter lead to ground.
3. Meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, troubleshoot the 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 upper side of the connector.

1. Turn the ignition switch to the ON position.
2. Set the meter selector to the OHMS position.
3. Connect the red tester lead to the red wire; then connect the black tester lead to the orange wire.
4. The meter must show less than 1 ohm.
5. Turn the ignition switch to the LIGHTS position.
6. Connect the red tester lead to the red wire; then connect the black tester lead to the orange wire.
7. The meter must show less than 1 ohm.
8. Connect the red tester lead to the red wire; then connect the black tester lead to the gray wire.
9. The meter must show less than 1 ohm.
10. With the switch in the OFF position, connect the red tester lead to the red wire and the black tester lead to each of the remaining wires (orange and gray). The meter must show an open circuit on both wires.

■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Handlebar Control Switches

The connector is the yellow one in front of the steering post. To access the connector, the front rack and front fenders 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.

RESISTANCE (Starter Button)

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 ohm.
4. With the starter button released, the meter must show an open circuit.
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 an open circuit.

■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 in front of 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 (red/white wire on some models); then connect the black tester wire to the other red/yellow wire (red wire on some models). 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 (blue/white wire on some models); then connect the black meter lead to the black wire (blue wire on some models). 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 (400 FIS/500)

The connector is the two-wire black snap-lock one in front of the steering post. To access the connector, the front rack and front fenders must be removed (see Section 8).

■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.
4. With the selector switch in the 4WD position, the meter must show an open circuit.

■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 D.C. Voltage position.
2. Connect the black tester lead to the negative battery terminal.
3. Connect the red tester lead to the red wire on the harness side of the connector.
4. Turn the ignition switch to the RUN position.
5. The meter must show 12 D.C. volts.

■NOTE: If the meter shows other than specified, check the harness, connector, 30 amp fuse, and battery connections.

Front Drive Selector Actuator (400 FIS/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.

VOLTAGE

1. Select the 2WD position on the front drive selector switch; then disconnect the three-prong 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 D.C. volts.

4. Connect the red tester lead to the white/red wire in the supply harness. The meter must show 12 D.C. 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 D.C. volts.
6. Connect the red tester lead to the orange wire in the supply harness. The meter must show 12 D.C. volts.

■NOTE: If the voltage readings are as specified and the actuator does not function correctly, replace the actuator (see Section 6).

Magneto Coils

VOLTAGE (Charging Coil - Output)

1. Set the meter selector to the D.C. 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 D.C. volts.

⚠ CAUTION

Do not run the engine at high RPM for more than 10 seconds.

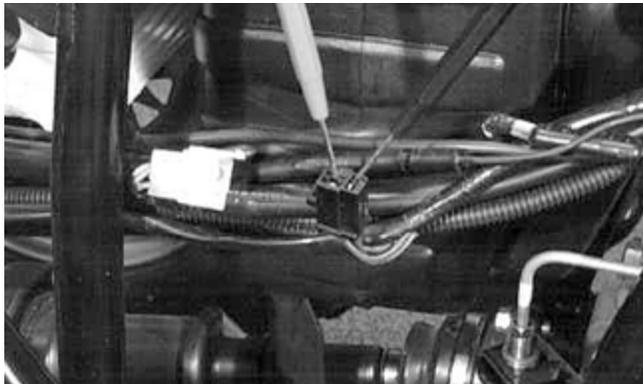
■NOTE: If voltage is lower than specified, test charging coil - no load.

VOLTAGE (Charging Coil - No Load)

The connector is the black and white one on the right side of the engine just above the brake cable adjuster.

■NOTE: Test the connector that comes from the engine.

1. Set the meter selector to the A.C. Voltage position.
2. Test between the three yellow wires (250/300) for a total of three tests or the three black wires (400/500) for a total of three tests.



AR630D

3. With the engine running at a constant 5000 RPM, all wire tests must show 60 A.C. volts.

⚠ CAUTION

Do not run the engine at high RPM for more than 10 seconds.

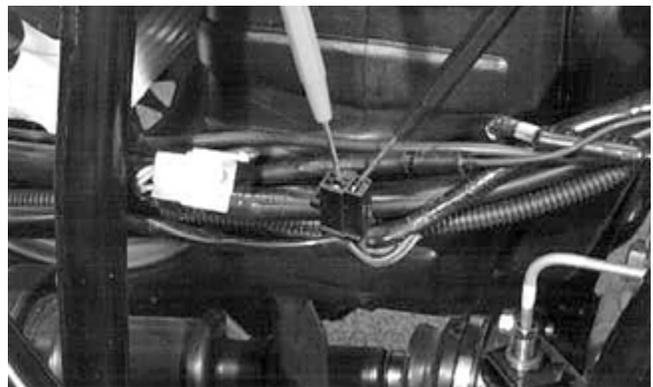
■NOTE: If both charging coil tests failed, check all connections, etc., and test again. If no voltage is present, replace the stator assembly.

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 yellow wires (250/300) for a total of three tests or the three black wires (400/500) for a total of three tests.



AR630D

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. Set the meter selector to the OHMS position.
2. On the 250/300, connect the red tester lead to the black/yellow wire; then connect the black tester lead to the green/white wire. The meter reading must be within specification.
3. On the 400/500, 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.

RESISTANCE (Source Coil - 400/500)

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 white wire.
3. The meter reading must be within specification.

■NOTE: If the meter shows other than specified in any resistance test, replace the stator assembly.

PEAK VOLTAGE (250/300)

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). 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.

Magneto Coil (Trigger)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the black/yellow wire; then connect the black tester lead to the green/white wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

Magneto Coil (Charging)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to one yellow wire; then connect the black tester lead to the other yellow wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

PEAK VOLTAGE (400)

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). 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.

Magneto Coil (Trigger)

1. Set the meter selector to the D.C. 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.

Magneto Coil (Source)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the white wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

Magneto Coil (Charging)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the black wire; then connect the black tester lead to black wire #1.

3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

■NOTE: Repeat steps 2-4 for black wire #2.

PEAK VOLTAGE (500)

■NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). 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.

Magneto Coil (Trigger)

1. Set the meter selector to the D.C. 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.

Magneto Coil (Source)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the white wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

Magneto Coil (Charging)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the black wire; then connect the black tester lead to black wire #1.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

■NOTE: Repeat steps 2-4 for black wire #2.

Starter Motor

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.
4. For assembly purposes, scribe a line across the outside of the starter assembly.



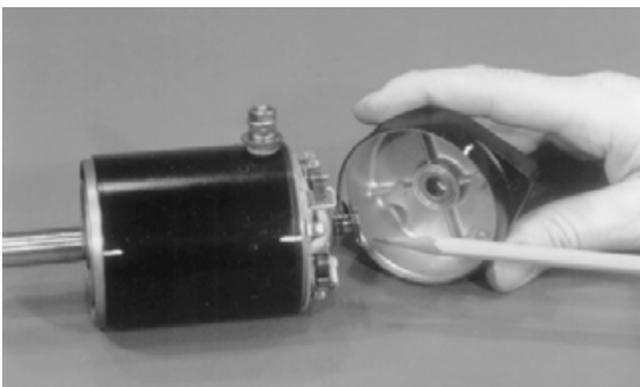
AR652D

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.



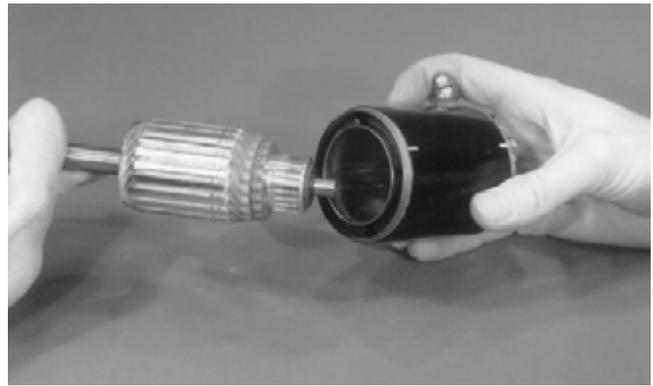
BC003

7. Remove the rear cover.



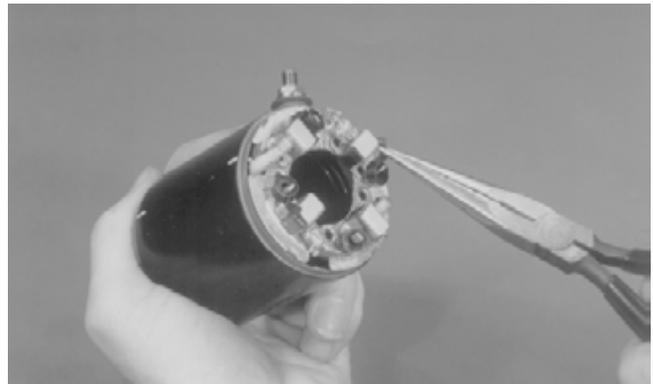
BC005

8. Slide the armature free of the starter housing.



BC006

9. Bend the two positive brushes outward; then remove the brush holder.

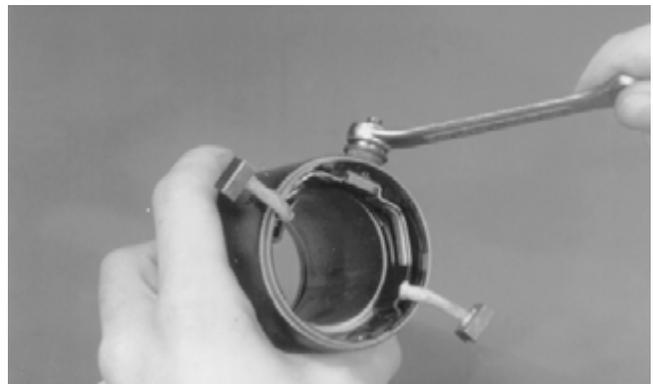


BC007



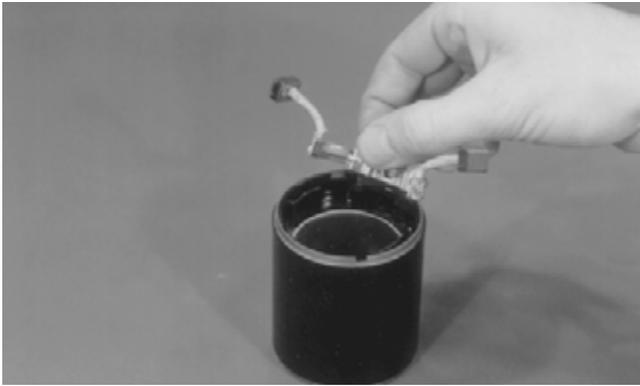
BC010

10. Remove the nut from the positive post. Account for the lock washer, flat washer, a fiber washer, and an O-ring.



BC008

- 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.

- 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.

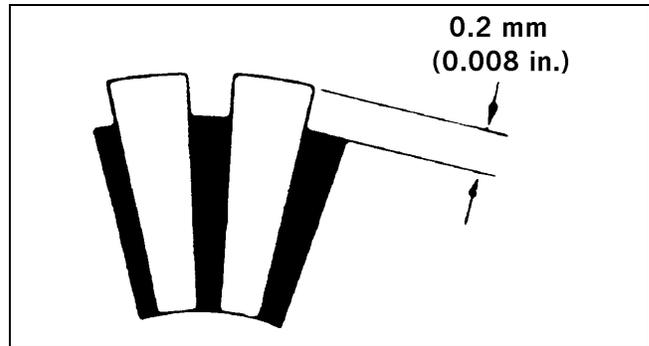
- Inspect all threaded areas for damage or stripped threads.
- Inspect the brush holder assembly and brushes for damage or wear. Using a caliper, measure the length of the brushes. If brush measurement is less than 10.1 mm (0.40 in.), replace with new brushes and brush springs as a set.
- Inspect the brush leads for cracks, wear, or fraying. If any of these conditions exist, replace with new brushes and brush springs as a set.
- Inspect the rear cover bushing for wear.
- Inspect the front cover bearing for wear.
- Inspect the brass commutator end of the armature for any burned spots or damage. If the commutator is lightly burned 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.

- 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.

- Using a caliper, measure the undercut. Maximum undercut groove must be 0.2 mm (0.008 in.).

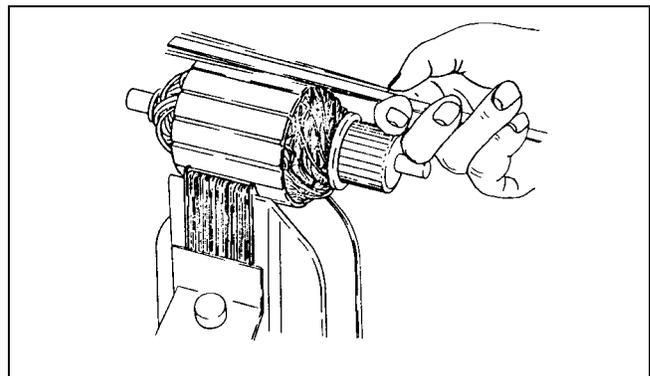


ATV-1054

⚠ CAUTION

Buildup in the grooves must be removed to prevent any chance of an electrical arc between individual sections of the commutator.

- Inspect the commutator for shorting using a multimeter and the following procedure.
 - Set the selector to the OHMS position.
 - Touch the black lead to the armature shaft.
 - 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.
- Inspect the armature for shorting using a "growler" and the following procedure.
 - Place the armature in the "growler."
 - 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

- Inspect the ground brushes to make sure they are properly grounded. Use a multimeter and the following procedure.
 - Set the selector to the OHMS position.
 - 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.

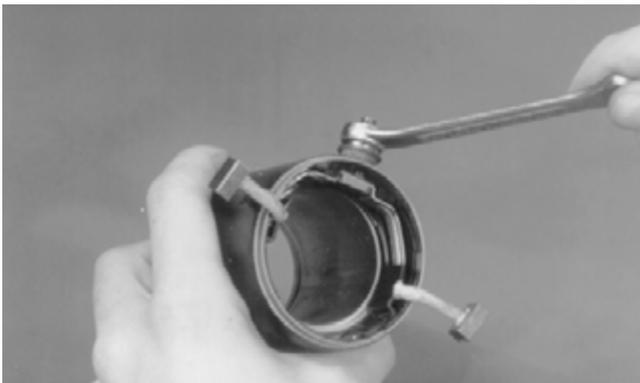
ASSEMBLING/INSTALLING

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.



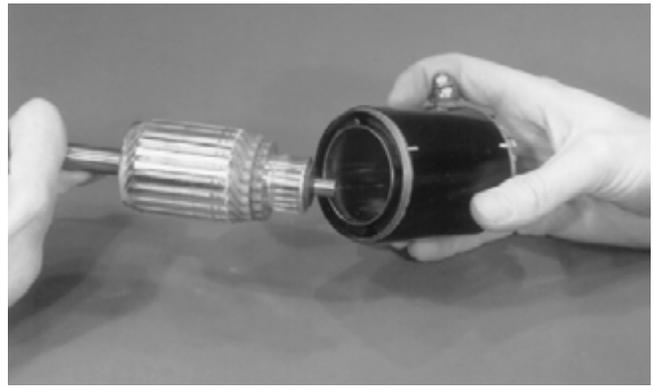
BC008

3. Align the tab on the brush holder with the notch in the starter housing; then install.



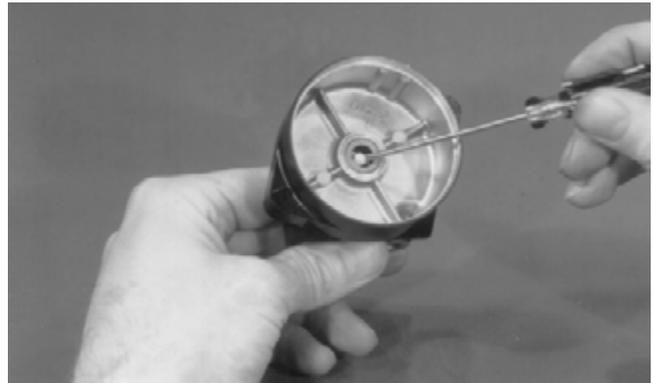
BC010

4. Install the armature into the starter housing; then while holding the brushes out, slide the commutator into the brush holder.



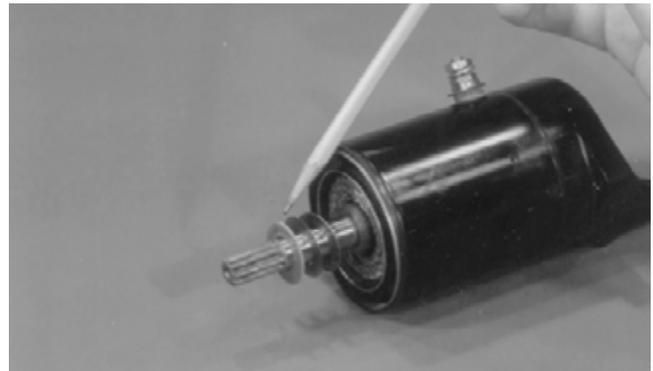
BC006

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.



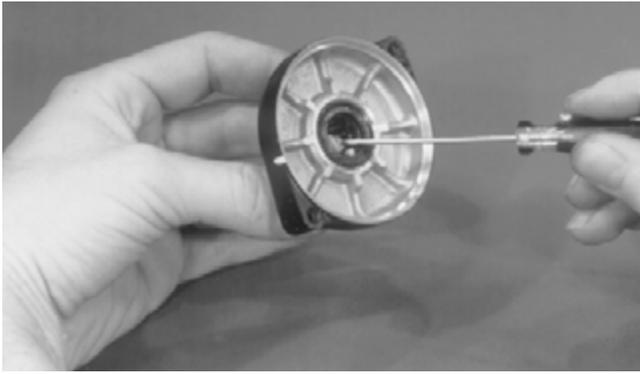
BC013

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.

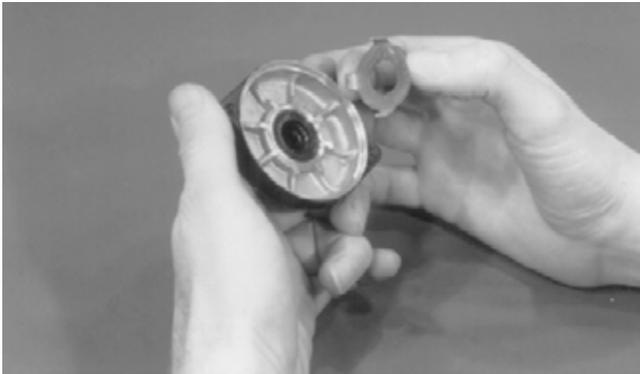


BC014

7. Apply a small amount of grease to the front cover bearing and seal; then install the seal protector.

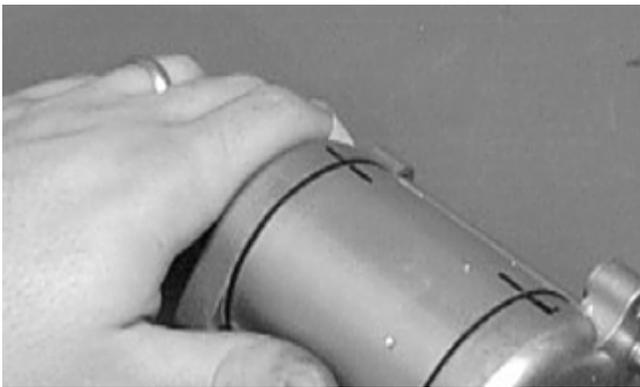


BC015



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 0.8-1.2 kg-m (6-9 ft-lb).



AR653D

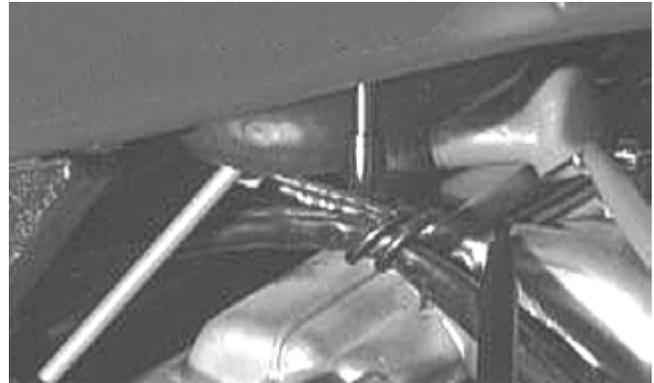
10. Apply a small amount of grease to the O-ring seal on the starter; then install the starter into the crankcase. Secure with two cap screws and wiring forms.
11. Secure the positive cable to the starter with the nut.
12. Connect the battery.

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 D.C. 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 battery voltage and the starter motor should operate.



AR607D

■NOTE: If the meter showed battery voltage but the starter did not operate or operated slowly, inspect battery voltage (at the battery), starter motor condition, and/or ground connections.

■NOTE: If the meter showed no battery voltage, inspect the main fuse, ground connections, starter motor lead, battery voltage (at the battery), or the switches.

Starter Relay (250/300/400 FIS/500)

RESISTANCE

⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Disconnect the battery; then verify that the ignition fuse is good. Disconnect all wires from the solenoid.
2. Set the meter selector to the OHMS position.
3. Connect the tester leads to each of the heavy posts of the solenoid.
4. The meter must show an open circuit.

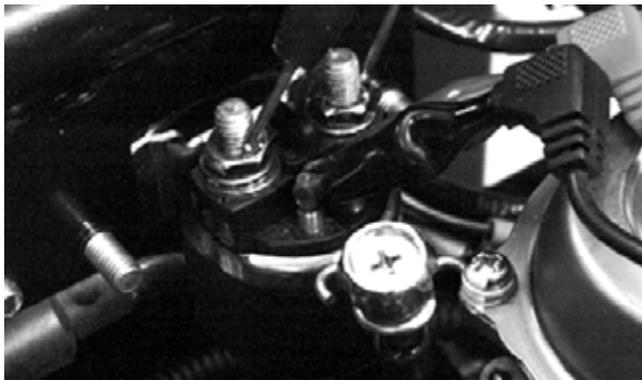


CH099D

■NOTE: Leave the tester leads connected to the solenoid posts for the following procedure.

■NOTE: An external 12-volt power supply “jumper” (positive and negative connections) must be used for this test. Also, it is very important that the meter leads and power supply connections are made to the appropriate terminals of the relay or damage to the multimeter will result.

5. Connect the power supply leads to each small terminal of the solenoid. There should be an audible “click” from the relay, and the meter must show less than 1 ohm.



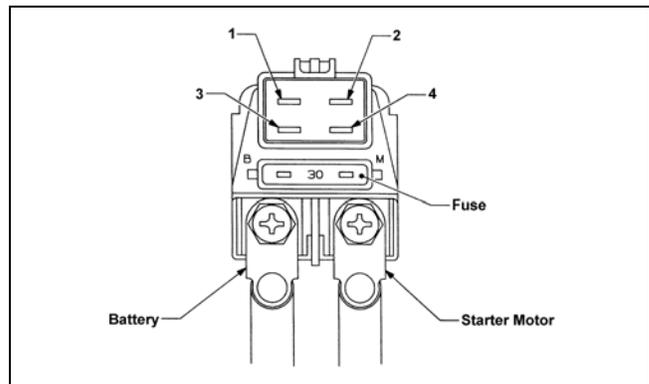
CH100D

■NOTE: If there was no audible “click” from the relay or if the meter shows more than 1 ohm, it must be replaced. If there was a “click,” continue to test resistance.

6. With the 12-volt power supply still connected, connect the red tester lead to the heavy battery cable terminal; then connect the black tester lead to the heavy starter motor cable terminal.
7. The meter must show less than 1 ohm.
8. With the 12-volt power supply disconnected, connect the tester leads to each small terminal of the solenoid.
9. The meter must show 4.3 ohms \pm 20%.

■NOTE: If the meter shows no resistance, the relay is out of tolerance or it must be replaced.

Starter Relay (400 ACT)



0732-513

RESISTANCE

⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Disconnect the battery; then verify that the starter relay 30-amp fuse is good.
2. Set the meter selector to the OHMS position.
3. Connect the red tester lead to terminal #1; then connect the black tester to terminal #2.
4. The meter must show an open circuit.

■NOTE: Leave the tester leads connected to the terminals for the following procedure.

■NOTE: An external 12-volt power supply “jumper” (positive and negative connections) must be used for this test. Also, it is very important that the meter leads and power supply connections are made to the appropriate terminals of the relay or damage to the multimeter will result.

5. Connect the power supply (positive) to terminal #3; then connect the power supply (negative) to terminal #4. There should be an audible “click” from the relay, and the meter must show less than 1 ohm.

■NOTE: If there was no audible “click” from the relay or if the meter shows more than 1 ohm, it must be replaced. If there was a “click,” continue to test resistance.

6. With the 12-volt power supply still connected, then connect the red tester lead to the heavy battery cable terminal; then connect the black tester lead to the heavy starter motor cable terminal.
7. The meter must show less than 1 ohm.
8. With the 12-volt power supply disconnected, connect the red tester lead to terminal #3; then connect the black tester lead to terminal #4.

9. The meter must show 3.6 ohms \pm 20%.

■NOTE: If the meter shows no resistance, the relay is out of tolerance or it must be replaced.

CDI Unit (250/300)

The CDI is located beneath the right rear fender panel 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.

Regulator/Rectifier (250/300)

The regulator/rectifier is located near the battery.

RESISTANCE

⚠ CAUTION

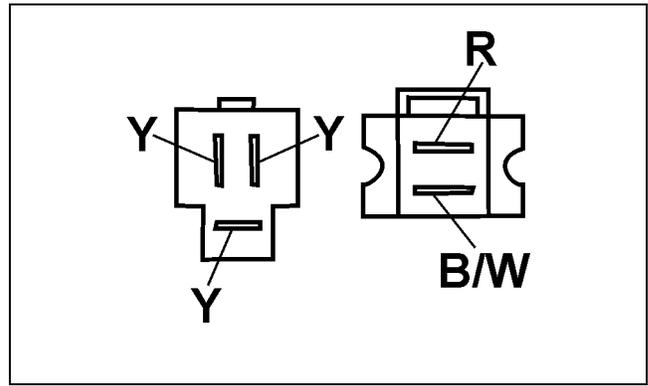
Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Test each combination as found in the following chart.

■NOTE: As an example, connect the red tester lead to the R terminal; then connect the black tester lead to a Y terminal. The meter must show 7-k ohms.

⚠ CAUTION

Before determining the regulator/rectifier is defective, perform every test combination shown in the chart.



ATV1087B

REGULATOR/RECTIFIER SPECIFICATIONS (k-ohms)

Negative Meter Lead To:	Positive Meter Lead To:				
	Y	Y	Y	R	B/W
Y	—	∞	∞	7	∞
Y	∞	—	∞	7	∞
Y	∞	∞	—	7	∞
R	∞	∞	∞	—	∞
B/W	7	7	7	30-50	—

∞ = Infinity

CDI Unit (400/500)

The CDI is located beneath the seat and fender panel 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.

Regulator/Rectifier (400/500)

The regulator/rectifier is located beneath the seat near the air-cleaner housing.

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

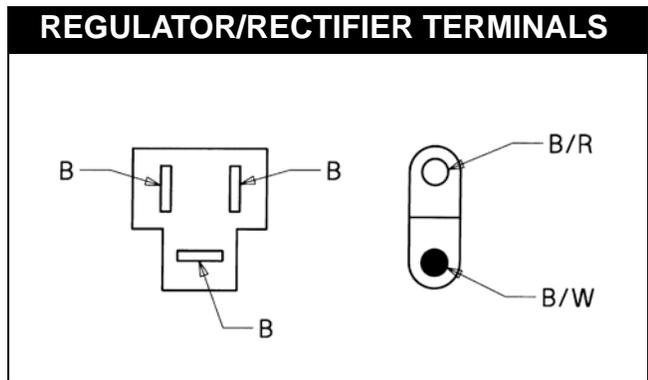
1. Set the meter selector to the OHMS position.

2. Test each combination as found in the following chart.

■NOTE: As an example, connect the red tester lead to the B/R terminal; then connect the black tester lead to a B terminal. The meter must show 1-10 k-ohms.

⚠ CAUTION

Before determining the regulator/rectifier is defective, perform every test combination shown in the chart.



0735-352

REGULATOR/RECTIFIER SPECIFICATIONS (k-ohms)

		Positive Meter Lead To:					
		B/R	B	B	B	B/W	Body
Negative Meter Lead To:	B/R	—	∞	∞	∞	∞	∞
	B	1-10	—	∞	∞	∞	∞
	B	1-10	∞	—	∞	∞	∞
	B	1-10	∞	∞	—	∞	∞
	B/W	3-15	1-10	1-10	1-10	—	∞
	Body	∞	∞	∞	∞	∞	—

∞ = Infinity REG/REC SPEC

Neutral Start Relay (400 ACT)

The connector is the white 4-prong one near the battery.

VOLTAGE (Connector)

■NOTE: The ignition switch must be in the ON position.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the orange wire; then connect the black tester lead to ground.
3. The meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, inspect the fuses, wiring harness, connectors, or ignition switch.

■NOTE: In the following test, the ignition switch must be in the ON position and the emergency stop switch must be in the RUN position.

4. With the black tester lead still connected to ground, connect the red tester lead to the yellow/green wire.
5. Depress the starter button. The meter must show battery voltage.

■NOTE: If the meter shows no battery voltage, inspect fuses, wiring harness, connectors, and switches.

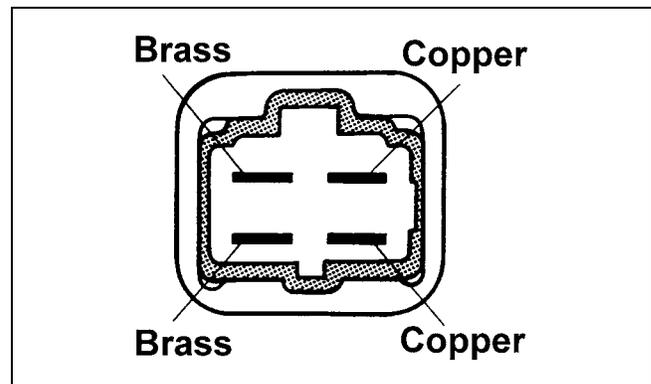
RESISTANCE (Relay - Brass Terminals)

⚠ CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■NOTE: An external 12-volt power supply “jumper” (positive and negative connections) must be used for this test. Also, it is very important that the meter leads and power supply connections are made to the appropriate terminals of the relay or damage to the multimeter will result.

1. Set the meter selector to the OHMS position.
2. Connect the power supply (positive) to one copper terminal; then connect the power supply (negative) to the other copper terminal. There should be an audible “click” from the relay.



ATV-1075

■NOTE: If there was no audible “click” from the relay, it must be replaced. If there was a “click,” continue to test resistance.

3. Set the meter selector to the OHMS position.
4. With the power supply still connected, connect the red tester lead to one brass terminal; then connect the black tester lead to the other brass terminal.
5. The meter must show less than 1 ohm.

■NOTE: If the meter shows more than 1 ohm (even though the “click” was heard in the power supply test), the relay must be replaced.

RESISTANCE (Relay - Copper Terminals)

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■NOTE: The external power supply will not be used for this test.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one copper terminal; then connect the black tester lead to the other copper terminal.
3. The meter must show 90 ohms \pm 20%.

■NOTE: If the meter shows no resistance, replace the relay.

Neutral Start/ Start-in-Gear Relays (400 FIS/ 500)

The relays are identical plug-in type located on the fuse block beneath the seat. Relay function can be checked by switching relay positions in the fuse block. The relays are interchangeable.

■NOTE: The relay schematic is embossed on the relay housing for testing continuity.

■NOTE: The fuse block and wiring harness are not a serviceable component and must be replaced as an assembly.

Headlights

The connectors are the two 3-prong ones secured to the front bumper supports (one on each side) with cable ties.

BULB VERIFICATION (Low and High Beam)

■NOTE: Perform this test on each headlight bulb. Also, a 12-volt external power supply w/jumpers will be needed.

1. Disconnect the wiring harness from the bulb to be tested.
2. Connect the power supply (positive) to one bulb contact; then connect the power supply (negative) to the remaining bulb contact.
3. The bulb should illuminate.
4. If the bulb fails to illuminate, it must be replaced.

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 inside bulb, and the HI beam is the outside bulb.

1. Set the meter selector to the D.C. 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 inside connectors (LO beam). The meter must show battery voltage.
4. With the dimmer switch in the HI position, test the two outside connectors (HI beam). The meter must show battery voltage.

■NOTE: If battery voltage is not shown in any test, inspect the fuses, 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.

BULB VERIFICATION

■NOTE: Perform this test on the taillight-brakelight side of the connector. Also, a 12-volt external power supply (jumper) will be needed.

1. Connect the power supply (positive) to the yellow wire; then connect the power supply (negative) to the brown wire.
2. The taillight should illuminate.
3. With the negative power supply still connected, connect the positive supply wire to the red wire.
4. The brakelight should illuminate.

■NOTE: If either the taillight or brakelight fails to illuminate, inspect the bulb, the connectors, or the component wiring harness.

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 D.C. Voltage position.
2. Connect the red tester lead to the pink 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 D.C. 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 engine timing, use the following procedure.

1. Attach the engine Timing Light (p/n 0644-197) to the spark plug high tension lead; then remove the timing inspection plug from the left-side crankcase cover.
2. With the Arctic Cat Engine Tachometer (p/n 0644-275) connected, start the engine and run at the specified RPM.
3. Ignition timing should be according to specifications.

Model	Timing
250	5° BTDC below 1800 RPM 35° BTDC above 3800 RPM
300	5° BTDC @ 1800 RPM 30° BTDC @ 3800 RPM
400	10° BTDC @ 1500 RPM
500	10° BTDC @ 1500 RPM

4. Install the timing inspection plug.

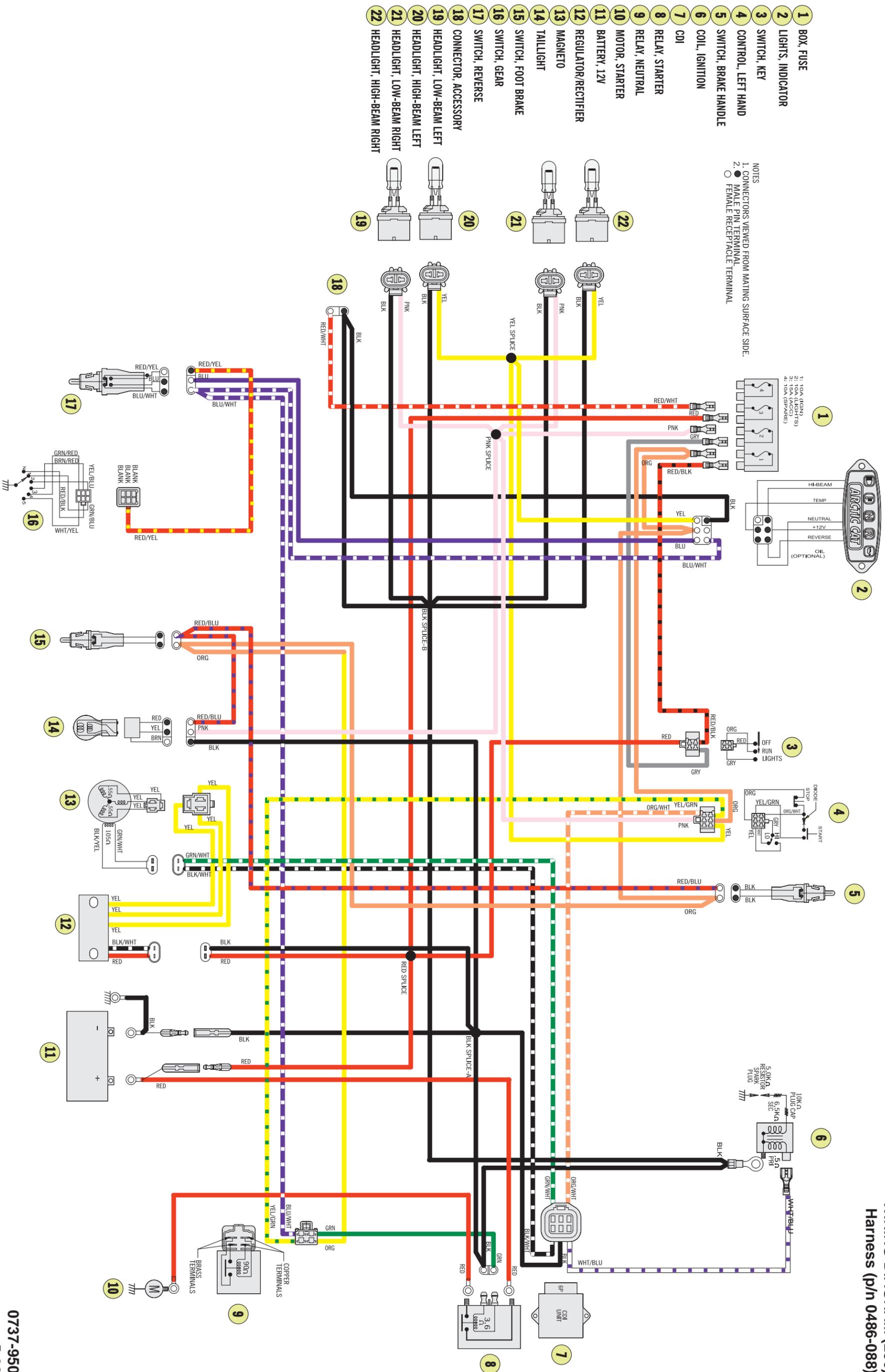
If ignition timing cannot be verified, the rotor may be damaged, the key may be sheared, the trigger coil bracket may be bent or damaged, or the CDI unit may be faulty.

NOTES

WIRING DIAGRAM (250) Harness (p/n 0486-088)

- 1 BOX, FUSE
- 2 LIGHTS, INDICATOR
- 3 SWITCH, KEY
- 4 CONTROL, LEFT HAND
- 5 SWITCH, BRAKE HANDLE
- 6 COIL, IGNITION
- 7 CDI
- 8 RELAY, STARTER
- 9 RELAY, NEUTRAL
- 10 MOTOR, STARTER
- 11 BATTERY, 12V
- 12 REGULATOR/RECTIFIER
- 13 MAGNETO
- 14 TAILLIGHT
- 15 SWITCH, FOOT BRAKE
- 16 SWITCH, GEAR
- 17 SWITCH, REVERSE
- 18 CONNECTOR, ACCESSORY
- 19 HEADLIGHT, LOW-BEAM LEFT
- 20 HEADLIGHT, HIGH-BEAM LEFT
- 21 HEADLIGHT, LOW-BEAM RIGHT
- 22 HEADLIGHT, HIGH-BEAM RIGHT

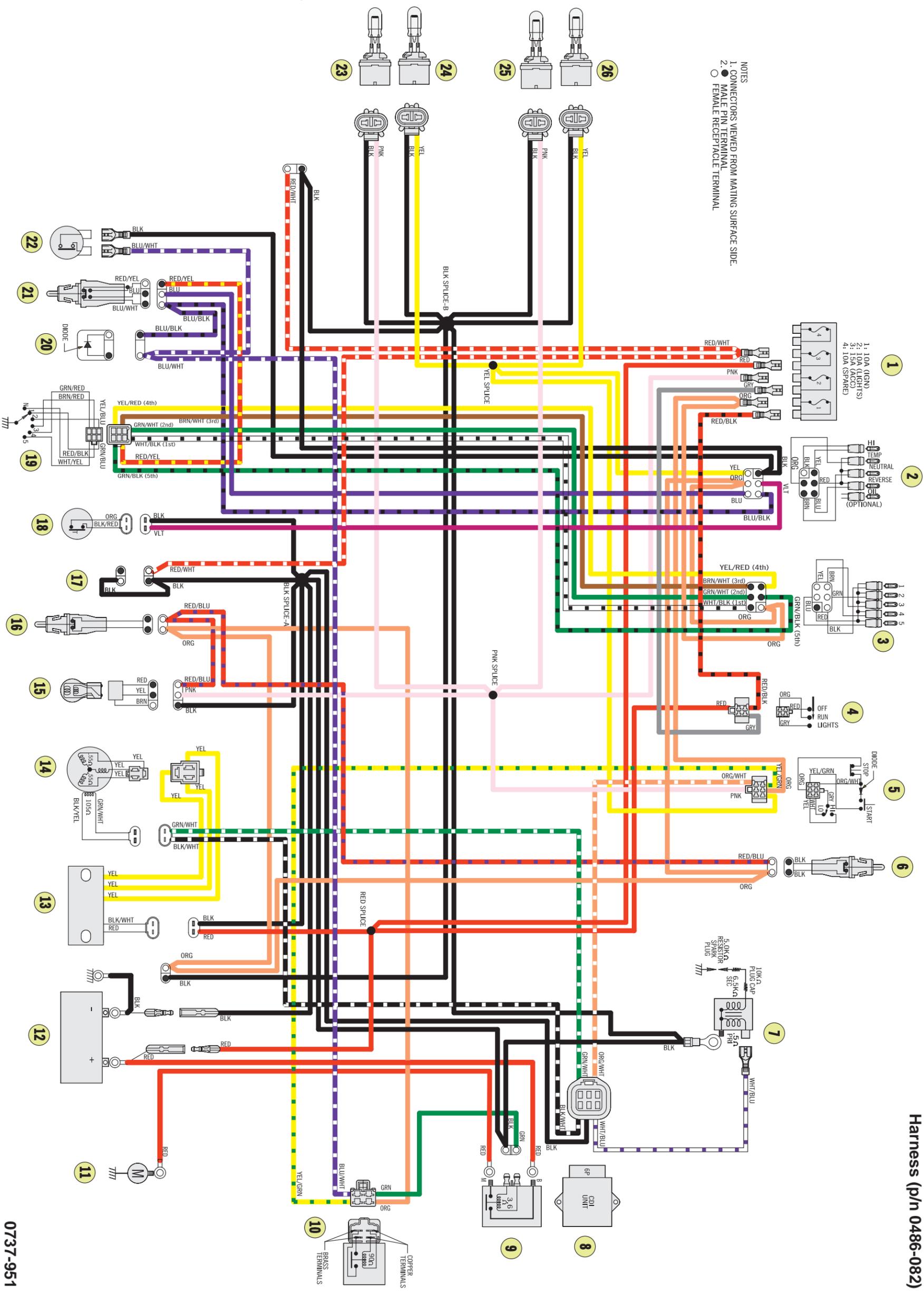
NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. ● MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL



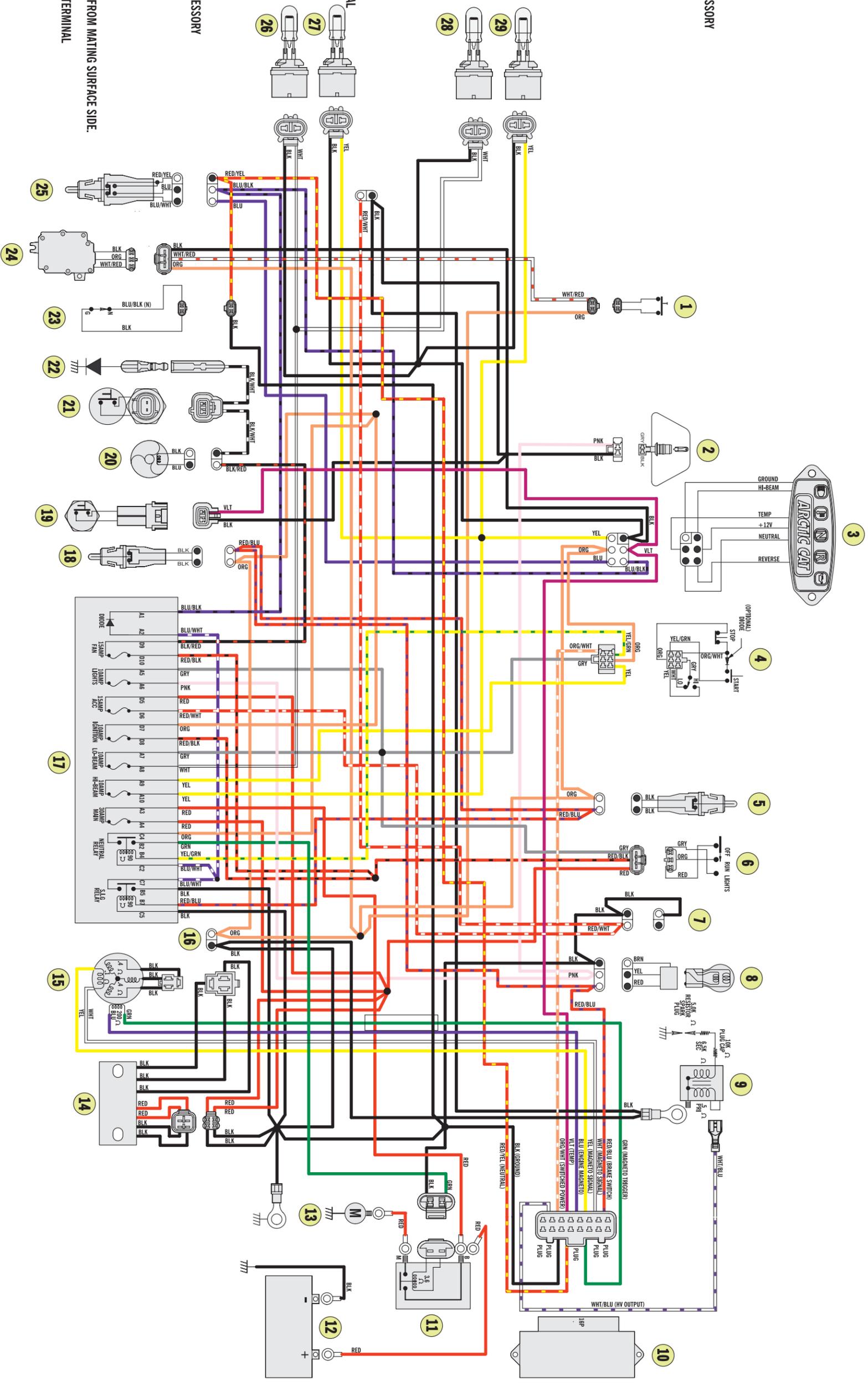
WIRING DIAGRAM (300 4x4)
Harness (p/n 0486-082)

- 1 BOX, FUSE
- 2 LIGHTS, INDICATOR
- 3 LIGHTS, GEAR POSITION
- 4 SWITCH, KEY
- 5 CONTROL, LEFT HAND
- 6 SWITCH, BRAKE HANDLE
- 7 COIL, IGNITION
- 8 CDI
- 9 RELAY, STARTER
- 10 RELAY, NEUTRAL
- 11 MOTOR, STARTER
- 12 BATTERY, 12V
- 13 REGULATOR/RECTIFIER
- 14 MAGNETO
- 15 TAILLIGHT
- 16 SWITCH, FOOT BRAKE
- 17 CONNECTOR, ACCESSORY
- 18 SWITCH, OIL TEMP.
- 19 SWITCH, GEAR
- 20 DIODE ASSY.
- 21 SWITCH, REVERSE
- 22 SWITCH, BRAKE PRESSURE
- 23 HEADLIGHT, LOW-BEAM LEFT
- 24 HEADLIGHT, HIGH-BEAM LEFT
- 25 HEADLIGHT, LOW-BEAM RIGHT
- 26 HEADLIGHT, HIGH-BEAM RIGHT

NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. ● MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL



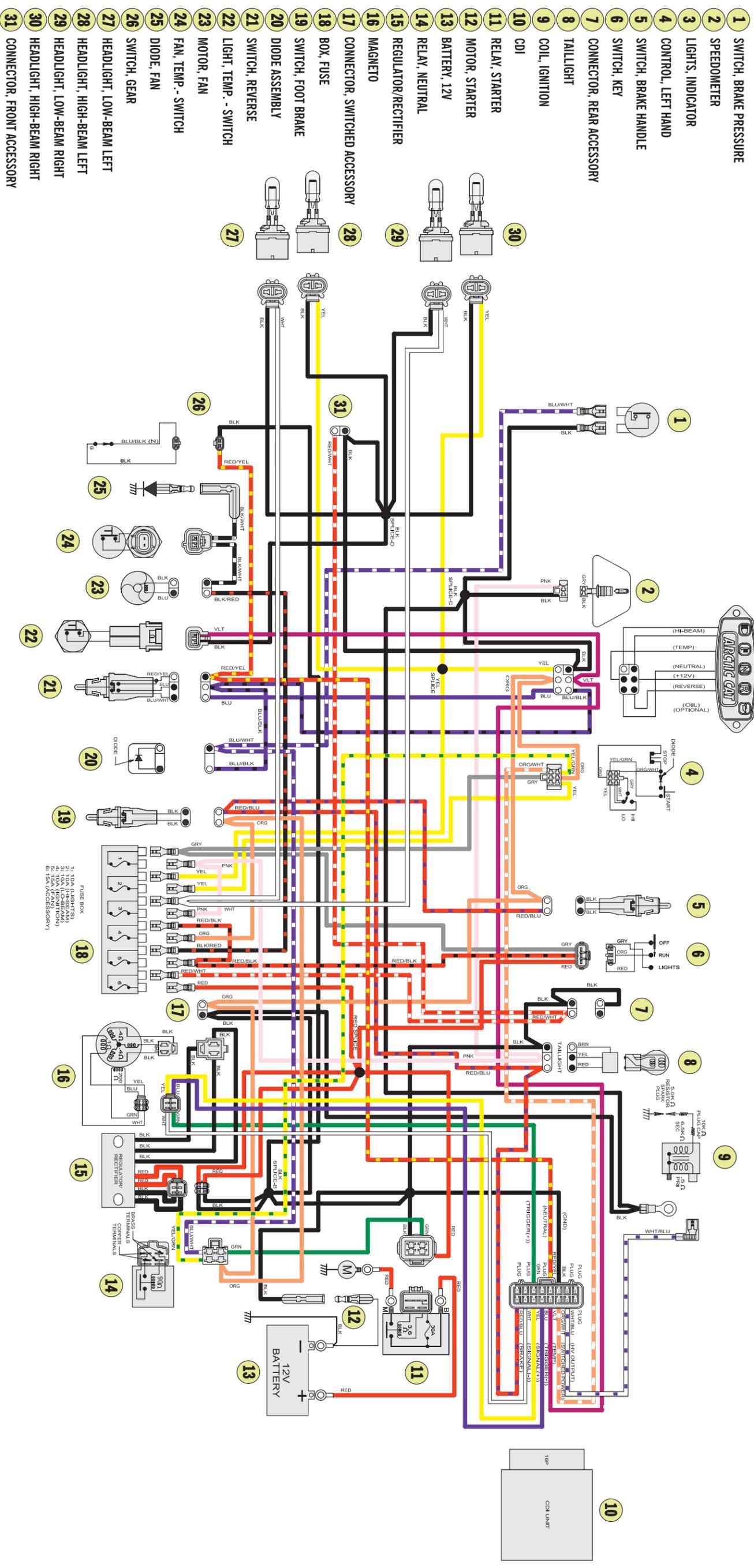
- 1 SWITCH, 2WD/4WD
- 2 SPEEDOMETER
- 3 LIGHTS, INDICATOR
- 4 CONTROL, LEFT HANDLE
- 5 SWITCH, BRAKE HANDLE
- 6 SWITCH, KEY
- 7 CONNECTOR, REAR ACCESSORY
- 8 TALLIGHT
- 9 COIL, IGNITION
- 10 CDI
- 11 RELAY, STARTER
- 12 BATTERY, 12V
- 13 MOTOR, STARTER
- 14 REGULATOR/RECTIFIER
- 15 MAGNETO
- 16 CONNECTOR, SW. ACC.
- 17 PDM
- 18 SWITCH, FOOT BRAKE
- 19 LIGHT, TEMP. SWITCH
- 20 MOTOR, FAN
- 21 FAN, TEMP. SWITCH
- 22 DIODE, FAN
- 23 SWITCH, ENGINE-NEUTRAL
- 24 ACTUATOR, 2WD/4WD
- 25 SWITCH, REVERSE
- 26 LIGHT, L. LOW-BEAM
- 27 LIGHT, L. HIGH-BEAM
- 28 LIGHT, R. LOW-BEAM
- 29 LIGHT, R. HIGH-BEAM
- 30 CONNECTOR, FRONT ACCESSORY



NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL

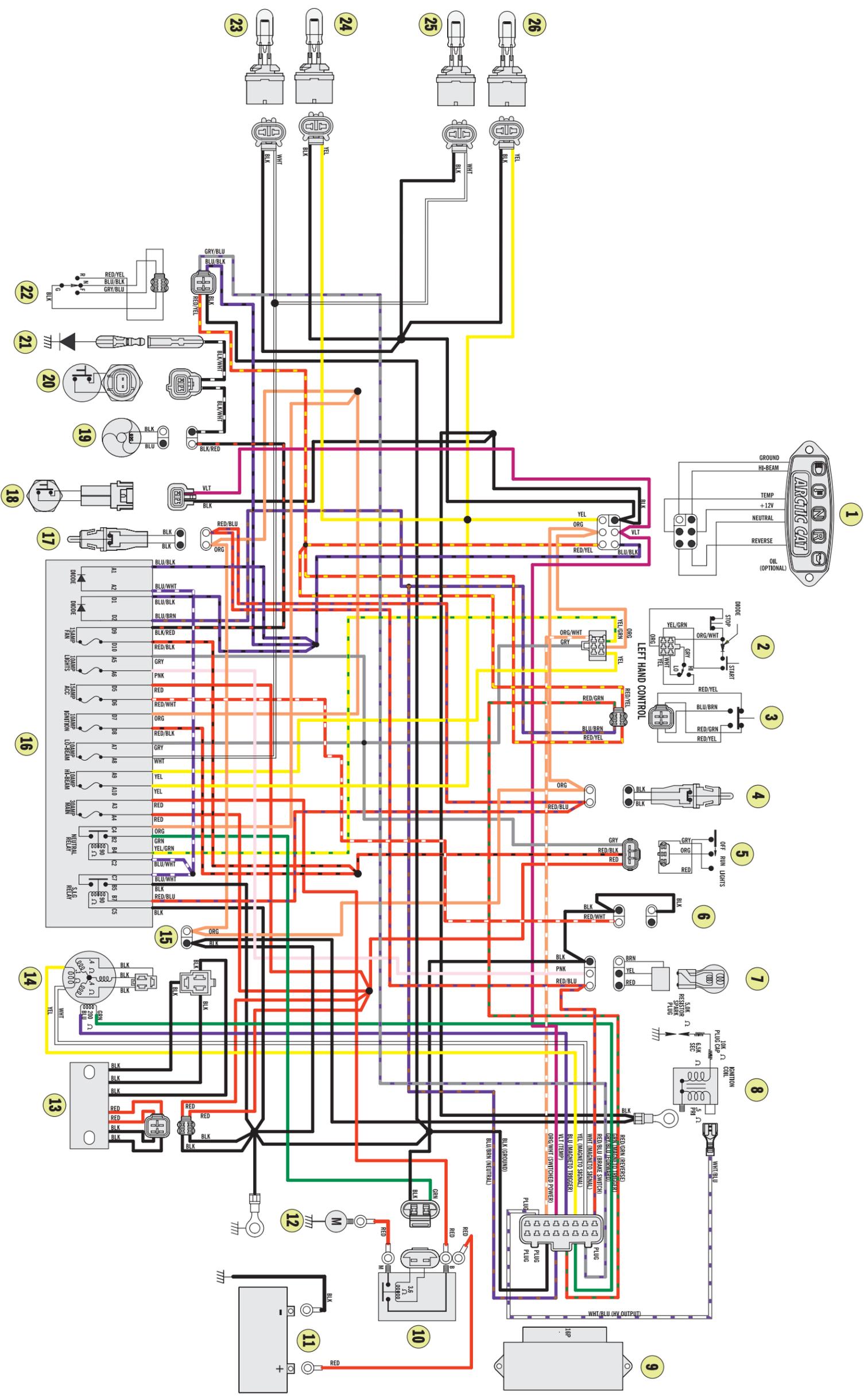
WIRING DIAGRAM (400 Manual Transmission)
Harness (p/n 0486-100) - ACT

- NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. ● MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL



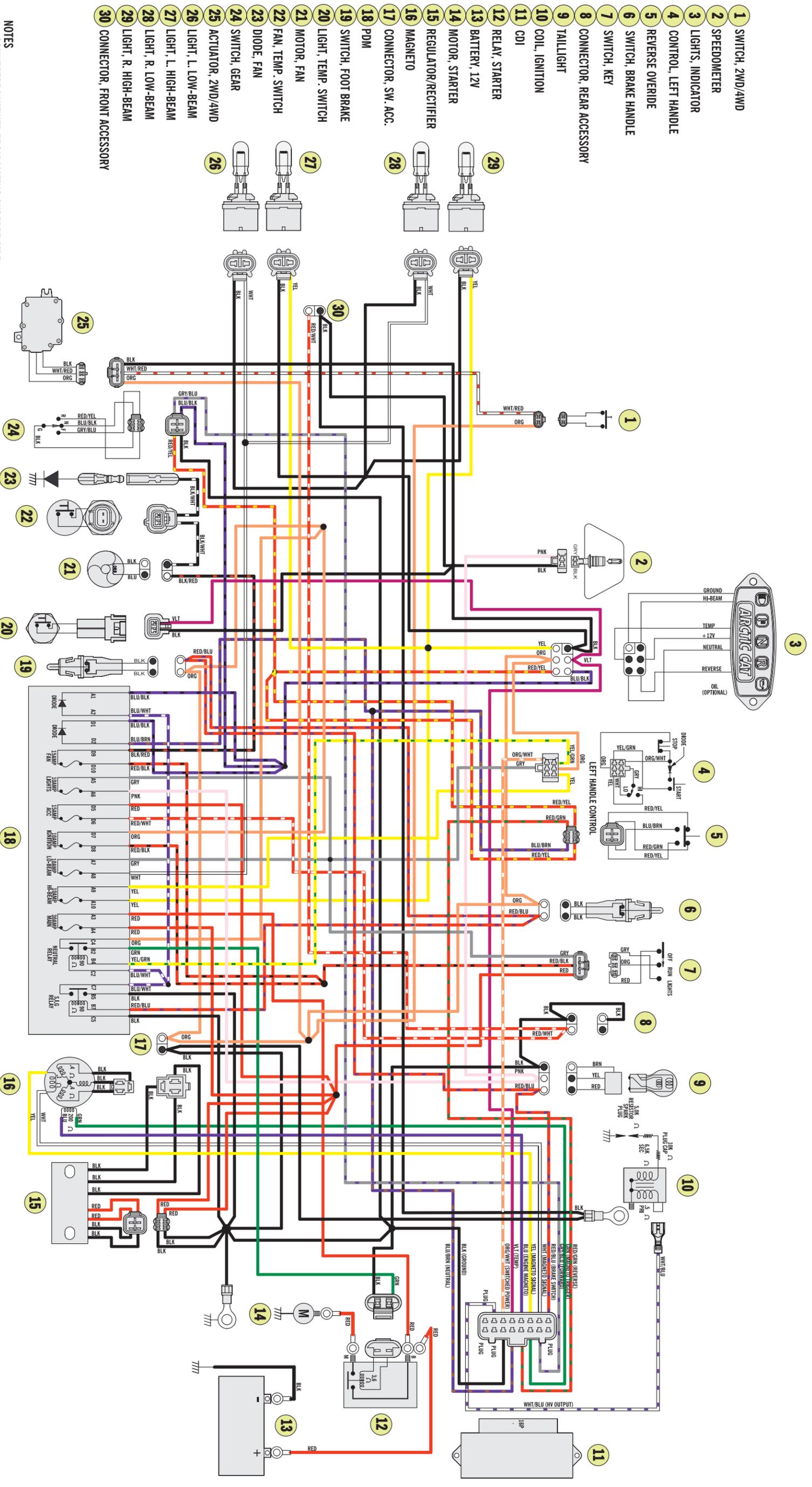
WIRING DIAGRAM (400 2x4 Automatic Transmission)
Harness (p/n 0486-120) - FIS

- 1 LIGHTS, INDICATOR
- 2 CONTROL, LEFT HANDLE
- 3 REVERSE OVERRIDE
- 4 SWITCH, BRAKE HANDLE
- 5 SWITCH, KEY
- 6 CONNECTOR, REAR ACCESSORY
- 7 TAILLIGHT
- 8 COIL, IGNITION
- 9 CDI
- 10 RELAY, STARTER
- 11 BATTERY, 12V
- 12 STARTER, MOTOR
- 13 REGULATOR/RECTIFIER
- 14 MAGNETO
- 15 CONNECTOR, SW. ACC.
- 16 PDM
- 17 SWITCH, FOOT BRAKE
- 18 LIGHT, TEMP. SWITCH
- 19 MOTOR, FAN
- 20 FAN, TEMP. SWITCH
- 21 DIODE, FAN
- 22 SWITCH, GEAR
- 23 LIGHT, L. LOW-BEAM
- 24 LIGHT, L. HIGH-BEAM
- 25 LIGHT, R. LOW-BEAM
- 26 LIGHT, R. HIGH-BEAM



- NOTES**
- 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 - 2. ● MALE PIN TERMINAL
 - FEMALE RECEPTACLE TERMINAL

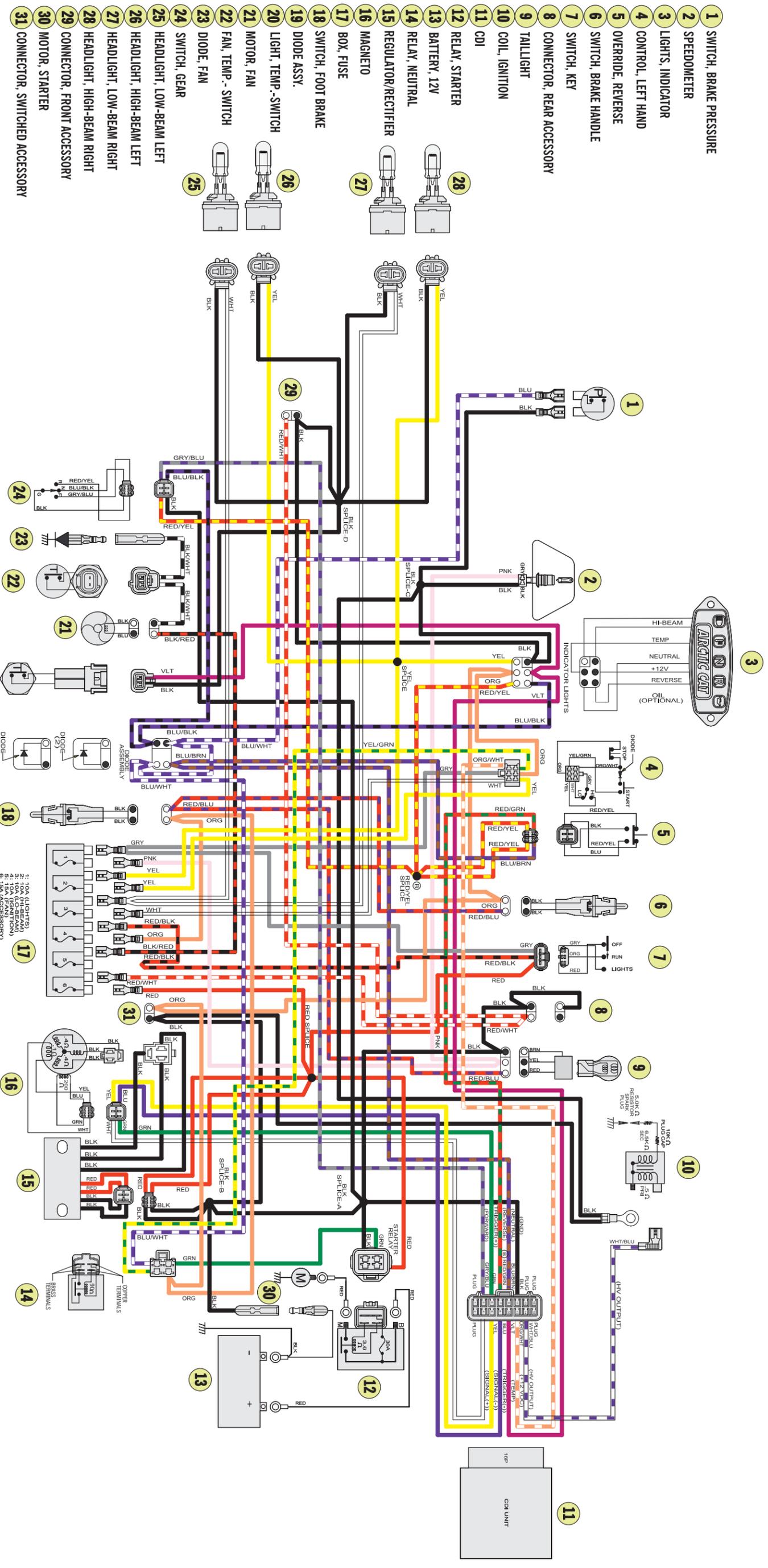
WIRING DIAGRAM (400 4x4 Automatic Transmission)
Harness (p/n 0486-118) - STD/FIS
Harness (p/n 0486-133) - TBX/FIS



- 1 SWITCH, 2WD/4WD
- 2 SPEEDOMETER
- 3 LIGHTS, INDICATOR
- 4 CONTROL, LEFT HANDLE
- 5 REVERSE OVERRIDE
- 6 SWITCH, BRAKE HANDLE
- 7 SWITCH, KEY
- 8 CONNECTOR, REAR ACCESSORY
- 9 TAILLIGHT
- 10 COIL, IGNITION
- 11 CDI
- 12 RELAY, STARTER
- 13 BATTERY, 12V
- 14 MOTOR, STARTER
- 15 REGULATOR/RECTIFIER
- 16 MAGNETO
- 17 CONNECTOR, SW. ACC.
- 18 PDM
- 19 SWITCH, FOOT BRAKE
- 20 LIGHT, TEMP. SWITCH
- 21 MOTOR, FAN
- 22 FAN, TEMP. SWITCH
- 23 DIODE, FAN
- 24 SWITCH, GEAR
- 25 ACTUATOR, 2WD/4WD
- 26 LIGHT, L. LOW-BEAM
- 27 LIGHT, L. HIGH-BEAM
- 28 LIGHT, R. LOW-BEAM
- 29 LIGHT, R. HIGH-BEAM
- 30 CONNECTOR, FRONT ACCESSORY

NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL

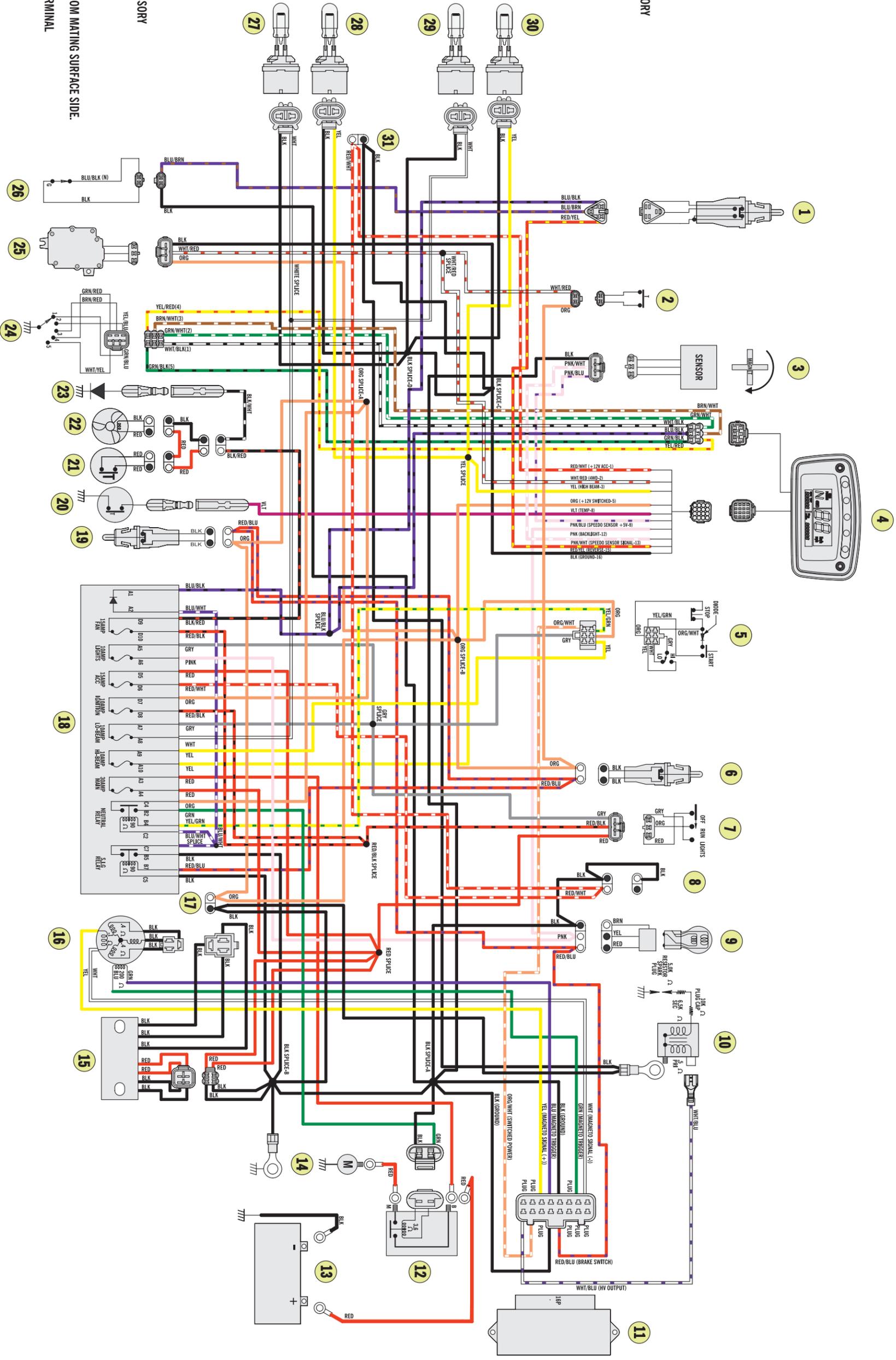
WIRING DIAGRAM (400 Automatic Transmission)
 Harness (p/n 0486-106) - ACT



NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. ● MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL

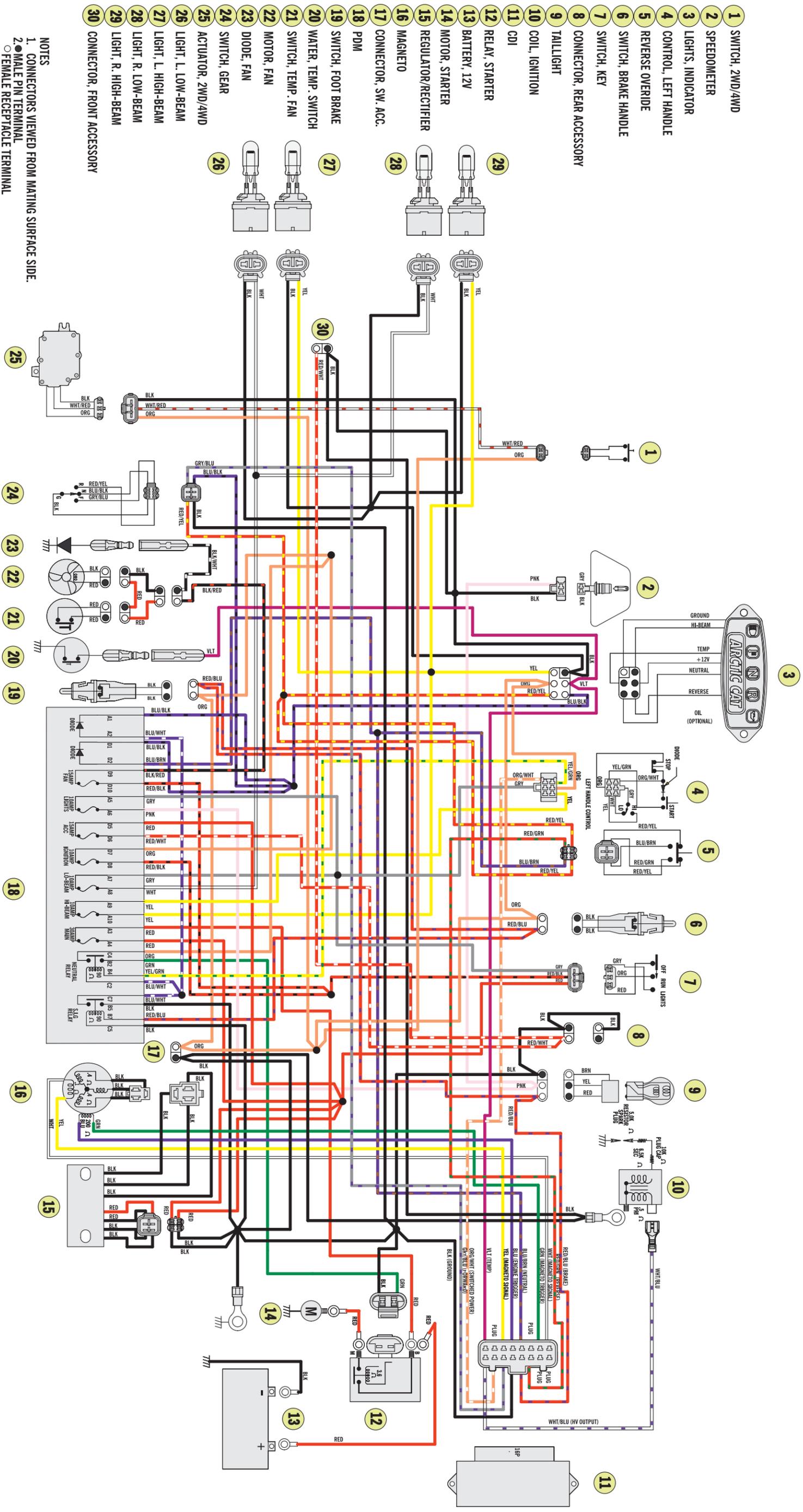
- 1. 10A (LIGHTS)
- 2. 10A (HI-BEAM)
- 3. 10A (CHIEF FAN)
- 4. 10A (GEN FAN)
- 5. 15A (FAN)
- 6. 15A (ACCESSORY)

- 1 SWITCH, REVERSE
- 2 SWITCH, 2WD/4WD
- 3 SENSOR, SPEEDOMETER
- 4 LCD, MULTIFUNCTION
- 5 CONTROL, LEFT HANDLE
- 6 SWITCH, BRAKE HANDLE
- 7 SWITCH, KEY
- 8 CONNECTOR, REAR ACCESSORY
- 9 TAILLIGHT
- 10 COIL, IGNITION
- 11 CDI
- 12 RELAY, STARTER
- 13 BATTERY, 12V
- 14 MOTOR, STARTER
- 15 REGULATOR/RECTIFIER
- 16 MAGNETO
- 17 CONNECTOR, SW. ACC.
- 18 PDM
- 19 SWITCH, FOOT BRAKE
- 20 SWITCH, WATER TEMP
- 21 SWITCH, TEMP. FAN
- 22 MOTOR, FAN
- 23 DIODE, FAN
- 24 SWITCH, GEAR
- 25 ACTUATOR, 2WD/4WD
- 26 SWITCH, ENGINE NEUTRAL
- 27 LIGHT, L. LOW-BEAM
- 28 LIGHT, L. HIGH-BEAM
- 29 LIGHT, R. LOW-BEAM
- 30 LIGHT, R. HIGH-BEAM
- 31 CONNECTOR, FRONT ACCESSORY



NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL

WIRING DIAGRAM (500 Automatic Transmission)
Harness (p/n 0486-124) - TBX/TRV

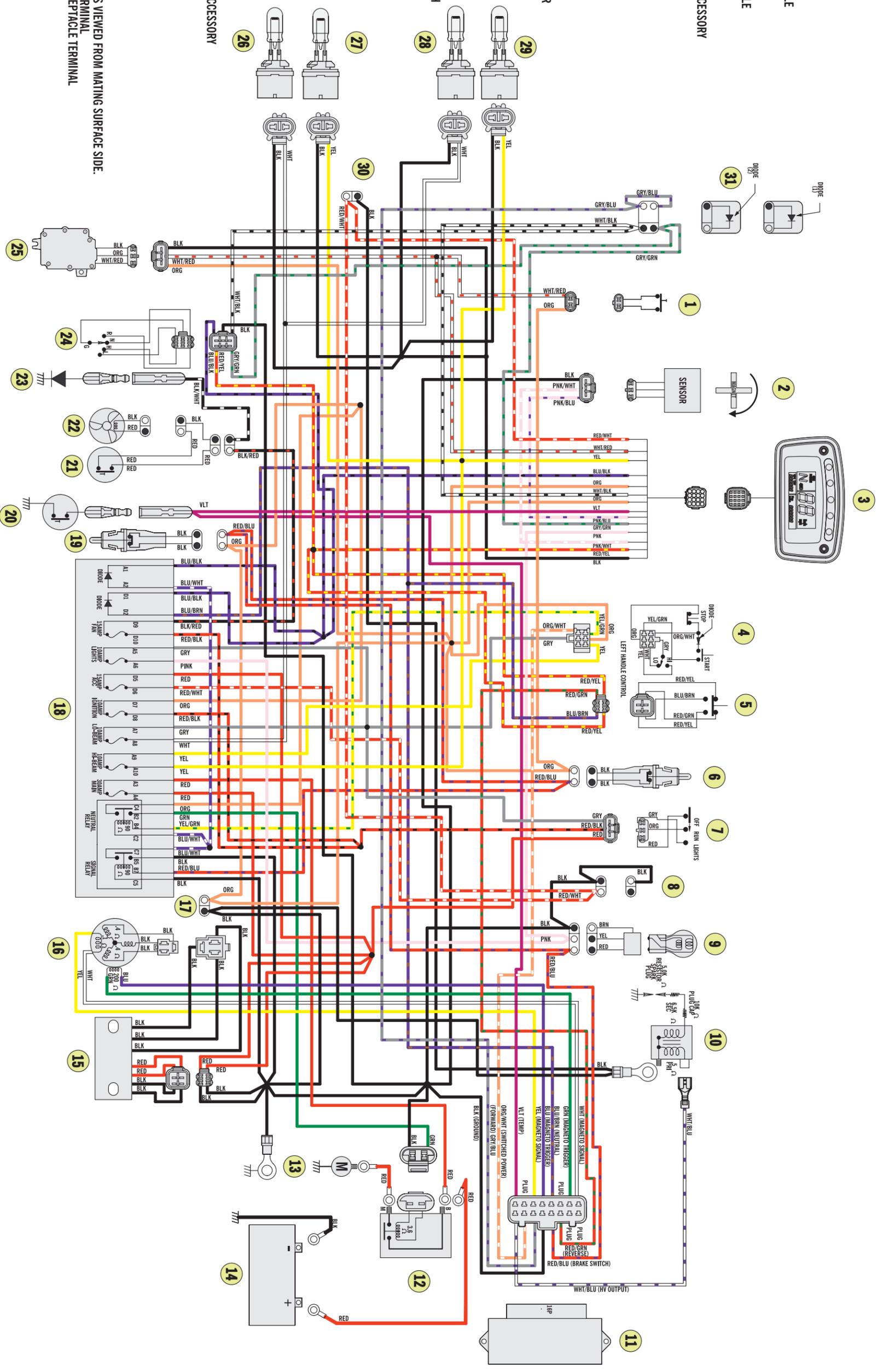


- 1 SWITCH, 2WD/4WD
- 2 SPEEDOMETER
- 3 LIGHTS, INDICATOR
- 4 CONTROL, LEFT HANDLE
- 5 REVERSE OVERRIDE
- 6 SWITCH, BRAKE HANDLE
- 7 SWITCH, KEY
- 8 CONNECTOR, REAR ACCESSORY
- 9 TAILLIGHT
- 10 COIL, IGNITION
- 11 CDI
- 12 RELAY, STARTER
- 13 BATTERY, 12V
- 14 MOTOR, STARTER
- 15 REGULATOR/RECTIFIER
- 16 MAGNETO
- 17 CONNECTOR, SW. ACC.
- 18 PDM
- 19 SWITCH, FOOT BRAKE
- 20 WATER, TEMP. SWITCH
- 21 SWITCH, TEMP. FAN
- 22 MOTOR, FAN
- 23 DIODE, FAN
- 24 SWITCH, GEAR
- 25 ACTUATOR, 2WD/4WD
- 26 LIGHT, L. LOW-BEAM
- 27 LIGHT, L. HIGH-BEAM
- 28 LIGHT, R. LOW-BEAM
- 29 LIGHT, R. HIGH-BEAM
- 30 CONNECTOR, FRONT ACCESSORY

NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. MALE PIN TERMINAL
 3. FEMALE RECEPTACLE TERMINAL

WIRING DIAGRAM (500 Automatic Transmission)
Harness (p/n 0486-141) - STD

- 1 SWITCH, 2WD/4WD
- 2 SENSOR, SPEEDO
- 3 LCD, MULTIFUNCTION
- 4 CONTROL, LEFT HANDLE
- 5 REVERSE OVERRIDE
- 6 SWITCH, BRAKE HANDLE
- 7 SWITCH, KEY
- 8 CONNECTOR, REAR ACCESSORY
- 9 TAILLIGHT
- 10 COIL, IGNITION
- 11 CDI
- 12 RELAY, STARTER
- 13 MOTOR, STARTER
- 14 BATTERY, 12V
- 15 REGULATOR/RECTIFIER
- 16 MAGNETO
- 17 CONNECTOR, SW. ACC.
- 18 PDM
- 19 SWITCH, FOOT BRAKE
- 20 WATER, TEMP. SWITCH
- 21 SWITCH, TEMP. FAN
- 22 MOTOR, FAN
- 23 DIODE, FAN
- 24 SWITCH, GEAR
- 25 ACTUATOR, 2WD/4WD
- 26 LIGHT, L. LOW-BEAM
- 27 LIGHT, L. HIGH-BEAM
- 28 LIGHT, R. LOW-BEAM
- 29 LIGHT, R. HIGH-BEAM
- 30 CONNECTOR, FRONT ACCESSORY
- 31 ASSEMBLY, DIODE



NOTES
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. ● MALE PIN TERMINAL
 ○ FEMALE RECEPTACLE TERMINAL

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.

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” on the lower-right corner indicates a 3.6:1 gear set ratio (10:36 teeth).
- B. A “1” on the lower-right corner indicates a 3.1:1 gear set ratio (11:34 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)	1.1-1.3 kg-m (8-9.5 ft-lb)	0.9-1.2 kg-m (6.5-9 ft-lb)
M8 (Torx T-40 Recess)	3.5-4.3 kg-m (25-31 ft-lb)	2.9-3.5 kg-m (21-25 ft-lb)
M10 (Torx T-50 Recess)	5.1-6.3 kg-m (37-45.5 ft-lb)	4.3-5.3 kg-m (31-38 ft-lb)

SPECIFICATIONS

Specific specifications regarding the 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.)

SPECIAL TOOLS

A number of special tools must be available to the technician when servicing the gear case.

Description	p/n
Boot Clamp Pliers	0444-120
Pinion Gear/Shaft Removal Tool	0444-127
Slide Hammer w/CV Joint Attachment	0444-123
CV Joint Attachment (Only)	0444-119
Internal Hex Socket (48 mm)	0444-104

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

TROUBLESHOOTING

If a noise is heard from the gear case area, it can be difficult to locate and/or diagnose. If the noise is related to wheel speed, but not to engine RPM, the problem is probably in the final drive or engine/transmission bevel gear set. When a problem is localized, a number of inspections must be made to pinpoint that problem. The most obvious of the inspections include CV boots, wheel and hub nut tightness, wheel bearing damage, gear case lubricant contamination, low lubricant level, seal leakage at the input shaft, CV joints, or selector arm.

■NOTE: Small metallic particles will collect on the magnetic drain plug as a normal part of break-in and will also give a metallic cast to drained lubricant. Contamination would include large particles or water which gives a “milky” look to the lubricant.

■NOTE: Lubricant on a new pinion housing assembly could be grease. If the front of the gear case is leaking at the rear drive boot, wipe excess lubricant from the bottom of the pinion housing; then operate the ATV for a period of time. Inspect the pinion housing area for any signs of leakage. If lubricant is again on the bottom of the pinion housing, the seal must be replaced.

Additional troubleshooting could include the following.

- Binding/abrupt motion: CV boot torn (grease loss, foreign object damage, broken cage); gear lubricant loss or not filled (bearing seizure, broken gear teeth, seal leakage, bladder or hose leakage, missing filler/drain plug).
- Noise from drive system: wheel or gear case bearing damage, improper gear backlash, improper assembly, low or no gear case lubricant.
- Lockup: gear case lubricant loss or not filled, water contamination causing bearing seizure.

Front Drive Actuator (400 FIS/500)

■NOTE: The actuator is not a serviceable component. If it is defective, it must be replaced.

■NOTE: The actuator will operate only when the ignition switch is in the ON position.

The front drive actuator is located on the left side of the front 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. If no sound is heard, see Section 5. If the actuator runs constantly or makes squealing or grinding sounds, the actuator must be replaced.

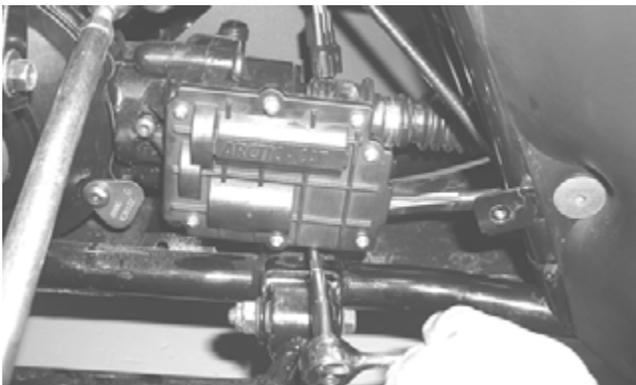
REMOVING

1. Remove the left-front inner fender panel; then disconnect the three-prong connector on the actuator harness.
2. Using a T-30 torx wrench, remove the mounting cap screw from the driveshaft side of the actuator.



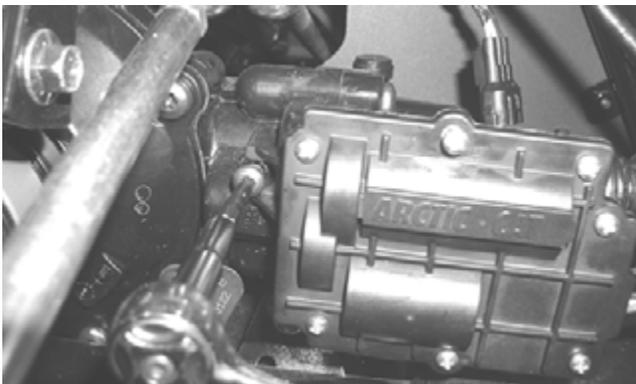
AG926

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.

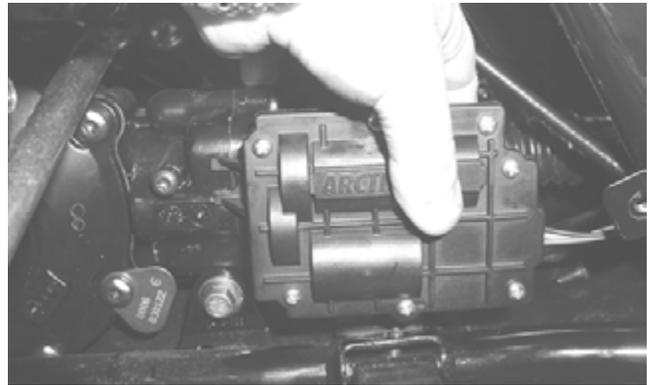


AG928

INSTALLING

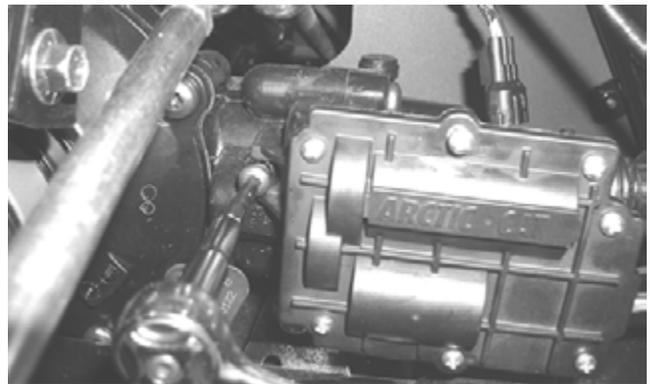
1. Ensure that all mounting surfaces are clean and free of debris.

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.



AG928

4. Loosen the front cap screw; then tighten the cap screw on the driveshaft side.



AG926

■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.

- Secure the wiring harness to the frame with a nylon cable tie; then install the inner fender panel.

Front Differential (FIS Models)

■NOTE: To remove the rear gear case on 400 FIS/500 models, see Rear Gear Case (400 FIS/500 Models) in this section.

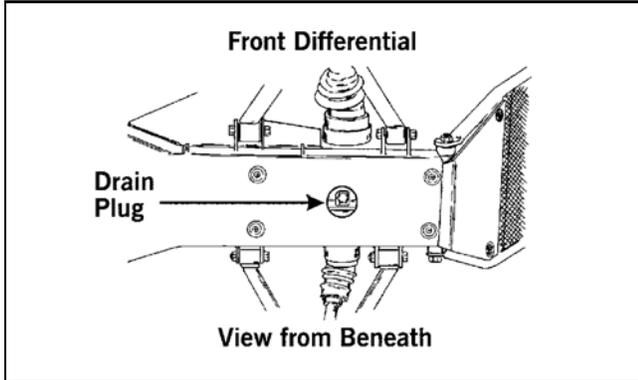
REMOVING DIFFERENTIAL

- 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.

- Remove the drain plug and drain the gear lubricant into a drain pan; then reinstall the plug.



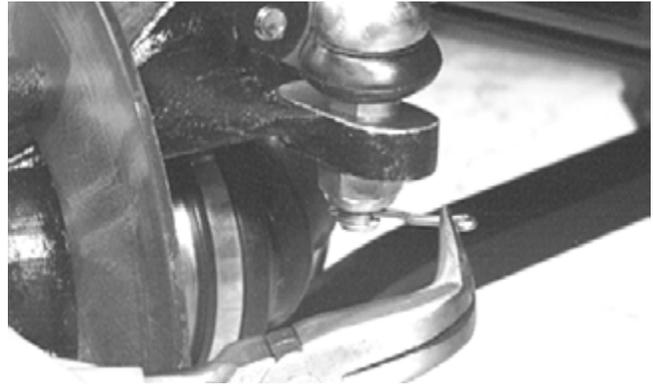
ATV0082A

- Remove the front wheels.
- Remove the boot guards.



AF934

- Pump up the hand brake; then engage the brake lever lock.
- Remove the cotter pin securing the hex nut; then remove the hex nut and washer. Release the brake lever lock.



CD008

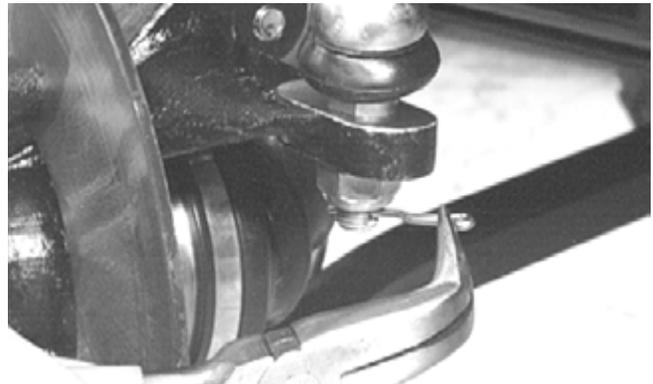
■NOTE: It is not necessary to remove the brake hoses from the calipers for this procedure.

- Remove the brake calipers. Account for the cap screws.



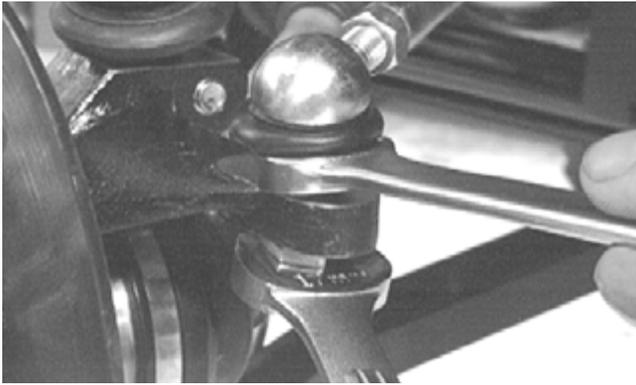
AF894D

- Remove the tie rod cotter pins and discard the pins.



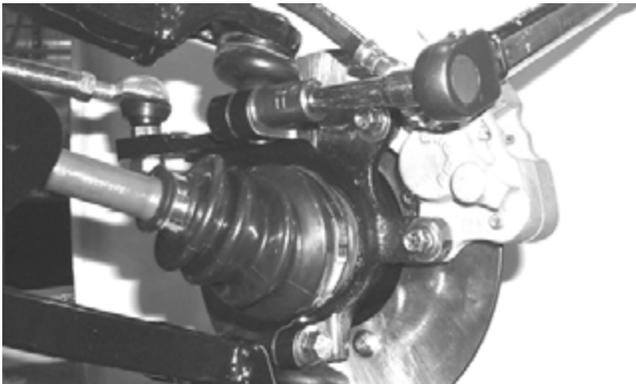
AF895D

- 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.



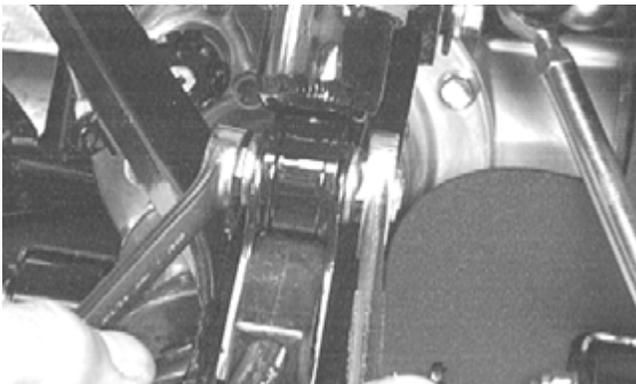
AF628D

11. Pull the steering knuckle away from the axle taking care not to damage the seals with the axle end.
12. Support the axle to not allow it to drop or hang.

⚠ CAUTION

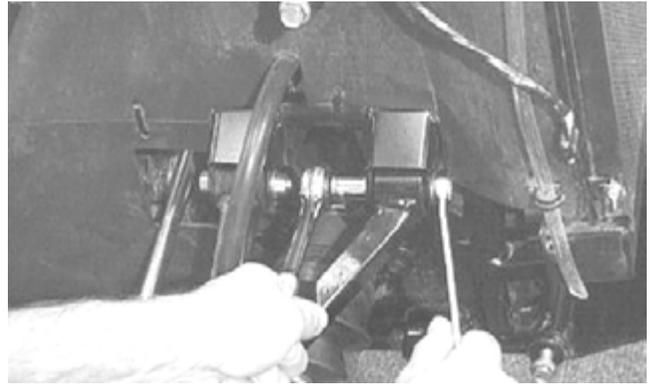
The axle must be supported. If the axle is allowed to drop or hang, damage to the inner CV joint may occur.

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.



AF610D

15. Using a slide hammer, remove the front axles.



AF899D

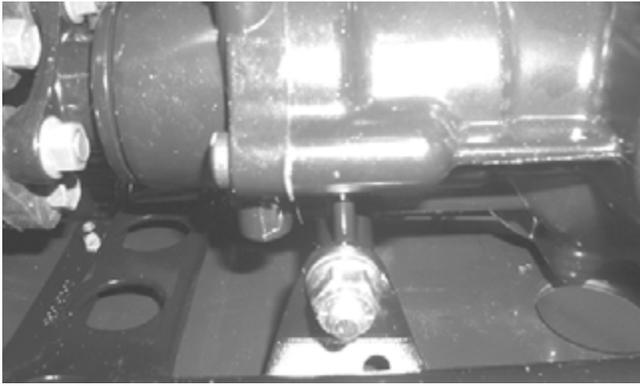
16. Remove the inner fender panels.



AF902D

NOTE: To remove the panels, there will be a torx-head screw and three cable ties per side.

17. Remove the lower differential mounting cap screw. Account for a lock nut and washers.



CD026

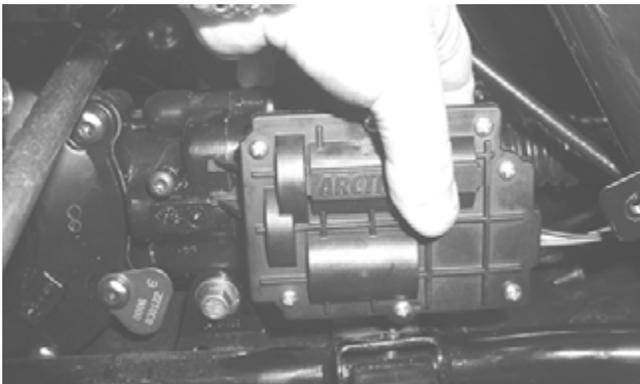
18. Remove the upper differential mounting cap screws.



CD016

19. Remove the differential from the frame.

20. Using a T-30 torx wrench, remove the three screws securing the front drive actuator to the gear case; then remove the actuator.



AG925

Disassembling Input Shaft

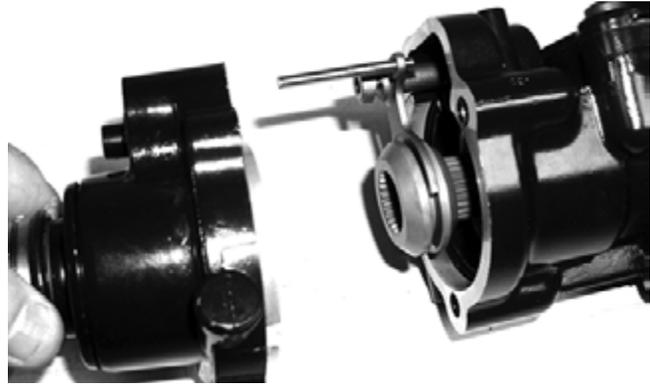
■NOTE: This procedure can be performed on a rear FIS gear case; however, some components may vary from model to model. The technician should use discretion and sound judgment.

1. Using a T-40 torx wrench, remove the cap screws securing the input shaft housing cover.



CD102

2. Using a rubber mallet, remove the cover. 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 side-cutter (or suitable substitute), remove the boot clamps; then remove the boots and splined drive from the input shaft.



CD114

4. Remove the input shaft from the housing.



AF983



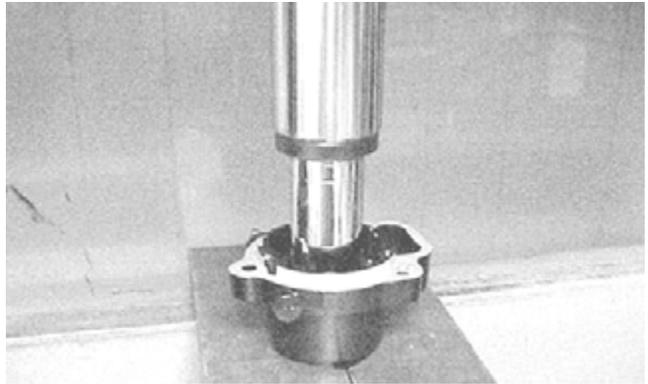
CD107

5. Using a seal removal tool, remove the input shaft seal. Account for a spacer.



AF982

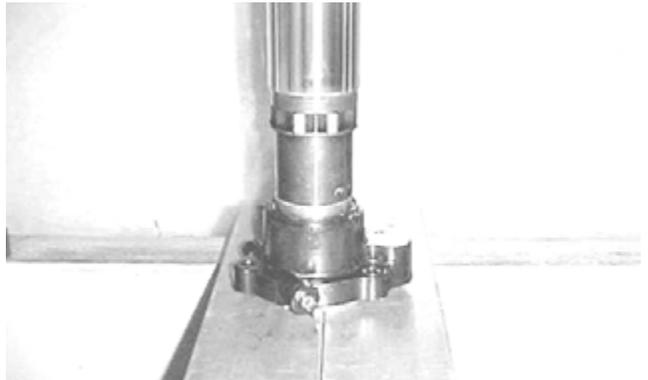
6. Remove the snap ring securing the input shaft bearing; then place the input shaft housing in a press and remove the bearing.



AF984

Assembling Input Shaft

1. Place the input shaft 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 large diameter spacer; then install the input shaft seal making sure it is flush with the edge of the housing.



AF995



AF996

3. Install the input shaft into the housing; then install the front boot and secure with Boot Clamp (p/n 0423-393) and the rear boot with Boot Clamp (p/n 0423-411).



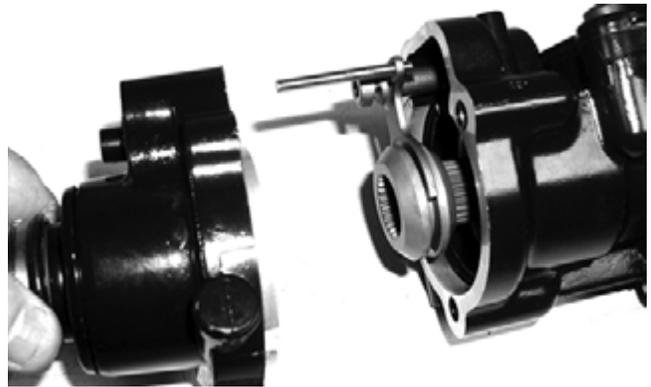
CD112



CD099

4. Place the input shaft assembly onto the gear housing; then secure with the existing cap screws. Tighten to 2.9-3.5 kg-m (21-25 ft-lb).

■NOTE: If a new gear housing is being installed, tighten the cap screws to 3.5-4.3 kg-m (25-31 ft-lb).



CD103

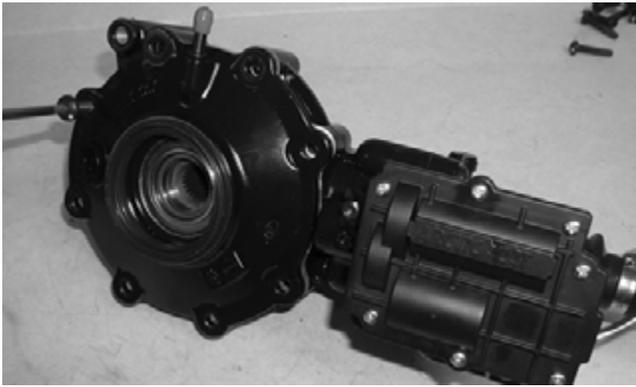


CD110

Disassembling Pinion Gear

■NOTE: This procedure can be performed on a rear FIS 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 differential cover. Account for and make note of the ID tag location for assembling purposes.

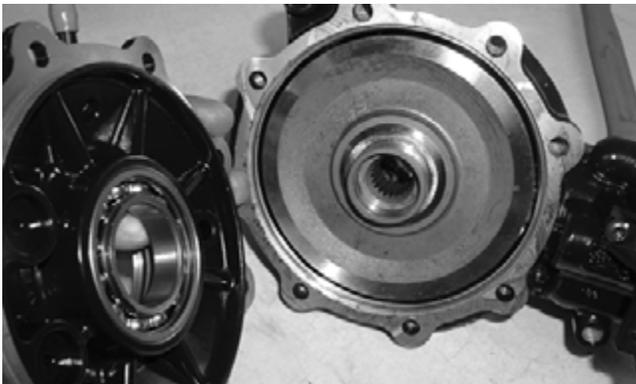


CD117

2. Using a plastic mallet, tap lightly to remove the differential cover. Account for an O-ring and shim. Mark the shim as left-side.



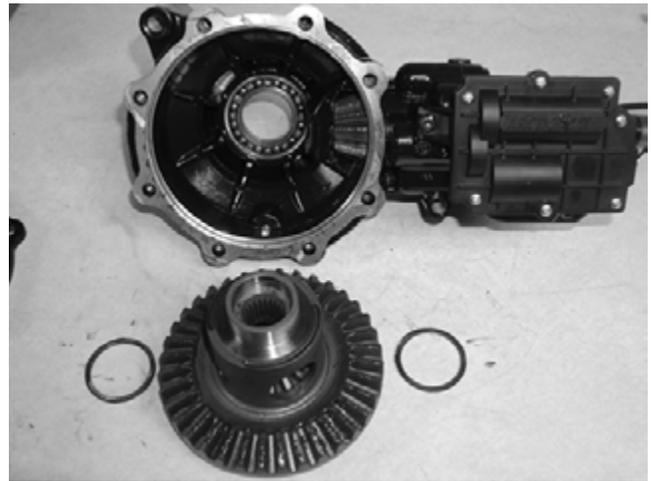
CD118



CD119

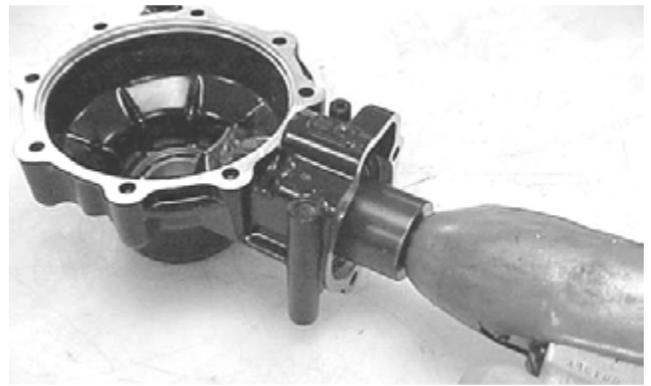
■NOTE: If the cover is difficult to remove, pry on the cover in more than one recessed location.

3. Remove the ring gear spider assembly and account for a shim. Mark the shim as right-side.



CD121

4. Using a T-40 torx driver, remove the input shaft housing.



CC875

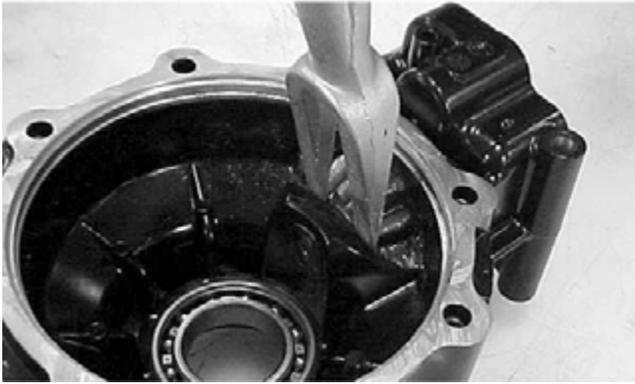
5. Using the 48 mm Internal Hex Socket (p/n 0444-104), remove the nut securing the pinion gear assembly.

■NOTE: On a front differential, the nut has right-hand threads. On a rear gear case, the nut has left-hand threads.

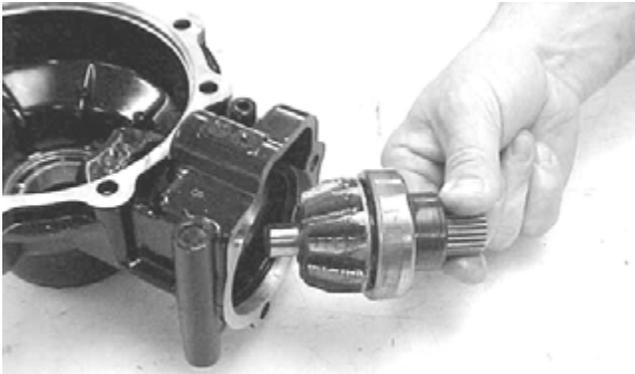


CC876

6. Using the Pinion Gear/Shaft Removal Tool (p/n 0444-127), and a hammer, remove the pinion gear from the housing.

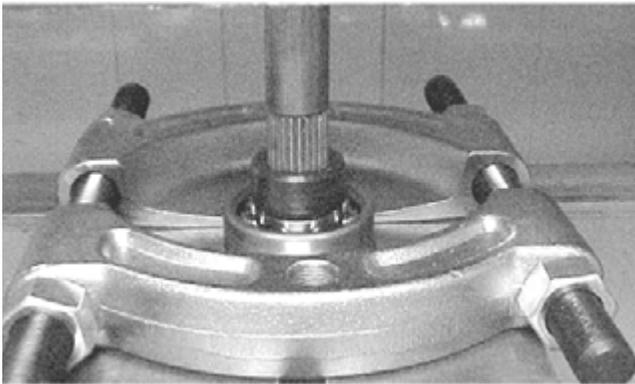


CC877



CC878

7. Secure the pinion gear in a bearing puller; then remove the pinion bearing using a press. Account for a collar, a bearing, and a shim.



CC879

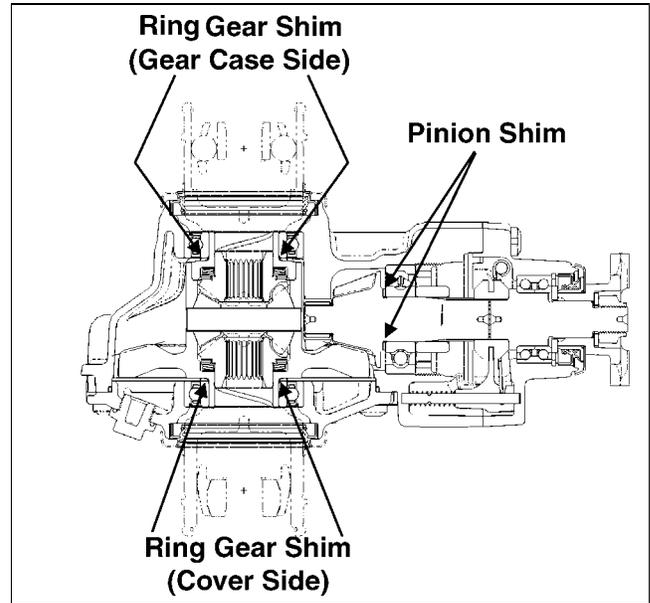


CC880

■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 O category.

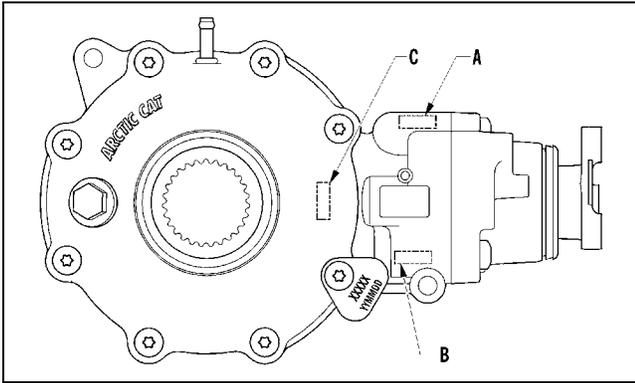
■NOTE: If the housing is being replaced, proceed to the following Shimming Procedure/Shim Selection sub-section.

Shimming Procedure/Shim Selection



502-119A

1. Press bearings into bores by outer ring to hard contact with seat.
2. Note the following shim selections (shims are nominally 1.5 mm/0.060 in. thick):
 - A. Pinion Gear Sub-Assembly - add the value (A) on the gear case housing with 1.5 mm (0.060 in.); then subtract the value on the 10-tooth pinion gear. This will give you the proper shim thickness.
 - B. Cover Side - add the value (B) on the gear case housing to the value (C) on the gear case cover; then add 1.5 mm (0.060 in.). This will give you the proper shim thickness.
 - C. Gear Case Side - install a 1.3-1.4 mm (0.050-0.055 in.) shim and tighten the bolts to 3.5-4.3 kg-m (25-31 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.

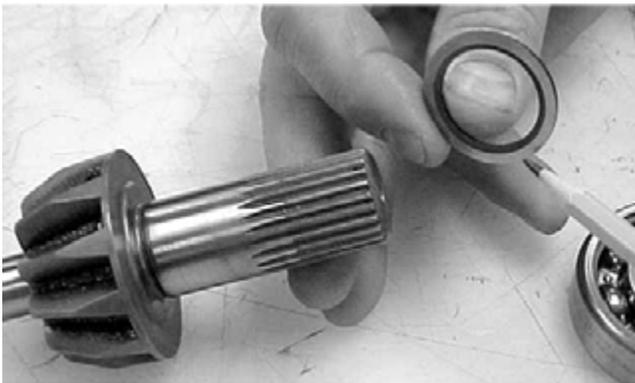


738-268A

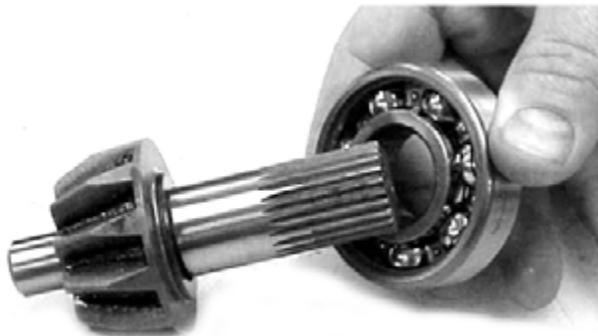
3. Apply molybdenum disulfide grease to all oil seal lips.
4. Prelubricate journal on pinion assembly with SAE 80W-90 hypoid gear lubricant prior to pressing assembly into gear case housing.
5. Tighten lock collar to 16.6 kg-m (120 ft-lb) and deform/lock edge approximately 1.5 mm (0.060 in.) into lower oil channel.

Assembling Pinion Gear

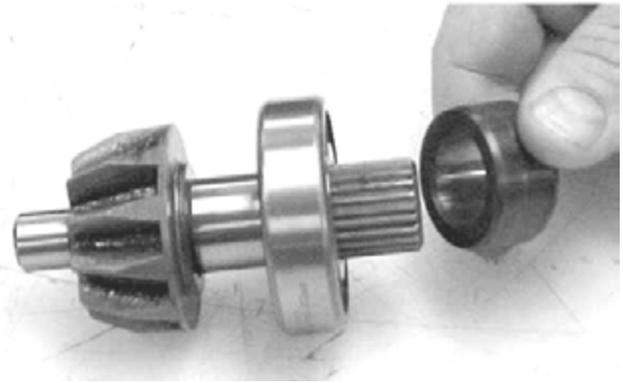
1. Place the shim (with the chamfer side toward the inside) onto the pinion shaft; then install the bearing onto the pinion shaft. Install the pinion shaft collar.



CC881

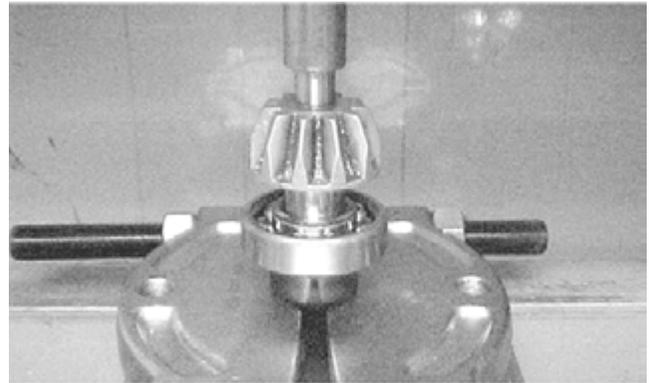


CC882



CC883

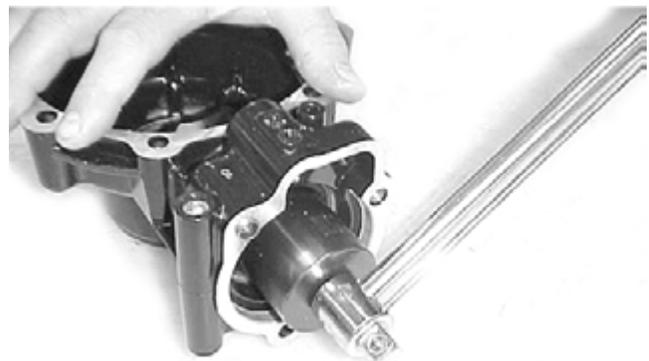
2. Place the pinion assembly in a bearing puller; then install the bearing using a press.



CC884

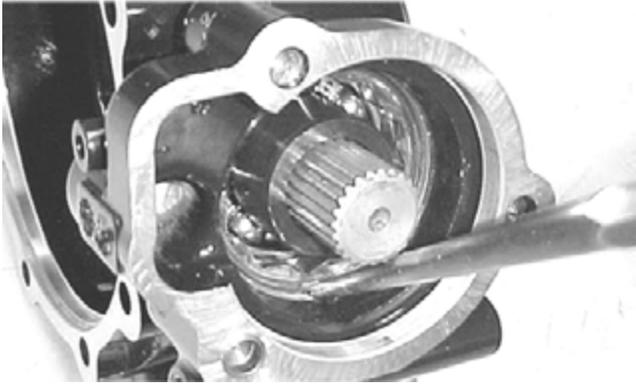
3. Install the pinion gear assembly into the housing. Using the 48 mm Internal Hex Socket (p/n 0444-104), secure the pinion gear assembly with the existing nut. Tighten to 17.3 kg-m (125 ft-lb).

■NOTE: On a front differential, the nut has right-hand threads. On a rear gear case, the nut has left-hand threads.



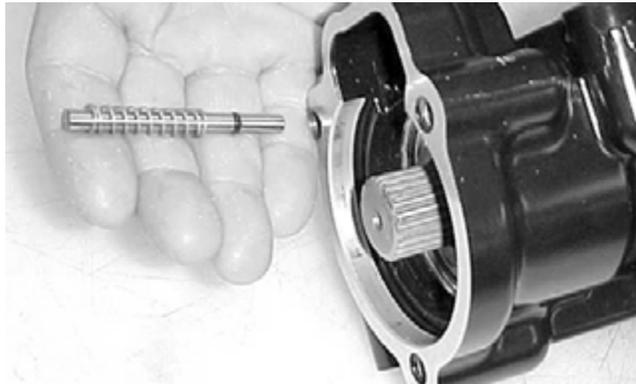
CC890

4. Place a punch on the edge of the nut in the oil gallery area; then using a hammer, stake the nut to ensure that the nut will remain securely tightened.



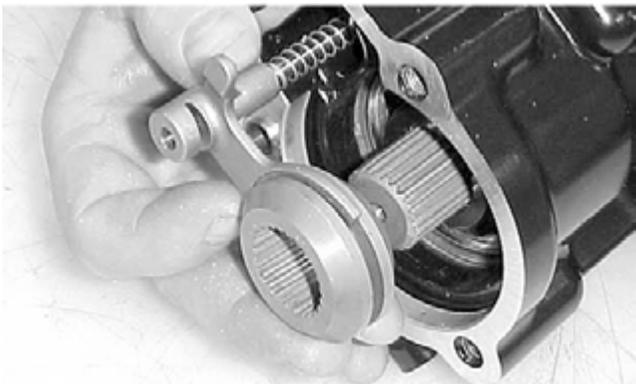
CC891

5. Install the shift fork shaft w/spring into the gear housing making sure the shaft O-ring is positioned to the inside.



CC892

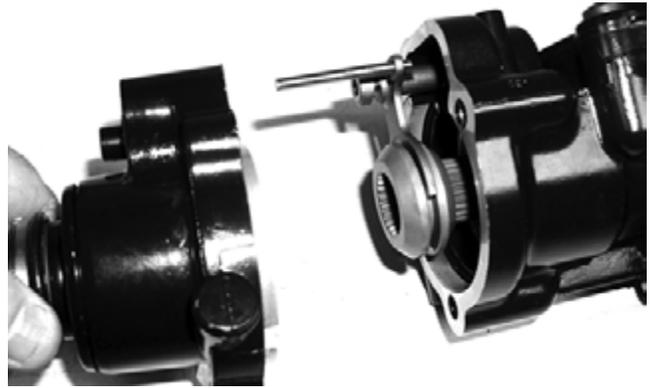
6. Install the shift fork assembly making sure the fork leg is facing upward. Apply a small amount of oil to the gasket; then install the gasket.



CC893

7. Place the input shaft assembly onto the gear housing; then secure with the existing cap screws. Tighten to 2.9-3.5 kg-m (21-25 ft-lb).

■NOTE: If a new gear housing is being installed, tighten the cap screws to 3.5-4.3 kg-m (25-31 ft-lb).



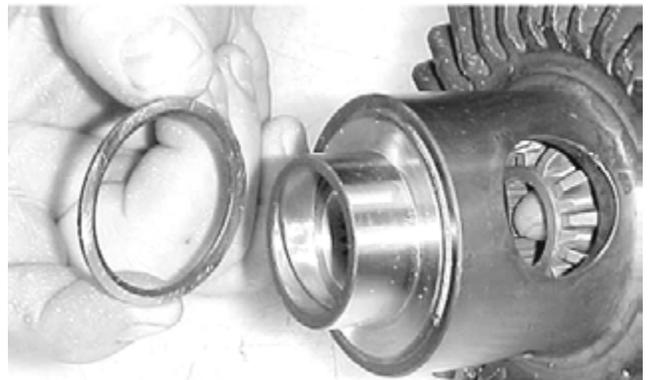
CD103



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.

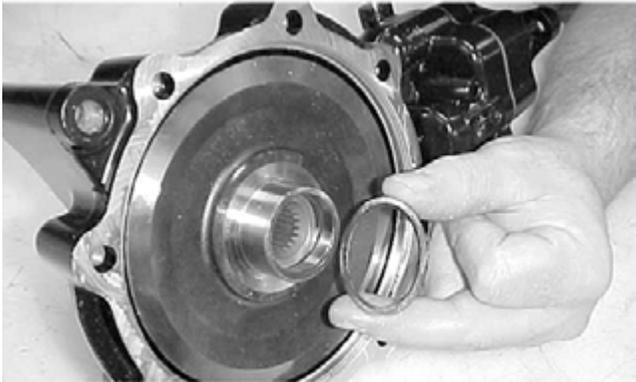
■NOTE: The spider and ring gear assembly must be replaced as a complete unit.



CC896



CC897

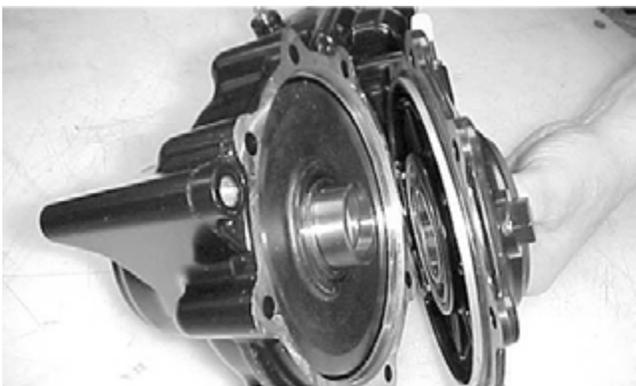


CC898

9. Making sure the O-ring is properly positioned on the differential cover, install the differential cover with existing hardware. Account for the ID tag. Tighten the cap screws to 2.9-3.5 kg-m, (21-25 ft-lb).

■NOTE: Grease can be applied to the O-ring for ease of assembling.

■NOTE: If a new gear housing is being installed, tighten the cap screws to 3.5-4.3 kg-m (25-31 ft-lb).



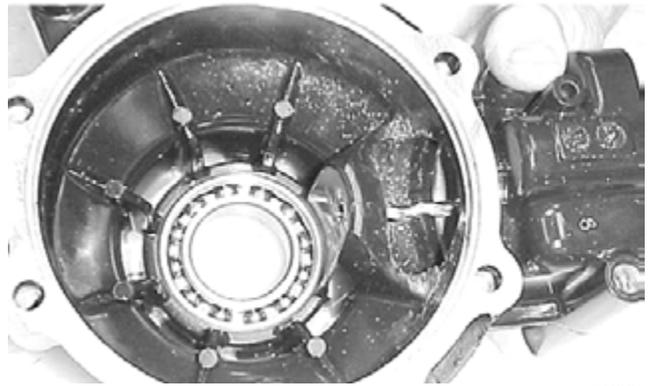
CC903

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 FIS gear case; however, some components may vary from model to model. The technician should use discretion and sound judgment.

1. Place a 6.35 mm (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 approximately 300°.



CC886

3. Using a flat-nosed punch, drive the bearing out of the housing.



CC887

Installing Needle Bearing

1. Place the new bearing into the housing.



CC888

- Using a suitable driver, install the needle bearing into the housing making sure the bearing is seated.

■NOTE: Do not push the bearing too far into the housing.



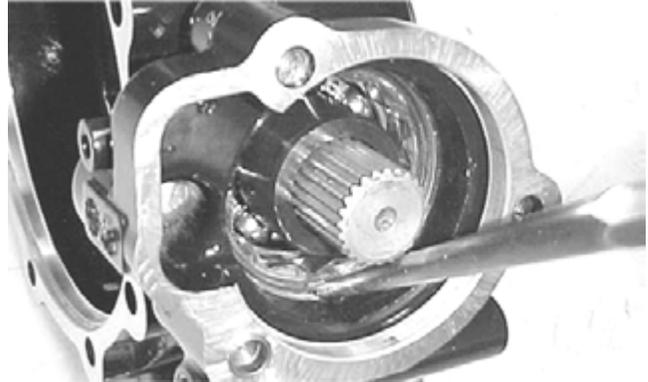
CC889

- Install the pinion shaft and secure with the existing 48 mm nut. Tighten to 17.3 kg-m (125 ft-lb).



CC890

- Place a punch on the edge of the nut in the oil gallery area; then using a hammer, stake the nut to ensure that the nut will remain securely tightened.



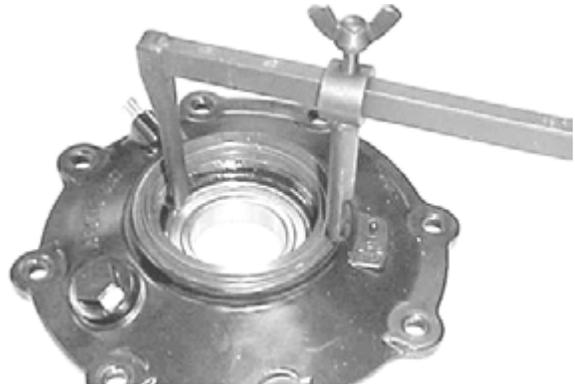
CC891

- Install the input shaft housing.

Removing/Installing Axle Seal

■NOTE: This procedure can be performed on a rear FIS gear case; however, some components may vary from model to model. The technician should use discretion and sound judgment.

- Remove the seal using a seal removal tool.



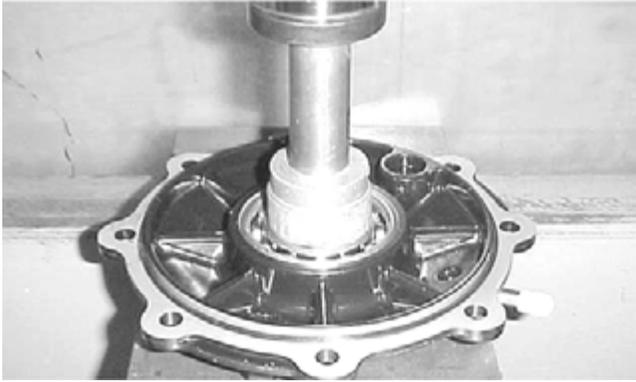
CC899

- Using a press, remove the bearing.



CC900

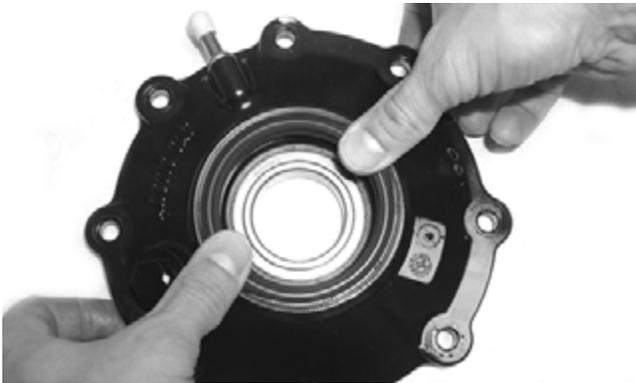
- Using a press, install the new axle bearing into the housing.



CC901

■NOTE: Prior to installing the seal, apply grease to the seal outside diameter.

4. Install the seal into the housing pressing evenly on the outside edge until the seal is seated.



CD018

5. Repeat steps 1-4 for the opposite side.

INSTALLING DIFFERENTIAL

1. Align the splined input shaft with the front output yoke splines; then place the differential into position on the frame and install the cap screws, washers, and flex-lock nuts. Tighten to 6.2 kg-m (45 ft-lb).



CD096

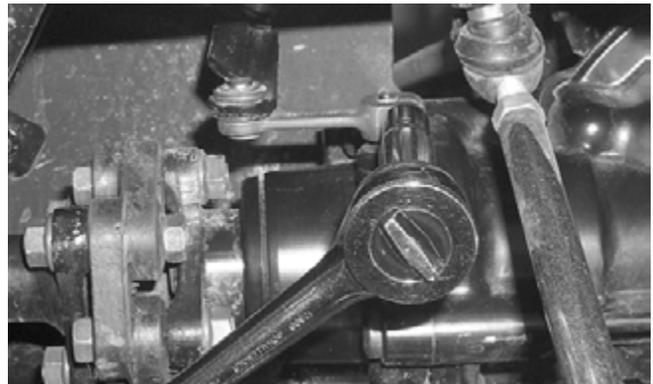


AF905D



AF904D

2. Pour 275 ml (9.3 fl oz) of SAE 80W-90 hypoid lubricant into the differential and install the filler plug. Tighten to 2.2 kg-m (16 ft-lb).
3. Install the selector arm making sure the marks made during removing align.

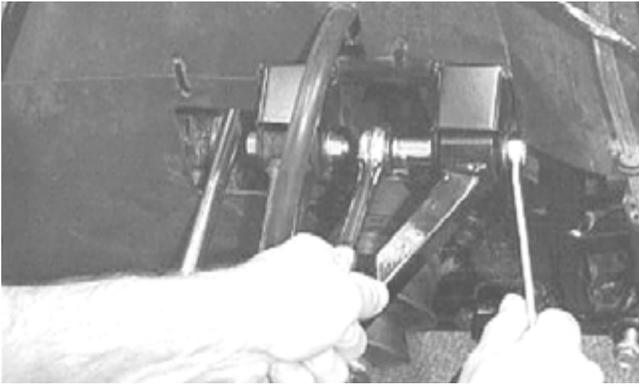


AF930

4. Install the inner fender panels.

■NOTE: To secure the side panels, use a torx-head screw and three cable ties per side.

5. Install the front axles.
6. Secure the upper A-arms with cap screws and lock nuts. Tighten to 4.8 kg-m (35 ft-lb).



AF610D

7. Install the boot guards.



AF934

8. Secure the lower shock eyelets with cap screws and lock nuts. Tighten to 4.8 kg-m (35 ft-lb).

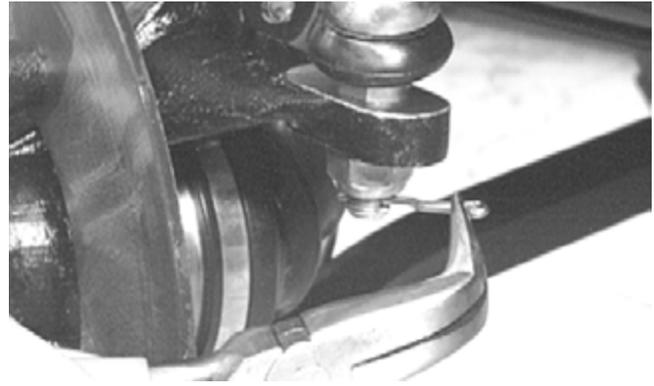


AF897D

9. Secure the tie rods with the lock nuts. Tighten securely; then install and spread the cotter pins.



AF896D



AF895D

10. Install the brake calipers. Secure with the cap screws tightened to 2.8 kg-m (20 ft-lb).



AF894D

11. Install the wheels and tighten to 5.5 kg-m (40 ft-lb).

12. Remove the ATV from the support stand.

Drive Axles

REMOVING REAR DRIVE AXLE (Fully Independent Suspension)

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 and rubber washer. Release the brake lever lock.



CD008

5. Remove the two brake calipers (right side only).

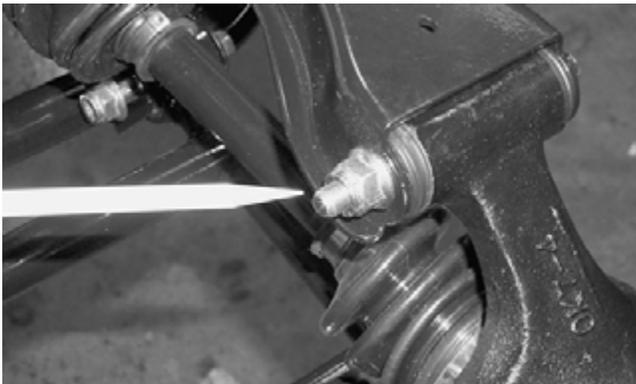
■NOTE: Do not allow the brake calipers to hang from their cable/hose.

⚠ 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.

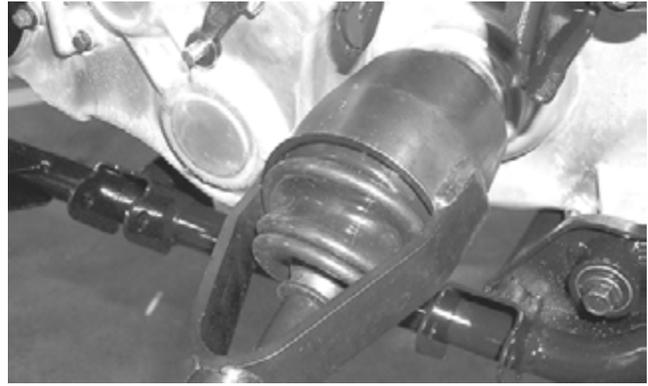


AF936

■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 (4x4 Models)

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 and washer. Release the brake lever lock.



CD008

■NOTE: It is not necessary to remove the brake hose from the caliper for this procedure.

5. Remove the brake caliper.

■NOTE: Support the caliper. Do not allow the caliper to hang from its hose.

⚠ CAUTION

The caliper should be supported. If the caliper is allowed to hang from its hose, damage may occur.



AF894D

6. Slide the hub w/brake disc out of the steering knuckle and set aside.
7. Remove the tie rod from the steering knuckle.

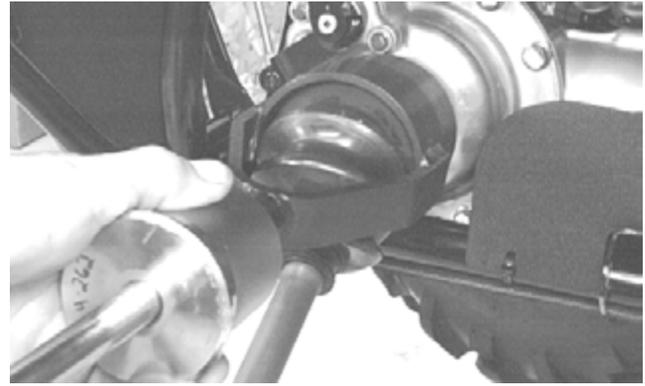


AF896D

8. Remove the cap screw and lock nut securing the lower shock eyelet 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.

9. Remove the cap screw securing the upper A-arm ball joint to the steering knuckle; then disengage the ball joint from the knuckle.
10. While holding the drive axle stationary, pull the top of the steering knuckle out and down until it is free of the drive axle.
11. Place a drain pan under the ATV to contain any oil leakage; then using a slide hammer, remove the drive axle.



AF899D

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.

DISASSEMBLING AXLES

1. Using a side-cutters (or suitable substitute), remove the large clamp from the boot.



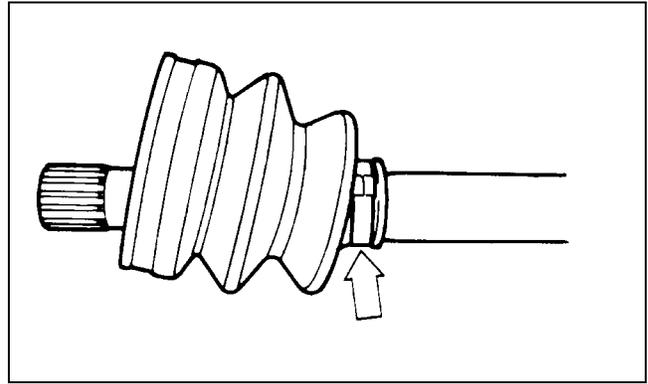
CD020

2. Wipe away excess grease to access the retaining ring. Using an awl or circlip pliers, remove the circlip.



CD021

- Using a snap ring pliers, remove the circlip securing the bearing ring to the shaft. Note the direction of the bearing for assembling purposes.



ATV-1048

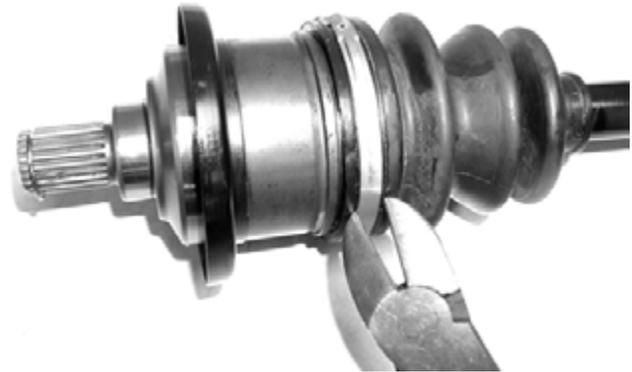
■NOTE: At this point if the outer boot is damaged, continue with step 7.



CD023

- 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.



CD020

- Apply grease from the kit into the knuckles and the new outer boot.

■NOTE: The large grease pack is for the inner drive axle bearing and boot assembly.



CD022

- 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.

- Using a side-cutters (or suitable substitute), remove the small clamp from the shaft.

- Slide the new outer 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.

- Using Boot Clamp Pliers (p/n 0444-120), secure both outer boot clamps.

CAUTION

It is important that the clamps are positioned correctly or they may loosen when in motion.



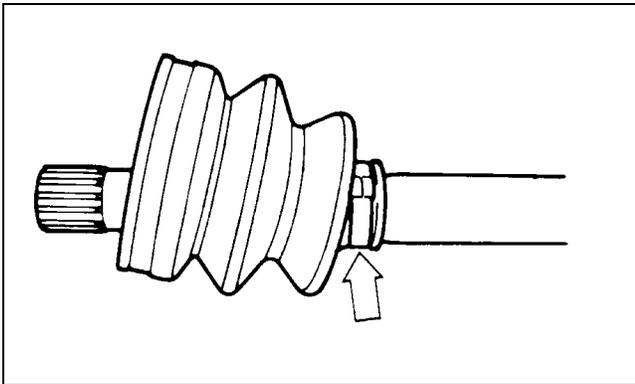
CD024

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.

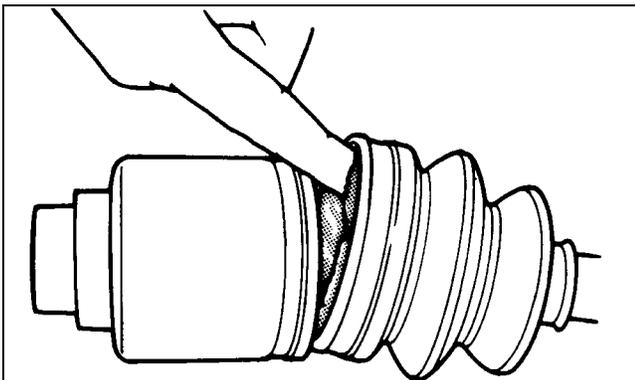
2. Using the boot clamp pliers, secure the small clamp of the inner boot.



ATV-1048

3. Apply grease from the kit onto the bearing ring making sure grease is on both the inner and outer sides; then apply the remainder of the grease into the housing and boot.

■NOTE: The large grease pack is for the inner drive axle bearing and boot assembly.



ATV-1052

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 circlip making sure the sharp side of the circlip faces away from the boot.



CD023

6. Making sure the marks made during disassembling align, slide the housing over the bearing ring; then install the circlip.



CD021

7. Slide the boot over the housing; then using the boot clamp pliers, secure the boot with the clamp.



CD024

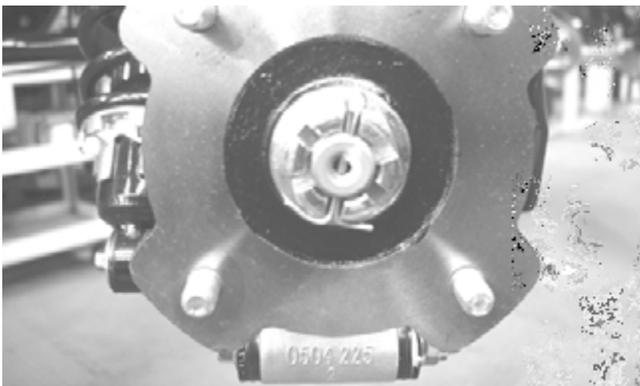
8. Inspect the axle components for correct positioning of the four clamps. Also, inspect the boots for being correctly positioned on the shaft.

INSTALLING REAR DRIVE AXLE (Fully Independent Suspension)

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 4.8 kg-m (35 ft-lb).
3. Place the hub into position on the axle followed by a washer and 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 2.1 kg-m (15 ft-lb). Tighten the hydraulic brake caliper cap screws to 2.8 kg-m (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 10.4 kg-m (75 ft-lb); then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



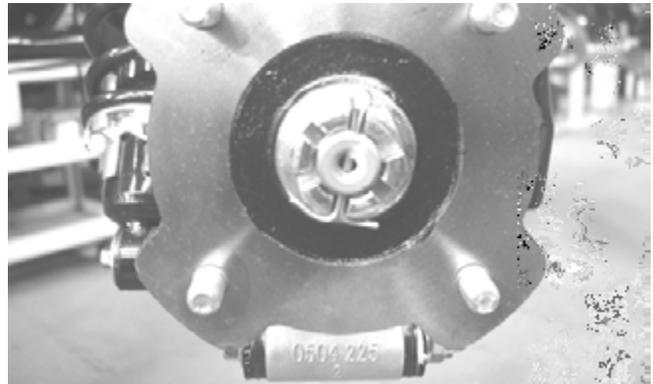
CD027

7. Install the wheel. Tighten to 5.5 kg-m (40 ft-lb).

8. Remove the ATV from the support stand and release the brake lever lock.
9. Check the engine/transmission oil level and add oil as necessary.

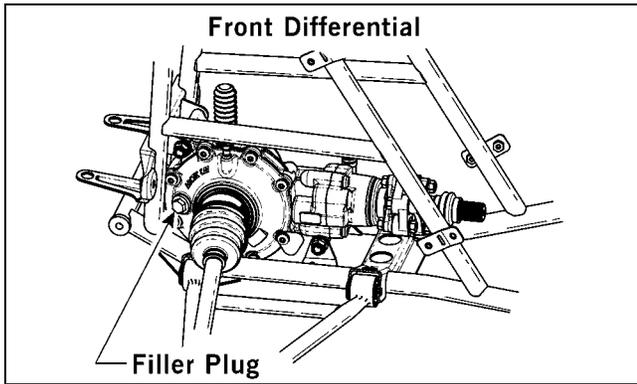
INSTALLING FRONT DRIVE AXLE (4x4 Models)

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 4.8 kg-m (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 4.8 kg-m (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 2.8 kg-m (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 10.4 kg-m (75 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 5.5 kg-m (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.



0736-568

ACT - Rear Suspension

REMOVING

1. Place the ATV on a support stand (positioned just in front of and behind the footrest on each side) so the wheels are off the floor.

WARNING

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

2. Remove the rear wheels.
3. Remove the cap screws securing the brake calipers to the bearing housing; then remove the calipers and lay aside.



CC783

CAUTION

Care should be taken not to damage the brake cable/hose when laying the calipers aside. Do not allow the calipers to hang from the brake cable/hose.

4. Remove the lower shock absorber cap screws and hex nuts; then disengage the shock absorbers from the axle housings.

CAUTION

Ensure that the rear gear case is properly supported BEFORE removing the shock absorber assemblies.



AF772D

5. Remove the four cap screws and nuts securing the rear of the swing arm(s) to the axle housing.

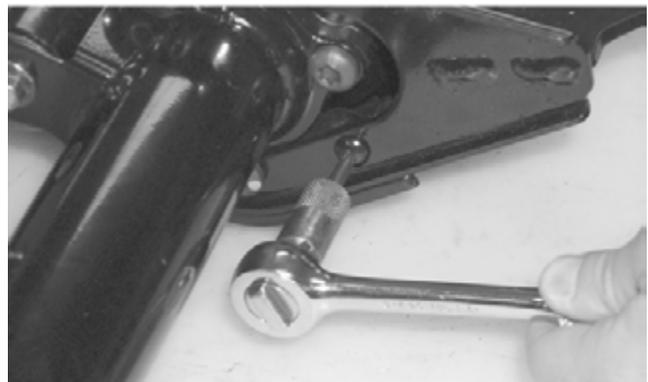


AF697D

6. Maneuver the axle assembly rearward allowing the propeller shaft to disengage and the final drive boot to separate from the drive housing.

DISASSEMBLING

1. Remove the cap screws securing the gear case panel; then remove the panel from the gear case.



CC762



CC763

2. Remove the cap screws securing the axle assembly to the axle housing; then remove the axle assembly from the housing. Account for a gasket.

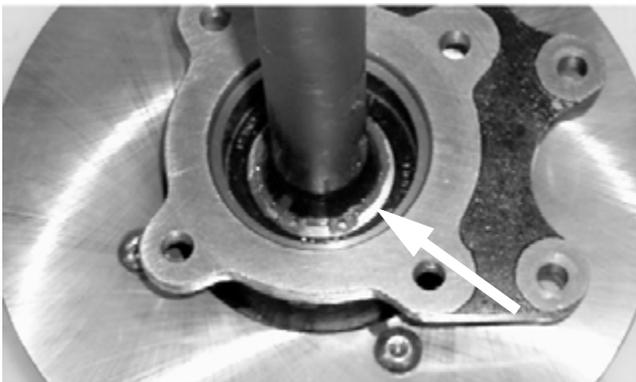


CC764



CC765

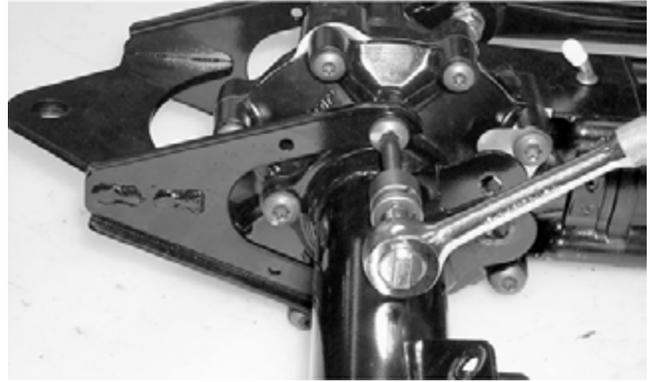
3. Remove the snap ring securing the bearing housing to the axle shaft; then slide the bearing housing off the shaft.



CC768A

4. Remove the four cap screws securing the hitch to the gear case; then remove the hitch.

■NOTE: Note that these cap screws are 37 mm (1.5 in.) in length for installing purposes.



CC769

5. Remove the two cap screws securing each axle housing to the gear case.

■NOTE: Note that these cap screws are 33 mm (1.3 in.) in length for installing purposes.



CC770

6. Remove the axle housing from the gear case. Account for a gasket.



CC771

CLEANING AND INSPECTING

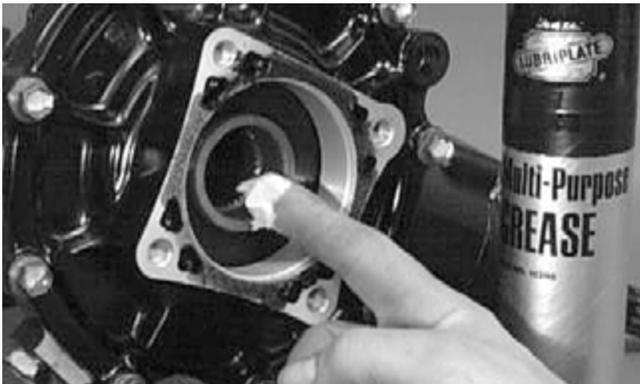
■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Clean all external components.

2. Inspect the case for leaks or damage.
3. Inspect splines for wear.
4. Inspect the seal for damage.
5. Inspect housing mounting bosses for wear or elongated holes.
6. Inspect the frame welds for cracking or bending.
7. Inspect the rear drive and plug threads for stripping or damage.
8. Inspect the axle bearings. Rotate the bearings by hand, and if any roughness or binding is noted, replace the bearings.

ASSEMBLING

1. Grease the splines of the ring gear.



AF705D

2. Make sure the rear gear case/axle housing O-ring is properly positioned; then secure the axle housing to the rear gear case with two 33 mm (1.3 in.) cap screws. Tighten to 4.3-5.3 kg-m (31-38 ft-lb).

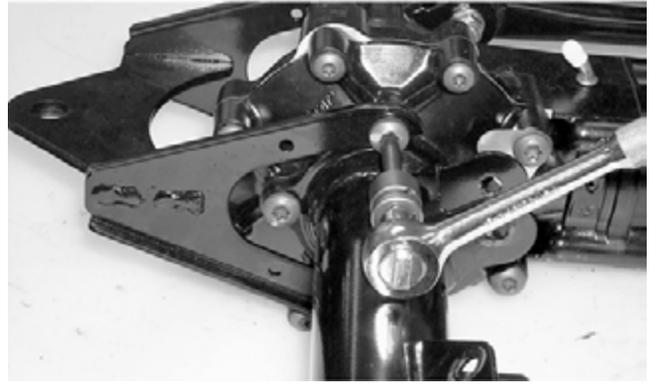
■NOTE: If a new gear housing is being installed, tighten the cap screws to 5.1-6.3 kg-m (37-45.5 ft-lb).



CC770

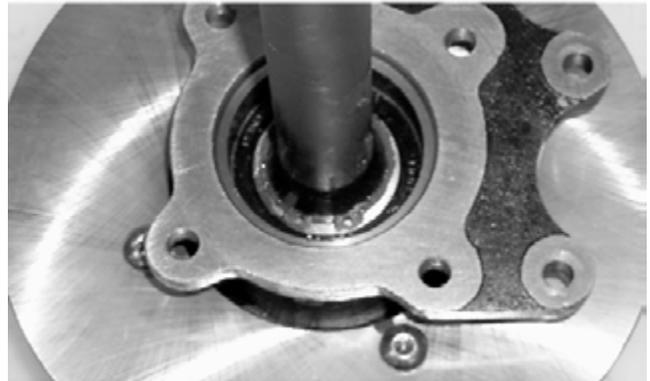
3. Secure the axle housing to the rear gear case with four 37 mm (1.5 in.) cap screws. Tighten to 4.3-5.3 kg-m (31-38 ft-lb).

■NOTE: If a new gear housing is being installed, tighten the cap screws to 5.1-6.3 kg-m (37-45.5 ft-lb).



CC769

4. Lightly grease the bearing housing seal; then slide the bearing housing onto the axle shaft. Secure with the snap ring.



CC768

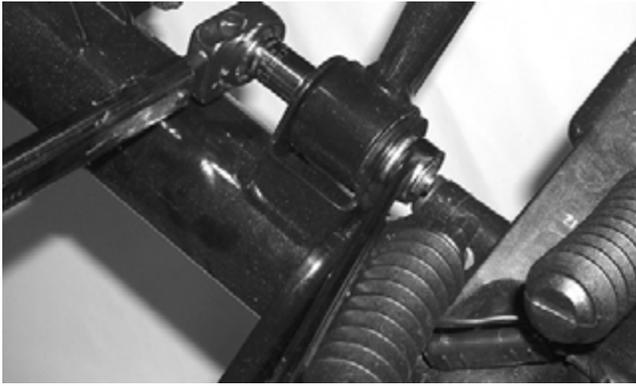
5. Place the axle gasket on the axle housing. Rotate the axle shaft slightly to ensure proper engagement with the gear case splines.
6. Rotate the bearing housing until the brake caliper mounting holes are on the top side; then secure the axle retainer assembly/axle assembly to the axle housing with four cap screws. Tighten to 5.5 kg-m (40 ft-lb).



CC764

INSTALLING

1. Maneuver the axle assembly forward making sure propeller shaft splines engage properly and the final drive boot is positioned over the drive housing.
2. Place the rear of the swing arm(s) into position on the axle housings and case; then secure with four cap screws and hex nuts. Tighten to 4.8 kg-m (35 ft-lb).



AF697D

- Place the shock absorber into the frame mounts and secure using the cap screws and hex nuts tightened to 4.8 kg-m (35 ft-lb).

⚠ CAUTION

Do not tighten nuts beyond the 4.8 kg-m (35 ft-lb) specification or the shock eyelet or mount **WILL** be damaged.

- Place the brake calipers into position on the axle retainer assembly; then secure with the cap screws. Tighten the auxiliary caliper to 2.1 kg-m (15 ft-lb) and the hydraulic caliper to 2.8 kg-m (20 ft-lb).

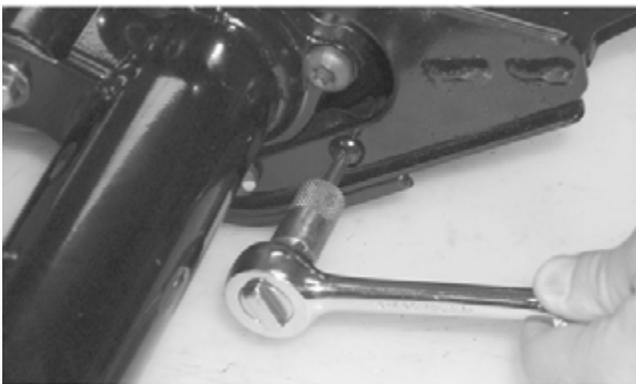


CC783

⚠ CAUTION

Care should be taken not to damage or kink the brake cable/hose when installing the calipers.

- Place the gear case panel into position and secure with the three cap screws. Tighten securely.



CC762



CC763

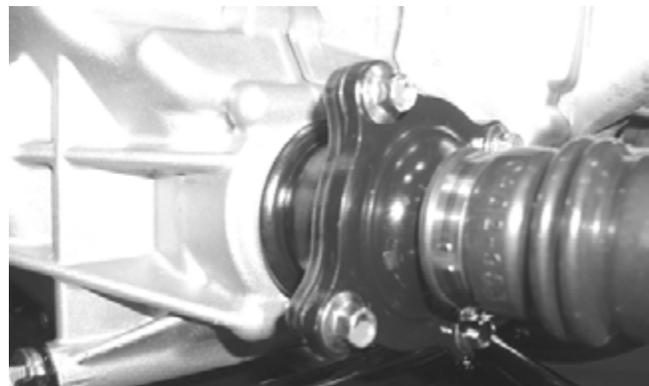
- Install the wheels and tighten to 5.5 kg-m (40 ft-lb).
- Remove the ATV from the support stand.

■NOTE: Check all fasteners for tightness and check the brakes for proper operation before test riding.

Rear Gear Case (400 FIS/500 Models)

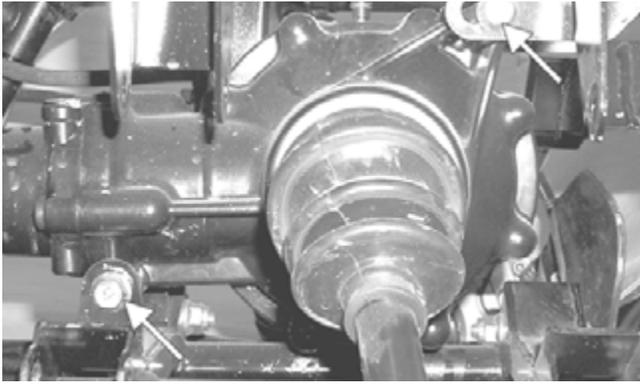
REMOVING

- Remove the left-side rear A-arms (see Rear A-Arms in Section 7).
- Remove both of the rear drive axles (see Drive Axles in this section).
- Remove the four cap screws securing the engine output shaft to the rear gear case input flange.



CD028

- 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, pinion gear, needle bearing, and axle seal on FIS models, see Front Differential (FIS Models) in this section.

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 4.3-5.3 kg-m (31-38 ft-lb).

■NOTE: If a new gear housing is being installed, tighten the cap screws to 5.1-6.3 kg-m (37-45.5 ft-lb).

2. Secure the engine output shaft to the rear gear case input flange with three cap screws (coated with red Loctite #271) and lock nuts. Tighten to 4.8 kg-m (35 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.



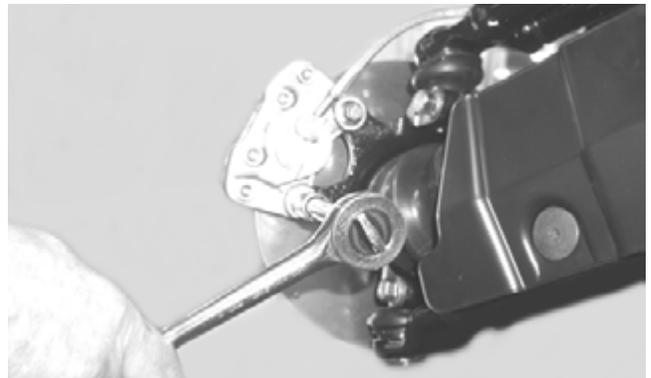
CD008

3. Remove the nut securing the hub. Account for a washer and a hub seal.



CD010

4. Remove the brake caliper.



CD007

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 sealing area of the hub for pits.
5. Inspect the hub splines for signs of wear.

6. Inspect the hub for cracks.

INSTALLING

1. Secure the brake disc to the hub with the four cap screws coated with blue Loctite #243. Tighten to 2.1 kg-m (15 ft-lb).
2. Apply grease to hub sealing area and on the splines.



AF736D

3. Install the hub assembly onto the splines of the shaft.



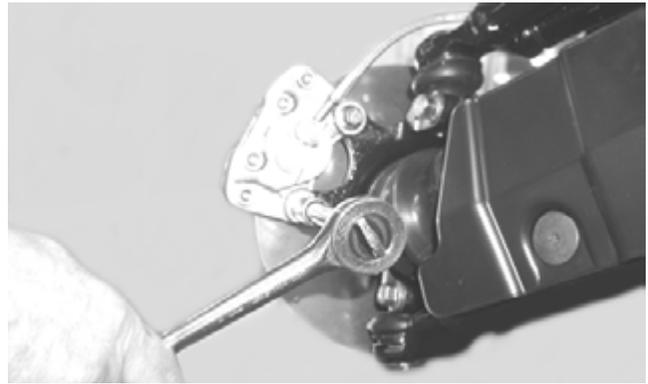
CD009

4. Insert the hub seal onto the shaft; then position it into the hub.



CD010

5. Place the washer onto the shaft; then secure the hub assembly with the nut. Tighten only until snug.
6. Secure the brake caliper to the knuckle with the two cap screws. Tighten the auxiliary caliper to 2.1 kg-m (15 ft-lb). Tighten the hydraulic caliper to 2.8 kg-m (20 ft-lb).



CD007

7. Tighten the hub nut (from step 5) to 10.4 kg-m (75 ft-lb); then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



CD008

8. Install the wheel and tighten to 5.5 kg-m (40 ft-lb).



CD006

9. Remove the ATV from the support stand.

Hydraulic Brake Caliper

■NOTE: The brake caliper 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 entire hydraulic system (reservoir, hoses, and caliper).



AF637D

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.



AF636D

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.

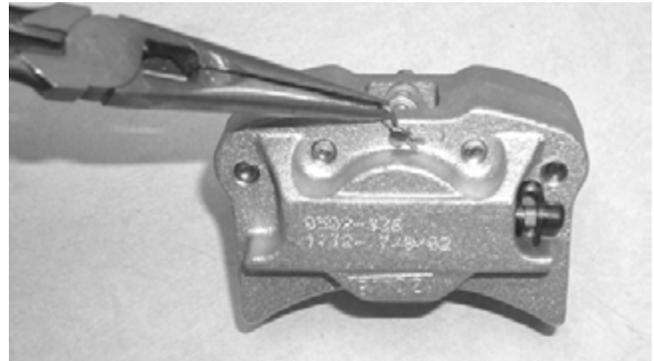
ASSEMBLING/INSTALLING

1. Push the pistons into the caliper as far as they will go to allow clearance for the brake pads.

CAUTION

Care should be taken that the piston and cylinder are not scratched.

2. Install the brake pads and secure with the pin and cotter pin.



CD029

3. Place the brake caliper assembly into position and secure with the cap screws. Tighten the caliper to 2.8 kg-m (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 4.2 kg-m (30 ft-lb).
5. Fill the reservoir; then bleed the brake system (see Section 2).
6. Install the wheel. Tighten to 5.5 kg-m (40 ft-lb).



CD006

7. Remove the ATV from the support stand and verify brake operation.

SECTION 7 - SUSPENSION

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Shock Absorbers

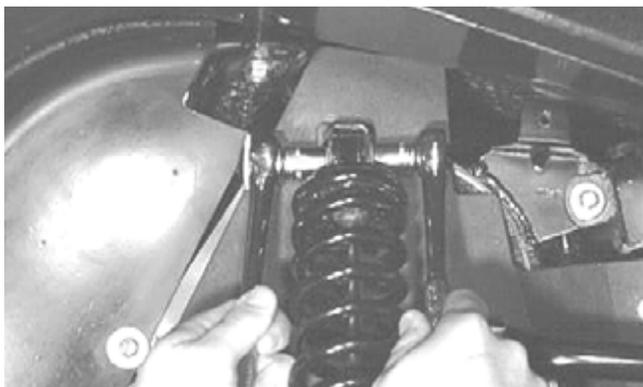
REMOVING

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. Account for bushings and sleeves from each.



AF605D

CAUTION

On the FIS style rear suspension, 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 rear suspension. 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 in parts-cleaning solvent.
2. Inspect each shock rod for nicks, pits, rust, bends, and oily residue.
3. Inspect all springs, spring retainers, shock rods, dampers, 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 nuts to 4.8 kg-m (35 ft-lb).

CAUTION

Do not tighten the nuts beyond the 4.8 kg-m (35 ft-lb) specification or the shock eyelet or mount WILL be damaged.

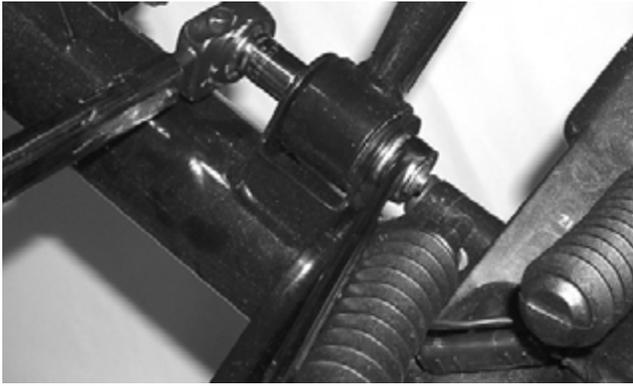
■ **NOTE:** On the fully independent rear suspension models, the rear shock absorber-to-lower A-arm torque factor is 2.8 kg-m (20 ft-lb).

3. Remove the ATV from the support stand.

Swing Arms (ACT - Rear Suspension)

REMOVING

1. Remove the cap screws and lock nuts securing the front of the swing arms to the frame brackets.
2. On the left side, remove the cap screws and lock nuts securing the rear of the swing arms to the axle housing; then remove the swing arms.



AF697D

3. On the right side, remove the cap screw and lock nut securing the outer swing arm to the axle housing; then remove the cap screw and lock nut securing the inner swing arm to the axle housing. Remove the hose grommets from the hose guides.
4. Remove the swing arms and note the location of the hose guides on the inner swing arm (for installing purposes).

CLEANING AND INSPECTING

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

1. Clean all swing arm components in parts-cleaning solvent.
2. Inspect all swing arm weldments for cracks or unusual bends.
3. Inspect all tubing for cracks or unusual bends.

INSTALLING

1. On the right side, place the inner swing arm into position and secure it to the axle housing with a cap screw and lock nut. Do not tighten at this time.
2. On the right side, place the outer swing arm into position and secure to the axle housing with a cap screw and lock nut. Do not tighten at this time.
3. Secure the two right side swing arms to the frame brackets with cap screws and hex nuts. Do not tighten at this time.
4. On the left side, secure the swing arms to the axle housing and frame brackets with cap screws and hex nuts; then tighten all fasteners to 4.8 kg-m (35 ft-lb).

Front A-Arms

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 wheel cap from the hub; then remove the cotter pin from the nut.



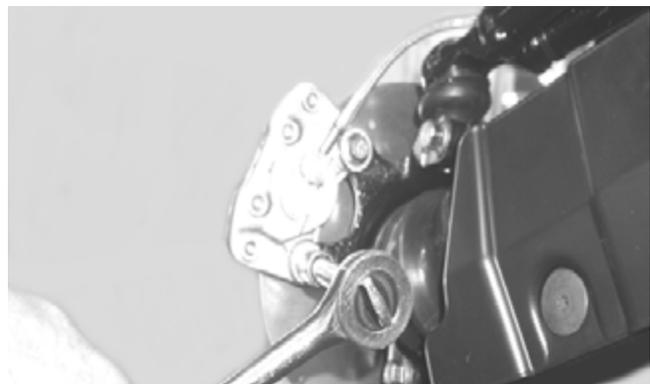
CD008

3. Remove the nut securing the hub. Account for a washer and a hub seal.



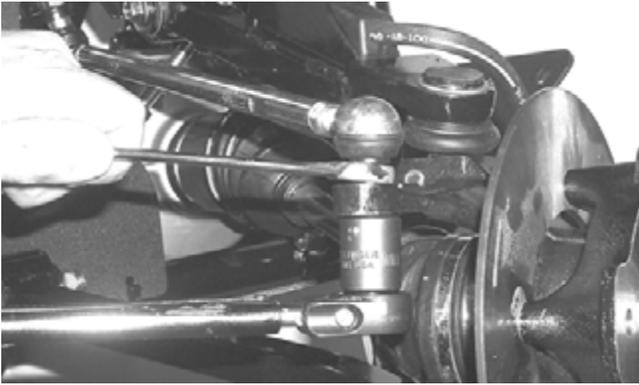
CD010

4. Remove the brake caliper.



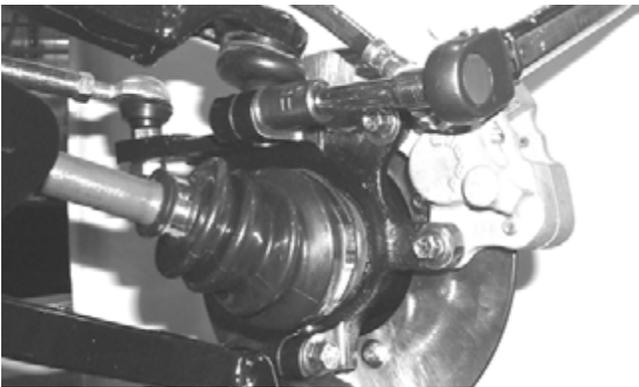
CD007

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.



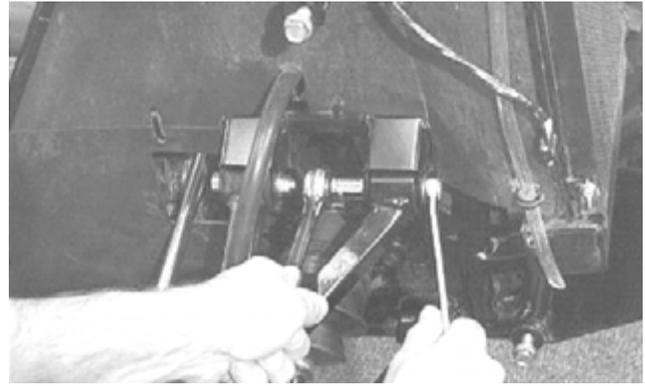
AF628D

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.



AF626D

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 in parts-cleaning solvent.
2. Clean the ball joint mounting hole of all residual Loctite, grease, oil, or dirt for installing purposes.
3. Inspect the A-arm for bends, cracks, and worn bushings.
4. Inspect the ball joint mounting holes for cracks or damage.
5. Inspect the frame mounts for signs of damage, wear, or weldment damage.

INSTALLING

1. Apply 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 circlip.



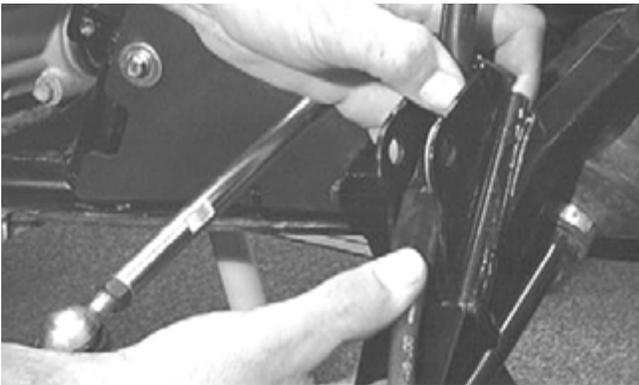
AF616D

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.



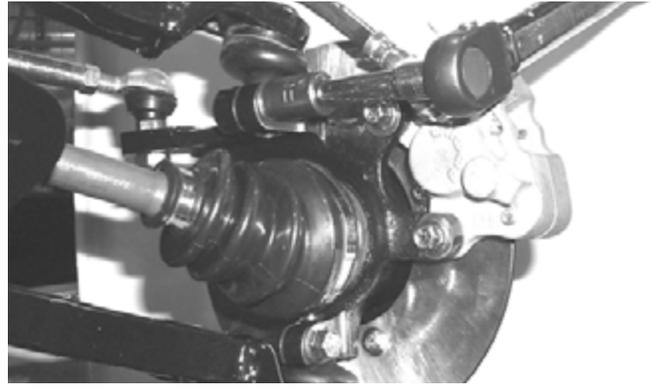
AF627D

4. Secure the lower eyelet of the shock absorber to the upper A-arm. Tighten nut to 4.8 kg-m (35 ft-lb).
5. Secure the A-arm assemblies to the frame mounts (from step 2). Tighten the cap screws to 4.8 kg-m (35 ft-lb).

⚠ CAUTION

Do not tighten the nut beyond the 4.8 kg-m (35 ft-lb) specification or the shock eyelet or mount WILL be damaged.

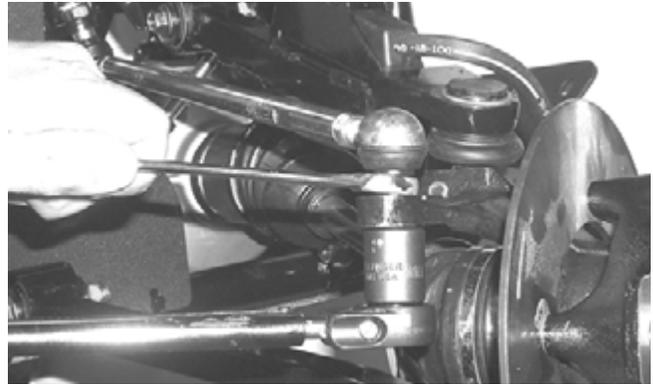
6. Install the knuckle assembly onto the ball joints and secure with cap screws. Tighten to 4.8 kg-m (35 ft-lb).



AF628D

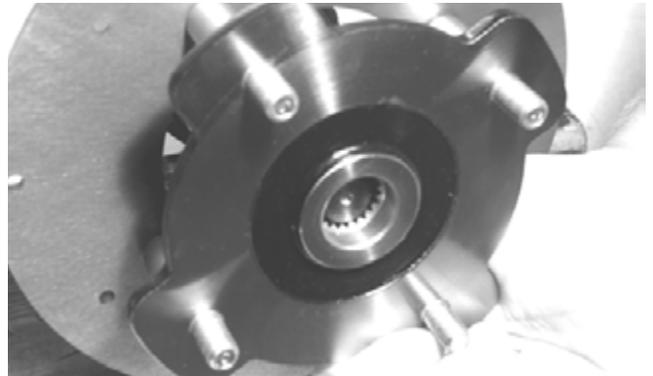
7. Install the tie rod end and secure with the nut. Tighten to 4.2 kg-m (30 ft-lb); then install a new cotter pin and spread the pin to secure the nut.

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



AF618D

8. Apply grease to hub sealing area and on the drive axle splines; then install the hub assembly onto the drive axle.



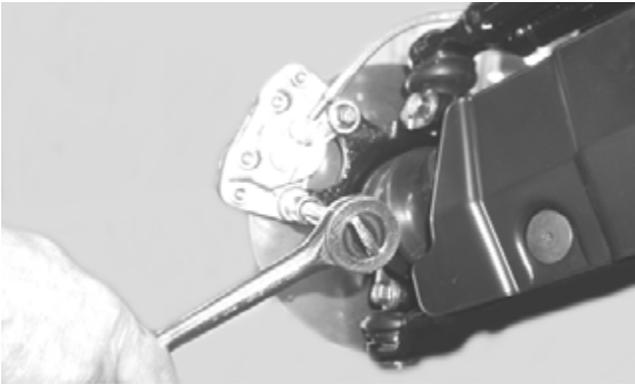
CD009

9. Insert the hub seal onto the drive axle; then position it into the hub.



CD010

10. Place the washer onto the shaft; then secure the hub assembly with the nut. Tighten only until snug.
11. Secure the brake caliper to the knuckle with the two cap screws. Tighten to 2.8 kg-m (20 ft-lb).



CD007

12. Secure the hub nut (from step 10) to the shaft/axle. Tighten to 10.4 kg-m (75 ft-lb).
13. Install a new cotter pin and spread the pin to secure the nut.



CD008

14. Install the wheel cap.
15. Install the wheel and tighten to 5.5 kg-m (40 ft-lb).



CD006

16. Remove the ATV from the support stand.

Rear A-Arms (FIS - Rear Suspension)

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 and rubber wheel cap.
4. Remove the cotter pin securing the hex nut; then remove the hex nut and washer. Release the brake lever lock.



CD008

5. Remove the two brake calipers (right side only).

NOTE: Do not allow the brake calipers to hang from their cable/hose.

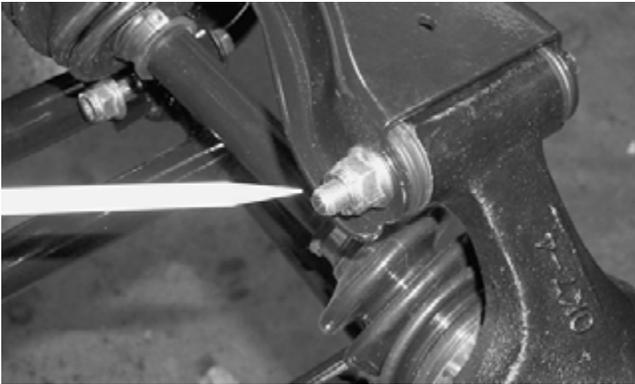
6. Remove the cap screws and lock nut securing the shock absorber to the frame and lower A-arm; then remove the shock absorber.

- Remove the cap screws securing the boot guard to the lower A-arm.



AF934

- Slide the hub out of the knuckle and set aside.
- Remove the cap screws and lock nuts securing the knuckle to the A-arms. Discard the lock nuts.



AF936

■NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.

- 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 and brake cable from the A-arm.

CLEANING AND INSPECTING

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

- Clean all A-arm components in parts-cleaning solvent.
- Inspect the A-arm for bends, cracks, and worn bushings.
- Inspect the frame mounts for signs of damage, wear, or weldment damage.

INSTALLING

- 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.
- 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 4.8 kg-m (35 ft-lb).
- Tighten the hardware securing the A-arms to the frame mounts (from step 1) to 4.8 kg-m (35 ft-lb).
- Apply grease to hub sealing area and on the drive axle splines; then install the hub assembly onto the drive axle.



CD009

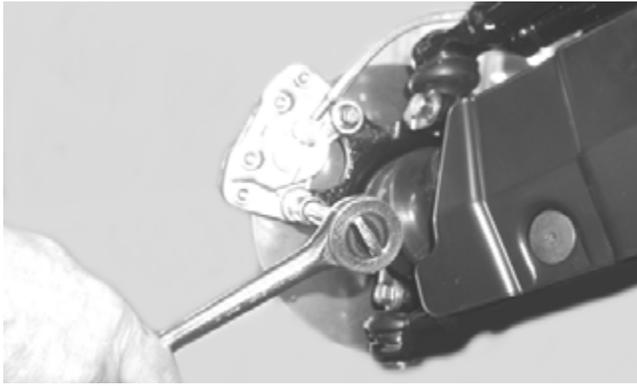
- Insert the hub seal onto the shaft; then position it into the hub.



CD010

- Place the washer onto the drive axle; then secure the hub assembly with the nut. Tighten only until snug.
- Secure the brake caliper to the knuckle with the two cap screws (right side only). Tighten the mechanical caliper to 2.1 kg-m (15 ft-lb). Tighten the hydraulic caliper to 2.8 kg-m (20 ft-lb).

■NOTE: Ensure that the brake hose and brake cable are properly routed and secured to the upper A-arm.



CD007

8. Secure the hub nut (from step 6) to the drive axle. Tighten to 10.4 kg-m (75 ft-lb).
9. Install a new cotter pin and spread the pin to secure the nut.



CD008

10. Secure the shock absorber to the frame with a cap screw and new lock nut. Tighten to 4.8 kg-m (35 ft-lb).
11. Secure the shock absorber to the lower A-arm with a cap screw and new lock nut. Tighten to 2.8 kg-m (20 ft-lb).
12. Secure the boot guard to the lower A-arm with the two cap screws. Tighten securely.
13. Install the wheel cap.
14. Install the wheel and tighten to 5.5 kg-m (40 ft-lb).
15. 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 below. 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/cm² (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.



CD006

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 with parts-cleaning solvent.
2. Clean the tires with soap and water.

3. Inspect each wheel for cracks, dents, or bends.
4. Inspect each tire for cuts, wear, missing lugs, and leaks.

INSTALLING

1. Install each wheel on its hub.



CD006

■NOTE: Make sure each wheel is installed on its proper hub as noted in removing (the “rotation arrow” must indicate forward direction of rotation).



AF612D

2. Tighten to 5.5 kg-m (40 ft-lb).

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.



CD005

2. Inspect the tires for damage, wear, or punctures.

⚠ WARNING

Do not operate the ATV if tire damage exists.

■NOTE: If repair is needed, follow the instructions found on the tire repair kit or remove the wheel and have it repaired professionally.

■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.

NOTES

SECTION 8 - STEERING/FRAME

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Steering Post/Tie Rods

■NOTE: Some components may vary from model to model. The technician should use discretion and sound judgment.

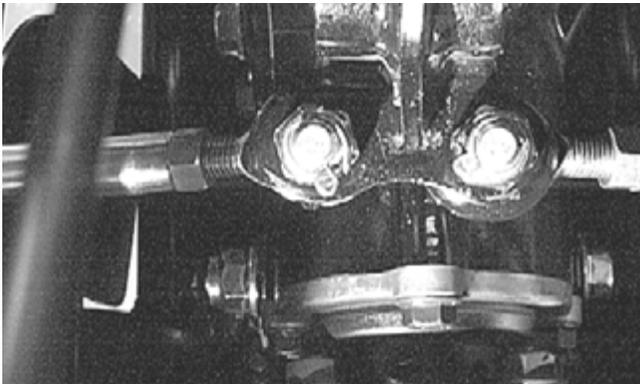
REMOVING

1. Remove the seat (see Seat in this section).
2. Turn the gas tank valve to the OFF position; then remove the left-side panel (see Front Fender/Side Panels in this section).
3. Disconnect the fuel hose to the carburetor.
4. Remove the screws and washers securing the gas tank.



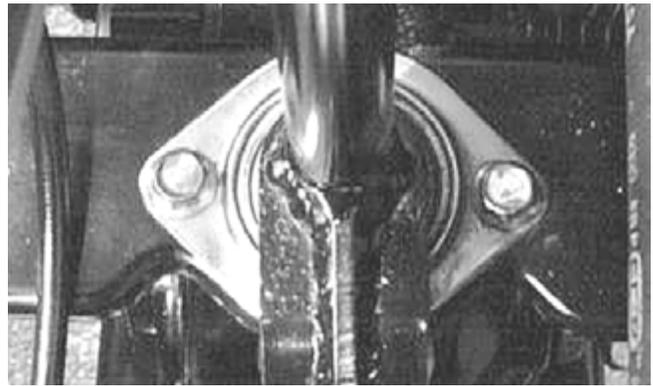
AL617D

5. Remove the cotter pin and slotted nut securing each tie rod end to the steering post arm. Remove the tie rod ends from the arm.



AF778D

6. Remove the cotter pin and slotted nut securing the side tie rod ends to the knuckles. Remove the tie rod ends from the knuckles; then remove the tie rods.
7. Remove the cap screws securing the steering post bearing flange.



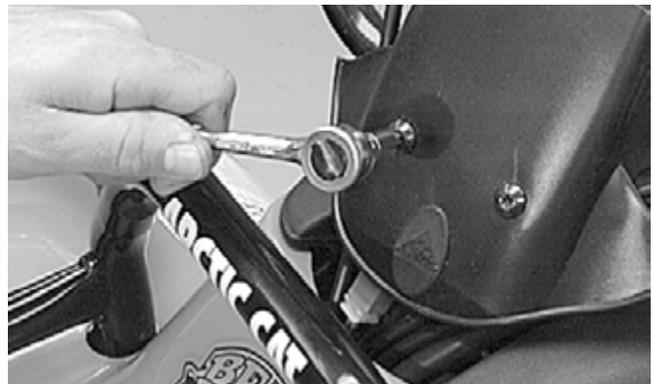
AL600D

8. On the 250/300 models, remove the screws securing the console. Account for a spacer.



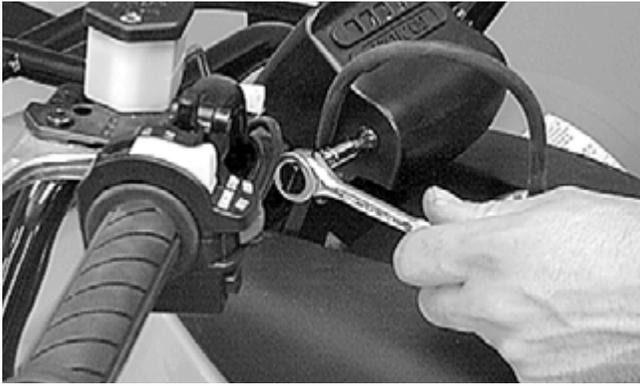
CH084D

9. On the 400/500 models, remove the cap screws securing the instrument pod.



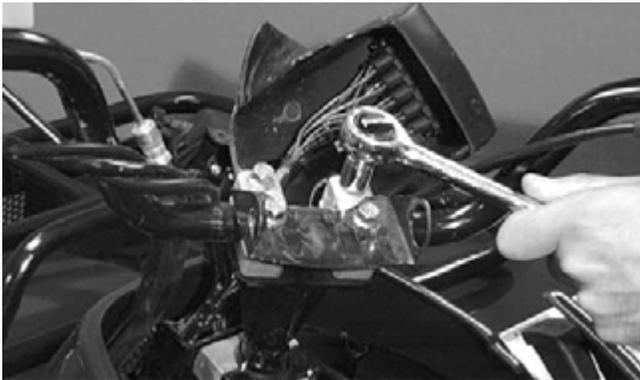
AL647D

10. Remove the retaining ring securing the ignition switch; then remove the machine screw (opposite the retaining ring). Account for a body collar.



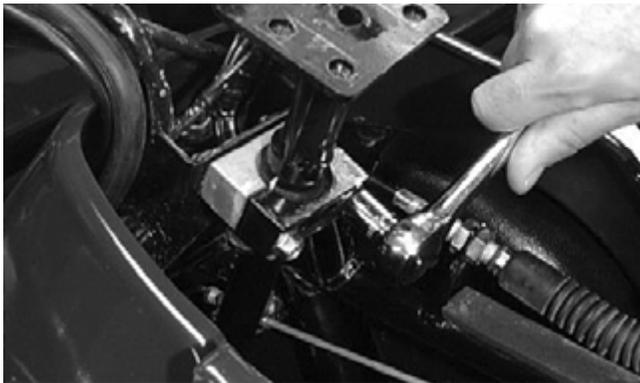
AF757D

11. Remove the four cap screws securing the handlebar caps (blocks) to the steering post; then move the handlebar out of the way.



AL614D

12. Remove the two cap screws securing the upper steering post bearing housings to the frame.



AL619D

13. Remove the steering post.



AL618D

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.

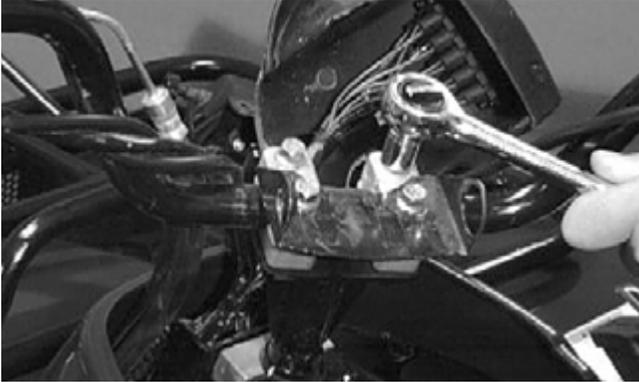
INSTALLING

1. Place the steering post into position; then place the upper steering post bearings and housings on the steering post and install the two cap screws through the housings and into the frame. Tighten the cap screws to 2.8 kg-m (20 ft-lb).



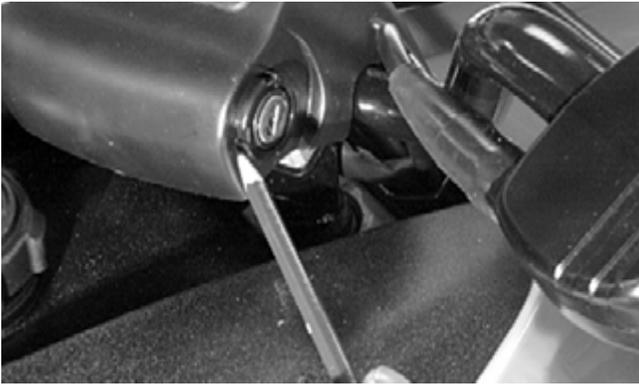
AL619D

2. Place the handlebar into position and secure with the handlebar caps (blocks). Tighten the four cap screws to 2.8 kg-m (20 ft-lb).



AL614D

3. On the 250/300 models, place the ignition switch into position; then place the console in position and secure with the screws, a spacer, and the retaining ring (opposite the screw).



CH087D



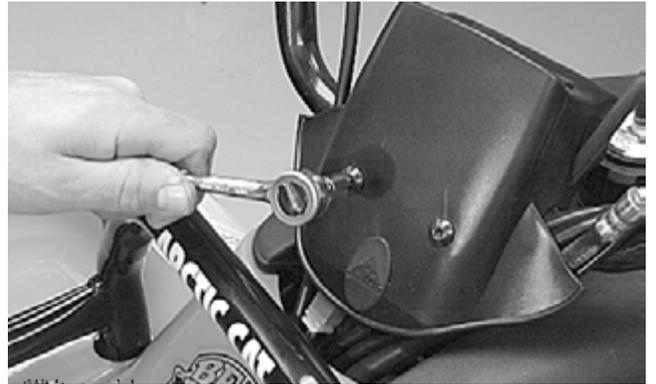
CH084D

4. On the 400/500 models, place the ignition switch into position; then place the instrument pod into position and secure with the machine screw, body collar, and the retaining ring (opposite the screw).



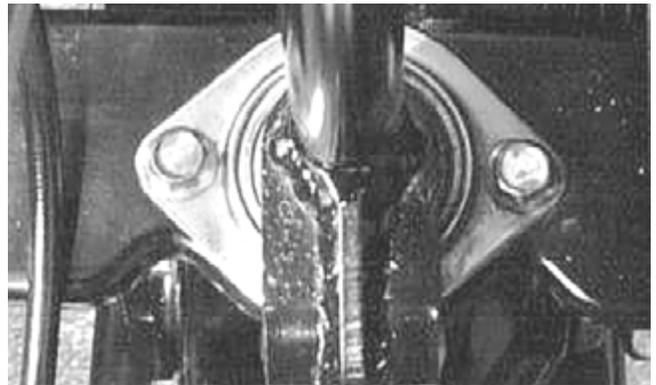
AF757D

5. On the 400/500 models, secure the front of the instrument pod with cap screws.



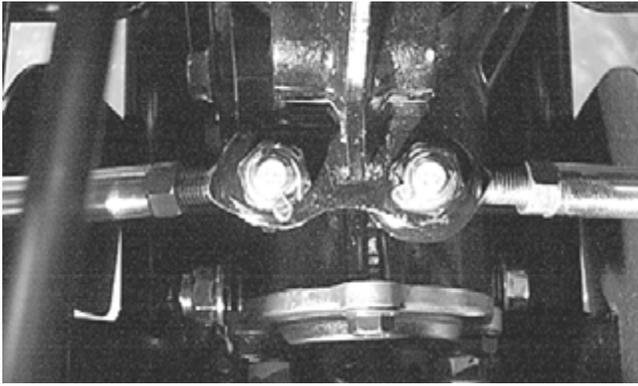
AL647D

6. Place the steering post bearing flange into position. Secure with the cap screws tightened to 2.8 kg-m (20 ft-lb).



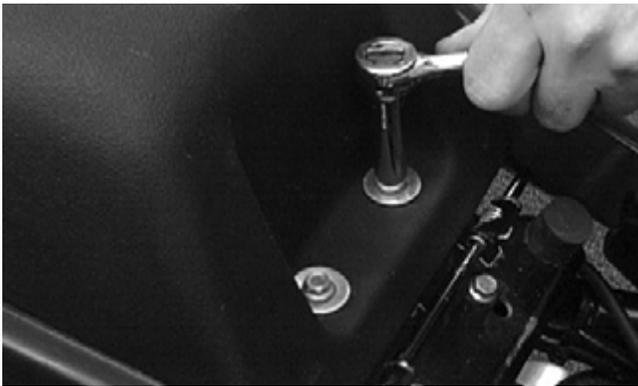
AL600D

7. Insert the tie rod ends into the knuckles; then install the slotted nuts and tighten to 4.2 kg-m (30 ft-lb). Lock the nuts with new cotter pins.
8. Insert the tie rod ends into the steering post arm; then install the slotted nuts and tighten to 4.2 kg-m (30 ft-lb). Lock the nuts with new cotter pins.



AF778D

- Place the gas tank into position. Secure with screws and washers.



AL617D

- Connect the fuel hose to the carburetor.
- Install the left-side panel (see Front Fender/Side Panels in this section); then install the seat (see Seat in this section).

■NOTE: Turn the gas tank valve to the ON position only if starting the engine.

Handlebar Grip

REMOVING

- Remove the plug from the head of the rivet.
- Using a 1/8-in. drill bit, drill out the rivet.
- Using compressed air between the grip and the handlebar, twist the grip back and forth until it slides free of the handlebar.

INSPECTING

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

- Inspect the grip for wear, cuts, or cracks.
- Inspect the grip for deterioration.

INSTALLING

■NOTE: Before installing a grip, use contact spray or alcohol to clean the inside of the grip and the handlebar of glue residue, oil, or any other contaminant.

- Apply a liberal amount of Handlebar Grip Adhesive (p/n 0636-071) to the inside of the grip.
- Align the rivet hole in the grip with the rivet hole in the handlebar; then align the notch (inside the grip) with the slot in the handlebar and slide the grip onto the handlebar until it is fully seated.
- Wipe off any excess glue; then secure the grip with a new rivet.
- Install the plug on the head of the rivet.

Steering Knuckles

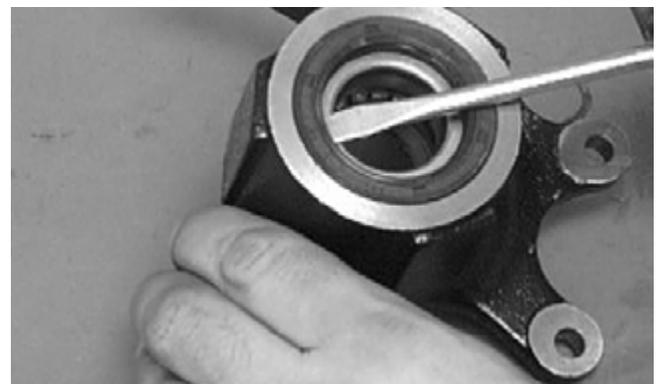
REMOVING AND DISASSEMBLING

- Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

⚠ WARNING

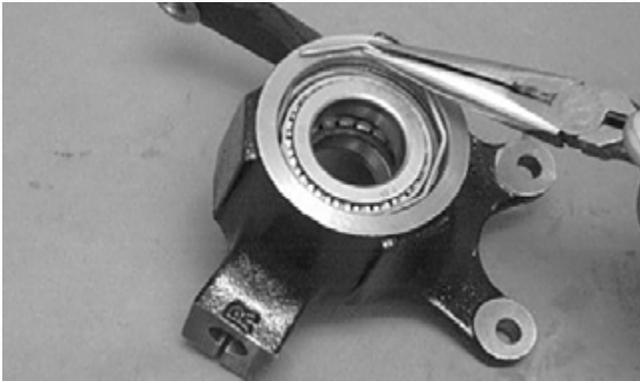
Make sure the ATV is solidly supported on the support stand to avoid injury.

- Remove the wheel cap from the hub; then remove the cotter pin from the nut.
- Remove the nut securing the hub. Account for a washer and a hub seal.
- Remove the brake caliper.
- Remove the hub assembly.
- Remove the cotter pin from the tie rod end and remove the tie rod end from the knuckle.
- Remove the two cap screws securing the ball joints in the knuckle.
- Tap the ball joint end out of the knuckle; then remove the knuckle.
- Remove the seal from the knuckle.



AF725D

10. Remove the bearing retainer.



AF726D

11. Remove the bearings.

⚠ 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.

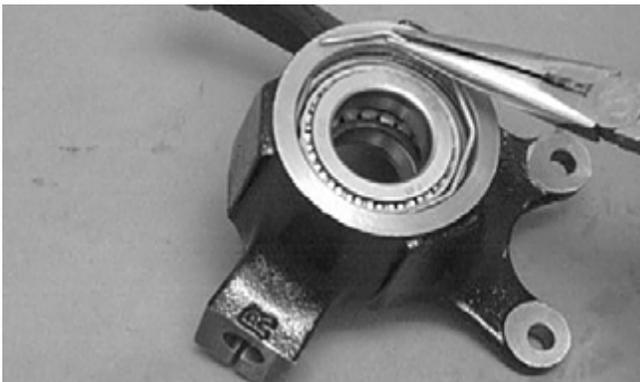
CLEANING AND INSPECTING

■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.

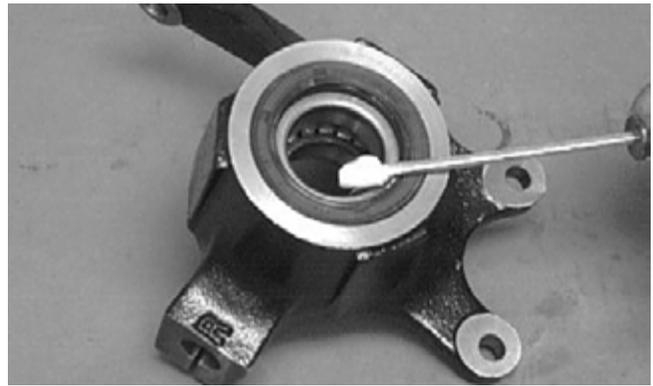
ASSEMBLING AND INSTALLING

1. Install the bearing.
2. Install the bearing retainer.



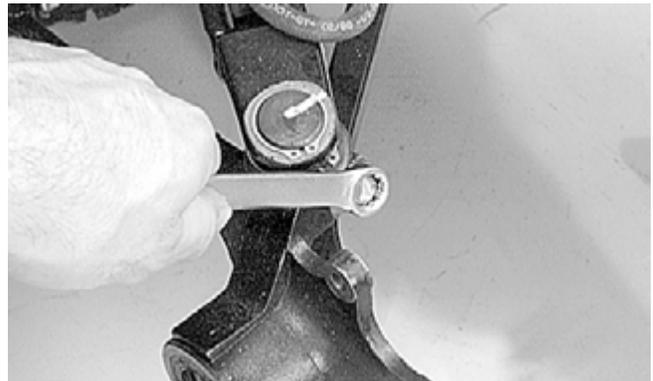
AF726D

3. Install a new seal into the knuckle making sure the seal is flush with the knuckle.
4. Apply grease to the seal.



AF724D

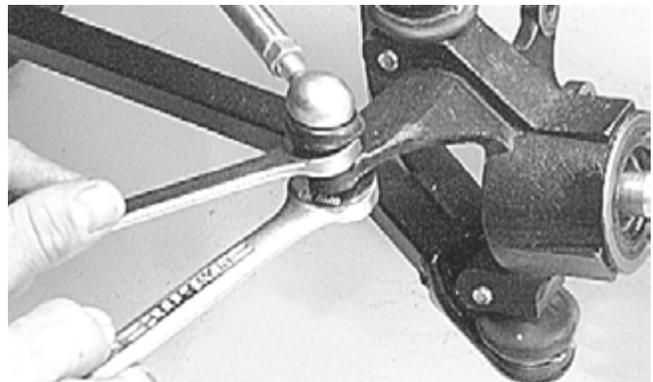
5. Install the knuckle to the upper and lower ball joints and secure with the two cap screws. Tighten to 4.8 kg-m (35 ft-lb).



AF760D

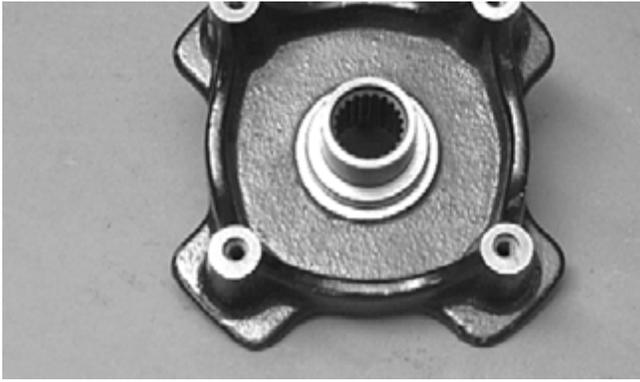
6. Install the tie rod end and secure with the nut. Tighten to 4.2 kg-m (30 ft-lb); then install a new cotter pin and spread the pin.

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



AF759D

7. Apply a small amount of grease to the hub sealing area and on the splines.



AF736D

8. Install the hub assembly onto the splines of the shaft.



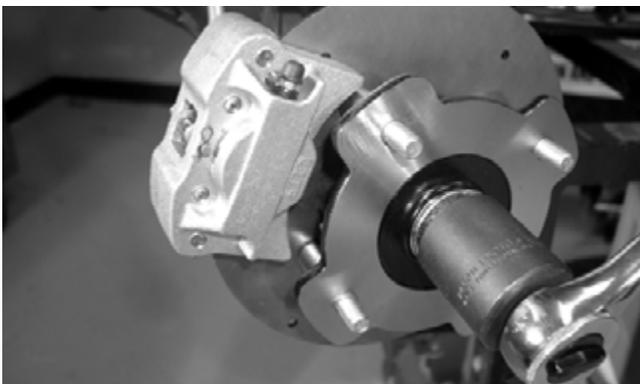
CD009

9. Insert the hub seal onto the shaft; then position it into the hub.



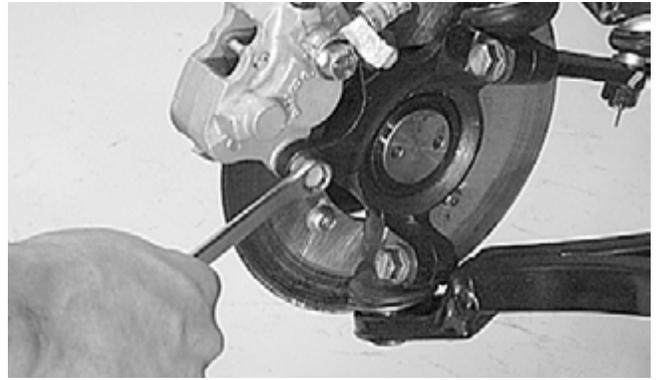
CD010

10. Place the washer onto the shaft; then secure the hub assembly with the nut. Tighten only until snug.



CD015

11. Secure the brake caliper to the knuckle with the two cap screws. Tighten to 2.8 kg-m (20 ft-lb).



AF746D

12. Secure the hub nut (from step 10) to the shaft. Tighten to 10.4 kg-m (75 ft-lb).

13. Install a new cotter pin and spread the pin to secure the nut.

14. Install the wheel cap.

15. Install the wheel and tighten to 5.5 kg-m (40 ft-lb).



CD006

16. Remove the ATV from the support stand.

Measuring/Adjusting Toe-In/Toe-Out

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.

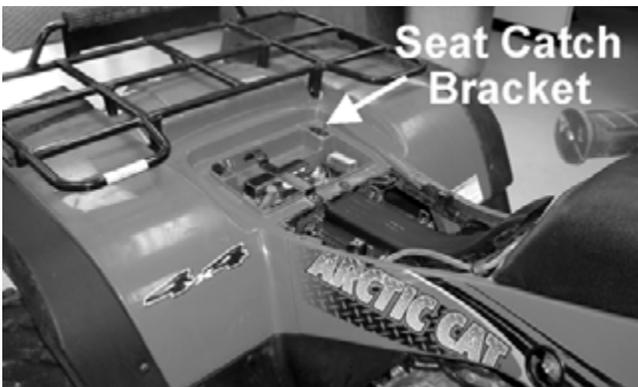


CD005

- 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).

- Measure the distance from the outside edge of each handlebar grip to the seat catch brackets.



CD012A

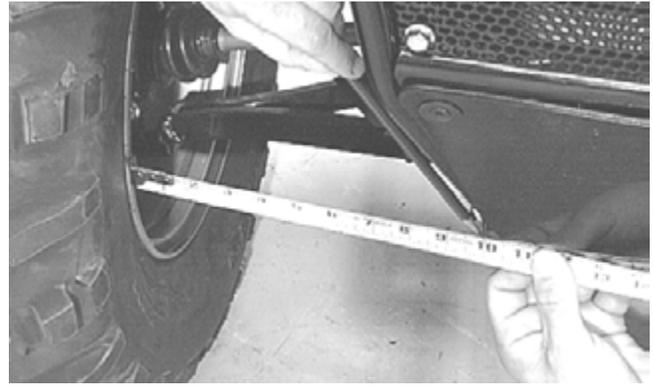
- Adjust the handlebar direction until the two measurements are equal; then secure the handlebar to the rear rack using tie-down straps.

■NOTE: Care must be taken not to allow the handlebar to turn while securing it.

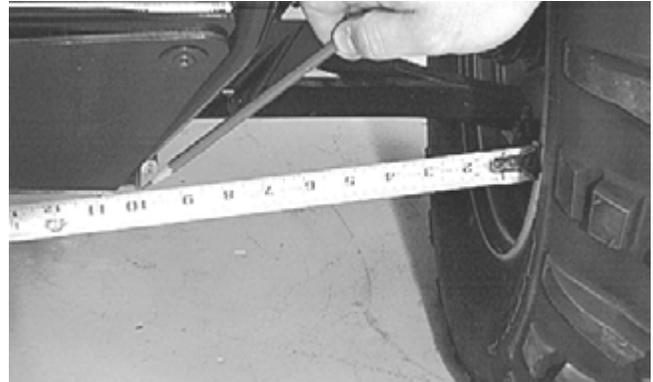


CD014

- Measure the distance from the inside of each front rim to the lower frame tube.



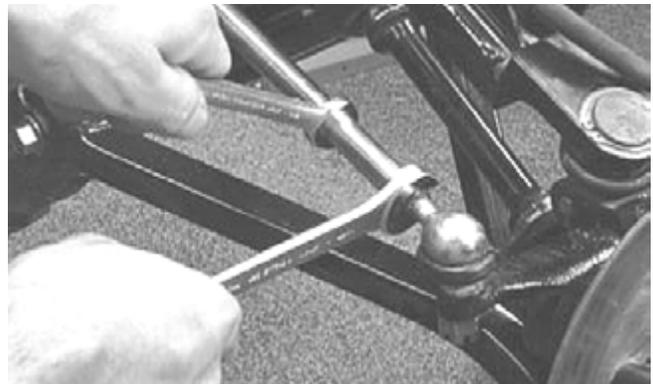
AF785D



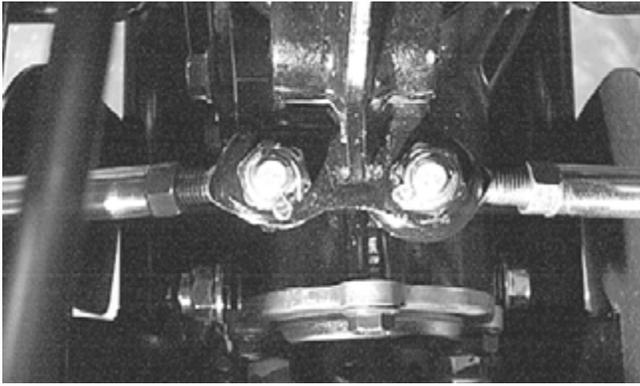
AF786D

■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.

- 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.

- Using a permanent marker of some type, mark the center of each front tire (at a height parallel to the belly panel).



AF789D

- Measure the overall width of the front tires (at a height parallel to the belly panel) at the front side; then record the measurement.
- Push the ATV forward until the marks are parallel to the belly panel on the back side; then measure the overall width of the front tires at the rear side.



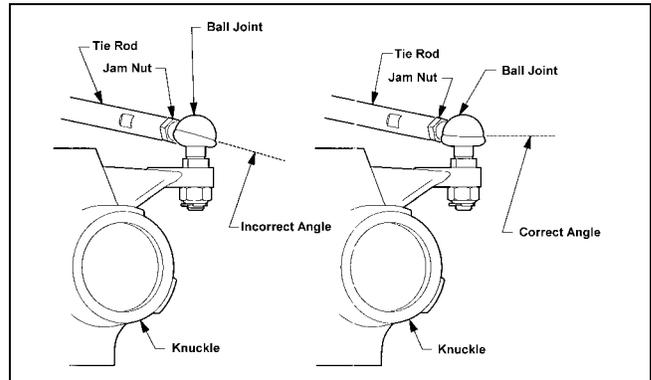
CD013

- The difference in the measurements must show 6.4 mm (1/4 in.) toe-in (the front measurement 6.4 mm (1/4 in.) less than the rear measurement).

■NOTE: The 6.4 mm (1/4 in.) toe-in difference is per side.

- If the difference in the measurements does not show a 6.4 mm (1/4 in.) toe-in, adjust both tie rods equally in until within specification.

■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

- Remove the two cap screws securing the fenders to the rack.



AF600DA

- Remove the cap screws securing the rack to the frame and front bumper assembly.
- 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.

- Clean all rack components with parts-cleaning solvent.
- Inspect all welds for cracking or bending.
- Inspect threaded areas of all mounting bosses for stripping.
- Inspect for missing decals and/or reflectors.

INSTALLING

1. Place the rack into position on the frame and bumper. Start the cap screws and finger-tighten only.
2. Install the two cap screws securing the rack to the fenders. Tighten all hardware securely.

Front Bumper Assembly

REMOVING

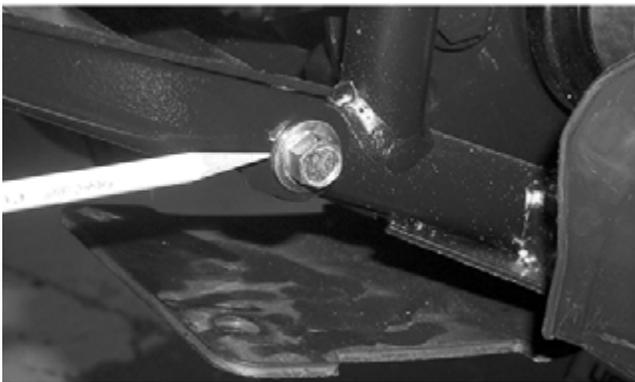
■NOTE: Remove the headlights with the front bumper.

1. Remove the main wiring harness connectors from the four headlights.
2. Remove the two screws securing the grille to the front bumper.
3. Remove the two push nuts securing the fender extension to the front bumper. Push the fender extension studs out of the front bumper.



CC856

4. Remove the four cap screws securing the front skid plate to the front bumper.
5. Remove the two cap screws securing the front bumper to the frame.



CC858

6. Remove the two cap screws securing the front bumper to the front bumper supports.



CC857

7. Remove the front bumper with headlights.

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.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect the wiring harness and headlights for damage.
5. Inspect the screen for damage or air-flow obstructions.

INSTALLING

1. Place the front bumper assembly into position on the frame and secure with four cap screws. Tighten securely.
2. Secure the front skid plate to the front bumper with the four cap screws. Tighten securely.
3. Place the two fender extension studs through the front bumper and secure with the existing push nuts.



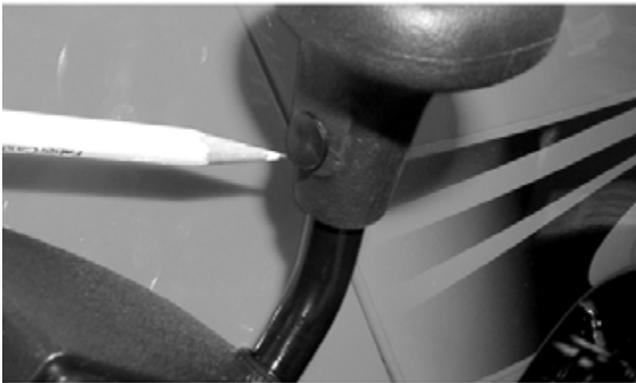
CC856

4. Position the grille in the front bumper and secure.
5. Connect the wiring to each of the headlights.

Front Fender/Side Panels

REMOVING

1. Remove the front rack (see Front Rack in this section).
2. Remove the three cap screws securing the two side panels to the frame and rear fenders; then remove the side panels.
3. Using a small flat-blade screwdriver, carefully remove the retaining pin securing the gear shift knob to the shift lever; then remove the knob from the lever.



CC852

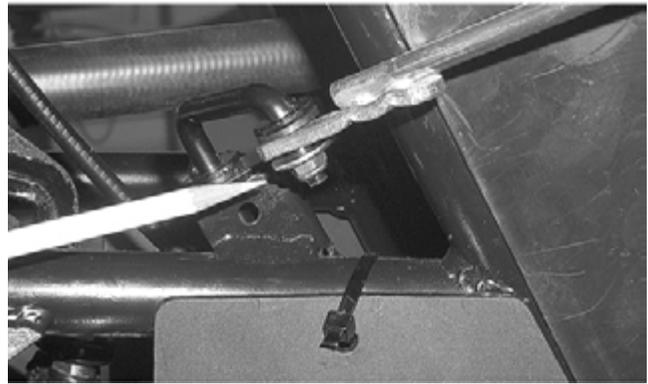
4. Remove the three machine screws securing the gear shift linkage cover to the fender and remove the cover.

■NOTE: The cover is located inside the left-front wheel well.



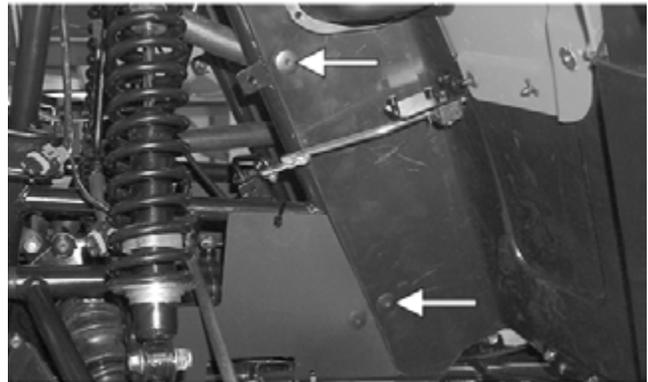
CC851

5. Remove the nut securing the drive selector linkage. Account for a washer and bushing.



CC853

6. Remove the six cap screws securing the fender to the frame.

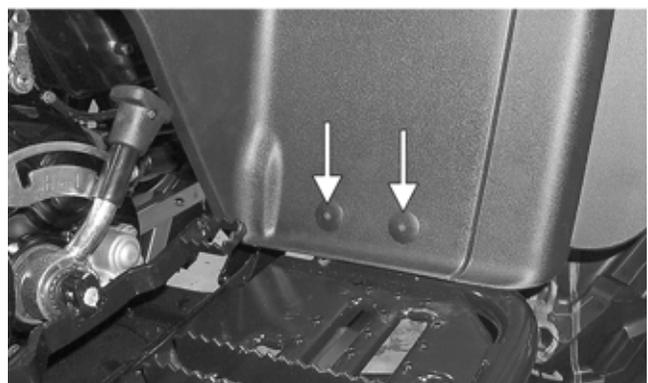


CC854A



CC855

7. Remove the four cap screws and nuts securing the fender to the footrests.



CC861A

8. Disconnect the wires from the accessory plug (if equipped); then remove the accessory plug from the fender.
9. Remove the fenders from the ATV.

CLEANING AND INSPECTING

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

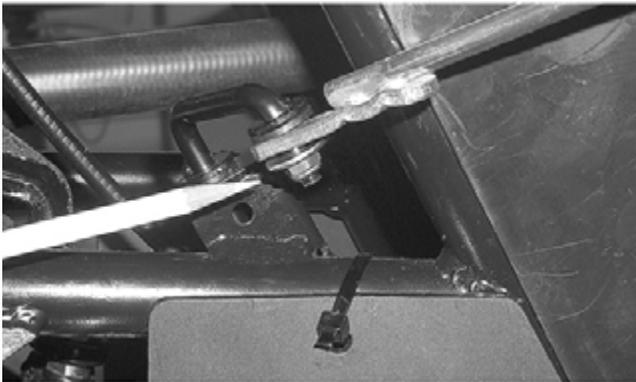
1. Clean all fender components with part-cleaning solvent and soap and water.
2. Inspect fenders for cracks and/or loose rivets.
3. Inspect for any missing decals.

INSTALLING

1. Place the fenders into position on the ATV.
2. Install the accessory plug (if equipped) into the fender; then connect the two accessory plug wires.

■NOTE: The accessory plug red wire goes on the center connector.

3. Install the cap screws (five per side) securing the fenders to the frame and footrests and finger-tighten; then tighten the ten fasteners securely.
4. Connect the drive selector linkage using existing hardware. Tighten securely.



CC853

5. Install the gear shift linkage cover in the left-front fender well. Tighten securely.



CC851

6. Place the gear shift knob into position on the shift lever and secure with the retaining pin.
7. Place the side panels into position and secure.
8. Install the front rack (see Front Rack in this section).

Fender Flares/Extensions

REMOVING

1. Using a side-cutter, remove the appropriate plastic rivets.

■NOTE: To remove a front extension, first remove the grille; then remove the push nuts securing the extension to the bumper.

2. Remove the cap screws securing the extensions or flares to the frame and footrest.
3. Remove the self-tapping screws securing the extension to the fender.

INSTALLING

1. Place the flare or extension into position. Using the Plastic Rivet Setter (p/n 0444-056), secure with Plastic Rivets (p/n 0423-046) or suitable substitute.
2. Secure the extensions or flares with the cap screws and self-tapping screws.

Footrests

REMOVING

1. Remove the cap screws securing the fender extension to the footrest. Account for all cap screws and one nut.

■NOTE: It will be easiest to remove the front inner cap screw by removing the nut from inside the wheel well.

2. On the right-side footrest, disconnect the foot brake switch from the main wiring harness.
3. Remove the cap screws securing the footrest to the frame; then remove the footrest.

■NOTE: On the right-side footrest, it will be necessary to remove the foot brake cable from the brake pedal.

CLEANING AND INSPECTING

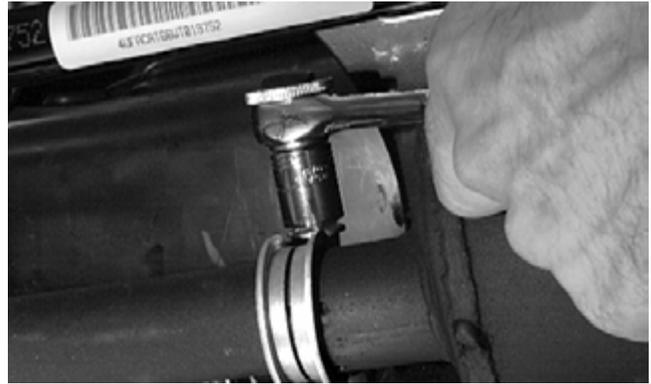
■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

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. Connect the foot brake cable to the brake pedal (right-side footrest).
2. Place the footrest into position on the frame and loosely secure with the four cap screws.
3. Secure the fender extension to the footrest with existing hardware. Tighten securely.
4. Tighten the 10 mm footrest cap screws (from step 2) to 5.5 kg-m (40 ft-lb); then tighten the 8 mm cap screws (from step 2) to 2.8 kg-m (20 ft-lb).
5. Connect the foot brake switch to the main wiring harness. Ensure that the harness is properly secured to the frame and away from any moving parts.



CH056D

Belly Panel

REMOVING

1. Remove the machine screws and shoulder washers securing the belly panel to the underside of the frame.
2. Remove the belly panel.

INSTALLING

1. Place the belly panel into position on the underside of the frame.
2. Install the machine screws and shoulder washers. Tighten securely.

Exhaust System

REMOVING MUFFLER

1. Remove the cap screws securing the muffler to the frame and account for all mounting hardware.
2. Loosen the clamp at the muffler/exhaust pipe juncture; then 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. Install the muffler on the frame and into the muffler/exhaust pipe juncture accounting for all mounting hardware.
2. Tighten cap screws securely; then tighten the juncture clamp.



CH056D

Rear Rack

REMOVING

1. Remove the cap screws securing the rear rack to frame and rear fenders. Account for any washers.
2. Lift the rack upward and remove from the frame.

CLEANING AND INSPECTING

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

1. Clean all rear rack components with parts-cleaning solvent.
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; then install the cap screws and any washers.
2. Tighten all fasteners securely.

Rear Fender

REMOVING

1. Remove the seat (see Seat in this section).
2. Remove the rear rack (see Rear Rack in this section).
3. Remove side panels (see Front Fender/Side Panels in this section).
4. Remove the cap screws and washers securing the fender to the frame and footrests.
5. On the 400/500 models:
 - A. Remove the battery hold-down and tool kit and disconnect the battery cables (negative cable first) and the vent hose; then remove the battery.
 - B. Remove the two screws securing the fuse panel to the fender; then disconnect all wires from the back of the panel.
 - C. Route the battery cables, fuse panel wiring, and vent hose out of the fender through the hole at the bottom of the battery compartment.
6. Disconnect the taillight wiring harness three-prong connector; then remove the fender.

CLEANING AND INSPECTING

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

1. Clean all rear fender components with parts-cleaning solvent and soap and water.
2. Inspect side panels, fender extensions, and rear fenders for cracks and loose rivets.
3. Inspect threaded areas of all mounting bosses for stripping.

4. Inspect for missing decals.

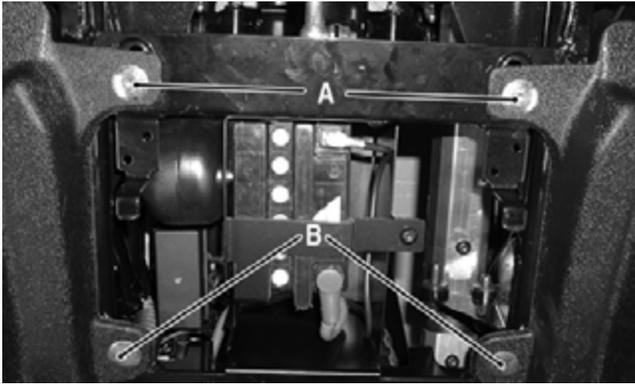
INSTALLING

1. Place the fender into position on the frame.
2. On the 400/500 models:
 - A. Route the battery cables, fuse panel wiring, and vent hose into the fender through the hole at the bottom of the battery compartment.
 - B. Using the cover of the fuse panel and the appropriate wiring diagram (see Section 5) as guides, connect the fuse panel wires.
 - C. Secure the fuse panel to the fender with the two screws. Tighten securely.
3. Secure the fender to the frame and footrests with existing cap screws and washers. Tighten securely.
4. On the 400/500, place the battery in position in the compartment; then install the vent hose, battery cables (positive cable first), the tool kit, and the battery hold-down.
5. Route the taillight wiring harness over the rear frame; then connect the three-prong connector.
6. Install the side panels (see Front Fender/Side Panels in this section).
7. Install the rear rack (see Rear Rack in this section).
8. Install the seat (see Seat in this section).

Side Storage Box (TBX Models)

REMOVING

1. Pull the cargo box latch knob (located on the left side between the cargo box and the rear tire) and fully raise the cargo box.
2. Pull the seat lock lever forward (located below the right side of the seat), raise the front end of the seat, and slide it forward and off the ATV.
3. Remove the two cap screws (located inside the side storage box) securing the box to the footrest.
4. Remove the screw securing the box to the side panel.
5. Remove cap screws (A and B) securing the box to the frame.



CD045A

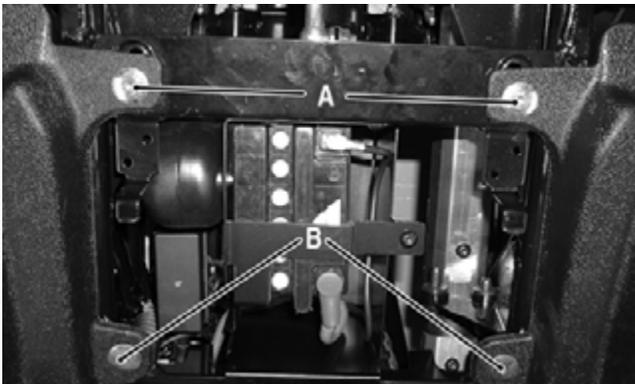
CLEANING AND INSPECTING

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

1. Clean all side storage box components with soap and water.
2. Inspect the box for cracks, tears, and loose mounting hardware.
3. Inspect the box hatch O-ring seals for cuts or tears.

INSTALLING

1. Place the side storage box into position on the frame; then secure with the two cap screws (A and B). Tighten cap screws to 2.8 kg-m (20 ft-lb).



CD045A

2. Secure the box to the side panel with the existing screw.
3. Secure the box to the footrest with existing hardware. Tighten securely.
4. Install the seat.
5. Lower the cargo box and press down firmly on the front of the box. The cargo box will automatically lock into position.

Cargo Box (TBX Models)

REMOVING

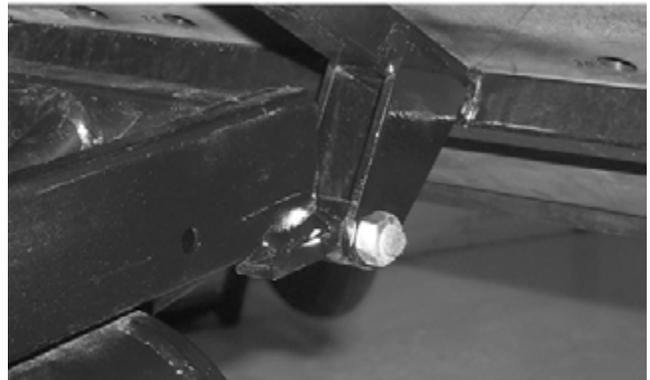
1. Pull the cargo box latch knob (located on the left side between the cargo box and the rear tire) and fully raise the cargo box.



CD042

2. Remove the retaining ring from the lower end of the box lift support; then separate the lift support from the lift support stud. Lower the cargo box.
3. Remove the two cap screws and lock nuts securing the cargo box to the frame; then remove the cargo box and 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.



CC866

CLEANING AND INSPECTING

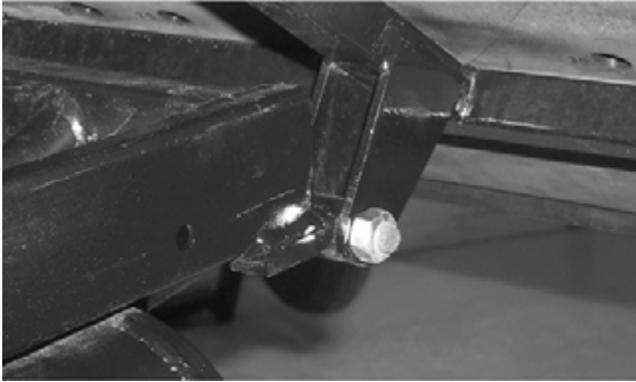
■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Clean all cargo box components with soap and water.
2. Inspect the cargo box for cracks, tears, and loose mounting hardware.
3. Inspect the welds of the cargo box frame for cracking or bending.

4. Inspect the cargo box gate latches for smooth operation.

INSTALLING

1. Place the cargo box into position on the frame. Secure with cap screws and new lock nuts. Tighten to 4.8 kg-m (35 ft-lb).



CC866

2. While an assistant holds the cargo box in the raised position, place the lower end of the cargo box onto the lift support stud; then secure with the retaining ring.
3. Lower the cargo box and press down firmly on the front of the box. It will automatically lock into position.

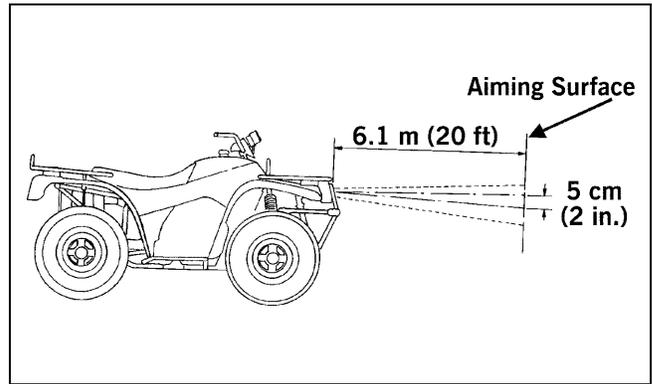
Adjusting Headlight

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.

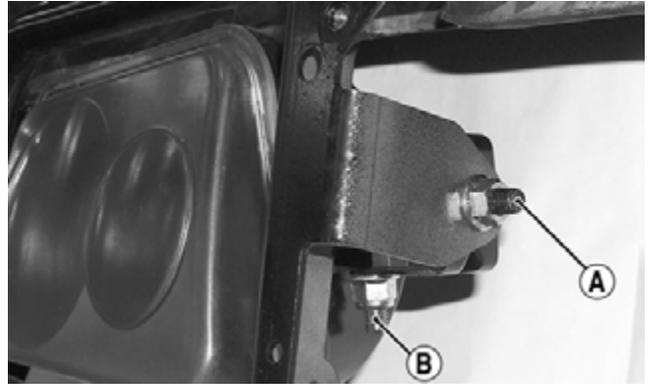
1. Position the ATV on a level floor so the headlights are approximately 6.1 m (20 ft) from an aiming surface (wall or similar aiming surface).

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.



ATV-0070



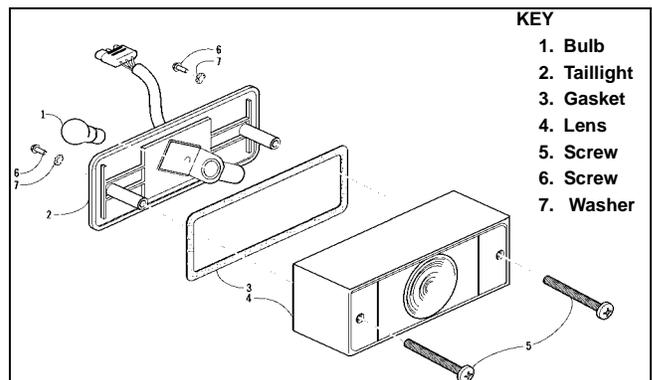
AF926A

7. Adjust each headlight until correct aim is obtained.
 - A. Horizontal - Loosen nut (A) and adjust for proper aiming. Tighten the nut securely.
 - B. Vertical - Loosen nut (B) and adjust for proper aiming. Tighten the nut securely.

WARNING

Do not operate the ATV unless the headlight beam is adjusted properly. An incorrectly adjusted beam will not provide the operator the optimum amount of light.

Taillight Assembly



0732-336

REMOVING

1. Unplug the three-prong connector and free the tail-light wiring harness from the frame.
2. Remove the torx-head cap screws securing the tail-light 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.

Seat

REMOVING/INSTALLING (250/300)

■NOTE: Some components may vary from model to model. The technician should use discretion and sound judgment.

REMOVING/INSTALLING (400 TBX/500 TBX)

1. To remove the seat, pull the seat lock lever forward (located below the right side of the seat). Raise the front end of the seat and slide it forward.
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 (400/500)

1. To remove the seat, pull the seat lock lever backward (located under the rear rack between the storage compartment and the frame). 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 (500 TRV)

1. To remove the front seat, pull the seat lock lever forward (located below the right side of the seat). Raise the front end of the seat and slide it forward.
2. To lock the seat into position, slide the rear of the seat into the seat retainers and push down firmly on front of seat. The seat should automatically lock into position.

■NOTE: The front seat must be removed prior to removing the rear seat.

3. To remove the rear seat, turn the backrest from the upright position; then pull the seat latch. Pull the seat backward slightly to unhook the front clips; then lift seat and slide it forward.
4. To lock the seat into position, slide the front clips into position on the frame making sure the seat is all the way forward; then push down on the rear of the seat to lock it into place.

NOTES

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 brake hose from the master cylinder.

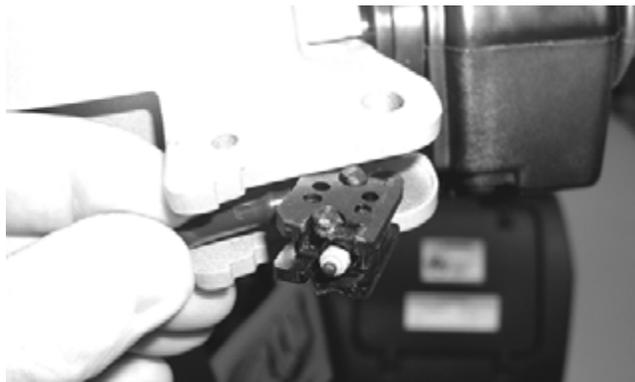


AG929

⚠ CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the ATV.

3. Remove the circlip 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.



AG924

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 brake hose 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.



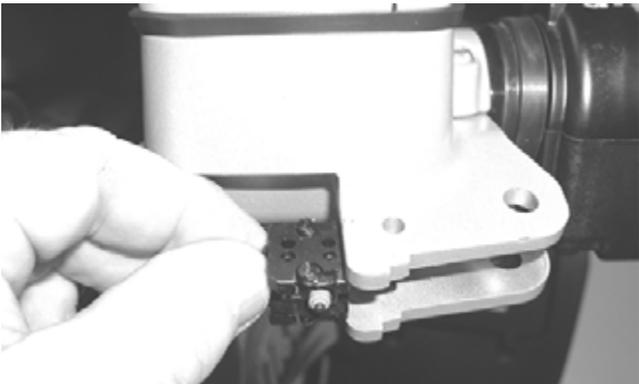
AG924

2. Install the brake hose on the master cylinder. Tighten to 0.8 kg-m (6 ft-lb).



AG929

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 circlip.



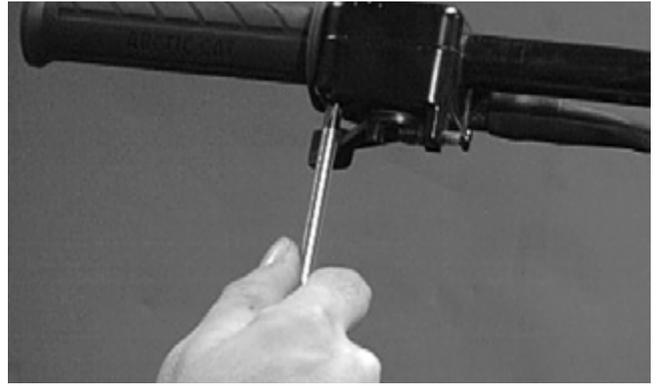
BC206

4. Bleed the brake system (see Section 2).

Throttle Control

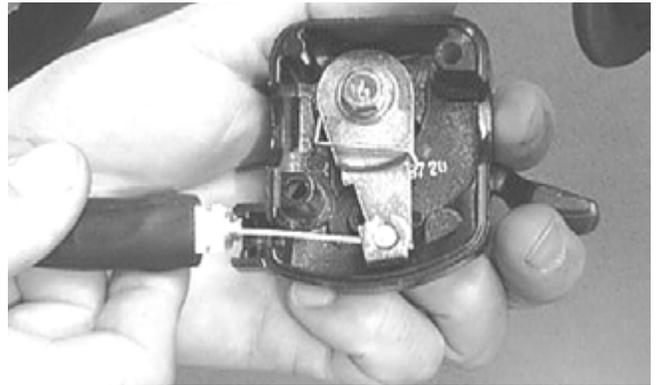
REMOVING

1. Remove the two machine screws securing the throttle control to the handlebar.



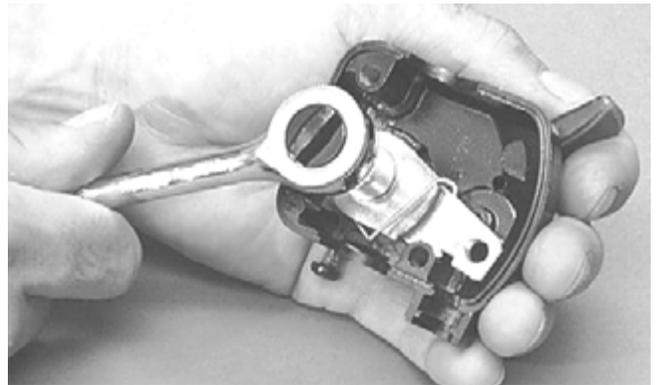
AL610D

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

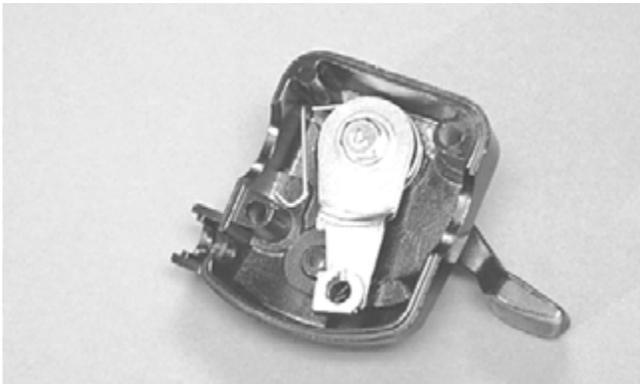
4. Remove the actuator arm and account for a bushing. Note the position of the return spring for installing purposes.



AF678D

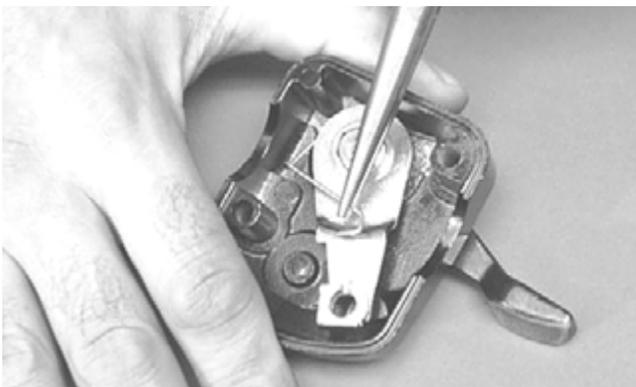
INSTALLING

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.



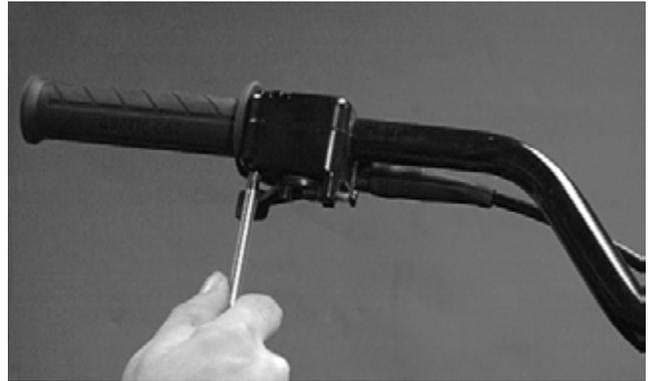
AF679D

2. Using a pair of needle-nose pliers, place the spring into position on the actuator arm.



AF680D

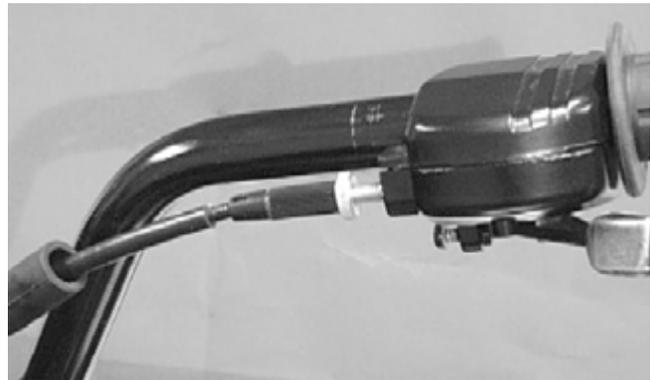
3. Place the two halves of the throttle control onto the handlebars and secure with the two machine screws.



AL610D

ADJUSTING

1. Slide the boot back to reveal the jam nut; then loosen the jam nut.



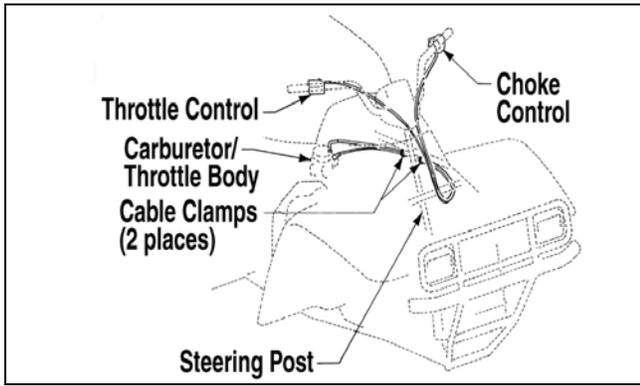
AF682D

2. Rotate the adjuster sleeve until 0.5-1.0 mm (0.02-0.04 in.) is attained.

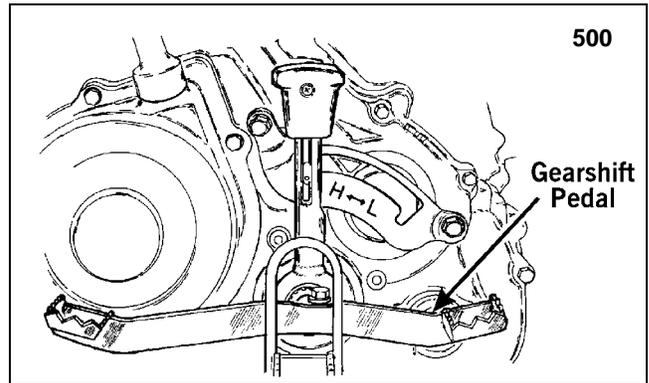


AL611D

3. Secure the adjustment by tightening the jam nut; then slide the boot over the jam nut.



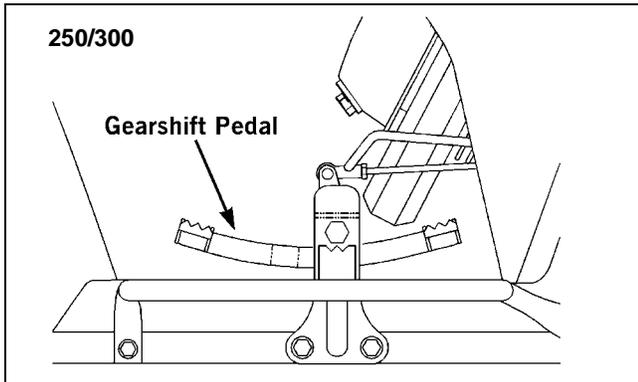
0732-412



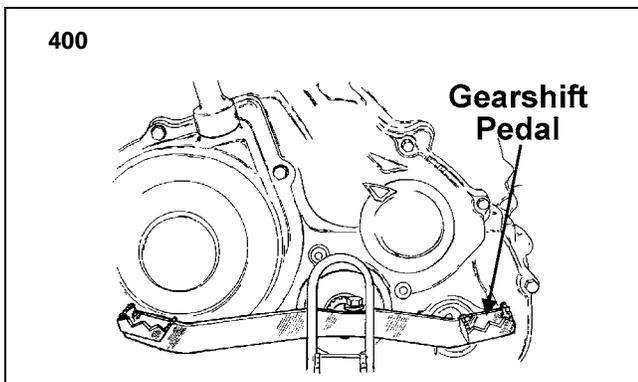
ATV0078B

Gearshift Pedal (Manual Transmission)

The gearshift pedal is attached to a ratchet mechanism in the transmission. Each time a gear is selected, the gearshift pedal will return to its normal position ready to select the next gear. To return to neutral, press down repeatedly (once for each gear) on the front of the pedal. Shift into gears by pressing down on the back of the pedal once for each gear. The ratchet mechanism makes it impossible to upshift or downshift more than one gear at a time.



736-567B

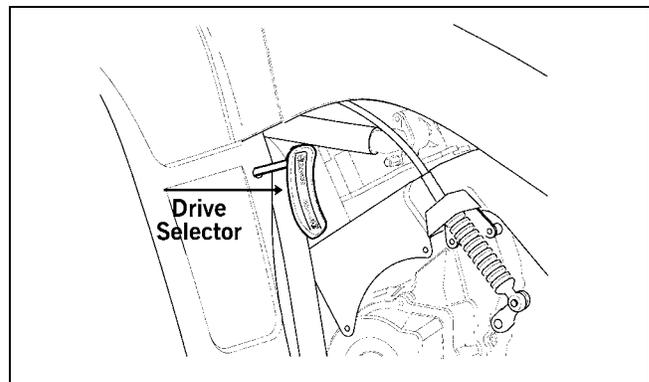


ATV0078C

Drive Selector (300/400 4x4 ACT Models)

The mechanical drive selector allows the operator to operate in either 2-wheel drive (rear wheels) or 4-wheel drive (all wheels). For normal riding on flat, dry, hard surfaces, 2-wheel drive should be sufficient. In situations of aggressive trail conditions, 4-wheel drive would be the desired choice.

To either engage or disengage the front wheels, come to a complete stop; then either push in (to engage) or pull out (to disengage) the front wheel differential. Apply slight throttle until positive engagement of the differential has been observed.



735-508A

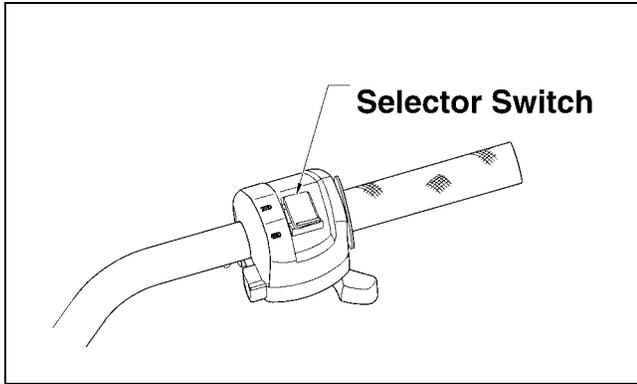
CAUTION

Do not attempt to either engage or disengage the front differential while the ATV is moving.

Drive Selector (400 FIS/ 500 Models)

The automatic drive selector allows the operator to operate in either 2-wheel drive (rear wheels) or 4-wheel drive (all wheels). For normal riding on flat, dry, hard surfaces, 2-wheel drive should be sufficient. In situations of aggressive trail conditions, 4-wheel drive would be the desired choice.

To either engage or disengage the front wheels, move the switch to the 4WD position or to the 2WD position.



738-422A

CAUTION

Do not attempt to either engage or disengage the front differential while the ATV is moving.

Reverse Shift Lever (Manual Transmission)

To shift into reverse gear, stop the ATV completely and shift the transmission into neutral. Pull the reverse shift lever fully rearward to the "R" position. When the ATV is in reverse gear, the gearshift pedal will not function.

WARNING

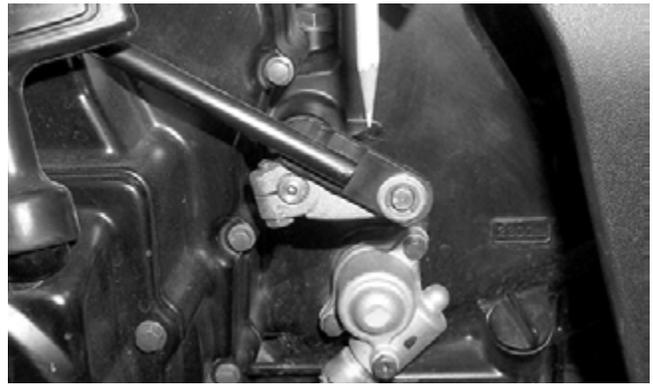
Never shift the ATV into reverse gear when the ATV is moving as it could cause the ATV to stop suddenly throwing the operator from the ATV.



0736-566

REMOVING

1. Remove the seat (see Section 8).
2. Remove the gas tank (see Section 4).
3. Remove the three machine screws securing the left-side panel to the frame and rear fender; then remove the left-side panel.
4. Remove the E-clip securing the shift rod to the engine shift arm.



AF942

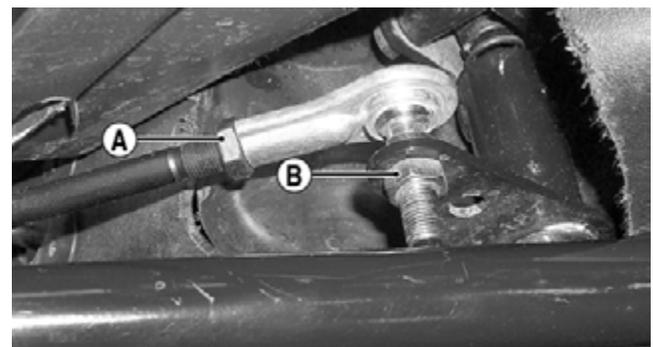
5. Remove the three machine screws securing the gear shift linkage cover to the fender and remove the cover.

■NOTE: The cover is located inside the left-front wheel well.



CC851

6. Remove the axle and nut securing the shift lever to the upper shift arm; then remove the shift lever. Account for the spring and two O-rings on the axle.
7. Using two open-end wrenches, remove the lock nut (B) securing the shift rod to the upper shift arm. Remove the shift rod and discard the lock nut.

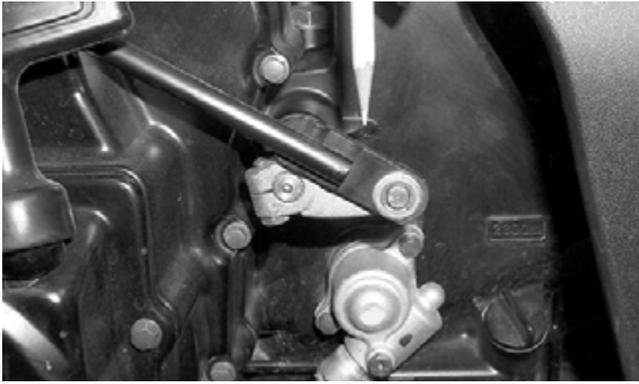


AF941A

■NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.

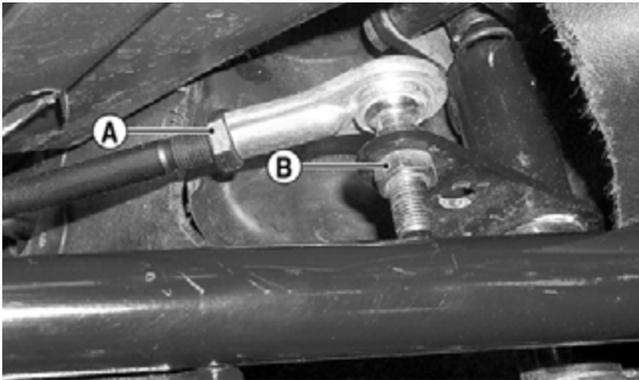
INSTALLING

1. Place the shift rod into position on the engine shift arm and secure with the existing E-clip.



AF942

- Using a new lock nut, secure the shift rod to the upper shift arm; then using two open-end wrenches, tighten securely.



AF941A

- 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.
- Install the gear shift linkage cover on the fender in the left-front wheel well. Tighten the three machine screws securely.
- Place the left-side panel into position on the frame and secure with the three machine screws.
- Install the gas tank (see Section 4); then install the seat (see Section 8).
- Check shift lever adjustment (see Section 2).

Shift Lever (Automatic Transmission)

The ATV with an automatic transmission has a dual-range transmission with reverse. To shift the ATV, follow these steps:

- To engage the high range from neutral, move the shift lever forward.
- To engage the low range from high range, move the shift lever outward and forward.

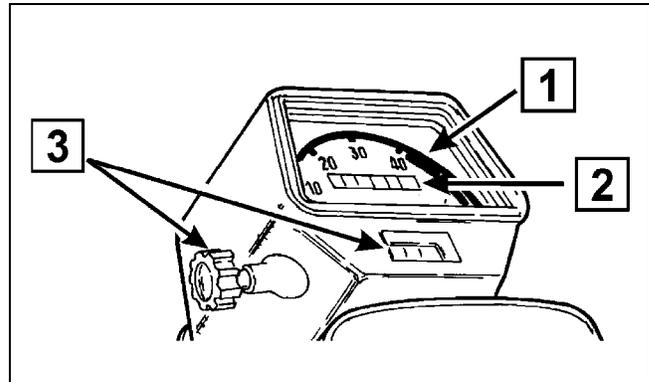


0736-565

- To engage reverse gear from neutral, move the shift lever outward and rearward into the R position.

Speedometer (STD)/ Indicator Lights

SPEEDOMETER (300/400/400 TBX/ 500 TBX/TRV)

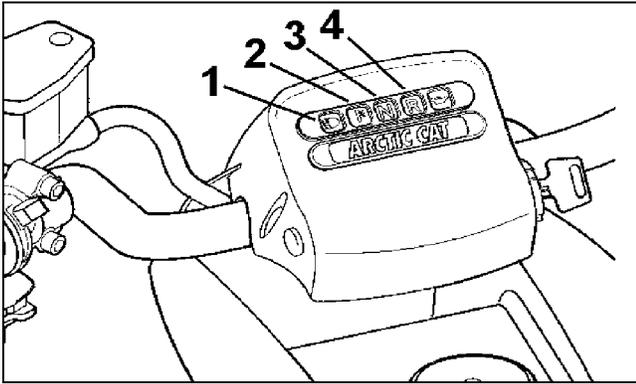


ATV0086E

- Speedometer** - The speedometer shows approximate speed.
- Odometer** - The odometer shows the total distance traveled.
- Trip Meter** - The trip meter is an odometer which can be reset. It can be used to show the distance traveled on short trips or between gas stops. Turning the knob counterclockwise resets the trip meter to zero.

INDICATOR LIGHTS (300/400/400 TBX/500 TBX/TRV)

■NOTE: The number and functions of indicator lights will vary from model to model.



733-707B

1. **High Beam Indicator** - A blue light will illuminate when the lights are on high beam. The light will not be illuminated when the lights are switched to low beam.
2. **Temperature Indicator** - A red light will illuminate if the engine overheats. The light should be off during normal operation.

CAUTION

Continued operation of the ATV with high engine temperature may result in engine damage or premature wear.

■NOTE: High engine RPM, low vehicle speed, or heavy load can raise engine temperature. Decreasing engine RPM, reducing load, and selecting an appropriate transmission gear can lower the temperature.

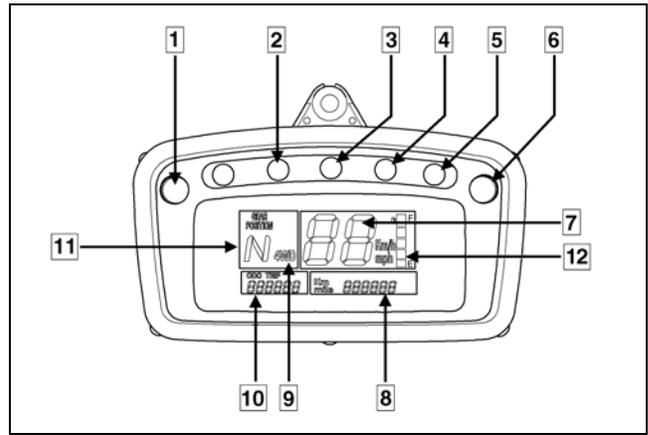
■NOTE: Debris in front of the engine (or packed between the cooling fins of the radiator on the 500 or packed between the oil cooler cooling fins on the 250/300/400) can reduce cooling capability. Using a hose, pressure-wash the radiator (on the 500) engine and oil cooler (on the 250/300/400) to remove any debris preventing air flow.

3. **Neutral Indicator** - A green light will illuminate when the transmission is in neutral and the ignition switch is on. The light will go out when shifted into any gear other than neutral.
4. **Reverse Indicator** - An orange light will illuminate when the transmission is shifted into reverse gear. The light will go off when shifted out of reverse.

Speedometer (Electronic)/Indicator Lights

SPEEDOMETER/INDICATOR LIGHTS (Functions)

■NOTE: The indicator lights will illuminate for approximately two seconds when the ignition switch is rotated to the ON position.



738-504A

1. **Odometer/Trip Meter Display Button** - Press the display button to display the Odometer (10), the A & B Trip Meters (10), and in conjunction with the Clock/Hour Meter Display Button (6), the speedometer km/h and mph displays.
2. **Reverse Indicator** - A red light will illuminate when the transmission is shifted into reverse gear. The light will go off when shifted out of reverse.
3. **Neutral Indicator** - A green light will illuminate when the transmission is in neutral and the ignition switch is on. The light will go out when shifted into any gear other than neutral.
4. **High Beam Indicator** - A blue light will illuminate when the lights are on high beam. The light will not be illuminated when the lights are switched to low beam.
5. **Temperature Indicator** - A red light will illuminate if the engine overheats. The light should be off during normal operation.

CAUTION

Continued operation of the ATV with high engine temperature may result in engine damage or premature wear.

■NOTE: High Engine RPM, low vehicle speed, or heavy load can raise engine temperature. Decreasing engine RPM, reducing load, and selecting an appropriate transmission gear can lower the temperature.

■NOTE: Debris in front of the engine (or packed between the cooling fins of the radiator) can reduce cooling capability. Using a hose, pressure-wash the radiator and the engine to remove any debris preventing air flow.

6. **Clock/Hour Meter Display Button** - Press the display button to switch to either the clock or hour meter and in conjunction with the Odometer/Trip Meter Display Button (1), the speedometer km/h and mph displays.

■NOTE: The clock icon indicates a 12-hour mode; the hour meter icon indicates total time the ATV is used.

A. Press and hold the display button until the minute display blinks; then adjust the minute display by pressing the button. Press the Odometer/Trip Meter Display Button (1) to set minute display.

■**NOTE:** If the display button is pressed in and held, the minute display will advance continuously.

B. After the minute display is set, the hour display will blink. Press the Clock/Hour Meter Display Button (6) to set hour display.

7. **Speedometer** - Shows approximate ATV speed in km/h and mph.

■**NOTE:** To display km/h or mph, press Display Button (1) to odometer; then press and hold Display Button (1) while pressing Clock/Hour Meter Display Button (6) for two seconds. Speedometer will display between km/h and mph.

8. **Clock/Hour Meter** - Clock indicates 12-hour mode; the hour meter indicates total time the ATV is used.

9. **4WD Indicator** - Displays 4WD when the front drive selector switch is moved to the 4WD position. Display will go off when 2WD is selected.

10. **Odometer/Trip Meters (A & B)** - Odometer registers the total distance the ATV has traveled. Trip meters can register two different types of distances (for instance, A could register trip distance and B could register distance between stops). Trip meters can be reset.

11. **Gear Position Indicator** - Displays which position the shift lever is in: R (reverse gear) and the Reverse Indicator (2) will illuminate, N (neutral) and the Neutral Indicator (3) will illuminate, and on the automatic transmission model H (high gear), and L (low gear).

REPLACING SPEEDOMETER

To replace the speedometer, use the following procedure.

1. Remove the four nylon fasteners securing the instrument pod; then remove the ignition switch retaining nut.



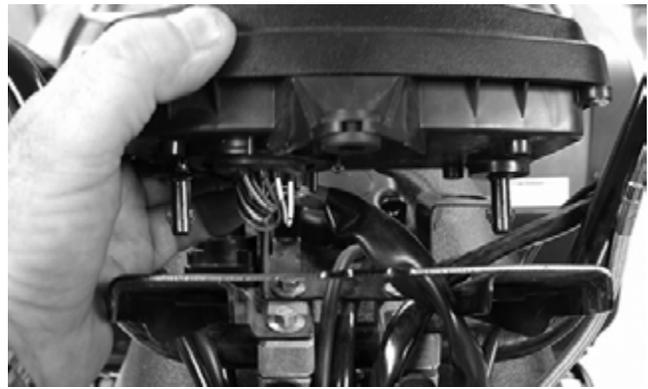
CD073

2. Remove the nut from the mounting stud; then dislodge the locating studs from the grommets.



CD074

3. Remove the left-side inner fender panel and disconnect the multi-pin speedometer connector; then route the speedometer wiring harness up through the opening in front of the steering post.



CD075

4. Route the new wiring harness down through the opening; then lubricate the two locating studs with liquid soap and press the studs into the grommets.



CD075A

5. Install the nut on the mounting stud (do not over-tighten); then secure the instrument pod cover with the fasteners.

6. Secure the ignition switch with the retaining nut.



CD076

7. Connect the multi-pin connector; then install and secure the left-side inner fender panel.

SECTION 10 - AIDS FOR MAINTENANCE

Table Of Contents

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Torque Specifications (250/300)

DRIVE TRAIN COMPONENTS			
Part	Part Bolted To	Torque	
		kg-m	ft-lb
Front Driveshaft (Coupler)**	Flange	4.2	30
Engine	Sub-Frame (Front/Rear)	5.5	40
Engine/Sub-Frame	Frame	5.5	40
Frame*	Front Diff Bracket/Upper	4.2	30
Front Differential*	Frame/Diff Bracket/Lower	5.5	40
Diff Housing Cover***	Diff Housing	2.6	19
Drive Bevel Gear Nut***	Shaft	11-13	79.5-94
Differential Gear Case***	Hub	2.3-3	16.5-22
Hub Nut	Front/Rear Shaft/Axle (max)	10.4	75
Oil Drain Plug	Front Diff	0.5	3.5
Oil Fill Plug	Front Diff	2.2	16
Oil Drain Plug	Engine	2.2	16
Oil Fittings*	Engine	1.1	8
Shift Arm	Engine	1.4	10
High/Low Shift Arm	Engine	1.1	8
2W/4W Shift Arm	Front Diff	1.1	8
Wheel	Hub	5.5	40
EXHAUST COMPONENTS			
Header Pipe	Engine	1.1	8
ELECTRICAL COMPONENTS			
Ground Cable	Engine	1.1	8
STEERING COMPONENTS			
Handlebar Block	Steering Post	2.8	20
Steering Post Bearing Housings	Frame	2.8	20
Steering Post Bearing Flange	Frame	2.8	20
Lower Steering Bearing Washer Cap Screw***	Steering Post	5.5	40
Tie Rod End	Knuckle/Steering Post	4.2	30
BRAKE COMPONENTS			
Brake Disc*	Hub	2.1	15
Brake Hose	Caliper	4.2	30
Brake Hose	Master Cylinder	0.8	6
Auxiliary Brake Lever	Frame	9.7	70
Master Cylinder Cover	Master Cylinder	.03	10 in.-lb
Brake Pressure Switch	Front Brake Block	2.1	15
Hydraulic Caliper	Knuckle	2.8	20
Auxiliary Caliper	Knuckle	2.1	15
CHASSIS COMPONENTS			
Sub-Frame	Frame	5.5	40
Footrest	Frame (8 mm)	2.8	20
Footrest	Frame (10 mm)	5.5	40
Foot Shift Lever	Footrest	9.7	70
Gas Tank Valve	Gas Tank	0.1	1
Reverse Shift Lever *	Frame	2.8	20
SUSPENSION COMPONENTS (Rear)			
Rear Shock	Sub-Frame	4.8	35
Rear Shock	Lower A-Arm	2.8	20
A-Arms (All)	Sub-Frame	4.8	35
Rear Knuckles	A-Arms	4.8	35

SUSPENSION COMPONENTS (Front)			
Part	Part Bolted To	Torque	
		kg-m	ft-lb
A-Arm (All)	Frame	4.8	35
Ball Joint Cap Screw	Knuckle	4.8	35
Shock Absorber	Frame	4.8	35
Shock Absorber	Upper A-Arm	4.8	35
ENGINE/TRANSMISSION			
Air Cleaner Assy	Frame	1.1	8
Clutch Shoe	Crankshaft	11	79.5
Clutch Sleeve Hub	Countershaft	8	58
Crankcase Half (6 mm)	Crankcase Half	0.9-1.3	6.5-9.5
Crankcase Half (8 mm)	Crankcase Half	2-2.4	14.5-17
Cylinder Head Cap Nuts/Nut	Cylinder	2.5	18
Cylinder Head/Crankcase	Cylinder	1.1	8
Hi/Lo Shifter Arm	Shifter Arm Shaft	1.1	8
Left-Side Cover	Crankcase Half	0.9-1.3	6.5-9.5
Oil Pump*	Crankcase	1	7
Recoil Starter	Left-Side Cover	0.8	6
Reverse Gear Shaft	Reverse Shift Shaft	1.1	8
Right-Side Cover	Crankcase Half	0.9-1.3	6.5-9.5
Magneto Rotor Nut	Crankshaft	16	116
Shifter Arm	Shifter Arm Shaft	1.1	8
Cam Sprocket	Camshaft	1.15	8.5
Starter Cup	Crankshaft	3.5	25
Valve Cover	Cylinder	1	7
Spark Plug	Engine	1.7	12

* w/Blue Loctite #243

** w/Red Loctite #271

*** w/Green Loctite #609

Torque Specifications (400/500 - Manual Transmission)

DRIVE TRAIN COMPONENTS			
Part	Part Bolted To	Torque	
		kg-m	ft-lb
Engine (Lower Rear/Front)	Frame	5.5	40
Engine (Upper Front Inside Bracket/Topside)	Frame Bracket	2.8	20
Engine Mount (Left-Side Upper Rear)	Frame	1.7	12
Engine (Left-Side Upper Rear)	Mount	5.5	40
Front Differential*	Frame/Diff Bracket	5.5	40
Bearing Housing/Axle Assy	Axle Housing	5.5	40
Diff Housing Cover***	Diff Housing	2.6	19
Drive Bevel Gear Nut***	Shaft	11-13	79.5-94
Differential Gear Case***	Hub	2.3-3	16.5-22
Hub Nut	Front/Rear Shaft/Axle (max)	10.4	75
Oil Drain Plug	Front Diff/Rear Dr	0.5	3.5
Oil Fill Plug	Front Diff/Rear Dr	2.2	16
Oil Drain Plug	Engine	2.2	16
Inspection Plug	Rear Dr	0.5	3.5
Wheel	Hub	5.5	40
EXHAUST COMPONENTS			
Exhaust Pipe	Engine/Frame	2.8	20
ELECTRICAL COMPONENTS			
Coil*	Head Bracket	1.7	12
Ground Wire	Engine	1.1	8
STEERING COMPONENTS			
Handlebar Block	Steering Post	2.8	20
Steering Post Bearing Housings	Frame	2.8	20
Steering Post Bearing Flange	Frame	2.8	20
Lower Steering Bearing Washer Cap Screw***	Steering Post	5.5	40
Tie Rod End	Knuckle/Steering Post	4.2	30
BRAKE COMPONENTS			
Brake Disc*	Hub	2.1	15
Brake Hose	Caliper	4.2	30
Brake Hose	Master Cylinder	0.8	6
Master Cylinder Cover	Master Cylinder	.03	10 in.-lb
Brake Pressure Switch	Front Brake Block	2.1	15
Auxiliary Brake Lever	Footrest	9.7	70
Hydraulic Caliper	Knuckle/Axle Retainer Assy	2.8	20
Auxiliary Caliper	Knuckle/Axle Retainer Assy	2.1	15
CHASSIS COMPONENTS			
Footrest	Frame (8 mm)	2.8	20
Footrest	Frame (10 mm)	5.5	40
Gas Tank Valve	Gas Tank	0.1	1
Reverse Shift Lever*	Frame	2.8	20

SUSPENSION COMPONENTS (Front)			
Part	Part Bolted To	Torque	
		kg-m	ft-lb
A-Arm (All)	Frame	4.8	35
Ball Joint Cap Screw	Knuckle	4.8	35
Shock Absorber	Frame	4.8	35
Shock Absorber	Upper A-Arm	4.8	35
SUSPENSION COMPONENTS (Rear)			
Axle Retainer Assy	Axle Housing	5.5	40
Axle Housing/Hitch	Rear Gear Case	4.8	35
Axle Housing/Hitch	Rear Gear Case (New)	5.5	40
Shock Absorber	Axle Housing/Frame	4.8	35
Swing Arms	Axle Housing	4.8	35
Swing Arms **	Frame	4.8	35
ENGINE/TRANSMISSION			
Clutch Shoe	Crankshaft	13	94
Clutch Sleeve Hub	Countershaft	10	72
Crankcase Half (6 mm)	Crankcase Half	0.9-1.3	6.5-9.5
Crankcase Half (8 mm)	Crankcase Half	2-2.4	14.5-17
Cylinder Head (Cap Screws)	Cylinder	3.8	27.5
Cylinder Head (6 mm Nuts)	Cylinder	1.1	8
Cylinder Head (8 mm Nut)	Cylinder	2.5	18
Left-Side Cover	Crankcase Half	0.9-1.3	6.5-9.5
Mechanical Water Pump Impeller	Pump Shaft	1.05	7.5
Oil Pump Drive Gear	Crank Balancer Shaft	8	58
Oil Pump*	Crankcase	1	7
Output Shaft Gear	Output Shaft	10	72
Rear Output Shaft	Output Joint	2.8	20
Recoil Starter	Left-Side Cover	0.8	6
Reverse Cam Stopper Housing	Crankcase	2.3	16.5
Right-Side Cover	Crankcase	0.9-1.3	6.5-9.5
Magneto Rotor Nut	Crankshaft	16	116
Shift Stop Housing	Crankcase	2.3	16.5
Cam Sprocket	Camshaft	1.5	11
Starter Cup	Crankshaft	3.5	25
Spark Plug	Engine	1.7	12

* w/Blue Loctite #243

** w/Red Loctite #271

*** w/Green Loctite #609

Torque Specifications (400/500 - Automatic Transmission)

DRIVE TRAIN COMPONENTS			
Part	Part Bolted To	Torque	
		kg-m	ft-lb
Engine Mount (Front Upper)	Frame	2.8	20
Engine Bracket (Upper)	Engine	2.8	20
Engine Mounting Through-Bolts	Frame	5.5	40
Engine Mount (Upper Rear)	Frame	1.7	12
Front Differential*	Frame/Diff Bracket	5.5	40
Rear Output Joint Assy	Engine	2.8	20
Bearing Housing/Axle Assy	Axle Housing	5.5	40
Diff Housing Cover***	Diff Housing	2.6	19
Drive Bevel Gear Nut***	Shaft	11-13	79.5-94
Differential Gear Case***	Hub	2.3-3	16.5-22
Hub Nut	Front/Rear Shaft/Axle (max)	10.4	75
Oil Drain Plug	Front Diff/Rear Dr	0.5	3.5
Oil Fill Plug	Front Diff/Rear Dr	2.2	16
Oil Drain Plug	Engine	2.2	16
Inspection Plug	Rear Drive	0.5	3.5
Wheel	Hub	5.5	40
EXHAUST COMPONENTS			
Exhaust Pipe	Engine/Frame	2.8	20
ELECTRICAL COMPONENTS			
Coil*	Head Bracket	1.7	12
Ground Wire	Engine	1.1	8
STEERING COMPONENTS			
Handlebar Block	Steering Post	2.8	20
Steering Post Bearing Housings	Frame	2.8	20
Steering Post Bearing Flange	Frame	2.8	20
Lower Steering Bearing Washer Cap Screw***	Steering Post	5.5	40
Tie Rod End	Knuckle/Steering Post	4.2	30
BRAKE COMPONENTS			
Brake Disc*	Hub	2.1	15
Brake Hose	Caliper	4.2	30
Brake Hose	Master Cylinder	0.8	6
Master Cylinder Cover	Master Cylinder	.03	10 in.-lb
Brake Pressure Switch	Front Brake Block	2.1	15
Auxiliary Brake Lever	Footrest	9.7	70
Hydraulic Caliper	Axle Retainer Assy	2.8	20
Auxiliary Caliper	Axle Retainer Assy	2.1	15
CHASSIS COMPONENTS			
Footrest	Frame (8 mm)	2.8	20
Footrest	Frame (10 mm)	5.5	40
Gas Tank Valve	Gas Tank	0.1	1
Reverse Shift Lever*	Frame	2.8	20

SUSPENSION COMPONENTS (Front)			
Part	Part Bolted To	Torque	
		kg-m	ft-lb
A-Arm (All)	Frame	4.8	35
Ball Joint Cap Screw	Knuckle	4.8	35
Shock Absorber	Frame	4.8	35
Shock Absorber	Upper A-Arm	4.8	35
SUSPENSION COMPONENTS (Rear)			
Axle Retainer Assy	Axle Housing	5.5	40
Axle Housing/Hitch	Rear Gear Case	4.8	35
Axle Housing/Hitch	Rear Gear Case (New)	5.5	40
Swing Arms	Axle Housing	4.8	35
Swing Arms**	Frame	4.8	35
Shock Absorber	Axle Housing/Frame	4.8	35
SUSPENSION COMPONENTS (Rear) TBX Model			
Axle Retainer Assy	Axle Housing	5.5	40
Axle Housing	Rear Gear Case	4.8	35
Axle Housing	Rear Gear Case (New)	5.5	40
Swing Arm	Frame	5.5	40
Shock Absorber	Frame	4.8	35
Shock Absorber	Swing Arm	4.8	35
Cargo Box Frame	ATV Frame	4.8	35
Cargo Box (Plastic)	Cargo Box Frame	1.7	12
Axle Housing	Swing Arm	4.8	35
Side Box (Upper)	Frame	2.8	20
Side Box (Lower)	Frame	2.5	18
Rear Gear Case U-Joint**	Driveshaft	5.5	40
ENGINE/TRANSMISSION			
Clutch Shoe	Crankshaft	13	94
Clutch Cover/ Housing Assy	Crankcase	1.1	8
Crankcase Half (6 mm)	Crankcase Half	0.9-1.3	6.5-9.5
Crankcase Half (8 mm)	Crankcase Half	2-2.4	14.5-17
Cylinder Head (Cap Screws)	Crankcase	3.8	27.5
Cylinder Head (6 mm)	Cylinder	1.1	8
Cylinder Head (8 mm)	Cylinder	2.5	18
Driven Pulley Nut	Fixed Face	10.4-11.8	75-85
Fixed Driven	Clutch Shaft	10.4-11.8	75-85
Ground Wire	Engine	1.1	8
Magneto Cover	Crankcase	1.1	8
Mechanical Water Pump Impeller	Pump Shaft	1.05	7.5
Movable Drive Face	Driveshaft	10.4-11.8	75-85
Oil Pump Drive Gear	Crank Balancer Shaft	5	36
Output Shaft Gear	Output Shaft	10	72
Recoil Starter	Left-Side Cover	0.8	6
Magneto Rotor Nut	Crankshaft	16	116
Cam Sprocket	Camshaft	1.5	11
Starter Cup	Crankshaft	3.5	25
V-Belt Cover	Crankcase	1.1	8
Plenum***	Engine	1.1	8
Spark Plug	Engine	1.7	12

* w/Blue Loctite #243

** w/Red Loctite #271

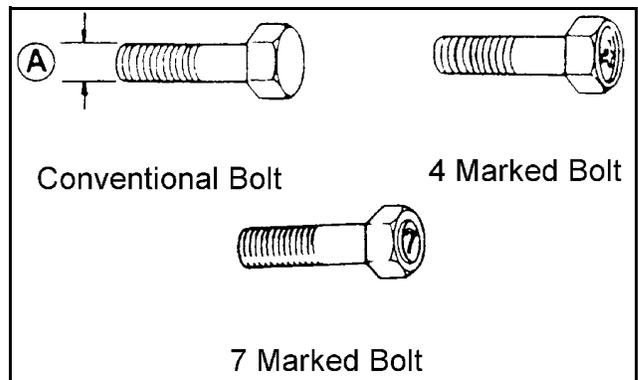
*** w/Green Loctite #609

Torque Conversions

ft-lb	kg-m								
1	0.1	21	2.9	41	5.7	61	8.4	81	11.2
2	0.3	22	3.0	42	5.8	62	8.6	82	11.3
3	0.4	23	3.2	43	5.8	63	8.7	83	11.5
4	0.6	24	3.3	44	6.1	64	8.9	84	11.6
5	0.7	25	3.5	45	6.2	65	9.0	85	11.8
6	0.8	26	3.6	46	6.4	66	9.1	86	11.9
7	1.0	27	3.7	47	6.5	67	9.3	87	12.0
8	1.1	28	3.9	48	6.6	68	9.4	88	12.2
9	1.2	29	4.0	49	6.8	69	9.5	89	12.3
10	1.4	30	4.2	50	6.9	70	9.7	90	12.5
11	1.5	31	4.3	51	7.1	71	9.8	91	12.6
12	1.7	32	4.4	52	7.2	72	10.0	92	12.8
13	1.8	33	4.6	53	7.3	73	10.1	93	12.9
14	1.9	34	4.7	54	7.5	74	10.2	94	13.0
15	2.1	35	4.8	55	7.6	75	10.4	95	13.1
16	2.2	36	5.0	56	7.7	76	10.5	96	13.3
17	2.4	37	5.1	57	7.9	77	10.7	97	13.4
18	2.5	38	5.3	58	8.0	78	10.8	98	13.6
19	2.6	39	5.4	59	8.2	79	10.9	99	13.7
20	2.8	40	5.5	60	8.3	80	11.1	100	13.8

Tightening Torque (General Bolts)

Type of Bolt	Thread Diameter A (mm)	Tightening Torque	
		kg-m	ft-lb
(Conventional or 4 Marked Bolt)	5	0.2-0.4	1.5-3.0
	6	0.4-0.7	3.0-5.0
	8	1.0-1.6	7.0-11.5
	10	2.2-3.5	16.0-25.5
(7 Marked Bolt)	5	0.3-0.6	2.0-4.5
	6	0.8-1.2	6.0-8.5
	8	1.8-2.8	13.0-20.0
	10	4.0-6.0	29.0-43.5



NOTES



SECTION 11 - TROUBLESHOOTING

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Engine

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

Problem: Engine will not start or is hard to start (Compression too low)	
Condition	Remedy
1. Valve clearance out of adjustment 2. Valve guides worn - seated poorly 3. Valves mistimed 4. Piston rings worn excessively 5. Cylinder bore worn 6. Spark plug seating poorly 7. Starter motor cranks too slowly - does not turn	1. Adjust clearance 2. Repair - replace guides 3. Adjust valve timing 4. Replace rings 5. Replace - rebore cylinder 6. Tighten plug 7. See Electrical in this section
Problem: Engine will not start or is hard to start (No spark)	
Condition	Remedy
1. Spark plug fouled 2. Spark plug wet 3. Magneto defective 4. CDI unit defective 5. Ignition coil defective 6. High-tension lead open - shorted	1. Clean - replace plug 2. Clean - dry plug 3. Replace magneto 4. Replace CDI unit 5. Replace ignition coil 6. Replace high tension lead
Problem: Engine will not start or is hard to start (No fuel reaching the carburetor)	
Condition	Remedy
1. Gas tank vent hose obstructed 2. Carburetor inlet needle defective 3. Fuel hose obstructed 4. Fuel screens obstructed	1. Clean vent hose 2. Replace needle 3. Clean - replace hose 4. Clean - replace inlet screen - valve screen
Problem: Engine stalls easily	
Condition	Remedy
1. Spark plug fouled 2. Magneto defective 3. CDI unit defective 4. Carburetor jets obstructed 5. Valve clearance out of adjustment	1. Clean plug 2. Replace magneto 3. Replace CDI unit 4. Clean jets 5. Adjust clearance
Problem: Engine noisy (Excessive valve chatter)	
Condition	Remedy
1. Valve clearance too large 2. Valve spring(s) weak - broken 3. Rocker arm - rocker arm shaft worn 4. Camshaft worn	1. Adjust clearance 2. Replace spring(s) 3. Replace arm - shaft 4. Replace camshaft
Problem: Engine noisy (Noise seems to come from piston)	
Condition	Remedy
1. Piston - cylinder worn 2. Combustion chamber carbon buildup 3. Piston pin - piston pin bore worn 4. Piston rings - ring groove(s) worn	1. Replace - service piston - cylinder 2. Clean chamber 3. Replace - service pin - bore 4. Replace rings - piston
Problem: Engine noisy (Noise seems to come from timing chain)	
Condition	Remedy
1. Chain stretched 2. Sprockets worn 3. Tension adjuster malfunctioning	1. Replace chain 2. Replace sprockets 3. Repair - replace adjuster
Problem: Engine noisy (Noise seems to come from clutch)	
Condition *	Remedy *
1. Crankshaft splines - bearings worn 2. Countershaft - hub splines worn 3. Clutch plate teeth worn 4. Driven - drive clutch plates distorted - broken 5. Clutch dampers weak	1. Replace crankshaft - bearings 2. Replace countershaft - hub 3. Replace clutch plate(s) 4. Replace clutch plate(s) 5. Replace dampers

Problem: Engine noisy (Noise seems to come from crankshaft)	
Condition	Remedy
<ol style="list-style-type: none"> 1. Bearing worn - burned 2. Lower rod-end bearing worn - burned 3. Connecting rod side clearance too large 	<ol style="list-style-type: none"> 1. Replace bearing 2. Replace bearing 3. Replace thrust washer(s)
Problem: Engine noisy (Noise seems to come from transmission)	
Condition	Remedy
<ol style="list-style-type: none"> 1. Gears worn - rubbing 2. Splines worn 3. Primary gears worn - rubbing 4. Bearings worn 5. Bushing worn 	<ol style="list-style-type: none"> 1. Replace gears 2. Replace shaft(s) 3. Replace gears 4. Replace bearings 5. Replace bushing
Problem: Engine noisy (Noise seems to come from secondary-transmission/left-side cover)	
Condition *	Remedy *
<ol style="list-style-type: none"> 1. Gears - shaft(s) worn 2. Bearing(s)/bushing(s) damaged 	<ol style="list-style-type: none"> 1. Replace gears - shafts 2. Replace bearing(s)/bushing(s)
Problem: Engine noisy (Noise seems to come from secondary bevel gear and final driven shaft)	
Condition	Remedy
<ol style="list-style-type: none"> 1. Drive - driven bevel gears damaged - worn 2. Backlash excessive 3. Tooth contact improper 4. Bearing damaged 5. Gears worn - rubbing 6. Splines worn 7. Final driven shaft thrust clearance too large 	<ol style="list-style-type: none"> 1. Replace gears 2. Adjust backlash 3. Adjust contact 4. Replace bearing 5. Replace gears 6. Replace shaft(s) 7. Replace thrust washer(s)
Problem: Clutch slipping	
Condition *	Remedy *
<ol style="list-style-type: none"> 1. Release roller out of adjustment - loss of freeplay 2. Clutch springs weak 3. Clutch shoes worn 4. Pressure disc worn - distorted 5. Clutch plates (driven - drive) distorted 	<ol style="list-style-type: none"> 1. Adjust clutch bolts 1 & 2 2. Replace springs 3. Replace shoes 4. Replace disc 5. Replace plates
Problem: Clutch dragging	
Condition *	Remedy *
<ol style="list-style-type: none"> 1. Clutch release roller out of adjustment - too much freeplay 2. Clutch springs weak 3. Pressure disc - clutch plates distorted 4. Clutch release mechanism worn - damaged 	<ol style="list-style-type: none"> 1. Adjust clutch bolts 1 & 2 2. Replace springs 3. Replace disc - plates 4. Adjust - replace mechanism
Problem: Transmission will not shift	
Condition *	Remedy *
<ol style="list-style-type: none"> 1. Gearshift cam broken 2. Gearshift forks distorted 3. Gearshift shaft worn 4. Clutch release mechanism worn - damaged 5. Reverse cable adjusted improperly 6. Gearshift cable adjusted improperly 	<ol style="list-style-type: none"> 1. Replace cam 2. Replace forks 3. Replace shaft 4. Adjust - replace mechanism 5. Adjust cable 6. Adjust cable
Problem: Transmission will not shift back	
Condition *	Remedy *
<ol style="list-style-type: none"> 1. Reverse shift cam broken 2. Shift shafts rubbing - sticking 3. Gearshift forks distorted - worn 4. Gearshift lever return spring broken - damaged 	<ol style="list-style-type: none"> 1. Replace cam 2. Repair shafts 3. Replace forks 4. Replace spring
Problem: Transmission jumps out of gear	
Condition *	Remedy *
<ol style="list-style-type: none"> 1. Shifting gears (driveshaft - countershaft) worn 2. Gearshift forks distorted - worn 3. Cam stopper spring (gearshift cam) weak 4. Gearshift lever stopper pin worn 	<ol style="list-style-type: none"> 1. Replace gears 2. Replace forks 3. Replace spring 4. Replace pin

Problem: Secondary-transmission will not shift or shift back	
Condition *	Remedy *
<ol style="list-style-type: none"> 1. Sliding dog broken - worn 2. Gearshift fork broken - worn 3. Hi/Low shift lever out of adjustment 4. Gearshift cam worn 5. Cam stopper spring weak 6. Gearshift fork shaft worn 	<ol style="list-style-type: none"> 1. Replace dog 2. Replace fork 3. Adjust lever 4. Replace cam 5. Replace spring 6. Replace shaft
Problem: Engine idles poorly	
Condition	Remedy
<ol style="list-style-type: none"> 1. Valve clearance out of adjustment 2. Valve seating poor 3. Valve guides defective 4. Rocker arms - arm shaft worn 5. Magneto defective 6. CDI unit defective 7. Spark plug fouled - gap too wide 8. Ignition coil defective 9. Float out of adjustment 10. Jets obstructed 11. Pilot screw setting improper 	<ol style="list-style-type: none"> 1. Adjust clearance 2. Replace - service seats - valves 3. Replace guides 4. Replace arms - shafts 5. Replace magneto 6. Replace CDI unit 7. Adjust gap - replace plug 8. Replace ignition coil 9. Adjust float height 10. Clean jets 11. Adjust pilot screw
Problem: Engine runs poorly at high speed	
Condition	Remedy
<ol style="list-style-type: none"> 1. High RPM "cut out" against RPM limiter 2. Valve springs weak 3. Valve timing out of adjustment 4. Cams - rocker arms worn 5. Spark plug gap too narrow 6. Ignition coil defective 7. Float level too low 8. Air cleaner element obstructed 9. Fuel hose obstructed 	<ol style="list-style-type: none"> 1. Shift into higher gear - decrease speed 2. Replace springs 3. Adjust timing 4. Replace cams - arms 5. Adjust gap 6. Replace ignition oil 7. Adjust float height 8. Clean element 9. Clean - prime hose
Problem: Exhaust smoke dirty or heavy	
Condition	Remedy
<ol style="list-style-type: none"> 1. Oil (in the engine) overfilled - contaminated 2. Piston rings - cylinder worn 3. Valve guides worn 4. Cylinder wall scored - scuffed 5. Valve stems worn 6. Stem seals defective 	<ol style="list-style-type: none"> 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"> 1. Valve clearance incorrect 2. Valve springs weak 3. Valve timing out of adjustment 4. Piston ring(s) - cylinder worn 5. Valve seating poor 6. Spark plug fouled 7. Rocker arms - shafts worn 8. Spark plug gap incorrect 9. Carburetor jets obstructed 10. Float level out of adjustment 11. Air cleaner element obstructed 12. Oil (in the engine) overfilled - contaminated 13. Intake manifold leaking air 14. Cam chain worn 	<ol style="list-style-type: none"> 1. Adjust clearance 2. Replace springs 3. Adjust timing 4. Replace - service rings - cylinder 5. Repair seats 6. Clean - replace plug 7. Replace arms - shafts 8. Adjust gap - replace plug 9. Clean jets 10. Adjust float height 11. Clean element 12. Drain excess oil - change oil 13. Tighten - replace manifold 14. Replace cam chain

Problem: Engine overheats	
Condition	Remedy
1. Carbon deposit (piston crown) excessive 2. Oil low 3. Octane low - gasoline poor 4. Oil pump defective 5. Oil circuit obstructed 6. Gasoline level (in float chamber) too low 7. Intake manifold leaking air 8. Coolant level low 9. Fan malfunctioning 10. Fan switch malfunctioning 11. Thermostat stuck - closed 12. Radiator hoses - cap damaged - obstructed	1. Clean piston 2. Add oil 3. Drain - replace gasoline 4. Replace pump 5. Clean circuit 6. Adjust float height 7. Tighten - replace manifold 8. Fill - examine system for leaks 9. Check fan fuse - replace fan 10. Replace fan switch 11. Replace thermostat 12. Clear obstruction - replace hoses

Drive

Problem: Power not transmitted from engine to wheels	
Condition	Remedy
1. Rear axle shaft 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 2. Propeller shaft serration worn - broken 3. Coupling damaged 4. Coupling joint serration worn - damaged 5. Front drive - driven bevel gears broken - damaged 6. Front differential gears/pinions broken - damaged 7. Sliding dog/shaft/fork worn - damaged 8. Front drive axle worn - damaged 9. Front drive axle serration worn - damaged	1. Replace gear(s) 2. Replace shaft 3. Replace coupling 4. Replace joint 5. Replace gear(s) 6. Replace gears - pinions 7. Replace gear(s) 8. Replace axle 9. Replace axle

Fuel System

Problem: Starting impaired	
Condition	Remedy
<ol style="list-style-type: none"> 1. Starter jet obstructed 2. Starter jet passage obstructed 3. Starter body - carburetor leaking air 4. Starter valve not operating properly 	<ol style="list-style-type: none"> 1. Clean jet 2. Clean passage 3. Tighten - adjust - replace gasket 4. Check - adjust valve
Problem: Idling or low speed impaired	
Condition	Remedy
<ol style="list-style-type: none"> 1. Slow jet obstructed - loose 2. Slow jet outlet obstructed 3. Low speed fuel screw setting incorrect 4. Starter valve not fully closed 5. Float height incorrect 	<ol style="list-style-type: none"> 1. Clean - tighten jet 2. Clean outlet 3. Adjust screw 4. Adjust valve 5. Adjust float height
Problem: Medium or high speed impaired	
Condition	Remedy
<ol style="list-style-type: none"> 1. High RPM "cut out" against RPM limiter 2. Main jet obstructed 3. Needle jet obstructed 4. Throttle vacuum piston not operating properly 5. Filter obstructed 6. Float height incorrect 7. Starter valve not fully closed 	<ol style="list-style-type: none"> 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 7. Adjust valve
Problem: Overflow and fuel level fluctuations	
Condition	Remedy
<ol style="list-style-type: none"> 1. Float valve worn - damaged 2. Float valve spring broken 3. Float not working properly 4. Float valve dirty 5. Float height too high - too low 	<ol style="list-style-type: none"> 1. Replace valve 2. Replace spring 3. Adjust float height - replace float 4. Clean valve 5. Adjust float height

Electrical

Problem: Spark absent or weak	
Condition	Remedy
<ol style="list-style-type: none"> 1. Ignition coil defective 2. Spark plug defective 3. Magneto defective 4. CDI unit defective 5. Pick-up coil defective 	<ol style="list-style-type: none"> 1. Replace ignition coil 2. Replace plug 3. Replace magneto 4. Replace CDI unit 5. Replace pick-up coil
Problem: Spark plug fouled with carbon	
Condition	Remedy
<ol style="list-style-type: none"> 1. Mixture too rich 2. Idling RPM too high 3. Gasoline incorrect 4. Air cleaner element dirty 5. Spark plug incorrect (too cold) 6. Valve seals cracked - missing 7. Oil rings worn - broken 	<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Spark plug incorrect (too hot) 2. Engine overheats 3. Spark plug loose 4. Mixture too lean 	<ol style="list-style-type: none"> 1. Replace plug 2. Service cooling system 3. Tighten plug 4. Adjust carburetor

Problem: Magneto does not charge	
Condition	Remedy
<ol style="list-style-type: none"> 1. Lead wires/connections shorted - loose - open 2. Magneto coils shorted - grounded - open 3. Regulator/rectifier shorted - punctured 	<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Lead wires shorted - open - loose (at terminals) 2. Stator coils (magneto) grounded - open 3. Regulator/rectifier defective 4. Electrolyte low 5. Cell plates (battery) defective 	<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Internal battery short circuited 2. Regulator/rectifier resistor damaged - defective 3. Regulator/rectifier poorly grounded 	<ol style="list-style-type: none"> 1. Replace battery 2. Replace resistor 3. Clean - tighten ground connection
Problem: Charging unstable	
Condition	Remedy
<ol style="list-style-type: none"> 1. Lead wire intermittently shorting 2. Magneto internally shorted 3. Regulator/rectifier defective 	<ol style="list-style-type: none"> 1. Replace lead wire 2. Replace magneto 3. Replace regulator/rectifier
Problem: Starter button not effective	
Condition	Remedy
<ol style="list-style-type: none"> 1. Battery charge low 2. Switch contacts defective 3. Starter motor brushes not seating 4. Starter relay defective 5. Emergency stop - ignition switch off 6. Wiring connections loose - disconnected 	<ol style="list-style-type: none"> 1. Recharge - replace battery 2. Replace switch 3. Repair - replace brushes 4. Replace relay 5. Turn on switches 6. Connect - tighten - repair connections
Problem: Battery "sulfation" (Acidic white powdery substance or spots on surfaces of cell plates)	
Condition	Remedy
<ol style="list-style-type: none"> 1. Charging rate too low - too high 2. Battery electrolyte excessive - insufficient 3. Specific gravity too high - too low 4. Battery run-down - damaged 5. Electrolyte contaminated 	<ol style="list-style-type: none"> 1. Replace battery 2. Keep electrolyte to prescribed level 3. Charge battery - add distilled water 4. Replace battery 5. Recharge - replace battery
Problem: Battery discharges too rapidly	
Condition	Remedy
<ol style="list-style-type: none"> 1. Electrolyte contaminated 2. Specific gravity too high 3. Charging system (charging operation) not set properly 4. Cell plates overcharged - damaged 5. Battery short-circuited 6. Specific gravity too low 	<ol style="list-style-type: none"> 1. Replace battery 2. Charge battery - add distilled water 3. Check magneto - regulator/rectifier - circuit connections - adjust for specified charging operation 4. Replace battery - correct charging system 5. Replace battery 6. Recharge battery
Problem: Battery polarity reversed	
Condition	Remedy
<ol style="list-style-type: none"> 1. Battery incorrectly connected 	<ol style="list-style-type: none"> 1. Reverse connections - replace battery

Steering/Suspension

Problem: Handling too heavy or stiff	
Condition	Remedy
<ol style="list-style-type: none"> 1. Front wheel alignment incorrect 2. Lubrication inadequate 3. Tire inflation pressure incorrect 4. Tie rod ends seizing 5. Linkage connections seizing 	<ol style="list-style-type: none"> 1. Adjust alignment 2. Lubricate appropriate components 3. Adjust pressure 4. Replace tie rod ends 5. Repair - replace connections
Problem: Steering oscillation	
Condition	Remedy
<ol style="list-style-type: none"> 1. Tires inflated unequally 2. Wheel(s) wobbly 3. Wheel hub cap screw(s) loose - missing 4. Wheel hub bearing worn - damaged 5. Tie rod ends worn - loose 6. Tires defective - incorrect 7. A-arm bushings damaged 8. Bolts - nuts (frame) loose 	<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Tires inflated unequally 2. Front wheel alignment incorrect 3. Wheel hub bearings worn - broken 4. Frame distorted 5. Shock absorber defective 	<ol style="list-style-type: none"> 1. Adjust pressure 2. Adjust alignment 3. Replace bearings 4. Repair - replace frame 5. Replace shock absorber
Problem: Steering impaired	
Condition	Remedy
<ol style="list-style-type: none"> 1. Tire pressure too high 2. Steering linkage connections worn 3. Cap screws (suspension system) loose 	<ol style="list-style-type: none"> 1. Adjust pressure 2. Replace connections 3. Tighten cap screws
Problem: Tire wear rapid or uneven	
Condition	Remedy
<ol style="list-style-type: none"> 1. Wheel hub bearings worn - loose 2. Front wheel alignment incorrect 	<ol style="list-style-type: none"> 1. Replace bearings 2. Adjust alignment
Problem: Steering noise	
Condition	Remedy
<ol style="list-style-type: none"> 1. Caps screws - nuts loose 2. Wheel hub bearings broken - damaged 3. Lubrication inadequate 	<ol style="list-style-type: none"> 1. Tighten cap screws - nuts 2. Replace bearings 3. Lubricate appropriate components
Problem: Suspension too soft	
Condition	Remedy
<ol style="list-style-type: none"> 1. Spring(s) weak 2. Shock absorber damaged 	<ol style="list-style-type: none"> 1. Replace spring(s) 2. Replace shock absorber
Problem: Suspension too stiff	
Condition	Remedy
<ol style="list-style-type: none"> 1. A-arm-related bushings worn 	<ol style="list-style-type: none"> 1. Replace bushing
Problem: Suspension noisy	
Condition	Remedy
<ol style="list-style-type: none"> 1. Cap screws (suspension system) loose 2. A-arm-related bushings worn 	<ol style="list-style-type: none"> 1. Tighten cap screws 2. Replace bushings

Problem: Rear wheel oscillation	
Condition	Remedy
<ol style="list-style-type: none"> 1. Rear wheel hub bearings worn - loose 2. Tires defective - incorrect 3. Wheel rim distorted 4. Wheel hub cap screws loose 5. Axle shaft nut loose (Manual Transmission) 6. Auxiliary brake adjusted incorrectly 7. Rear suspension arm-related bushing worn 8. Rear shock absorber damaged 9. Rear suspension arm nut loose 	<ol style="list-style-type: none"> 1. Replace bearings 2. Replace tires 3. Replace rim 4. Tighten cap screws 5. Tighten nut (Manual Transmission) 6. Adjust brake 7. Replace bushing 8. Replace shock absorber 9. Tighten nut

Brakes

Problem: Braking poor	
Condition	Remedy
<ol style="list-style-type: none"> 1. Pad worn 2. Pedal free-play excessive 3. Brake fluid leaking 4. Hydraulic system leaking air 5. Master cylinder/brake cylinder seal worn 	<ol style="list-style-type: none"> 1. Replace pads 2. Adjust free-play 3. Repair - replace hydraulic system 4. Bleed hydraulic system 5. Replace seal(s)
Problem: Brake lever travel excessive	
Condition	Remedy
<ol style="list-style-type: none"> 1. Hydraulic system entrapped air 2. Brake fluid low 3. Brake fluid incorrect 4. Piston seal - cup worn 	<ol style="list-style-type: none"> 1. Bleed hydraulic system 2. Add fluid to proper level 3. Replace with correct fluid 4. Replace seal - cup
Problem: Brake fluid leaking	
Condition	Remedy
<ol style="list-style-type: none"> 1. Connection joints loose 2. Hose cracked 3. Piston seal worn 	<ol style="list-style-type: none"> 1. Tighten joints 2. Replace hose 3. Replace seal

NOTES

