Foreword

This manual is designed primarily for use by snowmobile mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the snowmobile user who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, the adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, the mechanic should read the text, thoroughly familiarize himself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment is specified, makeshift tools or equipment should not be used. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation of the snowmobile.

Whenever you see the symbols shown below, heed their instructions! Always follow safe operating and maintenance practices.

WARNING

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to, or destruction of equipment.

NOTE: Indicates points of particular interest for more efficient and convenient operation.

This manual is divided into the following four sections:

(1) Specifications

This section contains general and technical specifications, a complete torque chart and engine performance curves.

(2) Maintenance and Theory of Operation

The procedures for inspection, adjustments and minor repair are described in this section. An explanation on the structure and function of each of the major components and assembly enables the mechanic to better understand what he is doing.

(3) Repair

This section shows the best method for removal, disassembly, inspection, assembly, and installation which are necessary for proper maintenance and repair. Assembly and installation notes are provided to explain special points.

(4) Appendix

The appendix in the back of the manual contains miscellaneous information, including metric reference and conversion charts, special tools, wiring diagram, and an index.

This shop manual has been prepared to assist the mechanic in servicing the KAWASAKI snowmobiles. All procedures contained within should be followed closely.

Description	Quantity	Torque	Loctite
DRIVEN CONVERTER AND BRAKE			
Disc brake to stationary sheave mounting - screw	3	95 in.lb (1.09 kg-m)	
Clevis retainer to cam mounting - bolt	1	95 in. lb (1.09 kg-m)	
Securing brake support bracket - nut	2	120 in. lb (1.38 kg-m)	
Caliper to mounting bracket - nut	1	19 ft lb (2.63 kg-m)	
CHAINCASE			
Chaincase mounting - nuts	4	28 ft lb (3.87 kg-m)	
Chaincase cover mounting - bolts	2	95 in. lb (1.09 kg-m)	
Top sprocket mounting - bolt	1	28 ft lb (3.87 kg-m)	242
Chaincase cover - plugs	2	20 in. lb (0.23 kg-m)	
Speedometer drive adapter	1	Hand Tighten	
Bearing support assembly to clevis mounting - nut	1	95 in. lb (1.09 kg-m)	
Tensioner to chaincase - nut	1	120 in. lb (1.38 kg-m)	
Bottom sprocket mounting - nut	1	55 ft lb (7.61 kg-m)	
Bearing support to shaft - bolt	1	19 ft lb (2.63 kg-m)	
SUSPENSION			
Track adjusting jam - nuts	2	35 ft lb (4.84 kg-m)	
Rear suspension bracket mounting - nuts	4	17 ft lb (2.35 kg-m)	
Mounting screws - washer to limiters	20	95 in. lb (1.09 kg-m)	
Rear axle support brackets mounting - bolts	8	95 in. lb (1.09 kg-m)	
Axle bracket mounting - bolts	8	95 in. lb (1.09 kg-m)	
Limiters to front suspension arm mounting - bolts	2	95 in. lb (1.09 kg-m)	
Shock absorber to rear suspension arm - nut	1	30 ft lb (4.15 kg-m)	
Eye bolts to suspension brackets - nuts	4	Adjust	
Screws to limiters - attaching nuts	2	95 in. lb (1.09 kg-m)	
Support brackets - attaching nuts	18	95 in. lb (1.09 kg-m)	
Wear strip attaching screws	4	60 in. lb (0.69 kg-m)	
Cross shaft mounting - bolts	2	28 ft lb (3.87 kg-m)	242
Upper idler shaft to chassis - mounting bolts	2	15 ft lb (2.07 kg-m)	242
Suspension brackets - front and rear mounting - bolts	8	25 ft lb (3.46 kg-m)	
Rear axle assembly - bolts	2	30 ft lb (4.15 kg-m)	
DRIVESHAFT			
Bearing housing mounting - bolts	3	95 in. lb (1.09 kg-m)	
SKI AND SPINDLE			
Skeg (ski wear runner) to ski - attaching nut	6	15 ft lb (2.07 kg-m)	
Spring to ski - attaching nuts	4	46 ft lb (6.36 kg-m)	
Shock absorber to ski and spindle - attaching nuts	4	35 ft lb (4.84 kg-m)	
Spindle to spring saddle - nut	2	35 ft lb (4.84 kg-m)	
Spring saddle to spring - nut	4	35 ft lb (4.84 kg-m)	

Two-Cycle Engine Theory of Operation

Introduction

All internal combustion engines are characterized by a four part cycle of operation. The four parts are: 1. Intake, 2. Compression, 3. Combustion, and 4. Exhaust.

A fuel/air mixture must be drawn into the efnn'-ine, compressed, burned, and exhausted.

A two-stroke engine uses only two strokes to accomplish all four parts.

Each of the four parts can be easily understood by following the path of the fuel/air mixture through the engine. (See Figure 2-1.)

1. Intake: On the upstroke of the piston a charge of fuel mixed with air is drawn into the engine through an open port in the cylinder.
2. Compression: Near the bottom of the downstroke, the intake port is closed, and the piston starts back up. This upstroke compresses the fuel/air mixture to a fraction of its former volume.
3. Combustion: When the mixture has been compressed, it is ignited and forces the piston down. This is called the power stroke.
4. Exhaust: After the power stroke, the burned gases exit through the now open exhaust port, and the cycle is ready to start again.

The piston is carried through each step from one power stroke to the next by the rotating inertia of the crankshaft.

The intake of a two-stroke engine is perhaps the most complex part of the cycle. After the fuel and air have been mixed in the carburetor, it is drawn into the crankcase. As the piston rises, a hole in the cylinder wall (the intake port) is uncovered by the lower edge of the piston. The rising piston effectively increases the volume of the crankcase, drawing in the mixture. On its return trip, the piston blocks the intake port and lightly compresses the mixture in the crankcase. At about 55°-60° BBDC (before bottom dead center), the upper edge of the piston uncovers ports in the cylinder wall that are connected to the crankcase. The mixture in the crankcase, under pressure, rushes through these transfer ports into the cyliner.

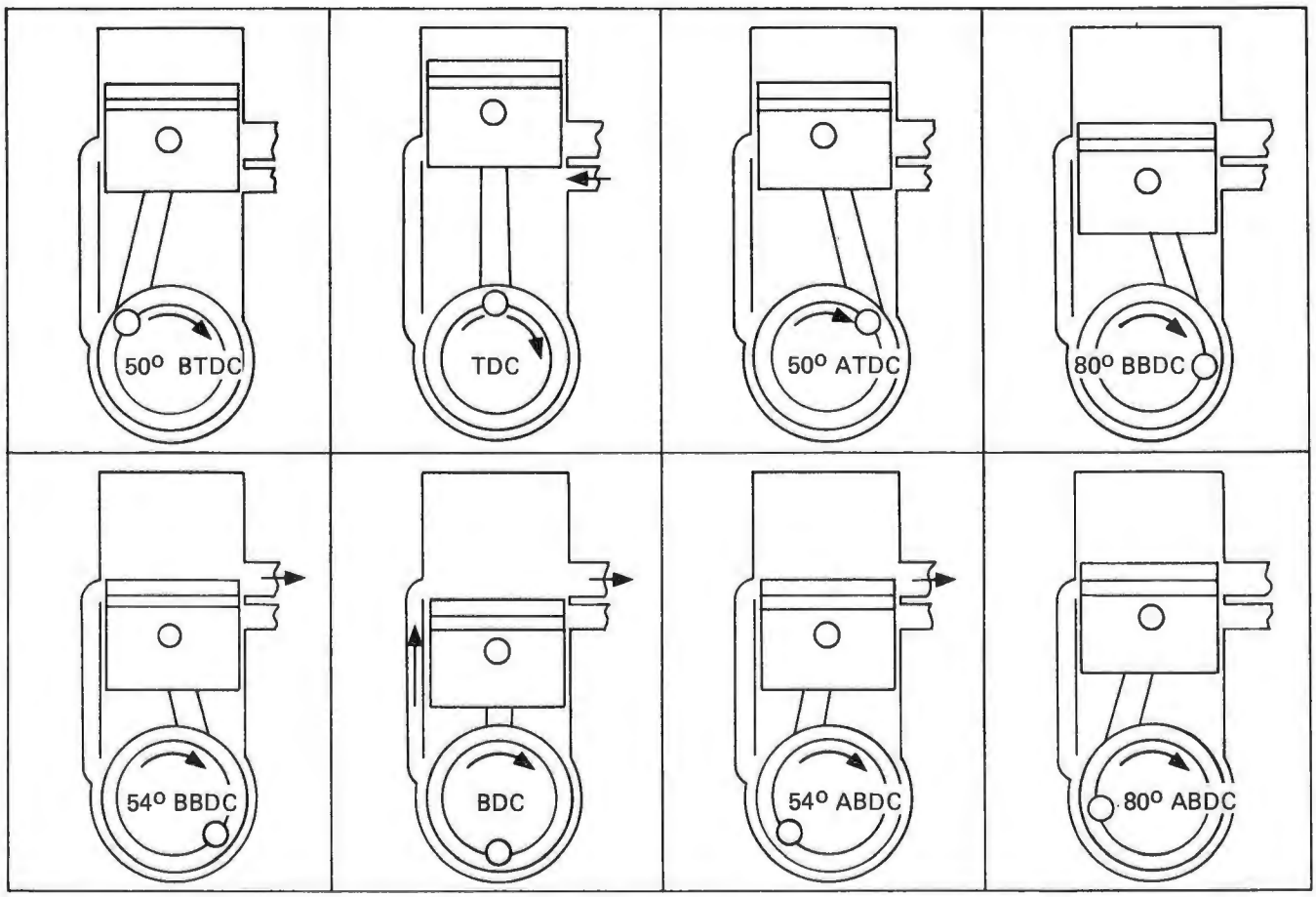


Figure 2-1

of fuel in the bowl drops, the floats drop slightly, and the needle valve moves down away from the seal. This allows fuel pumped from the tank by the fuel pump to flow into the bowl. As fuel enters the bowl, the floats rise, pushing the needle valve into contact with the valve seat, shutting off the flow of fuel. (See Figure 2-15.)

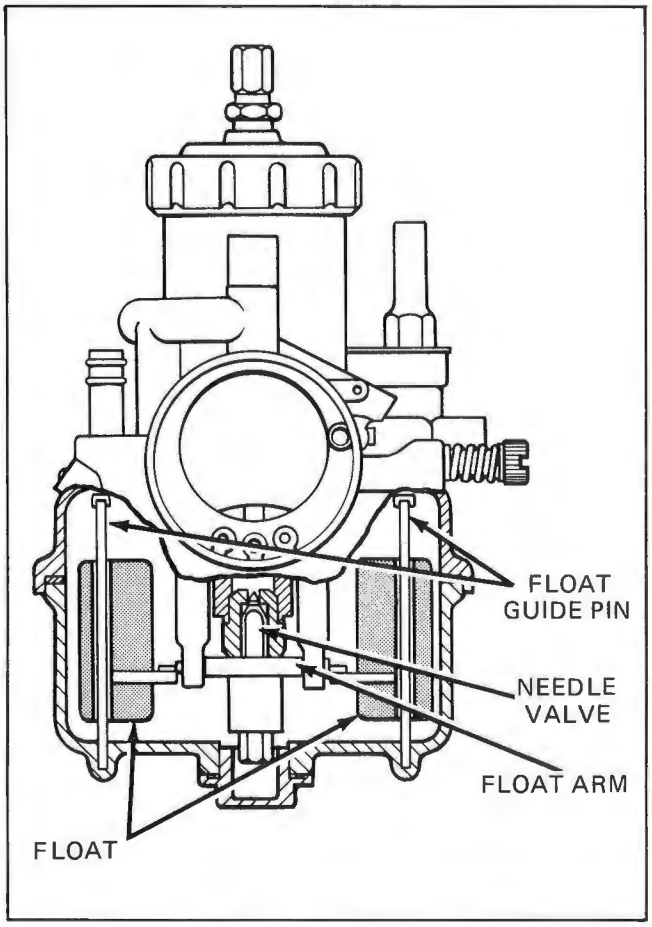


Figure 2-15

The fuel level affects how rich or lean the engine will run throughout its entire range. The reason for this is the drop in pressure that occurs in the venturi. The float bowl is vented to the atmosphere, so there is a pressure of 14.7 psi (1.03 kg-cm^2) pushing down on the surface of the fuel in the float bowl. When the engine is stopped, this pressure is on the surface of all the fuel in the float bowl, including the fuel inside the "feed tubes" which lead into the venturi. When the engine is running, the pressure in the venturi is less, and the pressure in the feed tubes is also less. The atmospheric pressure acting on the surface of the fuel in the bowl is much greater than the pressure acting on the fuel in the feed tube. Therefore, the level of fuel in the feed tube rises, pushing the fuel in the feed tube up into the venturi where it is released into the air stream as tiny droplets. (See Figure 2-16.)

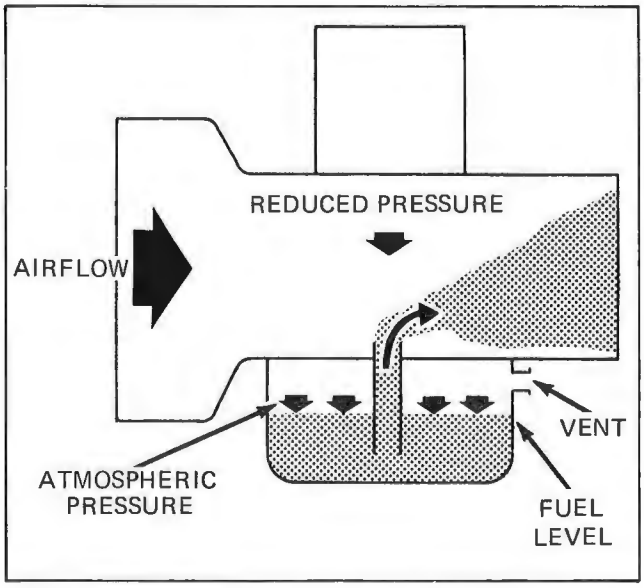


Figure 2-16

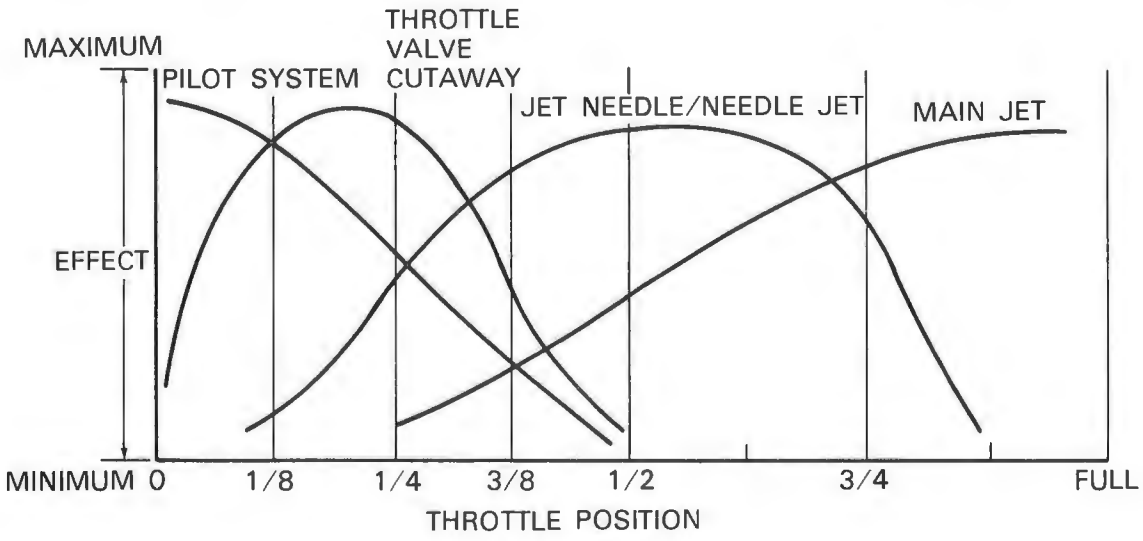


Figure 2-17

Track, Suspension, and Steering System Theory of Operation

The suspension system consists of the track and slider and the skis. (See Figure 2-36.)

The track provides flotation and propels the snowmobile. Support for the track and suspension is provided by the sliders. Adjustable spring-loaded arms attached to the sliders allow suspension adjustment for the weight of the rider(s). Suspension can also be adjusted for snow conditions and steering control.

Two skis are attached to the front of the snowmobile for steering control and flotation. A wear bar at the bottom of the ski protects the ski from wear and aids in steering control. The steering system connected to the ski consists of a spindle, steering arm, tie rod and handlebars.

Two-Cycle Engine Maintenance

Inspection

Inspect the engine and mating flanges for oil residue around flanges. Replace seals if leakage is evident.

Compression Check

A simple compression check is to pull the starter rope slowly. The starter rope should display noticeable resistance.

Use a compression gage for accurate measurement. Rotate engine at starting speed, with throttle in fully-open position. A compression reading of 90 to 95 psi (6.33-6.68 kg/cm^2) per cylinder is minimum. There should be no more than 10 percent difference between the two cylinders.

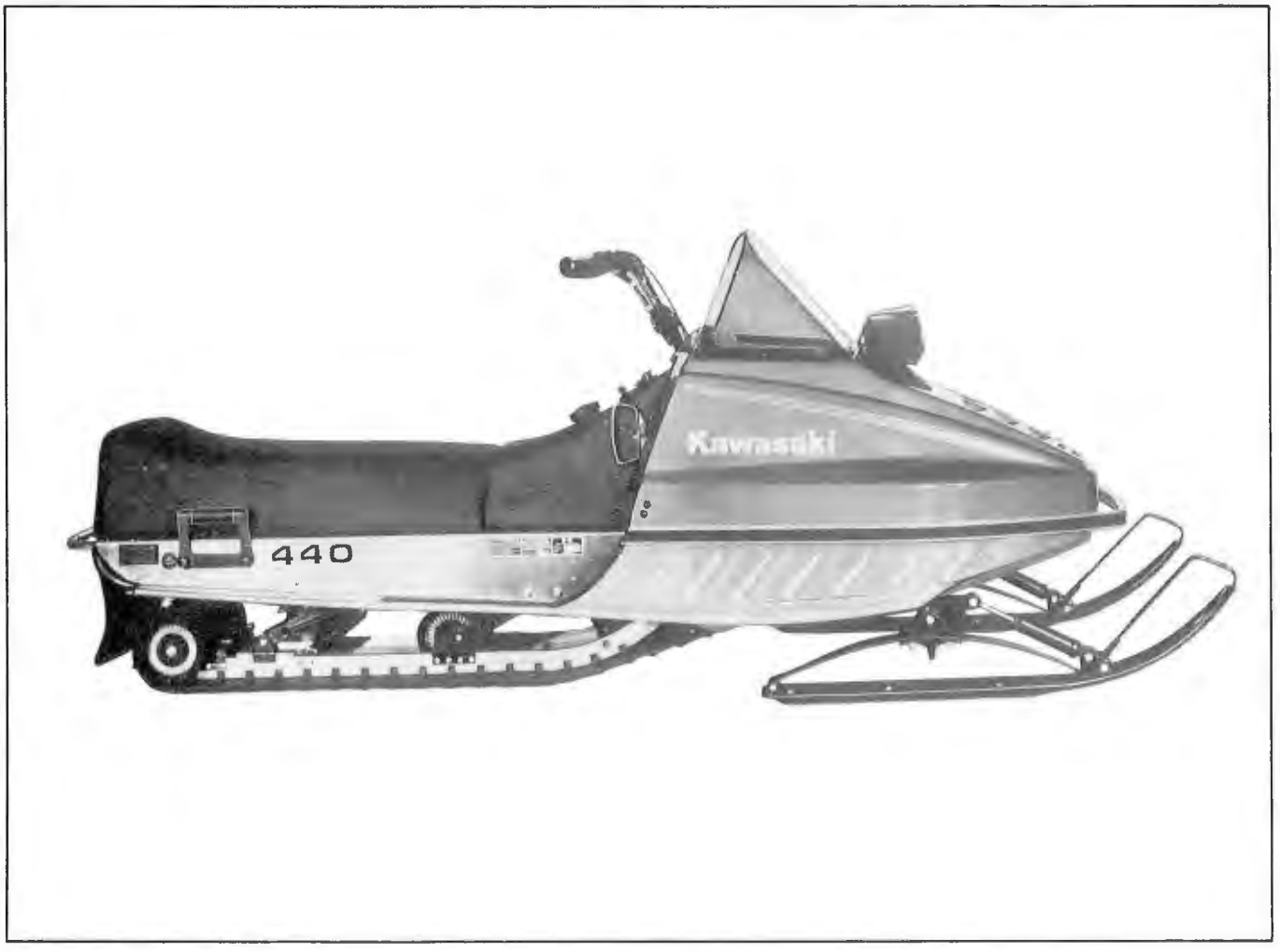


Figure 2-36

2. Disconnect the driven converter support arm from the chassis by removing the clevis pin from the yoke.

3. Rotate the movable half of the driven sheave towards the rear of the vehicle while pushing it towards the steering post. Assistance may be required to apply the brake while rotating sheave. (See Figure 2-63.)

Figure 2-63

WARNING

Use caution when removing the drive belt from the driven converter sheave since it is under a heavy spring load. Keep fingers and hands clear when releasing sheave.

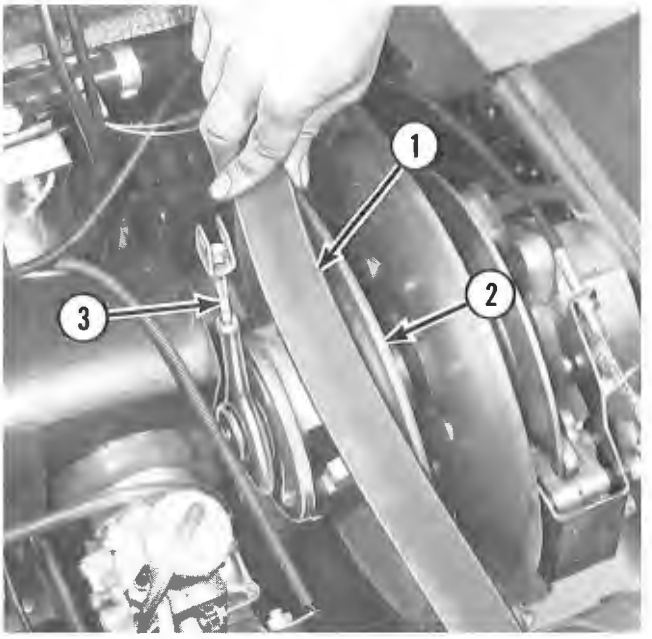
4. Roll the drive belt up and off the driven converter. Then release the movable sheave. (See Figure 2-64.)

5. Work the drive belt past the carburetor and air silencer, then remove it from the drive converter.

To install the new belt:

1. With the drive belt in position around the drive converter, work the belt past the carburetor and around the driven converter support arm.

2. Open the driven converter movable sheave to ease installation of the drive belt.



1. Drive Belt
2. Driven Converter Movable Sheave
3. Driven Converter Support Arm

Figure 2-64

3. Roll the drive belt over the top of the movable sheave, being careful not to pinch your fingers, and position in the driven converter.

4. Install the driven converter support arm to the chassis, and secure the clevis pin with safety clip.

5. Position the belt guard and secure it with the safety clip.

6. Close the hood and lock it into position with the hood latches.

NOTE: Always reinstall used belt so it will rotate in the same direction as it did originally.

Drive Converter

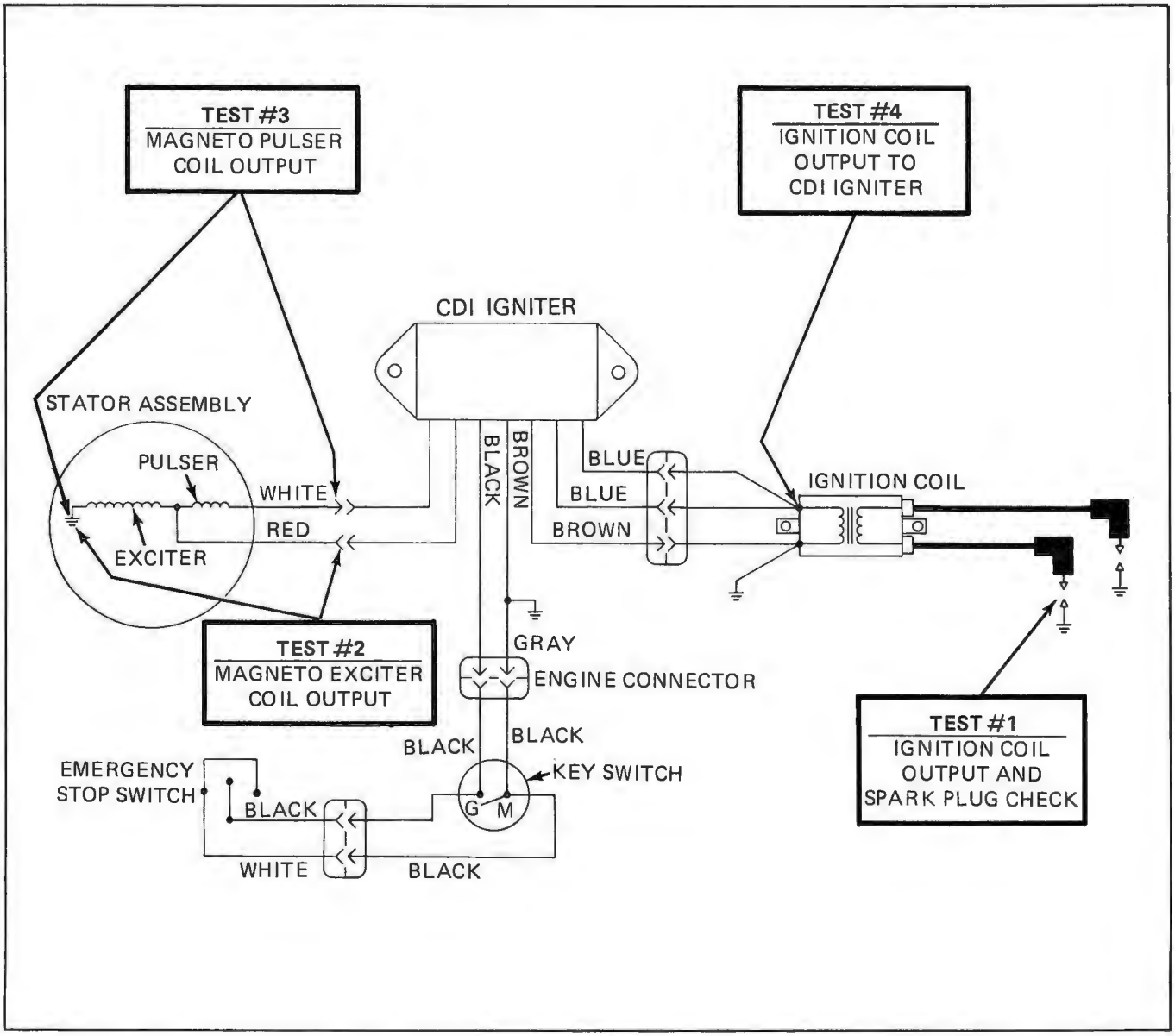
CAUTION

DO NOT LUBRICATE THE DRIVE CONVERTER. Any lubricant applied to the drive converter will drastically change the shifting characteristics, resulting in clutch failure and reduced drive belt life.

Clean the drive converter sheave surfaces once a year. Use a rag dipped in acetone liquid cleaner to remove water and oil. Remove rust or rubber with No. 260 and No. 320 emery cloth and polish with No. 400 emery cloth.

Engine Problem (continued)	Condition	Remedy
Engine will not start - fuel will not ignite.	1. Air leak between carburetor, silencer seal or cylinder.	1. Tighten mounting bolt and nuts.
	2. Carburetor adjusted incorrectly.	2. Adjust the carburetor.
	3. Water in carburetor.	3. Disassemble and clean carburetor.
	4. Engine is flooded.	4. Turn key switch OFF, remove spark plugs and dry them - crank engine over 5-10 times. Install spark plugs and start engine. If engine continues to flood, check carburetor.
	5. No compression (worn or broken rings, scored piston, hole in piston or damaged cylinder).	5. Check compression, replace worn or damaged parts.
	6. Blown head gasket.	6. Replace head gasket.
Engine does not idle or idle RPM fluctuates.	1. Air screw adjusted incorrectly.	1. Adjust air screw.
	2. Idle screw adjusted incorrectly.	2. Adjust idle screw.
	3. Defective fuel pump (check valve).	3. Service the fuel pump (check valve).
	4. Idle screw broken and embedded in main carburetor body casting.	4. Replace the idle screw and the main carburetor body casting.
	5. Impulse line cracked, kinked or broken.	5. Replace or repair impulse line.
	6. Enrichener cable adjusted incorrectly.	6. Adjust enrichener cable.
	7. Oil seals leaking.	7. Replace oil seals.
	8. Air leak (pressure check engine).	8. Disassemble and replace worn, defective, or damaged parts.
Engine develops power loss or runs on one cylinder.	1. Fouled or defective spark plug(s).	1. Replace the spark plug(s).
	2. Obstruction inside of muffler.	2. Remove obstruction or replace muffler.
	3. Defective CDI igniter.	3. Replace CDI igniter.
	4. In-line filter obstructed.	4. Replace in-line filter.

Test Procedures - Using CD Ignition Tester P/N T56019-201



TEST #1		TEST #2		TEST #3		TEST #4	
RANGE	DIAL SETTING	RANGE	DIAL SETTING	RANGE	DIAL SETTING	RANGE	DIAL SETTING
Low	25	High	50	Low	90	High	55

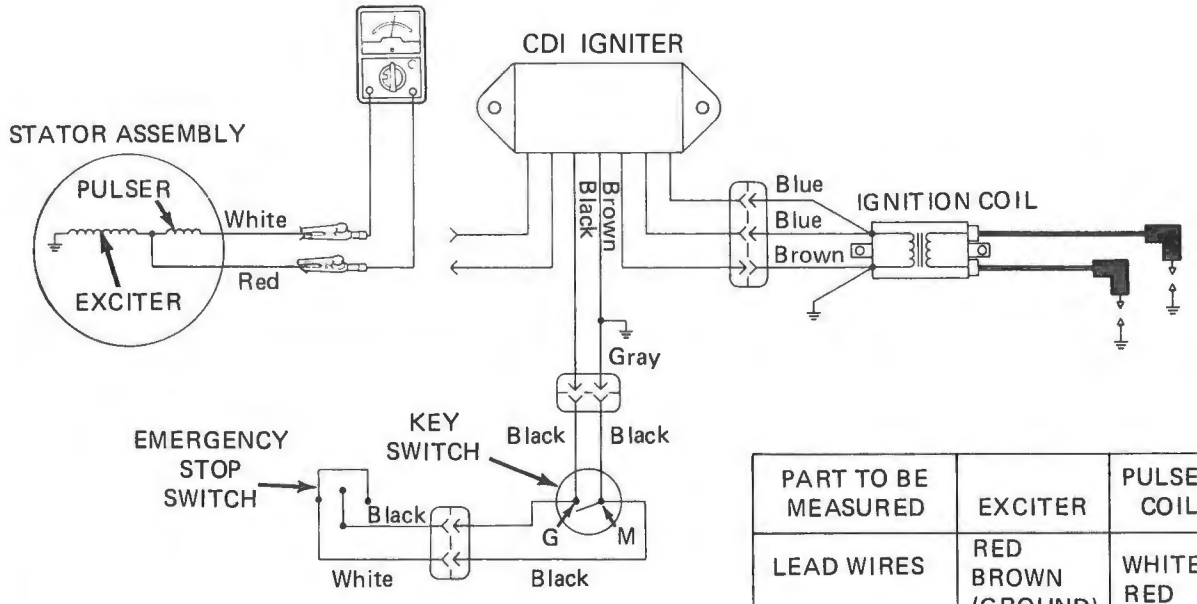
NOTE: Refer to following pages for detailed testing procedures.

2. CHECKING THE MAGNETO AND IGNITION COIL

Do not use an improper tester (insulation resistance testers or other testers with a battery of large capacity).

The use of a large capacity tester may ruin the CD igniter.

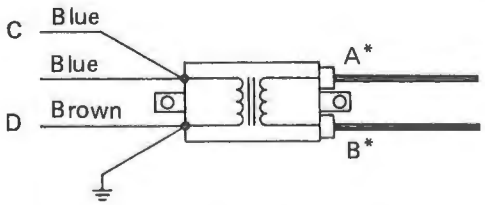
To locate the cause of trouble (broken coil, short circuit, etc.) measure the resistance of each coil winding.



PART TO BE MEASURED	EXCITER	PULSER COIL
LEAD WIRES	RED BROWN (GROUND)	WHITE-RED
RESISTANCE Ω	128 Ω ±20%	23Ω±20%
*VOLTAGE AC	40 VAC	4 VAC

* Measure at cranking speed with spark plugs installed.

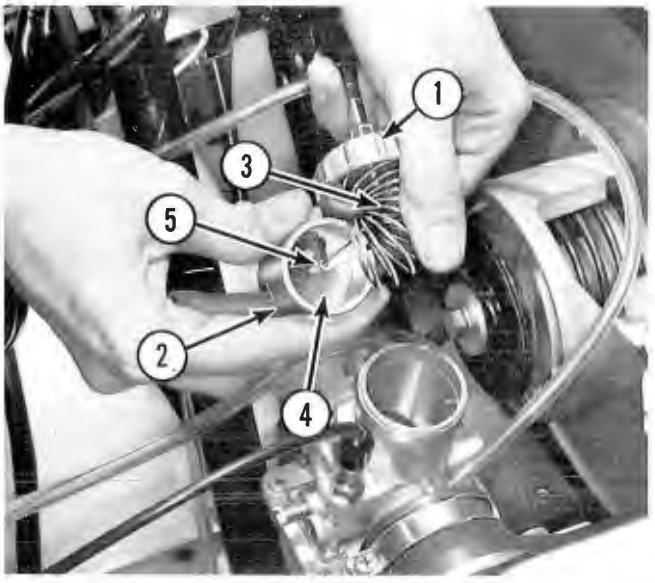
3. CHECKING THE IGNITION COIL



PARTS TO BE MEASURED	PRIMARY WINDING BLUE (C) - Ground (D)	SECONDARY WINDING A–B*
RESISTANCE**	0.37Ω±20%	10.2KΩ±20%

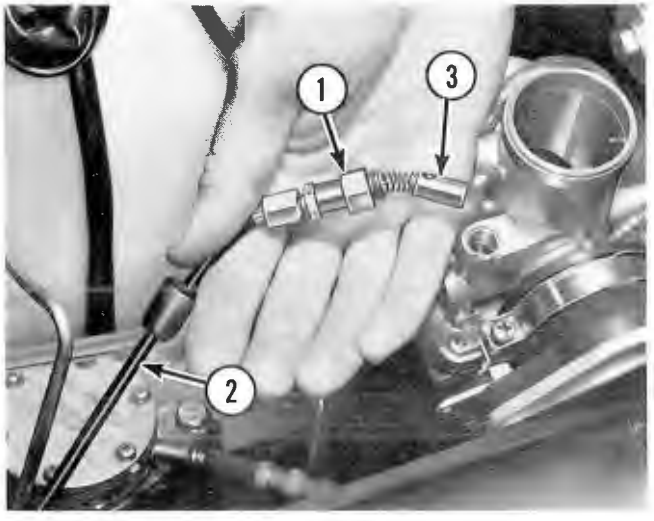
*With spark plug caps removed.
**Defective coils cannot always be detected using this test alone. Use of coil tester which simulates operating condition is the most reliable test method.

3. Unscrew the mixing body top assembly and pull out the throttle slide valve. (See Figure 3-7.)



1. Mixing Body Top Assembly
2. Throttle Slide Valve
3. Throttle Spring
4. Spring Seat Plate
5. Jet Needle

Figure 3-7



1. Enrichener Plunger Cap
2. Enrichener Cable
3. Enrichener Plunger

Figure 3-8

4. Compress the throttle spring and pull the spring from its seat. Slip the throttle cable through the slot in the spring seat plate. Remove the spring, spring seat plate, and jet needle from the throttle slide valve.
5. Unscrew the enrichener plunger cap and remove the enrichener plunger to release the enrichener cable. Unscrew the fitting and disconnect the enrichener cable. (See Figure 3-8.)
6. Loosen the screw on the carburetor holder clamp and remove the carburetor from the engine.

Disassembly of Carburetor

1. Select a clean work area for disassembling the carburetor. Most carburetor problems are caused by dirt in the system.
2. Clean the carburetor with fuel and blow dry with compressed air before disassembling. Do not blow high pressure air through the carburetor until it is disassembled.
3. Remove four screws with washers and separate the float chamber body from the upper carburetor body. Remove the gasket. (See Figure 3-9.)
4. To remove the main jet, unscrew from the upper carburetor body. Remove jet washer.
5. Push out the float arm pin and remove the float arm. Remove the float valve assembly and place in a secure location to prevent damage.
6. To remove the needle jet, use a soft rod (such as a pencil) to push the needle jet up through its bore.
7. Remove the pilot jet by unscrewing with a thin-bladed screwdriver.
8. Remove the throttle stop screw, spring, pilot air adjusting screw and spring.

Reassembly of Carburetor

Check carburetor parts for proper identification markings prior to reassembly. If the correct components are not installed the carburetor cannot be calibrated properly.

1. Throttle Slide Valve - 2.0CA
2. Needle - 6DH7
3. Needle Jet - 166Q-0
4. Pilot Jet - No. 20
5. Main Jet - No. 270
6. Carburetor Body - 34-179

1. Place the spring on the throttle stop screw and install in the carburetor body. (See Figure 3-9.) Turn in the screw about 10 turns.
2. Insert the spring and pilot air adjusting screw in the carburetor body. Turn the screw all the way in then turn out 1-1/2 turns for initial adjustment.

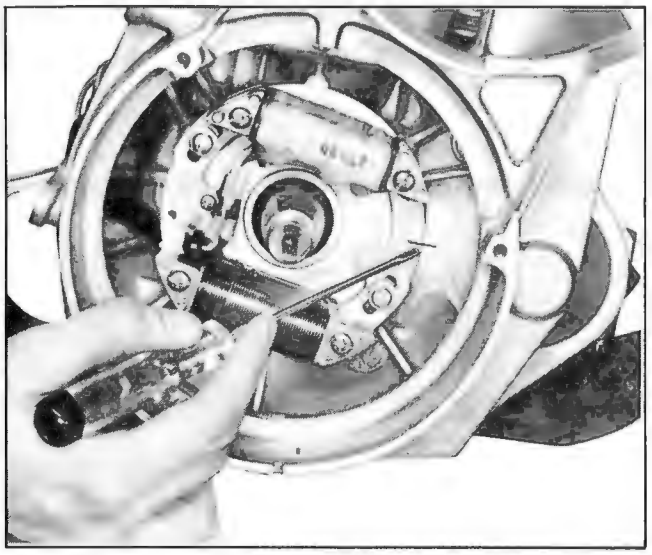


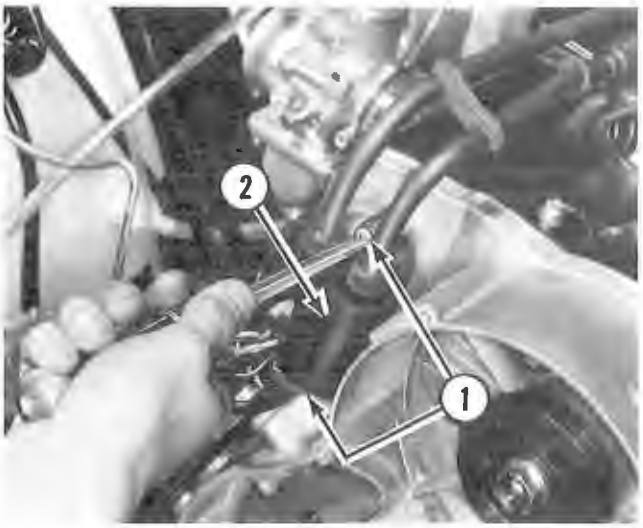
Figure 3-26

7. Remove the two screws and washers securing the stator plate to the crankcase and remove the stator assembly. Remove the stator harness and wires from the rubber grommet.

8. Refer to Figure 3-28 for stator disassembly sequence.

9. Separate the three wire connector. Remove the two screws holding the ignition coil to the fan housing. Remove the ignition coil. (See Figure 3-27.)

10. Remove the two screws securing the CDI igniter to the fan housing. Remove the CDI igniter.



1. Coil Mounting Screws
2. Ignition Coil

Figure 3-27

5. Install new head gaskets to cylinders.

6. Set cylinder heads in place on correct cylinders and loosely install the eight nuts, washers and lockwashers. Do not tighten cylinder nuts until intake manifold is installed. Refer to Section 2 for correct torque.

NOTE: The long nuts are installed on the outside studs of the PTO side cylinder head.

7. Install spark plugs and torque to 20 ft lb (2.77 kg-m).

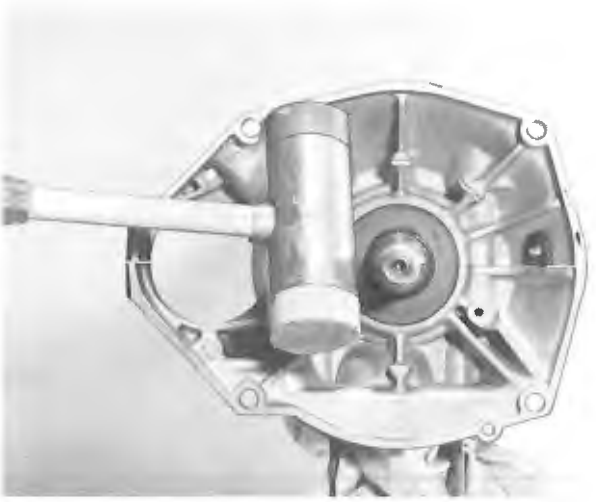


Figure 3-52

Crankcase Assembly

Disassembly

1. Remove eleven bolts, lockwashers and washers securing crankcase halves. (See Figure 3-51.)

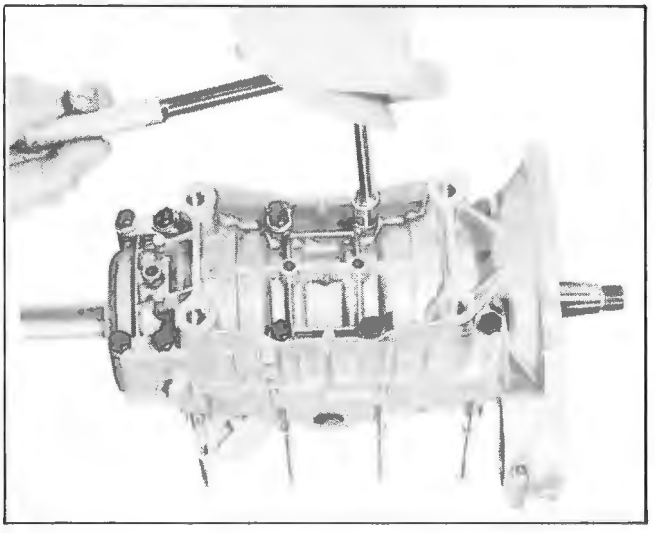
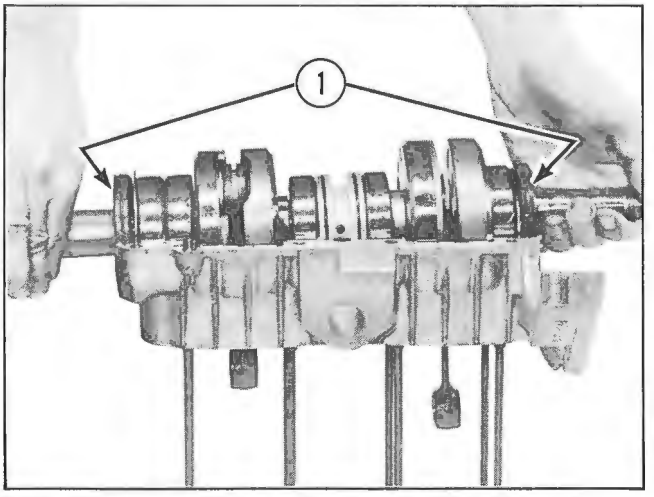


Figure 3-51



1. Oil Seals

Figure 3-53

2. With a plastic hammer tap on end of lower case half to break seal, and remove lower case. (See Figure 3-52.)

CAUTION

Never pry crankcase halves apart with screwdriver or similar tool. Sealing surfaces will be damaged making crankcase unusable.

3. Carefully remove crankshaft from crankcase. Remove oil seals and washers from crankshaft. (See Figure 3-53.)

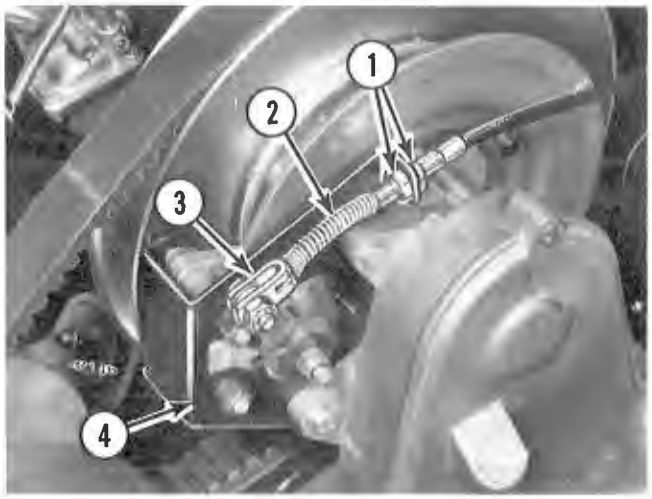
Inspection

1. Wash crankcase halves in cleaning solvent, dry using compressed air.

2. Inspect crankcase halves for scoring, pitting, scuffing or any imperfection in the castings that may cause a crankcase leak.

3. Check oil seals for wear, cracks or deterioration. Replace seal if damage is suspected. Check washers for damage.

4. Clean crankshaft in cleaning solvent, dry using compressed air.

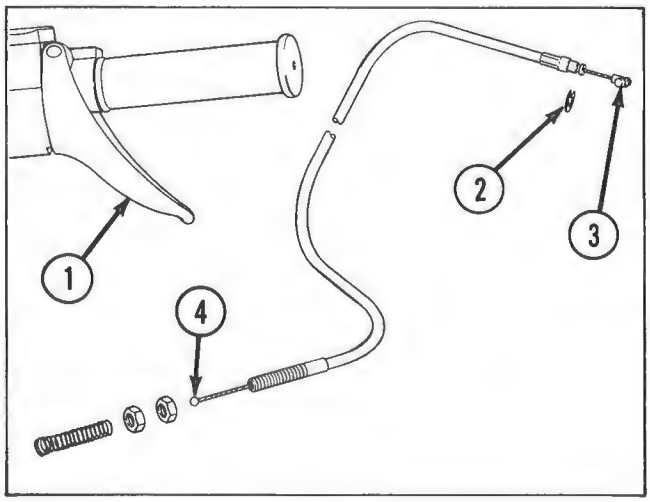


1. Locknuts
2. Return Spring
3. Retainer
4. Brake Support Bracket

Figure 3-71

3. Remove the snap ring and disconnect the brake cable end from the brake lever. (See Figure 3-72.)

4. Slot the hole in the console, through which the brake cable passes, to allow removal of the brake cable from the console.



1. Brake Lever
2. Snap Ring
3. Brake Cable End
4. Brake Cable Tip

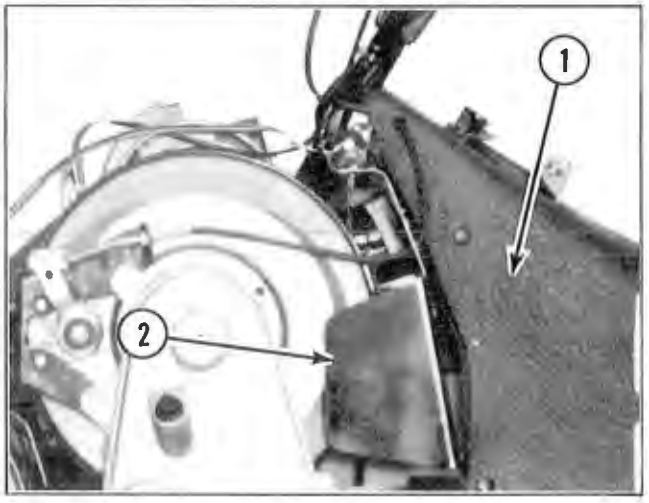
Figure 3-72

Installation

1. Place the end of the brake cable through the brake lever assembly and install the snap ring.

2. Connect the brake cable end to the brake lever.

3. Slide the other end of the brake cable through the hole in the fuel tank cover and the belt guard assembly. (See Figure 3-73.)



1. Fuel Tank Cover
2. Belt Guard Assembly

Figure 3-73

4. Install one locknut on the end of the brake cable and place it through the brake support bracket.

5. Install the second locknut and return spring on the end of the brake cable. Compress the spring and connect the brake cable tip to the retainer. For brake cable adjustment see Section 2. Squeeze the retainer to prevent the cable end from slipping out of the retainer slot.

Primer

Removal

1. Raise hood and disconnect fuel lines from primer pump noting position of tank-to-pump and pump-to-carburetor lines. (See Figure 3-74.)

2. Remove nut and internal star washer, and withdraw pump assembly through top of console.

NOTE: The primer pump is a non-serviceable item, requiring replacement as an assembly if any defect or malfunction is noted.

Repair

Inspect the brake pads for wear. If pad A is worn so only 1/32 in. (0.79 mm) protrudes from the caliper, replace pad A. Use contact cement to secure the new pad. If pad B is worn to 1/8 in. (3.18 mm), replace pad B.

Clean all parts in solvent. Be sure to keep oil and grease from the pads. Braking action will be impaired by oily or greasy pads.

Assembly

Apply coating of NEVER-SEEZ to push pins. Assemble and install brake caliper in the reverse order of removal and disassembly. Then adjust brake as instructed in Section 2.

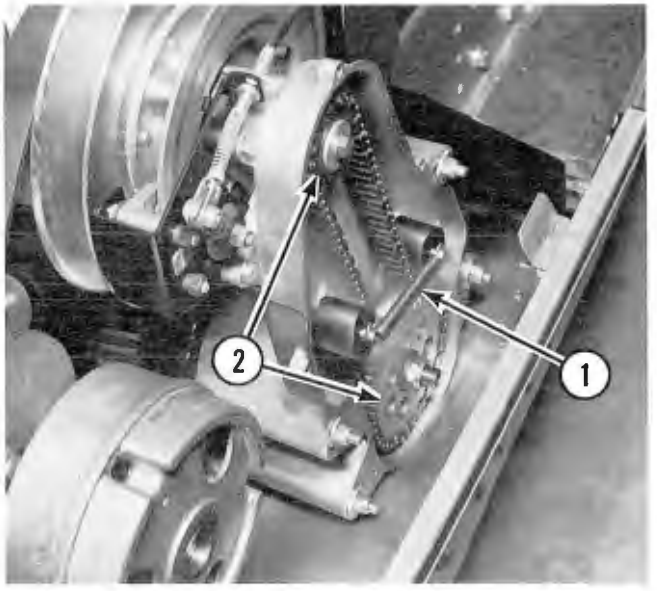
Drive Chain Replacement

Removal

1. Remove the chaincase cover and drain oil from chaincase into a suitable container. Inspect the chain cover gasket, and discard if damaged.
2. Remove chain tensioner spring.
3. Remove lower sprocket retaining nut, upper sprocket retaining bolt and remove sprockets and chain. (See Figure 3-87.)

Installation

1. Install the upper sprocket, lower sprocket and the chain as a unit. Install the lower sprocket retaining nut. Torque nut 55 ft lb (7.61 kg-m). Apply Loctite to upper sprocket retaining bolt. Install large washer and lockwasher. Torque sprocket retaining bolt to 19 ft lb (2.63 kg-m). Inspect chain guides, and service as described in Section 2.
2. Install chain tensioner spring and retaining pins.
3. Place O-ring gasket properly in cover, applying a light coating of sealer to hold it in place. Install cover to chaincase, and add chain oil to the lower edge of the level hole.



1. Chain Tensioner Spring
2. Sprockets

Figure 3-87

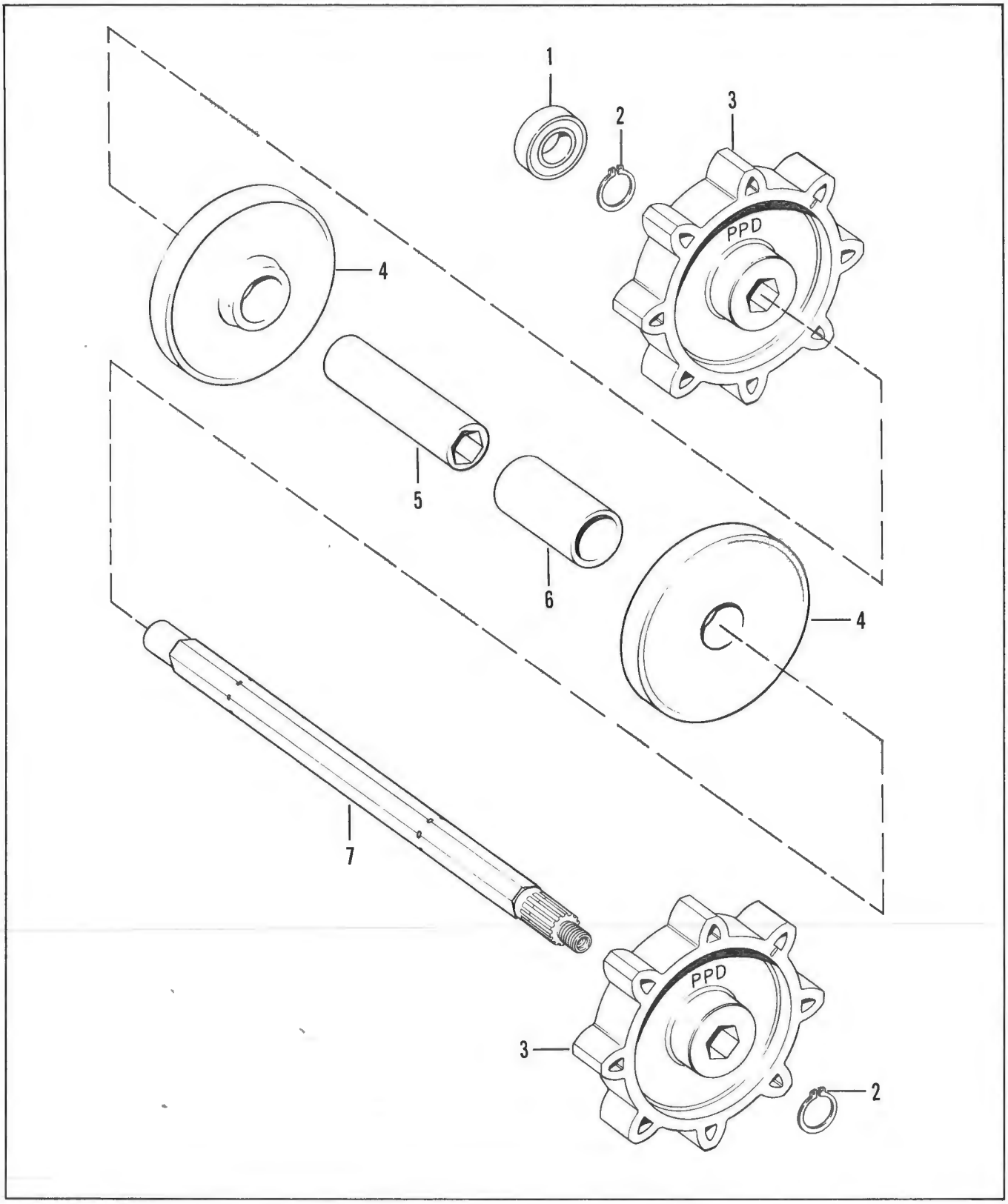
Slide Rail Suspension

Removal

1. Position the snowmobile on its right side, and loosen rear axle adjusting bolts to relieve track tension. (See Figure 3-88.)
2. Remove middle idler shaft, spacers, and wheels.

1. Bolt
2. Washer
3. Caliper A
4. Pad A
5. Pad B
6. Backup Washer
7. Caliper B
8. Push Pin
9. Bolt
10. Retainer
11. Bushing
12. Nut
13. Cam
14. Nut
15. Washer
16. Bushing
17. Spring
18. Nut
19. Bushing
20. Brake Support Bracket

Figure 3-86



1. Bearing
2. Snap Ring
3. Sprocket
4. Idler Wheel
5. Spacer
6. Spacer
7. Driveshaft

Figure 3-104