

FOREWORD

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This manual contains service, maintenance, and troubleshooting information for the 1999 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.

Service Department
Arctic Cat Inc.



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SECTION 1 - GENERAL INFORMATION

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Specifications*

(250 cc)

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) | 0.13 mm (0.005 in.) 0.25 mm (0.010 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) | 66 mm (2.598 in.) |
| Piston Diameter 18 mm (0.71 in.) from Skirt End | | 68.380 mm (2.6921 in.) |
| 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 | | 66 x 72 mm (2.60 x 2.84 in.) |
| Cylinder Trueness | (max) | 0.05 mm (0.002 in.) |
| Ring End Gap | (1st Ring) (2nd Ring) | 0.70 mm (0.028 in.) 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) | 17.030 mm (0.6705 in.) |
| Piston Pin Outside Diameter | (min) | 16.980 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) | 55 mm \pm 0.1 mm (2.165 in.) (\pm 0.004 in.) |
| Crankshaft Runout (max) | left 0.05 mm (0.002 in.) right 0.08 mm (0.003 in.) |
| Oil Pump Reduction Ratio | 1.566 (47/30) |
| Oil Pressure at 60°C (above) (140°F) @ 3000 RPM (below) | 10 psi 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 \pm 200 |
| Clutch Lock-Up RPM | 3400 \pm 300 |
| Primary Reduction Ratio | 3.150 (63/20) |
| Secondary Reduction Ratio | 1.125 (18/16) |

CLUTCH (cont)

| | | |
|--|--|--|
| Final Reduction Ratio | (front) (rear) | 3.090 (34/11) 3.647 (62/17) |
| Secondary- Transmission Reduction Ratio | (super low) (low) (high) | 3.176 (17/18 x 25/11 x 37/25) 1.480 (37/25) 1.112 (11/25 x 18/17 x 43/18) |
| 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 (29/12 x 34/29) |
| Shift Fork To Groove (side clearance) | | 0.10-0.50 mm (0.004-0.020 in.) |
| Secondary Transmission Fork to Groove (side clearance) | | 0.05-0.50 mm (0.002-0.020 in.) |
| Reverse Fork to Groove (side clearance) | | 0.10-0.50 mm (0.004-0.020 in.) |
| Shift Fork Groove (#1, #2, & #3) Width (secondary transmission- #1 & #2) (reverse) | | 4.5-4.6 mm (0.177-0.181 in.) 5.45-5.55 mm (0.215-0.219 in.) 4.0-4.1 mm (0.157-0.161 in.) |
| Shift Fork Thickness (secondary transmission- #1 & #2) (reverse) | | 4.3-4.4 mm (0.169-0.173 in.) 5.3-5.4 mm (0.209-0.213 in.) 3.8-3.9 mm (0.150-0.154 in.) |
| Engine Oil Thermo-Switch Operating Temperature | (off→on) (on→off) | 160°C (320°F) 140°C (284°F) |

CARBURETOR

| | |
|--|-----------------------------|
| Type | BST31 |
| Main Jet | 130 |
| Main Air Jet | 1.1 |
| Pilot Jet | 45 |
| Pilot Air Jet | 155 |
| Throttle Valve | 120 |
| Pilot Screw Setting (turns) | 2 3/4 |
| Jet Needle | 4D28-3 |
| Needle Jet | P-6M |
| Idle RPM | 1400-1600 |
| Valve Seat | 2.0 |
| Starter Jet | 50 |
| Pilot Outlet | 0.8 |
| Float Arm Height | 13 mm (0.5 in.) |
| Throttle Cable Free-Play (at lever) | 3 - 6 mm (1/8 - 1/4 in.) |

ELECTRICAL

| | |
|--|---|
| Ignition Timing | 5° BTDC @ 1800 RPM 35° 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) | 0.1-0.5 ohm (terminal to ground) 5200-7800 ohms (high tension-plug cap removed-to ground) |

ELECTRICAL (cont)

| | |
|--|---|
| Magneto Coil Resistance (trigger) (charging) | 90-140 ohms (Black/ Yellow to Green /White) 0.1-1.0 ohm (Yellow to Yellow) |
| Magneto Output (approx) | 220W @ 5000 RPM |
| CHASSIS | |
| Dry Weight (approx) | 250 kg (550 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 @ Rear Differential | 20.3 cm (8.0 in.) |
| Brake Type | Hydraulic w/Parking Brake Lock and Mechanical Foot 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 (2x4 model) | Front - 0.42 kg/cm ² (6 psi) Rear - 0.28 kg/cm ² (4 psi) |
| Turning Radius | 3.0 m (9.85 ft) |
| Front Rack Capacity | 34 kg (75 lb) |
| Rear Rack Capacity | 68 kg (150 lb) |
| Maximum Load Capacity | 193 kg (425 lb) |
| Maximum Load Capacity (w/trailer) | 477 kg (1050 lb) |
| MISCELLANY | |
| Gas Tank Capacity (rated) | 16 l (4.25 U.S. gal.) |
| Reserve Capacity | 4.6 l (1.2 U.S. gal.) |
| Engine Oil Capacity | 3.9 l (4.1 U.S. qt) |
| Gasoline (recommended) | 87 Octane Regular Unleaded |
| Engine Oil (recommended) | SAE 10W-40 |
| Taillight/Brakelight | 12V/7.5W |
| Headlight | 12V/35W |
| Starting System | Electric w/Manual Recoil (Emergency) |

* Specifications subject to change without notice.

Specifications*

(300 cc)

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) | 0.13 mm (0.005 in.) 0.25 mm (0.010 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) | 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.) |
| Piston Diameter 18 mm (0.71 in.) from Skirt End | 68.380 mm (2.6921 in.) |
| 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.) |
| Cylinder Trueness (max) | 0.05 mm (0.002 in.) |
| Ring End Gap (1st Ring) (2nd Ring) | 0.70 mm (0.028 in.) 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) | 17.030 mm (0.6705 in.) |
| Piston Pin Outside Diameter (min) | 16.980 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) | 55 mm \pm 0.1 mm (2.165 in.) (\pm 0.004 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 (above) (140°F) @3000 RPM (below) | 10 psi 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 \pm 200 |
| Clutch Lock-Up RPM | 3400 \pm 300 |
| Primary Reduction Ratio | 3.150 (63/20) |
| Secondary Reduction Ratio | 1.125 (18/16) |

| CLUTCH (cont) | | |
|---|-------------|--|
| 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) |
| Shift Fork To Groove (side clearance) | | 0.10-0.50 mm (0.004-0.020 in.) |
| Secondary Transmission Fork to Groove (side clearance) | | 0.05-0.50 mm (0.002-0.020 in.) |
| Reverse Fork to Groove (side clearance) | | 0.10-0.50 mm (0.004-0.020 in.) |
| Shift Fork Groove (#1, #2, & #3) Width (secondary transmission-#1 & #2) (reverse) | | 4.5-4.6 mm (0.177-0.181 in.) 5.45-5.55 mm (0.215-0.219 in.) 4.0-4.1 mm (0.157-0.161 in.) |
| Shift Fork (#1, #2, & #3) Thickness (secondary transmission-#1 & #2) (reverse) | | 4.3-4.4 mm (0.169-0.173 in.) 5.3-5.4 mm (0.209-0.213 in.) 3.8-3.9 mm (0.150-0.154 in.) |
| Engine Oil Thermo-Switch (on→off) Operating Temperature | (off→on) | 160°C (320°F) |
| | (on→off) | 140°C (284°F) |
| CARBURETOR | | |
| Type | | BST31 |
| Main Jet | | 137.5 |
| Main Air Jet | | 1.1 |
| Pilot Jet | | 45 |
| Pilot Air Jet | | 155 |
| Throttle Valve | | 120 |
| Pilot Screw Setting (turns) | | 2 3/4 |
| Jet Needle | | 4D28-3 |
| Needle Jet | | P-8M |
| Idle RPM | | 1400-1600 |
| Valve Seat | | 2.0 |
| Starter Jet | | 50 |
| Pilot Outlet | | 0.8 |
| Float Arm Height | | 13 mm (0.5 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 |

| ELECTRICAL (cont) | | |
|--|--|--|
| Ignition Coil Resistance (primary) (secondary) | | 0.1-0.5 ohm (terminal to ground) 5200-7800 ohms (high tension-plug cap removed-to ground) |
| Magneto Coil Resistance (trigger) (charging) | | 90-140 ohms (Black/ Yellow to Green/White) 0.1-1.0 ohm (Yellow to Yellow) |
| Magneto Output (approx) | | 220W @ 5000 RPM |
| CHASSIS | | |
| Dry Weight (approx) | | 2x4 Model - 250 kg (550 lb) 4x4 Model - 266 kg (585 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 @ Rear Differential | | 20.3 cm (8.0 in.) |
| Brake Type | | Hydraulic w/Parking Brake Lock and Mechanical Foot Brake |
| Wheelbase | | 127 cm (50 in.) |
| Tracking | | 89 cm (35 in.) |
| Tire Size (2x4 Model) | | Front - AT23 x 8-12 Rear - AT25 x 10-12 |
| Tire Size (4x4 Model) | | Front - AT24 x 9-12 Rear - AT25 x 10-12 |
| Tire Inflation Pressure (2x4 Model) | | Front - 0.42 kg/cm ² (6 psi) Rear - 0.28 kg/cm ² (4 psi) |
| Tire Inflation Pressure (4x4 Model) | | 0.28 kg/cm ² (4 psi) |
| Turning Radius | | 2.7 m (8.9 ft) |
| Front Rack Capacity | | 34 kg (75 lb) |
| Rear Rack Capacity | | 68 kg (150 lb) |
| Maximum Load Capacity | | 193 kg (425 lb) |
| Maximum Load Capacity (w/trailer) | | 477 kg (1050 lb) |
| MISCELLANY | | |
| Gas Tank Capacity (rated) | | 16 l (4.25 U.S. gal.) |
| Reserve Capacity | | 4.6 l (1.2 U.S. gal.) |
| Differential Capacity (front-4x4) | | 175 ml (5.8 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 | | SAE Approved 80W-90 Hypoid |
| Taillight/Brakelight | | 12V/5W |
| Headlight | | 12V/35W |
| Starting System | | Electric w/Manual Recoil (Emergency) |

* Specifications subject to change without notice.

Specifications*

(400 cc)

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 Seat Width | 0.9-1.1 mm (0.035-0.043 in.) |
| Valve Seat Angle (intake) (exhaust) | 45° 45° |
| Valve Face Width | 0.9-1.1 mm (0.035-0.043 in.) |
| Valve Face Radial Runout (max) | 0.03 mm (0.001 in.) |
| Valve Spring Free Length (max) (inner) (outer) | 35 mm (1.38 in.) 37.8 mm (1.49 in.) |
| Valve Spring Tension @ 28 mm (1.10 in.) (inner) | 5.3-6.5 kg (11.7-14.3 lb) |
| Valve Spring Tension @ 31.5 mm (1.24 in.) (outer) | 13.1-15.1 kg (28.9-33.3 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 (right & center) Holder Inside Diameter (left) | 22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.) |
| Camshaft Journal (right & center) Outside Diameter (left) | 21.959-21.980 mm (0.8645-0.8654 in.) 17.465-17.484 mm (0.6876-0.6883 in.) |
| Camshaft Runout (max) | 0.10 mm (0.004 in.) |
| Rocker Arm Inside Diameter | 12.000-12.018 mm (0.4724-0.4731 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 | 0.045-0.120 mm (0.0018-0.0047 in.) |
| Cylinder Bore | 84.000-84.085 mm (3.3071-3.3104 in.) |
| Piston Diameter 15 mm (0.6 in.) from Skirt End | 83.880-83.965 mm (3.3024-3.3057 in.) |
| Piston Ring (1st Ring) Free End Gap (approx) | 8.4-10.5 mm (0.33-0.41 in.) 9.5-11.8 mm (0.37-0.46 in.) |
| Bore x Stroke | 84 x 67 mm (3.30 x 2.64 in.) |
| Cylinder Trueness (max) | 0.05 mm (0.002 in.) |
| Ring End Gap (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) 1.21-1.23 mm (0.0476-0.0484 in.) (2nd) 1.21-1.23 mm (0.0476-0.0484 in.) (oil) 2.51-2.53 mm (0.0988-0.0996 in.) |
| Piston Ring Thickness | (1st) 1.17-1.19 mm (0.046-0.047 in.) (2nd) 1.17-1.19 mm (0.046-0.047 in.) |
| Piston Pin Bore | (max) 21.03 mm (0.828 in.) |
| Piston Pin Outside Diameter | (min) 20.98 mm (0.826 in.) |
| CRANKSHAFT | |
| Connecting Rod (small end inside diameter) (max) | 21.04 mm (0.8283 in.) |
| Connecting Rod (big end side-to-side) (max) | 0.1-1.0 mm (0.004-0.039 in.) |
| Connecting Rod (big end width) | 25.95-26 mm (1.022-1.024 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) | 0.05 mm (0.002 in.) |
| Oil Pump Reduction Ratio | 1.45 (29/20) |
| Oil Pressure at 60°C (above) (140°F) @ 3000 RPM (below) | 1.3 kg/cm² (18 psi) 1.7 kg/cm² (24 psi) |
| CLUTCH | |
| Clutch Release Screw | 1/8 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 | 139.8-140.2 mm (5.504-5.520 in.) |
| Clutch Shoe | No groove at any part |
| Clutch Engagement RPM | 1700 ± 200 |
| Clutch Lock-Up RPM | 3500 ± 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) |

| CLUTCH (cont) | | |
|-------------------------------------|-------------------|-----------------------|
| Gear Ratios | (1st) | 3.09 (34/11) |
| | (2nd) | 1.75 (28/16) |
| | (3rd) | 1.2 (24/20) |
| | (4th) | 0.956 (22/23) |
| | (5th) | 0.8 (20/25) |
| | (reverse) | 2.636 (24/11 x 29/24) |
| Shift Fork To Groove | | 0.1-0.3 mm |
| (side clearance) | | (0.004-0.012 in.) |
| Secondary Transmission Fork to | | 0.2 mm |
| Groove (side clearance) (max) | | (0.008 in.) |
| Reverse Fork to Groove (max) | | 0.3 mm |
| (side clearance) | | (0.012 in.) |
| Shift Fork Groove (#1 and #2) | Width | 5.5-5.6 mm |
| (secondary transmission) | | (0.217-0.220 in.) |
| | (reverse) | 5.4-5.5 mm |
| | | (0.213-0.217 in.) |
| | | 5.0-5.1 mm |
| | | (0.197-0.201 in.) |
| Shift Fork Thickness (#1 and #2) | 5.3-5.4 mm | |
| (secondary transmission) | (0.209-0.213 in.) | |
| | 5.3-5.4 mm | |
| (reverse) | (0.209-0.213 in.) | |
| | 4.8-4.9 mm | |
| | (0.189-0.193 in.) | |
| Thermostat Valve Opening | | 48.5-51.5°C |
| Temperature | | (119.3-124.7°F) |
| Thermostat Valve Lift | | Over 3 mm (0.12 in.) |
| | | at 65°C (149°F) |
| Cooling Fan (off→on) | | 115°C (239°F) |
| Temperature Sensor (on→off) | | 108°C (226°F) (min) |
| Switch Operating Temperature | | |
| Water Temperature (off→on) | | 95°C (203°F) |
| Warning Light Switch | | |
| CARBURETOR | | |
| Type | | BST34 |
| Main Jet | | 150 |
| Main Air Jet | | 1.1 |
| Pilot Jet | | 45 |
| Pilot Air Jet | | 145 |
| Throttle Valve | | 95 |
| Pilot Screw Setting (turns) | | 2 ± 1/8 |
| Jet Needle | | 4E07-4 |
| Needle Jet | | O-2 |
| Idle RPM | | 1400-1600 |
| Valve Seat | | 2.0 |
| Starter Jet | | 110 |
| Float Arm Height | | 14 mm |
| | | (0.6 in.) |
| Throttle Cable Free-Play (at lever) | | 3 - 6 mm |
| | | (1/8 - 1/4 in.) |
| ELECTRICAL | | |
| Ignition Timing | | 10° BTDC @ 1800 RPM |
| | | 30° BTDC @ 3800 RPM |
| Spark Plug Type | | NGK CR8E |
| Spark Plug Gap | | 0.7-0.8 mm |
| | | (0.028-0.032 in.) |
| Spark Plug Cap | | 8000-12,000 ohms |

| ELECTRICAL (cont) | | |
|-----------------------------------|---|--|
| Ignition Coil Resistance | (primary) | 0.1-1.0 ohm (terminal to ground) |
| | (secondary) | 12,000-30,000 ohms (high tension-plug cap removed-to ground) |
| Magneto Coil Resistance | (trigger) | 150-300 ohms (Green to Blue) |
| | (source/charge) | 0.05-1.0 ohm (Yellow to White) |
| | (charging) | 0.1-1.0 ohm (Black to Black) |
| Magneto Output | 340W @ 5000 RPM | |
| CHASSIS | | |
| Dry Weight (approx) | 2x4 Model-266 kg (586 lb) 4x4 Model-283.5 kg (625 lb) | |
| Length (overall) | 204 cm (80.5 in.) | |
| Height (overall) | 114 cm (45 in.) | |
| Width (overall) | 114 cm (45 in.) | |
| Suspension Travel | 18.2 cm (7.2 in.) | |
| Ground Clearance @ Differential | 23.3 cm (9.2 in.) | |
| Brake Type | Hydraulic w/Parking Brake Lock and Mechanical Foot Brake | |
| Wheelbase | 127 cm (50 in.) | |
| Wheel Stance | 89 cm (35 in.) | |
| Tire Size | Front | AT25 x 8-12 |
| | Rear | AT25 x 10-12 |
| Tire Inflation Pressure | Front | 0.28 kg/cm ² (4 psi) |
| | Rear 2x4 Model | 0.28 kg/cm ² (4 psi) |
| | Rear 4x4 Model | 0.25 kg/cm ² (3.5 psi) |
| Turning Radius | | 2.7 m (8.9 ft) |
| Front Rack Capacity | | 2x4 Model-41 kg (90 lb) 4x4 Model-45 kg (100 lb) |
| Rear Rack Capacity | | 2x4 Model-82 kg (180 lb) 4x4 Model-91 kg (200 lb) |
| Maximum Load Capacity | | 2x4 Model-193 kg (425 lb) 4x4 Model-227 kg (500 lb) |
| Maximum Load Capacity (w/trailer) | | 2x4 Model-554 kg (1220 lb) 4x4 Model-568 kg (1250 lb) |
| MISCELLANY | | |
| Gas Tank Capacity (rated) | 16 l (4.25 U.S. gal.) | |
| Reserve Capacity | 2.6 l (0.7 U.S. gal.) | |
| Coolant Capacity | 2.9 l (3 U.S. qt) | |
| Differential Capacity | Rear | 300 ml (10.1 fl oz) |
| Differential Capacity (4x4 Model) | Front | 175 ml (5.8 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 | | SAE Approved 80W-90 Hypoid |
| Taillight/Brakelight | | 12V/5W |
| Headlight | | 12V/35W |
| Starting System | | Electric w/Manual Recoil (Emergency) |

* Specifications subject to change without notice.

Specifications*

(500 cc)

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 Seat Width | 0.9-1.1 mm (0.035-0.043 in.) |
| Valve Seat Angle (intake) (exhaust) | 45° 45° |
| Valve Face Width | 0.9-1.1 mm (0.035-0.043 in.) |
| Valve Face Radial Runout (max) | 0.03 mm (0.001 in.) |
| Valve Spring Free Length (max) (inner) (outer) | 35 mm (1.38 in.) 37.8 mm (1.49 in.) |
| Valve Spring Tension @ 28 mm (1.10 in.) (inner) | 5.3-6.5 kg (11.7-14.3 lb) |
| Valve Spring Tension @ 31.5 mm (1.24 in.) (outer) | 13.1-15.1 kg (28.9-33.3 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 (right & center) Holder Inside Diameter (left) | 22.012-22.025 mm (0.8666-0.8671 in.) 17.512-17.525 mm (0.6894-0.6900 in.) |
| Camshaft Journal (right & center) Outside Diameter (left) | 21.959-21.980 mm (0.8645-0.8654 in.) 17.465-17.484 mm (0.6876-0.6883 in.) |
| Camshaft Runout (max) | 0.10 mm (0.004 in.) |
| Rocker Arm Inside Diameter | 12.000-12.018 mm (0.4724-0.4731 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 | 0.76-1.02 mm (0.030-0.040 in.) |
| Cylinder Bore | 87.500-87.515 mm (3.4448-3.4454 in.) |
| Piston Diameter 15 mm (0.6 in.) from Skirt End | 87.465-87.470 mm (3.4435-3.4437 in.) |
| Piston Ring (1st Ring) Free End Gap (max) (2nd Ring) | 11.3 mm (0.4448 in.) 9.7 mm (0.3818 in.) |
| Bore x Stroke | 87.5 x 82 mm (3.40 x 3.22 in.) |
| Cylinder Trueness (max) | 0.05 mm (0.002 in.) |
| Ring End Gap-Installed (max) | 0.70 mm (0.0275 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 (0.907 in.) |
| Connecting Rod (big end side-to-side) (max) | 0.1-1.0 mm (0.004-0.039 in.) |
| Connecting Rod (big end width) | 24.95-25 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 (0.0031 in.) |
| Oil Pump Reduction Ratio | 1.45 (29/20) |
| Oil Pressure at 60°C (above) (140°F) @ 3000 RPM (below) | 1.3 kg/cm ² (18 psi) 1.7 kg/cm ² (24 psi) |
| CLUTCH | |
| Clutch Release Screw | 1/4-1/2 turn back |
| Drive Plate (fiber) Thickness | 2.92-3.08 mm (0.1149-0.1212 in.) |
| Drive Plate (fiber) Tab | 13.05 mm (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.) |
| 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) |
| Secondary-Transmission Reduction Ratio (high) (low) | 1.5 (42/28) 2.363 (22/23 x 28/17 x 42/28) |

| CLUTCH (cont) | |
|--|--|
| Gear Ratios | (1st) 3.09 (34/11) (2nd) 1.75 (28/16) (3rd) 1.2 (24/20) (4th) 0.956 (22/23) (5th) 0.8 (20/25) (reverse) 2.636 (24/11 x 29/24) |
| Shift 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 (max) (side clearance) | 0.2 mm (0.008 in.) |
| Shift Fork Groove (#1 and #2) Width (secondary transmission) | 5.5-5.6 mm (0.217-0.220 in.) 5.3-5.4 mm (0.209-0.213 in.) 4.9-5.0 mm (0.193-0.197 in.) |
| Shift Fork Thickness (#1 and #2) (secondary transmission) | 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.) at 65°C (149°F) |
| Cooling Fan Thermo-Switch Operating Temperature | (off→on) 88-93°C (190-200°F) (on→off) 81°C (177°F) (min) |
| CARBURETOR | |
| Type | BST34 |
| Main Jet | 152.5 |
| Main Air Jet | 0.9 |
| Pilot Jet | 55 |
| Pilot Air Jet | 155 |
| Throttle Valve | 105 |
| Pilot Screw Setting (turns) | 2 ± 1/4 |
| Jet Needle | 5D40-4 |
| Needle Jet | O-4 |
| Idle RPM | 1200-1350 |
| Valve Seat | 2.3 |
| Starter Jet | 110 |
| Float Arm Height | 13 mm (0.5 in.) |
| Throttle Cable Free-Play (at lever) | 3 - 6 mm (1/8 - 1/4 in.) |
| ELECTRICAL | |
| Ignition Timing | 10° BTDC @ 1800 RPM 30° BTDC @ 3800 RPM |
| Spark Plug Type | NGK CR7E |
| Spark Plug Gap | 0.7-0.8 mm (0.028-0.032 in.) |
| Spark Plug Cap | 8000-12,000 ohms |
| Ignition Coil Resistance (primary) | 0.1-0.8 ohm (terminal to ground) |
| | 10,000-15,000 ohms (high tension-plug cap removed-to ground) |

| ELECTRICAL (cont) | |
|-----------------------------------|--|
| Magneto Coil Resistance (trigger) | 170-250 ohms (Green to Blue) |
| (source/charge) | 0.05-1.0 ohm (Yellow to White) |
| (charging) | 0.1-1.0 ohm (Black to Black) |
| Magneto Output | 325W @ 5000 RPM |
| CHASSIS | |
| Dry Weight (approx) | 283.5 kg (625 lb) |
| Length (overall) | 204 cm (80.5 in.) |
| Height (overall) | 114 cm (45 in.) |
| Width (overall) | 114 cm (45 in.) |
| Suspension Travel | 18.2 cm (7.2 in.) |
| Ground Clearance | 23.3 cm (9.2 in.) |
| Brake Type | Hydraulic w/Parking Brake Lock and Mechanical Foot Brake |
| Wheelbase | 127 cm (50 in.) |
| Tracking | 89 cm (35 in.) |
| Tire Size | AT26 x 10.5-12 |
| Tire Inflation Pressure | 0.35 kg/cm ² (5 psi) |
| Turning Radius | 2.7 m (8.9 ft) |
| Front Rack Capacity | 45 kg (100 lb) |
| Rear Rack Capacity | 91 kg (200 lb) |
| Maximum Load Capacity | 227 kg (500 lb) |
| Maximum Load Capacity (w/trailer) | 568 kg (1250 lb) |
| MISCELLANY | |
| Gas Tank Capacity (rated) | 16 l (4.25 U.S. gal.) |
| Reserve Capacity | 2.6 l (0.7 U.S. gal.) |
| Coolant Capacity | 2.9 l (3.0 U.S. qt) |
| Differential Capacity | Rear 300 ml (10.1 fl oz) Front 175 ml (5.8 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 | SAE Approved 80W-90 Hypoid |
| Taillight/Brakelight | 12V/5W |
| Headlight | 12V/35W |
| Starting System | Electric w/Manual Recoil (Emergency) |

* Specifications subject to change without notice.

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. Burnish the brake pads by driving the ATV in third gear up to 30 mph and then compressing the hand brake lever 15-20 times while decelerating to 0-5 mph. Repeat this procedure several times or until the brakes feel effective. This procedure burnishes the brake pads, stabilizes the pad material, and extends the life of the brake pads.

WARNING

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

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

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

Gasoline-Oil-Lubricant

RECOMMENDED GASOLINE

The recommended gasoline to use in this ATV 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.

A CAUTION

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

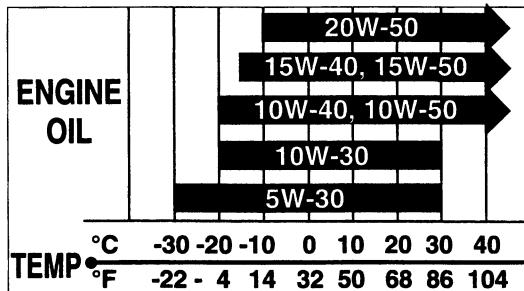
RECOMMENDED ENGINE/TRANSMISSION OIL

A 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 in this ATV 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 viscosity chart for details.

VISCOSITY CHART



RECOMMENDED DIFFERENTIAL LUBRICANT

The recommended differential 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 differentials.

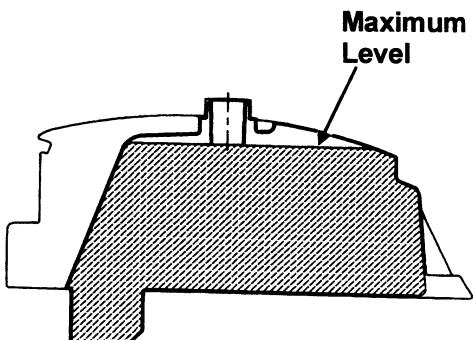
CAUTION

Any lubricant used in place of the recommended lubricant could cause serious differential 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.



ATV-0049

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 over-flow 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.

1

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

1. Clean the seat cushion with a damp cloth and allow it to dry.
2. Clean the ATV thoroughly by hosing 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.
3. Either drain the gas tank or add Fuel Stabilizer (p/n 0638-165) to the gas in the gas tank. Remove the air cleaner 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 cover.
4. Plug the exhaust hole in the muffler with a clean cloth.
5. Apply light oil to the upper steering post bushing, plungers of the shock absorbers, and cable ends.
6. Tighten all nuts, 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 screws are tightened to specifications.
7. On liquid cooled models, fill the cooling system to 1/2 in. above the radiator core with properly mixed coolant.
8. Polish the ATV thoroughly.
9. Disconnect the battery cables; then clean the battery posts and cables. Remove the battery 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 muffler.
3. Check all control wires and cables for signs of wear or fraying. Replace if necessary.
4. Change the engine/transmission oil and filter and (if applicable) the differential lubricant.
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; then coat the terminals with grease.
7. Check the entire brake systems (fluid level, pads, etc.), all controls, headlight, taillight, brakelight, and headlight aim; adjust or replace as necessary.
8. Tighten all nuts, cap screws, and screws making sure all calibrated nuts, cap screws, and screws are tightened to specifications.
9. Make sure the steering moves freely and does not bind.
10. Check the spark plug. Clean or replace as necessary.
11. Inspect the air filter and air cleaner housing for obstructions.
12. Check and inflate tires to recommended pressure.

SECTION 2 - PERIODIC MAINTENANCE/TUNE-UP

2

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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 Week or Every 100 Miles | Every Month or Every 300 Miles | Every 3 Months or Every 600 Miles | Every 6 Months or Every 900 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 Arrester | | | | | | C | | R |
| Gas/Vent Hoses | | | I | | | | | C |
| Gas Tank Valve | | | | | | | I | C |
| Throttle Cable | I | I | | | C, L | | | A, R |
| Carb Float Chamber (Bowl) | | | | 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 |
| Differential Lubricant | I | | I | | | I | R | |
| Clutch | I | | | | | I | | A |
| Tires | | | | I | | | | R |
| Steering Components | I | I | | I | | | | R |
| Front Axle Boots/Driveshaft Universal Joint | | | I* | | | | | R |
| Suspension/Shock Absorbers/Bushings | | | | | | I* | | R |
| Nuts/Cap Screws/Screws | 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 & Mechanical) | 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) |
| Upper Arm/Knuckle (Rear) | I | | | | L** | | | |

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

** If a rear arm grease fitting does not accept grease, do not force grease into the fitting.

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.

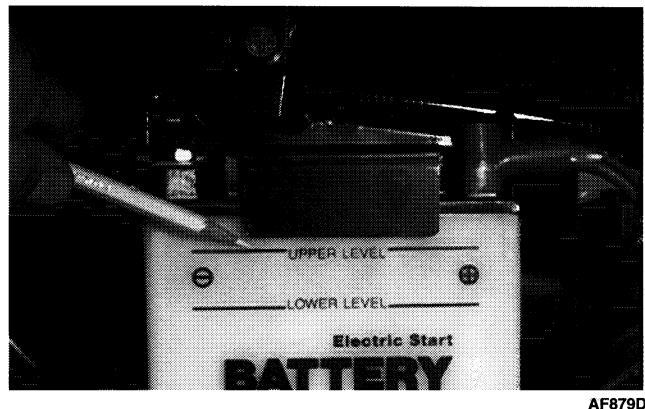
- A. Throttle Lever Pivot/Cable Ends
- B. Brake Lever Pivot/Cable Ends
- C. Mechanical Brake Cable Ends
- D. Choke Cable Upper End
- E. Reverse Lever Cable End
- F. Idle RPM Screw (Carburetor)
- G. Upper/Lower Rear Arms (6 locations-250/300 cc)

■ NOTE: If a rear arm grease fitting does not accept grease, do not force grease into the fitting.

Battery

The battery is located under the right rear fender (250/300 cc) or under the seat (400/500 cc).

Fig. 2-1



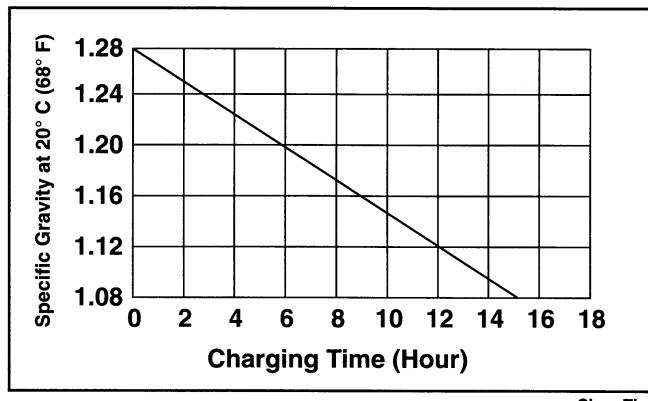
The level of the battery fluid must be kept between the upper and lower level lines at all times. If the level drops below the lower level line, add only **distilled water** until it reaches upper level line.

⚠ WARNING

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

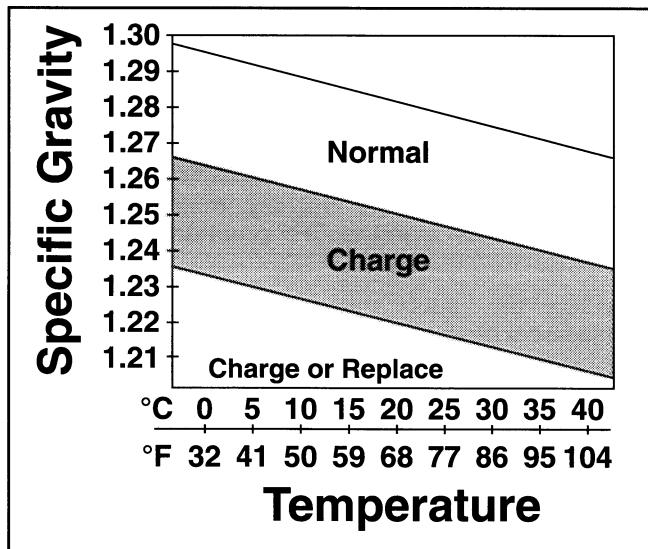
If the battery is discharged, remove the battery from the ATV and charge the battery at the standard charging rate of 1.4A x 10 hr.

Fig. 2-2



ChargTim

Fig. 2-3



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.

Fig. 2-4

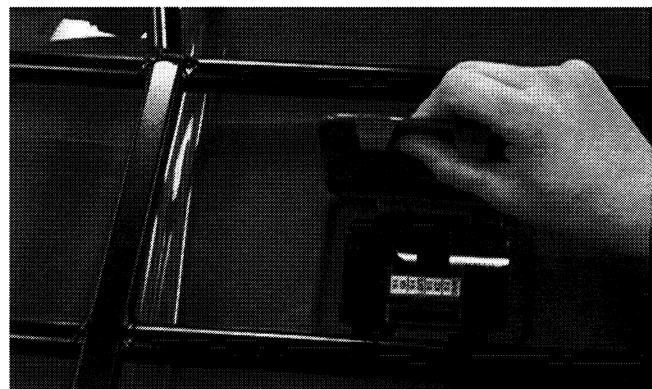


AF733D

Fuses

On the 250/300 cc, the fuses are located in the center of the front fender beneath a snap-on cover.

Fig. 2-5



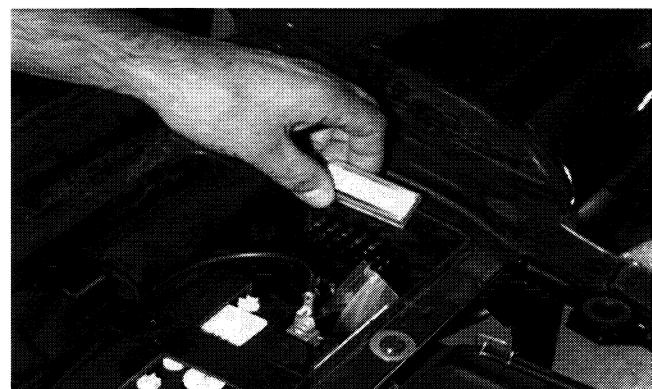
AR662D

On the 400/500 cc, the main fuse is located near the right side of the storage compartment. A spare main fuse is stored under starter motor relay.

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

On the 400/500 cc, the remaining fuses are located in a fuse block next to the battery under the seat. If there is any type of electrical system failure, always check the fuses first.

Fig. 2-6



AR655D

CAUTION

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

CAUTION

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

Air Cleaner (250/300 cc)

The two-part 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.

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

Fig. 2-7



CH044D

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

Fig. 2-8



CH045D

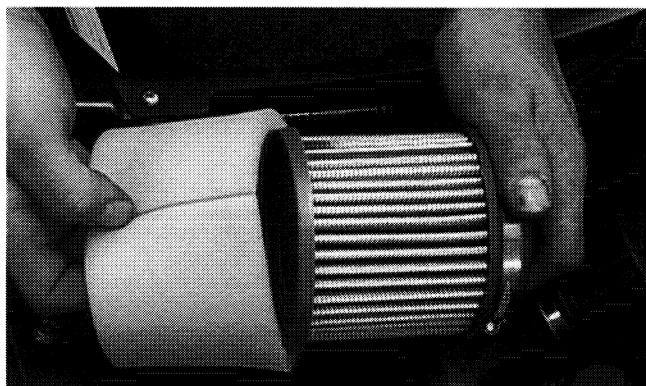
Fig. 2-9



CH046D

4. Remove the foam wrap from the filter.

Fig. 2-10



AL642D

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

6. Allow the foam wrap to air dry thoroughly.

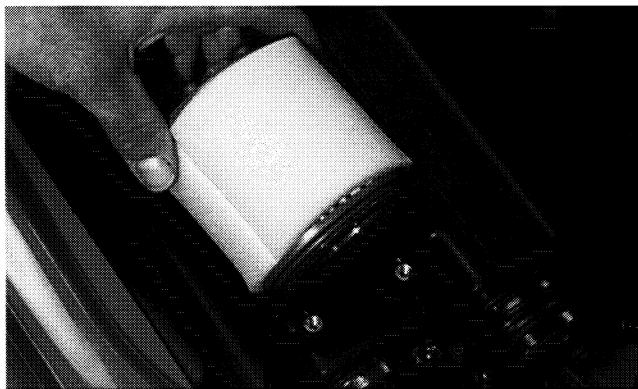
■ NOTE: Either allow the polyester filter to air dry or blow dry using low-pressure compressed air. Direct the compressed air through the filter from the opposite direction as normal operation air flow.

CAUTION

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

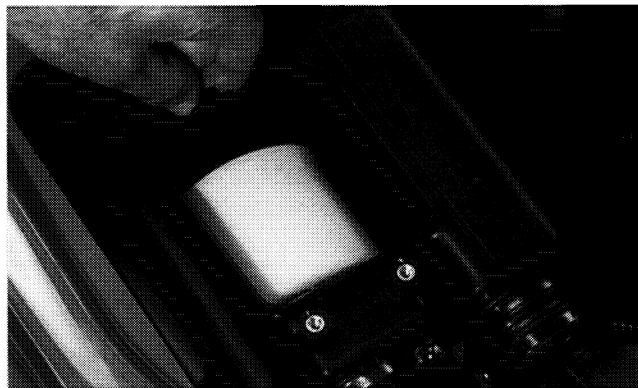
7. Place the foam wrap around the air filter; then install the filter with wrap into the air cleaner making sure it is properly in position and properly seated and secure with the retainer.

Fig. 2-11



CH046D

Fig. 2-12



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.

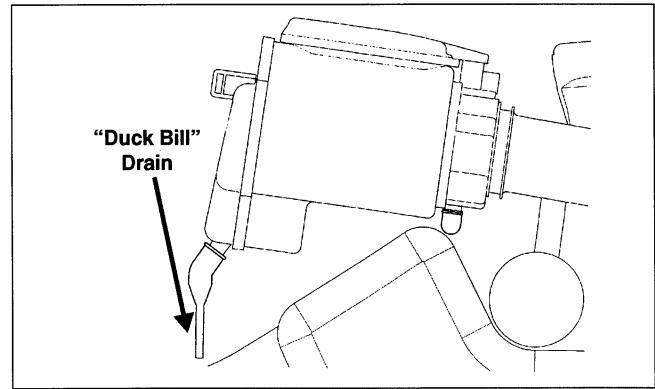
Fig. 2-13



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 "duck bill" drain beneath the air cleaner for debris and sealing.

Fig. 2-14

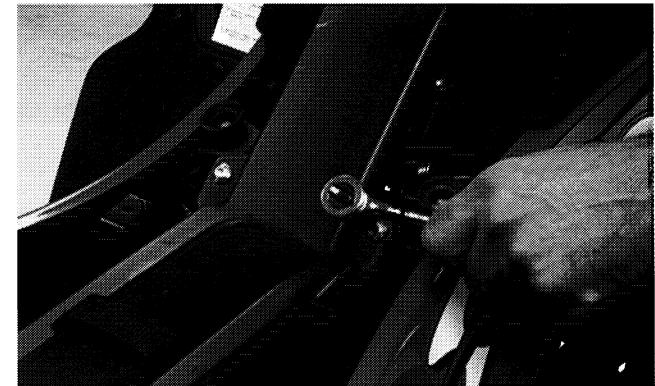


733-715A

REMOVING

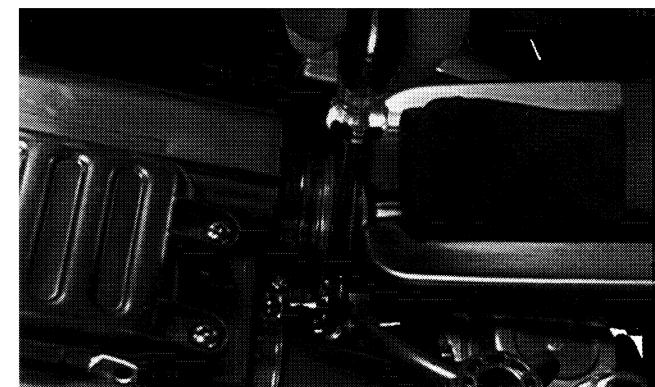
1. Remove the seat; then remove the air-intake snorkel.

Fig. 2-15



CH040D

Fig. 2-16



CH041D

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

Fig. 2-17



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

Fig. 2-18



Fig. 2-19

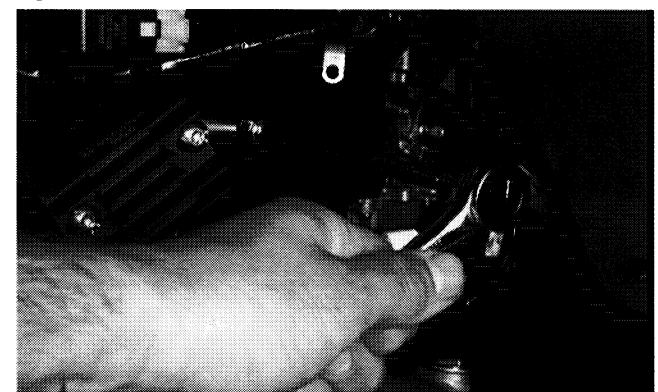


4. Remove the machine screws securing the air cleaner to the frame.

Fig. 2-20



Fig. 2-21



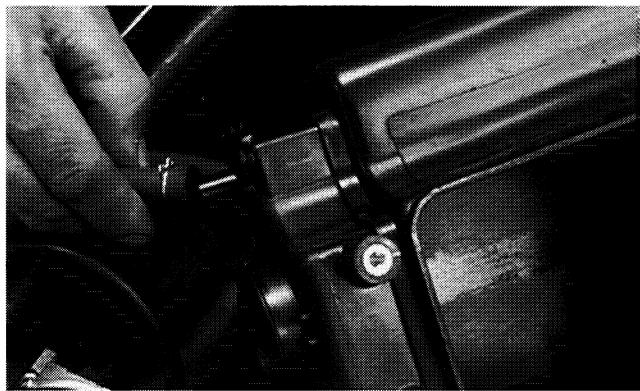
5. Loosen the clamp securing the air cleaner to the carburetor boot.

Fig. 2-22



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

Fig. 2-23

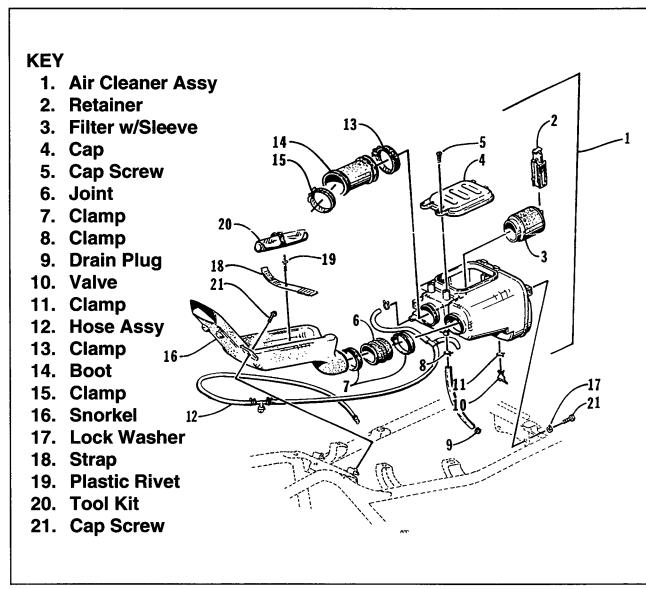


CH050D

7. Remove the air cleaner from the frame.

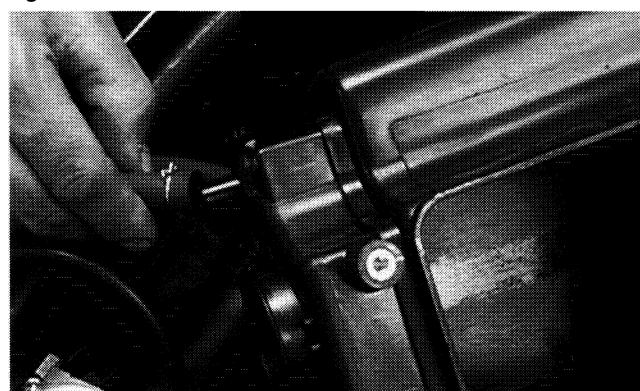
INSTALLING

Fig. 2-24



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

Fig. 2-25



CH050D

2. Secure the carburetor boot to the air cleaner.

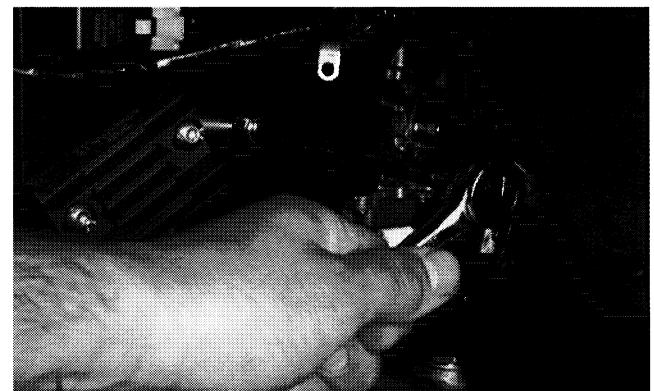
Fig. 2-26



CH049D

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

Fig. 2-27



CH048D

Fig. 2-28



CH047D

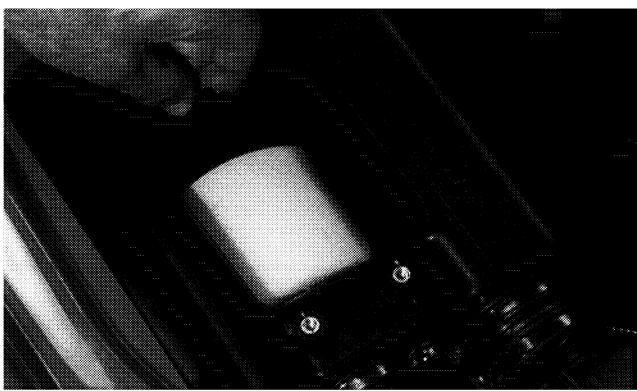
4. Install the filter with foam wrap into the air cleaner; then secure with the retainer.

Fig. 2-29



CH046D

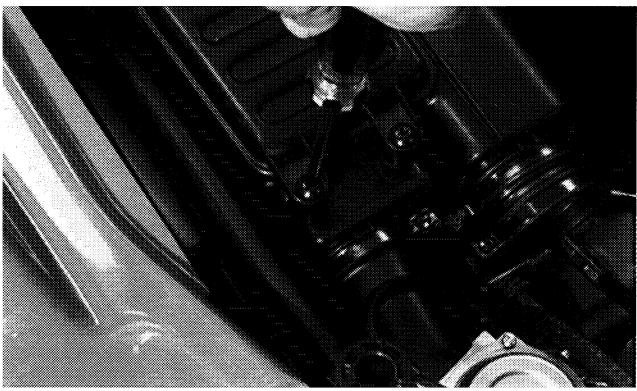
Fig. 2-30



CH045D

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

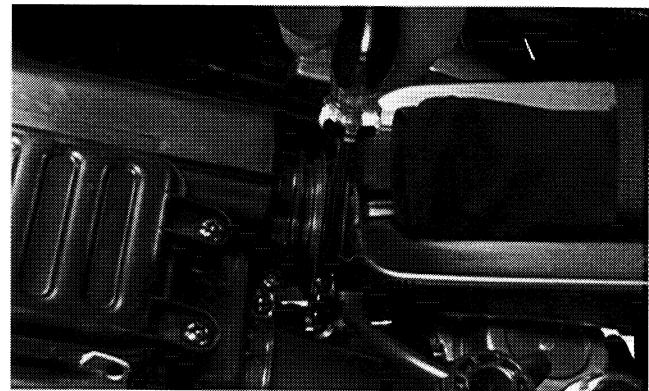
Fig. 2-31



CH044D

6. Install the air-intake snorkel.

Fig. 2-32



CH041D

Fig. 2-33



CH040D

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

Air Cleaner (400/500 cc)

The two-part 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 vehicle is used in dusty, wet, or muddy conditions can damage the ATV engine.

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

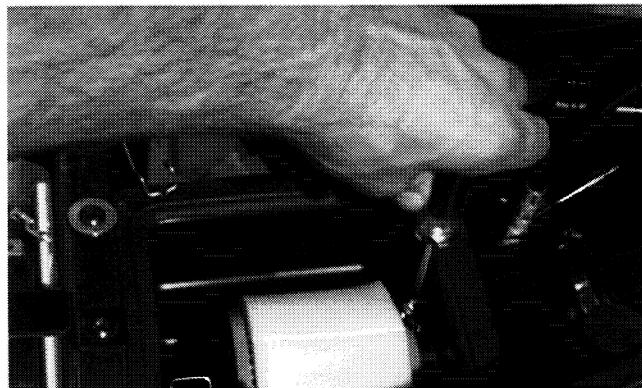
Fig. 2-34



AL645D

3. Loosen the clamp and remove the filter with foam wrap.

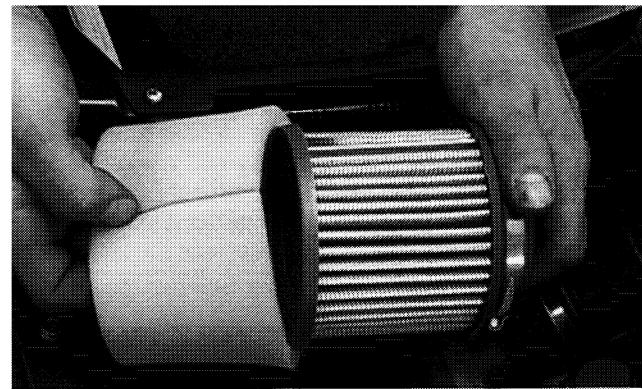
Fig. 2-35



AF640DA

4. Remove the foam wrap from the filter.

Fig. 2-36



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

CAUTION

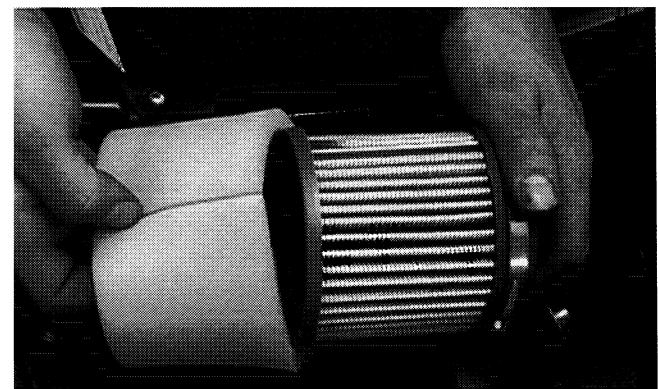
Do not put oil on either the filter or the foam wrap.

8. 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 clamp. Do not over-tighten the clamp.

CAUTION

Make sure the slot in the hose clamp screw is positioned at the 9 o'clock position or damage to the filter will result.

Fig. 2-37



AL642D

Fig. 2-38



AF640DA

9. Install the air cleaner cover on the retaining clips; then install the seat making sure the seat is properly secured.

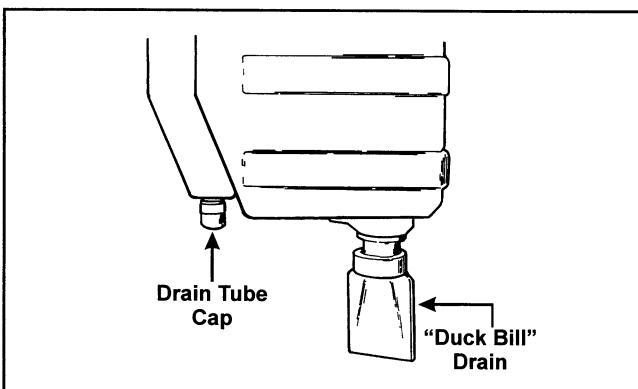
Fig. 2-39



AL645D

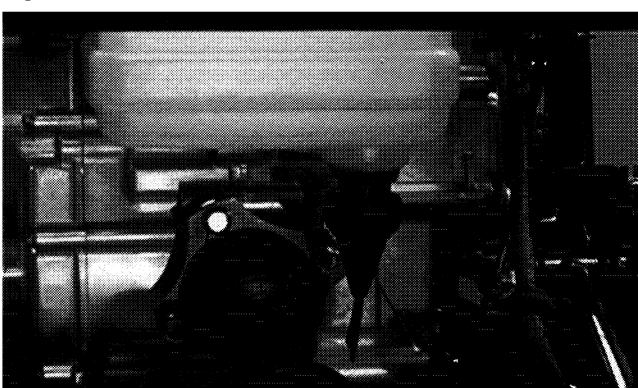
10. Check the drain tube for gasoline or oil accumulation. If noticed, remove the drain tube cap from beneath the front of the cleaner, drain the gasoline or oil into a suitable container, and install and secure the tube cap.
11. Inspect "duck bill" drain beneath the air cleaner for debris and sealing.

Fig. 2-40



ATV-0087

Fig. 2-41



AH601D

Fig. 2-42



AL645D

3. Loosen the clamp and remove the filter with foam wrap.

Fig. 2-43



AF640DA

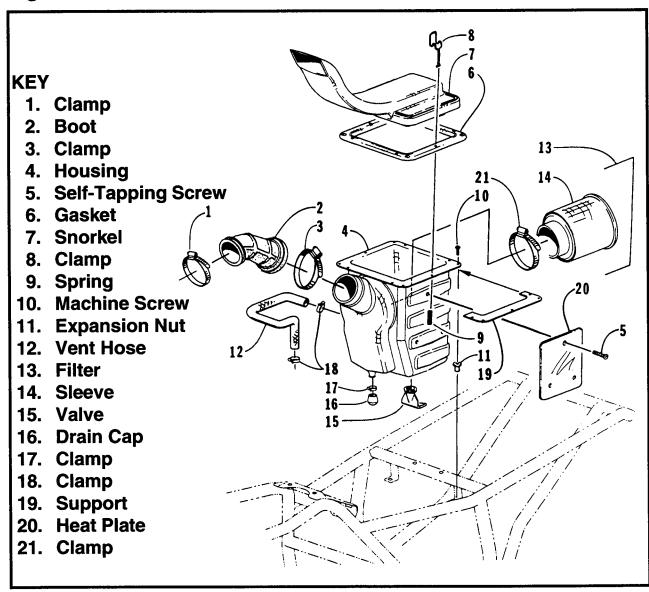
4. Loosen the clamp securing the air cleaner to the front boot; then loosen the clamp securing the air cleaner to the rear filter sleeve.
5. Remove the machine screws securing the air cleaner to the flange support and frame.
6. Remove the air cleaner from the frame.

REMOVING

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

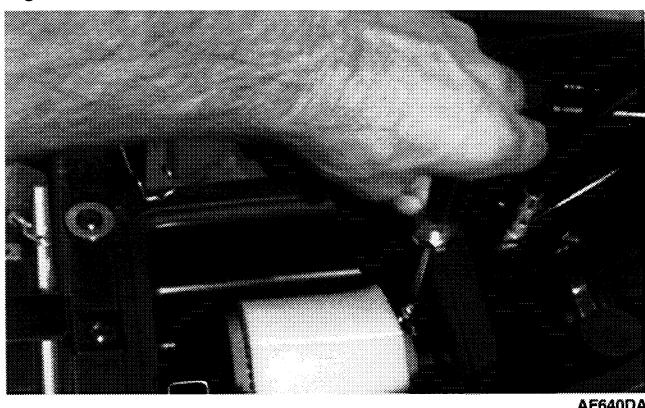
INSTALLING

Fig. 2-44



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.

Fig. 2-45



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

Fig. 2-46



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

Valve/Tappet Clearance

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

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

■ **NOTE:** On the 400/500 cc, 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 (250/300 cc) | |
|-------------------------------------|---------------------|
| Intake | 0.13 mm (0.005 in.) |
| Exhaust | 0.25 mm (0.010 in.) |

| VALVE/TAPPET CLEARANCE (400/500 cc) | |
|-------------------------------------|--------------------------------|
| Intake | 0.05-0.10 mm (0.002-0.004 in.) |
| Exhaust | 0.17-0.22 mm (0.007-0.009 in.) |

Fig. 2-47

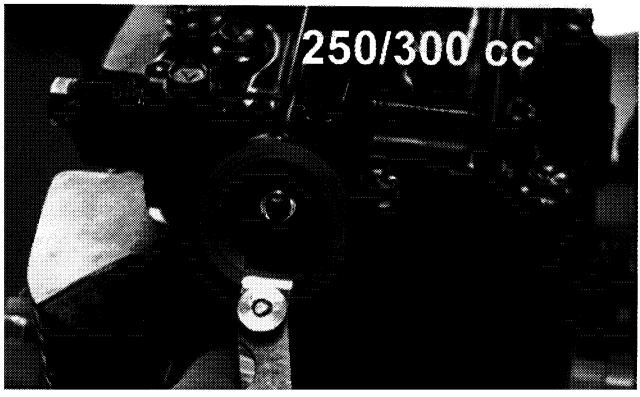
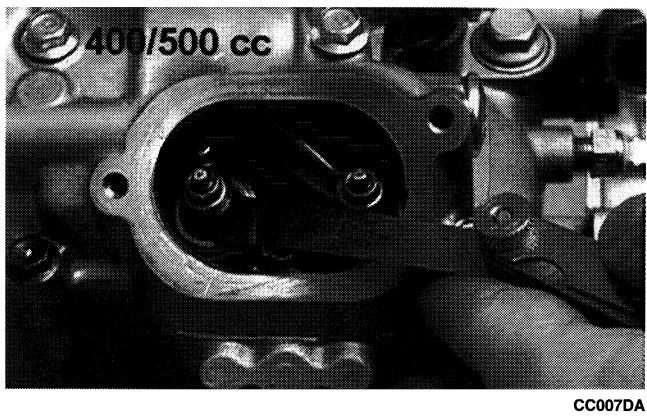


Fig. 2-48



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.

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

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

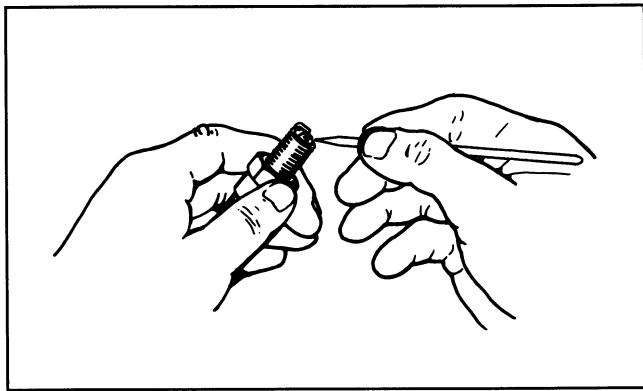
7. Pour 29.5 ml (1 fl oz) of oil into the spark plug hole, reattach the gauge, and retest compression.
8. If compression is now evident, service the piston rings (see Section 3).

Spark Plug

A light brown insulator indicates that the plug is correct. A white or dark insulator indicates that the engine may need to be serviced or the carburetor may need to be adjusted.

To maintain a hot, strong spark, keep the plug free of carbon.

Fig. 2-49

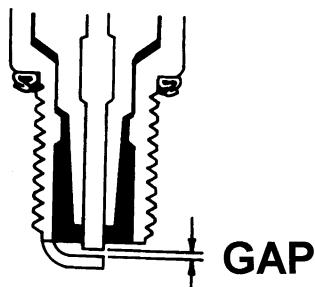


CAUTION

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 cc or to 0.7 - 0.8 mm (0.028 - 0.032 in.) on the 400/500 cc for proper ignition. Use a feeler gauge to check the gap.

Fig. 2-50



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

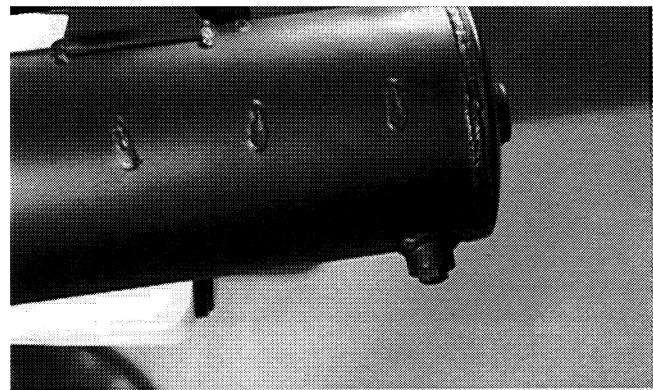
The muffler has a spark arrester which must be periodically cleaned. At the intervals shown in the Periodic Maintenance Chart, clean the spark arrester using the following procedure.

WARNING

Wait until the muffler cools to avoid burns.

1. Elevate the front of the ATV on a safety stand until the muffler is horizontal.
2. Shift the transmission into neutral and set the parking brake.
3. Remove the plug from the bottom of the muffler.

Fig. 2-51



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

Gas/Vent Hoses

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

Adjusting Throttle Cable

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

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

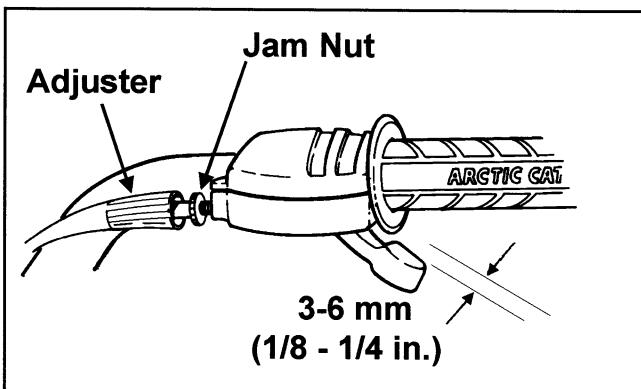
Fig. 2-52



AL611D

2. Slide the rubber boot away and turn the adjuster until the throttle cable has proper free-play of 3-6 mm (1/8 - 1/4 in.) at the lever.

Fig. 2-53



ATV-0047

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

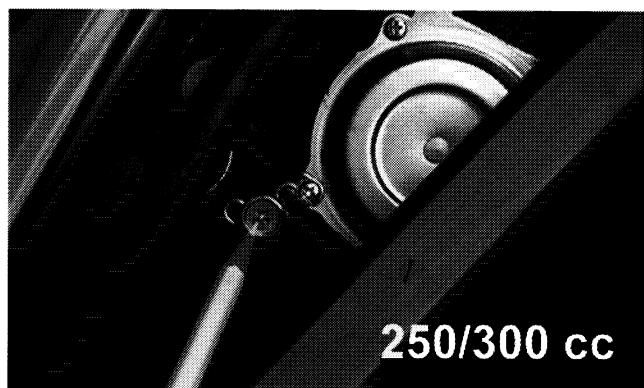
Adjusting Engine RPM (Idle)

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

To adjust idle RPM, use the following procedure.

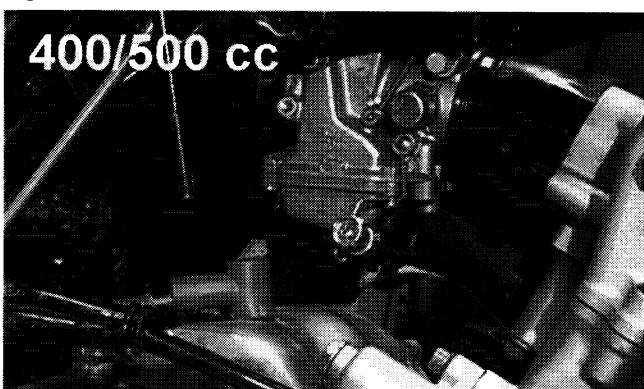
1. Start the engine and warm it up to normal operating temperature.
2. Turn the idle adjustment screw in or out until the engine idles at the recommended RPM.

Fig. 2-54



CH051DA

Fig. 2-55



AH600DA

| IDLE RPM | |
|------------|-------------|
| MODEL | RPM |
| 250/300 cc | 1400-1600 |
| 400 cc | 1400-1600 |
| 500 cc | 1200 - 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 cc)

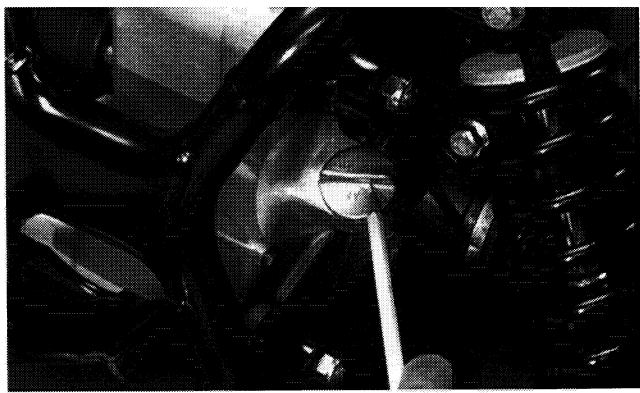
OIL-FILTER

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.

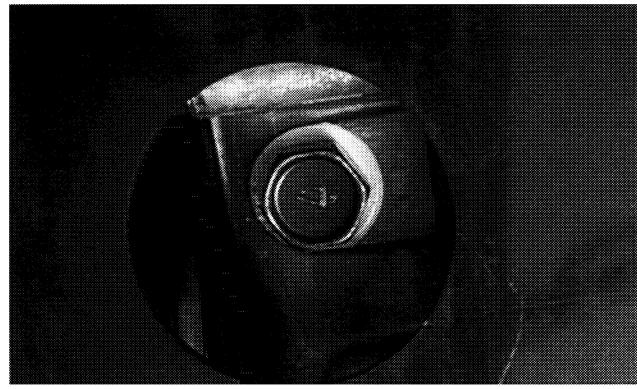
Fig. 2-56



CH079D

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

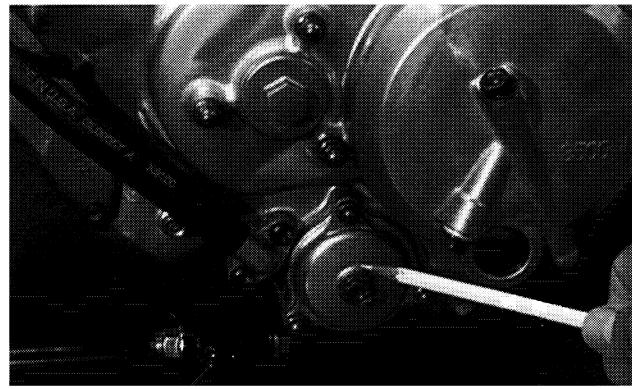
Fig. 2-57



CH054D

4. Remove the nuts securing the filter cover.

Fig. 2-58



CH080D

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

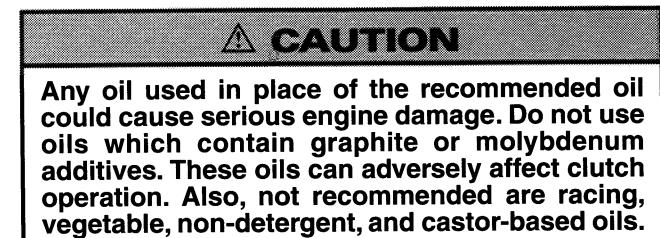
■ NOTE: Clean up any excess oil after removing the filter.

6. Apply oil to the new O-ring and check to make sure it is positioned correctly in the cover; then with the open end of the filter element directed toward the center of the engine, install the element making sure the spring is between the cover and the element.

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

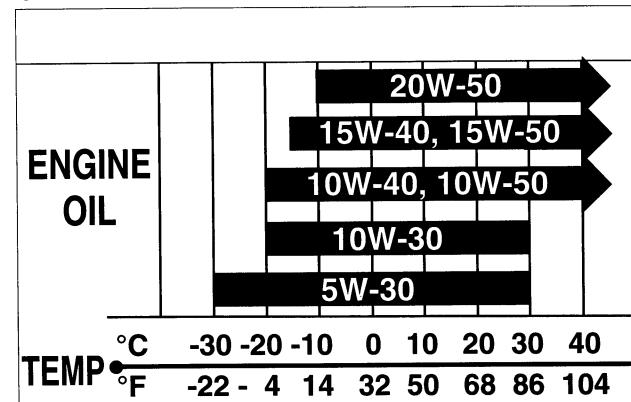


7. Place the filter cover in position and secure with the nut. Tighten securely.
8. Install the engine drain plug and tighten to 2.2 kg-m (16 ft-lb). Pour 3.9 l (4.1 U.S. qt) of the recommended oil in the filler hole; then install the filler plug.



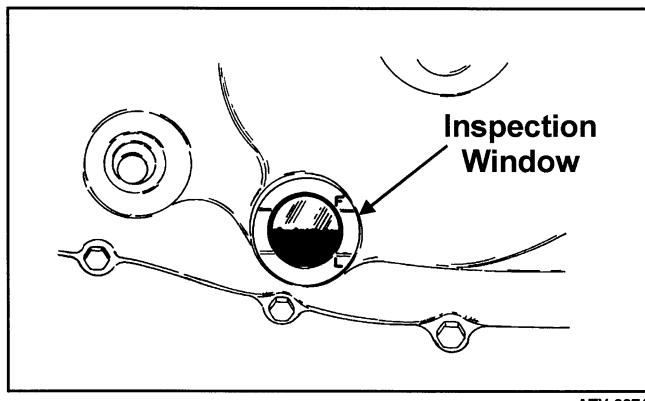
9. Start the engine (while the ATV is outside on level ground) and allow it to idle for a few minutes.

Fig. 2-59



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

Fig. 2-60



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.

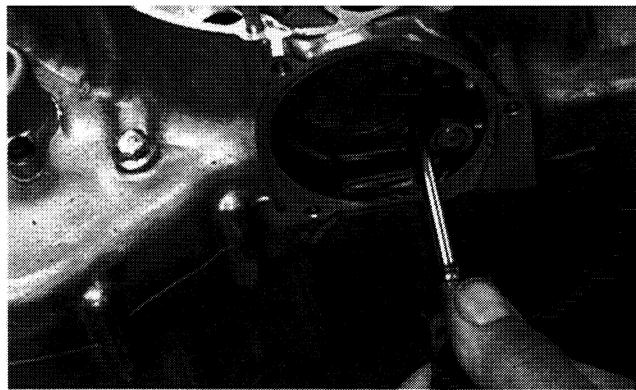
Fig. 2-61



CC442D

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

Fig. 2-62

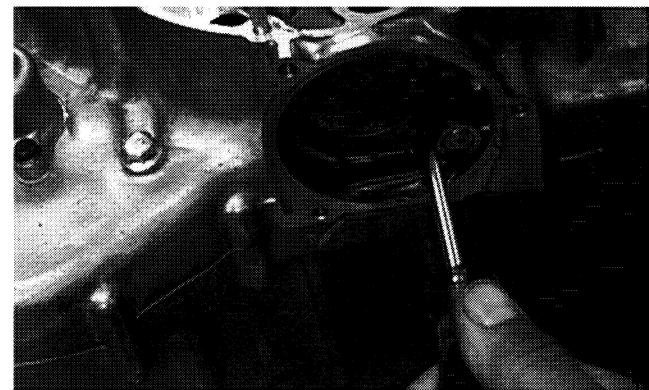


CC443D

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

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

Fig. 2-63

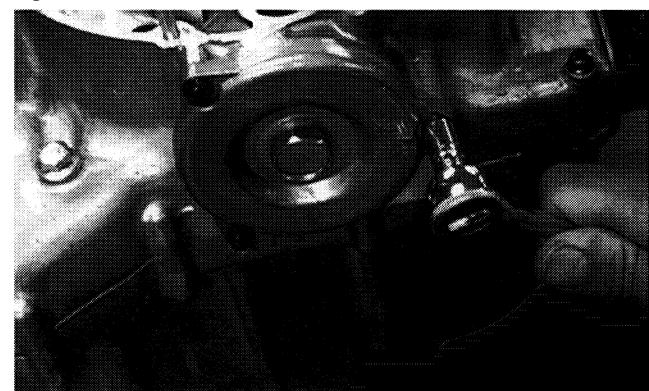


CC443D

2

5. Place the strainer cap into position; then secure with the Phillips-head cap screws.

Fig. 2-64



CC442D

6. Install the skid plate.

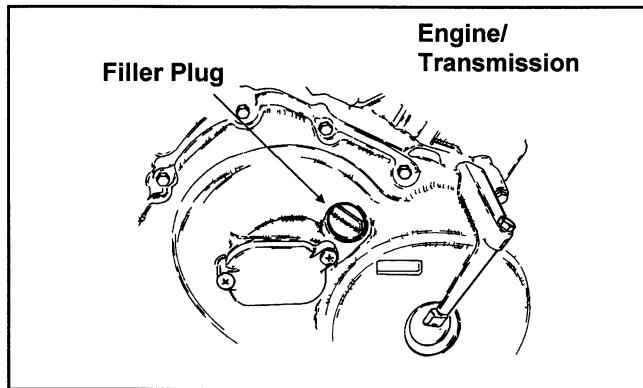
Engine/Transmission Oil - Filter - Strainer (400/500 cc)

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.

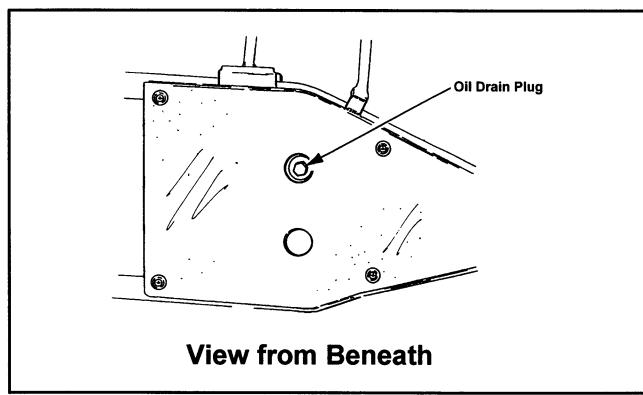
1. Park the ATV on level ground.
2. Remove the oil filler plug.

Fig. 2-65



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

Fig. 2-66



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.

Fig. 2-67



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

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

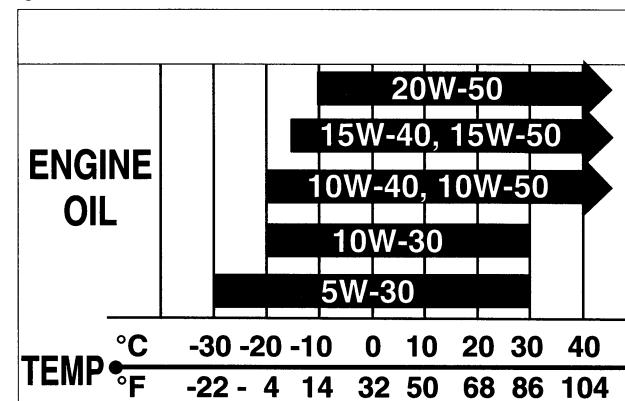
■ NOTE: Install a new O-ring each time the filter is replaced.

7. Install the oil filter drain plug and tighten to 2.2 kg-m (16 ft-lb).
8. Install the engine drain plug and tighten to 2.2 kg-m (16 ft-lb). Pour 3.4 l (3.5 U.S. qt) of the recommended oil in the filler hole.

CAUTION

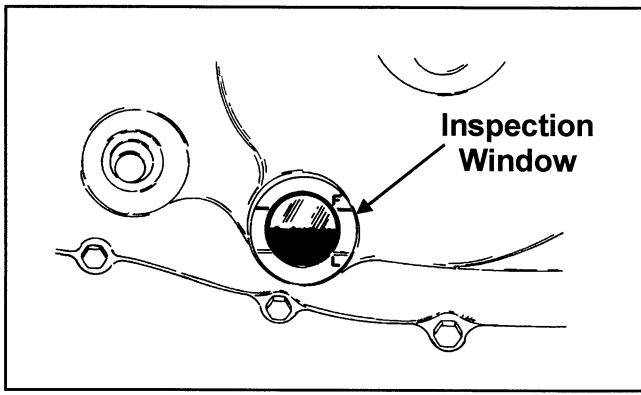
Any oil used in place of the recommended oil could cause serious engine damage. Do not use oils which contain graphite or molybdenum additives. These oils can adversely affect clutch operation. Also, not recommended are racing, vegetable, non-detergent, and castor-based oils.

Fig. 2-68



9. Start the engine (while the ATV is outside on level ground) and allow it to idle for a few minutes.
10. Turn the engine off and wait approximately one minute. Recheck the oil level in the engine oil inspection window. The oil level should be visible through the window. If oil is not visible, add recommended oil until the oil level is visible between the lines of the window.

Fig. 2-69



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

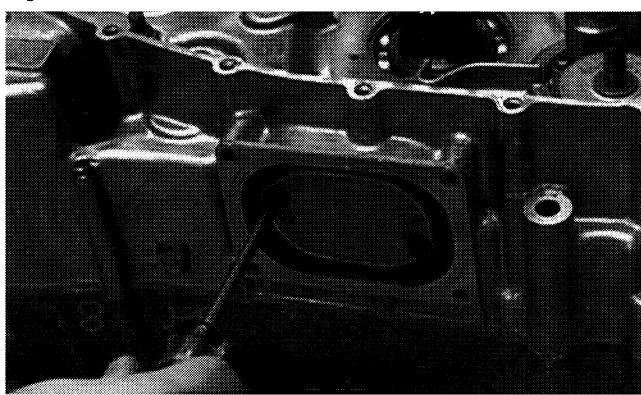
Fig. 2-70



CC091D

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

Fig. 2-71

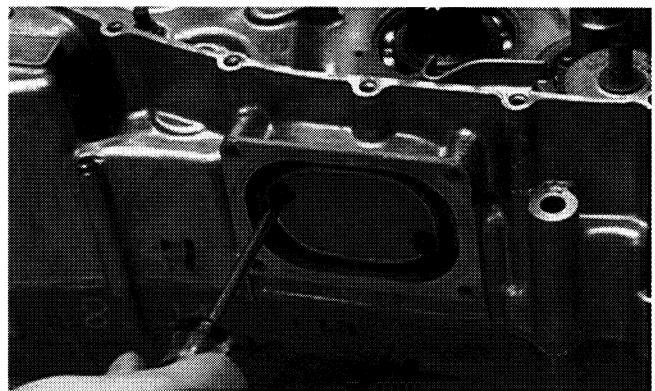


CC163D

■ 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.

Fig. 2-72



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.

Fig. 2-73



CC091D

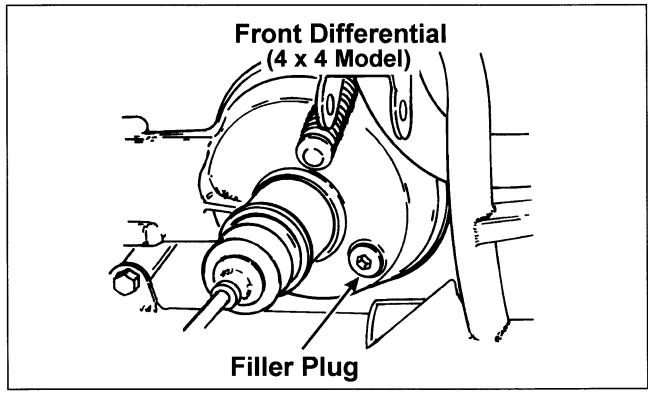
6. Install the skid plate.

Differential Lubricant

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

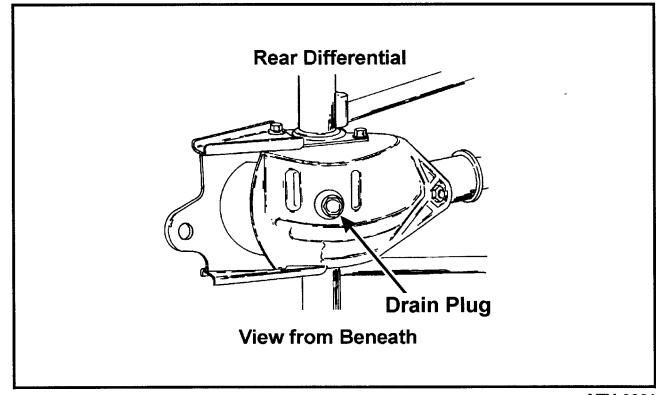
1. Place the ATV on level ground.
2. Remove the filler plug.

Fig. 2-74



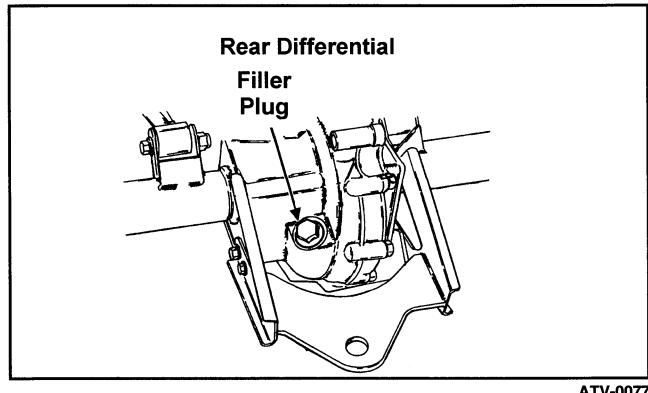
ATV-0089

Fig. 2-77



ATV-0081

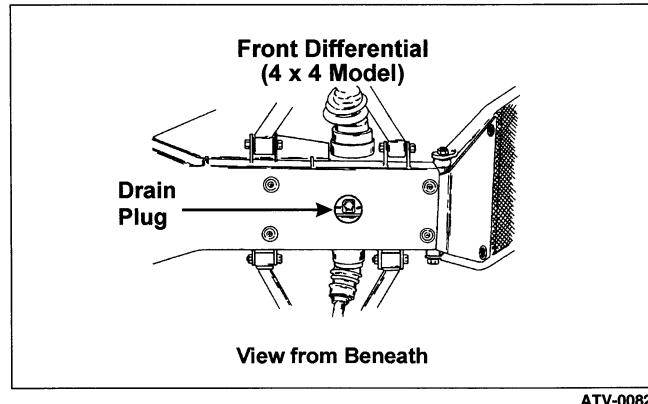
Fig. 2-75



ATV-0077

3. Drain the lubricant into a drain pan by removing the drain plug from the bottom of the differential case.

Fig. 2-76



ATV-0082

4. After all the lubricant has been drained, install the drain plug and tighten to 2.2 kg-m (16 ft-lb).
5. Pour the correct amount of recommended lubricant into the filler hole.
6. Install the filler plug.

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

CAUTION

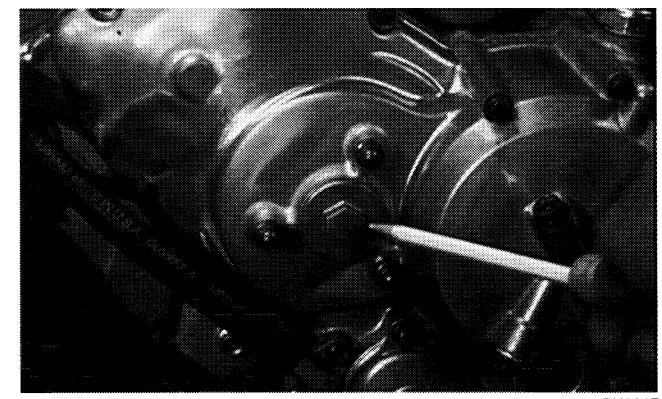
Water entering the outer end of the axle will not be able to enter the differential unless the differential seals are damaged.

Adjusting Clutch (250/300 cc)

To adjust the clutch, use the following procedure.

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

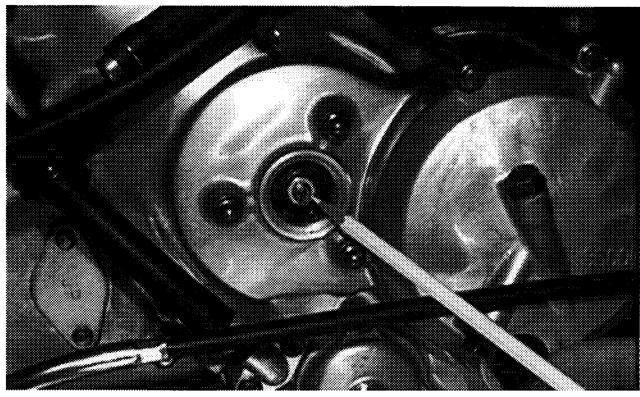
Fig. 2-78



CH081D

2. Loosen the jam nut securing the adjustment screw.

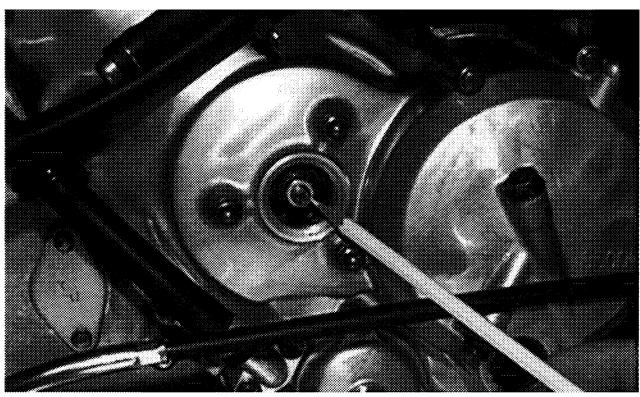
Fig. 2-79



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.

Fig. 2-80

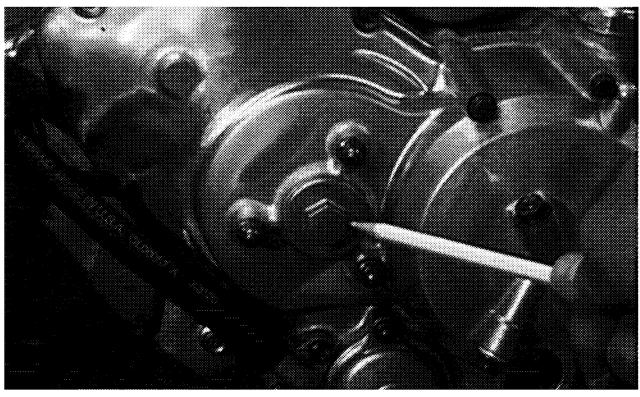


CH086D

■ 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.

Fig. 2-81



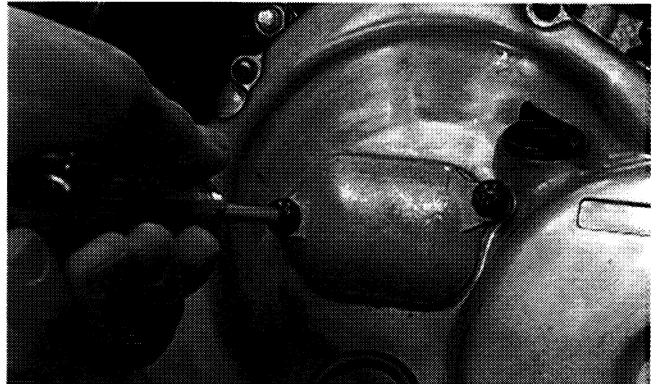
CH081D

Adjusting Clutch (400/500 cc)

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.

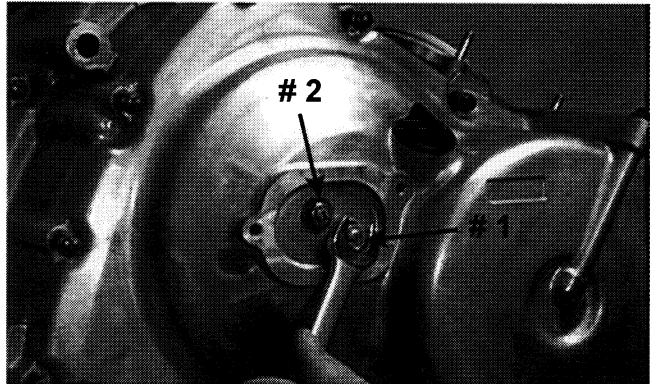
Fig. 2-82



AM600D

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

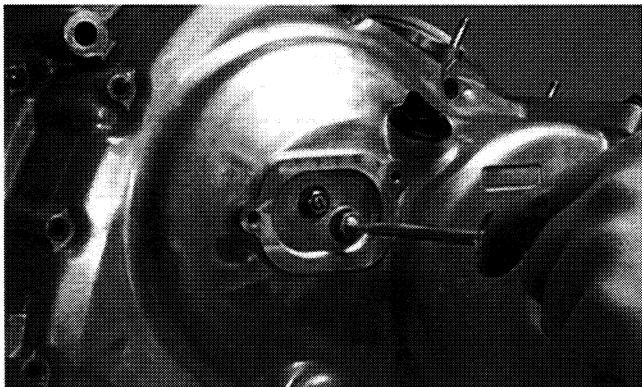
Fig. 2-83



CC037D

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

Fig. 2-84



CC038D

4. Rotate adjustment screw #2 alternately clockwise and counterclockwise to ensure free movement without binding; then lock the jam nut securing adjustment screw #2.
5. Rotate adjustment screw #1 clockwise 1/8 turn; then lock the jam nut securing adjustment screw #1.

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

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

Tires

TIRE SIZES

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

| 250 cc | Front | Rear |
|------------|----------------|----------------|
| Size | AT23 x 8-12 | AT24 x 9-12 |
| 300 cc | Front | Rear |
| Size (4x4) | AT24 x 9-12 | AT25 x 10-12 |
| Size (2x4) | AT23 x 8-12 | AT25 x 10-12 |
| 400 cc | Front | Rear |
| Size (4x4) | AT25 x 8-12 | AT25 x 10-12 |
| Size (2x4) | AT25 x 8-12 | AT25 x 10-12 |
| 500 cc | Front | Rear |
| Size | AT26 x 10.5-12 | AT26 x 10.5-12 |

WARNING

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

TIRE INFLATION PRESSURE

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.

| 250 cc | TIRE PRESSURE | |
|-----------------------|---------------------------------|---------------------------------|
| | FRONT | REAR |
| Up to 193 kg (425 lb) | 0.42 kg/cm ² (6 psi) | 0.28 kg/cm ² (4 psi) |

| 300 cc | TIRE PRESSURE | |
|---|---------------------------------|---------------------------------|
| | FRONT | REAR |
| 4x4 Model Up to 193 kg (425 lb) | 0.28 kg/cm ² (4 psi) | 0.28 kg/cm ² (4 psi) |
| 2x4 Model Up to 193 kg (425 lb) | 0.42 kg/cm ² (6 psi) | 0.28 kg/cm ² (4 psi) |

| 400 cc | TIRE PRESSURE | |
|---|---------------------------------|-----------------------------------|
| | FRONT | REAR |
| 4x4 Model Up to 227 kg (500 lb) | 0.28 kg/cm ² (4 psi) | 0.25 kg/cm ² (3.5 psi) |
| 2x4 Model Up to 193 kg (425 lb) | 0.28 kg/cm ² (4 psi) | 0.28 kg/cm ² (4 psi) |

| 500 cc | TIRE PRESSURE | |
|-----------------------|---------------------------------|---------------------------------|
| | FRONT | REAR |
| Up to 227 kg (500 lb) | 0.35 kg/cm ² (5 psi) | 0.35 kg/cm ² (5 psi) |

Steering Components

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

- Handlebar grips worn, broken, or loose.
- Handlebar bent, cracked, and equal and complete full-left and full-right capability.
- Steering post bearing assembly/bearing housing broken, worn, or binding.
- Ball joints worn, cracked, or damaged.
- Tie rods bent or cracked.
- Knuckles worn, cracked, or damaged.
- Cotter pins 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/Cap Screws

Tighten all nuts and cap screws. Make sure rivets holding components together are tight. Replace all loose rivets. Care must be taken that all calibrated nuts and cap screws are tightened to specifications.

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 cc | 5°/1800 35°/3800 |
| 300 cc | 5°/1800 30°/3800 |
| 400/500 cc | 10°/1800 30°/3800 |

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.

2

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

To replace the headlight bulb, use the following procedure.

CAUTION

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.

1. Remove the machine screw from beneath the headlight housing; then remove the lens cover.
- **NOTE: It may be necessary to carefully pull a certain amount of wiring harness slack through the housing for socket removal.**
2. Push in on the wiring harness socket and turn it counterclockwise to free the bulb; then remove the bulb.
3. Place the new bulb into position making sure the tab on the bulb base aligns with the recess in the housing.
4. Install the wiring harness socket making sure the tab in the socket aligns with its recess. Turn clockwise to lock socket in place.

■ **NOTE:** If wiring harness slack was established for removing the socket, carefully pull the wiring harness back through the housing.

5. Place the headlight into the housing and install the lens cover.
6. Install the machine screw and tighten until snug.

TAILLIGHT - BRAKELIGHT

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

1. Remove the two screws and remove the lens cover.
2. Push the bulb in and turn it counterclockwise.
3. Install the new bulb by turning it clockwise while pushing in.
4. Install the lens cover.

CAUTION

Tighten the lens cover screws only until they are snug.

CHECKING/ADJUSTING HEADLIGHT AIM

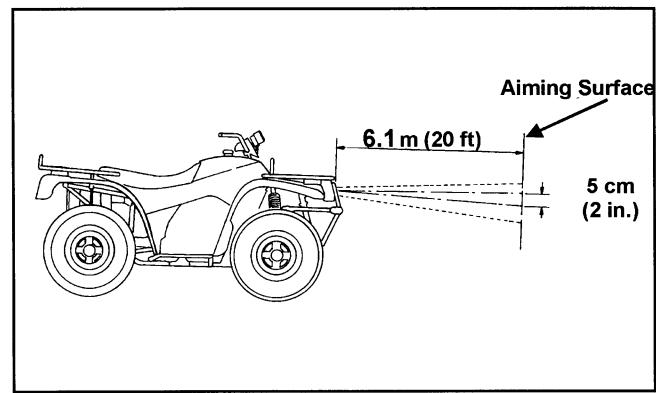
The headlights can be adjusted vertically and horizontally. The geometric center of the HIGH beam light zone is to be used for vertical and horizontal aiming.

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

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

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

Fig. 2-85



ATV-0070

7. Adjust each headlight until correct aim is obtained.

- A. Horizontal — Loosen the nut beneath the headlight mounting grommet; then adjust for proper aiming. Tighten the nut securely.
- B. Vertical — Loosen the nut on the side of the headlight housing; then adjust for proper aiming. Tighten the nut securely.

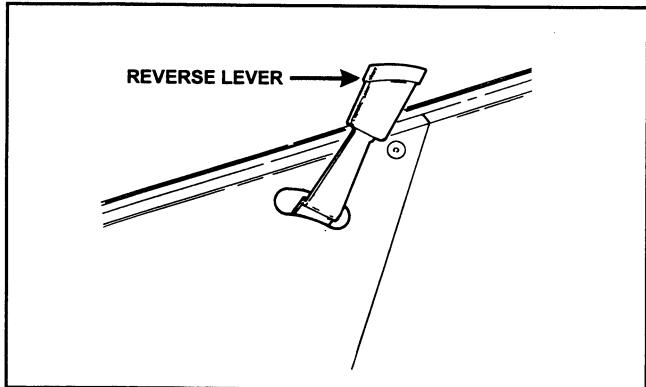
Switches

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 lever switch — reverse indicator light illuminates.
- D. Hi/Lo switch — headlight beam bright and dim.
- E. Brake switches — rear brakelight illuminates.

Adjusting Reverse Shift Lever

Fig. 2-86



ATV-0091

The ATV has a reverse gear. To shift into reverse gear, stop the ATV completely and shift the transmission into neutral. Pull the reverse shift lever fully rearward. When the ATV is in reverse gear, the gearshift pedal will not function and the reverse gear indicator light should be illuminated.

WARNING

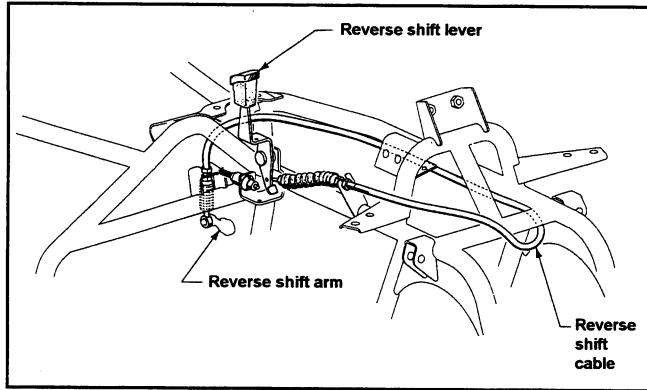
Never shift the ATV into reverse gear when the ATV is moving as it could cause the ATV to stop suddenly throwing the operator from the ATV.

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, use the following procedure.

1. Shift the lever to the "forward" position.
2. Disconnect the cable from the reverse shift arm by removing the clevis pin/clip.
3. At the adjuster, loosen the "upper" jam nut and thread it to the middle of the adjuster.
4. Shift the lever to the "reverse" position.
5. At the reverse shift arm, attempt to line the cable connector with the engine arm and install the clevis pin/clip.
6. If the clevis pin/clip cannot be installed, adjust the "lower" jam nut until it can be installed.
7. Tighten the "lower" jam nut and the "upper" jam nut to secure the adjustment.

■ NOTE: At this point the reverse lever should be adjusted correctly. If the indicator light does not illuminate, troubleshoot the other possible reasons.

Fig. 2-87



0732-414

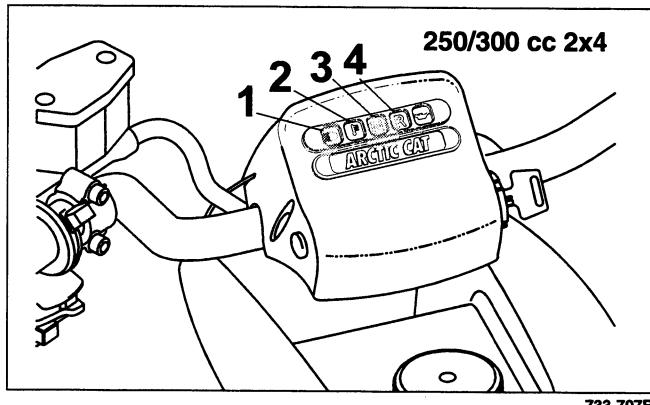
2

Indicator Lights/Gauge

Each time the ATV is used, the gauge and indicator should be checked for proper function. Use the following list for reference.

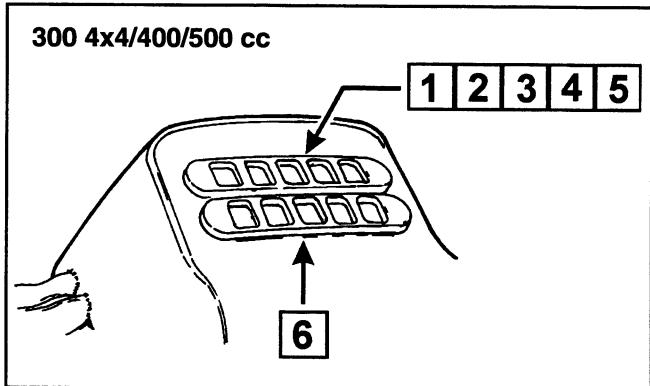
INDICATOR LIGHTS

Fig. 2-88



733-707B

Fig. 2-89



ATV0086B

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

CAUTION

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

3. Neutral Indicator — A green light will illuminate when the transmission is in neutral and the ignition switch is on. The light will go out when shifted into any gear other than neutral.
4. Reverse Indicator — An orange light will illuminate when the transmission is shifted into reverse gear. The light will go off when shifted out of reverse.
5. Low Oil-Pressure Indicator (Optional) - If installed, a red light will illuminate if the oil pressure is low. The light should be off during normal operation.

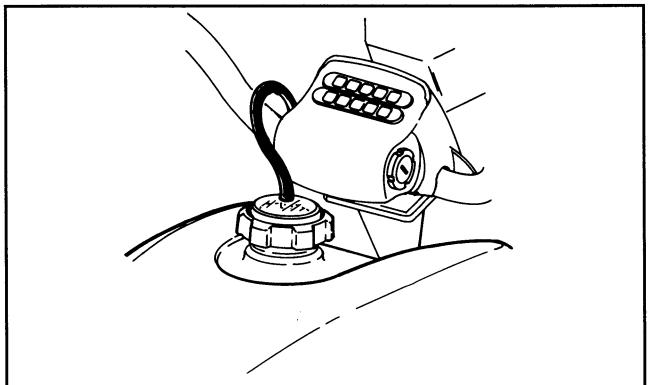
CAUTION

Continued operation of the ATV with low oil pressure will result in engine damage or premature wear.

6. Gear Selection Indicator — A yellow light will illuminate to indicate which gear (1-5) the transmission is shifted into.

GAS TANK CAP/GAUGE

Fig. 2-90



The gauge shows the approximate amount of gas remaining in the gas tank.

Frame/Welds/Racks

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

Electrical Connections

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

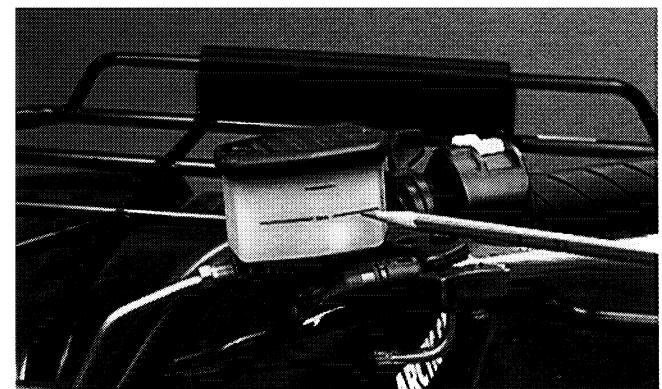
Hydraulic Brake System

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.

1. With the master cylinder in a level position, check the fluid level. It must be above the minimum line and below the maximum line.

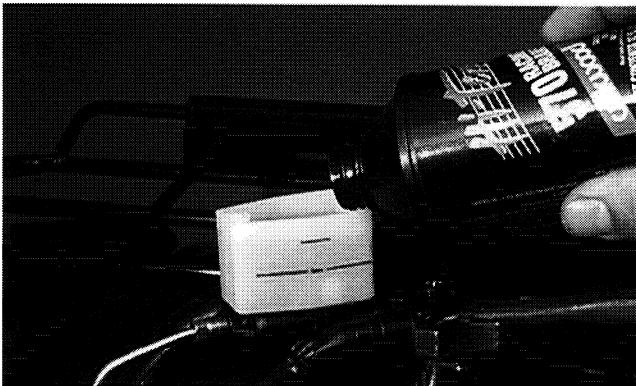
Fig. 2-91



2. Compress the brake lever several times to check for a firm lever. If the lever is not firm, the brake system must be bled.

3. To bleed the brake system, use the following procedure.
 - A. Remove the cover and fill the master cylinder to the maximum line of the reservoir with DOT 3 Hi-Temp Brake Fluid (p/n 0638-315).

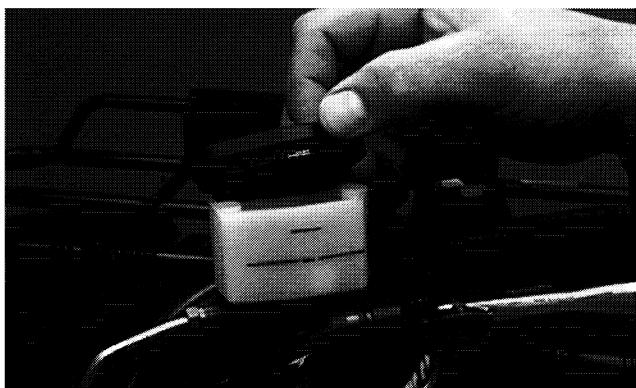
Fig. 2-92



AF769D

- B. Install and secure the cover; then slowly compress the brake lever several times.

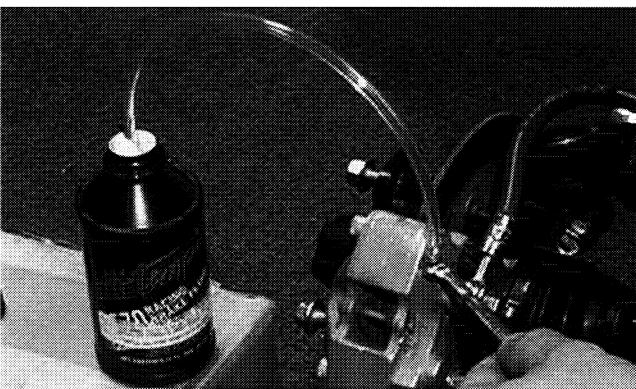
Fig. 2-93



AF768D

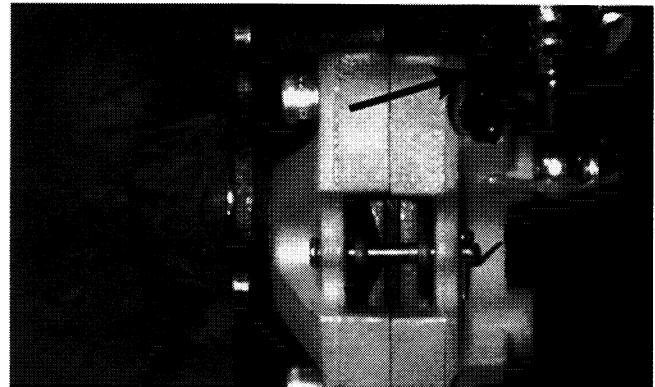
- C. Remove the protective cap, install one end of a clear hose onto one FRONT bleeder screw, and direct the other end into a container; then while holding slight pressure on the brake lever, open the bleeder screw and watch for air bubbles. Close the bleeder screw before releasing the brake lever. Repeat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

Fig. 2-94



AF637D

Fig. 2-95



AF739D

2

■ **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 D.O.T. 3 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.

INSPECTING HOSES

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

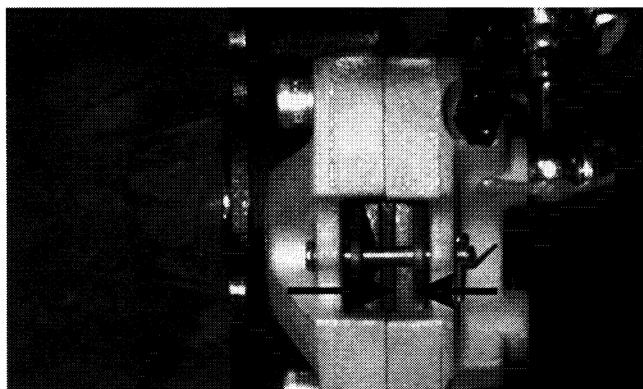
CHECKING/REPLACING PADS

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.

Fig. 2-96



AF739DB

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

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

4. To replace the brake pads, use the following procedure.
 - A. Remove the wheel.
 - B. Remove the cap screws securing the caliper to the bracket; then remove the cotter pin securing the pads and remove the pads.

Fig. 2-97



AF615D

- C. Install the new brake pads; then secure with the pin and cotter pin. Spread the cotter pin.
- D. Secure the caliper to the bracket with the cap screws. Tighten to 2.8 kg-m (20 ft-lb).

Fig. 2-98



AF615D

- E. Install the wheel. Tighten cap screws to 6.9 kg-m (50 ft-lb).

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

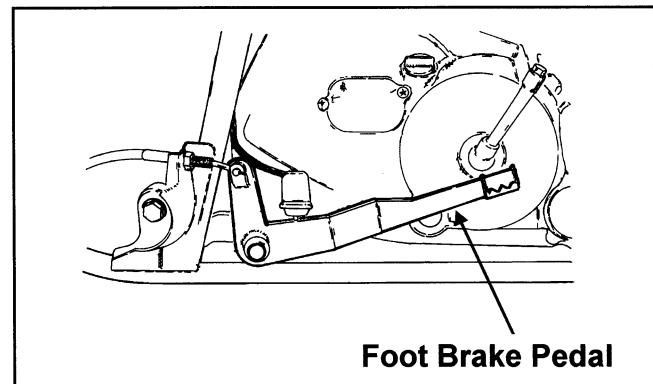
Mechanical Foot Brake

CHECKING

Although the rear brake has been adjusted at the factory, the brake should be checked for proper operation. The mechanical 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 foot brake pedal and attempt to move the ATV.

Fig. 2-99



Foot Brake Pedal

ATV0088C

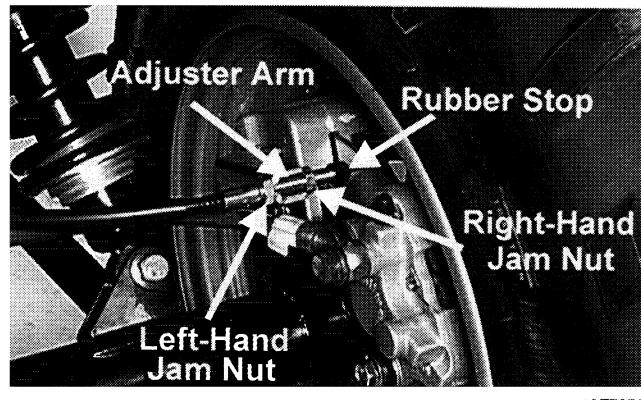
2. If the rear wheels are locked, it is adjusted properly.
3. If the rear wheels are not locked, it must be adjusted (set up).

ADJUSTING

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

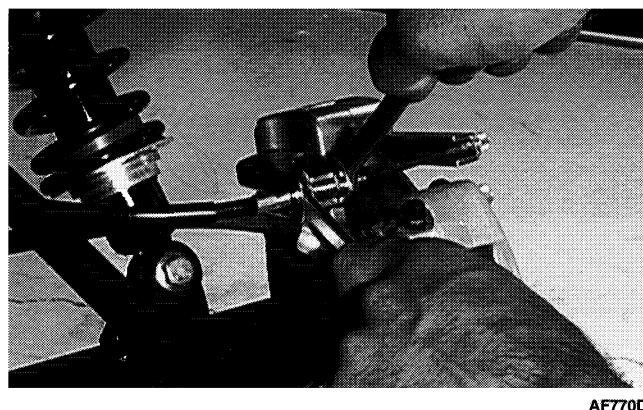
1. Loosen the right-hand jam nut (wheel-side when viewing from behind) of the adjuster arm.

Fig. 2-100



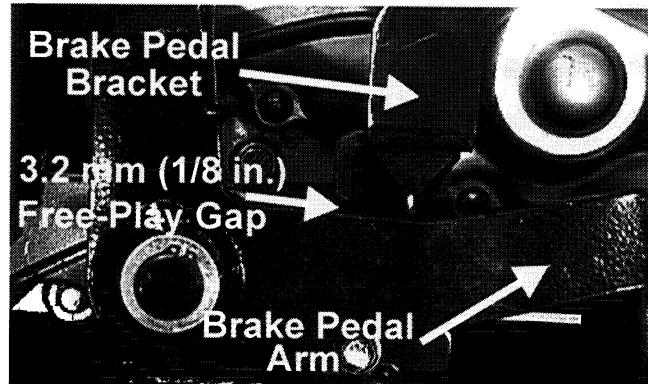
2. Pull the brake cable to the left and push the adjuster arm to the right.
3. While holding the cable and adjuster arm in this position, finger-tighten the left-hand jam nut until it contacts the adjuster arm; then loosen it 1 1/2 turns.
4. Tighten the right-hand jam nut securely against the adjuster arm.

Fig. 2-101



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

Fig. 2-102



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 foot 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, 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 mechanical brake to the axle housing.
4. Remove the brake pads from the caliper.

Inspecting and Measuring

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

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

Installing

1. Place the brake pads into the caliper.
- **NOTE:** The metal backing of the pad will be facing the adjuster arms when installed properly.
2. Slide brake caliper assembly over the brake disc and into position; then secure the caliper with the cap screws (coated with blue Loctite #243) tightened to 2.8 kg-m (20 ft-lb).
3. Install the wheel and secure with the cap screws tightened to 6.9 kg-m (50 ft-lb).
4. Adjust the brake (see Adjusting in this sub-section).
5. Remove the ATV from the support stand.

■ **NOTE:** Whenever installing new pads, the new pads must be burnished (see Burnishing Brake Pads in this section).

Burnishing Brake Pads

Brake pads (both hydraulic and mechanical) 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. Using third gear, accelerate to 30 mph; then compress brake lever or apply the mechanical foot brake to decelerate to 0-5 mph.
3. Repeat procedure on each brake system 20 times until brake pads are burnished.

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

4. Adjust the mechanical brake (if necessary).
5. Verify that the brakelight illuminates when the hand lever is compressed or the brake pedal is depressed.

Coolant (400/500 cc)

The ATV is equipped with a liquid cooling system for engine cooling. 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 1/2 in. above the radiator core.

Fig. 2-103



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.

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 250/300 cc and 400/500 cc 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 cc)

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) | 0.13 mm (0.005 in.) 0.25 mm (0.010 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 18 mm (0.71 in.) from Skirt End | | 68.380 mm (2.6921 in.) |
| 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.) |
| Ring End Gap | (1st Ring) (2nd Ring) | 0.70 mm (0.028 in.) 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) | 17.030 mm (0.6705 in.) |
| Piston Pin Outside Diameter | (min) | 16.980 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) | | 55 mm \pm 0.1 mm (2.165 in.) (\pm 0.004 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) | 10 psi 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 (cont) | | |
|---|---|--|
| 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) (rear) | 3.090 (34/11) 3.647 (62/17) |
| Secondary- Transmission Reduction Ratio | (super low) (low) (high) | 3.176 (17/18 x 25/11 x 37/25) 1.480 (37/25) 1.112 (11/25 x 18/17 x 43/18) |
| 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 (29/12 x 34/29) |
| Shift 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 (secondary transmission- #1 & #2) (reverse) | (#1, #2, & #3) | 4.5-4.6 mm (0.177-0.181 in.) 5.45-5.55 mm (0.215-0.219 in.) 4.0-4.1 mm 0.157-0.161 in.) |
| Shift Fork Thickness | (#1, #2, & #3) (secondary transmission- #1 & #2) (reverse) | 4.3-4.4 mm (0.169-0.173 in.) 5.3-5.4 mm (0.209-0.213 in.) 3.8-3.9 mm (0.150-0.154 in.) |
| Engine Oil Thermo-Switch Operating Temperature | (off→on) (on→off) | 160° C (320°F) 140° C (284°F) |

* Specifications subject to change without notice.

**250 cc

Specifications* (400/500 cc)

| VALVES AND GUIDES | | |
|---|-----------------------|--|
| Valve Face Diameter | (intake) (exhaust) | 30.6 mm (1.20 in.) 27 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 (0.0012-0.0024 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.) |

| VALVES AND GUIDES (cont) | | |
|--|--------------------|--|
| Valve Spring Free Length (max) | (inner) (outer) | 35.1 mm (1.38 in.) 37.8 mm (1.49 in.) |
| Valve Spring Tension @ 28 mm (1.10 in.) | (inner) | 5.3-6.5kg (11.7-14.3 lb) |
| Valve Spring Tension @ 31.5 mm (1.24 in.) | (outer) | 113.1-15.1 kg (28.9-33.3 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.) 17.465-17.484 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 | | 0.045-0.120 mm (0.0018-0.0047 in.) | 0.76-1.02 mm** (0.030-0.040 in.)** |
| Cylinder Bore | | 84.000-84.085 mm (3.3071-3.3104 in.) | 87.500-87.515 mm** (3.4448-3.4454 in.)** |
| Piston Diameter 15 mm (0.60 in.) | from Skirt End | 83.880-83.965 mm (3.3024-3.3057 in.) | 87.465-87.470 mm** (3.4435-3.4437 in.)** |
| Piston Ring (1st Ring) Free End Gap | (2nd Ring) | 8.4-10.5 mm (approx) (0.33-0.41 in.) (approx) | 11.3 mm (max)** (0.4448 in.)** |
| Bore x Stroke | | 9.5-11.8 mm (approx) (0.37-0.46 in.) (approx) | 9.7 mm (max)** (0.3818 in.)** |
| Cylinder Trueness | (max) | 84 x 67 mm (3.30 x 2.64 in.) | 87.5 x 82 mm** (3.40 x 3.22 in.)** |
| Ring End Gap | (max) | 0.50 mm (0.020 in.) | 0.70 mm** (0.0275 in.)** |
| Piston Ring to Groove (1st) Clearance (max) | (2nd) | 0.180 mm (0.0071 in.) | 0.150 mm (0.0059 in.) |
| Piston Ring Groove Width | (1st) (2nd) (oil) | 1.21-1.23 mm (0.0476-0.0484 in.) | 1.01-1.03 mm** (0.0397-0.0405 in.)** |
| Piston Ring Thickness | (1st) (2nd) | 1.21-1.23 mm (0.0476-0.0484 in.) | 0.97-0.99 mm** (0.0382-0.0389 in.)** |
| Piston Pin Bore | (max) | 2.51-2.53 mm (0.0988-0.0996 in.) | 1.17-1.19 mm (0.046-0.047 in.) |
| Piston Pin Outside Diameter | (min) | 21.03 mm (0.828 in.) | 23.03 mm** (0.907 in.)** |

CRANKSHAFT

| | | | |
|---|-------|-------------------------------------|---|
| Connecting Rod (small end inside diameter) | (max) | 21.04 mm (0.8283 in.) | 23.04 mm** (0.9070 in.)** |
| Connecting Rod (big end side-to-side) | | 0.1-1.0 mm (0.004-0.039 in.) | |
| Connecting Rod (big end width) | | 25.95-26.00 mm (1.022-1.024 in.) | 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) | 0.05 mm (0.002 in.) | 0.08 mm** (0.003 in.)** |

CRANKSHAFT (cont)

| | | | | |
|---|--|--|--|--|
| Oil Pump Reduction Ratio | 1.45 (29/20) | | | |
| Oil Pressure at 60°C (140°F) @3000 RPM | (above) | 1.3 kg/cm ² (18 psi) | | |
| | | | | |
| (below) | | 1.7 kg/cm ² (24 psi) | | |
| CLUTCH | | | | |
| Clutch Release Screw | 1/8 turn back | 1/4-1/2 turn back** | | |
| Drive Plate (fiber) Thickness | (min) | 2.62 mm (0.103 in.) 2.92-3.08 mm** (0.1149-0.1212 in.)** | | |
| Drive Plate (fiber) Tab | (min) | 13-14 mm (0.50-0.55 in.) 13.05 mm** (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 | | 139.8-140.2 mm (5.504-5.520 in.) 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 | RPM | 3500 ± 300 3600 ± 300** | | |
| Primary Reduction Ratio | 2.392 (67/280) | | | |
| Secondary Reduction Ratio | 1.133 (17/15) | | | |
| Final Reduction Ratio | (front) (rear) | 3.6 (36/10) 3.6 (36/107) | | |
| 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) | | |
| Shift Fork To Groove (side clearance) | 0.1-0.3 mm (0.004-0.0120 in.) | | | |
| Secondary Transmission Fork to Groove (side clearance) | 0.2 mm (0.008 in.) | | | |
| Reverse Fork to Groove (side clearance) | (max) | 0.3 mm (0.012 in.) 0.2 mm** (0.008 in.)** | | |
| Shift Fork Groove Width (#1 and #2) | 5.5-5.6 mm (0.217-0.220 in.) | | | |
| | | | | |
| (secondary transmission) | | | | |
| | | | | |
| (reverse) | | | | |
| 5.4-5.5 mm (0.213-0.217 in.) | | | | |
| | | | | |
| 5.0-5.1 mm (0.197-0.201 in.) 4.9-5.0 mm** (0.193-0.197 in.)** | | | | |
| Shift Fork Thickness (#1 and #2) | 5.3-5.4 mm (0.209-0.213 in.) | | | |
| | | | | |
| (secondary transmission) | | | | |
| | | | | |
| (reverse) | | | | |
| 5.3-5.4 mm (0.209-0.213 in.) | | | | |
| | | | | |
| 4.8-4.9 mm (0.189-0.193 in.) | | | | |
| Thermostat Valve Opening Temperature | 48.5-51.5°C (119.3-124.7°F) | 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) (on→off) | 115°C (239°F) 88-93°C** (190-200°F)** 108°C (226°F) (min) 81°C** (177°F)** (min) | | |

* Specifications subject to change without notice.

** 500 cc

Removing Engine/ Transmission (250/300 cc)

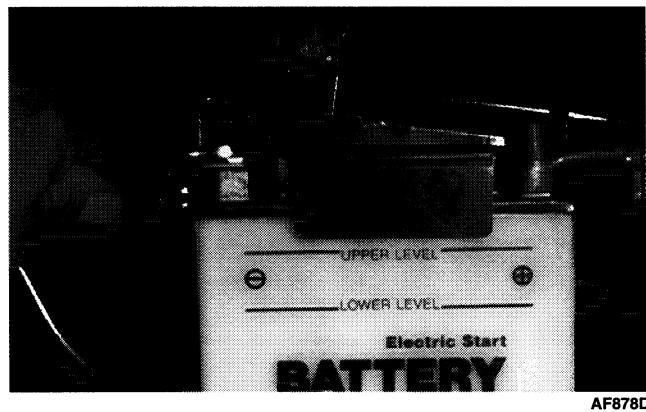
Many service procedures can be performed without removing the engine/transmission from the frame. Closely observe the note introducing each sub-section for this important information.

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.

1. Lift the seat lock lever and remove the seat.
2. Disconnect the battery by removing the negative cable first and then the positive cable.

Fig. 3-1



AF878D

Fig. 3-2



AF880D

3. Remove the battery hold-down bracket; then remove the battery.

A 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 beneath the engine/transmission.

Fig. 3-3



CH054D

5. Turn the gas tank valve to the OFF position.
6. Remove the springs securing the exhaust header pipe to the engine.

Fig. 3-4



CH055D

7. Loosen the exhaust pipe from the muffler and the frame; then remove the exhaust pipe. Account for grafoil gaskets.

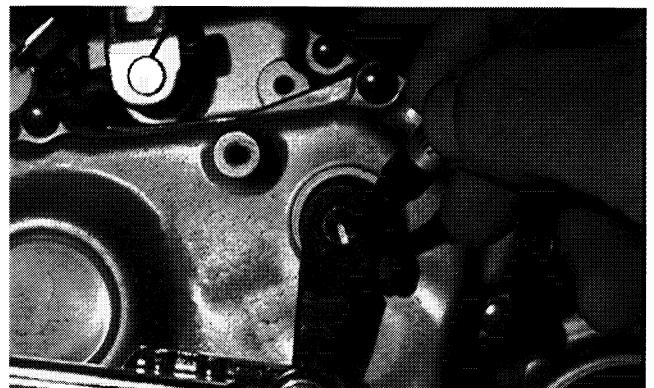
Fig. 3-5



CH056D

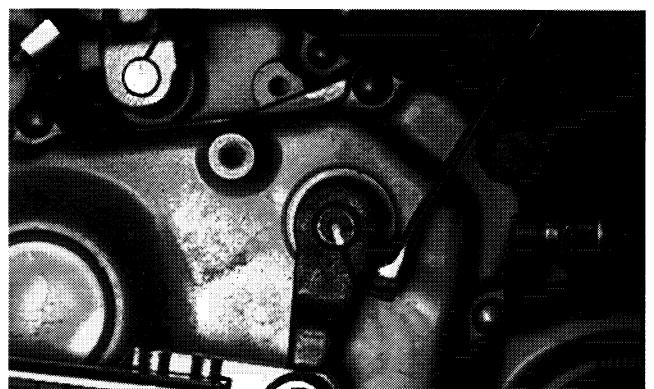
8. Mark the position of the hi/low range shifter arm; then remove the hi/low range shifter arm.

Fig. 3-6



CH057D

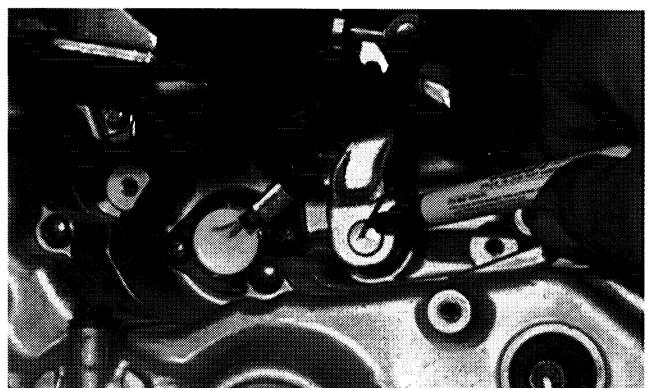
Fig. 3-7



CH058D

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

Fig. 3-8



CH059D

3

Fig. 3-9

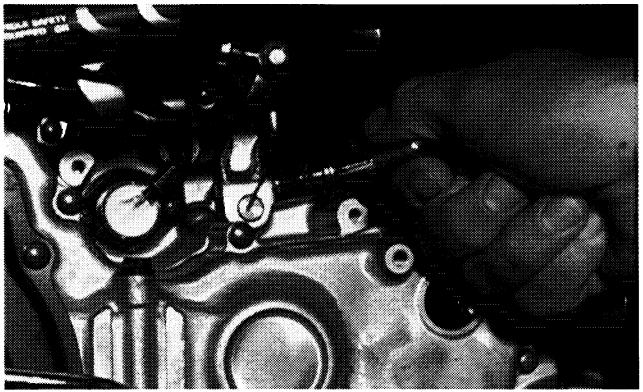
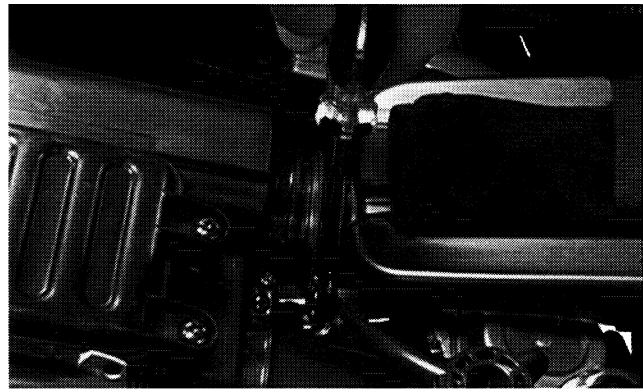
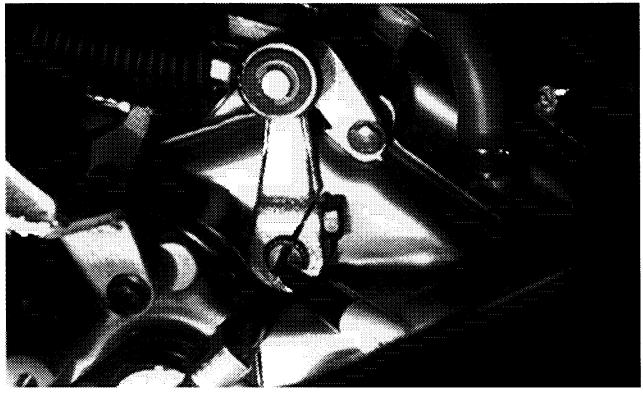


Fig. 3-12



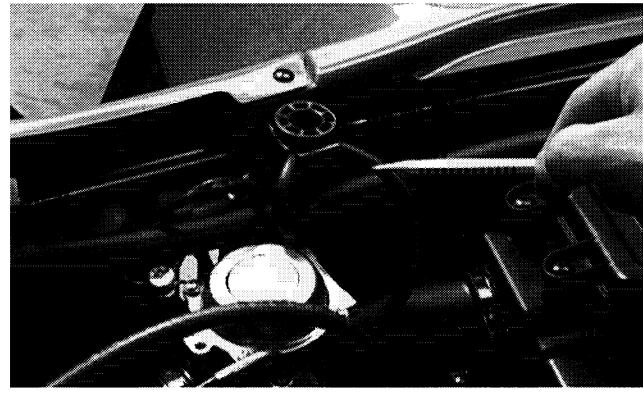
10. Mark the reverse gear shaft arm to the reverse shift shaft to aid in installing; then remove the cap screw securing the reverse gear shaft arm to the reverse shift shaft.

Fig. 3-10



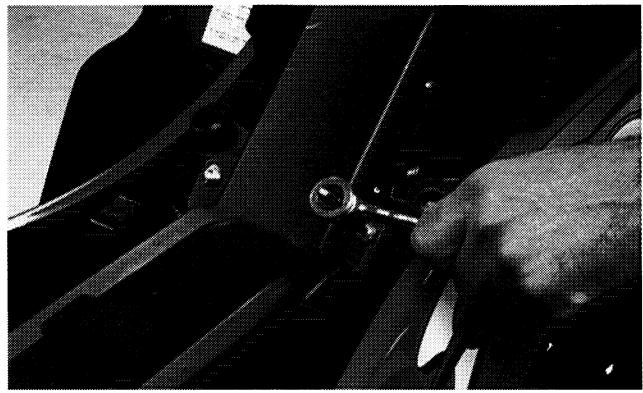
12. Loosen the clamps securing the carburetor boots to the air intake and the engine.

Fig. 3-13



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

Fig. 3-11



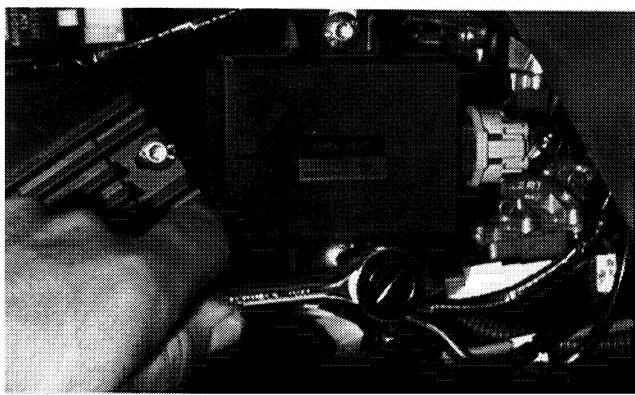
13. Remove the cap screws securing the air-cleaner assembly from the rear of the ATV.

Fig. 3-14



14. Remove the cap screws securing the CDI unit.

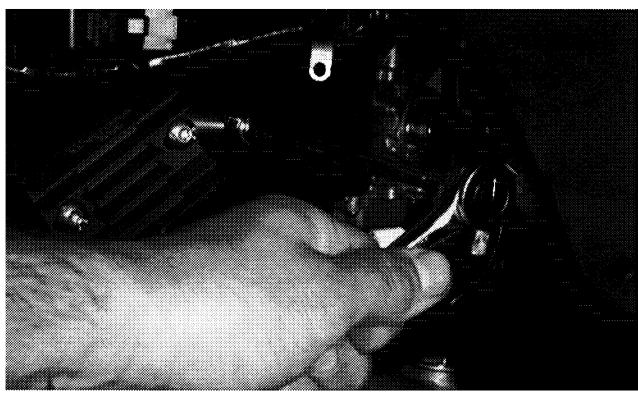
Fig. 3-15



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.

Fig. 3-16



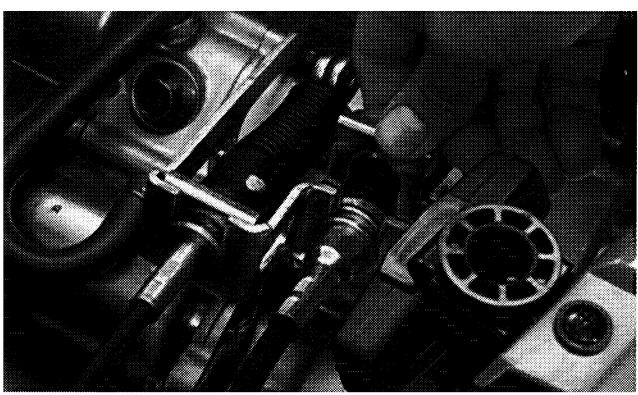
CH048D

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. Remove the clips securing the shifter cables to the bracket.

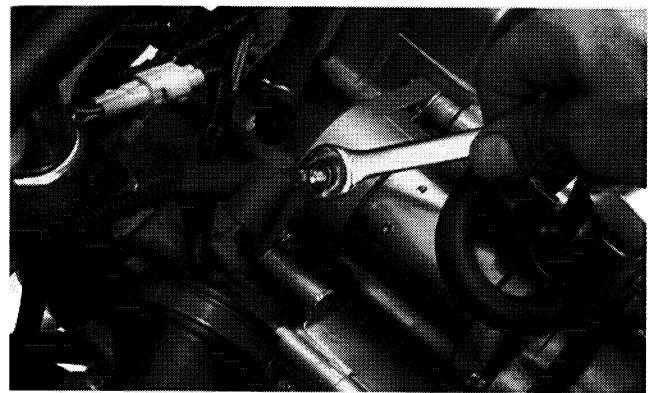
Fig. 3-17



CH062D

18. Disconnect the positive cable from the starter motor.

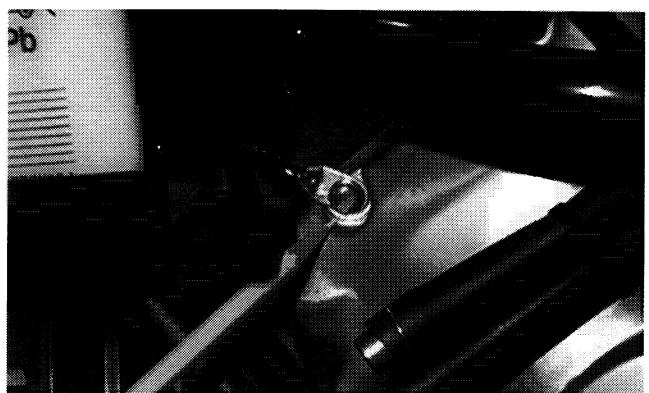
Fig. 3-18



CH063D

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

Fig. 3-19

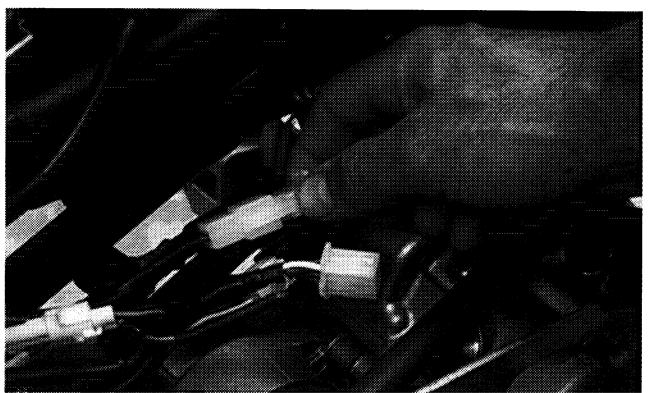


CH064D

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

21. Disconnect the main wiring harness connectors.

Fig. 3-20



CH065D

22. Remove the right-hand side panel.

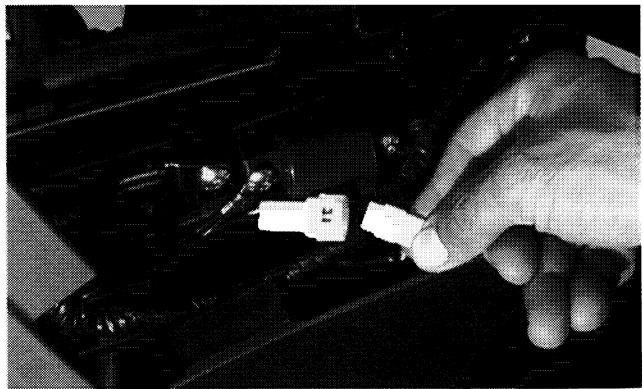
Fig. 3-21



CH066D

23. Disconnect the oil light switch.

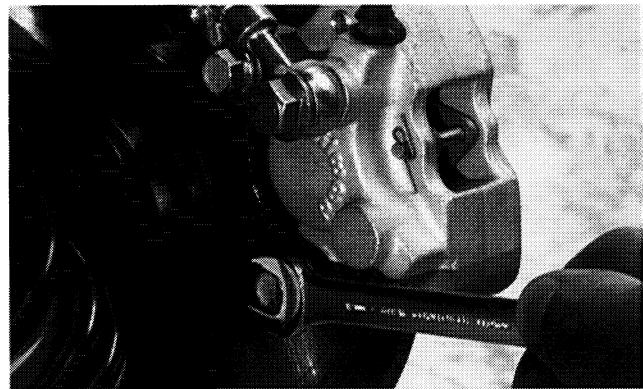
Fig. 3-22



CH067D

24. Remove the rear hydraulic brake caliper.

Fig. 3-23



CH068D

25. Remove the mechanical foot brake.

Fig. 3-24



CH069D

26. Remove the torx-head screw securing the brake hose to the upper suspension arm.

27. Remove the two oil cooler hoses from the engine.

Fig. 3-25



CH070D

28. Remove the skid plate from the rear end assembly.

29. Remove the two lower cap screws securing the sub-frame/engine assembly to the frame.

Fig. 3-26



CH071D

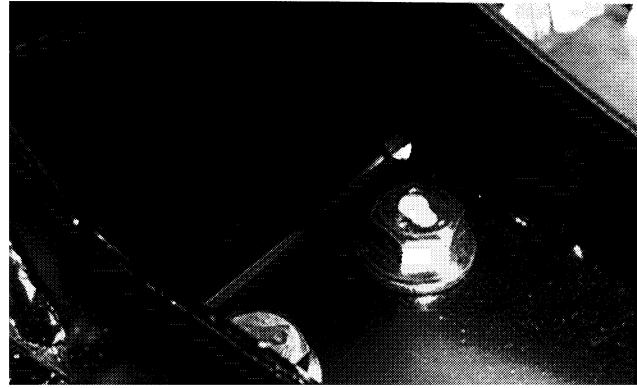
30. Secure the upper rear of the ATV to the work stand using tie-down straps to help prevent the ATV from falling forward when the engine/sub-frame assembly is removed.

⚠️ WARNING

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

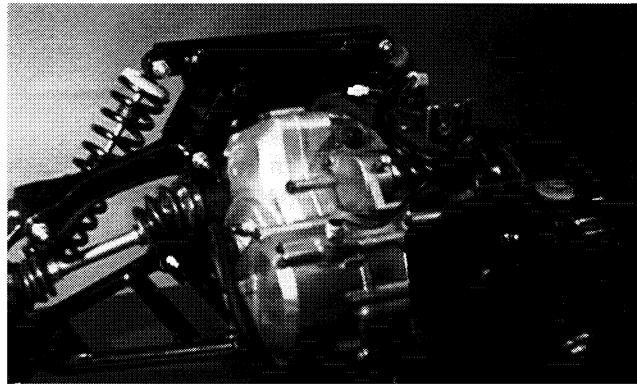
31. Place a large floor/transmission jack under the engine assembly; then remove the upper four cap screws securing the sub-frame to the frame. Place the engine assembly on a suitable work stand and remove the wheels.

Fig. 3-27



CH072D

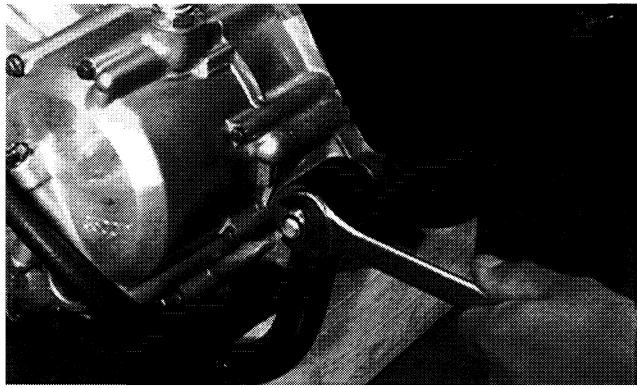
Fig. 3-28



CH073D

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

Fig. 3-29



CH074D

33. Remove the upper shock mount cap screw to allow access for removal of the two rear engine mount cap screws.

Fig. 3-30



CH076D

34. Remove the two rear cap screws securing the engine to the sub-frame.

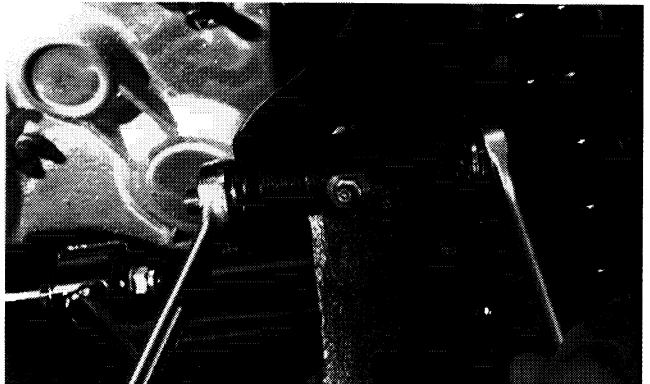
Fig. 3-31



CH075D

35. Remove the rear upper A-arm cap screws.

Fig. 3-32



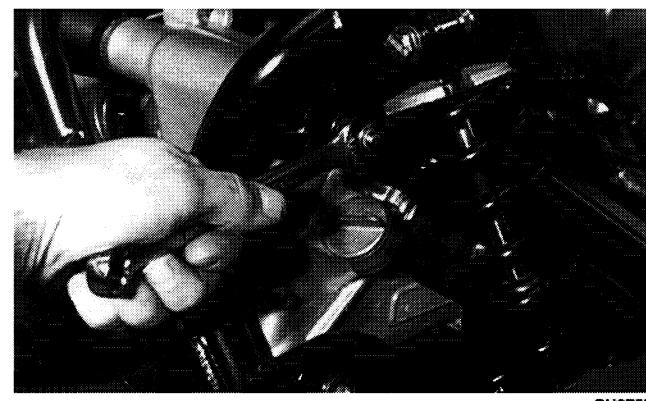
CH077D

36. Using Side Case Puller (p/n 0644-262) with an adapter, remove each drive axle assembly.

Fig. 3-33



Fig. 3-35



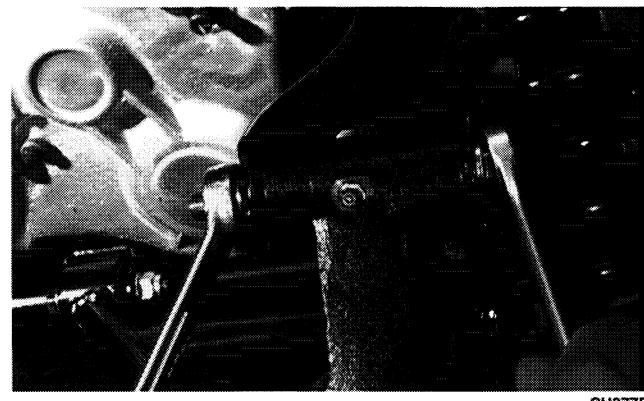
CH075D

Installing Engine/Transmission (250/300 cc)

■ 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 4.35-5.35 kg-m (31.5-38.5 ft-lb).

Fig. 3-34



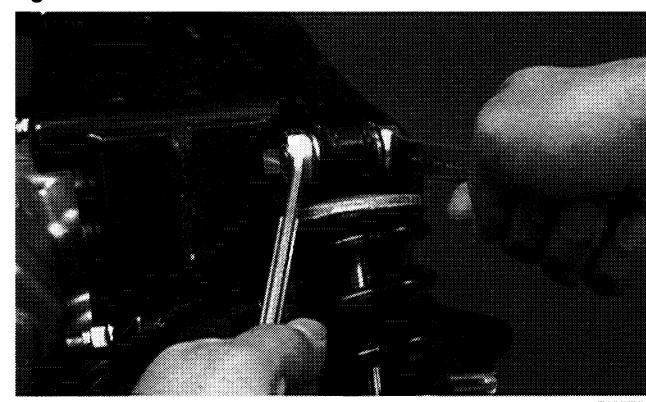
CH077D

4. Secure the rear of the engine to the sub-frame with cap screws and flat washers. Tighten to 5-6.1 kg-m (36-44 ft-lb).

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

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

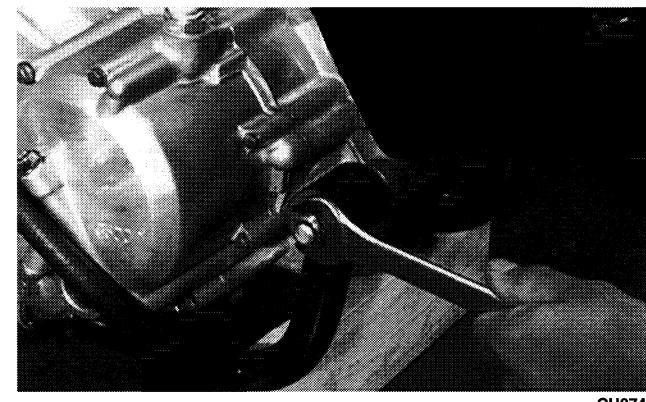
Fig. 3-36



CH076D

6. Secure the front of the engine to the sub-frame using a cap screw and spacers. Tighten to 5-6.1 kg-m (36-44 ft-lb).

Fig. 3-37



CH074D

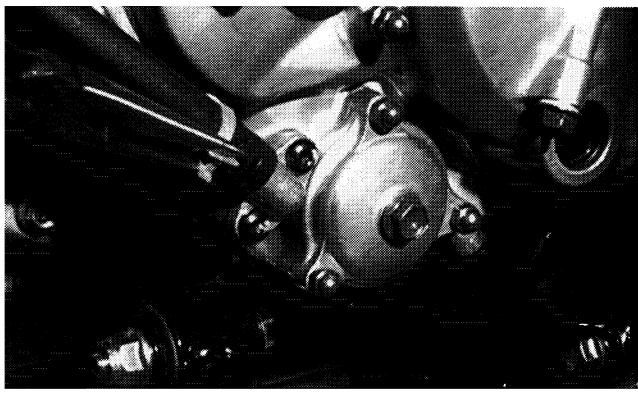
7. Secure the rear wheels to the engine/sub-frame assembly. Tighten to 6.2-7.6 kg-m (45-55 ft-lb).
8. Place the engine/sub-frame assembly onto a large floor/transmission jack and place the sub-frame assembly up and into position; then loosely start all six mounting cap screws.

⚠ WARNING

Support the ATV so it doesn't fall off the work 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 5.6 kg-m (40 ft-lb).
10. Tighten the two lower sub-frame mounting cap screws to 5.6 kg-m (40 ft-lb).
11. Secure the skid plate to the rear end assembly. Tighten to 1.1 kg-m (8 ft-lb).
12. Secure the two oil cooler hoses to the engine.

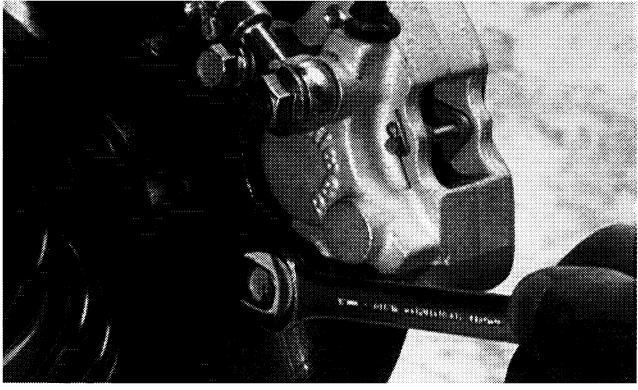
Fig. 3-38



CH070D

13. Secure the brake hose to the upper suspension arm with a torx-head screw. Tighten to 1.7 kg-m (12 ft-lb).
14. Tighten the rear hydraulic brake caliper to 2.8 kg-m (20 ft-lb).

Fig. 3-39



CH068D

15. Tighten the mechanical foot brake to 2.8 kg-m (20 ft-lb).

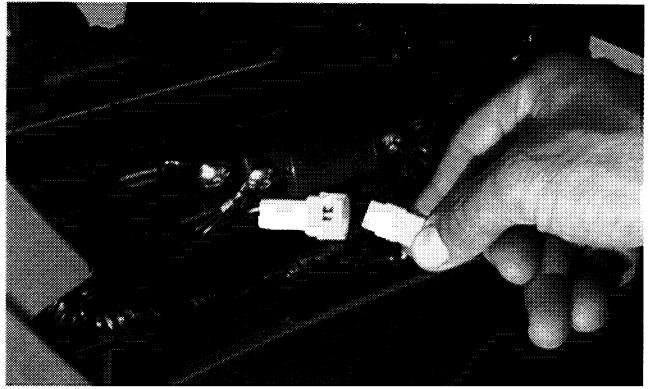
Fig. 3-40



CH069D

16. Secure the oil light switch to its connector.

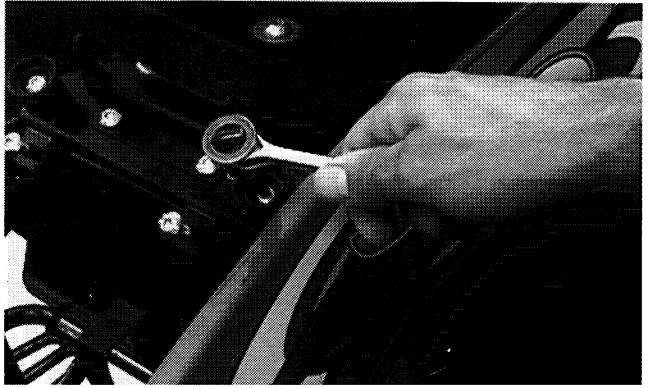
Fig. 3-41



CH067D

17. Secure the right-hand side panel.

Fig. 3-42



CH066D

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

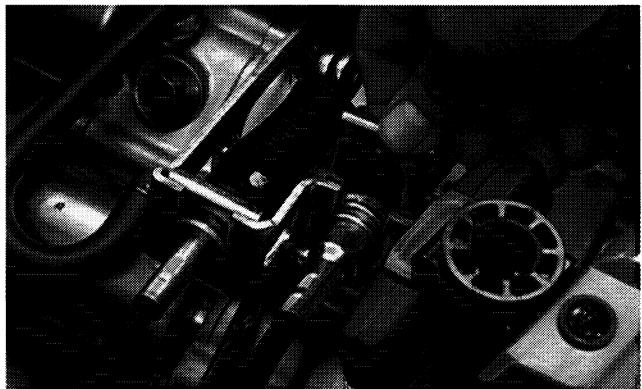
Fig. 3-43



CH065D

19. Secure the shifter cables to the bracket with clips.

Fig. 3-44



CH062D

20. Install the air-cleaner assembly into the frame and connect the crankcase breather hoses; then secure the air-cleaner assembly to the frame. Tighten to 1.1 kg-m (8 ft-lb).

Fig. 3-45



CH048D

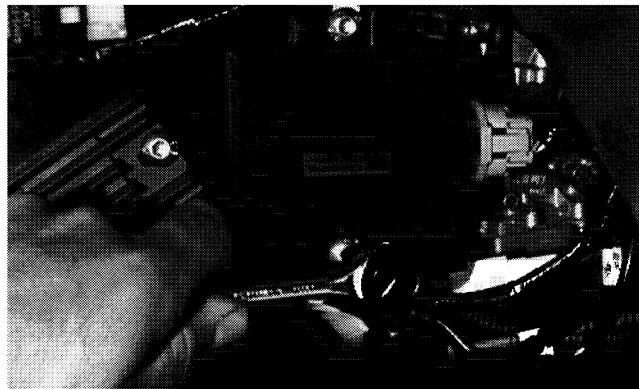
Fig. 3-46



CH047D

21. Secure the CDI unit to the frame. Tighten to 1.1 kg-m (8 ft-lb).

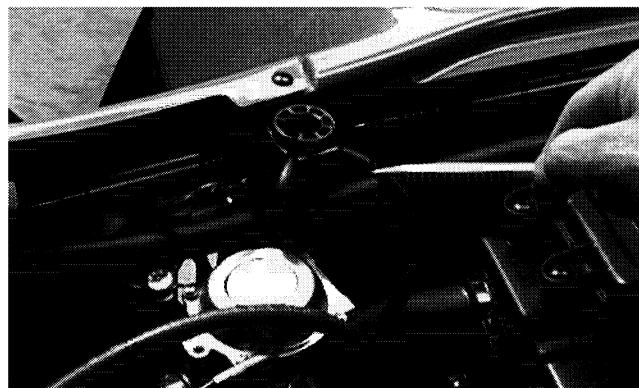
Fig. 3-47



AF882D

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

Fig. 3-48



CH043D

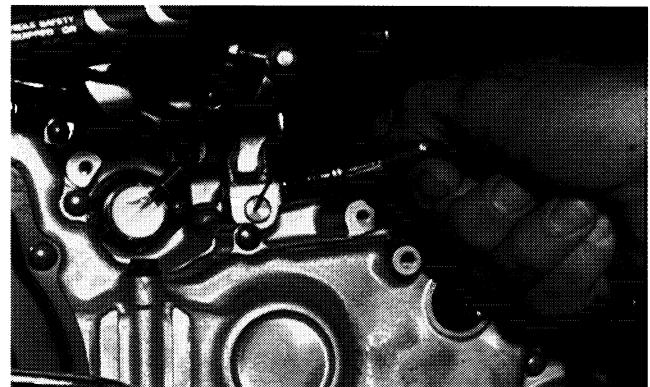
23. Secure the air-intake snorkel to the air-cleaner assembly and frame.

Fig. 3-49



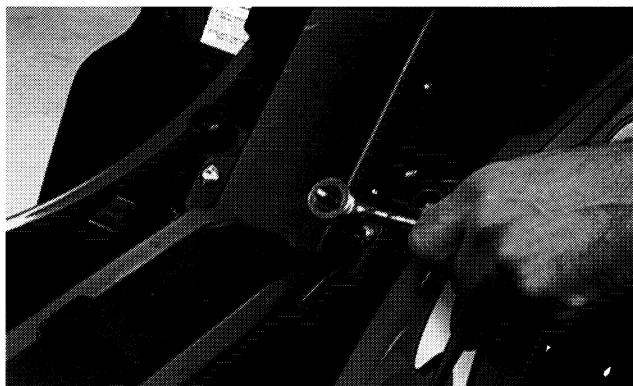
CH041D

Fig. 3-52



CH060D

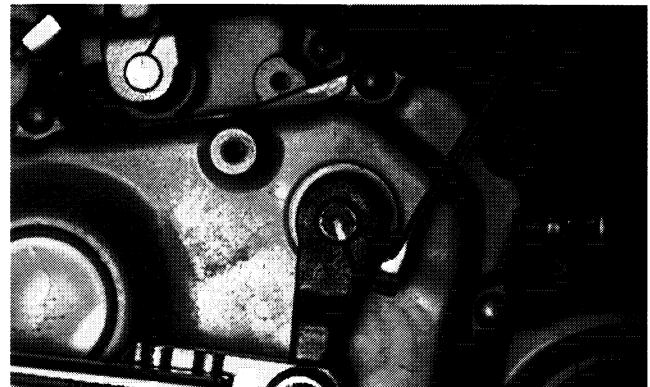
Fig. 3-50



CH040D

24. Secure the reverse gear shaft arm to the reverse shift shaft making sure that the alignment marks made during removing align. Tighten to 1.1 kg-m (8 ft-lb).

Fig. 3-53



CH058D

24. Secure the reverse gear shaft arm to the reverse shift shaft making sure that the alignment marks made during removing align. Tighten to 1.1 kg-m (8 ft-lb).

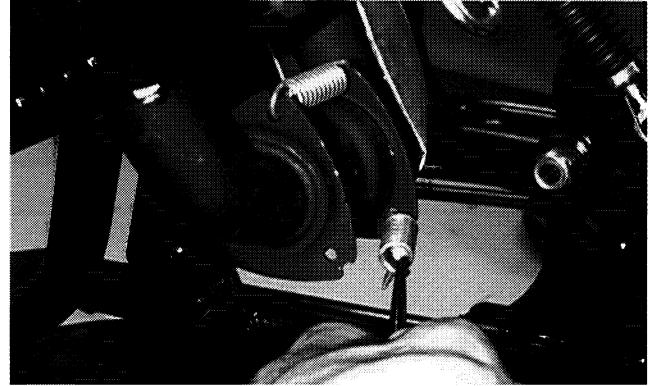
Fig. 3-51



CH061D

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

Fig. 3-54

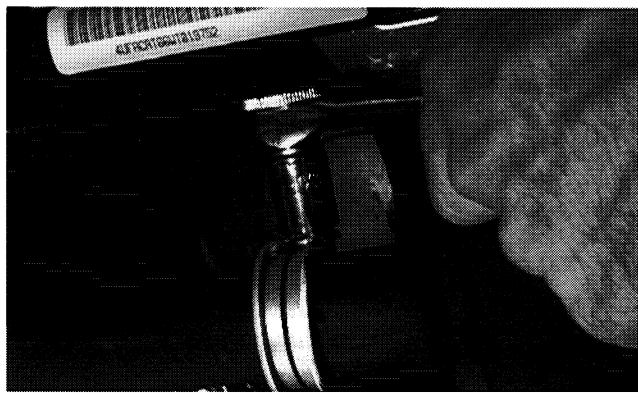


CH055D

25. Secure the shifter arm to the shifter arm shaft making sure that the alignment marks made during removing align. Tighten to 1.1 kg-m (8 ft-lb).

28. Secure the muffler and exhaust pipe. Tighten to 2.8 kg-m (20 ft-lb).

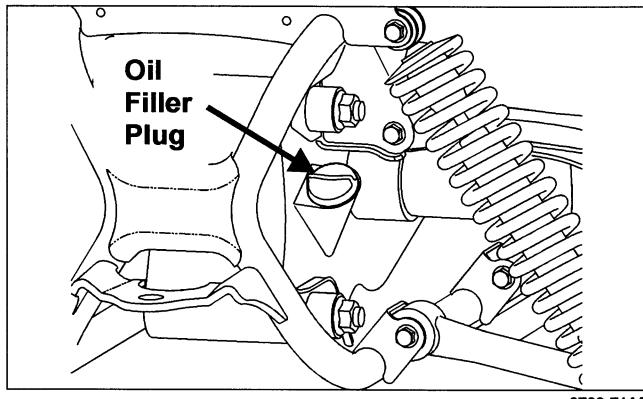
Fig. 3-55



CH056D

29. Turn the gas tank valve to the ON position.
30. Fill the engine with the correct motor oil (viscosity and quantity).

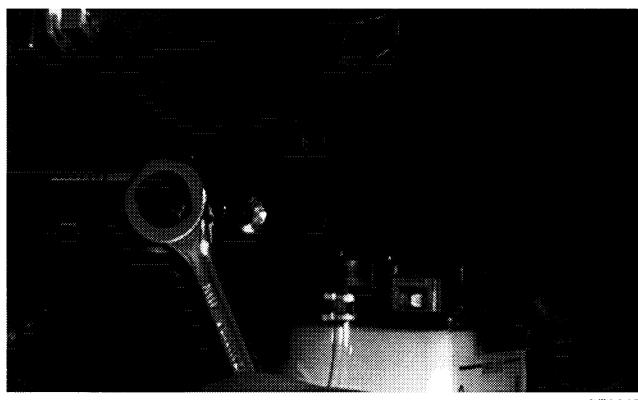
Fig. 3-56



0733-714A

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

Fig. 3-57



AF881D

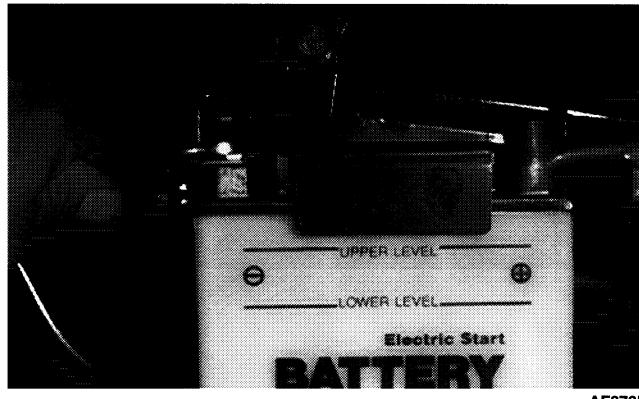
32. Connect the positive cable to the battery first; then the negative cable.

Fig. 3-58



AF880

Fig. 3-59



AF878D

33. Install the seat.
34. Adjust the mechanical foot brake to within specifications.
35. Remove the tie-down straps; then remove the ATV from the work stand.

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.

Removing Engine/ Transmission (400/500 cc)

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.

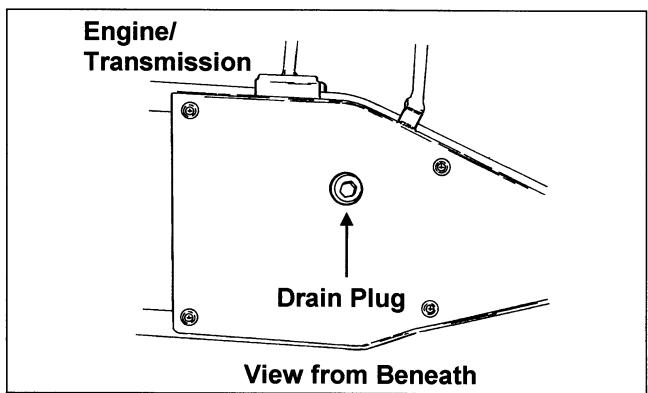
1. Lift the seat lock lever and remove the seat.
2. Remove the battery by removing the negative cable first and then the positive cable.

CAUTION

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

3. Drain the oil from beneath the engine/transmission; then drain the cooling system.

Fig. 3-60



ATV-0109

4. Drain the gas from the gas tank; then remove the tank (see Section 4).
5. Remove the front fenders and the front rack (see Section 8).
6. Remove the two cap screws securing the exhaust header pipe to the engine; then free the pipe from the engine. Account for a grafoil gasket.

7. Loosen the exhaust pipe from the muffler at the juncture in front of the muffler; then remove the exhaust pipe.

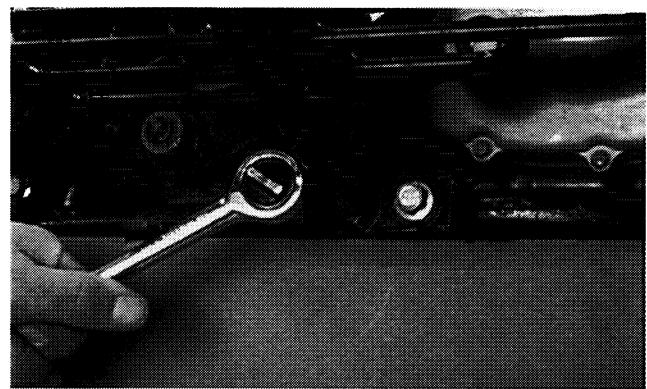
Fig. 3-61



AF775D

8. Remove the left-side footrest.

Fig. 3-62



AL629D

9. Mark the reverse gear shaft arm to the reverse shift shaft to aid in assembly and remove the cap screw securing the reverse gear shaft arm to the reverse shift shaft; then route the cable and arm away from the engine/transmission.

Fig. 3-63

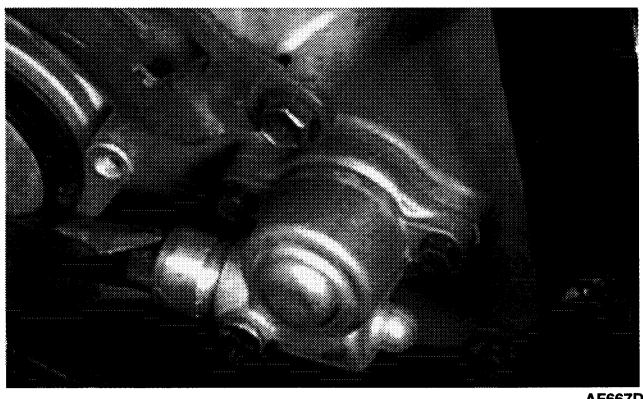


CC118D

■ NOTE: Use a cable tie or tape to keep the cable from interfering with the removal procedure.

10. Detach the speedometer cable by loosening the knurled nut and routing the cable away from the engine/transmission.

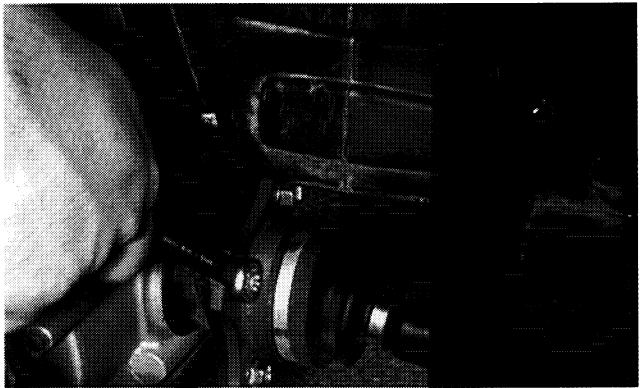
Fig. 3-64



AF667D

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

Fig. 3-65



CC119D

12. Detach the carburetor using the following procedure.

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

Fig. 3-66



CC120D

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

- A. 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.

13. Remove the clamp securing the upper coolant hose to the thermostat housing; then disconnect the hose.

Fig. 3-67



CC335D

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

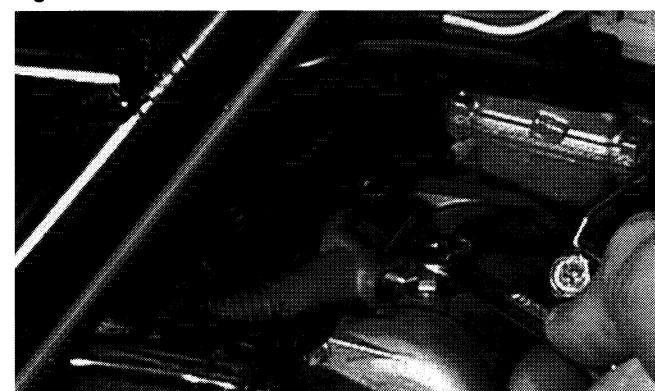
15. Disconnect the battery ground (negative) cable from the crankcase cover; then disconnect the positive cable from the starter motor.

Fig. 3-68



AR600D

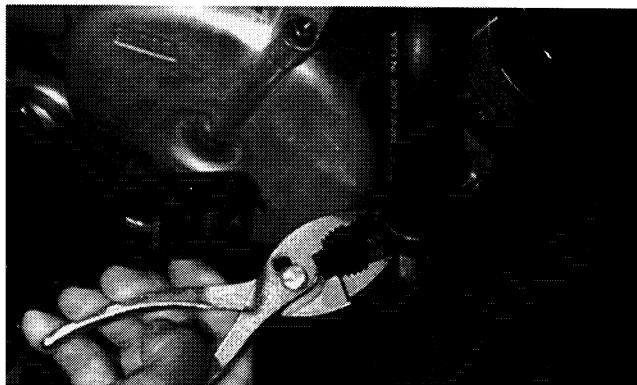
Fig. 3-69



AR604D

16. Remove the clamp securing the lower coolant hose to the water pump housing; then disconnect the hose.

Fig. 3-70



CC334D

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

Fig. 3-71

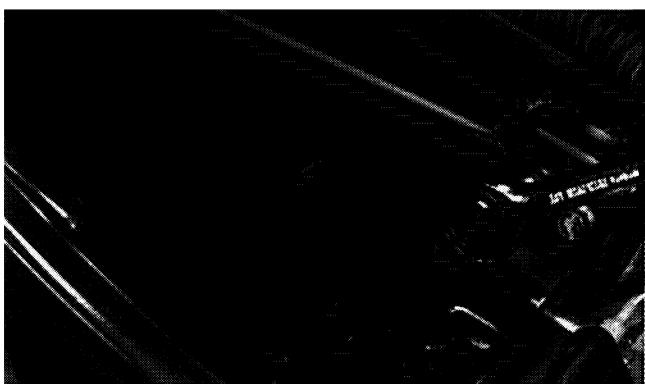


CC122D

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

A. Upper front: Four cap screws (inside the bracket) and one cap screw and nut (top side of the engine).

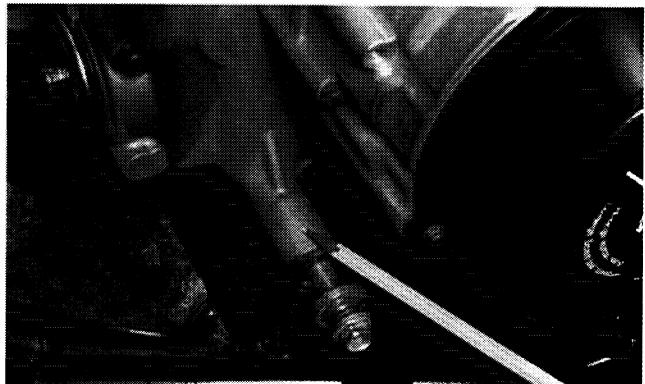
Fig. 3-72



AB600D

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

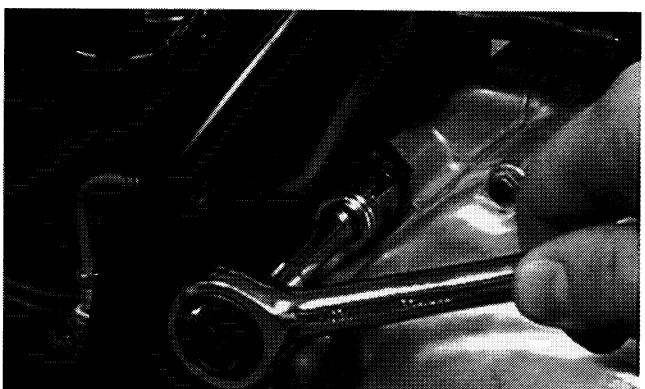
Fig. 3-73



CC123D

C. Upper rear: One cap screw and nut with flat washer.

Fig. 3-74



CC125D

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

Fig. 3-75



CC126D

19. Remove the engine/transmission from the left side of the frame.

Installing Engine/Transmission (400/500 cc)

■ 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.

Fig. 3-76



CC126D

- A. Lower rear: One cap screw and nut with flat washer. Tighten only until snug.
- B. Upper rear: One cap screw and nut with flat washer. Tighten only until snug.

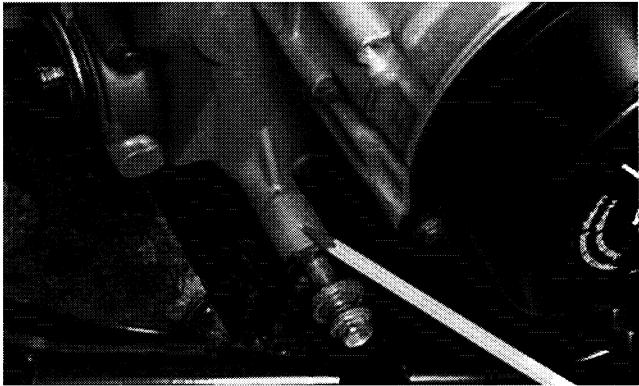
Fig. 3-77



CC125D

- A. Lower rear, upper rear, lower front, upper front (inside the bracket) to 5.5 kg-m (40 ft-lb).
- B. Upper front (top side of engine) to 2.8 kg-m (20 ft-lb).
- C. Lower front: One cap screw, nut, spacer, and washer. Tighten only until snug.

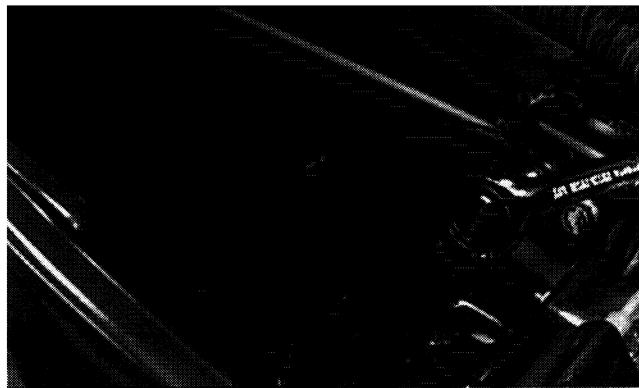
Fig. 3-78



CC123D

- D. Upper front: Four cap screws (inside the bracket) and one cap screw and nut (top side of engine). Tighten only until snug.

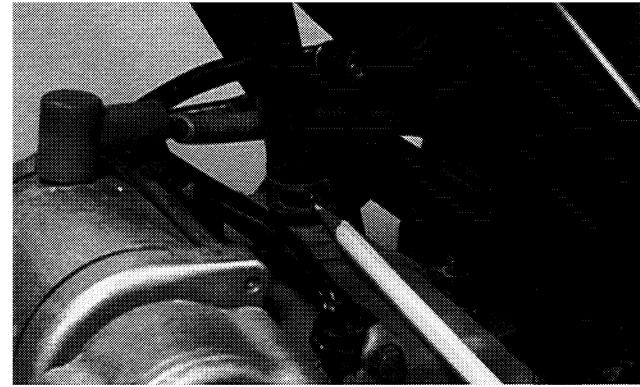
Fig. 3-79



AB600D

3. Tighten the engine mounting fasteners to the following specifications.
 - A. Lower rear, upper rear, lower front, upper front (inside the bracket) to 5.5 kg-m (40 ft-lb).
 - B. Upper front (top side of engine) to 2.8 kg-m (20 ft-lb).
4. Connect the crankcase breather vent hose and secure with the clamp.

Fig. 3-80



CC122D

5. Connect the lower coolant hose to the water pump housing and secure with the clamp.

Fig. 3-81



CC124D

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

Fig. 3-82



AR604D

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

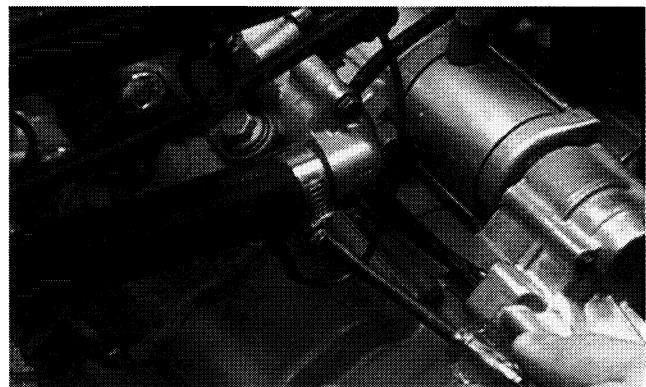
Fig. 3-83



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.

Fig. 3-84



CC121D

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

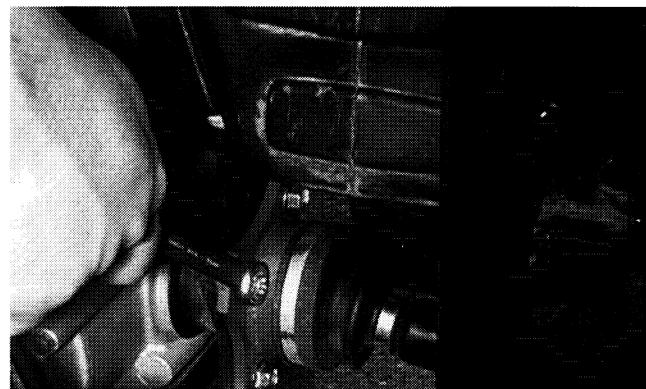
Fig. 3-85



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 (coated with red Loctite #271) and tighten to 2.8 kg-m (20 ft-lb).

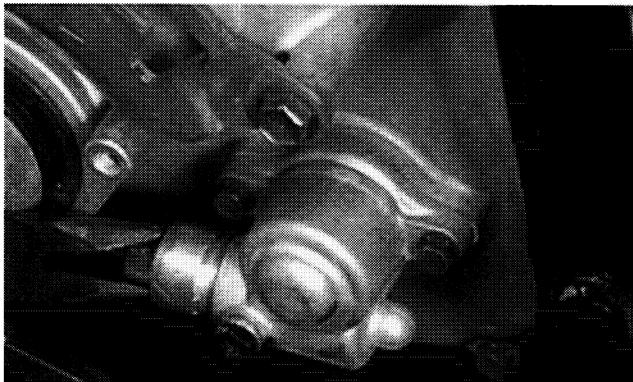
Fig. 3-86



CC119D

13. Place the speedometer cable into position and tighten the knurled nut.

Fig. 3-87



AF667D

14. Route the reverse cable to the engine; then install the reverse gear shaft arm to the reverse shift shaft (with the marks made during disassembly aligned) and secure with the cap screw.

Fig. 3-88



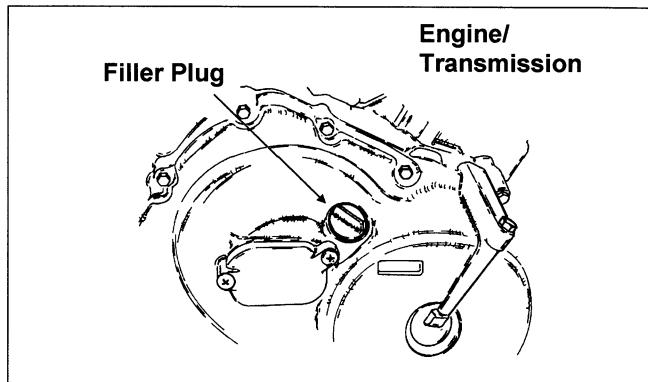
CC118D

15. Install the left-side footrest.
16. Place the exhaust pipe into position inside the frame and connect to the muffler at the juncture.

■ NOTE: If the muffler was removed, see Section 8.

17. Place the exhaust pipe header with new grafoil gasket into position on the cylinder head; install and tighten the cap screws to 2.8 kg-m (20 ft-lb).
18. Install the front fenders and the front rack (see Section 8).
19. Install the gas tank (see Section 4).
20. Pour 3.3 l (3.5 U.S. qt) of recommended oil into the engine/transmission filler hole; install the filler plug.

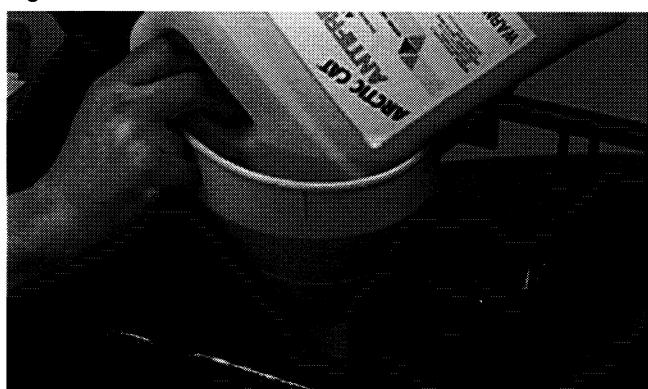
Fig. 3-89



ATV-0108

21. 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 1/2 in. above the radiator core.

Fig. 3-90



AN604D

22. Connect all remaining electrical connections; then install the battery making sure to connect the positive battery cable first and the negative cable last.
23. 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.

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.

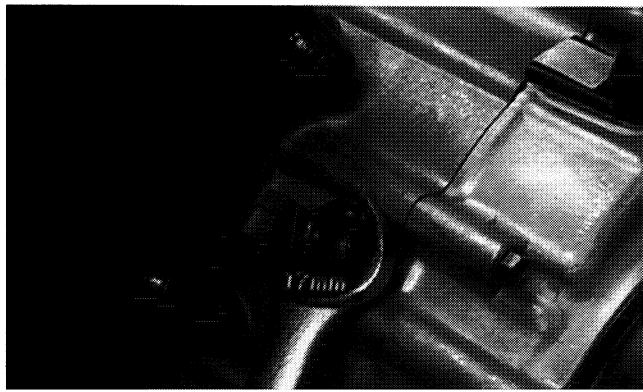
■ NOTE: The engine/transmission does not have to be removed from the frame for this procedure.

Removing Top-Side Components (250/300 cc)

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.

Fig. 3-91



CC411D

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

Fig. 3-92

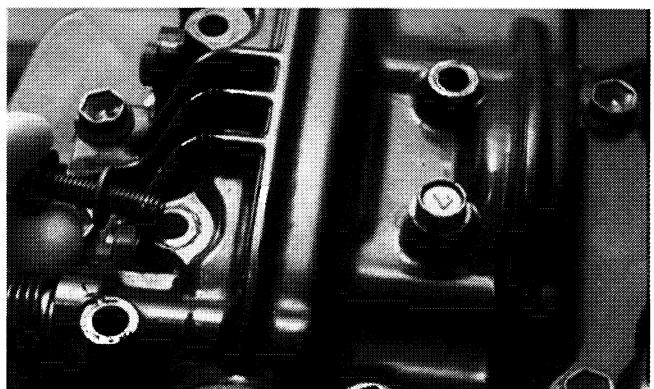


CC366D

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.

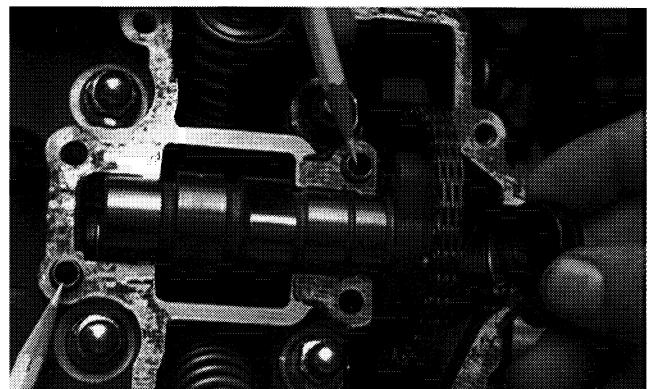
■ NOTE: If removing the valve cover only, the two cap screws w/rubber washers next to the compression release lever do not have to be removed.

Fig. 3-93



CC367D

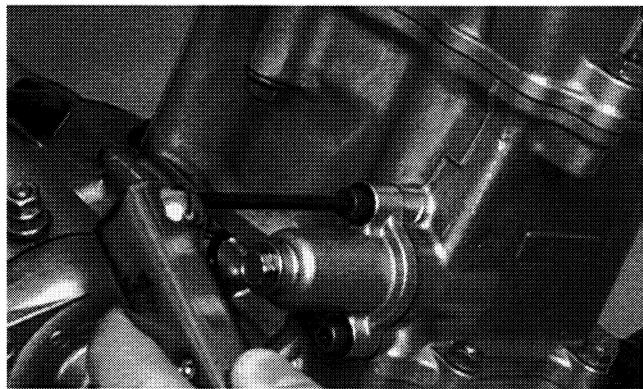
Fig. 3-94



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.

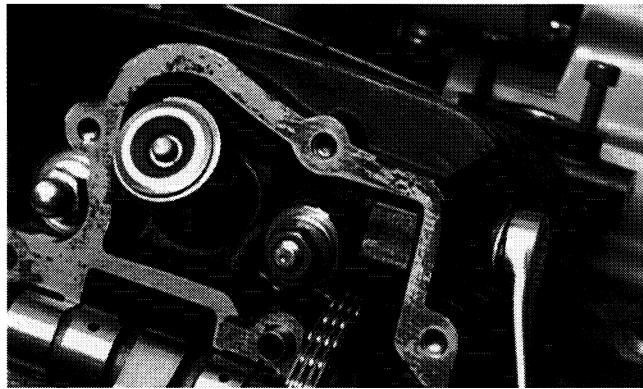
Fig. 3-95



CC010D

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

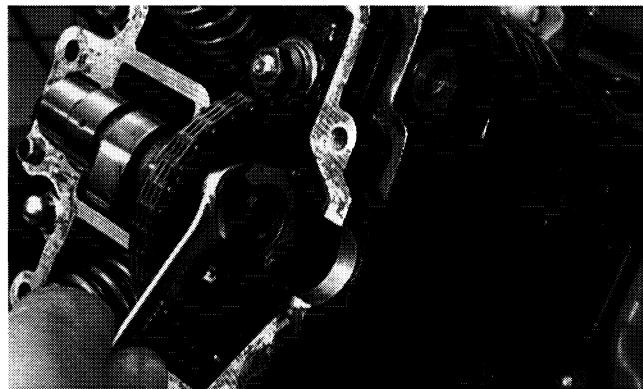
Fig. 3-96



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.

Fig. 3-97



CC372D

Fig. 3-98



CC373D

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

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

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

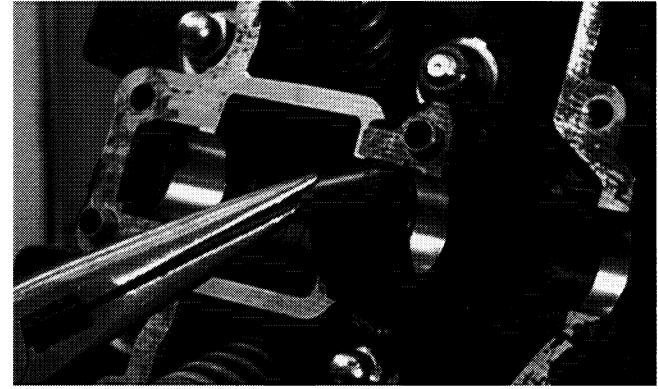
Fig. 3-99



CC374D

7. Using a needle-nosed pliers, remove the chain tensioner pad.

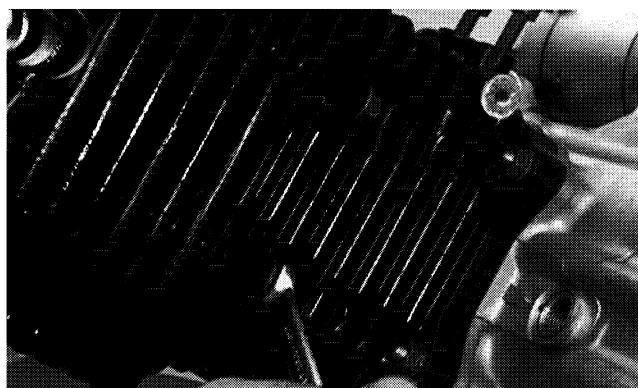
Fig. 3-100



CC375D

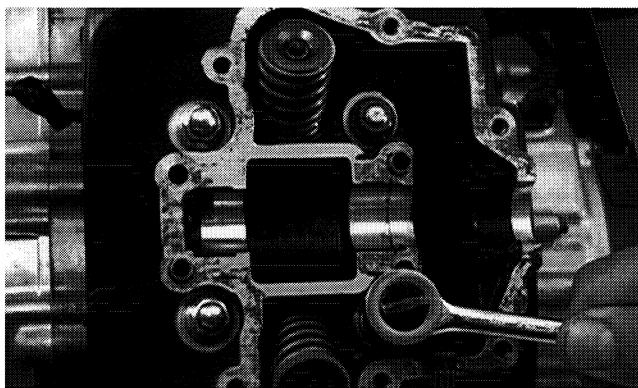
8. Remove the nuts securing the cylinder head to the cylinder; then remove the three cylinder head cap nuts and one nut with copper washers (note location of the cap nuts and nuts).

Fig. 3-101



CC376D

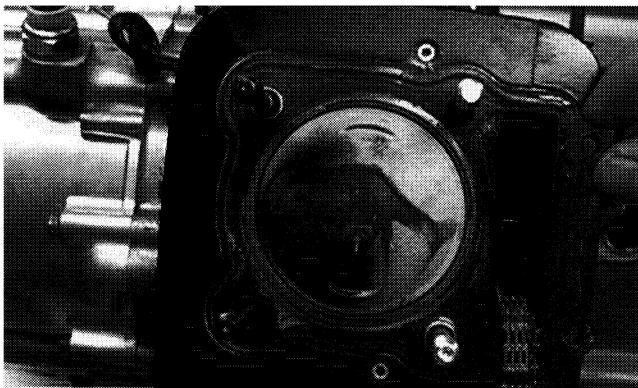
Fig. 3-102



CC377D

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

Fig. 3-103



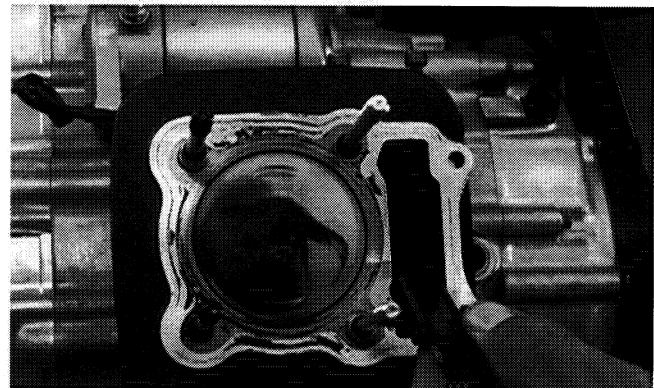
CC378D

10. Remove the cam chain guide.

 **AT THIS POINT**

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

Fig. 3-104



CC379D

3

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.

Fig. 3-105



CC380D

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.

 **AT THIS POINT**

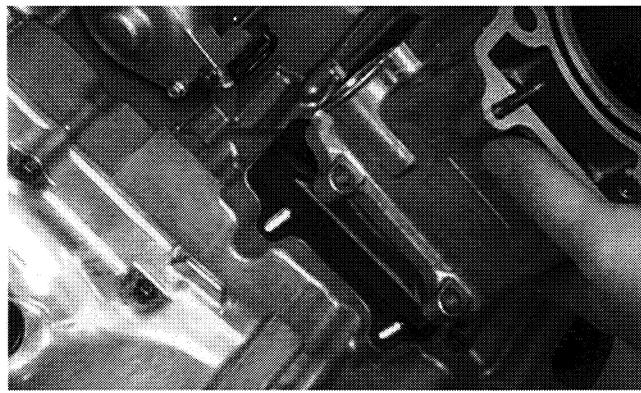
To service valves and cylinder head, see **Servicing Top-Side Components** in this sub-section.

Fig. 3-106



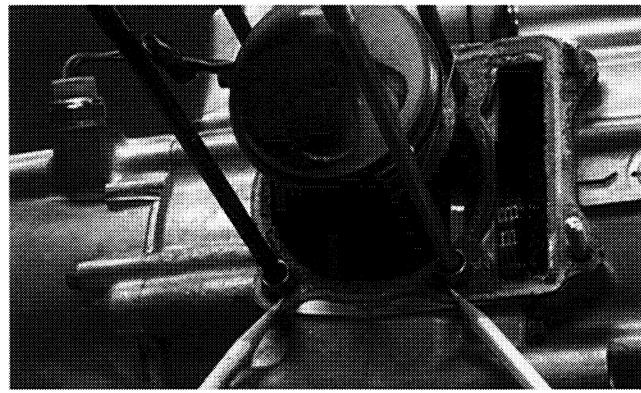
CC384D

Fig. 3-107



CC024D

Fig. 3-108



CC381D



AT THIS POINT

To service cylinder, see Servicing Top-Side Components in this 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.

Fig. 3-109

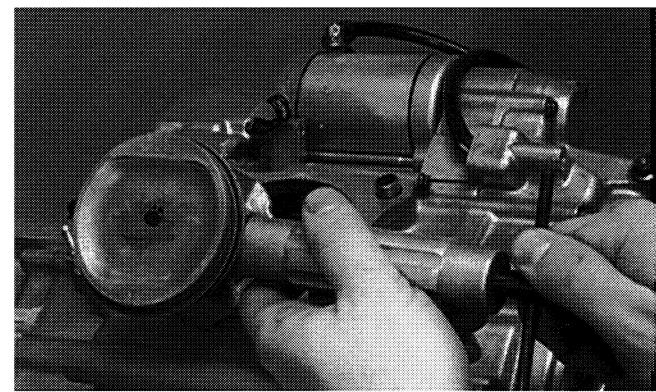


CC382D

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.

Fig. 3-110



CC033D

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

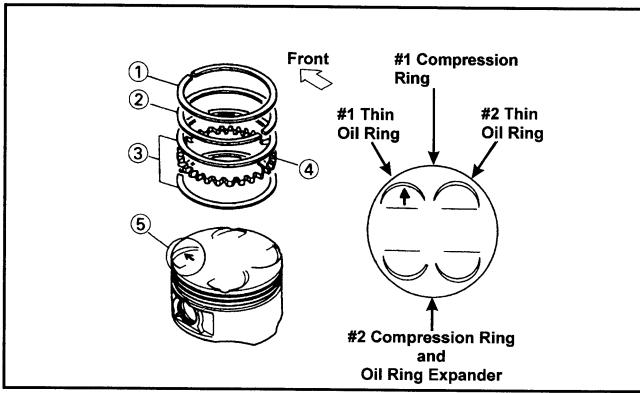


CAUTION

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.

Fig. 3-111



ATV-1085

- 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 in this sub-section.



AT THIS POINT

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

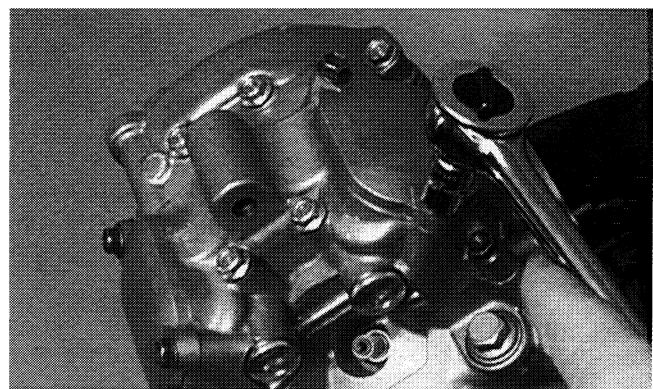
Removing Top-Side Components (400/500 cc)

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 four cap screws securing the two tappet covers; then remove the covers.

Fig. 3-112

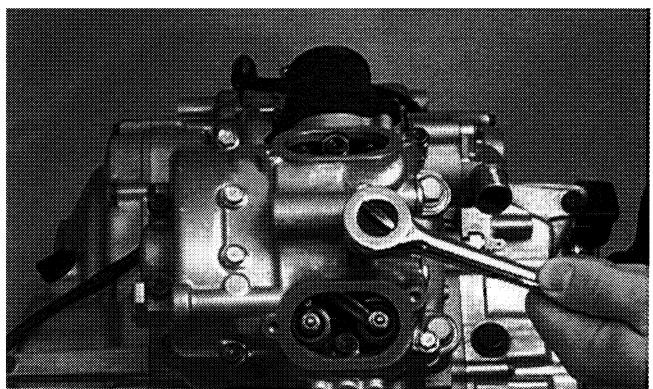


CC001D

NOTE: Keep the cap screws 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.

Fig. 3-113



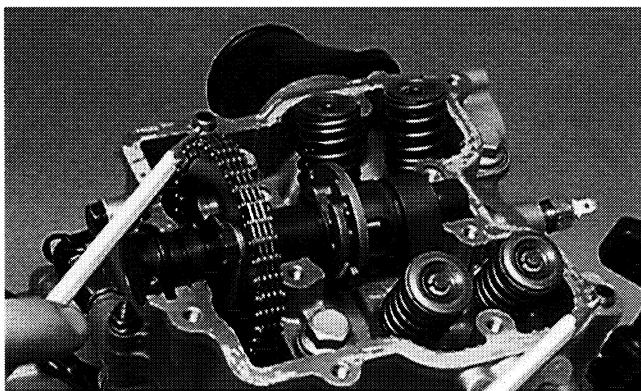
CC003D

Fig. 3-114



CC274D

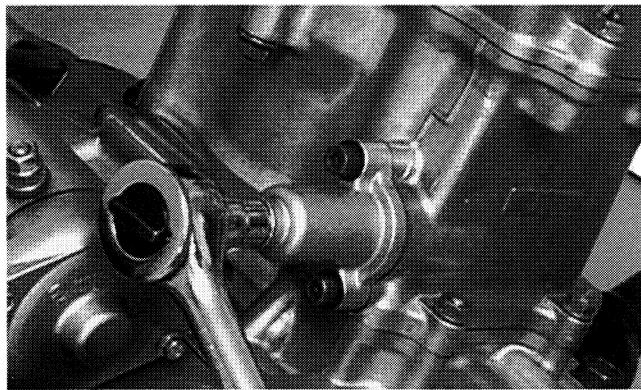
Fig. 3-115



CC273D

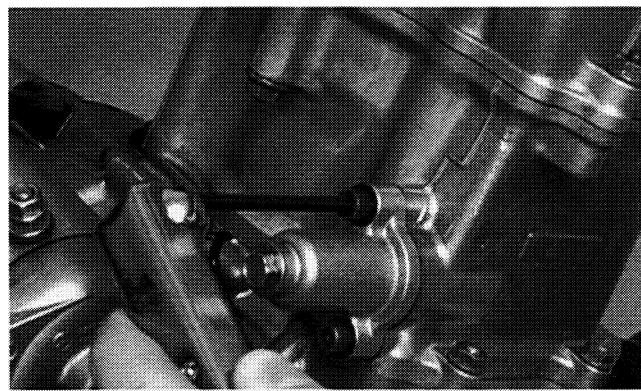
3. Loosen the cap screw on the end of the tensioner; then remove the two Allen-head cap screws securing the tensioner adjuster assembly and remove the assembly. Account for a gasket.

Fig. 3-116



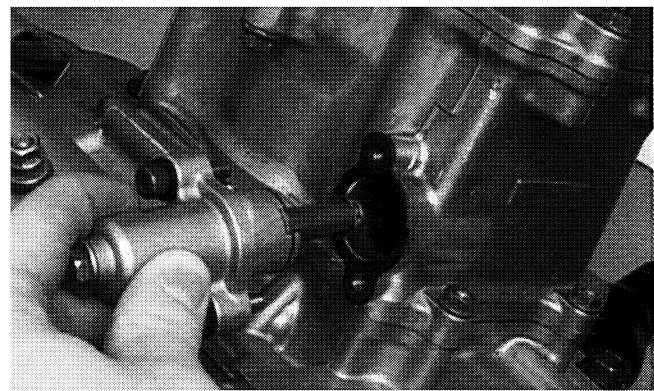
CC009D

Fig. 3-117



CC010D

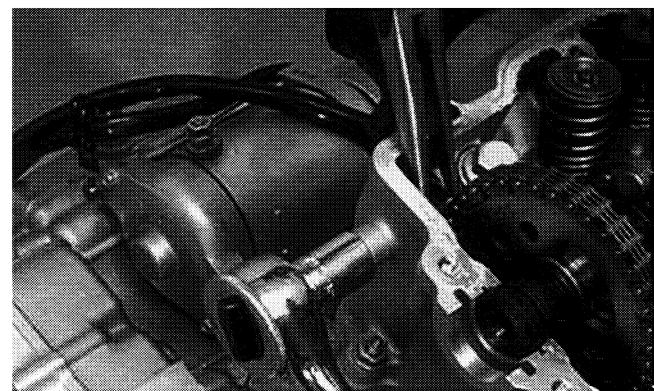
Fig. 3-118



CC011D

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

Fig. 3-119

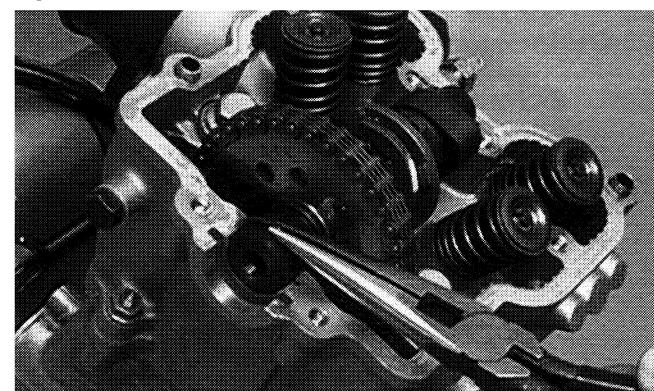


CC014D

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.

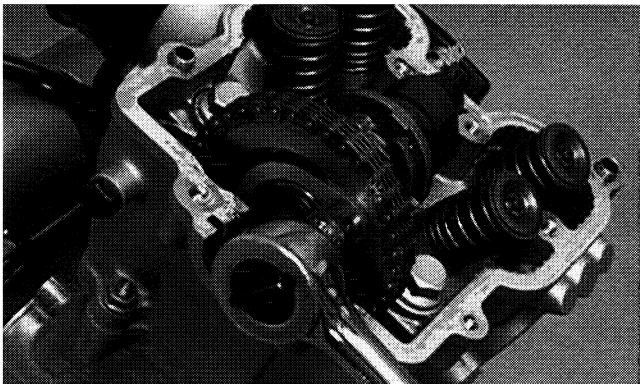
Fig. 3-120



CC012D

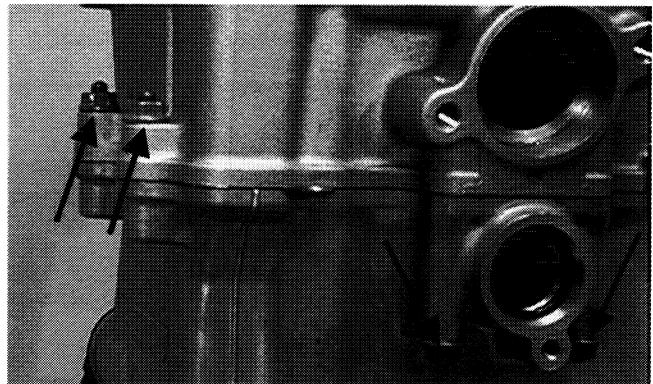
6. Bend the washer tabs and remove the two cap screws securing the sprocket to the camshaft; then drop the sprocket off the camshaft. While holding the chain, slide the sprocket and camshaft out of the cylinder head.

Fig. 3-121



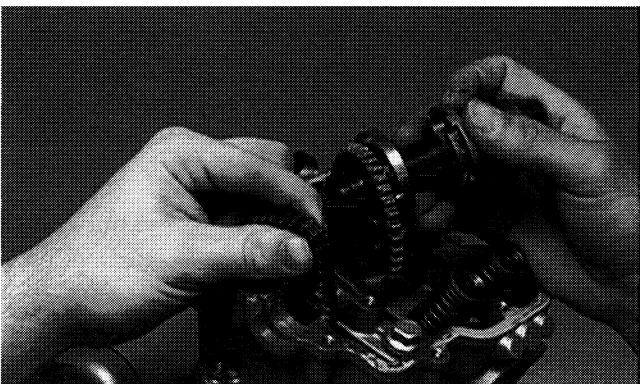
CC013D

Fig. 3-124



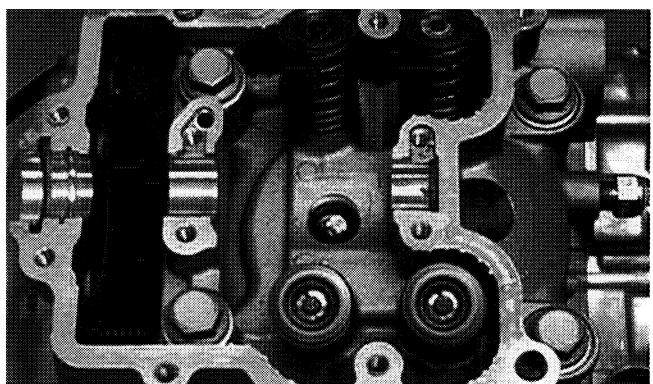
CC018D

Fig. 3-122



CC266D

Fig. 3-125

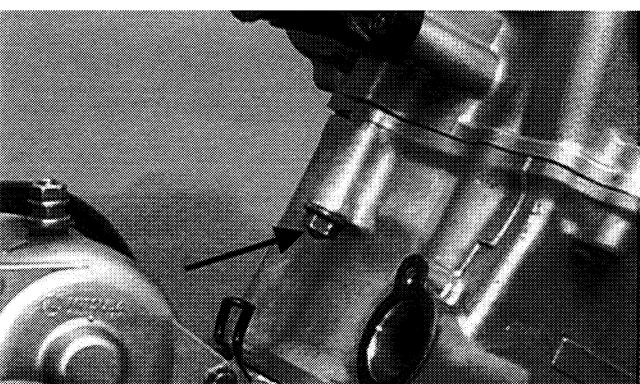


CC016D

■ 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).

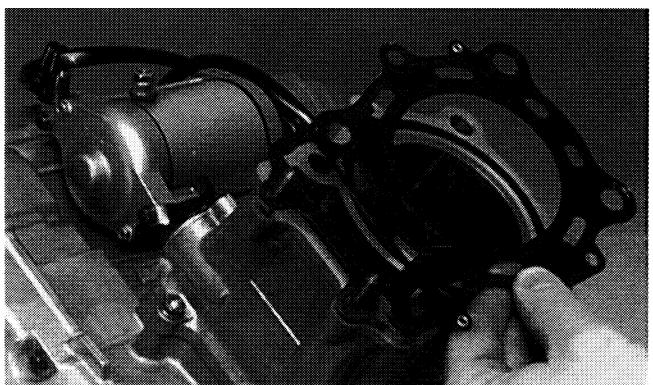
Fig. 3-123



CC017D

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

Fig. 3-126



CC020D

 **AT THIS POINT**

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

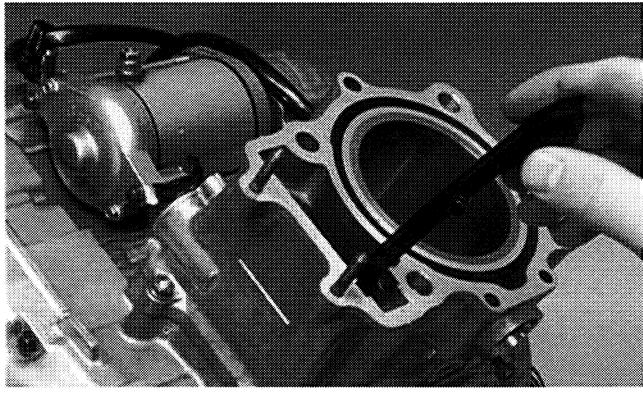
9. Remove the cam chain guide.



AT THIS POINT

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

Fig. 3-127



CC022D

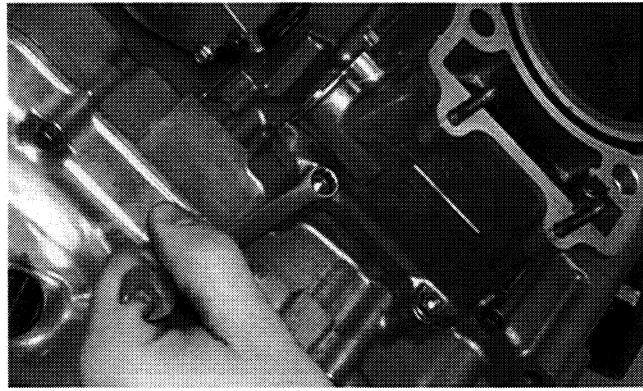
C. Cylinder

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.

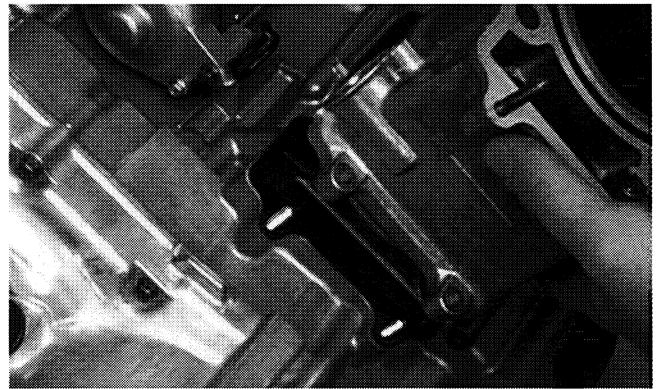
Fig. 3-128



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.

Fig. 3-129



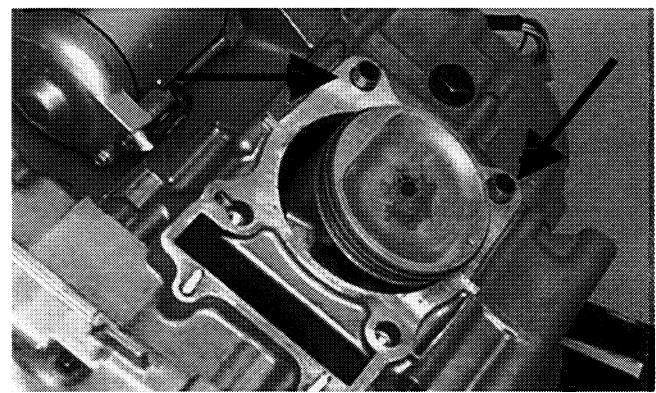
CC024D

Fig. 3-130



CC025D

Fig. 3-131



CC026D

AT THIS POINT

To service cylinder, see Servicing Top-Side Components in this 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.

Fig. 3-132

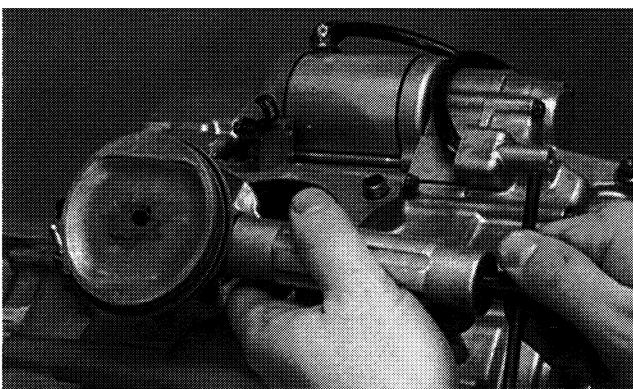


CC032D

14. Using the Piston-Pin Puller (p/n 0144-003), 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.

Fig. 3-133



CC033D

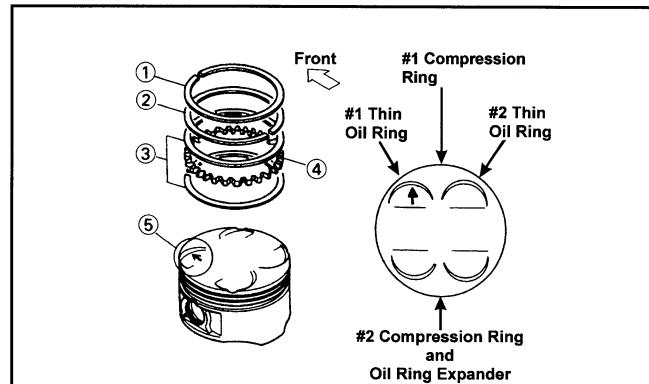
■ **NOTE:** Support the connecting rod with rubber bands to avoid damaging the rod or install the Connecting Rod Holder (p/n 0444-006).

⚠ 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.

Fig. 3-134



ATV-1085

- Starting with the top ring, slide one end of the ring out of the ring-groove.
- 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 in this sub-section.

👉 AT THIS POINT

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

Servicing Top-Side Components

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

VALVE ASSEMBLY

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

■ **NOTE:** The technician should reference the appropriate illustration and/or photograph for the model being serviced.

■ **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

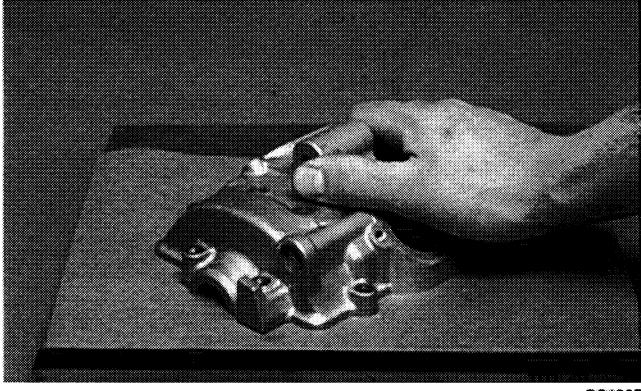
Do not remove an excessive amount of the sealing surface or damage to the camshaft will result. Always check camshaft clearance when resurfacing the valve cover.

Fig. 3-135



CC385D

Fig. 3-136



CC130D

CAUTION

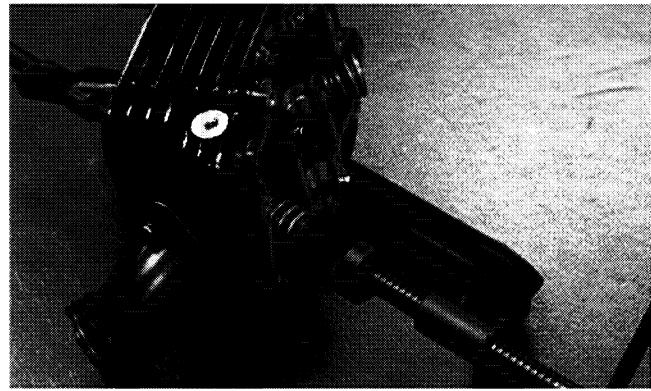
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

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.

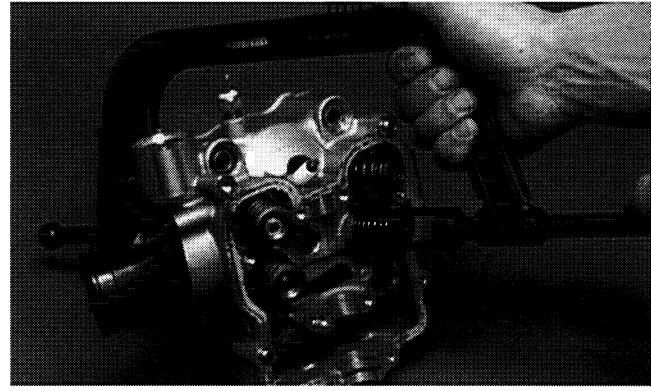
1. Using a valve spring compressor, compress the valve springs and remove the valve cotters. Account for an upper spring retainer.

Fig. 3-137



CC391D

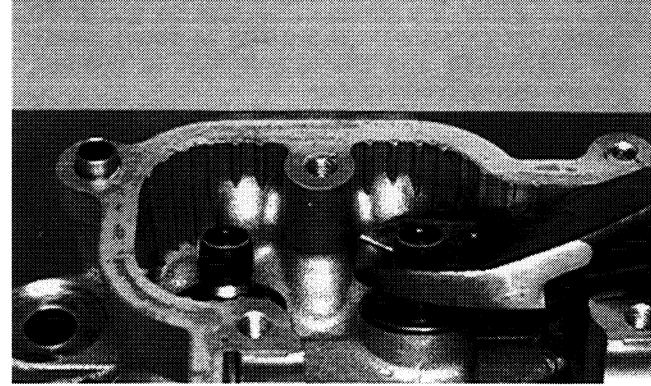
Fig. 3-138



CC132D

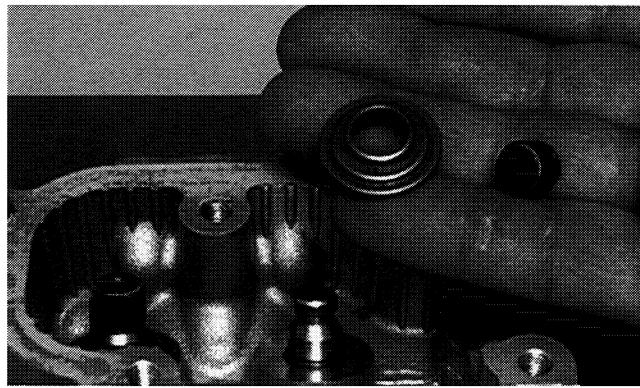
2. Remove the valve seal and the lower remaining spring seat. Discard the valve seal.

Fig. 3-139



CC134D

Fig. 3-140



CC136D

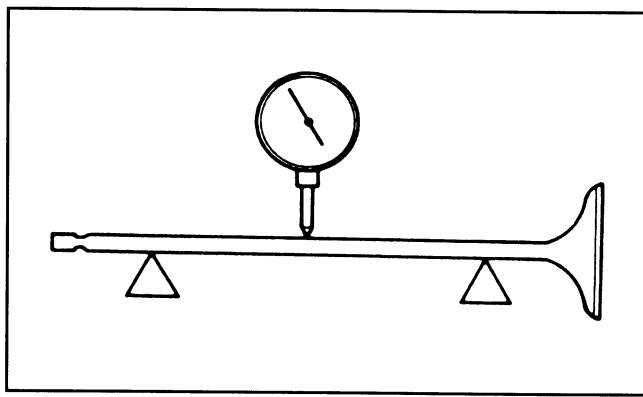
■ **NOTE: The valve seals must be replaced.**

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.

Fig. 3-141



ATV1082

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

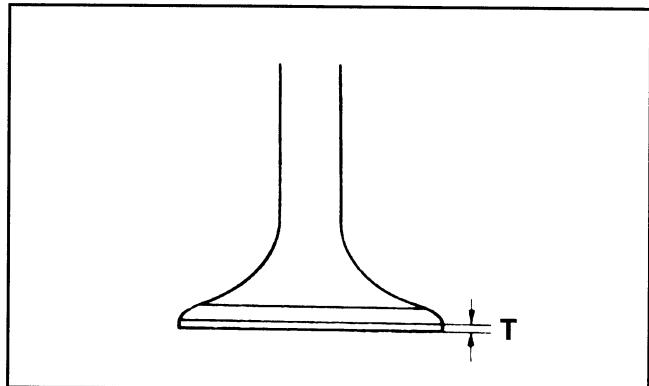
Measuring Valve Stem Outside Diameter

1. Using a micrometer, measure the valve stem diameter.
2. Acceptable diameter range (intake valve) is 5.475-5.490 mm (0.2156-0.2161 in.) for the 250/300 cc and 4.975 - 4.990 mm (0.1959 - 0.1965 in.) for the 400/500 cc.
3. Acceptable diameter range (exhaust valve) is 5.455-5.470 mm (0.2148-0.2154 in.) for the 250/300 cc and 4.955 - 4.970 mm (0.1951 - 0.1957 in.) for the 400/500 cc.

Measuring Valve Face/Seat Width

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

Fig. 3-142



ATV1004

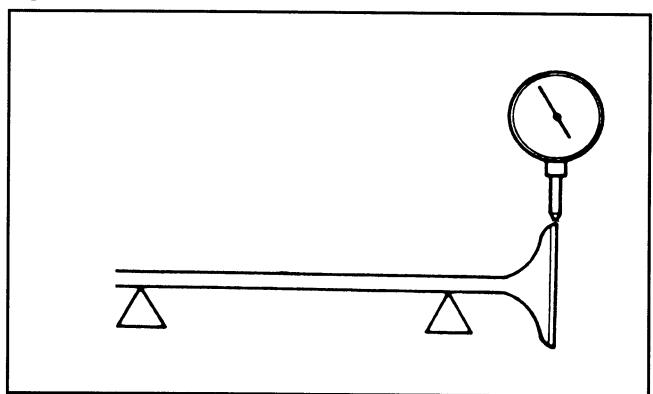
2. Acceptable width range is 0.9-1.1 mm (0.035-0.043 in.).

3

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.

Fig. 3-143



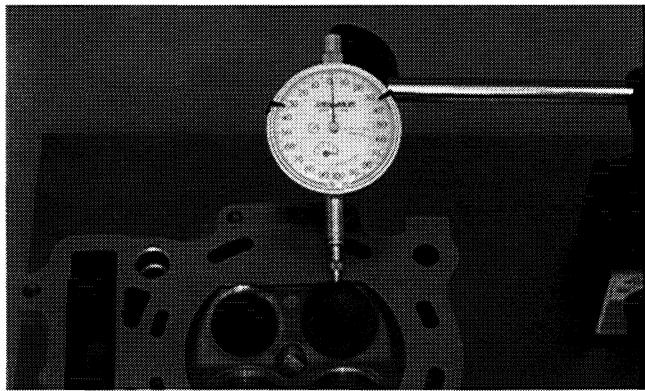
ATV1082A

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.

Fig. 3-144



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 Guides (Inside Diameter)

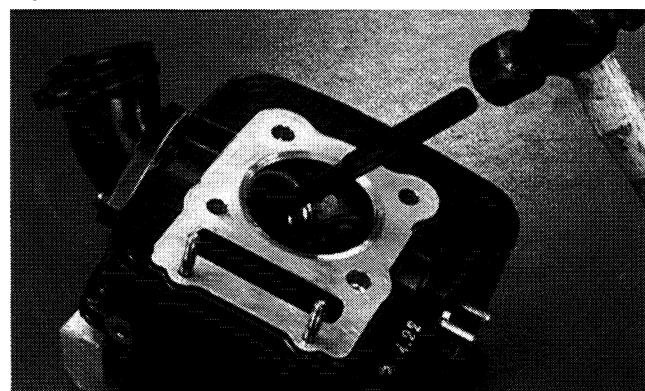
1. Insert a snap gauge 1/2 way down into each valve guide bore; then remove the gauge and measure it with a micrometer.
2. Acceptable inside diameter range is 5.500-5.512 mm (0.2165-0.2170 in.) for the 250/300 cc and 5.000 - 5.012 mm (0.1969 - 0.1973 in.) for the 400/500 cc.
3. If a valve guide is out of tolerance, it must be replaced.

Replacing Valve Guide

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

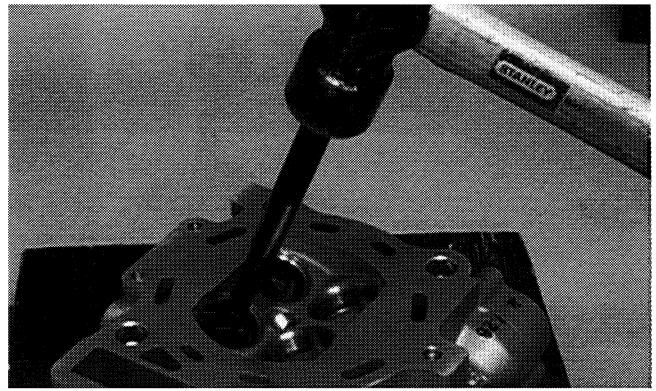
1. If a valve guide needs replacing, insert a valve guide remover into the valve seat side of the valve guide. Using a hammer, gently drive the valve guide out of the cylinder head.

Fig. 3-145



CC393D

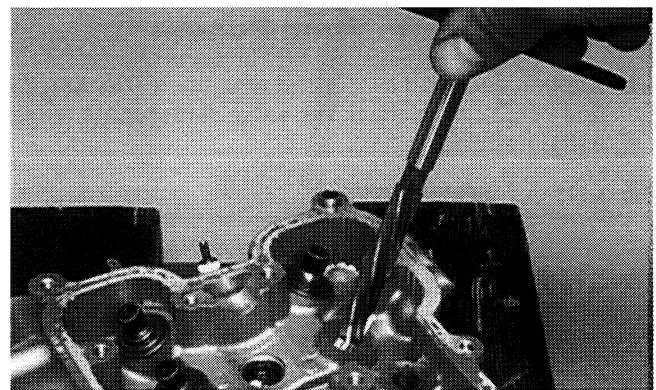
Fig. 3-146



CC137D

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

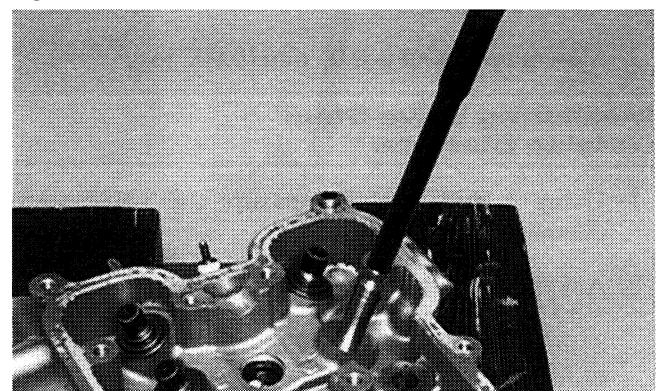
Fig. 3-147



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.

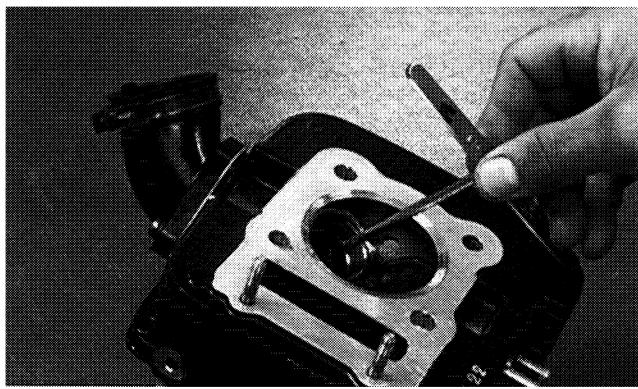
Fig. 3-148



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.

Fig. 3-149



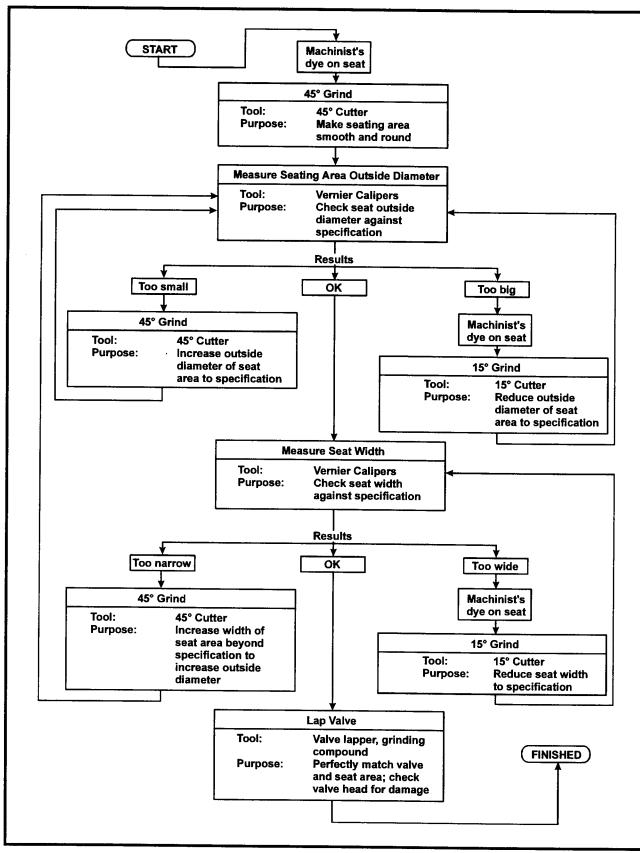
CC394D

Fig. 3-150



CC138D

Valve Seat/Guide Servicing Flow Chart



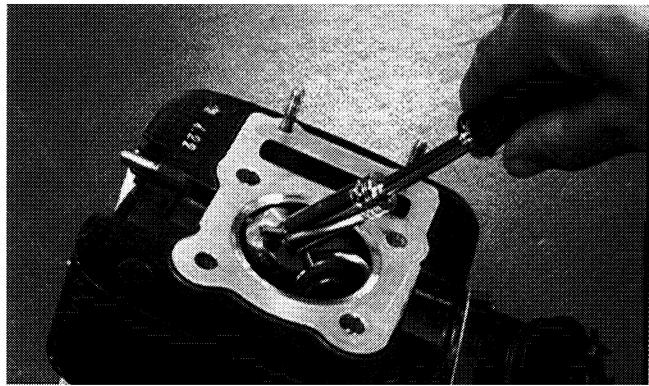
ATV-0107

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.

Fig. 3-151

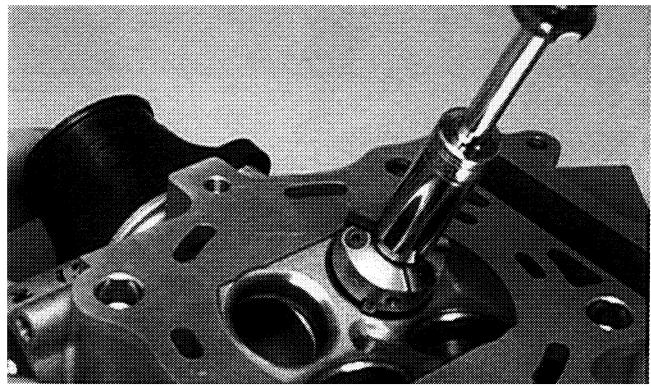


CC396D

3

■ NOTE: On the 400/500 cc, repeat procedure on the remaining exhaust valve.

Fig. 3-152



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.

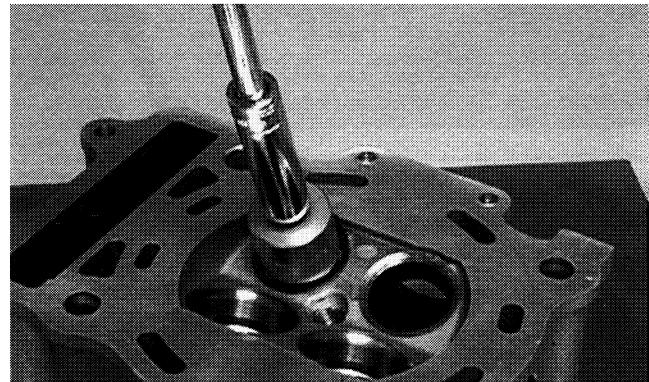
Fig. 3-153



CC395D

■ **NOTE:** On the 400/500 cc, repeat procedure on the remaining intake valve.

Fig. 3-154



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 Arms (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.).

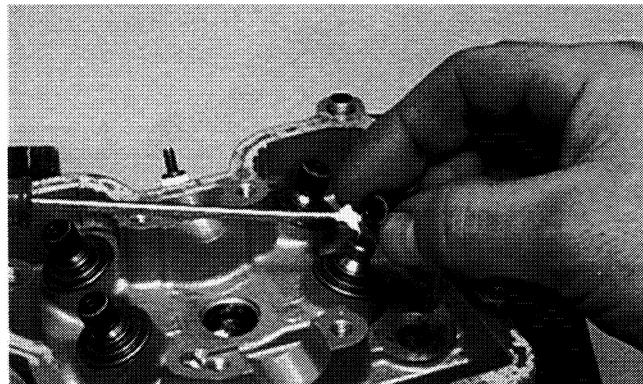
Measuring Rocker Arm Shafts (Outside Diameter)

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.) for the 250/300 cc and 11.973-11.984 mm (0.4714-0.4718 in.) for the 400/500 cc.

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.

Fig. 3-155

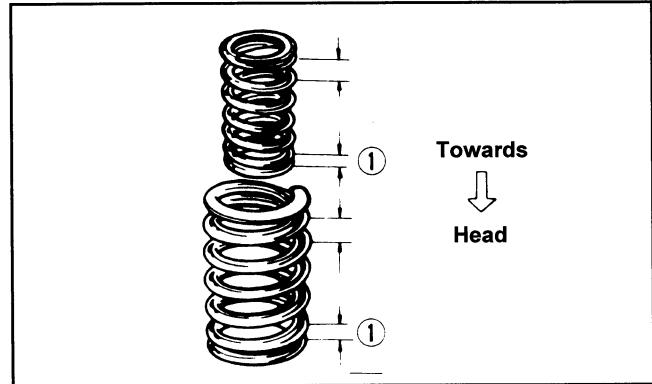


CC144D

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.

Fig. 3-156



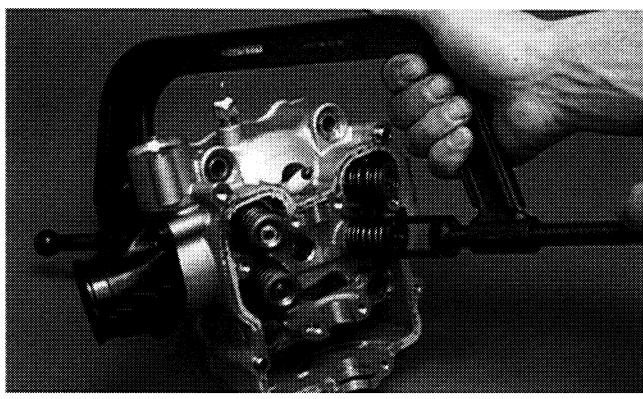
ATV1011

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

Fig. 3-157



Fig. 3-158



PISTON ASSEMBLY

■ NOTE: Whenever a piston, rings, or pins 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.

Fig. 3-159



■ 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.

Fig. 3-160



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

1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.

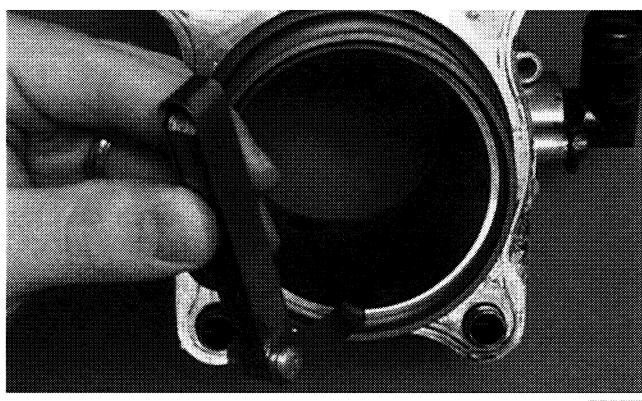
- Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be a maximum 0.70 mm (0.028 in.) 1st ring and 1.0 mm (0.039 in.) 2nd ring for the 250/300 cc, a maximum 0.50 mm (0.020 in.) both rings for the 400 cc, and a maximum 0.70 mm (0.0275 in.) both rings for the 500 cc.

Fig. 3-161



CC386D

Fig. 3-162

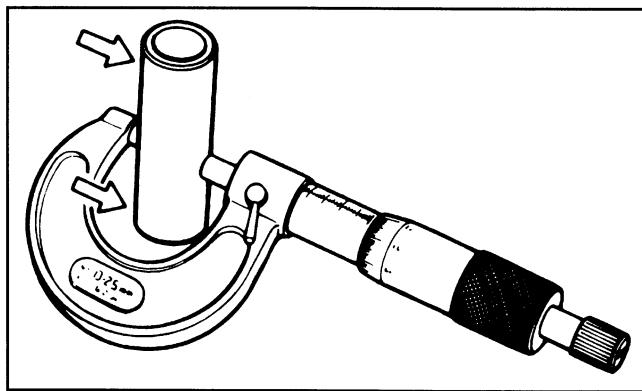


CC280D

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

- Measure the piston pin outside diameter at each end and in the center. If measurement is less than 16.980 mm (0.6685 in.) for the 250/300 cc, 20.98 mm (0.826 in.) for the 400 cc, and 22.98 mm (0.905 in.) for the 500 cc, the piston pin must be replaced.

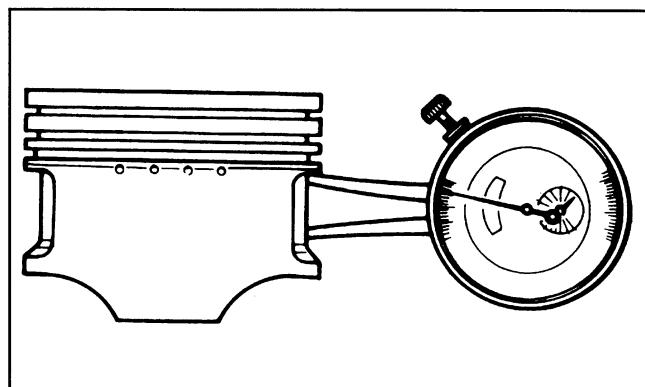
Fig. 3-163



ATV1070

- Insert an inside dial indicator into the piston-pin bore. The diameter must be a maximum 17.030 mm (0.6705 in.) for the 250/300 cc, 21.03 mm (0.828 in.) for the 400 cc, and 23.03 mm (0.907 in.) for the 500 cc. Take two measurements to ensure accuracy.

Fig. 3-164

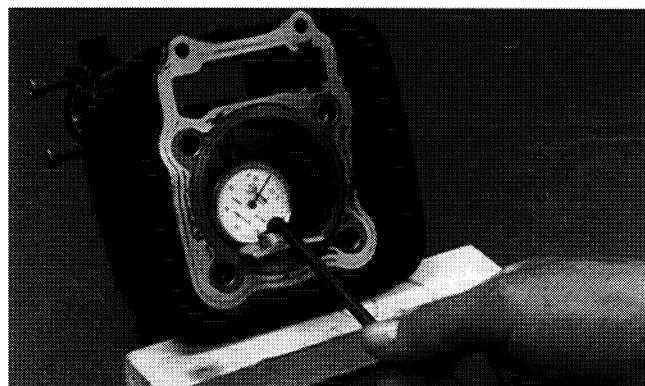


ATV1069

Measuring Piston Skirt/Cylinder Clearance

- Measure the cylinder front to back in six places.

Fig. 3-165



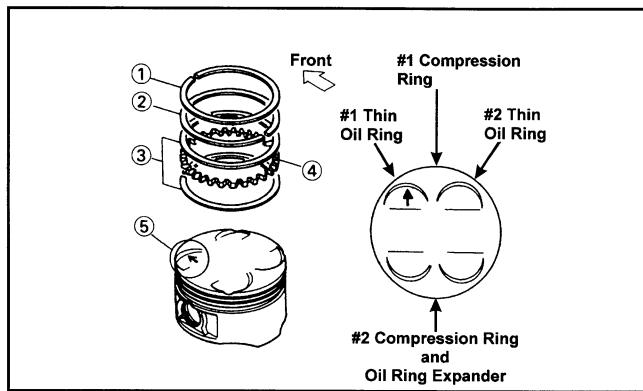
CC397D

- Measure the corresponding piston diameter at a point 18 mm (0.71 in.) for the 250/300 cc and 15 mm (0.60 in.) for the 400/500 cc 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.) for the 250/300 cc and within a range of 0.045-0.120 mm (0.0018-0.0047 in.) for the 400 cc or 0.76-1.02 mm (0.030-0.040 in.) for the 500 cc.

Installing Piston Rings

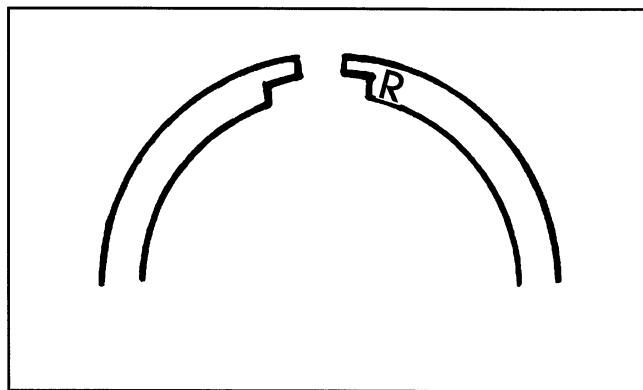
1. Install a thin ring, corrugated ring, and thin ring in the bottom groove of the piston. Stagger the gaps of the upper and lower thin rings.

Fig. 3-166



2. Install the middle and upper rings so the letter on the top surface of each ring faces the dome of the piston. Rotate the rings until the ring gaps are on directly opposite sides of the piston.

Fig. 3-167



726-306A

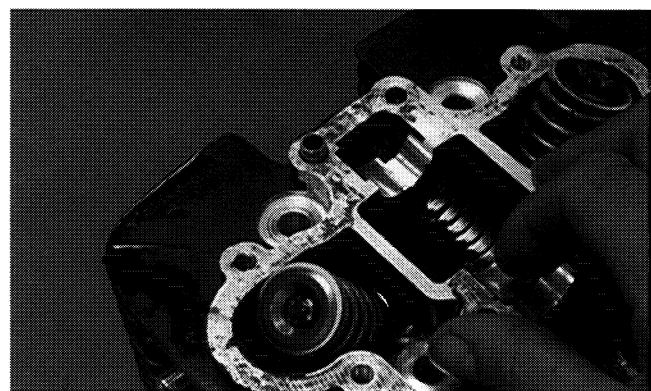
1. Using a non-metallic carbon removal tool, remove any carbon buildup from the combustion chamber being careful not to nick, scrape, or damage the combustion chamber or the sealing surface.
2. Inspect the spark plug hole for any damaged threads. Repair damaged threads using a "heli-coil" insert.
3. 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.

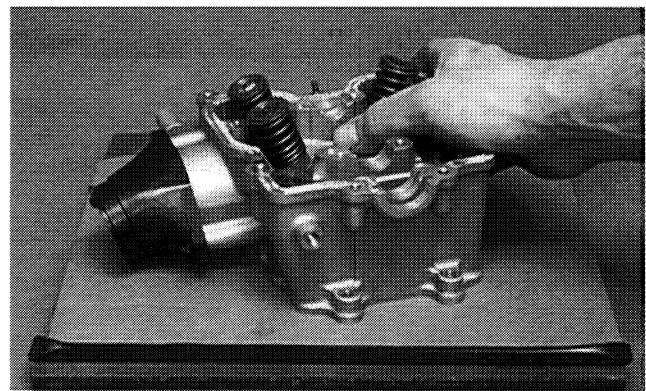
3

Fig. 3-168



CC387D

Fig. 3-169



CC128D

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.

Measuring Cylinder Head Distortion

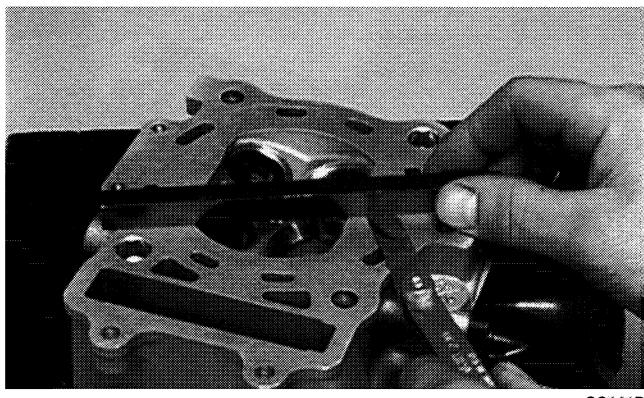
1. Remove any carbon buildup in the combustion chamber.
2. Lay a straightedge across the cylinder head; then using a feeler gauge, check the distortion factor between the head and the straightedge.
3. Maximum distortion is 0.05 mm (0.002 in.).

Fig. 3-170



CC388D

Fig. 3-171



CC141D

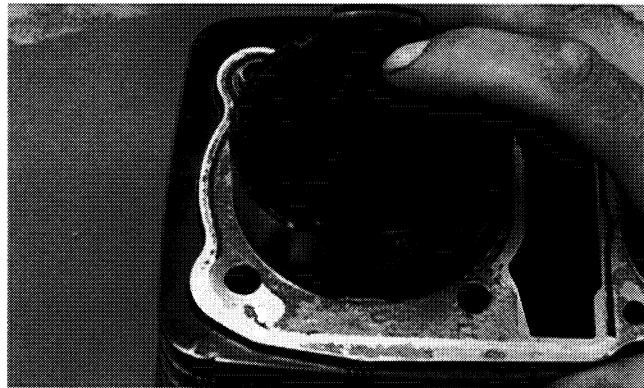
Cleaning/Inspecting Cylinder

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

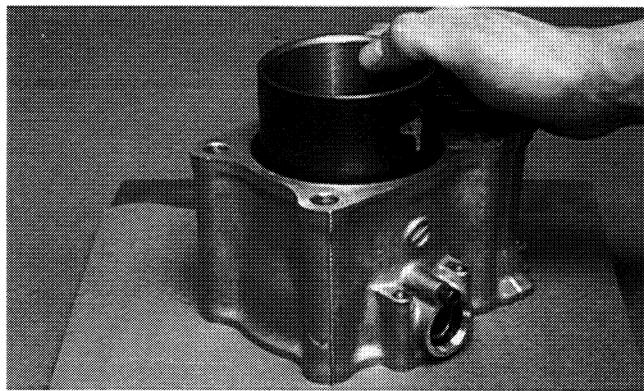
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

Fig. 3-172



CC389D

Fig. 3-173



CC129D

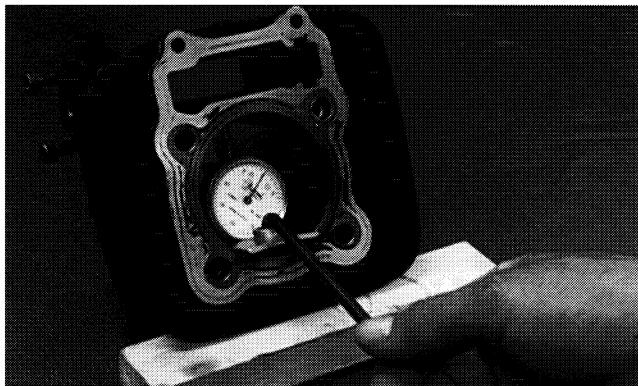
Inspecting Cam Chain Guide

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

Honing Cylinder

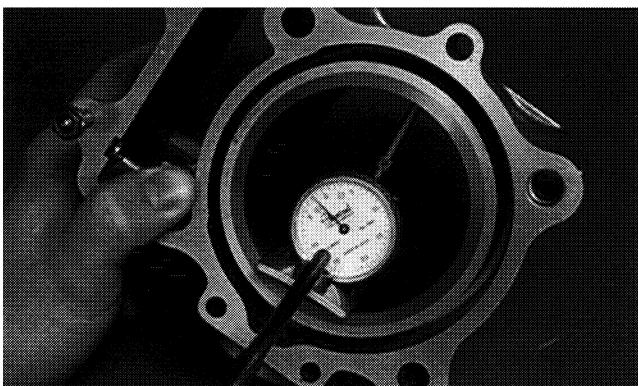
1. Using a slide gauge and a dial indicator or a snap gauge, measure the cylinder bore diameter in three locations from top to bottom and again from top to bottom at 90° from the first measurements for a total of six measurements. The trueness (out-of-roundness) is the difference between the highest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

Fig. 3-174



CC397D

Fig. 3-175

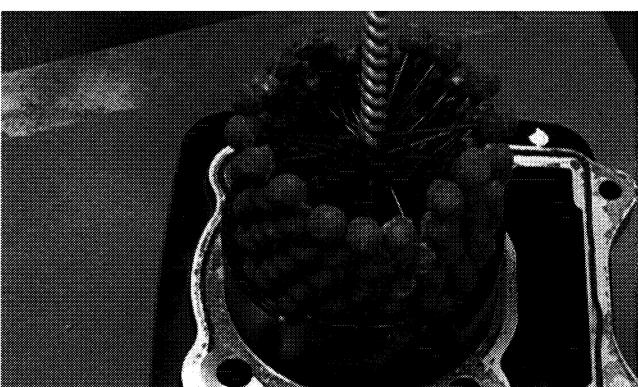


CC127D

2. Wash the cylinder in parts-cleaning solvent.
3. Inspect the cylinder for pitting, scoring, scuffing, and corrosion. If marks are found, repair the surface using a rigid cylinder hone.

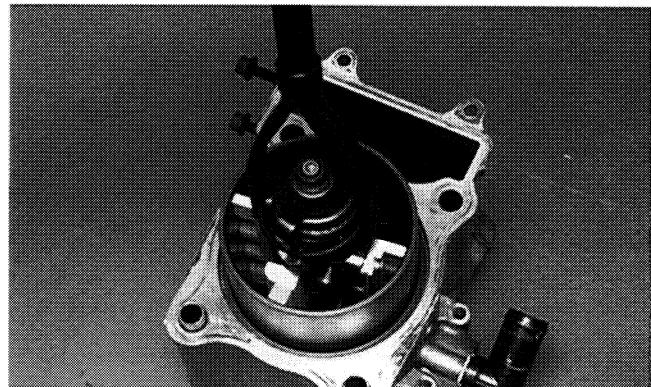
■ NOTE: To produce the proper 60° cross-hatch pattern, use a low RPM drill (600 RPM) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinder after honing using soap and hot water. Dry with compressed air; then immediately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

Fig. 3-176



CC390D

Fig. 3-177



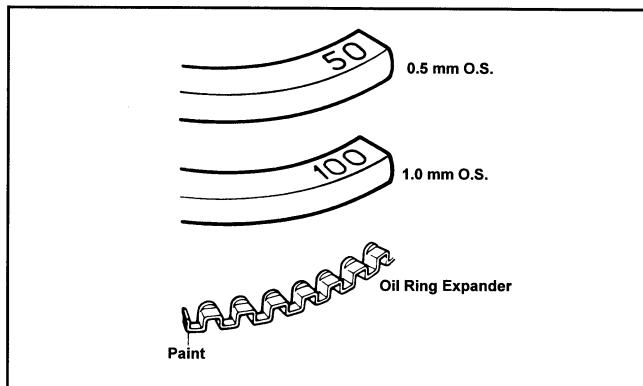
CC321D

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

Fig. 3-178



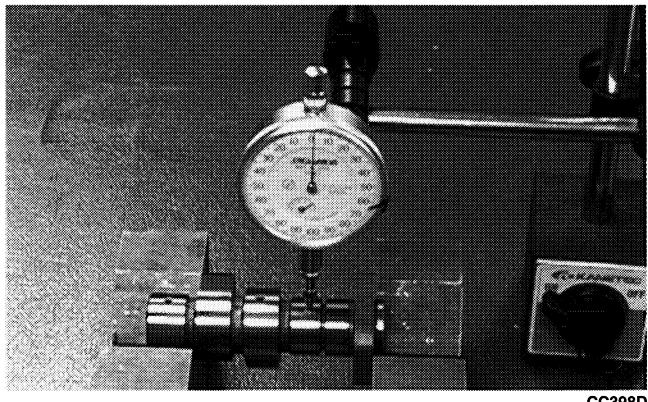
ATV-1068

Measuring Camshaft Runout

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

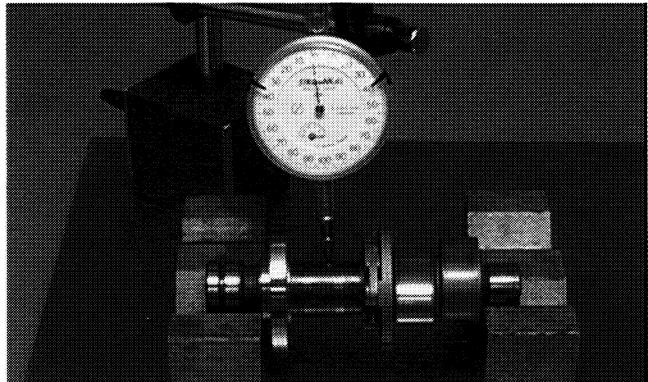
1. Place the camshaft on a set of V blocks; then position the dial indicator contact point against the shaft and zero the indicator.

Fig. 3-179



CC398D

Fig. 3-180



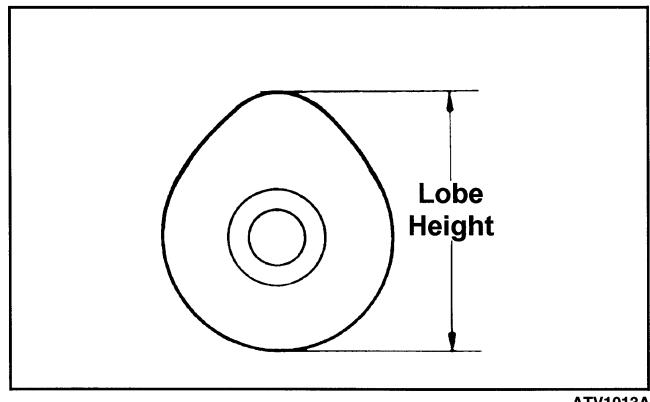
CC283D

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.

Fig. 3-181



ATV1013A

2. On the 250/300 cc, 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.). On the 400/500 cc, 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.).

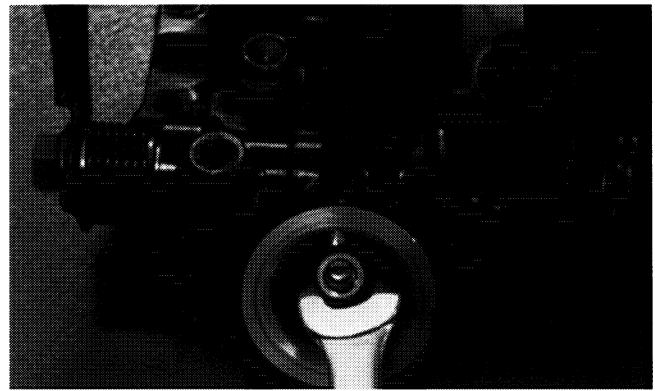
Inspecting Camshaft Bearing Journal

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

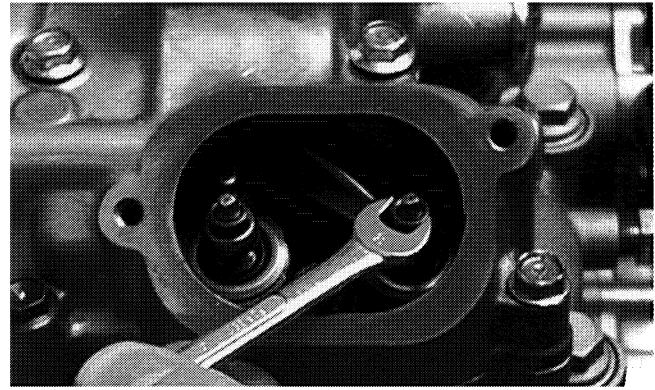
1. Remove the adjuster screws and jam nuts.

Fig. 3-182



CC407D

Fig. 3-183



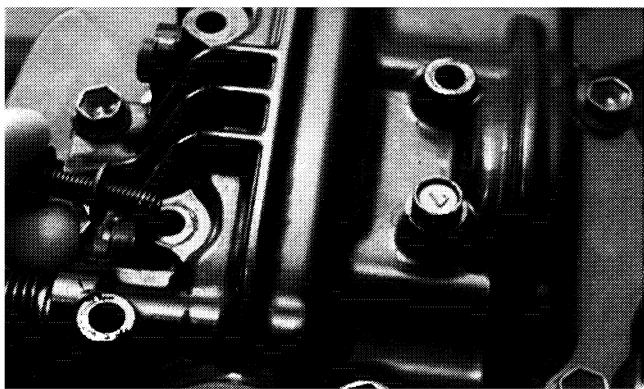
CC005D

2. Place a strip of plasti-gauge in each of the cam shaft 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.

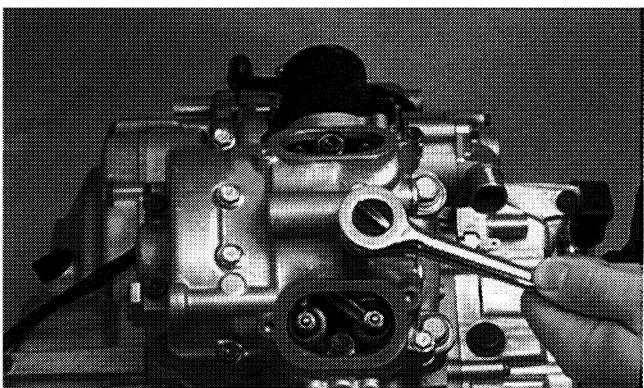
4. Remove the cap screws securing the valve cover to the cylinder; then remove the valve cover and camshaft.

Fig. 3-184



CC367D

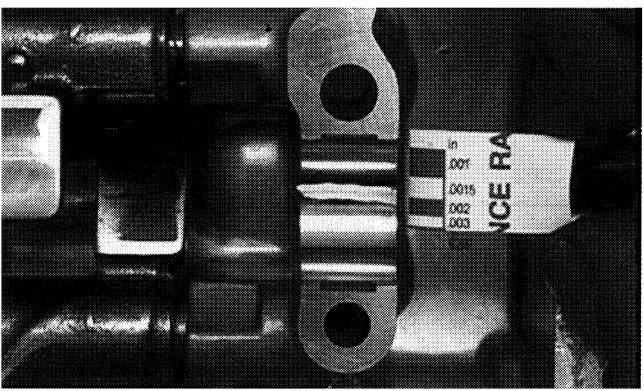
Fig. 3-185



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.

Fig. 3-186



CC145D

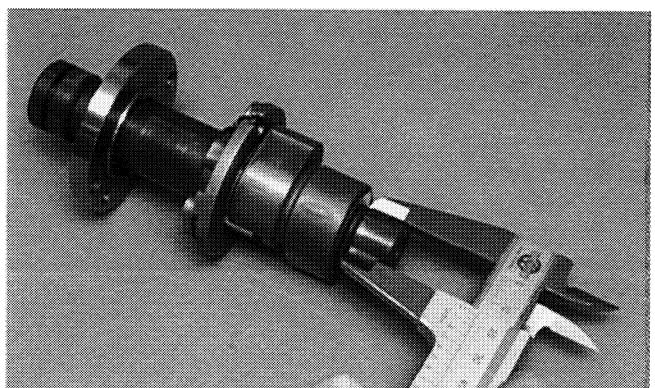
6. If clearance is excessive, measure the journals of the camshaft.

Fig. 3-187



CC399D

Fig. 3-188



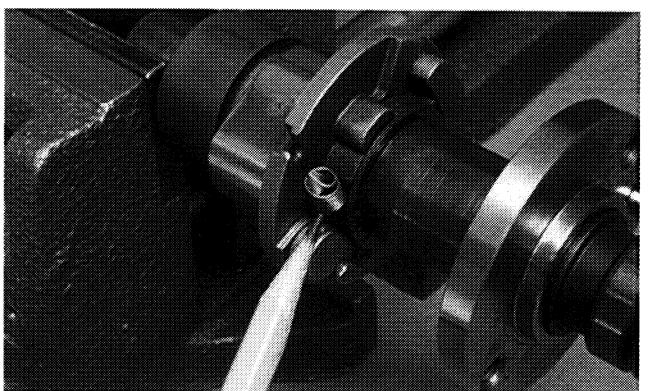
CC287D

■ **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 (400/500 cc)

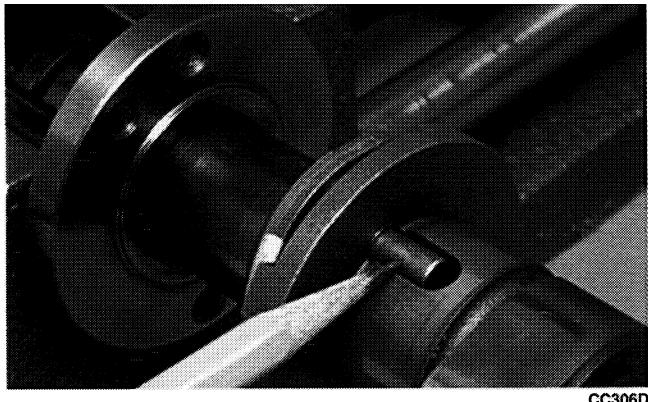
1. Inspect the spring and drive pin for damage.

Fig. 3-189



CC304D

Fig. 3-190



CC306D

Fig. 3-191



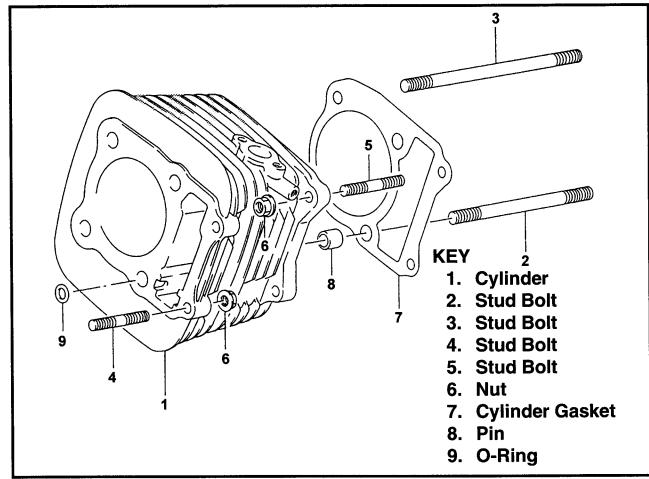
CC308D

2. If damaged, the camshaft must be replaced.

Installing Top-Side Components (250/300 cc)

A. Piston B. Cylinder

Fig. 3-192



0733-744

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

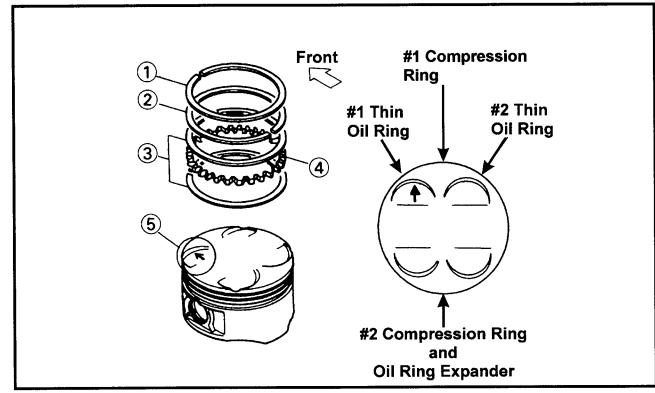
- Install a thin oil ring, corrugated oil ring, and thin oil ring in the bottom groove of the piston. Stagger the gaps of the upper and lower thin rings.

Fig. 3-193



CC400D

Fig. 3-194



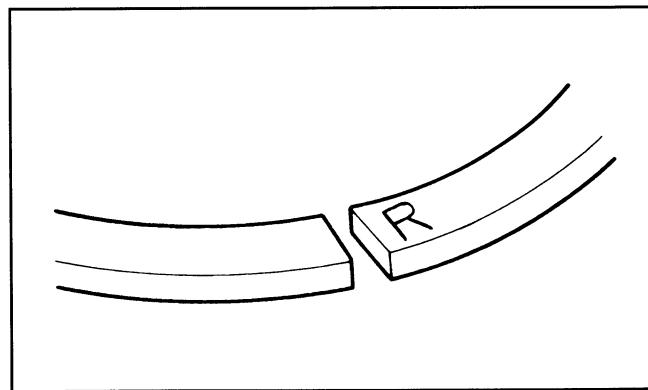
ATV-1085

■ NOTE: To be installed correctly, the ends of the corrugated oil ring must touch.

CAUTION

Install the middle and upper oil rings so the letter on the top surface of each ring faces the dome of the piston.

Fig. 3-195



ATV-1024

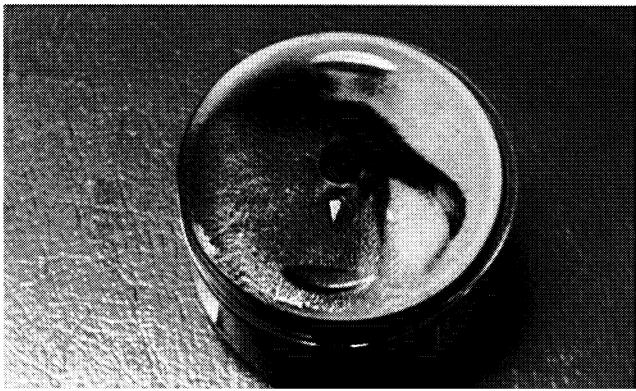
CAUTION

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.

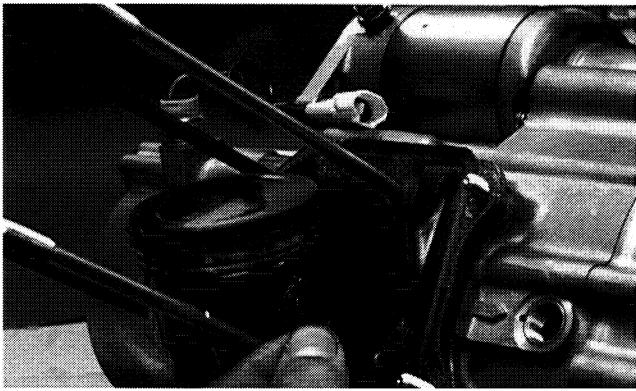
■ **NOTE: The piston should be installed so the arrow points towards the front.**

Fig. 3-196



CC383D

Fig. 3-197



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.

Fig. 3-198



CC381D

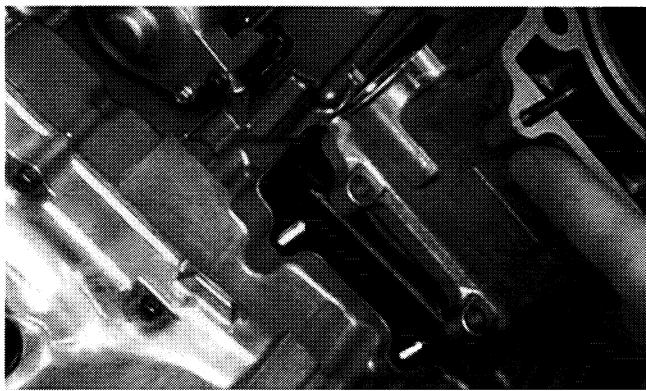
3. Lubricate the inside wall of the cylinder; then using a ring compressor or the fingers, compress the rings and slide the cylinder over the piston. Route the cam chain up through the cylinder cam chain housing; then remove the piston holder and seat the cylinder firmly on the crankcase.

3

CAUTION

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

Fig. 3-199

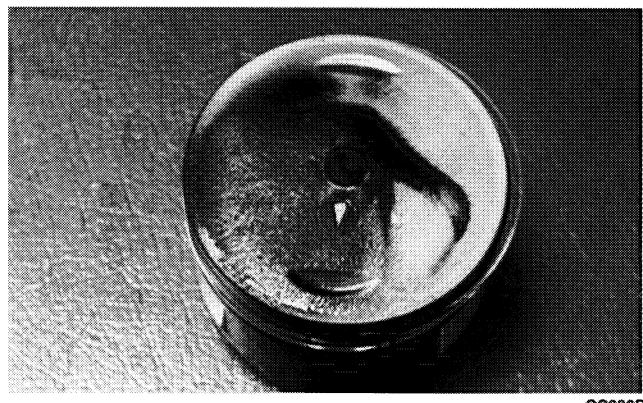


CC024D

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.**

Fig. 3-200



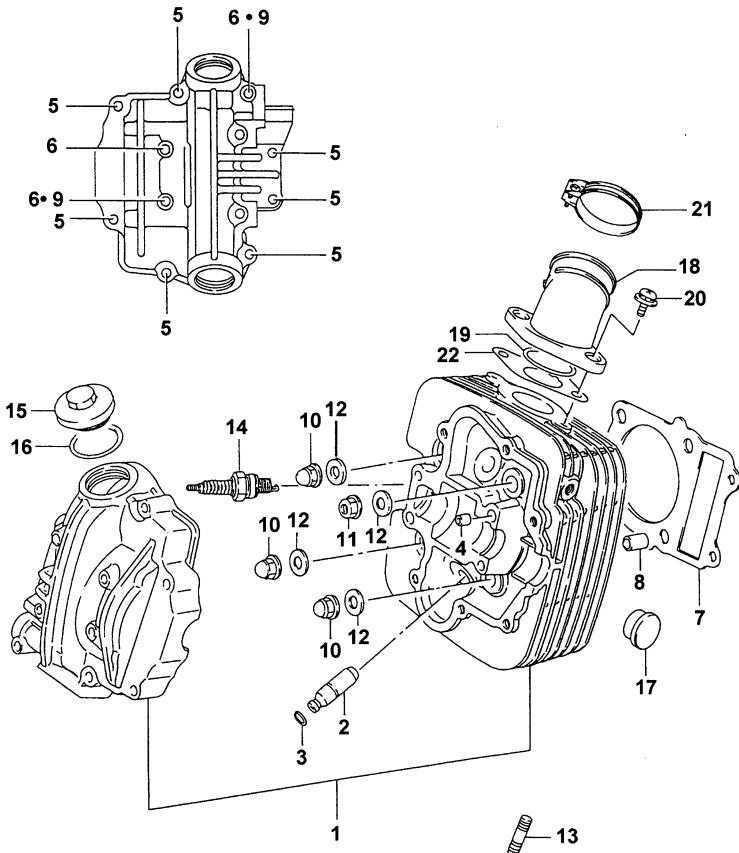
CC380D

C. Cylinder Head D. Valve Cover

Fig. 3-201

KEY

- 1. Cylinder Head Assy
- 2. Valve Guide
- 3. O-Ring
- 4. Pin
- 5. Cap Screw
- 6. Cap Screw
- 7. Cylinder Head Gasket
- 8. 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 Assy
- 19. O-Ring
- 20. Cap Screw
- 21. Clamp
- 22. Gasket



0733-743

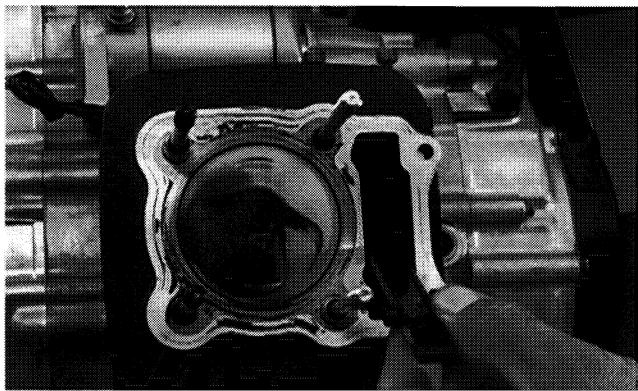
■ NOTE: Steps 1-4 in the preceding sub-section must precede this procedure.

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.

Fig. 3-202



CC379D

6. Install the O-ring onto the front left-side stud.

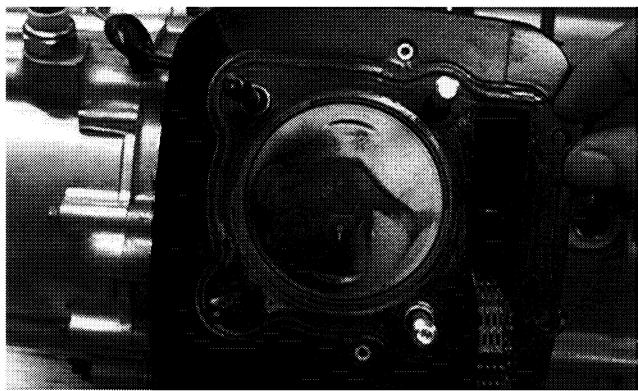
Fig. 3-203



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.

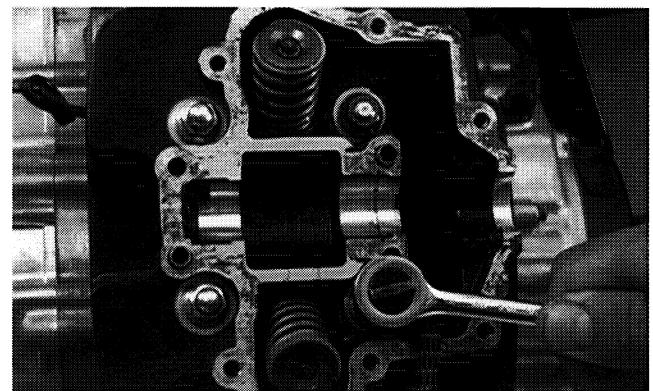
Fig. 3-204



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.

Fig. 3-205



CC377D

9. Loosely install the remaining cylinder head nuts.

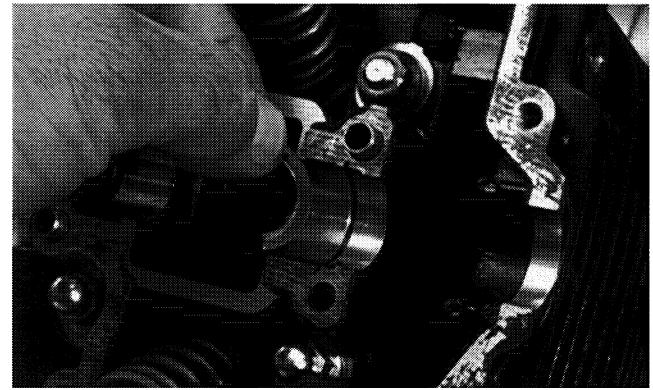
Fig. 3-206



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.

Fig. 3-207



CC374D

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

Fig. 3-208



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.

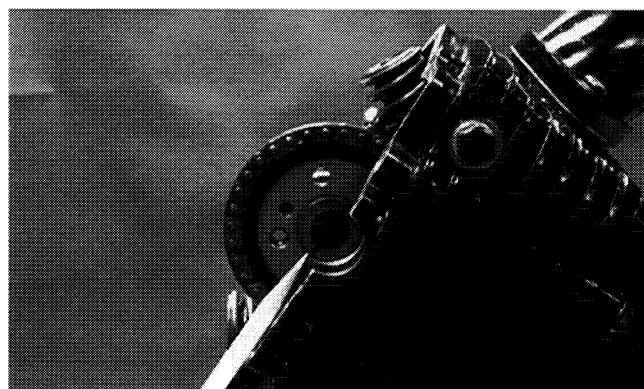
Fig. 3-209



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.

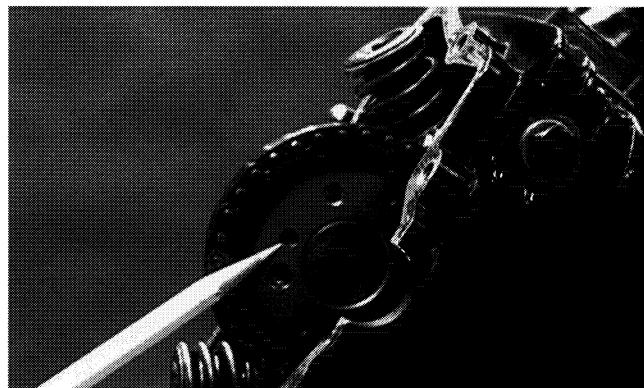
Fig. 3-210



CC401D

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

Fig. 3-211



CC402D

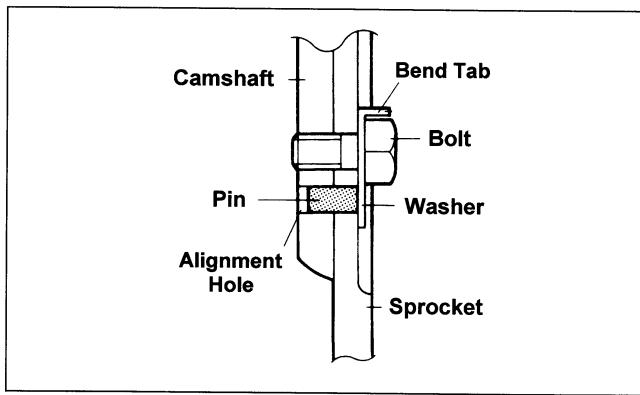
14. When the camshaft assembly is seated, ensure the following.
 - A. Piston still at top-dead-center.
 - B. Camshaft lobes directed down (toward the piston).
 - C. Camshaft alignment marks parallel to the valve cover mating surface.
 - D. Recessed side of the sprocket directed toward the cam lobes.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

CAUTION

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

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

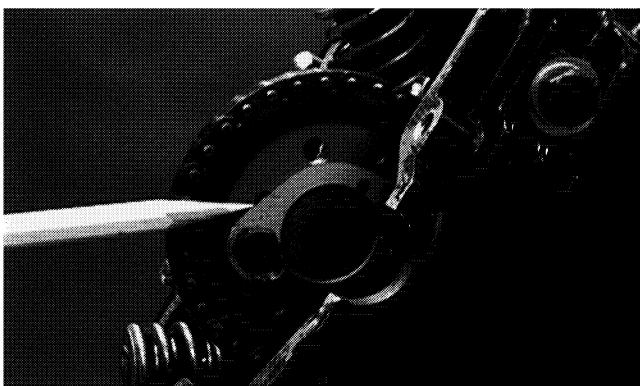
Fig. 3-212



CAUTION

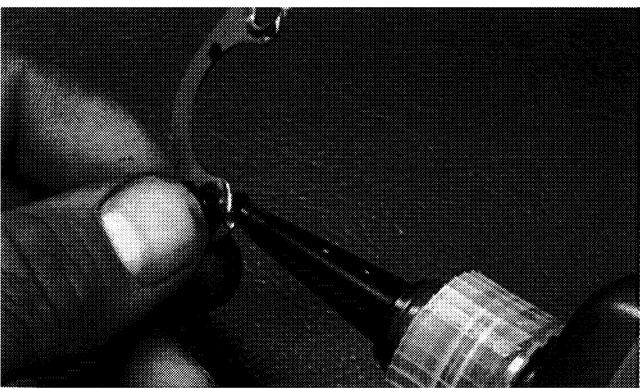
Care must be taken that the tab washer is installed correctly to cover the alignment hole on the sprocket. If the alignment pin falls out, severe engine damage will result.

Fig. 3-213



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

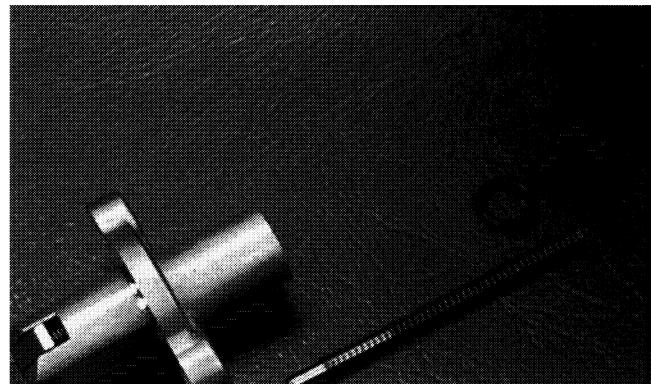
Fig. 3-214



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.

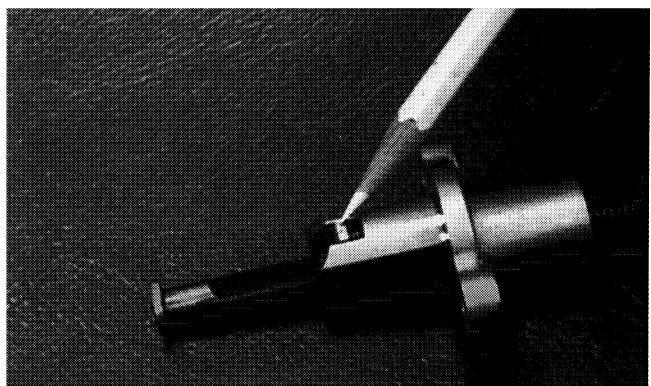
Fig. 3-215



3

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

Fig. 3-216



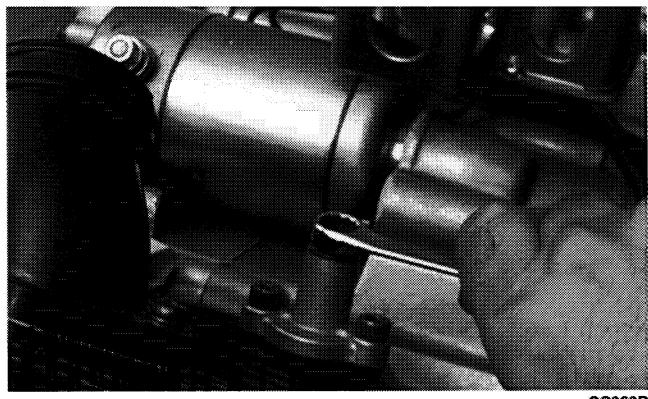
20. Place the chain tensioner assembly and gasket into position on the cylinder and secure with the two Allen-head cap screws.

Fig. 3-217



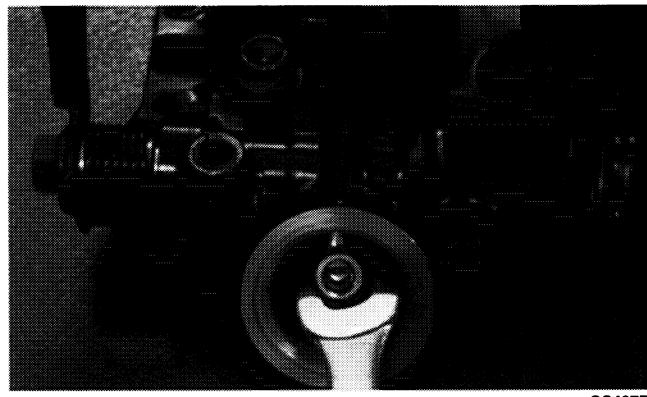
21. Install the cap screw into the end of the chain tensioner.

Fig. 3-218



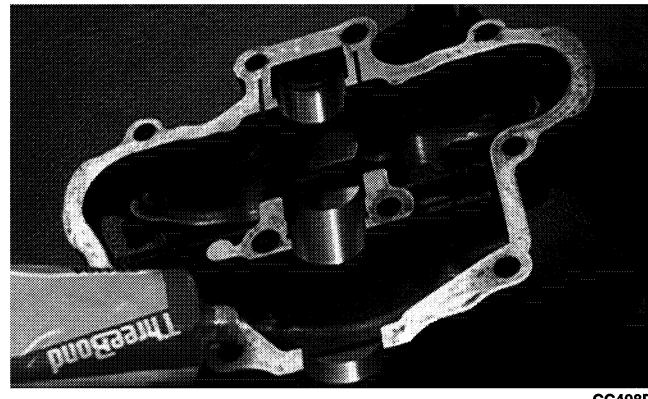
22. Rotate the crankshaft until the second cap screw securing the sprocket can be installed; then install the cap screw (coated with red Loctite #271) and tighten to 1.15 kg-m (8.5 ft-lb). Bend the tab to secure the cap screw.
23. Rotate the crankshaft until the first cap screw securing the sprocket 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.

Fig. 3-219



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

Fig. 3-220

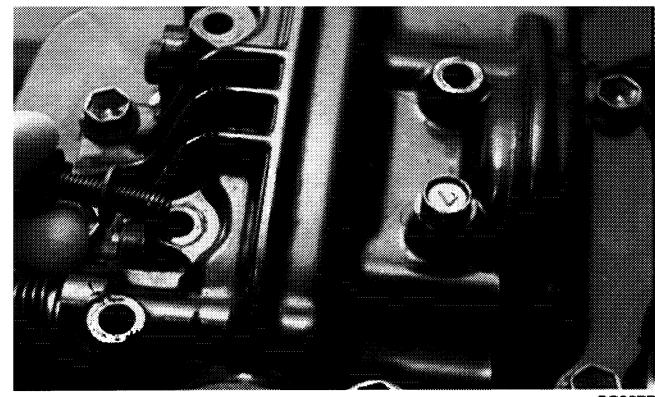


26. Place the valve cover into position.

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

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

Fig. 3-221

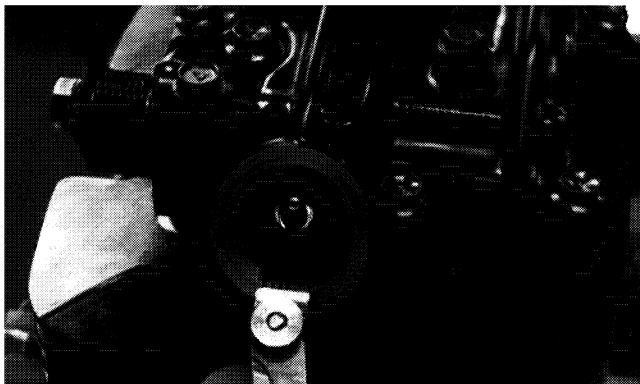


28. In a crisscross pattern starting from the center and working outward, tighten the cap screws to 1 kg-m (7 ft-lb).

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

- A. Turn the engine over until the piston reaches top dead center on the compression stroke.
- B. Insert a feeler gauge between the tappet and valve until slight friction is felt when sliding the feeler gauge back and forth.

Fig. 3-222



CC409D

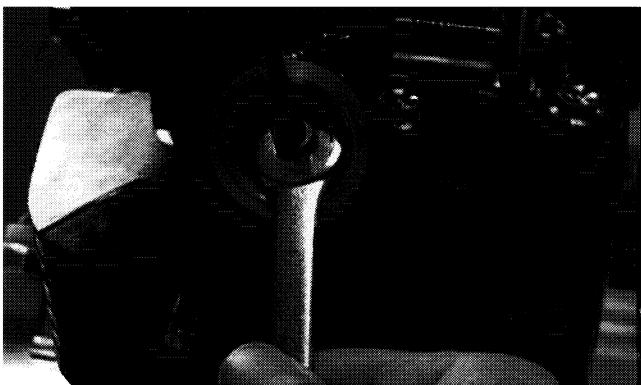
| VALVE/TAPPET CLEARANCE (Cold Engine) | |
|--------------------------------------|---------------------|
| Intake | 0.13 mm (0.005 in.) |
| Exhaust | 0.25 mm (0.010 in.) |

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.

C. If clearance is not within specifications, loosen the jam nut and rotate the tappet adjuster screw until the clearance is within specifications.

Fig. 3-223



CC410D

D. Tighten each jam nut securely after completing the adjustment.

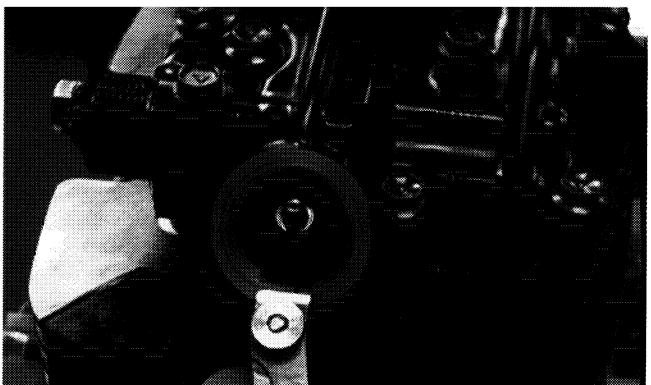
Fig. 3-224



CC407D

E. Recheck valve/tappet clearance to verify the adjustment.

Fig. 3-225



CC409D

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

Fig. 3-226



CC366D

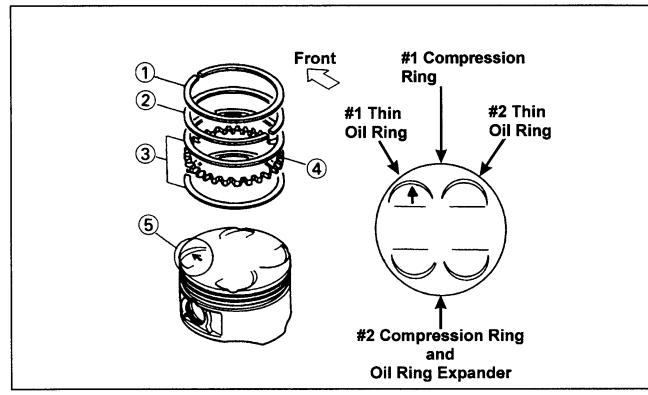
31. Install the spark plug; then install the timing inspection plug.

Fig. 3-227



CC411D

Fig. 3-229

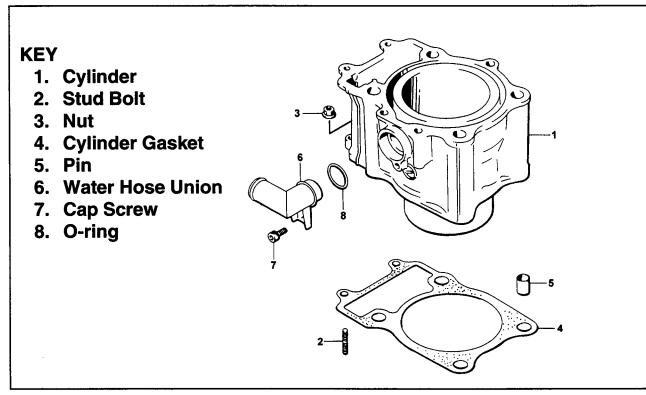


ATV-1085

Installing Top-Side Components (400/500 cc)

A. Piston B. Cylinder

Fig. 3-228

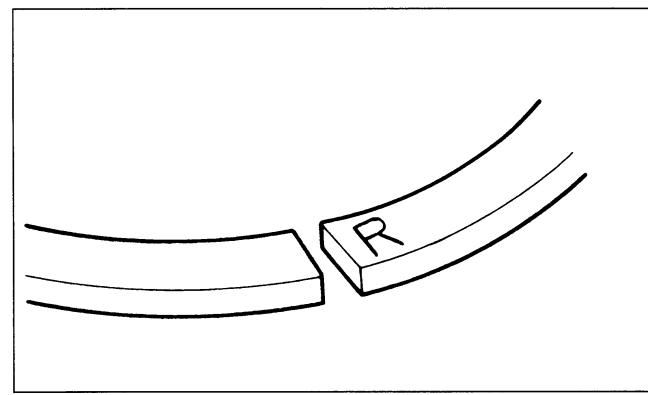


0732-301

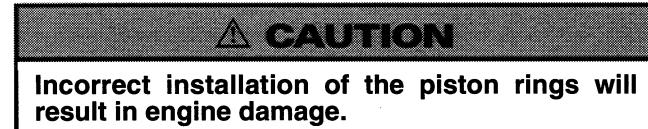
■ NOTE: If the piston rings were removed, install them in this sequence.

- A. Install a thin oil ring, corrugated oil ring, and thin oil ring in the bottom groove of the piston. Stagger the gaps of the upper and lower thin rings.

Fig. 3-230



ATV-1024



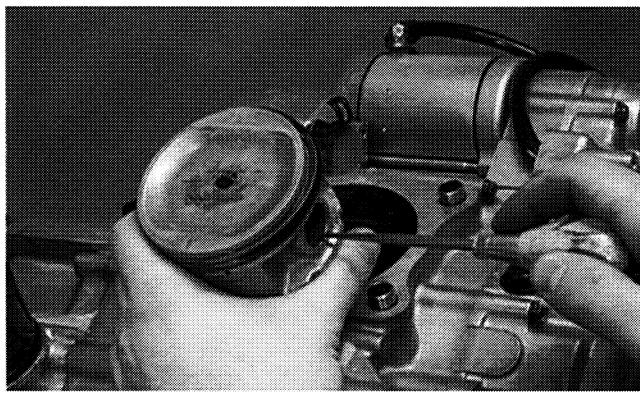
■ CAUTION

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.

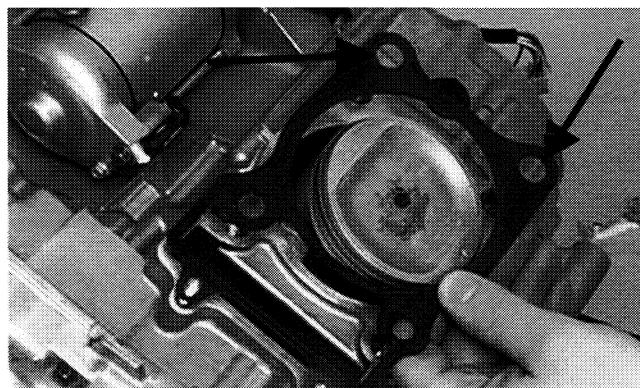
Fig. 3-231



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.

Fig. 3-232



CC025D

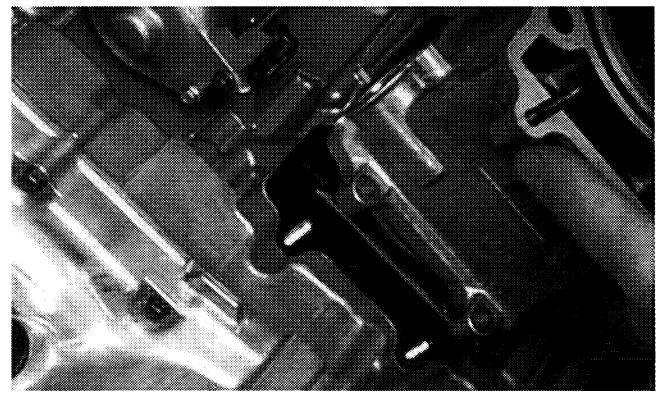
3. Lubricate the inside wall of the cylinder; then using a ring compressor or the fingers, compress the rings and slide the cylinder over the piston. Route the cam chain up through the cylinder cam chain housing; then remove the piston holder and seat the cylinder firmly on the crankcase.



CAUTION

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

Fig. 3-233



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.

3

Fig. 3-234



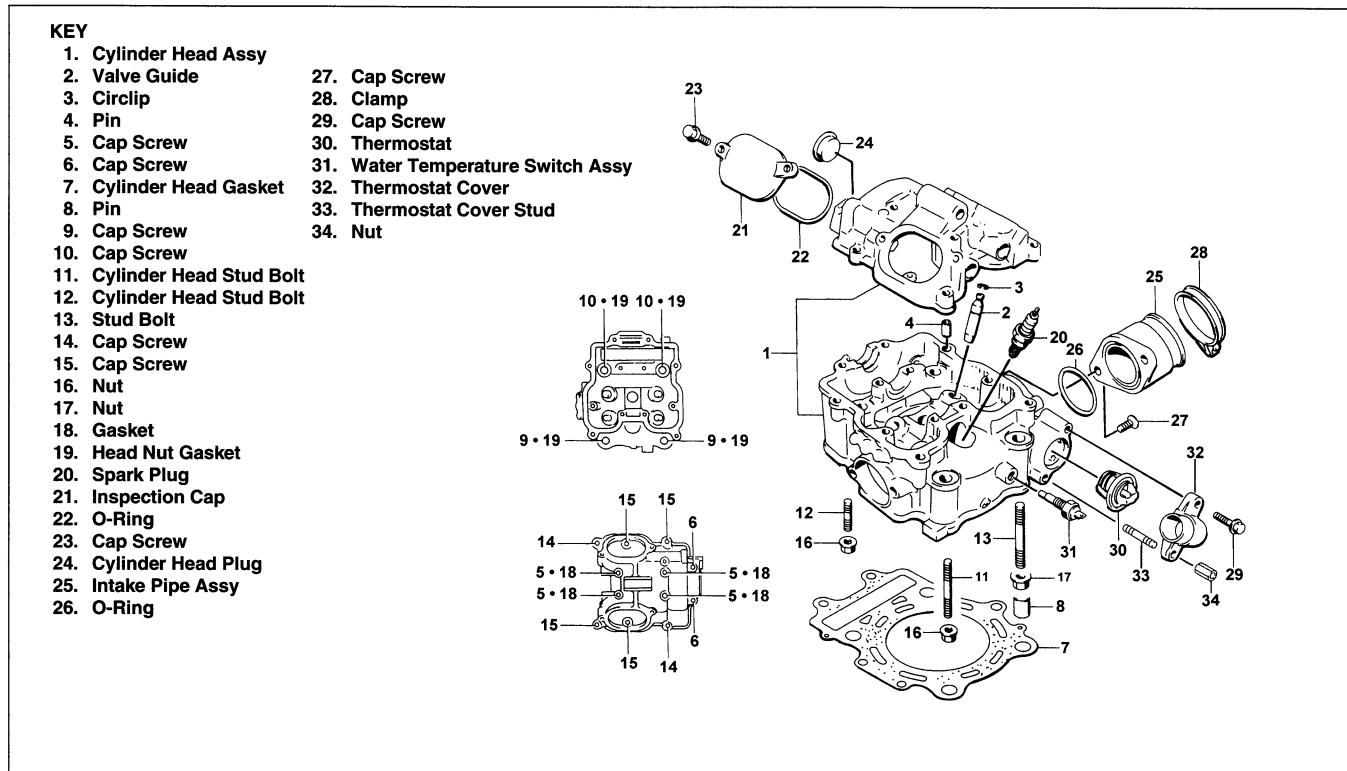
CC023D

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

C. Cylinder Head

D. Valve Cover

Fig. 3-235



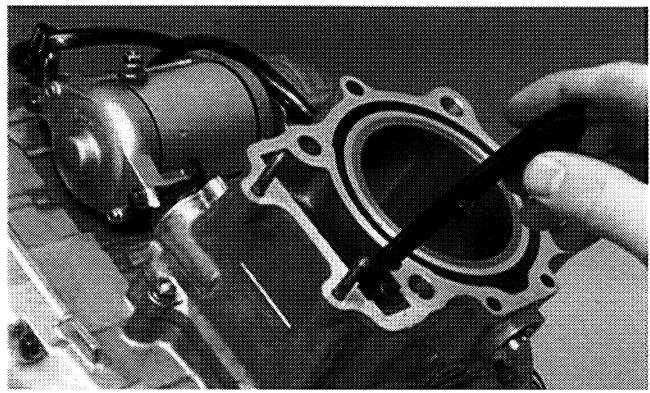
0734-324

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

6. Place the chain guide into the cylinder.



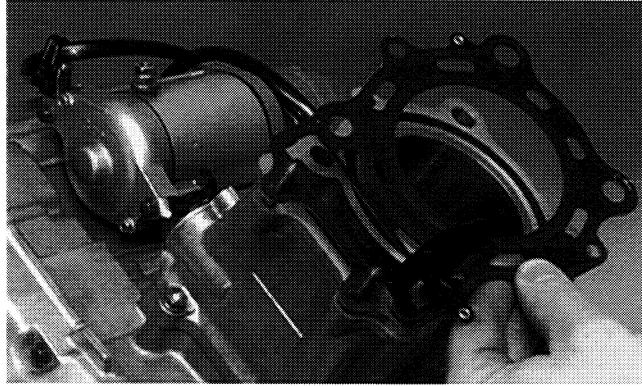
Fig. 3-236



CC022D

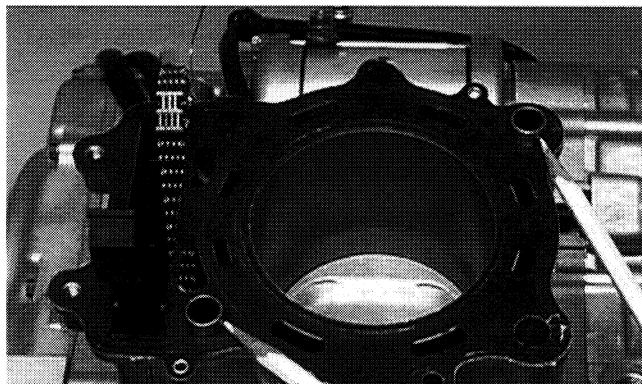
7. Place the head gasket into position on the cylinder. Place the alignment pins into position; then place the head assembly into position on the cylinder.

Fig. 3-237



CC020D

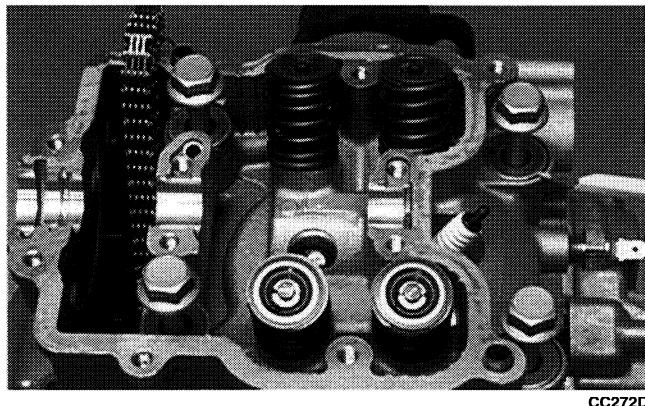
Fig. 3-238



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.

Fig. 3-239



9. Loosely install the five cylinder head nuts.

Fig. 3-240

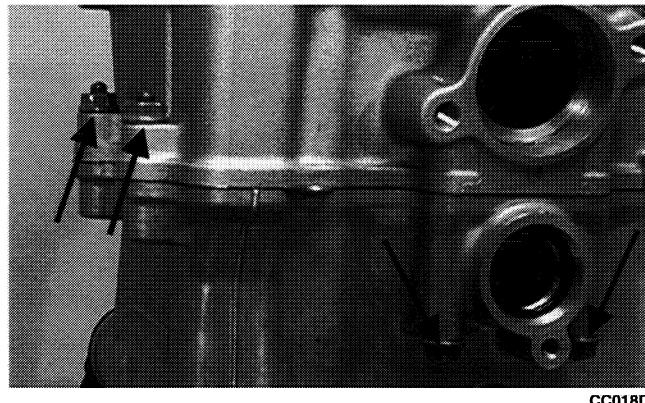
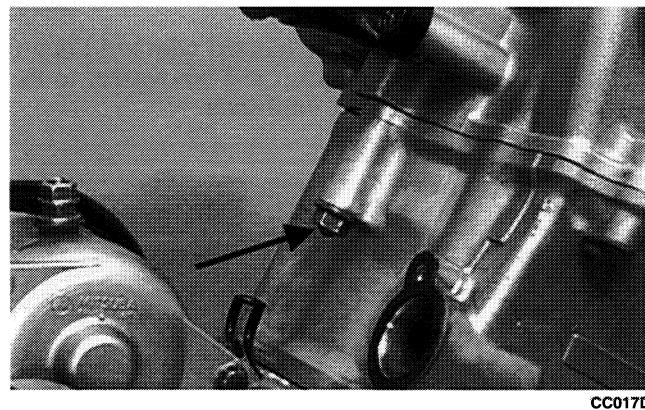


Fig. 3-241

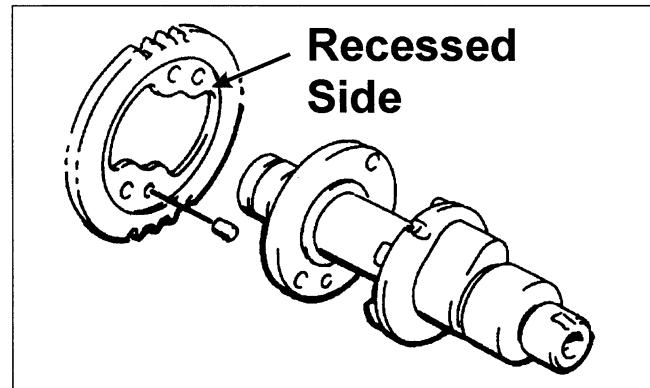


10. In a crisscross pattern, tighten the four cylinder head cap screws to 3.8 kg-m (27.5 ft-lb); then tighten the 8 mm nut to 2.5 kg-m (18 ft-lb). Using a crisscross pattern, tighten the four 6 mm nuts to 1.1 kg-m (8 ft-lb). Tighten the two cylinder to crankcase nuts securely.

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.

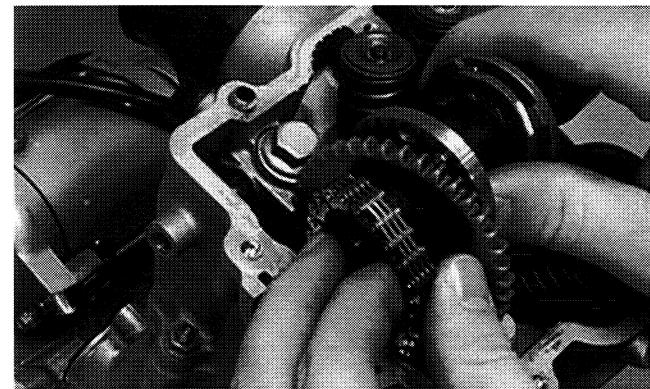
Fig. 3-242



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

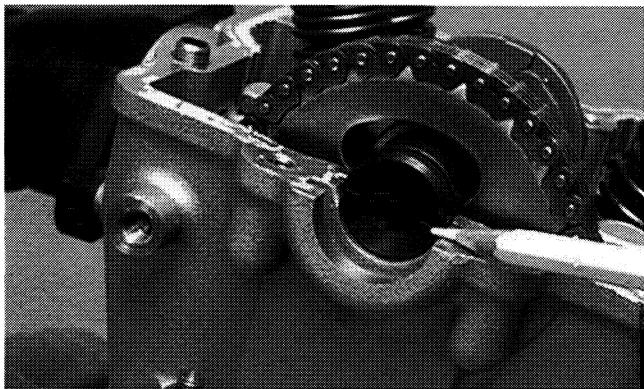
13. With the cam lobes directed down (toward the piston), maneuver the camshaft/sprocket assembly through the chain and towards its seating position; then loop the chain over the sprocket.

Fig. 3-243



■ **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.

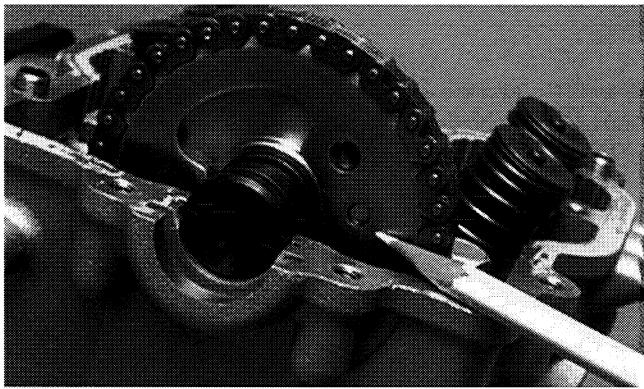
Fig. 3-244



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.

Fig. 3-245



CC268D

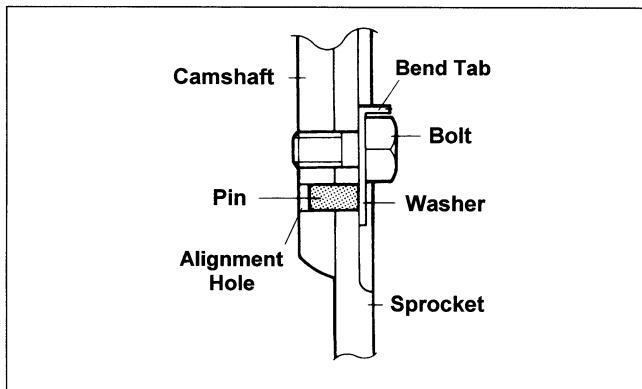
- A. Piston still at top-dead-center.
- B. Camshaft lobes directed down (toward the piston).
- C. Camshaft alignment marks parallel to the valve cover mating surface.
- D. Recessed side of the sprocket directed toward the cam lobes.
- E. Camshaft alignment pin and sprocket alignment hole (smallest) are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

Fig. 3-246

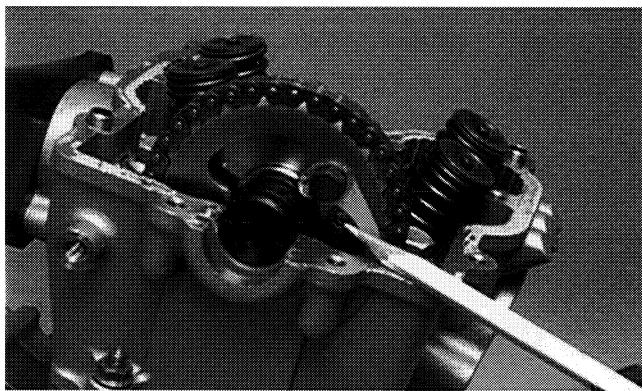


ATV1027

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.

Fig. 3-247



CC270D

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

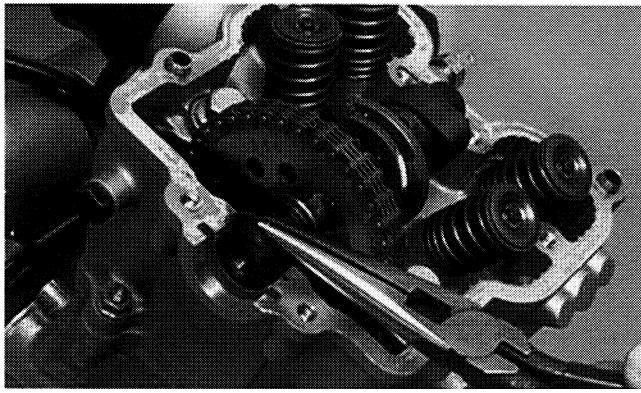
Fig. 3-248



CC269D

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

Fig. 3-249



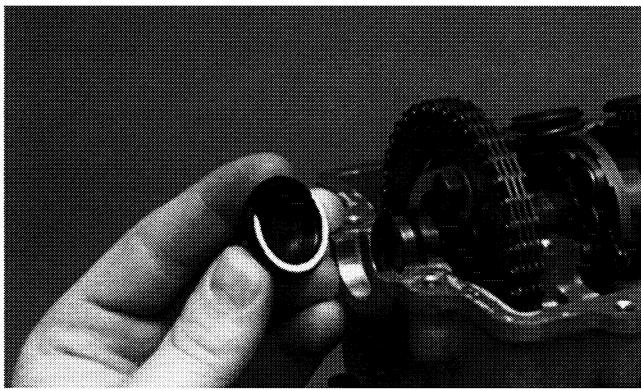
CC012D

18. 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.

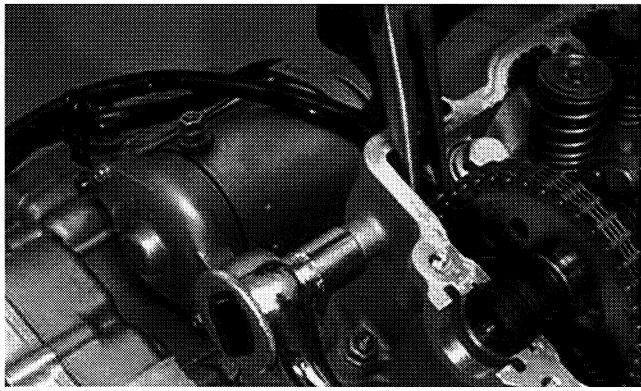
Fig. 3-250



CC274D

19. Place the chain tensioner into position and secure with the cap screw and washer.

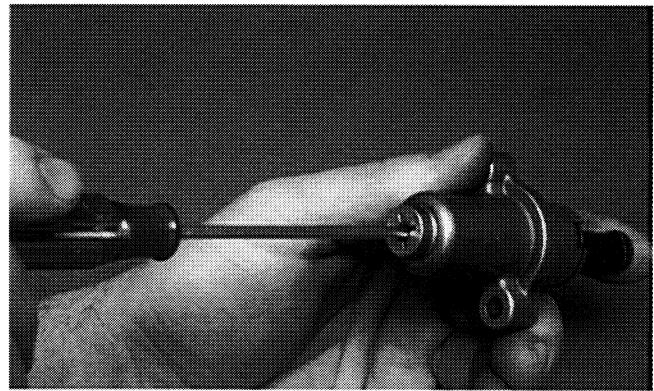
Fig. 3-251



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.

Fig. 3-252



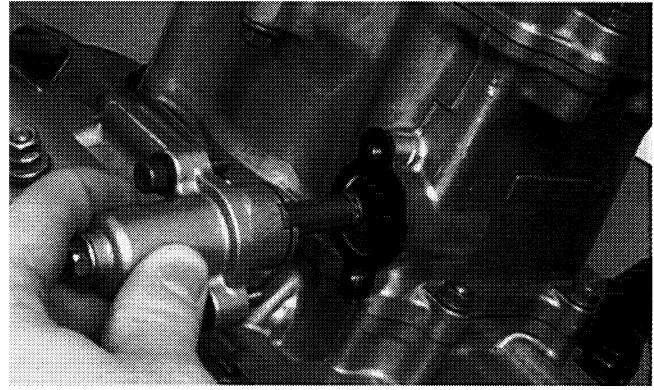
CC309D

3

■ **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.

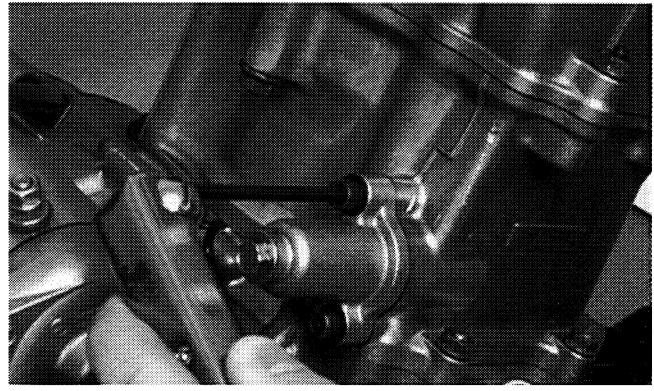
21. Place the chain tensioner adjuster assembly and gasket into position on the cylinder and secure with the two Allen-head cap screws.

Fig. 3-253



CC011D

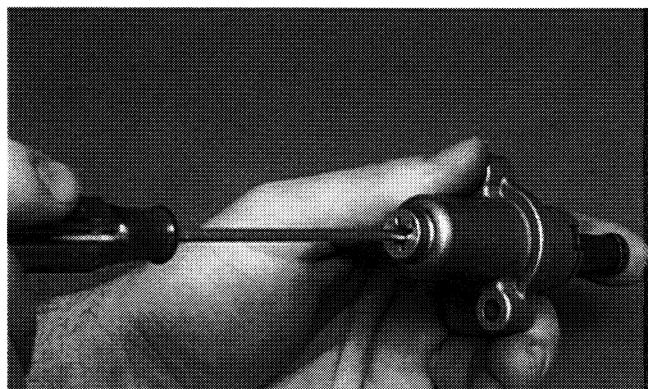
Fig. 3-254



CC010D

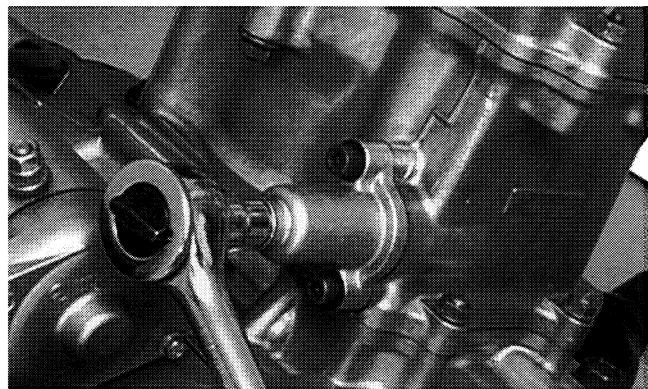
- Using a flat-blade screwdriver, rotate the adjuster screw inside the tensioner counterclockwise until all tension is released; then install the cap screw into the end of the chain tensioner.

Fig. 3-255



CC309D

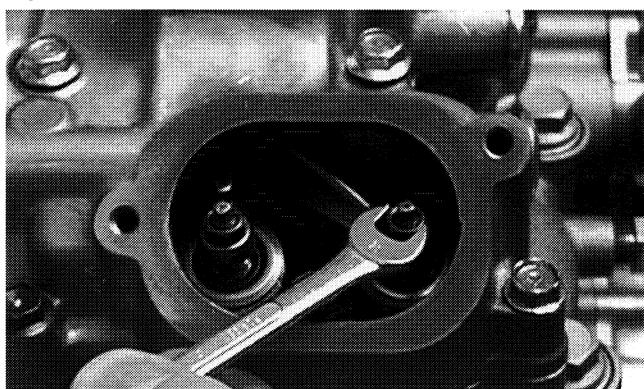
Fig. 3-256



CC009D

- Rotate the crankshaft until the second cap screw securing the sprocket can be installed; then install the cap screw (coated with red Loctite #271) and tighten to 1.15 kg-m (8.5 ft-lb). Bend the tab to secure the cap screw.
- Rotate the crankshaft until the first cap screw securing the sprocket can be addressed; then tighten to 1.15 kg-m (8.5 ft-lb). Bend the tab to secure the cap screw.
- Loosen the four adjuster screw jam nuts; then loosen the four adjuster screws on the rocker arms in the valve cover.

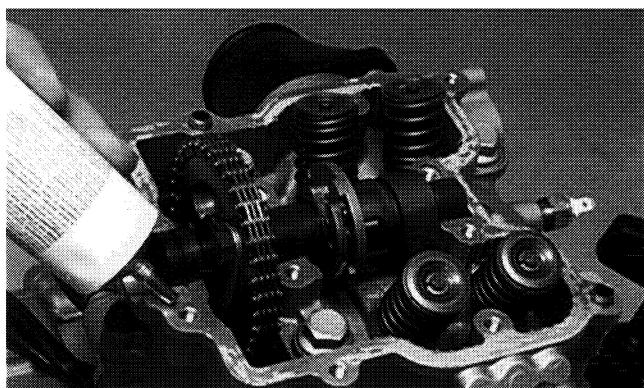
Fig. 3-257



CC005D

- Apply a thin coat of Three Bond Sealant (p/n 0636-070) to the mating surfaces of the cylinder head and valve cover.

Fig. 3-258



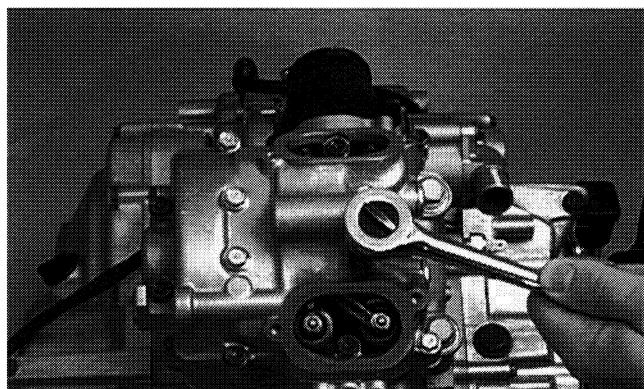
CC275D

- Place the valve cover into position.

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

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

Fig. 3-259

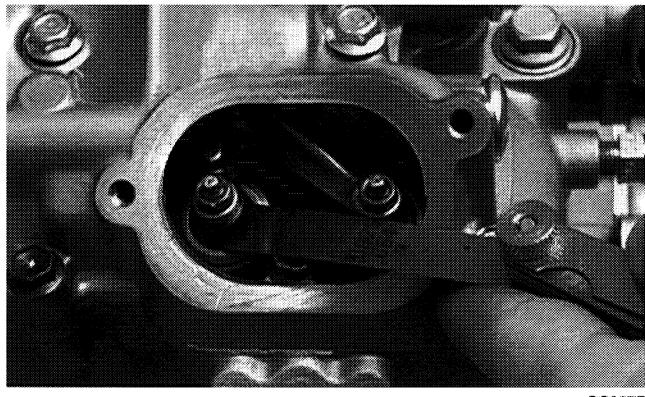


CC003D

- In a crisscross pattern starting from the center and working outward, tighten the cap screws to 1 kg-m (7 ft-lb).

30. Adjust valve/tappet clearance using the following procedure.
 - A. Turn the engine over until the piston reaches top dead center on the compression stroke.
 - B. Insert a feeler gauge between the tappet and valve until slight friction is felt when sliding the feeler gauge back and forth.

Fig. 3-260



CC007D

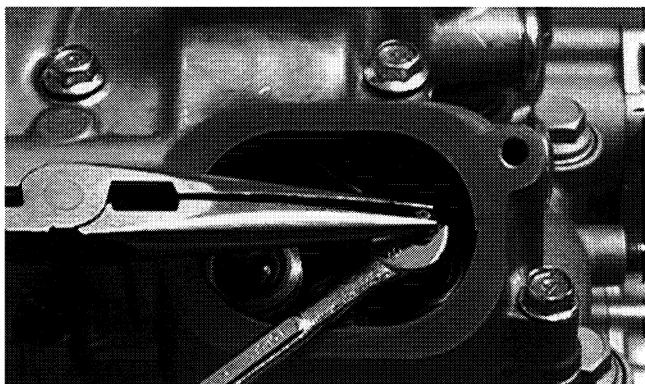
| VALVE/TAPPET CLEARANCE (Cold Engine) | |
|--------------------------------------|--------------------------------|
| Intake | 0.05-0.10 mm (0.002-0.004 in.) |
| Exhaust | 0.17-0.22 mm (0.007-0.009 in.) |

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.

- C. If clearance is not within specifications, loosen the jam nut and rotate the tappet adjuster screw until the clearance is within specifications.

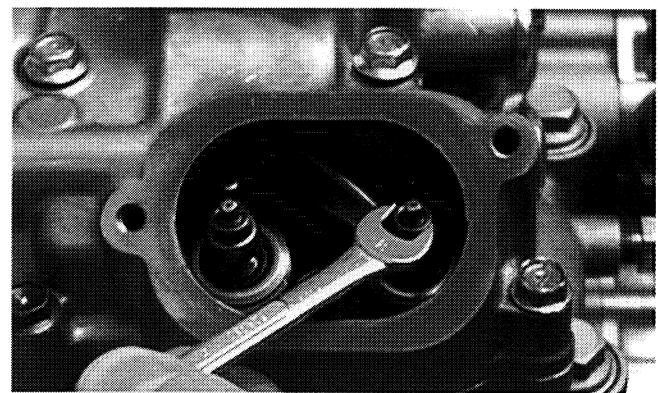
Fig. 3-261



CC006D

- D. Tighten each jam nut securely after completing the adjustment.

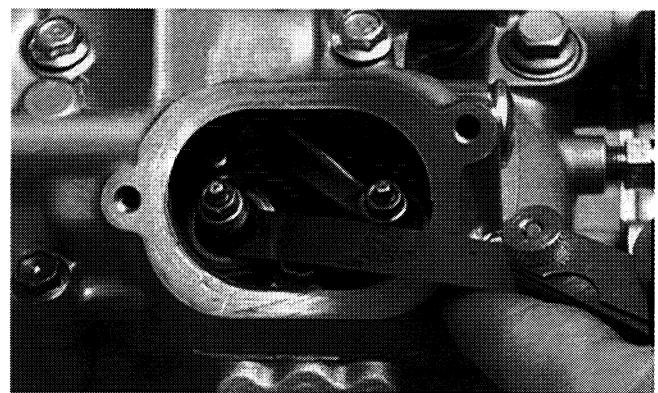
Fig. 3-262



CC005D

- E. Recheck valve/tappet clearance to verify the adjustment.

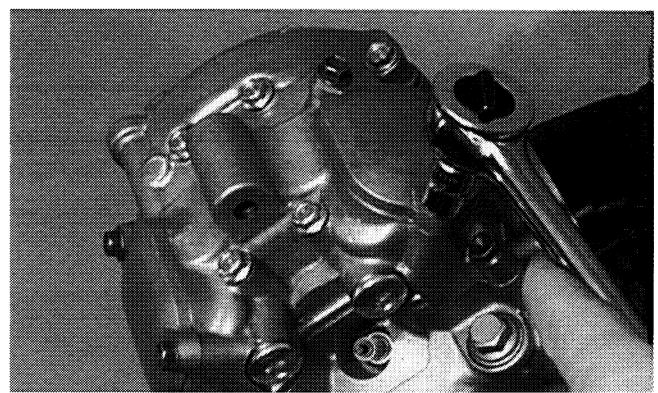
Fig. 3-263



CC007D

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

Fig. 3-264



CC001D

32. If removed, install the spark plug.

Left-Side Components

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

☞ AT THIS POINT

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

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

Removing Left-Side Components (250/300 cc)

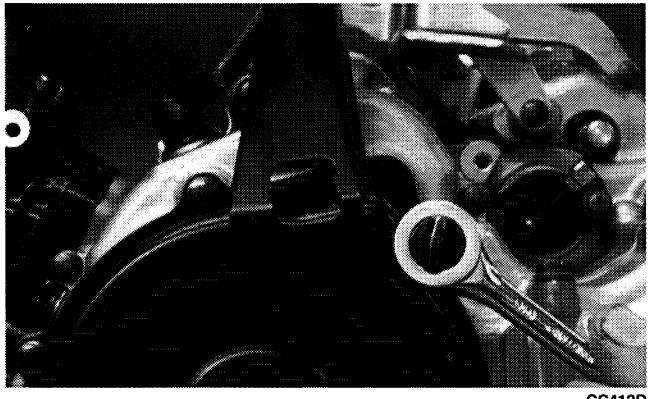
A. Recoil Starter B. Speedometer Drive C. Cover/Stator Assembly

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 in this sub-section.

Fig. 3-265



CC412D

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.

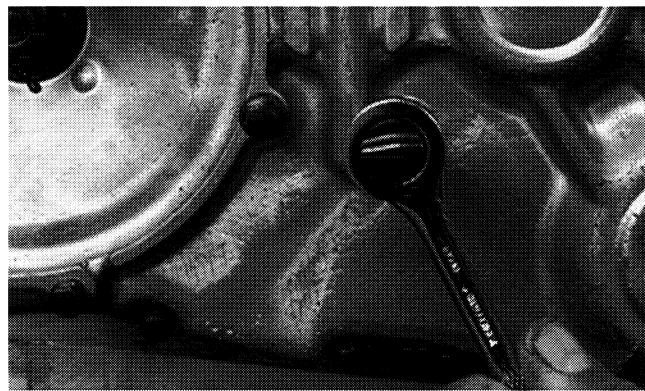
Fig. 3-266



CC413D

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.

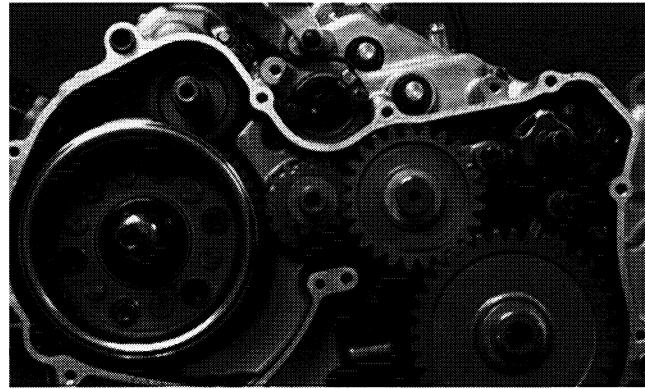
Fig. 3-267



CC414D

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

Fig. 3-268

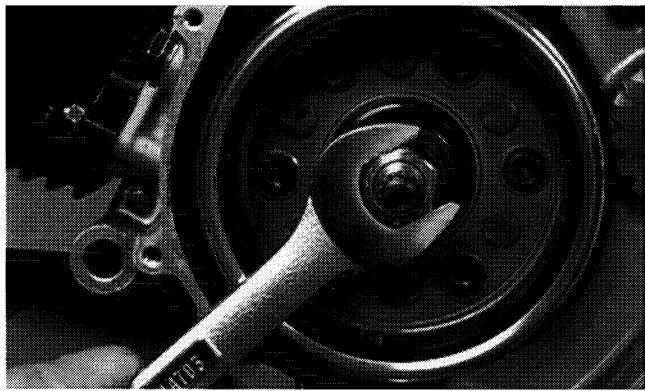


CC415D

■ **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.

5. Remove the nut securing the rotor to the crankshaft.

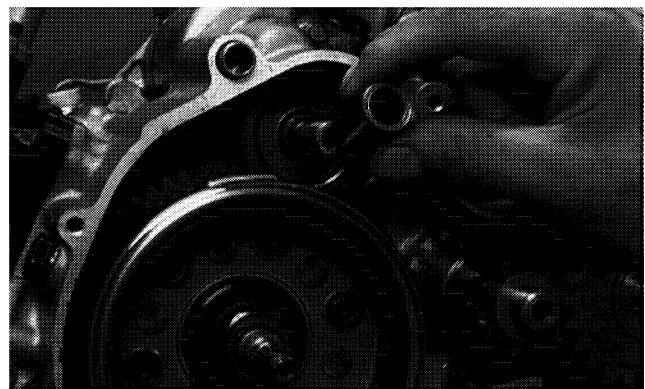
Fig. 3-269



CC416D

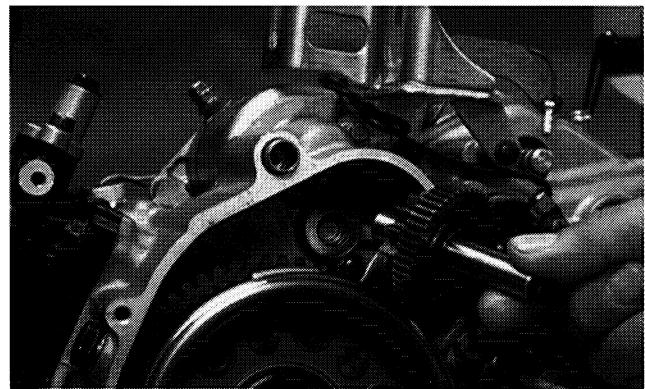
6. Remove the starter idler gear spacer; then remove the starter idler gear and shaft.

Fig. 3-270



CC454D

Fig. 3-271



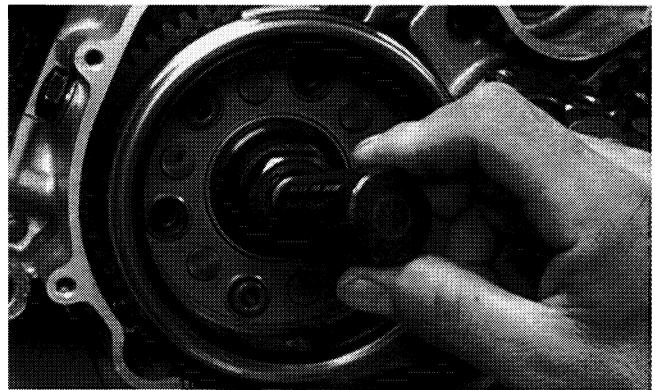
CC455D

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.

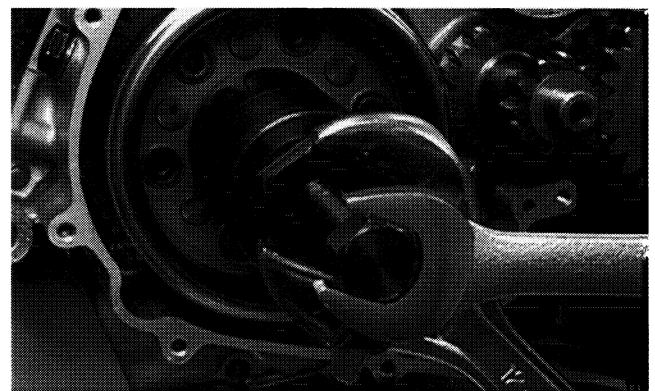
Fig. 3-272



CC417D

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

Fig. 3-273



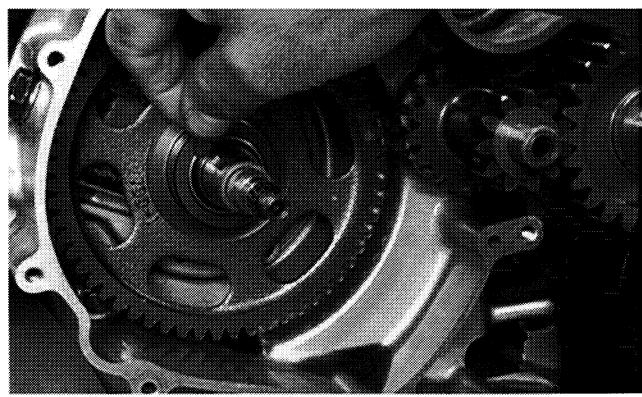
CC456D

Fig. 3-274



CC457D

Fig. 3-275



CC458D

9. Remove the starter clutch gear assembly from the crankcase.

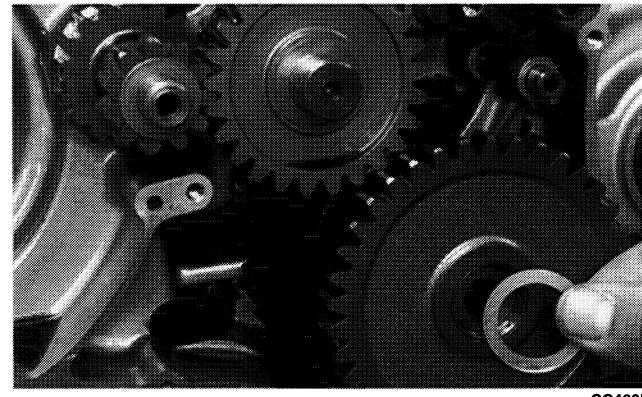
Fig. 3-276



CC459D

10. Remove the driven gear and washer from the crankcase.

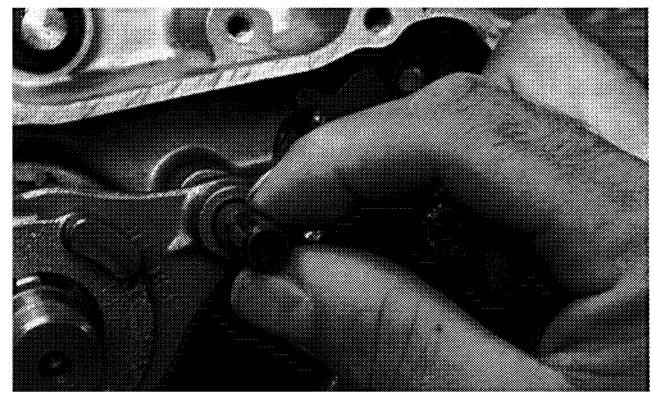
Fig. 3-277



CC460D

11. Remove the drive gear and washer from the driveshaft.
12. Remove the short shift fork shaft from the crankcase.

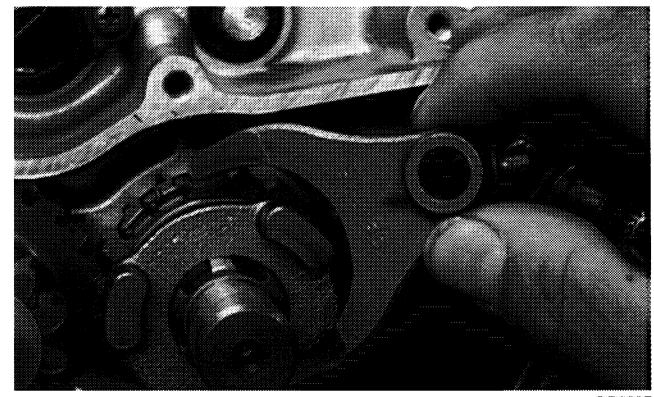
Fig. 3-278



CC462D

13. Remove the short shift fork.

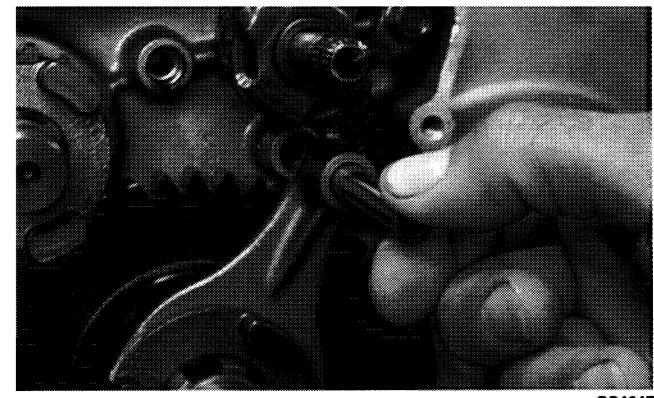
Fig. 3-279



CC463D

14. Remove the long shift fork shaft from the crankcase.

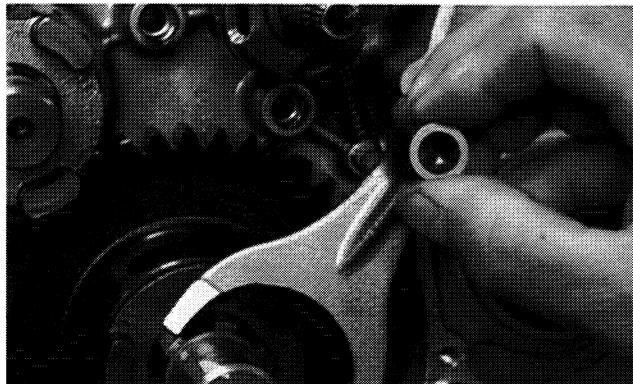
Fig. 3-280



CC464D

15. Remove the long shift fork.

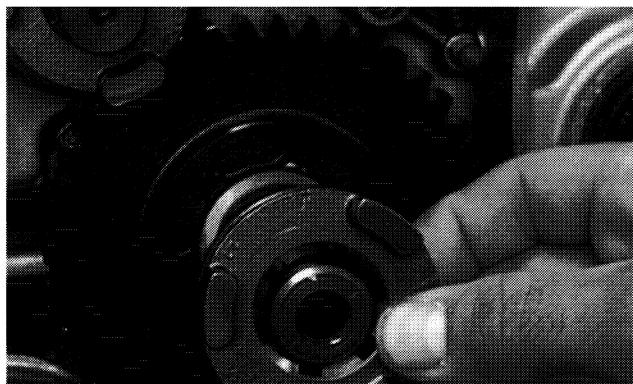
Fig. 3-281



CC465D

16. Remove the driven gear dog from the sub-transmission shaft.

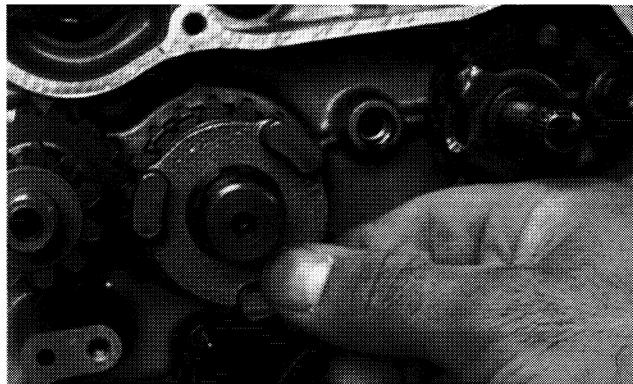
Fig. 3-282



CC466D

17. Remove the drive gear dog from the driveshaft.

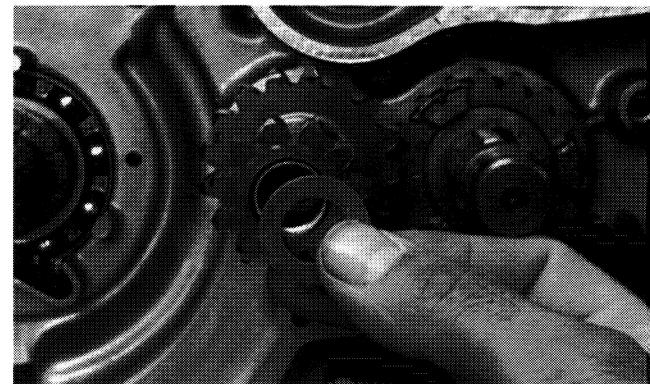
Fig. 3-283



CC467D

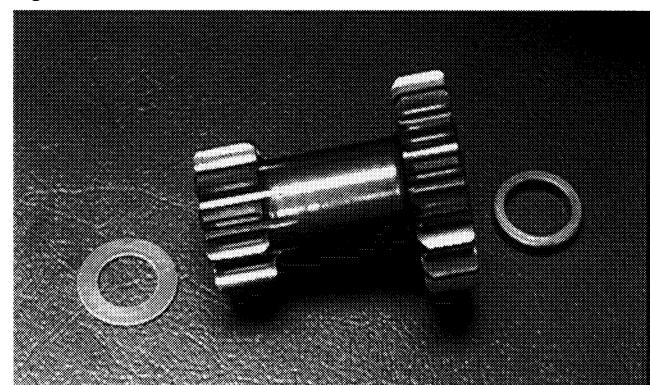
18. Remove the idler gear and washers from the countershaft. Account for the thick washer on the inside.

Fig. 3-284



CC468D

Fig. 3-285



CC477D

19. Remove the sub-transmission gear cam from the crankcase.

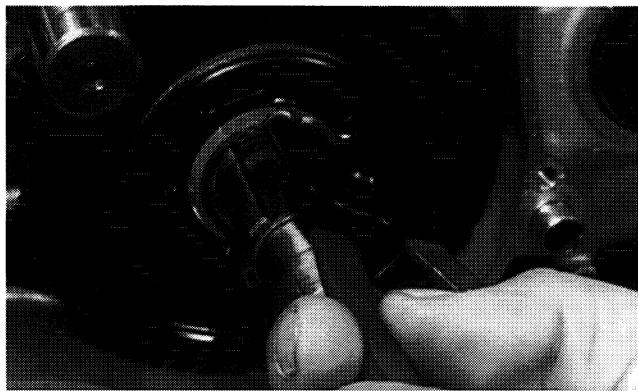
Fig. 3-286



CC469D

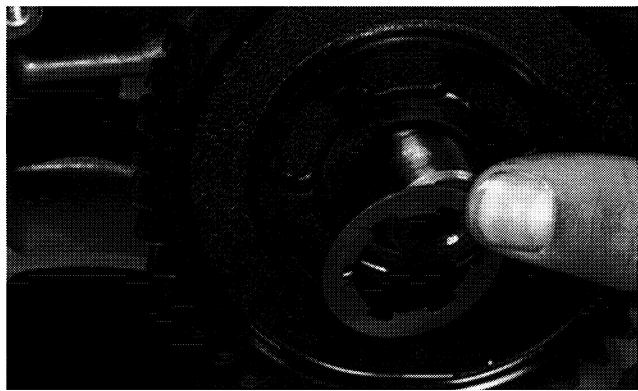
20. Remove the circlip and washer from the sub-transmission shaft; then remove the driven gear. Account for a washer.

Fig. 3-287



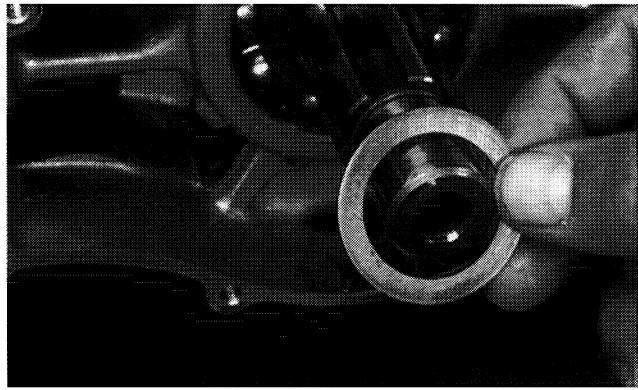
CC470D

Fig. 3-288



CC471D

Fig. 3-289



CC472D

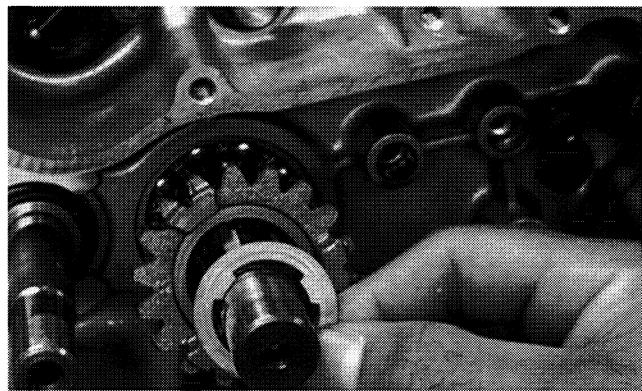
21. Remove the drive gear circlip from the driveshaft; then remove the drive gear and washer from the driveshaft. Account for a bushing and a spacer. Note the location of the oil hole in the bushing for assembly purposes.

Fig. 3-290



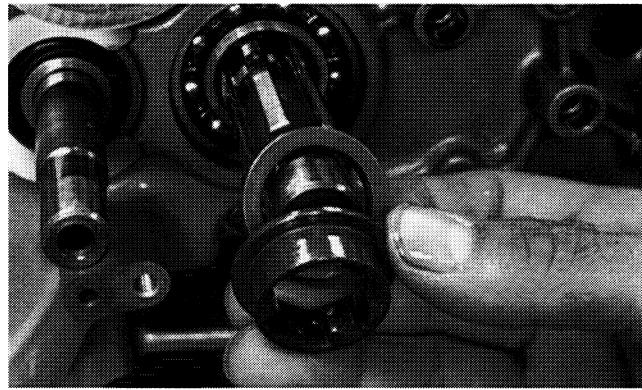
CC473D

Fig. 3-291



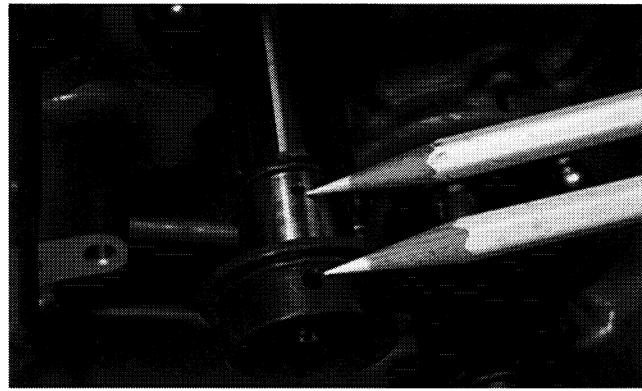
CC474D

Fig. 3-292



CC475D

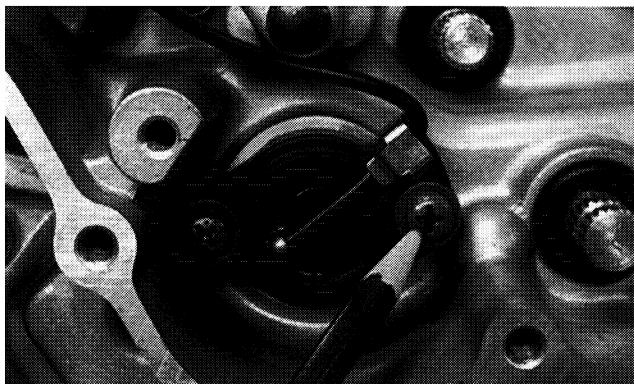
Fig. 3-293



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.

Fig. 3-294



CC478D

Fig. 3-295

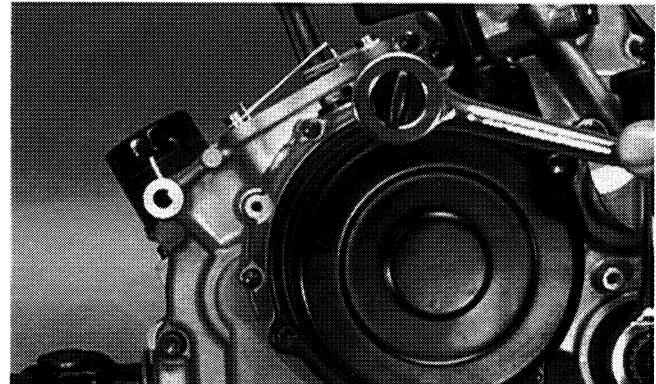


CC479D

AT THIS POINT

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

Fig. 3-296

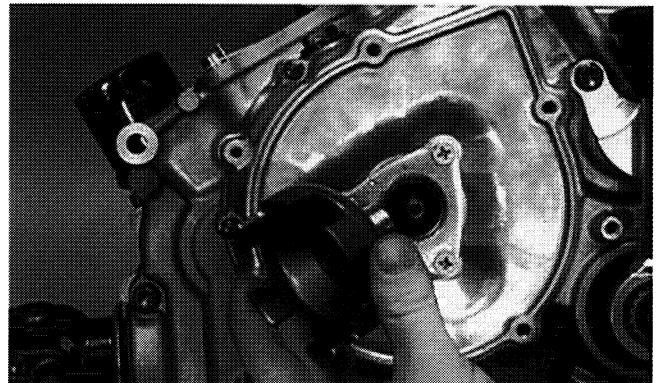


CC039D

3

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.

Fig. 3-297

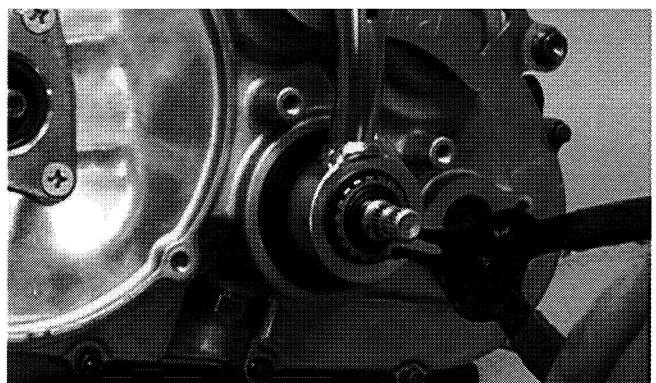


CC041D

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.

Fig. 3-298



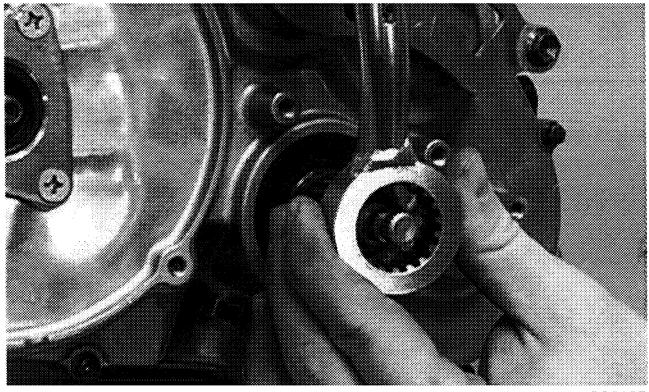
CC044D

Removing Left-Side Components (400/500 cc)

- A. Recoil Starter**
- B. Hi/Low Shifter Assembly**
- C. Speedometer Drive**
- D. Cover/Stator Assembly**

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.

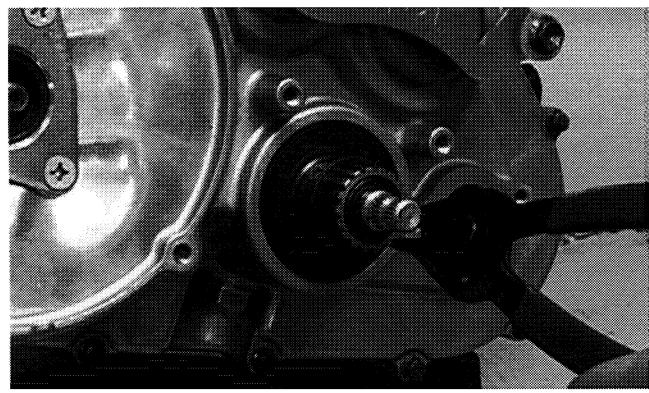
Fig. 3-299



CC045D

4. Remove the inside circlip.

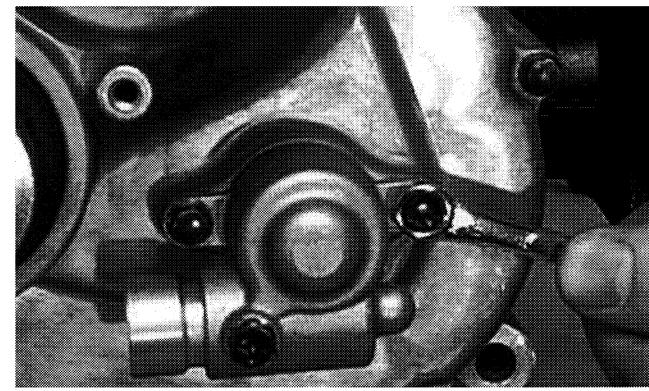
Fig. 3-300



CC046D

5. Remove the two cap screws securing the speedometer drive adapter; then remove the adapter. Account for the gasket.

Fig. 3-301



CC042D

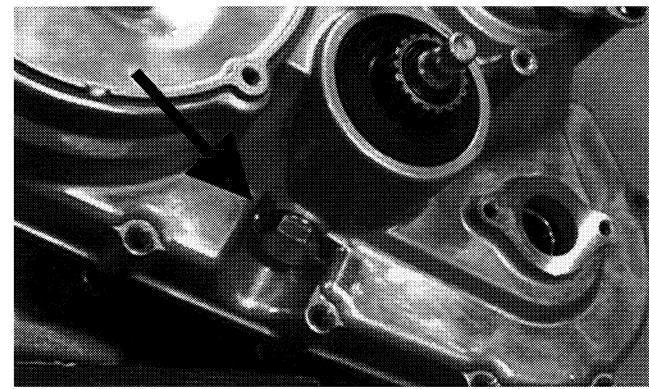
Fig. 3-302



CC043D

6. Remove the shift stop housing assembly from beneath the shift shaft housing. Account for the stopper and spring.

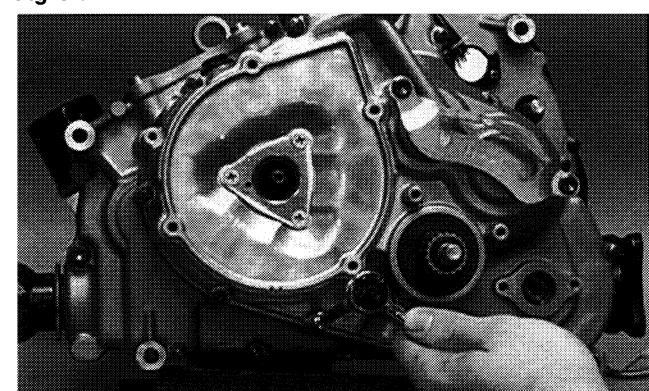
Fig. 3-303



CC054D

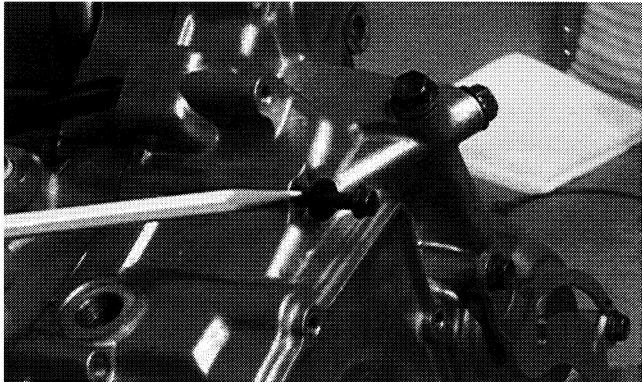
7. Lay the engine/transmission on its right side; then remove the fourteen cap screws securing the left-side cover to the crankcase and note the location of the long cap screw with rubber washer.

Fig. 3-304



CC047D

Fig. 3-305

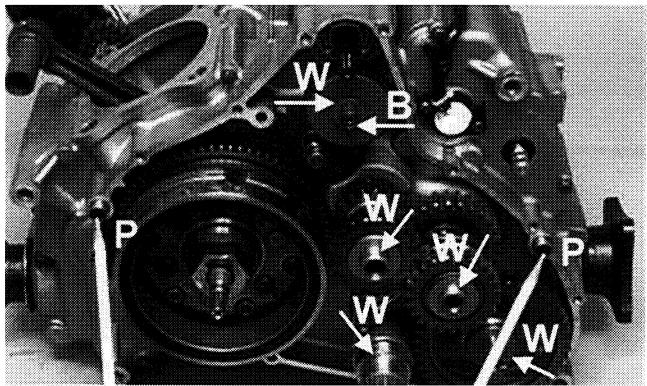


CC055D

8. While continuously tapping in on the splined Hi/Low range shift shaft, remove the left-side cover w/stator assembly. 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.

Fig. 3-306



CC326D

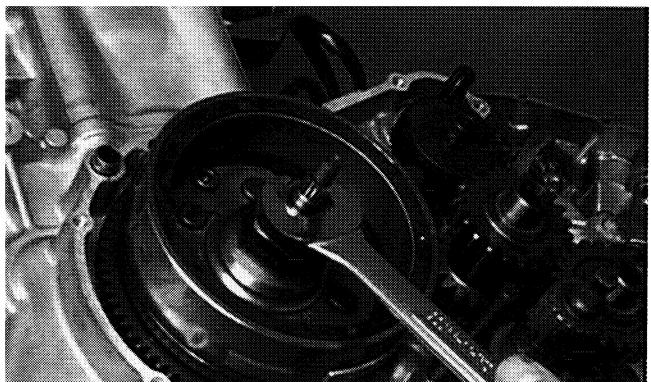
E. Magneto Rotor

F. Idle Gear Assembly

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

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

Fig. 3-307



CC147D

Fig. 3-308



CC327D

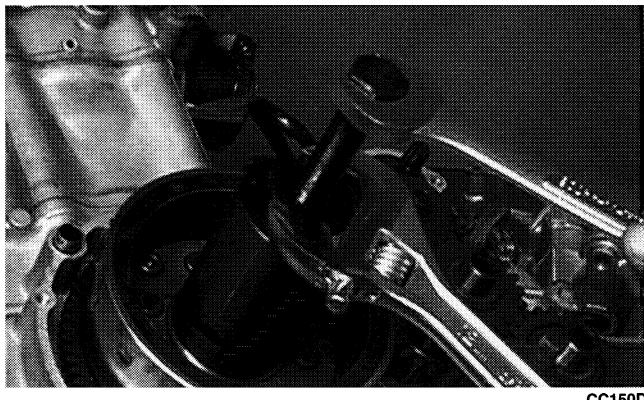
10. Using the Magneto Rotor Remover Set (p/n 0444-075), remove the rotor assembly from the crankshaft. Account for the key; then remove the starter clutch gear assembly and washer.

Fig. 3-309



CC149D

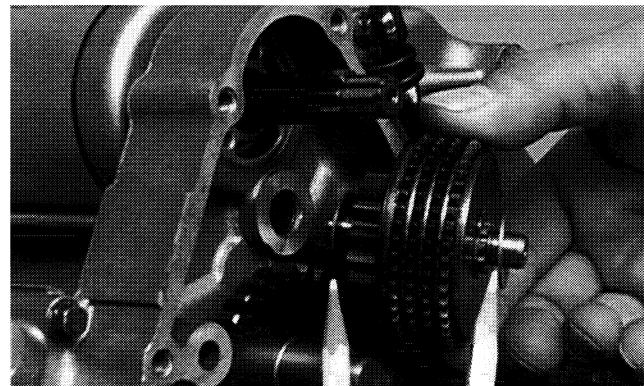
Fig. 3-310



11. Remove the idle gear limiter assembly from the crankcase; then account for a washer on each end of the assembly.

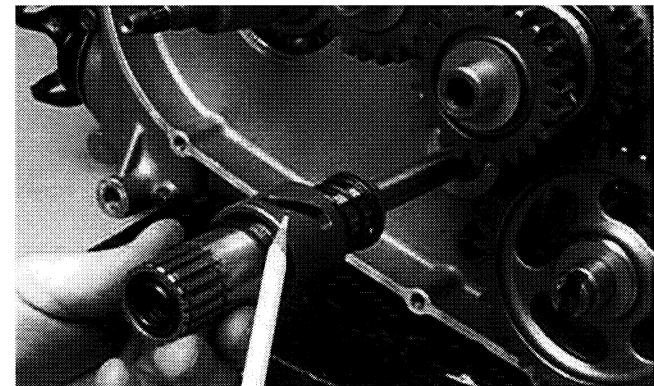
■ NOTE: Each end of the shaft should have a bushing. The bushings may stay on the shaft or in the case halves.

Fig. 3-311



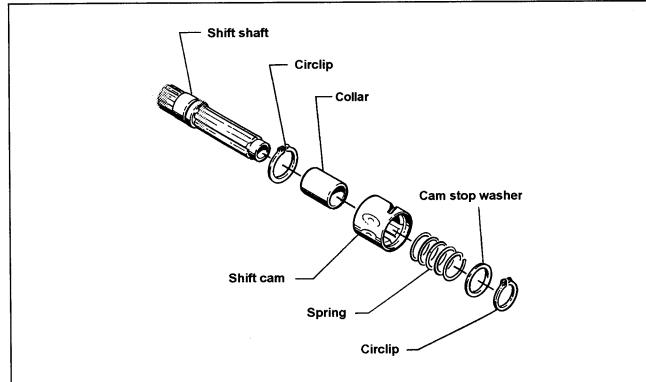
12. Remove the fork shaft from the crankcase boss; then remove the shift fork. Remove the shift shaft assembly from the gear shift shaft.

Fig. 3-312



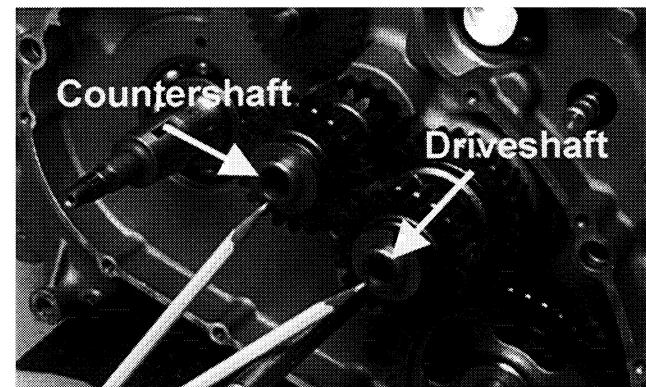
■ NOTE: If servicing the shift shaft assembly, care must be taken not to install the shift cam improperly or the transmission will not shift properly.

Fig. 3-313



13. Remove a washer from the countershaft and from the driveshaft.

Fig. 3-314



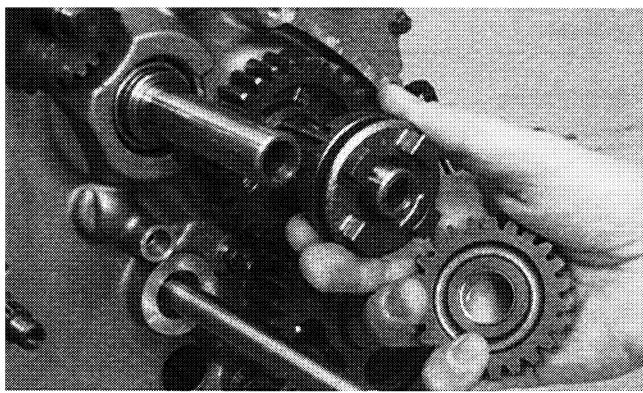
14. Remove the idle gear from the countershaft.

Fig. 3-315



15. Remove the #2 gear and the select sliding dog gear from the driveshaft.

Fig. 3-316



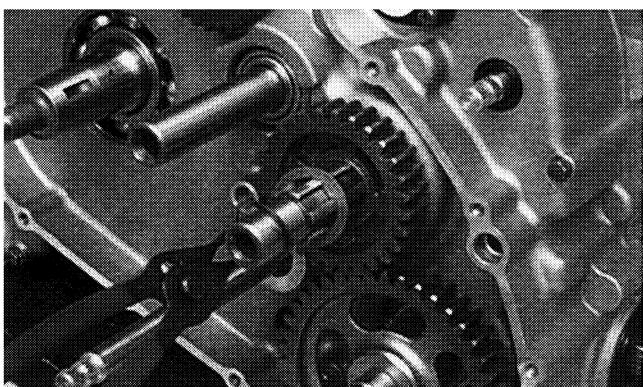
CC061D

 **AT THIS POINT**

To service gear shift fork, see Servicing Left-Side Components in this sub-section.

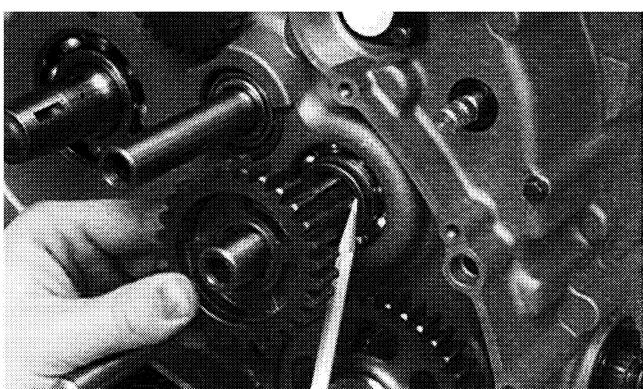
16. Remove the circlip and washer from the driveshaft; then remove the driven gear. Account for a driven spacer and a spacer.

Fig. 3-317



CC059D

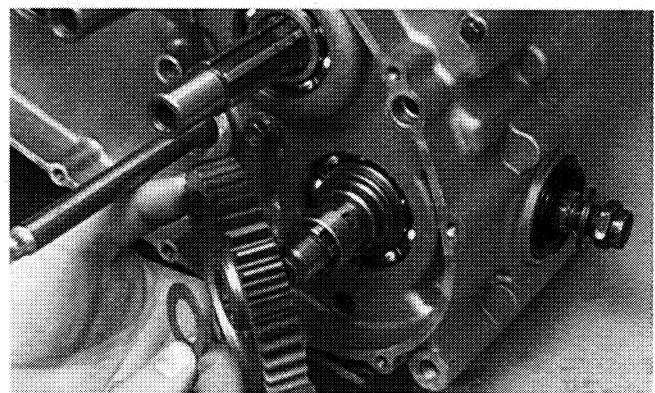
Fig. 3-318



CC062D

17. Remove the washer and the #1 gear from the output shaft; then account for the bushing.

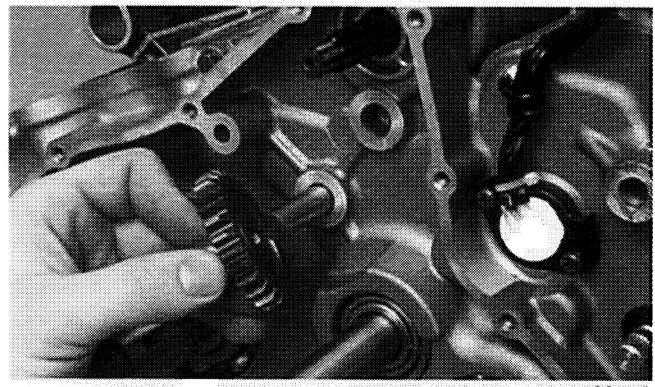
Fig. 3-319



CC063D

18. Remove the starter idle gear from the pin; then remove the pin.

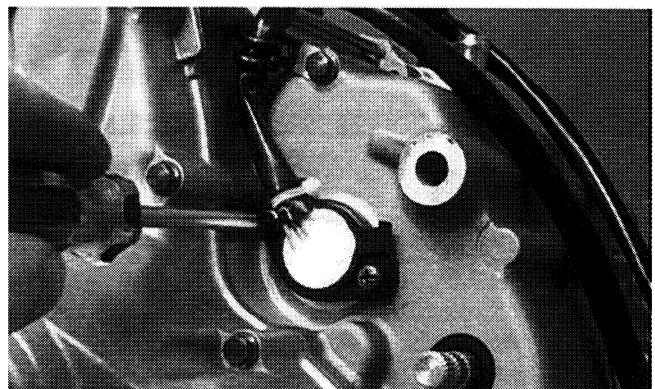
Fig. 3-320



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.

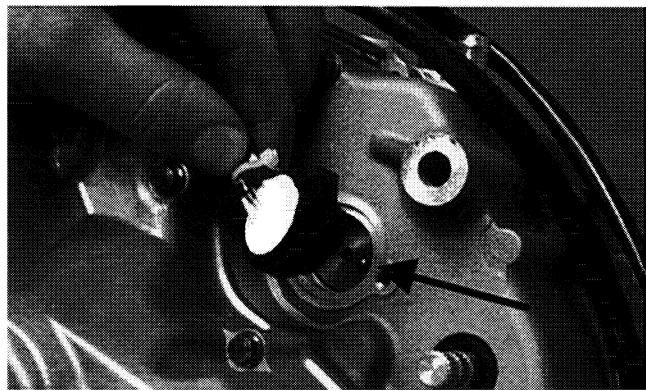
Fig. 3-321



CC048D

3

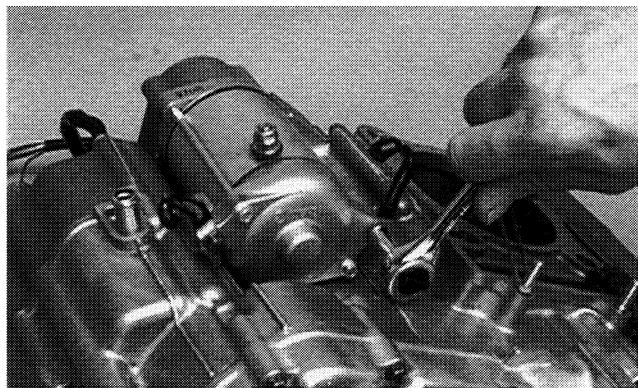
Fig. 3-322



CC049D

20. Remove the two cap screws securing the starter to the crankcase; then remove the starter. Account for the wiring forms.

Fig. 3-323



CC065D



AT THIS POINT

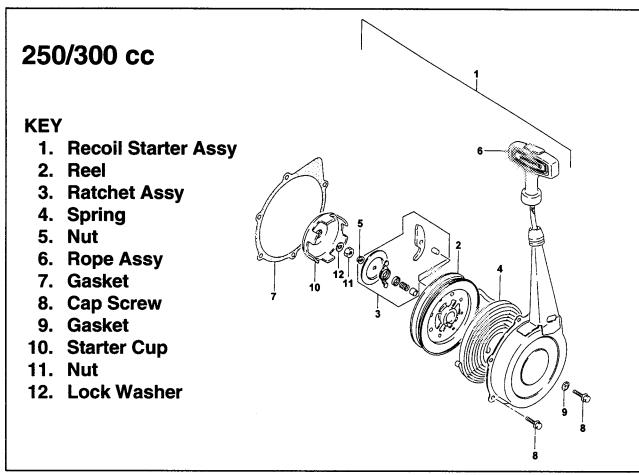
To service center crankcase components only, proceed to Removing Right-Side Components.

Servicing Left-Side Components

■ NOTE: The technician should reference the appropriate illustration and/or photo for the model being serviced.

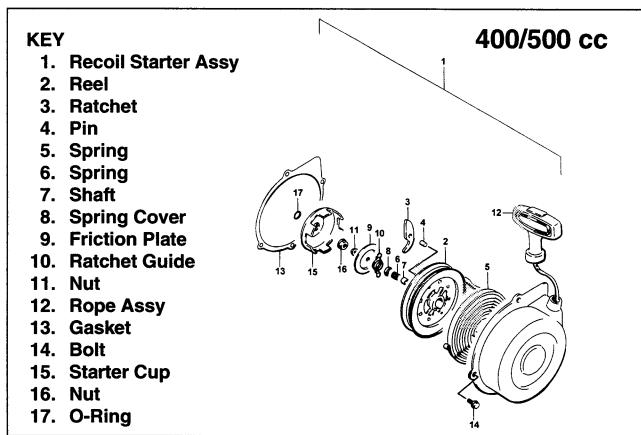
RECOIL STARTER

Fig. 3-324



0733-751

Fig. 3-325



0732-309



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 (on the 250/300 cc) the location of the single washer closest to the center of the crankcase. Account for a gasket.

Fig. 3-326

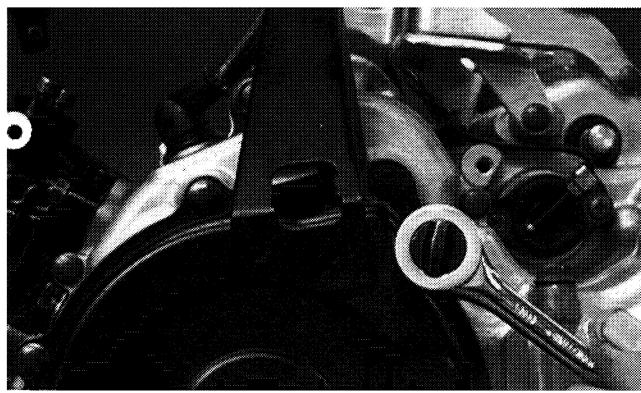


Fig. 3-327

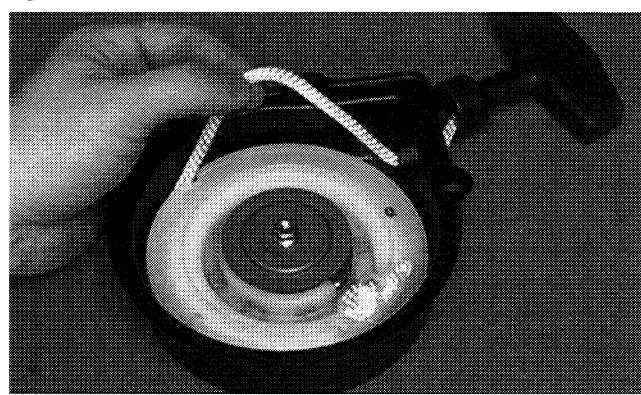


⚠️ WARNING

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.

Fig. 3-328

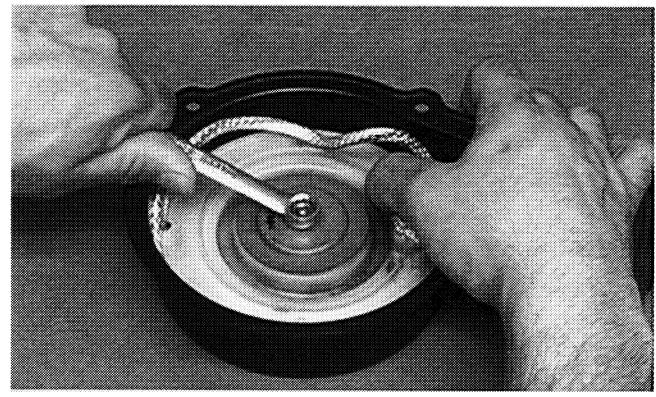


⚠️ CAUTION

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

3. Remove the nut.

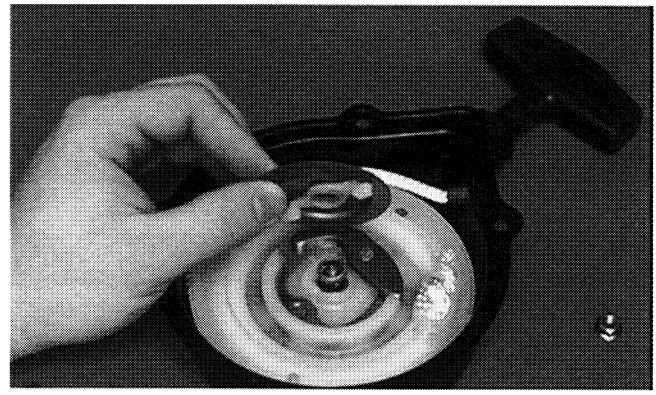
Fig. 3-329



3

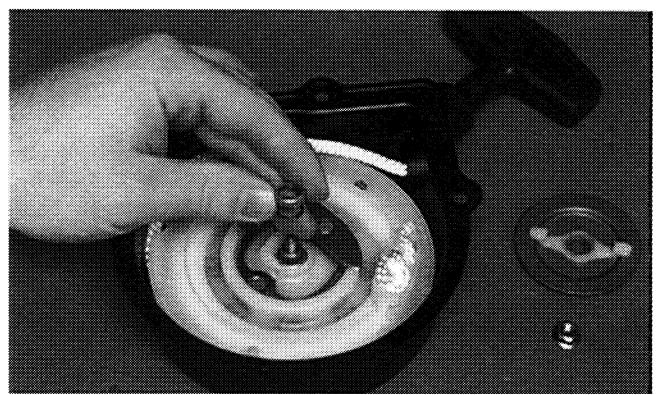
4. Slowly release the friction plate and lift the plate with ratchet guide free of the recoil housing; then remove the ratchet guide from the friction plate.

Fig. 3-330



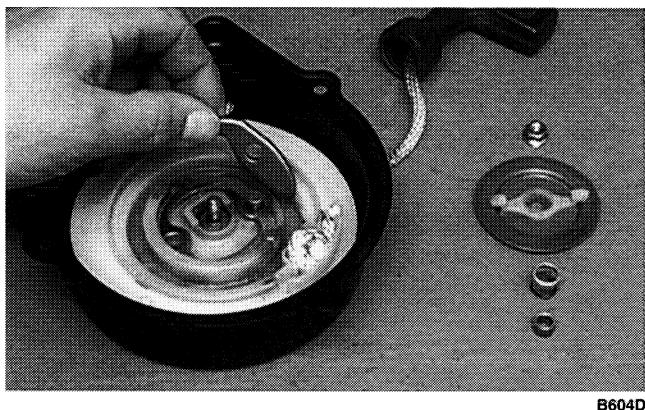
5. Remove the spring, collar, and friction spring.

Fig. 3-331



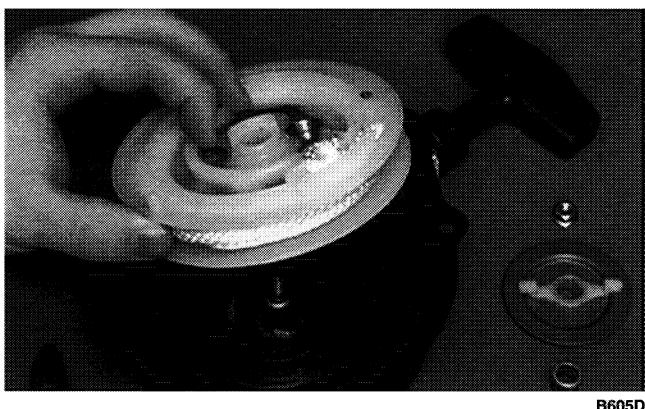
6. Remove the ratchet.

Fig. 3-332



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

Fig. 3-333



⚠️ 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 spring from the housing 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 housing.
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.

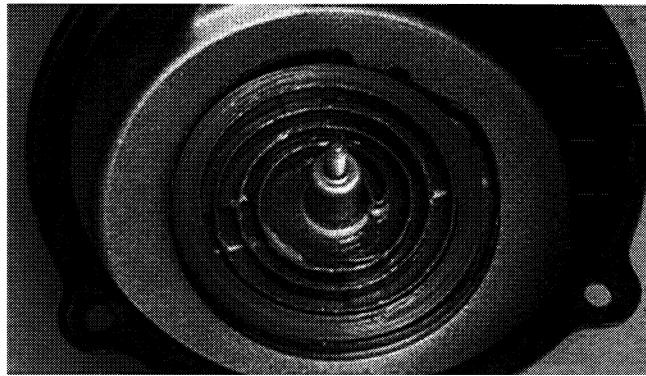
1. Clean all components.
2. Inspect the springs and ratchet for wear or damage.
3. Inspect the reel and housing for cracks or damage.
4. Inspect the shaft for wear, cracks, or damage.
5. Inspect the rope for breaks or fraying.
6. Inspect the spiral spring for cracks, crystallization, or abnormal bends.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

Assembling/Installing

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

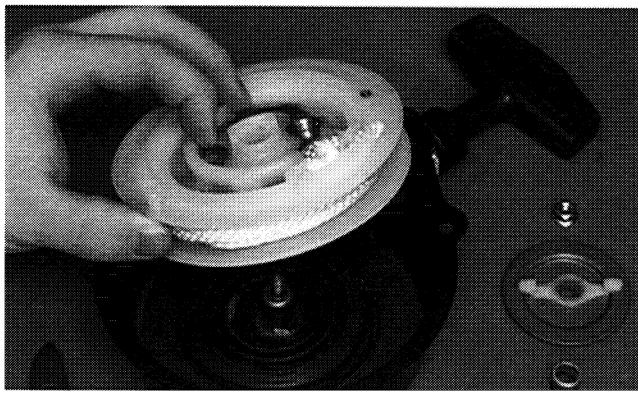
■ NOTE: The recoil spring must seat evenly in the recoil case.

Fig. 3-334



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 housing; 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 spring with the notch in the reel.

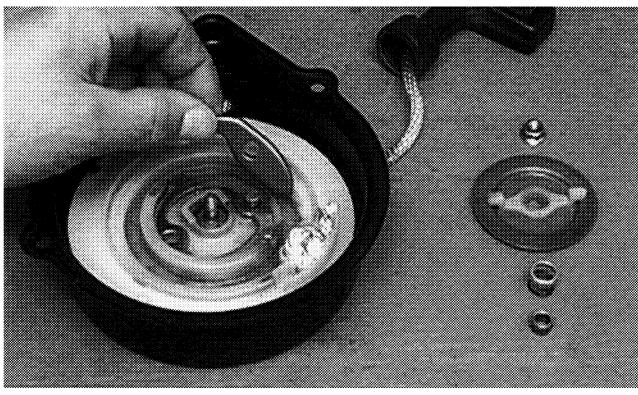
Fig. 3-335



B605D

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

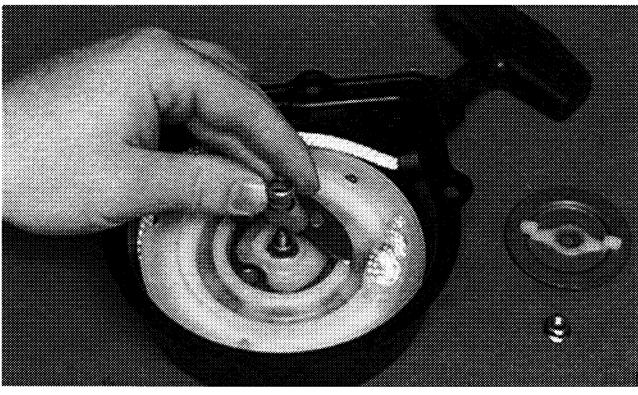
Fig. 3-336



B604D

7. Install the friction spring and the spring cover.

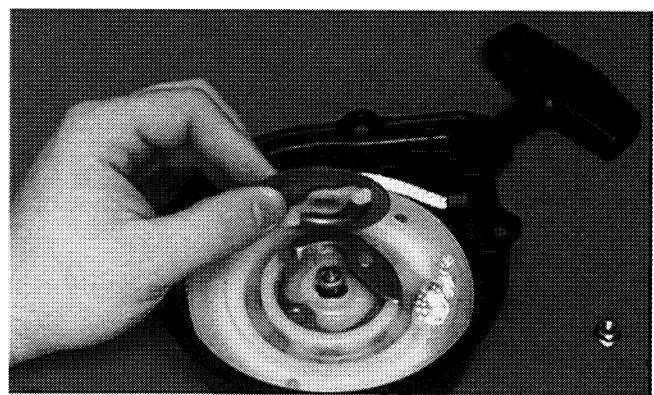
Fig. 3-337



B603D

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

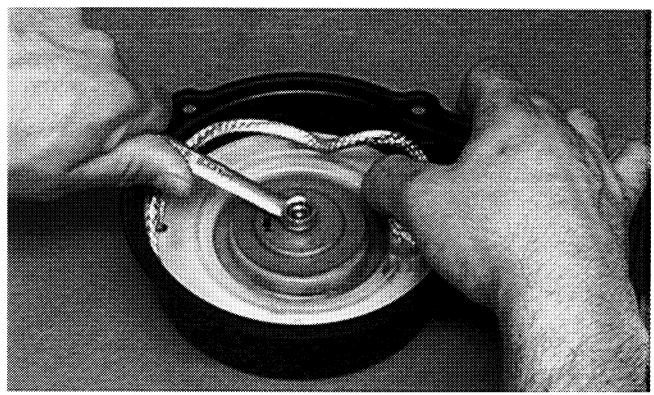
Fig. 3-338



B602D

9. While pushing down on the reel, install the nut. Tighten to 1 kg-m (7 ft-lb).

Fig. 3-339



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).

Fig. 3-340

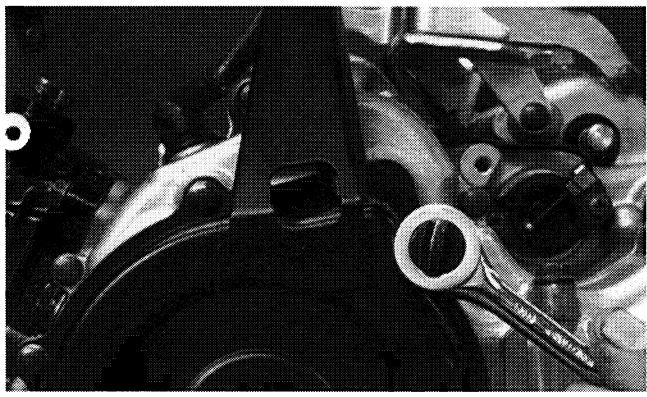
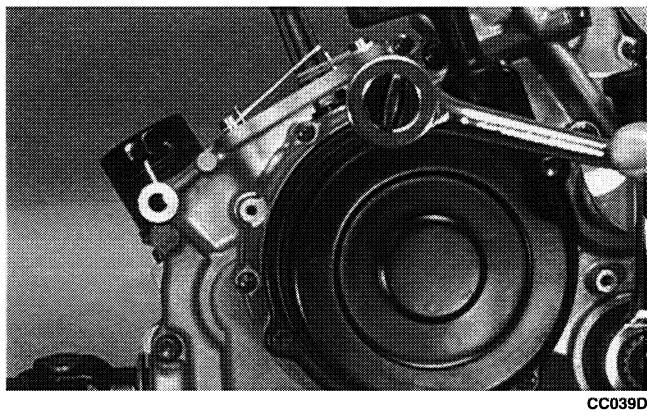


Fig. 3-341

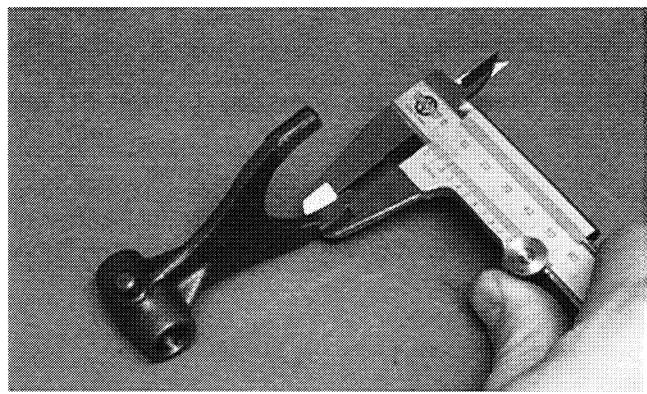


MEASURING SHIFT FORK (THICKNESS)

■ 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.

Fig. 3-342



SHIFT FORK THICKNESS (250/300 cc)

| | |
|----------------------------------|------------------------------|
| #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.) |

SHIFT FORK THICKNESS (400/500 cc)

| | |
|------------------------|------------------------------|
| #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.

Fig. 3-343



SHIFT FORK GROOVE WIDTH (250/300 cc)

| | |
|----------------------------------|--------------------------------|
| #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.) |

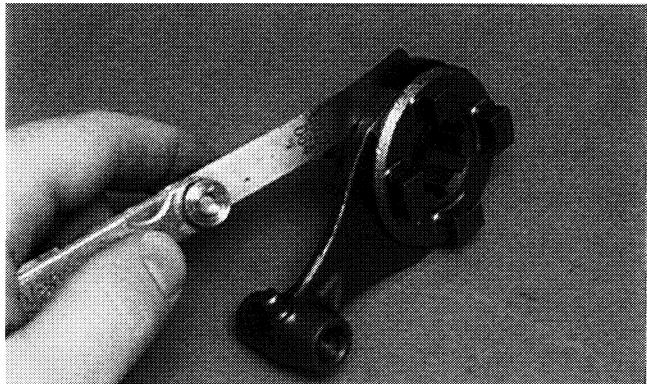
SHIFT FORK GROOVE WIDTH (400/500 cc)

| | | |
|------------------------|------------------------------|------------------------------|
| #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 | 400 cc | 5.0-5.1 mm (0.197-0.201 in.) |
| | 500 cc | 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.

Fig. 3-344



CC292D

**SHIFT FORK TO GROOVE SIDE CLEARANCE
(250/300 cc)**

| | |
|------------------------|--------------------------------|
| 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.) |

**SHIFT FORK TO GROOVE SIDE CLEARANCE
(400/500 cc)**

| | |
|------------------------|---------------------------------|
| Engine | 0.1-0.3 mm (0.004-0.0120 in.) |
| Secondary Transmission | (max) 0.2 mm (0.008 in.) |
| Reverse | 400 cc (max) 0.3 mm (0.012 in.) |
| | 500 cc (max) 0.2 mm (0.008 in.) |

**Installing Left-Side
Components
(250/300 cc)**

**A. Idle Gear Assembly
B. Magneto Rotor**

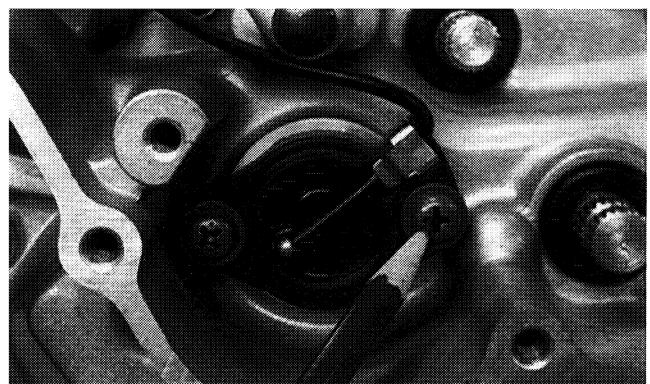
1. Place the shift-indicator sending unit into position making sure the neutral contact and spring are inside the case and a well-oiled O-ring is properly positioned. Secure with Phillips-head screws.

Fig. 3-345



CC479D

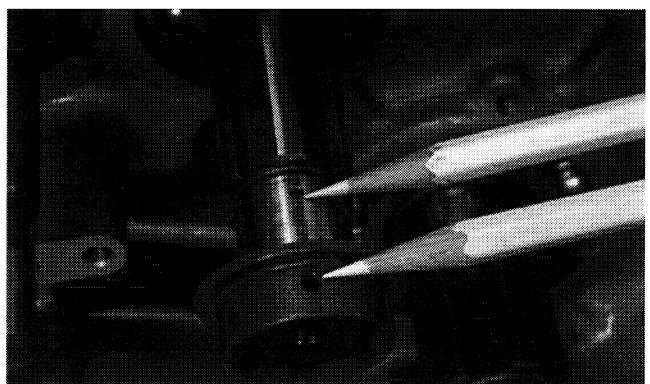
Fig. 3-346



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.

Fig. 3-347



CC476D

Fig. 3-348

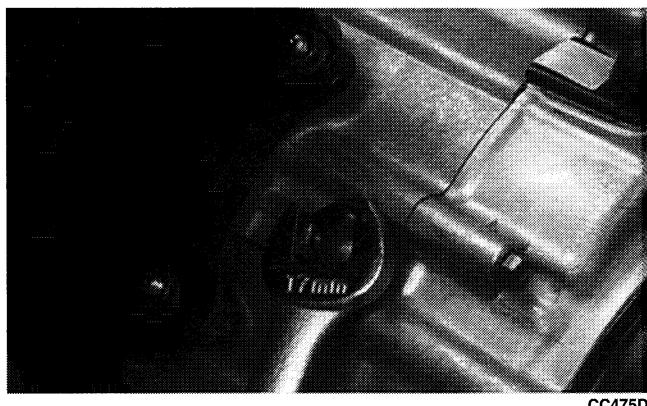


Fig. 3-349

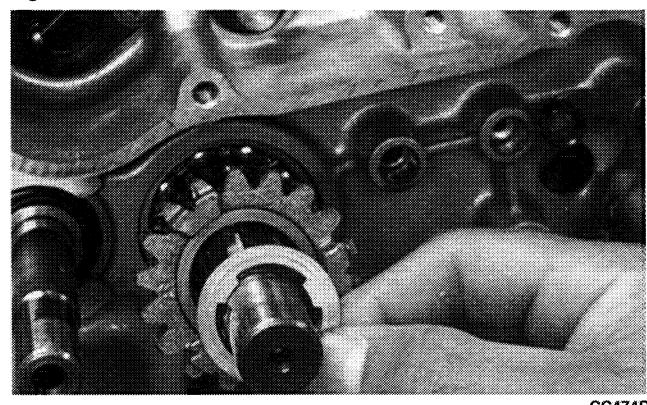
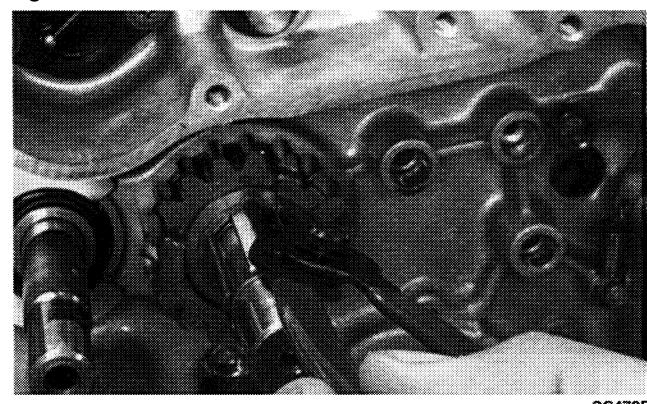


Fig. 3-350



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

■ NOTE: The slots in the gear must face towards the left-side cover when installed.

Fig. 3-351

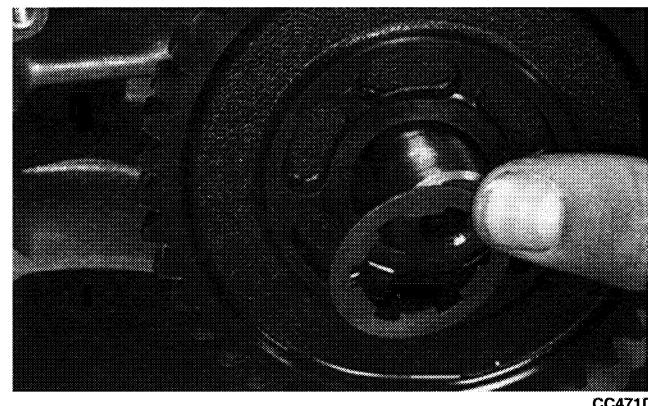
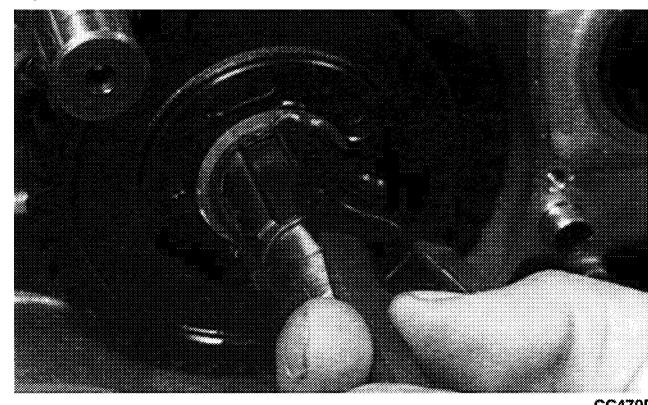
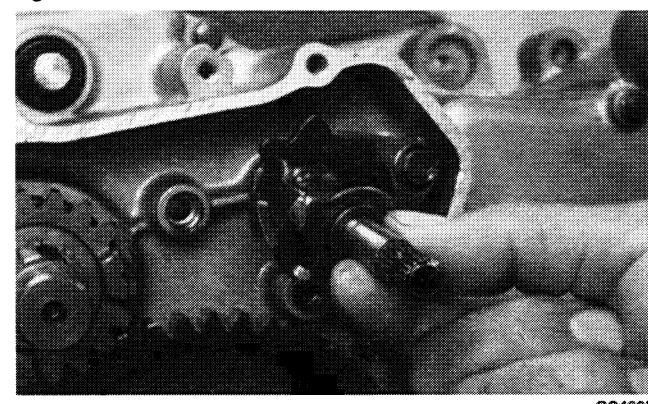


Fig. 3-352



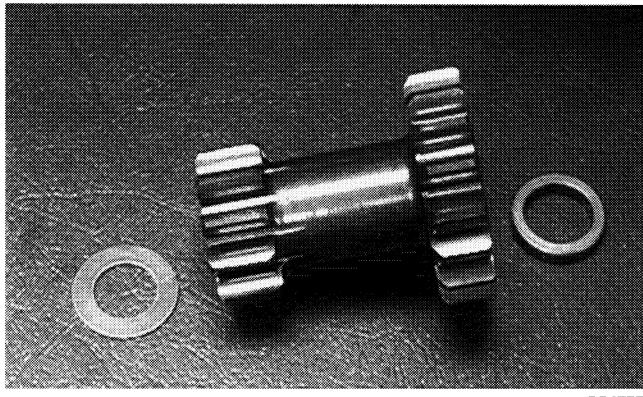
4. Install the sub-transmission gear cam.

Fig. 3-353



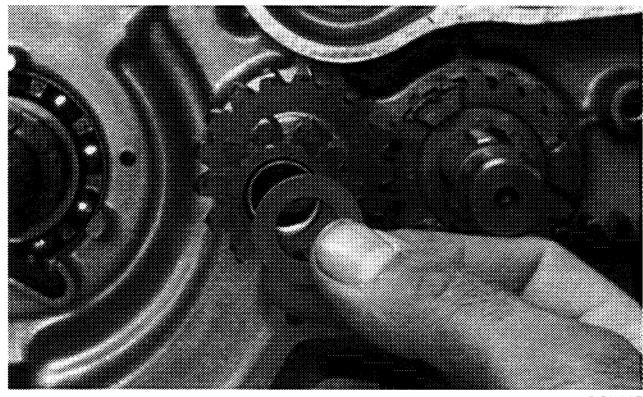
5. Install the idler gear and washers noting the thick washer on the inside from disassembly.

Fig. 3-354



CC477D

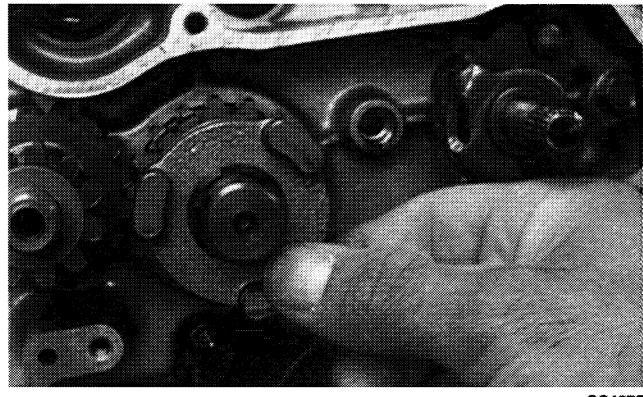
Fig. 3-355



CC468D

6. Install the drive gear dog onto the driveshaft.

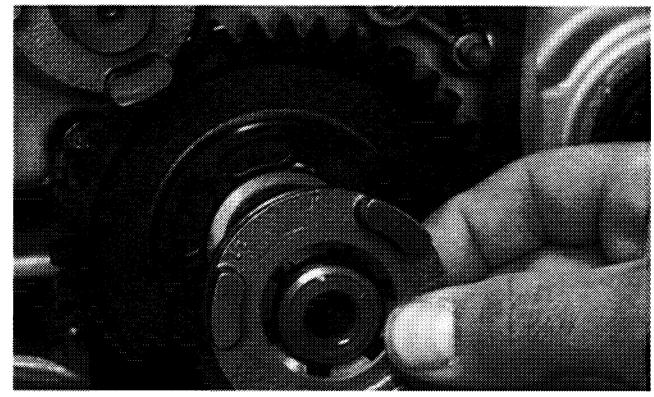
Fig. 3-356



CC467D

7. Place the driven gear dog onto the sub-transmission shaft.

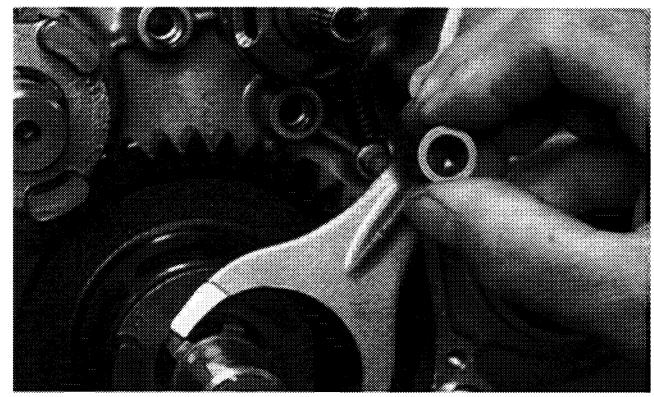
Fig. 3-357



CC466D

8. Install the long shift fork.

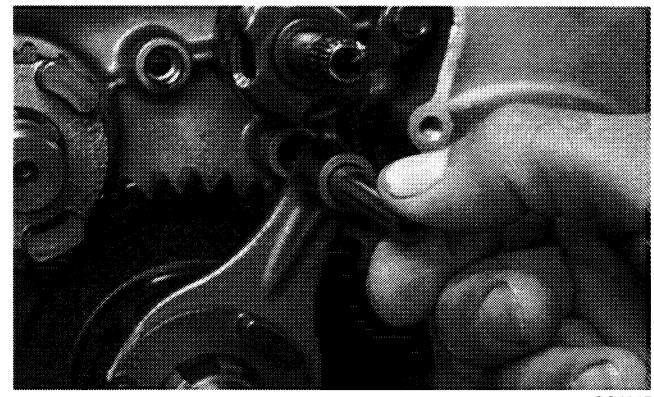
Fig. 3-358



CC465D

9. Install the long shift fork shaft.

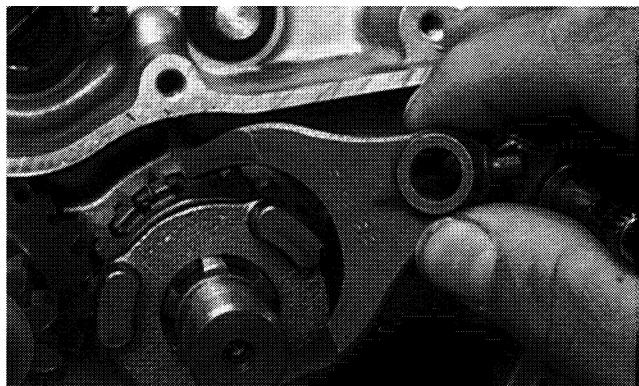
Fig. 3-359



CC464D

10. Install the short shift fork.

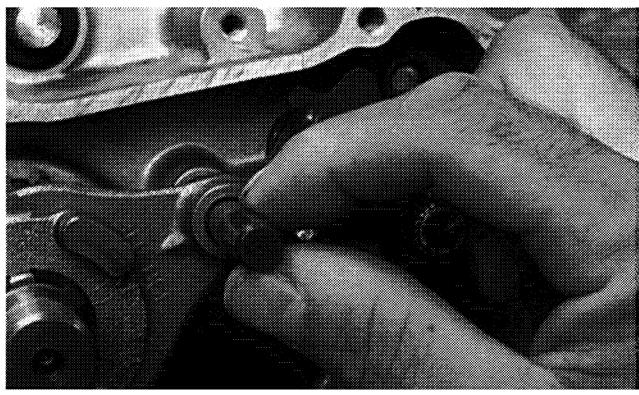
Fig. 3-360



CC463D

11. Install the short shift fork shaft.

Fig. 3-361

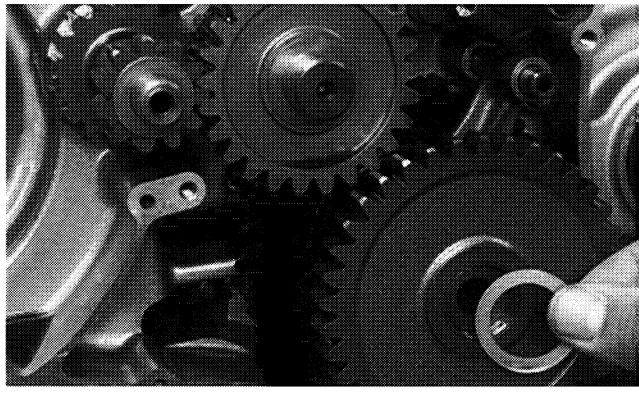


CC462D

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

13. Install the driven gear and washer.

Fig. 3-362



CC460D

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

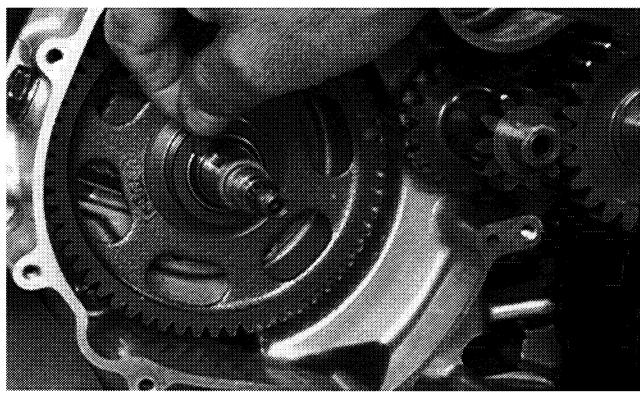
Fig. 3-363



CC459D

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

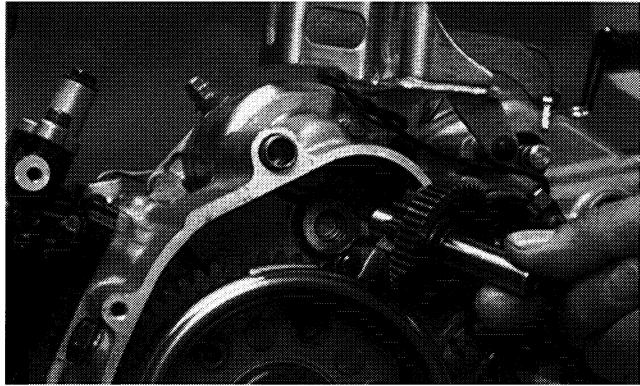
Fig. 3-364



CC458D

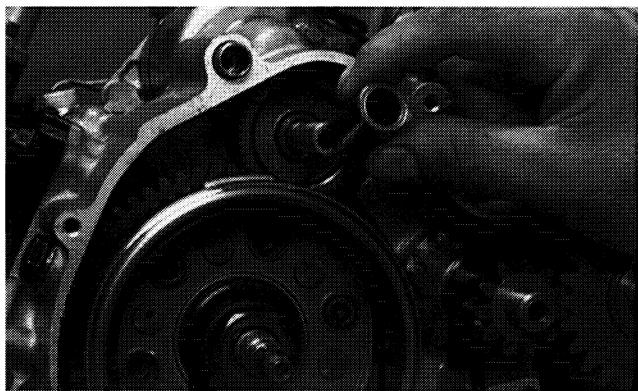
16. Install the starter idler gear and shaft; then install the spacer.

Fig. 3-365



CC455D

Fig. 3-366



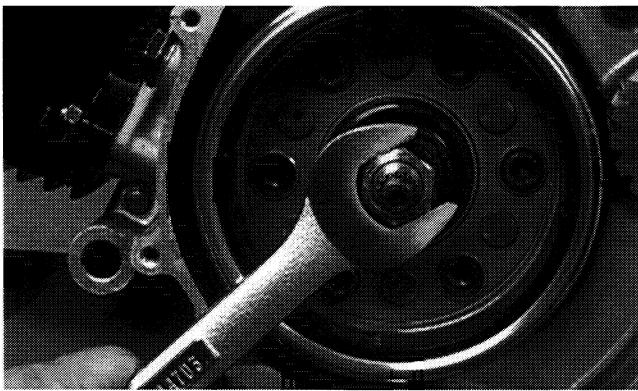
CC454D

C. Stator Assembly/Cover
D. Speedometer Drive
E. Recoil Starter

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

17. Install the rotor nut on the crankshaft and tighten until the rotor is properly seated; then tighten to 16 kg-m (115.5 ft-lb).

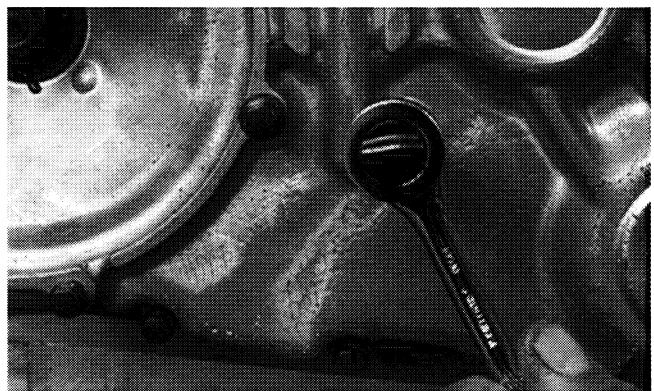
Fig. 3-367



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. Note the location of the different-sized cap screws.

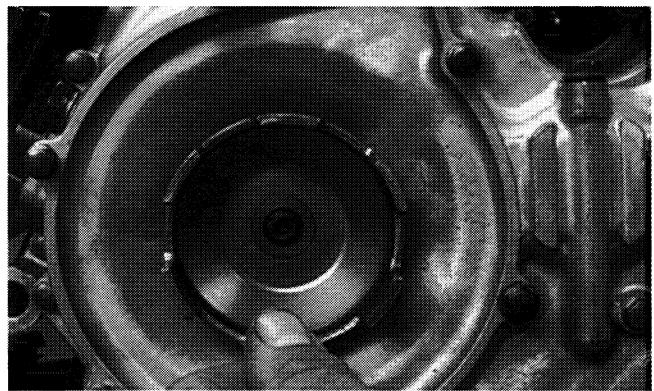
Fig. 3-368



CC414D

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).

Fig. 3-369



CC413D

21. 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).

Fig. 3-370



CC412D

3

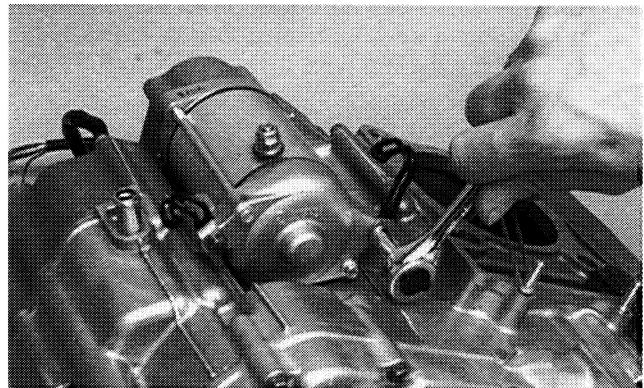
Installing Left-Side Components (400/500 cc)

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.

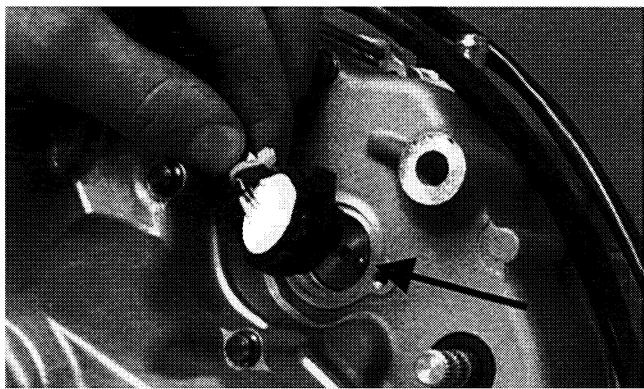
Fig. 3-371



CC065D

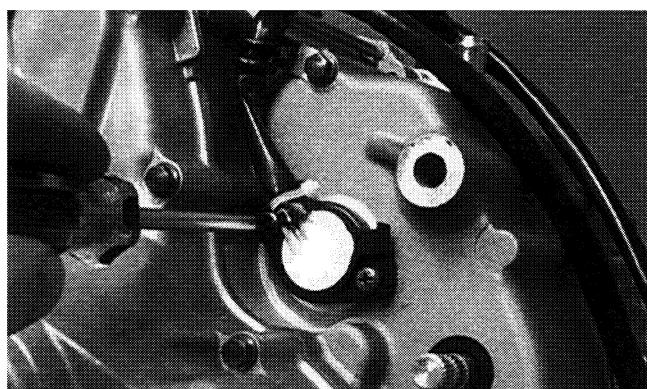
2. Place the shift-indicator sending unit into position making sure the neutral contact and spring are inside the case and a well-oiled O-ring is properly positioned. Secure with Phillips-head screws.

Fig. 3-372



CC069D

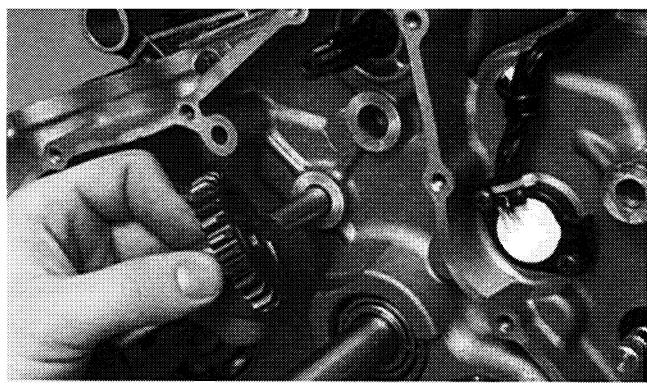
Fig. 3-373



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.

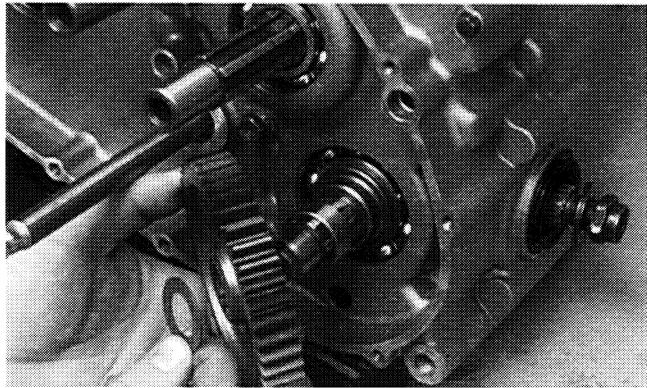
Fig. 3-374



CC064D

4. Place the spacer onto the output shaft; then install the driven gear and washer.

Fig. 3-375



CC063D

5. Install the spacer onto the driveshaft.

Fig. 3-376



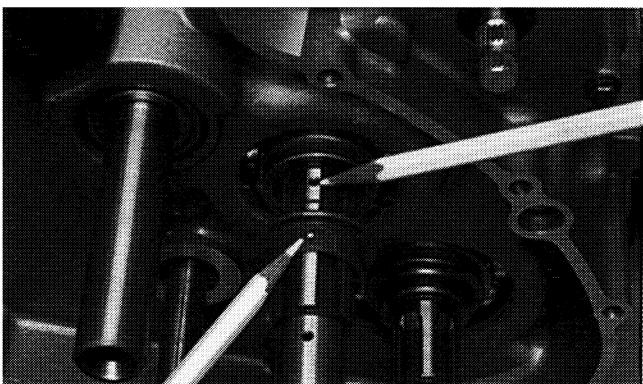
CC258D

6. Place the splined driven 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.

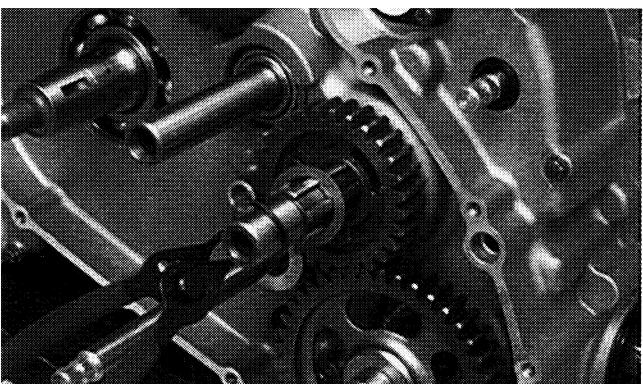
Fig. 3-377



CC259D

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

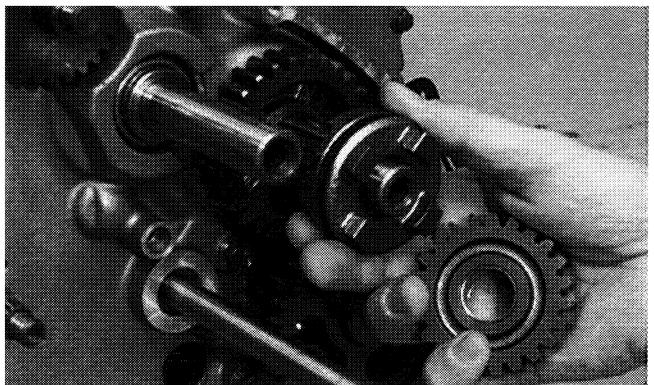
Fig. 3-378



CC059D

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

Fig. 3-379



CC061D

9. Place the idle gear spacer and idle gear onto the countershaft.

Fig. 3-380



CC262D

Fig. 3-381

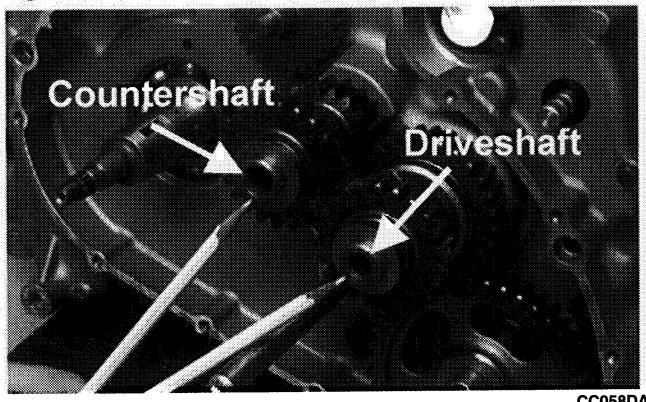


CC060D

10. Place a washer on both the driveshaft and the countershaft.

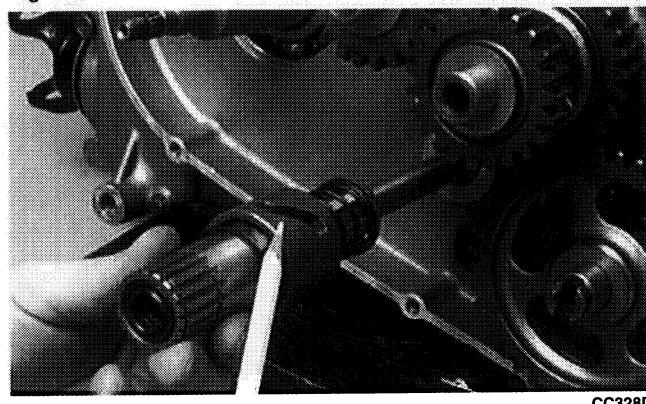
3

Fig. 3-382



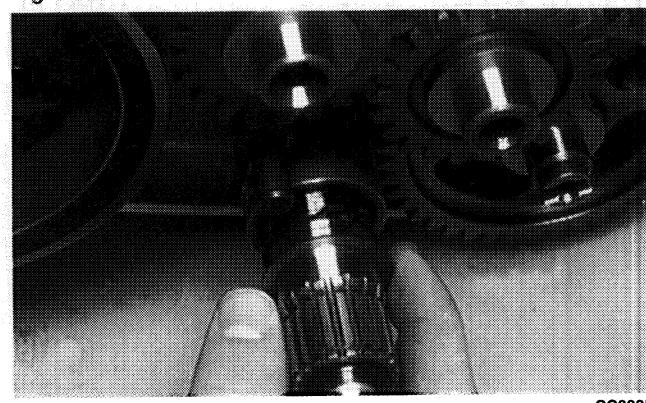
11. With the slot in the shift shaft assembly facing upward, place the assembly on the gear shift shaft.

Fig. 3-383



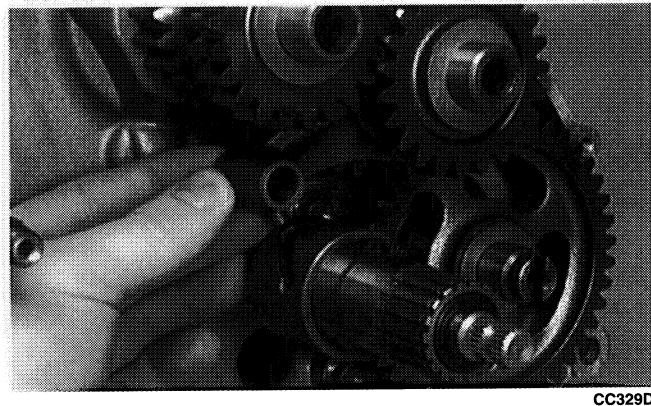
12. Place the left shaft washer on the shift shaft.

Fig. 3-384



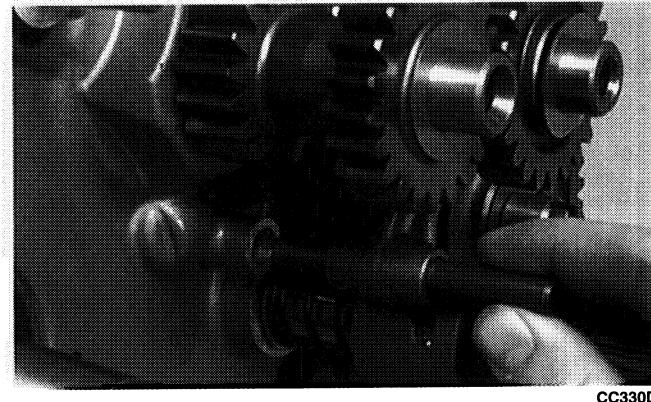
13. With the shift fork peg positioned in the shift shaft assembly slot, install the shift fork in the sliding dog gear.

Fig. 3-385



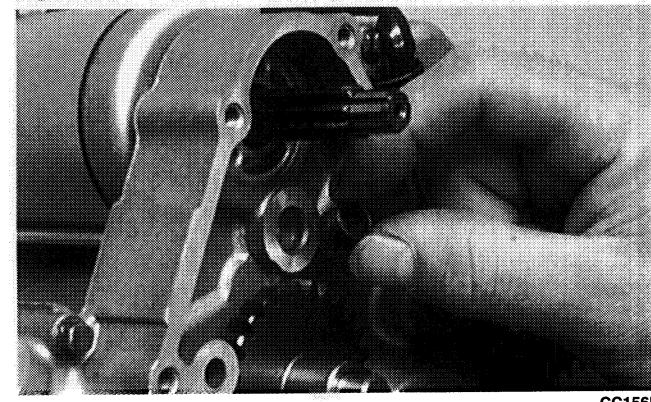
14. Slide the shift fork shaft through the shift fork and into the crankcase.

Fig. 3-386



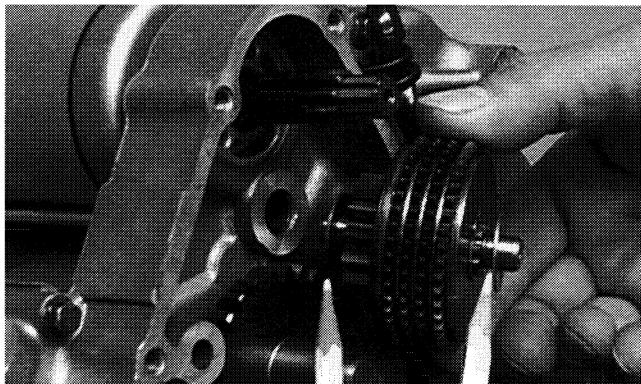
15. Insert a bushing into the idle gear limiter boss in the crankcase.

Fig. 3-387



16. Place a washer on each end of the idle gear limiter assembly and install in the crankcase.

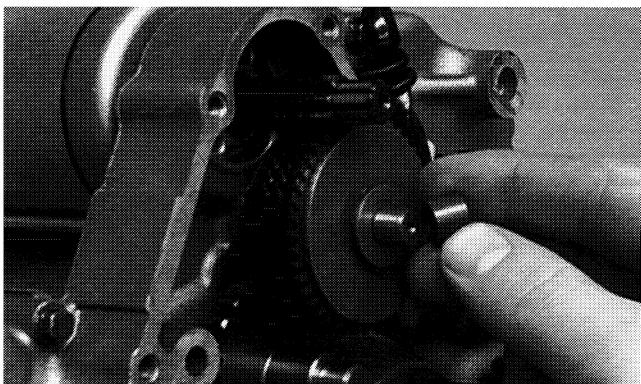
Fig. 3-388



CC157D

17. Place the remaining bushing on the idle gear limiter shaft.

Fig. 3-389



CC158D

18. Place the starter clutch gear assembly onto the crankshaft; then place the key into its notch.

Fig. 3-390



CC331D

Fig. 3-391

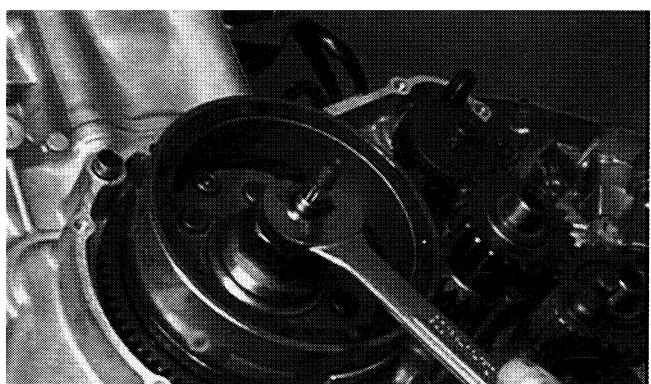


CC332D

19. Place the magneto rotor into position on the crankshaft; then install the magneto nut on the crankshaft and tighten until the rotor is properly seated. Tighten to 16 kg-m (115.5 ft-lb).

3

Fig. 3-392

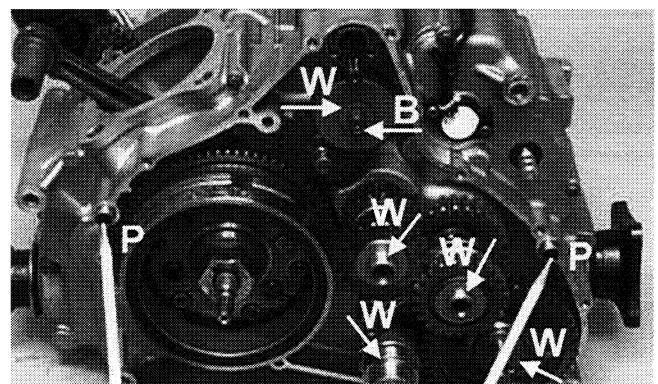


CC147D

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.**

Fig. 3-393



CC326D

C. Stator Assembly/Cover
D. Speedometer Drive
E. Hi/Low Shifter Assembly
F. Recoil Starter

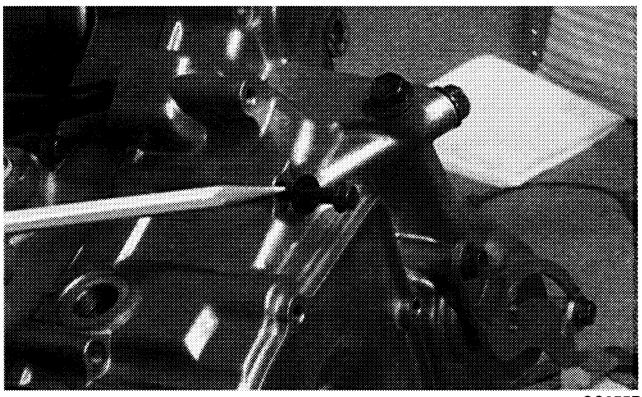
■ **NOTE:** Steps 1-20 in the preceding sub-section must precede this procedure.

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.

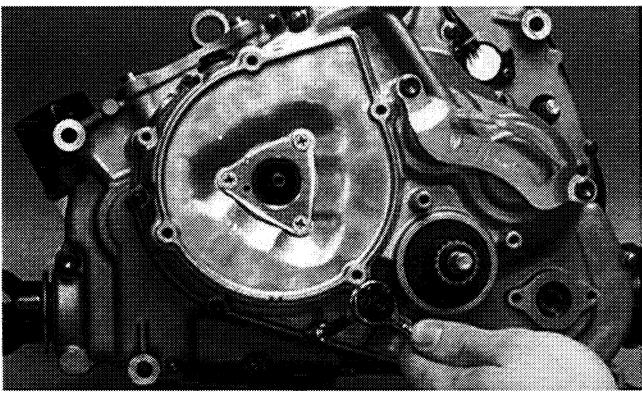
22. Install the fourteen cap screws to secure the left-side cover. Note the location of the long cap screw with rubber gasket.

Fig. 3-394



CC055D

Fig. 3-395

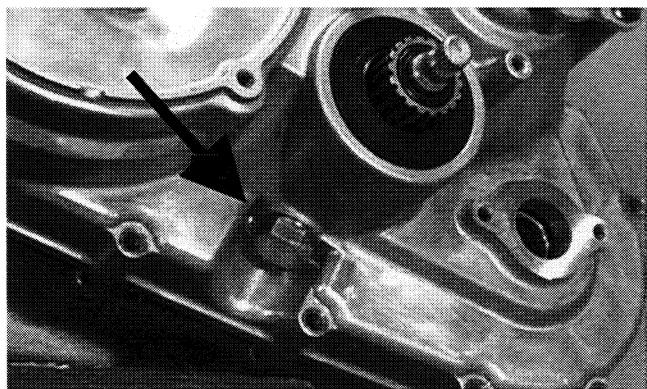


CC047D

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).

Fig. 3-396



CC054D

25. Place the speedometer drive adapter and gasket into position and secure with the two cap screws. Tighten to 1 kg-m (7 ft-lb).

CAUTION

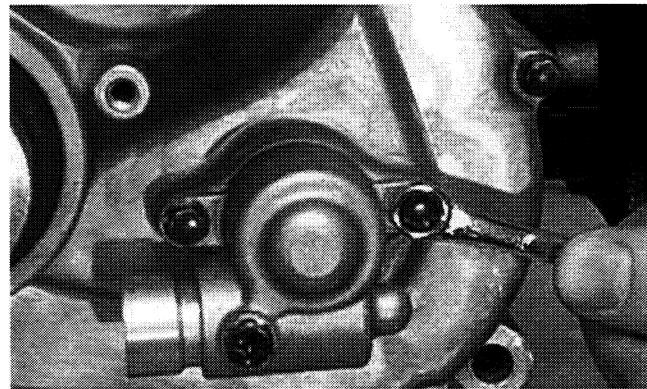
Make sure the speedometer gear and output shaft gear match up during assembly.

Fig. 3-397



CC043D

Fig. 3-398

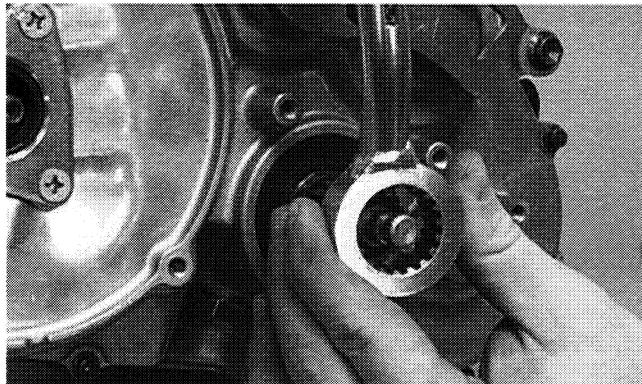


CC042D

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.

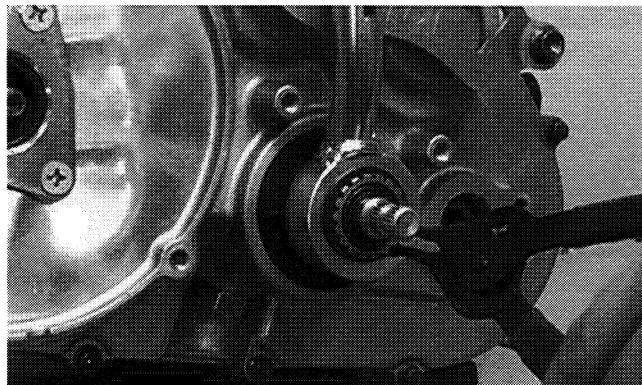
Fig. 3-399



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.

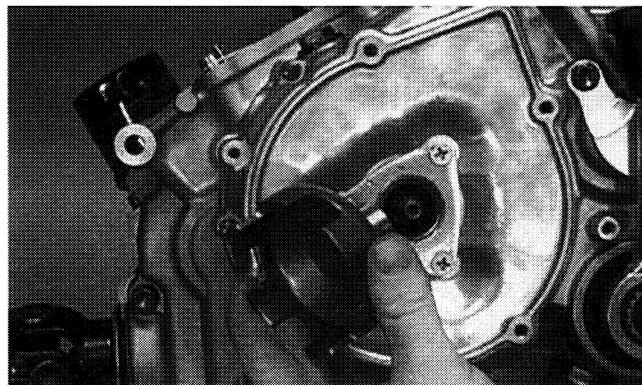
Fig. 3-400



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).

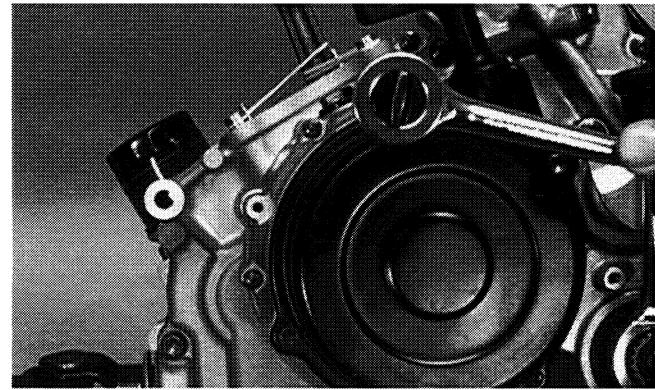
Fig. 3-401



CC041D

29. 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).

Fig. 3-402



CC039D

3 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.

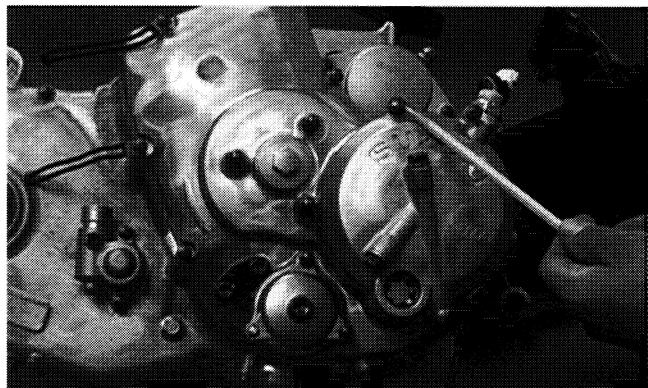
■ **NOTE:** The engine/transmission does not have to be removed from the frame for this procedure.

Removing Right-Side Components (250/300 cc)

A. Cover B. Release Roller Guide

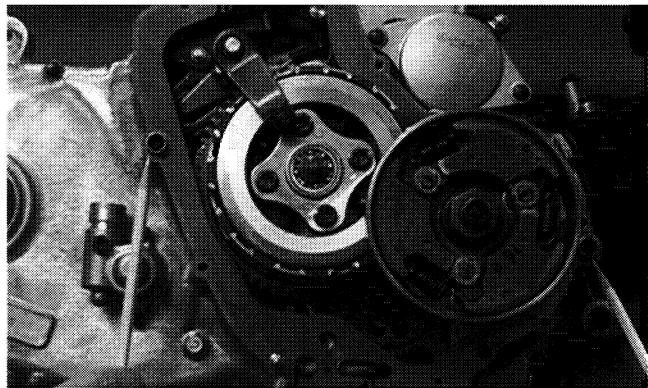
1. Lay the engine/transmission on its side; then remove the cap screws securing the right-side cover to the crankcase. Remove the cover. Note the locations of the long cap screw and rubber washer and the two wire forms. Account for the gasket and for two alignment pins.

Fig. 3-402



CC421D

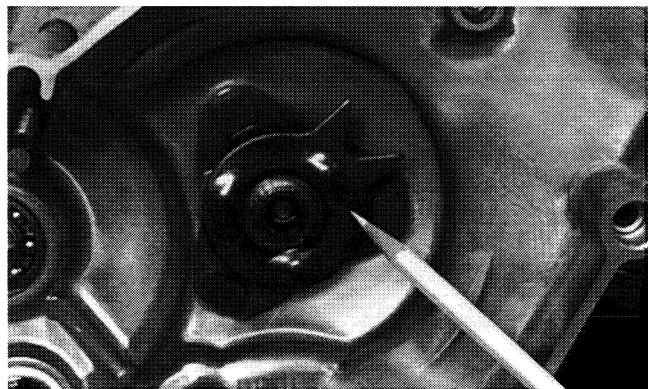
Fig. 3-403



CC423D

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

Fig. 3-404



CC422D

Fig. 3-405



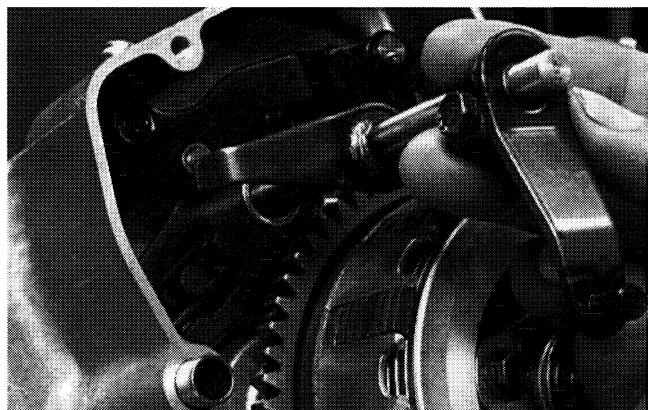
CC082D

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

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

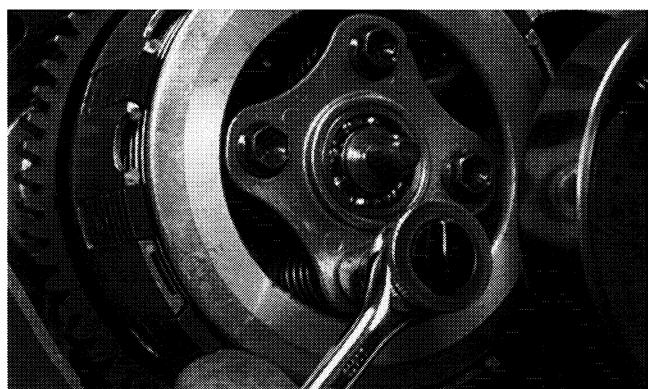
2. Slide the clutch release arm and gear shift shaft out of the crankcase; then in a crisscross pattern, remove the four cap screws securing the clutch release roller assembly.

Fig. 3-406



CC424D

Fig. 3-407



CC425D

3. Remove the release roller assembly. Account for four springs.

4. Remove the starter clutch-shoe nut (left-hand threads) and washer from the driveshaft; then using a clutch shoe remover, remove the clutch shoe.

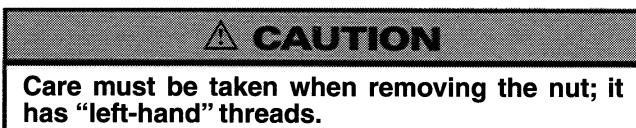
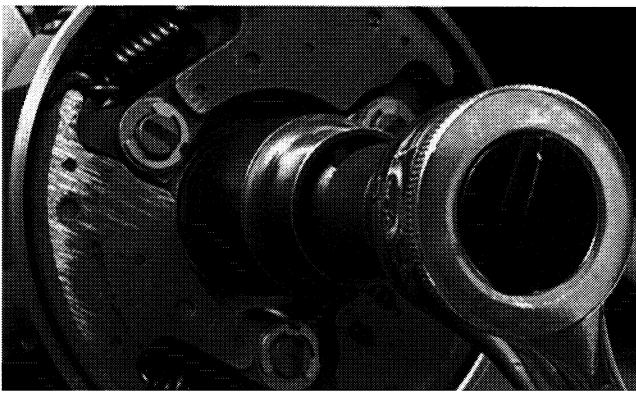


Fig. 3-408



CC426D

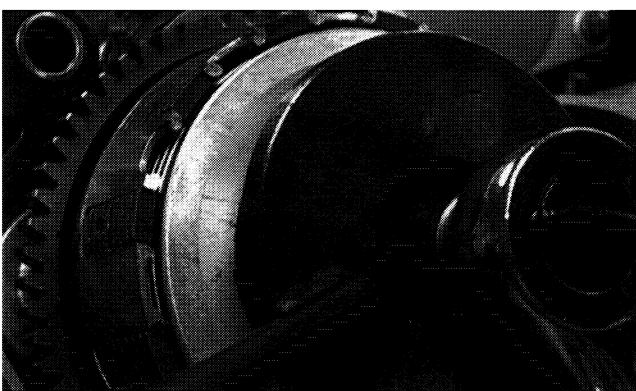
Fig. 3-409



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.

Fig. 3-410



CC428D

7. Scribe a line across the primary driven clutch to aid in assembly.

Fig. 3-411

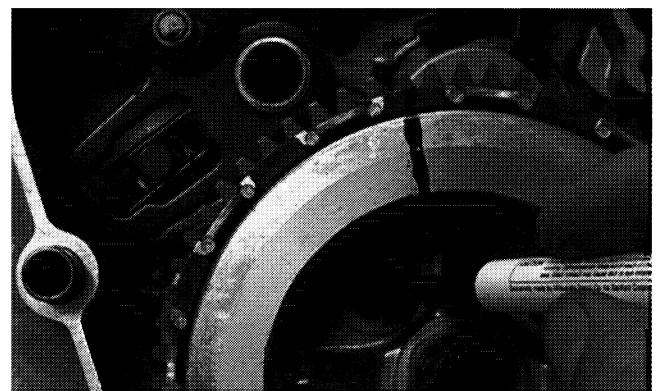


CC429D

8. Remove the primary driven clutch assembly from the countershaft. Account for the sleeve and washers.

3

Fig. 3-412



CC430D

☞ AT THIS POINT

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

F. Gear Shift Shaft G. Oil Pump/Oil Strainer

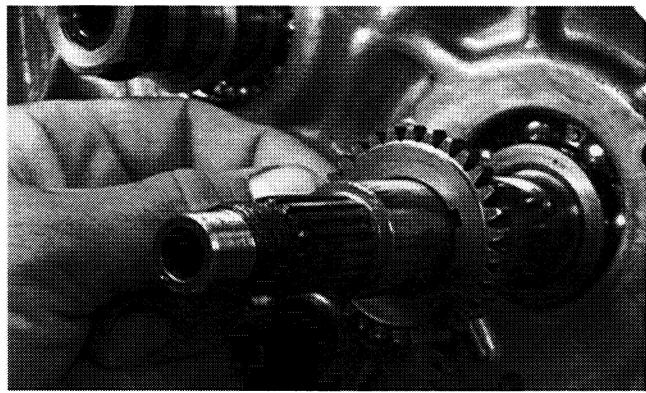
■ NOTE: Steps 1-8 in the preceding sub-sections must precede this procedure.

☞ AT THIS POINT

To service cam chain, see **Servicing Right-Side Components** in this sub-section.

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

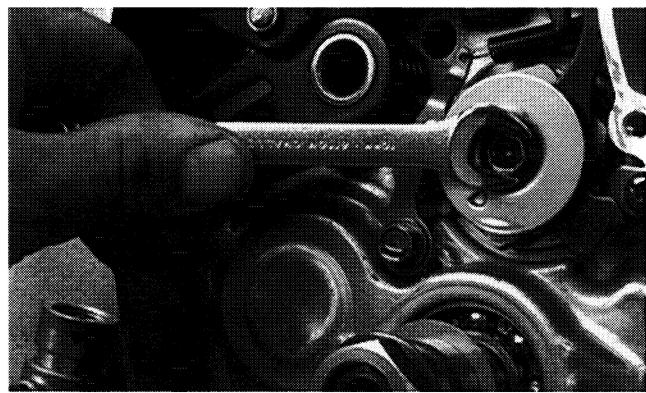
Fig. 3-413



CC432D

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

Fig. 3-414



CC433D

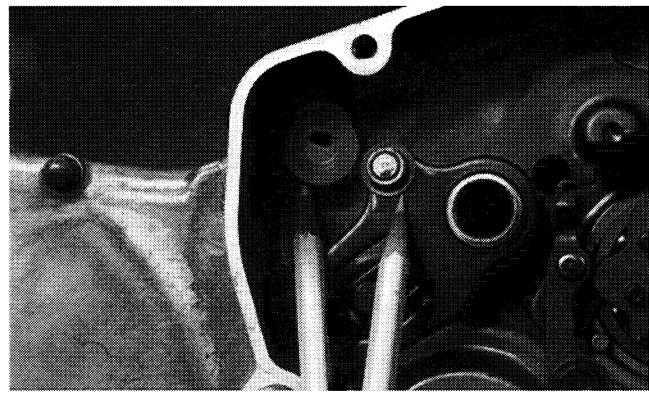
11. Remove the cap screw securing the gear shifting arm assembly; remove the assembly and account for a washer and a roller.

Fig. 3-415



CC434D

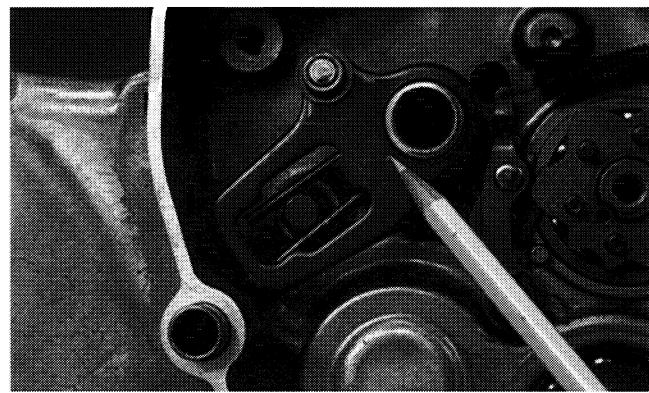
Fig. 3-416



CC435D

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

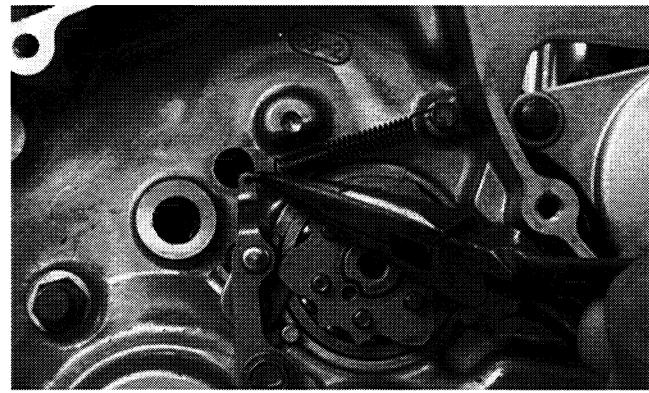
Fig. 3-417



CC436D

13. Remove the spring from the cam stopper.

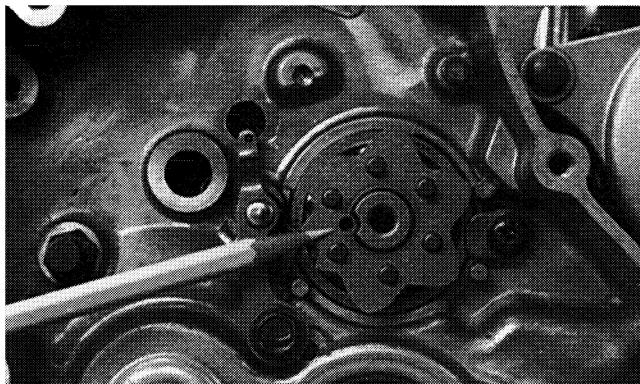
Fig. 3-418



CC437D

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

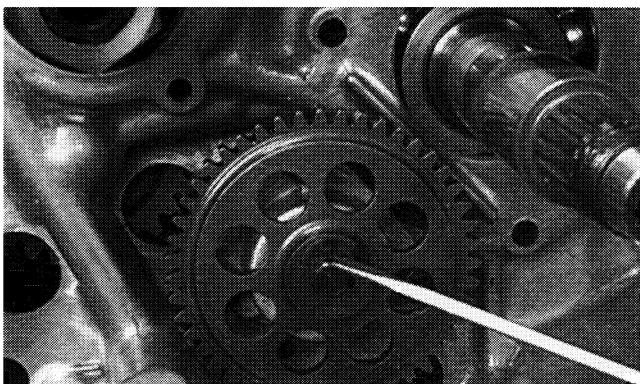
Fig. 3-419



CC438D

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

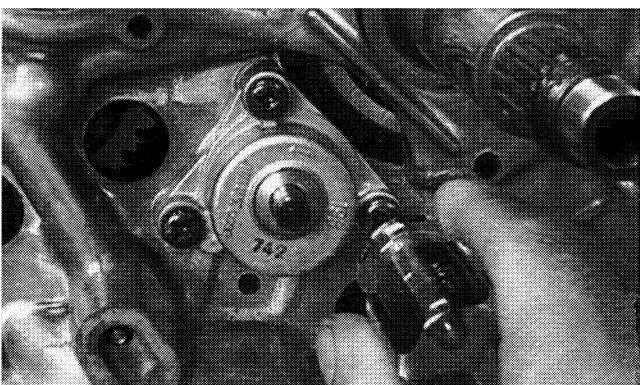
Fig. 3-420



CC439D

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

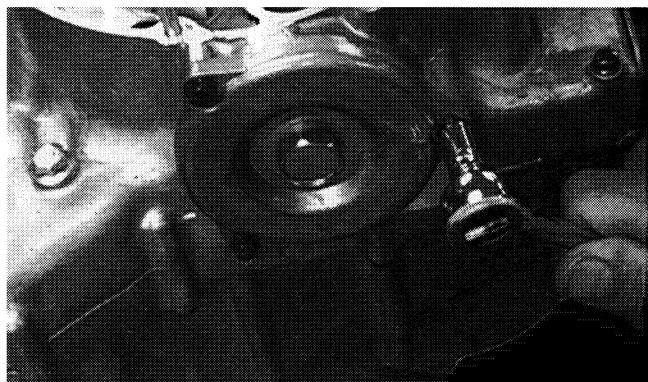
Fig. 3-421



CC440D

17. Remove the Phillips-head cap screws securing the oil strainer cap. Note the arrow on the cap for assembly purposes.

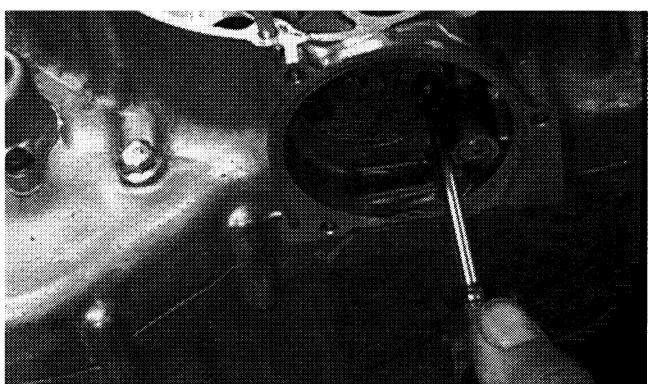
Fig. 3-422



CC442D

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

Fig. 3-423



CC443D

AT THIS POINT

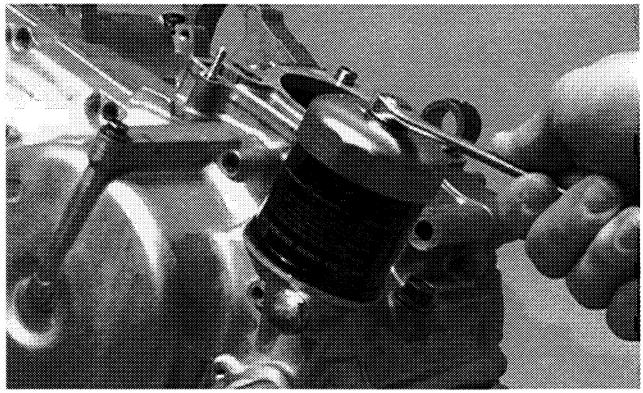
To service center crankcase components only,
proceed to Separating Crankcase Halves.

Removing Right-Side Components (400/500 cc)

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 0444-042), remove the oil filter.

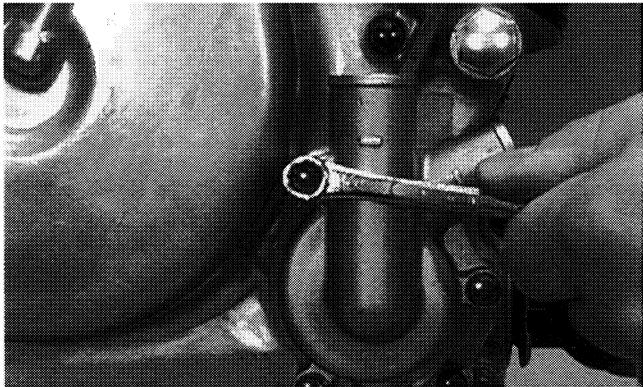
Fig. 3-424



CC067D

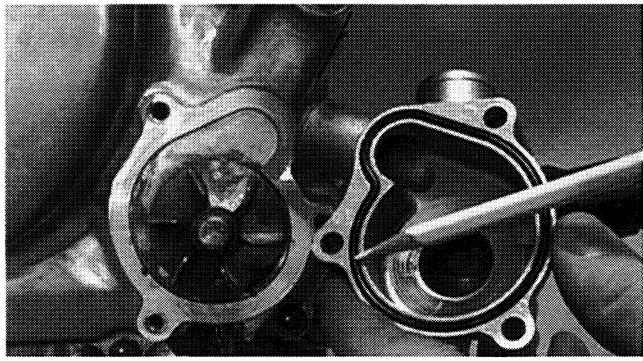
3. Remove the three cap screws securing the water pump cover to the right-side cover; then remove the water pump cover. Account for the O-ring.

Fig. 3-425



CC027D

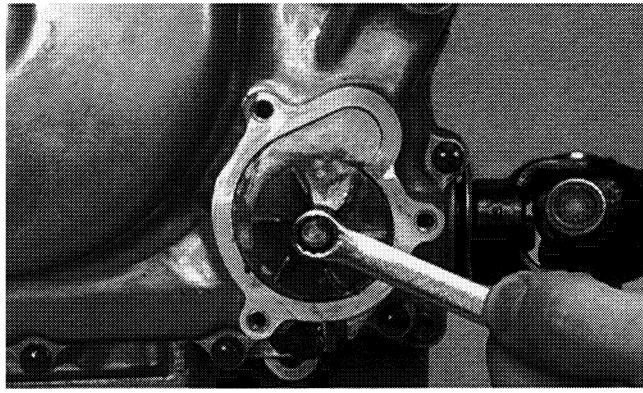
Fig. 3-426



CC028D

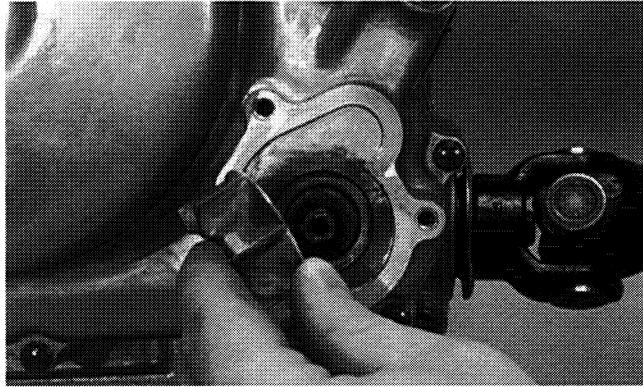
4. Remove the cap screw securing the impeller to the impeller shaft; then remove the impeller. Account for the rubber retainer and porcelain seal.

Fig. 3-427



CC029D

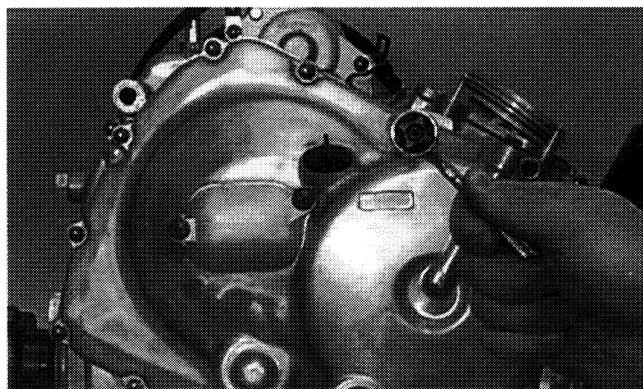
Fig. 3-428



CC030D

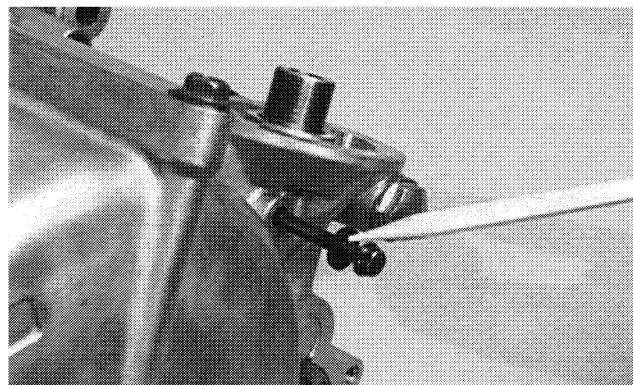
5. Lay the engine/transmission on its left side; then remove the fifteen cap screws securing the right-side cover to the crankcase. Remove the cover. Note the location of the long cap screw and rubber washer. Account for the gasket and for two alignment pins.

Fig. 3-429



CC034D

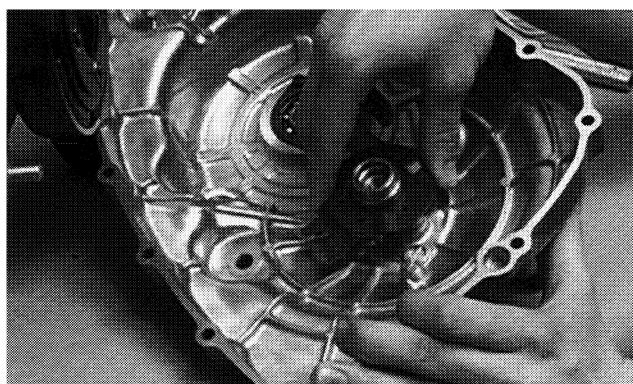
Fig. 3-430



CC068D

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

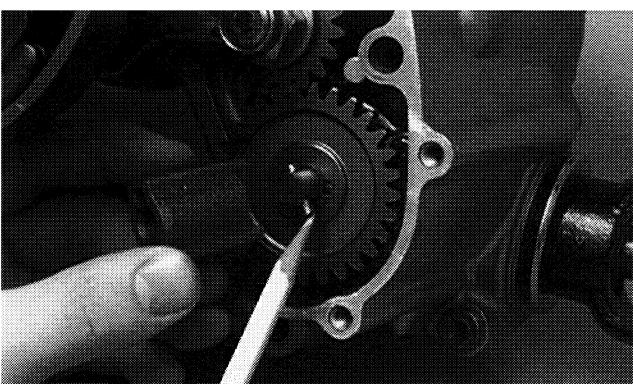
Fig. 3-431



CC070D

6. Remove the water pump drive joint from the water pump shaft. Account for the pin.

Fig. 3-432



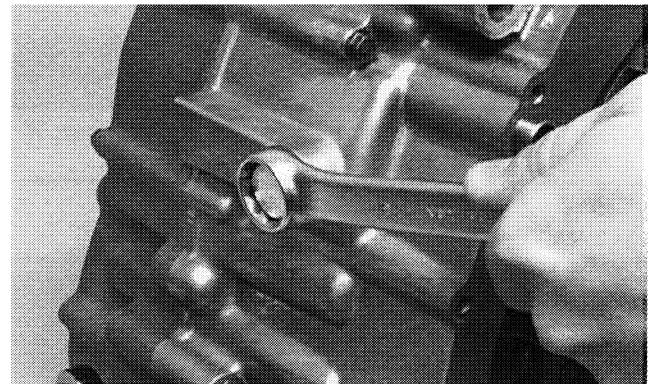
CC082D

C. Primary Driven Gear
D. Primary Driven 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.

Fig. 3-433



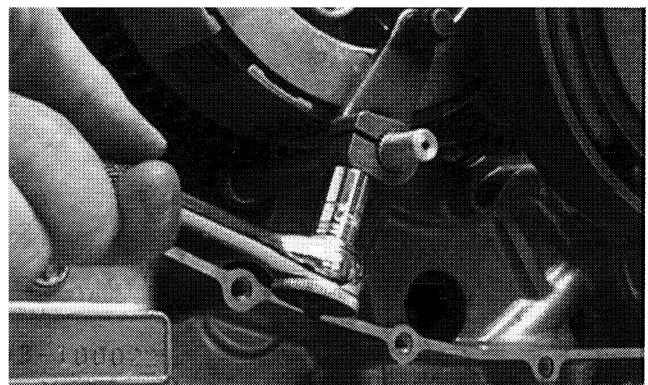
CC069D

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.

3

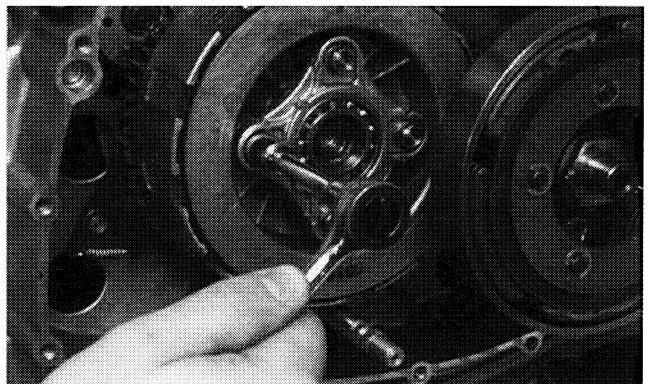
■ **NOTE:** Scribe a reference mark with a marker on the arm and shaft to aid in assembly.

Fig. 3-434



CC073D

Fig. 3-435



CC074D

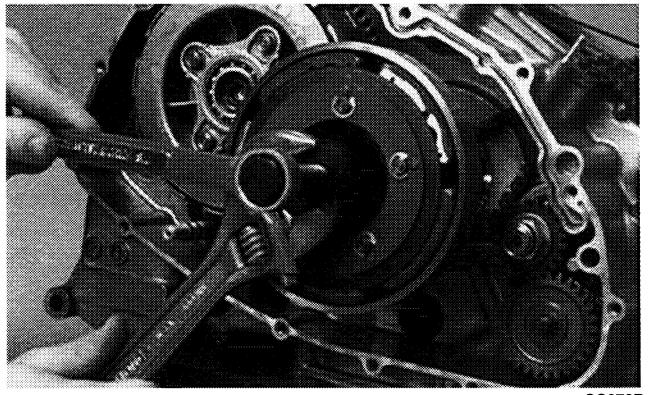
9. Remove the release roller assembly. Account for four springs.

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.

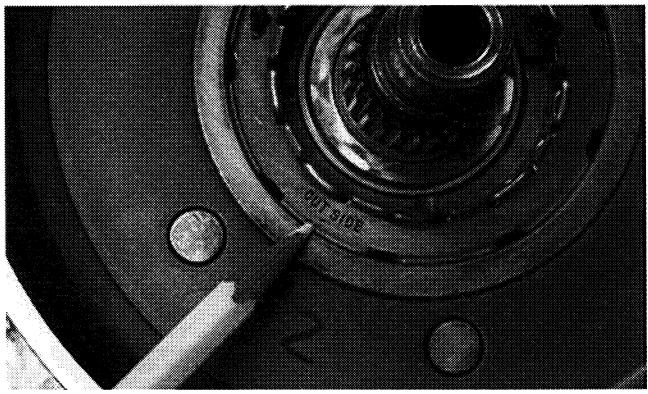
Fig. 3-436



CC072D

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

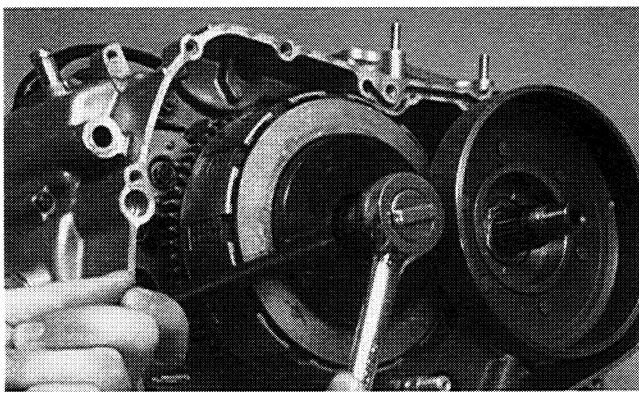
Fig. 3-437



CC075D

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

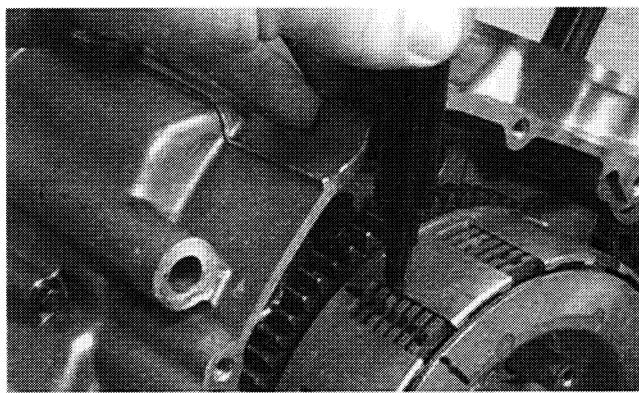
Fig. 3-438



CC076D

13. Scribe a line across the primary driven clutch assembly to aid in assembly.

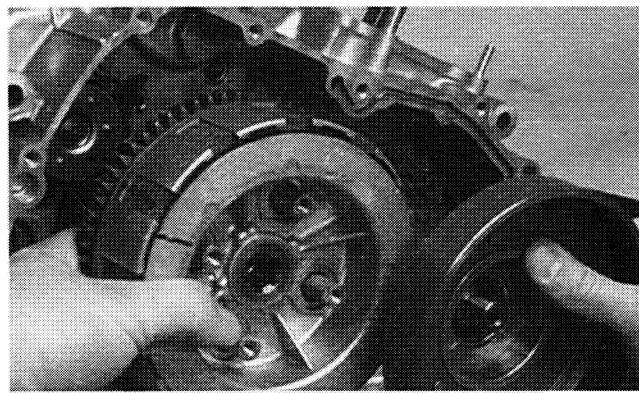
Fig. 3-439



CC077D

14. Simultaneously, remove the primary driven clutch assembly and starter clutch housing from their respective shafts. Account for the sleeve and washers.

Fig. 3-440



CC078D

 **AT THIS POINT**

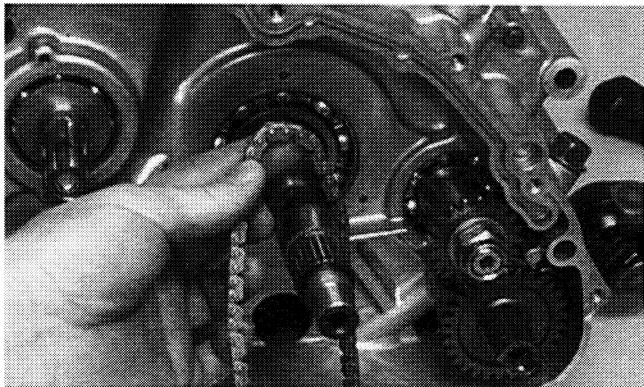
To service clutch components, see Servicing Right-Side Components in this sub-section.

F. Gear Shift Shaft 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.

Fig. 3-441



AT THIS POINT

To service cam chain, see Servicing Right-Side Components in this sub-section.

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.

Fig. 3-442

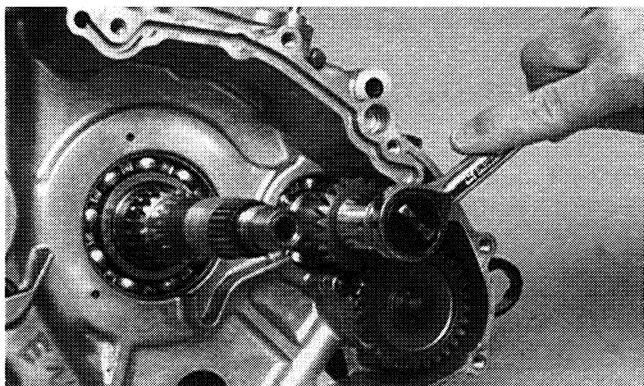
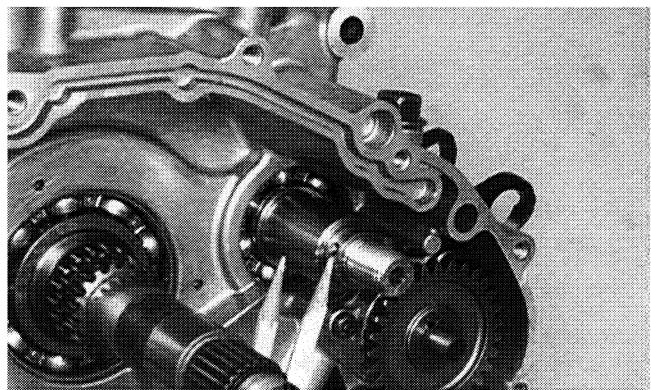
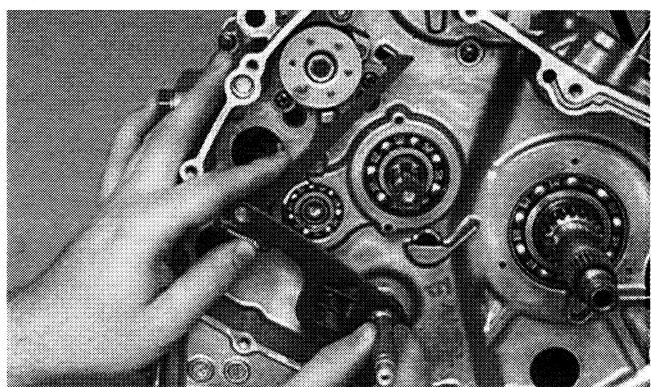


Fig. 3-443



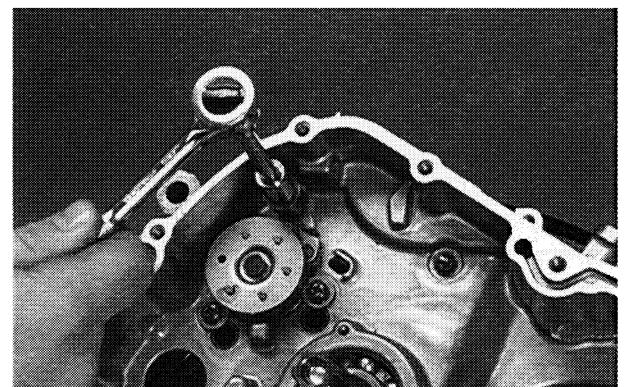
17. Remove the gear shift shaft from the crankcase.

Fig. 3-444



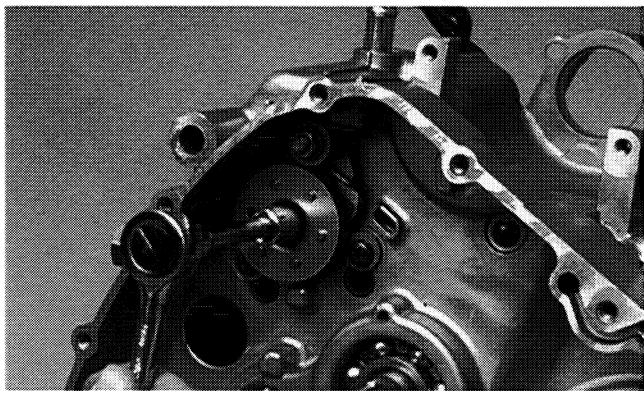
18. Remove the gear shift cam stopper support assembly from crankcase; then account for a washer and a stopper.

Fig. 3-445



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.

Fig. 3-446



CAUTION

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

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

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

Fig. 3-447

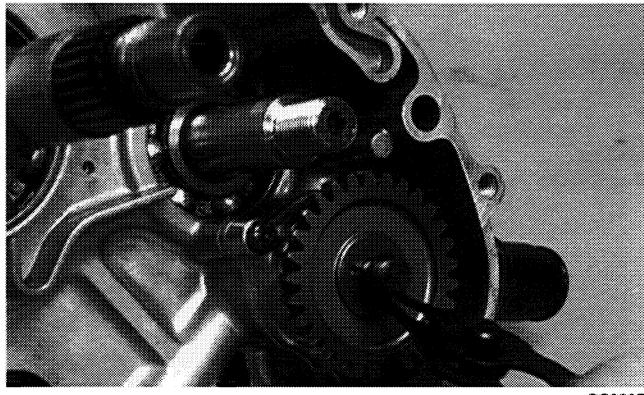
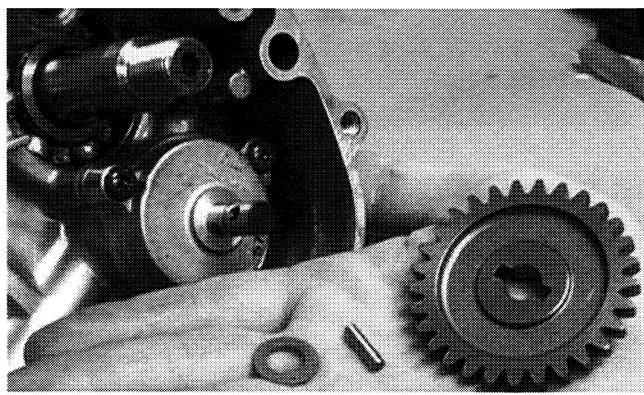
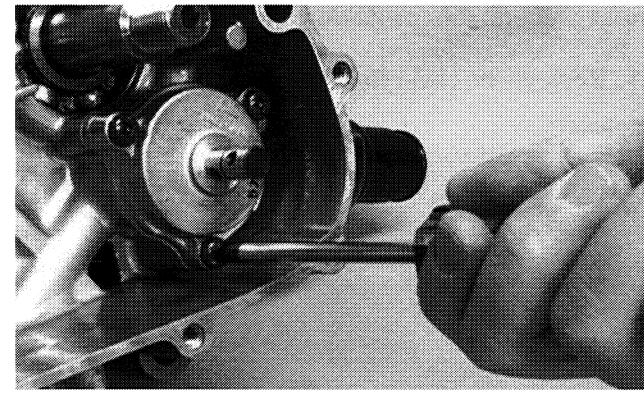


Fig. 3-448



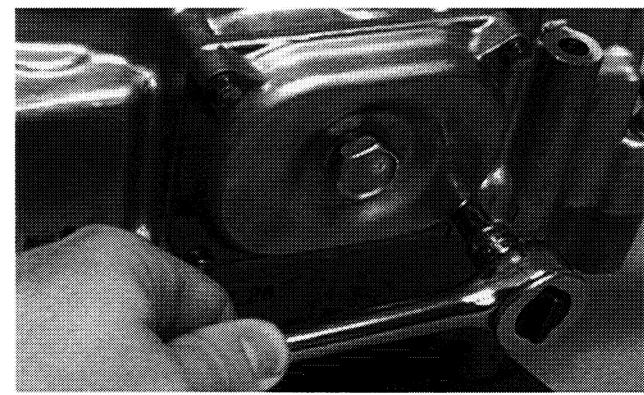
21. Remove the three Phillips-head screws securing the oil pump; then remove the oil pump.

Fig. 3-449



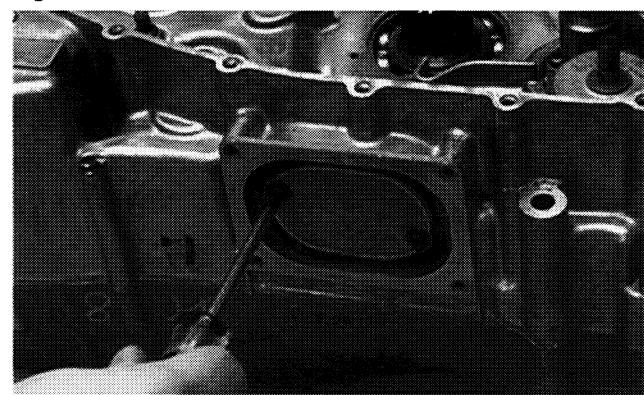
22. Remove the cap screws securing the oil strainer cap; then remove the cap. Account for the O-ring.

Fig. 3-450



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

Fig. 3-451



 **AT THIS POINT**

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

Servicing Right-Side Components

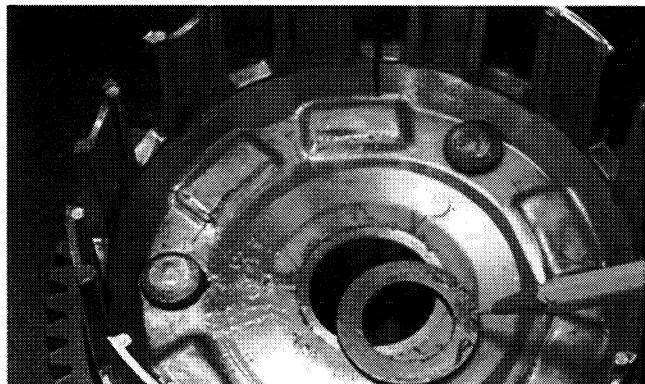
■ **NOTE:** The technician should reference the appropriate illustration and/or photograph for the model being serviced.

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

INSPECTING/MEASURING CLUTCH DRIVEN PLATE WARPAGE

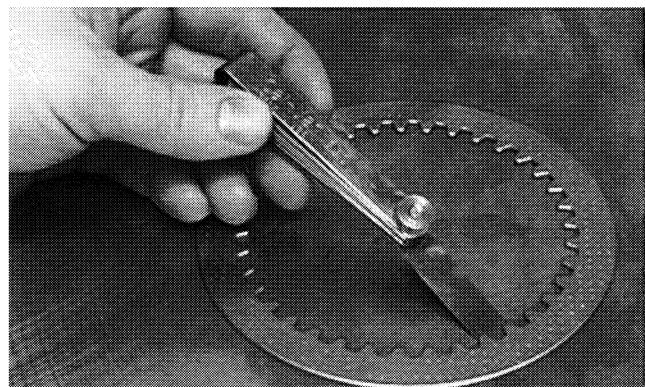
■ **NOTE:** On the 250/300 cc after removing the clutch hub and clutch plates, account for the washer beneath the clutch hub.

Fig. 3-452



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.

Fig. 3-453

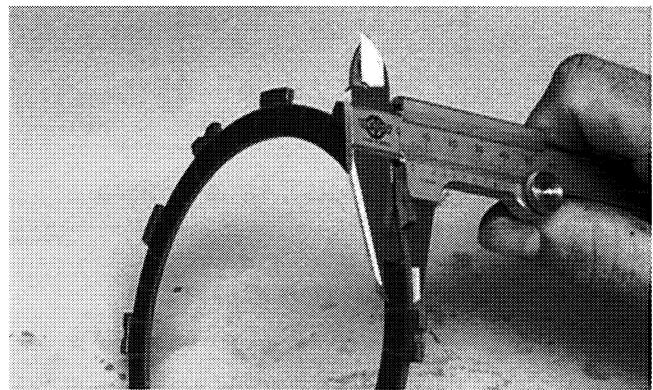


3. Maximum driven plate warpage must be 0.1 mm (0.004 in.).

MEASURING CLUTCH DRIVE PLATE (Fiber) THICKNESS

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

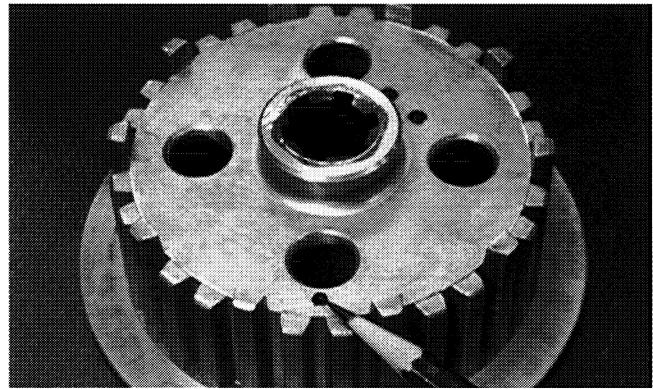
Fig. 3-454



2. Drive plate thickness must be a minimum of 2.42 mm (0.094 in.) for the 250/300 cc, 2.62 mm (0.103 in.) for the 400 cc, and within a range of 2.92-3.08 mm (0.1149-0.1212 in.) for the 500 cc.
3. If the fiber plate tabs are damaged, the plate must be replaced.
4. Inspect the clutch hub (clutch sleeve hub on the 400/500 cc) for grooves or notches. If grooves or notches are present, replace the hub.

■ **NOTE:** On the 250/300 cc, note the location of the timing mark on the hub for assembly purposes.

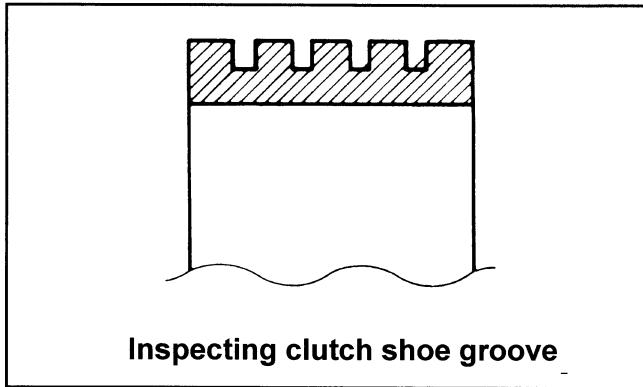
Fig. 3-455



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.

Fig. 3-456



ATV1014

INSPECTING STARTER CLUTCH HOUSING

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

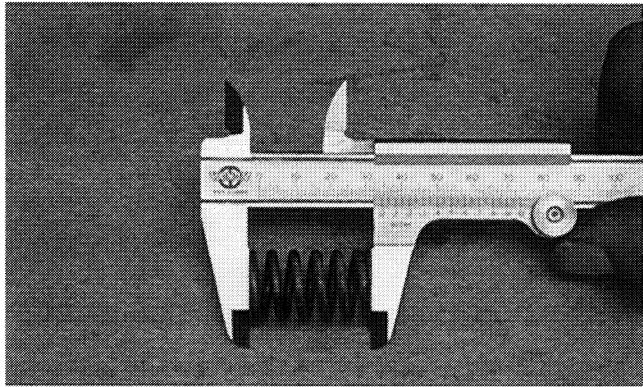
INSPECTING PRIMARY ONE-WAY DRIVE

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

MEASURING CLUTCH SPRING LENGTH

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

Fig. 3-457



2. Overall length must be a minimum of 27.5 mm (1.08 in.) for the 250/300 cc and 33.7 mm (1.33 in.) for the 400/500 cc.

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.

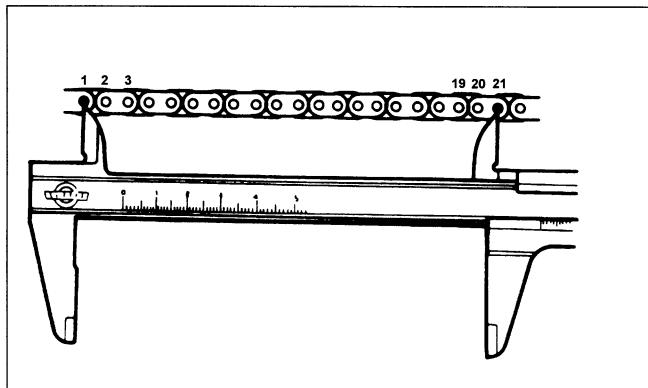
Fig. 3-458



MEASURING CAM CHAIN LENGTH (400/500 cc)

1. Apply approximately 13 kg (28.5 lb) of force to both ends of the cam chain.
2. With the chain extended, use a calipers to measure the length along 20 pins.

Fig. 3-459



3. Standard length is 127 - 127.36 mm (4.99-5.0 in.).
4. Maximum length must be 128.9 mm (5.07 in.).

Installing Right-Side Components (250/300 cc)

A. Oil Strainer/Oil Pump

B. Gear Shift Shaft

1. Place the oil strainer into position beneath the crankcase and tighten with the Phillips-head cap screws coated with red Loctite #271 to 0.5 kg-m (3.5 ft-lb).

CAUTION

The legs of the strainer must be directed out.

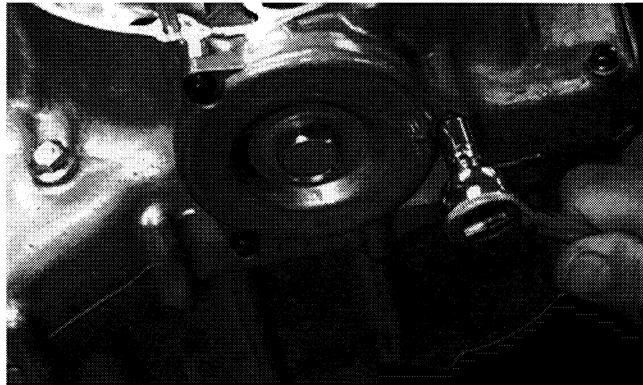
Fig. 3-460



CC443D

2. 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 2.3 kg-m (16.5 ft-lb).

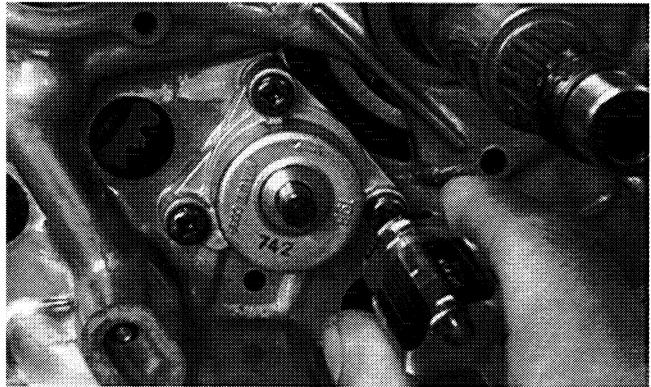
Fig. 3-461



CC442D

3. Place the oil pump into position on the crankcase and secure with the Phillips-head screws coated with blue Loctite #242. Tighten to 1 kg-m (7 ft-lb).

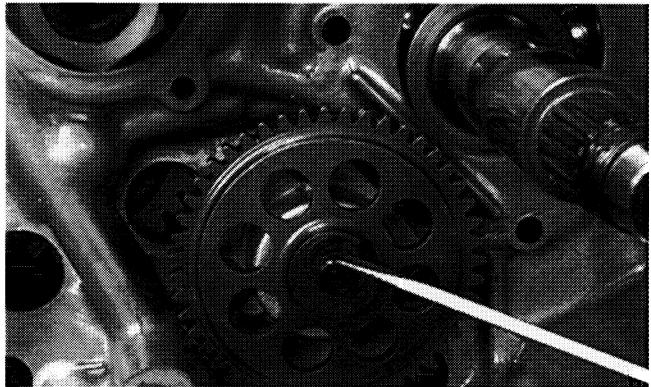
Fig. 3-462



CC440D

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 in, and secure with the circlip.

Fig. 3-463



CC439D

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 to 1 kg-m (7 ft-lb).

Fig. 3-464

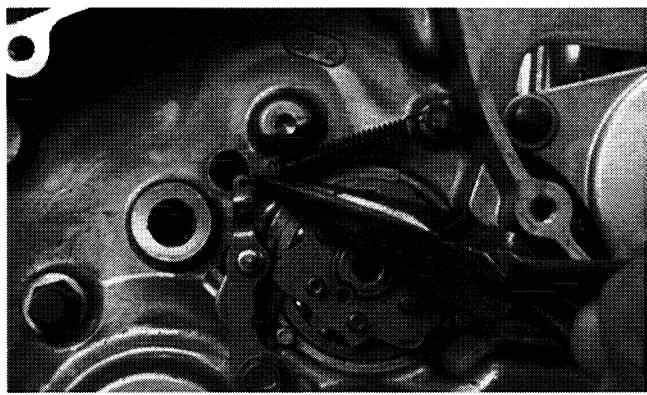


CC438D

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

6. Install the spring onto the cam stopper.

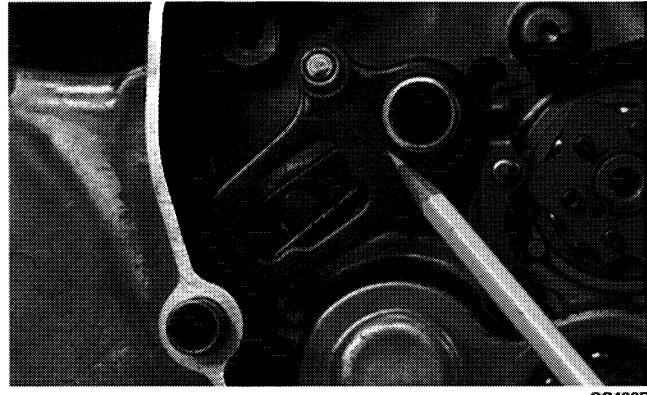
Fig. 3-465



CC437D

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

Fig. 3-466

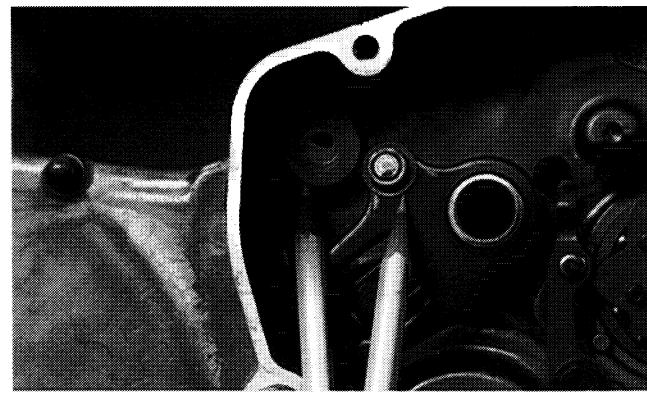


CC436D

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.

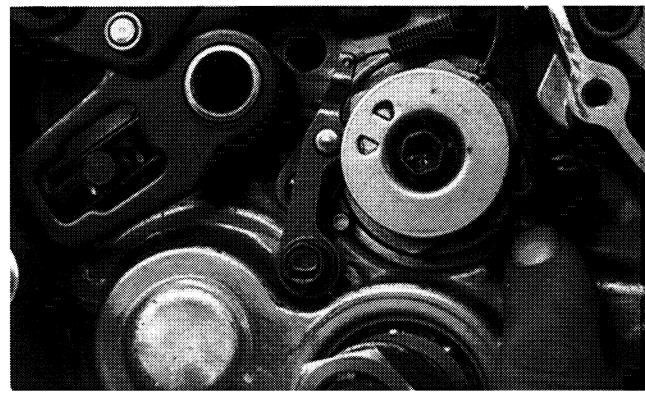
■ NOTE: When installing the arm assembly, make sure to lift the spring loaded portion to install between the pin retainer and stopper plate. Also, make sure the link arm roller is in its hole.

Fig. 3-467



CC435D

Fig. 3-468



CC449D

Fig. 3-469



CC451D

C. Starter Clutch Housing
D. Primary Driven Gear
E. Primary Driven Clutch

■ 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.

Fig. 3-470



CC432D

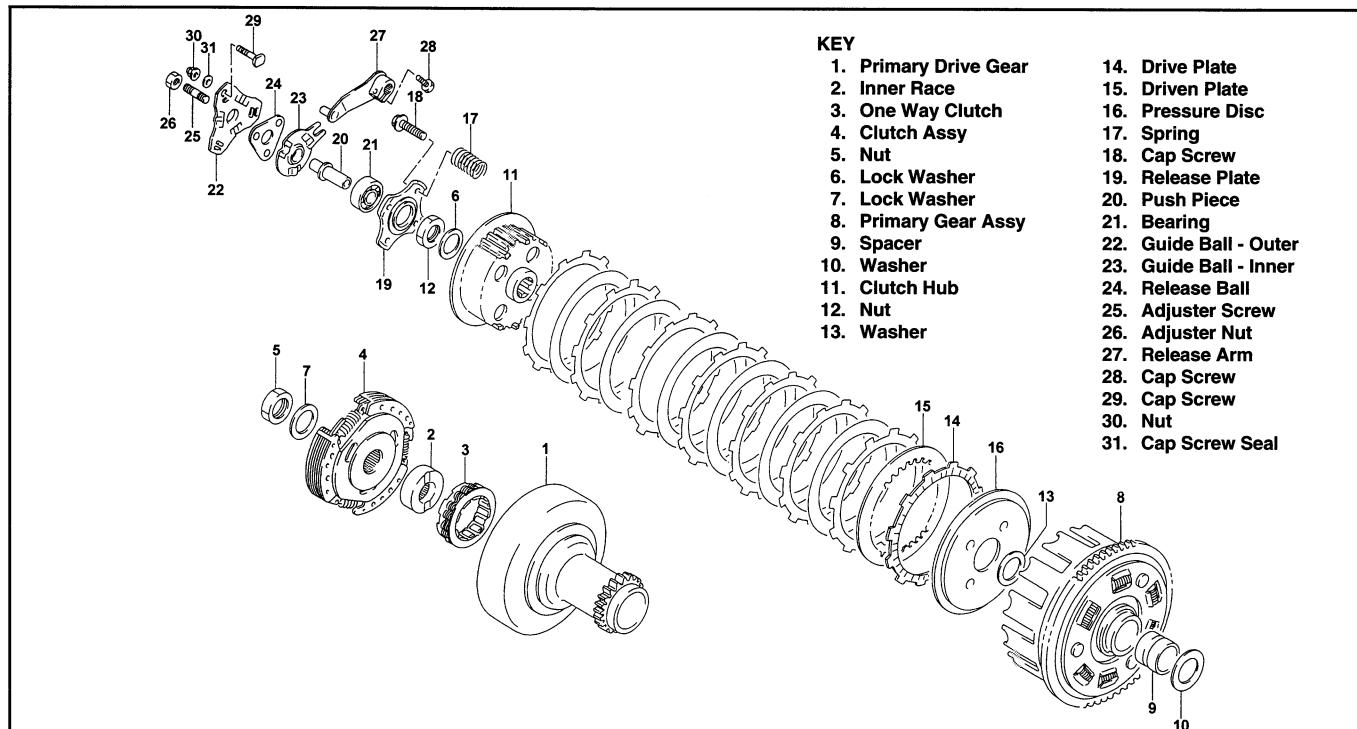
10. Install the primary driven washer and sleeve onto the countershaft.

Fig. 3-471



CC431D

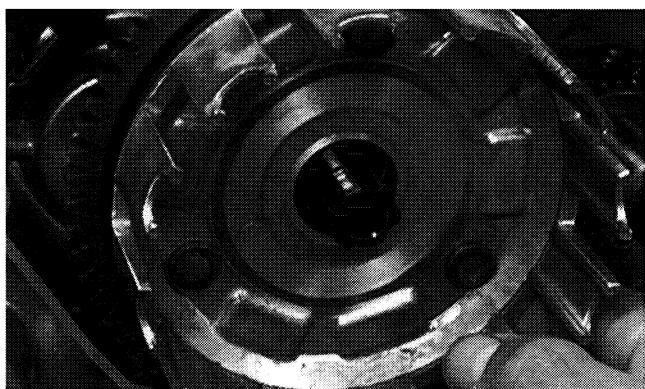
Fig. 3-472



0733-753

11. Install the primary gear assembly housing onto the countershaft; then install the washer.

Fig. 3-473



CC452D

Fig. 3-474

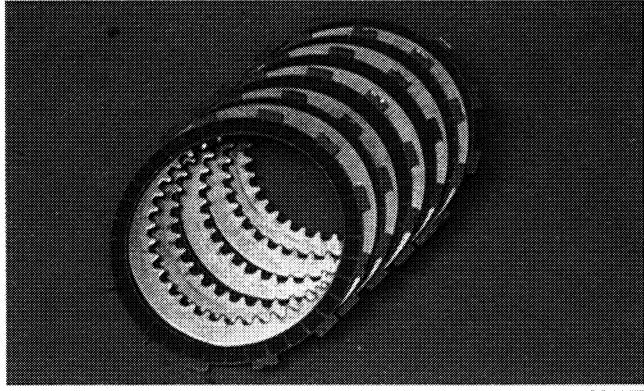


CC453D

12. Place the clutch hub on a work bench; then alternately install the 6 drive clutch fiber plates and the 5 driven clutch steel plates onto the hub making sure the marks made during servicing on the hub and plates align.



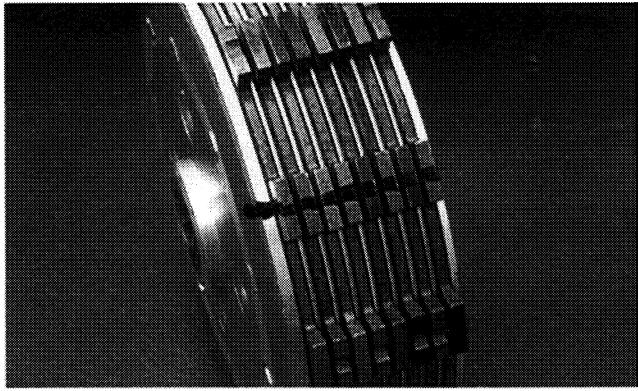
Fig. 3-475



CC337D

13. Install the pressure disc onto the plates making sure the mark scribed in removing is aligned.

Fig. 3-476

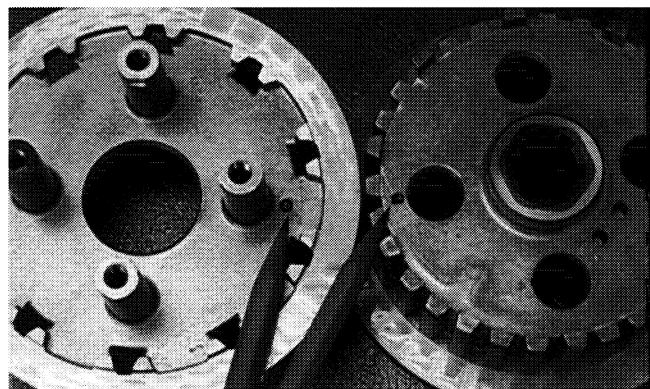


CC447D

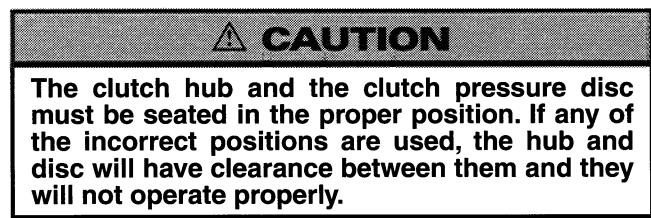
■ NOTE: If alignment marks were not scribed during removing, it may be necessary to reposition the clutch hub and the clutch pressure disc until the two components seat correctly with no clearance between them.

■ NOTE: The alignment dots must also be aligned to assure that the clutch assembly works properly.

Fig. 3-477



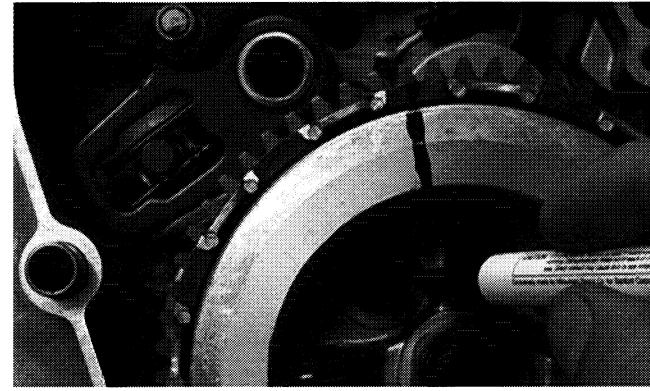
CC448D



14. Place the primary driven clutch assembly onto the countershaft.

■ NOTE: Note the alignment mark scribed on the primary driven gear assembly during disassembly.

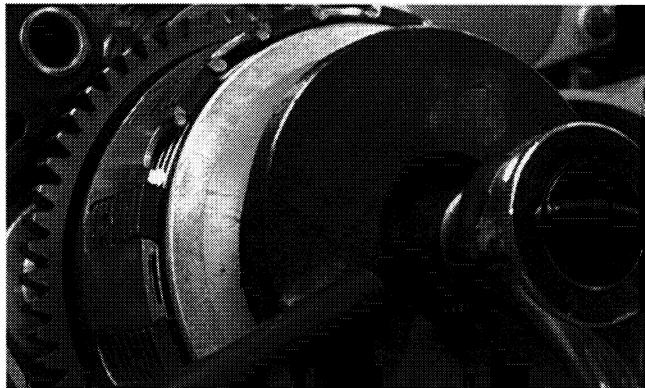
Fig. 3-478



CC430D

15. Using a clutch sleeve hub holder, install the nut (threads coated with red Loctite #271) and washer. Tighten to 10 kg-m (72.5 ft-lb).

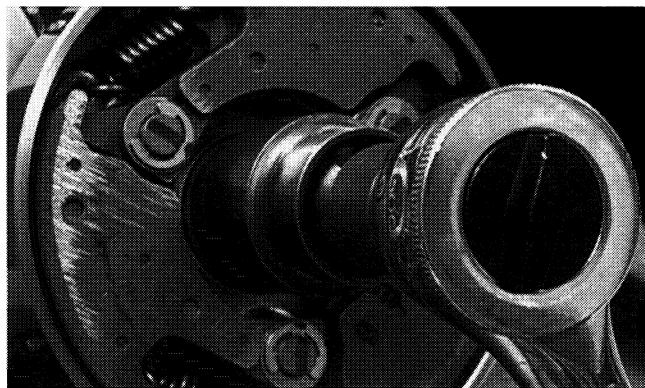
Fig. 3-479



CC428D

16. Place the primary drive one-way clutch housing onto the crankshaft.
17. Install the clutch shoe and washer; then secure with the starter clutch-shoe nut (left-hand threads) coated with red Loctite #271. Tighten to 13 kg-m (94 ft-lb).

Fig. 3-480

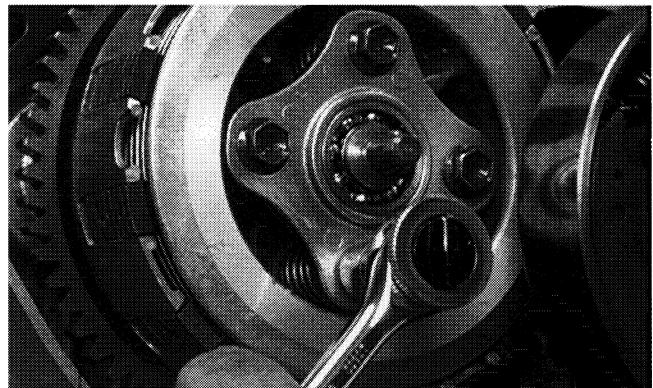


CC426D

18. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, secure with the four cap screws to 1 kg-m (7 ft-lb).

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

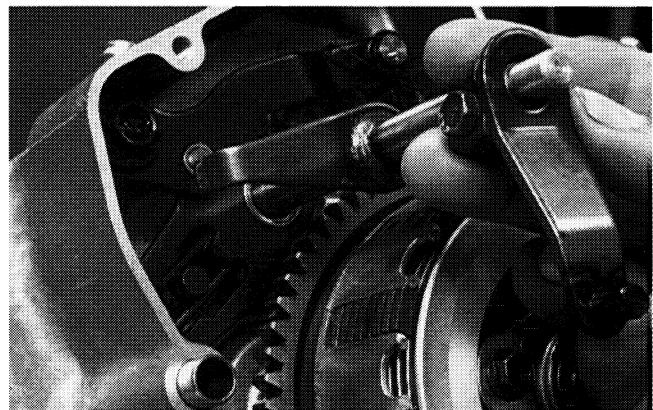
Fig. 3-481



CC425D

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

Fig. 3-482



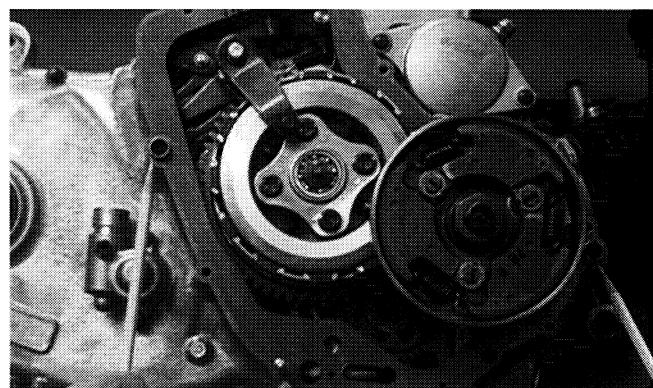
CC424D

F. Release Roller Guide G. Cover

■NOTE: Steps 1-19 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.

Fig. 3-483



CC423D

20. Install the right-side cover 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.

Fig. 3-484

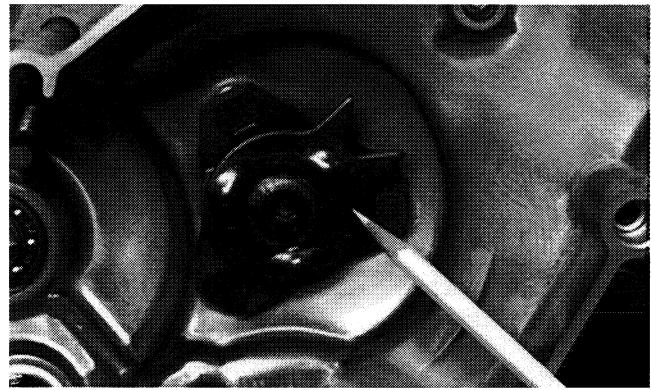
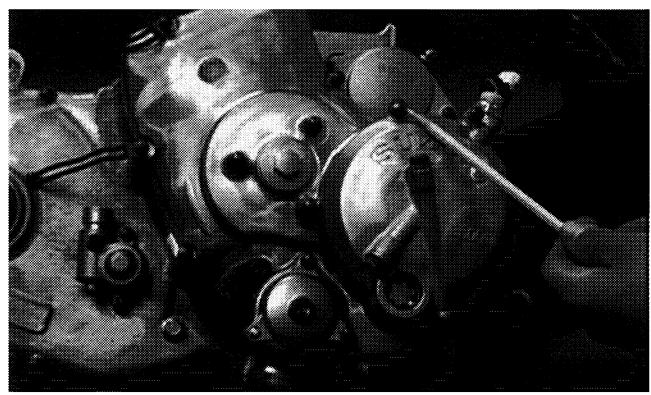


Fig. 3-485



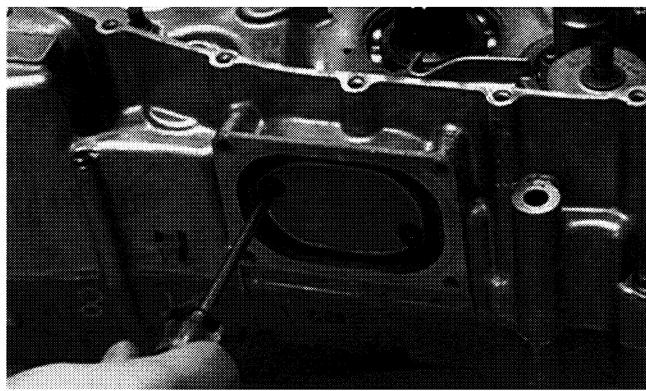
21. Tighten the cap screws in a crisscross pattern to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

Installing Right-Side Components (400/500 cc)

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 with the Phillips-head cap screws to 0.5 kg-m (3.5 ft-lb).

Fig. 3-486



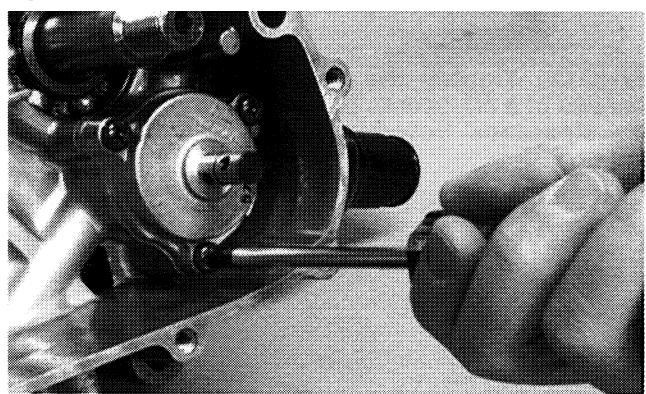
2. Place the strainer cap into position on the strainer making sure the O-ring is properly installed and secure with the cap screws; then install and tighten the oil drain plug to 2.3 kg-m (16.5 ft-lb).

Fig. 3-487



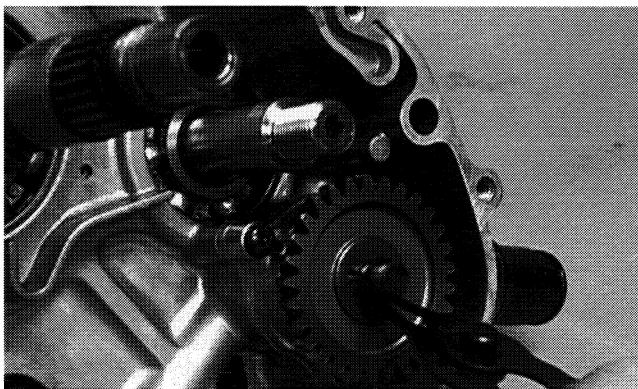
3. Place the oil pump into position in the crankcase and secure with the three Phillips-head screws coated with blue Loctite #242. Tighten to 1 kg-m (7 ft-lb).

Fig. 3-488



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

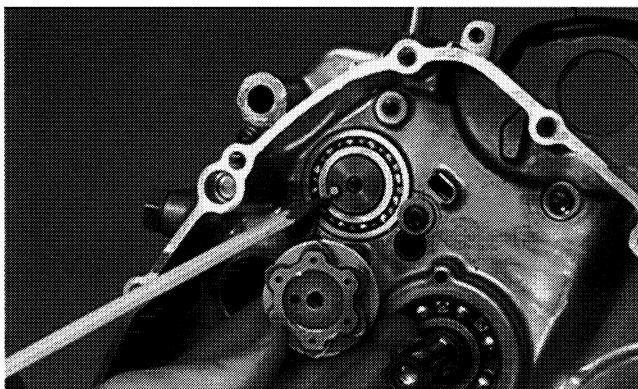
Fig. 3-489



CC088D

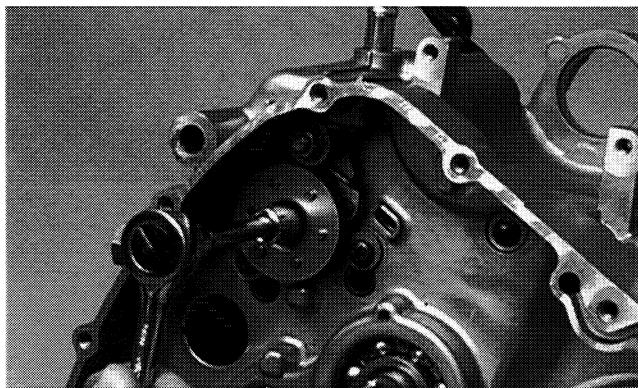
5. Place the gear shift cam plate and guide onto the gear shift cam making sure the alignment pin was installed. Secure assembly with the cap screw coated with blue Loctite #242. Tighten to 1 kg-m (7 ft-lb).

Fig. 3-490



CC087D

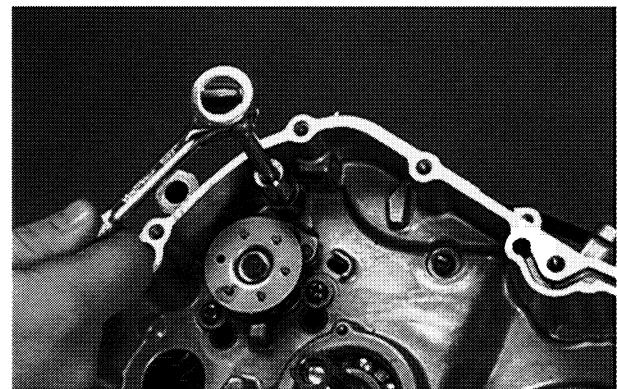
Fig. 3-491



CC164D

6. Install the gear shift cam stopper support assembly making sure the washer, stopper, and spring are properly positioned.

Fig. 3-492



CC086D

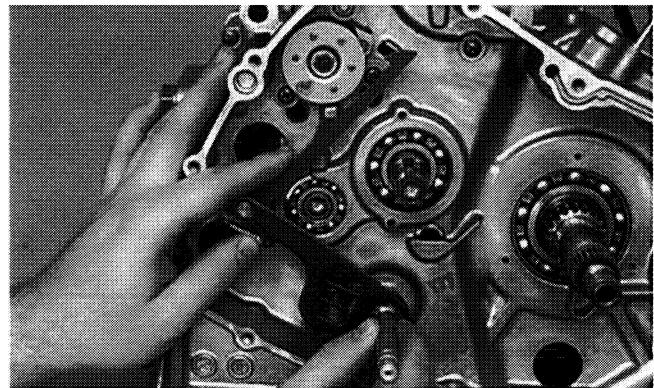
Fig. 3-493



CC153D

7. Install the gear shift shaft.

Fig. 3-494



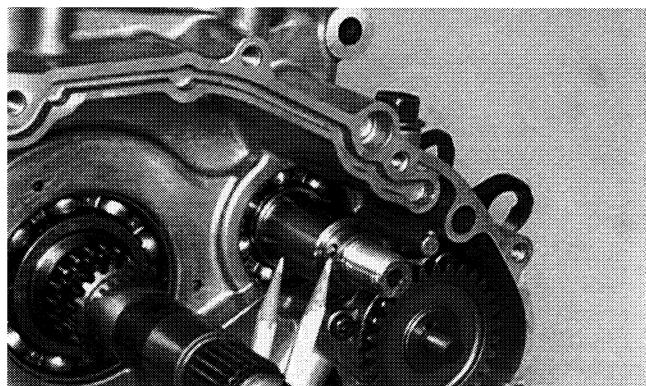
CC085D

C. Starter Clutch Housing
D. Primary Driven Gear
E. Primary Driven Clutch

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

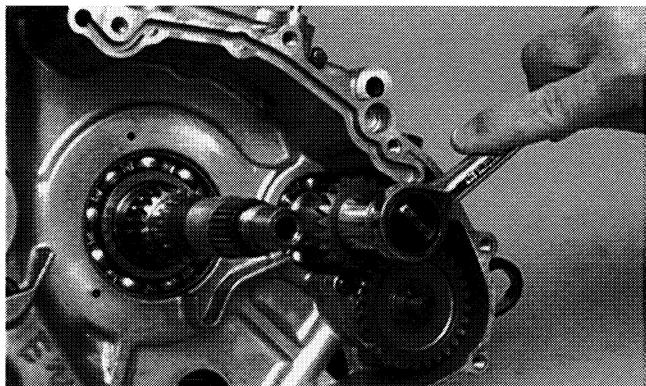
8. Install the spacer, pin, and oil pump drive gear onto the crank balancer shaft; then secure with the washer and nut tightened to 8 kg-m (58 ft-lb).

Fig. 3-495



CC081D

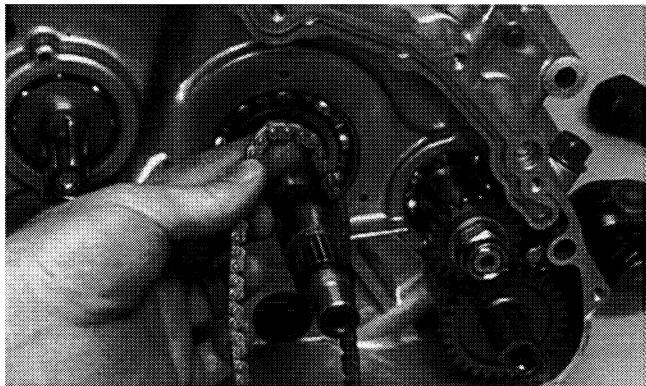
Fig. 3-496



CC080D

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

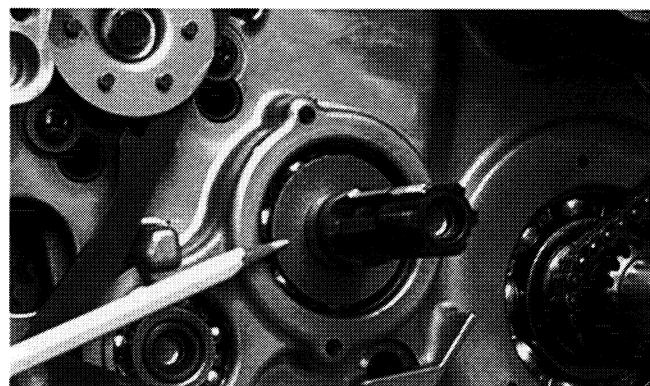
Fig. 3-497



CC079D

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

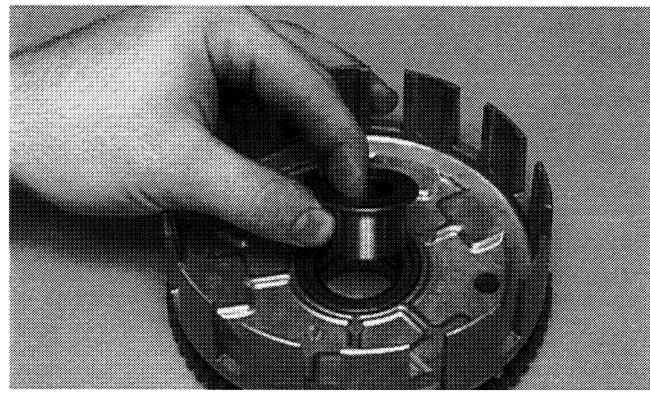
Fig. 3-498



CC232D

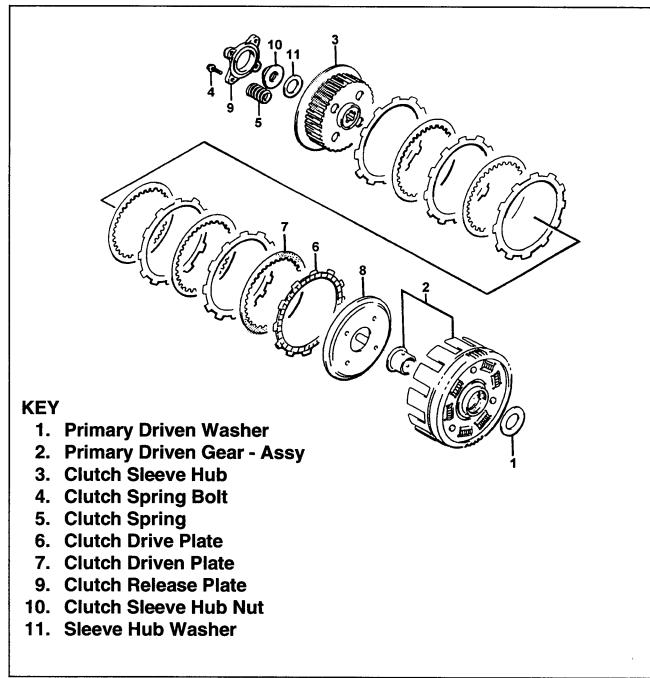
11. Install the bushing into the primary driven gear.

Fig. 3-499



CC239D

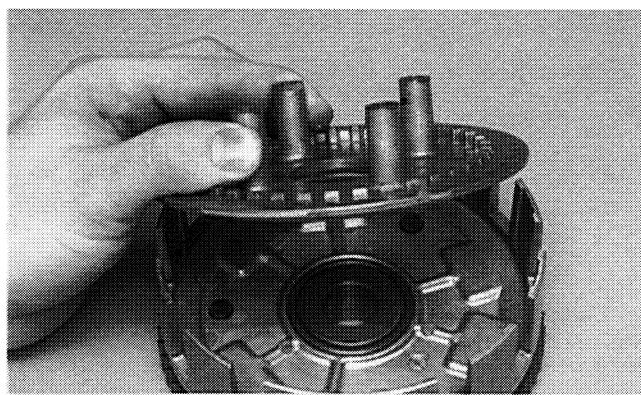
Fig. 3-500



732-312A

12. Install the clutch pressure disc.

Fig. 3-501



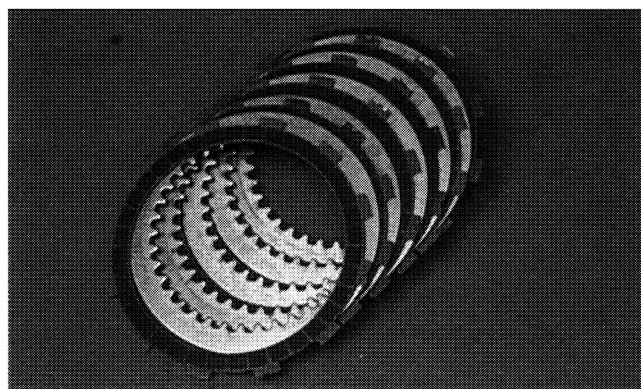
CC238D

13. Alternately install the 6 drive clutch fiber plates and the 5 driven clutch steel plates.

CAUTION

The six drive clutch fiber plates and the five driven clutch steel plates must be alternately installed starting and ending with a drive clutch fiber plate.

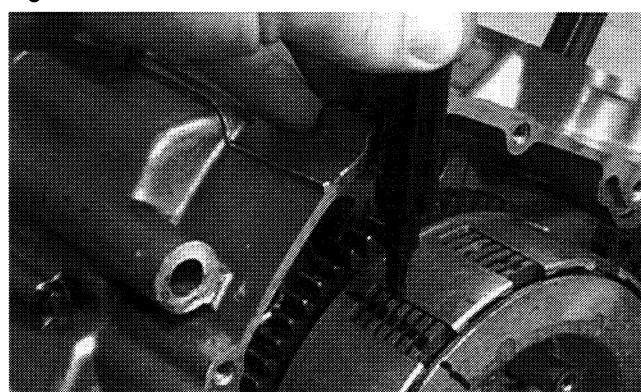
Fig. 3-502



CC337D

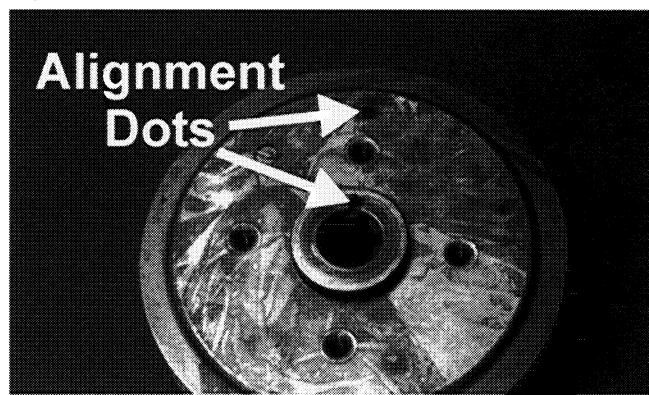
14. Install the clutch sleeve hub making sure the marks scribed in removing are aligned. The alignment dots must also be aligned to assure that the clutch assembly works properly.

Fig. 3-503



CC077D

Fig. 3-504

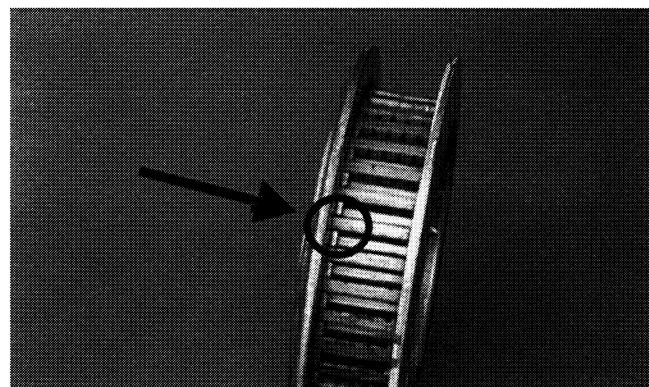


CC364A

■ NOTE: If alignment marks were not scribed during removing, it may be necessary to reposition the clutch sleeve hub and the clutch pressure disc until the two components seat correctly with no clearance between them.

3

Fig. 3-505



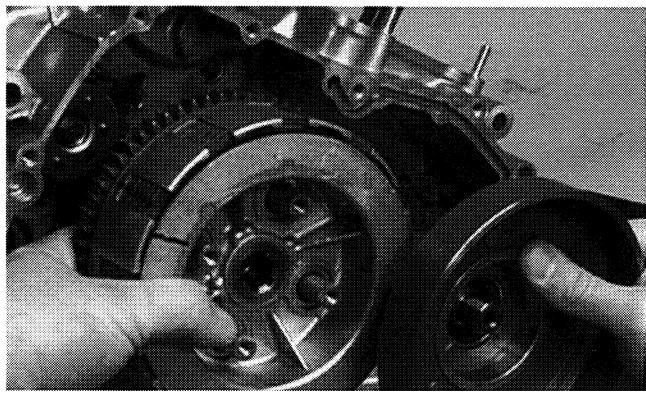
CC365A

CAUTION

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

15. Simultaneously, place the primary driven clutch assembly and the starter clutch housing on their respective shafts making sure the sleeve is properly positioned in the primary assembly.

Fig. 3-506

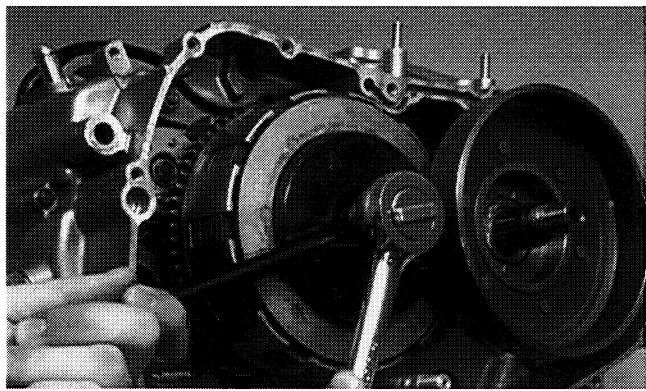


CC078D

■ **NOTE: Note the alignment mark scribed on the primary driven gear assembly during disassembly.**

16. Using the Clutch Sleeve Hub Holder (p/n 0444-007), install the nut coated with red Loctite #271 and washer. Tighten to 10 kg-m (72.5 ft-lb).

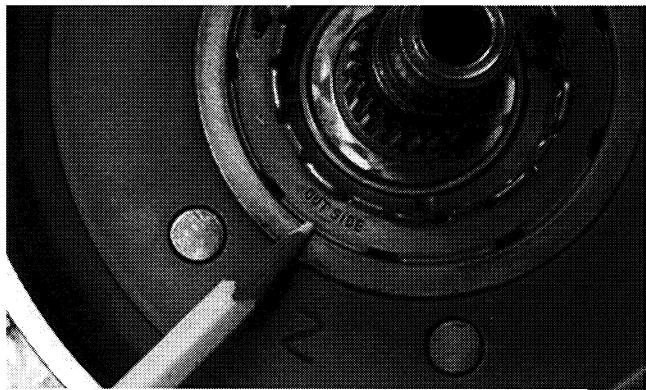
Fig. 3-507



CC076D

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

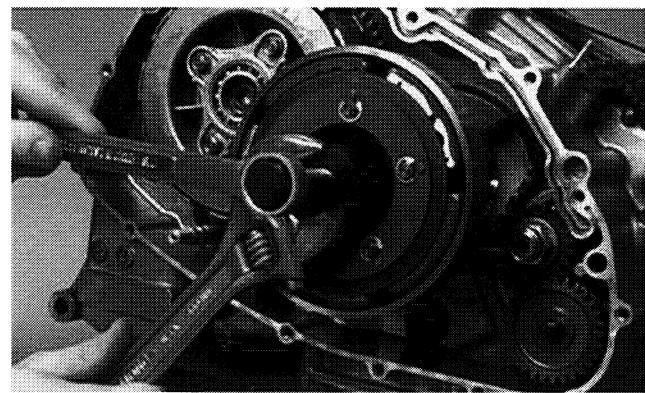
Fig. 3-508



CC075D

18. Install the clutch shoe and washer; then secure with the starter clutch-shoe nut (left-hand threads) coated with red Loctite #271. Tighten to 13 kg-m (94 ft-lb).

Fig. 3-509

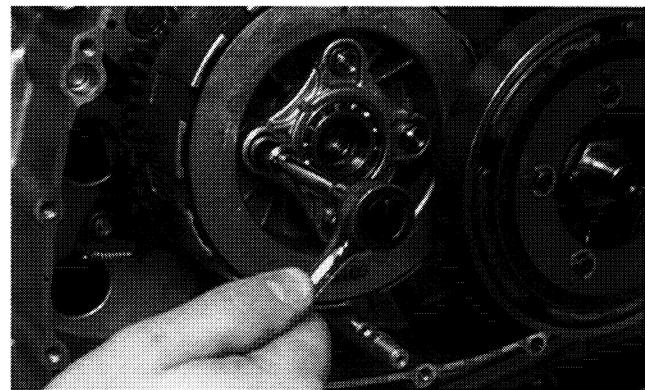


CC072D

19. Install the release roller assembly making sure the four springs are in position; then using a crisscross pattern, secure with the four cap screws to 1 kg-m (7 ft-lb).

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

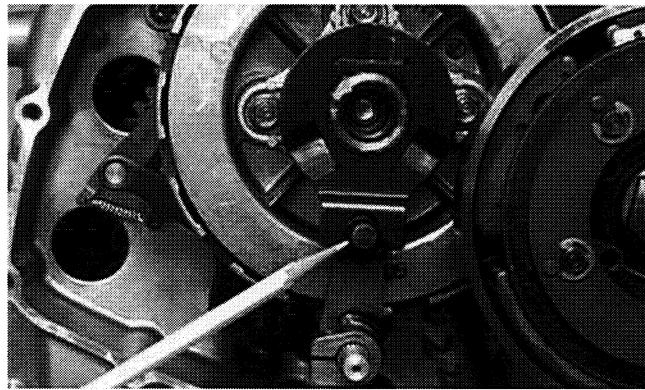
Fig. 3-510



CC074D

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

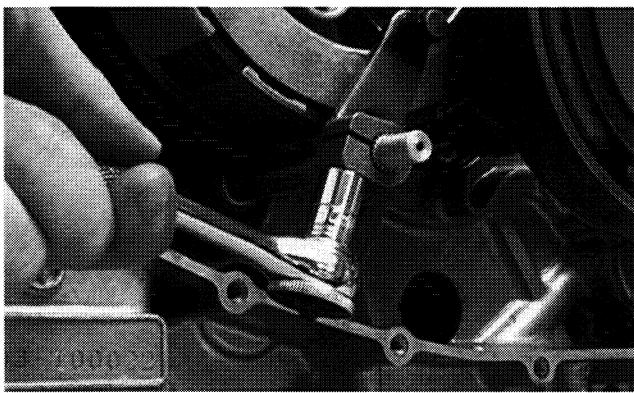
Fig. 3-511



CC162D

- Secure the clutch release arm with the cap screw coated with blue Loctite #242. Tighten to 1 kg-m (7 ft-lb).

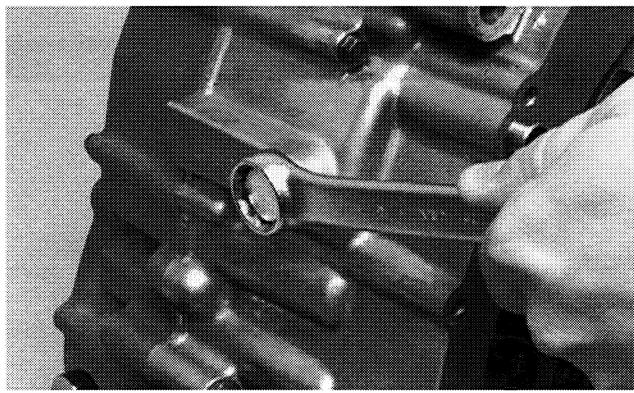
Fig. 3-512



CC073D

- 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).

Fig. 3-513



CC069D

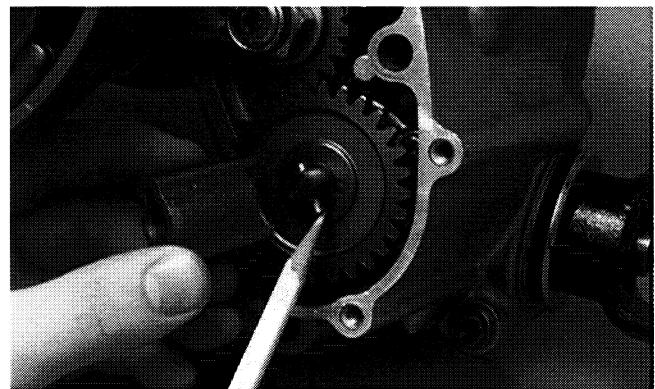
F. Water Pump **G. Oil Filter**

■ NOTE: Steps 1-22 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.

- Place the water pump drive joint into position on the water pump shaft making sure the pin is properly positioned.

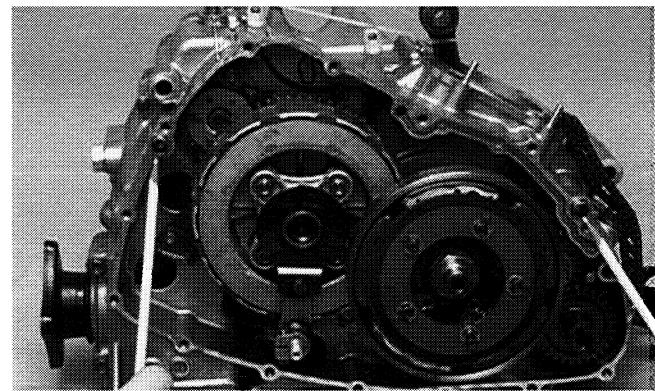
Fig. 3-514



CC082D

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

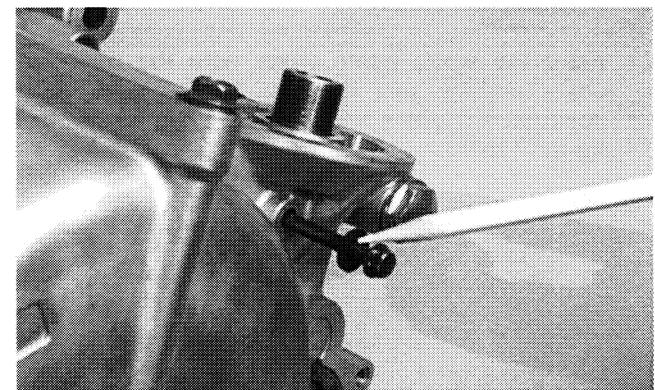
Fig. 3-515



CC256D

- 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.

Fig. 3-516



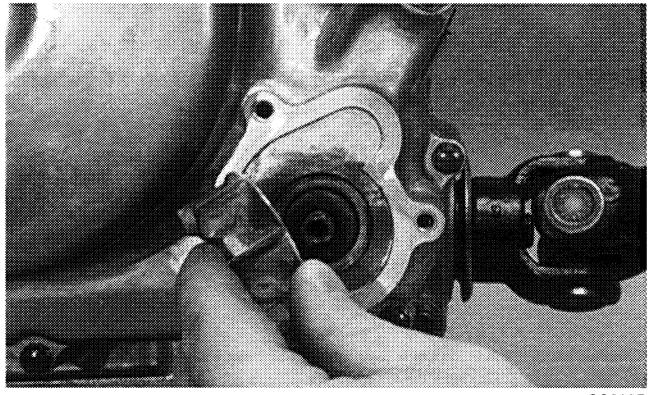
CC068D

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

26. Lubricate the impeller with anti-seize compound; then place the impeller onto the impeller shaft noting the proper positioning of the porcelain seal and rubber retainer. Tighten the cap screw to 0.8 kg-m (6 ft-lb).

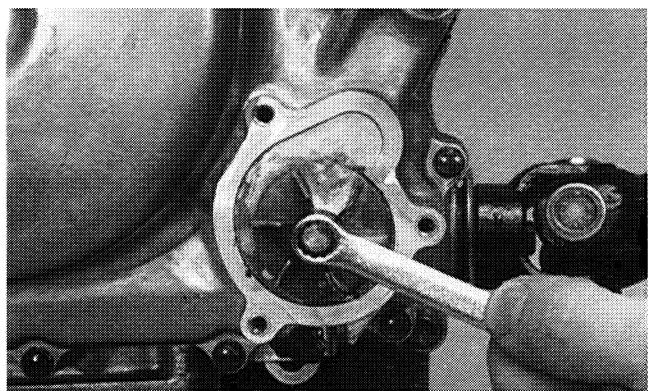
■ NOTE: The black rubber portion of the seal should lie flat against the inside of the impeller. The white porcelain portion of the seal (with the stripe) should be installed against the black rubber seal (the shoulders of the black rubber seal will aid in holding the porcelain seal in position).

Fig. 3-517



CC030D

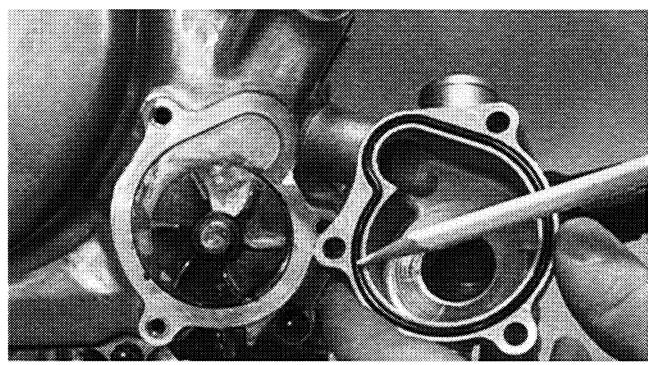
Fig. 3-518



CC029D

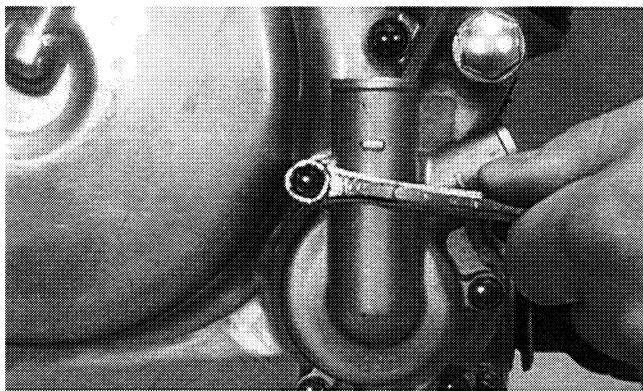
27. Place the water pump cover onto the right-side cover making sure the new O-ring is properly positioned. Tighten with the three cap screws to 1 kg-m (7 ft-lb).

Fig. 3-519



CC028D

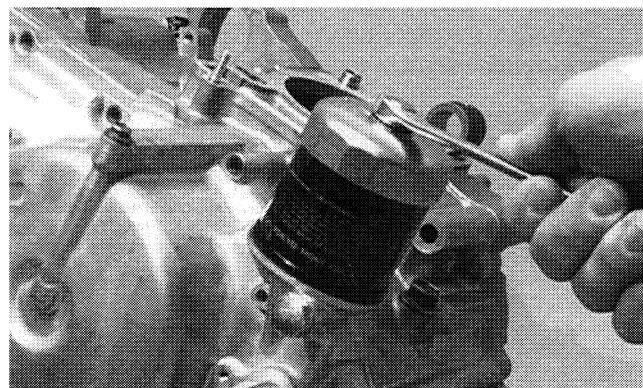
Fig. 3-520



CC027D

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

Fig. 3-521



CC067D

29. Install the coolant hose on the water pump and secure with the clamp.

Center Crankcase Components

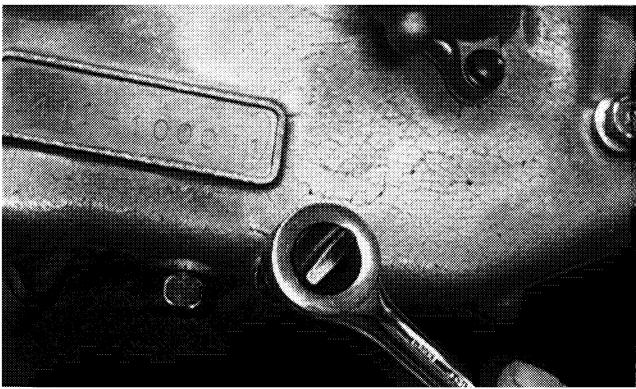
■ NOTE: This procedure cannot be done with the engine/transmission in the frame. Complete Removing procedures for Top-Side, Left-Side, and Right-Side must precede this procedure.

■ 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 (250/300 cc)

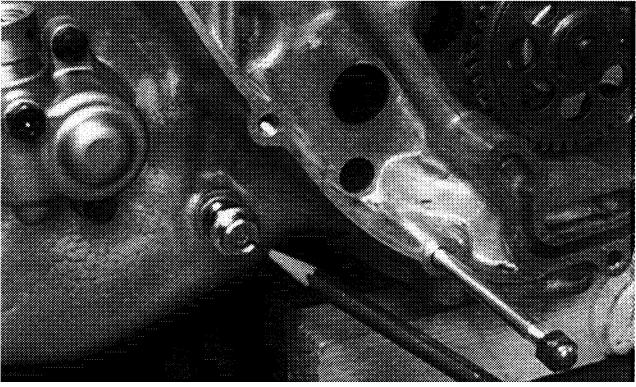
1. Remove the right-side cap screws securing the crankcase halves. Note the location of the cap screw with the copper washer.

Fig. 3-522



CC480D

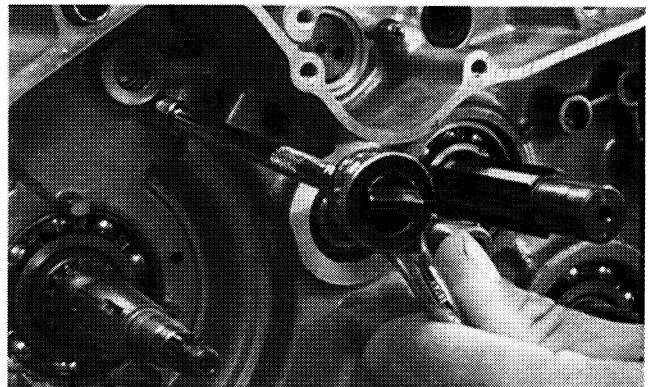
Fig. 3-523



CC481D

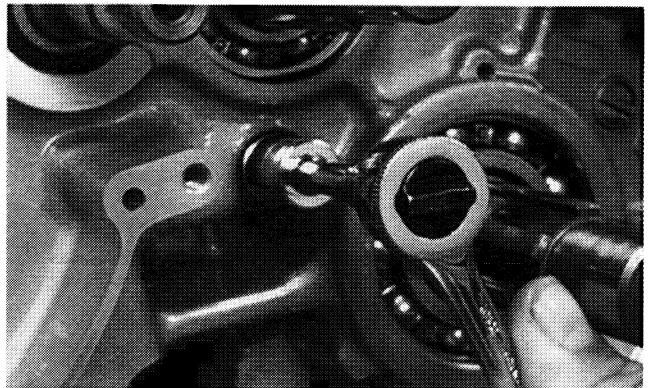
2. Remove the left-side cap screws securing the crankcase halves. Note the location of the different-lengthed cap screws. Account for the shift cable bracket.

Fig. 3-524



CC482D

Fig. 3-525

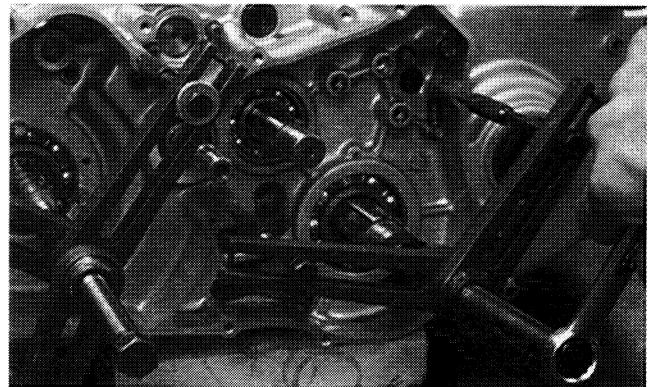


CC483D

3. 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.

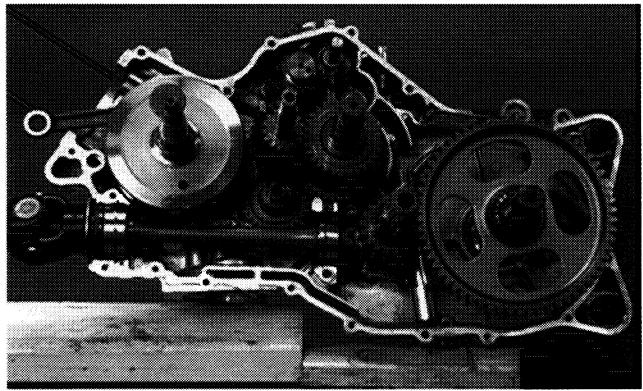
■ NOTE: To keep the shaft/gear assemblies intact for identification, tap the shafts toward the right-side crankcase half when separating the halves.

Fig. 3-526



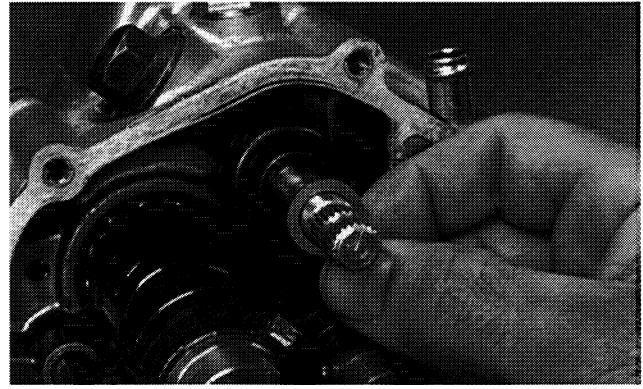
CC484D

Fig. 3-527



CC485D

Fig. 3-528



CC486D

Disassembling Crankcase Half (250/300 cc)

1. Remove the oil breather screen from the crankcase. Note the direction of the tabs for assembly purposes.

Fig. 3-529



CC487D

2. Remove the rear final driven gear and shaft.

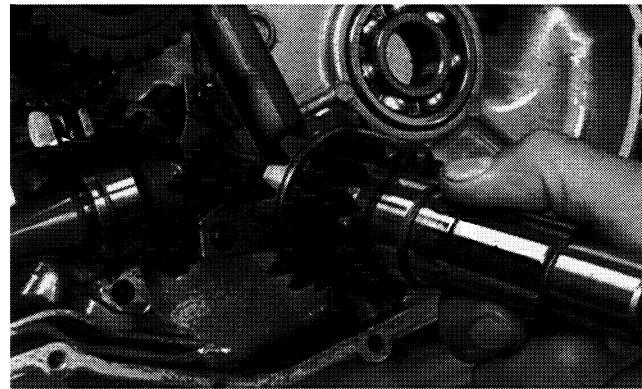
Fig. 3-530



CC488D

3. Remove the sub-transmission shaft assembly.

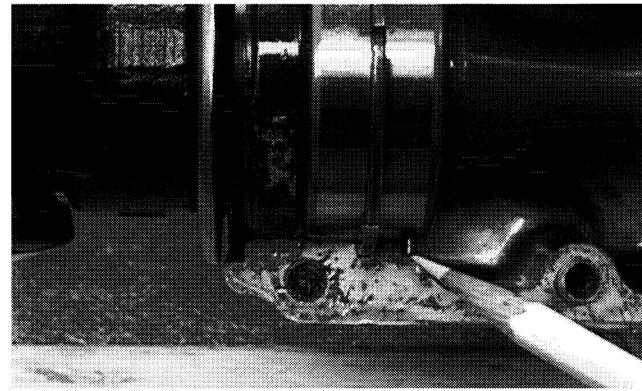
Fig. 3-531



CC489D

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

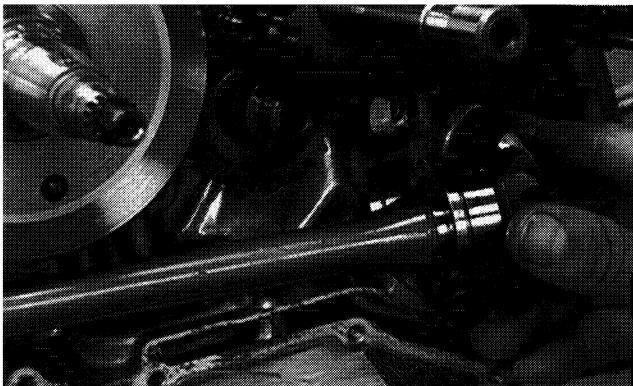
Fig. 3-532



CC490D

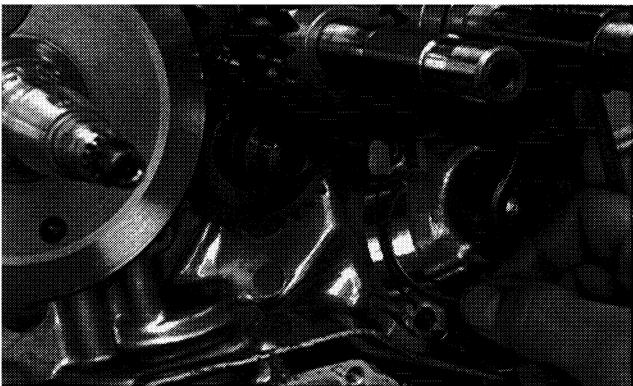
4. Remove the secondary output shaft; then account for the C-ring.

Fig. 3-533



CC491D

Fig. 3-534



CC492D

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

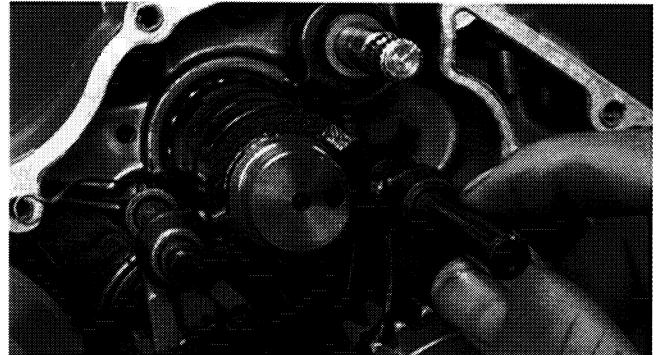
Fig. 3-535



CC493D

6. Remove the long gear shifting fork shaft.

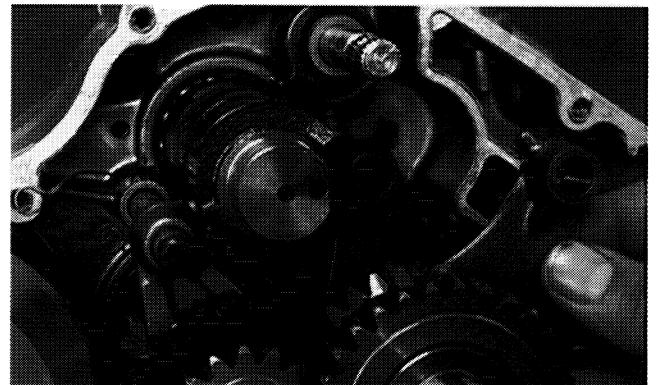
Fig. 3-536



CC494D

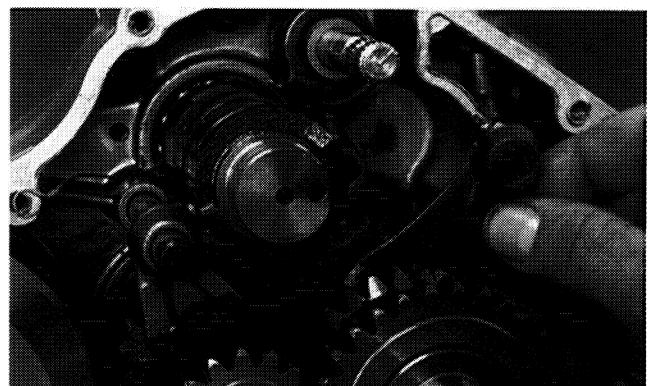
7. Remove the outer and center shifting forks.

Fig. 3-537



CC495D

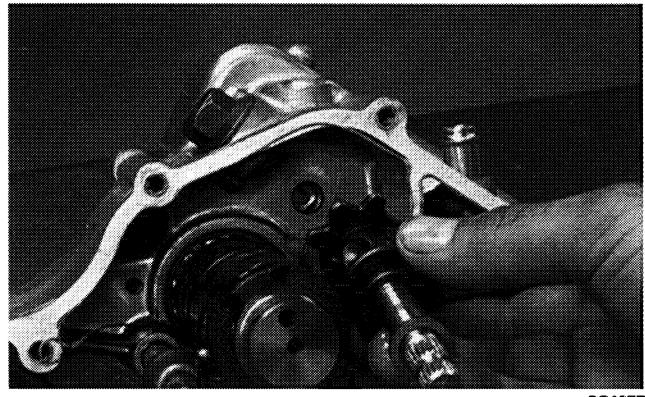
Fig. 3-538



CC496D

8. Remove the reverse shifting cam.

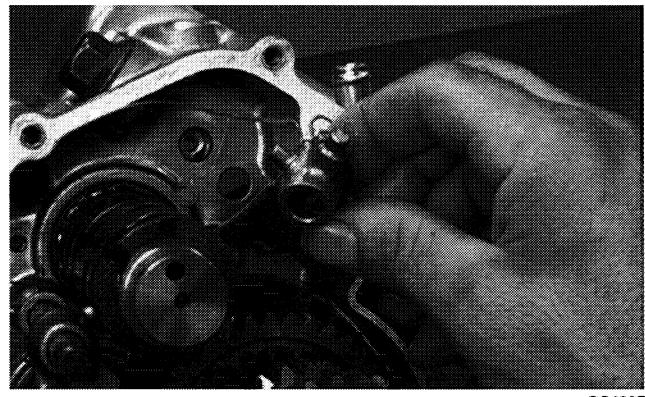
Fig. 3-539



CC497D

9. Remove the inner shifting fork.

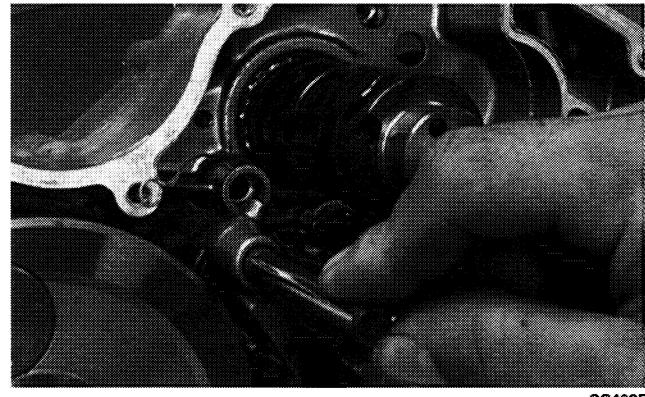
Fig. 3-540



CC498D

10. Remove the short gear shifting fork shaft.

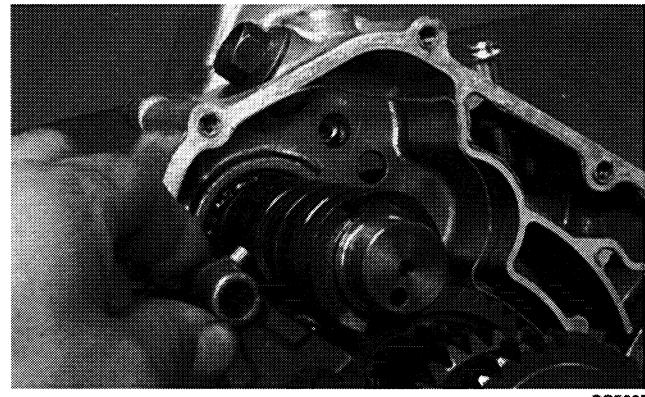
Fig. 3-541



CC499D

11. Remove the front gear shifting fork.

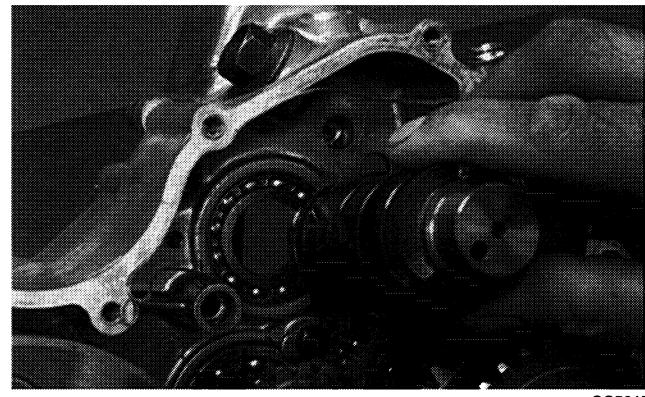
Fig. 3-542



CC500D

12. Remove the gear shifting cam.

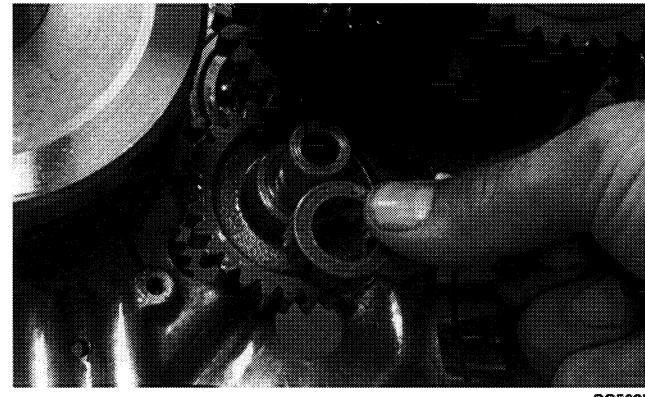
Fig. 3-543



CC501D

13. Remove the spacer from the reverse idle shaft.

Fig. 3-544



CC502D

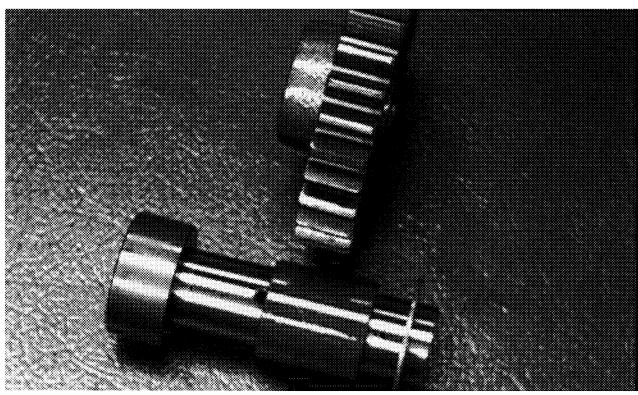
14. Remove the reverse idle shaft assembly. Account for the gear, bushing, and washer.

Fig. 3-545



CC503D

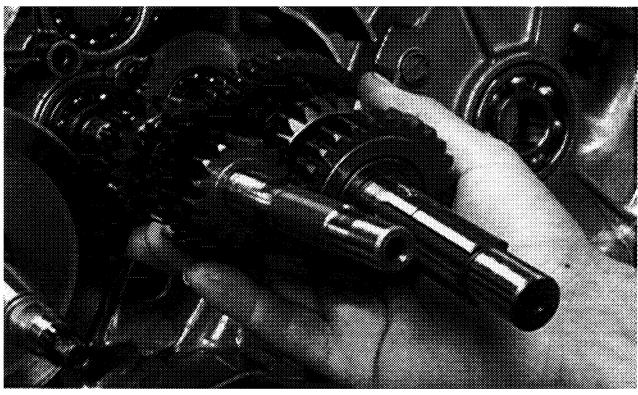
Fig. 3-546



CC504D

15. Simultaneously, remove the driveshaft and countershaft assemblies from the crankcase.

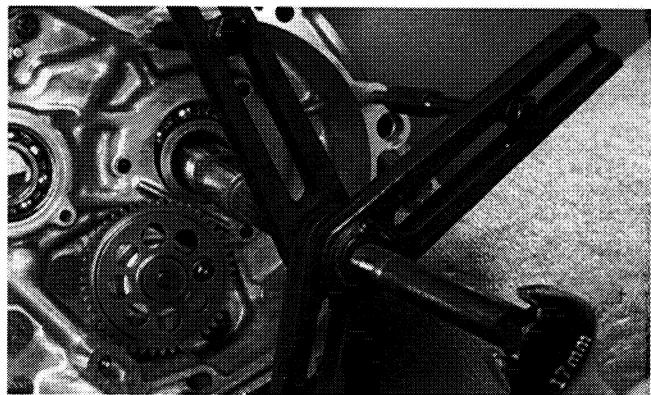
Fig. 3-547



CC505D

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

Fig. 3-548



CC507D

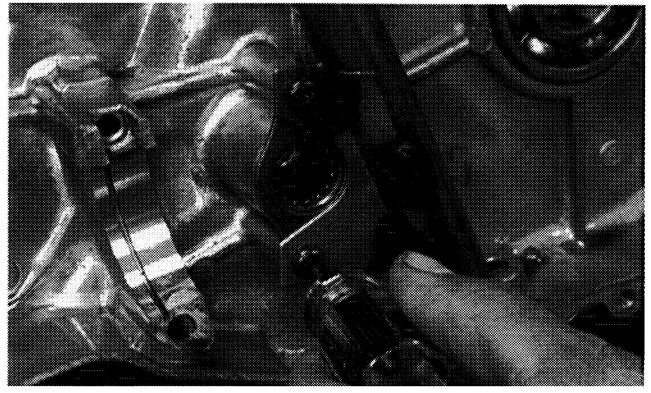
AT THIS POINT

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

3

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

Fig. 3-549

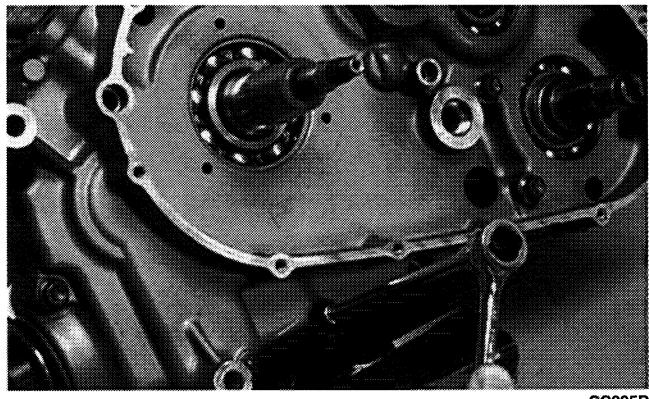


CC506D

Separating Crankcase Halves (400/500 cc)

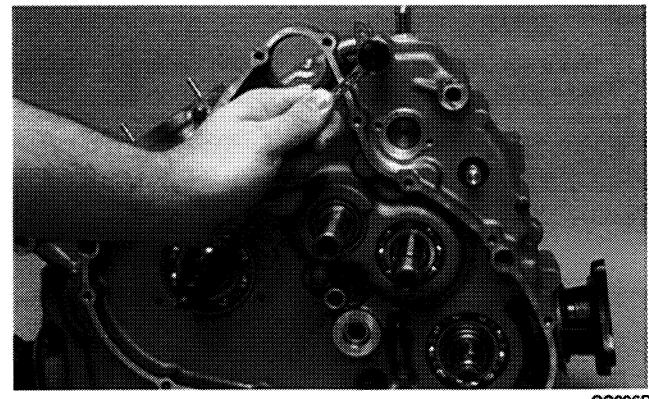
1. Remove the four left-side 6 mm cap screws (one from inside the case) securing the crankcase halves. Note the location of the different-lengthed cap screws.

Fig. 3-550



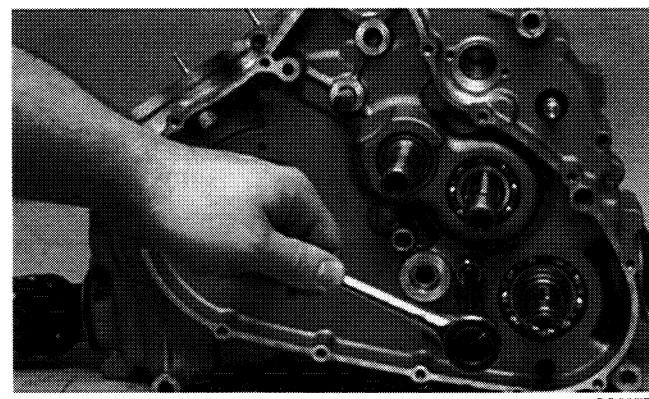
2. Remove the seven right-side 6 mm cap screws securing the crankcase halves. Note the location of the wiring form. Note the location of the different-lengthed cap screws.

Fig. 3-551



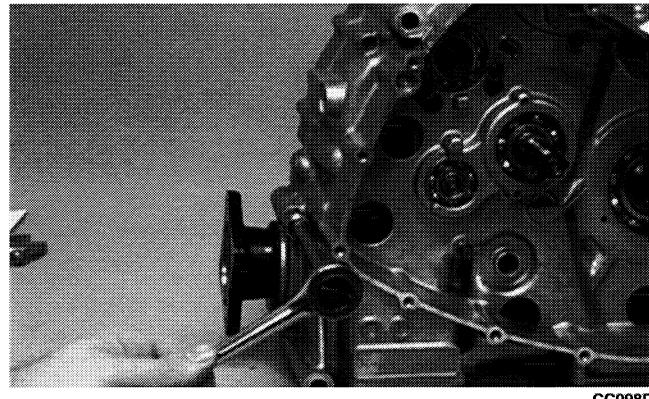
3. Remove the three left-side 8 mm cap screws (two from inside the case) securing the crankcase halves. Note the location of the different-lengthed cap screws.

Fig. 3-552



4. Lay the crankcase on the left side; then remove the three right-side 8 mm cap screws securing the crankcase halves.

Fig. 3-553



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

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

Fig. 3-554

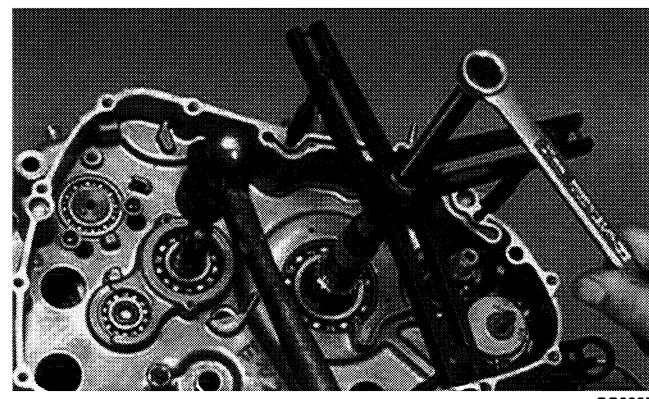


Fig. 3-555

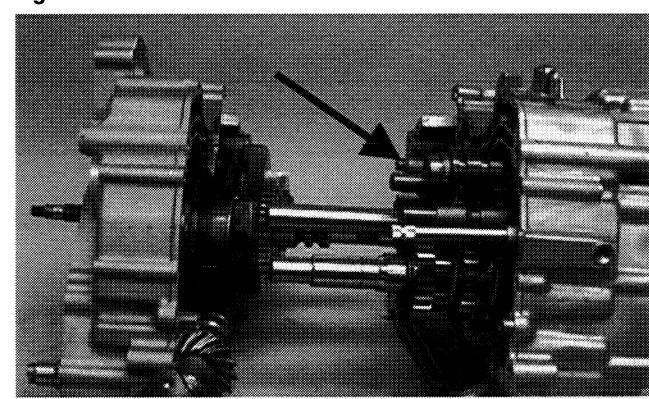


Fig. 3-556



CC101D

Fig. 3-557

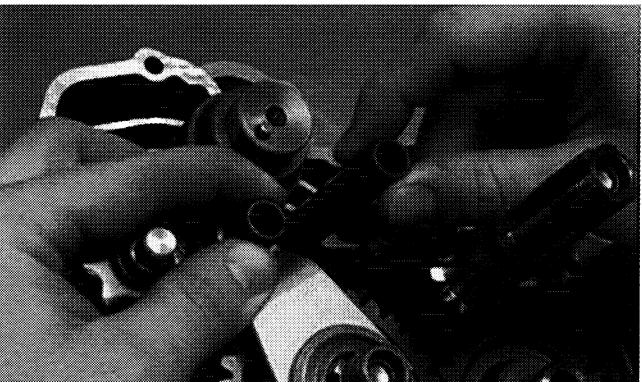


CC102D

Disassembling Crankcase Half (400/500 cc)

1. Remove the two gear shift fork shafts.

Fig. 3-558



CC104D

2. Remove the reverse shift cam and spacer.

Fig. 3-559



CC103D

3. Disengage four forks from the gear shift cam.

Fig. 3-560



CC105D

4. Remove the gear shift cam.

Fig. 3-561



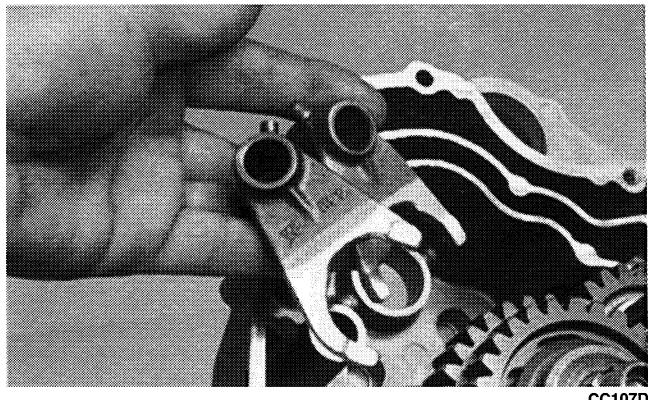
CC106D

5. Remove the two remaining forks.

☞ AT THIS POINT

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

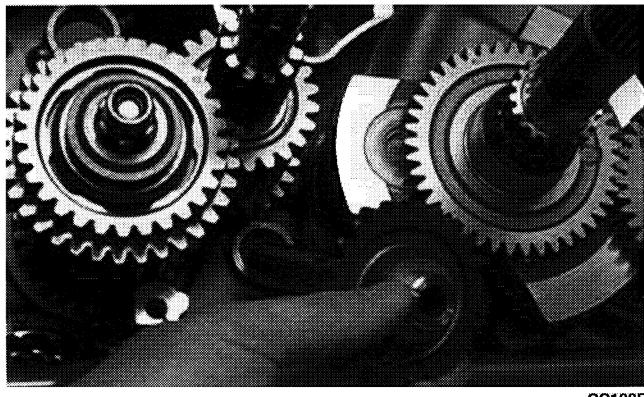
Fig. 3-562



CC107D

6. Remove the reverse idle shaft. Account for the bushing, two washers, and the circlip.

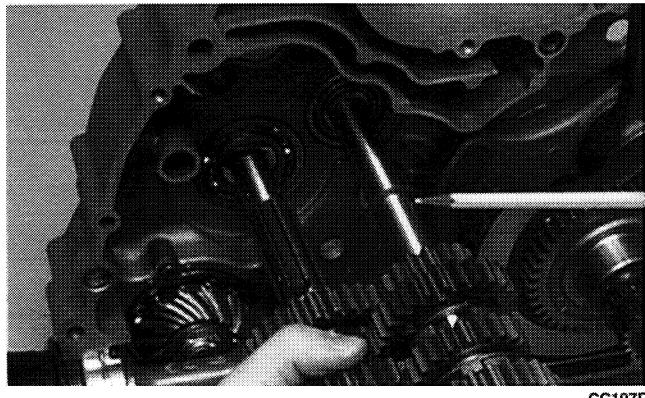
Fig. 3-563



CC108D

7. Simultaneously, remove the driveshaft and countershaft assemblies. Account for the washer on the countershaft.

Fig. 3-564



CC197D

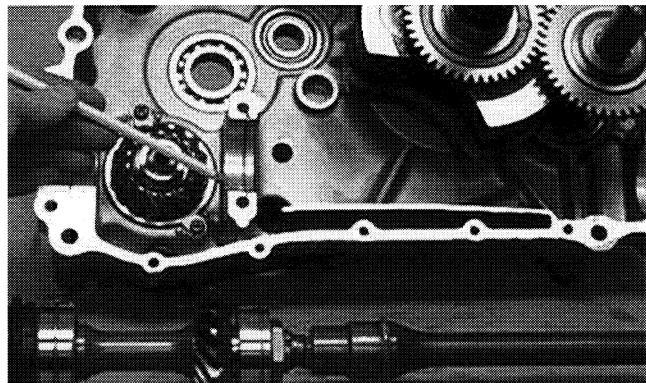
AT THIS POINT

To service the driveshaft and/or countershaft, see Servicing Center Crankcase Components in this 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 and rear shaft assemblies. Account for the bearing C-ring.

Fig. 3-565



CC110D

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

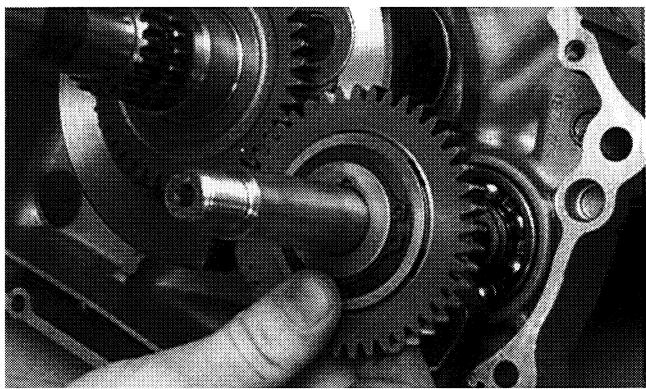
Fig. 3-566



CC166D

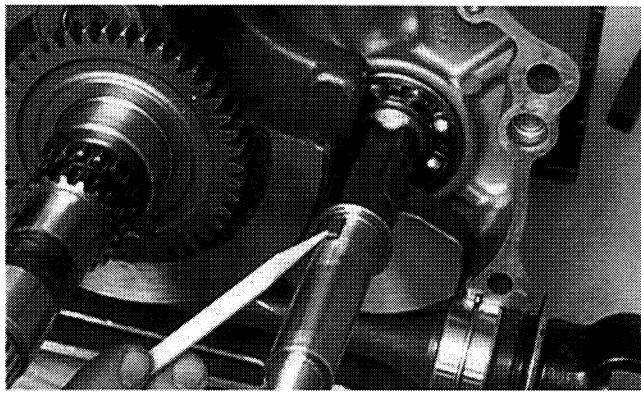
9. Remove the driven gear from the crank balancer. Account for a key.

Fig. 3-567



CC167D

Fig. 3-568



CC165D

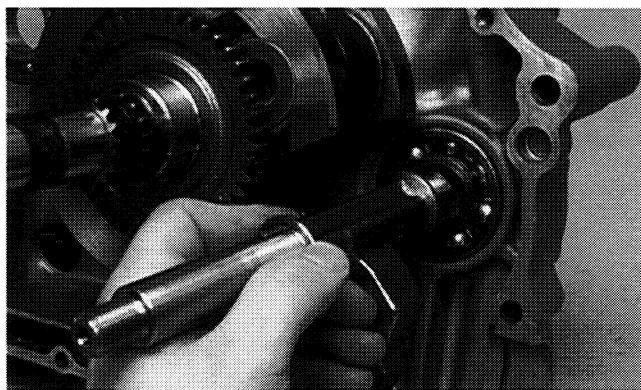
AT THIS POINT

To service the driven gear, see Servicing Center Crankcase Components in this 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.

Fig. 3-569

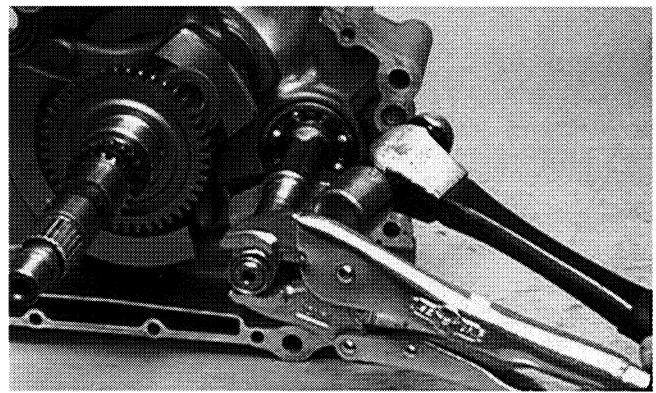


CC168D

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

■ **NOTE:** To aid in removing the crank balancer shaft, it may be necessary to install the nut on the end of the shaft; then while holding the nut securely with a vise-grip pliers, tap on the pliers to pull the shaft out of the right-side bearing.

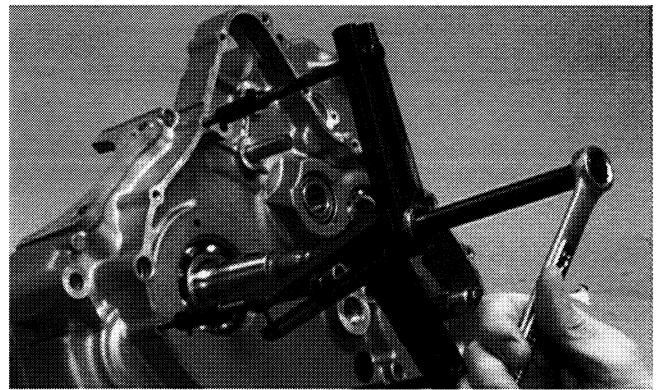
Fig. 3-570



CC161D

11. Using the Crankcase Separator/Crankshaft Remover (p/n 0444-009), push the crankshaft assembly out of the crankcase.

Fig. 3-571



CC115D

AT THIS POINT

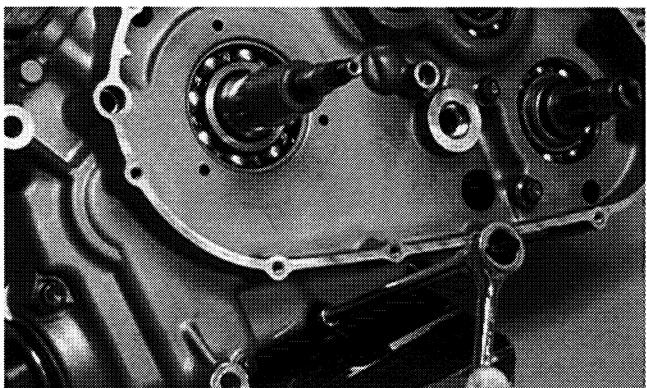
To service crankshaft assembly, see Servicing Center Crankcase Components in this sub-section.

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, 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).

Fig. 3-572



CC116D

Servicing Center Crankcase Components

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

■ NOTE: The technician should reference the appropriate illustration and/or photograph for the model being serviced.

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.

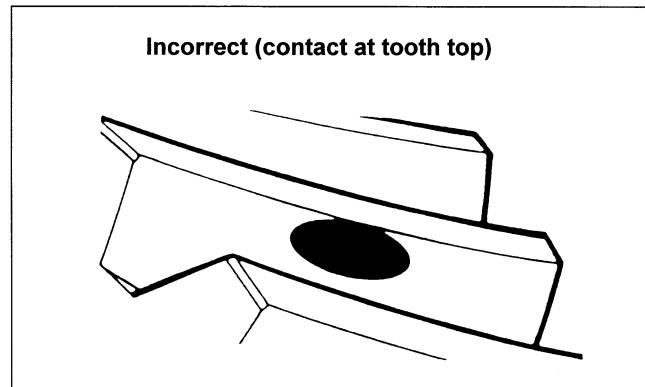
| Backlash Measurement | Shim Correction |
|-----------------------------------|-------------------------|
| Under 0.05 mm (0.002 in.) | Decrease Shim Thickness |
| At 0.05-0.33 mm (0.002-0.013 in.) | No Correction Required |
| Over 0.33 mm (0.013 in.) | Increase Shim Thickness |

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.

Fig. 3-573



ATV-0103

Fig. 3-574

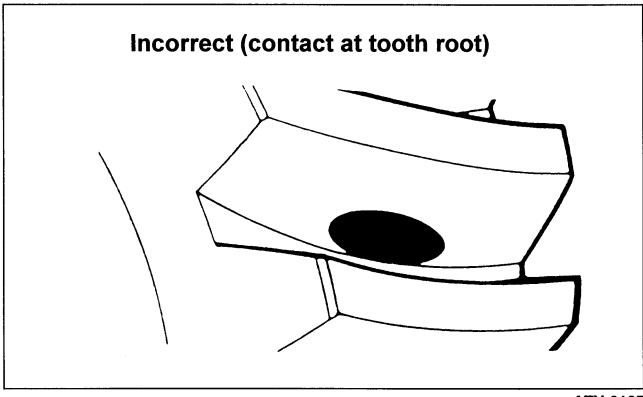
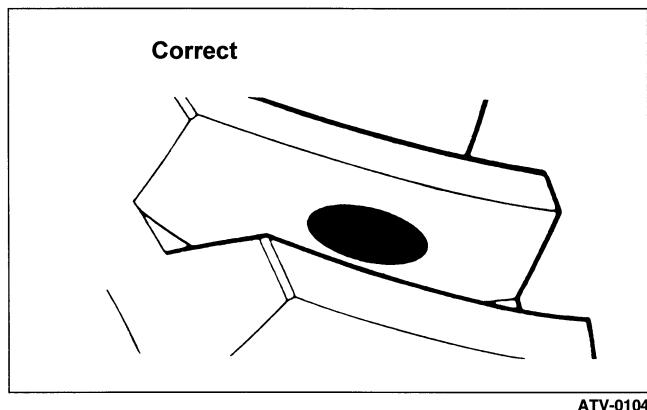


Fig. 3-575



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 |

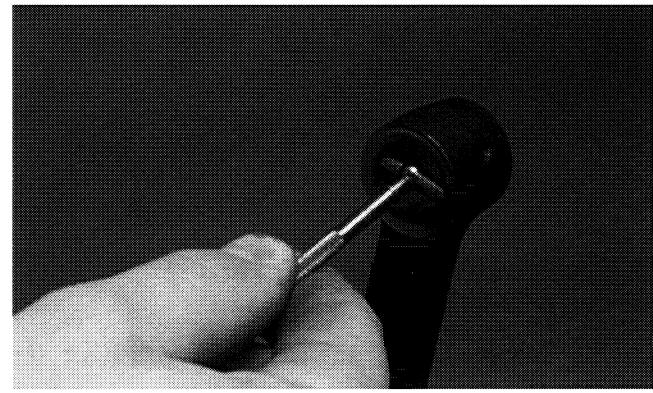
■ NOTE: To correct tooth contact, steps 1 and 2 (with NOTE) of "Correcting Backlash" must be followed and the above "Tooth Contact/Shim Correction" chart must be consulted.

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.

Fig. 3-576



3

2. Maximum diameter is 17.040 mm (0.6709 in.) for the 250/300 cc, 21.04 mm (0.8283 in.) for the 400 cc, and 23.04 mm (0.9070 in.) for the 500 cc.

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.).

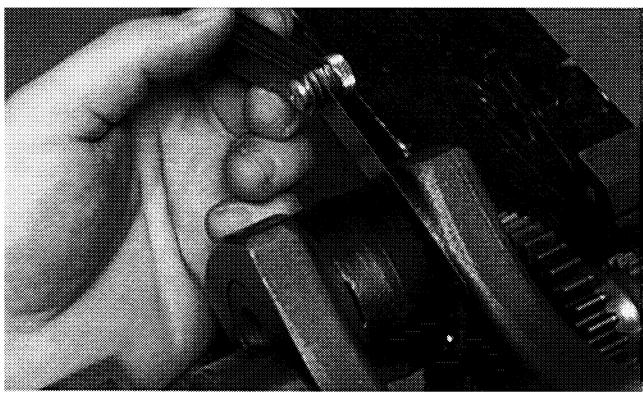
Measuring Connecting Rod (Big End Side-to-Side)

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.

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.

Fig. 3-577



CC289D

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

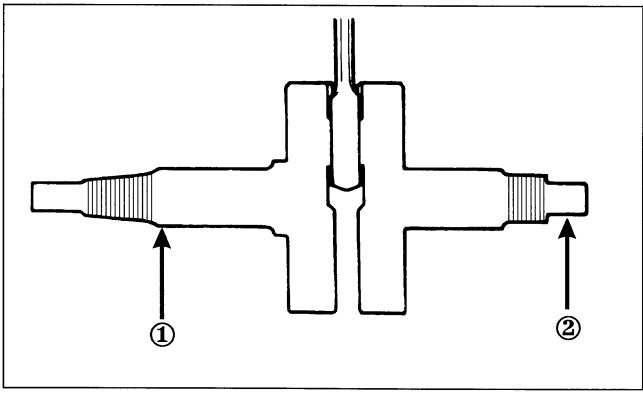
Measuring Connecting Rod (Big End Width)

1. Using a calipers, measure the width of the connecting rod at the big-end bearing.
2. Acceptable width range is 17.95-18.00 mm (0.707-0.709 in.) for the 250/300 cc, 25.95-26.00 mm (1.022-1.024 in.) for the 400 cc, and 24.95-25.00 mm (0.9822-0.9842 in.) for the 500 cc.

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.

Fig. 3-578



ATV-1074

3. Zero the indicator and rotate the crankshaft slowly.

CAUTION

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

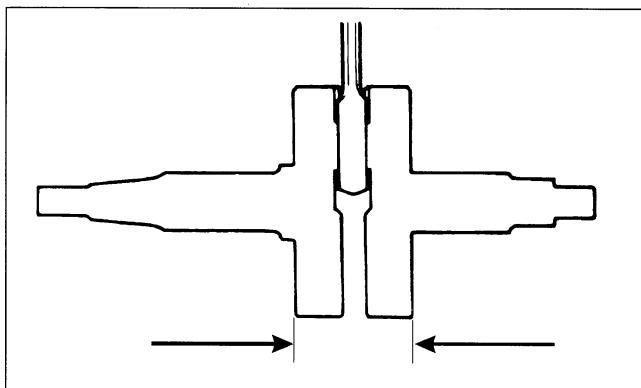
4. Maximum runout is 0.05 mm (0.002 in.) for the left side and 0.08 mm (0.003 in.) for the right side on the 250/300 cc, 0.05 mm (0.002 in.) for both sides on the 400 cc, and 0.08 mm (0.003 in.) for both sides on the 500 cc.

■ 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.

Fig. 3-579



ATV-1017

2. Acceptable width range is 55 mm (2.165 in.) \pm 0.1 mm (0.004 in.) for the 250/300 cc and 70.9-71.1 mm (2.796-2.804 in.) for the 400/500 cc.

DRIVESHAFT

Disassembling

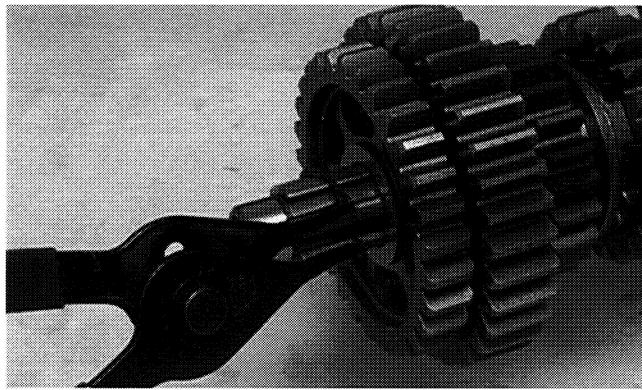
1. In order, remove the reverse dog, circlip, washer (lock washer on the 250/300 cc), reverse driven gear, and bushing from the driveshaft.

Fig. 3-580



CC228D

Fig. 3-581



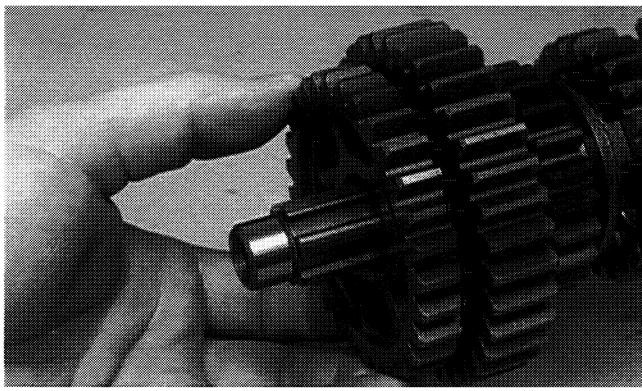
CC227D

Fig. 3-582



CC226D

Fig. 3-583



CC225D

Fig. 3-584



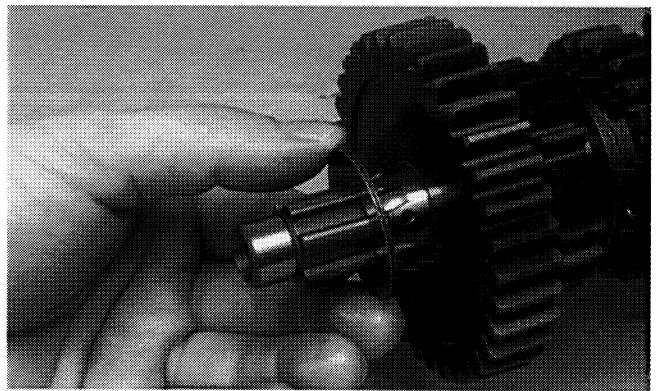
CC224D

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

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

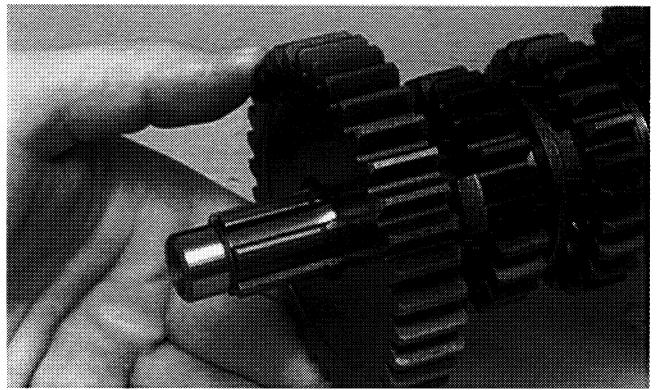
3

Fig. 3-585



CC223D

Fig. 3-586



CC222D

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

Fig. 3-587



CC221D

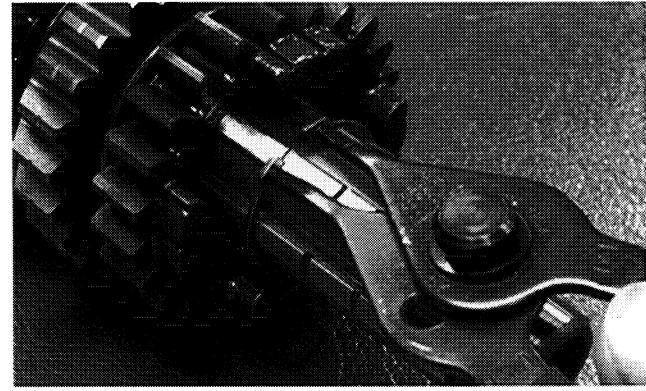
Fig. 3-588



CC220D

■ NOTE: On the 250/300 cc, remove the 4th driven circlip.

Fig. 3-589



CC508D

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

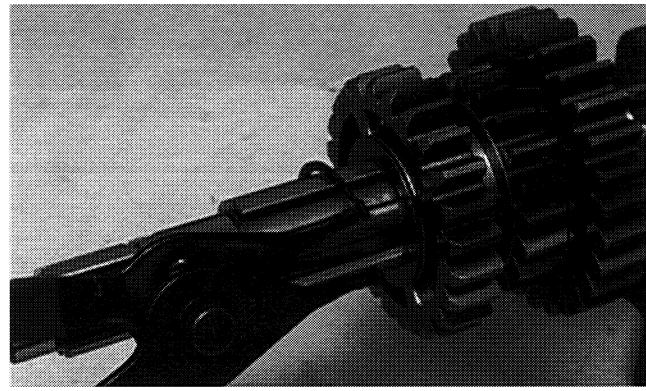
Fig. 3-590



CC219D

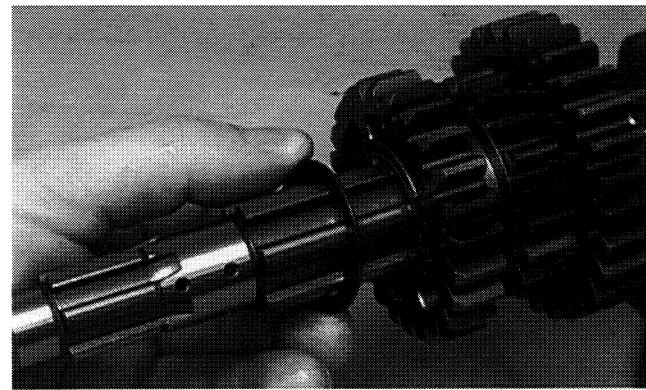
5. Remove the 3rd driven circlip; then remove the 3rd driven washer (lock washer on the 250/300 cc) from the driveshaft.

Fig. 3-591



CC216D

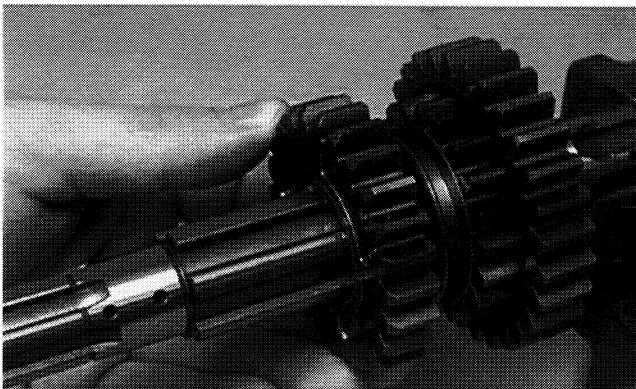
Fig. 3-592



CC215D

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

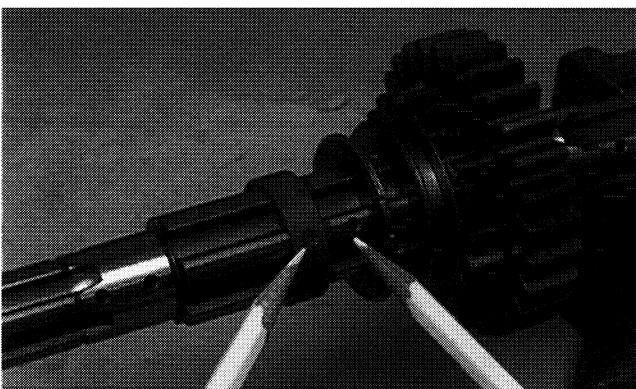
Fig. 3-593



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 assembly purposes.

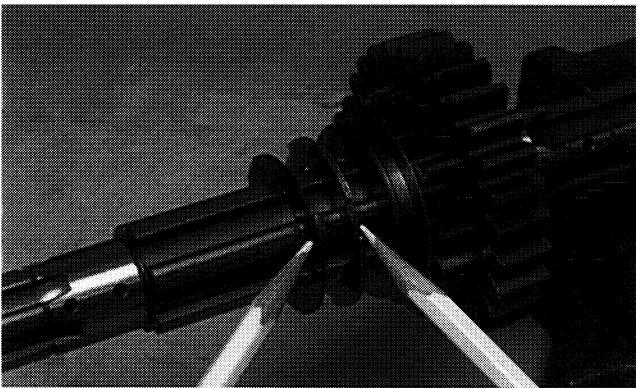
Fig. 3-594



CC213D

8. Remove the 3rd driven washer (lock washer on the 250/300 cc) from the driveshaft. Note the tabs facing toward the 5th driven gear for assembly purposes.

Fig. 3-595



CC212D

9. Remove the 3rd driven washer (lock washer on the 250/300 cc) by rotating it out of the groove. Note the groove closest to the 5th driven gear for assembly.

Fig. 3-596



CC211D

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

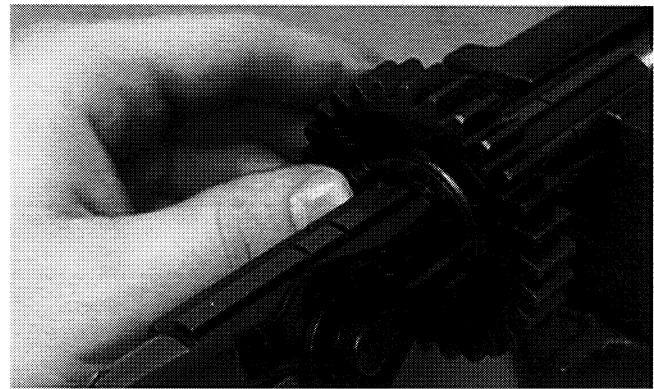
Fig. 3-597



CC210D

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

Fig. 3-598



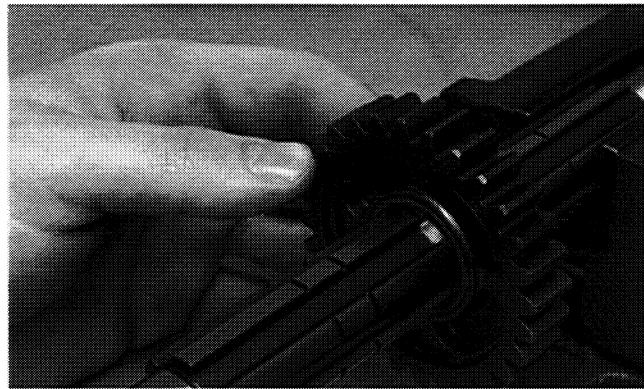
CC209D

Fig. 3-599



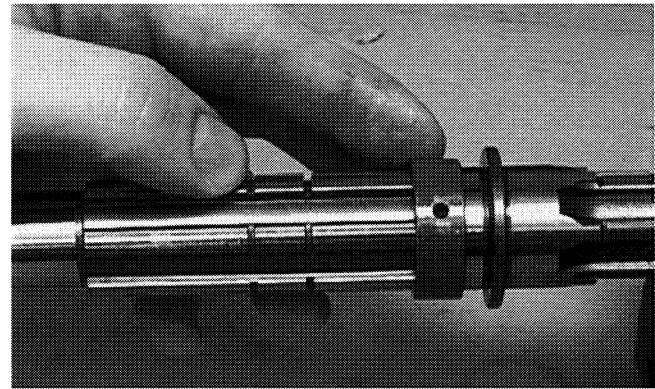
CC208D

Fig. 3-600



CC207D

Fig. 3-601



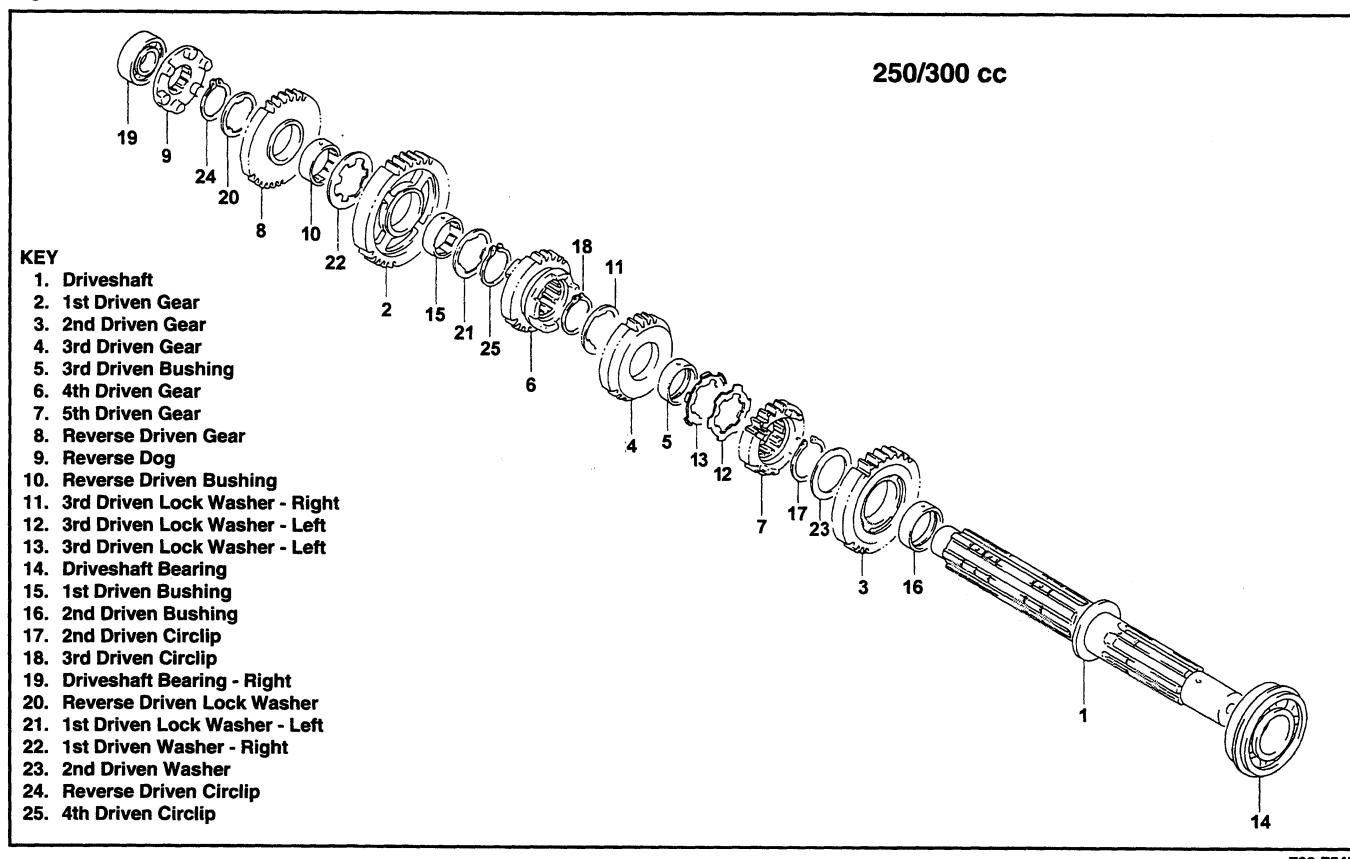
CC206D

 **AT THIS POINT**

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

Assembling

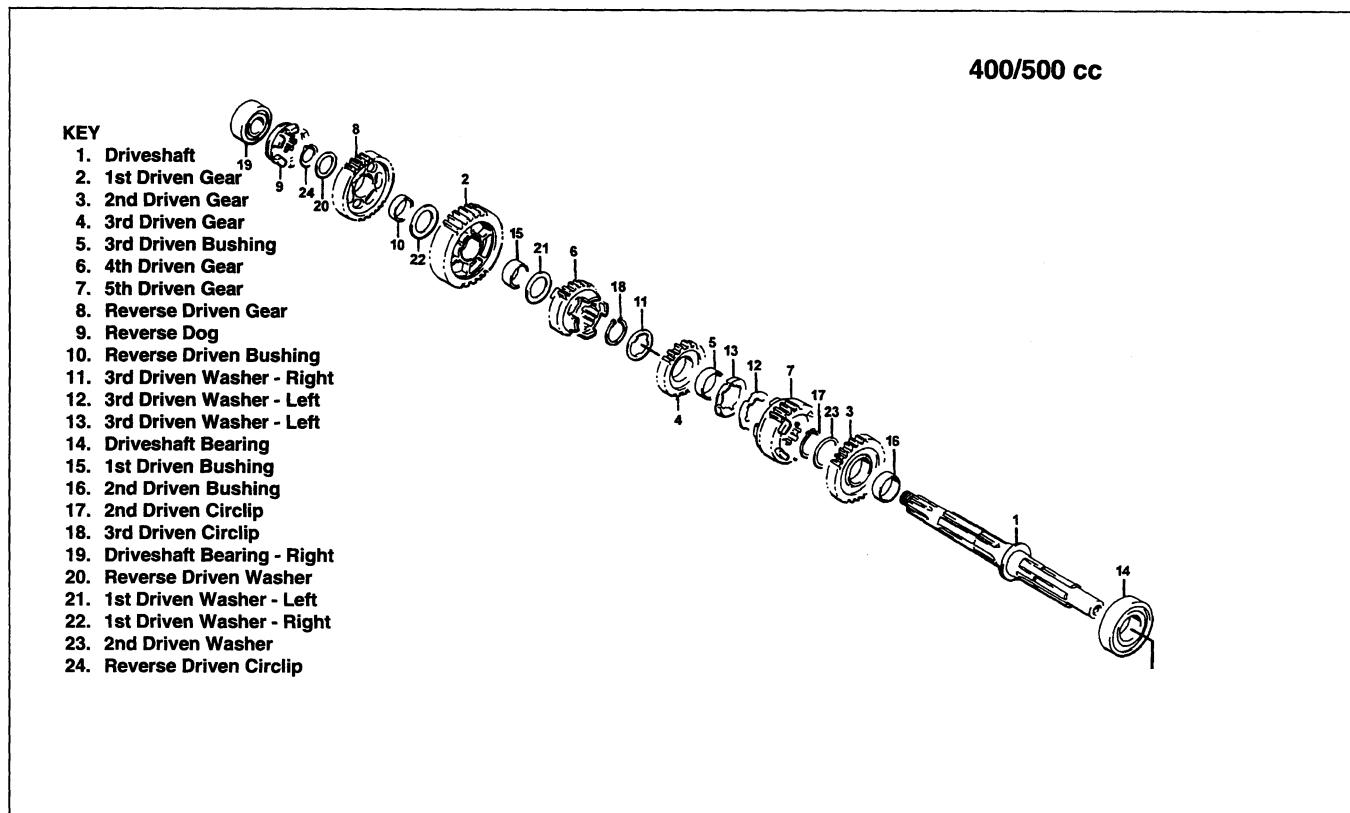
Fig. 3-602



733-754B

3

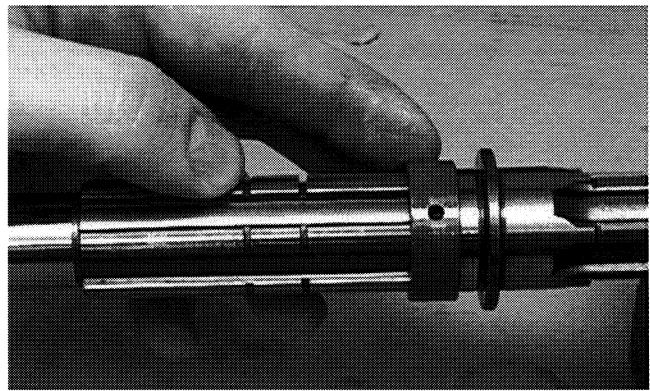
Fig. 3-603



734-386A

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

Fig. 3-604



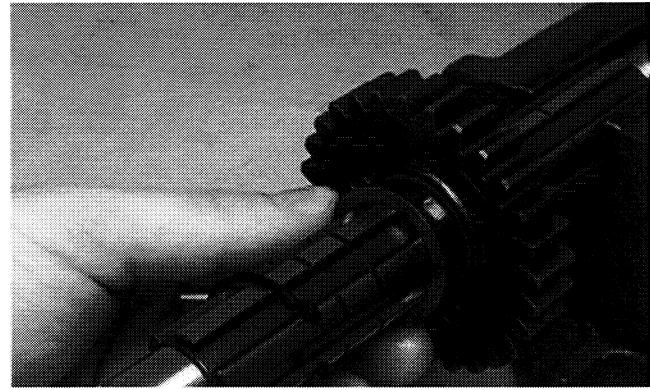
CC206D

Fig. 3-605



CC207D

Fig. 3-606



CC208D

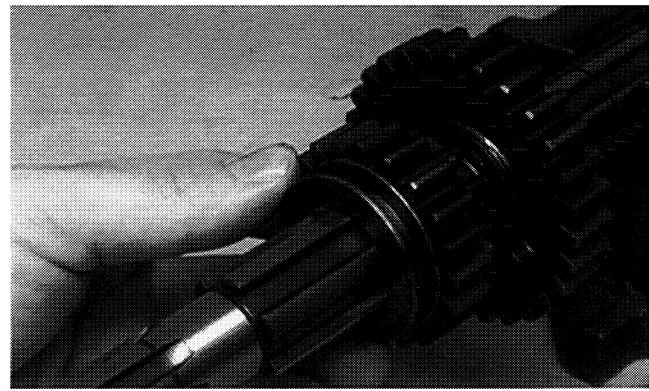
Fig. 3-607



CC209D

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

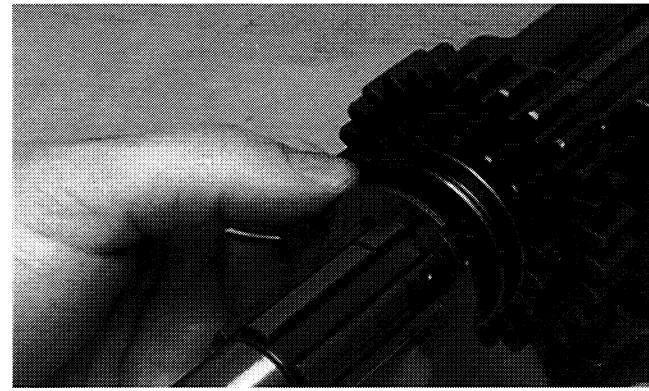
Fig. 3-608



CC210D

3. Install the 3rd driven washer (lock washer on the 250/300 cc). Lock it into the groove closest to the 5th driven gear (as noted in disassembly) by rotating it when it is in the groove.

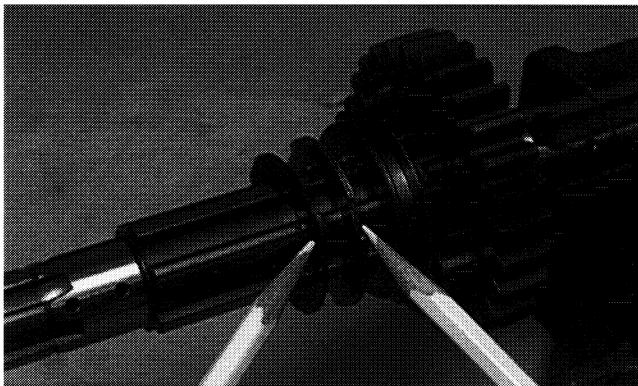
Fig. 3-609



CC211D

4. Install the 3rd driven washer (lock washer on the 250/300 cc) onto the driveshaft making sure the tabs are facing toward the 5th driven gear. Make sure the tabs intertwine with the 3rd driven washer on the 400/500 cc.

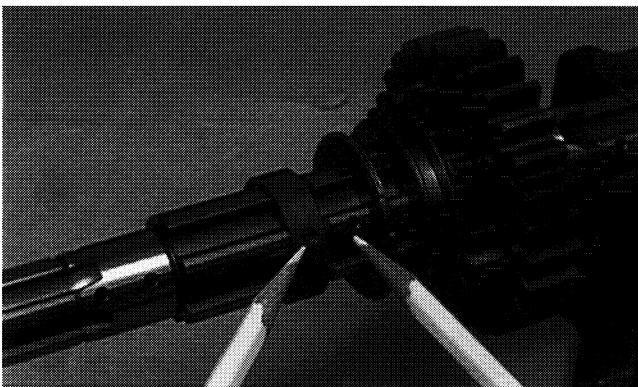
Fig. 3-610



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 disassembly).

Fig. 3-611



CC213D

CAUTION

It is very important to assure the oil feed hole in the bushing and oil supply hole in the driveshaft align. If not aligned, engine damage will result.

6. In order, install the 3rd driven gear, washer (lock washer on the 250/300 cc), and circlip onto the driveshaft.

Fig. 3-612



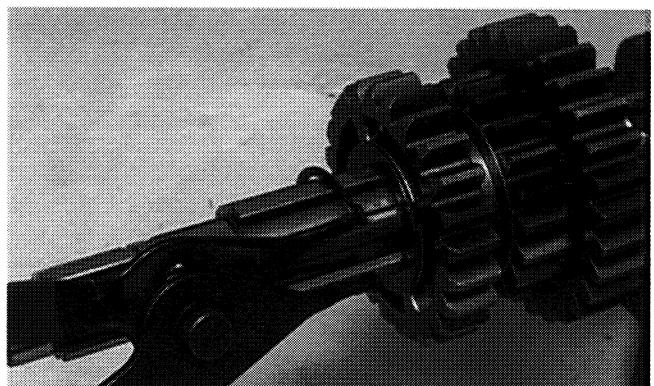
CC214D

Fig. 3-613



CC215D

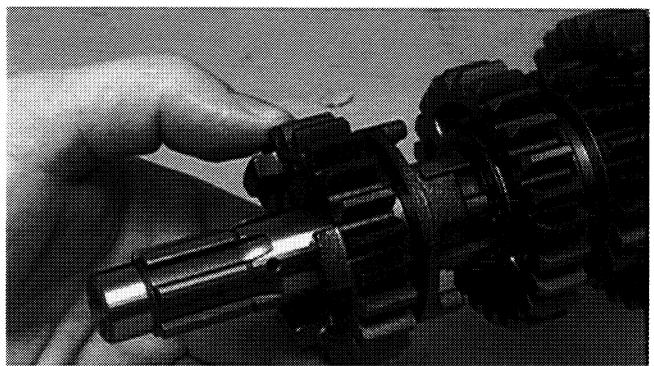
Fig. 3-614



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 disassembly.

Fig. 3-615



CC219D

■ NOTE: On the 250/300 cc, secure with the circlip.

Fig. 3-616



CC508D

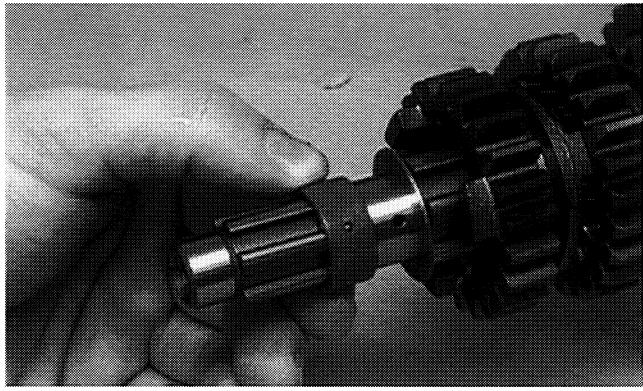
8. Install the 1st driven washer onto the shoulder of the splined shaft; then install the 1st driven bushing, gear, and washer (right side).

Fig. 3-617



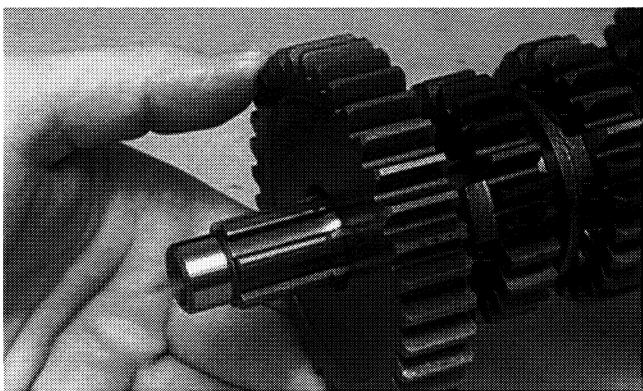
CC220D

Fig. 3-618



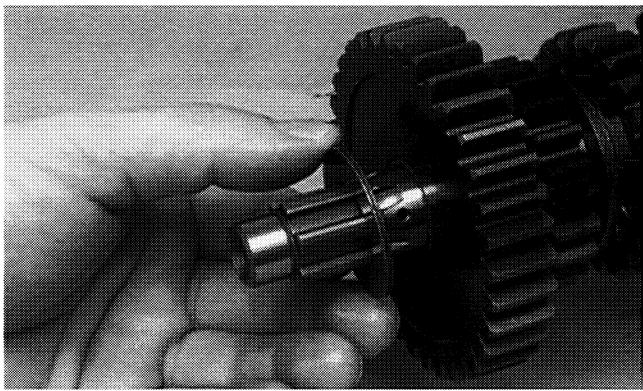
CC221D

Fig. 3-619



CC222D

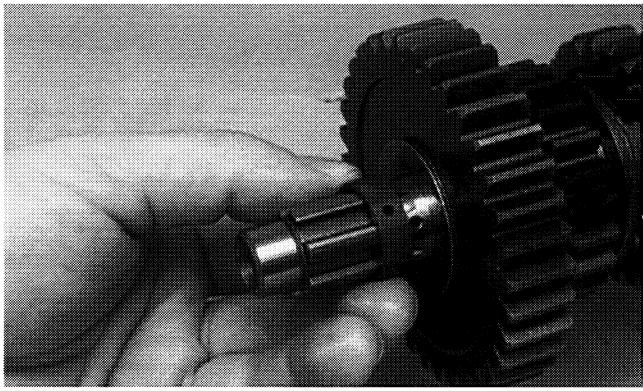
Fig. 3-620



CC223D

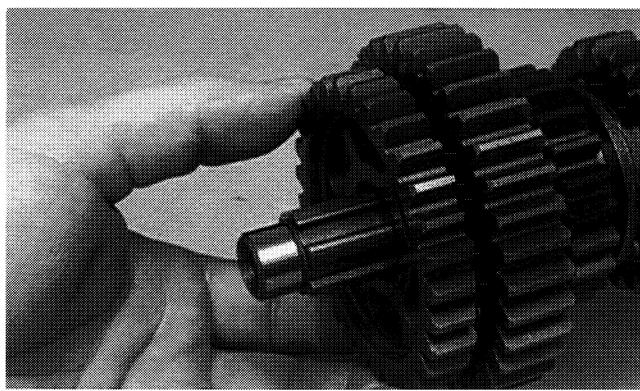
9. In order, install the bushing, reverse driven gear, washer (lock washer on the 250/300 cc), circlip, and reverse dog onto the driveshaft.

Fig. 3-621



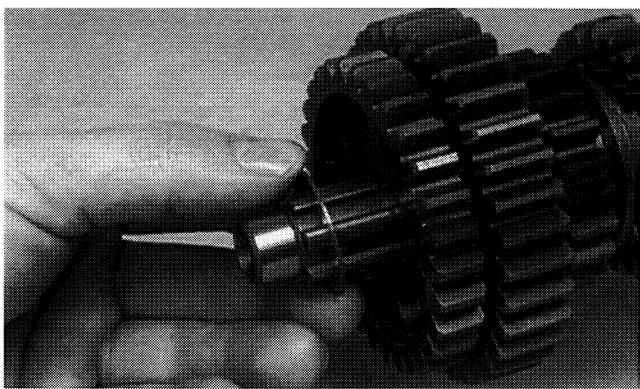
CC224D

Fig. 3-622



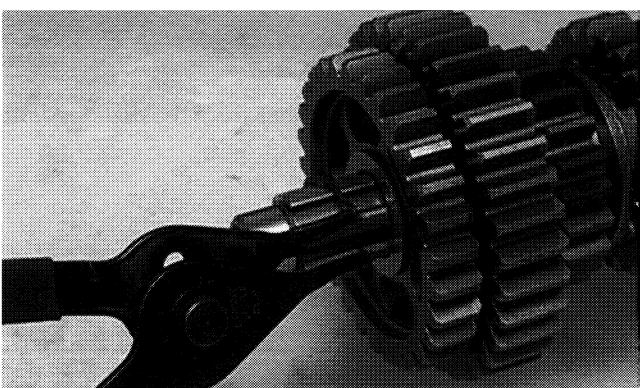
CC225D

Fig. 3-623



CC226D

Fig. 3-624



CC227D

Fig. 3-625



CC228D

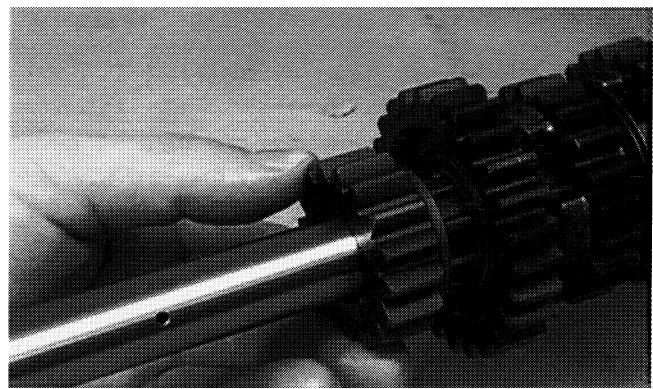
■ **NOTE:** The driveshaft is now completely assembled for installation.

COUNTERSHAFT

Disassembling

1. On the 400/500 cc, remove the 2nd drive washer; then remove the 2nd drive gear from the countershaft.

Fig. 3-626



CC204D

3

■ **NOTE:** On the 250/300 cc, remove the 2nd drive gear from the countershaft using a bearing separator and a hydraulic press.



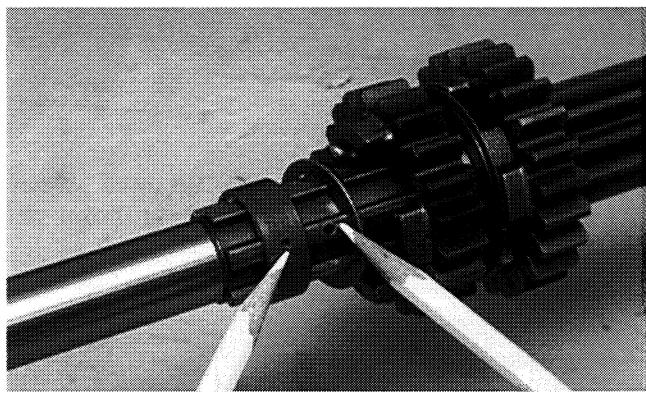
2. Remove the 5th drive gear from the countershaft. On the 400/500 cc, account for the 5th drive bushing.

Fig. 3-627



CC203D

Fig. 3-628



CC202D

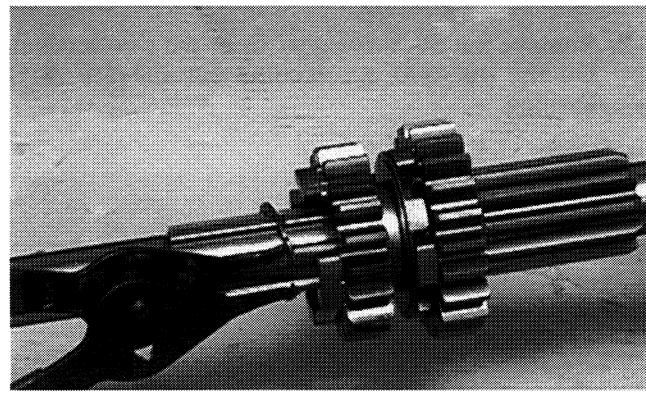
3. Remove the 5th drive washer and 5th drive circlip from the countershaft.

Fig. 3-629



CC201D

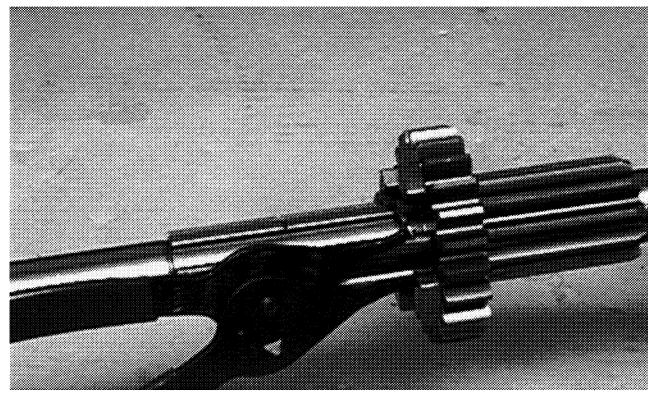
Fig. 3-630



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.

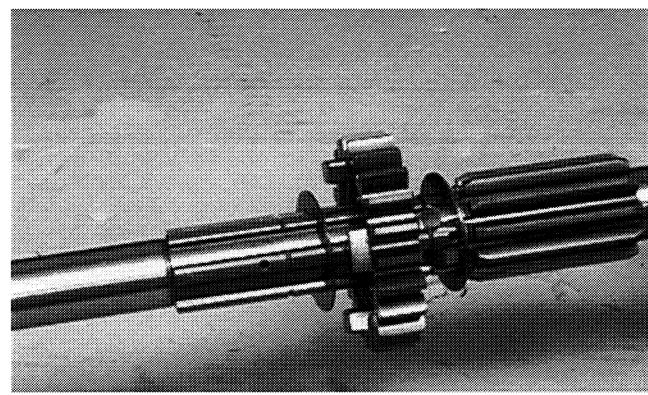
Fig. 3-631



CC199D

■ NOTE: On the 250/300 cc, account for the bushing in front of the gear. On the 400/500 cc, account for the bushing in back of the gear.

Fig. 3-632



CC198D

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

Assembling

Fig. 3-633

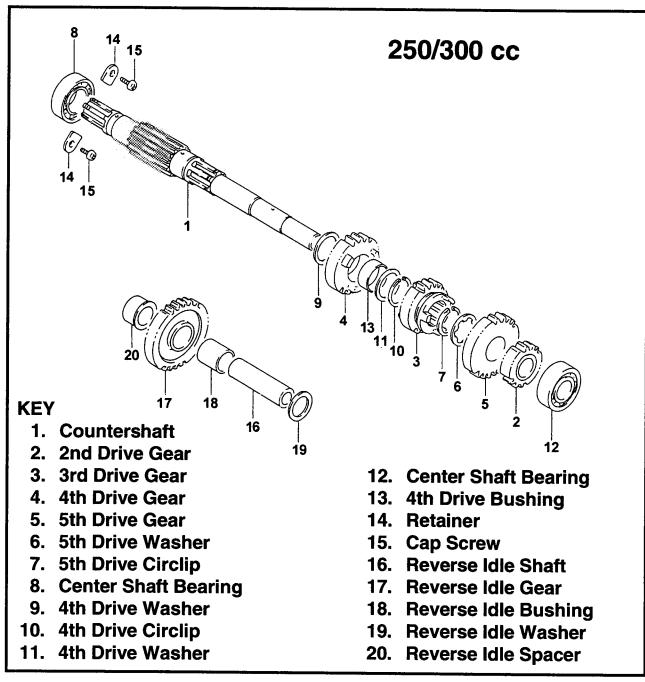
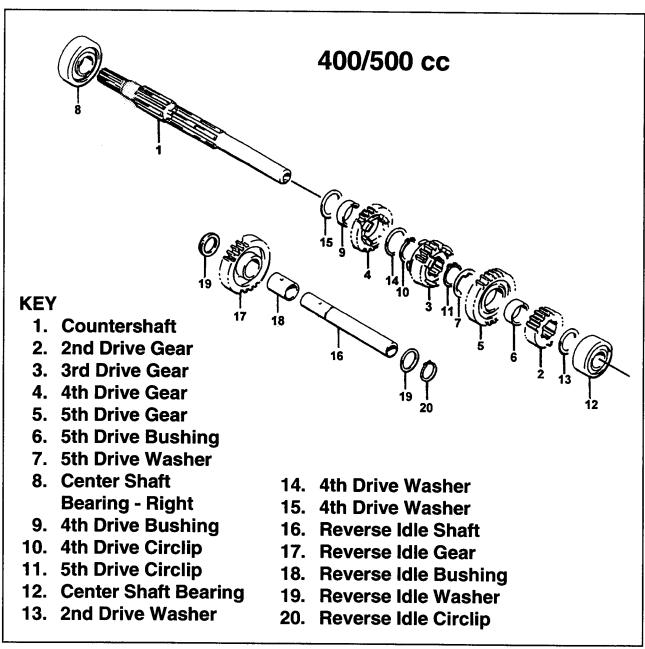


Fig. 3-634



1. Install the 4th drive washer onto the countershaft.
2. Install the 4th drive gear making sure the bushing is in back of the gear on the 400/500 cc or that it is in front of the gear on the 250/300 cc; then install the 4th drive washer onto the countershaft. Secure with the circlip.

Fig. 3-635

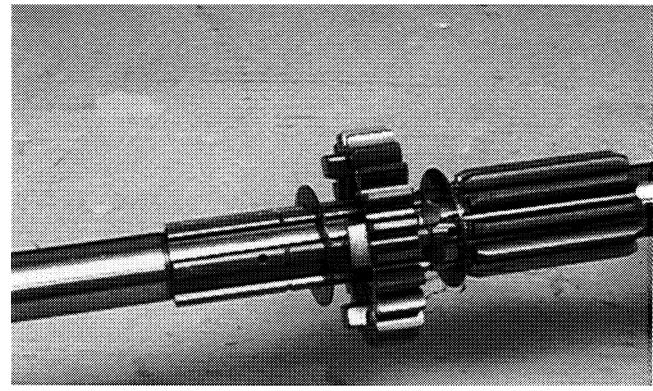
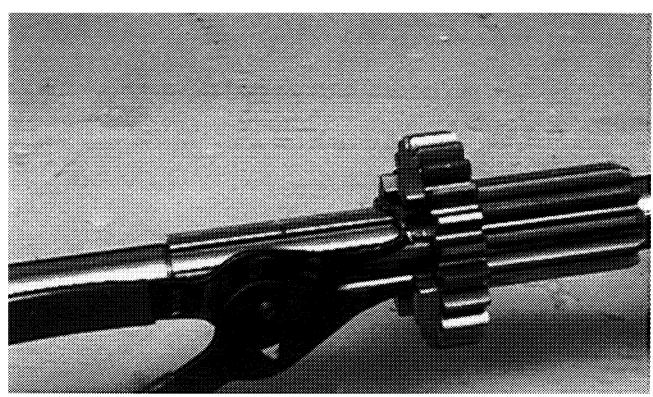
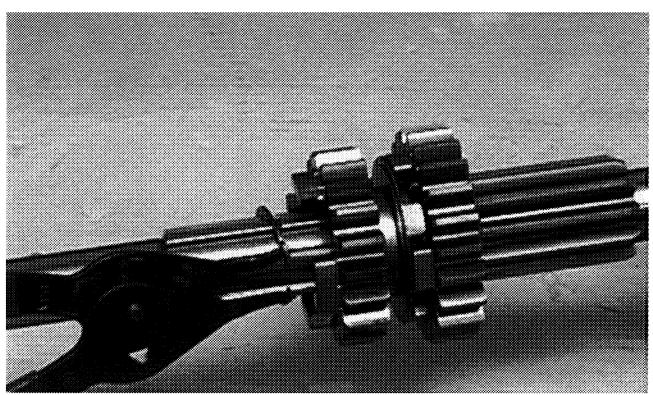


Fig. 3-636



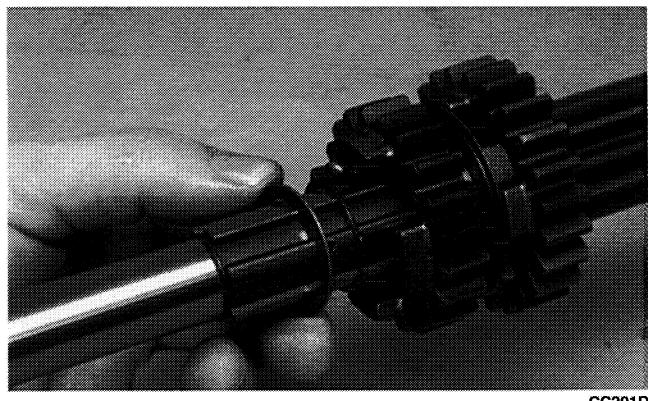
3. Install the 3rd drive gear; then install the 5th drive circlip onto the countershaft.

Fig. 3-637



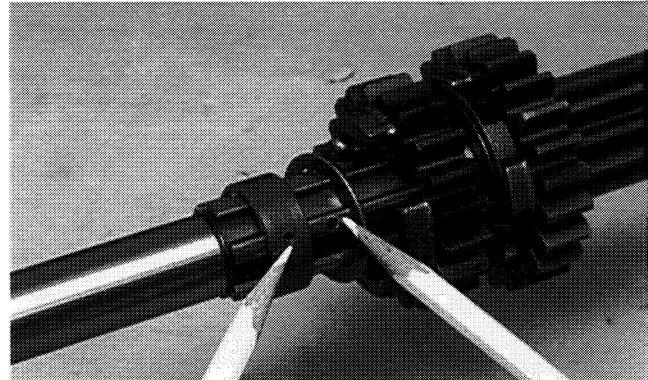
4. Install the 5th drive washer and 5th drive gear onto the countershaft making sure the oil holes align.

Fig. 3-638



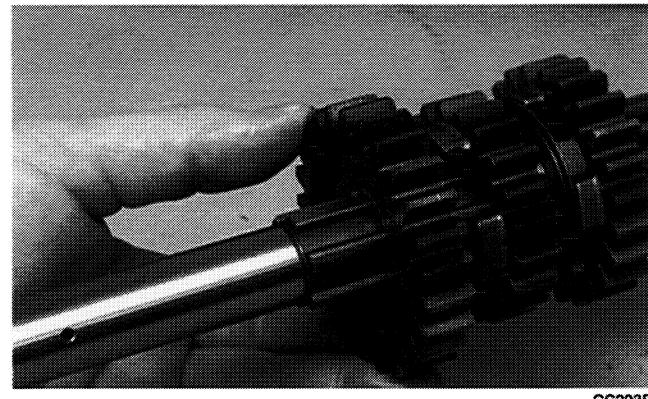
CC201D

Fig. 3-639



CC202D

Fig. 3-640



CC203D

5. On the 250/300 cc, press the 2nd drive gear onto the countershaft leaving an 0.25 mm (0.010 in.) gap between the 2nd and 5th drive gears.

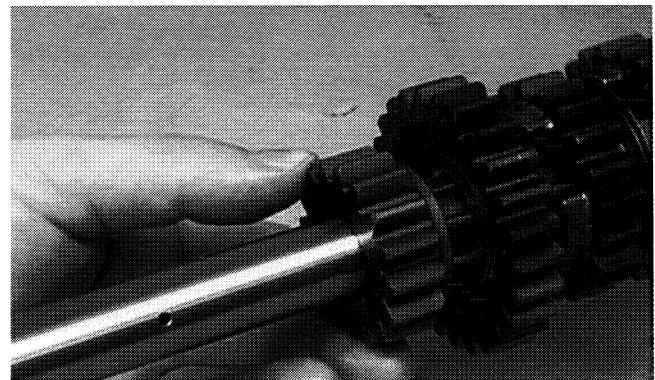
■ NOTE: When pressing the 2nd drive gear onto the countershaft, the inside of the gear must be oil free; then apply a thin even coat of green Loctite #620 being careful not to get Loctite on the other gears.

CAUTION

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

6. On the 400/500 cc, install the 2nd drive gear and 2nd drive washer onto the countershaft.

Fig. 3-641



CC204D

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

DRIVEN GEAR (400/500 cc)

Disassembling

1. Remove the circlip securing the driven gear. Account for a spring washer and thrust washer.

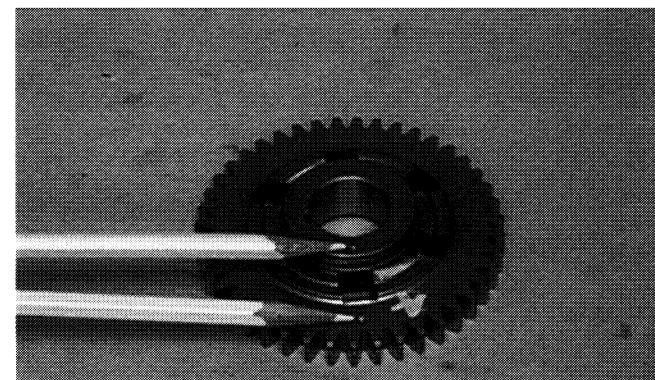
Fig. 3-642



CC182D

2. Note the position of the alignment marks for installation; then remove the driven gear with inner race. Account for three pins and six springs.

Fig. 3-643



CC183D

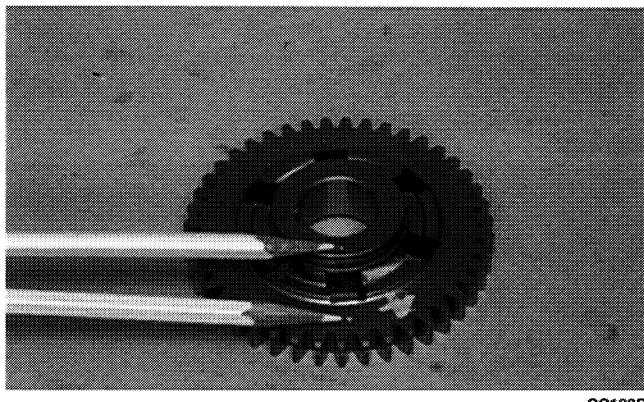
Inspecting

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

Assembling

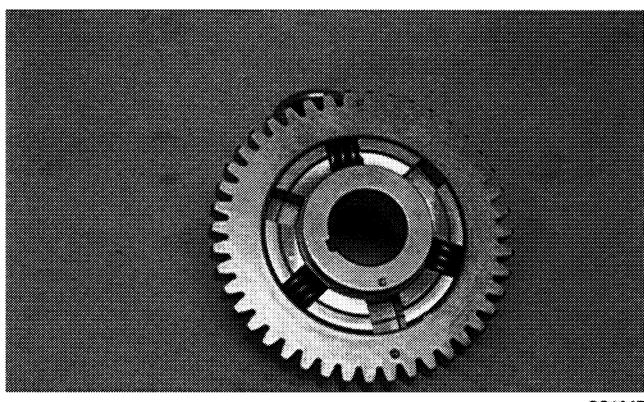
1. Align the alignment marks of the driven gear and inner race.

Fig. 3-644



2. Install three springs (every other one) proceeding away from the alignment marks.

Fig. 3-645



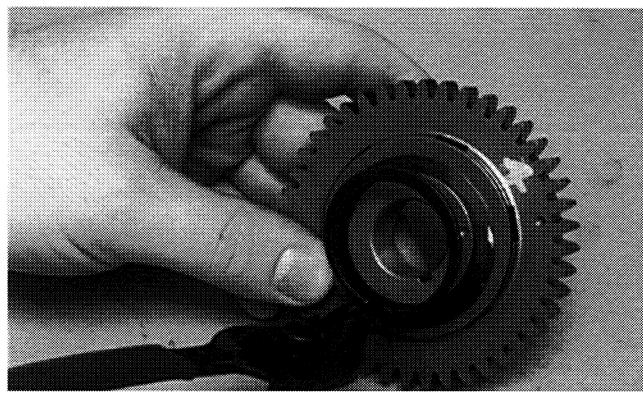
3. Using a needle-nosed pliers, insert each remaining spring part way into the slot; then install a pin and push the spring/pin assembly into the slot.

Fig. 3-646



4. Install the thrust washer and spring washer (with its raised inner portion directed away from the gear); then install the circlip with the sharp edge facing away from the gear.

Fig. 3-647



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

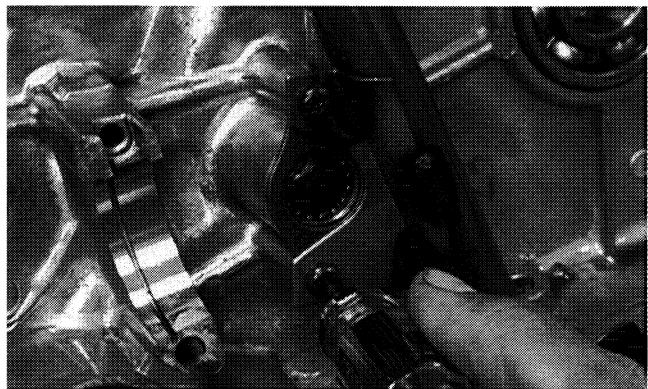
Assembling Crankcase Half (250/300 cc)

■ **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.

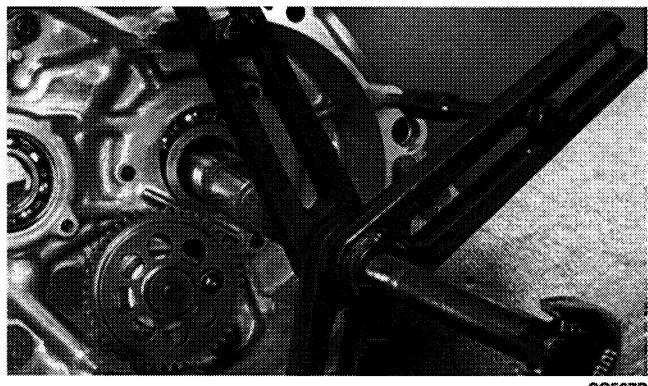
Fig. 3-648



CC506D

2. Using a crankshaft installer, install the crankshaft.

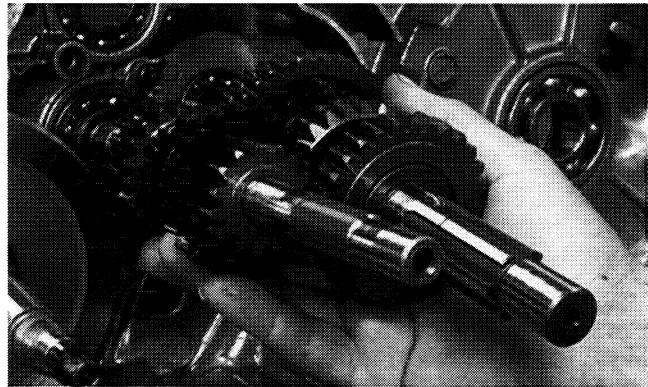
Fig. 3-649



CC507D

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

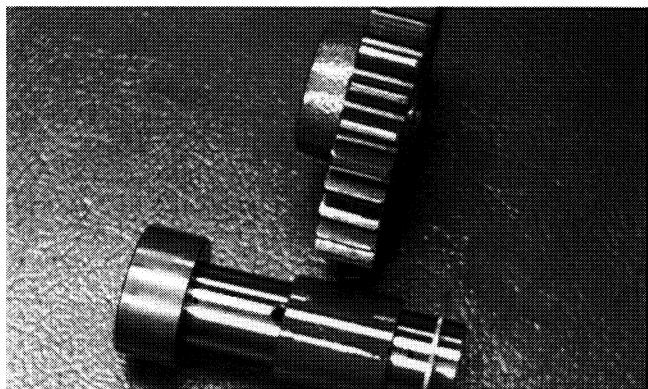
Fig. 3-650



CC505D

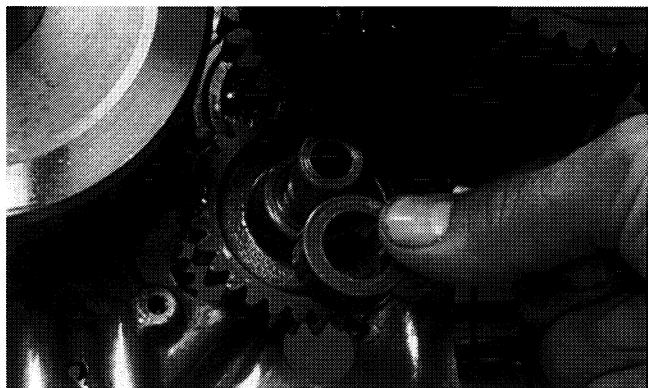
4. Install the reverse idle shaft; then install a washer, bushing, reverse idle gear, and a spacer.

Fig. 3-651



CC504D

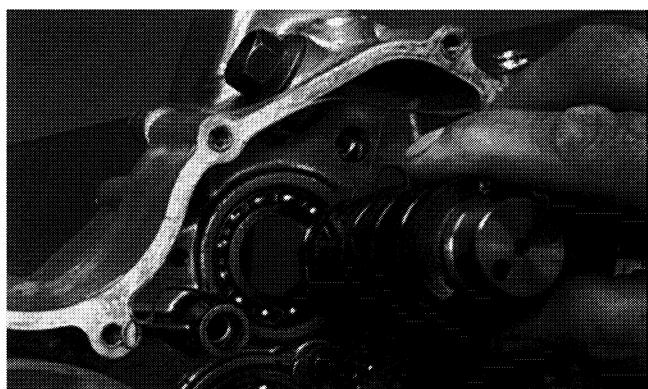
Fig. 3-652



CC502D

5. Install the gear shifting cam.

Fig. 3-653



CC501D

6. Install the front gear shifting fork.

Fig. 3-654



CC500D

7. Install the short gear shifting fork shaft.

Fig. 3-655



CC499D

8. Install the inner shifting fork.

Fig. 3-656



CC498D

9. Install the reverse shifting cam and washer.

Fig. 3-657



CC497D

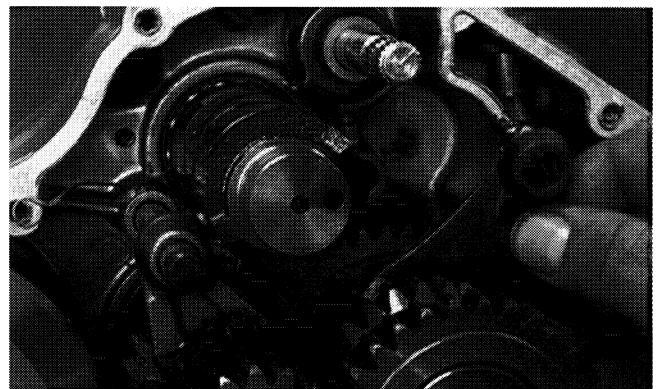
Fig. 3-658



CC486D

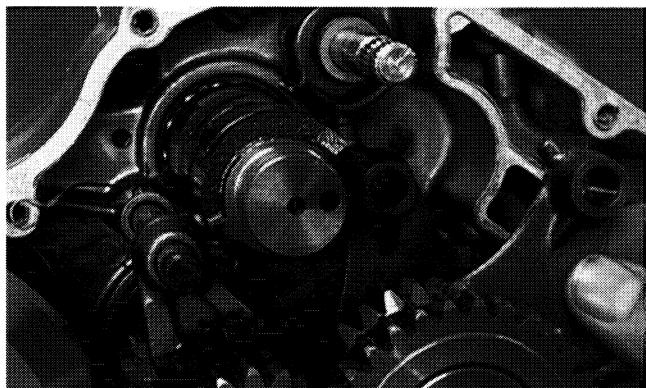
10. Install the center and outer shifting forks.

Fig. 3-659



CC496D

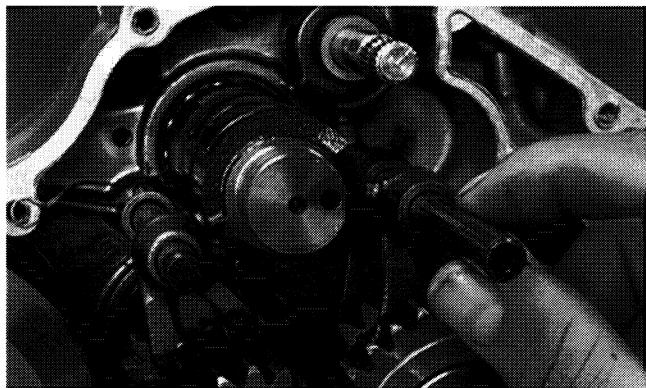
Fig. 3-660



CC495D

11. Install the long gear shifting fork shaft.

Fig. 3-661



CC494D

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

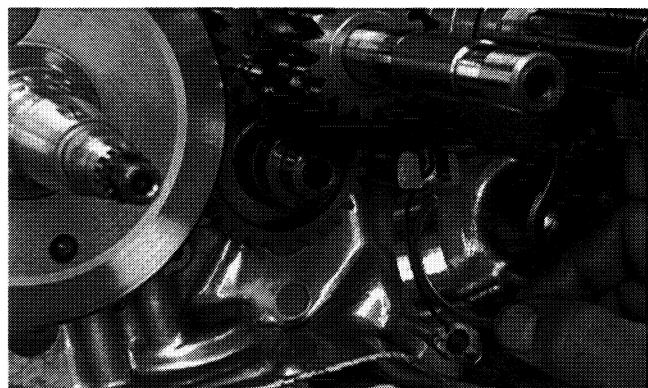
Fig. 3-662



CC493D

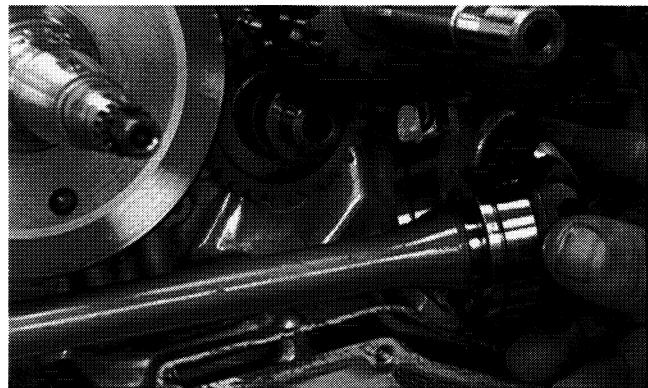
13. Place the C-ring into position; then install the secondary output shaft noting the location of the bearing alignment from disassembly.

Fig. 3-663



CC492D

Fig. 3-664



CC491D

Fig. 3-665



CC490D

14. Install the sub-transmission shaft assembly.

CAUTION

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

Fig. 3-666



CC489D

15. Install the rear final driven shaft and gear.

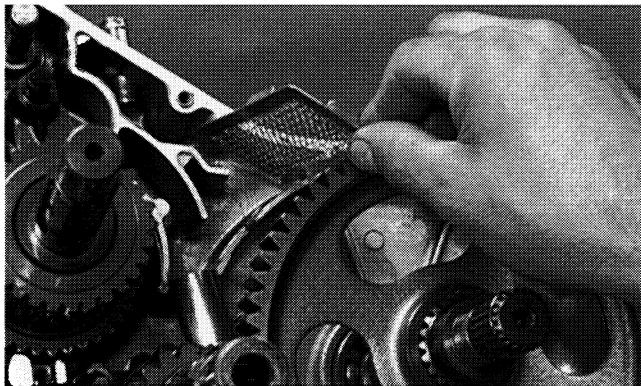
Fig. 3-667



CC488D

16. Install the oil breather screen noting the direction of the tabs from disassembly.

Fig. 3-668

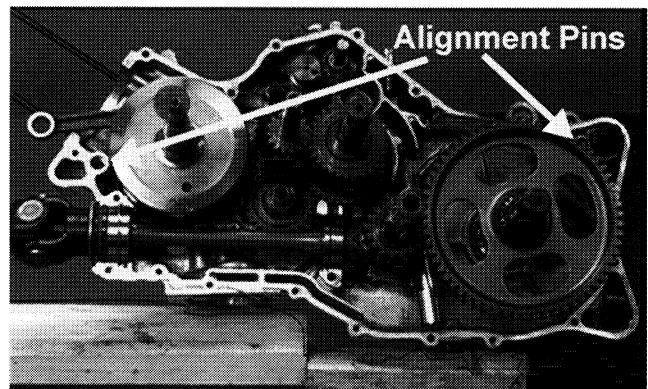


CC487D

Joining Crankcase Halves (250/300 cc)

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.

Fig. 3-669

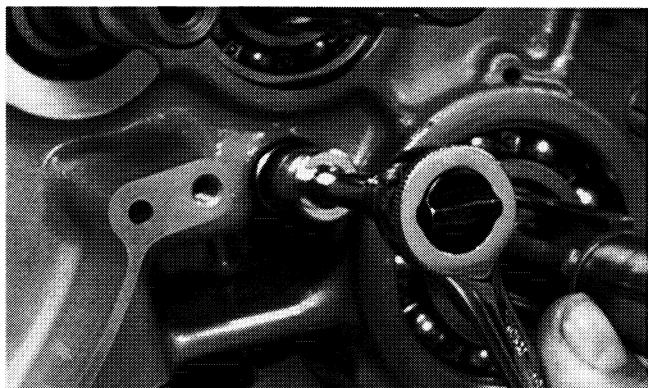


CC485DA

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

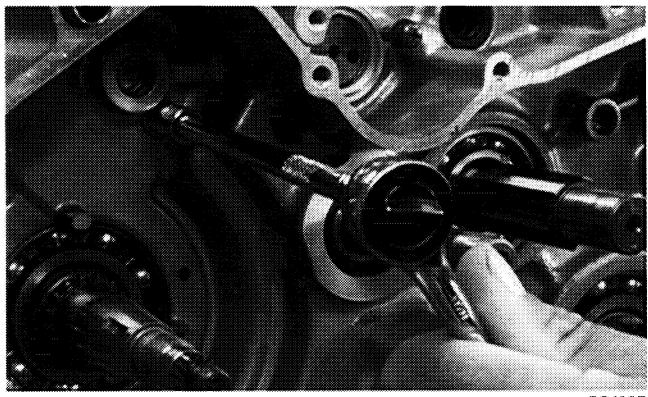
■ **NOTE:** Rotate the shafts back and forth to ensure no binding or sticking occurs while tightening the cap screws.

Fig. 3-670



CC483D

Fig. 3-671



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.

Fig. 3-672

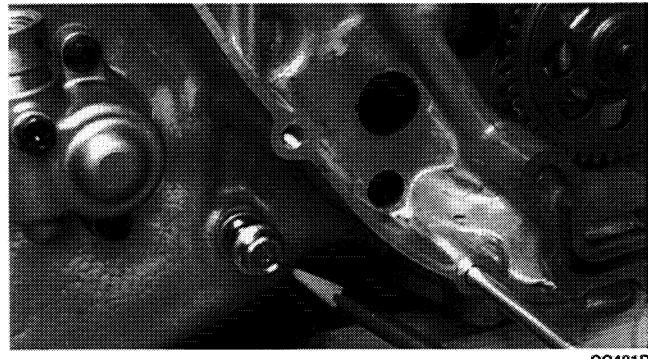
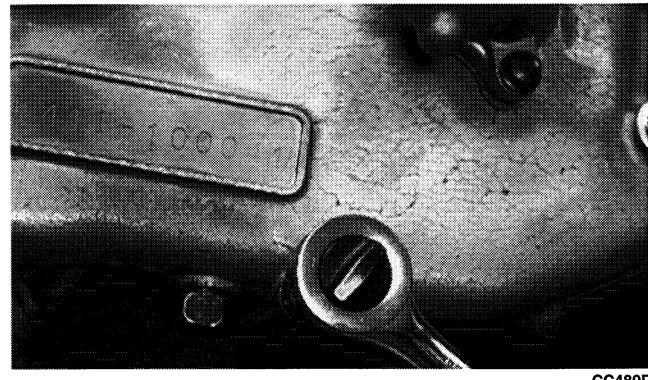


Fig. 3-673



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 (14.5-17.5 ft-lb).

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

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

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

AT THIS POINT

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

Assembling Crankcase Half (400/500 cc)

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

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

1. To install the output shaft, 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 (72.5 ft-lb).

Fig. 3-674

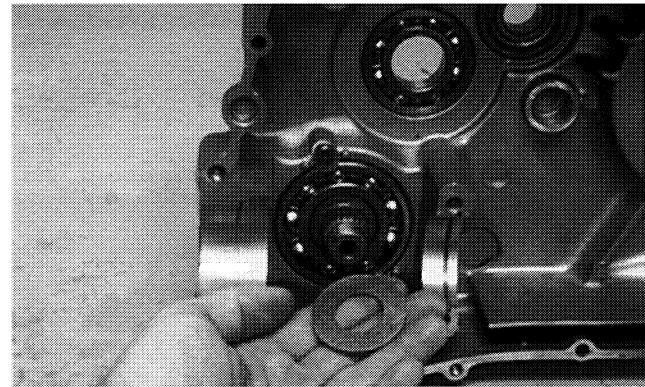
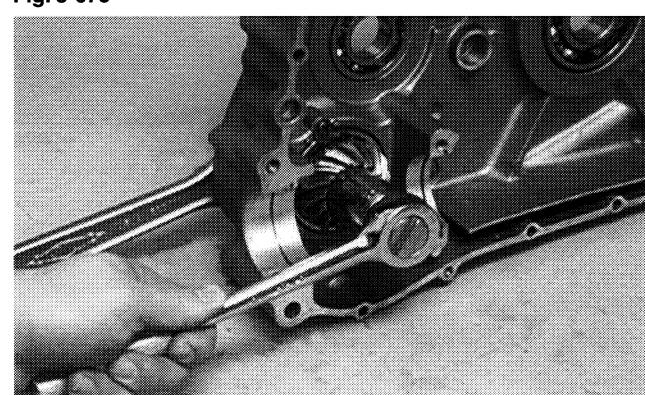
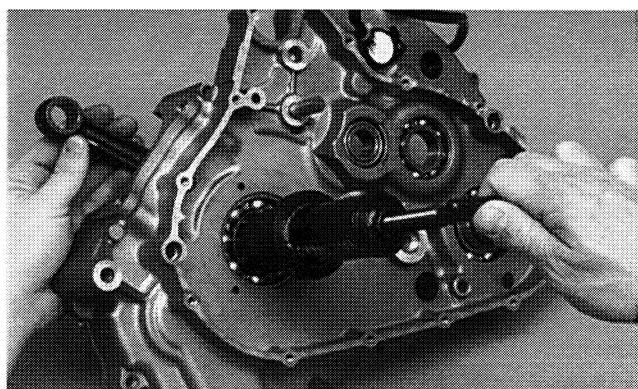


Fig. 3-675



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

Fig. 3-676

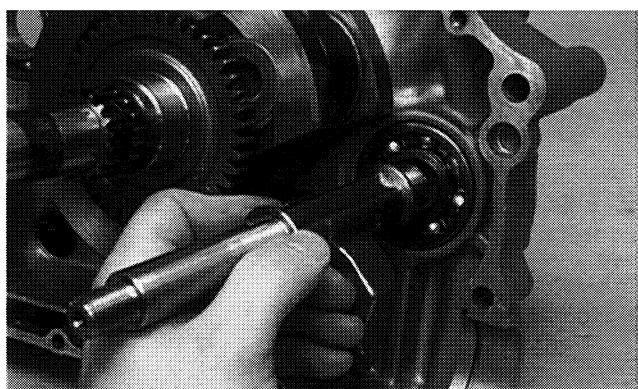


CC151D

3. Install the crank balancer.

■ NOTE: When installing the crank balancer, rotate the crankshaft counterweight away from the crank balancer counterweight.

Fig. 3-677



CC168D

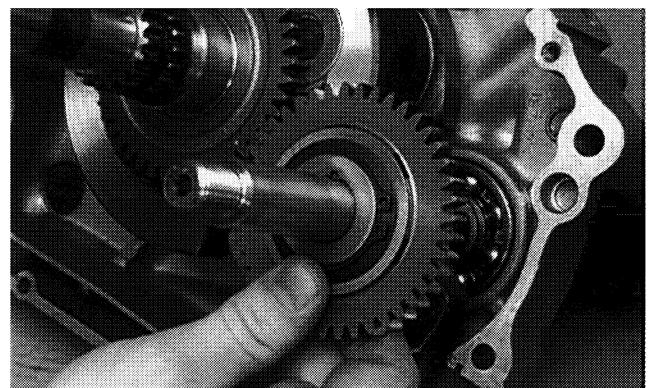
4. With the key in position, slide the driven gear onto the crank balancer making sure the timing marks are aligned.

Fig. 3-678



CC165D

Fig. 3-679



CC167D

Fig. 3-680



CC166D

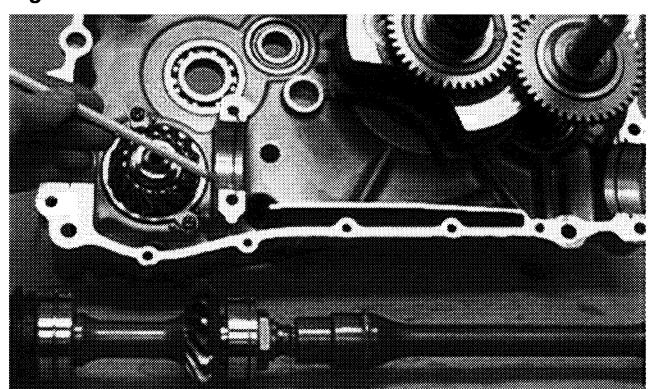
3

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

CAUTION

The bearing pins must be positioned into the crankcase.

Fig. 3-681



CC110D

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

Fig. 3-682

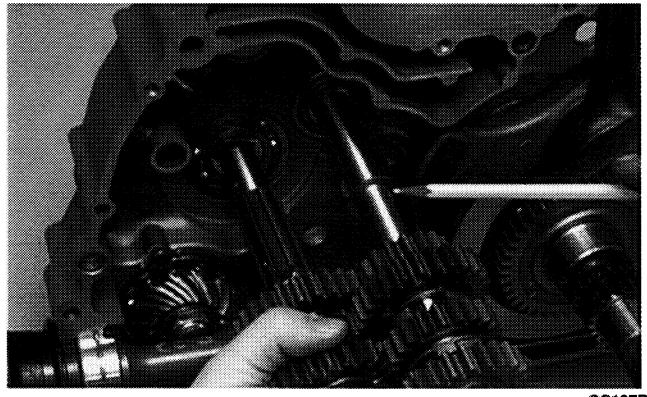
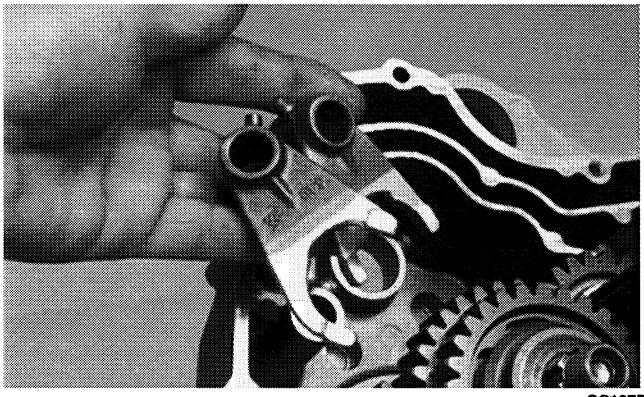


Fig. 3-685



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.

Fig. 3-683

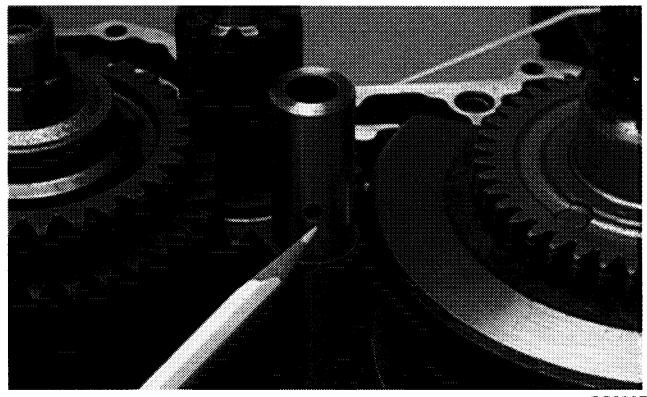
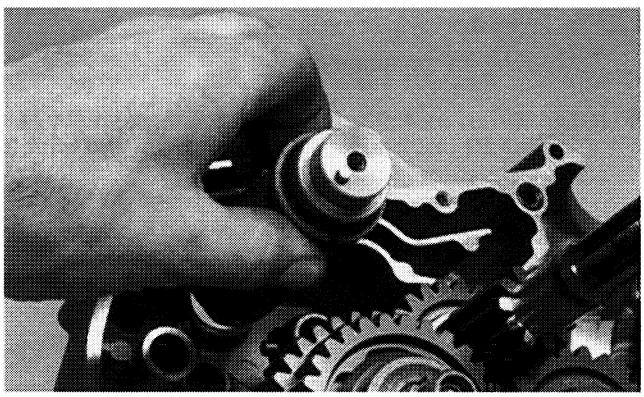


Fig. 3-686



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

Fig. 3-684

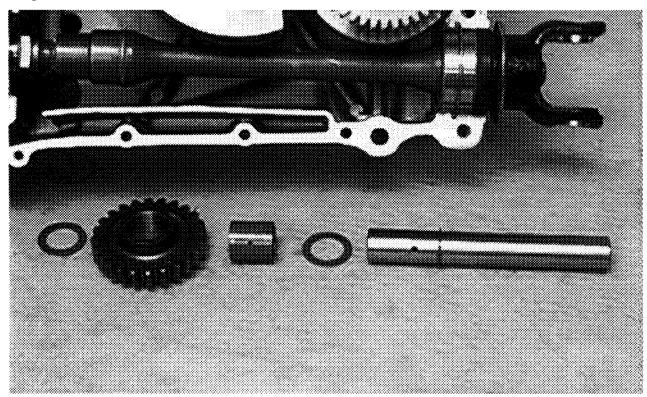
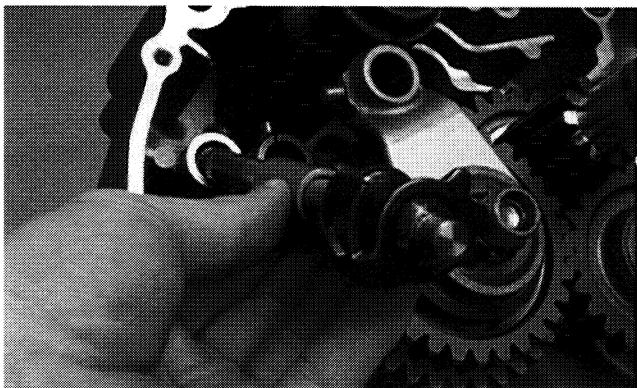


Fig. 3-687



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

Fig. 3-688



CC103D

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

Fig. 3-689



CC104D

Joining Crankcase Halves (400/500 cc)

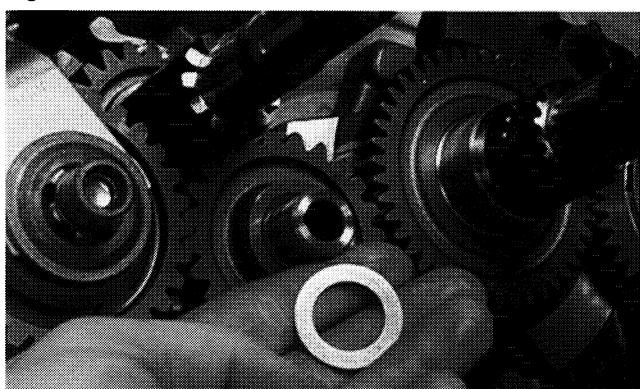
1. Place the O-ring in the left-side crankcase half and verify that the shim washer is on the idler shaft; then apply Three Bond Sealant (p/n 0636-070) to the mating surfaces. Place the right-side half onto the left-side half.

Fig. 3-690



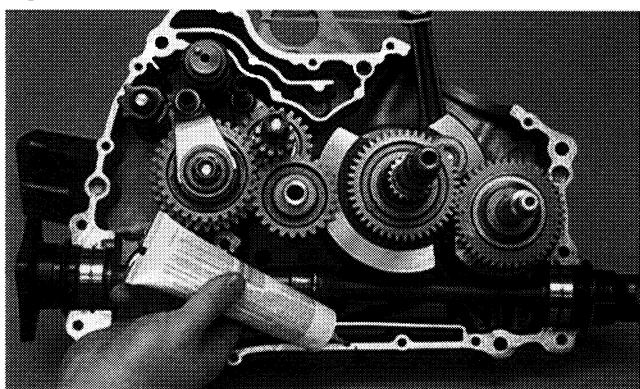
CC101D

Fig. 3-691



CC102D

Fig. 3-692

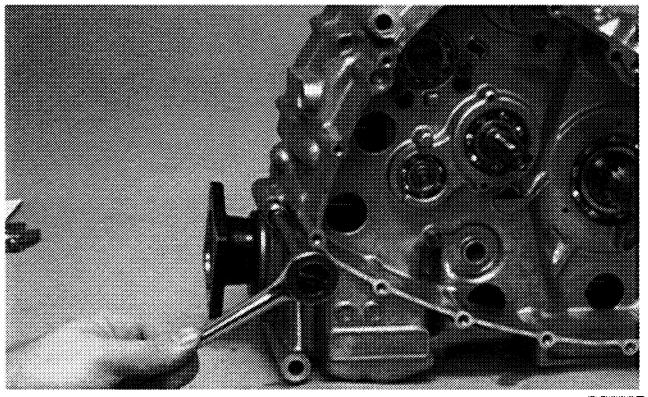


CC234D

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; then tighten only until snug.

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

Fig. 3-693

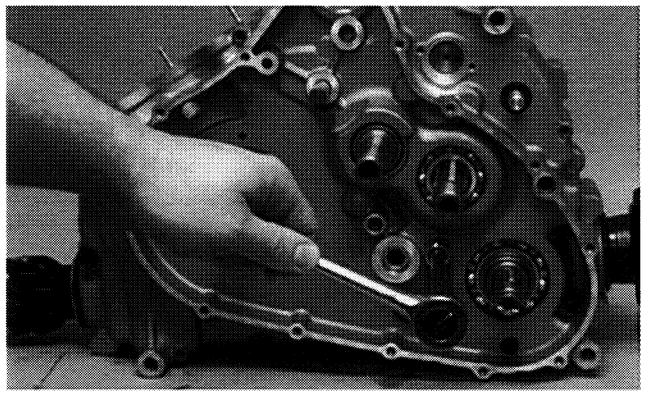


CC098D

4. From the right 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.

Fig. 3-694

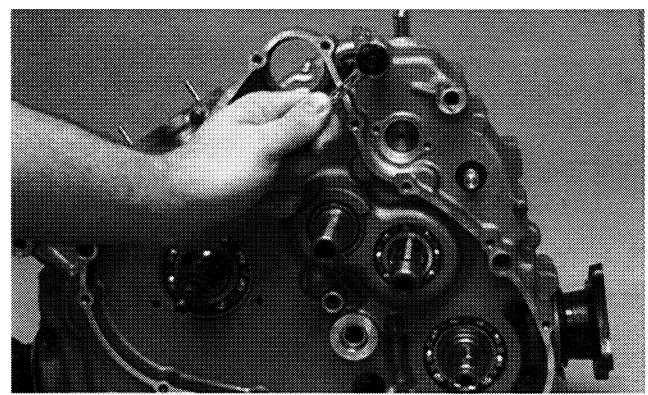


CC097D

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.

Fig. 3-695

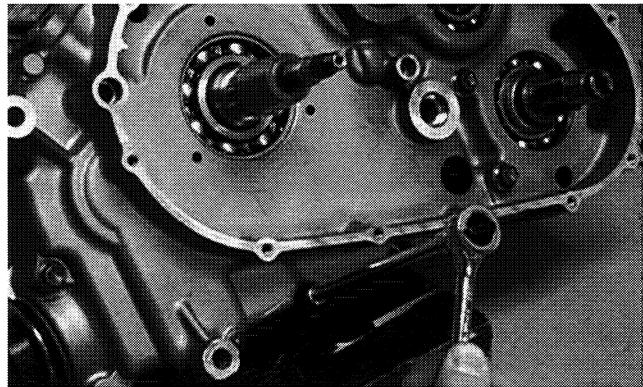


CC096D

6. From the right side, install the four 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.

Fig. 3-696



CC095D

7. 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 (14.5-17.5 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 to 0.9-1.3 kg-m (6.5-9.5 ft-lb).

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

AT THIS POINT

After completing center crankcase components, proceed to [Installing Right-Side Components](#), to [Installing Left-Side Components](#), and to [Installing Top-Side Components](#).

SECTION 4 - FUEL/LUBRICATION/COOLING

4

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Carburetor Specifications

250/300 cc

| | |
|-------------------------------------|--------------------------------|
| Type | BST31 |
| Main Jet | 137.5 130* |
| Main Air Jet | 1.1 |
| Pilot Jet | 45 |
| Pilot Air Jet | 155 |
| Throttle Valve | 120 |
| Pilot Screw Setting (turns) | 2 3/4 |
| Needle Jet | P-6M (250 cc) P-8M (300 cc) |
| Jet Needle | 4D28-3 |
| Idle RPM | 1400-1600 |
| Valve Seat | 2.0 |
| Starter Jet | 50 |
| Pilot Outlet | 0.8 |
| Float Arm Height | 13 mm (0.5 in.) |
| Throttle Cable Free-Play (at lever) | 3 - 6 mm (1/8 - 1/4 in.) |

*250 cc

400 cc

| | |
|-------------------------------------|-----------------------------|
| Type | BST34 |
| Main Jet | 150 |
| Main Air Jet | 1.1 |
| Pilot Jet | 45 |
| Pilot Air Jet | 145 |
| Throttle Valve | 95 |
| Pilot Screw Setting (turns) | 2 ± 1/8 |
| Jet Needle | 4E07-4 |
| Needle Jet | O-2 |
| Idle RPM | 1400-1600 |
| Valve Seat | 2.0 |
| Starter Jet | 110 |
| Float Arm Height | 14 mm (0.6 in.) |
| Throttle Cable Free-Play (at lever) | 3 - 6 mm (1/8 - 1/4 in.) |

500 cc

| | |
|-------------------------------------|-----------------------------|
| Type | BST34 |
| Main Jet | 152.5 |
| Main Air Jet | 0.9 |
| Pilot Jet | 55 |
| Pilot Air Jet | 155 |
| Throttle Valve | 105 |
| Pilot Screw Setting (turns) | 2 ± 1/4 |
| Jet Needle | 5D40-4 |
| Needle Jet | O-4 |
| Idle RPM | 1200-1350 |
| Valve Seat | 2.3 |
| Starter Jet | 110 |
| Float Arm Height | 13 mm (0.5 in.) |
| Throttle Cable Free-Play (at lever) | 3 - 6 mm (1/8 - 1/4 in.) |

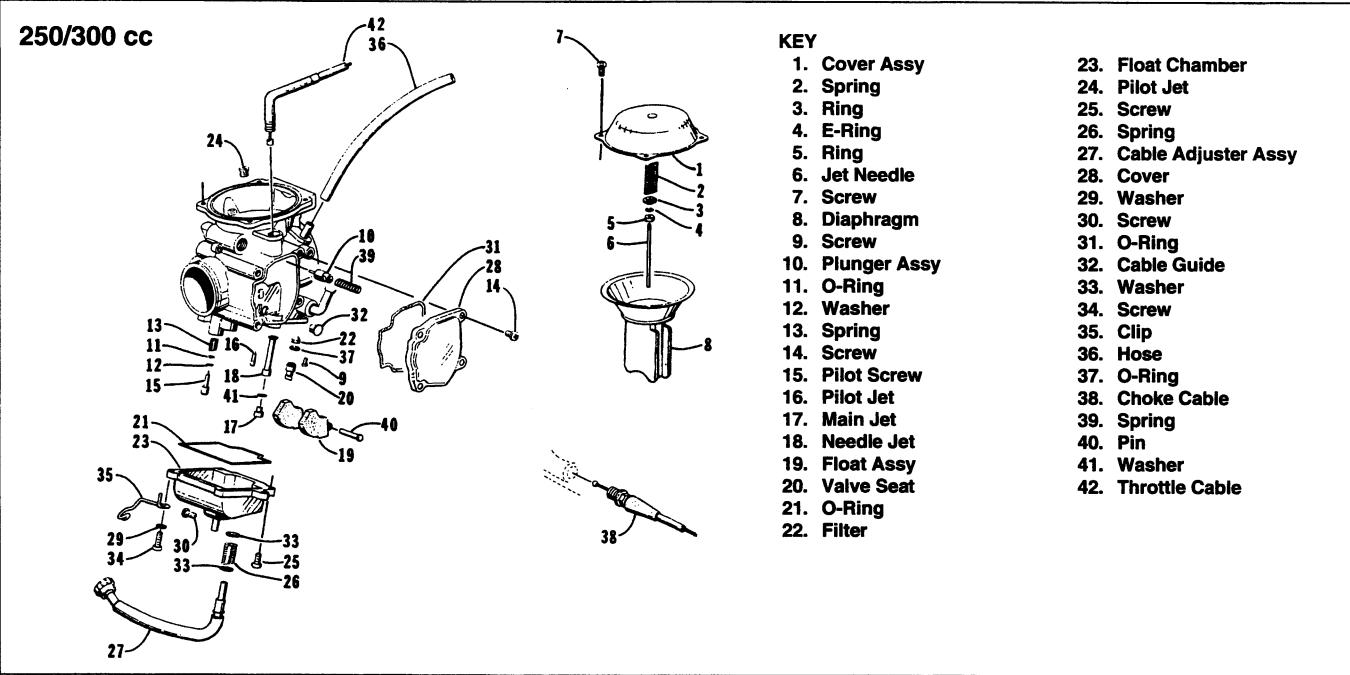
WARNING

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

■ NOTE: When starting a cold engine, the choke lever must be held fully down to obtain full-choke operation.

Carburetor

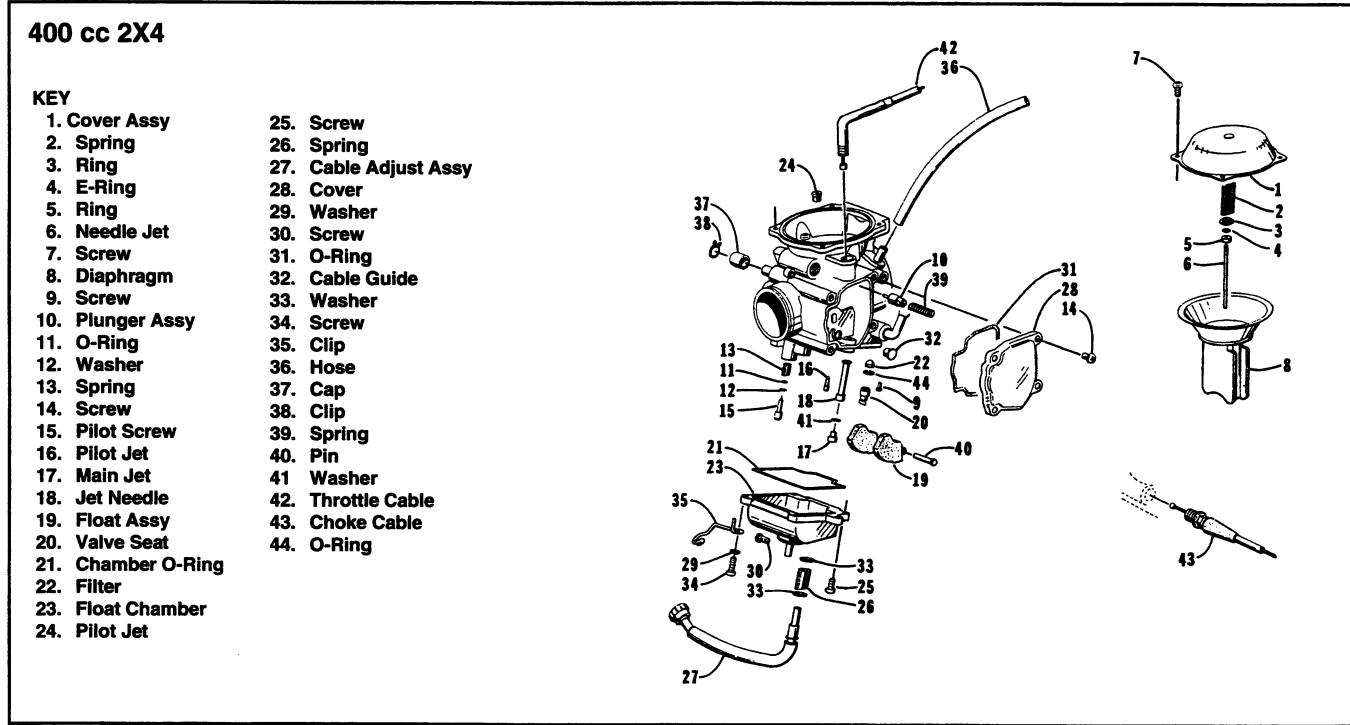
Fig. 4-1



0733-773

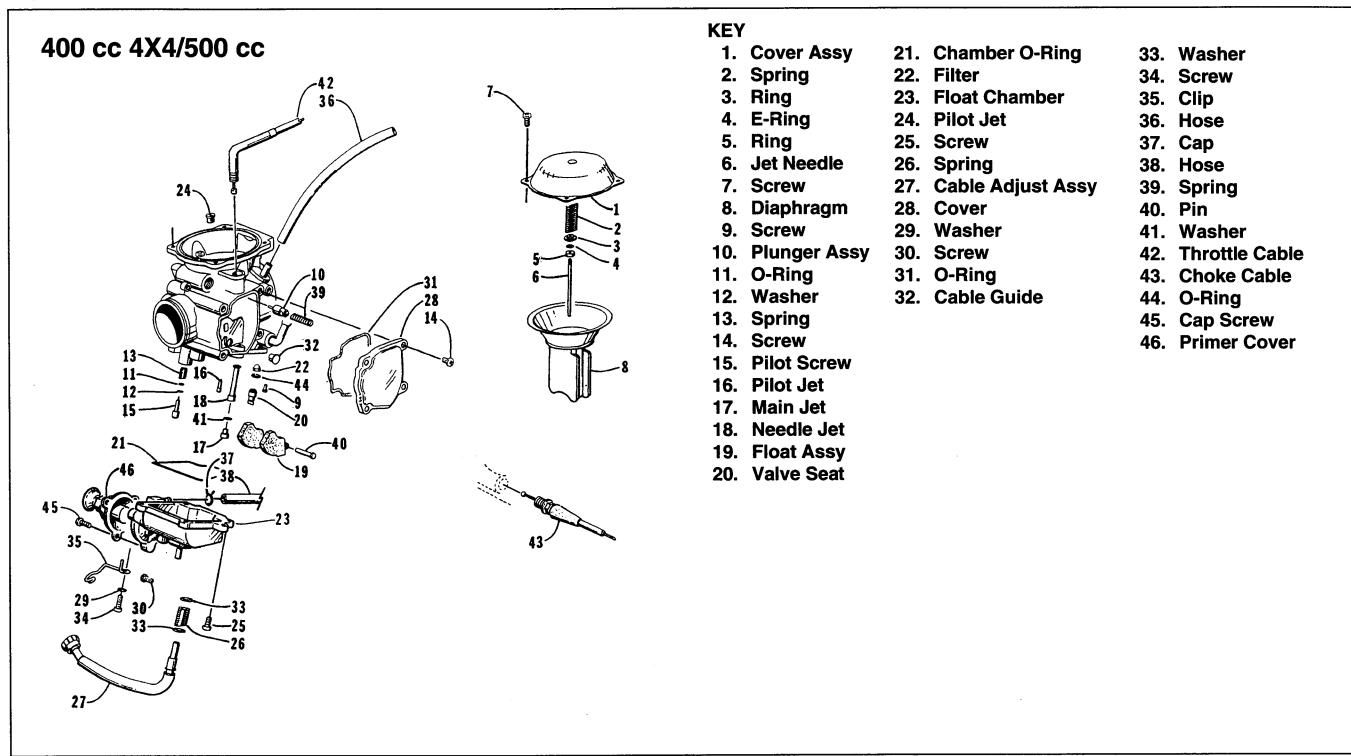
4

Fig. 4-2



0733-937

Fig. 4-3

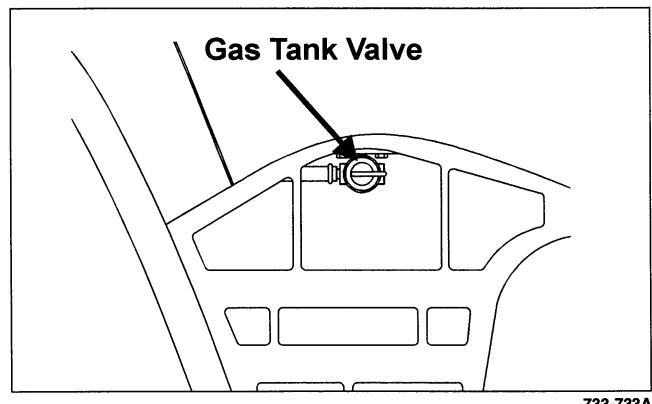


0734-298

REMOVING (250/300 cc)

1. Turn the gas tank valve to the OFF position; then disconnect the fuel supply hose from the carburetor.

Fig. 4-4



2. Remove the air-intake snorkel.

Fig. 4-5

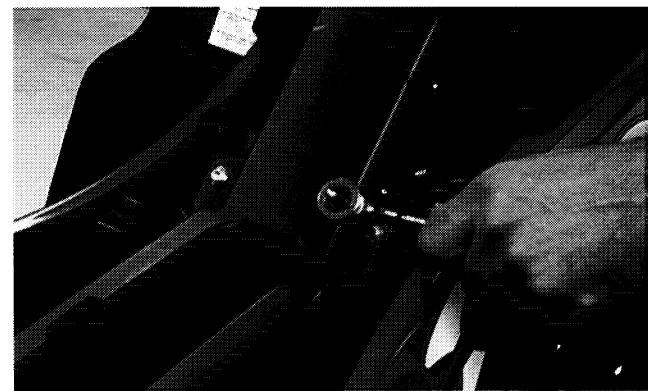
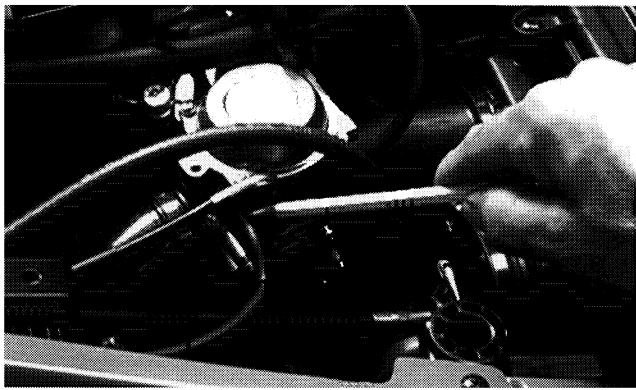


Fig. 4-6



3. Remove the choke plunger housing; then route the choke cable away from the engine.

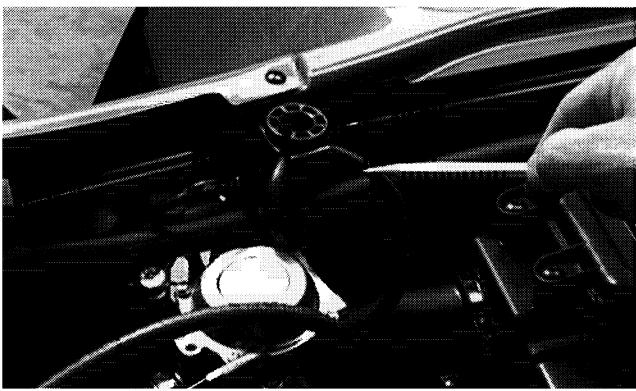
Fig. 4-7



CH042D

4. Route the two vent hoses from the slots in the frame.

Fig. 4-8



CH043D

5. Remove the four Phillips-head screws (with washer and lock washer) securing the throttle actuator cover; then remove the throttle actuator cover.

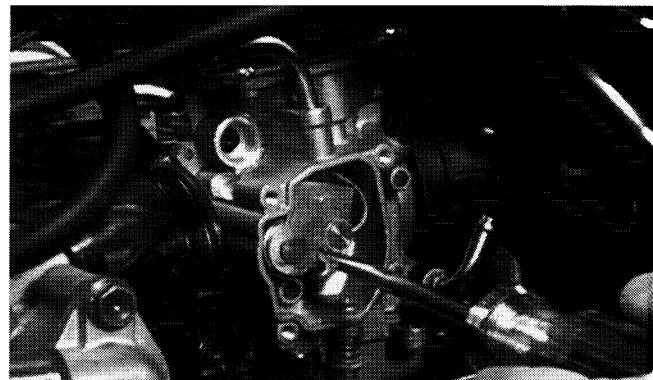
Fig. 4-9



CH021D

6. Using a screwdriver, rotate the actuator arm to the full-up position; then using a pair of needle-nose pliers, remove the throttle cable from the actuator. Account for the drum.

Fig. 4-10



CH022D

Fig. 4-11



CH023D

7. Lift the throttle cable from the carburetor and route it away from the engine.
8. Loosen the flange clamps; then remove the carburetor from the two carburetor boots.

Fig. 4-12

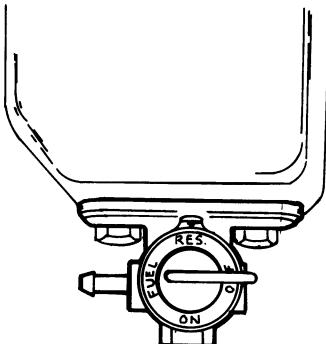


CH049D

REMOVING (400/500 cc)

1. Turn the gas tank valve to the OFF position; then disconnect the fuel supply hose from the carburetor.

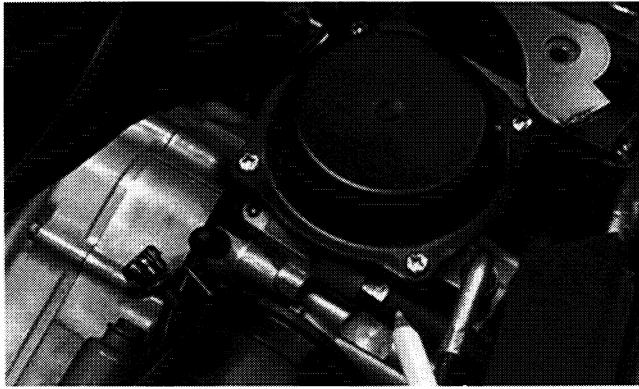
Fig. 4-13



ATV-0076

2. Remove the choke plunger housing; then route the choke cable away from the engine.

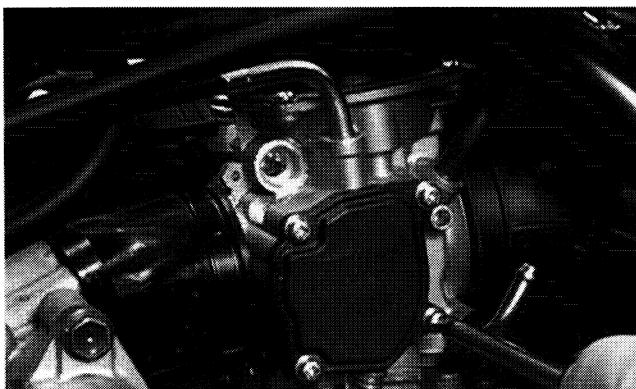
Fig. 4-14



CH020D

3. Route the two vent hoses from the slots in the frame.
4. Remove the four Phillips-head screws (with washer and lock washer) securing the throttle actuator cover; then remove the throttle actuator cover.

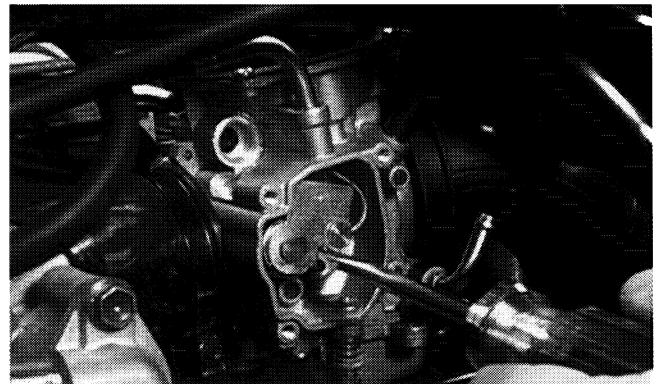
Fig. 4-15



CH021D

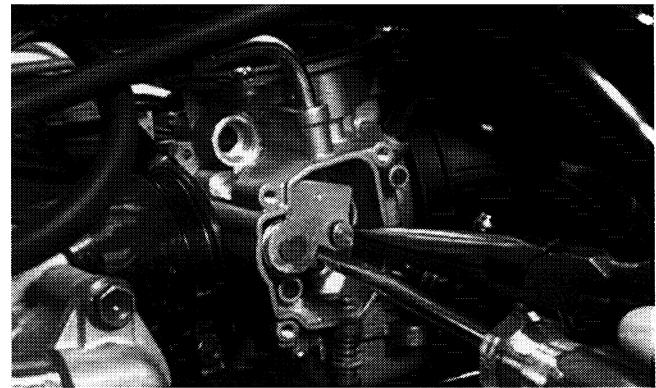
5. Using a screwdriver, rotate the actuator arm to the full-up position; then using a needle-nose pliers, remove the throttle cable from the actuator. Account for the drum.

Fig. 4-16



CH022D

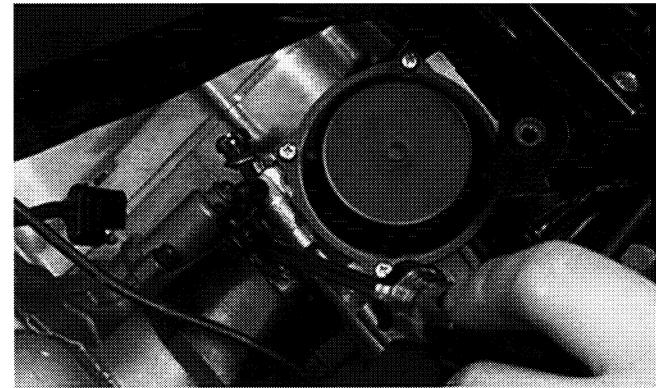
Fig. 4-17



CH023D

6. Lift the throttle cable from the carburetor and route it away from the engine.
7. Loosen the flange clamps; then remove the carburetor from the two carburetor boots.

Fig. 4-18



CC120D

DISASSEMBLING

1. Remove the four Phillips-head screws securing the top cover; then remove the cover.

Fig. 4-19



CH015D

2. Remove the diaphragm from the carburetor body and account for the spring, washer, and piston valve.

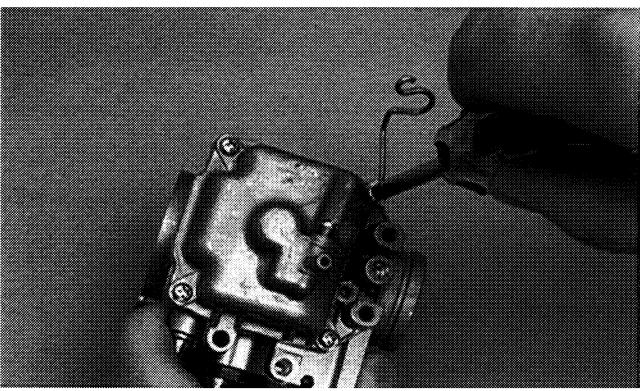
Fig. 4-20



CH034D

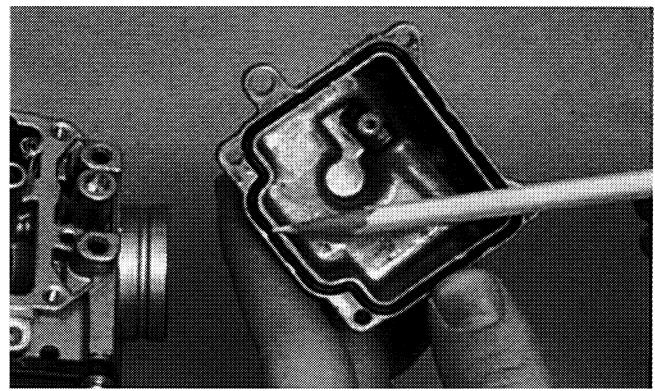
3. Remove the four Phillips-head screws securing the float chamber; then remove the chamber. Account for the O-ring. Note position of the idle speed adjuster wire form. Remove the idle RPM speed adjuster link.

Fig. 4-21



CH002D

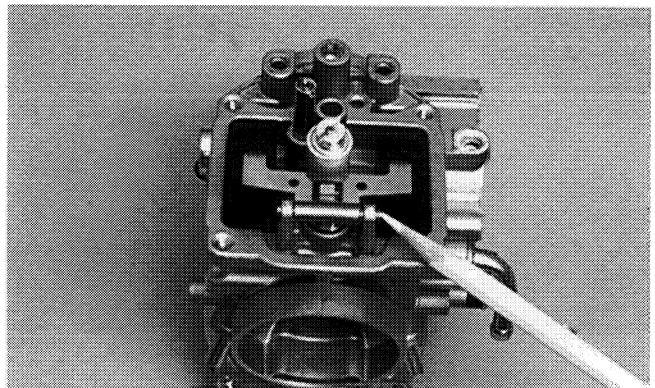
Fig. 4-22



CH004D

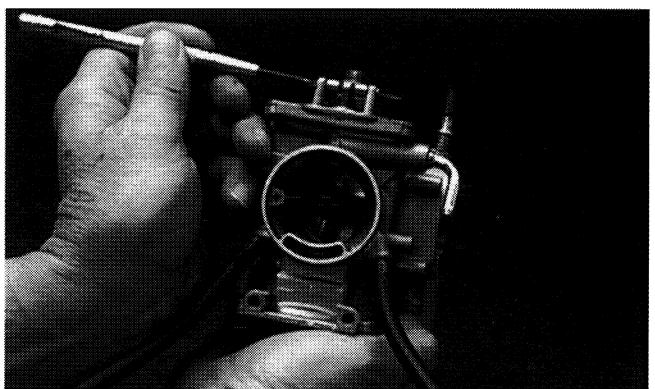
4. Visually inspect and note the direction the float pin is installed for assembly purposes; then using a spring loaded center punch, remove the float pin. Lift the float with needle valve from the carburetor body.

Fig. 4-23



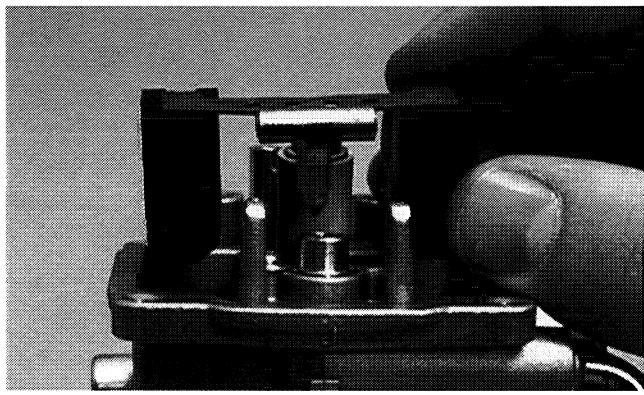
CH005D

Fig. 4-24



CH102D

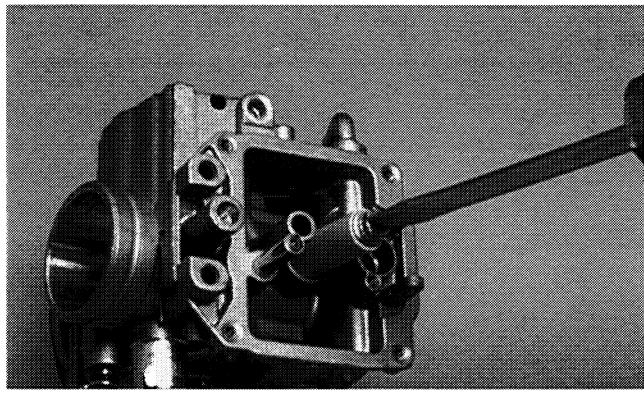
Fig. 4-25



CH007D

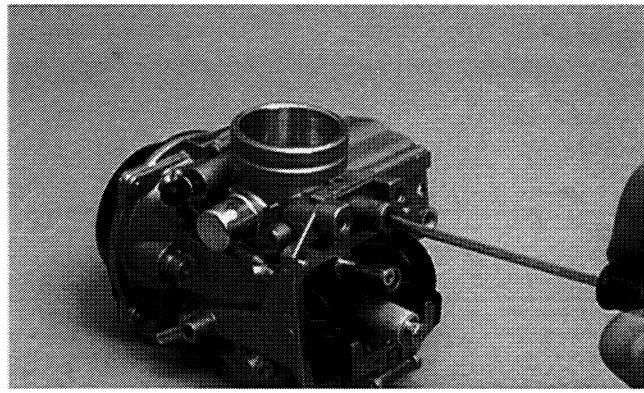
5. Remove the main jet and washer; then remove the pilot screw. Account for a spring, washer, and O-ring.

Fig. 4-26



CH014D

Fig. 4-27

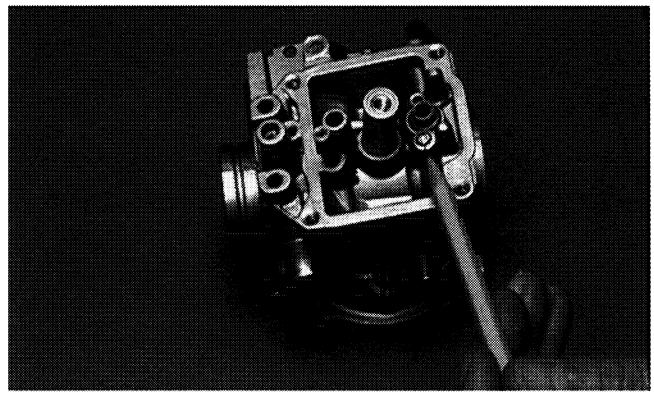


CH032D

CAUTION

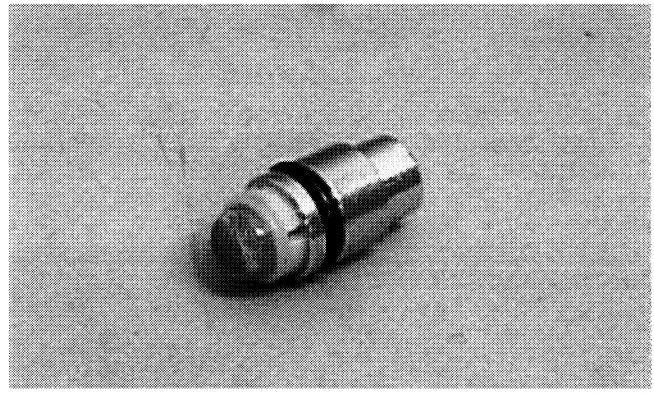
Do not remove the throttle valve or throttle valve shaft or damage will occur.

Fig. 4-28



CH010D

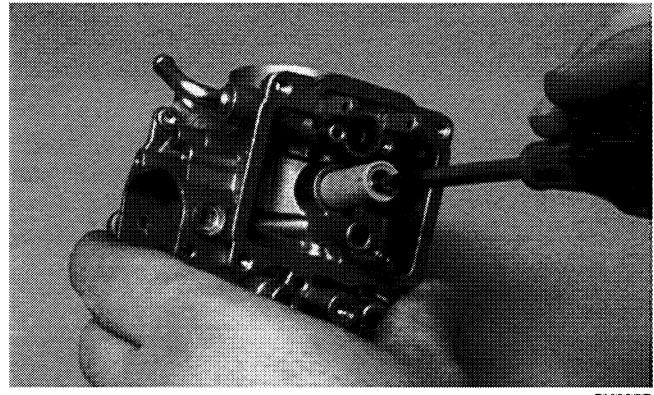
Fig. 4-29



CH011D

7. Remove the needle jet from the top of the carburetor body.

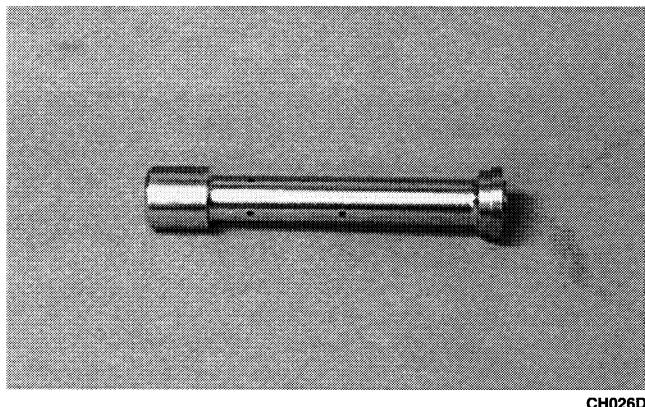
Fig. 4-30



CH025D

6. Remove the Phillips-head screw securing the needle valve seat; then remove the seat/screen assembly. Account for the O-ring.

Fig. 4-31



CLEANING AND INSPECTING

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

WARNING

When drying components with compressed air, always wear safety glasses.

CAUTION

DO NOT place any non-metallic components in parts-cleaning solvent because damage or deterioration will result.

1. Place all metallic components in a wire basket and submerge in carburetor cleaner.
2. Soak for 30 minutes; then rinse with fresh parts-cleaning solvent.
3. Wash all non-metallic components with soap and water. Rinse thoroughly.
4. Dry all components with compressed air only making sure all holes, orifices, and channels are unobstructed.
5. Inspect the carburetor body for cracks, nicks, stripped threads, and any other imperfections in the casting.
6. Inspect the piston valve and plunger for cracks or imperfections in the casting.
7. Inspect the condition of the throttle valve return spring.
8. Inspect float for damage.
9. Inspect gasket and O-rings for distortion, tears, or noticeable damage.
10. Inspect tips of the jet needle, pilot screw, and the inlet needle valve for wear, damage, or distortion.

11. Inspect the pilot jet and main jet for obstructions or damage.

■ NOTE: If the pilot jet is obstructed, the mixture will be extremely lean at idle and part-throttle operation.

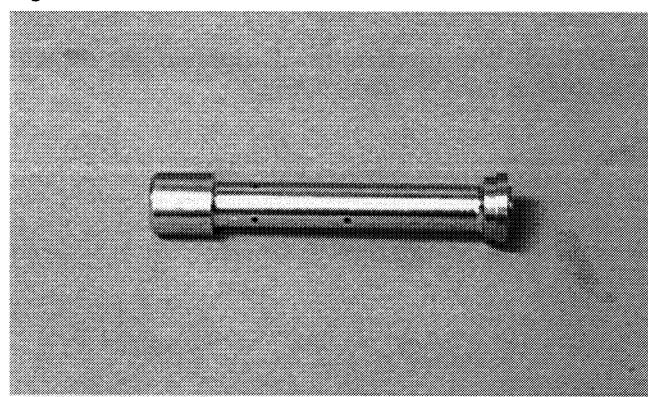
12. Inspect the choke plunger and seat for wear or damage.
13. Inspect the carburetor mounting flange for damage and tightness.

ASSEMBLING

1. Install the needle jet by inserting it from the top of the carburetor.

■ NOTE: The needle jet has a flat side which must align with the flat in the carburetor.

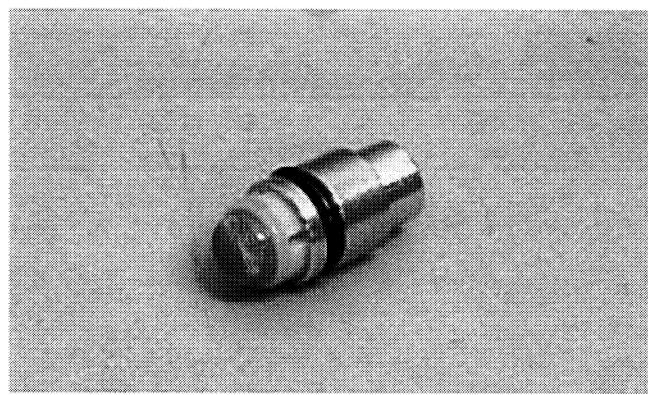
Fig. 4-32



CH026D

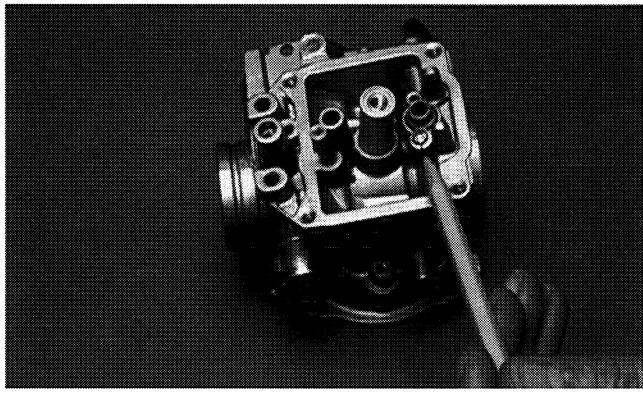
2. Install the needle valve seat/screen assembly into the carburetor making sure the O-ring was properly positioned; then secure with the Phillips-head screw.

Fig. 4-33



CH011D

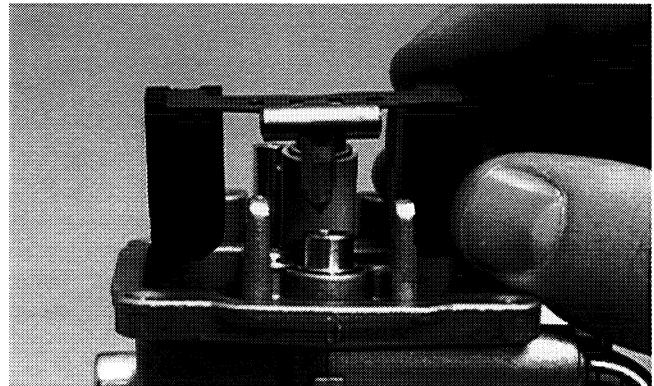
Fig. 4-34



CH010D

■ NOTE: The float pin must be installed from the same direction as it was removed.

Fig. 4-37



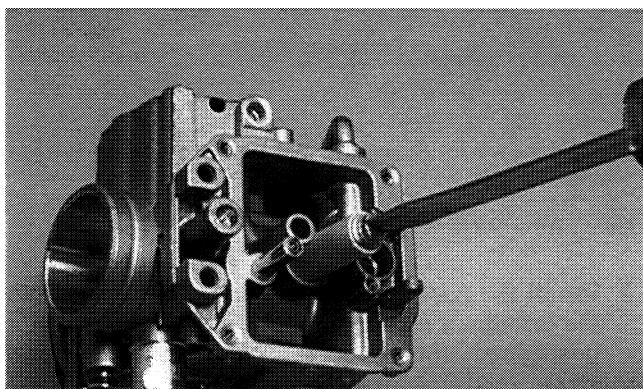
CH007D

■ NOTE: If the throttle valve and throttle shaft were removed. Install and check for proper operation.

3. Install the main jet; then install the pilot screw with spring, washer, and O-ring.

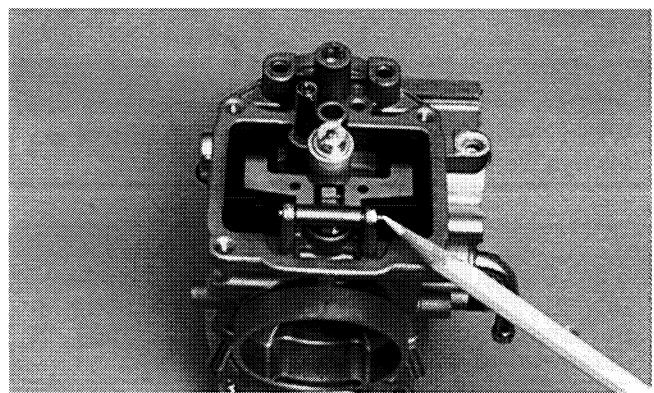
■ NOTE: A thin application of lightweight oil will help to seat the O-ring properly.

Fig. 4-35



CH014D

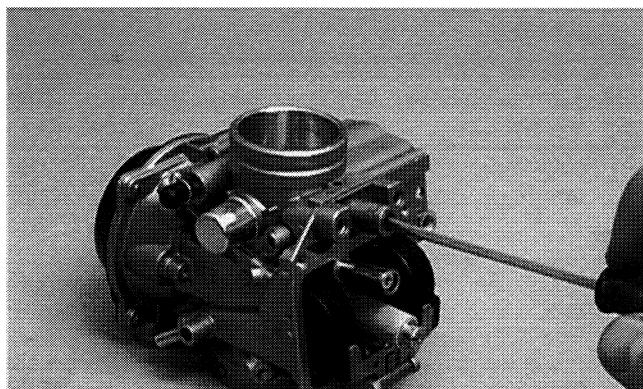
Fig. 4-38



CH005D

■ NOTE: Check float arm height by inverting the carburetor freeing the float arm; then measuring with a caliper the height when the float arm is in contact with the needle valve. Float arm height should fall within specifications. To adjust, bend the actuator arm tab.

Fig. 4-36

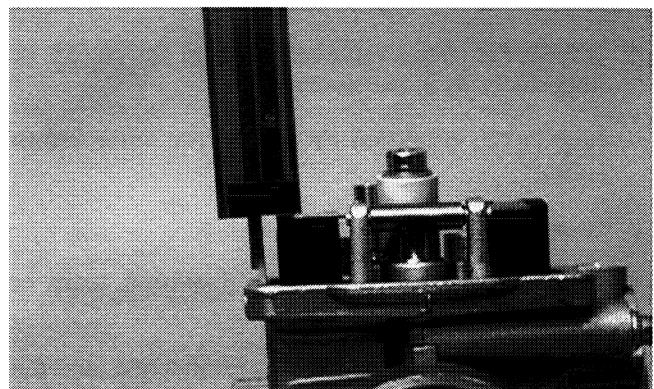


CH032D

Float Arm Height

| | | |
|----------------|-------|---------|
| 250/300/500 cc | 13 mm | 0.5 in. |
| 400 cc | 14 mm | 0.6 in. |

Fig. 4-39



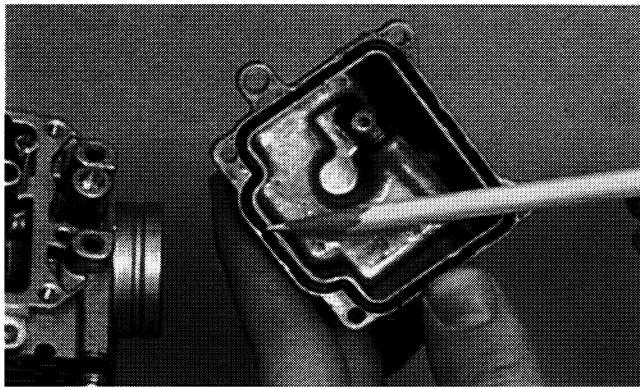
CH035D

■ NOTE: Turn the pilot screw clockwise until it is lightly seated; then turn it counterclockwise the recommended number of turns as an initial setting.

4. Place the needle valve and float into position and secure with the float pin.

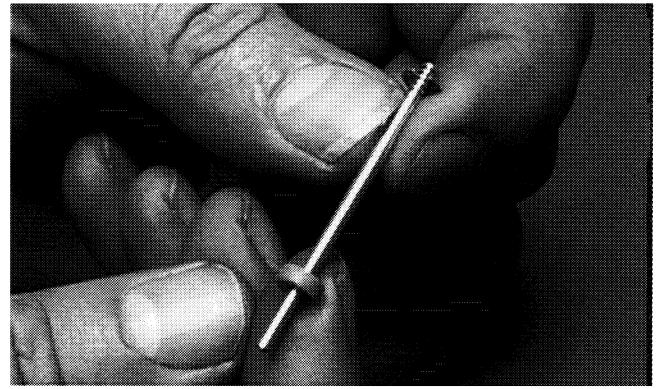
5. Place the float chamber into place making sure the O-ring is properly seated; then secure with the four Phillips-head screws. Note the position of the wire form.

Fig. 4-40



CH004D

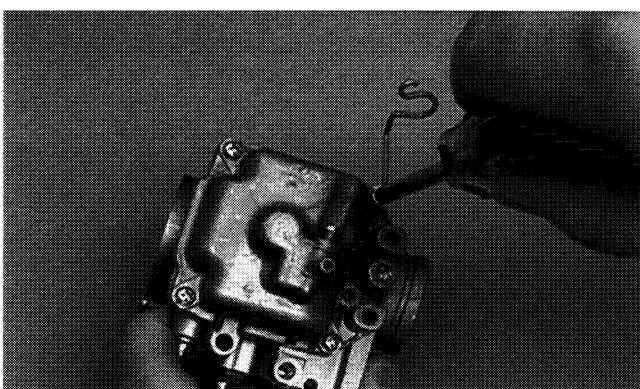
Fig. 4-43



CH108D

■ NOTE: There are five jet needle E-clip positions. The top position is number 1 and the bottom position is number 5.

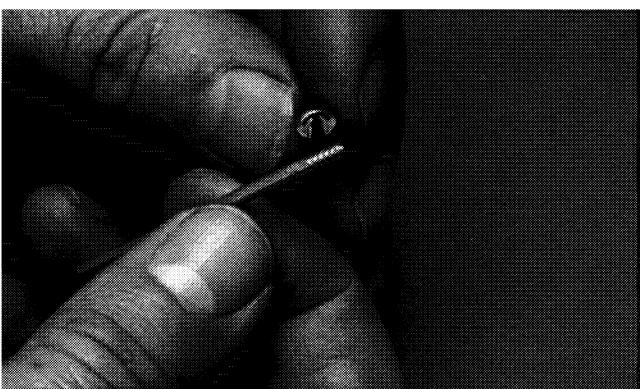
Fig. 4-41



CH002D

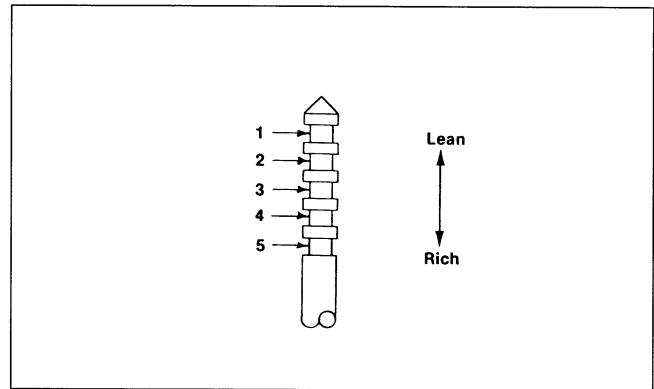
6. Install the idle RPM speed adjuster cable.
7. If the jet needle E-clip was removed, snap the E-clip into the proper groove at the top of the jet needle; then with the E-clip in position, slide the plastic washer up from the bottom of the jet needle and tight against the E-clip.

Fig. 4-42



CH107D

Fig. 4-44



0725-266

8. Insert the jet needle into the piston valve making sure it enters the center hole at the bottom. Place the plastic washer down on top of the jet needle making sure it sits flat with the end of the needle positioned in the center of the washer.

Fig. 4-45



CH109D

9. Push the diaphragm downward as identified in the following figure; then insert the piston valve into the carburetor body with the four dimples positioned toward the engine.

Fig. 4-46

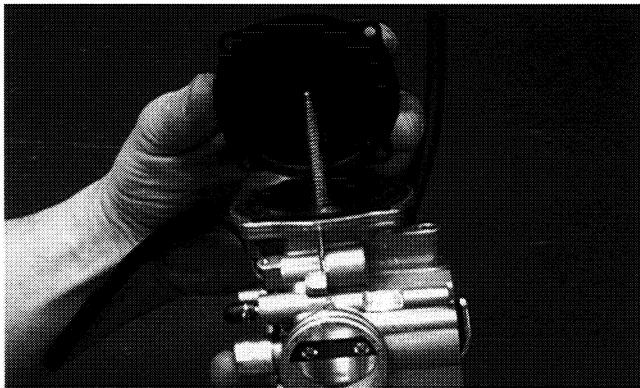


CH110D

10. Place the return spring and top cover into position and secure with four Phillips-head screws.

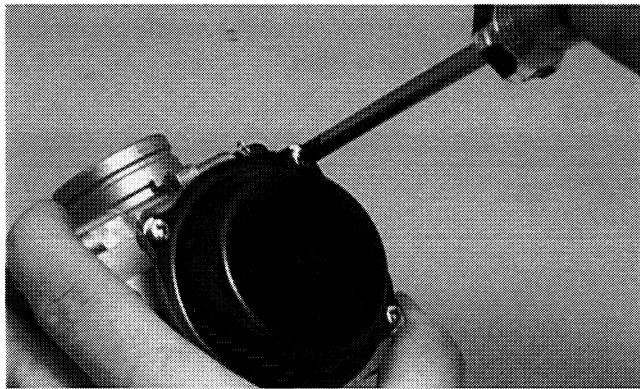
■ NOTE: The center post on the underside of the cover must be centered inside the spring.

Fig. 4-47



CH112D

Fig. 4-48



CH015D

INSTALLING (250/300 cc)

1. Place the carburetor into the two carburetor boots and tighten the flange clamps.

Fig. 4-49



CH049D

2. Place the throttle cable into the carburetor. Using a screwdriver, rotate the actuator arm to the full-up position; then using a needle-nose pliers, install the cable into the actuator arm drum.

Fig. 4-50



CH022D

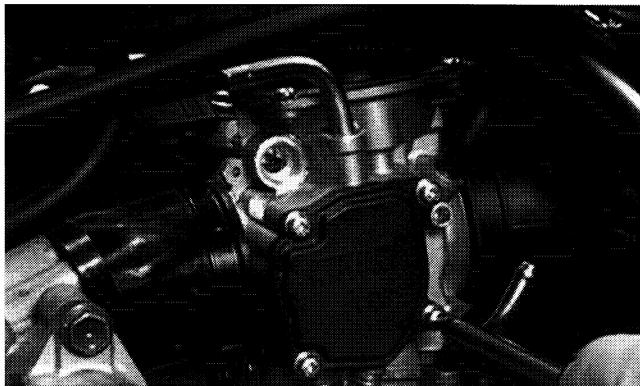
Fig. 4-51



CH023D

3. Place the throttle actuator cover into place and secure with the four Phillips-head screws (with washer and lock washer).

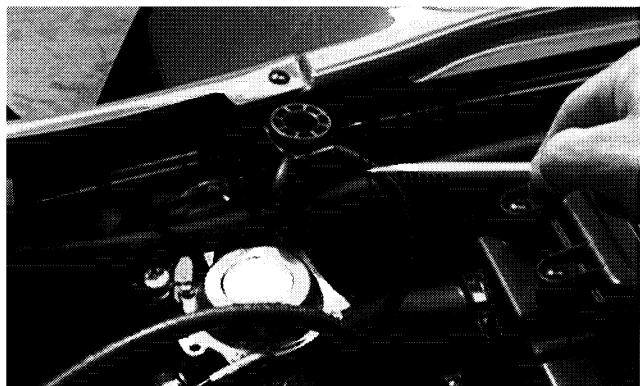
Fig. 4-52



CH021D

4. Route the two vent hoses through the slots in the frame.

Fig. 4-53



CH043D

5. Place the choke cable into position and install the choke cable housing.

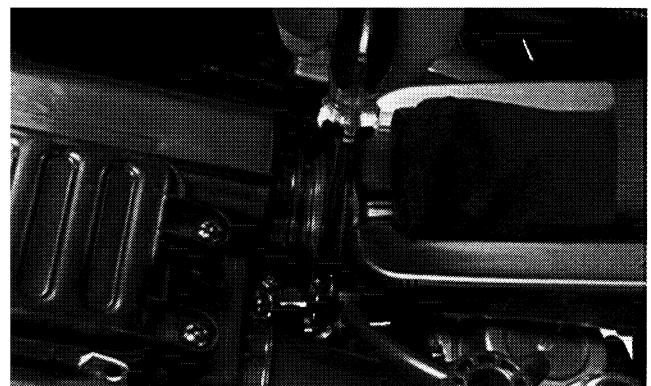
Fig. 4-54



CH042D

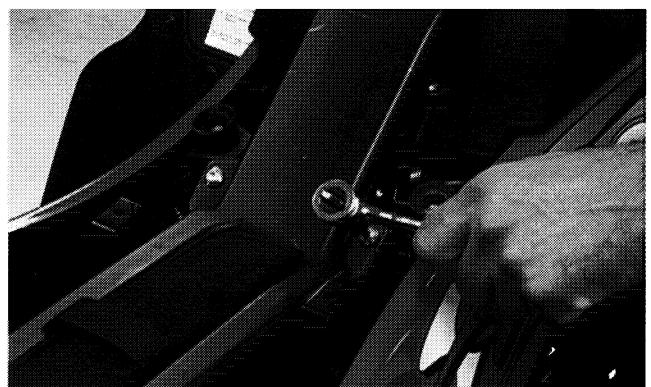
6. Secure the air-intake snorkel.

Fig. 4-55



CH041D

Fig. 4-56



CH040D

7. Connect the fuel supply hose to the carburetor; then turn the gas tank valve to ON. Check for leakage.

INSTALLING (400/500 cc)

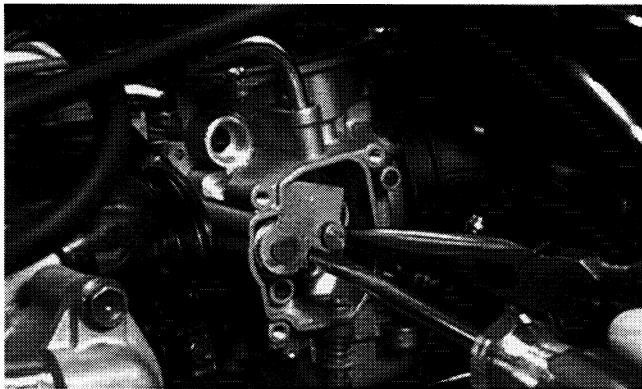
1. Place the carburetor into the two carburetor boots and tighten the flange clamps.
2. Place the throttle cable into the carburetor. Using a screwdriver, rotate the actuator arm to the full-up position; then using a needle-nose pliers, install the cable into the actuator arm drum.

Fig. 4-57



CH022D

Fig. 4-58



3. Place the throttle actuator cover into place and secure with the four Phillips-head screws (with washer and lock washer).

Fig. 4-59



4. Route the two vent hoses through the slots in the frame.
5. Place the choke cable into position and install the choke cable housing.

Fig. 4-60

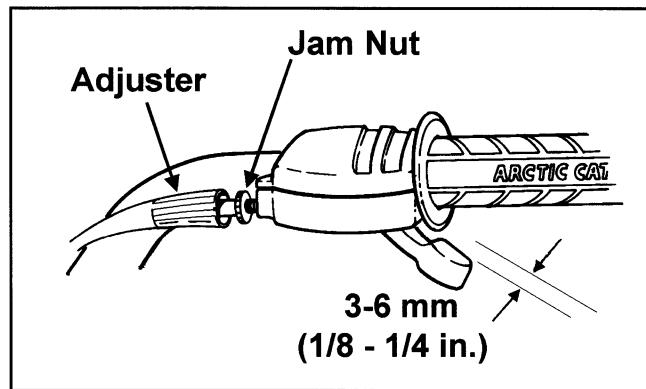


6. Connect the fuel supply hose to the carburetor; then turn the gas tank valve to ON. Check for leakage.

Throttle Cable Free-Play

1. Check throttle cable free-play at the lever; free-play should be 3-6 mm (1/8 - 1/4 in.).
2. To adjust, slide the rubber boot away from the adjuster located near the throttle lever. Loosen the jam nut and rotate the adjuster in the appropriate direction until proper free-play is attained. Tighten the jam nut against the adjuster; then slide the rubber boot over the adjuster.

Fig. 4-61



Engine RPM (Idle)

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

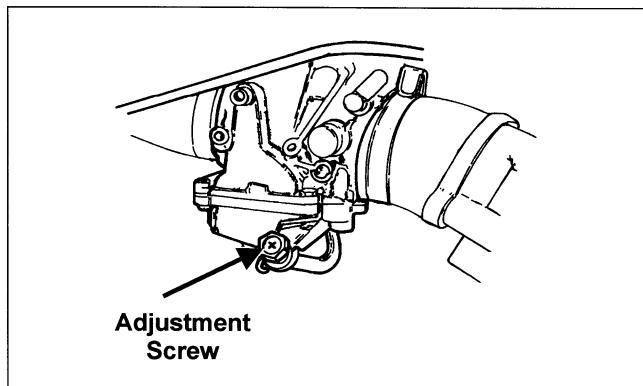
To adjust idle RPM, use the following procedure.

1. Start the engine and warm it up to operating temperature.
2. Turn the idle adjustment screw (located at the right side of the carburetor) clockwise or counter-clockwise until the engine idles at 1400-1600 RPM (250/300/400 cc) or 1200-1350 RPM (500 cc).

WARNING

Adjust the idle to the correct RPM. Make sure the engine is fully warm before adjusting the idle RPM.

Fig. 4-62



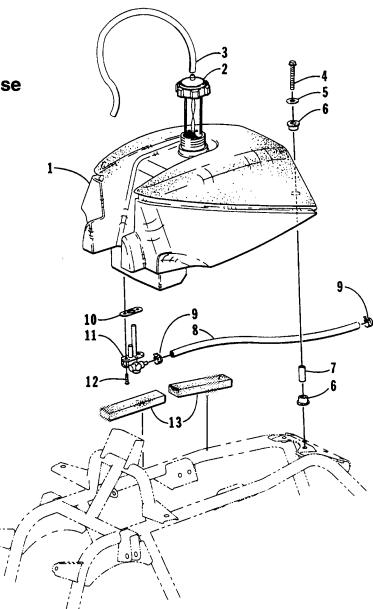
ATV-0071

Gas Tank

Fig. 4-63

KEY

1. Gas Tank
2. Gas Tank Cap
3. Gas Cap Vent Hose
4. Cap Screw
5. Washer
6. Bushing
7. Collar
8. Hose
9. Hose Clamp
10. Gasket
11. Gas Tank Valve
12. Cap Screw
13. Gas Tank Pad



0732-346

4

WARNING

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

REMOVING

1. Turn the gas tank valve to the OFF position.
2. Remove the seat.
3. Remove the air-intake snorkel (250/300 cc) or the air cleaner housing cover (400/500 cc).

Fig. 4-64



CH040DA

Fig. 4-65

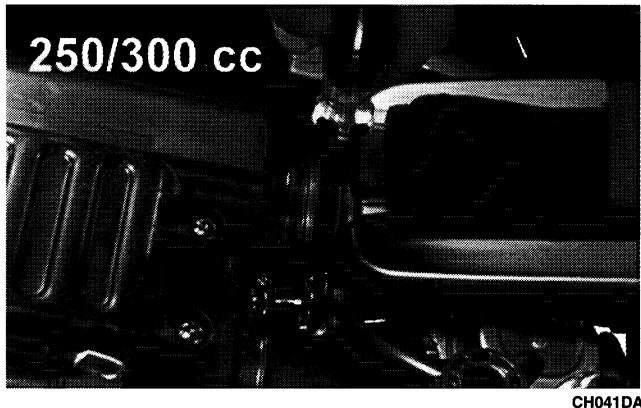
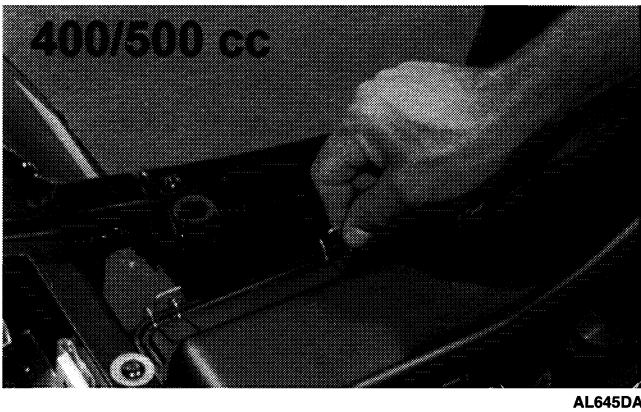


Fig. 4-66



4. Disconnect the hose from the carburetor to the gas tank at the tank connection.
5. Cut the tie-down securing the fuel hose to the cables and hoses.
6. Remove the torx-head screws (250/300 cc) or the two cap screws (400/500 cc) securing the gas tank to the frame. Account for two sleeves and two washers.

Fig. 4-67

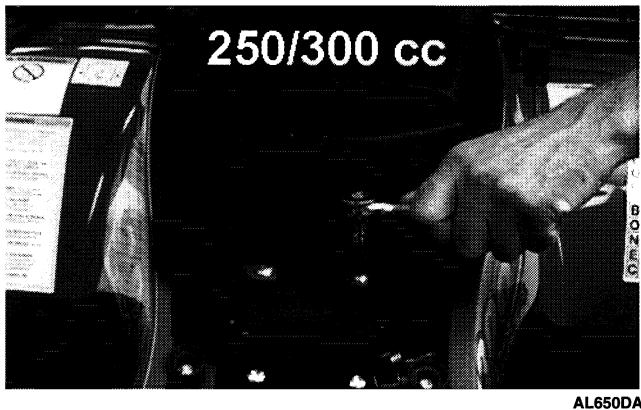
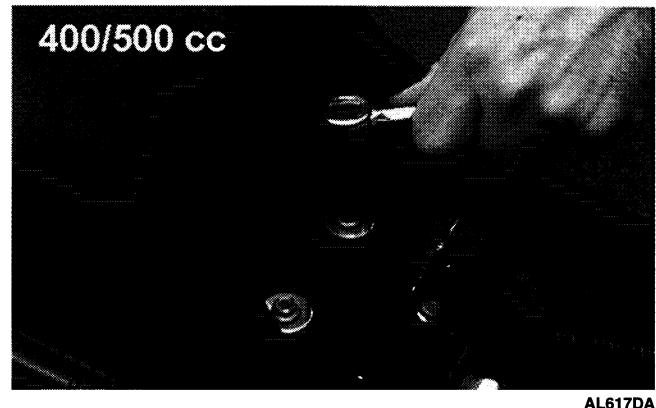


Fig. 4-68



7. Remove the vent hose; then remove the gas tank.

CLEANING AND INSPECTING

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

1. Clean all gas tank components with parts-cleaning solvent.
2. Inspect all hoses for cracks or leaks.
3. Inspect gas tank valve, tank cap, and tank for leaks, holes, and damaged threads.
4. Inspect the gas gauge for proper operation.

INSTALLING

1. Place the gas tank into position on the frame; then install the torx-head screws (250/300 cc) or the two cap screws (400/500 cc), sleeves, and washers. Tighten to 1.7 kg-m (12 ft-lb).
2. Connect the fuel hose from the carburetor; then secure hose to cables and hoses with a cable tie.
3. Install the air-intake snorkel (250/300 cc) or the air cleaner housing cover (400/500 cc).
4. Install the vent hose; then fill the gas tank with gasoline.
5. Turn the gas tank valve to the ON position and inspect for leakage.
6. Install the seat.

Gas Tank Valve

This ATV has a valve incorporated into the bottom of the gas tank. There are three positions: ON, RES, and OFF.

Fig. 4-69

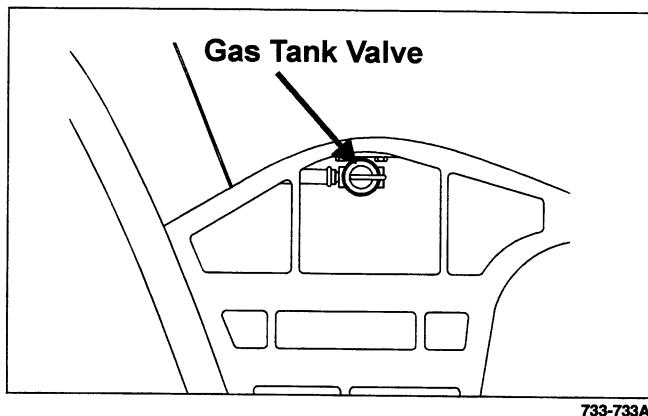
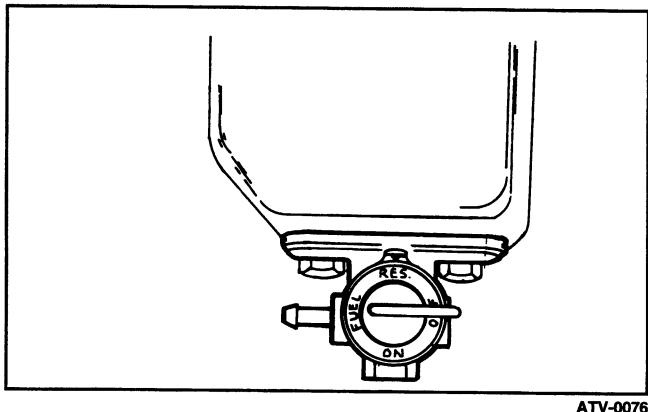


Fig. 4-70



In the OFF position, the valve will not allow gasoline to flow to the carburetor. In the ON position (the normal operating position), gasoline will flow from the tank to the carburetor. In this position, 4.6 l (1.2 U.S. gal.) on the 250/300 cc or 2.6 l (0.7 U.S. gal.) on the 400/500 cc will remain in the tank as a reserve quantity. Moving the valve to the RES position will allow the operator to use the remaining gasoline in the tank. When turning the valve to any of the three positions, be sure the indicator is pointed directly at the position desired.

REMOVING/INSPECTING

1. Remove the gas hose from the valve by releasing the spring clamp.
2. Remove the two screws securing the valve; then remove the valve. Account for the gasket.
3. Inspect the gasket and valve/tank mating surfaces for damage or deterioration.
4. Inspect for and remove any obstructions in the valve.

INSTALLING

1. Place the valve and gasket into position on the tank and secure with the screws.
2. Install the gas hose onto the valve with the spring clamp.

WARNING

Never leave the valve in the ON or RES position when the engine is not running.

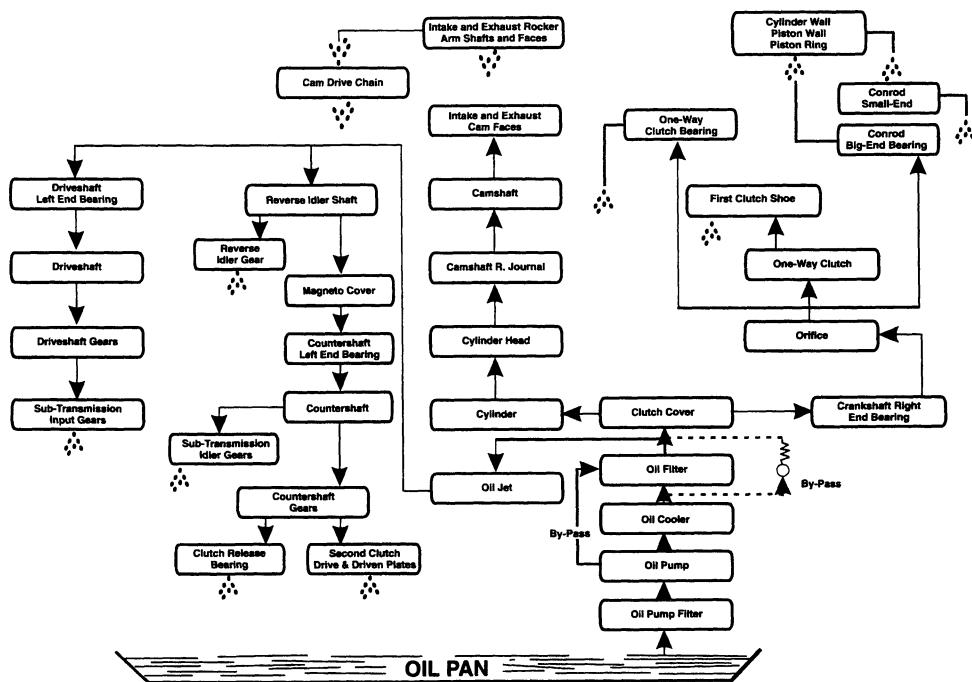
Gas/Vent Hoses

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

Oil Flow Charts

Fig. 4-71

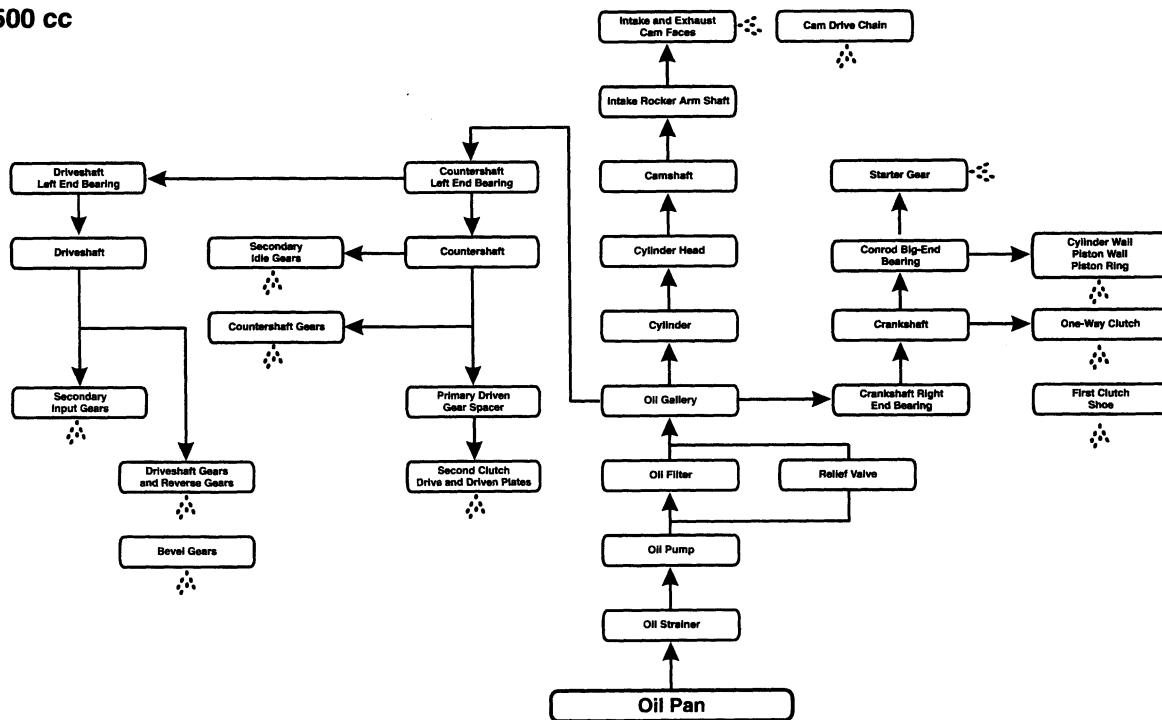
250/300 cc



ATV-0111

Fig. 4-72

400/500 cc



ATV-0106

Oil Pump

■ NOTE: Whenever internal engine components wear excessively or break and whenever oil is contaminated, the oil pump should be disassembled, cleaned and inspected, and serviced as necessary.

Fig. 4-73

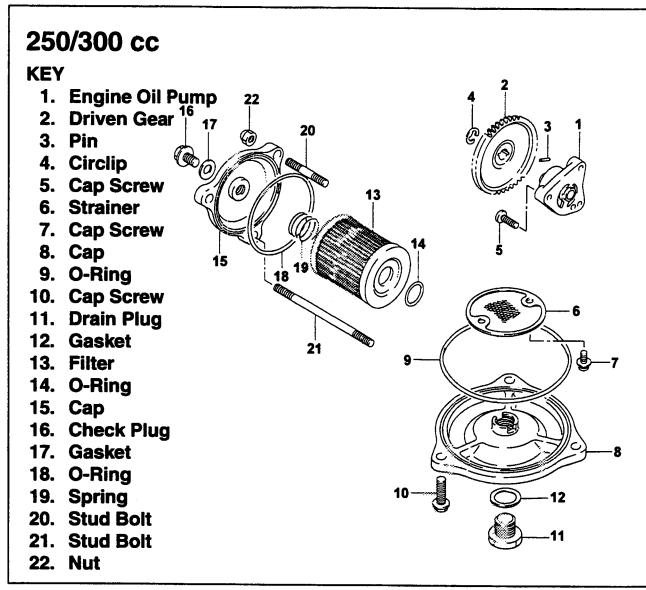
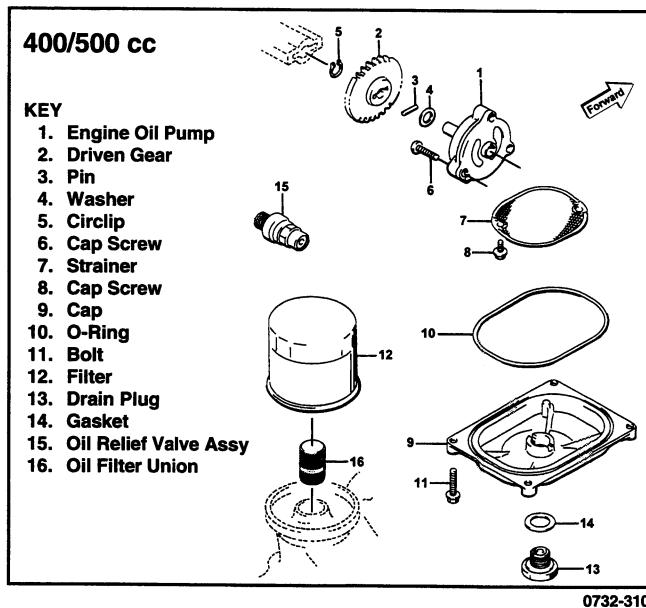


Fig. 4-74



REMOVING/DISASSEMBLING

1. Remove the oil pump from the engine (see Right-Side Components in Section 3).
2. Remove the Phillips-head screw on the back side of the pump and separate the pump housing and cover. Note the position of the inner and outer rotors and alignment pin for assembly.
3. Remove oil pump components.

CLEANING AND INSPECTING

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

1. Clean all oil-pump components.
2. Inspect the rotors for scoring and gouges.
3. Inspect the alignment pin for damage.
4. Inspect the pump housing and cover for cracks or damage.

4

ASSEMBLING/INSTALLING

1. Place the rotors into the pump housing making sure the alignment pin is in the groove of the rotor.
2. Place the cover onto the pump housing.
3. Secure the pump with the Phillips-head screw coated with Red Loctite #271.
4. Install the oil pump into the engine (see Right-Side Components in Section 3).

Testing Oil Pump Pressure

■ NOTE: The engine must be warmed up to operating temperature for this test.

1. Connect the Arctic Cat Engine Tachometer (p/n 0644-275) to the engine.
2. Connect the Oil Pressure Gauge (p/n 0444-039) to the oil filter drain plug.

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

3. Start the engine and run at 3000 RPM.
4. The oil pressure gauge must read as specified.

| |
|--------------------------------|
| 250/300 cc |
| OIL PRESSURE @ 3000 RPM |
| 0.7-2.8 kg/cm ² |
| (10-40 psi) |

| |
|--------------------------------|
| 400/500 cc |
| OIL PRESSURE @ 3000 RPM |
| 1.3-1.7 kg/cm ² |
| (18-24 psi) |

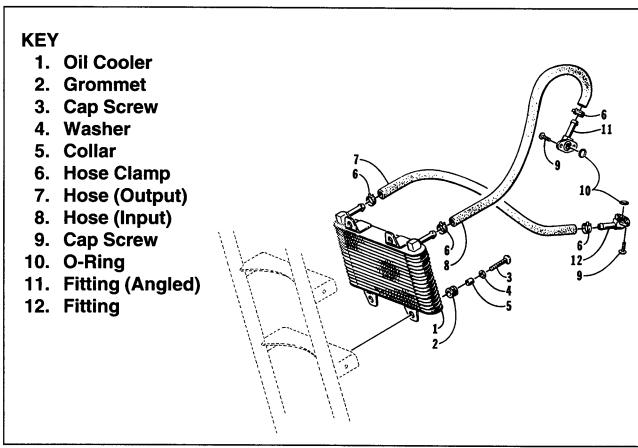
Oil Temperature-60°C (140°F)

■ NOTE: If the oil pressure is lower than specified, check for an oil leak, damaged oil seal, or a defective oil pump.

■ NOTE: If the oil pressure is higher than specified, check for too heavy engine oil weight (see Section 2), clogged oil passage, clogged oil filter, or improper installation of the oil filter.

Oil Cooler (250/300 cc)

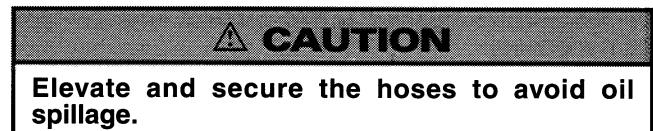
Fig. 4-75



REMOVING

■ NOTE: It is not necessary to drain the engine oil for this procedure.

1. Remove the input and output hoses from the fittings on the cooler.



2. Remove the torx-head screws securing the oil cooler to the frame. Account for grommets, collars, and washers.

Fig. 4-76

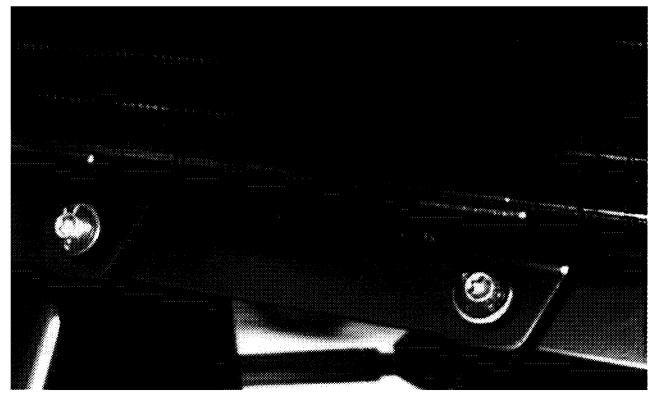


3. Remove the oil cooler from the frame.

INSTALLING

1. Place the collar into position in the frame.
2. Secure the cooler to the frame with the torx-head screws, washers, collars, and spacers.

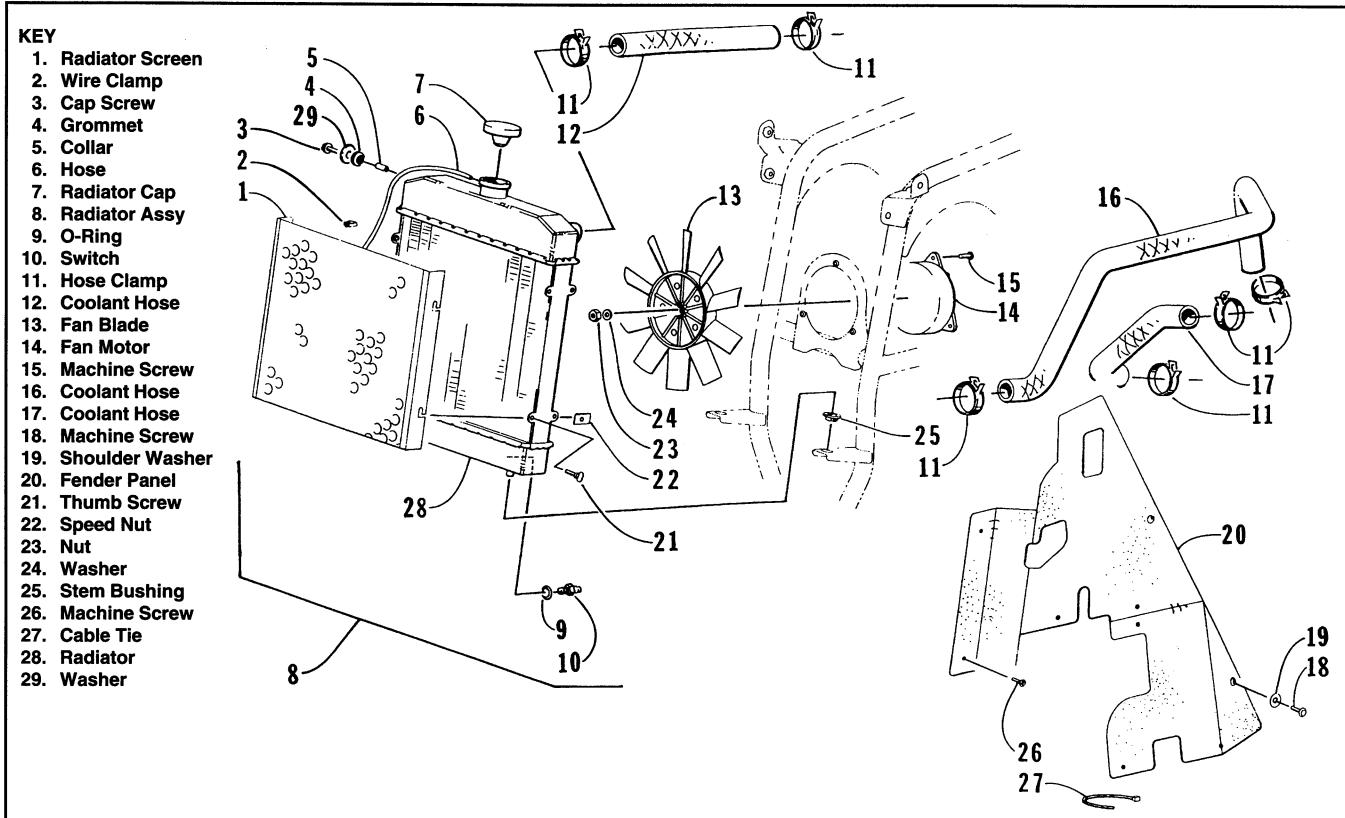
Fig. 4-77



3. Install the hoses onto their respective fittings and secure with the clamps.

Cooling System (400/500 cc)

Fig. 4-78



0733-422

4

The ATV is equipped with a liquid cooling system for engine cooling. 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 1/2 in. above the radiator core.

Fig. 4-79

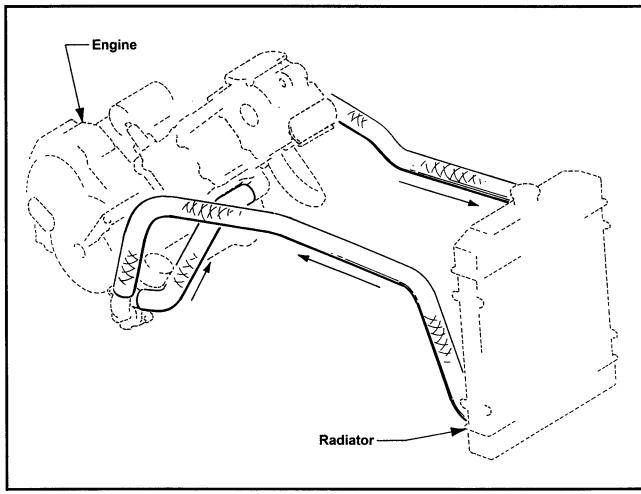


AN604D

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.

Fig. 4-80

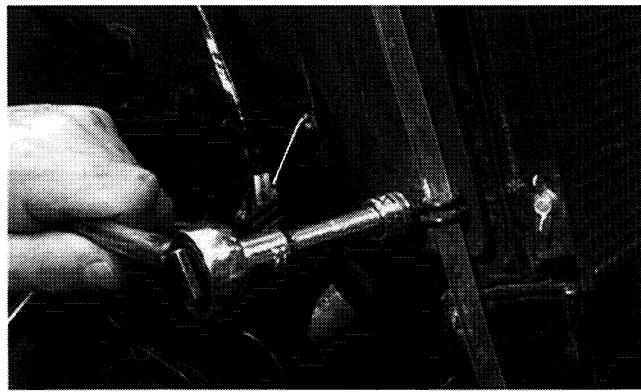


0732-411

REMOVING RADIATOR

1. Drain the coolant at the engine.
2. Remove the front rack (see Section 8).
3. Remove the front fenders (see Section 8).
4. Remove the four machine screws securing the fender panels to the radiator.

Fig. 4-81



AF622D

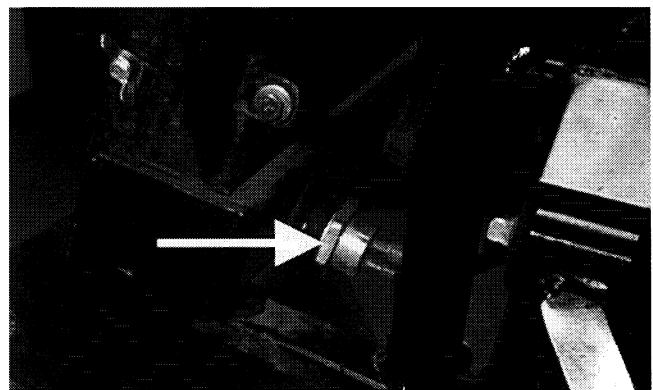
5. Remove the upper and lower coolant hoses; then disconnect the fan temperature switch leads.

Fig. 4-82



AF734D

Fig. 4-83



AF731D

6. Remove the two cap screws securing the radiator to the frame.
7. Remove the radiator and account for the two grommets with collar inserts.

■ **NOTE:** If the fan switch is to be removed, the threads are standard right-hand threads.

CLEANING AND INSPECTING

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

1. Flush the radiator with water to remove any contaminants.
2. Inspect the radiator for leaks and damage.
3. Inspect all hoses for cracks and deterioration.
4. Inspect all fasteners and grommets for damage or wear.

INSTALLING RADIATOR

■ **NOTE:** If the fan switch was removed, apply teflon tape to the threads; then install the switch and tighten securely.

1. Place the radiator with grommets and collar inserts into position on the frame; then install the two cap screws. Tighten securely.
2. Connect the fan temperature switch leads; then install the upper and lower coolant hoses. Secure with hose clamps.

Fig. 4-84

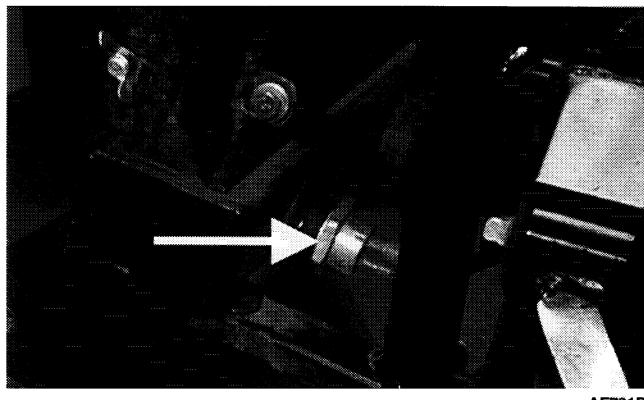
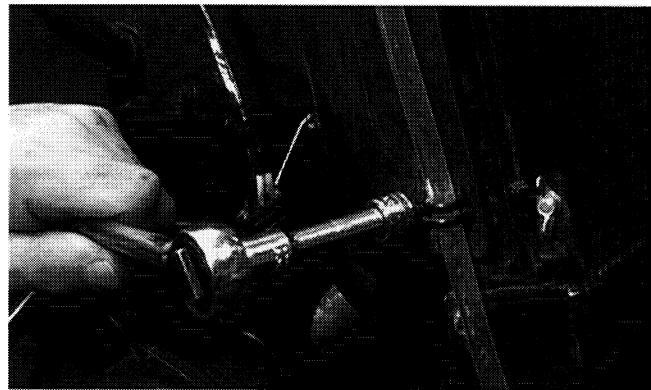


Fig. 4-85



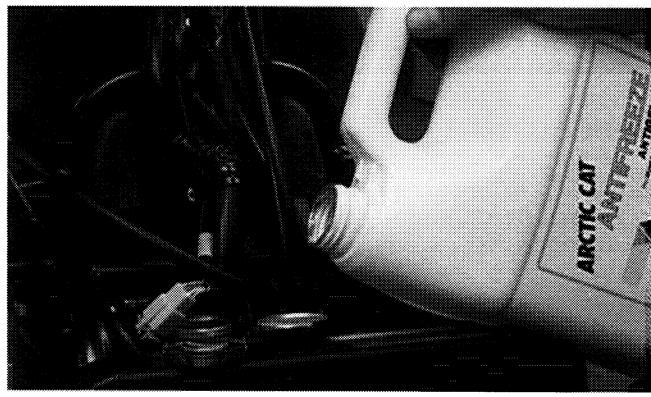
3. Place the fender panels into position on the radiator; then install the four machine screws and tighten to 0.7 kg-m (5 ft-lb).

Fig. 4-86



4. Install the front fenders (see Section 8).
5. Install the front rack (see Section 8).
6. Fill the cooling system (2.9 l or 3 U.S. qt) with antifreeze. Check for leakage.

Fig. 4-87

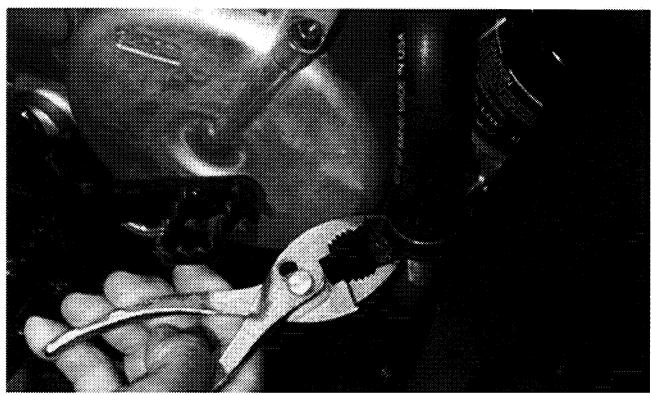


4

REMOVING HOSES/THERMOSTAT

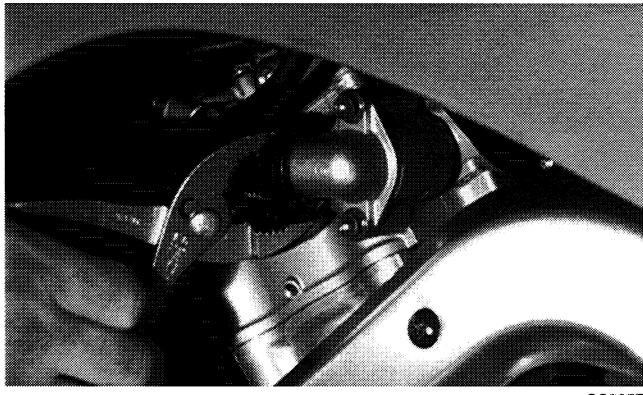
1. Drain the coolant from the cooling system.
2. Remove the hose clamps securing the lower coolant hose to the water pump housing and to the radiator; then remove the lower hose.

Fig. 4-88



3. Remove the clamps securing the upper coolant hose to the thermostat housing and to the radiator; then remove the upper hose.

Fig. 4-89



CC335D

4. Remove the clamps securing the crossover coolant hose to the water pump and to the engine water inlet.
5. Remove the two cap screws securing the thermostat housing to the cylinder head. Account for an O-ring and a thermostat.

INSPECTING

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

1. Inspect the thermostat for corrosion, wear, or spring damage.
2. Using the following procedure, inspect the thermostat for proper operation.
 - A. Suspend the thermostat in a container filled with water.
 - B. Heat the water and monitor the temperature with a thermometer.
 - C. The thermostat should start to open at 48.5-51.5°C (119.3-124°F).
 - D. If the thermostat does not open, it must be replaced.
3. Inspect all coolant hoses, connections, and clamps for deterioration, cracks, and wear.

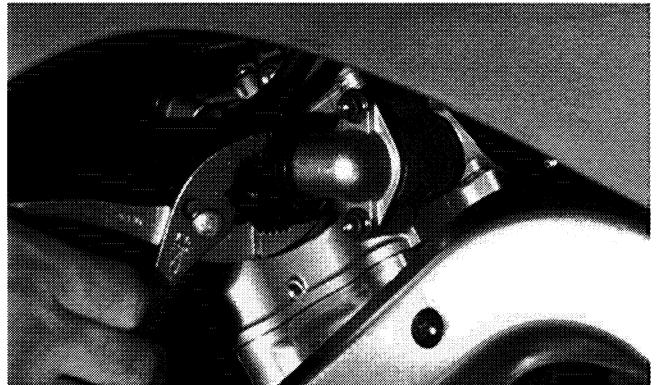
■NOTE: All coolant hoses and clamps should be replaced every four years or 4000 miles.

INSTALLING HOSES/THERMOSTAT

1. Place the thermostat and O-ring into the thermostat housing; then secure the thermostat housing to the cylinder head with the two cap screws.

2. Install the crossover coolant hose onto the water pump and engine water inlet. Secure with the two hose clamps.
3. Slide the upper hose onto the thermostat housing and radiator. Secure with the two hose clamps.

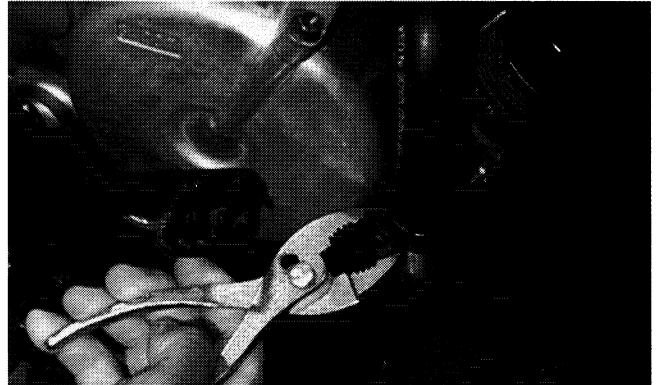
Fig. 4-90



CC335D

4. Install the lower coolant hose onto the water pump housing and radiator. Secure with the two hose clamps.

Fig. 4-91



CC334D

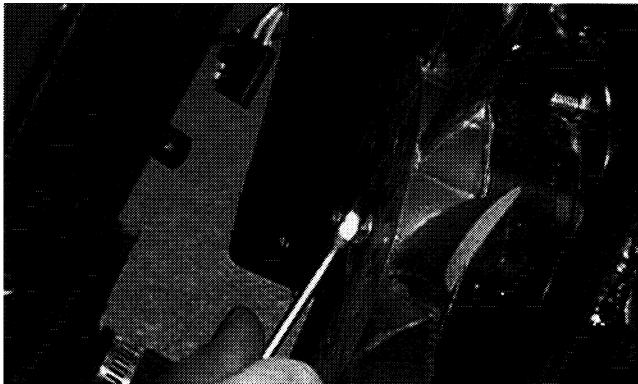
5. Fill the cooling system (2.9 l or 3 U.S. qt) with antifreeze. Check for leakage.

REMOVING FAN

■NOTE: It is not necessary to drain the cooling system or to remove any coolant hoses for this procedure.

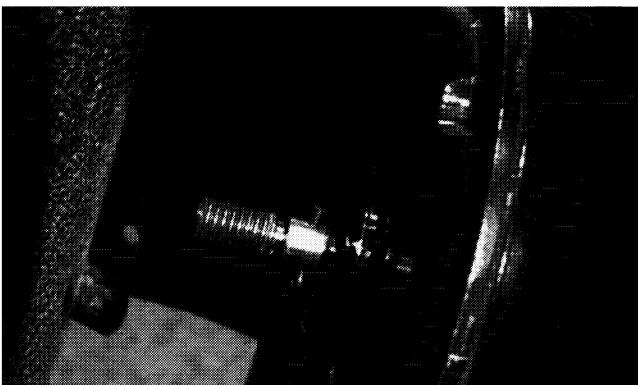
1. Remove the left-hand-threaded nut and washer securing the fan blade to the fan motor. Account for a shaft pin.

Fig. 4-92



AF642D

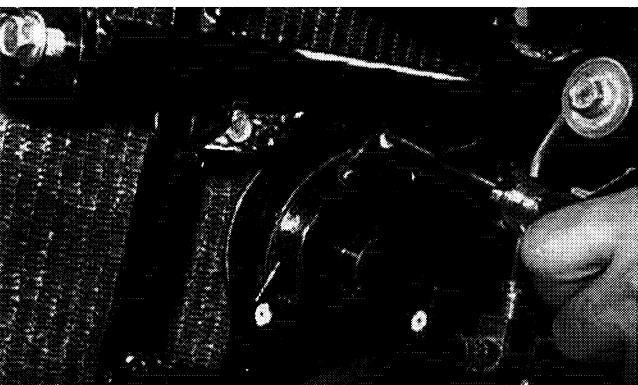
Fig. 4-93



AF641D

2. Remove the three machine screws securing the fan motor to the frame; then disconnect the wiring harness.

Fig. 4-94



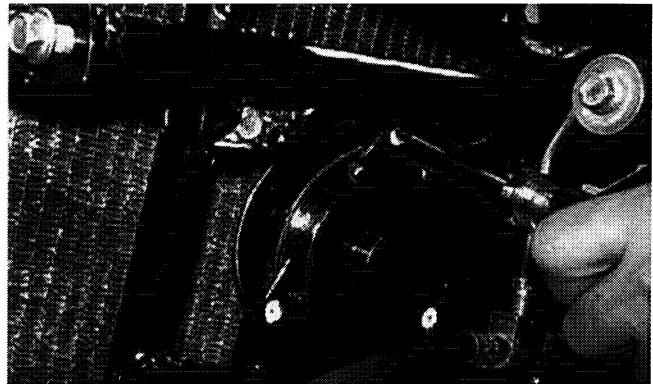
AF640D

3. Slide the fan motor rearward out of the frame.

INSTALLING FAN

1. Place the fan motor into position in the frame; then connect the wiring harness.
2. Secure the fan motor to the frame with the three machine screws.

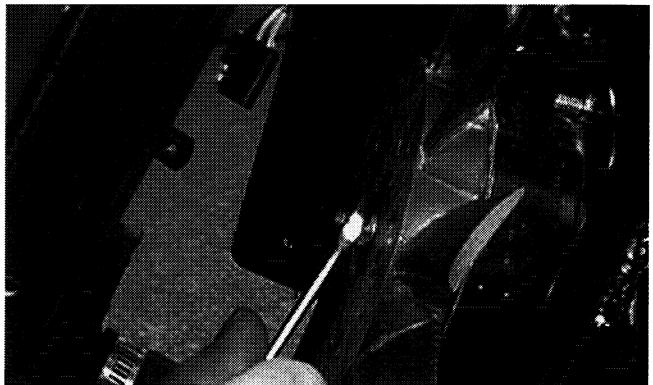
Fig. 4-95



AF640D

3. Place the fan blade with shaft pin onto the motor and secure with the left-hand-threaded nut (threads coated with blue Loctite #242) and washer. Tighten to 0.3 kg-m (2 ft-lb).

Fig. 4-96

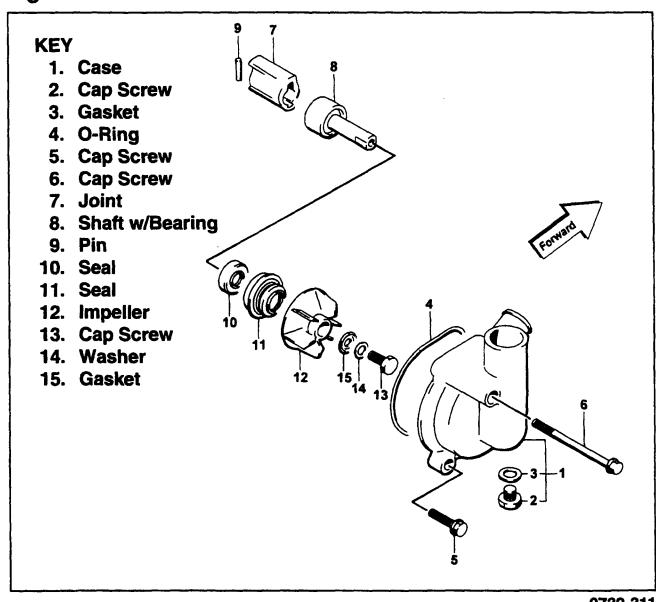


AF642D

4

REMOVING/DISASSEMBLING WATER PUMP

Fig. 4-97



1. Drain the coolant.
2. Remove the three cap screws securing the water pump case. Note the position of the long cap screw and account for the O-ring.
3. Remove the impeller cap screw, washer, and gasket.
4. Remove the mechanical seal using this procedure.
 - A. Tap the tip of a small sheet metal screw into the inner-metal edge of the seal.
 - B. Grip the screw with a pair of vise-grip pliers and pull the seal out. Account for the drive seal.

CLEANING AND INSPECTING

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

1. Clean all pump components in solvent.
2. Inspect the mechanical seal and drive seal for damage.
- **NOTE:** If the mechanical seal and/or drive seal are damaged, they must be replaced as a set.
3. Inspect the impeller for corrosion or damage.

ASSEMBLING/INSTALLING WATER PUMP

■ **NOTE:** Treat seals and O-rings with clean antifreeze for initial lubrication.

1. Press the mechanical seal with drive seal into the impeller by hand.
2. Install the mechanical seal assembly onto the water pump shaft and secure with the cap screw, washer, and gasket. Tighten the cap screw to 1.05 kg-m (7.5 ft-lb).
3. Place the water pump case into position and secure with the three cap screws. Note the position of the long cap screw from removal.
4. Fill the cooling system (2.9 l or 3 U.S. qt) with antifreeze.
- **NOTE:** While the cooling system is being filled, air pockets may develop; therefore, run the engine for five minutes after the initial fill, shut the engine off, and then fill the cooling system to 1/2 in. above the radiator core.
5. Check the entire cooling system for leakage.

SECTION 5 - ELECTRICAL SYSTEM

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Specifications

| 250 cc | |
|--|--|
| IGNITION | |
| Ignition Timing | 5° BTDC @ 1800 RPM 35° 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) | 0.1-0.5 ohm (terminal to ground) 5200-7800 ohms (high tension - plug cap removed - to ground) |
| MAGNETO | |
| Magneto Coil Resistance (trigger) (charging) | 90-140 ohms (Black/Yellow to Green/White) 0.1-1.0 ohm (Yellow to Yellow) |
| Magneto Output | 220W @ 5000 RPM |

| 300 cc | |
|--|--|
| IGNITION | |
| 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) | 0.1-0.5 ohm (terminal to ground) 5200-7800 ohms (high tension - plug cap removed - to ground) |
| MAGNETO | |
| Magneto Coil Resistance (trigger) (charging) | 90-140 ohms (Black/Yellow to Green/White) 0.1-1.0 ohm (Yellow to Yellow) |
| Magneto Output | 220W @ 5000 RPM |

| 400/500 cc | |
|-----------------|--|
| IGNITION | |
| Ignition Timing | 10° BTDC @ 1800 RPM 30° BTDC @ 3800 RPM |
| Spark Plug Type | NGK CR8E NGK CR7E* |
| Spark Plug Gap | 0.7-0.8 mm (0.028-0.032 in.) |
| Spark Plug Cap | 8000-12,000 ohms |

IGNITION (cont)

| Ignition Coil Resistance (400 cc) (primary) (secondary) | 0.1-1.0 ohm (terminal to ground) 12,000-30,000 ohms (high tension - plug cap removed - to ground) |
|---|---|
| Ignition Coil Resistance (500 cc) (primary) (secondary) | 0.1-0.8 ohm (terminal to ground) 10,000-15,000 ohms (high tension - plug cap removed - to ground) |
| MAGNETO | |
| Magneto Coil Resistance (Trigger) (Source/Charge) (Charging) | 150-300 ohms (Green to Blue) 170-250 ohms* (Green to Blue) 0.05-1.0 ohm (Yellow to White) 0.1-1.0 ohm (Black to Black) |
| Magneto Output | 340W @ 5000 RPM 325W @ 5000 RPM* |

*500 cc

Battery

WARNING

Anytime service is performed on a battery, the following must be observed: keep sparks, open flame, cigarettes, or any other flame away. Always wear safety glasses. Protect skin and clothing when handling a battery. When servicing battery in enclosed space, keep the area well-ventilated. Make sure venting tube of battery is always open once battery is filled with electrolyte.

1. Remove the battery from the ATV.

WARNING

Remove the negative cable first; then remove the positive cable.

■ NOTE: On the 400/500 cc, the seat assembly must be removed.

CAUTION

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

2. Remove the vent plugs; then fill the battery with electrolyte to the **UPPER** level indicated on the battery.

■ **NOTE:** Electrolyte should be at room temperature before filling. Do not use water or any other liquid to activate a battery.

⚠ WARNING

Electrolyte is a sulfuric acid solution. Avoid spillage and contact with skin, eyes, and clothing.

3. Allow the battery to stand for 15-30 minutes after filling. Electrolyte level may fall during this time. Refill with electrolyte to **UPPER** level line.
4. Trickle-charge the battery at 1.4 amps for 8-10 hours.
5. After charging, check electrolyte level and fill with **DISTILLED WATER** as necessary; then install the vent plugs. Wash off acid spillage with water and dry the battery.

⚠ CAUTION

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

6. Place the battery into position in the ATV and secure.
7. Connect cables to the proper terminals: positive cable to the positive terminal (+) and negative cable to the negative terminal (-). Connect the negative cable last.

⚠ CAUTION

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

8. Check the vent tube to make sure it is not pinched or obstructed in any way and that it is properly routed down through the frame.

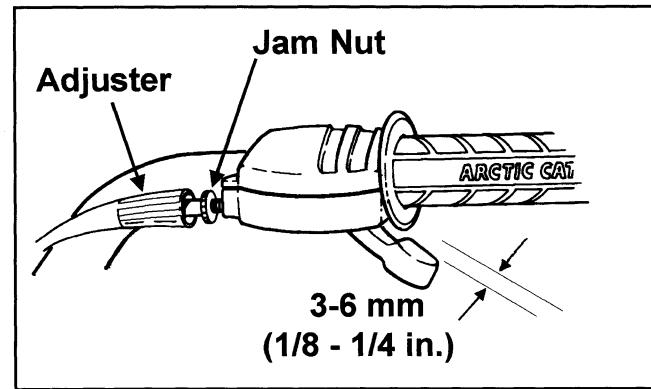
RPM Limiter

The ATV has an RPM limiter system to limit the engine RPM. One way to eliminate the activation of the RPM limiter is to utilize the throttle limiter screw at the throttle lever.

■ **NOTE:** This ATV is equipped with a CDI unit that retards ignition timing when maximum RPM is approached. When the RPM limiter is activated, it could be misinterpreted as a high-speed misfire.

1. Ensure that the throttle cable is adjusted correctly at 3-6 mm (1/8-1/4 in.) free-play at the lever.

Fig. 5-1

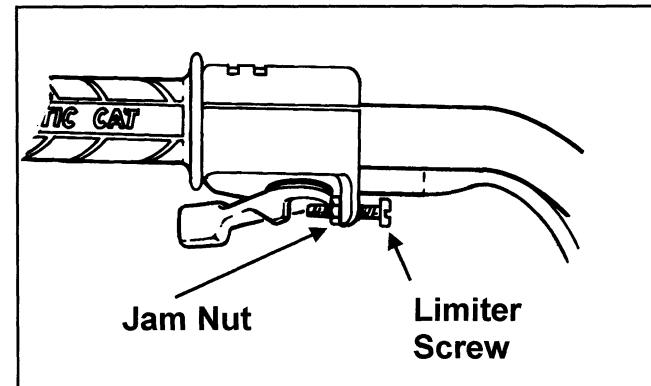


ATV-0047

5

2. Loosen the jam nut of the limiter screw and rotate the screw clockwise until RPM is limited to under 9000 RPM (250/300 cc) or under 8300 RPM (400/500 cc); then tighten the jam nut.

Fig. 5-2



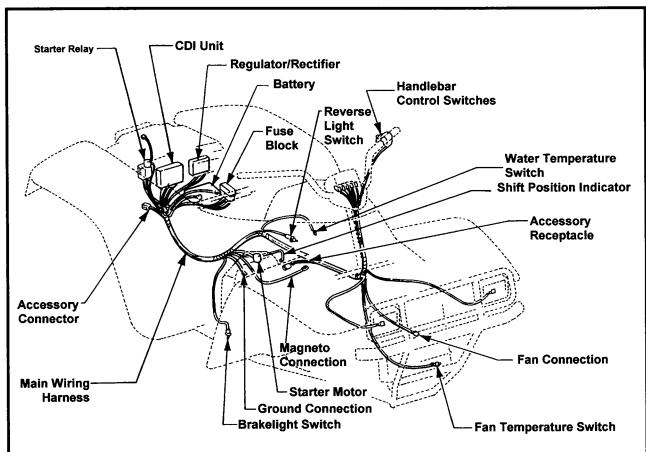
ATV-0053

Testing Electrical Components

All of the electrical tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191). If any other type of meter is used, readings may vary due to internal circuitry. When troubleshooting a specific component, always verify first that the fuse(s) are good, that the bulb(s) are good, that the connections are clean and tight, that the battery is fully charged, and that all appropriate switches are activated.

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

Fig. 5-3



0732-410

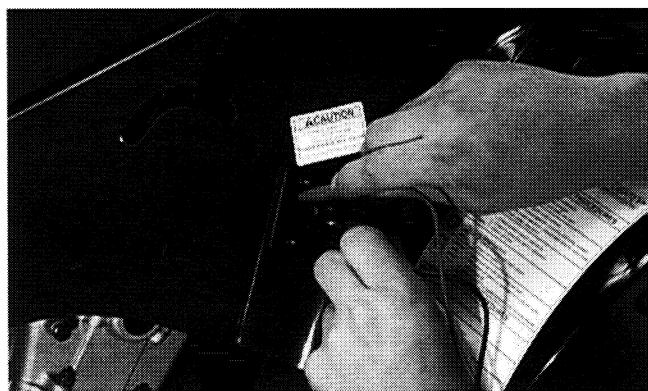
Accessory Receptacle/Connector (400/500 cc)

■ NOTE: This test procedure is for either the receptacle or the connector.

VOLTAGE

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the red/white wire or the positive connector; connect the black tester lead to ground.

Fig. 5-4



AR606D

3. The meter must show battery voltage.

■ NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, receptacle, connector, or the main wiring harness.

Brakelight Switch (Foot)

The switch connector is the two-prong connector on the right side of the engine directly above the brake cable adjuster.

■ NOTE: The ignition switch must be in the ON position.

VOLTAGE (Wiring Harness Side)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the orange wire; connect the black tester lead to ground.

Fig. 5-5



AR627D

3. The meter must show battery voltage.

■ NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, switch, or the main wiring harness.

■ NOTE: If the meter shows battery voltage, the main wiring harness is good; test the switch/component, the connector, and the switch wiring harness for resistance.

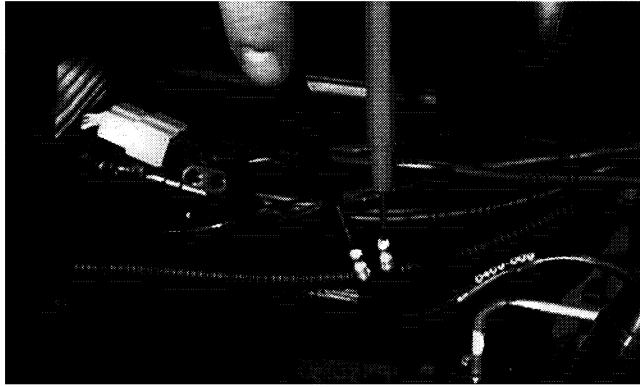
RESISTANCE (Brakelight Switch Connector)

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one black wire; connect the black tester lead to the other black wire.

Fig. 5-6



3. When the brake pedal is depressed, the meter must show less than 1 ohm.

■ NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Brakelight Switch (Handlebar Control)

The switch connector is the two-prong black connector in front of the steering post. To access the connector, the front rack and front fenders must be removed (see Section 8).

■ NOTE: The ignition switch must be in the ON position.

VOLTAGE (Wiring Harness Connector)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the orange wire; connect the black tester lead to ground.

Fig. 5-7



3. The meter must show battery voltage.

■ NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, switch, or the main wiring harness.

■ NOTE: If the meter shows battery voltage, the main wiring harness is good; test the switch/component, the connector, and the switch wiring harness for resistance.

RESISTANCE (Brakelight Switch Connector)

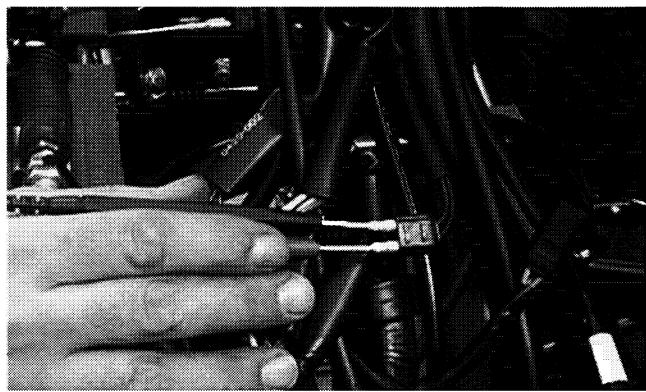
CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■ NOTE: The brake lever must be compressed for this test. Also, the ignition switch must be in the OFF position.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one black wire; connect the black tester lead to the other black wire.

Fig. 5-8



AR621D

3. When the lever is compressed, the meter must show less than 1 ohm.

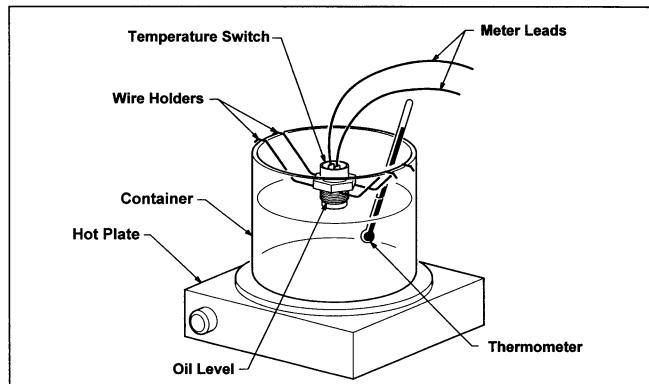
■ NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Oil Temperature Switch (250/300 cc)

1. Connect the meter leads (selector in the OHMS position) to the temperature switch contacts.
2. Suspend the temperature switch and a thermometer in a container of oil; then heat the oil.

■ NOTE: Neither the temperature switch nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend switch and thermometer.

Fig. 5-9



3. When the oil temperature reaches 160° C (320° F), the meter should read a closed circuit.
4. Allow the oil to cool, and when the temperature is at (or just before) a temperature of 140° C (284° F), the meter should read an open circuit.
5. If the readings are not as indicated, the temperature switch must be replaced.
6. Apply teflon tape to the threads of the switch; then install the switch and tighten securely.
7. Connect the temperature switch leads.

Fan Motor (400/500 cc)

To access the connector (located directly behind the fan), the front rack and front fenders must be removed (see Section 8).

■ NOTE: The ignition switch must be in the ON position.

VOLTAGE (Main Harness Connector to Fan Motor)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the black/red wire (the black 2-prong at the fan motor); connect the black tester lead to ground.
3. Remove the two spade terminals from the fan temperature switch (located on the lower left corner of the radiator); then using a "jumper wire," jump the spade wires together.
4. The meter must show battery voltage.

■ NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, motor, switches, or the main wiring harness.

■ NOTE: If the meter shows battery voltage, the main wiring harness is good. The connector and the switch wiring harness should be checked for resistance.

RESISTANCE (Fan Motor Connector)

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the blue wire; connect the black tester lead to the black wire.

Fig. 5-10



AR645D

3. The meter must show less than 1 ohm.

■ NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

■ NOTE: To determine if the fan motor is good, connect the blue wire from the fan connector to a 12 volt D.C. power supply; then connect the black wire from the fan connector to ground. The fan should operate.

CAUTION

Care should be taken to keep clear of the fan blades.

Fan Switch (400/500 cc)

The switch is located on the lower-left inside corner.

■ NOTE: The ignition switch must be in the ON position.

VOLTAGE (Wiring Harness Connections)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the red/black wire; connect the black tester lead to ground.
3. The meter must show battery voltage.

■ NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, switch, ignition switch, or the main wiring harness.

■ NOTE: If the meter shows battery voltage, the main wiring harness is good; test the switch/component, the connector, and the switch wiring harness for resistance.

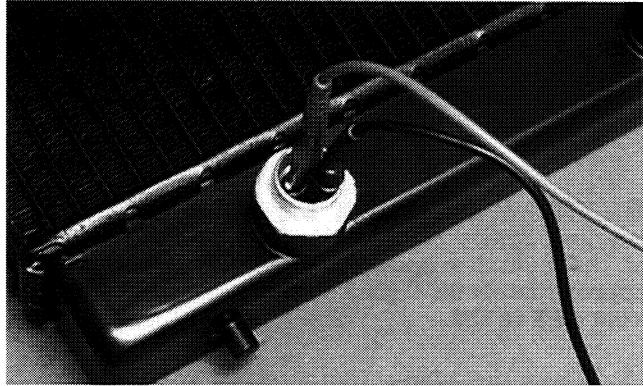
RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to either connector of the switch; connect the black tester lead to the other connector.

Fig. 5-11



AR646D

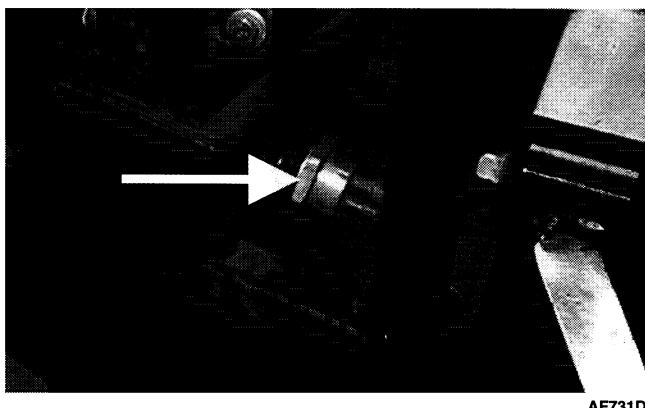
3. The meter must show an open circuit.

TESTING TEMPERATURE

1. With the coolant cold, drain the cooling system.
2. Disconnect the fan switch leads; then remove the switch.

■ NOTE: The threads on the fan switch are standard right-hand threads.

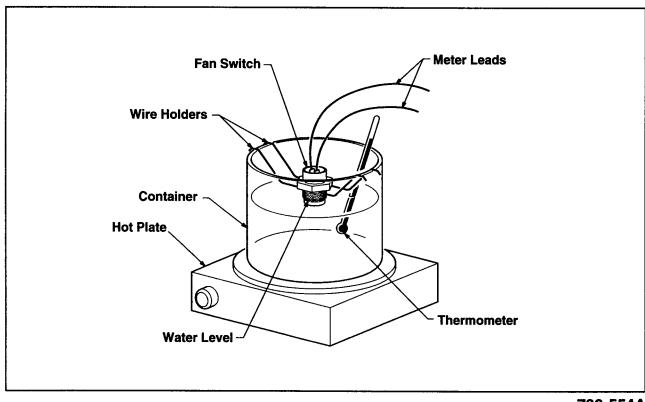
Fig. 5-12



3. Connect the meter leads (selector in the OHMS position) to the fan switch contacts.
4. Suspend the fan switch and a thermometer in a container of water; then heat the water.

■ NOTE: Neither the fan switch nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend switch and thermometer.

Fig. 5-13



■ NOTE: When testing the water temperature warning light switch (located on the left-hand side of the cylinder head), the temperature must be approximately 95°C (203°F) when the switch moves from OFF to ON.

5. When the water temperature reaches 90° C (194° F), the meter should read a closed circuit.

6. Allow the water to cool, and when the temperature is at (or just before) a temperature of 80° C (176° F), the meter should read an open circuit.

7. If the readings are not as indicated, the fan switch must be replaced.

8. Apply teflon tape to the threads of the switch; then install the switch and tighten securely.

9. Connect the fan switch leads.

10. Fill the cooling system according to specifications.

■ NOTE: While the cooling system is being filled, air pockets may develop; therefore, run the engine for five minutes after the initial fill, shut the engine off, and then fill the cooling system to 1/2 in. above the radiator core.

11. Check the entire cooling system for leaks.

Fuse Block

On the 250/300 cc, the fuse block is located under the front fender access panel. To access the fuse block, the panel must be removed from the fender.

On the 400/500 cc, the fuse block is located next to the battery under the seat. To access the fuse block, the seat must be removed.

■ NOTE: If all voltage is lost at the fuse block, check the condition of the fuses.

Fig. 5-14



■ NOTE: The ignition switch must be in the LIGHTS position.

1. Remove all fuses from the fuse box.
2. Set the meter selector to the D.C. Voltage position.
3. Connect the black tester lead to ground.

4. Using the red tester lead, contact each end of the fuse holder connector terminals individually.

Fig. 5-15

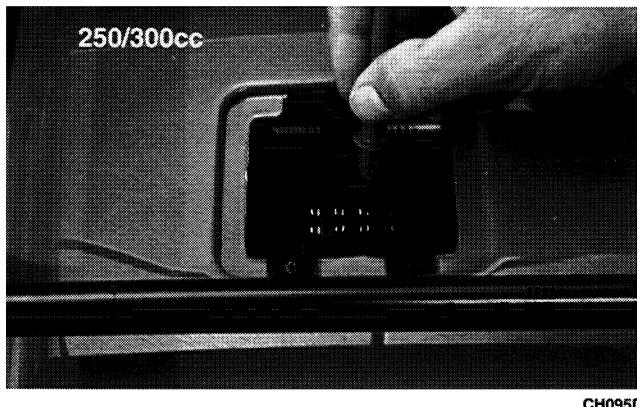
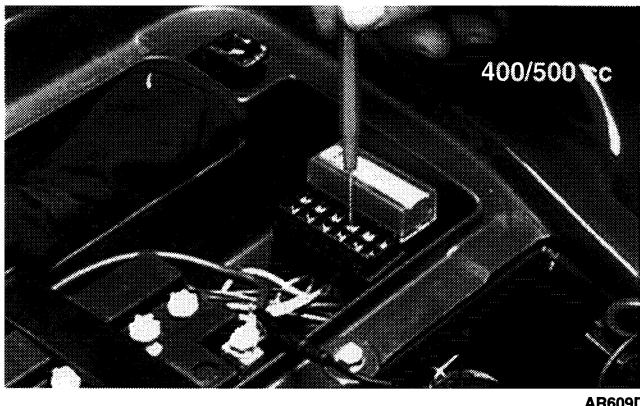


Fig. 5-16



5. The meter must show battery voltage from one side of the connector terminal ends.

■ NOTE: Battery voltage will be indicated from only one side of the fuse holder connector terminal; the other side will show an open circuit.

■ NOTE: When testing the HI fuse holder, the headlight dimmer switch must be in the HI position; when testing the LO fuse holder, the headlight dimmer switch must be in the LO position.

■ NOTE: On the 400/500 cc when testing the FAN fuse, the fan temperature switch must be bypassed. Disconnect the fan switch wires at the switch and connect them with a jumper wire.

■ NOTE: If the meter shows no battery voltage, troubleshoot the battery, switches, fuse block, or the main wiring harness.

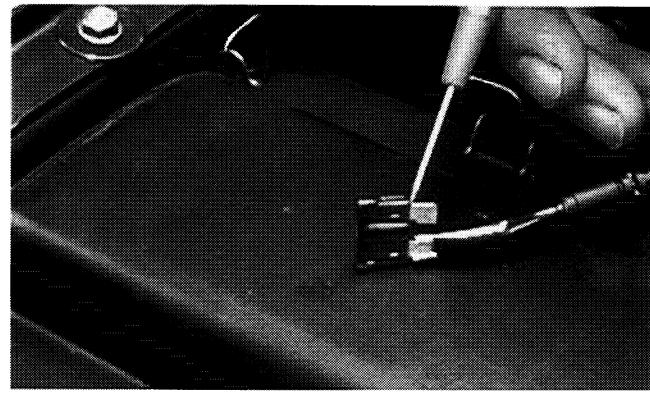
Fuses

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one spade end of the fuse; connect the black tester lead to the other spade end.

Fig. 5-17



3. The meter must show less than 1 ohm resistance. If the meter reads open, replace the fuse.

■ NOTE: Make sure the fuses are returned to their proper position according to amperage. Refer to the fuse block cover for fuse placement.

Gear Position Lights (300 4x4/400/500 cc)

The connector is the white six-prong connector located just behind the reverse lever. The connector being tested will be the female connector coming from the main wiring harness.

■ NOTE: For these tests, a 12-volt power supply "jumper" should be used to supply power.

FIRST GEAR

1. Connect the jumper power supply wire to the white/black wire.
2. The first gear position indicator light should illuminate.

SECOND GEAR

1. Connect the jumper power supply wire to the green/white wire.
2. The second gear position indicator light should illuminate.

THIRD GEAR

1. Connect the jumper power supply wire to the brown/white wire.
2. The third gear position indicator light should illuminate.

FOURTH GEAR

1. Connect the jumper power supply wire to the yellow/red wire.
2. The fourth gear position indicator light should illuminate.

FIFTH GEAR

1. Connect the jumper power supply wire to the green/black wire.
2. The fifth gear position indicator light should illuminate.

■ NOTE: If the gear position indicator lights work properly, the gear position wiring harness, connectors, and bulbs are good. Troubleshoot the gear position switch or the red/black wire from the indicator light harness.

Gear Position Switch (300 4x4/400/500 cc)

■ NOTE: The ignition switch must be in the OFF position. Also, the tests should be made at the white connector directly behind the reverse lever. Test the lower end of the connector (coming from the switch).



CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

NEUTRAL POSITION

■ NOTE: For these tests, the meter selector should be set to the OHMS position.

1. Connect the red tester lead to the red/black wire; connect the black tester lead to ground.
2. With the shifter in the neutral position, the meter must show less than 1 ohm.

FIRST GEAR

1. Connect the red tester lead to the white/yellow wire; connect the black tester lead to ground.
2. With the shifter in the first gear position, the meter must show less than 1 ohm.

SECOND GEAR

1. Connect the red tester lead to the green/red wire; connect the black tester lead to ground.
2. With the shifter in the second gear position, the meter must show less than 1 ohm.

THIRD GEAR

1. Connect the red tester lead to the brown/red wire; connect the black tester lead to ground.
2. With the shifter in the third gear position, the meter must show less than 1 ohm.

FOURTH GEAR

1. Connect the red tester lead to the yellow/blue wire; connect the black tester lead to ground.
2. With the shifter in the fourth gear position, the meter must show less than 1 ohm.

FIFTH GEAR

1. Connect the red tester lead to the green/blue wire; connect the black tester lead to ground.
2. With the shifter in the fifth gear position, the meter must show less than 1 ohm.

■ NOTE: If any of the above tests show more than 1 ohm, the switch/harness and/or the connectors must be replaced.

Ignition Coil/Magneto

On the 250/300 cc, the ignition coil is attached to the upper frame behind the right-hand side panel. To access the coil, the seat and right-hand side panel must be removed (see Section 8).

On the 400/500 cc, the ignition coil is on top of the engine. To access the coil, the seat and gas tank (see Section 4) must be removed.

VOLTAGE (Primary Side)

■ NOTE: The ignition switch must be in the ON position; the emergency stop switch must be in the RUN position. Also, the white/blue wire must be disconnected from the coil.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the black tester lead to the white/blue wire; connect the red tester lead to ground.
3. The meter must show $31V \pm 20\%$.
4. With the tester leads connected, depress the starter button.
5. The meter must show $130V \pm 20\%$.

■ NOTE: If the voltage is not as specified in one or both of the above tests, inspect the main wiring harness, connectors, source/charge coil, magneto rotor and magnets, magneto rotor key, or the CDI unit.

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■ NOTE: For these tests, the meter selector should be set to the OHMS position.

Primary Winding

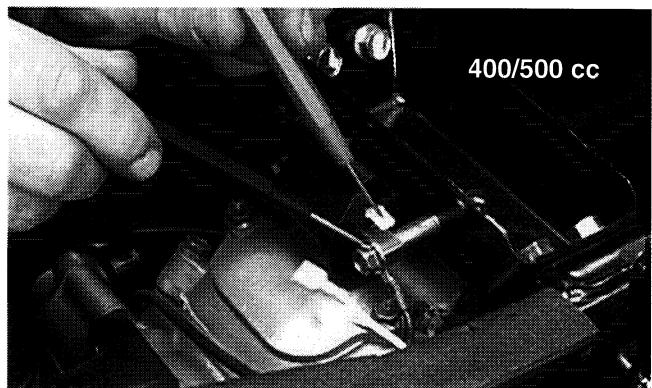
1. Connect the red tester lead to the terminal (with the wire removed); connect the black tester lead to ground.

Fig. 5-18



CH097D

Fig. 5-19



AR615D

5

2. The meter must show $0.1\text{--}0.5$ ohm (250/300 cc), $0.1\text{--}1.0$ ohm (400 cc), or $0.1\text{--}0.8$ ohm (500 cc).

Secondary Winding

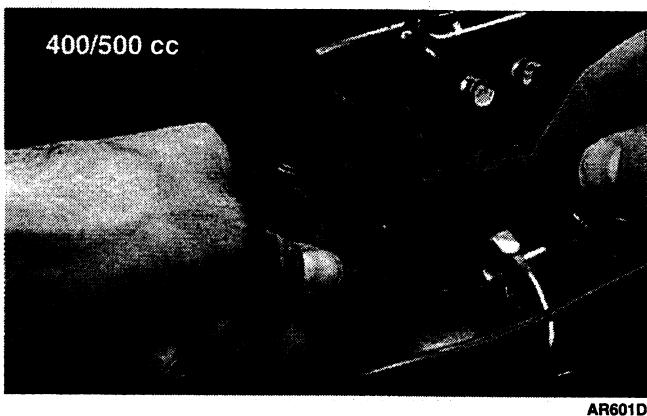
1. Connect the red tester lead to the high tension lead (spark plug wire with the cap removed); connect the black tester lead to ground.

Fig. 5-20



CH098D

Fig. 5-21



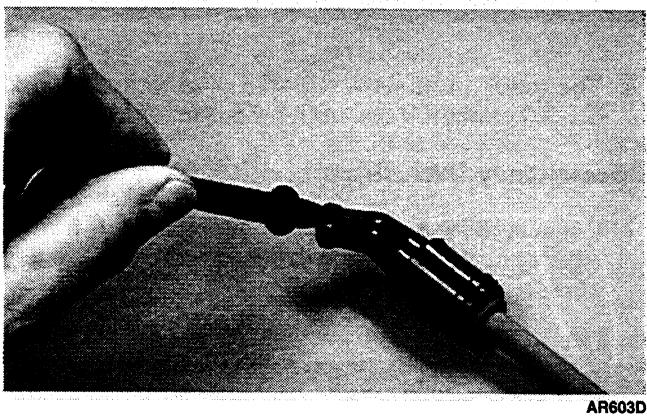
2. The meter must show 5200-7800 ohms (250/300 cc), 12,000-30,000 ohms (400 cc), or 10,000-15,000 ohms (500 cc).

■ NOTE: If the meter does not show as specified, replace ignition coil.

Spark Plug Cap

1. Connect the red tester lead to one end of the cap; connect the black tester lead to the other end of the cap.

Fig. 5-22



2. The meter must show 8000-12,000 ohms.

■ NOTE: If the meter does not read as specified, replace the spark plug cap.

Indicator Lights

The connector is the 6-prong connector (without the white wire) in front of the steering post. To access the connector, the front rack and front fenders must be removed (see Section 8).

■ NOTE: The ignition switch must be OFF. Also, perform this test on the upper side of the connector.

■ NOTE: For these tests, a 12-volt power supply "jumper" should be used to supply power.

HI BEAM LIGHT

1. Connect the yellow wire to the jumper power supply wire.
2. Connect the black wire to ground.
3. The HI beam indicator light should illuminate.

TEMPERATURE LIGHT (Oil/Water)

1. Connect the red wire to the jumper power supply wire.
2. Connect the orange wire to ground.
3. The oil temperature (250/300 cc) or water temperature (400/500 cc) warning indicator light should illuminate.

NEUTRAL POSITION LIGHT

1. Connect the red wire to the power supply wire.
2. Connect the brown wire to ground.
3. The neutral position indicator light should illuminate.

REVERSE POSITION LIGHT

1. Connect the red wire to the power supply wire.
2. Connect the blue wire to ground.
3. The reverse position indicator light should illuminate.

■ NOTE: If a light fails to illuminate in any one of the indicator light tests, the connector, wiring harness, or a bulb must be replaced.

HI BEAM INDICATOR VOLTAGE

■ NOTE: The ignition switch must be in the LIGHTS position. Also, the dimmer switch must be in the HI position, and the test must be performed on the lower side of the connector.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the yellow wire; connect the black tester lead to the black wire.
3. The meter must show battery voltage.

■ NOTE: The meter may show less than 12 volts due to the draw from the headlights.

OIL TEMPERATURE LIGHT VOLTAGE (250/300 cc)

■ NOTE: The ignition switch must be in the ON position, and the test must be performed on the lower side of the switch.

1. Set the meter selector to the D.C. Voltage position.
2. Disconnect the white oil temperature switch connector from the switch (on the top right side of the engine) and ground the violet wire to the engine. The temperature light should illuminate.
3. Connect the red tester lead to the violet wire (main harness side); then connect the black tester lead to a ground.
4. The meter must show battery voltage.

WATER TEMPERATURE LIGHT VOLTAGE (400/500 cc)

■ NOTE: The ignition switch must be in the ON position, and the test must be performed on the lower side of the switch.

1. Set the meter selector to the D.C. Voltage position.
2. Remove the violet water temperature switch wire connector from the switch (on the left side of the engine below the water hose) and ground it to the engine.
3. Connect the red tester lead to the red/black wire from the fan temperature switch; connect the black tester lead to the violet wire from the water temperature switch.
4. The meter must show battery voltage.

NEUTRAL POSITION VOLTAGE

■ NOTE: The ignition switch must be in the ON position. Also, the shifter must be in the NEUTRAL position, and the test must be performed on the lower side of the connection.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the red/black wire; connect the black tester lead to the blue/white wire.
3. The meter must show battery voltage.

REVERSE POSITION VOLTAGE

■ NOTE: The ignition switch must be in the ON position. Also, the reverse lever must be in the REVERSE position, and the test must be performed on the lower side of the connector.

1. Set the meter selector to the D.C. Voltage position.

2. Connect the red tester lead to the red/black wire; connect the black tester lead to the blue wire.
3. The meter must show battery voltage.

■ NOTE: If the meter fails to show voltage in any of the above tests, the connector, fuse, switch, or wiring harness must be replaced.

Ignition Switch

The connector is the green one beneath the console. To access the connector, the speedometer and instrument pod must be removed.

VOLTAGE

■ NOTE: Perform this test on the lower side of the connector.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red meter lead to the red wire; connect the black meter lead to ground.
3. Meter must show battery voltage.

■ NOTE: If the meter shows no battery voltage, troubleshoot the battery or the main wiring harness.

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■ NOTE: Perform this test on the upper side of the connector.

1. Turn the ignition switch to the ON position.
2. Set the meter selector to the OHMS position.
3. Connect the red tester lead to the red wire; connect the black tester lead to the orange wire.
4. The meter must show less than 1 ohm.
5. Turn the ignition switch to the LIGHTS position.
6. Connect the red tester lead to the red wire; connect the black tester lead to the orange wire.
7. The meter must show less than 1 ohm.
8. Connect the red tester lead to the red wire; connect the black tester lead to the gray wire.

9. The meter must show less than 1 ohm.
10. With the switch in the OFF position, connect the red tester lead to the red wire and the black tester lead to each of the remaining wires (orange and gray). The meter must show an open circuit on both wires.

■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Handlebar Control Switches

The connector is the yellow one in front of the steering post. To access the connector, the front rack and front fenders must be removed (see Section 8).

■NOTE: These tests should be made on the top side of the connector.

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

RESISTANCE (HI Beam)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the yellow wire; connect the black tester lead to the gray wire.
3. With the dimmer switch in the HI position, the meter must show less than 1 ohm.

■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

RESISTANCE (LO Beam)

1. Connect the red tester lead to the white wire; connect the black tester lead to the gray wire.
2. With the dimmer switch in the LO position, the meter must show an open circuit.

■NOTE: If the meter reads resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

RESISTANCE (Starter Button)

1. Set the meter selector to the Diode position.

2. Connect the red tester lead to the orange/white wire; connect the black tester lead to the yellow/green wire.
3. With the starter button depressed, the meter must show 0.5 - 0.7 ohm.
4. With the starter button released, the meter must show an open circuit.
5. Connect the red tester lead to the yellow/green wire; connect the black tester lead to the orange/white wire.
6. With the starter button depressed, the meter must show an open circuit.

■NOTE: If the meter does not show as specified, replace the switch/component, connector, or switch harness.

RESISTANCE (Emergency Stop)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the orange wire; connect the black tester lead to the orange/white wire.
3. With the switch in the OFF position, the meter must show an open circuit.
4. With the switch in the RUN position, the meter must show less than 1 ohm.

■NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Magneto Assembly

VOLTAGE (Charging Coils - Output)

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the positive battery post; connect the black tester lead to the negative battery post.
3. With the engine running at a constant 5000 RPM (with the headlights on), the meter must show 14-15.5 D.C. volts.

CAUTION

Do not run the engine at high RPM for more than 10 seconds.

■ NOTE: If voltage is lower than specified, test charging coils - no load.

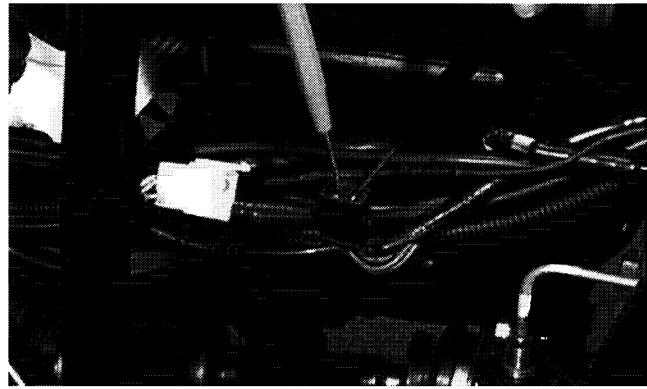
VOLTAGE (Charging Coils - No Load)

The connector is the black and white one on the right side of the engine just above the brake cable adjuster.

■ NOTE: Test the connector that comes from the engine.

1. Set the meter selector to the A.C. Voltage position.
2. Using the multimeter, test between the three black wires for a total of three tests.

Fig. 5-23



3. With the engine running at a constant 5000 RPM, all three black wire tests must show 60 D.C. volts.

CAUTION

Do not run the engine at high RPM for more than 10 seconds.

■ NOTE: If both charging coil tests failed, check all connections, etc., and test again. If no voltage is present, replace the stator assembly.

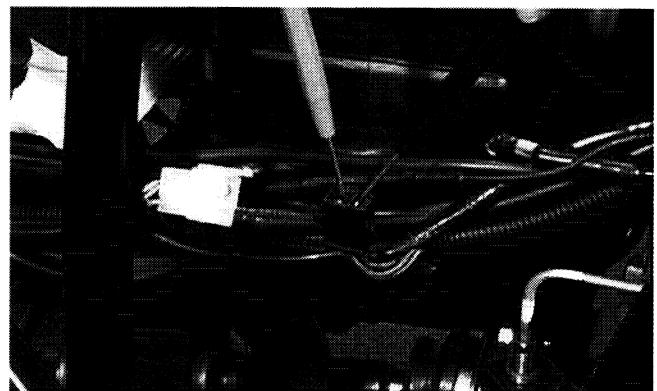
RESISTANCE (Charging Coils)

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to OHMS position.
2. Using the multimeter, test between the three yellow wires (250/300 cc) or the three black wires (400/500 cc) for a total of three tests.

Fig. 5-24



AR630D

3. In all tests, the meter must show 0.1 - 1.0 ohm.

RESISTANCE (Trigger Coil)

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Set the meter selector to the OHMS position.
2. On the 250/300 cc, connect the red tester lead to the black/yellow wire; connect the black tester lead to the green/white wire. The meter must show 90-140 ohms.
3. On the 400/500 cc, connect the red tester lead to the green wire; connect the black tester lead to the blue wire. The meter must show 150-300 ohms on the 400 cc or 170-250 ohms on the 500 cc.

RESISTANCE (Source/Charge Coil-400/500 cc)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the yellow wire; connect the black tester lead to the white wire.
3. The meter must show 0.05-1.0 ohm.

■ NOTE: If the meter shows other than specified in any resistance test, replace the stator assembly.

Starter Motor

REMOVING/DISASSEMBLING

1. Disconnect the battery.

⚠ WARNING

Always disconnect the negative battery cable from the battery first; then disconnect the positive cable.

2. Remove the nut securing the positive cable to the starter; then remove the cable from the starter.

Fig. 5-25

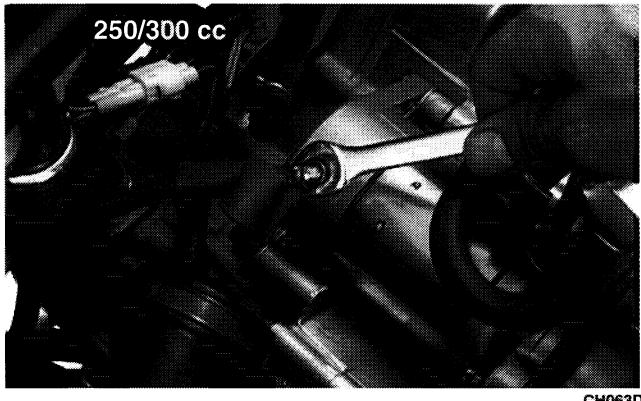
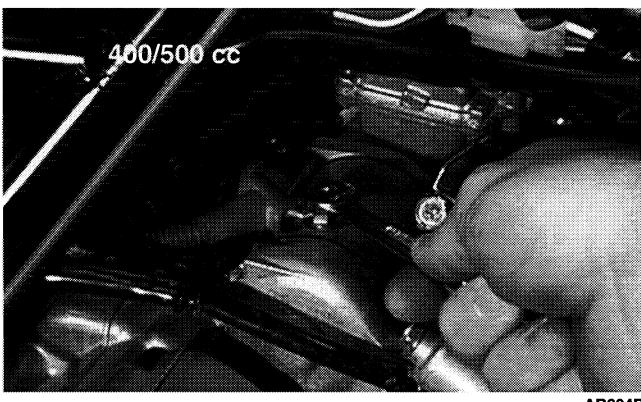


Fig. 5-26



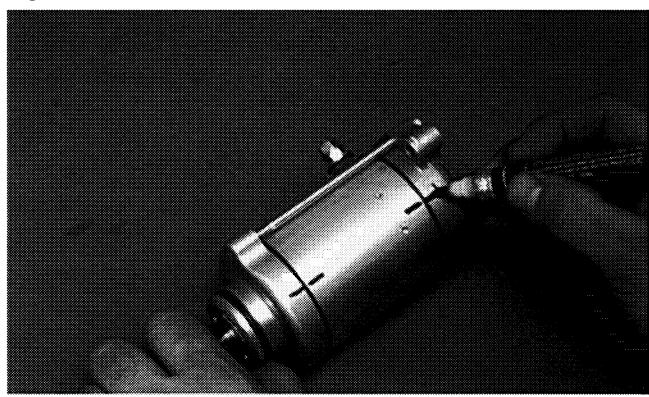
3. Remove the two cap screws securing the starter to the crankcase; then remove the starter. Account for the wiring forms and an O-ring.

Fig. 5-27



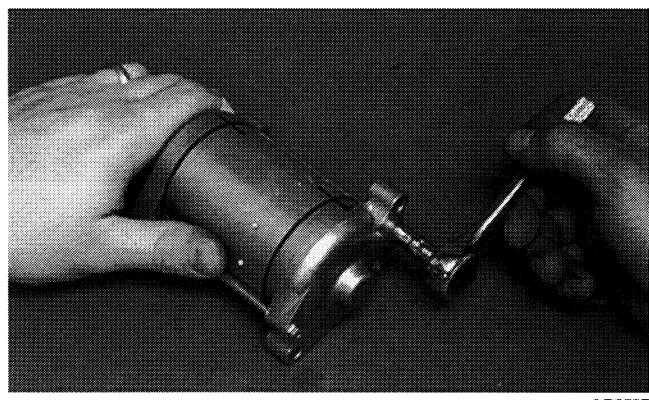
4. For assembly purposes, scribe a line across the outside of the starter assembly.

Fig. 5-28



5. Remove the two long starter cap screws securing the starter components.

Fig. 5-29



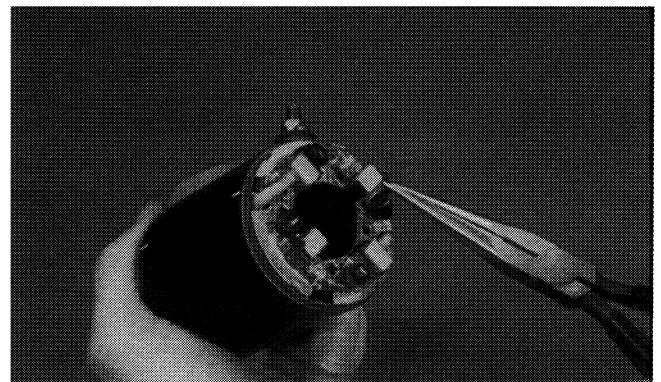
6. Remove the front cover from the starter housing and armature shaft. Account for a seal protector and three washers.

Fig. 5-30



BC003

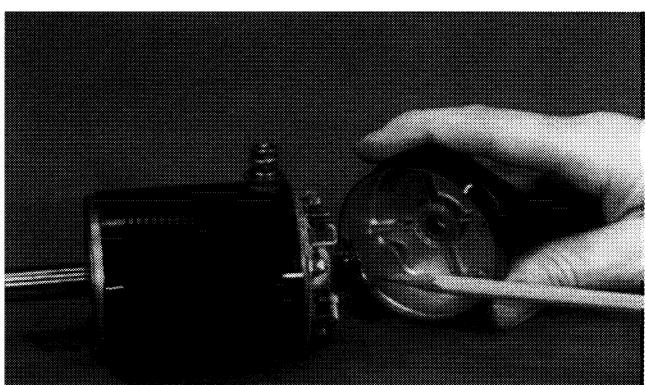
Fig. 5-33



BC007

7. Remove the rear cover.

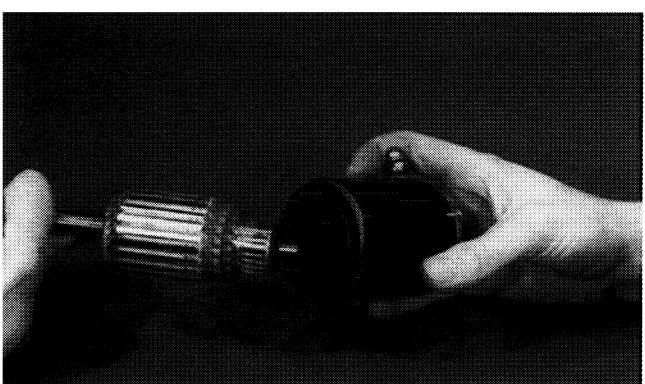
Fig. 5-31



BC005

8. Slide the armature free of the starter housing.

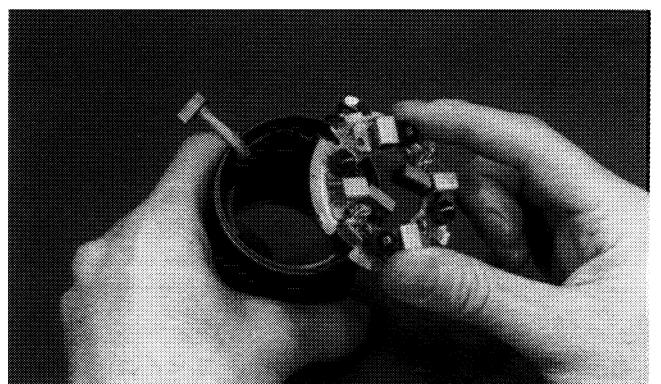
Fig. 5-32



BC006

9. Bend the two positive brushes outward; then remove the brush holder.

Fig. 5-34



BC010

5

10. Remove the nut from the positive post. Account for the lock washer, flat washer, a fiber washer, and an O-ring.

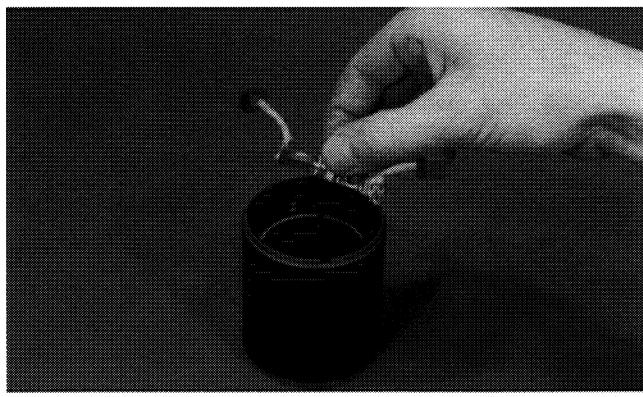
Fig. 5-35



BC008

11. Remove the positive brush assembly from the starter housing.

Fig. 5-36



BC009

CLEANING AND INSPECTING

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

1. Thoroughly clean all components except the armature and brushes in parts-cleaning solvent; then dry with compressed air.

CAUTION

Do not wash the armature and brushes in any kind of solvent. Use only compressed air and a clean dry, lint-free cloth.

2. Inspect all threaded areas for damage or stripped threads.
3. Inspect the brush holder assembly and brushes for damage or wear. Using a caliper, measure the length of the brushes. If brush measurement is less than 9 mm (0.40 in.), replace with new brushes and brush springs as a set.
4. Inspect the brush leads for cracks, wear, or fraying. If any of these conditions exist, replace with new brushes and brush springs as a set.
5. Inspect the rear cover bushing for wear.
6. Inspect the front cover bearing for wear.
7. Inspect the brass commutator end of the armature for any burned spots or damage. If the commutator is lightly burned or damaged, the armature must be replaced. This is a molded commutator and turning it down in a lathe should not be attempted.

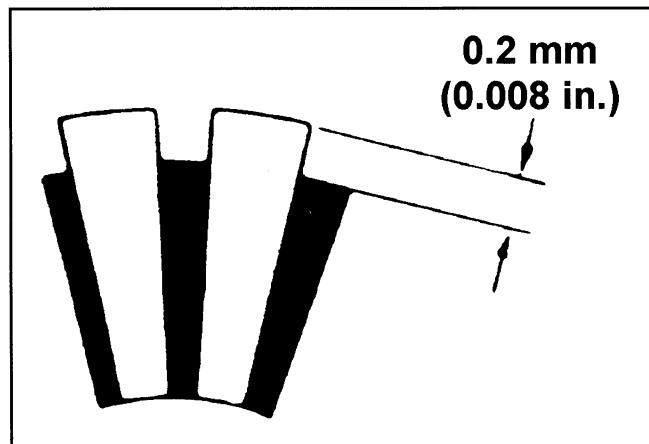
CAUTION

Do not use emery cloth to clean the commutator as emery particles will become imbedded in the brass commutator resulting in a short circuit. Use only #200 grit sandpaper.

8. Inspect the commutator end of the armature for buildup in the grooves. Carefully remove any buildup by undercutting using a thinly ground hacksaw blade. Do not undercut any deeper than the original groove which can be seen by looking at the end of the commutator.

9. Using a caliper, measure the undercut. Maximum undercut groove must be 0.2 mm (0.008 in.).

Fig. 5-37



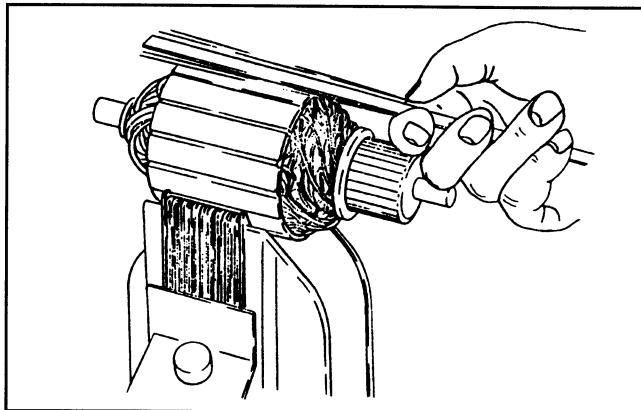
ATV-1054

CAUTION

Buildup in the grooves must be removed to prevent any chance of an electrical arc between individual sections of the commutator.

10. Inspect the commutator for shorting using a multimeter and the following procedure.
 - A. Set the selector to the OHMS position.
 - B. Touch the black lead to the armature shaft.
 - C. Using the red tester lead, probe the commutator end of the armature. The meter indicator should not change. If the indicator shows resistance, the armature is shorted and must be replaced.
11. Inspect the armature for shorting using a "growler" and the following procedure.
 - A. Place the armature in the "growler."
 - B. While holding a metal strip on the armature, rotate the armature an entire revolution. If the metal strip vibrates at any point on the armature, the armature is shorted and must be replaced.

Fig. 5-38



0725-653

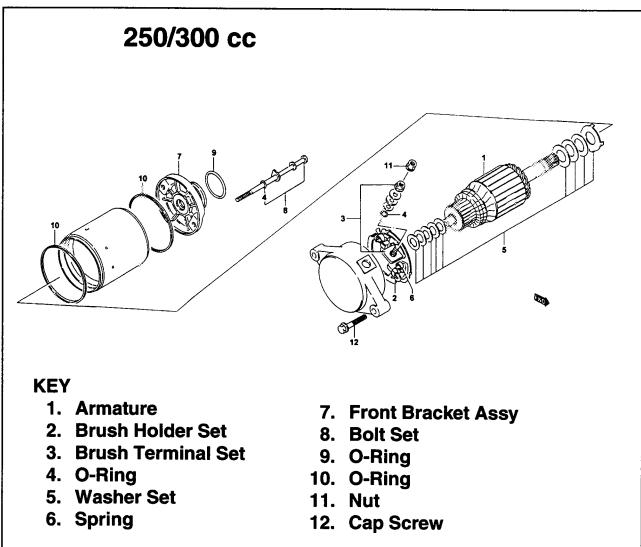
12. Inspect the ground brushes to make sure they are properly grounded. Use a multimeter and the following procedure.

- A. Set the selector to the OHMS position.
- B. Touch the black tester lead to a ground brush.
- C. Touch the red tester lead to the brush holder assembly.

NOTE: If no resistance is indicated, check the ground connection for tightness and for cleanliness. If there is still no meter indication, replace the brush assembly.

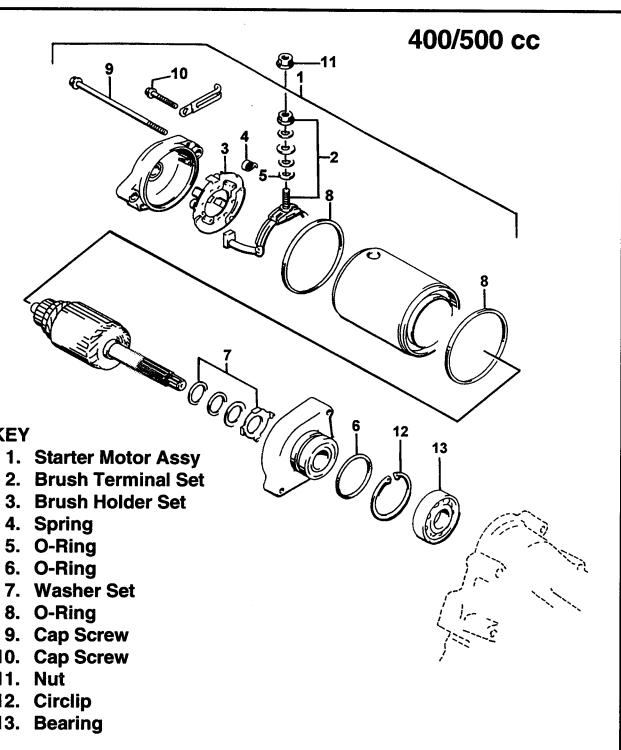
ASSEMBLING/INSTALLING

Fig. 5-39



0733-760

Fig. 5-40

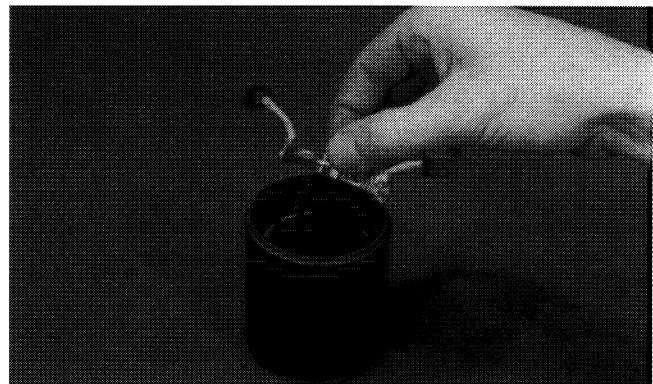


0732-320

1. Install the positive post on the positive brush assembly; then install on the starter housing.

5

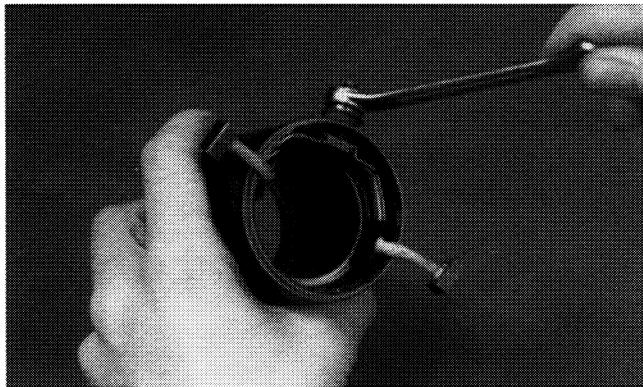
Fig. 5-41



BC009

2. On the positive post, install an O-ring washer, a fiber washer, a flat washer, and a lock washer. Secure with the nut.

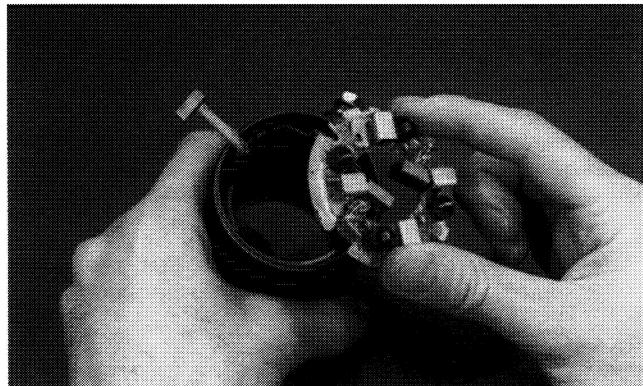
Fig. 5-42



BC008

3. Align the tab on the brush holder with the notch in the starter housing; then install.

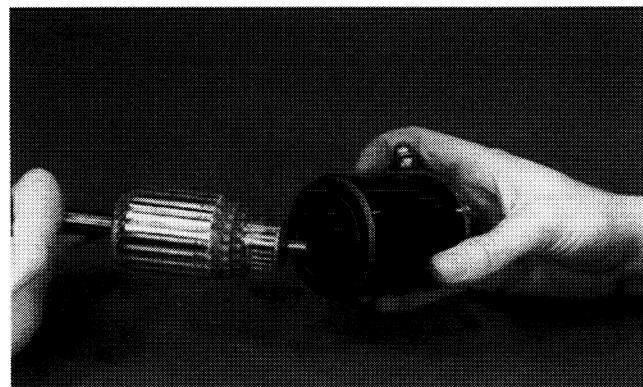
Fig. 5-43



BC010

4. Install the armature into the starter housing; then while holding the brushes out, slide the commutator into the brush holder.

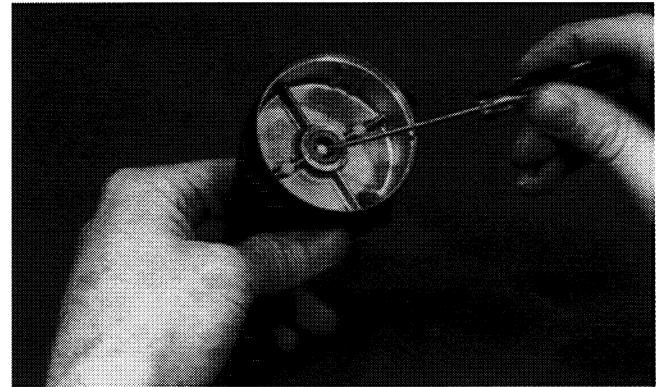
Fig. 5-44



BC006

5. Apply a small amount of grease to the rear cover bushing; then install the cover on the starter housing making sure the reference marks align.

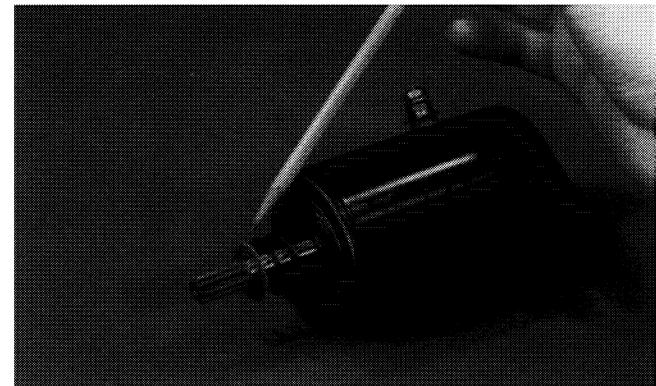
Fig. 5-45



BC013

6. In order, install the thick metal washer, thin metal washer, and the fiber washer on the armature shaft; then install the housing O-ring on the starter housing.

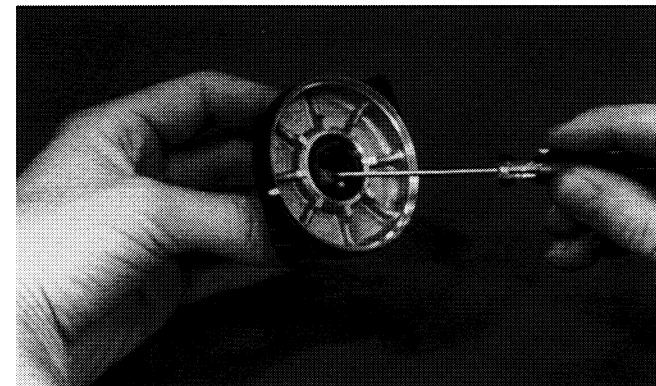
Fig. 5-46



BC014

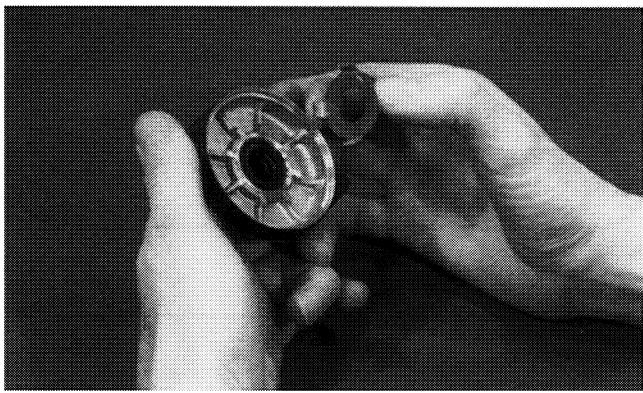
7. Apply a small amount of grease to the front cover bearing and seal; then install the seal protector.

Fig. 5-47



BC015

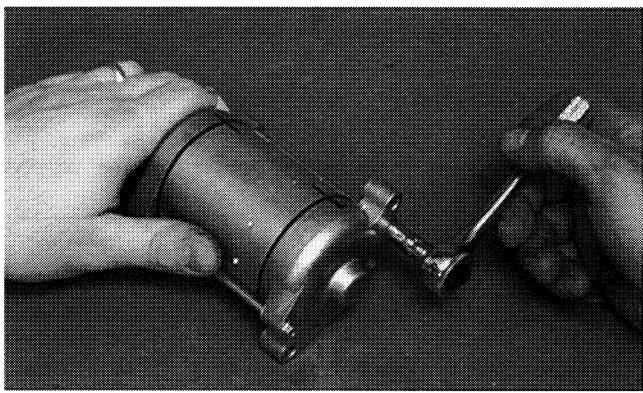
Fig. 5-48



BC004

8. Place the front cover onto the housing making sure it seats properly.
9. Apply red Loctite #271 to the threads of the two long cap screws and install. Tighten to 0.8-1.2 kg-m (6-9 ft-lb).

Fig. 5-49



AR653D

10. Apply a small amount of grease to the O-ring seal on the starter; then install the starter into the crankcase. Secure with two cap screws and wiring forms.
11. Secure the positive cable to the starter with the nut.
12. Connect the battery.

TESTING VOLTAGE

Perform this test on the starter motor positive terminal. To access the terminal, slide the boot away.

■ NOTE: The ignition switch must be in the ON position, the emergency stop switch in the RUN position, and the reverse lever in the FORWARD position.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the starter terminal; connect the black tester lead to ground.

3. With the starter button depressed, the meter must show battery voltage and the starter motor should operate.

Fig. 5-50



AR607D

■ NOTE: If the meter showed battery voltage but the starter did not operate or operated slowly, inspect battery voltage (at the battery), starter motor condition, and/or ground connections.

■ NOTE: If the meter showed no battery voltage, inspect the main fuse, ground connections, starter motor lead, battery voltage (at the battery), or the switches.

5

Starter Relay (250/300 cc)

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Disconnect the battery; then verify that the ignition fuse is good. Disconnect all wires from the solenoid.
2. Set the meter selector to the OHMS position.
3. Connect the tester leads to each of the heavy posts of the solenoid.
4. The meter must show an open circuit.

Fig. 5-51



■ NOTE: Leave the tester leads connected to the solenoid posts for the following procedure.

■ NOTE: An external 12-volt power supply "jumper" (positive and negative connections) must be used for this test. Also, it is very important that the meter leads and power supply connections are made to the appropriate terminals of the relay or damage to the multimeter will result.

5. Connect the power supply leads to each small terminal of the solenoid. There should be an audible "click" from the relay, and the meter must show less than 1 ohm.

Fig. 5-52



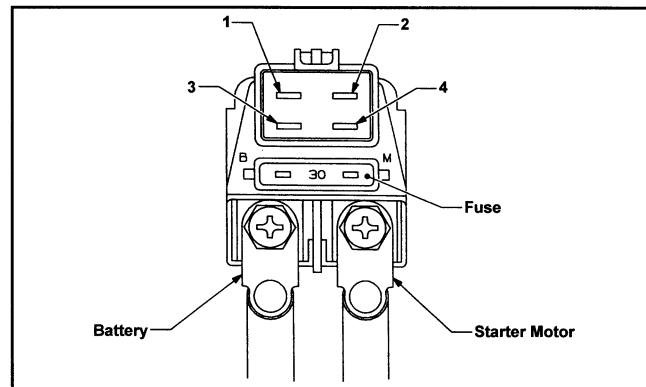
■ NOTE: If there was no audible "click" from the relay or if the meter shows more than 1 ohm, it must be replaced. If there was a "click," continue to test resistance.

6. With the 12-volt power supply still connected, now connect the red tester lead to the heavy battery cable terminal; connect the black tester lead to the heavy starter motor cable terminal.
7. The meter must show less than 1 ohm.
8. With the 12-volt power supply disconnected, connect the tester leads to each small terminal of the solenoid.
9. The meter must show $4.3 \text{ ohms} \pm 20\%$.

■ NOTE: If the meter shows no resistance, the relay is out of tolerance or it must be replaced.

Starter Relay (400/500 cc)

Fig. 5-53



RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

1. Disconnect the battery; then verify that the starter relay 30-amp fuse is good.
2. Set the meter selector to the OHMS position.
3. Connect the red tester lead to terminal #1; connect the black tester lead to terminal #2.
4. The meter must show an open circuit.

■ NOTE: Leave the tester leads connected to the terminals for the following procedure.

■ NOTE: An external 12-volt power supply "jumper" (positive and negative connections) must be used for this test. Also, it is very important that the meter leads and power supply connections are made to the appropriate terminals of the relay or damage to the multimeter will result.

5. Connect the power supply (positive) to terminal #3; connect the power supply (negative) to terminal #4. There should be an audible "click" from the relay, and the meter must show less than 1 ohm.

■ NOTE: If there was no audible "click" from the relay or if the meter shows more than 1 ohm, it must be replaced. If there was a "click," continue to test resistance.

- With the 12-volt power supply still connected, now connect the red tester lead to the heavy battery cable terminal; connect the black tester lead to the heavy starter motor cable terminal.
- The meter must show less than 1 ohm.
- With the 12-volt power supply disconnected, connect the red tester lead to terminal #3; connect the black tester lead to terminal #4.
- The meter must show 3.6 ohms \pm 20%.

NOTE: If the meter shows no resistance, the relay is out of tolerance or it must be replaced.

CDI Unit (250/300 cc)

The CDI is located beneath the right rear fender panel near the battery.

The CDI is rarely the cause for electrical problems; however, if the CDI is suspected, test resistance values thoroughly and completely. Also, if the CDI is suspected (resistance test values are slightly out of specification), substitute another CDI unit to verify the suspected one is defective.

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

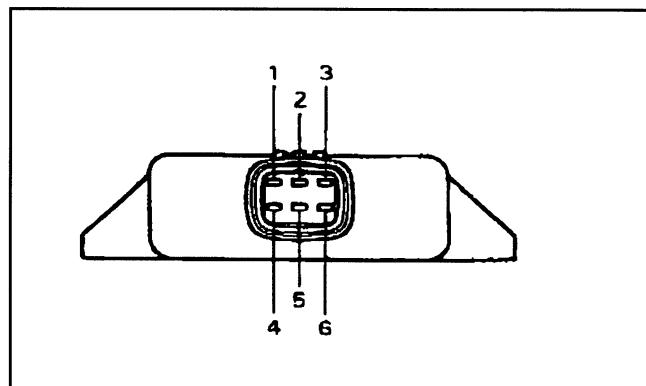
- Set the meter selector to the OHMS position.
- Test each combination as found in the following chart. Write down each test value for each test for comparison with the value in the chart.

NOTE: As an example, connect the red tester lead to terminal #2; then connect the black tester lead to terminal #3. The meter must show 20-100 k-ohms.

CAUTION

Before determining the CDI unit is defective, perform every test combination shown in the chart.

Fig. 5-54



ATV0099A

CDI UNIT ELECTRICAL TEST SPECIFICATIONS (k-ohms)

| Negative Meter Lead To: | Positive Meter Lead To: | | | | | |
|-------------------------|-------------------------|--------|--------|----------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | — | 2-10 | 50-150 | ∞ | 2-10 | 2-10 |
| 2 | ∞ | — | 20-80 | ∞ | 0 | 0 |
| 3 | ∞ | 20-100 | — | ∞ | 20-100 | 20-100 |
| 4 | ∞ | 1-7 | 50-150 | — | 1-7 | 1-7 |
| 5 | ∞ | 0 | 20-80 | ∞ | — | 0 |
| 6 | ∞ | 0 | 20-80 | ∞ | 0 | — |

∞ = Infinity

5

Regulator/Rectifier (250/300 cc)

The regulator/rectifier is located near the battery.

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

- Set the meter selector to the OHMS position.

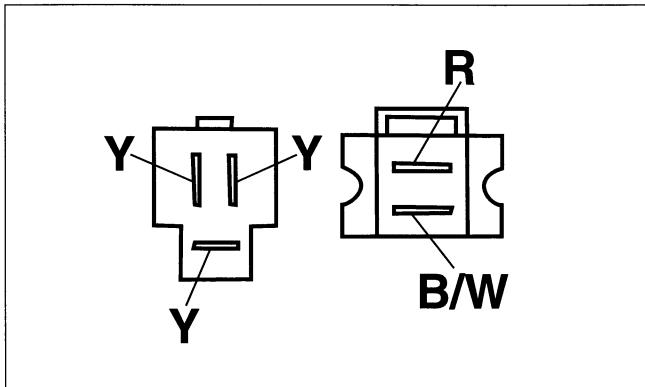
- Test each combination as found in the following chart.

NOTE: As an example, connect the red tester lead to the R terminal; connect the black tester lead to a Y terminal. The meter must show 7 ohms.

CAUTION

Before determining the regulator/rectifier is defective, perform every test combination shown in the chart.

Fig. 5-55



ATV1087B

| REGULATOR/RECTIFIER SPECIFICATIONS (k-ohms) | | | | | | |
|--|-------------------------|---|---|---|-------|--------------|
| Negative Meter Lead To: | Positive Meter Lead To: | | | | | ∞ = Infinity |
| | | Y | Y | Y | R | |
| | Y | — | ∞ | ∞ | 7 | ∞ |
| | Y | ∞ | — | ∞ | 7 | ∞ |
| | Y | ∞ | ∞ | — | 7 | ∞ |
| | R | ∞ | ∞ | ∞ | — | ∞ |
| | B/W | 7 | 7 | 7 | 30-50 | — |

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

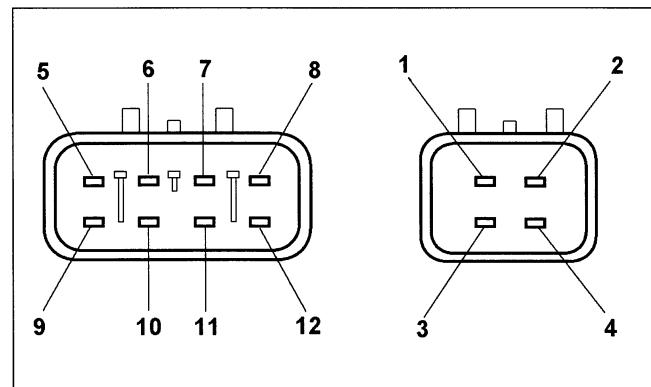
1. Set the meter selector to the OHMS position.
2. Test each combination as found in the following chart. Write down each test value for each test for comparison with the value in the chart.

■ NOTE: As an example, connect the red tester lead to terminal #1; connect the black tester lead to terminal #3. The meter must show 5-22 k-ohms.

CAUTION

Before determining the CDI unit is defective, perform every test combination shown in the chart.

Fig. 5-56



ATV-0099

The CDI is located beneath the seat and fender panel near the battery.

The CDI is rarely the cause for electrical problems; however, if the CDI is suspected, test resistance values thoroughly and completely. Also, if the CDI is suspected (resistance test values are slightly out of specification), substitute another CDI unit to verify the suspected one is defective.

| CDI UNIT ELECTRICAL TEST SPECIFICATIONS (k-ohms) | | | | | | | | | | | | |
|--|-------------------------|-------|-------|--------|--------|---|---|------|------|--------|------|----|
| Negative Meter Lead To: | Positive Meter Lead To: | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | 1 | — | 0 | 5-22 | 11-45 | ∞ | ∞ | 0 | 0 | 60-400 | 300~ | ∞ |
| | 2 | 0 | — | 5-22 | 11-45 | ∞ | ∞ | 5-22 | 5-22 | 60-400 | 300~ | ∞ |
| | 3 | 5-22 | 5-22 | — | — | ∞ | ∞ | ∞ | ∞ | 60-400 | 300~ | ∞ |
| | 4 | 15-60 | 15-60 | 24-100 | — | ∞ | ∞ | ∞ | ∞ | 80-500 | 300~ | ∞ |
| | 5 | ∞ | ∞ | ∞ | ∞ | — | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| | 6 | ∞ | ∞ | ∞ | ∞ | ∞ | — | ∞ | ∞ | ∞ | ∞ | ∞ |
| | 7 | 0 | 0 | 5-22 | 11-45 | ∞ | ∞ | — | 0 | 60-500 | 300~ | ∞ |
| | 8 | 0 | 0 | 5-22 | 11-45 | ∞ | ∞ | 0 | — | 60-500 | 300~ | ∞ |
| | 9 | 1-6 | 1-6 | 9-35 | 22-90 | ∞ | ∞ | 1-7 | 1-7 | — | 300~ | ∞ |
| | 10 | 2-9 | 2-9 | 10-40 | 26-100 | ∞ | ∞ | 2-9 | 2-9 | 80-500 | — | ∞ |
| | 11 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | — | ∞ |
| | 12 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | — |

∞ = Infinity

CDI Chart

Regulator/Rectifier (400/500 cc)

The regulator/rectifier is located beneath the seat and fender panel behind the battery.

RESISTANCE

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

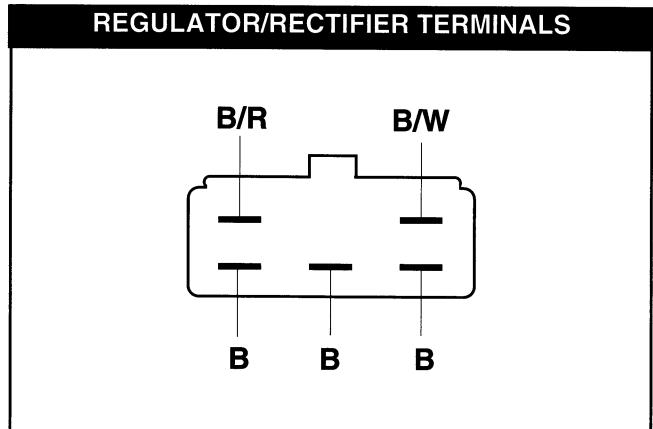
1. Set the meter selector to the OHMS position.
2. Test each combination as found in the following chart.

NOTE: As an example, connect the red tester lead to the B/R terminal; connect the black tester lead to a B terminal. The meter must show 1-10 k-ohms.

CAUTION

Before determining the regulator/rectifier is defective, perform every test combination shown in the chart.

Fig. 5-57



ATV1087A

5

| REGULATOR/RECTIFIER SPECIFICATIONS (k-ohms) | | | | | | |
|---|-------------------------|------|------|------|-----|------|
| Negative Meter Lead To: | Positive Meter Lead To: | | | | | |
| | B/R | B | B | B | B/W | Body |
| | — | ∞ | ∞ | ∞ | ∞ | ∞ |
| | 1-10 | — | ∞ | ∞ | ∞ | ∞ |
| | 1-10 | ∞ | — | ∞ | ∞ | ∞ |
| | 1-10 | ∞ | ∞ | — | ∞ | ∞ |
| | 3-15 | 1-10 | 1-10 | 1-10 | — | ∞ |

∞ = Infinity

REG/REC SPEC

Neutral Start Relay

The connector is the white 4-prong one near the battery.

VOLTAGE (Connector)

■ **NOTE:** The ignition switch must be in the ON position.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the orange wire; connect the black tester lead to ground.
3. The meter must show battery voltage.

■ **NOTE:** If the meter shows no battery voltage, inspect the fuses, wiring harness, connectors, or ignition switch.

■ **NOTE:** In the following test, the ignition switch must be in the ON position and the emergency stop switch must be in the RUN position.

4. With the black tester lead still connected to ground, connect the red tester lead to the yellow/green wire.
5. Depress the starter button. The meter must show battery voltage.

■ **NOTE:** If the meter shows no battery voltage, inspect fuses, wiring harness, connectors, and switches.

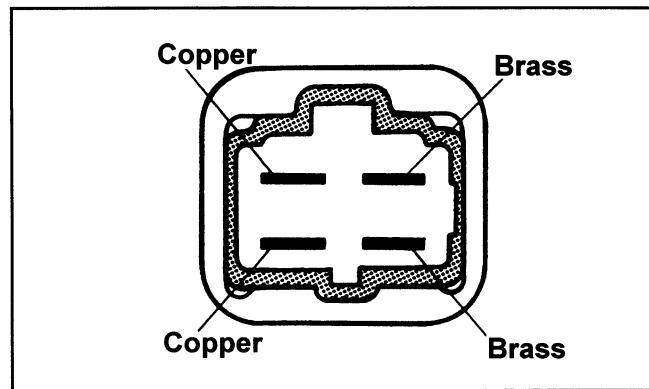
RESISTANCE (Relay - Copper Terminals)

CAUTION
Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■ **NOTE:** An external 12-volt power supply "jumper" (positive and negative connections) must be used for this test. Also, it is very important that the meter leads and power supply connections are made to the appropriate terminals of the relay or damage to the multimeter will result.

1. Set the meter selector to the OHMS position.
2. Connect the power supply (positive) to one brass terminal; connect the power supply (negative) to the other brass terminal. There should be an audible "click" from the relay.

Fig. 5-58



ATV-1075

■ **NOTE:** If there was no audible "click" from the relay, it must be replaced. If there was a "click," continue to test resistance.

3. Set the meter selector to the OHMS position.
4. With the power supply still connected, connect the red tester lead to one copper terminal; connect the black tester lead to the other copper terminal.
5. The meter must show less than 1 ohm.

■ **NOTE:** If the meter shows more than 1 ohm (even though the "click" was heard in the power supply test), the relay must be replaced.

RESISTANCE (Relay - Brass Terminals)

CAUTION
Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

■ **NOTE:** The external power supply will not be used for this test.

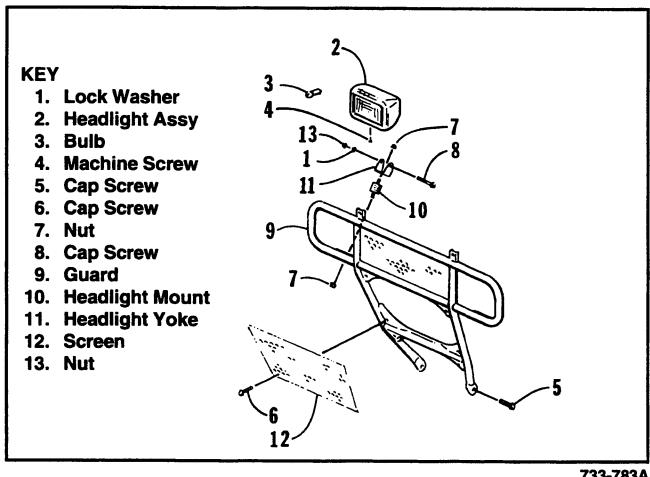
1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one brass terminal; connect the black tester lead to the other brass terminal.
3. The meter must show 90 ohms \pm 20%.

■ **NOTE:** If the meter shows no resistance, replace the relay.

Headlights

The connectors are the two 3-prong ones secured to the front bumper supports (one on each side) with cable ties.

Fig. 5-59



733-783A

BULB VERIFICATION (Low and High Beam)

NOTE: Perform this test in turn on the headlight side of both connectors. Also, a 12-volt external power supply (jumper) will be needed.

1. Connect the power supply (positive) to the white wire; connect the power supply (negative) to the black wire.
2. The low beam of the headlight bulb should illuminate.
3. With the negative power supply still connected, now connect the positive power supply to the yellow wire.
4. The high beam of the headlight bulb should illuminate.

NOTE: If the appropriate beam of the headlight bulb did not illuminate, inspect the bulb, the connectors, or the component wiring harness.

VOLTAGE (Headlights/Harnesses)

NOTE: Perform this test in turn on the main harness side of both connectors. Also, the ignition switch must be in the LIGHTS position.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the white wire; connect the black tester lead to the black wire.

3. With the dimmer switch in the LO position, the meter must show battery voltage.
4. With the black tester lead still connected, now connect the red tester lead to the yellow wire.
5. With the dimmer switch in the HI position, the meter must show battery voltage.

NOTE: If battery voltage is not shown in either or both tests, inspect the fuses, battery, main wiring harness, connectors, or the left handlebar switch.

Taillight - Brakelight

The connector is the 3-prong one located under the rear fender assembly.

BULB VERIFICATION

NOTE: Perform this test on the taillight-brakelight side of the connector. Also, a 12-volt external power supply (jumper) will be needed.

1. Connect the power supply (positive) to the yellow wire; connect the power supply (negative) to the brown wire.
2. The taillight should illuminate.
3. With the negative power supply still connected, now connect the positive power supply wire to the red wire.
4. The brakelight should illuminate.

NOTE: If either the taillight or brakelight fails to illuminate, inspect the bulb, the connectors, or the component wiring harness.

VOLTAGE (Taillight)

NOTE: Perform this test on the main harness side of the connector. Also, the ignition switch should be in the LIGHTS position.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the gray wire; connect the black tester lead to the black wire.
3. With the ignition key in the LIGHTS position, the meter must show battery voltage.

NOTE: If the meter shows no voltage, inspect fuses, wiring harness, connectors, and switches.

VOLTAGE (Brakelight)

■ NOTE: Perform this test on the main harness side of the connector. Also, the ignition switch should be in the ON position and the brake (either foot pedal or hand lever) must be applied.

■ NOTE: Make sure the brake lever (hand) and brake pedal (foot) are properly adjusted for this procedure.

1. Set the meter selector to the D.C. Voltage position.
2. Connect the red tester lead to the red wire; connect the black tester lead to the black wire.
3. With either brake applied, the meter must show battery voltage.

■ NOTE: If the meter shows no voltage, inspect bulb, fuses, wiring harness, connectors, and switches.

Ignition Timing

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

1. Attach the engine Timing Light (p/n 0644-197) to the spark plug high tension lead; then remove the timing inspection plug from the left-side crankcase cover.
2. With the Arctic Cat Engine Tachometer (p/n 0644-275) connected, start the engine and run at 1800 RPM and then at 3800 RPM.
3. Ignition timing should be according to specifications.

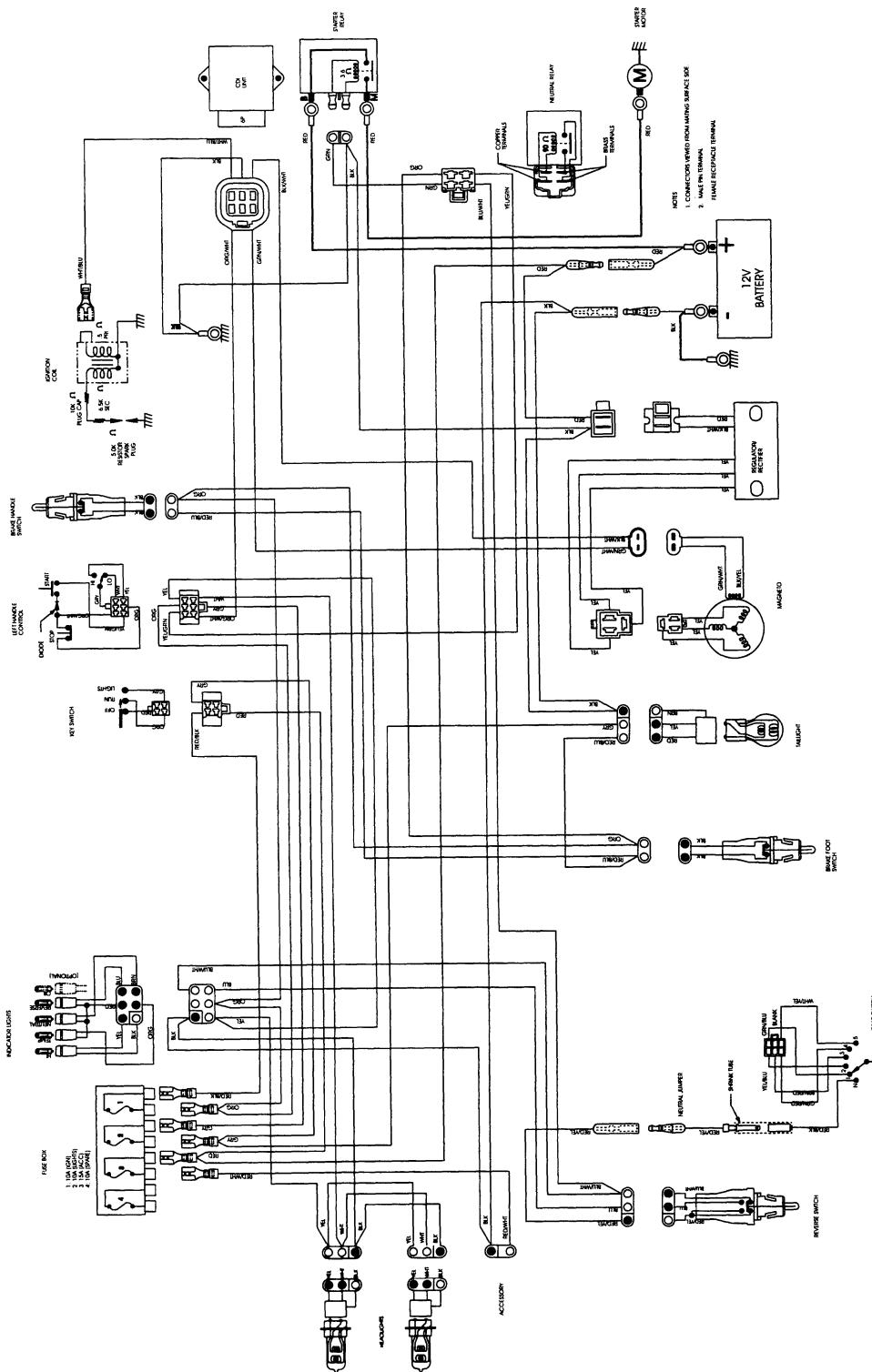
| Model | Timing |
|------------|--|
| 250 cc | 5° BTDC @ 1800 RPM 35° BTDC @ 3800 RPM |
| 300 cc | 5° BTDC @ 1800 RPM 30° BTDC @ 3800 RPM |
| 400/500 cc | 10° BTDC @ 1800 RPM 30° BTDC @ 3800 RPM |

4. Install the timing inspection plug.

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

Fig. 5-60

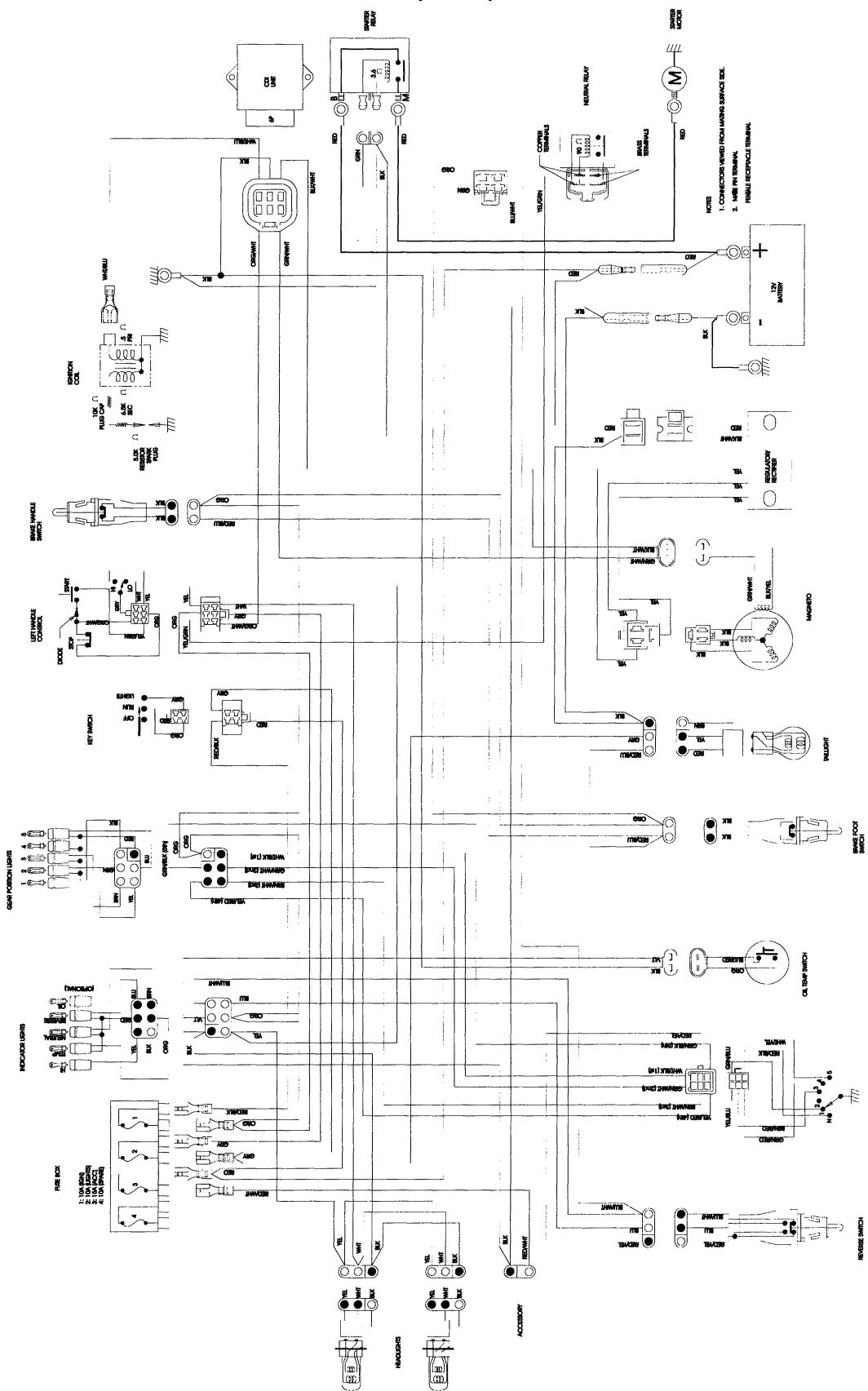
WIRING DIAGRAM (250 cc)



5

Fig. 5-61

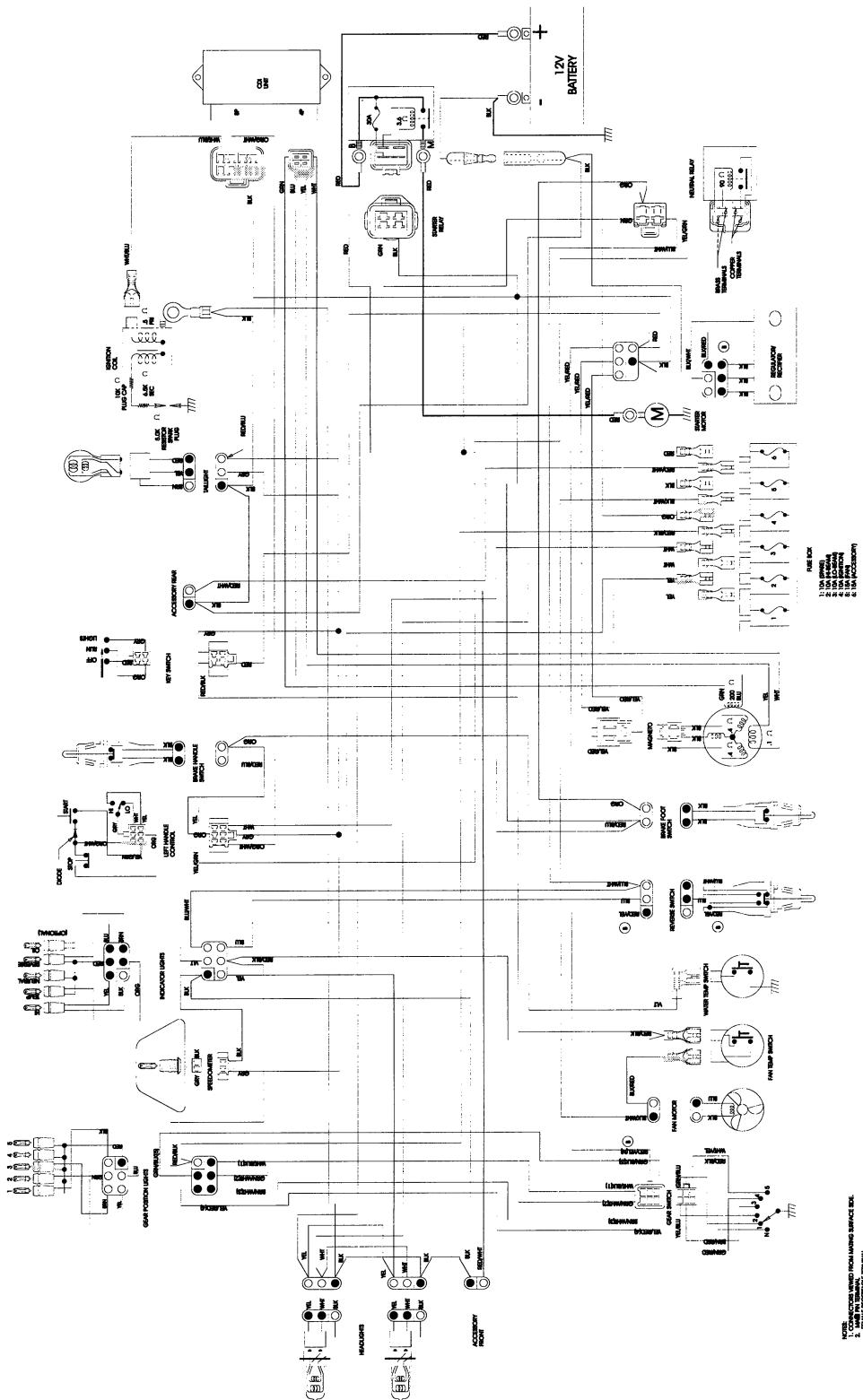
**WIRING DIAGRAM
(300 cc)**



0486-026

Fig. 5-62

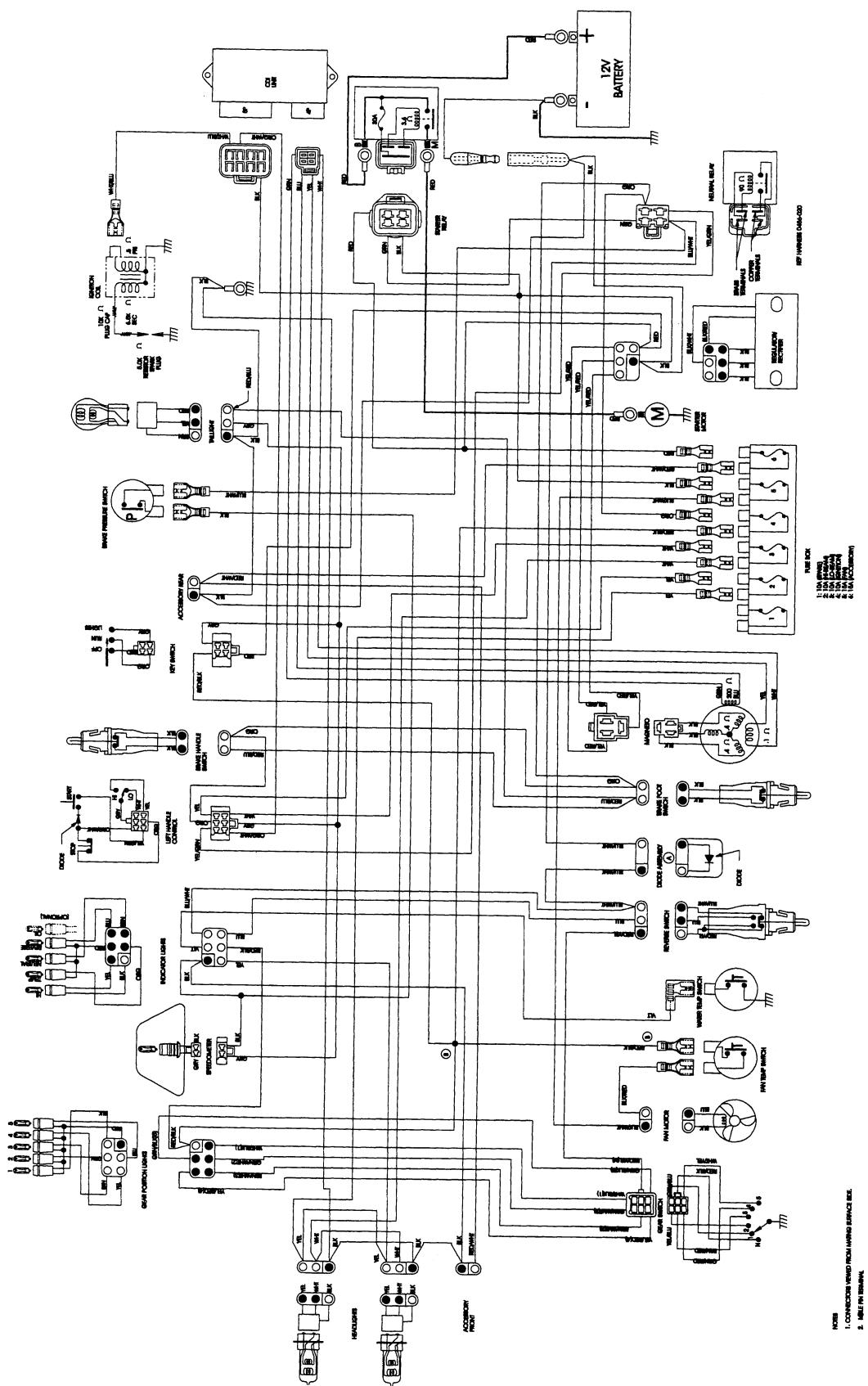
WIRING DIAGRAM (400 cc)



NOTE:
 1. CONNECTORS VIEWED FROM MATING SURFACE SIDE.
 2. MALE PIN TERMINAL
 FEMALE RECEIVER TERMINAL.

Fig. 5-63

**WIRING DIAGRAM
(500 cc)**



NOTE
1. CONNECT VENT FROM MAIN DUCT TO
2. HEAD TURNING
REAR TURNING TUBE.

SECTION 6 — DRIVE SYSTEM

6

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| | |
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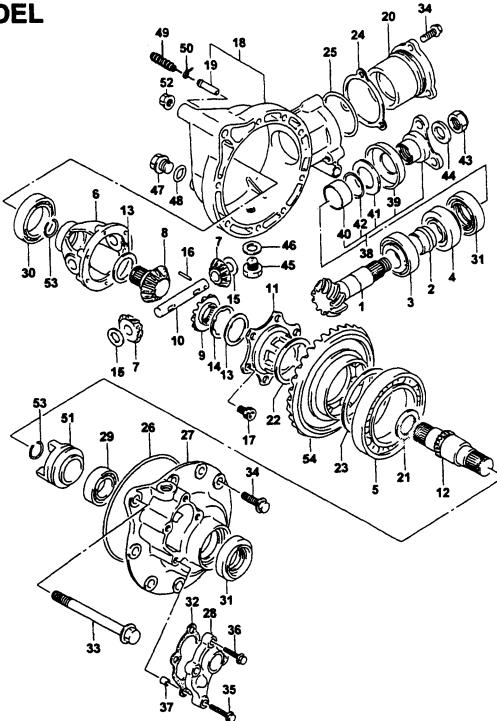
Differential/Axles Assembly Schematics

Fig. 6-1

FRONT GEAR ASSEMBLY - 300 cc 4x4 MODEL

KEY

| | |
|-----------------------------|-----------------------|
| 1. Drive Bevel Gear | 27. Driven Gear |
| 2. Spacer | Bearing Case |
| 3. Bearing | 28. Cover |
| 4. Bearing | 29. Bearing |
| 5. Bearing | 30. Bearing |
| 6. Differential Case | 31. Oil Seal |
| 7. Differential Side Pinion | 32. Case Cover Gasket |
| 8. Right Gear | 33. Cap Screw |
| 9. Left Gear | 34. Cap Screw |
| 10. Pinion Shaft | 35. Cap Screw |
| 11. Hub | 36. Cap Screw |
| 12. Driven Output Shaft | 37. Pin |
| 13. Washer | 38. Drive Bevel |
| 14. Washer | Gear Flange |
| 15. Washer | 39. Plate |
| 16. Pinion Shaft Pin | 40. Collar |
| 17. Cap Screw | 41. Oil Seal |
| 18. Differential Housing | 42. O-Ring |
| 19. Union | 43. Nut |
| 20. Drive Bevel Gear | 44. Washer |
| Housing | 45. Drain Plug |
| 21. Washer | 46. Gasket |
| 22. Shim Set - | 47. Filler Plug |
| Drive Bevel Gear | 48. O-Ring |
| 23. Shim Set - | 49. Bladder |
| Drive Gear Bearing | 50. Cable Tie |
| 24. Shim Set - Drive | 51. Dog |
| Bevel Housing | 52. Nut |
| 25. O-Ring | 53. Circlip |
| 26. O-Ring | 54. Driven Bevel Gear |



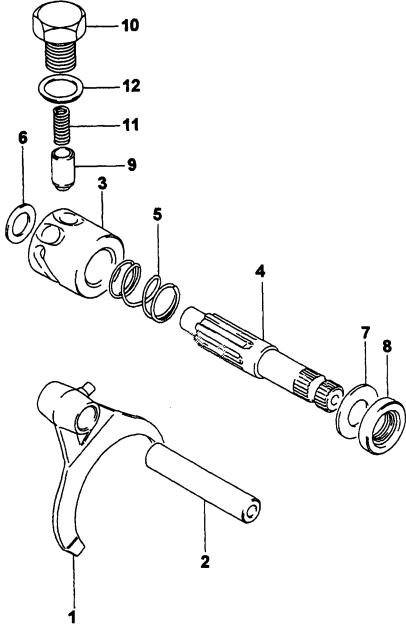
0733-758

Fig. 6-2

FRONT LOCK ASSEMBLY - 300 cc 4x4 MODEL

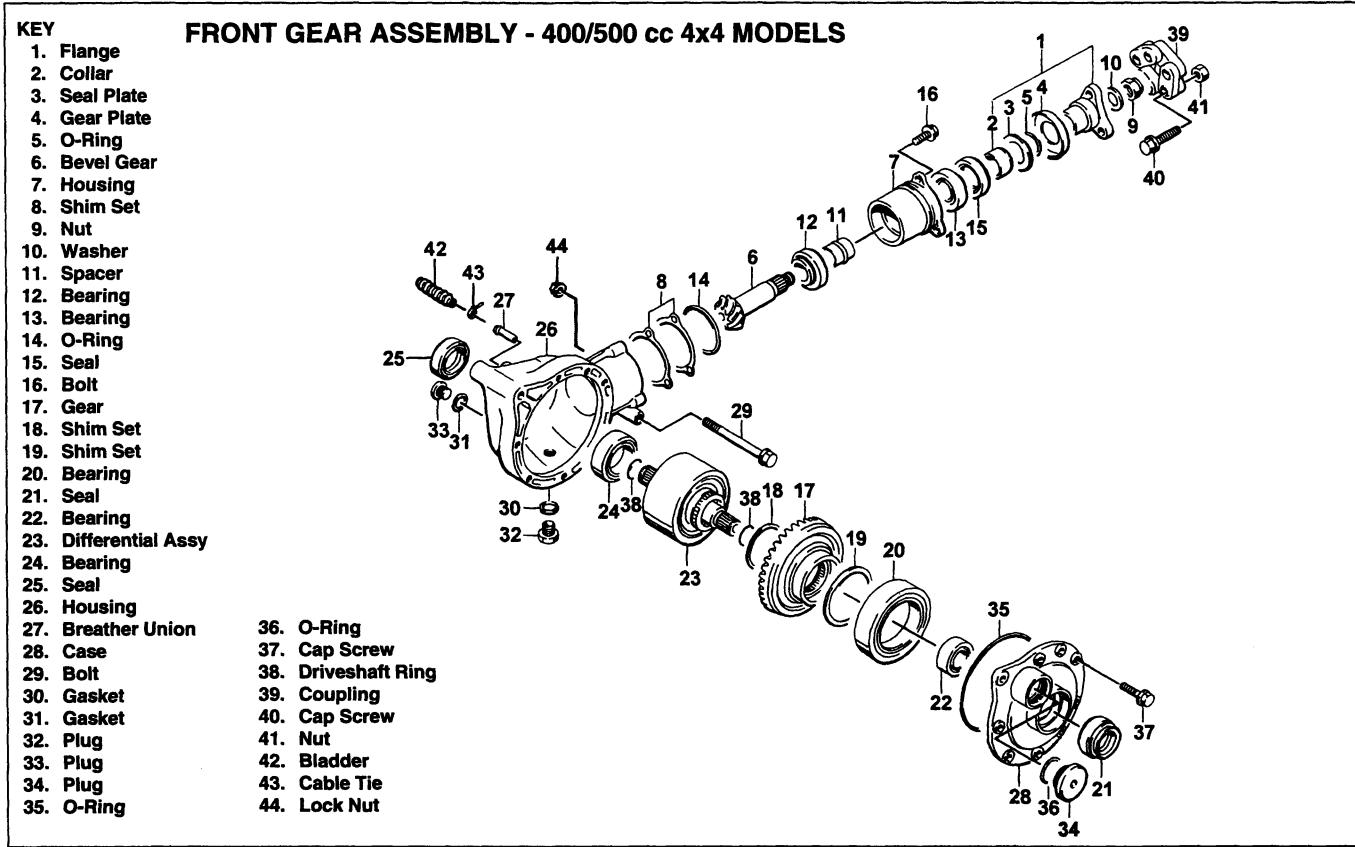
KEY

| |
|-----------------|
| 1. Locking Fork |
| 2. Fork Shift |
| 3. Locking Cam |
| 4. Camshaft |
| 5. Spring |
| 6. Washer |
| 7. Washer |
| 8. Oil Seal |
| 9. Stopper |
| 10. Housing |
| 11. Spring |
| 12. Gasket |



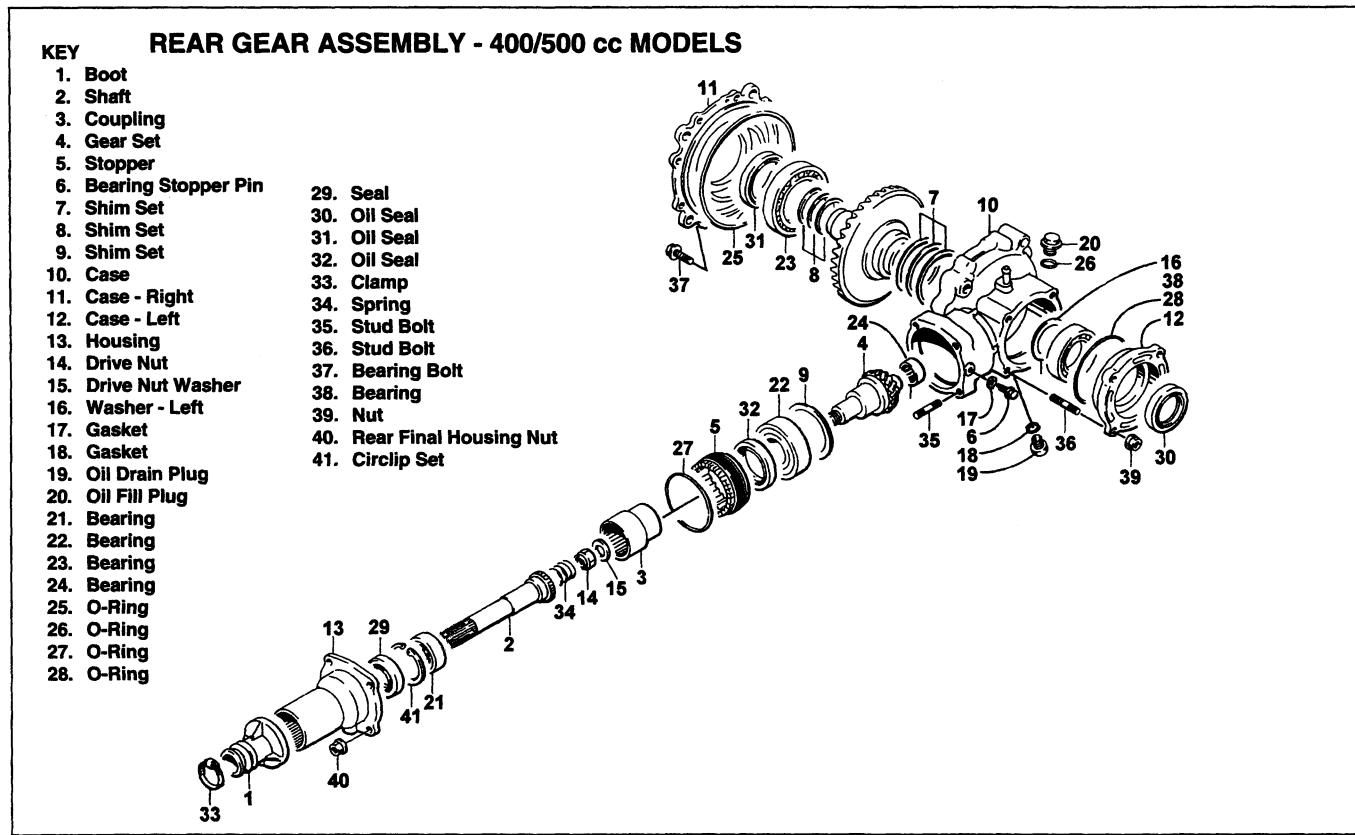
0733-759

Fig. 6-3



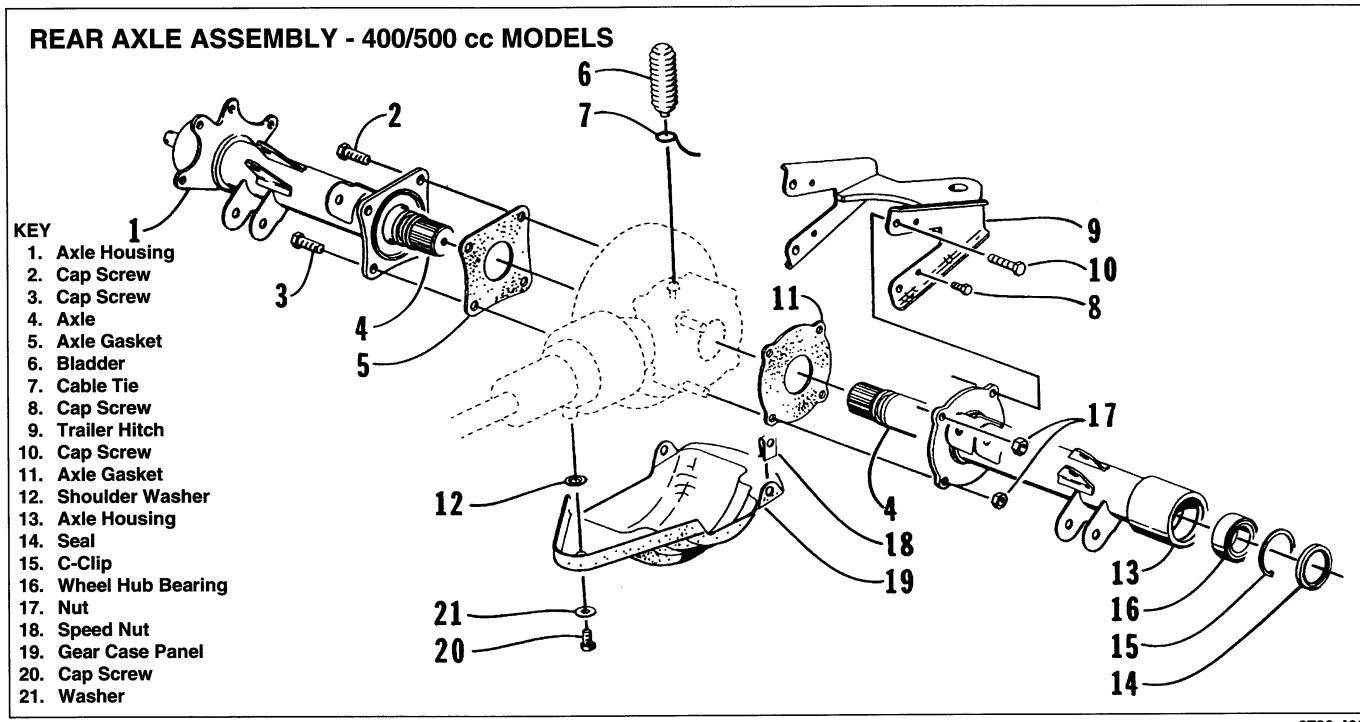
0733-412

Fig. 6-4



0732-319

Fig. 6-5



Front Differential (300 cc 4x4 Model)

The front differential is a non-serviceable component. If it is damaged or worn, it must be replaced as a complete unit.

REMOVING

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

WARNING

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

2. Remove the drain plug and drain the gear lubricant into a drain pan; then reinstall the plug.

Fig. 6-6



AF893D

3. Remove the wheels.
4. Remove the brake calipers. Account for the cap screws.

Fig. 6-7



AF894D

5. Remove the tie rod cotter pins.

Fig. 6-8



AF895D

6. Remove the tie rod lock nuts.

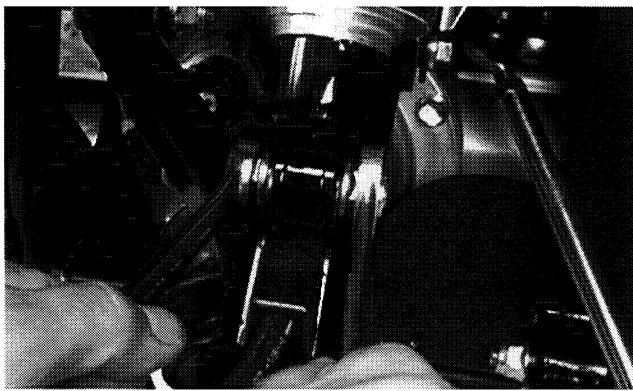
Fig. 6-9



AF896D

7. Remove the lower shock bolts. Account for the lock nuts.

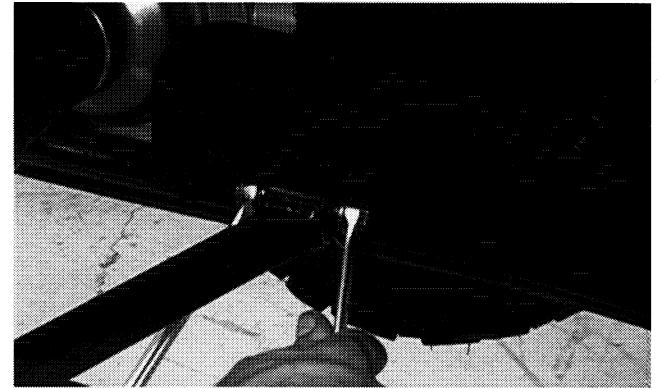
Fig. 6-10



AF897D

8. Remove the A-arm lock nuts and cap screws.

Fig. 6-11



AF898D

9. Using a slide-hammer, remove the front axles.

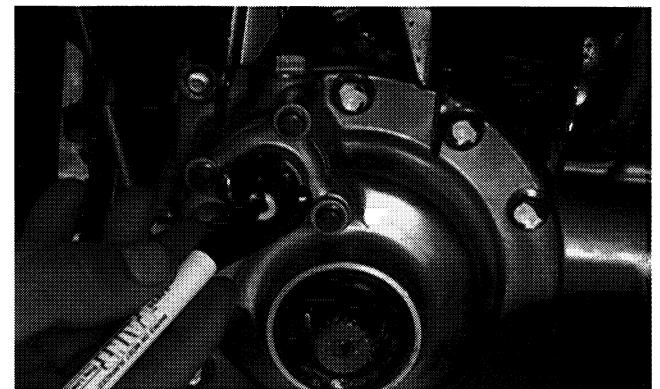
Fig. 6-12



AF899D

10. Mark the cam arm for assembly purposes.

Fig. 6-13

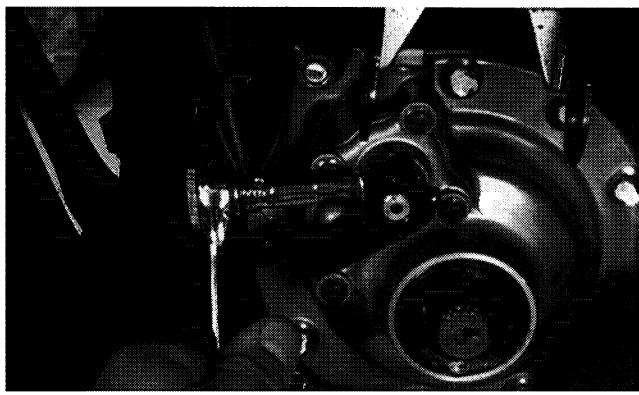


AF900D

11. Remove the cam arm.

6

Fig. 6-14



AF901D

12. Remove the inner fender panels.

Fig. 6-15

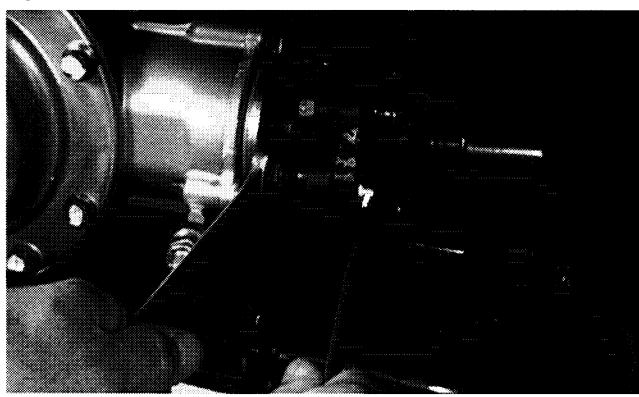


AF902D

■NOTE: To remove the panels, there will be a torx-head screw, a body washer, and cable ties per side.

13. Remove the coupler cap screws. Account for the lock nuts.

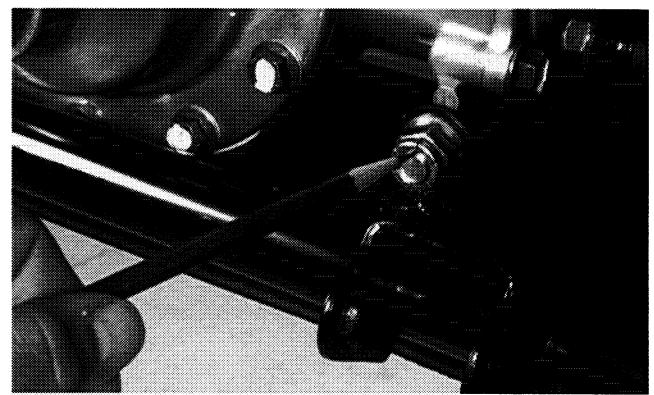
Fig. 6-16



AF903D

14. Remove the lower differential mounting cap screw. Account for a lock nut.

Fig. 6-17



AF904D

15. Remove the upper differential mounting cap screws.

Fig. 6-18



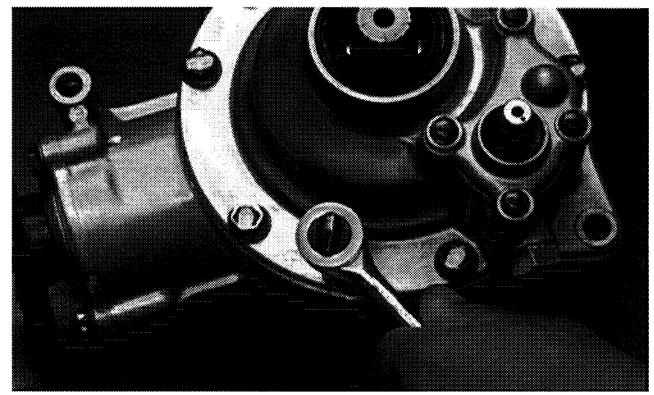
AF905D

16. Remove the differential from the frame.

DISASSEMBLING

1. Remove the cap screws securing the driven bevel gear housing cover.

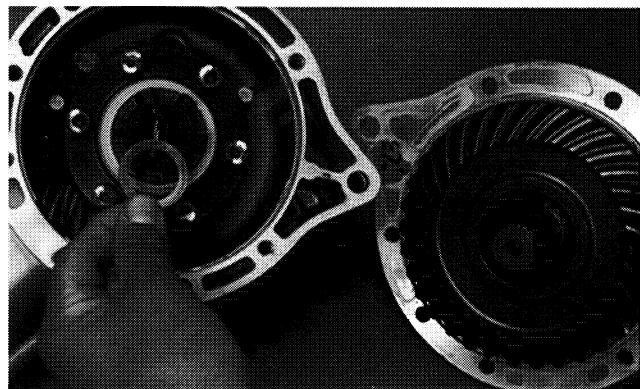
Fig. 6-19



AF799D

2. Remove driven bevel gear assembly from the differential housing; then account for any shims.

Fig. 6-20



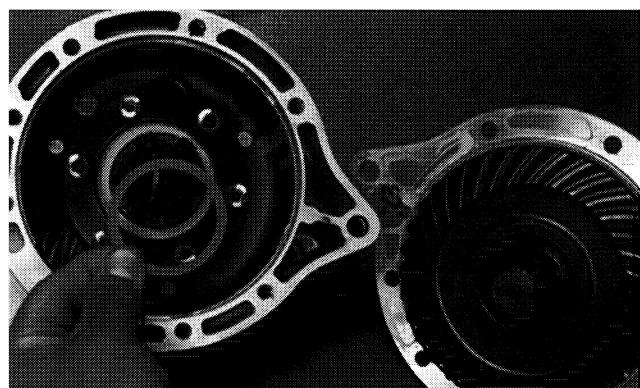
AF800D

Fig. 6-23



AF803D

Fig. 6-21



AF801D

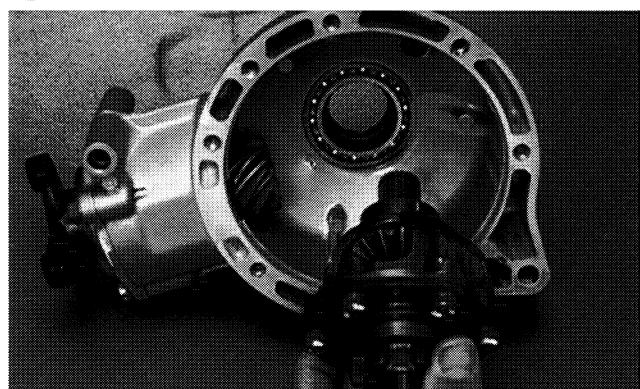
Fig. 6-24



AF804D

3. Remove the differential case assembly from the differential housing.

Fig. 6-22



AF802D

4. Remove the cap screws securing the drive bevel gear assembly from the differential housing.

6

Fig. 6-25



AF805D

5. Account for any shims and an O-ring.
6. Remove the nut securing the drive bevel gear.
7. Account for a flat washer.
8. Tap the drive bevel gear assembly free from its housing.

Fig. 6-26



AF806D

9. Remove the spacer from the drive bevel gear.

Fig. 6-27



AF807D

10. Remove the dust seal. Account for the bearing.

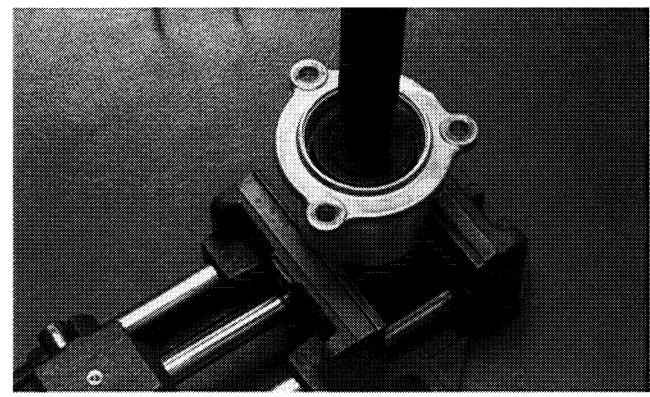
Fig. 6-28



AF808D

11. Remove the bearing cups from the drive bevel gear housing.

Fig. 6-29

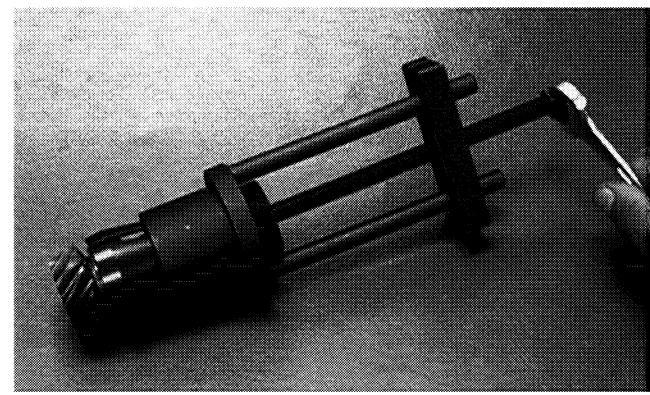


AF809D

■ NOTE: This step should be done only if the bearing cups need service.

12. Remove the bearing from the drive bevel gear shaft.

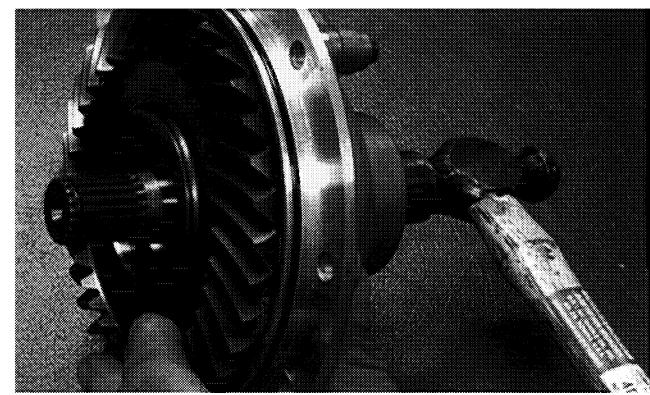
Fig. 6-30



AF810D

13. Remove the driven output shaft from the housing cover.

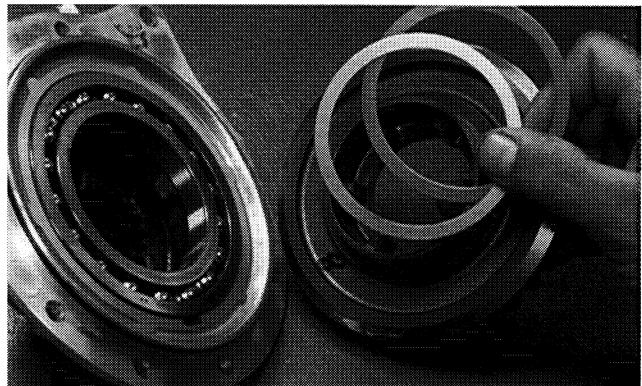
Fig. 6-31



AF811D

14. Remove the driven bevel gear and account for shims.

Fig. 6-32



AF812D

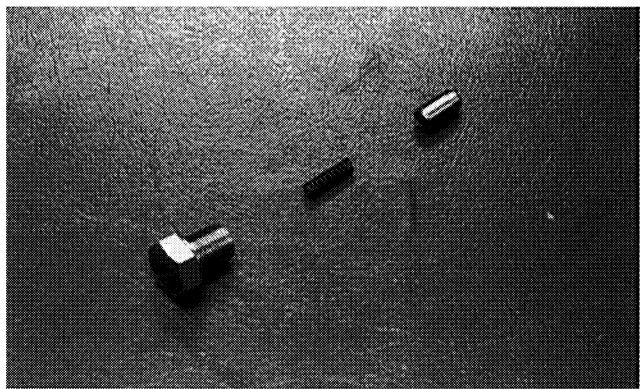
15. Remove the shift stopper detent assembly. Account for the stopper, spring, and gasket.

Fig. 6-33



AF813D

Fig. 6-34



AF814D

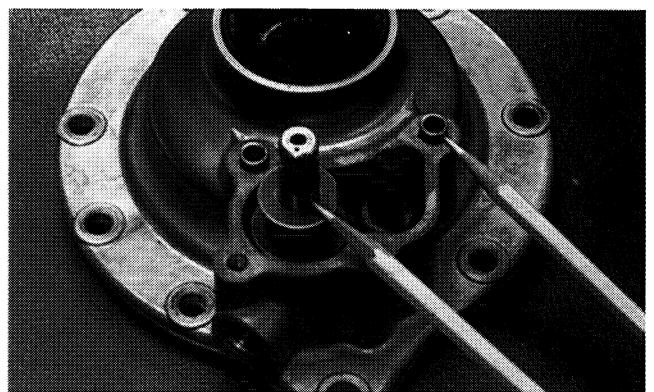
16. Remove the cap screws securing the selection lever cover to the housing cover. Account for alignment pins, a gasket, and a washer.

Fig. 6-35



AF815D

Fig. 6-36

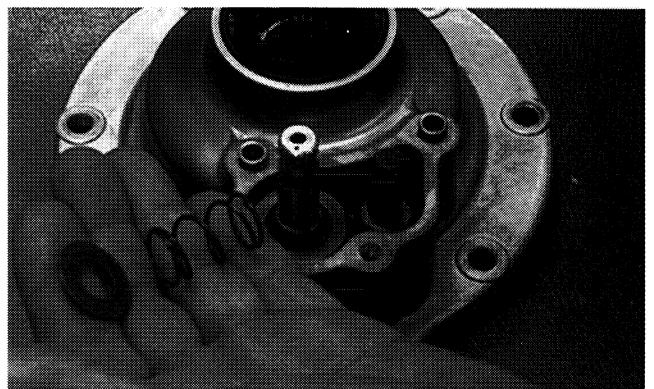


AF816D

17. Remove the washer and the spring from the camshaft.

6

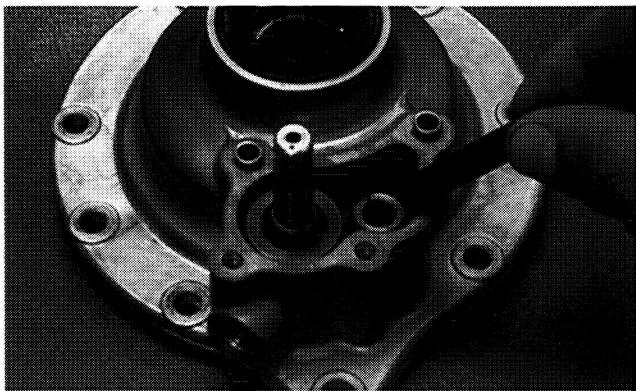
Fig. 6-37



AF817D

18. Remove the shift fork shaft.

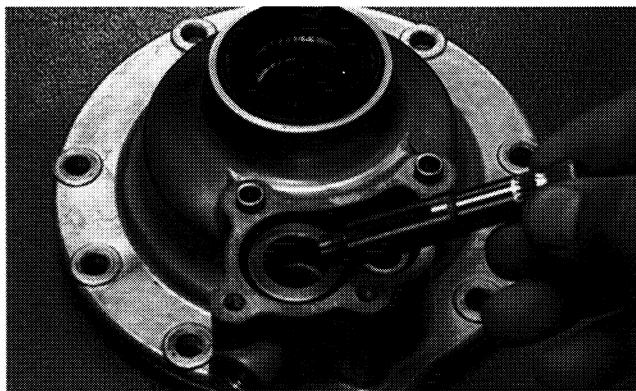
Fig. 6-38



AF818D

19. Remove the camshaft from the locking cam.

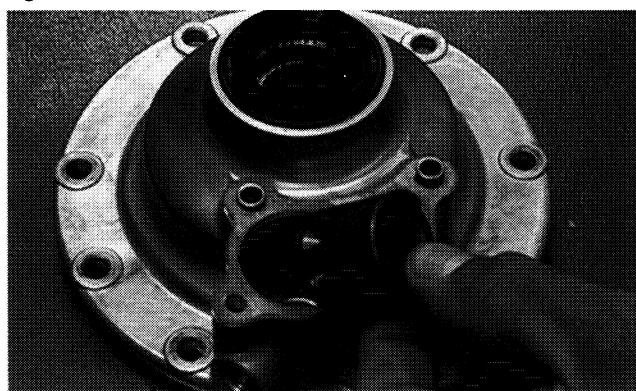
Fig. 6-39



AF819D

20. Remove the locking cam from the housing cover.

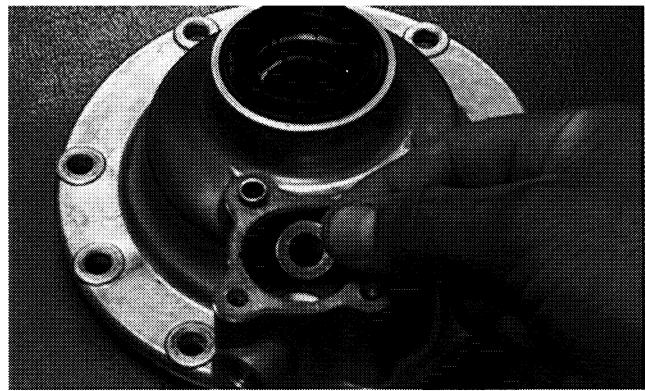
Fig. 6-40



AF820D

21. Remove the washer from the housing cover.

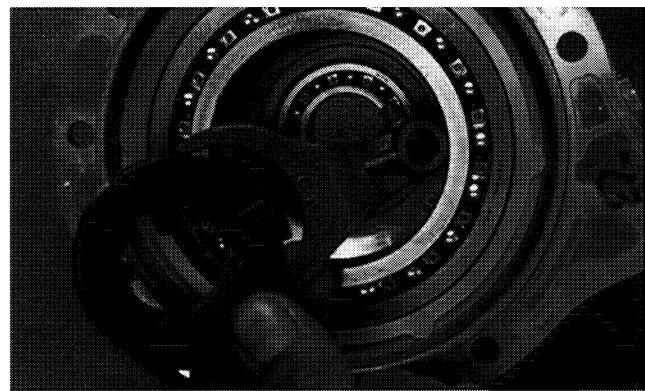
Fig. 6-41



AF821D

22. Turn the housing cover over; then remove the shift fork and the dog.

Fig. 6-42



AF822D

23. Remove the seal from the housing cover.

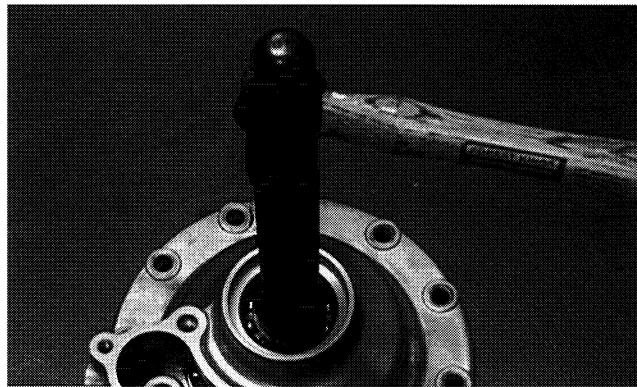
Fig. 6-43



AF823D

24. Remove the small bearing from the housing cover.

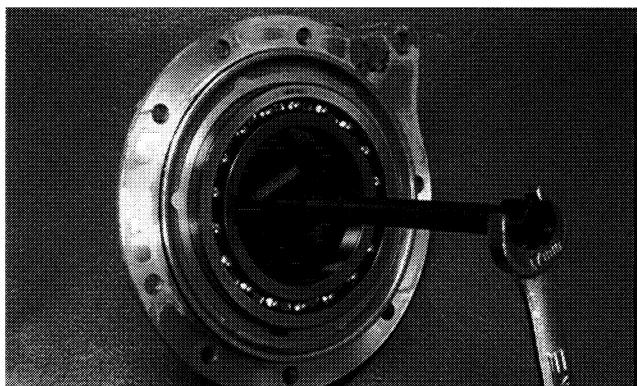
Fig. 6-44



AF824D

25. Remove the large bearing from the housing cover.

Fig. 6-45



AF825D

26. Remove the O-ring from the housing cover.

Fig. 6-46



AF826D

27. Remove the seal from the differential housing.

Fig. 6-47



AF827D

28. Remove the bearing from the differential housing.

Fig. 6-48



AF828D

29. Remove the oil level inspection plug and account for an O-ring.

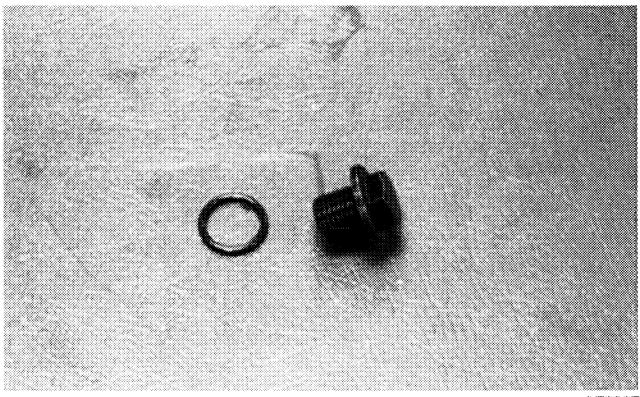
6

Fig. 6-49



AF829D

Fig. 6-50



AF830D

30. Remove the magnetic drain plug and account for the gasket.

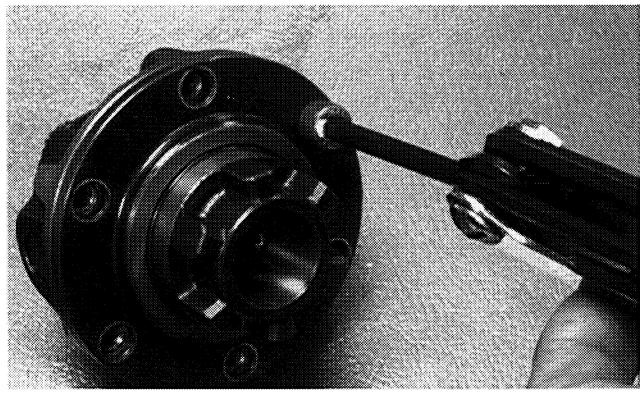
Fig. 6-51



AF831D

31. Remove the hex-head cap screws securing the differential gear case assembly.

Fig. 6-52



AF833D

32. Separate the hub from the differential gear case and account for any shims.

Fig. 6-53



AF834D

33. Separate the left-side gear from the side pinion gears.

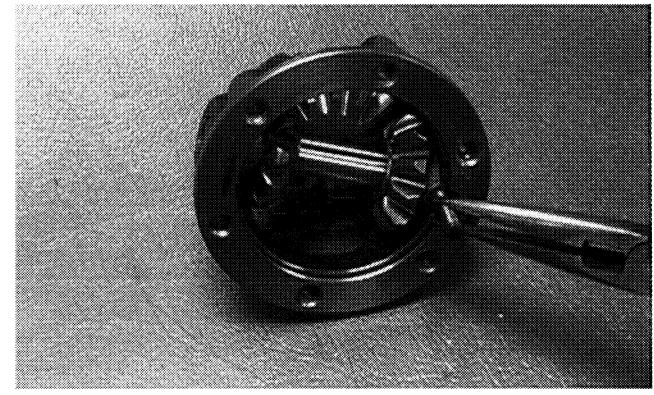
Fig. 6-54



AF835D

34. Remove the pinion shaft pin.

Fig. 6-55



AF836D

35. Remove the pinion shaft and account for two side pinion gears and washers.

Fig. 6-56

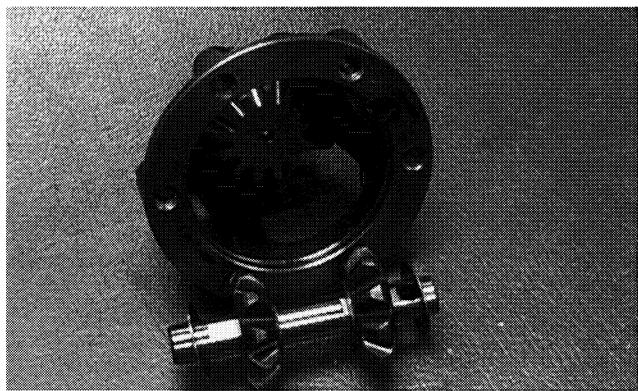


Fig. 6-59



36. Remove the right-side gear from the differential case and account for washer(s).

Fig. 6-57



Fig. 6-60



6

4. Inspect the shifter fork for wear, gouges, and straightness.

CLEANING AND INSPECTING

1. Clean all metallic components with parts-cleaning solvent.
2. Inspect all threaded holes for any damage.

Fig. 6-58

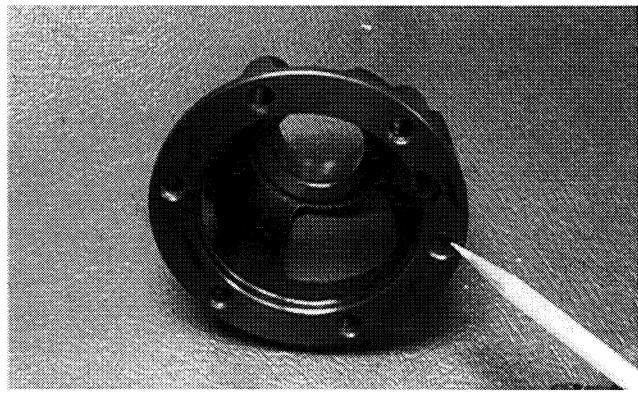


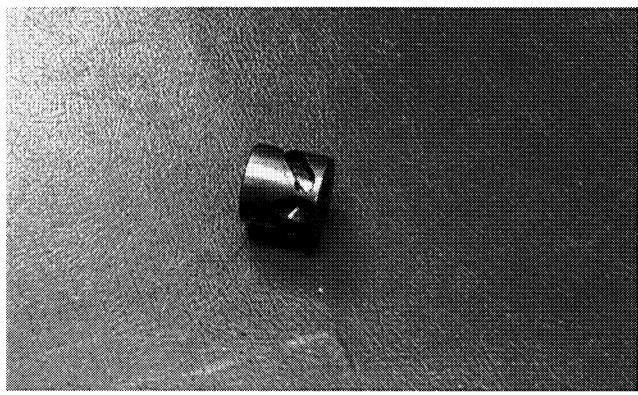
Fig. 6-61



3. Inspect all teeth on all gears and shafts for any chips, wear, or missing teeth. Replace as needed.

5. Inspect the locking cam for any abnormal wear or gouges.

Fig. 6-62



AF843D

6. Inspect the magnetic drain plug for damaged magnet and for damaged threads.

Fig. 6-63



AF832D

7. Inspect all bearings for abnormal wear, lack of lubrication, cracks, scoring, roughness, or missing ball bearings.

Fig. 6-64



AF844D

8. Inspect the O-ring groove in the housing cover.

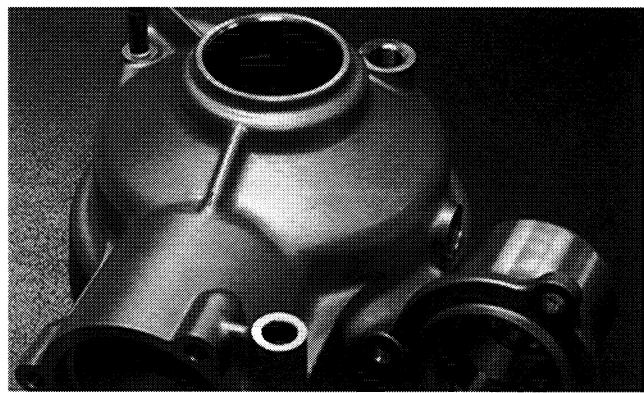
Fig. 6-65



AF845D

9. Inspect the differential housing and housing cover for cracks or porosity.

Fig. 6-66



AF850D

ASSEMBLING

1. Position the washer on the right-side gear; then install the right-side gear into the differential case.

Fig. 6-67



AF838D

2. While holding the differential case with the pinion shaft hole upward, insert the pinion shaft (with the alignment hole toward the top) through the differential case and through a washer, two gears, and another washer.

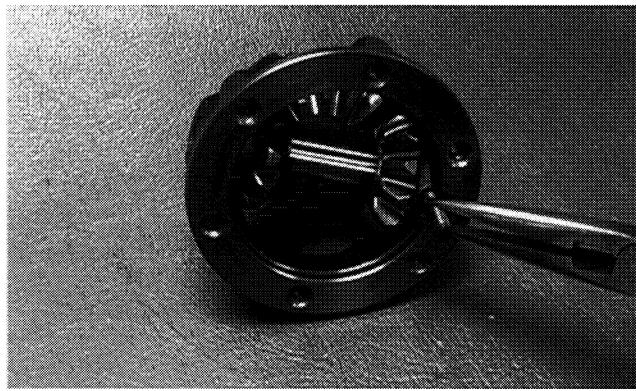
Fig. 6-68



AF837D

3. Install the pinion shaft pin.

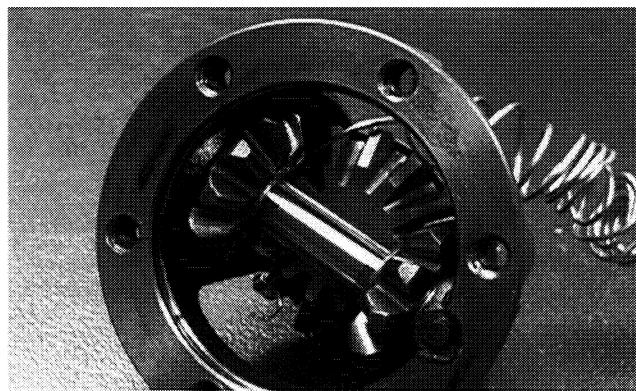
Fig. 6-69



AF836D

4. Measure gear teeth backlash using the following procedure.
 - A. Insert a 7.6 cm (3 in.) section of 0.5 mm (0.020 in.) solder between the teeth of the gears; then rotate the gears allowing the solder to be pulled through the gears.

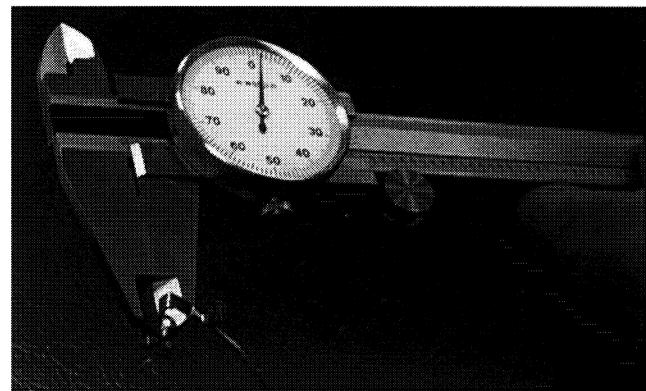
Fig. 6-70



AF846D

- B. Measure the flattened portion of the solder. Measurement must be between 0.05-0.10 mm (0.002-0.004 in.).

Fig. 6-71



AF847D

■ **NOTE: If the measurement is not within specification, the right-side gear must be shimmed.**

■ **NOTE: To determine which shim to use, measure the existing shim thickness; then using the existing shim as a guide, adjust backlash by referring to the Shim Chart.**

| SHIM CHART | |
|------------|----------------------|
| p/n | Thickness |
| 3423-294 | 0.8 mm (0.0315 in.) |
| 3423-295 | 1.0 mm (0.0394 in.) |
| 3423-296 | 1.2 mm (0.0472 in.) |

5. Position the shims on the left-side gear; then install the left-side gear into the hub. Place the hub assembly into the differential gear case.

6

Fig. 6-72



AF834D

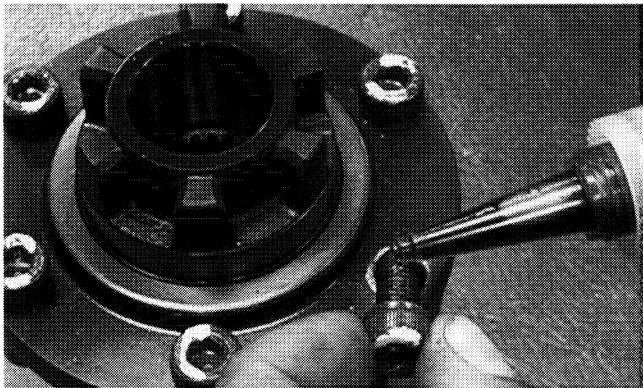
6. Measure gear case/hub clearance using the following procedure.

- A. Using a feeler gauge, measure clearance at 3, 6, 9, and 12 o'clock positions.
- B. Measurements must be between 0.4-0.6 mm (0.016-0.024 in.).

■ **NOTE: If measurements are not within specification, the gear case and hub must be shimmed (see Shim Chart).**

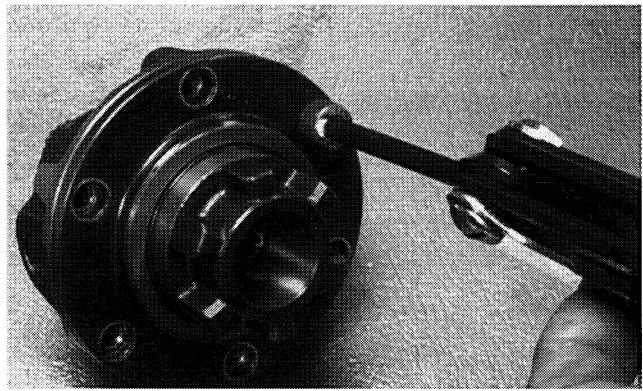
7. Apply green Loctite #270 to the Allen-head screws; then secure the differential gear case to the hub. Tighten to 2.3-3 kg-m (16.5-22 ft-lb).

Fig. 6-73



AF849D

Fig. 6-74



AF833D

8. Install the magnetic drain plug with the gasket. Tighten to 2.7 kg-m (20 ft-lb).

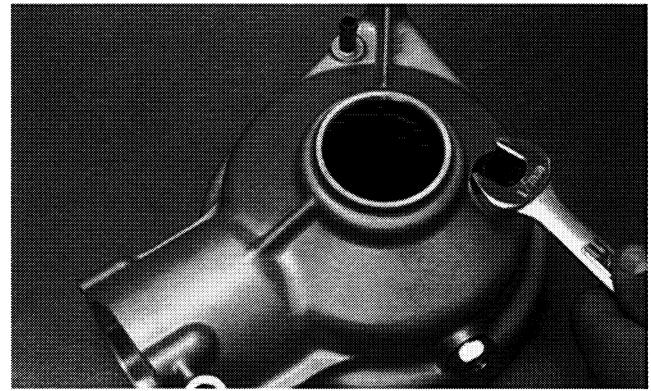
Fig. 6-75



AF831D

9. Install the oil level inspection plug with the O-ring. Tighten to 2.7 kg-m (20 ft-lb).

Fig. 6-76



AF829D

10. Install the bearing into the differential housing.

Fig. 6-77



AF851D

11. Install the seal into the differential housing.

Fig. 6-78

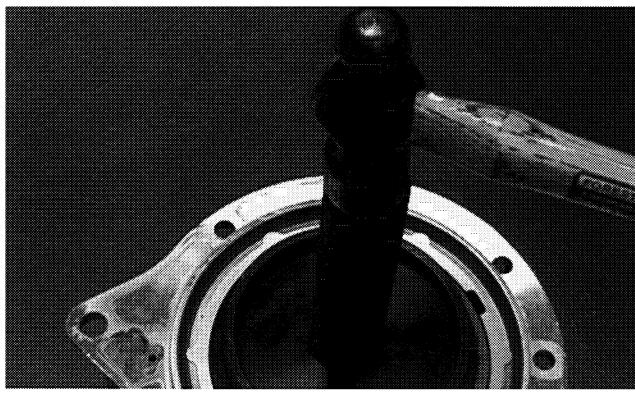


AF852D

12. Using Arctic Cat Low Temp Grease (p/n 0636-593), grease the lips of the seal.

13. Install the large bearing into the housing cover.

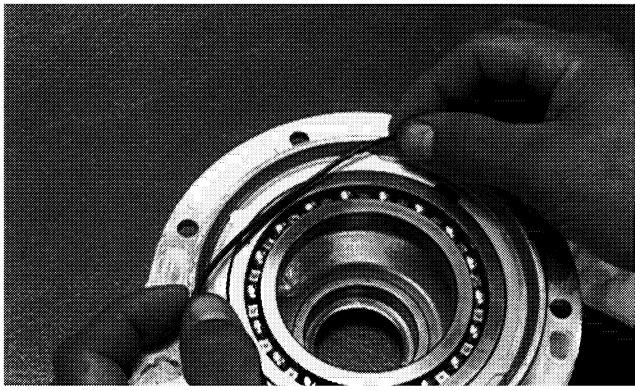
Fig. 6-79



AF853D

14. Install the O-ring into the groove of the housing cover.

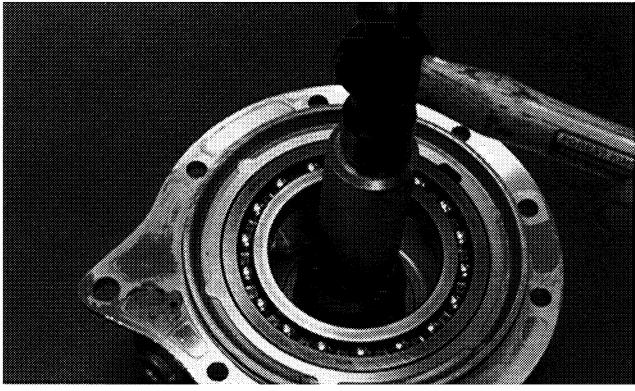
Fig. 6-80



AF854D

15. Install the small bearing into the housing cover.

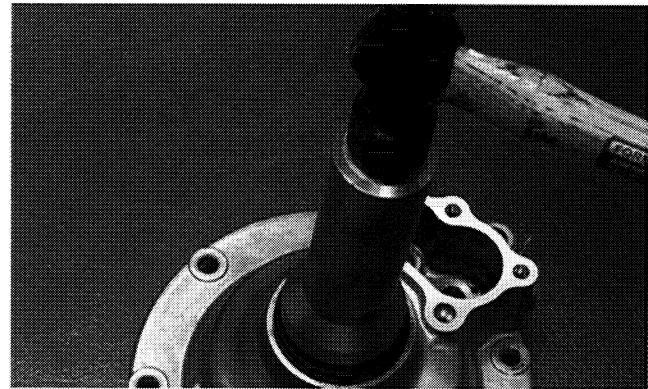
Fig. 6-81



AF855D

16. Install the seal into the housing cover.

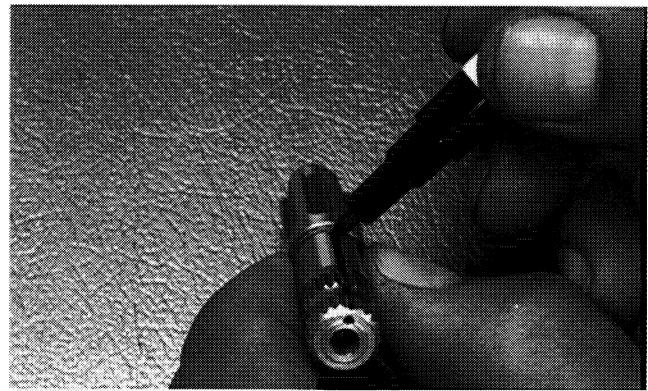
Fig. 6-82



AF856D

17. Using a marker, draw a reference line on the camshaft in line with the alignment dot.

Fig. 6-83



AF857D

18. Using a marker, draw a reference line on the locking cam.

Fig. 6-84



AF858D

■ **NOTE:** This reference mark should be drawn on the right side of the first detent which is next to the shift fork locating pin groove.

19. While holding the camshaft with the detents facing downward, install the camshaft into the locking cam making sure the alignment lines are aligned.

■ **NOTE:** The locking cam detent must be in the downward position.

Fig. 6-85



AF859D

20. Install the washer onto the bottom end of the camshaft.

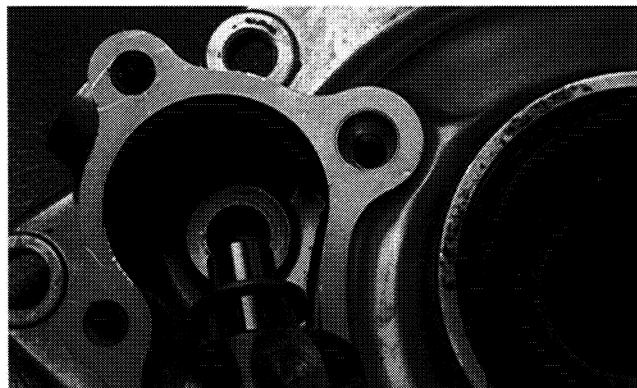
Fig. 6-86



AF860D

21. Install the camshaft assembly into the housing cover.

Fig. 6-87



AF861D

22. Install the shift fork and the dog into the housing cover.

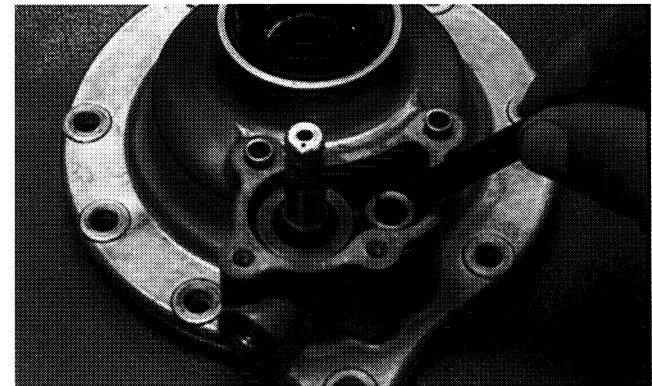
Fig. 6-88



AF822D

23. Install the shift fork shaft through the shift fork and into the housing cover making sure the shift fork locating pin is positioned into the groove of the locking cam.

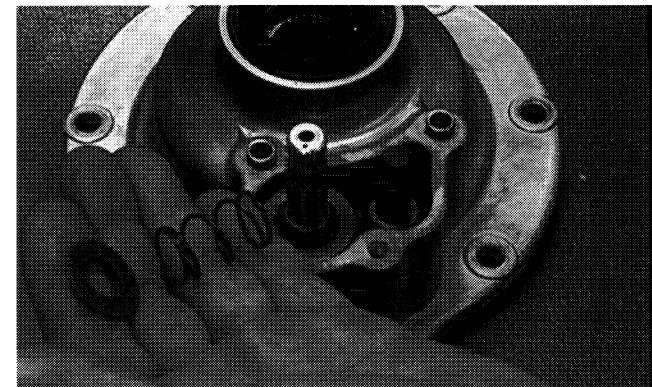
Fig. 6-89



AF818D

24. Install the spring and washer onto the camshaft.

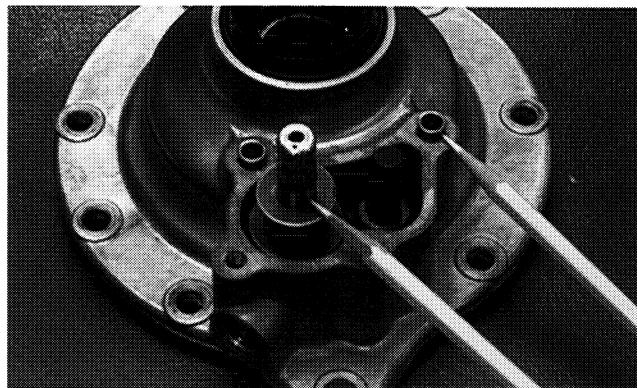
Fig. 6-90



AF817D

25. Install the alignment pin, gasket, and washer.

Fig. 6-91



AF816D

26. Using low temperature grease, grease the lips of the seal; then install the selection lever cover and seal assembly onto the differential housing. Secure with the cap screws tightened to 1.1 kg-m (8 ft-lb).

Fig. 6-92



AF815D

■ NOTE: The two longer cap screws must be positioned next to the large seal.

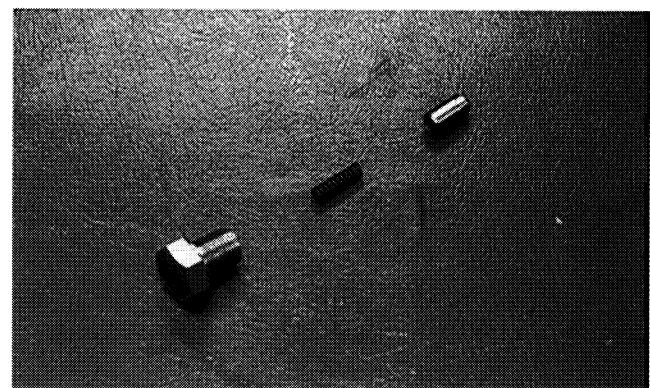
Fig. 6-93



AF862D

27. Install the spring and stopper into the differential housing.

Fig. 6-94



AF814D

Fig. 6-95

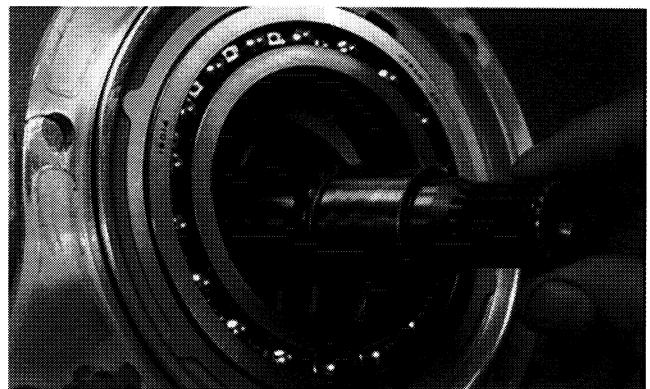


AF813D

28. Install the differential housing assembly with the gasket onto the housing cover. Tighten the cap screws to 1.1 kg-m (8 ft-lb).
29. Install the driven output shaft through the dog and into the housing cover.

6

Fig. 6-96



AF863D

30. Install the bearing onto the bevel gear shaft.

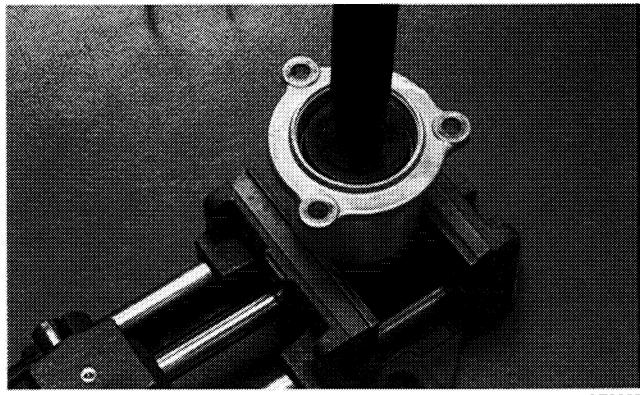
Fig. 6-97



AF864D

31. If the bearing cups were removed, install them into the bevel gear housing.

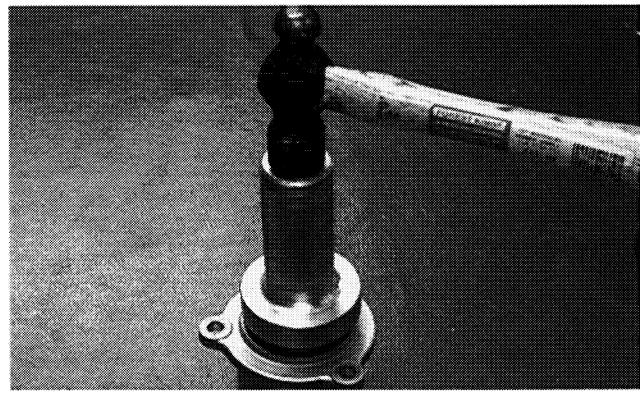
Fig. 6-98



AF809D

32. Install the bearing and the dust seal; then apply low temperature grease to the seal.

Fig. 6-99



AF865D

33. Install the spacer onto the bevel gear.

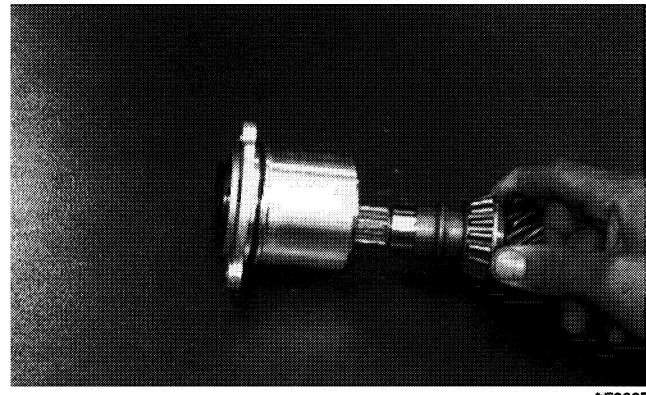
Fig. 6-100



AF807D

34. Install the drive bevel gear assembly into its housing.

Fig. 6-101



AF866D

35. Place the drive bevel gear flange onto the case housing and place the washer onto the shaft; then apply green Loctite #270 to the nut and tighten to 11-13 kg-m (79.5-94 ft-lb).

Fig. 6-102



AF805D

36. Place any shims removed onto the drive bevel gear assembly, place the O-ring into the groove, and apply low temperature grease to the O-ring; then install the drive bevel gear assembly into the differential housing.

- Secure the drive bevel gear assembly with the cap screws coated with green Loctite #270. Tighten to 2.8 kg-m (20 ft-lb).

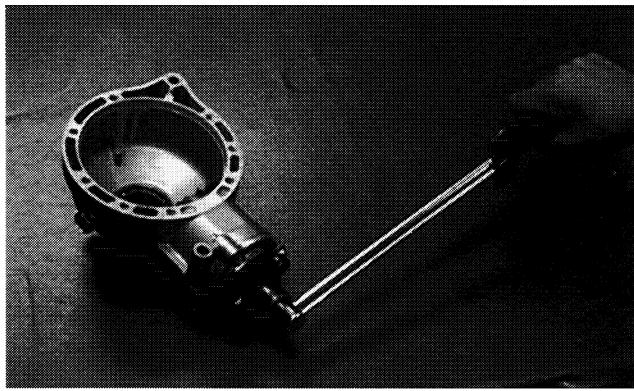
Fig. 6-103



AF803D

- Rotate the drive bevel gear flange clockwise and counterclockwise a number of rotations to seat the bearing; then using a torque wrench, determine the exact in.-lb needed to rotate the shaft.

Fig. 6-104



AF867D

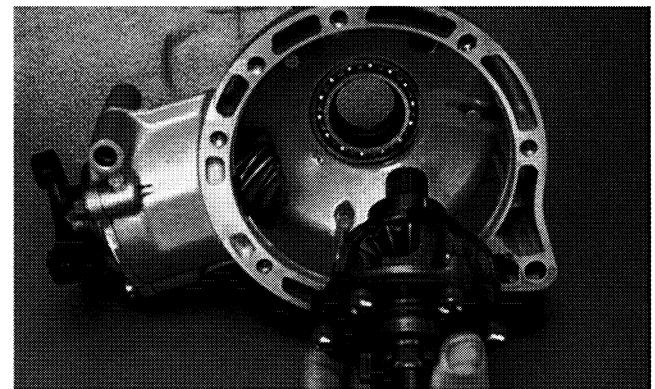
- The maximum preload must be within a range of 5-9 kg-cm (4.3-7.8 in.-lb). If the preload is beyond the specified range, the drive bevel gear nut must be loosened and tightened to 9-11 kg-m (65-79.5 ft-lb).

■ NOTE: After the nut has been tightened, redo the preload range test to verify the preload range.

■ NOTE: If the bearing(s) or shim(s) have been replaced, the backlash must be checked and adjusted if necessary.

- Install the differential case assembly into the differential housing.

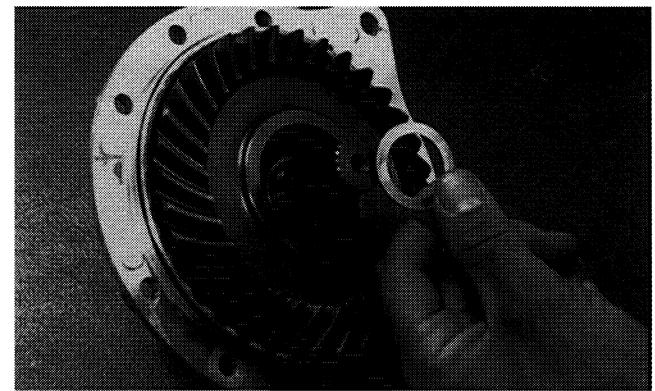
Fig. 6-105



AF802D

- Place any small shim(s) removed onto the differential housing cover driven output shaft; then place any large shim(s) removed onto the differential case assembly. Install the differential case assembly into the differential housing.

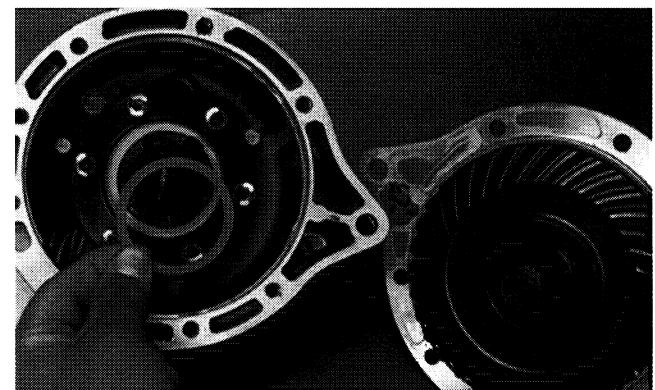
Fig. 6-106



AF869D

6

Fig. 6-107

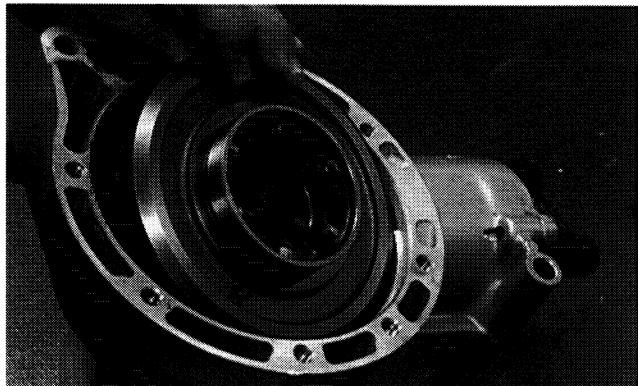


AF801D

- Check drive bevel gear/driven bevel gear backlash using the following procedure.

- Install the driven bevel gear into the differential housing.

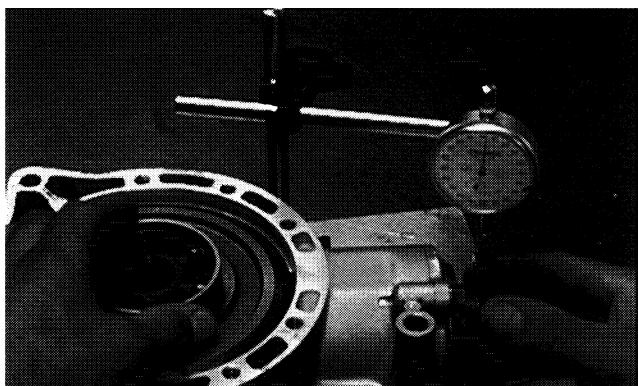
Fig. 6-108



AF870D

- B. Using a suitable cylindrical stand (such as a bearing driver or a roll of duct tape) as a work fixture, place the differential housing onto a surface plate.
- C. Mount a magnetic-based dial indicator on the surface plate; then place the contact point on one ear of the drive bevel gear flange.

Fig. 6-109



AF871D

- D. Rotate the drive bevel gear back and forth and note the total indicator runout.
- E. Maximum runout must be within a range of 0.00-0.05 mm (0.00-0.002 in.).

■ NOTE: If the backlash range is not within tolerance, remove or add shim(s) on the drive bevel gear assembly. Adding shim(s) will increase backlash; removing shim(s) will decrease backlash.

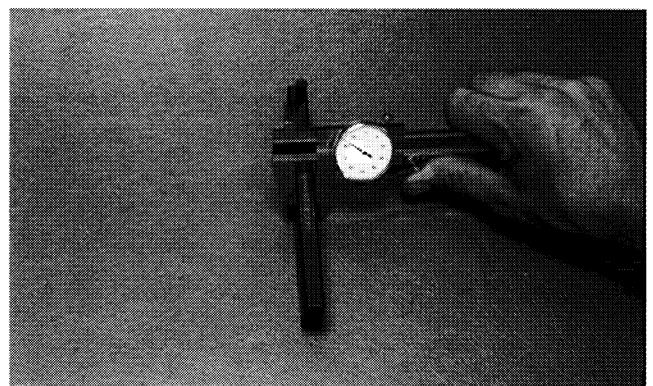
Fig. 6-110



AF804D

43. Check driven bevel gear/driven output shaft bearing clearance using the following procedure.
 - A. Measure the width of a suitable straightedge; then record the width measurement.

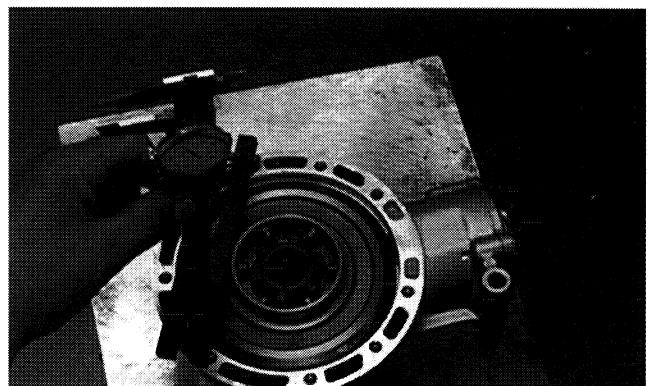
Fig. 6-111



AF873D

- B. Using a calipers, measure the depth from the straightedge to the driven bevel gear.

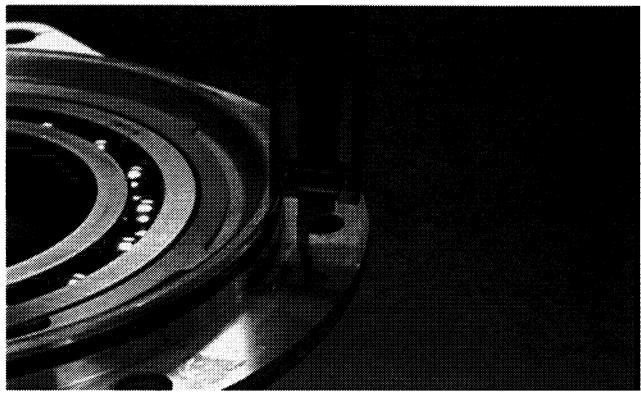
Fig. 6-112



AF872D

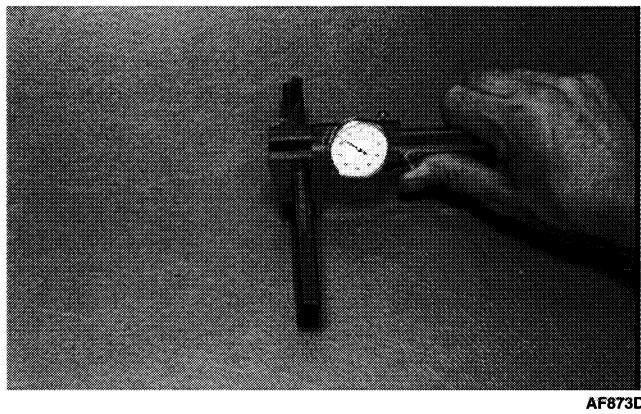
- C. After subtracting the width of the straightedge, record the driven bevel gear depth.
- D. Using a calipers, measure the height of the driven output shaft bearing housing cover; then record the height measurement.

Fig. 6-113



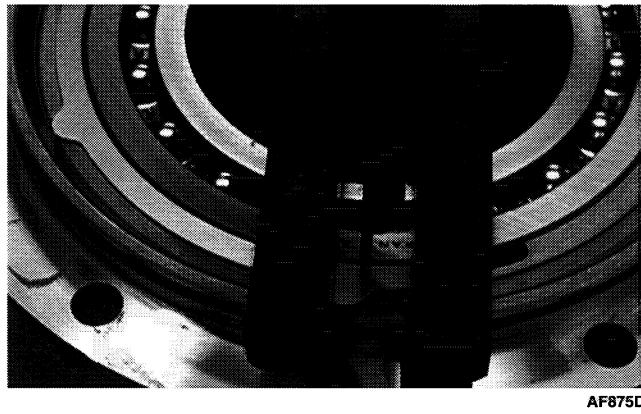
E. Measure the width of a suitable straightedge; then record the width measurement.

Fig. 6-114



F. Using a calipers, measure the height from the straightedge to the driven shaft output bearing race.

Fig. 6-115



G. After subtracting the width of the straightedge, record the driven output shaft bearing race height.

H. Subtract the driven output shaft bearing race height from the driven output shaft bearing housing cover height; then record the measurement.

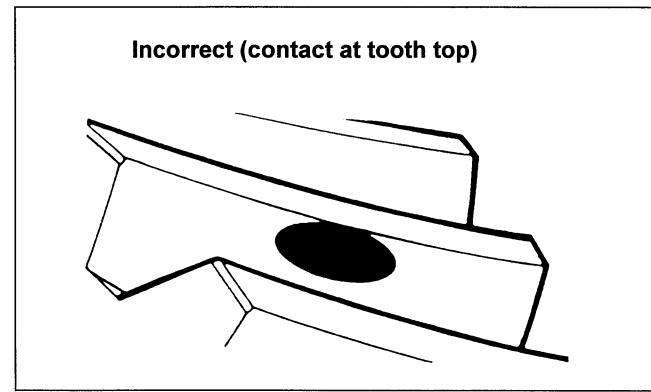
I. The difference between the measurement recorded in step C and the measurement recorded in step H determines the size of the shim to use.

■ **NOTE:** As an example, if the final driven bevel gear depth measurement (from step C) is 0.195 in. and the final driven output shaft bearing race height measurement (from step H) is 0.158 in., the difference is 0.037 in. and an 0.020 in. shim and an 0.016 in. shim must be used to bring the clearance within tolerance.

44. Check gear tooth contact using the following procedure.

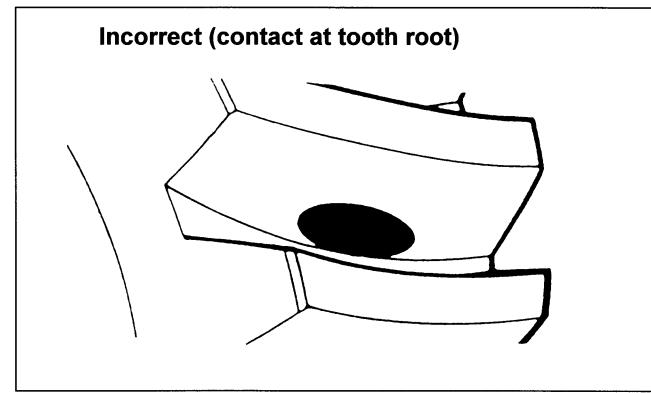
- Clean the gear teeth of old oil and grease residue.
- Apply a thin, even coat of a machinist-layout dye to several teeth of the gear.
- Rotate the gear several revolutions in both directions.
- Examine the tooth contact pattern in the dye and compare the pattern to the illustrations.

Fig. 6-116



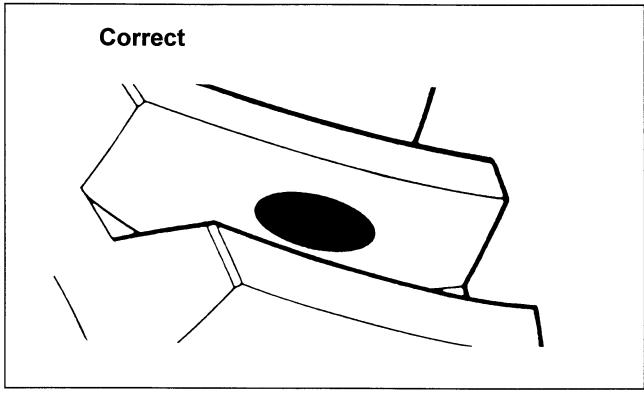
6

Fig. 6-117



6-23

Fig. 6-118



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

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

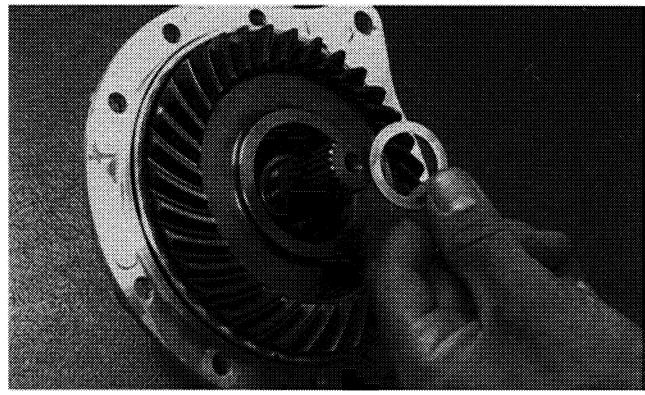
E. If tooth contact pattern is comparable to an incorrect pattern illustration, shim the drive bevel gear housing assembly according to the chart.

Fig. 6-119



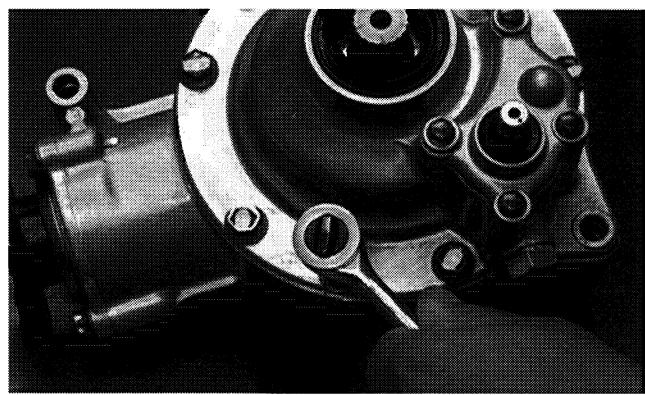
45. Place the appropriate shim on the driven bevel gear, place the driven output shaft through the dog and into the differential cover, and place the washer onto the shaft.

Fig. 6-120



46. Apply Three Bond Sealant (p/n 0636-070) onto the mating surface of the housing cover; then carefully assembly the differential housing and housing cover.
47. Secure the housing cover/differential housing with the cap screws coated with green Loctite #270 tightened to 1.7 kg-m (12 ft-lb).

Fig. 6-121



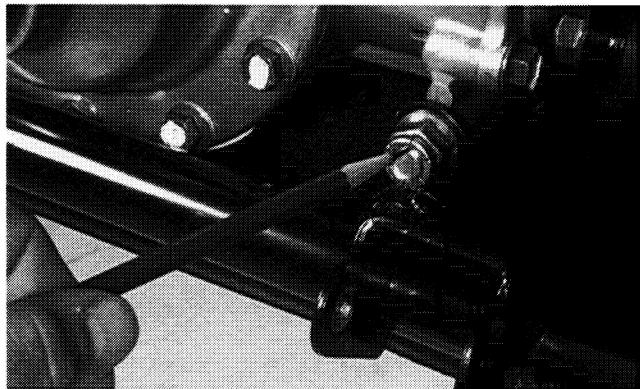
INSTALLING

1. Place the differential into position on the frame and install the cap screws (coated with red Loctite #271) and lock nut. Tighten to 5.5 kg-m (40 ft-lb).

Fig. 6-122



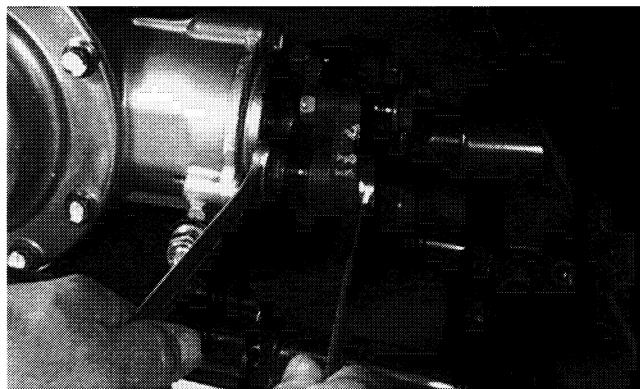
Fig. 6-123



AF904D

2. Secure the coupler with cap screws (coated with red Loctite #271) and lock nuts. Tighten to 5.5 kg-m (40 ft-lb).

Fig. 6-124



AF903D

3. Install the inner fender panels.

Fig. 6-125

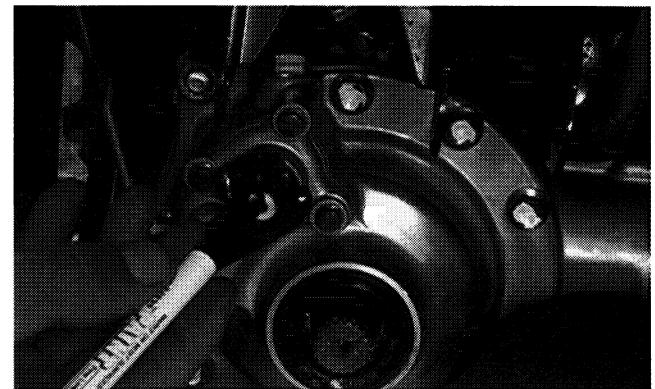


AF902D

■ NOTE: To secure the side panels, use a torx-head screw, a body washer, and cable ties per side.

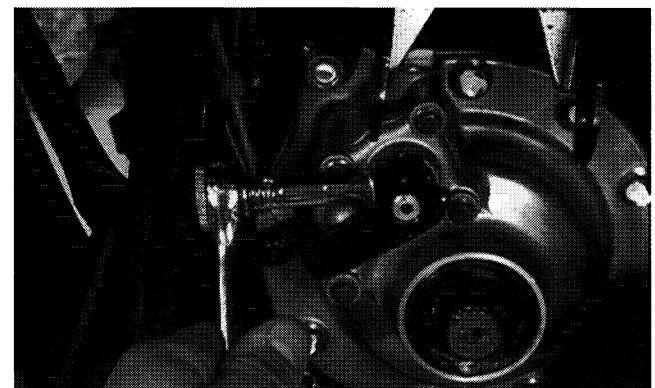
4. Install the cam arm making sure the marks made during removing align.

Fig. 6-126



AF900D

Fig. 6-127



AF901D

5. Install the front axles.
6. Secure the A-arms with cap screws and lock nuts. Tighten to 4.8 kg-m (35 ft-lb).

6

Fig. 6-128



AF898D

7. Secure the lower shock eyelets with cap screws and lock nuts. Tighten to 4.8 kg-m (35 ft-lb).

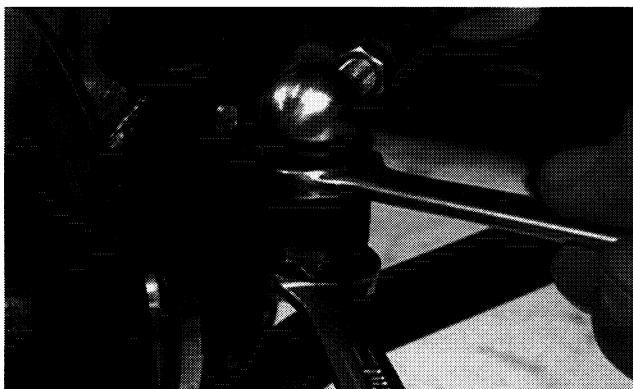
Fig. 6-129



AF897D

8. Secure the tie rods with the lock nuts. Tighten to 4.2 kg-m (30 ft-lb); then install and spread the cotter pins.

Fig. 6-130



AF896D

Fig. 6-131



AF895D

9. Install the brake calipers. Secure with the cap screws tightened to 2.8 kg-m (20 ft-lb).

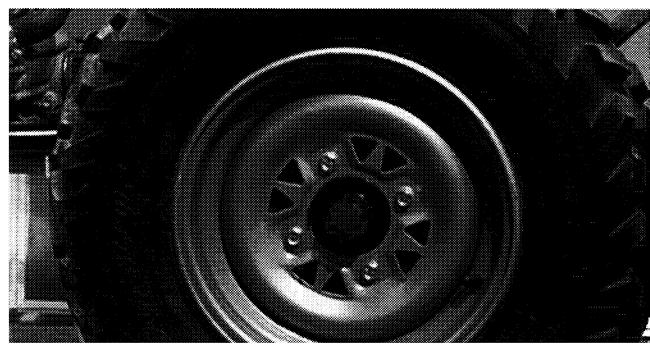
Fig. 6-132



AF894D

10. Install the wheels and tighten the cap screws to 6.9 kg-m (50 ft-lb).

Fig. 6-133



AF611D

11. Pour the recommended amount of SAE 80W-90 hypoid lubricant into the differential and install the filler plug. Tighten to 2.2 kg-m (16 ft-lb).

12. Remove the ATV from the support stand.

Drive Axles (300 cc 4x4 Model)

REMOVING

1. Remove the drive axles.

CLEANING AND INSPECTING

■ NOTE: Always clean and inspect the drive axle components to determine if any service or replacement is necessary.

1. Using a clean towel, wipe away any oil or grease from the axle components.

Fig. 6-134



AF883D

2. Inspect boots for any tears, cracks, or deterioration.

■ NOTE: If a boot is damaged in any way, it must be replaced with a boot kit.

3. Inspect clamps for looseness or damage; replace as necessary.

DISASSEMBLING

1. Loosen the large clamp and slide it off the boot.

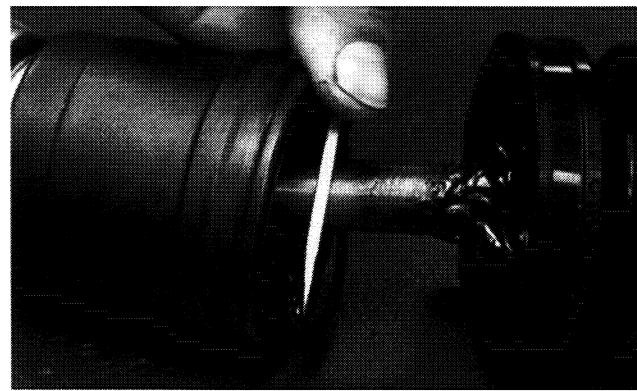
Fig. 6-135



AF884D

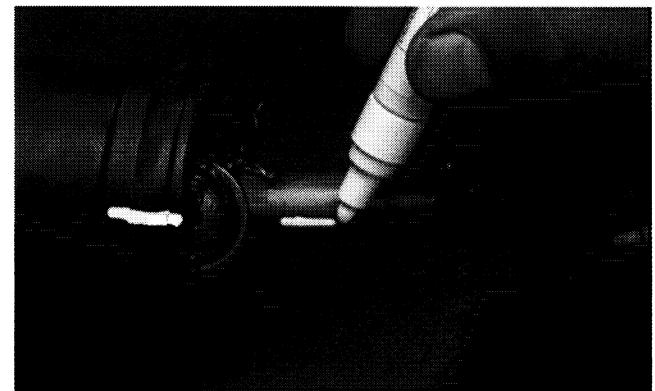
2. Wipe away excess grease to access the retaining ring. Using an awl or circlip pliers, remove the circlip; then mark the housing to the bearing ring.

Fig. 6-136



AF885D

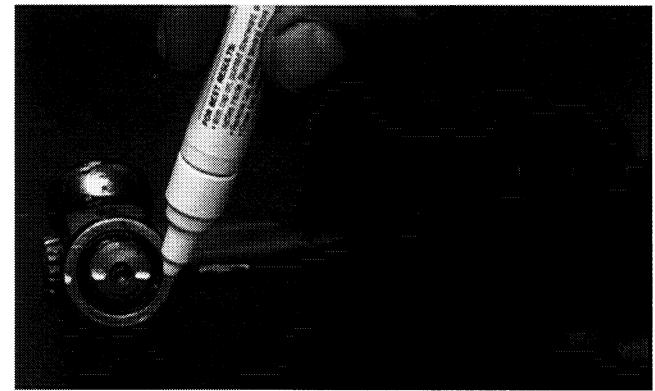
Fig. 6-137



AF886D

3. Mark the bearing ring to the shaft.

Fig. 6-138



AF887D

4. Using a snap ring pliers, remove the circlip securing the bearing ring to the shaft.

Fig. 6-139



AF888D

5. Note the difference inside each bearing ring end for assembly purposes; then remove the bearing ring.

■ NOTE: The end without splines must face inward.

6

Fig. 6-140



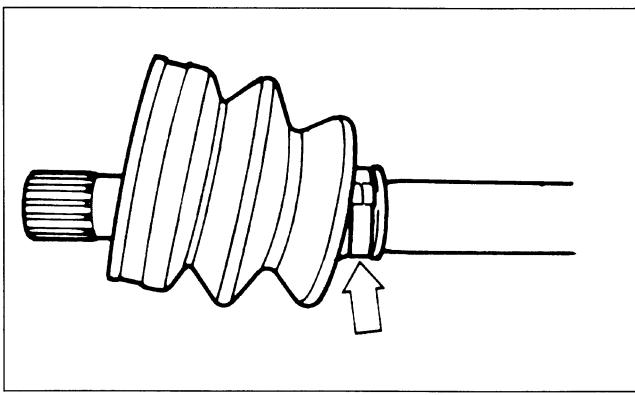
AF890D

6. Inspect the splines of the shaft, the bearing ring, and the housing for damage.

■ NOTE: If any damage is apparent to the splines, the bearing ring, and/or the housing, the drive axle must be replaced as an assembly.

7. Loosen the small clamp and slide the clamp and boot off the shaft.

Fig. 6-141



ATV-1048

■ NOTE: At this point if the outer boot is damaged, continue with step 8.

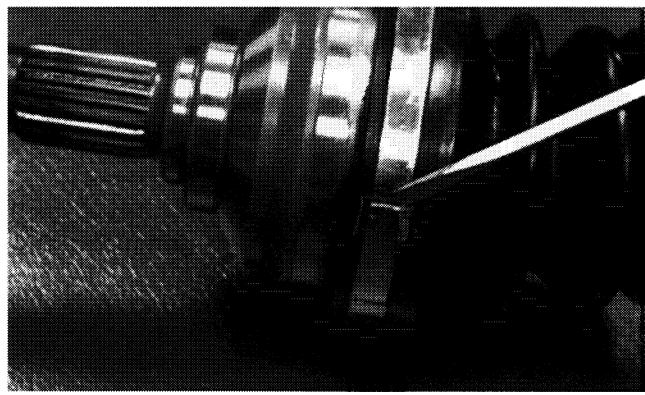
8. Loosen both outer boot clamps and slide the outer boot off the shaft. Note the position of the different-sized clamps for installation purposes.

Fig. 6-142



AF891D

Fig. 6-143



AF892D

9. Apply grease from the kit into the knuckles and the new outer boot.

■ NOTE: The large grease pack is for the inner drive axle bearing and boot assembly.

10. Slide the new outer boot onto the shaft with the new clamps positioned as shown. Note the different-sized clamps from removal.

■ NOTE: The boot is positioned correctly when the small end of the boot seats down into the recessed groove.

11. Secure both outer boot clamps.

 **CAUTION**

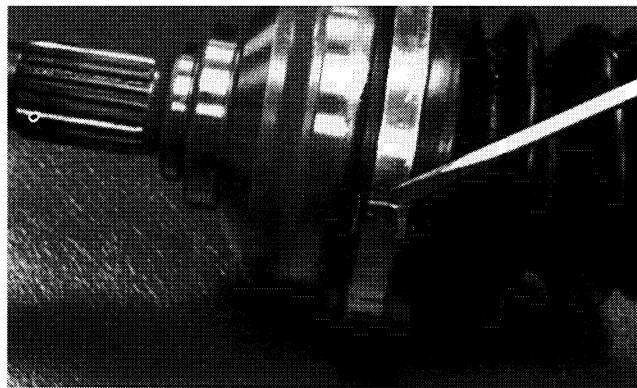
It is important that the clamps are positioned correctly or they may loosen when in motion.

Fig. 6-144



AF891D

Fig. 6-145



AF892D

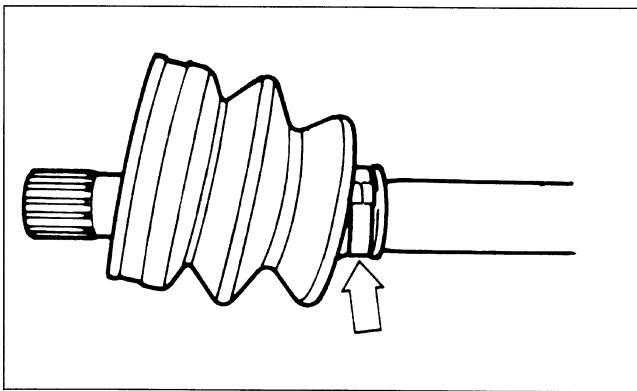
ASSEMBLING

1. Install the inner boot with the small clamp making sure the ends of the clamps are positioned correctly.

■ NOTE: The boot is positioned correctly when the small end of the boot seats down into the recessed groove.

2. Secure the small clamp of the inner boot.

Fig. 6-146

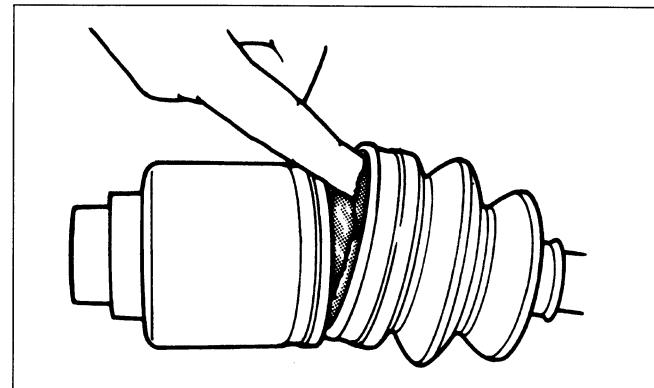


ATV-1048

3. Apply grease from the kit onto the bearing ring making sure grease is on both the inner and outer sides; then apply the remainder of the grease into the housing and boot.

■ NOTE: The large grease pack is for the inner drive axle bearing and boot assembly.

Fig. 6-147



ATV-1052

4. Install the bearing onto the shaft making sure the side without splines goes onto the shaft first.

Fig. 6-148



AF890D

6

CAUTION

The bearing ring must go onto the shaft with the side without splines facing toward the small clamp of the inner boot or severe damage will result.

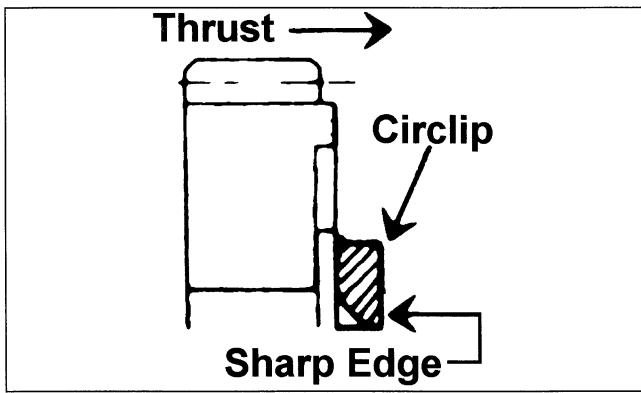
5. Secure the bearing ring with the circlip making sure the sharp side of the circlip faces away from the boot.

Fig. 6-149



AF888D

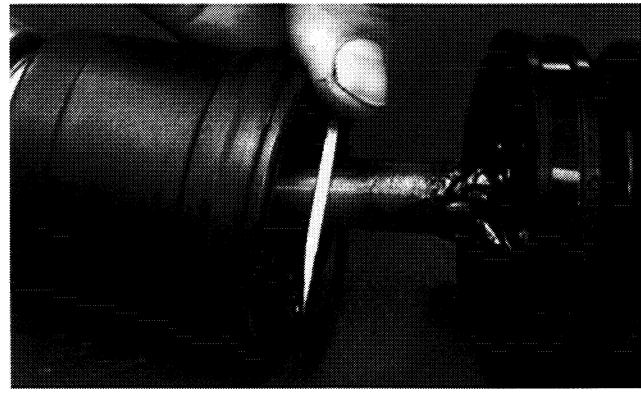
Fig. 6-150



ATV1073A

6. Making sure the marks made during disassembly align, slide the housing over the bearing ring; then install the circlip.

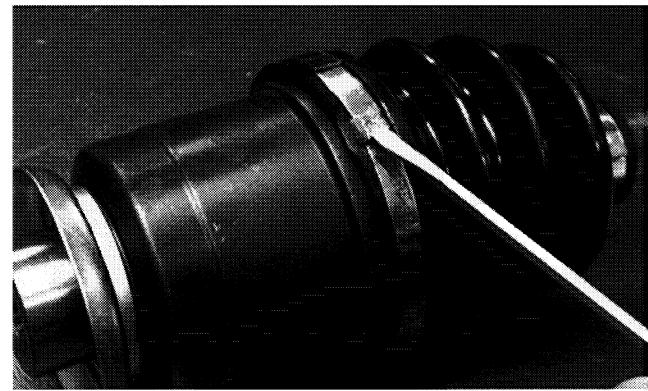
Fig. 6-151



AF885D

7. Slide the boot over the housing and secure the boot with the clamp.

Fig. 6-152



AF884D

8. Inspect the axle components for correct positioning of the four clamps. Also, inspect the boots for being correctly positioned on the shaft.

Differential/Axles (400/500 cc Models)

The differential is a non-serviceable component. If it is damaged or worn, it must be replaced.

REMOVING

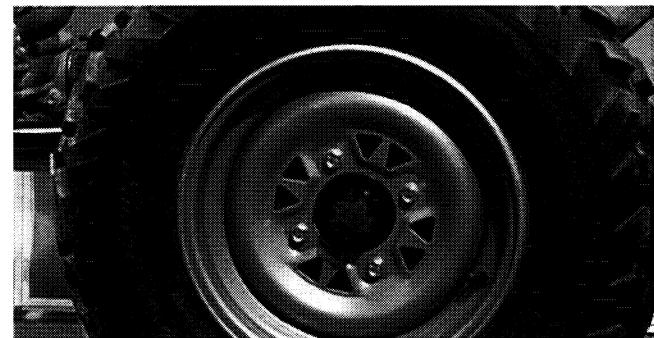
1. Place the ATV on a support stand (positioned just in front of and behind the footrest on each side) so the wheels are off the floor.

WARNING

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

2. Remove the rear wheels.

Fig. 6-153

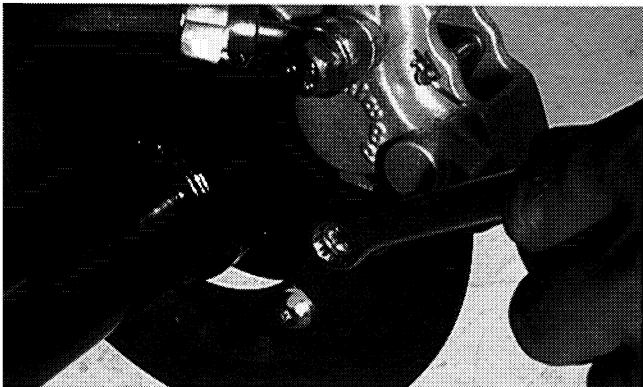


AF611D

3. Remove the clip securing the mechanical brake cable to the cable guide; then loosen the socket-head cap screws securing the mechanical brake caliper to the brake disc. Remove the caliper from the disc and lay aside.

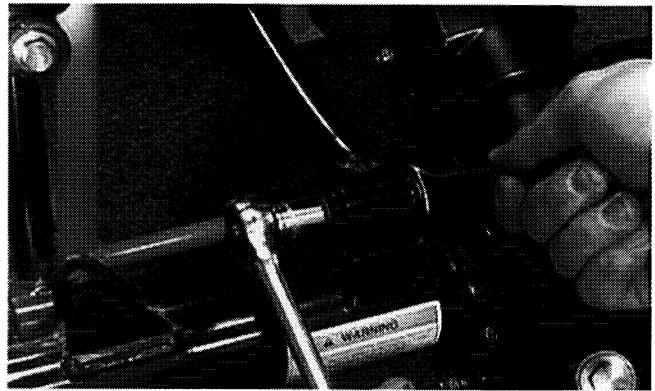
4. Loosen the two cap screws securing the hydraulic brake caliper to the housing bracket; then remove the caliper from the disc and lay aside.

Fig. 6-154



AF773D

Fig. 6-156



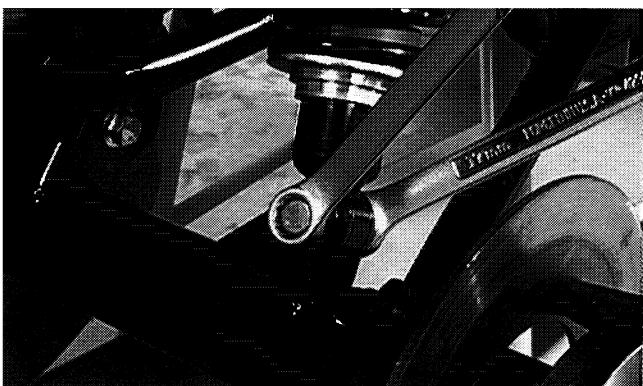
AF697D

7. Maneuver the axle assembly rearward allowing the propeller shaft to disengage and the final drive boot to separate from the drive housing.

DISASSEMBLING

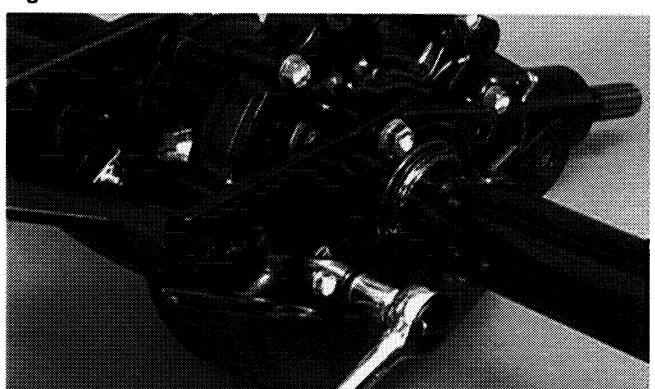
5. Remove the lower shock absorber cap screws and hex nuts; then disengage the shock absorbers from the axle housings. Account for inserts and sleeves.
6. Remove the four cap screws and three hex nuts securing the rear of the swing arms to the axle housings and differential case.

Fig. 6-155



AF772D

Fig. 6-157

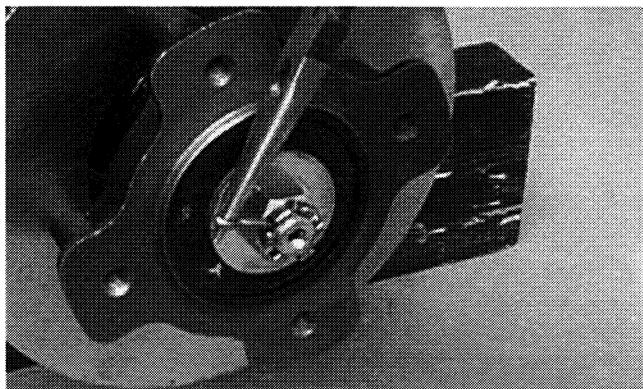


AF698D

2. Remove the wheel caps from the hubs; then remove the cotter pins from the hex nuts.

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

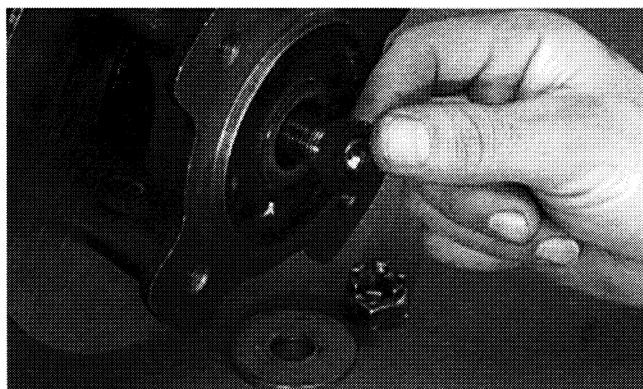
Fig. 6-158



AF700D

3. Remove the hex nuts securing the wheel hubs. Account for the washers and hub seals.

Fig. 6-159



AF701D

4. Remove the hubs and account for the brake disc on the right side.

Fig. 6-160



AF702D

5. Remove the cap screws securing the axle housings to the differential case.

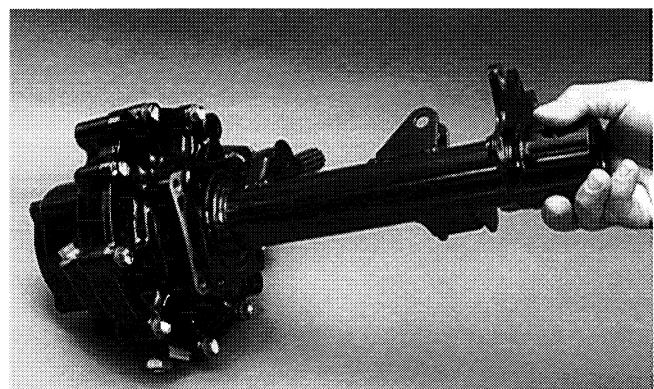
Fig. 6-161



AF699D

6. Remove the axle housings from the differential case. Account for a gasket on each side.

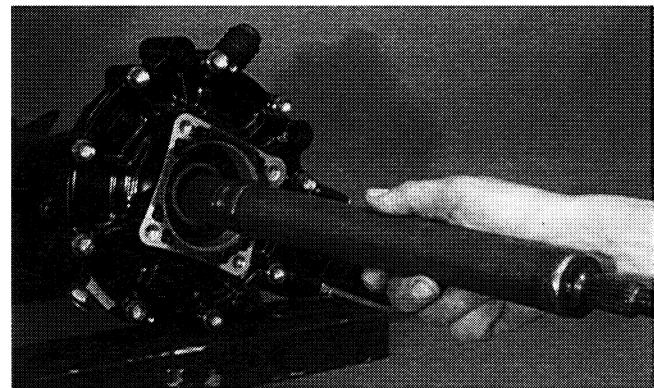
Fig. 6-162



AF780D

7. Remove a seal, C-clip, and wheel hub bearing from each axle housing; then remove the axles.

Fig. 6-163



AF704D

CLEANING AND INSPECTING

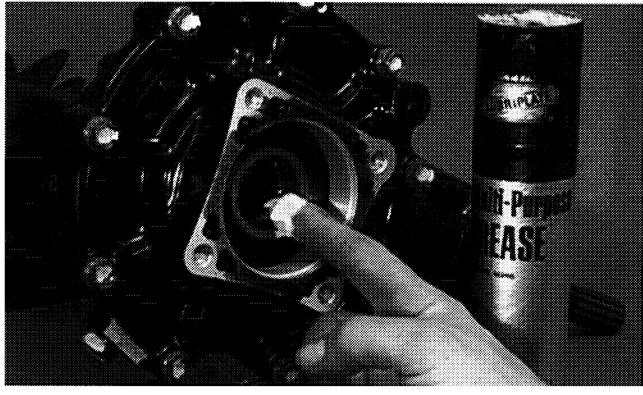
1. Clean all external differential components with parts-cleaning solvent.
2. Inspect the differential for leaks or damage.
3. Inspect splines for wear.
4. Inspect the seal for damage.

5. Inspect housing mounting bosses for wear or elongated holes.
6. Inspect the frame welds for cracking or bending.
7. Inspect the differential and plug threads for stripping or damage.

ASSEMBLING

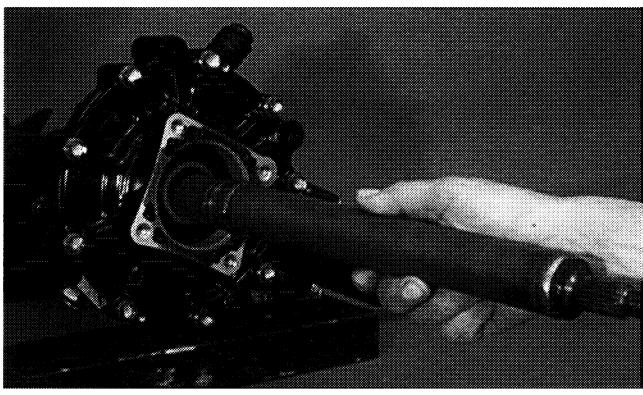
1. Grease the splines of the axle housing.

Fig. 6-164



2. Install the axles into the housing and install the hub bearings, C-clips, and seals.

Fig. 6-165



3. Place a new gasket on each side of the axle housings and place the housings into position; then secure the axle housings to the differential case with cap screws.

■ NOTE: The left-side axle housing 8 mm stud must be coated with blue Loctite #242 and the nuts tightened to 2.1 kg-m (15 ft-lb). The 8 mm cap screws should be tightened to 2.8 kg-m (20 ft-lb). The right-side axle housing three short 10 mm cap screws should be tightened to 5.5 kg-m (40 ft-lb), and the remaining long 10 mm cap screw should be tightened to 4.8 kg-m (35 ft-lb).

Fig. 6-166

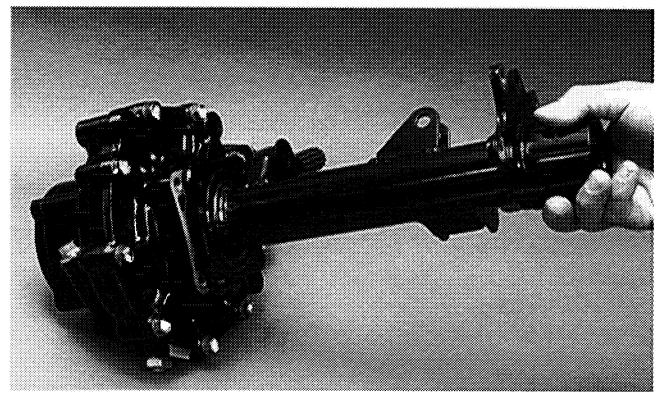
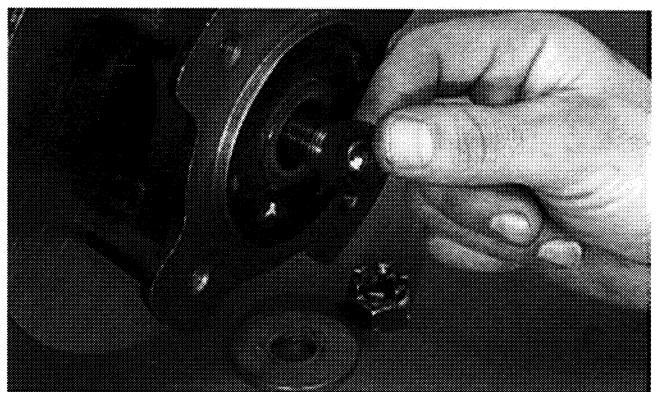


Fig. 6-167



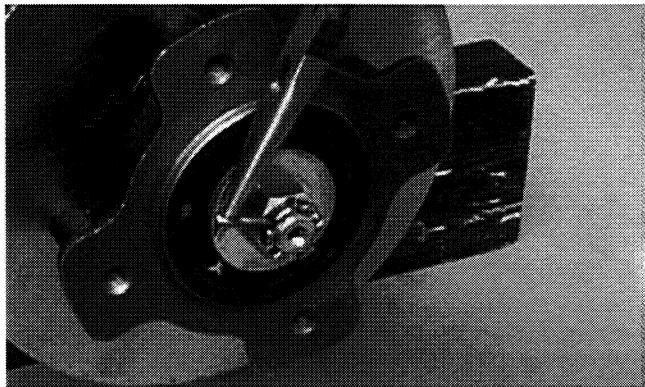
4. Place the wheel hubs and the seals into position (note the brake disc on the right side) and secure with the hex nuts tightened to 11.8 kg-m (85 ft-lb).

Fig. 6-168



5. Install new cotter pins and spread the pins; then install the wheel caps onto the hubs.

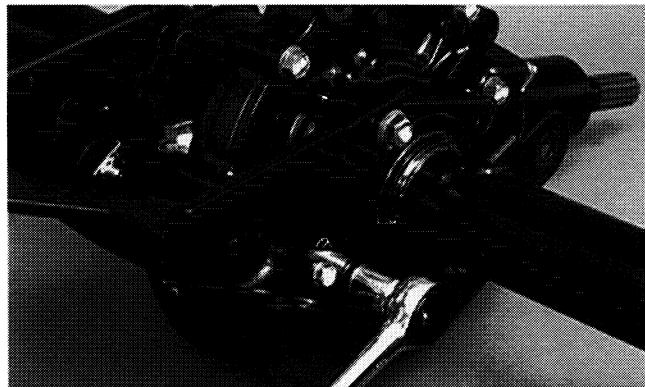
Fig. 6-169



AF700D

6. Place the gear case panel into position and secure with the cap screws and washers. Tighten the 10 mm cap screws to 4.4 kg-m (32 ft-lb), the 8 mm cap screws to 2.2 kg-m (16 ft-lb), and the panel clips to 0.7 kg-m (5 ft-lb).

Fig. 6-170



AF698D

■ **NOTE: Note the position of the shoulder washer from disassembly.**

INSTALLING

1. Maneuver the axle assembly forward making sure propeller shaft splines engage properly and the final drive boot is positioned over the drive housing.
2. Place the rear of the swing arms into position on the axle housings and differential case; then secure with four cap screws and three hex nuts. Tighten to 5.5 kg-m (40 ft-lb).

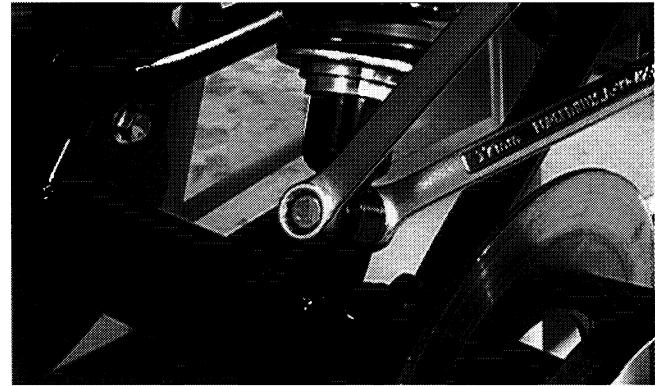
Fig. 6-171



AF697D

3. Place the shock absorber inserts and sleeves into the shock eyelets and secure the shock absorbers to the axle housings using the cap screws and hex nuts tightened to 5.5 kg-m (40 ft-lb).

Fig. 6-172



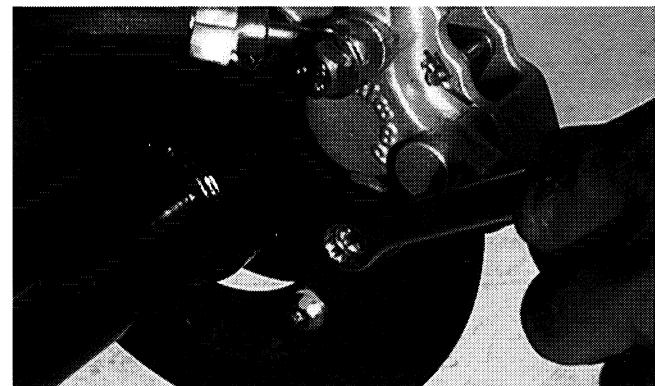
AF772D

CAUTION

Do not tighten nuts beyond the 5.5 kg-m (40 ft-lb) specification or the shock eyelet or mount WILL be damaged.

4. Place the hydraulic brake caliper into position on the housing bracket; then secure with the cap screws tightened to 2.8 kg-m (20 ft-lb).

Fig. 6-173



AF773D

CAUTION

Care should be taken not to damage or kink the brake hose when installing the caliper.

5. Place the mechanical brake caliper into position on brake disc; then secure with the socket-head cap screws.
6. Place the brake cable w/grommet into the guide and secure with the clip.
7. Install the wheels and tighten the cap screws to 6.9 kg-m (50 ft-lb).

Fig. 6-174



AF611D

8. Remove the ATV from the support stand.

■ NOTE: Check all fasteners for tightness and check the brakes for proper operation before test riding.

Wheel Hub

REMOVING

1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.



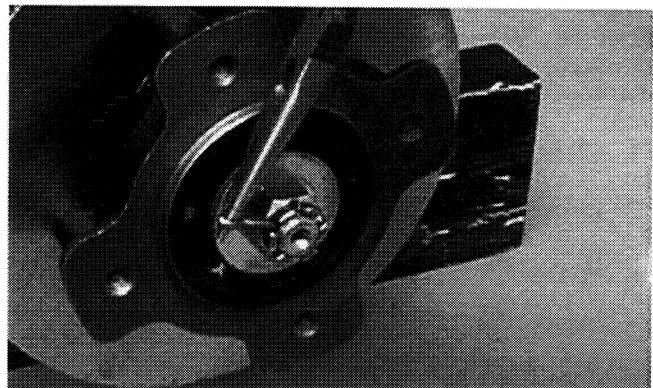
WARNING

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

2. Remove the wheel cap from the hub; then remove the cotter pin from the nut.

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

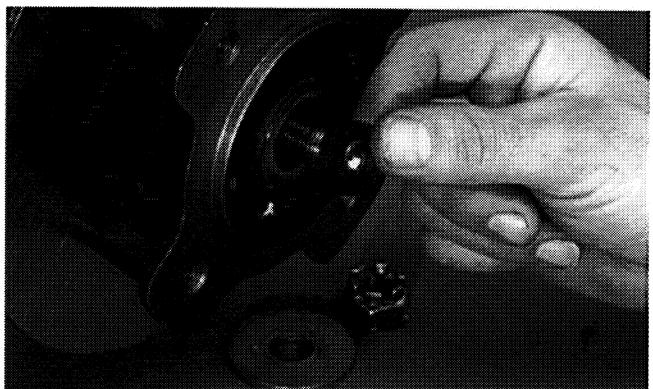
Fig. 6-175



AF700D

3. Remove the nut securing the hub. Account for a washer and a hub seal.

Fig. 6-176



AF701D

4. Remove the brake caliper.

Fig. 6-177



AF615D

5. Remove the hub assembly.

6. Remove the four cap screws securing the brake disc.

CLEANING AND INSPECTING

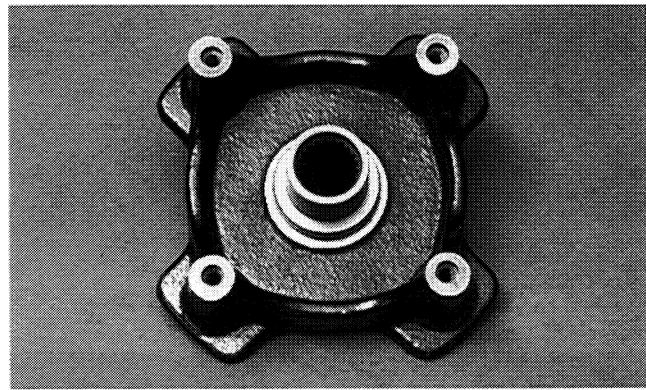
■ NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Clean all hub components.
2. Inspect all threads for stripping or damage.
3. Inspect the brake disc for cracks or warping.
4. Inspect the sealing area of the hub for pits.
5. Inspect the hub splines for signs of wear.
6. Inspect the hub for cracks.

INSTALLING

1. Secure the brake disc to the hub with the four cap screws coated with red Loctite #271. Tighten to 2.1 kg-m (15 ft-lb).
2. Apply grease to hub sealing area and on the splines.

Fig. 6-178



AF736D

3. Install the hub assembly onto the splines of the shaft.

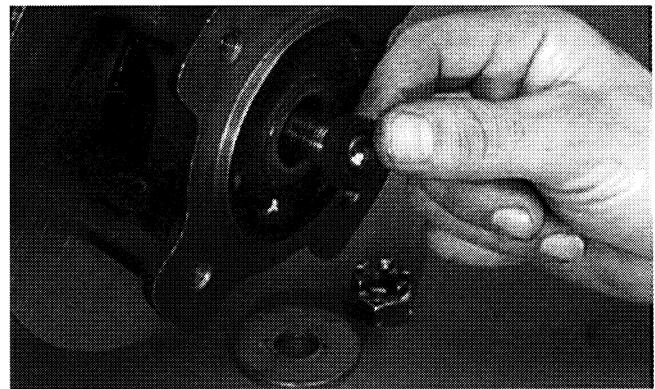
Fig. 6-179



AF702D

4. Insert the hub seal onto the shaft; then position it into the hub.

Fig. 6-180



AF701D

5. Place the washer onto the shaft; then secure the hub assembly with the nut. Tighten only until snug.
6. Secure the brake caliper to the knuckle with the two cap screws. Tighten to 2.8 kg-m (20 ft-lb).

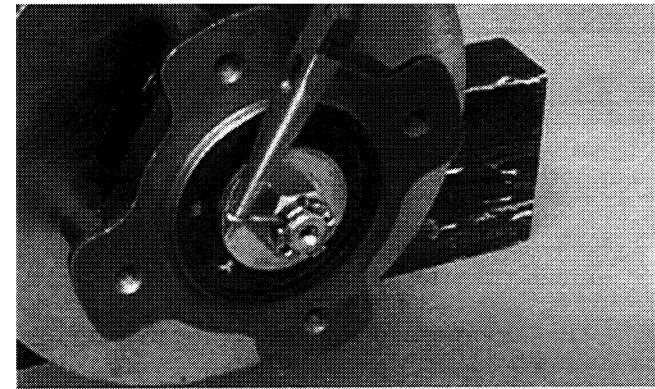
Fig. 6-181



AF615D

7. Tighten the hub nut to 11.8 kg-m (85 ft-lb).
8. Install a new cotter pin and spread the pin to secure the nut.

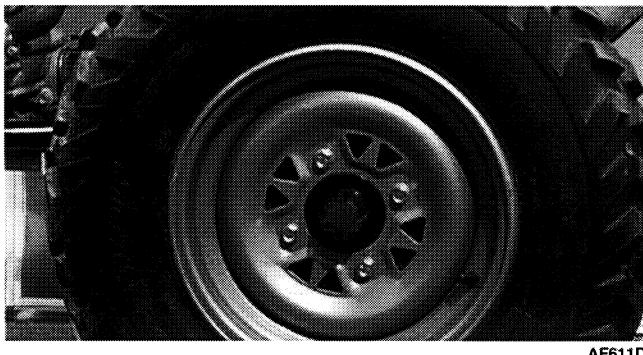
Fig. 6-182



AF700D

9. Install the wheel cap.
10. Install the wheel and tighten the cap screws to 6.9 kg-m (50 ft-lb).

Fig. 6-183



11. Remove the ATV from the support stand.

Hydraulic Brake Caliper

■ **NOTE:** The brake caliper is a non-serviceable component; it must be replaced as an assembly.

REMOVING/DISASSEMBLING

1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

WARNING

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

2. Drain the brake fluid from the entire hydraulic system (master cylinder, hoses, and caliper).

Fig. 6-184

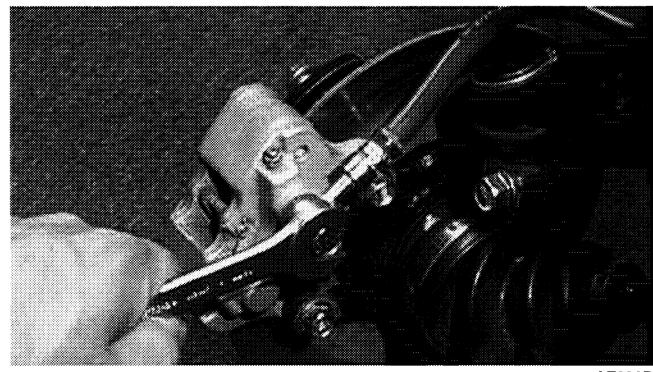


CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the ATV and do not reuse brake fluid.

3. Remove the brake hose from the caliper; then remove the caliper.

Fig. 6-185



CLEANING AND INSPECTING

1. Clean all caliper components (except the brake pads) with parts-cleaning solvent.

2. Inspect the brake pads for damage and excessive wear.

■ **NOTE:** For measuring brake pads, see Section 2.

ASSEMBLING/INSTALLING

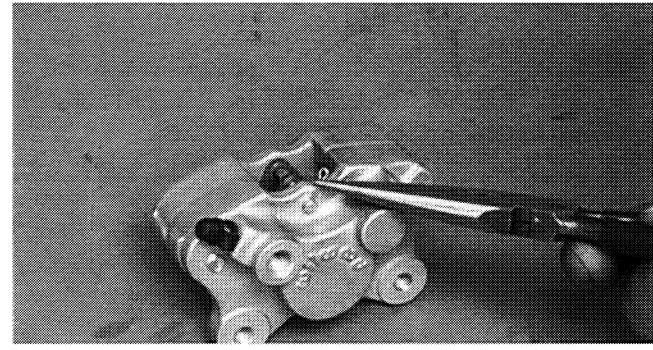
1. Push the pistons into the caliper as far as they will go to allow clearance for the brake pads.

CAUTION

Care should be taken that the piston and cylinder are not scratched.

2. Install the brake pads and secure with the pin and cotter pin.

Fig. 6-186



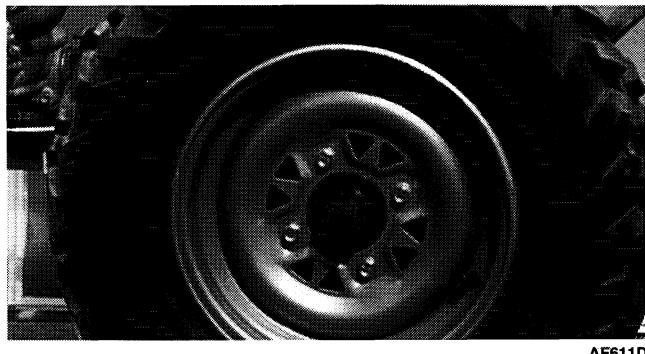
6

3. Place the brake caliper assembly into position and secure with the cap screws tightened to 2.8 kg-m (20 ft-lb).

4. Place a new flat washer on each side of the brake hose fitting and install it on the caliper. Tighten to 2.8 kg-m (20 ft-lb).

5. Fill the master cylinder; then bleed the brake system (see Section 2).
6. Install the wheel. Tighten the cap screws to 6.9 kg-m (50 ft-lb).

Fig. 6-187



7. Remove the ATV from the support stand and verify brake operation.

Hydraulic Brake Assembly Schematics

Fig. 6-188

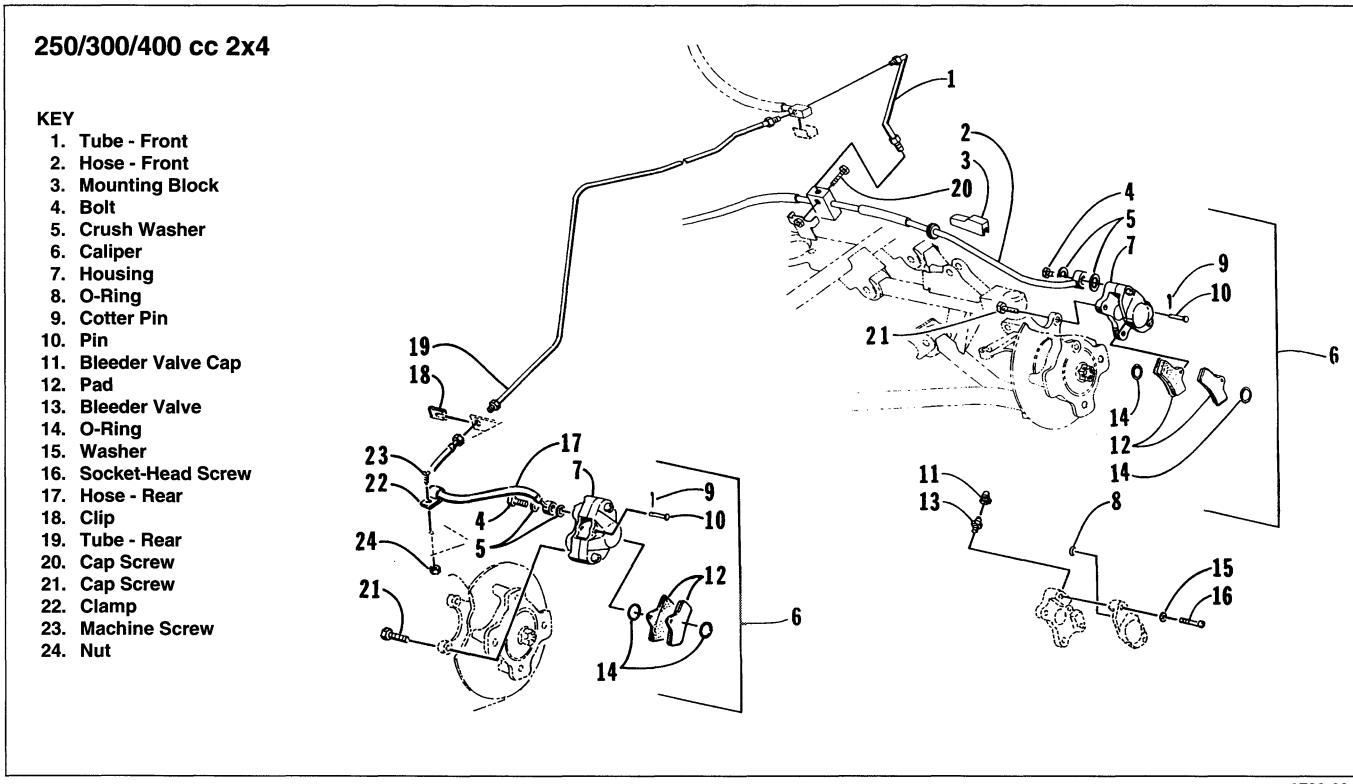
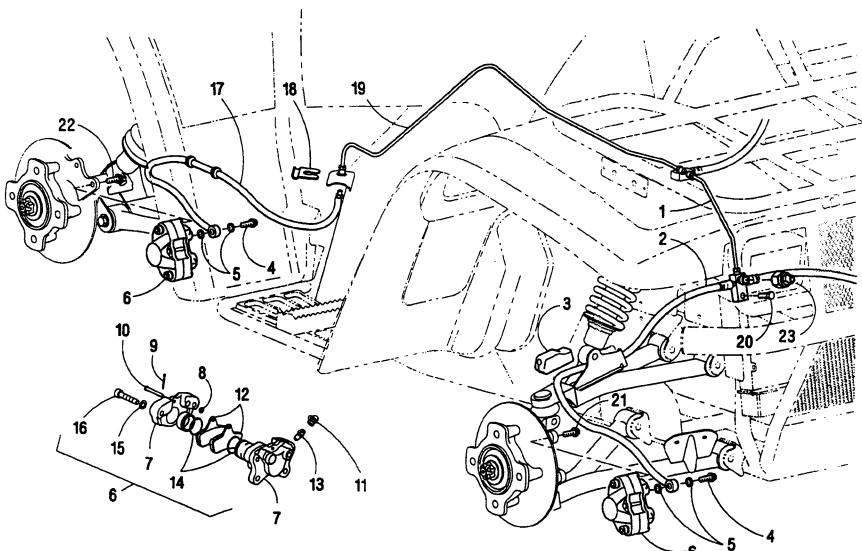


Fig. 6-189

400 4x4/500 cc

KEY

1. Tube - Front
2. Hose - Front
3. Mounting Block
4. Bolt
5. Crush Washer
6. Caliper
7. Housing
8. O-Ring
9. Cotter Pin
10. Pin
11. Bleeder Valve Cap
12. Pad
13. Bleeder Valve
14. O-Ring
15. Washer
16. Socket-Head Screw
17. Hose - Rear
18. Clip
19. Tube - Rear
20. Cap Screw
21. Cap Screw
22. Cap Screw
23. Pressure Switch (500 cc)



0734-518

SECTION 7 - SUSPENSION

7

TABLE OF CONTENTS

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| Front and Rear | |
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| A-Arms | 7-5 |
| Wheels and Tires | 7-8 |

Front and Rear Shock Absorber Assemblies

Fig. 7-1

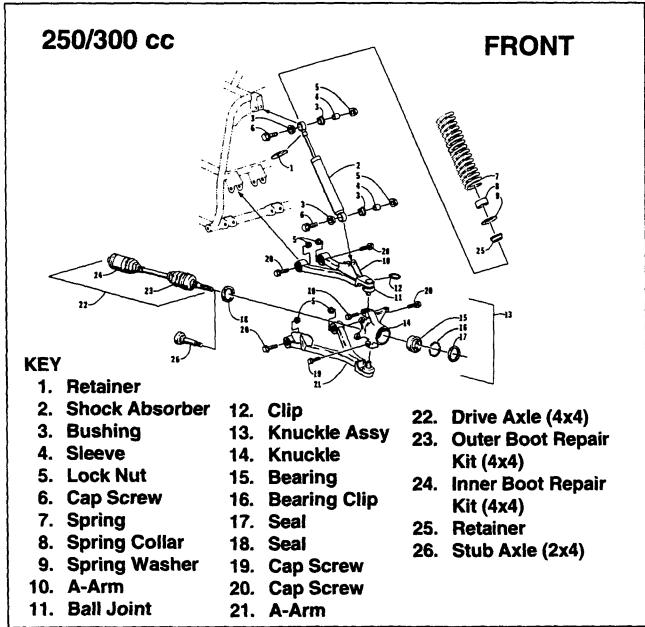


Fig. 7-2

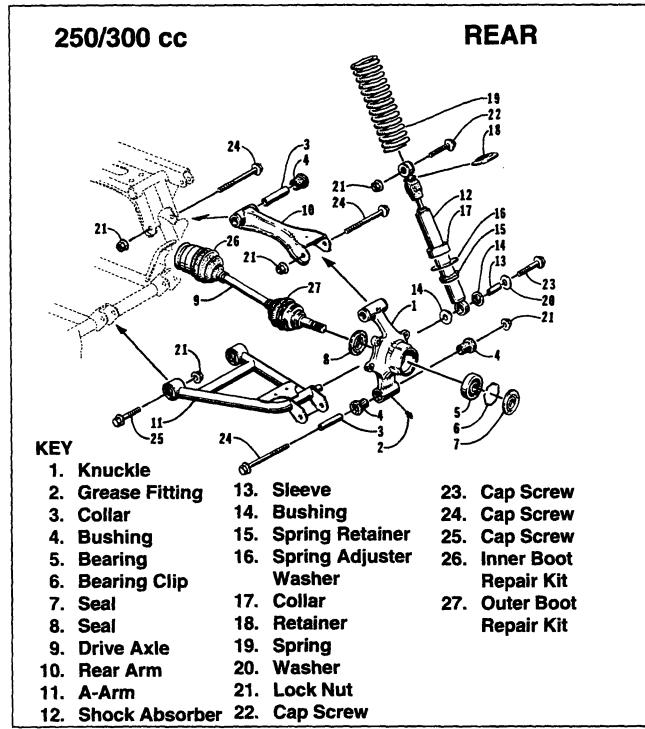


Fig. 7-3

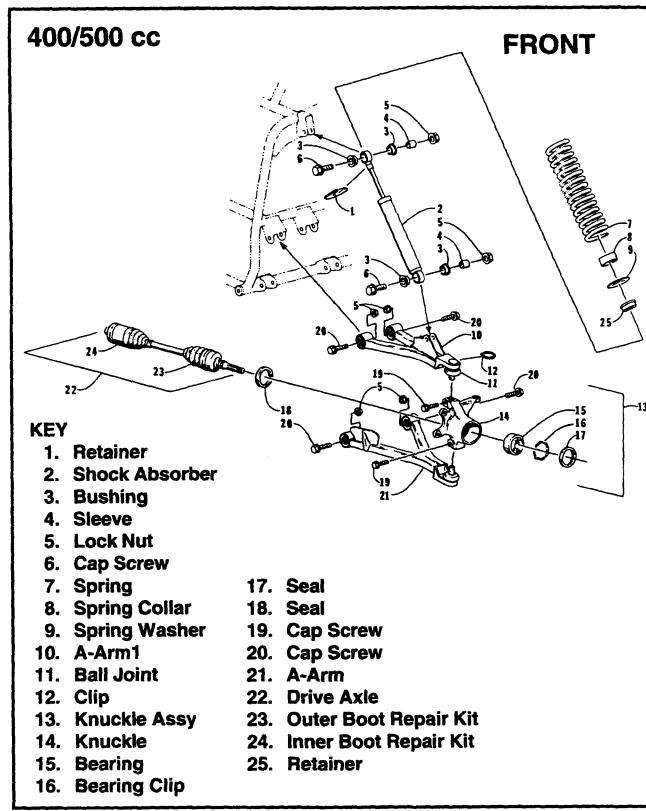
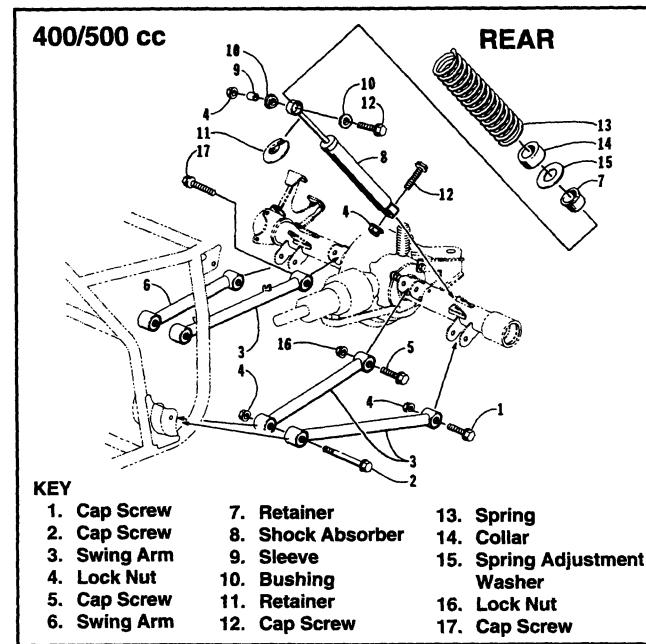


Fig. 7-4



REMOVING

1. Secure the ATV on a support stand to elevate the wheels and to release load on the suspension.

⚠ WARNING

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

2. Remove the two cap screws and nuts securing each front shock absorber to the frame. Account for bushings and sleeves from each.

Fig. 7-5

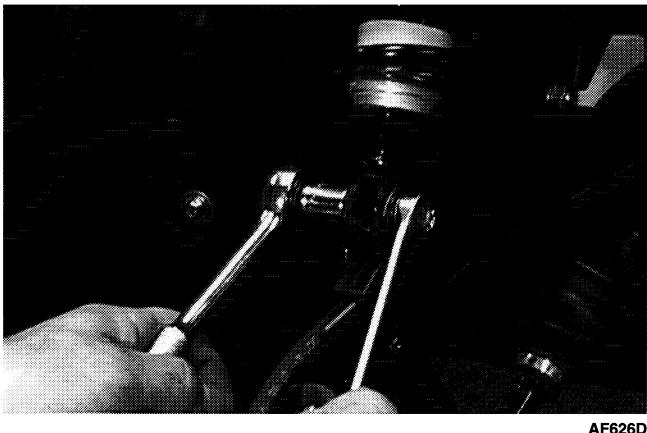


⚠ CAUTION

Additional support stands are necessary to support the rear axle when the shock absorbers are removed or damage may occur.

3. Remove the two cap screws and nuts securing each rear shock absorber to the frame and rear suspension. Account for bushings and sleeves from each.

Fig. 7-6



4. Compress the shock absorber spring, remove the retainer, and remove the spring.

Fig. 7-7



CLEANING AND INSPECTING

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

1. Clean all shock absorber components in parts-cleaning solvent.
2. Inspect each shock rod for nicks, pits, rust, bends, and oily residue.
3. Inspect all springs, spring retainers, shock rods, dampers, bushings, shock bodies, and eyelets for cracks, leaks, and bends.

INSTALLING

1. Place the shock absorber spring over the shock absorber, compress the spring, and install the retainer.
2. Place bushings and sleeves (where appropriate) into shock eyelet; then install shock with two cap screws and nuts. Tighten all nuts to 4.8 kg-m (35 ft-lb).

⚠ CAUTION

Do not tighten the nuts beyond the 4.8 kg-m (35 ft-lb) specification or the shock eyelet or mount WILL be damaged.

3. Remove the ATV from support stands.

Swing Arms (400/500 cc Models)

REMOVING

1. Remove the cap screws and hex nuts securing the front of the swing arms to the frame brackets.
2. On the left side, remove the cap screws and hex nuts securing the rear of the swing arms to the axle housing; then remove the swing arms.

Fig. 7-8



AF697D

3. On the right side, remove the cap screw and hex nut securing the outer swing arm to the axle housing; then remove the cap screw securing the inner swing arm to the differential case. Remove the hose grommets from the hose guides.
4. Remove the swing arms and note the location of the hose guides on the inner swing arm (for assembly).

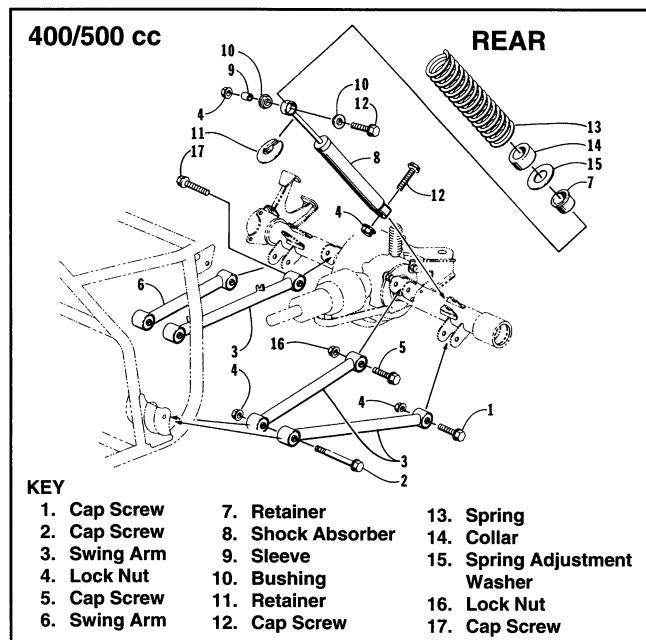
CLEANING AND INSPECTING

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

1. Clean all swing arm components in parts-cleaning solvent.
2. Inspect all swing arm weldments for cracks or unusual bends.
3. Inspect all tubing for cracks or unusual bends.

INSTALLING

Fig. 7-9



0733-399

1. On the right side, place the inner swing arm into position and secure it to the differential case with a cap screw. Do not tighten at this time.
2. On the right side, place the outer swing arm into position and secure to the axle housing with a cap screw and hex nut. Do not tighten at this time.
3. Secure the two right side swing arms to the frame brackets with cap screws and hex nuts. Do not tighten at this time.
4. On the left side, secure the swing arms to the axle housing and frame brackets with cap screws and hex nuts; then tighten all fasteners to 5.5 kg-m (40 ft-lb).

A - ARMS

REMOVING

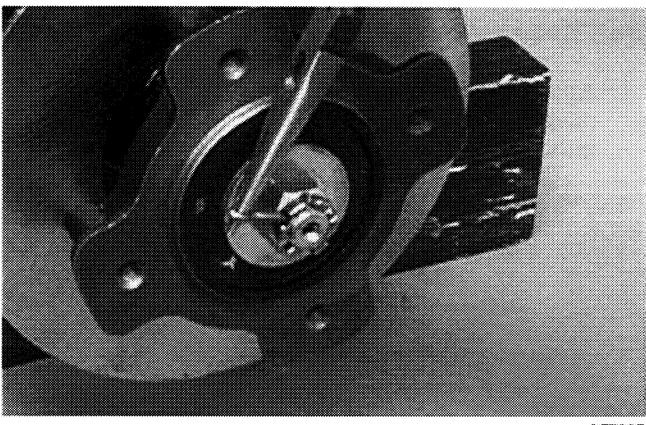
1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

⚠ WARNING

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

2. Remove the wheel cap from the hub; then remove the cotter pin from the nut.

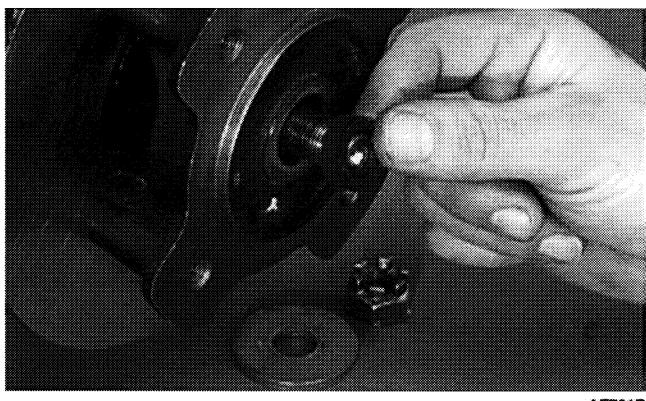
Fig. 7-10



AF700D

3. Remove the nut securing the hub. Account for a washer and a hub seal.

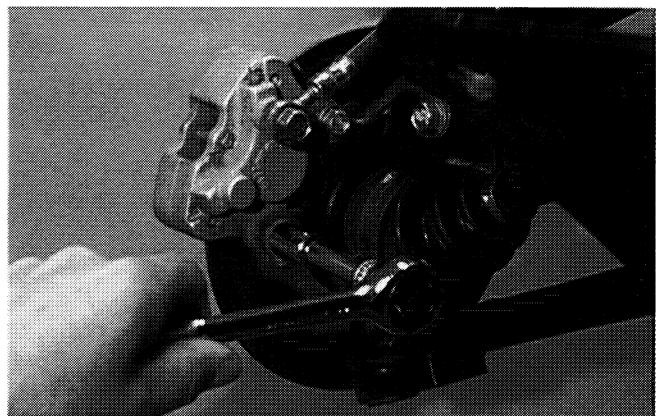
Fig. 7-11



AF701D

4. Remove the brake caliper.

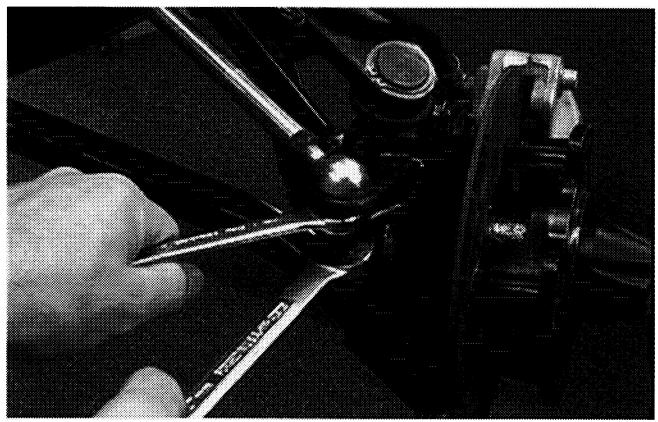
Fig. 7-12



AF615D

5. Remove the hub assembly.
6. Remove the cotter pin and slotted nut securing the tie rod end to the knuckle; then remove the tie rod end from the knuckle.

Fig. 7-13



AF618D

7. Remove the two cap screws securing the ball joints to the knuckle.

Fig. 7-14



AF628D

8. Tap the ball joints out of the knuckle; then remove the knuckle.

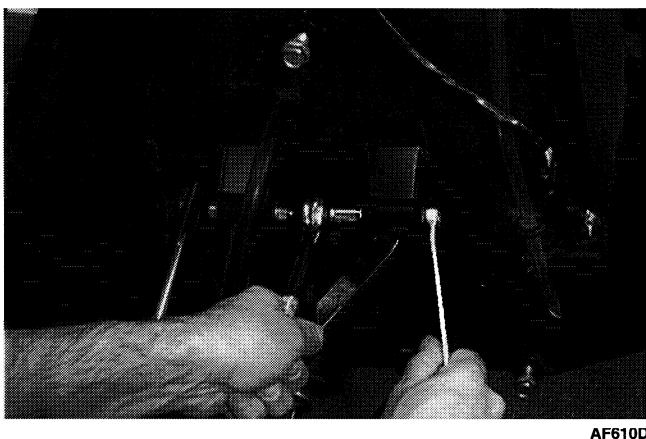
9. Remove the lower shock absorber eyelet from the upper A-arm.

Fig. 7-15



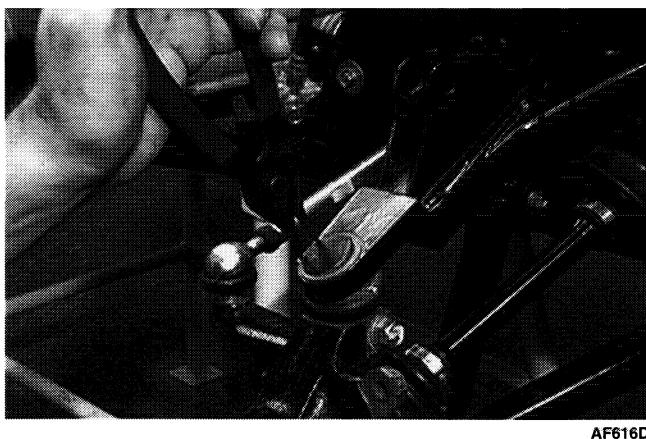
10. Remove the cap screws securing the A-arm to the frame.

Fig. 7-16



11. Remove the circlip from the ball joint; then remove the ball joint from the A-arm.

Fig. 7-17



CLEANING AND INSPECTING

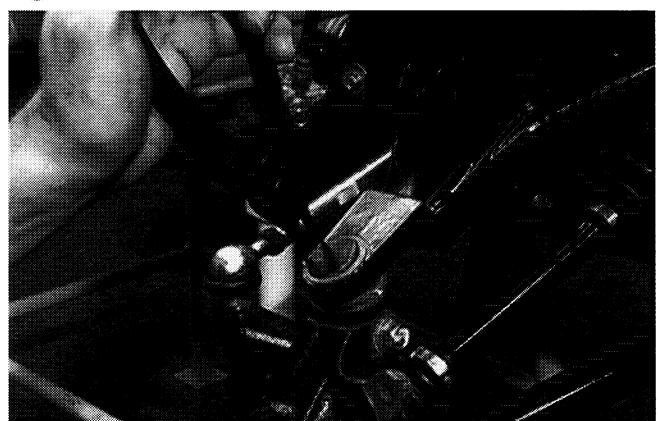
■ NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Clean all A-arm components in parts-cleaning solvent.
2. Clean the ball joint mounting hole of all residual Loctite, grease, oil, or dirt for assembly purposes.
3. Inspect the A-arm for bends, cracks, and worn bushings.
4. Inspect the ball joint mounting holes for cracks or damage.
5. Inspect the frame mounts for signs of damage, wear, or weldment damage.

INSTALLING

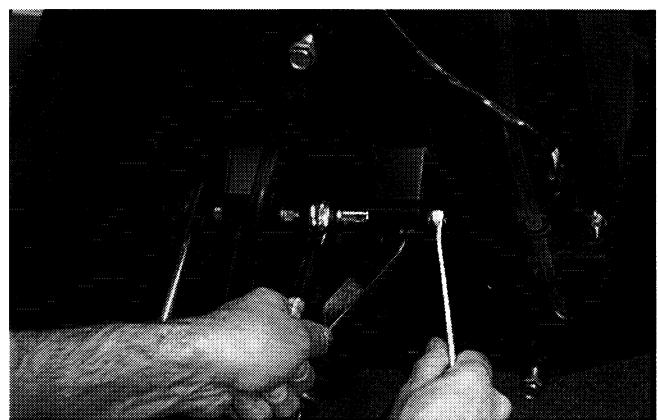
1. Apply green Loctite #609 to the entire outside diameter of the ball joints; then install the ball joints into the A-arm and secure with the circlip.

Fig. 7-18



2. Install the A-arm assembly into the frame mounts and secure with the cap screws. Only finger-tighten at this time.

Fig. 7-19



3. Route the brake hose through the upper A-arm shock absorber mount.

Fig. 7-20



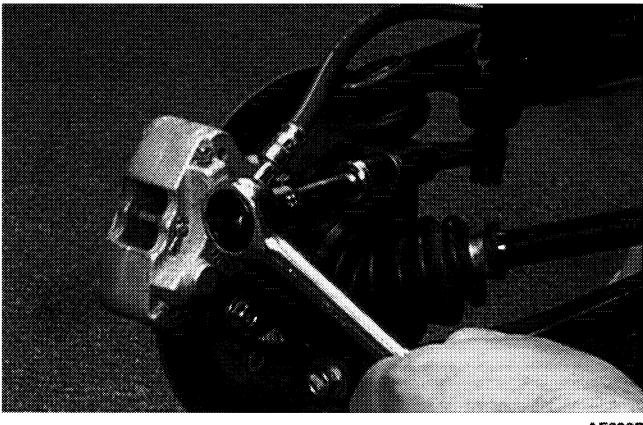
4. Secure the lower eyelet of the shock absorber to the upper A-arm. Tighten nut to 4.8 kg-m (35 ft-lb).

CAUTION

Do not tighten the nut beyond the 4.8 kg-m (35 ft-lb) specification or the shock eyelet or mount WILL be damaged.

5. Install the knuckle assembly onto the ball joints and secure with two cap screws. Tighten to 5.5 kg-m (40 ft-lb).

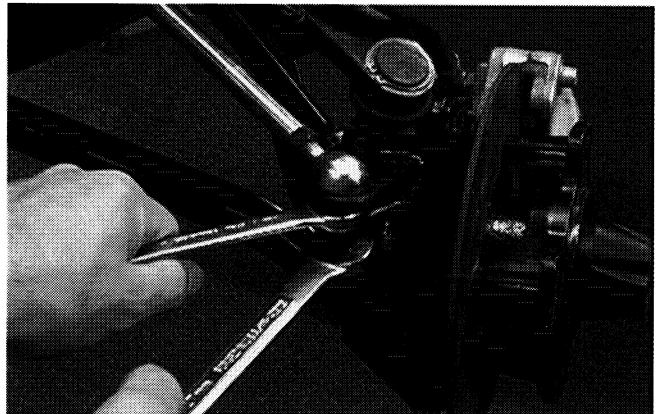
Fig. 7-21



6. Install the tie rod end and secure with the nut. Tighten to 4.2 kg-m (30 ft-lb); then install a new cotter pin and spread the pin to secure the nut.

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

Fig. 7-22



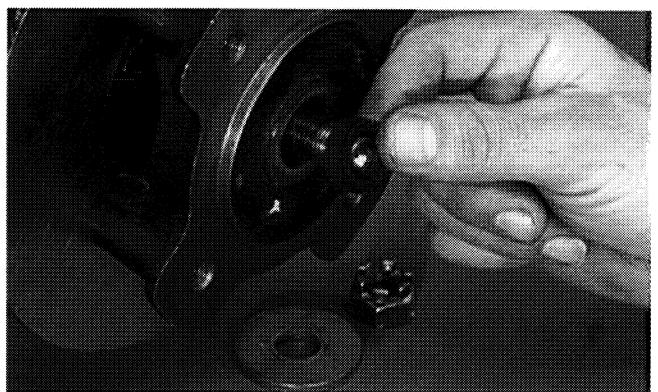
7. Apply grease to hub sealing area and on the splines.
8. Install the hub assembly onto the splines of the shaft.

Fig. 7-23



9. Insert the hub seal onto the shaft; then position it into the hub.

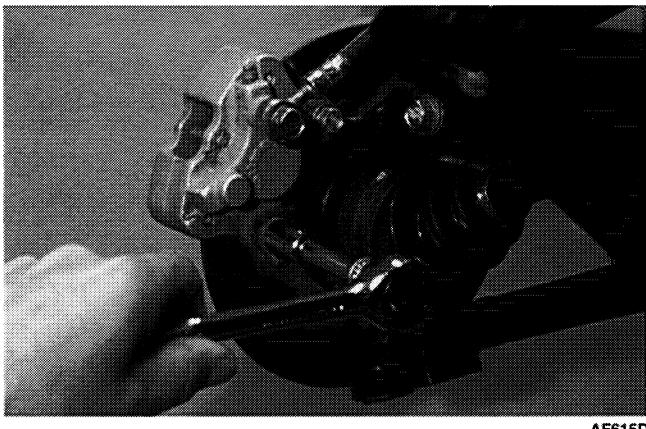
Fig. 7-24



7

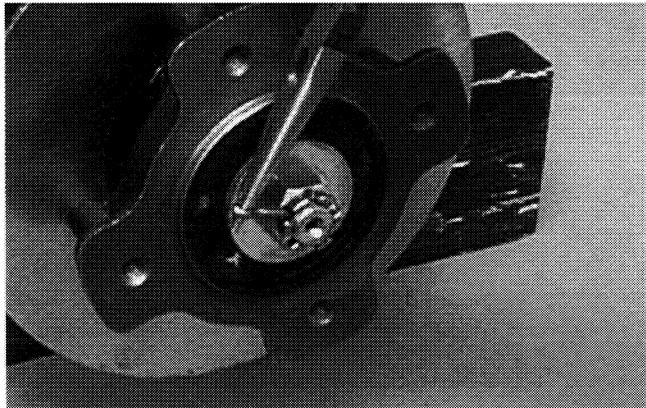
10. Place the washer onto the shaft; then secure the hub assembly with the nut. Tighten only until snug.
11. Secure the brake caliper to the knuckle with the two cap screws. Tighten to 2.8 kg-m (20 ft-lb).

Fig. 7-25



12. Tighten the hub nut to 11.8 kg-m (85 ft-lb).
13. Install a new cotter pin and spread the pin to secure the nut.

Fig. 7-26



14. Install the wheel cap.
15. Install the wheel and tighten the cap screws to 6.9 kg-m (50 ft-lb).

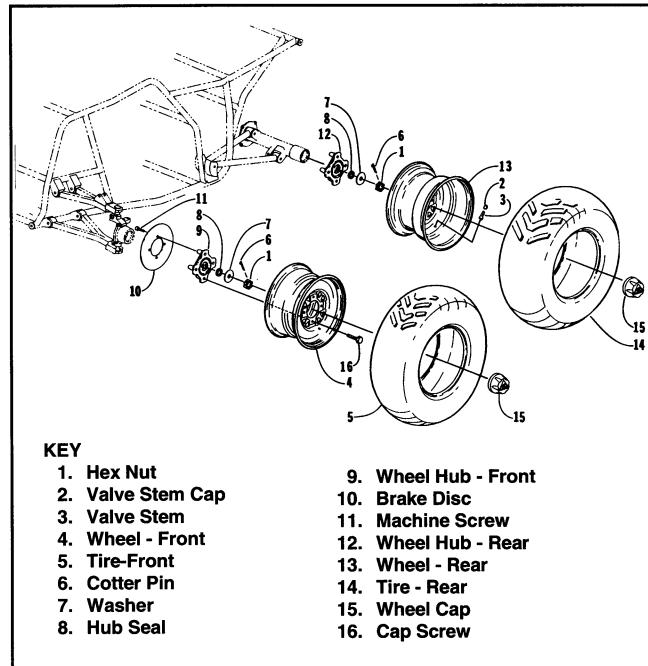
Fig. 7-27



16. Remove the ATV from the support stand.

Wheels and Tires

Fig. 7-28



TIRE SIZE

WARNING

Use only Arctic Cat approved tires when replacing tires. Failure to do so could result in unstable ATV operation.

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

| 250 cc | Front | Rear |
|--------|-------------|-------------|
| Size | AT23 x 8-12 | AT24 x 9-12 |

| 300 cc | Front | Rear |
|------------|---------------|----------------|
| Size (4x4) | AT24 x 9 -12 | AT25 x 10 - 12 |
| Size (2x4) | AT23 x 8 - 12 | AT25 x 10 -12 |

| 400 cc | Front | Rear |
|------------|--------------|---------------|
| Size (4x4) | AT25 x 8 -12 | AT25 x 10 -12 |
| Size (2x4) | AT25 x 8 -12 | AT25 x 10 -12 |

| 500 cc | Front | Rear |
|--------|-----------------|-----------------|
| Size | AT26 x 10.5 -12 | AT26 x 10.5 -12 |

⚠ WARNING

Do not mix tire tread patterns. Use the same pattern type on front and rear. Failure to heed warning could cause poor handling qualities of the ATV and could cause excessive drive train damage not covered by warranty.

TIRE INFLATION PRESSURE

| 250 cc | TIRE PRESSURE | |
|------------------------|--------------------------------------|--------------------------------------|
| | FRONT | REAR |
| Up to 193 kg (425 lbs) | 0.42 kg/cm ² (6.0 psi) | 0.28 kg/cm ² (4.0 psi) |

| 300 cc | TIRE PRESSURE | |
|---|--------------------------------------|--------------------------------------|
| | FRONT | REAR |
| 4x4 Model Up to 193 kg (425 lb) | 0.28 kg/cm ² (4.0 psi) | 0.28 kg/cm ² (4.0 psi) |
| 2x4 Model Up to 193 kg (425 lb) | 0.42 kg/cm ² (6.0 psi) | 0.28 kg/cm ² (4.0 psi) |

| 400 cc | TIRE PRESSURE | |
|---|--------------------------------------|--------------------------------------|
| | FRONT | REAR |
| 4x4 Model Up to 227 kg (500 lb) | 0.28 kg/cm ² (4.0 psi) | 0.25 kg/cm ² (3.5 psi) |
| 2x4 Model Up to 193 kg (425 lb) | 0.28 kg/cm ² (4.0 psi) | 0.28 kg/cm ² (4.0 psi) |

| 500 cc | TIRE PRESSURE | |
|-----------------------|--------------------------------------|--------------------------------------|
| | FRONT | REAR |
| Up to 227 kg (500 lb) | 0.35 kg/cm ² (5.0 psi) | 0.35 kg/cm ² (5.0 psi) |

⚠ WARNING

Always maintain proper tire inflation pressure.

REMOVING

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

⚠ WARNING

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

2. Remove the four 10 mm cap screws securing each wheel to the hub; then remove the wheels.

■ NOTE: Keep left-side and right-side wheels separated for installing them on their proper sides.

Fig. 7-29



AF611D

CLEANING AND INSPECTING

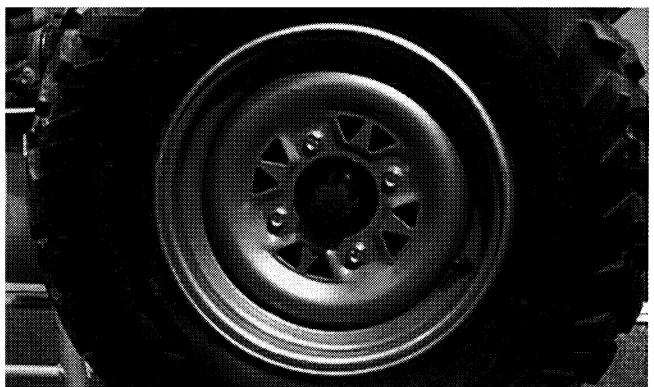
■ NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Clean the wheels and hubs with parts-cleaning solvent.
2. Clean the tires with soap and water.
3. Inspect each wheel for cracks, dents, or bends.
4. Inspect each tire for cuts, wear, missing lugs, and leaks.

INSTALLING

1. Install each wheel on its hub with four cap screws.

Fig. 7-30



AF611D

■ NOTE: Make sure each wheel is installed on its proper hub as noted in removing (the "rotation arrow" must indicate forward direction of rotation).

Fig. 7-31



AF612D

Fig. 7-32



AL628D

2. Tighten cap screws to 6.9 kg-m (50 ft-lb).

CHECKING/INFLATING

1. Using an air gauge, measure the air pressure in each tire. Adjust the air pressure as necessary to meet the specified pressure.
2. Inspect the tires for damage, wear, or punctures.

WARNING

Do not operate the ATV if tire damage exists.

■ NOTE: If repair is needed, follow the instructions found on the tire repair kit or remove the wheel and have it repaired professionally.

3. Check and adjust the air pressure in each tire to the specified pressure.

■ NOTE: Be sure all tires are the specified size and have identical tread pattern.

4. Check the front wheel toe-in and toe-out and adjust as necessary (see Section 8).
5. Test drive the ATV on a dry, level surface and note any pulling to the left or right during acceleration, deceleration, and braking.

■ NOTE: If pulling is noted, measure the circumference of the front and rear tires on the pulling side. Compare the measurements with the tires on the opposite side. If pulling is noted during braking only, check and adjust the brakes as necessary and recheck operation (see Section 2 - Brake Systems).

6. Increase the air pressure in the tires with the smallest circumference measurement until all tires are equal in circumference.
7. Repeat steps 5 - 6 as necessary to ensure proper handling.

SECTION 8 - STEERING/FRAME

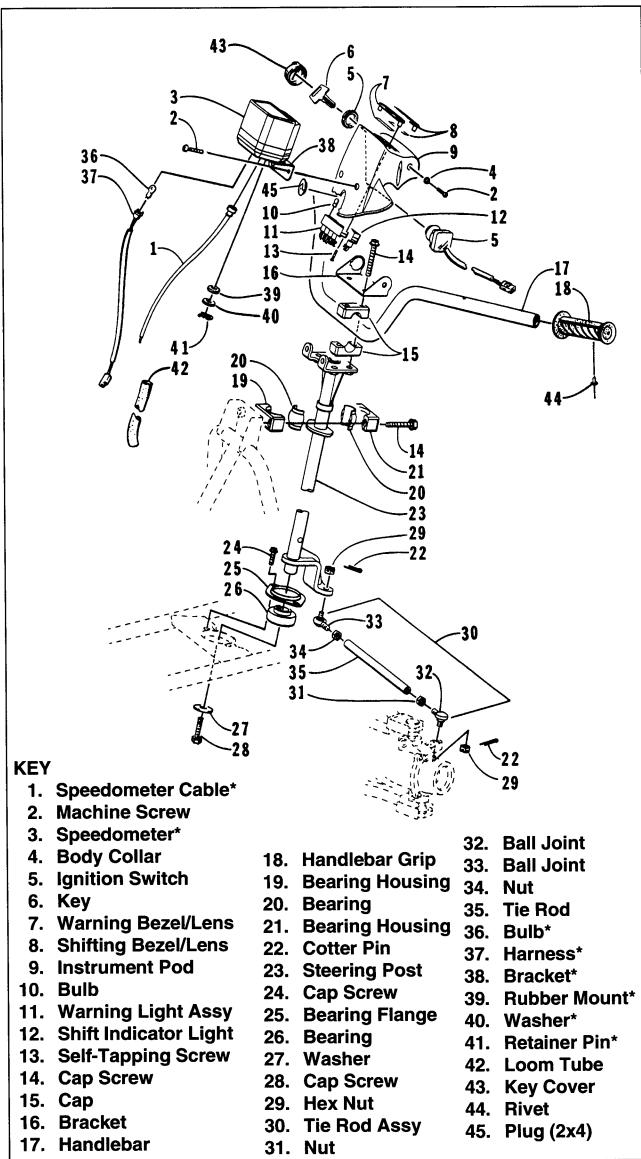
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Steering Post/ Handlebar/Tie Rods

Fig. 8-1



* N/A for 2x4 Models

REMOVING

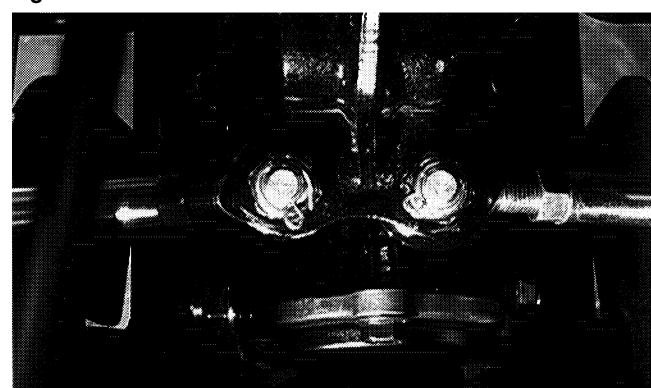
1. Remove the seat.
2. Turn the gas tank valve to the OFF position; then remove the left-side panel.
3. Disconnect the fuel hose to the carburetor.
4. Remove the screws and washers securing the gas tank. Account for spacers.

Fig. 8-2



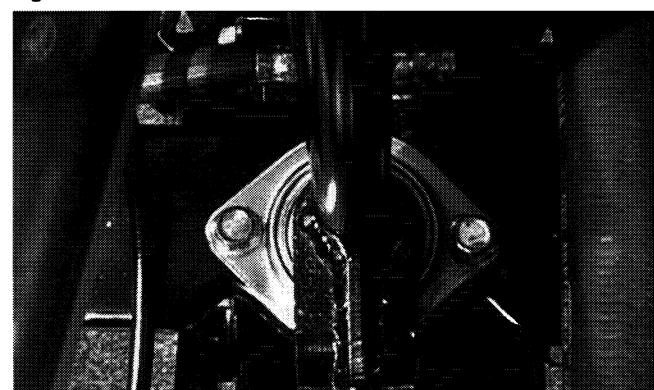
5. Remove the cotter pin and slotted nut securing each tie rod end to the steering post actuator arm. Remove the tie rod ends from the arm.

Fig. 8-3



6. Remove the cotter pin and slotted nut securing each opposite side tie rod end to the knuckles. Remove the tie rod ends from the knuckles; then remove the tie rods.
7. Remove the cap screws securing the bearing flange to the support bracket.

Fig. 8-4



8. On the 250/300 cc models, remove the screws securing the console. Account for a spacer.

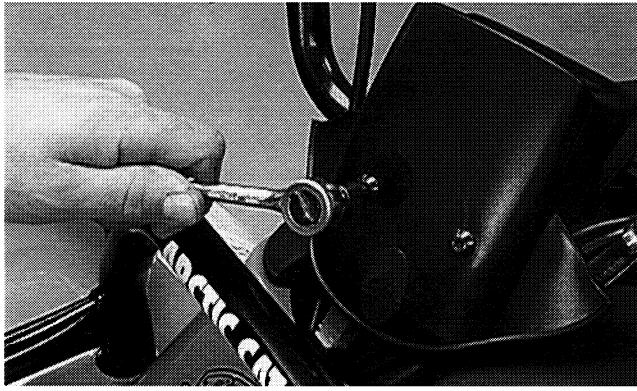
Fig. 8-5



CH084D

9. On the 400/500 cc models, remove the cap screws securing the instrument pod.

Fig. 8-6



AL647D

10. Remove the retaining ring securing the ignition switch; then remove the machine screw (opposite the retaining ring). Account for a body collar.

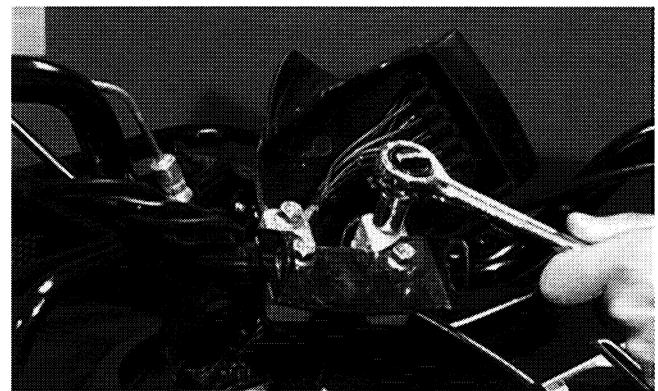
Fig. 8-7



AF757D

11. Remove the four cap screws securing the handlebar caps (blocks) to the steering post.

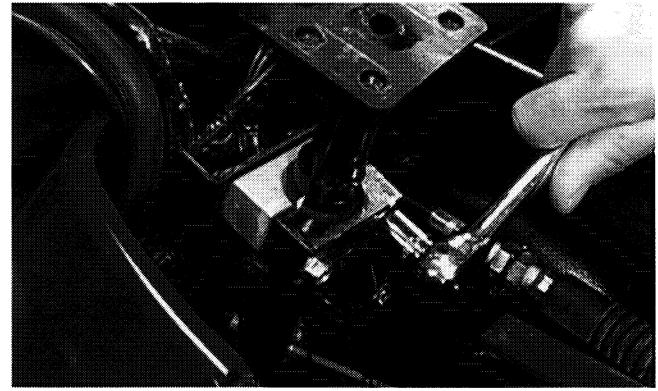
Fig. 8-8



AL614D

12. Remove the two cap screws securing the upper steering post bearing to the steering support.

Fig. 8-9



AL619D

13. Remove the steering post.

Fig. 8-10



AL618D

8

CLEANING AND INSPECTING

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

1. Wash the tie rod ends in parts-cleaning solvent. Dry with compressed air. Inspect the pivot area for wear. Apply a low-temperature grease to the ends.

⚠ WARNING

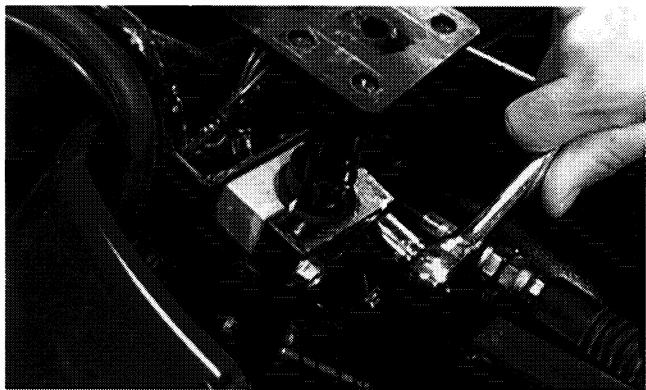
Always wear safety glasses when using compressed air.

2. Inspect the tie rods for damaged threads or wear.
3. Inspect the tie rods for cracks or unusual bends.
4. Inspect all welded areas for cracks or deterioration.
5. Inspect the steering post and steering-post brackets for cracks, bends, or wear.
6. Inspect the bearing halves, bearing caps, and bearing housings for cracks or wear.
7. Inspect the handlebar tube for cracks, wear, or unusual bends.
8. Inspect the handlebar grips for damage or wear.

INSTALLING

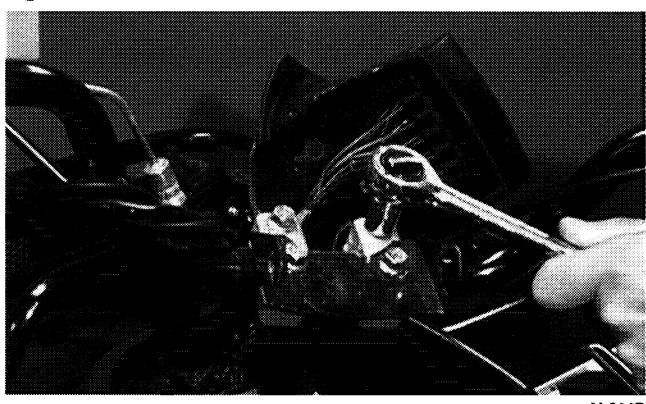
1. Place the steering post into position; then place the upper steering post bearing on the steering support and install the two cap screws. Tighten to 2.8 kg-m (20 ft-lb).

Fig. 8-11



2. Place the handlebars into position and secure with the handlebar caps (blocks). Tighten the four cap screws to 2.8 kg-m (20 ft-lb).

Fig. 8-12



3. On the 250/300 cc models, place the ignition switch into position; then place the console in position and secure with the screws, a spacer, and the retaining ring (opposite the screw).

Fig. 8-13

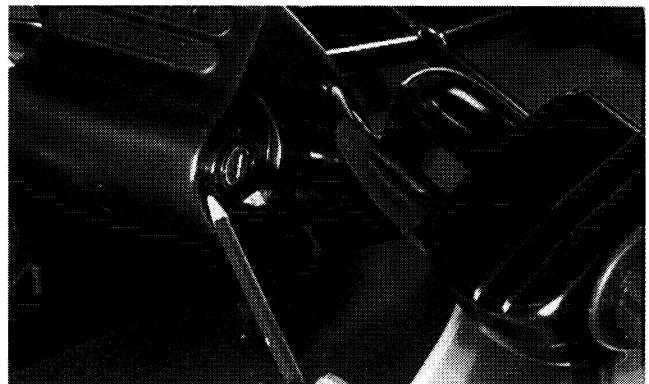


Fig. 8-14



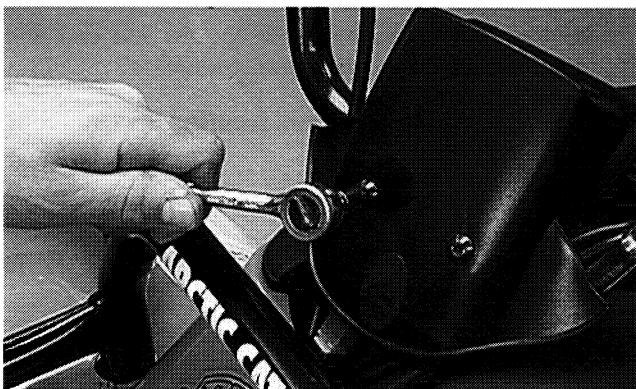
4. On the 400/500 cc models, place the ignition switch into position; then place the instrument pod into position and secure with the machine screw, body collar, and the retaining ring (opposite the screw).

Fig. 8-15



5. On the 400/500 cc models, secure the front of the instrument pod with cap screws.

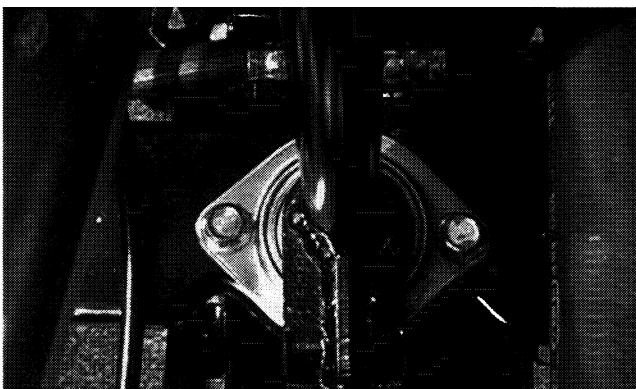
Fig. 8-16



AL647D

6. Place the bearing flange into position on the support bracket. Secure with the cap screws.

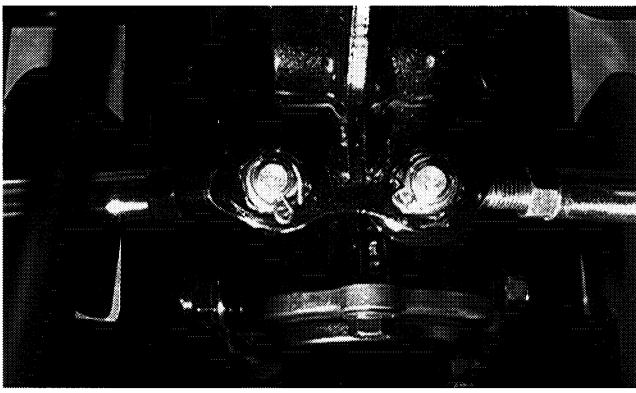
Fig. 8-17



AL600D

7. Insert each tie rod end into the actuator arm; then install the slotted nut and tighten to 4.2 kg-m (30 ft-lb). Lock the nuts with the cotter pins.

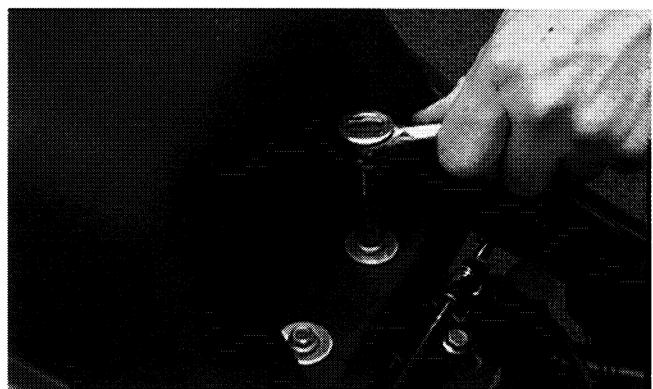
Fig. 8-18



AF778D

8. Place the gas tank (accounting for spacers) into position. Secure with screws and washers.

Fig. 8-19



AL617D

9. Connect the fuel hose to the carburetor.
10. Install the left-side panel; then install the seat.

■ NOTE: Turn the gas tank valve to the ON position only if starting the engine.

Handlebar Grip

REMOVING

1. Remove the plug from the head of the rivet.
2. Using a 1/8-in. drill bit, drill out the rivet.
3. Using compressed air between the grip and the handlebar, twist the grip back and forth until it slides free of the handlebar.

INSPECTING

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

1. Inspect the grip for wear, cuts, or cracks.
2. Inspect the grip for deterioration.

INSTALLING

■ NOTE: Before installing a grip, use contact spray or alcohol to clean the inside of the grip and the handlebar of glue residue, oil, or any other contaminant.

1. Apply a liberal amount of Handlebar Grip Adhesive (p/n 0636-071) to the inside of the grip.
2. Align the rivet hole in the grip with the rivet hole in the handlebar; then align the notch (inside the grip) with the slot in the handlebar and slide the grip onto the handlebar until it is fully seated.

3. Wipe off any excess glue; then secure the grip with a new rivet.
4. Install the plug on the head of the rivet.

Knuckles/Spindles

REMOVING AND DISASSEMBLING

1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

⚠ WARNING

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

2. Remove the wheel cap from the hub; then remove the cotter pin from the nut.

Fig. 8-20



AF613D

3. Remove the nut securing the hub. Account for a washer and a hub seal.
4. Remove the brake caliper.

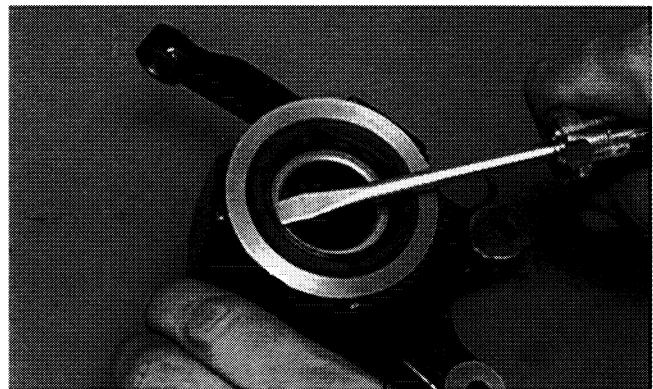
Fig. 8-21



AF615D

5. Remove the hub assembly.
6. Remove the cotter pin from the tie rod end and remove the tie rod end from the knuckle.
7. Remove the two cap screws securing the ball joints in the knuckle.
8. Tap the ball joint end out of the knuckle; then remove the knuckle.
9. Remove the seal from the knuckle.

Fig. 8-22



AF725D

10. Remove the bearing retainer.

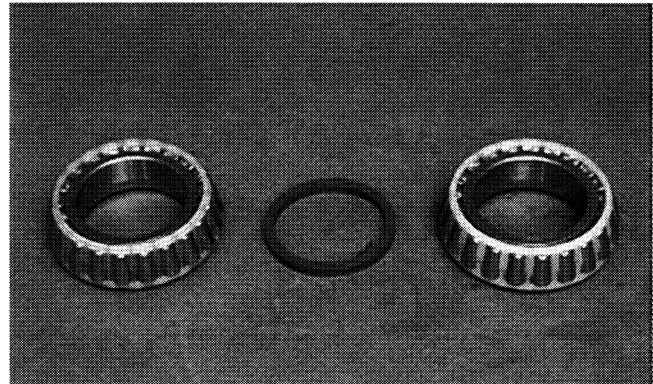
Fig. 8-23



AF726D

11. Remove the bearings and spacer.

Fig. 8-24



AF727D

CAUTION

Use extreme care when removing the bearings. If the bearings are allowed to fall, they will be damaged and will have to be replaced.

NOTE: If replacement is necessary, always replace bearings and races as a set.

CLEANING AND INSPECTING

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

1. Clean all knuckle components.
2. Inspect the bearings and races for pits, gouges, rusting, or premature wear.
3. Inspect the knuckle for cracks, breaks, or porosity.
4. Inspect threads for stripping or damage.

ASSEMBLING AND INSTALLING

Fig. 8-25

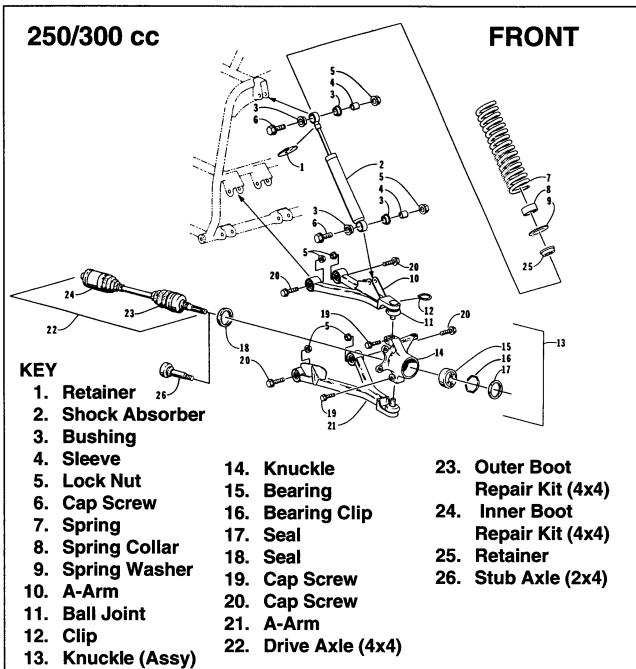
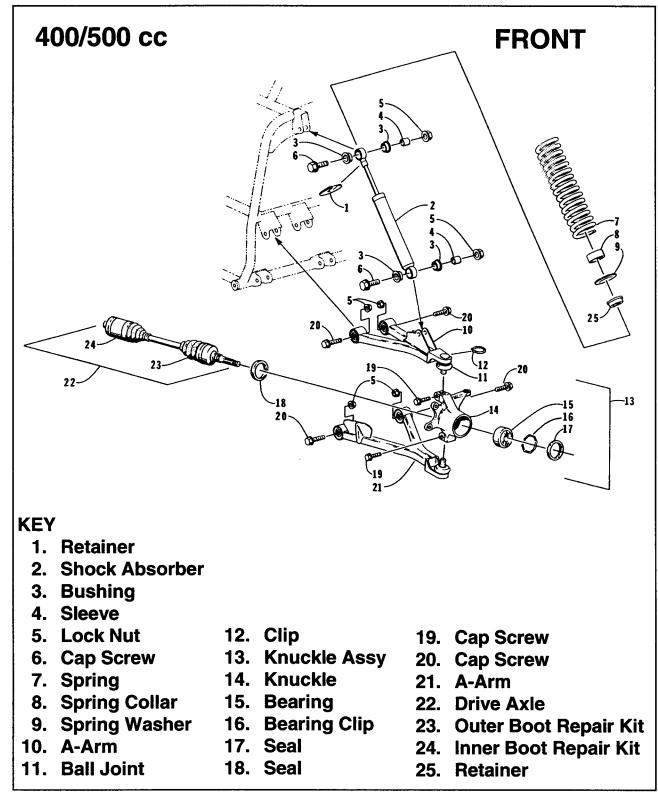
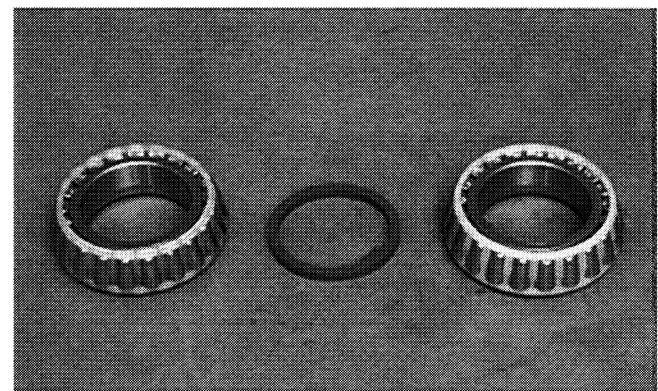


Fig. 8-26



1. Using water-resistant wheel bearing grease, pack the bearings.
2. Install the bearings (back-to-back with a spacer between) into the knuckle.

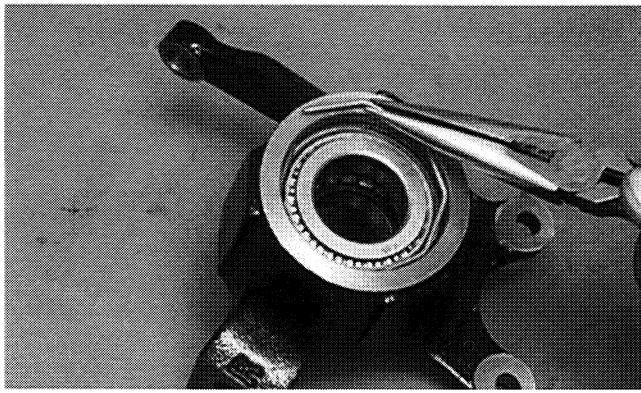
Fig. 8-27



AF727D

3. Install the bearing retainer.

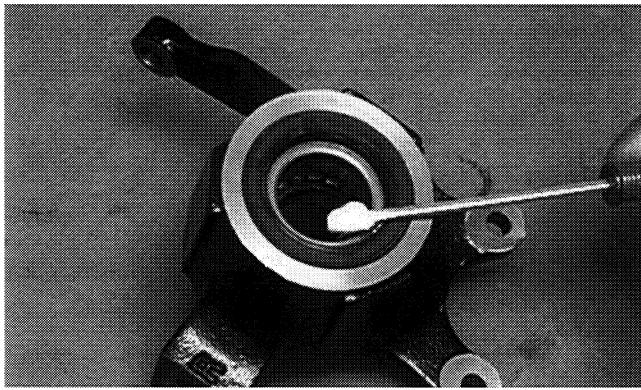
Fig. 8-28



AF726D

4. Install a new seal into the knuckle making sure the seal is flush with the knuckle; then apply grease to the seal.

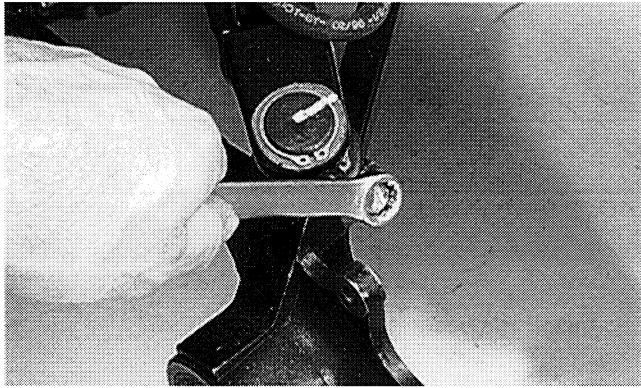
Fig. 8-29



AF724D

5. Install the knuckle onto the ball joints and secure with the two cap screws. Tighten to 5.5 kg-m (40 ft-lb).

Fig. 8-30

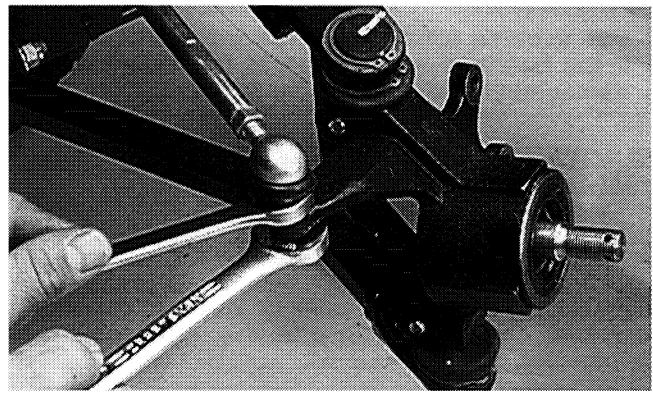


AF760D

6. Install the tie rod end and secure with the nut. Tighten to 4.2 kg-m (30 ft-lb); then install a new cotter pin and spread the pin.

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

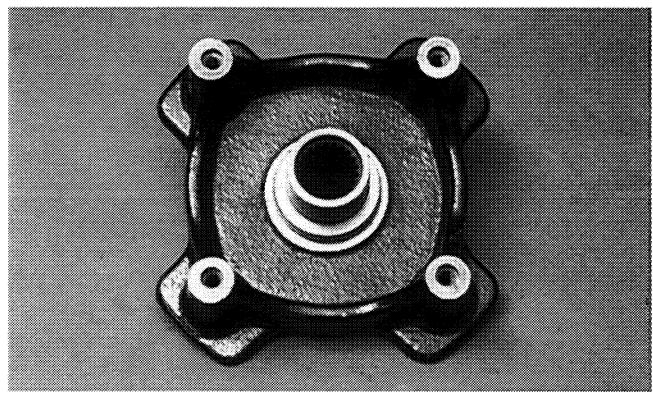
Fig. 8-31



AF759D

7. Apply a small amount of grease to the hub sealing area and on the splines.

Fig. 8-32



AF736D

8. Install the hub assembly onto the splines of the shaft.

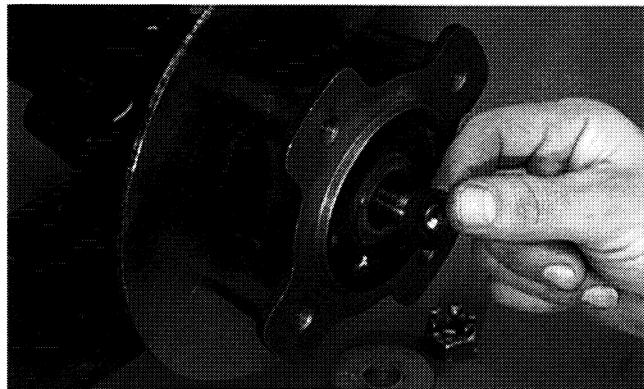
Fig. 8-33



AF702A

9. Insert the hub seal onto the shaft; then position it into the hub.

Fig. 8-34



AF701D

10. Place the washer onto the shaft; then secure the hub assembly with the nut. Tighten only until snug.

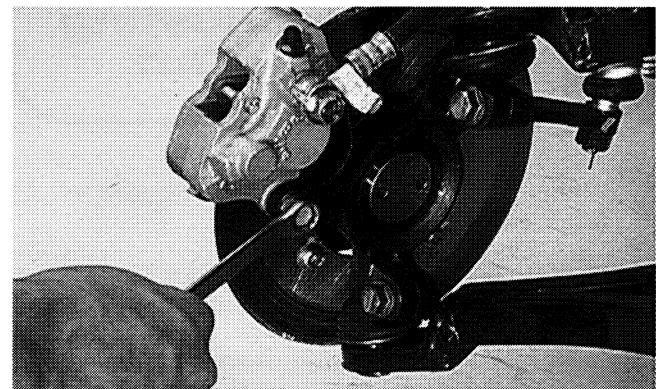
Fig. 8-35



AF614D

11. Secure the brake caliper to the knuckle with the two cap screws. Tighten to 2.8 kg-m (20 ft-lb).

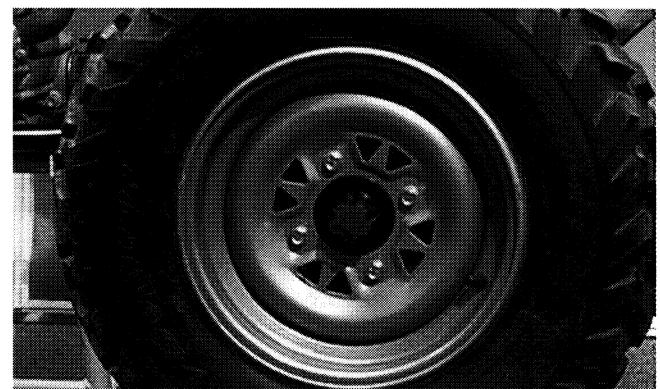
Fig. 8-36



AF746D

12. Tighten the hub nut to 11.8 kg-m (85 ft-lb).
13. Install a new cotter pin and spread the pin to secure the nut.
14. Install the wheel cap.
15. Install the wheel and tighten the cap screws to 6.9 kg-m (50 ft-lb).

Fig. 8-37



AF611D

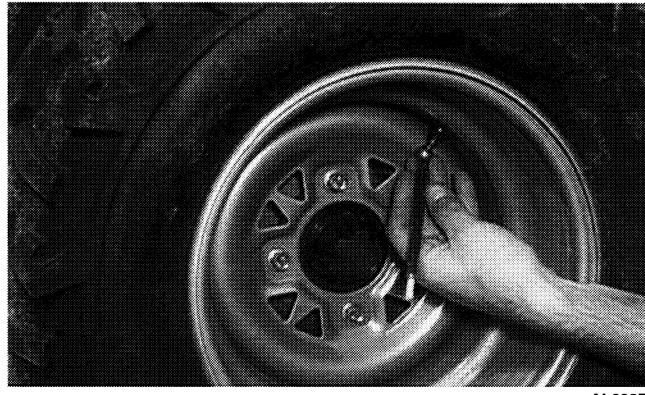
16. Remove the ATV from the support stand.

Measuring/Adjusting Toe-In/Toe-Out

1. Thoroughly wash the ATV to remove excess weight (mud, etc.).
2. Refer to the specifications and ensure the tires are properly inflated to the recommended pressure.

■ NOTE: Ensure the inflation pressure is correct in the tires or inaccurate measurements can occur.

Fig. 8-38

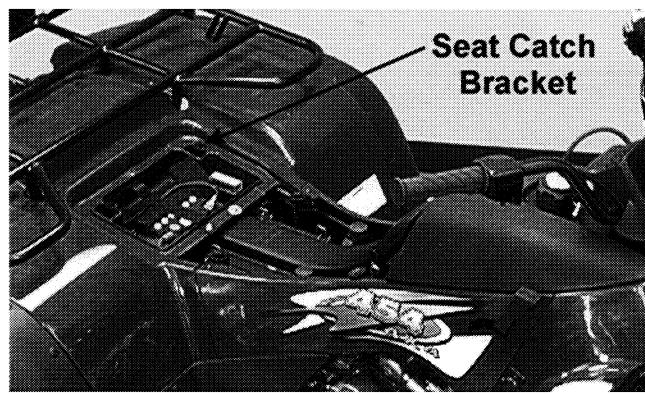


3. Place the ATV in a level position taking care not to push down or lift up on the front end; then turn the handlebar to the straight ahead position.

■ NOTE: When measuring and adjusting, there should be a normal operating load on the ATV (without an operator but with Arctic Cat approved accessories).

4. Measure the distance from the outside edge of each handlebar grip to the seat catch brackets.

Fig. 8-39



5. Adjust the handlebar direction until the two measurements are equal; then secure the handlebar to the rear rack using tie-down straps.

■ NOTE: Care must be taken not to allow the handlebar to turn while securing it.

Fig. 8-40



6. Measure the distance from the inside of each front rim to the lower frame tube.

Fig. 8-41

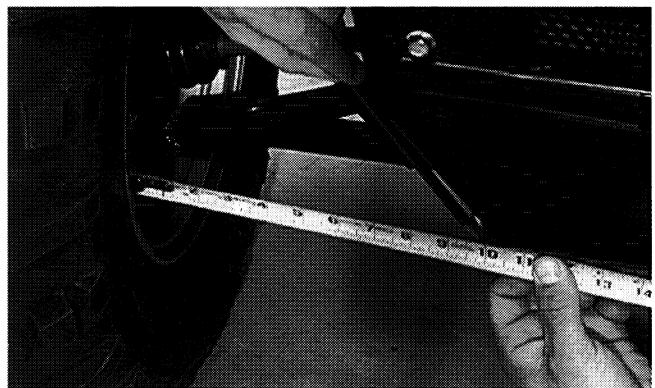
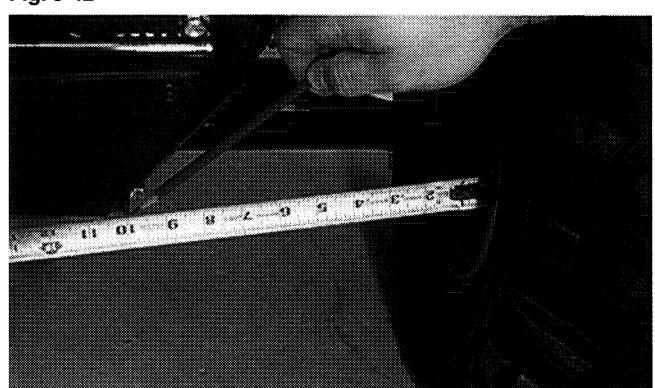


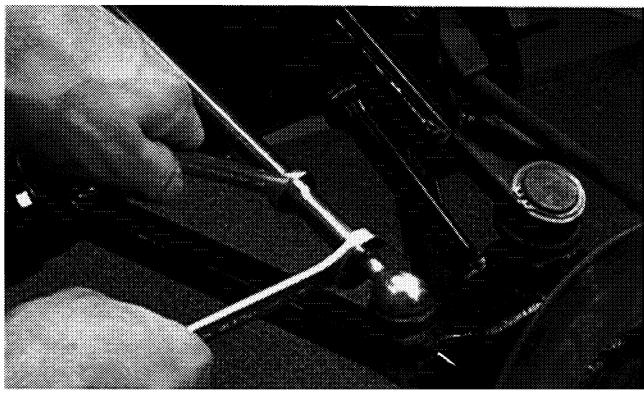
Fig. 8-42



■ NOTE: The distances from the inside rims to the frame tubes should be equal. If the measurements are equal, proceed to step 8; if the measurements are not equal, proceed to step 7.

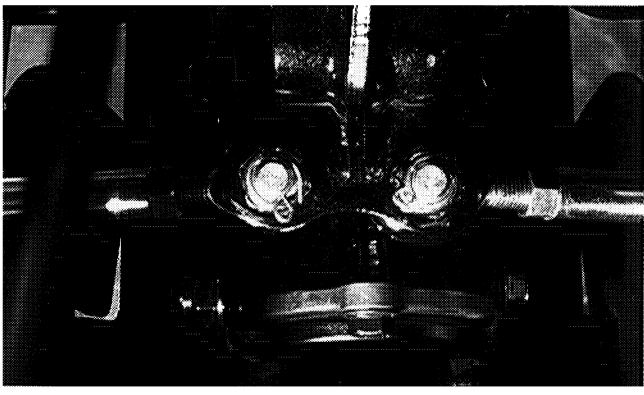
7. To make the measurements equal, loosen the appropriate tie rod jam nuts and adjust accordingly; then proceed to step 8.

Fig. 8-43



AF617D

Fig. 8-44



AF778D

■ NOTE: The front wheels do not have to be removed to adjust the tie rod. Also, care should be taken not to disturb the handlebar position.

8. Using a permanent marker of some type, mark the center of each front tire (at a height parallel to the belly panel).

Fig. 8-45

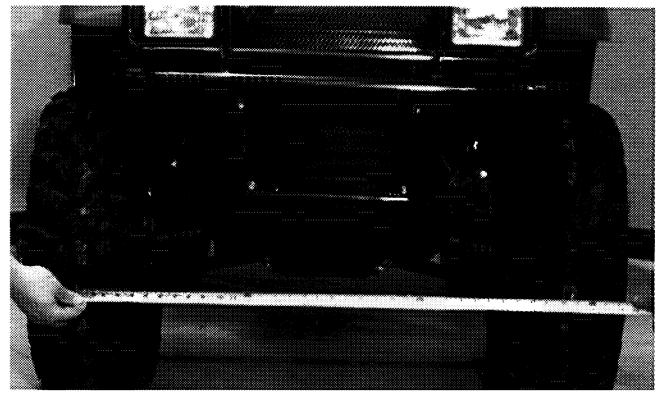


AF789D

9. Measure the overall width of the front tires (at a height parallel to the belly panel) at the front side; then record the measurement.

10. Push the ATV forward until the marks are parallel to the belly panel on the back side; then measure the overall width of the front tires at the rear side.

Fig. 8-46



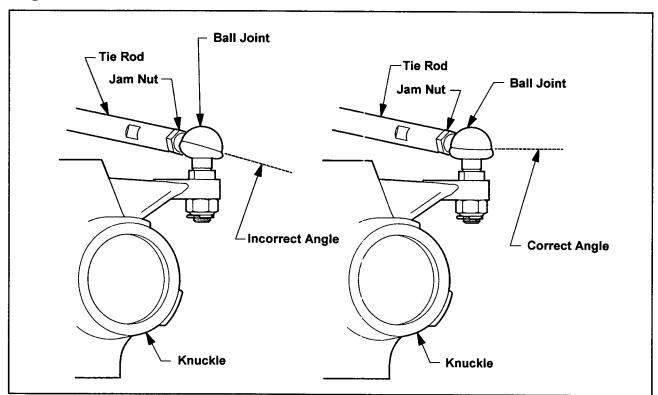
AF791D

11. The difference in the measurements must show 6.4 mm (1/4 in.) toe-in (the front measurement 6.4 mm (1/4 in.) less than the rear measurement).

12. If the difference in the measurements does not show a 6.4 mm (1/4 in.) toe-in, adjust both tie rods equally in until within specification.

■ NOTE: Prior to locking the jam nuts, make sure the ball joints are at the center of their normal range of motion and at the correct angle.

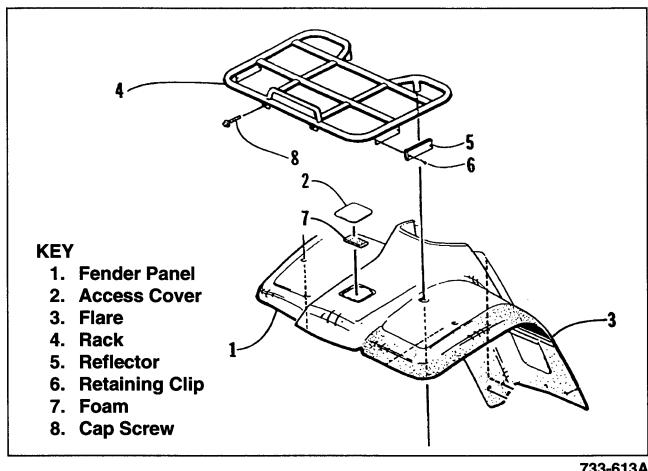
Fig. 8-47



733-559A

Front Rack

Fig. 8-48



REMOVING

1. Remove the screws and washers securing the fenders to the rack.

Fig. 8-49



AF600DA

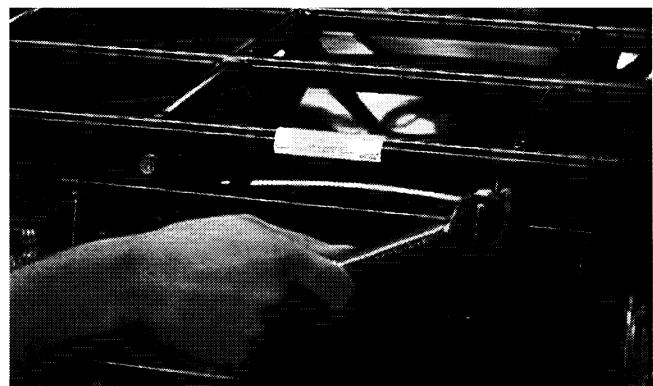
2. Remove the cap screws and washers securing the rack to the frame and front bumper assembly.

Fig. 8-50



AF601D

Fig. 8-51



AF607D

3. Remove the front rack from the ATV.

CLEANING AND INSPECTING

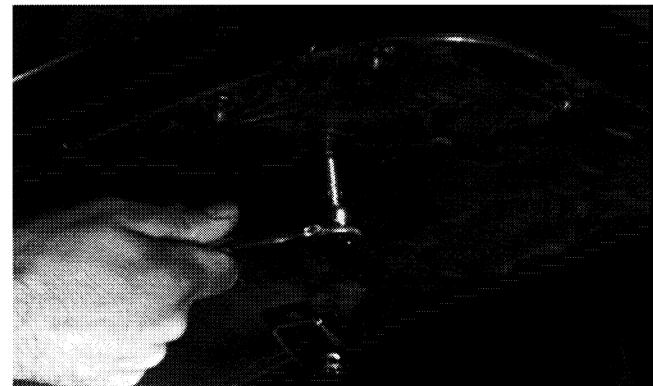
■ NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Clean all rack components with parts-cleaning solvent.
2. Inspect all welds for cracking or bending.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect for missing decals and/or reflectors.

INSTALLING

1. Place the rack into position on the frame and bumper. Start the cap screws and finger-tighten only.
2. Install the screws and washers securing the rack to the fenders. Do not tighten at this time.

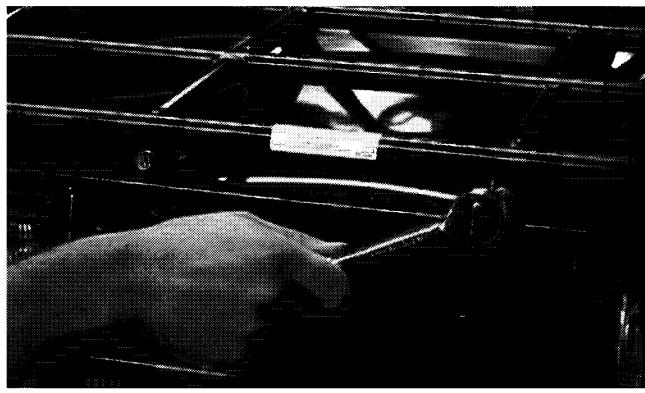
Fig. 8-52



AF600DA

3. Tighten the two bumper to rack 8 mm cap screws to 2.8 kg-m (20 ft-lb).

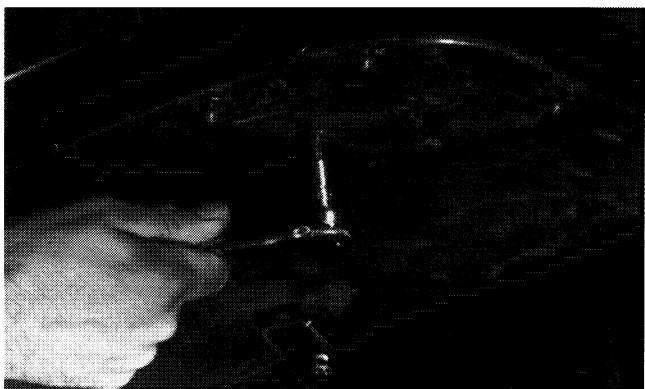
Fig. 8-53



AF607D

4. Tighten the two rack to fender 6 mm screws to 2.2 kg-m (16 ft-lb).

Fig. 8-54



AF600DA

5. Tighten the frame to rack 10 mm cap screws to 5.5 kg-m (40 ft-lb).

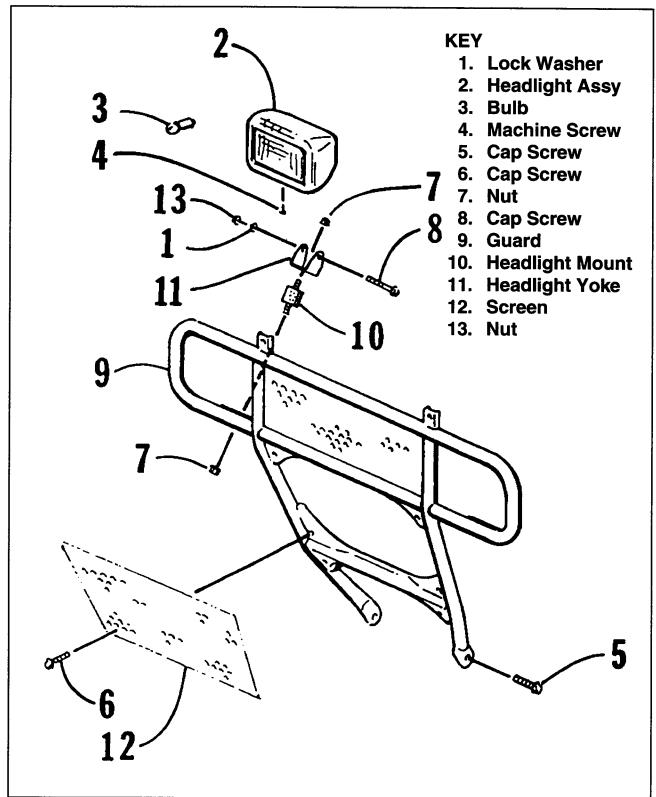
Fig. 8-55



AF601D

Front Bumper Assembly

Fig. 8-56



733-783A

8

REMOVING

1. Unplug the wiring harness from each headlight assembly; then cut the cable tie (if necessary) securing the main wiring harness to the front bumper.
2. Remove the torx-head screws securing the belly panel to the bumper. Account for two concave washers.

Fig. 8-57



AF608DA

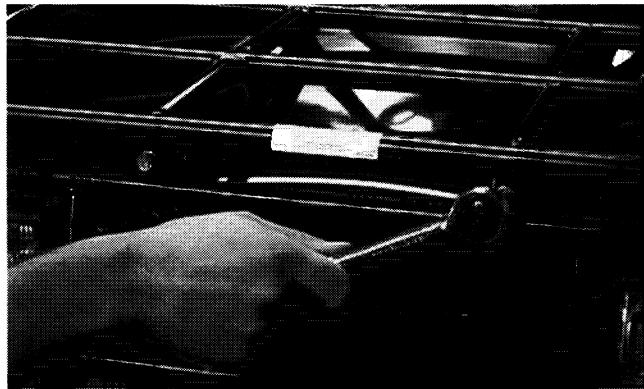
3. Remove the cap screws securing the bumper assembly to the frame and rack; then remove bumper assembly.

Fig. 8-58



AF604D

Fig. 8-59



AF607D

CLEANING AND INSPECTING

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

1. Clean all bumper components with parts-cleaning solvent.
2. Inspect all welds for cracking or bending.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect the wiring harness and headlights for damage.
5. Inspect the screen for damage or air-flow obstructions.

INSTALLING

1. Place the bumper assembly into position on the frame and start all cap screws. Finger-tighten only.
2. Secure the belly panel to the bumper with torx-head screws and concave washers. Tighten to 1.1 kg-m (8 ft-lb).

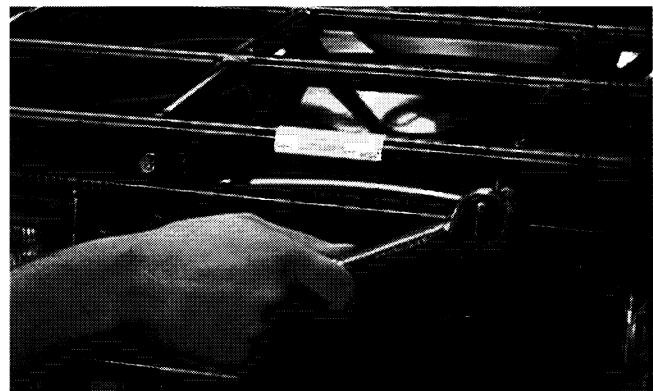
Fig. 8-60



AF608DA

3. Tighten the two bumper to rack 8 mm cap screws to 2.8 kg-m (20 ft-lb).

Fig. 8-61



AF607D

4. Tighten the bumper to frame cap screws to 5.5 kg-m (40 ft-lb).

Fig. 8-62



AF604D

5. Connect wiring harness to each headlight assembly.
6. Secure the wiring harnesses to the bumper assembly with a cable tie (if necessary).

Front Fender/ Side Panels

Fig. 8-63

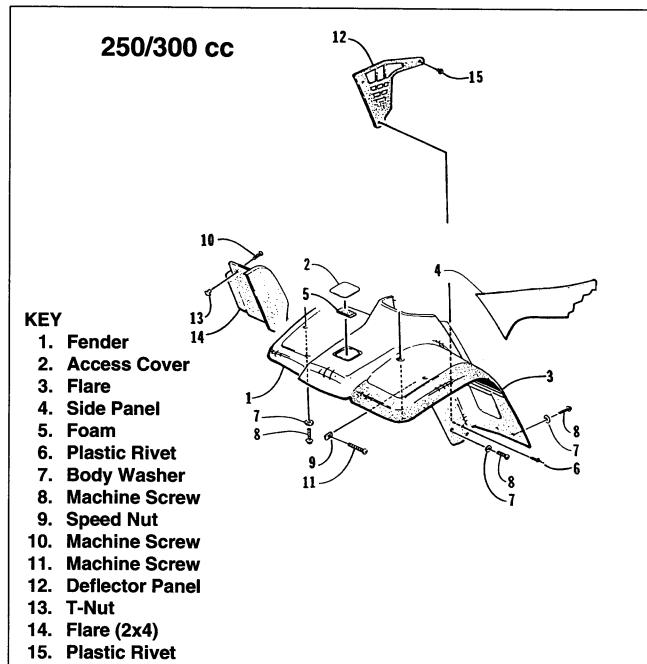


Fig. 8-64

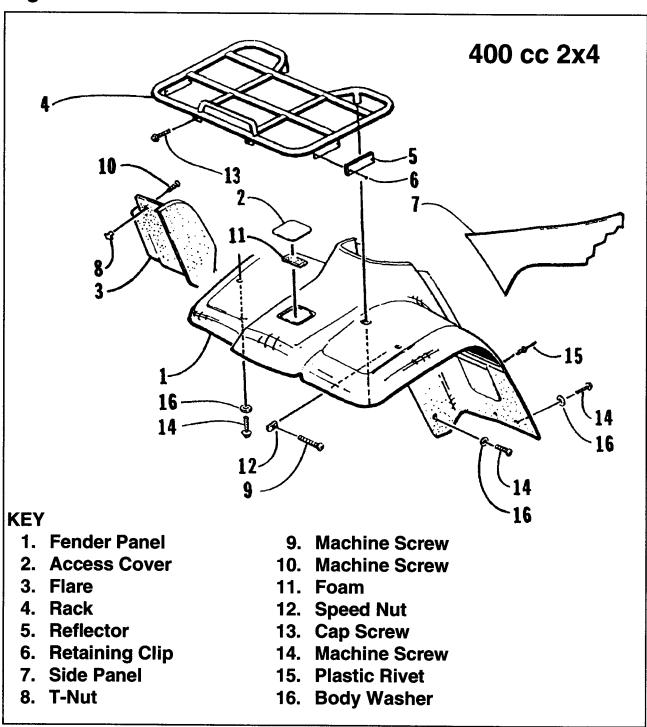
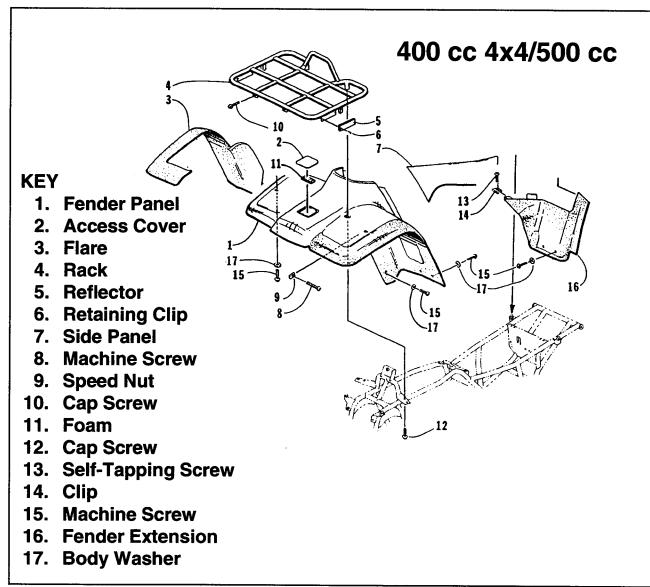


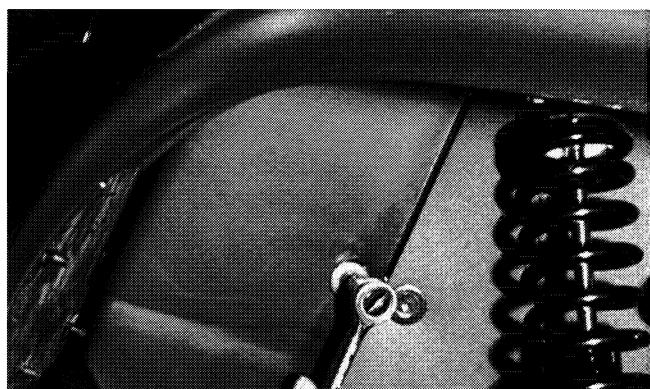
Fig. 8-65



REMOVING

1. Remove the front rack (see Front Rack in this section).
2. Remove the machine screws and washers securing the front fenders to the footrest and frame.

Fig. 8-66



3. On the 250/300 cc models, remove the plastic rivets securing the deflector panels to the frame.

CLEANING AND INSPECTING

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

1. Clean all fender components with part-cleaning solvent and soap and water.
2. Inspect fenders for cracks and/or loose rivets.
3. Inspect for any missing decals.

INSTALLING

1. Place the fenders into position on the footrest and frame; secure with machine screws.

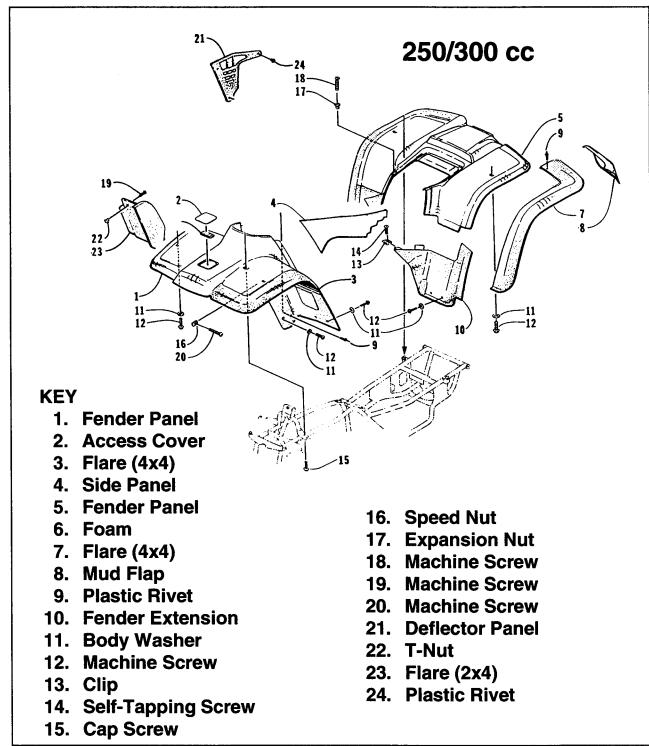
Fig. 8-67



2. Tighten the machine screws securely.
3. On the 250/300 cc models, secure the deflector panels with plastic rivets.
4. Install the front rack (see Front Rack in this section).

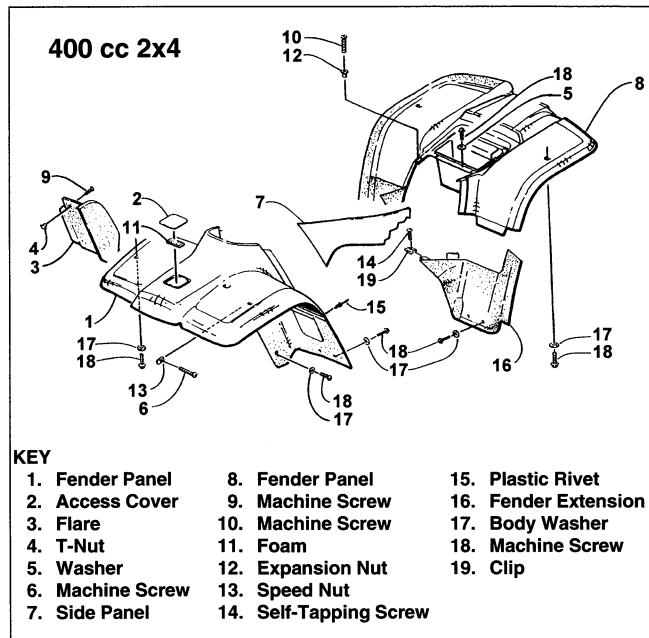
Fender Flares/ Extensions

Fig. 8-68



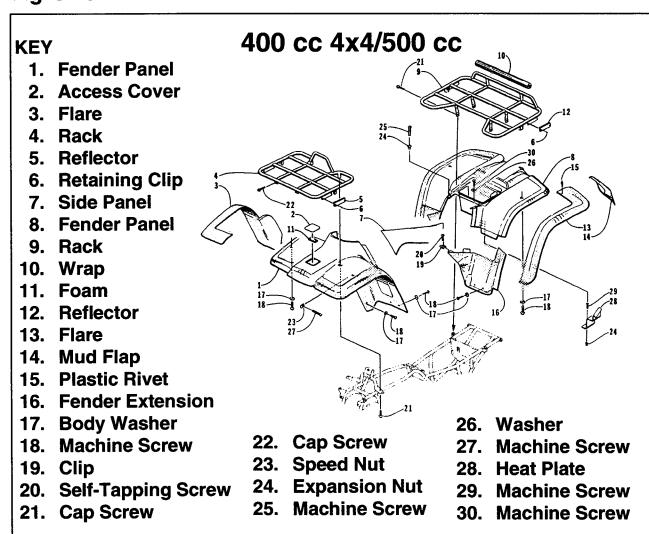
733-613C

Fig. 8-69



733-780B

Fig. 8-70



0734-275

REMOVING

1. Using a side-cutter, remove the appropriate plastic rivets.

■ NOTE: If removing a front extension, remove the self-tapping screw securing the extension to the side panel.

2. Remove the screws securing the extensions or flares to the frame and footrest. Account for concave washers and T-nuts.

■ NOTE: The rear extensions are secured with clips and self-tapping screws.

INSTALLING

1. Place the flare or extension into position. Using the Plastic Rivet Setter (p/n 0444-056), secure with Plastic Rivets (p/n 0423-046) or suitable substitute.

NOTE: If installing a front extension, secure to the side panel with the self-tapping screw and clip.

2. Secure the extensions or flares with the screws, T-nuts, and concave washers.

NOTE: The rear extensions are secured with clips and self-tapping screws.

Belly Panel

Fig. 8-71

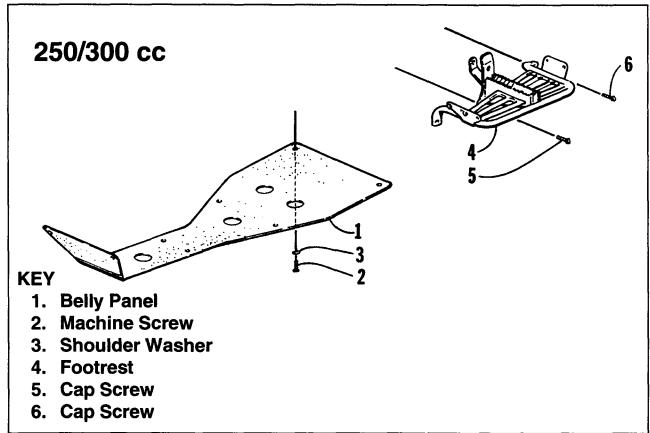
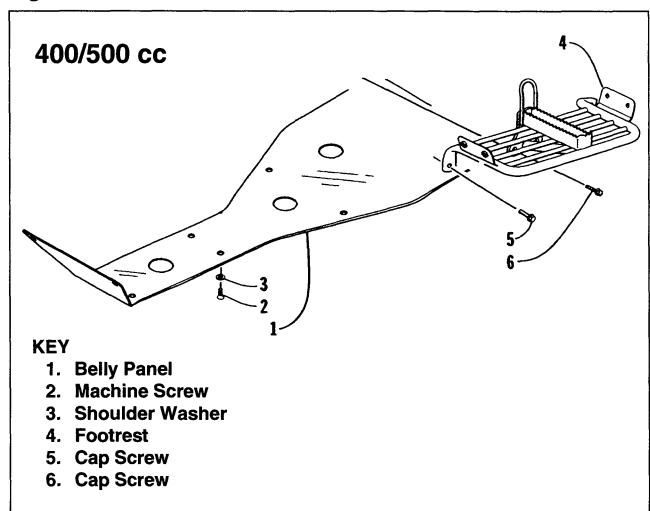


Fig. 8-72



REMOVING

1. Remove the machine screws and shoulder washers securing the belly panel to the underside of the frame.

2. Remove the belly panel.

INSTALLING

1. Place the belly panel into position on the underside of the frame.
2. Install the machine screws and shoulder washers. Tighten to 1.1 kg-m (8 ft-lb).

Exhaust System

Fig. 8-73

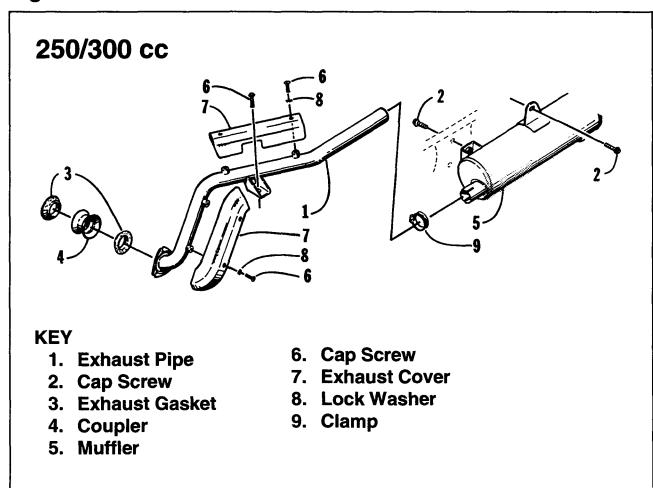
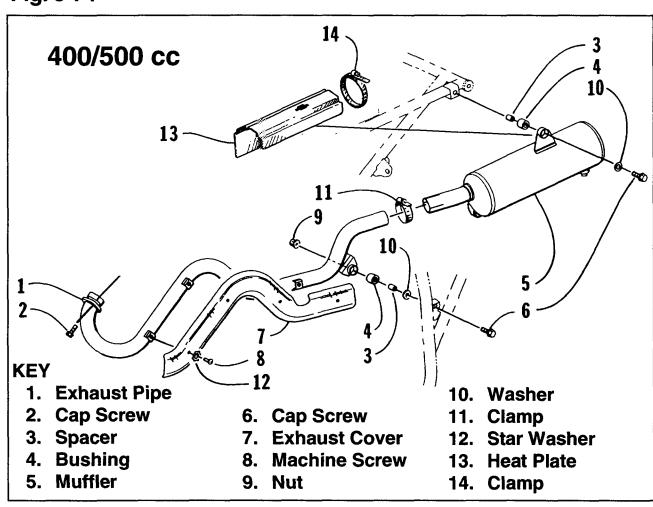


Fig. 8-74

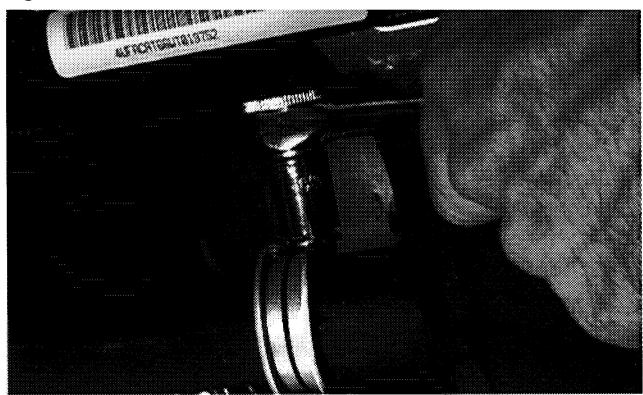


8

REMOVING MUFFLER

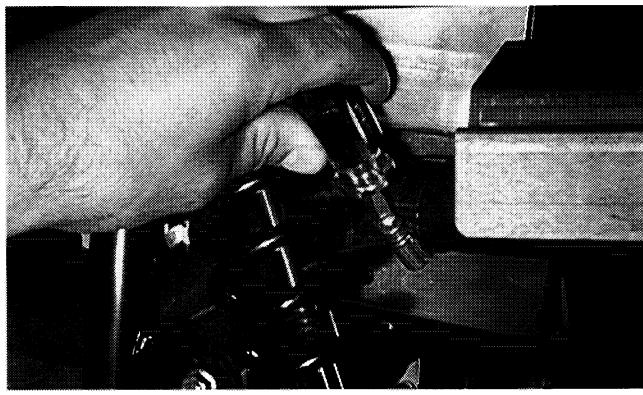
1. Remove the cap screws securing the muffler to the frame and account for all mounting hardware.
2. Loosen the clamp at the muffler/exhaust pipe juncture; then remove the muffler.

Fig. 8-75



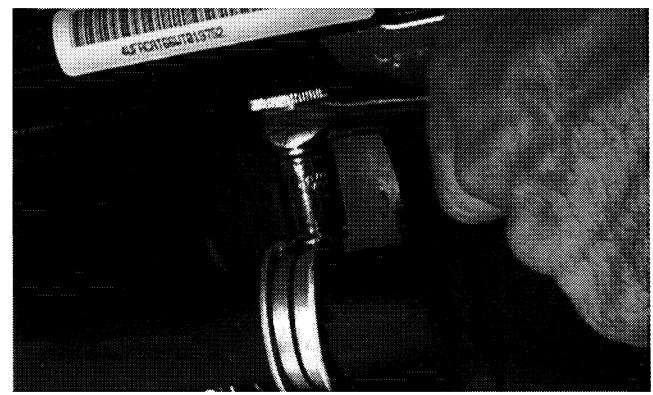
CH056D

Fig. 8-76



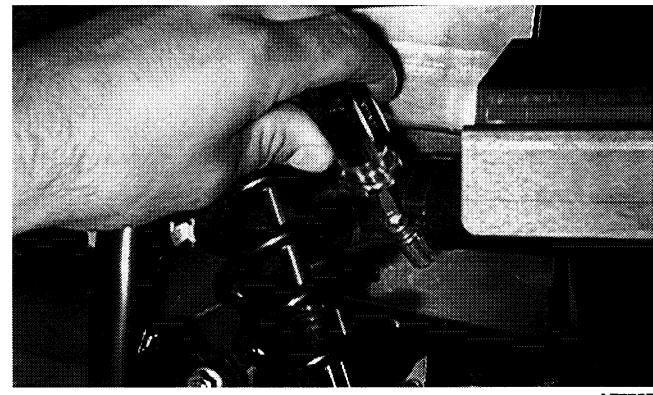
AF775D

Fig. 8-77



CH056D

Fig. 8-78



AF775D

INSPECTING MUFFLER

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

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

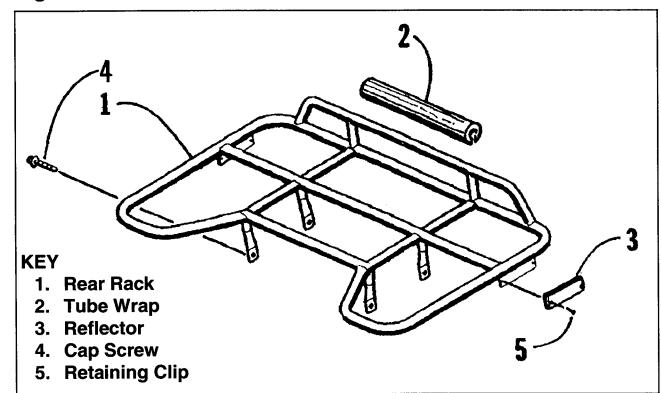
■ NOTE: For additional details on cleaning the muffler/spark arrester, see Section 2.

INSTALLING MUFFLER

1. Install the muffler on the frame and into the muffler/exhaust pipe juncture accounting for all mounting hardware.
2. Tighten cap screws to 2.8 kg-m (20 ft-lb); then tighten the juncture clamp.

Rear Rack

Fig. 8-79



733-780C

REMOVING

1. Remove the seven cap screws securing the rear rack to frame and rear fenders. Account for any washers.
2. Lift the rack upward and remove from the frame.

CLEANING AND INSPECTING

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

1. Clean all rear rack components with parts-cleaning solvent.
2. Inspect all welds for cracking or bending.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect for missing decals and/or reflectors.

INSTALLING

1. Place the rack into position on the frame; then install the cap screws and any washers.
2. Tighten the three 6 mm machine screws to 1.7 kg-m (12 ft-lb).
3. Tighten the four 10 mm cap screws to 5.5 kg-m (40 ft-lb).

Rear Fender

Fig. 8-80

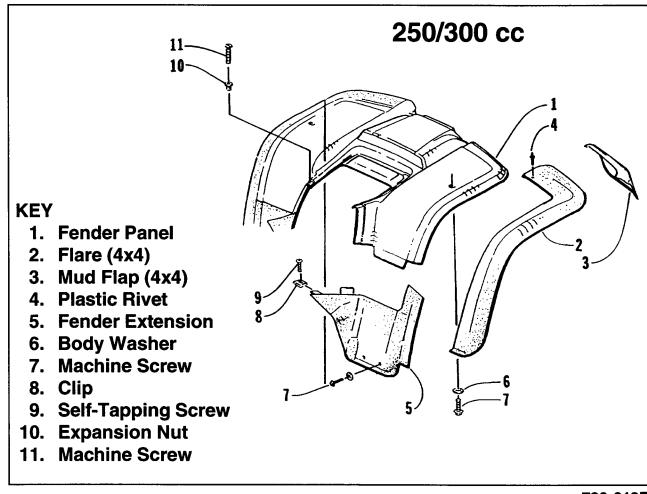
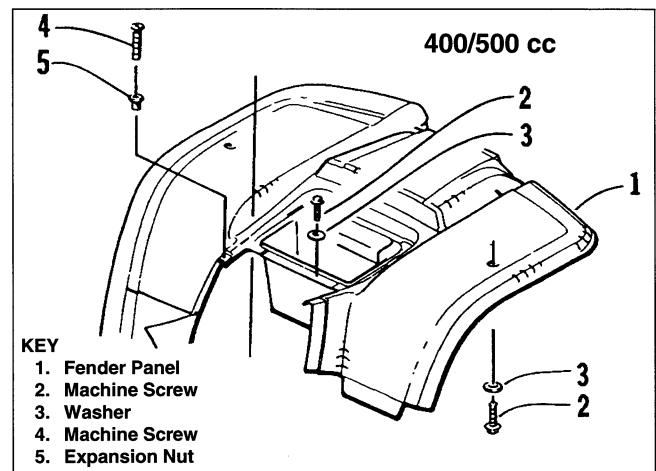


Fig. 8-81



REMOVING

1. Remove the seat (see Seat in this section).
2. Remove the rear rack (see Rear Rack in this section).
3. Remove side panels (see Front Fender/Side Panels in this section).
4. Remove the cap screws and washers securing the fender to the frame.

■ NOTE: On the 400/500 cc models, account for the battery hold-down bracket.

5. Disconnect the taillight wiring harness three-prong connector; then remove the fender.

CLEANING AND INSPECTING

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

1. Clean all rear fender components with parts-cleaning solvent and soap and water.
2. Inspect side panels, fender extensions, and rear fenders for cracks and loose rivets.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect for missing decals.

INSTALLING

1. Place the rear fender into position on the frame; then install the cap screws and washers (with battery hold-down bracket on the 400/500 cc models).
2. Tighten the cap screws to 5.5 kg-m (40 ft-lb).

3. Route the taillight wiring harness over the rear frame; then connect the three-prong connector.
4. Install the side panels (see Front Fender/Side Panels in this section).
5. Install the rear rack (see Rear Rack in this section).
6. Install the seat (see Seat in this section).

Adjusting Headlight

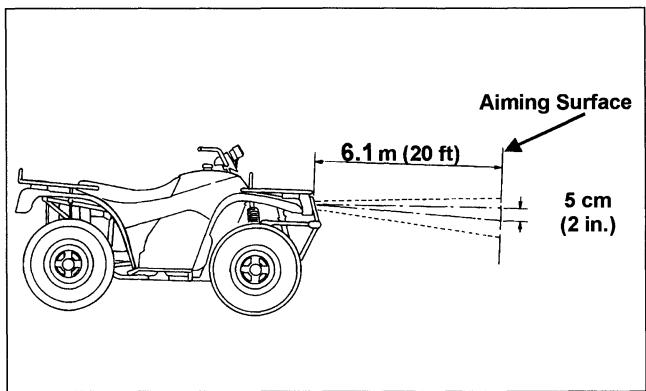
The headlights can be adjusted vertically and horizontally. The geometric center of the HIGH beam light zone is to be used for vertical and horizontal aiming.

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

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

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

Fig. 8-82



7. Adjust each headlight until correct aim is obtained.

A. Horizontal — Loosen the nut beneath the headlight mounting grommet; then adjust for proper aiming. Tighten the nut to 1.7 kg-m (12 ft-lb).

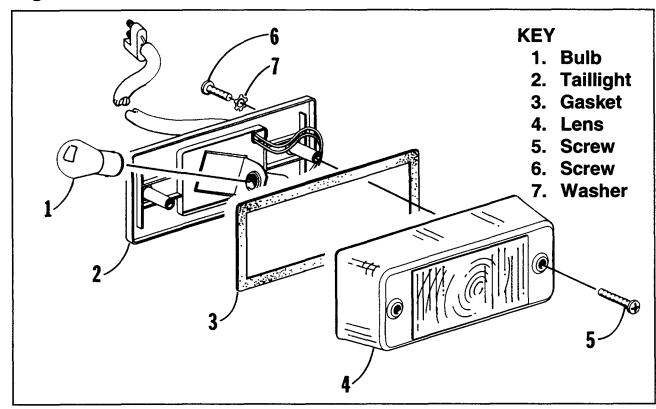
B. Vertical — Loosen the nut on the side of the headlight housing; then adjust for proper aiming. Tighten the nut securely.

WARNING

Do not operate the ATV unless the headlight beam is adjusted properly. An incorrectly adjusted beam will not provide the operator the optimum amount of light.

Taillight Assembly

Fig. 8-83



REMOVING

1. Unplug the three-prong connector and free the taillight wiring harness from the frame.
2. Remove the torx-head cap screws securing the taillight assembly to the frame. Account for any washers.
3. Remove the taillight assembly.

INSPECTING

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

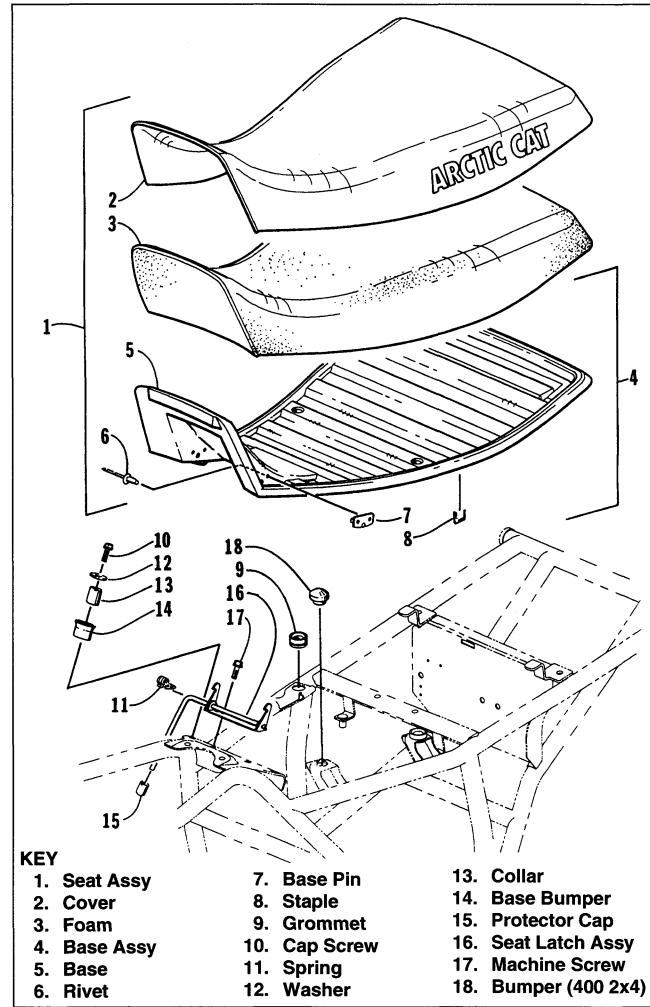
1. Inspect wiring harness, three-prong connector, lens, base, cap screws, and socket for damage.
2. Inspect all wires for corrodng, pinching, and cracking.
3. Inspect the bulb for wattage, voltage, and proper operation.

INSTALLING

1. Place the assembly into position on the frame and secure with torx-head cap screws and any washers.
2. Tighten the cap screws securely.
3. Route the wiring harness over the rear frame; then connect the three-prong connector.

Seat

Fig. 8-84



0733-423

8

1. Trip the seat release lever located under the right side panel by pulling it rearward; then lift up and pull forward on the front of the seat to remove.
2. To install, slide the seat rearward until it is in position and press down to allow the seat to lock into place.

SECTION 9 - CONTROLS/INDICATORS

9

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Hand Brake Lever/ Master Cylinder Assembly

■ **NOTE:** The master cylinder is a non-serviceable component; it must be replaced as an assembly.

REMOVING

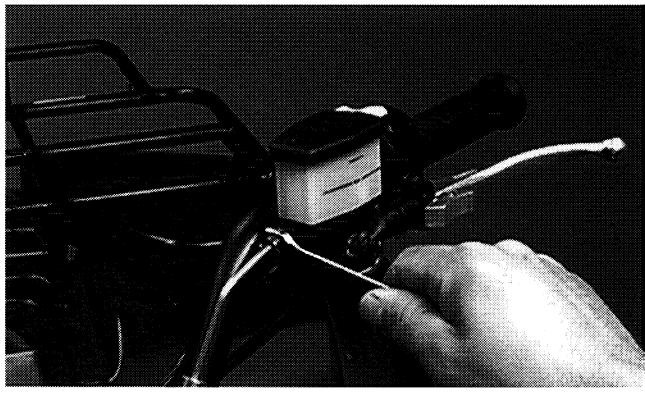
1. Slide a piece of flexible tubing over one of the wheel bleeder valves and direct the other end into a container. Remove the reservoir cover; then open the bleeder valve. Allow the brake fluid to drain completely.

Fig. 9-1



2. Place an absorbent towel around the connection to absorb brake fluid. Remove the brake hose from the master cylinder.

Fig. 9-2



CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the ATV.

3. Remove the clamp screws securing the brake assembly to the handlebar; then remove the assembly from the handlebar.

Fig. 9-3



AF656D

DISASSEMBLING

1. Remove the lever mounting bolt and lock nut securing the brake lever to the master cylinder.
2. Remove the two screws securing the brake reservoir to the master cylinder; then remove the reservoir. Account for the gasket, the cover, and the O-ring.

INSPECTING

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

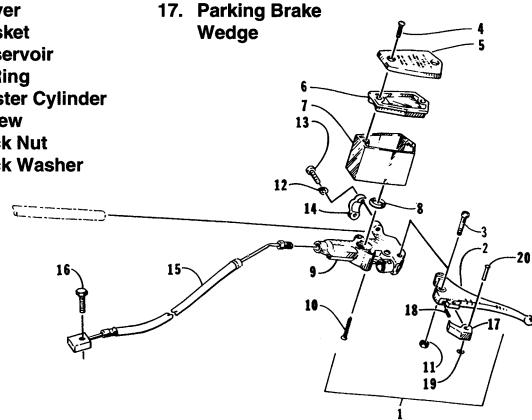
1. Inspect the bolt securing the brake lever for wear and for cracked, stretched, or damaged threads.
2. Inspect the O-ring for deterioration and distortion.
3. Inspect the reservoir for cracks and leakage.
4. Inspect the brake hose for cracks and deterioration and the condition of the fittings (threaded and compression).

ASSEMBLING

Fig. 9-4

KEY

| | | |
|---------------------|-------------------|---------------|
| 1. Brake Lever Assy | 13. Clamp Screw | 18. Spring |
| 2. Brake Lever | 14. Clamp | 19. Press Nut |
| 3. Cap Screw | 15. Hose | 20. Pin |
| 4. Screw | 16. Cap Screw | |
| 5. Cover | 17. Parking Brake | |
| 6. Gasket | Wedge | |
| 7. Reservoir | | |
| 8. O-Ring | | |
| 9. Master Cylinder | | |
| 10. Screw | | |
| 11. Lock Nut | | |
| 12. Lock Washer | | |



0733-434

1. Install the O-ring, reservoir, gasket, and cover on the master cylinder. Secure with two screws tightened to 1.1 kg-m (8 ft-lb).
2. Install the brake lever onto the master cylinder and secure with the lever mounting bolt and new lock nut. Tighten the lock nut just to the point of ensuring free brake lever movement.

⚠ WARNING

Do not over-tighten the lock nut. Over-tightening the lock nut will cause the brake lever to bind. The lever must work freely and fully return to its stop after installation.

⚠ WARNING

A new lock nut must be used to secure the brake lever.

INSTALLING

1. Position the brake assembly on the handlebar. Secure with clamp screws; then tighten securely.

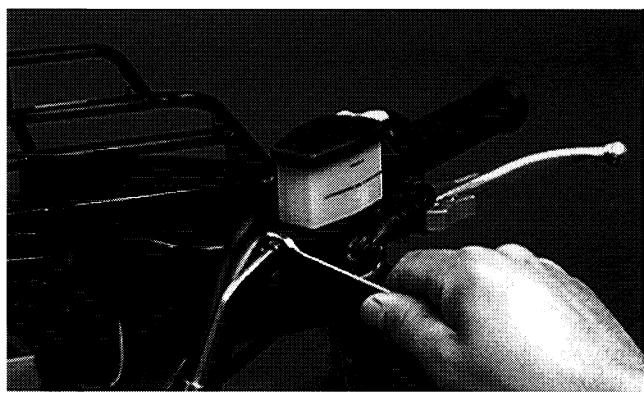
Fig. 9-5



AF656D

2. Install the brake hose on the master cylinder. Tighten securely.

Fig. 9-6



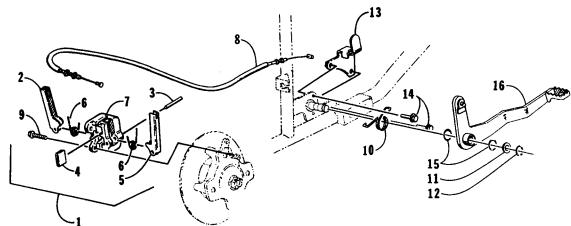
AF774D

Mechanical Foot Brake Assembly

Pressing the mechanical foot brake pedal downward will apply the mechanical brake to the rear wheels.

Fig. 9-7

250/300 cc



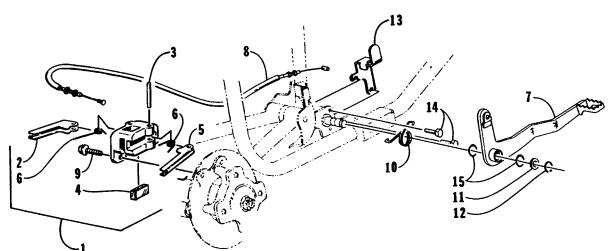
KEY

| | |
|--------------------------|----------------------|
| 1. Mechanical Brake Assy | 10. Spring |
| 2. Inner Arm | 11. Washer |
| 3. Arm Pin | 12. Snap Ring |
| 4. Pad | 13. Bracket |
| 5. Outer Arm | 14. Cap Screw |
| 6. Arm Spring | 15. O-Ring |
| 7. Housing | 16. Foot Brake Pedal |
| 8. Cable | |
| 9. Cap Screw | |

0733-691

Fig. 9-8

400/500 cc



KEY

| | |
|--------------------------|-----------------------|
| 1. Mechanical Brake Assy | 8. Brake Cable |
| 2. Inner Arm | 9. Cap Screw |
| 3. Arm Pin | 10. Foot Brake Spring |
| 4. Pad | 11. Washer |
| 5. Outer Arm | 12. Snap Ring |
| 6. Arm Spring | 13. Bracket |
| 7. Foot Brake Pedal | 14. Cap Screw |
| | 15. O-Ring |

0733-403

3. Bleed the brake system (see Section 2).

Fig. 9-9

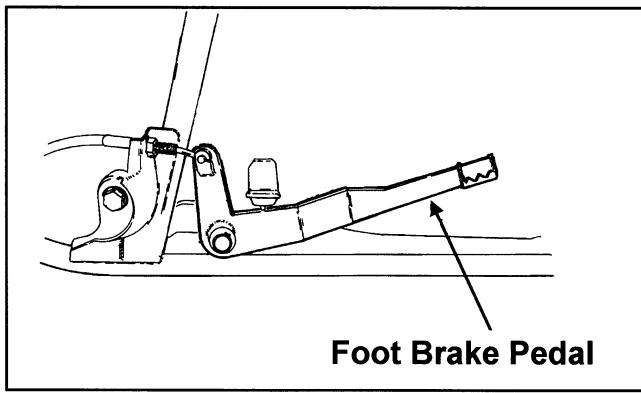
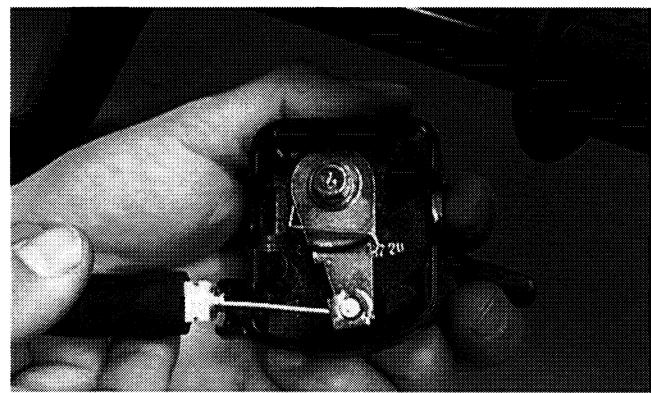
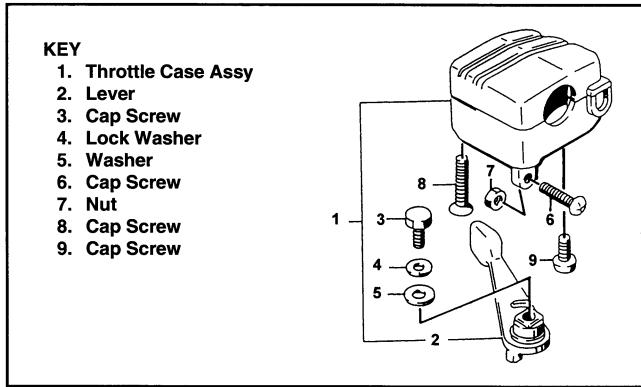


Fig. 9-12



Throttle Control

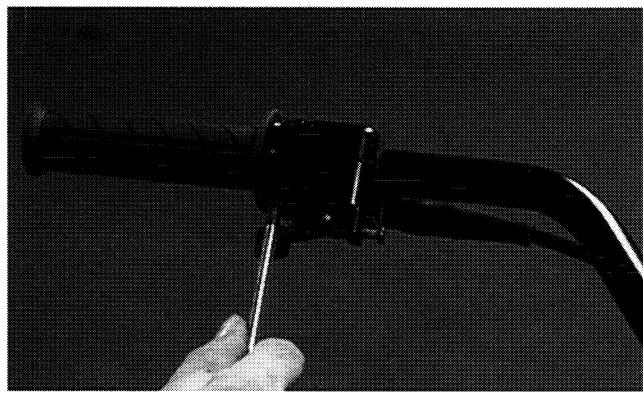
Fig. 9-10



REMOVING

1. Remove the two machine screws securing the throttle control to the handlebar.

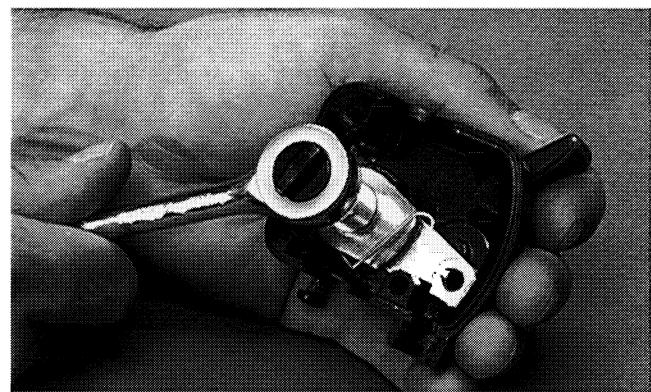
Fig. 9-11



2. Slide the grommet out of the lower half of the throttle control; then remove the cable from the actuator arm.

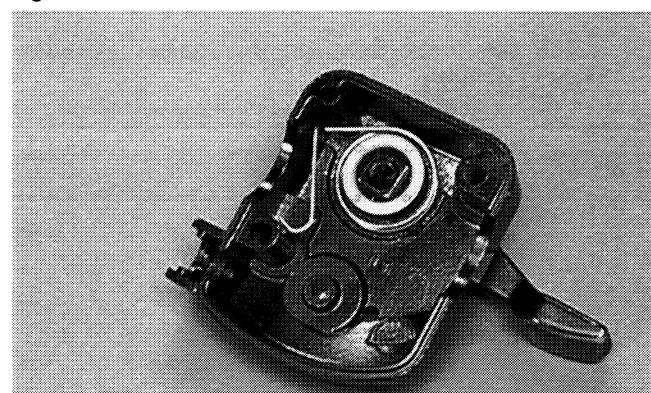
3. Remove the cap screw, lock washer, and washer securing the actuator arm to the throttle control lever.

Fig. 9-13



4. Remove the actuator arm and account for a bushing. Note the position of the return spring for installing purposes.

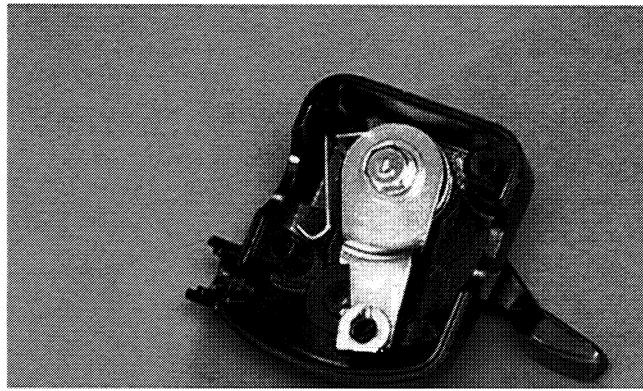
Fig. 9-14



INSTALLING

1. Place the return spring into the throttle control; then place the bushing and actuator arm into position. Secure with the cap screw, lock washer, and washer.

Fig. 9-15



AF679D

2. Using a pair of needle-nose pliers, place the spring into position on the actuator arm.

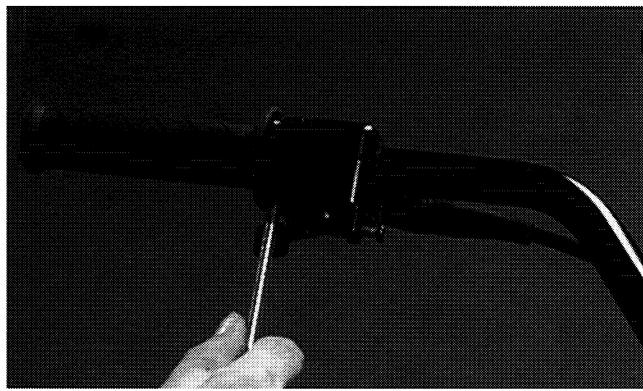
Fig. 9-16



AF680D

3. Place the two halves of the throttle control onto the handlebars and secure with the two machine screws.

Fig. 9-17

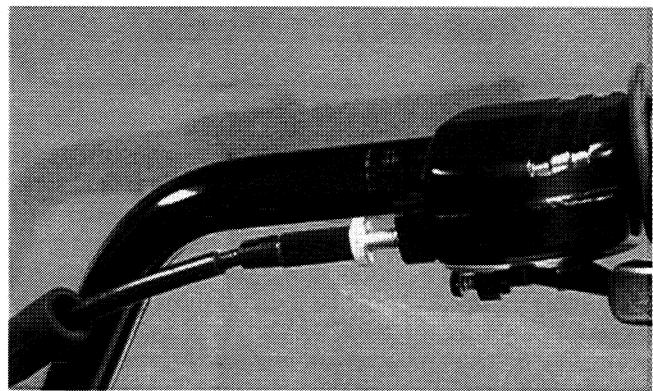


AL610D

ADJUSTING

1. Slide the boot back to reveal the jam nut; then loosen the jam nut.

Fig. 9-18



AF682D

2. Rotate the adjuster sleeve until 0.5-1.0 mm (0.02-0.04 in.) is attained.

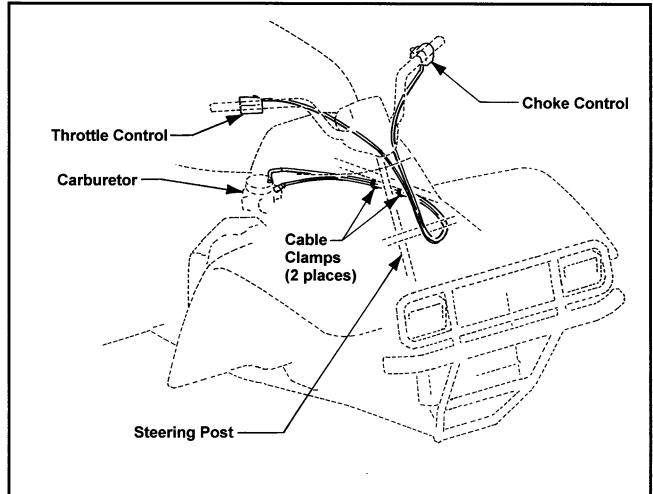
Fig. 9-19



AL611D

3. Secure the adjustment by tightening the jam nut; then slide the boot over the jam nut.

Fig. 9-20

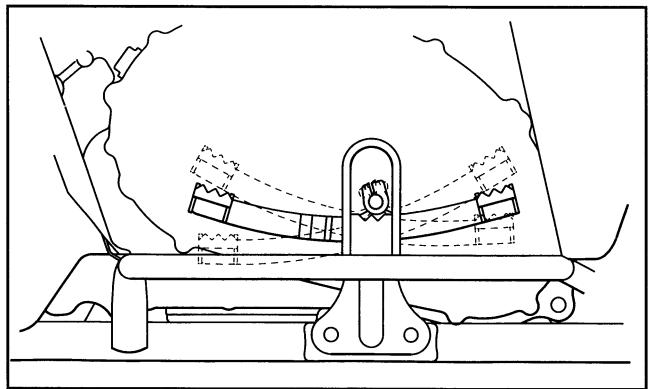


0732-412

Gearshift Pedal

The ATV has a 5-speed transmission. The gearshift pedal is attached to a ratchet mechanism in the transmission. Each time a gear is selected, the gearshift pedal will return to its normal position ready to select the next gear. To return to neutral, press down repeatedly (once for each gear) on the front of the pedal. Shift into gears by pressing down on the back of the pedal once for each gear. The ratchet mechanism makes it impossible to upshift or downshift more than one gear at a time.

Fig. 9-21



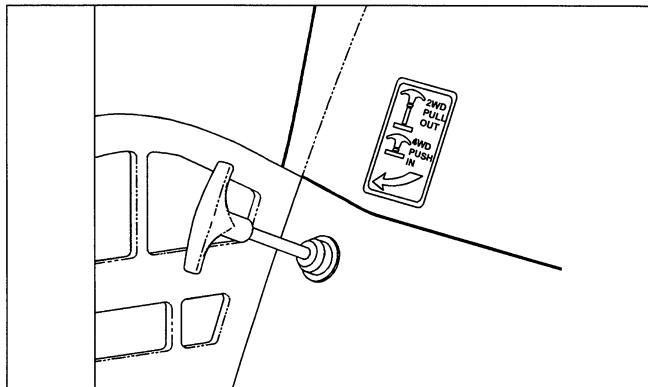
0732-753

Drive Selector (300 cc 4x4)

This ATV has a mechanical drive selector which allows the operator to operate in either 2-wheel drive (rear wheels) or 4-wheel drive (all wheels). For normal riding on flat, dry, hard surfaces, 2-wheel drive should be sufficient. In situations of aggressive trail conditions, 4-wheel drive would be the desired choice.

To either engage or disengage the front wheels, come to a complete stop; then either push in (to engage) or pull out (to disengage) the front wheel differential. Apply slight throttle until positive engagement of the differential has been observed.

Fig. 9-22



0733-732

CAUTION

Do not attempt to either engage or disengage the front differential while the ATV is moving.

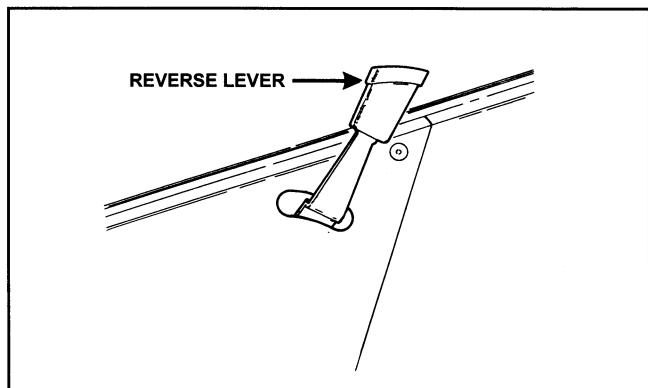
Reverse Shift Lever

The ATV has a reverse gear. To shift into reverse gear, stop the ATV completely and shift the transmission into neutral. Pull the reverse shift lever fully rearward. When the ATV is in reverse gear, the gearshift pedal will not function.

WARNING

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

Fig. 9-23



ATV-0091

Reverse Shift Lever and Cable

Fig. 9-24

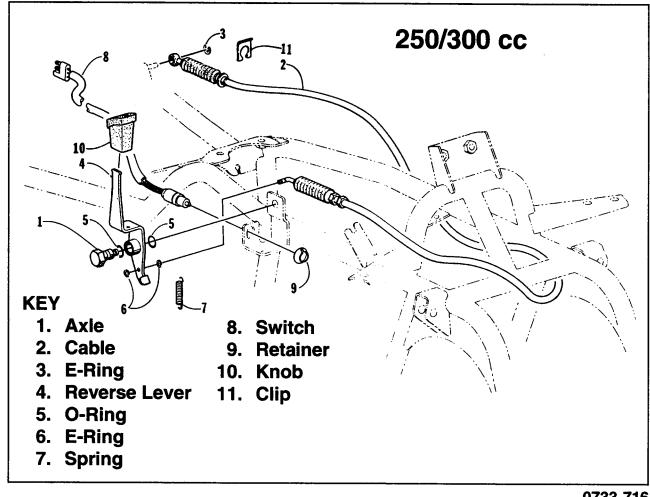
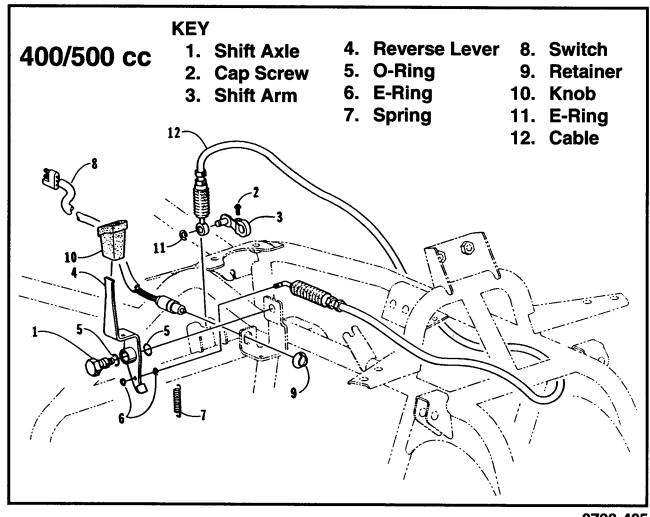


Fig. 9-25



REMOVING

1. Remove the E-ring securing the reverse cable to the reverse shift lever.

Fig. 9-26



2. Remove the reverse lever over-center spring from the reverse lever and reverse lever bracket.

Fig. 9-27



3. Remove the reverse shift axle securing the reverse lever to the reverse lever bracket. Account for two O-rings.

Fig. 9-28



Fig. 9-29



AF781D

4. Remove the E-ring and pin securing the reverse cable to the reverse actuator arm; then loosen the jam nut securing the lower end of the reverse cable to the frame.
5. Loosen the jam nuts securing the upper and lower end of the reverse cable to the frame; then remove the reverse cable.

■ NOTE: It will be necessary to route the cable out of any wire forms or cable ties.

INSTALLING

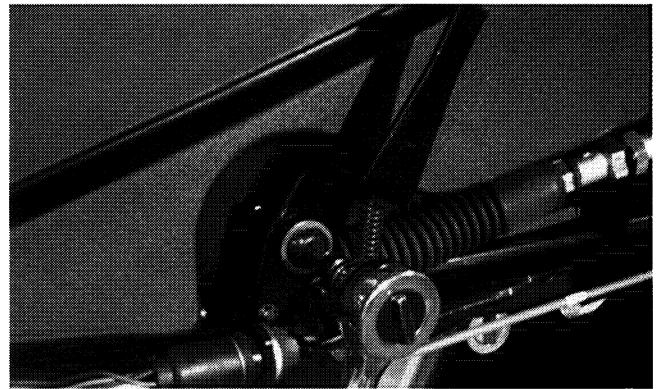
1. Slide the reverse shift axle into the reverse shift lever. With an O-ring on the reverse shift axle, secure the reverse lever to the reverse lever bracket with the reverse shift axle.

Fig. 9-30



AF781D

Fig. 9-31



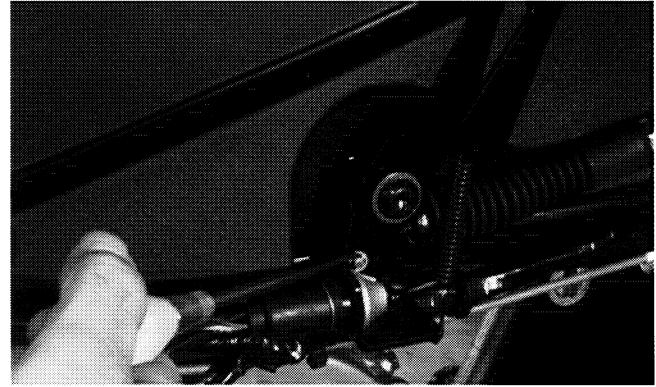
AF715DA

2. Route the reverse cable from the reverse shift shaft through the frame and to the reverse shift lever.

■ NOTE: Route the reverse cable through the appropriate wire forms and secure with cable ties.

3. Place each end of the reverse cable into the frame mounts and secure with the jam nuts
4. Insert the upper end of the reverse cable into the hole in the reverse lever and secure with an E-ring.

Fig. 9-32



AF714DA

5. Install the reverse lever over-center spring to the reverse lever and reverse lever bracket.

Fig. 9-33



AF713DA

6. Place the loop on the lower end of the reverse cable into the slot in the reverse actuator arm. Secure the cable to the actuator with a pin and E-ring.

ADJUSTING

■ NOTE: Mark the reverse shift shaft to the reverse actuator arm to aid in reassembly.

1. Remove the cap screw securing the reverse actuator arm to the reverse shift shaft; then slide the arm off the reverse shift shaft.

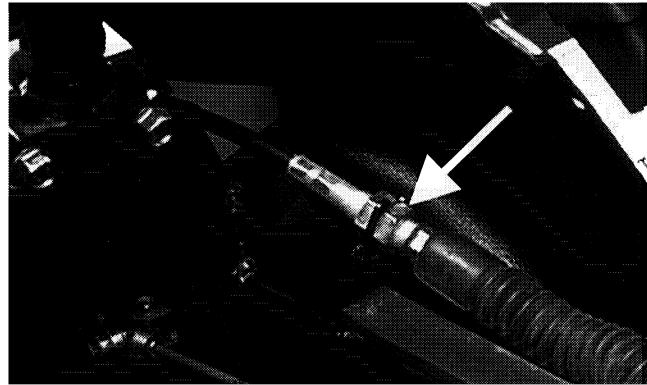
Fig. 9-34



CC118D

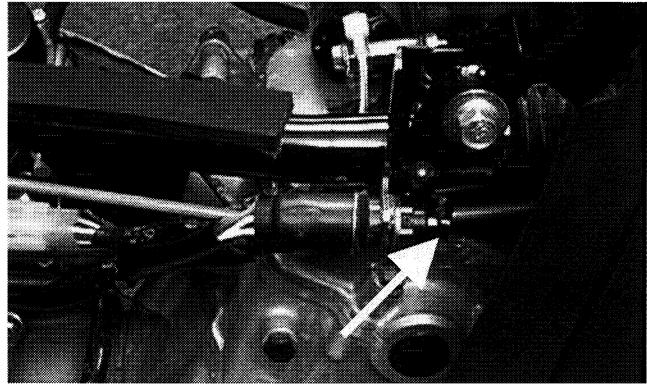
2. Loosen the jam nut securing the upper end of the reverse cable to the frame; then adjust the cable housing until the reverse indicator switch is fully depressed.

Fig. 9-35



AF663D

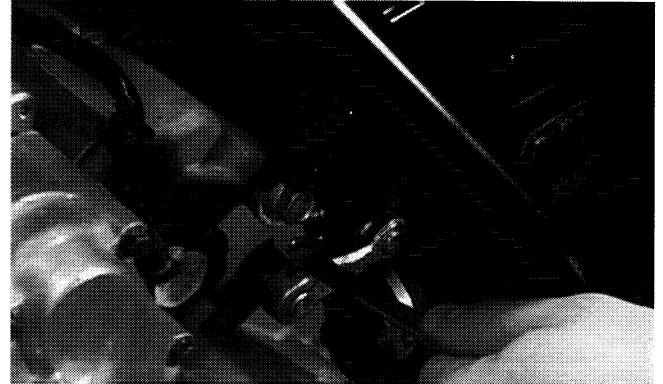
Fig. 9-36



AF666D

3. Tighten the jam nut securing the upper reverse cable housing to the frame.
4. Loosen the jam nut securing the lower reverse cable housing to the frame; then while aligning the reverse actuator with the reverse shift shaft, lengthen or shorten the cable length until the actuator slides freely onto the shift shaft.
5. Tighten the jam nut securing the reverse cable housing to the frame. Secure the reverse actuator to the shift shaft with the cap screw.

Fig. 9-37

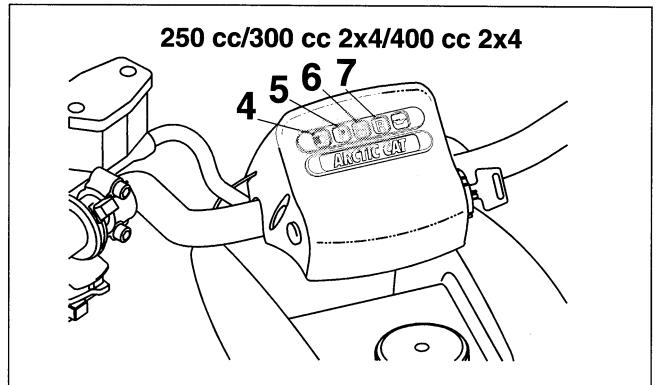


CC118D

6. With the engine running, check the operation of the reverse shift lever.

Speedometer/Indicator Lights

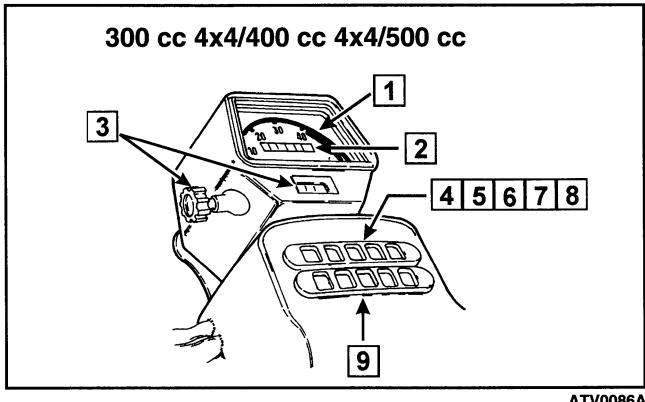
Fig. 9-38



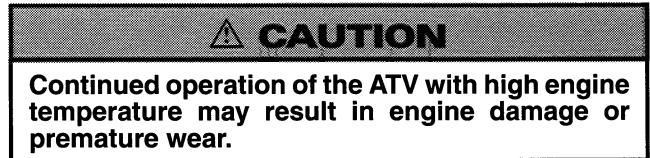
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733-707A

Fig. 9-39



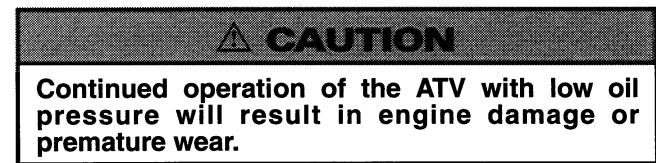
- Speedometer** — The speedometer shows approximate speed.
- Odometer** — The odometer shows the total distance traveled.
- Trip Meter** — The trip meter is an odometer which can be reset. It can be used to show the distance traveled on short trips or between gas stops. Turning the knob counterclockwise resets the trip meter to zero.
- 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.



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

- 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.
- Low Oil-Pressure Indicator (Optional)** — If installed, a red light will illuminate if the oil pressure is low. The light should be off during normal operation.



- Gear Selection Indicator** — A yellow light will illuminate to indicate which gear (1-5) the transmission is shifted into.

SECTION 10 - AIDS FOR MAINTENANCE

10

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Torque Specifications (250/300 cc Models)

| Part Bolting From | Part Bolting To | Torque | |
|---------------------|--------------------------|--------|-------|
| | | kg-m | ft-lb |
| A-Arms L&R | Frame | 4.8 | 35 |
| Battery Cover | Frame | 1.1 | 8 |
| Belly Panel | Frame/Sub-Frame | 1.1 | 8 |
| Belly Panel | Front Bumper | 1.1 | 8 |
| Brake Hose | Caliper | 2.8 | 20 |
| Brake Hose | Frame | 1.7 | 12 |
| Brake Disc * | Hub | 2.1 | 15 |
| CDI | Frame | 1.1 | 8 |
| Coil | Head Bracket | 1.1 | 8 |
| Drive Coupler* | Front Input Shaft Flange | 4.2 | 30 |
| Engine | Sub-Frame | 5.5 | 40 |
| Sub-Frame | Frame | 2.8 | 20 |
| Exhaust Cover | Exhaust Pipe | 1.1 | 8 |
| Header Pipe | Engine | 1.1 | 8 |
| Exhaust Pipe | Frame | 2.8 | 20 |
| Footrest | Frame 10 mm | 5.5 | 40 |
| Footrest | Frame 8 mm | 2.8 | 20 |
| Frame * | Front Diff Bracket/Upper | 4.2 | 30 |
| Frame | Front Rack (6 mm) | 1.7 | 12 |
| Frame | Front Rack (10 mm) | 5.5 | 40 |
| Frame | Parking Brake Assy | 1.7 | 12 |
| Front Bumper | Frame | 5.5 | 40 |
| Front Bumper | Front Rack | 2.8 | 20 |
| Front Differential* | Frame/Diff Bracket/Lower | 5.5 | 40 |
| Front Fender | Front Rack | 2.2 | 16 |
| Gas Tank | Frame | 1.7 | 12 |
| Gas Tank Valve | Gas Tank | 0.7 | 5 |
| Handlebar Block | Steering Post | 2.8 | 20 |
| Headlight | Headlight Bracket | 1.7 | 12 |

| Part Bolting From | Part Bolting To | Torque | |
|--------------------------|---------------------------|--------|-------|
| | | kg-m | ft-lb |
| Headlight Mount | Bumper/Bracket | 1.7 | 12 |
| Hub | Front Drive Axle (max) | 10.3 | 75 |
| Inner Fenders | Frame | 0.7 | 5 |
| Speedometer/Inst. Pod | Steering Post | 1.1 | 8 |
| Instrument Pod | Switch Bracket | 1.1 | 8 |
| Knuckle | Ball Joint | 4.8 | 35 |
| Knuckle | Caliper | 2.8 | 20 |
| Rear Knuckle | A-Arms | 4.8 | 35 |
| Mechanical Brake | Rear Knuckle | 2.8 | 20 |
| Muffler | Frame | 2.8 | 20 |
| Oil Drain Plug | Engine | 2.2 | 16 |
| Drain/Fill Plug | Differential | 2.2 | 16 |
| Rear Rack | Frame (6 mm) | 1.7 | 12 |
| Rear Rack | Frame (10 mm) | 5.5 | 40 |
| Rev. Shift Assy | Frame* | 2.1 | 15 |
| Seat Bumper | Frame | 1.7 | 12 |
| Seat Lock | Frame | 1.1 | 8 |
| Shift Lever | Engine | 1.4 | 10 |
| Spark Plug | Engine | 1.7 | 12 |
| Reverse Lever | Engine | 1.1 | 8 |
| High/Low/Super Low Lever | Engine | 1.1 | 8 |
| Shock Absorber (Front) | Frame | 4.8 | 35 |
| Shock Absorber | Upper A-Arm/ Swing Arm | 4.8 | 35 |
| Steering Post | Frame | 2.8 | 20 |
| Steering Post Flange | Frame | 2.8 | 20 |
| Rear Upper Arm | Frame/Knuckle | 4.8 | 35 |
| Tie Rod End | Knuckle/Steering Post | 4.2 | 30 |
| Voltage Regulator | Frame | 1.7 | 12 |
| Wheel | Hub | 6.9 | 50 |

* w/Blue Loctite #242

Torque Specifications (400/500 cc Models)

| Part Bolting From | Part Bolting To | Torque | |
|----------------------|--------------------------|--------|-------|
| | | kg-m | ft-lb |
| A-Arms L&R | Frame | 4.8 | 35 |
| Battery Hold-Down | Frame | 1.1 | 8 |
| Belly Panel | Frame | 1.1 | 8 |
| Belly Panel | Front Bumper | 1.1 | 8 |
| Brake Hose | Caliper | 2.8 | 20 |
| Brake Hose | Frame | 1.7 | 12 |
| Brake Disc * | Hub | 2.1 | 15 |
| CDI | Frame | 1.7 | 12 |
| Coil * | Head Bracket | 1.7 | 12 |
| Drive Coupler* | Front Input Shaft Flange | 4.2 | 30 |
| Engine | Frame | 5.5 | 40 |
| Engine | Head Bracket | 2.8 | 20 |
| Exhaust Cover | Exhaust Pipe | 1.1 | 8 |
| Exhaust Pipe | Engine | 2.8 | 20 |
| Exhaust Pipe | Frame | 2.8 | 20 |
| Fan Motor | Frame | 0.7 | 5 |
| Fan Blade * | Fan Motor | 0.4 | 3 |
| Footrest | Frame 10 mm | 5.5 | 40 |
| Footrest | Frame 8 mm | 2.8 | 20 |
| Frame * | Front Diff Bracket/Upper | 4.2 | 30 |
| Frame | Front Rack (6 mm) | 1.7 | 12 |
| Frame | Front Rack (10 mm) | 5.5 | 40 |
| Frame | Parking Brake Assy | 1.7 | 12 |
| Front Bumper | Frame | 5.5 | 40 |
| Front Bumper | Front Bumper Support | 5.5 | 40 |
| Front Bumper | Front Rack | 2.8 | 20 |
| Front Bumper Support | Frame | 2.8 | 20 |
| Front Differential* | Frame/Diff Bracket/Lower | 5.5 | 40 |
| Front Fender | Front Rack | 2.2 | 16 |
| Gas Tank | Frame | 1.7 | 12 |
| Gas Tank Valve | Gas Tank | 0.7 | 5 |
| Handlebar Block | Steering Post | 2.8 | 20 |
| Headlight | Headlight Bracket | 1.7 | 12 |
| Headlight Mount | Bumper/Bracket | 1.7 | 12 |
| Head Mount | Frame | 2.8 | 20 |
| Hitch | Rear Diff Panel Clips | 0.7 | 5 |
| Hitch | Rear Diff (8 mm) | 2.8 | 20 |
| Hitch | Rear Diff (10 mm) | 4.8 | 35 |

| Part Bolting From | Part Bolting To | Torque | |
|----------------------------|----------------------------|--------|-------|
| | | kg-m | ft-lb |
| Hub | Front Drive Axle (max) | 10.4 | 75 |
| Inner Fenders | Radiator | 0.7 | 5 |
| Speedometer/Inst. Pod | Steering Post | 1.1 | 8 |
| Instrument Pod | Switch Bracket | 1.1 | 8 |
| Knuckle | Ball Joint | 4.8 | 35 |
| Knuckle | Caliper | 2.8 | 20 |
| LH Axle Housing/Hitch* | Rear Diff Housing | 2.8 | 20 |
| LH Inner Swing Arm | Axle Housing | 4.8 | 35 |
| Mechanical Brake | Axle Housing | 2.8 | 20 |
| Muffler | Frame | 2.8 | 20 |
| Oil Drain Plug | Differential | 2.2 | 16 |
| Drain Plug | Engine | 2.2 | 16 |
| RAD Grommet | Frame | 1.7 | 12 |
| Rear Diff Panel | Rear Diff Housing | 1.7 | 12 |
| Rear - Left Axle Housing* | Diff Case - 8 mm Nuts | 2.1 | 15 |
| Rear - Left Axle Housing | Diff Case - 8 mm Cap Screw | 2.8 | 20 |
| Rear - Right Axle Housing* | Diff Case - 10 mm | 4.8 | 35 |
| Rear - Right Axle Housing | Diff Case/Shock Mt | 4.8 | 35 |
| Rear Rack | Frame (6 mm) | 1.7 | 12 |
| Rear Rack | Frame (10 mm) | 5.5 | 40 |
| Rear Swing Arm | Axle Housing | 4.8 | 35 |
| Rev. Shift Assy * | Frame | 2.1 | 15 |
| RH Axle Housing | Caliper | 2.8 | 20 |
| RH Axle Housing/Hitch | Rear Diff Housing | 4.8 | 35 |
| RH Inner Swing Arm/Housing | Rear Diff Housing | 4.8 | 35 |
| Seat Bumper | Frame | 1.7 | 12 |
| Seat Lock | Frame | 1.1 | 8 |
| Shift Lever | Engine | 1.7 | 12 |
| Shock Absorber (Front) | Frame | 4.8 | 35 |
| Shock Absorber | Upper A-Arm/Swing Arm | 4.8 | 35 |
| Spark Plug | Engine | 1.7 | 12 |
| Steering Post | Frame | 2.8 | 20 |
| Steering Post Flange | Frame | 2.8 | 20 |
| Swing Arms | Frame | 4.8 | 35 |
| Tie Rod End | Knuckle/Steering Post | 4.2 | 30 |
| Voltage Regulator | Frame | 1.7 | 12 |
| Wheel | Hub | 6.9 | 50 |

* w/Blue Loctite #242

Torque Conversions

| ft-lb | kg-m |
|-------|------|-------|------|-------|------|-------|------|-------|------|
| 1 | 0.1 | 21 | 2.9 | 41 | 5.7 | 61 | 8.4 | 81 | 11.2 |
| 2 | 0.3 | 22 | 3.0 | 42 | 5.8 | 62 | 8.6 | 82 | 11.3 |
| 3 | 0.4 | 23 | 3.2 | 43 | 5.8 | 63 | 8.7 | 83 | 11.5 |
| 4 | 0.6 | 24 | 3.3 | 44 | 6.1 | 64 | 8.9 | 84 | 11.6 |
| 5 | 0.7 | 25 | 3.5 | 45 | 6.2 | 65 | 9.0 | 85 | 11.8 |
| 6 | 0.8 | 26 | 3.6 | 46 | 6.4 | 66 | 9.1 | 86 | 11.9 |
| 7 | 1.0 | 27 | 3.7 | 47 | 6.5 | 67 | 9.3 | 87 | 12.0 |
| 8 | 1.1 | 28 | 3.9 | 48 | 6.6 | 68 | 9.4 | 88 | 12.2 |
| 9 | 1.2 | 29 | 4.0 | 49 | 6.8 | 69 | 9.5 | 89 | 12.3 |
| 10 | 1.4 | 30 | 4.2 | 50 | 6.9 | 70 | 9.7 | 90 | 12.5 |
| 11 | 1.5 | 31 | 4.3 | 51 | 7.1 | 71 | 9.8 | 91 | 12.6 |
| 12 | 1.7 | 32 | 4.4 | 52 | 7.2 | 72 | 10.0 | 92 | 12.8 |
| 13 | 1.8 | 33 | 4.6 | 53 | 7.3 | 73 | 10.1 | 93 | 12.9 |
| 14 | 1.9 | 34 | 4.7 | 54 | 7.5 | 74 | 10.2 | 94 | 13.0 |
| 15 | 2.1 | 35 | 4.8 | 55 | 7.6 | 75 | 10.4 | 95 | 13.1 |
| 16 | 2.2 | 36 | 5.0 | 56 | 7.7 | 76 | 10.5 | 96 | 13.3 |
| 17 | 2.4 | 37 | 5.1 | 57 | 7.9 | 77 | 10.7 | 97 | 13.4 |
| 18 | 2.5 | 38 | 5.3 | 58 | 8.0 | 78 | 10.8 | 98 | 13.6 |
| 19 | 2.6 | 39 | 5.4 | 59 | 8.2 | 79 | 10.9 | 99 | 13.7 |
| 20 | 2.8 | 40 | 5.5 | 60 | 8.3 | 80 | 11.1 | 100 | 13.8 |

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| Peak Voltage Reading Adapter | (p/n 0644-307) | 20 |

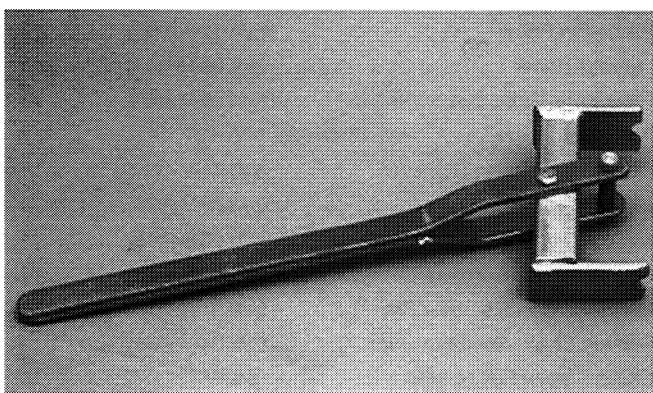
BODY/SUSPENSION

Shock Spring Removal Tool

p/n: 0644-057

Usage: Compress shock springs for easy replacement on all models.

Fig. 1



AE074

Rivnut Tool Insert Bit/Replacement Rivnuts

p/n: 0644-233

p/n: 0623-557

Usage: With Rivnut Tool (p/n 0644-232) and using Rivnuts (p/n 0623-557), replace rivnuts.

Plastic Rivet Setter

p/n: 0444-056

Usage: Secure fender extensions on all models.

Fig. 2



CE049

Rivnut Tool

p/n: 0644-232

Usage: Collapse and install rivnuts.

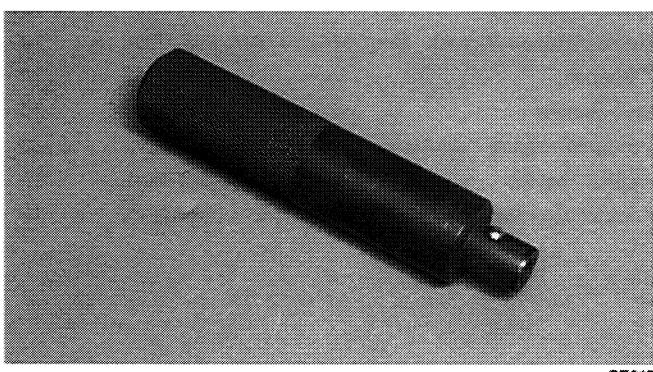
DRIVE SYSTEM

Driven Bevel Gear Bearing Installer Handle

p/n: 0444-026

Usage: With Installer/Remover Cup (p/n 0444-052), install or remove bearings and seals in differentials on 4x4 models.

Fig. 3



CE017

Installer/Remover Cup

p/n: 0444-052

Usage: With Driven Handle (p/n 0444-026), install or remove bearings and seals in differentials on 4x4 models.

Fig. 4



CE006

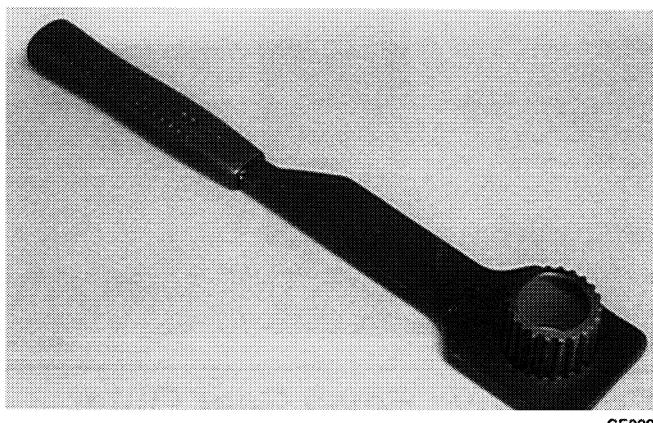
DRIVE SYSTEM (cont)

Final Driven Gear Coupling Holder

p/n: 0444-036

Usage: Hold final driven gear coupler on 400 cc and 500 cc models.

Fig. 5



CE029

Front Driven Output Shaft Bearing Remover/Installer

p/n: 0444-025

Usage: Install or remove bearings in differentials on 4x4 models.

Fig. 6



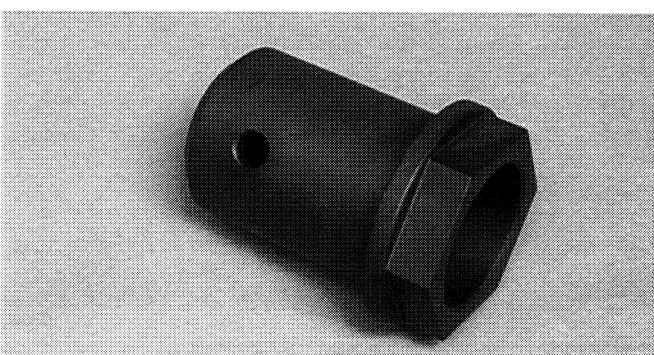
CE018

Final Gear Stopper Bearing Retainer Wrench

p/n: 0444-028

Usage: Hold final gear bearing on 400 cc and 500 cc models.

Fig. 7



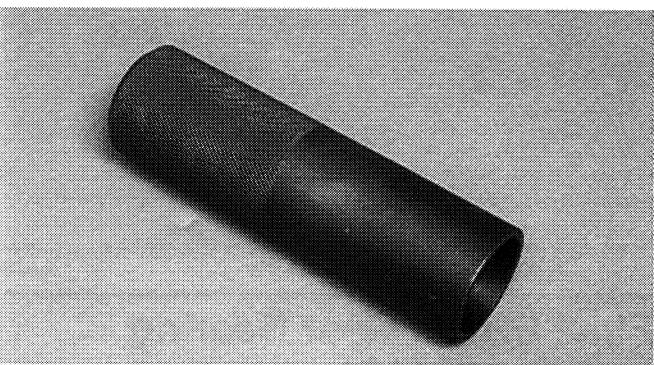
CE022

Front Drive Bevel Gear Outer Bearing Race Installer

p/n: 0444-023

Usage: Install bearing in differential cases on 4x4 models.

Fig. 8



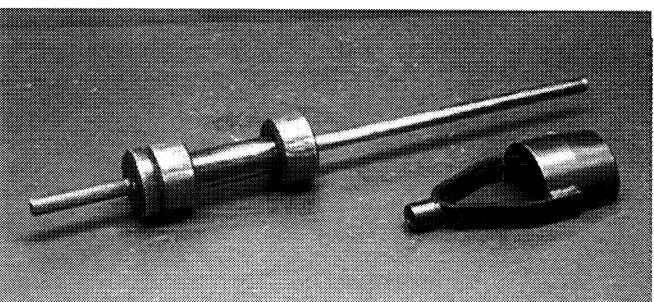
CE014

Front Drive Axle Puller

p/n: 0444-099

Usage: Remove drive axle from differential housings on all models.

Fig. 9



AE159D

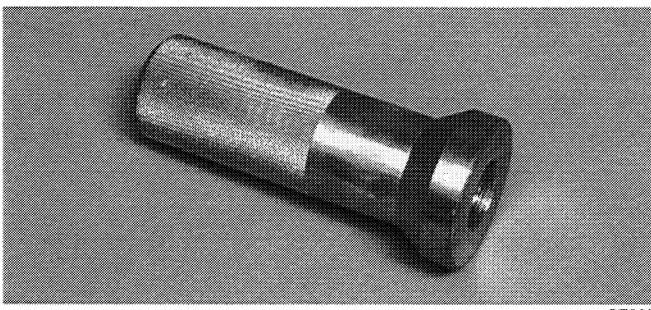
DRIVE SYSTEM (cont)

Front Driven Bevel Gear Bearing Remover

p/n: 0444-020

Usage: Service differential gear assembly on 4x4 models.

Fig. 10

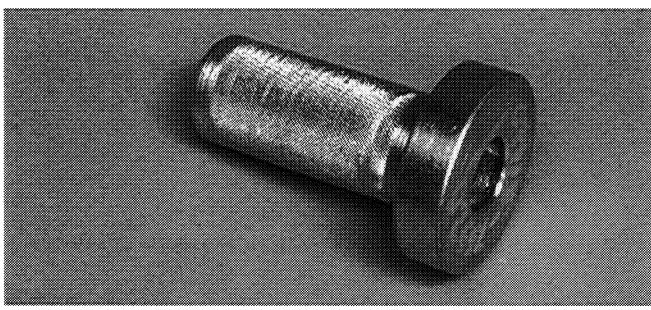


Final Driven Gear Bearing Remover (R&L)

p/n: 0444-022

Usage: Remove bearing on final drive on 400 cc and 500 cc models.

Fig. 11



Final Driven Gear Bearing Installer (R&L)

p/n: 0444-024

Usage: Install bearing on final drive on 400 cc and 500 cc models.

Fig. 12



Quick-Disconnect Coupler

p/n: 0644-308

Usage: Hold 1/4-in. hex drive Torx Bits (Fig. 18), Hex Bits (Fig. 19), and Phillips-Head Bits (Fig. 20).

Fig. 13

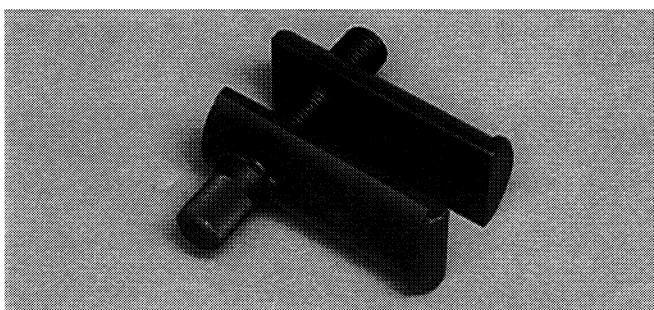


Front Drive Bevel Gear Outer Bearing Race Remover

p/n: 0444-021

Usage: Remove bearings in differentials on 4x4 models.

Fig. 14



Final Driven Gear Seal Installer

p/n: 0444-027

Usage: Install final driven gear seals on the 400 cc and 500 cc models.

Fig. 15



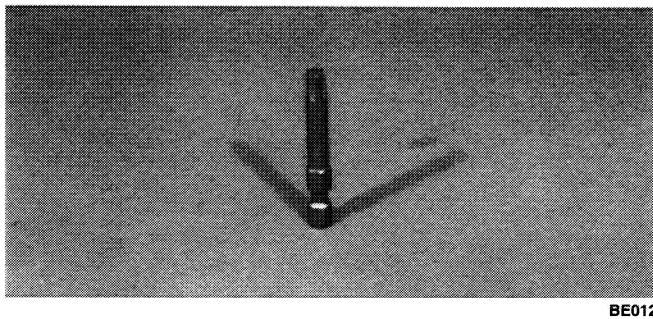
DRIVE SYSTEM (cont)

Torx Bit (5/16 in. Hex Drive Insert)

p/n: 0644-314

Usage: With Insert Holder (p/n 0644-315), remove and install torx-head screws.

Fig. 16

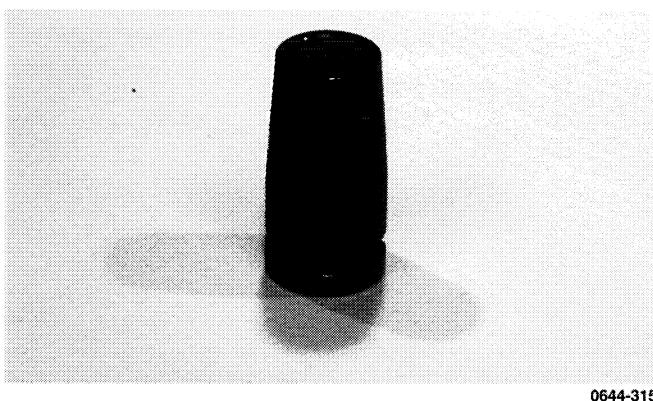


Insert Holder (5/16 in.)

p/n: 0644-315

Usage: With Torx Bit (p/n 0644-314), remove and install torx-head screws.

Fig. 17



Torx Bits (1/4 in. Hex Drive)

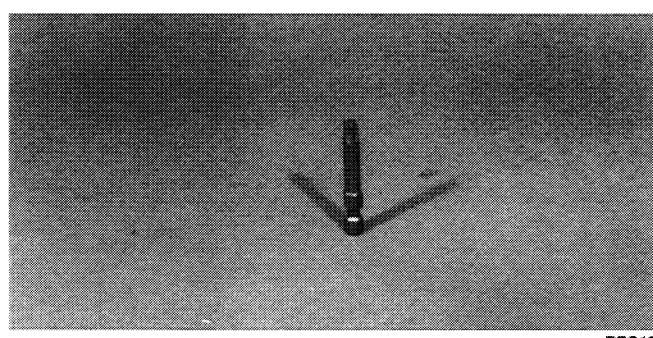
p/n: 0644-312 (#25)

p/n: 0644-215 (#30)

p/n: 0644-313 (#40)

Usage: Remove and install torx-head screws.

Fig. 18



Hex Bits (1/4 in. Hex Drive)

p/n: 0644-317 (5 mm)

p/n: 0644-316 (6 mm)

Usage: Remove and install bolts and screws.

Fig. 19



Phillips-Head Bits (1/4 in. Hex Drive)

p/n: 0644-319 (#2)

p/n: 0644-318 (#3)

Usage: Remove and install Phillips-head screws.

Fig. 20



ENGINE OVERHAUL

Valve Seat Resurfacing Kit

p/n: 0444-074

Usage: Resurface valve seats on all models.

Fig. 21

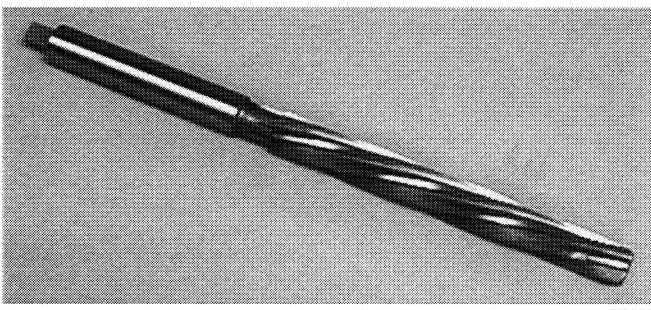


Replacement Valve Guide Reamer (Outer)

p/n: 0444-014

Usage: Ream cylinder head outside diameter for the installation of oversized valve guides on 400 cc and 500 cc models.

Fig. 22

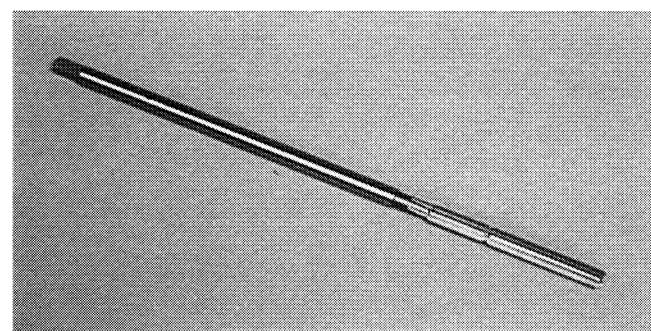


Standard Valve Guide Reamer (Inner)

p/n: 0444-017

Usage: Ream valve guides to the standard size on 400 cc and 500 cc models.

Fig. 23

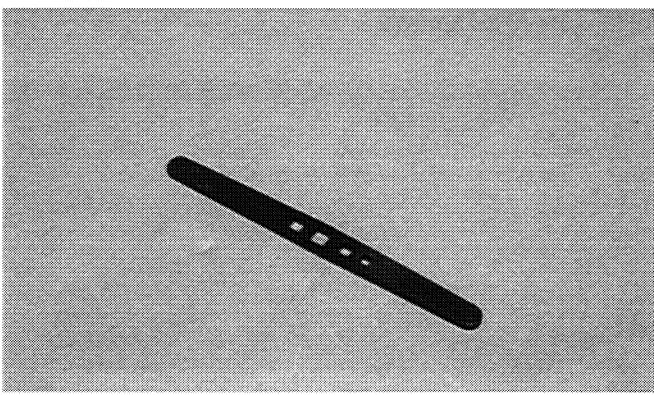


Reamer Handle

p/n: 0444-015

Usage: Drive all reamers.

Fig. 24

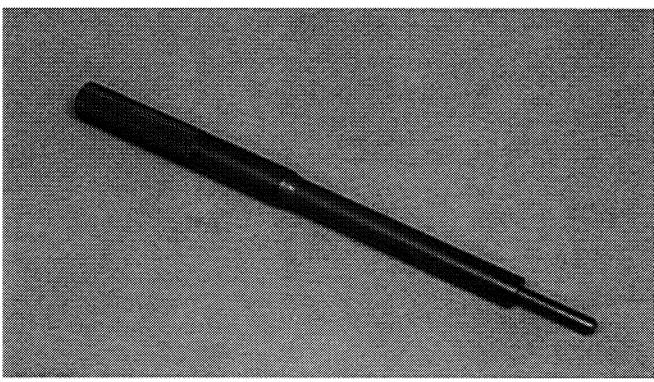


Valve Guide Remover/Installer

p/n: 0444-085

Usage: Remove or install valve guides on 250 cc and 300 cc models.

Fig. 25

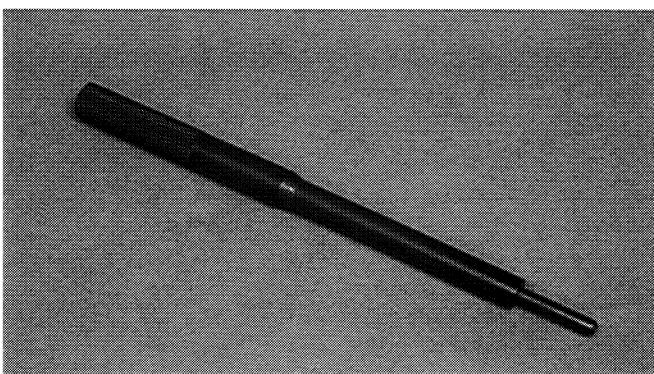


Valve Guide Remover/Installer

p/n: 0444-016

Usage: Remove or install valve guides on 400 cc and 500 cc models.

Fig. 26



ENGINE OVERHAUL (cont)

Valve Seat Resurfacing Tools

p/n: 0444-045 Exhaust Valve Guide Pilot Shaft, Small (400 cc and 500 cc models)

p/n: 0444-048 15/45° Exhaust Valve Seat Cutter (all models)

p/n: 0444-049 15° Intake Valve Seat Cutter (all models)

p/n: 0444-050 Intake Valve Guide Pilot Shaft, Large (400 cc and 500 cc models)

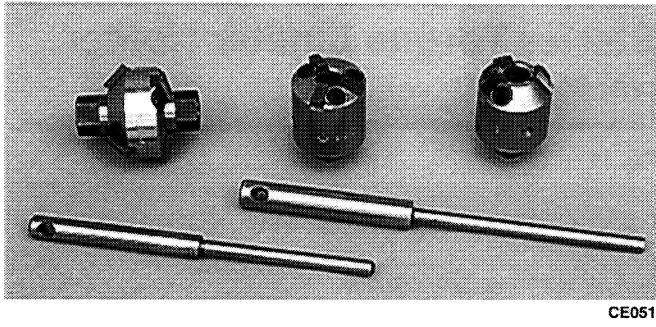
p/n: 0444-058 45° Exhaust Valve Seat Cutter (all models)

p/n: 0444-086 Exhaust Valve Guide Pilot Shaft (250 cc and 300 cc models)

p/n: 0444-087 Intake Valve Guide Pilot Shaft (250 cc and 300 cc models)

Usage: Resurface valve seats.

Fig. 27

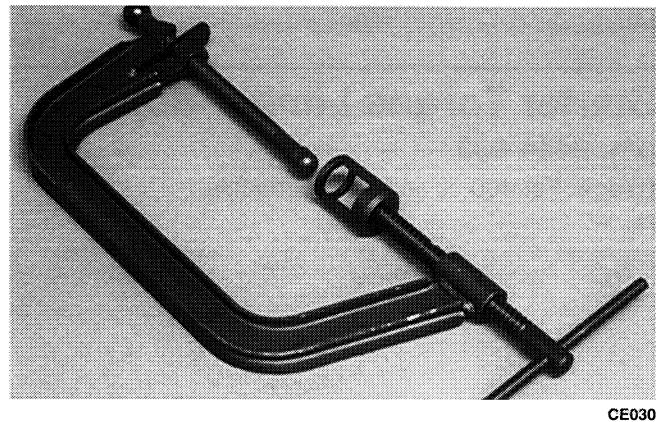


Valve Spring Compressor

p/n: 0444-011

Usage: Remove valve springs on all models.

Fig. 28

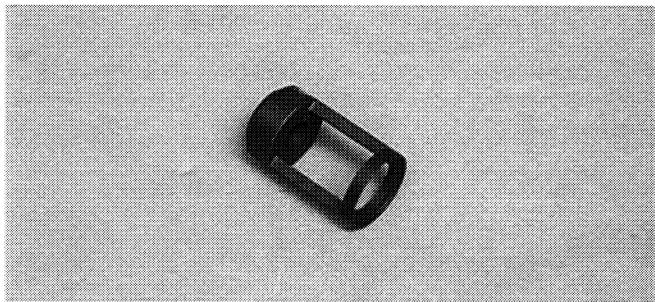


Valve Spring Compressor Attachment

p/n: 0444-012

Usage: With Valve Spring Compressor (p/n 0444-011) for small valve springs.

Fig. 29

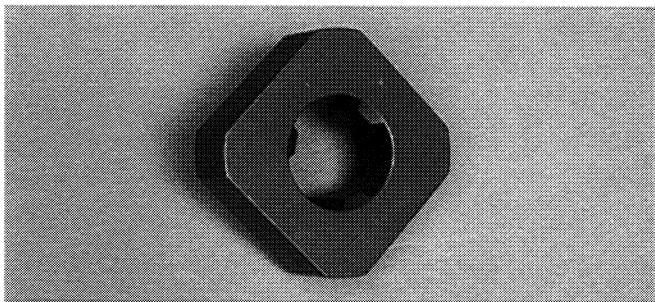


Output Shaft Holder

p/n: 0444-035

Usage: Hold the output shaft on 400 cc and 500 cc models.

Fig. 30



Deep Socket (1/2-in. Drive/22 mm)

p/n: 0444-046

Usage: Remove crankshaft nut on all models.

Fig. 31



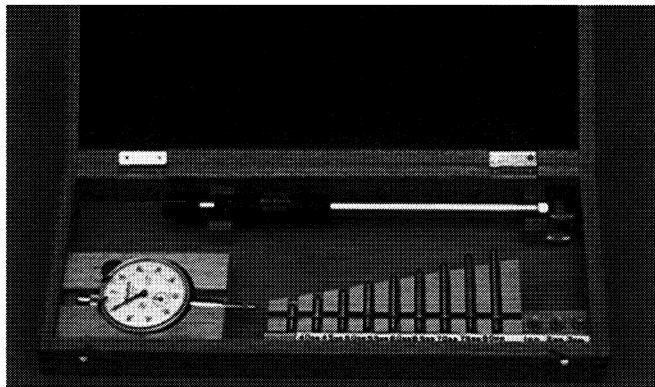
ENGINE OVERHAUL (cont)

Cylinder Trueness Gauge

p/n: 0644-071

Usage: Measure cylinder trueness on all models.

Fig. 32



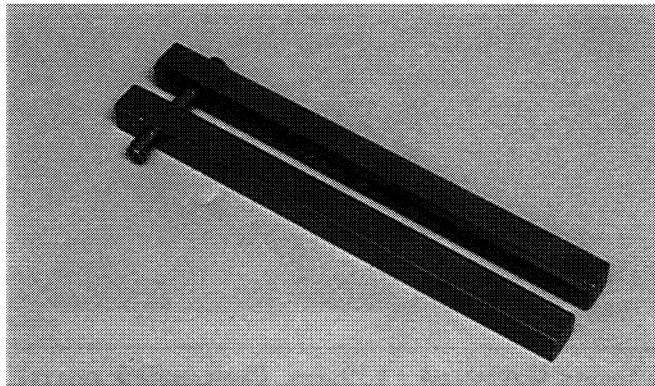
AE118

Connecting Rod Holder

p/n: 0444-006

Usage: Prevent connecting rod damage on all models.

Fig. 33



CE019

Multi-Seal Remover

p/n: 0444-019

Usage: Remove large seals on all models.

Fig. 34



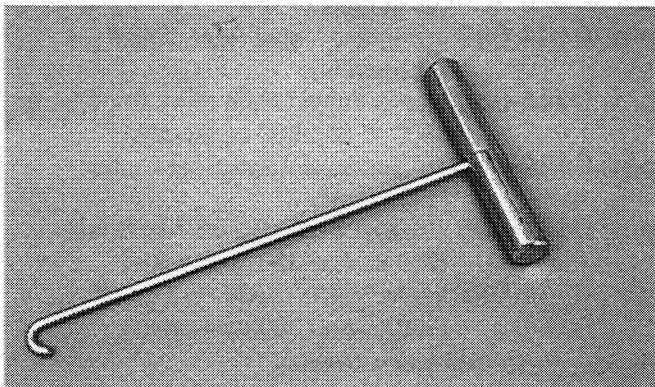
CE027

Seal Removal Tool

p/n: 0644-072

Usage: Remove small seals.

Fig. 35



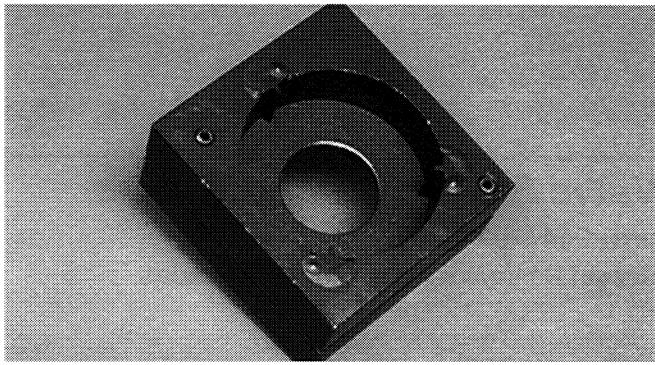
AE077

Starter Torque Limiter Holder

p/n: 0444-030

Usage: Hold starter limiter on 400 cc and 500 cc models.

Fig. 36



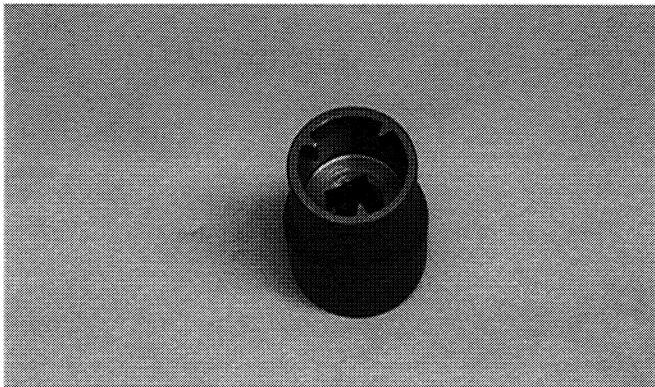
CE008

Starter Torque Limiter Socket

p/n: 0444-033

Usage: For 400 cc and 500 cc models.

Fig. 37



CE009

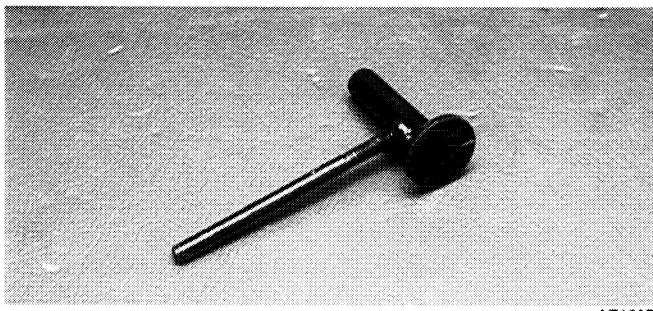
ENGINE OVERHAUL (cont)

Valve Clearance Adjuster

p/n: 0444-078

Usage: Adjust valve clearance faster and easier on 400 cc and 500 cc models.

Fig. 38



AE160D

Valve Gap Adjuster

p/n: 0444-092

Usage: Adjust valves faster and easier on 250 cc and 300 cc models.

Fig. 39



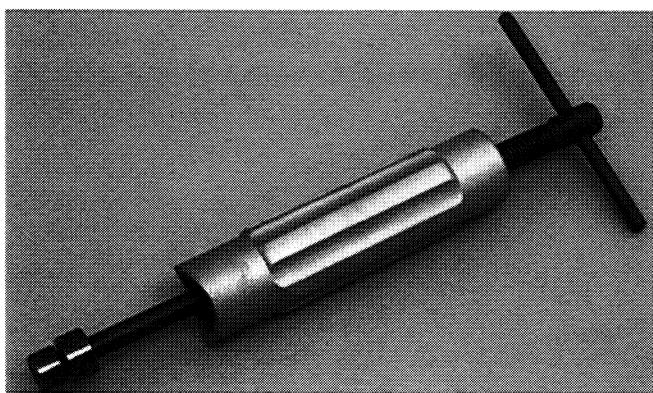
AE162D

Piston Pin Puller

p/n: 0144-003

Usage: Remove piston pins on all models.

Fig. 40



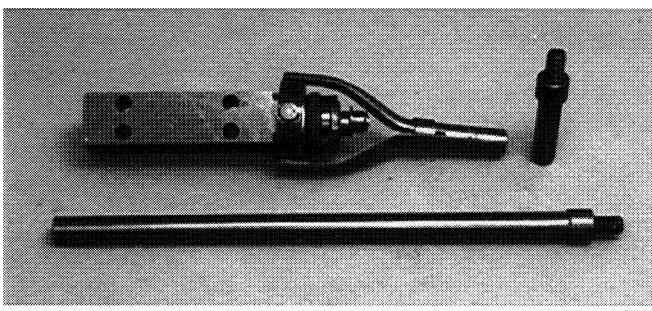
AE028

Cylinder Hone

p/n: 0644-041

Usage: With Rigid Hone Stone Set (p/n 0644-043), hone/true cylinders.

Fig. 41



AE067

Rigid Hone Stone Set (2.7-4.1 in.)

p/n: 0644-043

Usage: Replacement rigid hone stones 68.5-104.1 mm (2.7-4.1 in.) for Cylinder Hone (p/n 0644-041).

Fig. 42



AE068

Ball Hone

p/n: 0644-035 60-64 mm (2.3-2.5 in.)

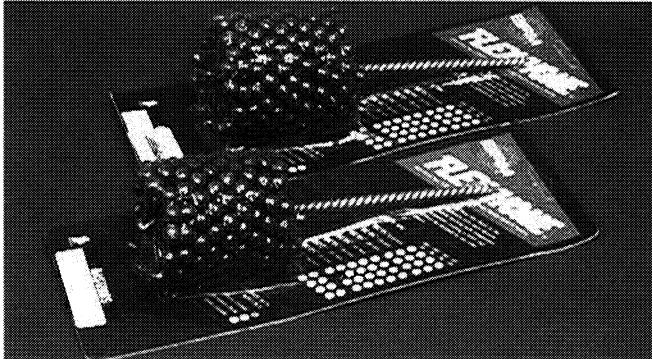
p/n: 0644-036 65-70 mm (2.5-2.7 in.)

p/n: 0644-037 72-74 mm (2.8-2.9 in.)

p/n: 0644-121 76-83 mm (2.9-3.2 in.)

Usage: Deglaze cylinder bores.

Fig. 43



AE065

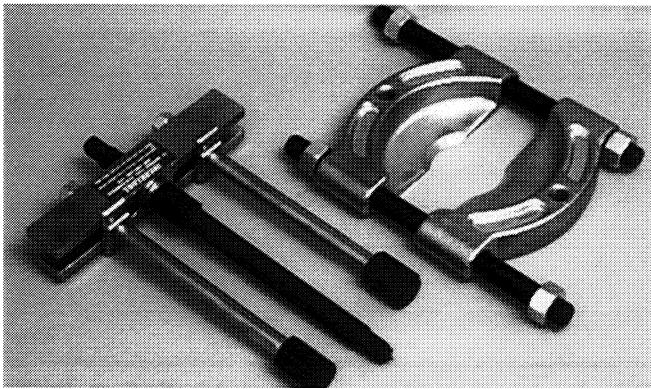
ENGINE OVERHAUL (cont)

Crankshaft Bearing Remover

p/n: 0144-302

Usage: Remove crankshaft bearings.

Fig. 44



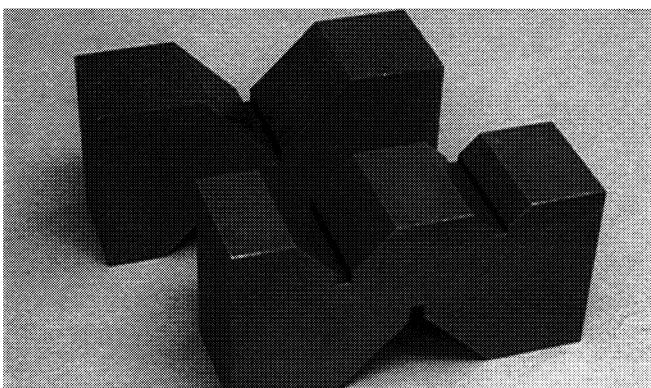
AE043

V Blocks

p/n: 0644-022

Usage: Check crankshaft runout.

Fig. 45



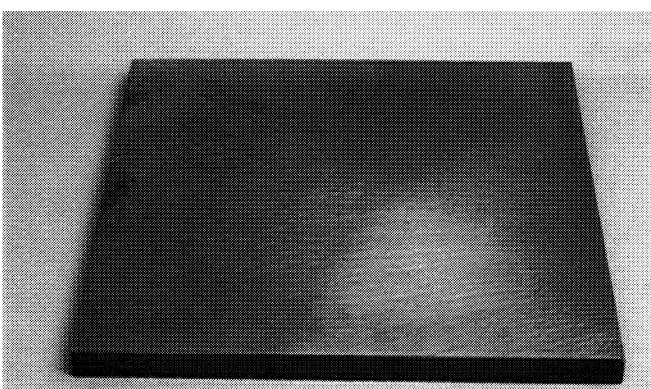
AE061

Surface Plate

p/n: 0644-016

Usage: True sealing surfaces.

Fig. 46



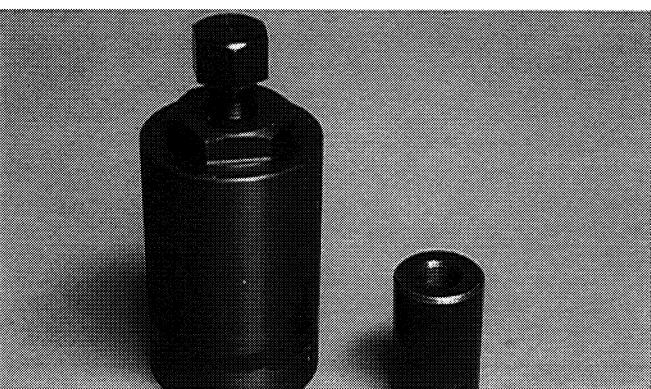
AE058

Magneto Rotor Remover Set

p/n: 0444-082

Usage: Remove rotor on 250 cc and 300 cc models.

Fig. 47



CE012

Magneto Rotor Remover Set

p/n: 0444-075

Usage: Remove rotor on 400 cc and 500 cc models.

Fig. 48



CE012

Primary Clutch Shoe Remover

p/n: 0444-034

Usage: Remove primary clutch shoe on 250 cc, 300 cc, and 400 cc models.

Fig. 49



CE011

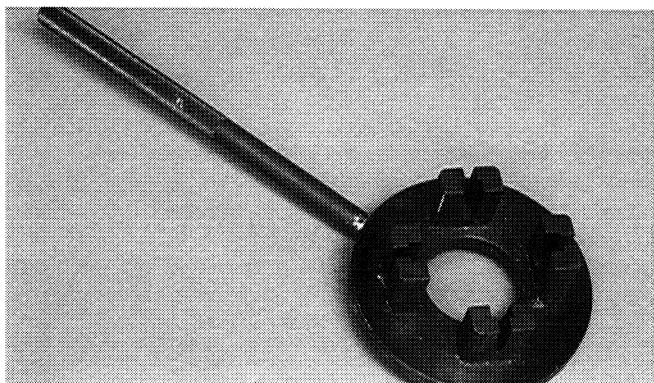
ENGINE OVERHAUL (cont)

Clutch Sleeve Hub Holder

p/n: 0444-007

Usage: Hold clutch housing for nut installation or removal on all models.

Fig. 50



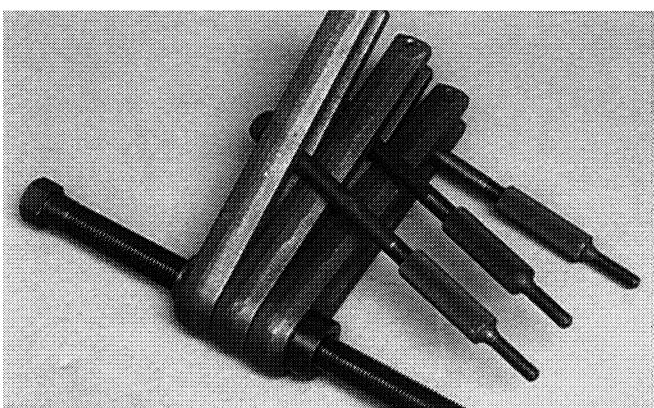
CE025

Crankcase Separator/ Crankshaft Remover

p/n: 0444-009

Usage: Separate crankcase on all models.

Fig. 51



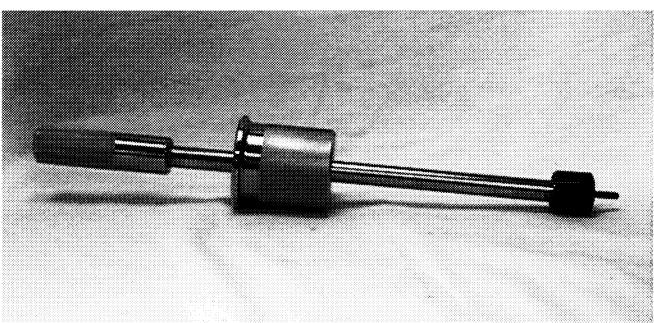
CE026

Side Case Puller

p/n: 0644-262

Usage: Pull left-side cover from engine.

Fig. 52



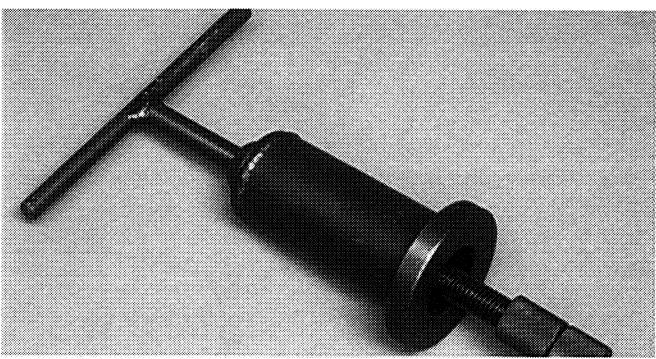
0644-262

Crankshaft Installer

p/n: 0444-018

Usage: Aid crankshaft installation on all models.

Fig. 53



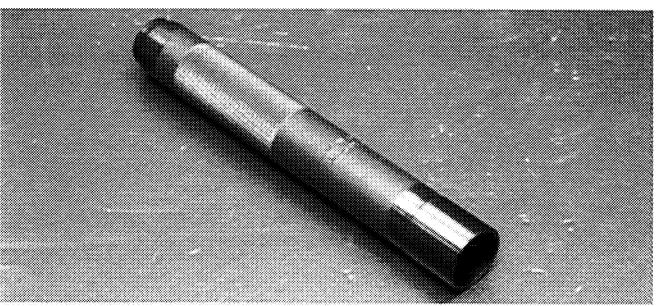
CE023

Bearing Installer

p/n: 0444-084

Usage: Install bearings on 250 cc and 300 cc models.

Fig. 54



AE154D

Ball Hone

p/n: 0644-290 60-64 mm (2.3-2.5 in.)

p/n: 0644-291 65-70 mm (2.5-2.7 in.)

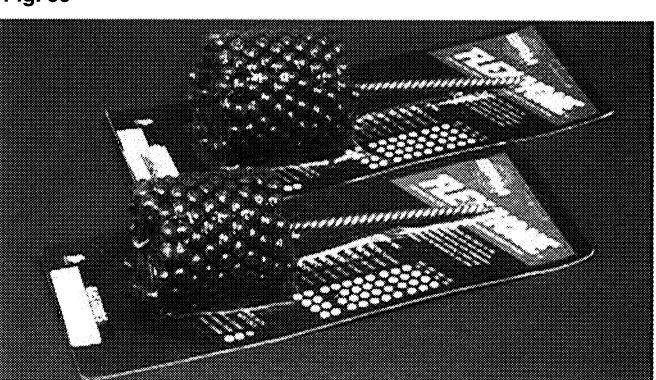
p/n: 0644-292 72-74 mm (2.8-2.9 in.)

p/n: 0644-293 76-83 mm (2.9-3.2 in.)

p/n: 0644-294 83-88 mm (2.9-3.5 in.)

Usage: Deglaze Nicosil plated cylinders. All are 320 grit.

Fig. 55



AE065

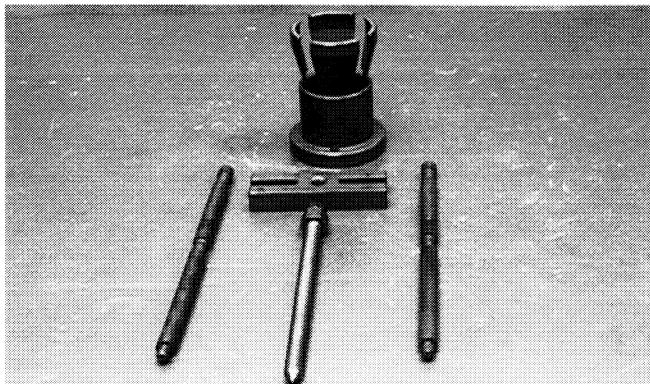
ENGINE OVERHAUL (cont)

Bearing Inner Race Remover

p/n: 0444-054

Usage: Remove bearing race on all models.

Fig. 56



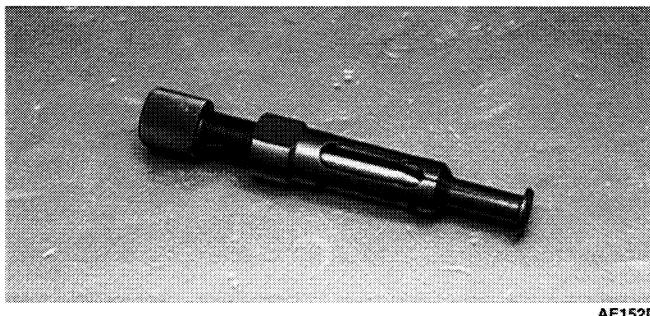
AE155D

Blind Bearing Remover

p/n: 0444-089

Usage: Remove small blind bearings on all models.

Fig. 57



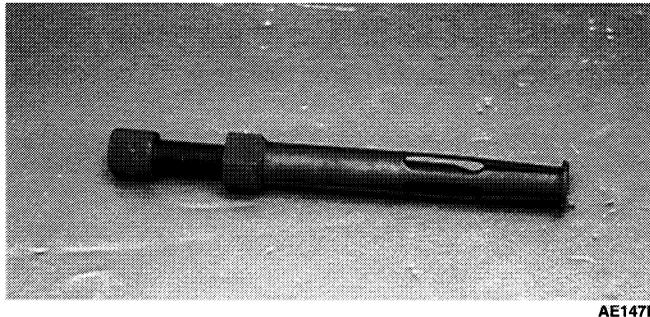
AE152D

Blind Bearing Remover

p/n: 0444-081

Usage: Remove large blind bearings on all models.

Fig. 58



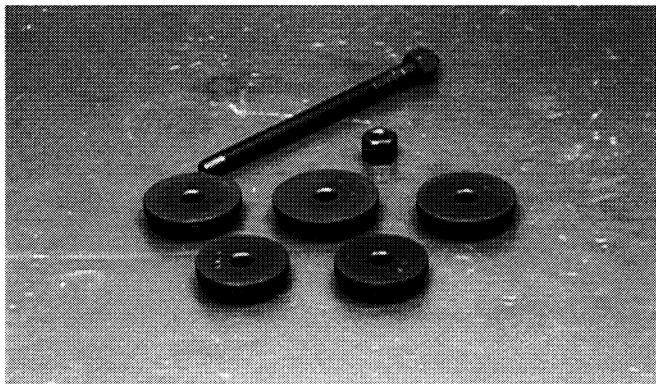
AE147D

Bearing Installer

p/n: 0444-083

Usage: Install bearings on all models.

Fig. 59



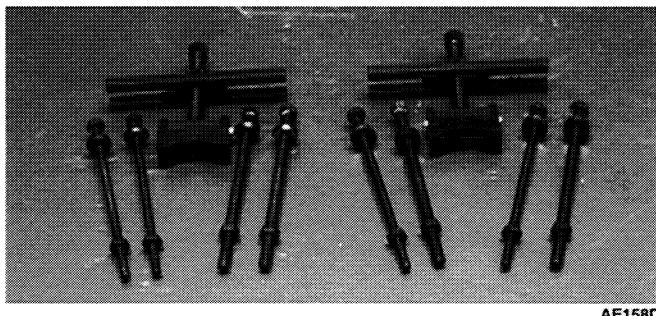
AE157D

Bearing Holder

p/n: 0444-080

Usage: Hold output shaft bearing on 4x4 models.

Fig. 60



AE158D

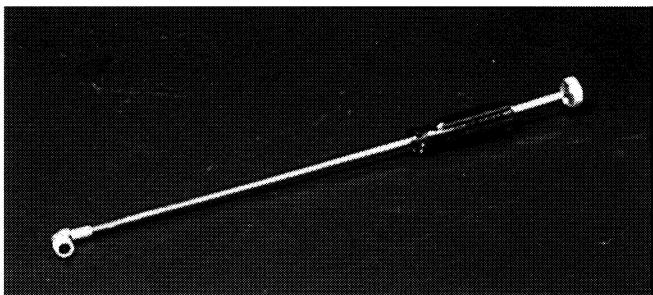
FUEL SYSTEM

90° Carburetor Adjustment Screwdriver

p/n: 0644-289

Usage: Adjust carburetors faster and easier on all models.

Fig. 61



AE161D

Troubleshooting/Tune-Up

Fluke Model 73 Multimeter w/Case

p/n: 0644-191

Usage: Test electrical circuits within $\pm 0.5\%$ accuracy.

Fig. 62



AE114

Timing Light

p/n: 0644-197

Usage: Verify engine timing on two and four cycle engines.

Fig. 63



AE054

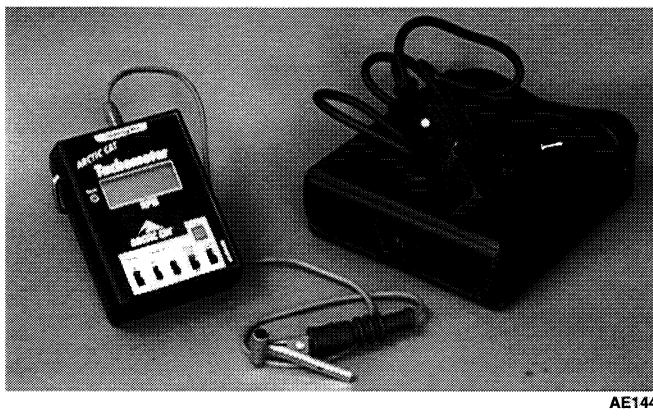
Troubleshooting/Tune-Up (cont)

Arctic Cat Engine Tachometer

p/n: 0644-275

Usage: Measure engine RPM on all models.

Fig. 64



AE144

Engine Timing Gauge

p/n: 0144-009

Usage: Verify engine timing marks.

Fig. 65



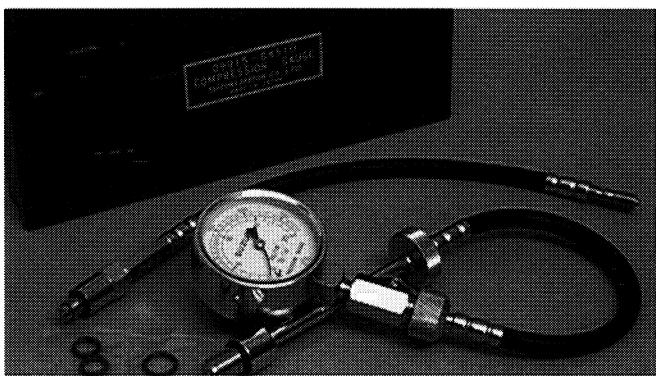
AE031

Compression Tester w/12 mm Adapter

p/n: 0444-096

Usage: Check engine secondary compression.

Fig. 66



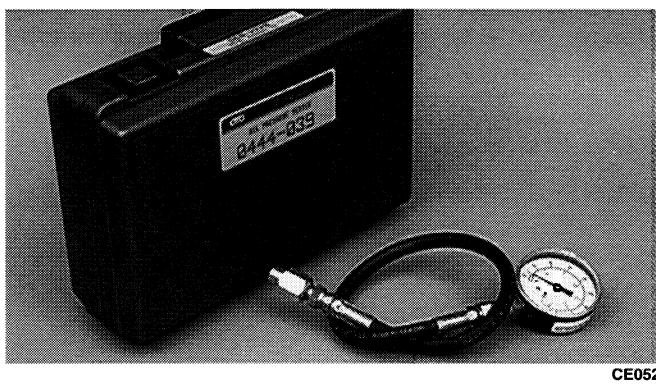
CE038

Oil Pressure Gauge

p/n: 0444-039

Usage: Test oil pressure (comes with adapter for 400 cc and 500 cc models).

Fig. 67



CE052

12 mm Compression Tester Adapter

p/n: 0444-093

Usage: With Compression Tester (p/n 0444-038), check engine secondary compression.

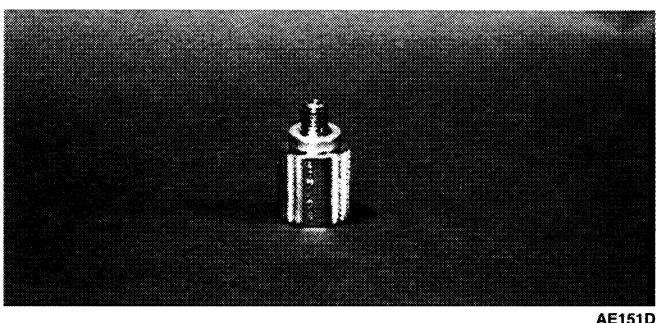
Troubleshooting/Tune-Up (cont)

Oil Pressure Gauge Adapter

p/n: 0444-088

Usage: With Oil Pressure Gauge (p/n 0444-039), test oil pressure on 250 cc and 300 cc models.

Fig. 68



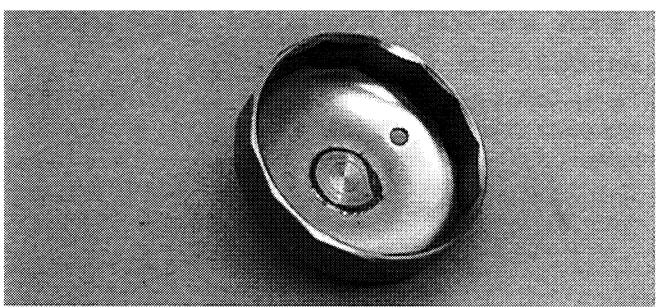
AE151D

Oil Filter Wrench

p/n: 0444-042

Usage: Remove oil filters on 400 cc and 500 cc models.

Fig. 69



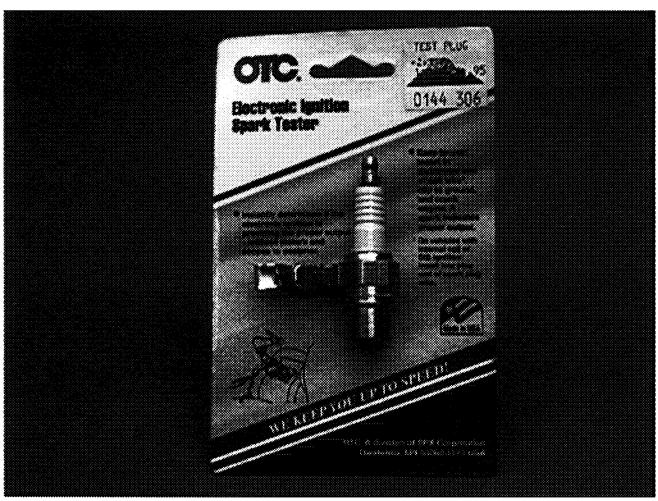
CE041

Ignition Test Plug

p/n: 0144-306

Usage: Test ignition system output on all engines.

Fig. 70



AE045

Metric T-Handle Wrench

p/n: 0644-257 (8 mm)

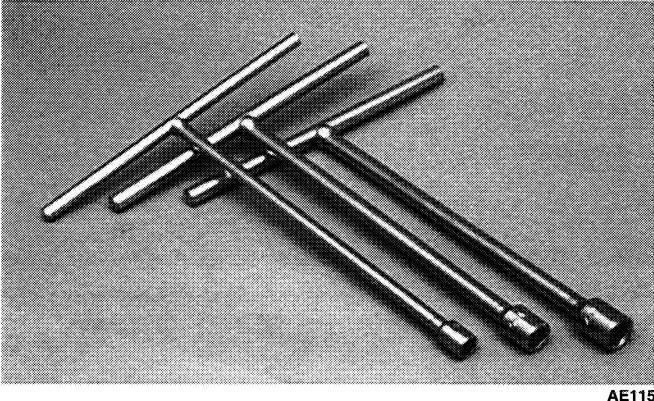
p/n: 0644-024 (10 mm)

p/n: 0644-025 (12 mm)

p/n: 0644-026 (14 mm)

Usage: Remove or install metric nuts and cap screws.

Fig. 71



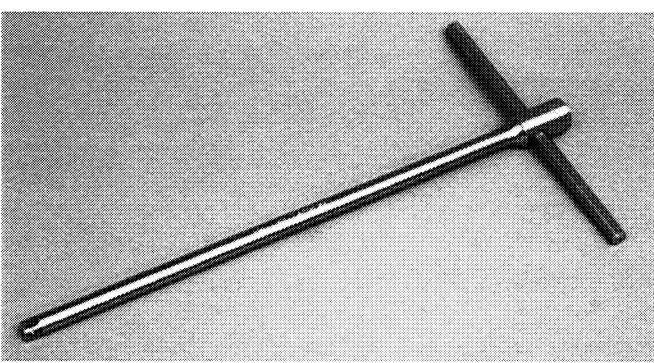
AE115

T Wrench

p/n: 0644-021

Usage: Drive 3/8-in. sockets or other 3/8-in. accessories.

Fig. 72



AE060

Troubleshooting/Tune-Up (cont)

Stud Runner

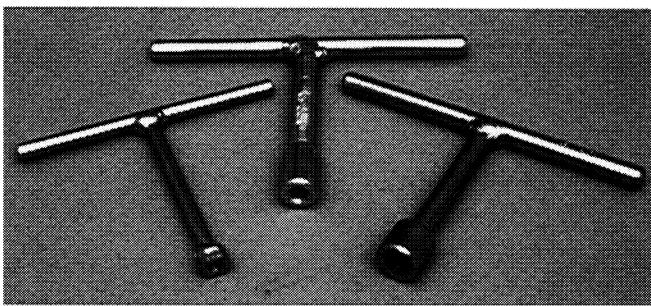
p/n: 0644-018 (6 mm)

p/n: 0644-019 (8 mm)

p/n: 0644-020 (10 mm)

Usage: Install metric studs in cylinders and crankcases.

Fig. 73



AE059

Vacuum/Pressure Test Pump

p/n: 0644-131

Usage: Check components for either vacuum or pressure leaks.

Fig. 74



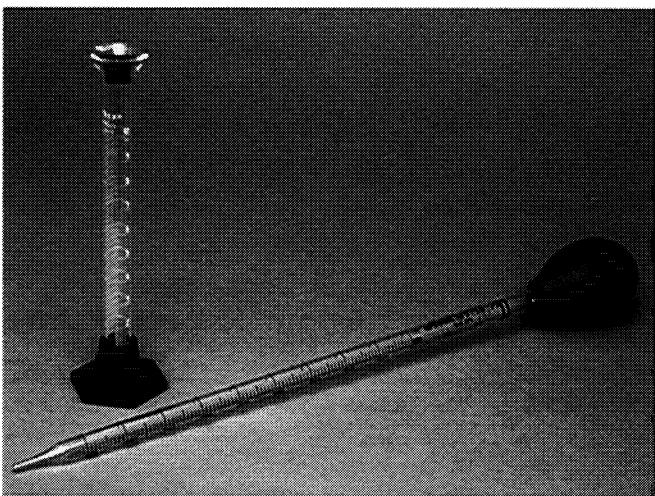
AE099

Alcohol Test Kit

p/n: 0644-044

Usage: Test gasoline for alcohol.

Fig. 75



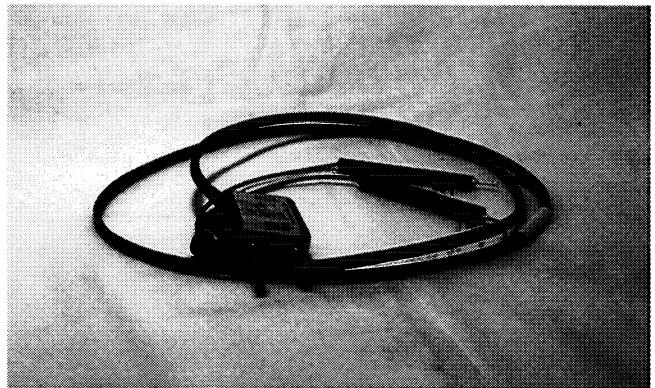
AE068

Peak Voltage Reading Adapter

p/n: 0644-307

Usage: With Fluke Model 73 Multimeter (p/n 0644-191), read peak voltage.

Fig. 76



0644-307

SECTION 11 – TROUBLESHOOTING

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Engine

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

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

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

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

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

| Condition | Remedy |
|---|--|
| 1. Gas tank vent hose obstructed | 1. Clean vent hose |
| 2. Carburetor inlet needle defective | 2. Replace needle |
| 3. Fuel hose obstructed | 3. Clean — replace hose |
| 4. Fuel screens obstructed | 4. Clean — replace inlet screen — valve screen |

Problem: Engine stalls easily

| Condition | Remedy |
|---|---------------------|
| 1. Spark plug fouled | 1. Clean plug |
| 2. Magneto defective | 2. Replace magneto |
| 3. CDI unit defective | 3. Replace CDI unit |
| 4. Carburetor jets obstructed | 4. Clean jets |
| 5. Valve clearance out of adjustment | 5. Adjust clearance |

Problem: Engine noisy (Excessive valve chatter)

| Condition | Remedy |
|--|------------------------|
| 1. Valve clearance too large | 1. Adjust clearance |
| 2. Valve spring(s) weak — broken | 2. Replace spring(s) |
| 3. Rocker arm — rocker arm shaft worn | 3. Replace arm — shaft |
| 4. Camshaft worn | 4. Replace camshaft |

| | |
|--|--|
| Problem: Engine noisy (Noise seems to come from piston) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Piston — cylinder worn Combustion chamber carbon buildup Piston pin — piston pin bore worn Piston rings — ring groove(s) worn | <ol style="list-style-type: none"> Replace — service piston — cylinder Clean chamber Replace — service pin — bore Replace rings — piston |
| Problem: Engine noisy (Noise seems to come from timing chain) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Chain stretched Sprockets worn Tension adjuster malfunctioning | <ol style="list-style-type: none"> Replace chain Replace sprockets Repair — replace adjuster |
| Problem: Engine noisy (Noise seems to come from clutch) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Crankshaft splines — bearings worn Countershaft — hub splines worn Clutch plate teeth worn Driven — drive clutch plates distorted — broken Clutch dampers weak | <ol style="list-style-type: none"> Replace crankshaft — bearings Replace countershaft — hub Replace clutch plate(s) Replace clutch plate(s) Replace dampers |
| Problem: Engine noisy (Noise seems to come from crankshaft) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Bearing worn — burned Lower rod-end bearing worn — burned Connecting rod side clearance too large | <ol style="list-style-type: none"> Replace bearing Replace bearing Replace thrust washer(s) |
| Problem: Engine noisy (Noise seems to come from transmission) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Gears worn — rubbing Splines worn Primary gears worn — rubbing Bearings worn Bushing worn | <ol style="list-style-type: none"> Replace gears Replace shaft(s) Replace gears Replace bearings Replace bushing |
| Problem: Engine noisy (Noise seems to come from secondary-transmission/left-side cover) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Gears — shaft(s) worn Bearing(s)/bushing(s) damaged | <ol style="list-style-type: none"> Replace gears — shafts Replace bearing(s)/bushing(s) |
| Problem: Engine noisy (Noise seems to come from secondary bevel gear and final driven shaft) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Drive — driven bevel gears damaged — worn Backlash excessive Tooth contact improper Bearing damaged Gears worn — rubbing Splines worn Final driven shaft thrust clearance too large | <ol style="list-style-type: none"> Replace gears Adjust backlash Adjust contact Replace bearing Replace gears Replace shaft(s) Replace thrust washer(s) |

Problem: Clutch slipping

| Condition | Remedy |
|---|------------------------------|
| 1. Release roller out of adjustment — loss of freeplay | 1. Adjust clutch bolts 1 & 2 |
| 2. Clutch springs weak | 2. Replace springs |
| 3. Clutch shoes worn | 3. Replace shoes |
| 4. Pressure disc worn — distorted | 4. Replace disc |
| 5. Clutch plates (driven — drive) distorted | 5. Replace plates |

Problem: Clutch dragging

| Condition | Remedy |
|---|-------------------------------|
| 1. Clutch release roller out of adjustment — too much freeplay | 1. Adjust clutch bolts 1 & 2 |
| 2. Clutch springs weak | 2. Replace springs |
| 3. Pressure disc — clutch plates distorted | 3. Replace disc — plates |
| 4. Clutch release mechanism worn — damaged | 4. Adjust — replace mechanism |

Problem: Transmission will not shift

| Condition | Remedy |
|---|-------------------------------|
| 1. Gearshift cam broken | 1. Replace cam |
| 2. Gearshift forks distorted | 2. Replace forks |
| 3. Gearshift shaft worn | 3. Replace shaft |
| 4. Clutch release mechanism worn — damaged | 4. Adjust — replace mechanism |
| 5. Reverse cable adjusted improperly | 5. Adjust cable |
| 6. Gearshift cable adjusted improperly | 6. Adjust cable |

Problem: Transmission will not shift back

| Condition | Remedy |
|--|-------------------|
| 1. Reverse shift cam broken | 1. Replace cam |
| 2. Shift shafts rubbing — sticking | 2. Repair shafts |
| 3. Gearshift forks distorted — worn | 3. Replace forks |
| 4. Gearshift lever return spring broken — damaged | 4. Replace spring |

Problem: Transmission jumps out of gear

| Condition | Remedy |
|---|-------------------|
| 1. Shifting gears (driveshaft — countershaft) worn | 1. Replace gears |
| 2. Gearshift forks distorted — worn | 2. Replace forks |
| 3. Cam stopper spring (gearshift cam) weak | 3. Replace spring |
| 4. Gearshift lever stopper pin worn | 4. Replace pin |

Problem: Secondary-transmission will not shift or shift back

| Condition | Remedy |
|--|-------------------|
| 1. Sliding dog broken — worn | 1. Replace dog |
| 2. Gearshift fork broken — worn | 2. Replace fork |
| 3. Hi/Low shift lever out of adjustment | 3. Adjust lever |
| 4. Gearshift cam worn | 4. Replace cam |
| 5. Cam stopper spring weak | 5. Replace spring |
| 6. Gearshift fork shaft worn | 6. Replace shaft |

Problem: Engine idles poorly

| Condition | Remedy |
|---|-------------------------------------|
| 1. Valve clearance out of adjustment | 1. Adjust clearance |
| 2. Valve seating poor | 2. Replace — service seats — valves |
| 3. Valve guides defective | 3. Replace guides |
| 4. Rocker arms — arm shaft worn | 4. Replace arms — shafts |
| 5. Magneto defective | 5. Replace magneto |
| 6. CDI unit defective | 6. Replace CDI unit |
| 7. Spark plug fouled — gap too wide | 7. Adjust gap — replace plug |
| 8. Ignition coil defective | 8. Replace ignition coil |
| 9. Float out of adjustment | 9. Adjust float height |
| 10. Jets obstructed | 10. Clean jets |
| 11. Pilot screw setting improper | 11. Adjust pilot screw |

Problem: Engine runs poorly at high speed

| Condition | Remedy |
|--|--|
| 1. High RPM “cut out” against RPM limiter | 1. Shift into higher gear — decrease speed |
| 2. Valve springs weak | 2. Replace springs |
| 3. Valve timing out of adjustment | 3. Adjust timing |
| 4. Cams — rocker arms worn | 4. Replace cams — arms |
| 5. Spark plug gap too narrow | 5. Adjust gap |
| 6. Ignition coil defective | 6. Replace ignition oil |
| 7. Float level too low | 7. Adjust float height |
| 8. Air cleaner element obstructed | 8. Clean element |
| 9. Fuel hose obstructed | 9. Clean — prime hose |

Problem: Exhaust smoke dirty or heavy

| Condition | Remedy |
|---|---------------------------------------|
| 1. Oil (in the engine) overfilled — contaminated | 1. Drain excess oil — replace oil |
| 2. Piston rings — cylinder worn | 2. Replace — service rings — cylinder |
| 3. Valve guides worn | 3. Replace guides |
| 4. Cylinder wall scored — scuffed | 4. Replace — service cylinder |
| 5. Valve stems worn | 5. Replace valves |
| 6. Stem seals defective | 6. Replace seals |

Problem: Engine lacks power

| Condition | Remedy |
|--|---------------------------------------|
| 1. Valve clearance incorrect | 1. Adjust clearance |
| 2. Valve springs weak | 2. Replace springs |
| 3. Valve timing out of adjustment | 3. Adjust timing |
| 4. Piston ring(s) — cylinder worn | 4. Replace — service rings — cylinder |
| 5. Valve seating poor | 5. Repair seats |
| 6. Spark plug fouled | 6. Clean — replace plug |
| 7. Rocker arms — shafts worn | 7. Replace arms — shafts |
| 8. Spark plug gap incorrect | 8. Adjust gap — replace plug |
| 9. Carburetor jets obstructed | 9. Clean jets |
| 10. Float level out of adjustment | 10. Adjust float height |
| 11. Air cleaner element obstructed | 11. Clean element |
| 12. Oil (in the engine) overfilled — contaminated | 12. Drain excess oil — change oil |
| 13. Intake manifold leaking air | 13. Tighten — replace manifold |
| 14. Cam chain worn | 14. Replace cam chain |

Problem: Engine overheats

| Condition | Remedy |
|--|---------------------------------------|
| 1. Carbon deposit (piston crown) excessive | 1. Clean piston |
| 2. Oil low | 2. Add oil |
| 3. Octane low — gasoline poor | 3. Drain — replace gasoline |
| 4. Oil pump defective | 4. Replace pump |
| 5. Oil circuit obstructed | 5. Clean circuit |
| 6. Gasoline level (in float chamber) too low | 6. Adjust float height |
| 7. Intake manifold leaking air | 7. Tighten — replace manifold |
| 8. Coolant level low | 8. Fill — examine system for leaks |
| 9. Fan malfunctioning | 9. Check fan fuse — replace fan |
| 10. Fan switch malfunctioning | 10. Replace fan switch |
| 11. Thermostat stuck — closed | 11. Replace thermostat |
| 12. Radiator hoses — cap damaged — obstructed | 12. Clear obstruction — replace hoses |

Drive

Problem: Power not transmitted from engine to wheels

| Condition | Remedy |
|--|----------------------------|
| 1. Rear axle shaft serration worn — broken | 1. Replace shaft |
| Problem: Power not transmitted from engine to either front wheel | |
| Condition | Remedy |
| 1. Secondary drive — driven gear teeth broken | 1. Replace gear(s) |
| 2. Propeller shaft serration worn — broken | 2. Replace shaft |
| 3. Coupling damaged | 3. Replace coupling |
| 4. Coupling joint serration worn — damaged | 4. Replace joint |
| 5. Front drive — driven bevel gears broken — damaged | 5. Replace gear(s) |
| 6. Front differential gears/pinions broken — damaged | 6. Replace gears — pinions |
| 7. Sliding dog/shaft/fork worn — damaged | 7. Replace gear(s) |
| 8. Front drive axle worn — damaged | 8. Replace axle |
| 9. Front drive axle serration worn — damaged | 9. Replace axle |

Fuel System

| | |
|--|---|
| Problem: Starting impaired | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Starter jet obstructed Starter tube obstructed Starter body — carburetor leaking air Starter plunger not operating properly | <ol style="list-style-type: none"> Clean jet Clean tube Tighten — adjust — replace gasket Check — adjust plunger |
| Problem: Idling or low speed impaired | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Pilot jet — pilot air jet obstructed — loose Pilot outlet — bypass obstructed Pilot screw setting incorrect Starter plunger not fully closed Float height incorrect | <ol style="list-style-type: none"> Clean — tighten jet(s) Clean outlet — bypass Adjust pilot screw Adjust plunger Adjust float height |
| Problem: Medium or high speed impaired | |
| Condition | Remedy |
| <ol style="list-style-type: none"> High RPM "cut out" against RPM limiter Main jet — main air jet obstructed Needle jet obstructed Throttle valve not operating properly Filter obstructed Float height incorrect Starter plunger not fully closed | <ol style="list-style-type: none"> Shift into higher gear — decrease speed Clean main jet — air jet Clean needle jet Check throttle valve operation Clean filter Adjust float height Close plunger |
| Problem: Overflow and fuel level fluctuations | |
| Condition | Remedy |
| <ol style="list-style-type: none"> Needle valve worn — damaged Needle valve spring broken Float not working properly Needle valve dirty Fuel level too high — too low | <ol style="list-style-type: none"> Replace needle valve Replace spring Adjust float height — replace float Clean needle valve Adjust float height |

Electrical

Problem: Spark absent or weak

| Condition | Remedy |
|-----------------------------------|--------------------------|
| 1. Ignition coil defective | 1. Replace ignition coil |
| 2. Spark plug defective | 2. Replace plug |
| 3. Magneto defective | 3. Replace magneto |
| 4. CDI unit defective | 4. Replace CDI unit |
| 5. Pick-up coil defective | 5. Replace pick-up coil |

Problem: Spark plug fouled with carbon

| Condition | Remedy |
|---|-------------------------------|
| 1. Mixture too rich | 1. Adjust carburetor |
| 2. Idling RPM too high | 2. Adjust carburetor |
| 3. Gasoline incorrect | 3. Change to correct gasoline |
| 4. Air cleaner element dirty | 4. Clean element |
| 5. Spark plug incorrect (too cold) | 5. Replace plug |

Problem: Spark plug electrodes overheat or burn

| Condition | Remedy |
|--|---------------------------|
| 1. Spark plug incorrect (too hot) | 1. Replace plug |
| 2. Engine overheats | 2. Service cooling system |
| 3. Spark plug loose | 3. Tighten plug |
| 4. Mixture too lean | 4. Adjust carburetor |

Problem: Magneto does not charge

| Condition | Remedy |
|---|--|
| 1. Lead wires/connections shorted — loose — open | 1. Repair — replace — tighten lead wires |
| 2. Magneto coils shorted — grounded — open | 2. Replace magneto coils |
| 3. Regulator/rectifier shorted — punctured | 3. Replace regulator/rectifier |

Problem: Magneto charges, but charging rate is below the specification

| Condition | Remedy |
|--|--------------------------------|
| 1. Lead wires shorted — open — loose (at terminals) | 1. Repair — tighten lead wires |
| 2. Stator coils (magneto) grounded — open | 2. Replace stator coils |
| 3. Regulator/rectifier defecitve | 3. Replace regulator/rectifier |
| 4. Electrolyte low | 4. Add distilled water |
| 5. Cell plates (battery) defective | 5. Replace battery |

Problem: Magneto overcharges

| Condition | Remedy |
|--|--------------------------------------|
| 1. Internal battery short circuited | 1. Replace battery |
| 2. Regulator/rectifier resistor damaged — defective | 2. Replace resistor |
| 3. Regulator/rectifier poorly grounded | 3. Clean — tighten ground connection |

Problem: Charging unstable

| Condition | Remedy |
|---|--------------------------------|
| 1. Lead wire intermittently shorting | 1. Replace lead wire |
| 2. Magneto internally shorted | 2. Replace magneto |
| 3. Regulator/rectifier defective | 3. Replace regulator/rectifier |

Problem: Starter button not effective

| Condition | Remedy |
|---|---|
| 1. Battery charge low | 1. Recharge — replace battery |
| 2. Switch contacts defective | 2. Replace switch |
| 3. Starter motor brushes not seating | 3. Repair — replace brushes |
| 4. Starter relay defective | 4. Replace relay |
| 5. Emergency stop — ignition switch off | 5. Turn on switches |
| 6. Wiring connections loose — disconnected | 6. Connect — tighten — repair connections |

Problem: Battery "sulfation"(Acidic white powdery substance or spots on surfaces of cell plates)

| Condition | Remedy |
|--|---|
| 1. Charging rate too low — too high | 1. Replace battery |
| 2. Battery electrolyte excessive — insufficient | 2. Keep electrolyte to prescribed level |
| 3. Specific gravity too high — too low | 3. Charge battery — add distilled water |
| 4. Battery run-down — damaged | 4. Replace battery |
| 5. Electrolyte contaminated | 5. Recharge — replace battery |

Problem: Battery discharges too rapidly

| Condition | Remedy |
|---|--|
| 1. Electrolyte contaminated | 1. Replace battery |
| 2. Specific gravity too high | 2. Charge battery — add distilled water |
| 3. Charging system (charging operation) not set properly | 3. Check magneto — regulator/rectifier — circuit connections — adjust for specified charging operation |
| 4. Cell plates overcharged — damaged | 4. Replace battery — correct charging system |
| 5. Battery short-circuited | 5. Replace battery |
| 6. Specific gravity too low | 6. Recharge battery |
| 7. Electrolyte contaminated | 7. Replace battery |

Problem: Battery polarity reversed

| Condition | Remedy |
|---|--|
| 1. Battery incorrectly connected | 1. Reverse connections — replace battery |

Steering/Suspension

Problem: Handling too heavy or stiff

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

Problem: Steering oscillation

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

Problem: Steering pulling to one side

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

Problem: Steering impaired

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

Problem: Tire wear rapid or uneven

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

Problem: Steering noise

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

Problem: Suspension too soft

| Condition | Remedy |
|--|---------------------------|
| 1. Spring(s) weak | 1. Replace spring(s) |
| 2. Shock absorber damaged | 2. Replace shock absorber |
| Problem: Suspension too stiff | |
| Condition | Remedy |
| 1. A-arm-related bushings worn | 1. Replace bushing |
| Problem: Suspension noisy | |
| Condition | Remedy |
| 1. Cap screws (suspension system) loose | 1. Tighten cap screws |
| 2. A-arm-related bushings worn | 2. Replace bushings |
| Problem: Rear wheel oscillation | |
| Condition | Remedy |
| 1. Rear wheel hub bearings worn — loose | 1. Replace bearings |
| 2. Tires defective — incorrect | 2. Replace tires |
| 3. Wheel rim distorted | 3. Replace rim |
| 4. Wheel hub cap screws loose | 4. Tighten cap screws |
| 5. Axle shaft nut loose | 5. Tighten nut |
| 6. Rear brake adjusted incorrectly | 6. Adjust brake |
| 7. Rear suspension arm-related bushing worn | 7. Replace bushing |
| 8. Rear shock absorber damaged | 8. Replace shock absorber |
| 9. Rear suspension arm nut loose | 9. Tighten nut |

Brakes

Problem: Braking poor

| Condition | Remedy |
|--|--------------------------------------|
| 1. Pad worn | 1. Replace pads |
| 2. Pedal free-play excessive | 2. Adjust free-play |
| 3. Brake fluid leaking | 3. Repair — replace hydraulic system |
| 4. Hydraulic system leaking air | 4. Bleed hydraulic system |
| 5. Master cylinder/brake cylinder seal worn | 5. Replace seal(s) |

Problem: Brake lever travel excessive

| Condition | Remedy |
|--|-------------------------------|
| 1. Hydraulic system entrapped air | 1. Bleed hydraulic system |
| 2. Brake fluid low | 2. Add fluid to proper level |
| 3. Brake fluid incorrect | 3. Replace with correct fluid |
| 4. Piston seal — cup worn | 4. Replace seal — cup |

Problem: Brake fluid leaking

| Condition | Remedy |
|-----------------------------------|-------------------|
| 1. Connection joints loose | 1. Tighten joints |
| 2. Hose cracked | 2. Replace hose |
| 3. Piston seal worn | 3. Replace seal |