
FOREWORD

This manual contains service, maintenance, and troubleshooting information for the 2003 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)
Ignition Coil Resistance (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)
Magneto Coil Resistance (charging)	0.44-0.66 ohm (yellow to yellow)
Magneto Coil Peak Voltage (trigger)	3.12-4.68 volts (black/yellow to green/white)
Magneto Coil Peak Voltage (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	3.4 L (3.5 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)

1

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) (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 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

CHASSIS

Dry Weight (approx)	2x4 - 248 kg (545 lb) 4x4 - 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 (2x4)	Front - AT23 x 8-12 Rear - AT25 x 10-12
Tire Size (4x4)	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 - 4x4)	275 ml (9.3 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 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*

(400 - Automatic Transmission)

CARBURETOR	
Type	Keihin CVK32
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 @ 3000 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 (primary/CDI) Voltage	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 (trigger) Voltage (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
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

CHASSIS (Cont)	
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 - KT25 x 8-12 Rear - KT25 x 10-12 - ACT Rear - KT25 x 11-12 - 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*

(400 - Manual Transmission)

1

CARBURETOR	
Type	Keihin CVK32
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 @ 3000 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)
Igniton 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)	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

CHASSIS (Cont)	
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 - KT25 x 8-12 Rear - KT25 x 10-12 - ACT Rear - KT25 x 11-12 - 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) (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 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 #1) (black to black #2)
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.)

CHASSIS (Cont)	
Brake Type	Hydraulic w/Brake Lever Lock and Auxiliary Brake
Wheelbase	127 cm (50 in.)
Tracking	89 cm (35 in.)
Tire Size	Front - KT25 x 8-12 Rear - KT25 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 - Automatic Transmission)

1

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) (secondary)	0.4-0.6 ohm (terminal to ground) 5200-7800 ohms (high tension - plug cap removed - to ground)
Igniton Coil Peak Voltage (primary/CDI)	142.4-213.6 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)	4.2-6.3 volts (green to blue) 0.40-0.62 volt (yellow to white) 9.44-14.2 volts (black to black #1) (black to black #2)
Magneto Output (approx)	325W @ 5000 RPM

CHASSIS

Dry Weight (approx)	293 kg (646 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 - KT25 x 8-12 Rear - KT25 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
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 TBX)

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) (secondary)	0.4-0.6 ohm (terminal to ground) 5200-7800 ohms (high tension - plug cap removed - to ground)
Igniton Coil Peak Voltage (primary/CDI)	142.4-213.6 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)	4.2-6.3 volts (green to blue) 0.40-0.62 volt (yellow to white) 9.44-14.2 volts (black to black #1) (black to black #2)
Magneto Output (approx)	325W @ 5000 RPM

CHASSIS

Dry Weight (approx)	331.5 kg (731 lb)
Length (overall)	244.5 cm (96.25 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	147 cm (58 in.)
Tracking	89 cm (35 in.)
Tire Size	Front - KT25 x 8-12 Rear - KT25 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
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.

1

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.

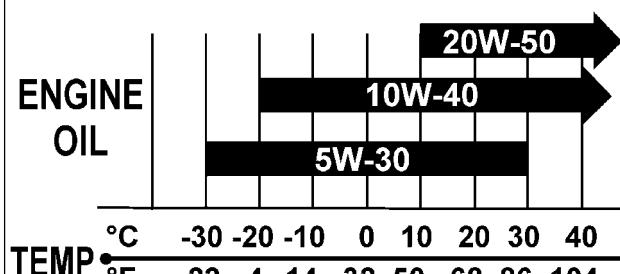
RECOMMENDED ENGINE/TRANSMISSION OIL

⚠ 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.

VISCOSITY CHART



OILCHART



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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.

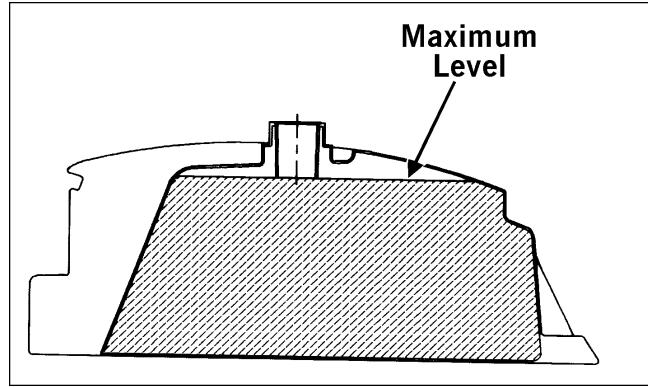
⚠ CAUTION

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.



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.
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. Inspect the air filter and air cleaner housing for obstructions.

1

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 200 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			R (4000 Mi or 18 Mo)
Muffler/Spark Arrestor						C	R
Gas/Vent Hoses		I					C
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		I		R*		R
Oil Strainer	I				I		C
Front Differential/Rear Drive Lubricant	I		I	I	I	R	
Clutch	I				I		A
Tires				I			R
Steering Components	I	I		I			R
V-Belt	I				I		R
Suspension (Ball joint boots, drive axle boots front and rear, tie rods, differential and rear drive bellows)				I*			R
Nuts/Cap Screws/Screws	I			I	I		A
Ignition Timing						I	
Headlight/Taillight- Brakelight	I	I					R
Switches		I					R
Reverse Shift Lever					I		A-L
Choke Cable				I	C-L		R
Recoil Starter	I						C-R
Handlebar Grips	I						R
Handlebars	I						R
Gauges/Indicators	I						R
Frame/Welds/Racks			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)

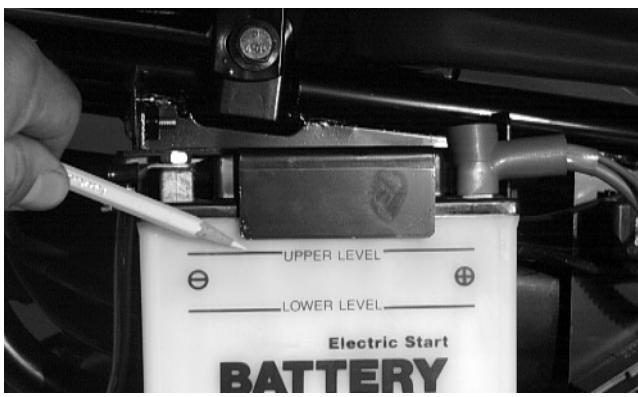
* Service/Inspect more frequently when operating in adverse conditions.

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
- E. Reverse Lever Cable End
- F. Idle RPM Screw (Carburetor)

Battery

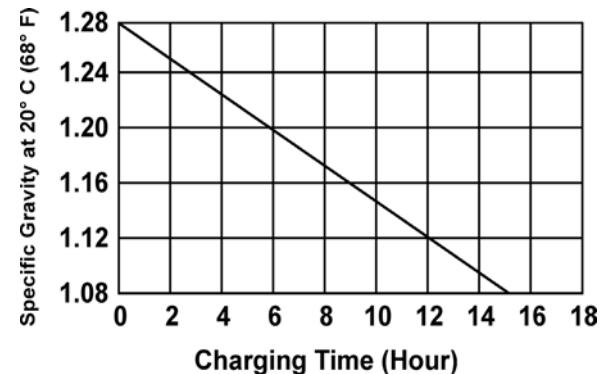


The level of the battery fluid must be kept between the upper and lower level lines at all times. If the level drops below the lower level line, add only **distilled water** until it reaches upper level line.

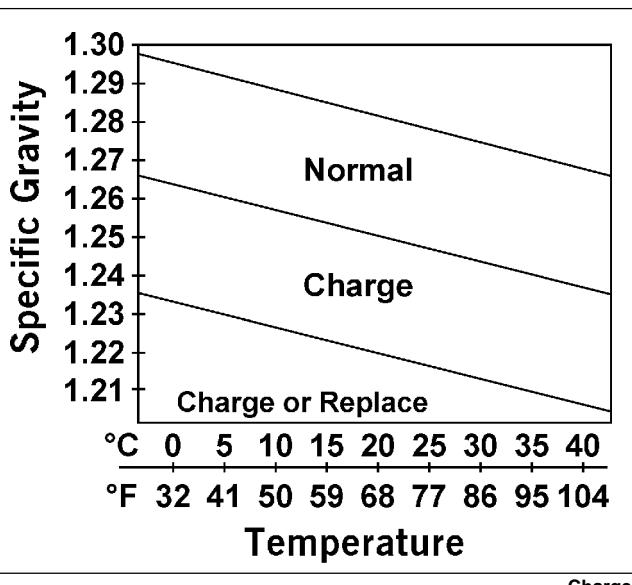
⚠ WARNING

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

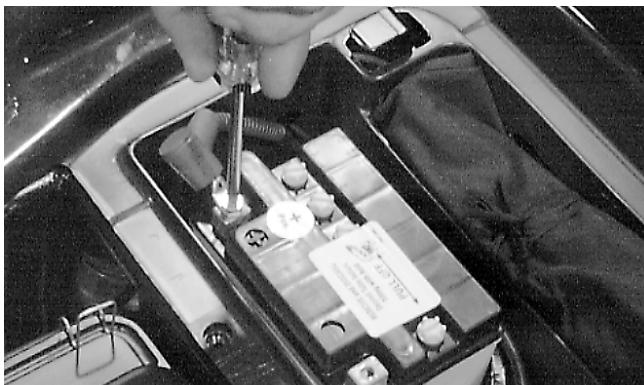
Never exceed the standard charging rate.

5. 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.

6. Place the battery into position in the ATV and secure with the hold-down bracket.
7. 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.
8. 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.

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

The remaining fuses are located in a fuse block under the center cover in the front fender assembly (on the 250/300) or under the seat (on the 400/500).

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

250/300	400/500
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

⚠ 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.

FUSES

The main (30 Amp) fuse is located in a fuse block on the frame near the right rear tire and protected by a snap-on cover.

1. Remove the seat.

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



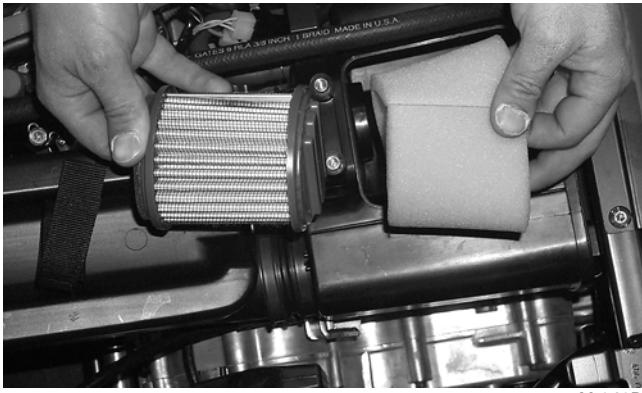
CH044D

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



CH045D

4. Remove the 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.

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

2



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.



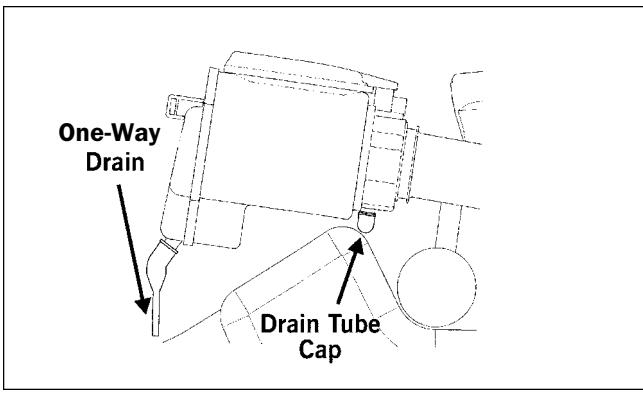
CH044D

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.

CAUTION

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



733-715B



CH044D

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.

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

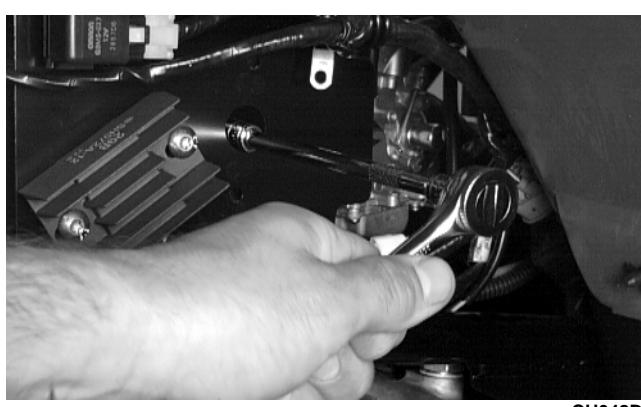


CH045D

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



CH047D



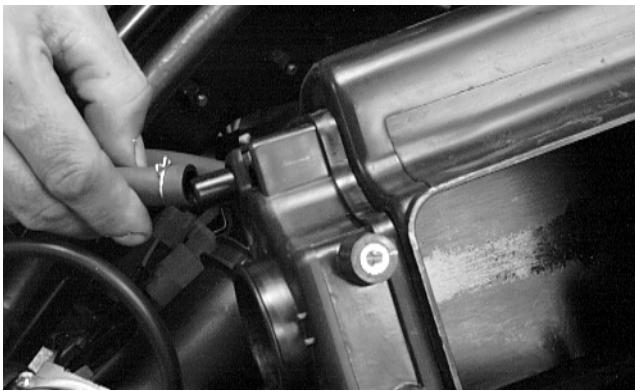
CH048D

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



CH049D

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



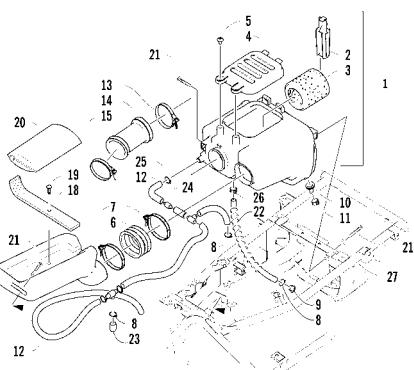
CH050D

7. Remove the air cleaner from the frame.

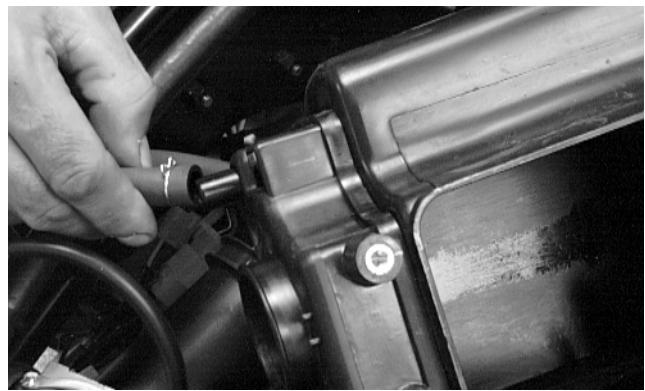
INSTALLING AIR CLEANER

KEY

- 1. Air Cleaner Assy
- 2. Retainer Slider
- 3. Filter
- 4. Cap
- 5. Cap Screw
- 6. Joint
- 7. Clamp
- 8. Clip
- 9. Drain Plug
- 10. Valve
- 11. Clamp
- 12. Breather Hose
- 13. Clamp
- 14. Boot
- 15. Clamp
- 16. Snorkel
- 17. Clip
- 18. Strap
- 19. Plug
- 20. Tool Kit
- 21. Cap Screw
- 22. Spring
- 23. Plug
- 24. Check Valve
- 25. Clip
- 26. Clamp
- 27. Lock Washer



0736-899



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

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

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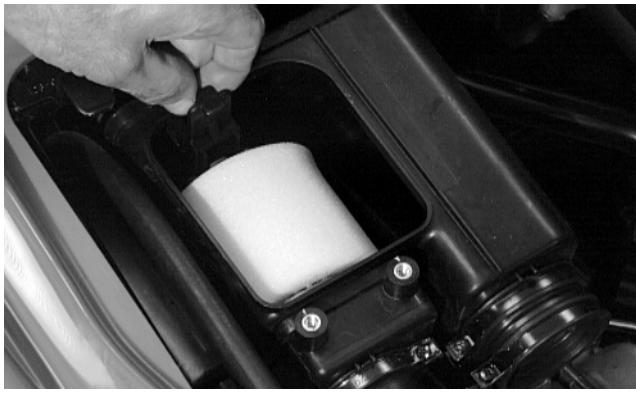
[Back to Section TOC](#)

2

Next

Back

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



CH040D

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

Air Cleaner/Filter (400/500)

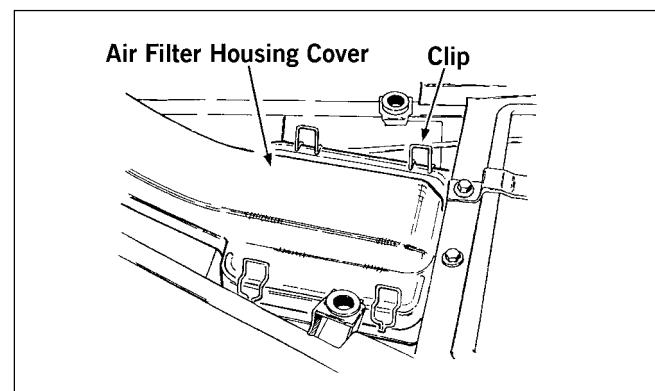
The air filter inside the air filter housing must be kept clean to provide good engine power and gas mileage. If the ATV is used under normal conditions, service the filter at the intervals specified. If operated in dusty, wet, or muddy conditions, inspect and service the filter more frequently. Use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

CLEANING AND INSPECTING FILTER

CAUTION

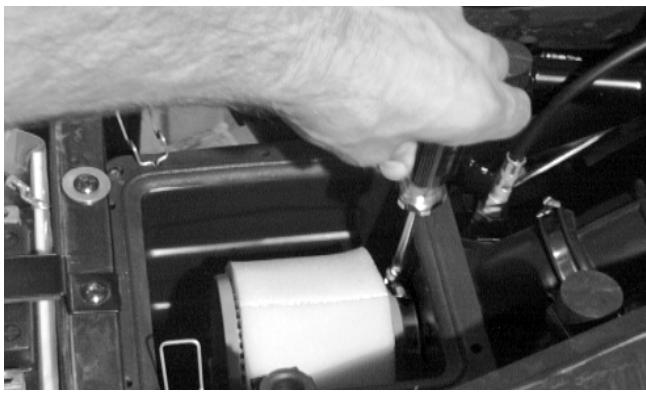
Failure to inspect the air filter frequently if the vehicle is used in dusty, wet, or muddy conditions can damage the engine.

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



733-444A

3. Loosen the clamp; then remove the filter.



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

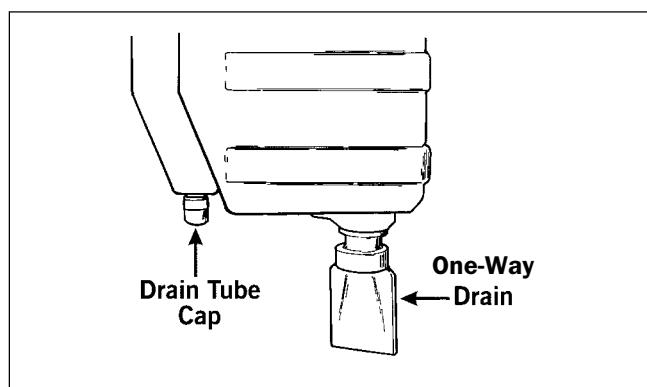
A torn air filter can cause damage to the ATV engine. Dirt and dust may get inside the engine if the element is torn. Carefully examine the element for tears before and after cleaning it. Replace the element with a new one if it is torn.

7. Clean any dirt or debris from inside the air cleaner. Be sure no dirt enters the carburetor.
8. Place the filter in the air filter housing making sure it is properly in position and properly seated and secure with the clamp.
9. 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

1. 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.

2. Inspect one-way drain beneath the main housing for debris and for proper sealing.



2

REMOVING AIR CLEANER

1. Remove the seat.
2. Remove the air cleaner cover from the retaining clips.



3. Loosen the clamp and remove the filter.

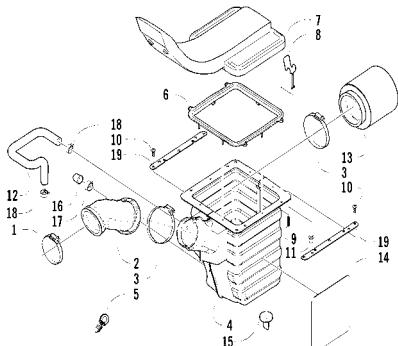


AF640DA

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

INSTALLING

KEY
1. Clamp
2. Boot
3. Clamp
4. Housing
5. Clip
6. Gasket
7. Snorkel
8. Clamp
9. Spring
10. Machine Screw
11. Expansion Nut
12. Vent Hose
13. Filter
14. Heat Shield
15. Valve
16. Drain Cap
17. Clamp
18. Clamp
19. Support



0736-950

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



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



7. 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.**

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.**

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

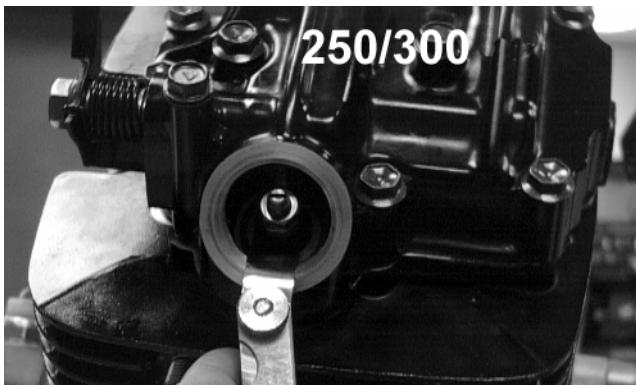
⚠ CAUTION

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

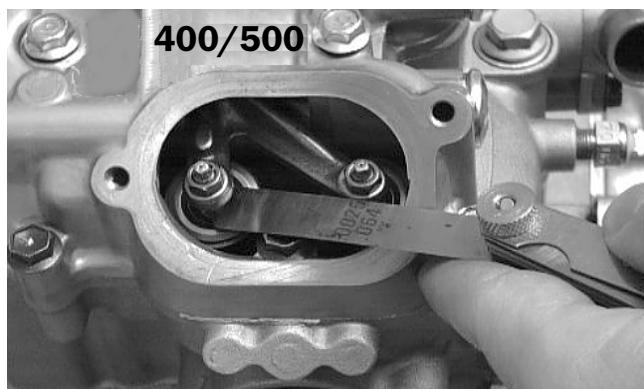
VALVE/TAPPET CLEARANCE (250)	
Intake	0.03-0.08 mm (0.001-0.003 in.)
Exhaust	0.08-0.13 mm (0.003-0.005 in.)

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 (0.007-0.009 in.)



CC409DA



CC007DA

4. Install the timing inspection plug.
5. 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.

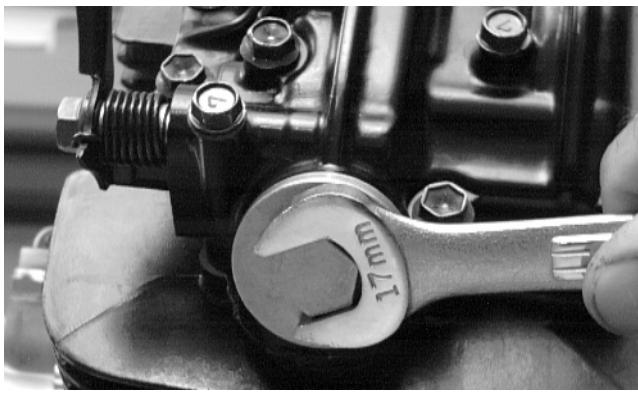
3. Place the valve adjuster onto the jam nut securing the tappet adjuster screw; then rotate the valve adjuster dial clockwise until the end is seated in the tappet adjuster screw.
4. While holding the valve adjuster dial in place, use the valve adjuster handle and loosen the jam nut; then rotate the 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.

2



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.

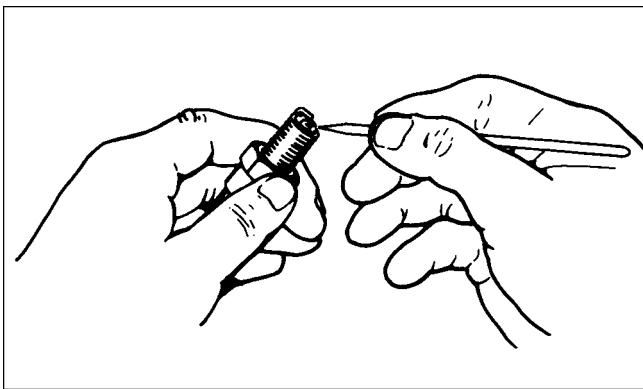
- Verify starter cranks engine over.
- Gauge is functioning properly.
- Throttle lever in the full-open position.
- Valve/tappet clearance correct.
- Valve bent or burned.
- Valve seat burned.

■ 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.

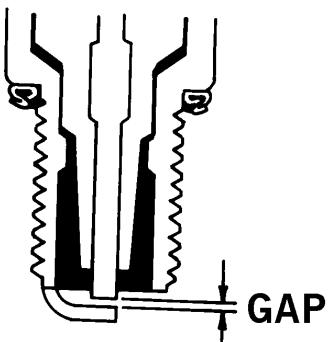


ATV-0051

⚠ 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 Arrestor

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.

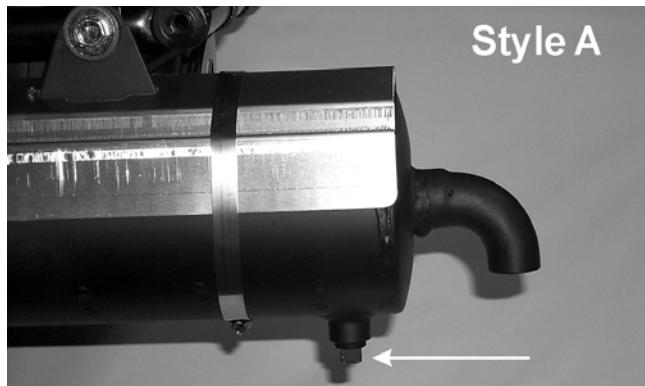
⚠ WARNING

Wait until the muffler cools to avoid burns.

■ NOTE: Determine which style muffler/spark arrester is being serviced and refer to the appropriate procedure.

STYLE A

- Shift the transmission into neutral and set the brake lever lock.
- Elevate the front of the ATV on a safety stand until the muffler is horizontal.
- Remove the plug from the bottom of the muffler.



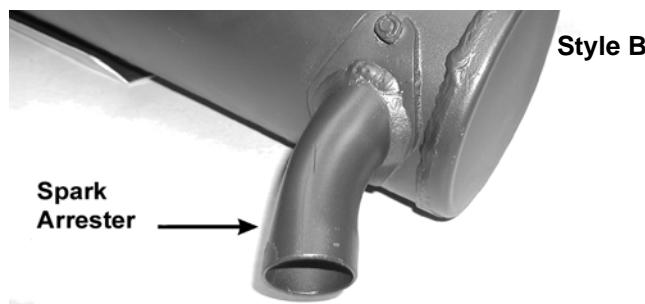
AN600A

2

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

STYLE B

- Remove the nuts securing the spark arrester; then remove the arrester.



AN616A

- Using a wire brush, remove carbon deposits from the arrester taking care not to damage the screen.

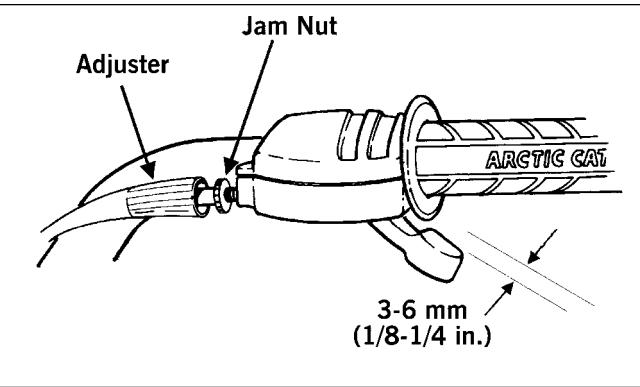


AN617

- Check the arrester screen for holes or tears, and check the condition of the gasket. Replace components as necessary.
- Install the spark arrester and nuts; tighten nuts to 1.1 kg-m (8 ft-lb).

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.



ATV-0047

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

Adjusting Throttle Cable

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

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



AL611D

- 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.

Adjusting Engine RPM (Idle)

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

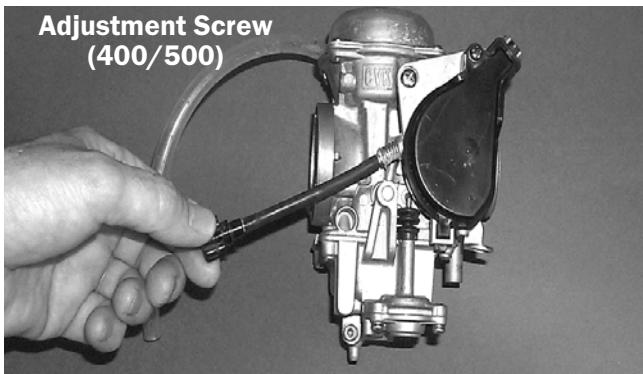
■ NOTE: To access the idle adjustment screw, it will be necessary to remove the seat on the 250/300 models. The idle adjustment screw is located on the right-hand side of the carburetor on the 400/500 models.

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

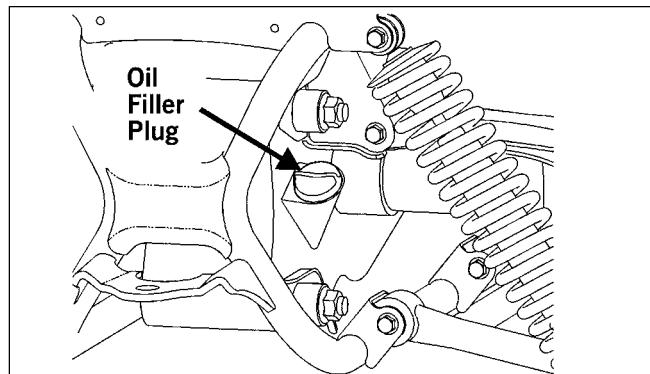


Adjustment Screw (250/300/400 Auto)

CC795B



AF920C



733-714A

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.

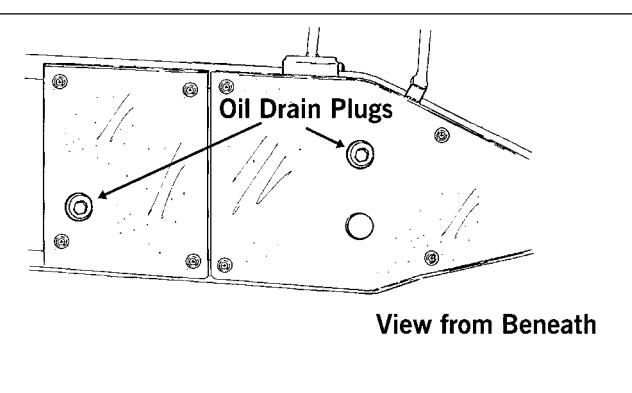
Engine/Transmission Oil - Filter - Strainer (250/300)

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.

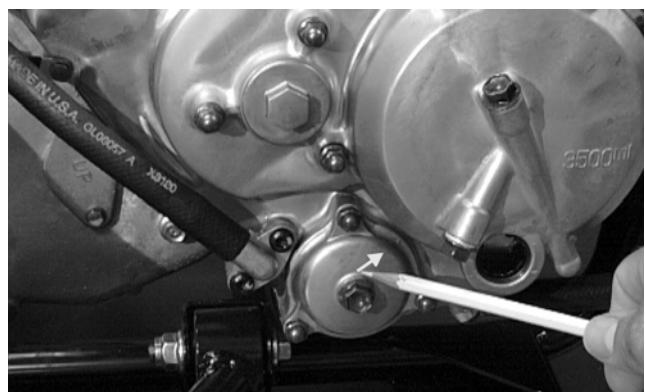
3. Remove both drain plugs from the bottom of the engine and drain the oil into a drain pan.



View from Beneath

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.



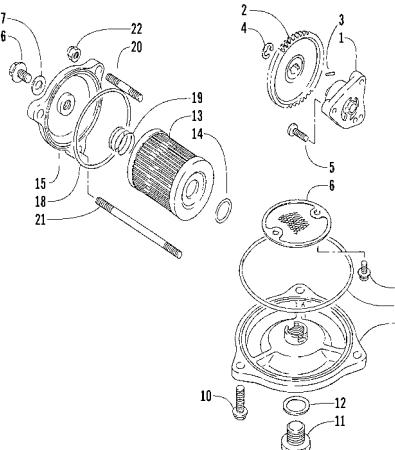
CH080DA

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

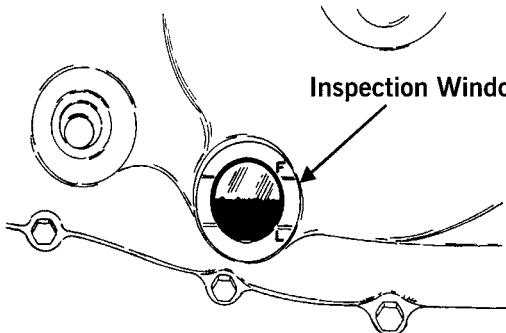
6. Apply oil to a new cover O-ring and check to make sure it is positioned correctly in the cover. With the open end of the filter element directed toward the center of the engine, slide the element into position.

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
21. Stud Bolt
22. Nut



0733-752

Inspection Window

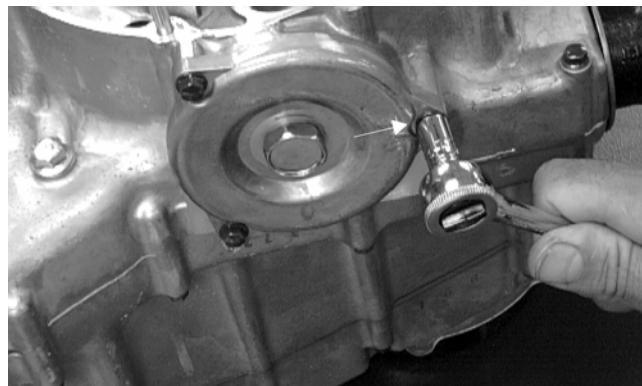
ATV-0074

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

STRAINER

To check the oil strainer, use the following procedure.

1. Remove the skid plate.
2. 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

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



CC443D

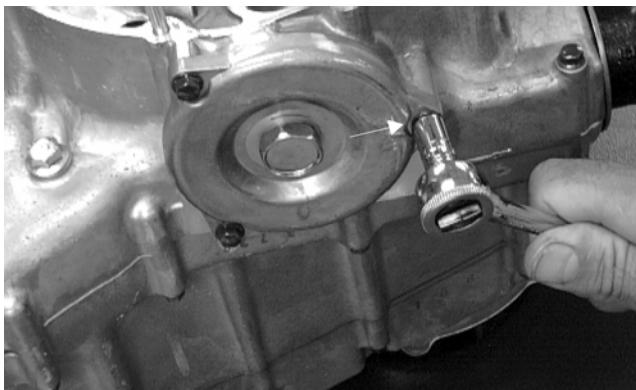
■ NOTE: To service the oil strainer, see Section 3.

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



CC443D

5. 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

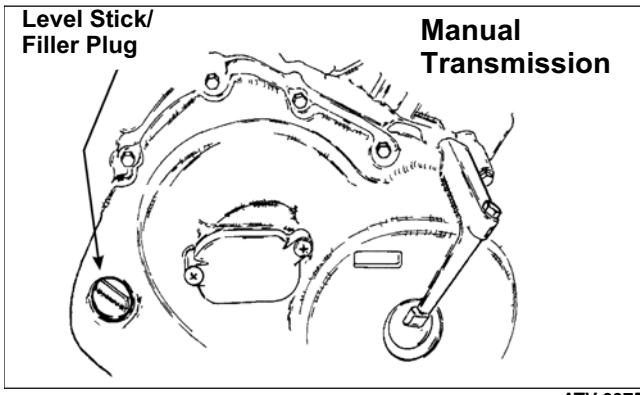
6. Install the skid plate.

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

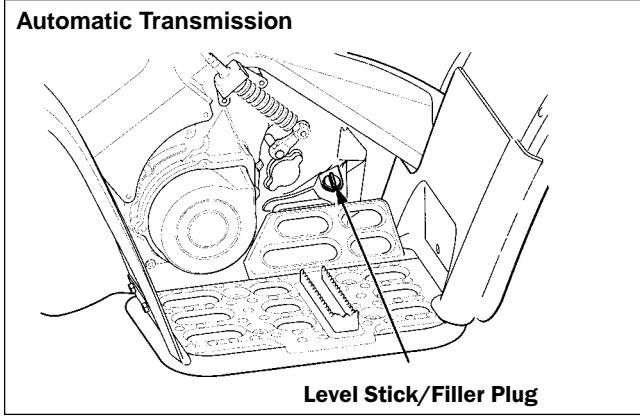
OIL - FILTER

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.

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



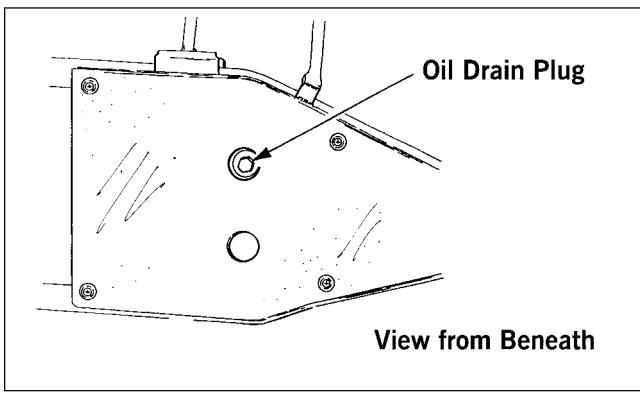
ATV-0075



2

0735-505

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



733-441A

4. 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.
5. 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.

6. Apply oil to a new filter O-ring and check to make sure it is positioned correctly; then install the new oil filter. Tighten securely.

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

7. Install the oil filter drain plug and tighten securely.
8. 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.

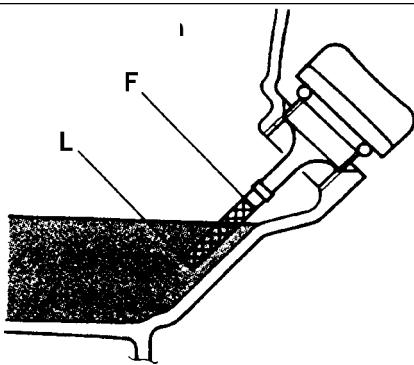
9. Start the engine (while the ATV is outside on level ground) and allow it to idle for a few minutes.
10. Turn the engine off and wait approximately one minute.
11. Unscrew the oil level stick and wipe it with a clean cloth.
12. Install the oil level stick until the threads touch engine case.

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

13. 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

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

STRAINER

To check the oil strainer, use the following procedure.

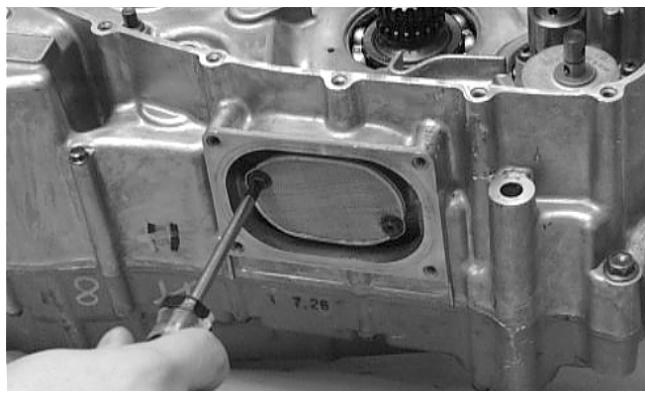
1. Remove the skid plate.

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



CC091D

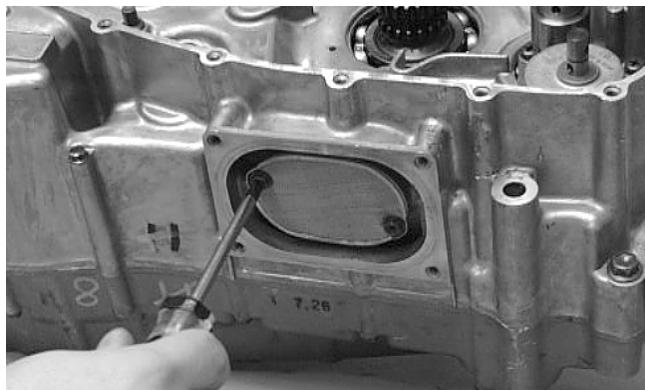
3. Remove the two Phillips-head cap screws securing the strainer.



CC163D

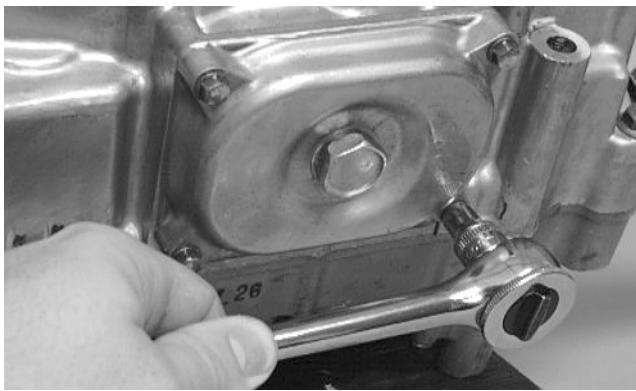
■ NOTE: To service oil strainer, see Section 3.

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



CC163D

5. 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

6. 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.

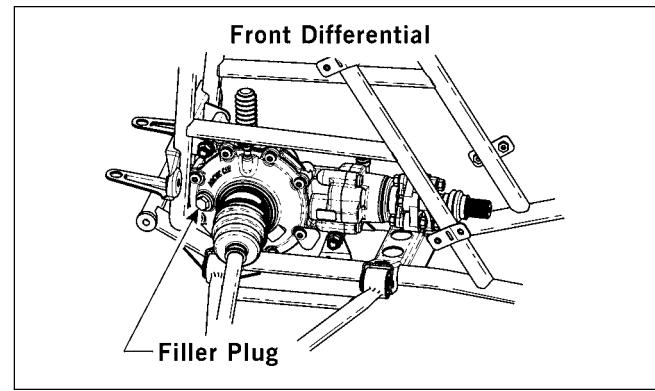
1. On FIS models, remove the rear drive filler plug; the lubricant level should be 1 in. below the threads of the plug. If low, add SAE approved 80W-90 hypoid gear lube as necessary.
2. On ACT models, remove the rear drive inspection plug; the lubricant level should be at the threads of the plug. If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



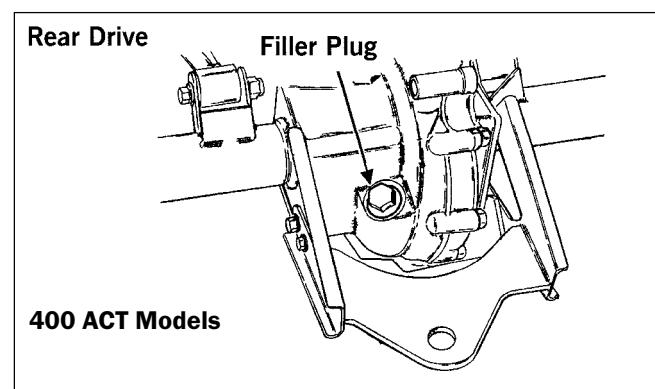
AF923A

To change the lubricant, use the following procedure.

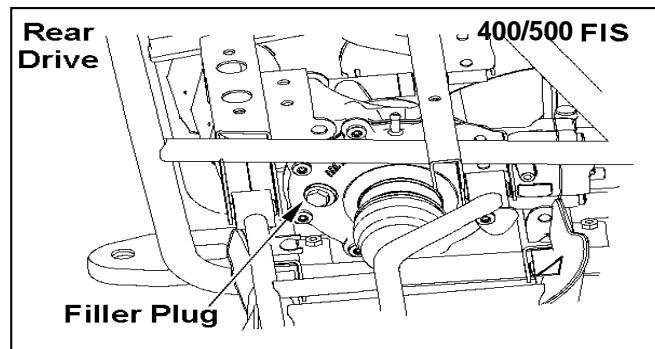
1. Place the ATV on level ground.
2. Remove each oil filler plug.



0736-568

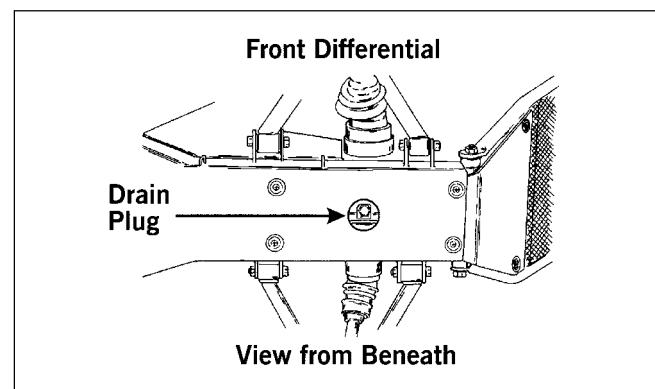


ATV-0077

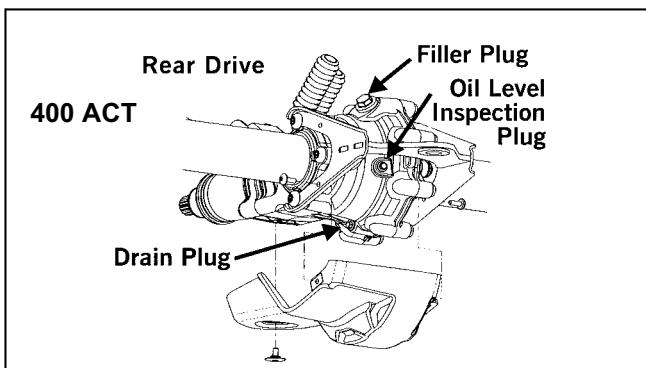


737-686A

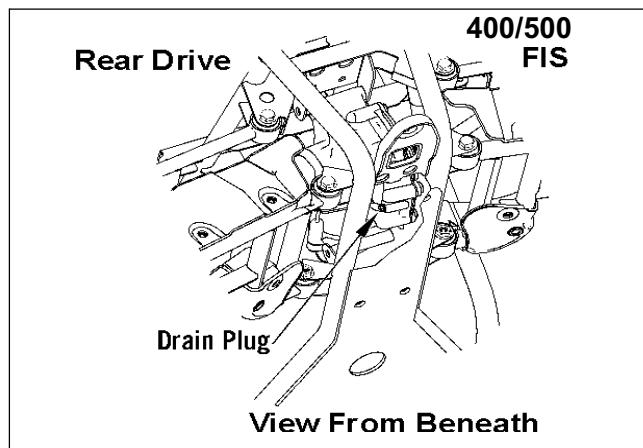
3. Drain the oil into a drain pan by removing in turn the drain plug from each.



ATV0082A



ATV-1096



737-651A

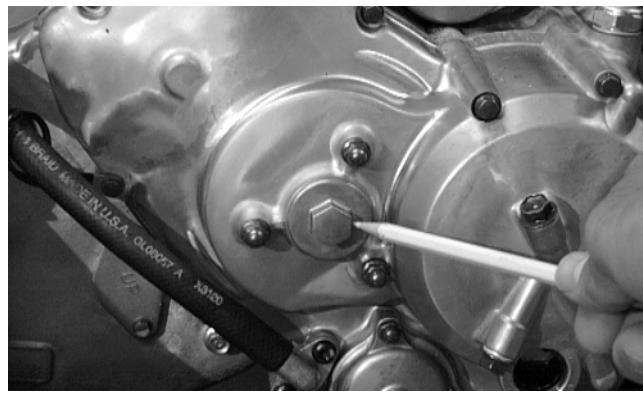
4. After all the oil has been drained, install the drain plugs and tighten to 0.5 kg-m (3.5 ft-lb).
5. Pour the appropriate amount of recommended oil into the filler hole.
6. Install the filler plugs.

■ 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.

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

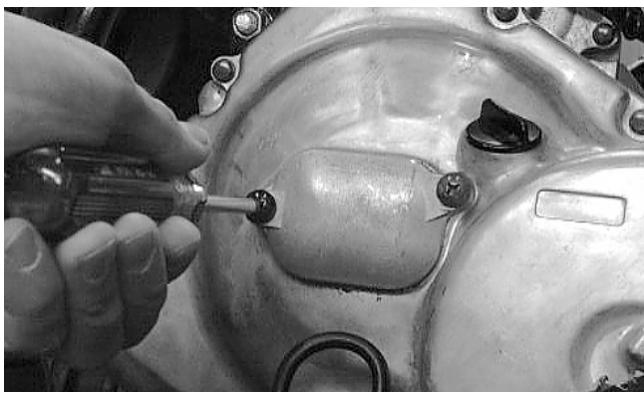
Adjusting Clutch (250/300)

To adjust the clutch, use the following procedure.

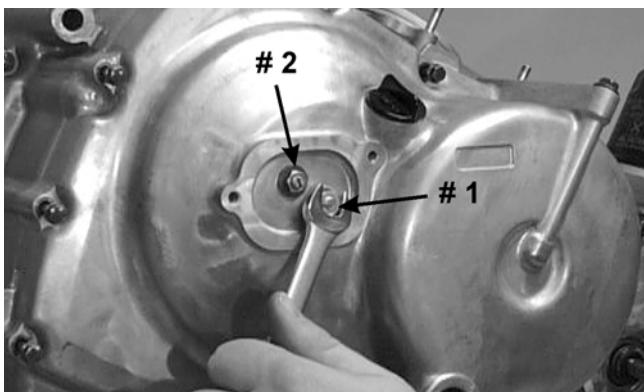
Adjusting Clutch (400/500 Manual Transmission)

To adjust the clutch, use the following procedure.

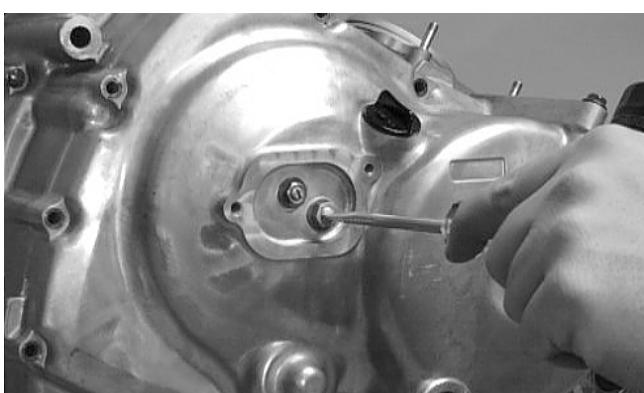
1. Using an impact driver, remove the screws securing the cover and remove the cover. Account for the O-ring.



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



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



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

2

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. Rubber 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 @ 3000
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.



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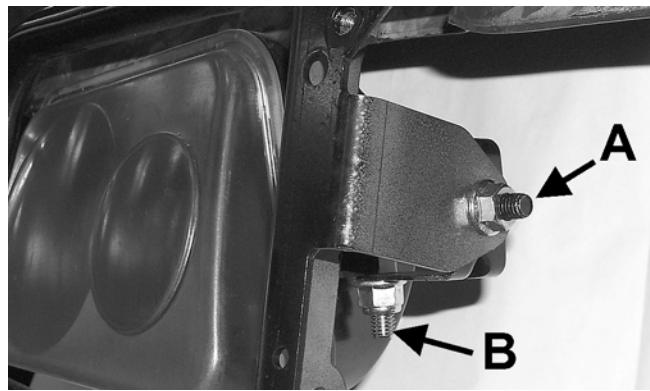
[Back to Section TOC](#)



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.



AF926A

CAUTION

Tighten the lens cover screws only until they are snug.

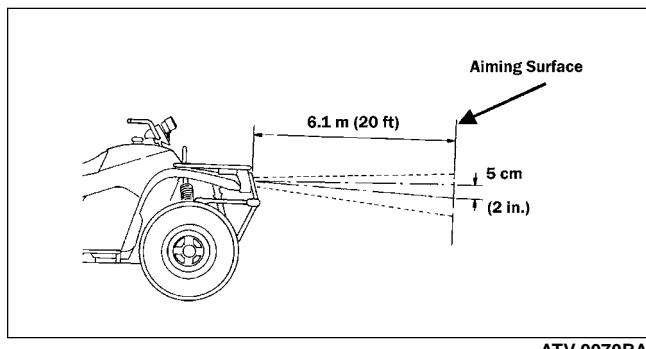
CHECKING/ADJUSTING HEADLIGHT AIM

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-0070BA

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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.

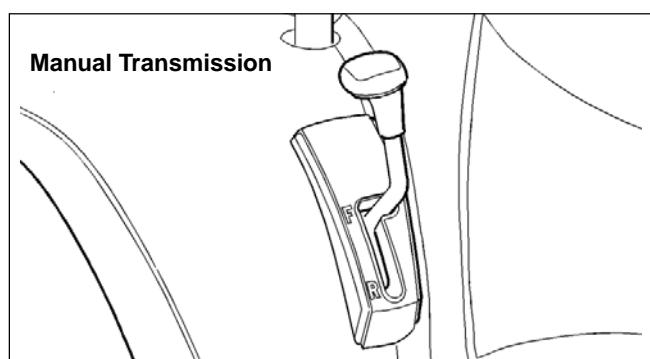
Switches

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

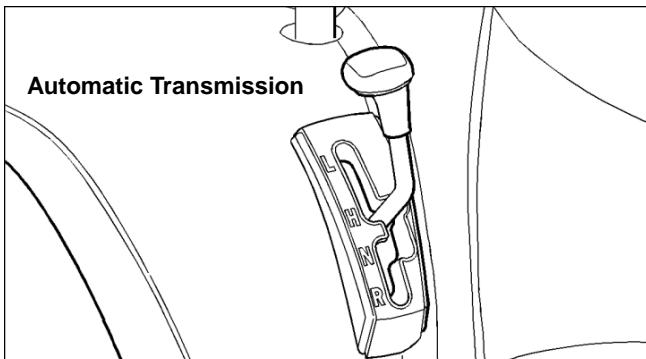
- A. Ignition switch — engine will start.
- B. Emergency stop switch — engine will stop.
- C. Reverse switch — reverse indicator light illuminates.
- D. Hi/Lo switch — headlight beam bright and dim.
- E. Brake switches — rear brakelight illuminates.

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

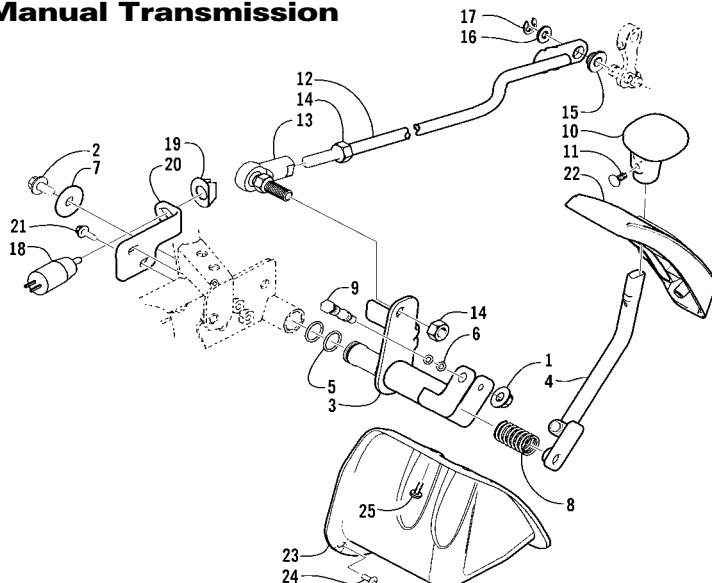
Never shift the ATV into reverse gear when the ATV is moving as it could cause the ATV to stop suddenly throwing the operator from the ATV.

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

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

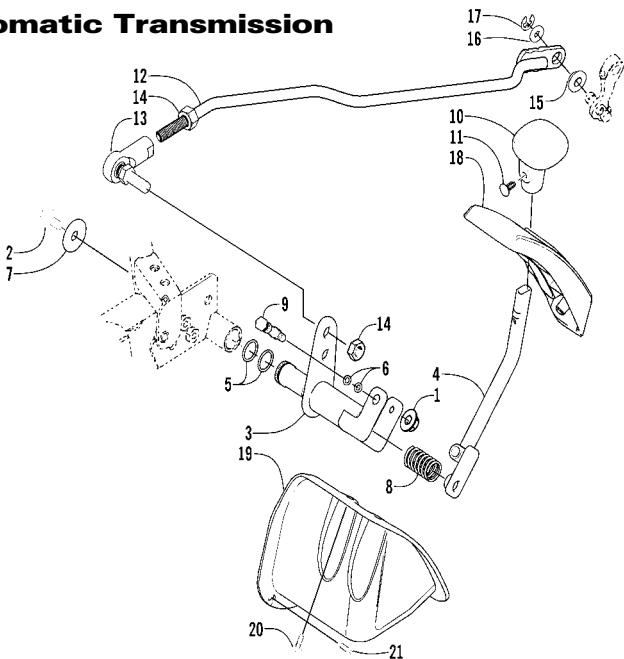
Manual Transmission



0737-593

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

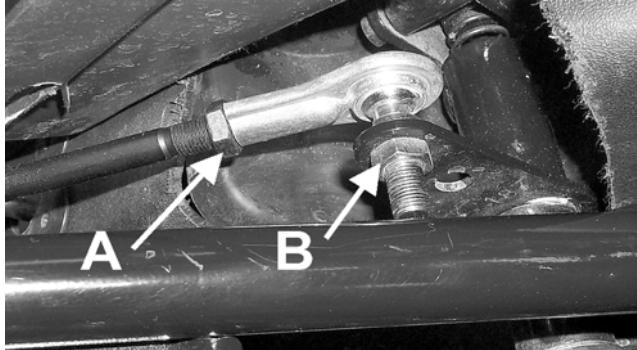
Automatic Transmission



0737-699

2

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).

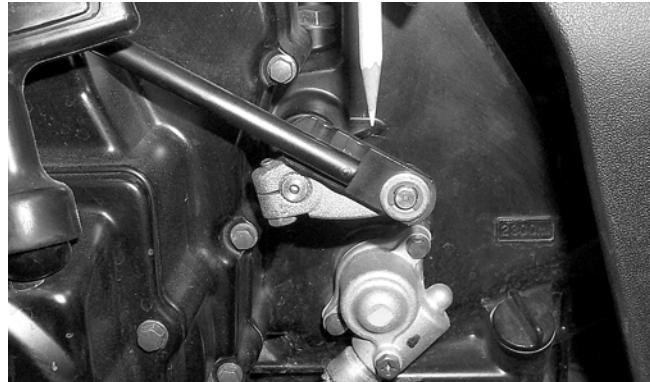


AF941A

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.



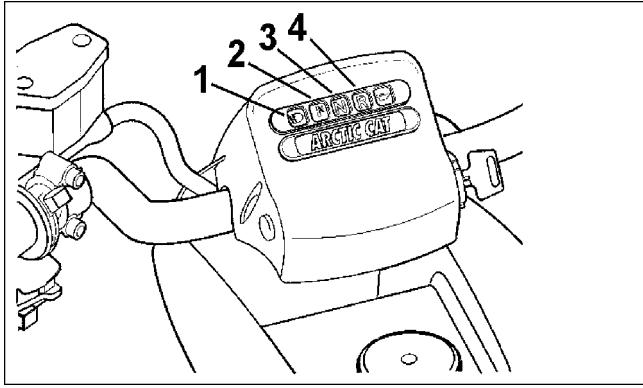
AF942

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

- 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.
- 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.

Coolant Temperature Switch	
OFF to ON	115° C (239° F) - Approx
ON to OFF	108° C (226° F) - Approx

- 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.
- 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.

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

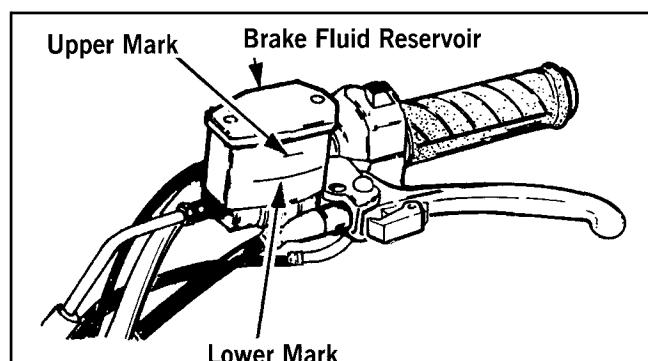
The electrical connections should be checked periodically for proper function. In case of an electrical failure, check fuses, connections (for tightness, corrosion, damage), and/or bulbs. If an electrical component needs to be tested for proper function, see Section 5.

Hydraulic Hand Brake System

CHECKING/BLEEDING

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

- With the master cylinder in a level position, check the fluid level. It must be above the lower mark and below the upper mark.



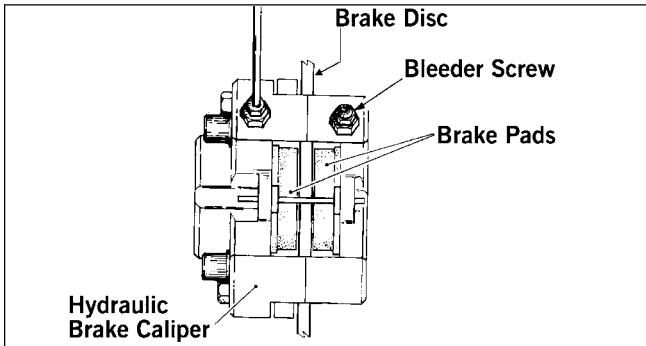
733-443C

- Compress the brake lever several times to check for a firm lever. If the lever is not firm, the brake system must be bled.
- To bleed the brake system, use the following procedure.

- A. Remove the cover and fill the master cylinder 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.



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730-434B

■ **NOTE:** During the bleeding procedure, watch the master cylinder reservoir very closely to make sure there is always a sufficient amount of brake fluid. If the fluid level gets below the bottom line on the reservoir, refill the reservoir before the bleeding procedure is continued.

- 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.

⚠ WARNING

Using the Operator's Manual as a guide, instruct the customer on the proper use, care, burnishing procedure, and maintenance of the hydraulic brake system.

2

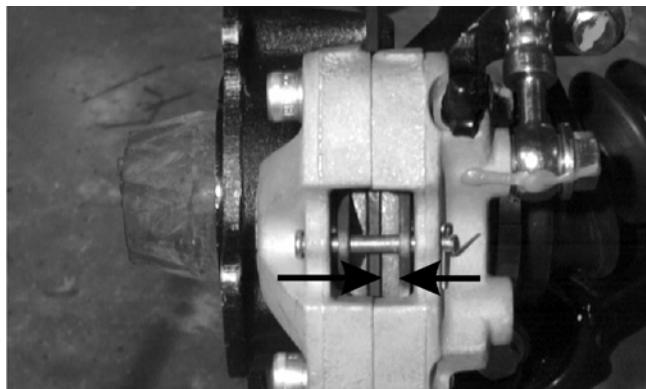
INSPECTING HOSES

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.

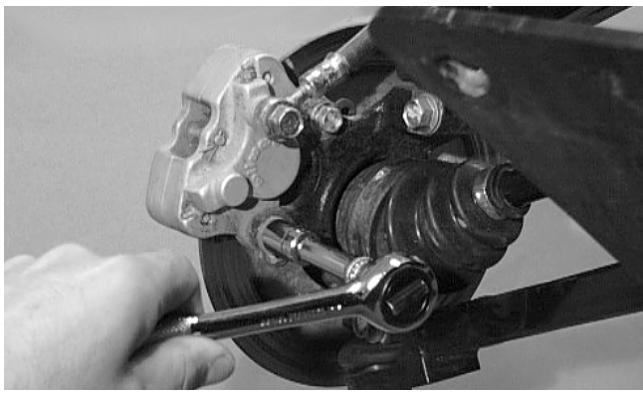


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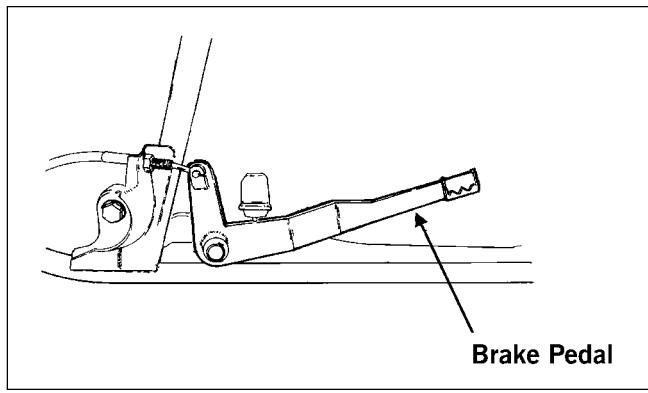
3. If thickness of either brake pad is less than 3.2 mm (0.125 in.), the brake pads must be replaced.

■ **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.

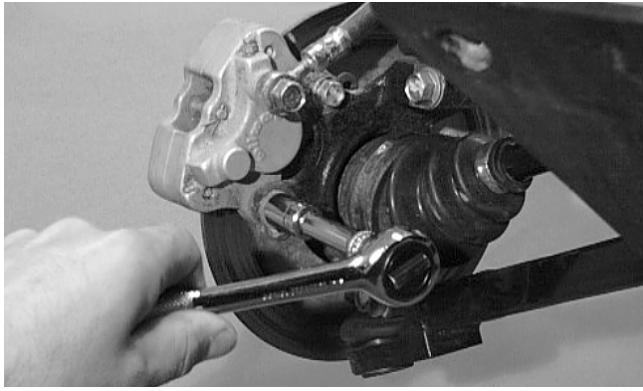


AF615D



ATV0088D

- 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.

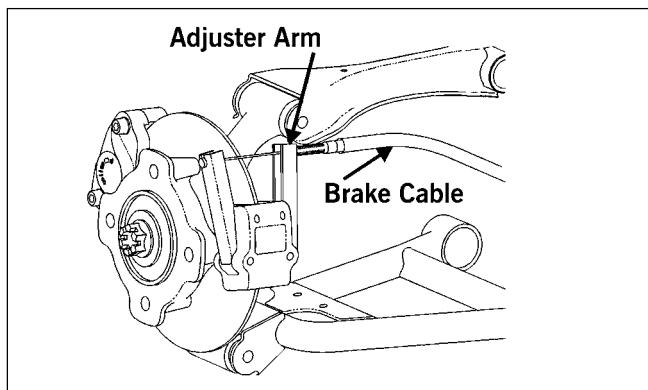
2. If the rear wheels are locked, it is adjusted properly.
3. If the rear wheels are not locked, it must be adjusted (set up).

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.

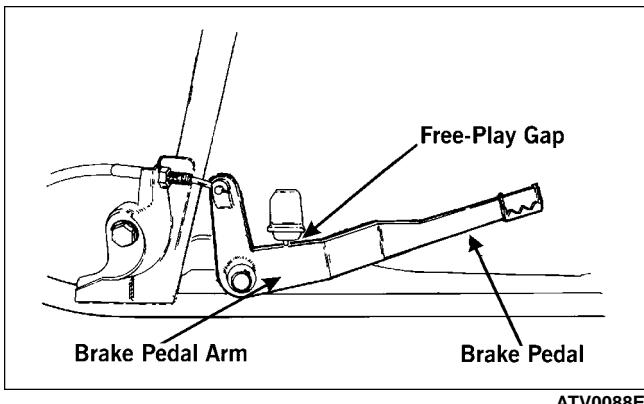
1. Loosen the right-hand jam nut (wheel-side when viewing from behind) of the adjuster arm.



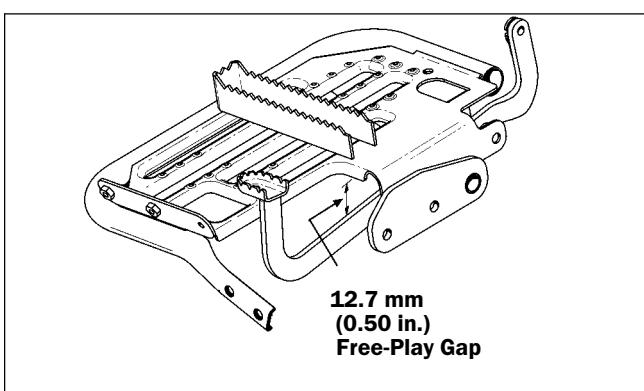
733-730B

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.



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



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.
2. ■ **NOTE:** The metal backing of the pad will be facing the adjuster arms when installed properly.
3. 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).
4. Install the wheel and secure. Tighten to 5.5 kg-m (40 ft-lb).
5. Adjust the brake (see Adjusting in this sub-section).
6. 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).

2

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

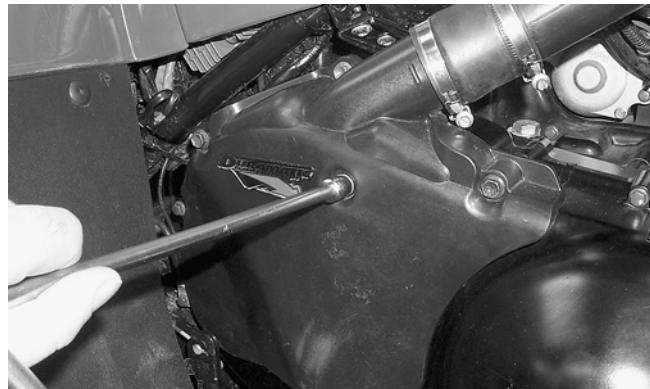
1. Remove the right-side footrest (see Section 8).

2. Loosen the clamp securing the cooling shroud to the cooling duct.



AF931

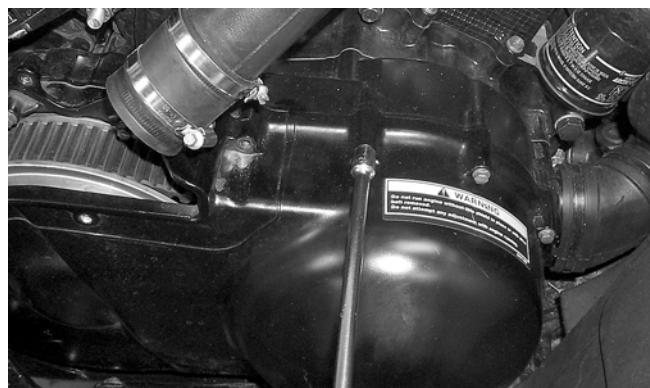
3. Remove the cap screws securing the cooling shroud to the V-belt cover; then remove the cooling shroud.



AF932

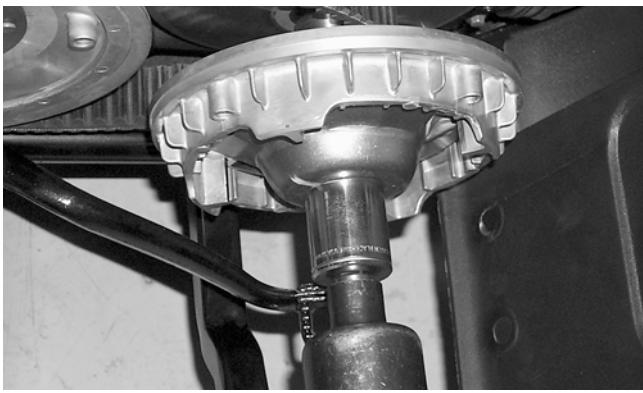
4. Remove the cap screws securing the V-belt cover noting the location of the different-lengthed cap screws for installing purposes; then using a rubber mallet, gently tap on the cover tabs to loosen the cover. Remove the cover.

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

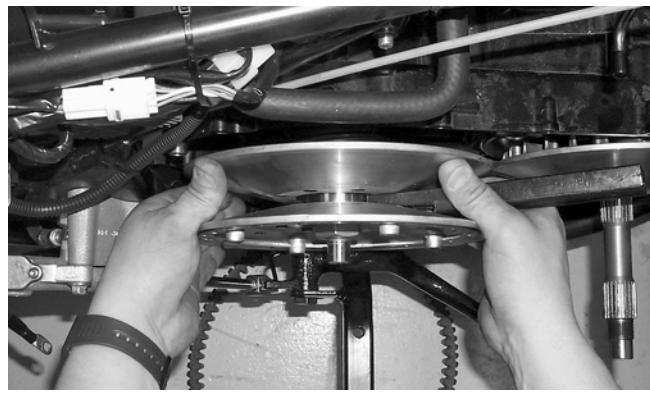


AF933

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



CC546

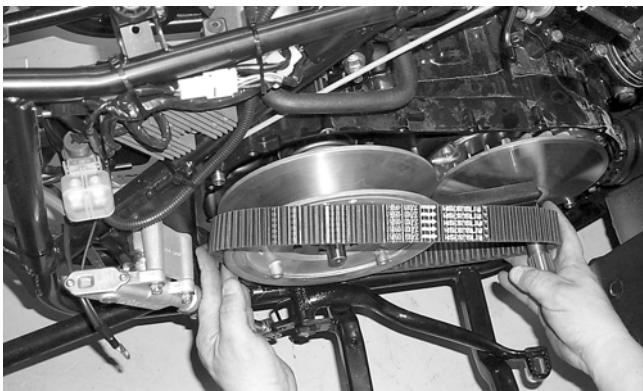


CC549



CC547

6. Remove the V-belt.



CC550

2



CC550

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

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

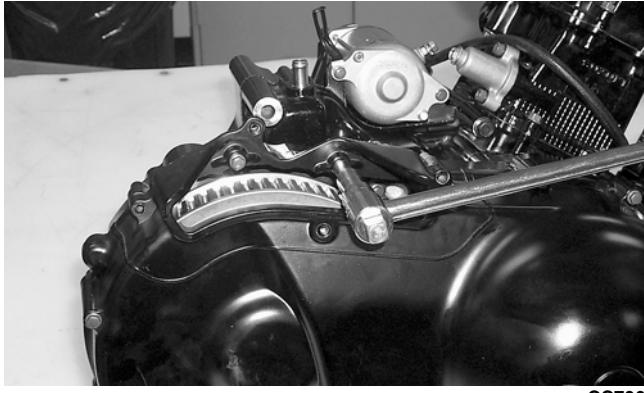


CC552

■ **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).



8. Secure the front fender to the footrest with the two cap screws. Tighten securely.

9. Install the right-side footrest (see Section 8).

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

6. Place the cooling shroud into position on the V-belt cover; then secure with cap screws. Tighten securely.
7. Tighten the clamp securing the cooling shroud to the cooling duct.



SECTION 3 - ENGINE/TRANSMISSION

3

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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) (exhaust)	33 mm (1.3 in.) 28 mm (1.1 in.)
Valve/Tappet Clearance (cold engine)	(intake) (exhaust) (exhaust)	0.03-0.08 mm (0.001-0.003 in.) 0.08-0.13 mm (0.003-0.005 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 (0.0012-0.0024 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) (exhaust)	5.475-5.490 mm (0.2156-0.2161 in.) 5.455-5.470 mm (0.2148-0.2154 in.)
Valve Stem Runout	(max)	0.05 mm (0.002 in.)
Valve Head Thickness	(max)	0.5 mm (0.02 in.)
Valve Stem End Length	(max)	2.7 mm (0.11 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 (max)	(inner) (outer)	35.1 mm (1.38 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)
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) (exhaust)	33.820 mm (1.331 in.) 33.490 mm (1.318 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.)
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 (2.700 in.) 66 mm** (2.598 in.)**
Piston Diameter		68.380 mm (2.6921 in.)
18 mm (0.71 in.) from Skirt End		
Piston Ring Free End Gap	(1st ring) (2nd ring)	6.2-7.8 mm (0.24-0.31 in.) 7.3-9.1 mm (0.29-0.36 in.)
Bore x Stroke		68.5 x 76 mm (2.69 x 2.99 in.) 66 x 72 mm** (2.60 x 2.84 in.)**
Cylinder Trueness	(max)	0.05 mm (0.002 in.)
Piston Ring End Gap - Installed	(1st ring) (max)	0.70 mm (0.0276 in.)
(2nd ring)		1.0 mm (0.039 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)	1.01-1.04 mm (0.040-0.041 in.) 1.22-1.24 mm (0.048-0.049 in.) 2.01-2.03 mm (0.079-0.080 in.)
Piston Ring Thickness	(1st) (2nd)	0.97-0.99 mm (0.038-0.039 in.) 1.17-1.19 mm (0.046-0.047 in.)
Piston Pin Bore	(max)	17.03 mm (0.6705 in.)
Piston Pin Outside Diameter	(min)	16.98 mm (0.6685 in.)

CRANKSHAFT

Connecting Rod (small end inside diameter)	(max)	17.040 mm (0.6709 in.)
Connecting Rod (big end side-to-side)		0.1-1.0 mm (0.004-0.039 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 (2.161-2.169 in.)
Crankshaft Runout (max)	(left) (right)	0.05 mm (0.002 in.) 0.08 mm (0.003 in.)
Oil Pump Reduction Ratio		1.566 (47/30)
Oil Pressure at 60°C (140°F) @ 3000 RPM	(above) (below)	0.7 kg/cm² (10 psi) 2.8 kg/cm² (40 psi)

CLUTCH

Clutch Release Screw	1/8 turn back
Drive Plate (fiber) Thickness (min)	2.42 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	1900 ± 200
Clutch Lock-Up RPM	3400 ± 300
Primary Reduction Ratio	3.150 (63/20)
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)
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 Width (#1, #2, & #3)	4.5-4.6 mm (0.177-0.181 in.)
(secondary transmission - #1 & #2)	5.45-5.55 mm (0.215-0.219 in.)
(reverse)	4.0-4.1 mm (0.157-0.161 in.)
Shift Fork Thickness (#1, #2, & #3)	4.3-4.4 mm (0.169-0.173 in.)
(secondary transmission - #1 & #2)	5.3-5.4 mm (0.209-0.213 in.)
(reverse)	3.8-3.9 mm (0.150-0.154 in.)
Engine Oil Thermo-Switch Operating Temperature (off↔on)	160°C (320°F)
(on↔off)	140°C (284°F)

* Specifications subject to change without notice.

**250

Specifications* **(400 - 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.) 0.22-0.27 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	(max)	0.5 mm (0.02 in.)
Valve Stem End Length	(max)	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	(max)	38.8 mm (1.53 in.)
Valve Spring Tension @ 31.5 mm (1.24 in.)	(outer)	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 Holder Inside Diameter (right & center)	(left)	22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal Outside Diameter (right & center)	(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	0.060-0.073 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 (max)	0.50 mm (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) 1.01-1.03 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 (small end inside diameter) (max)	20.04 mm (0.7889 in.)
Connecting Rod (big end side-to-side)	0.1-1.0 mm (0.004-0.039 in.)
Connecting Rod (big end width)	21.95-22.00 mm (0.8642-0.8661 in.)
Connecting Rod (small end deflection) (max)	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 Pump Reduction Ratio	1.59 (29/20)
Oil Pressure at 60°C (140°F) @ 3000 RPM (above) (below)	1.1 kg/cm² (16 psi) 1.5 kg/cm² (21 psi)
Engine Oil Thermo-Switch Operating Temperature (off→on) (on→off)	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 (cold engine)	(intake) (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 (max)		0.5 mm (0.02 in.)
Valve Stem End Length (max)		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 (max)		38.8 mm (1.53 in.)
Valve Spring Tension @ 31.5 mm (1.24 in.) (outer)		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 Holder Inside Diameter (right & center) (left)		22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal Outside Diameter (right & center) (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	0.060-0.073 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 (max)	0.50 mm (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) 1.01-1.03 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 (small end inside diameter) (max)	20.04 mm (0.7889 in.)
Connecting Rod (big end side-to-side)	0.1-1.0 mm (0.004-0.039 in.)
Connecting Rod (big end width)	21.95-22.00 mm (0.8642-0.8661 in.)
Connecting Rod (small end deflection) (max)	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 Pump Reduction Ratio	1.59 (29/20)
Oil Pressure at 60°C (140°F) @ 3000 RPM (above) (below)	0.6 kg/cm² (9 psi) 1.0 kg/cm² (14 psi)
Engine Oil Thermo-Switch Operating Temperature (off↔on) (on↔off)	160°C (320°F) 140°C (284°F)

CLUTCH	
Clutch Release Screw	1/4 - 1/2 turn back
Drive Plate (fiber) Thickness (min)	2.62 mm (0.103 in.)
Drive Plate (fiber) Tab	13-14 mm (0.50-0.55 in.)
Driven Plate (warpage) (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 3800 - 4400
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)	2.453 (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) (max)	0.2 mm (0.008 in.)
Reverse Fork to Groove (side clearance)	0.1-0.3 mm (0.004-0.012 in.)
Shift Fork Groove Width (#1and #2) (secondary transmission) (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	(max)	0.5 mm (0.02 in.)
Valve Stem End Length	(max)	1.8 mm (0.07 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	(max)	38.8 mm (1.53 in.)
Valve Spring Tension @ 31.5 mm (1.24 in.)	(outer)	18.6-21.4 kg (41-47 lb)

CAMSHAFT AND CYLINDER HEAD

Cam Lobe Height (min)	(intake) (exhaust)	33.150 mm (1.305 in.) 33.220 mm (1.308 in.)
Camshaft Journal Oil Clearance	(max)	0.15 mm (0.0059 in.)
Camshaft Journal Holder Inside Diameter	(right & center) (left)	22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal Outside Diameter	(right & center) (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.)
Cam Chain Length	(max)	278.4 mm (30.9 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)	11.2 mm (max) (0.4409 in.) 11.9 mm (max) (0.4685 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		0.10-0.25 mm (0.0039-0.0098 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)		0.10-0.45 mm (0.0039-0.0177 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 Pump Reduction Ratio		1.45 (29/20)
Oil Pressure at 60°C (140°F) @ 3000 RPM	(above) (below)	1.2 kg/cm² (17 psi) 1.6 kg/cm² (23 psi)
Cooling Fan Thermo-Switch Operating Temperature	(off↔on) (on↔off)	88° C (190° F) 82° C (179.6° F) (min)
Engine Coolant Thermo-Switch Operating Temperature	(off↔on) (on↔off) (Approx)	115°C (239°F) 108°C (226°F) 108°C (226°F) (Approx)

* Specifications subject to change without notice.

Specifications*

(500 - 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 (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	(max)	0.5 mm (0.02 in.)
Valve Stem End Length	(max)	1.8 mm (0.07 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	(max)	38.8 mm (1.53 in.)
Valve Spring Tension @ 31.5 mm (1.24 in.)	(outer)	18.6-21.4 kg (41-47 lb)

CAMSHAFT AND CYLINDER HEAD

Cam Lobe Height (min)	(intake) (exhaust)	33.150 mm (1.305 in.) 33.220 mm (1.308 in.)
Camshaft Journal Oil Clearance	(max)	0.15 mm (0.0059 in.)
Camshaft Journal Holder Inside Diameter	(right & center) (left)	22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.)
Camshaft Journal Outside Diameter	(right & center) (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.)
Cam Chain Length	(max)	278.4 mm (30.9 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)	11.2 mm (max) (0.4409 in.) 11.9 mm (max) (0.4685 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		0.10-0.25 mm (0.0039-0.0098 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)		0.10-0.45 mm (0.0039-0.0177 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 Pump Reduction Ratio		1.45 (29/20)
Oil Pressure at 60°C (140°F) @3000 RPM	(above) (below)	1.2 kg/cm² (17 psi) 1.6 kg/cm² (23 psi)

CLUTCH	
Clutch Release Screw	1/4-1/2 turn back
Drive Plate (fiber) Thickness (min)	2.92-3.08 mm (0.1149-0.1212 in.)
Drive Plate (fiber) Tab	13.05 mm (min) (0.5137 in.)
Driven Plate (warpage) (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	3600 ± 300
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)	2.363 (22/23 x 28/17 x 42/28) 1.5 (42/28)
Gear Ratios (1st) (2nd) (3rd) (4th) (5th) (reverse)	3.09 (34/11) 1.75 (28/16) 1.2 (24/20) 0.956 (22/23) 0.8 (20/25) 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 (max) to Groove (side clearance)	0.2 mm (0.008 in.)
Reverse Fork to Groove (max) (side clearance)	0.2 mm (0.008 in.)
Shift Fork Groove (#1and #2) Width (secondary transmission) (reverse)	5.5-5.6 mm (0.217-0.220 in.) 5.4-5.5 mm (0.213-0.217 in.) 4.9-5.0 mm (0.193-0.197 in.)
Shift Fork (#1 and #2) Thickness (secondary transmission) (reverse)	5.3-5.4 mm (0.209-0.213 in.) 5.3-5.4 mm (0.209-0.213 in.) 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.) @ 65°C (149°F)
Cooling Fan Thermo-Switch Operating Temperature	(off↔on) 88°C (190°F) (on↔off) 82°C (179.6°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.

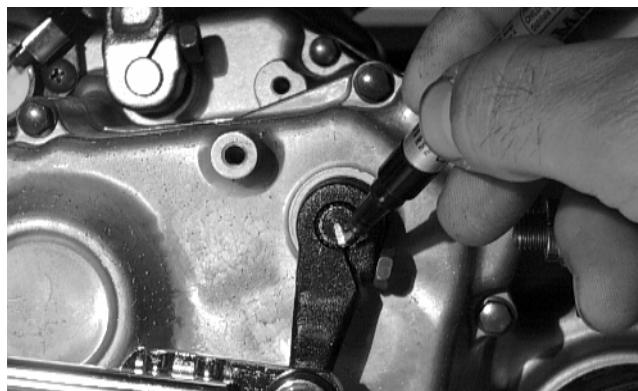
CAUTION

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.



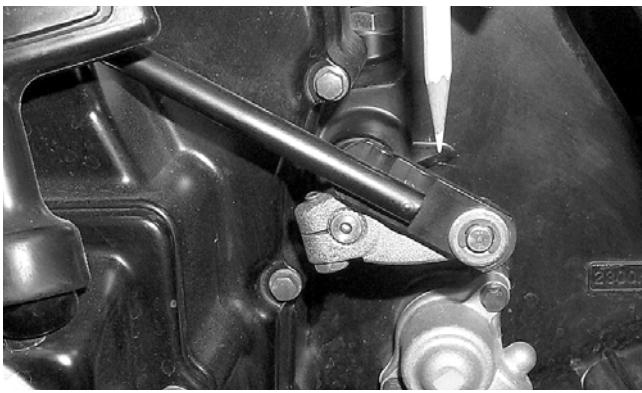
CH057D

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.



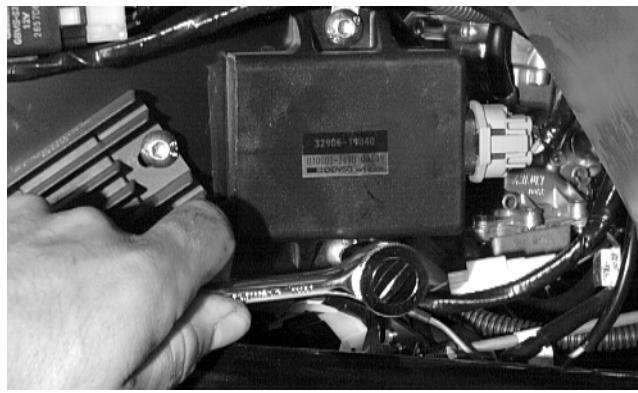
CH041D

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.

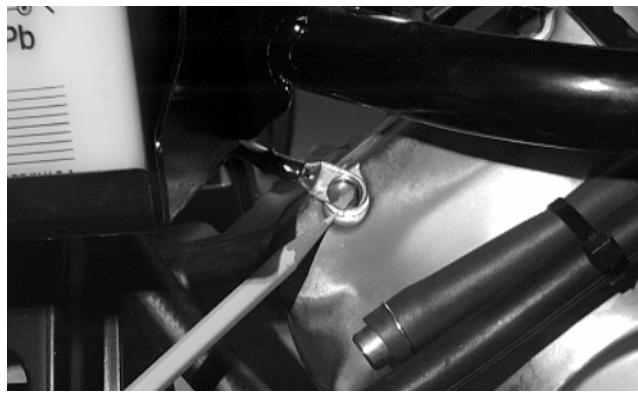


CH048D

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.

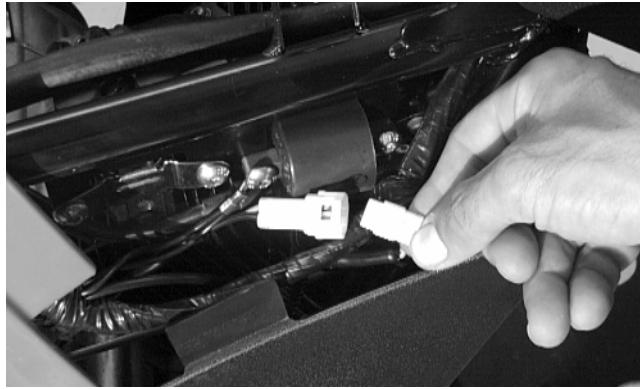
20. Disconnect the main wiring harness connectors.



CH065D

21. Remove the right-hand side panel.

22. Disconnect the oil light switch.



CH067D

23. Remove the rear hydraulic brake caliper.

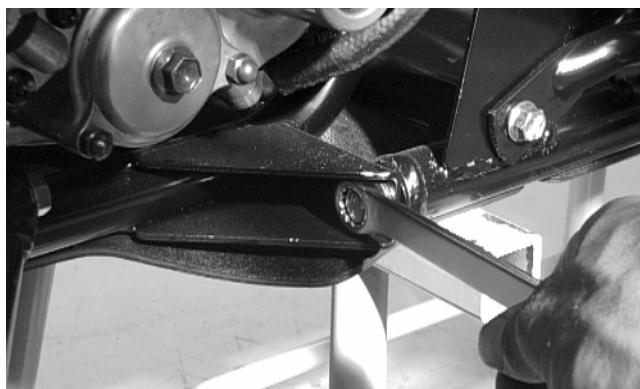
24. Remove the auxiliary brake.

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.



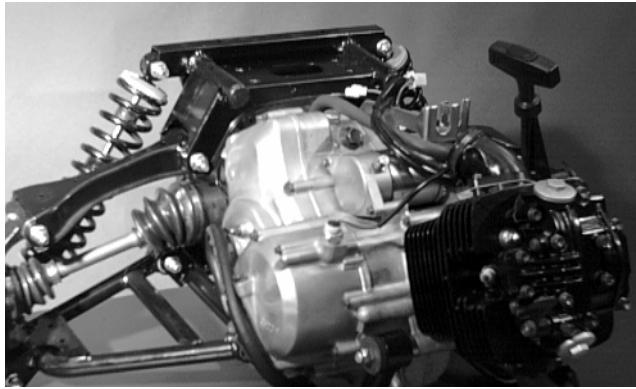
CH071D

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

3

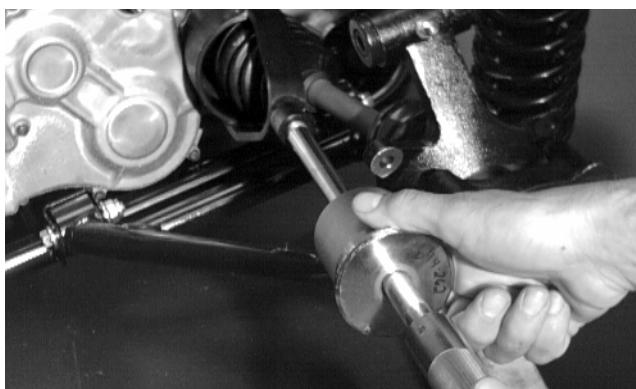
31. Remove the cap screw securing the front engine mount to the sub-frame. Account for spacers.

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.

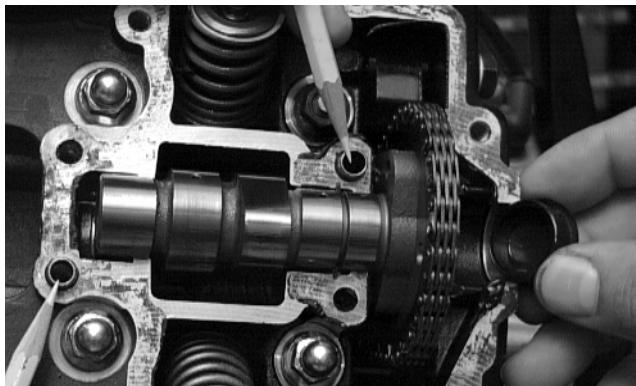
■ NOTE: The engine/transmission does not have to be removed from the frame for this procedure.



CC366D

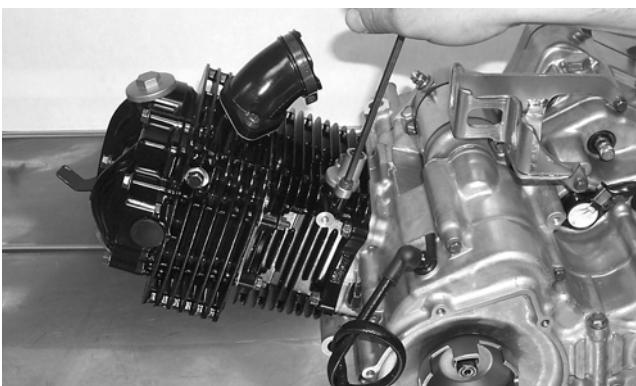
2. Remove the cap screws securing the valve cover to the head; account for the locations of any rubber washers on top side cap screws. Remove the valve cover. Account for the cylinder head plug. Note the location of two alignment pins.

■ 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.



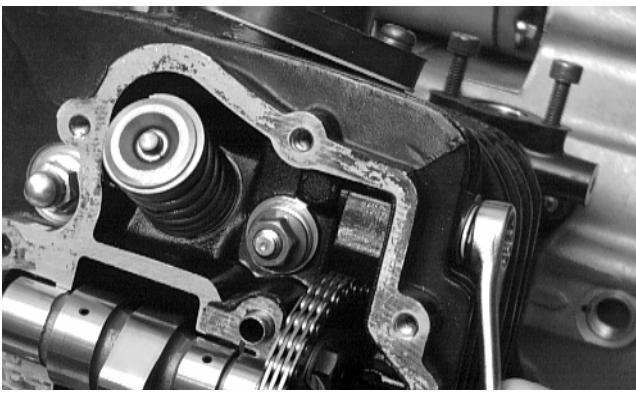
CC524D

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



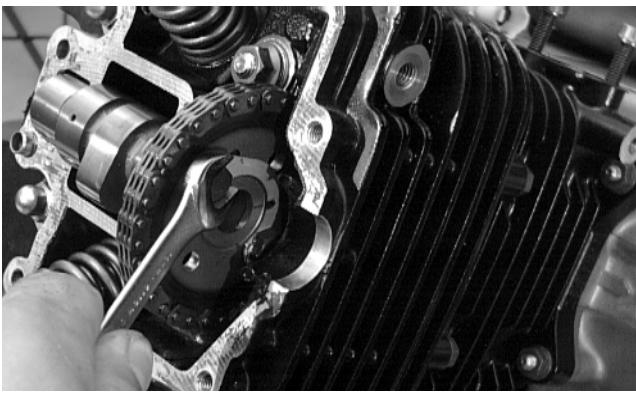
CC411D

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



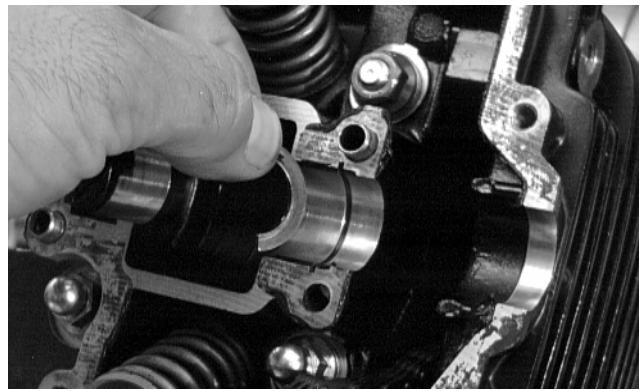
CC371D

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.



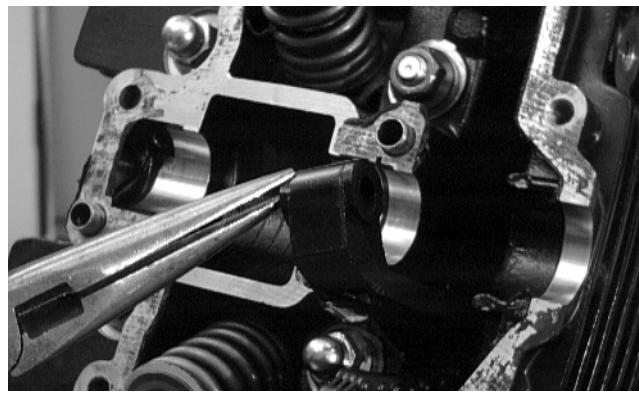
CC372D

■ **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.



CC375D

3

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).



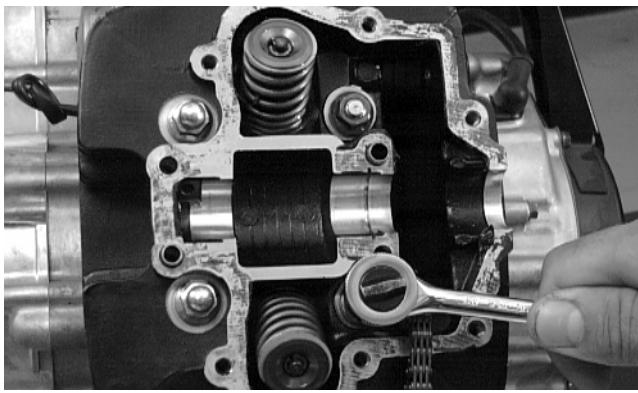
CC373D

■ **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.

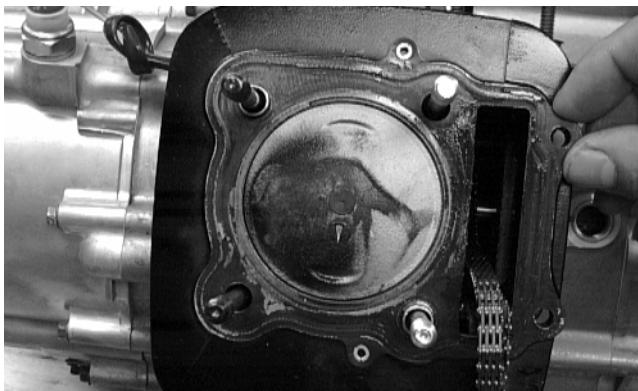


CC376D



CC377D

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



CC378D

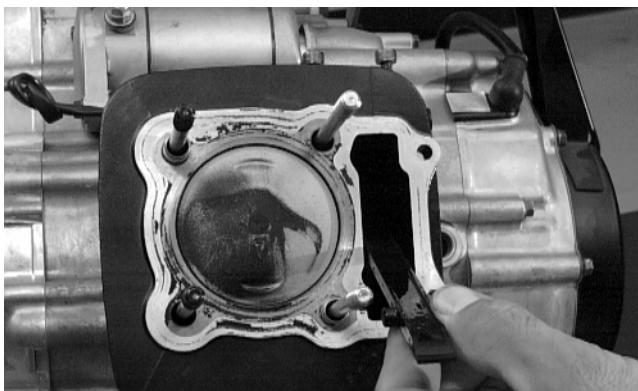
AT THIS POINT

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

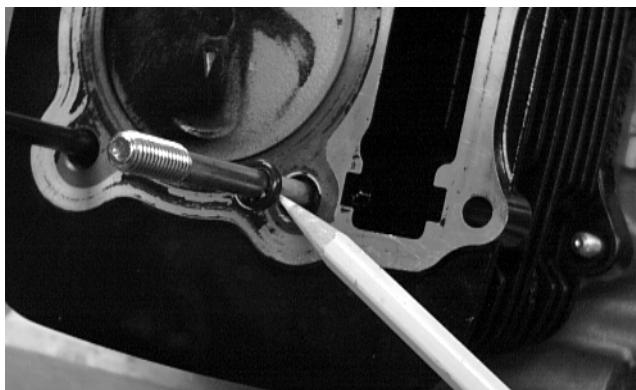
C. Cylinder

D. Piston

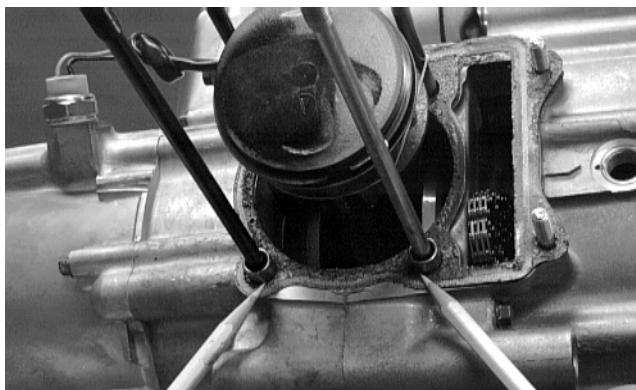
■ **NOTE:** Steps 1-10 in the preceding sub-section must precede this procedure.

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.

3

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 engine/transmission 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.

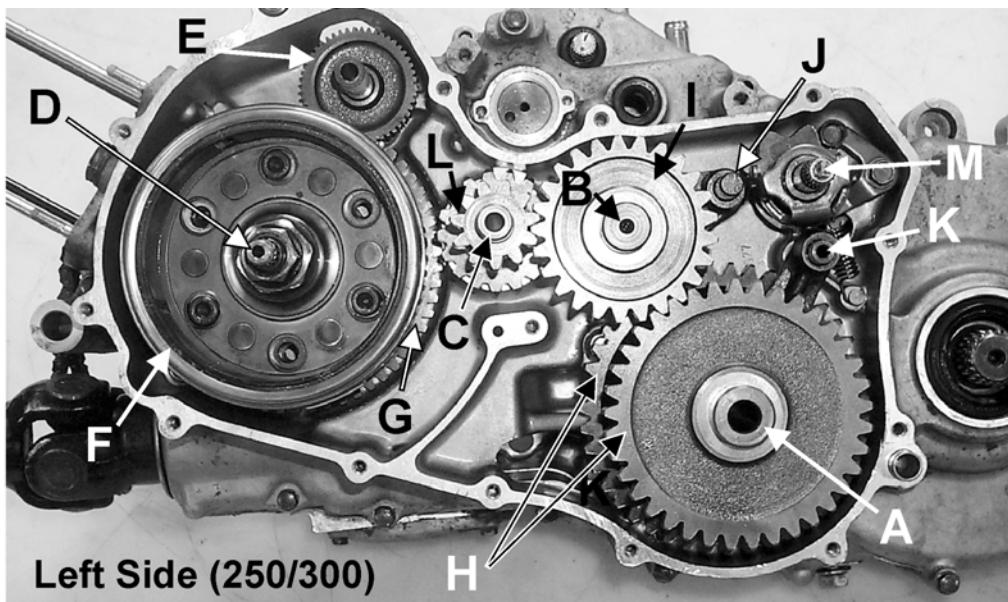
4. Remove the left-side cover w/stator assembly. Account for a gasket, two alignment pins, and a starter idler gear spacer.

■ 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.

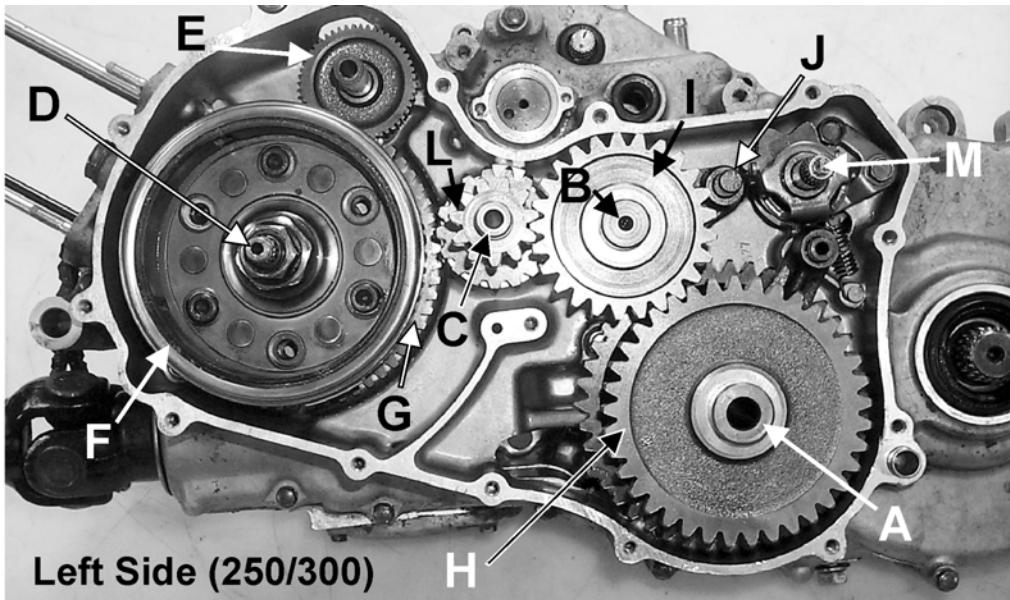


KEY CC846A (4x4)



A. Sub-Transmission Shaft	H. Driven Gear (2) Assembly
B. Driveshaft	I. Drive Gear Assembly
C. Countershaft	J. Shift Shaft with Fork (Short)
D. Crankshaft	K. Shift Shaft with Fork (Long, 4x4 only)
E. Starter Idler Gear Assembly	L. Idler Gear with Two Washers
F. Magneto Rotor Assembly	M. Sub-Transmission Gear Cam
G. Starter Clutch Gear Assembly	

CC846A



KEY CC873A (2x4)

3

- A. Sub-Transmission Shaft
- B. Driveshaft
- C. Countershaft
- D. Crankshaft
- E. Starter Idler Gear Assembly
- F. Magneto Rotor Assembly
- G. Starter Clutch Gear Assembly

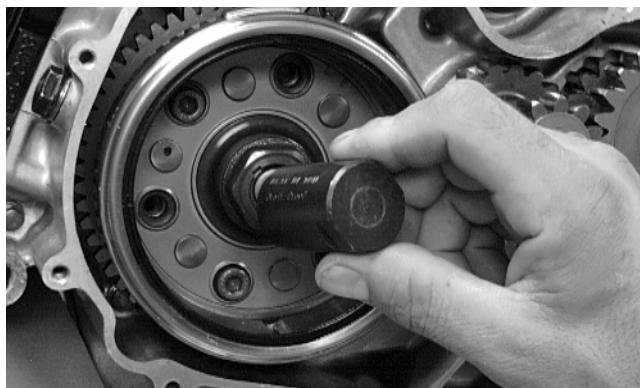
- H. Driven Gear (1)
- I. Drive Gear
- J. Shift Shaft with Fork
- K. N/A
- L. Idler Gear with Two Washers
- M. Sub-Transmission Gear Cam

CC873A

D. Magneto Rotor E. Idle Gear Assembly

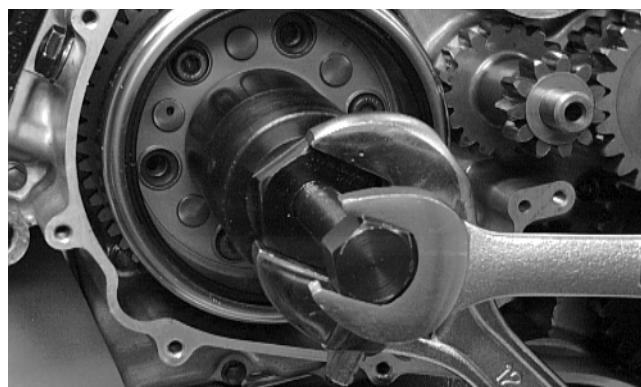
■ NOTE: Steps 1-6 in the preceding sub-section must precede this procedure.

7. Install the magneto rotor puller adapter.



CC417D

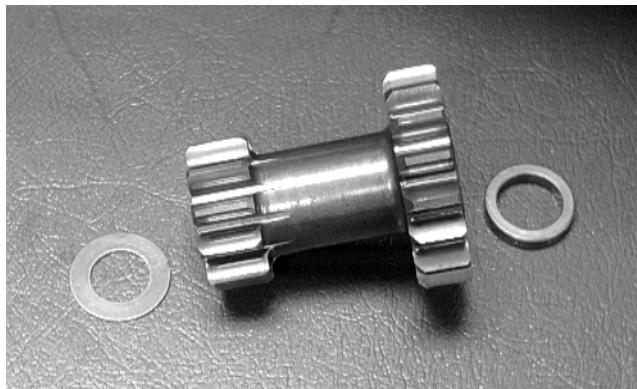
8. Using a magneto rotor remover; remove the magneto rotor assembly (F) from the crankshaft. Account for the key.



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.



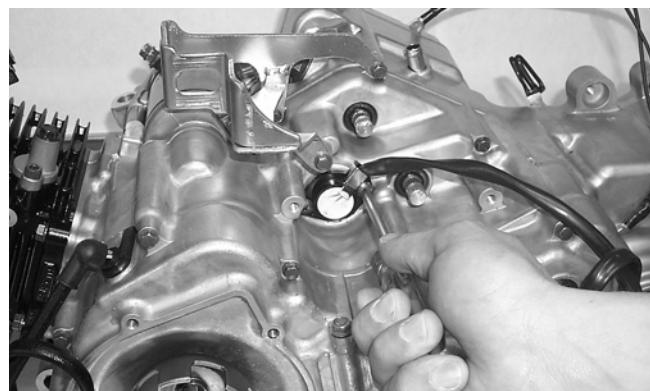
CC477D

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

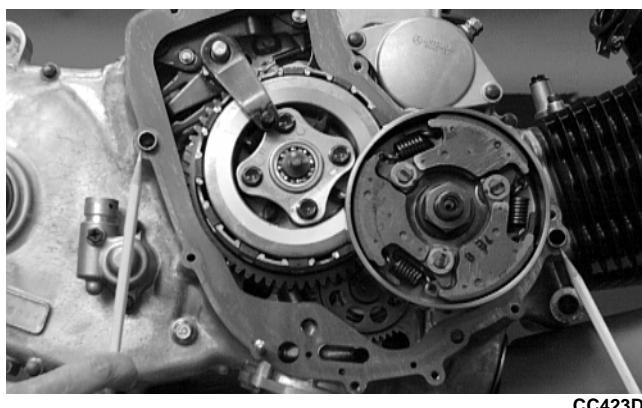
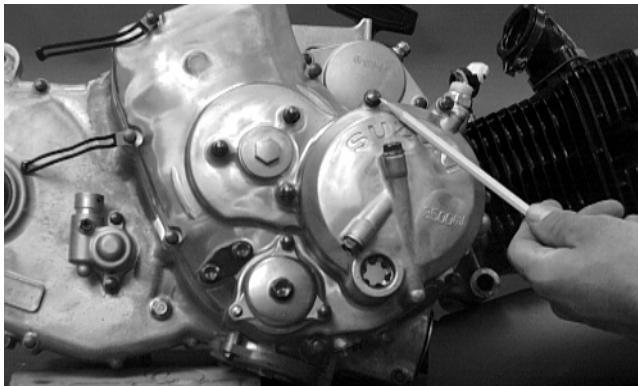
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

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

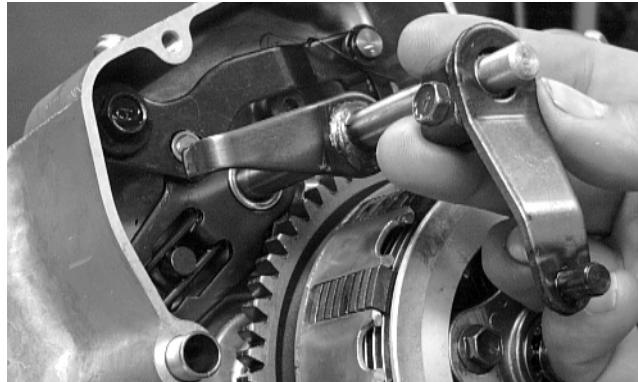
Removing Right-Side Components

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.



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.



3



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.

⚠ CAUTION

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



■ 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.

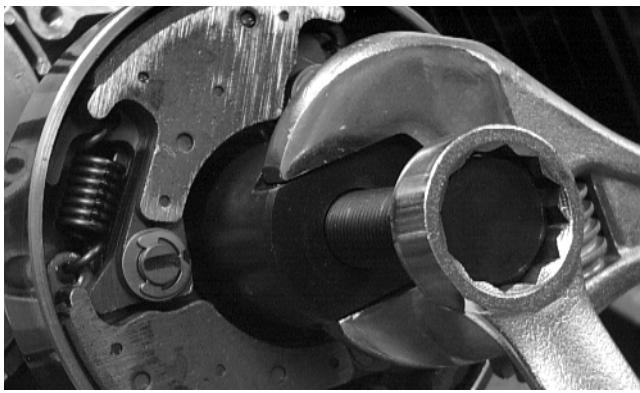
B. Release Roller Assembly

C. Starter Clutch Shoe

D. Starter Clutch Housing

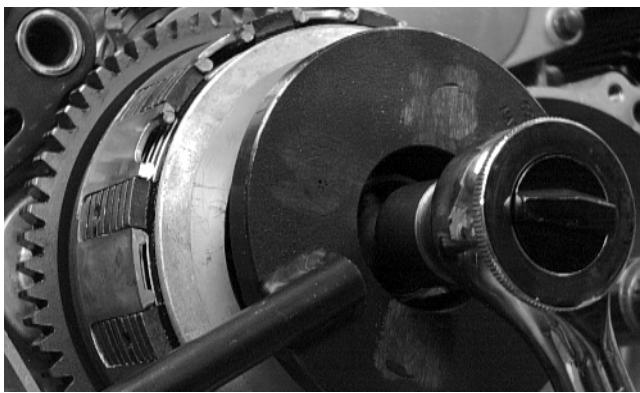
E. Primary Clutch

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



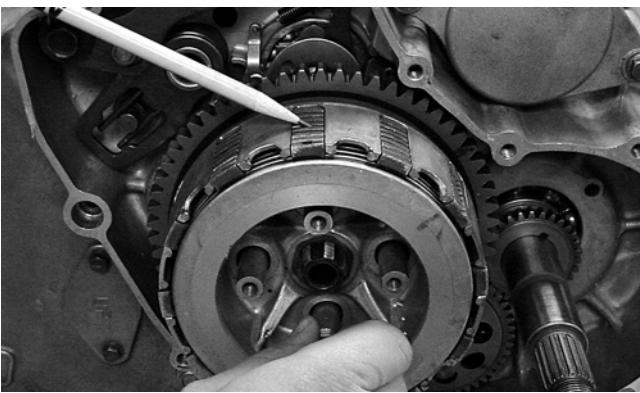
CC427D

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

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



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.

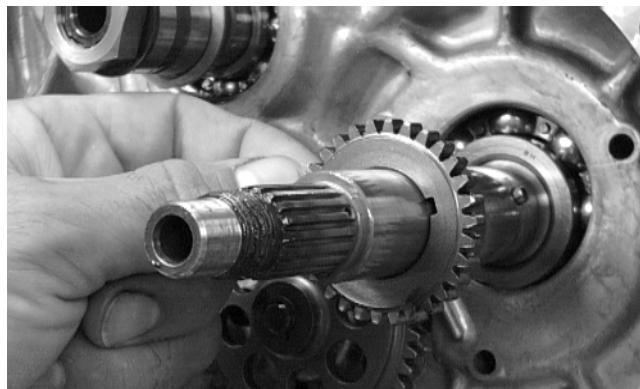
F. Gear Shifting Arm G. Oil Pump/Oil Strainer

■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.



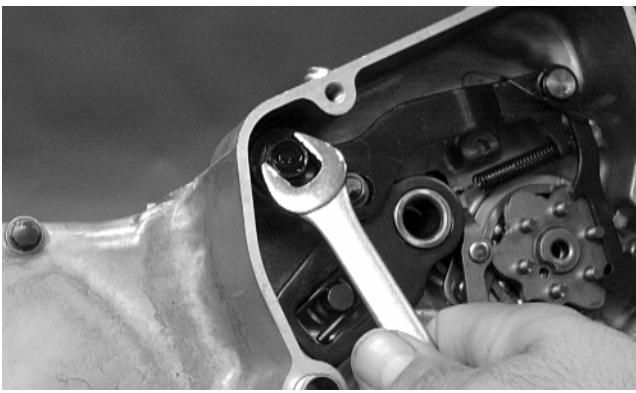
CC432D

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



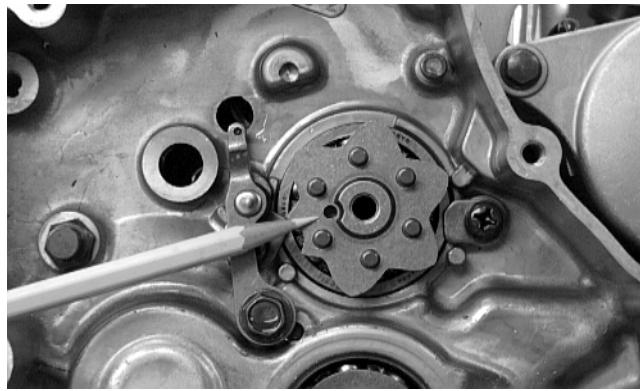
CC433D

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

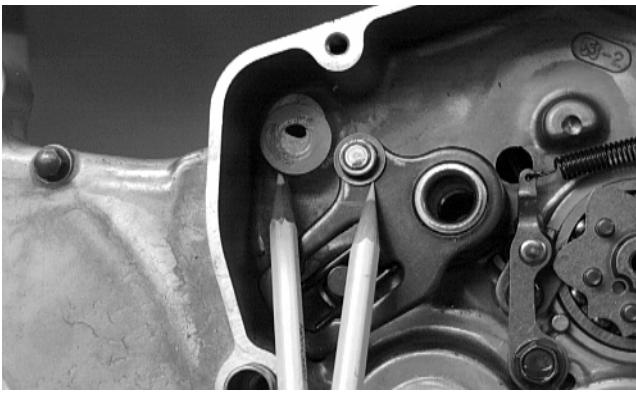


CC434D

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

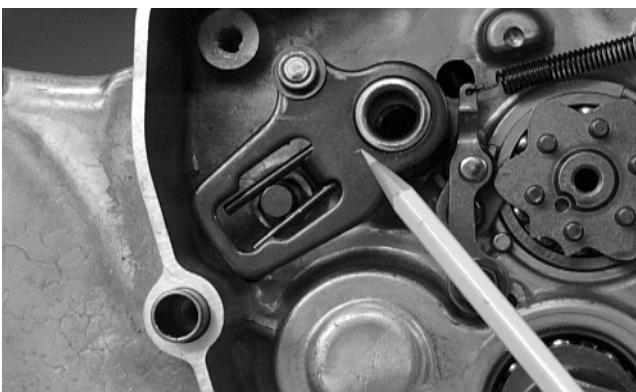


CC438D



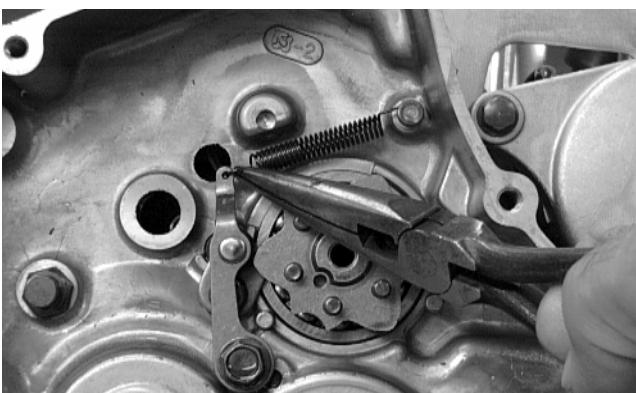
CC435D

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



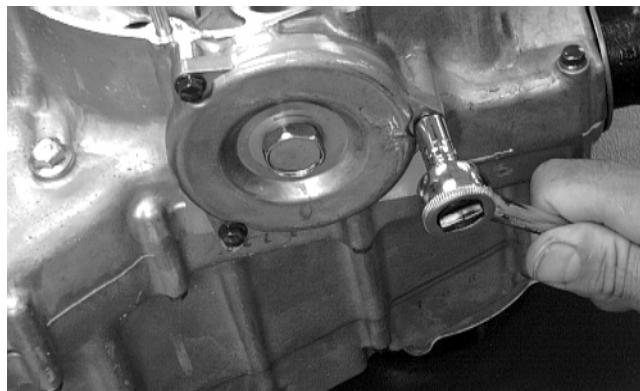
CC436D

12. Remove the spring from the cam stopper.



CC437D

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



CC442D

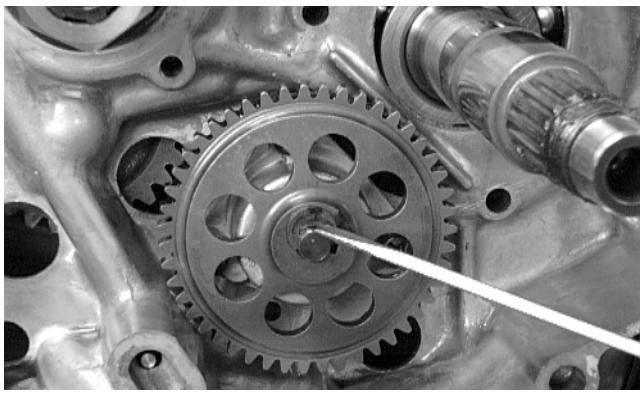
15. Remove the screws securing the strainer; then remove the strainer.



CC443D

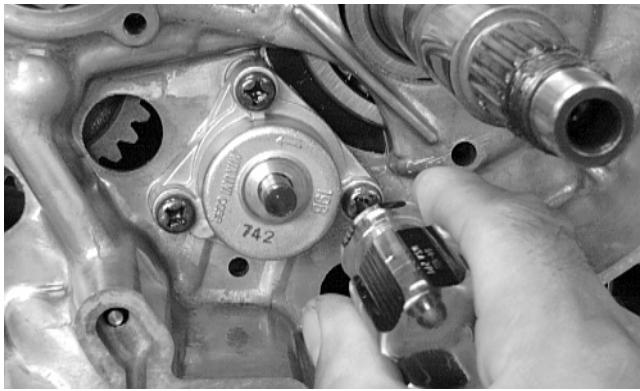
■ **NOTE: If service on the oil pump is necessary, follow steps 16-17.**

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.

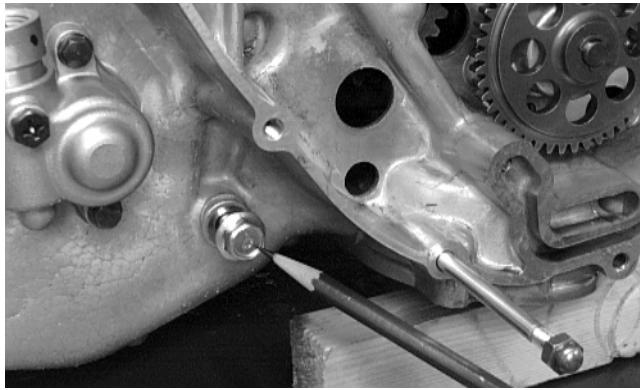
Center Crankcase Components

■ **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.



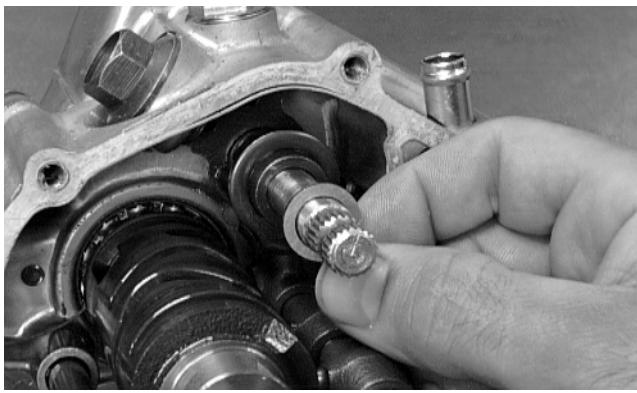
CC481D

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.

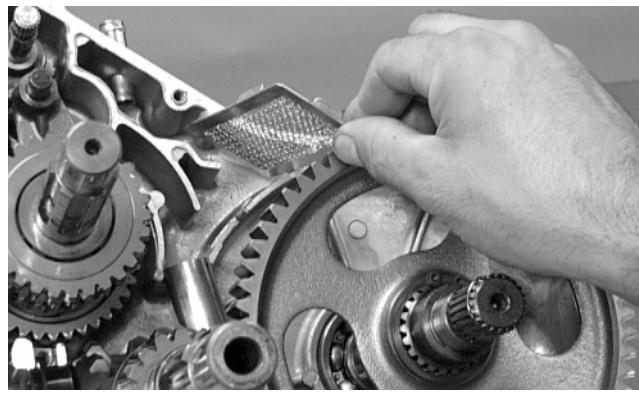
■ **NOTE:** To keep the shaft/gear assemblies intact for identification, tap the shafts toward the right-side crankcase half when separating the halves.



CC484D



CC486D



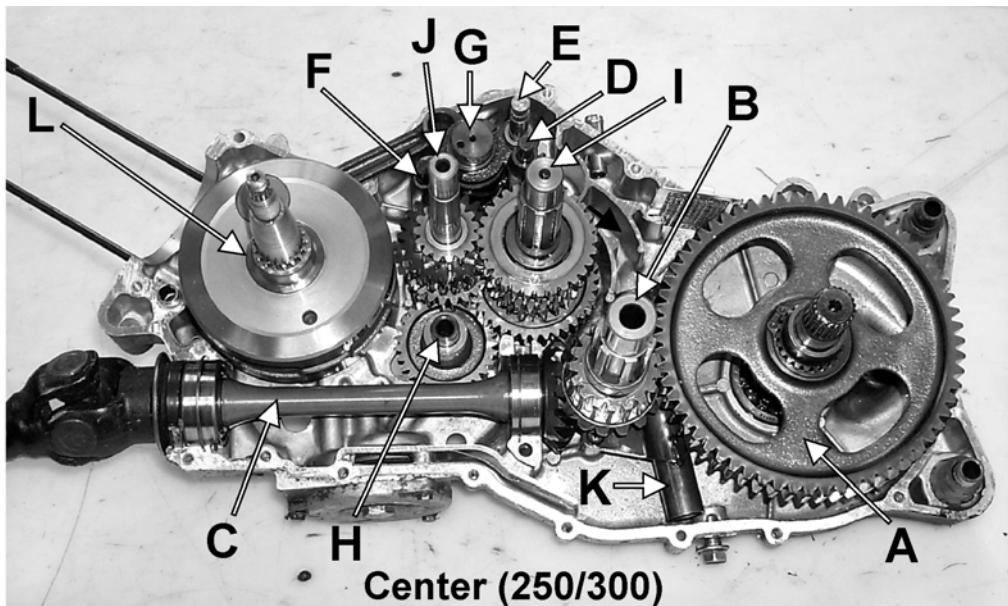
CC487D

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

3

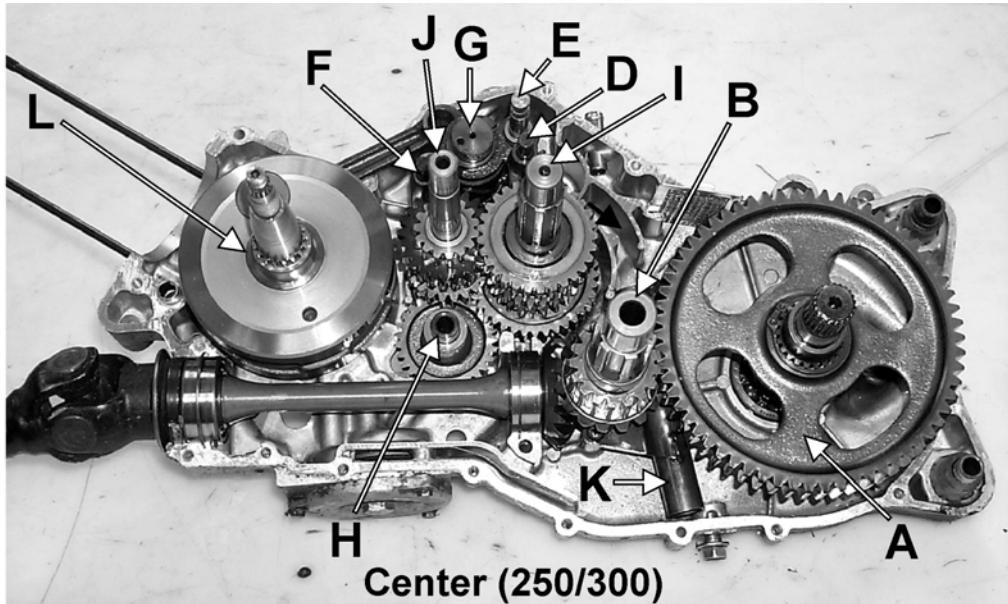
Disassembling Crankcase Half

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



KEY CC836A (4x4)	
A. Final Driven Gear with Shaft	F. Shift Shaft (Short) with 1 Fork
B. Sub-Transmission Shaft Assembly	G. Gear Shifting Cam
C. Secondary Output Shaft (4x4 only)	H. Reverse Idle Shaft Assembly
D. Shift Shaft (Long) with 3 Forks	I. Driveshaft Assembly
E. Reverse Shifting Cam	J. Countershaft Assembly
	K. Oil Pipe
	L. Crankshaft Assembly

CC836A



KEY CC872A (2x4)



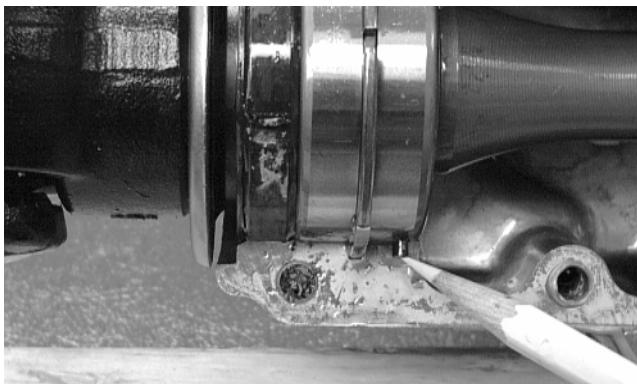
A. Final Driven Gear with Shaft	F. Shift Shaft (Short) with 1 Fork
B. Sub-Transmission Shaft Assembly	G. Gear Shifting Cam
C. (N/A)	H. Reverse Idle Shaft Assembly
D. Shift Shaft (Long) with 3 Forks	I. Driveshaft Assembly
E. Reverse Shifting Cam	J. Countershaft Assembly
	K. Oil Pipe
	L. Crankshaft Assembly

CC872A

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

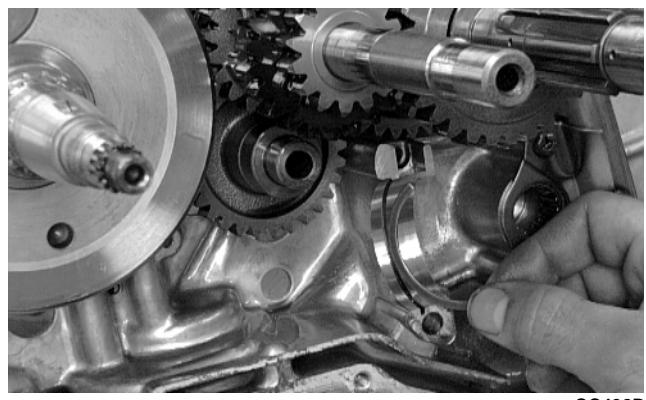
2. Remove the rear final driven gear w/shaft (A).
3. Remove the sub-transmission shaft assembly (B).

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



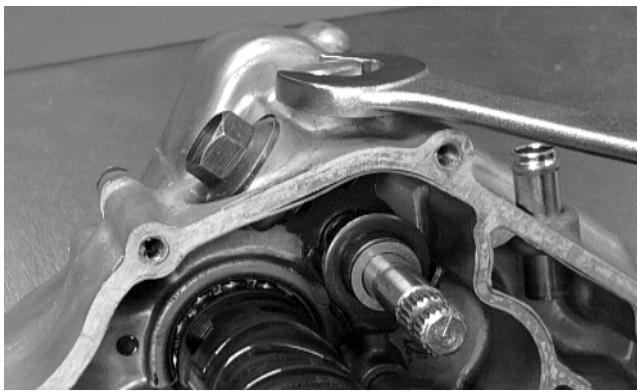
CC490D

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

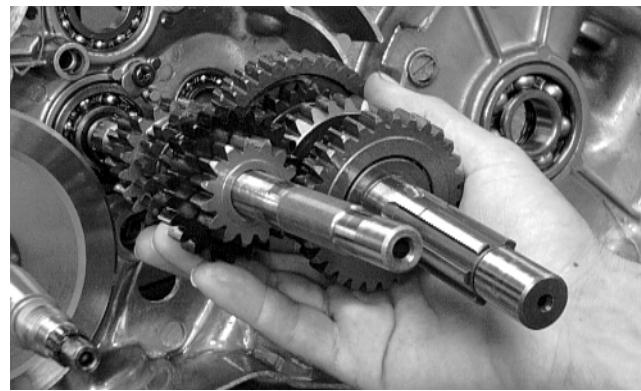


CC492D

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



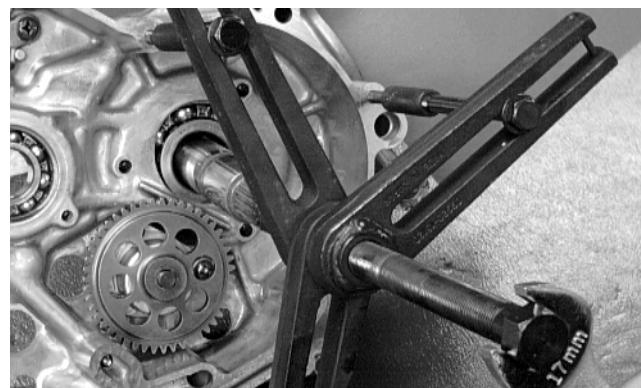
CC493D



CC505D

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.

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



CC507D

3

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.

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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

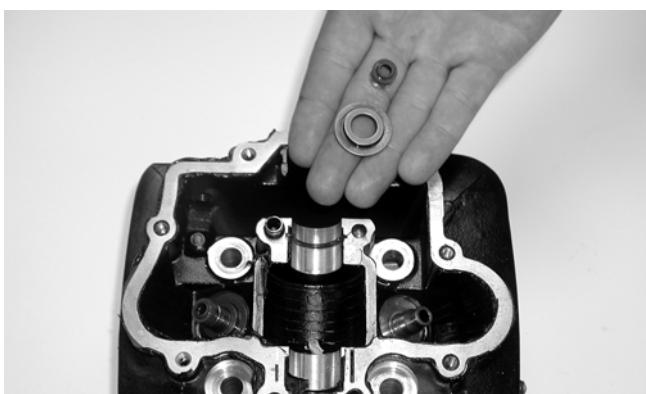
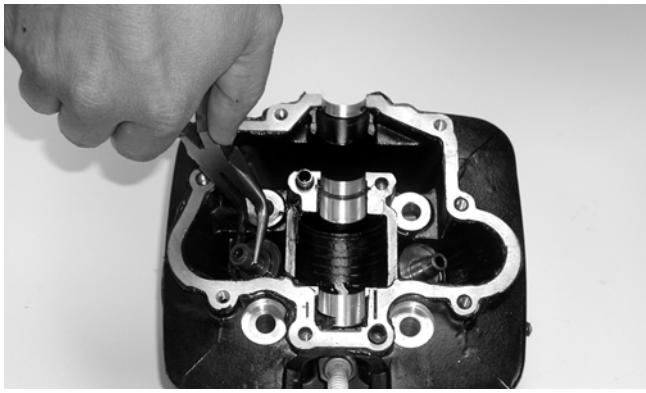
■ NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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.

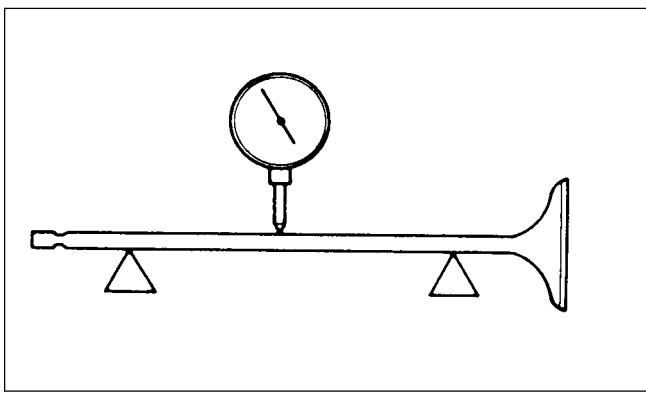


■ **NOTE:** The valve seals must be replaced.

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.



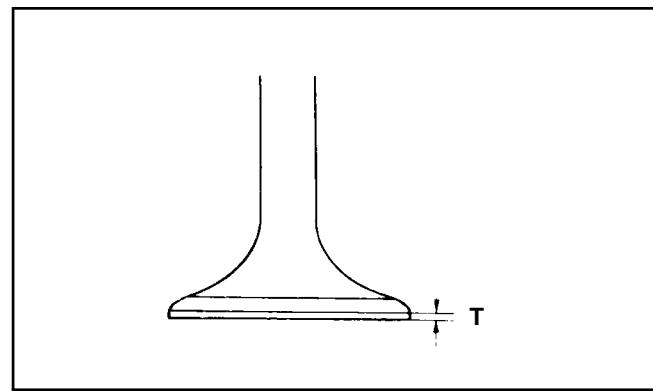
2. Maximum runout is 0.05 mm (0.002 in.).

Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) is 5.475-5.490 mm (0.2156-0.2161 in.).
3. Acceptable diameter range (exhaust valve) is 5.455-5.470 mm (0.2148-0.2154 in.).

Measuring Valve Face/Seat Width

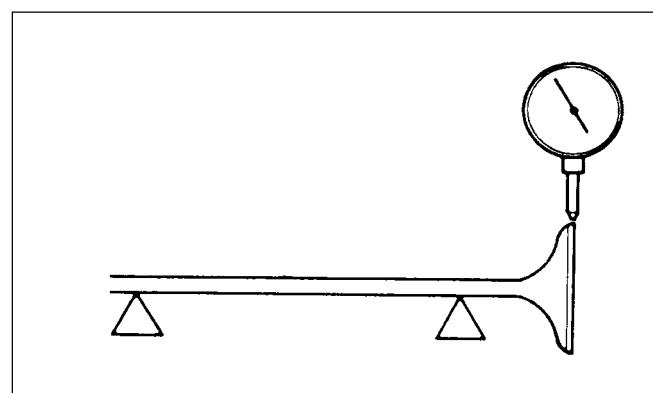
1. Using a micrometer, measure the width of the valve face.



2. Acceptable width range is 0.9-1.1 mm (0.035-0.043 in.).

Measuring Valve Face Radial Runout

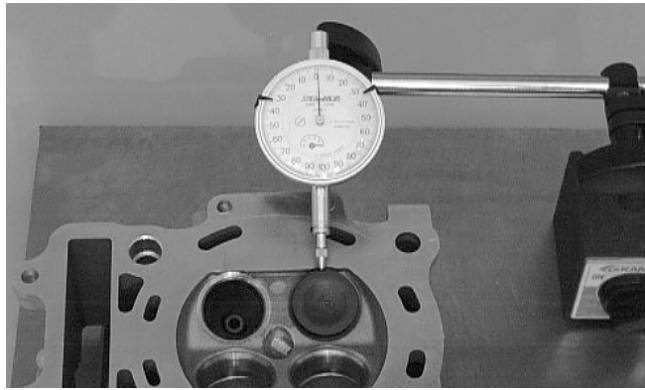
1. Mount a dial indicator on the surface plate; then place the valve stem on a set of V blocks.
2. Position the dial indicator contact point on the outside edge of the valve face; then zero the indicator.



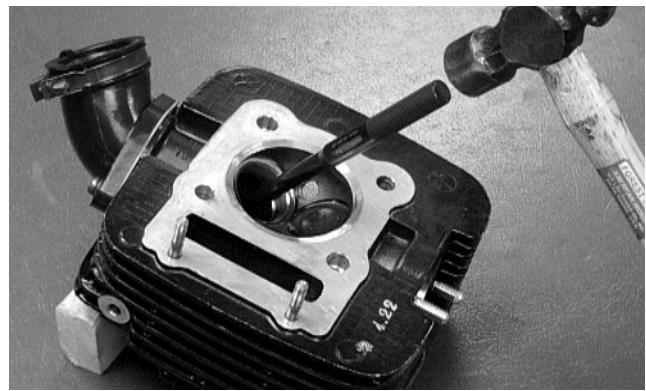
3. Rotate the valve in the V blocks.
4. Maximum runout is 0.03 mm (0.001 in.).

Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

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



3. Push the valve from side to side; then from top to bottom.
4. Maximum "wobble" deflection is 0.35 mm (0.014 in.).



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



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 is 5.500-5.512 mm (0.2165-0.2170 in.).
3. If a valve guide is out of tolerance, it must be replaced.

Replacing Valve Guide

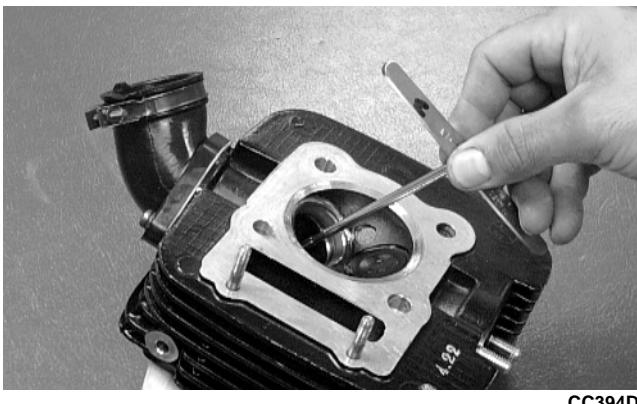
■NOTE: If a valve guide is worn or damaged, it must be replaced.

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.

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.

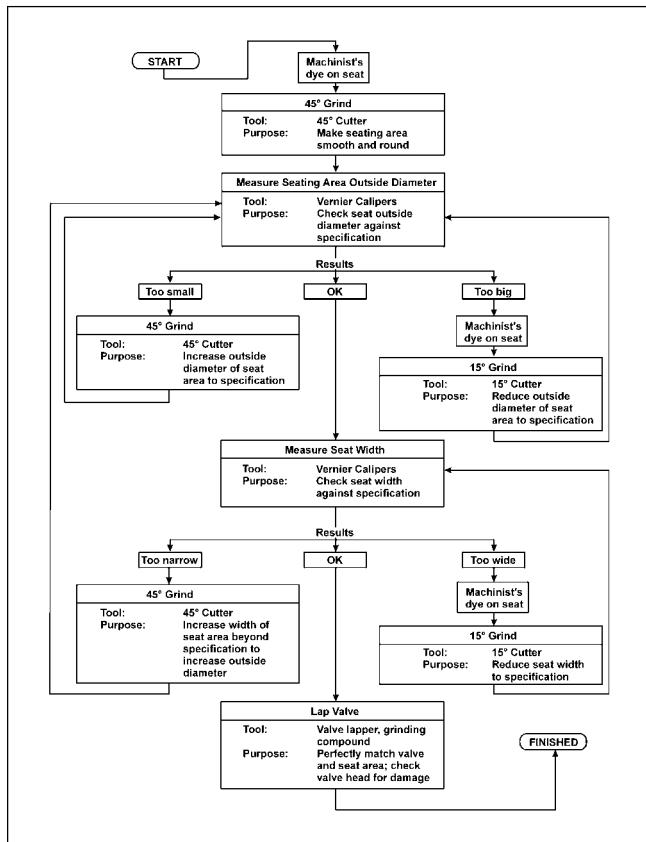


4. After installing the guide, use the standard valve guide reamer to remove all burrs and tight areas that may remain in each valve guide.



CC394D

Valve Seat/Guide Servicing Flow Chart

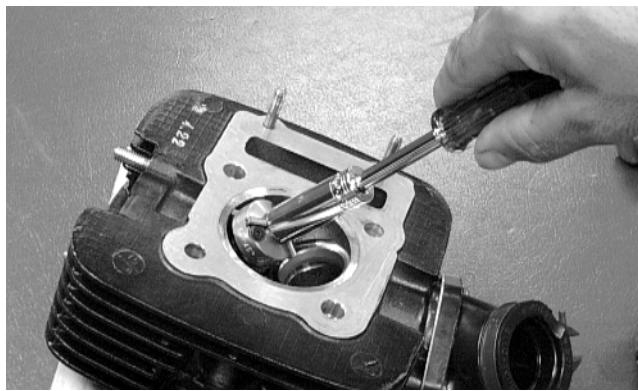


ATV-0107

Grinding Valve Seats

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

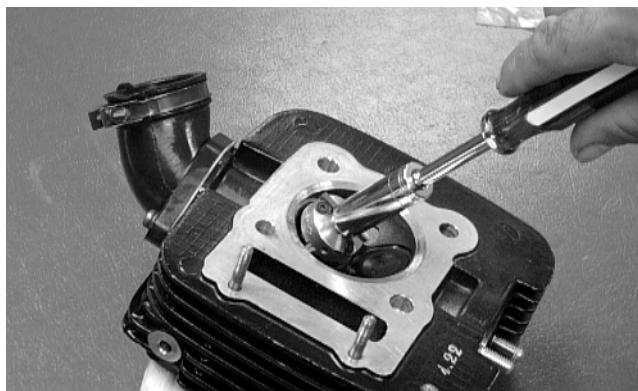
1. Insert an exhaust valve seat pilot shaft into the exhaust valve guide. Slide the exhaust valve seat grinding tool onto the pilot shaft; then using light pressure on a driver handle and a deep socket, grind the exhaust valve seat until within specifications.



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.

3



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 is 12.000-12.018 mm (0.472-0.473 in.).

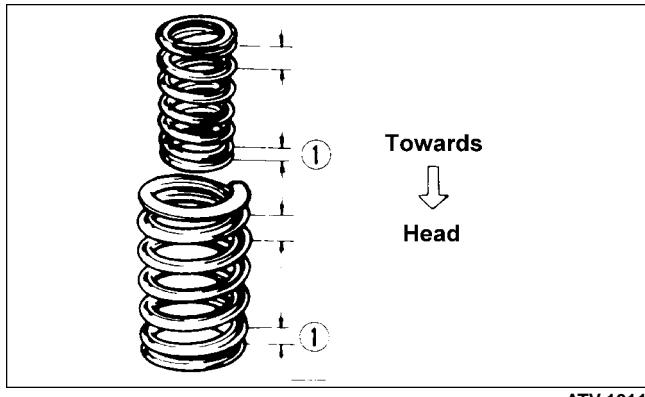
Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range is 11.977-11.995 mm (0.4715-0.4722 in.).

Installing Valves

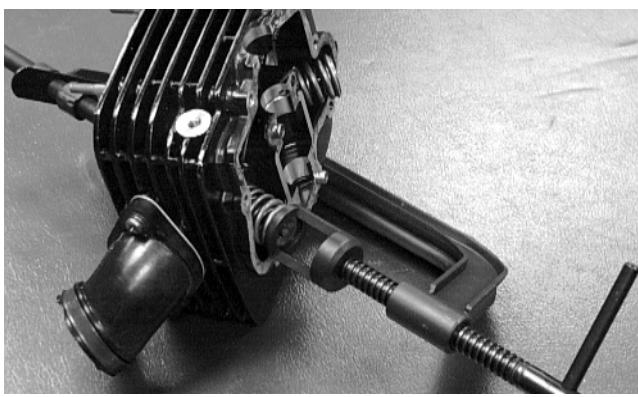
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.
2. Insert each valve into its original valve location.
3. Install the valve springs with the painted end of the spring facing away from the cylinder head.

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



■ 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.



PISTON ASSEMBLY

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

Cleaning/Inspecting Piston

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



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

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

Removing Piston Rings

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



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

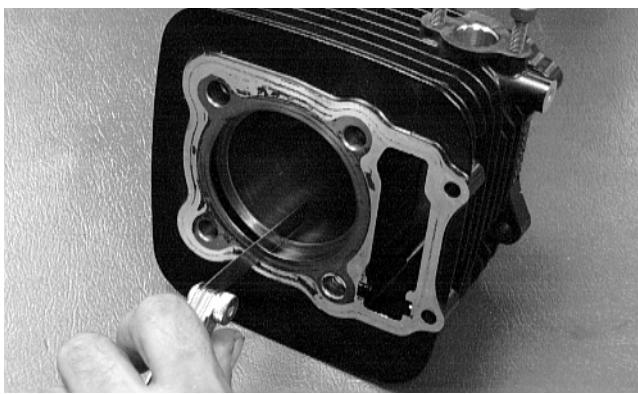
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

⚠ 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)

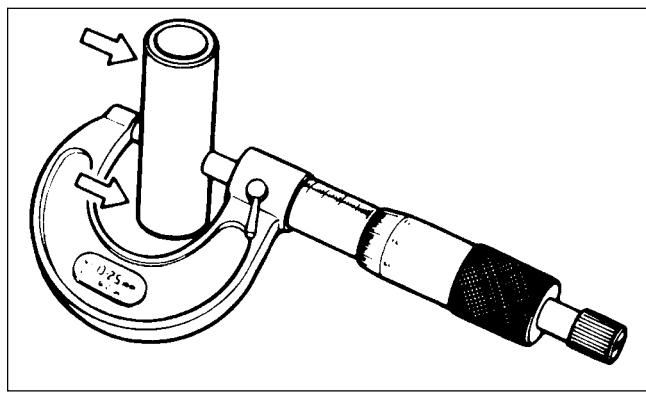
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be a maximum 0.70 mm (0.0276 in.) 1st ring and 1.0 mm (0.039 in.) 2nd ring.



CC386D

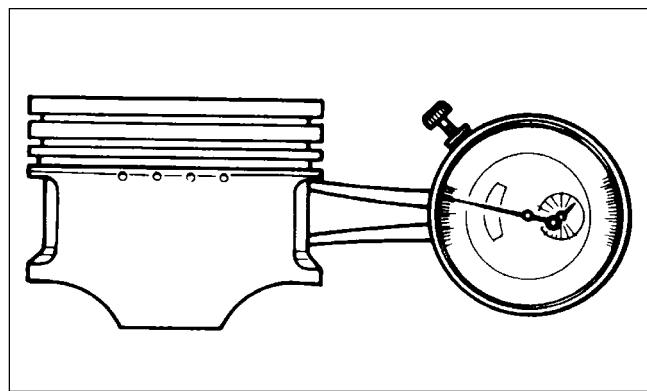
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is less than 16.98 mm (0.6685 in.), the piston pin must be replaced.



ATV-1070

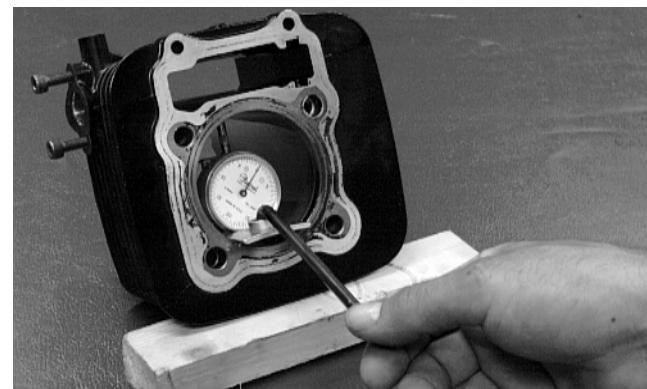
2. Insert an inside dial indicator into the piston-pin bore. The diameter must be a maximum 17.03 mm (0.6705 in.). Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/Cylinder Clearance

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



CC397D

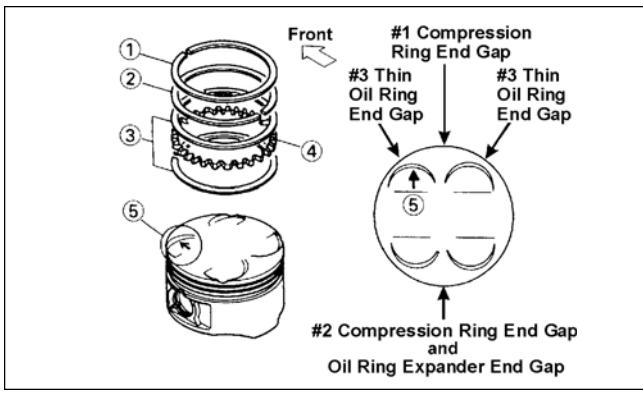
2. Measure the corresponding piston diameter at a point 18 mm (0.71 in.) above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be a maximum 0.12 mm (0.0047 in.).

Installing Piston Rings

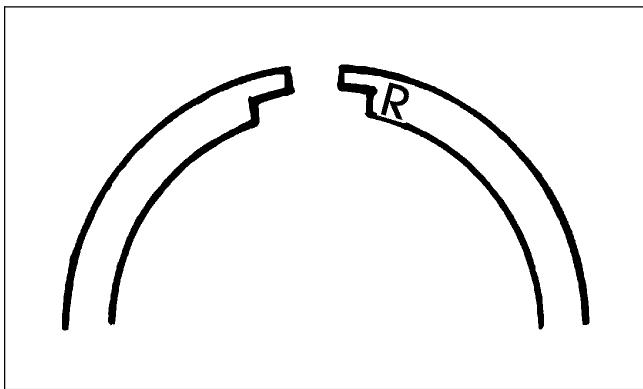
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

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

3



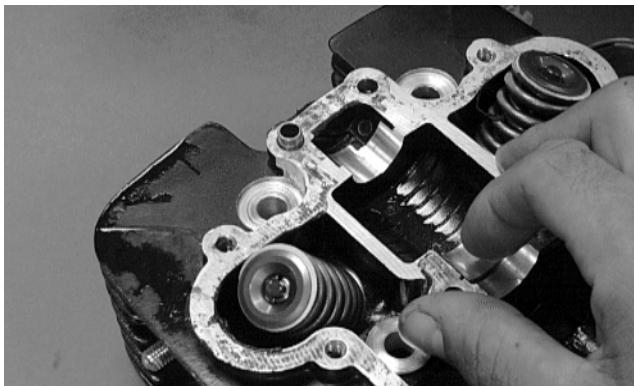
2. Install the compression rings (1 and 2) so the letter on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring end gaps are on directly opposite sides of the piston (see illustration).



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

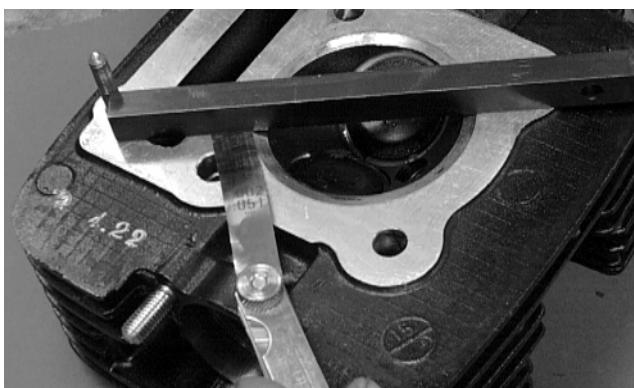
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.



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 is 0.05 mm (0.002 in.).



CC388D

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.

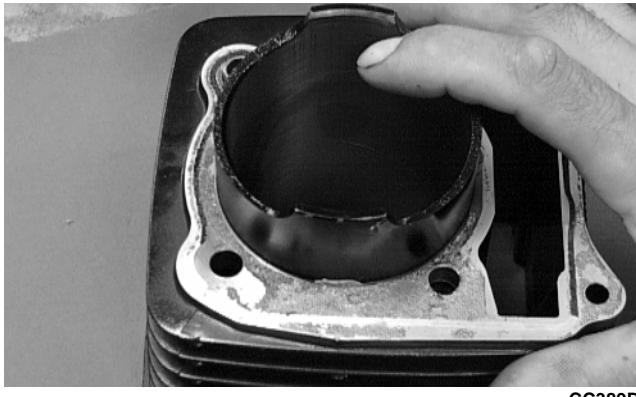
Cleaning/Inspecting Cylinder

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.



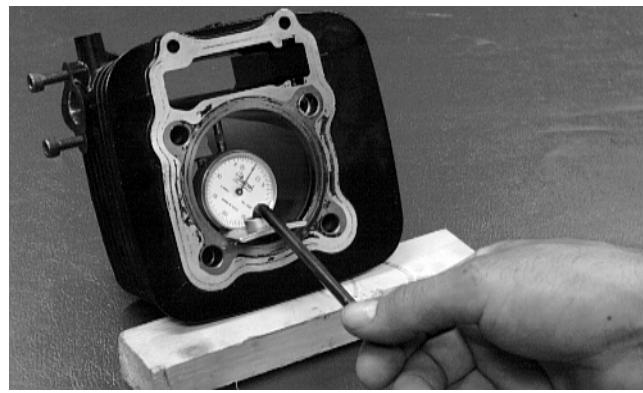
CC389D

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

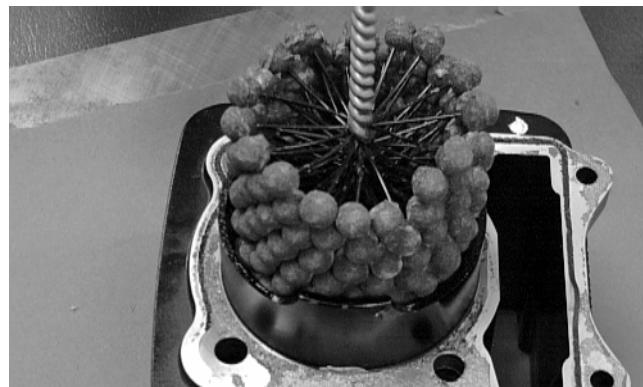
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must be 0.05 mm (0.002 in.).



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.

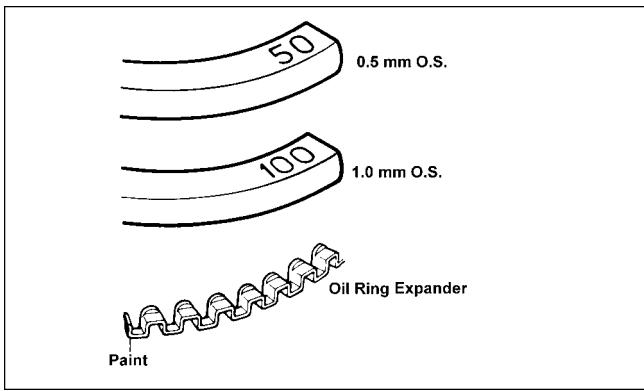


CC390D

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.

3

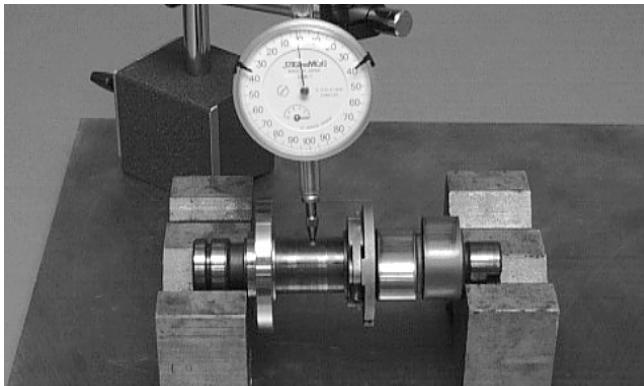


ATV-1068

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.

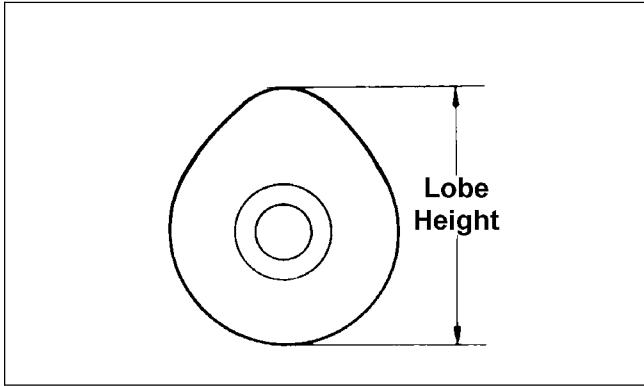


CC283D

2. Rotate the camshaft and note runout; maximum tolerance is 0.10 mm (0.004 in.).

Measuring Camshaft Lobe Height

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



ATV1013A

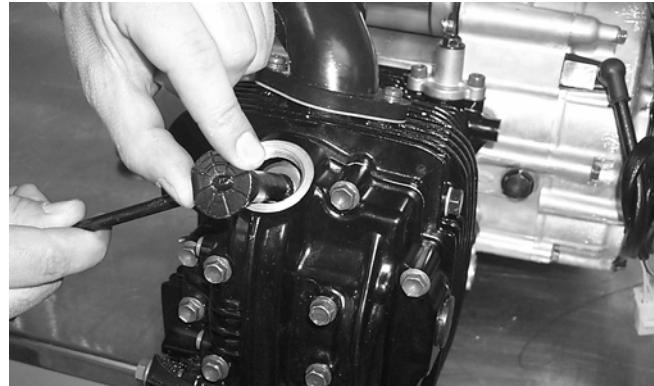
2. The intake lobe height must be a minimum 33.820 mm (1.331 in.); exhaust lobe height must be a minimum 33.490 mm (1.318 in.).

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.

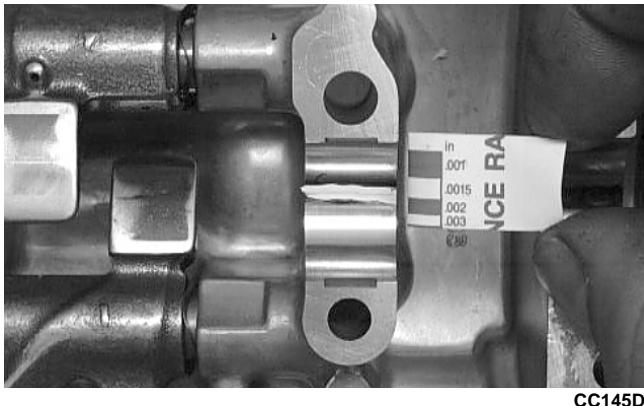
■ **NOTE:** Do not rotate the camshaft when measuring clearance.

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

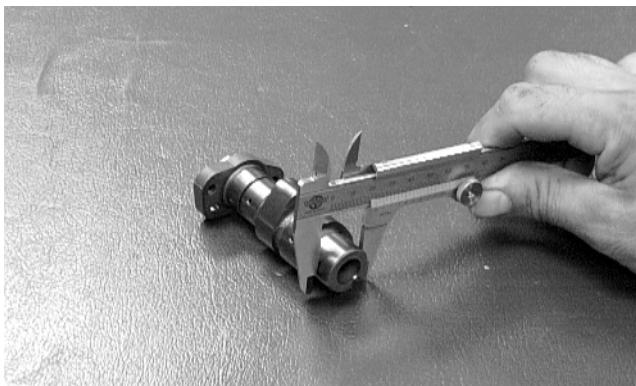


CC367D

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.



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



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

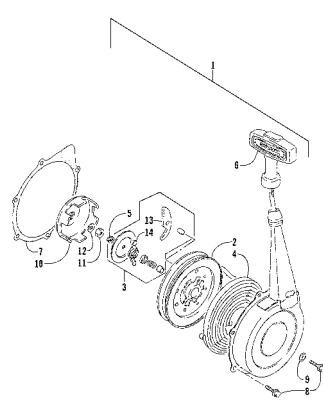
Servicing Left-Side Components

RECOIL STARTER

250/300

KEY

1. Recoil Starter Assy
2. Reel
3. Ratchet Assy
4. Spiral Spring
5. Nut
6. Rope Assy
7. Gasket
8. Cap Screw
9. Gasket
10. Starter Cup
11. Nut
12. Lock Washer
13. Ratchet
14. Guide



0736-194

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 noting the location of the single washer closest to the center of the crankcase. Account for a gasket.

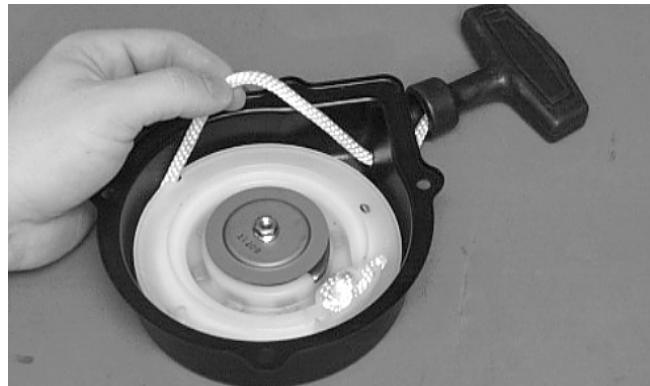


3

WARNING

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

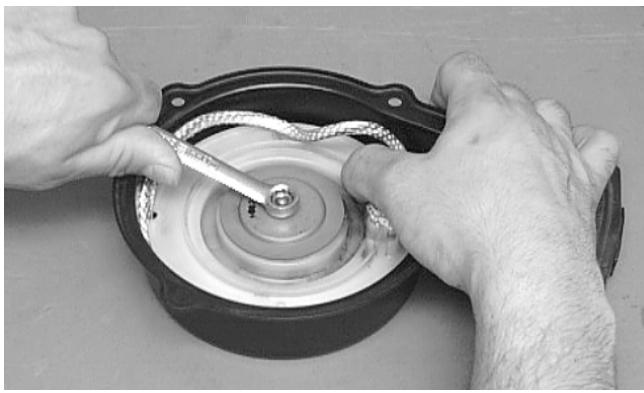
2. Rotate the reel counterclockwise until the notch of the reel is near the rope guide in the case. Guide the rope into the notch and slowly allow the reel to retract until all spiral spring tension is released.



CAUTION

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

3. Remove the nut.



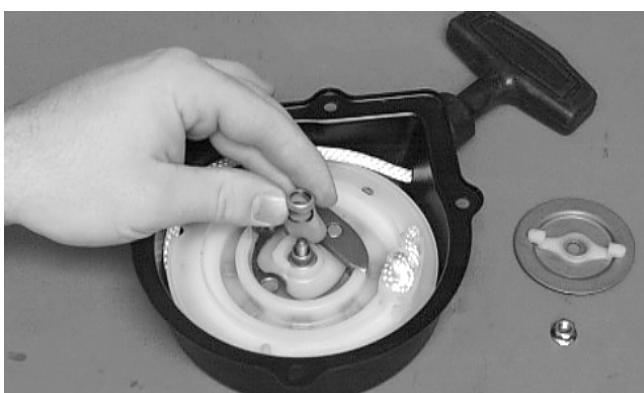
B601D

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.



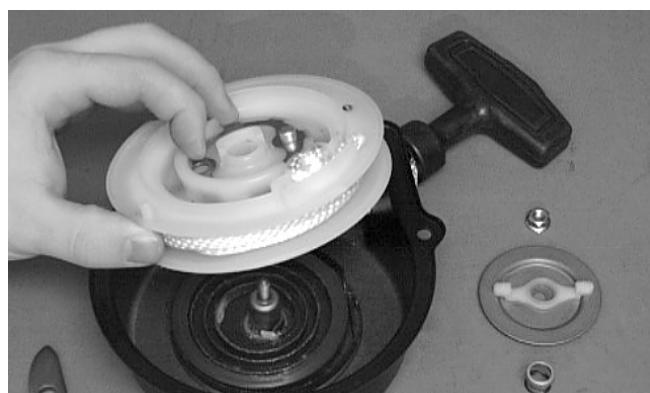
B603D

6. Remove the ratchet and account for the 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.

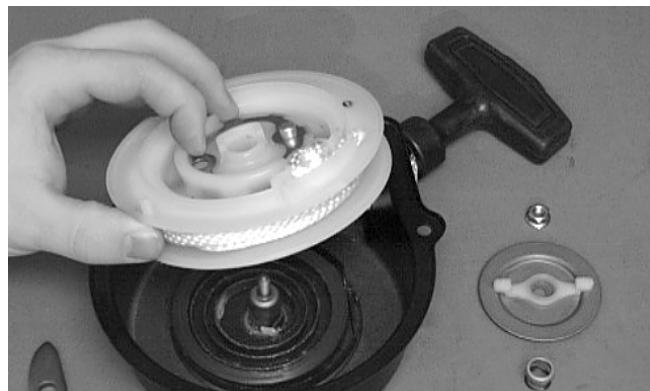
■ NOTE: The spiral spring must seat evenly in the recoil case.



B606D

2. Insert the rope through the hole in the reel and tie a knot in the end; then wrap the rope 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.



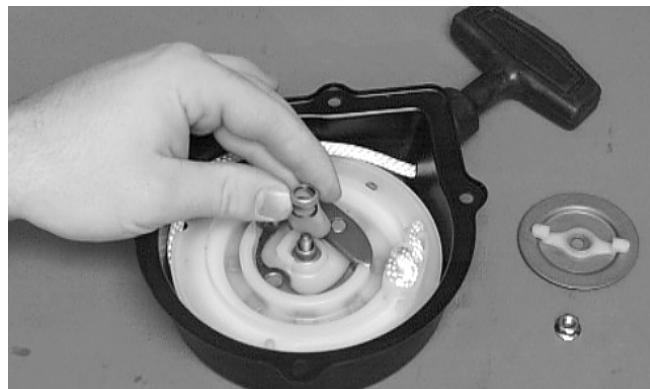
B605D

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

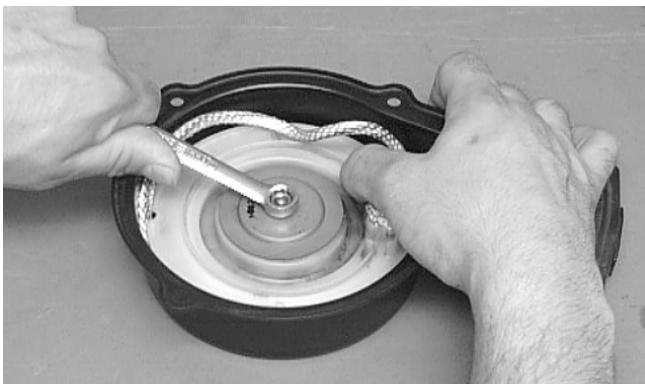
8. Install the friction plate with the ratchet guide fitting into the ratchet.

3



B602D

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

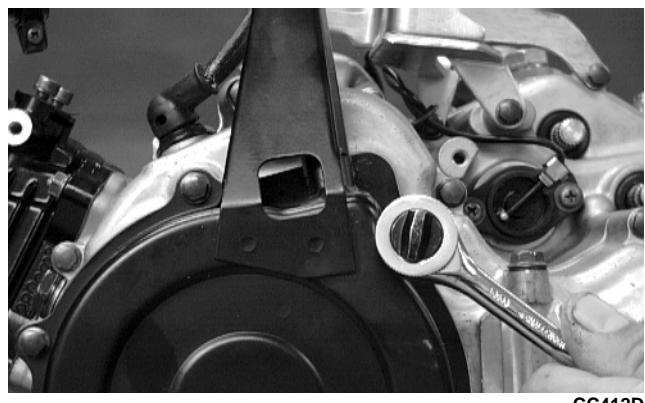


B601D

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 the specified range.

SHIFT FORK THICKNESS (250/300)	
#1, #2, and #3	4.3-4.4 mm (0.169-0.173 in.)
Secondary Transmission #1 and #2	5.3-5.4 mm (0.209-0.213 in.)
Reverse	3.8-3.9 mm (0.150-0.154 in.)

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 the specified range.

SHIFT FORK GROOVE WIDTH (250/300)	
#1, #2, and #3	4.5-4.6 mm (0.177-0.181 in.)
Secondary Transmission #1 and #2	5.45-5.55 mm (0.215-0.219 in.)
Reverse	4.0-4.1 mm (0.157-0.161 in.)

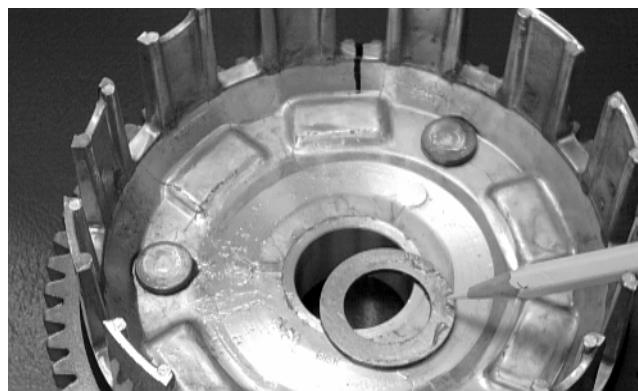
MEASURING SHIFT FORK TO GROOVE (Side Clearance)

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.

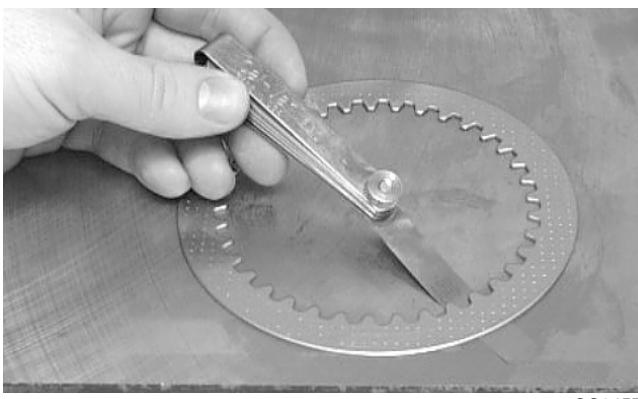


3. Shift fork to groove side clearance must be within specifications.

SHIFT FORK TO GROOVE SIDE CLEARANCE (250/300)	
Engine	0.10-0.50 mm (0.004-0.020 in.)
Secondary Transmission	0.05-0.50 mm (0.002-0.020 in.)
Reverse	0.10-0.50 mm (0.004-0.020 in.)



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.

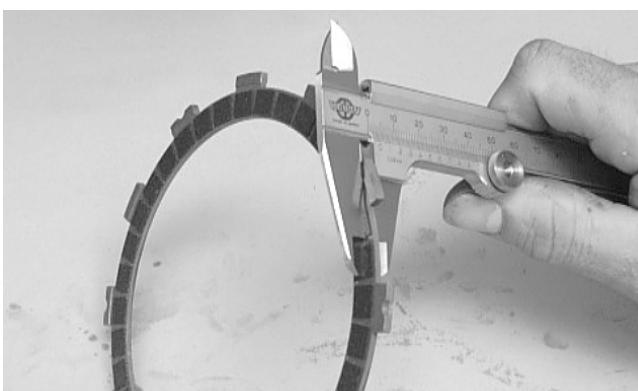


3

3. Maximum driven plate warpage must be 0.1 mm (0.004 in.).

Measuring Clutch Drive Plate (Fiber) Thickness

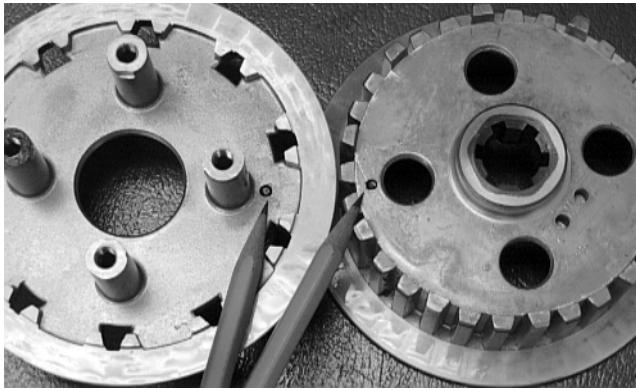
1. Using a calipers, in turn measure the thickness of each drive plate in several locations.



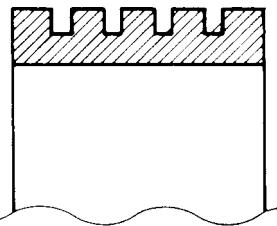
2. Drive plate thickness must be a minimum of 2.42 mm (0.094 in.).
3. If the fiber plate tabs are damaged, the plate must be replaced.

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 clutch shoe groove

ATV1014

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.

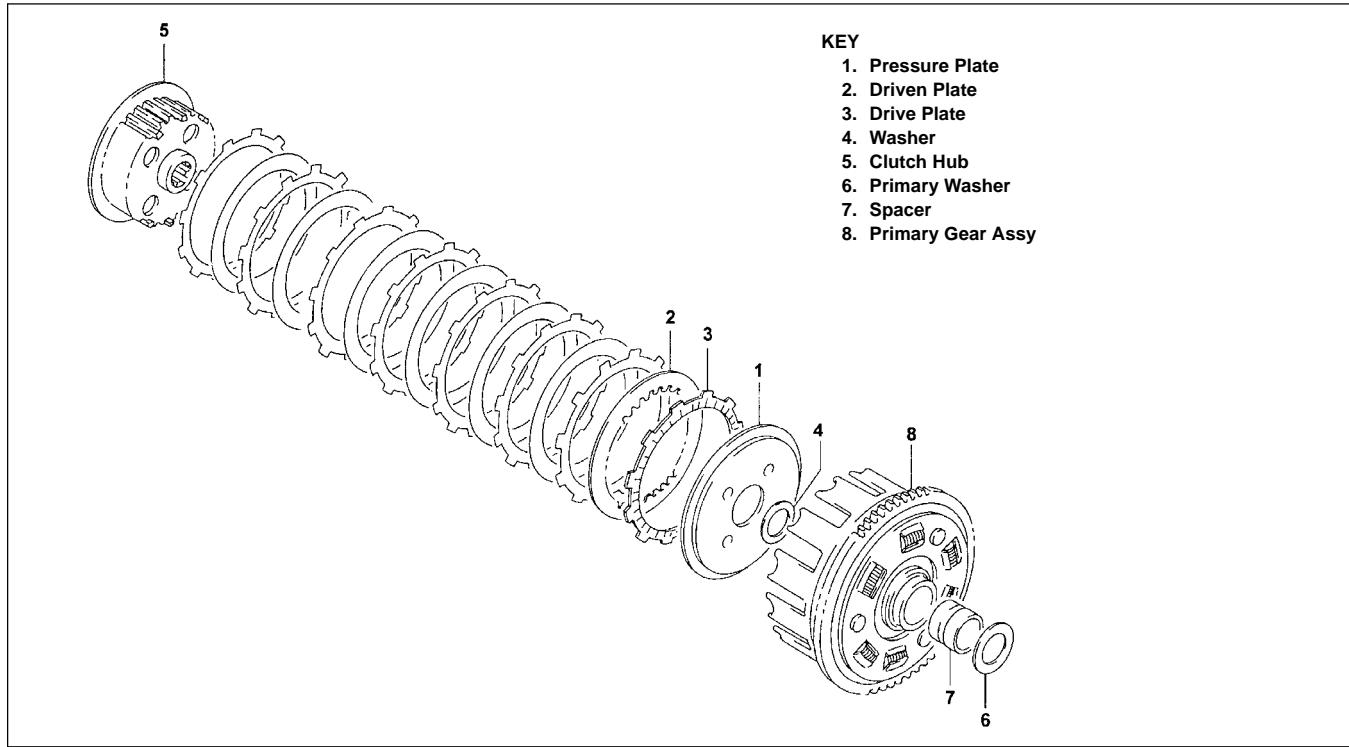
Inspecting Starter Clutch Housing

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

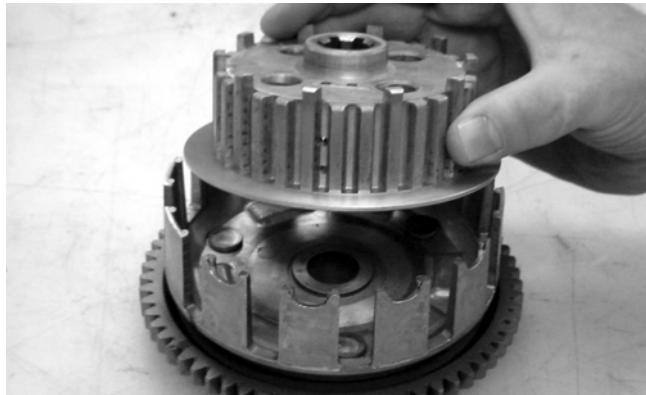
1. Insert the drive into the clutch housing.
2. Rotate the inner race by hand and verify the inner race rotates only one direction.
3. If the inner race is locked in place or rotates both directions, the drive assembly must be replaced.

Assembling Primary Clutch



733-753A

1. Place the clutch hub upside down into the primary gear assembly.

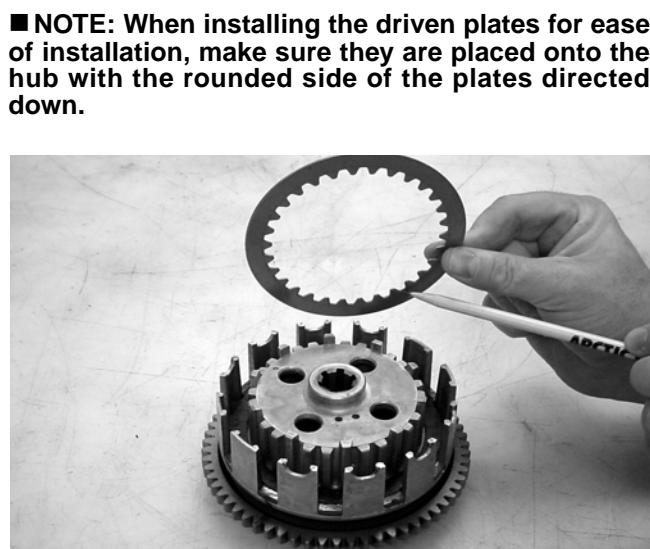


CC920



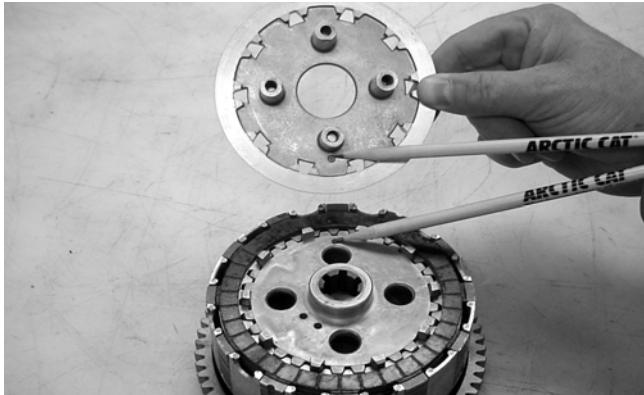
CC921

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.

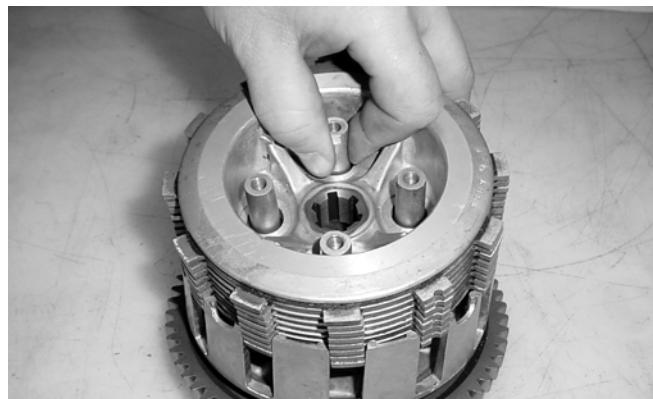


CC922

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

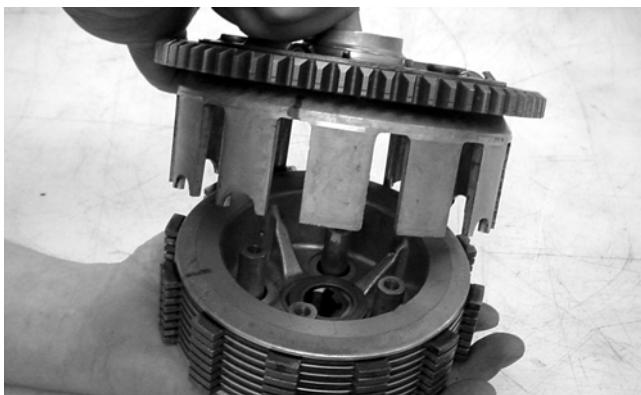


CC923



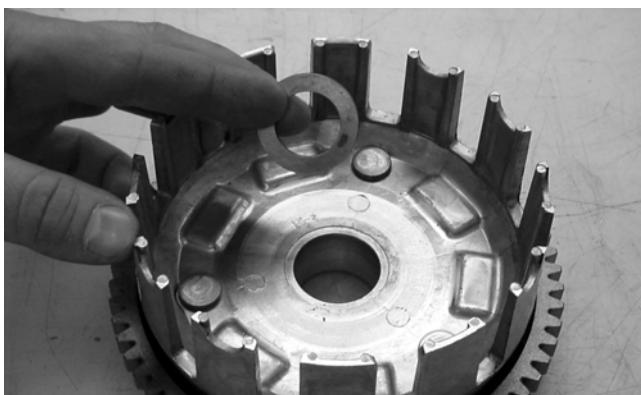
CC926

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.



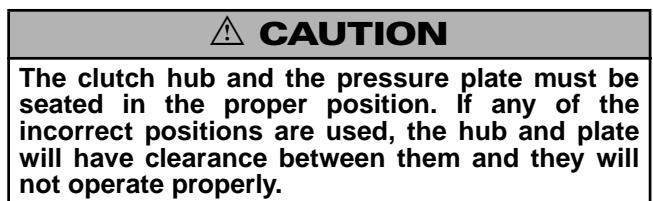
CC924

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



CC925

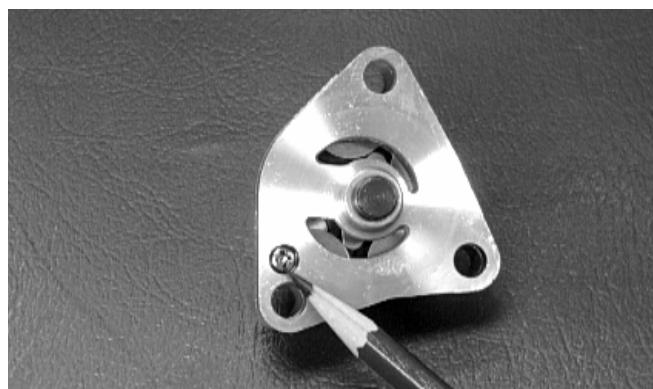
6. Place the clutch hub assembly into the primary gear assembly.



■ 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

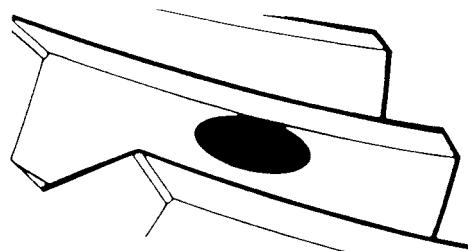
Checking Tooth Contact

■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.

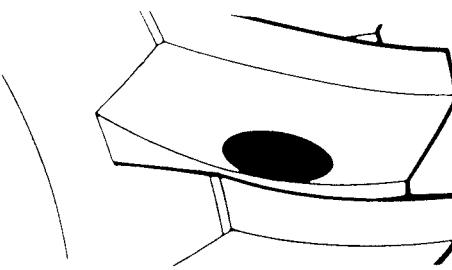
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.
5. Rotate the secondary driven bevel gear several revolutions in both directions.
6.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

Incorrect (contact at tooth top)



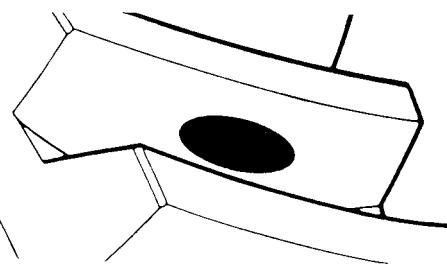
ATV-0103

Incorrect (contact at tooth root)



ATV-0105

Correct



ATV-0104

Correcting Tooth Contact

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

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

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

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

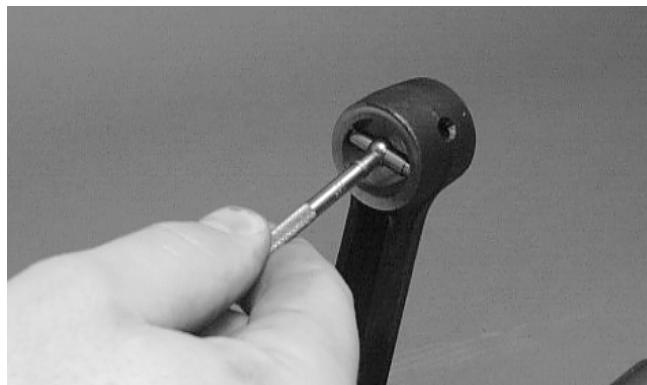
CAUTION

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

CRANKSHAFT ASSEMBLY

Measuring Connecting Rod (Small End Inside Diameter)

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



CC290D

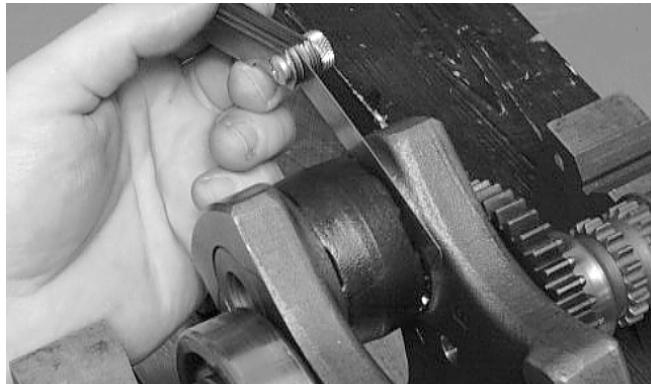
- Maximum diameter is 17.040 mm (0.6709 in.).

Measuring Connecting Rod (Small End Deflection)

- 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.
- Zero the indicator and push the small end of the connecting rod away from the dial indicator.
- Maximum deflection is 3 mm (0.12 in.).

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

- Push the lower end of the connecting rod to one side of the crankshaft journal.
- Using a feeler gauge, measure the gap between the connecting rod and crankshaft journal.



CC289D

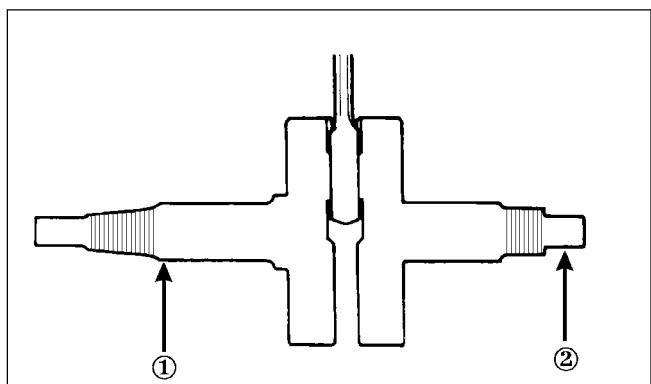
- Acceptable gap range is 0.1-1.0 mm (0.004-0.039 in.).

Measuring Connecting Rod (Big End Width)

- Using a calipers, measure the width of the connecting rod at the big-end bearing.
- Acceptable width range is 17.95-18.00 mm (0.707-0.709 in.).

Measuring Crankshaft (Runout)

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



ATV-1074

- Zero the indicator and rotate the crankshaft slowly.

CAUTION

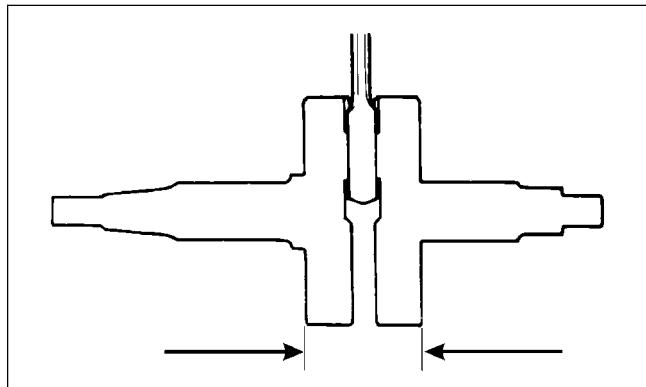
Care should be taken to support the connecting rod when rotating the crankshaft.

4. Maximum runout is 0.05 mm (0.002 in.) for the left side and 0.08 mm (0.003 in.) for the right side.

■ **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.



2. Acceptable width range is 54.9-55.1 mm (2.161-2.169 in.).

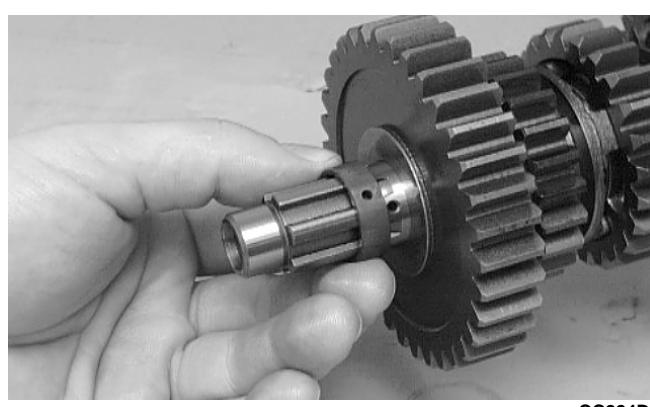
DRIVESHAFT

Disassembling

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

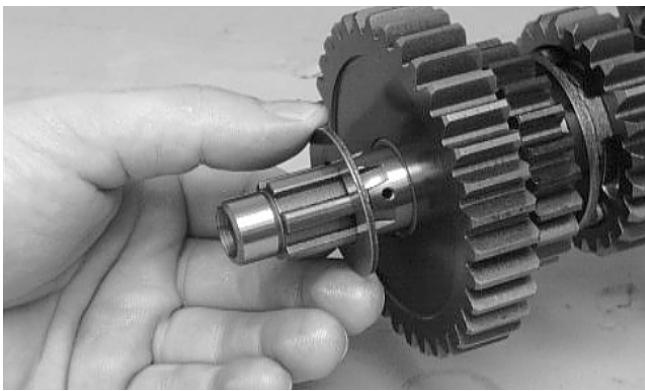


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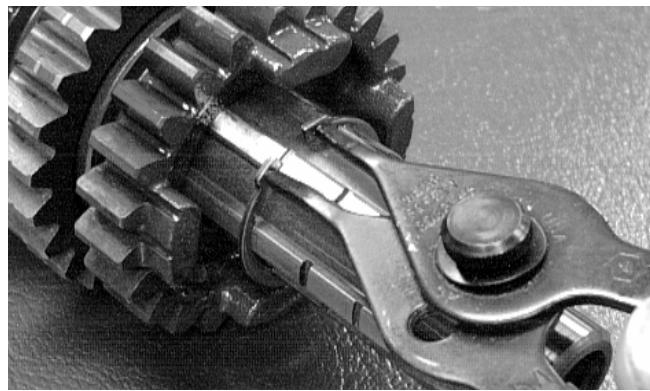


■ **NOTE: The teeth on the bushing must face the 1st driven gear.**

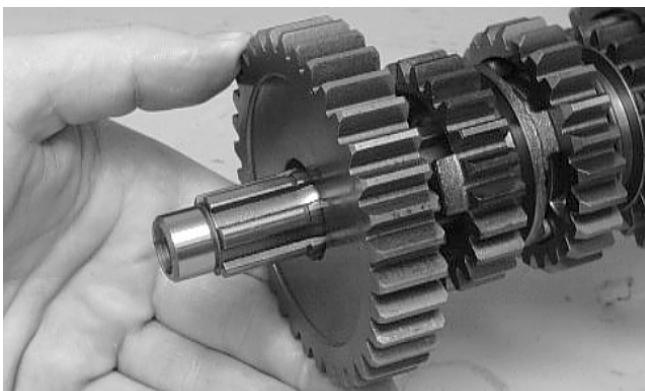
2. Remove the 1st driven washer (right side); then remove the 1st driven gear from the driveshaft.



CC223D



CC508D

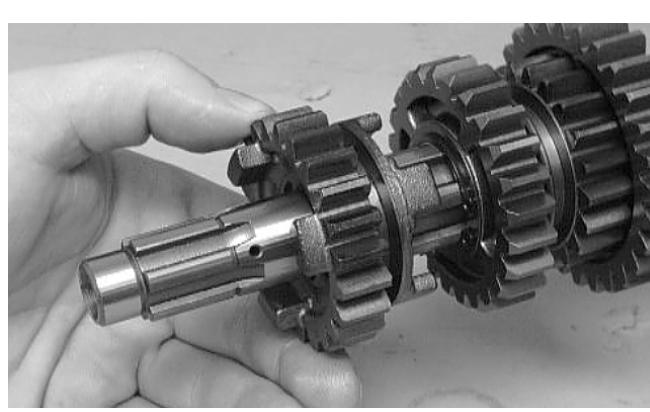


CC222D

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



CC221D



CC219D

4. Remove the 4th driven gear from the driveshaft. Note the four small dogs facing toward the 3rd driven gear for assembling purposes.

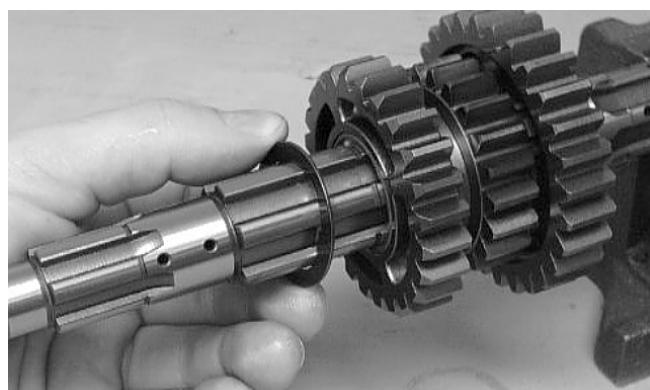


CC220D

■ NOTE: Remove the 4th driven circlip.

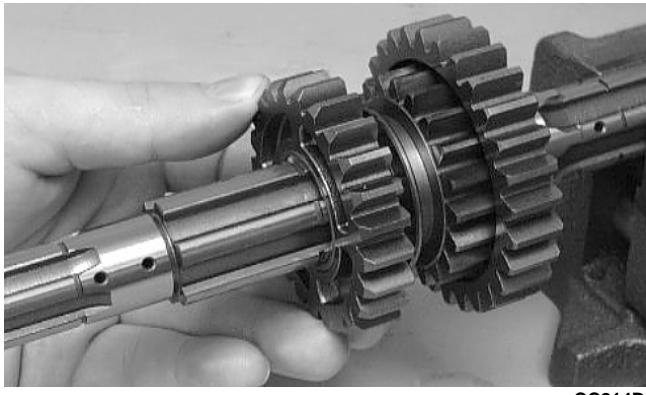


CC216D



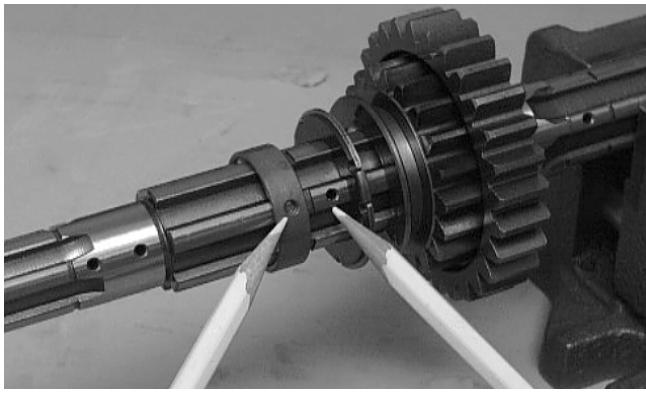
CC215D

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



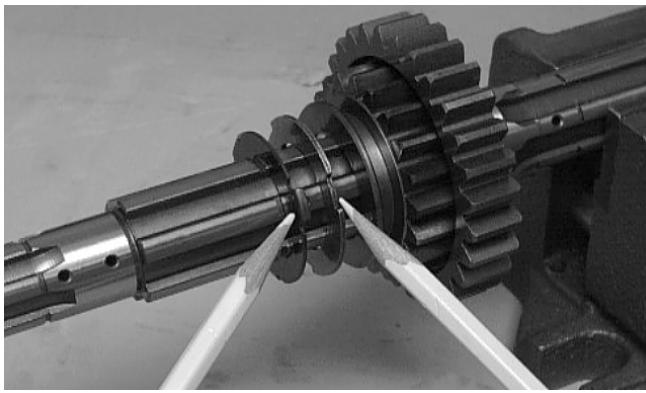
CC214D

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.



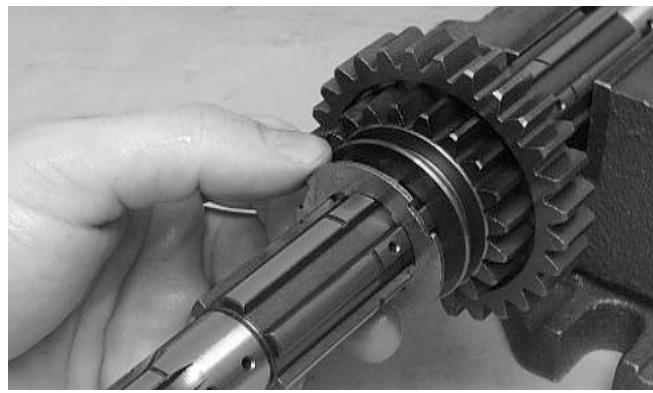
CC213D

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.



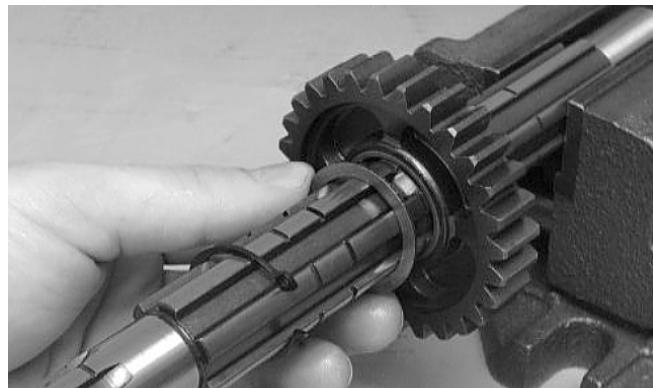
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CC210D

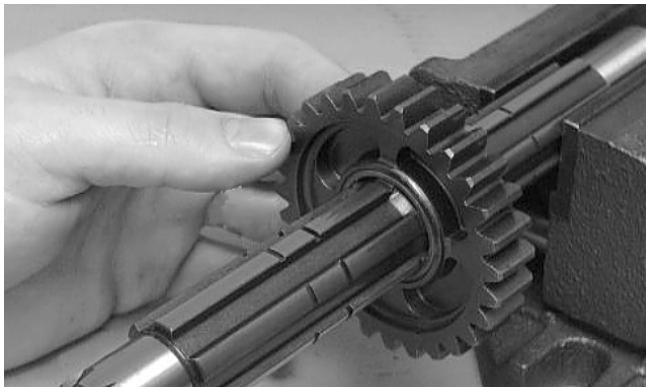
11. In order, remove the 2nd driven circlip, washer, gear, and bushing from the driveshaft.



CC209D



CC208D



CC207D

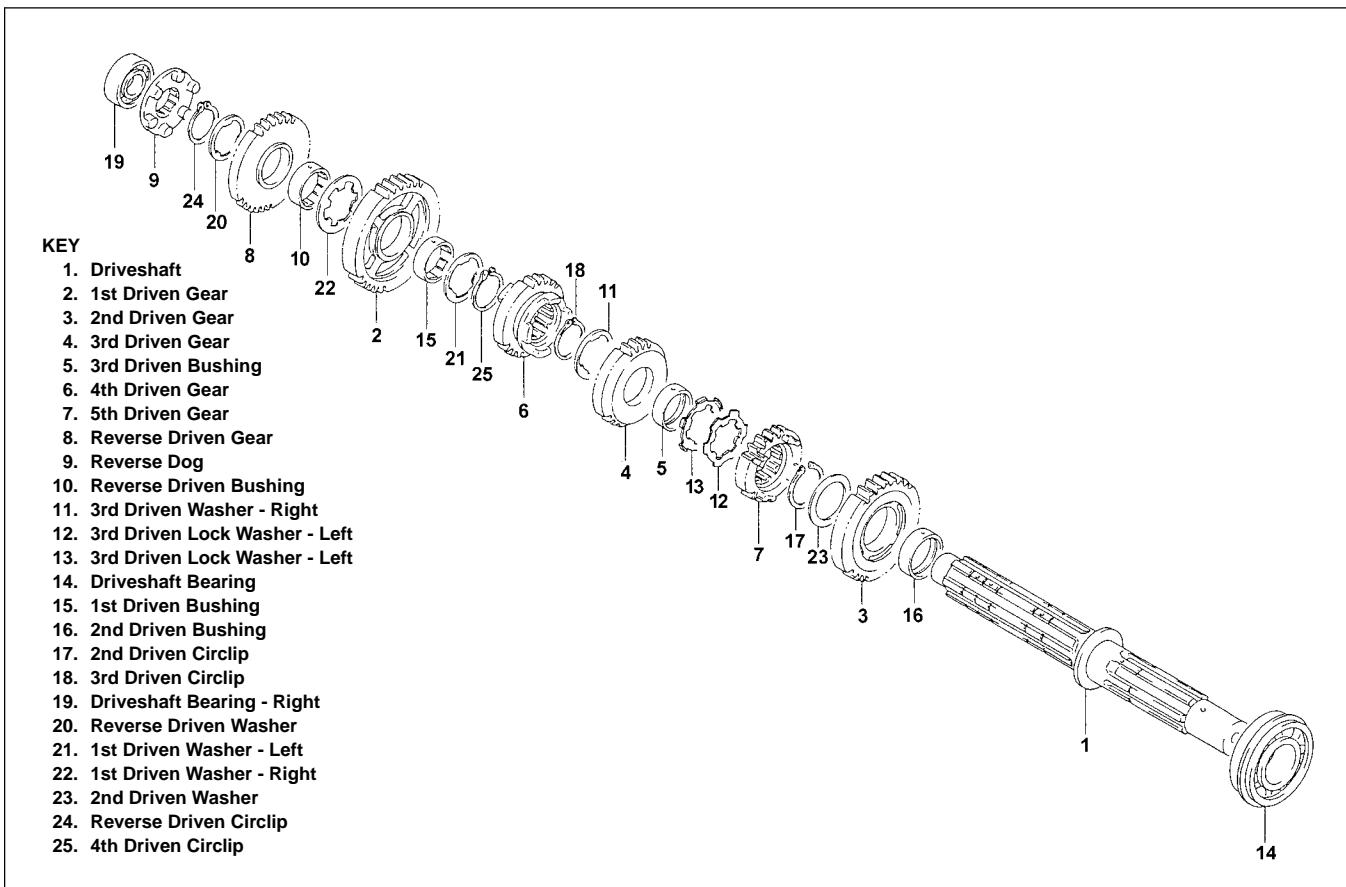


CC206D

☞ 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.



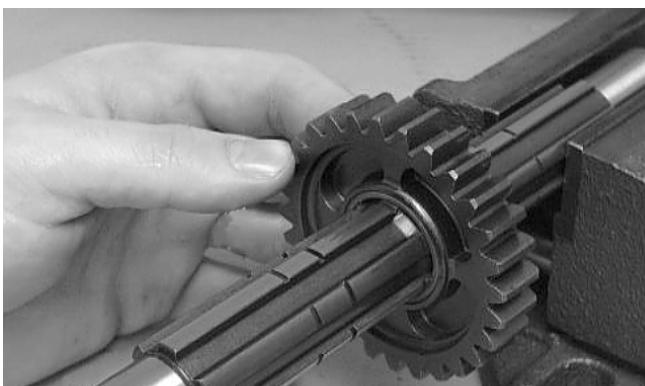
CC206D

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

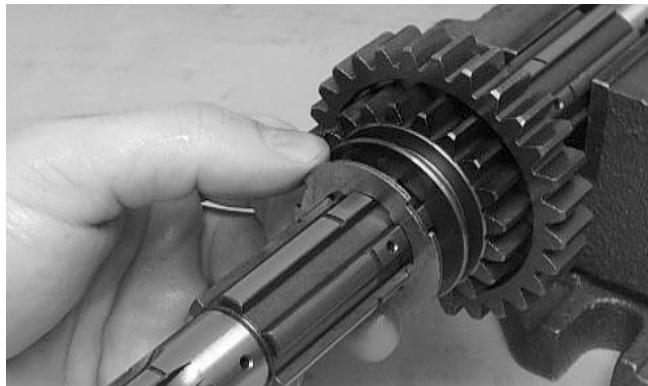


CC210D

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.

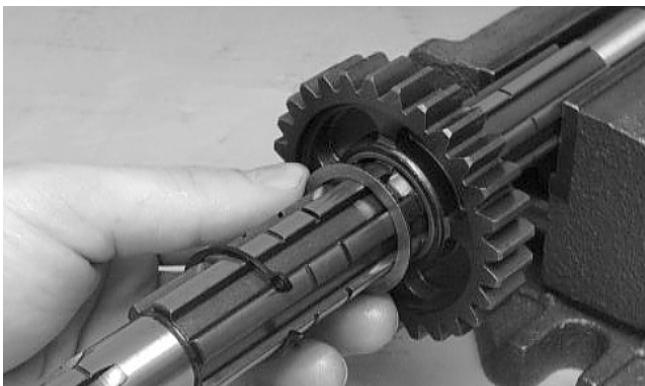


CC207D

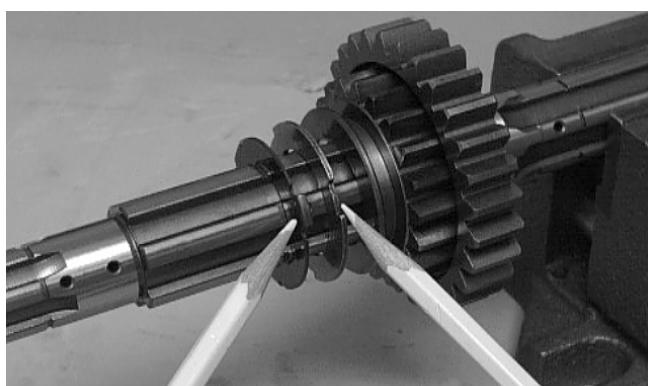


CC211D

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

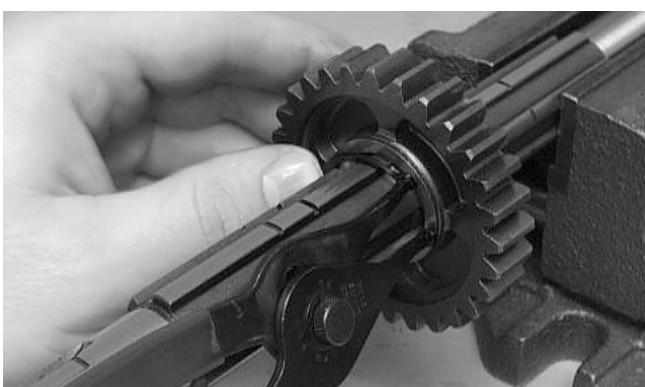


CC208D

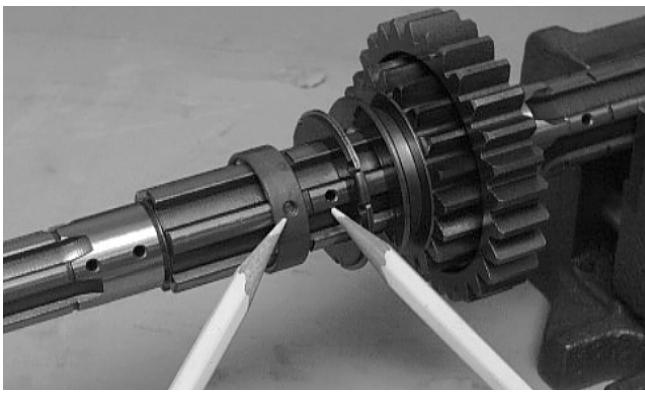


CC212D

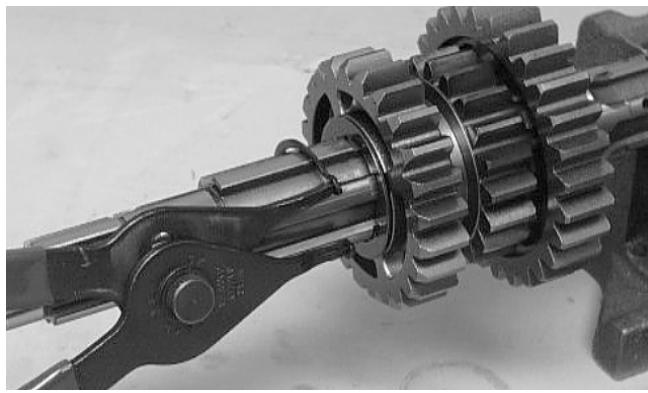
5. Install the 3rd driven bushing onto the driveshaft making sure the oil feed hole in the bushing aligns with the appropriate oil supply hole in the driveshaft (as noted in disassembling).



CC209D



CC213D

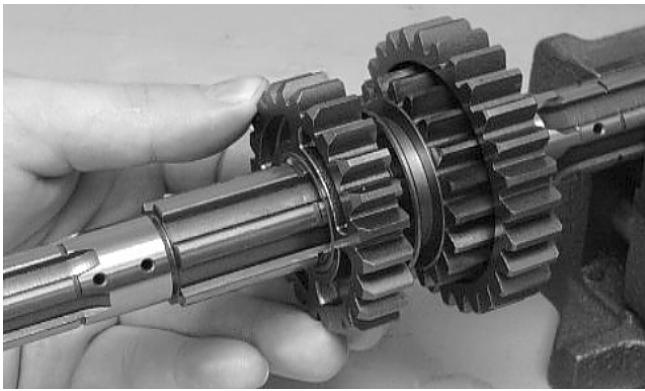


CC216D

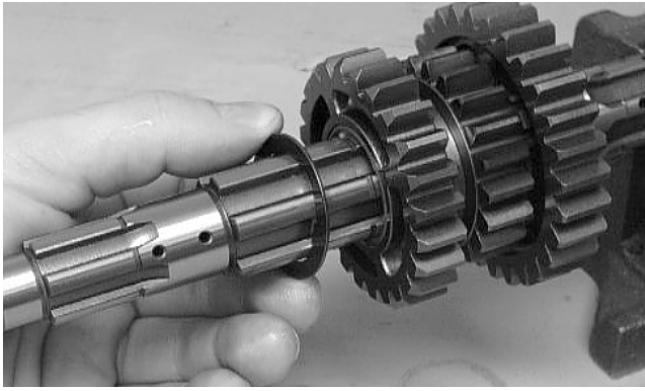
⚠ CAUTION

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.

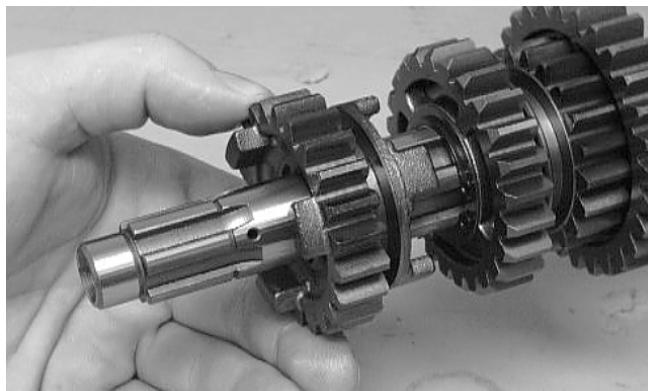


CC214D



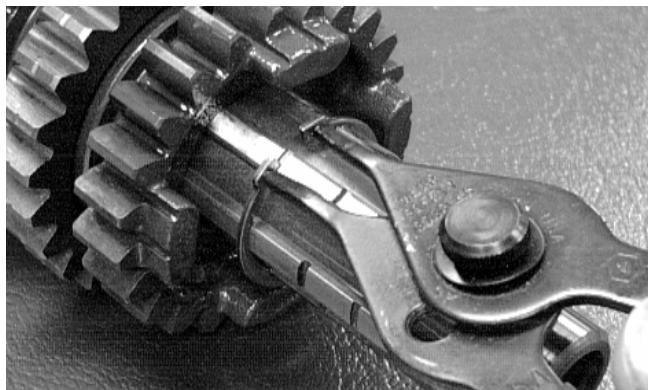
CC215D

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.



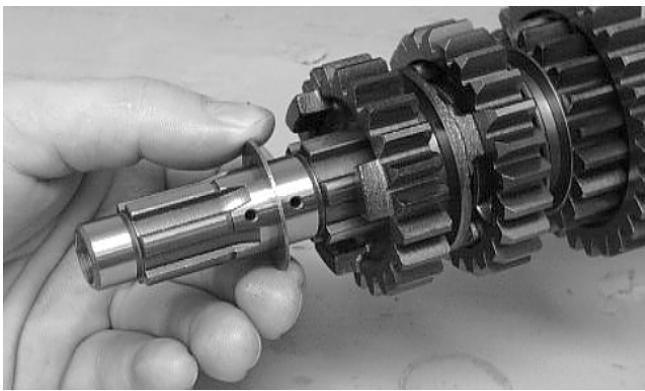
CC219D

■ NOTE: Secure with the circlip.



CC508D

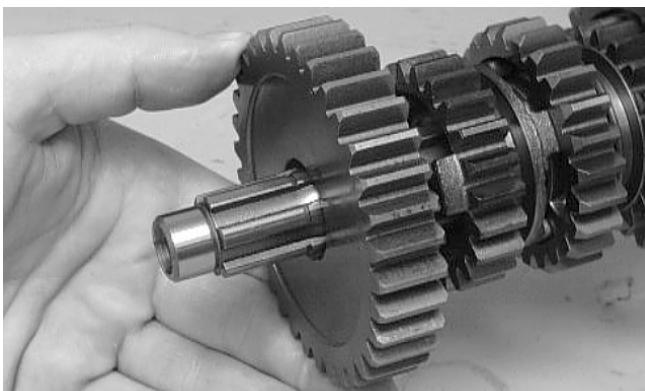
8. Install the 1st driven washer (left side) onto the shoulder of the splined shaft; then install the 1st driven bushing and gear.



CC220D

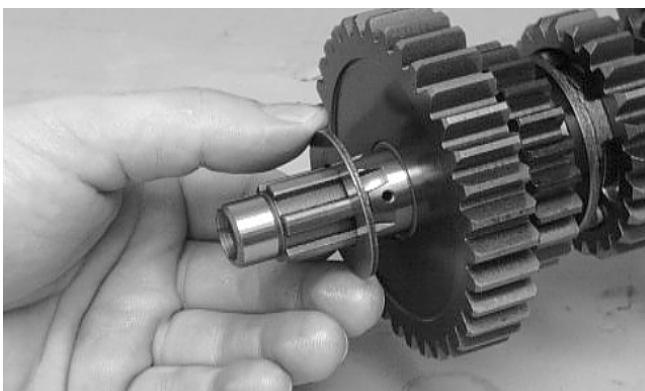


CC221D



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.

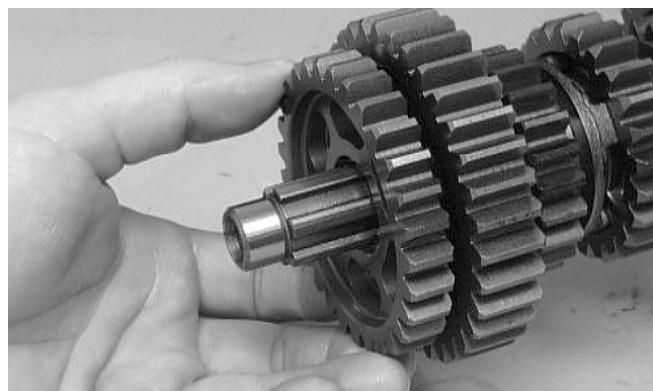
3

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.

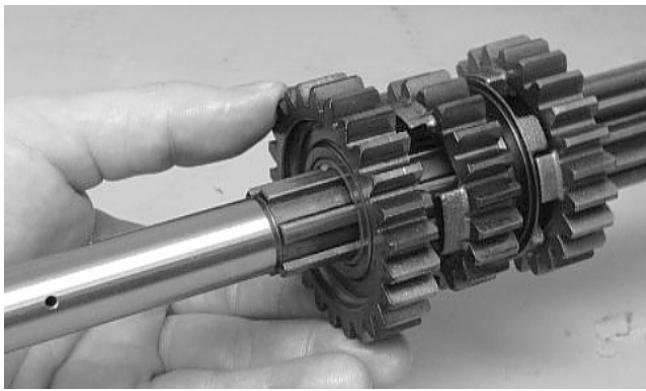


CC225D



CC226D

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



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

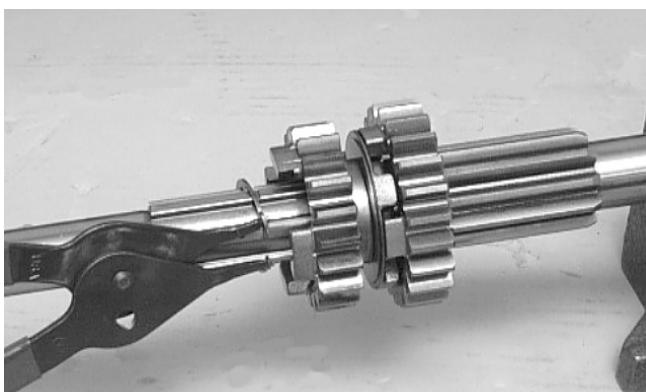
Disassembling

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



CAUTION

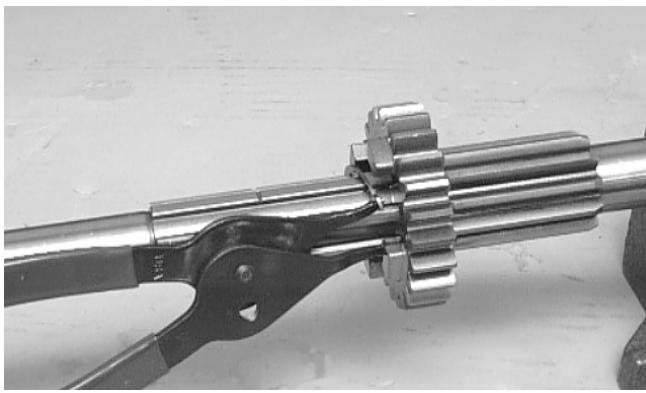
Pressing the 2nd drive gear off may be done twice before shaft replacement is necessary.



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

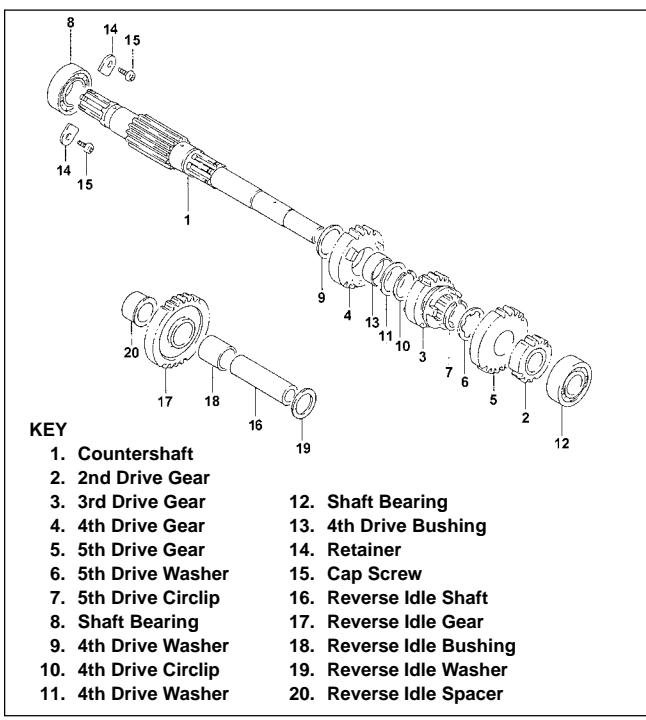
■ **NOTE: Account for the bushing in front of the gear.**



CC198D

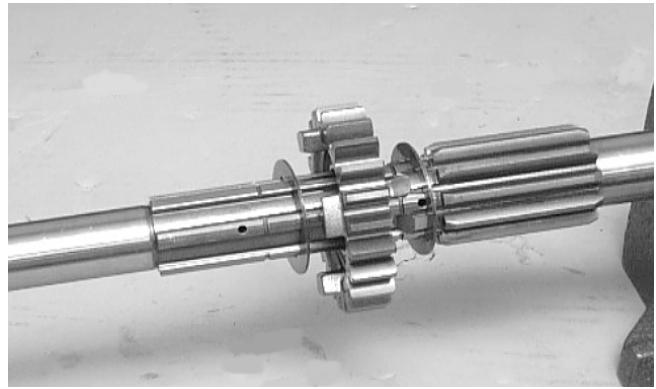
6. Remove the 4th drive washer from the countershaft.

Assembling

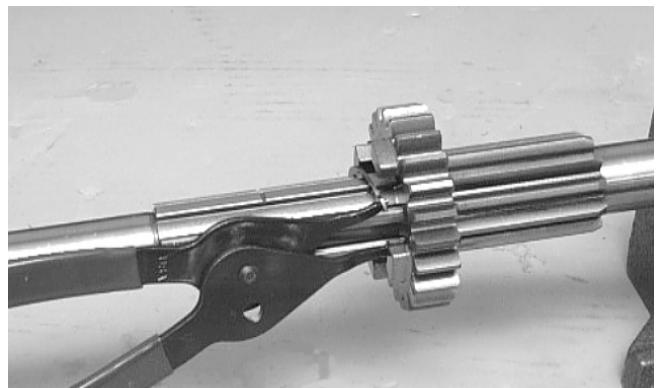


733-754C

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



CC199D

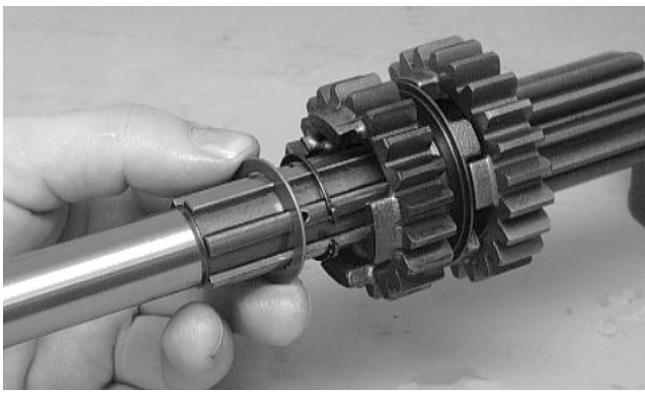
3

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

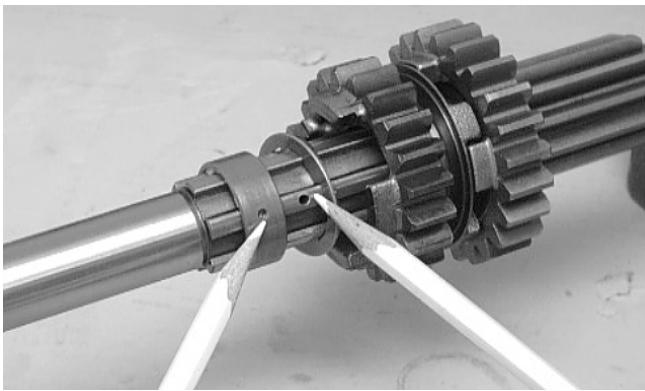


CC200D

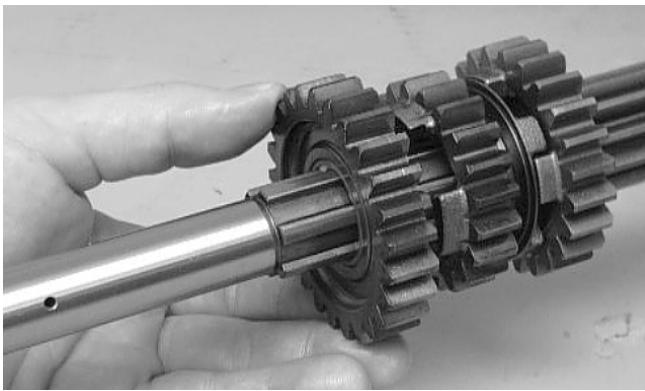
4. Install the 5th drive washer and 5th drive gear onto the countershaft making sure the oil holes align.



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.

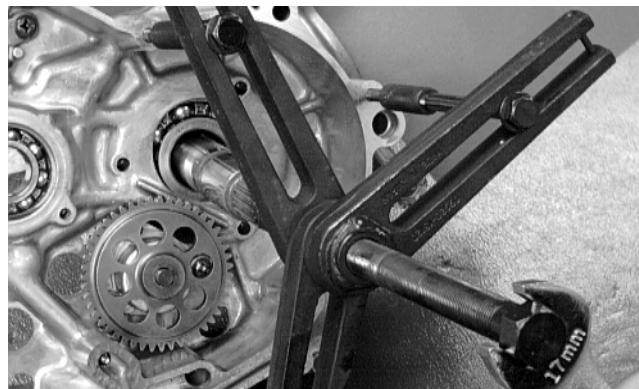
■ NOTE: The countershaft is now completely assembled for installation.

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.



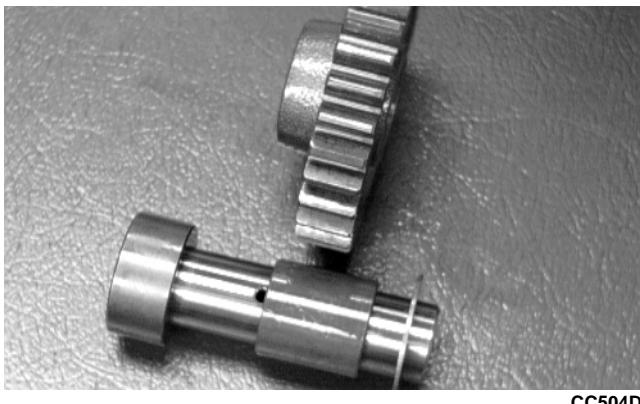
CC507D

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



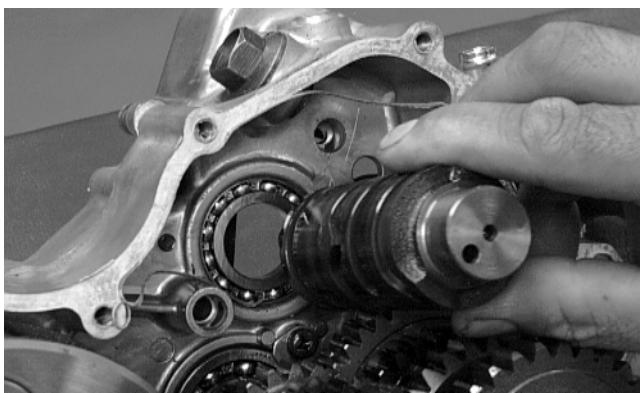
CC505D

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



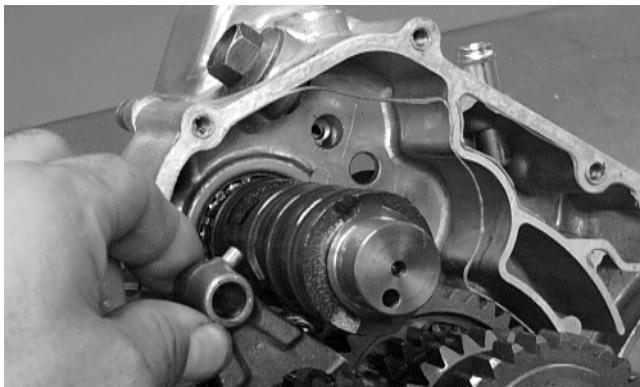
CC504D

5. Install the gear shifting cam.



CC501D

6. Install the front gear shifting fork.



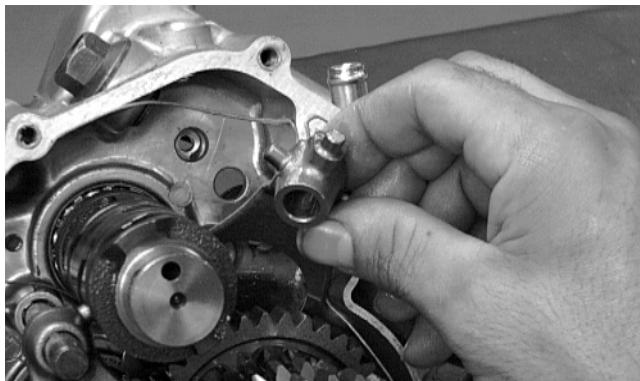
CC500D

7. Install the short gear shifting fork shaft.



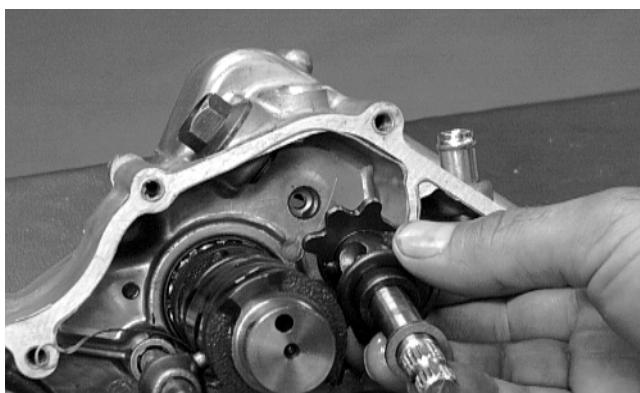
CC499D

8. Install the inner shifting fork.



CC498D

9. Install the reverse shifting cam and washer.



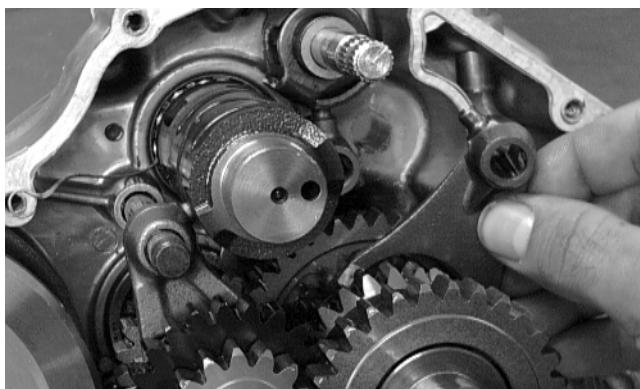
CC497D

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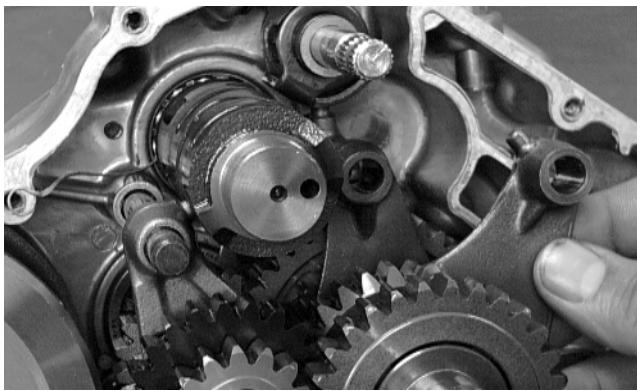


CC486D

10. Install the center and outer shifting forks.

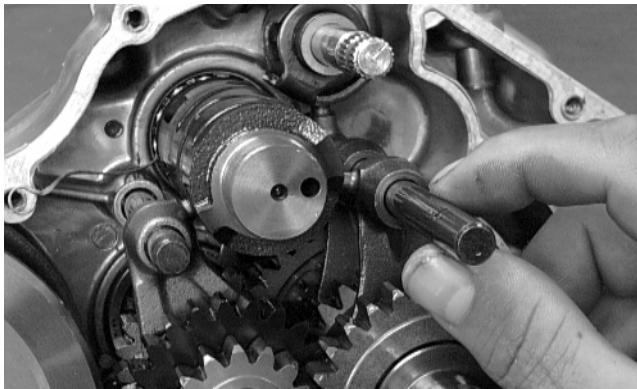


CC496D



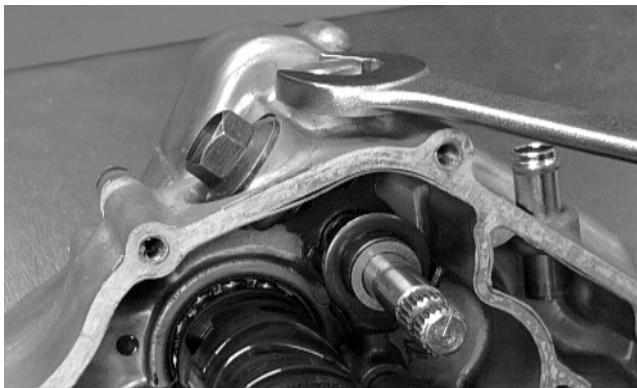
CC495D

11. Install the long gear shifting fork shaft.



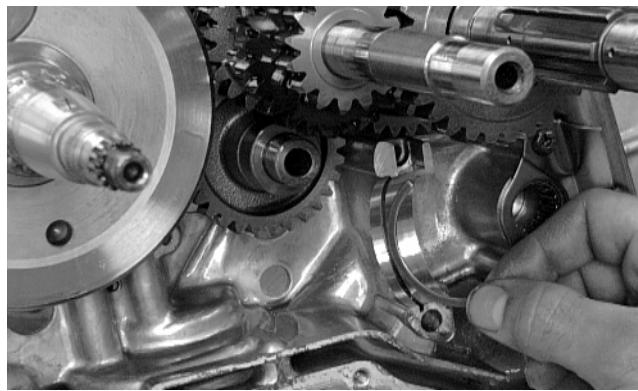
CC494D

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

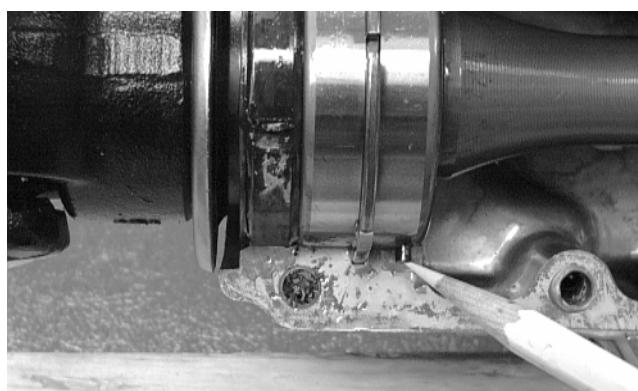


CC493D

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.

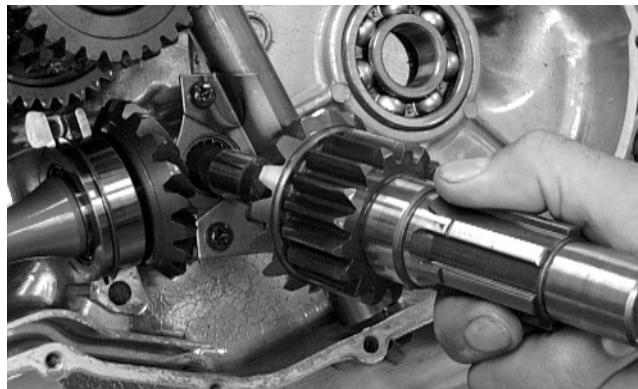
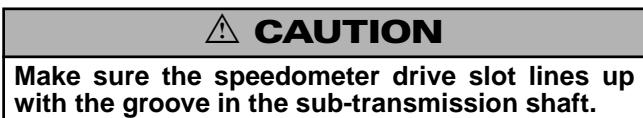


CC492D



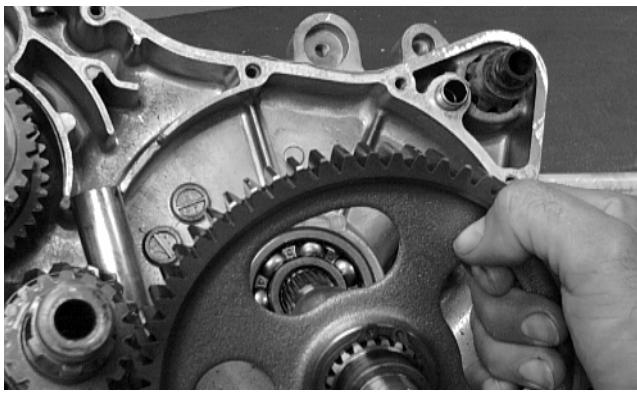
CC490D

14. Install the sub-transmission shaft assembly.



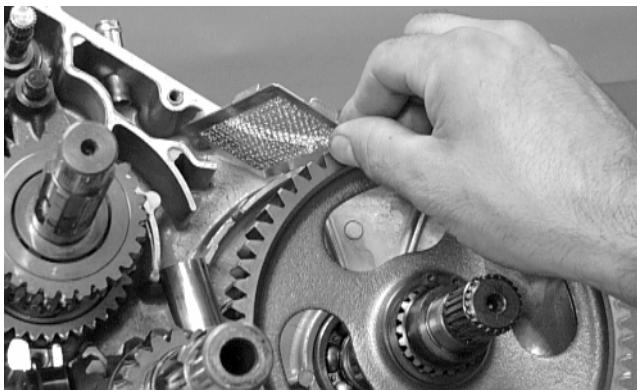
CC489D

15. Install the final driven shaft and gear.



CC487D

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

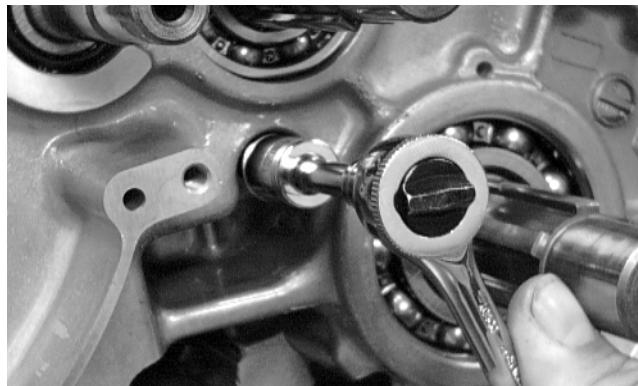


CC487D

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

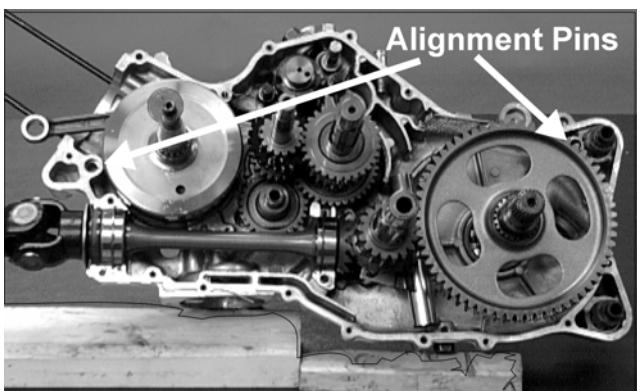
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CC482D

Joining Crankcase Halves

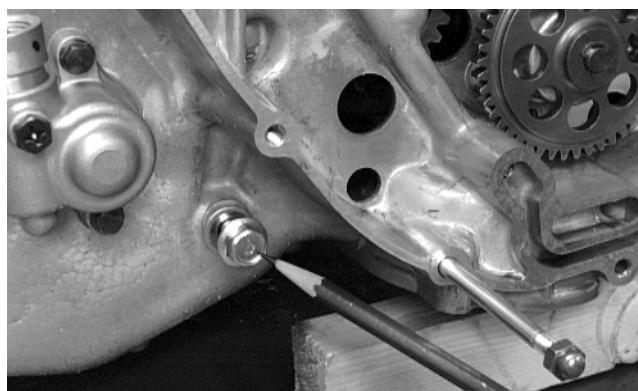
1. Verify that the alignment pins are in place and that both case halves are clean and grease free. Apply Three Bond Sealant (p/n 0636-070) to the mating surfaces. Place the right-side half onto the left-side half.



CC485DA

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

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.

7. 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

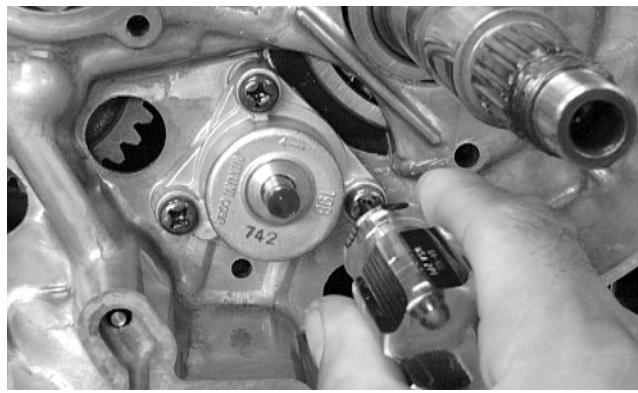
After completing center crankcase components, proceed to **Installing Right-Side Components**, to **Installing Left-Side Components**, and to **Installing Top-Side Components**.

Installing Right-Side Components

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

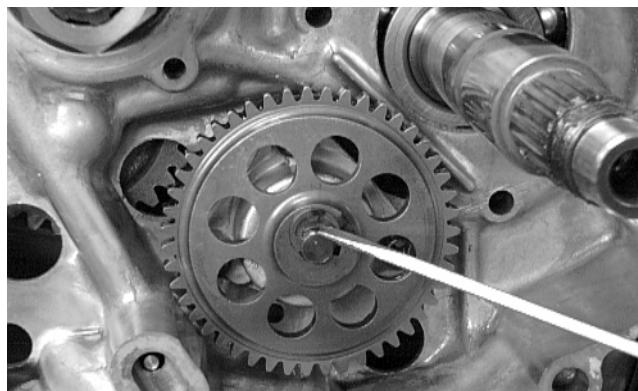
■NOTE: If the oil pump was serviced, follow steps 1-2.

1. 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

2. 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

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

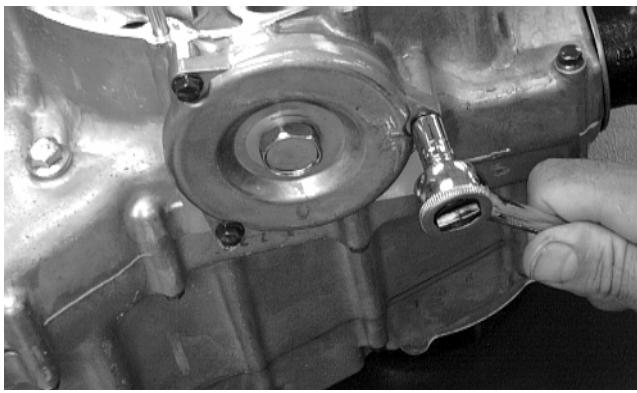
CAUTION

The legs of the strainer must be directed out.



CC443D

4. 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

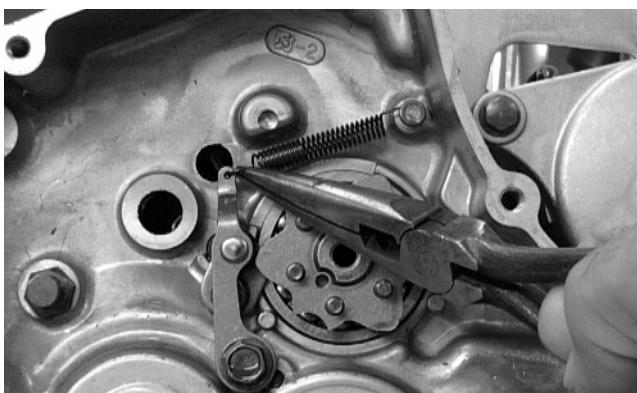
5. Place the stopper plate pins and the pin retainer into position noting the alignment pin. Secure assembly with the cap screw coated with red Loctite #271. Tighten securely.



CC438D

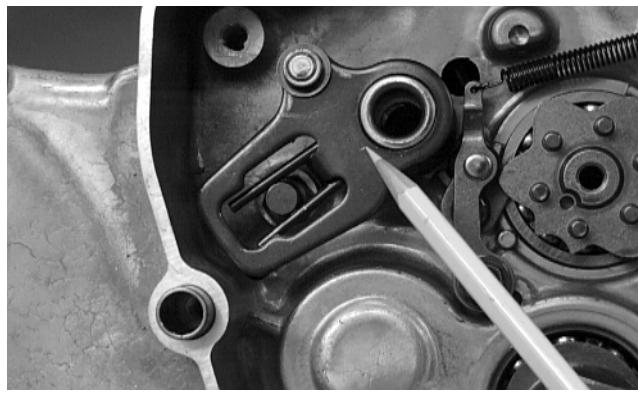
■ **NOTE:** The detent in the pin retainer must be straddling a pin.

6. Install the spring onto the cam stopper.



CC437D

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

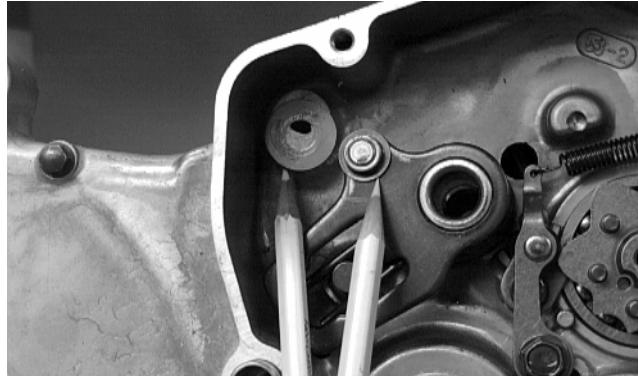


CC436D

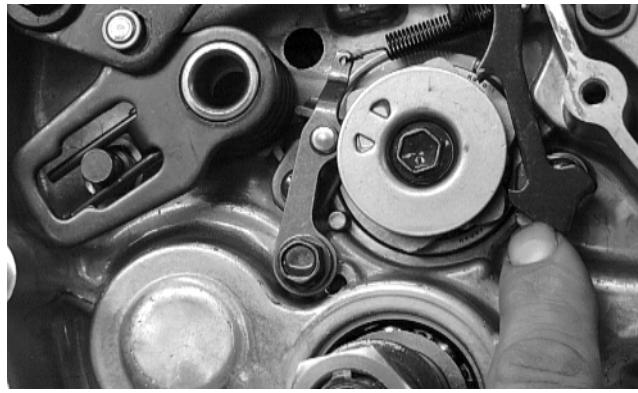
8. Install the gear shifting arm assembly making sure the washer and roller are properly positioned. Secure with the cap screw coated with red Loctite #271.

■ **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.

3



CC435D



CC449D



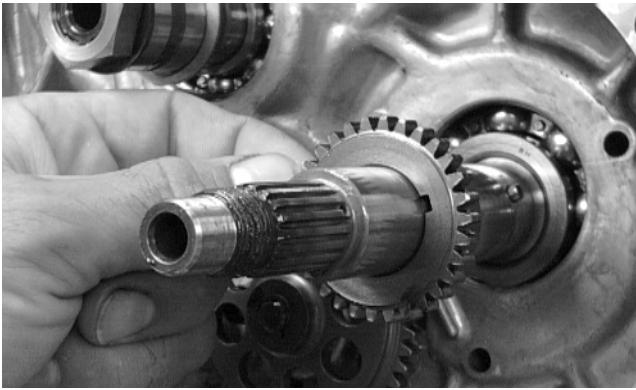
CC451D

C. Primary Clutch D. Starter Clutch Shoe

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

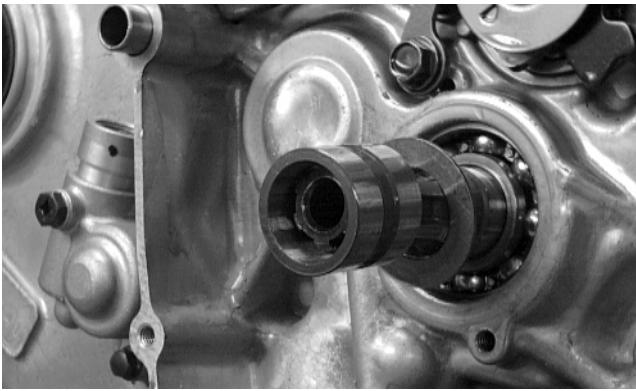
9. Install the oil pump drive gear onto the crankshaft making sure the pin is properly positioned.

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



CC432D

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



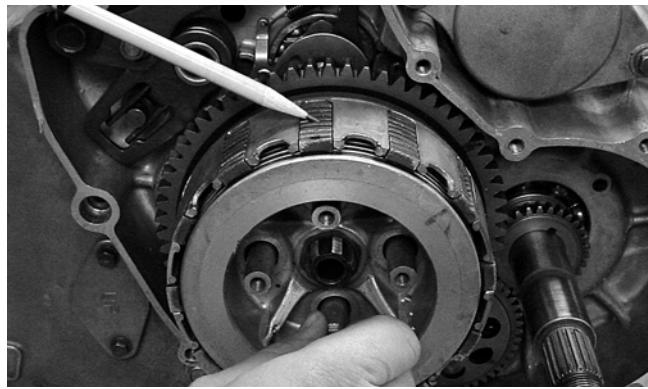
CC431D

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.

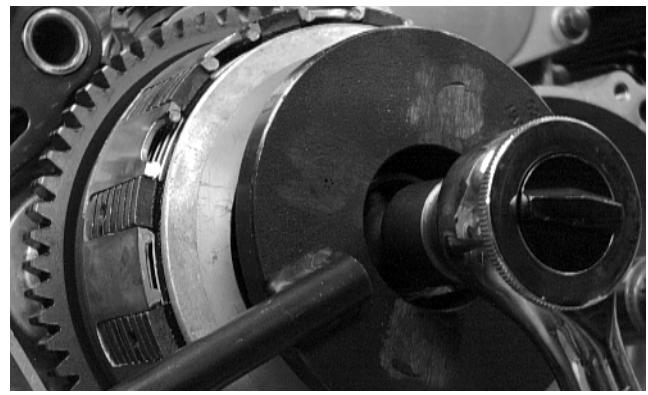
11. Place the primary clutch assembly onto the countershaft.

■ **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.



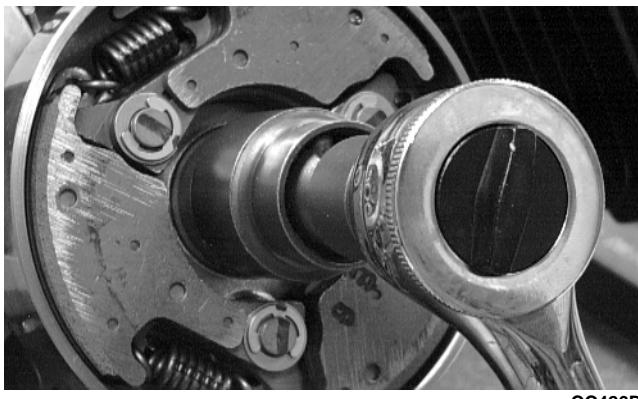
CC914

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).

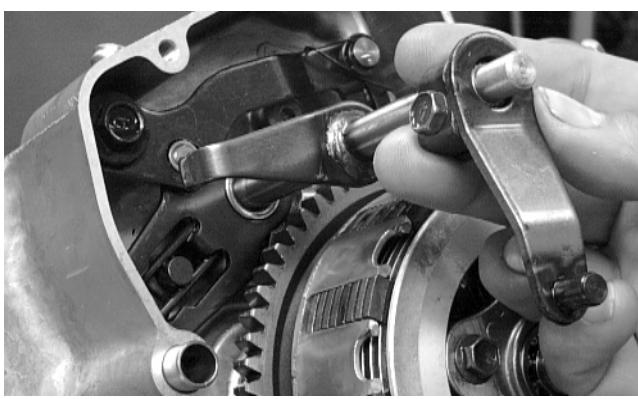


15. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, tighten the four cap screws securely.

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



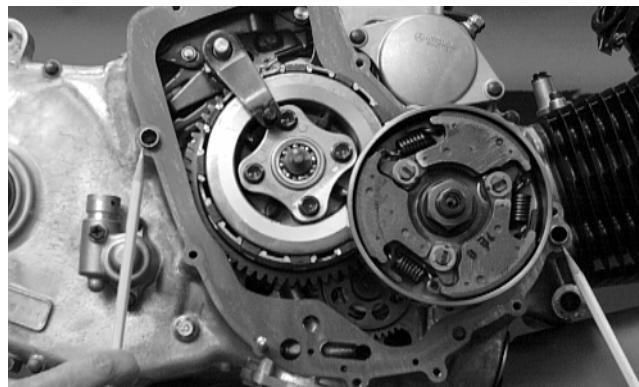
16. Slide the clutch release arm and gear shift shaft into the crankcase.



E. Release Roller Guide F. Cover

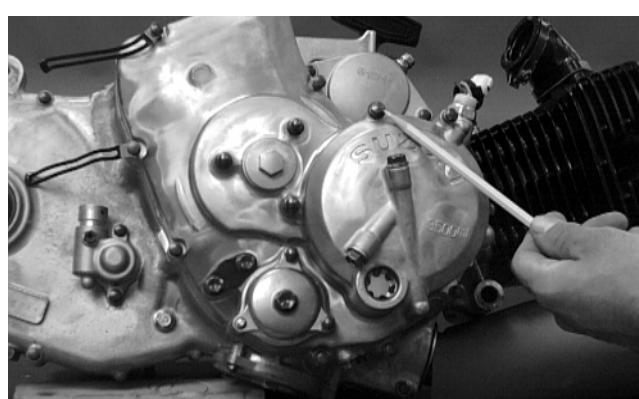
■NOTE: Steps 1-16 of the preceding sub-sections must precede this procedure.

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



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.

3



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

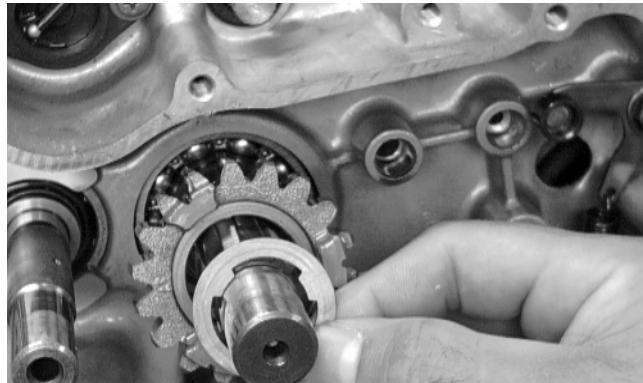
1. Place the shift-indicator sending unit into position making sure the neutral contact and spring are inside the case and a well-oiled O-ring is properly positioned. Secure with Phillips-head screws.



CC479D



CC475D



CC474D

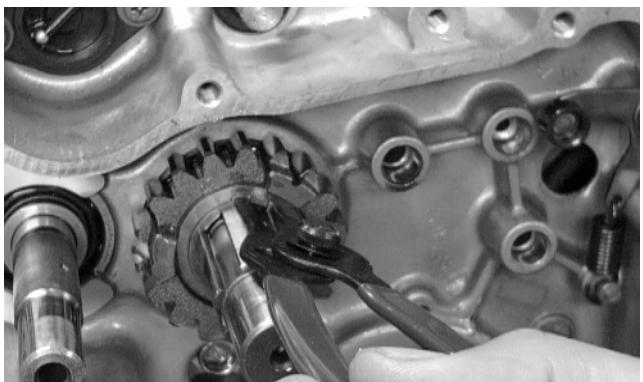


CC478D

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.



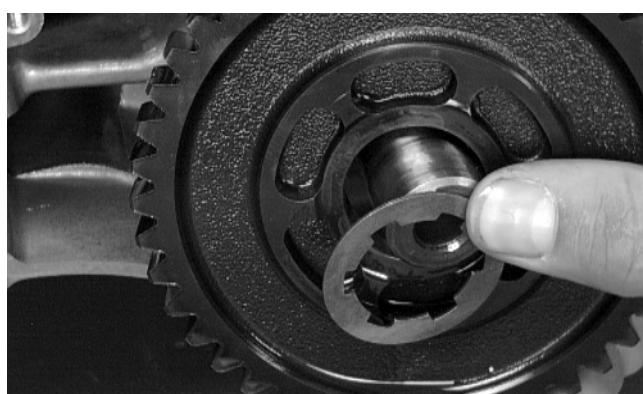
CC476D



CC473D

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.**

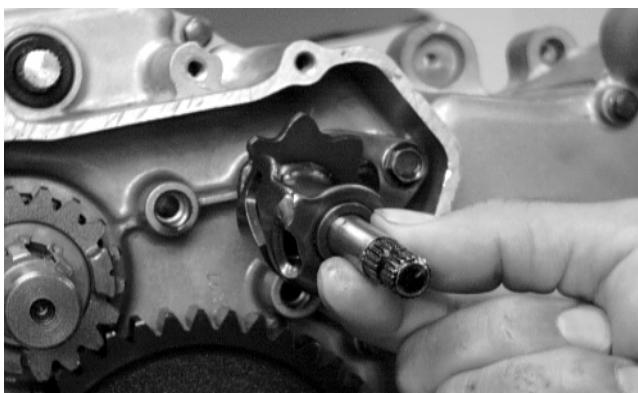


CC471D



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.

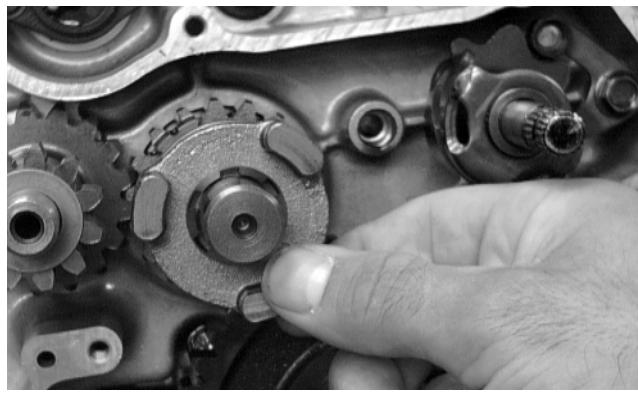


CC477D



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

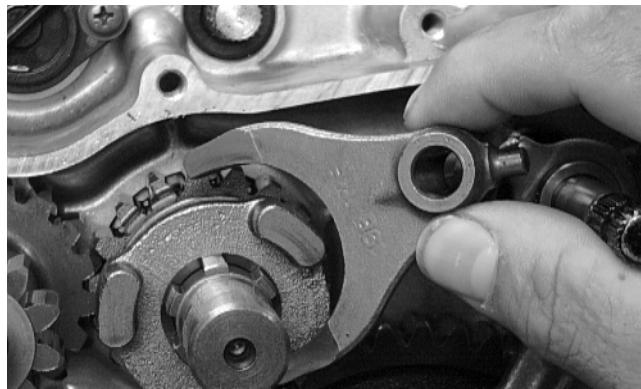
9. Install the long shift fork shaft (4x4).



CC464D

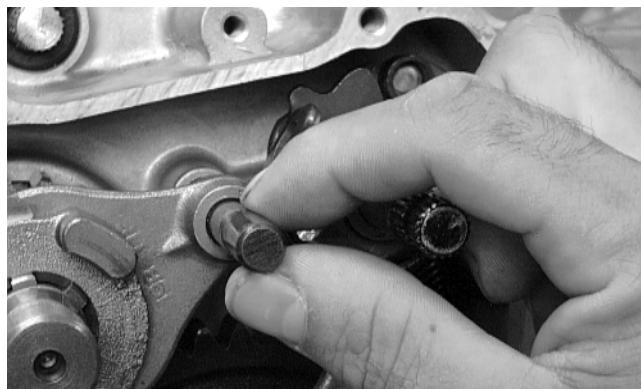
3

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.

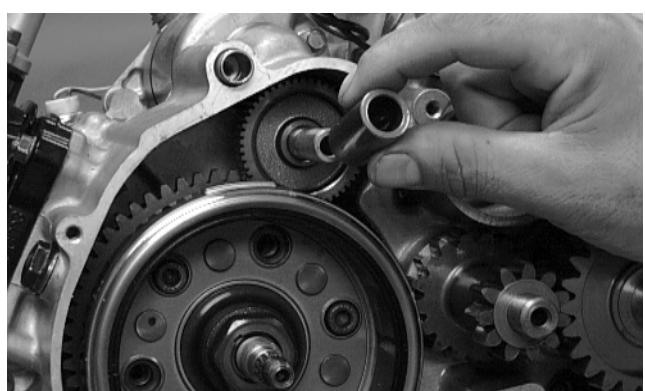


CC458D

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



CC455D



CC454D

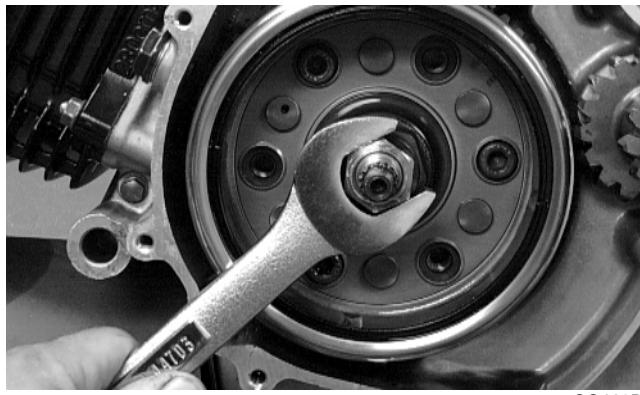
C. Stator Assembly/Cover

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.

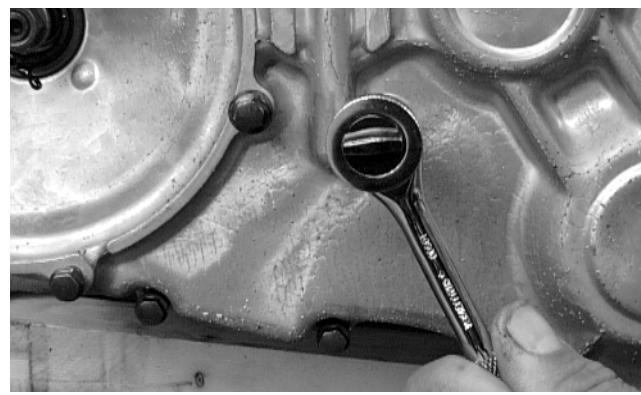
19. Install the cap screws to secure the left-side cover noting the location of the different-sized cap screws; then only finger-tighten at this time.

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).



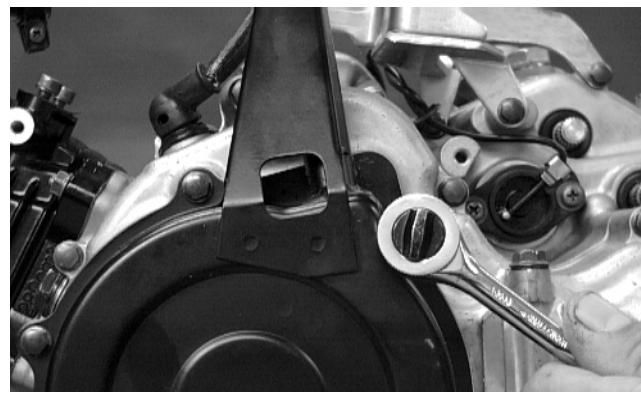
CC413D

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).



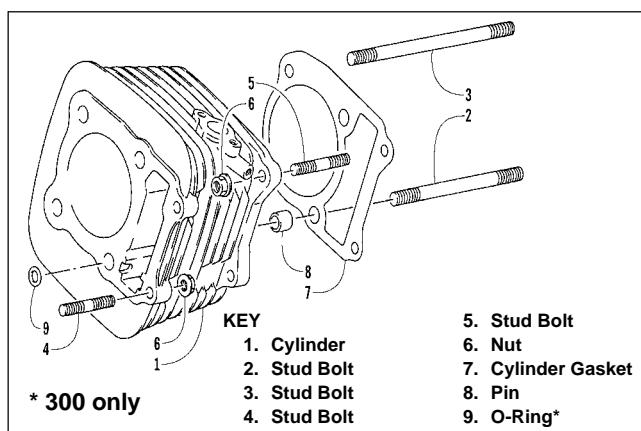
CC412D

3

Installing Top-Side Components

A. Piston

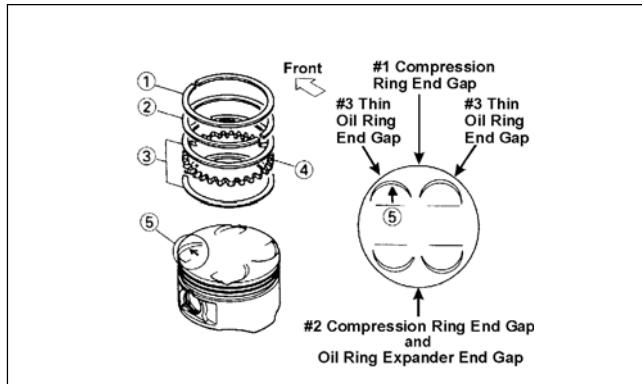
B. Cylinder



0733-744

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

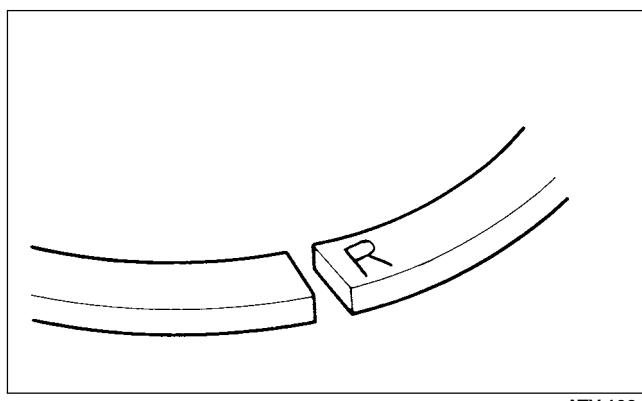
A. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



CC383D

■ **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.

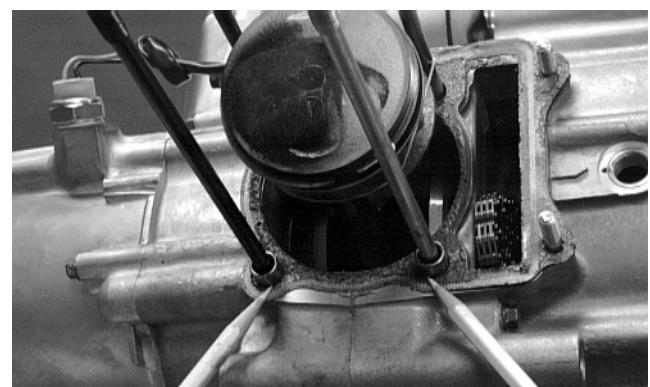


CC383D



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.

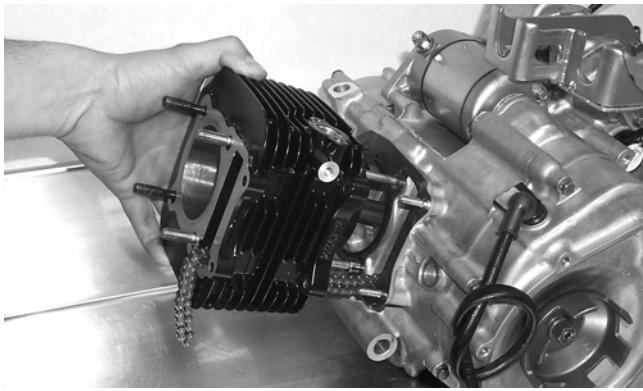


CC381D

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.

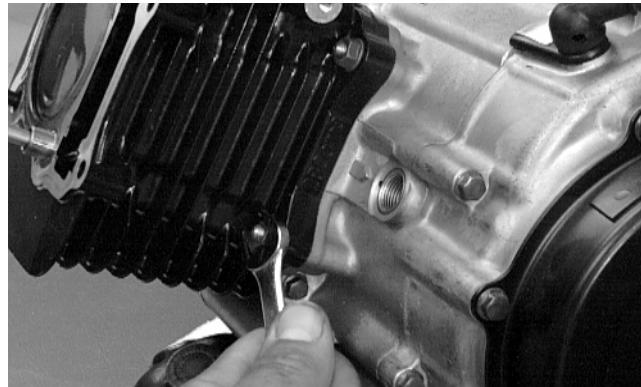
⚠ CAUTION

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



CC525D

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



CC380D

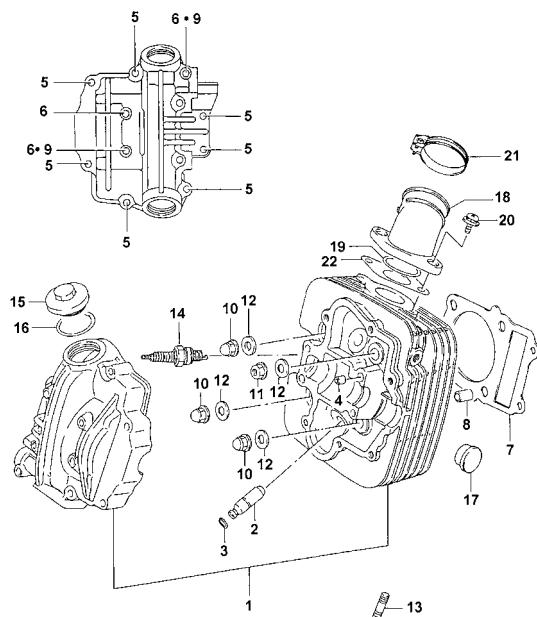
4. Loosely install the two nuts which secure the cylinder to the crankcase.

C. Cylinder Head

D. Valve Cover

KEY

1. Cylinder Head Assy
2. Valve Guide
3. O-Ring
4. Dowel Pin
5. Cap Screw
6. Cap Screw
7. Cylinder Head Gasket
8. Dowel Pin
9. Gasket
10. Nut
11. Nut
12. Gasket
13. Stud Bolt
14. Spark Plug
15. Inspection Cap
16. O-Ring
17. Cylinder Head Plug
18. Intake Pipe
19. O-Ring
20. Screw
21. Clamp
22. Gasket



3

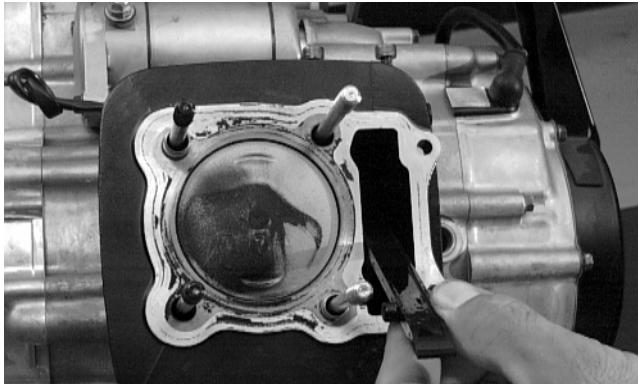
0733-743

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

5. Place the chain guide into the cylinder.

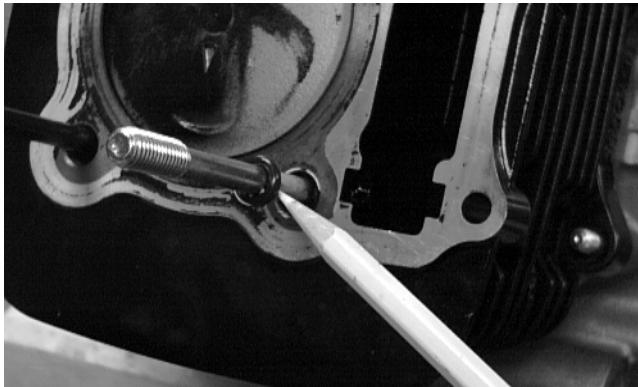
CAUTION

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



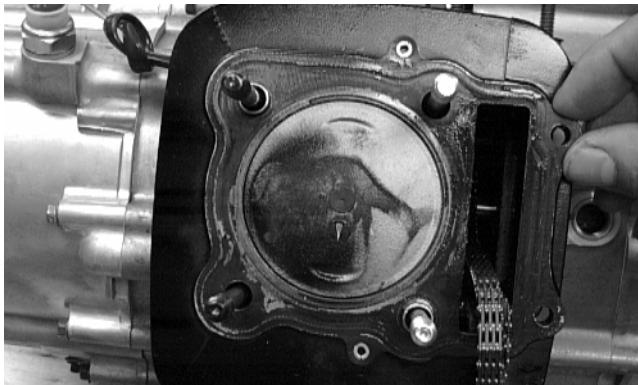
CC379D

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



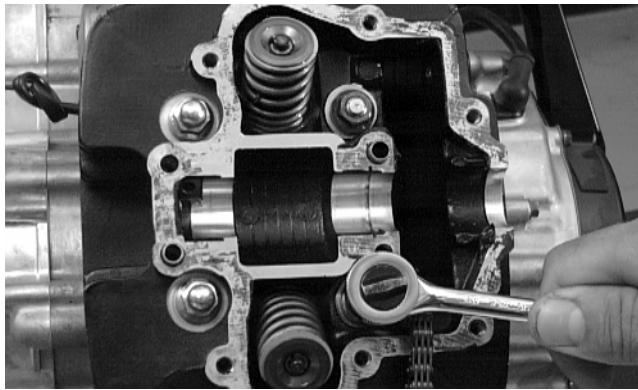
CC384D

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

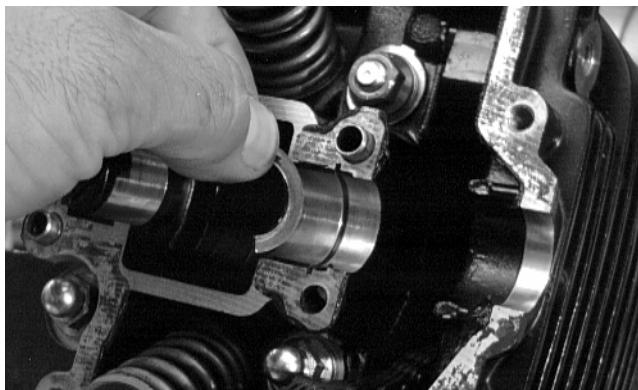
9. Loosely install the remaining cylinder head nuts.



CC376D

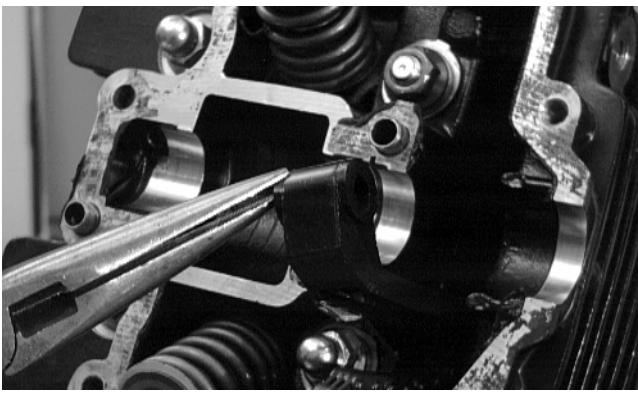
10. In a crisscross pattern, tighten the three cylinder head cap nuts and one nut to 2.5 kg-m (18 ft-lb). Tighten the remaining head nuts and the cylinder-to-crankcase nuts to 1.1 kg-m (8 ft-lb).

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

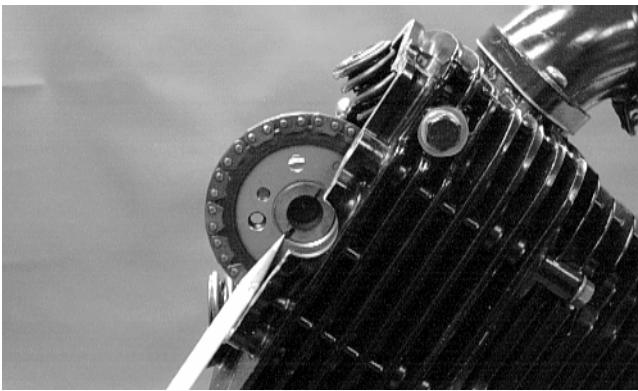
■ **NOTE:** At this point, oil the camshaft bearings, cam lobes, and the three seating journals on the cylinder.

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.

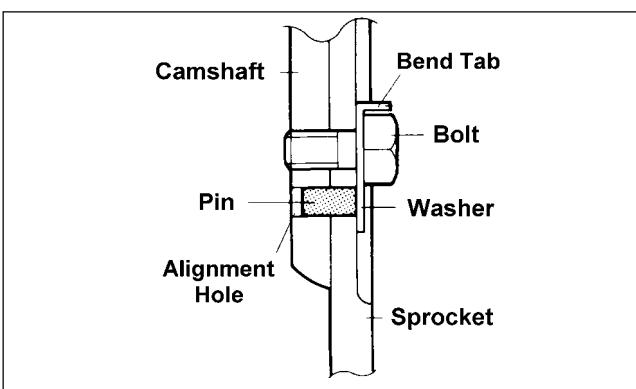
- Piston still at top-dead-center.
- Camshaft lobes directed down (toward the piston).
- Camshaft alignment marks parallel to the valve cover mating surface.
- Recessed side of the sprocket directed toward the cam lobes.
- Camshaft alignment pin and sprocket alignment hole (smallest) are aligned.

3

⚠ CAUTION

If any of the above factors are not as stated, go back to step 13 and carefully proceed.

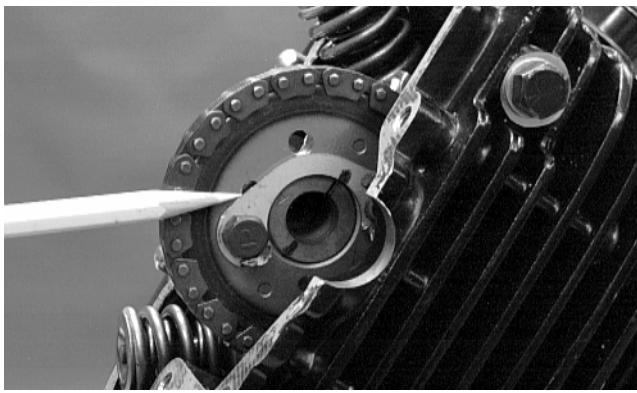
15. Place the tab washer onto the sprocket making sure it covers the pin in the alignment hole.



ATV-1027

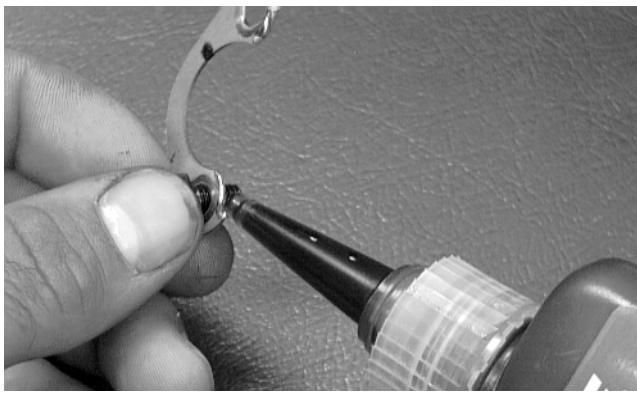
⚠ CAUTION

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.



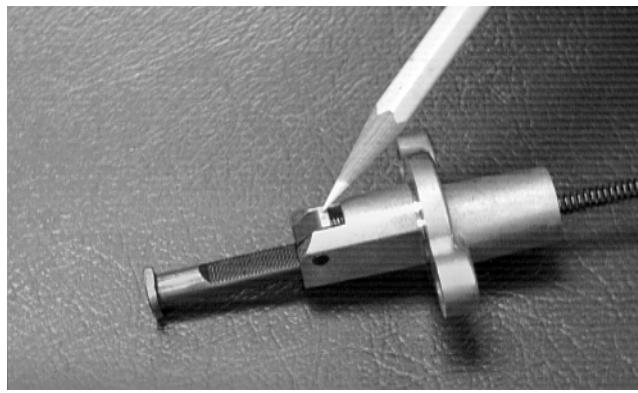
CC404D

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.



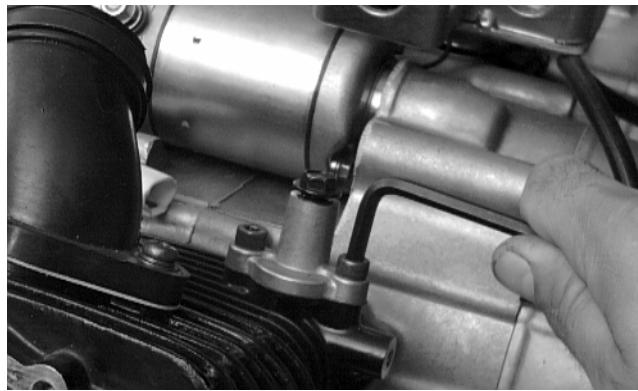
CC405D

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



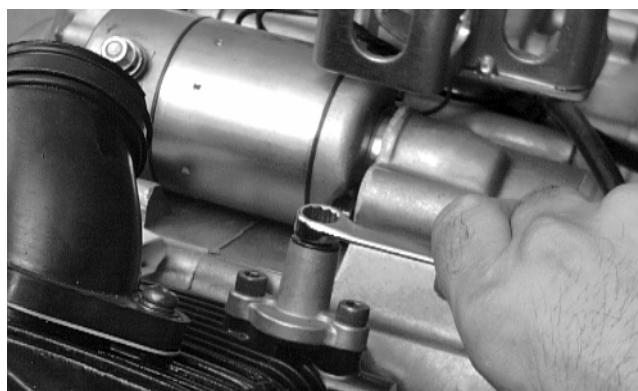
CC406D

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

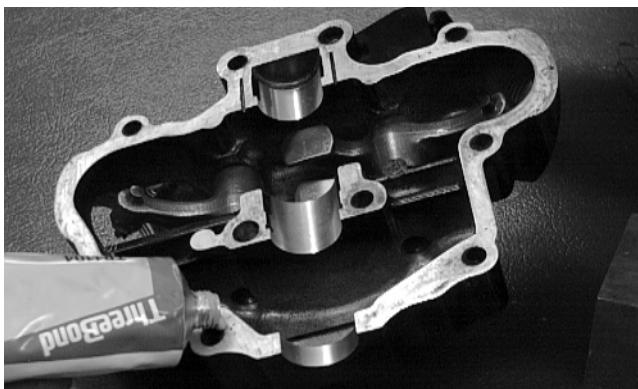
22. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw and tighten to 1.15 kg-m (8.5 ft-lb). Bend the tab to secure the cap screw.
23. Rotate the crankshaft until the first cap screw securing the sprocket to the camshaft 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).

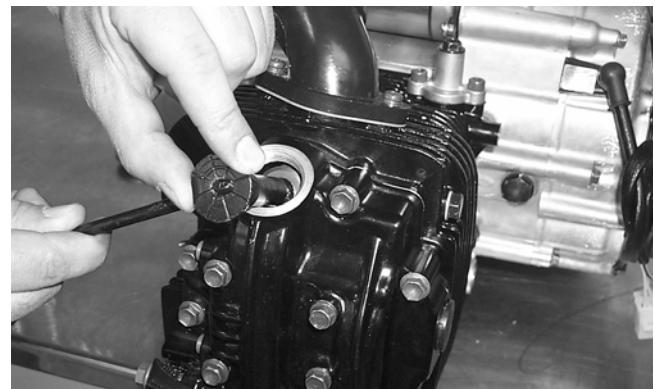
29. Adjust valve/tappet clearance using the following procedure.

■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.



CC552D

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 proper valve/tappet clearance is attained.

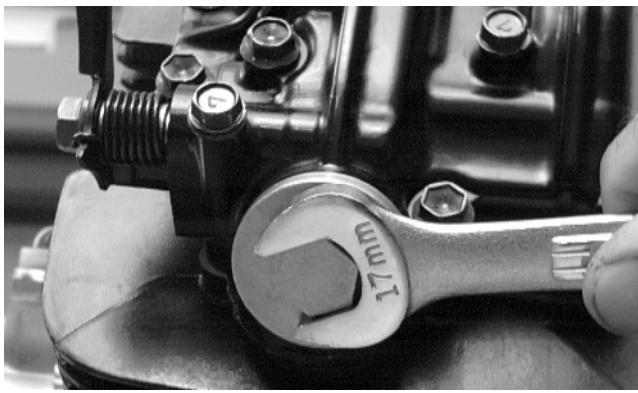
■NOTE: Refer to the appropriate Specifications for the proper valve/tappet clearance.

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

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.

3

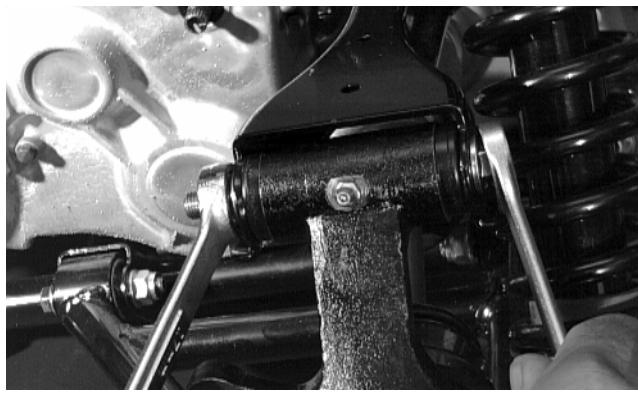


CC366D

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



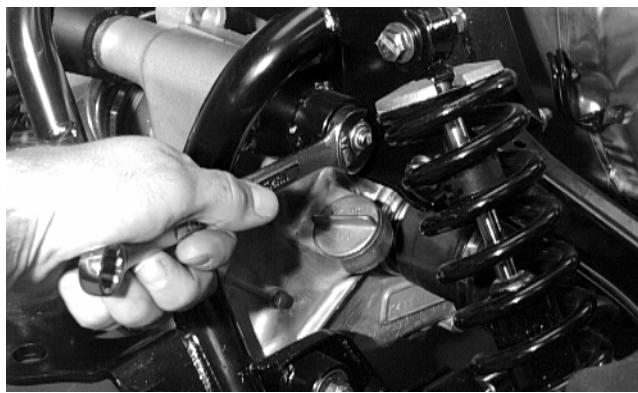
CC411D



CH077D

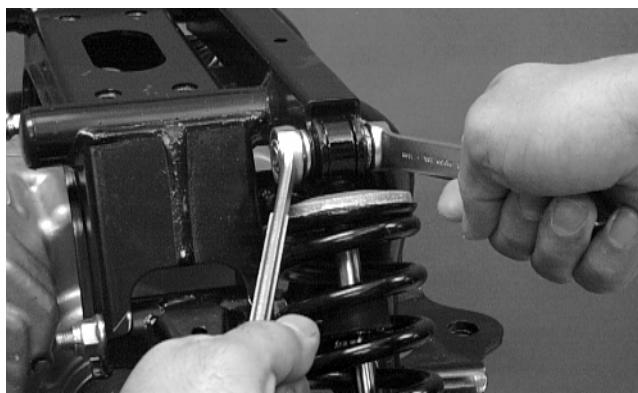
4. Secure the rear of the engine to the sub-frame with cap screws and flat washers. Tighten to 5.5 kg-m (40 ft-lb).

■ 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).



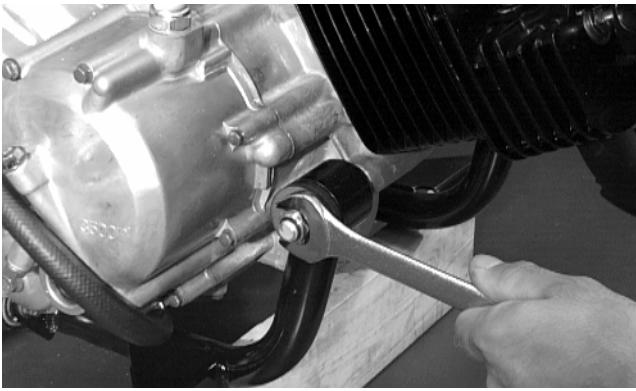
CH076D

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).

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).



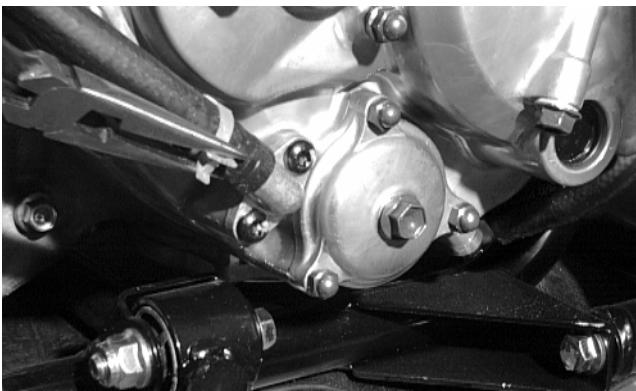
CH074D

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

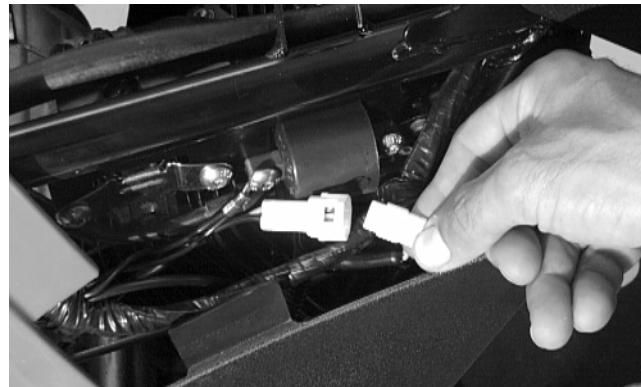
13. Secure the brake hose holder to the upper suspension arm with a torx-head screw. Tighten securely.

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

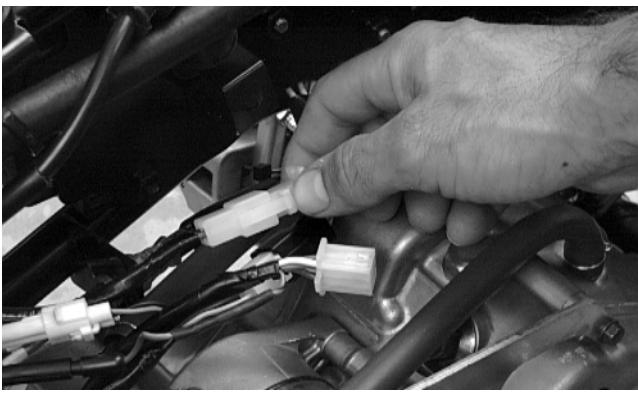
17. Secure the right-hand side panel.



CH066D

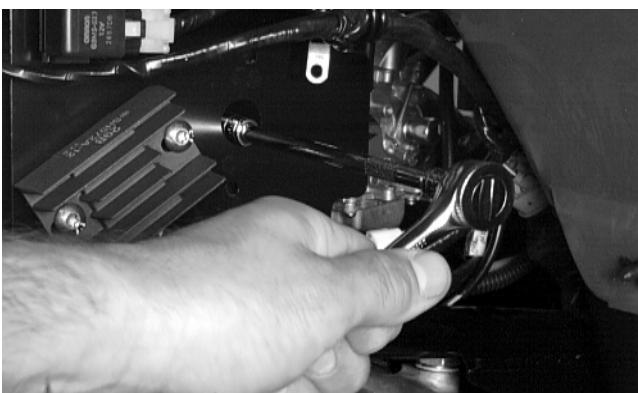
18. Secure the remaining connectors to the main wiring harness.

3



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.

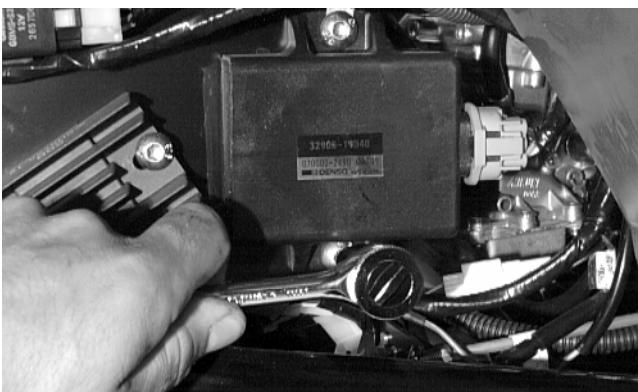


CH048D



CH047D

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



AF882D

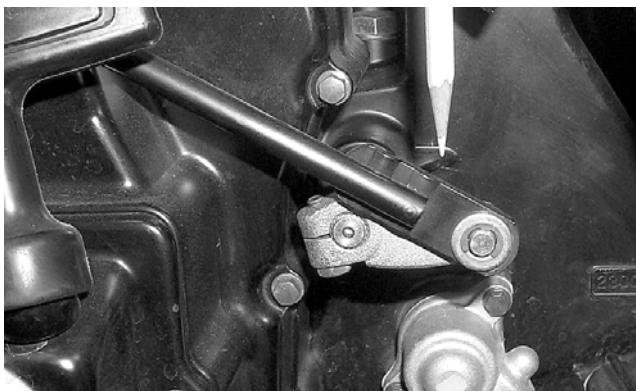
21. Install the carburetor into the air-intake boots; then tighten the clamps. Route the vent hoses in the seat stop holes.



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.



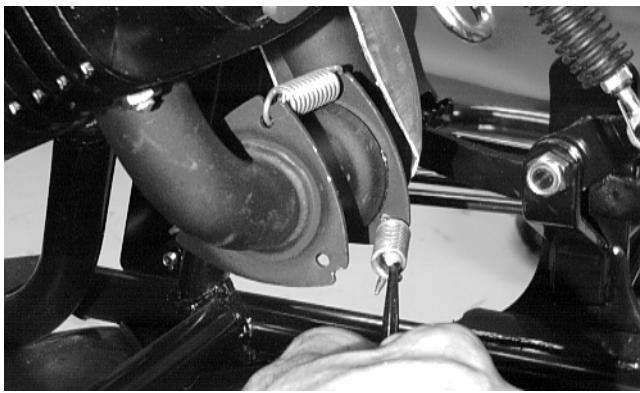
CH060D

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.



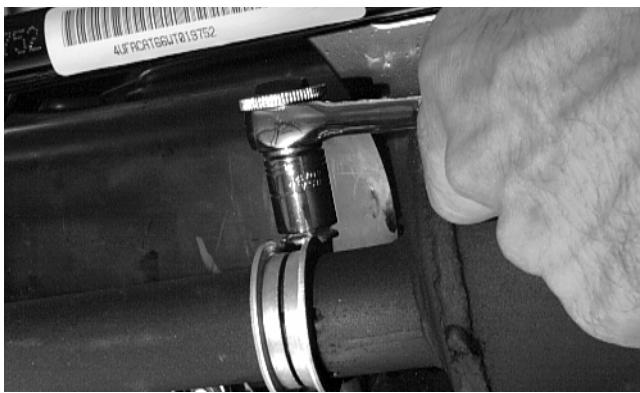
CH058D

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



CH055D

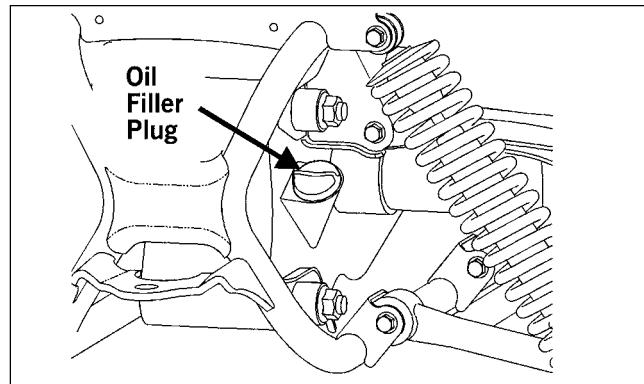
27. Secure the muffler and exhaust pipe. Tighten securely.



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

3

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

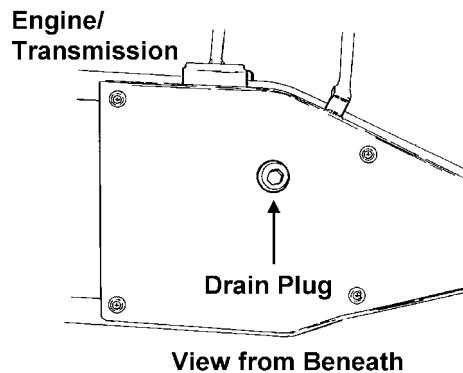
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

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.



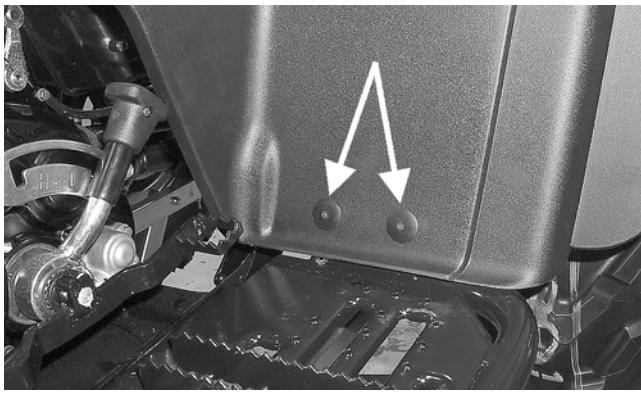
ATV-0109

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.



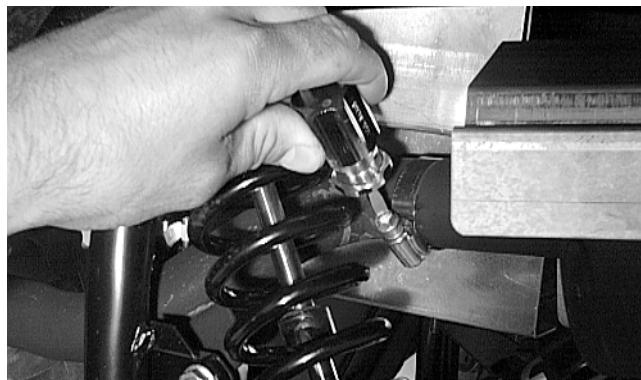
CC933

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



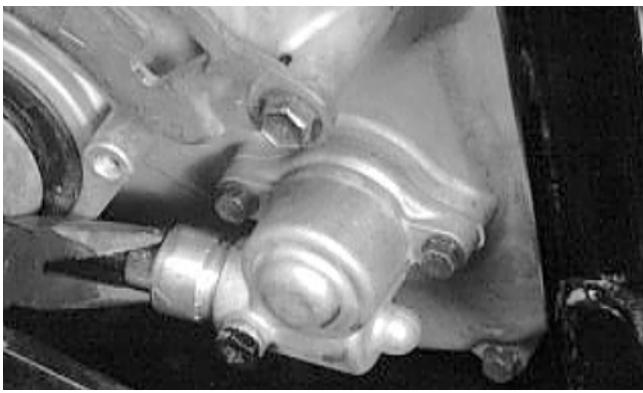
CC934

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



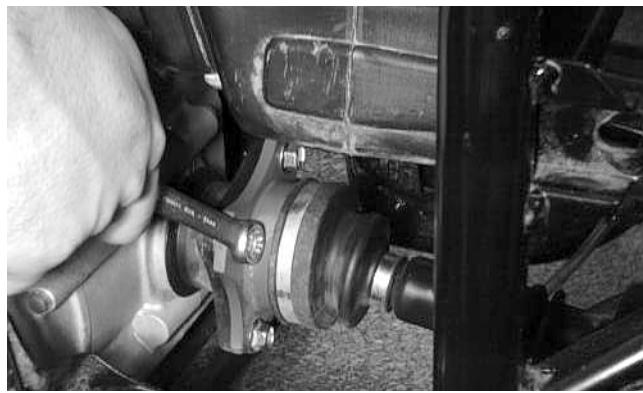
CC935

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.

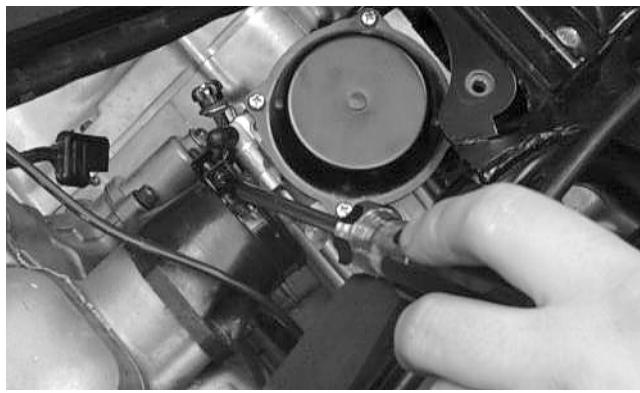
18. Detach the carburetor using the following procedure.

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.

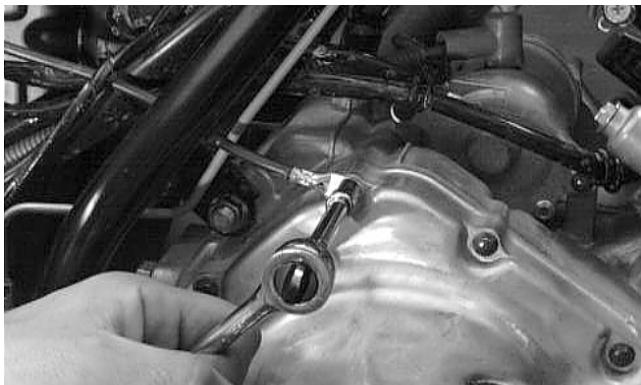


CC937

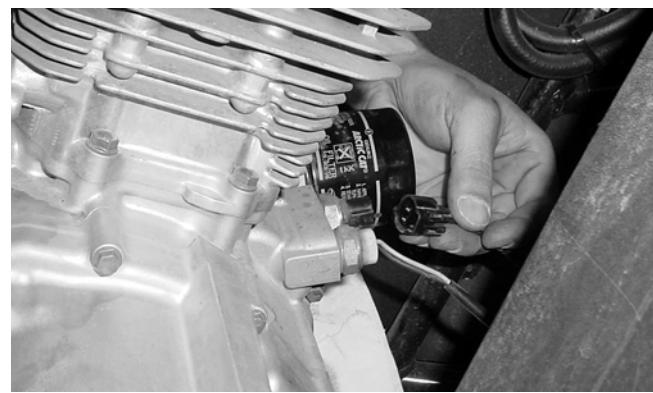
■ **NOTE: After disconnecting the oil cooler hoses, plug them to prevent leakage from the cooler.**

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.

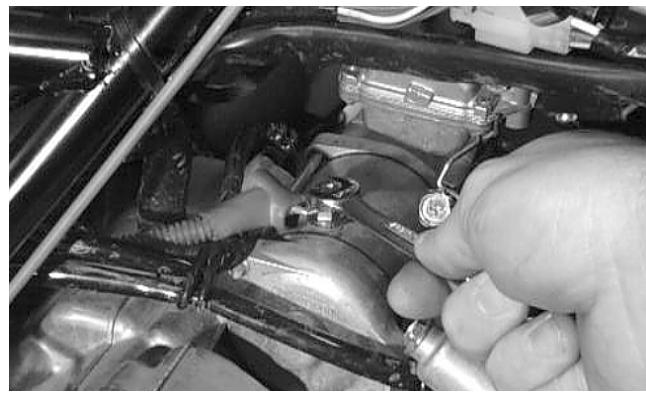
21. Disconnect the battery ground (negative) cable from the crankcase cover; then disconnect the positive cable from the starter motor.



AR600D



CC939



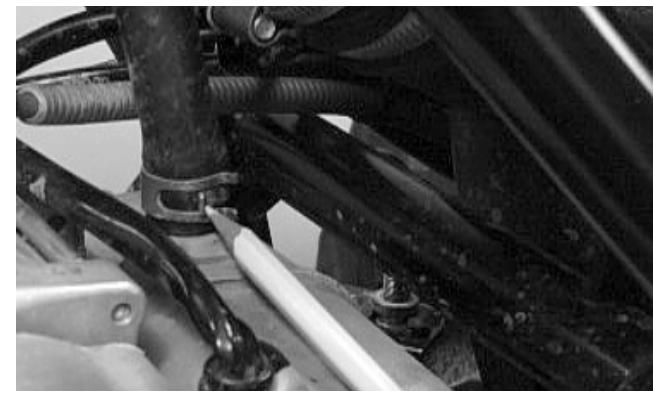
AR604D

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

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

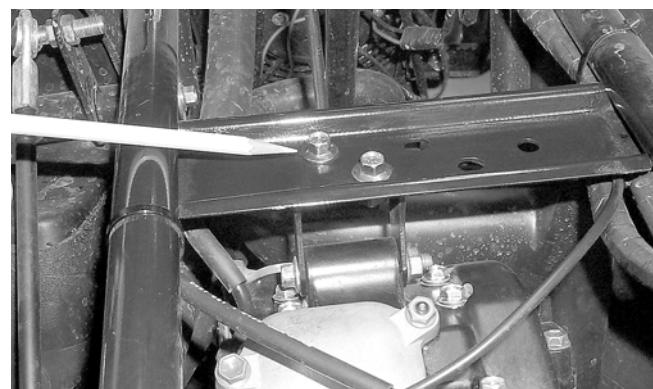


CC122DA

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.

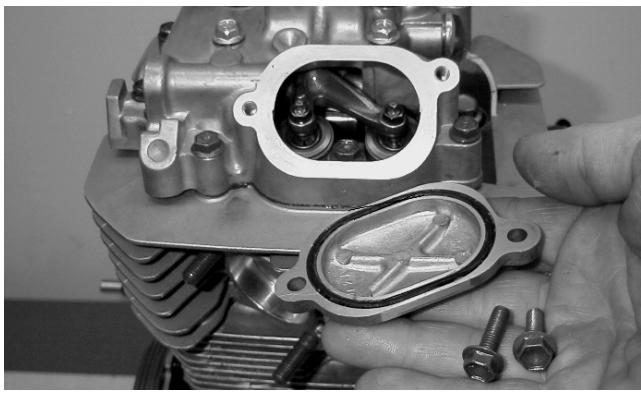
Removing Top-Side Components

A. Valve Cover B. Cylinder Head

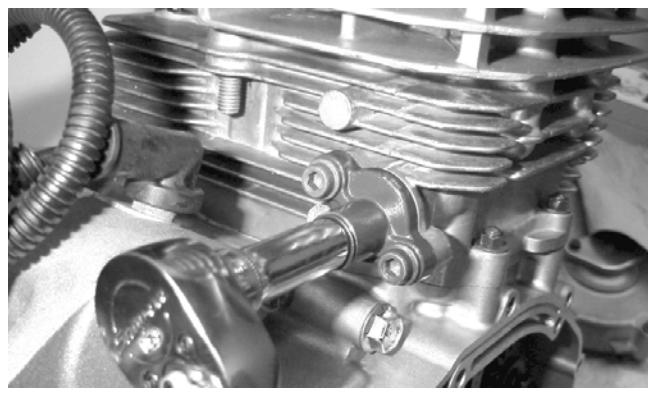
■ NOTE: Remove the spark plug and timing inspection plug; then using the recoil starter, rotate the crankshaft to top-dead-center of the compression stroke.

■ 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



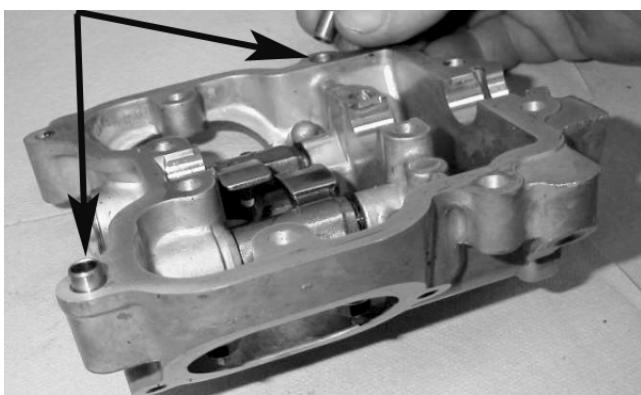
MD1245

■ **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.

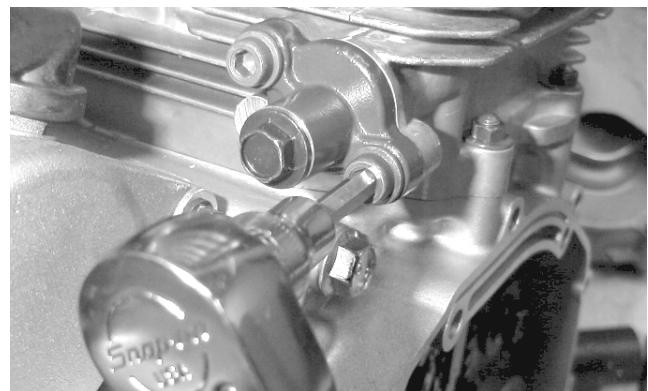


MD1261



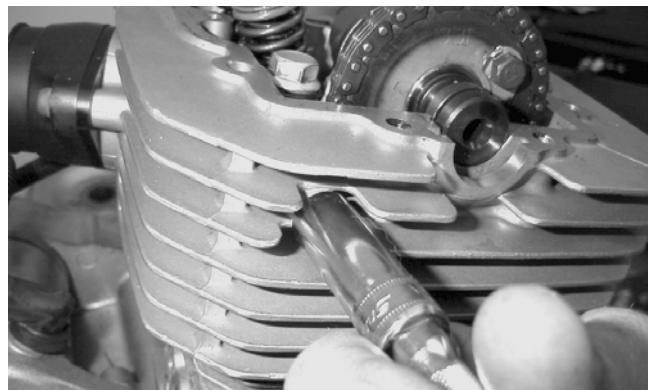
MD1354

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.



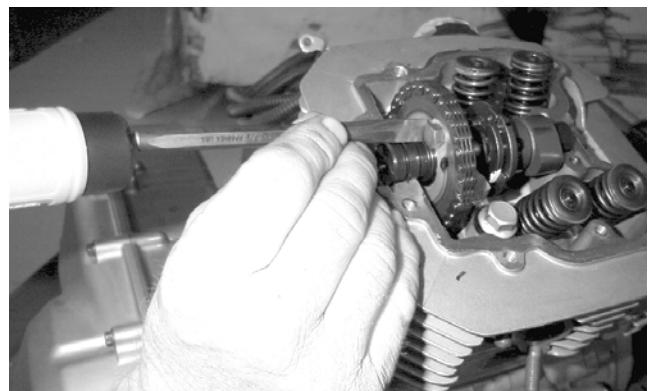
MD1254

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

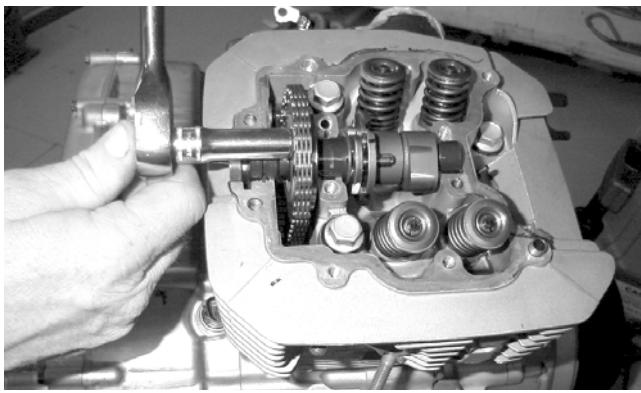


MD1251

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



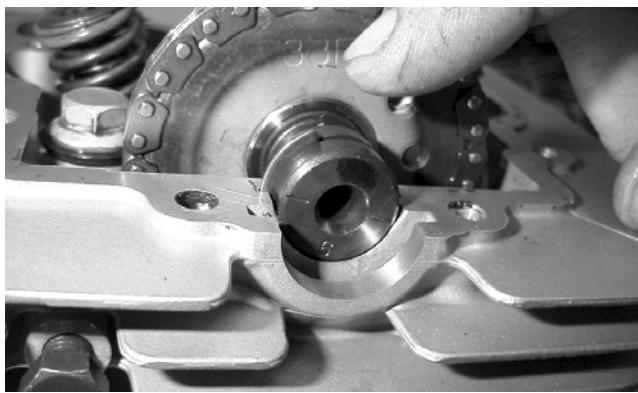
MD1136



MD1137

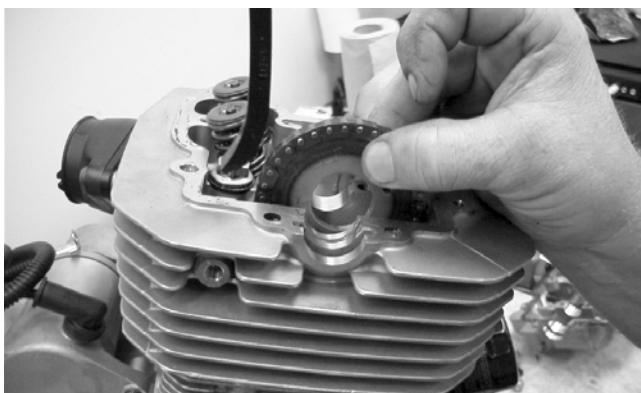
6. Using an awl, rotate the C-ring in its groove until it is out of the cylinder head; then remove the C-ring.

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



MD1131

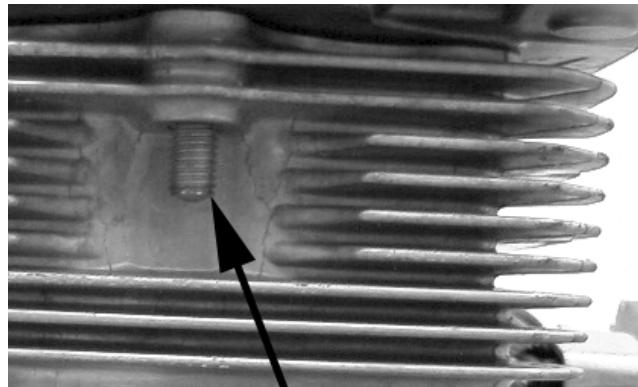
7. Note the timing marks for installing purposes; then drop the sprocket off the camshaft. While holding the chain, slide the sprocket and camshaft out of the cylinder head. Account for an alignment pin.



MD1132

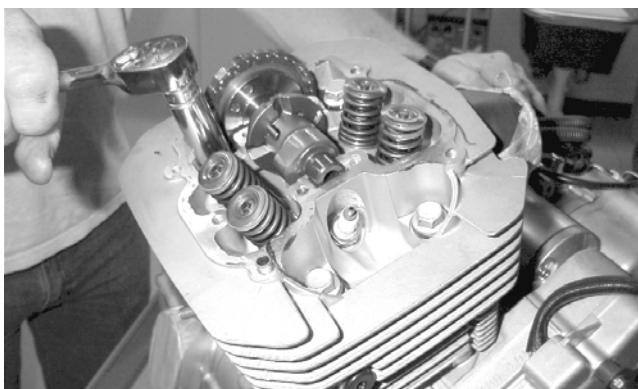
■ NOTE: Loop the chain over the cylinder and secure it with a wire to keep it from falling into the crankcase.

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



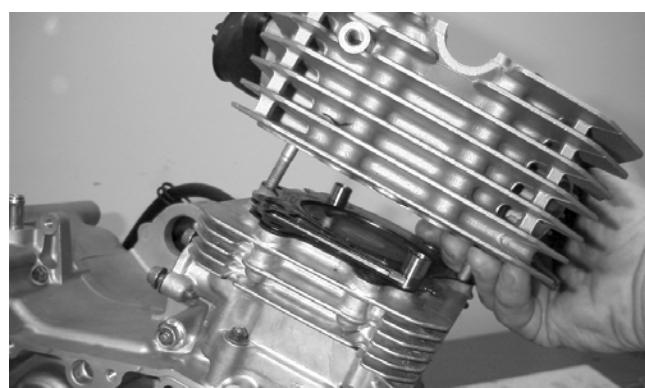
MC1192

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



MD1167

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



MD1163

AT THIS POINT

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

11. Remove the cam chain guide.

☞ AT THIS POINT

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

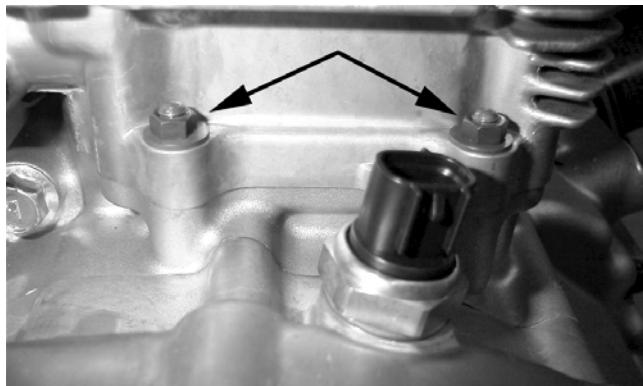


MD1173

C. Cylinder D. Piston

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

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

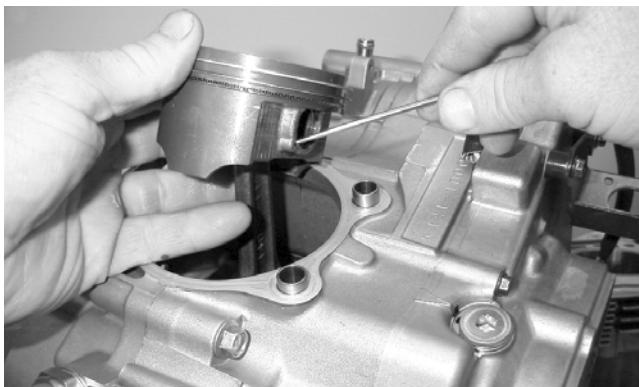
To service cylinder, see Servicing Top-Side Components sub-section.

3

⚠ CAUTION

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

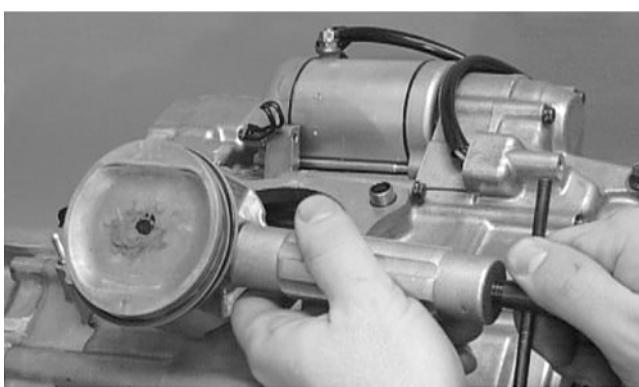
14. Using an awl, remove one piston-pin circlip. Take care not to drop it into the crankcase.



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.

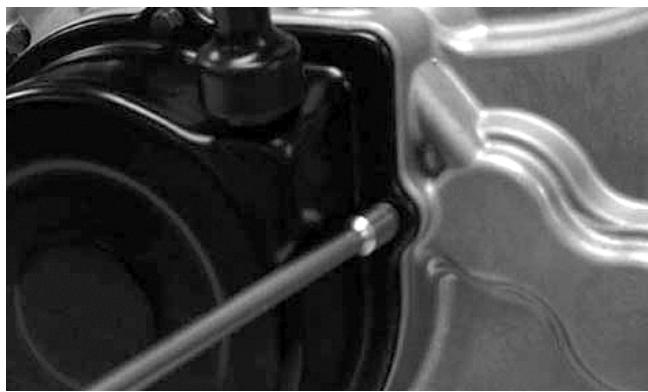
👉 AT THIS POINT

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

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.

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.

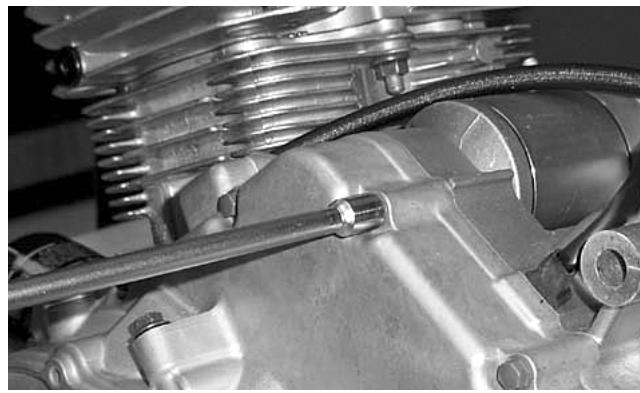
👉 AT THIS POINT

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.



CC944



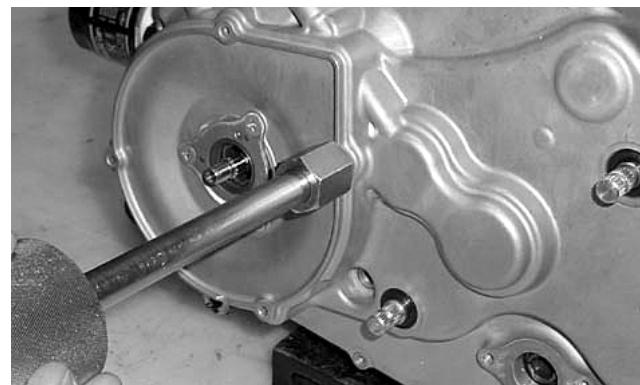
CC945

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



CC947

3



CC946

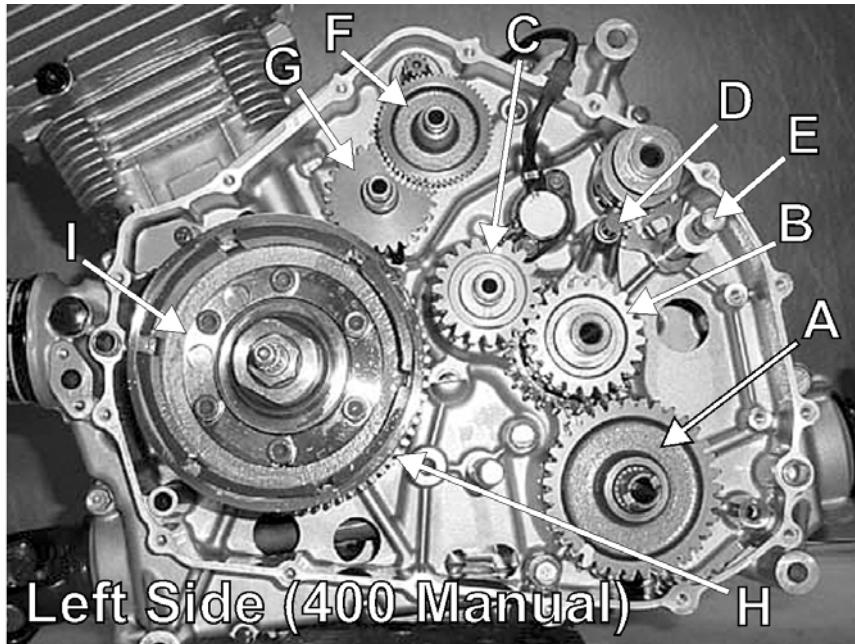
5. Remove the cap screws securing the left-side cover to the crankcase (fifteen 6 mm and one 8 mm); then using a slide hammer w/6 mm adapter (p/n 0644-310), remove the left-side cover.

■ **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.



KEY CC948A

A. Driven Gear	F. Starter Idler Gear #1
B. Drive Gears #1 & #2	G. Starter Idler Gear #2
C. Idler Gear	H. Starter Clutch Gear Assembly
D. Shift Fork with Pin	I. Rotor/Flywheel
E. Shift Shaft	

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

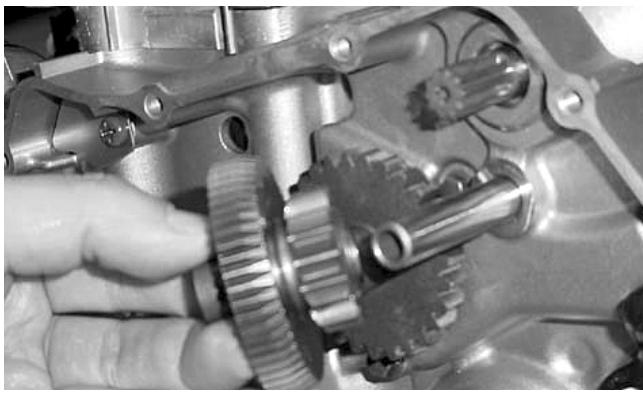
7. Using the Magneto Rotor Remover (p/n 0444-075), remove the rotor/flywheel assembly from the crankshaft. Account for the key; then remove the starter clutch gear assembly (H) w/washer.

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



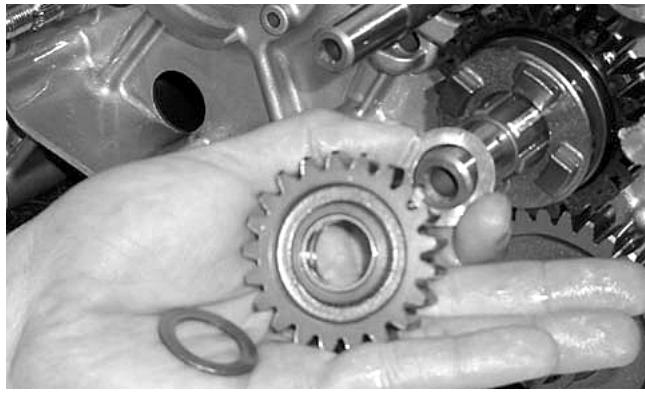
CC949

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

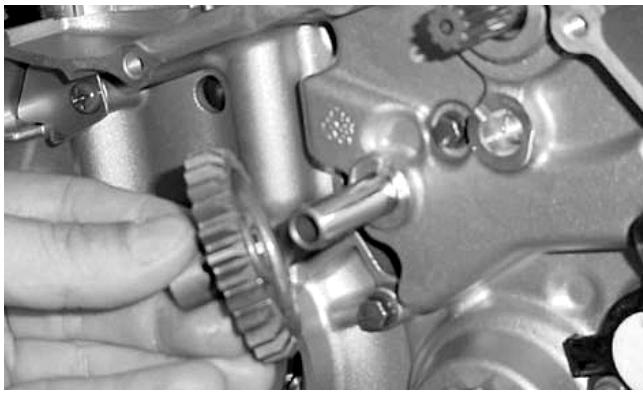


CC950

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

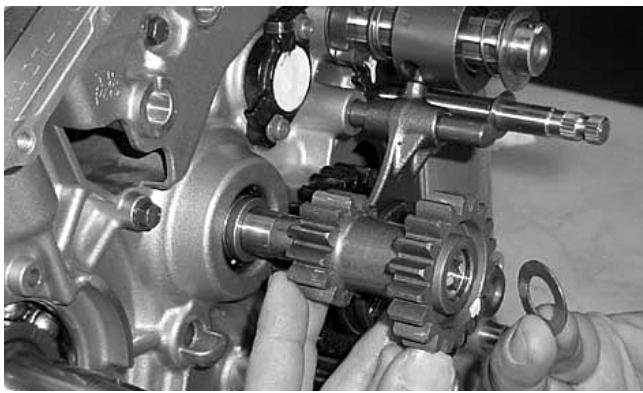


CC954



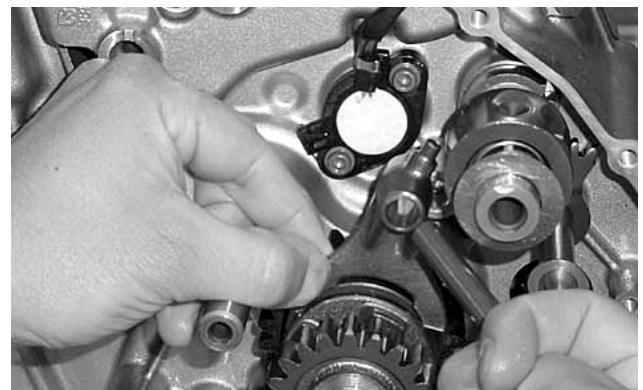
CC950

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



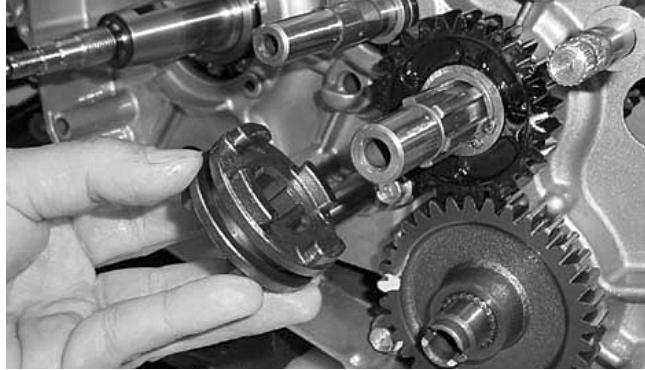
CC952

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



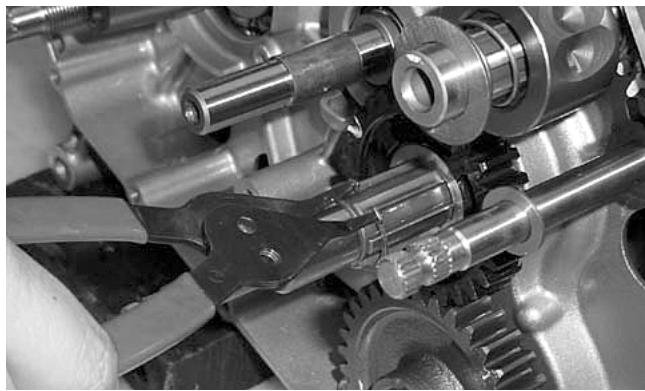
CC953

12. Remove the sliding dog from the driveshaft.

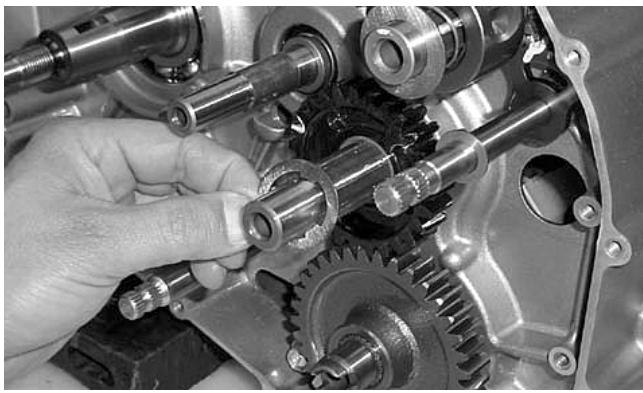


CC966

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

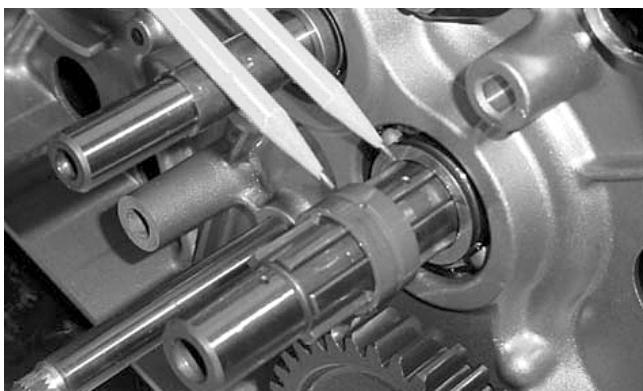


CC955



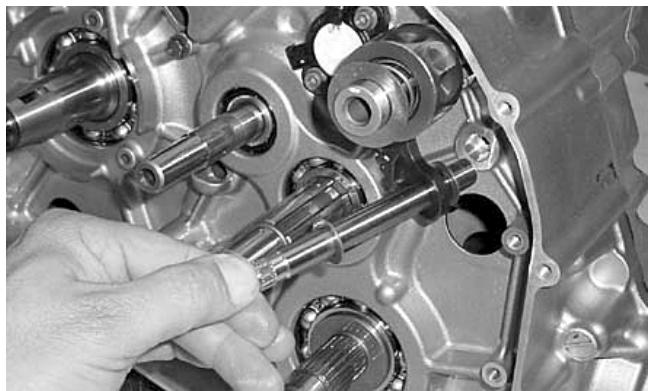
CC956

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



CC957

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



CC950



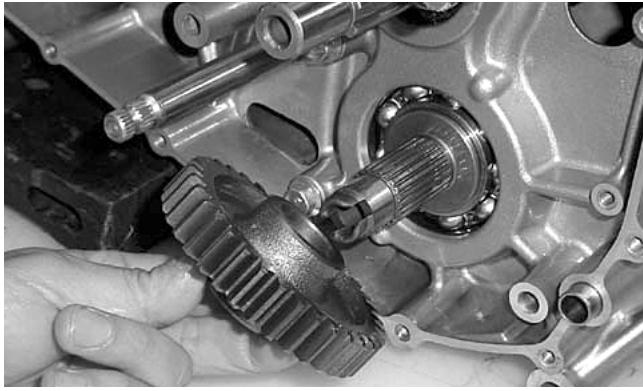
CC961

16. Remove the secondary stopper camshaft assembly. Account for the two shims.



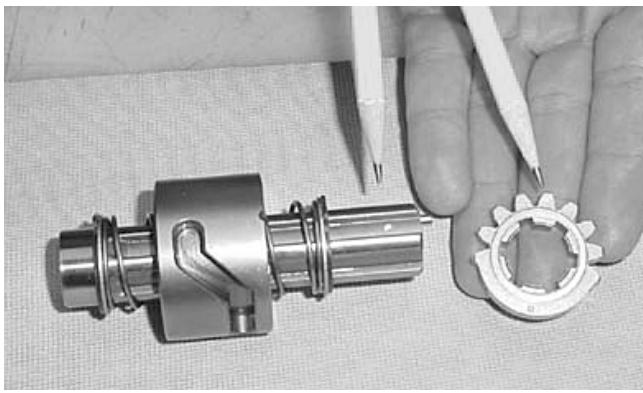
CC962

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



CC959

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

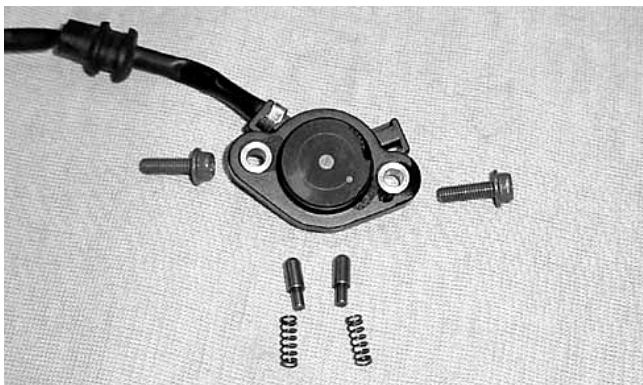


CC963

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



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.

3

Removing Right-Side Components

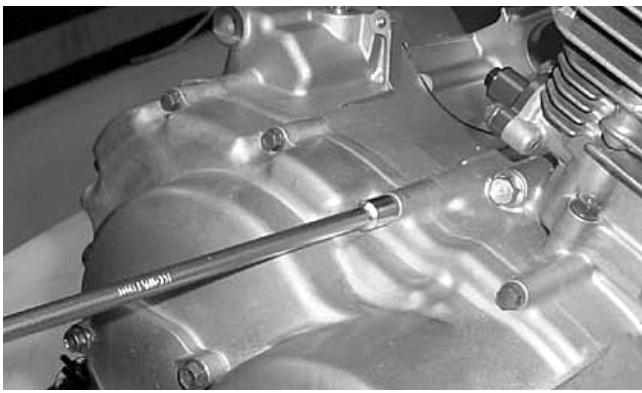
A. Oil Filter

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

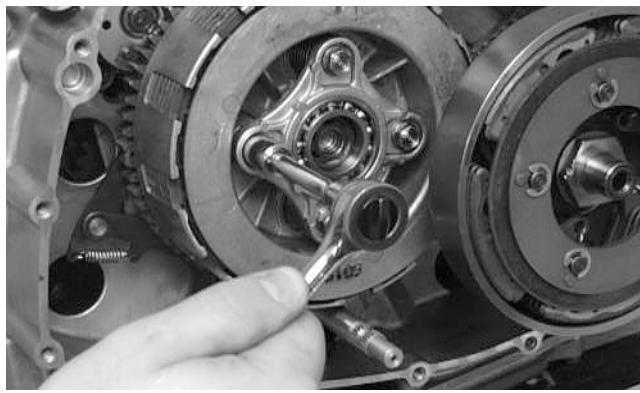


CC967

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



CC074D

■ **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

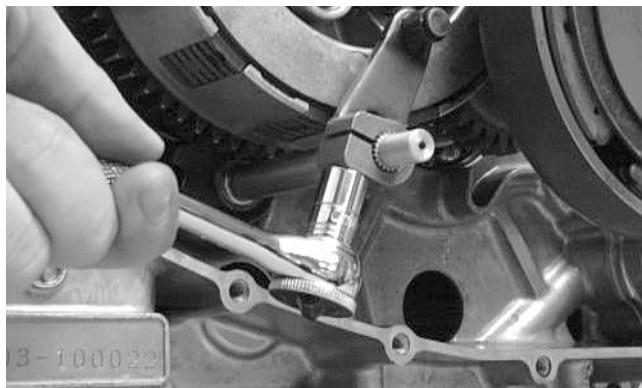
C. Primary Clutch

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

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

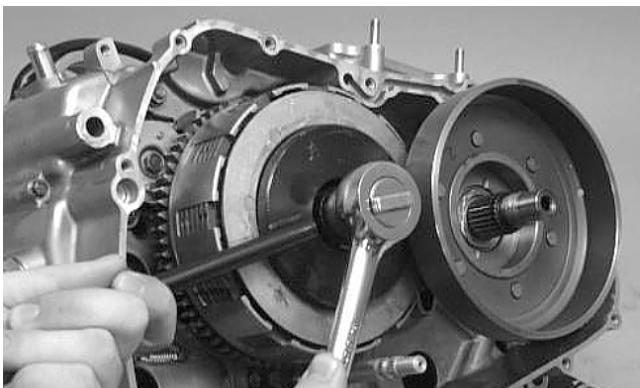
Care must be taken when removing the nut; it has "left-hand" threads.

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



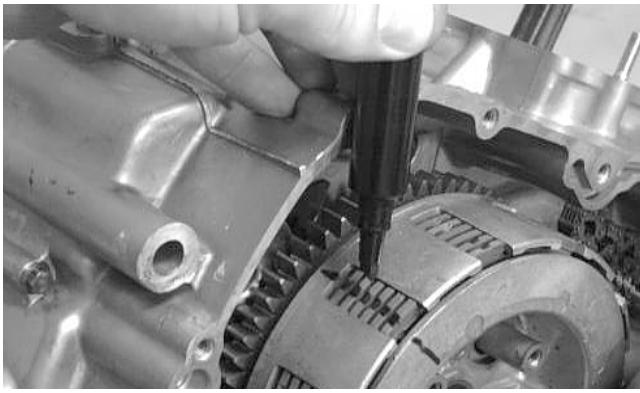
CC075D

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



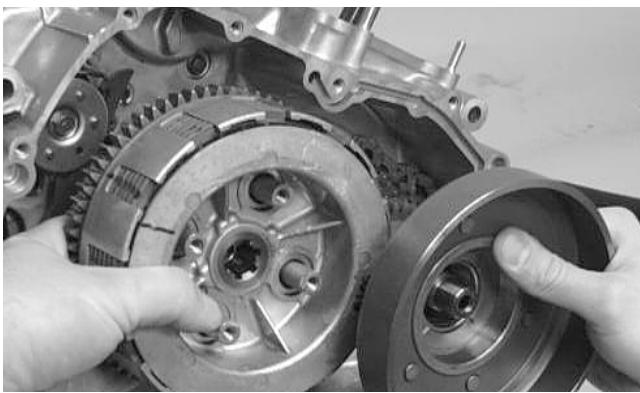
CC076D

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

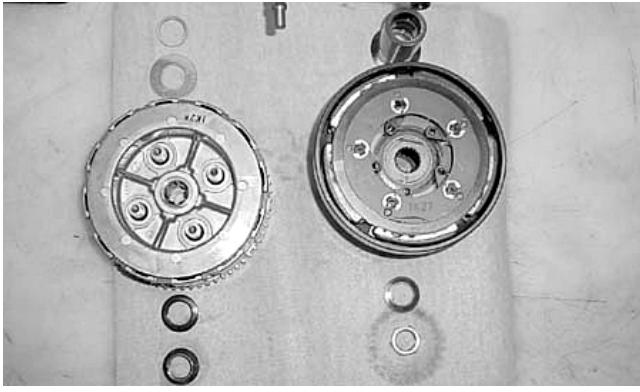


CC077D

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



CC078D



CC969

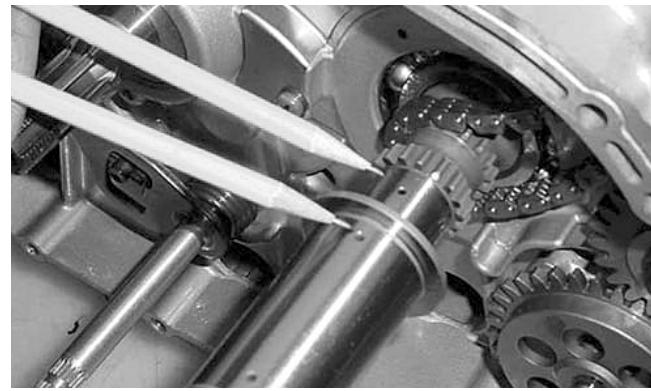
AT THIS POINT

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

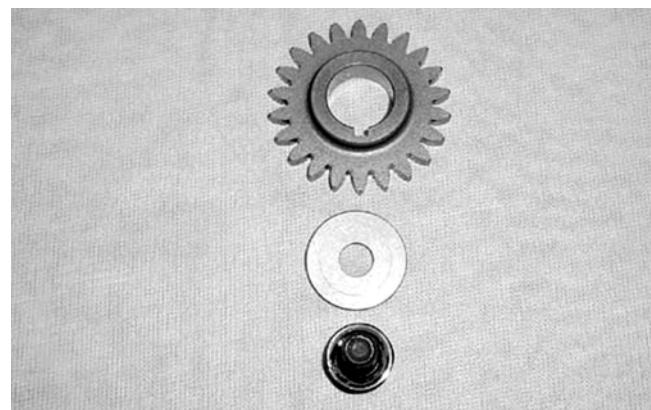
10. Remove the nut and washer securing the oil pump drive gear to the crank balancer shaft; then remove the gear and account for the pin, gear, washer, and nut.

3

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

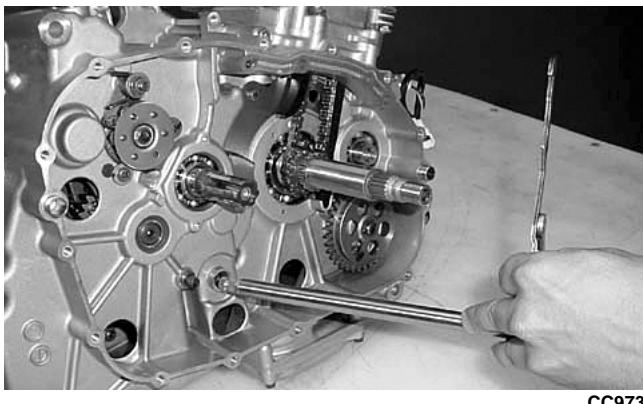


CC971



CC972

11. Remove the gear shift shaft from the crankcase.



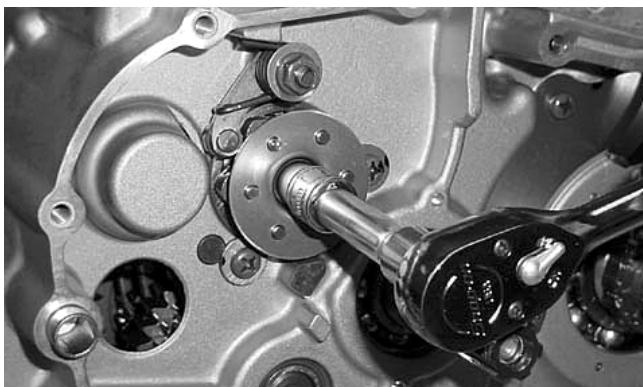
CC973

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

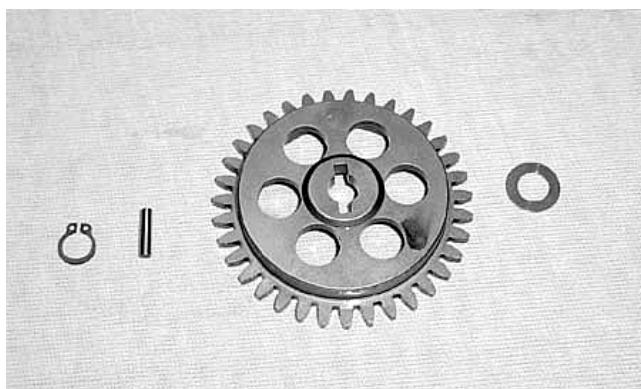
■ **NOTE:** For general servicing, it is advisable to disassemble, clean, and inspect the oil pump. If any wear or damage is suspected, replace the oil pump.

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.

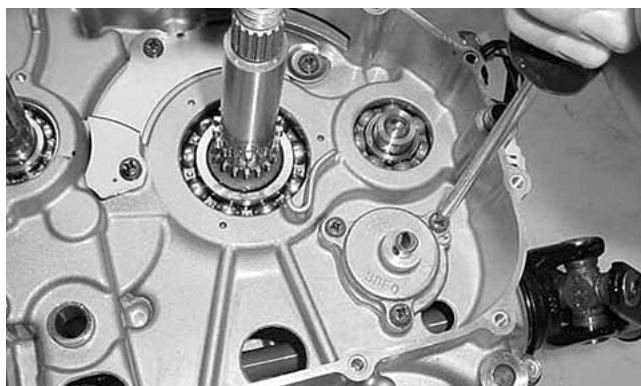


CC976



CC977

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

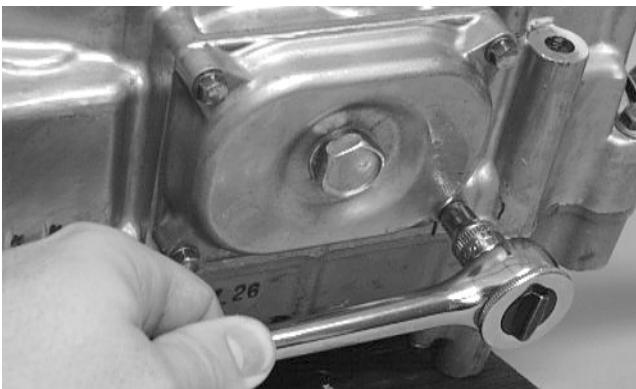


CC978

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

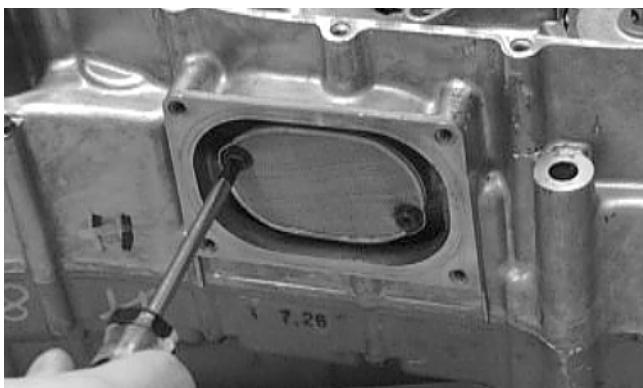
⚠ CAUTION

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



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.

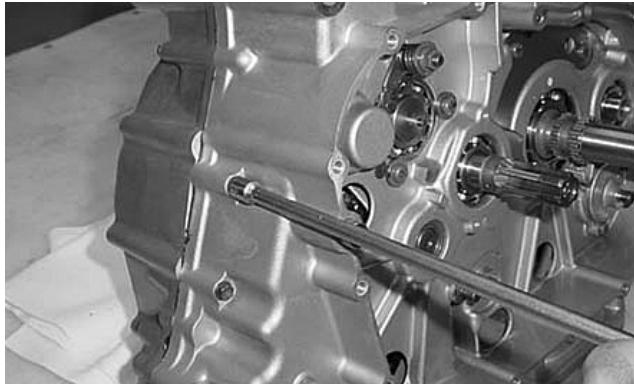
Center Crankcase Components

■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.

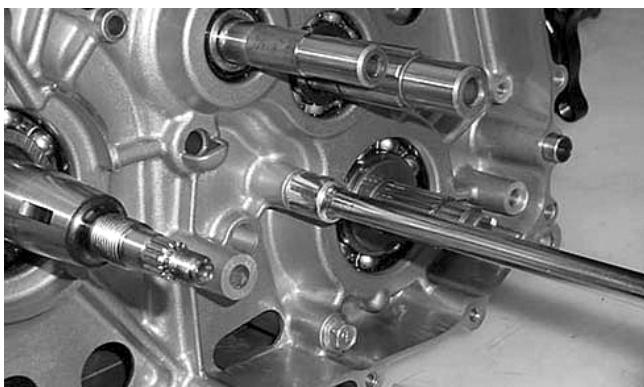


CC979



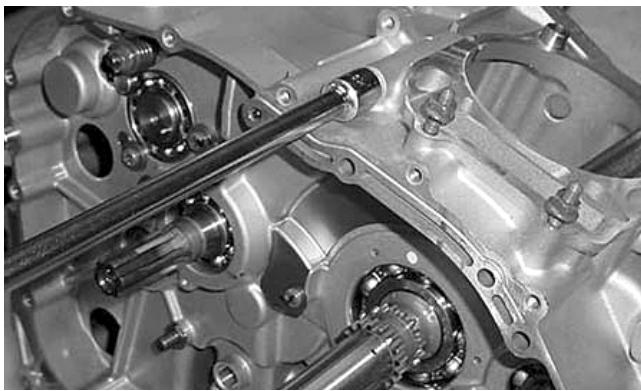
CC980

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.

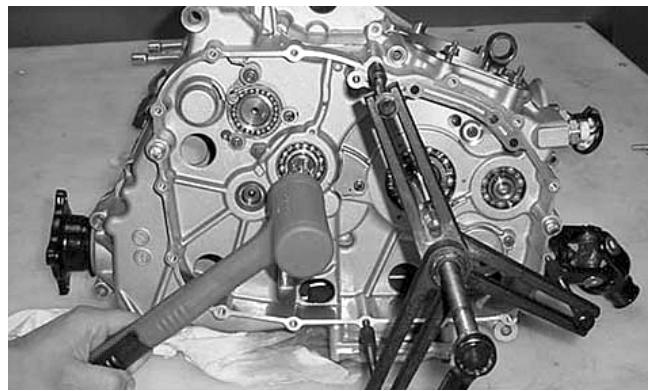


CC981

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



CC982



CC983

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.

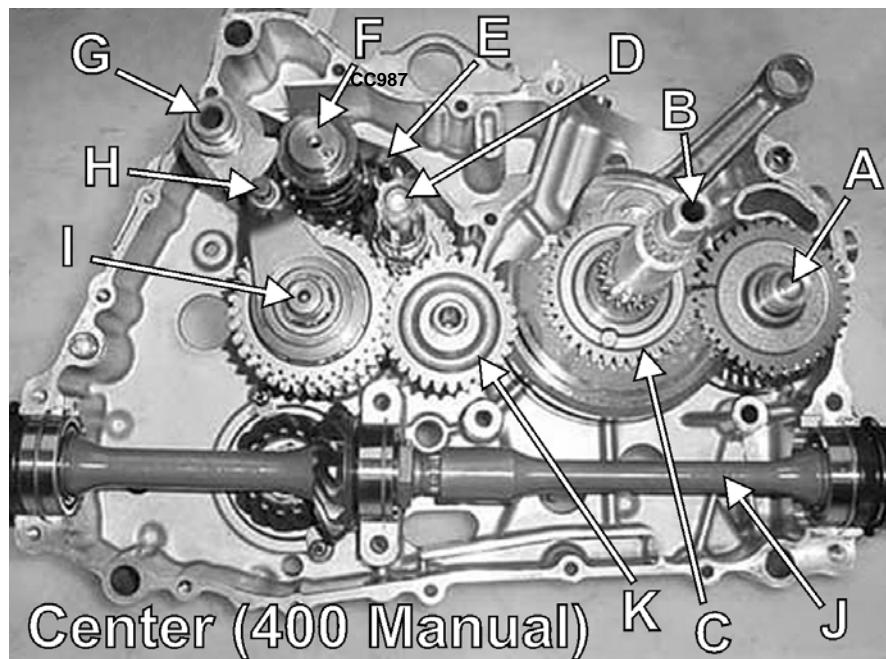
■NOTE: To keep the shaft/gear assemblies intact for identification, tap the shafts toward the left-side crankcase half when separating the halves.



CC984

Disassembling Crankcase Half

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



3

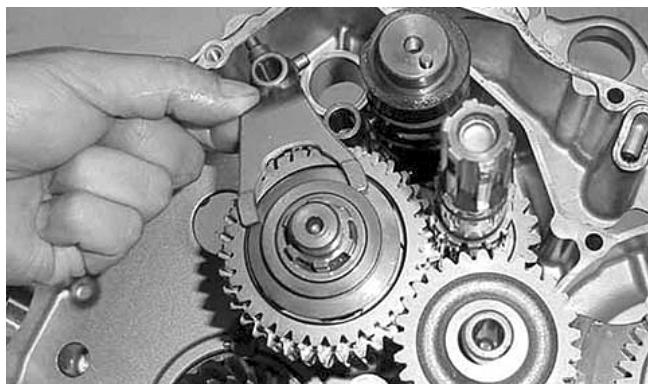


KEY CC985A

A. Crank Balancer Assembly	F. Gear Shift Cam
B. Crankshaft	G. Reverse Shift Cam
C. Balancer Drive Gear with Pin	H. Shift Shaft with 3 Forks
D. Countershaft Assembly	I. Driveshaft Assembly
E. Shift Shaft with Fork	J. Output Shaft Assembly (4x4 Shown)
	K. Reverse Idle Gear

■ 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.



CC985A

5. Remove the gear shift cam (F).



CC165D

6. 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.

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

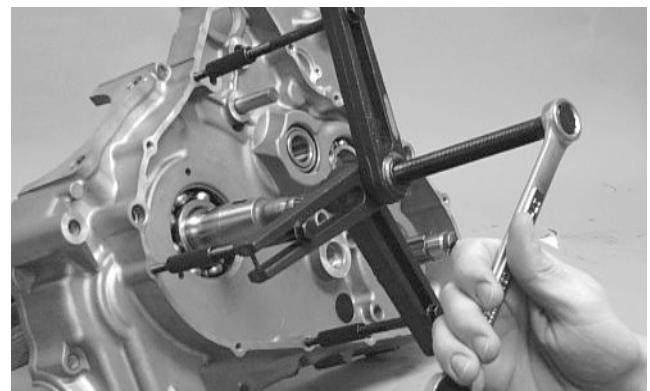
9. Remove the driven gear from the crank balancer assembly (A). Account for a key.

■ 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

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

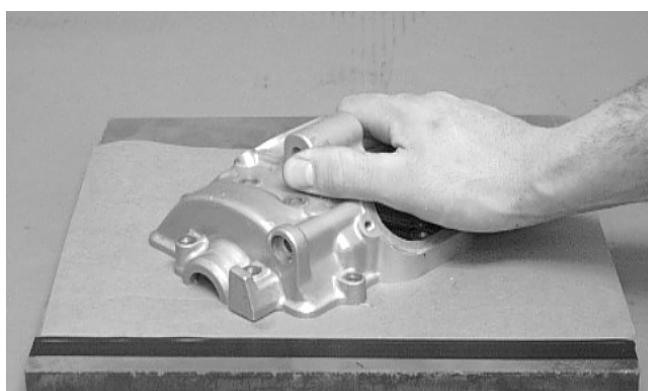
■ **NOTE:** If the valve cover cannot be trued, the cylinder head assembly must be replaced.

3

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.

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Removing Valves

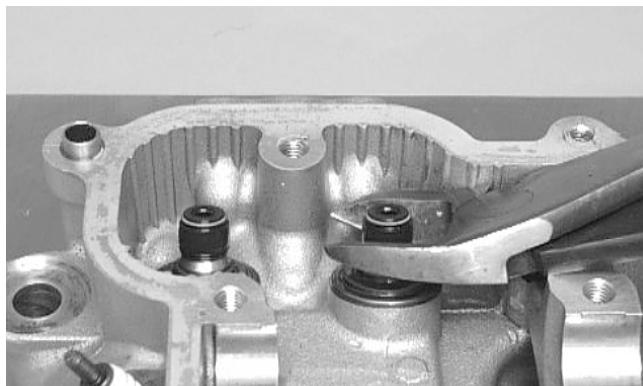
■ **NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.**

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

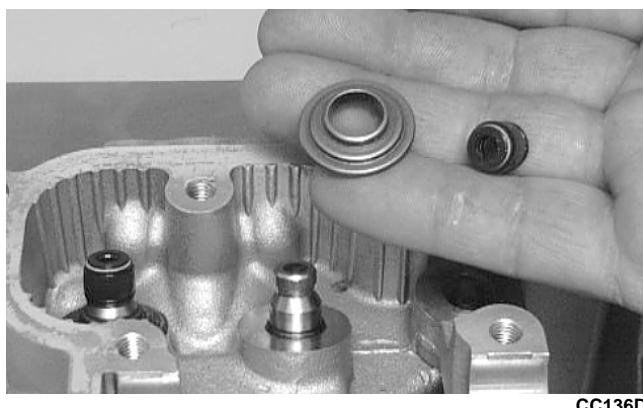


CC994

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



CC134D



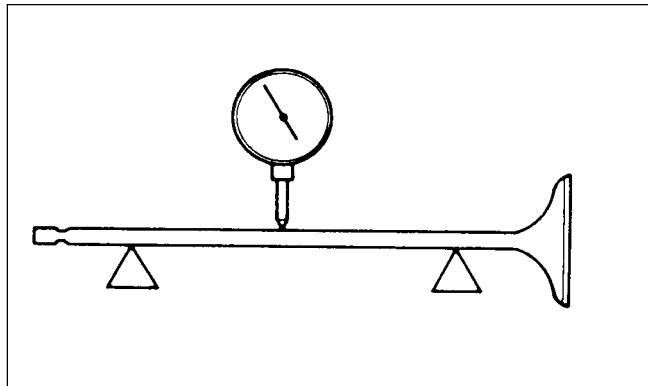
CC136D

■ **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

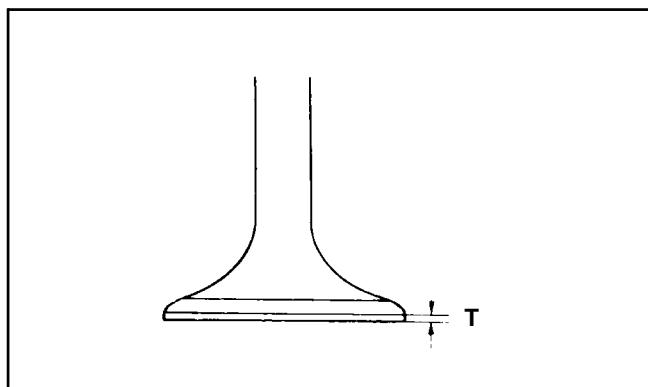
2. Maximum runout is 0.05 mm (0.002 in.).

Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) is 4.975 - 4.990 mm (0.1959 - 0.1965 in.).
3. Acceptable diameter range (exhaust valve) is 4.955 - 4.970 mm (0.1951 - 0.1957 in.).

Measuring Valve Face/Seat Width

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



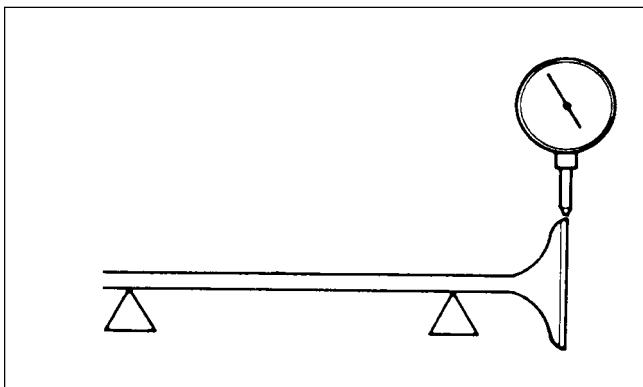
ATV-1004

2. Acceptable width range is 0.9-1.1 mm (0.035-0.043 in.).

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.

- Position the dial indicator contact point on the outside edge of the valve face; then zero the indicator.

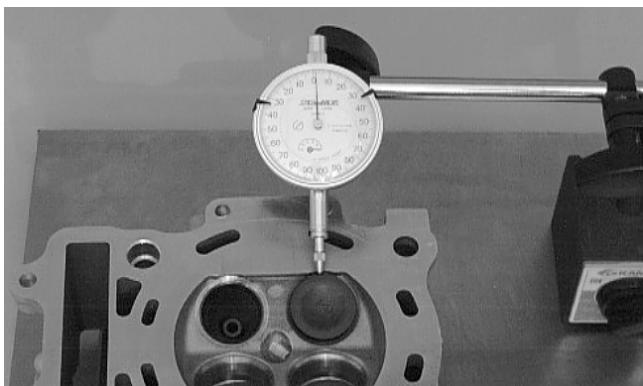


ATV1082A

- Rotate the valve in the V blocks.
- Maximum runout is 0.03 mm (0.001 in.).

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 is 0.35 mm (0.014 in.).

Measuring Valve Guide (Inside Diameter)

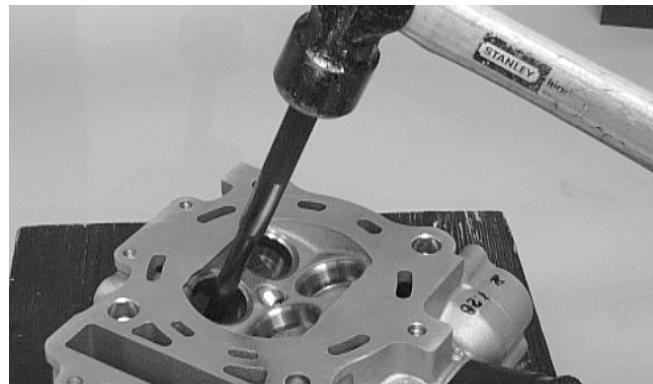
- Insert a snap gauge 1/2 way down into each valve guide bore; then remove the gauge and measure it with a micrometer.
- Acceptable inside diameter range is 5.000 - 5.012 mm (0.1969 - 0.1973 in.).

- 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.

- 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

3

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



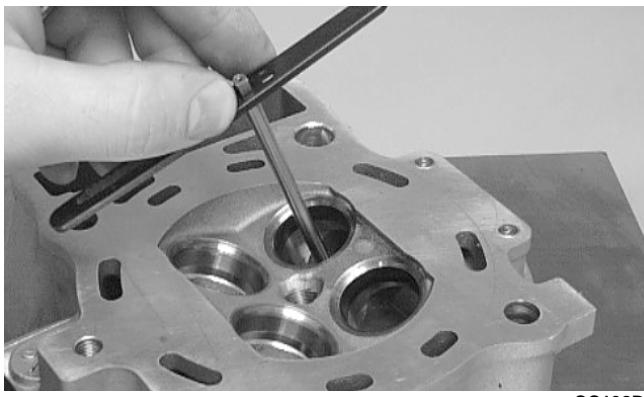
CC142D

- 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.



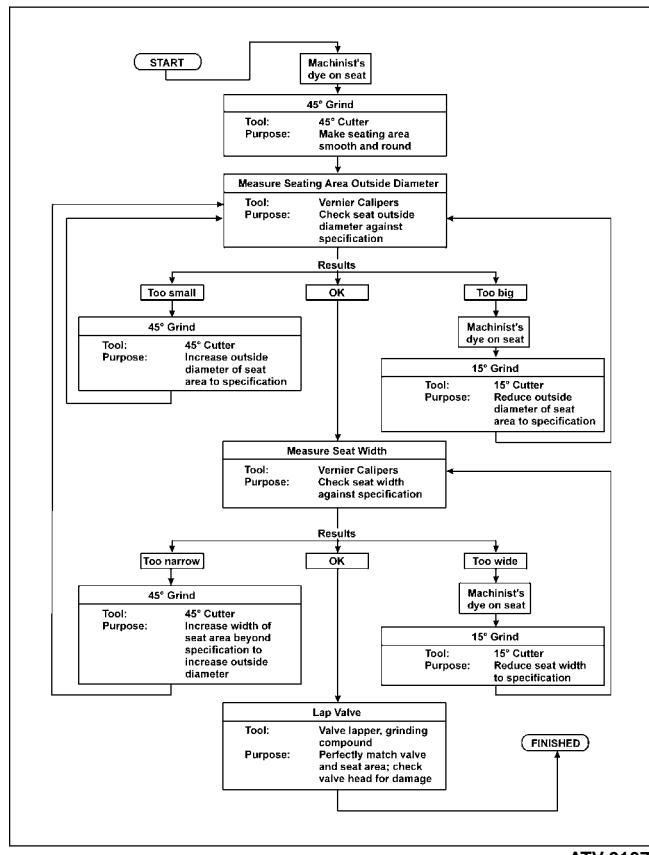
CC143D

- 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



Grinding Valve Seats

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

- 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

- 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.

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

Measuring Rocker Arm (Inside Diameter)

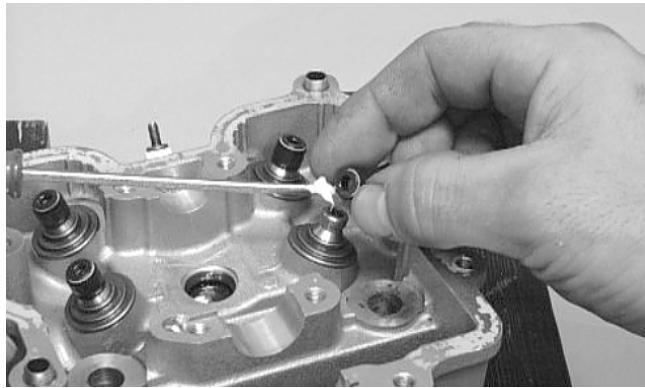
1. Using a dial calipers, measure the inside diameter of the rocker arm.
2. Acceptable inside diameter range is 12.000-12.018 mm (0.472-0.473 in.).

Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range is 11.973-11.984 mm (0.4714-0.4718 in.).

Installing Valves

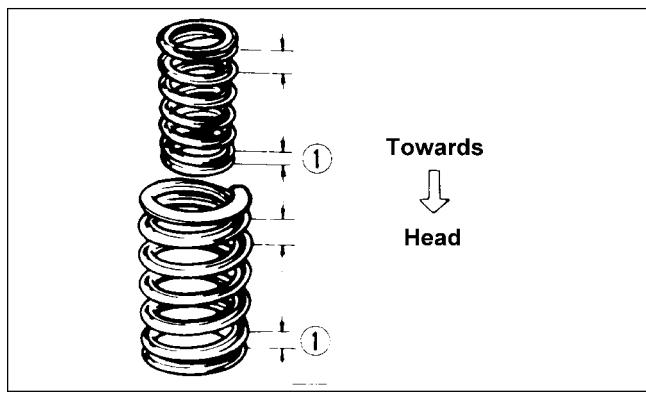
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



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.

3

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

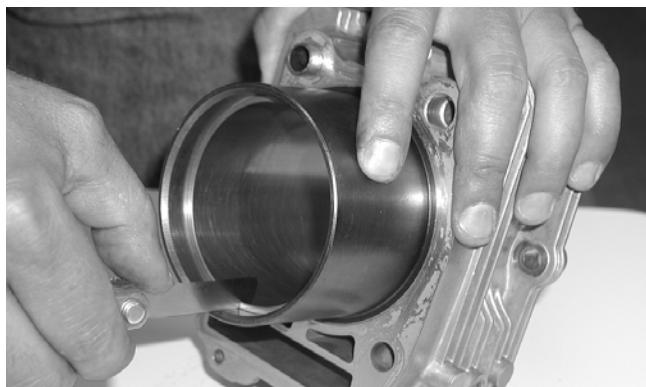
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

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)

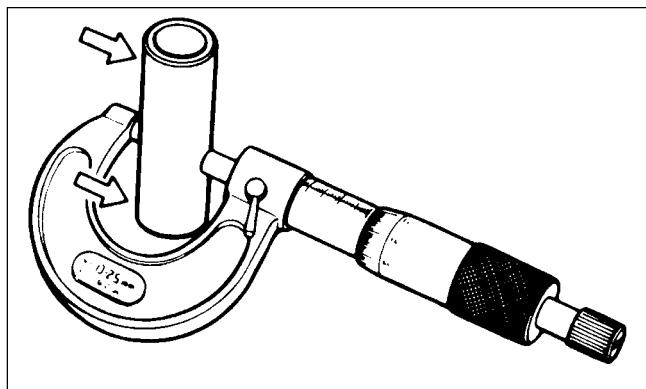
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be a maximum 0.50 mm (0.020 in.) both rings.



CC995

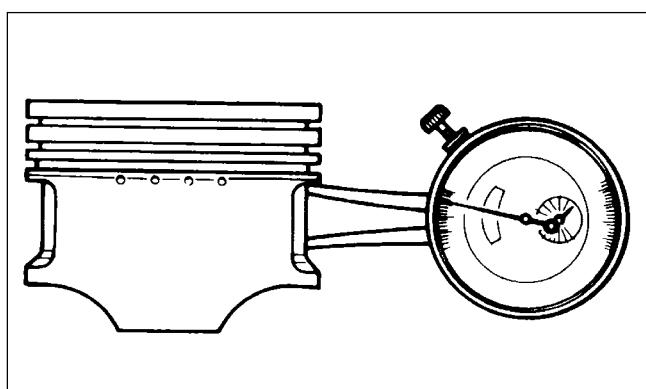
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is less than 19.98 mm (0.787 in.), the piston pin must be replaced.



ATV-1070

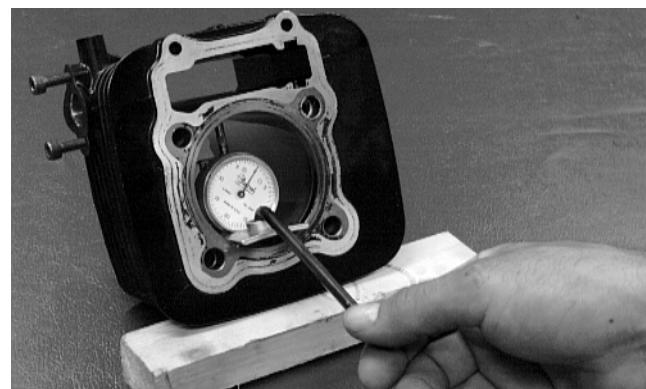
2. Insert an inside dial indicator into the piston-pin bore. The diameter must be a maximum 20.03 mm (0.789 in.). Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/ Cylinder Clearance

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



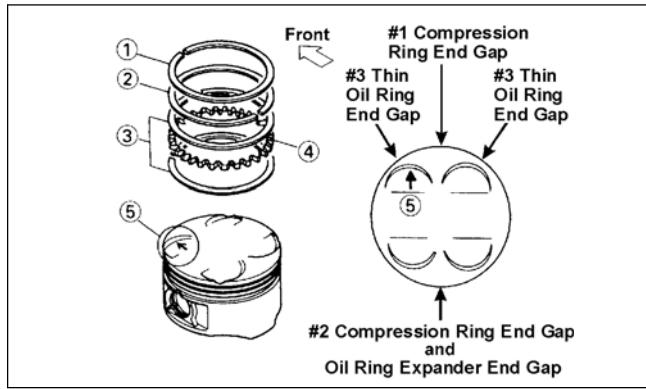
CC397D

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 a range of 0.060-0.073 mm (0.0024-0.0029 in.).

Installing Piston Rings

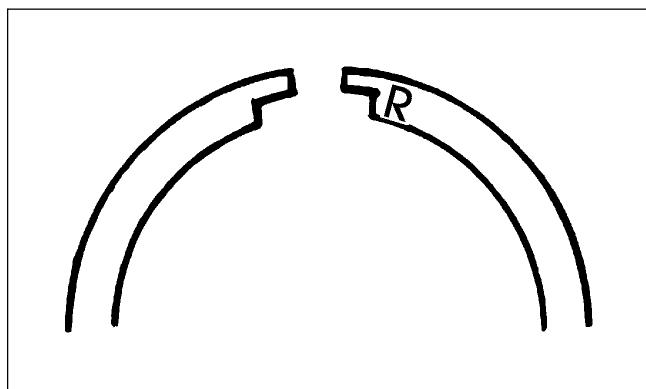
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■ 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



CYLINDER/CYLINDER HEAD ASSEMBLY

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

Cleaning/Inspecting Cylinder Head

⚠ CAUTION

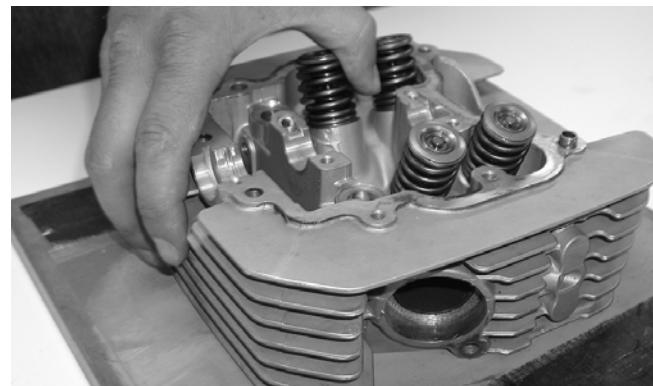
The cylinder head studs must be removed for this procedure.

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.

3

⚠ CAUTION

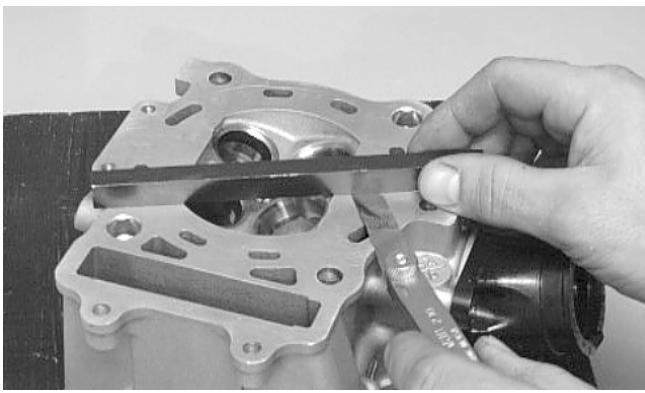
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.



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 is 0.05 mm (0.002 in.).



CC141D

Cleaning/Inspecting Cylinder

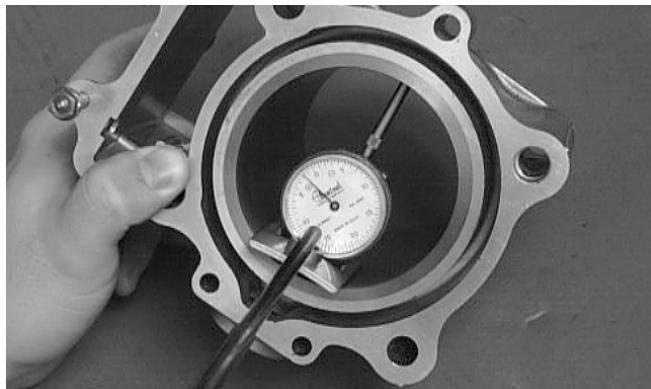
1. Wash the cylinder in parts-cleaning solvent.
2. Inspect the cylinder for pitting, scoring, scuffing, warpage, and corrosion. If marks are found, repair the surface using a cylinder hone (see Honing Cylinder in this sub-section).
3. Place the cylinder on the surface plate covered with #400 grit wet-or-dry 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.

Honing Cylinder

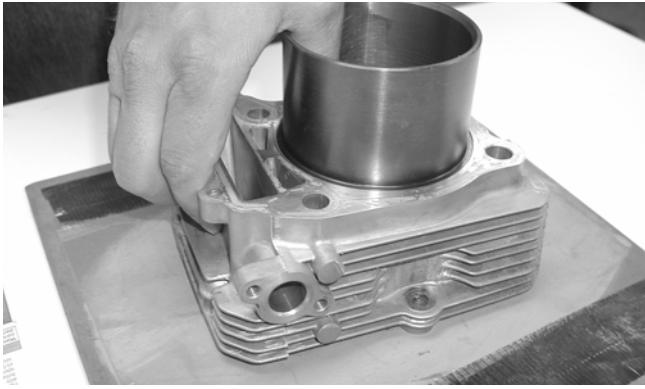
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must be 0.05 mm (0.002 in.).



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.



CC997



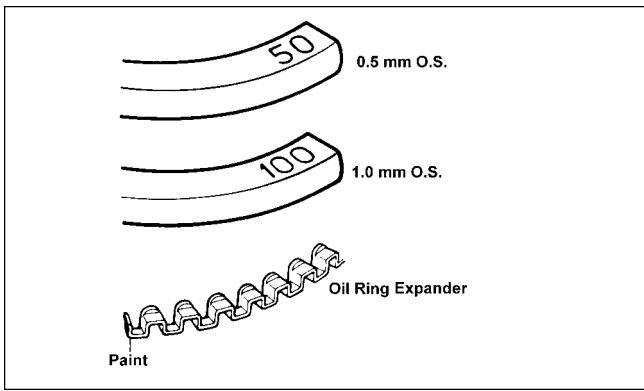
CC998

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.

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.

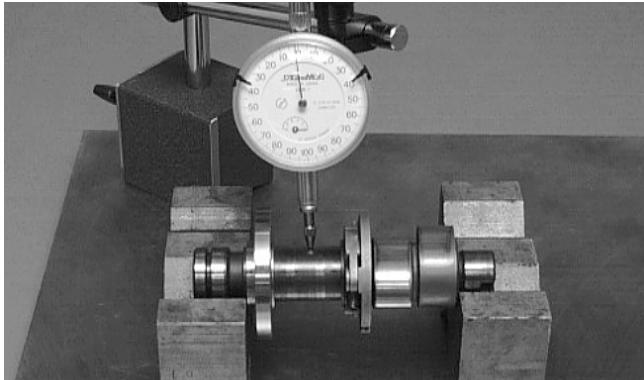


ATV-1068

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.

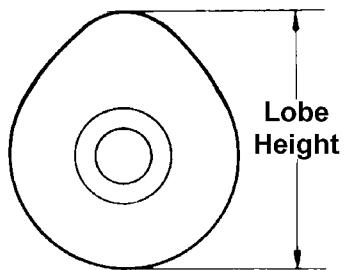


CC283D

2. Rotate the camshaft and note runout; maximum tolerance is 0.10 mm (0.004 in.).

Measuring Camshaft Lobe Height

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



ATV1013A

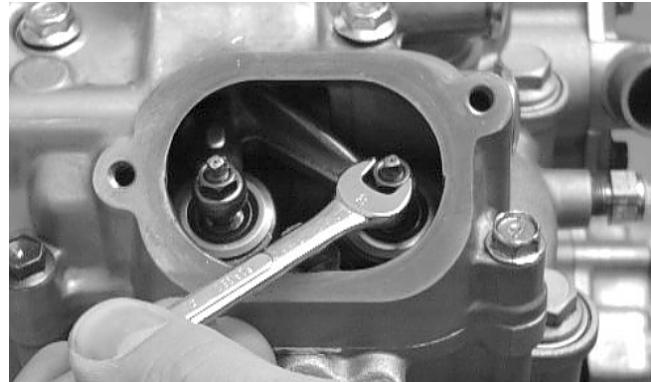
2. The intake/exhaust lobe heights must be a minimum 32.830 mm (1.293 in.).

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.

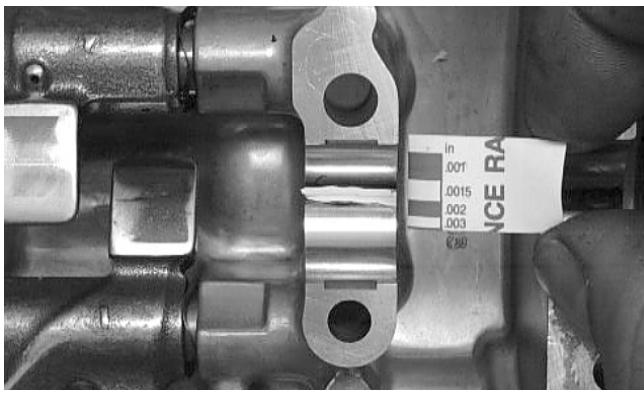
■ **NOTE:** Do not rotate the camshaft when measuring clearance.

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

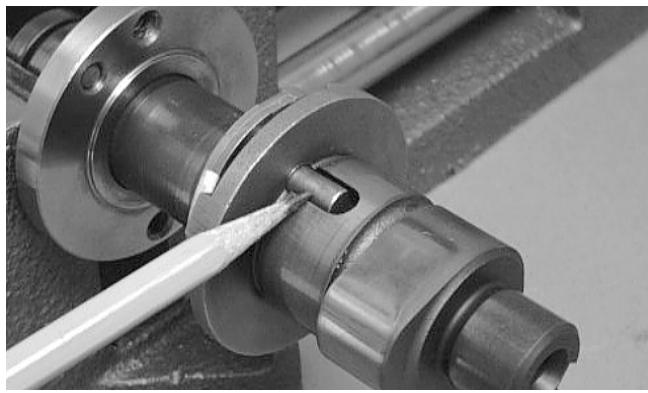


MD1261

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.

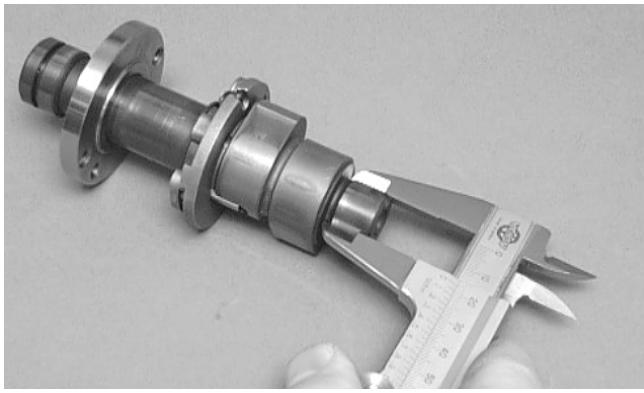


CC145D



CC306D

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



CC287D



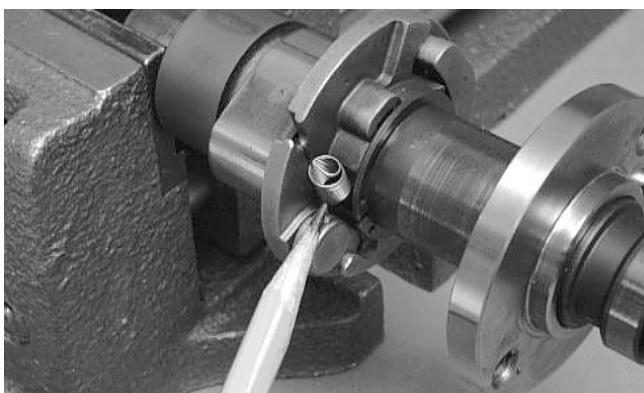
CC308D

2. If damaged, the camshaft must be replaced.

■ **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.



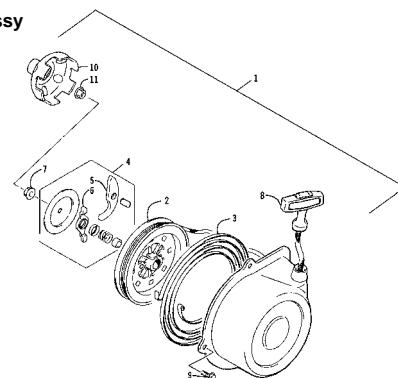
CC304D

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



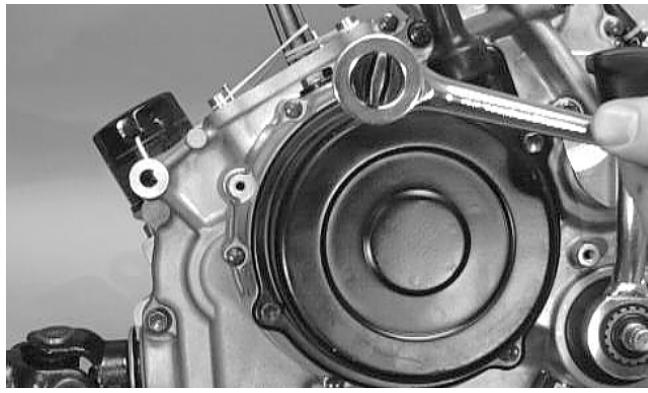
0737-034

⚠ 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.



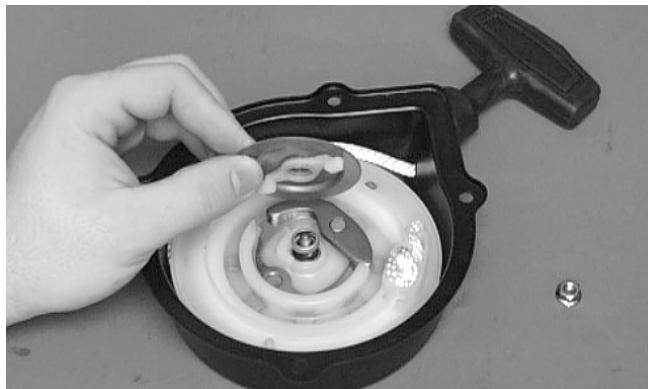
CC039D

3. Remove the nut.



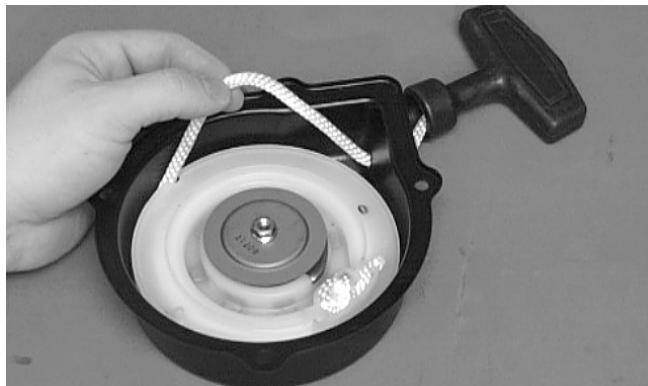
B601D

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

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.

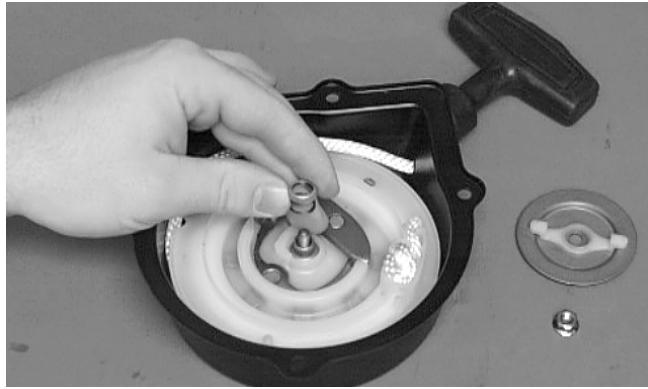


B600D

⚠ CAUTION

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

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

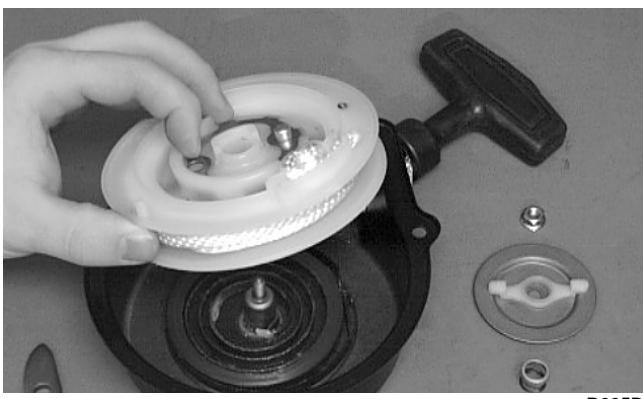


B603D

6. Remove the ratchet and account for the pin.



7. Carefully lift the reel free of the case making sure the spiral spring does not accidentally disengage from the case.



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.

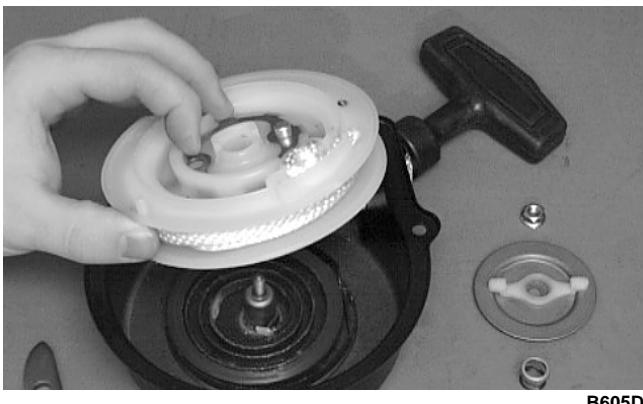
Assembling/Installing

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.

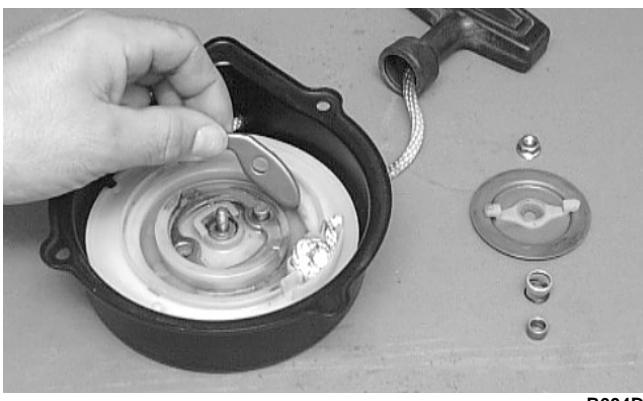


2. Insert the rope through the hole in the reel and tie a knot in the end; then wrap the rope counterclockwise around the reel leaving approximately 50 cm (20 in.) of rope free of the reel.
3. Apply low-temperature grease to the spring and hub.
4. Thread the end of the rope through the guide hole of 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.



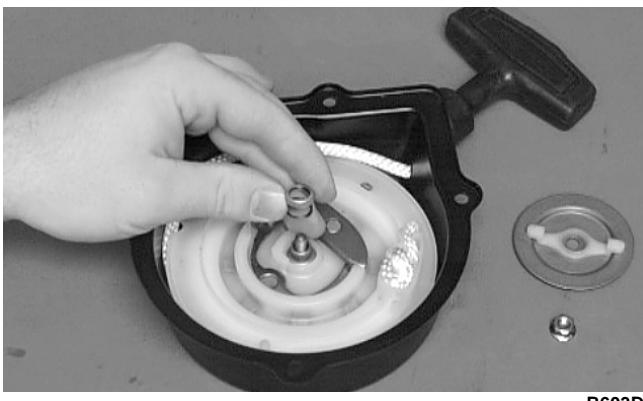
B605D

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



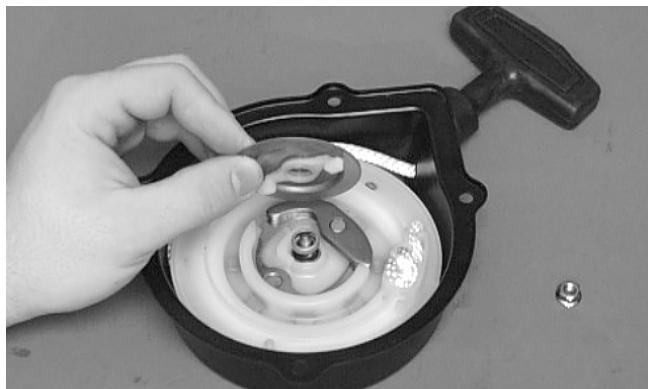
B604D

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



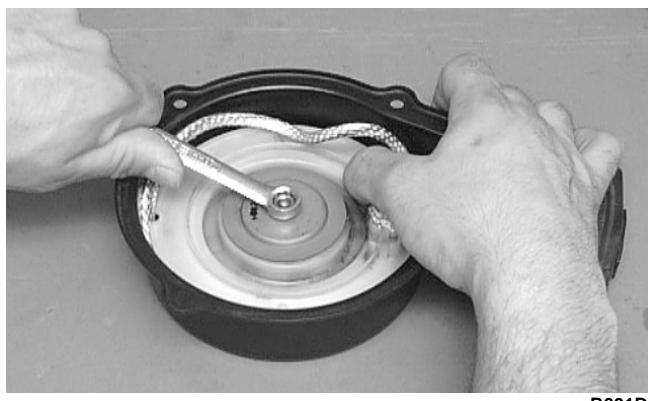
B603D

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

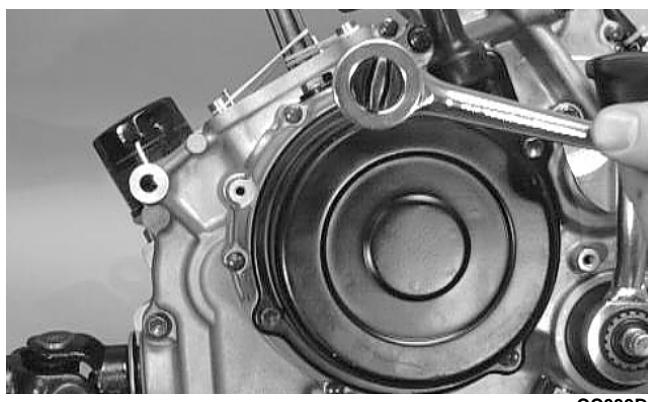
10. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.

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).

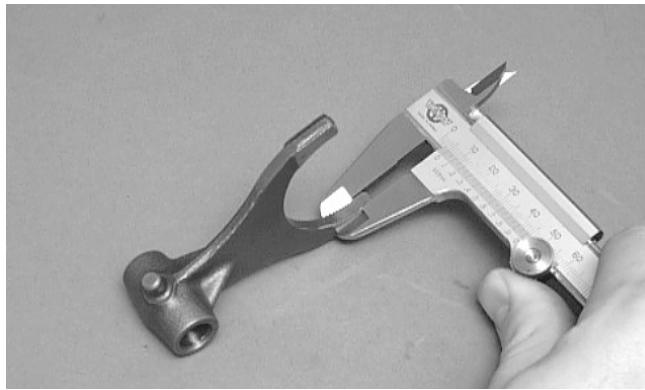


CC039D

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.

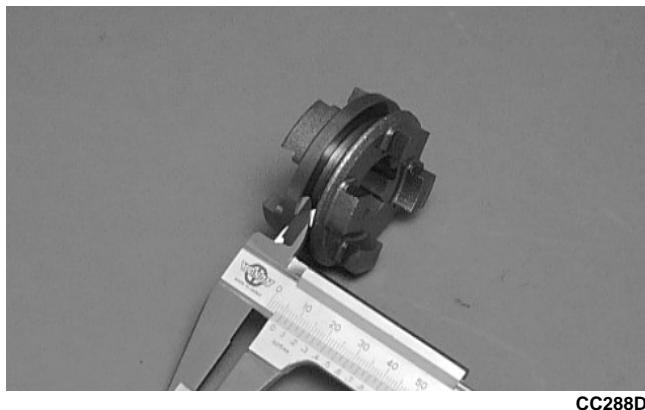


2. Shift fork thickness must be within the specified range.

SHIFT FORK THICKNESS	
#1 and #2	4.3-4.4 mm (0.169-0.173 in.)
Secondary Transmission	5.3-5.4 mm (0.209-0.213 in.)
Reverse	3.8-3.9 mm (0.150-0.153 in.)

MEASURING SHIFT FORK GROOVE (Width)

1. Using a calipers, in turn measure the width of each shift fork groove.



2. Shift fork groove width must be within the specified range.

SHIFT FORK GROOVE WIDTH	
#1 and #2	4.5-4.6 mm (0.177-0.181 in.)
Secondary Transmission	5.4-5.5 mm (0.213-0.217 in.)
Reverse	4.0-4.1 mm (0.157-0.161 in.)

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.



3. Shift fork to groove side clearance must be within specifications.

SHIFT FORK TO GROOVE SIDE CLEARANCE	
Engine	0.1-0.3 mm (0.004-0.012 in.)
Secondary Transmission (max)	0.2 mm (0.008 in.)
Reverse	0.1-0.3 mm (0.004-0.012 in.)

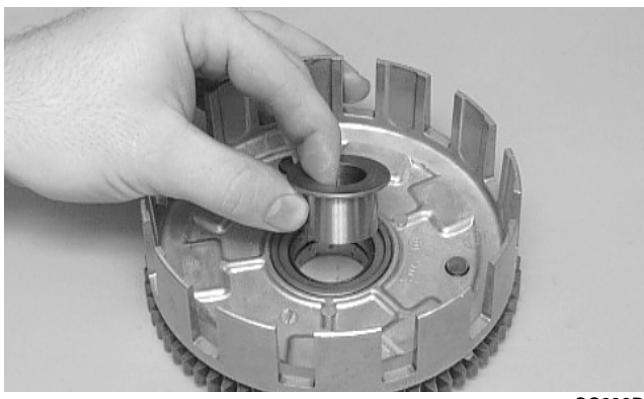
Servicing Right-Side Components

■ 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.

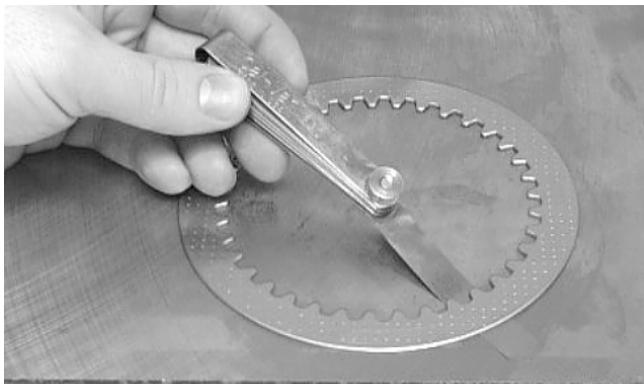
■ NOTE: When removing components from the primary gear assembly, account for the bushing that fits into the primary gear.



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.

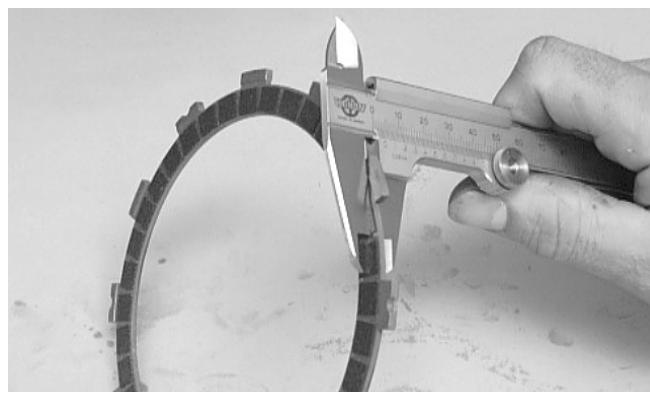


CC245D

3. Maximum driven plate warpage must be 0.1 mm (0.004 in.).

Measuring Clutch Drive Plate (Fiber) Thickness

1. Using a calipers, in turn measure the thickness of each drive plate in several locations.



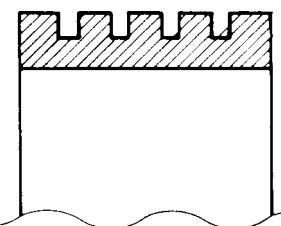
CC243D

2. Drive plate thickness must be a minimum of 2.62 mm (0.103 in.).
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.

3

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, scratches, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

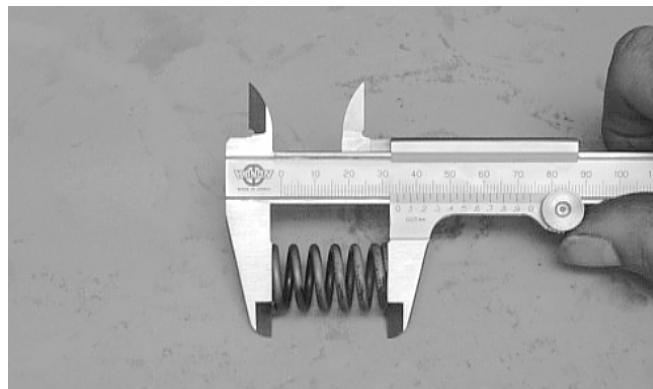
Inspecting Primary One-Way Drive

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

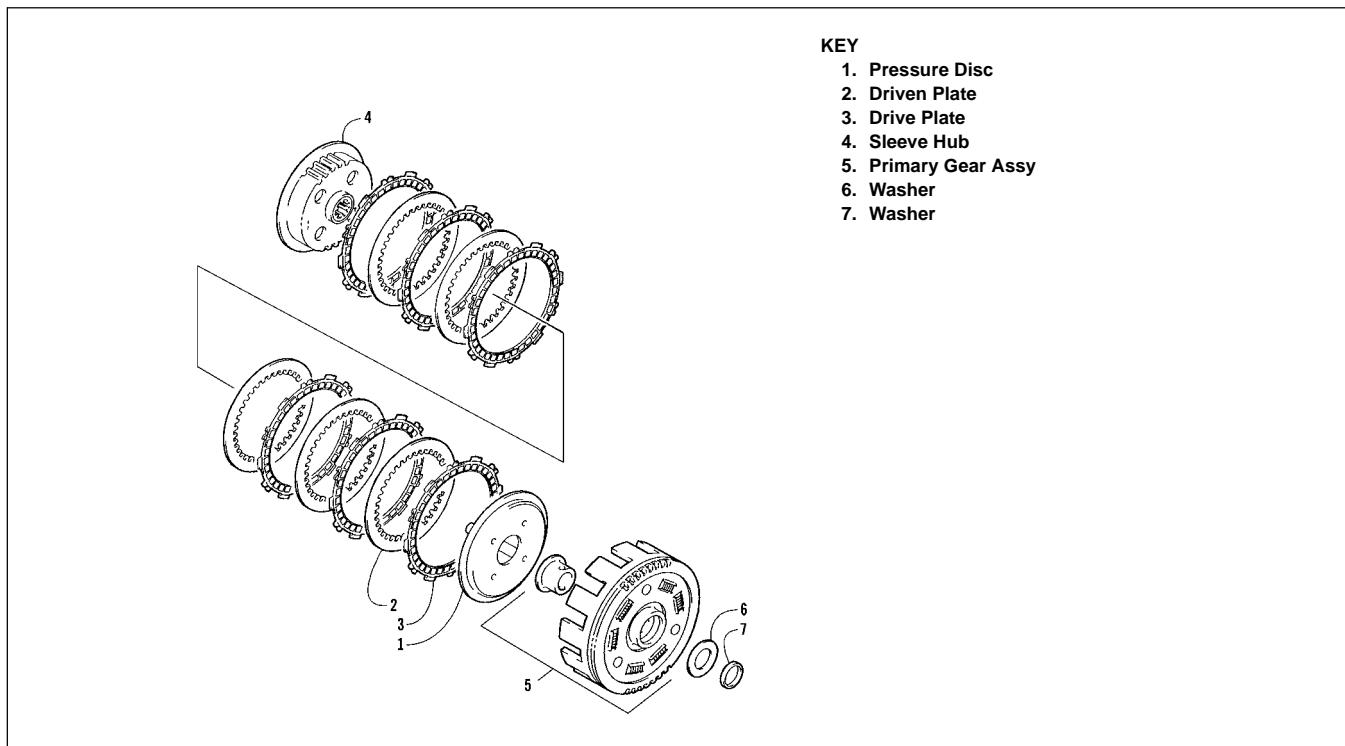
1. Using a calipers, measure the overall free length of the clutch spring.



CC247D

2. Overall length must be a minimum of 33.7 mm (1.33 in.).

Assembling Primary Clutch



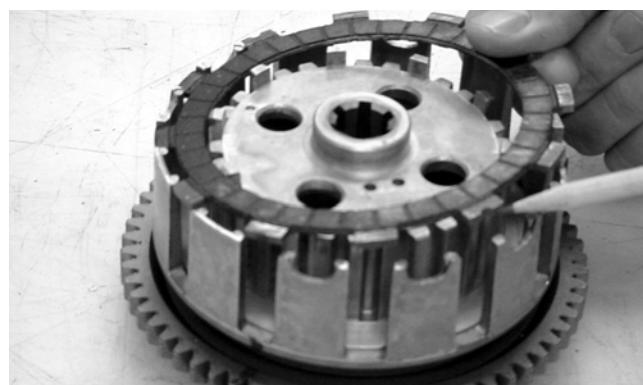
737-731A

1. Place the clutch hub upside down into the primary gear assembly.



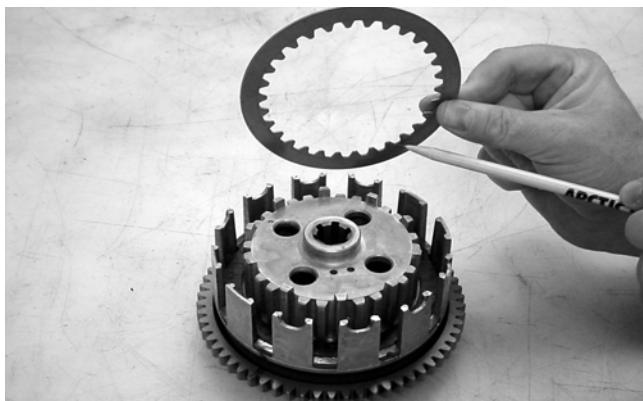
CC920

2. Alternately install the drive plates and driven plates onto the hub (starting with and ending with a drive plate) making sure the tabs with the notches are all in line with each other.



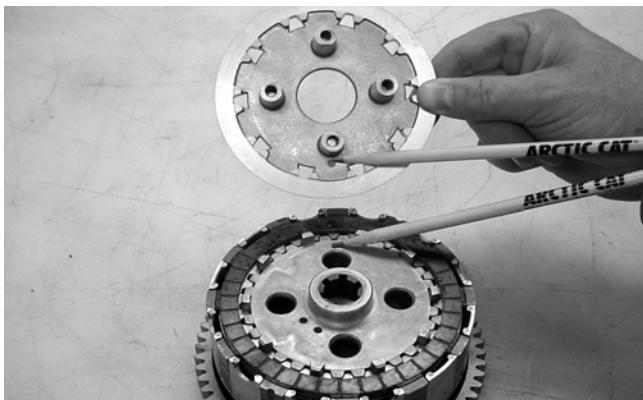
CC921

■ **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.



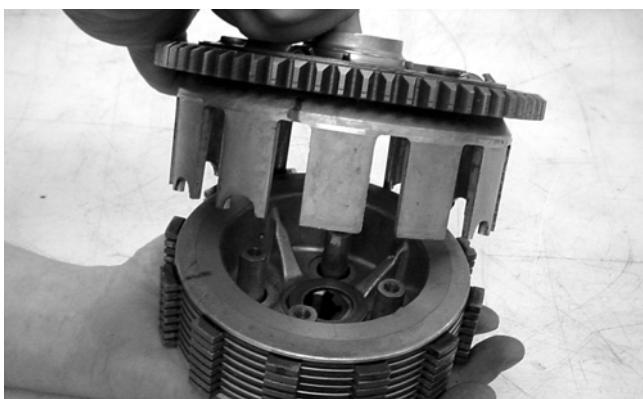
CC922

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



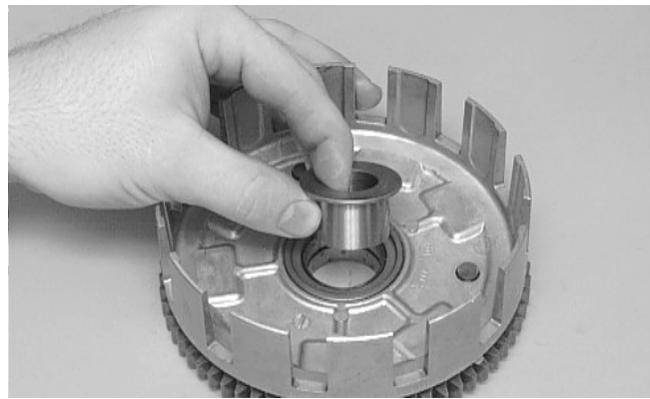
CC923

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.



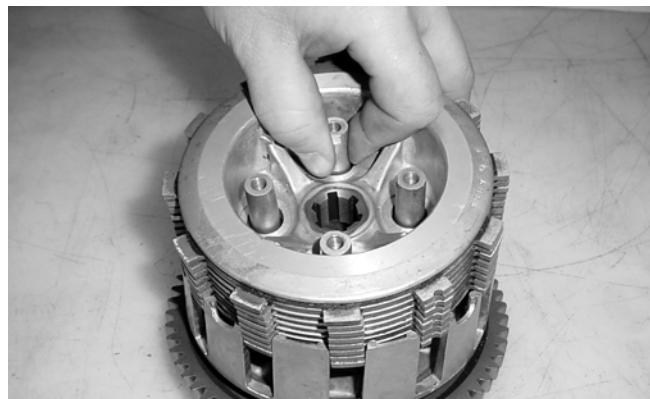
CC924

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

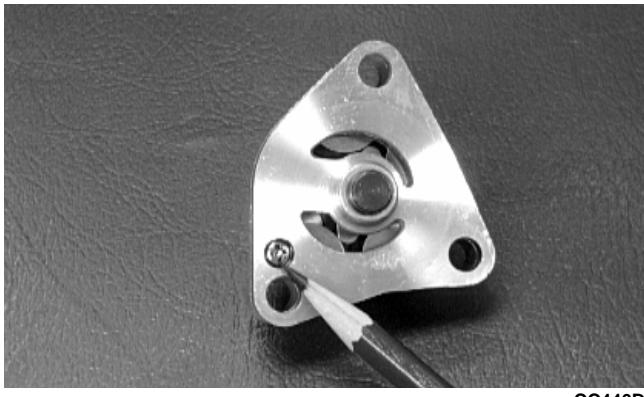
The clutch hub and the pressure plate must be seated in the proper position. If any of the incorrect positions are used, the hub and plate will have clearance between them and they will not operate properly.

■ **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.

3



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.

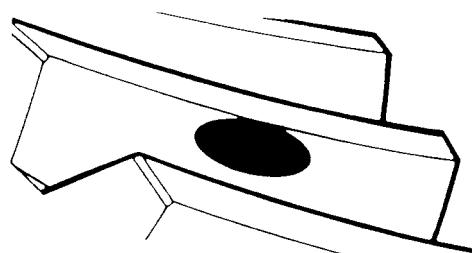
Backlash Measurement	Shim Correction
Under 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

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.

Incorrect (contact at tooth top)

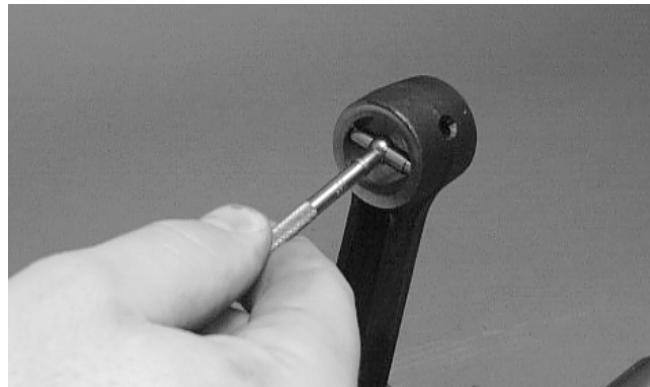


ATV-0103

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

3

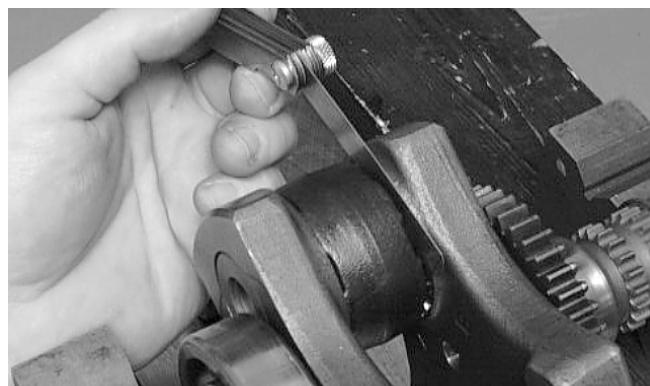
2. Maximum diameter is 20.04 mm (0.7889 in.).

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 is 3 mm (0.12 in.).

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

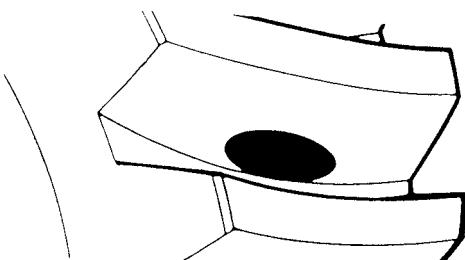
1. Push the lower end of the connecting rod to one side of the crankshaft journal.
2. Using a feeler gauge, measure the gap between the connecting rod and crankshaft journal.



CC289D

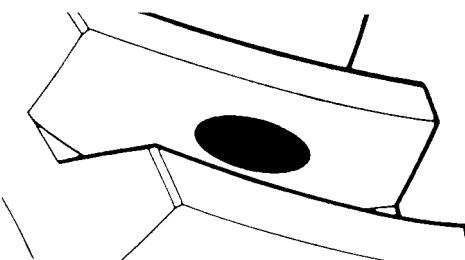
3. Acceptable gap range is 0.1-1.0 mm (0.004-0.039 in.).

Incorrect (contact at tooth root)



ATV-0105

Correct



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

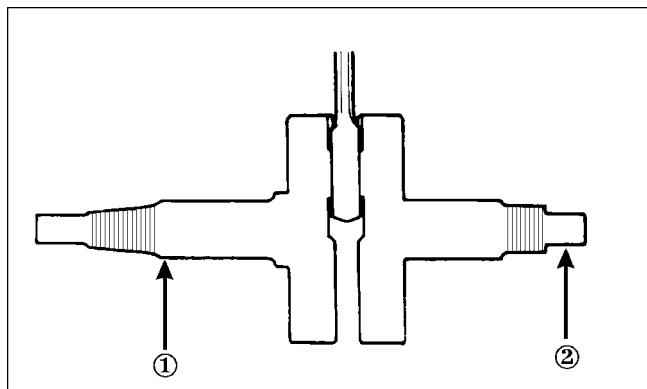
After correcting tooth contact, backlash must again be checked and corrected (if necessary). Continue the correcting backlash/correcting tooth contact procedures until they are both within tolerance values.

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 is 21.95-22.00 mm (0.8642-0.8661 in.).

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.



3. Zero the indicator and rotate the crankshaft slowly.

⚠ CAUTION

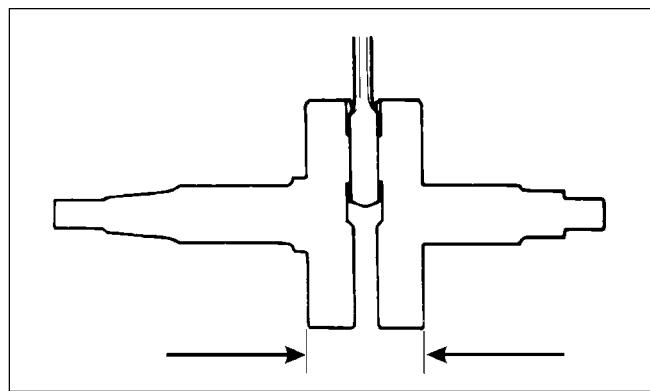
Care should be taken to support the connecting rod when rotating the crankshaft.

4. Maximum runout is 0.08 mm (0.003 in.) for both sides.

■ 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.



2. Acceptable width range is 59.9-60.1 mm (2.358-2.366 in.).

DRIVESHAFT

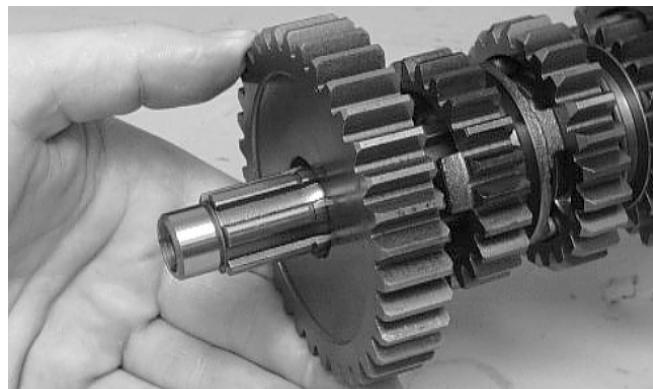
Disassembling

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





CC226D



CC222D



CC225D

3

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.



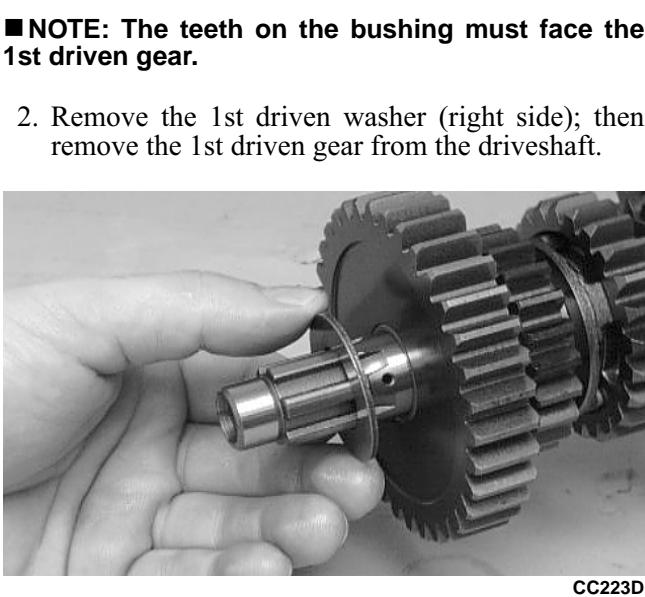
CC221D



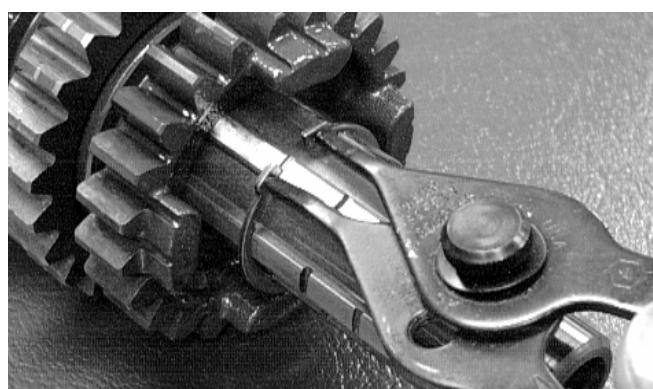
CC224D



CC220D

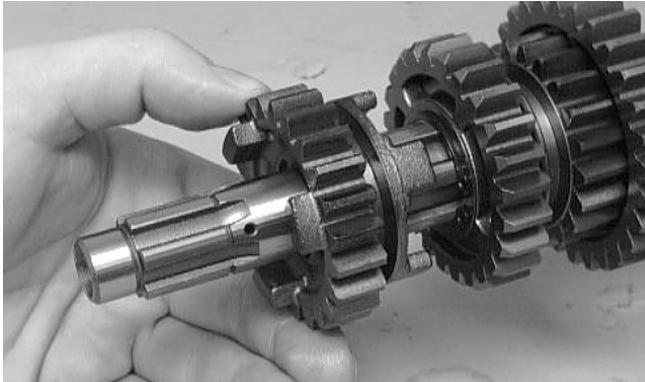


CC223D



CC508D

4. Remove the 4th driven gear from the driveshaft. Note the four small dogs facing toward the 3rd driven gear for assembling purposes.



CC219D

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

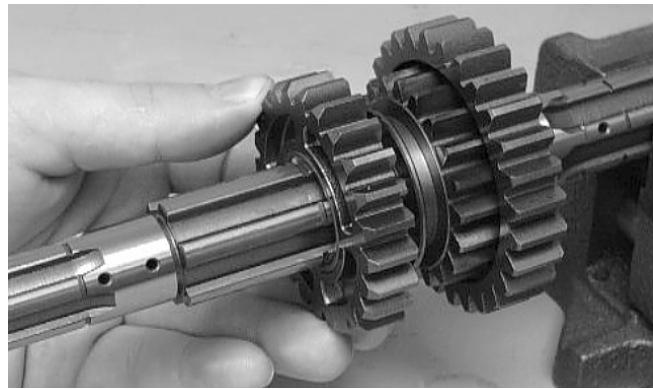


CC216D



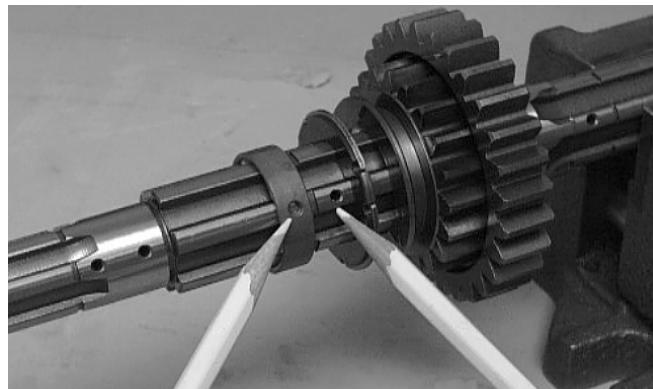
CC215D

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



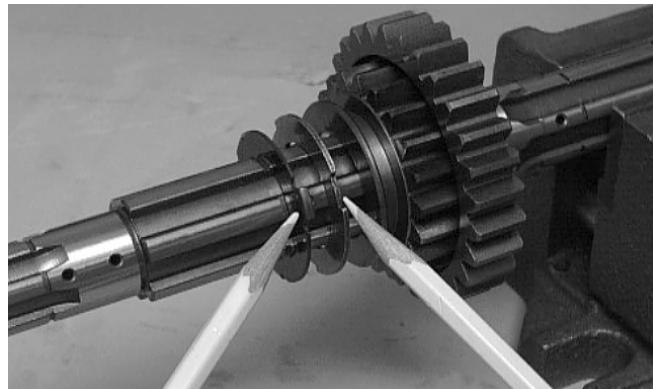
CC214D

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.



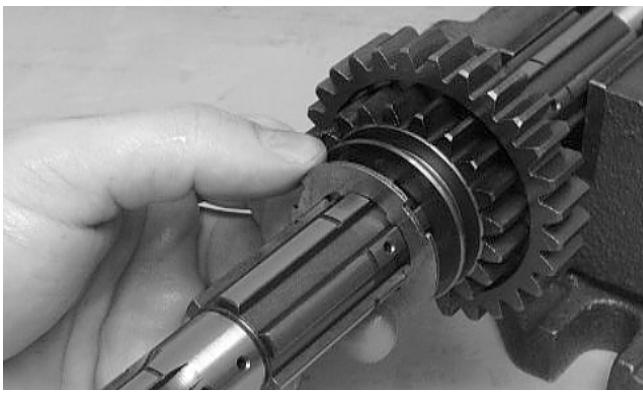
CC213D

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

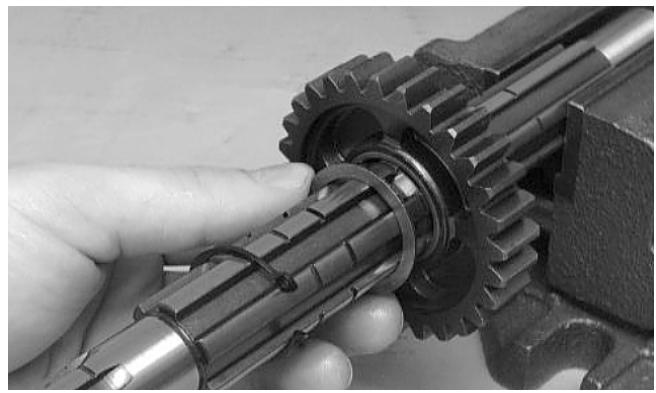


CC212D

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.

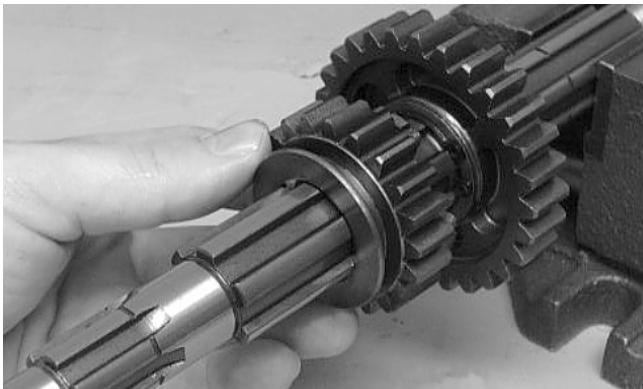


CC211D



CC208D

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



CC210D



3

CC207D

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



CC209D

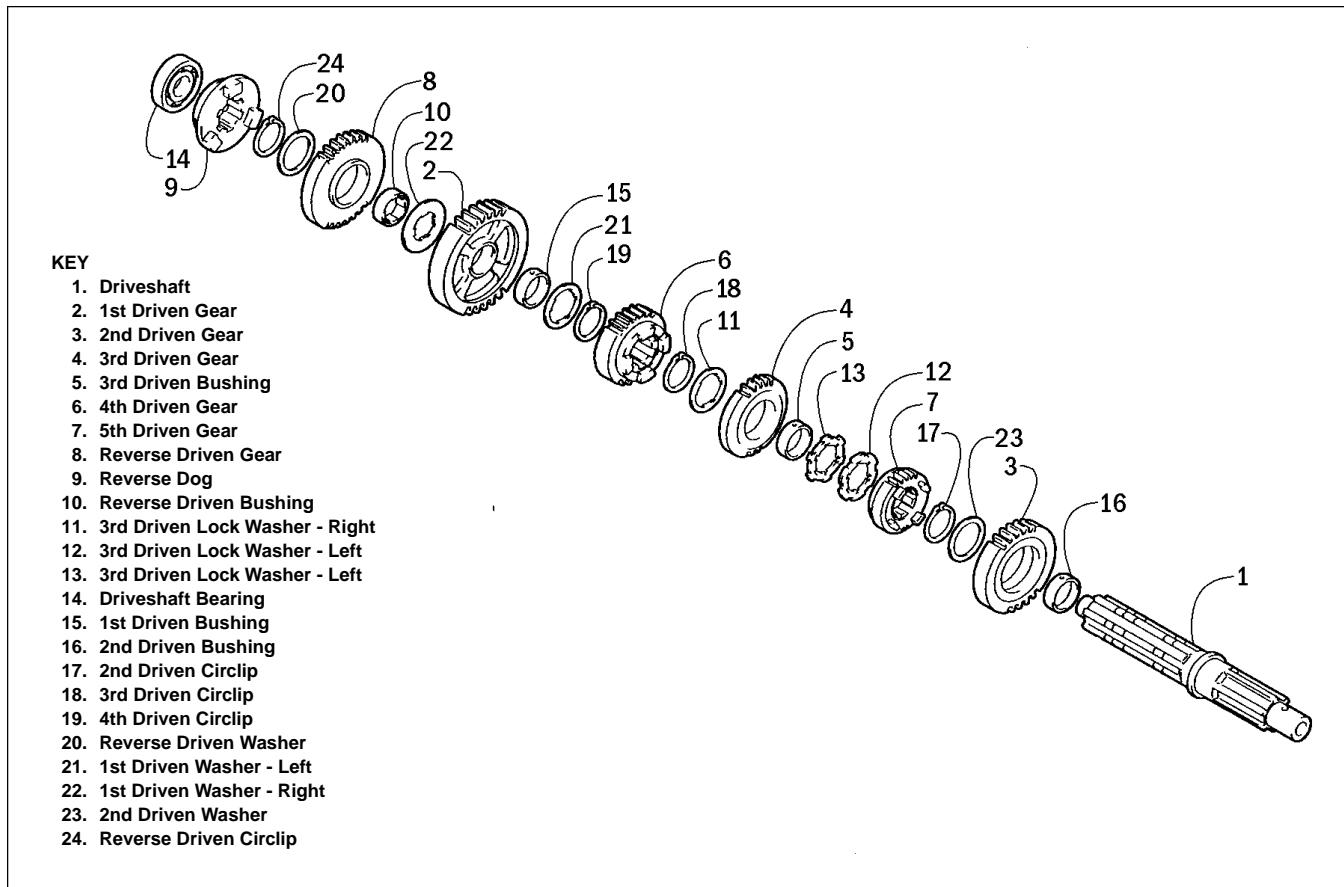


CC206D

 **AT THIS POINT**

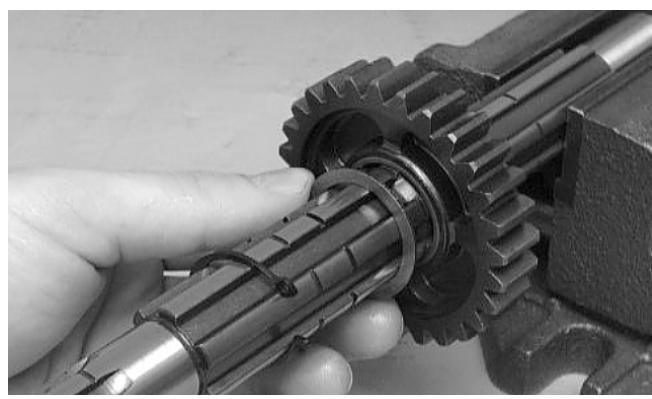
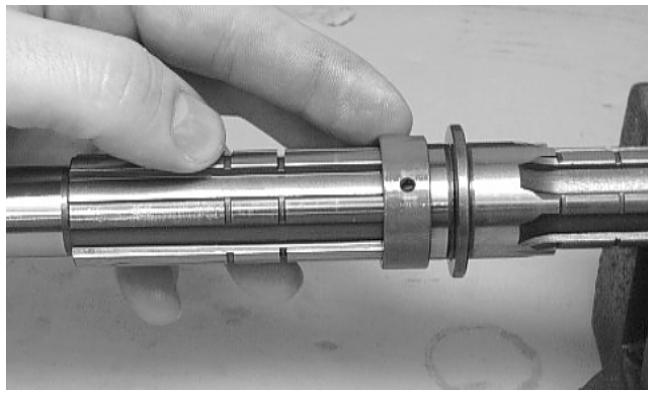
To service secondary gears, see Servicing Center Crankcase Components in this sub-section.

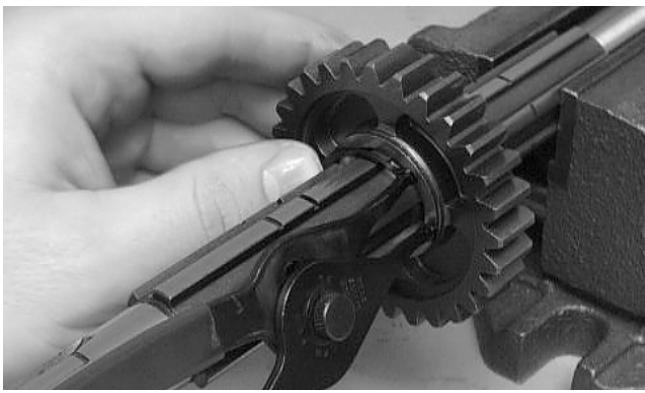
Assembling



737-733A

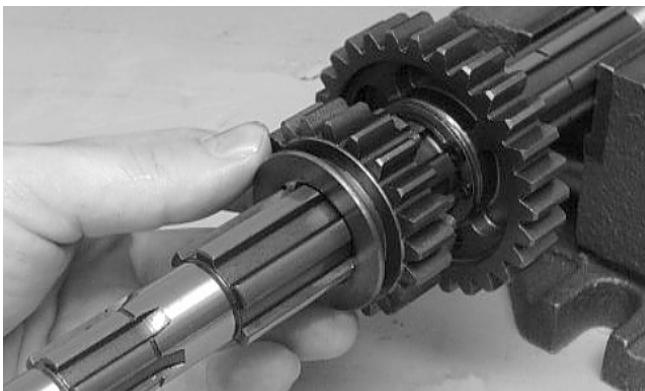
1. In order, install the 2nd driven bushing, gear, washer, and circlip onto the driveshaft.





CC209D

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



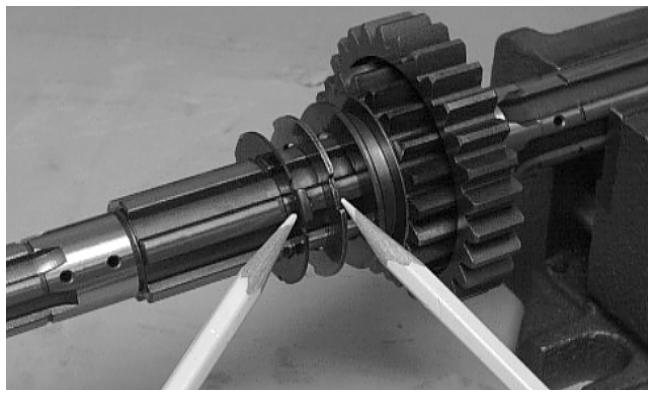
CC210D

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.



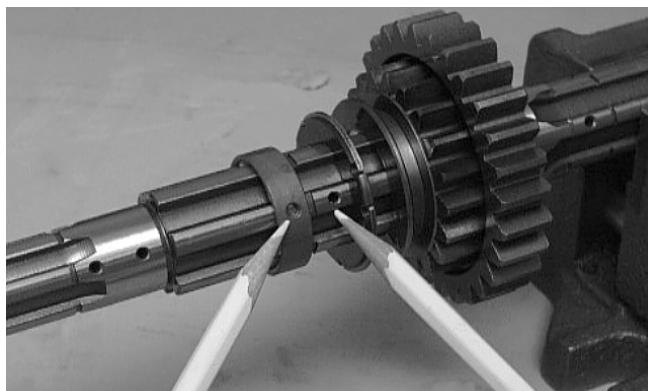
CC211D

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).



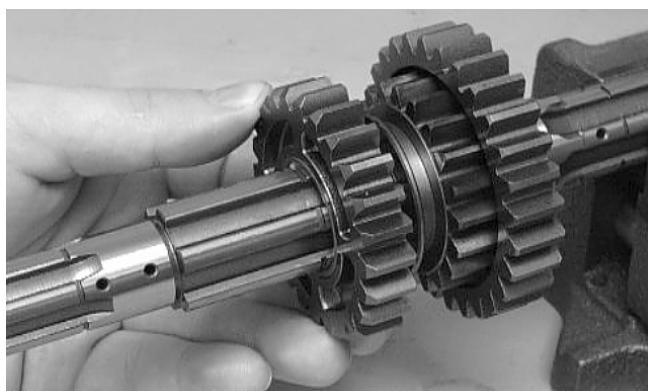
CC213D

3

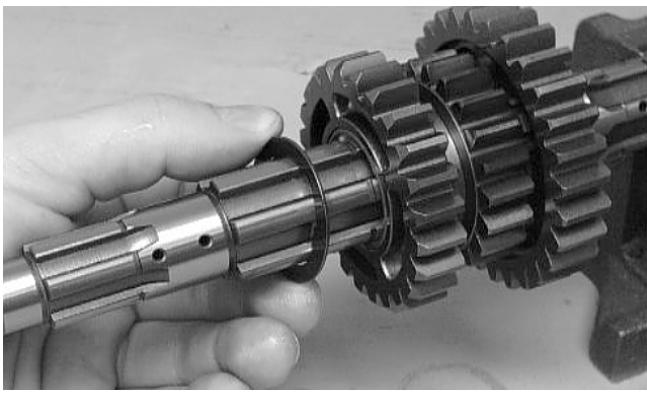
CAUTION

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.

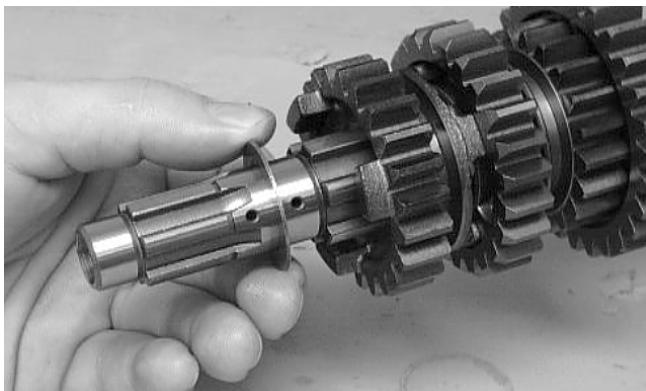


CC214D



CC215D

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

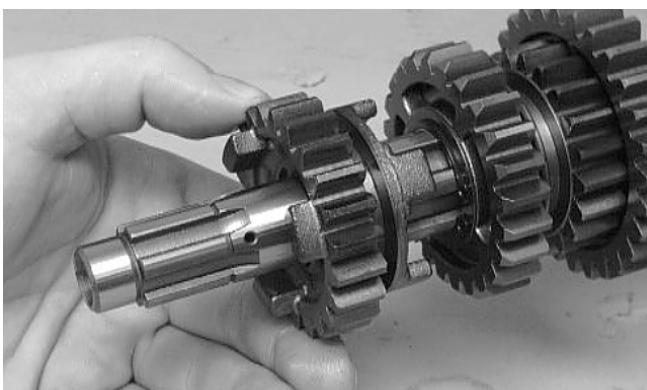


CC220D



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



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.



CC508D



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

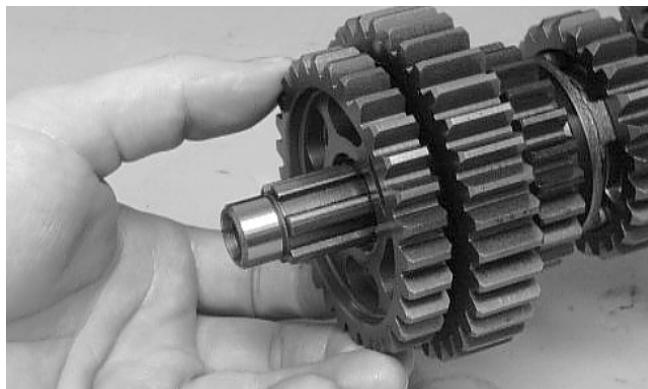
Failure to align the oil ports will result in serious engine damage.

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, circlip, and reverse dog onto the driveshaft.



CC225D



3

CC226D



CC227D



CC228D

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

COUNTERSHAFT

Disassembling

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



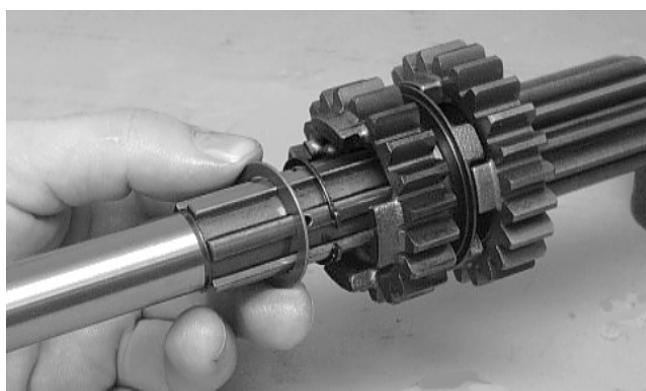
CC204D

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

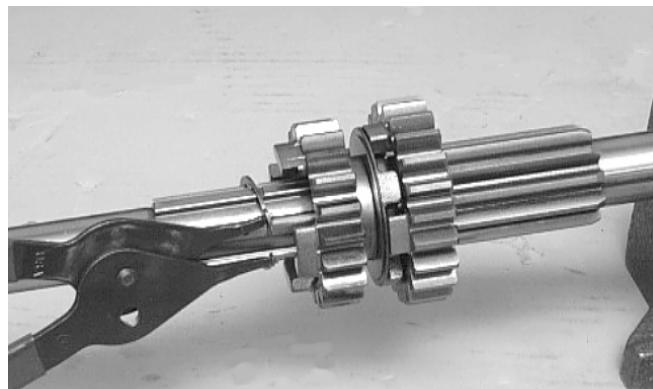


CC203D

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

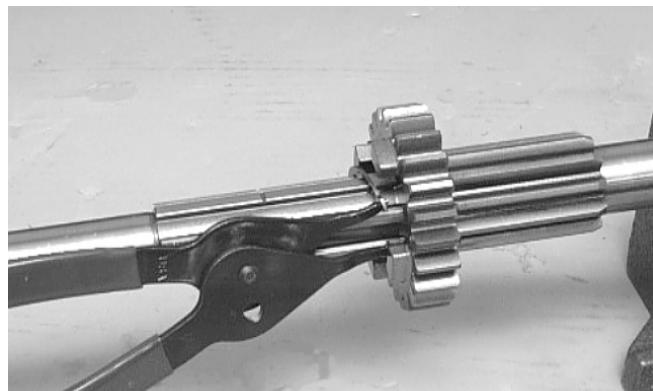


CC201D



CC200D

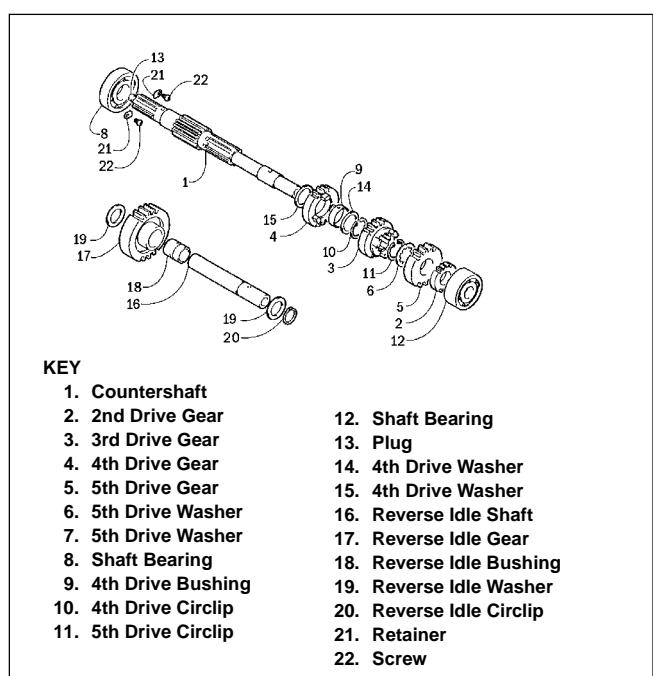
4. Remove the 3rd drive gear from the countershaft.
5. Remove the 4th drive circlip securing the 4th drive gear on the countershaft; then remove the first 4th drive washer and 4th drive gear. Account for the bushing.



CC199D

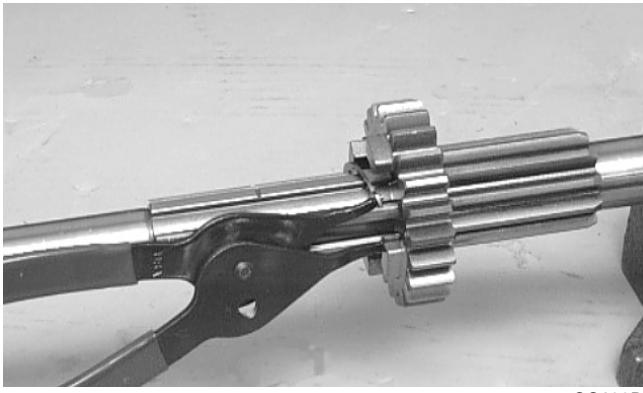
6. Remove the other 4th drive washer from the countershaft.

Assembling



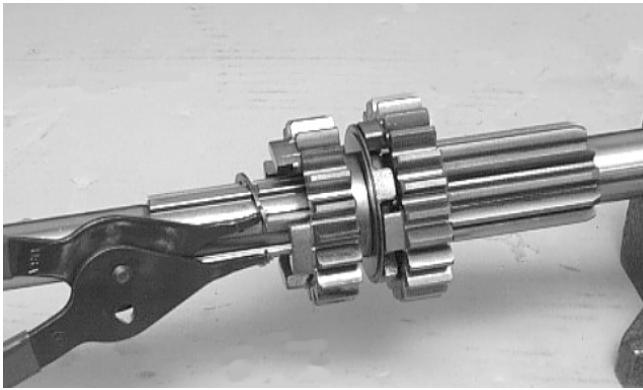
737-733B

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.



CC200D

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



CC201D



CC203D

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



3

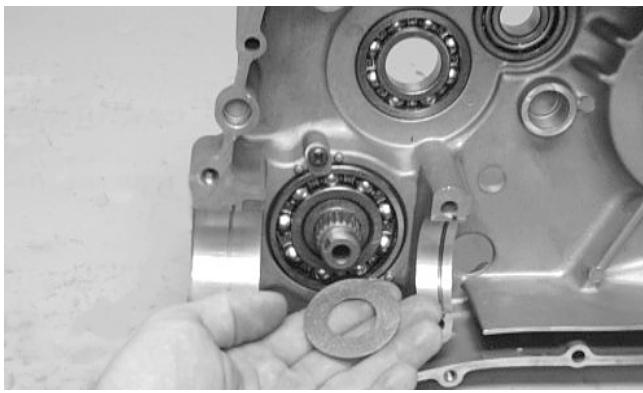
■ NOTE: The countershaft is now completely assembled for installation.

Assembling Crankcase Half

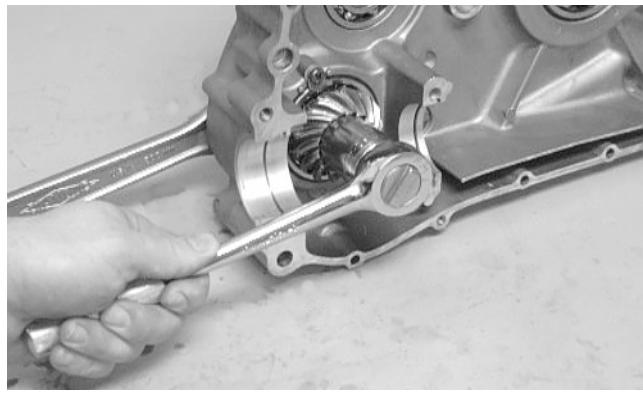
■ NOTE: For ease of assembly, install components on the left-side crankcase half.

■ 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).

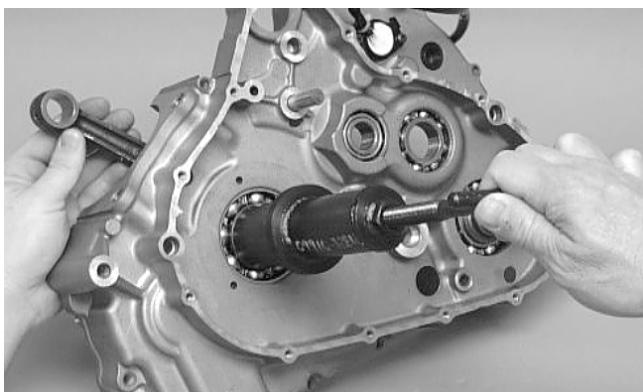


CC117D



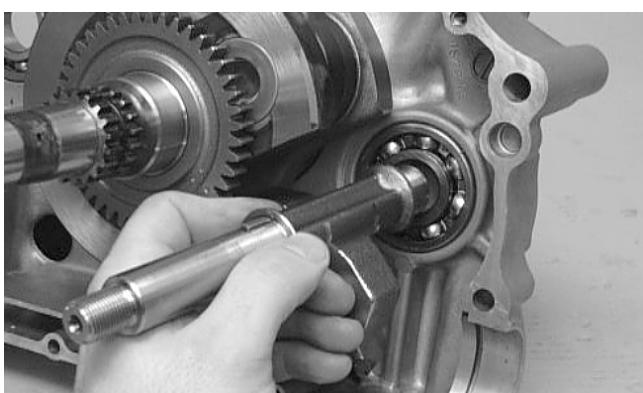
CC116D

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



CC151D

3. Install the crank balancer.

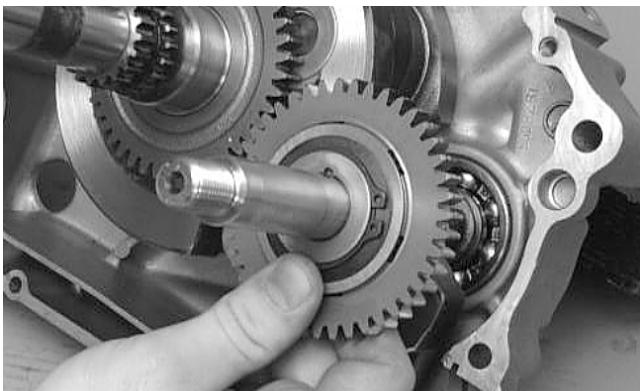


CC168D

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



CC165D



CC167D

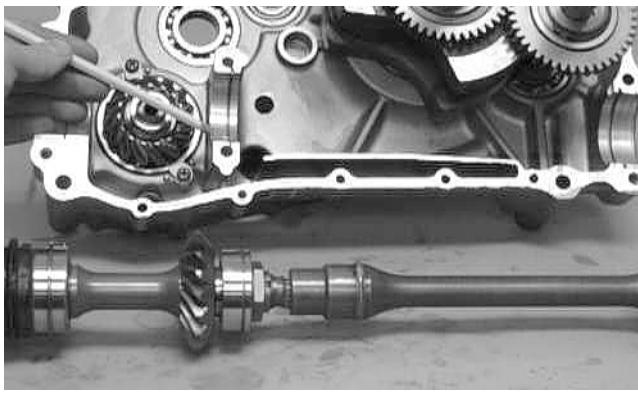


CC166D

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

CAUTION

The bearing pins must be positioned into the crankcase.



CC110D

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



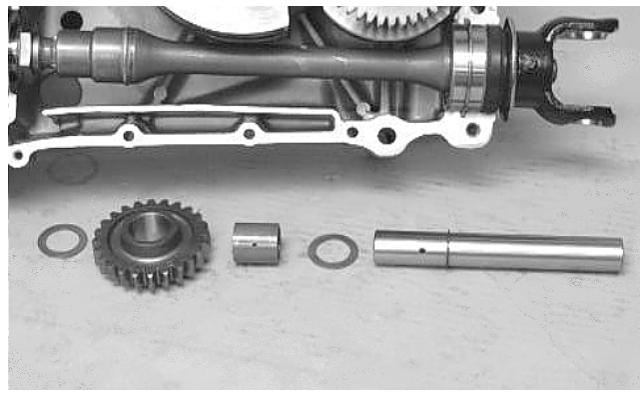
CC197D

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.

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

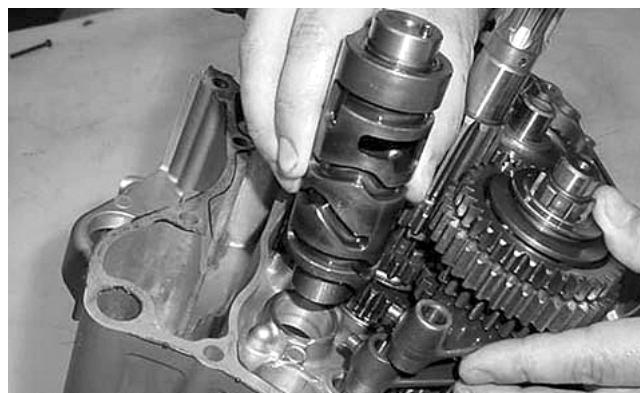


CC229D



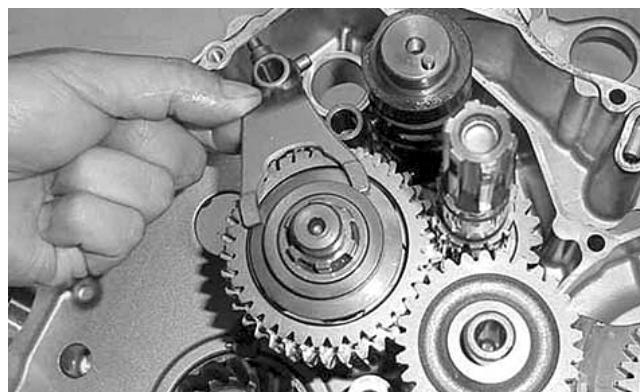
CC231D

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

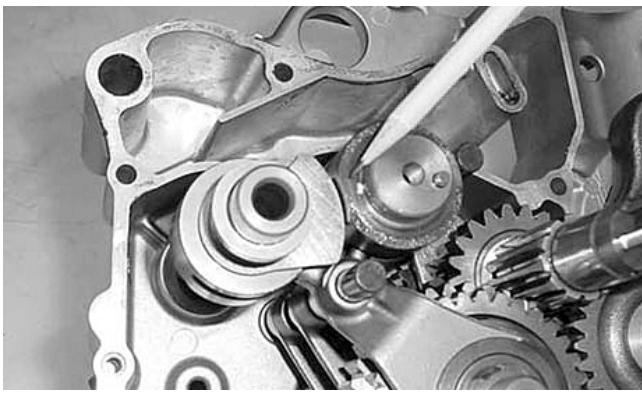
9. Engage the four forks to the gear shift cam; then install the reverse shift cam and spacer.



CC986

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

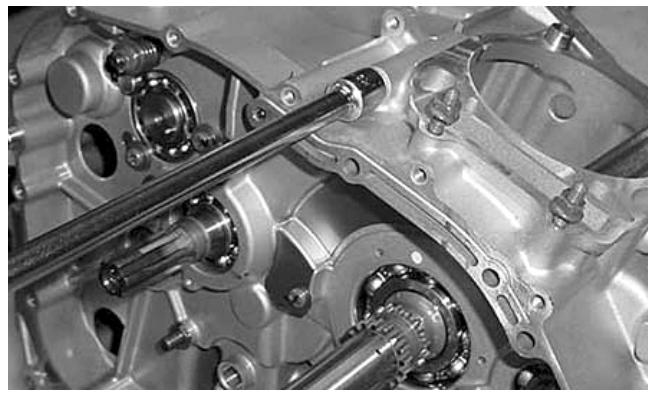
3



CC988

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

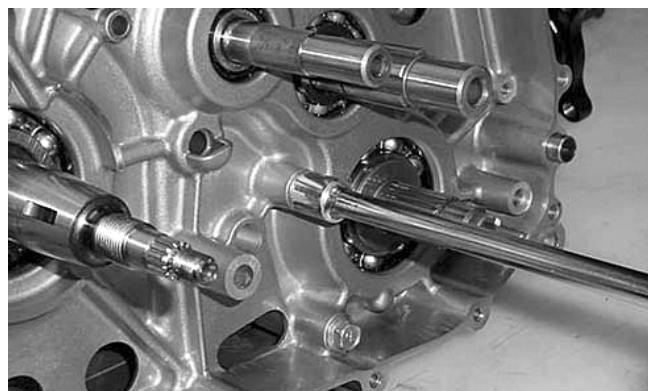
■NOTE: Prior to joining crankcase halves, turn the shift cam to ensure all gears shift properly.



CC982

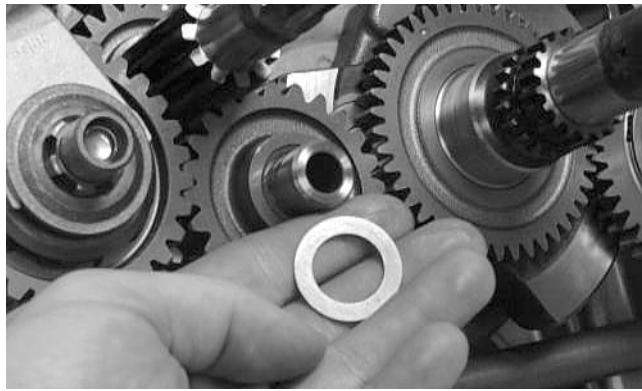
4. From the left side, install the three case half 8 mm cap screws (two inside the case); then tighten only until snug.

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



CC981

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.



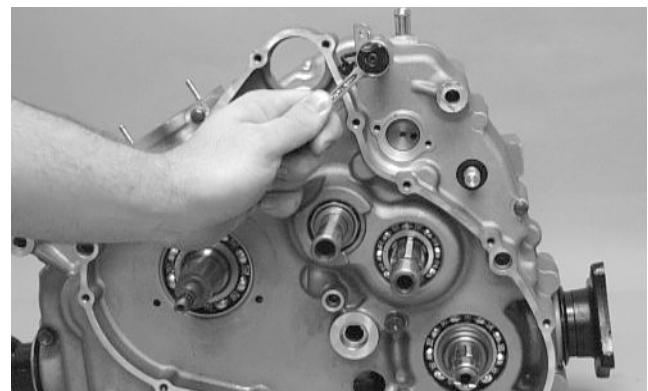
CC102D

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.

5. From the left side, install the seven case half 6 mm cap screws; then tighten only until snug.

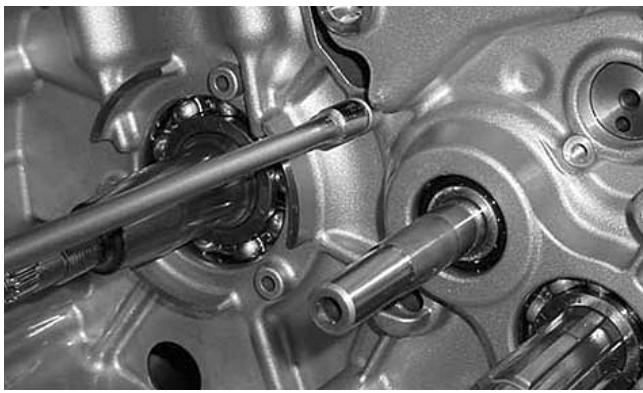
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.



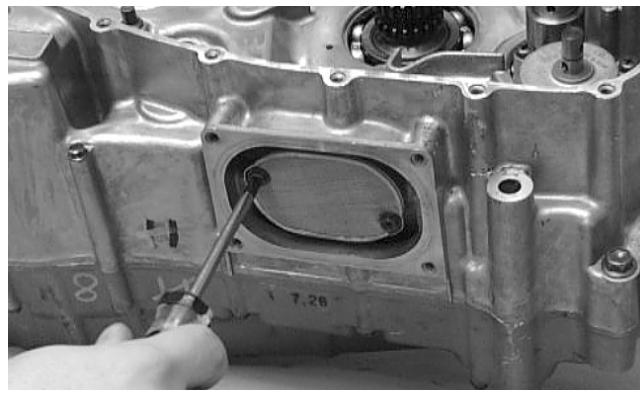
CC096D

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



CC163D

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

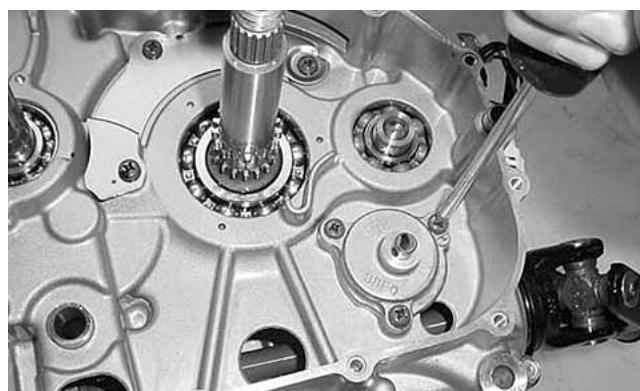
1. Place the oil strainer with a new O-ring into position beneath the crankcase and tighten securely with the Phillips-head cap screws.

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).

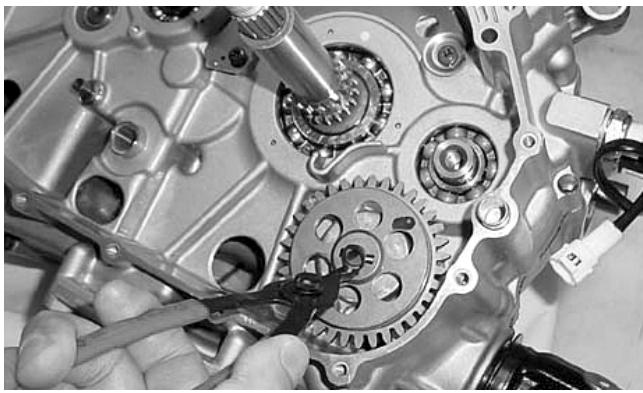


CC978

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

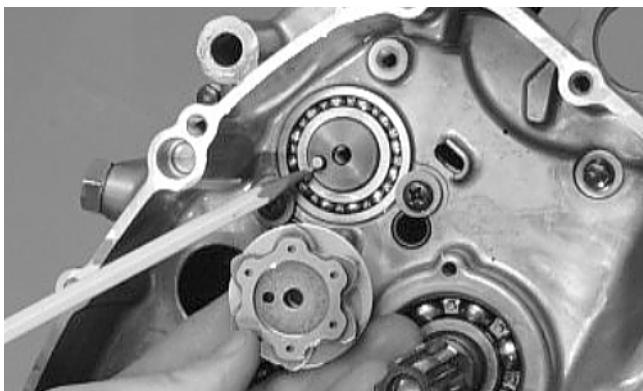
■NOTE: Always use a new circlip when installing the driven gear.

3

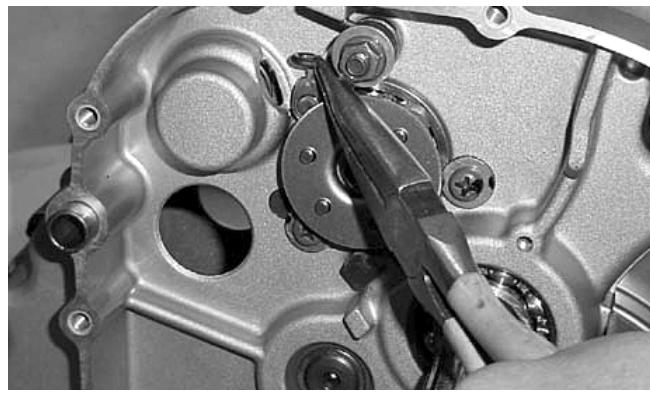


CC976

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.

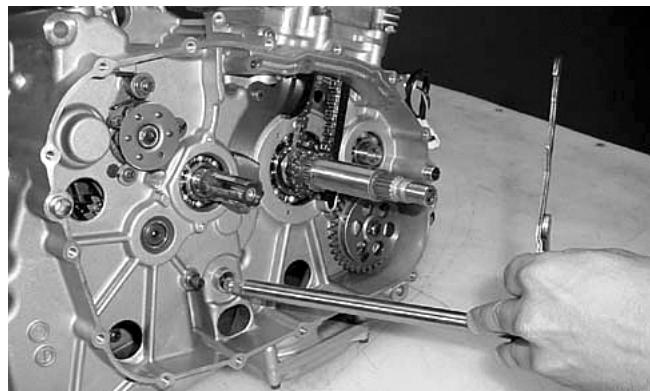


CC087D



CC974

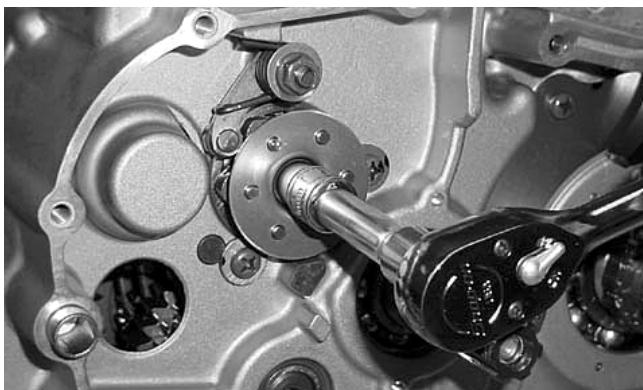
7. Install the gear shift shaft.



CC973

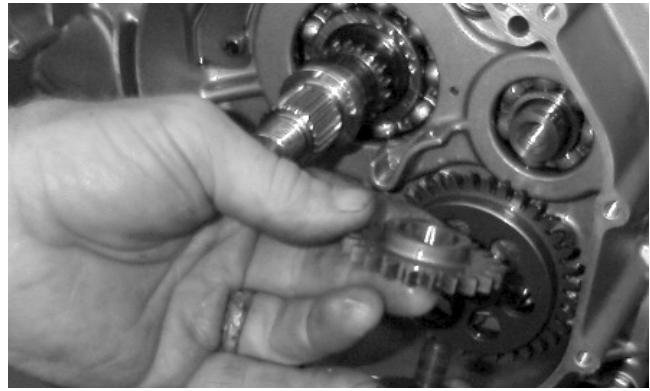
**C. Primary Driven Gear
D. Primary Clutch
E. Starter Clutch Shoe**

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

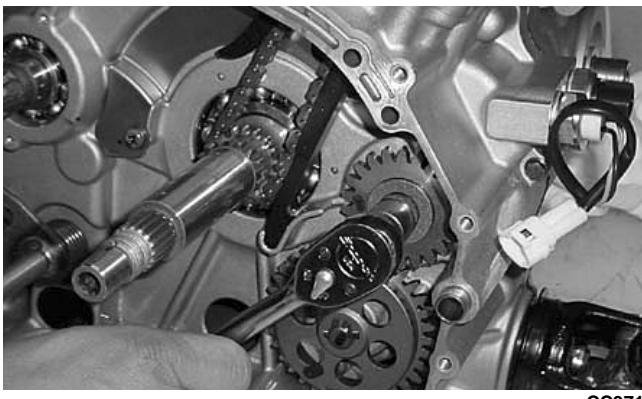


CC975

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

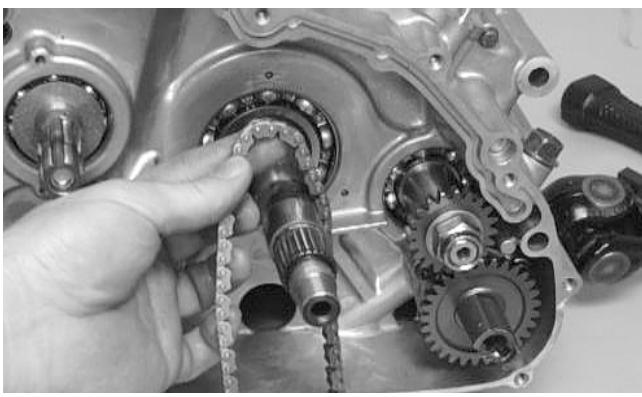


MD1017



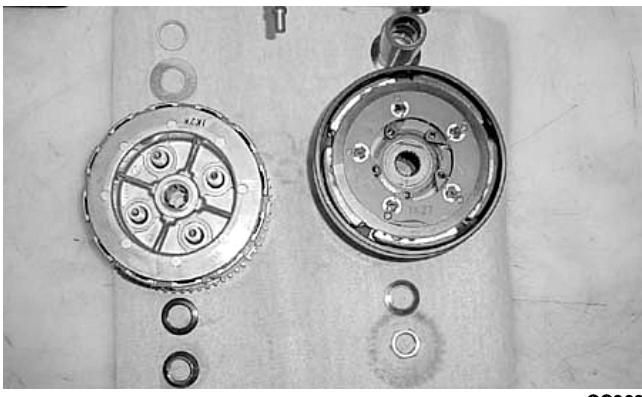
CC971

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

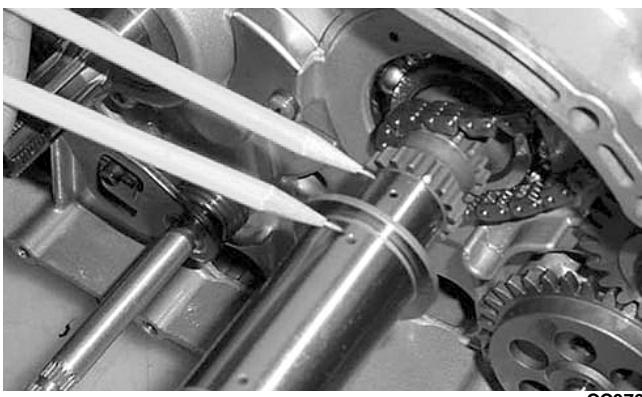


CC079D

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.



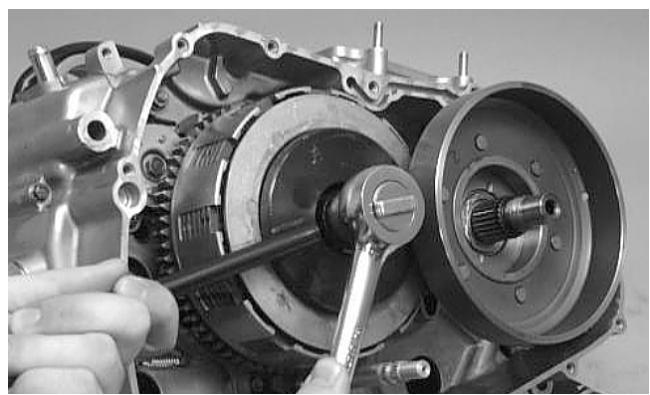
CC078D

3

■ 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.

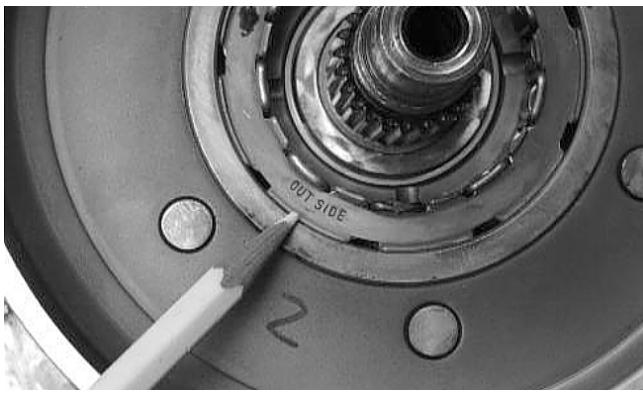
12. Using a clutch sleeve hub holder, install the nut and washer. Tighten to 10 kg-m (72 ft-lb).

■ 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

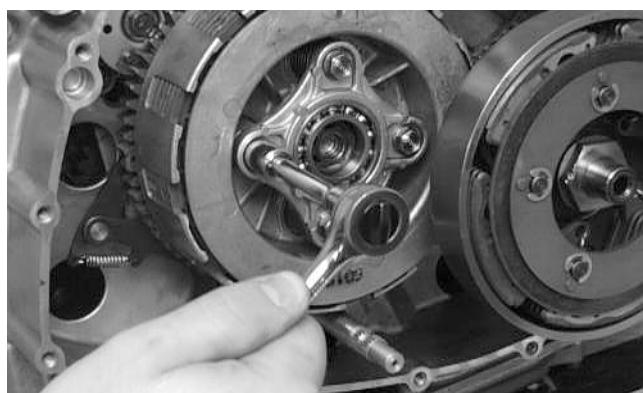
14. Install the starter clutch shoe and washer; then secure with the starter clutch-shoe nut (left-hand threads). Tighten to 13 kg-m (94 ft-lb); then using a center punch, stake the nut.



CC990

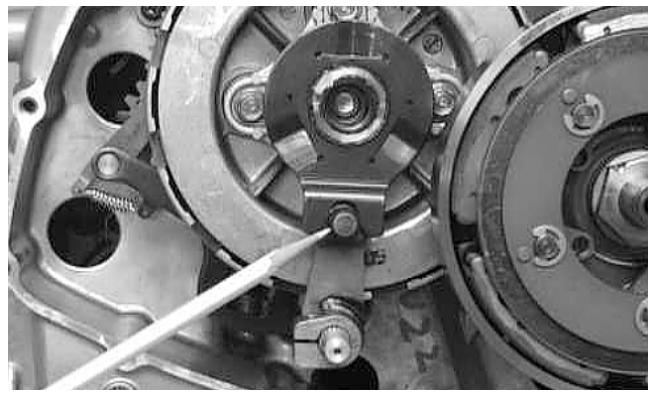
15. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, tighten the four cap screws securely.

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



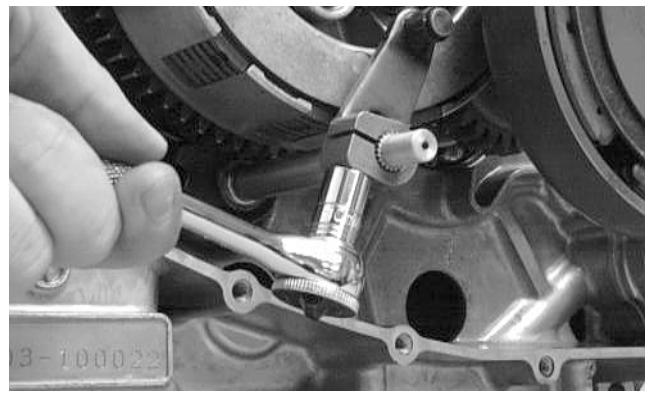
CC074D

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.



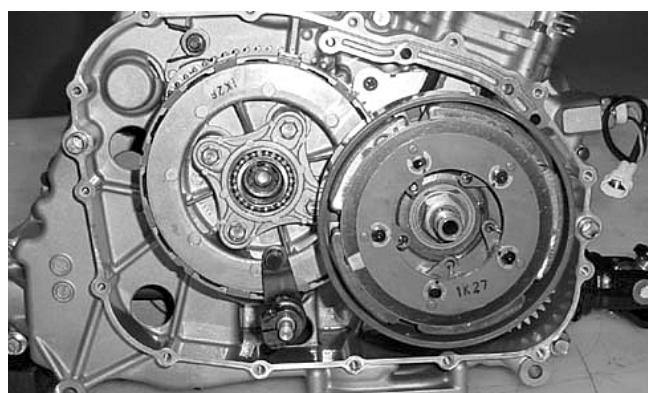
CC073D

F. Oil Filter

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

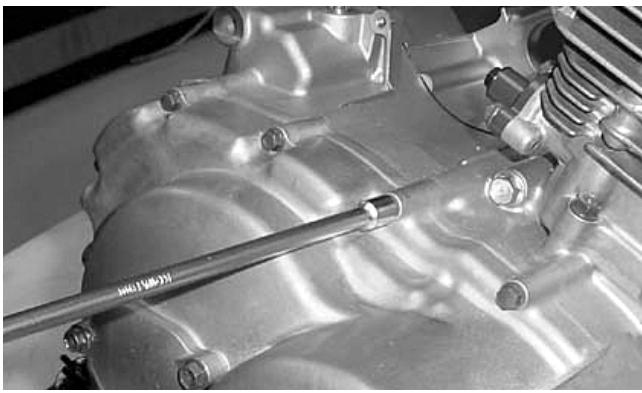
■ NOTE: Lubricate all internal components with 10W-40 oil prior to installing the right-side cover.

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



CC989

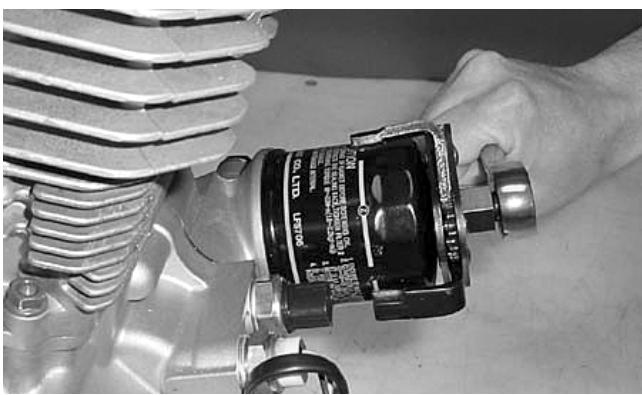
18. Place the gasket and right-side cover into position making sure the release roller guide remains correctly positioned; then install the fifteen cap screws.



CC968

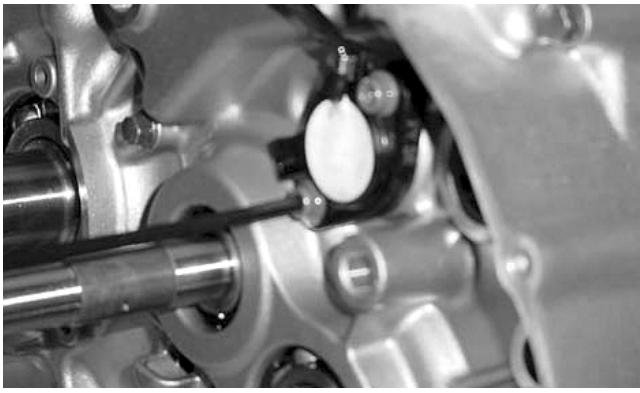
19. Tighten the cap screws in a crisscross pattern to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

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



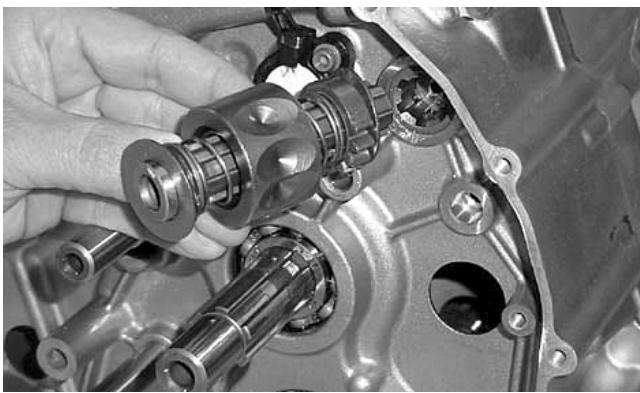
CC967

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

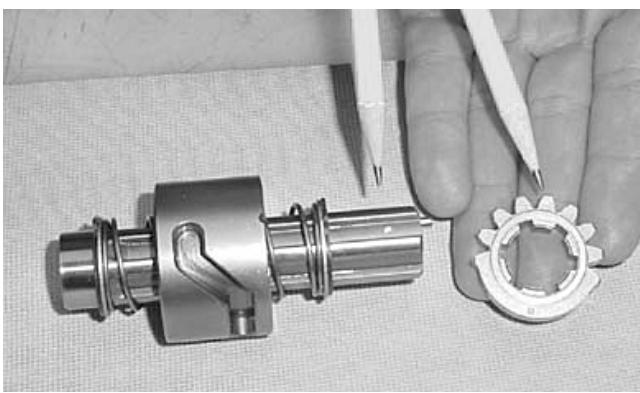
3. Install the secondary stopper camshaft w/one inner shim and one outer shim.



CC962

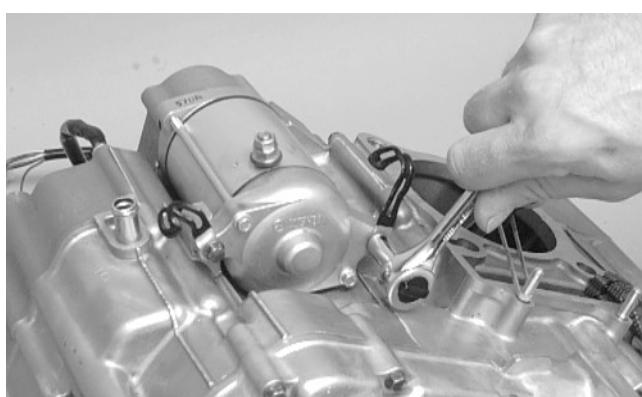
3

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

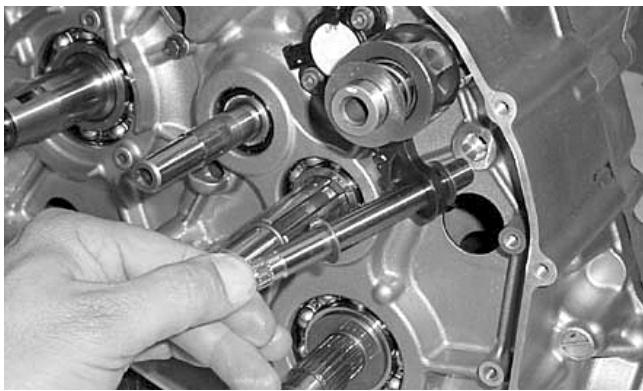


CC963

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



CC065D



CC960

5. Install the driven gear onto the output shaft.



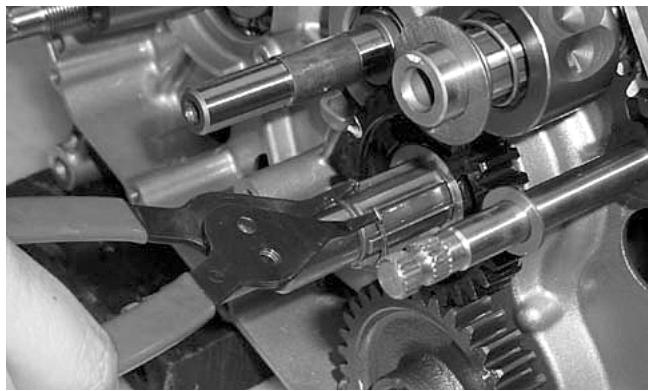
CC959

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.



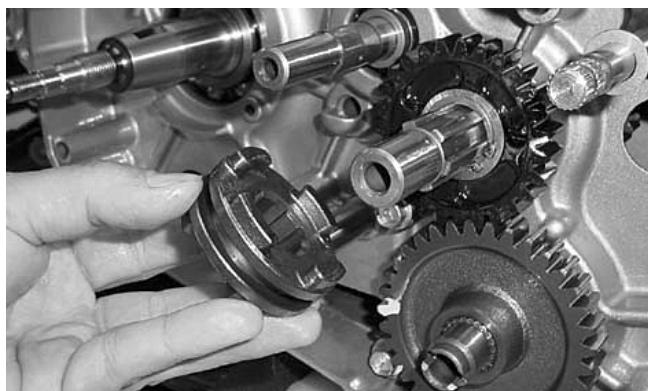
CC957

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

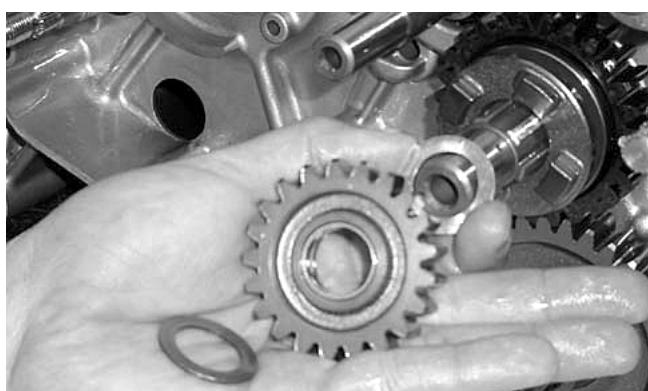


CC955

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

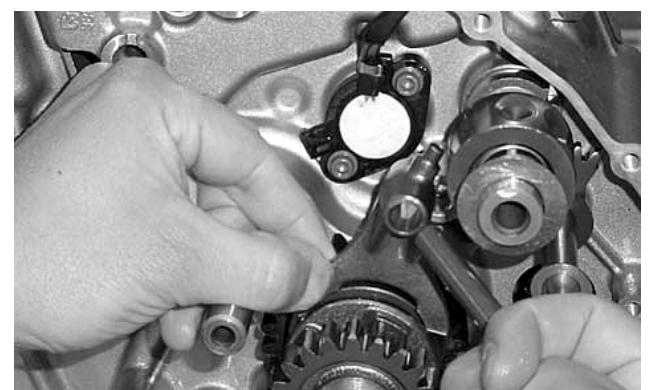


CC966



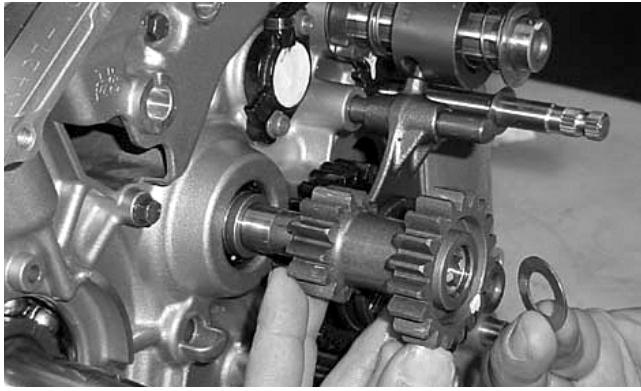
CC954

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

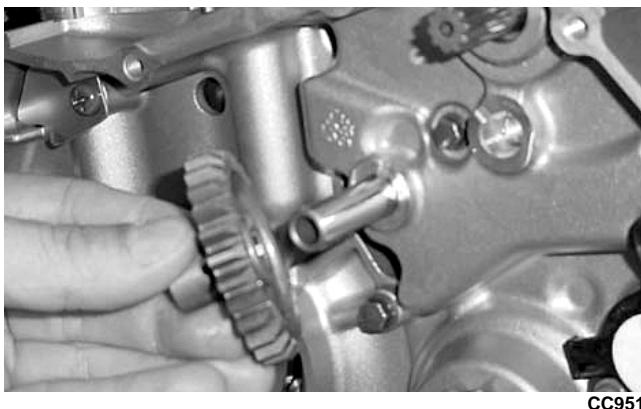


CC953

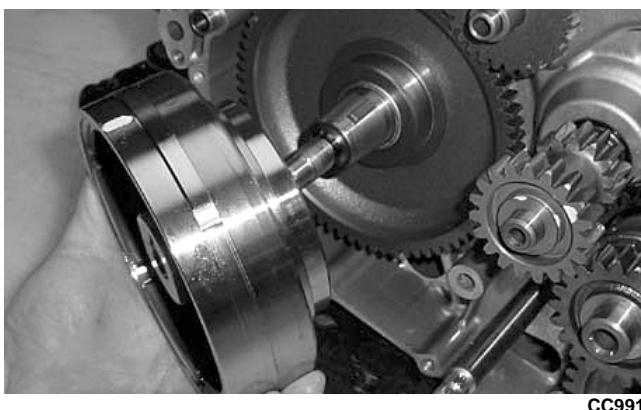
10. Install the drive idler gear with one spacer and one washer.



11. Install starter idler gear #2 and pin.

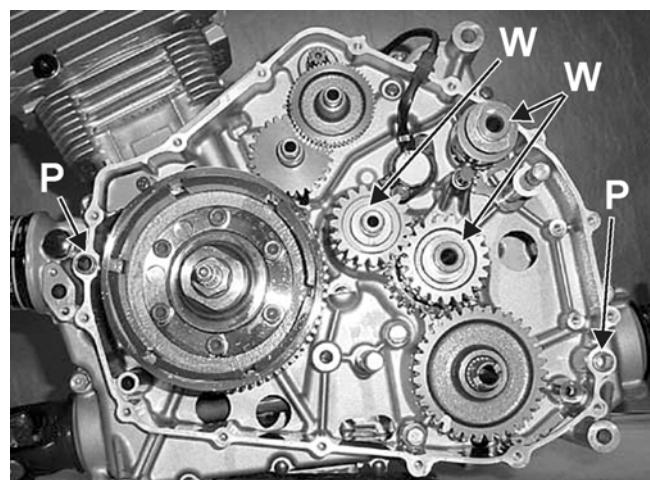


12. Install the starter clutch gear assembly onto the crankshaft. Place the key into its notch. Place the magneto rotor into position on the crankshaft; then install the magneto rotor nut on the crankshaft and tighten until the rotor is properly seated. Tighten to 16 kg-m (116 ft-lb).



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

■ NOTE: Make sure that three washers and two alignment pins are in place.



C. Cover

D. Speedometer Drive

E. Hi/Low Shifter Assembly

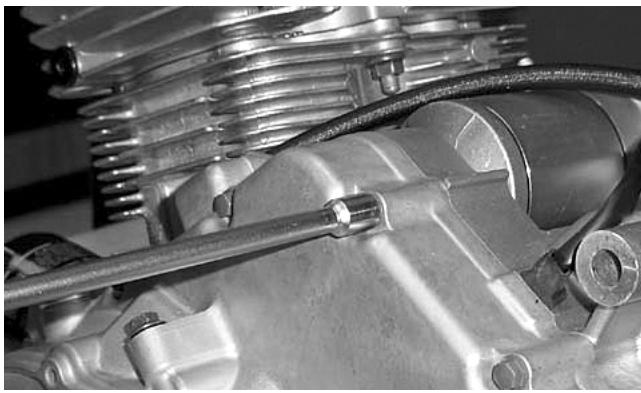
F. Recoil Starter

■ 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

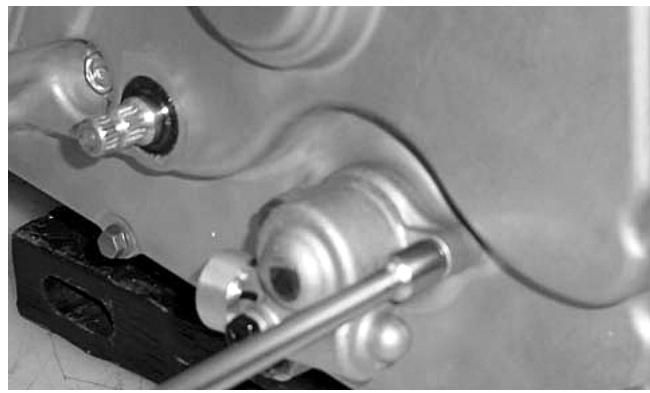
18. Place the speedometer drive adapter and gasket into position and secure with the two cap screws. Tighten securely.

⚠ CAUTION

Make sure the speedometer gear and output shaft gear match up during assembly.



CC947



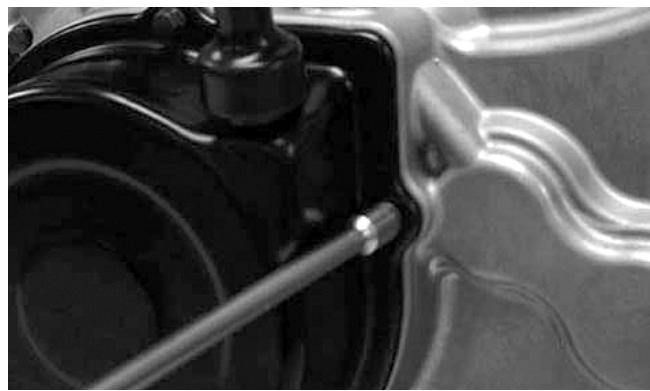
CC992

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

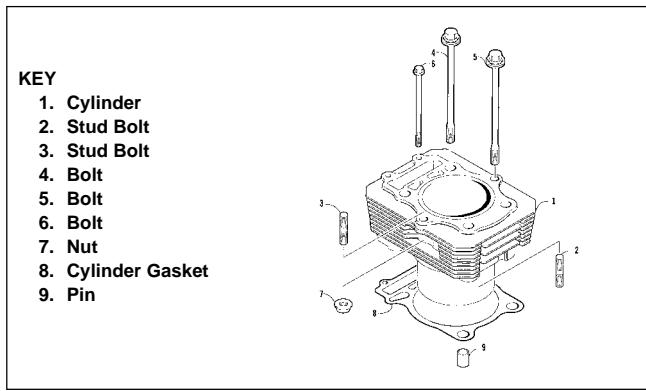
20. Place the recoil starter assembly into position on the left-side cover; then tighten four cap screws to 0.8 kg-m (6 ft-lb).



CC942

Installing Top-Side Components

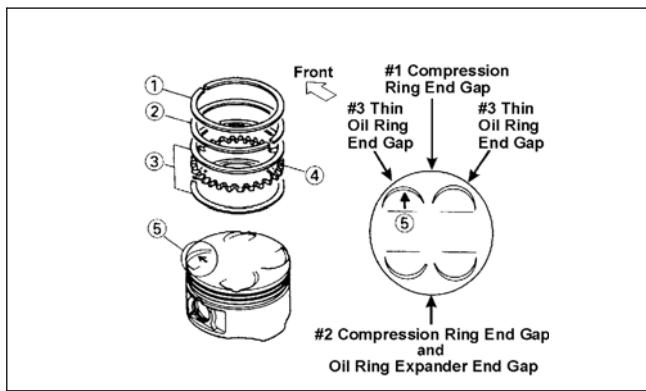
- A. Piston**
- B. Cylinder**



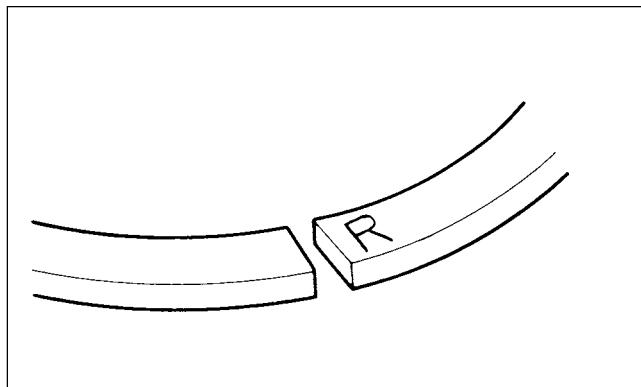
■ **NOTE:** If the piston rings were removed, install them in this sequence.

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.



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.

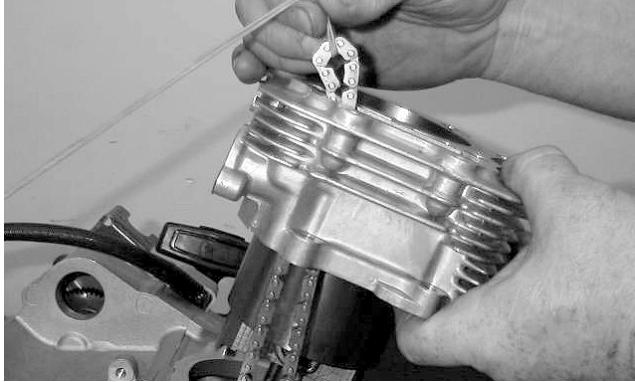


MD1344

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

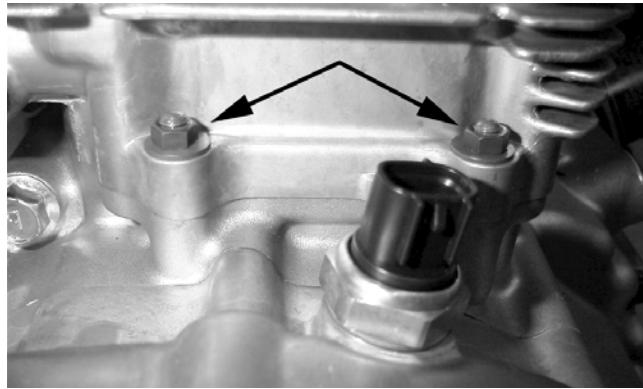
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



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.



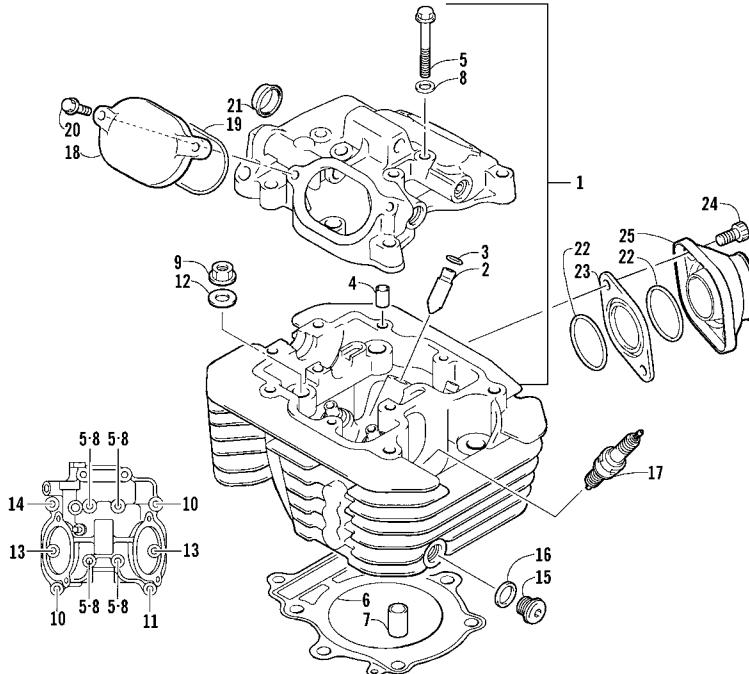
MD1226

C. Cylinder Head

D. Valve Cover

KEY

1. Cylinder Head Assy	24. Screw
2. Valve Guide	25. Intake Manifold
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	



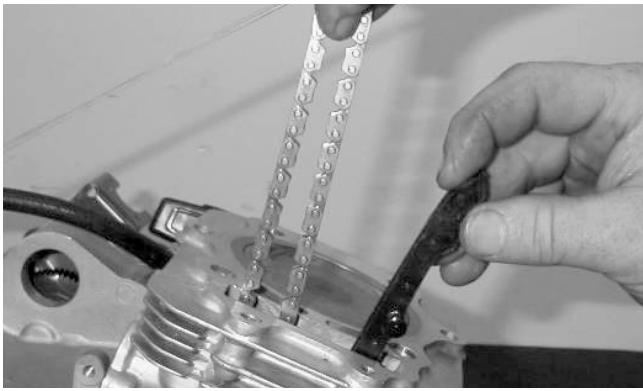
0737-038

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

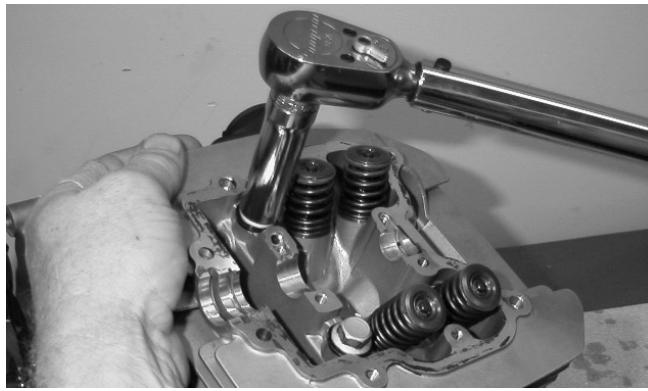
5. While keeping tension on the cam chain, place the chain guide into the cylinder.

⚠ CAUTION

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



MD1349



MD1270

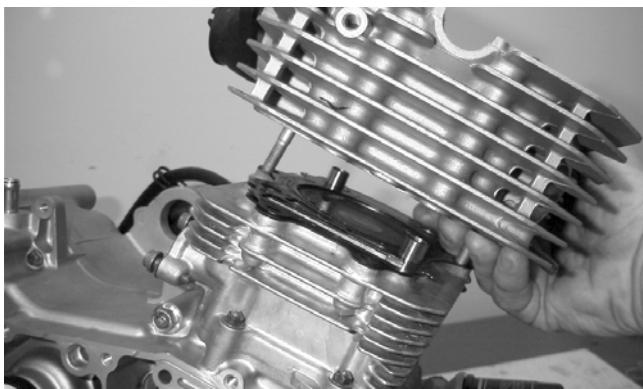
6. Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder making sure the cam chain is routed through the chain cavity.

CAUTION

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



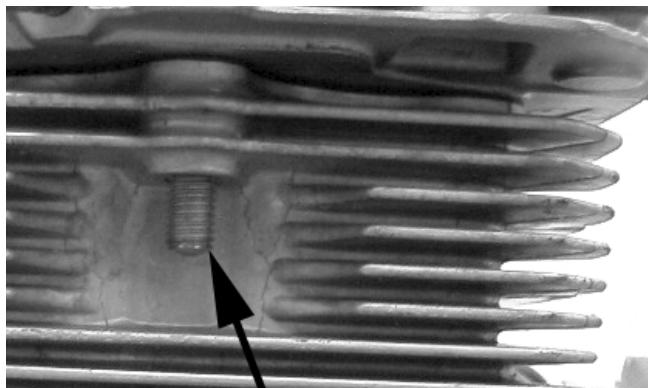
MD1347



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.

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



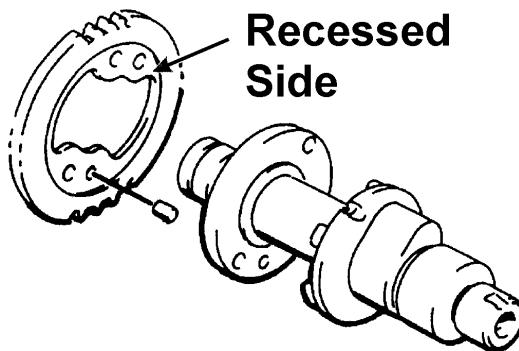
3

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).

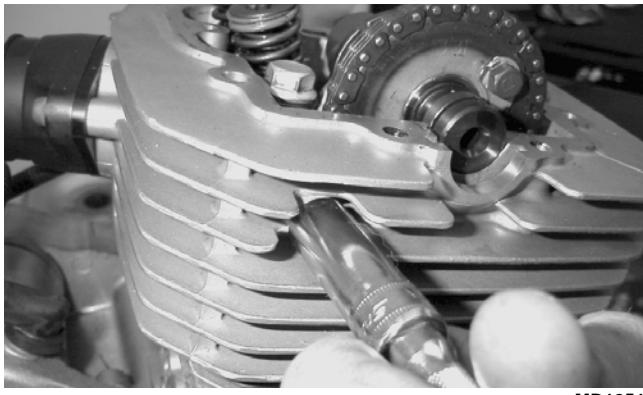
10. With the timing inspection plug removed and the chain held tight, rotate the crankshaft until the piston is at top-dead-center.

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 chain over the sprocket.



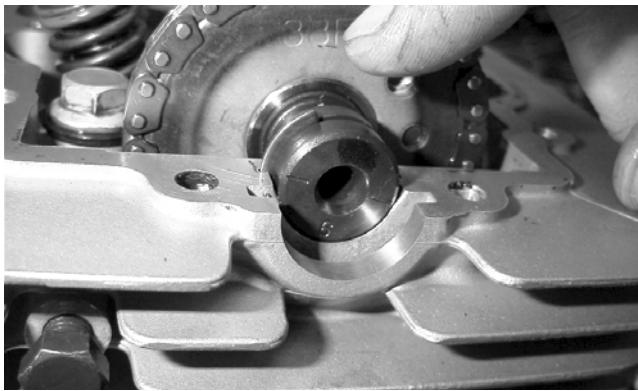
732-307B

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.

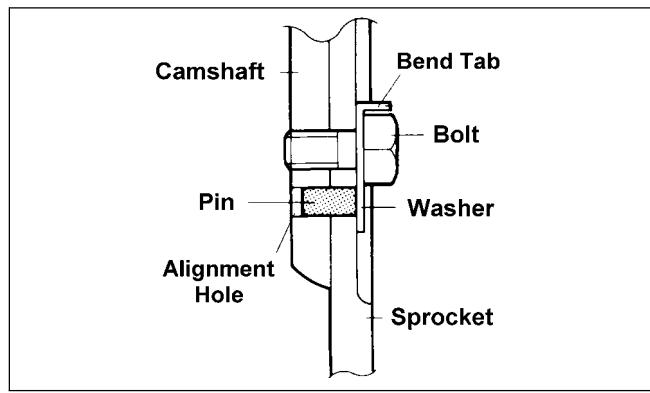
■ **NOTE:** When the camshaft assembly is seated, make sure the alignment pin in the camshaft aligns with the smallest hole in the sprocket.



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.

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

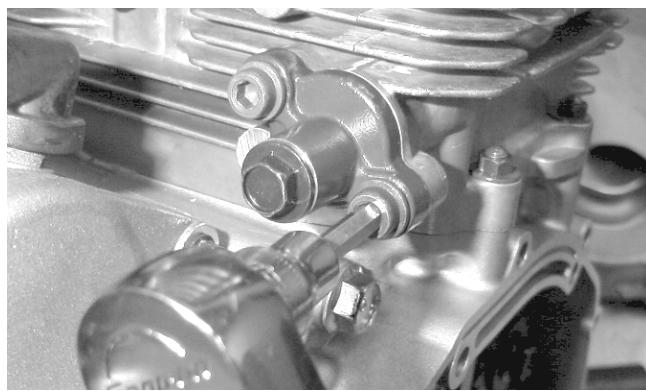
E. Camshaft alignment pin and sprocket alignment hole (smallest) are aligned.

⚠ 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.

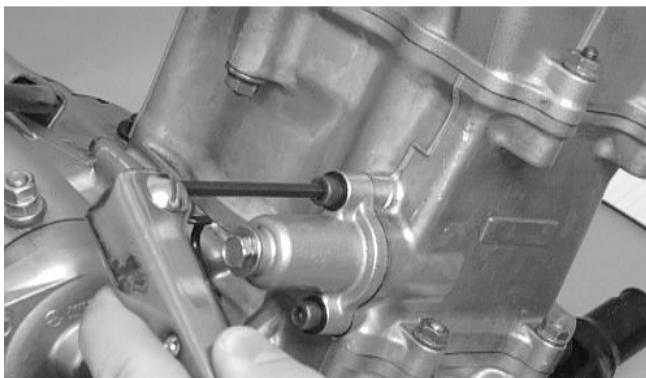
19. Remove the cap screw from the end of the chain tensioner; then account for the plunger, spring, and O-ring.



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



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.



3

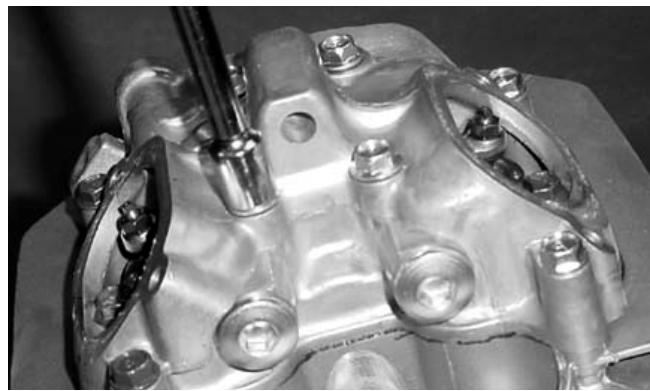
22. Install the cap screw and spring into the end of the chain tensioner. Tighten securely.



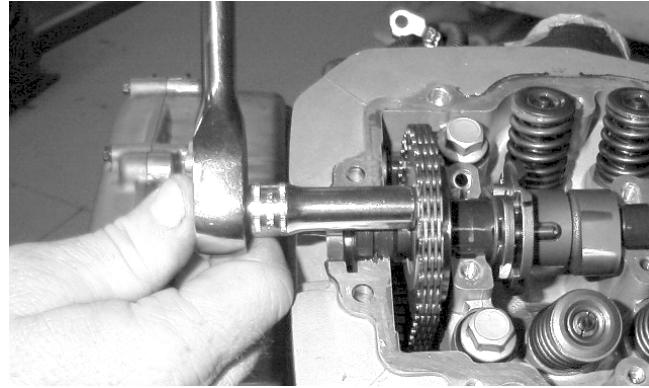
23. Rotate the crankshaft until the first cap screw securing the sprocket to the camshaft can be installed; then install the cap screw. Do not tighten at this time.
24. Rotate the crankshaft until the second cap screw securing the sprocket to the camshaft can be installed; then install the cap screw. Do not tighten at this time.



MD1136



CC999



MD1137

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 proper valve/tappet clearance is attained.

■NOTE: Refer to the appropriate Specifications for the proper valve/tappet clearance.

■ 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; 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.



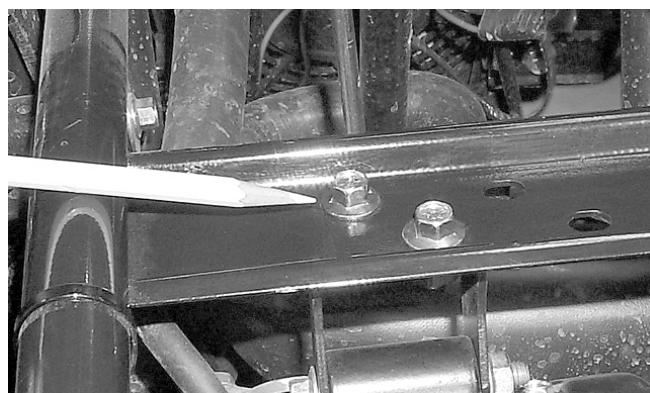
CC125D

- 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.

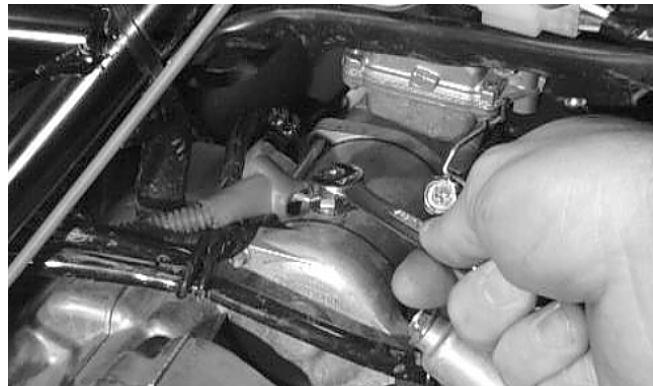


CC939



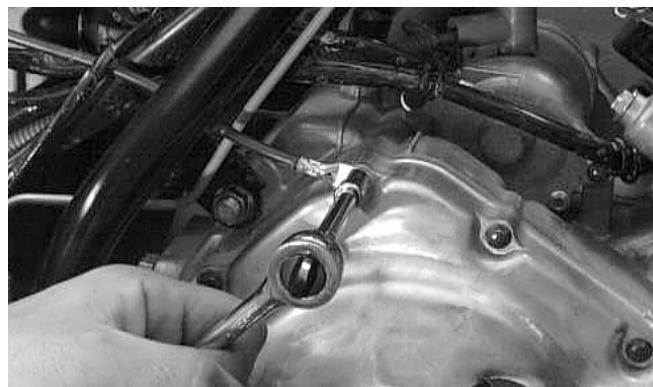
CC938

7. Connect the positive cable to the starter motor and install the protective boot.



AR604D

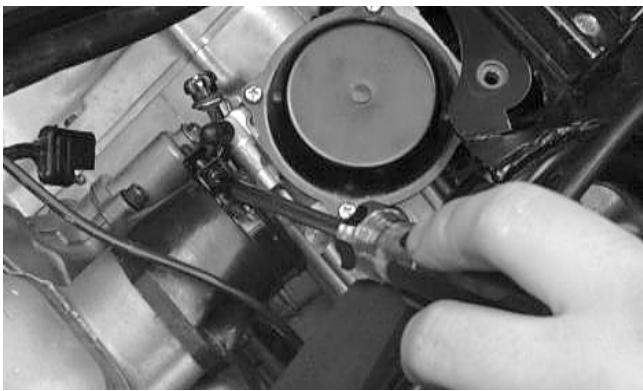
8. Connect the battery ground (negative) cable to the crankcase cover.



AR600D

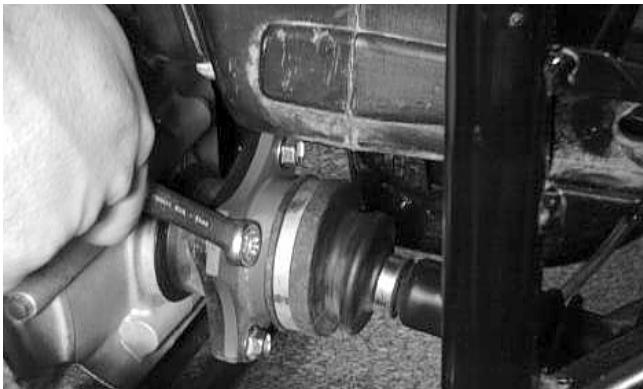
9. Install the high tension lead on the spark plug.

10. Install the carburetor assembly and secure the intake manifold and air inlet boot.



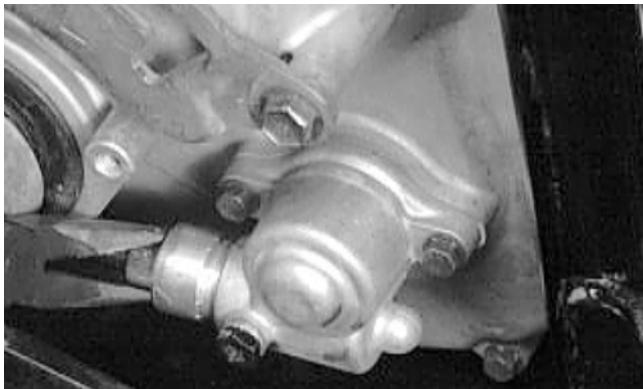
CC120D

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).



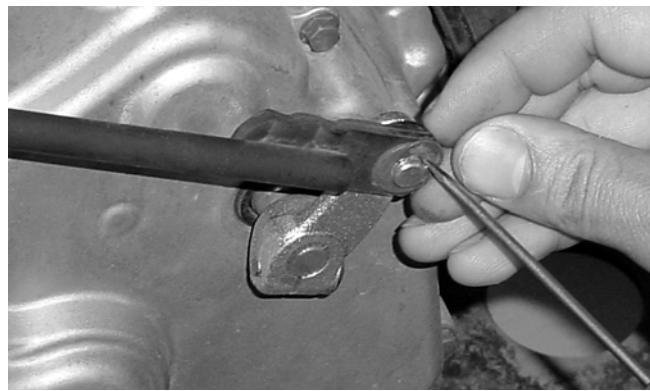
CC119D

13. On the 4x4, place the speedometer cable into position and tighten the knurled nut.



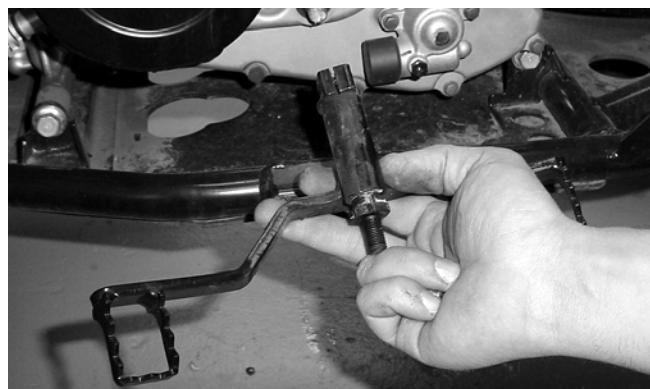
AF667D

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.

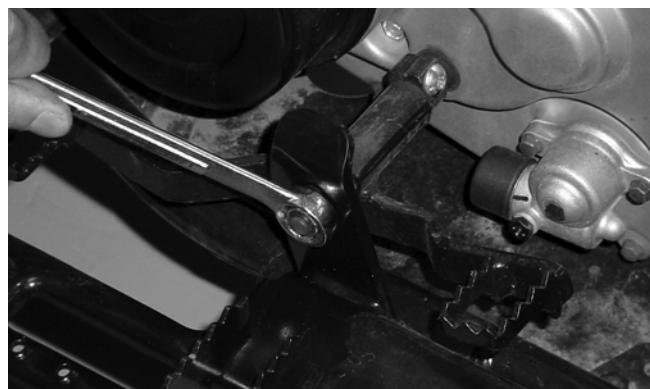


CC935

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).

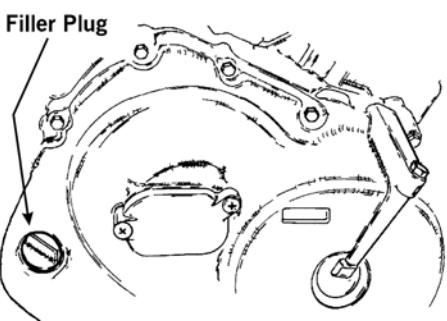
21. Install the gas tank (see Section 4).
22. Place the right-side and left-side panels into position; then install the existing hardware and tighten securely.
23. Carefully guide the battery cables and fuse block wiring up through the access hole into the battery tray.
24. Connect all fuse block wiring 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

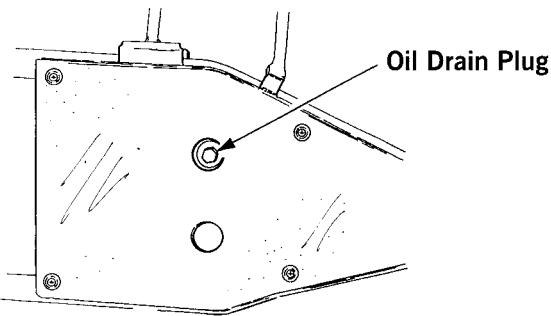
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

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.

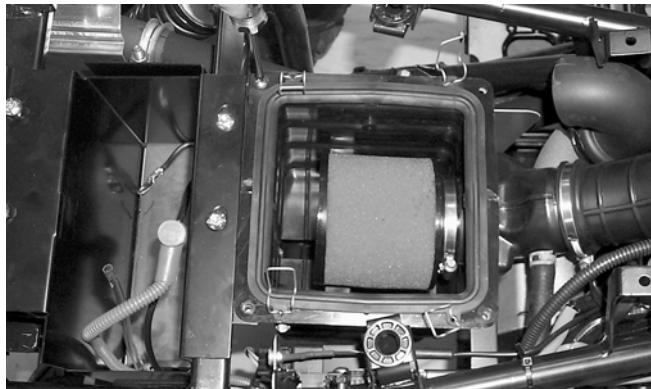


CC533

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

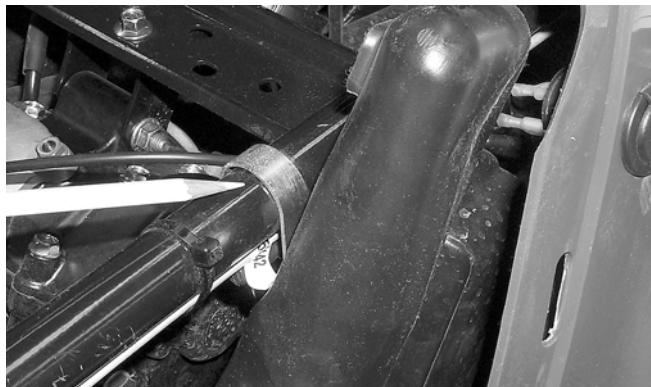
3

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.



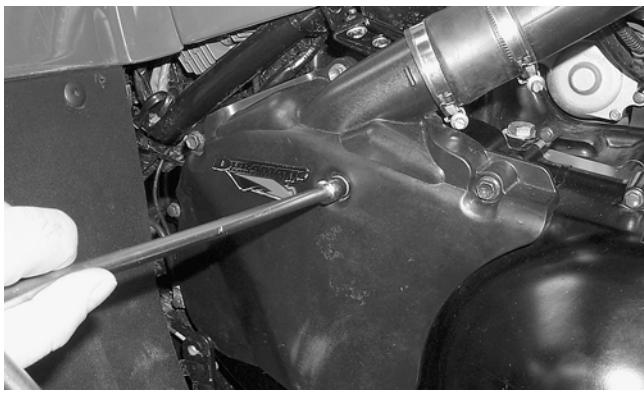
CC536

12. Remove the hardware securing the cooling duct assembly to the frame.



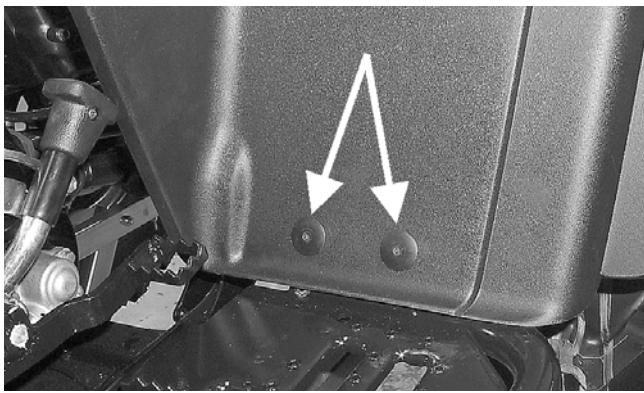
AF938

13. Remove the cooling duct shroud from the V-belt cover.



AF932

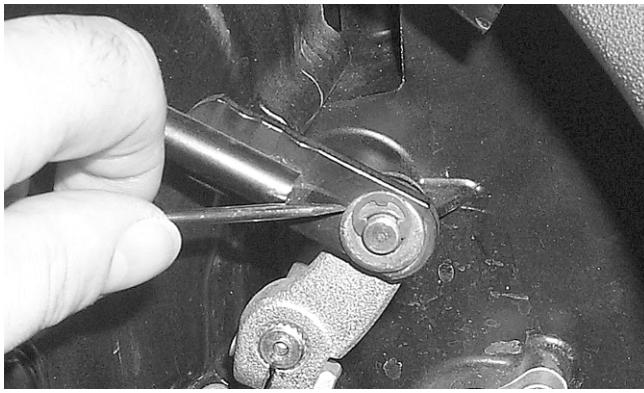
14. Remove the hardware securing both footrests to the frame and front fender.



CC861A

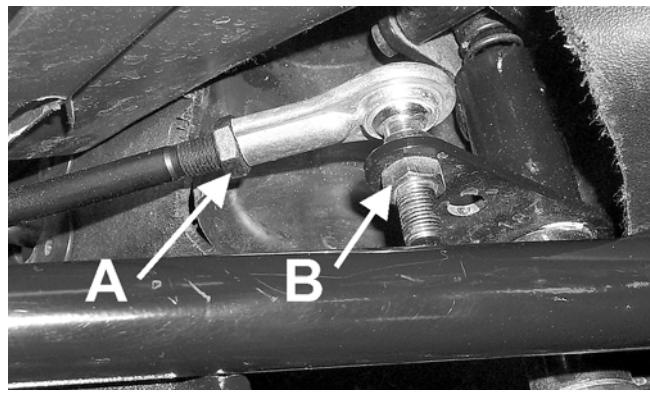
15. Loosen the clamp securing the carburetor to the intake; then route the carburetor assembly up and away from the engine.

16. Remove the E-clip securing the shift rod to the engine shift arm.



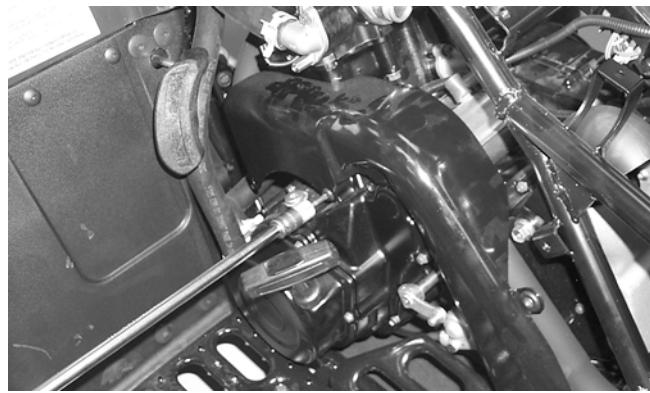
AF962

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.

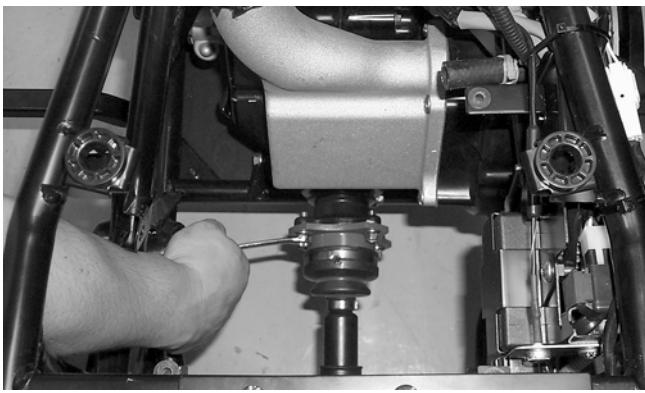
■ NOTE: It is not necessary to remove the front fender to remove the engine; however, removing the screws securing the inner front fenders will allow the fender to be moved to accommodate the removing of the exhaust pipe and engine.

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.



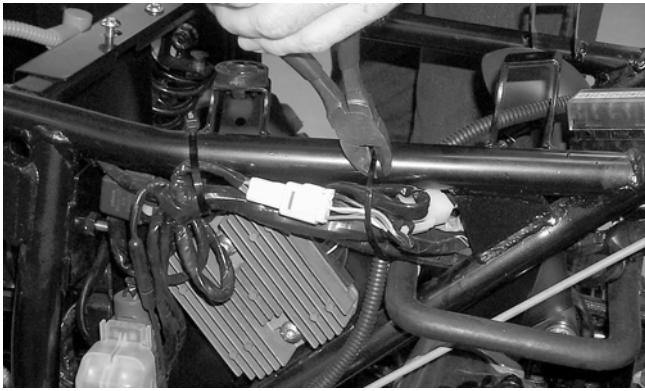
CC565



CC566

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

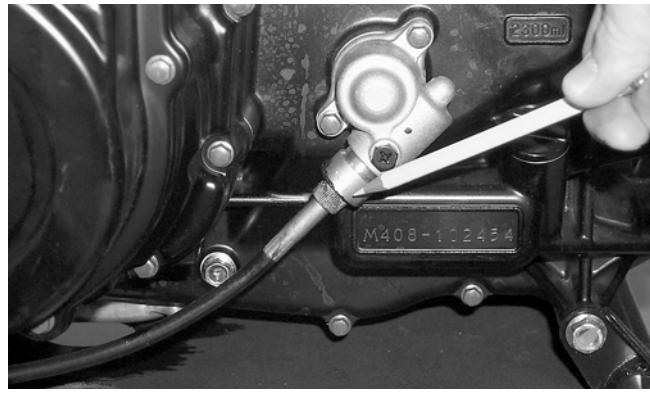
23. On the right side, cut the cable ties securing the wiring harness to the frame.



CC567

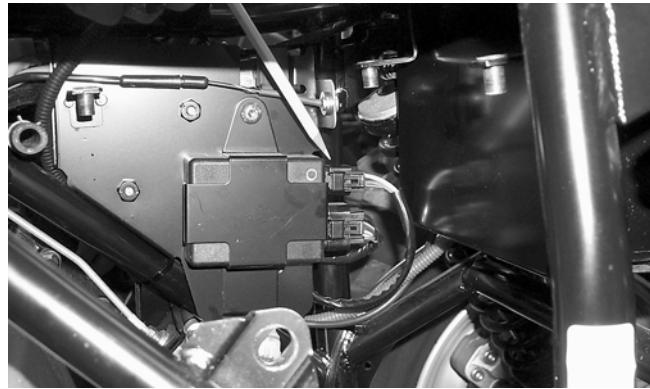
24. Remove the positive cable from the starter motor and route it out of the way.

25. Remove the speedometer cable from the speedometer gear housing.



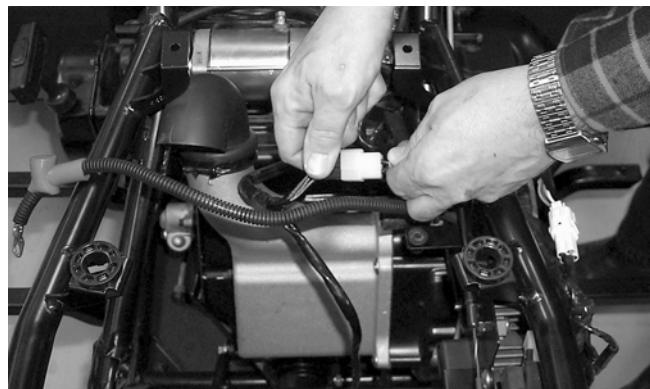
CC568

26. Disconnect the top connector at the CDI unit.



CC569

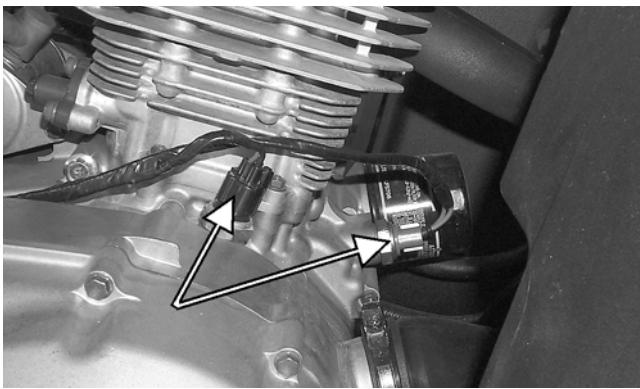
27. Disconnect the stator-to-rectifier/regulator connector.



CC570

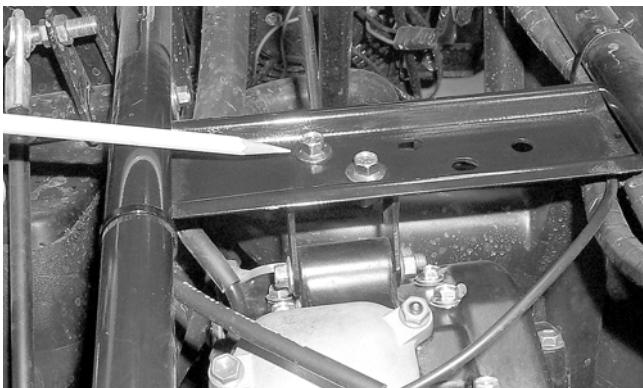
28. Remove the temperature sensor wires from the engine.

■ **NOTE:** There are two temperature sensors.



AF964B

29. Remove the two cap screws securing the front upper engine mount to the frame.



AF939

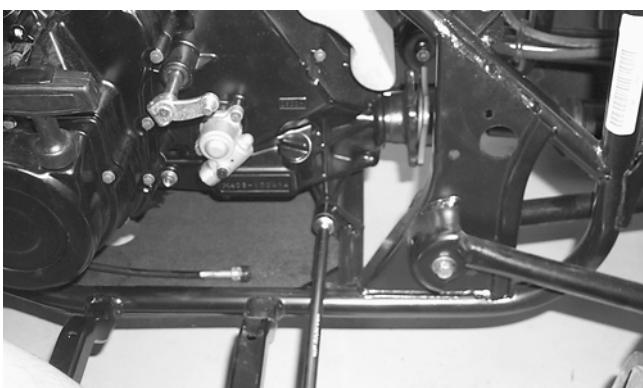
30. Remove the cap screw and flange nut securing the upper engine bracket to the engine; then remove the bracket.

31. Remove the spark plug wire from the spark plug.

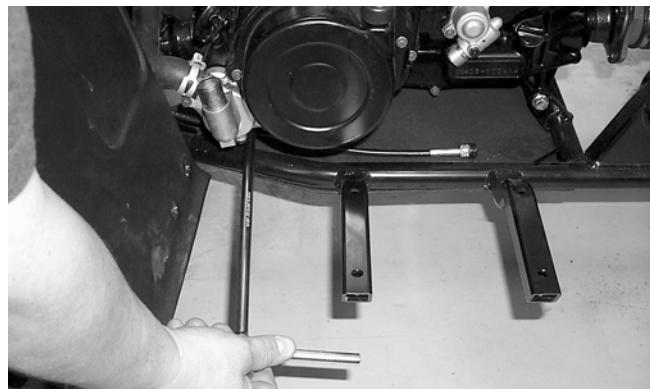
32. Remove the shift indicator connector from the main wiring harness.

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

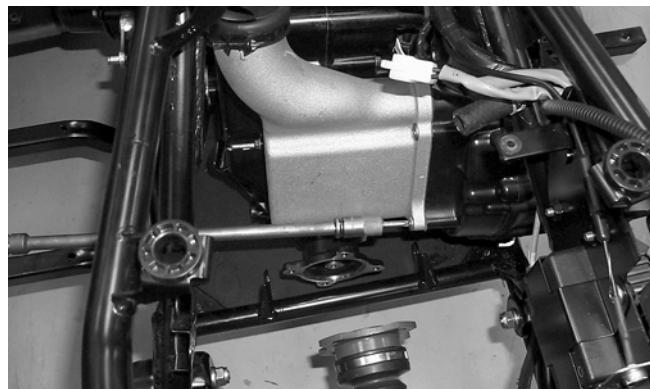
35. Remove the caps screws securing the two upper rear engine mounts to the frame.

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

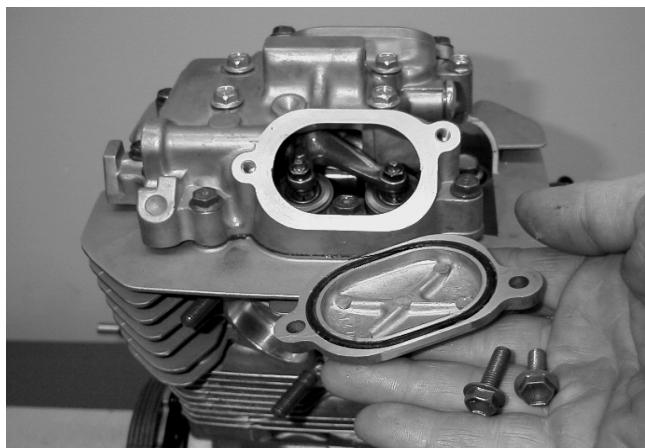
A. Valve Cover

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.

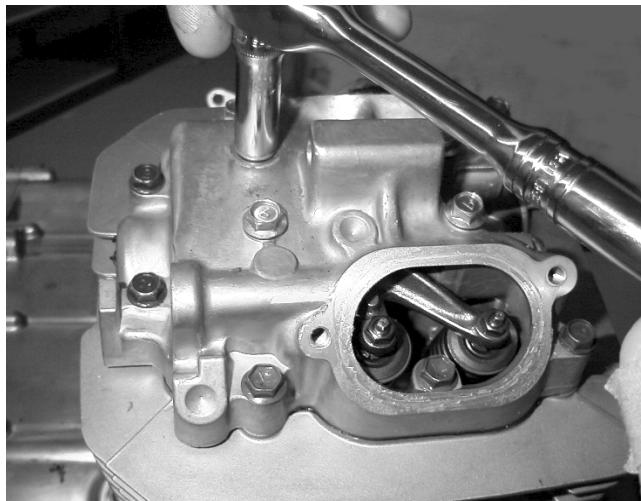
1. Remove the cap screws securing the two tappet covers. Remove the two tappet covers. Account for the O-rings.



MD1264

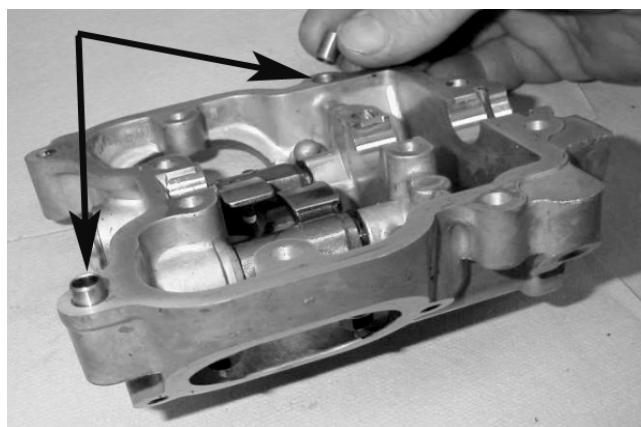
■ NOTE: Keep the mounting hardware with the covers for assembly purposes.

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

3

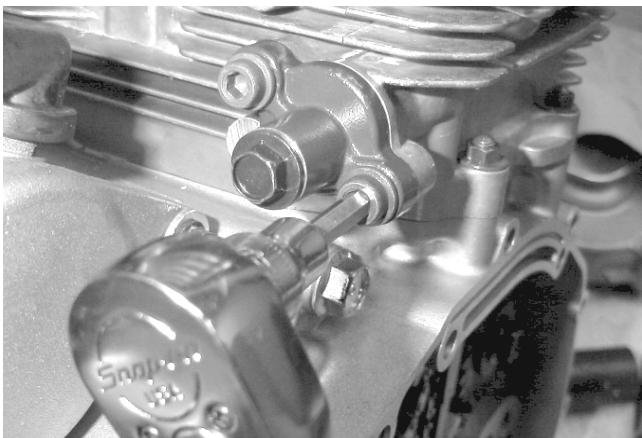


MD1354

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



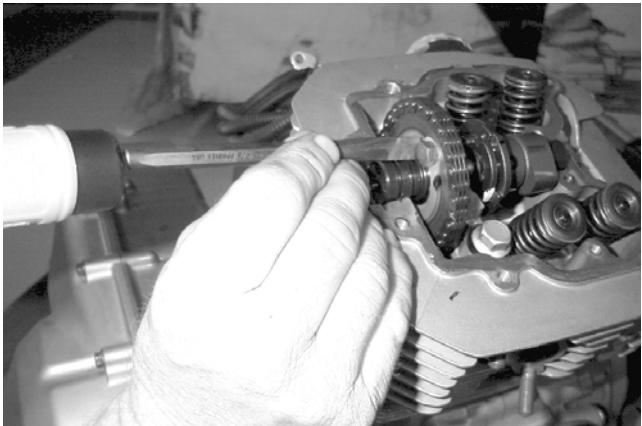
MD1254

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

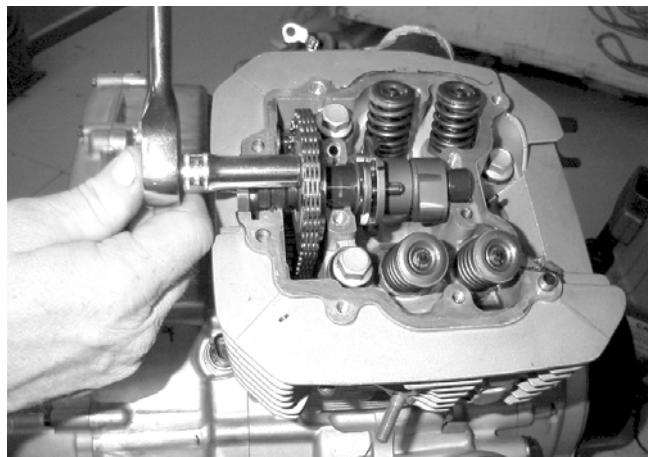


MD1251

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



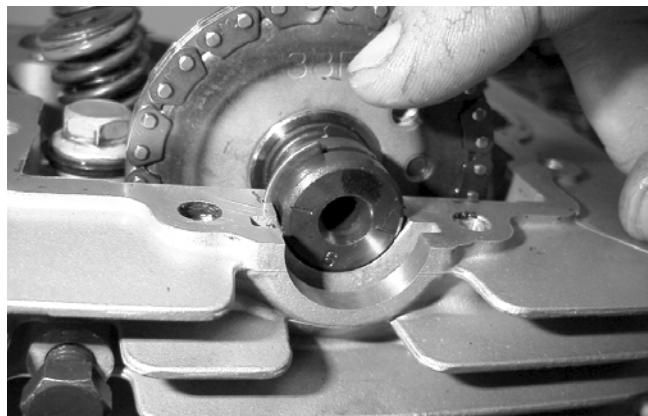
MD1136



MD1137

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

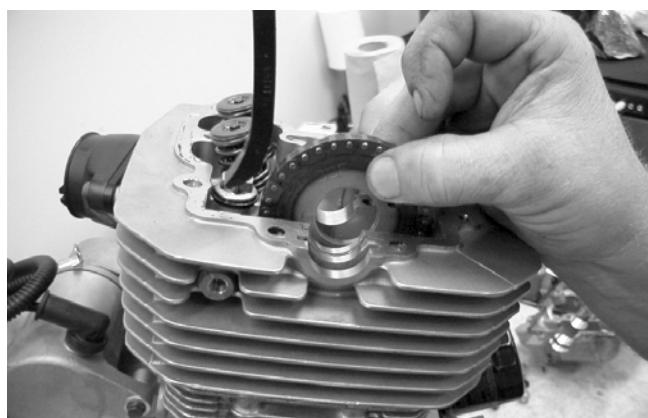
■ NOTE: Care should be taken not to drop the C-ring down into the crankcase.



MD1131

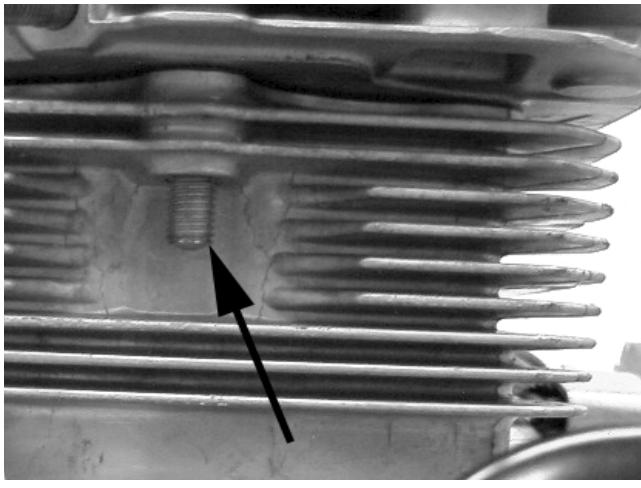
7. Noting the timing marks for installing purposes, drop the sprocket off the camshaft. While holding the cam chain, slide the sprocket and camshaft out of the cylinder head. Account for an alignment pin.

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

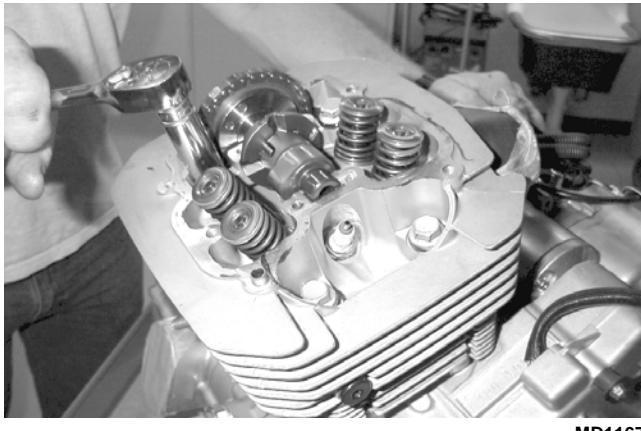


MD1132

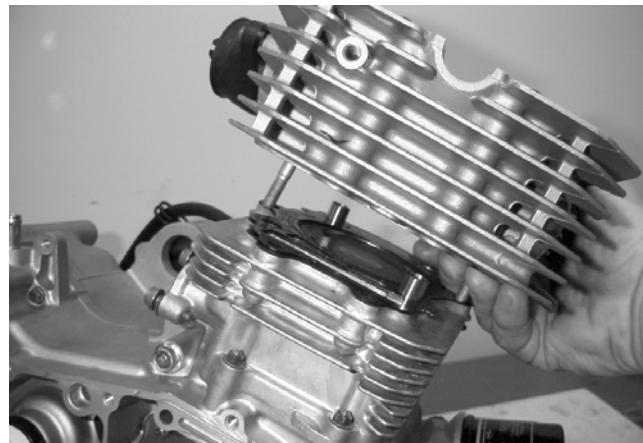
8. Remove the cam chain tensioner by lifting it from the chain cavity; then remove the two lower nuts securing the cylinder head to the cylinder, one in front and one in rear.



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



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



AT THIS POINT

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

3

11. Remove the cam chain guide.

AT THIS POINT

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

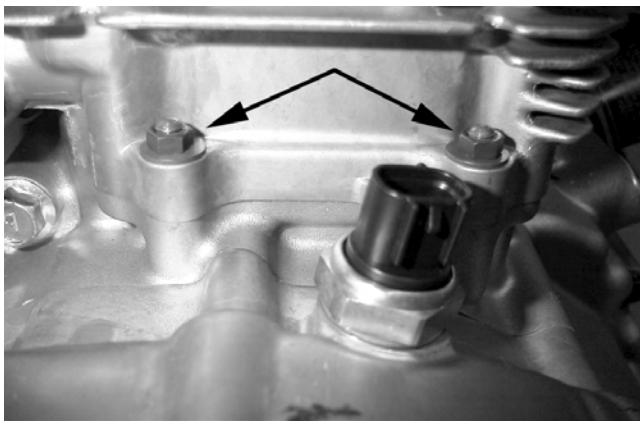


C. Cylinder

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

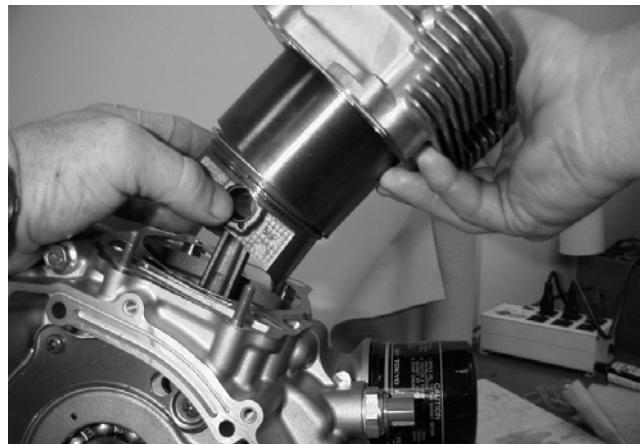
13. Lift the cylinder off the crankcase taking care not to allow the piston to drop against the crankcase. Account for the gasket and two alignment pins.



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.



MD1214



MD1219

☞ **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.

⚠ **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

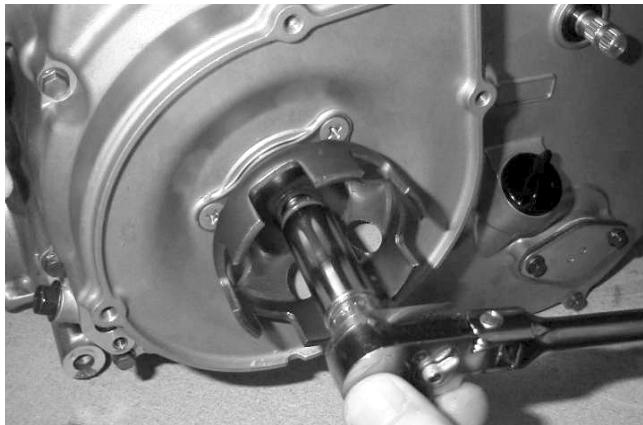
1. Remove the four recoil starter cover cap screws. Remove the recoil starter assembly noting the location of the single washer. Note the condition of the recoil cover gasket. Replace if damaged.

☞ AT THIS POINT

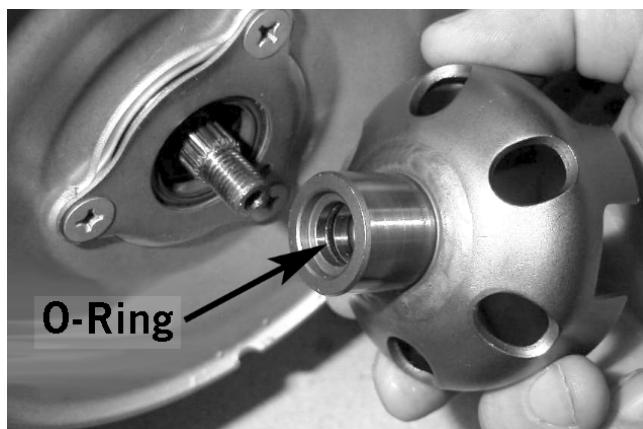
To service the recoil starter, see Servicing Left-Side Components sub-section.

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.

3



MD1303

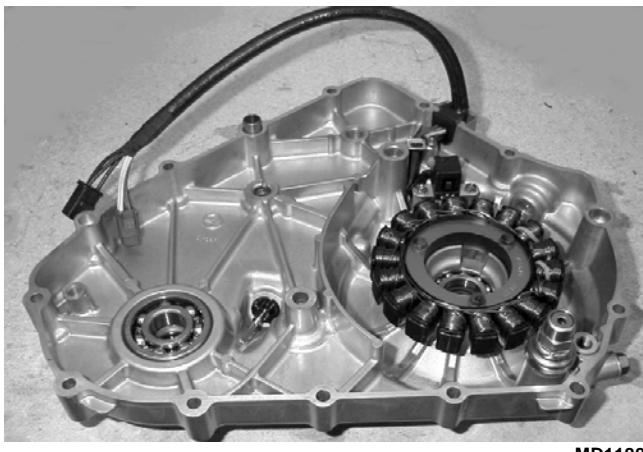


MD1304

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.



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.

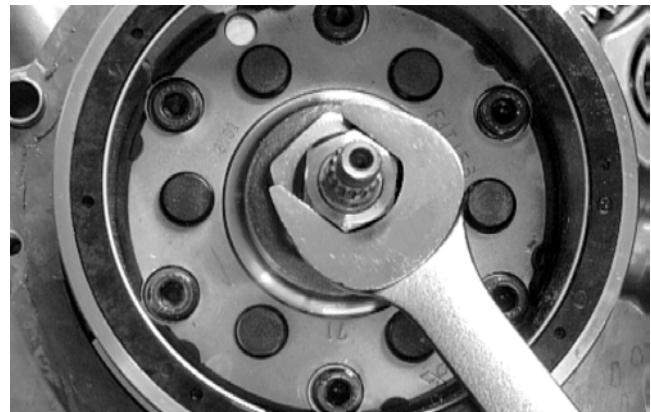


■ NOTE: Inspect the inside of the left-side cover for any shaft washers that may have come off with the cover. Make sure they are returned to their respective shafts and that the starter idler gear spacer is on the shaft or in the cover.

D. Rotor/Flywheel E. Starter Motor

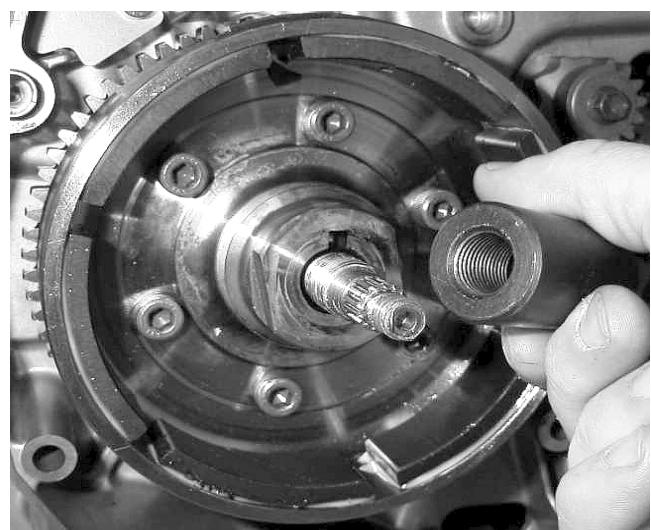
■ NOTE: Steps 1-4 in the preceding sub-section must precede this procedure.

5. Remove the rotor/flywheel nut.



MD1194

6. Install Magneto Rotor Remover Adapter (p/n 0444-075).



MD1365

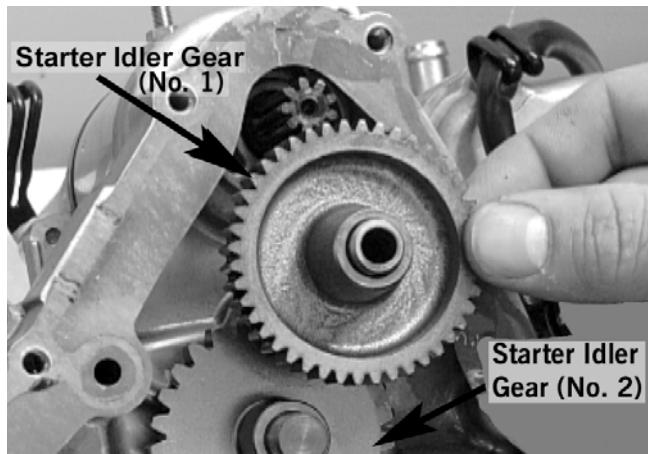
CAUTION

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



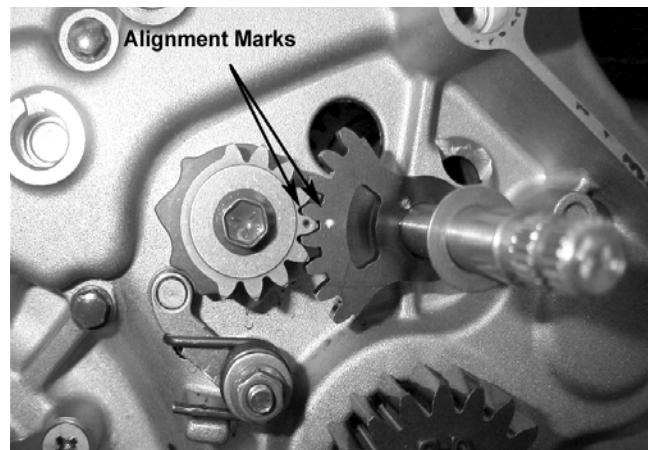
MD1305

3

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.

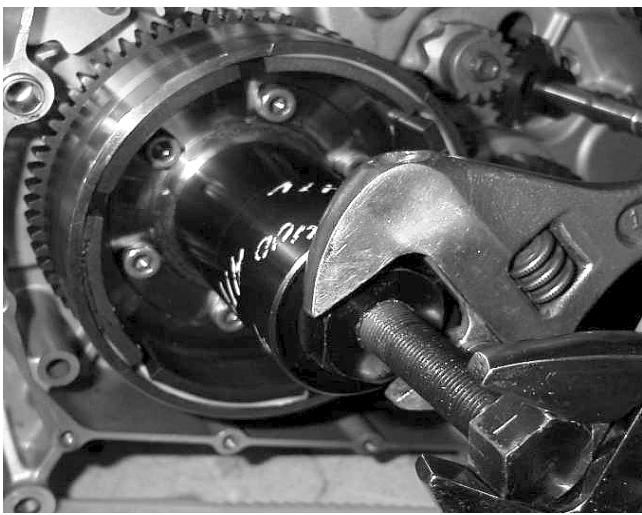


MD1369



MD1239

10. Remove the shift detent cam. Note position of spacer for installing purposes.



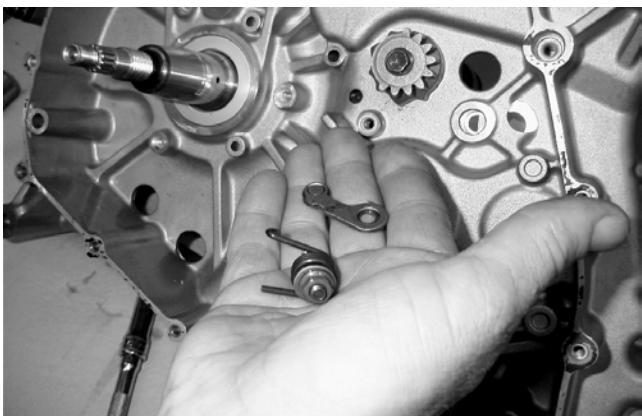
MD1370



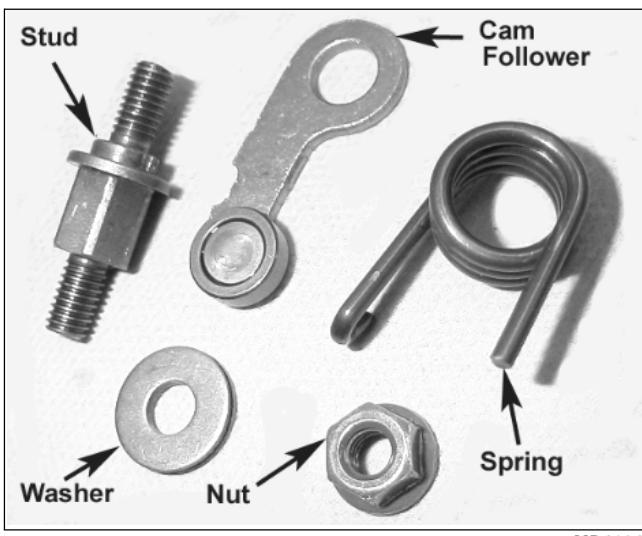
MD1086

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

11. Remove the cam follower assembly.



MD1076



MD1231

12. Remove the spacer from the driveshaft noting the direction of the stepped side for installing purposes.



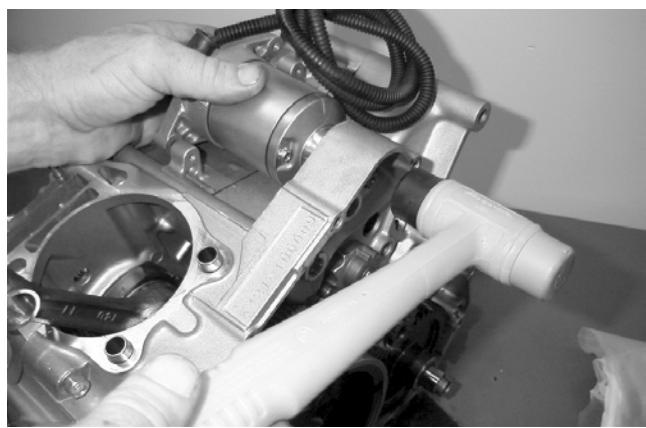
MD1224

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

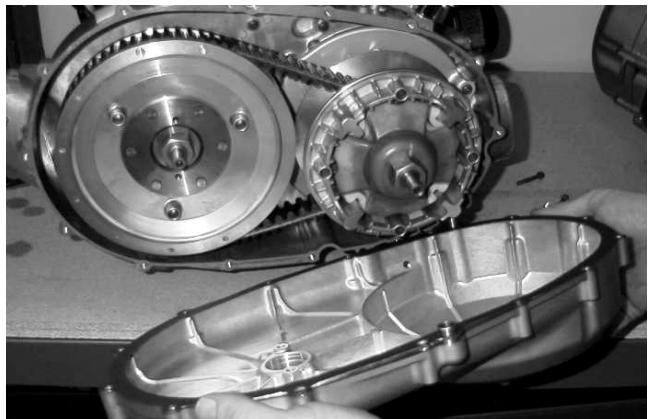
To service center crankcase components only, proceed to Removing Right-Side Components.

■ 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

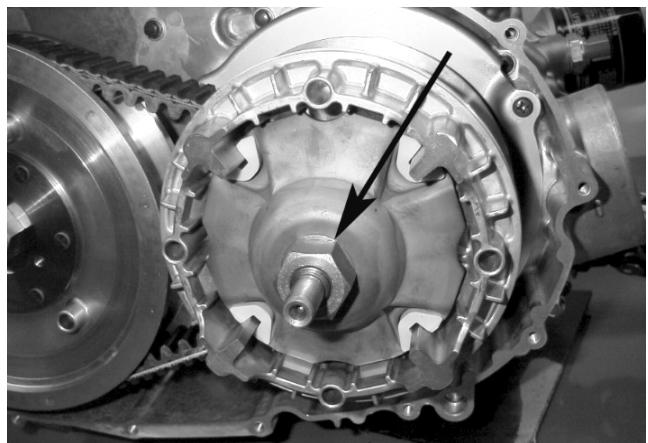
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

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



MD1307

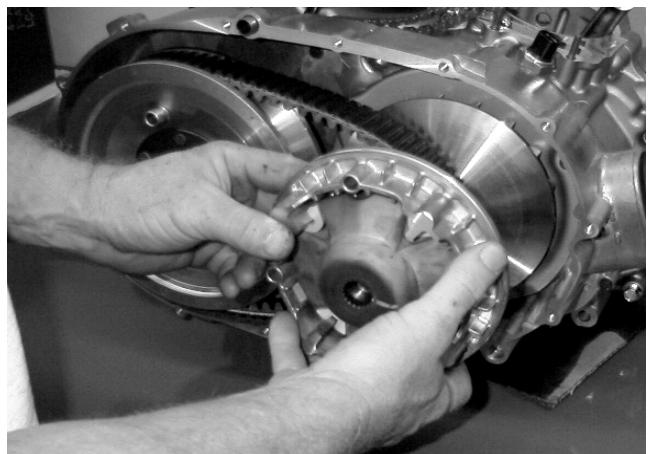
2. Remove the nut holding the movable drive face onto the crankshaft.



MD1033

3

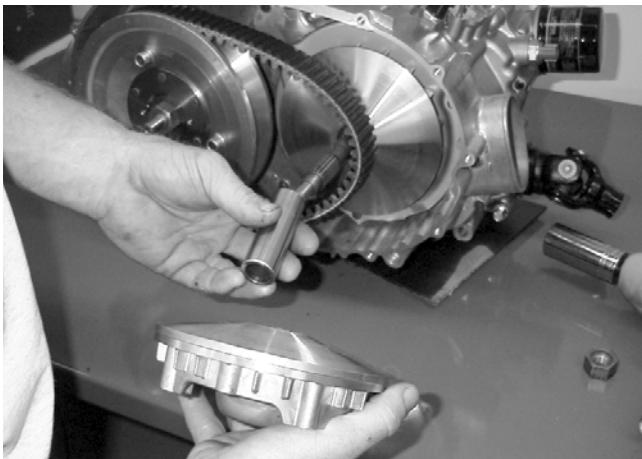
3. Remove the movable drive face and spacer. Account for the eight movable drive face rollers and outer drive face cover.



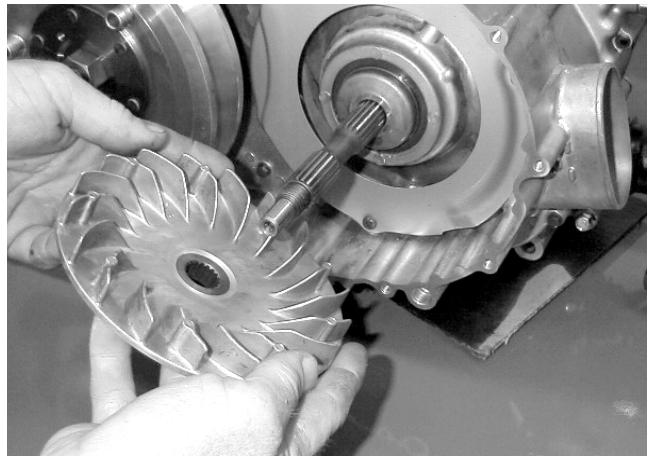
MD1035



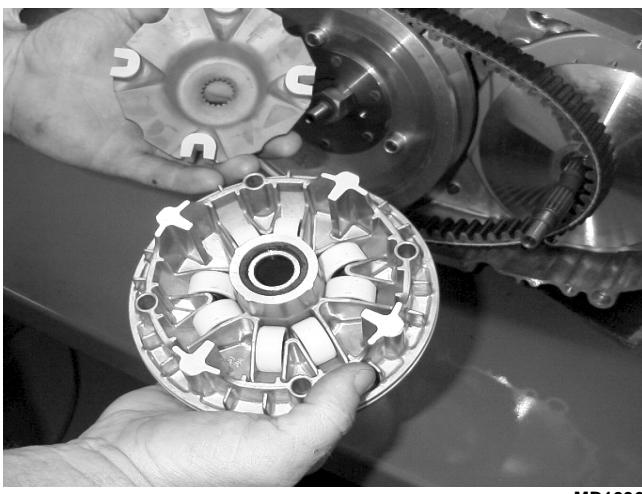
MD1306



MD1034

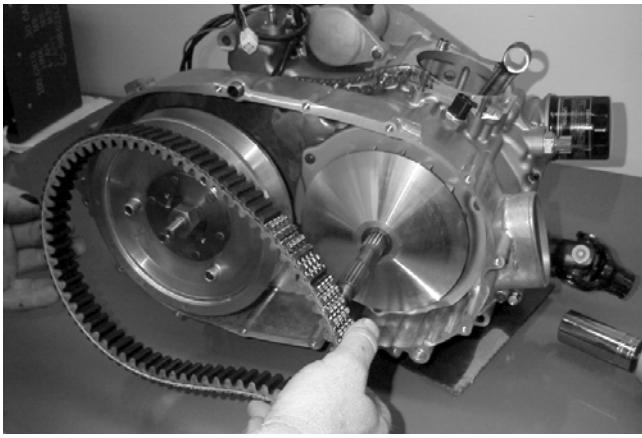


MD1094



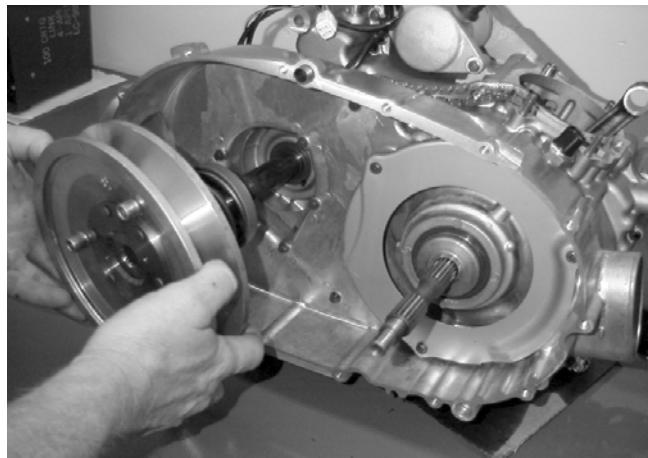
MD1036

4. Remove the V-belt.



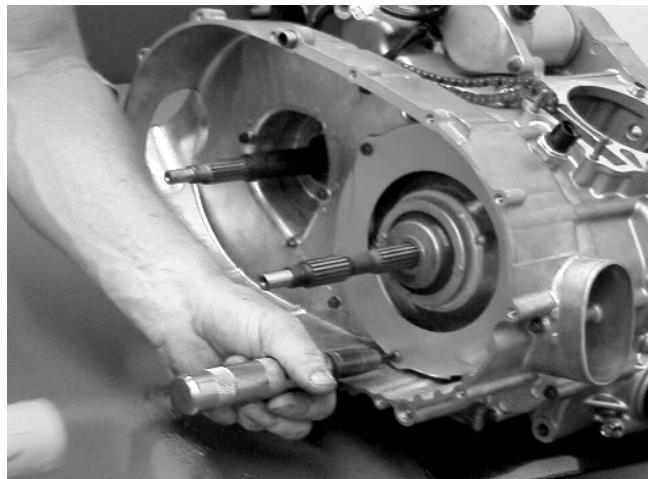
MD1118

5. Remove the fixed drive face.



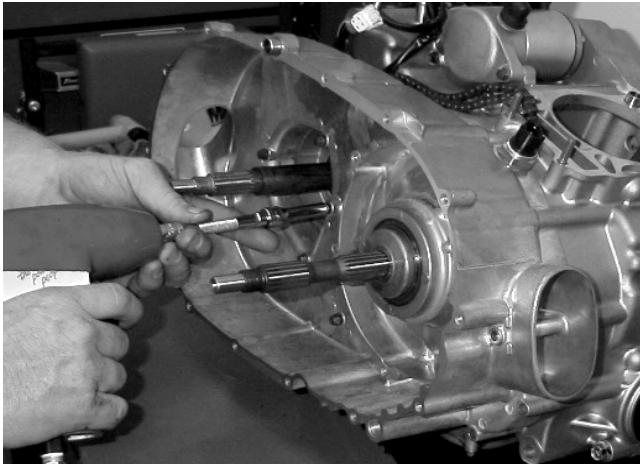
MD1068

6. Remove the nut holding the driven clutch assembly; then remove the driven clutch assembly.



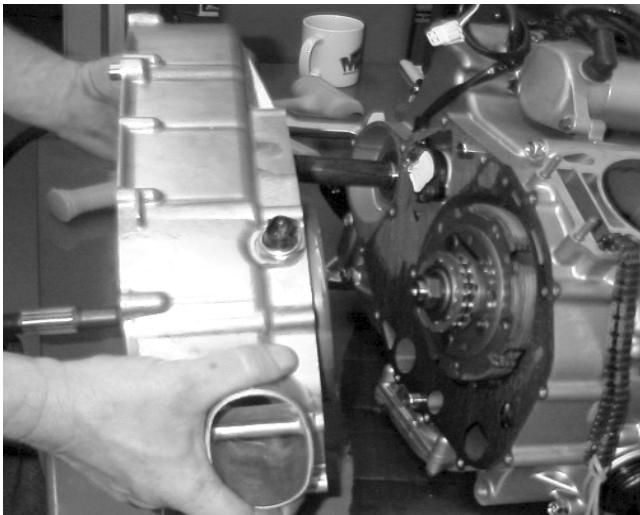
MD1092

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



MD1117

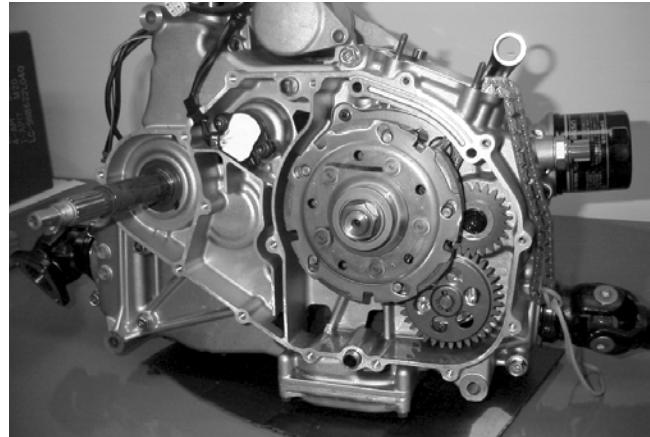
9. Using a rubber mallet, loosen the clutch cover; then pull it away from the right-side crankcase half. Account for two alignment pins and gasket.



MD1118

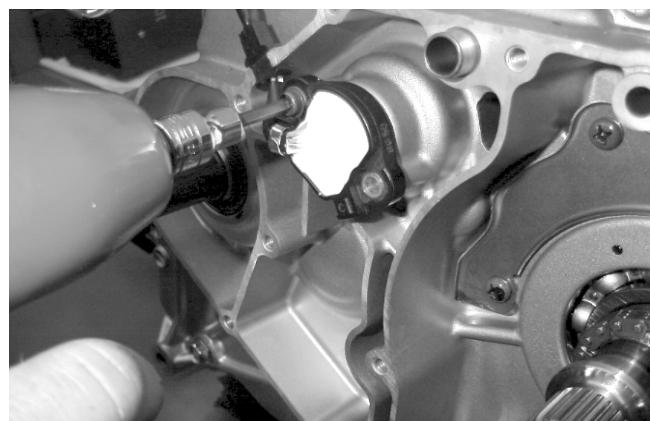
D. Gear Position Switch
E. Centrifugal Clutch Assembly
F. Oil Pump Drive Gear
G. Oil Pump Driven Gear

■ 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.



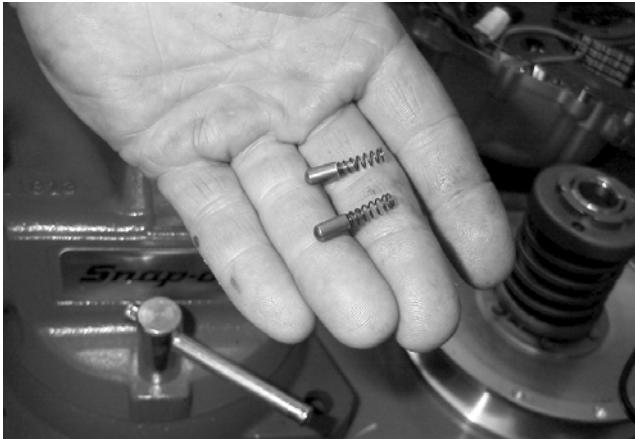
MD1041

11. Remove the gear position indicator switch. Account for two contact pins and two springs.



MD1040

3



MD1043

12. Remove the one-way sprag clutch noting the direction of the green dot or the stamp tag **OUTSIDE** for installing purposes.



MD1286

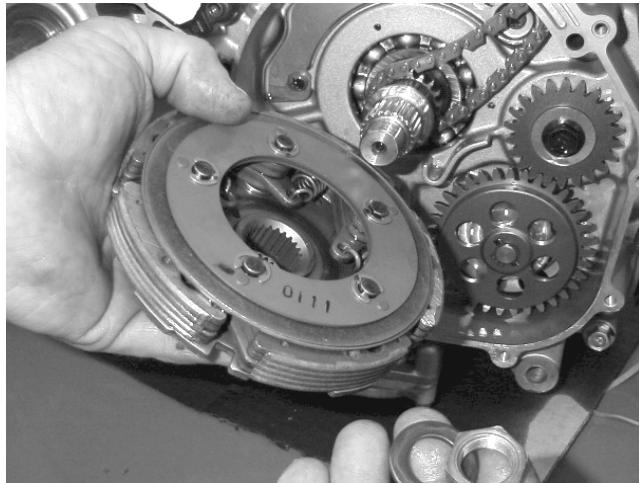
13. Remove the left-hand threaded nut holding the centrifugal clutch assembly.

CAUTION

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

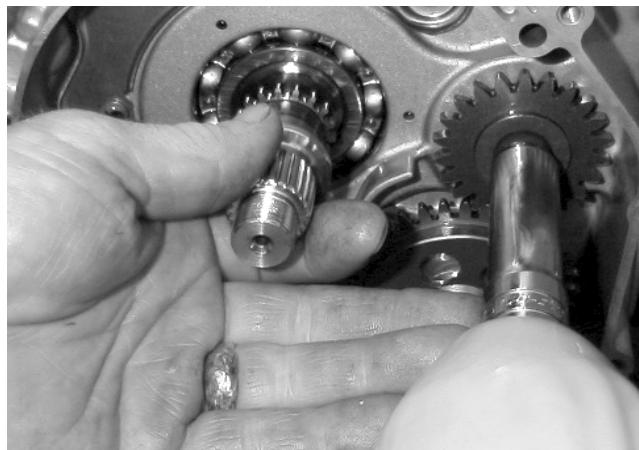


MD1014



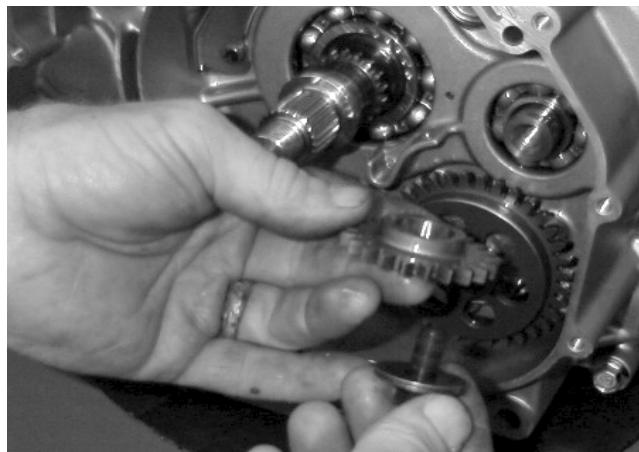
MD1016

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

3

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.



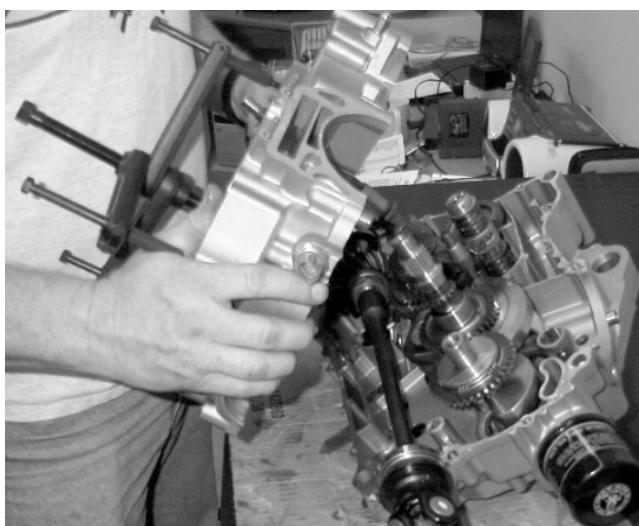
MD1006

2. 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.



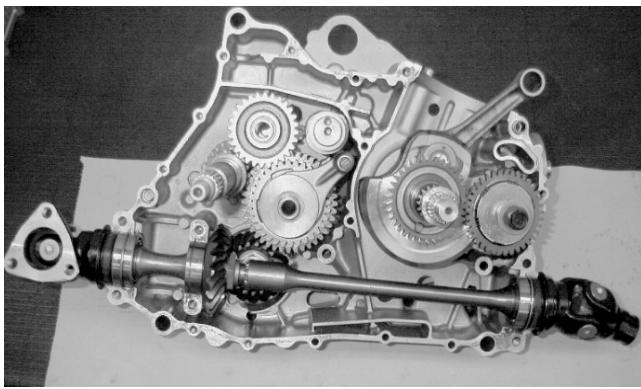
MD1313



MD1012

Disassembling Crankcase Half

1. 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.**

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



MD1325



CC870

3. Remove the driveshaft.



MD1326

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



MD1327

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



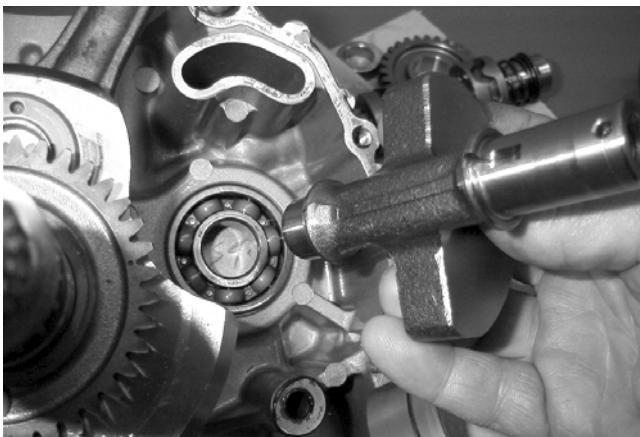
MD1328

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



MD1329

7. Remove the counterbalance gear. Account for the key and inner and outer thrust washers.
8. Remove the counterbalance shaft.

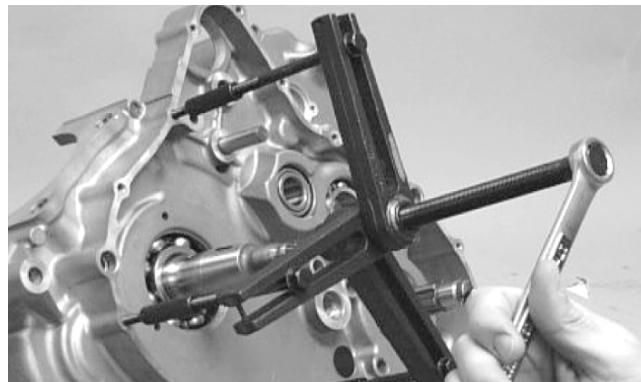


MD1024



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)

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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

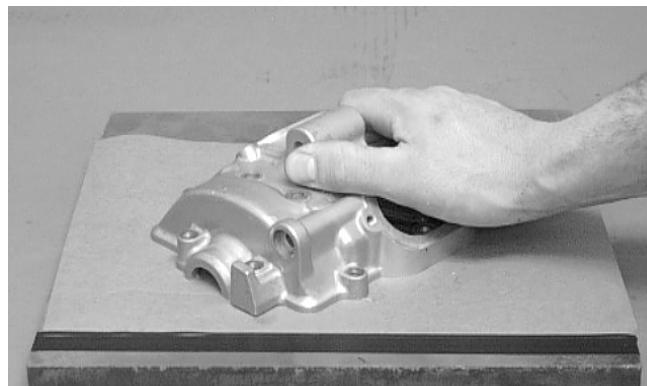
■ NOTE: If the valve cover cannot be trued, the cylinder head assembly must be replaced.

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

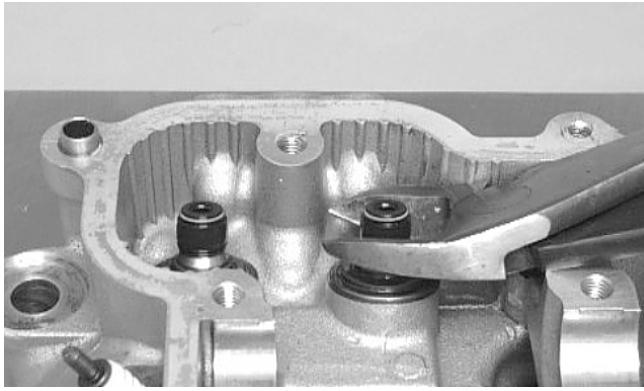
■ NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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

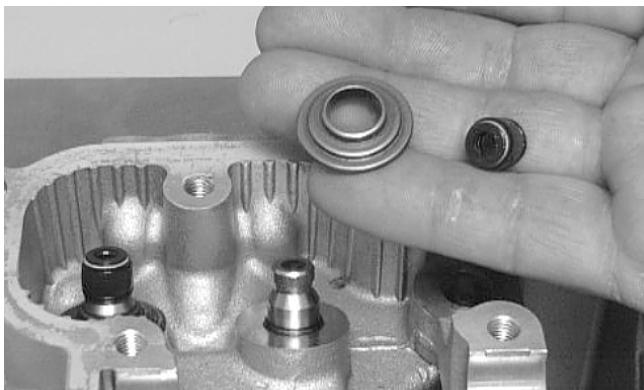


CC994

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



CC134D



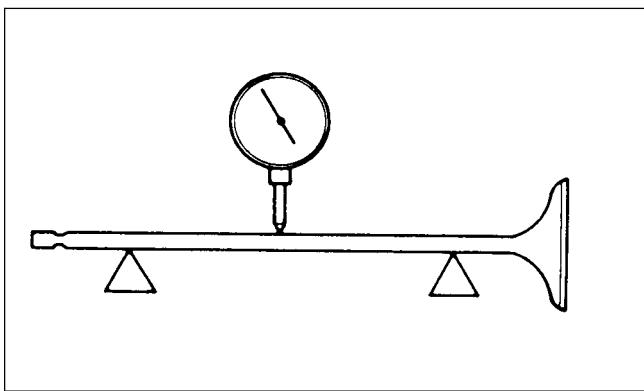
CC136D

■ 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

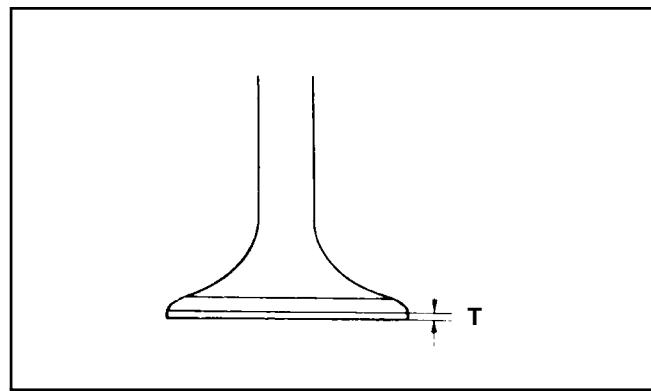
2. Maximum runout is 0.05 mm (0.002 in.).

Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) is 4.975 - 4.990 mm (0.1959 - 0.1965 in.).
3. Acceptable diameter range (exhaust valve) is 4.955 - 4.970 mm (0.1951 - 0.1957 in.).

Measuring Valve Face/Seat Width

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

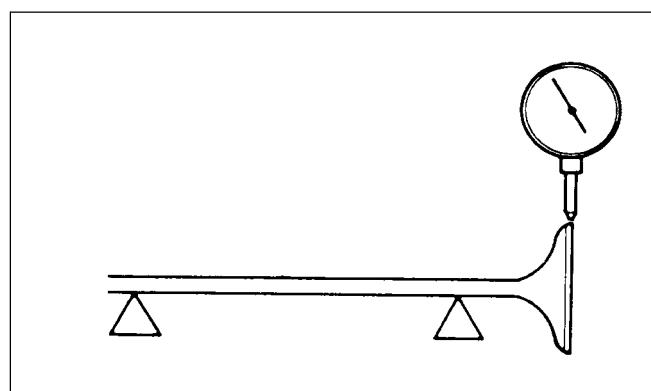


ATV-1004

2. Acceptable width range is 0.9-1.1 mm (0.035-0.043 in.).

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.

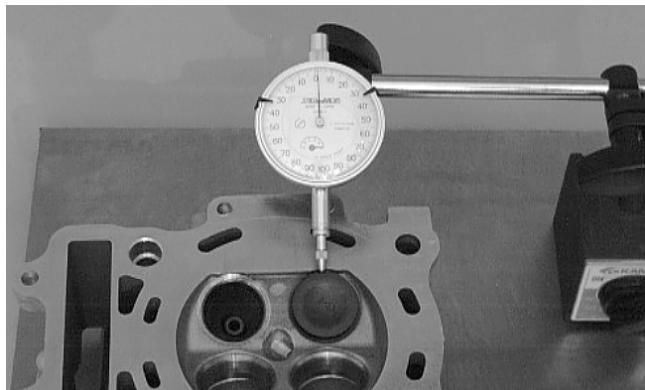


ATV1082A

3. Rotate the valve in the V blocks.
4. Maximum runout is 0.03 mm (0.001 in.).

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 is 0.35 mm (0.014 in.).

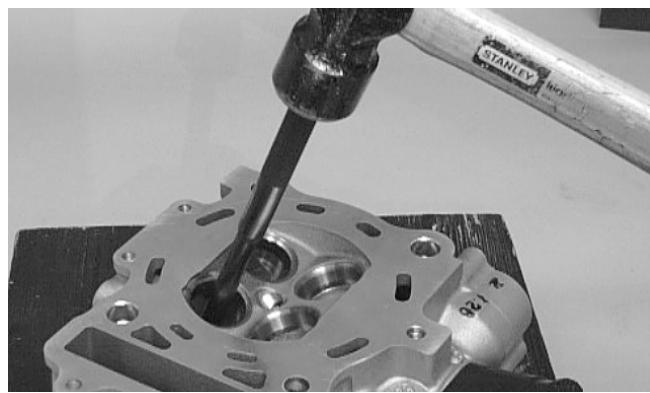
Measuring Valve Guide (Inside Diameter)

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 is 5.000 - 5.012 mm (0.1969 - 0.1973 in.).
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.



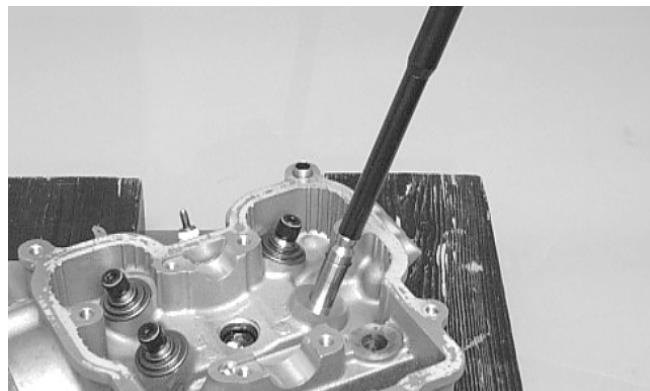
CC137D

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



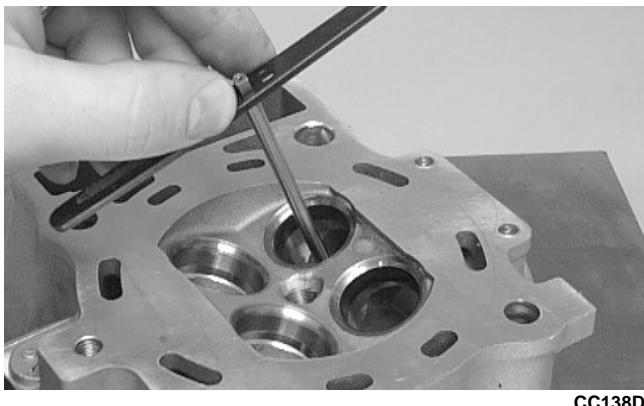
CC142D

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.



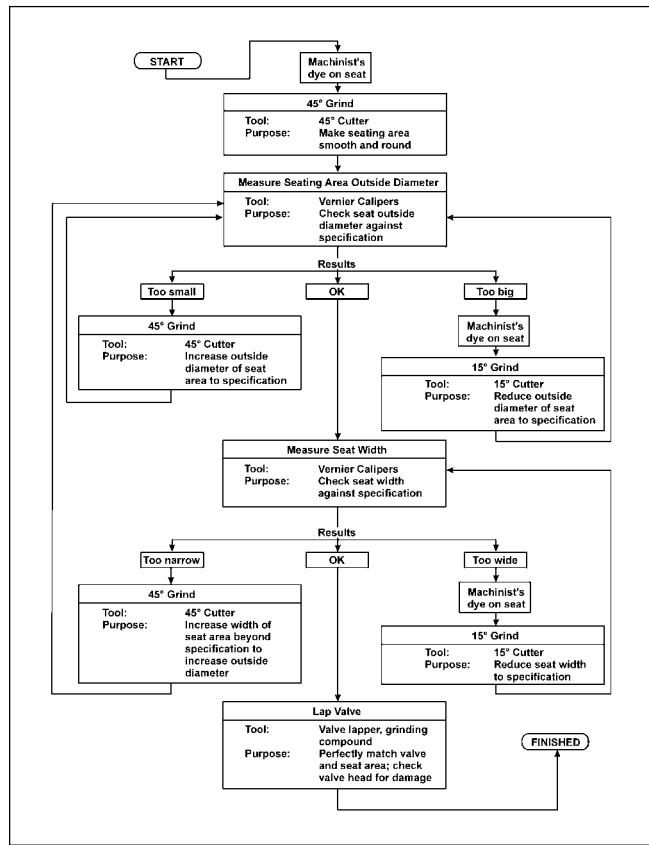
CC143D

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.

- Acceptable inside diameter range is 12.000-12.018 mm (0.472-0.473 in.).

Measuring Rocker Arm Shaft (Outside Diameter)

- Using a micrometer, measure the outside diameter of the rocker arm shaft.
- Acceptable outside diameter range is 11.973-11.984 mm (0.4714-0.4718 in.).

Installing Valves

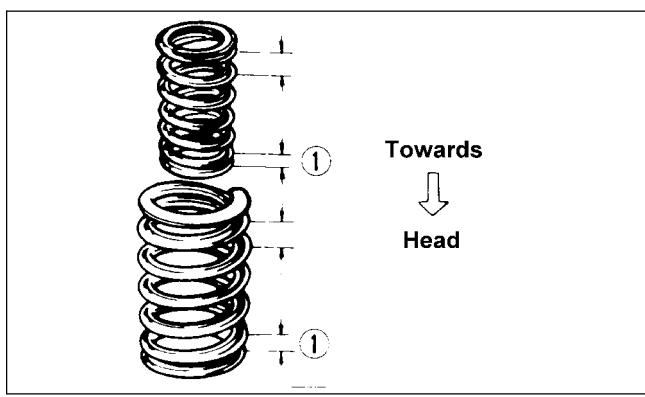
- Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



CC144D

- Insert each valve into its original valve location.
- 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

- 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

3

- Using a non-metallic carbon removal tool, remove any carbon buildup from the dome of the piston.
- Inspect the piston for cracks in the piston pin, dome, and skirt areas.
- 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.

- 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

- 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

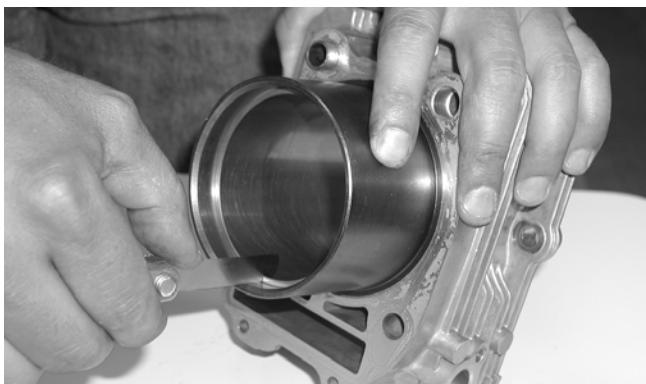
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

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)

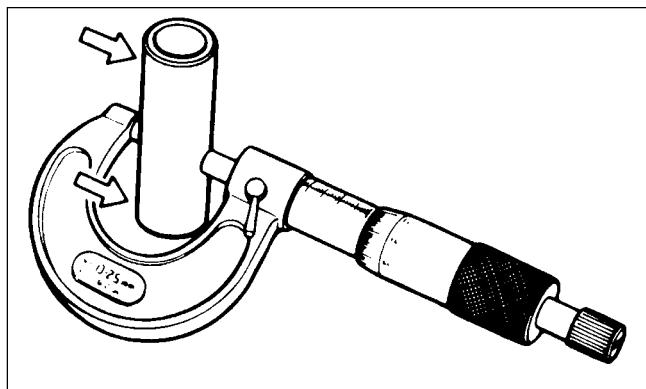
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be a maximum 0.50 mm (0.020 in.) both rings.



CC995

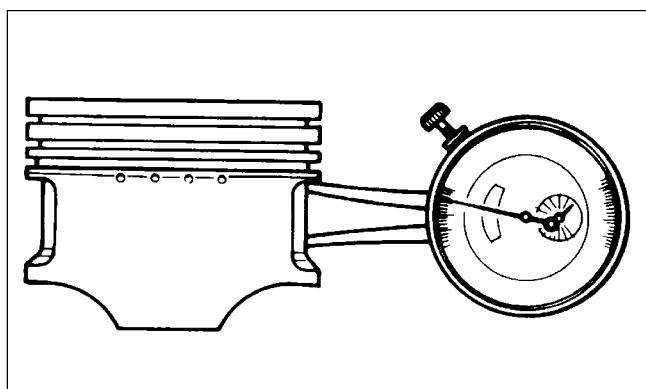
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is less than 19.98 mm (0.787 in.), the piston pin must be replaced.



ATV-1070

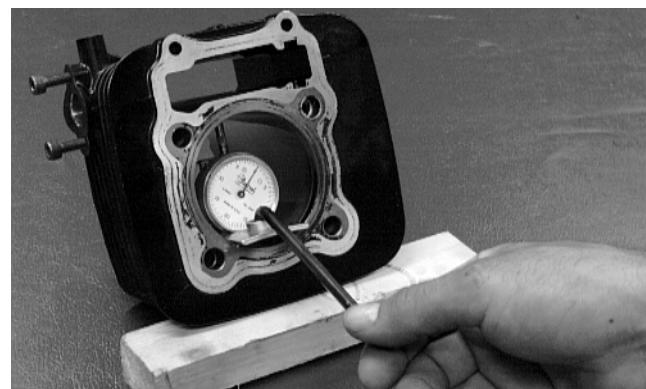
2. Insert an inside dial indicator into the piston-pin bore. The diameter must be a maximum 20.03 mm (0.789 in.). Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/ Cylinder Clearance

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



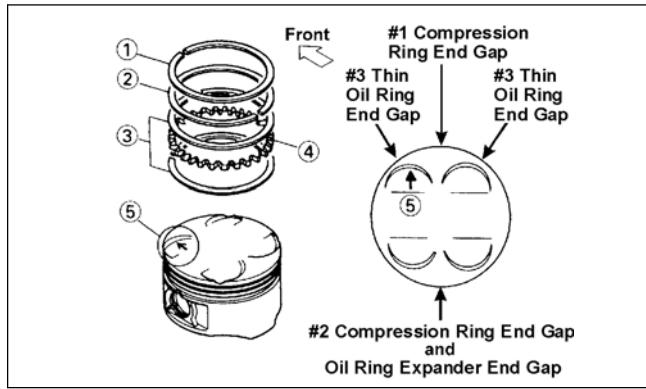
CC397D

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 a range of 0.060-0.073 mm (0.0024-0.0029 in.).

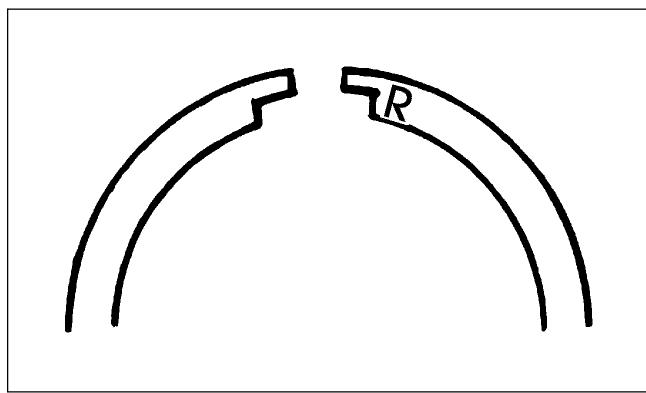
Installing Piston Rings

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.



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.



CYLINDER/CYLINDER HEAD ASSEMBLY

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

Cleaning/Inspecting Cylinder Head

⚠ CAUTION

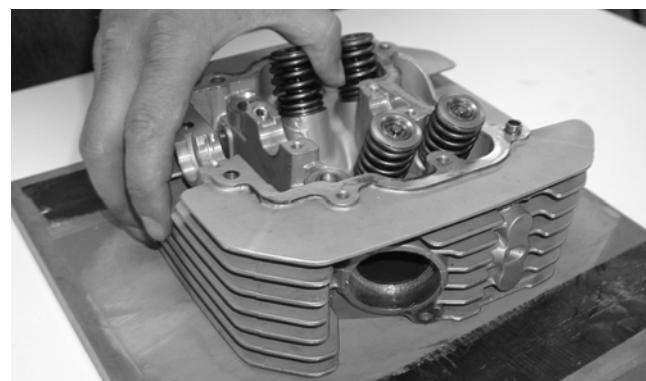
The cylinder head studs must be removed for this procedure.

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.

3

⚠ CAUTION

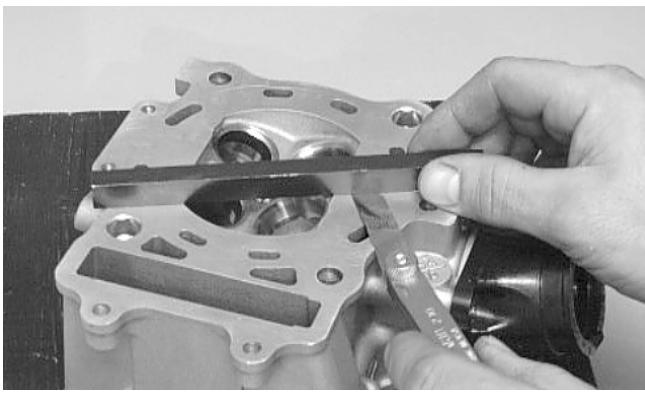
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.



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 is 0.05 mm (0.002 in.).



CC141D

Cleaning/Inspecting Cylinder

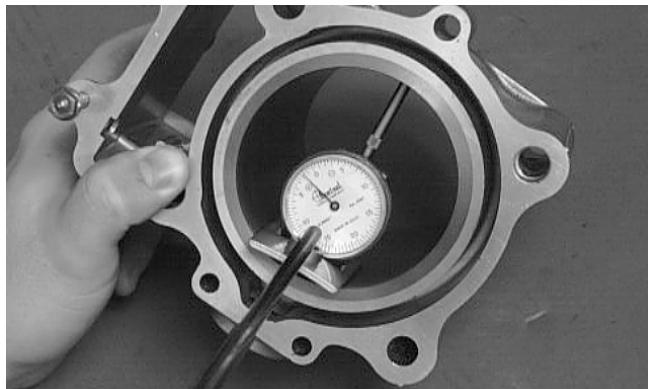
1. Wash the cylinder in parts-cleaning solvent.
2. Inspect the cylinder for pitting, scoring, scuffing, warpage, and corrosion. If marks are found, repair the surface using a cylinder hone (see Honing Cylinder in this sub-section).
3. Place the cylinder on the surface plate covered with #400 grit wet-or-dry 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.

Honing Cylinder

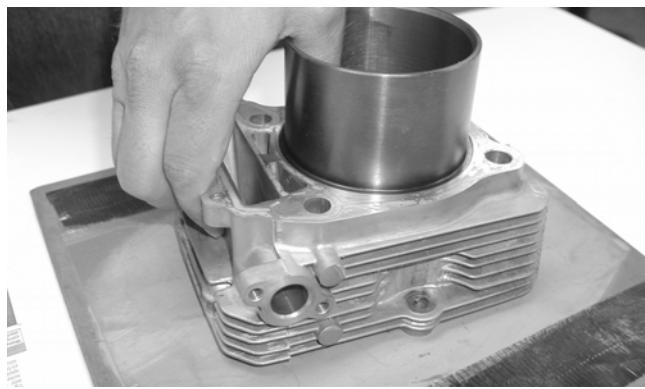
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must be 0.05 mm (0.002 in.).



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.

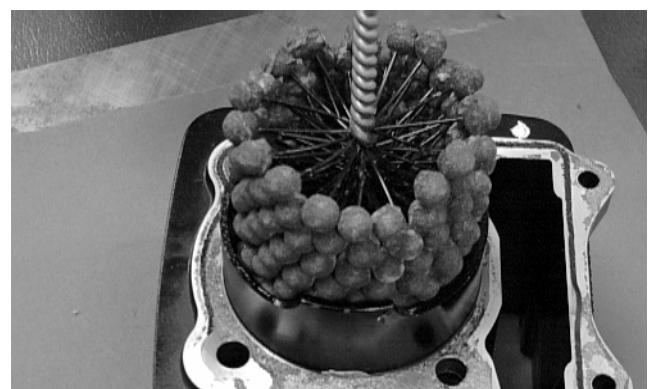
■ NOTE: To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately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



CC997

Inspecting Cam Chain Guide

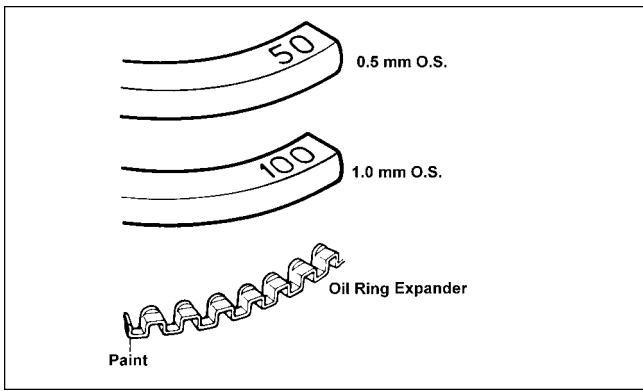
1. Inspect cam chain guide for cuts, tears, breaks, or chips.
2. If the chain guide is damaged, it must be replaced.



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.

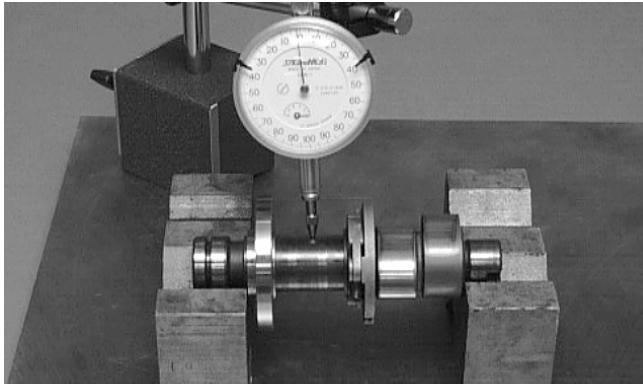


ATV-1068

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.

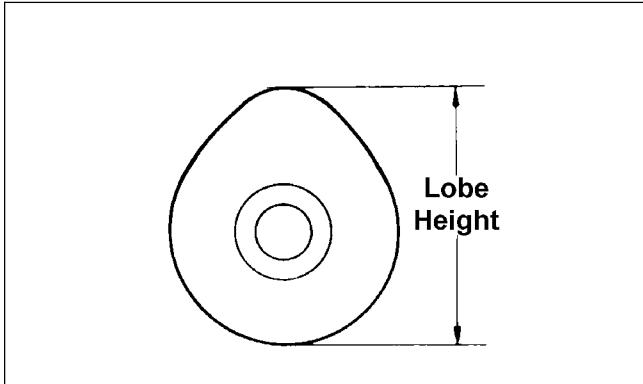


CC283D

2. Rotate the camshaft and note runout; maximum tolerance is 0.10 mm (0.004 in.).

Measuring Camshaft Lobe Height

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



ATV1013A

2. The intake/exhaust lobe heights must be a minimum 32.830 mm (1.293 in.).

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.

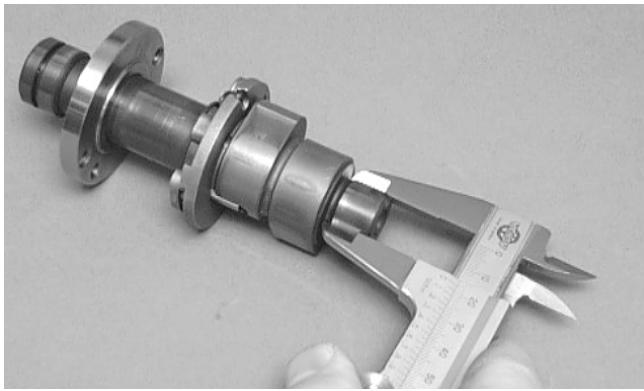


CC145D



CC306D

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

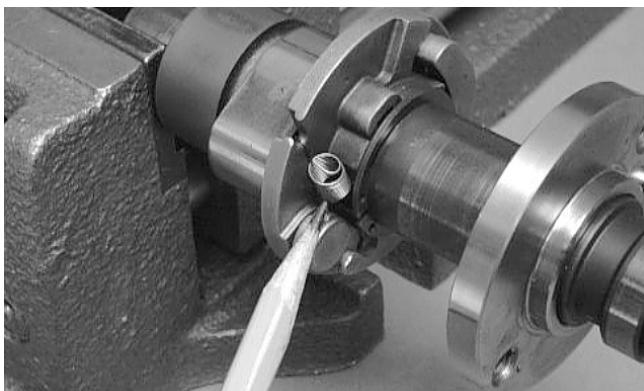


CC287D

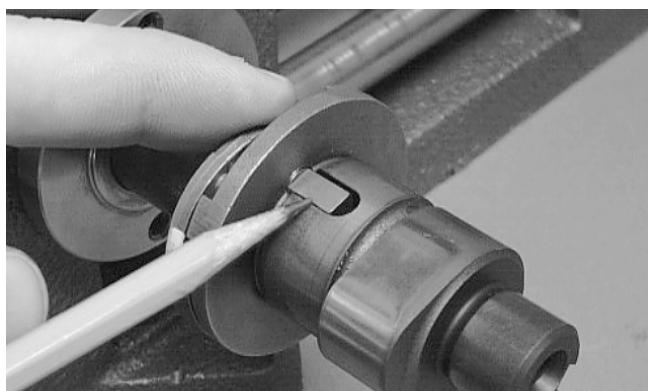
■ **NOTE:** If the journals are worn, replace the camshaft; then measure the clearance again. If it is still out of tolerance, replace the cylinder head.

Inspecting Camshaft Spring/Drive Pin

1. Inspect the spring and drive pin for damage.



CC304D



CC308D

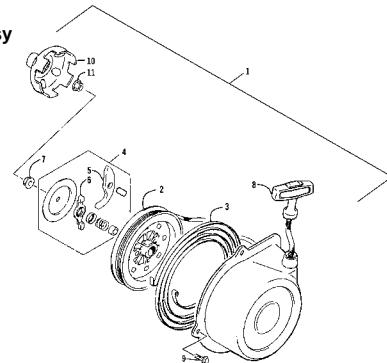
2. If damaged, the camshaft must be replaced.

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



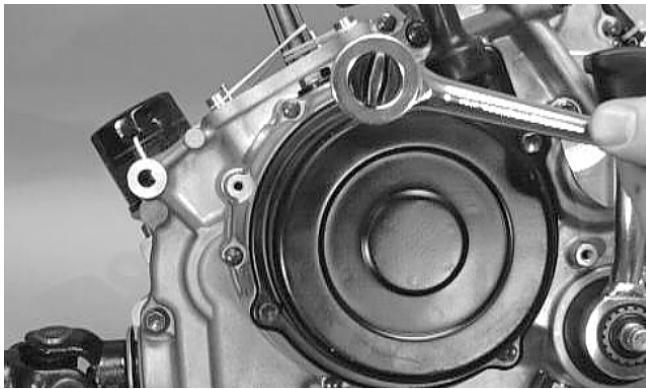
0737-034

⚠️ **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.

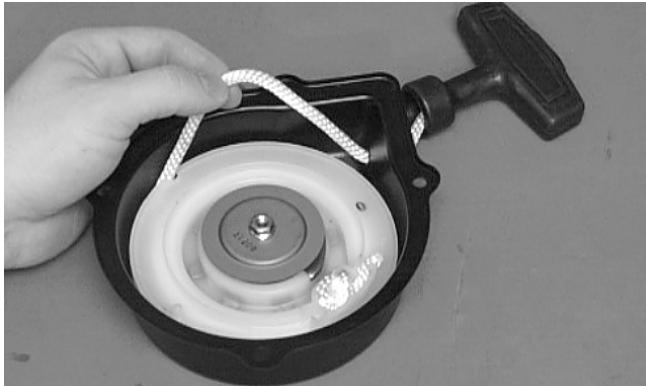


CC039D

⚠️ **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

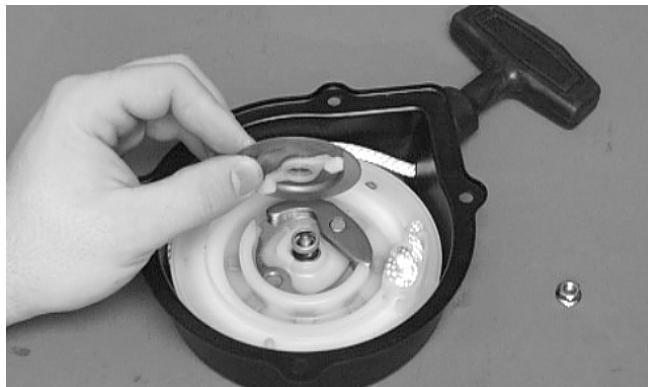
3. Remove the nut.



B601D

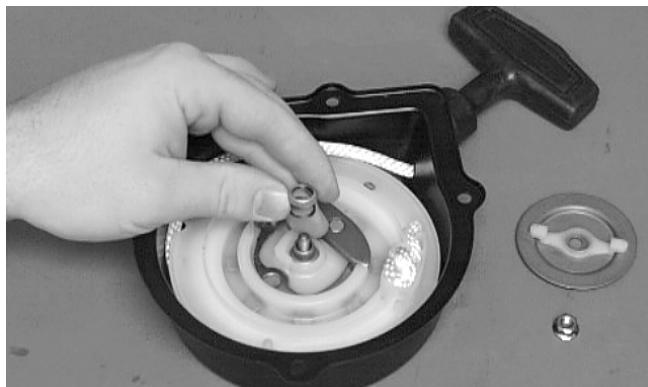
4. Slowly release the friction plate and lift the plate with ratchet guide free of the recoil case; then remove the ratchet guide from the friction plate.

3



B602D

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



B603D

6. Remove the ratchet and account for the pin.

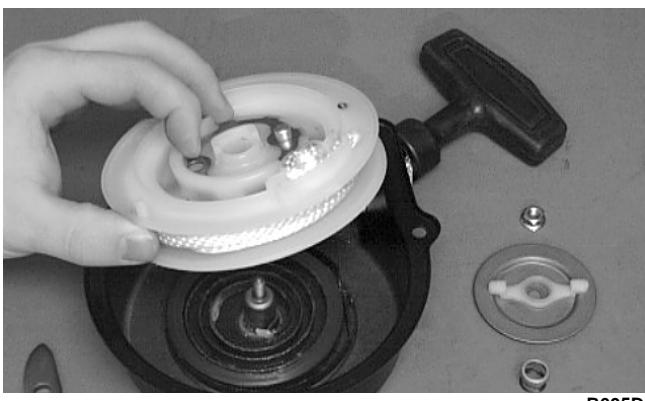
⚠️ **CAUTION**

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



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

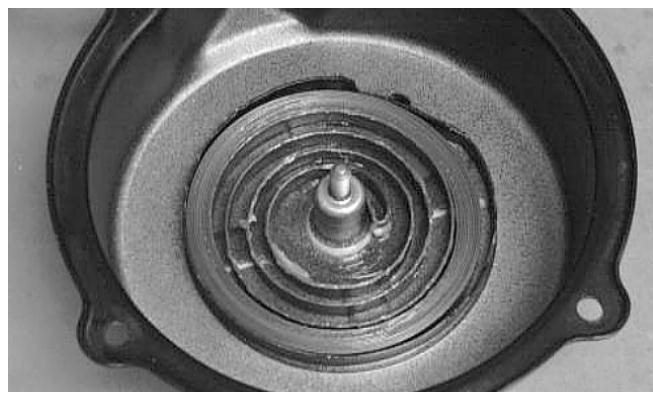
■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

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

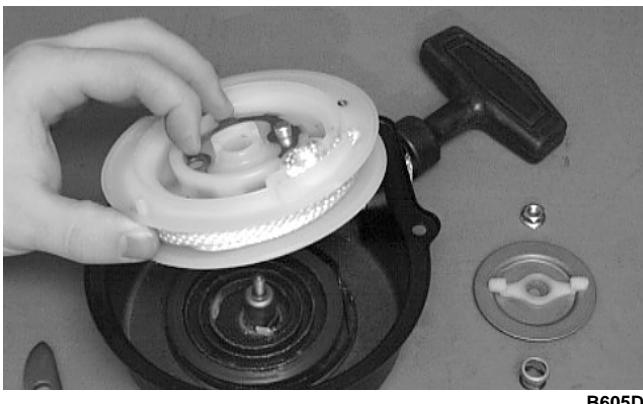
1. If removed, insert the spiral spring into the case with the outer end of the spring around the mounting lug in the case; then wind it in a counterclockwise direction until the complete spring is installed.

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



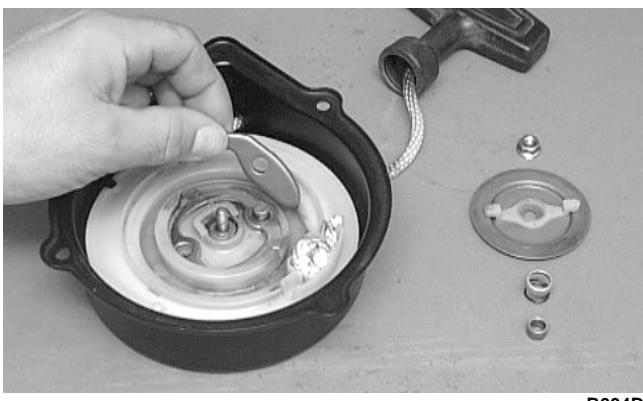
B606D

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.



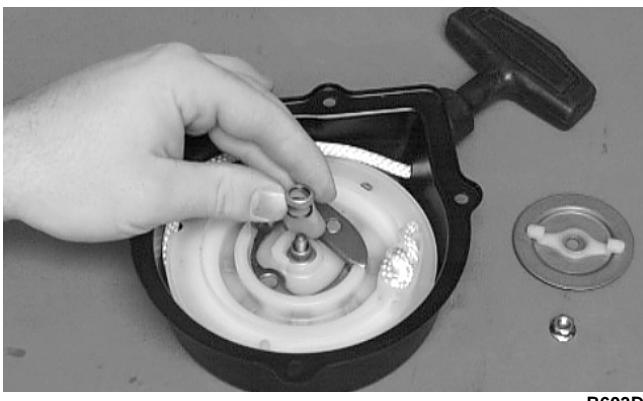
B605D

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



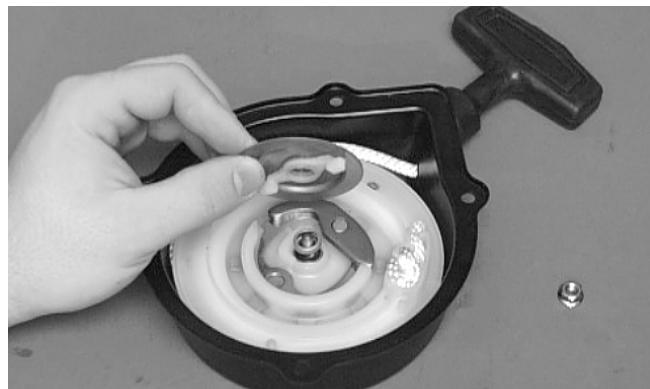
B604D

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



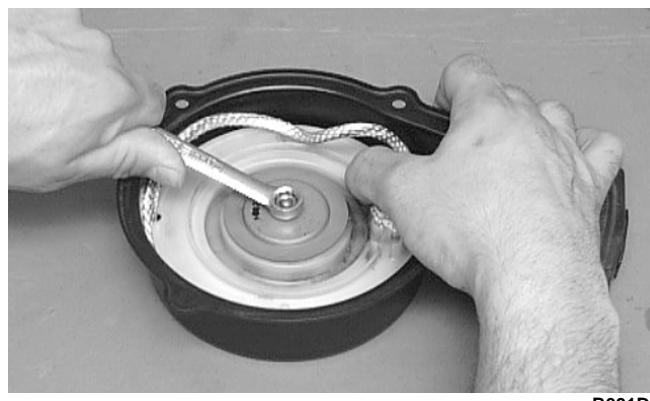
B603D

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

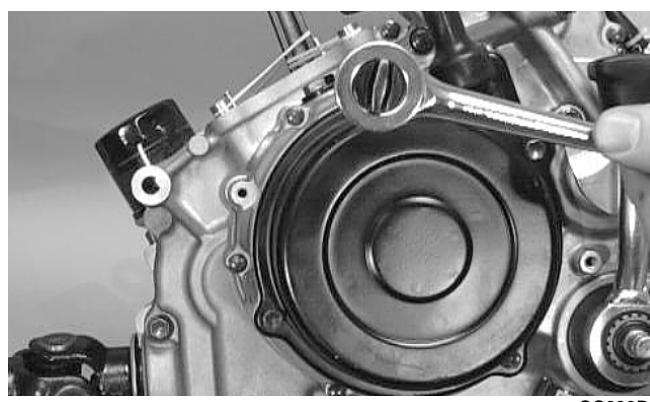
10. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.

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).



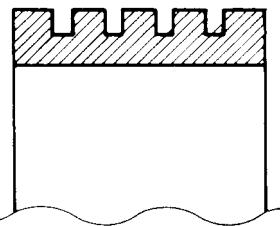
CC039D

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.



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.

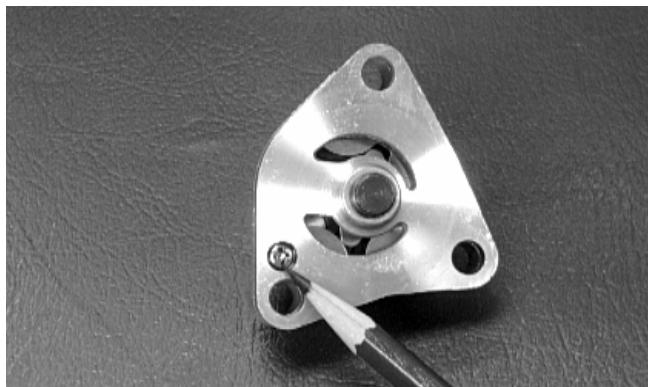
INSPECTING PRIMARY ONE-WAY DRIVE

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.

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.



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.

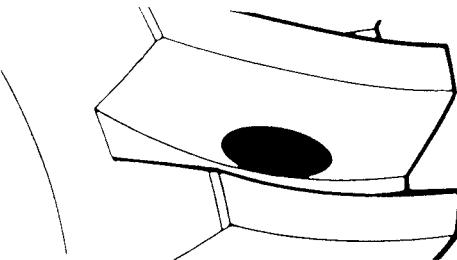
Backlash Measurement	Shim Correction
Under 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

Checking Tooth Contact

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

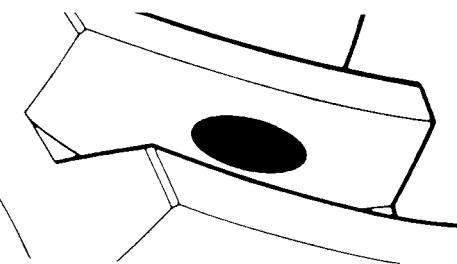
1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.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

Incorrect (contact at tooth root)



ATV-0105

Correct



ATV-0104

3

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.

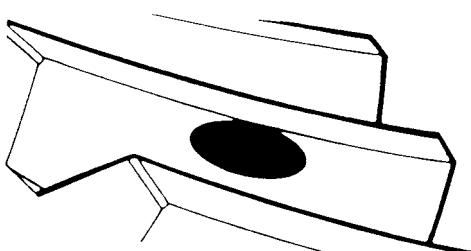
Tooth Contact	Shim Correction
Contacts at Top	Decrease Shim Thickness
Contacts at Root	Increase Shim Thickness

■ 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.

Incorrect (contact at tooth top)

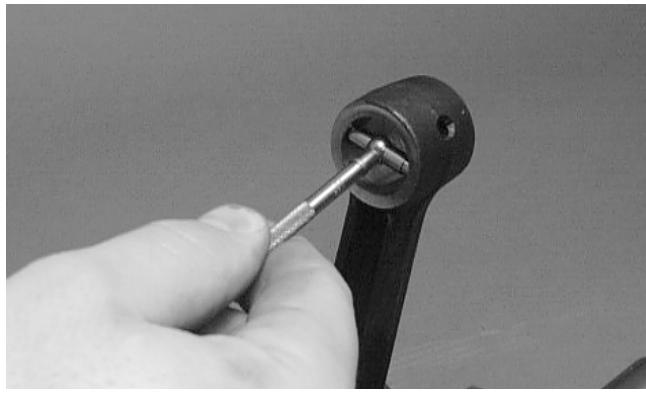


ATV-0103

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 is 20.04 mm (0.7889 in.).

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 is 3 mm (0.12 in.).

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

1. Push the lower end of the connecting rod to one side of the crankshaft journal.
2. Using a feeler gauge, measure the gap between the connecting rod and crankshaft journal.



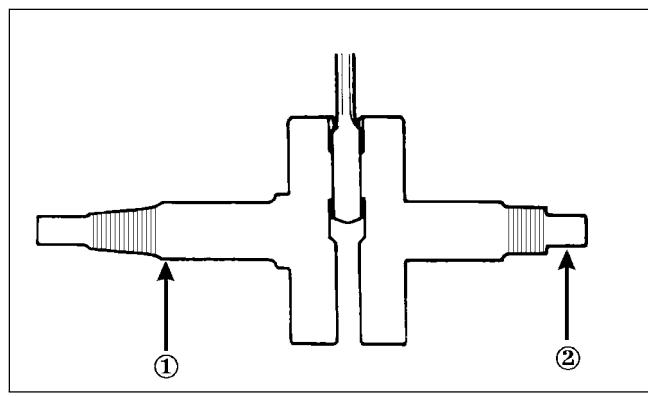
3. Acceptable gap range is 0.1-1.0 mm (0.004-0.039 in.).

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 is 21.95-22.00 mm (0.8642-0.8661 in.).

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.



3. Zero the indicator and rotate the crankshaft slowly.

CAUTION

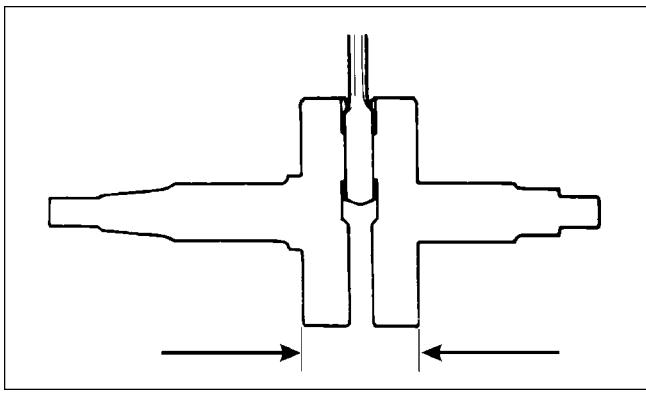
Care should be taken to support the connecting rod when rotating the crankshaft.

4. Maximum runout is 0.08 mm (0.003 in.) for both sides.

■ **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

- Acceptable width range is 59.9-60.1 mm (2.358-2.366 in.).

COUNTERSHAFT

⚠ CAUTION

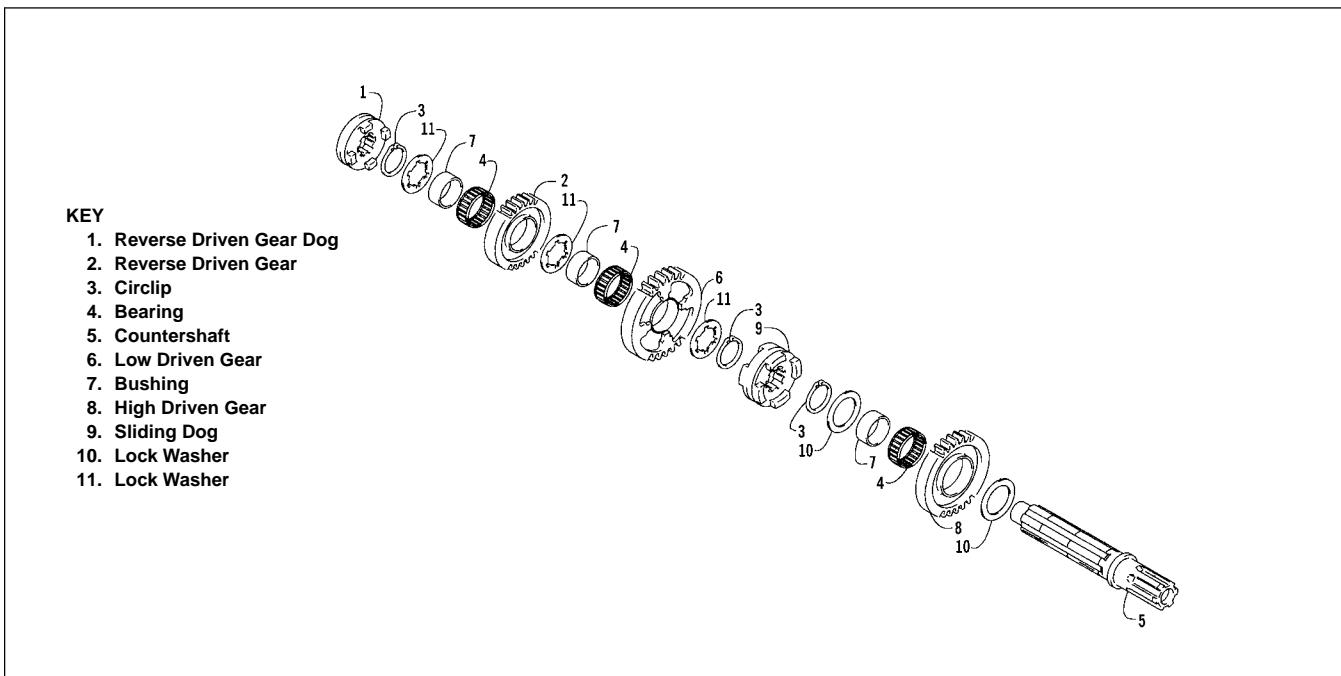
When disassembling the countershaft, care must be taken to note the direction each major component (dog, gear) faces. If a major component is installed facing the wrong direction, transmission damage may occur and/or the transmission will malfunction. In either case, complete disassembly and assembly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

Disassembling

- Remove the reverse driven gear dog; then remove the circlip securing the reverse driven gear.
- Remove the reverse driven gear and account for the washer, bushing, and bearing.
- Remove the low driven gear washer; then remove the low driven gear. Account for the bushing and bearing.
- Remove the washer; then remove the circlip securing the sliding dog. Remove the sliding dog.
- Remove the high driven gear circlip; then remove the high driven gear. Account for the washer, bushing, and bearing.

3

Assembling



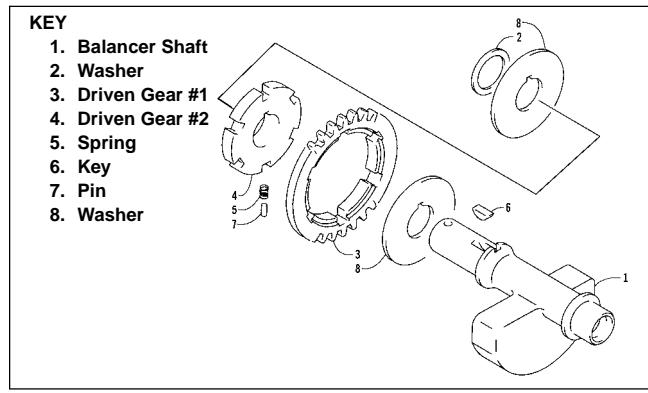
737-053A

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



737-050A

Disassembling

1. Remove the small and large washers from the balancer shaft.
2. Note the position of the alignment marks for assembling purposes; then remove driven gear #1 with driven gear #2. Account for pins and springs.
3. Remove driven gear #2 from gear #1; then account for a large washer and a key.

Inspecting

1. Inspect the gear, pins, and keyway for wear.
2. Inspect the springs for damage or fatigue.

Assembling

1. Place driven gear #2 into driven gear #1; then align the alignment marks of driven gear #1 and driven gear #2.
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.
3. Place the key and the large washer into position on the balancer shaft.
4. 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

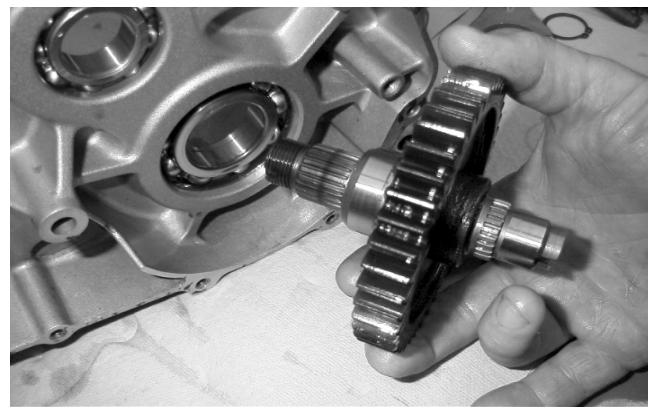
■NOTE: For ease of assembly, install components on the right-side crankcase half.

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

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



MD1199



MD1079

2. 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

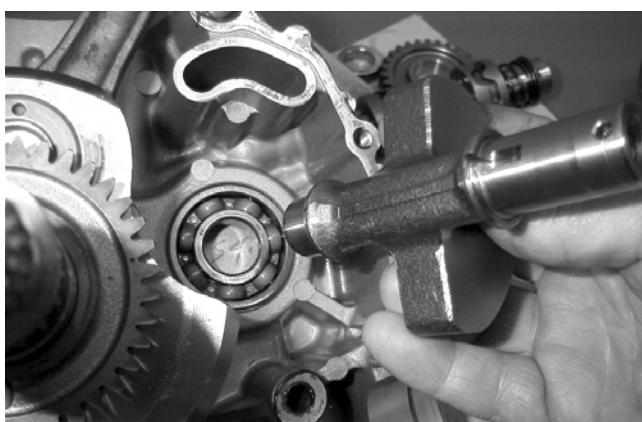
3. Apply a liberal amount of oil to the crankshaft bearing. Using a propane torch, heat the bearing until the oil begins to smoke; then slide the crankshaft assembly into place.



MD1334

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

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



MD1024

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



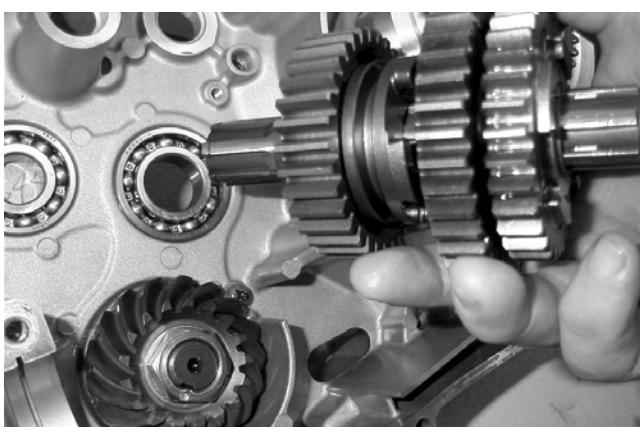
3

6. Keeping the two holes facing up, install the shift cam and inner and outer washers.

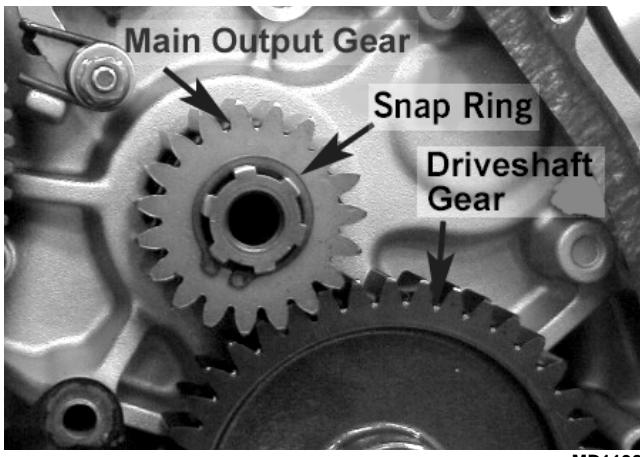


MD1329

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.



MD1032



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



9. Install the input driveshaft.

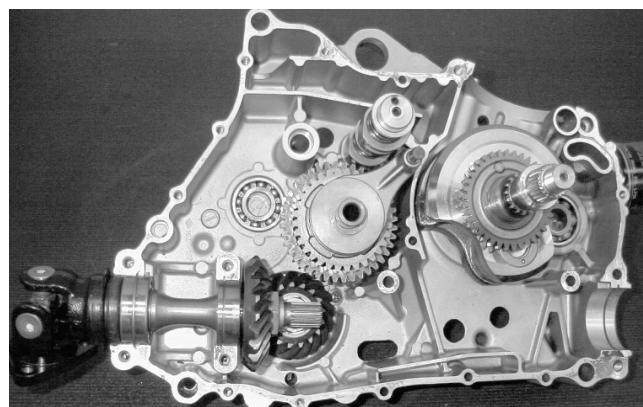


10. Install the washer, spacer, sleeve, reverse idler gear, and washer.



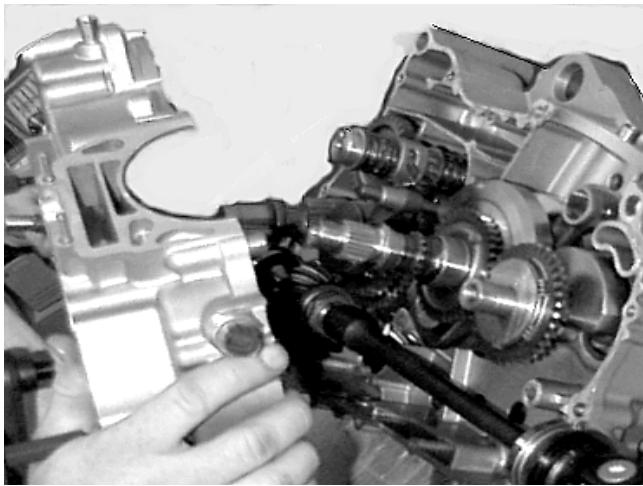
11. Install the secondary (4x4 models) and primary driveshaft assemblies. Account for the bearing alignment C-ring on the bearing boss next to the pinion gear.

■ NOTE: On the 4x4, align the bearing alignment pin on the secondary output shaft.

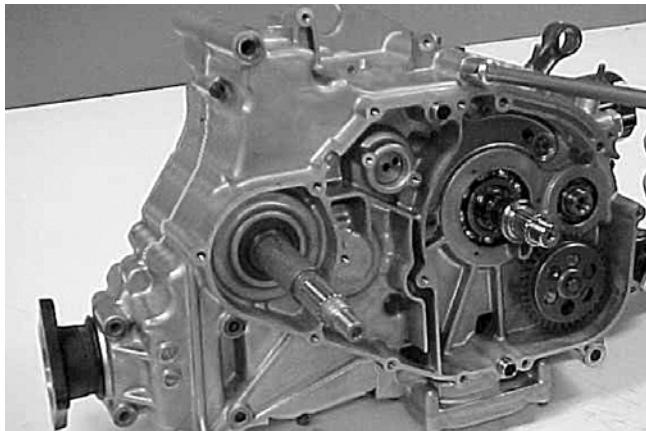


Joining Crankcase Halves

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.



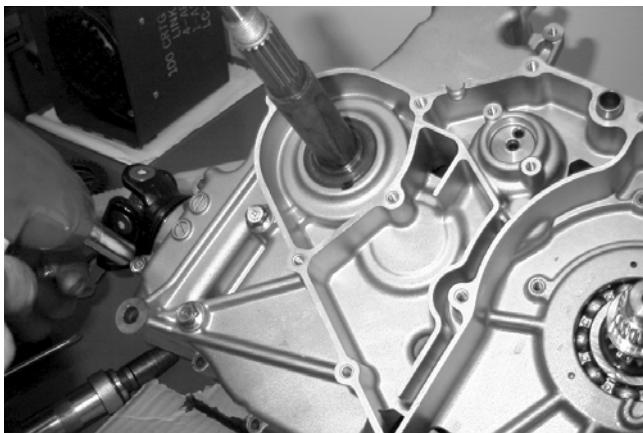
MD1336



CC871

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.

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.

3

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**.

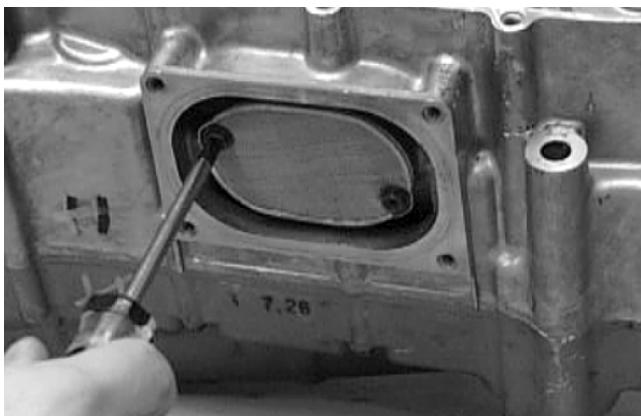
Installing Right-Side Components

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

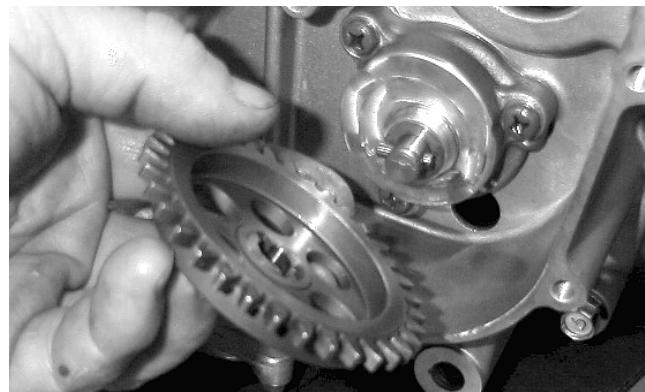
3. Place two alignment pins and the oil pump into position on the crankcase and secure with the Phillips-head screws coated with blue Loctite #243. Tighten to 1 kg-m (7 ft-lb).



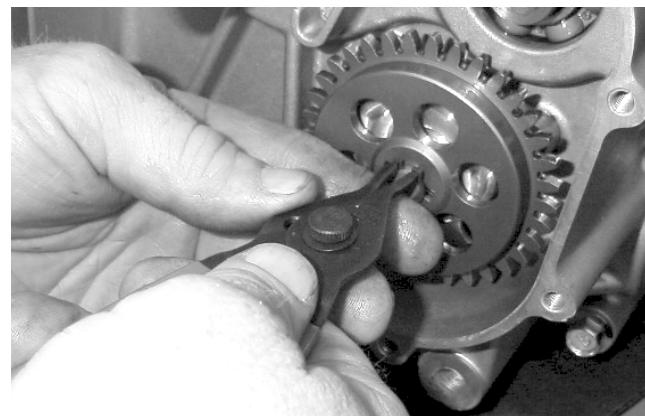
MD1060

4. 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

5. Install the cam chain.

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

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



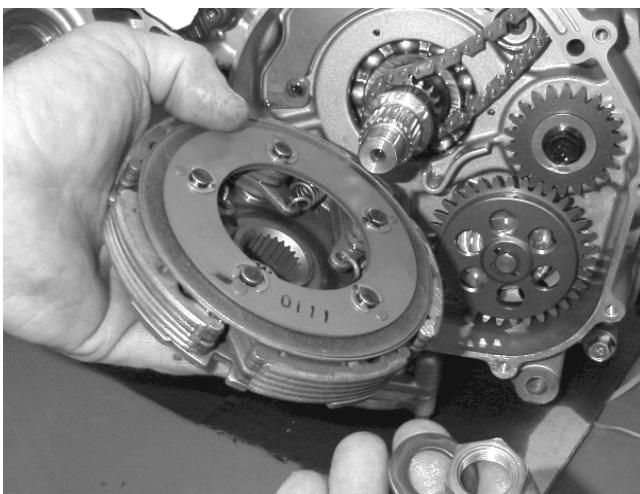
MD1017



MD1018

7. Install the centrifugal clutch assembly and left-hand threaded nut. Tighten securely.

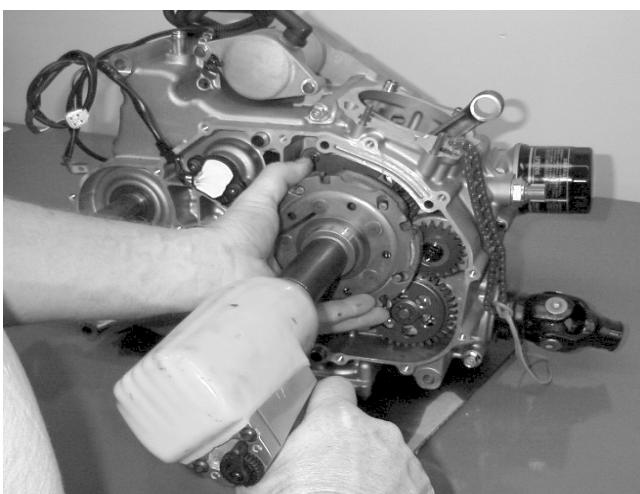
■ NOTE: The flat side of the left-hand threaded nut should be towards the clutch.



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.

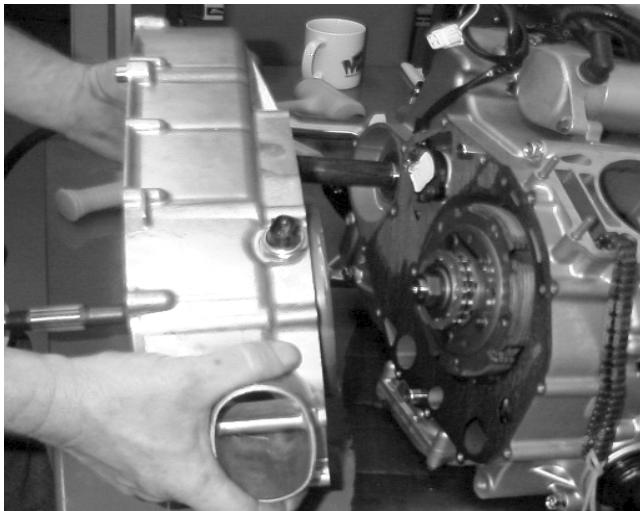


MD1040

B. Clutch Cover C. Fixed Drive Face D. Movable Drive Face

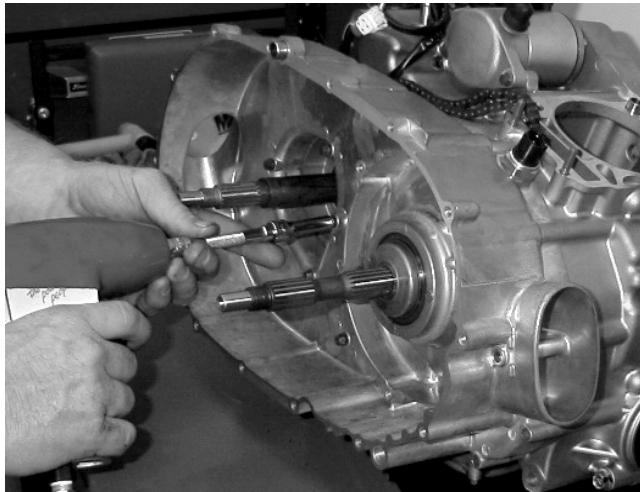
■ NOTE: Steps 1-10 in the preceding sub-section must precede this procedure.

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



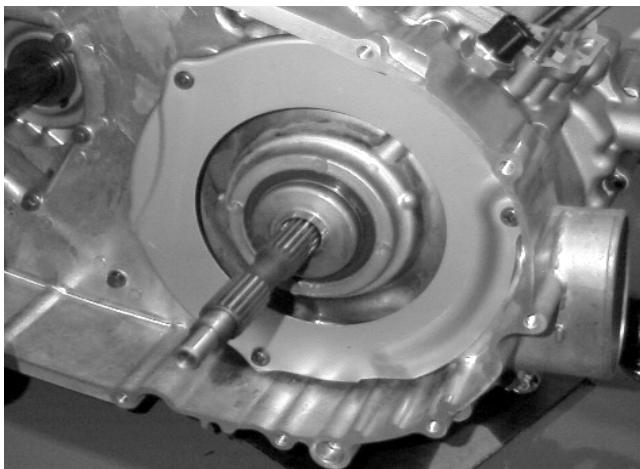
MD1115

12. Tighten the clutch cover cap screws securely.



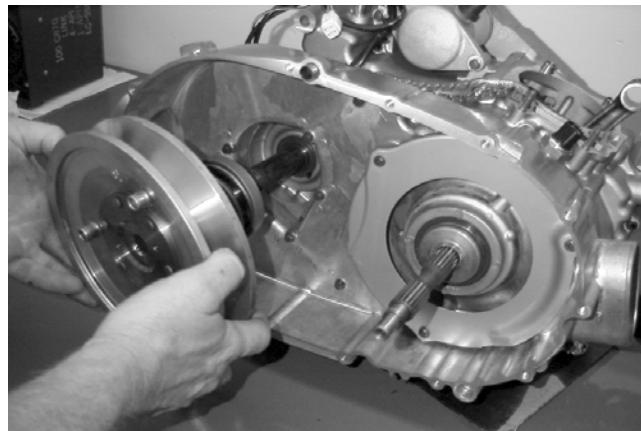
MD1117

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 clutch 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).



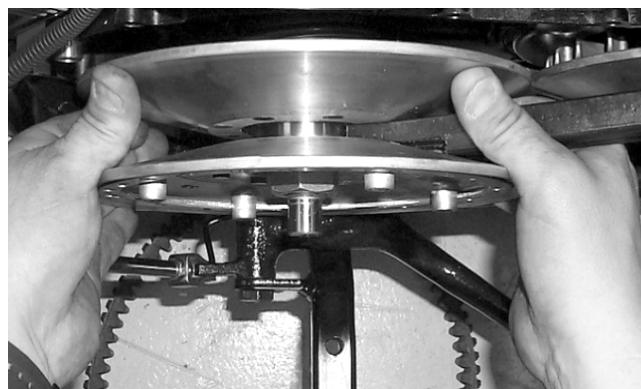
MD1068



MD1339

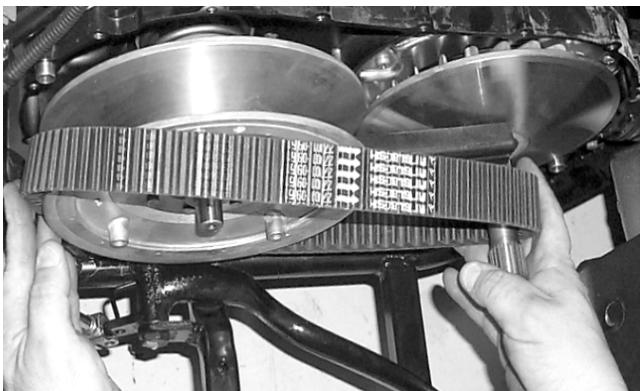
15. Slide the fixed drive face assembly onto the front shaft.

16. Spread the faces of the driven clutch by pushing the inner face toward the engine while turning it counterclockwise; 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 clutch and over the front shaft.



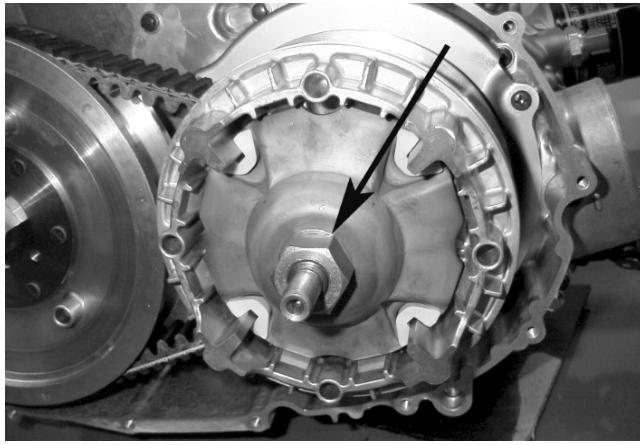
MD1341

■ **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

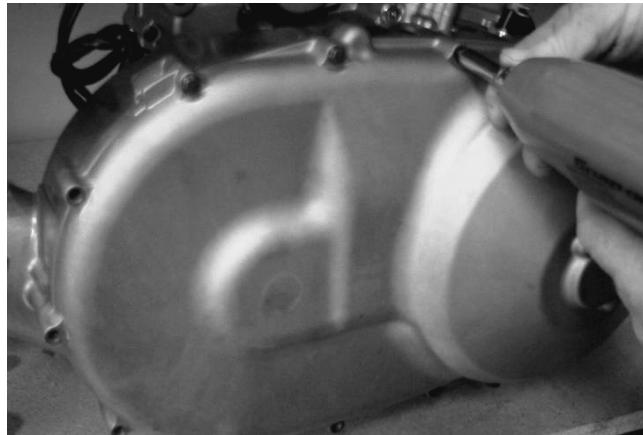


MD1033

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

19. Rotate the V-belt and drive assemblies until the V-belt is flush with the top of the driven clutch.

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 crisscross pattern, tighten cap screws to 1.1 kg-m (8 ft-lb).



MD1306

3

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.



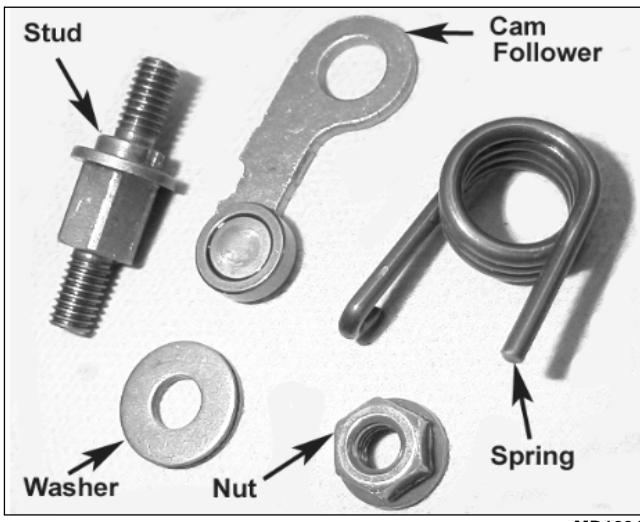
MD1224

4. Install the shift detent cam making sure the spacer is properly positioned.



MD1086

5. Install the cam follower assembly.



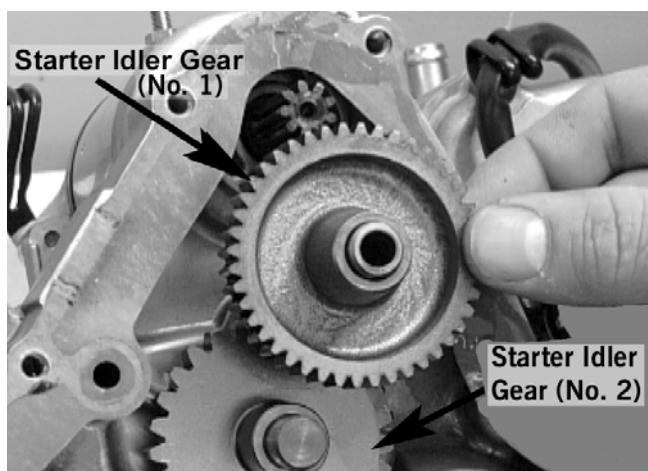
MD1231

6. Install the gear shift shaft assembly and washer making sure to align the alignment marks.



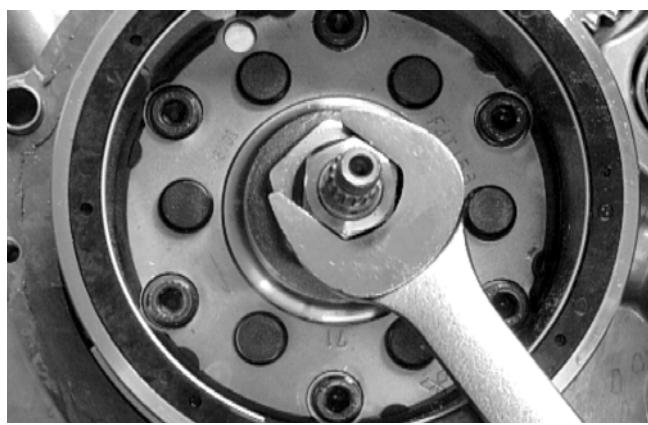
MD1239

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/flywheel (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

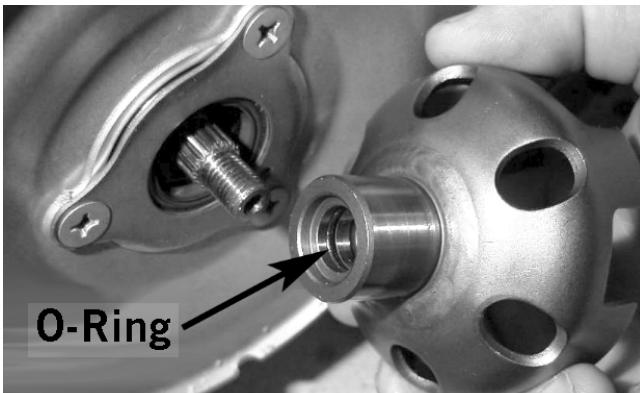
■ NOTE: Steps 1-8 in the preceding sub-section must precede this procedure.

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

11. 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

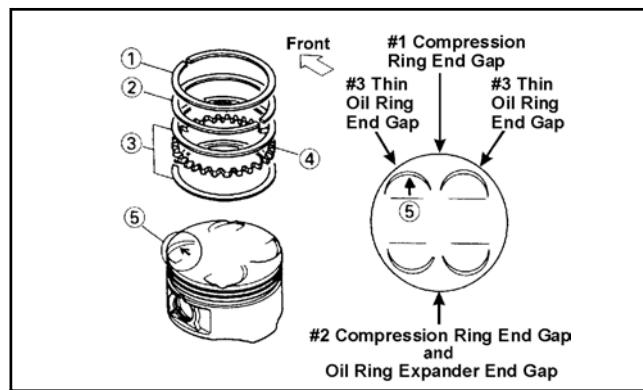
A. Piston

B. Cylinder

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

3

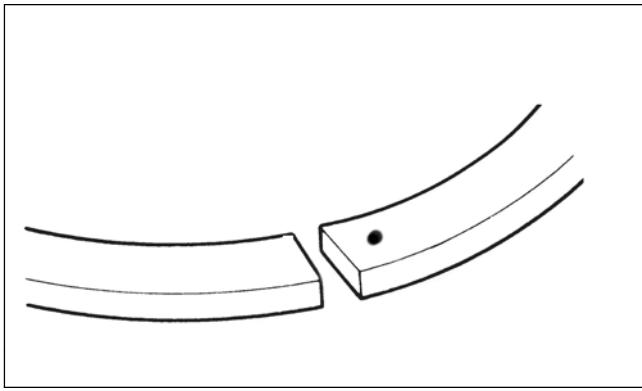
A. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



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 according to the illustration.



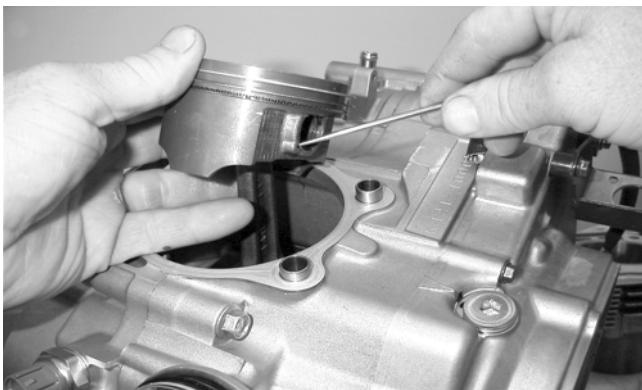
MD1343

⚠ CAUTION

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

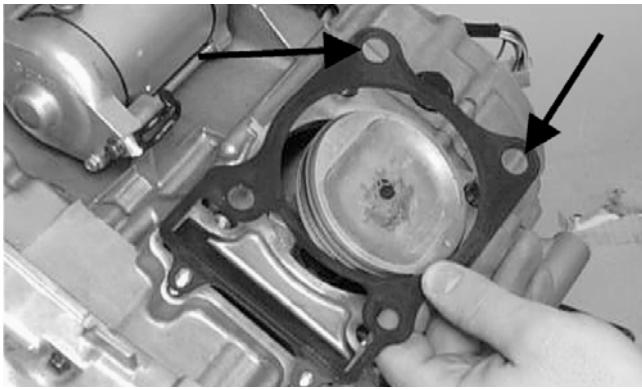
1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

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



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.

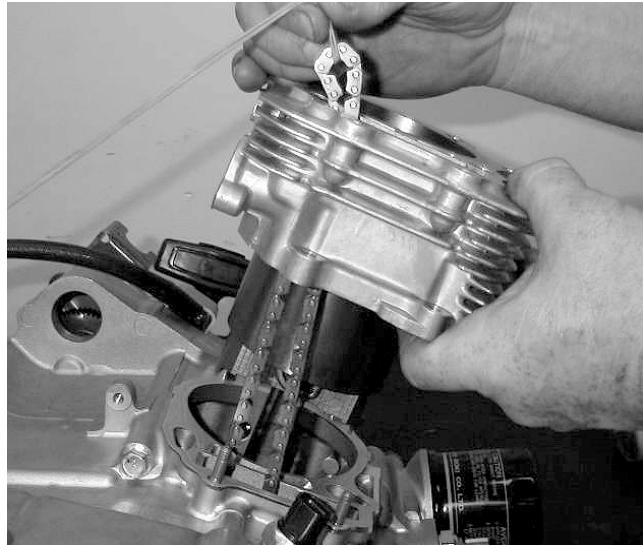


MD1344

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

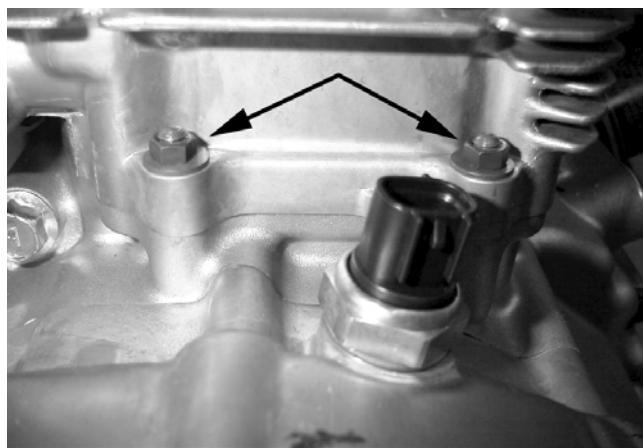
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



MD1345

4. Loosely install the two nuts with washers which secure the cylinder to the right-side crankcase half.

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



MD1226

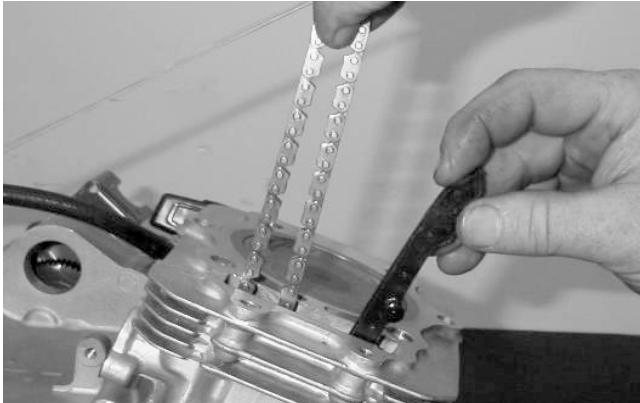
**C. Cylinder Head
D. Valve Cover**

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

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

⚠ CAUTION

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

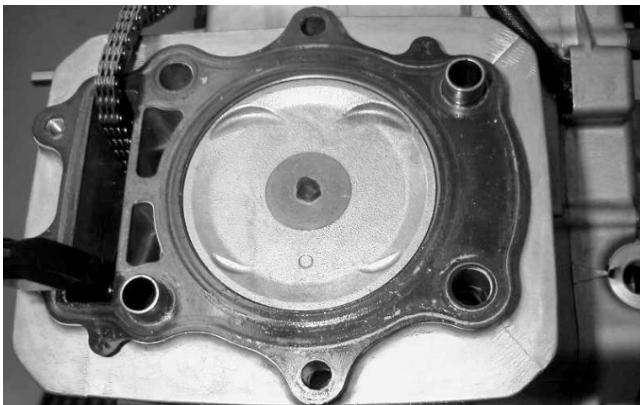


MD1349

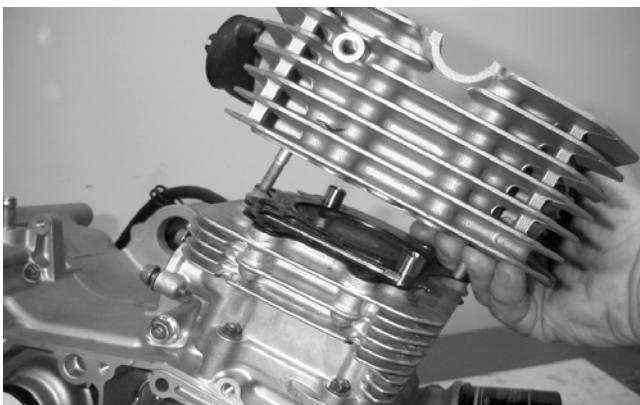
6. Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder making sure the cam chain is routed through the chain cavity.

⚠ CAUTION

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

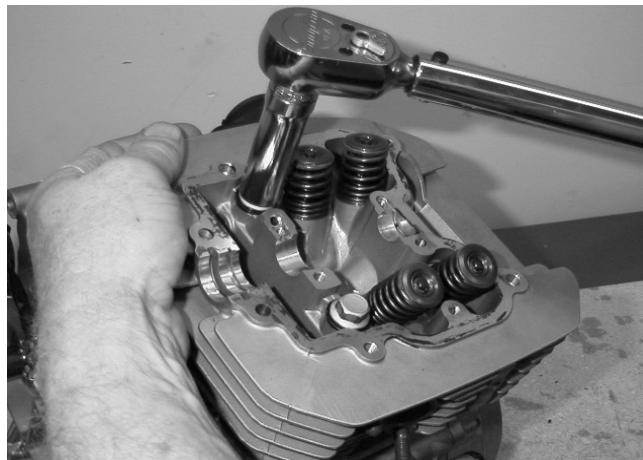


MD1347



MD1163

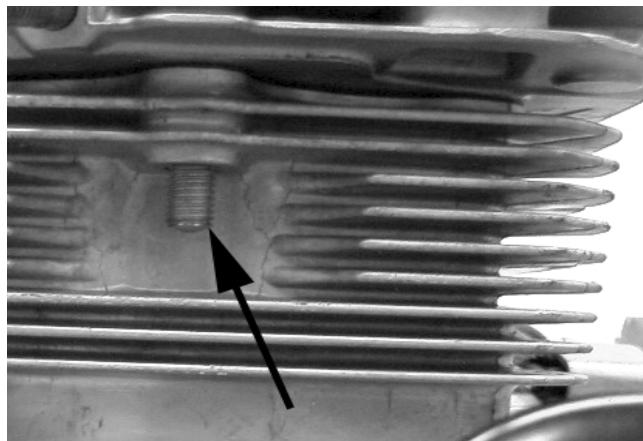
7. Install the four cylinder head cap screws with washers. Note that the two cap screws on the right side of the cylinder head nearest the cam sprocket are longer than the two cap screws on the left (spark plug) side. Tighten only until snug.



MD1270

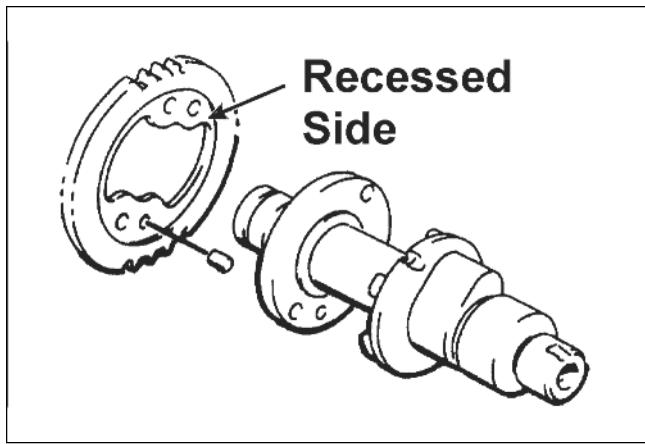
3

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



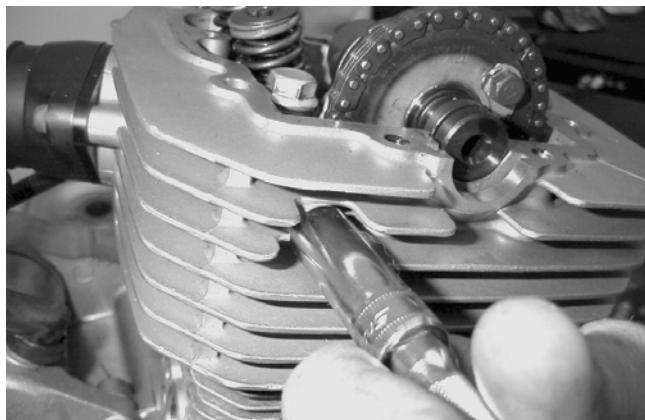
MD1192

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.



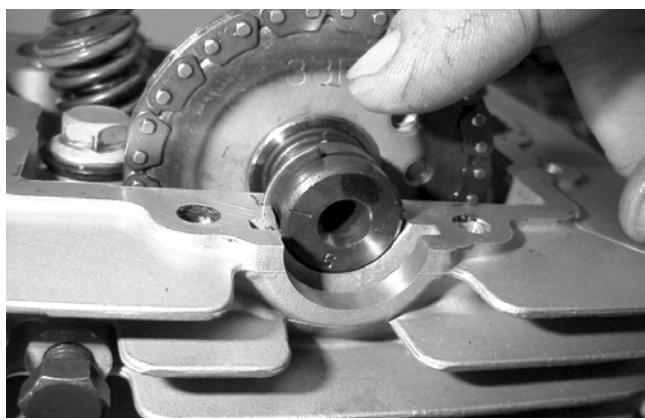
MD1359

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.

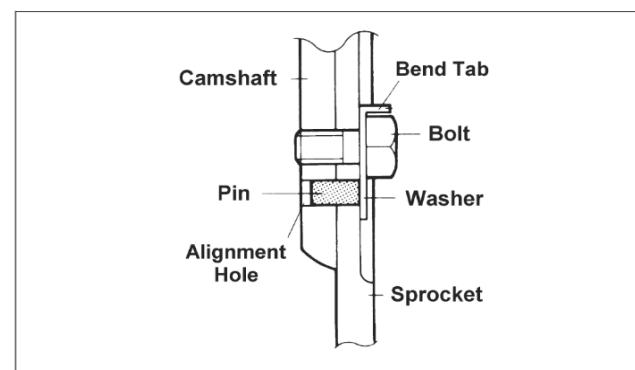
■ NOTE: When the camshaft assembly is seated, make sure the alignment pin in the camshaft aligns with the smallest hole in the sprocket.



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.

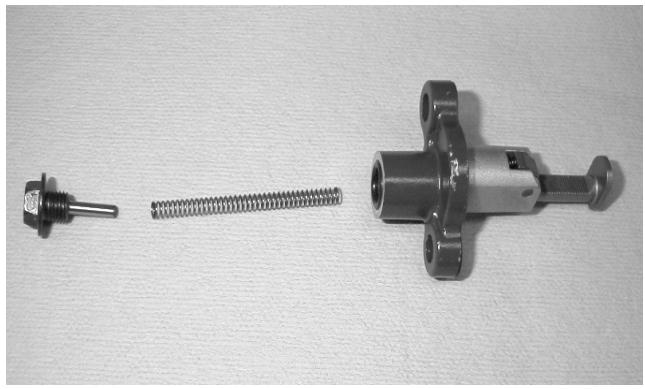
⚠ CAUTION

If any of the above factors are not as stated, go back to step 13 and carefully proceed.

⚠ CAUTION

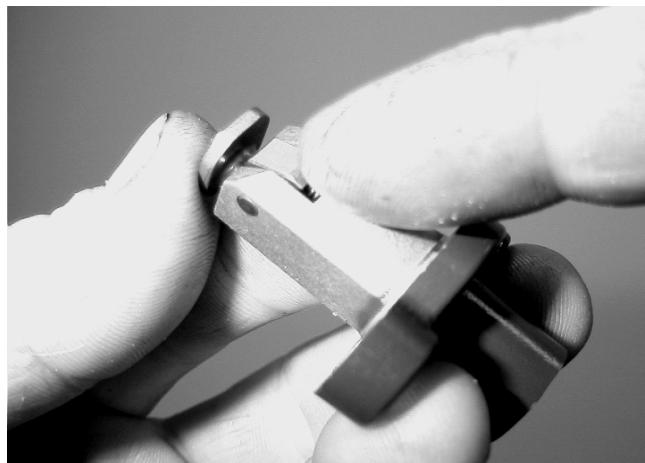
Care must be taken that the tab washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.

- 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.



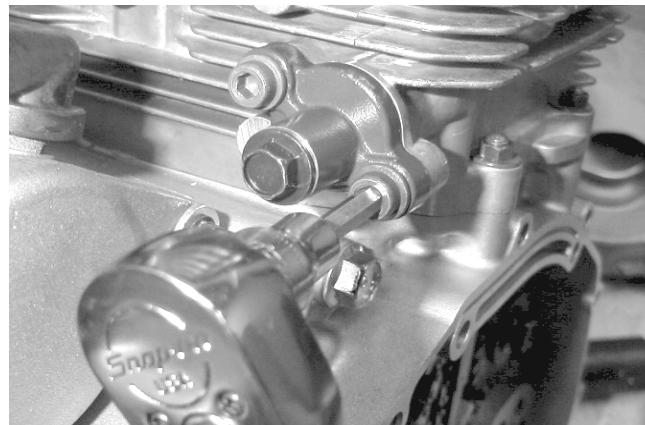
MD1248

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



MD1146

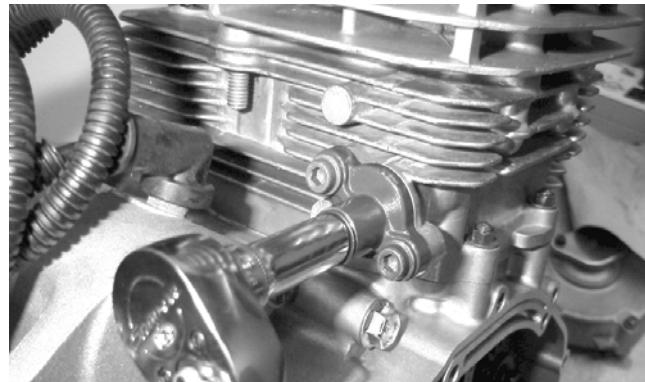
- 20. Place the cam chain tensioner assembly and gasket into the cylinder making sure the ratchet side is facing toward the top of the cylinder and secure with the two Allen-head screws.



MD1254

3

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

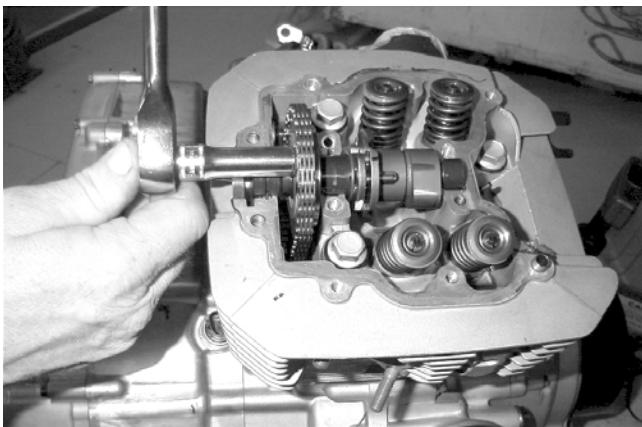


MD1245

- 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

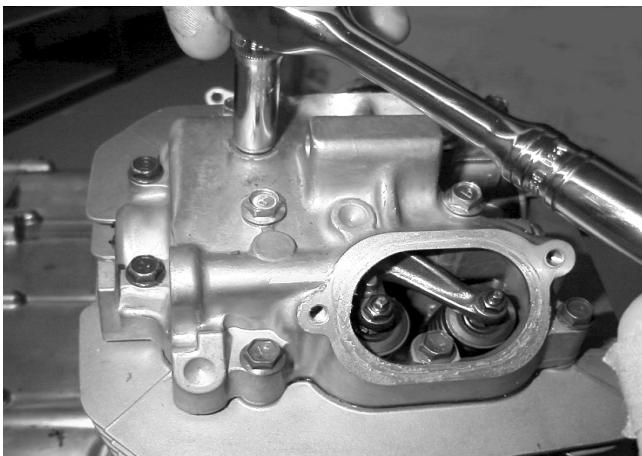


MD1137

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

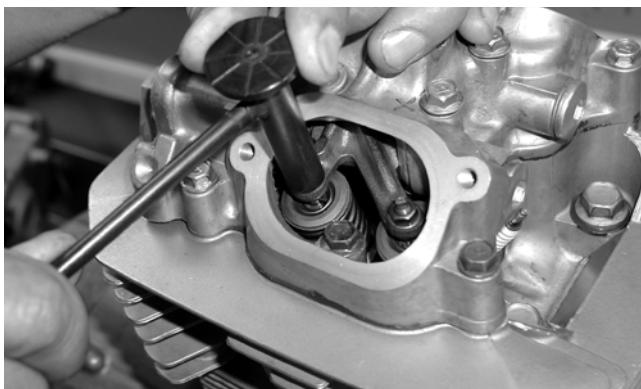
28. In a crisscross pattern starting from the center and working outward, tighten the cap screws (from step 27) to 1 kg-m (7 ft-lb).
29. Adjust valve/tappet clearance using the following procedure.

■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.



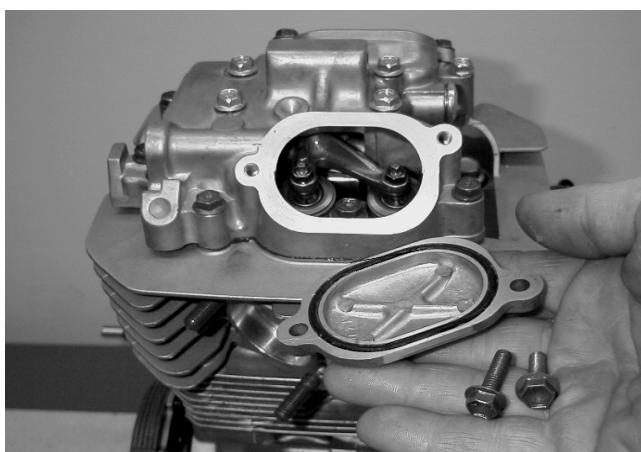
CD001

- 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 counterclockwise until proper valve/tappet clearance is attained.

■NOTE: Refer to the appropriate Specifications 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.

- 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.

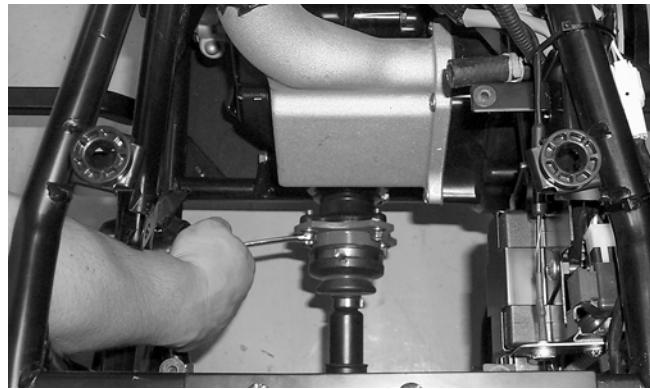
Installing Engine/Transmission

■ **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.



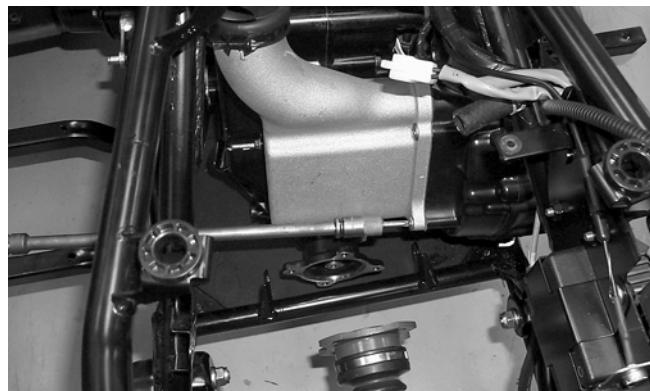
3. Position the two upper rear engine mounts in place on the frame and loosely secure with existing hardware; then install the three engine mounting through-bolts making sure to account for a washer on the upper bolt and a spacer on the lower front bolt. Tighten only until snug.
4. Align the front and 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).



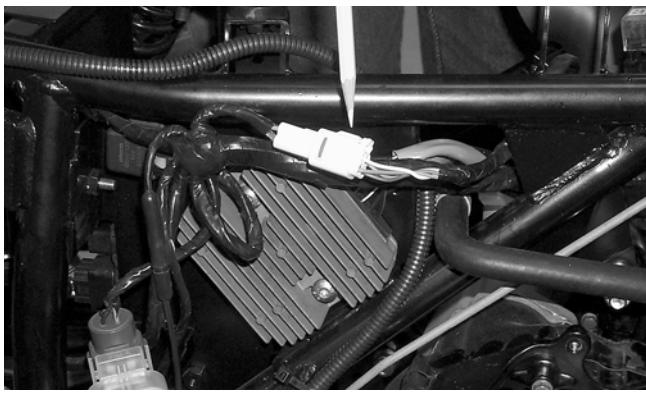
3



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.



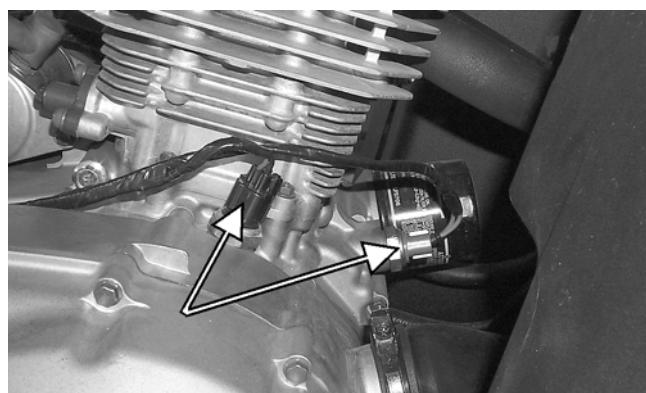
10. Secure the engine ground wire to the engine with a cap screw. Tighten to 1.1 kg-m (8 ft-lb).
11. Install the shift indicator connector to the main wiring harness.



CC573

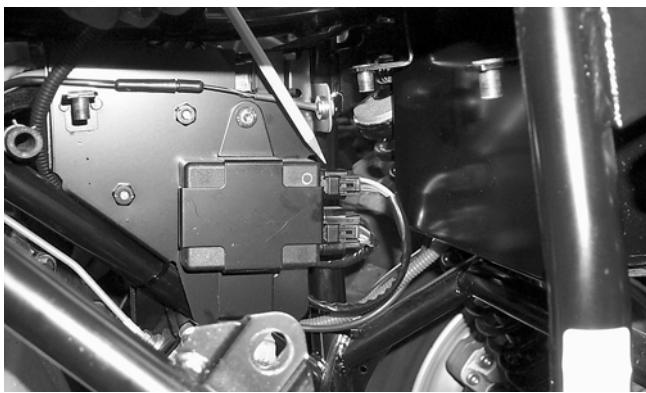
12. Connect the temperature sensor wires to the engine.

■ NOTE: There are two temperature sensors.



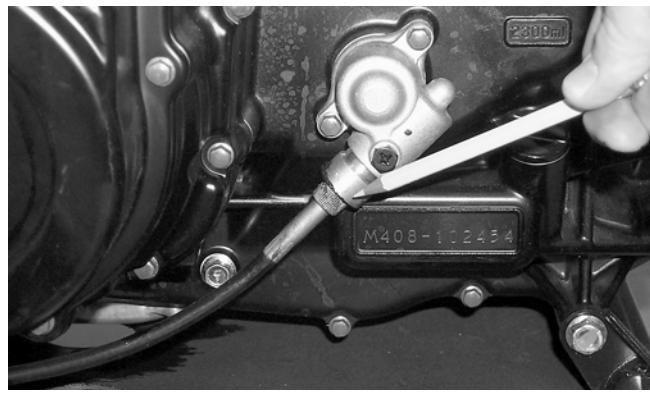
AF964B

13. Secure the stator wires to the CDI unit.



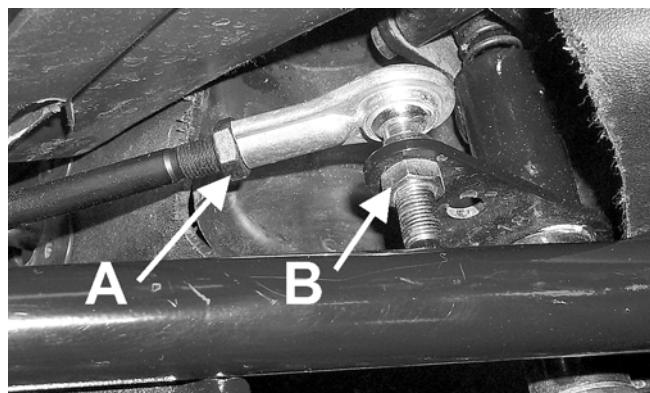
CC569

14. Secure the speedometer cable to the speedometer gear housing.



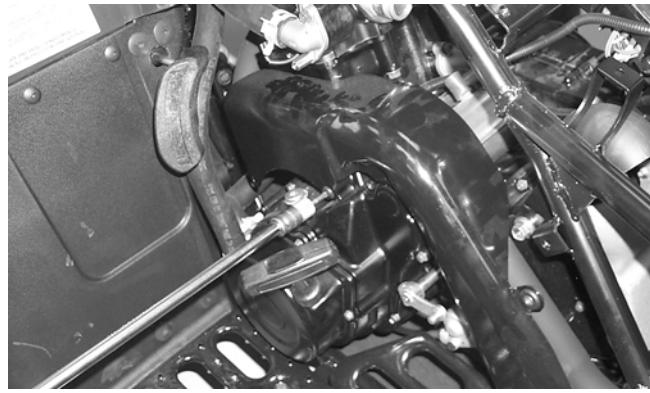
CC568

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.

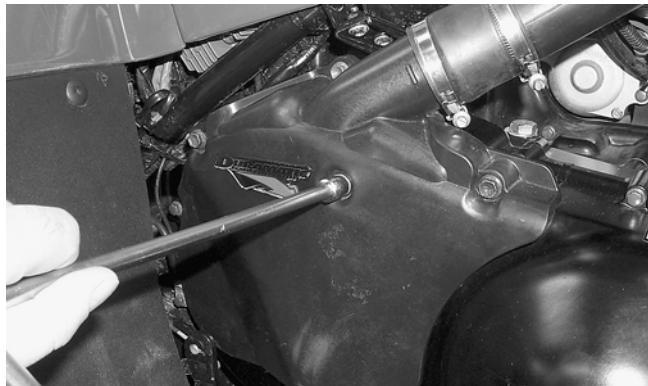


CC560

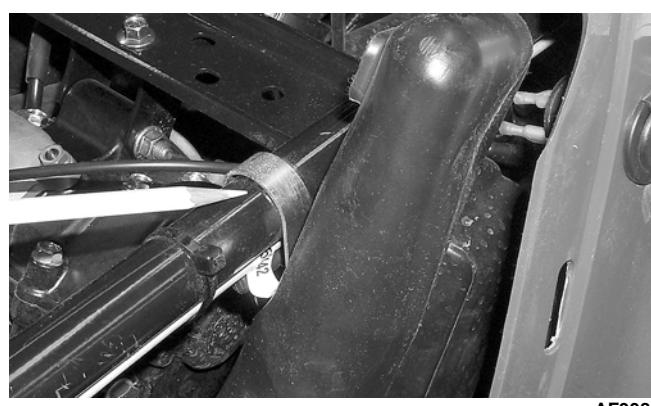
21. Install the carburetor into the intake hose. Tighten the hose clamp.

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.



CC534



CC533

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.



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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(500 - Automatic Transmission)

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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

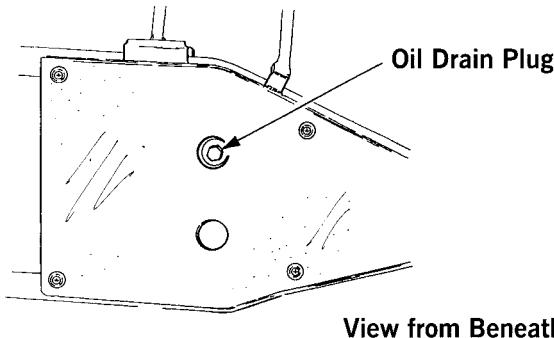
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

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

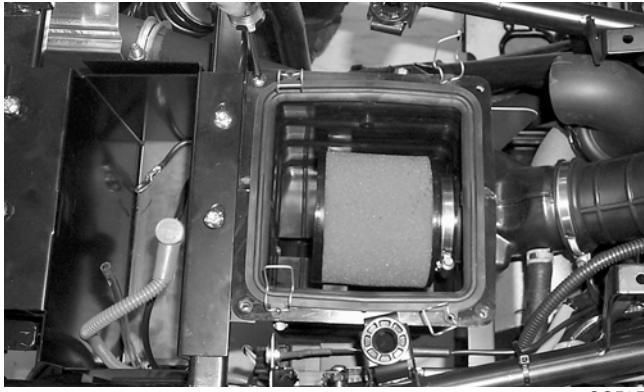
6. Remove the hardware securing the right-side and left-side panels; then remove the panels.
7. Turn the gas tank valve to the OFF position; then remove the fuel hose and vent hose.



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.



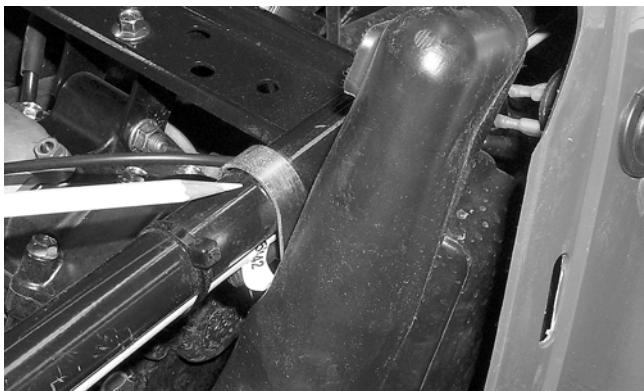
CC535

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.



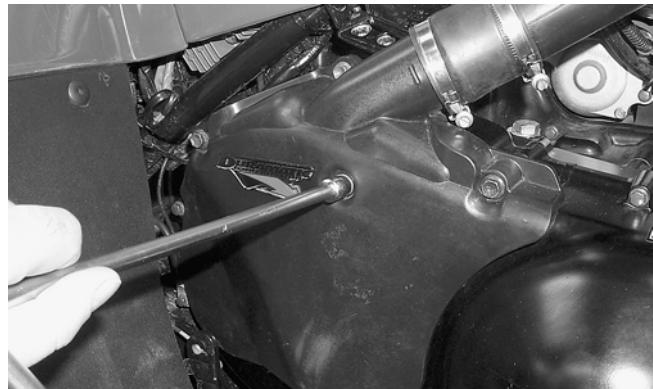
CC536

12. Remove the hardware securing the cooling duct assembly to the frame.



AF938

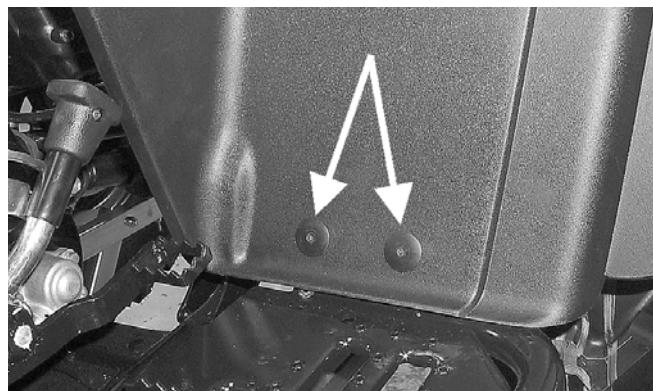
13. Remove the cooling duct shroud from the V-belt cover.



AF932

14. Remove the hardware securing both footrests to the frame and front fender.

3



CC861A

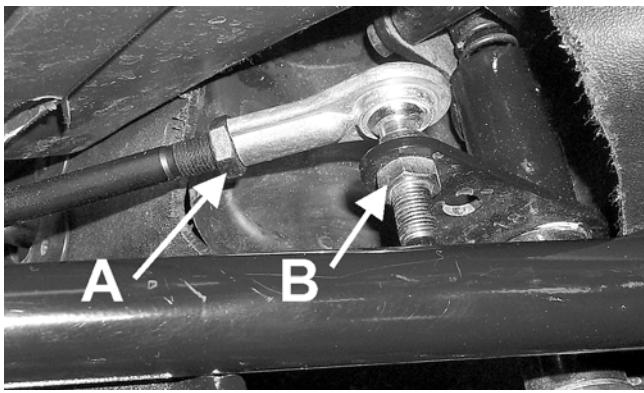
15. Loosen the clamp securing the carburetor to the intake; then route the carburetor assembly up and away from the engine.

16. Remove the E-clip securing the shift rod to the engine shift arm.

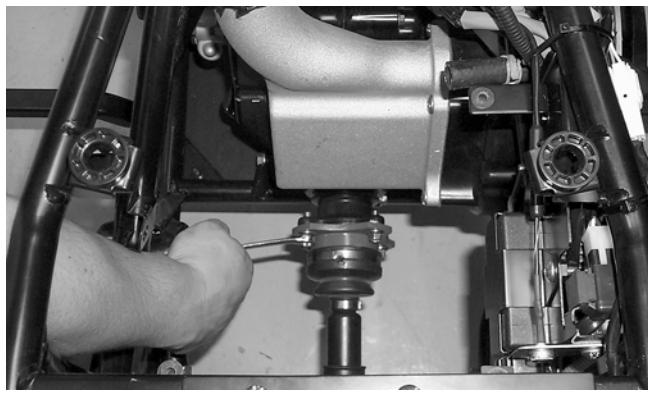


AF962

17. Remove the lock nut (B) securing the shift rod to the shift lever arm; then remove the shift rod.

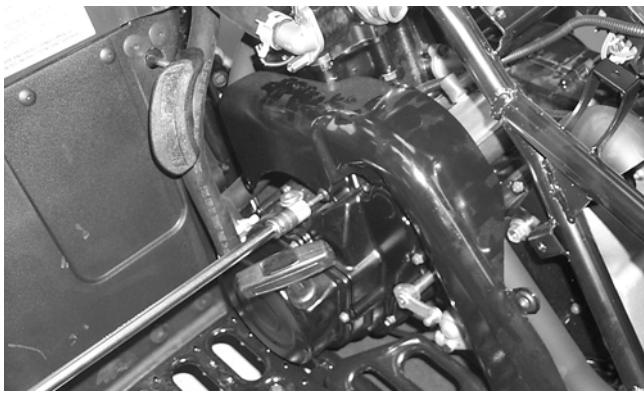


AF941A



CC565

18. Remove the torx-head screws securing the exhaust pipe shroud; then remove the shroud.



CC560



CC566

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.

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

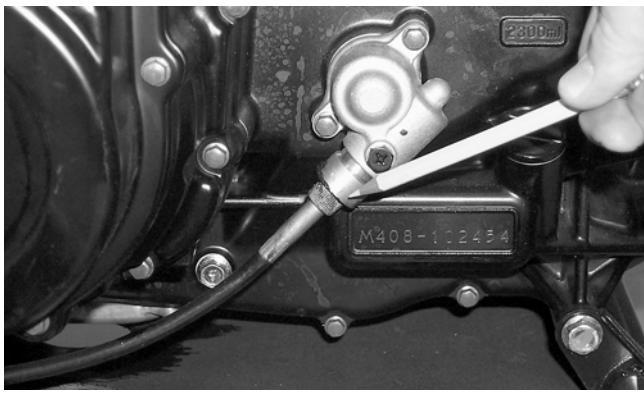
23. On the right side, cut the cable ties securing the wiring harness to the frame.



CC567

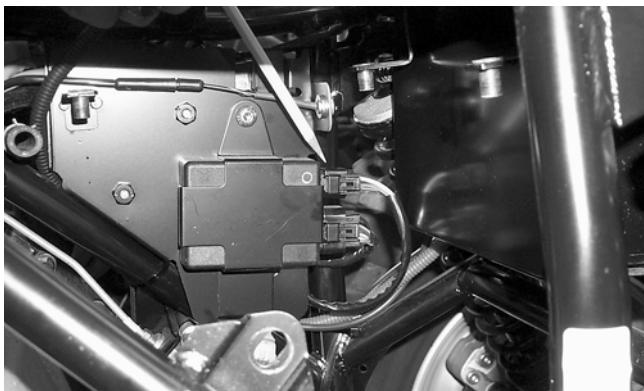
24. Remove the positive cable from the starter motor and route it out of the way.

25. Remove the speedometer cable from the speedometer gear housing.



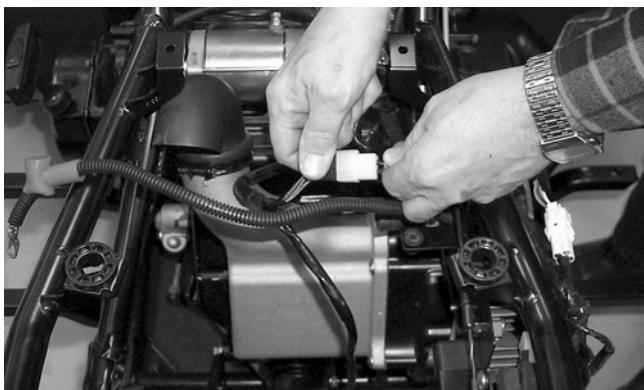
CC568

26. Disconnect the top connector at the CDI unit.



CC569

27. Disconnect the stator-to-rectifier/regulator connector.



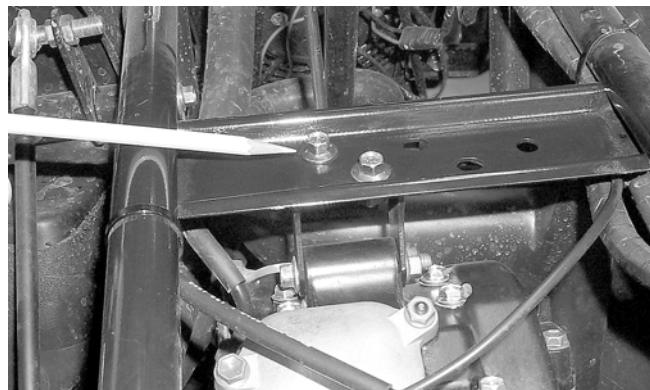
CC570

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

3

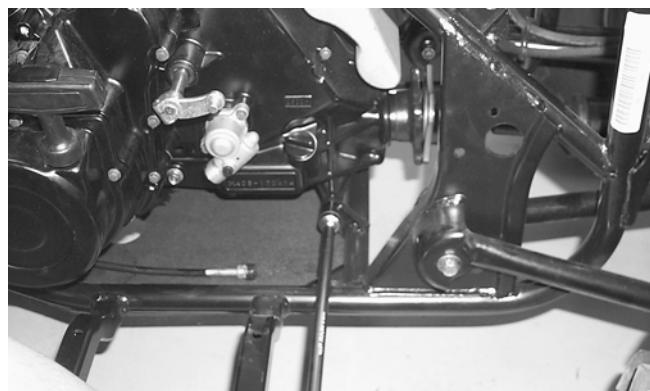
30. Remove the cap screw and flange nut securing the upper engine bracket to the engine; then remove the bracket.

31. Remove the spark plug wire from the spark plug.

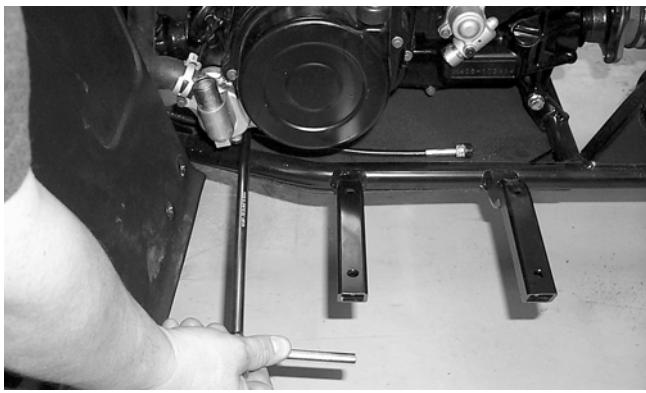
32. Remove the shift indicator connector from the main wiring harness.

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



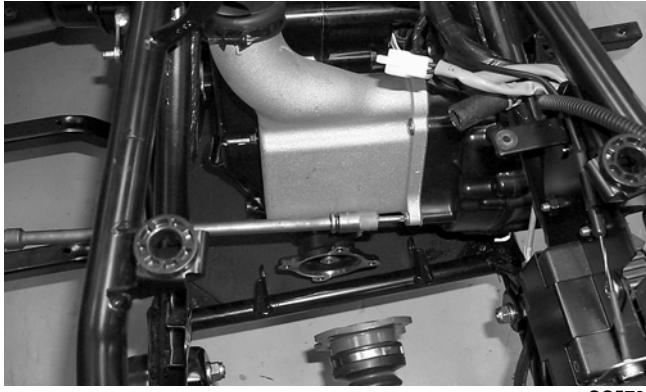
CC577

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.

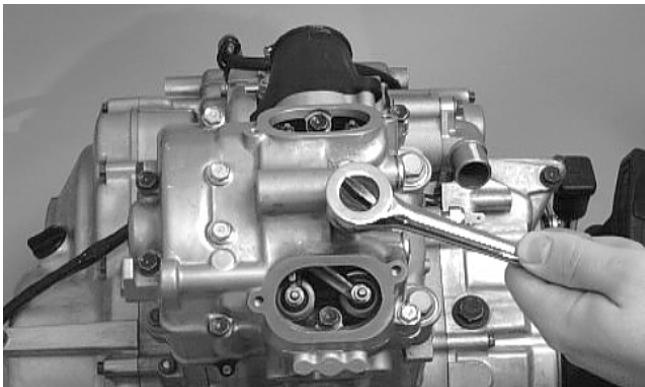
1. Remove the two tappet covers.



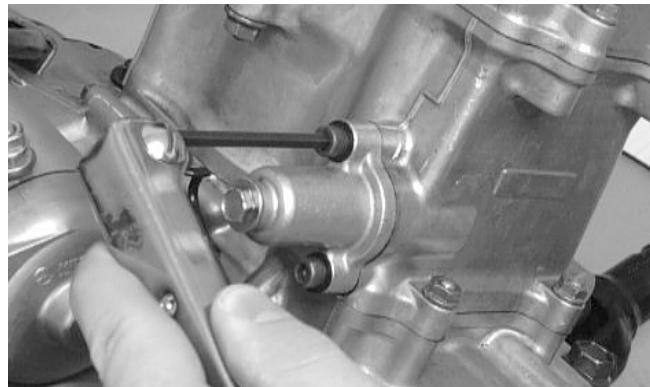
CC001D

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

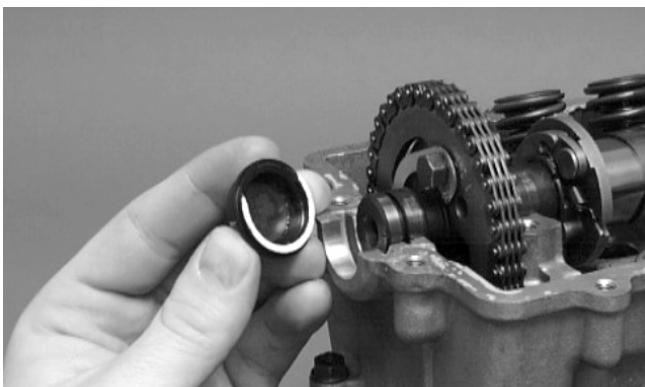
2. Remove the 12 cap screws securing the valve cover to the head; account for the four rubber washers on the top side cap screws. Remove the valve cover. Account for and note the orientation of the cylinder head plug. Note the location of two alignment pins.



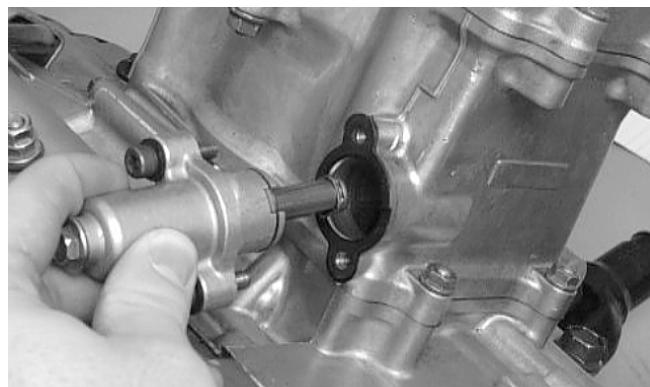
CC003D



CC010D

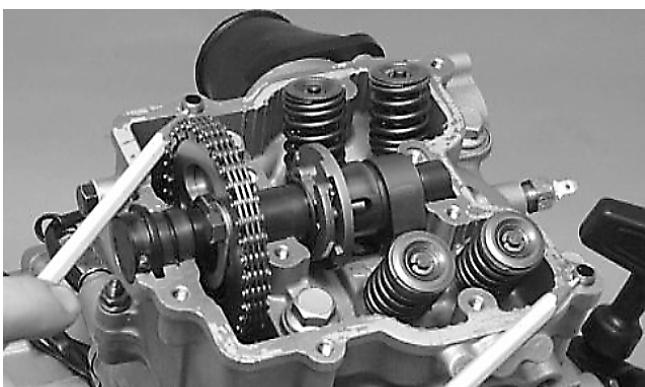


CC274D



CC011D

3



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

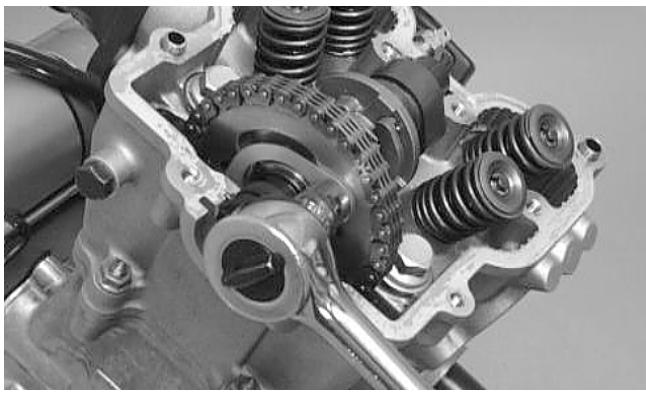
4. Using an awl, rotate the C-ring in its groove until it is out of the cylinder head; then remove the C-ring.

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



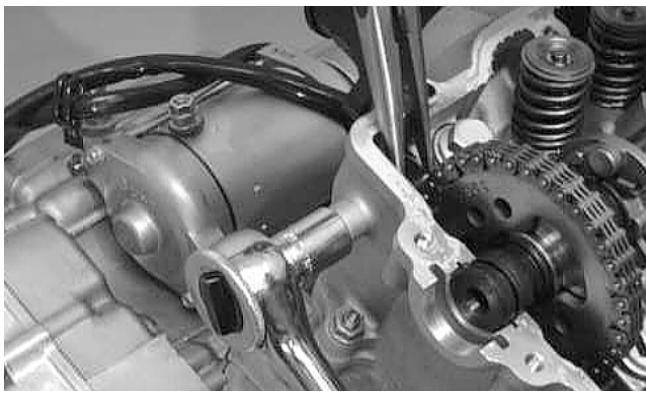
CC012D

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



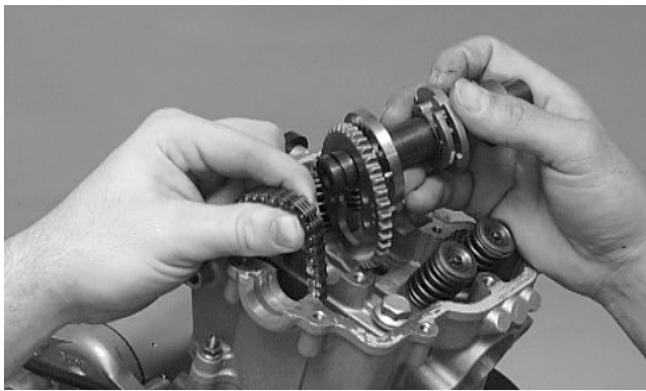
CC013D

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



CC014D

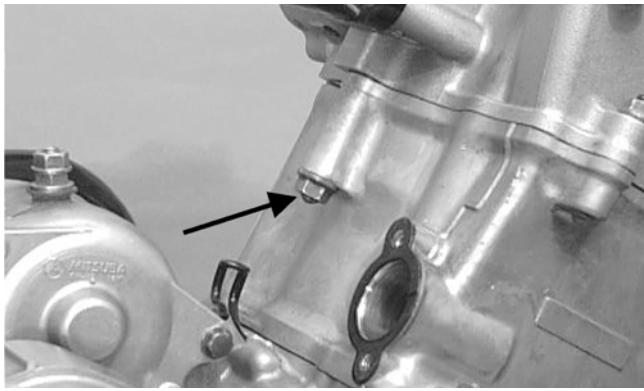
7. While holding the chain, slide the sprocket and camshaft out of the cylinder head.



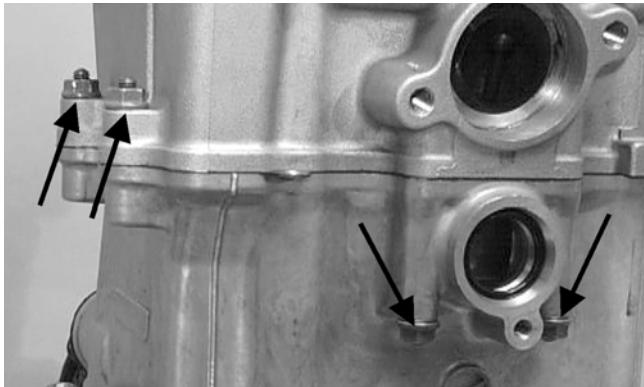
CC266D

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

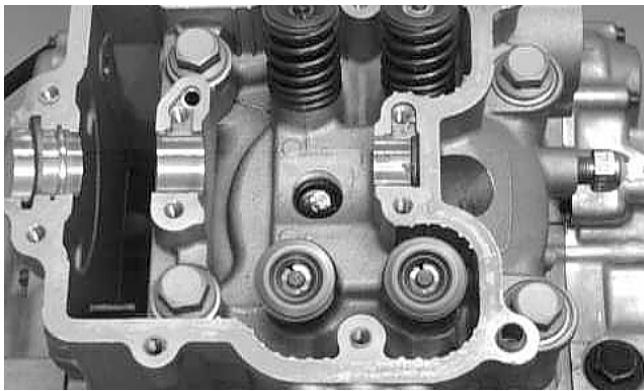
8. Remove the five nuts securing the cylinder head to the cylinder; then remove the four cylinder head cap screws with copper washers (note location of the different-sized cap screws and nuts).



CC017D

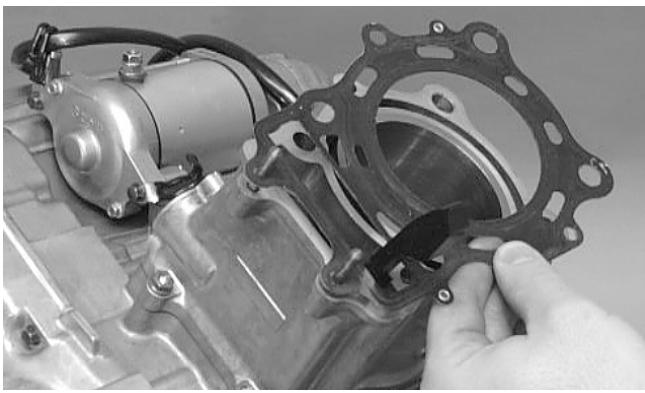


CC018D



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.



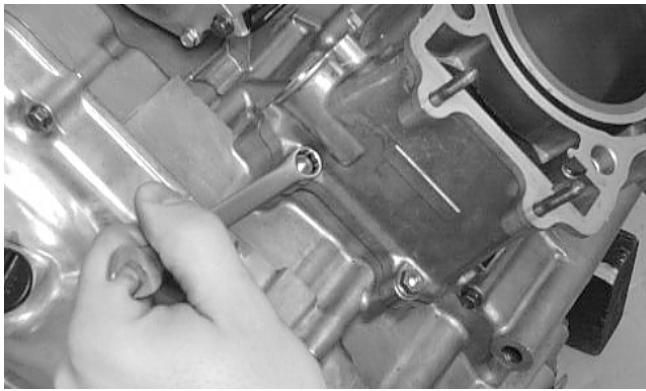
CC022D

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.

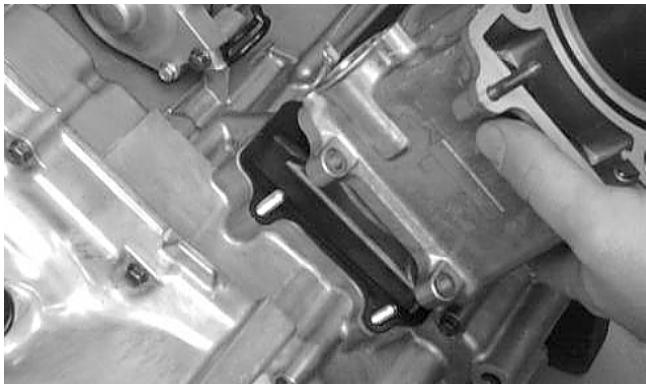
11. Remove the two nuts securing the cylinder to the crankcase.



CC023D

3

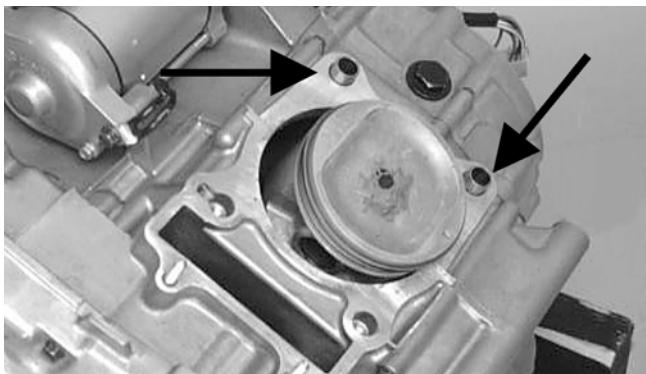
12. Lift the cylinder off the crankcase taking care not to allow the piston to drop against the crankcase. Account for the gasket and two alignment pins.



CC024D



CC025D



CC026D

■ 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.

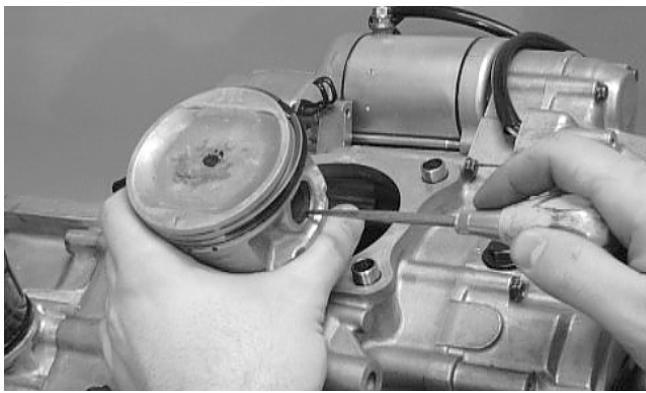
☞ AT THIS POINT

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.

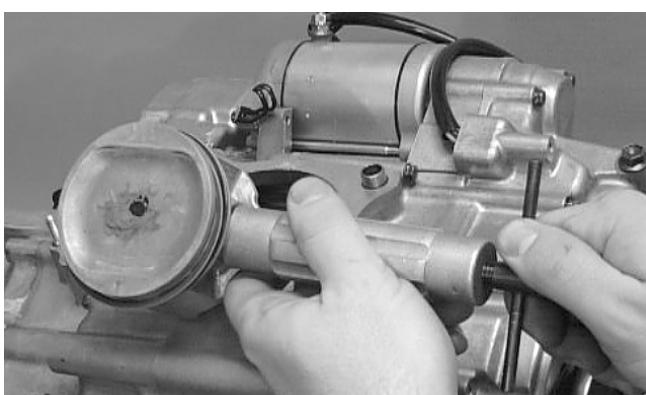
13. Using an awl, remove one piston-pin circlip.



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

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

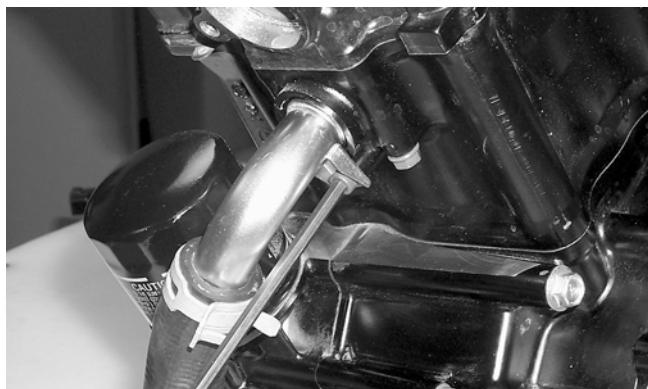
4. Remove the two cap screws securing the speedometer gear housing; then remove the housing. Account for the gasket.



CC625

3

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.

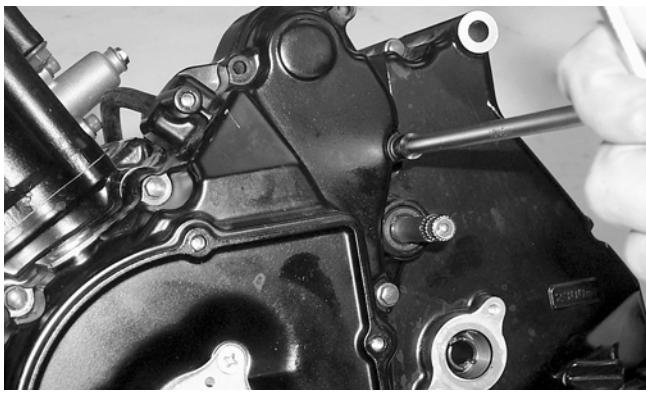


CC623

☞ AT THIS POINT

To service the water pump, see Section 4.

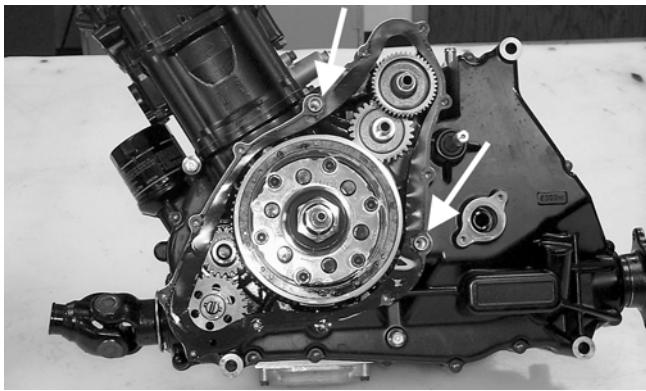
7. Remove the 13 cap screws securing the left-side cover to the crankcase noting the location of the different-sized cap screws for installing purposes.



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

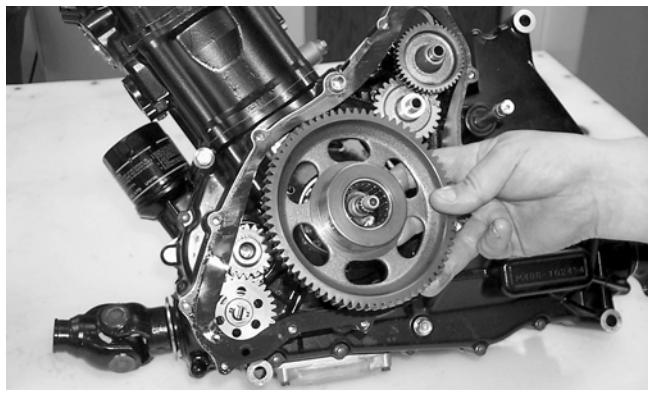
9. Remove the nut securing the magneto rotor to the crankshaft; then install the magneto rotor puller adapter.

■ 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.



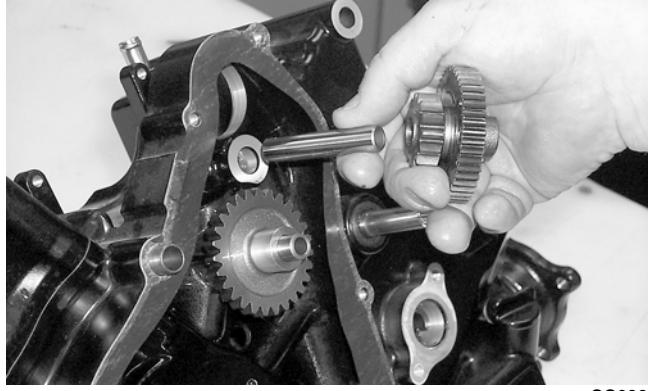
CC632



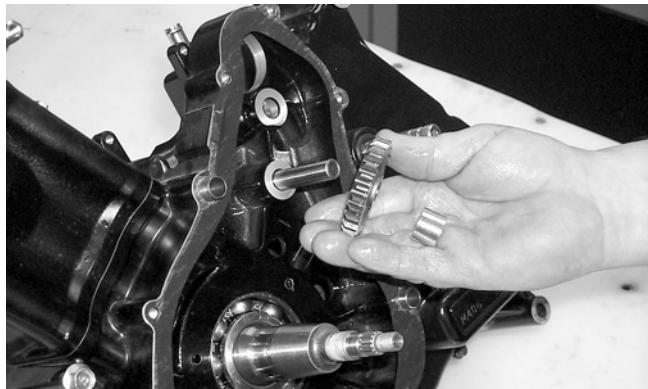
CC634

☞ AT THIS POINT
To service the magneto assembly, see Section 5.

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

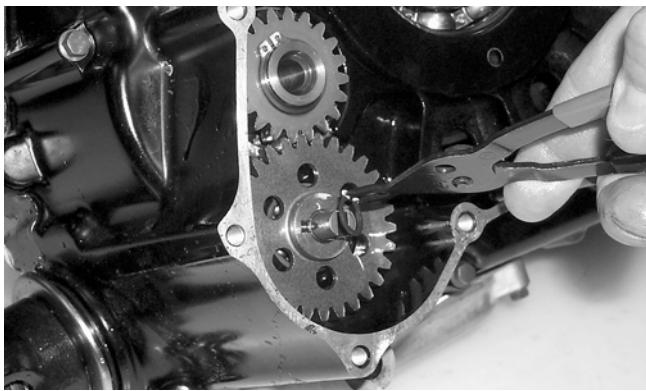


CC636



CC637

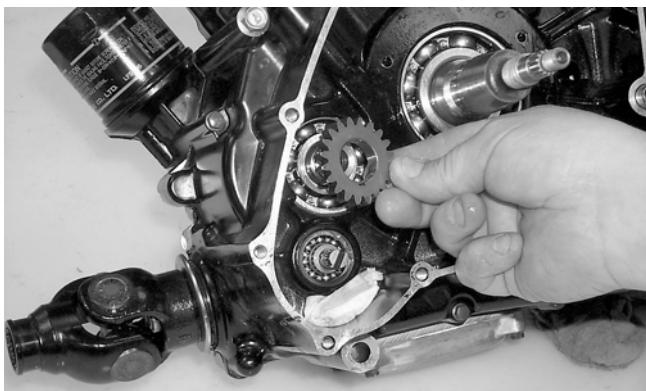
12. Remove the snap ring securing the water pump driven gear; then remove the gear noting the direction of the sides of the gear for installing purposes. Account for the driven gear alignment pin.



CC638

■ **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.

13. 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

3

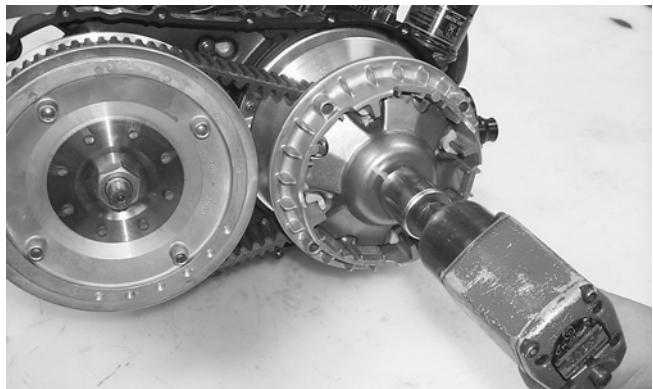
Removing Right-Side Components

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.

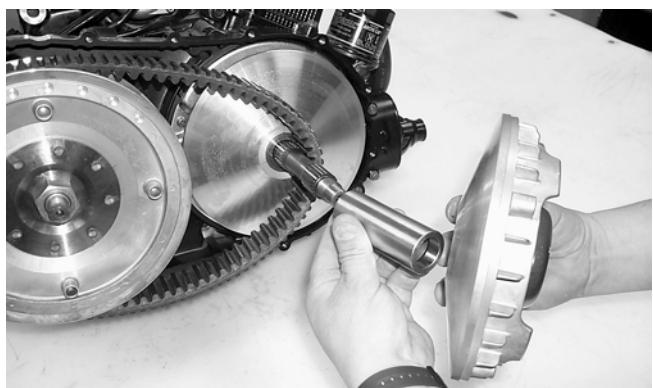


CC580

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



CC581



CC582

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.

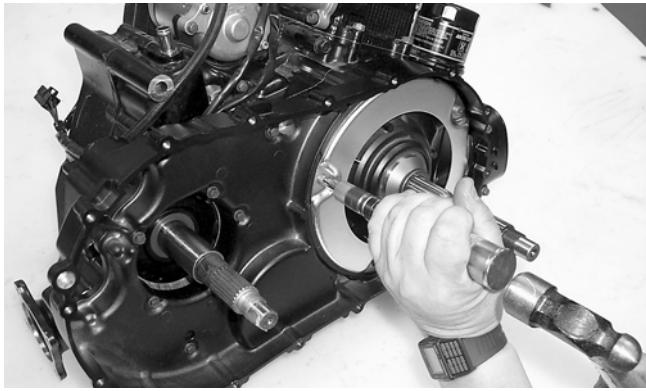
■ **NOTE:** The engine/transmission does not have to be removed from the frame for this procedure.

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

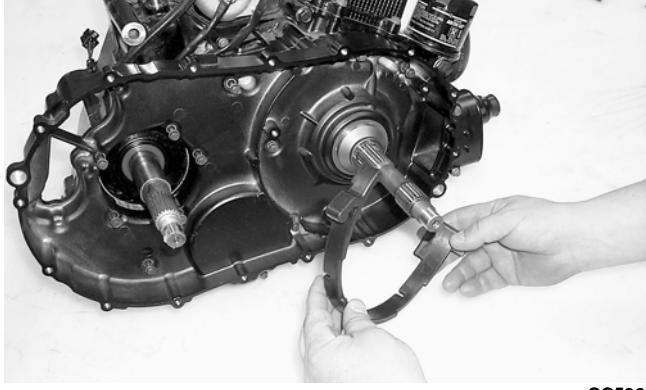


CC585

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

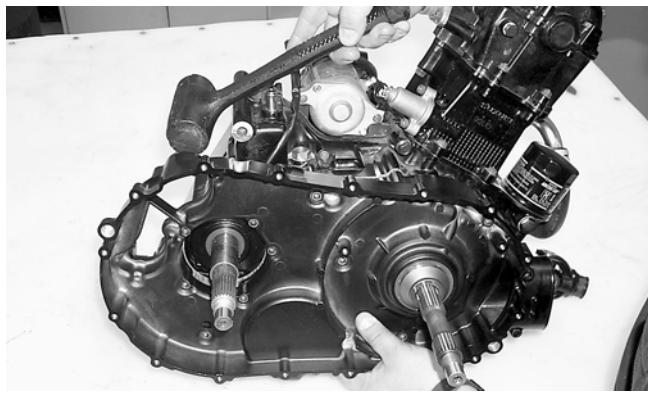


CC590

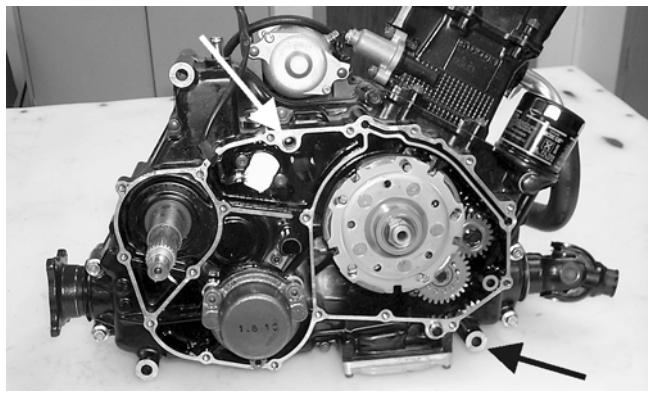
7. Remove the cap screws securing the clutch cover. Note the location of the different-lengthed cap screws for installing purposes. Using a rubber mallet, carefully remove the cover. Account for two alignment pins.

CAUTION

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

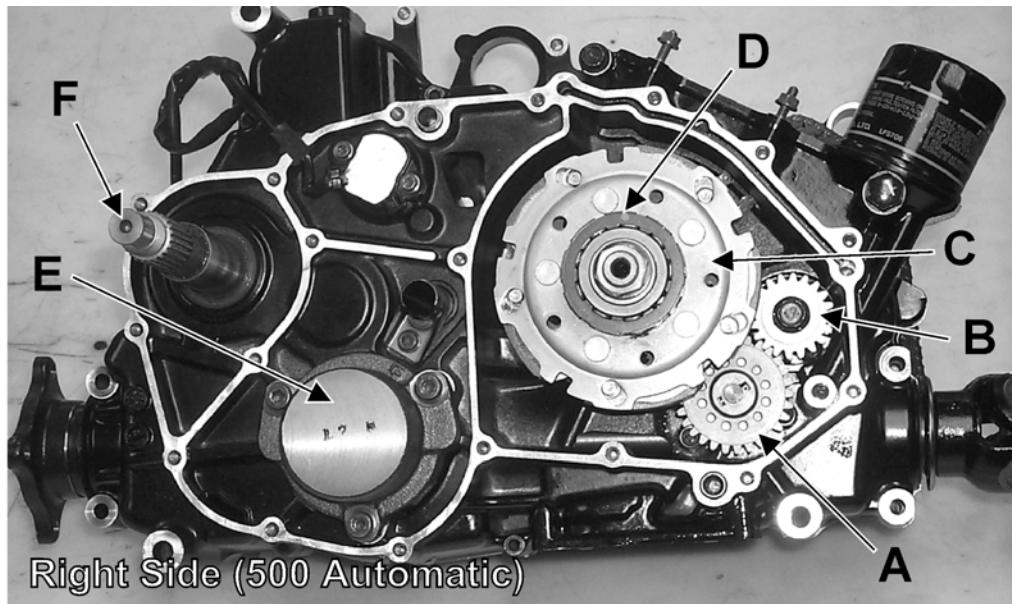


CC591



CC600A

■ NOTE: For steps 8-14, refer to illustration CC829A.



3

	KEY CC829A	
A. Oil Pump Driven Gear B. Oil Pump Drive Gear C. Clutch Shoe Assembly D. One-Way Clutch (Green Dot MUST show)		E. Final Drive Carrier Bearing Housing F. Input Shaft

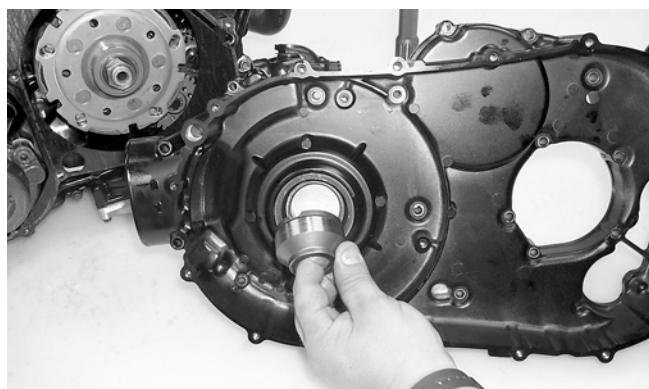
CC829A

■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.



CC596



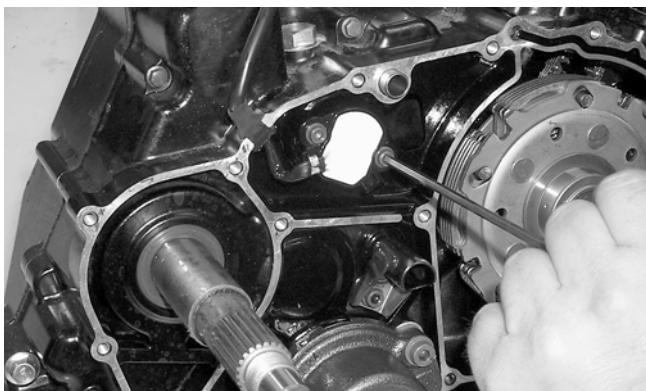
CC595

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

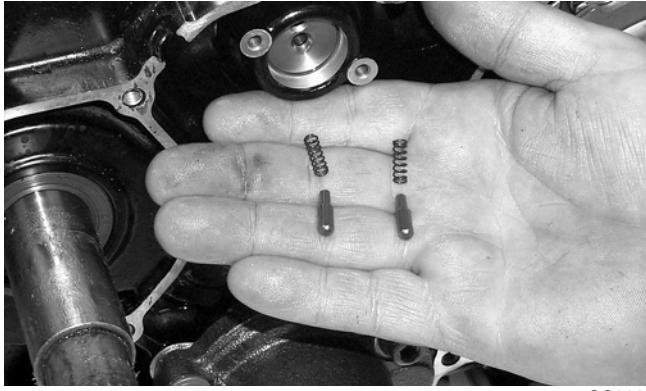


CC597

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

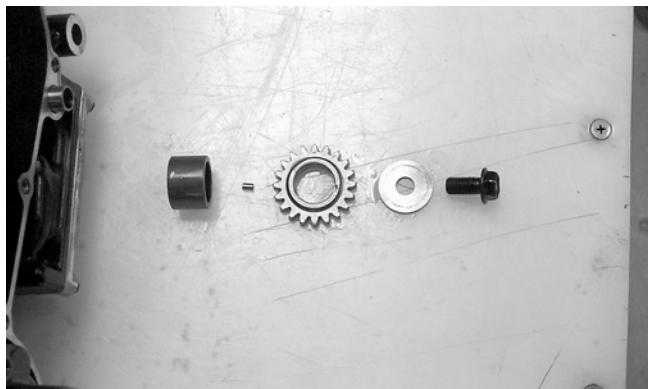


CC603

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

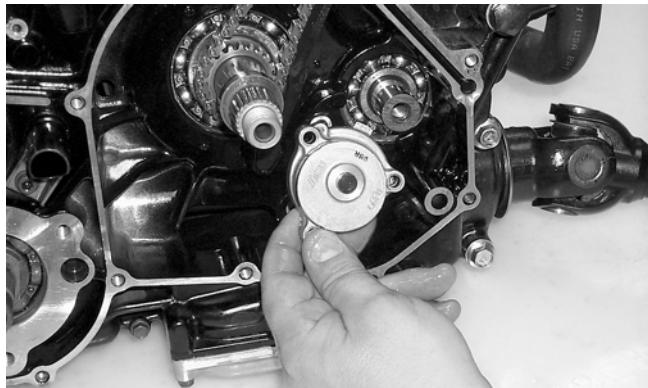
■NOTE: The washer is also directional. The flat side of the washer must face toward the clutch assembly when installing.

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

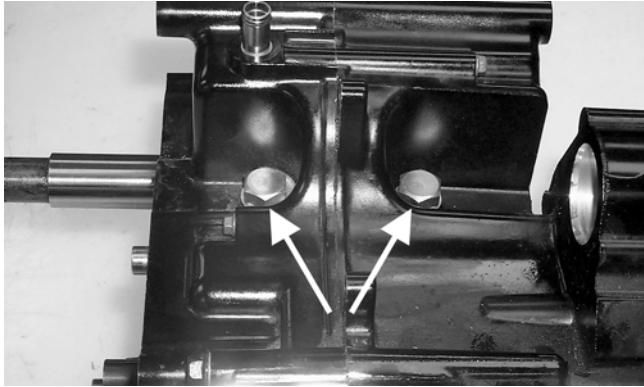
Center Crankcase Components

■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.

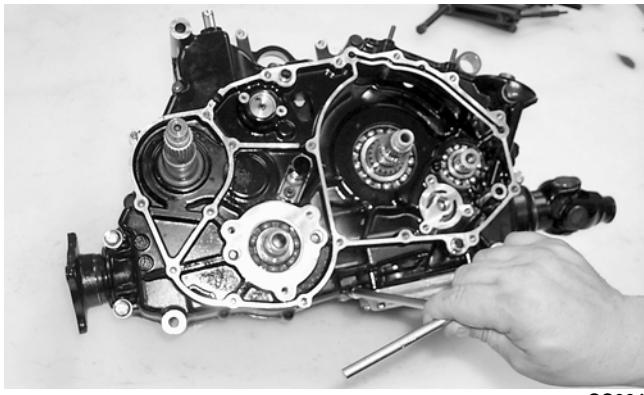
■NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

Separating Crankcase Halves

1. Remove the two shift cam stoppers from the top of the crankcase.



2. Remove the right-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws.



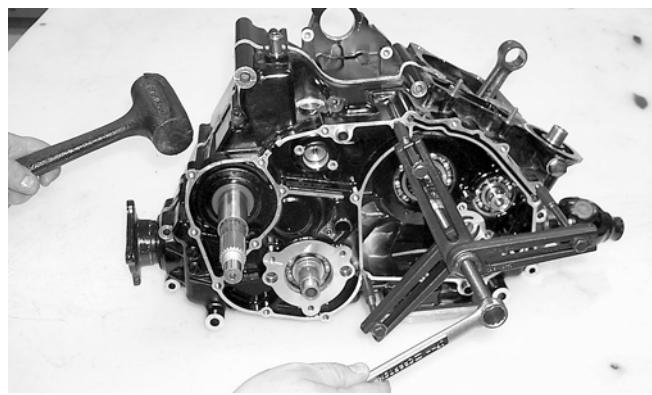
3. Remove the left-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws.



3

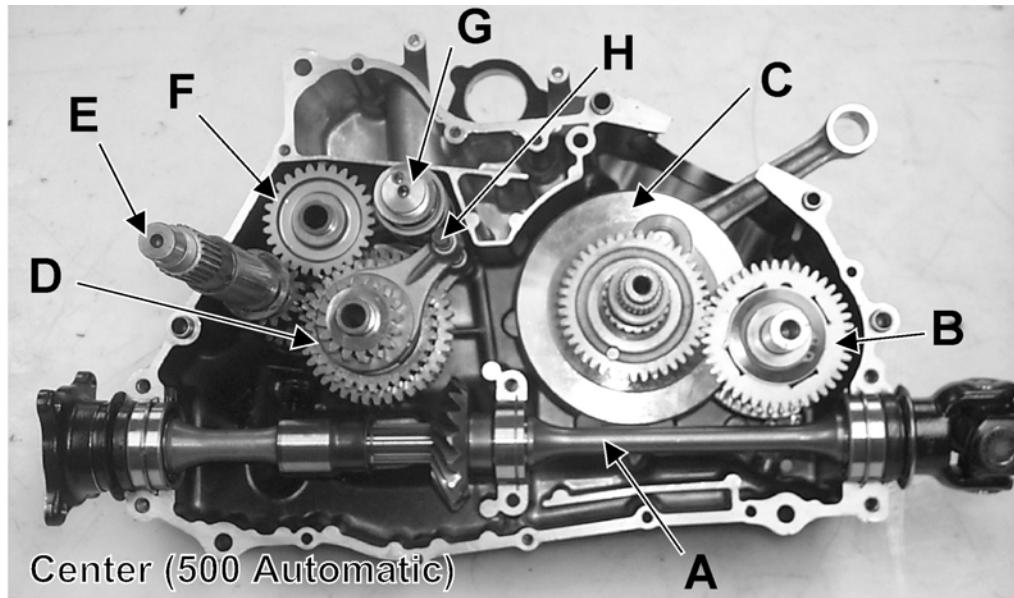
4. Using the Crankcase Separator/Crankshaft Remover (p/n 0444-009) and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins.

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



Disassembling Crankcase Half

■ NOTE: For steps 1-7, refer to illustration CC821A.



KEY CC821A	
A. Secondary Driven Shaft Assembly	E. Driveshaft
B. Crank Balancer Assembly	F. Reverse Idler Gear Assembly
C. Crankshaft	G. Gear Shift Shaft
D. Countershaft Assembly	H. Shift Shaft with 2 Forks

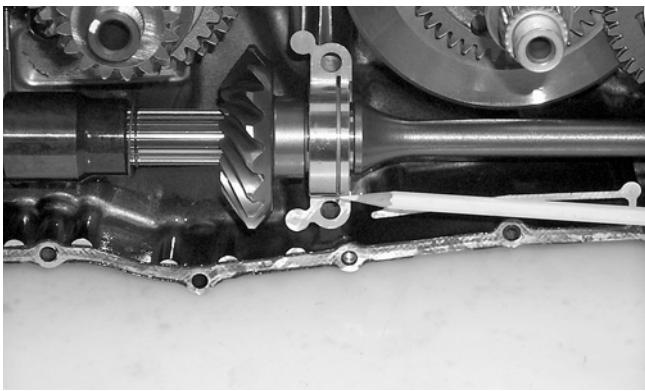
CC821A

■ 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.

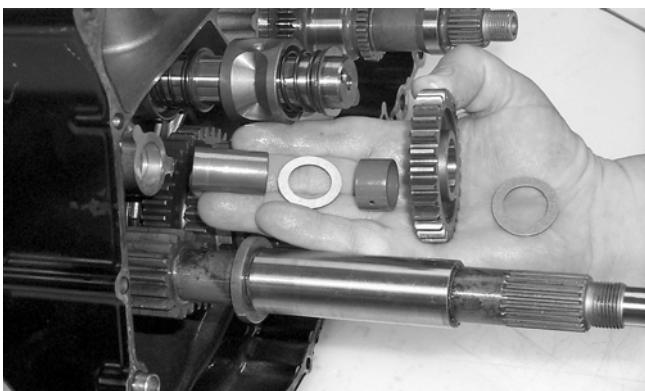


CC666



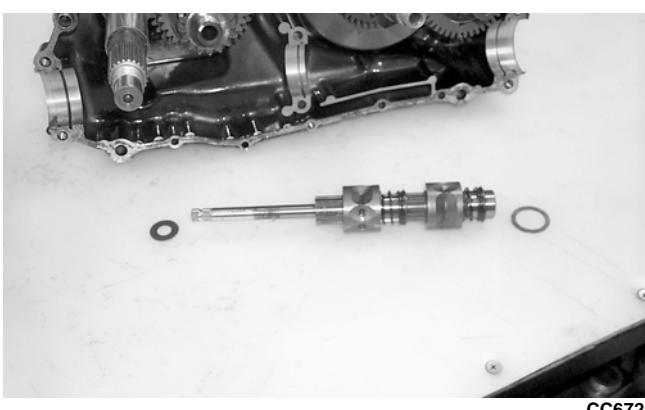
CC667

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



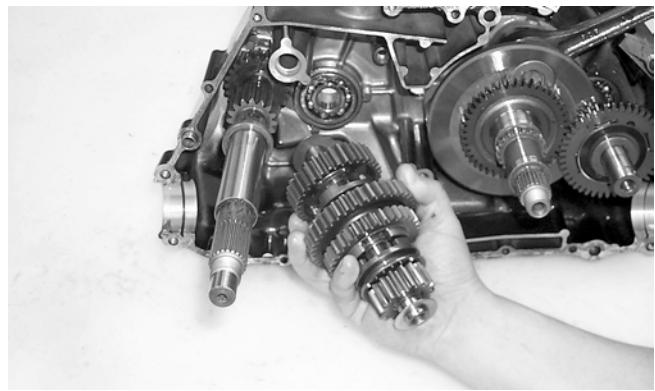
CC668

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

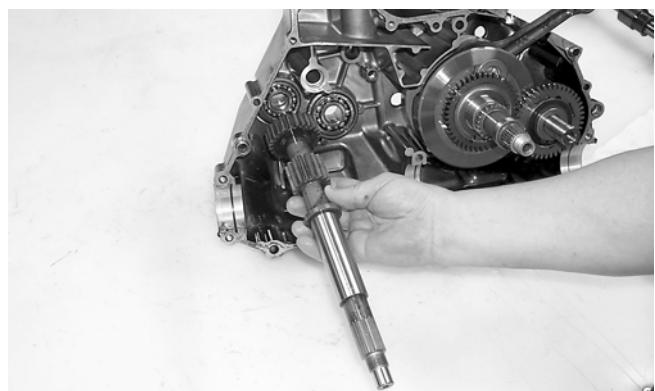
5. Remove the countershaft assembly (D). Account for a washer on each end of the countershaft.



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

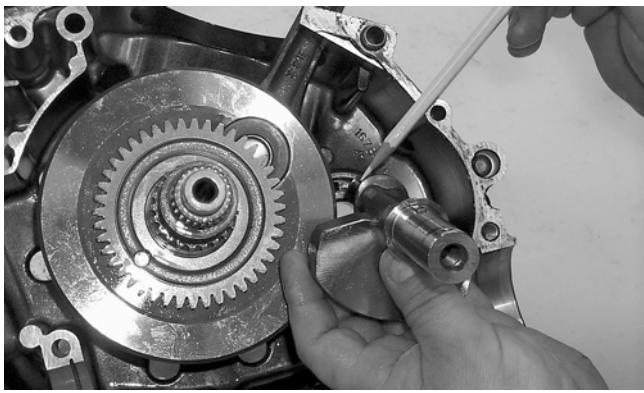
7. Note the alignment dots on the crank balancer assembly (B) gear and crankshaft (C) gear for assembling purposes; then slide the crank balancer gear off the crankshaft. Account for the key in the keyway.



CC676

8. Remove the crank balancer.

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



CC678

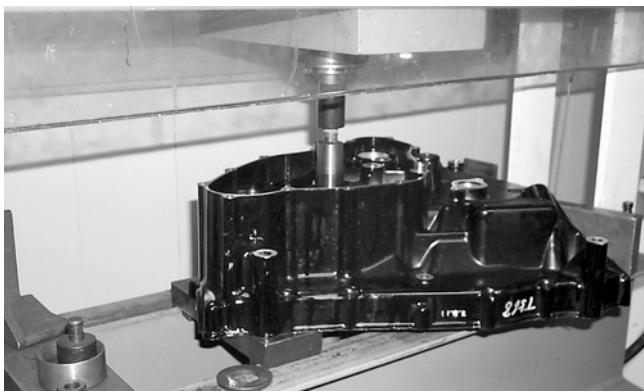
9. Remove the snap ring securing the water pump driven gear shaft.



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

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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.

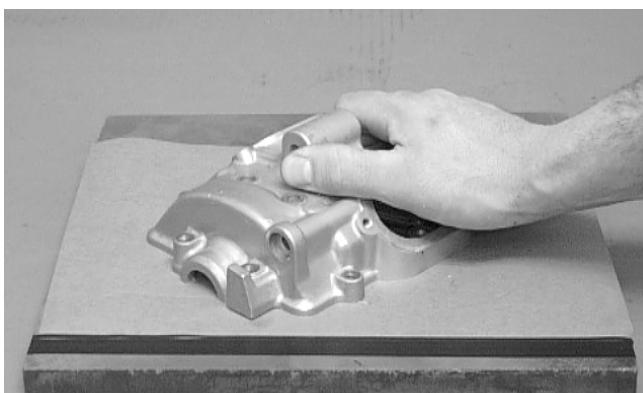
1. Wash the valve cover in parts-cleaning solvent.

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.

3



CC130D

CAUTION

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

Removing Valves

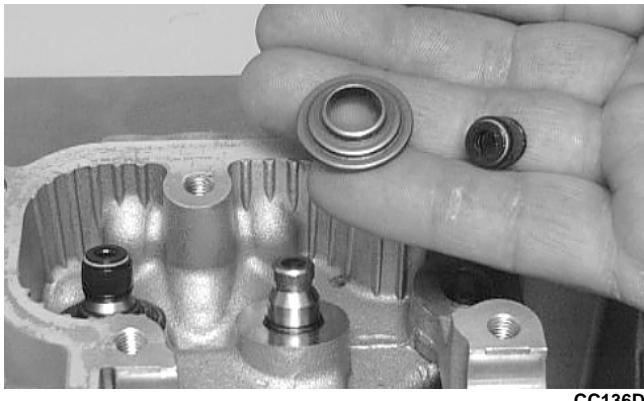
■ NOTE: Keep all valves and valve components as a set. Note the original location of each valve set for use during installation. Return each valve set to its original location during installation.

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



CC132D

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



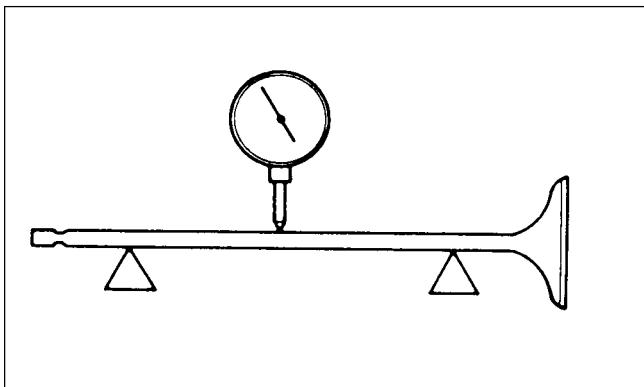
CC136D

■ **NOTE:** The valve seals must be replaced.

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

Measuring Valve Stem Runout

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



ATV-1082

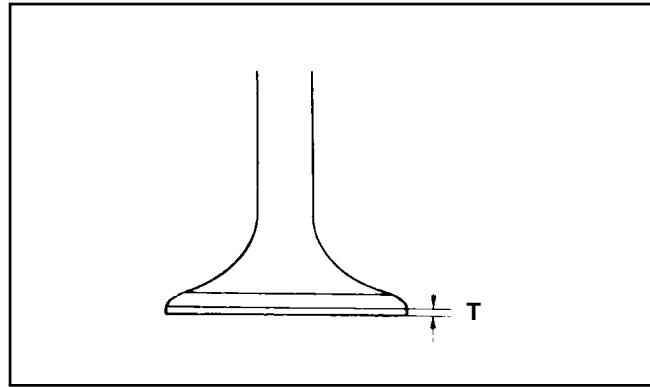
2. Maximum runout is 0.05 mm (0.002 in.).

Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) is 4.975-4.990 mm (0.1959 - 0.1965 in.).
3. Acceptable diameter range (exhaust valve) is 4.955-4.970 mm (0.1951 - 0.1957 in.).

Measuring Valve Face/Seat Width

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

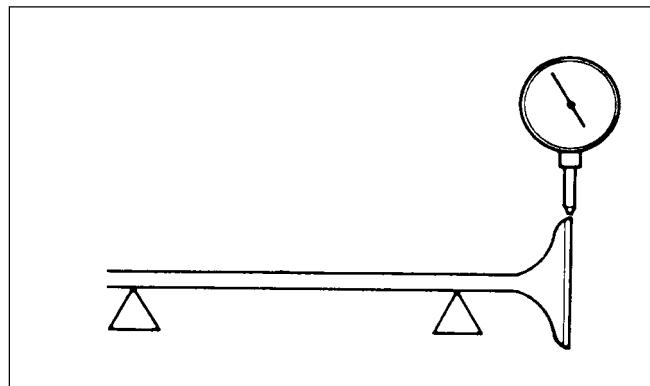


ATV-1004

2. Acceptable width range is 0.9-1.1 mm (0.035-0.043 in.).

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.

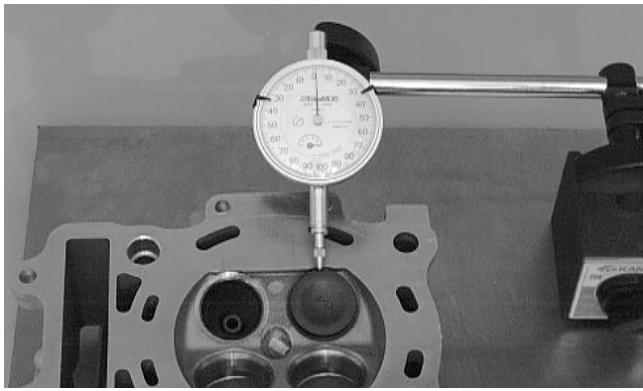


ATV1082A

3. Rotate the valve in the V blocks.
4. Maximum runout is 0.03 mm (0.001 in.).

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 is 0.35 mm (0.014 in.).

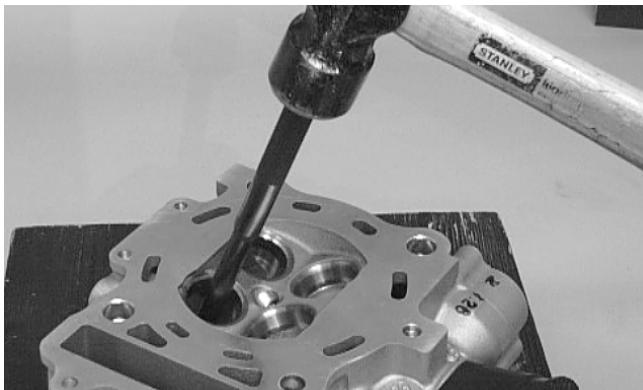
Measuring Valve Guide (Inside Diameter)

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 is 5.000 - 5.012 mm (0.1969 - 0.1973 in.).
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

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.



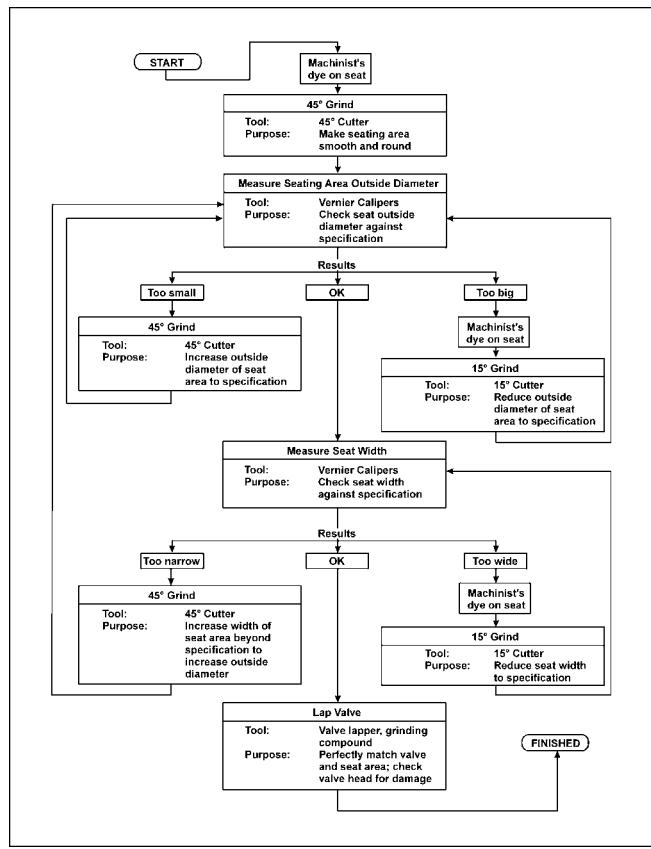
CC143D

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 is 12.000-12.018 mm (0.472-0.473 in.).

Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range is 11.973-11.984 mm (0.4714-0.4718 in.).

Installing Valves

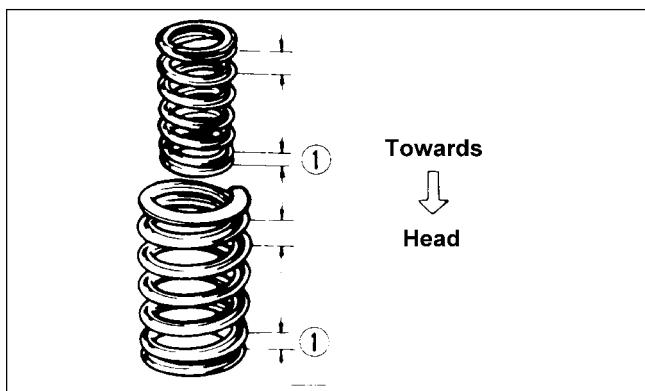
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



CC144D

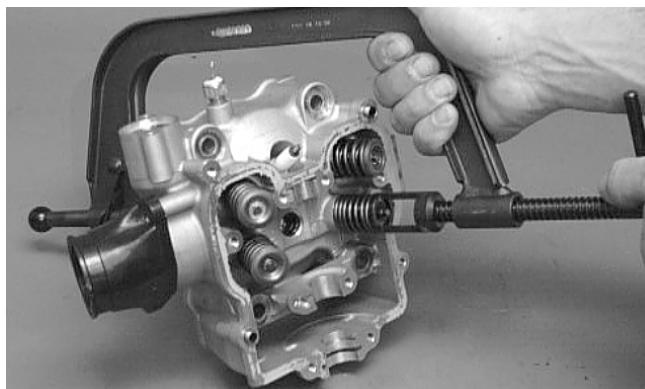
2. Insert each valve into its original valve location.
3. Install the valve springs with the painted end of the spring facing away from the cylinder head.

■ 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.



3

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

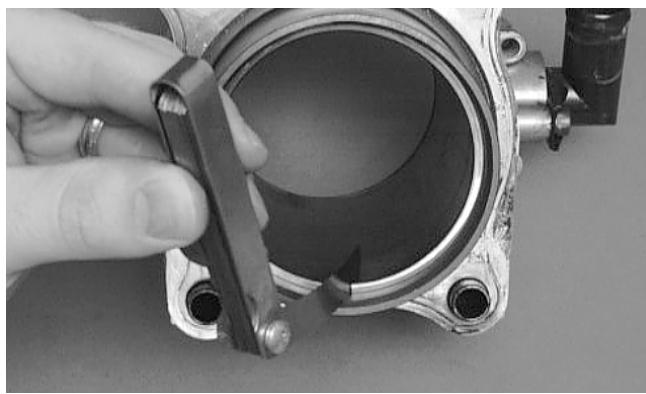
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

⚠ 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)

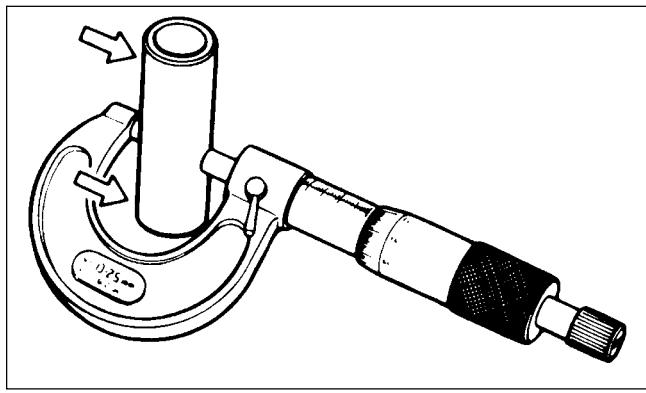
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within a range of 0.10-0.25 mm (0.0039-0.0098 in.) both rings.



CC280D

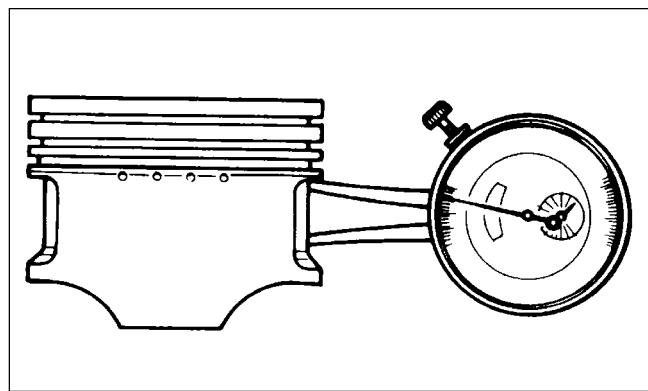
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is less than 22.98 mm (0.905 in.), the piston pin must be replaced.



ATV-1070

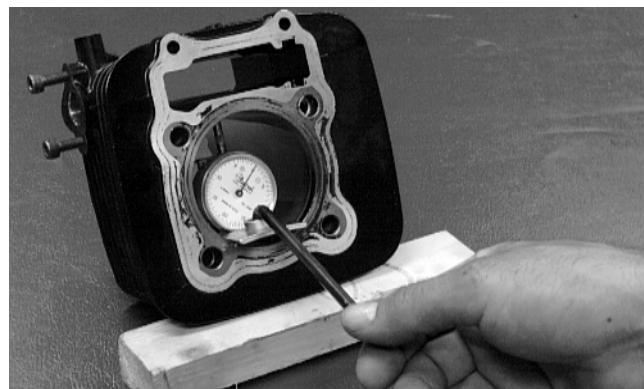
2. Insert an inside dial indicator into the piston-pin bore. The diameter must be a maximum 23.03 mm (0.907 in.). Take two measurements to ensure accuracy.



ATV-1069

Measuring Piston Skirt/Cylinder Clearance

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

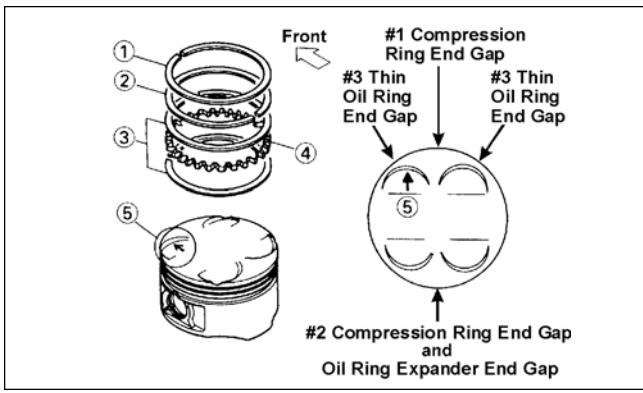


CC397D

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 a range of 0.030-0.040 mm (0.0011-0.0015 in.).

Installing Piston Rings

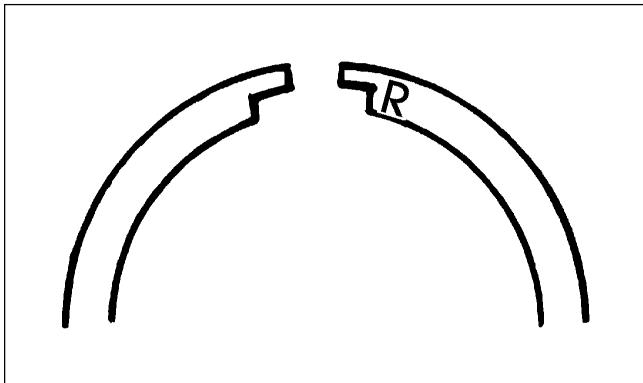
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



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

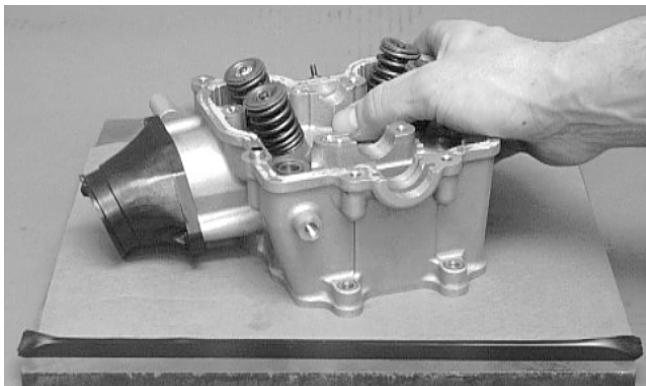
The cylinder head studs must be removed for this procedure.

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 is 0.05 mm (0.002 in.).



CC141D

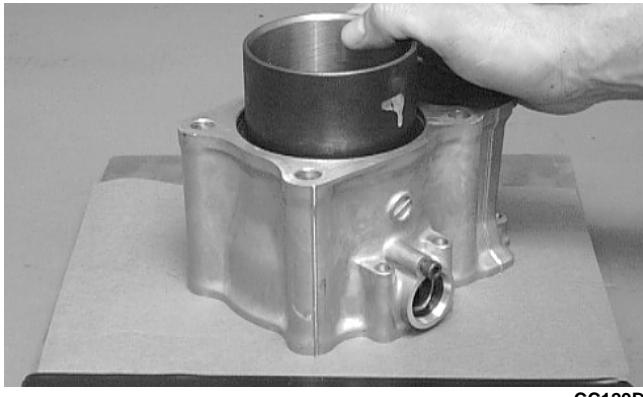
Cleaning/Inspecting Cylinder

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.



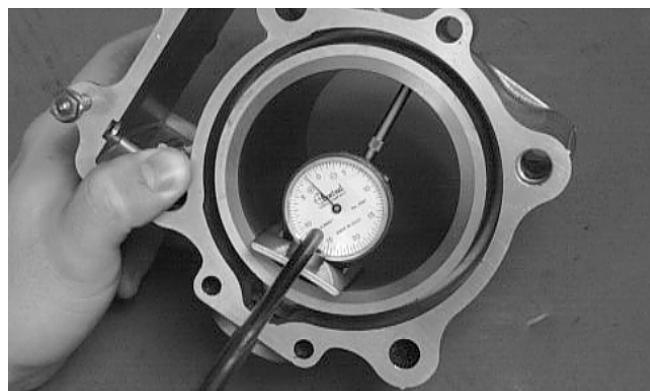
CC129D

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

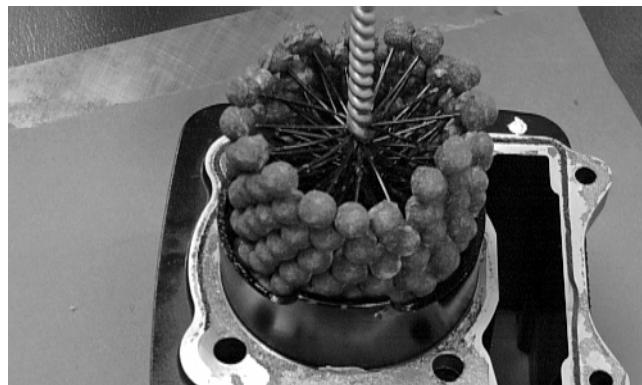
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must be 0.05 mm (0.002 in.).



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.

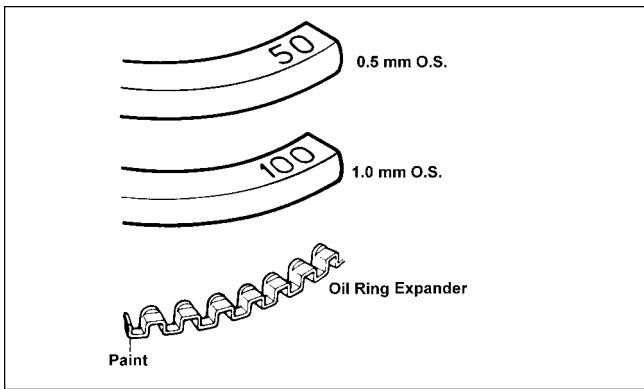
■ **NOTE:** To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately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

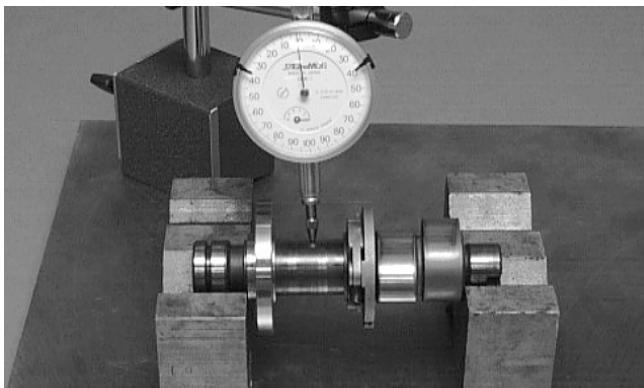


ATV-1068

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.

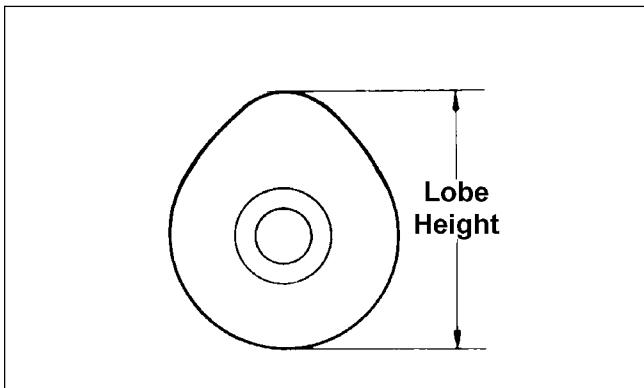


CC283D

2. Rotate the camshaft and note runout; maximum tolerance is 0.10 mm (0.004 in.).

Measuring Camshaft Lobe Height

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



ATV1013A

2. The intake lobe height must be a minimum 33.150 mm (1.305 in.); exhaust lobe height must be a minimum 33.220 mm (1.308 in.).

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.

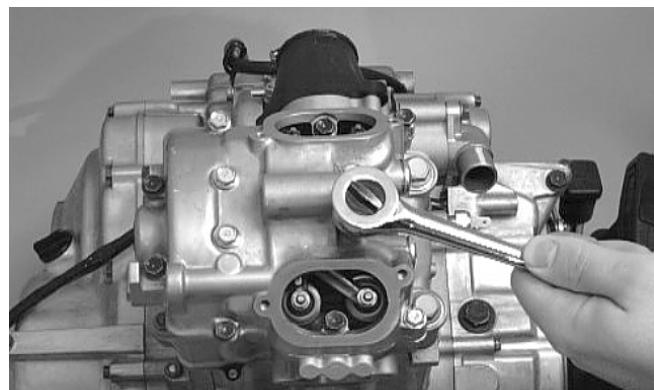


CC005D

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.

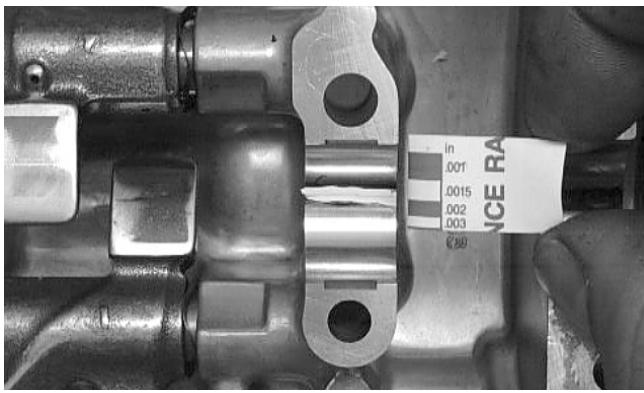
■ **NOTE:** Do not rotate the camshaft when measuring clearance.

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.

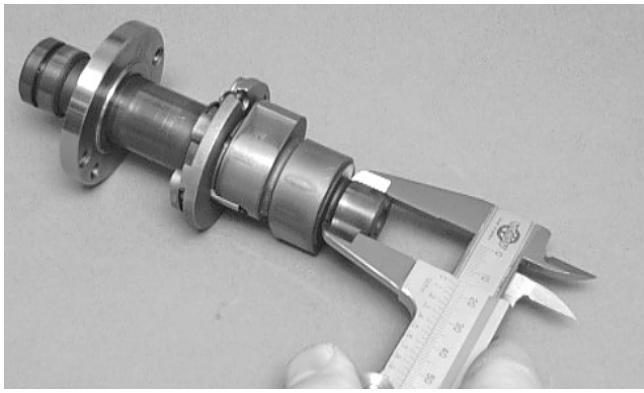


CC145D

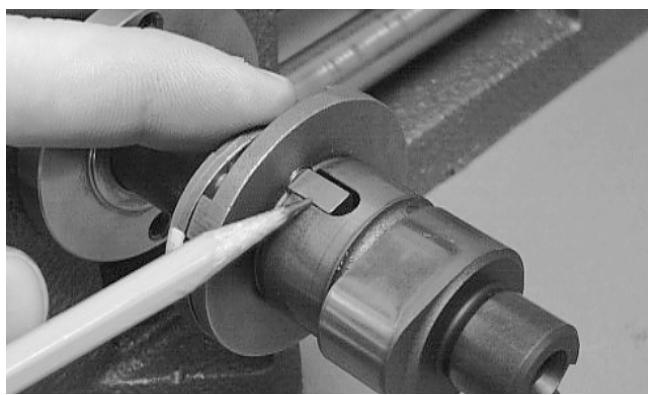


CC306D

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



CC287D



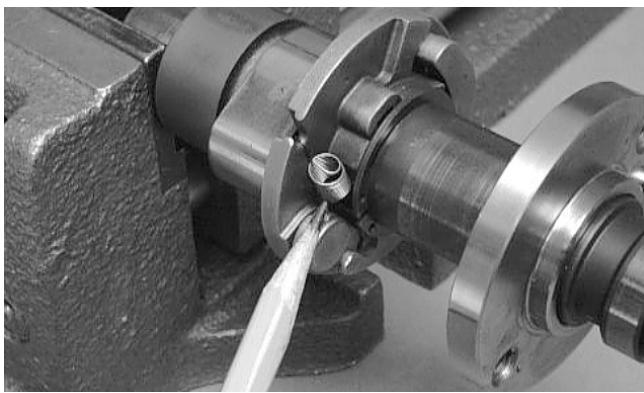
CC308D

2. If damaged, the camshaft must be replaced.

■ **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.



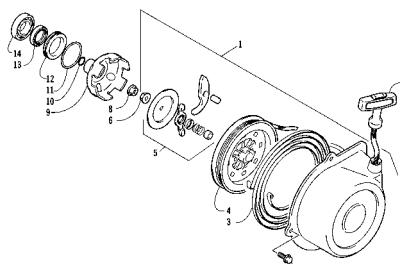
CC304D

Servicing Left-Side Components

RECOIL STARTER

KEY

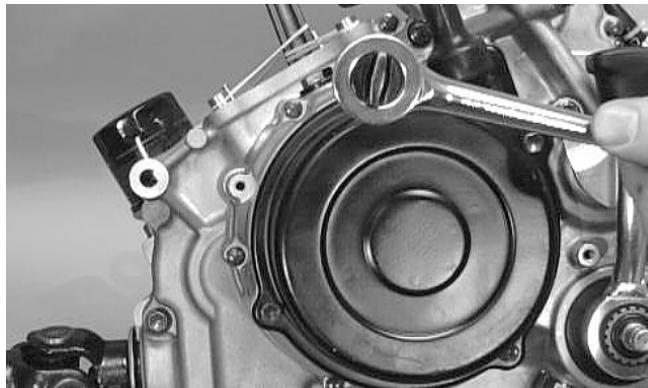
1. Recoil Starter Assy
2. Rope Assy
3. Spiral Spring
4. Reel
5. Ratchet Assy
6. Nut
7. Cap Screw
8. Nut
9. Starter Cup
10. O-Ring
11. O-Ring
12. Spacer
13. Oil Seal
14. Bearing



0737-764

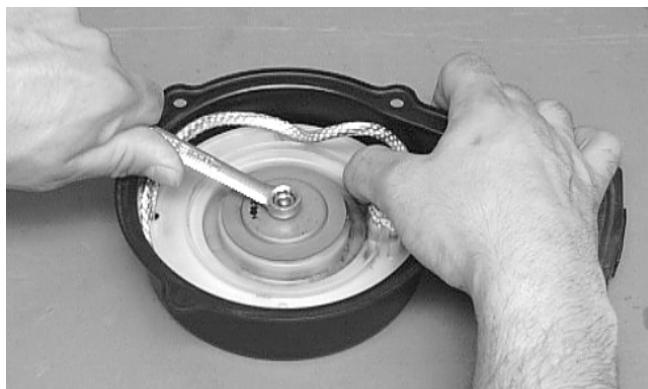
Removing/Disassembling

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



CC039D

3. Remove the nut.



B601D

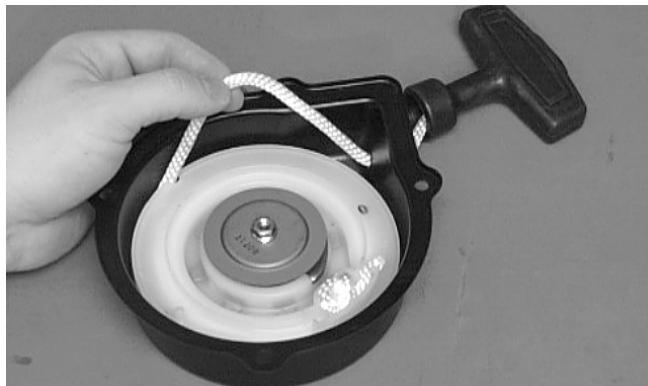
4. Slowly release the friction plate and lift the plate with ratchet guide free of the recoil case; then remove the ratchet guide from the friction plate.

3

⚠ WARNING

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

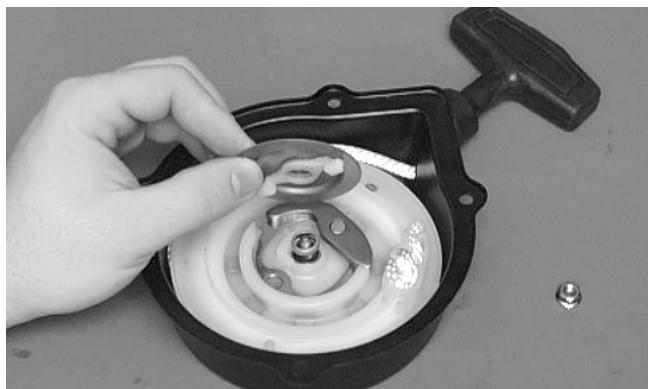
2. Rotate the reel counterclockwise until the notch of the reel is near the rope guide in the case. Guide the rope into the notch and slowly allow the reel to retract until all spiral spring tension is released.



B600D

⚠ CAUTION

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



B602D

5. Remove the spring, collar, and friction spring.

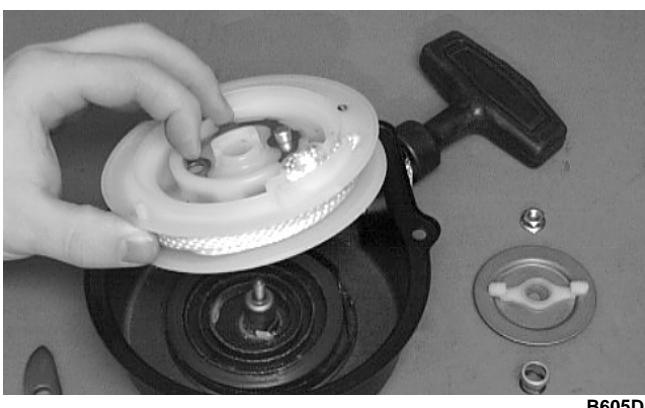


B603D

6. Remove the ratchet and account for the pin.



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



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.

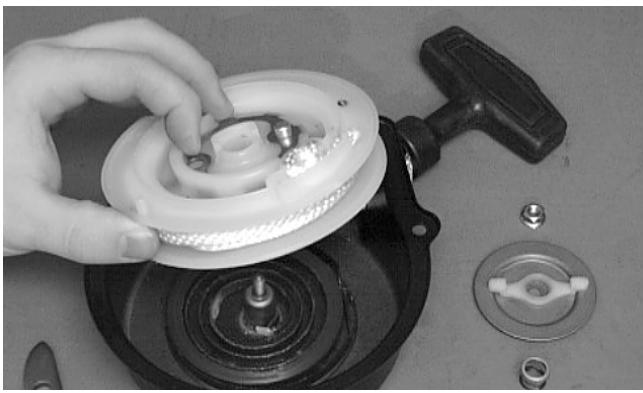
Assembling/Installing

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.

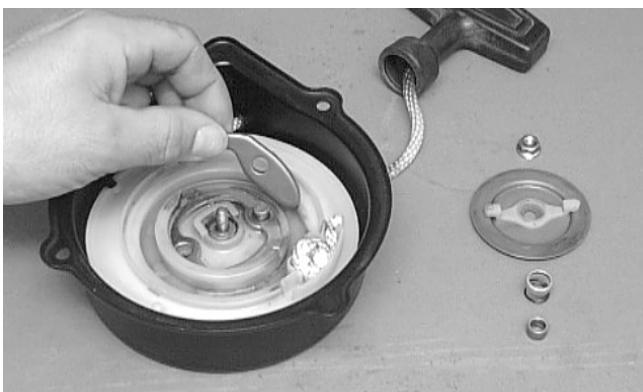


2. Insert the rope through the hole in the reel and tie a knot in the end; then wrap the rope counterclockwise around the reel leaving approximately 50 cm (20 in.) of rope free of the reel.
3. Apply low-temperature grease to the spring and hub.
4. Thread the end of the rope through the guide hole of 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.



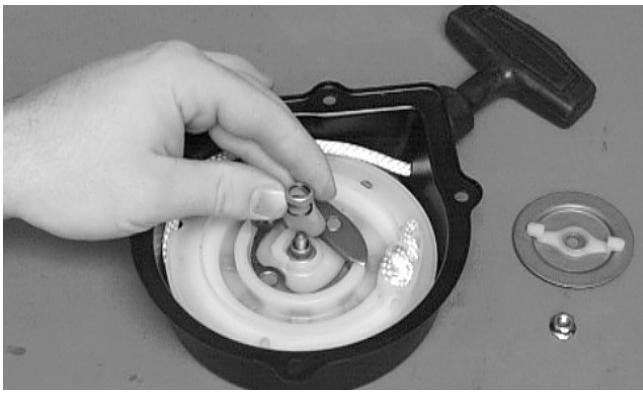
B605D

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



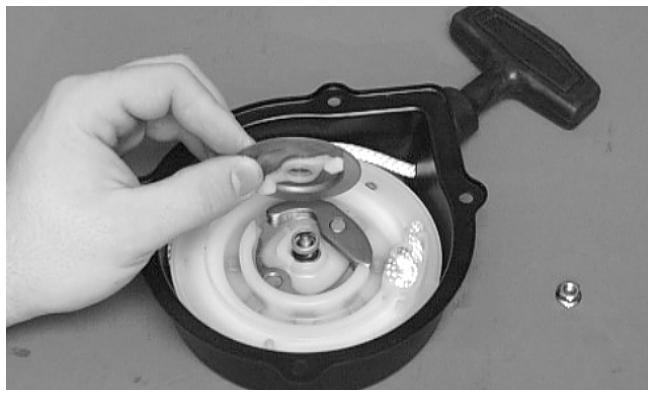
B604D

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.

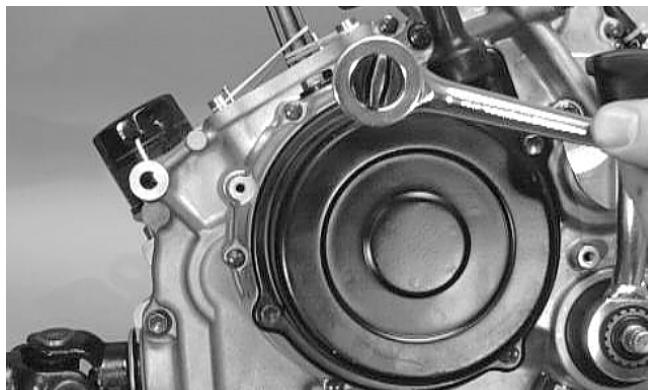


B601D

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).



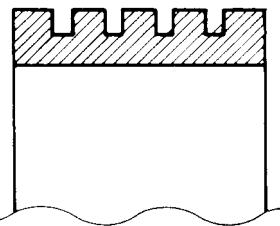
CC039D

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.



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.

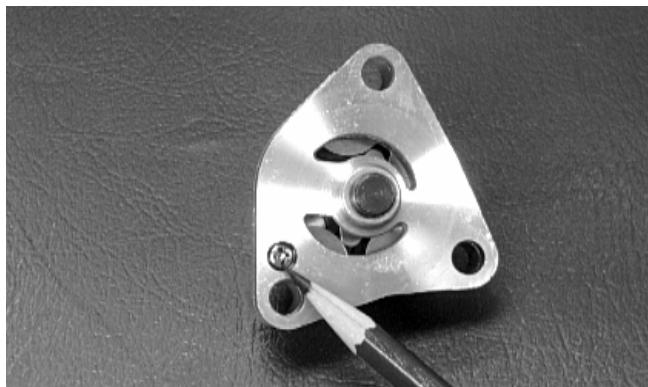
INSPECTING PRIMARY ONE-WAY DRIVE

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.

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.

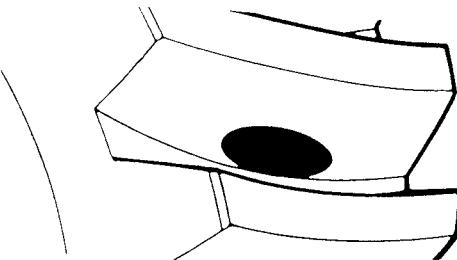
Backlash Measurement	Shim Correction
Under 0.05 mm (0.002 in.)	Decrease Shim Thickness
At 0.05-0.33 mm (0.002-0.013 in.)	No Correction Required
Over 0.33 mm (0.013 in.)	Increase Shim Thickness

Checking Tooth Contact

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

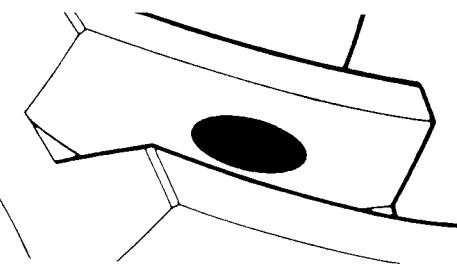
1. Remove the secondary driven output shaft assembly from the left-side crankcase half.
2. Clean the secondary driven bevel gear teeth of old oil and grease residue.
3. Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
4. Install the secondary driven output shaft assembly.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

Incorrect (contact at tooth root)



ATV-0105

Correct



ATV-0104

3

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.

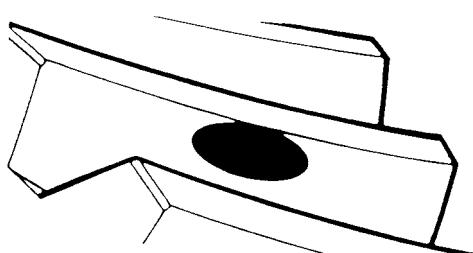
Tooth Contact	Shim Correction
Contacts at Top	Decrease Shim Thickness
Contacts at Root	Increase Shim Thickness

■ 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.

Incorrect (contact at tooth top)

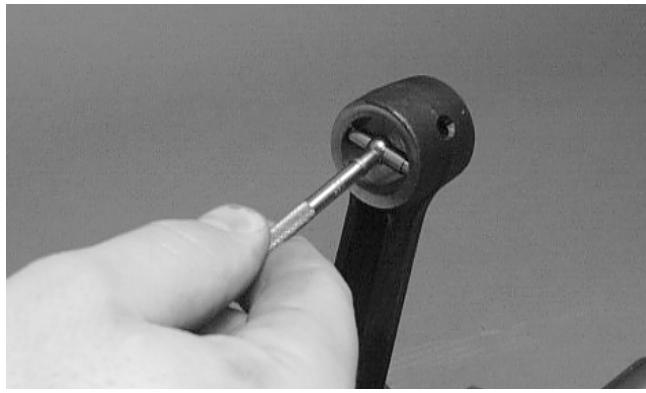


ATV-0103

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 is 23.04 mm (0.9070 in.).

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 is 3 mm (0.12 in.).

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

1. Push the lower end of the connecting rod to one side of the crankshaft journal.
2. Using a feeler gauge, measure the gap between the connecting rod and crankshaft journal.



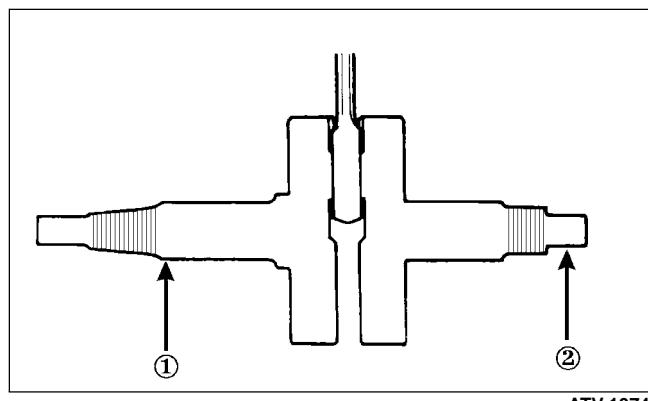
3. Acceptable gap range is 0.10-0.45 mm (0.0039-0.0177 in.).

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 is 24.95-25.00 mm (0.9822-0.9842 in.).

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.



3. Zero the indicator and rotate the crankshaft slowly.

⚠ CAUTION

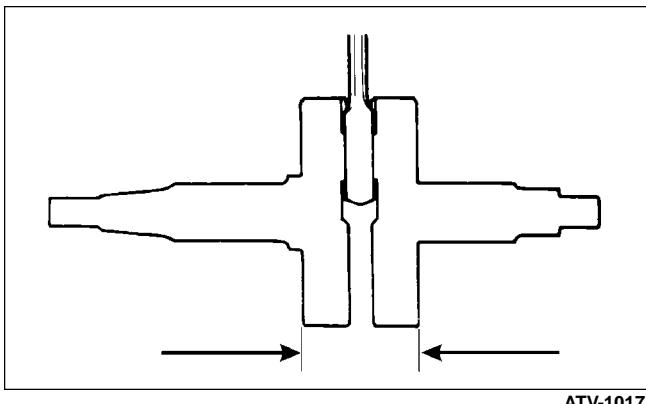
Care should be taken to support the connecting rod when rotating the crankshaft.

4. Maximum runout is 0.08 mm (0.003 in.) for both sides.

■ 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

- Acceptable width range is 70.9-71.1 mm (2.796-2.804 in.).

COUNTERSHAFT

⚠ CAUTION

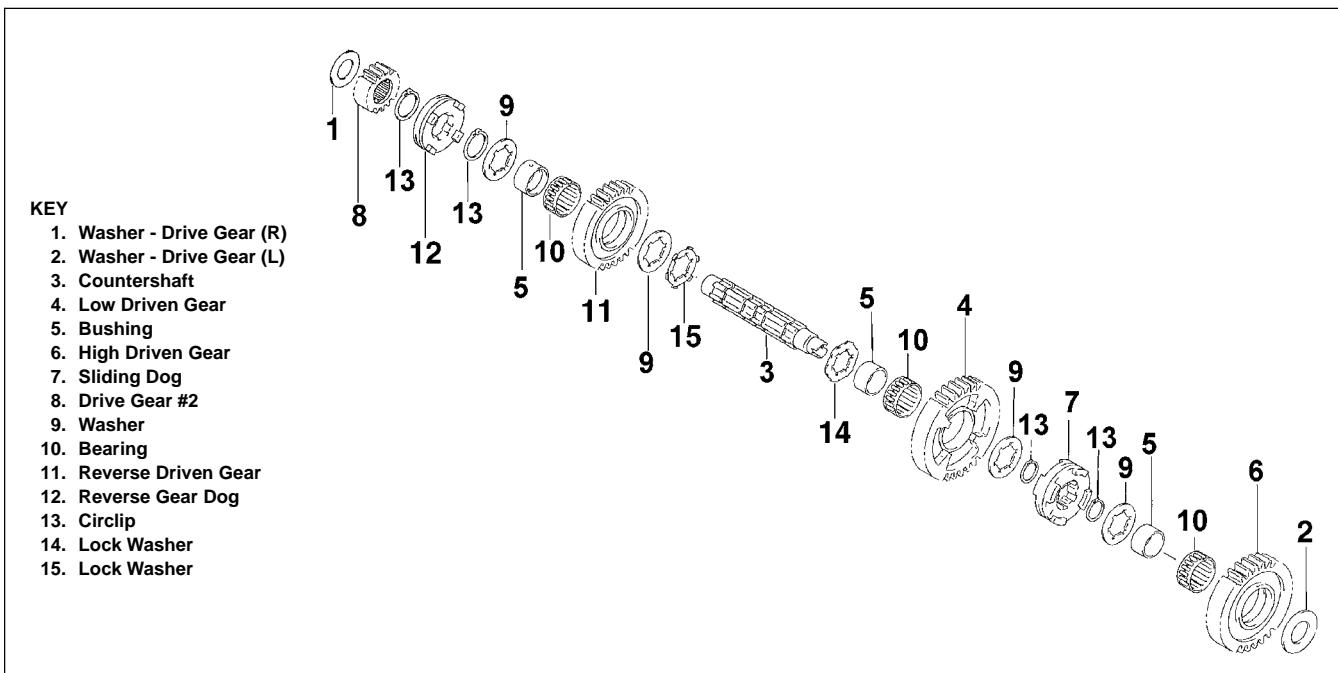
When disassembling the countershaft, care must be taken to note the direction each major component (dog, gear) faces. If a major component is installed facing the wrong direction, transmission damage may occur and/or the transmission will malfunction. In either case, complete disassembly and assembly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

Disassembling

- Remove drive gear #2; then remove the circlip securing the reverse gear dog.
- Remove the reverse gear dog; then remove the circlip securing the reverse driven gear.
- Remove the reverse driven gear and account for the washer, bushing, and bearing.
- Remove the low driven gear washer and lock washers; then remove the low driven gear. Account for the bushing and bearing.
- Remove the washer; then remove the circlip securing the sliding dog. Remove the sliding dog.
- Remove the high driven gear circlip; then remove the high driven gear. Account for the washer, bushing, and bearing.

3

Assembling



735-618A

- Place the high driven gear onto the countershaft making sure the bearing, bushing, and washer are properly positioned. Secure with the circlip.

- Place the sliding dog onto the countershaft; then secure with the circlip. Place the washer next to the circlip.

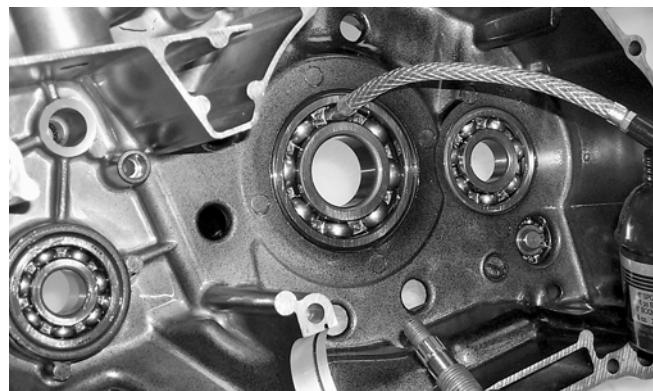
3. Place the low driven gear onto the countershaft making sure the bearing and bushing are properly positioned; then place the lock washers and washer onto the shaft.
4. Place the reverse driven gear onto the countershaft making sure the bearing, bushing, and washer are properly positioned; then secure 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.



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.



CC688

Assembling Crankcase Half

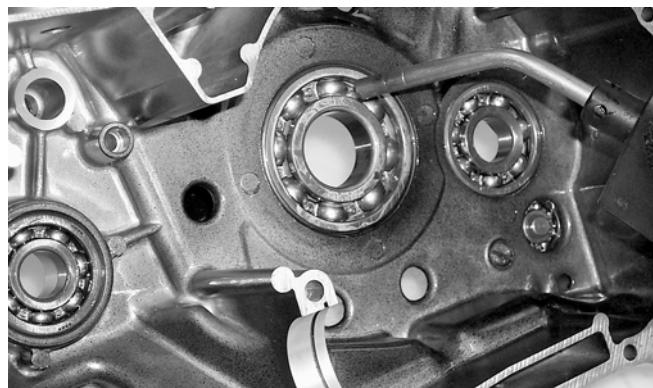
1. Install the output shaft assembly into the crankcase making sure the two gears, shim, washer, and nut are properly sequenced.



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.



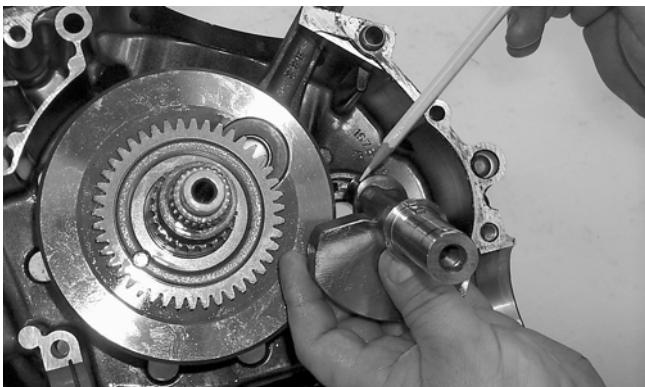
CC689

■ 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

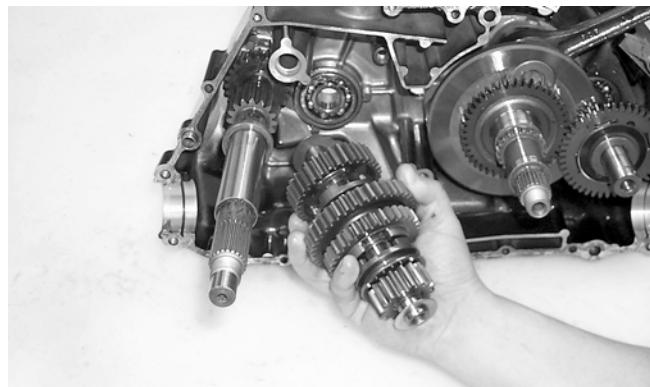
■ NOTE: It will be necessary to rotate the crank balancer until the counterweight is facing away from the crankshaft; then rotate the crankshaft clockwise into the journal area to allow the crank balancer to be fully seated.

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.



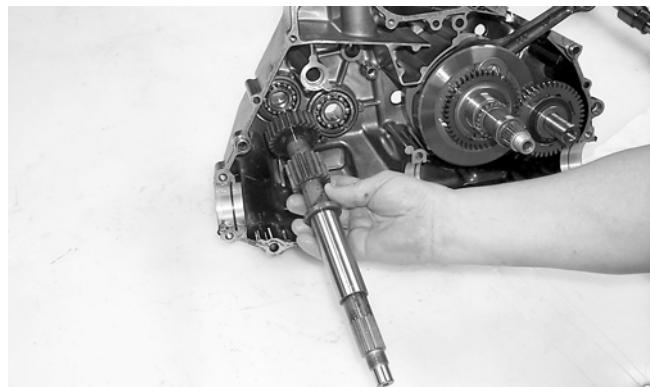
CC676

6. Place a washer on each end of the countershaft assembly; then install the assembly.



CC674

7. Install the driveshaft.



CC675

3

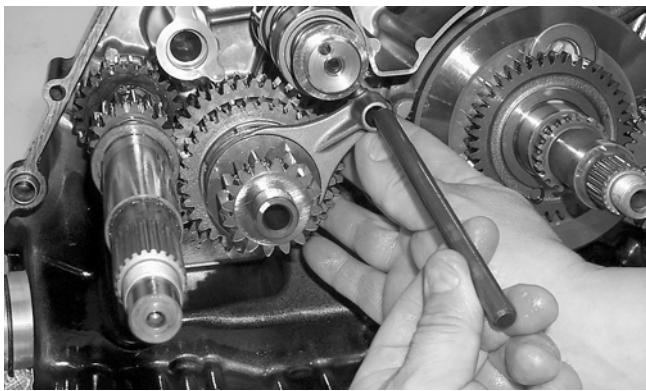
8. Place a washer on each end of the gear shift shaft; then install the shaft assembly making sure the two holes on the end of the shaft are positioned vertically.



CC671

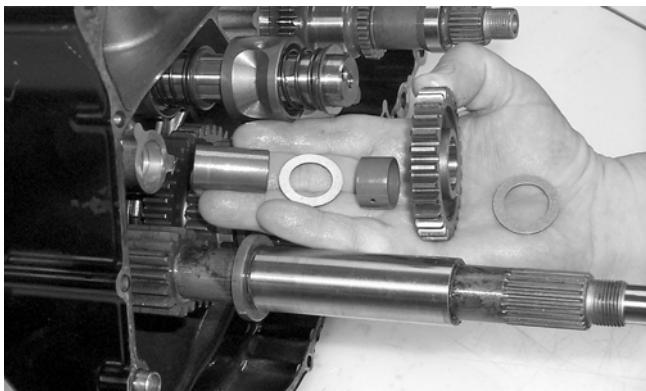
9. Insert the two shift forks into the sliding dogs noting the direction of the tabs from disassembling; then install the shift fork shaft.

■ NOTE: Make sure the shift fork tabs face upward and that they are properly seated into the shift cams.



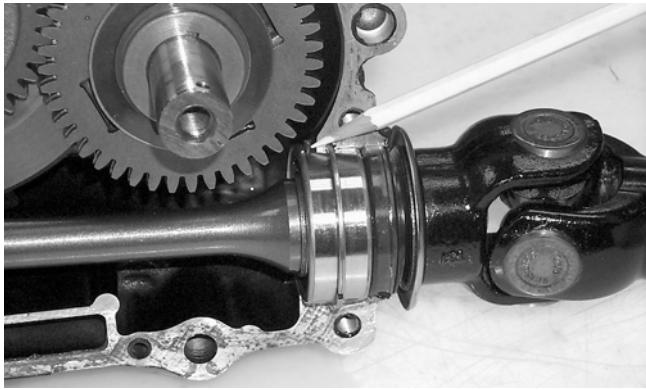
CC669

10. Install the reverse idler gear assembly noting the positioning of the two washers, gear, bushing, and shaft.

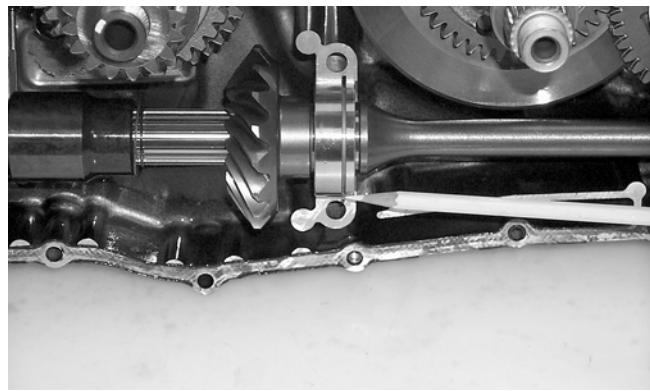


CC668

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

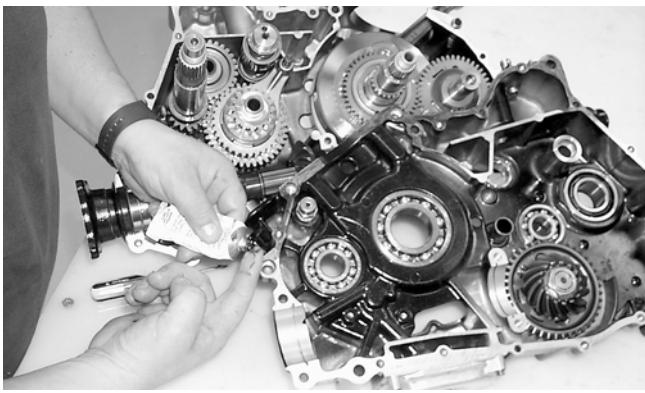
13. Place the oil strainer cap into position making sure the O-ring is in position; then secure the cap with cap screws. Tighten securely.



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.

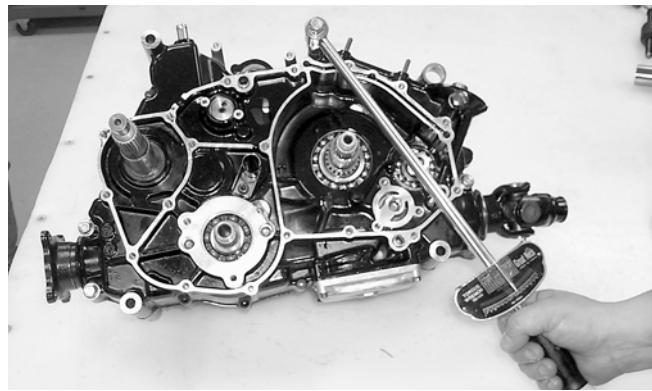
■ **NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.**

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).

3



CC697

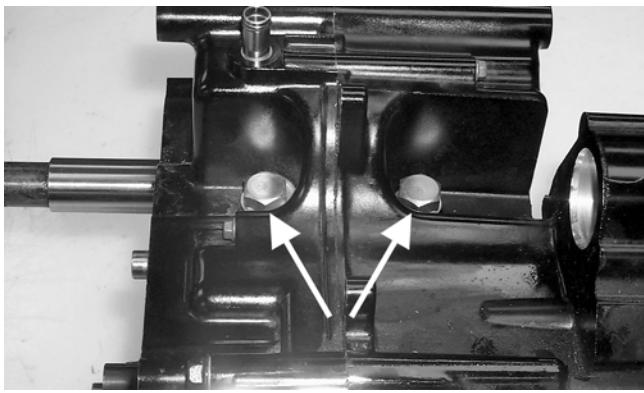
■ **NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.**

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).

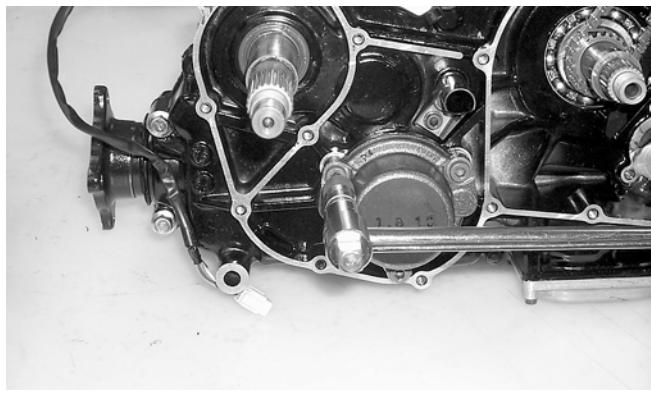
■ **NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.**

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



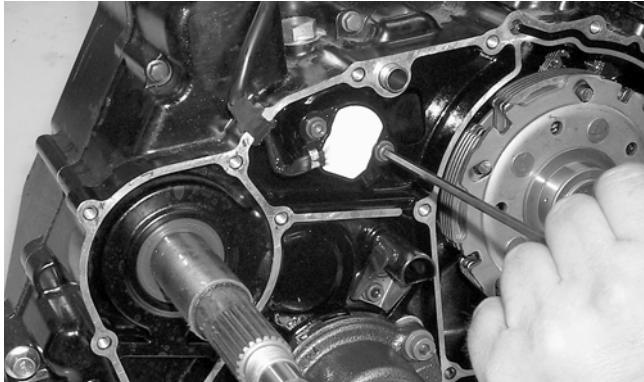
CC711

☞ 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**.

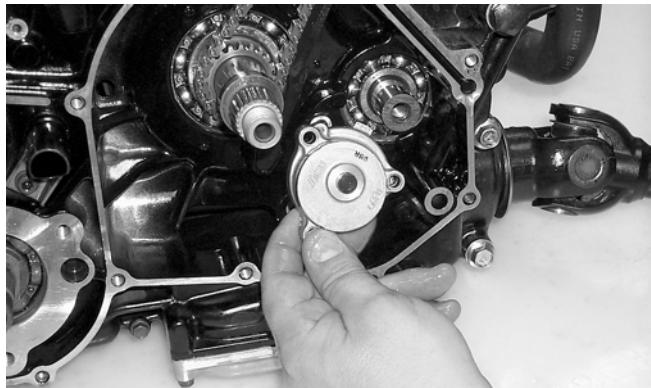
Installing Right-Side Components

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.



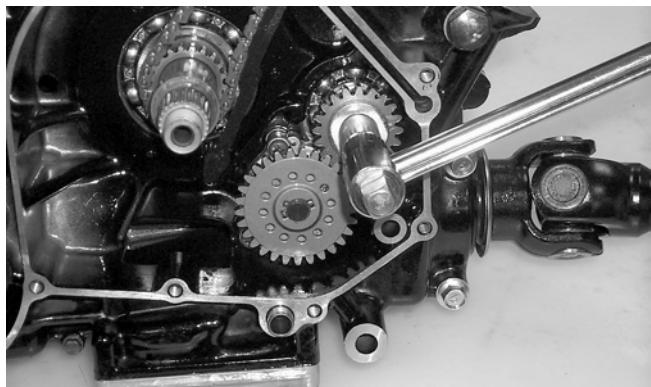
CC602

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



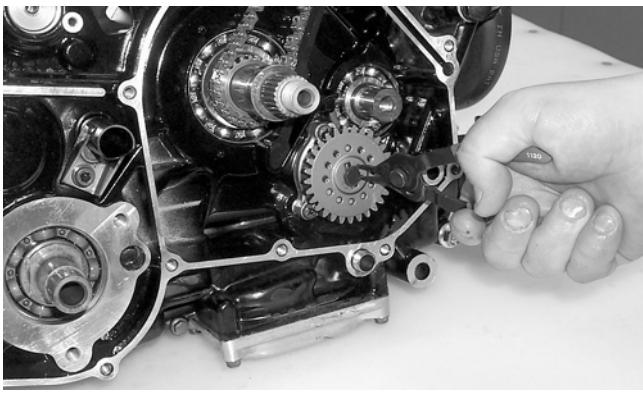
CC613

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



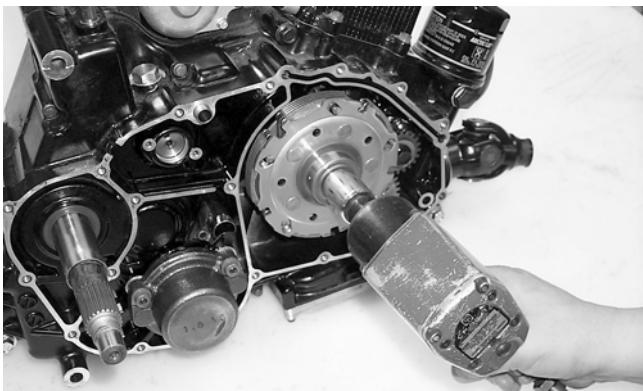
CC609

■ **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).

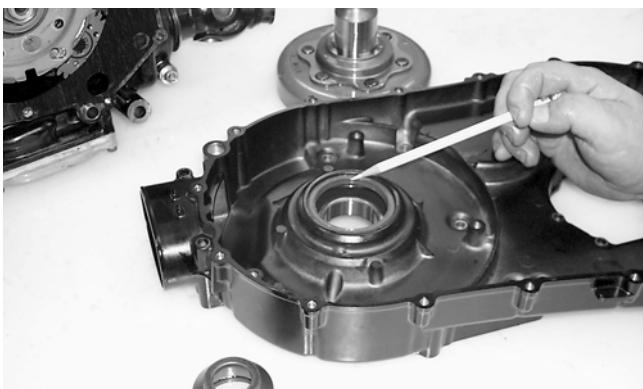
CAUTION

Care must be taken that the directional washer be installed correctly and note that the nut has left-hand threads.

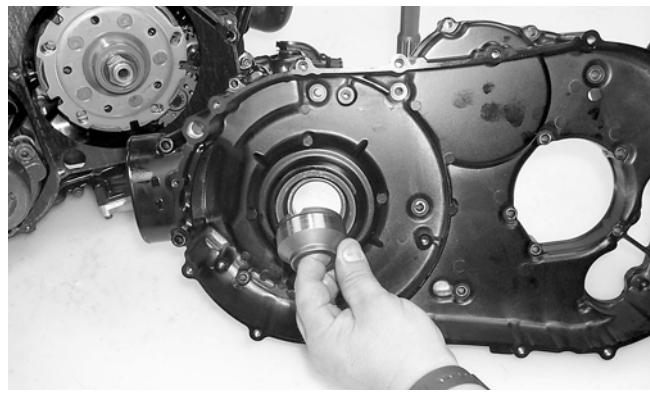


CC604

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



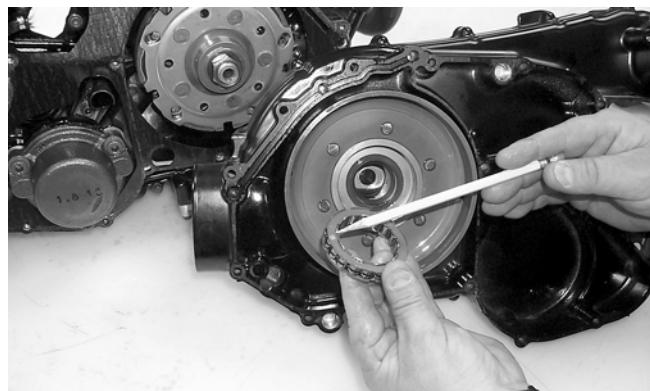
CC597



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.

3



CC592

CAUTION

When installed correctly, the green alignment dot (or the word OUTSIDE) on the one-way clutch DOES NOT SHOW.

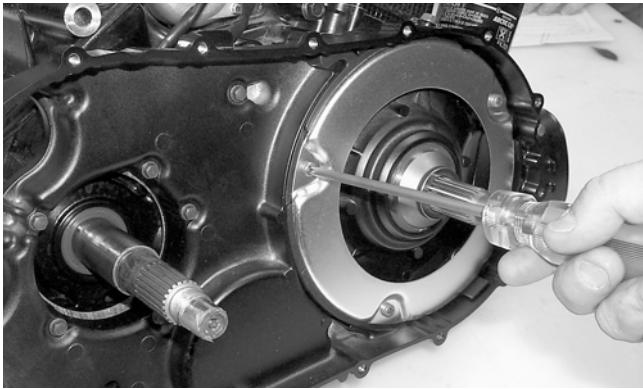
11. Place the clutch cover/clutch housing assembly into position on the crankcase; then secure with the cap screws making sure the different-lengthed cap screws are in their proper location. Tighten to 1.1 kg-m (8 ft-lb).
12. Place the air intake plate cushion into position; then install the air intake plate. Tighten the Phillips-head screws (threads treated with a small amount of red Loctite #271) securely.



CC589

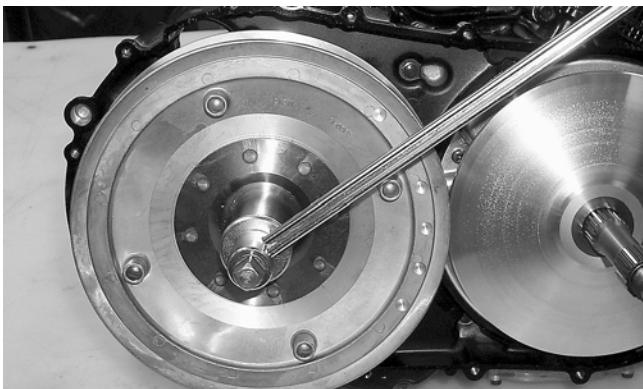


CC549



CC586

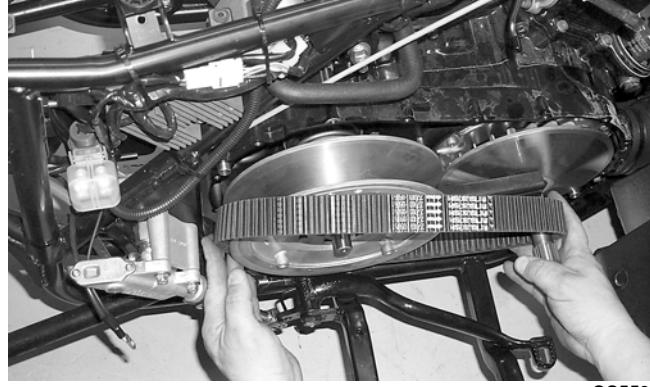
13. Place the fixed driven assembly into position and secure with the nut. Tighten to 10.4-11.8 kg-m (75-85 ft-lb).



CC726

14. Slide the fixed drive face onto the shaft.

15. Spread the faces of the driven clutch by pushing the inner face toward the engine while turning it counterclockwise; then when the faces are separated, insert a wedge (approximately 3/8 in. thick) between the faces. Release the inner face.



CC550

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

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

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).

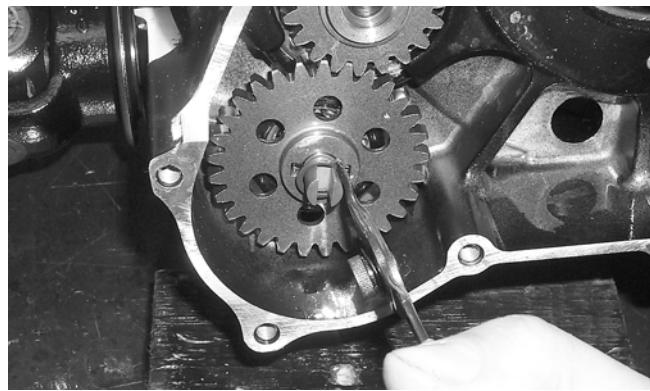
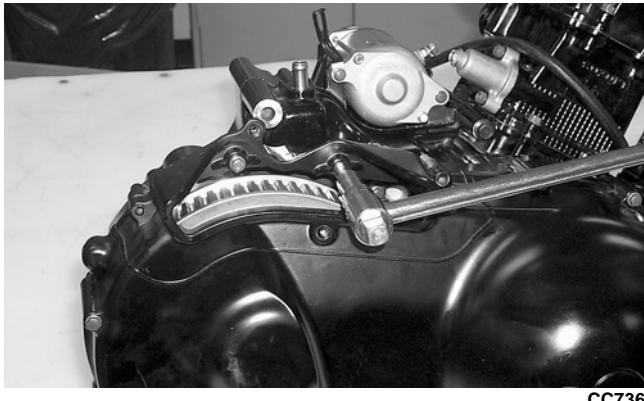


CC552

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

18. Rotate the V-belt and clutches until the V-belt is flush with the top of the driven clutch.

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).



CC845

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

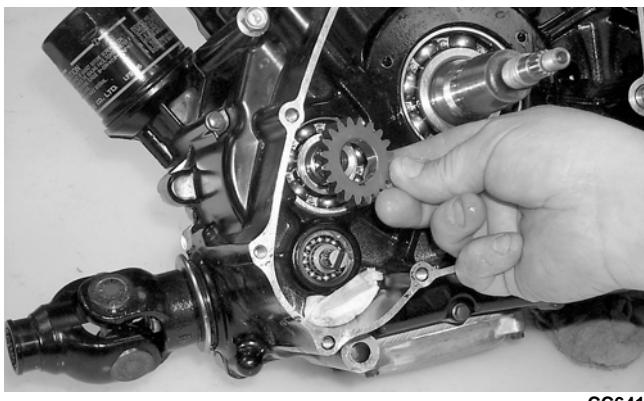
■ **NOTE:** Once the gears are secured, remove the oil passage plug from the crankcase.

3

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.



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

■ **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.

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.



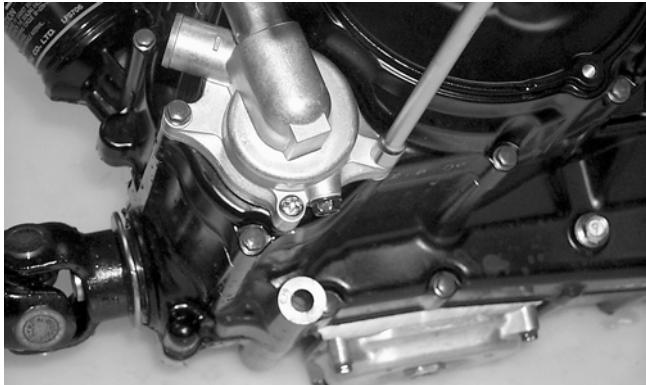
CC709



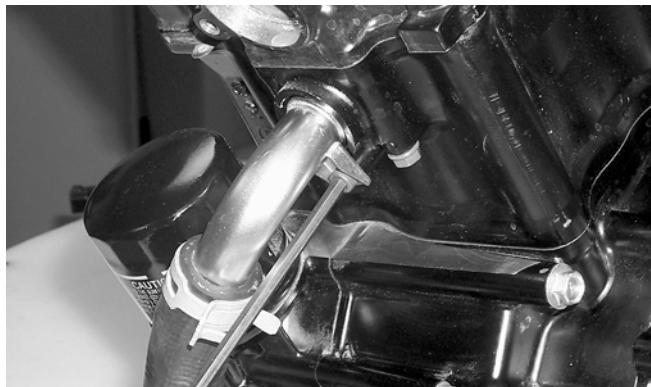
CC619

⚠ 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



CC620

9. Install the crossover tube on the water pump and cylinder head making sure the O-ring is properly positioned.

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).

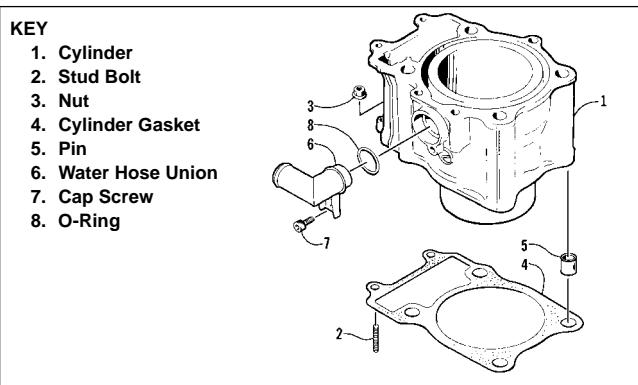


CC710

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

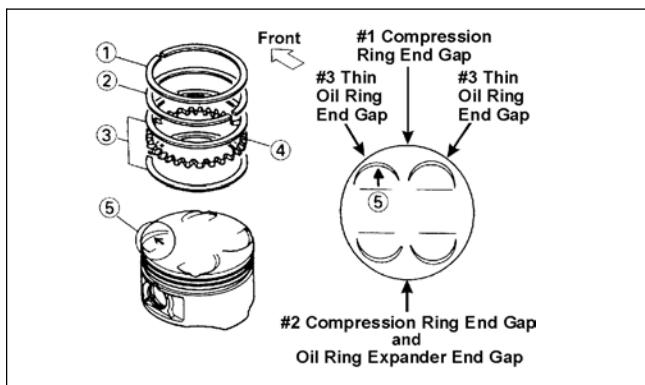
A. Piston B. Cylinder



0732-301

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

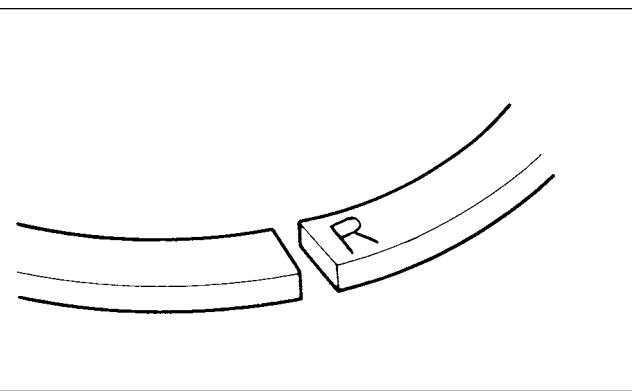
- A. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.



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

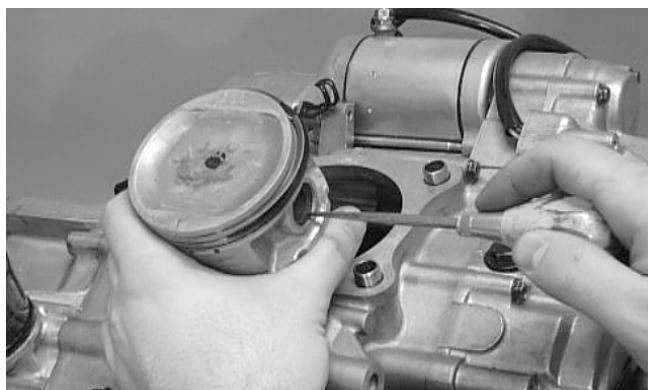
CAUTION

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.

3

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



CC032D

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

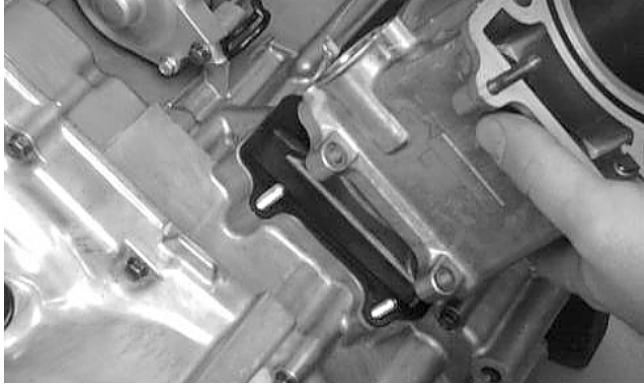


CC025D

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

⚠ CAUTION

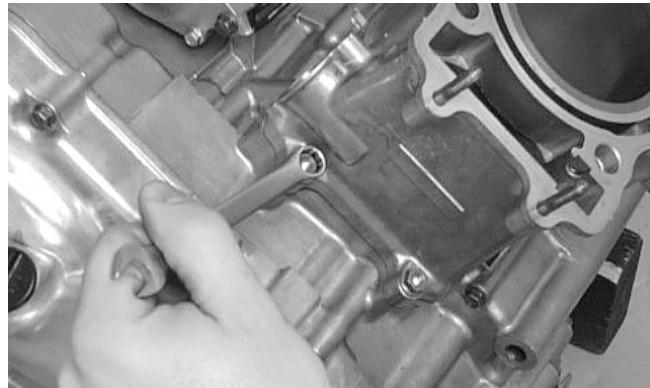
The cylinder should slide on easily. Do not force the cylinder or damage to the piston, rings, cylinder, or crankshaft assembly may occur.



CC024D

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

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



CC023D

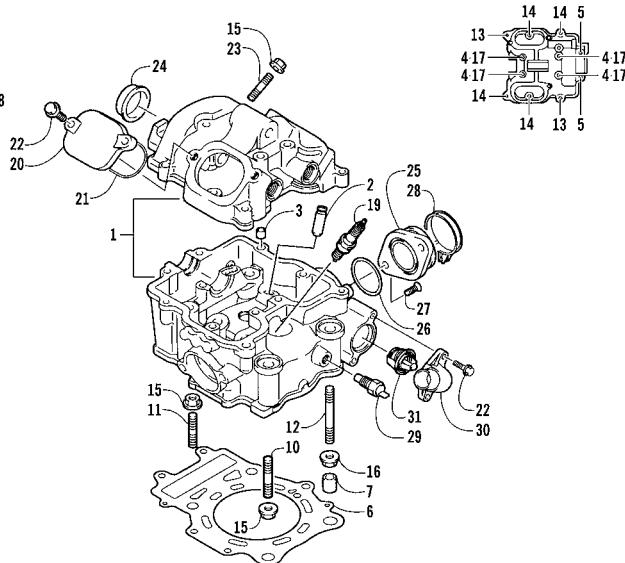
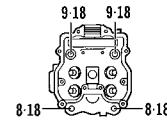
5. Install the coolant hose onto the crankcase union and tighten the clamp.

C. Cylinder Head

D. Valve Cover

KEY

1. Cylinder Head Assy	21. O-Ring
2. Valve Guide	22. Cap Screw
3. Pin	23. Stud Bolt
4. Cap Screw	24. Cylinder Head Plug
5. Cap Screw	25. Intake Pipe Assy
6. Cylinder Head Gasket	26. O-Ring
7. Pin	27. Cap Screw
8. Cap Screw	28. Clamp
9. Cap Screw	29. Temperature Switch Assy
10. Stud Bolt	30. Thermostat Cover
11. Stud Bolt	31. Thermostat
12. Stud Bolt	32. Intake Tube
13. Cap Screw	
14. Cap Screw	
15. Nut	
16. Nut	
17. Gasket	
18. Gasket	
19. Spark Plug	
20. Inspection Cap	



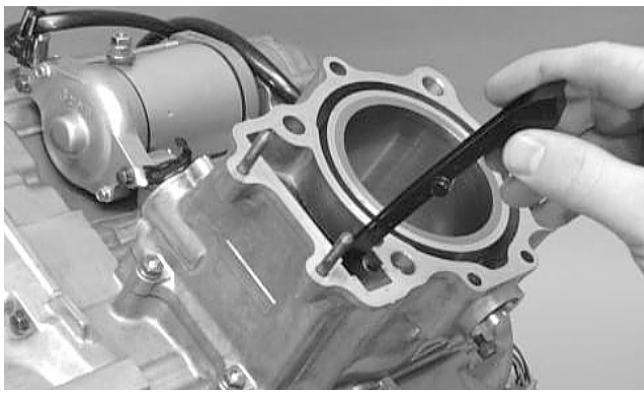
0737-755

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

6. Place the chain guide into the cylinder.

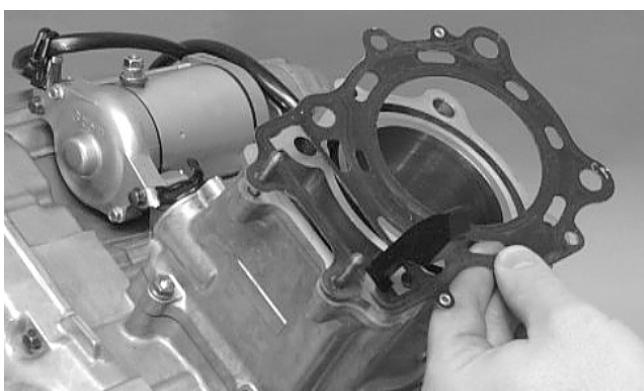
⚠ CAUTION

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

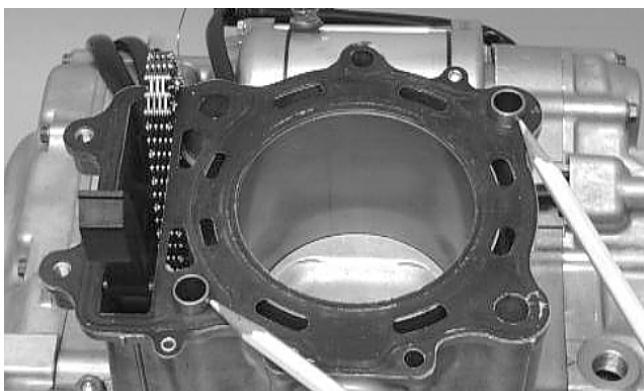


CC022D

7. Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder.

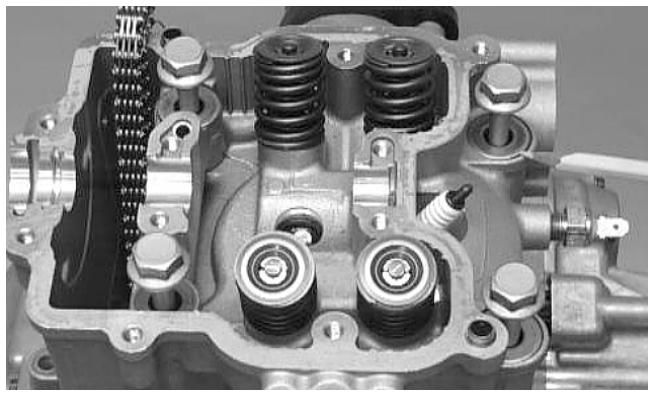


CC020D



CC265D

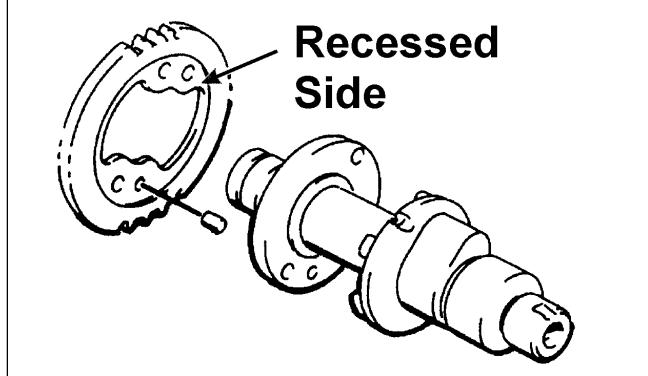
8. Install the four cylinder head cap screws with copper washers (note the locations of the different-lengthed cap screws). Tighten only until snug.



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.

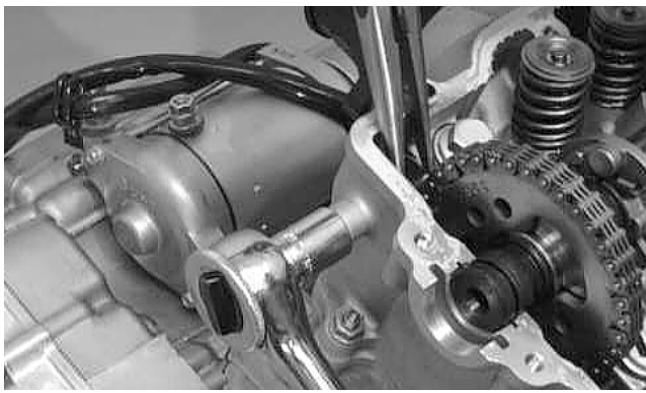
3



732-307B

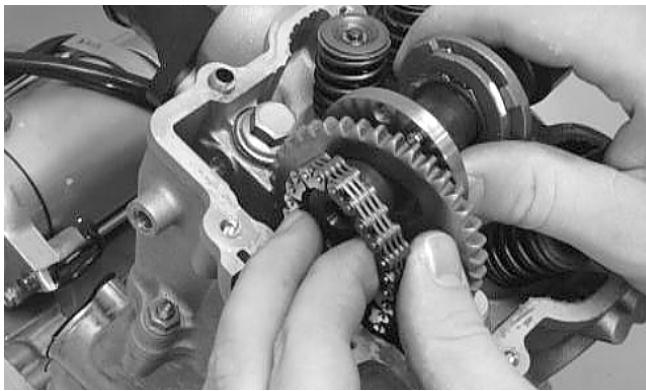
■ **NOTE: At this point, oil the camshaft bearings, cam lobes, and the three seating journals on the cylinder.**

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.



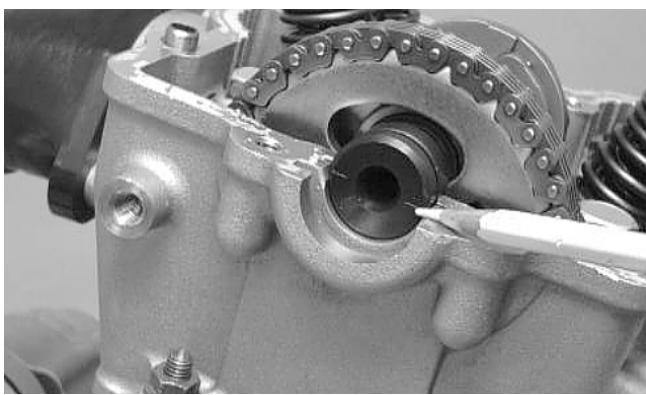
CC014D

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.



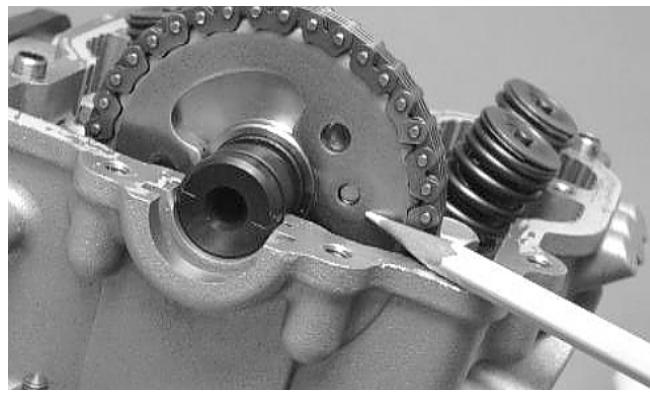
CC015D

■ 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.



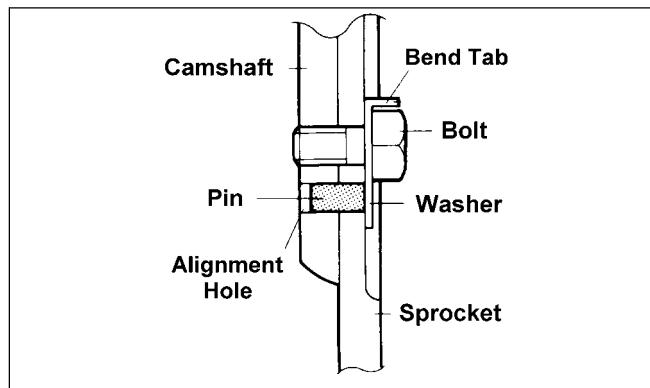
CC268D

- 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.

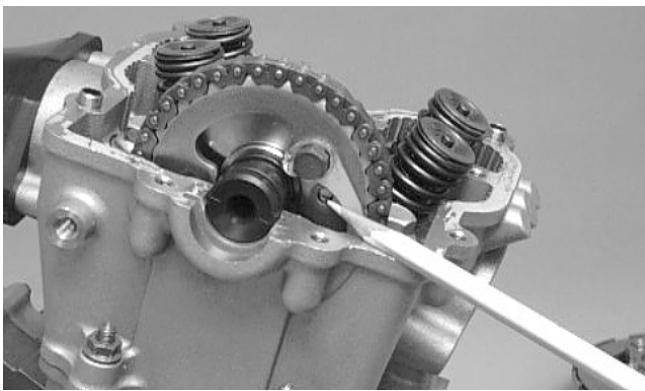
16. Place the tab-washer onto the sprocket making sure it covers the pin in the alignment hole.



ATV1027

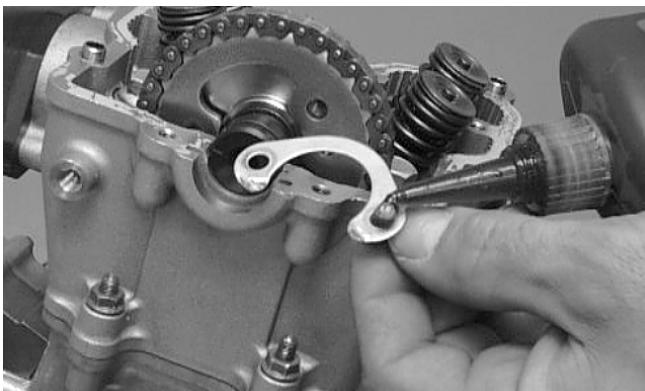
⚠ CAUTION

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.



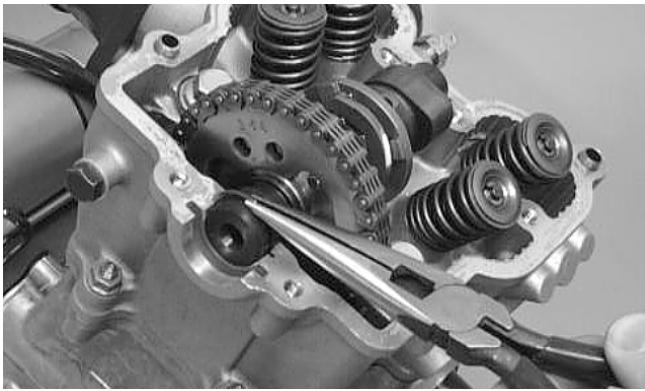
CC270D

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.



CC269D

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

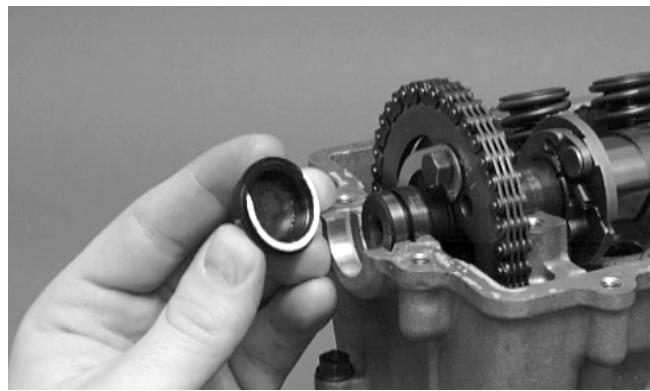


CC012D

19. Install the cylinder head plug in the cylinder head with the open end facing upward and toward the inside.

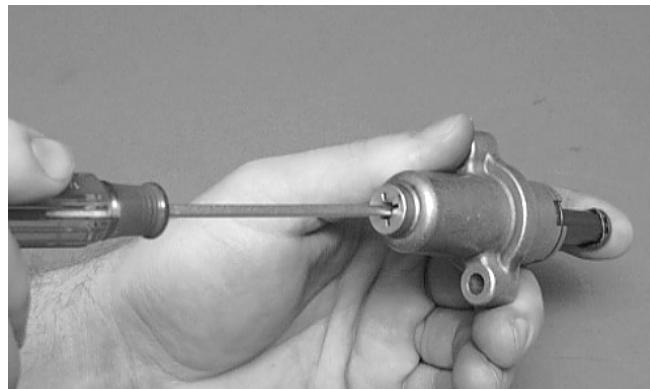
CAUTION

The open end of the plug must be positioned upward.



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.

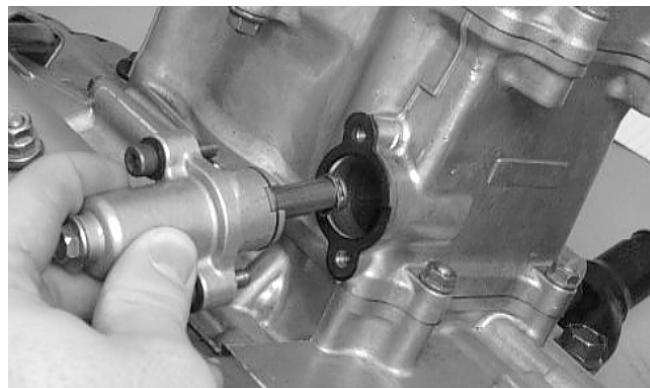


3

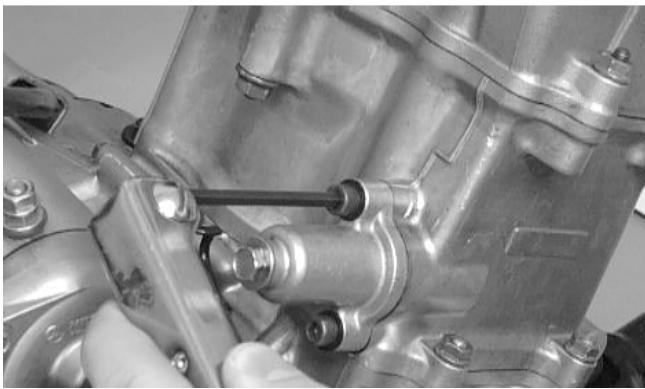
CC309D

■ 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.

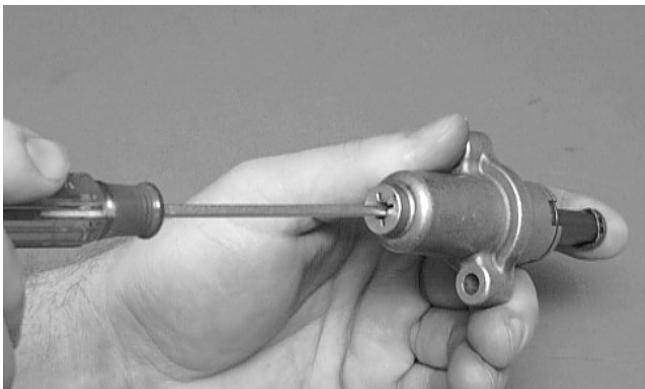


CC011D

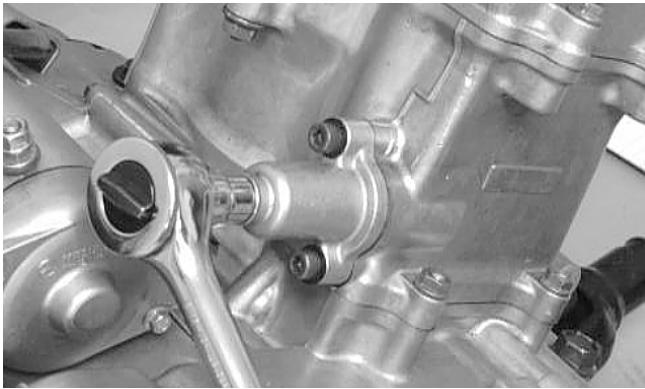


CC010D

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.



CC309D

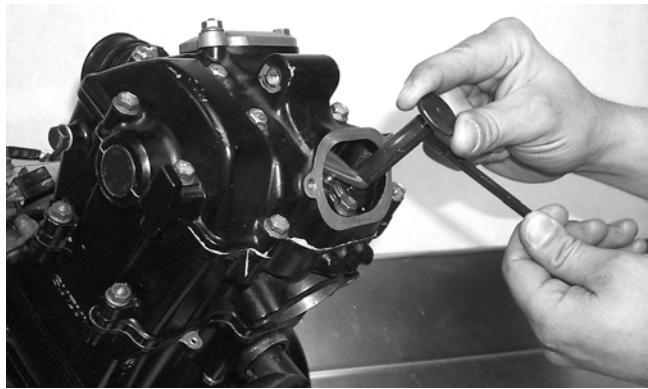


CC009D

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.

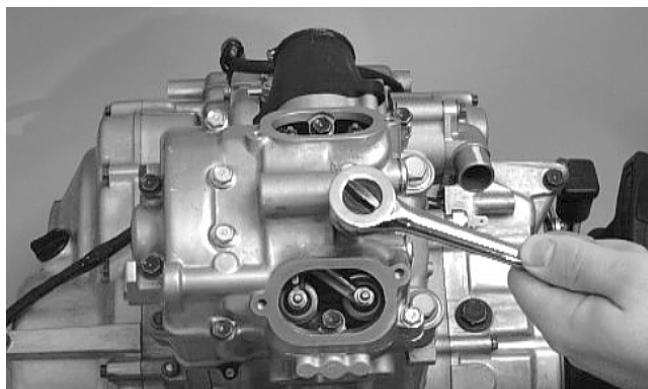


CC275D

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 counterclockwise until proper valve/tappet clearance is attained.

■NOTE: Refer to the appropriate Specifications 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.

- 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).

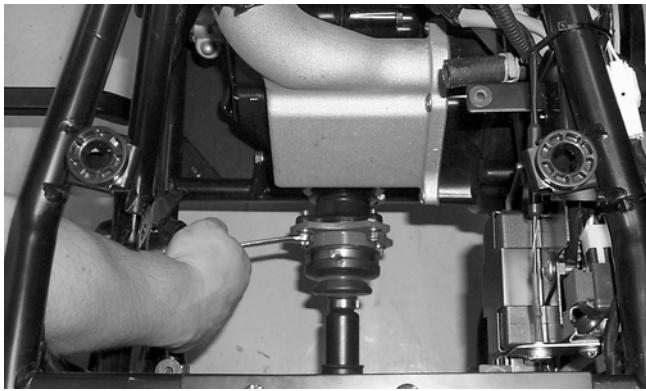
1. From the right side, place the engine/transmission into the frame making sure it is properly positioned in the frame with the front and rear driveshafts properly aligned.
2. Slightly raise the front of the engine and insert the front driveshaft coupler.



CC578

3

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

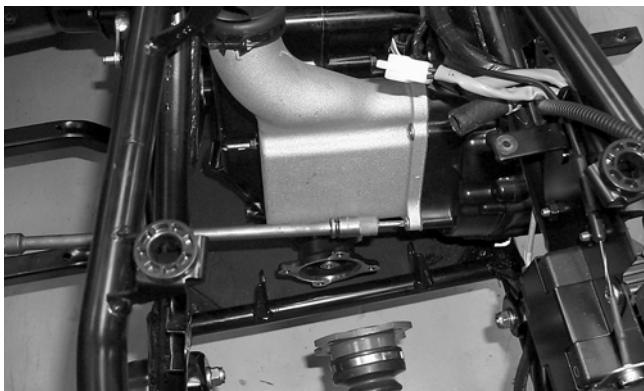
Installing Engine/Transmission

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



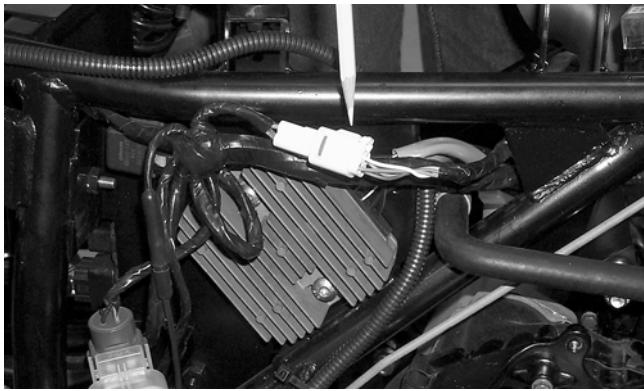
CC566

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.



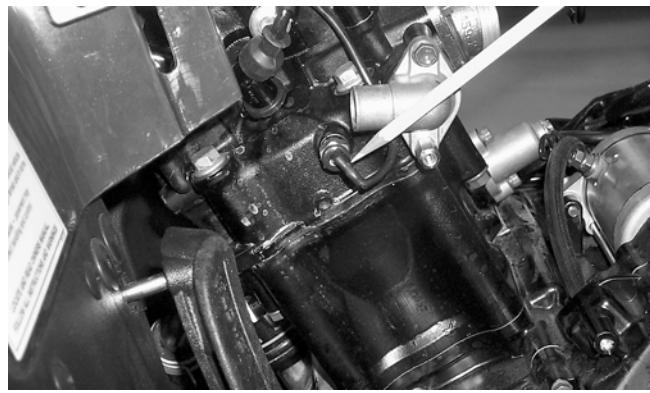
CC579

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.



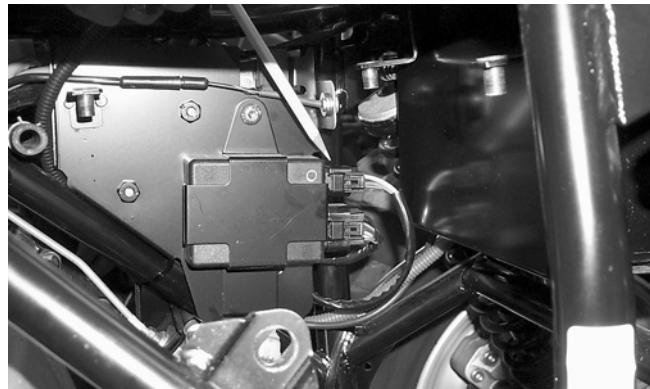
CC573

12. Connect the temperature sensor wire to the engine.



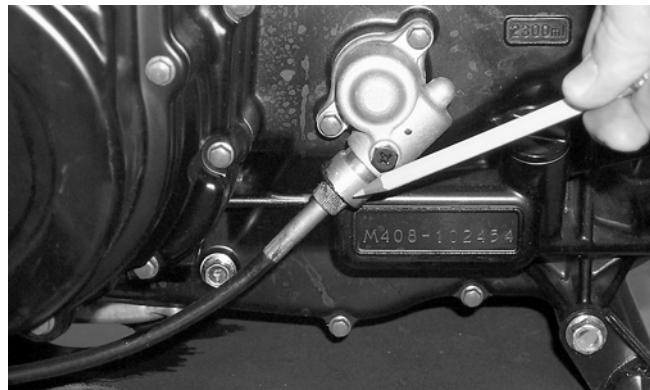
CC571

13. Secure the stator wires to the CDI unit.



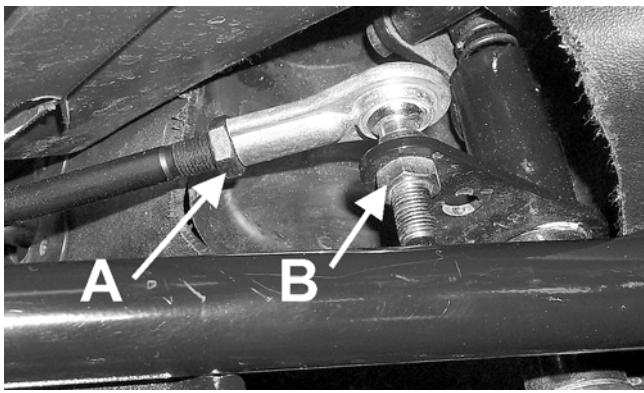
CC569

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.



20. Install the exhaust pipe shroud and secure with the existing torx-head screws. Tighten securely.



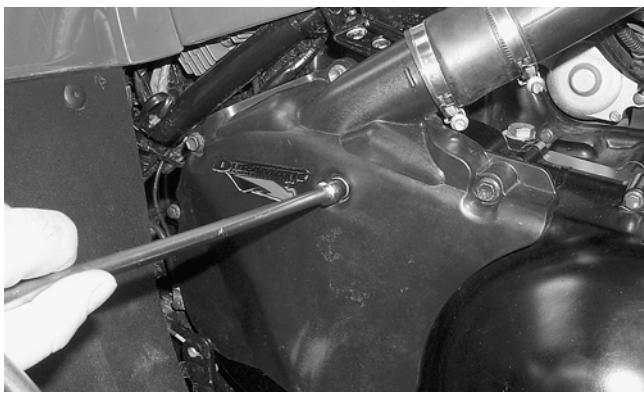
CC560

21. Install the carburetor into the intake hose. Tighten the hose clamp.

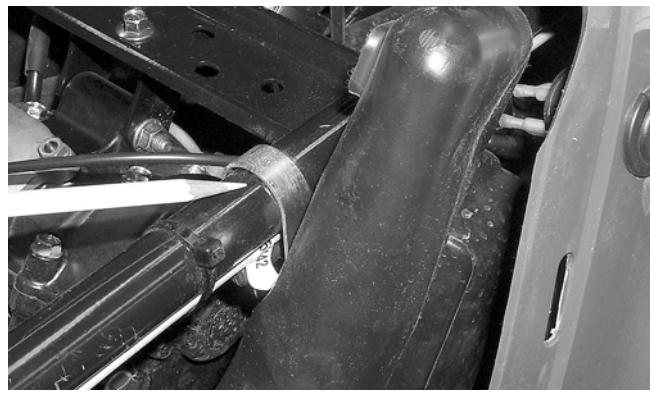
22. Place the footrests in position on the frame; then secure with existing hardware. Tighten the 10 mm cap screws to 5.5 kg-m (40 ft-lb) and the 8 mm cap screws to 2.8 kg-m (20 ft-lb).

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 crankcase vent hose to the air cleaner housing.



CC536

26. Install the rear rack/fender assembly with existing hardware. Tighten securely.

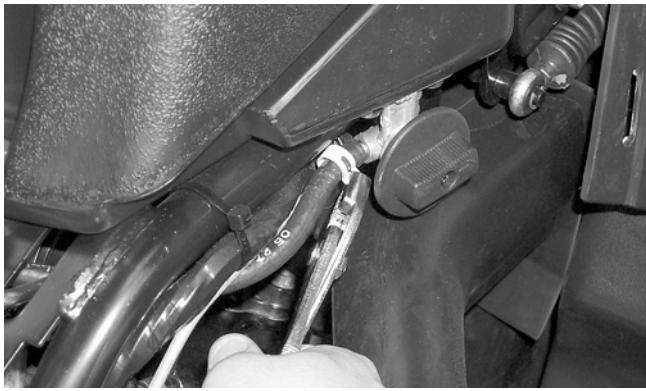
27. Secure the wiring harness to the frame with cable ties.

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

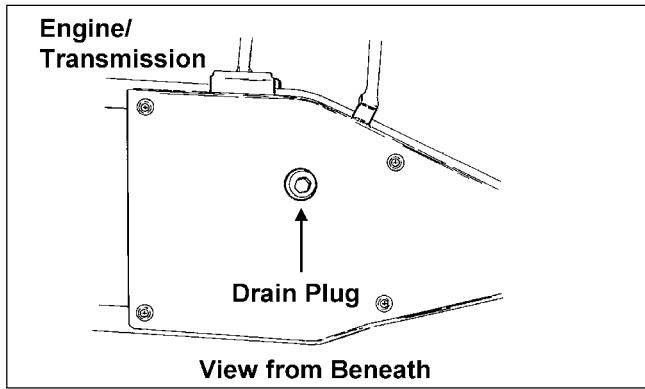
Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

- 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.

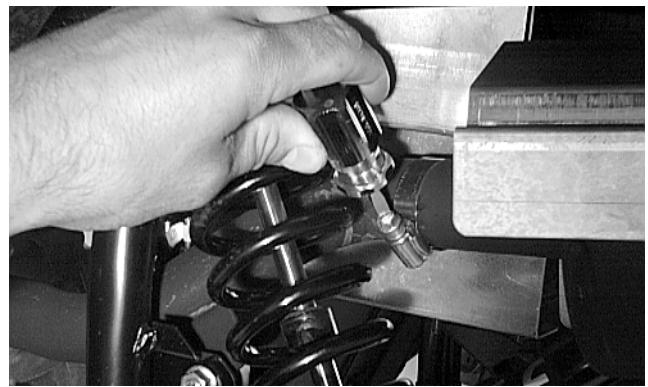
- Carefully guide the battery cables and fuse block wiring down through the access hole into the engine compartment for future removing.
- Drain the oil from beneath the engine/transmission; then drain the cooling system.



- Remove the hardware securing the right-side and left-side panels; then remove the panels.
- Turn the gas tank valve to the OFF position; then remove the fuel hose and vent hose.
- Remove the gas tank.
- Remove the rear fenders and the rear rack (see Section 8).
- Remove the hardware securing both footrests to the frame and front fender.

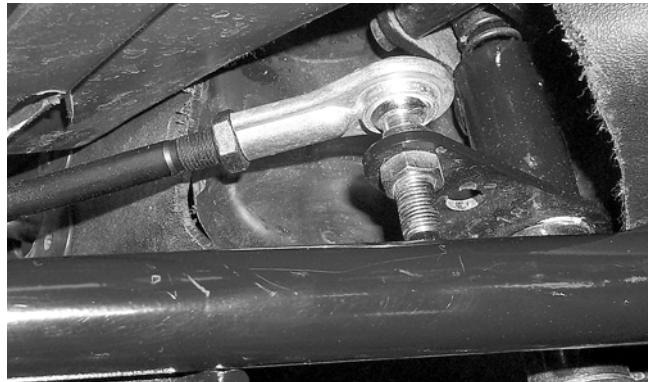


- Remove the two cap screws securing the exhaust pipe to the engine; then loosen the exhaust pipe from the muffler at the juncture in front of the muffler.

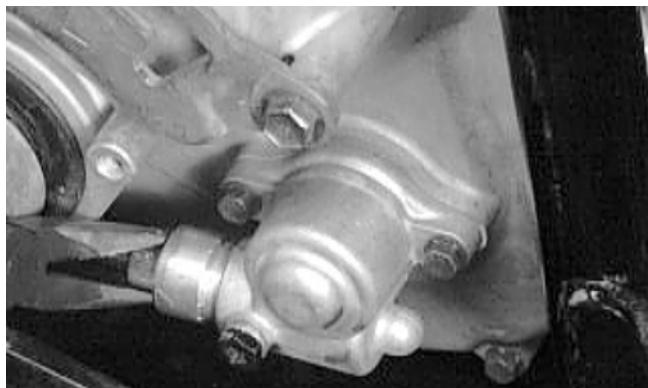


- Remove the exhaust pipe and account for the grafoil gasket.
- Mark the reverse gear shaft arm to the reverse shift shaft to aid in installing and remove the cap screw securing the reverse gear shaft arm to the reverse shift shaft; then remove the lock nut securing the upper shift rod end to the shift lever arm. Remove the shift rod.

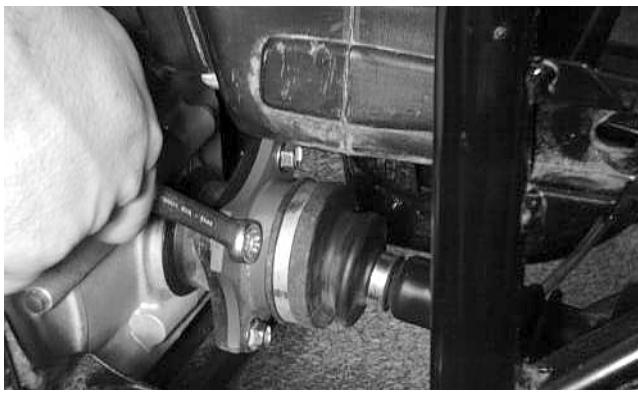
3



- Detach the speedometer cable by loosening the knurled nut and routing the cable away from the engine/transmission.

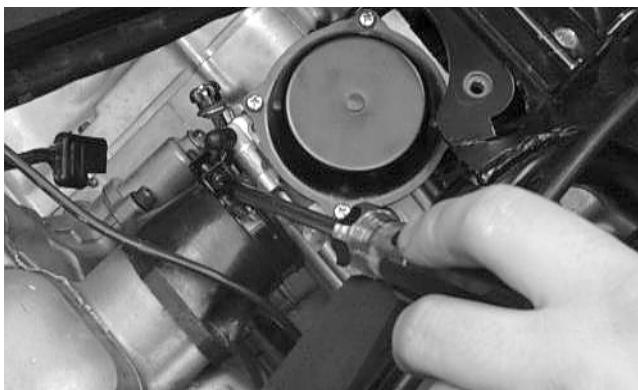


- Remove the four cap screws securing the rear output joint to the transmission and push the shaft away from the transmission.



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.

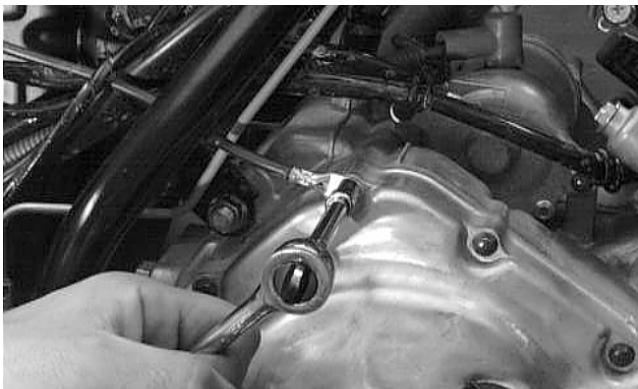
■ NOTE: Use cable ties or tape to secure the carburetor assembly above the handlebars to keep it from interfering with the removal procedure.

18. Remove the clamp securing the upper coolant hose to the thermostat housing; then disconnect the hose.

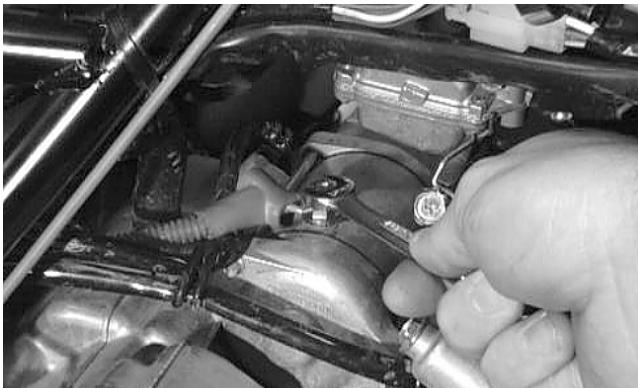


CC335D

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



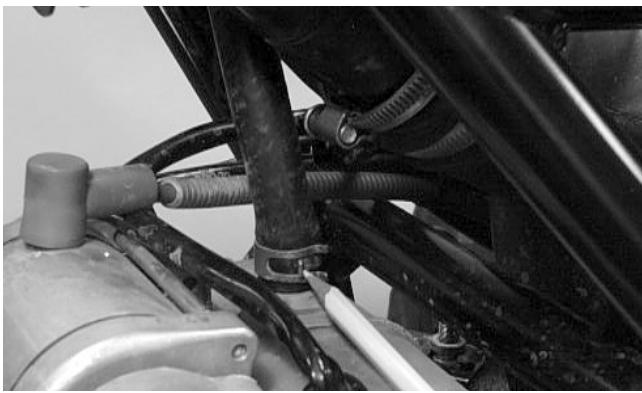
AR604D

21. Remove the clamp securing the lower coolant hose to the water pump housing; then disconnect the hose.



CC334D

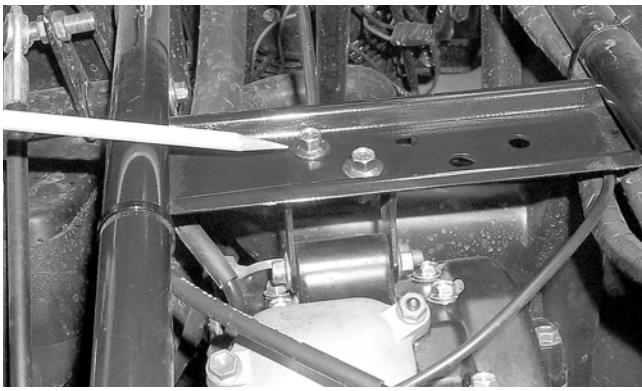
22. Loosen the clamp on the crankcase breather vent hose; then disconnect the hose and route it away from the engine.



CC122D

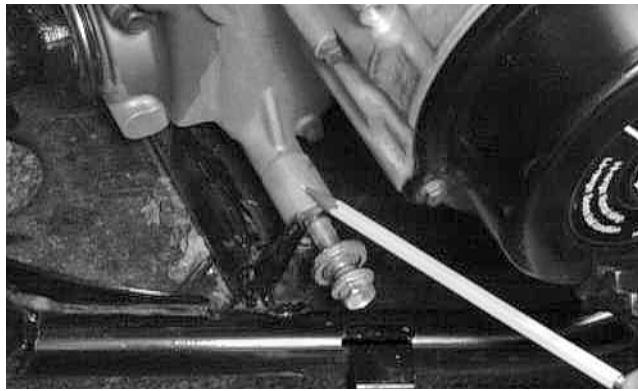
23. Remove the engine/transmission mounting fasteners in the following sequence:

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



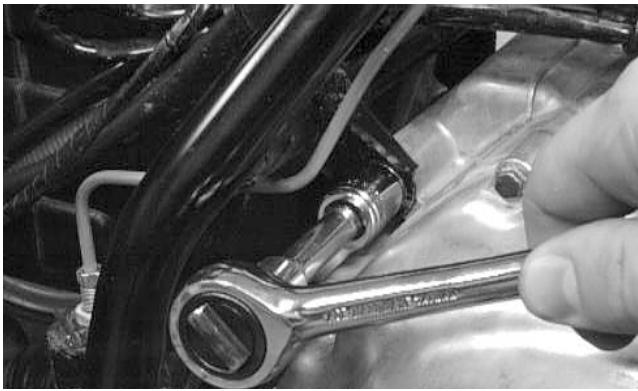
AF939

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

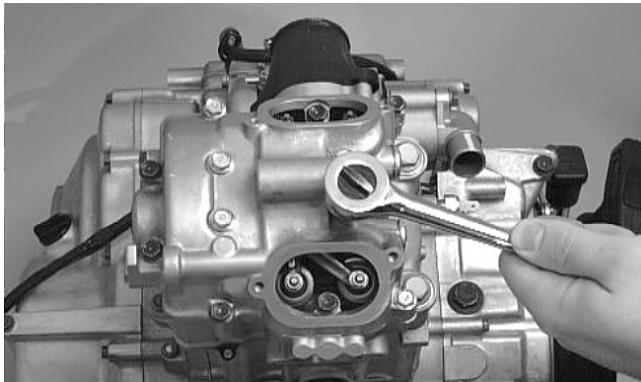
■ NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

☞ 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.

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

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.



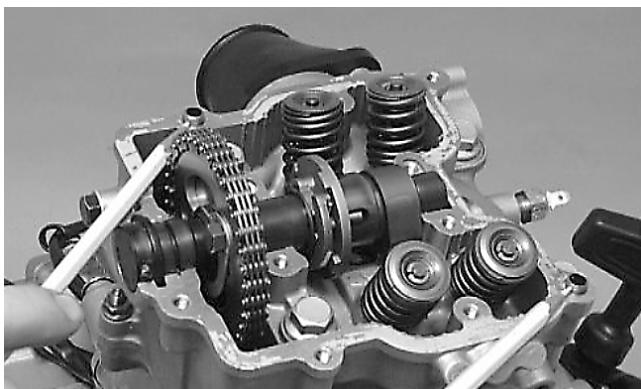
CC001D

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



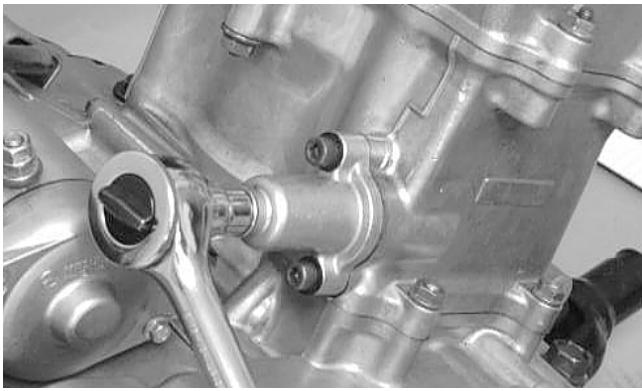
CC274D

■ 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.

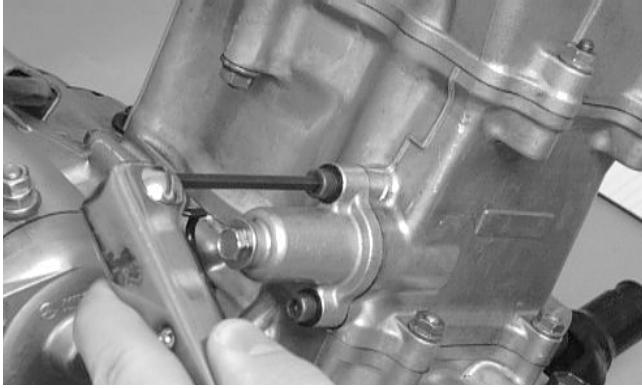


CC273D

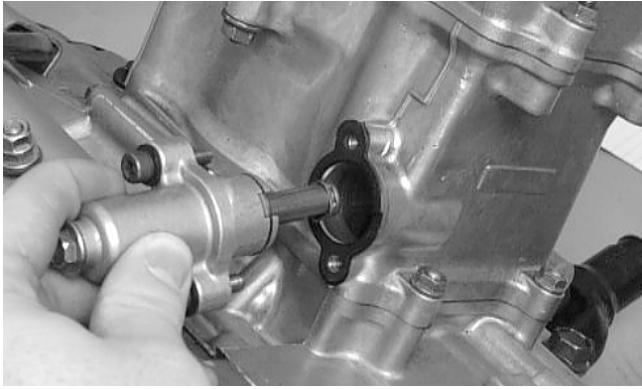
3. Loosen the cap screw on the end of the tensioner; then remove the two Allen-head cap screws securing the tensioner adjuster assembly and remove the assembly. Account for a gasket.



CC009D



CC010D



CC011D

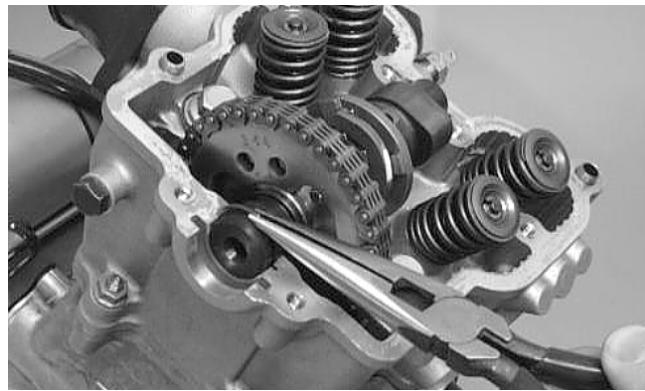
4. Remove the cap screw securing the chain tensioner (account for a washer); then remove the tensioner.



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.

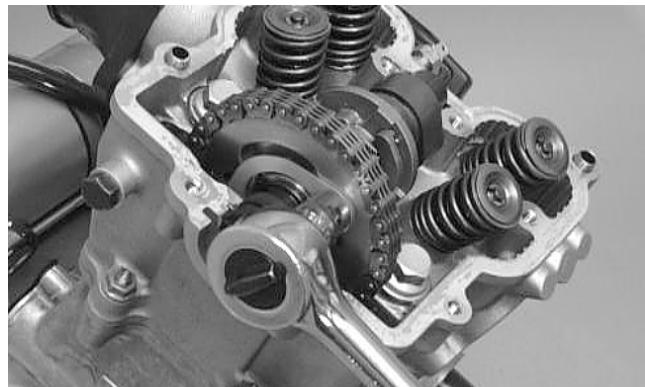
■ **NOTE:** Care should be taken not to drop the C-ring down into the crankcase.



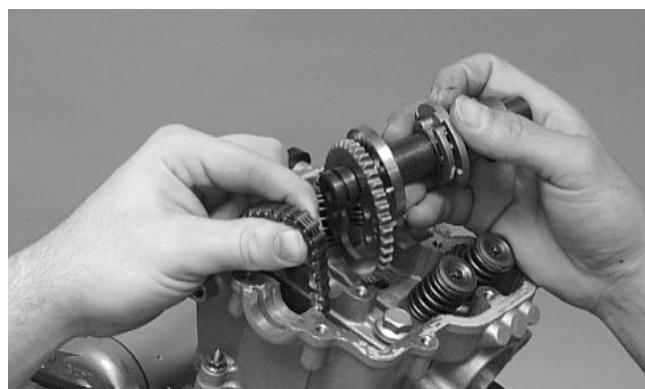
CC012D

3

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.



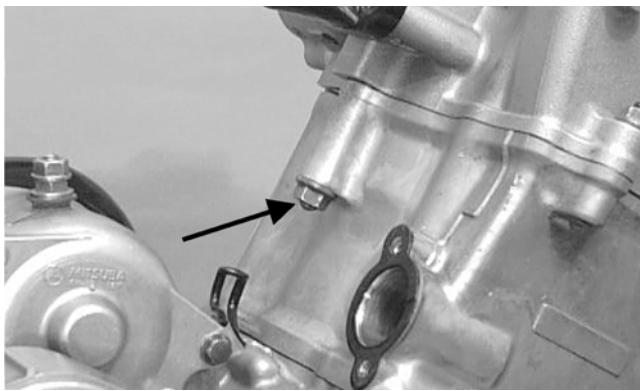
CC013D



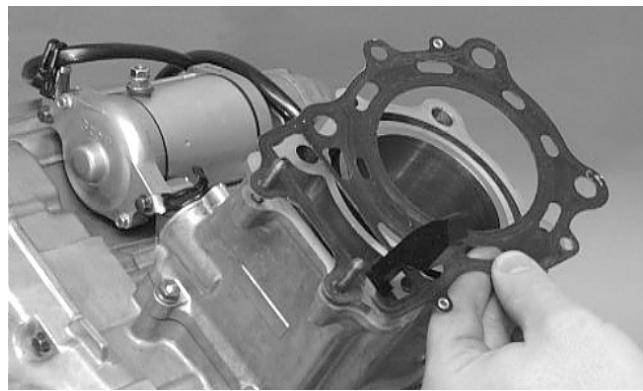
CC266D

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

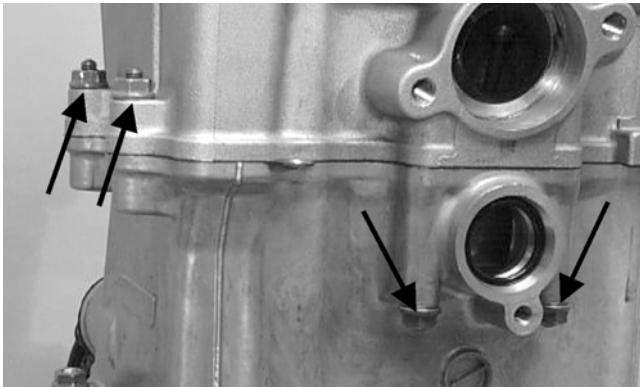
7. Remove the five nuts securing the cylinder head to the cylinder; then remove the four cylinder head cap screws with copper washers (note location of the different-sized cap screws and nuts).



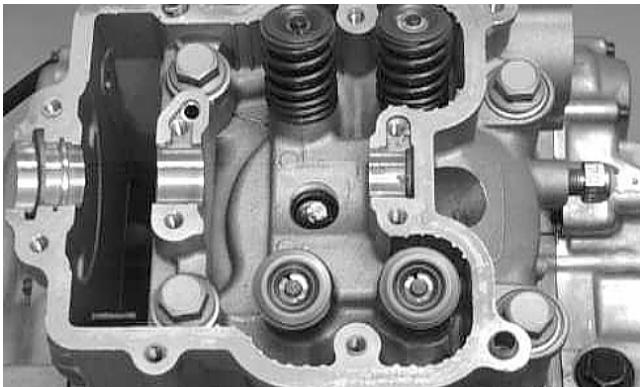
CC017D



CC020D



CC018D

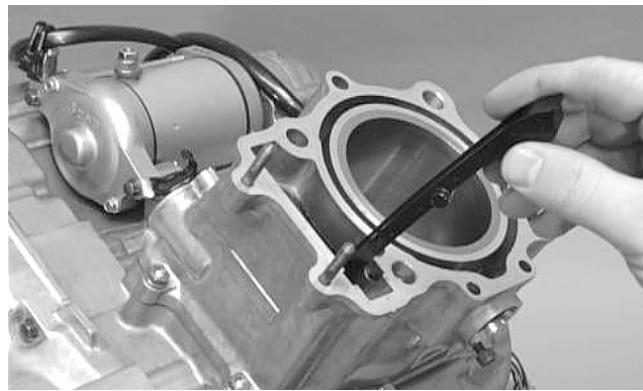
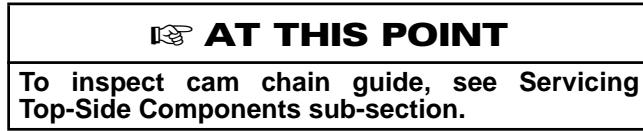


CC016D

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



9. Remove the cam chain guide.



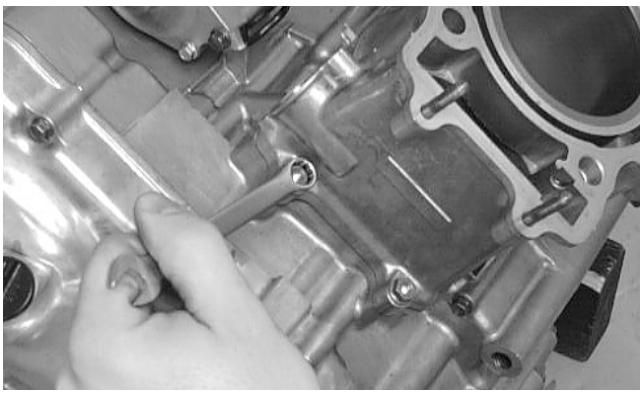
CC022D

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.

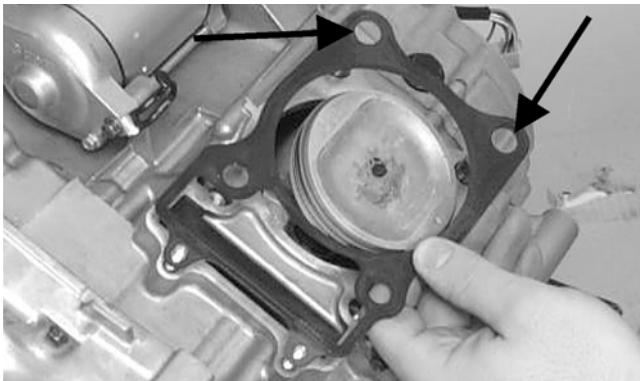


CC023D

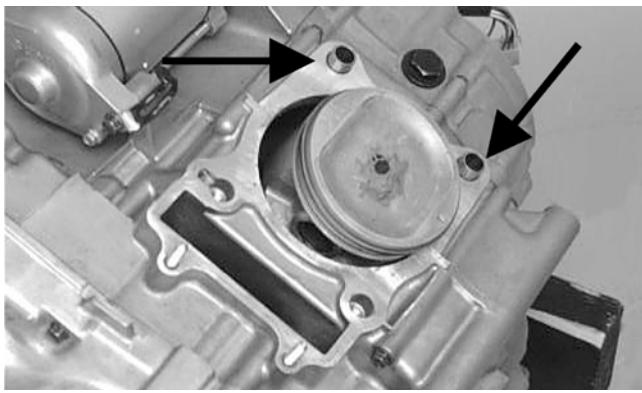
12. Lift the cylinder off the crankcase taking care not to allow the piston to drop against the crankcase. Account for the gasket and two alignment pins.



CC024D



CC025D



CC026D

☞ AT THIS POINT

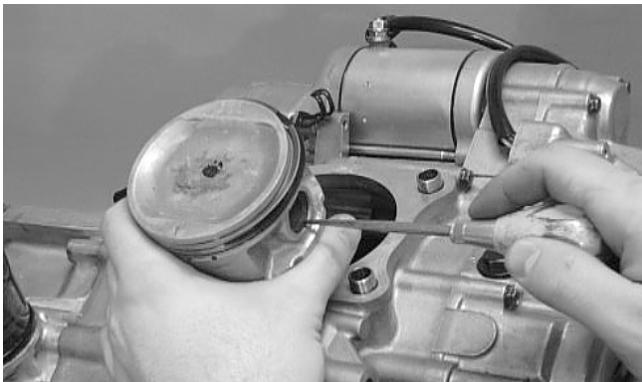
To service cylinder, see Servicing Top-Side Components sub-section.

⚠ CAUTION

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

3

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.

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.

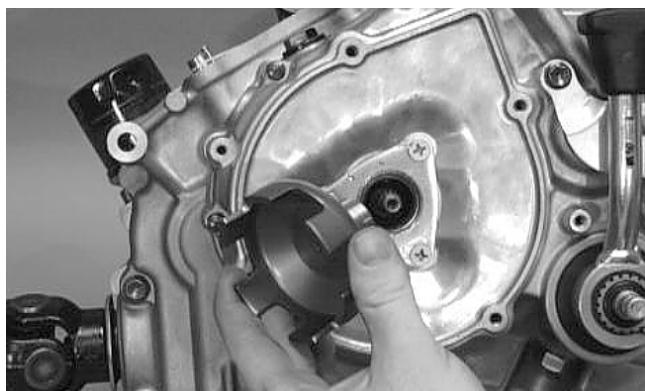
👉 AT THIS POINT

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.

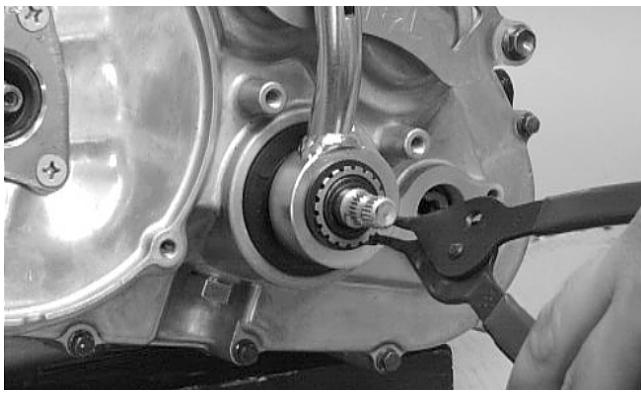
Left-Side Components

■ 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.

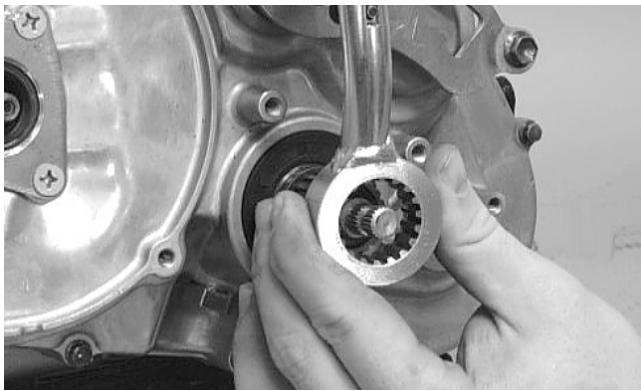
■ NOTE: The engine/transmission does not have to be removed from the frame for this procedure.



CC044D

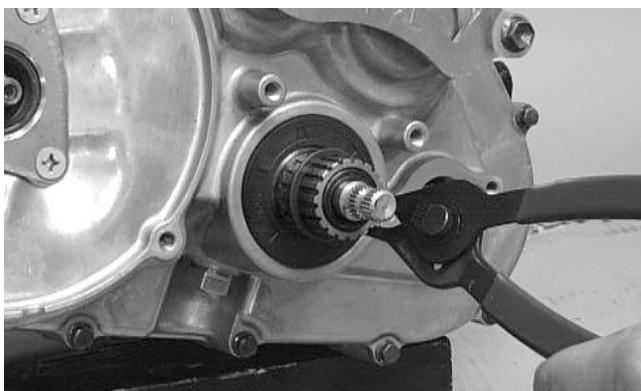


CC043D



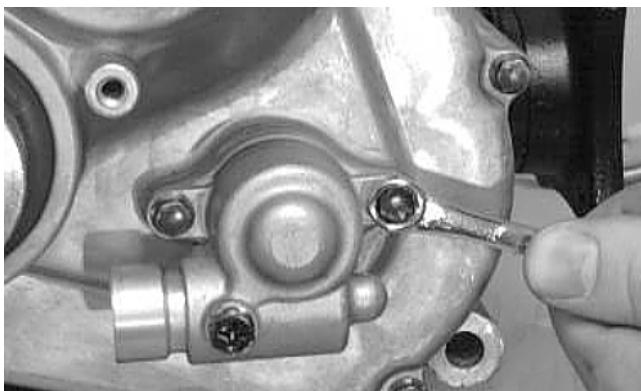
CC045D

4. Remove the inside circlip.



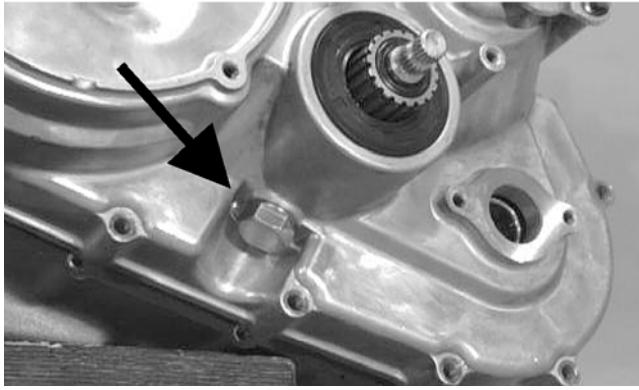
CC046D

5. Remove the two cap screws securing the speedometer drive adapter; then remove the adapter. Account for the gasket.



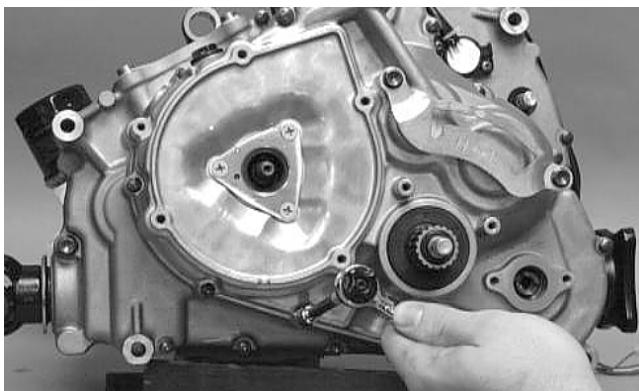
CC042D

6. Remove the shift stop housing assembly from beneath the shift shaft housing. Account for the stopper and spring.

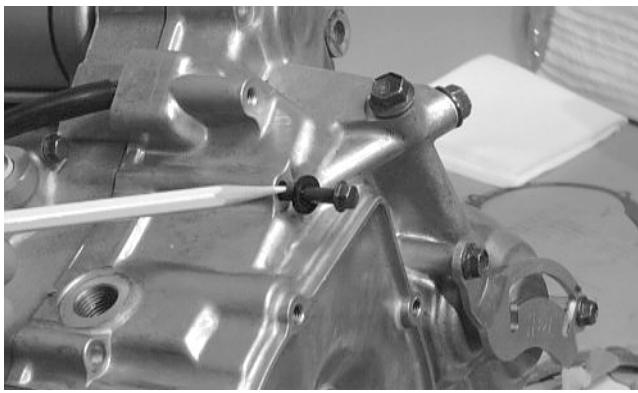


CC054D

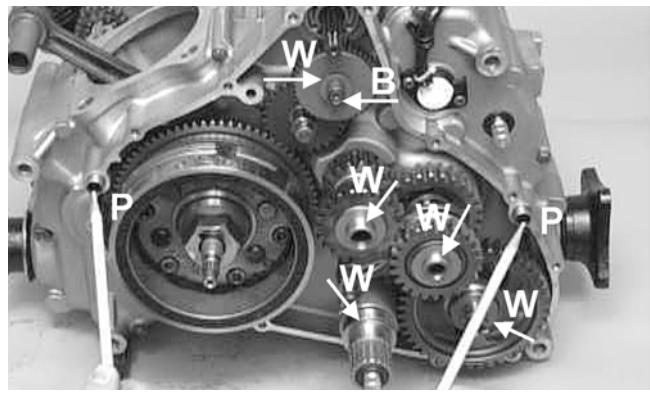
7. Remove the fourteen cap screws securing the left-side cover to the crankcase and note the location of the long cap screw with rubber washer.



CC047D



CC055D



CC326D

8. 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.

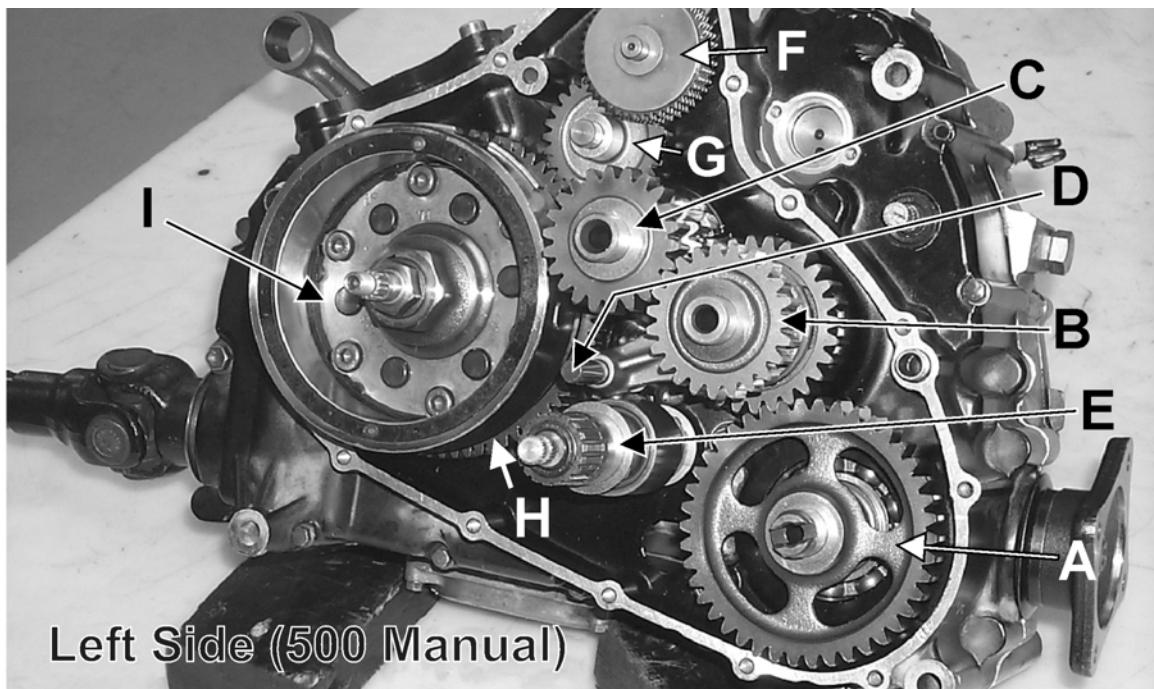
■ **NOTE:** Inspect the inside of the left-side cover for any shaft washers that may have come off with the cover. Make sure they are returned to their respective shafts and that the idle gear bushing is on the shaft or in the cover.

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 CC820A.



KEY CC820B



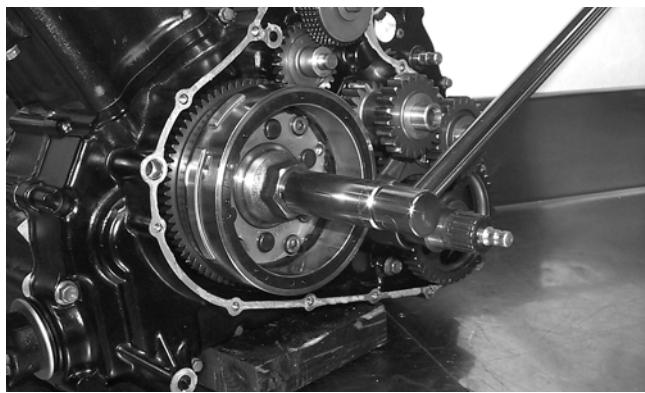
A. Output Shaft with Driven Gear
 B. Drive Gears #1 & #2
 C. Idle Gear
 D. Shift Fork with Shaft
 E. Shift Shaft Assembly

F. Starter Gear Assembly
 G. Starter Idle Gear
 H. Starter Clutch Gear Assembly
 I. Rotor/Flywheel

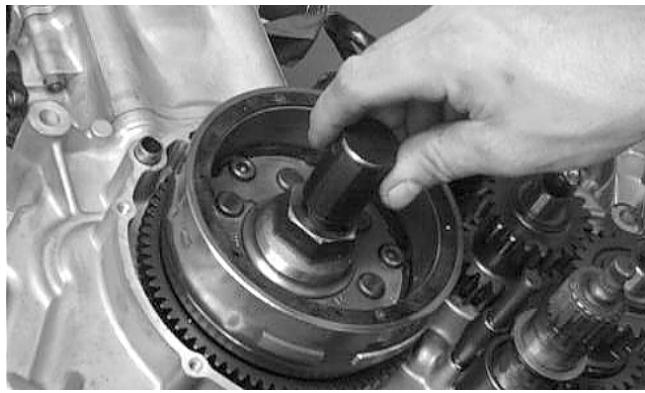
CC820A

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

9. Remove the nut securing the rotor/flywheel (I) to the crankshaft; then install the magneto rotor remover adapter.



CC147D

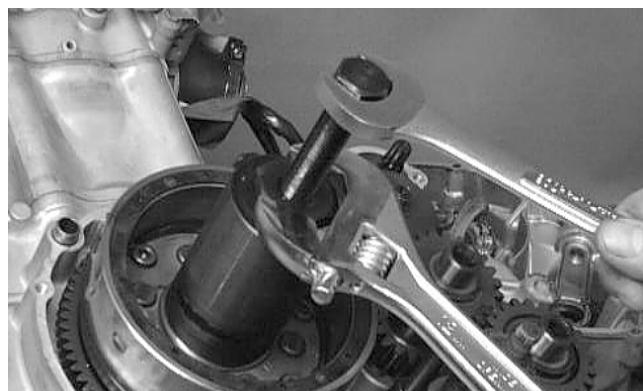


CC327D

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.



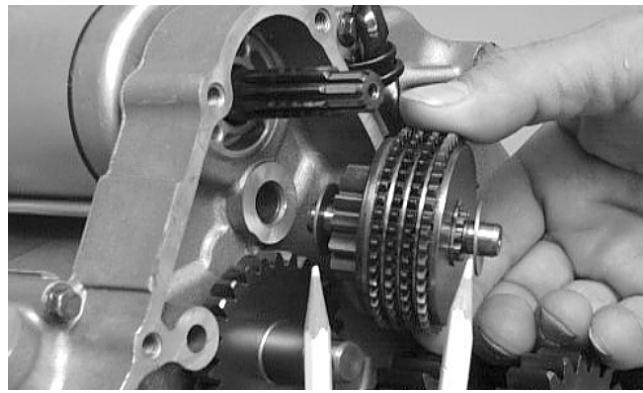
CC149D



CC150D

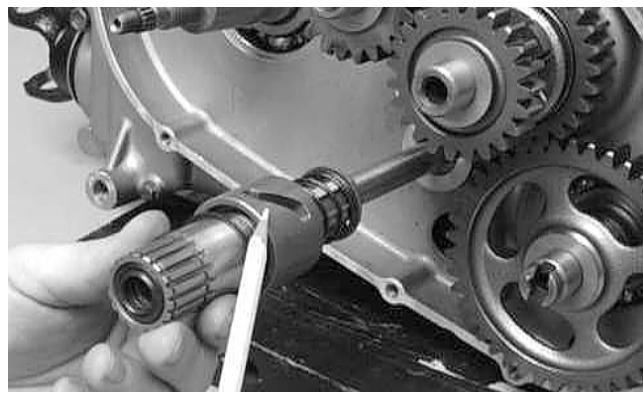
11. Remove the starter gear assembly (F) from the crankcase; then account for a washer on each end of the assembly.

■ **NOTE: There are bushings on each end of the assembly. The bushings may stay with the assembly or in the case halves.**



CC157D

12. Remove the shift fork shaft (D) from the crankcase boss; then remove the shift fork from the shaft. Remove the shift shaft assembly (E) from the fixed shaft. Account for the left shaft washer.



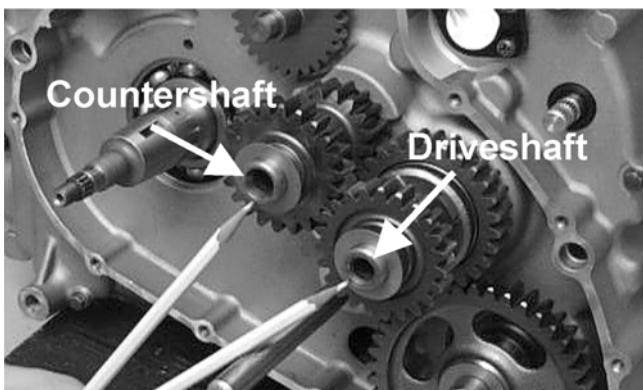
CC057D

3



CC333D

13. Remove a washer from the countershaft and from the driveshaft.



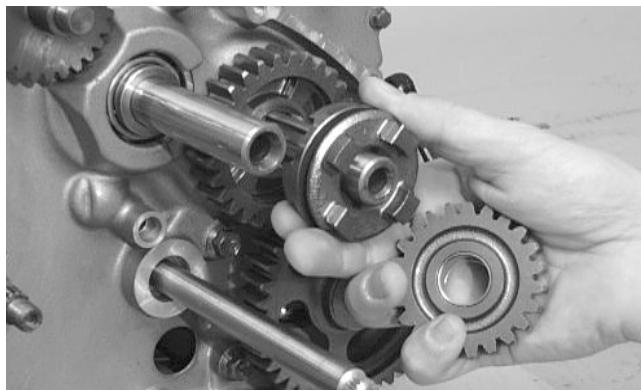
CC058DA

14. Remove the idle gear (C) and spacer from the countershaft.



CC060D

15. Remove the #2 drive gear (B) and the select sliding dog gear from the driveshaft. Account for a bushing and a washer.

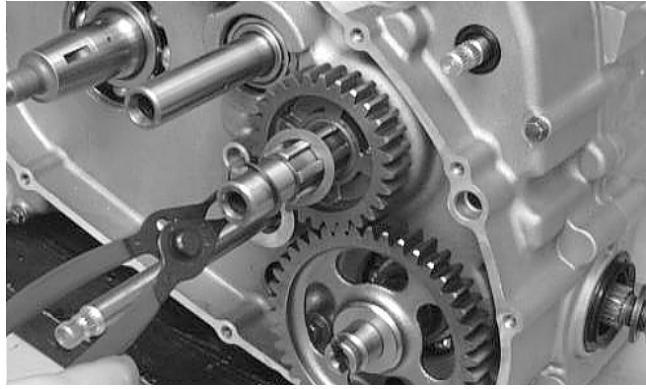


CC061D

☞ AT THIS POINT

To service shift fork, see Servicing Left-Side Components sub-section.

16. Remove the circlip and washer from the driveshaft; then remove the #1 drive gear (B). Account for a splined bushing and a spacer.

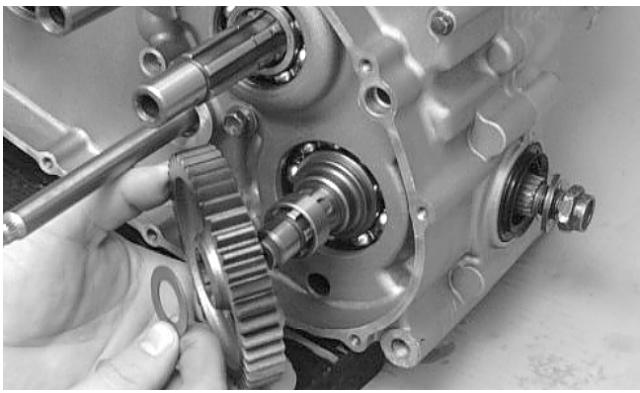


CC059D



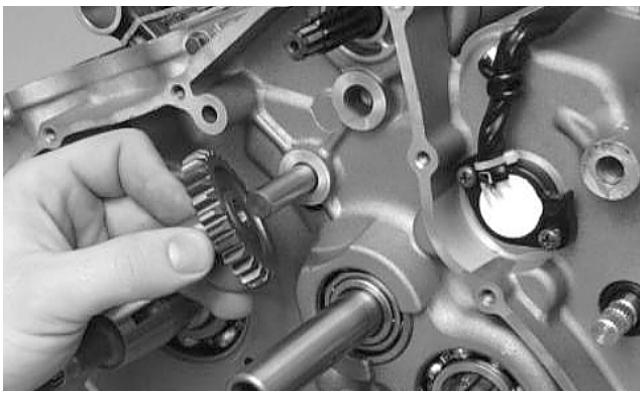
CC062D

17. Remove the washer and driven gear (A) from the output shaft; then account for the bushing.



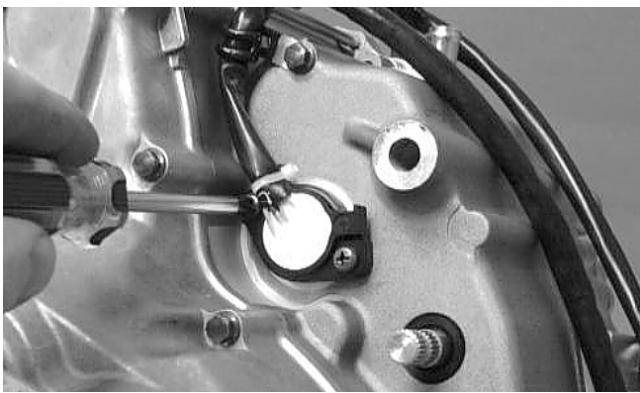
CC063D

18. Remove the starter idle gear (G) from the pin; then remove the pin.

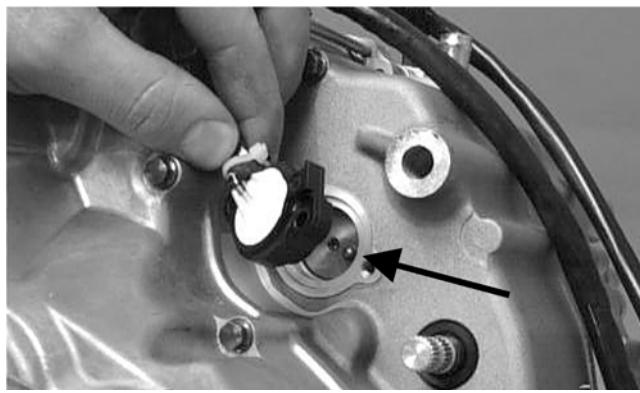


CC064D

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

3

☞ **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**

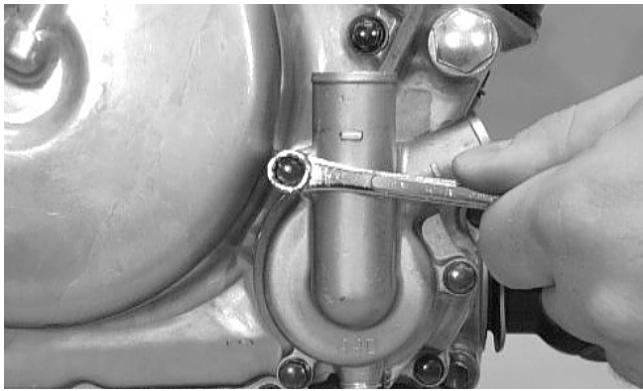
To service any one specific component, only limited disassembly of components may be necessary. Note the AT THIS POINT information in each sub-section.

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

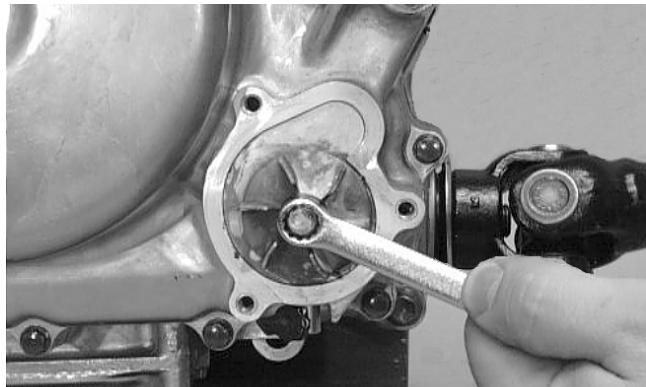
Removing Right-Side Components

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

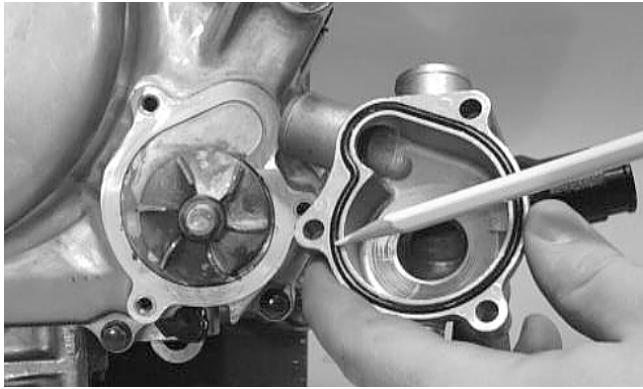


CC029D

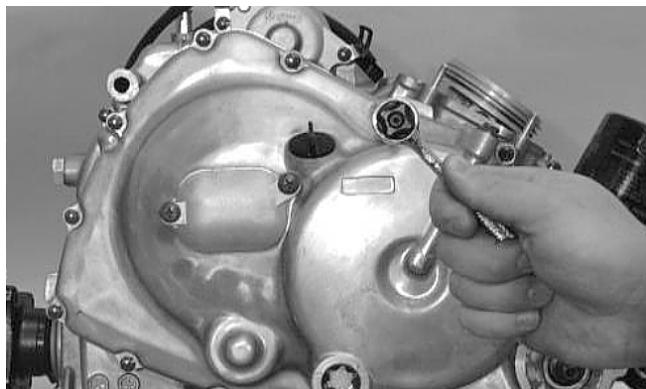


CC030D

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.



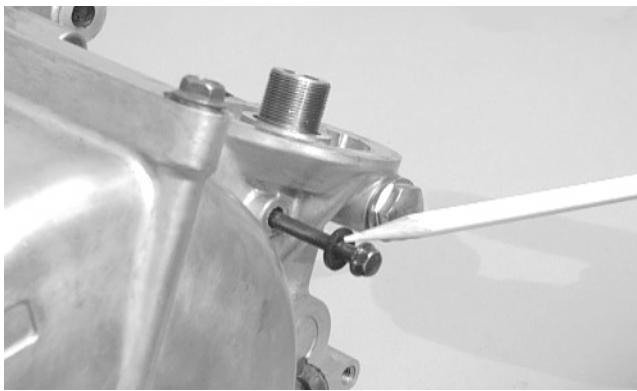
CC028D



CC034D

4. Remove the cap screw securing the impeller to the impeller shaft; then remove the impeller. Account for the rubber retainer and porcelain seal.

■ **NOTE:** The water pump housing does not have to be removed when removing the right-side cover.



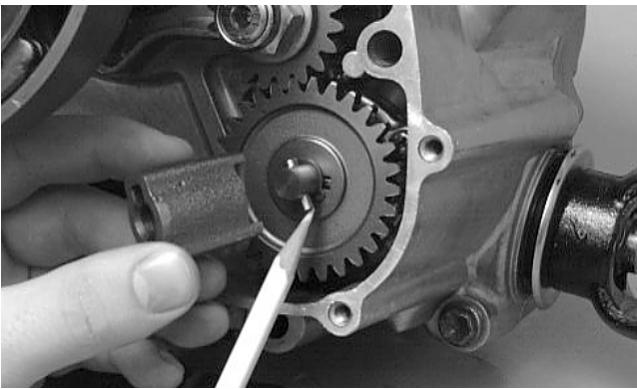
CC068D

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



CC070D

6. Remove the water pump drive joint from the water pump shaft. Account for the pin.

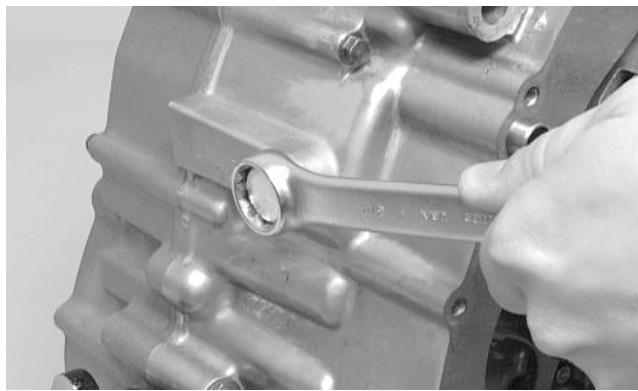


CC082D

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.



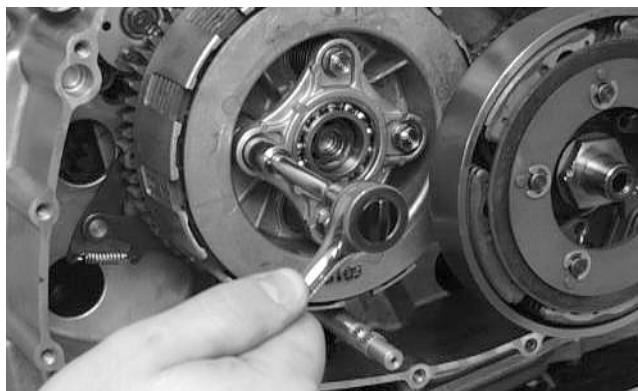
CC069D

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

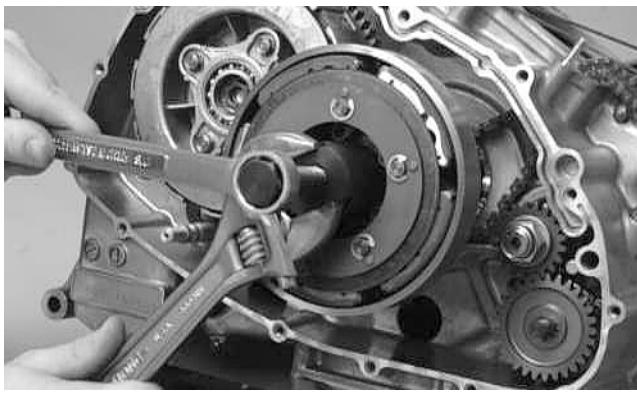


CC074D

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.



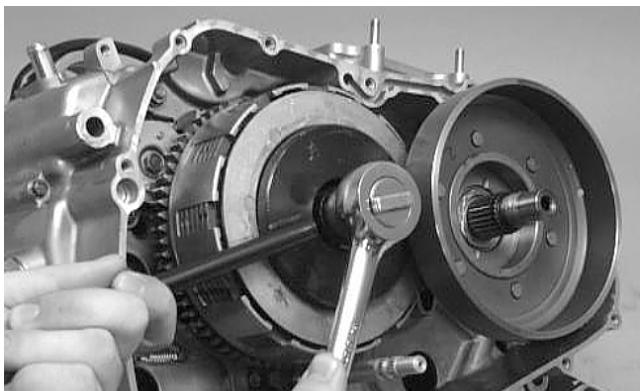
CC072D

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



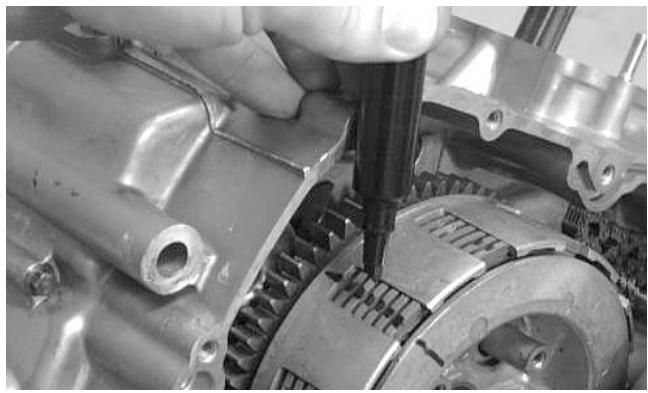
CC075D

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**

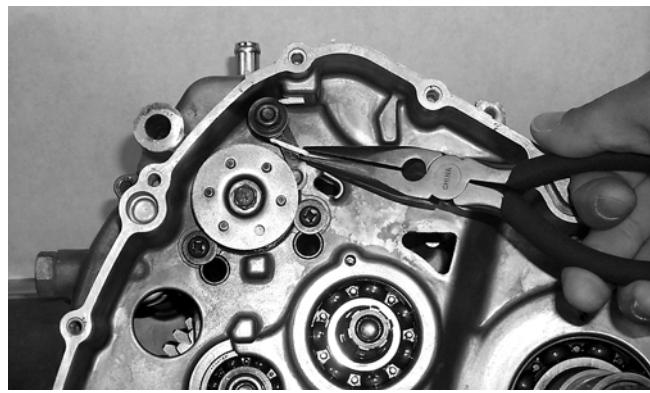
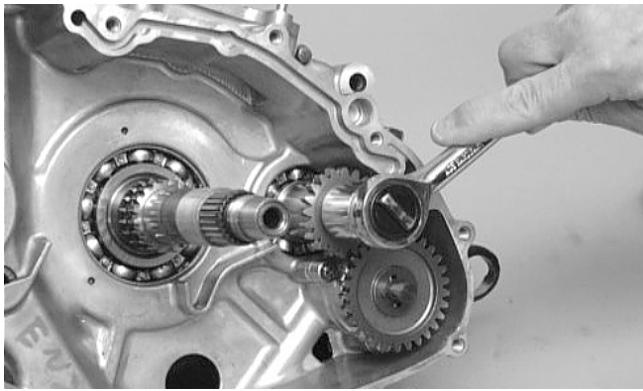
■ NOTE: Steps 1-14 in the preceding sub-sections must precede this procedure.

15. Remove the chain from the crankcase.

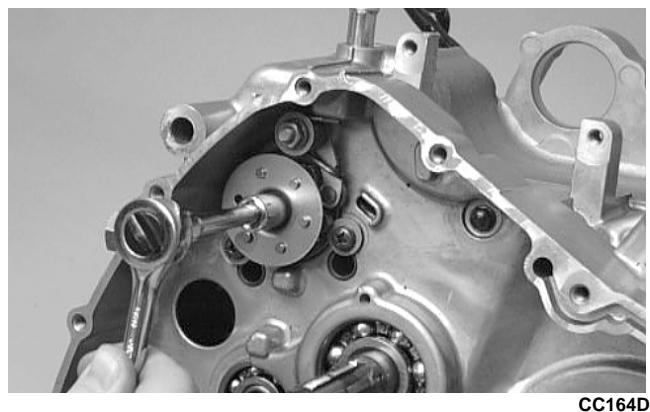
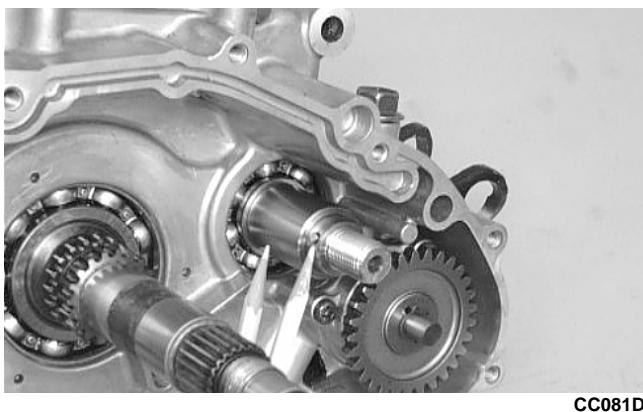


CC079D

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.

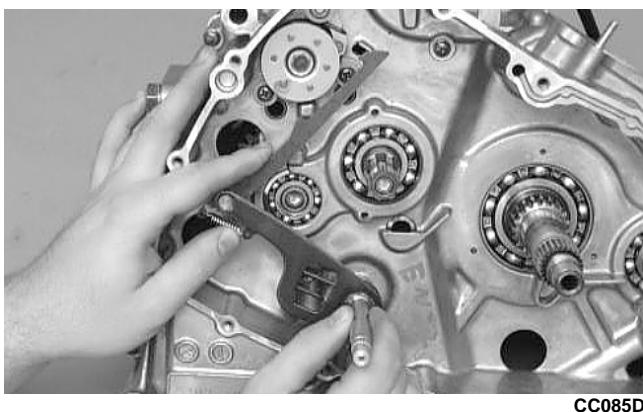


19. Remove the cap screw securing the gear shift cam plate and guide to the gear shift cam; then remove the cam plate and guide.



3

17. Remove the gear shift shaft from the crankcase.



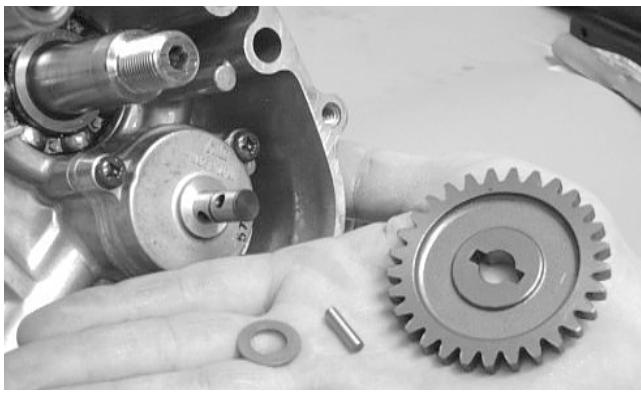
18. Release the tension from the gear shift cam stopper arm spring.



■ 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.

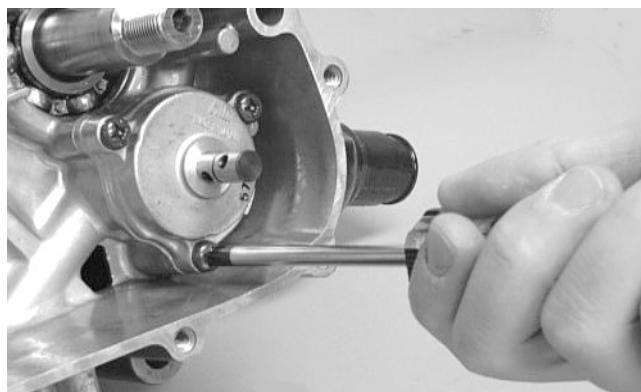
20. Remove the circlip securing the oil pump driven gear; then remove the gear. Account for the pin and the washer.





CC089D

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



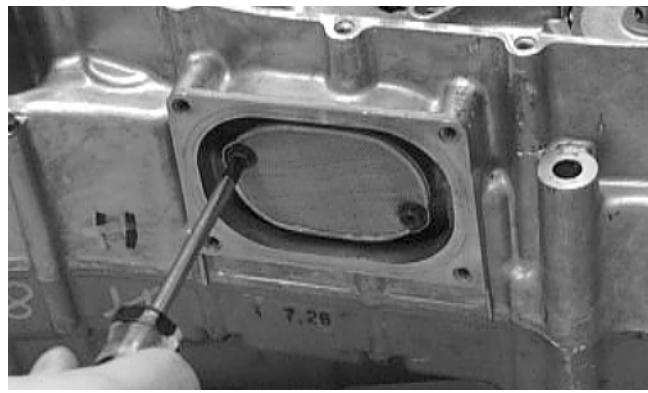
CC090D

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.

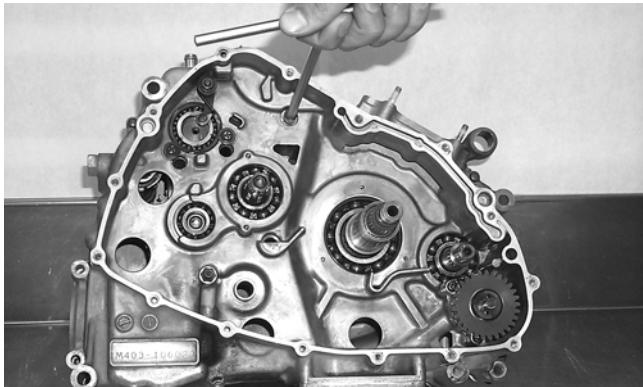
Center Crankcase Components

■ **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.

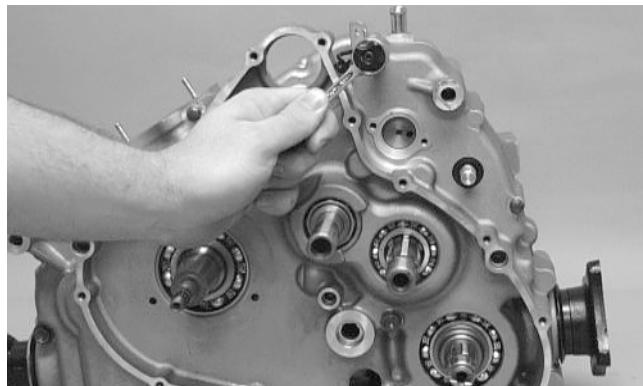
Separating Crankcase Halves

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.



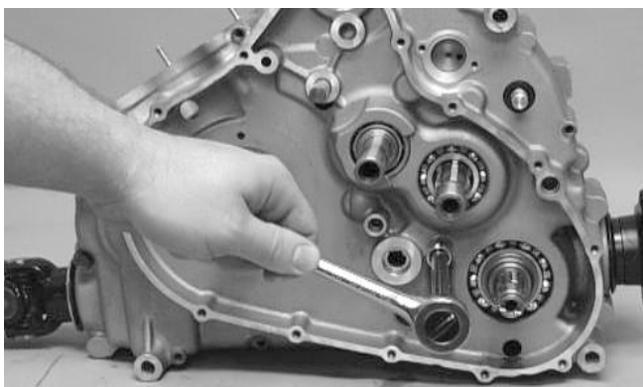
CC530D

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.



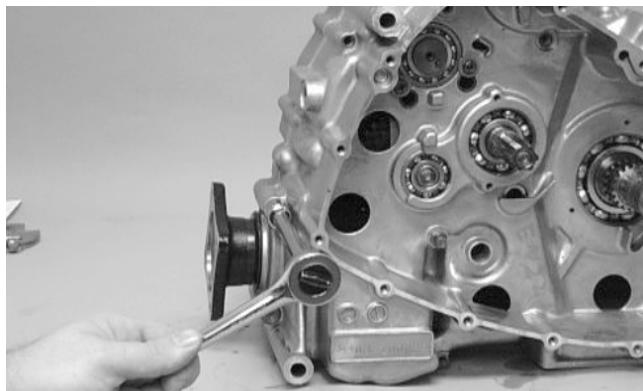
CC096D

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.

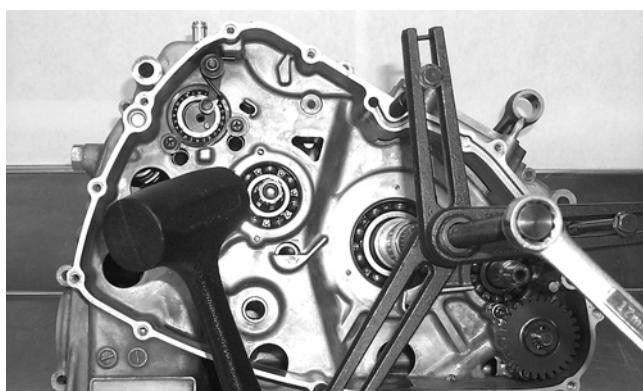


CC098D

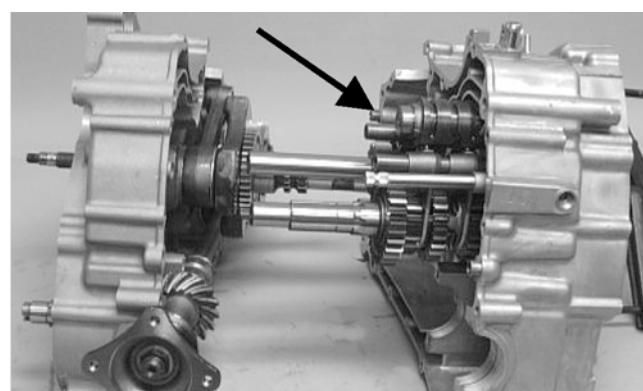
5. Using the Crankcase Separator/Crankshaft Remover (p/n 0444-009) and tapping lightly with a rubber mallet, separate the crankcase halves. Account for two alignment pins, an O-ring, and a washer.

3

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



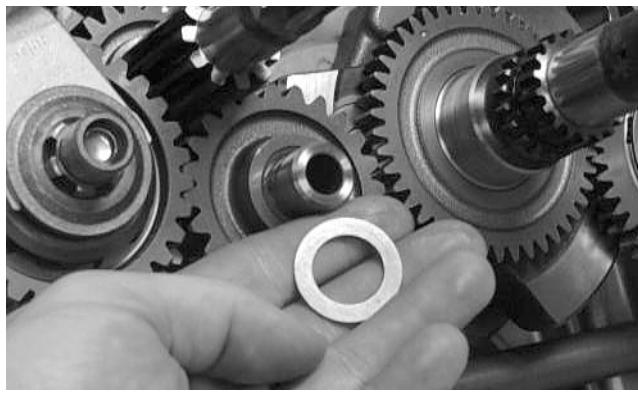
CC099D



CC100D



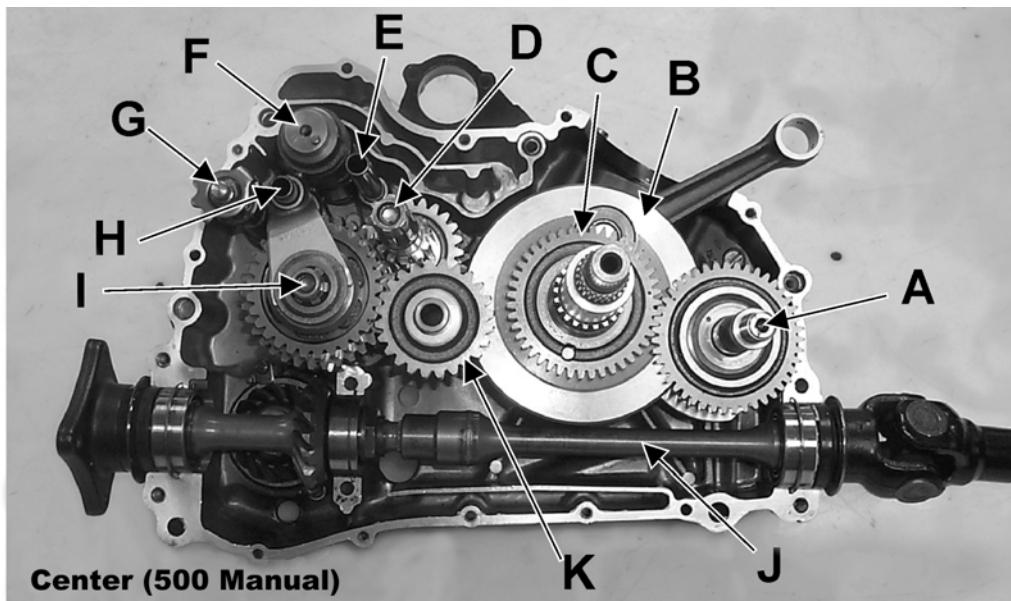
CC101D



CC102D

Disassembling Crankcase Half

■ NOTE: For steps 1-10, refer to illustration CC803A.

**KEY CC803A**

- A. Crank Balancer Assembly
- B. Crankshaft
- C. Balancer Drive Gear with Pin
- D. Countershaft Assembly
- E. Shift Shaft with Fork
- F. Gear Shift Cam

- G. Reverse Shift Cam
- H. Shift Shaft with 3 Forks
- I. Driveshaft Assembly
- J. Output Shaft (4x4 Shown)
- K. Reverse Idle Gear

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

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

AT THIS POINT

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

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

AT THIS POINT

To service the driveshaft and/or countershaft, see Servicing Center Crankcase Components sub-section.

■ NOTE: For efficiency, if the driveshaft and/or countershaft are not being serviced, it is preferable to leave them assembled. The technician should use discretion and sound judgment.

8. Remove the front output shaft (J) and rear shaft assemblies. Account for the bearing C-ring.

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



CC166D

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



CC165D

3

AT THIS POINT

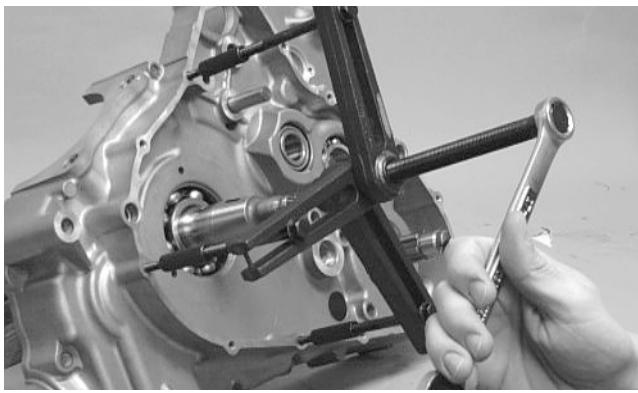
To service the driven gear, see Servicing Center Crankcase Components sub-section.

■ 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.

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 the Crankcase Separator/Crankshaft Remover (p/n 0444-009), push the crankshaft assembly out of the crankcase.



CC115D

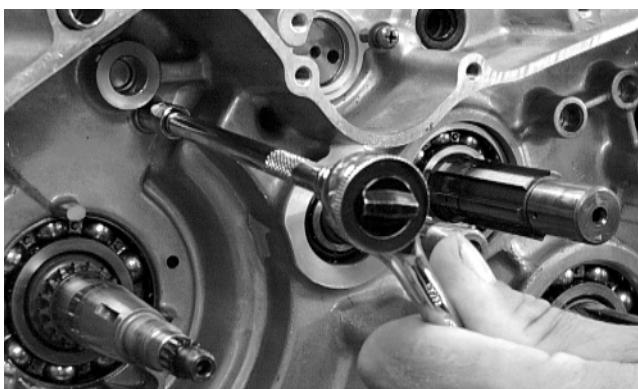
AT THIS POINT

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.

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

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Crankshaft Assembly	3-296
Driveshaft	3-297
Countershaft	3-305

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.

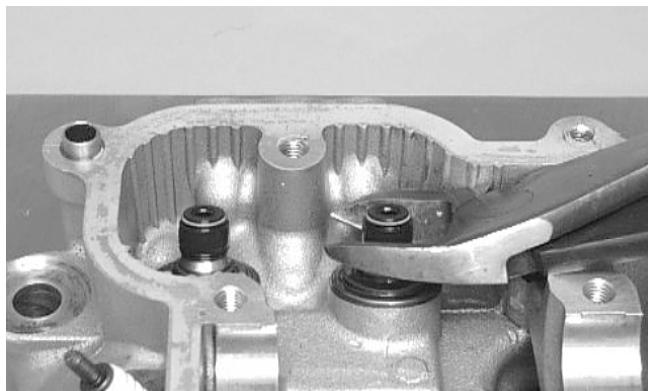
1. Wash the valve cover in parts-cleaning solvent.

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.

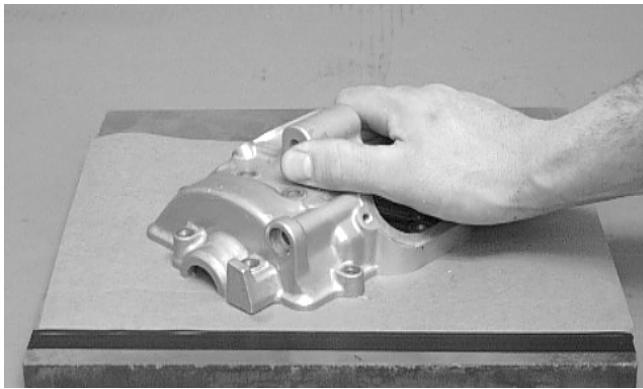
⚠ CAUTION

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.

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

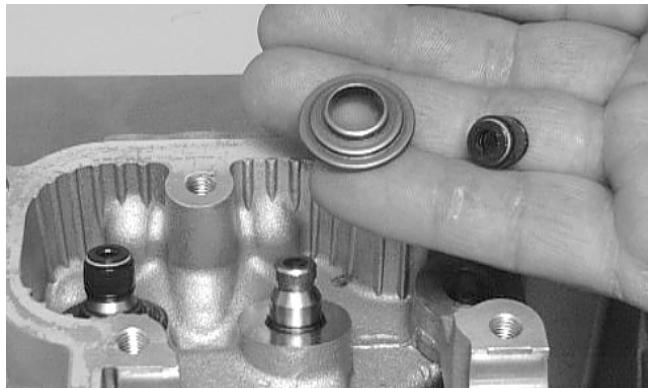


CC134D



CC130D

3



CC136D

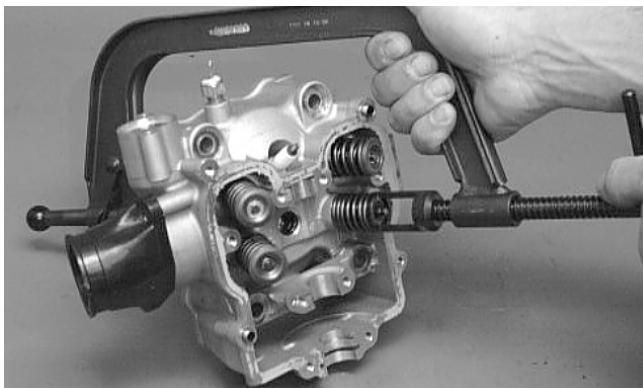
⚠ CAUTION

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.



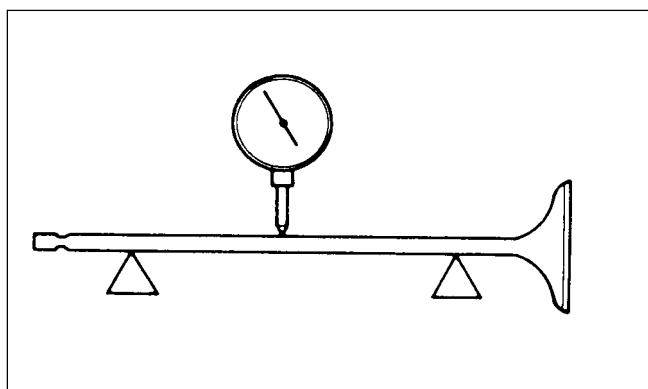
CC132D

■ 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

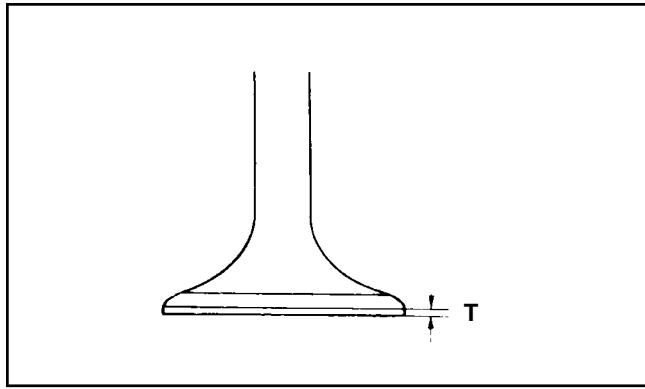
2. Maximum runout is 0.05 mm (0.002 in.).

Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem outside diameter.
2. Acceptable diameter range (intake valve) is 4.975 - 4.990 mm (0.1959 - 0.1965 in.).
3. Acceptable diameter range (exhaust valve) is 4.955 - 4.970 mm (0.1951 - 0.1957 in.).

Measuring Valve Face/Seat Width

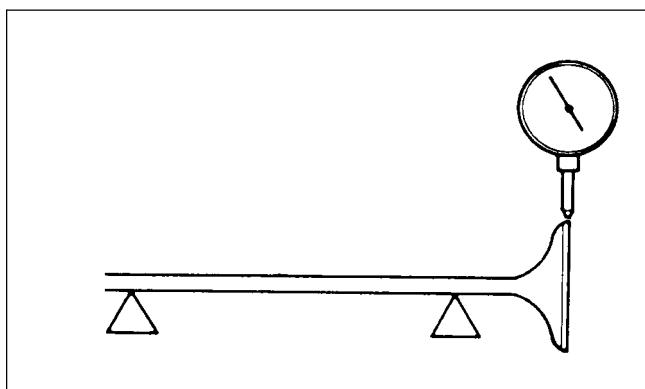
1. Using a micrometer, measure the width of the valve face.



2. Acceptable width range is 0.9-1.1 mm (0.035-0.043 in.).

Measuring Valve Face Radial Runout

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

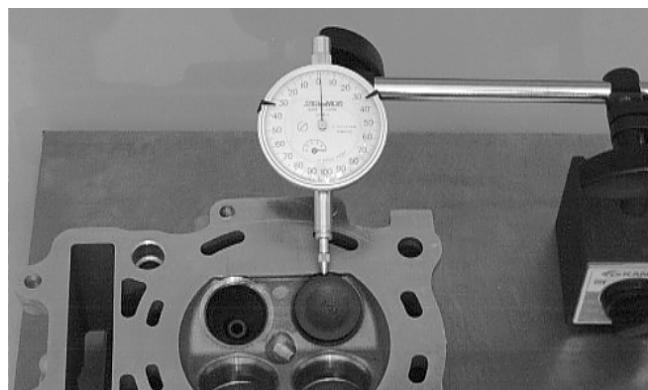


3. Rotate the valve in the V blocks.

4. Maximum runout is 0.03 mm (0.001 in.).

Measuring Valve Guide/Valve Stem Deflection (Wobble Method)

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



3. Push the valve from side to side; then from top to bottom.
4. Maximum "wobble" deflection is 0.35 mm (0.014 in.).

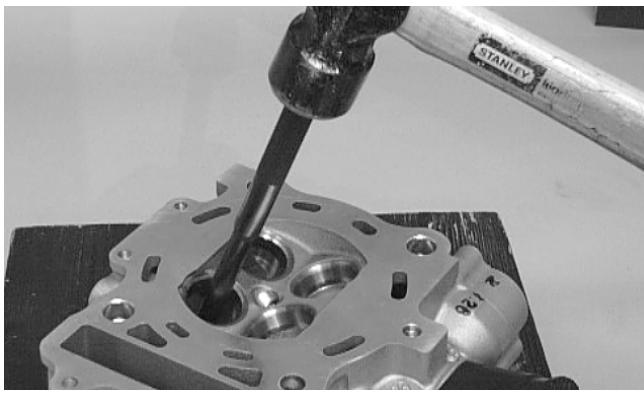
Measuring Valve Guide (Inside Diameter)

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 is 5.000 - 5.012 mm (0.1969 - 0.1973 in.).
3. If a valve guide is out of tolerance, it must be replaced.

Replacing Valve Guide

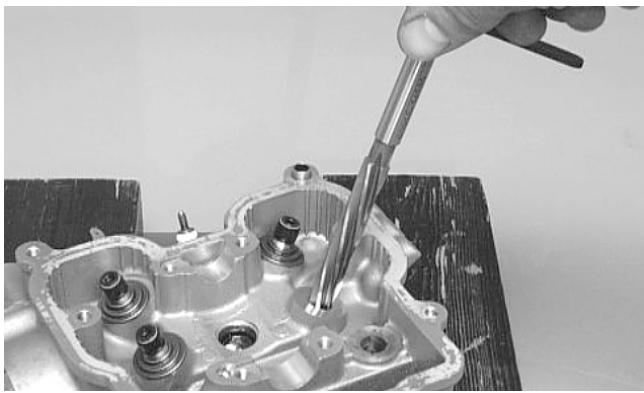
■ **NOTE: If a valve guide is worn or damaged, it must be replaced.**

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.



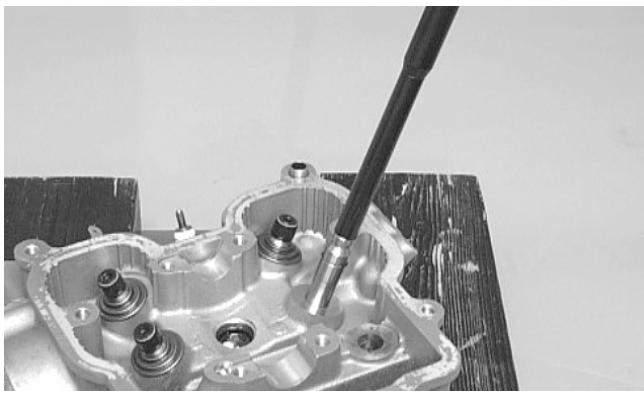
CC137D

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



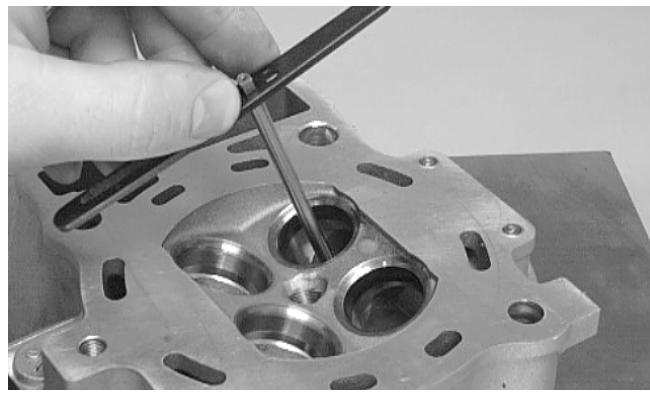
CC142D

- 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.



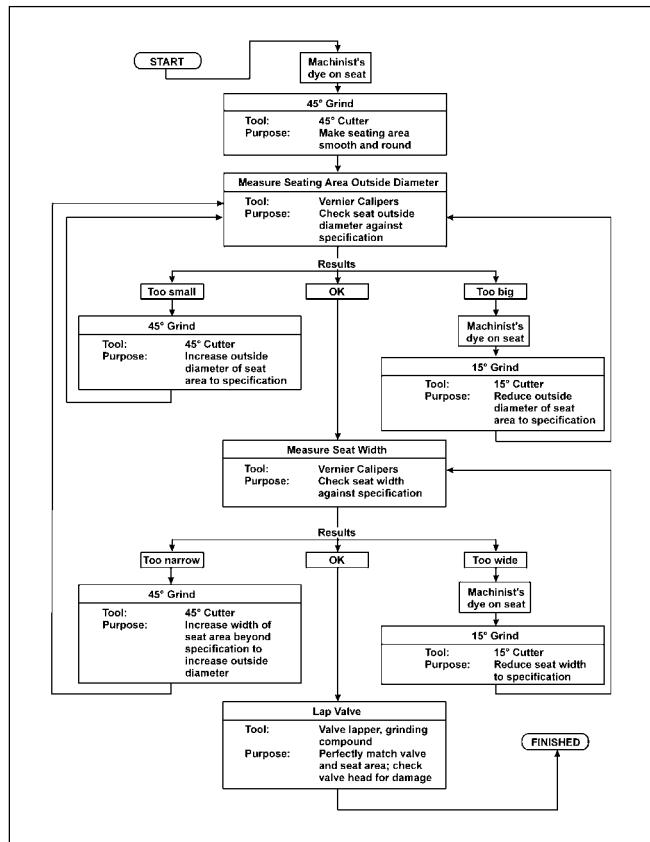
CC143D

- 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.**

- 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.

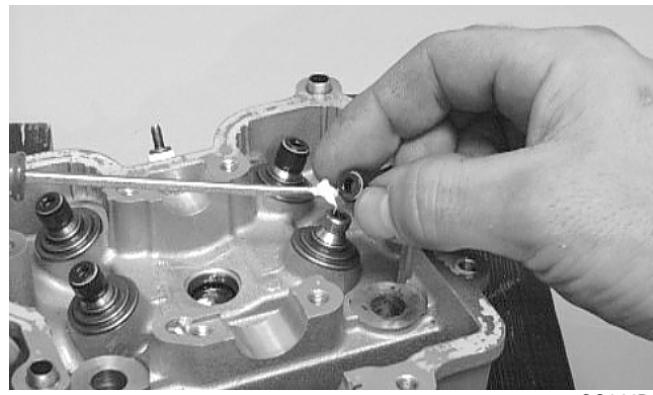
2. Acceptable inside diameter range is 12.000-12.018 mm (0.472-0.473 in.).

Measuring Rocker Arm Shaft (Outside Diameter)

1. Using a micrometer, measure the outside diameter of the rocker arm shaft.
2. Acceptable outside diameter range is 11.973-11.984 mm (0.4714-0.4718 in.).

Installing Valves

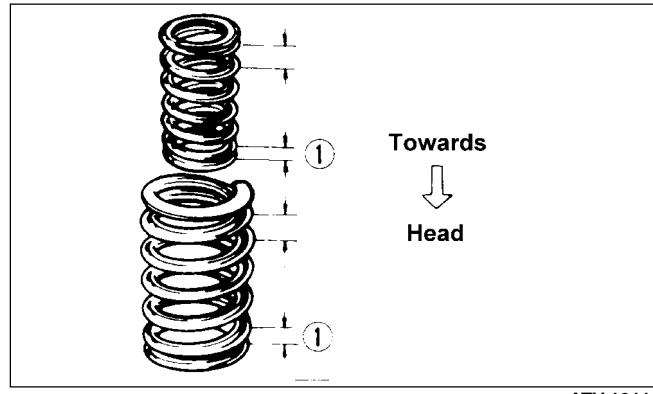
1. Apply grease to the inside surface of the valve seals; then place a lower spring seat and valve guide seal over each valve guide.



CC144D

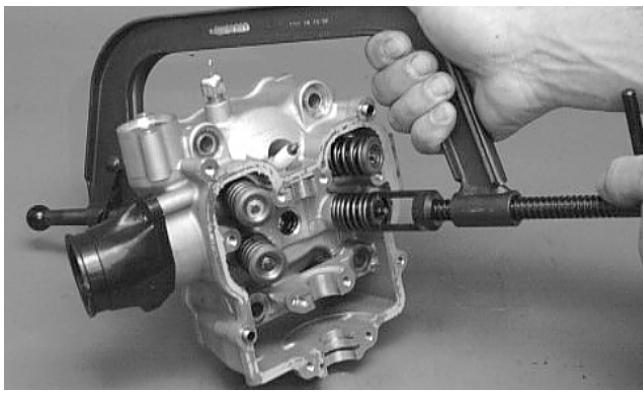
2. Insert each valve into its original valve location.
3. Install the valve springs with the painted end of the spring facing away from the cylinder head.

■ **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



CC400D

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.

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

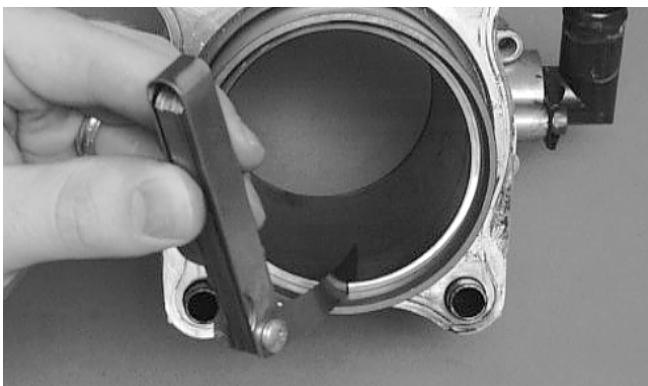
1. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge.
2. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

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)

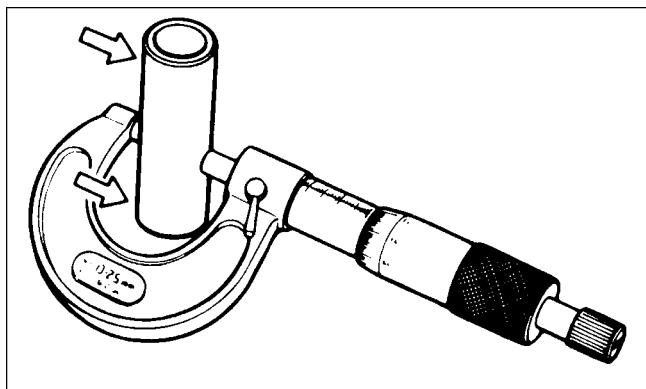
1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within a range of 0.10-0.25 mm (0.0039-0.0098 in.) both rings.



CC280D

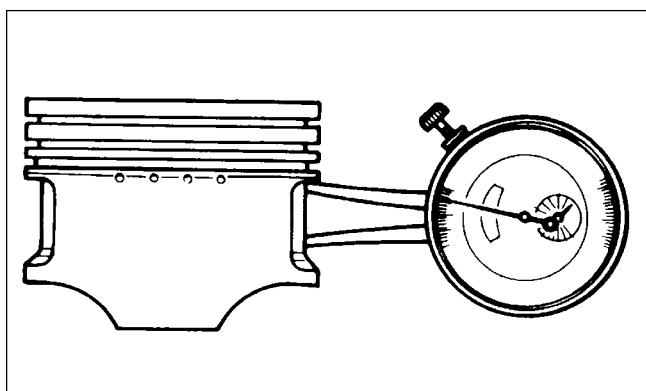
Measuring Piston Pin (Outside Diameter) and Piston-Pin Bore

1. Measure the piston pin outside diameter at each end and in the center. If measurement is less than 22.98 mm (0.905 in.), the piston pin must be replaced.



ATV-1070

2. Insert an inside dial indicator into the piston-pin bore. The diameter must be a maximum 23.03 mm (0.907 in.). Take two measurements to ensure accuracy.



ATV-1069

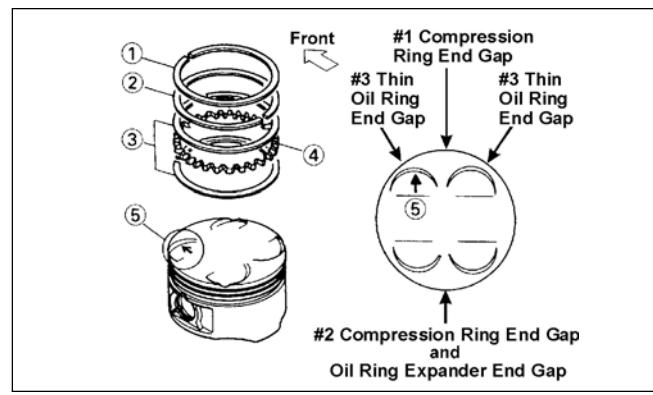
Measuring Piston Skirt/Cylinder Clearance

1. Measure the cylinder front to back in six places.
2. Measure the corresponding piston diameter at a point 15 mm (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 a range of 0.030-0.040 mm (0.0011-0.0015 in.).

Installing Piston Rings

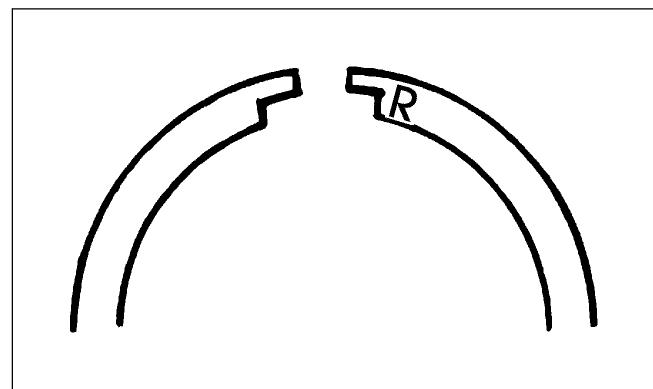
1. Install a thin oil ring (3), ring expander (4), and thin oil ring (3) in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

■ 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

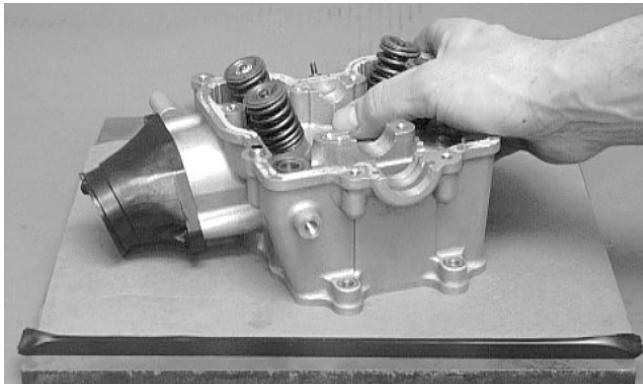
The cylinder head studs must be removed for this procedure.

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.



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 is 0.05 mm (0.002 in.).



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.

3



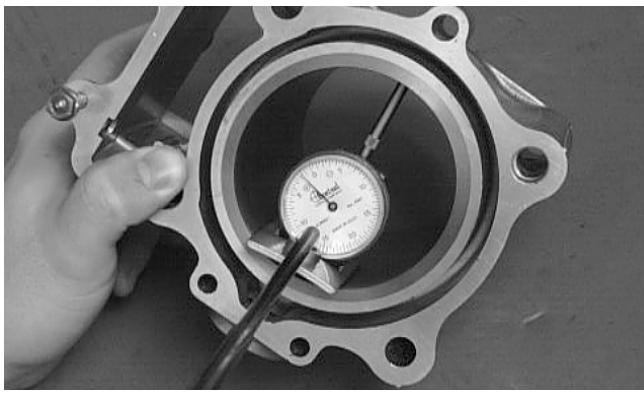
CC129D

Inspecting Cam Chain Guide

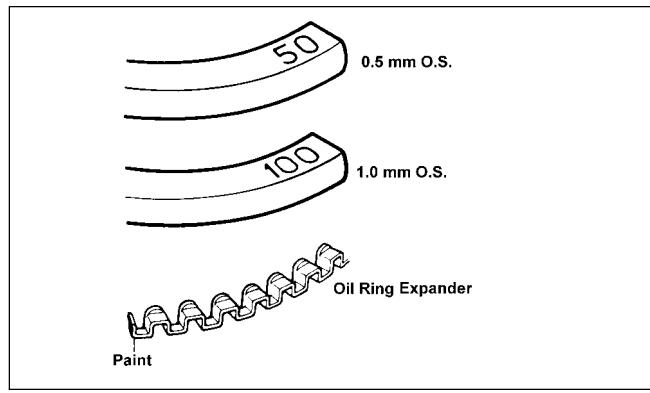
1. Inspect cam chain guide for cuts, tears, breaks, or chips.
2. If the chain guide is damaged, it must be replaced.

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 be 0.05 mm (0.002 in.).



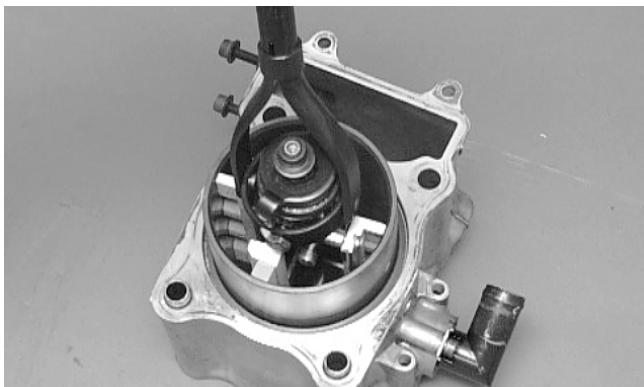
CC127D



ATV-1068

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.

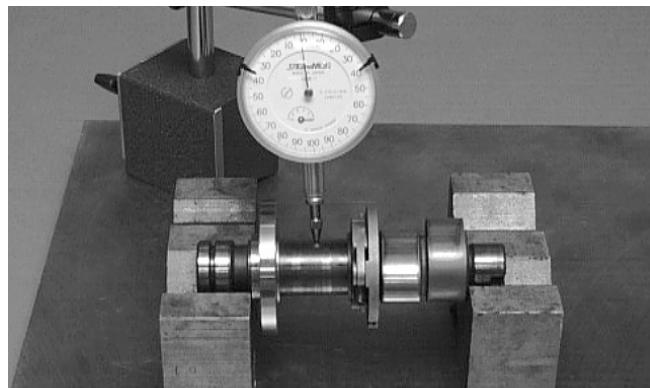
4. If any measurement exceeds the limit, hone the cylinder and install an oversized piston or replace the cylinder.

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

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.

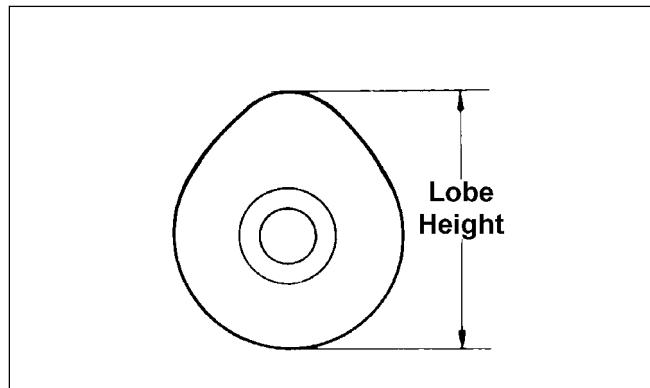


CC283D

2. Rotate the camshaft and note runout; maximum tolerance is 0.10 mm (0.004 in.).

Measuring Camshaft Lobe Height

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



ATV1013A

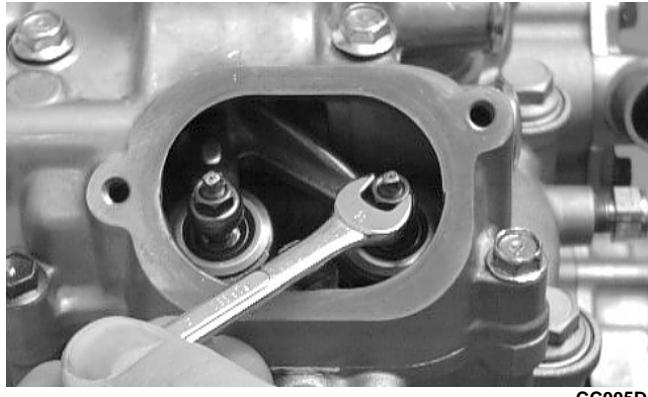
2. The intake lobe height must be a minimum 33.150 mm (1.305 in.); exhaust lobe height must be a minimum 33.220 mm (1.308 in.).

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.

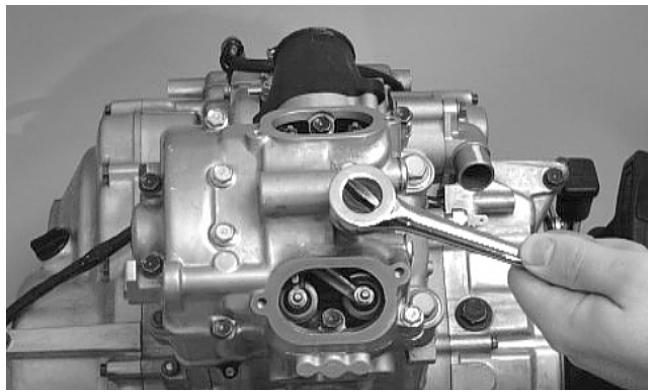


CC005D

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.

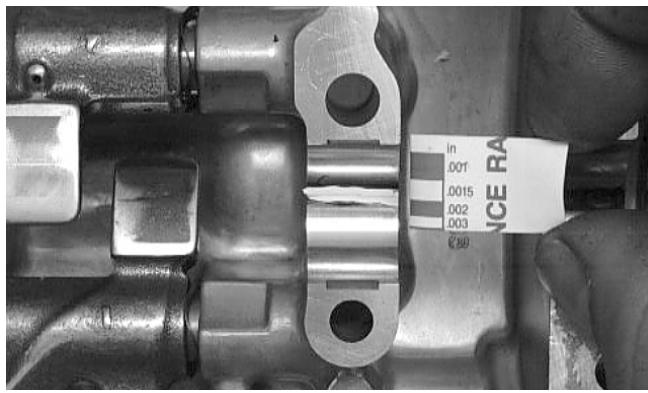
■ **NOTE: Do not rotate the camshaft when measuring clearance.**

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



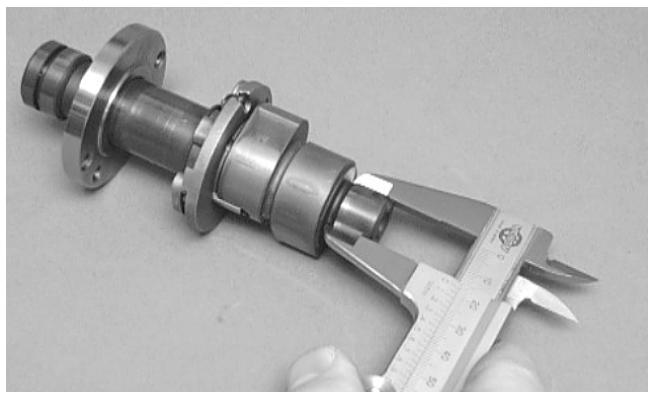
CC003D

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.

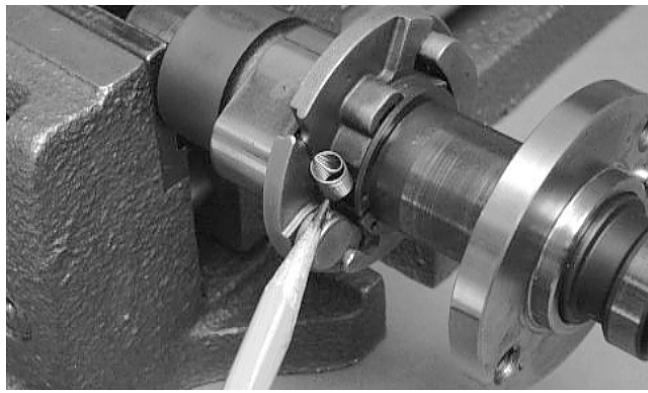


CC287D

■ **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

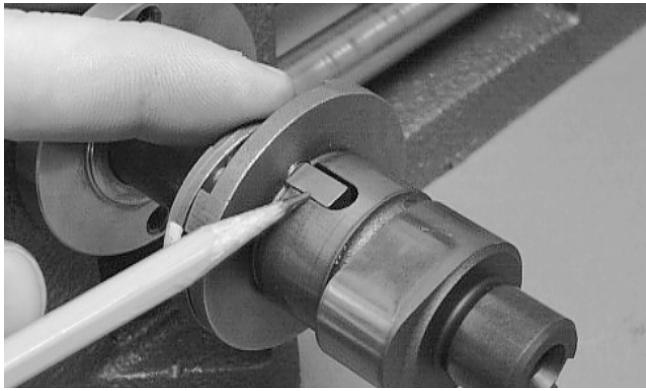
1. Inspect the spring and drive pin for damage.



CC304D



CC308D

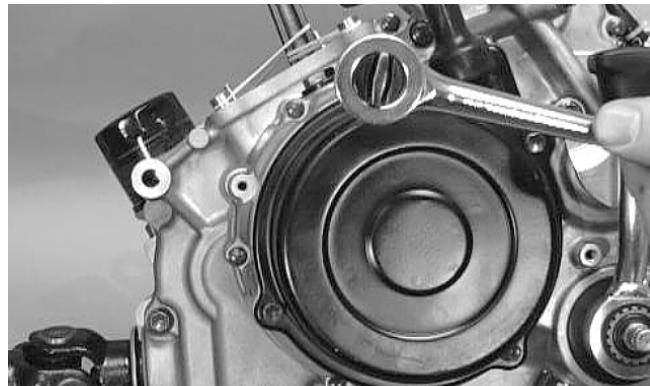


CC308D

2. If damaged, the camshaft must be replaced.

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.



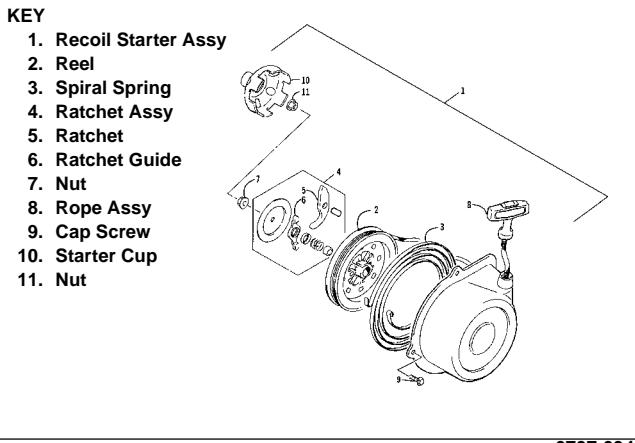
B600D

⚠ CAUTION

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

3. Remove the nut.

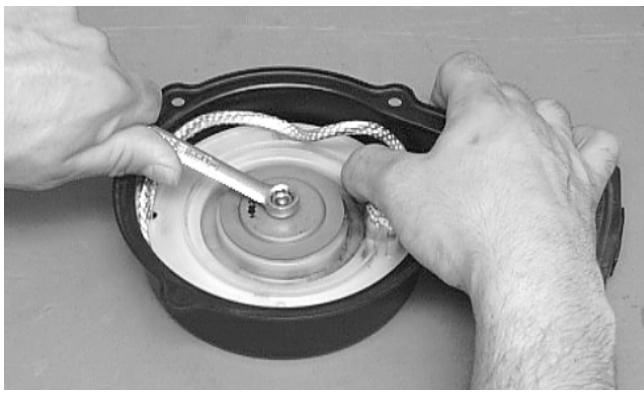
RECOIL STARTER



0737-034

⚠ WARNING

Always wear safety glasses when servicing the recoil starter.



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.



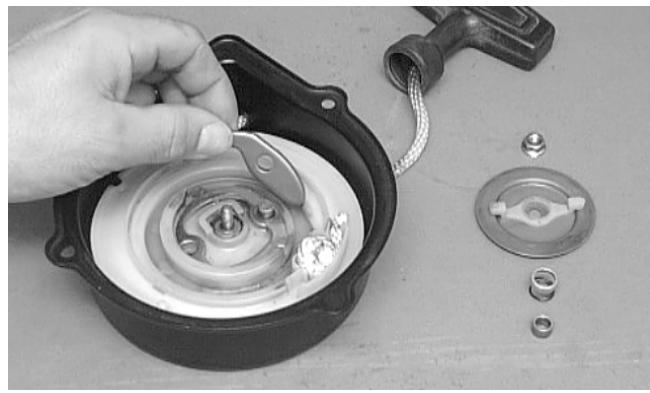
B602D

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



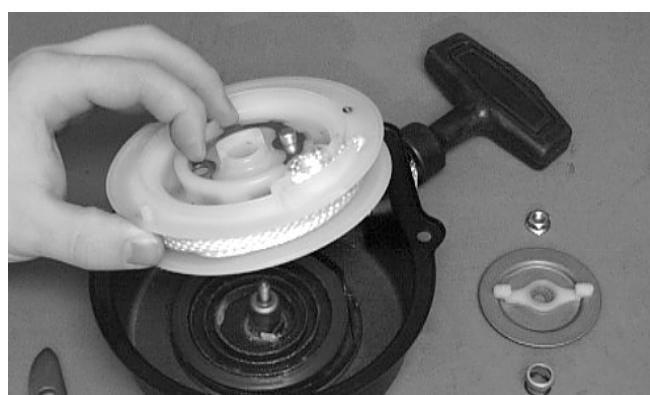
B603D

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

3

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

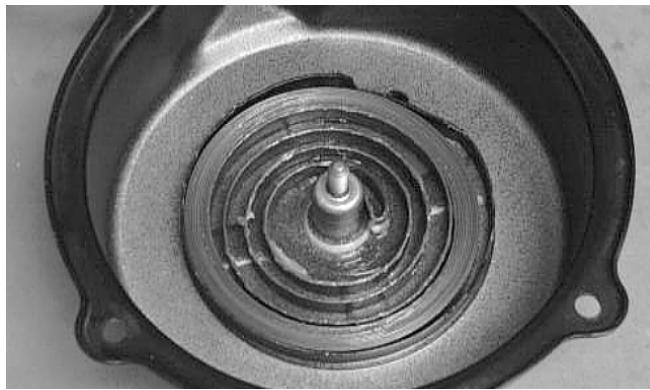
■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

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.

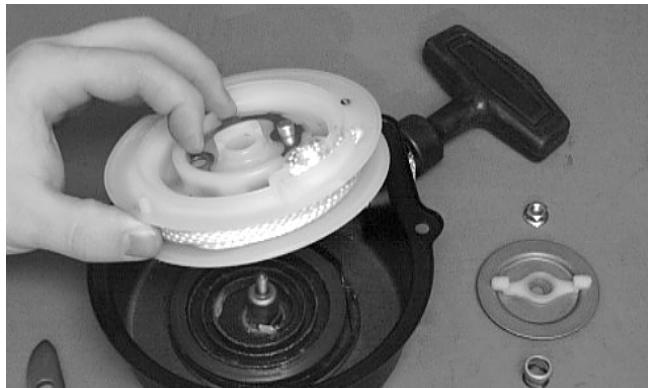
■NOTE: The spiral spring must seat evenly in the recoil case.



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.



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



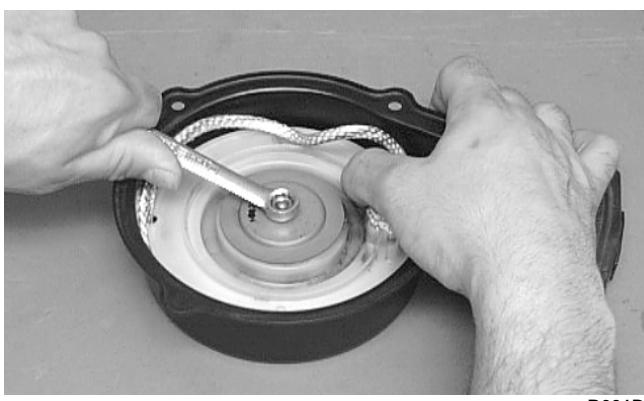
7. Install the shaft, spring, and the spring cover.



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



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



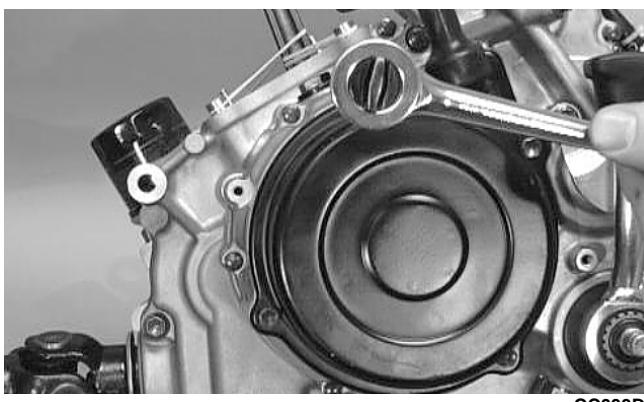
10. With the 50 cm (20 in.) of rope exposed, hook the rope in the notch of the reel.

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).



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.



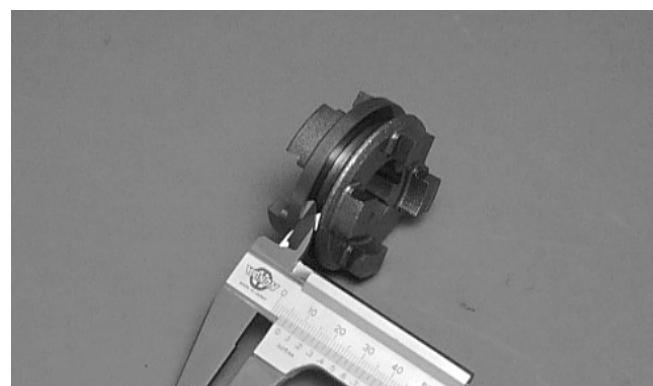
3

2. Shift fork thickness must be within the specified range.

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.)

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 the specified range.

SHIFT FORK GROOVE WIDTH	
#1 and #2	5.5-5.6 mm (0.217-0.220 in.)
Secondary Transmission	5.4-5.5 mm (0.213-0.217 in.)
Reverse	4.9-5.0 mm (0.193-0.197 in.)

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.

SHIFT FORK TO GROOVE SIDE CLEARANCE	
Engine	0.1-0.3 mm (0.004-0.012 in.)
Secondary Transmission (max)	0.2 mm (0.008 in.)
Reverse (max)	0.2 mm (0.008 in.)

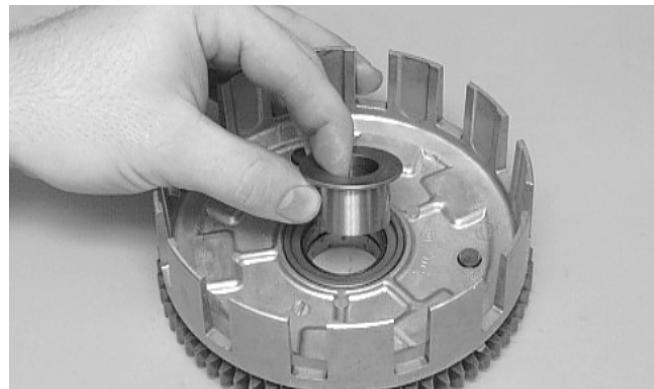
Servicing Right-Side Components

■ 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.

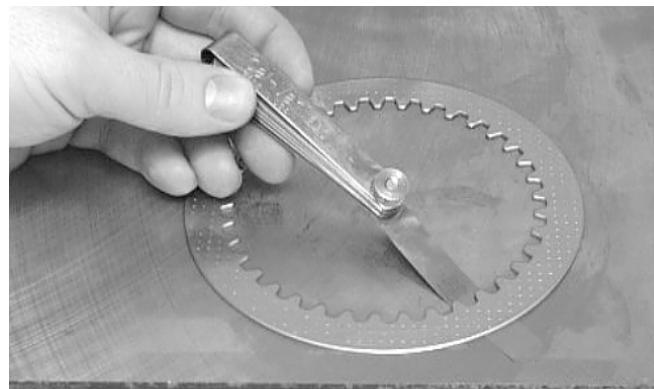
■ NOTE: When removing components from the primary gear assembly, account for the bushing that fits into the primary gear.



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.

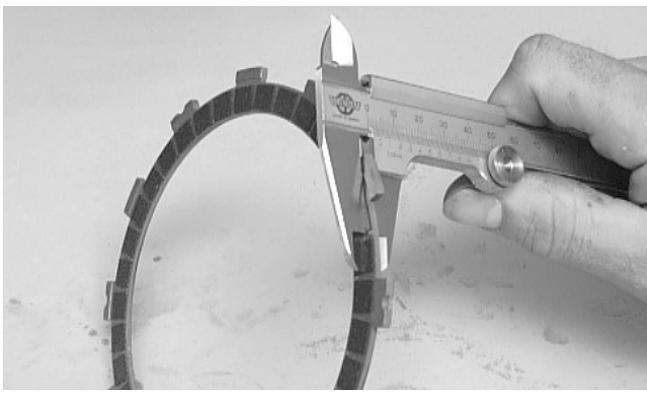


CC245D

3. Maximum driven plate warpage must be 0.1 mm (0.004 in.).

Measuring Clutch Drive Plate (Fiber) Thickness

1. Using a calipers, in turn measure the thickness of each drive plate in several locations.

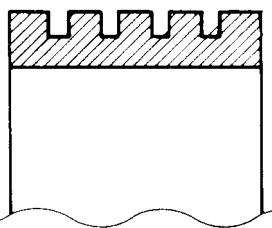


CC243D

2. Drive plate thickness must be within a range of 2.92-3.08 mm (0.1149-0.1212 in.).
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

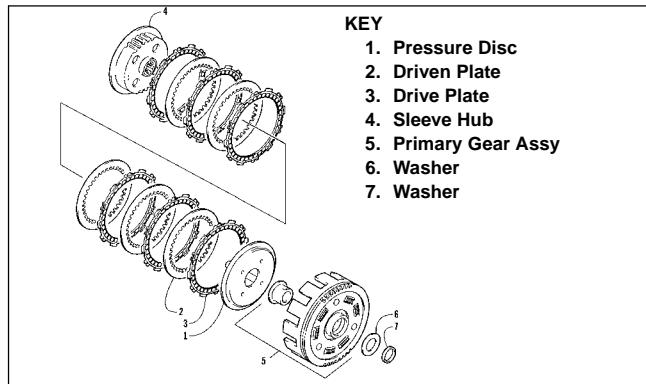
1. Inspect the starter clutch housing for burns, marks, scuffs, cracks, scratches, or uneven wear.
2. If the housing is damaged in any way, the housing must be replaced.

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.

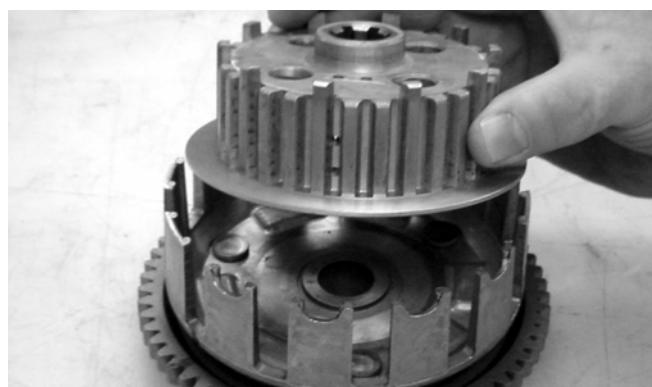
3. If the inner race is locked in place or rotates both directions, the drive assembly must be replaced.

Assembling Primary Clutch



737-731A

1. Place the clutch hub upside down into the primary gear assembly.



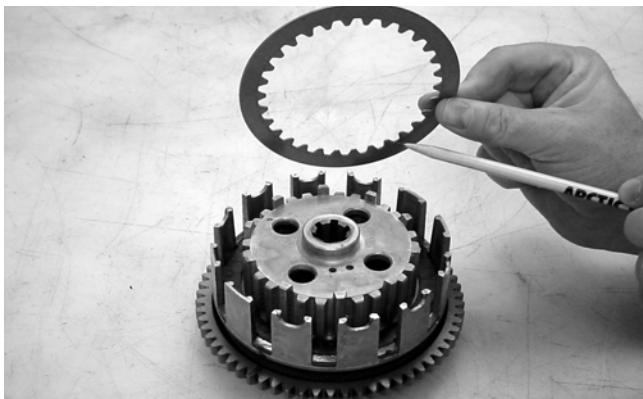
CC920

2. Alternately install the drive plates and driven plates onto the hub (starting with and ending with a drive plate) making sure the tabs with the notches are all in line with each other.



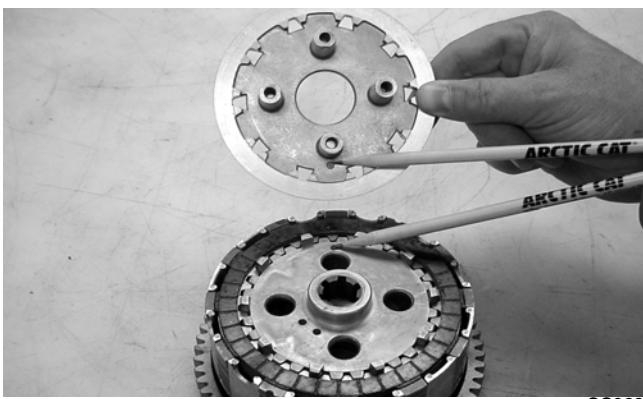
CC921

■ **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.



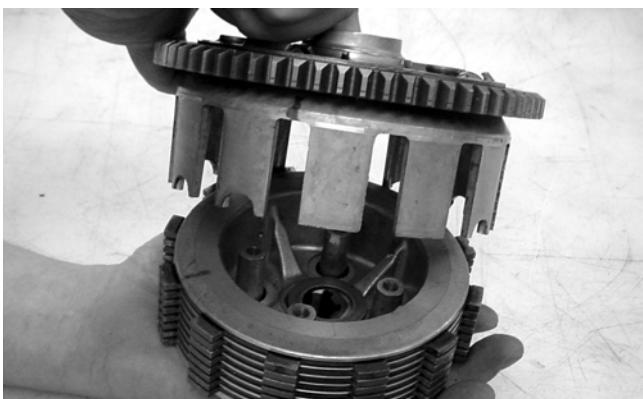
CC922

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



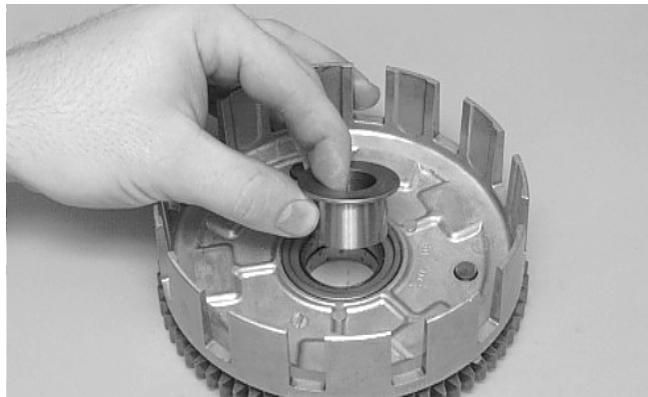
CC923

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.



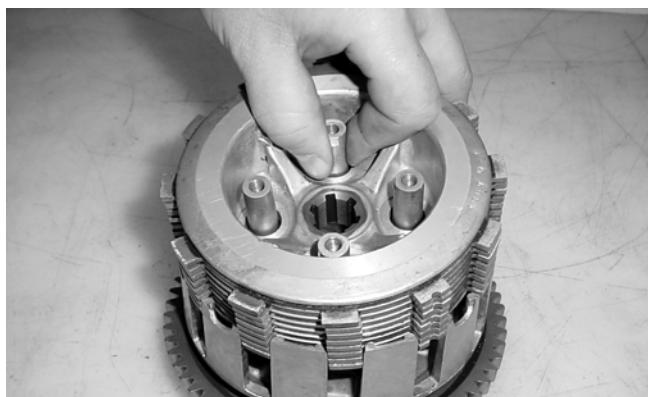
CC924

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



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



CC926

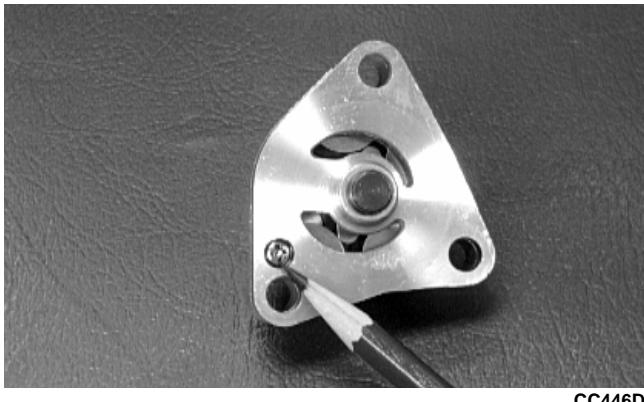
CAUTION

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

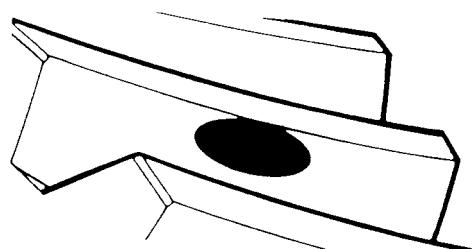
Checking Tooth Contact

3

■ **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.

Incorrect (contact at tooth top)

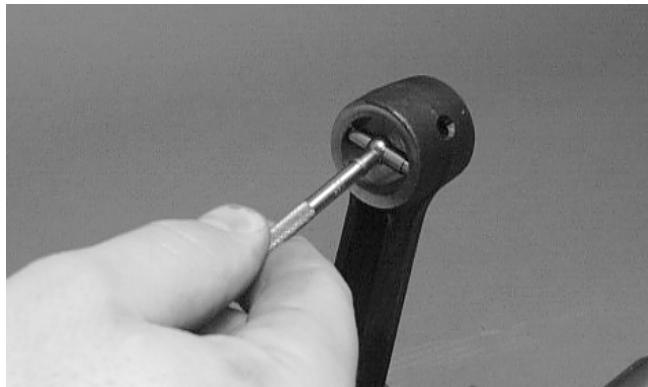


ATV-0103

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

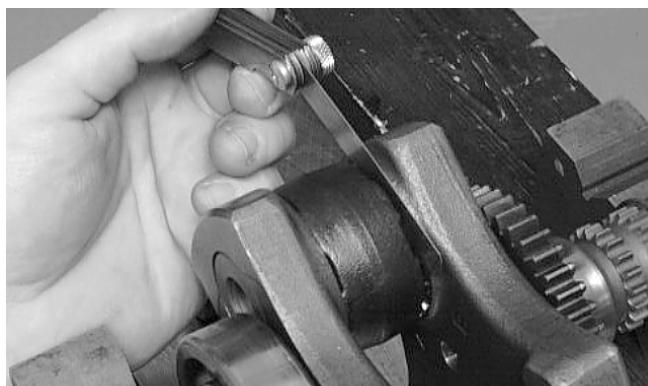
2. Maximum diameter is 23.04 mm (0.9070 in.).

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 is 3 mm (0.12 in.).

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

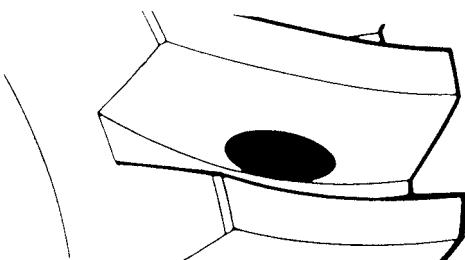
1. Push the lower end of the connecting rod to one side of the crankshaft journal.
2. Using a feeler gauge, measure the gap between the connecting rod and crankshaft journal.



CC289D

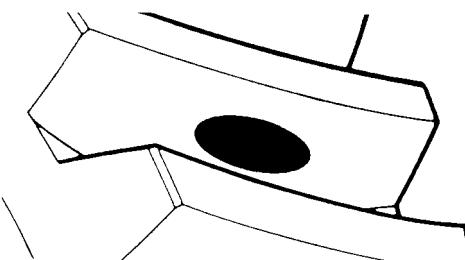
3. Acceptable gap range is 0.10-0.45 mm (0.0039-0.0177 in.).

Incorrect (contact at tooth root)



ATV-0105

Correct



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

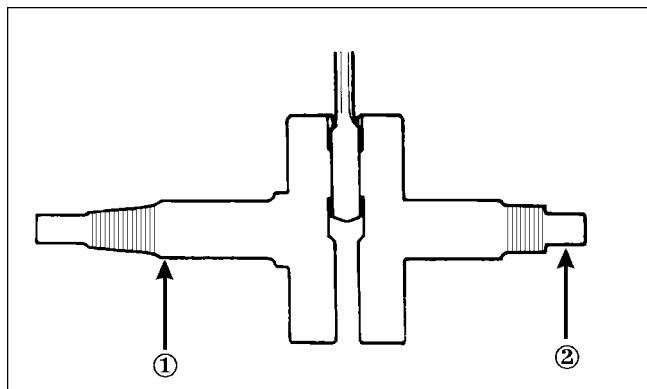
After correcting tooth contact, backlash must again be checked and corrected (if necessary). Continue the correcting backlash/correcting tooth contact procedures until they are both within tolerance values.

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 is 24.95-25.00 mm (0.9822-0.9842 in.).

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.



3. Zero the indicator and rotate the crankshaft slowly.

⚠ CAUTION

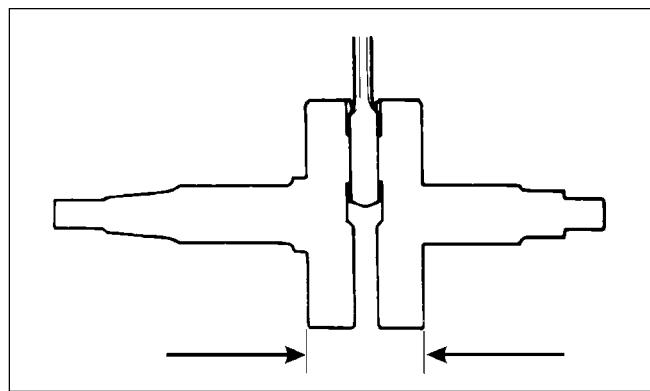
Care should be taken to support the connecting rod when rotating the crankshaft.

4. Maximum runout is 0.08 mm (0.003 in.) for both sides.

■ 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.



2. Acceptable width range is 70.9-71.1 mm (2.796-2.804 in.).

DRIVESHAFT

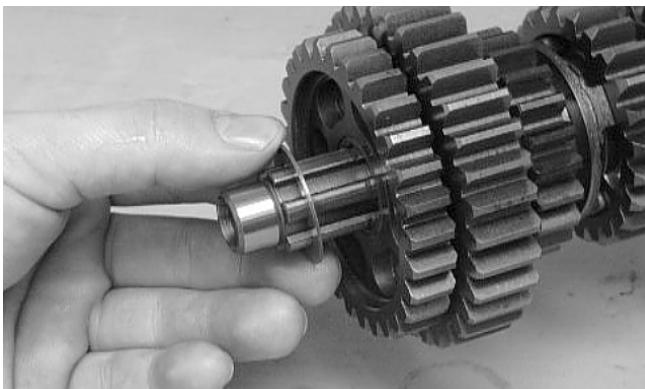
Disassembling

3

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



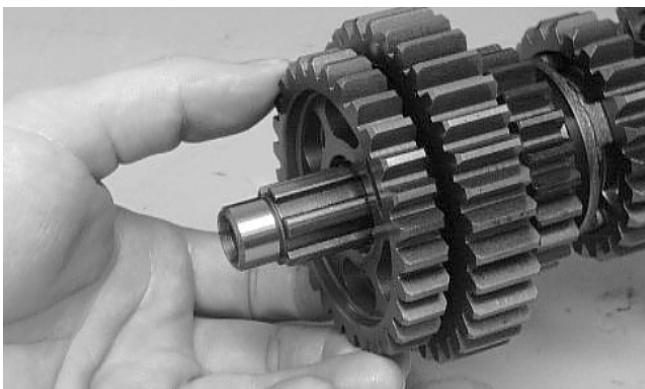
CC227D



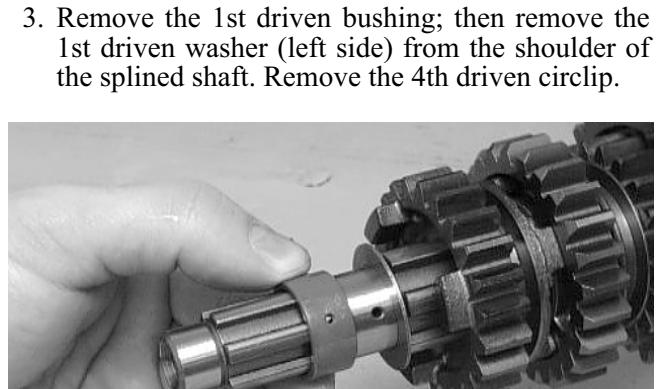
CC226D



CC222D



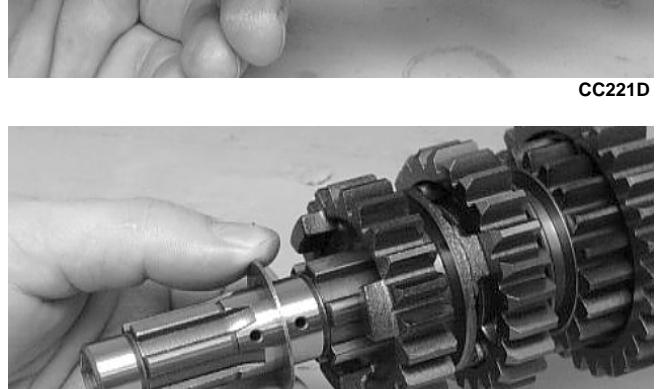
CC225D



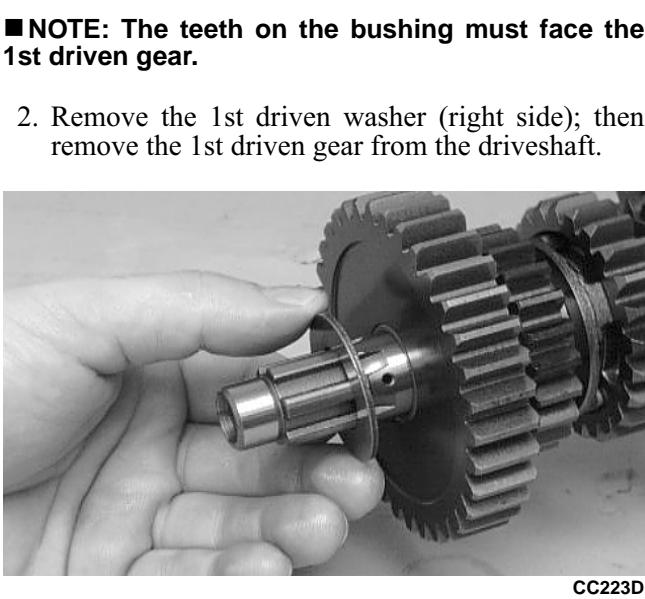
CC221D



CC224D



CC220D

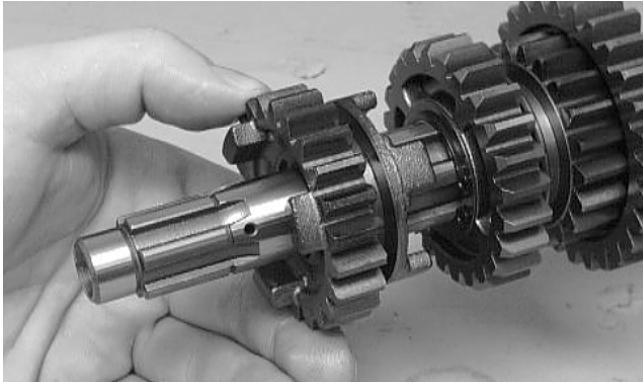


CC223D



CC508D

4. Remove the 4th driven gear from the driveshaft. Note the four small dogs facing toward the 3rd driven gear for assembling purposes.

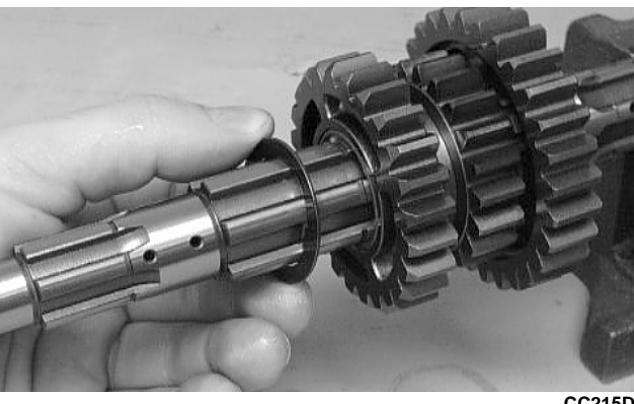


CC219D

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

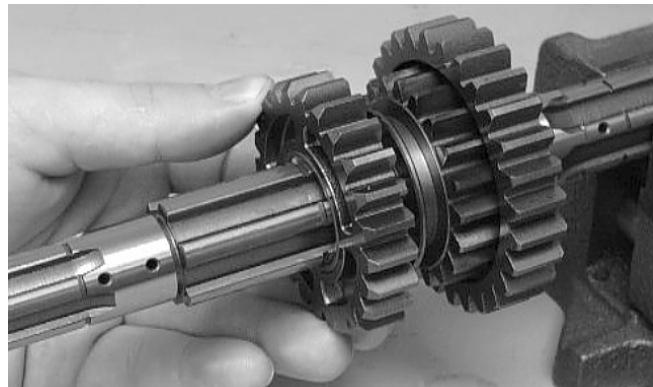


CC216D



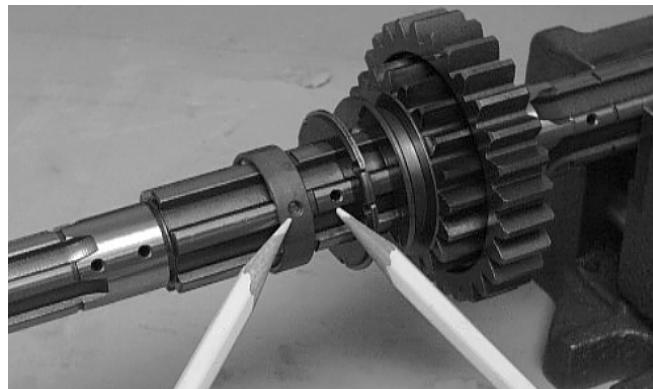
CC215D

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



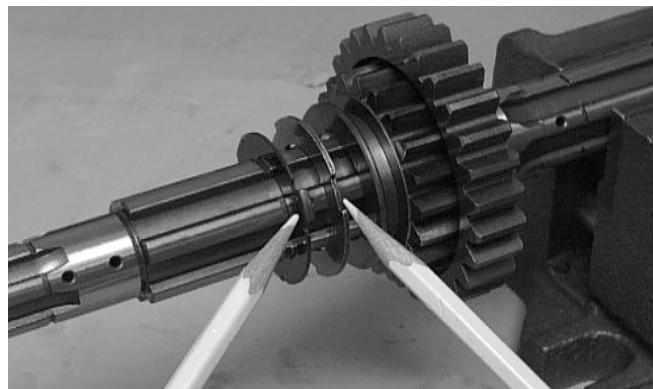
CC214D

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.



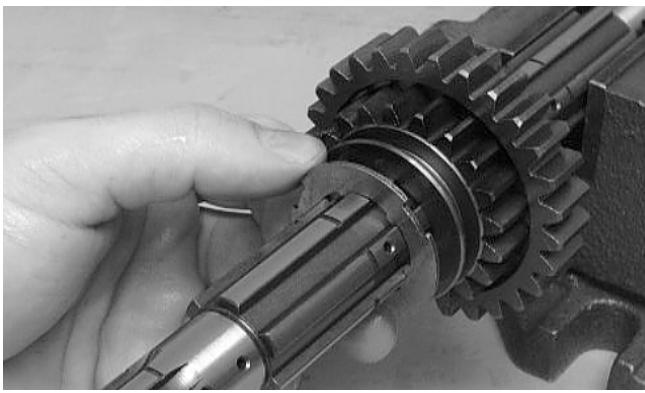
CC213D

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

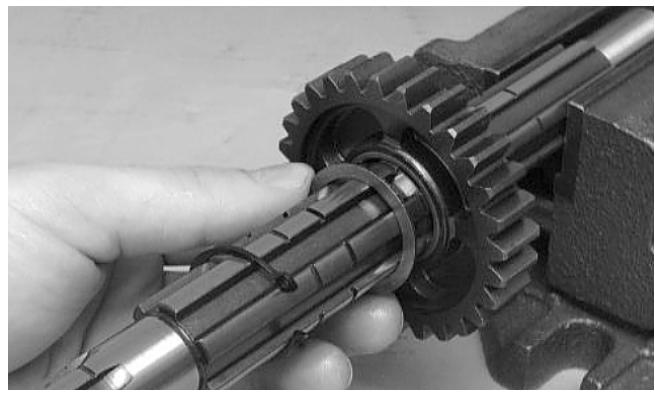


CC212D

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.

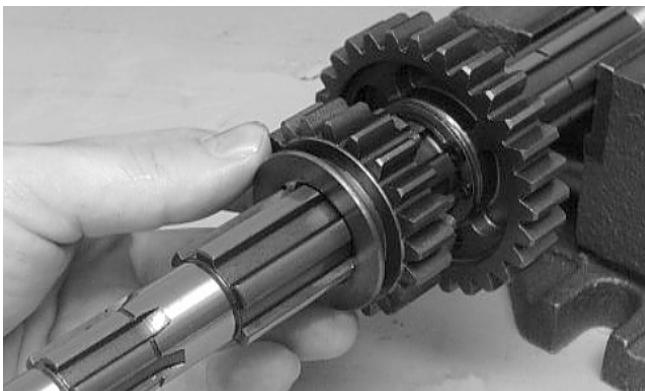


CC211D



CC208D

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

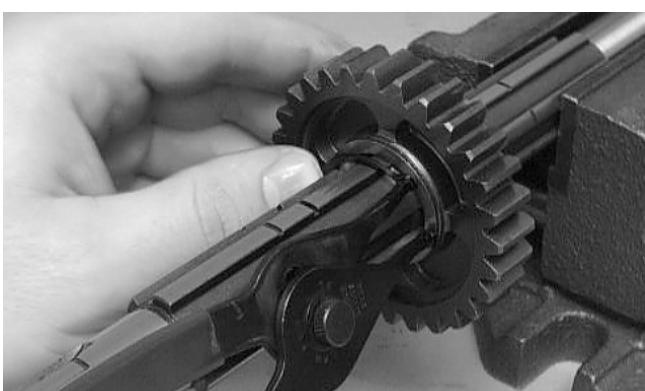


CC210D



CC207D

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



CC209D



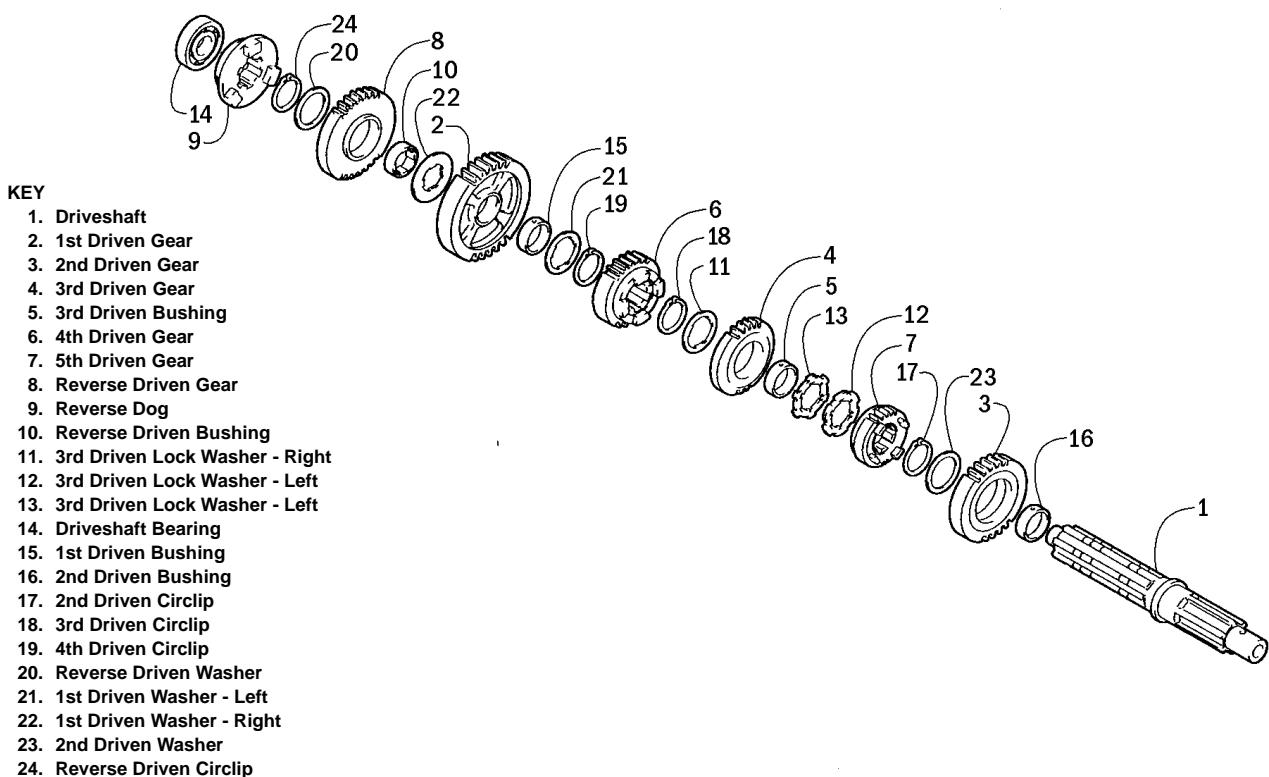
CC206D

 **AT THIS POINT**

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

Assembling

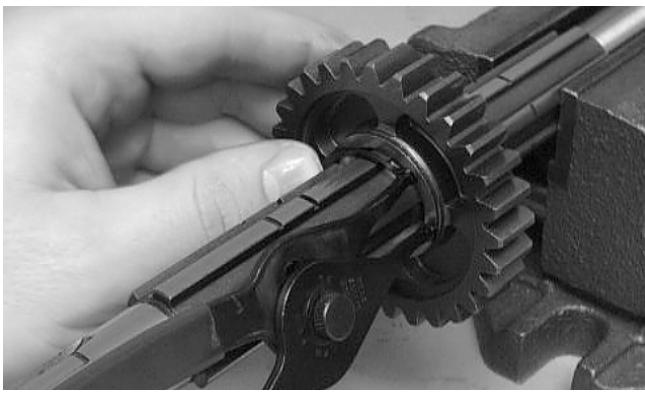
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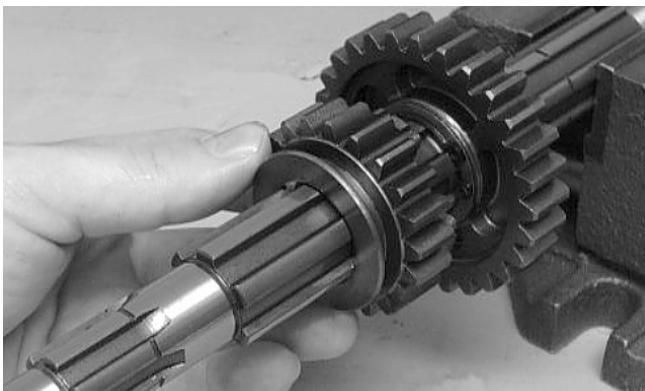
1. In order, install the 2nd driven bushing, gear, washer, and circlip onto the driveshaft.





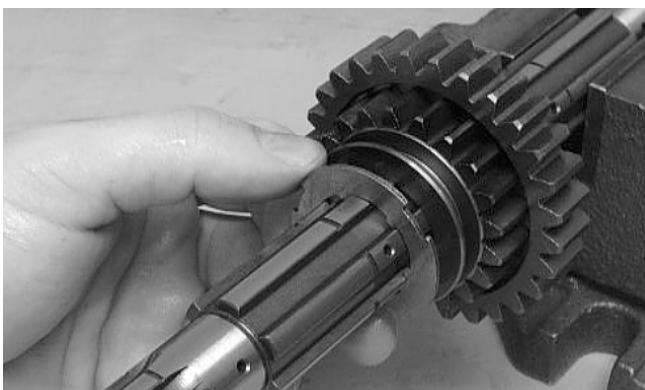
CC209D

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



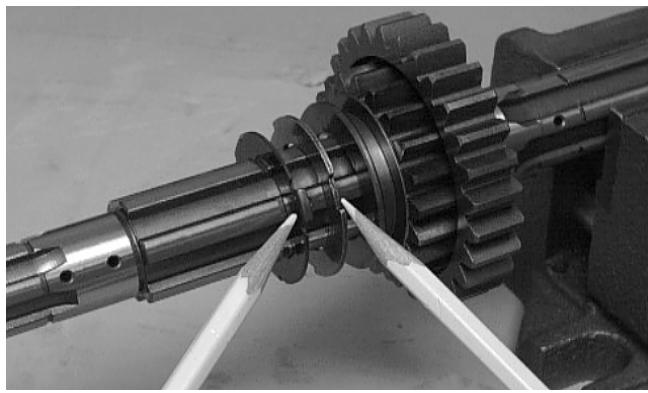
CC210D

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.



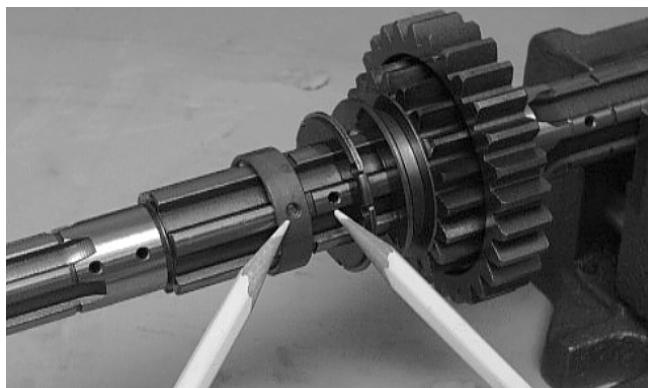
CC211D

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.



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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).

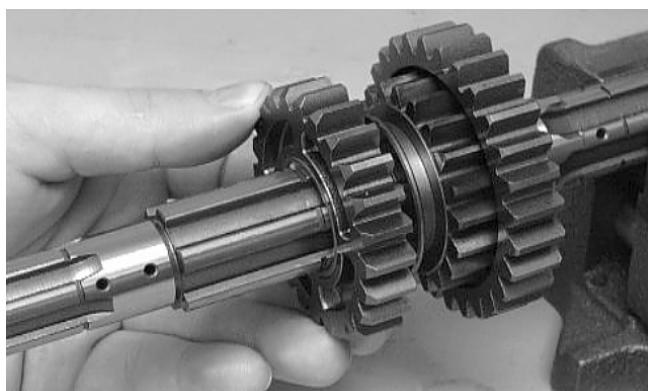


CC213D

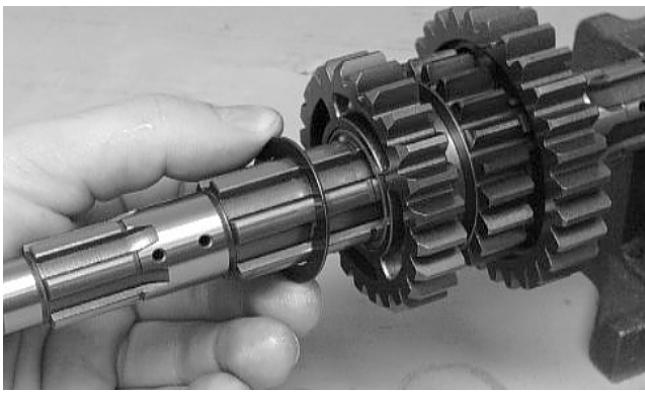
CAUTION

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.

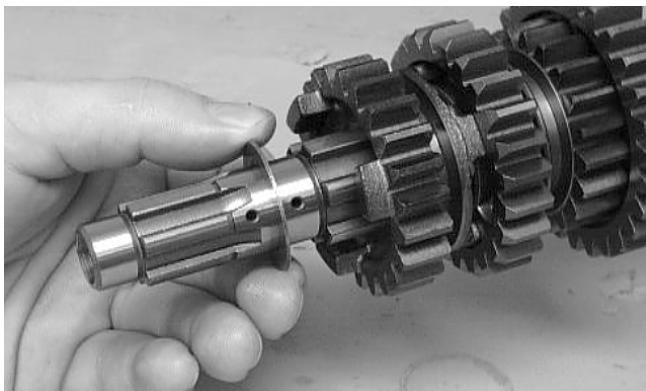


CC214D



CC215D

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

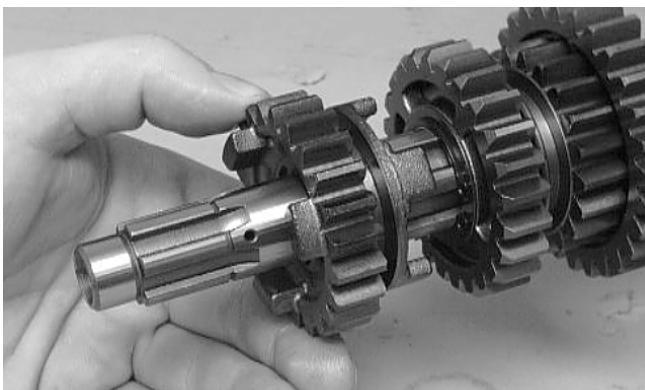


CC220D



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.

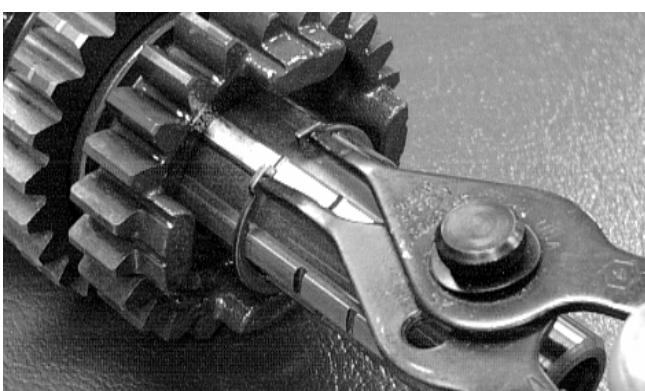


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CC221D

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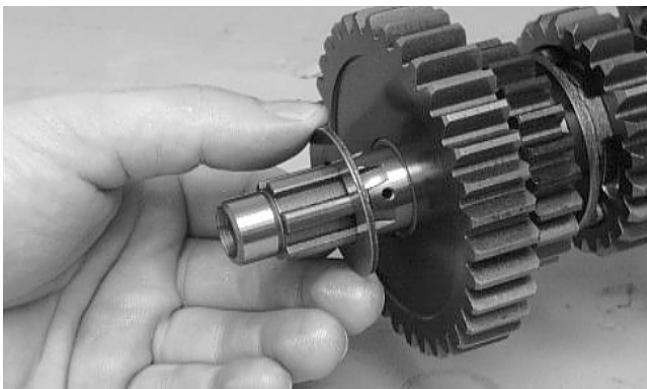


CC508D



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.

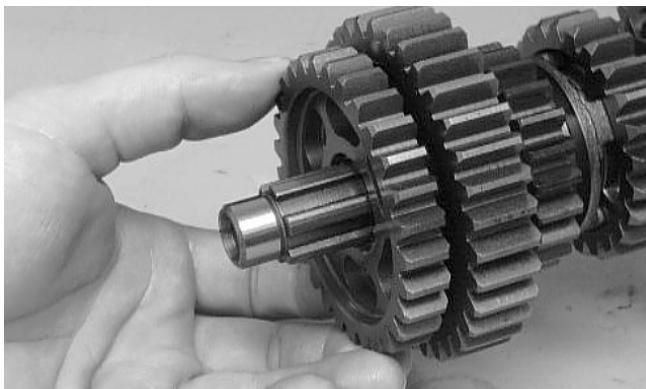


CC223D

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



CC225D



CC226D



CC227D



CC843

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.



CC228D

12. In order, install the reverse driven gear, washer, circlip, and reverse dog onto the driveshaft.

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

COUNTERSHAFT

Disassembling

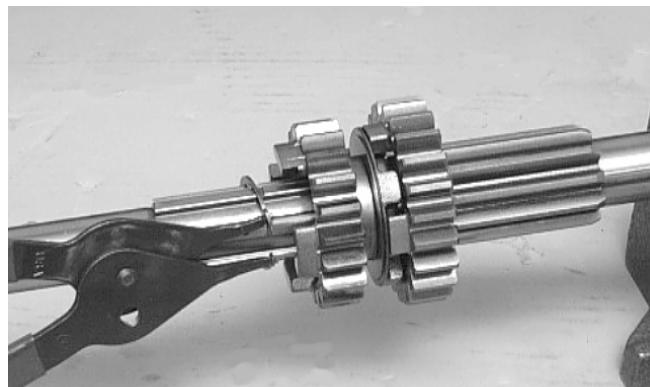
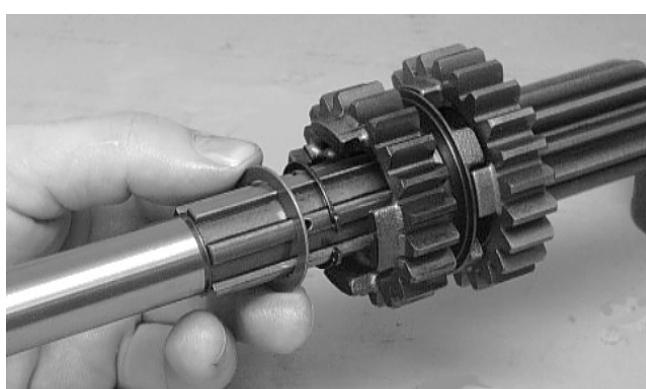
1. Remove the 2nd drive gear from the countershaft.



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



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



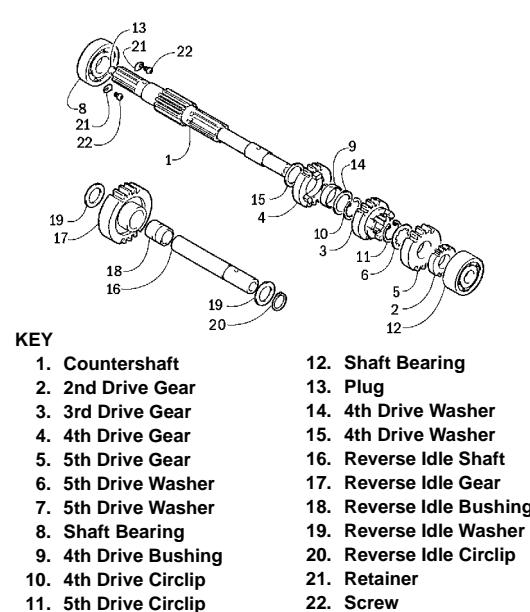
CC200D

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.



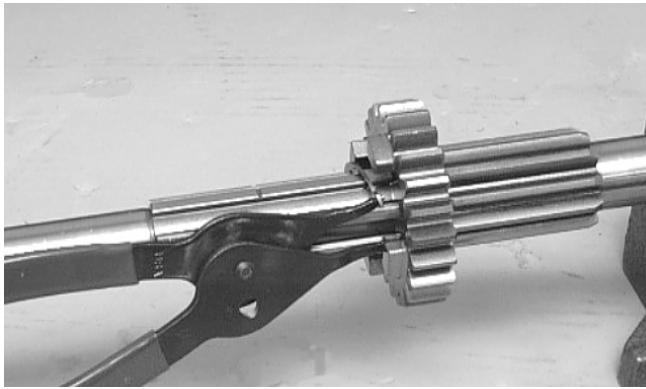
6. Remove the other 4th drive washer from the countershaft.

Assembling



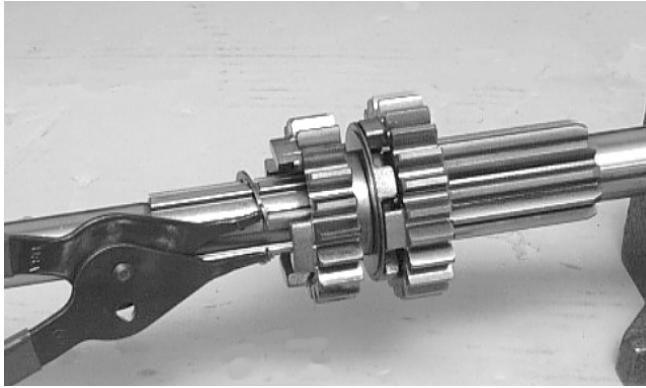
737-733B

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.



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

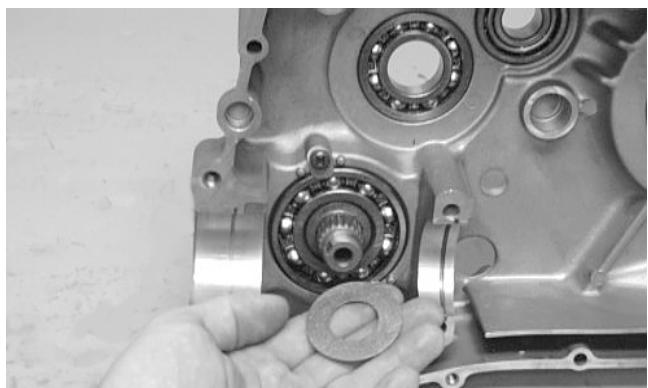
■ **NOTE:** The countershaft is now completely assembled for installation.

Assembling Crankcase Half

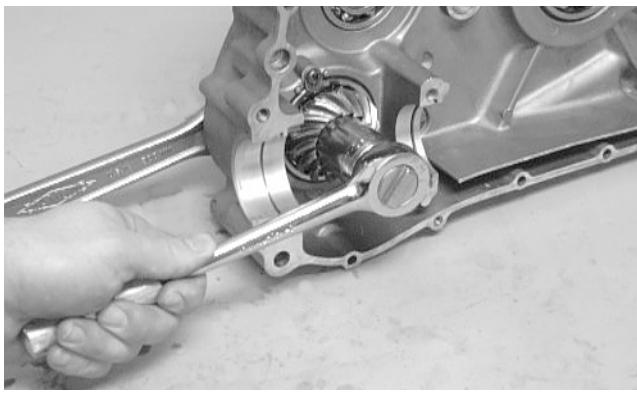
■ **NOTE:** For ease of assembly, install components on the left-side crankcase half.

■ **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).

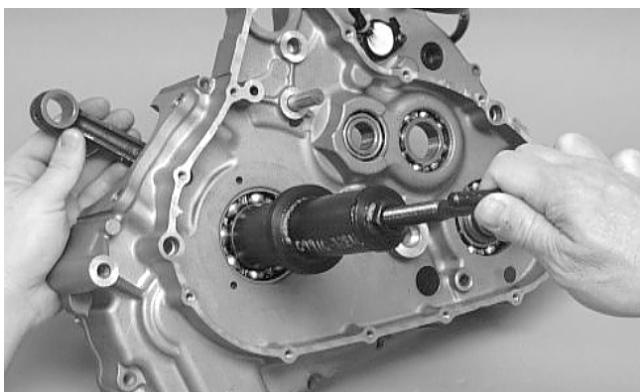


CC117D



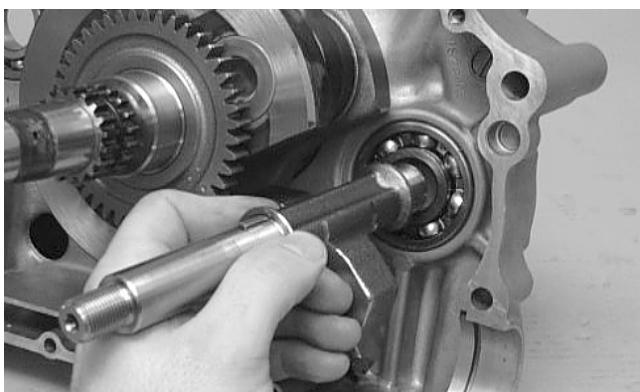
CC116D

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



3

CC167D

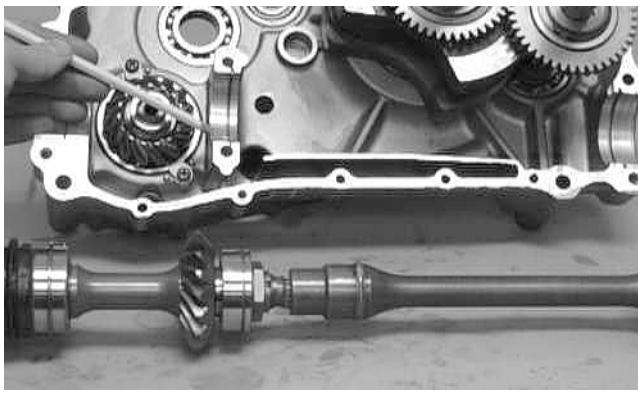


CC166D

5. Place the bearing C-ring into position in the crankcase; then install the front output shaft and rear shaft assemblies.

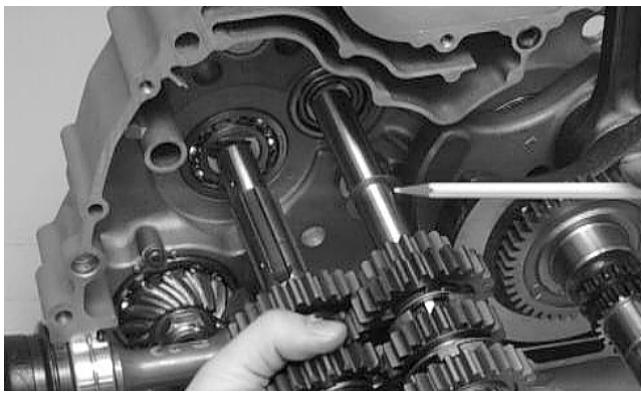
CAUTION

The bearing pins must be positioned into the crankcase correctly or damage to the crankcase may occur.



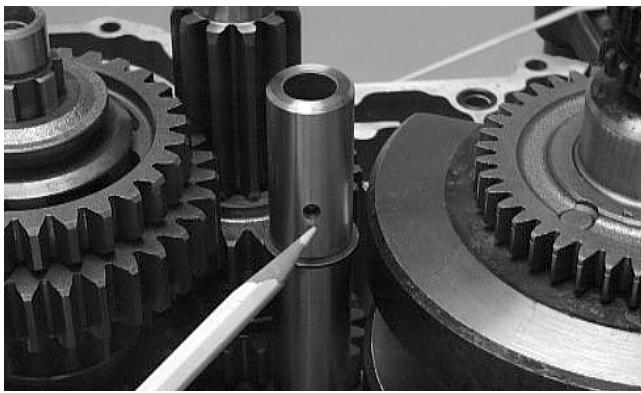
CC110D

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

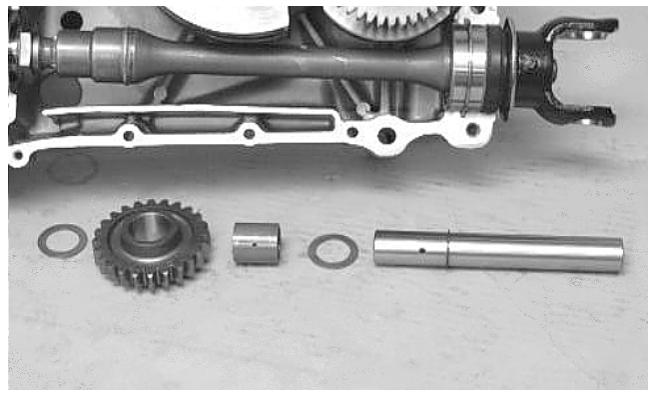


CC197D

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.

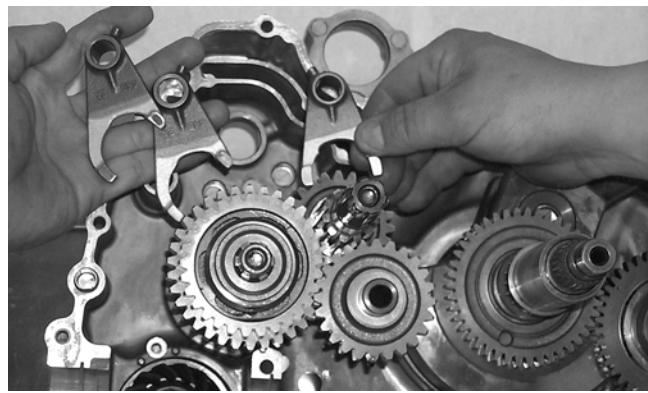


CC229D



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

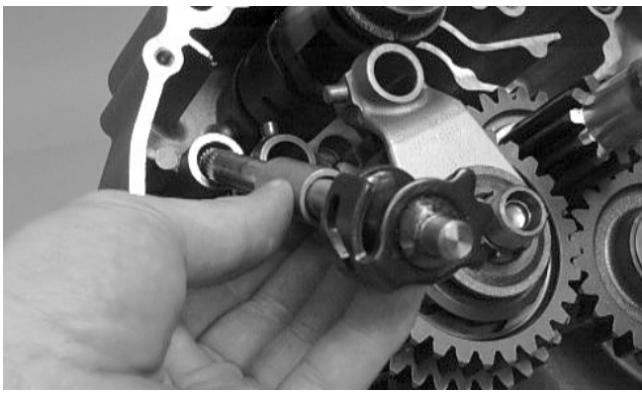


CC106D

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

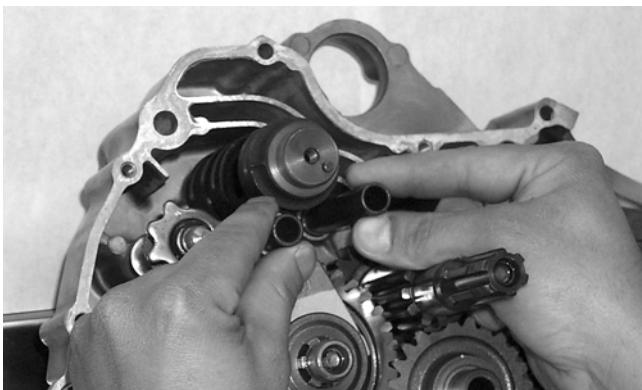


CC105D



CC103D

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

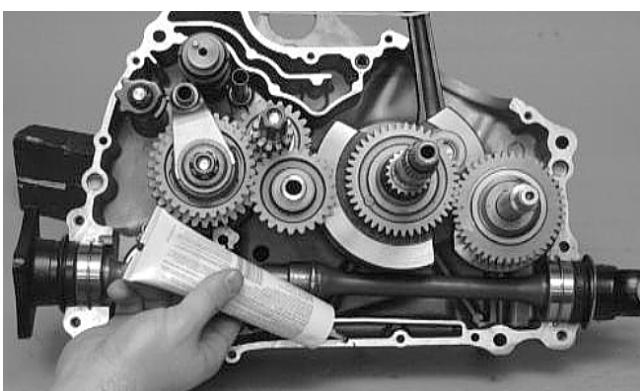


CC104D

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



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

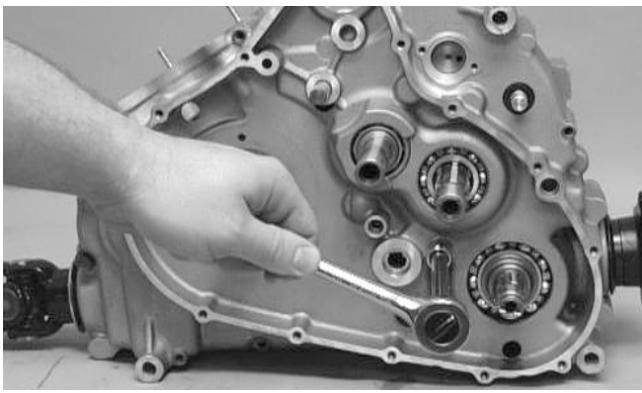
1. Place the O-ring in the left-side crankcase half and verify that the washer is on the idler shaft; then apply Three Bond Sealant (p/n 0636-070) to the mating surfaces. Place the right-side half onto the left-side half.



CC101D

4. From the right side, install the three case half 8 mm cap screws; then tighten only until snug.

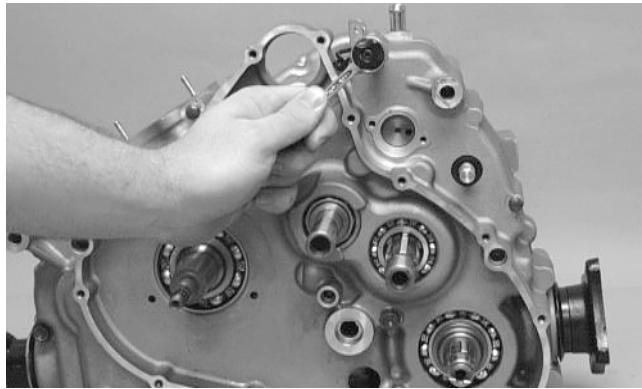
■ **NOTE:** Rotate the shafts back and forth to ensure no binding or sticking occurs.



CC097D

5. 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.

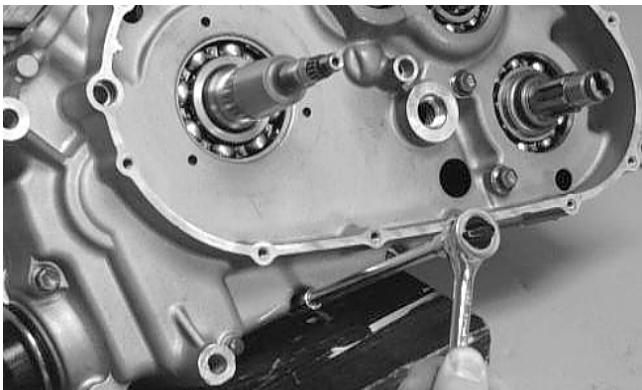
■NOTE: Rotate the shafts back and forth to ensure no binding or sticking occurs.



CC096D

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.



CC095D

7. In a crisscross/case-to-case pattern, tighten the 8 mm cap screws (from steps 3-6) 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.

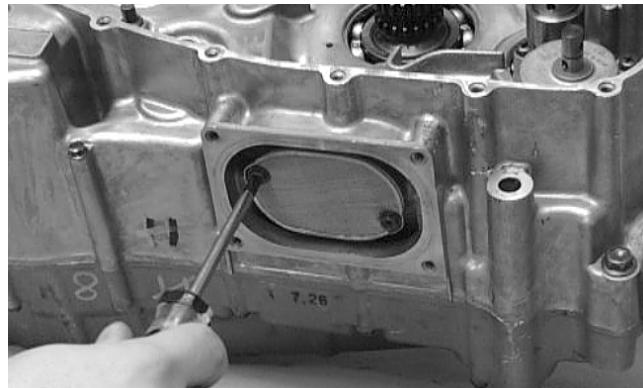
⚠ CAUTION

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

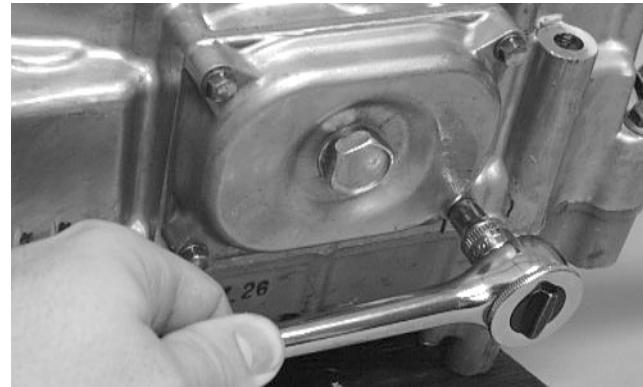
A. Oil Strainer/Oil Pump B. Gear Shift Shaft

1. Place the oil strainer with a new O-ring into position beneath the crankcase and tighten securely with the Phillips-head cap screws.



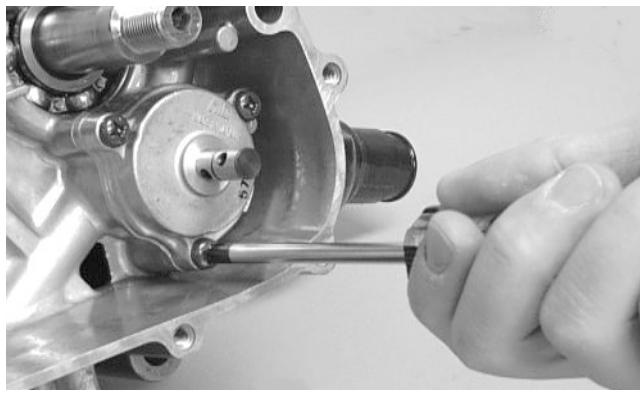
CC163D

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

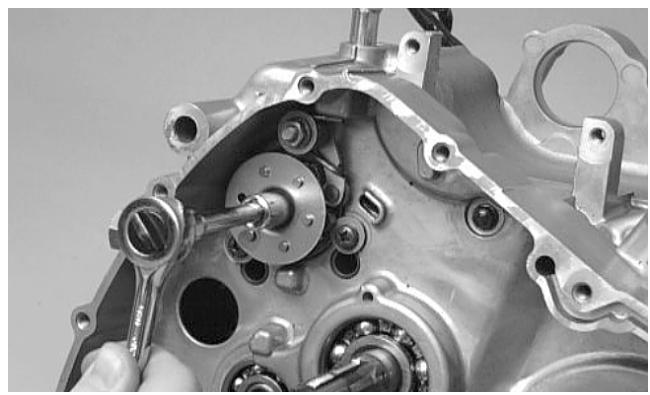
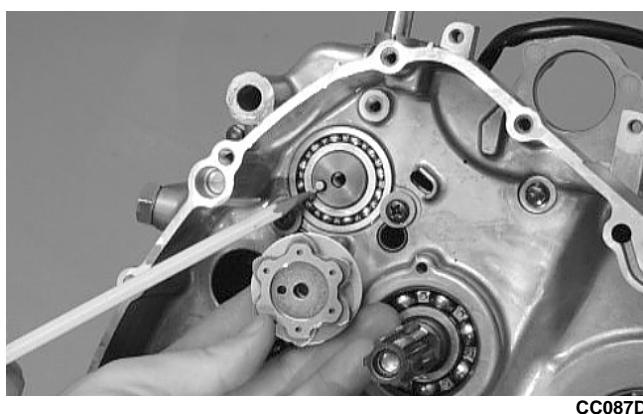
3. Place the oil pump into position in the crankcase and secure with the three Phillips-head screws coated with blue Loctite #243. Tighten to 1 kg·m (7 ft-lb).



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



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.



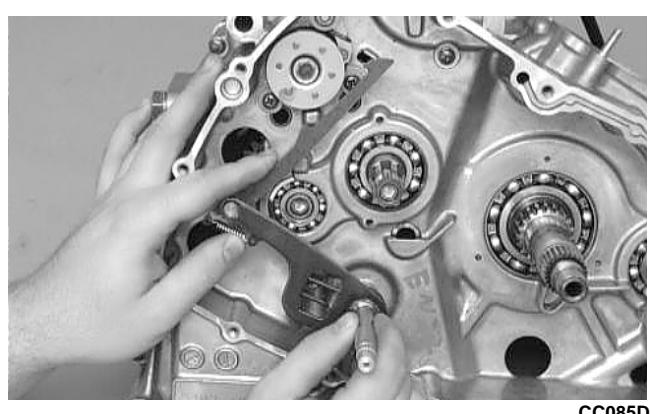
6. Attach the spring to the gear shift cam stopper arm.



3



7. Install the gear shift shaft.



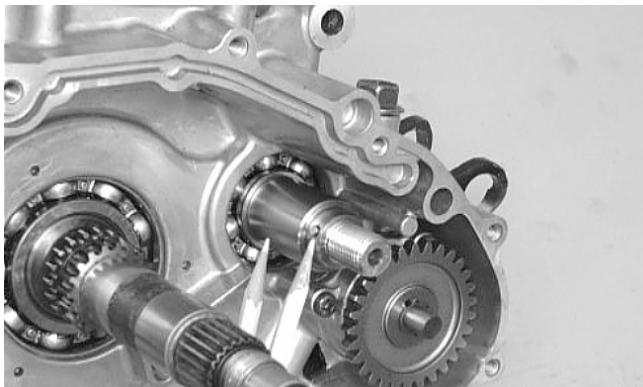
C. Primary Driven Gear

D. Primary Clutch

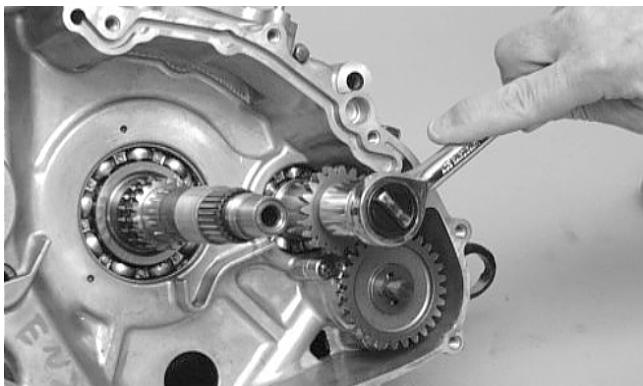
E. Starter Clutch Shoe

■ 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



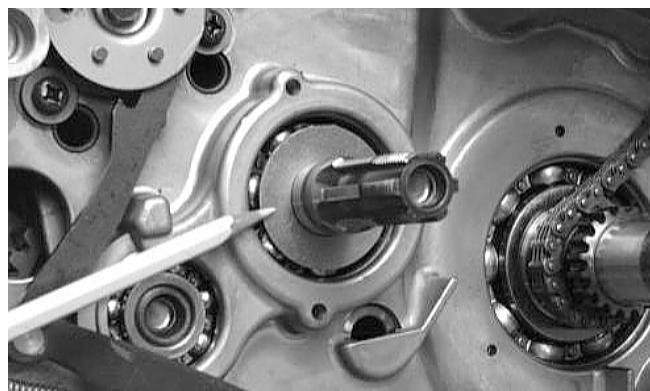
CC080D

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.

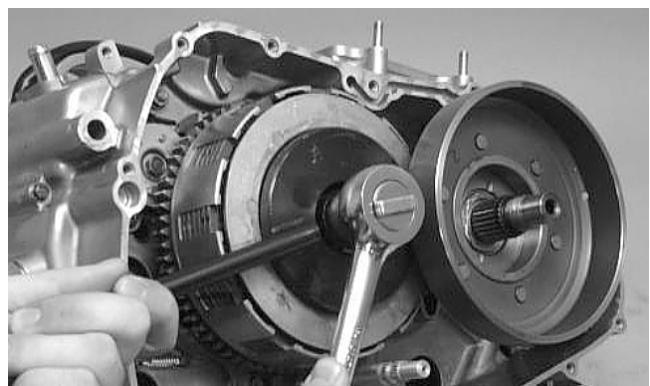
11. Simultaneously, place the primary clutch assembly and the starter clutch housing on their respective shafts making sure the sleeve is properly positioned in the primary assembly.



CC078D

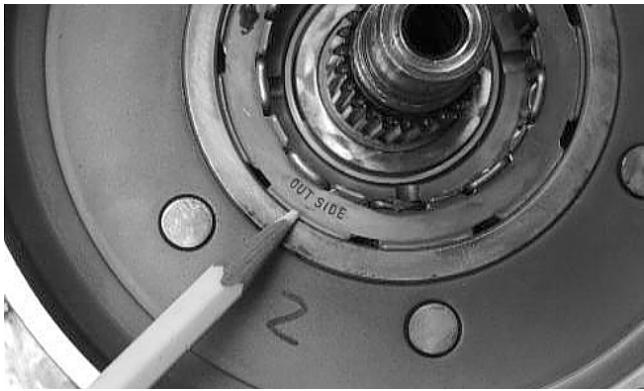
■ NOTE: Note the alignment mark scribed on the primary driven gear assembly during disassembly.

12. Using the Clutch Sleeve Hub Holder (p/n 0444-007), install the nut and washer. Tighten to 10 kg-m (72 ft-lb).



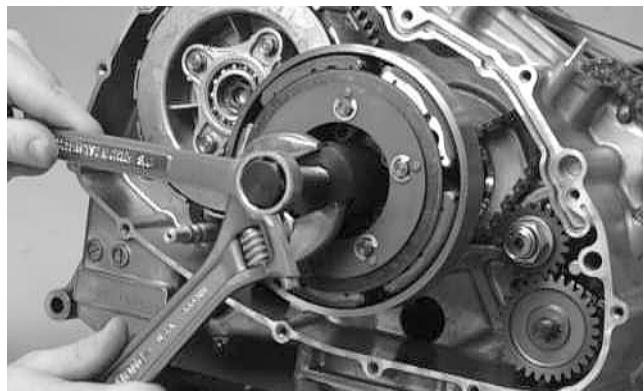
CC076D

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



CC075D

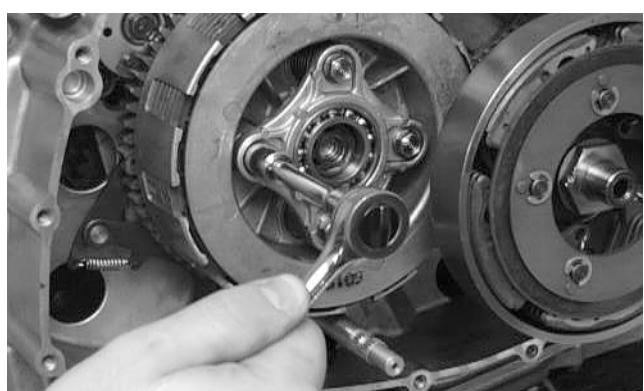
14. Install the clutch shoe and washer; then secure with the starter clutch shoe nut (left-hand threads). Tighten to 13 kg-m (94 ft-lb); then using a center punch, stake the nut.



CC072D

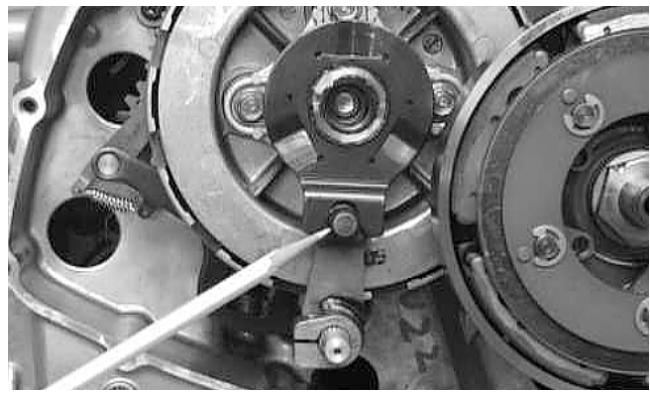
15. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, tighten the four cap screws securely.

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



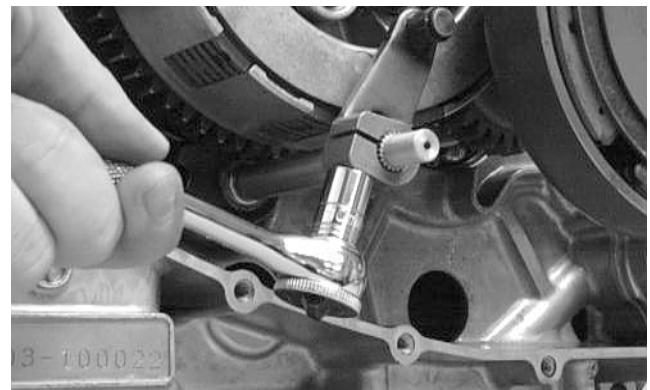
CC074D

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

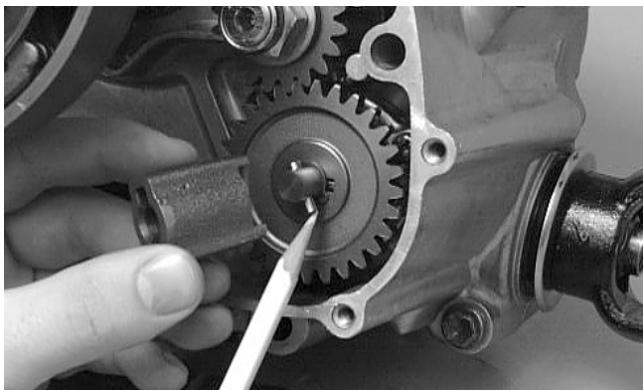
F. Water Pump

G. Oil Filter

■ NOTE: Steps 1-18 of the preceding sub-sections must precede this procedure.

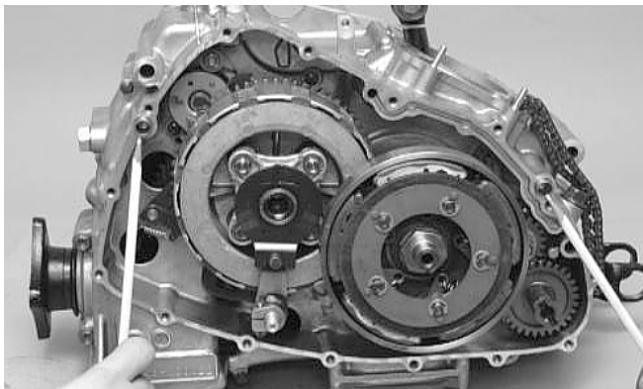
■ NOTE: Lubricate all internal components with 10W-40 oil prior to installing the right-side cover.

19. Place the water pump drive joint into position on the water pump shaft making sure the pin is properly positioned.



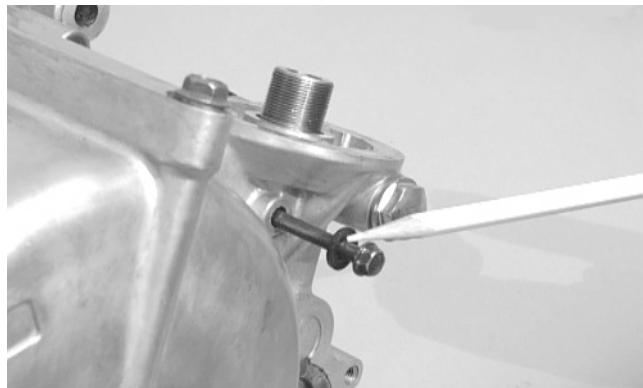
CC082D

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



CC256D

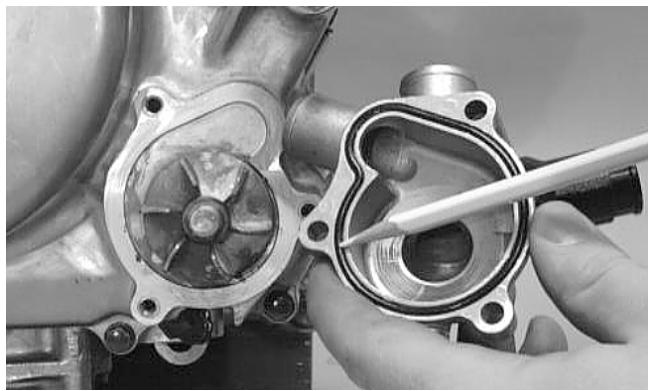
20. Place the gasket and right-side cover into position making sure the release roller guide remains correctly positioned and that the water pump drive adapter aligns; then install the fifteen cap screws. Note the proper location of the long cap screw with rubber washer.



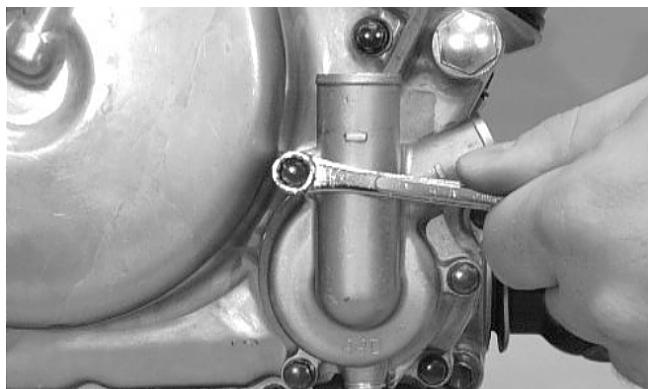
CC068D

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.



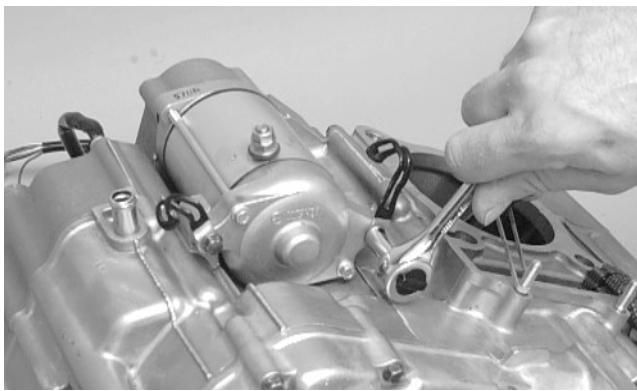
CC067D

24. Install the coolant hose on the water pump and secure with the clamp.

Installing Left-Side Components

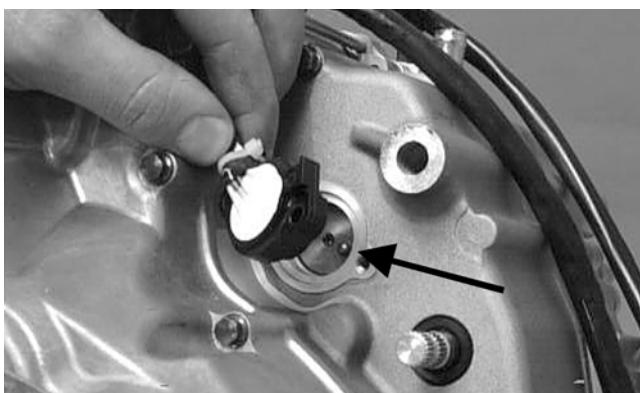
A. Idle Gear Assembly **B. Magneto Rotor**

1. Place the starter into position on the crankcase and secure with the cap screws. Note the position of the wiring form.

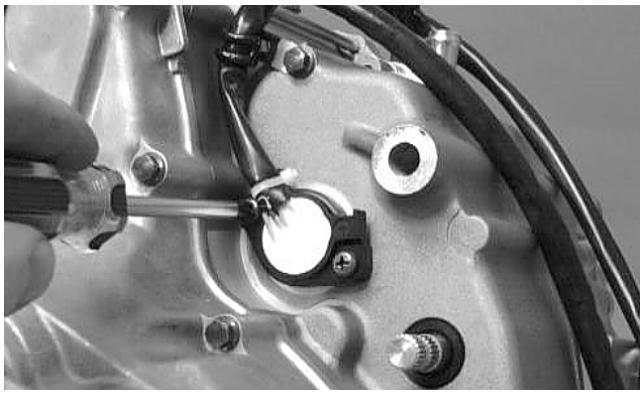


CC065D

2. 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.

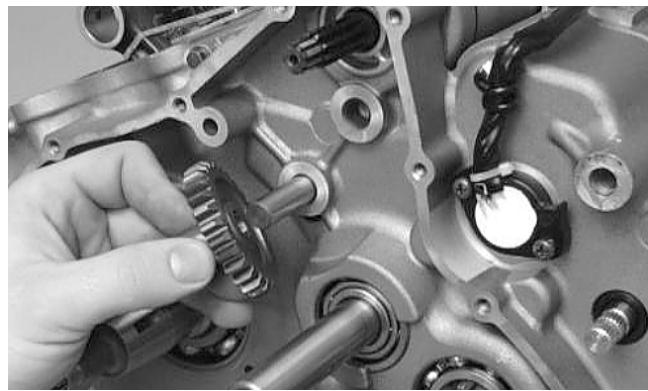


CC049D



CC048D

3. Install the starter idle gear pin into the crankcase; then with the beveled side of the idle gear facing the crankcase, install the idle gear.



CC064D

4. Place the bushing onto the output shaft; then install the driven gear and washer.



3

CC063D

5. Install the spacer onto the driveshaft.

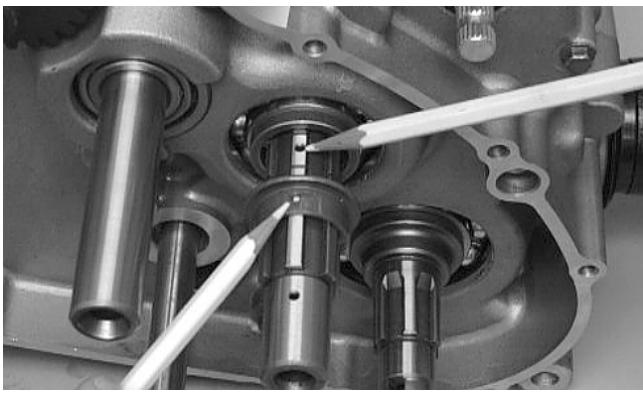


CC258D

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

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.



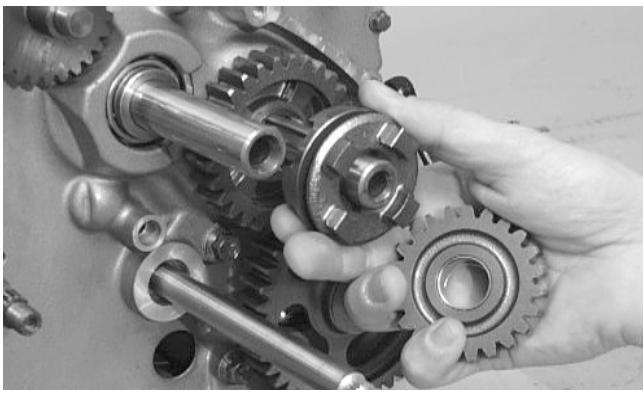
CC259D

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



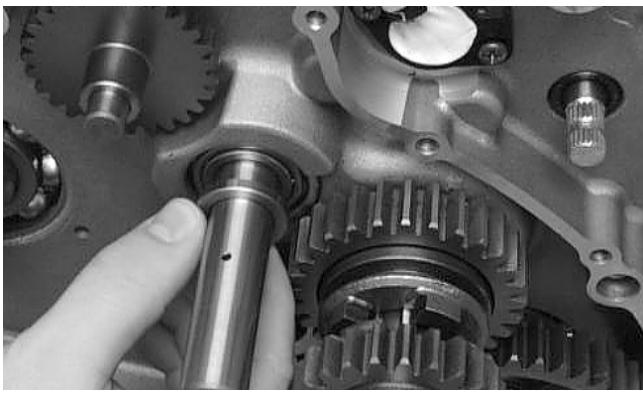
CC059D

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.



CC061D

9. Place the idle gear spacer and idle gear onto the countershaft.

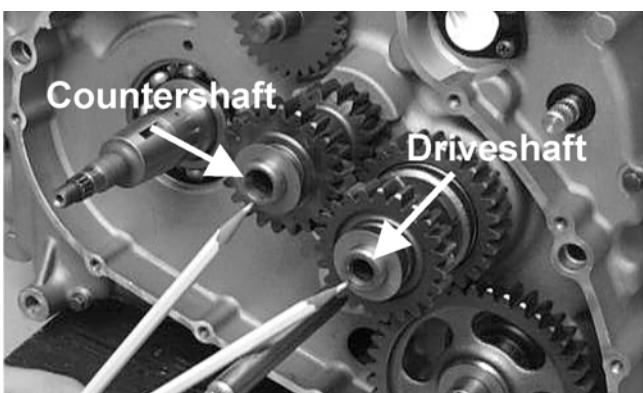


CC262D



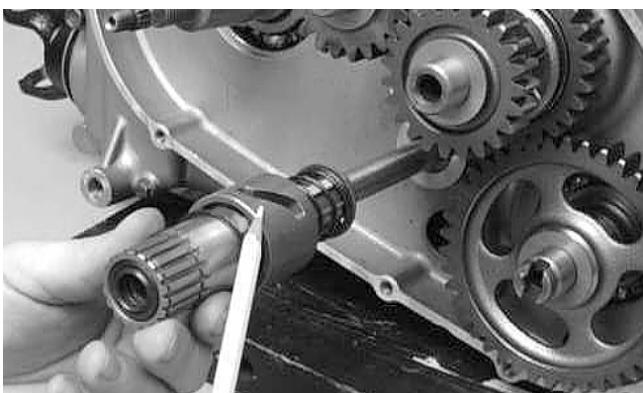
CC060D

10. Place a washer on both the driveshaft and the countershaft.



CC058D

11. With the slot in the shift shaft assembly facing upward, place the assembly on the fixed shaft.



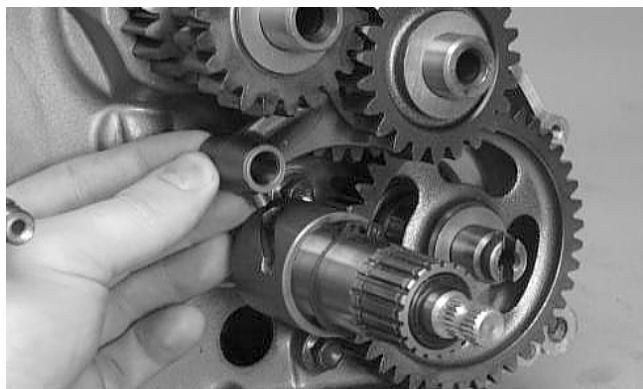
CC328D

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.



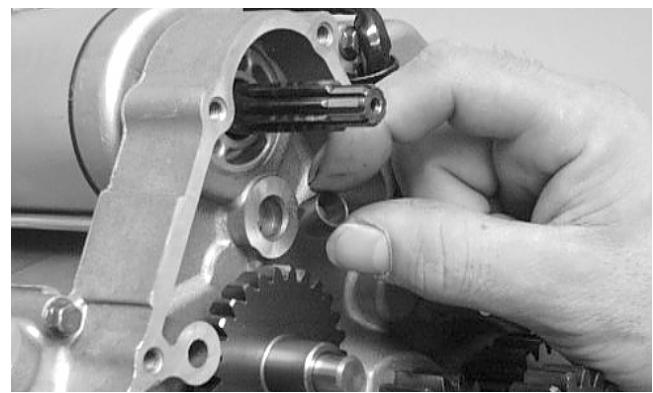
CC329D

14. Slide the shift fork shaft through the shift fork and into the crankcase boss.



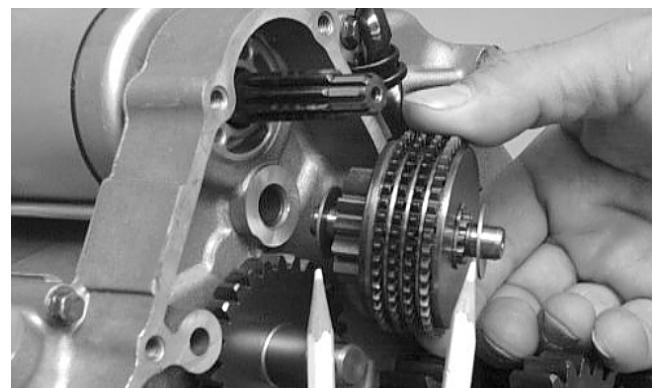
CC330D

15. Insert a bushing into the starter gear assembly boss in the crankcase.



CC156D

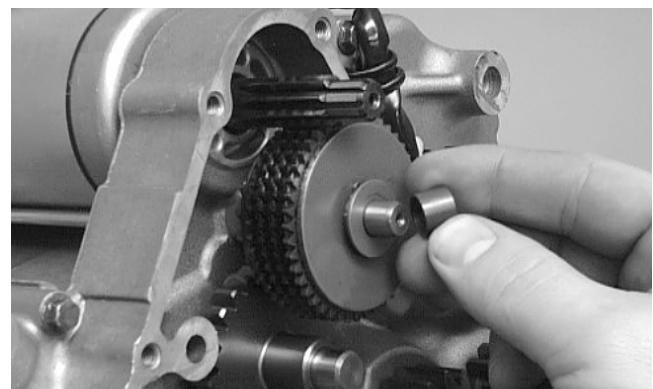
16. Place a washer on each end of the starter gear assembly and install in the crankcase.



CC157D

3

17. Place the remaining bushing on the starter gear assembly.

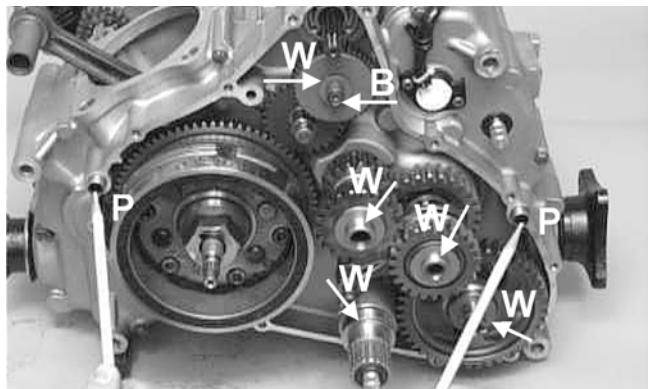


CC158D

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

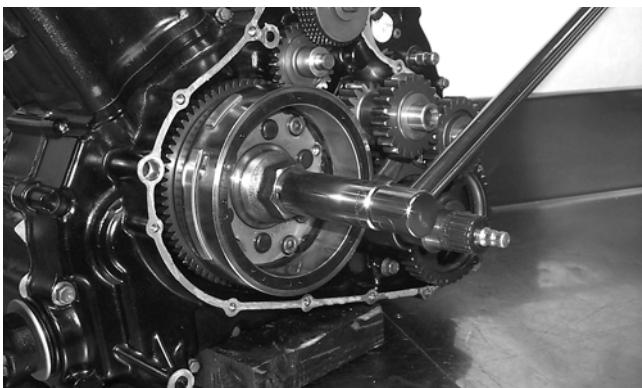


CC326D



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.

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.

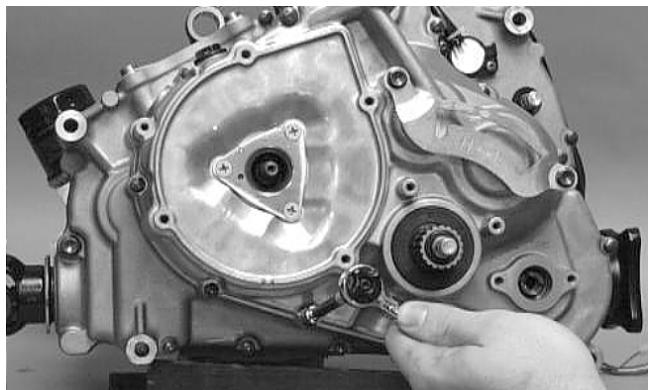
21. Place the gasket and left-side cover into position on the crankcase.

■ 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. Note the location of the long cap screw with rubber washer.

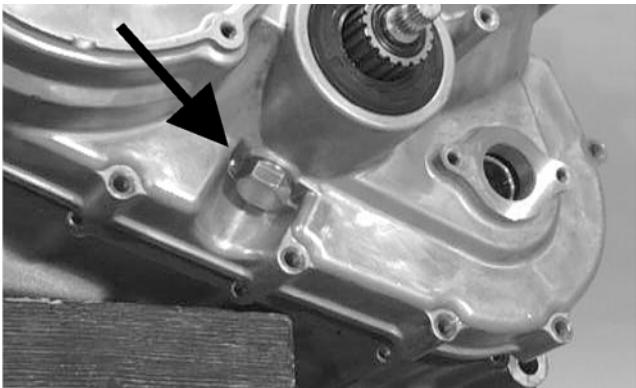


CC055D



CC047D

23. In a crisscross pattern, tighten the cap screws to 0.9-1.3 kg-m (6.5-9.5 ft-lb).
24. Place the shift stop housing assembly into position beneath the shift shaft housing making sure the spring and stopper are correctly positioned. Tighten to 2.3 kg-m (16.5 ft-lb).



CC054D

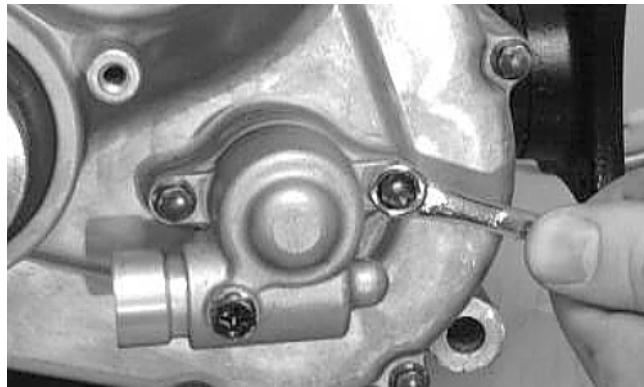
25. Place the speedometer drive adapter and gasket into position and secure with the two cap screws. Tighten securely.

CAUTION

Make sure the speedometer gear and output shaft gear match up during assembly.



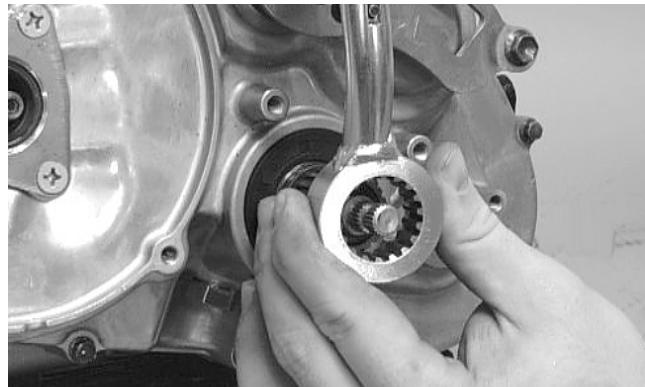
CC043D



CC042D

26. 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.

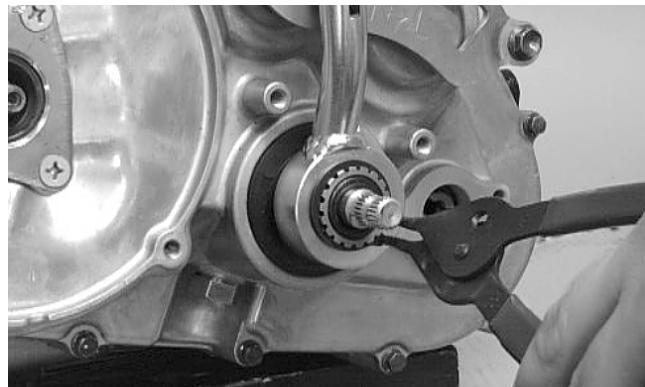
■ NOTE: Position the shift lever part way onto the splines and verify the subtransmission is in hi range. If not, shift into hi range.



CC045D

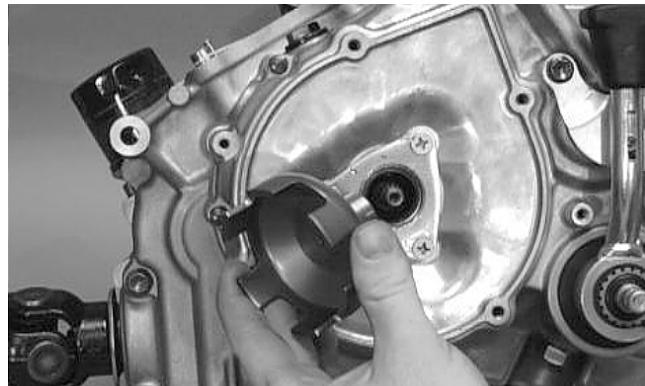
27. Pull up on the hi/low shift T-handle and guide the T-handle stop pin into the hi range lever stop plate slot; then slide the shift lever assembly the rest of the way onto the shift shaft. Secure with the outer circlip making sure the sharp side of the circlip faces away from the hi/low-range lever.

3



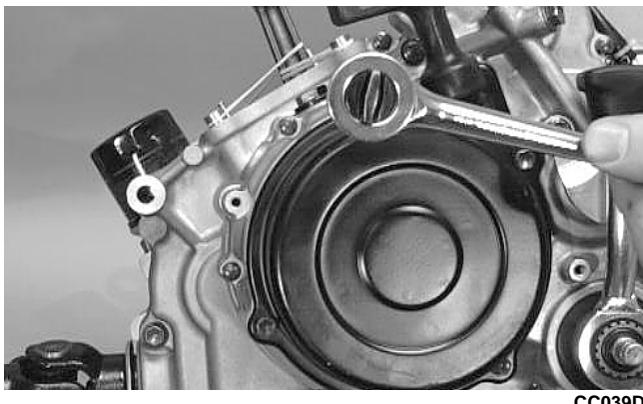
CC044D

28. 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

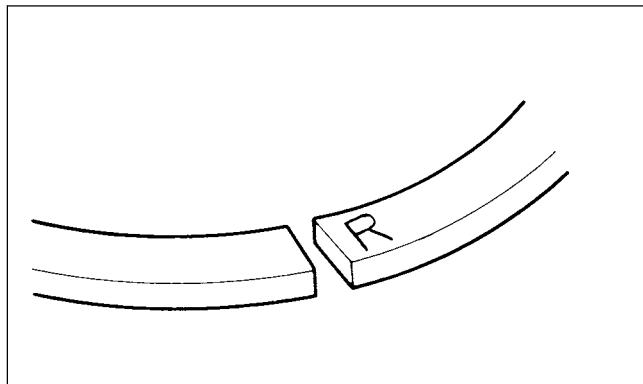
29. Place the recoil starter assembly into position on the left-side cover; then tighten four cap screws to 0.8 kg-m (6 ft-lb).



CC039D

B. Stagger the end gaps of the upper and lower thin oil rings according to the illustration.

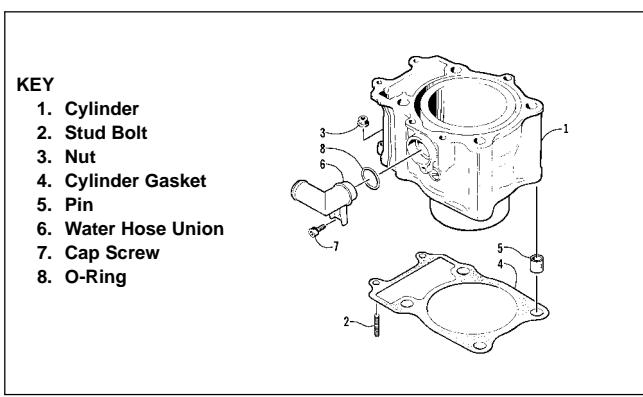
■ **NOTE:** Note the direction of the exhaust side of the piston (5) for correct ring end gap orientation.



ATV-1024

Installing Top-Side Components

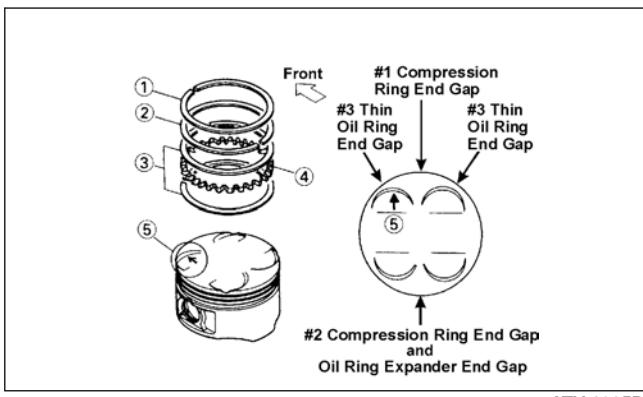
A. Piston
B. Cylinder



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

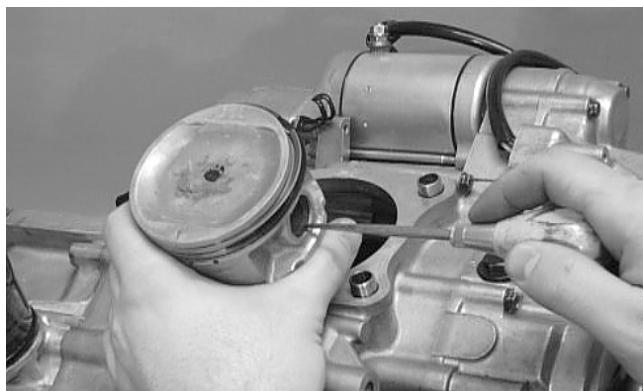
C. Install the compression rings (1 and 2) so the letter on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring end gaps are on directly opposite sides of the piston (see illustration).

CAUTION

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

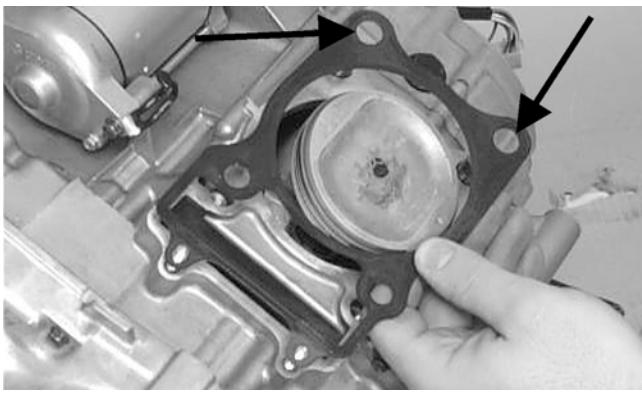
1. Install the piston on the connecting rod making sure there is a circlip on each side and the open end of the circlip faces upwards.

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

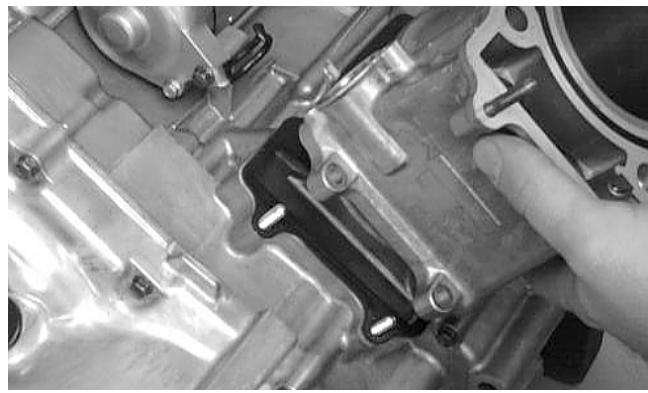


CC032D

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



CC025D



CC024D

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.

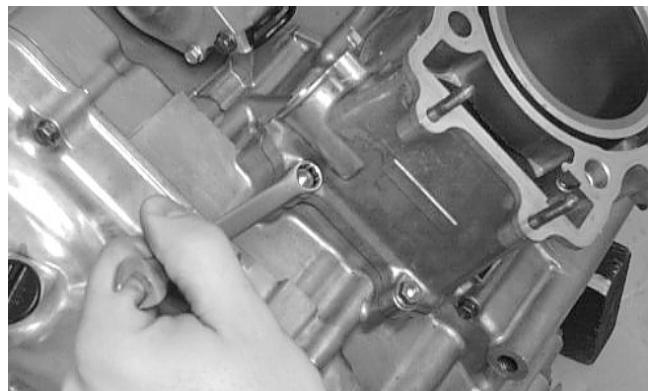
CAUTION

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

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.**

3



CC023D

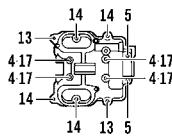
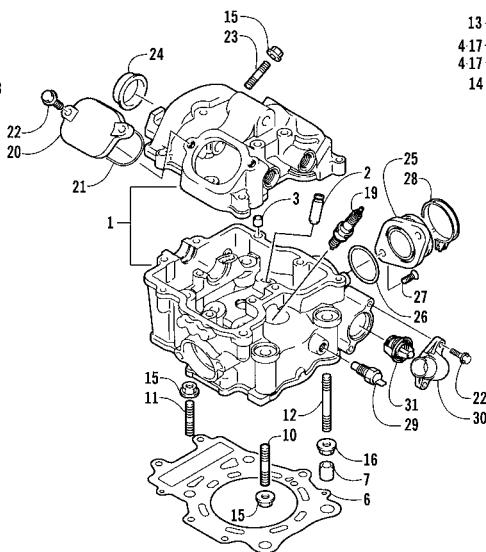
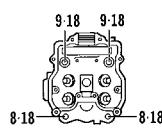
5. Install the coolant hose onto the crankcase union and tighten the clamp.

C. Cylinder Head

D. Valve Cover

KEY

1. Cylinder Head Assy	24. Cylinder Head Plug
2. Valve Guide	25. Intake Pipe Assy
3. Dowel Pin	26. O-Ring
4. Cap Screw	27. Cap Screw
5. Cap Screw	28. Clamp
6. Cylinder Head Gasket	29. Water Temperature Switch Assy
7. Dowel Pin	30. Thermostat Cover
8. Cap Screw	31. Thermostat
9. Cap Screw	32. Intake Tube
10. Stud Bolt	
11. Stud Bolt	
12. Stud Bolt	
13. Cap Screw	
14. Cap Screw	
15. Nut	
16. Nut	
17. Gasket	
18. Head Nut Gasket	
19. Spark Plug	
20. Inspection Cap	
21. O-Ring	
22. Cap Screw	
23. Stud Bolt	



0737-755

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

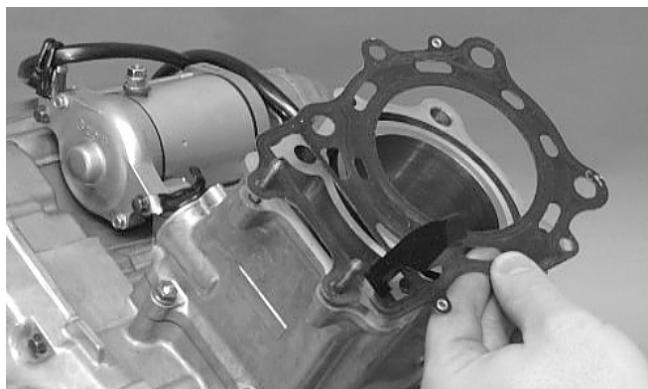
6. Place the chain guide into the cylinder.

⚠ CAUTION

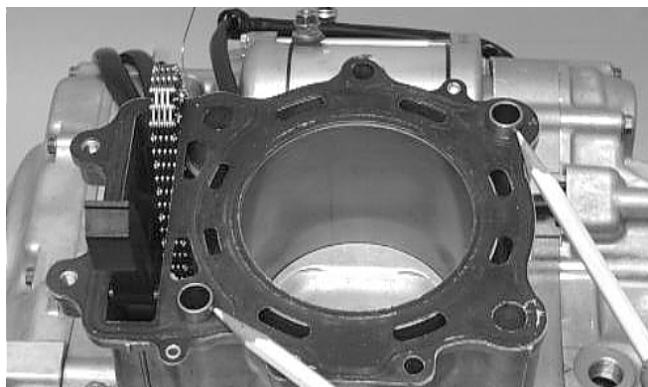
Care should be taken that the bottom of the chain guide is secured in the crankcase boss.



CC022D



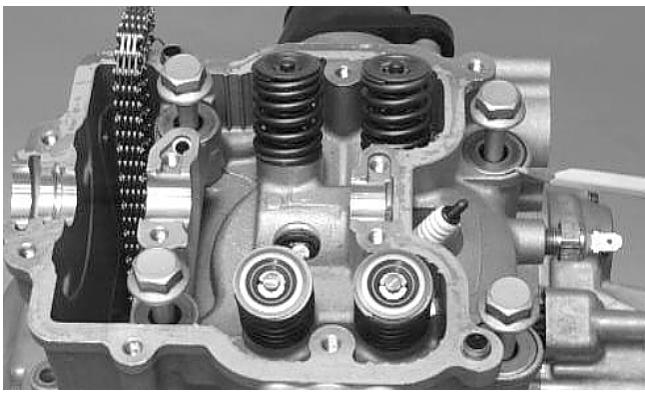
CC020D



CC265D

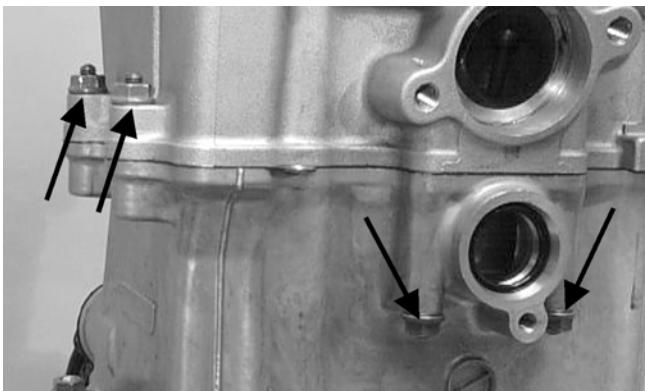
7. Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder.

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

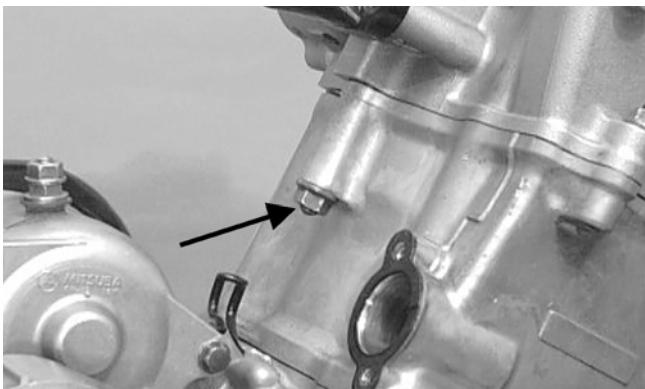


CC272D

9. Loosely install the five cylinder head nuts.



CC018D

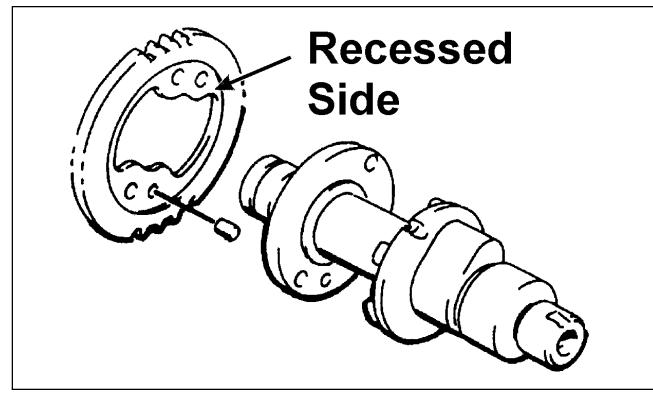


CC017D

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.

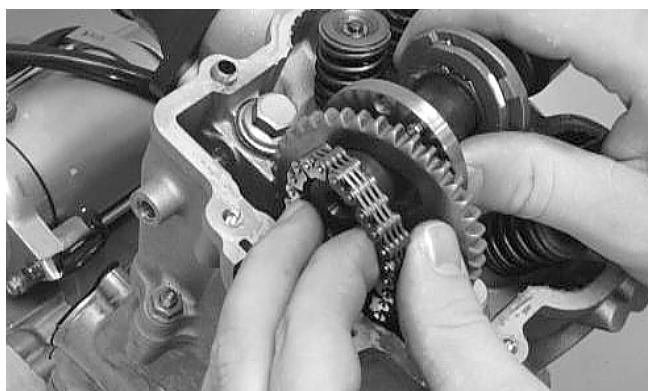


732-307B

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

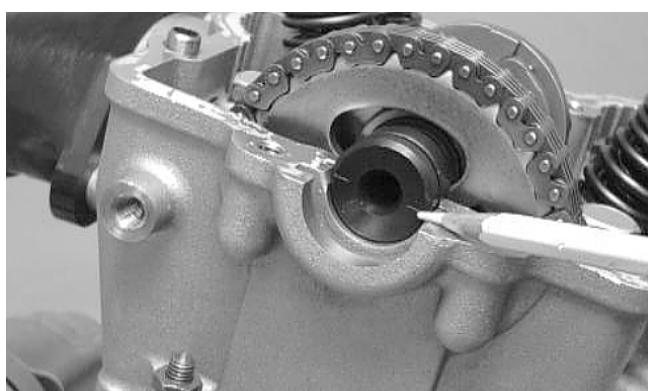
13. With the cam lobes directed down (toward the piston), maneuver the camshaft/sprocket assembly through the chain and towards its seating position; then loop the chain over the sprocket.

3



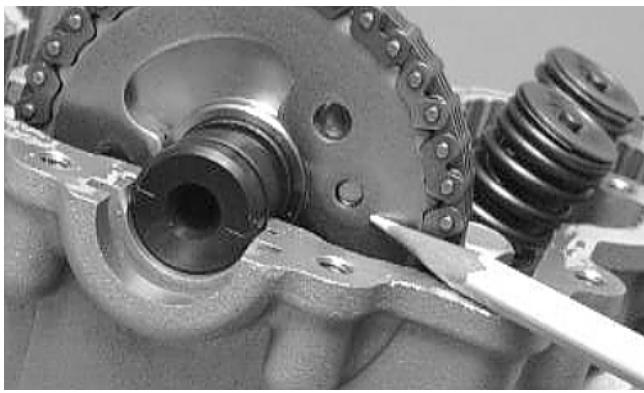
CC015D

■ **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.



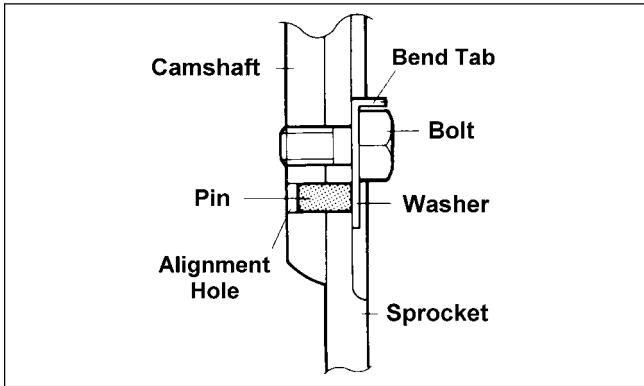
CC268D

- 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.

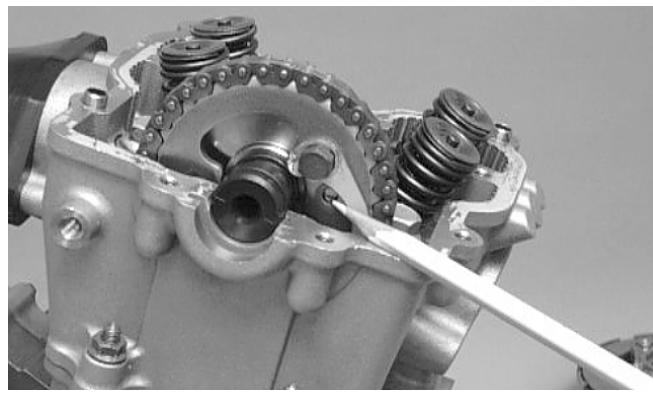
15. Place the tab-washer onto the sprocket making sure it covers the pin in the alignment hole.



ATV-1027

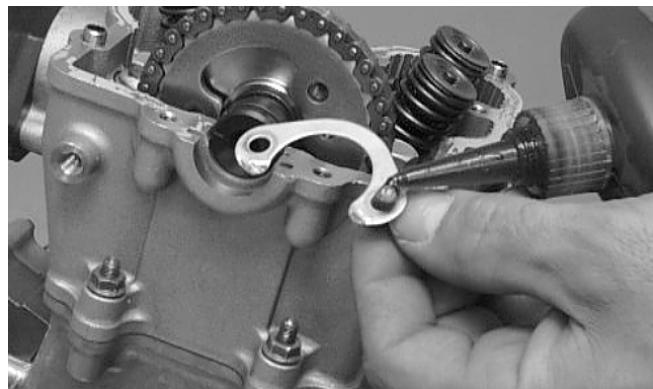
CAUTION

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.



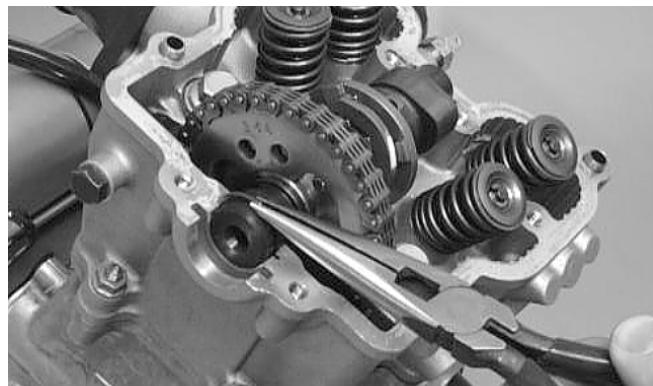
CC270D

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



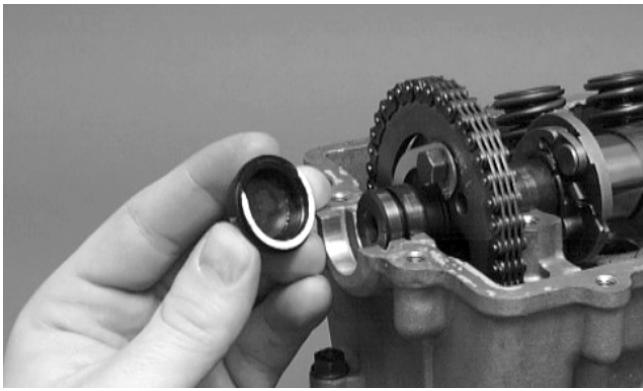
CC269D

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



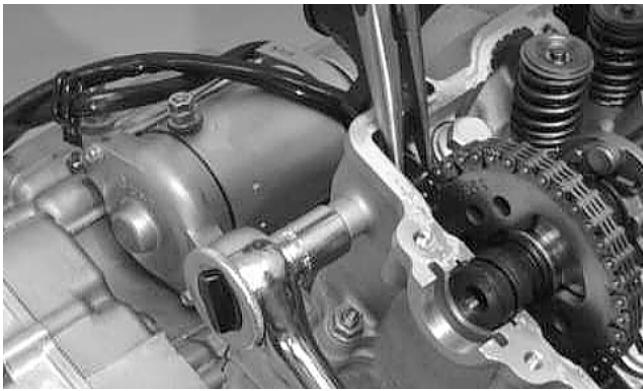
CC012D

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.



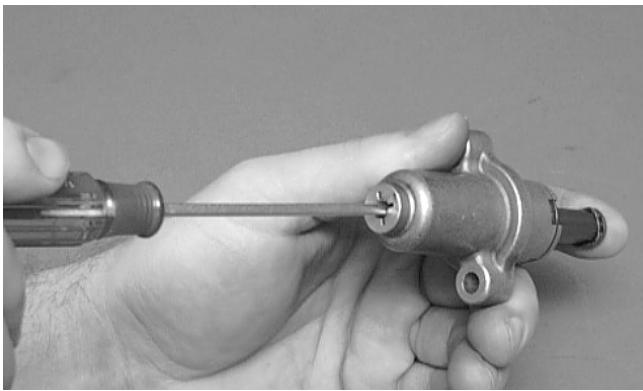
CC274D

19. Place the chain tensioner into position and secure with the cap screw and washer.



CC014D

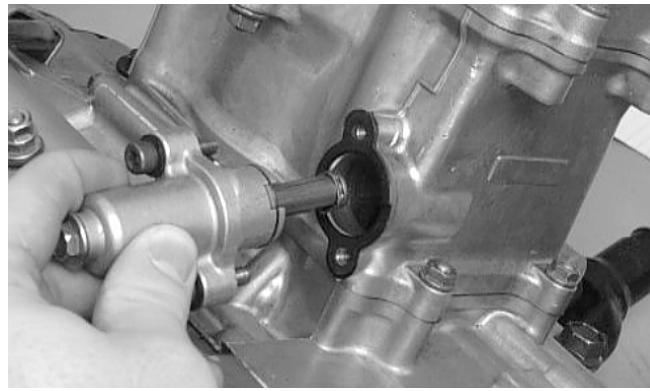
20. Remove the cap screw from the end of the chain tensioner; then using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner clockwise until the screw bottoms.



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.



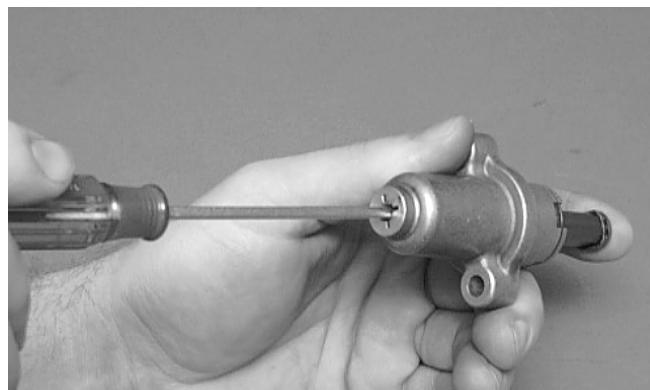
CC011D



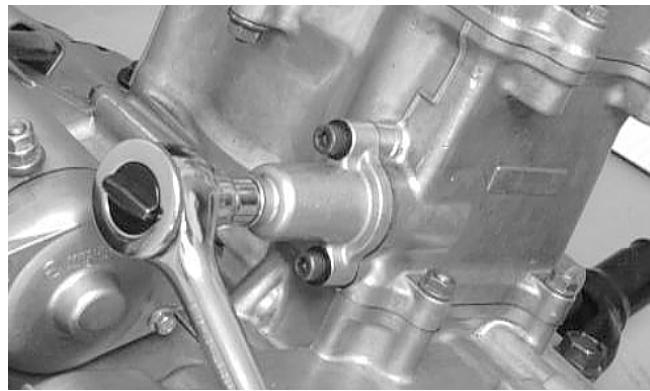
3

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.



CC309D



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.

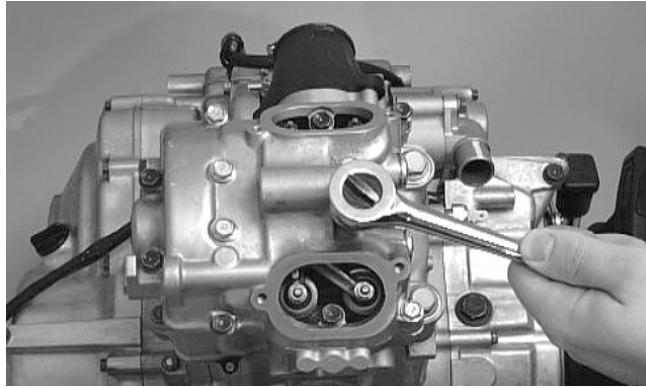


CC275D

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.

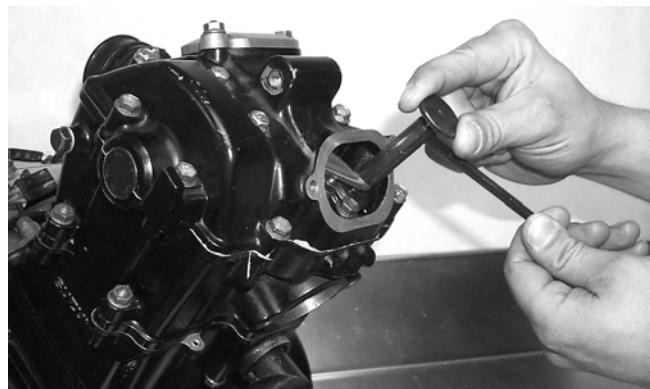


CC003D

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 counterclockwise until proper valve/tappet clearance is attained.

■NOTE: Refer to the appropriate Specifications for the proper valve/tappet clearance.

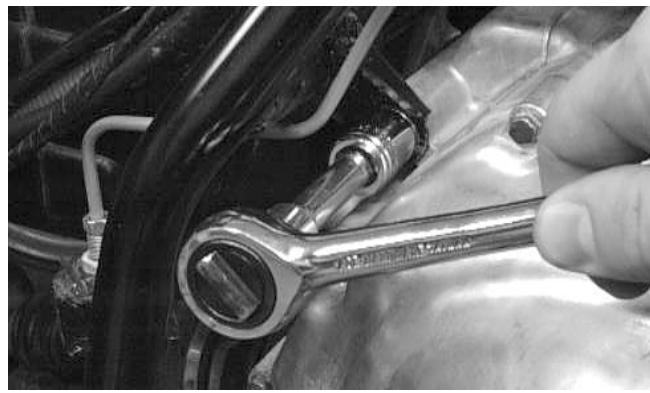
■NOTE: Rotating the valve adjuster dial counterclockwise will open the valve/tappet clearance by 0.05 mm (0.002 in.) per mark.

- 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).



CC125D

C. Lower front: One cap screw, nut, spacer, and washer. Tighten only until snug.



CC123D

3

Installing Engine/Transmission

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

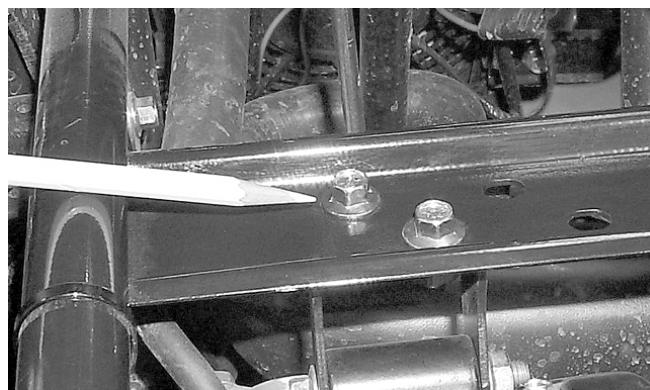
1. From the left side, place the engine/transmission into the frame.
2. Install the mounting fasteners securing the engine/transmission in the following sequence.

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.

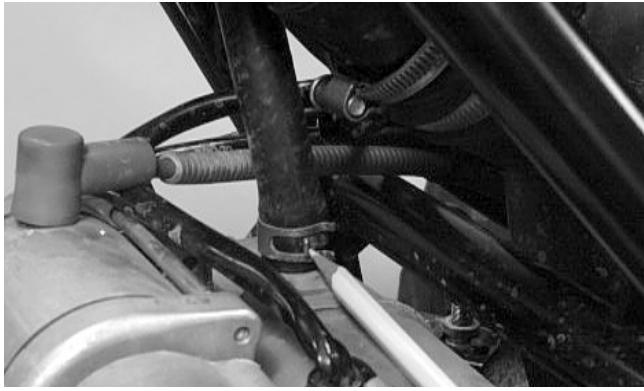


AF939

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.



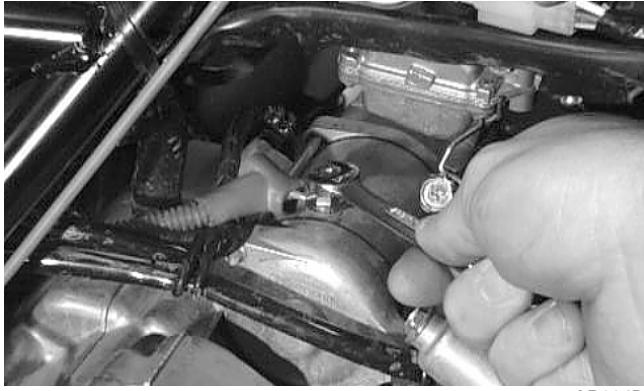
CC122D

5. Connect the lower coolant hose to the water pump housing and secure with the clamp.



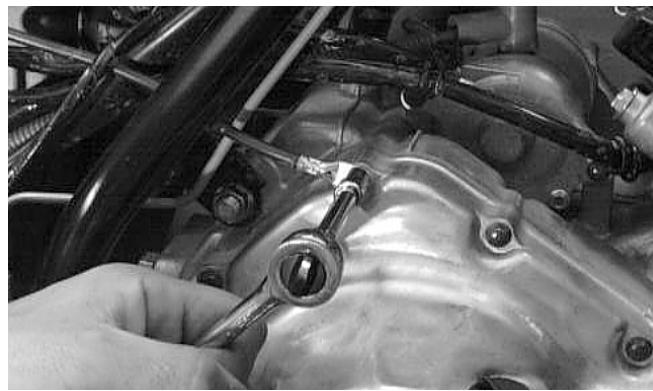
CC124D

6. Connect the positive cable to the starter motor and install the protective boot.



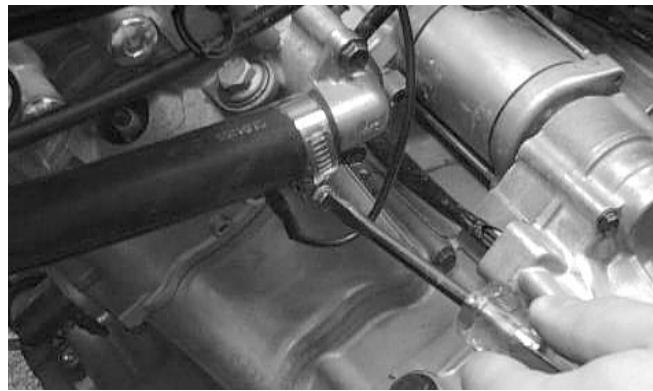
AR604D

7. Connect the battery ground (negative) cable to the crankcase cover.



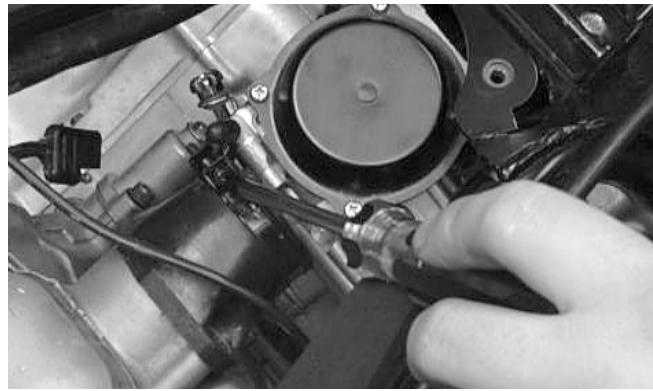
AR600D

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.



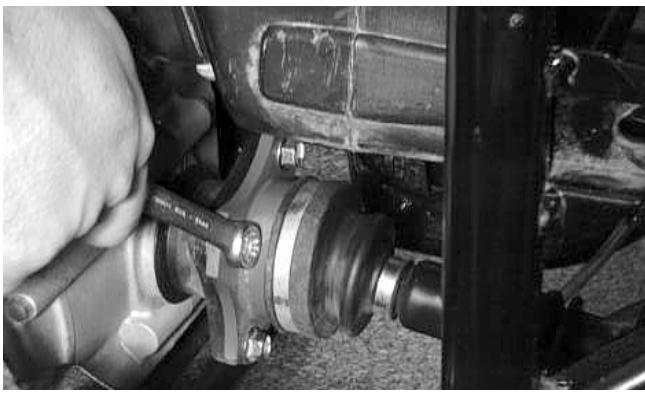
CC121D

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

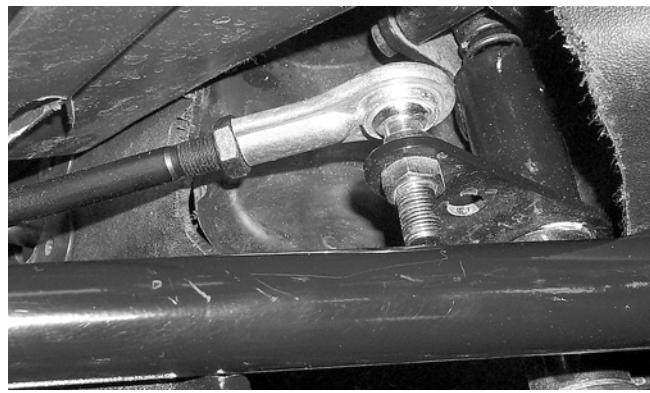
14. To install the reverse shift rod, use the following procedure:

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.

3

■ 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.

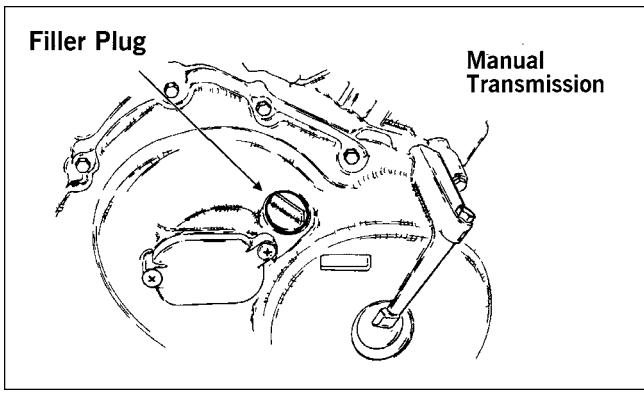
22. Connect all fuse block wiring according to the marking made in removing; then place the fuse block into position and secure with two screws.

■ 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.



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.



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.