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ENGINE SERVICING (STORAGE)

For storage during the summer months, the Arctic Cat Panther Snowmobile must be serviced properly to prevent rusting and component deterioration. The following items are suggested to prepare the snowmobile for summer storage. The instructions are intended for use to protect the engine and mechanical components from rust, undue tension, etc.

1. Remove the seat cushion from the snowmobile. Wash cushion with a damp rag and store the cushion in a dry place.

2. Clean the snowmobile thoroughly by hosing off dirt, oil, grass and other foreign matter from the skid frame, tunnel, hood and belly pan. Allow the snowmobile to dry thoroughly.

Note: DO NOT get water into any part of the engine or the intake silencer.

3. Drain all the fuel from the fuel tank. Next, disconnect the fuel line from the carburetor inlet fitting. Finally, start the engine and allow it to idle until it stops from lack of fuel. Install fuel line on carburetor inlet fitting.

Note: If fuel is allowed to remain in the fuel tank and fuel system, varnish and gum deposits may very well occur, resulting in improper operation of the fuel system and engine.

4. Check the fuel tank filter and the in-line fuel filter.

5. Plug the hole in the muffler and intake silencer with clean rags.

6. Disconnect the high tension wires from the spark plugs. Remove plugs from the cylinder heads. Second, pull the recoil rope slowly until the piston reaches top dead center (TDC). Third, pour one ounce of Arctic Cat Engine Preservative or snowmobile oil into the spark plug hole. Fourth, pull the recoil rope slowly about ten times. Next, repeat the second, third and fourth steps on the opposite cylinder. Finally, install the spark plugs in the cylinder heads and connect the high tension wires to the plugs.

7. Check and clean the fuel tank filter. Spray the inside of the tank with a rust preventative lubricant. Install fuel tank gauge cap.

8. Drain chain case lubricant by removing the chain case cover and gasket. Allow lubricant to flow onto rags placed in belly pan, just below the chain case. Clean the chain case and the chain case cover. Install chain case cover and gasket. Pour 8 ounces of Arctic Chain Lube into the filler hole. Install the filler and check plug in the chain case cover.

9. Remove the drive belt from the drive clutch and driven pulley. Lay the belt on a flat surface or slide it into a cardboard sleeve during storage to prevent warping or distortion.

10. Service drive clutch and driven pulley.

11. Apply light oil on the steering post bushings, ski spindles and the front and rear pivot bushings of the skid frame.

12. Lubricate the grease fittings on the rear arm of the skid frame with low-temperature grease, using a flexible hose grease gun.

13. Touch up all rusted or chipped paint surfaces; sand lightly before painting.

14. Release all track tension by loosening the track tension adjusting bolts. Rotate track every two weeks to prevent the track from warping or taking a "set".

15. Tighten all nuts, bolts and screws. Make sure rivets are tight and holding components together.

16. Clean and polish the hood, console and chassis with an automotive cleaner wax. DO NOT USE SOLVENTS OR SPRAY CLEANERS. THE PROPELLENT WILL DAMAGE THE FINISH ON THE CONSOLE, TOOLBOX AND FUEL TANK SHROUD.

17. If possible, store the snowmobile indoors. Raise the track off the floor by blocking up the rear end of the snowmobile. Cover the snowmobile to protect it from dust and dirt.

18. If the snowmobile must be stored outdoors, block the entire snowmobile off the ground and cover it with a heavy tarpaulin.

'74 PANTHER ENGINE SPECIFICATIONS

Description	340 Engine	440 Engine
Engine Model	T1C340S2A	T1C440S2A
No. of Cylinders	2	2
Displacement	339cc	436cc
Bore	60mm/2.362 in.	68mm/2.677 in.
Stroke	60mm/2.362 in.	60mm/2.362 in.
Effective Compression Ratio	6.6:1	6.6:1
Intake Port Timing BTDC	78.9°/28.2mm/1.110 in.	78.9°/28.2mm/1.110 in.
Transfer Port Timing BBDC	61.3°/12.4mm/0.488 in.	61.3°/12.4mm/0.488 in.
Exhaust Port Timing BBDC	86.1°/23.8mm/0.937 in.	86.1°/23.8mm/0.937 in.
Allowable Cylinder Head Distortion	None	None
Cylinder Diameter	2.36220-2.36295 in.	2.67716-2.67791 in.
Piston Diameter (1/32 inch below 2nd ring)	2.355 in.	2.670 in.
Piston Diameter at Skirt	2.361 in.	2.676 in.
Piston Pin Bore Diameter	0.6298-0.6301 in.	0.6298-0.6301 in.
Piston Pin Diameter	0.6297-0.6299 in.	0.6297-0.6299 in.
Piston Ring Side Play	0.004-0.006 in. (Top Ring) 0.002-0.004 in. (Bottom Ring)	0.004-0.006 in. (Top Ring) 0.002-0.004 in. (Bottom Ring)
Piston Ring End Gap	0.006-0.014 in.	0.008-0.016 in.
Piston Skirt Clearance	0.0008-0.0022 in.	0.0008-0.0022 in.
Connecting Rod Radial Play	0.0008-0.0012 in.	0.0008-0.0012 in.
Connecting Rod Small End Diameter	0.7875-0.7880 in.	0.7875-0.7880 in.
Crankshaft End Play	0-0.030 in.	0-0.030 in.
Crankshaft Run Out	0.0012 in. (max)	0.012 in. (max)
Ignition Type	Standard CDI	Standard CDI
Dynamic Ignition Timing	25° or 0.139 in. @ 6000 rpm	25° or 0.139 in. @ 6000 rpm
Static Ignition Timing	Align Timing Marks	Align Timing Marks
Lighting System Output	12 Volt/100 Watt	12 Volt/100 Watt
Lighting Coil	0.18 ohm	0.18 ohm
Pulser Coil	23.5 ohms	23.5 ohms
Exciter Coil	195 ohms	195 ohms
Ignition Coil Primary	0.365 ohm	0.365 ohm
Ignition Coil Secondary	10,200 ohms	10,200 ohms
Spark Plug Type	*NGK-B8ESA	*NGK-B8ESA
Spark Plug Gap	0.028-0.032 in.	0.028-0.032 in.
Axial Fan Belt Tension	0.138-0.177 in. @ 11.02 lb	0.138-0.177 in. @ 11.02 lb
Engine Torque Specifications		
Cylinder Head Bolts	16 ft-lb	16 ft-lb
Crankcase Bolts and Nuts	16 ft-lb	16 ft-lb
Flywheel Nut	60 ft-lb	60 ft-lb
Recoil Bolt	5 ft-lb	5 ft-lb
Spark Plug	20 ft-lb	20 ft-lb

*Alternate Spark Plugs: Champion N3 or AC-S42XL

'75 PANTHER ENGINE SPECIFICATIONS

Description	440 Engine
Engine Model	T1D440A2A
No. of Cylinders	2
Displacement	436cc
Bore	68mm/2.677 in.
Stroke	60mm/2.362 in.
Effective Compression Ratio	6.6:1
Intake Port Timing BTDC	78.9°/28.2mm/1.110 in.
Transfer Port Timing BBDC	61.3°/12.4mm/0.488 in.
Exhaust Port Timing BBDC	86.1°/23.8mm/0.937 in.
Allowable Cylinder Head Distortion	None
Cylinder Diameter	67.995-68.025mm/2.676-2.678 in.
Piston Diameter (1/32 in. below 2nd ring)	2.670 in.
Piston Diameter at Skirt	2.676 in.
Piston Pin Diameter	0.6297-0.6299 in.
Piston Pin Bore Diameter	0.6298-0.6301 in.
Piston Ring Side Play	0.004-0.006 (Top Ring) 0.002-0.004 (Bottom Ring)
Ring End Gap	0.008-0.016 in.
Piston Skirt to Cylinder Clearance	0.0006-0.0025 in.
Connecting Rod Radial Play	0.0008-0.0012 in.
Connecting Rod Big End Side Play	0.016-0.020 in.
Connecting Rod Small End Diameter	0.7875-0.7880 in.
Crankshaft End Play	0-0.030 in.
Crankshaft Run Out	0.0012 in. (max)
Ignition Type	Standard CDI
Dynamic Ignition Timing	25° or 0.139 in. @ 6000 rpm
Static Ignition Timing	Align Timing Marks
Lighting System Output	12 Volt/100 Watt
Lighting Coil	0.14 ohm
Pulser Coil	23.5 ohms
Exciter Coil	195 ohms
Ignition Coil Primary	0.365 ohm
Ignition Coil Secondary	10,200 ohms
Spark Plug Type	*NGK-B8ESA
Spark Plug Gap	0.028-0.032 in.
Axial Fan Belt Tension	0.138-0.177 in. @ 11.02 lb
Engine Torque Specifications	
Cylinder Head Bolts	16 ft-lb
Crankcase Bolts and Nuts	16 ft-lb
Flywheel Nut	60 ft-lb
Recoil Bolt	5 ft-lb
Spark Plug	20 ft-lb

*Alternate Spark Plugs: Champion N3 or AC-S42XL

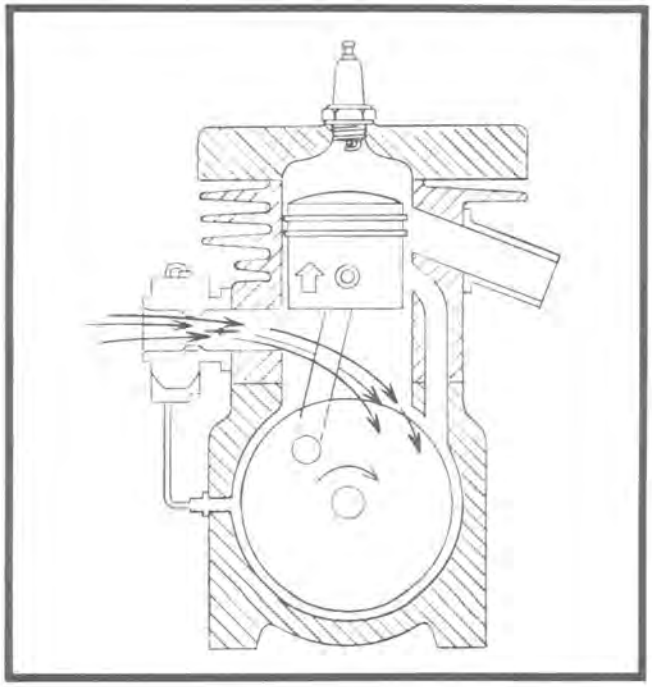
THEORY OF OPERATION

The two-cycle engine used in the Arctic Cat Snowmobile is an Otto Cycle (spark ignition) type. This type of engine uses five steps to complete one operating cycle. The five steps are: (1) Intake; (2) Transfer; (3) Compression/Ignition; (4) Power; and (5) Exhaust. These five steps of operation are known as the engine's work cycle and occur during one crankshaft revolution and two strokes of the piston; therefore, the name "two-stroke" or "two-cycle". Each of the five steps is discussed in the following paragraphs.

The Arctic Cat two-cycle engine uses the piston as a sliding valve to complete the work cycle. Since the fuel/air mixture provided by the carburetor will only flow from a high to a low pressure area, the pressure within the crankcase must be lowered to allow intake of fuel. This is accomplished when the piston starts its upward stroke from "bottom dead center" (BDC) and exposes the intake port.

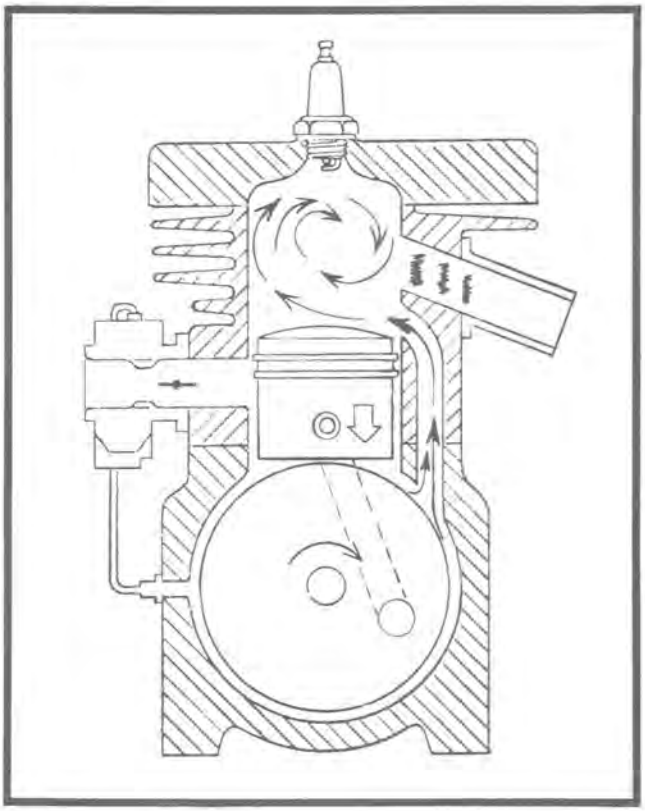
The first step of the engine's work cycle is the INTAKE of fuel and air from the carburetor, Fig. II-1. As the piston moves upward in the cylinder and opens the intake port, a crankcase vacuum is generated and, as a result, fuel/air rushes into the lower portion of the cylinder and down into the low pressured crankcase. This charge of fuel remains in the crankcase, lubricating the crankshaft main bearings and needle bearings, until the piston starts the downstroke and uncovers the transfer ports.

Fig. II-1



The second step is the TRANSFER of fuel from the crankcase to the cylinder, Fig. II-2. As the piston starts the downstroke from "top dead center" (TDC), the fuel/air charge in the crankcase is compressed. But when the piston slides by and opens the transfer ports, the fuel/air mixture is forced into the cylinder by way of the transfer ports. Finally, the piston moves to BDC.

Fig. II-2



The third step is the COMPRESSION and IGNITION of the fuel/air mixture, Fig. II-3. During this step, the fuel/air mixture in the cylinder is compressed by the upward movement of the piston from BDC. At a predetermined point slightly before the piston reaches TDC, an electrical spark jumps the air gap between the center and side electrodes of the spark plug. This action (ignition) causes the compressed fuel/air mixture to start burning. At cranking speeds, the spark occurs slightly before TDC; however, the spark advances fully when the speed of the engine increases. This change in electrical spark timing is controlled by the flyweight type, centrifugally-governed, automatic spark advance mechanism. Finally, after combustion begins, the piston continues to TDC, then starts its descent.

THEORY OF OPERATION

Fig. II-3

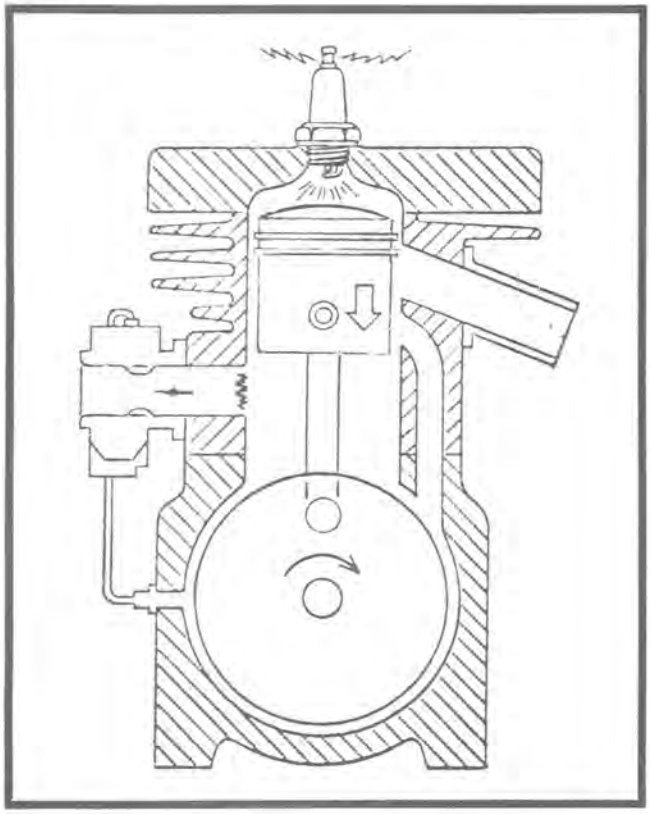
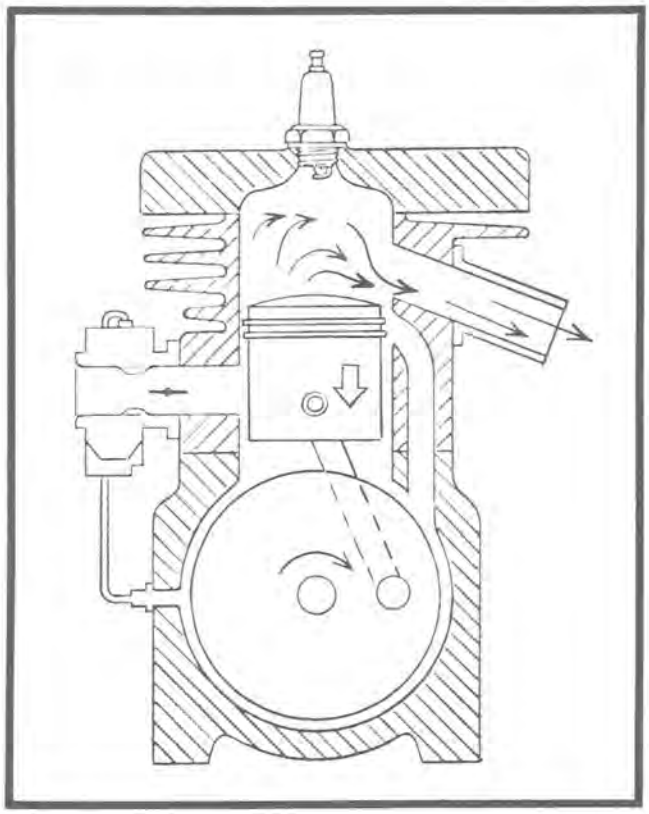


Fig. II-4



The next step, after the fuel/air mixture ignites, is the POWER stroke, Fig. II-3. When the piston starts downward, the burning gases cause maximum combustion pressure on the dome of the piston. This forceful downward pressure is transmitted through the connecting rod and, because of crankshaft design, is changed to radial motion. The force of combustion continues until the piston eventually slides by and uncovers the exhaust port.

The last step of the engine's work cycle (EXHAUST) is the expending of burned gases from the cylinder by way of the exhaust port, Fig. II-4. When the piston slides by and uncovers the exhaust port, most of the exhaust gases are expelled; however, some exhaust gases do remain in the cylinder. Nevertheless, complete exhaust takes place when the piston slides further down the cylinder and uncovers the transfer ports. As a new charge of fuel/air mixture flows into the cylinder by way of the transfer ports, the remaining exhaust gases are forced out of the cylinder. And because the muffler is specially designed to exert a momentary back pressure into the cylinder, the fuel/air mixture remains in the cylinder instead of escaping with the exhaust gases. After this step is completed, the complete five-step "work cycle" is repeated.

In conclusion, two steps of operation occur at the same time; intake and compression/ignition, or exhaust and transfer. All five steps occur during one crankshaft revolution and two strokes of the piston. The fuel/air mixture ignites slightly before the piston reaches top dead center (TDC). After ignition, the fuel/air mixture burns at a controlled rate, rather than exploding instantaneously. The rate by which the fuel/air mixture burns is controlled by the total number of fuel molecules in the mixture. Therefore, the carburetor must be adjusted correctly to ensure optimum engine performance.

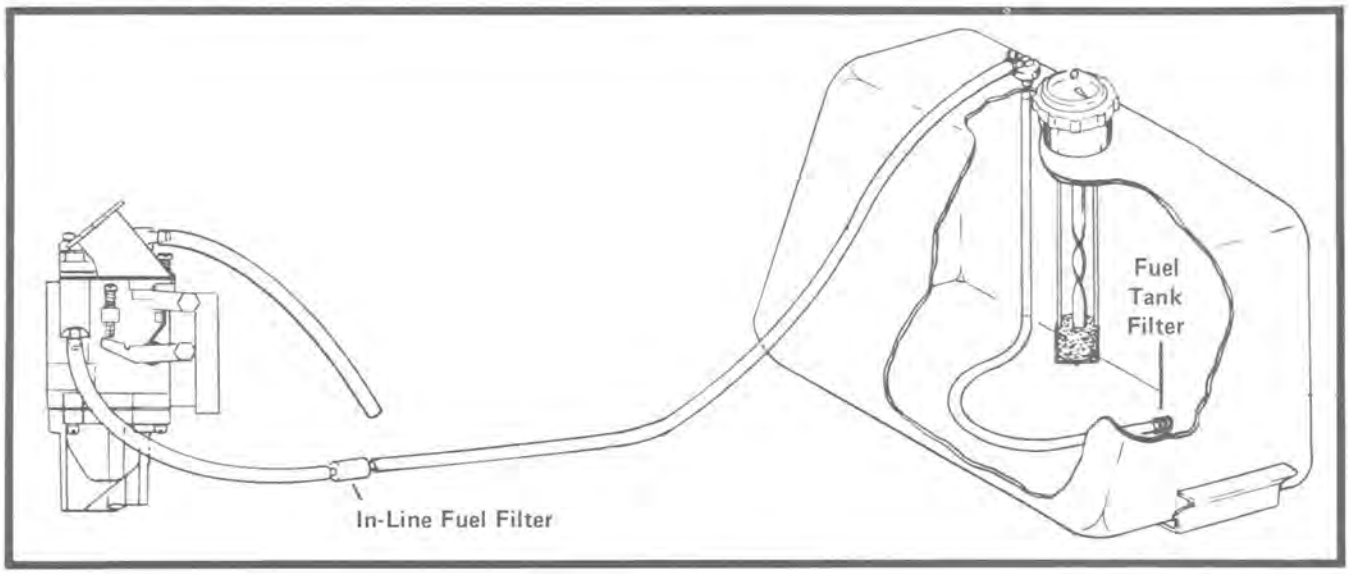
BEFORE TROUBLE SHOOTING ENGINE

Check Fuel Tank Filter

Equipment Necessary: Gasoline, Compressed Air and 12-Inch Piece of Stiff Wire

Inside the fuel tank on the end of the fuel line is a brass screen fuel filter, Fig. II-5. The filter must be clean to allow the fuel line to carry the maximum volume of fuel to the carburetor. If the fuel filter or vent hole in the fuel tank gauge cap is obstructed, fuel flow through the fuel line will be restricted; therefore, the filter must be cleaned.

Fig. II-5



1. If the fuel tank gauge cap vent hole is plugged, remove the obstruction by washing it in gasoline. After cleaning, dry with compressed air.

2. Form a hook on the end of a piece of stiff wire.

3. Insert the hook through the filler hole; then pull the fuel line and filter from within the fuel tank.

4. Examine the fuel filter. If filter is obstructed, clean it by using gasoline. If brass screen or spring is damaged, replace the fuel filter.

CAUTION

Do not clean the fuel filter by scraping it with a wire brush or similar tool because the screen may be damaged. Thus, foreign particles may enter the fuel line and, as a result, cause engine damage.

5. Install filter and fuel level gauge cap.

Check In-Line Fuel Filter

Equipment Necessary: Gasoline

The fuel line has an in-line filter, just before the carburetor fuel inlet fitting, Fig. II-5. The filter must be clean to allow the fuel line to carry the maximum volume of fuel to the carburetor. If the in-line fuel filter is obstructed, fuel flow through the fuel line will be restricted; therefore, the filter must be cleaned.

1. Remove the in-line fuel filter from the fuel line. After filter is removed, plug the fuel line to prevent fuel drainage from the fuel tank.

2. The in-line fuel filter is a unitized component and does not have a replaceable filtering element. Therefore, clean the filter by back-flushing, using gasoline.

3. When the fuel filter is clean, install it in the fuel line. Arrow on filter must point toward the carburetor.

4. Make sure fuel line connections on fuel tank, fuel filter and carburetor fittings are tight. If fuel line is cracked or deteriorated, replacement is necessary.

BEFORE TROUBLE SHOOTING ENGINE

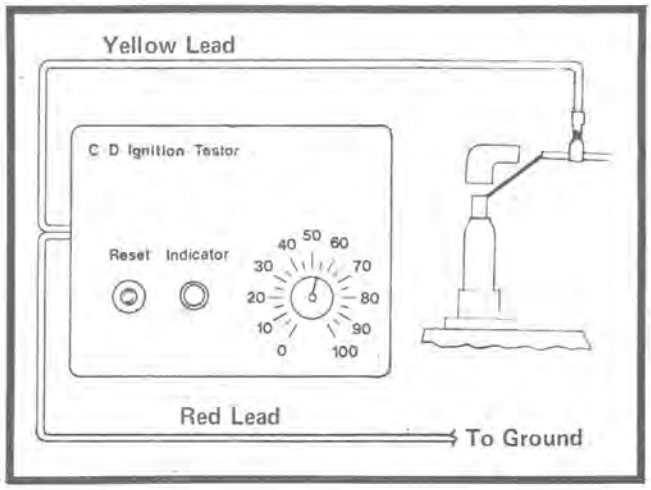
Check High Voltage Output

Equipment Necessary: Electro-Specialties CD Ignition Tester Model 1, New Spark Plugs and 13/16-Inch Spark Plug Socket

1. Remove the spark plug cap from the no. 2 (MAG Side) spark plug. Next, remove the cap from the high tension wire. Finally, connect the high tension wire to the top of the spark plug, using a suitable metal connector.

2. Connect the yellow lead of the CDI tester to the MM-1 secondary output adaptor. Next, connect the MM-1 adaptor to the no. 2 high tension wire, Fig. II-6. Also, connect the red tester lead to a good ground on the snowmobile frame, Fig. II-6. Finally, set tester dial at 55, Fig. II-6.

Fig. II-6



3. Grasp the recoil handle and crank the engine over quickly.

4. If red light on tester illuminates, spark plug and high voltage output is satisfactory. If red light does not illuminate, proceed to step 5.

Note: Press the reset button after the red light on the CDI tester illuminates. Repeat test three times for conclusive results.

5. Remove old spark plug from the no. 2 cylinder (MAG Side); then install a new plug, using a 13/16-inch spark plug socket. Connect the high tension wire to the top of the spark plug, using a suitable metal connector.

6. Connect the MM-1 adaptor to the no. 2 high tension wire. Next, connect the red lead of the CDI tester to a good ground on the snowmobile frame. Finally, set tester dial at 55.

7. Grasp the recoil handle and crank the engine over quickly.

8. If red light on tester illuminates, high voltage output is satisfactory and indicates the old spark plug is defective. However, if red light does not illuminate, the ignition system or main wiring harness may be defective. Therefore, check both the ignition system and main wiring harness to isolate the problem (See: Section IV — Electrical System, Ignition System and Main Wiring Harness Check, page IV-21).

Check Crankshaft Runout

Equipment Necessary: Torque Wrench, Dial Indicator, Clutch Puller (Part No. 0144-104), Cleaning Solvent, Clean Rag, Compressed Air, 10mm Socket, 13/16-Inch Spark Plug Socket and 3-Inch Extension

Note: Maximum crankshaft runout is 0.0012 of an inch.

1. Using the puller, remove the drive clutch from the crankshaft.

2. Clean all dirt, grease and foreign material off end of crankshaft, using cleaning solvent and a clean rag. Dry crankshaft with compressed air.

3. Remove the spark plugs from the cylinder heads, using a 13/16-inch spark plug socket.

4. Remove the three bolts and lock washers holding recoil housing in place, using a 10mm socket and 3-inch extension.

5. Set up dial indicator and place moveable end against outside diameter of crankshaft.

6. Slowly rotate the flywheel while someone watches the dial indicator. Maximum runout must not exceed 0.0012 of an inch. If

BEFORE TROUBLE SHOOTING ENGINE

crankshaft runout exceeds 0.0012 of an inch, the crankshaft is defective and must be replaced. If runout is within 0.0012 of an inch, install the drive clutch, spark plugs and recoil housing.

Note: Tighten the clutch bolt to 55-60 ft-lb, the spark plugs to 20 ft-lb and the recoil bolts to 5 ft-lb.

TROUBLE SHOOTING

Problem	Condition	Remedy
Engine will not start because there is no spark.	1. Ignition switch not ON or malfunctioning.	1. Turn switch ON or replace ignition switch.
	2. Emergency shut-off switch in OFF position or malfunctioning.	2. Move switch to ON or replace the emergency shut-off switch.
	3. Throttle safety switch adjusted incorrectly.	3. Adjust throttle safety switch (cable tension).
	4. Spark plug fouled, oiled or damaged.	4. Replace the spark plug.
	5. RFI suppressor cap damaged, leaking or shorted.	5. Replace RFI suppressor cap.
	6. High tension wire loose, grounded or shorted.	6. Service high tension wire/coils.
	7. Defective CDI box.	7. Replace CDI box.
	8. Defective exciting coil.	8. Replace exciting coil.
	9. Defective pulser coil.	9. Replace pulser coil.
	10. Defective ignition coil.	10. Replace ignition coil.
	11. Improper air gap between exciting coil and pulser coil and the flywheel magnets.	11. Adjust air gap, using the CDI gauge.
	12. Weak flywheel magnets.	12. Replace the flywheel.
Engine will not start because it does not get fuel.	1. Fuel tank empty.	1. Fill fuel tank with fuel.
	2. Cracked, broken or pinched fuel line.	2. Replace the fuel line.
	3. Obstructed or damaged fuel tank filter or in-line filter.	3. Clean or replace fuel tank filter or in-line filter.
	4. Carburetor fuel pump malfunctioning.	4. Service the carburetor.
	5. Impulse line is cracked, broken or pinched.	5. Replace the impulse line.
	6. Carburetor adjusted incorrectly.	6. Adjust the carburetor.

TROUBLE SHOOTING

Problem	Condition	Remedy
Engine will not start because fuel will not ignite.	1. Air leak between carburetor, insulator block or intake manifold.	1. Tighten mounting bolt and nuts, or service the insulator block (sealing surfaces must be flat).
	2. Carburetor fuel and/or air screws adjusted incorrectly.	2. Adjust the carburetor.
	3. Water in the carburetor.	3. Disassemble and clean carburetor.
	4. Engine is flooded.	4. Turn ignition switch OFF, remove spark plug and dry it — crank engine over 5-10 times. Finally, install spark plug and start engine. If engine continues to flood, service the carburetor.
	5. No compression (caused by worn or broken rings, scored piston, hole in piston or damaged cylinder).	5. Check compression and replace worn or damaged parts.
	6. Blown head gasket.	6. Replace head gasket.
Engine will not idle or idle rpm fluctuates.	1. Idle air screw adjusted incorrectly.	1. Adjust idle air screw and idle fuel screw.
	2. Idle fuel screw adjusted incorrectly.	2. Adjust idle fuel screw and idle air screw.
	3. Defective carburetor fuel pump (check valve).	3. Service the fuel pump (check valve).
	4. Tip of idle fuel screw broken off and embedded in the main carburetor body casting.	4. Replace the idle fuel screw and the main carburetor body casting.
	5. Impulse line cracked, kinked or broken.	5. Replace or service the impulse line.

TROUBLE SHOOTING

Problem	Condition	Remedy
Engine develops power loss or runs on one cylinder.	1. Vent hole in fuel tank gauge cap obstructed.	1. Remove obstruction from vent hole by washing in gasoline; then use compressed air to blow out any remaining dirt.
	2. Fouled or defective spark plug(s).	2. Replace the spark plug(s).
	3. Obstruction inside of muffler.	3. Remove obstruction or replace the muffler.
	4. Defective CDI box.	4. Replace CDI box.
	5. Fuel tank filter or in-line filter obstructed.	5. Clean filter or replace filter if it is defective.
	6. Carbon buildup in exhaust port.	6. Clean exhaust port.
	7. Defective pulsing coil.	7. Replace pulsing coil.
	8. Rings worn excessively.	8. Replace the rings.
	9. Crankcase pressure is low.	9. Check for crankcase leaks (end seal, cylinder base gasket or between crankcase halves); then replace seal or gasket, or reseal the crankcase halves.
	10. Hole in top of piston.	10. Replace the piston and any affected component(s). Also, clean crankcase and crankshaft.
	11. Blown head gasket.	11. Replace head gasket.
	12. Broken (shorted) high tension wire.	12. Replace complete ignition coil.
	13. Defective RFI suppressor cap.	13. Replace RFI suppressor cap.
Engine overheats.	1. Excessive carbon deposits in combustion chamber, exhaust port or muffler.	1. Clean affected components.
	2. Stiff rings caused by excessive carbon buildup.	2. Clean or replace rings.
	3. Cooling fins obstructed.	3. Clean cooling fins.
	4. Axial fan damaged, or axial fan belt slipping or broken.	4. Repair or replace axial fan, or replace or adjust axial fan belt.
	5. Spark plug heat range too hot.	5. Install spark plug having lower heat range.
	6. Carburetor adjusted incorrectly.	6. Adjust carburetor (See: Section III — Fuel System, Trouble Shooting).

TROUBLE SHOOTING

Problem	Condition	Remedy
	7. Air leak between carburetor, intake manifold or cylinders.	7. Seal affected component(s).
	8. Drive system (drive clutch, driven pulley, drive belt and track) adjusted, worn or working improperly.	8. Trouble shoot the drive system (See: Section V – Drive System, Trouble Shooting).
	9. Incorrect fuel/oil mixture ratio (too lean).	9. Make sure 20:1 fuel/oil mixture is being used.
Engine backfires or has irregular running condition. **Note: Engine may eventually overheat.**	1. Throttle safety switch adjusted incorrectly.	1. Adjust throttle safety switch (tension throttle wire).
	2. High tension wire sporadically shorting out.	2. Replace complete ignition coil.
	3. Fouled or incorrect spark plug (heat range too hot).	3. Replace spark plug or install spark plug having colder heat range.
	4. Air leak between carburetor and intake manifold.	4. Service the carburetor insulator block to make sure it is not warped.
	5. Air leak between intake manifold and cylinders.	5. Service the intake manifold insulator blocks to make sure they are not warped. Also, install new intake manifold gaskets.
Engine four-cycles.	1. Carburetor adjusted incorrectly.	1. Adjust the carburetor (See: Section III – Fuel System, Trouble Shooting).
	2. Dirt between needle valve and valve seat.	2. Service the carburetor (See: Section III – Fuel System).

TROUBLE SHOOTING

Problem	Condition	Remedy
Engine stops (suddenly) after it has been running.	1. Defective ignition coil.	1. Replace ignition coil.
	2. Obstructed fuel tank or in-line fuel filter.	2. Clean or replace filter(s).
	3. Fuel line obstructed or pinched.	3. Remove obstruction or get pinched area out of fuel line.
	4. Defective CDI box.	4. Replace CDI box.
	5. Spark plug bridged.	5. Replace spark plug.
	6. Seized piston(s).	6. Replace piston and any affected components.
	7. Seized crankshaft.	7. Replace crankshaft and any affected components.
	8. Defective exciting coil.	8. Replace exciting coil.
	9. Defective pulsing coil.	9. Replace pulsing coil.
Engine stops (gradually) after it has been running.	1. Obstructed fuel tank or in-line fuel filter.	1. Clean or replace filters.
	2. Fuel line obstructed or pinched.	2. Remove obstruction or get pinched area out of fuel line.
	3. Head gasket gradually burning away.	3. Replace head gasket.
	4. Cylinder head gradually loosening.	4. Tighten cylinder head nuts to correct torque value (16-18 ft-lb).
	5. Spark plug(s) gradually loosening.	5. Tighten spark plugs to correct torque value (18-20 ft-lb).

ENGINE REMOVAL

General

To improve clarity, the engine is shown removed from the snowmobile chassis, even though many service procedures may be performed with the engine mounted in the chassis. However, a major service procedure usually can be accomplished more efficiently if the engine is removed from the snowmobile chassis.

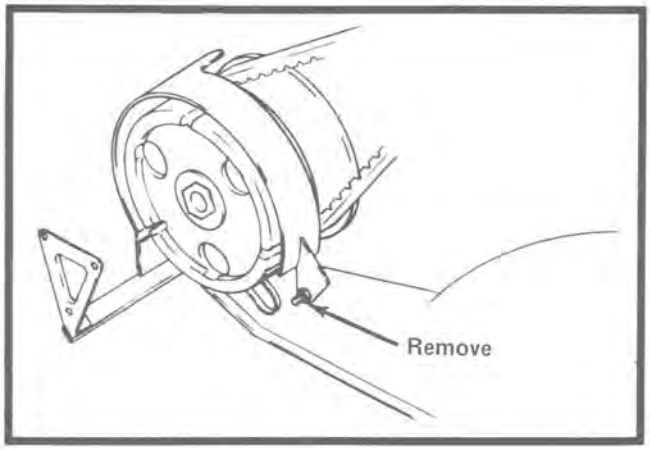
Note: When removing the engine from the snowmobile chassis, keep all hardware together.

Remove Engine from Snowmobile Chassis

Equipment Necessary: 1/2-Inch Socket, 9/16-Inch Socket, 7/16-Inch Open End Wrench, 10mm Socket, 3-Inch Extension, Screwdriver Having a 1/4-Inch Blade and 12-Inch Extension

1. Remove the lock nut holding clutch guard to side of front end assembly, Fig. II-7, using a 1/2-inch socket.

Fig. II-7



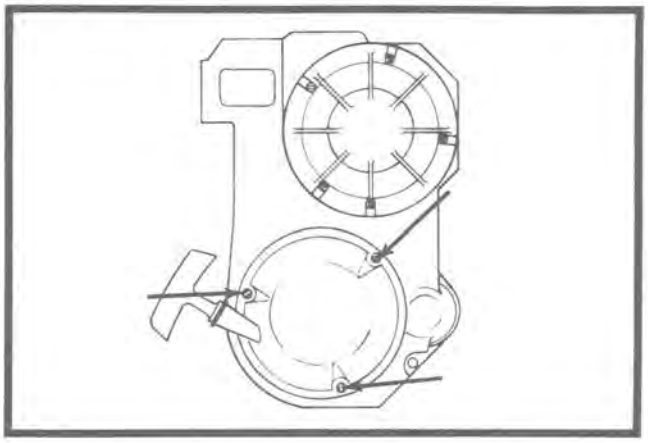
Note: Remove the two retaining pins and remove guard on 1975 models.

2. Also, remove the two lock nuts holding front of clutch guard to front end assembly, using a 7/16-inch open end wrench.

3. Remove the drive belt from the driven pulley and drive clutch.

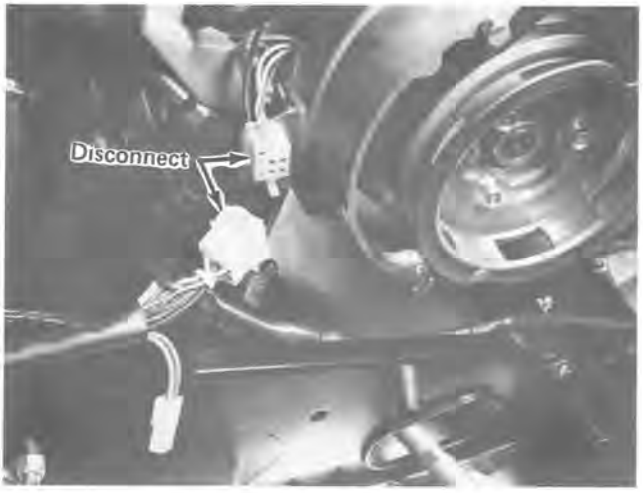
4. Remove two of the three slotted hex head bolts and lock washers holding the recoil starter against the fan housing, Fig. II-8, using a 10mm socket and 3-inch extension. Before removing the last hex head bolt and lock washer, grasp the recoil starter to prevent a sudden retraction toward the recoil handle mounting bracket.

Fig. II-8



5. Disconnect the main wiring harness connector from the engine connector by pressing the engine connector tabs together; then pull connector apart, Fig. II-9.

Fig. II-9

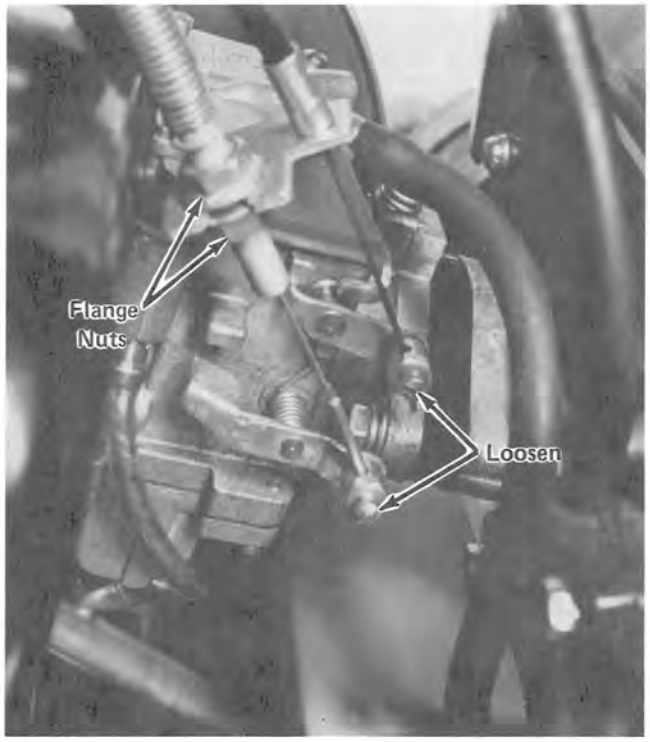


6. Loosen the two screws holding the choke wire and throttle wire to their respective carburetor controls, Fig. II-10, using a screwdriver having a 1/4-inch blade.

7. Loosen the two throttle cable flange nuts from the mounting bracket on the carburetor, Fig. II-10, using two 1/2-inch open end wrenches. Now, slide throttle cable to the side.

ENGINE REMOVAL

Fig. II-10



8. Remove the choke cable from the mounting bracket on the carburetor by sliding the E-ring off the bottom of the metal portion of the cable, Fig. II-11, using a screwdriver having a 1/4-inch blade. Also, move the choke cable to the side.

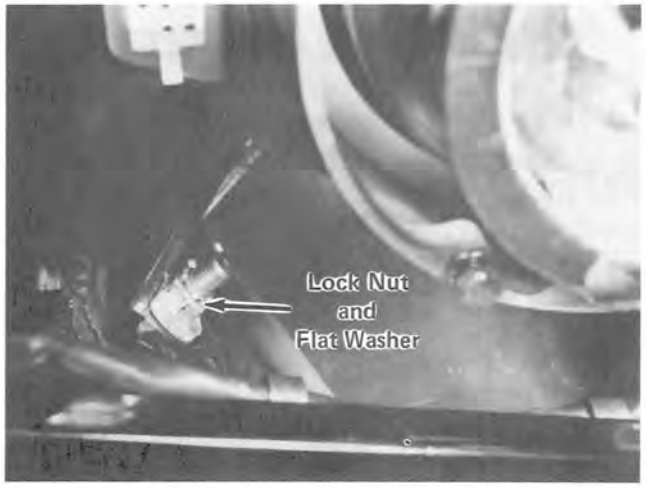
Fig. II-11

9. Carefully pull the fuel line off of the carburetor inlet fitting, Fig. II-11; then, quickly plug the end of the fuel line to prevent unnecessary fuel drainage from the fuel tank. After plugging the fuel line, lay it down.

10. Remove the slotted hex head cap screws, lock washers and flat washers holding the air silencer against the carburetor, using a 7/16-inch socket. After cap screws are removed, slide air silencer away from carburetor and set it aside.

11. Loosen back of motor plate by removing the two lock nuts and flat washers from the top of the two rear motor mounts, Fig. II-12, using a 9/16-inch socket.

Fig. II-12



12. Loosen front of motor plate by removing the two lock nuts and flat washers from the top of the two front motor mounts, Fig. II-13, using a 9/16-inch socket and 12-inch extension.

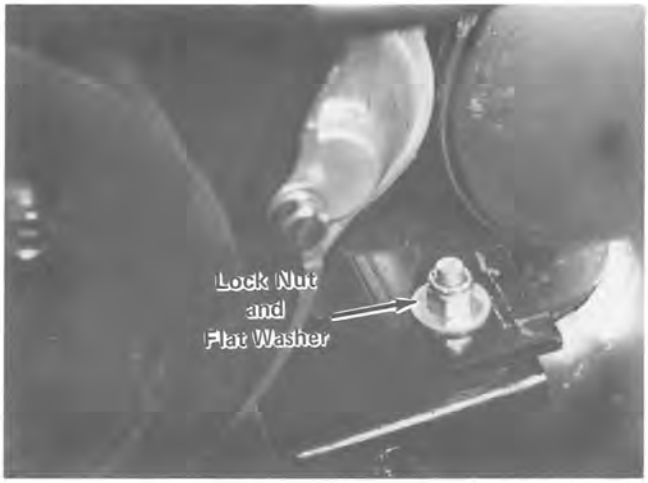
Note: If the engine is equipped with an electric starter, the solenoid is usually mounted on the right front motor mount.

13. Disconnect the black cable from the starter motor by removing the nut and lock washer holding the cable on the terminal, using a 10mm socket. Now, move the solenoid to the right side of the belly pan.

14. Lift the engine out of the chassis and set the engine on a workbench.

ENGINE REMOVAL

Fig. II-13



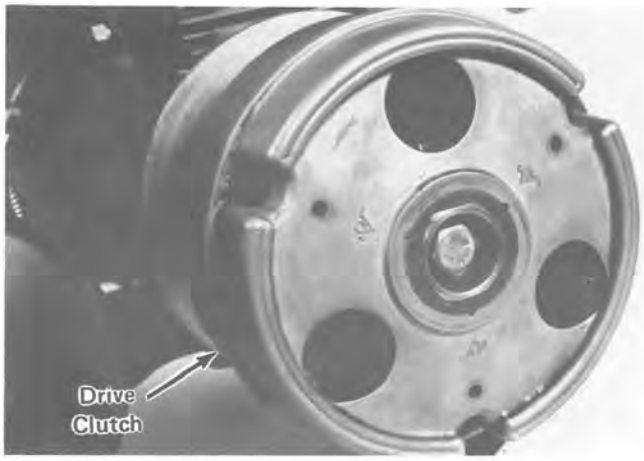
ENGINE SERVICING (DISASSEMBLY)

Remove External Components

Equipment Necessary: Clutch Puller (Part No. 0144-104), Air Impact Wrench, Amp Terminal Extractor (Part No. 0144-100), Screwdriver Having a 5/16-Inch Blade, 9/32-Inch Open End Wrench, 3/8-Inch Hex Key Wrench, 10mm Socket, 13mm Socket, 9/16-Inch Open End Wrench, 9/16-Inch Socket, 3/4-Inch Socket, 3-Inch Extension and 12-Inch Extension

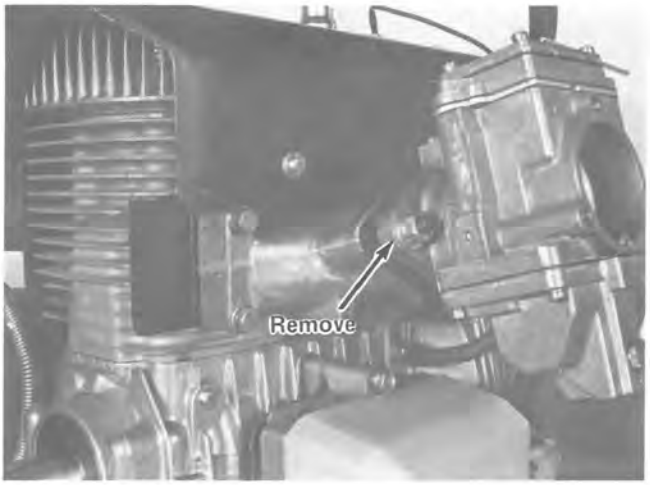
1. Remove drive clutch from crankshaft, Fig. II-14, using air impact wrench, clutch puller and 3/4-inch socket.

Fig. II-14



2. Remove impulse line from crankcase fitting, Fig. II-15. Next, disassemble carburetor from intake manifold by removing the two nuts, flat washers and lock washers, Fig. II-15, using a 12mm open end wrench. Finally, slide gaskets, insulators and bushings off intake studs.

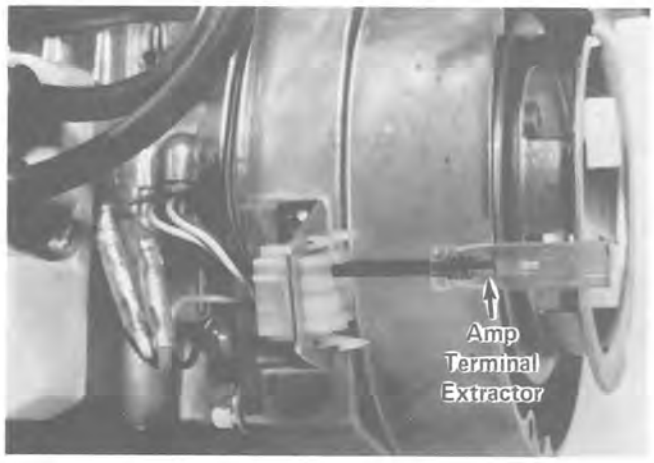
Fig. II-15



3. Disconnect high tension wires from spark plugs. Also, remove heat sensor wire from the engine connector, using the amp terminal extractor, Fig. II-16.

ENGINE SERVICING (DISASSEMBLY)

Fig. II-16



4. Remove heat sensor from cylinder head, using a 9/32-inch open end wrench.

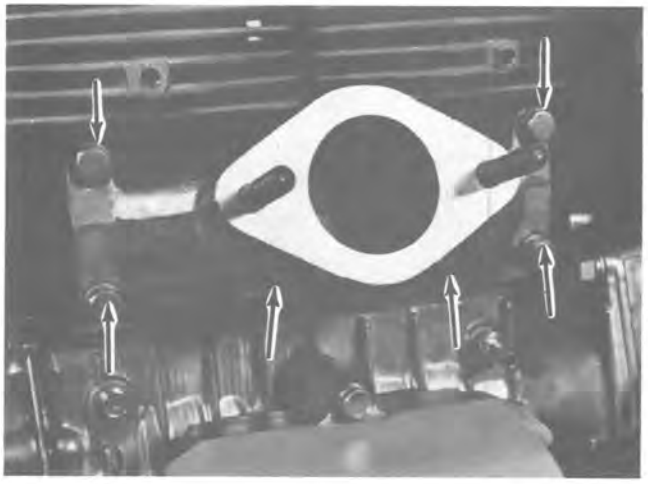
5. Remove the eleven screws, lock washers and flat washers holding top cover, Fig. II-17, intake cover and exhaust cover on cylinders, using a screwdriver having a 5/16-inch blade. In addition, remove cap screw, lock washer and flat washer holding the high tension wire clamp and top cover to the fan housing, Fig. II-17, using a 10mm socket. Top cover can then be removed from cylinder heads.

Fig. II-17

6. Remove the six cap screws, lock washers and flat washers holding intake manifold against cylinders, Fig. II-18, using a 10mm socket and 3-inch extension. The intake manifold, gaskets, insulator blocks and cylinder cover can now be removed.

Note: Use steps 7, 8 and 10 if engine must be disassembled completely. If only top end maintenance will be performed, use steps 7, 9 and 10.

Fig. II-18

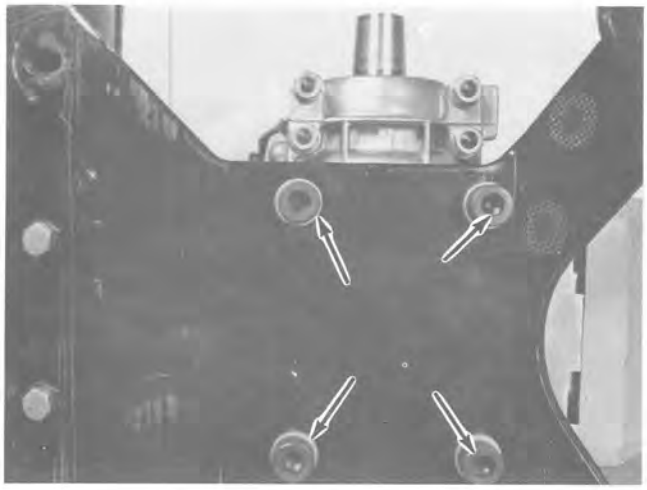


7. Remove the four brass nuts and lock washers holding exhaust manifold on cylinder, Fig. II-19, using a 13mm socket and 12-inch extension.

Fig. II-19

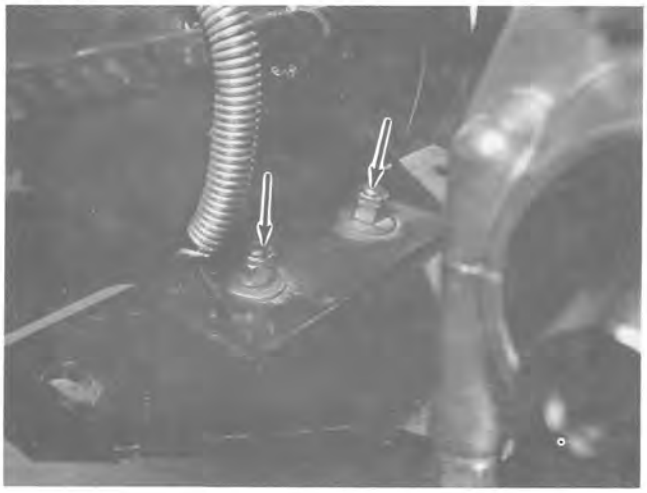
8. Remove the four socket head screws and lock washers holding motor plate on bottom of crankcase, Fig. II-20, using a 3/8-inch hex key socket. Now, slide motor plate and complete exhaust system, including the manifold, off exhaust studs; then set complete assembly aside.

Fig. II-20



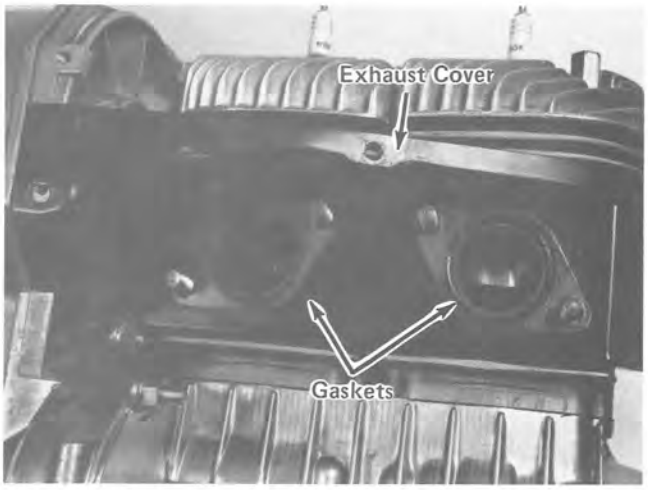
9. Loosen muffler bracket from motor plate by removing the two cap screws, flat washers and lock nuts, Fig. II-21, using a 9/16-inch open end wrench and 9/16-inch socket. Next, pull muffler away from exhaust manifold.

Fig. II-21



10. Slide exhaust cover and gaskets off exhaust studs, Fig. II-22.

Fig. II-22

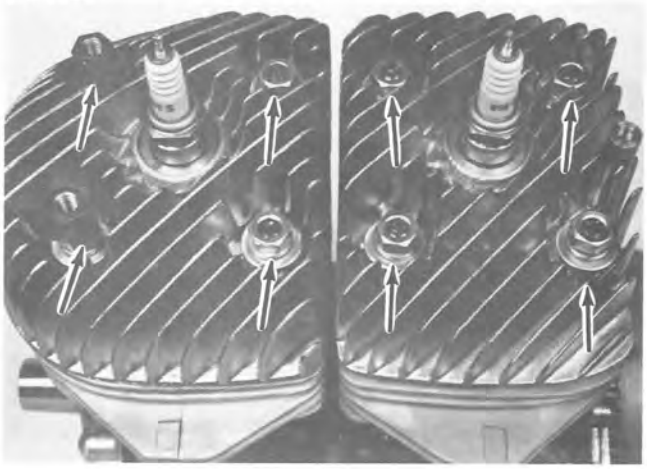


Remove Cylinder Heads

Equipment Necessary: Needle-Nose Pliers, Piston Pin Puller w/Small Retainer Piece (Part No. 0144-003), 13mm Socket and 3-Inch Extension

1. Remove the eight nuts, lock washers and flat washers holding cylinder heads on cylinders, Fig. II-23, using a 13mm socket and 3-inch extension. Carefully lift cylinder heads and head gaskets off cylinder studs.

Fig. II-23



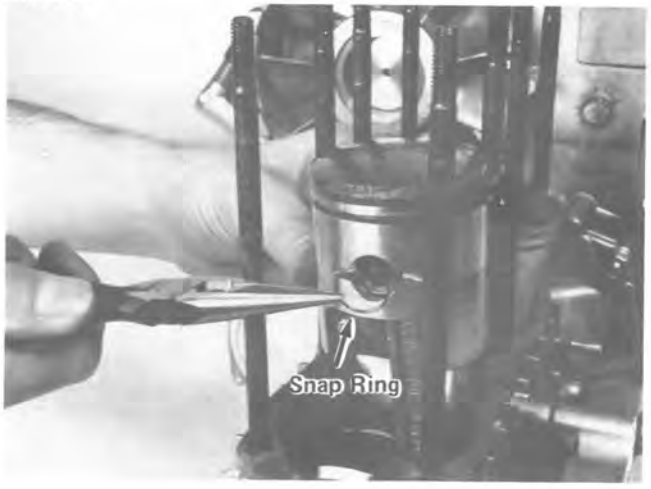
2. Carefully lift cylinders off cylinder studs, Fig. II-24. Slide both cylinder base gaskets off cylinder studs, Fig. II-24.

ENGINE SERVICING (DISASSEMBLY)

Fig. II-24

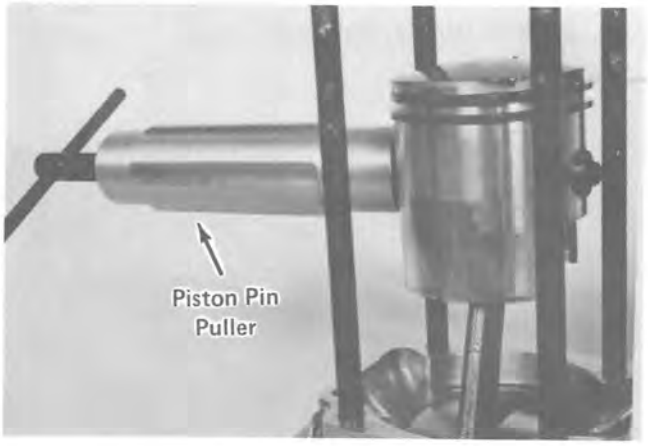
3. Remove outside snap ring retaining piston pin to PTO side piston, Fig. II-25, using a needle-nose pliers.

Fig. II-25



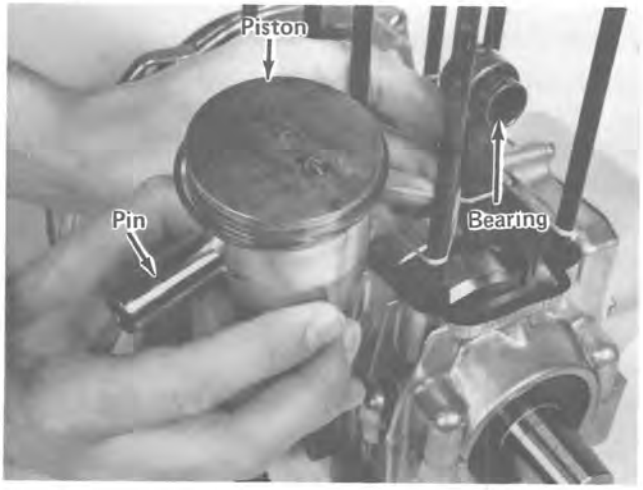
4. Install piston pin puller from PTO side; then remove piston pin, Fig. II-26.

Fig. II-26



5. After piston pin is removed, set piston and piston pin aside with the matching cylinders. Next, remove needle bearing from small end of the connecting rod. Keep piston, piston pin and needle bearing together, Fig. II-27, because the components have a definite wear-in characteristic.

Fig. II-27



CAUTION

If cylinder, piston, piston pin and needle bearing are not kept together as a set, severe engine damage will result.

6. Remove PTO side snap ring retaining piston pin in MAG side piston, using a needle-nose pliers.

7. Install piston pin puller from PTO side and remove piston pin.

8. After piston pin is removed, set piston and piston pin aside with the matching cylinders. Next, remove needle bearing from small end of connecting rod. Keep piston, piston pin and needle bearing together because the components have a definite wear-in characteristic.

ENGINE SERVICING (DISASSEMBLY)

CAUTION

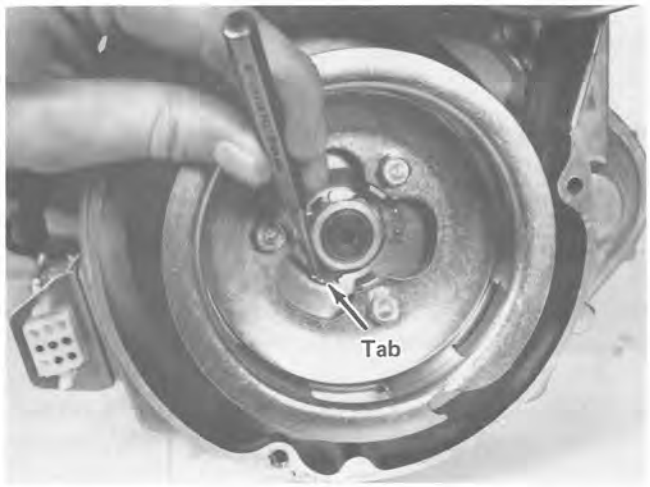
If cylinder, piston, piston pin and needle bearing are not kept together as a set, severe engine damage will result.

Remove Fan Housing and Flywheel

Equipment Necessary: Hammer, Fan Holder (Part No. 0144-004), 1/4 x 3/32-Inch Pin Punch, 10mm Socket, 13mm Open End Wrench, 13mm Socket, 24mm Socket and 3-Inch Extension

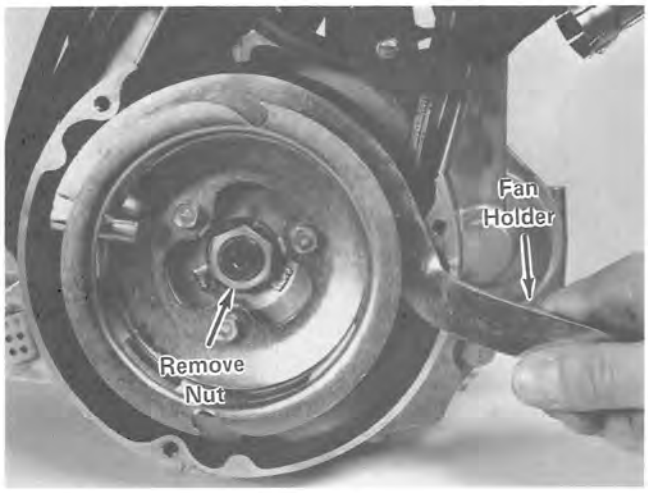
1. Drive the two locking tabs away from nut holding drive pulley and flywheel on crankshaft, using a hammer and 1/4 x 3/32-inch pin punch, Fig. II-28. Make sure locking tabs are driven against fan drive pulley.

Fig. II-28



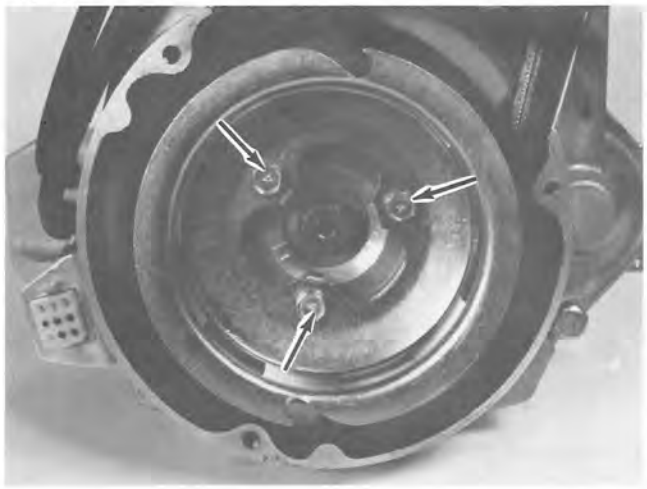
2. Remove nut and locking tab washer holding fan drive pulley and flywheel on crankshaft, using fan holder, Fig. II-29, air impact wrench and 24mm socket.

Fig. II-29



3. Disassemble auxiliary starting pulley and fan drive pulley from flywheel by removing the three bolts and lock washers, Fig. II-30, using an air impact wrench, 10mm socket and 3-inch extension.

Fig. II-30



4. Remove both the auxiliary starting pulley and fan drive pulley, Fig. II-31.

Fig. II-31

5. Remove the four nuts, lock washers and flat washers holding fan housing against crankcase, Fig. II-32, using an air impact wrench and 13mm socket. Also, remove the bolt, two flat washers, lock washer and nut at base of electric start mount, Fig. II-32, using an air impact wrench, 13mm wrench and 13mm socket.

Note: If engine is equipped with an electric starter, remove the nut, lock washer and flat washer holding top of starter motor. In addition, remove the two bolts, lock washers and flat washers holding starter motor bracket on crankcase, using a 10mm socket.

Fig. II-32

6. Squeeze engine connector locking tabs together, using thumb and forefinger. Then slide connector out of connector bracket.

7. Pull fan housing away from crankcase.

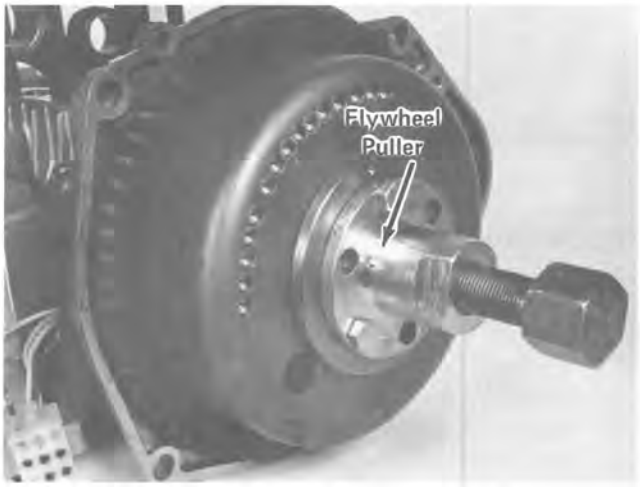
8. Disassemble axial fan only if there is reason to do so (See: Disassemble Axial Fan, page II-). If axial fan disassembly is not required, remove the flywheel (See: Remove Flywheel and Loosen Magneto Assembly, page II-23).

Remove Flywheel and Loosen Magneto Assembly

Equipment Necessary: Flywheel Puller w/6 x 18mm Bolts (Part No. 0144-064), Hammer, Side Cutter, Screwdriver Having a 5/16-Inch Blade, 1-1/16 Inch Open End Wrench, 10mm Socket and 1-1/16 Inch Socket

1. Install flywheel puller against flywheel with the 6 x 18mm bolts, Fig. II-33, using an air impact wrench and 10mm socket.

Fig. II-33



2 Holding flywheel puller with a 1-1/16 inch open end wrench, tighten flywheel puller bolt, using a 1-1/16 inch socket. When puller bolt is tight, hit head of puller bolt with hammer; flywheel will break away from the crankshaft taper. Then slide flywheel off crankshaft and remove puller from flywheel. Lay flywheel aside, making sure magnets face upward.

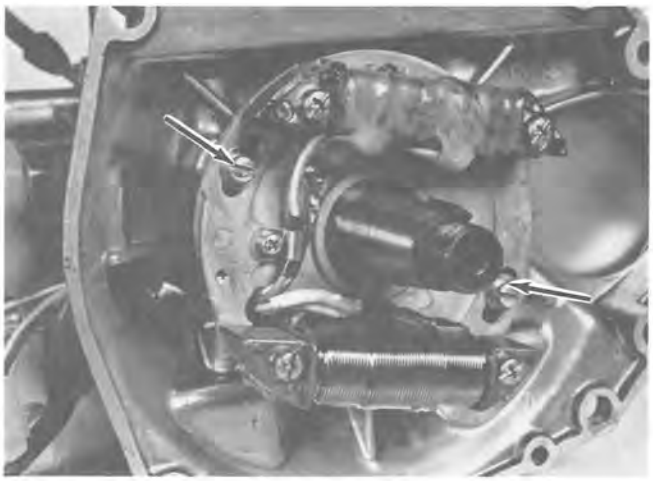
CAUTION

Always lay flywheel on a clean, dry area of the work bench. Damage may result if dirt and other foreign particles come in contact with flywheel, especially the magnets.

3. Remove woodruff key from keyway in crankshaft, Fig. II-34, using a side cutter.

4. Free the magneto base plate from crankcase by removing the two screws, lock washers and flat washers, Fig. II-34, using a screwdriver having a 5/16-inch blade.

Fig. II-34

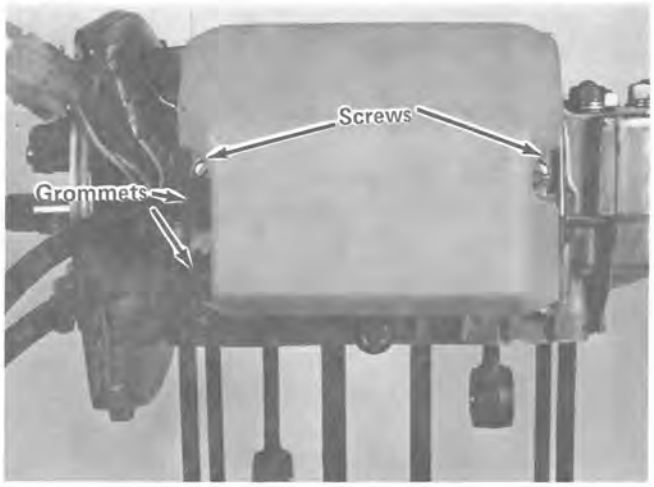


Remove External Coil Cover and Bracket

Equipment Necessary: Screwdriver Having a 5/16-Inch Blade, 10mm Socket and 3-Inch Extension

1. Remove the two rubber sealing grommets from coil cover, Fig. II-35. Then slide both grommets approximately 10 inches up the high tension wires.

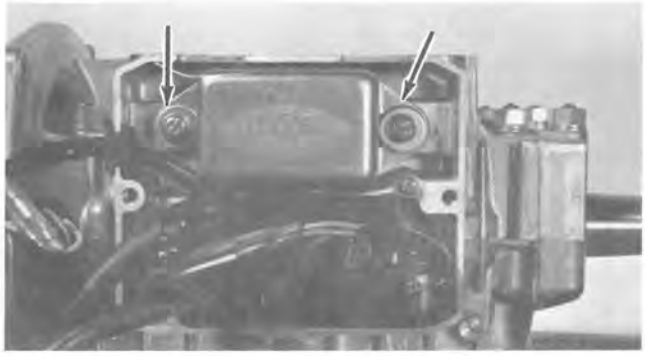
Fig. II-35



2. Remove the two screws, lock washers and flat washers holding coil cover against coil bracket, Fig. II-35, using a screwdriver having a 5/16-inch blade. Also, slide cover up high tension wires to gain access to remaining components.

3. Remove the two screws, lock washers and flat washers holding CDI box against coil bracket, Fig. II-36, using a screwdriver having a 5/16-inch blade.

Fig. II-36



4. Remove the bolt, lock washer and flat washer located under CDI box, Fig. II-37, using a 10mm socket and 3-inch extension.

Fig. II-37

5. Remove the bolt, lock washer, flat washer and fiber packing holding top of coil bracket to crankcase, using a 10mm socket and 3-inch extension.

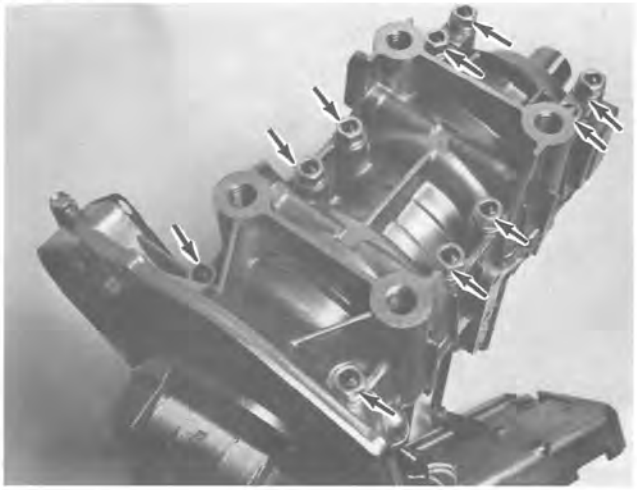
Split Crankcase and Remove Crankshaft

Equipment Necessary: Rubber Mallet, 13mm Socket and 3-Inch Extension

1. Set engine on cylinder studs. Also, remove the ten nuts, lock washers and flat washers holding crankcase halves together, Fig. II-38,

using an air impact wrench, 3-inch extension and 13mm socket.

Fig. II-38

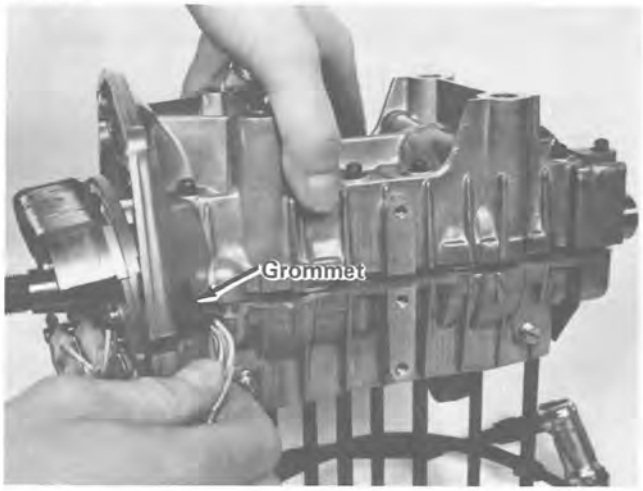


2. Hit short center studs on bottom of crankcase until the two halves split, using a rubber mallet.

3. When crankcase is partially split, remove the rubber grommet from between crankcase halves, Fig. II-39. Set complete magneto base plate assembly and external coil aside.

4. Completely split the crankcase.

Fig. II-39

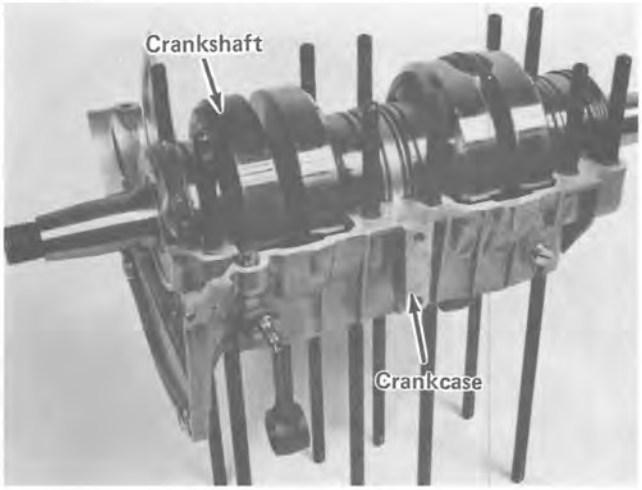


CAUTION

DO NOT use a screwdriver or similar tool to pry crankcase halves apart. Doing so will damage sealing surface of crankcase halves.

5. Remove crankshaft from crankcase, Fig. II-40.

Fig. II-40



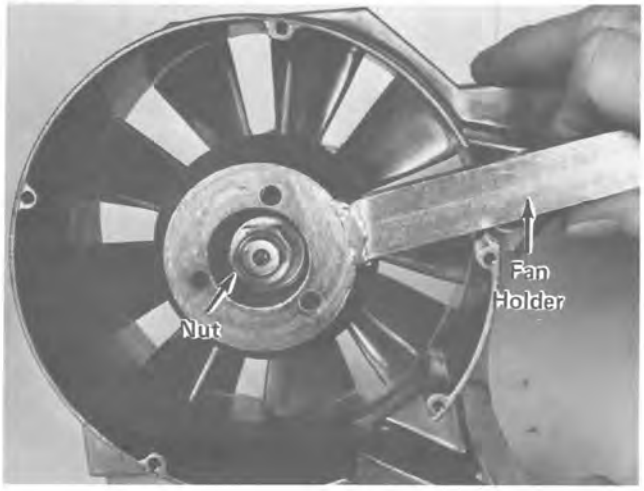
Disassemble Axial Fan

Equipment Necessary: Fan Holder (Part No. 0144-004), Rubber Mallet, Side Cutter, Hammer, Snap Ring Pliers, Screwdriver Having a 1/4-Inch Blade, 1/4 x 3/32-Inch Pin Punch and 19mm Socket

1. Remove five screws, lock washers and flat washers holding fan cover on fan housing. Remove fan belt.

2. Hold the axial fan pulley in place, using the fan holder (part no. 0144-004), Fig. II-41; then remove the nut and lock washer holding the pulley on the axial fan shaft, using a 19mm socket.

Fig. II-41

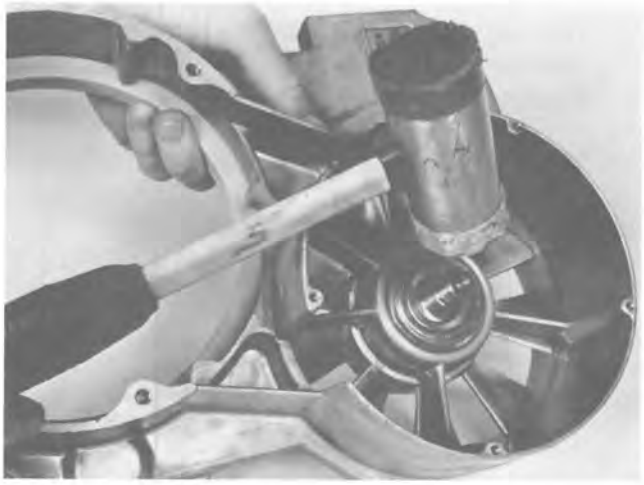


3. Slide the pulley sheaves and spacer washers off the axial fan shaft, Fig. II-42; then remove woodruff key from shaft, using a side cutter.

Fig. II-42

4. Remove the axial fan from the fan housing by hitting the fan shaft with a rubber mallet, Fig. II-43. The shaft must be driven completely through the bearings that retain the axial fan shaft in place.

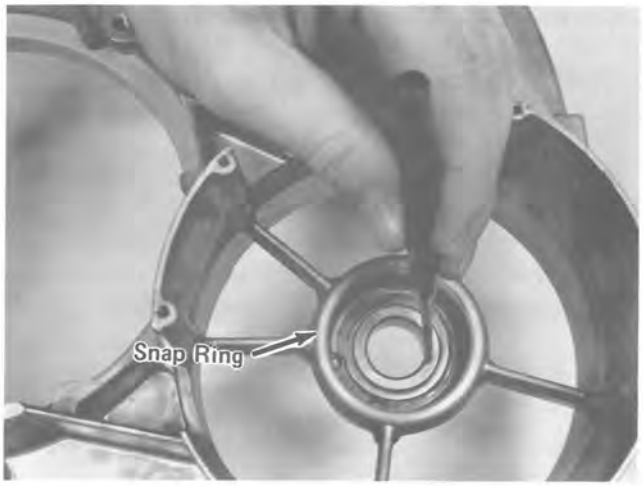
Fig. II-43



5. After the fan is removed, drive the bearing out of the bore in the fan housing, using a hammer and a 1/4 x 32/32-inch pin punch, Fig. II-44. Make sure to account for the spacer washers positioned between the two bearings. Remove remaining bearing, using a hammer and a 1/4 x 3/32-inch pin punch, Fig. II-45.

Fig. II-44

Fig. II-45



6. Remove the snap ring from the groove in the bore of the fan housing, Fig. II-45, using a snap ring pliers.

7. If required, remove the three screws and rectangular washers holding the plastic ring, using a screwdriver having a 1/4-inch blade.

TOP AND BOTTOM END FAILURES

Excessive heat in the combustion chamber is caused by incorrect ignition timing, a lean fuel mixture or spark plugs having a heat range that is too hot. Too much heat in the combustion chamber eventually contributes to piston, cylinder and cylinder head failures. Therefore, when servicing an engine, check the condition of these components to better evaluate the operating characteristics of the engine.

Piston Seizure

When a piston becomes excessively hot, it will start to melt and eventually seize to the cylinder wall. The exhaust port side of the cylinder and piston will show signs of scuffing and melting. Another component, the cylinder head, will have aluminum deposits embedded on its inside surface due to excessive combustion chamber temperatures which cause the aluminum to begin to melt.

Piston Dome Burn-Out

A hole in the dome of the piston is usually caused by a spark plug having too hot a heat range, or incorrect ignition timing. Therefore, if the engine is not timed correctly, detonation results and eventually causes a complete burn-out (hole) in the piston dome.

Piston Ring Damage (Breakage)

Again, as in piston seizure and piston dome burn-out, piston ring breakage is caused by excessive heat buildup in the combustion chamber. Close examination of the piston pin will show a blue/black color, also caused by too much heat. The consequences of excessive heat are usually that a portion of the piston breaks off and, later, causes the ring(s) to break. The piston, ring(s), cylinder and cylinder head will be damaged, and, also, in many cases, metal filings may get into the crankshaft bearings or big end rod bearings. If the big end rod bearing is damaged, the bottom of the webbs and connecting rod usually are scuffed severely. The bearing mount surfaces in the crankcase halves also may show signs of scuffing.

INSPECTING & CLEANING COMPONENTS

Inspect and Clean Cylinder Head

Equipment Necessary: Nonferrous Carbon Scraper, Cleaning Solvent, Compressed Air and Surface Plate

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

1. Remove major carbon deposits from the inside of the cylinder head, using a nonferrous carbon scraper.

CAUTION

Be careful when scraping carbon out of the cylinder head. Accidental damage to the sealing surface of the cylinder head will decrease engine performance and may cause an engine failure.

2. Wash the cylinder head in cleaning solvent; when it is clean, dry it with compressed air.

3. Inspect the inside surface of the cylinder head for embedded aluminum deposits and other noticeable damage.

4. Lay the sealing surface of the cylinder head on a surface plate. There is to be no distortion of the sealing surface (no clearance between the cylinder head sealing surface and the surface plate).

Inspect and Clean Cylinder

Equipment Necessary: Nonferrous Carbon Scraper, Cleaning Solvent, Compressed Air and Surface Plate

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

INSPECTING & CLEANING COMPONENTS

1. Remove major carbon deposits from the exhaust port, using a nonferrous carbon scraper.

> **CAUTION**
> **Be careful when scraping carbon out of the exhaust port. Accidental damage to the exhaust port or cylinder will decrease engine performance and eventually cause an engine failure.**

2. Carefully wash the cylinder in cleaning solvent; when it is clean, dry it with compressed air.

3. Inspect the inside surface of the cylinder for damage of any kind (port edge not smooth or chrome damage).

4. Lay the top sealing surface of the cylinder on a surface plate. There is to be no distortion of the sealing surface (no clearance between the cylinder sealing surface and the surface plate).

Inspect and Clean Crankcase

Equipment Necessary: Cleaning Solvent, Compressed Air

1. Wash the crankcase halves in cleaning solvent; when the halves are clean, dry them with compressed air.

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

> **CAUTION**
> **The crankcase halves must mate uniformly to form a sealed unit. If the halves do not seal, the engine will not perform at optimum levels.**

Inspect and Clean Crankshaft and Related Parts

Equipment Necessary: Cleaning Solvent, Compressed Air

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

1. Inspect the oil seals for wear, cracks, rubber deterioration, cuts or damaged spring. If condition of seal is doubtful, replace the seal. Also, check the washers for damage.

2. Wash the crankshaft in cleaning solvent; when it is clean, dry it with compressed air.

3. Inspect the keyway for rough edges and examine the external threaded end of the crankshaft for wear, scoring or damaged threads.

4. Inspect the taper on both ends of the crankshaft for scratches, wear or scoring and, also, examine the internal threads on the PTO end for damage.

5. Inspect the crankshaft main bearings for external wear, scoring or scuffing, and for free rotation. If the condition of the bearings is doubtful, replacement is necessary (See: Removing Main Bearings, page II-32).

Note: Only the outside main bearings on the crankshaft are replaceable. If the two inside main bearings are damaged, the crankshaft must be replaced.

6. Check the center seal dowel pin and the two "O" rings for damage.

7. Inspect the connecting rods small end needle bearings for wear, scoring, other damage and for free bearing rotation. If the condition of the bearing is doubtful, it must be replaced. A complete piston pin set, not just a new needle bearing, is to be used. The piston pin set includes a piston pin and needle bearing.

Inspect and Clean Piston

Equipment Necessary: Nonferrous Carbon Scraper, Ring Groove Cleaner, Cleaning Solvent and Compressed Air

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

1. Examine the piston dome for carbon buildup and for carbon that may have washed off the dome. If the piston dome is "washed off" in

INSPECTING & CLEANING COMPONENTS

any area, the cause is fuel "blow-by" during the compression/ignition stroke. Contributing to the "blow-by" are two main deficiencies: (1) a cylinder that is not cylindrical (out of round); and (2) piston rings that are worn excessively.

2. After examining the piston dome, scrape off the major carbon buildup, using a nonferrous carbon scraper.

3. After removing the piston rings, clean the ring grooves, using a ring groove cleaner or section of a ring.

CAUTION

Be careful when scraping carbon off the piston dome and from within the piston ring grooves. Accidental damage to the piston will decrease engine performance and may cause an engine failure.

4. Wash the piston in cleaning solvent; when it is clean, dry it with compressed air.

5. Inspect the piston for corrosion, pitting or scoring.

Inspect Axial Fan and Belt

Equipment Necessary: Cleaning Solvent, Compressed Air

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

1. Wash the axial fan in cleaning solvent; when it is clean, dry it with compressed air.

2. Inspect the axial fan for cracks, broken blades or nicks in the blades. If only a blade is nicked, it can be repaired by smoothing off the rough edges, using a file having fine serrations.

3. Inspect the keyway in the axial fan shaft for rough edges and examine the threaded end of the shaft for wear, scoring and damaged threads.

4. Inspect the axial fan bearings for external wear, scoring or scuffing, and free rotation.

5. Inspect the two axial fan sheaves for excessive wear.

6. Examine the axial fan belt. Replace the belt if it is frayed, cracked, stretched excessively or has deteriorated in any way.

7. Inspect the axial fan bore in the fan housing for scuffing and any other noticeable damage.

MEASURING CRITICAL COMPONENTS

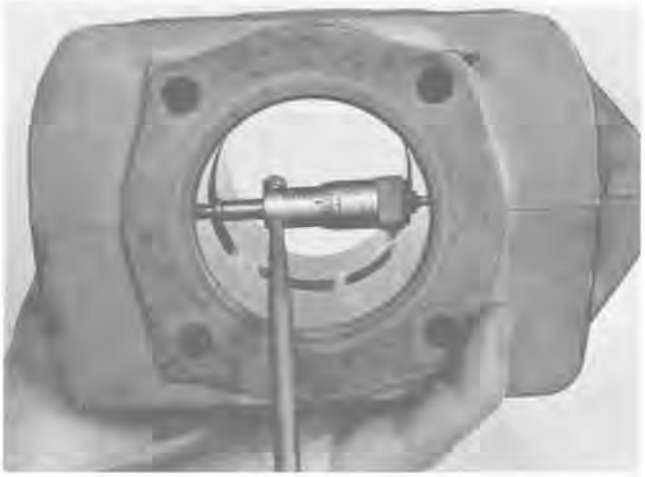
Check Cylinder Wear

Equipment Necessary: Inside Micrometer

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

1. Insert an inside micrometer approximately 3/8 inch below the top of the cylinder bore, Fig. II-46, and take two measurements (front to back, side to side). Micrometer reading must be between 2.3622-2.3681 inches for the 340cc engine and be between 2.6772-2.6831 inches for the 440cc engine. The two measurements must not vary by more than 0.0020 of an inch.

Fig. II-46



2. Next, take two measurements (front to back, side to side) just above the intake port, using an inside micrometer. Micrometer reading must be 2.3622-2.3681 inches for the 340cc engine and 2.6772-2.6831 inches for the 440cc engine. The two measurements must not vary by more than 0.0020 of an inch.

Note: Compare the measurement obtained in step 1 and step 2. If the measurements vary by more than 0.0020 of an inch, the cylinder must be replaced.

Check Piston Skirt/Cylinder Clearance

Equipment Necessary: Inside Micrometer, 3-Inch Outside Micrometer

1. Insert an inside micrometer approximately 1/4 inch into the bottom of the cylinder bore, Fig. II-47. Measurement must be taken from front to back (intake to exhaust) at bottom of cylinder. Micrometer reading must be 2.3622-2.3681 inches for the 340cc engine and 2.6772-2.6831 for the 440cc engine. Record this measurement.

Note: If the 340cc cylinder bore (2.3622-2.3681 inches) or the 440cc cylinder bore (2.6772-2.6831) exceeds the specified tolerance, the cylinder must be replaced.

Fig. II-47

2. Measure the piston 1/4 inch above the bottom of the piston skirt, using a 3-inch outside micrometer, Fig. II-48. Record this reading.

Fig. II-48

3. Subtract the piston skirt measurement (step 2) from the cylinder bore measurement (step 1). The difference between the two measurements must fall between 0.0008-0.0020 of an inch. If piston skirt/cylinder clearance exceeds 0.0020 of an inch, there is excessive clearance and the problem must be corrected before the engine is assembled.

Note: If the 340cc cylinder bore (2.3622-2.3681 inches) or the 440cc cylinder bore (2.6772-2.6831) is within the specified tolerance range, and the piston skirt/cylinder clearance exceeds 0.0020 of an inch, the piston must be replaced. Whenever replacing a piston, a new piston pin and needle bearing must also be installed.

Check Piston Ring Groove and Ring Slide Clearance

Equipment Necessary: 1-Inch Outside Micrometer, Straight Edge and Feeler Gauge

1. Remove rings from piston ring grooves. Also, clean carbon deposits from the ring grooves, using a piece of broken ring or a thin carbon scraper.

2. Measure the thickness at the ends and center arc of the top and bottom rings, Fig. II-49, using a 1-inch outside micrometer. Thickness of top and bottom rings, Fig. II-50, for both the 340cc engine and 440cc engine must be 0.0775-0.0787 of an inch. If the thickness of the ring is not as specified however, the ring is not within tolerance and a new ring set must be installed.

MEASURING CRITICAL COMPONENTS

Note: After measuring the thickness of the rings, the width of the top and bottom rings must also be checked, Fig. II-51. Use step 3 to check the width of the 340cc engine rings and step 4 to check the 440c engine rings.

Fig. II-49

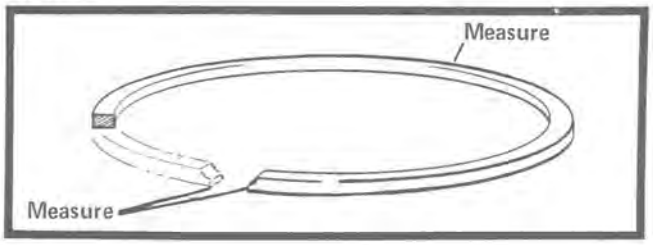
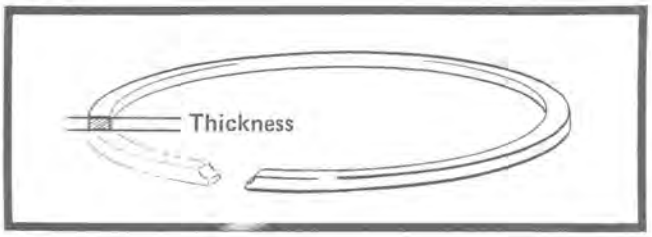
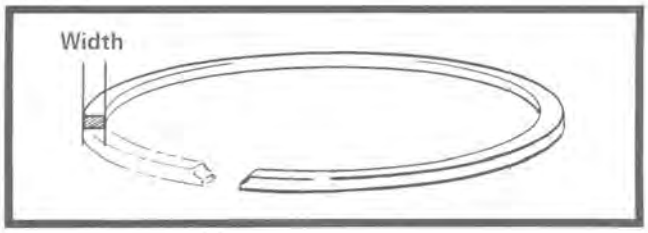


Fig. II-50



3. 340cc Piston Ring Width – Measure the width at the ends and center arc of the top and bottom rings, Fig. II-50, using a 1-inch outside micrometer. Width of the top ring, Fig. II-51, must be 0.097-0.105 of an inch. The width of the bottom ring must be 0.082-0.090 of an inch. If the width of the rings is not as specified however, the ring(s) is not within tolerance. Therefore, a new ring set must be installed.

Fig. II-51



Note: Proceed to steps 5 and 6 after performing step 3.

4. 440cc Piston Ring Width – Measure the width at the ends and center arc of the top and bottom rings, using a 1-inch outside micrometer. Width of the top ring, Fig. II-51, must be 0.1107-0.1187 of an inch. The width of the bottom ring must be 0.1037-0.1117 of an inch. If the width of the ring is not as specified however, the ring is not within tolerance and a new ring set must be installed.

Note: Proceed to steps 5 and 6 after performing step 4.

5. Install a new ring set that is within the specified limits (See: Steps 2, 3 and 4) into the piston ring grooves. The no. 2 ring expander must be installed in the bottom piston ring groove. After the expander has been installed, the bottom ring can be installed.

Note: There is a difference between the top (no. 1) ring and the bottom (no. 2) ring. The width of the top ring is greater than that of the bottom ring. However, the rings are identified by the numbers 1 and 2, which are stamped near the open end of the ring.

6. Lay a straight edge along the side of the piston and push the ring into the piston ring groove, Fig. II-52. Next, slide a feeler gauge between the top of the ring and the ring groove (side clearance), Fig. II-52. Top ring side clearance must be 0.004-0.006 of an inch and the bottom ring side clearance must be 0.002-0.004 of an inch for both the 340cc engine and the 440cc engine.

Note: If the top ring side clearance exceeds 0.006 of an inch or the bottom ring side clearance exceeds 0.004 of an inch, the piston ring groove is worn beyond the service limit and the piston must be replaced. And, since the piston, piston pin and needle bearing have definite wear characteristics, the components must be replaced as a set. Therefore, if the piston is replaced, also replace the piston pin and needle bearing.

Fig. II-52

MEASURING CRITICAL COMPONENTS

Check Piston Ring End Gap and Ring Wear

Equipment Necessary: Feeler Gauge, 1-Inch Outside Micrometer

1. Remove carbon deposits from the piston ring. Do not accidentally damage the ring.

2. Insert the piston ring approximately 3/8 inch into the top of the cylinder bore, Fig. II-53. Insert the dome of the piston into the bore and against the ring. This will position the ring correctly in the cylinder bore.

Fig. II-53

3. Slide a feeler gauge between the ends of the ring, Fig. II-53. Ring end gap must be 0.006-0.014 of an inch for the 340cc engine and 0.008-0.016 of an inch for the 440cc engine. If the ring end gap is not as specified, the ring(s) is not within tolerance. Therefore, check the ring for wear (proceed to step 4), or check the cylinder for wear (See: Check Cylinder Wear, page II-27).

4. Since the amount of wear at the ends and at the arc of the piston ring influences ring end gap, the piston ring dimensions must be held to close tolerances. Therefore, check the thickness and width of the top and bottom ring, using a 1-inch outside micrometer, (See: Step 5).

5. Measure the thickness at the ends and at the center arc of the top and bottom piston rings, Fig. II-54, using a 1-inch outside micrometer. Thickness of the top and bottom ring, Fig. II-55, for both the 340cc engine and 440cc engine must be 0.0775-0.0787 of an inch. If the thickness of the ring is not as specified, the ring is not within tolerance and a new ring set must be installed.

Fig. II-54

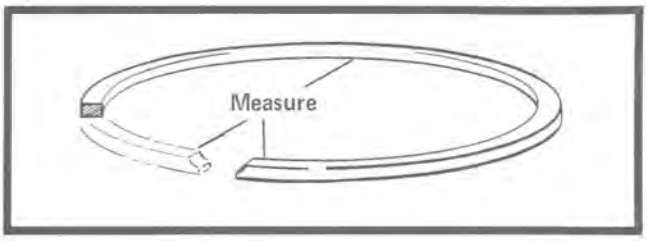
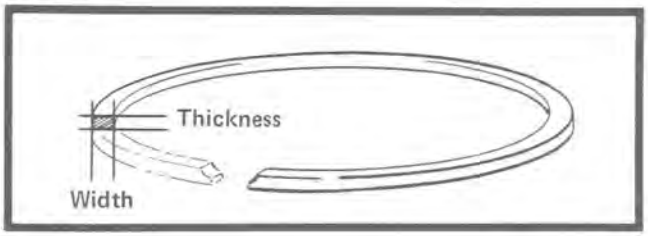


Fig. II-55



Note: After performing steps 1-5, the width of the top and bottom ring, Fig. II-55, must also be checked. Use step 6 to check the 340cc engine rings and step 7 to check the 440cc engine rings.

6. 340cc Piston Ring Width — Measure the width, Fig. II-55, at the ends and at the center arc of the top and bottom rings, using a 1-inch outside micrometer. Width of top ring must be 0.097-0.105 of an inch. The width of the bottom ring must be 0.082-0.090 of an inch. If the width of the rings is not as specified, the ring(s) is not within tolerance; therefore, a new ring set must be installed.

7. 440cc Piston Ring Width — Measure the width, Fig. II-55, at the ends and at the center arc of the top and bottom rings, using a 1-inch outside micrometer. Width of top ring must be 0.1107-0.1187 of an inch. The width of the bottom ring must be 0.1037-0.1117 of an inch. If the width of the ring(s) is not as specified, the ring(s) is not within tolerance and a new ring set must be installed.

Check Piston Pin and Piston Pin Bore

Equipment Necessary: 1-Inch Outside Micrometer, Inside Snap Gauge

1. Make sure the piston pin is clean.

2. Measure the piston pin approximately 1/4 of an inch from both ends, using a 1-inch outside micrometer, Fig. II-56. Piston pin diameter must be 0.6297-0.6299 of an inch. If measurement is not as specified, replace the piston pin and needle bearing as a set.

Fig. II-56

3. Insert an inside snap gauge approximately 1/4 of an inch from the outside of the piston pin bore of the piston, Fig. II-57. Remove snap gauge and measure it with a 1-inch outside micrometer. Piston pin bore diameter must be 0.6298-0.6301 of an inch. If measurement is not as speicifed, replace the piston, piston pin and needle bearing. Also, perform this step on opposite end of piston pin bore.

Fig. II-57

Check Connecting Rod Small End Diameter and Big End Side Play

Equipment Necessary: Inside Snap Gauge (3/4 - 1-1/4 Inch), 1-Inch Outside Micrometer and Feeler Gauge

1. Insert an inside snap gauge (3/4 - 1-1/4 inch) into the bore of the connecting rod small end, Fig. II-58. Lock the snap gauge in position when it is positioned correctly.

Fig. II-58

2. Carefully, slide the snap gauge from within the bore of the connecting rod small end. Measure the snap gauge, using an outside micrometer. Measurement (connecting rod small end diameter) must be 0.7874-0.7880 of an inch. If the connecting rod small end diameter is not as specified, the connecting rod is defective. Perform this step on remaining connecting rod.

Note: Since the connecting rod is not a replaceable part, the crankshaft must be replaced if the small end diameter is not within the specified tolerance range.

3. After moving the bottom end of the connecting rod to one side, slide a feeler gauge between the spacer washer and the connecting rod big end, Fig. II-59. This measurement between the spacer washer and connecting rod big end is known as "side play". Side play must be 0.016-0.020 of an inch. If the connecting rod big end side play is not as specified, there is excessive wear.

MEASURING CRITICAL COMPONENTS

Fig. II-59

SERVICING CRANKSHAFT MAIN BEARINGS

Removing Main Bearings

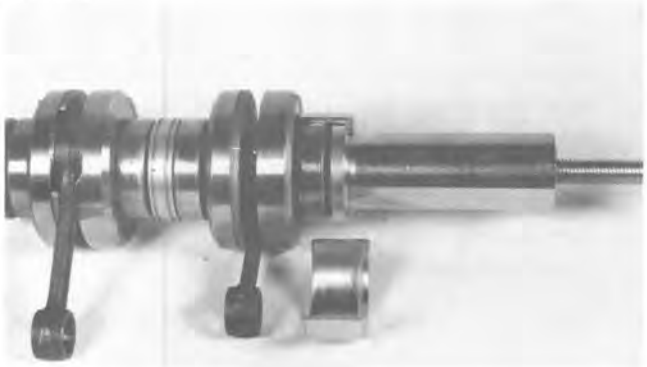
Equipment Necessary: Bearing Puller w/Appropriate Shells (Part No. 0144-080), Protective Dowel, Hammer, Bearing Splitter (Such as a Chisel) and 7/8-Inch Socket

Note: There is one bearing on the MAG end of the crankshaft and two bearings on the PTO end. Use steps 1 and 2 to remove the bearing from the MAG end and steps 3-6 to remove the two bearings from the PTO end of the crankshaft.

1. Install the bearing puller and two half shells around the bearing, Fig. II-60. Next, slide the appropriate retaining ring over the half shells. Hold all components in place.

2. Tighten the bearing puller bolt, Fig. II-60, until the bearing releases from the crankshaft taper, using a 7/8-inch socket.

Fig. II-60



3. Separate the PTO end main bearings approximately 1/8 inch, using a bearing splitter, such as a chisel, and a hammer, Fig. II-61.

Fig. II-61

4. After the bearings are separated, install the protective dowel into the threaded bore in the PTO end of the crankshaft, Fig. II-62.

SERVICING CRANKSHAFT MAIN BEARINGS

Fig. II-62

5. Install the bearing puller and two half shells around the bearings, Fig. II-63. Next, slide the appropriate retaining ring over the half shells. Hold all components in place.

6. Tighten the bearing puller bolt, Fig. II-63, until the bearing releases from the crankshaft taper, using a 7/8-inch socket.

Note: If the remaining bearing on the PTO end of the crankshaft must be replaced, repeat steps 5 and 6.

Fig. II-63

ENGINE SERVICING (ASSEMBLY)

Center Crankshaft in Crankcase and Install MAG End Main Bearing

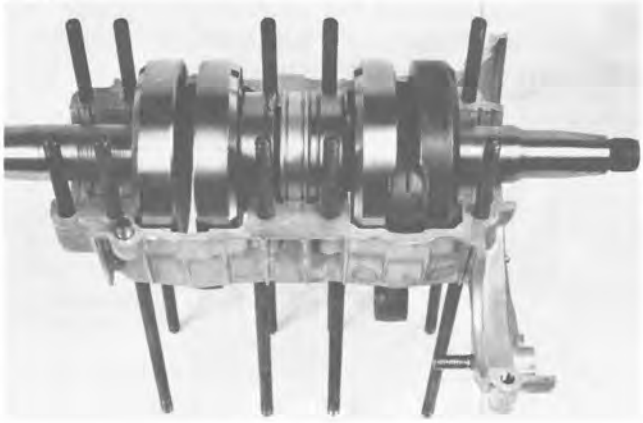
Equipment Necessary: Pliers, Vise, Rag, Propane Torch or Hot Oil and 1-Inch Outside Micrometer

1. Clean the crankshaft and crankcase thoroughly.

2. Set top half of crankcase on cylinder studs.

3. Install the crankshaft (without bearings) in the top half of the crankcase, Fig. II-64. Make sure crankshaft is seated properly in the crankcase.

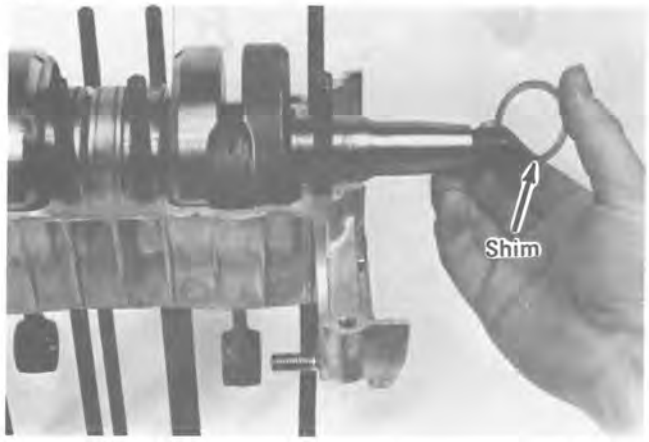
Fig. II-64



4. Slide a no. 3 shim (part no. 3000-160), which is 0.012 of an inch thick, onto the MAG end of the crankshaft, Fig. II-65.

Note: The no. 3 shim is used only as a starting point for centering the crankshaft in the crankcase. Measure the shim to make sure it is the correct thickness, using a 1-inch outside micrometer.

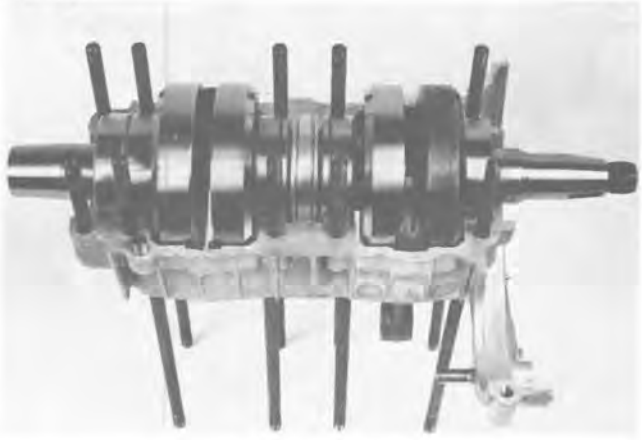
Fig. II-65



5. After the shim is installed on the MAG end of the crankshaft, slide one "dummy bearing" onto the MAG end of the crankshaft and two "dummy bearings" onto the PTO end, Fig. II-66.

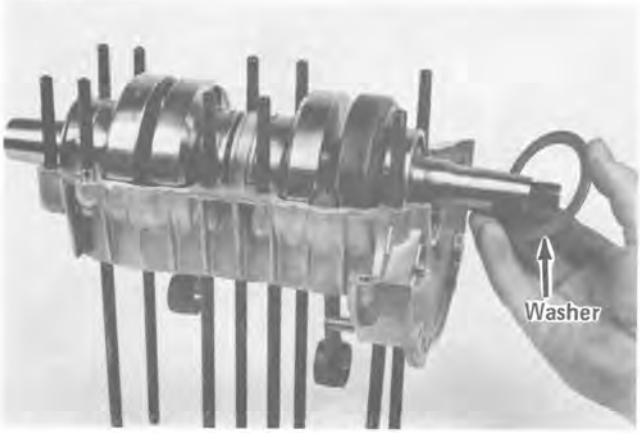
Note: Make sure the shim is not "cocked" on the crankshaft. If the shim is "cocked", crankshaft centering will be incorrect.

Fig. II-66



6. Slide a large retaining washer onto the MAG end and PTO end of the crankshaft; then seat washers in appropriate crankcase groove, Fig. II-67.

Fig. II-67

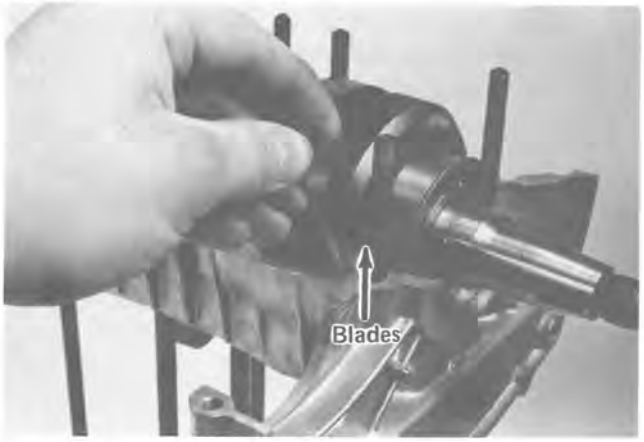


7. Push the PTO end of the crankshaft toward the MAG side of the crankcase, until all free-play is eliminated. To determine if the free-play is eliminated from between the crankshaft and crankcase, try to rotate the MAG end retaining washer while exerting slight pressure against the PTO end of the crankshaft. If the retaining washer does not rotate, there is no free-play. However, if the retaining washer rotates, there is still free-play. Therefore, drive the PTO end of the crankshaft toward the MAG side of the crankcase.

8. Next, install feeler gauge blades between the most outboard MAG side flyweight and the crankcase, Fig. II-68, to determine the amount of clearance. Record this dimension.

Note: While measuring clearance, exert slight pressure against the PTO end of the crankshaft to make sure there is no free-play that could produce an inaccurate crankshaft centering result.

Fig. II-68



ENGINE SERVICING (ASSEMBLY)

9. Install feeler gauge blades between the most outboard PTO side flyweight and the crankcase, Fig. II-69, to determine the amount of clearance. Record this dimension.

Note: While measuring clearance, exert slight pressure against the PTO end of the crankshaft to make sure there is no free-play that could produce an inaccurate crankshaft centering result.

Fig. II-69

10. Compare the measurement obtained in step 8 and step 9. The crankshaft is centered in the crankcase when the measurement between the MAG side flyweight and crankcase and the PTO side flyweight and crankcase is the same, or within 0.005 of an inch. When the crankshaft is centered, proceed to step 12. However, if the measurements obtained in steps 8 and 9 differ by more than 0.005 of an inch, proceed to step 11.

11. If the measurement obtained in step 8 is less than the measurement obtained in step 9, remove the retaining washer and "dummy bearing" from the MAG end of the crankshaft and install a thicker shim in place of the original shim. If the measurement obtained in step 8 is greater than the measurement obtained in step 9, install a thinner shim in place of the original shim. To determine the proper shim, find the difference of the measurements obtained in step 8 and step 9; then divide by 2 and refer to the shim chart. After the shim is installed, repeat steps 5-10.

Note: A complete list of shims is shown in the shim chart below. The table includes the shim number, Kawasaki part number, Arctic part number, thickness of the shim and the inside diameter of the shim. Always measure the shim to make sure of the thickness.

12. Remove the crankshaft from the crankcase. Next, slide the retaining washer and "dummy bearings" off the crankshaft. Make sure the shim remains on the crankshaft.

13. Install the crankshaft in a vise, making sure the MAG end is pointing upward. Be sure shim is in place on crankshaft, Fig. II-70. Wrap a rag around the crankshaft to guard against possible damage from the vise jaws.

SHIM CHART

Shim Number	Kawasaki Part Number	Arctic Part Number	Shim Thickness	Inside Diameter of Shim
1	318801-3231-00	3000-158	0.004"	1.260"
2	318801-3232-00	3000-159	0.008"	1.260"
3	318801-3233-00	3000-160	0.012"	1.260"
4	318801-3234-00	3000-161	0.016"	1.260"
5	318801-3235-00	3000-162	0.020"	1.260"
6	318801-3236-00	3000-163	0.024"	1.260"

Fig. II-70

14. Using hot oil or a propane torch, heat the inner race of a new bearing. Heating the bearing will expand the inner race, thereby allowing the bearing to slide onto the crankshaft.

15. When the bearing is heated thoroughly, slide it onto the crankshaft until it seats against the MAG side flyweight and shim. Use a pliers to slide the bearing onto the crankshaft, Fig. II-71.

Fig. II-71

⚠ WARNING ⚠

DO NOT pick up a hot bearing with bare hands; use a pliers. A severe burn will result if the hot bearing is touched with a bare hand.

16. Set end play and install PTO end main bearings (See: Set Crankshaft End Play and Install PTO End Main Bearings, page II-36).

Set Crankshaft End Play and Install PTO End Main Bearings

Equipment Necessary: Rag, Vise, Propane Torch or Hot Oil, Dummy Bearing, Dial Indicator, Crankshaft Shims, Pliers and 1-Inch Micrometer

1. Install the crankshaft in a vise, making sure the PTO end is pointing upward. Wrap a rag around the crankshaft to guard against possible damage from the vise jaws, Fig. II-72.

Fig. II-72

2. Using hot oil or a propane torch, heat the inner race of a new bearing. Heating the bearing will expand the inner race, thereby allowing the bearing to be slid onto the crankshaft.

3. When the bearing is heated thoroughly, slide it onto the PTO end of the crankshaft until it seats against the PTO side flyweight, Fig. II-73. Use a pliers to slide the bearing onto the crankshaft.

Fig. II-73

⚠ WARNING ⚠

DO NOT pick up a hot bearing with bare hands; use a pliers. A severe burn will result if a hot bearing is touched with a bare hand.

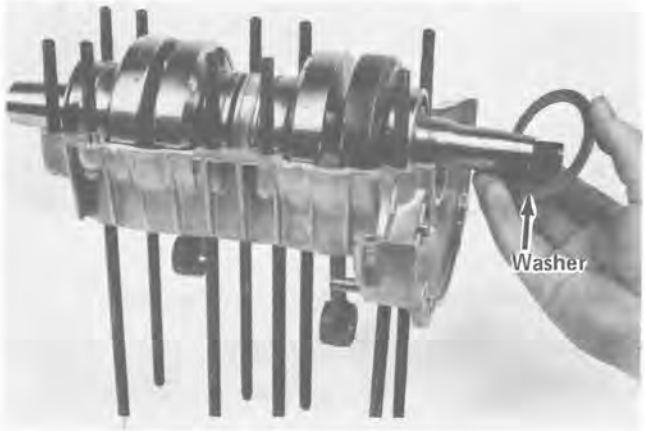
4. Set top half of crankcase on cylinder studs.

5. Slide a "dummy bearing" onto the PTO end of the crankshaft. Make sure the "dummy bearing" is positioned against inside bearing.

6. Install the crankshaft in the top half of the crankcase. Make sure crankshaft is seated properly in the crankcase.

7. Slide a large retaining washer onto the MAG end and PTO end of the crankshaft; then seat washers in the appropriate crankcase groove, Fig. II-74.

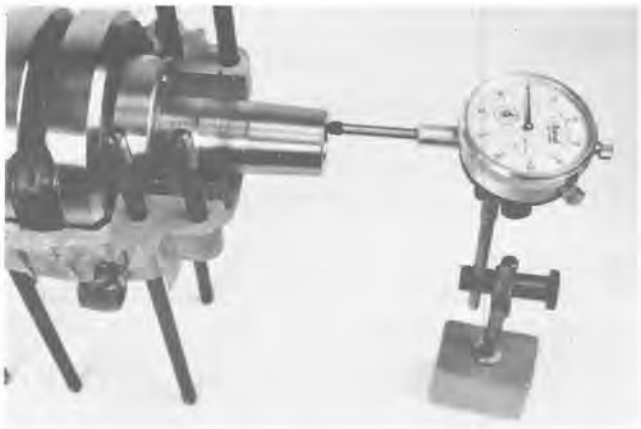
Fig. II-74



8. Push PTO end of the crankshaft toward the MAG side of the crankcase until all free-play is eliminated. To determine if the free-play is eliminated from the crankshaft and crankcase, try to rotate the MAG end retaining washer while exerting slight pressure against the PTO end of the crankshaft. If the retaining washer does not rotate, free-play is eliminated. However, if the retaining washer rotates, there is still free-play. Therefore, drive or push the PTO end of the crankshaft toward the MAG side of the crankcase.

9. Secure a dial indicator on the crankcase and slide moveable stem of the indicator against the end of the crankshaft until significant indicator needle movement is noticed. Finally, rotate the dial indicator bezel until the 0 mark lines up with the indicator needle, Fig. II-75.

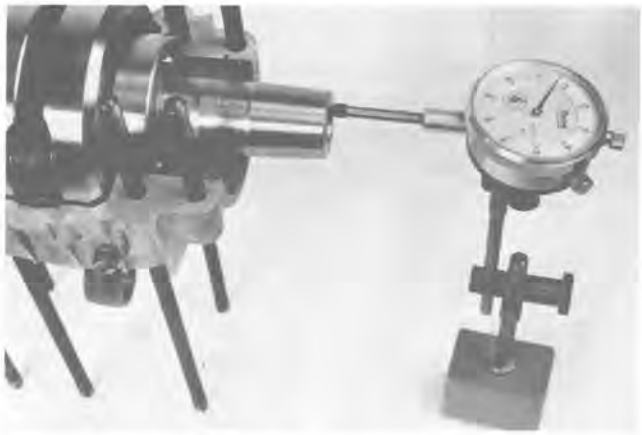
Fig. II-75



10. Carefully push the MAG end of the crankshaft toward the PTO side of the crankcase until the retaining washer cannot be rotated. If retaining washer rotates, crankshaft is not pushed far enough.

11. Observe the reading on the dial indicator, Fig. II-76. If the reading exceeds 0.008 of an inch, a shim must be installed between the two bearings. Select the appropriate shim from the shim chart (See: Shim Chart, page II-35). Use steps 12 and 13 for shim installation. However, if the end play reading is 0.008 of an inch, proceed to step 14.

Fig. II-76



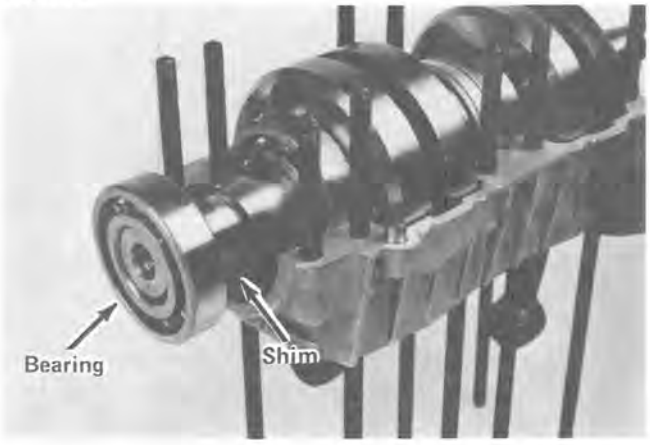
Note: A sample reading that might be obtained in step 7 is a dial indicator reading of 0.024 of an inch. Even though the reading, which is the end play, is within the acceptable tolerance

range (0.000 - 0.030 of an inch), a service specification of 0.008 of an inch is suggested. Therefore, if the end play is 0.024 of an inch, a no. 4 shim, which is 0.016 of an inch thick, is required to obtain the correct end play (0.008 of an inch). Always measure the shim to make sure of the thickness.

12. If a shim must be installed, remove the retaining ring and dummy bearing from the PTO end of the crankshaft. Install the appropriate shim on the crankshaft, Fig. II-77.

Note: Make sure the shim is not "cocked" on the crankshaft. If the shim is "cocked" however, an inaccurate end play reading will be obtained.

Fig. II-77



13. Slide the "dummy bearing" onto the PTO end of the crankshaft, Fig. II-77. Repeat steps 6-11 to verify the end play specification.

14. After correct end play is established, remove the crankshaft from the crankcase. Next, slide the retaining washer and "dummy bearing" off the crankshaft. Make sure the shim remains on the crankshaft if one is required.

15. Install the crankshaft in a vise, making sure the PTO end is pointing upward. Wrap a rag around the crankshaft to guard against possible damage from the vise jaws.

16. Using hot oil or a propane torch, heat the inner race of a new bearing. Heating the bearing will expand the inner race, thereby allowing the bearing to be slid onto the crankshaft.

17. When the bearing is heated thoroughly, slide it onto the PTO end of the crankshaft until it pushes against the inside bearing and shim, Fig. II-78. However, if a shim is not required, there must be bearing to bearing contact. Use a pliers to slide the bearing onto the crankshaft.

Fig. II-78

⚠ WARNING ⚠

DO NOT pick up a hot bearing with bare hands; use a pliers. A severe burn will result if a hot bearing is touched with a bare hand.

Install Crankshaft in Upper Crankcase Half

Equipment Necessary: No Special Tools Required

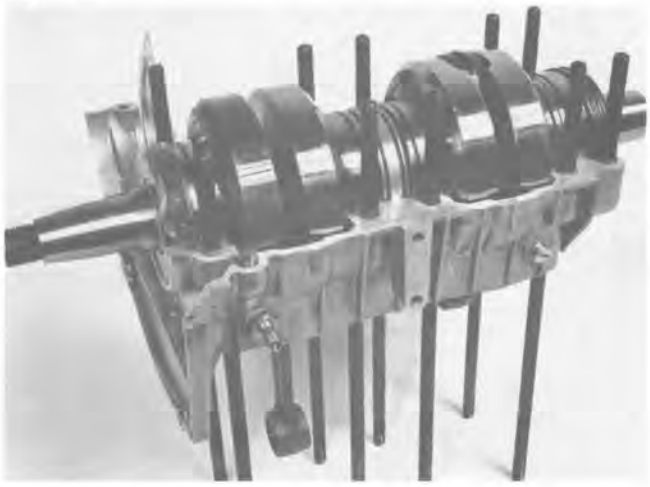
1. Set upper half of crankcase on cylinder studs.

2. Install the crankshaft in the top half of the crankcase, making sure the center seal dowel pin slides in the locating hole. Also, the thrust washers and oil seals must seat in their respective mounting grooves, Fig. II-79.

● CAUTION ●

Make sure the bearings, thrust washers and oil seals are seated firmly in the crankcase half. If components are not seated properly, engine damage may result.

Fig. II-79



Install Lower Crankcase Half

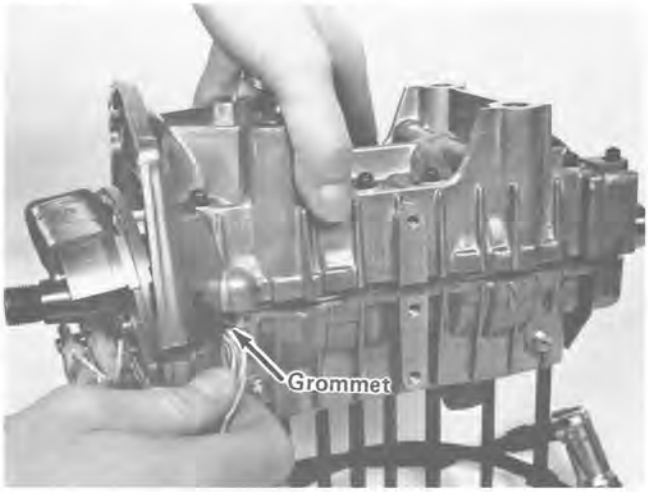
Equipment Necessary: Crankcase Sealer, Torque Wrench, 13mm Socket and 3-Inch Extension

1. Slide the magneto base plate assembly on the MAG end of the crankshaft; then place the rubber grommet holding the wires running to the external coil on the crankcase half.

2. Apply crankcase sealer (part no. 3000-211) on both sealing surfaces of the crankcase halves.

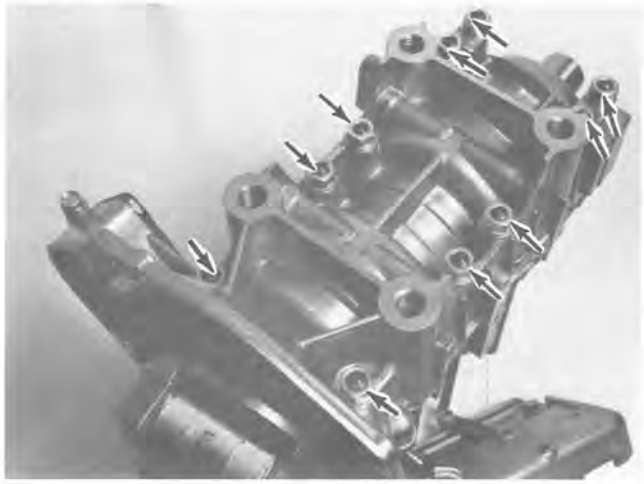
3. Holding the grommet in position, install the bottom crankcase half on the short studs, making sure the grommet seats between the cut-out formed by the mated halves, Fig. II-80.

Fig. II-80



4. Secure the crankcase halves together with the ten flat washers, lock washers and nuts, using a 13mm socket and 3-inch extension. Tighten the nuts to 16 ft-lb in the sequence shown in Fig. II-81, using a torque wrench and 13mm socket.

Fig. II-81



5. Also, install the flat washer, lock washer and bolt that holds crankcase together at the electric start opening, using a 10mm socket. Tighten the bolt to 5 ft-lb, using a torque wrench and 10mm socket.

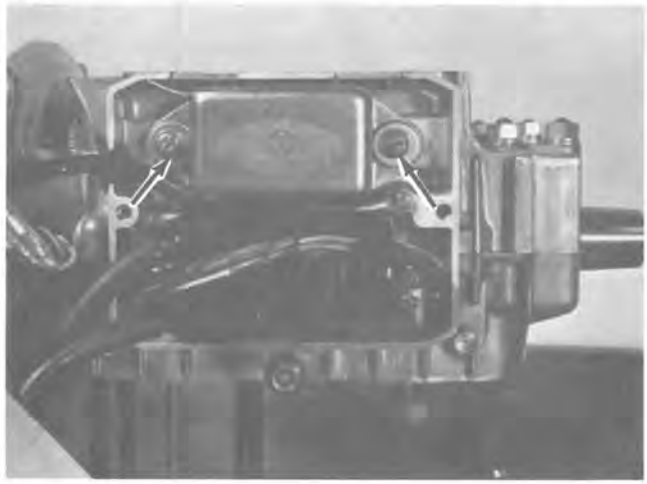
Install External Coil Bracket and Cover

Equipment Necessary: Light Oil, Torque Wrench, Screwdriver Having a 5/16-Inch Blade, 10mm Socket and 3-Inch Extension

1. Position the coil insulator bracket and the coil bracket against the mounting boss on the side of the crankcase. Secure coil bracket to crankcase with two bolts, lock washers and flat washers, using a 10mm socket and 3-inch extension. Tighten bolts to 2-4 ft-lb, using a torque wrench, 10mm socket and 3-inch extension.

2. Position the CDI unit against the mounting holes in the coil bracket; then secure CDI unit in place with two screws, lock washers and flat washers, Fig. II-82, using a screwdriver having a 5/16-inch blade.

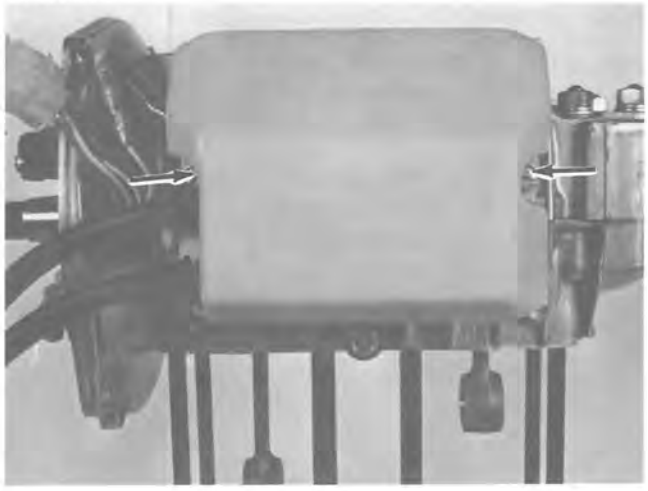
Fig. II-82



3. Slide the coil cover down the high tension wires and into position on the coil bracket. Secure cover to coil bracket with two large screws, lock washers and flat washers, Fig. II-83, using a screwdriver having a 5/16-inch blade. Slide the two rubber grommets into the coil cover, Fig. II-83.

Note: Applying light oil on the high tension wires will enable the grommets to slide easily. Wipe oil off high tension wires after sliding grommets into the coil cover.

Fig. II-83



Install Magneto Base Plate and Flywheel

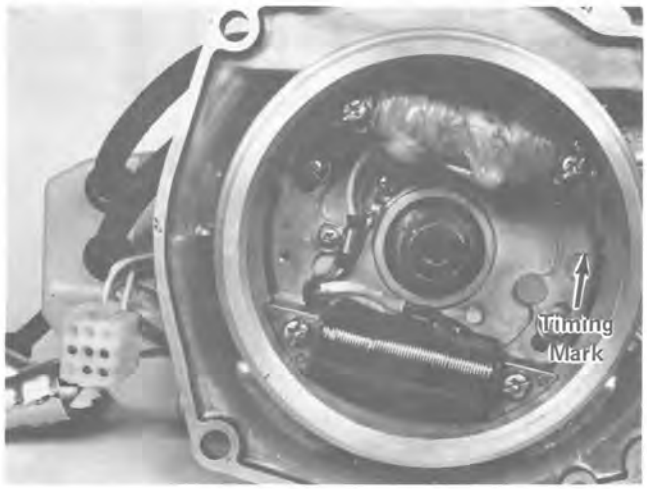
Equipment Necessary: Torque Wrench, Hammer, Spanner Wrench (Part No. 0144-007), Screwdriver Having a 5/16-Inch Blade, 1/4 x 3/32-Inch Pin Punch, 10mm Socket, 24mm Socket and 3-Inch Extension

1. Align the timing mark in the base plate with the boss molded in the crankcase, Fig. II-84.

2. When alignment is obtained, secure base plate against crankcase with two screws, lock washers and flat washers, using a screwdriver having a 5/16-inch blade, Fig. II-84.

Note: Check alignment of the base plate timing mark and crankcase boss. If alignment is not correct, repeat steps 1 and 2.

Fig. II-84

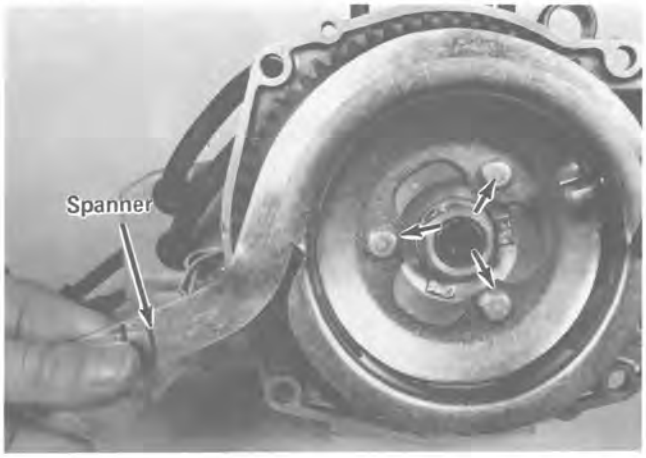


3. Seat the woodruff key in the crankshaft.

4. Slide the flywheel onto the crankshaft and over the coils. Retain the flywheel in place with the special lock tab washer and nut.

5. Install the auxiliary rope pulley against the flywheel with the three recoil starter screws, using a 10mm socket and 3-inch extension, Fig. II-85.

Fig. II-85



CAUTION

Use the recoil starter screws to hold auxiliary rope pulley and fan drive pulley when installing the rope pulley for the purpose of holding the flywheel and tightening the large nut. If the pulley bolts are used accidentally, the end of the bolts will come in contact with the coils, resulting in damage.

6. Hold the flywheel in place by installing the spanner wrench (part no. 0144-007) on the auxiliary rope pulley, Fig. II-85.

7. While holding the spanner wrench, tighten the flywheel nut to 60 ft-lb, using a torque wrench and 24mm socket.

8. Remove the spanner wrench from the rope pulley; then remove three recoil starter bolts holding auxiliary rope pulley against flywheel, using a 10mm socket and 3-inch extension.

9. Bend the locking tab against the side of the flywheel nut, using a hammer and 1/4 x 3/32-inch pin punch.

Install Pistons and Cylinders

Equipment Necessary: Two-Cycle Snowmobile Oil, 1-1/4 x 5-Inch Piston Retaining Bar and Ring Compressor w/Medium Size Ring (Part No. 0144-001)

Note: If a new piston is being installed, a new ring set and expander should have already been installed in the piston ring grooves. Ring expander must be installed in the lower ring groove.

1. Slide new cylinder base gaskets over the cylinder studs and position the gaskets on the crankcase, Fig. II-86.

Note: Make sure the gaskets are positioned correctly on the crankcase.

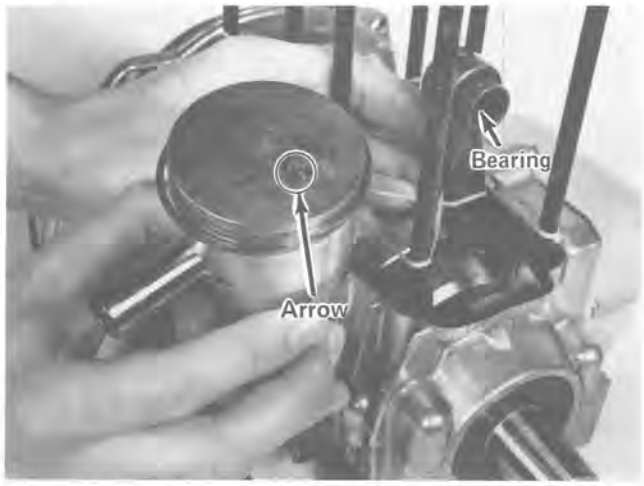
2. Lubricate the connecting rod needle bearings, the inside of the small end of the connecting rod and the outside of the piston pin, using two-cycle snowmobile oil.

Fig. II-86

3. Slide the needle bearing into the small end of the connecting rod, Fig. II-87.

4. Place the piston over the small end of the connecting rod, making sure the arrow on the dome of the piston, Fig. II-87, points toward the exhaust side of the engine. Secure piston on the connecting rod with the piston pin.

Fig. II-87

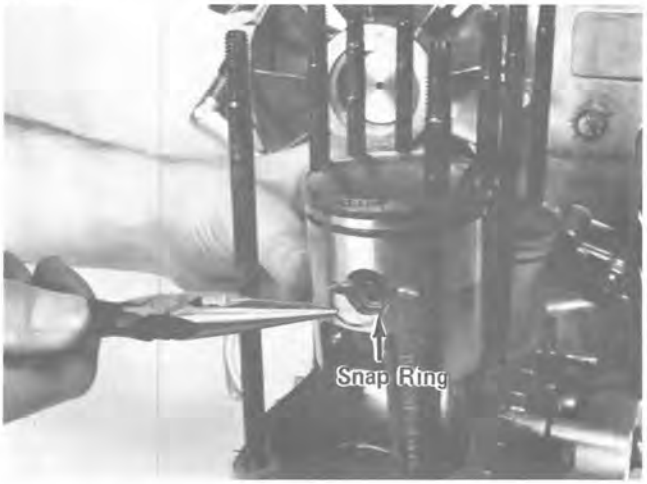


5. Retain the piston pin with the snap ring, Fig. II-88. Make sure the snap ring is seated in the groove in the piston pin bore of the piston.

CAUTION

The open ends of the snap ring must either be positioned up or down in relation to the notches in the side of the piston. If the open ends of the snap ring are positioned even with the notches, the snap ring may release from its groove and, therefore, cause engine damage.

Fig. II-88



6. Lubricate the piston, rings and bore of the cylinder, using two-cycle snowmobile oil.

7. Lay the piston retaining bar on the crankcase, Fig. II-89; then carefully rotate the crankshaft until the piston skirt contacts the bar.

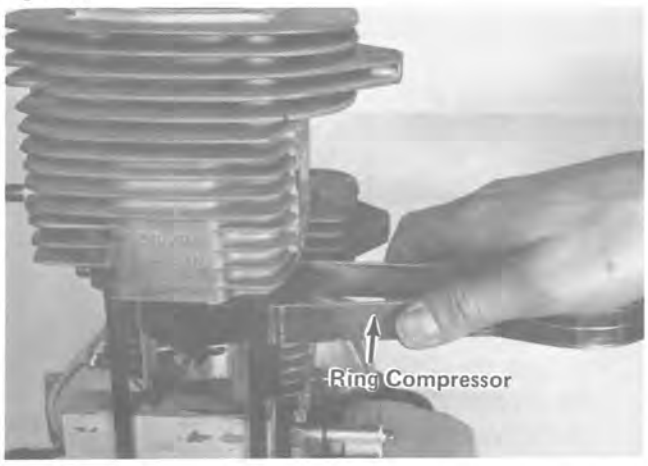
8. Install the ring compressor (part no. 0144-001) over both rings on the piston, Fig. II-89.

9. Compress the rings; now slide the cylinder on the cylinder studs and over the piston, Fig. II-89.

10. After the cylinder is installed over both piston rings, remove the retaining bar from below the piston, and remove the ring compressor from around the connecting rod.

11. Repeat steps 1-10 for installation of the remaining piston and cylinder.

Fig. II-89

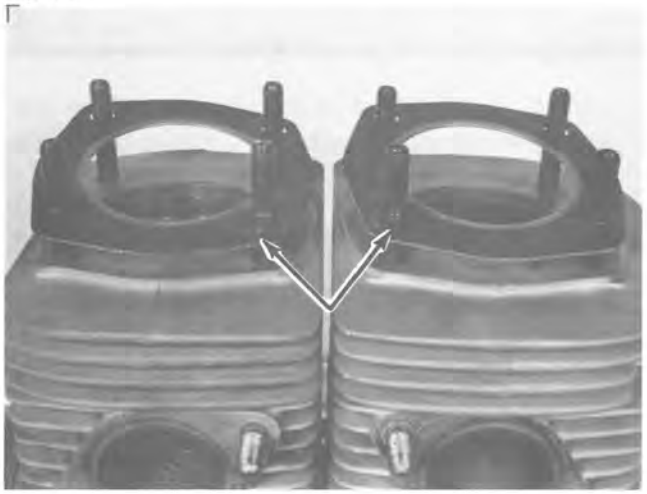


Install Cylinder Heads and Intake Manifold

Equipment Necessary: Torque Wrench, 10mm Socket, 13mm Socket and 3-Inch Extension

1. Slide the head gaskets over the cylinder studs and onto the top of the cylinders, Fig. II-90. The wide metal section of the gasket is to lay on the top of the cylinder.

Fig. II-90

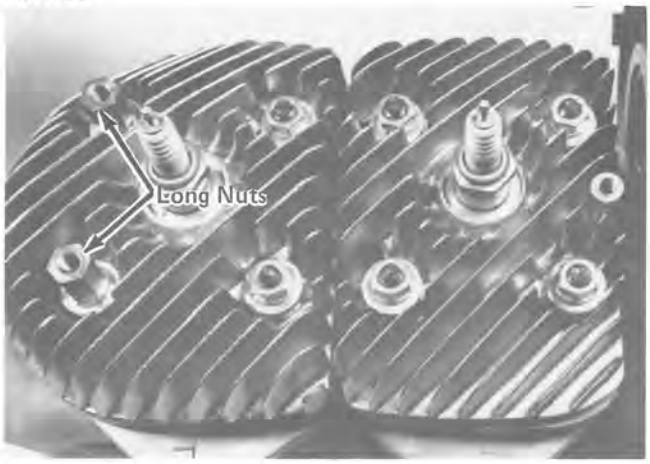


2. Slide the appropriate cylinder heads on their corresponding cylinders, Fig. II-91.

Fig. II-91

3. Secure the cylinder heads loosely on the cylinders with 8 nuts, lock washers and flat washers. Nuts must be only FINGER-TIGHT at this time. The two long nuts must be installed on the outside studs of the PTO side cylinder head, Fig. II-92.

Fig. II-92

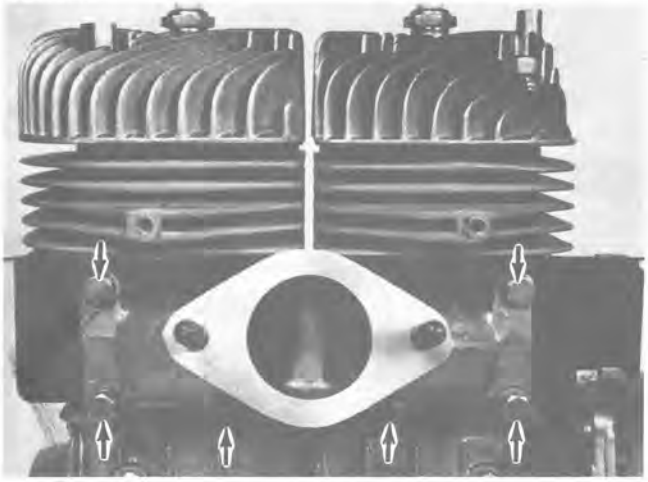


Note: DO NOT tighten cylinder head nuts until the intake cover, gaskets, insulator blocks and the intake manifold are mounted against the side of the cylinders.

4. Mount the intake manifold, gaskets, insulator, gaskets, intake cover and remaining gaskets on the side of the cylinders with 6 bolts, lock washers and flat washers, Fig. II-93, using a 10mm socket and 3-inch extension. Tighten the bolts to 4-5 ft-lb, using a torque wrench, 10mm socket and 3-inch extension.

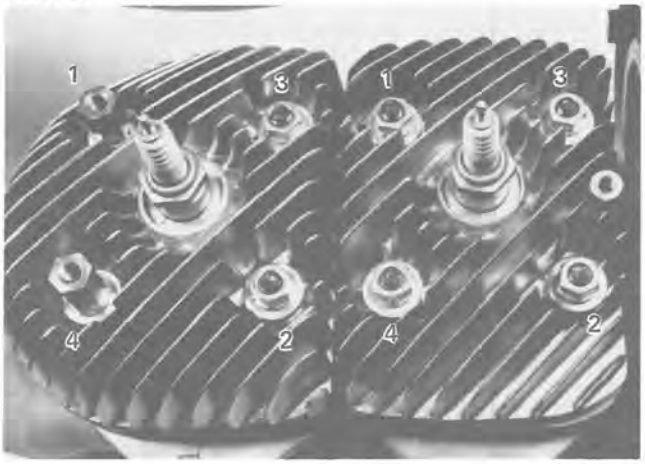
Note: The two long bolts must be installed at the bottom center of the intake manifold.

Fig. II-93



5. Tighten the cylinder head nuts to 16 ft-lb in the sequence shown in Fig. II-94, using a torque wrench, 13mm socket and 3-inch extension.

Fig. II-94



Assemble Axial Fan

Equipment Necessary: Snap Ring Pliers, Press or Vise, Rubber Mallet, Fan Holder (Part No. 0144-004) and 19mm Socket

1. Install the snap ring into the groove in the bore of the fan housing, using a snap ring pliers.

2. Heat the bore in the fan housing, using a propane torch; then install one of the bearings into the bore of the fan housing. Make sure the bearing is seated against the snap ring.

3. Slide the bearing spacer washers into the bore of the axial fan housing. Washers are to be positioned on the inside of the snap ring that separates the bearings.

4. Heat the bore in the fan housing, using a propane torch; then install the remaining bearing into the bore of the fan housing. Make sure the bearing is seated against the spacer washers.

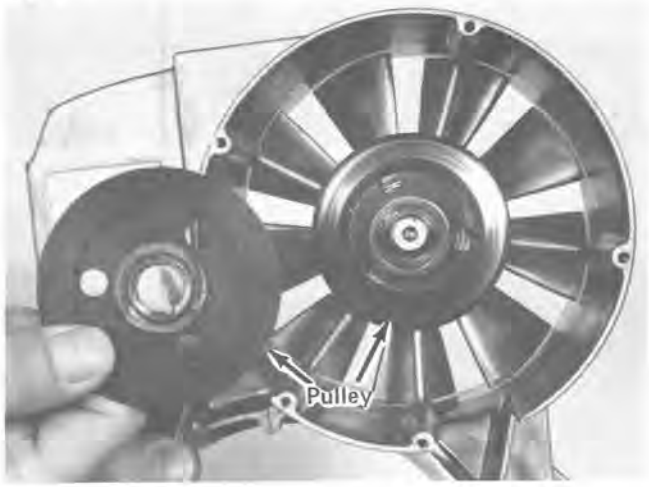
5. Position the axial fan to the inside of the fan housing; then slide the shaft through the bearings. A rubber mallet may have to be used to drive the shaft completely through the bearings.

Note: Be sure aluminum housing is thoroughly cooled before driving shaft through bearings.

6. Slide one of the pulley sheaves onto the shaft. Also, seat the woodruff key in the axial fan shaft keyway, Fig. II-95.

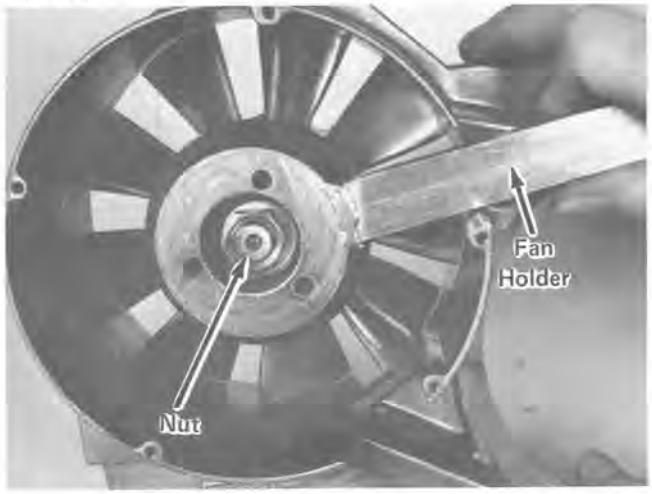
7. Slide spacer washers and remaining pulley sheave onto the shaft. The keyway in the outside pulley sheave must mate with the woodruff key to ensure proper installation of all the components, Fig. II-95.

Fig. II-95



8. Secure all components on the shaft with a lock washer and nut, using a 19mm socket and fan holder (part no. 0144-004), Fig. II-96. Tighten nut to 30 ft-lb.

Fig. II-96



Install Fan Housing

Equipment Necessary: 10mm Socket, 13mm Socket, 13mm Open End Wrench and 6-Inch Extension

Note: Electric start is optional.

1. Install the fan housing against the side of the crankcase.

Note: If engine IS NOT going to be equipped with an electric start motor, use step 2. If engine is going to be equipped with an electric start motor, use steps 3-5.

2. Secure the fan housing to the crankcase with bolt (at bottom of starter motor mount), six nuts, lock washers and flat washers, using a 13mm socket on the exhaust side and a 13mm open end wrench on the intake side. Tighten the nuts to 16 ft-lb.

3. Secure the fan housing to the intake side of the crankcase with two nuts, lock washers and flat washers, using a 13mm open end wrench. Next, secure the exhaust side of the fan housing with two nuts, lock washers and flat washers, using a 13mm socket. Tighten nuts to 16 ft-lb. DO NOT install bolt, nuts, lock washers and flat washers above and below the electric starter motor opening in the fan housing.

4. Place the electric starter motor into position in relation to the crankcase and the opening in the fan housing. Secure starter motor to fan housing with the bolt, lock washers and 3 flat washers, using a 13mm open end wrench.

5. Secure the starter motor to the mounting boss on the crankcase with two bolts and lock washers, using a 10mm socket and 6-inch extension.

Install Fan Drive Pulley, Fan Belt and Auxiliary Rope Pulley

Equipment Necessary: Torque Wrench, Screwdriver Having a 1/4-Inch Blade, 10mm Socket and 3-Inch Extension

1. Install the axial fan belt around the fan pulley.

2. Place the fan drive pulley inside the bottom of the belt, Fig. II-97; then secure fan drive pulley and auxiliary rope pulley to the flywheel with 3 bolts and lock washers, using a 10mm socket and 3-inch extension, Fig. II-98. Tighten the bolts to 4 ft-lb, using a torque wrench, 10mm socket and 3-inch extension.

Fig. II-97

Fig. II-98

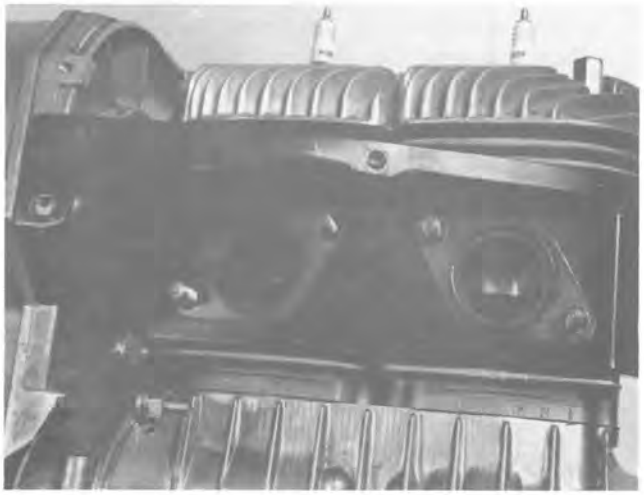
3. Mount the fan cover against the top of the fan housing with 5 screws, lock washers and flat washers, using a screwdriver having a 1/4-inch blade.

Install External Components

Equipment Necessary: Torque Wrench, Screwdriver Having a 5/16-Inch Blade, 9/32-Inch Open End Wrench, 3/8-Inch Hex Key Socket, 12mm Open End Wrench, 13mm Socket, 9/16-Inch Socket, 9/16-Inch Open End Wrench, 3/4-Inch Socket and 12-Inch Extension

1. Slide the exhaust gaskets and exhaust cover on the studs; then secure the cover to the fan housing with a screw, lock washer and flat washer, Fig. II-99. DO NOT TIGHTEN SCREW.

Fig. II-99



2. Install top cover on cylinder heads with 9 screws, lock washers and flat washers, using a screwdriver having a 5/16-inch blade. Also, secure the high tension wire rubber clamp to the fan housing, Fig. II-100, with a cap screw, lock washer and flat washer, using a 10mm socket. Tighten all screws holding cover on fan housing and cylinders. Connect high tension wires to the spark plugs.

Note: If engine was disassembled completely, perform steps 3-15. However, if only top end maintenance was performed, use steps 3-5 and 7-15.

Fig. II-100

3. Slide two exhaust gaskets on the exhaust studs.

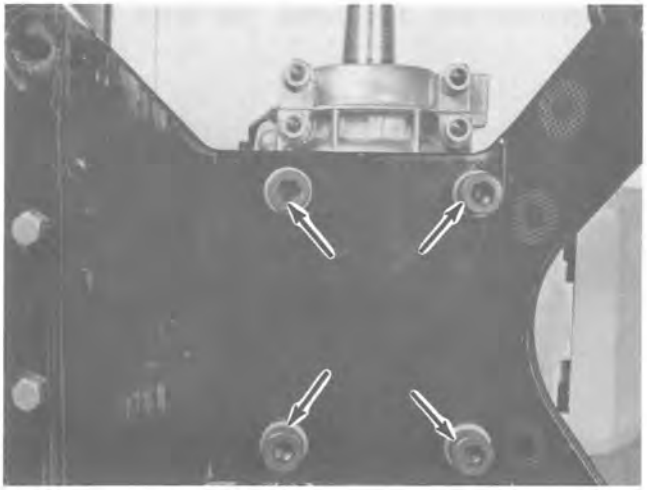
4. Slide the complete exhaust assembly and motor plate into position on the engine. Exhaust manifold must be mounted on the exhaust studs.

5. Retain the exhaust manifold on the exhaust studs by installing the brass nuts and plated lock washers, Fig. II-101. DO NOT TIGHTEN THE NUTS.

Fig. II-101

6. Secure the motor plate on the bottom of the crankcase with the 4 socket head screws and lock washers, Fig. II-102, using a 3/8-inch hex key socket. Tighten the screws to 46 ft-lb, using a torque wrench and 3/8-inch hex key socket.

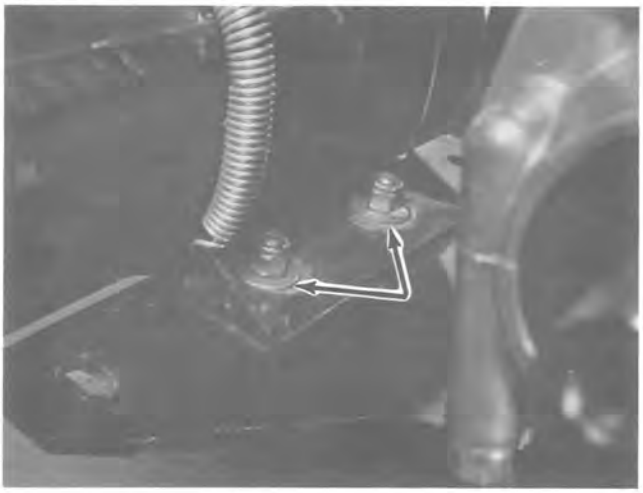
Fig. II-102



7. Now tighten the brass nuts holding the exhaust manifold against the cylinders to 10 ft-lb, using a torque wrench, 13mm socket and 12-inch extension.

8. Secure the muffler bracket on the motor plate with 2 cap screws, flat washers and lock nuts, Fig. II-103, using a 9/16-inch open end wrench and 9/16-inch socket.

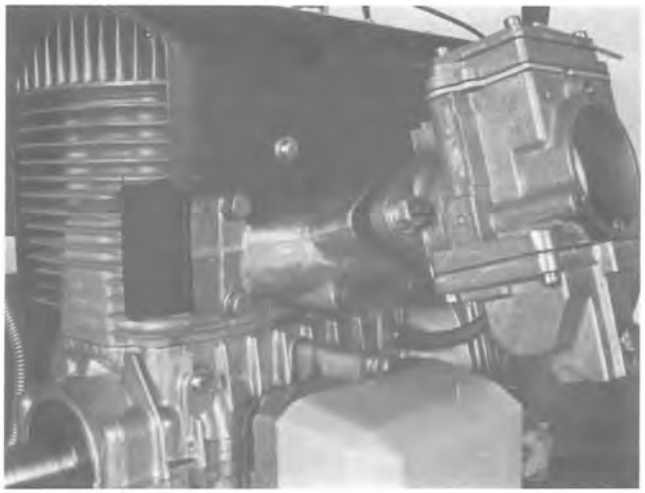
Fig. II-103



9. Slide an intake insulator gasket, insulator block and another insulator gasket on the intake manifold studs.

10. Slide carburetor collar on both intake studs; then mount the carburetor on the studs and secure it in place with 2 nuts, lock washers and flat washers, Fig. II-104, using a 13mm open end wrench.

Fig. II-104



CAUTION

The seal between the carburetor insulator gaskets, insulator block and the intake manifold must be good. If the components do not form a good seal, excessive air will be drawn into the engine and, as a result, engine damage will result.

ENGINE SERVICING (ASSEMBLY)

11. Connect the impulse line to the crankcase fitting and carburetor fuel pump fitting.

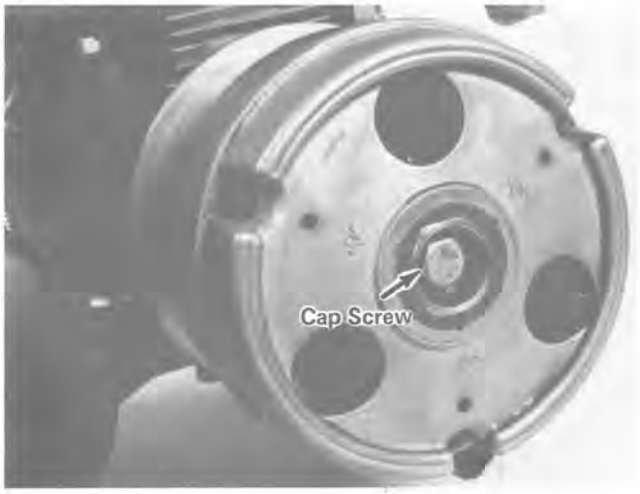
12. Install the engine connector in the engine connector bracket. The connector is to be positioned so the gray and the black wires are facing up.

13. Install the heat indicator light sensor in the MAG side cylinder head, using a 9/32-inch open end wrench. DO NOT OVER TIGHTEN sensor. Then slide wire behind the rubber high tension wire bracket.

14. Slide the terminal at the end of the heat indicator wire into the lower right mounting hole in the engine connector.

15. With the long cap screw and lock washer, install the drive clutch on the crankshaft, Fig. II-105, using a 3/4-inch socket. Tighten the cap screw to 75 ft-lb, using a torque wrench and 3/4-inch socket.

Fig. II-105



ENGINE INSTALLATION

Install Engine in Snowmobile Chassis

Equipment Necessary: Torque Wrench, Screwdriver Having a 1/4-Inch Blade, 10mm Socket, 7/16-Inch Socket, 7/16-Inch Open End Wrench, 1/2-Inch Socket, Two 1/2-Inch Open End Wrenches, 9/16-Inch Socket, 3-Inch Extension and 12-Inch Extension

1. Set the engine assembly onto the 4 motor mounts. Start by sliding the motor plate onto the rear mounts, then slide motor plate onto front mounts.

2. Secure the motor plate on the motor mounts with 4 flat washers and lock nuts, using a 9/16-inch socket and 12-inch extension. Tighten the lock nuts to 30 ft-lb, using a torque wrench, 9/16-inch socket and 12-inch extension.

3. Slide the clutch guard onto the studs on the front and side of the front end assembly. Secure the side of the clutch guard on the stud with a lock nut, using a 1/2-inch socket. Also, secure the front of the clutch guard to the two front studs with two lock nuts, using a 7/16-inch open end wrench.

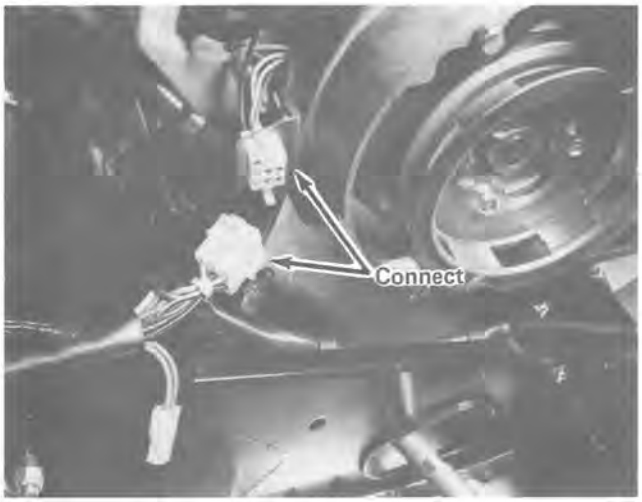
Note: On 1975 models, place clutch guard in place and secure with two retaining pins.

4. Slide the fuel line onto the carburetor inlet fitting.

5. Mount the air silencer against the carburetor with three slotted hex head cap screws, lock washers and flat washers, using a 7/16-inch socket. Tighten the three cap screws to 4-5 ft-lb, using a torque wrench and 7/16-inch socket.

6. Connect the main wiring harness connector to the engine connector, Fig. II-106.

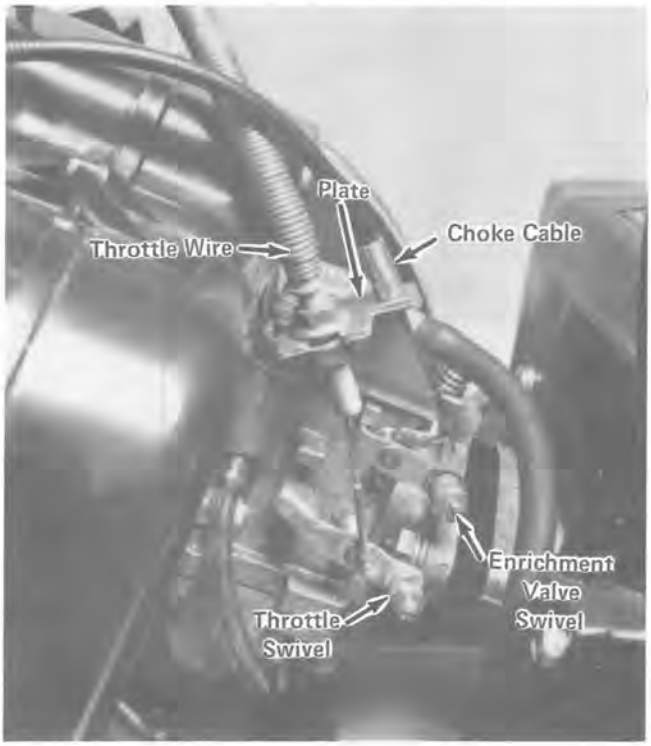
Fig. II-106



7. Install the throttle cable between the slot in the throttle control bracket plate, Fig. II-107. Tighten the flange nuts against the bracket plate, using two 1/2-inch open end wrenches.

Note: Approximately 3/4 inch of the threaded cable is to extend below the bottom flange nut.

Fig. II-107



8. Slide the throttle wire through the carburetor throttle swivel, Fig. II-107; then adjust the throttle (See: Section III – Fuel System, Throttle Adjustment, page III-19).

9. Push the choke cable through the hole in the throttle control bracket plate. Secure cable in place by sliding the E-ring into the groove in the end of the cable, Fig. II-107.

10. Slide the choke wire through the carburetor enrichment valve swivel, Fig. II-107, making sure the enrichment valve arm is fully forward (toward engine). Pull console-mounted choke control out approximately 1/16 of an inch while holding the enrichment valve arm fully forward. Secure the choke control wire in the swivel with the retaining screw, using a screwdriver having a 1/4-inch blade.

Note: The reason for pulling the choke knob away from the console is to make sure the enrichment valve is closed (not working) when the console-mounted choke knob is pushed in.

11. Mount the recoil starter against the fan housing with three slotted hex head bolts and lock washers, using a 10mm socket and 3-inch extension. Tighten the bolts to 5 ft-lb, using a torque wrench, 10mm socket and 3-inch extension.

12. Check the offset and parallelism between the drive clutch and driven pulley (See: Section V – Drive System, Alignment Instructions).

13. Install the drive belt around the drive clutch and driven pulley.

14. Adjust the carburetor (See: Section III – Fuel System, Adjust Carburetor).

CAUTION

Whenever the engine is overhauled completely, it must be broken in, just like a new engine (See: Section IA – General, Break-In). Therefore, tell the customer to follow the break-in instructions found in the Panther Operator's Manual. Failure to comply with break-in instructions may cause engine damage.

ENGINE SERVICING (RECOIL STARTER)

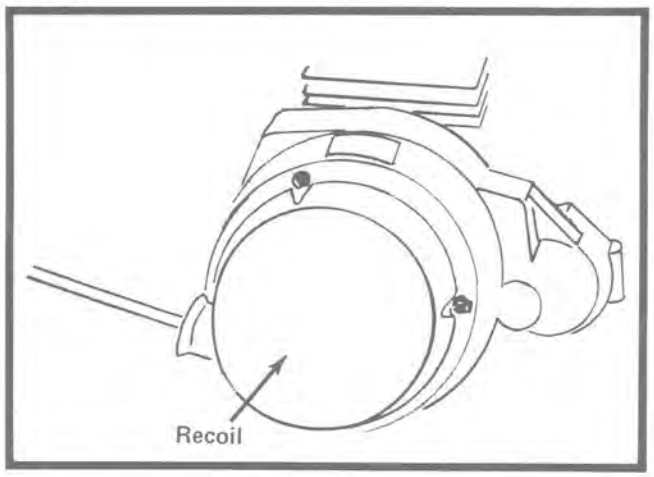
Remove Recoil Starter

Equipment Necessary: Screwdriver Having a 7/16-Inch Blade, 10mm Socket, 7/16-Inch Wrench and 3-Inch Extension

1. Open the hood.

2. Remove the three slotted cap screws, securing recoil to magneto housing, Fig. II-108, using a 10mm socket and 3-inch extension.

Fig. II-108



3. Grasp the recoil and pull away from magneto housing. Allow the recoil to slowly retract.

4. Remove the console-mounted recoil cable bracket, using a screwdriver having a 7/16-inch blade and a 7/16-inch wrench. Just before removing the last screw, grasp the recoil handle so it does not suddenly retract toward the main recoil housing.

Disassemble Recoil Starter

Equipment Necessary: 13mm Socket

1. Lay the recoil on a bench or carefully clamp it in a vise.

2. Pull recoil handle about two feet out. Hold recoil reel firmly to prevent it from turning. Using a short piece of wire, pull the recoil rope upward between the rope guide and pulley.

3. Slowly allow recoil reel to rotate until the notch in reel is near rope guide. Place rope in notch and allow the reel to rotate until all main spring tension is released.

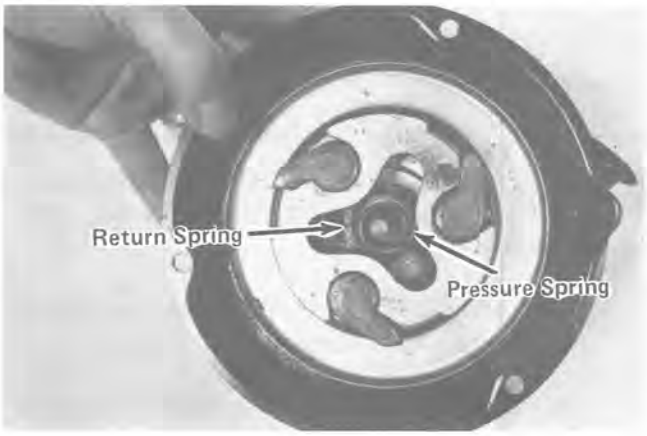
4. While exerting a slight downward pressure on the retainer cover, slowly remove the nut, lock washer and flat washer securing recoil parts in place, Fig. II-109, using a 13mm socket.

Fig. II-109

5. Rotate retainer cover until cover is free of the spiral return spring. Lift retainer cover off.

6. Carefully remove the three starter pawls, the return spring and the pressure spring, Fig. II-110, from the recoil.

Fig. II-110



7. Remove the washer under the pressure spring.

8. Remove the knot from the recoil handle end of the rope. Slide the end piece and the handle off the rope.

9. Carefully lift the recoil reel off the center hub, making sure that the recoil spring does not accidentally disengage from the recoil case. Spring should remain in the case II-111.

ENGINE SERVICING (RECOIL STARTER)

Fig. II-111

Note: If recoil spring damage is suspected, proceed to step 10. If damage is not evident, do not remove the recoil spring from the recoil case. No further disassembly is required if the recoil spring is not removed. Proceed to Inspect Recoil Parts, page II-50.

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

Inspect Recoil Parts

Equipment Necessary: No Special Tools Required

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

1. Inspect the retainer cover, washers and starter pawls for excessive wear.
2. Inspect the recoil housing and hub for excessive wear, cracks or damage.
3. Check the recoil rope for fraying or cuts.
4. Inspect the spring for cracks, crystallization and abnormal bends.
5. Inspect the starter handle and rope guide for cracks, damage or deterioration.

Assemble Recoil Starter

Equipment Necessary: 13mm Socket

1. Position the hook shaped of the recoil spring around the mounting lug in the recoil case.
2. Continue to insert the recoil spring, winding in a counterclockwise direction. Insert the windings one at a time until the complete recoil spring is installed.

Note: Recoil spring must seat evenly on the cable pulley to ensure correct installation.

3. If a new rope is to be installed, thread rope through the small flat washer, hole in recoil reel and hole in rope guide; then tie a knot in the recoil end of rope to prevent rope from being pulled through recoil reel.
4. Thread other end of rope through the recoil handle and the recoil rope end piece. Secure in place by making a knot in the end of the rope.
5. Apply a light coat of low-temperature grease (Texaco 2346 EP or equivalent) on the recoil case hub, Fig. II-112.
6. Apply a few drops of light oil on the recoil spring, Fig. II-112. Wipe any excess oil off the spring.
7. Place recoil reel with rope over the recoil case hub, making sure that the spring mounting lug on the reel is aligned with the hook on the end of the recoil main spring.

Fig. II-112

8. When recoil reel is seated correctly in the recoil case, place the bottom spring washer against reel.

9. Install the pressure spring and return spring in the recoil; then place the three recoil pawls in position, Fig. II-113.

Note: Return spring pointed end must seat in the reel. Loop must be facing upward.

Fig. II-113

10. Form a small hook on a piece of wire. Use the wire to guide the return spring when installing the retainer cover. Rotate the cover until spring is in position.

11. Secure cover in place with a flat washer, lock washer and nut, Fig. II-114. Tighten nut to 16 ft-lb, using a torque wrench and a 13mm socket.

Fig. II-114

12. With about two feet of rope exposed, hook the rope and install in the notch of the recoil reel. Use this notch for adequate clearance. Rotate the reel three or four turns to correctly tension recoil; then pull recoil rope to release it from the notch.

13. Pull recoil rope out two or three times to check for correct operation. If tension is not sufficient, increase tension one turn at a time as in step 12.

Install Recoil Starter

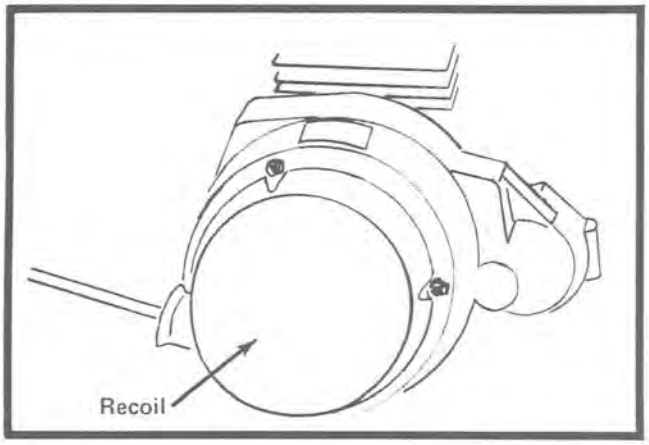
Equipment Necessary: Torque Wrench, Screwdriver Having a 7/16-Inch Blade, 10mm Socket, 7/16-Inch Wrench and 3-Inch Extension

1. Place recoil assembly in position against fan housing.

2. Secure recoil in place with three recoil bolts, Fig. II-115. Tighten bolts to 5 ft-lb, using a torque wrench, 10mm socket and 3-inch extension.

Note: Just before finally tightening bolts, grasp recoil handle and slowly pull until the starter pawls engage; then tighten bolts.

Fig. II-115



3. Pull recoil handle until the console recoil bracket can be installed. Install the two mounting screws and secure bolts with two flat washers and lock nuts. Tighten screws, using a screwdriver having a 7/16-inch blade and a 7/16-inch wrench.

Note: The handle must be held until the bracket is secured to prevent a possible recoil of the handle.

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FUEL SYSTEM SPECIFICATIONS

Description	Specification
Fuel Tank Capacity	6.25 U.S. Gal.
Carburetor Type	Walbro WF-1
Air Screw Setting (Break-In)	1-3/4 Turns Open
Fuel Screw Setting (Break-In)	3/4 Turn Open
Float Setting	15/16-Inch
Main Jet Usage	
0 - 5,000 Ft.	*0.076 Inch
4,000 - 7,000 Ft.	0.074 Inch
6,000 - 8,000 Ft.	0.072 Inch
8,000 - 12,000 Ft.	0.070 Inch
Main Jet Part Number	
0.076	6503-022
0.074	6503-021
0.073	6503-065
0.072	6503-020
0.070	6503-019

*Factory Installed in All Arctic Cat Panther Snowmobiles

FUEL SYSTEM

General (Fig. III-1)

The fuel system utilized in the Arctic Cat Panther snowmobile consists of a fuel tank, fuel line, impulse line and a carburetor with integrally-mounted fuel pump. The fuel pump is activated by crankcase impulses that pass through the impulse line.

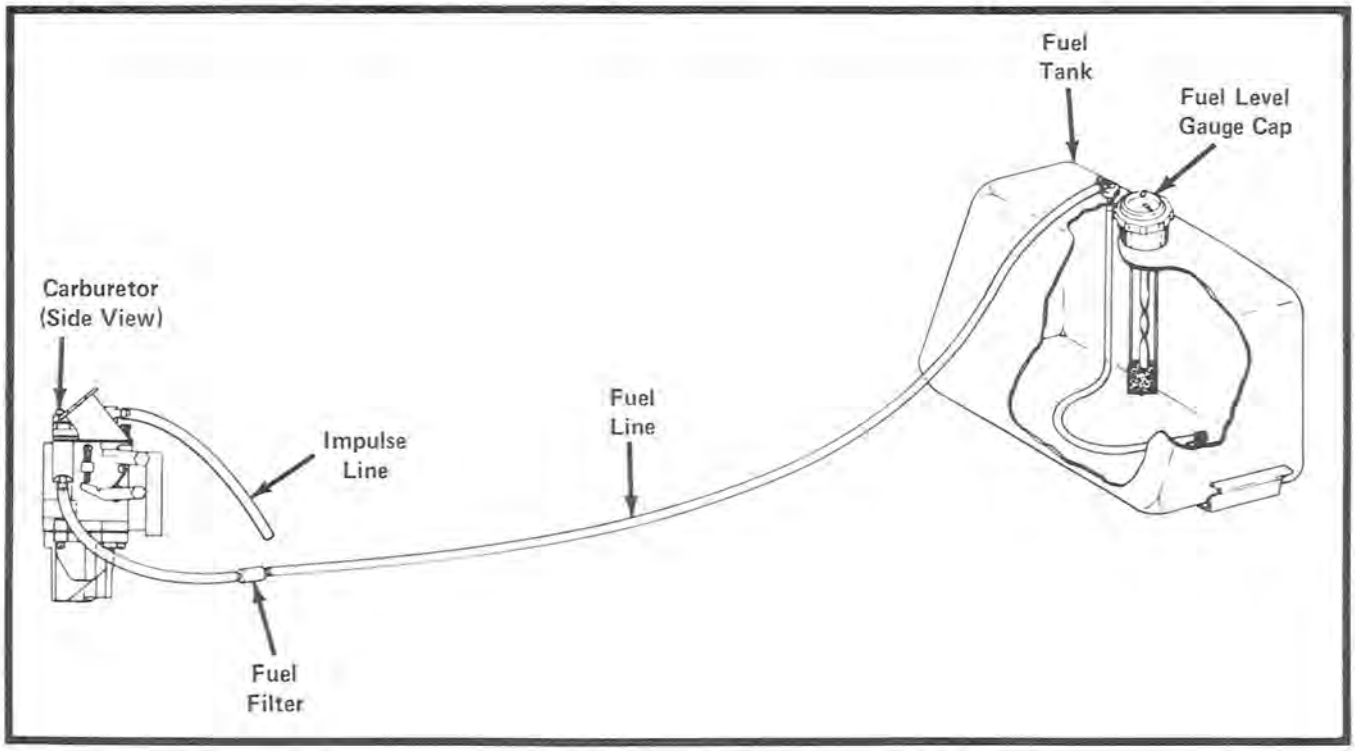
The only lubrication for the Arctic Cat engine is the fuel mixture used during the combustion process and, for this reason, significant importance is placed on fuel mixing. The correct ratio of gasoline to oil is 20:1. If the fuel mixture contains too much oil, excessive carbon deposits will form on the piston and in the cylinder head, and the spark plug will eventually foul because of incomplete combustion.

The fuel tank is made of 20 gauge cold rolled steel and has an approximate capacity of 6.25 U.S. gallons. The outside of the fuel tank is specially cleaned, then coated with a gasoline/oil-resistant paint. The tank is equipped with a vented fuel level gauge cap that allows vapor gasses to escape into the atmosphere and, also, allows fuel to flow to the carburetor. If a vent hole would not be provided in the fuel level gauge cap or if the vent hole became obstructed, fuel would not flow from the fuel tank.

The fuel tank is also equipped with a fitting to accommodate the fuel line. The section of fuel line that extends down to the bottom of the fuel tank has a screened filter at the end which filters out impurities in the gasoline that would normally flow to the carburetor. As an added precaution, an in-line filter is also placed in the fuel line, just before the carburetor-mounted fuel pump. These filters are required to ensure foreign matter does not pass into the engine and cause severe damage.

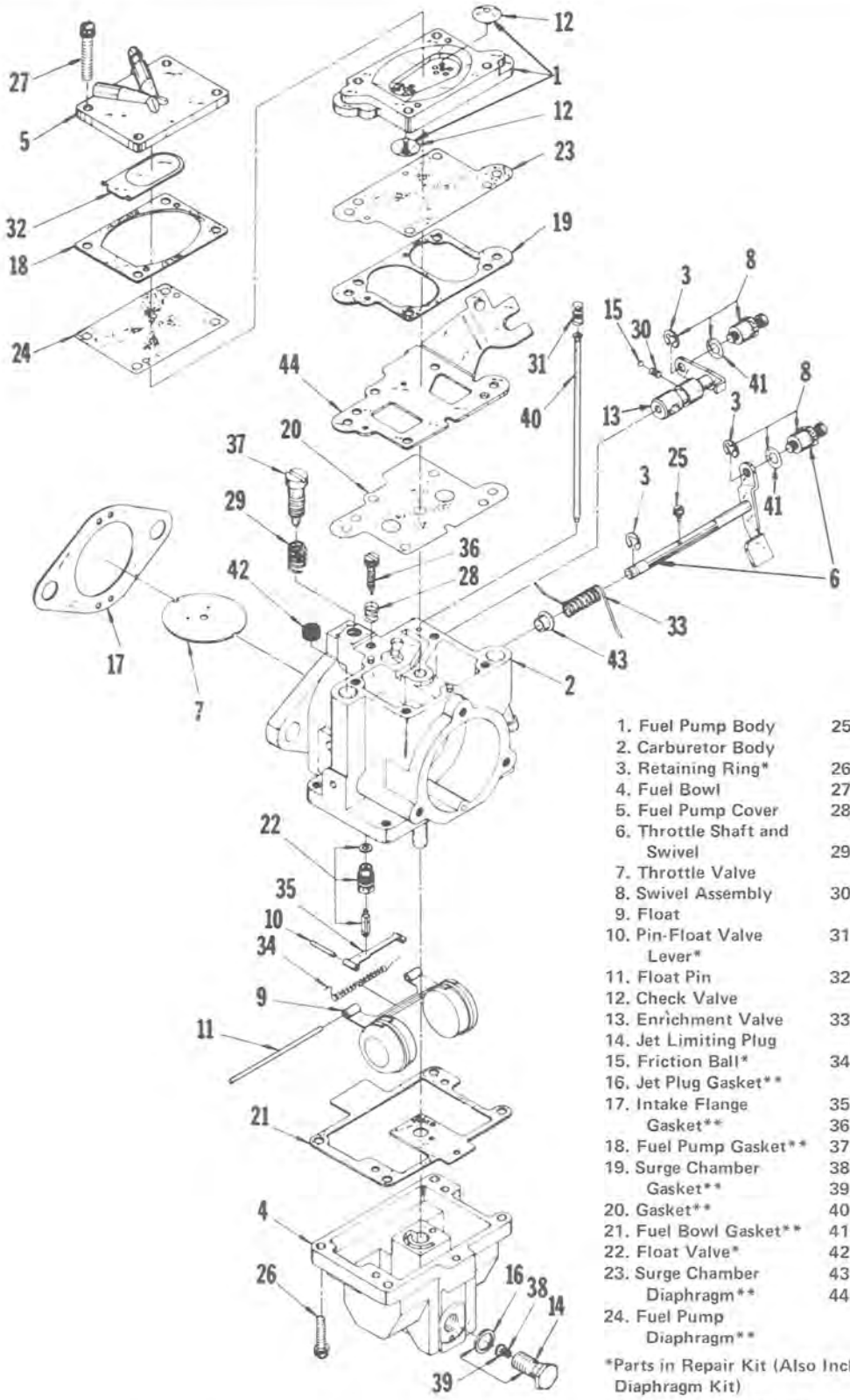
To transmit fuel from the fuel tank to the engine, the Walbro WF-1 carburetor is used. The carburetor is a float-type, has integrally-mounted fuel pump and has a fixed main jet. The fuel pump is operated by crankcase impulses which pass through the impulse line that is connected to the fuel pump and engine crankcase. The primary function of the carburetor is to meter a precise volume of fuel and, at a specific time, change liquid fuel to a vapor that is mixed with air, resulting in a volatile gas that can be ignited by the spark plug. And because the carburetor has a high fuel volume capacity, vapor locking is virtually nonexistent.

Fig. III-1



WALBRO WF-1 CARBURETOR

Fig. III-2



1. Fuel Pump Body
2. Carburetor Body
3. Retaining Ring*
4. Fuel Bowl
5. Fuel Pump Cover
6. Throttle Shaft and Swivel
7. Throttle Valve
8. Swivel Assembly
9. Float
10. Pin-Float Valve Lever*
11. Float Pin
12. Check Valve
13. Enrichment Valve
14. Jet Limiting Plug
15. Friction Ball*
16. Jet Plug Gasket**
17. Intake Flange Gasket**
18. Fuel Pump Gasket**
19. Surge Chamber Gasket**
20. Gasket**
21. Fuel Bowl Gasket**
22. Float Valve*
23. Surge Chamber Diaphragm**
24. Fuel Pump Diaphragm**
25. Throttle Valve Screw*
26. Fuel Bowl Screw*
27. Fuel Pump Screw*
28. Idle Fuel Screw Springs
29. Idle Air Screw Spring
30. Enrichener Friction Spring*
31. Idle Tube Pressure Spring*
32. Fuel Pump Leaf Spring
33. Throttle Return Spring
34. Float Support Spring
35. Float Valve Lever
36. Idle Fuel Screw
37. Idle Air Screw
38. High Speed Jet
39. Jet Assembly
40. Idle Fuel Feed Tube
41. Swivel
42. Fuel Inlet Screen
43. Throttle Bushing
44. Throttle Bracket Plate

*Parts in Repair Kit (Also Includes Gasket/Diaphragm Kit)

**Parts in Gasket/Diaphragm Kit

BEFORE TROUBLE SHOOTING THE CARB.

Check Fuel Tank Filter

Equipment Necessary: Gasoline, Compressed Air, and 12-Inch Piece of Stiff Wire

Inside the fuel tank on the end of the fuel line is a brass screen fuel filter. The filter must be clean to allow the fuel line to transmit the maximum volume of fuel to the carburetor. If the fuel filter or vent hole in the fuel tank gauge cap is obstructed, fuel flow will be restricted — cleaning is required.

1. If the fuel tank gauge cap vent hole is plugged, remove the obstruction by washing it in gasoline. After cleaning, dry with compressed air.
2. Form a hook on the end of a piece of stiff wire.
3. Insert the hook through the filter hole; then pull the fuel line and filter from within the fuel tank.
4. Examine the condition of the fuel filter. If filter is obstructed, clean it by using gasoline. If brass screen or spring is damaged, replace the fuel filter.
5. Install filter and fuel tank gauge cap.

Check In-Line Fuel Filter

Equipment Necessary: Gasoline

The fuel line incorporates an in-line fuel filter, just before the carburetor fuel inlet fitting. The filter must be clean to allow the fuel line to transmit the maximum volume of fuel to the carburetor. If the in-line fuel filter is obstructed, fuel flow will be restricted — cleaning is required.

1. Remove the in-line fuel filter from the fuel line. After filter is removed, plug the fuel line to prevent fuel drainage from the fuel tank.
2. The in-line fuel filter is a unitized component and does not have a replaceable filtering element. Therefore, the only cleaning that can be performed is a back-flush of the filter, using gasoline.
3. When the fuel filter is clean, install it in the fuel line. Arrow on filter must point toward the carburetor.
4. Check the fuel line for proper connection on the fuel tank, fuel filter and carburetor fittings, and make sure they are tight. If fuel line is cracked or deteriorated, replacement is necessary.

Starting a Flooded Engine

Equipment Necessary: 13/16-Inch Spark Plug Socket and Torque Wrench

1. Make sure the ignition key is in the OFF position.
2. Disconnect the high tension wires from the spark plugs; then remove the spark plugs, using a 13/16-inch spark plug socket.
3. Crank the engine over 10-15 times because this will clear the engine of excess fuel.
4. Dry the spark plugs and install them in the cylinder heads. Tighten the spark plugs to 16-18 ft. lbs., using a 13/16-inch spark plug socket and a torque wrench. Connect the high tension wires to the spark plugs.
5. Start the engine (see Section I, General Starting/Stopping Instructions, page I-9).

Note: If the engine continues to flood, trouble shoot the carburetor (see Carburetor Trouble Shooting, page III-7).

Check High Voltage Output

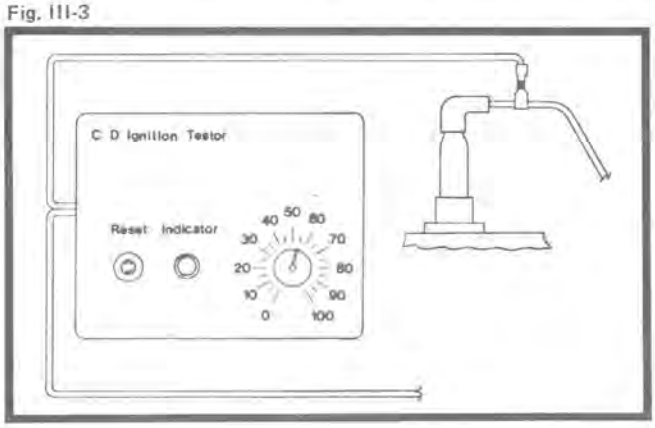
Equipment Necessary: Electro-Specialties CD Ignition Tester Model No. 1 with Secondary Output Lead, New Spark Plugs, 13/16-Inch Spark Plug Socket and Torque Wrench

Before the carburetor is considered to be seriously defective, make sure there is enough high voltage output from the ignition coils to ignite the fuel mixture in the cylinder.

1. Remove RFI suppressor cap from MAG side high tension wire. Next, connect the CD ignition tester's secondary output lead to the yellow lead on the CD ignition tester; then install the opposite end of the secondary output lead on the MAG side high tension wire, Fig. III-3.
2. Connect the remaining CD ignition tester to ground, Fig. III-3. Set tester dial on 55.

BEFORE TROUBLE SHOOTING THE CARB.

Fig. III-3



3. Grasp the recoil handle and crank the engine over quickly.

4. If the red light on the CD ignition tester illuminates when both high tension wires are checked, the spark plug and high voltage output is satisfactory and, therefore, a carburetor problem exists. If red light did not illuminate, proceed to step 5.

Note: Remember to press the RESET button after the red light illuminates. Repeat the test three times for conclusive results.

5. Remove the customer's old spark plugs and install new spark plugs, using a 13/16-inch spark plug socket and torque wrench. Tighten spark plugs to 16-18 ft. lbs. Connect the high tension wires to the spark plugs.

6. Connect the secondary output lead to the high tension wire and the other lead to ground, Fig. III-3. Set tester dial on 55.

7. Grasp the recoil handle and crank the engine over quickly.

8. If red light on tester illuminates when both high tension wires are checked, high voltage output from the coil is satisfactory, but the customer's old spark plug is defective. If the red light on the tester did not illuminate, there is a problem in the ignition system, NOT THE CARBURETOR. Since this is the case, check the ignition system and wiring harness to isolate the problem (see Section IV, Electrical System, Ignition System and Main Wiring Harness Check).

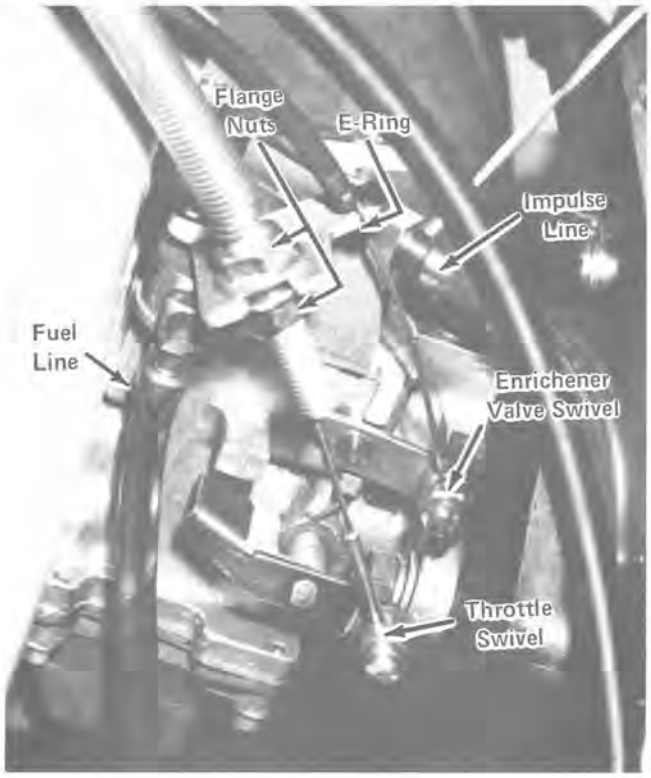
CARBURETOR TROUBLE SHOOTING

Problem	Condition	Remedy
Engine will not start because fuel does not get into fuel bowl.	Obstruction (corrosion) between float valve and seat.	Disassemble carburetor and clean thoroughly (make sure neoprene insert in float valve seat is clean).
Engine will not start, whether cold or hot, unless choke control is pulled out.	Tip of fuel screw broken off and embedded in main body of carburetor.	Replace main body and fuel screw.
Fuel runs out of high speed air bleed in fuel bowl and enrichener valve hole at back of carburetor.	Foreign matter between float valve and seat, causing float to stay open continuously.	Disassemble carburetor and clean thoroughly (make sure neoprene insert in float valve is clean).
Poor acceleration from idle (carburetor too rich).	1. Air screw approximately 2-4 turns open and fuel screw approximately 1-2 turns open. 2. Float punctured.	1. Adjust carburetor (see Initial Adjustment and Final Adjustment, pages III-21 and III-22). 2. Replace float.
Poor acceleration from idle (carburetor too lean).	Air screw approximately 2-4 turns open and fuel screw approximately 3/4-1 turn open.	Adjust carburetor (see Initial Adjustment and Final Adjustment, pages III-21 and III-22).
Engine runs lean on PTO side, but fouls plug on mag side.	Air silencer cracked or baffle installed wrong.	Replace air silencer.
Engine runs slightly lean at top end.	Air pocket in fuel line caused by leaky check valve(s).	Replace check valve(s).

CARBURETOR REMOVAL

Remove Carburetor from Intake Manifold (Fig. III-4)

Fig. III-4



Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, Two 1/2-Inch Open-End Wrenches, 13mm Wrench, and 7/16-Inch Socket

1. Remove the fuel line from the carburetor and plug the line to prevent fuel from flowing out of the fuel tank and through the fuel line. Also remove the impulse line from the fuel pump cover.

2. Remove the choke control wire from the carburetor enrichener valve swivel, using a screwdriver having a 1/4-inch blade. Also remove the E-ring holding the choke cable in throttle control bracket plate, using a screwdriver having a 1/4-inch blade.

3. Remove the throttle control wire from the carburetor throttle swivel, using a 1/4-inch blade.

4. Loosen the two flange nuts holding the throttle cable to the throttle control bracket plate, using two, 1/2-inch open-end wrenches.

5. Remove the two nuts, lock washers, and flat washers holding the carburetor against the intake manifold, using a 13mm open-end wrench.

6. Slide carburetor, collar bushings, insulator gaskets, and insulator block off the intake studs.

7. Remove the three cap screws, lock washers, and flat washers holding air intake silencer to the carburetor, using a 7/16-inch socket. This step is only to be performed if removal of silencer from carburetor is required.

CARBURETOR SERVICING (DISASSEMBLY)

General

Before the Walbro WF-1 carburetor is disassembled, clean the exterior of the carburetor using carburetor cleaner.

Remove Fuel Bowl and Related Components

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, Needle Nose Pliers, Punch, Hammer, 5/16-Inch Socket, and a Piece of Stiff Wire

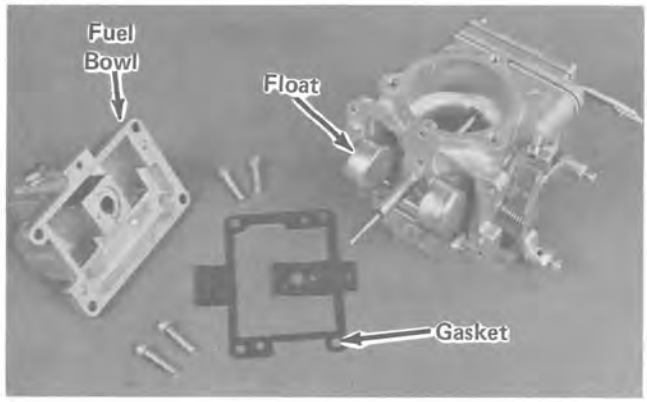
1. Remove the four screws and lock washers holding the fuel bowl on the main carburetor body, Fig. III-5, using a screwdriver having a 1/4-inch blade.

2. Carefully remove the fuel bowl, Fig. III-5, which will expose the fuel bowl gasket, floats, float lever, float valve, and the float valve seat.

Note: Observe the position of the float support spring so it can be installed properly when the carburetor is assembled.

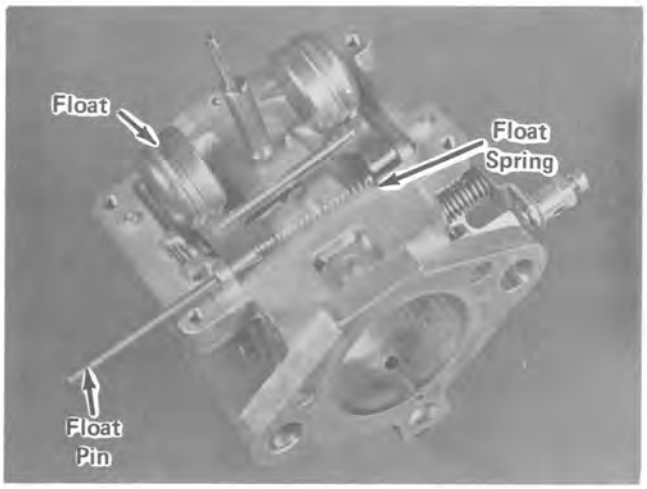
CARBURETOR SERVICING (DISASSEMBLY)

Fig. III-5



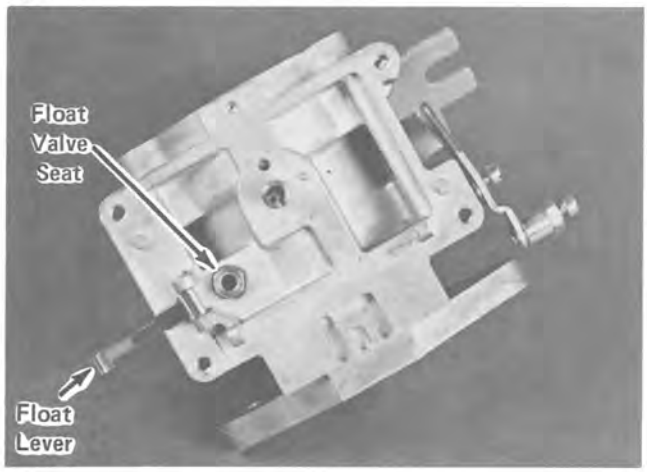
3. Remove the float pin, using a needle nose pliers. The float and float spring will now be free for removal purposes, Fig. III-6.

Fig. III-6



4. Pivot the float lever away from the carburetor body and slide the float valve out of the float valve seat, Fig. III-7.

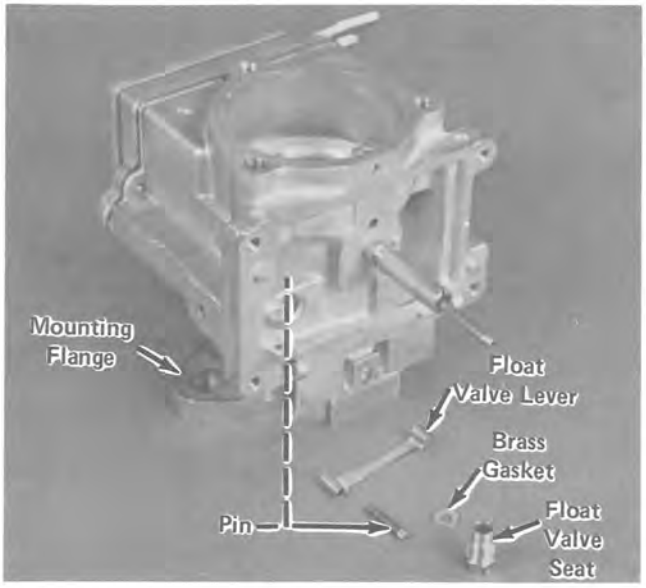
Fig. III-7



5. Lightly tap the float valve lever pin out toward the carburetor mounting flange, Fig. III-7, using a punch and hammer. After the float valve pin is removed, the float valve lever will be free.

6. Remove the float valve seat, Fig. III-8, from the main carburetor body, using a 5/16-inch socket. Carefully remove the brass gasket, Fig. III-8, from the carburetor body float valve seat area, using a piece of stiff wire.

Fig. III-8



CAUTION

Be extremely careful when removing the brass gasket. If the threads for the float valve seat are accidentally damaged when using the stiff wire, carburetor body replacement will be required.

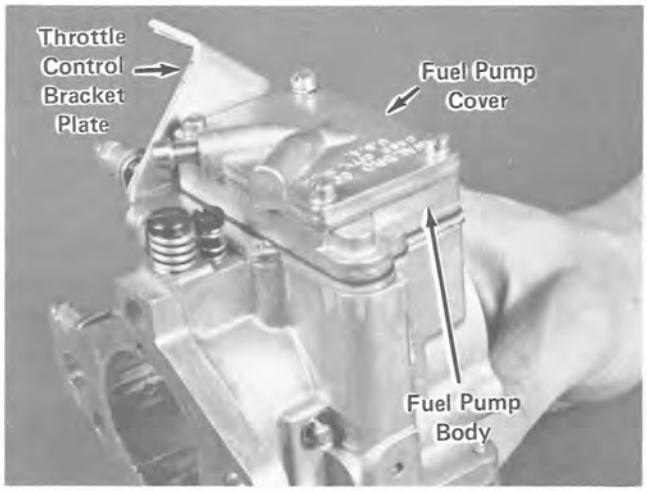
Remove Fuel Pump and Related Components

Equipment Necessary: Screwdriver Having a 14-Inch Blade

1. Remove the four screws and lock washers that secure the fuel pump cover, fuel pump body, and throttle control bracket plate on the carburetor body, Fig. III-9, using a screwdriver having a 1/4-inch blade.

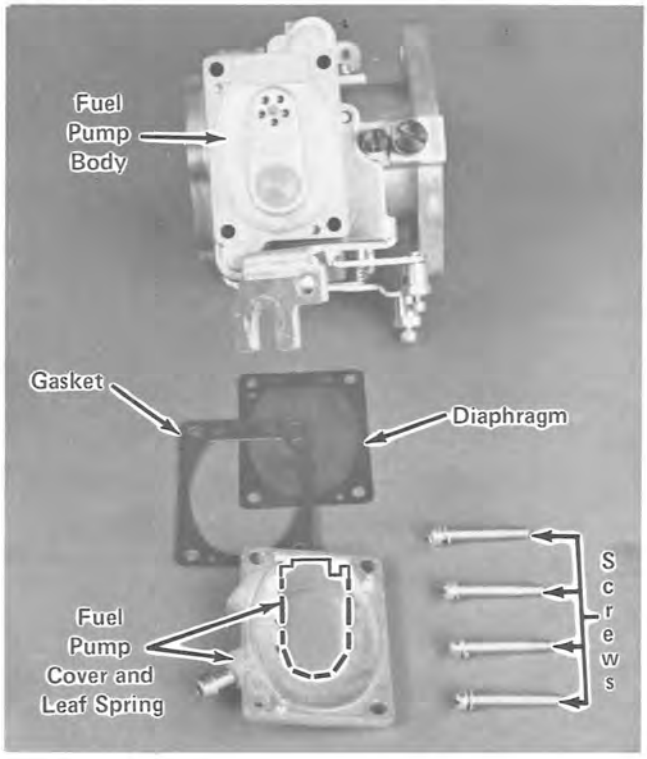
CARBURETOR SERVICING (DISASSEMBLY)

Fig. III-9



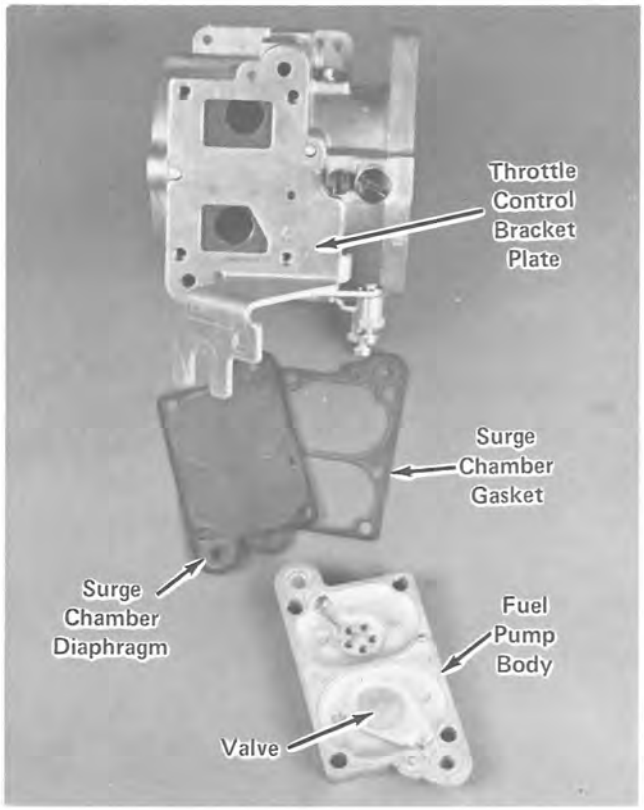
2. After the screws and lock washers are removed, remove the fuel pump cover and leaf spring, gasket, and diaphragm, which will expose the fuel pump body, Fig. III-10.

Fig. III-10



3. Remove the fuel pump body, surge chamber diaphragm, and surge chamber gasket, which will expose the throttle control bracket plate, Fig. III-11.

Fig. III-11



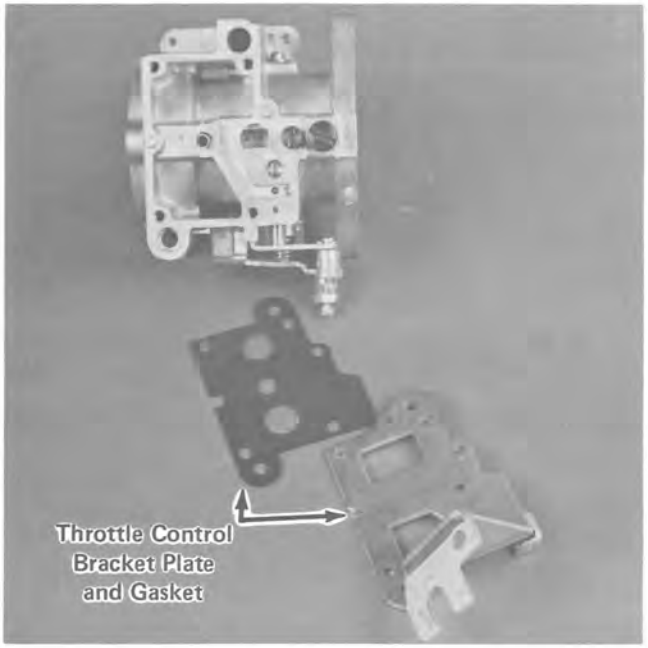
CAUTION

DO NOT remove the rubber fuel pump valves from the fuel pump body unless valve replacement is required. Valve damage is usually incurred when the valves are removed. To make valve installation easier when replacement is required, lubricate the valve with oil; then press the valve into position in the fuel pump body.

4. Remove the throttle control bracket plate and gasket, Fig. III-12.

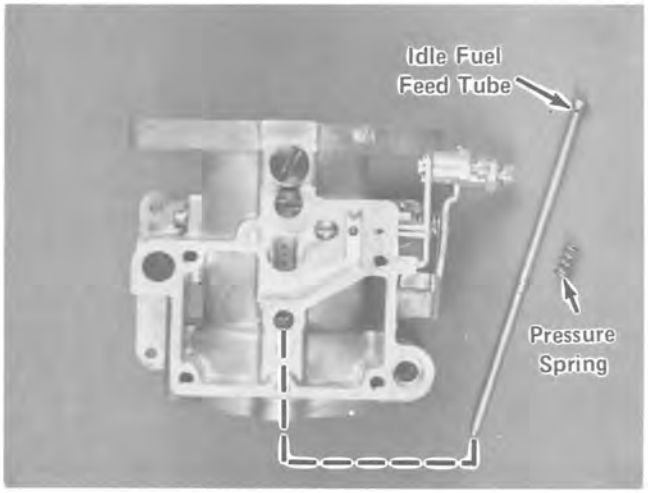
CARBURETOR SERVICING (DISASSEMBLY)

Fig. III-12



5. Remove the idle fuel feed tube and pressure spring from the carburetor body, Fig. III-13.

Fig. III-13



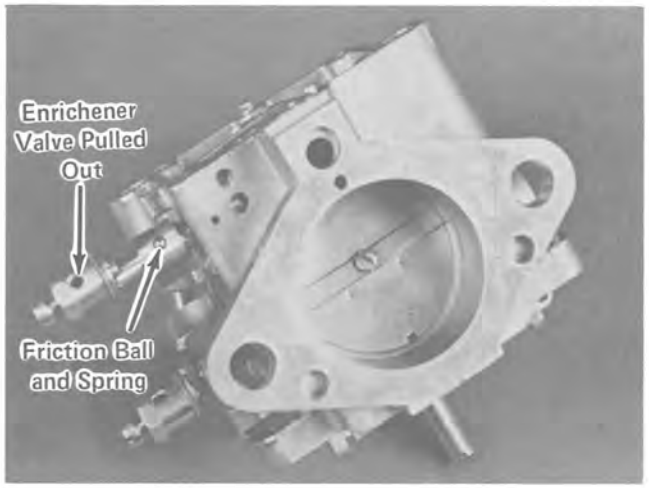
Remove Carburetor Control Components

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade and 1/2-Inch Socket

1. Remove the idle air screw and the idle fuel screw, using a screwdriver having a 1/4-inch blade. Also, account for the two springs.

2. Grasp the carburetor body and hold it in an upright position. Pivot the enrichment valve up and carefully (slowly) pull the enrichener valve out of the carburetor body, Fig. III-14.

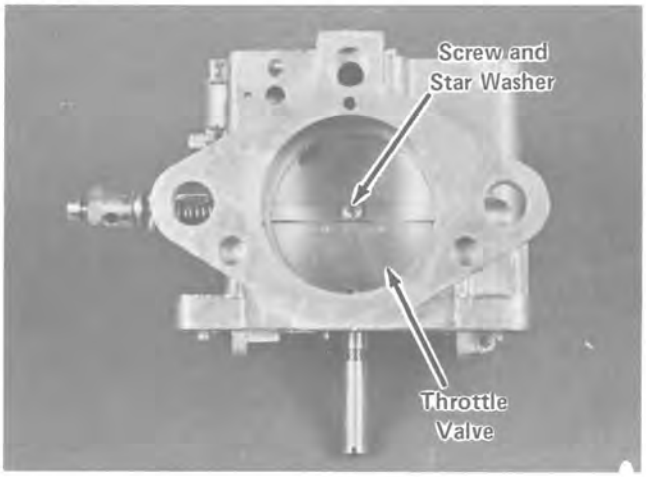
Fig. III-14



3. Place the enrichener valve in a cupped hand and allow the friction ball and spring, Fig. III-14, to fall out of the valve.

4. Remove the screw and star washer holding the throttle valve between the throttle shaft, Fig. III-15, using a screwdriver having a 1/4-inch blade. Rotate the throttle shaft until the throttle valve is parallel to the carburetor bore; then pull the valve from between the split in the throttle shaft, using thumb and forefinger.

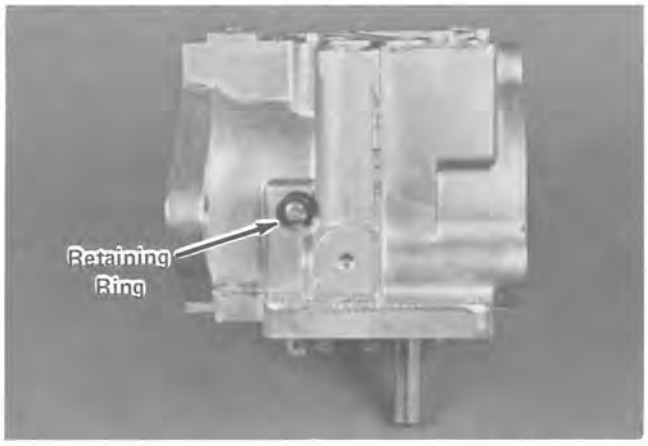
Fig. III-15



5. Push the retaining ring off the throttle shaft, Fig. III-16, using a screwdriver having a 1/4-inch blade.

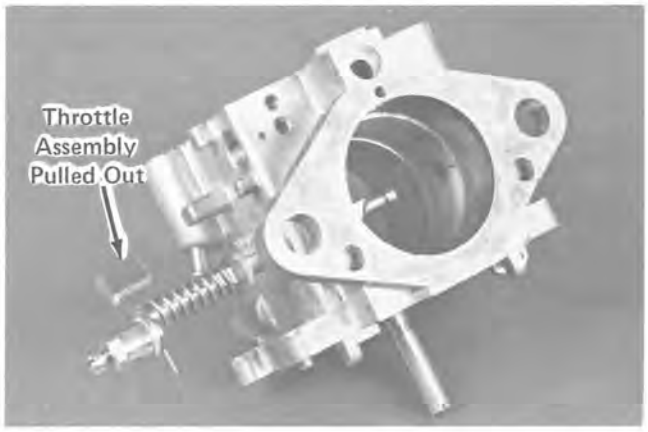
CARBURETOR SERVICING (DISASSEMBLY)

Fig. III-16



6. Slowly allow the throttle return spring to release all tension. When spring tension is released, pull the throttle shaft, spring, and bushing out of the carburetor body, Fig. III-17.

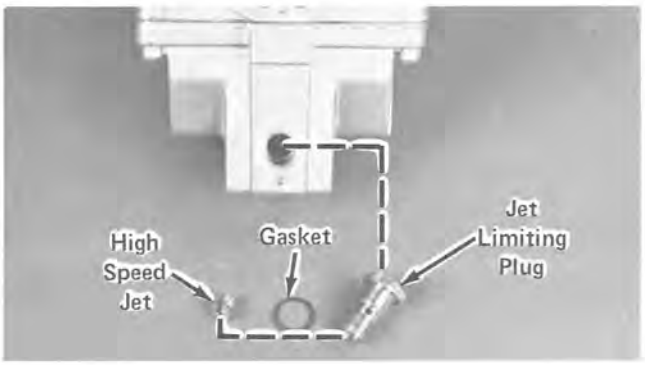
Fig. III-17



Note: DO NOT lose the bushing located next to the throttle return spring. The bushing serves as a seal between the throttle shaft and carburetor body. A defective or nonexistent bushing will cause a lean carburetor condition.

7. Remove the jet limiting plug and gasket from the fuel bowl, Fig. III-18, using a 1/2-inch socket. Remove the high speed jet from the jet limiting plug, Fig. III-18, using a screwdriver having 1/4-inch blade. At this time carburetor is disassembled completely.

Fig. III-18



CLEANING INDIVIDUAL COMPONENTS

Cleaning

Equipment Necessary: Cleaning Fluid, Carburetor Cleaner and Compressed Air

1. Carefully wash all metalic carburetor components, using cleaning fluid.

CAUTION

DO NOT place any of the nonferous components, such as gaskets and diaphragms, in the cleaning fluid because deterioration may occur. Since the rubber check valves are not to be removed from the fuel pump body unless replacement is required, the fuel pump with check valves must be washed in cleaning fluid, not carburetor cleaner.

CLEANING INDIVIDUAL COMPONENTS

2. After metallic carburetor components are cleaned, place all metallic components, except the fuel pump body, in a basket and submerse in carburetor cleaner.

> **CAUTION**
>
> **DO NOT submerse the fuel pump body in carburetor cleaner if the rubber check valves are intact. However, if the valves are removed from the fuel pump body, only because of deterioration, the body can be submersed in carburetor cleaner.**

3. Allow the carburetor components to soak in the carburetor cleaner solution for approximately one hour. After the one hour soak period, remove the components from the basket and rinse them with clean carburetor cleaner.

4. Dry the components with compressed air, making sure all holes, channels, and orifices are open.

> **CAUTION**
>
> **DO NOT damage the small brass orifice plugs that meter air and fuel for proper carburetor operation. If plugs are damaged, carburetor body replacement is required.**

INSPECTING INDIVIDUAL COMPONENTS

Inspecting

Equipment Necessary: No Special Tools Required

1. Examine the float for punctures by submersing it in cleaning solution; then watch for the escape of air bubbles from the float. If air escapes from the float, it is defective and must be replaced.

2. Inspect the fuel inlet screen. Blow compressed air through the float valve seat to free the screen of any obstruction.

> **CAUTION**
>
> **DO NOT blow high pressure air through the carburetor until it is disassembled completely. DAMAGE to the float, brass orifice plugs, and other components WILL occur if high pressure air is blown through the carburetor when completely assembled.**

3. Examine the carburetor body, fuel pump cover, fuel pump body, and throttle control bracket plate for cracks, nicks, stripped threads, and any noticeable imperfection in the castings. If any of these conditions exist, replacement of the particular component is required.

4. Examine the rubber fuel pump check valves. If the valves are distorted, swollen, or do not seal against the casting, replacement is required.

5. Inspect all diaphragms, and gaskets for distortion, tears, and any other noticeable damage. Replace components as conditions dictate.

6. Check the throttle return spring, idle fuel feed tube pressure spring, air screw spring, fuel screw spring, and the float support spring. If a spring is damaged or condition is doubtful, replacement is required.

7. Inspect the air screw, fuel screw, high speed jet, jet plug, float valve, and float valve seat for wear, broken tips, damaged threads, and excessive pitting. Replace components as conditions dictate.

8. Examine the throttle shaft and enrichener valve mounting holes in the carburetor body. Excessive wear between the shafts will cause a lean carburetor condition because air will enter between the shaft and mounting hole. If the throttle shaft, enrichener valve, and/or carburetor mounting holes are worn, replace the appropriate components.

9. Inspect the throttle shaft and enrichener valve control mounting swivels for wear,

INSPECTING INDIVIDUAL COMPONENTS

stripped threads, damaged retaining ring, or a broken retaining screw. If any of these conditions exist, replacement is required.

10. Inspect the throttle valve for wear or damage. Make sure the screw and star washer holds the throttle valve tightly between the split section of the throttle shaft.

CARBURETOR SERVICING (ASSEMBLY)

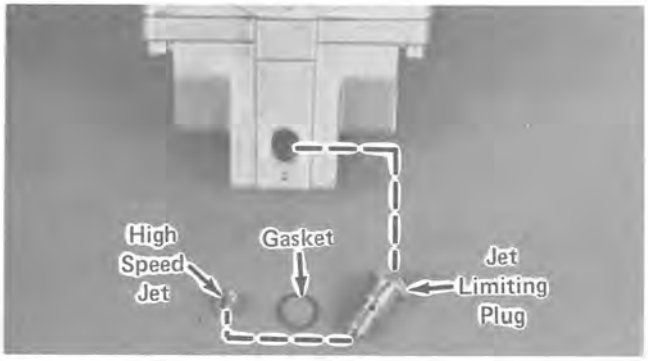
Install Carburetor Control Components

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, 1/2-Inch Socket and Torque Wrench

Note: When the Walbro WF-1 carburetor is to be rebuilt, use a repair kit (Arctic Part No. 6503-025) for complete servicing. The repair kit also includes a gasket and diaphragm kit (Arctic Part No. 6503-015). The gasket/diaphragm kit may be ordered separately if only these specific components (gaskets and diaphragms) are to be replaced.

1. Install the high speed jet in the jet limiting plug, using a screwdriver having a 1/4-inch blade; then install the jet limiting plug and gasket in the fuel bowl, Fig. III-19, using a 1/2-inch socket. Tighten the jet limiting plug to 4-6 ft. lbs., using a 1/2-inch socket and torque wrench.

Fig. III-19

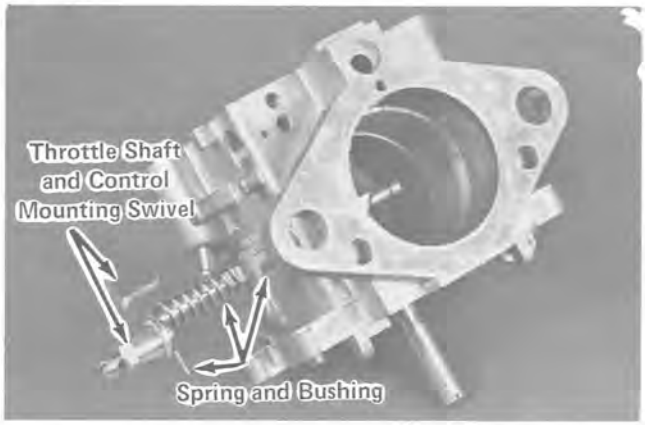


2. Install a control mounting swivel on the throttle shaft if replacement was required, Fig. III-20.

3. Slide the throttle return spring and bushing onto the throttle shaft, Fig. III-20. Flat side of bushing is to contact the carburetor body when shaft is installed.

4. Seat the throttle return spring against the flat surface of the throttle arm. Hold throttle arm vertically in relation to the top of the carburetor. Make sure the end of the throttle return spring points toward the bottom of the carburetor, Fig. III-20.

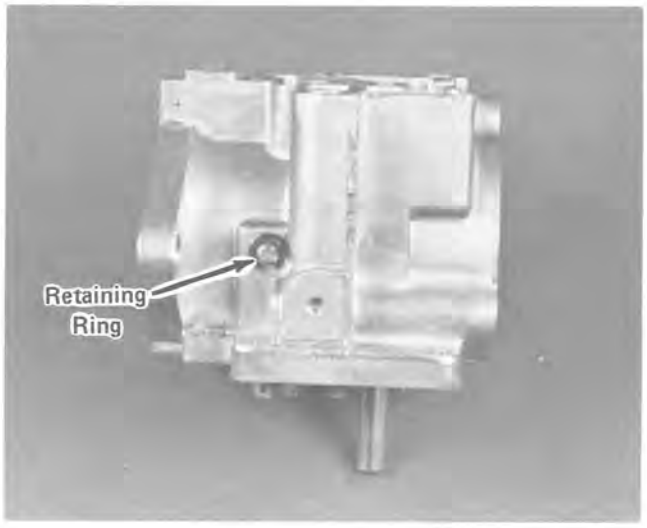
Fig. III-20



5. Slide throttle shaft through the carburetor body until the bushing and spring contact the side of the body. Rotate the throttle arm 1/4 turn counterclockwise and push the throttle shaft completely through the carburetor body. Hold throttle shaft in this position.

6. Secure the throttle shaft in place with the retaining ring, Fig. III-21. Release throttle arm.

Fig. III-21



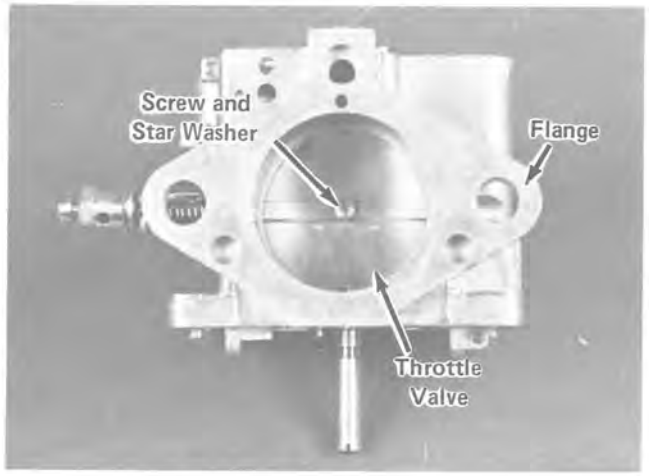
CARBURETOR SERVICING (ASSEMBLY)

7. Rotate the throttle arm counterclockwise and slide the throttle valve between the split section of throttle shaft. Line up hole in throttle shaft and valve. Carefully open and close the throttle a few times to center the valve in the carburetor bore.

Note: The number stamped into the throttle valve must be positioned near the bottom of the carburetor bore, and facing the mounting flange.

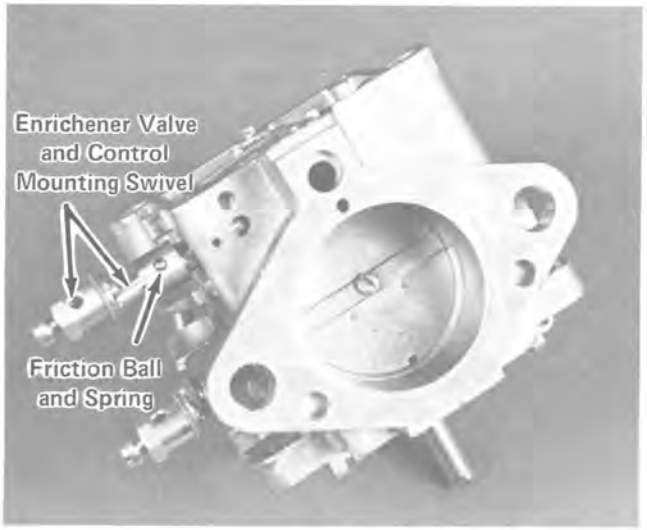
8. When the throttle valve is centered properly, secure it in place with screw and star washer, Fig. III-22, using a screwdriver having a 1/4-inch blade.

Fig. III-22



9. Install a control mounting swivel, Fig. III-23, on the enrichener valve if replacement was required.

Fig. III-23



10. Insert the friction spring and ball into the small bore at end of enrichener valve, Fig. III-23. Hold enrichener valve vertically in relation to the top of the carburetor. Make sure the control swivel points toward the top of the carburetor.

11. Push the enrichener valve, friction spring and ball into the carburetor body mounting hole.

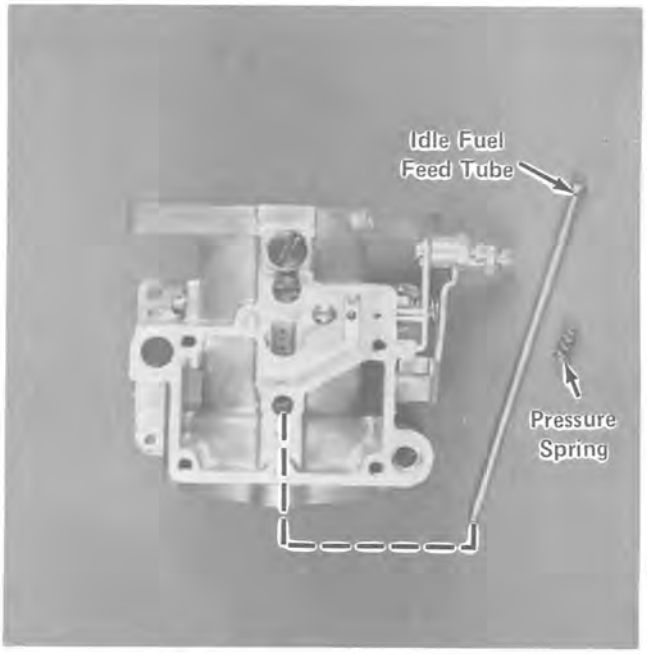
12. Install the air screw and fuel screws, along with their respective springs, in the top of the carburetor body. Seat both screws finger-tight only. DO NOT USE A SCREWDRIVER.

Install Fuel Pump and Related Components

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade

1. Slide the tapered end of the idle fuel feed tube into its mounting hole and through the carburetor body, Fig. III-24. Place the pressure spring on top of the idle fuel feed tube.

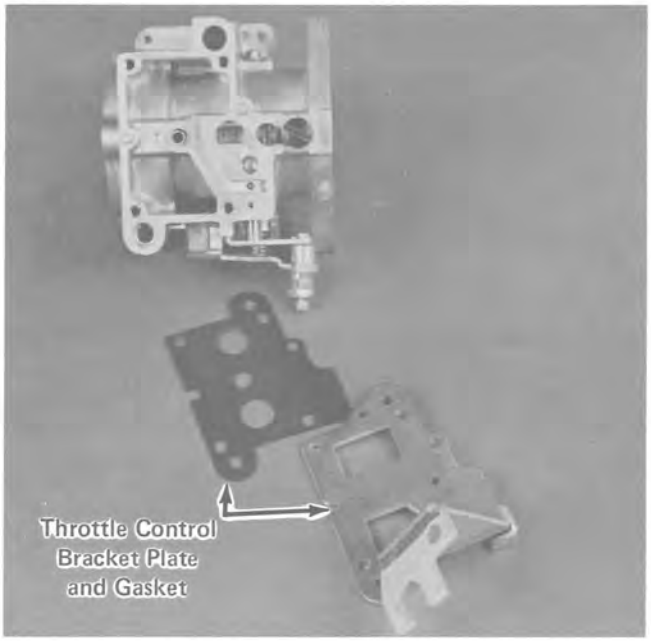
Fig. III-24



2. Install the fuel pump gasket and throttle control bracket plate on top of the carburetor, Fig. III-25. Hold components in position.

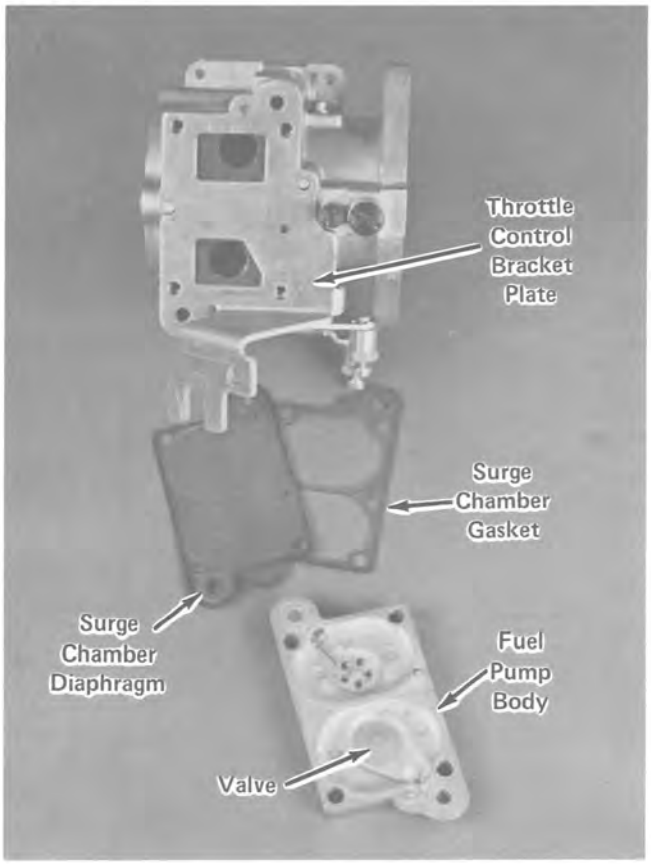
CARBURETOR SERVICING (ASSEMBLY)

Fig. III-25



3. Place the surge chamber gasket, surge chamber diaphragm, and the fuel pump body on the throttle control bracket plate, Fig. III-26. Hold all components in position.

Fig. III-26

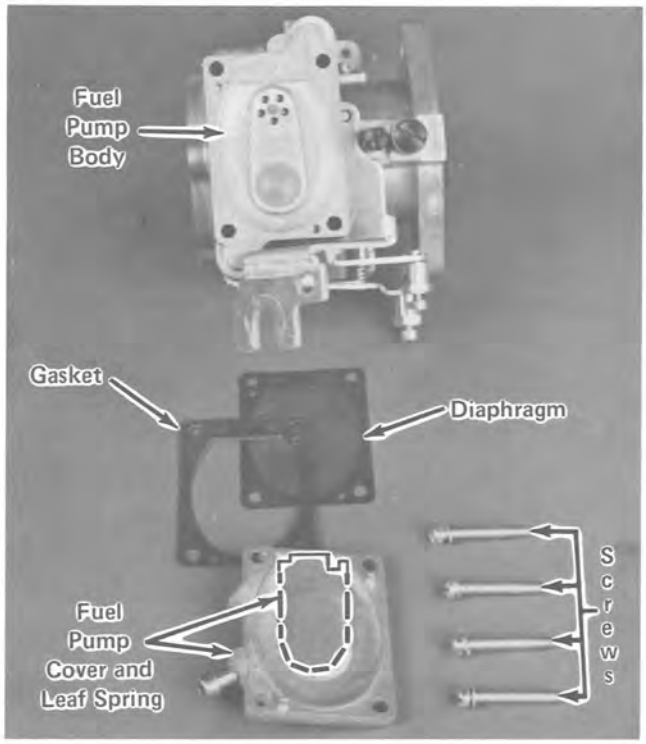


Note: The two surge chambers, Fig. III-26, in the fuel pump body must face the throttle control bracket plate to assure proper operation of the carburetor.

4. Place the fuel pump diaphragm, pump gasket, and cover with leaf spring on the fuel pump body, Fig. III-27.

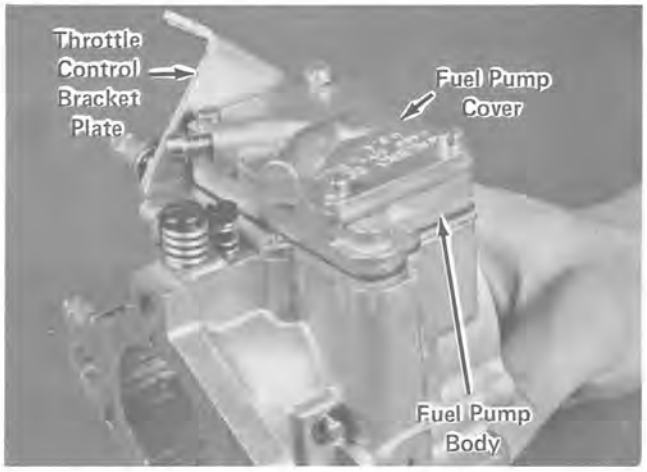
Note: The leaf spring tabs must be seated in the fuel pump cover to assure proper carburetor operation.

Fig. III-27



5. Secure the fuel pump cover, fuel pump body, throttle control bracket plate, gaskets, and diaphragms to top of the carburetor body with four screws and lock washers, Fig. III-28, using a screwdriver having a 1/4-inch blade. Tighten screws securely so an air leak cannot occur.

Fig. III-28

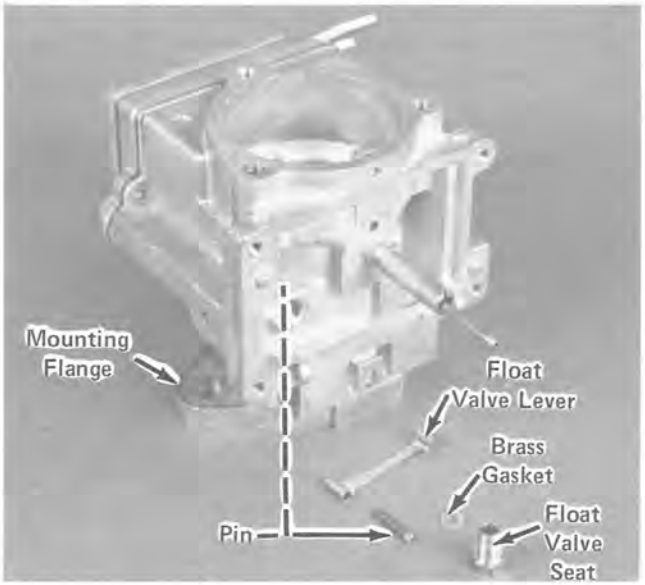


Install Fuel Bowl and Related Components

Equipment Necessary: 5/16-Inch Socket, Torque Wrench, 1/4 x 3/32-Inch Flat-End Punch, Hammer and Screwdriver Having a 1/4-Inch Blade

1. Install the float valve seat gasket and the float valve seat in the bottom of the carburetor body, Fig. III-29, using a 5/16-inch socket. Tighten the float valve seat to 3 ft. lbs., using a 5/16-inch socket and torque wrench.

Fig. III-29

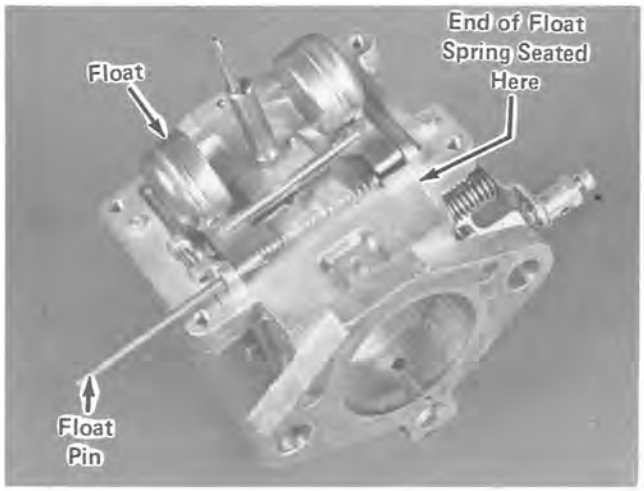


2. Position the float valve lever between the mounting tabs and secure in place with float valve lever pin, Fig. III-29. The half-moon tab at the end of the float valve lever must face away from the carburetor.

Note: The splined end of the pin must be positioned nearest the mounting flange side of the carburetor. Therefore, the nonsplined end of the pin must be inserted into the mounting tab hole nearest the mounting flange. Seat the float valve lever pin, using a 1/4 x 3/32-inch flat-end punch and hammer.

3. Position the float between the mounting tabs; then slide the float pin through one mounting tab and one end of the float pivot, Fig. III-30.

Fig. III-30



4. Place the float support spring on the pin; then slide the pin through the spring, opposite side float pivot, and remaining mounting tab.

Note: One end of the float support spring must be seated behind the control side mounting tab, Fig. III-30.

5. Push the end of the return spring, nearest the float valve seat, toward the control side float mounting tab; then preload the spring 1/2 turn and seat it on top of the float arm.

Note: Check for proper float spring installation by holding the carburetor in an upright position. Pull float down approximately 3/4-inch, then release it – spring tension is to pull float toward the bottom of the carburetor body. If float does not move toward carburetor body, the float spring is installed incorrectly.

6. Pull the float and float valve lever away from the carburetor body. Slide the tapered end of the float valve into the float valve seat. Move

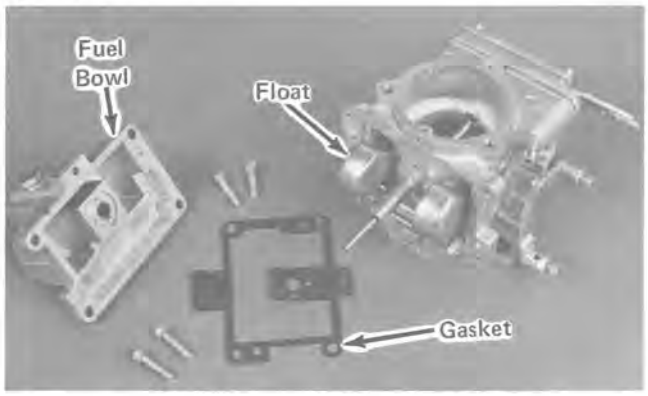
CARBURETOR SERVICING (ASSEMBLY)

float valve lever over the float valve, and allow the float to return to its normal position.

7. Set the float level (see Check Floats and High Speed Jet, page III-21).

8. Install the fuel bowl gasket on the bottom of the carburetor body, Fig. III-31. Carefully, slide the fuel bowl over the idle fuel feed tube and into position on the carburetor body, Fig. III-31.

Fig. III-31



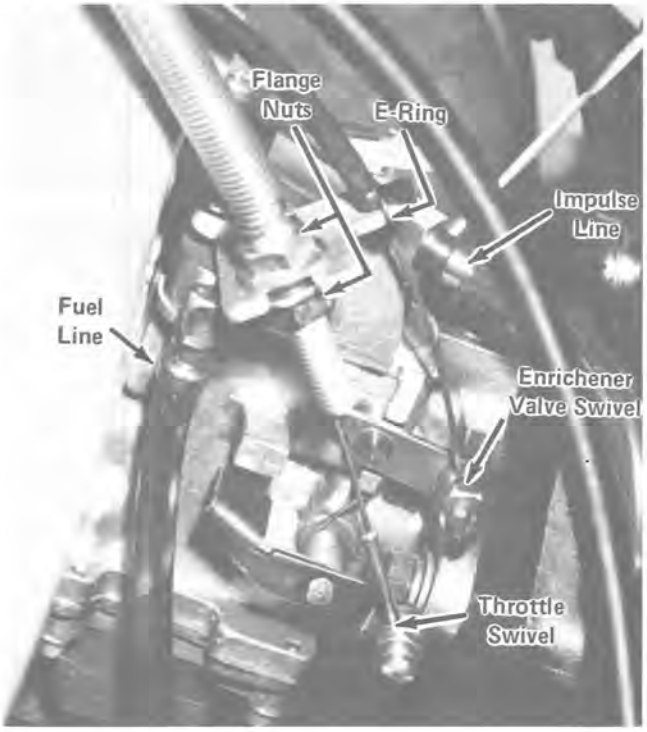
Note: The idle fuel feed tube is to seat in the fuel bowl. Just before the fuel bowl seats on the gasket, slight spring tension against the idle fuel feed tube must be felt. If slight spring pressure is not evident, the pressure spring was not installed when fuel pump and related components were assembled (see Install Fuel Pump and Related Components, step 1, page III-15).

9. Secure the fuel bowl on the bottom of the carburetor with four screws and lock washers, Fig. III-31, using a screwdriver having a 1/4-inch blade. Tighten screws securely to prevent fuel leakage from the fuel bowl.

CARB. INSTALLATION/ADJUSTMENTS

Install Carburetor on Intake Manifold (Fig. III-32)

Fig. III-32



Equipment Necessary: 7/16-Inch Socket, Torque Wrench, 13mm Open-End Wrench, Two 1/2-Inch Open-End Wrenches and Screwdriver Having a 1/4-Inch Blade

1. Check the carburetor insulator block for flatness before the carburetor is mounted (see Check Insulator Block, page III-19).

2. Mount the air intake silencer on the carburetor with three cap screws, lock washers, and flat washers, using a 7/16-inch socket. Tighten the screws to 4 ft. lbs., using a 7/16-inch socket and torque wrench.

3. Slide an insulator gasket, insulator block, and another insulator gasket onto the intake manifold studs. Also slide the two collar bushings onto the studs.

4. Mount the carburetor on the intake manifold studs with two nuts, lock washers, and flat washers, using a 13mm open-end wrench. Tighten the nuts securely.

CARB. INSTALLATION/ADJUSTMENTS

Note: If there was room for a torque wrench to be used, the proper torque value would be 18-22 ft. lbs.

CAUTION

Make sure the two nuts holding carburetor against intake manifold are tight. If the nuts are not tight or if the insulator block is warped, the engine will draw an excessive amount of air. And the result will be a lean carburetor condition, causing severe engine damage.

5. Install the throttle cable between the slot in the throttle control bracket plate. Tighten the flange nuts against the bracket plate, using two, 1/2-inch open-end wrenches.

Note: Approximately 3/4-inch of threaded cable is to extend below the bottom flange nut.

6. Slide the throttle control wire through the carburetor throttle swivel; then adjust throttle (see Throttle Adjustment, page III-19).

7. Push the choke control through the hole in the throttle control bracket plate, and secure in place with E-ring, using a screwdriver having a 1/4-inch blade.

8. Slide the choke control wire through the carburetor enrichener valve swivel, making sure the enrichener valve arm is fully forward (toward engine). Pull console-mounted choke control out approximately 1/16-inch while holding the enrichener valve arm fully forward. Secure the choke control wire in the swivel with the retaining screw, using a screwdriver having a 1/4-inch blade.

Note: The reason for pulling the choke away from the console is to make sure the enrichener valve is closed (not working) when the console-mounted choke control is pushed in.

9. Remove the plug from the fuel line and push the line over the carburetor inlet fitting. Also install the impulse line on the fuel pump cover fitting.

10. Adjust the carburetor (see Adjust Carburetor, page III-20).

Check Carburetor Insulator Block

Equipment Necessary: Pane of Glass, No. 280 Grit Sandpaper and a Clean Rag

1. Lay a piece of no. 280 grit sandpaper on a pane of glass; then slide the carburetor insulator block on the sandpaper. Repeat this step on the opposite side of the insulator block.

2. Examine the insulator block for high spots. If high spots are evident, continue to sand down the insulator block until the insulator block is flat (see step 1). Repeat this step on opposite side of insulator block.

3. When both sides of insulator block are flat, remove sandpaper grit and other buildup from the block, using a clean rag.

Throttle Adjustment

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade and Needle-Nose Pliers

WARNING

Frequently observe the condition of the throttle control wire, cable, and threaded housing. If the throttle control wire, cable, or threaded housing is kinked, stretched, frayed, or does not operate smoothly, replacement is required. A defective throttle control wire, cable, or housing may contribute to serious injury and/or damage to the snowmobile.

The correct adjustment is when the carburetor throttle valve is open completely, while the hand-actuated throttle lever lightly contacts the handle grip.

1. Make sure the engine is not running, then open the hood.

2. Loosen the retaining screw holding the throttle control wire in the carburetor throttle swivel, Fig. III-33, using a screwdriver having a 1/4-inch blade.

3. Pull all slack from the throttle wire plus an additional 1/16-inch of spring tension, using a needle-nose pliers. Hold throttle wire in this position.

CARB. INSTALLATION/ADJUSTMENTS

4. Secure the throttle control wire in the carburetor throttle swivel with the retaining screw, Fig. III-33, using a screwdriver having a 1/4-inch blade.

Note: If the engine fails to start within a reasonable length of time, repeat steps 2-4. The throttle safety switch spring must be tensioned to properly activate the switch. Therefore, if all the throttle control wire slack is not "taken up", plus an additional 1/16-inch of spring tension, the throttle safety switch will not allow the engine to start.

Fig. III-33

CARBURETOR ADJUSTMENTS

Adjust Carburetor

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, Quik Jack and Shop Tach (Revolution Counter)

The Arctic Cat snowmobile engine is equipped with a Walbro WF-1 series carburetor that features an air screw, fuel screw, fixed high speed jet, and float-regulated fuel level. The air screw governs the idle speed by metering the volume of air that is allowed to enter the idle system, and the fuel screw meters the volume of fuel that is allowed to enter the idle system.

Note: Rotate the AIR SCREW clockwise (close) to decrease idle RPM and counterclockwise (open) to increase idle RPM. Rotate FUEL SCREW clockwise (close) to lean out the fuel mixture and counterclockwise (open) to richen the fuel mixture.

The "fixed" high speed jet meters the volume of fuel that passes through the high speed circuit. The high speed circuit works from approximately 25 degrees to full throttle opening. Altitude and temperature variations may require changing the high speed jet to obtain maximum performance.

The fuel level in the fuel bowl is regulated by the projection of the floats. Reacting in conjunction with the floats is a float valve that allows gasoline to flow into the fuel bowl to maintain a constant fuel level. Correct float level (15/16-inch) is necessary to assure proper operation of the engine (see Check Floats and Main Jet, page III-21).

Note: If there is dirt between the float valve and seat, wear or damage to the float valve or seat, or if the float is punctured or adjusted improperly (float too high), fuel overflow will occur. Conversely, if the float valve sticks in the seat, a limited volume of fuel will flow through the carburetor.

One important fact to remember, and it should also be explained to the customer, is that the engine requires approximately 10-20 hours of running time before the idle circuit (slow speed) can be fine tuned. As a result, the break-in settings of the AIR SCREW and FUEL SCREW must be

slightly richer than normal. Because of the slightly richer settings, engine idle may be somewhat erratic and acceleration will not be smooth or quick.

Check Floats and High Speed Jet

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, Scale, and 1/2-Inch Socket

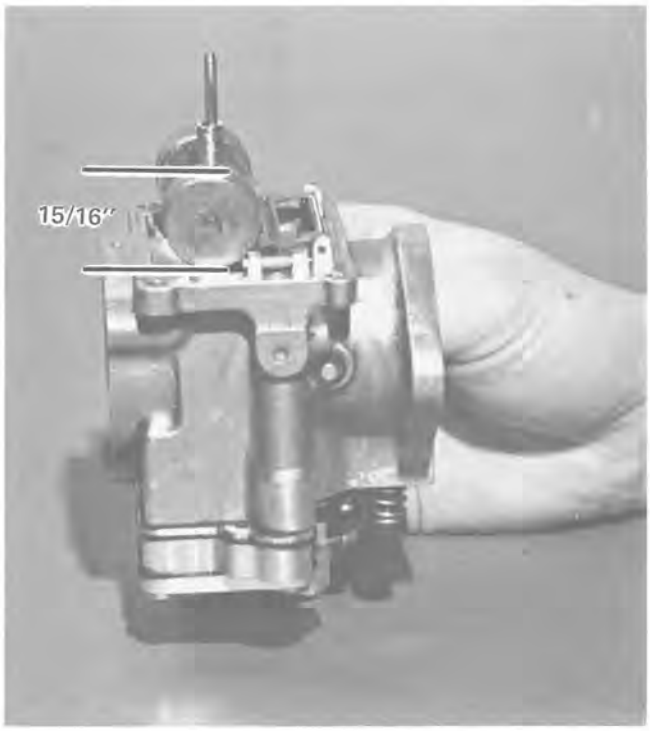
1. Remove the carburetor from the intake manifold if not already removed (see Remove Carburetor from Intake Manifold, page III-8).

2. Remove the four screws and lock washers holding the fuel bowl on carburetor body, using a screwdriver having a 1/4-inch blade.

3. Remove the fuel bowl and gasket from the carburetor body.

4. Measure the distance from the carburetor body (no gasket) to the top of the float, Fig. III-34, using a scale. Correct distance is to be 15/16-inch.

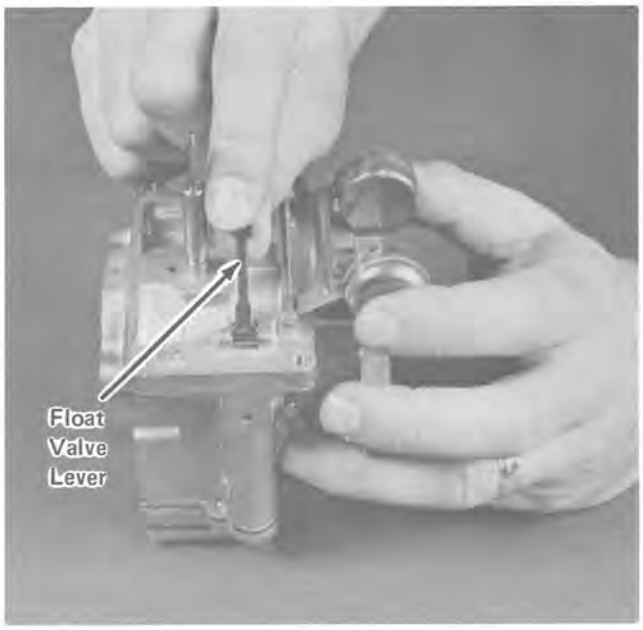
Fig. III-34



5. If float level is 15/16-inch, proceed to step 7. If float level is not 15/16-inch, proceed to step 6.

6. When a float adjustment is necessary, bend the float valve lever, Fig. III-35, to obtain specified float setting (15/16-inch). When specified float setting is obtained, proceed to step 7.

Fig. III-35



7. Remove the jet limiting plug and gasket from the fuel bowl, using a 1/2-inch socket; then look at the jet contained in the limiting plug. Number stamped into head of jet is to be:

Altitude (Ft.)	Main Jet to Use
0 - 5,000	0.076 Inch
4,000 - 7,000	0.074 Inch
6,000 - 8,000	0.072 Inch
8,000 - 12,000	0.070 Inch

Install high speed jet, gasket, and jet limiting plug in the fuel bowl, using a 1/2-inch socket. Tighten jet limiting plug to 4-6 ft. lbs.

8. Install fuel bowl and gasket on carburetor body and secure in place with four screws and lock washers, using a screwdriver having a 1/4-inch blade.

Initial Adjustment (New Engine)

AIR SCREW — 1-3/4 Turns Open
FUEL SCREW — 3/4 Turn Open
FACTORY-INSTALLED MAIN JET — 0.076 Inch

1. Check the fuel and impulse lines to make sure they are fitted properly.

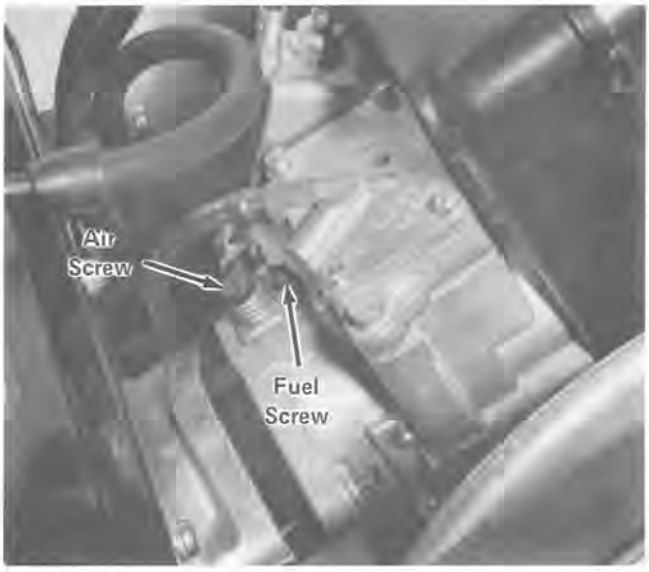
CARBURETOR ADJUSTMENTS

2. Rotate the AIR SCREW clockwise until it just closes, Fig. III-36, using a screwdriver having a 1/4-inch blade.

CAUTION

Do not force the air screw; forcing will cause damage to the air screw or carburetor casting.

Fig. III-36



3. Rotate the AIR SCREW 1-3/4 turns counterclockwise (open), Fig. III-36, using a screwdriver having a 1/4-inch blade.

4. Rotate the FUEL SCREW clockwise until it just closes, Fig. III-36, using a screwdriver having a 1/4-inch blade.

CAUTION

Do not force the fuel screw; forcing will cause damage to the fuel screw or carburetor casting.

5. Rotate the FUEL SCREW 3/4 turn counterclockwise (open), Fig. III-36, using a screwdriver having a 1/4-inch blade.

6. Fill the fuel tank with gasoline and oil mixture (20:1).

Note: Steps 1-5 have been an initial adjustment. No less than 10-20 miles of engine break-in are required before the FINAL ADJUSTMENT of the carburetor (idle circuit) can be made.

Final Adjustment

Note: Make sure the AIR SCREW is set at 1-3/4 turns open and the FUEL SCREW is at 3/4 turn open.

1. Start the engine and run it until normal engine operating temperature is reached.

2. Rotate the AIR SCREW, Fig. III-36, clockwise (close) until the engine idles at 2000-2500 RPM, using a screwdriver and a shop tach (revolution counter).

3. Rotate the FUEL SCREW clockwise (close) until maximum RPM in relation to the AIR SCREW setting is obtained, Fig. III-36, using a screwdriver having a 1/4-inch blade.

4. If idle RPM is too high, repeat steps 2 and 3. If idle RPM is acceptable, proceed to step 5.

5. Check for acceleration.

   A. Raise rear of snowmobile off the shop floor, using a Quik Jack. Make sure track is off the floor and free to rotate.

   B. Grasp the throttle lever and compress it very quickly; then release it. The engine should have accelerated quickly and smoothly. If engine hesitates, rotate the FUEL SCREW counterclockwise (open) 1/8 turn at a time until acceleration is acceptable.

Note: If the AIR SCREW, Fig. III-36, is adjusted improperly (2-3 turns open), the FUEL SCREW, Fig. III-36, will have to be set too rich (open) to obtain an acceptable idle RPM. The excessively-rich FUEL SCREW setting, in actuality, reduces the idle RPM by means of a "flooding" condition, which causes the engine to "load-up" with fuel while idling. When engine is accelerated to top speed under field conditions, the engine will run rich (sluggish) for a short time; then the engine will clear itself out and run efficiently, as long as the correct high speed jet is being used, and maximum throttle is sustained. Another negative characteristic of having the AIR SCREW set too far open (2-3 turns) is hard starting. The problems described above can be eliminated by adjusting the carburetor properly.

AIR INTAKE SILENCER SERVICING

Air Intake Silencer

Used in conjunction with the carburetor is a specially-designed air intake silencer. The function of the silencer is to quiet the intake of fresh air used in carburetion, and to catch fuel that "spits back" out of the carburetor.

CAUTION

The air intake silencer must be secured to the carburetor when the engine is running and when the carburetor is to be adjusted. If the intake silencer is removed for any reason, DO NOT RUN THE ENGINE because severe engine damage will occur. Make sure the silencer is not cracked and does not have any internal damage. The silencer must also be clean and free of obstructions.

Air Intake Silencer Removal

Equipment Necessary: 7/16-Inch Socket

1. Shut the engine off and open the hood.
2. Remove the three cap screws, lock washers, and flat washers holding the air intake silencer against the front of the carburetor, using a 7/16-inch socket.
3. Slide the silencer away from the carburetor. Check the silencer for cracks, damaged rivets, or internal damage. Replace the silencer if any of the conditions are evident. SILENCER CANNOT BE REPAIRED.

Air Intake Silencer Installation

Equipment Necessary: 7/16-Inch Socket

1. Slide a lock washer and flat washer on the three silencer retaining cap screws; then slide the cap screws through the mounting holes in the silencer.
2. Move the silencer into position against the carburetor and start the three cap screws. Make sure rectangular opening in silencer is toward the top of the carburetor.
3. Secure the silencer against the carburetor by tightening the cap screws, using a 7/16-inch socket.
4. Tighten the cap screws to 4-5 ft. lbs., using a 7/16-inch socket and torque wrench.

FUEL TANK SERVICING

General

The fuel tank is made of 20 gauge cold rolled steel, and has an approximate capacity of 6.25 U.S. gallons. The outside of the fuel tank is specially cleaned, then coated with a gasoline/oil resistant paint. The tank is equipped with a vented fuel level gauge cap that allows vapor gasses to escape into the atmosphere and, also, allows fuel to flow to the carburetor. If a vent hole would not be provided in the fuel level gauge cap or if the vent hole became obstructed, fuel would not flow from the fuel tank.

The fuel tank is also equipped with a fitting to accommodate the fuel line. The section of fuel line extending down to the bottom of the tank has a screened filter at the end, which filters out major impurities in the fuel mixture that would normally flow to the carburetor. Also contained in the screened filter is a ball check valve that prevents in-line fuel from flowing back to the fuel tank when the engine is not running.

Fuel Tank Removal

Equipment Necessary: Approved Gasoline Container, Screwdriver Having a 3/16-Inch Blade, Piece of Cardboard, Cold Chisel Having a 7/16-Inch Cutting Edge, Hammer, 9/16-Inch Socket, 3-Inch Extension, Stubby Screwdriver Having a 7/16-Inch Blade and 7/16-Inch Socket

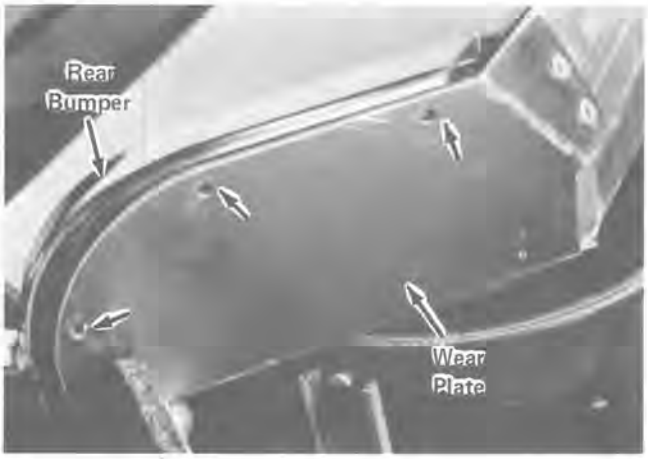
1. Drain fuel from fuel tank by disconnecting fuel line at carburetor. Allow fuel to flow into an approved gasoline container.
2. Remove the seat cushion; then pull the taillight/brakelight connectors apart.

3. Remove the fuel tank gauge cap. Pull the fuel line, L-shaped fitting, and the pick-up line out of the fuel tank.

4. Tip the snowmobile on its side and allow it to lay on a piece of cardboard to protect against scratching.

5. Remove the three rivets holding rear bumper to wear plate at end of running board, Fig. III-37, using a cold chisel having a 7/16-inch cutting edge, and a hammer.

Fig. III-37



6. Tip the snowmobile on its opposite side and allow it to lay on a piece of cardboard to protect against scratching.

7. Remove the three rivets holding rear bumper to wear plate at end of running board, Fig. III-37, using a cold chisel having a 7/16-inch cutting edge, and a hammer.

Note: Both sides of the bumper should now be free of the wear plate. This is necessary because the entire rear bumper must be removed to accomplish fuel tank removal.

8. Tip the snowmobile upright. Remove the rear cap screws and lock washers holding rear of skid frame on the inside of the tunnel, using a 9/16-inch socket and 3-inch extension. Raise the rear of the tunnel. The rear section of the skid frame and track is to remain on the shop floor.

9. Remove the eight slotted machine screws and cap nuts holding the back and sides of the rear bumper to the tunnel, using a stubby screwdriver having a 7/16-inch blade, and 7/16-inch socket.

Note: When all the slotted machine screws and cap nuts are removed, the snow flap and backing plate will be free of the tunnel.

10. Raise the back of the rear bumper slightly; then slide complete fuel tank, rear bumper, and shroud off the tunnel. Fuel tank can now be removed from the rear bumper and shroud.

Cleaning Fuel Tank

Equipment Necessary: Liquid Detergent, Boiling Water, Cleaning Solvent and Gasoline/Oil Mixture (20:1)

1. Plug the opening in the fuel tank that accommodates the fuel line fitting.

2. Pour one quart of cleaning solvent into the fuel tank. Install fuel tank gauge cap and shake the tank vigorously. Remove cap from tank and dump out solvent. Repeat this step as often as is necessary to clean the inside of the tank.

3. Pour two quarts of boiling water into the tank. Install fuel tank gauge cap and shake the tank vigorously. Remove cap from tank and dump out all water.

4. Allow the inside of the fuel tank to dry.

Note: Because boiling water is used to flush the tank, the metal gets hot and, as a result, will dry the inside of the tank completely. Complete drying time is usually approximately 20 minutes.

5. When the inside of the fuel tank is dry, pour one quart of 20:1 gasoline/oil mixture into the tank. Install fuel tank gauge cap and shake the tank vigorously. Dump out mixture when the inside of the tank is completely coated. Install fuel tank gauge cap.

6. Clean the outside of the fuel tank, using liquid detergent and water. DO NOT GET WATER INTO THE FUEL TANK.

FUEL TANK SERVICING

Inspecting Fuel Tank

Equipment Necessary: No Special Tools Required

1. Inspect the fuel tank for cracks and other fractures or punctures. Replace the fuel tank if severely damaged.

Note: Minor damage or punctures (leaks) may be repaired if the circumstances seem practical.

2. Touch up any fuel tank surface that is rusted; sand lightly before painting.

3. Inspect the fuel line fitting. If deterioration is evident or condition is doubtful, replace the appropriate component(s).

4. Examine the fuel filter at the end of the fuel line. If the filter is obstructed, wash in clean gasoline and blow out with compressed air. If the brass screen is damaged or if the ball check valve does not restrict backward flow of fuel to the fuel tank, fuel filter replacement is necessary.

Fuel Tank Installation

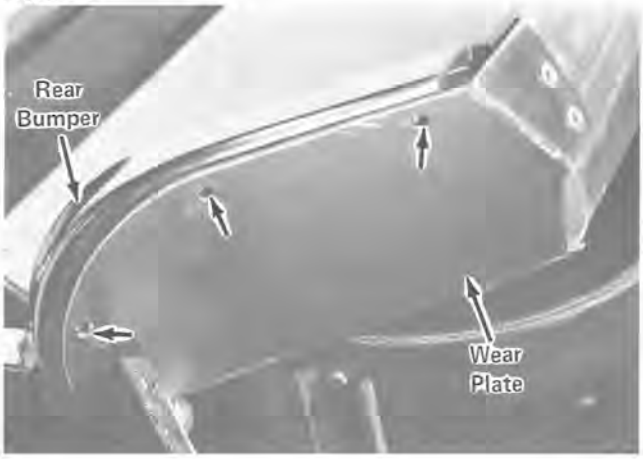
Equipment Necessary: Stubby Screwdriver Having a 7/16-Inch Blade, 7/16-Inch Socket, Pop Rivet Tool, Piece of Cardboard, 9/16-Inch Socket, 3-Inch Extension, and Torque Wrench

1. Fit the fuel tank between the rear bumper and shroud, Fig. III-38. The ends of the fuel tank channels must seat between the retaining brackets on inside surface of left and right side shroud. Make sure to slide the taillight/brakelight wires through the channels at both sides of the fuel tank.

CAUTION

Make sure the taillight/brakelight wires do not bind or get pinched in any manner. If a wire gets pinched, a short circuit may develop and cause lighting circuit problems.

Fig. III-38



2. With the rear of the tunnel raised off the shop floor, set the assembled fuel tank, rear bumper, and shroud on the tunnel.

3. Align the holes in the sides of the rear bumper (near hand grips) with the holes in the tunnel. Secure sides of the rear bumper to tunnel with two slotted machine screws and cap nuts, using a stubby screwdriver having a 7/16-inch blade, and 7/16-inch socket. Perform this step on the opposite side of rear bumper.

Note: Cap nuts are to be positioned on the outside of the rear bumper.

4. Install the end plate, snow flap, and back of rear bumper to tunnel with four slotted machine screws and cap nuts, using a stubby screwdriver having a 7/16-inch blade, and 7/16-inch socket.

Note: Cap nuts are to be positioned on the outside of the rear bumper.

5. Secure the sides of the rear bumper to the wear plates with six rivets, Fig. III-37, using a pop rivet tool.

6. Push the taillight/brakelight connectors together.

7. Lower the back of the tunnel to the shop floor.

8. Insert the fuel pick-up line with filter, and the L-shaped fitting into the hole at top of fuel tank. Make sure the rubber seal around the

fitting seats in the hole. A little oil on the rubber seal will allow it to slide into the hole easily.

9. Install the fuel tank gauge cap.

10. Tip the snowmobile onto its side and allow it to lay on a piece of cardboard to protect against scratching.

11. Align the hole in the skid frame rear axle with the mounting hole in the tunnel; then secure the axle in place with lock washer and cap screw, using a 9/16-inch socket and 3-inch extension. DO NOT TIGHTEN CAP SCREW COMPLETELY.

Note: Rear axle may not line up with mounting holes in tunnel. To obtain proper alignment, it may be necessary to drive the rear arm of the skid frame in the direction desired, using a hammer.

12. Tip the snowmobile on its opposite side and allow it to lay on a piece of cardboard to protect against scratching.

13. Align the hole in the skid frame rear axle with the mounting hole in the tunnel; then secure the axle in place with lock washer and cap screw, using a 9/16-inch socket and 3-inch extension. Tighten both cap screws to 35 ft. lbs., using a 9/16-inch socket, 3-inch extension, and torque wrench.

Note: Rear axle may not line up with mounting holes in tunnel. To obtain proper alignment, it may be necessary to drive the rear arm of the skid frame in the direction desired, using a hammer.

14. Check track tension (see Section VI, Suspension, Track Tension, page VI-16).

15. Check the track alignment (see Section VI, Suspension, Track Alignment, page VI-16).

NOTES

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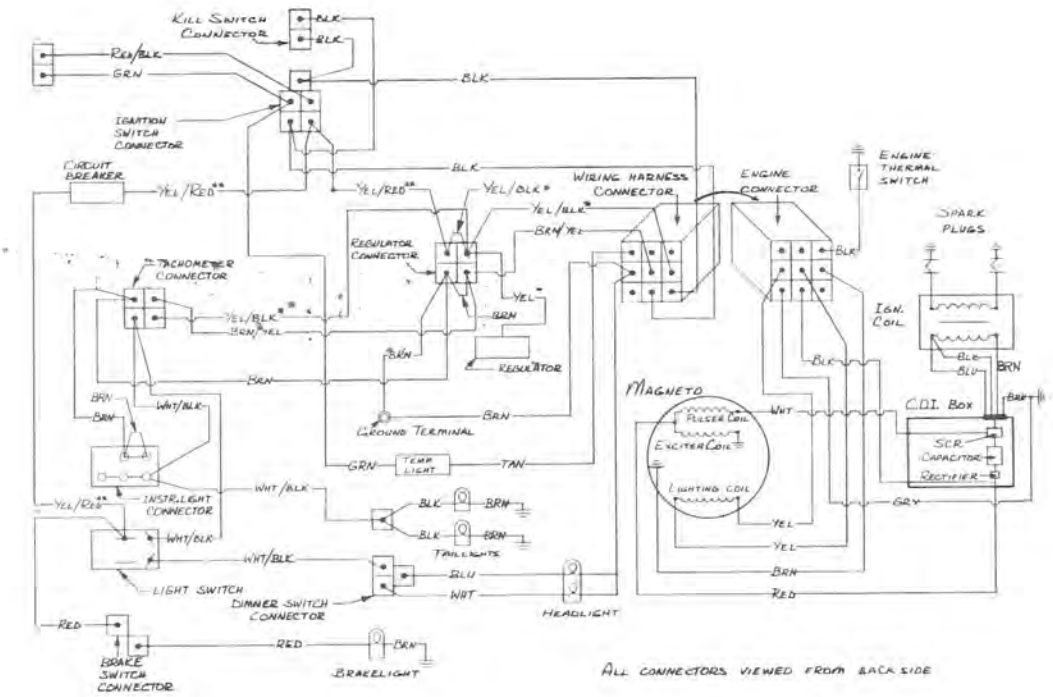
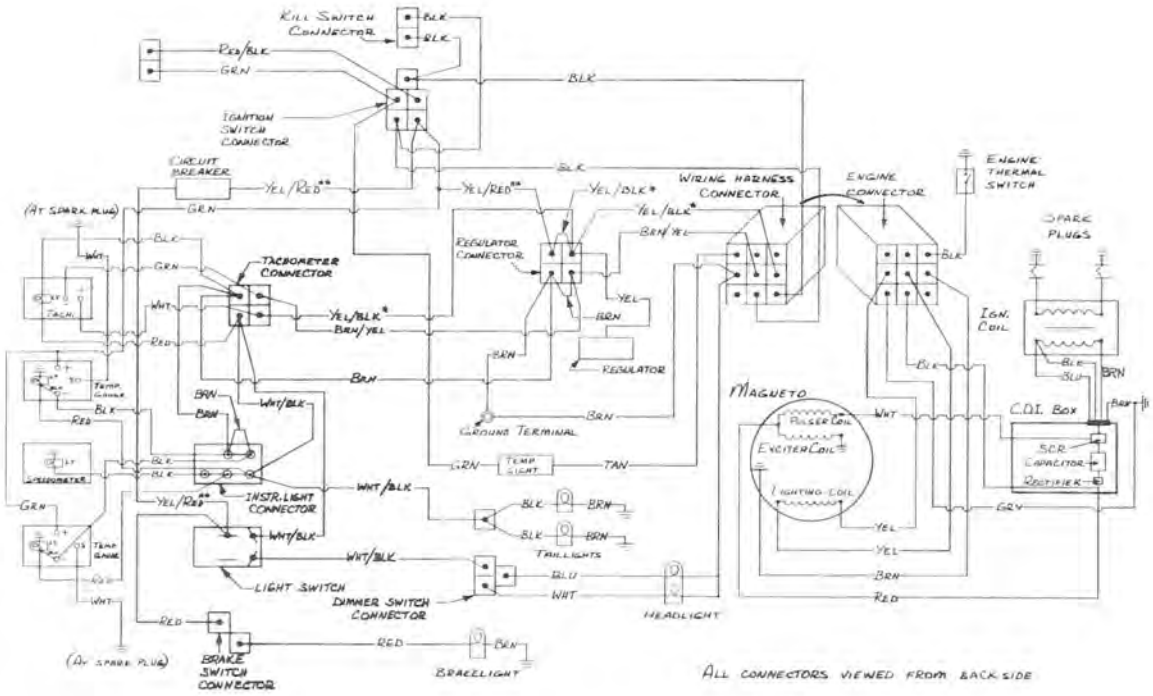
1974 PANTHER WIRING-RECOIL START

Fig. IV-1



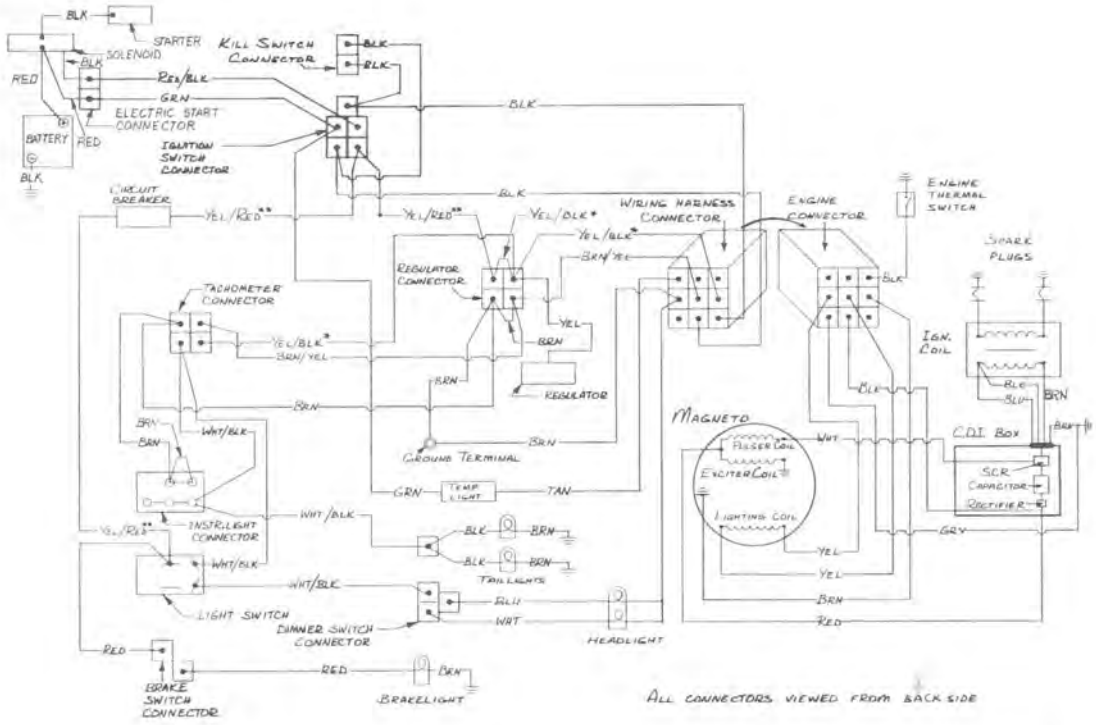
1974 PANTHER WIRING-RECOIL W/ACC.

Fig. IV-2



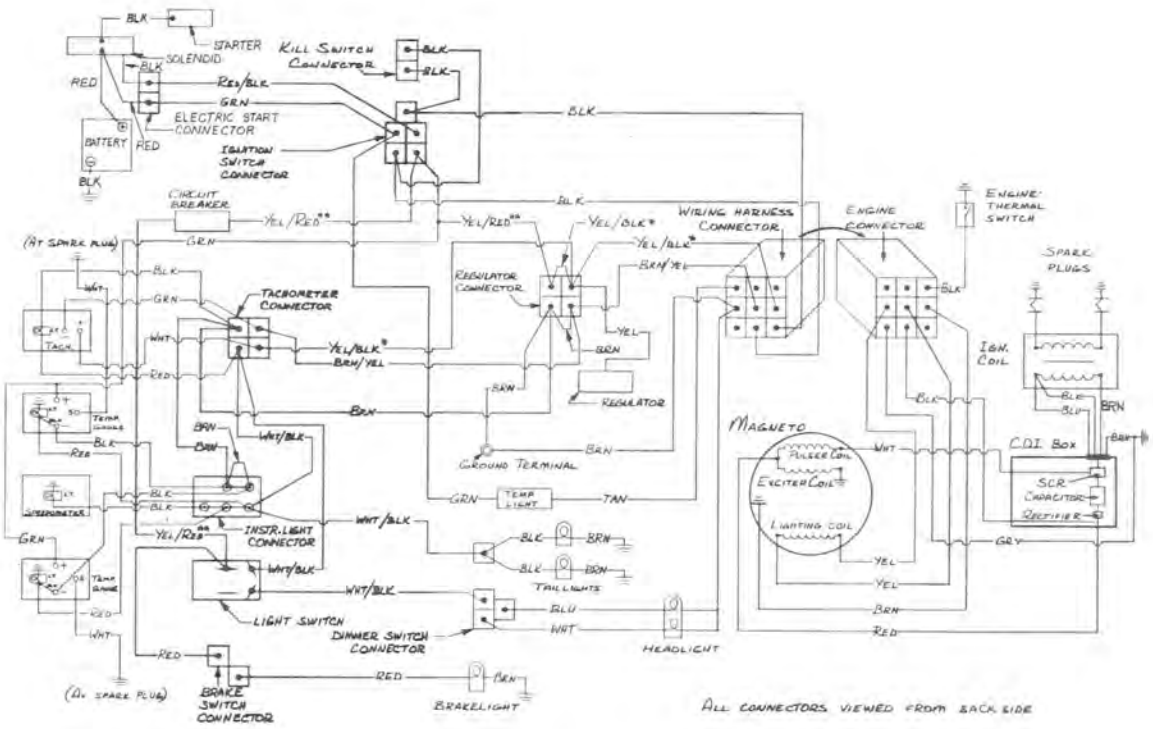
1974 PANTHER WIRING-ELECTRIC START

Fig. IV-3



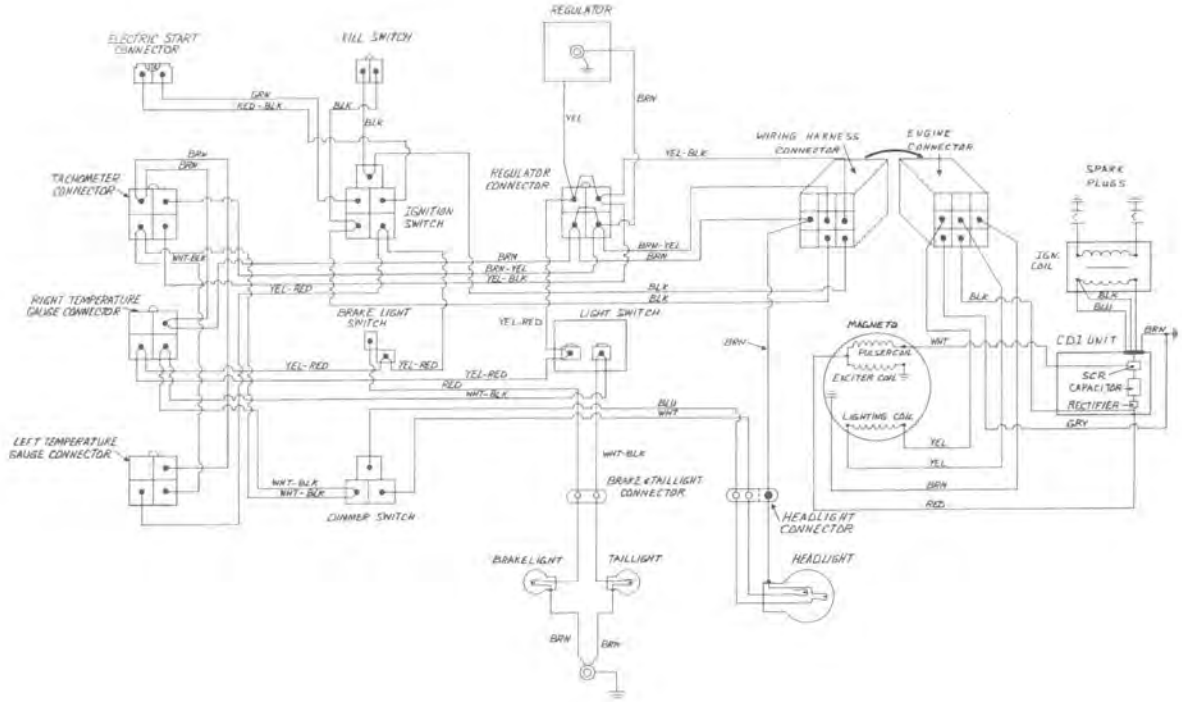
1974 PANTHER WIRING-ELEC. START W/ACC.

Fig. IV-4



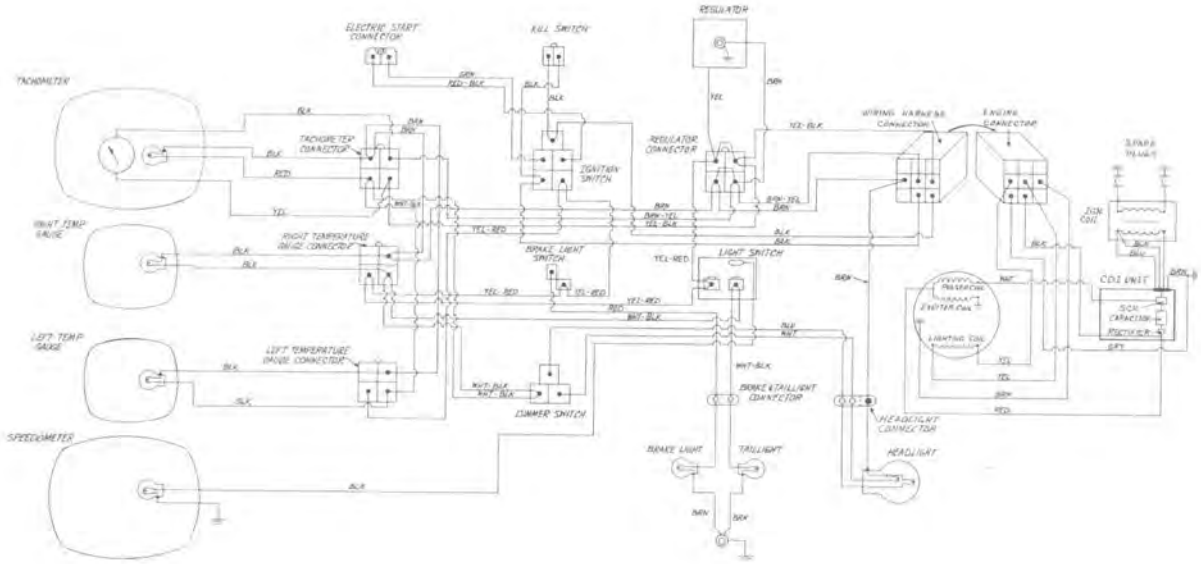
1975 PANTHER WIRING-RECOIL START

Fig. IV-5



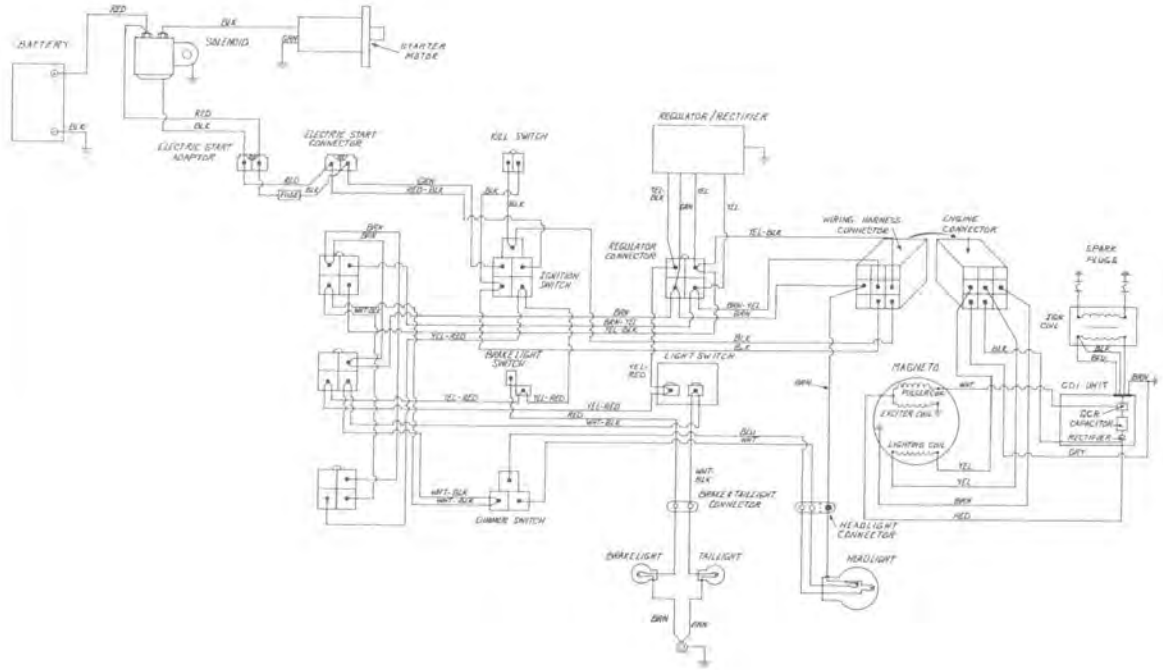
1975 PANTHER WIRING-RECOIL W/ACC.

Fig. IV-6



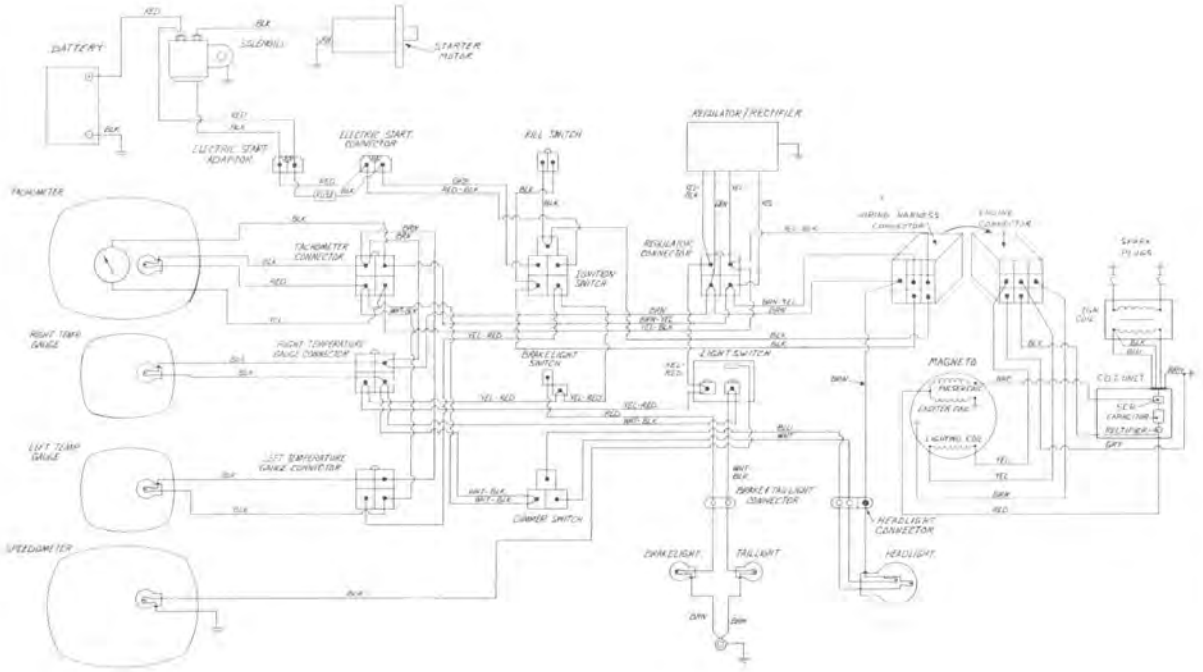
1975 PANTHER WIRING-ELECTRIC START

Fig. IV-7



1975 PANTHER WIRING-ELEC. START W/ACC.

Fig. IV-8



SWITCHES AND CONNECTORS

Fig. IV-9

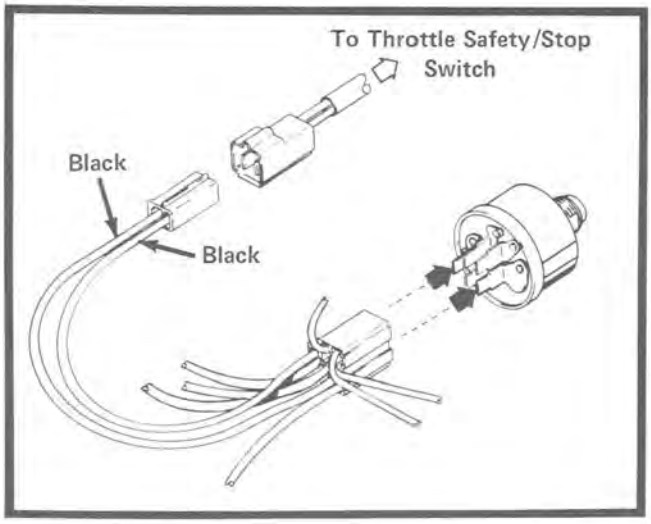


Fig. IV-12

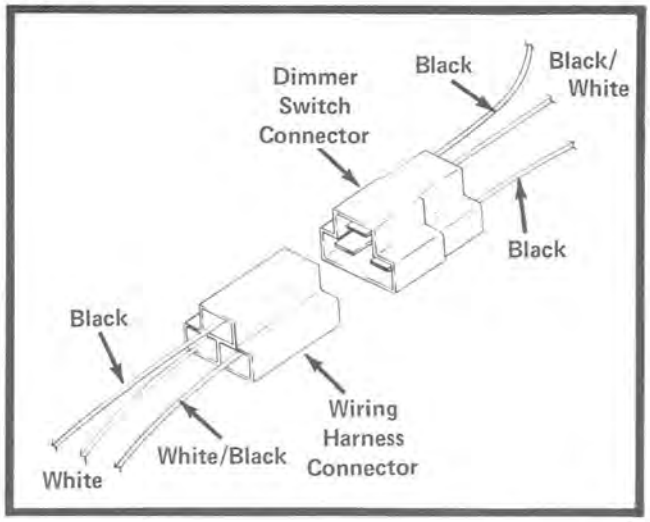


Fig. IV-10

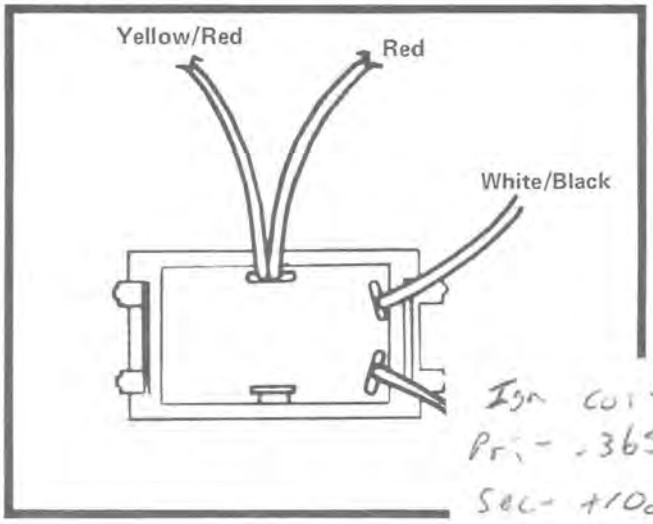
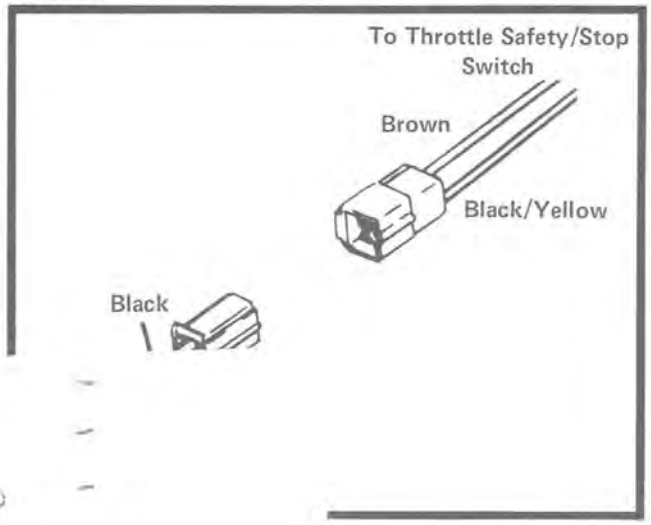
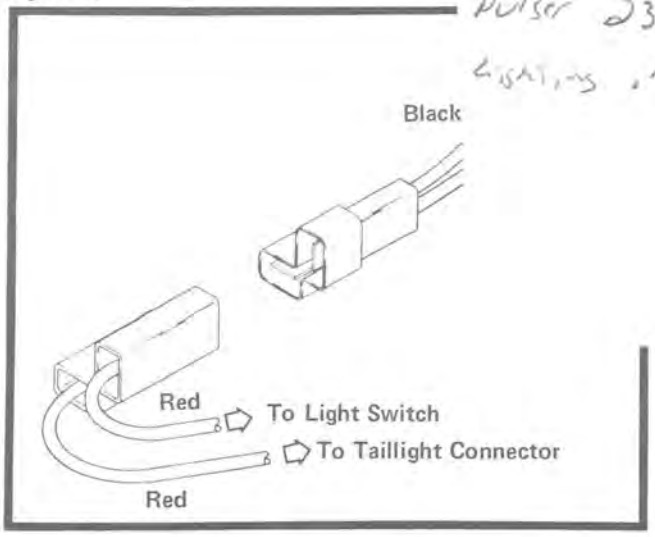


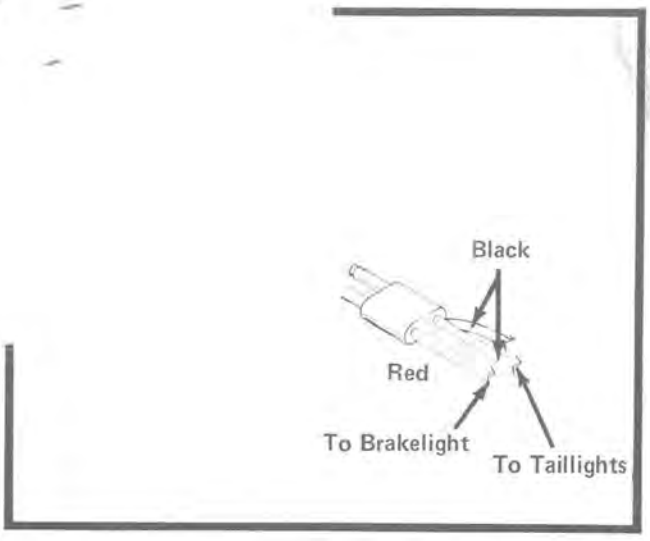
Fig. IV-13



Ign coil
Pri - .365
Sec - 11020
exciter 195
pulser 23.5
resistance .8

Fig. IV-11





1974-75 PANTHER ELEC. SPECS

Description	Arctic P/N	Test Value	Tester Connections	
		Ohmmeter Testing		
Spark Plug Cap	3001-431	5500 + 25% - 15%	Ohmmeter leads to opposite ends of the spark plug gap.	
Ignition Coil	3001-461			
Primary		0.365 Ohms	+ To Blue	- To Brown
Secondary		+ 10200 Ohms	+ To No. 1 High Tension Lead	- To No. 2 High Tension Lead
Exciter Coil	3001-053	195 Ohms	+ To Red	- To Ground
Pulser Coil	3001-054	23.5 Ohms	+ To Red	- To White
Lighting Coil	3001-055	0.18 Ohms	+ To Yellow	- To Remaining Yellow
		Output Test with Electro Specialties CDI Tester Model No. 1		
Ignition Coil	3001-461	+ 55	- To No. 2 High Tension	+ To Ground
Exciter Coil	3001-053	40	- To Red from Stator	+ To Ground
Pulser Coil	3001-054	40	- To White from Stator	+ To Ground
CDI Unit	3001-462	40	- To Blue, Leave Other Blue Open	+ To Brown
		Voltmeter Test		
Lighting Coil	3001-055	12-15 Volts	+ To Yellow Red at Light Switch	- To Ground

CAUTION

Voltage is AC on standard models, DC on electric start models. Caution should be used if tests are conducted with a defective voltage regulator, or with the regulator disconnected. Voltage may rise to several hundred volts at high engine rpm if regulator is defective.

		Replacement Parts		Mfg. No.
Spark Plug	0217-029	0.028 in. Gap	Feeler Gauge	NGK - B8ESA
Headlight ('74 Panther)	0109-558			G.E. - 4492
Headlight ('75 Panther)	0109-617			Arctic
Taillight Bulb	0109-445			68
Brakelight Bulb	0109-446			1142
Speedometer Bulb	0109-453			53 X
Tachometer Bulb				1893
Temperature Gauge Bulb	0109-453			53 X

Note: Unless specified otherwise, all test values have a tolerance of ± 10%.

+ Reading is with spark plug cap removed.

GLOSSARY

ac	Abbreviation for alternating current.
alternating current	Alternating current is electric current that reverses its direction at regularly-recurring intervals.
alternator	An alternator is an electrical generator that produces alternating current.
ampere	An ampere measures steady current flow produced by one volt applied across a resistance of one ohm.
armature	An armature is the iron core of an electromagnet. In a starter motor, the armature is used as the drive shaft.
battery	A battery is a storage cell for electrical energy. To store energy, the battery changes electrical energy into chemical energy. By contrast, when the battery supplies power, the stored chemical energy is changed into electrical energy.
capacitor (condenser)	A capacitor is an electrical component that can be charged and, subsequently, store a small amount of electrical energy.
CDI	Abbreviation for capacitor discharge ignition.
circuit	A circuit is the path electric current takes, from a power source, through a wire, and back to the power source. Current only flows through a complete circuit.
coil	A coil is a series of turns of wire around an iron core. The coil forms a magnetic field when electric current is passed through the wire.
conductor	A substance capable of transmitting electricity.
cycle	A cycle is the rise and fall of positive and negative electrical voltage at alternator output terminals. Below, a cycle is illustrated in wave form. 
dc	Abbreviation for direct current.
direct current	Direct current is electric current that flows in one direction only, and is substantially constant in value.
diode	A diode is an electrical component that allows current to flow in only one direction. In an ac circuit, a diode allows current to flow during half of the cycle, resulting in "pulsating" direct current.
electrode	An electrode is a conductor used to establish electrical contact with a nonmetalic part of a circuit. A spark plug has two electrodes: center and side. The gap between the electrodes is the resistance in the electrical circuit.
electromagnet	An electromagnet is a core of magnetic material (iron) surrounded by coils of wire through which an electric current is passed to magnetize the core.
electromotive force	An electromotive force is the voltage or electrical pressure that moves or tends to move electricity (current flow).

GLOSSARY

electrolysis	Electrolysis is the chemical change produced by passing an electric current through an electrolyte solution. Therefore, electrical energy is changed to chemical energy.
electrolyte	Battery electrolyte is a solution of distilled water and sulfuric acid that can carry current.
exciter coil	An exciter coil is used to produce electrical energy for the primary circuit of the ignition coil.
farad	Farad is the unit of measure used to determine the amount of electrical energy that a capacitor can hold. The unit of measure used in ignition systems is microfarad.
field	A field is the magnetic lines of force surrounding a magnet. In an electric motor, the electromagnetic coils mounted in fixed positions in the case provide a field to attract the armature. These coils are called field coils.
generator	A generator produces electricity when its conductor passes through a magnetic field; thus, mechanical energy is changed into electrical energy.
ground	A ground is a conducting material used as a common return for electric current. Every electrical circuit has a ground, and the chassis of a snowmobile is an example.
ignition	The electrical arc used to start the burn of combustible fuel in an engine. This arc is produced by applying high voltage to the spark plug.
induction	The process of generating electrical energy in a conductor by causing the conductor to intersect magnetic lines of force. Moving a conductor through a magnetic field, as in a magneto alternator, or by building and collapsing a magnetic field around a conductor causes induction.
load	A load in an electrical circuit is the component or components requiring electricity for operation. The load on a snowmobile electrical circuit is the lights, tachometer and charge requirements of the battery.
magnet	A magnet is a body that attracts ferrous materials, and is capable of producing magnetic lines of force external to itself.
magneto	A magneto is an alternator with permanent magnets for its field, and is used to generate current for ignition.
ohm	An ohm is the unit of measure used to tell the resistance of a conductor of electricity.
parallel	A parallel arrangement of electrical load components is when all positive poles, electrodes and terminals are joined to one conductor and all negative ones to another conductor.
polarity	Polarity is the description of positive or negative poles of a magnet or electrical circuit.
primary	The primary coil is a low resistance coil through which induced current passes. After exciter coil voltage is generated, the primary winding induces high voltage in the ignition coil secondary.

GLOSSARY

rectifier	A rectifier converts alternating current to direct current and also allows current to flow in only one direction.
SCR	An abbreviation for silicone controlled rectifier. The SCR is a switch-like device that opens to allow current flow and closes to stop current flow. Current flow only results after enough voltage is applied to the triggering component of the SCR.
series	A series arrangement of electrical components is when the positive pole, electrode or terminal is joined to a negative one by a conductor. The first and last conductor are then connected to the positive and negative poles of the power source.
secondary	The secondary coil is a high resistance coil that produces the high voltage needed to jump the air gap between the center and side electrode of the spark plug.
solenoid	A solenoid is a cylindrical electromagnet having a moveable iron core that moves into a coil when current flows. In the electric start system, the core closes a heavy-duty switch to carry the high amperage required by the starter motor.
volt	A volt is used to measure the amount of electrical pressure from a power source.
watt	A watt is used to measure the quantity of electrical energy by a current of one ampere under a pressure of one volt.

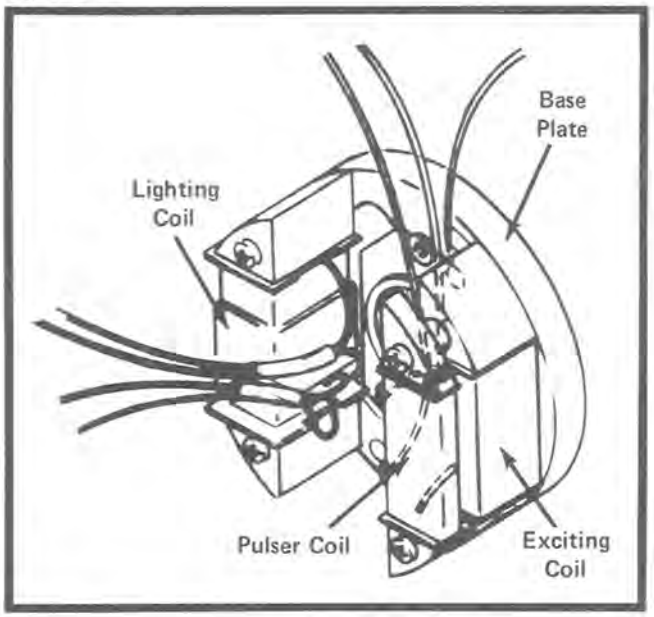
THEORY OF OPERATION

General

The Panther snowmobile electrical system consists of two, somewhat separate, systems; the ignition system and the magneto alternator system. Electrical current for both systems is produced by the flywheel magneto generator assembly (12 volt, 100 watts).

The flywheel magneto generator assembly, Fig. IV-15, consists of the components listed below:

Fig. IV-15



1. Flywheel w/Magnets
2. Base Plate
3. 100 Watt Lighting Coil
4. Ignition Pulser Coil
5. Ignition Exciter Coil
6. CDI Unit
7. External Coil (Mounted Externally on Engine)
8. Spark Plug

The remaining components that comprise the ignition system are: the ignition switch, emergency shut-off switch and throttle safety switch.

The magneto alternator system produces 100 watts and is regulated at 12 volts. The generated electric current provides the spark that is necessary to ignite the fuel/air mixture in the combustion chamber, and also, by passing through the wiring harness and switches, allows for operation of the lights and electrical acessories.

In summary, a flywheel magneto generator assembly that produces maximum output will allow the engine to run smoothly, and all other electrical systems will operate correctly. By contrast, without maximum output from the flywheel magneto generator assembly, the engine and other electrical systems will not operate correctly.

Ignition System

The function of the ignition system is to ignite the fuel/air mixture in the combustion chamber at a moment of compression (firing moment) that produces the strongest power stroke.

Igniting of the fuel/air mixture in the combustion chamber is accomplished by a generated electrical arc across the center and side electrode (air gap) of the spark plug. If the arc is not of sufficient voltage, ignition will be poor and result in less than optimum performance. To produce and control the necessary voltage required for ignition, a number of electrical components are used in conjunction with each other. These five components are:

1. FLYWHEEL-MOUNTED PERMANENT MAGNETS – The flywheel-mounted permanent magnets provide a moving magnetic field when the flywheel is rotating around the coils.

2. EXCITING COIL – Mounted on the base plate, just below the pulser coil, is the exciting coil. One lead of the exciting coil is grounded to the engine through the coil attaching screws, and the other lead (red) is connected to the CDI unit.

3. PULSER COIL – Mounted on the base plate just above the exciting coil is the pulser. One lead of the pulser coil is attached to the same red lead as the exciter coil. The other (white) lead is connected to the CDI unit.

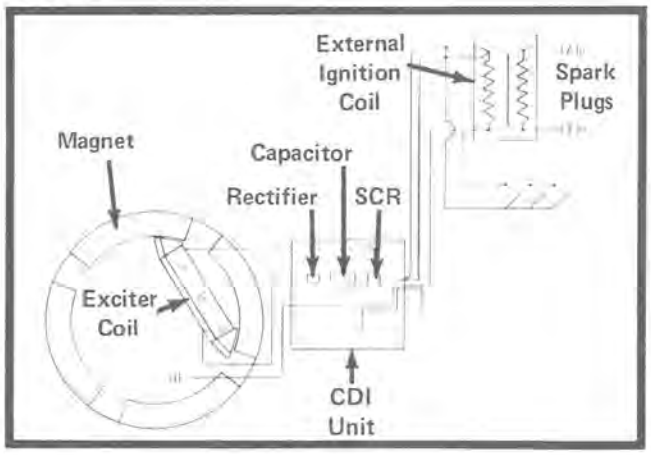
4. CDI UNIT – A CDI unit, mounted on the coil bracket, contains a rectifier, capacitor and a solid state switch.

5. IGNITION COIL – An ignition coil is mounted on the coil bracket with a high tension lead going to each spark plug.

THEORY OF OPERATION

High voltage current is required to jump the spark plug air gap, which will result in ignition of the fuel/air mixture in the combustion chamber. Current is induced in the exciting coil by the rotation of the four magnets, Fig. IV-16. Since the magnets are alternately mounted, and also, alternately pass the exciting coil, the magnetic forces change direction of travel. Because the magnetic forces travel from north to south (positive to negative), the direction of flow changes every 90 degrees of flywheel rotation. Therefore, the electricity induced in the exciting coil winding will also alternate in direction of flow. The term for this type of flow is "alternating current".

Fig. IV-16



The CD ignition system cannot utilize alternating current, so the current from the exciter coil is routed through a rectifier to eliminate the negative flow, Fig. IV-16. The positive flow passes through the rectifier and is stored in the capacitor in the CDI unit, Fig. IV-16. The capacitor is connected to the primary winding of the ignition coil through an SCR. The SCR, Fig. IV-16, acts as a switch for the exciter current. With the SCR (switch) open, the exciter current builds up a charge in the capacitor. To fire the spark plug, the SCR (switch) is closed or triggered by a pulse from the pulser coil, Fig. IV-16. The position of this pulser coil, in relation to the magnets and the piston, triggers the SCR at the precise moment (25° at 6000 rpm) to ensure the most efficient combustion. When the SCR (switch) closes, a circuit is completed from the capacitor to the ignition coil primary. As a result, current flows through the external ignition coil primary, Fig. IV-16.

Like a transformer, the external ignition coil is made of two separate windings; a low voltage "primary" and high voltage "secondary", Fig. IV-16. As current flows through the "primary", the magnetic field builds up, resulting in the induction of the "secondary". Because of the required high voltage current that is needed to jump the air gap between the center and side electrodes of the spark plug, a considerable increase in voltage must take place.

But how is this increase in voltage generated? The wire turn ratio of the secondary is considerably more than that of the primary, which accounts for the increased secondary output. Because the secondary has a high voltage output, it is wound above the primary, which prevents a short circuit of the coil. Because the secondary is wound above the primary, the magnetic force lines of the primary are broken, resulting in the induction of an electromotive force (emf) in the secondary. Therefore, the secondary allows high voltage current to flow to the spark plug and jump the air gap between the center and side electrode, Fig. IV-16. At the moment of spark, the compressed fuel/air mixture in the combustion chamber is ignited, causing expansion and a single power stroke.

The timing of the ignition spark, as previously stated, is accomplished by a trigger impulse to the CDI unit and SCR switch. The trigger impulse is induced in the pulser coil by the flywheel magnets. The SCR requires a certain voltage to actuate it. At cranking speeds and low rpm there is enough voltage to actuate the SCR when the piston is 10° before top dead center (BTDC). By contrast, at 6000 rpm the SCR is actuated when the piston is 25° BTDC. Advancing the timing by electronic means ensures easy starting and maximum efficiency at high rpm. The most important advantages of CDI are: stronger ignition at cranking speeds, no maintenance requirements of breaker points and simpler adjustment of timing. These result in easier starting, peak performance and low maintenance.

Other components that function in the ignition system, but not mounted on the engine, are: the ignition switch, the throttle safety switch and the emergency shut-off switch. The switches are all connected in parallel with the external ignition coil primary, Fig. IV-16, and the engine frame, which is also a common ground. If any one of the switches is closed (OFF), the induced exciting coil current is routed to ground, rather than allowing the current to flow to the external ignition coil and spark plug. Therefore, a closed ignition switch, emergency

shut-off switch or throttle safety switch will not allow the engine to start because there is no ignition spark.

Working between the throttle lever and carburetor-mounted throttle is the spring-actuated throttle safety switch. When the throttle cable is tensioned properly at the carburetor-mounted throttle arm, the switch is constantly open, thereby allowing current to flow to the spark plug for ignition. By contrast, if the throttle cable is not tensioned properly at the carburetor-mounted throttle arm, the switch is closed, forcing the induced current in the exciting coil to flow to ground. Consequently, the engine will not start because there is no high voltage current to the spark plug.

Note: To make sure the throttle safety switch operates properly, proper adjustment is critical. Therefore, check throttle safety switch (See: Section III – Fuel System, Throttle Adjustment).

Magneto Alternator System

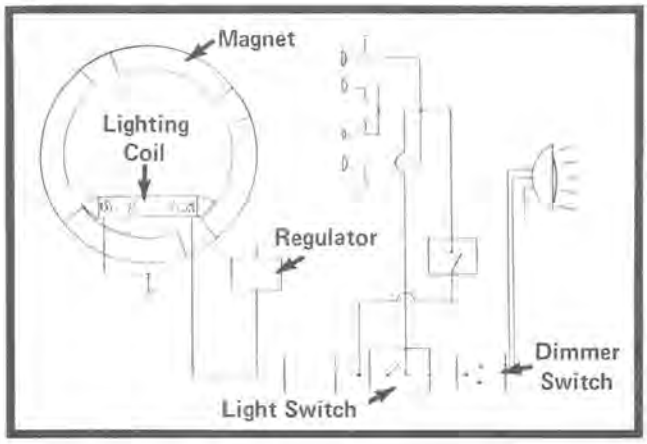
The function of the magneto alternator system is to produce electrical current required by the headlight, taillights and brakelights. For their operation, accessories such as a speedometer, tachometer, heat gauges and an electric starter also draw upon the output of the magneto alternator. To produce and control the current necessary for the lighting system, a number of electrical components are used in conjunction with each other. The two components are:

1. FLYWHEEL-MOUNTED PERMANENT MAGNETS – The flywheel-mounted permanent magnets provide a moving magnetic field when the flywheel is rotating around the lighting coil.

2. LIGHTING COIL – Mounted on the base plate, opposite the exciting and pulsing coil, is the large 100 watt lighting coil. The two yellow wires of the lighting coil are connected to the engine connector.

As stated in the first paragraph, current is required to operate the headlight, taillights, brakelights and accessories that require output from the lighting coils. To accomplish this, current is induced in the lighting coil by the rotation of the four magnets, Fig. IV-17. Since the magnets are alternately mounted, and also, alternately pass the lighting coil, the magnetic forces change direction of travel. Because the magnetic forces travel from north to south (maximum positive to maximum negative), the direction of flow changes every 90 degrees of flywheel rotation. The lighting system uses every positive and negative current impulse to supply electricity to the lighting system. For every crankshaft rotation, four electrical impulses take place. When the engine is at idle (approximately 3000 rpm), the output of the lighting coil is 12,000 electrical impulses per minute. Therefore, the electrical impulses occur so fast that blinking lights, or the decrease in output, which occurs just after maximum positive and just before maximum negative, cannot be detected.

Fig. IV-17



After current is induced in the lighting coil, the current flows to the lights and other accessories by way of wiring harnesses and switches. Current will flow to the headlight, taillights and brakelights only when the light switch is ON (closed circuit), Fig. IV-17. By contrast, the induced current in the lighting coil is routed through the voltage regulator and to ground when the light switch is OFF (open circuit), Fig. IV-17. Therefore, the voltage regulator directs any unwanted or excess voltage that is not used by the lighting system to ground.

Current flowing to the headlight must first flow to the headlight dimmer switch, Fig. IV-17. By moving the switch to high beam, the high beam circuit is closed; thus, current is routed to the headlight high beam filament. By contrast, when the dimmer switch is on low beam, the low beam circuit is closed; thus, current is routed to the headlight low beam filament.

THEORY OF OPERATION

Electric Start System

The function of the electric start system is to crank the engine, by means of an electric motor. To produce and store the current necessary for the electric start system, a number of components are used in conjunction with each other. The six components are:

1. FLYWHEEL-MOUNTED PERMANENT MAGNETS – The flywheel-mounted permanent magnets provide a moving magnetic field when the flywheel is rotating around the coils.

2. LIGHTING COIL – Mounted on the base plate, opposite the exciter and pulser coil, is the large 100 watt lighting coil. The two yellow wires of the lighting coil are connected to the engine connector.

3. REGULATOR/RECTIFIER – The voltage regulator/rectifier routes to ground unwanted or excess voltage not used by the electric start system or the lighting system. It also converts alternating current (ac) to direct current (dc), which is required to charge the battery.

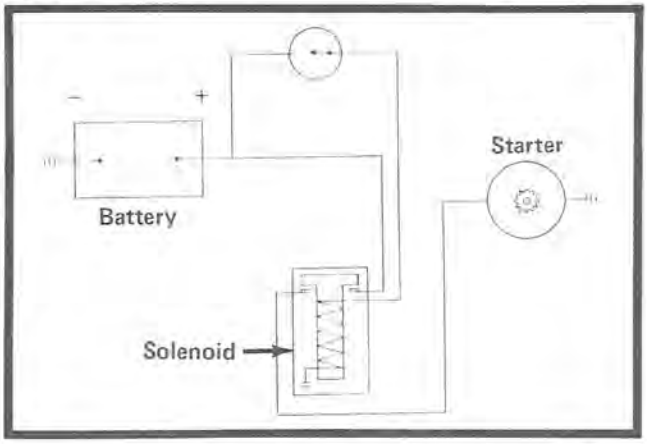
4. STARTER MOTOR AND RING GEAR – The starter motor and ring gear are used to crank the engine.

5. BATTERY – The battery stores the electrical energy supplied to the electric starter motor for cranking.

6. SOLENOID – The starter solenoid acts as a switch to allow current to pass from the battery, through the heavy cables and to the starter motor.

To start the engine, using the electric start motor, direct current flows from the battery, through the heavy cable and activates the electric starter motor. Since the starter motor requires a substantial amount of current for operation, heavy gauge battery and ground cables are used for transmission of direct current. To keep the heavy cables as short as possible, a solenoid is used. The solenoid acts as a switch between the battery and starter motor, Fig. IV-18. Starter motor engagement with the ring gear takes place when the ignition switch is in the START position. At this time, the heavy cable circuit to the battery is closed, resulting in direct current flow to the starter motor and subsequent starter gear engagement with the ring gear, Fig. IV-18.

Fig. IV-18



The battery is used as a storage center and power source for the electric start motor. To operate the starter motor, the battery must be fully charged, so maximum output from the battery will result. Current for the battery charge system is supplied by the magneto alternator system. When generated current, which is induced in the lighting coil by the rotating magnets, is routed to the regulator/rectifier, it is alternating current; this type of current will not charge the battery. Therefore, alternating current must be changed to direct current for battery charging. Because a change from alternating current to direct current is made within the regulator/rectifier, the battery receives only positive charges, resulting in a fully charged battery. When the battery is fully charged, the regulator/rectifier routes the excess current to ground, which prevents damage to the charging and lighting systems.

Tachometer

Note: Use Fig. IV-19 for recoil start engine and Fig. IV-20 for electric start engine.

The function of the tachometer is to register the rpm of the crankshaft. To accomplish this, the positive (+) and negative (-) terminals on the back of the tachometer are connected in parallel with the lighting coil, which sends positive pulses to the tachometer. These positive pulses flow through a coil in the tachometer and create an electromagnetic force, resulting in tachometer needle move-

ment against pressure of a spring. Therefore, as the pulse rate of the magneto generator increases, so does the tachometer needle movement. By contrast, as the pulse rate decreases, the electromagnetic force decreases, allowing the force of the spring on the indicator needle to become dominant; a decrease in rpm reading results.

Mounted in the tachometer and connected in parallel with the lighting circuit is the tachometer light bulb. The only function of the bulb is to illuminate the tachometer dial and it does not affect any mechanical function.

Fig. IV-19

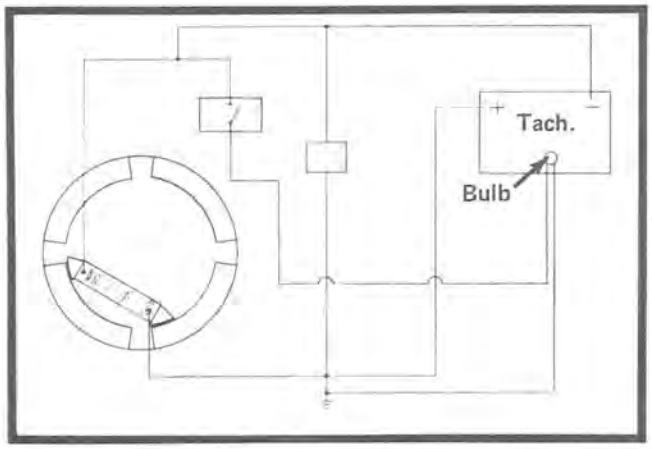
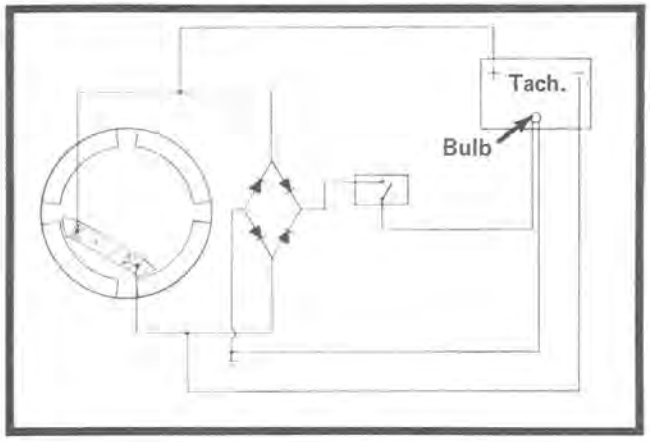


Fig. IV-20

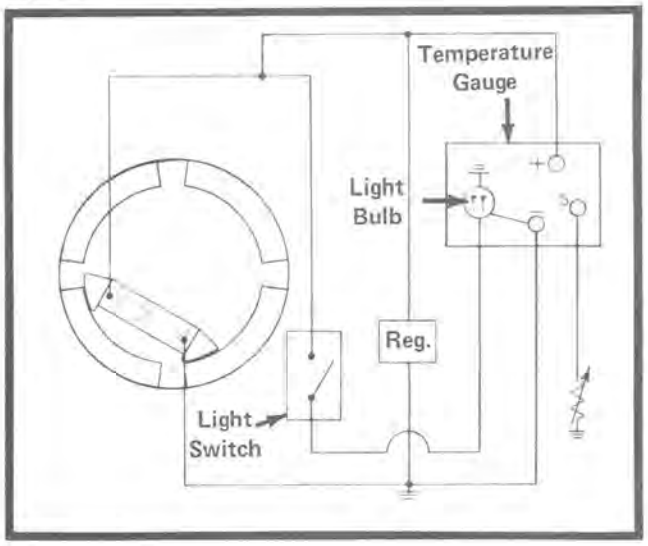


Electronic Temperature Gauge (0134-866)

The function of the gauge is to indicate cylinder head temperature. To accomplish this, the gauge is connected in parallel with the magneto alternator, which is the power source for the gauge, Fig. IV-21. A heat sensor is also connected to the gauge and mounted between the spark plug and cylinder head. When the engine is running, output from the magneto alternator moves the indicator needle to the lowest temperature reading. At the same time, another circuit within the gauge is completed by the heat sensor. As the cylinder head temperature increases, the resistance in the heat sensor decreases and allows more current to flow to the gauge. Because of the increased current flow to the gauge, the indicator needle will register a higher cylinder head temperature reading. The opposite happens when the cylinder head temperature decreases. Resistance in the heat sensor increases and allows less current to flow to the gauge. Because of the decreased current flow to the gauge, the indicator needle will register a lower cylinder head temperature.

Mounted in the gauge, and connected in parallel with the lighting circuit, is the temperature gauge light bulb, Fig. IV-21. The only function of the bulb is to illuminate the gauge dial and it does not affect any mechanical function.

Fig. IV-21



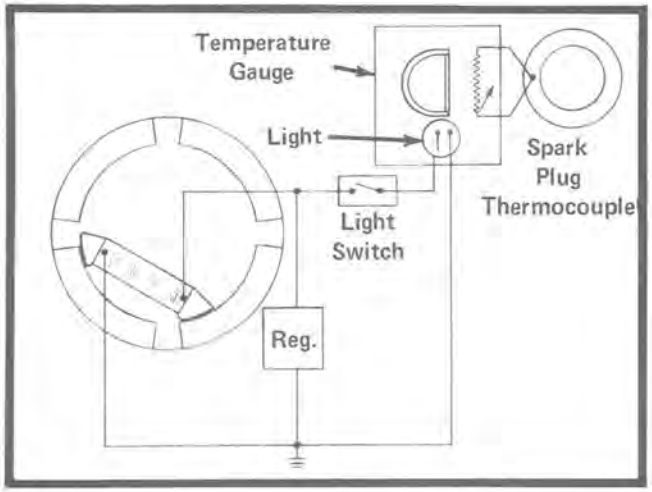
Thermocouple Temperature Gauge (0134-915)

The function of the gauge is to indicate cylinder head temperature. This gauge does not use an external power source except to provide current to illuminate the temperature gauge bulb, Fig. VI-22; thus, the gauge will indicate cylinder head temperature at all times. A heat sensor (thermocouple) is connected to the gauge and mounted between the spark plug and cylinder head. The thermocouple contains two unlike conductors, which, when exposed to temperature variations, cause a current to flow. The rate of change of current flow will cause the indicator needle to change positions.

THEORY OF OPERATION

Mounted in the gauge, and connected in parallel with the lighting circuit, is the temperature gauge light bulb, Fig. IV-22. The only function of the bulb is to illuminate the gauge dial and it does not affect any other function of the gauge.

Fig. IV-22



Heat Indicator Light (1974 Only)

The console-mounted heat indicator light is a warning device used to alert the operator of engine overheating. If the light is illuminated, the engine must be shut off or engine damage will result. The indicator light has three wires that must be connected: green, tan and black. The green wire connects to the B terminal of the ignition switch and supplies voltage to the bulb. The tan wire connects to a black wire at the main engine wire harness connector. The black wire connects to a thermal switch in the cylinder head. The switch is calibrated to close when cylinder head temperature rises to dangerous levels. In addition, the thermal switch mounted on the cylinder head completes the circuit from the magneto through the indicator light when the switch closes; thus, the light illuminates.

BEFORE TROUBLE SHOOTING IGN. SYSTEM

Check Fuel Delivery to Engine

Oftentimes, the fuel system will not be functioning properly and, as a result, may lead the service technician to believe there is a problem in the ignition electrical system. Therefore, before the ignition system is considered to be malfunctioning, check the fuel system to make sure the engine is getting fuel.

1. Check fuel tank filter (See: Section III – Fuel System, Check Fuel Tank Filter, page III-5).

2. Check in-line fuel filter (See: Section III – Fuel System, Check In-Line Fuel Filter, page III-5).

3. Make sure the carburetor is adjusted properly and delivering fuel to the engine.

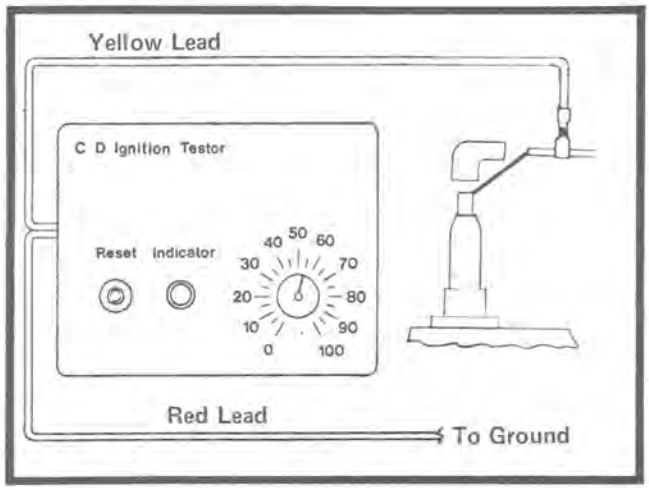
Check High Voltage Output

Equipment Necessary: Electro-Specialties CD Ignition Tester Model 1, New Spark Plugs and 13/16-Inch Spark Plug Socket

1. Remove the spark plug cap from the no. 2 (MAG side) spark plug. Next, unscrew the cap from the high tension wire. Finally, connect the high tension wire to the top of the spark plug, using a suitable metal connector.

2. Connect the yellow lead of the CDI tester to the MM-1 secondary output adaptor. Next, connect the MM-1 adaptor to the no. 2 high tension wire, Fig. IV-23. Also, connect the red tester lead to a good ground on the snowmobile frame, Fig. IV-23. Finally, set tester dial at 55, Fig. IV-23.

Fig. IV-23



BEFORE TROUBLE SHOOTING IGN. SYSTEM

3. Grasp the recoil handle and crank the engine over quickly.

4. If red light on tester illuminates, spark plug and high voltage output is satisfactory. If red light does not illuminate, proceed to step 5.

Note: Press the reset button after the red light on the CDI tester illuminates. Repeat test three times for conclusive results.

5. Remove old spark plug from the no. 2 cylinder (MAG side); then install a new plug, using a 13/16-inch spark plug socket. Connect the high tension wire to the top of the spark plug, using a suitable metal connector.

6. Connect the MM-1 adaptor to the no. 2 high tension wire. Next, connect the red lead of the CDI tester to a good ground on the snowmobile frame. Finally, set tester dial at 55.

7. Grasp the recoil handle and crank the engine over quickly.

8. If red light on tester illuminates, high voltage output is satisfactory and indicates the old spark plug is defective. However, if red light does not illuminate, the ignition system or main wiring harness may be defective. Therefore, check both the ignition system and main wiring harness to isolate the problem (See: Ignition System and Main Wiring Harness Check, page IV-21).

IGNITION SYSTEM TESTING

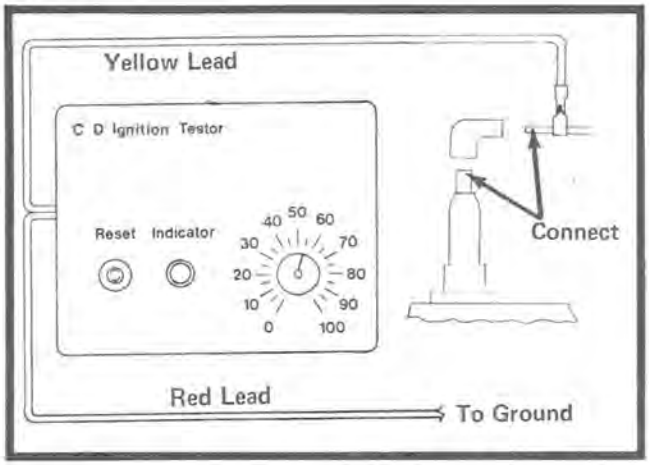
Ignition System and Main Wiring Harness Check

Equipment Necessary: Electro-Specialties CD Ignition Tester Model 1

1. Disconnect the main wiring harness from the engine connector plug.

2. Remove the spark plug cap from the no. 2 high tension wire; then connect the high tension wire directly to the spark plug. Connect the positive (red) lead of the tester to ground and the negative (yellow) tester lead to the no. 2 high tension wire, Fig. IV-24. Use the MM-1 secondary output adaptor. Set the dial at 55.

Fig. IV-24



3. Grasp the recoil handle, then crank the engine over quickly.

4. If red light illuminates, high voltage output is satisfactory and indicates there is a problem in the main wiring harness or related switches. Check all the switches to find the problem area (See: Check Main Wiring Harness and Related Switches, page IV-21). If red light did not illuminate, high voltage is not satisfactory and indicates there is a problem in the ignition system, not in the main harness or switches. Check ignition system components to find the problem area (See: Check Ignition-Related Components, page IV-23).

Note: Remember to press the RESET button after the red light on the CDI tester illuminates. Repeat test three times for conclusive results.

Check Main Wiring Harness and Related Switches

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2, Screwdriver Having a 1/4-Inch Blade

Note: Before checking harness and switches, loosen screw holding throttle wire to carburetor-mounted throttle arm, using screwdriver having a 1/4-inch blade. Pull all slack out of the

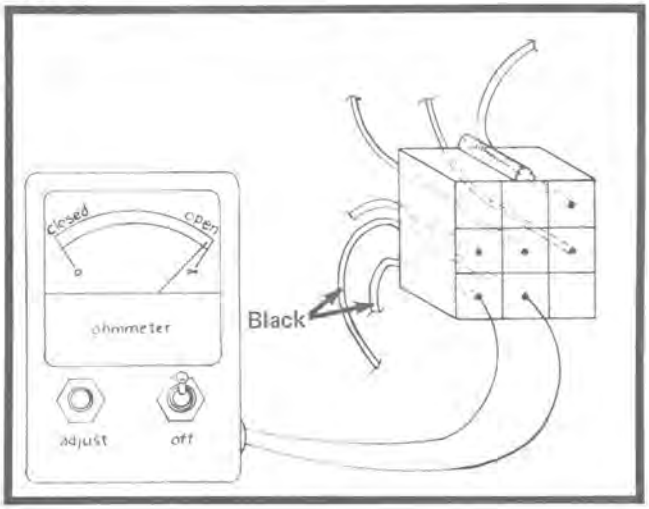
throttle wire, plus an additional 1/16 inch, which will tension the throttle safety switch; then tighten screw.

1. Make sure the main wiring harness is disconnected from the engine connector plug.

2. Rotate the ignition switch to the ON position.

3. Connect one lead of the ohmmeter to a black wire in the wiring harness connector plug and the other lead to the remaining black wire in the connector plug, Fig. IV-25.

Fig. IV-25

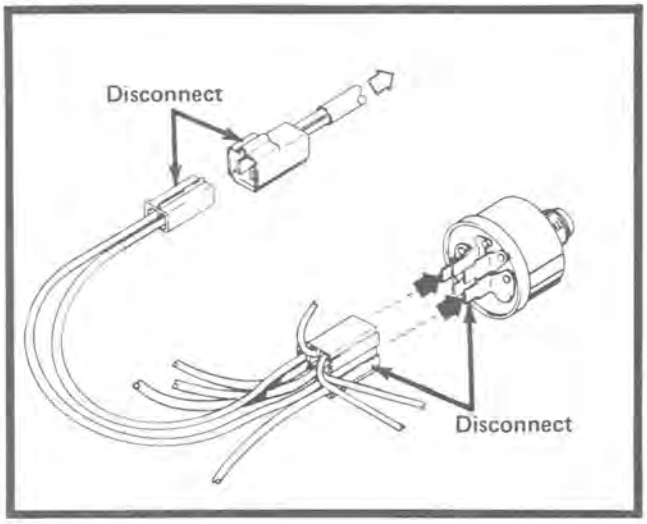


4. If the ohmmeter reads infinity, an OPEN circuit exists, and the switches are satisfactory. If the ohmmeter reads 0 or very low resistance, a short circuit exists, and a switch may not be operating properly. To determine if a switch or the wiring harness is defective, proceed to step 5 and 6.

5. Disconnect the main wiring harness connector plug from the ignition switch, Fig. IV-26. Also, disconnect emergency shut-off switch plug from the plug having two black wires running to the ignition switch connector, Fig. IV-26.

6. If the ohmmeter now registers infinity (OPEN), the switch is satisfactory. If the ohmmeter registers 0, the main wiring harness is defective and must be replaced.

Fig. IV-26



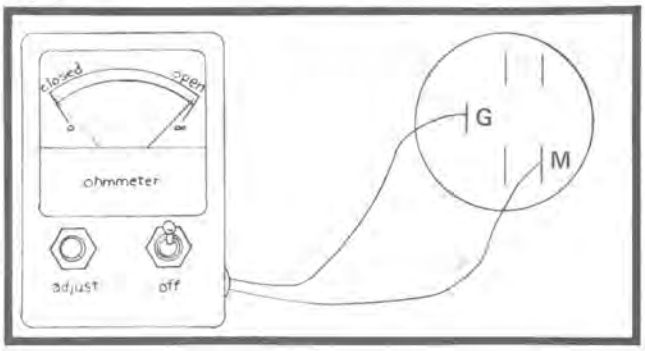
Ignition Switch and Throttle Safety/Stop Switch Check

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2, Screwdriver Having a 1/4-Inch Blade

1. Rotate ignition switch to the ON position.

2. Connect one lead of the ohmmeter to the G terminal on ignition switch and the other lead to the M terminal, Fig. IV-27.

Fig. IV-27



3. If ohmmeter registers infinity (OPEN), the ignition switch is satisfactory; proceed to step 4. If the ohmmeter registers 0 (CLOSED), the ignition switch is defective and is to be replaced.

Note: Before performing steps 4, 5 and 6, loosen screw holding throttle wire in carburetor-mounted throttle arm, using a screwdriver having a 1/4-inch blade. Pull all slack out of

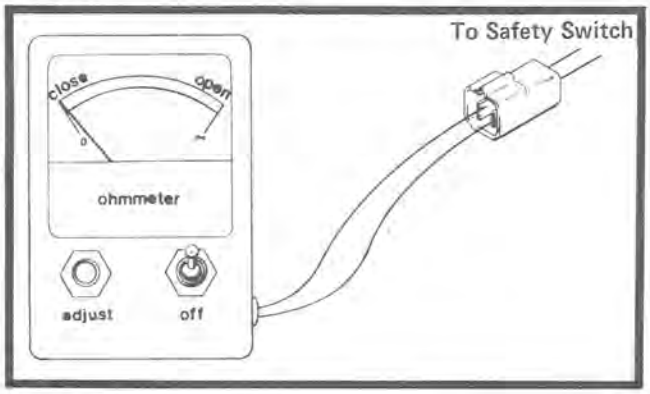
throttle wire, plus an additional 1/16 inch, which will tension the throttle safety switch properly; then tighten screw.

4. Connect one lead of the ohmmeter to the brown wire running to the throttle safety/stop switch and the other lead to the black wire having a yellow tracer, Fig. IV-28. This wire also runs to the throttle safety/stop switch.

5. Check the emergency shut-off switch and make sure it is in the ON (center) position.

6. If ohmmeter registers 0 (CLOSED), the throttle safety/stop switch is defective and must be replaced, Fig. IV-28. If ohmmeter registers infinity (OPEN), the switch is satisfactory.

Fig. IV-28



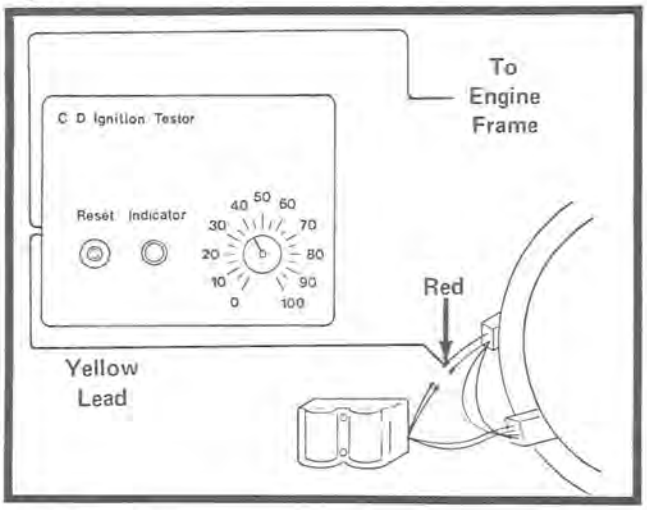
Check Ignition-Related Components

Equipment Necessary: Electro-Specialties CD Ignition Tester Model 1

Note: Remember to press the reset button after the red light on the CDI tester illuminates. Repeat test three times for conclusive results.

1. Exciter Coil Test: Disconnect the red and white wires from the exciter coil and the CDI unit, Fig. IV-29. Connect the positive (red) tester lead to the engine frame. Connect the negative (yellow) tester lead to the red wire from the exciter coil, Fig. IV-29. Set the tester dial at 40, then crank the engine over quickly. If the red light on the tester illuminates, the output of the exciter coil is satisfactory. If the red light on the tester does not illuminate, the exciter coil must be replaced. Repeat test three times for conclusive results.

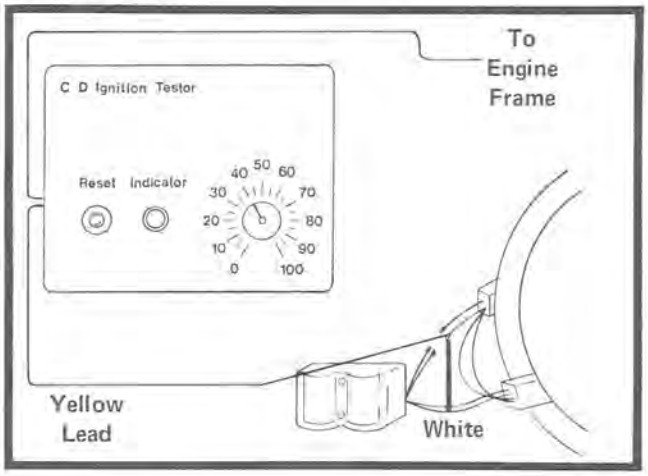
Fig. IV-29



2. Pulser Coil Test: Make sure the white lead of the pulser coil is disconnected from the white wire of the CDI unit. Next, connect the positive (red) tester lead to the engine frame and the negative (yellow) tester lead to the white lead from the pulser coil, Fig. IV-30. Set the tester dial at 40, then crank the engine over quickly. If the red light on the tester illuminates, the pulser coil output is satisfactory. If the red light on the tester does not illuminate, the pulser coil must be replaced. Repeat test three times for conclusive results.

Note: If the tests show both the exciter coil and pulser coil are satisfactory, proceed with external coil and CDI unit testing (See: Check CDI Unit and External Ignition Coil, page IV-24).

Fig. IV-30



IGNITION SYSTEM TESTING

Check CDI Unit, External Ignition Coil and RFI Suppressors

Equipment Necessary: Screwdriver Having a 5/16-Inch Blade, Electro-Specialties CD Ignition Tester Model 1, Ohmmeter Model PC2 and Arctic Multitester

Note: Remember to press the reset button after the red light on the CDI tester illuminates. Repeat test three times for conclusive results.

CDI UNIT

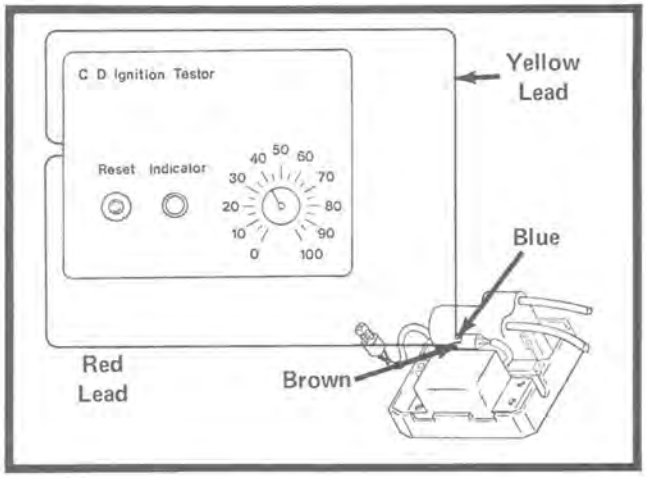
1. Remove the ignition coil and CDI unit bracket from the engine, using a screwdriver having a 5/16-inch blade. Make certain the red wire and the white wire from the exciter and pulser coils are connected to the matching wires on the CDI unit.

2. Disconnect the triple wire plugs connecting the CDI unit to the external ignition coil, Fig. IV-31.

Fig. IV-31

3. Connect the positive (red) tester lead to the brown wire terminal on the CDI part of the triple plug and the negative (yellow) tester lead to one of the blue wires on the CDI plug, Fig. IV-32. Leave the remaining blue wire open. Set the tester dial on 40, then crank the engine over quickly. If the red light on the tester illuminates, the CDI unit is satisfactory. If the red light on the tester does not illuminate, the CDI unit must be replaced. Repeat the test three times for conclusive results.

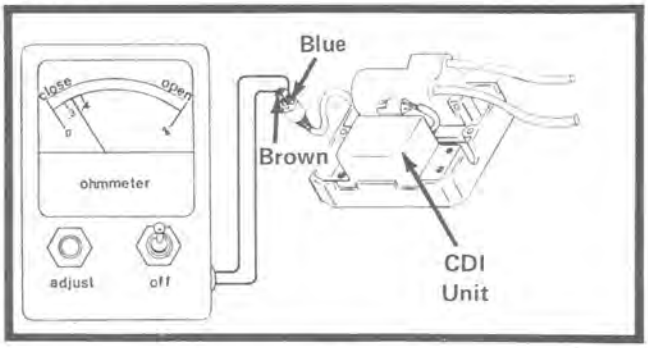
Fig. IV-32



EXTERNAL IGNITION COIL

1. Connect one lead of the PC2 ohmmeter to either of the blue wires on the ignition coil end of the triple plug and the other ohmmeter lead to the brown wire on the triple plug, Fig. IV-33. The ohmmeter reading should be 0.365 ohms. However, a range of 0.328-0.401 ohms is acceptable. If the reading is within specifications, the ignition coil is satisfactory (proceed to step 2). If the reading is not within specifications, replace the ignition coil.

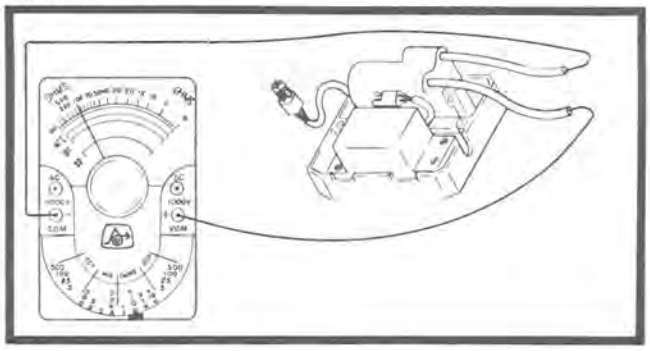
Fig. IV-33



2. After setting the multitester selector at 100X, connect one tester lead to each high tension wire, Fig. IV-34. The reading should be 10,200 ohms. However, a range of 9,180-11,220 ohms is acceptable. If the reading is not in this range, replace the ignition coil.

IGNITION SYSTEM TESTING

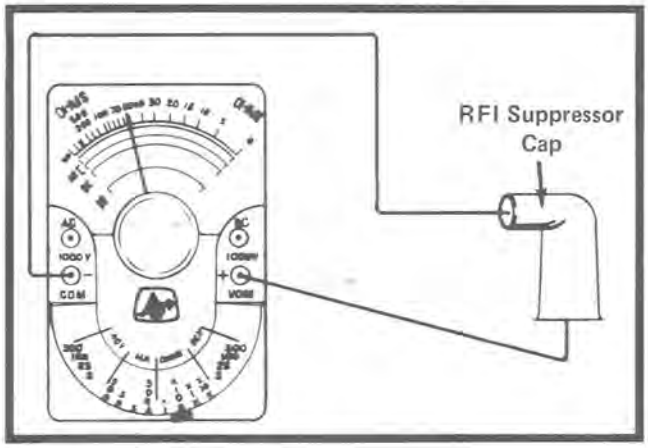
Fig. IV-34



RFI SUPPRESSOR CAPS

1. With the multitester selector set on 100X, connect one tester lead to each end of the RFI cap, Fig. IV-35. The reading should be 5500 ohms. However, a range of 4675-6875 is acceptable. If the reading is not in this range, replace the RFI suppressor caps.

Fig. IV-35



2. Carefully inspect the caps for cracks or evidence of leakage. A defective cap will cause erratic ignition and engine performance, hard starting and plug fouling. If a cap is defective, replace it.

BEFORE TROUBLE SHOOTING LIGHT SYST.

Check Headlight, Taillights and Brakelights

Oftentimes, the light bulb will not be functioning properly because it is burned out or loose in the socket, and, as a result, may lead the service technician to believe there is a problem in the magneto alternator or other areas of the lighting system. Therefore, before the magneto alternator or lighting system is considered to be malfunctioning, check the light bulbs for broken filaments, etc.

1. Check taillight and brakelight bulbs (See: Check Taillights and Brakelights, page IV-25).

2. Check headlight bulb (See: Check '74 Panther Headlight, page IV-26, and Check '75 Panther Headlight, page IV-27).

LIGHTING SYSTEM TESTING

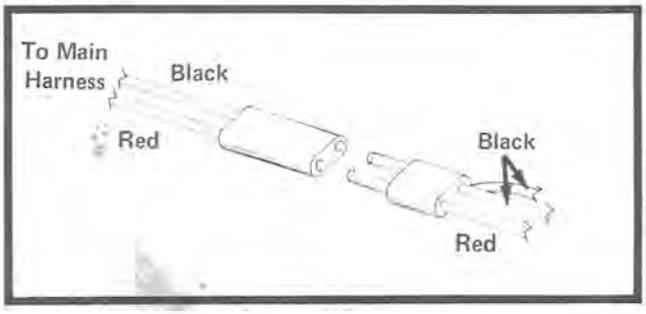
Check Taillights and Brakelights

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Remove the seat from the tunnel.

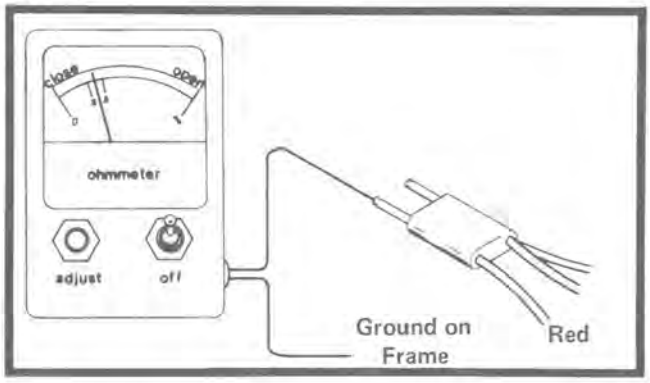
2. Disconnect the taillight/brakelight connectors, Fig. IV-36.

Fig. IV-36



3. Connect one lead of the ohmmeter to the red wire running to the brakelight, and the other lead to a suitable ground, Fig. IV-37.

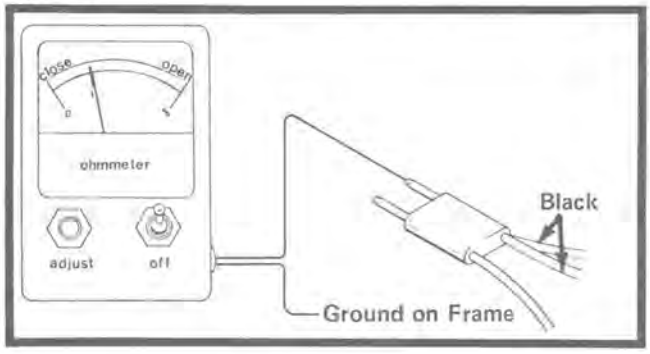
Fig. IV-37



4. If the ohmmeter registers low resistance (approximately 0.6-0.8), the brakelight is acceptable. If the ohmmeter registers infinity (OPEN), there is a bad ground, broken red wire or the brakelight bulb is burned out.

5. Connect one lead of the ohmmeter to the two black wires running to the taillights, and the other lead to a suitable ground, Fig. IV-38.

Fig. IV-38



6. If the ohmmeter registers low resistance (approximately 1 ohm), the taillights are acceptable. If the ohmmeter registers slightly higher resistance (approximately 2 ohms), one of the taillight bulbs is not making contact in the socket or is burned out. If the ohmmeter registers infinity (OPEN), there is a bad ground, broken black wire or both taillight bulbs are burned out.

Note: The taillights, brakelights and wires have now been checked. If all the components checked out to be acceptable, and a malfunction still exists in the brakelights and taillights, the problem area must be isolated (See: Isolate Problem to Magneto Alternator or Wiring Circuit, page IV-27).

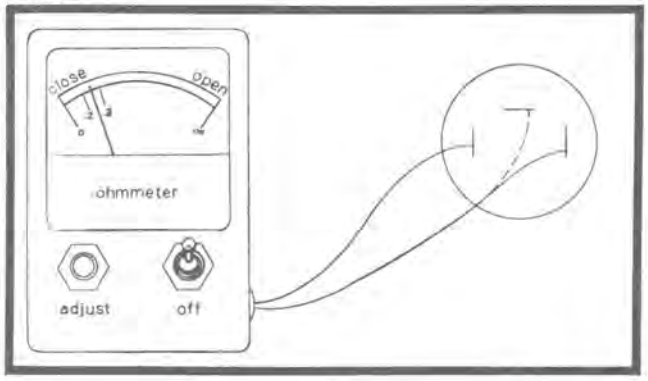
Check Headlight - '74 Panther

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Disconnect the headlight connector from the headlight terminals.

2. Connect one lead of the ohmmeter to ground terminal on headlight (where brown wire connects) and the other lead to the high beam headlight terminal (where blue wire connects), Fig. IV-39.

Fig. IV-39



3. If the ohmmeter registers low resistance (0.2-0.3), the high beam filament is acceptable. Check low beam if headlight malfunction still exists (see step 4). If the ohmmeter registers high resistance or infinity (OPEN), the high beam filament is burned out and, therefore, the headlight must be replaced.

4. Connect one lead of the ohmmeter to ground terminal on headlight (where brown wire connects) and the other lead to the low beam headlight terminal (where the white wire connects), Fig. IV-39.

5. If the ohmmeter registers low resistance (0.2-0.3), the low beam filament is acceptable. If the ohmmeter registers high resistance or infinity (OPEN), the low beam filament is burned out and, therefore, the headlight must be replaced.

Note: The headlight has now been checked. If it checked out to be acceptable and a mal-

function still exists in the headlight, the problem area must be isolated (See: Isolate Problem to Magneto Alternator or Wiring Circuit, page IV-27).

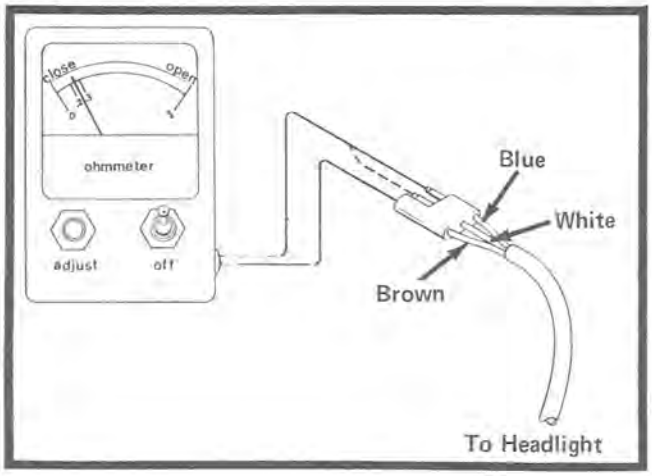
Check Headlight - '75 Panther

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Disconnect the headlight harness connector from wiring harness connector.

2. Connect one lead of the ohmmeter to the ground terminal (where brown wire connects) in headlight harness connector and the other tester lead to the high beam terminal (where blue wire connects), Fig. IV-40.

Fig. IV-40



3. If the ohmmeter registers low resistance (0.2-0.3), the high beam filament is acceptable. Check low beam if headlight malfunction still exists (See: Step 4). If the ohmmeter registers high resistance or infinity (OPEN), the high beam filament is burned out and, therefore, the headlight must be replaced.

4. Connect one lead of the ohmmeter to ground terminal (where brown wire connects) in headlight harness connector and the other tester lead to the low beam terminal (where white wire connects), Fig. IV-40.

5. If the ohmmeter registers low resistance (0.2-0.3), the low beam filament is acceptable. If the ohmmeter registers high resistance or infinity (OPEN), the low beam filament is burned out and, therefore, the headlight must be replaced.

Note: The headlight has now been checked. If it checked out to be acceptable and a malfunction still exists in the headlight, the problem area must be isolated (See: Isolate Problem to Magneto Alternator or Wiring Circuit, page IV-27).

Isolate Problem to Magneto Alternator or Wiring Circuit

Equipment Necessary: Multitester, Quik-Jak

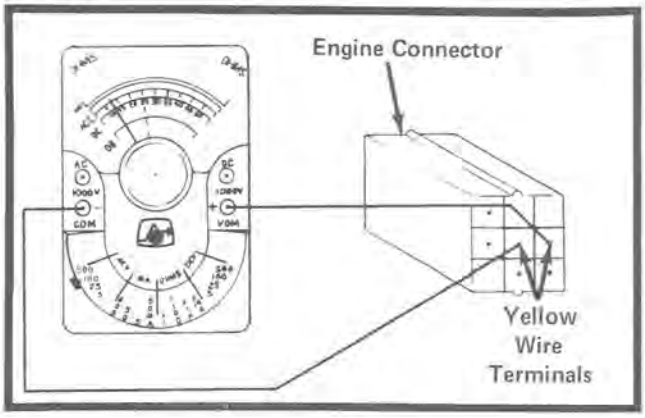
Note: Use either a voltmeter or ohmmeter to isolate the lighting problem to the magneto alternator or wiring harness. If a voltmeter is used, proceed by following steps 1-5. If ohmmeter is used, check resistance of lighting coils (See: Step 6 only).

1. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

2. Disconnect the main wiring harness from the engine connector plug.

3. Set the multitester selector at 100 AC volts. In the engine connector plug, connect one lead of the voltmeter to one yellow wire terminal and the other tester lead to the remaining yellow wire terminal, Fig. IV-41.

Fig. IV-41



4. Start the engine and allow it to idle. The voltmeter must register some degree of AC voltage (approximately 10-15 AC volts), Fig. IV-41. Grasp the throttle and accelerate slightly. As the engine rpm increases, the voltmeter must register 20-30 AC volts.

LIGHTING SYSTEM TESTING

CAUTION

Make sure AC voltmeter has the capacity to test in excess of 30 AC volts. High engine rpm can cause high voltage and, as a result, may damage on-line components (AC voltmeter, etc.).

5. If output is 10-15 AC volts at idle, and also, raises to 20-30 AC volts when slight acceleration takes place, the magneto alternator (lighting coil) is satisfactory and indicates a wiring circuit problem. If the output is not satisfactory, the magneto alternator is malfunctioning and must be checked further (See: Check Magneto Alternator, page IV-31). Shut engine off and remove the Quik-Jak.

6. An alternate method of testing the magneto alternator (lighting coils) is with an ohmmeter (See: Check Resistance of Lighting Coils, page IV-28).

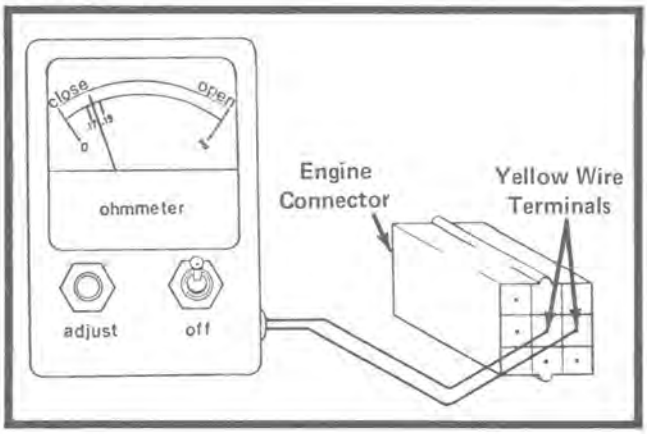
Check Resistance of Lighting Coils

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Disconnect the main wiring harness from the engine connector.

2. In the engine connector plug, connect one lead of the ohmmeter to one yellow wire terminal, and the other tester lead to the remaining yellow wire terminal, Fig. IV-42.

Fig. IV-42



3. The ohmmeter must register 0.17-0.19 ohms.

4. If the ohmmeter registers 0.17-0.19 ohms, the lighting coil is satisfactory and indicates a wiring circuit problem (See: Check Voltage Regulator, page IV-28). If the ohmmeter does not register 0.17-0.19 ohms, the lighting coil is defective and must be replaced.

MAIN WIRING CIRCUIT TESTING

Check Voltage Regulator

Equipment Necessary: Multitester, Quik-Jak

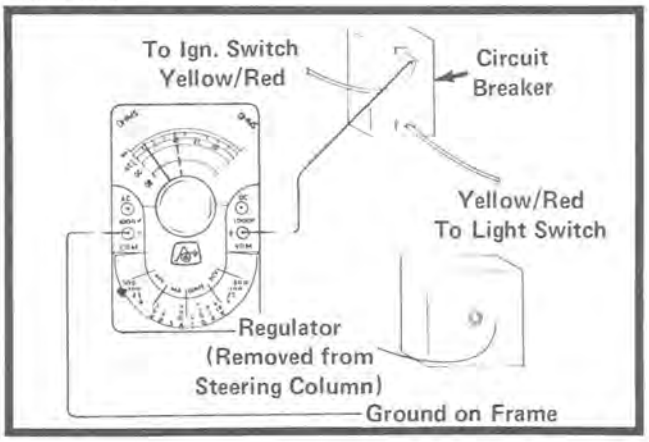
1. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

2. Connect the main wiring harness connector to the engine connector plug.

3. Remove the voltage regulator from the steering column. Leave it connected to the wire harness, but isolate it from the chassis.

4. Set multitester selector at 100 AC volts. Connect one lead of the AC voltmeter to the yellow w/red wire on the circuit breaker and the other tester lead to GROUND on the steering column, Fig. IV-42A.

Fig. IV-42A



MAIN WIRING CIRCUIT TESTING

5. Start the engine and allow it to idle rapidly. The voltmeter must register approximately 12-15 AC volts. Grasp the throttle and accelerate slightly. As the engine rpm increases, the voltmeter must register 20-30 AC volts.

> **CAUTION**
>
> **Make sure the AC voltmeter has the capacity to test in excess of 30 AC volts. High engine rpm can cause high voltage and, as a result, may damage on-line components (AC voltmeter, etc.).**

6. If the voltmeter registers 12-15 AC volts at engine idle, and 20-30 AC volts when engine is accelerated slightly, adequate power is getting to the system. Proceed to step 7. By contrast, if the voltmeter does not register 12-15 AC volts at engine idle and 20-30 AC volts when the engine is accelerated, there is either a problem in the magneto alternator wiring circuit between the engine connector and the regulator ground on steering column, or between the engine connector and the circuit breaker.

7. With the engine at idle, and the AC voltmeter leads connected to the yellow w/red wire of the circuit breaker and GROUND (see step 4), connect the voltage regulator to the steering column. Voltmeter must register 12-15 AC volts at idle and when engine is accelerated.

8. If voltmeter registers 12-15 AC volts, the voltage regulator is operating correctly and indicates there may be a problem in the circuit breaker (See: Step 9). If voltmeter does not register 12-15 AC volts, the voltage regulator is defective and must be replaced.

9. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other lead to a circuit breaker terminal, Fig. IV-42A. Voltmeter must register 12-15 AC volts. If voltmeter registers 12-15 AC volts, check the opposite circuit breaker terminal; it also must have 12-15 AC volts. If either circuit breaker terminal does not have 12-15 AC volts, the circuit breaker is defective and must be replaced.

WIRING CIRCUIT TESTING

Check Light Switch for Voltage

Equipment Necessary: Multitester, Quik-Jak

1. Move light switch to the OFF position.

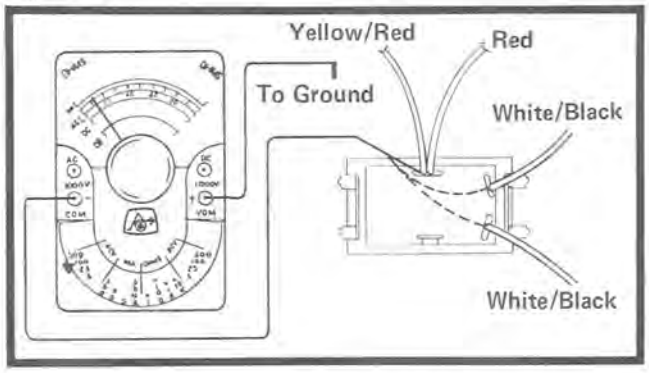
2. Connect the main wiring harness connector to the engine connector plug.

3. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

4. Start the engine and allow it to idle.

5. Set the multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other lead to the horizontally-oriented terminal holding a yellow w/red wire, Fig. IV-43. Voltmeter must register 12-15 AC volts. DO NOT REMOVE WIRES FROM SWITCH.

Fig. IV-43



6. If voltmeter registers 12-15 AC volts, check the two vertically-oriented terminals (See: Step 7). If voltmeter does not register 12-15 AC volts, there is a problem in the yellow w/red wire running from the circuit breaker

terminal to the horizontally-oriented light switch terminal.

7. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other tester lead to a vertically-oriented light switch terminal, Fig. IV-43. Move light switch to the ON position. Voltmeter must register 12-15 AC volts. DO NOT REMOVE WIRES FROM SWITCH.

8. If the voltmeter registers 12-15 AC volts, the light switch is acceptable and indicates a problem in the brake switch, dimmer switch or related wires (See: Check Brake Switch and Dimmer Switch, page IV-30). If the voltmeter does not register 12-15 AC volts, the light switch is defective and must be replaced. To positively verify a defective switch, check it with an ohmmeter (See: Check Light Switch Resistance, page IV-30).

Check Light Switch Resistance

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

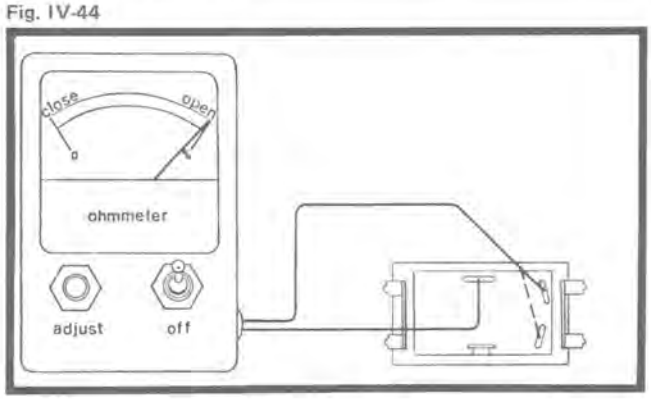
1. Shut the engine off.

2. Remove the wires from the light switch terminals.

3. Move the light switch to the OFF position.

4. Connect one lead of the ohmmeter to a horizontally-oriented terminal on the light switch and the other lead to a vertically-oriented terminal, Fig. IV-44. Ohmmeter must register OPEN. Check remaining vertically-oriented terminal in the same manner, Fig. IV-44.

Fig. IV-44



5. If ohmmeter does not register OPEN, the light switch is defective and must be replaced. If the ohmmeter registers OPEN, proceed to step 6.

6. Move the light switch to the ON position. Ohmmeter must register CLOSED.

7. If ohmmeter registered CLOSED, the light switch is acceptable. If the ohmmeter does not register CLOSED, the light switch is defective and must be replaced.

8. Check the brake switch and dimmer switch (See: Check Brake Switch and Dimmer Switch, page IV-30).

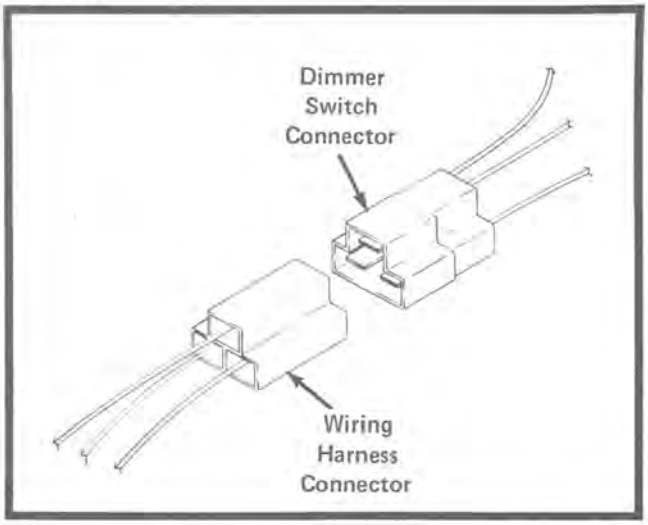
Check Brake Switch and Dimmer Switch

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Shut engine off.

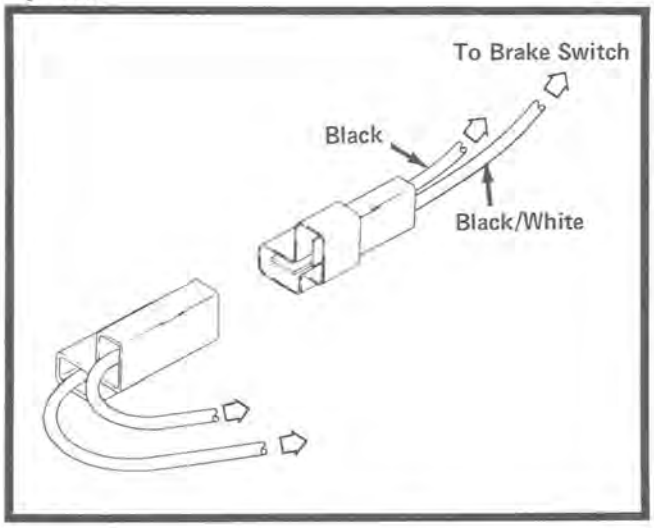
2. Disconnect the connectors holding three wires running to the dimmer switch, Fig. IV-45.

Fig. IV-45



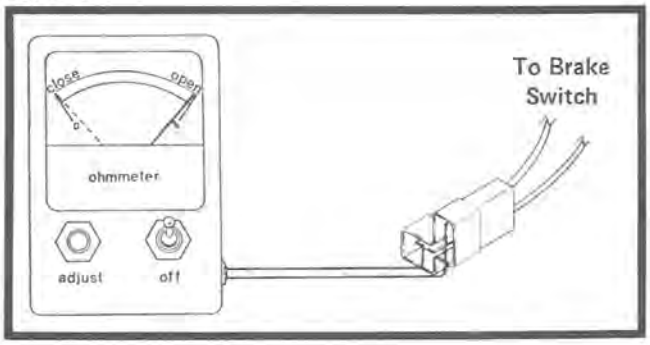
3. Disconnect the Z-shaped connectors holding two wires running to the brake switch, Fig. IV-46.

Fig. IV-46



4. Connect one lead of the ohmmeter to the terminal in the Z-shaped connector and the other lead to the remaining terminal in the Z-shaped connector holding the two wires running to the brake switch, Fig. IV-47. Ohmmeter must register OPEN.

Fig. IV-47



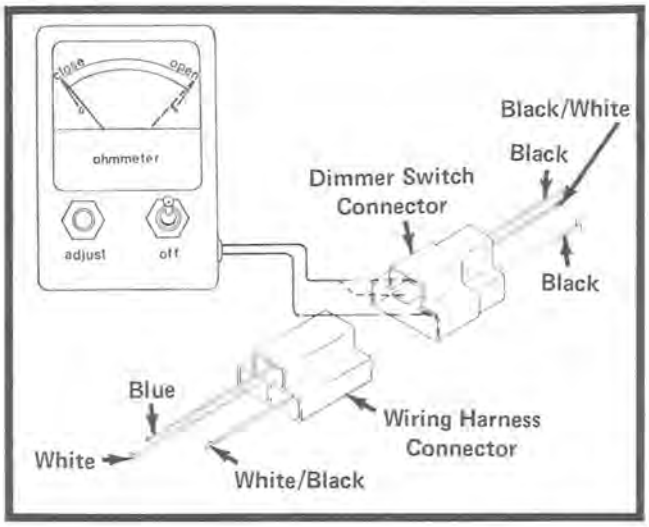
5. If the ohmmeter does not register OPEN, the switch is defective and must be replaced. If the ohmmeter registers OPEN, proceed to step 6.

6. Squeeze the brake lever. Ohmmeter must register CLOSED, Fig. IV-47.

7. If ohmmeter registers CLOSED, the brake switch is acceptable and indicates a possible dimmer switch problem (See: Step 8). If the ohmmeter registers OPEN, the brake switch is defective and must be replaced.

8. Connect one ohmmeter lead to the single black wire in the three terminal connector running to the dimmer switch, and the other lead to the high beam terminal in the three terminal connector of the dimmer switch, Fig. IV-48. The terminal can be identified by noting that it mates with the blue wire in the wiring harness half of the plug. The ohmmeter must show CLOSED when the dimmer switch is in the high beam position, Fig. IV-48. The ohmmeter must register OPEN with the dimmer switch in the low beam position, Fig. IV-48. Change the ohmmeter lead from the high beam terminal to the low beam terminal, Fig. IV-48. The terminal can be identified by noting that it mates with the white wire in the wiring harness half of the plug, Fig. IV-48. With the dimmer switch in the low beam position, the ohmmeter must register CLOSED. With the switch in the high beam position, the ohmmeter must register OPEN, Fig. IV-48.

Fig. IV-48



Check Magneto Alternator

Equipment Necessary: Electro-Specialties Ohmmeter PC2

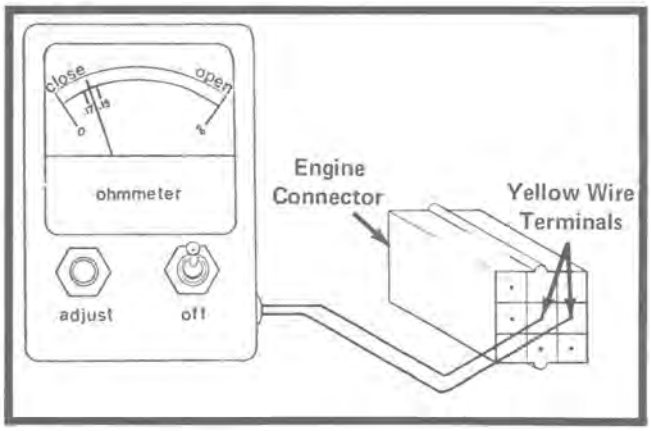
1. Shut the engine off.

2. Disconnect the main wiring harness connector from the engine connector.

3. In the engine connector, connect one lead of the ohmmeter to one yellow wire terminal, the other tester lead to the remaining yellow wire terminal, Fig. IV-49.

WIRING CIRCUIT TESTING

Fig. IV-49



4. The ohmmeter must register 0.17-0.19 ohms. If the ohmmeter registers 0.17-0.19 ohms, the lighting coil is aceptable. If the ohmmeter does not register 0.17-0.19 ohms, the lighting coil is defective and must be replaced.

5. The lighting coil has now been checked for proper resistance.

Note: If voltage output of the magneto alternator does not improve after all the preceding tests are performed, the flywheel magnets may be weak. Compare the magnetic attraction of the old flywheel against the attraction of a new flywheel. Install a new flywheel if the old flywheel magnets do not seem to be strong enough.

ELECTRIC START TESTING

General Battery Care

The battery is perishable and, therefore, must be maintained properly to ensure peak output. When a battery requires charging, a slow charge must be used. The following maintenance steps will ensure peak battery output.

1. Check the electrolyte level in the battery every week. If electrolyte is low, add pure distilled water until proper level is obtained. DO NOT OVERFILL BATTERY.

CAUTION

Overfilling the battery will cause the electrolyte to be forced out through the vent hole in the battery cell caps, resulting in a diluted solution strength. And when the discharged solution contacts the battery terminals, cables and other snowmobile parts, corrosion will result and cause damage.

2. Make sure the battery base and hold down clamp are free of corrosion and other foreign matter.

3. Adjust the hold down clamp to keep the battery from shaking, but not so tight that a strain is exerted on the battery case.

4. Before connecting the battery cables to the battery terminals, clean both of the battery terminals and cable connectors to ensure good contact.

5. Coat the battery terminals and cables with petroleum jelly after the battery cables are connected to the terminals.

Note: When connecting the battery cables to the terminals, install the positive (+) cable first, then the negative (-) cable.

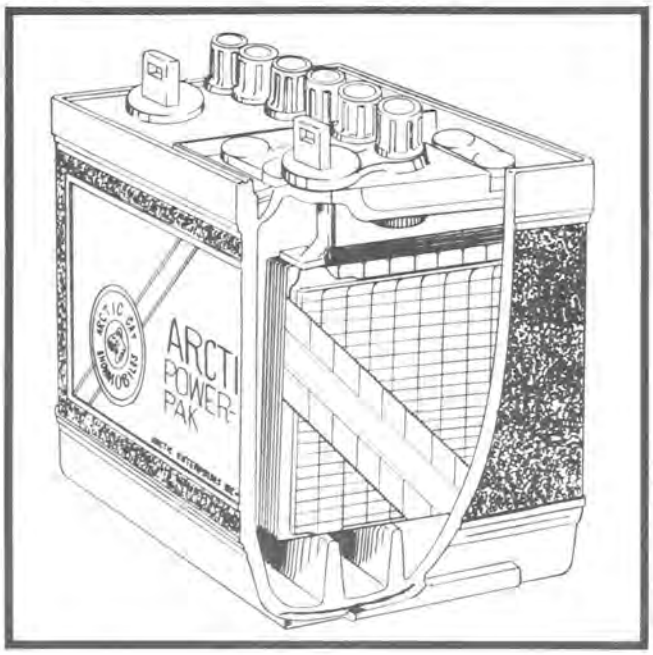
Check Battery Charge

Equipment Necessary: Hydrometer, Multitester

The electrolyte solution in the battery must be checked frequently to make sure the battery is fully charged. The electrolyte solution consists of sulfuric acid and distilled water that varies in weight in relation to battery charge. When the battery charge decreases, acid is released from the solution and transposed to the battery plates, Fig. IV-50, resulting in a decrease in electrolyte weight.

ELECTRIC START TESTING

Fig. IV-50



1. Remove the battery cell caps and withdraw a sample of electrolyte solution from one of the cells.

2. Check the hydrometer reading to see what the charge of the battery is (See: Battery Charge Table, below).

BATTERY CHARGE TABLE

Specific Gravity	State of Charge	Battery Freeze Point
1.260	Fully Charged	-74°F.
1.230	3/4 Charged	-42°F.
1.200	1/2 Charged	-16°F.
1.170	1/4 Charged	0°F.
1.110	Discharged	+19°F.

3. If the battery charge is low, install battery cell caps and charge the battery, using a 12 volt "slow charge" battery charger. Remove battery from snowmobile chassis when charging the battery.

   A. Above +60°F. – 3 Amperes for 4 hours.

   B. Below +60°F. – 3 Amperes for 6 hours.

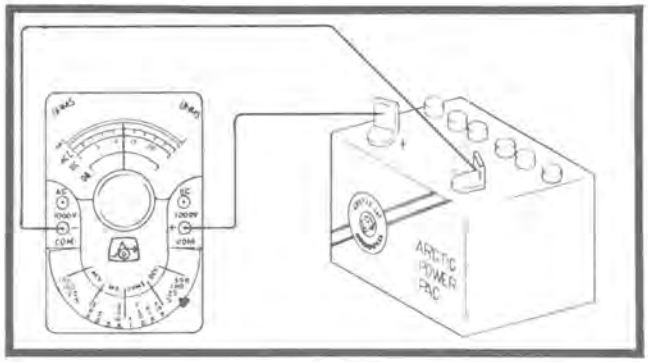
⚠ WARNING ⚠

The hydrogen gas formed while the battery is being charged is extremely explosive. To prevent an explosion, keep open flame, electrical spark, cigars and cigarettes away from the battery.

4. After the battery is fully charged, install it in the snowmobile chassis; then connect positive (+) and negative (-) cables to the corresponding battery terminals.

Note: Before installing battery in snowmobile chassis, check the output of the battery. Set multitester selector at 25 DC volts. Connect one lead of the DC voltmeter to the positive (+) battery terminal and the other tester lead to the negative (-) terminal, Fig. IV-51. Voltmeter must register 12 DC volts, Fig. IV-51. If the voltmeter registers 12 DC volts, the battery is acceptable. If the voltmeter does not register 12 DC volts, the battery is defective and must be replaced.

Fig. IV-51



Changing Battery Electrolyte

Under normal conditions, the battery electrolyte should not have to be changed. However, the solution can be changed if it is accidentally neutralized by adding an alkaline substance, or if the solution is spilled. DO NOT CHANGE ELECTROLYTE IN AN OLD BATTERY.

When electrolyte is drained from the battery, waste materials, the result of repetitive charging and discharging, may release from the sediment chambers and become lodged in the separators. If this situation occurs, a battery short circuit may result, causing damage to the electrical system.

ELECTRIC START TESTING

1. Charge the battery until "gassing" in all cells is clearly evident.

Note: Gassing is the bubbling action of the electrolyte. If one or more cells fail to gas, do not proceed to the next step. There is a structural defect in the battery and it must be replaced.

2. Check the specific gravity of the electrolyte solution at three consecutive hourly intervals, using a hydrometer. Hydrometer reading must be the same at each check.

3. Drain the electrolyte solution from the charged battery and fill with distilled water.

4. Charge the battery (See: Battery Charge Table, page IV-33).

5. Drain the solution from the battery; then add prepared electrolyte to the battery cells. FILL TO CORRECT LEVEL.

6. Re-charge the battery (See: Check Battery Charge, page IV-32).

Note: If the specific gravity accidentally gets too high, add pure distilled water to the solution in each cell until the specific gravity reading is as specified (See: Battery Charge Table, page IV-33).

7. After the battery is fully charged, install it in the snowmobile chassis; then connect positive (+) and negative (-) cables to corresponding battery terminals.

Check Solenoid

Equipment Necessary: Quik-Jak, Multitester

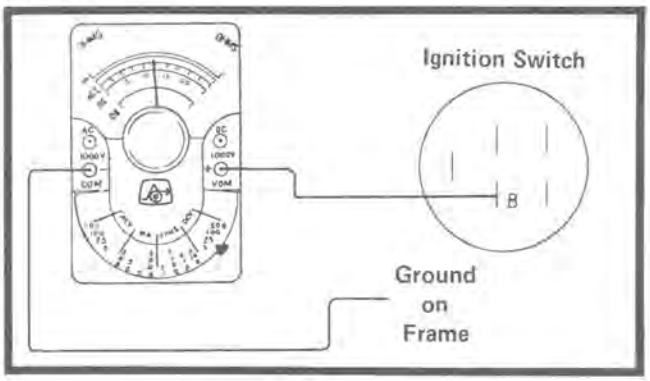
1. Check the battery charge rate and voltage output (See: Check Battery Charge, page IV-32).

2. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

3. Rotate the ignition switch to the OFF position.

4. Set multitester selector at 25 DC volts. Connect one lead of the DC voltmeter to ground, and the other tester lead to the B terminal on the ignition switch, Fig. IV-52. Voltmeter must register 12 DC volts. DO NOT REMOVE IGNITION CONNECTOR FROM IGNITION SWITCH.

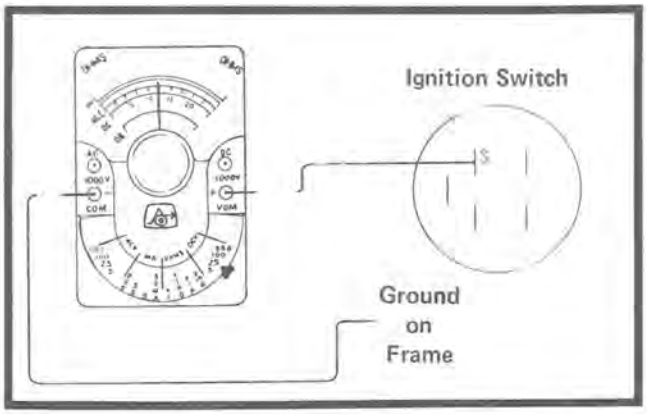
Fig. IV-52



5. If voltmeter does not register 12 DC volts, there is a problem in the green wire running from the battery to the ignition switch. If voltmeter registers 12 DC volts, voltage is getting to the ignition switch (proceed to step 6).

6. Set multitester selector at 25 DC volts. Connect one lead of the voltmeter to ground and the other tester lead to the S terminal on the ignition switch, Fig. IV-53. Rotate the ignition switch to the START position. Voltmeter must register 12 DC volts. DO NOT REMOVE IGNITION CONNECTOR FROM IGNITION SWITCH.

Fig. IV-53

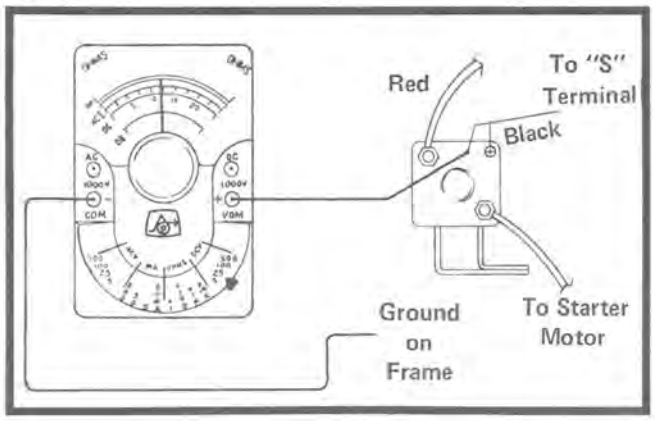


7. If voltmeter does not register 12 DC volts, the ignition switch is defective and must be replaced. If voltmeter registers 12 DC volts, the ignition switch is acceptable (proceed to step 8).

ELECTRIC START TESTING

8. Set multitester selector at 25 DC volts. Connect one lead of the voltmeter to ground and the other tester lead to the small terminal on the solenoid, Fig. IV-54. Rotate ignition key to start. Voltmeter must register 12 DC volts, Fig. IV-54.

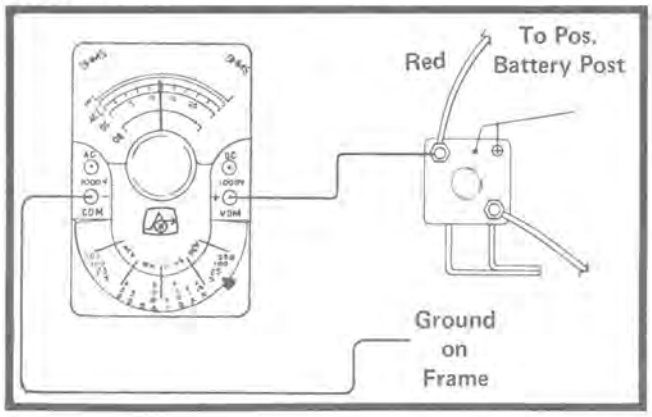
Fig. IV-54



9. If the voltmeter does not register 12 DC volts, there is a problem in the red and black wire running from the solenoid to the ignition switch. If the voltmeter registers 12 DC volts, proceed to step 10.

10. Set multitester selector at 25 DC volts. Connect one lead of the voltmeter to ground and the other tester lead to the red cable terminal on the solenoid, Fig. IV-55. Voltmeter must register 12 DC volts.

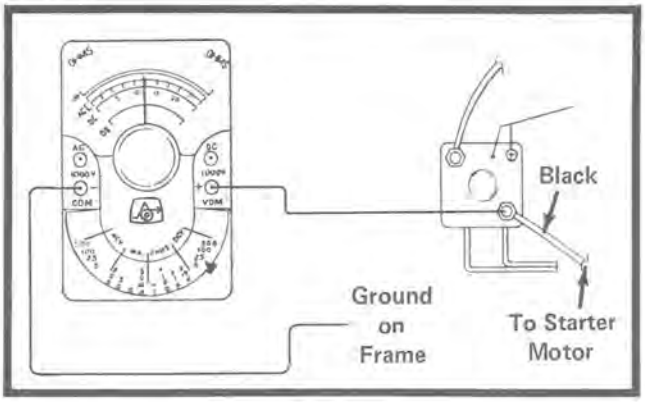
Fig. IV-55



11. If voltmeter registers 12 DC volts, proceed to step 12. If voltmeter does not register 12 DC volts, the red cable is defective and must be replaced.

12. Set multitester selector at 25 DC volts. Connect one lead of the voltmeter to the black cable terminal on the solenoid and the other tester lead to ground, Fig. IV-56. Rotate ignition switch to the START position. Voltmeter must register 12 DC volts.

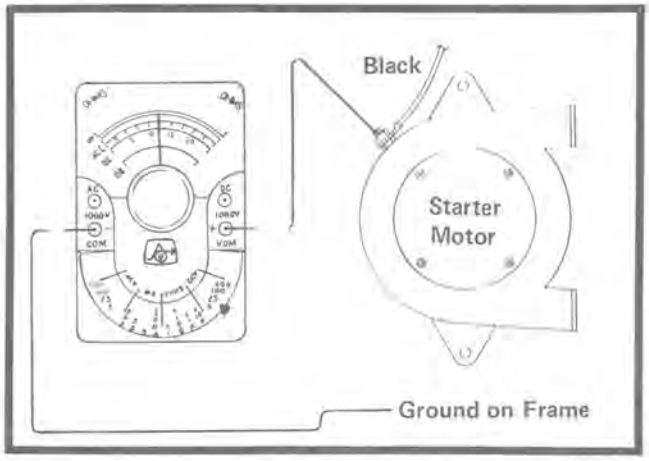
Fig. IV-56



13. If voltmeter registers 12 DC volts, proceed to step 14. If voltmeter does not register 12 DC volts, the solenoid is defective and must be replaced.

14. Set multitester selector at 25 DC volts. Connect one lead of the voltmeter to ground, and the other tester lead to the black cable terminal on the starter motor, Fig. IV-57. Rotate ignition switch to the START position. Voltmeter must register 12 DC volts.

Fig. IV-57



15. If voltmeter registers 12 DC volts, the starter motor is defective and must be replaced. If voltmeter does not register 12 DC volts, the black cable running from the solenoid to the starter motor is defective.

ELECTRIC START TESTING

Check Starter Motor

Equipment Necessary: Quik-Jak, Multitester

1. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

2. Make sure battery output is acceptable (See: Check Battery Charge, page IV-32).

3. Make sure the solenoid is operating (See: Check Solenoid, page IV-34).

4. Set multitester selector at 25 DC volts. Connect one lead of the voltmeter to ground and the other tester lead to the starter motor terminal, Fig. IV-57. Rotate ignition switch to the START position. Voltmeter must register approximately 12 DC volts.

Note: A slight drop in voltage may take place because of the cranking load on the starter motor. This condition is acceptable.

5. If the voltmeter registers approximately 12 DC volts, but the starter motor does not crank or cranks slowly, the battery ground and starter motor ground must be checked (proceed to step 6). If there is a large drop in voltage, a component in the starter motor is defective (See: Check Starter Motor Components, page IV-36).

6. Check the battery and starter motor ground connections. If the ground connections are satisfactory, a component in the starter motor is defective (See: Check Starter Motor Components, page IV-36).

Check Starter Motor Components

Equipment Necessary: Ohmmeter, Fiberglass Paper

1. Check the surface of the commutator and, if it is rough, polish the commutator, using fiberglass paper.

2. Measure the depth of the commutator and the distance between segments. Commutator depth is 0.008 of an inch, and distance between segments is 0.019-0.031 of an inch.

3. Check the winding insulation between the commutator and armature core or shaft. If the ohmmeter registers OPEN, the armature is acceptable. If a reading is obtained, the armature must be replaced.

4. Check the armature coil for a short circuit, using a growler. With armature installed in growler, place thin strip of steel on armature surface and rotate armature. If the steel strip does not vibrate, the armature is acceptable. If the steel strip does vibrate, the armature has a short circuit and must be replaced.

5. With the armature removed, check the field coil for open circuits, using an ohmmeter. With the ohmmeter leads connected to field coil brushes, the ohmmeter must register CLOSED. If the ohmmeter registers OPEN, a wire is disconnected and must be replaced. Also check the field coil and yoke. If the ohmmeter registers CLOSED, replace the defective part.

6. Check the brush box for insulating defects, using an ohmmeter. Make sure brush holder is straight and sliding part of brush is clean. Connect one lead of the ohmmeter to positive (+) side brush box, and the other lead to negative (-) side base plate. Ohmmeter must register OPEN. Any other reading indicates faulty insulation, and replacement of the brush box is required.

TACHOMETER TESTING

Check Tachometer

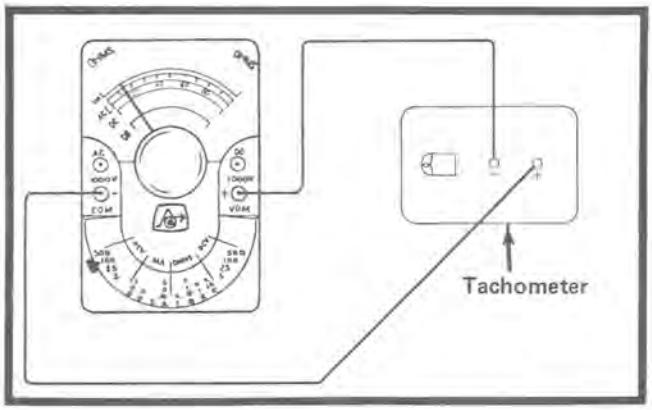
Equipment Necessary: Quik-Jak, Multitester

1. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

2. Start the engine and allow it to idle.

3. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to the positive (+) terminal (white lead) on the tachometer and the other tester lead to the negative (-) terminal (green lead), Fig. IV-58. Voltmeter must register 12-15 AC volts.

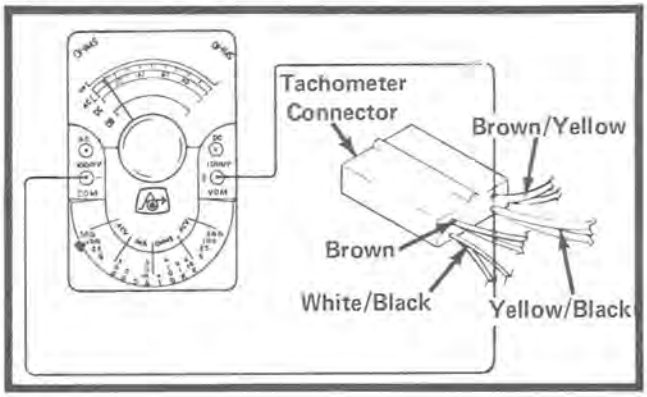
Fig. IV-58



4. If the voltmeter registers 12-15 AC volts, but the tachometer does not operate, the tachometer must be replaced because it is defective. If the voltmeter does not register 12-15 AC volts, there is a problem in another area (proceed to step 5).

5. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to the brown/yellow wire at the tachometer connector and the other tester lead to the yellow and black wire at the tachometer connector, Fig. IV-59. Voltmeter must register 12-15 AC volts.

Fig. IV-59



6. If voltmeter registers 12-15 AC volts and the tachometer does not operate, the wires running from the tachometer to the tachometer connector are defective. If voltmeter does not register 12-15 AC volts, the magneto alternator may be defective (See: Check Magneto Alternator, page IV-31), or the wires from the regulator connector to the tachometer connector may be defective.

TEMPERATURE GAUGE TESTING

Check AC Voltage at Temperature Gauge

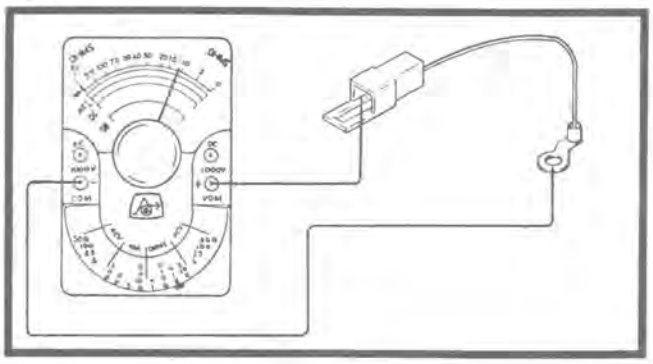
Equipment Necessary: 13/16-Inch Spark Plug Socket, Ohmmeter, Quik-Jak and Multitester

1. Remove the spark plug and temperature gauge sensor from the cylinder head, using a 13/16-inch spark plug socket. Make sure top of cylinder head near spark plug hole is clean to ensure a good ground for the sensor. Disconnect sensor from temperature gauge.

2. Set multitester selector at 1K ohms. Connect one lead of the ohmmeter to the sensor wire terminal and the other tester lead to the sensor, Fig. IV-60. Ohmmeter must register 10,000-11,000 ohms when sensor is at room temperature, Fig. IV-60. If ohmmeter registers 10,000-11,000 ohms, sensor is acceptable (proceed to step 3). If ohmmeter does not register 10,000-11,000 ohms, replace the sensor. After sensor replacement is made, proceed to step 3.

TEMPERATURE GAUGE TESTING

Fig. IV-60



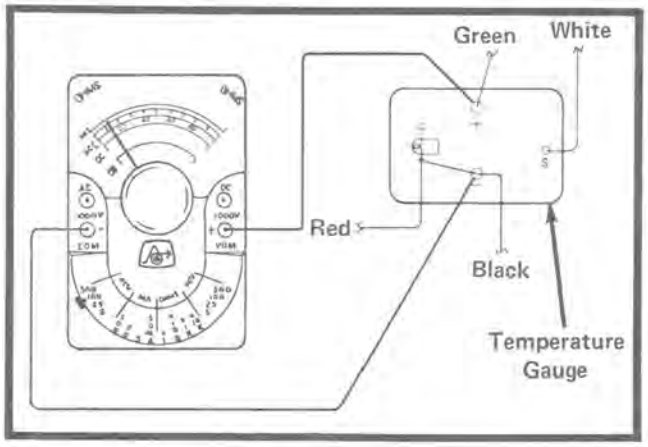
3. Install the temperature gauge sensor and a new spark plug in cylinder head, using a 13/16-inch spark plug socket. DO NOT USE SPARK PLUG WASHER IF TEMPERATURE GAUGE SENSOR IS USED. Connect sensor to temperature gauge.

4. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

5. Start the engine and allow it to idle.

6. Set multitester selector at 100 AC volts. Connect one lead of the AC voltmeter to the positive (+) terminal (green wire) on the temperature gauge and the other tester lead to negative (-) terminal (black wire) on the temperature gauge, Fig. IV-61. Voltmeter must register 12-15 AC volts, Fig. IV-61, and temperature gauge needle must point to COLD.

Fig. IV-61



7. As a final check of the gauge when the engine is idling, attach a jumper wire from the sensor to engine ground. Temperature gauge needle must move to HOT if gauge is working properly. If needle does not point to HOT, the gauge is defective and must be replaced.

TROUBLE SHOOTING TEMP. GAUGE

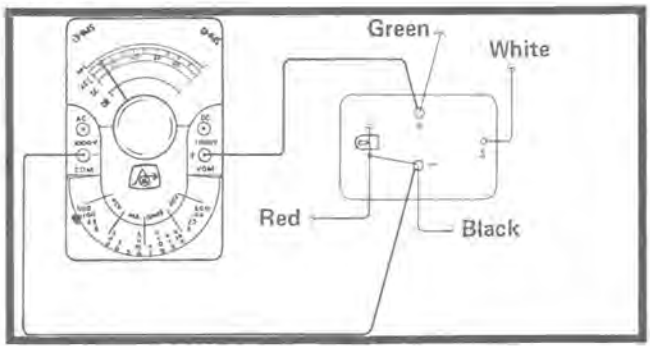
Check Temperature Gauge

Equipment Necessary: Quik-Jak, Multitester

Note: The gauge is calibrated to read from 250°F to 475°F. Some engines operating at light loads and in cold temperatures may not reach the operating range of the instrument. Thus, someone may mistakenly think the gauge is defective. However, if the tests show the gauge to be acceptable, the gauge will record when temperature rises above 250°F.

1. Install the Quik-Jak to raise the snowmobile off the floor. Set the multitester selector at 100 AC volts. Connect one tester lead to the positive terminal (green wire) on the gauge and the other tester lead to the negative terminal (black wire) on the gauge, Fig. IV-62. With the engine running, the AC voltmeter must register 12-15 AC volts, and the gauge must show a COLD reading; then proceed to step 2. However, if the voltmeter registers 12-15 AC volts, but the gauge reading remains at 475°F, the gauge is defective and must be replaced. If the voltmeter reading is not 12-15 AC volts, proceed to magneto alternator check (See: Check Magneto Alternator, page IV-31).

Fig. IV-62



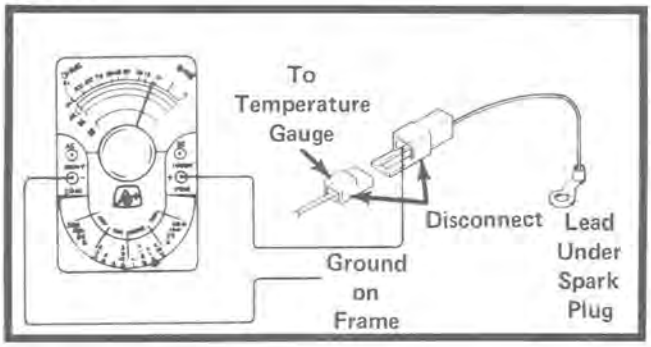
TROUBLE SHOOTING TEMP. GAUGE

2. With the engine running and the gauge showing a cold reading, disconnect the sensor wire at the connector. Touch the sensor wire from the gauge to ground. The temperature gauge needle must move to approximately 475°F. If the gauge moves to approximately 475°F, the gauge is operating correctly. If the gauge does not move to a hot reading when the sensor wire is grounded, the gauge is defective and must be replaced.

Note: Before replacing the gauge, check the sensor lead attached to the S terminal on the temperature gauge for continuity (See: Step 3).

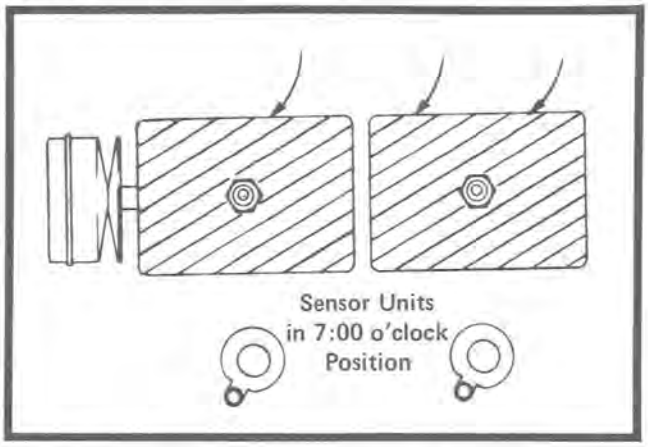
3. Shut the engine off. Set the multitester selector to 100X ohms. Attach one lead of the ohmmeter to the sensor connector and the other lead to GROUND, Fig. IV-63. A reading of approximately 11,000 ohms should be registered with the sensor at 60-70 degrees. As the temperature of the sensor rises, the ohms reading will decrease. If the ohmmeter readings do not follow this pattern, the sensor is defective and must be replaced.

Fig. IV-63



Note: The sensor units are affected by the cooling air passing across the cylinder heads. To shield the sensor unit from this air passage, the sensor unit must be positioned behind the spark plug in relation to the air flow. Thus, on a free-air engine, the sensor must be directly behind the spark plug. By contrast, on an axial flow engine, the sensor unit must be positioned at approximately 7:00 o'clock as viewed from the operator's position, Fig. IV-64.

Fig. IV-64



4. To check for proper gauge calibration, a resistor of known value should be attached between the sensor lead and GROUND.

   243 ohms should produce a 250°F reading.

   174 ohms should produce a 275°F reading.

   121 ohms should produce a 305°F reading.

   60.4 ohms should produce a 353°F reading.

   302 ohms should produce a 405°F reading.

   16.2 ohms should produce a 255°F reading.

   Tolerances of ± 10°F are acceptable.

Note: Needles are dampened. A small amount of vibration may be necessary for accurate readings.

5. Proper calibration of the sensor can also be made by heating the sensor to a temperature given in step 4; then check the resistance of the sensor, using an ohmmeter.

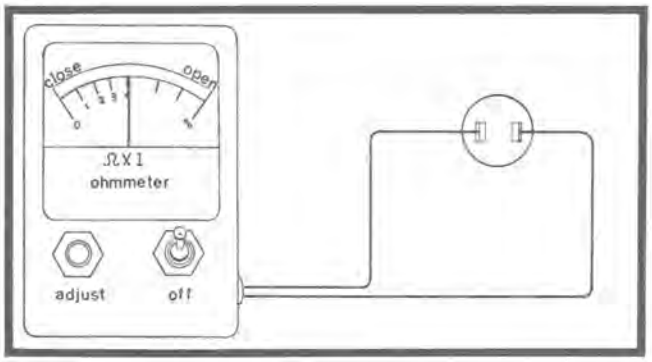
TROUBLE SHOOTING HEAT LIGHT

Check Heat Indicator Light

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2, Multitester

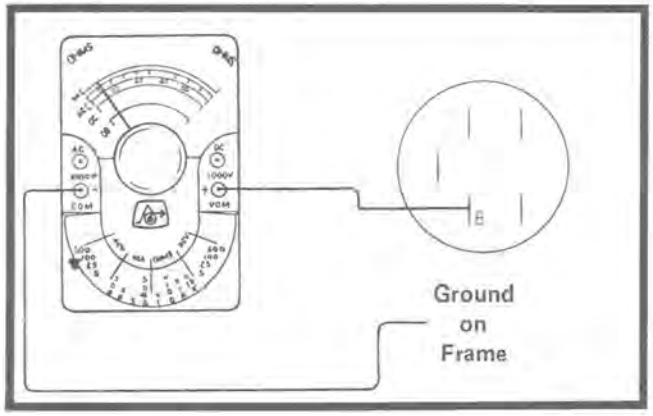
1. Bulb Test – Disconnect the wires from the heat indicator light. Connect ohmmeter leads to terminals on back of heat indicator light, Fig. IV-65. The ohmmeter must register approximately 4 ohms, Fig. IV-65. If ohmmeter registers 4 ohms, the bulb is acceptable; proceed to step 2. If the ohmmeter registers OPEN, the bulb is defective and must be replaced.

Fig. IV-65



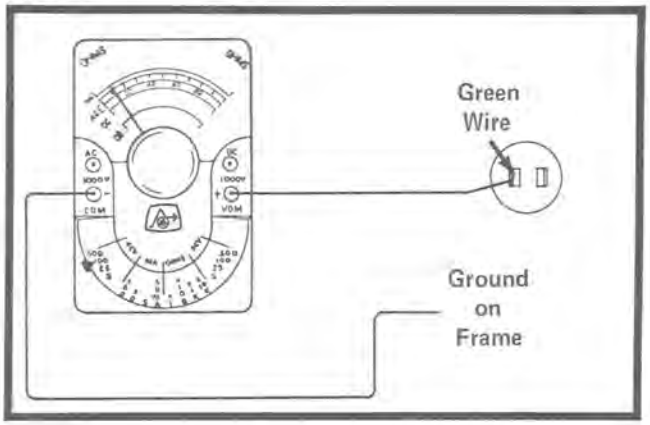
2. Power Source Test – Set the multitester selector at 100 AC volts (25 DC volts for electric start models). With the engine running, connect the positive tester lead to the B terminal of the ignition switch and the negative tester lead to GROUND, Fig. IV-66. If the tester registers 12-15 volts, proceed to step 3. If the tester does not register 12-15 volts, check the magneto alternator (See: Check Magneto Alternator, page IV-31).

Fig. IV-66



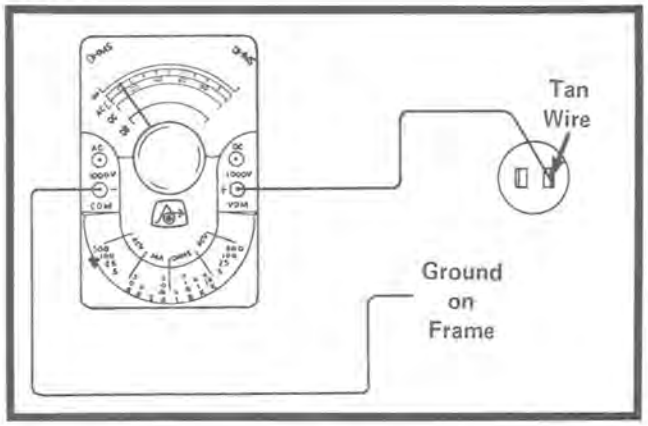
3. Set the multitester selector at 100 AC volts (25 DC volts for electric start models). With the engine running, connect the positive tester lead to the green wire at back of heat indicator light and the negative lead to GROUND, Fig. IV-67. The tester must register 12-15 volts. If the tester registers 12-15 volts, proceed to step 4. If the tester does not register 12-15 volts, the green wire is defective and must be replaced.

Fig. IV-67



4. Set the multitester selector at 100 AC volts (25 DC volts for electric start models). With the engine running, connect the positive tester lead to the tan wire terminal in the wiring harness engine connector and the negative tester lead to GROUND, Fig. IV-68. The tester must register 12-15 volts. If the tester registers 12-15 volts, proceed to step 5. If the tester does not register 12-15 volts, the tan wire is defective and must be replaced.

Fig. IV-68

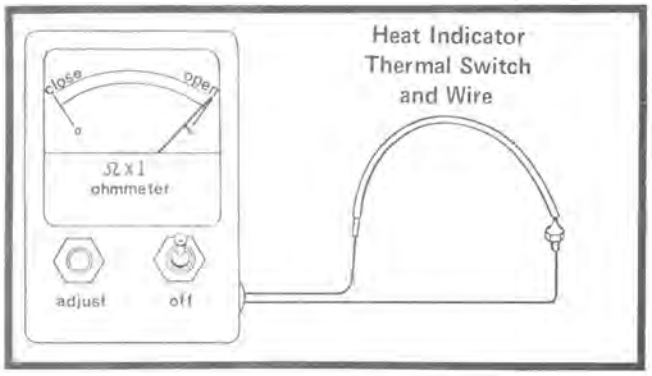


5. Remove the thermal switch from the cylinder head and the wire from the engine connector. Using an ohmmeter, connect one tester lead to the thermal switch and the other tester lead to the wire terminal, Fig. IV-69. The

TROUBLE SHOOTING HEAT LIGHT

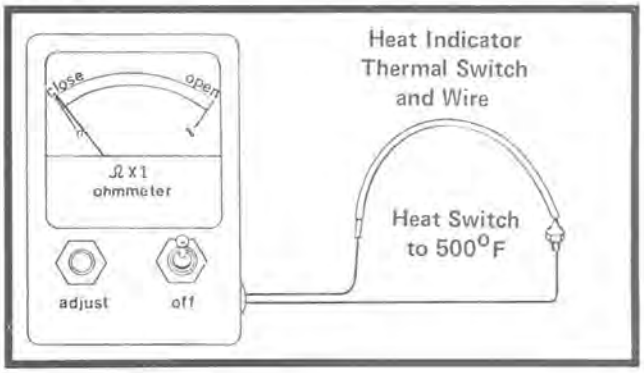
tester must register OPEN (infinity). If the tester registers OPEN, proceed to step 6. If the tester registers CLOSED, the thermal switch is defective and must be replaced.

Fig. IV-69



6. Heat the thermal switch to approximately 500°F. Using an ohmmeter, connect one tester lead to the thermal switch and the other tester lead to the wire terminal, Fig. IV-70. The tester must register CLOSED (no resistance), Fig. IV-70. If the tester registers OPEN, the thermal switch is defective and must be replaced.

Fig. IV-70



ELECTRICAL ADJUSTMENTS

Checking Ignition Timing

Equipment Necessary: Screwdriver Having a 5/16-Inch Blade, 11mm Socket, 3-Inch Extension, Torque Wrench and Sun Rocket Timing Light-Model RTL 55-2

If the magneto base plate was removed, the only adjustment required is to align the mark on the base plate with the "boss" in the crankcase. When marks are aligned, tighten the base plate retaining screws, using a screwdriver having a 5/16-inch blade. Then install the recoil starter assembly with three slotted hex head bolts and lock washers, using an 11mm socket and 3-inch extension. Tighten the bolts to 5 ft-lb, using a torque wrench.

After the magneto base plate and recoil starter assembly are installed, check the ignition timing, using a Sun Rocket Timing Light.

1. Raise the rear of the snowmobile off the shop floor, using a hoist. Make sure the track is free to rotate.

2. Start the engine and let it idle.

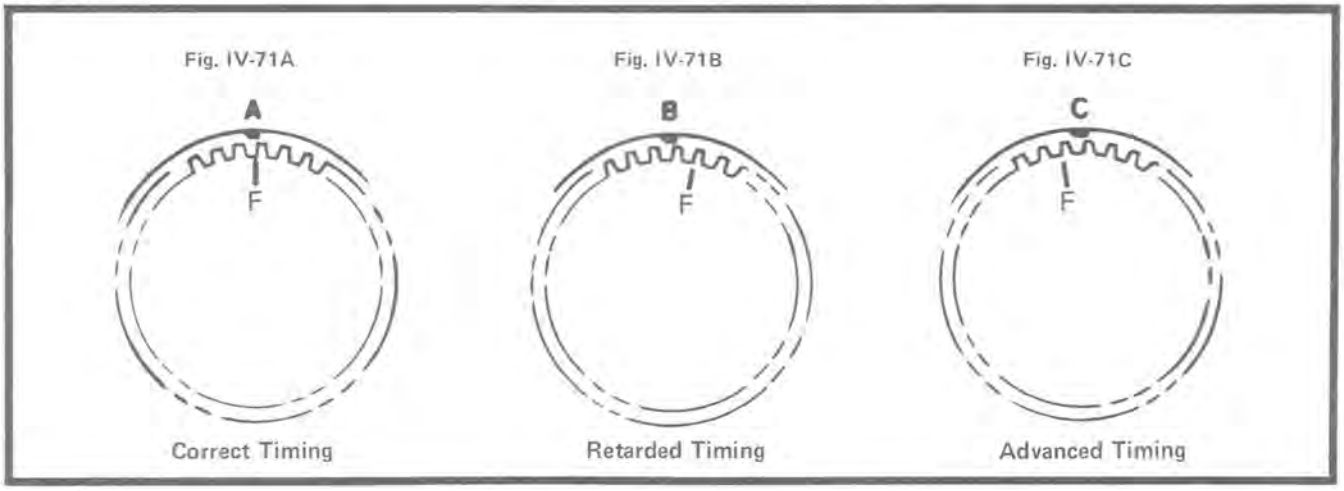
3. Plug the timing light power source cord into a 115 VAC electrical outlet. Connect the other lead of the timing light onto the high tension wire.

4. With the engine running at 6000 rpm, aim the light between the recoil housing and axial fan housing. The "F" mark in the flywheel must line up with the stationary timing mark in the fan housing, Fig. IV-71A. If the "F" mark is past the timing mark in the fan housing, the timing is retarded, Fig. IV-71B; therefore, correct the situation by advancing the timing (See: Step 5). If the "F" mark is before the timing mark in the fan housing, the timing is advanced, Fig. IV-71C; therefore, correct the situation by retarding the timing (See: Step 6).

Note: Perform steps 3 and 4 to both high tension wires to verify identical timing between cylinders.

5. Advance Ignition Timing — Shut the engine off. Next, remove the recoil housing. Now, loosen the base plate retaining screws, using a screwdriver having a 5/16-inch blade. Finally, move the base plate counterclockwise to ADVANCE the timing; then tighten base plate retaining screws and install the recoil housing. Tighten recoil bolts to 5 ft-lb.

Fig. IV-71



6. Retard Ignition Timing — Shut the engine off. Next, remove the recoil housing. Now, loosen the base plate retaining screws, using a screwdriver having a 5/16-inch blade. Finally, move the base plate clockwise to RETARD the timing; then tighten base plate retaining screws and install the recoil housing. Tighten recoil bolts to 5 ft-lb.

7. Again, check the timing (See: Steps 1-4).

Headlight Aiming Adjustment

Equipment Necessary: Tape Measure, Phillips Screwdriver Having a No. 1 Blade

The headlight can be adjusted for vertical and horizontal aim of the high and low beam. The geometric center of the high beam light zone must be used for vertical and horizontal service aiming.

1. Make sure suspension is adjusted correctly.

2. Position the snowmobile on a level floor so the headlight is approximately 25 feet away from a wall or similar aiming surface.

3. Measure the distance from the floor to midpoint of headlight, using a tape measure. REMEMBER THIS DISTANCE.

4. Using distance obtained in step 3, place an appropriate mark on the wall or similar headlight aiming surface.

5. Activate the headlight and move the dimmer switch to high beam position. DO NOT USE LOW BEAM — IMPROPER HEADLIGHT AIM WILL RESULT.

6. Observe the aim of the headlight beam. Correct aim is when the most intense beam is focused and centered 2 inches below the mark made on the wall or similar aiming surface. If headlight aim is not as specified, an adjustment is required (See: Step 7).

7. To adjust the vertical or horizontal aim of the headlight beam, adjust the four screws located at the corners of the headlight, using a screwdriver having a no. 1 blade.

SPARK PLUG INFORMATION

SPARK PLUG TABLE

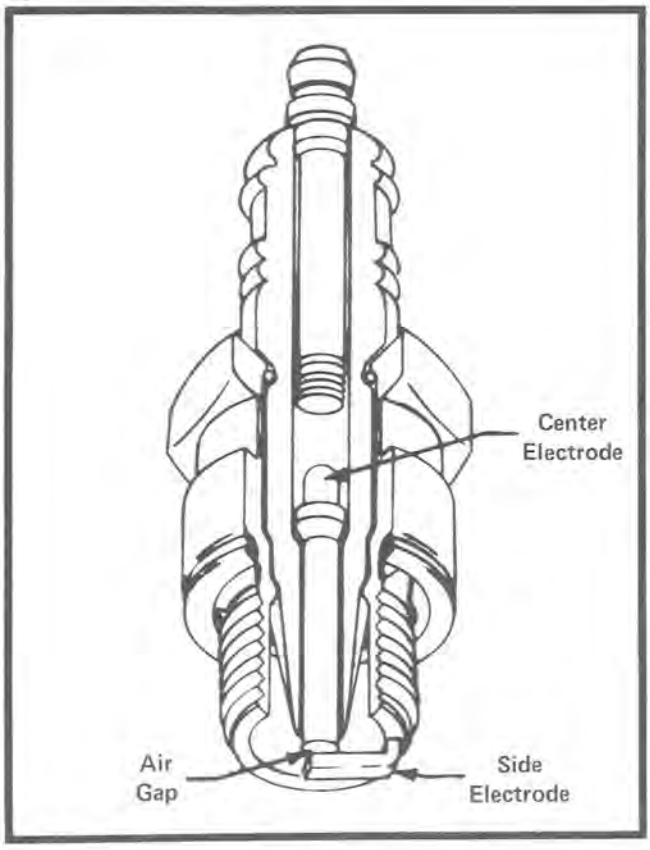
Hot Spark Plug	NGKB7ESA
Factory-Supplied Spark Plug . .	*NGKB8ESA
Colder Spark Plug	NGKB9ESA

*Alternate Spark Plugs: Champion N3 or AC-S42XL

Spark Plug Structure

The NGK spark plug used in the Arctic Cat Snowmobile engine is made of two electrodes separated by an air gap. Completely insulated in the glass core of the spark plug is the center electrode, Fig. IV-72. The side electrode is connected to the base of the spark plug, Fig. IV-72. When high voltage current is released from the "secondary" of the external ignition coil, the current flows through the center electrode and jumps the air gap to the side electrode. The spark generated between the two electrodes ignites the fuel mixture in the combustion chamber.

Fig. IV-72



Heat Range — Heat range is the ability of the spark plug to dissipate heat away from the center electrode and insulating material. The rate of heat dissipation is controlled by the design of the spark plug insulator and shell structure. When heat is being dissipated, the path followed is:

1. Spark Plug Shell
2. Metal Washer
3. Threads in Cylinder Head
4. Cool Air from Fan

A spark plug having a hot heat range has a long center electrode extension and, as a result, dissipates heat slowly. By contrast, a spark plug having a cold heat range has a short center electrode extension and, as a result, dissipates heat rapidly.

Heat dissipation is also affected by the metal washer positioned between the spark plug and top of the cylinder head. To make sure the seal between the base of the spark plug and top of the cylinder head is adequate, the spark plug must be tightened to 18-20 ft-lb. If the spark plug is tightened more than 20 ft-lb, the metal washer is flattened completely and, as a result, the spark plug burns colder than normal because heat is dissipated too rapidly. By contrast, if the spark plug is tightened less than 18 ft-lb, the metal washer is not flattened enough and, as a result, the spark plug burns hotter than normal because heat is dissipated slowly. When heat is dissipated too slowly, the cylinders, pistons, cylinder heads and crankcase may be damaged.

Recommended Spark Plug

The recommended spark plug to use is an NGKB8ESA. The correct air gap is 0.028-0.032 of an inch. For the majority of snowmobile drivers, the factory supplied NGKB8ESA spark plug provides optimum engine performance. However, varying terrain, temperature and operating usage may require a different heat range spark plug. As an example, pulling a cutter or sustained cross-country riding usually requires a colder heat range spark plug (NGKB9ESA). By contrast, trail riding or other continued slow speed driving usually requires a hotter heat range spark plug (NGKB7ESA). To determine if the spark plug is burning properly, examine the center electrode insulator (See: Reading Spark Plug, page IV-44).

SPARK PLUG INFORMATION

Reading Spark Plug

A good method of checking the operating temperature of the engine is to examine the center electrode insulator of the spark plug. Perform the examination after the snowmobile is operated like it usually will be driven.

1. Pull the spark plug caps off the spark plugs. Next, remove the spark plugs from the cylinder heads, using a 13/16-inch spark plug socket.

2. Examine the center electrode insulator of each spark plug.

   A. TAN or LIGHT BROWN insulator indicates correct spark plug heat range.

   B. LIGHT GRAY or WHITE insulator indicates overheating of the engine. This condition is caused by a loose spark plug, lean condition, overloading or incorrect spark plug heat range (too hot).

   Note: If the gasoline and oil mixture ratio is correct (20:1), the carburetor is adjusted correctly and the spark plug is tightened to 18-20 ft-lb, replace the spark plug with one having a colder heat range.

   C. BLACK insulator indicates fuel in the combustion chamber is not burning completely. This condition is caused by too much oil in the fuel mixture, a rich condition or incorrect spark plug heat range (too cold).

   Note: If the gasoline and oil mixture ratio is correct (20:1) and the carburetor is adjusted correctly, replace the spark plug with one having a hotter heat range.

3. First, apply a light film of graphite grease on the threads of the spark plug. Next, install the spark plug in the cylinder head; then tighten spark plug to 18-20 ft-lb, using a torque wrench and 13/16-inch spark plug socket. Finally, install the spark plug cap on top of the spark plug.

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1974 DRIVE CLUTCH SPECIFICATIONS

Description	Specifications			
	Low Altitude		High Altitude	
	340cc Engine	440cc Engine	340cc Engine	440cc Engine
Arctic Drive Clutch Model	0225-040	0225-039	0225-040	0225-039
Clutch Engagement Speed (approx rpm)	3500	3500	4000	3500
Maximum Drive Clutch rpm	7000	7000	7000	7000
Spring Part Number	0146-067	0146-067	0146-068	0146-067
Spring Color	Yellow	Yellow	Green	Yellow
*Spring Length - New w/No Load (in.)	4.35 ± 0.187	4.35 ± 0.187	4.35 ± 0.156	4.35 ± 0.187
Number of Spring Coils	5.35	5.35	5.0	5.35
Spring Wire Diameter (in.)	0.187	0.187	0.142	0.187
Spring Rate	45-53 lb/in.	45-53 lb/in.	60-66 lb/in.	45-53 lb/in.
Spring Pressure @ 1-1/4 Inch Compression (lb)	145-165	145-165	192-212	145-165
Weight Part Number	0146-106	0146-105	0146-106	0146-105
Weight Color	Red	Black	Red	Black
Weight Outside Diameter (in.)	0.530	0.598	0.530	0.598
Weight Thickness (in.)	0.250	0.250	0.250	0.250
Weight - Total Gram Weight (g)	5.958	7.858	5.958	7.858
Ramp Part Number	0146-143	0146-143	0146-143	0146-143
Clutch/Pulley "Center to Center" (in.)	10.187 or 10-3/16	10.187 or 10-3/16	10.187 or 10-3/16	10.187 or 10-3/16
Clutch/Pulley Offset (in.)	0.380 3/8	0.380 or 3/8	0.380 or 3/8	0.380 or 3/8
Moveable Sheave "Travel Distance on Shaft" (in.)	1.125 or 1-1/8	1.125 or 1-1/8	1.125 or 1-1/8	1.125 or 1-1/8

*After approximately 50 miles, the spring will take a "set" and lose 0.25 (1/4) of an inch of its total length. However, no significant loss of spring compression will occur because of the decreased spring length.

1975 DRIVE CLUTCH SPECIFICATIONS

Description	Specifications	
	Low Altitude	High Altitude
Arctic Drive Clutch Model	0225-055	0225-055
Clutch Engagement Speed (approx rpm)	3200	3500
Maximum Drive Clutch rpm	7000	7000
Spring Part Number	0146-066	0146-066
Spring Color	Red	Yellow
*Spring Length - New w/No Load (in.)	4.35 ± 0.234	4.35 ± 0.187
Number of Spring Coils	5.15	5.35
Spring Wire Diameter (in.)	0.177	0.187
Spring Rate	39-45 lb/in.	45-53 lb/in.
Spring Pressure @ 1-1/4 Inch Compression (lb)	120-140	145-165
Weight Part Number	0146-105	0146-105
Weight Color	Black	Black
Weight Outside Diameter (in.)	0.598	0.598
Weight Thickness	0.250	0.250
Weight - Total Gram Weight (g)	7.858	7.858
Ramp Part Number	0146-143	0146-143
Clutch/Pulley "Center to Center" (in.)	10.187 or 10-3/16	10.187 or 10-3/16
Clutch/Pulley "Offset" (in.)	0.454 or 29/64	0.454 or 29/64
Moveable Sheave Travel Distance on Shaft (in.)	1.131	1.131

*After approximately 50 miles, the spring will take a "set" and lose 0.25 (1/4) of an inch of its total length. However, no significant loss of spring compression will occur because of the decreased spring length.

1974 & 1975 DRIVEN PULLEY SPECS

Description	Specifications			
	Low Altitude		High Altitude	
	1974 Model Driven	1975 Model Driven	1974 Model Driven	1975 Model Driven
Arctic Driven Pulley Model	0226-007	0226-009	0226-007	0226-009
Driven Pulley Diameter (in.)	10.625 or 10-5/8	10.656 or 10-21/32	10.625 or 10-5/8	10.656 or 10-21/32
Cam Angle in Degrees	30	30	30	30
Spring Part Number	0148-070	0148-070	0148-070	0148-070
Spring Color	Black	Black	Black	Black
Spring Length - New w/No Load (in.)	4.60	4.60	4.60	4.60
Spring Diameter (in.)	2.880	2.880	2.880	2.880
Spring Wire Diameter (in.)	0.156	0.156	0.156	0.156
Spring Preload - Counterclockwise	2nd Hole - 1/3 Turn	2nd Hole - 1/3 Turn	2nd Hole - 1/3 Turn	2nd Hole - 1/3 Turn
Clutch/Pulley "Center to Center" (in.)	10.187 or 10-3/16	10.187 or 10-3/16	10.187 or 10-3/16	10.187 or 10-3/16
Clutch/Pulley "Offset" (in.)	0.380 or 3/8	0.454 or 29/64	0.380 or 3/8	0.454 or 29/64
Stationary/Moveable Sheave Distance - Closed (in.)	1.250 or 1-1/4	1.250 or 1-1/4	1.250 or 1-1/4	1.250 or 1-1/4
Stationary/Moveable Sheave Distance - Fully Open (in.)	2.125 or 2-1/8	2.125 or 2-1/8	2.125 or 2-1/8	2.125 or 2-1/8
Moveable Sheave "Travel Distance on Shaft" (in.)	0.875 or 7/8	0.875 or 7/8	0.875 or 7/8	0.875 or 7/8

1974 & 1975 DRIVE BELT SPECIFICATIONS

Description	Specifications	
	Low Altitude	High Altitude
Drive Belt Part Number	0227-007	0227-007
Outside Circumference (in.)	43-1/4 ± 3/16	43-1/4 ± 3/16
Diameter - Top Surface (in.)	1-1/4 ± 1/32	1-1/4 ± 1/32
Thickness - Top of Belt to Bottom of Lug (in.)	17/32 ± 1/32	17/32 ± 1/32
Belt Taper Angle in Degrees	28	28

1974 & 1975 SPROCKET/CHAIN SPECS

Description	Specifications			
	Low Altitude		High Altitude	
	1974 340cc Engine	1974 & 1975 440cc Engine	1974 340cc Engine	1974 & 1975 440cc Engine
Sprocket Ratio - Top/Bottom Sprocket	19/39	19/35	17/39	19/39
Chain Pitch	92	90	92	92
Chain Type - Link Belt	Silent Chain	Silent Chain	Silent Chain	Silent Chain

1974 & 1975 TRACK SPECIFICATIONS

Description	Specifications			
	Low Altitude		High Altitude	
	1974 Track	1975 Track	1974 Track	1975 Track
Track Part Number	0110-790	0110-901	0110-790	0110-901
Track Width (in.)	17	17	17	17
Track Length on Ground (in.)	36	36	36	36
Cleat Part Number	0102-086	0102-086	0102-086	0102-086
Cleat Type and Number of Solid Rivets Holding Each Side Belt	2/3 Flared 3 Rivets	2/3 Flared 4 Rivets	2/3 Flared 3 Rivets	2/3 Flared 4 Rivets

SPRING CHART

	Part No.	Spr. Rate Lbs./Inch	Spr. Comp. @ 1.25 Inches	*Spring Length No. Load	No. Coils	Color Code
Light	0146-065	22.5 - 27.5	67.5 - 87.5 lb	*4.35 in. ±0.25	5.1	White
	0146-066	39 - 45	120 - 140 lb	*4.35 in. ±0.234	5.15	Red
	0146-067	45 - 53	145 - 165 lb	*4.35 in. ±0.187	5.35	Yellow
Heavy	0146-068	60 - 66	192 - 212 lb	*4.35 in. ±0.156	5.0	Green

*After approximately 50 miles, the spring will take a "set" and lose 0.25 (1/4) of an inch of its total length. However, no significant loss of spring compression will occur because of the decreased spring length.

WEIGHT CHART

	Part No.	Gram Weight	Outside Diameter	Inside Diameter	Thickness	Color Code
Light	0146-159	2.500	0.377	0.205	0.250	White
	0146-108	3.058	0.406	0.205	0.250	Yellow
	0146-175	3.725	0.437	0.205	0.250	Red
	0146-135	4.479	0.471	0.205	0.250	Black
	0146-176	4.675	0.500	0.205	0.228	Green
	0146-107	4.958	0.491	0.205	0.250	White
	0146-279	5.457	0.511	0.205	0.250	Black
	0146-106	5.958	0.530	0.205	0.250	Red
	0146-278	6.475	0.549	0.205	0.250	Black
	0146-123	6.992	0.568	0.205	0.250	Yellow
	0146-105	7.858	0.598	0.205	0.250	Black
	0146-136	9.279	0.644	0.205	0.250	Green
	0146-104	9.750	0.665	0.205	0.250	White
Heavy	0146-166	—	0.684	0.205	0.250	Red

THEORY OF OPERATION

General

The Drive System consists of the drive clutch, drive belt, driven pulley, sprockets, chain, track drive and track. Operating as a complete system, the components deliver optimum power to the track under varying snow conditions and load factors (resistance on the track).

The Arctic Cat Snowmobile uses a torque sensing, sheave-type, variable ratio (3.79:1) drive clutch and driven pulley. This method of transmitting power from the drive clutch, by means of a belt, to the driven pulley is used to multiply engine torque needed by the track to pull the snowmobile through varying snow depths, up and down steep hills and mountains and across open hard-packed areas. The Arctic drive clutch and driven pulley automatically determine the proper ratio that will allow the snowmobile to move without hesitation from drive clutch engagement speed to high speed operation, no matter what the snow conditions are (resistance).

Resistance (load on the track) has an effect on the ratio that the drive clutch and driven pulley automatically "seeks out". As resistance increases and more torque is needed, the belt will "down shift" to a larger radius on the driven pulley. If track resistance decreases, the belt will "up shift" to a 1:1 ratio between the drive clutch and driven pulley. Engine rpm change slightly during the "down shift" and "up shift" pattern.

Snowmobile speed is controlled by the "ratio" the belt "seeks" between the drive clutch and driven pulley. If the ratio of the drive clutch and driven pulley is 3.79:1 and engine rpm are 6,000, the snowmobile should move at the slowest designed speed possible. However, when the ratio changes to 1:1 and engine rpm are 6,000, the snowmobile should move at the fastest designed speed possible. The reason for this is: at a 3.79:1 ratio, the drive clutch must turn 3.79 revolutions before the driven pulley can turn 1 revolution. In contrast, when there is a 1:1 ratio, the drive clutch turns one revolution as does the driven pulley.

Note: Minimum and maximum mph are affected by the sprocket ratio being used (See: 1974 and 1975 Sprocket/Chain Specifications, Sprocket Ratio, page V-5).

In the paragraphs that follow, elements of the drive clutch and driven pulley will be explained. Knowing what effect the various elements have on the drive clutch and driven pulley will help you to understand the operating characteristics of the "Arctic Drive System".

Spring (Drive Clutch)

The drive clutch spring is made of straight, high-quality spring steel wire that has excellent spring rate retention qualities. The wire is wound to a definite number of coils and to a predetermined length that will provide the desired spring rate. Once the spring rate is established, the spring is color coded for identification (See: 1974 or 1975 Drive Clutch Specifications, Spring Color Code, page V-2 or V-3).

Note: In comparing spring rates, four factors will affect the rate characteristic:

1. **Wire Diameter**
2. **Spring Diameter**
3. **Number of Coils**
4. **Spring Length**

Spring Comparison – When comparing two different springs, a strong spring will have larger diameter wire and fewer coils in relation to a spring of the same length. In contrast, a weak spring will have smaller diameter wire, more coils, have a larger diameter and be longer than the spring being compared to.

The primary function of the spring is to control initial moveable sheave engagement with the side of the drive belt and stationary sheave. When the engine is idling, the moveable sheave does not push against the side of the belt because the spring keeps the moveable and stationary sheave apart. Since the distance between the sheaves is more than the width of the drive belt, power is not transmitted from the drive clutch to the driven pulley. However, as engine rpm increase to the specified clutch engagement speed (See: 1974 or 1975 Drive Clutch Specifications, Clutch Engagement Speed, page V-2 or V-3), rollers and centrifugal weights move outward on three ramps with enough force to overcome the pressure of the spring. Now, because the moveable sheave pushes against the side of the drive belt and squeezes it between the sheaves, drive clutch engagement takes place. Therefore, drive clutch engagement speed is increased or decreased by using springs having different spring

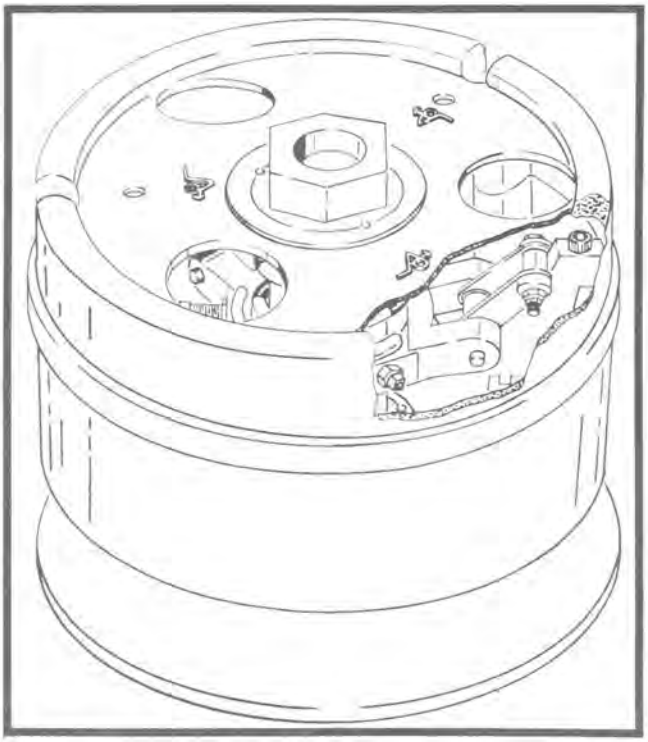
rates. A spring having a spring rate of 50 lb/in. will cause the drive clutch to engage at a higher rpm than a spring rated at 40 lb/in.

Note: The desired drive clutch engagement speed is when the engine puts out enough horsepower rpm to move the snowmobile from a stop without hesitation or a "flat spot".

Weights, Rollers and Ramps

The weights and rollers are bolted to arms that are pinned to the spider, Fig. V-1. The spider has three arms: each arm has two weights and a roller with bushing that is retained to the arm by a small bolt and lock nut, Fig. V-1. The complete spider assembly (arms, weights and rollers) is fastened to the stationary sheave shaft by three set screws and a split ring.

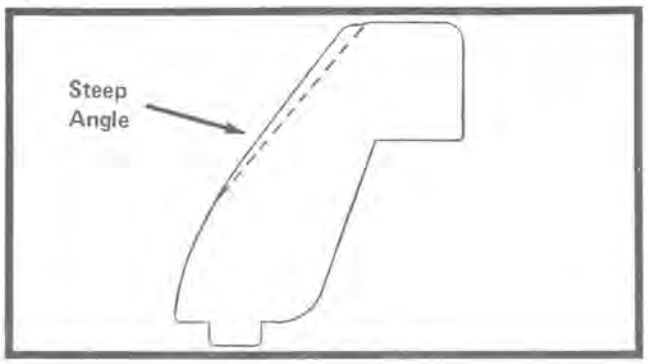
Fig. V-1



The function of the weights is to provide an outward force against the spring while the rollers roll on the three ramps. The three ramps are designed so clutch engagement is smooth, and the total shift pattern is responsive to various loads. When the engine is idling (less than clutch engagement rpm), the force against the ramp by the rollers and weights is not enough to overcome the outward pressure of the spring. However, as engine rpm increase and predetermined clutch engagement speed takes place, the weights are thrown outward by centrifugal force caused by increased engine rpm. Since the outward movement of the weights overcomes the pressure of the spring, the moveable sheave pushes the drive belt against the stationary sheave. Power is then transmitted from the drive clutch through the remainder of the drive system.

As engine speed increases to peak horsepower rpm, centrifugal force throws the weights with rollers progressively outward along the angle of the three ramps, Fig. V-1. A ramp that has a steep angle, Fig. V-2, will take more engine rpm and longer to shift from engagement speed through the complete shift pattern. By contrast, if the ramp angle is decreased, Fig. V-2, it will take less time and engine rpm to shift from engagement speed through the complete shift pattern. And if the track has only a light load when maximum engine rpm are achieved, the drive belt is pushed to the maximum radius between the drive clutch sheaves. When the belt is at maximum radius, there is a 1:1 ratio between the drive clutch and driven pulley and, provided all other parts of the drive system are working correctly, the snowmobile will move at the fastest designed speed possible.

Fig. V-2



Note: A light weight increases drive clutch engagement rpm, and therefore, the drive clutch takes longer to completely "shift up". By contrast, a heavy weight decreases drive clutch engagement rpm and takes less time to completely "shift up".

CUSTOMIZING DRIVE CLUTCH

As produced, the Arctic Cat Snowmobile is "clutched" for average customer usage. However, three parts (variables) can be changed to produce different clutching characteristics. The three drive clutch variables are:

1. Spring
2. Weights
3. Ramps

By understanding these clutching variables the Arctic Drive Clutch can be customized to suit almost any condition or owner request.

One variable affecting the drive clutch operation is the spring. The spring's primary function is to control initial moveable sheave engagement with the side of the drive belt and stationary sheave (engagement). In addition, the spring also affects engine rpm maintained throughout the drive clutch shift pattern. A light (weak) spring decreases drive clutch engagement speed and maximum engine rpm – the result is a slow shift pattern. By contrast, a heavy (strong) spring increases drive clutch engagement speed and maximum engine rpm – the result is a quick shift pattern.

Another drive clutch variable affecting engine rpm is the weight. A light weight slightly increases drive clutch engagement speed and produces higher engine rpm throughout the shift pattern. By contrast, a heavy weight slightly decreases drive clutch engagement speed and produces lower engine rpm throughout the shift pattern.

The only other variable affecting "up shift" and "down shift" is the ramp. The ramp is designed so the shift pattern is within the peak torque curve (rpm) of the engine. A ramp that is **cut back at the top**, Fig. V-3, will cause the engine to run at lower rpm. However, a ramp that is **not cut back** as far as the standard ramp, Fig. V-4, will cause the engine to run at higher rpm. A ramp that is **cut back at the bottom**, Fig. V-5, will increase drive clutch engagement speed. By contrast, a ramp that is **not cut back** as far as the standard ramp, Fig. V-6, will decrease drive clutch engagement speed.

Fig. V-3

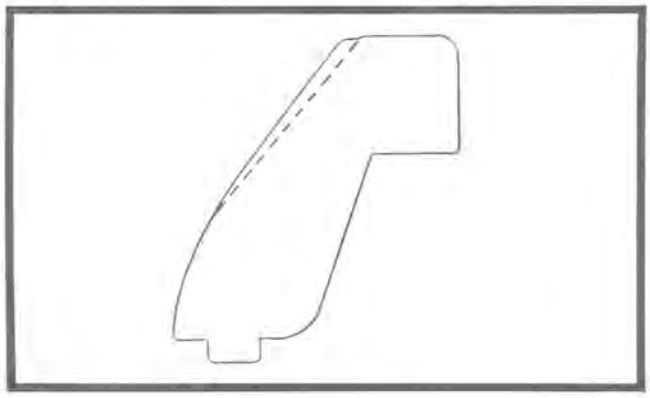


Fig. V-4

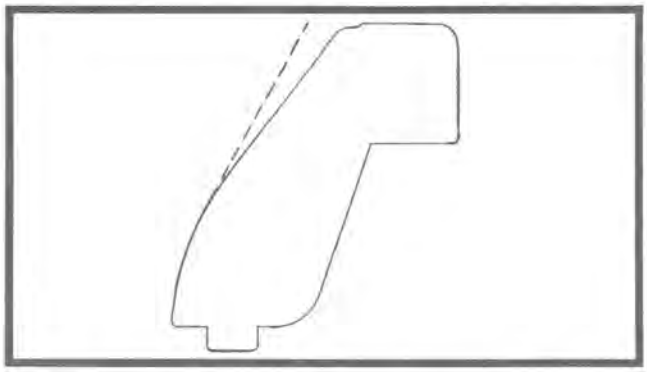


Fig. V-5

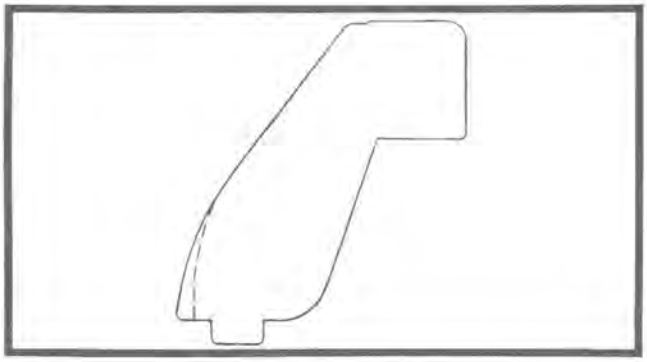
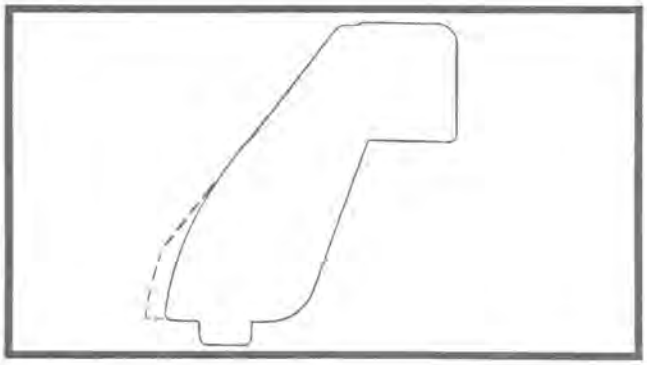


Fig. V-6



In conclusion, the spring, weights and ramps have a combined effect on drive clutch operation. The weight chart and spring chart is to be used as a guide to satisfy clutching requests that a customer may make (See: Weight Chart, page V-6, and Spring Chart, page V-5).

DRIVE CLUTCH TROUBLE SHOOTING

Problem	Condition	Remedy
Drive clutch engages before specified rpm.	1. Wrong spring. 2. Weak spring. 3. Wrong weights.	1. Check specifications for correct spring. 2. Check spring pressure. 3. Check specifications for correct weights.
Drive clutch engages after specified rpm.	1. Wrong spring. 2. Wrong weights. 3. Dirty clutch. 4. Worn (flat spots) rollers and ramps. 5. Bushing in cover housing and moveable sheave worn excessively on inside diameter.	1. Check specifications for correct spring. 2. Check specifications for correct weights. 3. Clean clutch. 4. Replace rollers and ramps. 5. Replace appropriate parts – see Parts Manual.
Maximum drive clutch rpm too high.	1. Weights too light. 2. Wrong ramps (ramp angle too steep at top).	1. Check specifications for correct weights. 2. Check specifications for correct ramps.
Maximum drive clutch rpm too low.	1. Weights too heavy. 2. Wrong ramps (ramp angle too flat at top).	1. Check specifications for correct weights. 2. Check specifications for correct ramps.
Shift up through midrange takes place too quickly.	1. Weights too heavy. 2. Wrong ramps (ramp angle too steep). 3. Drive clutch spring too weak. 4. Drive pulley spring preload too loose. 5. Driven pulley spring too weak.	1. Check specifications for correct weights. 2. Check specifications for correct ramps. 3. Check spring pressure. 4. Increase driven pulley spring preload. 5. Replace driven pulley spring.
Shift up through midrange takes place too slowly.	1. Weights too light. 2. Wrong ramps (ramp angle too flat). 3. Drive clutch spring too strong. 4. Driven pulley spring preload too tight. 5. Driven pulley spring too strong.	1. Check specifications for correct weights. 2. Check specifications for correct ramps. 3. Check spring pressure. 4. Decrease driven pulley spring preload. 5. Replace driven pulley spring.

DRIVE CLUTCH TROUBLE SHOOTING

Problem	Condition	Remedy
Belt deposits on drive clutch face or hex shaft.	1. Wrong "offset".	1. Remove belt deposits and establish correct "offset" — see specifications.
	2. Belt worn because of hourly usage.	2. Install new belt and check "center to center distance" and "offset" — see specifications.
Drive clutch does not disengage at idle — engine starts hard and has tendency to stall because of belt drag.	1. Moveable sheave Duralon bearing set screws backed out.	1. Stake moveable sheave Duralon bearing set screws.
	2. Drive belt outside circumference below specifications.	2. Check drive belt specifications (outside circumference).
	3. Thickness of belt on inside diameter exceeds specifications.	3. Check drive belt specifications (belt thickness on inside diameter).

BELT TROUBLE SHOOTING

Problem	Condition	Remedy
1. Normal belt side wear.	1. Normal and minimal side pressure applied to belt.	1. Install new belt – wear is normal.
2. Belt will not shift to top of drive clutch (1:1 ratio).	2. Belt worn across top surface (less than 1-1/16") after many hours of use.	2. Install new belt – wear is normal.
3. Cracks between belt lugs when flexed.	3. Occurs after many hours of use.	3. Install new belt – wear is normal.
Belt is glazed or baked on its side – not normal and is caused by heat buildup.	1. Wrong belt – excessive slippage.	1. Install correct drive belt – see Parts Manual.
	2. Driver applied too much throttle under heavy load – excessive slippage.	2. Tell driver to decrease throttle under heavy load condition; install new belt.
	3. Weak drive clutch spring.	3. Perform spring pressure test; install new spring if spring is weak.
	4. Drive clutch engagement rpm too low.	4. Adjust engagement rpm – see specifications.
	5. Improper drive clutch operation (sticking, etc.).	5. Remove and service drive clutch; install new belt if one is needed.
	6. Drive clutch and driven pulley "offset/parallelism" is incorrect.	6. Check and adjust "offset/parallelism"; install new belt if one is needed.
	7. Grease on drive clutch or driven pulley sheave surface.	7. Clean sheaves; install new belt if one is needed.
Lugs torn off inside of belt.	Drive clutch engages suddenly (engagement speed too high).	Remove and service drive clutch; install new belt, if one is needed.
Belt worn in one spot.	1. Track frozen to skid frame or front drive.	1. Free the track and install new belt.
	2. Track tension too tight.	2. Adjust track tension and install new belt.
	3. Idle speed too high.	3. Reduce idle rpm and install new belt.
	4. Improper operation of drive clutch.	4. Repair or replace drive clutch and install new belt.
Cracks at base of belt lug.	Continuous over revving when snowmobile is operated.	Decrease rpm and install new belt.

BELT TROUBLE SHOOTING

Problem	Condition	Remedy
1. Belt disintegrates.	1. Drive clutch and driven pulley "offset/parallelism" is incorrect.	1. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.
2. Frayed or broken cord on side of belt.	2. Drive clutch and driven pulley "offset/parallelism" is incorrect.	2. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.
3. Belt turns over at high speeds.	3. Drive clutch and driven pulley "offset/parallelism" is incorrect.	3. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.
4. Belt side wear usually occurs after belt is glazed or baked because of slippage.	4. Drive clutch and driven pulley "offset/parallelism" is incorrect.	4. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.

DRIVEN PULLEY TROUBLE SHOOTING

Problem	Condition	Remedy
Engine rpm low and belt shifted completely through driven pulley.	1. Weak spring. 2. Broken spring.	1. Move end of spring clockwise on driven pulley to increase spring tension. 2. Install new spring.
Engine rpm high and belt takes too long to shift through driven pulley.	1. Wrong spring – too heavy. 2. Sliding shoes worn excessively. 3. Dirty driven pulley hub. 4. Worn driven pulley sheave.	1. Install correct spring. 2. Install new sliding shoes. 3. Clean driven pulley. 4. Install new sheave.

CHAIN/SPROCKET TROUBLE SHOOTING

Problem	Condition	Remedy
Chain rattle in chain case.	1. Chain tension too loose. 2. Chain stretched beyond adjustable limit.	1. Adjust chain tension. 2. Install new chain and sprockets.
Chain slips on sprockets.	1. Chain tension too loose. 2. Chain stretched beyond adjustable limit. 3. Sprocket teeth worn.	1. Adjust chain tension. 2. Install new chain and sprockets. 3. Install new sprockets and chain.
Chain slips off sprockets.	1. Chain tension too loose. 2. Sprocket teeth worn. 3. Sprockets misaligned.	1. Adjust chain tension. 2. Install new sprockets and chain. 3. Align top sprocket with bottom sprocket.

TRACK TROUBLE SHOOTING

Problem	Condition	Remedy
Edge of track is frayed.	1. Track is misaligned. 2. Outer belts worn out because of hourly usage. 3. Track hits rivets in tunnel, even though track alignment is correct.	1. Set track tension and alignment. 2. Install new outer belt(s). 3. Remove rivets that are too long and install correct rivet.
Track is grooved (worn) or burnt on inside surface of outer belt(s).	1. Track tension is too tight. 2. Rear idler wheels do not turn or are otherwise damaged.	1. Set track tension and alignment. 2. Install new rear idler wheels, and set track tension and alignment.
Track is grooved or gouged on center belt.	Center brace(s) of skid frame hanging down and contacting inside surface of center belt.	Repair skid frame center brace and install new center belt if it is damaged.
Internal drive lugs worn on inside surface.	Track is misaligned.	Set track tension and alignment. If lugs are worn excessively, install new outer belt(s).
Track ratches or hits on body tunnel (top).	1. Track tension is too loose. 2. Track drive sprockets not timed in relation to drive lugs. 3. Track drive sprockets turn on shaft. 4. Internal drive lugs worn because of hourly usage.	1. Set track tension and alignment. 2. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 3. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 4. Install new outer belt(s).
Accelerated hi-fax wear.	1. Slide rail(s) is bent. 2. Worn cleat on surface that contacts hi-fax. 3. Track is misaligned.	1. Straighten slide rail(s) or install new skid frame. 2. Install new hi-fax or cleats. 3. Set track tension and alignment.

DRIVE CLUTCH BEARING TOLERANCE

Inspect and Measure Bearing for Wear

The maximum allowable bearing wear or clearance between the hex shaft and bearing is critical for correct drive clutch operation. The flats on the drive clutch are directly associated with the large bearing area. This bearing area, added to the high bearing load capacity and low coefficient of friction, result in improved life expectancy of the clutch.

For assembly purposes, radial clearance between the hex shaft and bearing is necessary, and a slightly greater clearance does not adversely affect clutch operation. However, the maximum allowable bearing wear tolerance is limited by the clearance between the ramp and inside surface of the roller arm.

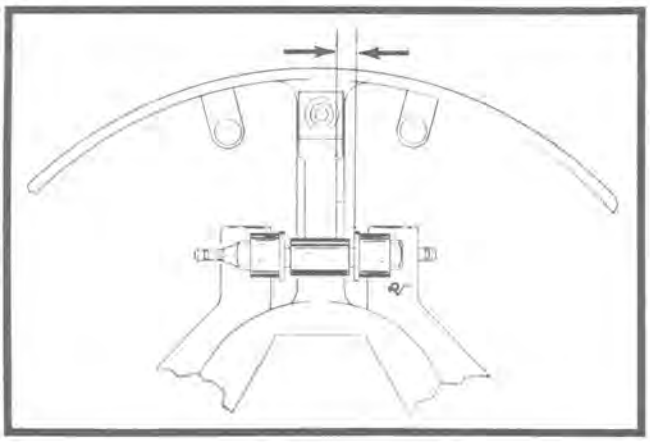
If the bearing is considered to be worn, roller arm and ramp clearance can be visually inspected by looking into the clutch, or the clutch can be removed from the crankshaft and measured. The visual inspection method and measurement method are explained below.

Visual Inspection Method

Equipment Necessary: Flashlight

1. Look into the clutch and rotate it clockwise and counterclockwise; a flashlight may be necessary to see the inside of the clutch. Look at the inside surface of the roller arm; there must not be any contact between the roller arm and ramp, Fig. V-7.

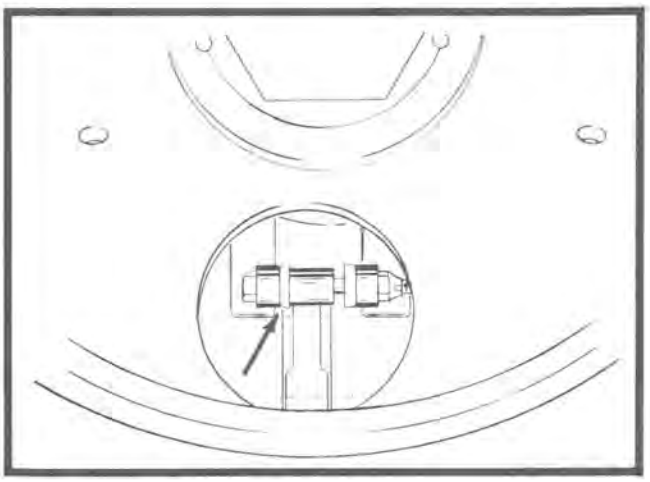
Fig. V-7



2. If there is no contact between the roller arm and ramp, Fig. V-7, the maximum allowable drive clutch bearing wear is within tolerance. Drive clutch is acceptable.

3. If there is contact between the roller arm and ramp, Fig. V-8, the maximum allowable drive clutch bearing wear is not within tolerance. Drive clutch moveable sheave and cover housing must be replaced.

Fig. V-8



Measurement Method

Equipment Necessary: 1/4-Inch Hex Key Wrench, Tri-Square, Scribe and Calipers or Scale

1. Remove the drive clutch from the crankshaft (See: Remove Drive Clutch, page V-18).

2. Remove cover housing and spring (See: Disassemble Drive Clutch, steps 1-3, page V-18).

3. Install cover housing with three socket head cap screws, using a 1/4-inch wrench.

4. Keeping the stationary sheave fixed, rotate the moveable sheave counterclockwise until all clearance is taken up, Fig. V-9. Scribe a line on the moveable sheave, using a tri-square and scribe, Fig. V-9.

DRIVE CLUTCH BEARING TOLERANCE

Fig. V-9

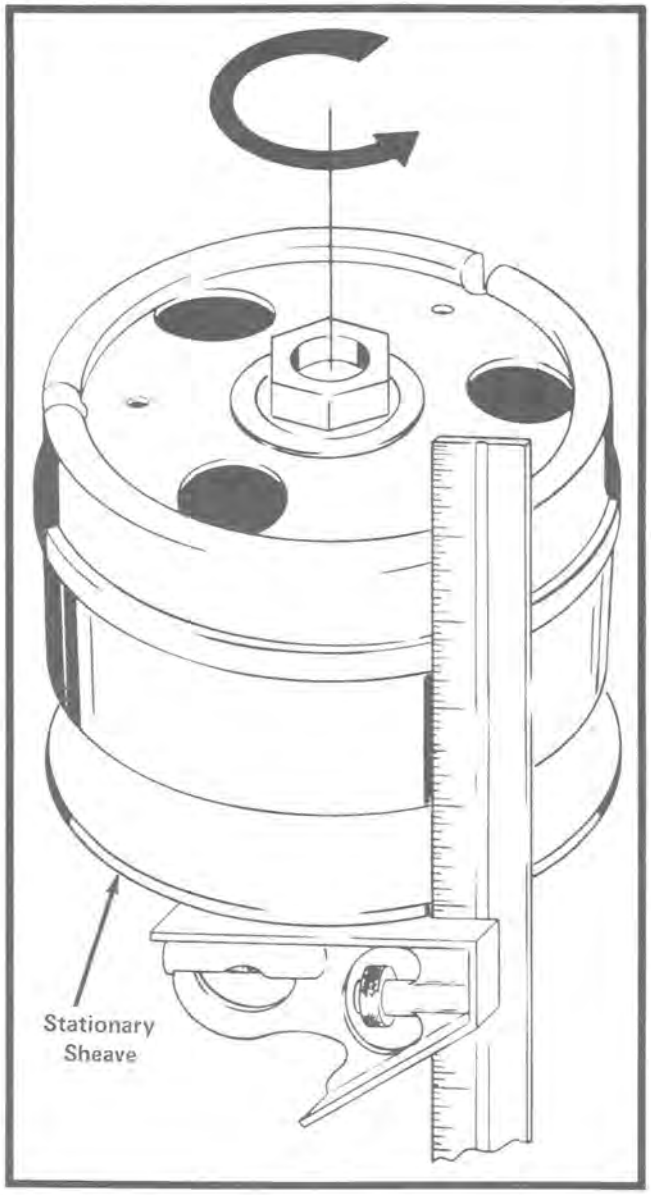
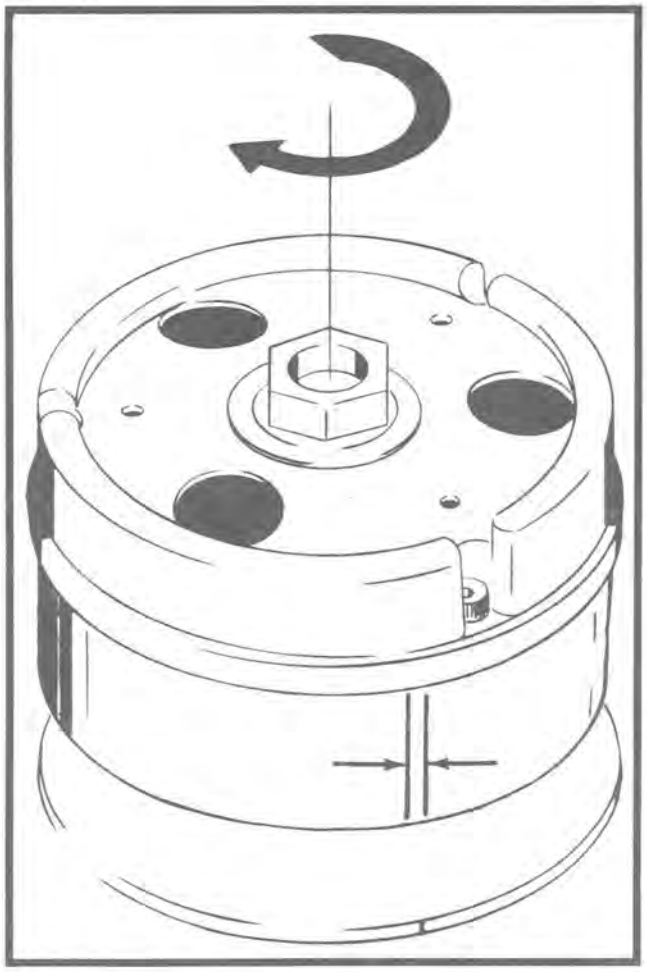


Fig. V-10



5. Keeping the stationary sheave fixed, rotate the moveable sheave clockwise until all clearance is taken up, Fig. V-10. Scribe another line on the moveable sheave, using a tri-square and scribe, Fig. V-10.

6. Measure distance between the two scribe marks, Fig. V-10, using a caliper or scale.

7. If distance between the two scribed lines is less than 5/32 inch (0.156"), the maximum allowable drive clutch bearing wear is within tolerance. Drive clutch is acceptable.

8. If distance between the two scribed lines is more than 5/32 inch (0.156"), the maximum allowable drive clutch bearing wear is not within tolerance. Drive clutch moveable sheave and cover housing must be replaced.

DRIVE CLUTCH REMOVAL

Remove Drive Clutch

Equipment Necessary: 3/4-Inch Socket, Air Impact Tool and Clutch Puller

1. After opening the hood, remove drive belt.

2. Remove the cap screw and lock washer holding the drive clutch on the crankshaft, using an air impact tool and 3/4-inch socket.

3. Slide the clutch puller bolt (See: Section VIII Tools, page VIII-15) into the center hub of the drive clutch; thread puller bolt into crankshaft. Back puller bolt out 1/2 turn after it "bottoms out" in the crankshaft.

4. Pull the drive clutch off the crankshaft, using an air impact tool and 3/4-inch socket.

DRIVE CLUTCH DISASSEMBLY

Disassemble Drive Clutch

Equipment Necessary: 1/4-Inch Hex Key Wrench, 1/4-Inch Wrench, 3/16-Inch Wrench, 3/8-Inch Wrench and 9/64-Inch Hex Key Wrench

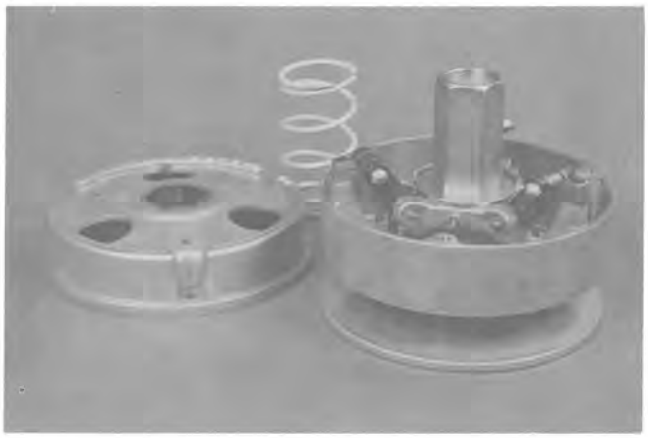
1. Place a large flat washer on puller bolt, then thread puller bolt into the center of the hex shaft, starting on the cover housing side. Continue to thread puller bolt in until washer and head of bolt contact cover housing.

2. Remove the three socket head cap screws, Fig. V-11, holding the cover housing against the moveable sheave, using a 1/4-inch hex key wrench. After socket head cap screws are removed, remove the puller bolt from the center of the hex shaft.

Fig. V-11

3. Remove cover housing and slide spring off stationary sheave center hub, Fig. V-12.

Fig. V-12



4. Loosen the three jam nuts, using a 1/4-inch wrench, Fig. V-13. Also, loosen the three set screws, Fig. V-13, until the spider is loose on the hex shaft, using a 3/16-inch wrench.

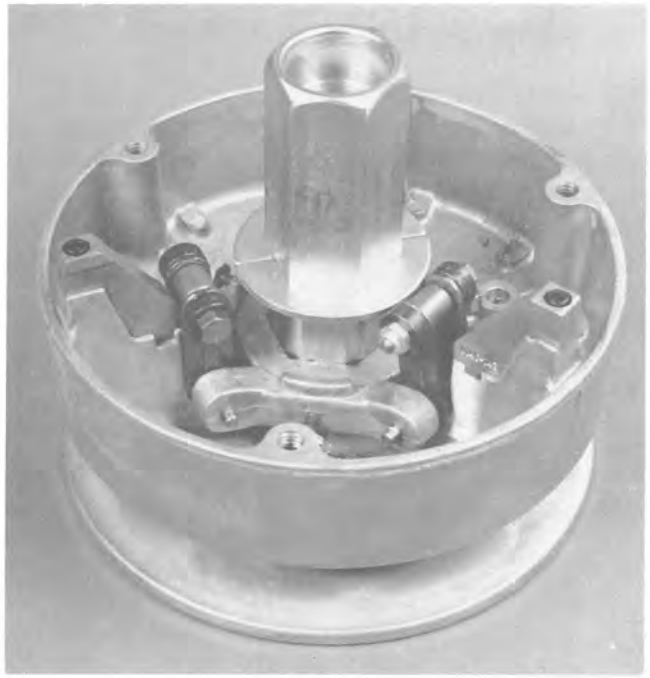
Fig. V-13

DRIVE CLUTCH DISASSEMBLY

5. Push the spider assembly down against the moveable sheave, Fig. V-14.

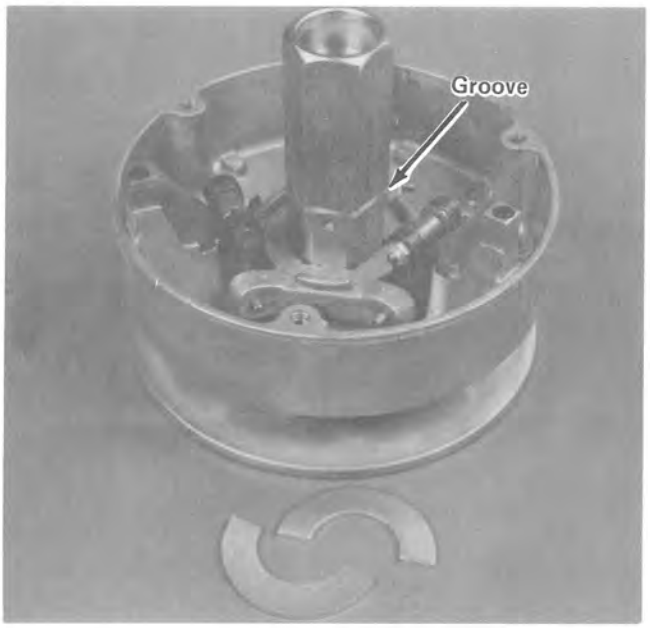
Note: The spider assembly may stick on the hex shaft even after the set screws are loosened and downward pressure is exerted. If this happens, the spider assembly is to be forced down on the hex shaft.

Fig. V-14



6. Slide the split ring halves out of the groove in the hex shaft, Fig. V-15.

Fig. V-15

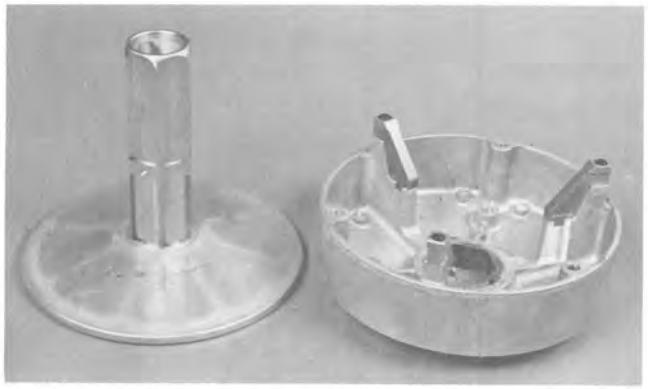


7. Mark the spider assembly in relation to the hex shaft so that it can be reinstalled in the same position; then slide spider assembly off hex shaft, Fig. V-16.

Fig. V-16

8. Slide moveable sheave off hex shaft, Fig. V-17.

Fig. V-17



9. If the spider, rollers or weights are to be serviced, use the following instructions.

   A. Remove lock nut and cap screw holding weights, roller and bushing to the roller arm, using a 3/8-inch wrench, Fig. V-18.

   B. Slide roller with bushing from between roller arm, Fig. V-18.

Note: There are two small "ears" protruding on the inside of the roller arm. Make sure ears "seat" in slots of roller bushing.

   C. Perform steps A and B on remaining roller arms.

DRIVE CLUTCH DISASSEMBLY

Fig. V-18

Note: A complete roller kit with bushing is to be installed, even if only 1 roller with bushing is worn or damaged. New rollers with bushings will have a definite "wear-in" pattern. If rollers with bushings are to be replaced, new ramps are to be installed (See: Step 10).

10. Remove the cap screws retaining the ramps to the moveable sheave, using a 9/64-inch hex key wrench. Slide ramp out of "ramp setting" in moveable sheave.

Note: A complete ramp kit is to be installed, even if only 1 ramp is worn or damaged. If ramps are to be replaced, new rollers with bushings are to be installed.

CLEANING INDIVIDUAL PARTS

Cleaning

Equipment Necessary: Cleaning Solvent and Compressed Air

1. Wash grease, dirt and foreign matter off all parts, using cleaning solvent. Dry the parts with compressed air.

2. If drive belt accumulations are on the stationary sheave, moveable sheave or the moveable sheave Duralon bushing, the accumulations are to be removed, using cleaning solvent ONLY. Dry the parts with compressed air.

CAUTION

DO NOT use steel wool or a wire brush to clean parts having a Duralon bushing; damage will result if bushing is contacted.

INSPECTING INDIVIDUAL PARTS

Inspecting

Equipment Necessary: Cleaning Solvent and Compressed Air

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

1. Inspect the stationary sheave, moveable sheave and cover housing for cracks and imperfections in the casting.

2. Inspect the spider for cracks and imperfections in the casting. Arms, weights and rollers with bushings are to be without damage or wear.

3. Inspect the ramp "settings" on the inside of the moveable sheave for wear and cracks.

4. Inspect the spring for proper compression qualities (See: Spring Compression Test, page V-21). If spring compression is not as specified or damage is evident, replacement is necessary.

5. Inspect the ramps for wear pattern that may develop after usage.

6. Inspect all threaded components for stripped or otherwise damaged threads.

7. Inspect the hex shaft; no burrs or rough edges are to be evident. Use a fine file to remove

INSPECTING INDIVIDUAL PARTS

burrs and rough edges. If filing was necessary, the stationary sheave and hex shaft is to be washed in cleaning solvent to remove metal filings. Dry the shaft with compressed air.

8. Inspect the set screws retaining the Duralon bearing in the moveable sheave. Set screws are to be 1/16 inch below the casting on the inside surface of the moveable sheave. Set screws are to be staked on inside of moveable sheave. If set screws are not staked, do so (See: Stake Moveable Sheave Duralon Bearing Set Screws, page V-21).

SPRING COMPRESSION SPECIFICATION

Spring Compression Test

Equipment Necessary: Spring Pressure Tester

The spring is to be a specific length and have definite pressure characteristics to ensure proper drive clutch engagement (See: 1974 or 1975 Drive Clutch Specifications, page V-2 or V-3). Spring pressure reading must be as specified when checked with a spring pressure tester (See: 1974 or 1975 Drive Clutch Specifications, page V-2 or V-3). If the spring pressure is within tolerance and an engagement problem is still experienced, another part in the drive clutch is affecting engagement rpm.

1. Place spring between compression pad and scale contact surface, Fig. V-19.

2. Push compression arm down 1-1/4 inches; then read the number of pounds registered on the indicator, Fig. V-19. Indicator reading is to be as specified (See: 1974 or 1975 Drive Clutch Specifications, page V-2 or V-3). If indicator reading is less than specified spring pressure, install a new spring.

Fig. V-19

STAKING MOVEABLE SHEAVE SET SCREW

Stake Moveable Sheave Duralon Bearing Set Screws

Equipment Necessary: 3/32-Inch Hex Key Wrench, 1/8-Inch Diameter, Pin Punch and Hammer

The three set screws holding the Duralon bearing in the moveable sheave have a tendency to back out. When this happens the drive clutch will not disengage at idle speed and will have a tendency to creep. Hard starting may be evident and the snowmobile may "lurch" forward when the recoil rope is pulled. To correct the problem, the set screws are to be staked.

1. Examine the set screws holding the Duralon bearing in the moveable sheave. The head of the set screws is to be 1/16 inch below the surface of the casting as viewed from the inside of the moveable sheave.

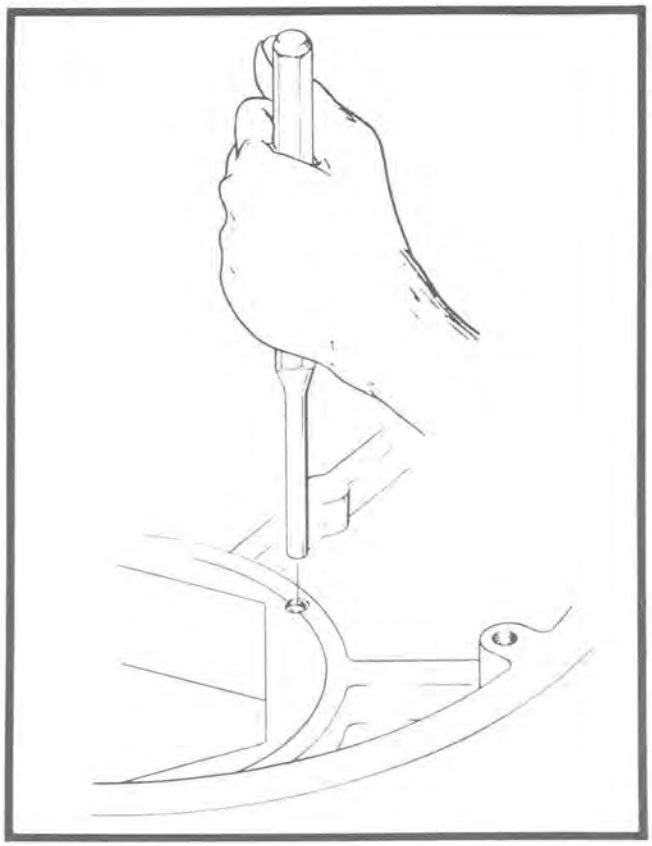
STAKING MOVEABLE SHEAVE SET SCREW

2. If set screws are not 1/16-inch below casting surface, tighten set screws until proper measurement is evident, using a 3/32-inch hex key wrench.

3. After set screws are tightened, the casting is to be staked on the outside edge of each set screw, using a 1/8-inch pin punch, and a hammer, Fig. V-20.

Note: When staking is performed, strike the punch with the hammer, using sufficient force to deform the threads, but not so hard as to break off a part of the casting. This procedure will keep the set screws in place and prevent them from backing out.

Fig. V-20



DRIVE CLUTCH ASSEMBLY

Assemble Drive Clutch

Equipment Necessary: 9/64-Inch Hex Key Wrench, Torque Wrench, 3/8-Inch Socket, 3/8-Inch Wrench, 3/16-Inch Socket and 1/4-Inch Hex Key Wrench

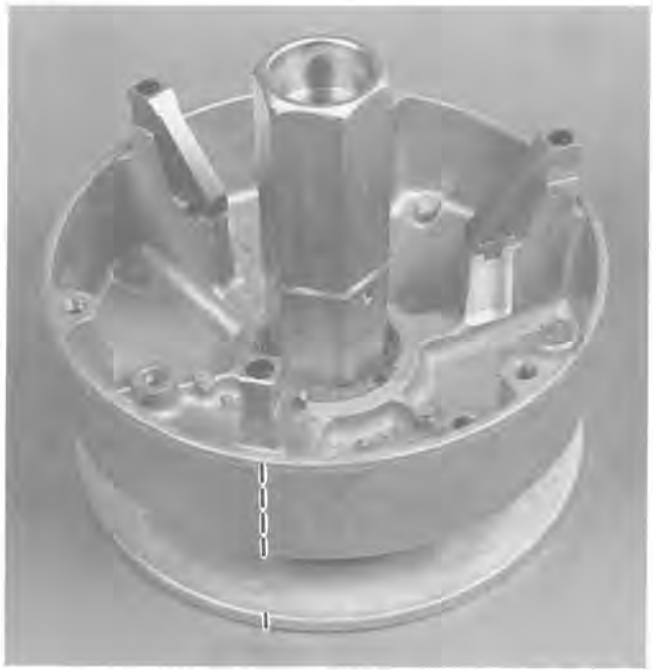
1. Make sure all drive clutch parts have been cleaned, repaired or replaced.

2. Install ramp in moveable sheave and secure in place with socket-head cap screw, using a 9/64-inch hex key wrench. Tighten socket-head cap screw to 2-2.5 ft-lb, using a torque wrench. Install remaining ramps.

Note: A complete ramp kit must be installed, not an individual ramp. If new ramps are being installed, a new roller kit with bushings must be installed.

3. Slide the moveable sheave onto the stationary sheave hex shaft, Fig. V-21. The alignment marks on both sheaves MUST line up to keep the clutch balanced.

Fig. V-21



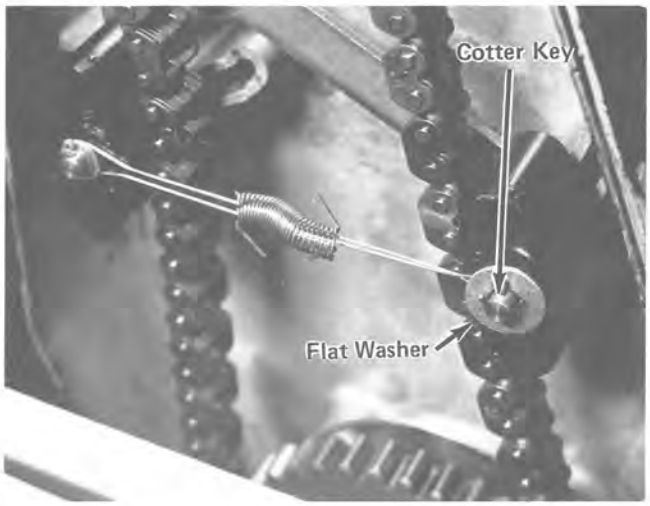
DRIVEN PULLEY REMOVAL

3. Remove the six cap screws and star washers holding the chain case cover against the chain case, using a 1/2-inch socket. Next, pull the cover away from the chain case. Make sure to account for the chain case gasket.

4. Wipe up chain lube that flowed out of the chain case.

5. Remove the cotter key and flat washer, Fig. V-29, holding the brake pad tension spring on the brake pad dowel pin, using a needle nose pliers. Slide spring off dowel pin.

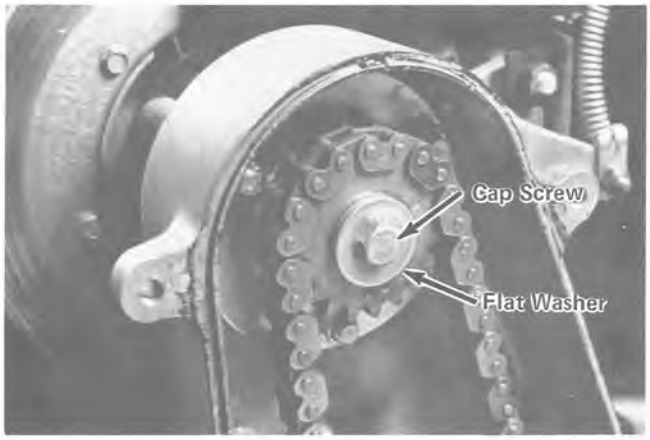
Fig. V-29



6. Remove the cap screw and flat washer retaining the top sprocket on the driven shaft, Fig. V-30, using a 1/2-inch socket.

7. Thread cap screw approximately halfway back into the driven shaft. Cap screw is used for bottoming the puller bolt when sprocket is being pulled off driven shaft.

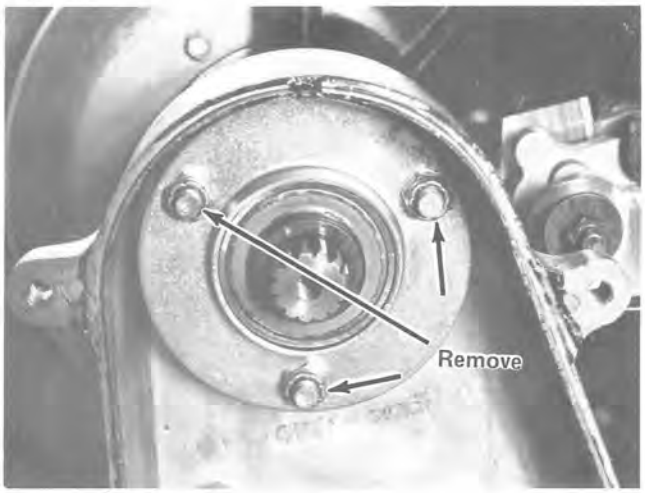
Fig. V-30



8. Pull upper sprocket and chain off the driven shaft, using a two-prong puller. After sprocket is pulled off the shaft, remove the cap screw from the driven shaft.

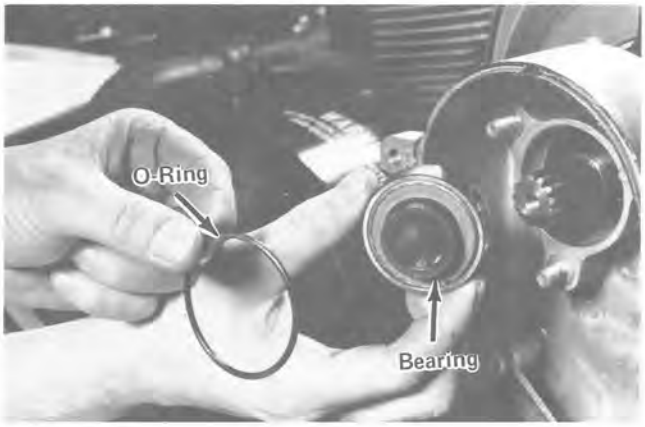
9. Remove the three lock nuts holding the bearing flange on the mounting studs, Fig. V-31, using a 1/2-inch socket and 3-inch extension. Slide bearing flange off mounting studs.

Fig. V-31



10. Slide O-ring and bearing off the driven shaft, Fig. V-32.

Fig. V-32



Remove Driven Pulley from Shaft

Equipment Necessary: 9/32-Inch Hex Key Wrench, 5/32 x 1/8-Inch Pin Punch, Hammer, Fine File, 1/2-Inch Open End Wrench, 13mm Open End Wrench, Hard Wooden Dowel Punch and Screwdriver Having a 7/16-Inch Blade

DRIVEN PULLEY REMOVAL

1. Remove the cap screw and flat washer holding the driven pulley on the driven shaft, using a 1/2-inch open end wrench.

Note: There may be a shim with the cap screw and flat washer holding the driven pulley on the shaft. The shim is used to keep driven pulley from sliding laterally on the driven shaft.

Fig. V-33

2. Loosen the set screws holding the two driven pulley lock collars in position on the driven shaft, Fig. V-33, using a 9/32-inch hex key wrench. Next, drive the bearing lock collar in the opposite direction of normal shaft rotation (counterclockwise), using a hammer and 5/32 x 1/8-inch pin punch.

Note: Before trying to remove the driven shaft, remove burrs from the shaft, using a fine file.

3. Loosen the two cap screws holding the brake assembly to the brake mount, using a 1/2-inch open end wrench, Fig. V-34.

4. Remove the two nuts, lock washers and flat washer holding the carburetor on the mounting studs, using a 13mm open end wrench. Slide carburetor assembly off studs and set it aside.

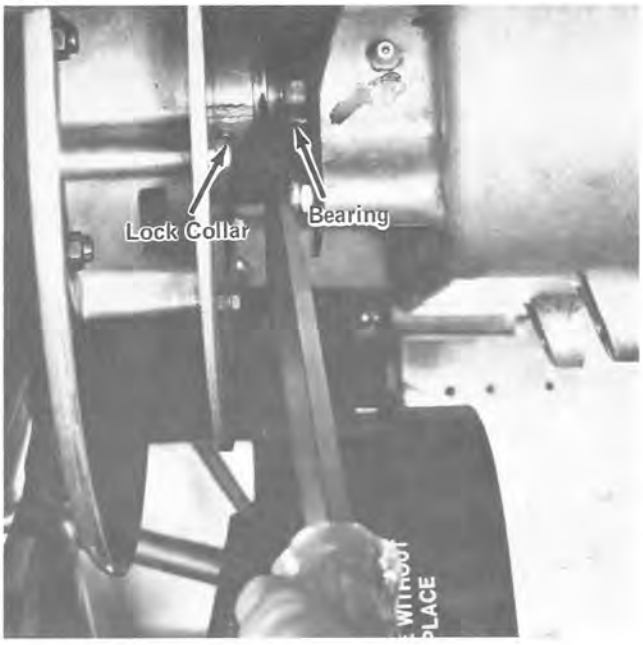
Note: Fuel line, impulse line and control cables do not have to be disconnected from the carburetor.

Fig. V-34

5. Drive the driven shaft through the driven pulley and chain case, using a hard wooden dowel punch and a hammer. After shaft is removed, account for the long key that holds pulley on shaft.

Note: When driving the shaft, hold blade of a large screwdriver between the lock collar and bearing, Fig. V-35, to prevent the shaft from locking up.

Fig. V-35



DRIVEN PULLEY REMOVAL

6. Just before shaft is removed completely, grasp driven pulley to prevent it from falling into the belly pan, Fig. V-36. Also, slide lock collars off the shaft.

Fig. V-36

7. Remove the three lock nuts holding the driven pulley guard against the inside of the chain case, Fig. V-37, using a 1/2-inch socket. Also, remove the cap screw holding bottom of guard to curved section of front end, Fig. V-37, using a 1/2-inch socket.

Fig. V-37

8. If the bearing on the inside of the chain case must be replaced, drive it out toward the steering post, Fig. V-38, using a hammer and 5/32 x 1/8-inch pin punch. Account for the "O" ring.

Note: If the brake disc must be serviced, remove it from the driven pulley (See: Remove Brake Disc, page V-30). However, if the driven pulley is to be serviced, it must be disassembled (See: Disassemble Driven Pulley, page V-30).

Fig. V-38

BRAKE DISC REMOVAL

Remove Brake Disc

Equipment Necessary: 5/16-Inch Wrench

1. Remove driven pulley from shaft (See: Driven Pulley Removal, page V-27).
2. Remove the six cap screws holding the brake disc against the stationary sheave hub.
3. Remove brake disc.

CLEANING & INSPECTING PARTS

Cleaning and Inspecting

Equipment Necessary: Cleaning Solvent, Compressed Air

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

1. Wash all grease, belt accumulations and foreign matter off the brake disc, using cleaning solvent.
2. Inspect mounting holes in brake disc for cracks or excessive wear.
3. Inspect brake disc for gouges and grooves.

BRAKE DISC INSTALLATION

Installing Brake Disc

Equipment Necessary: 5/16-Inch Socket, Torque Wrench

1. Be sure disc is clean and has been inspected for possible defects.
2. Position the brake disc against the stationary sheave hub. Secure in place with six cap screws, using a torque wrench and 5/16-inch socket. Tighten cap screw to 2 ft-lb (25 in.-lb).

DRIVEN PULLEY DISASSEMBLY

Disassemble Driven Pulley

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, Rubber Mallet

Note: If the stationary sheave must be replaced or the driven pulley must be completely disassembled, the brake disc must be removed (See: Remove Brake Disc, page V-30).

1. Holding stationary sheave of driven pulley in place, rotate moveable sheave counterclockwise until shoe ramps do not contact cam of torque bracket.
2. Force torque bracket down on shaft until it "bottoms out". Keep downward pressure on the torque bracket.
3. Carefully pry the two-piece split ring off the stationary sheave shaft, using a screwdriver having a 1/4-inch blade, Fig. V-39.

Fig. V-39

DRIVEN PULLEY DISASSEMBLY

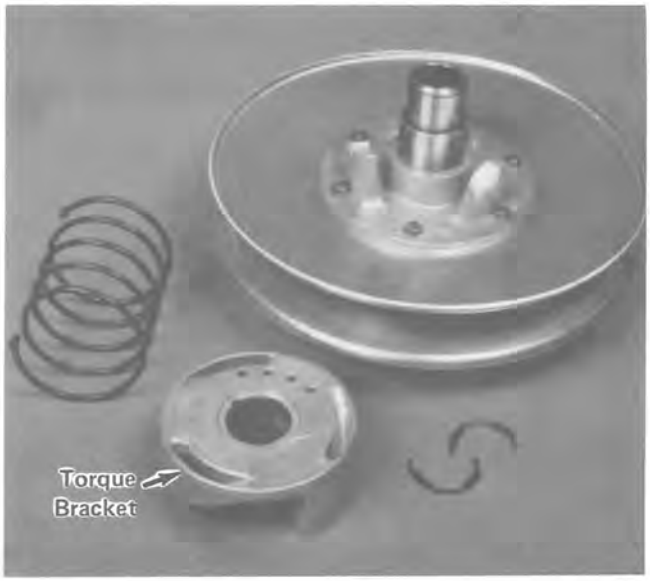
⚠ WARNING ⚠

Keep downward pressure on the torque bracket. If downward pressure is not applied, a sudden upward release of the spring could cause personal injury.

4. Slide torque bracket and spring off stationary sheave shaft, Fig. V-40.

Note: If torque bracket is hard to remove, a three-prong puller may be used to pull torque bracket off the shaft.

Fig. V-40



5. Slide moveable sheave off stationary sheave shaft, Fig. V-41.

Fig. V-41

6. Remove key from keyway in stationary sheave shaft. Next, slide bronze bearing off shaft.

7. Remove torque bracket shoe ramps, if servicing is needed, using a pliers.

8. Clean and inspect driven pulley (See: Cleaning and Inspecting Driven Pulley Parts, page V-31).

CLEANING DRIVEN PULLEY PARTS

Cleaning

Equipment Necessary: Cleaning Solvent, Compressed Air or Clean Rags

1. Wash grease, drive belt accumulations and foreign matter off all parts, using cleaning solvent. Dry parts with compressed air or clean rags.

2. If drive belt accumulations are on stationary sheave, stationary sheave shaft or moveable sheave, the accumulations are to be removed, using cleaning solvent ONLY. Dry the parts with compressed air or clean rags.

● CAUTION ●

DO NOT use steel wool or wire brush to clean any of the driven pulley parts. If sheaves are gouged, the result of using steel wool or a wire brush, drive belt may not slide properly between sheaves; result will be decreased performance and possible accelerated belt wear.

INSPECTING DRIVEN PULLEY PARTS

Note: Whenever a part is worn excessively, cracked, scratched, defective or damaged in any way, replacement is necessary.

1. Inspect shoe ramps for wear or damage.

2. Inspect rivet and weld areas for looseness and cracks.

3. Inspect torque brackets for cracks, wear and other noticeable damage.

4. Inspect stationary and moveable sheave for rough surfaces, grooves and scratches. Use fine emery cloth to repair minor damage.

5. Inspect spring for distortion, crystallization or breaks.

DRIVEN PULLEY ASSEMBLY

Assemble Driven Pulley

Equipment Necessary: Slip Joint Pliers, Rubber Mallet

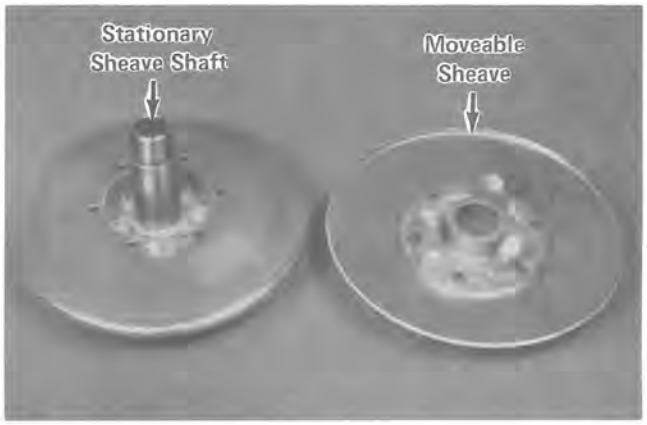
1. Be sure all clutch parts are cleaned, inspected and replaced, if necessary.

2. Install shoe ramps into torque bracket; then seat sliding shoes into casting, using a rubber mallet.

3. Slide bearing onto the stationary sheave shaft. Next, seat key in keyway, using a rubber mallet.

4. Slide moveable sheave onto stationary sheave shaft, Fig. V-42.

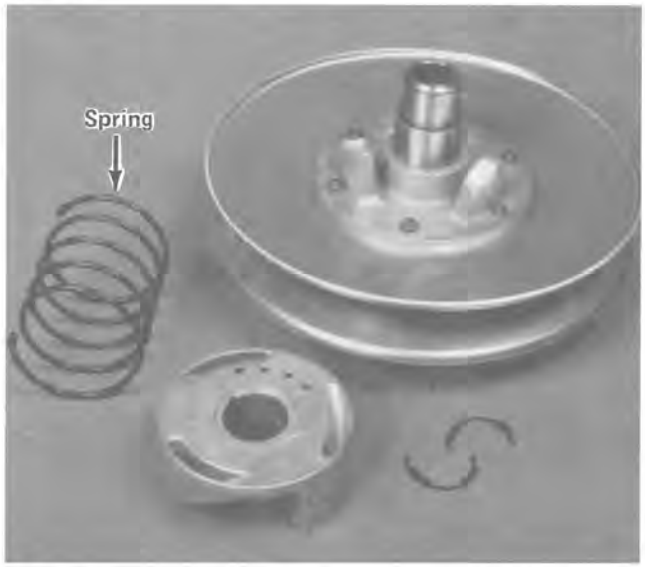
Fig. V-42



5. Slide spring onto the stationary sheave shaft, Fig. V-43. Install the turned up end of spring into hole in moveable sheave.

6. Place torque bracket on the spring, Fig. V-43. Install turned up end of spring into the second hole (standard spring tension) in the torque bracket.

Fig. V-43



7. Line up the key in stationary sheave shaft with the keyway in the torque bracket. Push torque bracket onto stationary sheave shaft, making sure key slides into keyway in the torque bracket. Continue to push torque bracket down until its tips are just above the sliding shoes. A rubber mallet may be used to drive the torque bracket down on the shaft.

8. Rotate moveable sheave counterclockwise until slight spring resistance is felt; then rotate moveable sheave an additional 1/3 turn (120°).

9. Maintaining spring preload, push torque bracket down on the shaft until the bracket "bottoms out" on the bearing.

DRIVEN PULLEY ASSEMBLY

10. Install the two-piece split ring in the groove at end of stationary sheave shaft. Squeeze the split ring halves together to prevent torque bracket from releasing, using a slip joint pliers.

11. Slowly, allow torque bracket to release against the split ring.

Note: If brake disc was removed, install it now (See: Install Brake Disc, page V-30).

CHAIN CASE HOUSING REMOVAL

Remove Chain Case

Equipment Necessary: 1/2-Inch Socket, 1/2-Inch Wrench, Rubber Mallet, Cardboard, 9/16-Inch Socket, 3-Inch Extension and 7/16-Inch Socket

Note: If snowmobile is equipped with an electric starter, remove the battery from chassis, using two 10mm wrenches.

1. Remove driven pulley and driven shaft (See: Driven Pulley Removal, page V-26).

2. Remove the three lock nuts holding driven pulley guard to top of chain case, Fig. V-44, using a 1/2-inch socket. Also, remove cap screw holding bottom of driven pulley guard to front end, using a 1/2-inch socket.

Note: The brake and brake cable do not have to be removed or disconnected to accomplish clutch shield removal.

Fig. V-44

3. Remove cap screw holding front of chain case to front end, Fig. V-44, using a 1/2-inch socket.

4. Remove the two cap screws and lock washers holding the rear axles of the skid frame to the body tunnel, using a 9/16-inch wrench.

5. Tip the snowmobile on its MAG side. Use a piece of cardboard to guard against scratching the hood. Next, move rear of skid frame away from the tunnel to gain additional working room around track drive shaft.

6. Remove the two lock nuts and carriage bolts holding side of chain case to front end, using a 1/2-inch wrench.

7. Remove the cap screw and flat washer, Fig. V-45, holding the lower sprocket on the track drive shaft, using a 1/2-inch socket. Thread cap screw approximately halfway into the track drive shaft. Cap screw is used for bottoming puller bolt when sprocket is being pulled off track drive shaft.

Fig. V-45

8. Pull bottom sprocket and chain off track drive shaft, using a short two-prong puller. After sprocket is pulled, remove cap screw from track drive shaft.

CHAIN CASE HOUSING REMOVAL

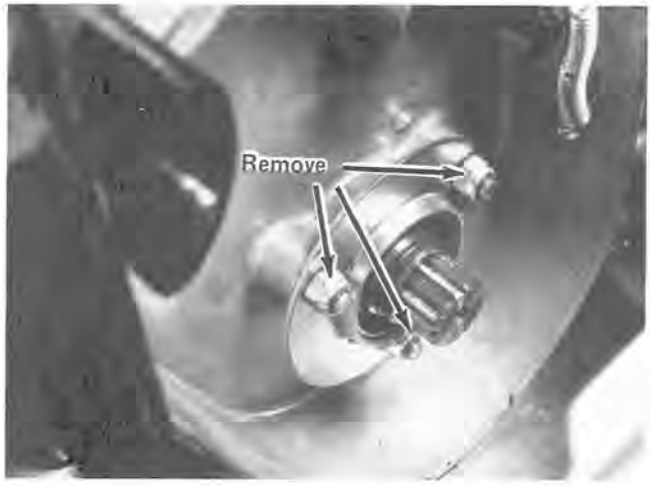
9. Remove the three lock nuts and flat washers holding chain case to inside of tunnel, using a 1/2-inch wrench.

10. Remove the three lock nuts, Fig. V-46, holding drive shaft bearing flange, bearing, chain case and track drive shaft in place, using a 1/2-inch wrench. Remove flange, bearing and O-ring.

11. Remove chain case from side of tunnel and front end.

12. Remove cap screw holding chain tightener assembly, against inside of chain case, using a 7/16-inch socket and 3-inch extension.

Fig. V-46



CLEANING INDIVIDUAL PARTS

Cleaning

Equipment Necessary: Cleaning Solvent, Compressed Air and Clean Rags

1. Wash all grease, chain lube and foreign matter off chain case and related parts, using cleaning solvent. After all parts are clean, dry them, using compressed air.

INSPECTING INDIVIDUAL PARTS

Inspecting

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

1. Inspect chain case for cracks and imperfections in the casting.

2. Inspect chain tightener arm bushing for excessive play.

3. Inspect chain tightener arms for cracks or faults at the mounting bolt hole and tightener pad dowel pin.

4. Inspect chain tightener pads for cracks or excessive wear.

5. Inspect all bearings, bearing flanges and O-rings for damage or wear.

CHAIN CASE HOUSING INSTALLATION

Install Chain Case

Equipment Necessary: 7/16-Inch Socket, 1/2-Inch Socket, 9/16-Inch Socket, 3-Inch Extension, Rubber Mallet and Torque Wrench

1. Be sure all components are clean and have been inspected for possible defects.

2. Place chain tightener assembly link arms in position on inside of chain case. In sequence, slide cap screw through bushing, long link arm and short link arm. Tighten cap screw to 8 ft-lb, using a torque wrench and 7/16-inch socket.

Note: If new stud collars must be installed in chain case, use a short piece of pipe (0.315 ID) to drive the collars into place in the chain case.

3. Position bottom of chain case against track drive shaft hole in tunnel. Retain chain case against side of front end and tunnel by installing three flat washers and lock nuts on chain case studs that protrude into the inside of the tunnel. DO NOT TIGHTEN lock nuts.

Fig. V-47

4. Retain side of chain case to tunnel and front end with two carriage bolts and lock nuts, using a 1/2-inch socket. Carriage bolts must be installed from inside of tunnel and lock nuts on outside of chain case. DO NOT TIGHTEN LOCK NUTS.

5. Retain front chain case mount to top of front end with cap screw, Fig. V-47, using a 1/2-inch socket. DO NOT TIGHTEN CAP SCREW.

6. Now, tighten the three lock nuts located on inside of tunnel to 16-18 ft-lb, using a 1/2-inch open end wrench. Tightening lock nuts will hold bottom of chain case against side of tunnel.

7. Tighten two lock nuts retaining side of chain case to tunnel and front end to 16-18 ft-lb, using a torque wrench and 1/2-inch socket.

8. Tighten cap screw retaining front mount of chain case to 12 ft-lb, using a torque wrench and 1/2-inch socket.

9. Slide bearing onto track drive shaft and into chain case, until bearing bottoms against shoulder on track drive shaft.

Note: Nonsealed side of bearing must face toward inside of chain case.

10. Install O-ring on bearing.

11. Slide bearing flange onto studs. Secure bearing flange, O-ring and bearing in place with three lock nuts, Fig. V-48. Tighten lock nuts to 16-18 ft-lb, using a torque wrench and 1/2-inch socket.

12. Install sprocket on track drive shaft; then secure it on track drive shaft with flat washer and cap screw. Tighten cap screw to 17 ft-lb, using a torque wrench and 1/2-inch socket.

13. Install driven pulley, top sprocket and chain (See: Install Driven Pulley, page V-36).

Fig. V-48

CHAIN CASE HOUSING INSTALLATION

Install Driven Pulley

Equipment Necessary: Low-Temperature Grease (Texaco 2346 EP or Equivalent), 1/2-Inch Socket, 3-Inch Extension, Torque Wrench, 5/16 x 1/8-Inch Pin Punch, Hammer, 3/32-Inch Hex Key Wrench, 12-Inch Straight Edge, Needle Nose Pliers, 13mm Open End Wrench and 3/4-Inch Socket

Note: If the bearing on the inside of the chain case was removed, proceed to steps 1-5. However, if the inside bearing was not removed, proceed to step 6.

1. Apply a generous amount of low-temperature grease on the open side of the driven shaft bearing.

2. Slide the bearing into the chain case. Make sure the bearing collar extends toward the steering post, and also, make sure it bottoms against the machined seat in the chain case.

3. Slide O-ring onto bearing.

4. Install the driven pulley guard on the three mounting studs and start the three lock nuts, Fig. V-49, using a 1/2-inch socket. DO NOT TIGHTEN LOCK NUTS AT THIS TIME.

Fig. V-49

5. Secure the bottom of the guard to the chain case and front end assembly with a cap screw, Fig. V-49. Tighten cap screw to 12 ft-lb, using a torque wrench and 1/2-inch socket.

6. Slide driven shaft through chain case starting from the outside to the inside. Splined end of shaft must face outward.

7. In sequence, slide lock collar and offset adjusting collar onto the nonsplined end of the shaft. The bearing lock collar having recessed inside diameter must face the inside bearing collar so bearing can be locked in place.

8. Slide the driven pulley onto the shaft, Fig. V-50. Make sure brake disc is positioned between the brake pucks.

Fig. V-50

9. Apply a generous amount of low-temperature grease on the open side of the driven shaft bearing.

10. Slide bearing onto the splined end of driven shaft, Fig. V-51, until it bottoms against the shoulder on the shaft. Make sure bearing collar extends toward the splines.

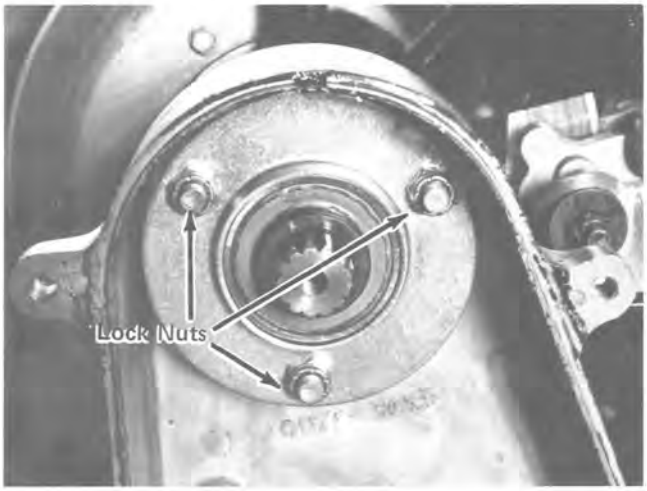
Fig. V-51

CHAIN CASE HOUSING INSTALLATION

11. Continue to slide shaft through chain case and driven pulley until the outside bearing bottoms against shoulder in chain case. Slide O-ring onto bearing, Fig. V-51.

12. Slide bearing flange onto studs. Secure bearing flange, O-ring and bearing in place with three lock nuts. Tighten lock nuts to 16-18 ft-lb, Fig. V-52, using a torque wrench, 1/2-inch socket and 3-inch extension.

Fig. V-52



13. Now tighten to 12 ft-lb, the three lock nuts holding driven pulley guard against inside of chain case, using a 1/2-inch open-end wrench.

14. Line up keyway in driven shaft with keyway on inside of driven pulley hub. Install long key, Fig. V-53, to retain driven pulley in place. A long punch and hammer may be required when installing the key.

Fig. V-53

15. Push driven shaft toward open side of chain case until the shaft stops. Make sure lock collar does not contact the inside bearing collar when shaft is being pushed.

16. Slide lock collar onto bearing collar; then drive lock collar forward (counterclockwise), Fig. V-54, using a 5/16 x 1/8-inch pin punch and hammer.

Note: Lock collar is locked tightly on the bearing and shaft when bearing begins to turn with the collar.

Fig. V-54

17. Tighten lock collar set screw, Fig. V-55, using a 3/32-inch hex key wrench.

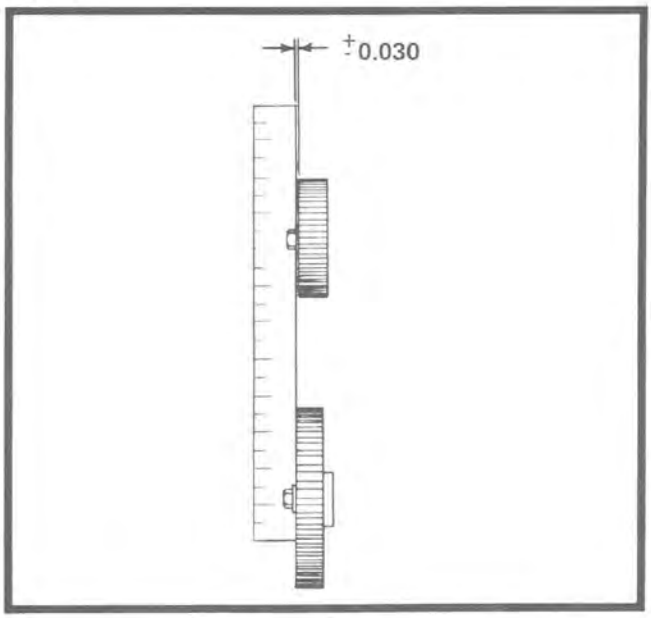
CHAIN CASE HOUSING INSTALLATION

Fig. V-55

18. Check Sprocket Alignment – First, install sprocket on driven shaft splines. Then secure sprocket on shaft with flat washer and cap screw, using a 1/2-inch socket. Finally, lay a 12-inch straight edge on face of top and bottom sprocket. No more than a 1/32-inch gap is to be evident between the straight edge and face of the sprocket, Fig. V-56.

Note: If top sprocket is to the outside of being parallel, remove bottom sprocket and position a shim washer on the inside of the sprocket. By contrast, if top sprocket is to the inside of being parallel, remove top sprocket and position a shim washer on the inside of the sprocket.

Fig. V-56



19. Remove cap screw and flat washer holding top sprocket on driven shaft, using a 1/2-inch socket and 3-inch extension. Next, assemble drive chain around large bottom sprocket and top sprocket. Finally, push top sprocket and chain onto splines of the driven shaft.

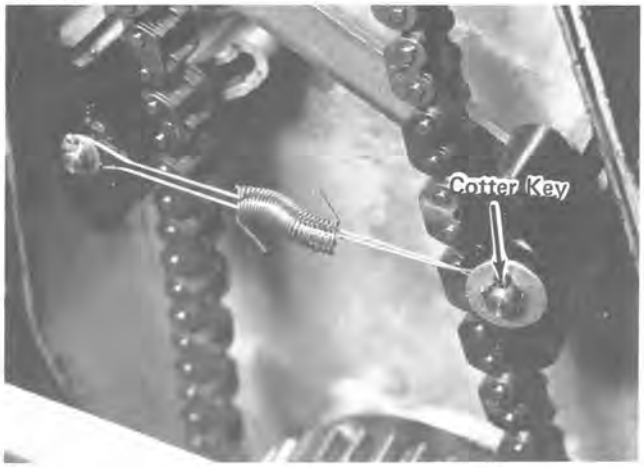
20. Secure sprocket on driven shaft with flat washer and cap screw, using a 1/2-inch socket and 3-inch extension, Fig. V-57. Tighten cap screw to 16-18 ft-lb, using a torque wrench and 1/2-inch socket.

Note: When cap screw is being tightened, sprocket will draw evenly onto the track drive shaft splines.

Fig. V-57

21. Install chain tensioner spring on dowel pin in the chain tightener pad. Next, slide flat washer onto dowel pin and retain parts in place with cotter key, Fig. V-58, using a needle nose pliers.

Fig. V-58



CHAIN CASE HOUSING INSTALLATION

22. Install gasket and chain case cover against chain case with six cap screws and star washers. Tighten cap screws to 10 ft-lb, using a torque wrench, 1/2-inch socket and 3-inch extension.

> **CAUTION**
> **Make sure the two nuts holding carburetor against intake studs are tight. If an air leak develops because the nuts are loose, a lean carburetor condition will cause engine damage.**

23. Align drive clutch and driven pulley (See: Drive Clutch/Driven Pulley Alignment, page V-25).

24. When drive clutch and driven pulley are aligned, rotate offset adjusting collar against the driven pulley. Tighten set screw in collar, using a 3/32-inch hex key wrench, Fig. V-59.

Note: Be sure "offset" is not changed accidentally when collar is moved against driven pulley and when set screw is tightened.

Fig. V-59

25. Secure driven pulley on driven shaft with cap screw and flat washer, Fig. V-59, using a 1/2-inch socket. Next, pull driven pulley against flat washer; then push driven pulley toward chain case. No movement is to be evident. If movement occurs, remove cap screw and flat washer; add shims on shaft until movement is eliminated. Finally, secure driven pulley on driven shaft with cap screw, flat washer and shim(s). Tighten cap screw to 16-18 ft-lb, using a torque wrench and 1/2-inch socket.

26. Slide carburetor onto the intake mounting studs and secure in place with two nuts, lock washers and flat washers, using a 13mm open end wrench.

> **CAUTION**
> **Make sure chain case gasket and cover are installed evenly, thereby assuring a good seal between chain case and chain case cover. If a leak develops after filling chain case with chain lube because of an improper seal, damage to the chain and sprocket will result because of insufficient lubrication.**

27. Remove filler plug at top of chain case, using a 3/4-inch socket. Next, pour 8 ounces of ARCTIC CHAIN LUBE into the chain case, using a funnel. Finally, install filler plug and tighten it to 10 ft-lb, using a torque wrench and 3/4-inch socket.

Note: If snowmobile is equipped with an electric starter, install the battery in the chassis, using two 10mm wrenches.

TRACK DRIVE REMOVAL

Remove Chain Case Cover and Bottom Sprocket

Equipment Necessary: Two 10mm Wrenches, Rags, 1/2-Inch Socket, Short Two-Prong Puller and Needle Nose Pliers

Note: If snowmobile is equipped with an electric starter, remove the battery from chassis, using two 10mm wrenches.

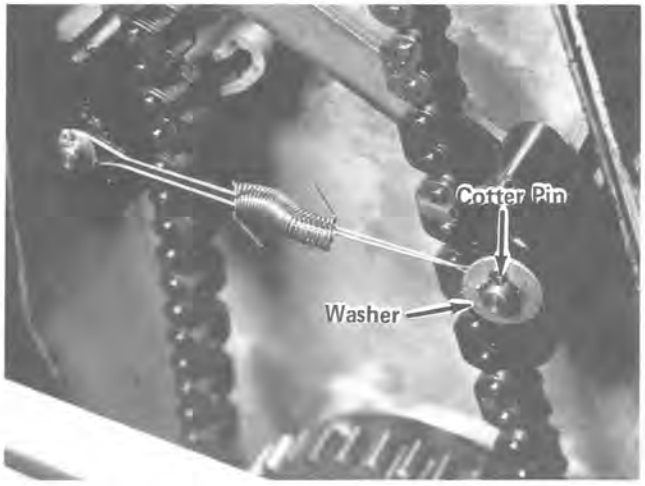
1. Place rags under chain case cover to absorb chain lube that will flow when chain case cover is removed.

2. Remove six cap screws and star washers securing chain case cover, using a 1/2-inch socket. Pull chain case cover away from case; chain lube will flow on rags.

Note: If chain lube spills into belly pan or onto other components, wipe clean, using a dry rag.

3. Remove cotter pin and washer from either chain tightener dowel pin, using a needle nose pliers, Fig. V-60. Then slide spring off dowel pin.

Fig. V-60



4. Remove cap screw and flat washer securing bottom sprocket on track drive shaft, using a 1/2-inch socket, Fig. V-61.

5. Thread cap screw approximately halfway into the track drive shaft. Cap screw is used for bottoming the puller bolt when sprocket is being pulled off track drive shaft.

6. Pull bottom sprocket and chain off track drive shaft, using a short two-prong puller. After sprocket is pulled, remove cap screw from track drive shaft.

Fig. V-61

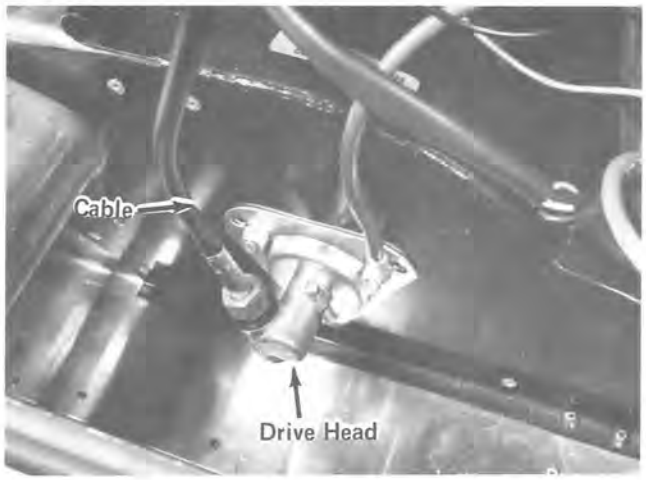
Remove Skid Frame and Track Drive Shaft

Equipment Necessary: Cardboard, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Pin Punch, Hammer, 1/2-Inch Socket, 9/16-Inch Socket and Snowmobile Hoist

1. Remove skid frame from tunnel (See: Section VI – Suspension, Skid Frame Removal, page VI-3).

2. If snowmobile is equipped with a speedometer, remove the drive head and disconnect cable coupling from track drive shaft, Fig. V-62, using a screwdriver and 3/4-inch open end wrench.

Fig. V-62



TRACK DRIVE REMOVAL

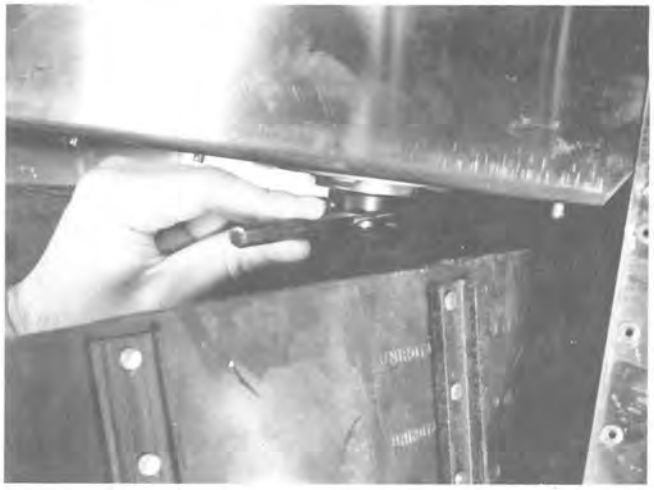
3. Tip snowmobile onto PTO side. Use a piece of cardboard to protect against scratching the hood.

4. Loosen set screw holding bearing lock collar on MAG end of track drive shaft, Fig. V-63, using a 1/8-inch hex key wrench.

Fig. V-63

5. Drive lock collar in opposite direction of normal shaft rotation, Fig. V-64, using a hammer and 5/16 x 1/8-inch pin punch.

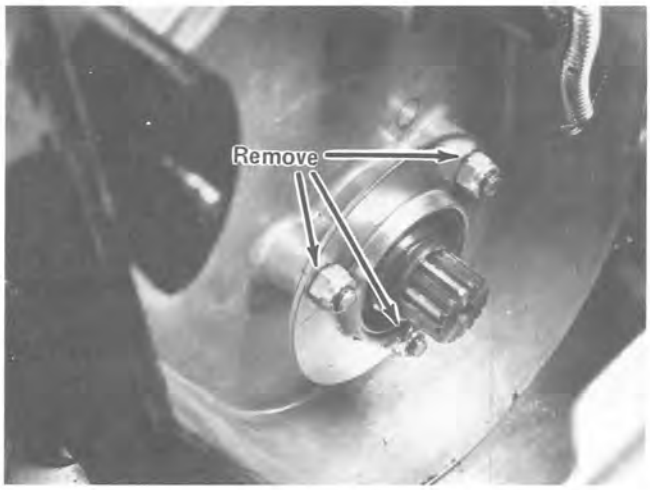
Fig. V-64



6. Tip snowmobile upright; then raise back end off shop floor approximately 3 feet, using a hoist or stand.

7. Remove the three lock nuts holding bearing flange against inside of chain case, Fig. V-65, using a 1/2-inch socket. Slide bearing flange, bearing and O-ring out of chain case.

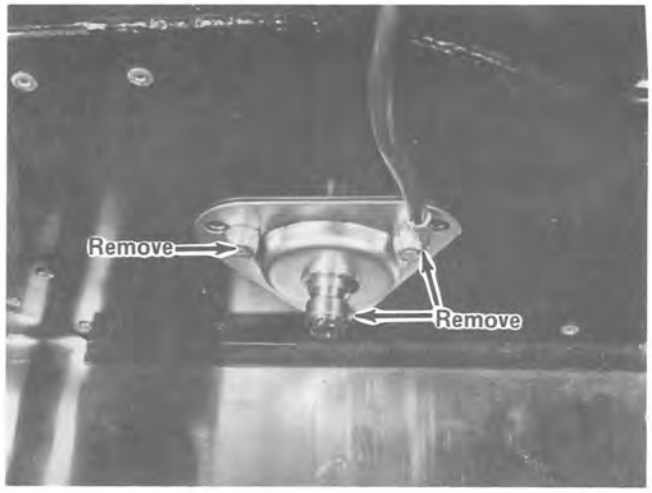
Fig. V-65



8. Remove the three lock nuts and carriage bolts holding bearing flanges against MAG side of front end, Fig. V-66, using a 1/2-inch socket.

Note: If snowmobile is equipped with an electric starter, the ground cable must be removed.

Fig. V-66

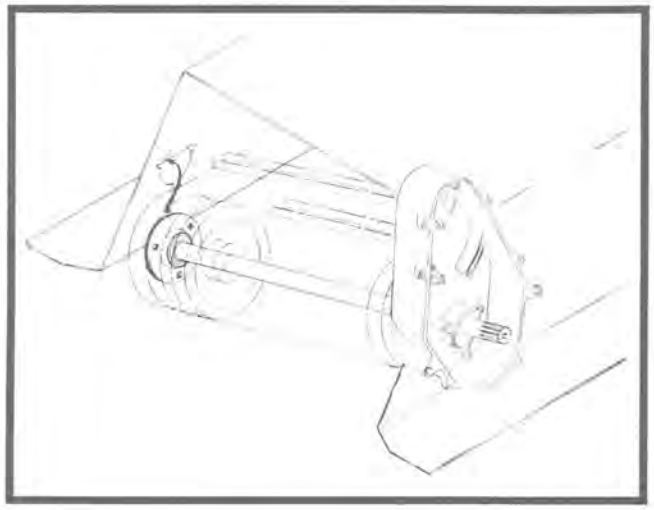


TRACK DRIVE REMOVAL

9. Slide track drive shaft toward PTO side until its opposite end is out of the mounting hole in front end assembly; then remove opposite end of shaft from hole in front end assembly, Fig. V-67.

10. Track drive shaft is now removed and completely disassembled.

Fig. V-67



TRACK DRIVE INSTALLATION

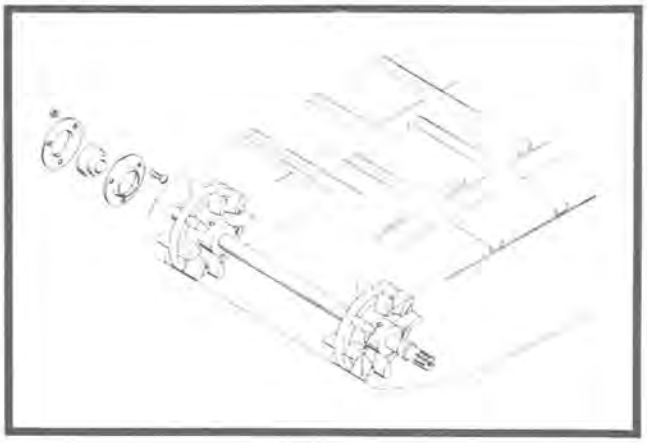
Install Track Drive Shaft and Skid Frame

Equipment Necessary: 1/2-Inch Socket, Torque Wrench, 5/16 x 1/8-Inch Pin Punch, Hammer, 1/8-Inch Hex Key Wrench, Steel Tape Measure, 3/4-Inch Open End Wrench and Screwdriver Having 1/4-Inch Blade

1. Position track drive shaft between track. Splined end of shaft must point toward chain case.

2. In sequence, slide lock collar (large ID toward end of shaft), bearing flange (radiused part of flange toward lock collar), bearing (race toward lock collar) and another bearing flange (radiused part of flange toward end of shaft) onto the non-splined end of track drive shaft, Fig. V-68.

Fig. V-68

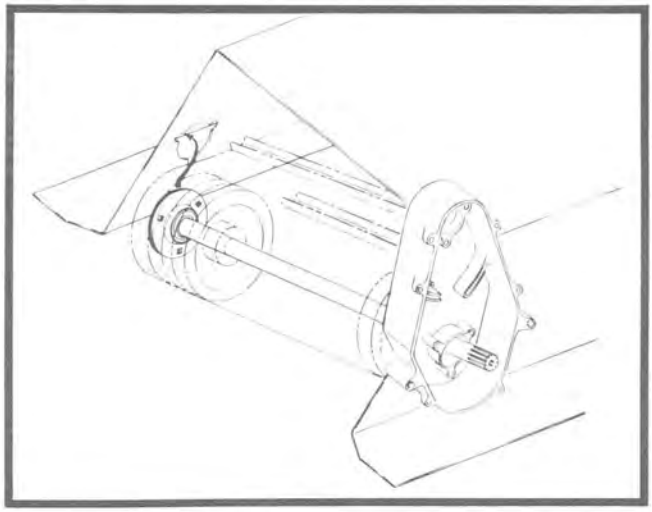


3. Lift track drive shaft and track into position between the tunnel; then push splined end of track drive shaft through hole in chain case and front end, Fig. V-69. Continue to push shaft through hole until opposite end of shaft can be pushed through hole in MAG side of tunnel.

TRACK DRIVE INSTALLATION

4. With track in position, swing drive shaft up and slide non-splined end of shaft through hole in MAG side of tunnel, Fig. V-69.

Fig. V-69



5. Align holes in bearing flanges with holes in MAG side of tunnel and front end assembly. Retain parts in place with three carriage bolts and lock nuts, Fig. V-70. DO NOT tighten lock nuts.

Note: Head of carriage bolt must be positioned on inside of tunnel. In addition, speedometer flange and battery ground must be installed if the snowmobile is so equipped.

Fig. V-70

6. Slide bearing onto splined end of track drive shaft and into chain case until bearing bottoms against shoulder on track drive shaft.

Note: Nonsealed side of bearing must face toward inside of chain case to ensure proper bearing lubrication.

7. Install O-ring on bearing.

8. Slide bearing flange onto studs. Secure bearing flange, O-ring and bearing in place with three lock nuts, Fig. V-71. Tighten lock nuts to 16-18 ft-lb, using a torque wrench and 1/2-inch socket.

Fig. V-71

9. Line up track drive shaft sprockets so sprocket edge is equidistant from inside edge of tunnel, using a steel tape measure.

10. Now tighten three lock nuts to 16-18 ft-lb, Fig. V-72, which will secure the track drive shaft to MAG side of tunnel, using a torque wrench and 1/2-inch socket.

Fig. V-72

TRACK DRIVE INSTALLATION

11. Tip snowmobile onto PTO side. Use a piece of cardboard to protect against scratching the hood.

12. When track drive shaft is centered between tunnel, slide MAG side lock collar against bearing. Drive lock collar in direction of normal shaft rotation, using a hammer and 5/16 x 1/8-inch pin punch, Fig. V-73.

Fig. V-73

13. Tighten lock collar set screw, using a 1/8-inch hex key, Fig. V-74.

14. Position the snowmobile upright.

15. Install skid frame (See: Section VI – Suspension, Skid Frame Installation, page VI-15).

Fig. V-74

Install Sprocket and Chain Case Cover

Equipment Necessary: 1/2-Inch Socket, Torque Wrench, 12-Inch Straight Edge, ARCTIC CHAIN LUBE (8 Oz) and Funnel

1. Install drive chain around top sprocket and large bottom sprocket; then push large sprocket onto track drive shaft splines. Next, secure sprocket on track drive shaft with cap screw and flat washer, Fig. V-75, using a 1/2-inch socket. Tighten cap screw to 16-18 ft-lb, using a torque wrench and 1/2-inch socket.

Note: When cap screw is being tightened, sprocket will draw evenly onto track drive shaft splines.

Fig. V-75

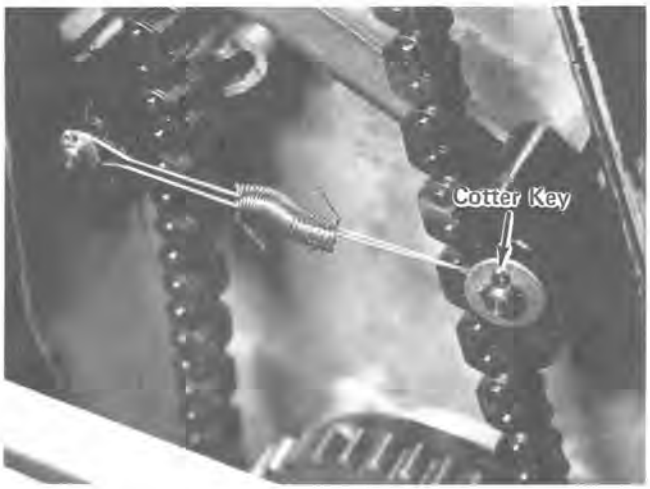
2. Check Sprocket Alignment – Lay a 12-inch straight edge on the face of the top and bottom sprockets. No more than 1/32-inch gap is to be evident between the straight edge and face of the sprocket.

Note: If top sprocket is to the outside of being parallel, remove bottom sprocket and position a shim washer on the inside of the sprocket. By contrast, if the top sprocket is to the inside of being parallel, remove the top sprocket and position a shim washer on the inside of the sprocket.

3. Install chain tightener spring on dowel pin in chain tightener pad. Next, slide flat washer onto dowel pin and retain parts in place with cotter key, Fig. V-76, using a needle nose pliers.

TRACK DRIVE INSTALLATION

Fig. V-76



4. Install gasket and chain case cover against chain case with six cap screws and star washers. Tighten cap screws to 10 ft-lb, using a torque wrench, 1/2-inch socket and 3-inch extension.

Note: If snowmobile is equipped with an electric starter, install the battery in the chassis, using two 10mm wrenches.

5. Remove filler plug at top of chain case, using a 3/4-inch socket. Next, pour 8 ounces of ARCTIC CHAIN LUBE into the chain case, using a funnel. Finally, install filler plug and tighten it to 10 ft-lb, using a torque wrench and 3/4-inch socket.

CAUTION

Make sure chain case gasket and cover are installed evenly, thereby assuring a good seal between chain case and chain case cover. If a leak develops after filling chain case with chain lube because of an improper seal, damage to the chain and sprocket will result because of insufficient lubrication.

TRACK SERVICING

General

The track consists of three belts, held together by three-quarter length cleats (commonly referred to as two-thirds cleats), which are riveted to the track belts. Both outer belts have molded internal drive lugs on the inside surface. These drive lugs engage with the track drive shaft sprockets to provide efficient, smooth, power transfer. The track not only drives the snowmobile but acts as a cushion to absorb minor impacts and, working in conjunction with the brake, exerts a drag on the snow surface to aid in slowing down or stopping the snowmobile.

Note: When the molded internal drive lugs become worn on one side because of hourly usage, the track can be reversed to get maximum track life.

Removing Track

Equipment Necessary: Cardboard, 1/8-Inch Hex Key Wrench, 5/16-Inch Pin Punch, Hammer, Hoist, 1/2-Inch Socket, Screwdriver Having 1/4-Inch Blade and 3/4-Inch Open End Wrench

1. Remove chain case cover and bottom sprocket (See: Remove Chain Case Cover and Bottom Sprocket, page V-40).

2. Remove skid frame and track drive shaft (See: Remove Skid Frame and Track Drive Shaft, page V-40).

TRACK INSTALLATION

Install Track

Equipment Necessary: 1/2-Inch Socket, Torque Wrench, 5/16 x 1/8-Inch Pin Punch, Hammer, 1/8-Inch Hex Key Wrench and 3/4-Inch Open End Wrench

1. Install track drive shaft and skid frame (See: Install Track Drive Shaft and Skid Frame, page V-42).

2. Install sprocket and chain case cover (See: Install Sprocket and Chain Case Cover, page V-44).

NOTES

NOTES

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TROUBLE SHOOTING

Problem	Condition	Remedy
Edge of track is frayed.	1. Track is misaligned. 2. Outer belts worn out because of hourly usage. 3. Track strikes rivets in tunnel, even though alignment is correct.	1. Set track tension and alignment. 2. Install new outer belt(s). 3. Remove affected rivets that are too long and install correct type rivet.
Track is grooved (worn) or burnt on inside surface of outer belt(s).	1. Track tension is too tight. 2. Rear idler wheels do not turn or otherwise damaged.	1. Set track tension and alignment. 2. Install new rear idler wheels and set track tension and alignment.
Track is grooved or gouged on center belt.	1. Center brace(s) of skid frame hanging down and contacting inside surface of center belt.	1. Repair skid frame center brace and install new center belt if damage is excessive.
Internal drive lugs worn on inside surface.	1. Track is misaligned.	1. Set track tension and alignment. If lugs are worn excessively, install new outer belt(s).
Track ratchets or hits on body tunnel (top).	1. Track tension is too loose. 2. Track drive sprockets not timed in relation to drive lugs. 3. Track drive sprockets turn on shaft. 4. Internal drive lugs worn because of hourly usage.	1. Set track tension and alignment. 2. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 3. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 4. Install new outer belt(s).
Accelerated Hi-Fax Wear	1. Slide rail(s) is bent. 2. Badly worn cleat on surface that contacts hi-fax. 3. Track is misaligned.	1. Straighten slide rail(s) or install new skid frame. 2. Install new hi-fax and/or cleats. 3. Set track tension and alignment.

SKID FRAME REMOVAL

General

The specially-designed slide rail and torsion spring suspension system allows the Arctic Cat Snowmobile to maneuver and negotiate in most snow conditions. The slide rail operating principle is to create maximum track pressure on the snow surface. Proper adjustment, lubrication and overhaul will ensure proper operation, thereby contributing to total snowmobile performance.

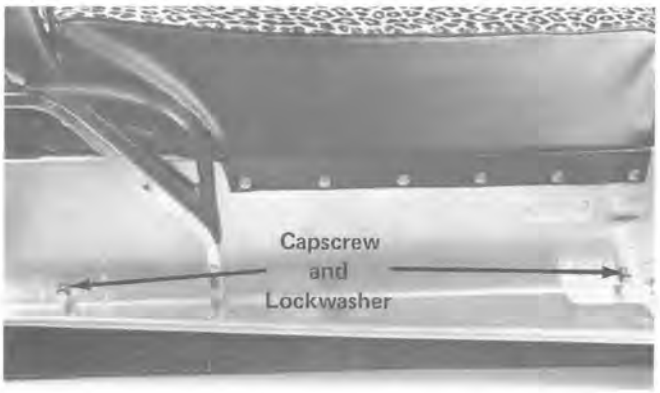
Skid Frame

Equipment Necessary: 9/16-Inch Socket, 3-Inch Extension and Quik Jack (Hoist)

1. Position the snowmobile in its normal upright position.

2. Remove 4 capscrews and lockwashers, Fig. VI-1, that secure front and rear skid frame mounting axles to the body tunnel, using a 9/16-inch socket and 3-inch extension.

Fig. VI-1



3. Raise rear of snowmobile off the floor approximately 2 feet, using a Quik Jack or similar type hoist.

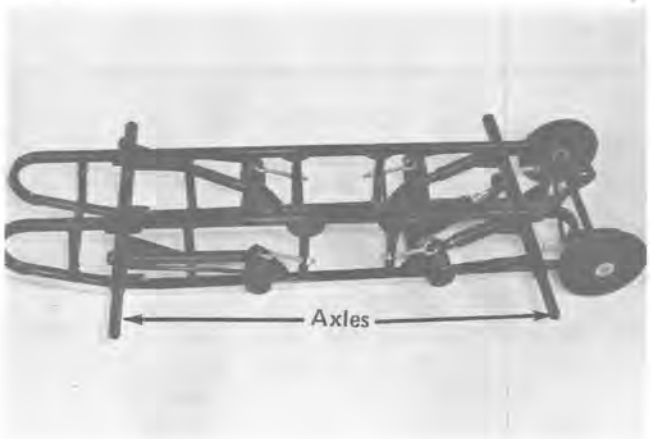
Note: As rear is being raised, track and skid frame is to remain on floor.

4. Grasp skid frame and pull from within track sections, Fig. VI-2.

Fig. VI-2

5. Slide the axles out of front and rear arms, Fig. VI-3.

Fig. VI-3



SKID FRAME DISASSEMBLY

Remove Hi-Fax Slides

Equipment Necessary: 1/2-Inch Chisel, Hammer and 5/16 x 1/8-Inch Punch

Note: Examine hi-fax slides for wear, cracks and deterioration. If conditions dictate, replace the hi-fax slides. A good indication of excessive hi-fax wear is when rivet heads are flush with top surface of hi-fax slide. If hi-fax slides will not be serviced, remove the front arm (see Remove Front Arm, page VI-4).

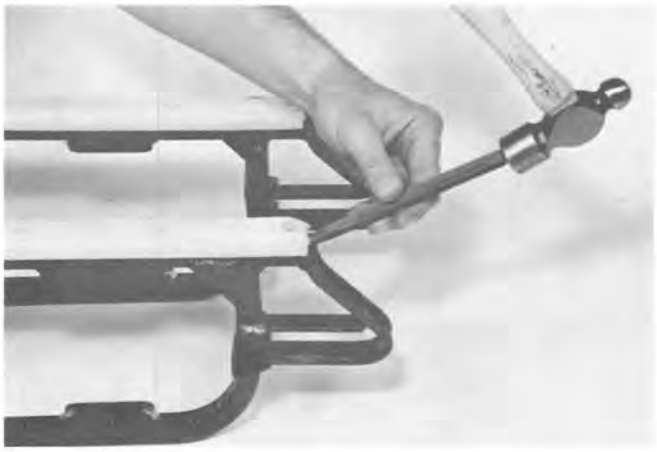
1. Set skid frame on a clean working surface; hi-fax slides to face upward.

2. Remove rivets that secure hi-fax slides to skid frame rail, using an air tool with 1/2-inch chisel. As an alternative, use hammer and a 1/2-inch chisel, Fig. VI-4.

Note: When removing rivets that secure hi-fax slides to skid frame, start at back of skid frame and work forward.

SKID FRAME DISASSEMBLY

Fig. VI-4



3. Remove all rivet ends from skid frame, using a 5/16 x 1/8-inch punch. DO NOT ELONGATE HOLES IN SKID FRAME.

Remove Front Arm

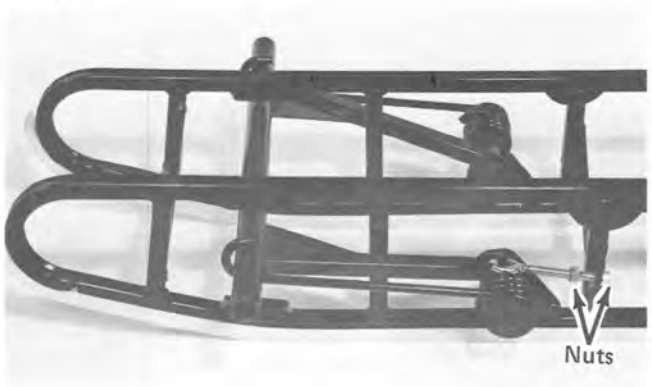
Equipment Necessary: 9/16-Inch Deep-Well Socket and 9/16-Inch Combination Wrench

1. Set the skid frame on a clean working surface; hi-fax side to contact working surface.

> **CAUTION**
>
> **Do not accidentally damage hi-fax slides when servicing skid frame. Accidental damage that is undetected will cause accelerated hi-fax wear and possible track deterioration.**

2. Loosen and remove nuts, Fig. VI-5, that secure eye bolt to skid frame mounting flange, using a 9/16-inch deep-well socket and open end wrench. Repeat this step on opposite side eye bolt.

Fig. VI-5



3. Remove eye bolts from front springs, Fig. VI-6.

Fig. VI-6

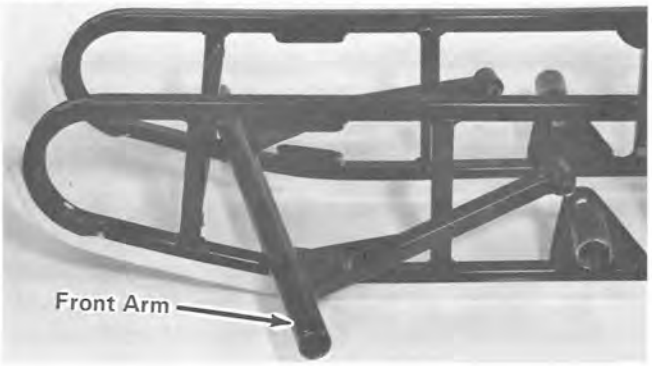
4. Remove capscrew, large flat washer and locknut that secures front arm and springs to skid frame pivot mount, using a 9/16-inch socket and wrench, Fig. VI-7. Repeat this step on opposite side.

Fig. VI-7

5. Slide springs off front arm and skid frame pivot mounts.

6. Rotate front arm to the side and remove from within inside of skid frame, Fig. VI-8.

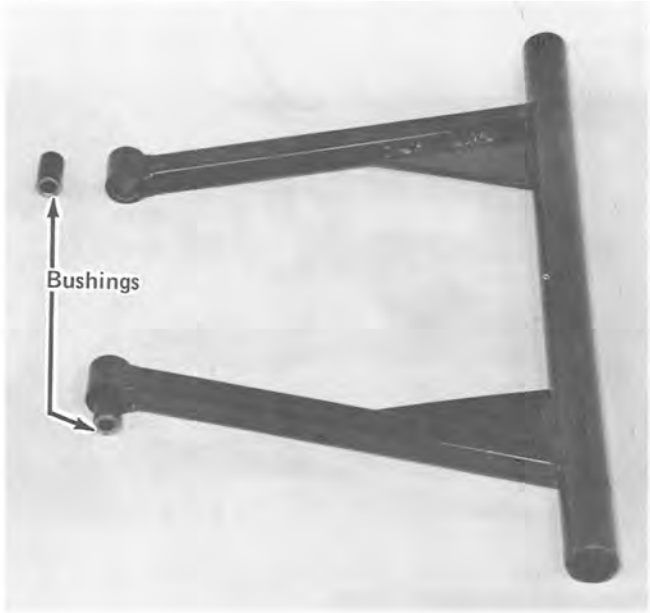
Fig. VI-8



SKID FRAME DISASSEMBLY

Note: Account for 2 bushings located in front arm pivot points, Fig. VI-9.

Fig. VI-9



Remove Rear Arm

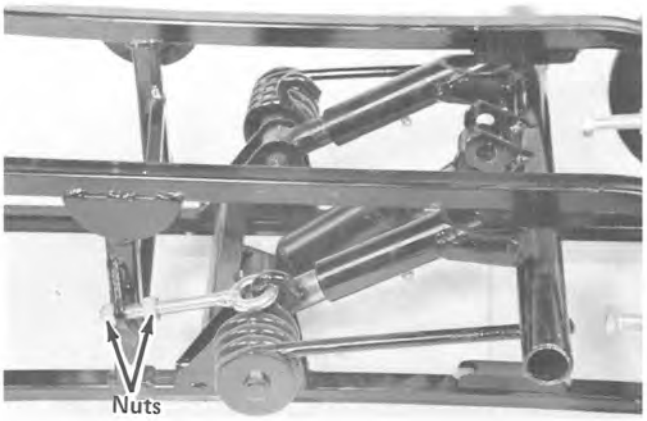
Equipment Necessary: 5/8-Inch Short Socket, 5/8-Inch Wrench, 9/16-Inch Deep-Well Socket and 9/16-Inch Combination Wrench

1. Remove locknut and capscrew, Fig. VI-9, that secures shock absorber to rear arm, using a 5/8-inch short socket and wrench.

Fig. VI-9

2. Loosen and remove nuts, Fig. VI-10, that secure eye bolt to eye bolt mounting flange, using a 9/16-inch deep-well socket and wrench. Repeat this step on opposite side eye bolt.

Fig. VI-10



3. Remove eye bolts from rear springs, Fig. VI-11.

Fig. VI-11

4. Remove capscrew, large flat washer and locknut that secures rear arm and springs to rear arm mount, using a 9/16-inch socket and wrench, Fig. VI-12.

Fig. VI-12

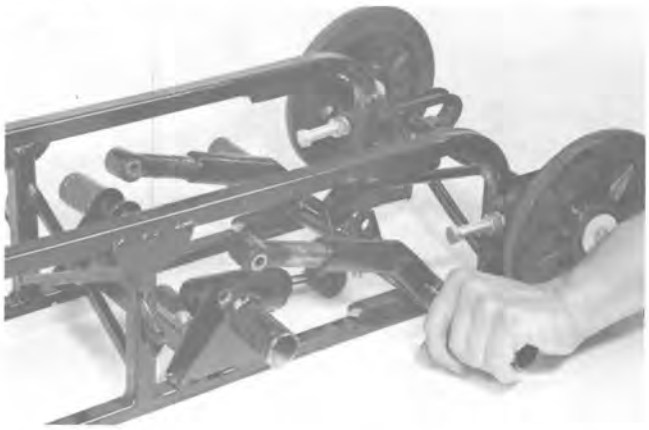
SKID FRAME DISASSEMBLY

5. Pull rear arm backward until spring ends slide out of mounting holes, Fig. VI-13; then slide springs off spring pivot mounts.

Fig. VI-13

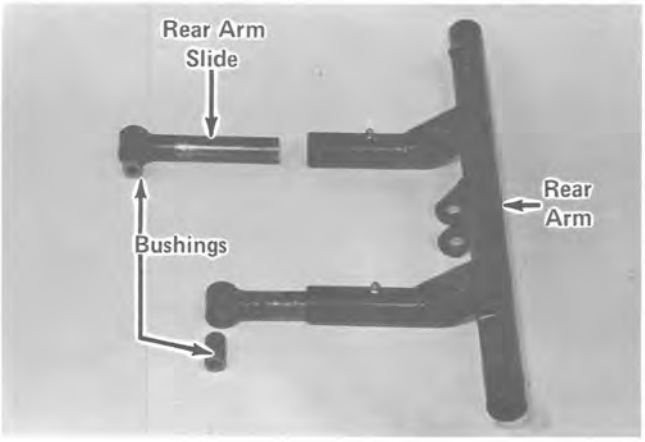
6. Slide rear arm from within inside of skid frame, Fig. VI-14.

Fig. VI-14



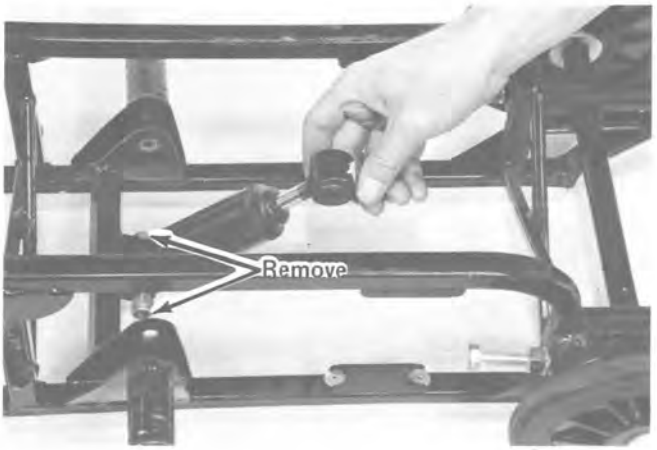
Note: Account for 2 bushings located in rear arm pivot points and separate rear arm slides from rear arm, Fig. VI-15.

Fig. VI-15



7. Remove locknut and capscrew, Fig. VI-16, that secures shock absorber to skid frame cross member mount, using a 5/8-inch short socket and wrench.

Fig. VI-16



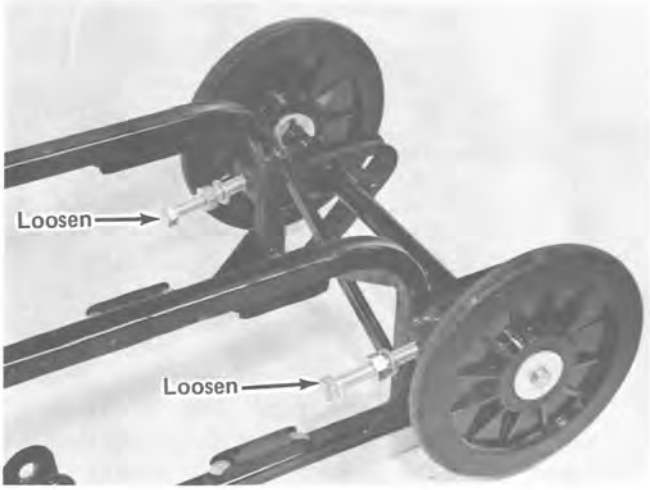
Remove Rear Idler Wheels

Equipment Necessary: 5/8-Inch Socket, 11/16-Inch Open End Wrench, 1/2-Inch Socket, Hammer, 5/16 x 1/8-Inch Punch, 3/16-Inch Allen Wrench and 1/2-Inch Nonferous Dowel

Note: If rear idler wheel is damaged and must be replaced, install 2 new rear idler wheels. A worn and a new rear idler wheel may cause track drive problems.

1. Loosen idler wheel adjusting bolts, Fig. VI-17, using a 5/8-inch socket on the bolt and 11/16-inch open end wrench on the nut.

Fig. VI-17



SKID FRAME DISASSEMBLY

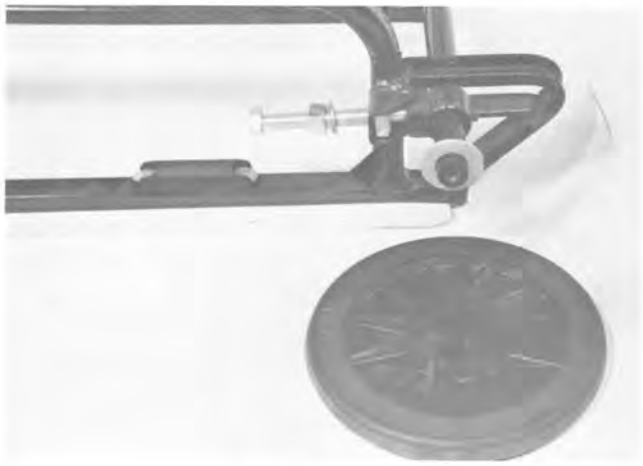
Note: If skid frame is damaged and replacement is necessary, remove the 2 idler wheel adjusting bolts, hex nuts, lockwashers and square nuts.

2. Remove capscrew and flat washer, Fig. VI-18, that secures idler wheel to idler wheel axle, using a 1/2-inch socket. Repeat this step on opposite side.

Fig. VI-18

3. Slide rear idler wheel and large flat washer off axle, Fig. VI-19.

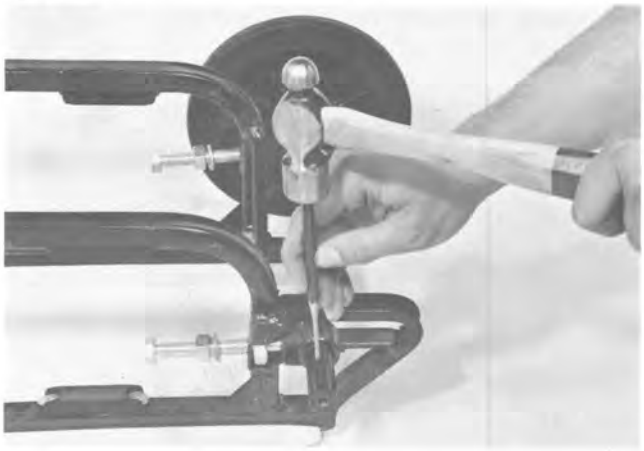
Fig. VI-19



Note: It may be necessary to tap lightly near center hub before rear idler wheel will slide off axle.

4. Remove drive pin from axle, using a hammer and 5/16 x 1/8-inch punch, Fig. VI-20.

Fig. VI-20

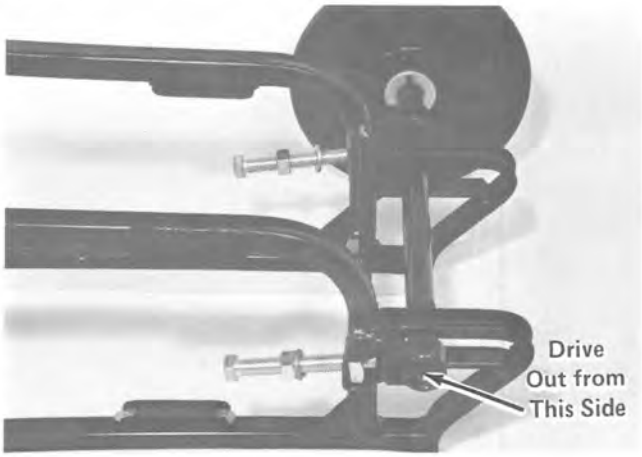


5. Remove set screw from spacer, using a 3/16-inch Allen wrench, Fig. VI-21. Remove set screw from opposite side spacer.

Fig. VI-21

6. Drive out rear axle, using a 1/2-inch nonferous dowel and hammer, Fig. VI-22.

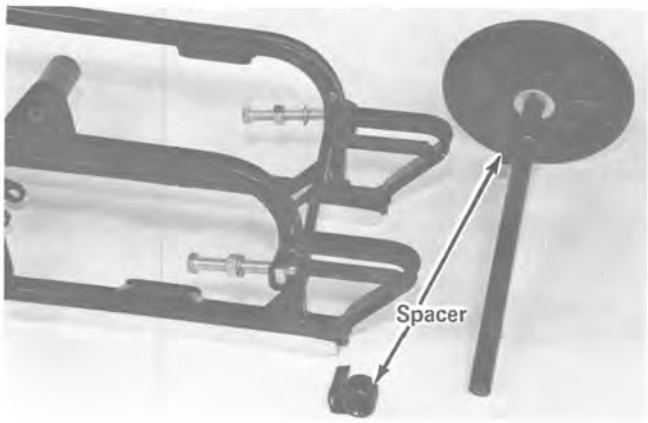
Fig. VI-22



SKID FRAME DISASSEMBLY

7. When axle is removed from within the skid frame, account for the 2 spacers, Fig. VI-23.

Fig. VI-23



8. Remove rear idler wheel and related components from opposite end of axle.

CLEANING

Cleaning

Equipment Necessary: Soap, Water, Clean Rag, Degreaser Solution, Compressed Air and Kerosene

1. Wash entire skid frame with soap and water; dry thoroughly with clean rag.

2. Touch up all rusted and chipped paint surfaces; sand affected skid frame area lightly before painting.

3. Remove bushings from front arm; clean arm and bushings with degreaser. Dry components thoroughly with compressed air.

4. Remove bushings from rear arm and separate rear arm from its sliding ends. Clean arm, sliding ends and bushings with degreaser. Also check rear arm spring bushings for wear and deterioration. Dry components thoroughly with compressed air.

5. Wash the rear idler wheels with soap and water; dry thoroughly with clean rag.

6. Wash remaining components in kerosene; dry thoroughly with compressed air.

INSPECTING COMPONENTS

Inspecting

Equipment Necessary: No Special Tools Required

1. Inspect all threaded components for stripped threads. Replace component(s) if damaged.

2. Inspect all bushings and corresponding pivot areas for damage, cracks and excessive wear. Replace component(s) if conditions dictate.

3. Inspect rear idler wheels for cracks, center hub wear and rubber deterioration. Replace both rear idler wheels if damage or wear is evident. Bearing must rotate freely.

Note: Rear idler wheels are to be replaced as a set, not as individual components.

4. Make sure that axles are not bent. Replace axle(s) if conditions dictate.

5. Inspect all springs for abnormal bends and cracks. Replace spring(s) if conditions dictate.

6. Inspect the eye bolts for separation of eye and abnormal bend. Replace component(s) if conditions dictate.

7. Inspect front and rear arm pivot points on skid frame. Repair any damage that exists.

8. Inspect eye bolt mounting flanges at center of skid frame. Repair any damage that exists.

9. Inspect the entire skid frame. No unusual bend is to be evident in the skid frame. Replace skid frame if conditions dictate.

SKID FRAME ASSEMBLY

Install Hi-Fax Slides

Equipment Necessary: Pop Rivets, Rivet Tool and Propane Torch

Note: Make sure skid frame and related components are clean (see Cleaning, page VI-9) and have been inspected for wear, defects and damage (see Inspecting, page VI-9).

1. Before attempting to install hi-fax slides on skid frame rail, make sure hi-fax is at room temperature (+70°F.).

2. Install a new hi-fax slide in first hole at curved end of skid frame rail, using a pop rivet and rivet tool.

3. With front of hi-fax slide secured to curved end of skid frame, carefully heat the hi-fax, using a propane torch. Immediately bend hi-fax slide into position on skid frame rail and continue to secure hi-fax slide, using rivets and rivet tool.

Note: Hi-fax slide is to be heated so as to conform with curved end of skid frame rail. If hi-fax slide is not heated, breakage may occur when riveting to curved section of skid frame rail.

4. Continue to secure hi-fax slide to remainder of skid frame rail.

5. Repeat steps 2 - 4 on opposite side skid frame rail.

Install Rear Idler Wheels

Equipment Necessary: Tape Measure, 3/16-Inch Allen Wrench, Hammer, 1/2-Inch Socket and Torque Wrench

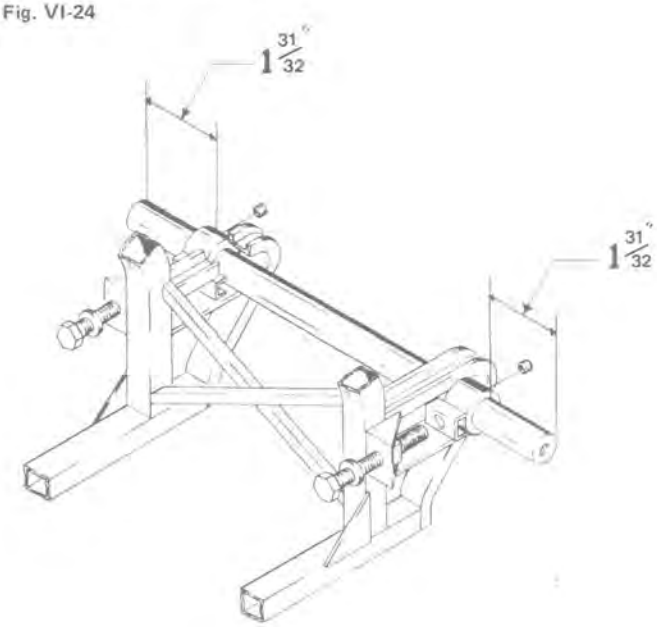
Note: Make sure skid frame and related components are clean (see Cleaning, page VI-9) and have been inspected for wear, defects and damage (see Inspecting, page VI-9).

1. If removed during disassembly, install idler wheel adjusting bolts, hex nuts, lockwashers and square nuts to the skid frame mounting flange.

Note: Adjusting bolts are to extend through square nuts only 1/4-inch.

2. Slide idler wheel axle between skid frame axle slide, Fig. VI-24.

Fig. VI-24



3. Slide spacers onto idler wheel axle, making sure that spacer extension is positioned to the inside (between skid frame axle slide).

4. Seat the spacers against the axle slides. Measure distance from outside edge of spacers to end of idler wheel axle, using a tape measure, Fig. VI-24. Correct measurement is when spacers are equidistant from axle ends.

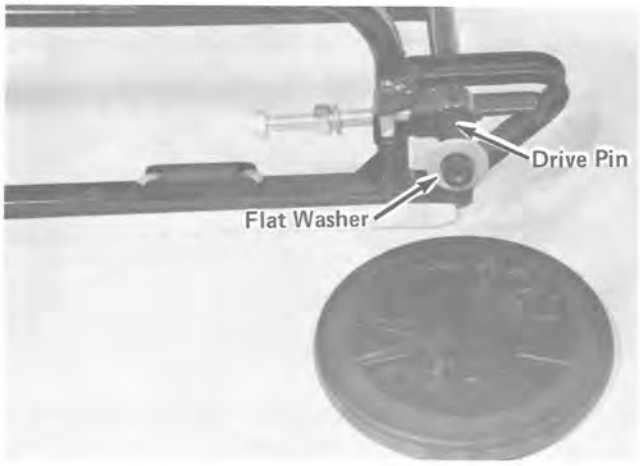
5. When correct measurement is obtained, tighten both spacer set screws, using a 3/16-inch Allen wrench, Fig. VI-25. Tighten set screws securely.

Fig. VI-25

SKID FRAME ASSEMBLY

6. Install drive pin, Fig. VI-26, in each end of idler wheel axle, using a hammer. Drive pin is to extend equally on both sides of axle.

Fig. VI-26



7. Place a large flat washer on the idler wheel axle, Fig. VI-26.

8. Hold rear idler wheel in position and secure to axle with capscrew and flat washer, Fig. VI-27, using a 1/2-inch socket. Tighten capscrew to 14 - 19 ft. lbs. torque, using a torque wrench.

Fig. VI-27

Note: Largest diameter recess at center of idler wheel is to fit against the large flat washer that contacts the drive pin, Fig. VI-26.

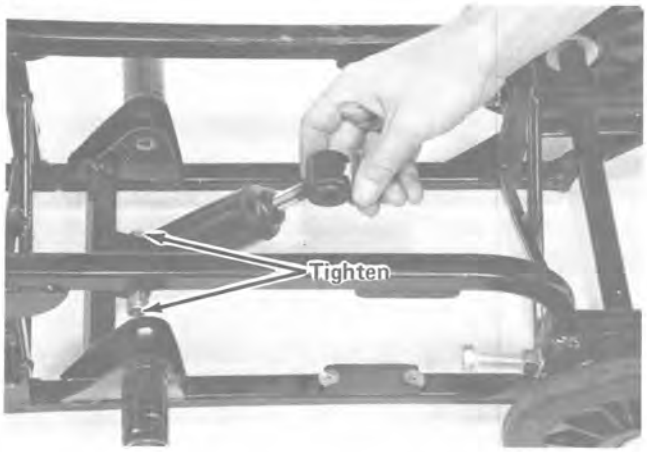
9. Repeat steps 7 and 8 on opposite side of idler wheel axle.

Install Rear Arm

Equipment Necessary: 5/8-Inch Short Socket, 5/8-Inch Wrench, 9/16-Inch Deep-Well Socket, 9/16-Inch Open End Wrench, Torque Wrench, Grease Gun and Low-Temperature Grease (Texaco 2346EP or Equivalent)

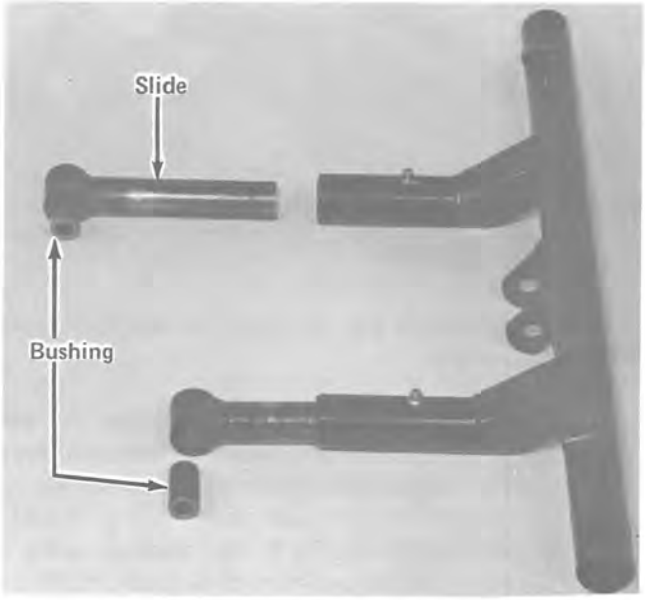
1. Install stationary end of shock absorber between the skid frame cross member mount and secure in place with capscrew and locknut, Fig. VI-28, using a 5/8-inch short socket and wrench. Tighten locknut to 45 - 55 ft. lbs. torque, using a 5/8-inch short socket and torque wrench.

Fig. VI-28



2. Install rear arm slides into rear arm and insert bushing into both rear arm slide pivot points, Fig. VI-29.

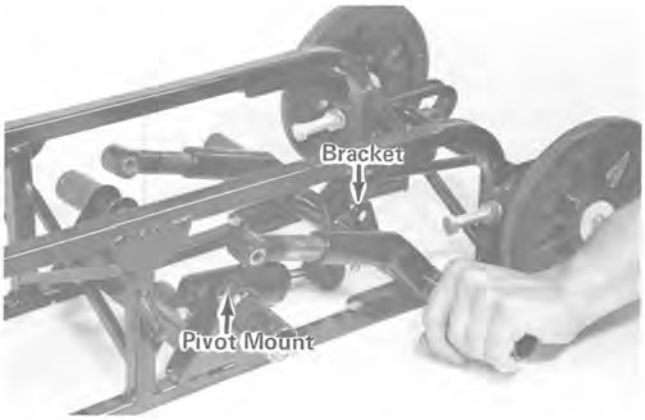
Fig. VI-29



SKID FRAME ASSEMBLY

3. Position rear arm assembly on inside of skid frame and allow rear arm pivot points to slide between rear arm pivot mounts on the skid frame, Fig. VI-30.

Fig. VI-30



Note: Ensure rear arm shock mounting bracket faces upward, Fig. VI-30. Upward position of shock mounting bracket is necessary for correct shock absorber installation.

4. Slide rear arm springs onto the spring pivot mounts, Fig. VI-31. Pull rear arm backward until spring ends can be slid into the rear arm mounting holes, Fig. VI-31. Push rear arm forward.

Fig. VI-31

Note: Hooked end of spring for eye bolt is to face inward.

5. Slide large flat washer onto capscrew. Secure the spring and rear arm to the skid frame with capscrew, large flat washer and locknut, using a 9/16-inch socket and wrench, Fig. VI-32. Tighten locknut to 35 ft. lbs. torque, using a 9/16-inch socket and torque wrench. Perform this step on opposite side of skid frame.

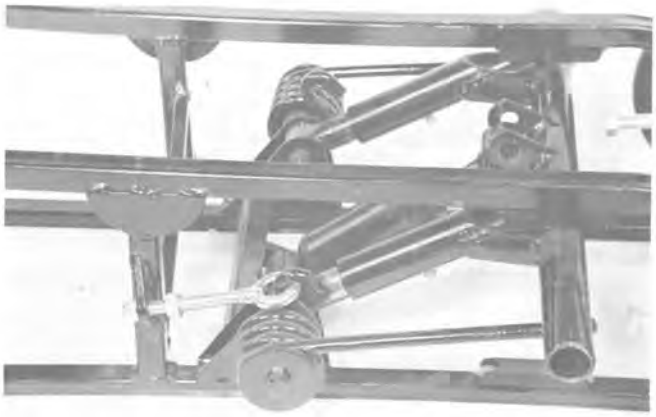
Fig. VI-32

6. Thread a nut halfway onto eye bolt and slide eye bolt onto hooked end of rear spring, Fig. VI-33. Perform this step on remaining eye bolt.

Fig. VI-33

7. Slide both eye bolt ends through the respective eye bolt mounting flanges on the skid frame. Hold components in place and install nuts on both eye bolts, Fig. VI-34.

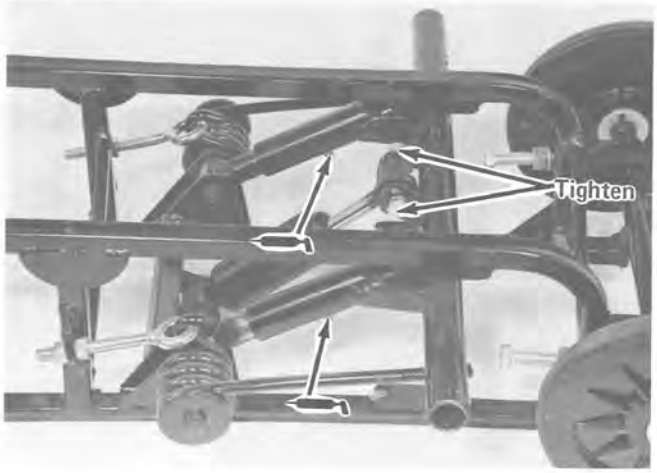
Fig. VI-34



SKID FRAME ASSEMBLY

8. Secure shock absorber to rear arm with a capscrew and locknut, Fig. VI-35, using a 5/8-inch short socket and wrench. Tighten locknut to 45 - 55 ft. lbs. torque, using a 5/8-inch short socket and torque wrench.

Fig. VI-35



9. Tighten eye bolt adjusting nut so approximately 5/8-inch of eye bolt extends through the nut, Fig. VI-35, using a 9/16-inch deep-well socket. Lock adjustment in place by "bottoming" jam nut against eye bolt mounting flange, Fig. VI-35, using a 9/16-inch open end wrench. Perform this step on opposite side eye bolt.

Note: Make sure both eye bolts are adjusted equally.

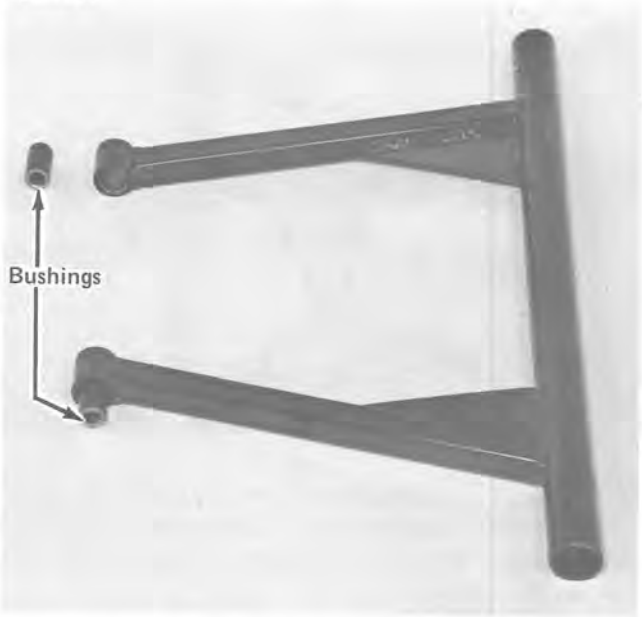
10. Lubricate the rear arms with low-temperature grease (Texaco 2346EP or equivalent), Fig. VI-35, using a hand grease gun. Two or three pumps on the grease gun handle will provide enough grease for proper lubrication.

Install Front Arm

Equipment Necessary: 9/16-Inch Deep-Well Socket, 9/16-Inch Open End Wrench and Torque Wrench

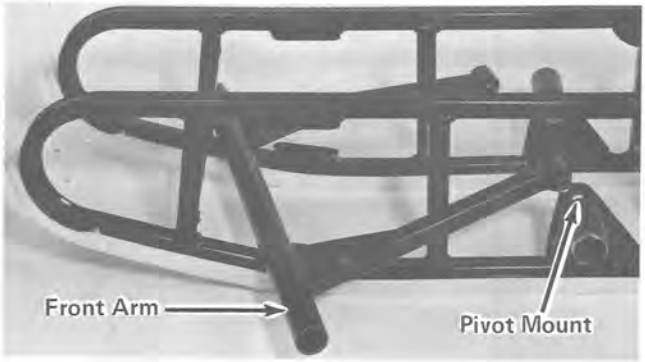
1. Insert bushing into front arm pivot points, Fig. VI-36.

Fig. VI-36



2. Position front arm on inside of skid frame, Fig. VI-37, and allow front arm pivot points to slide between front arm pivot mounts on the skid frame.

Fig. VI-37



3. Slide front arm springs onto front arms and spring pivot mount on the skid frame.

Note: Hooked end of spring for eye bolt is to face inward.

4. Slide large flat washer onto capscrew. Secure spring and front arm to the skid frame with capscrew, large flat washer and locknut, using a 9/16-inch socket and wrench, Fig. VI-38. Tighten locknut to 45 - 55 ft. lbs. torque, using a 9/16-inch socket and torque wrench. Perform this step on opposite side of skid frame.

SKID FRAME ASSEMBLY

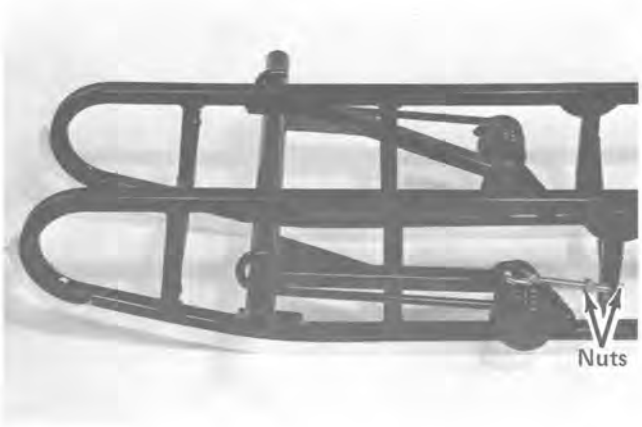
Fig. VI-38

5. Thread a nut halfway onto eye bolt and slide eye bolt onto hooked end of front spring, Fig. VI-39. Perform this step on remaining eye bolt.

Fig. VI-39

6. Slide both eye bolt ends through the respective eye bolt mounting flanges on the skid frame. Hold components in place and install nuts on both eye bolts, Fig. VI-40.

Fig. VI-40



7. Tighten eye bolt adjusting nut so that approximately 1/2-inch of eye bolt extends through the nut, using a 9/16-inch deep-well socket. Lock adjustment in place by "bottoming" jam nut against eye bolt mounting flange, using a 9/16-inch open end wrench. Perform this step on opposite side eye bolt.

Note: Make sure both eye bolts are adjusted equally.

SKID FRAME INSTALLATION

Install Skid Frame

Equipment Necessary: Low-Temperature Grease (Texaco 2346EP or Equivalent), Cardboard, 9/16-Inch Socket, 3-Inch Extension and Torque Wrench

1. Spread a light film of low-temperature grease (Texaco 2346EP or equivalent) on the front and rear skid frame mounting axles.

2. Tip snowmobile onto its side and use a piece of cardboard to protect against scratching.

3. Pull track away from body tunnel and install skid frame within the confines of the track. Slide axles through front and rear arms of the skid frame.

4. Move front arm of skid frame into position with front mounting hole in the body tunnel. Slide lockwasher onto capscrew and secure front arm to tunnel, using a 9/16-inch socket. DO NOT TIGHTEN CAPSCREW – THREAD IN ONLY HALFWAY, Fig. VI-41.

Fig. VI-41

SKID FRAME INSTALLATION

Note: To aid in centering front arm of skid frame with holes in tunnel, position skid frame and track at a 45° angle to bottom of tunnel.

5. Push skid frame and track up into the tunnel. Tip snowmobile onto its opposite side and use a piece of cardboard to protect against scratching.

6. Secure front arm to tunnel following directions given in step 4.

7. Move rear arm of skid frame into position with rear mounting holes in body tunnel. Slide lockwasher onto capscrew and secure rear arm to tunnel, using a 9/16-inch socket and 3-inch extension. DO NOT TIGHTEN CAPSCREW – THREAD IN ONLY HALFWAY, Fig. VI-42.

Fig. VI-42

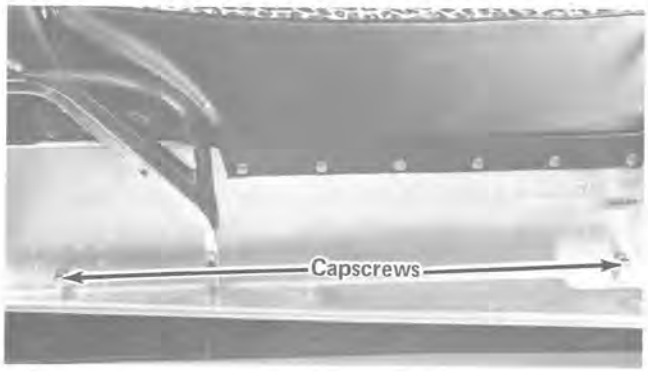
Note: Rear arm of skid frame may not line up with mounting holes in tunnel. To obtain proper alignment of rear arm and mounting holes, drive rear arm in proper direction until alignment is obtained; a rubber hammer is to be used.

8. Tip snowmobile on opposite side and use a piece of cardboard to protect against scratching.

9. Slide lockwasher onto capscrew and secure rear arm to tunnel, using a 9/16-inch socket and 3-inch extension. Tip snowmobile upright.

10. Tighten front and rear arm mounting capscrews, Fig. VI-43, to 35 ft. lbs. torque, using a torque wrench.

Fig. VI-43



ADJUSTMENTS

Track Tension

Equipment Necessary: Quik Jack, 11/16-Inch Open End Wrench, 5/8-Inch Socket and Tape Measure

WARNING

Shut engine off and make sure ignition switch is in the OFF position. Personal injury may result if this warning is not complied with.

1. Make sure both rear idler wheels are positioned between the internal drive lugs.

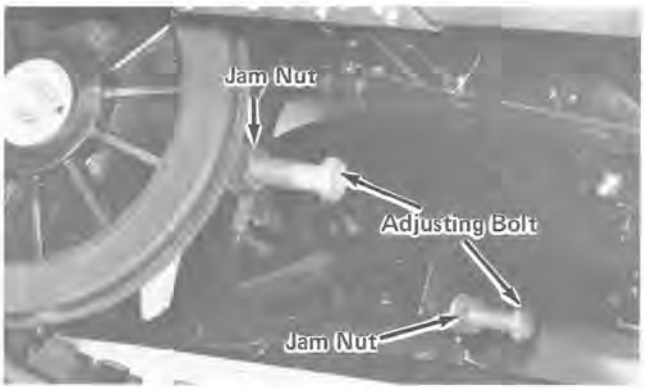
2. Using a Quik Jack, raise rear of snowmobile until track is completely off the shop floor.

3. Press down on track at midspan and measure distance between bottom of hi-fax slides and inside surface of track, using a tape measure. Desired distance is to be 1-1/4 - 1-1/2 inches.

4. If measurement is not 1-1/4 - 1-1/2 inches, loosen idler wheel adjusting bolt jam nut, Fig. VI-44, using an 11/16-inch open end wrench. Back jam nut off until it is approximately 1/2-inch away from the adjusting bolt head. Perform this step on opposite side idler wheel adjusting bolt jam nut.

5. If measurement obtained in step 3 is more than 1-1/2 inches, tighten adjusting bolts, Fig. VI-44. If measurement obtained in step 3 is less than 1-1/4 inches, loosen adjusting bolts, Fig. VI-44. When specified measurement (1-1/4 - 1-1/2 inches) is obtained, lock adjustment in place by bottoming jam nuts against skid frame, using an 11/16-inch open end wrench.

Fig. VI-44



Note: An excellent check at this time would be to slide your hand along the inside of the tunnel and vigorously push underside of track up and down. Track must not hit top of tunnel or slap on the skid frame.

6. After correct track tension is obtained, check track alignment (see Track Alignment, page VI-16).

Note: Track tension and track alignment are both interrelated; always perform both adjustments, even if only one particular adjustment seems necessary. Always establish correct track tension before checking and/or adjusting track alignment.

Track Alignment

Equipment Necessary: Quik Jack, 5/8-Inch Socket and 11/16-Inch Open End Wrench

Proper track alignment is obtained when rear idler wheels are equidistant from inside edges of internal drive lugs.

WARNING

Shut engine off and make sure ignition switch is in the OFF position. DO NOT allow anyone to stand in front or to the rear of the snowmobile when checking track alignment. Personal injury or bystander injury may result if this warning is not complied with.

1. Make sure both rear idler wheels are positioned between the internal drive lugs.

2. Using a Quik Jack, raise rear of snowmobile until track is completely off the shop floor and free to rotate. Skis are to be placed against a wall or another stationary object.

3. Start engine, accelerate slightly to turn the track several revolutions and SHUT ENGINE OFF (ignition switch in OFF position). Note to which side the track has run.

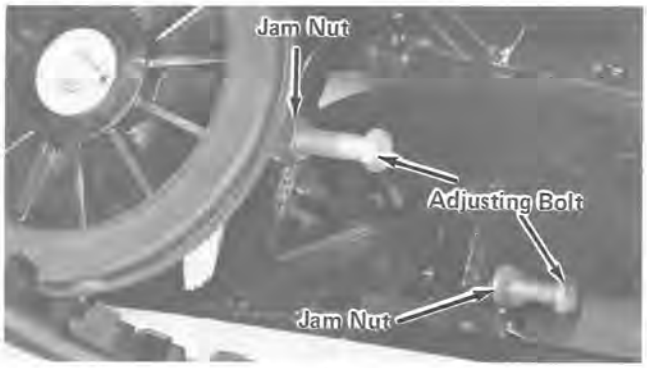
Note: Allow track to coast to a stop when checking track alignment. DO NOT apply brake as this may produce an inaccurate alignment condition.

4. If track ran to the left or right and is rubbing against inside surface of internal drive lugs, loosen idler wheel adjusting bolt jam nut, Fig. VI-45, using an 11/16-inch open end wrench. Back jam nut off until it is approximately 1/2-inch away from the adjusting bolt head. Perform this step on opposite side idler wheel adjusting bolt jam nut.

5. Rotate adjusting bolts, Fig. VI-45, clockwise or counterclockwise until proper alignment is established, using a 5/8-inch socket. Bottom jam nuts against skid frame, using an 11/16-inch open end wrench.

Note: After the jam nuts are bottomed against the skid frame, an equal length of bolt is to extend back from the jam nut to the bolt head. This relationship in itself will ensure proper track alignment.

Fig. VI-45



6. When adjustment is completed, lower rear of snowmobile, start engine and test run the track under actual operating conditions.

7. After test run is completed, recheck track alignment and adjust if necessary.

Note: Make sure correct track tension is maintained when alignment is adjusted.

Suspension Adjustment

Equipment Necessary: 9/16-Inch Open End Wrench

The suspension is to be set up for either the operator only or the operator and passenger combined. Total operator and passenger weight have a direct influence on the rear adjustment. The front adjustment is to be made for snow conditions.

Hard Packed Snow — Front spring, Fig. VI-46, adjustment is to be increased (tighten adjusting nuts) to allow track to remain on top of the snow.

Trail Riding — If constant trail riding is anticipated, front spring, Fig. VI-46, adjustment is to be increased (tighten adjusting nuts), which will allow skis to be turned easier than when adjustment is loose. Tightening front adjusting nuts increases spring tension and as a result, decreases downward pressure on the skis; decreased pressure on skis accounts for easier turning effort characteristics. Loosening front adjusting nuts decreases spring tension and as a result, increases downward pressure on the skis; increased pressure on skis makes turning more difficult for the operator but the compensation is more positive turning characteristics.

To obtain the best ride, the suspension (front and rear springs) must be tensioned properly. The tension can be changed by adjusting the eye bolt pull against the springs.

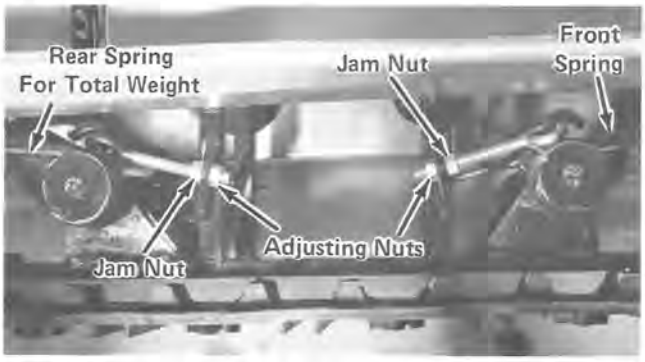
1. Back jam nut, Fig. VI-46, away from front or rear eye bolt mounting flange, using a 9/16-inch open end wrench. Perform this step on opposite side.

2. Tighten or loosen adjusting nut, Fig. VI-46, to obtain desired suspension adjustment, using a 9/16-inch open end wrench. Perform this step on opposite side.

3. When desired tension is obtained, lock adjustment in place by bottoming jam nut, Fig. VI-46, against eye bolt mounting flange, using a 9/16-inch open end wrench. Perform this step on opposite side.

Note: Maintain equal suspension adjustment on both sides of the skid frame.

Fig. VI-46



NOTES

NOTES

NOTES

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STEERING SERVICING

Remove Throttle Control Handle or Cap

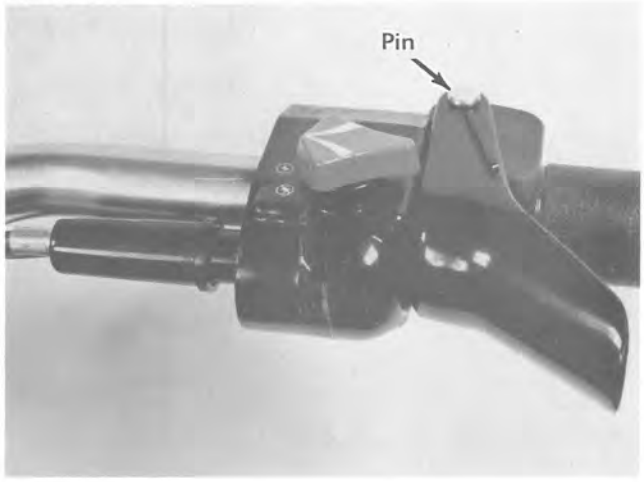
Equipment Necessary: Hammer, Side Cutters, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade and 1/4 x 3/32-Inch Punch

1. Loosen the screw holding the throttle wire in the carburetor throttle swivel, using a screwdriver having a 1/4-inch blade.

2. Remove the protective pad from the handlebar.

3. Remove the retaining ring from the pin, Fig. VII-1, holding the throttle lever to the throttle handle, using a screwdriver having a 1/4-inch blade.

Fig. VII-1



4. Remove the pin holding the throttle lever on the throttle handle. Then disconnect end of throttle wire from "seat" in throttle lever, Fig. VII-2.

Fig. VII-2

5. Cut the nylon strap holding control cables, using a side cutters.

6. Slide the cover off the throttle safety/stop switch casing, Fig. VII-3; then disconnect throttle wire end piece from the switch block, Fig. VII-4.

Fig. VII-3

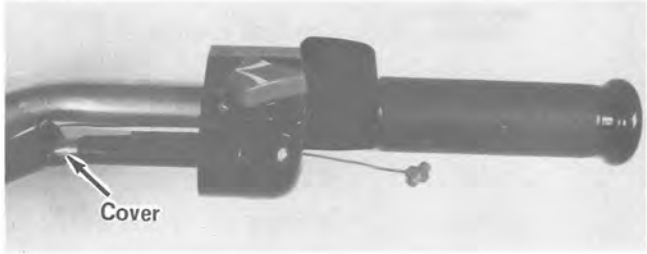
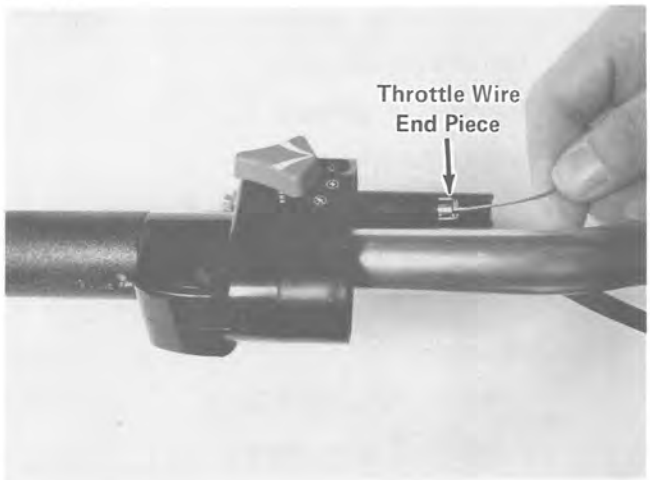
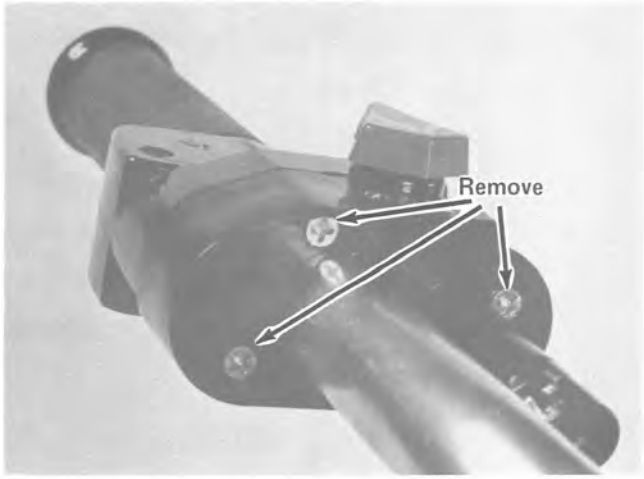


Fig. VII-4



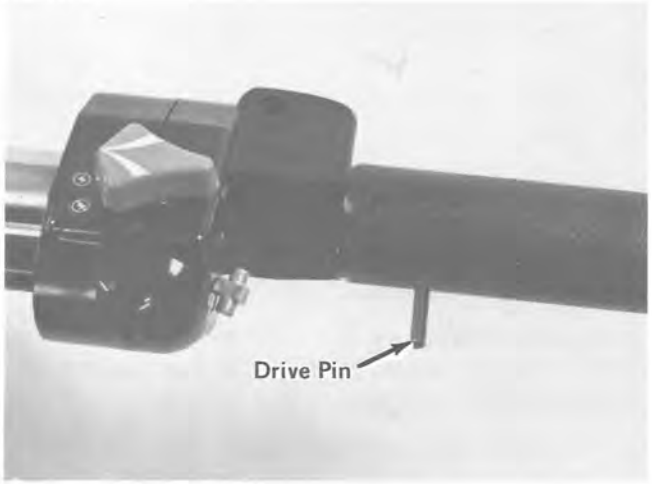
7. Remove the three screws, Fig. VII-5, holding the throttle cap and handle together, using a phillips screwdriver having a no. 2 blade.

Fig. VII-5



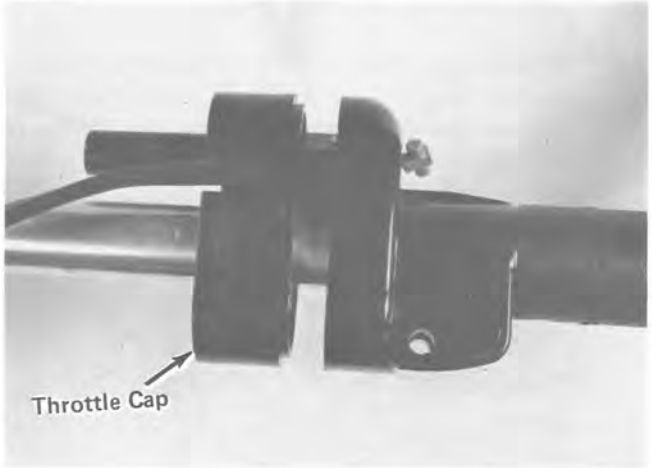
8. Remove the drive pin holding the throttle handle on the handlebars, Fig. VII-6, using a hammer and a 1/4 x 3/32-inch punch.

Fig. VII-6



9. Separate the throttle handle from the throttle cap, Fig. VII-7.

Fig. VII-7



Install Throttle Control Handle or Cap

Equipment Necessary: Hammer, Needle-Nose Pliers, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade and 1/4 x 3/32-Inch Punch

1. Slide the throttle control cap onto the handlebars, making sure the recess in the cap is toward the center of the handlebars.

2. Slide the throttle control handle on the handlebars, making sure the throttle lever pin hole is toward the front of the snowmobile.

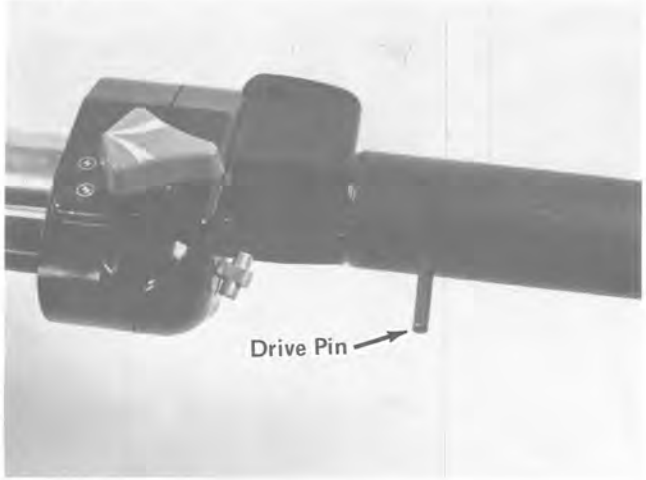
3. Secure the throttle handle in place with the drive pin, using a hammer and a 1/4 x 3/32-inch punch.

Note: Use steps 4-6 and 8-11 when replacing throttle handle only. When replacing throttle cap, use steps 4-11.

4. Install closed end of throttle safety/stop switch in the mounting hole and slotted track in the throttle handle. Hold switches in position.

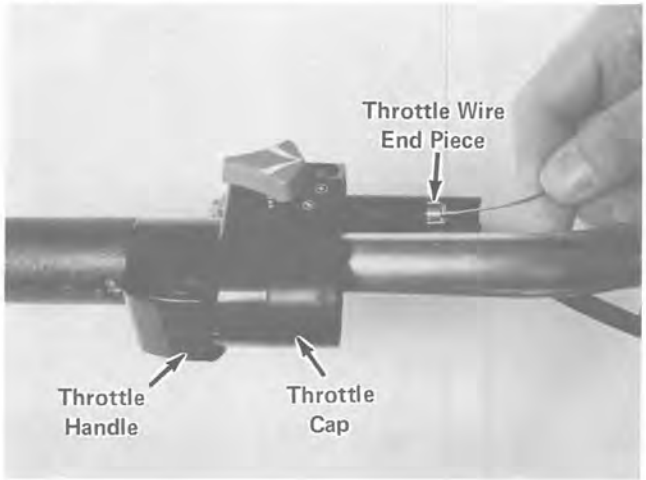
5. Slide the throttle cap over the open end of the switch casing and up against the throttle handle, Fig. VII-8. Hold components in place.

Fig. VII-8



6. Secure throttle cap and handle together with three screws, Fig. VII-9, using a phillips screwdriver having a no. 2 blade.

Fig. VII-9

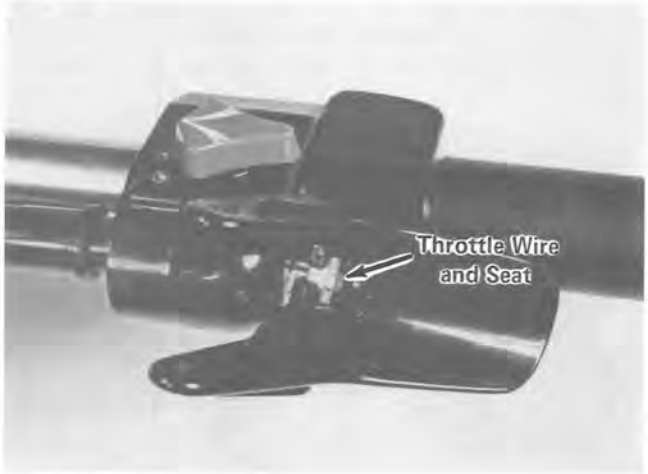


7. Install the throttle wire end piece, Fig. VII-9, in the switch block. Also, slide metal throttle cable end piece into slot at the end of switch casing; then slide cover over switch casing.

Note: Cover must be pushed over switch casing until approximately 3/8 inch of the metal throttle cable retainer extends out of the throttle safety/stop switch cover.

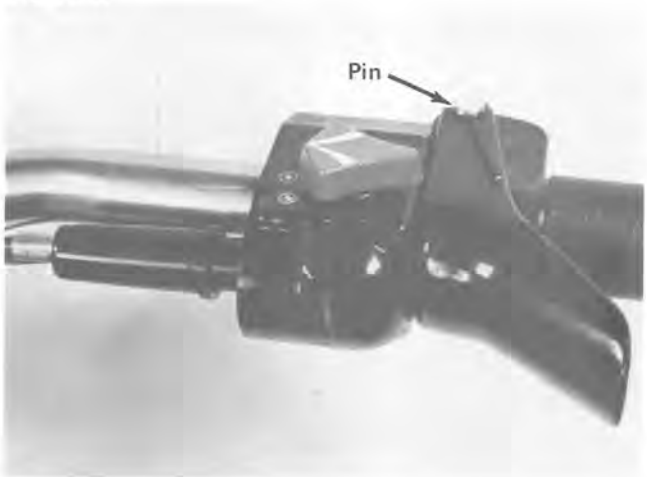
8. Install throttle wire extension end piece into the throttle lever seat, Fig. VII-10.

Fig. VII-10



9. Install the throttle lever and "seated" end piece on the throttle handle with pin and retaining ring, Fig. VII-11, using a screwdriver having a 1/4-inch blade to push the ring onto the end of the pin.

Fig. VII-11



10. Slide carburetor end of throttle wire through the hole in carburetor control arm swivel. Pull end of throttle wire until all slack is removed, using a needle-nose pliers; then pull an additional 1/16 inch of wire to preload the throttle safety/stop switch spring. Finally, tighten the retaining screw, using a screwdriver having a 1/4-inch blade.

11. Install nylon strap around cables and handlebars.

12. Install protective pad on handlebars.

Remove Throttle Safety/Stop Switch

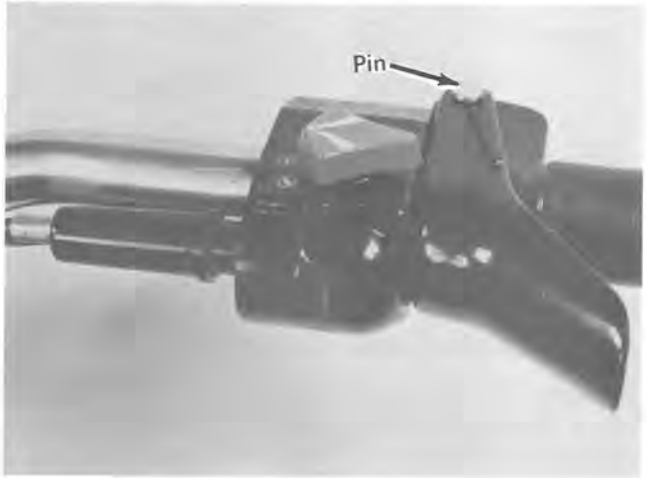
Equipment Necessary: Side Cutters, Phillips Screwdriver Having a No. 2 Blade and a Screwdriver Having a 1/4-Inch Blade

1. Remove the protective pad from the handlebars. Also, cut the nylon strap holding cables on handlebars, using a side cutters.

2. Loosen the screw holding the throttle wire in the carburetor throttle swivel, using a screwdriver having a 1/4-inch blade.

3. Remove the retaining ring from the bottom of the pin, Fig. VII-12, holding the throttle lever on the throttle handle, using a screwdriver having a 1/4-inch blade.

Fig. VII-12



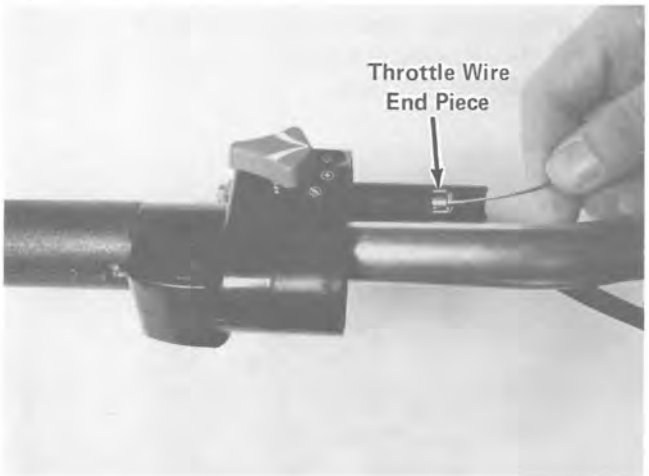
4. Pull out pin holding the throttle lever on the throttle handle; then disconnect end of throttle wire from the "seat" in throttle lever, Fig. VII-13.

Fig. VII-13

5. Pull the cover off the throttle safety/stop switch casing and slide it down the throttle cable, Fig. VII-14; then disconnect throttle wire end piece from the switch block, Fig. VII-15.

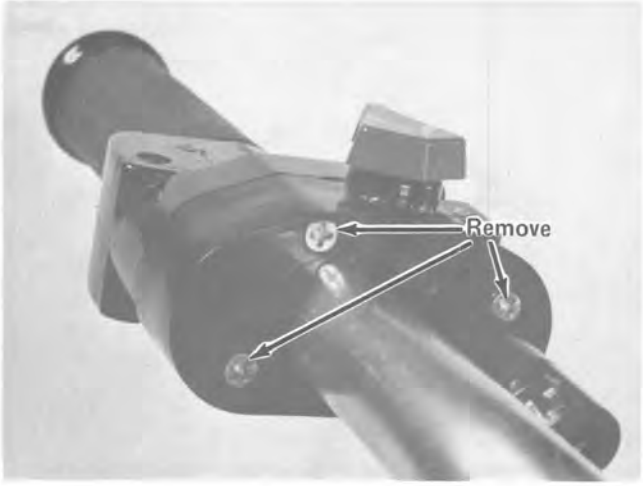
Fig. VII-14

Fig. VII-15



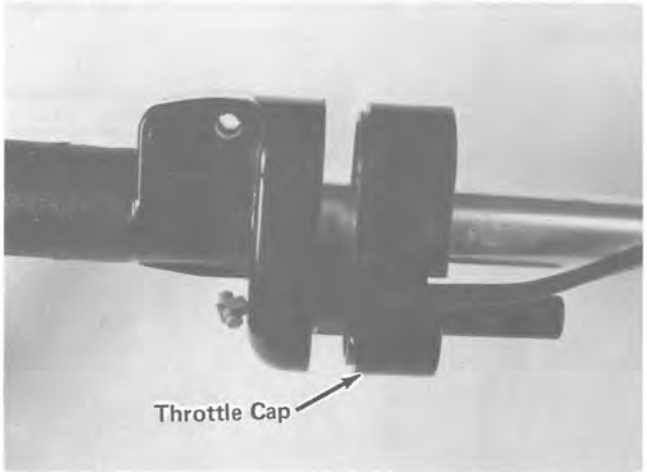
6. Remove the three screws, Fig. VII-16, holding the throttle safety/stop switch between the throttle cap and handle, using a phillips screwdriver having a no. 2 blade.

Fig. VII-16



7. Slide throttle cap toward center of handlebars until the throttle safety/stop switch casing is free of the cap, Fig. VII-17.

Fig. VII-17

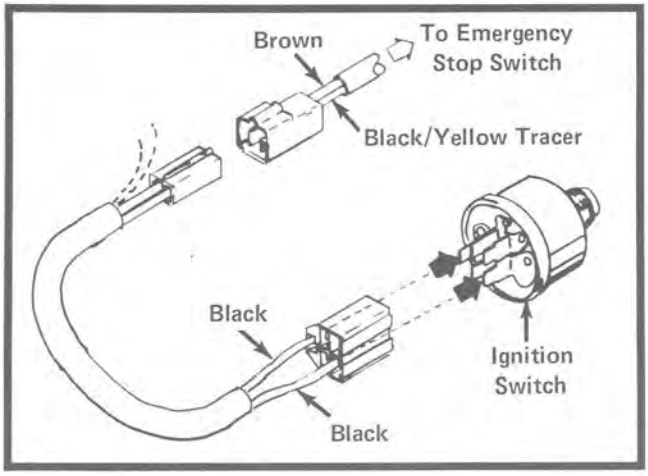


8. Pull throttle safety/stop switch out of the handle.

9. Disconnect the square connector at end of throttle safety/stop switch from connector holding the two black wires running to the "G" and "M" terminals on the ignition switch, Fig. VII-18.

10. Remove the brown wire and the black wire having a yellow tracer from the square connector at end of throttle safety/stop switch harness, using a screwdriver having a 1/4-inch blade.

Fig. VII-18



Note: Connector must be removed from the harness because harness can then be pulled through the upper steering post clamp and bracket. If connector is allowed to remain on the harness, the connector will not slide between the clamp and bracket.

11. Pull the throttle safety/stop switch harness through the upper steering post clamp and bracket, Fig. VII-19.

Fig. VII-19

Install Throttle Safety/Stop Switch

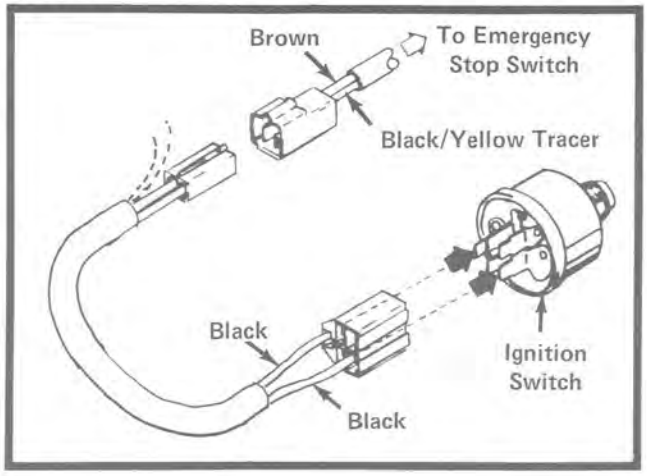
Equipment Necessary: Needle-Nose Pliers, Phillips Screwdriver Having a No. 2 Blade and a Screwdriver Having a 1/4-Inch Blade

1. Remove the connector from the end of the throttle safety/stop switch harness, using a screwdriver having a 1/4-inch blade.

2. Slide end of throttle safety/stop switch harness through the instrument panel and then the upper steering post clamp and bracket, Fig. VII-19.

3. Install the throttle safety/stop switch wires in the square connector. Next, push the safety/stop switch connector over the connector holding the two black wires running to the "G" and "M" terminals on the ignition switch, Fig. VII-20.

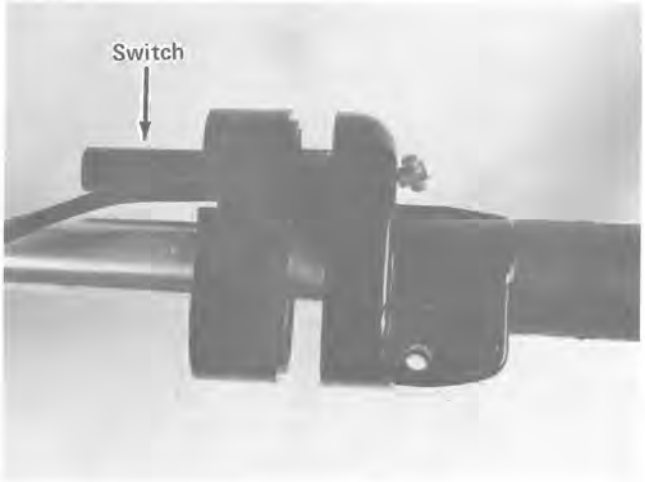
Fig. VII-20



4. Slide the safety/stop switch cover onto the throttle cable, making sure widest end of cover is toward end of throttle cable.

5. Install closed end of throttle safety/stop switch in the mounting hole and slotted track in the throttle handle, Fig. VII-21. Hold switches in position.

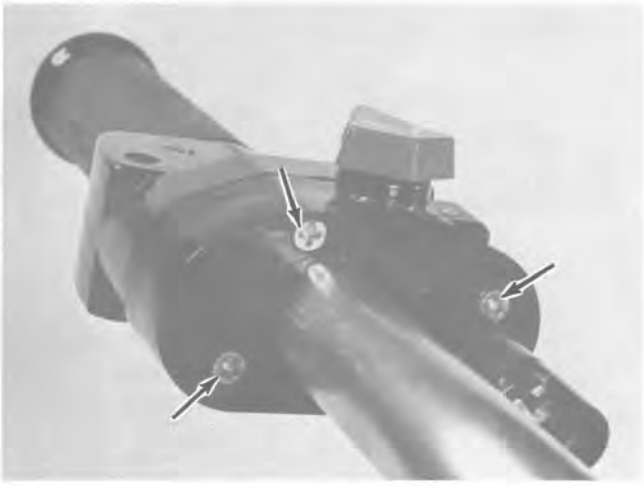
Fig. VII-21



6. Slide the throttle cap over the open end of the switch casing and up against the throttle handle. Hold all components in place.

7. Secure throttle safety/stop switch between the throttle cap and handle with three phillips screws, Fig. VII-22, using a phillips screwdriver having a no. 2 blade.

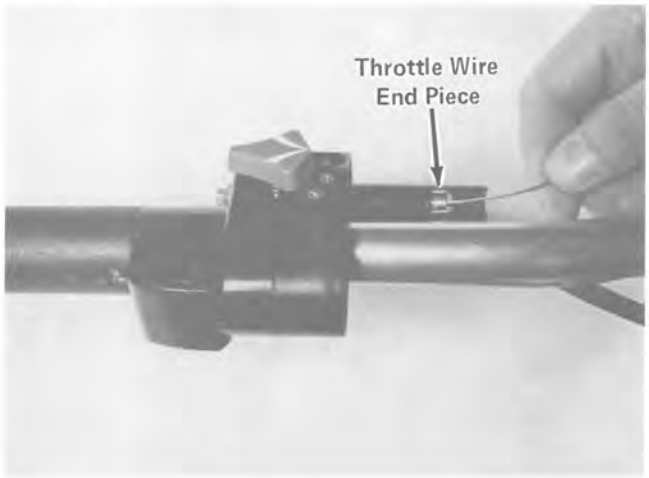
Fig. VII-22



8. Install the throttle wire end piece in the switch block, Fig. VII-23. Also, slide metal throttle cable retainer into slots at end of switch casing; then slide cover over switch casing.

Note: Cover must be pushed over switch casing until approximately 3/8 inch of the metal throttle cable retainer extends out of the throttle safety/stop switch.

Fig. VII-23

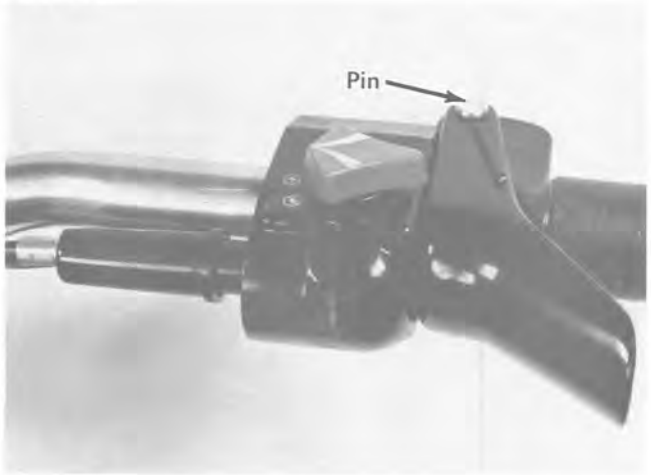


9. Install throttle wire extension end piece into the throttle lever seat, Fig. VII-24.

Fig. VII-24

10. Install the throttle lever and "seated" end piece on the throttle handle with pin and retaining ring, Fig. VII-25, using a screwdriver having a 1/4-inch blade to push the ring onto the pin.

Fig. VII-25



11. Slide carburetor end of throttle wire through hole in carburetor control arm swivel. Pull end of throttle wire until all slack is removed, using a needle-nose pliers; then pull an additional 1/16 inch of throttle wire to preload the throttle safety/stop switch and hold wire in this position. Finally, tighten the retaining screw, using a screwdriver having a 1/4-inch blade.

Note: The desired adjustment is when the handle-mounted throttle lever lightly contacts

the throttle handle and, at the same time, the carburetor throttle valve is open completely.

12. Install nylon strap around cables and handlebars.

13. Install protective pad on handlebars.

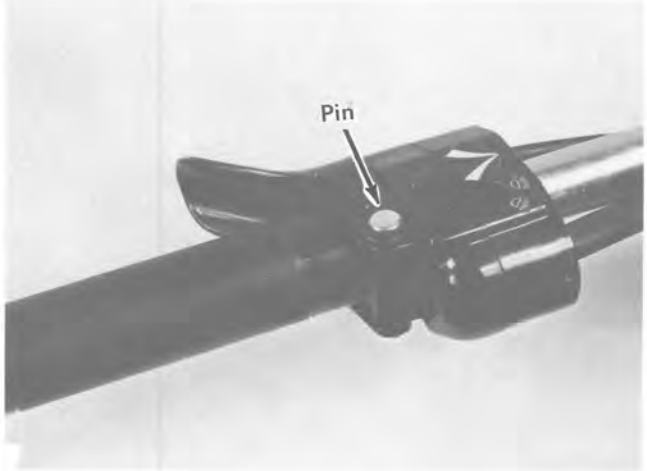
Remove Brake Control Handle or Cap

Equipment Necessary: Hammer, Pliers, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade and 1/4 x 3/32-Inch Punch

1. Remove the protective pad from the handlebars. Also, cut the nylon strap, using a side cutters.

2. Remove the retaining ring from the pin holding the brake lever to the brake handle, Fig. VII-26, using a screwdriver having a 1/4-inch blade.

Fig. VII-26



3. Pull out pin holding brake lever on the brake handle.

4. Rotate the brake lever to expose the end of the brake cable. Next, grasp the brake wire end piece, Fig. VII-27, using a pliers; then pull brake cable end piece out of seat in brake lever.

Fig. VII-27

5. Remove the three screws holding the brake cap and handle together, Fig. VII-28, using a phillips screwdriver having a no. 2 blade. Slide the cap, dimmer switch and brake switch away from the handle, Fig. VII-29.

Fig. VII-28

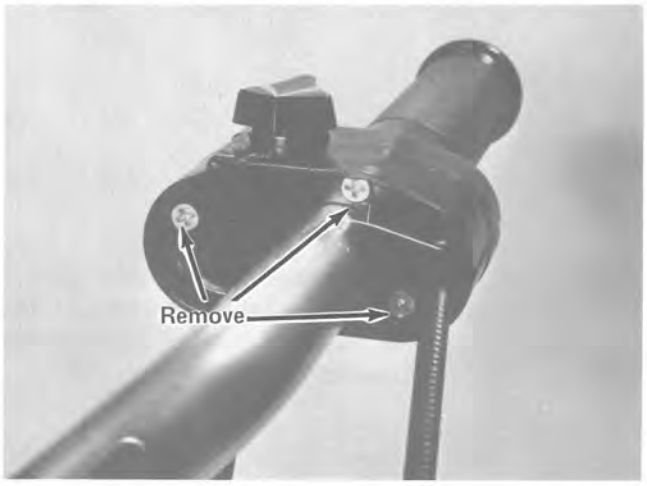
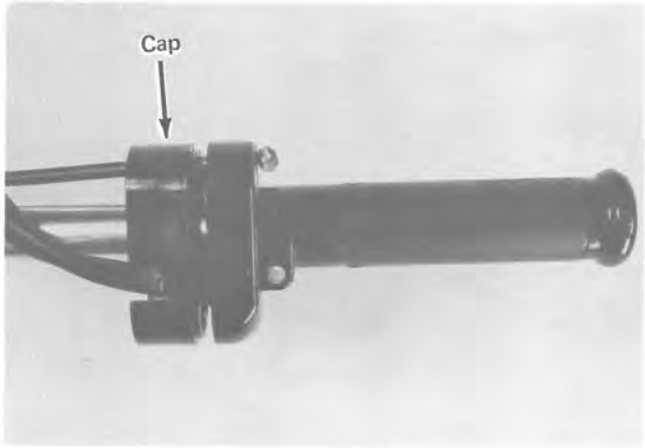


Fig. VII-29

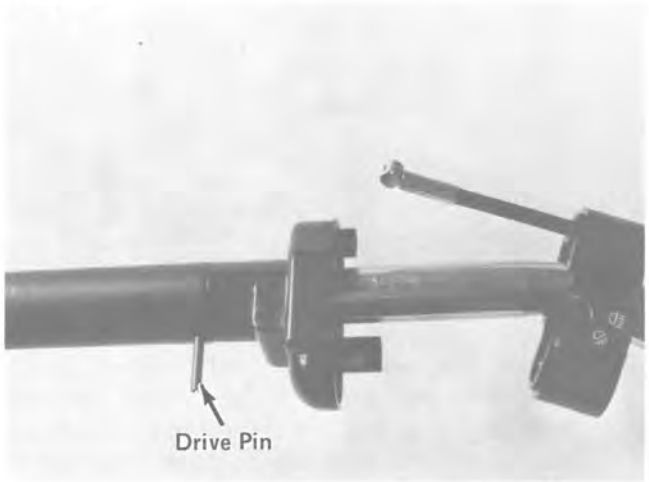


6. Grasp the brake wire end piece, using a pliers, and, also, grasp brake cable with one hand. Pull brake wire outward while pulling the brake cable out of its mount in the brake handle, Fig. VII-30.

Fig. VII-30

7. Remove the drive pin holding the brake handle on the handlebars, Fig. VII-31, using a hammer and a 1/4 x 3/32-inch punch.

Fig. VII-31



8. Grasp the brake wire end piece, using a pliers, and, also, grasp the brake cable with one hand. Pull brake wire outward while pulling the brake cable out of its mount in the brake control cap, Fig. VII-32; then slide cap off handlebars.

Fig. VII-32

Install Brake Control Handle or Cap

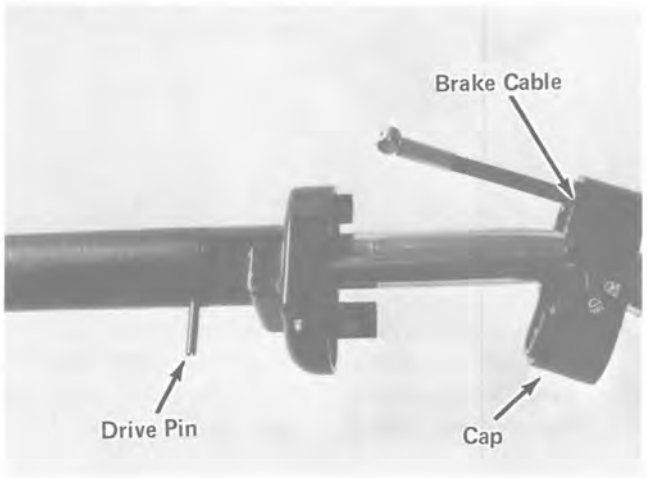
Equipment Necessary: Hammer, Pliers, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade and 1/4 x 3/32-Inch Punch

1. Slide the brake control cap onto the handlebars. Make sure the recess in the cap is toward the center of the handlebars.

2. Grasp the brake wire end piece, using a pliers. Also, grasp brake cable with one hand. Pull brake wire outward while installing end of brake cable into its mount in the brake control cap, Fig. VII-33.

3. Slide the brake control handle on the handlebars, making sure the brake lever pin hole is toward the rear of the snowmobile.

Fig. VII-33



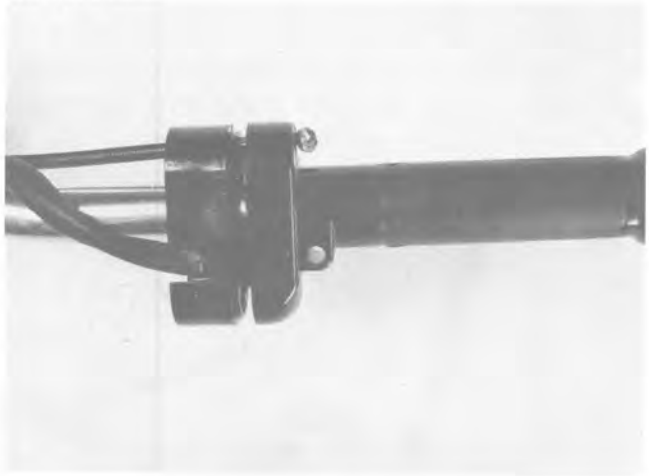
4. Secure the brake handle in place with the drive pin, Fig. VII-33, using a hammer and a 1/4 x 3/32-inch punch.

5. Again, grasp the brake wire end piece, using a pliers, and, also, grasp brake cable with one hand. Pull brake wire outward while installing end of brake cable into its mount in the brake control handle mount, Fig. VII-34.

Fig. VII-34

6. Insert the brake switch and dimmer switch into their respective mounts in the brake handle. Brake switch wires must be positioned under and to the front of the handlebars, Fig. VII-35.

Fig. VII-35



7. Push brake control cap against brake control. Secure the brake control and cap together with three screws, Fig. VII-36, using a phillips screwdriver having a no. 2 blade.

Fig. VII-36

8. Grasp the brake wire end piece, using a pliers; then install end piece in the brake lever seat, Fig. VII-37.

Fig. VII-37

9. Install the brake lever and "seated" brake wire on the brake handle with pin and retaining ring, Fig. VII-38, using a screwdriver having a 1/4-inch blade to push the ring on the end of the pin.

10. Install the nylon strap around cables and handlebars.

11. Install the protective pad on the handlebars.

Fig. VII-38

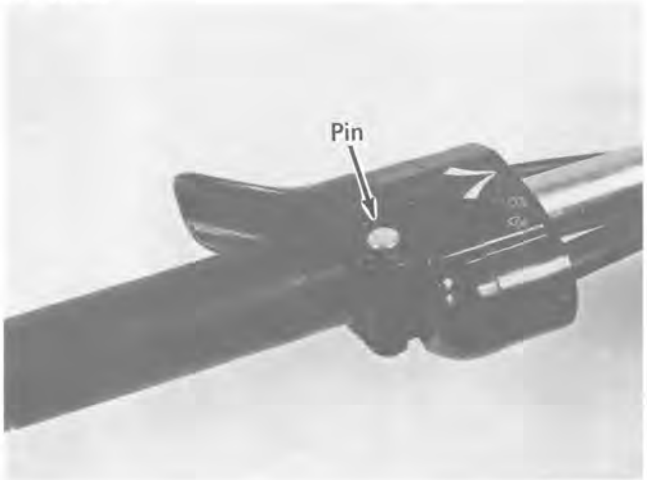
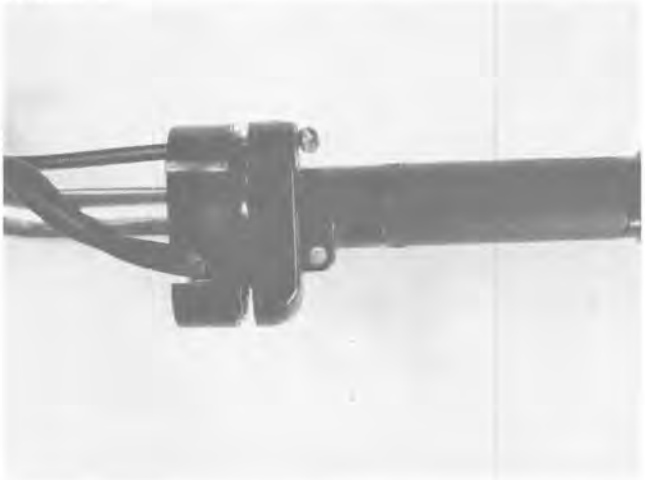


Fig. VII-40



Remove Brake/Dimmer Switch

Equipment Necessary: Side Cutters, Phillips Screwdriver Having a No. 2 Blade and a Screwdriver Having a 1/4-Inch Blade

1. Remove the protective pad from the handlebars. Also, cut the nylon strap holding cables on handlebars, using a side cutters.

2. Remove the three screws holding the brake/dimmer switches between the brake handle and brake handle cap, Fig. VII-39, using a phillips screwdriver having a no. 2 blade.

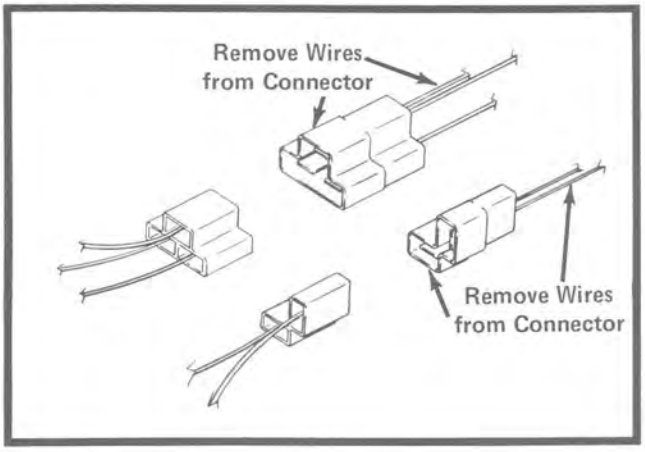
Fig. VII-39

3. Slide brake cap toward center of handlebars, Fig. VII-40, until the brake/dimmer switch can be removed from the brake handle.

4. Pull brake/dimmer switch out of brake handle and cap.

5. Remove the two black wires and the black wire having a white tracer from the T-shaped connector at end of brake/dimmer switch harness, Fig. VII-41, using a screwdriver having a 1/4-inch blade. Also, remove the black wire and the black wire having a white tracer in the Z-shaped connector, using a screwdriver having a 1/4-inch blade.

Fig. VII-41



Note: Connector must be removed from end of brake/dimmer switch because the harness can then be pulled through the upper steering post clamp and bracket. If connector is allowed to remain on the harness, connector will not slide through the upper steering post clamp and bracket.

6. Pull the brake/dimmer switch harness through the upper steering post clamp and bracket, Fig. VII-42.

Fig. VII-42

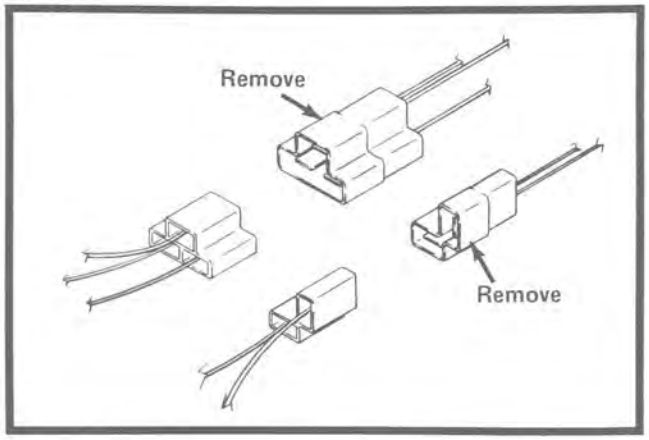
Fig. VII-44

Install Brake/Dimmer Switch

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade

1. Remove the T-shaped connector from the end of the brake/dimmer switch harness and, also, the Z-shaped connector from the switch harness, Fig. VII-43, using a screwdriver having a 1/4-inch blade.

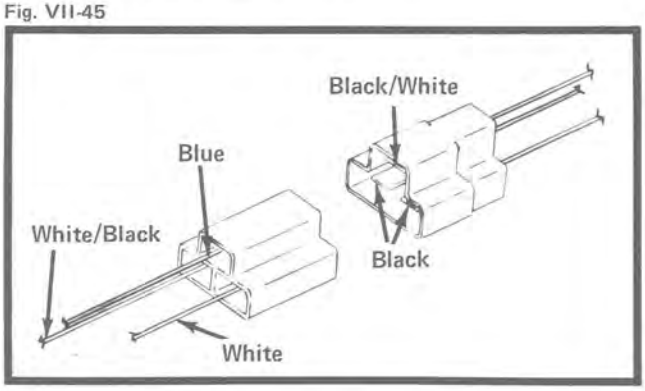
Fig. VII-43



2. Slide end of brake/dimmer switch harness through the instrument panel; then the upper steering post clamp and bracket, Fig. VII-44.

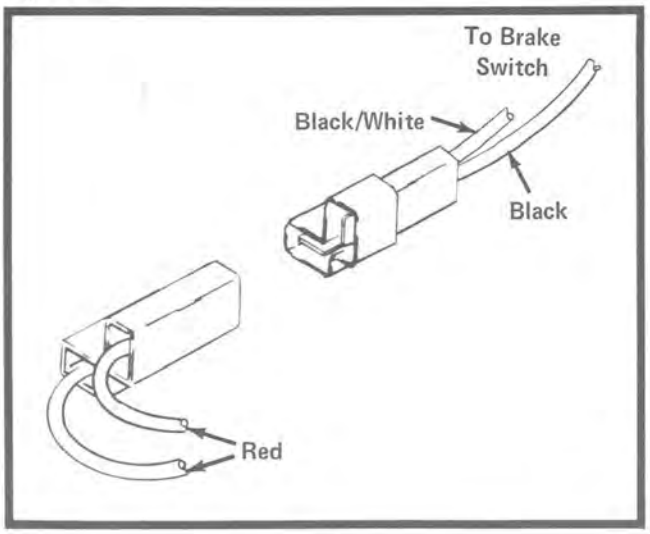
3. Install the two black wires and the black wire having a white tracer coming from the dimmer switch into the T-shaped connector. Next, push the brake/dimmer switch connector (T-shaped) over the T-shaped connector holding the two white wires having black tracers and, also, a blue wire. The white wires having a black tracer run to the two vertically-oriented light switch terminals, and the blue wire runs to the taillight/brakelight connector, Fig. VII-45.

Fig. VII-45



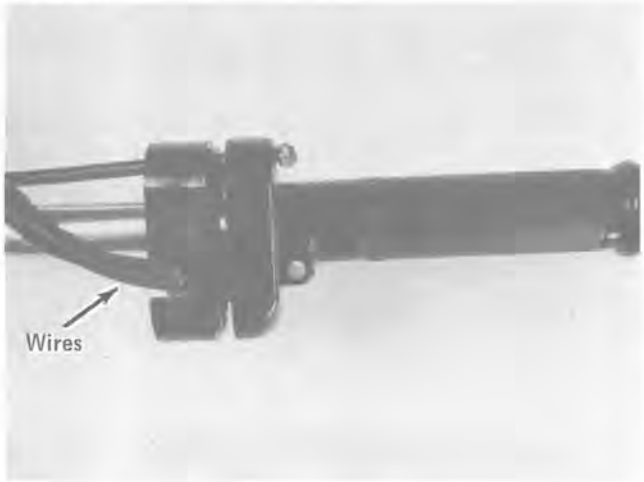
4. Install the remaining black wire and the black wire having a white tracer in the Z-shaped connector of the brake switch into the matching connector of the main wiring harness, Fig. VII-46.

Fig. VII-46



5. Install the brake switch cylinder in the mounting hole in the brake handle, and the dimmer switch into the slotted track in brake handle. Brake/dimmer switch wires must be installed into the handle from under the handlebars, Fig. VII-47.

Fig. VII-47



6. Slide the brake handle cap over the brake/dimmer switch and against the brake handle. Hold all components in place.

7. Secure the brake/dimmer switch between the brake handle cap and handle with three phillips screws, Fig. VII-48, using a phillips screwdriver having a no. 2 blade.

8. Install nylon strap around cables and handlebars.

9. Install protective pad on handlebars.

Fig. VII-48

Remove Tie Rod Ends and Tie Rod

Equipment Necessary: 7/16-Inch Open End Wrench, 1/2-Inch Socket, 9/16-Inch Open End Wrench and 9/16-Inch Socket

1. Remove the two lock nuts holding the front of the clutch guard to the front end assembly, using a 7/16-inch open end wrench.

2. Remove three lock nuts holding the side of the clutch guard to the front end assembly, using a 1/2-inch socket. Now slide clutch guard off mounting studs.

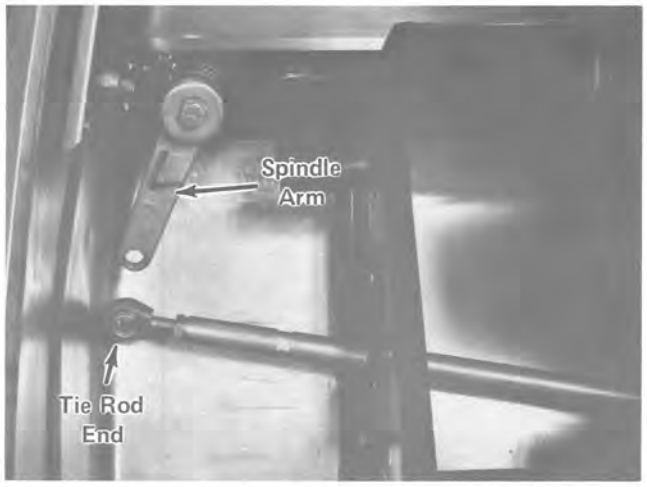
Note: Remove the 1975 model clutch guard by removing the two pins securing clutch guard on the front end.

3. Loosen the jam nut retaining tie rod in place, using a 9/16-inch open end wrench.

Note: On 1975 models, loosen the two jam nuts on the steering adjuster stud, using a 9/16-inch open end wrench.

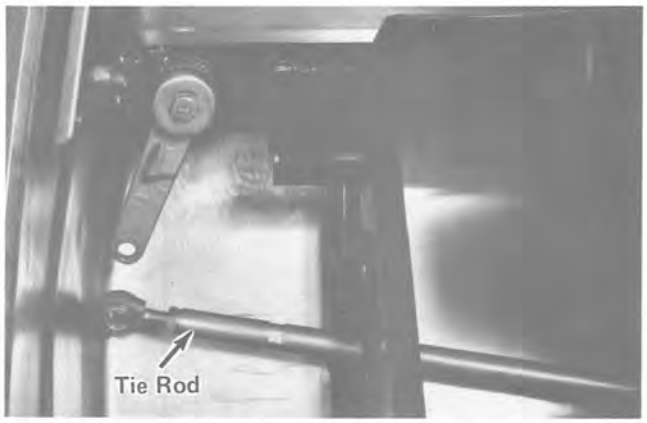
4. Remove the cap screw and lock nut holding tie rod end to spindle arm, Fig. VII-49, using a 9/16-inch socket and 9/16-inch open end wrench. Perform this step on both tie rod ends.

Fig. VII-49



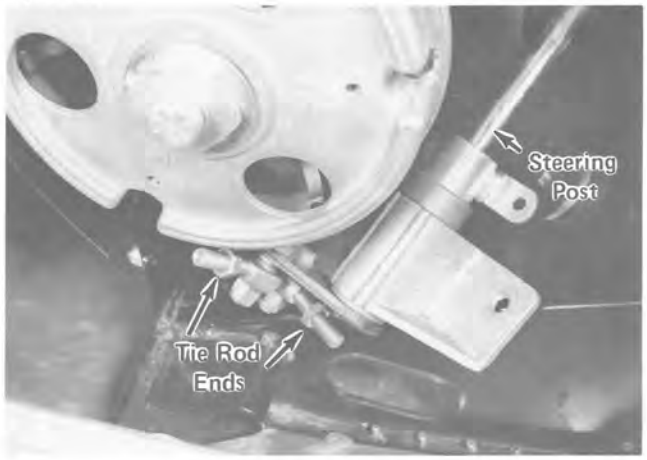
5. Rotate the tie rods clockwise to remove them from the steering post tie rod end, Fig. VII-50, using a 9/16-inch open end wrench.

Fig. VII-50



6. If steering post tie rod end must be replaced, pivot handlebars to the side to expose the bottom of the steering post; then remove the cap screw and lock nut holding tie rod end to steering post, Fig. VII-51, using a 9/16-inch socket and 9/16-inch open end wrench.

Fig. VII-51



Install Tie Rod Ends and Tie Rod

Equipment Necessary: 7/16-Inch Open End Wrench, 1/2-Inch Socket, 9/16-Inch Socket and 9/16-Inch Open End Wrench

1. Thread jam nut approximately three-fourths of the way onto the brass colored tie rod end.
2. Install brass tie rod end on steering post with cap screw and lock nut, using a 9/16-inch socket and 9/16-inch open end wrench.
3. Thread tie rod (clockwise) approximately halfway onto steering post tie rod end, Fig. VII-52.
4. Thread jam nut approximately three-fourths of the way onto the silver tie rod end.
5. Install the silver tie rod end approximately halfway into the tie rod.

Fig. VII-52

⚠ WARNING ⚠

Tie rods must be threaded halfway into the tie rods to assure maximum steering linkage strength. Personal injury could result if the snowmobile is operated when these components are neglected, damaged or adjusted incorrectly.

6. Align the skis (See: Ski Alignment, page VII-22).

Note: The 1975 models use two jam nuts and an adjusting stud on spindle end of the tie rod. To adjust, loosen the two jam nuts, using a 9/16-inch open end wrench; then turn adjusting stud in the appropriate direction. When skis are aligned, tighten the jam nuts.

7. Mount the clutch guard on the mounting studs; then secure front of clutch guard with two lock nuts, using a 7/16-inch open end wrench, and the side of the guard with a lock nut, using a 1/2-inch socket.

Remove Steering Post

Equipment Necessary: Hammer, Screwdriver Having a 7/16-Inch Blade, 5/16 x 1/8-Inch Pin Punch, 7/16-Inch Socket, 7/16-Inch Open End Wrench, 9/16-Inch Socket, 9/16-Inch Open End Wrench and 3-Inch Extension

1. Remove both outside tie rod ends and tie rods from the steering post w/tie rods (See: Remove Tie Rod Ends and Tie Rod, page VII-13).

2. Remove the protective pad from the handlebars.

3. Loosen the six three-quarter-turn studs holding the instrument panel to the lower shroud, using a screwdriver having a 7/16-inch blade.

4. Pull sides of instrument panel outward and remove it from the lower shroud.

Note: If so equipped, gauges can be left in the console, however, speedometer drive cable and housing may have to be disconnected if there is not sufficient working room to remove post.

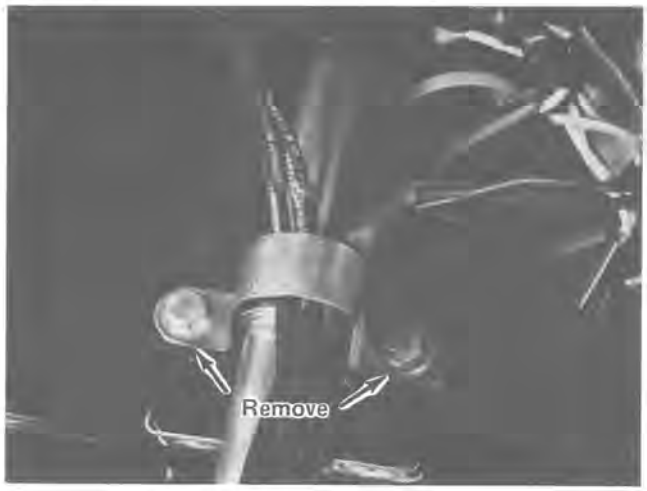
5. Loosen the throttle handle by driving the spring pin out, using a hammer and a 5/16 x 1/8-inch pin punch. DO NOT REMOVE THROTTLE HANDLE.

6. Loosen the brake handle by driving the spring pin out, using a hammer and a 5/16 x 1/8-inch pin punch. DO NOT REMOVE BRAKE HANDLE.

7. Remove the two cap screws and lock nuts holding upper steering post clamp and bracket to the steering post tower, Fig. VII-53, using a 7/16-inch socket and 7/16-inch open end wrench. Set steering post clamp aside.

8. Tip the snowmobile on the PTO side and allow it to lay on the snowmobile stand (part no. 0144-082).

Fig. VII-53



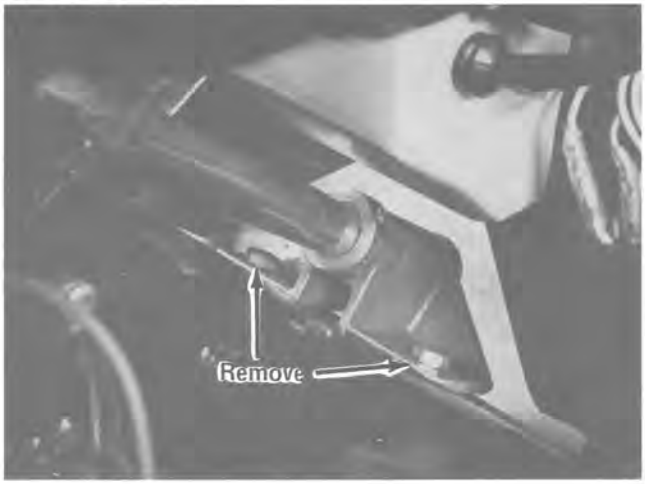
9. Remove the two cap screws and lock nuts holding the lower steering post bracket to the curved section of the front end assembly, Fig. VII-53A, using a 3-inch extension, 9/16-inch socket and 9/16-inch open end wrench.

10. Slide throttle handle and brake handle off the handlebars by moving the steering post from side to side.

11. After throttle and brake handles are removed, slide steering post up and away from the steering post tower.

12. Remove the cap screw and lock nut securing tie rod end to steering post, using a 9/16-inch socket and 9/16-inch wrench. Remove remaining tie rod end from opposite side.

Fig. VII-53A



Install Steering Post

Equipment Necessary: Hammer, Snowmobile Stand (Part No. 0144-082), Torque Wrench, Screwdriver Having a 7/16-Inch Blade, 7/16-Inch Socket, 7/16-Inch Open End Wrench, 9/16-Inch Socket and 9/16-Inch Wrench

1. Install both brass tie rods on bottom of steering post with two cap screws and lock nuts, using a 9/16-inch socket and a 9/16-inch wrench. Tighten lock nuts to 35 ft-lb, using a torque wrench, 9/16-inch socket and 9/16-inch wrench.

Note: Brass colored tie rod ends are left-hand thread and, therefore, must both be installed on the bottom mount of the steering post.

2. Slide the steering post into position on the steering post tower.

3. Slide the brake handle assembly into position. Align the hole in the brake handle and handlebars; then secure brake handle in position with a spring pin, using a hammer.

4. Slide the throttle handle assembly into position. Align the hole in the brake handle and handlebars; then secure brake handle in position with spring pin, using a hammer.

5. Tip the snowmobile on the PTO side and allow it to lay on the snowmobile stand (part no. 0144-082).

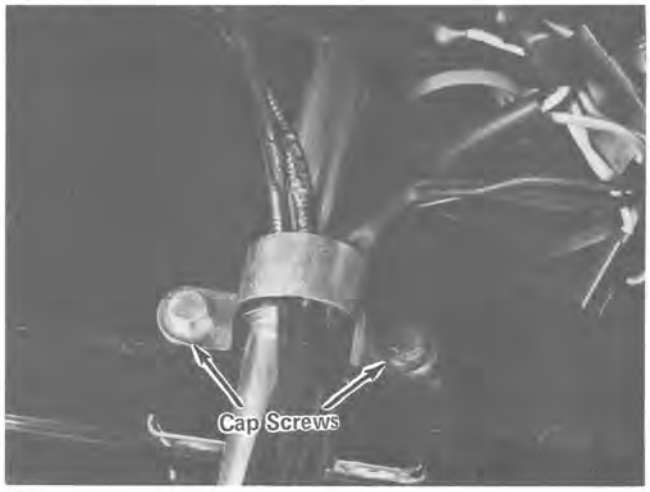
6. Install lower steering post bracket on curved section of front end assembly with two cap screws and lock nuts, Fig. VII-54. Tighten the lock nuts to 35 ft-lb, using a torque wrench, 9/16-inch socket and 9/16-inch wrench.

7. Tip the snowmobile upright and remove the snowmobile stand.

Fig. VII-54

8. Slide the upper steering post clamp and bracket into position on the steering tower. Place throttle cable, brake cable, throttle safety/dimmer switch harness between the upper steering post clamp and bracket. Retain upper steering post clamp and bracket to the steering post tower with two cap screws and lock nuts, Fig. VII-55. Tighten the cap screws to 10 ft-lb, using a torque wrench, 7/16-inch socket and 7/16-inch open end wrench.

Fig. VII-55



⚠ WARNING ⚠

Make sure control cables and electrical wiring harnesses are not pinched between the upper steering post clamp and bracket. If a cable or wiring harness is pinched, a mechanical or electrical failure may eventually occur, resulting in possible injury to the operator or damage to the snowmobile.

9. Install the instrument panel on the lower shroud with the six quarter-turn studs, using a screwdriver having a 7/16-inch blade.

10. If equipped with gauges connect the speedometer drive cable and housing to the speedometer. Also, connect any other wires that were disconnected.

11. Install the protective pad on the handlebars.

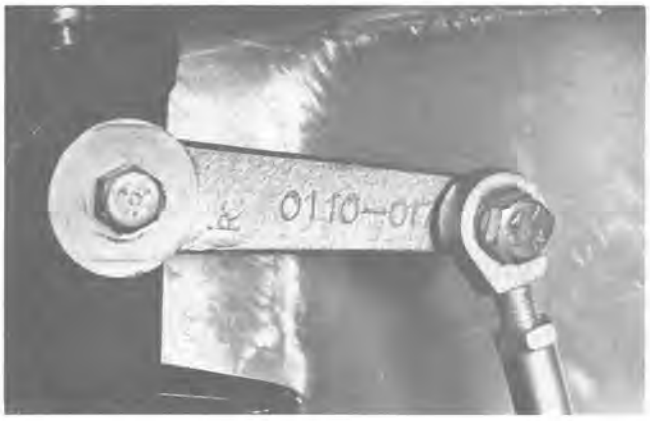
12. Install tie rods and tie rod ends (See: Install Tie Rod Ends and Tie Rod, page VII-14).

Remove Ski Spindle

Equipment Necessary: Hammer, 1/2-Inch Diameter Brass Punch, 1/2-Inch Socket, 1/2-Inch Wrench and 9/16-Inch Socket

1. Remove the cap screw and flat washer holding the spindle arm to the spindle, Fig. VII-56, using a 1/2-inch socket.

Fig. VII-56



2. Slide U-bend washers and flat washers off the spindle shaft.

3. Block the front end up so the entire ski (spindle shaft) can be removed from the spindle mount. After the spindle shaft is removed from the spindle mount, account for the flat washer on the shaft.

Note: The spindle shaft may stick in the spindle mount. If this occurs, use a 1/2-inch diameter brass punch and drive the spindle shaft out of the spindle mount.

4. Remove the cap screws and lock nut holding top mount of shock absorber to the spindle, Fig. VII-57, using a 5/8-inch socket and wrench. Account for the short sleeve inserted in the end of the shock absorber moveable end.

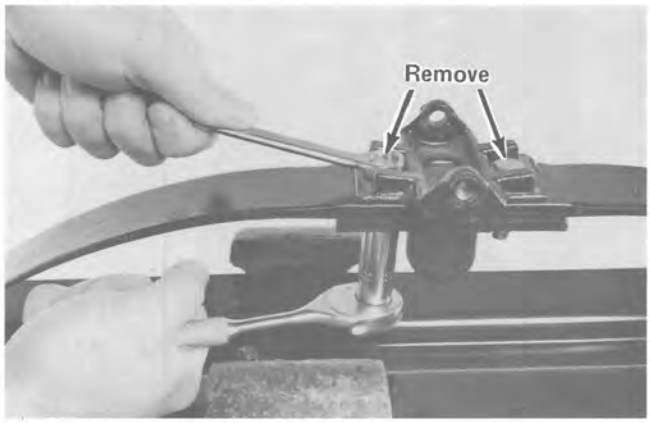
Fig. VII-57

5. Remove the lock nut and cap screw, Fig. VII-58, holding spindle to ski saddle, using a 9/16-inch socket.

Note: The lock nut must first be removed from the cap screw; then the cap screw can be removed. Since the ski saddle is threaded, disassembly must be done in this order.

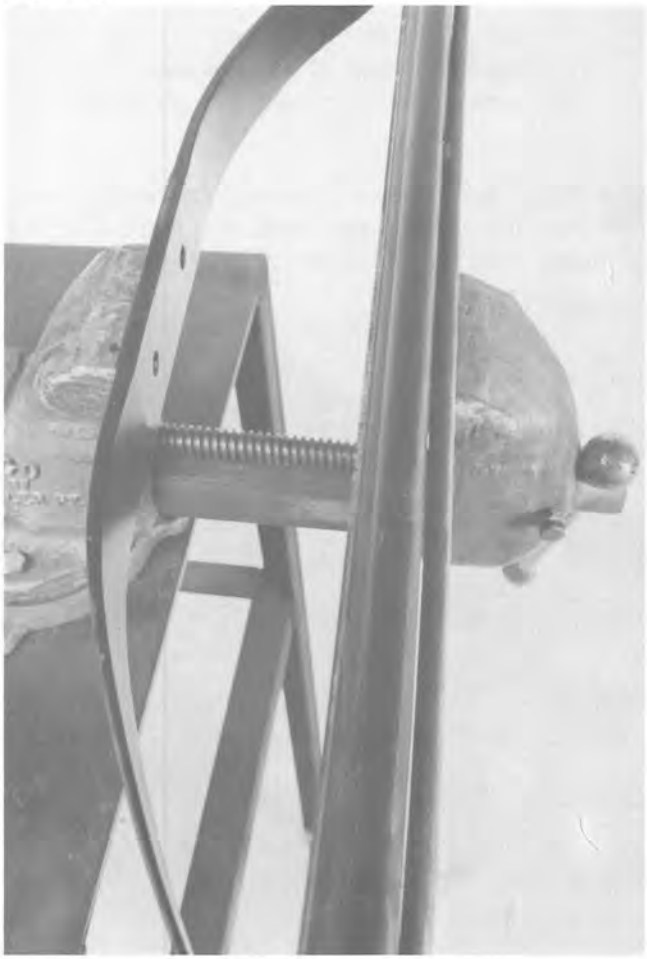
6. Lift spindle free of ski saddle.

Fig. VII-64



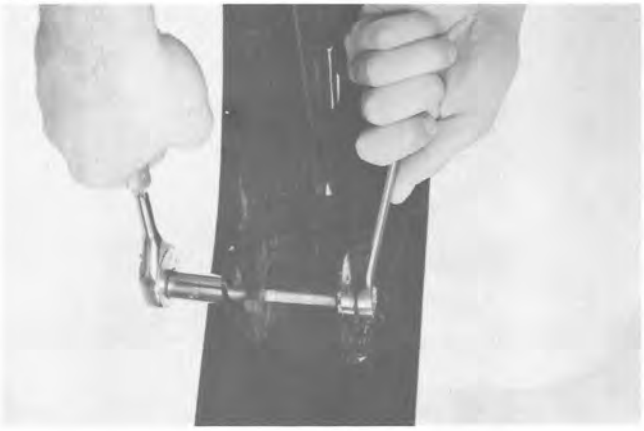
4. Place ski in a vise and compress spring approximately one inch, Fig. VII-65.

Fig. VII-65



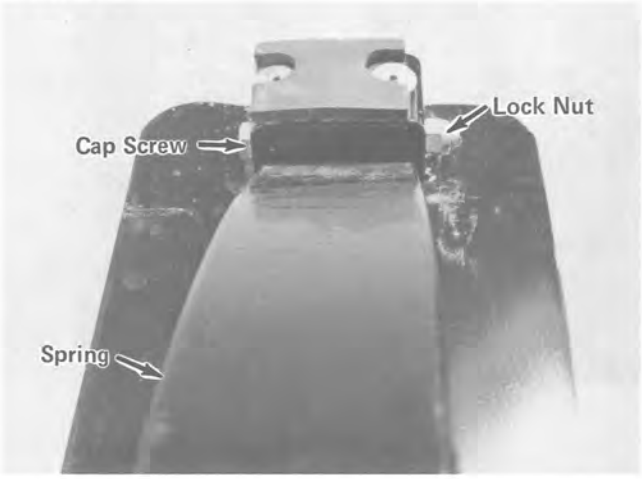
5. Remove the cap screw and lock nut, Fig. VII-66, holding front of spring and spring side saddle between the mount bracket, using a 9/16-inch socket and wrench. After cap screw is removed, slowly release the vise pressure against the spring.

Fig. VII-66



6. Remove the cap screw and lock nut, Fig. VII-67, holding spring to rear mount bracket of the ski, using a 1/2-inch socket and wrench. Ski spring can now be replaced.

Fig. VII-67



Install Ski Spring

Equipment Necessary: Low-Temperature Grease (Texaco 2346 EP or Equivalent), Torque Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, 9/16-Inch Socket, 9/16-Inch Wrench, 5/8-Inch Socket and 5/8-Inch Wrench

1. Install end of spring between mount bracket at rear of ski, Fig. VII-67. Secure spring in place with cap screw and lock nut. Tighten lock nut to 20 ft-lb, using a torque wrench, 1/2-inch socket and 1/2-inch wrench.

Note: Lock nut must be positioned on the inside of the ski.

2. Place spring slide saddle and spring between the front mount bracket, Fig. VII-68.

Fig. VII-68

3. Place ski in a vise and compress spring until cap screw and lock nut can be installed, Fig. VII-69. When holes are aligned, install the cap screw and lock nut. Tighten lock nut to 35 ft-lb, using a torque wrench, 9/16-inch socket and 9/16-inch wrench.

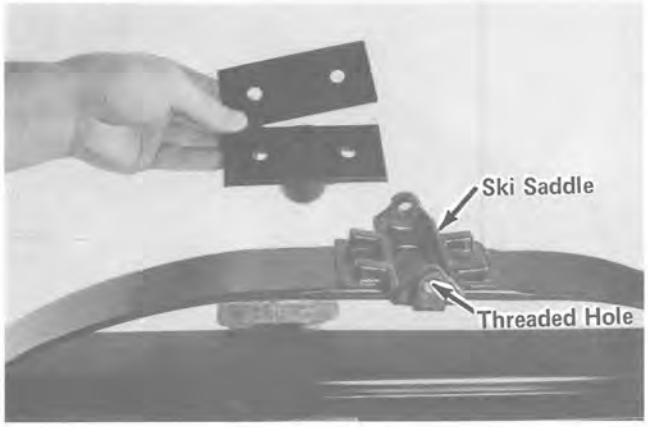
Note: Lock nut must be positioned on the inside of the ski.

Fig. VII-69

4. Change position of the ski in the vise and place the ski saddle on top of the spring, Fig. VII-70. Threaded hole in saddle must be positioned toward the inside of the ski. Place plastic liner and bumper block under the saddle and spring. Hold parts in place.

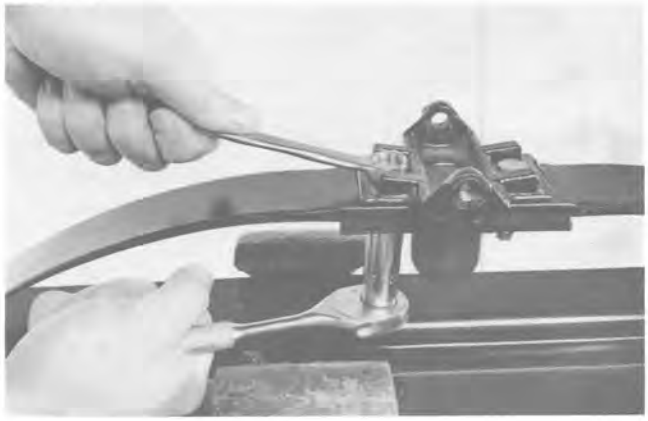
Note: Threaded side of the saddle must be on the inside of the ski.

Fig. VII-70



5. Secure parts in place with two cap screws and lock nuts, Fig. VII-71. Tighten the lock nuts to 35 ft-lb, using a torque wrench, 9/16-inch socket and 9/16-inch wrench.

Fig. VII-71



6. Place ski saddle into position on spindle and secure in place with a cap screw, Fig. VII-72. Tighten cap screw to 30 ft-lb, using a torque wrench and a 9/16-inch socket.

Note: Head of cap screw is to be on opposite side of threaded hole in ski saddle.

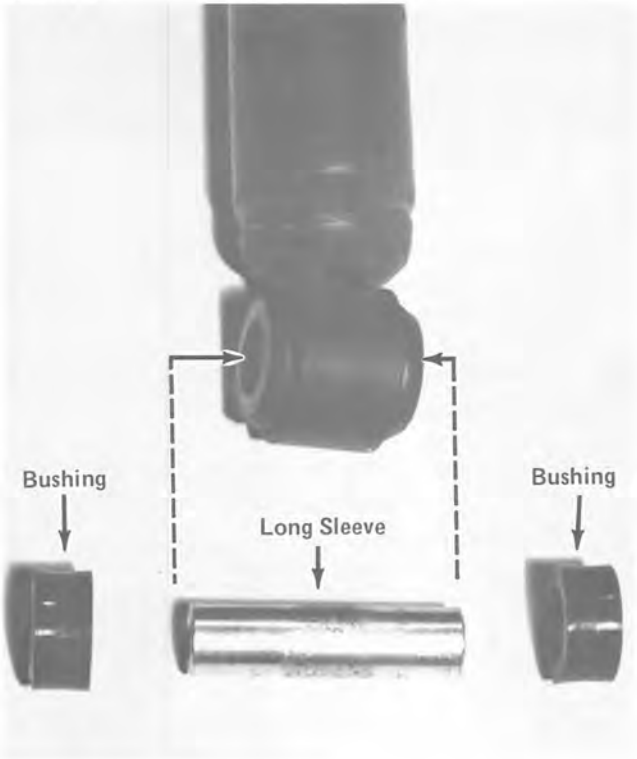
7. Thread lock nut onto cap screw and tighten to 30 ft-lb, using a torque wrench and a 9/16-inch socket.

Fig. VII-72

8. Slide long sleeve through stationary end of shock absorber, Fig. VII-73; then place a plastic bushing on each end of the long sleeve.

Note: Flat end surface of the plastic bushing is to contact the shock absorber and radiused end surface is to contact mount bracket on ski.

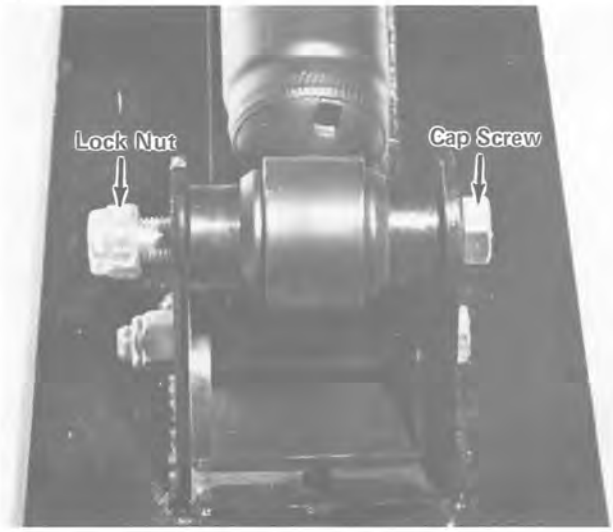
Fig. VII-73



9. Apply low-temperature grease (Texaco 2346 EP or equivalent) on the unthreaded portion of the cap screw holding stationary end of shock absorber to mount bracket.

10. Place stationary end of shock absorber between the mount bracket; then secure in place with cap screw and lock nut, Fig. VII-74, using a 5/8-inch socket and wrench. Tighten lock nut to 50 ft-lb, using a torque wrench, 5/8-inch socket and 5/8-inch wrench.

Fig. VII-74



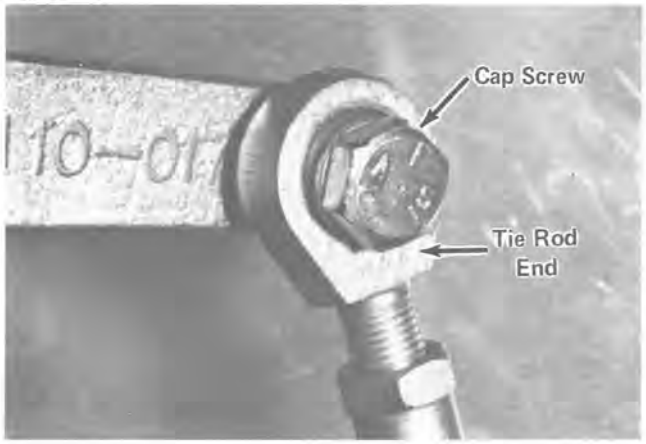
Ski Alignment

Equipment Necessary: Torque Wrench, Tape Measure, 9/16-Inch Socket and 9/16-Inch Open End Wrench

1. Remove the cap screw and lock nut holding the tie rod end to the spindle arm, Fig. VII-75, using a 9/16-inch socket and 9/16-inch open end wrench. Separate tie rod end from the spindle arm. Perform this step on opposite tie rod end.

2. Position the skis straight forward and establish a parallel relationship.

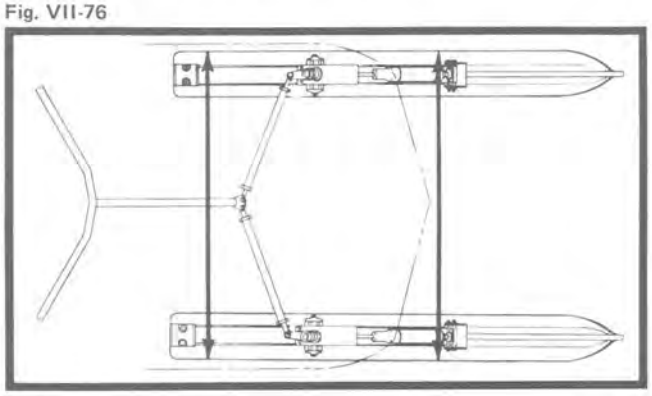
Fig. VII-75



3. Measure the distance to the outside edge of both skis, using a tape measure, Fig. VII-76. Make sure the measurement is taken behind the front spring mount and just ahead of the rear spring mount. Skis are to be parallel (same measurement at front and rear of ski) or have a maximum of 1/4-inch "toe in" (front measurement 1/4 inch less than at rear).

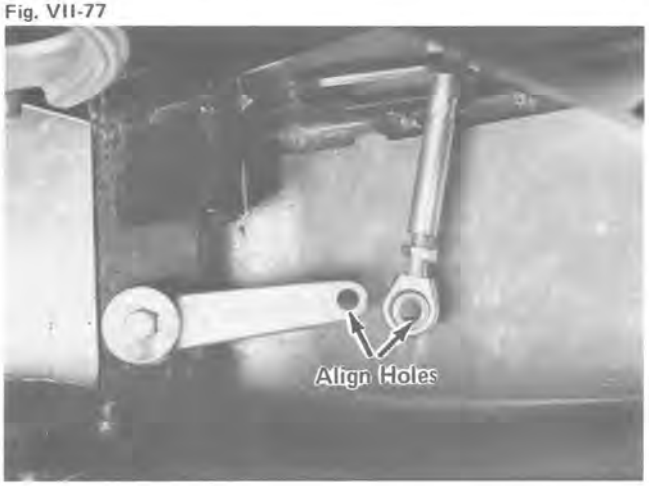
4. Position the handlebars straight forward in relation to the skis.

Fig. VII-76



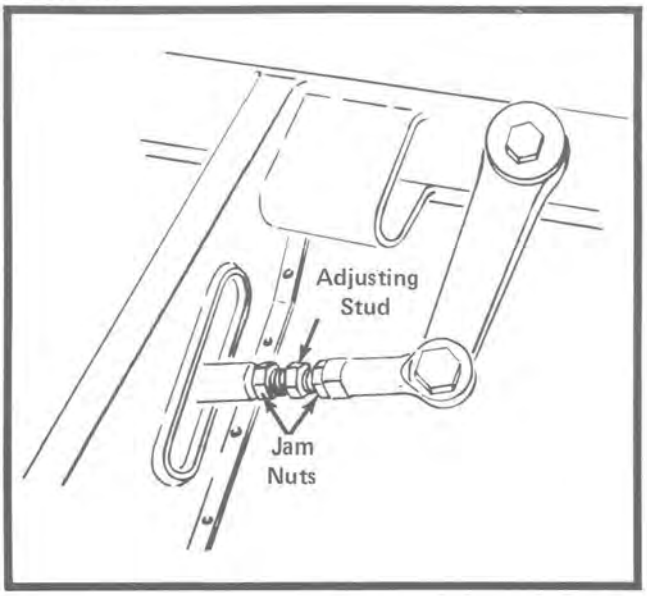
5. Rotate the outside tie rod end until the mounting hole lines up with the hole in the spindle arm, Fig. VII-77. Secure tie rod end to spindle arm with a cap screw and lock nut. Tighten cap screw to 35 ft-lb, using a torque wrench, 9/16-inch socket and 9/16-inch open end wrench.

Fig. VII-77



Note: The 1975 models use two jam nuts and an adjusting stud on the spindle end of the tie rod. To adjust, loosen the two jam nuts, using a 9/16-inch open end wrench; then rotate the adjuster in the appropriate direction until hole in tie rod and steering arm are aligned. Secure tie rod end to the spindle arm. Tighten the jam nuts, Fig. VII-77A.

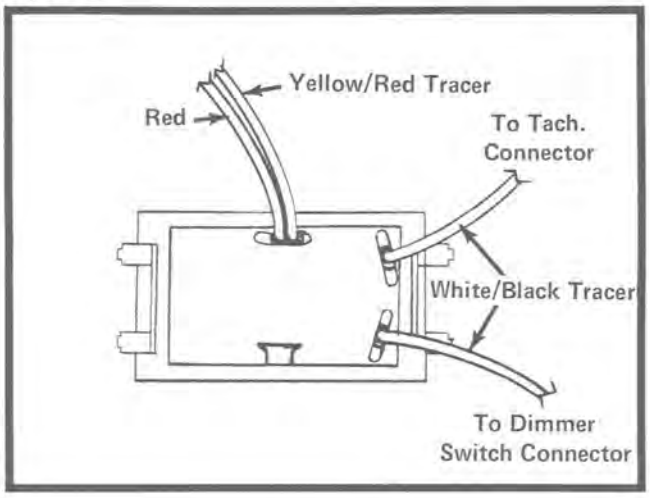
Fig. VII-77A



6. Bottom the jam nut against the tie rod, Fig. VII-75, using a 9/16-inch open end wrench.

7. Perform steps 5 and 6 on remaining tie rod end.

Fig. VII-83



5. Install the heat indicator light in the instrument panel. Also, connect the wires to the heat indicator light terminals.

Note: Step 5 does not apply on 1975 models.

6. Slide the complete choke cable assembly through the instrument panel, Fig. VII-84, and secure in place with the clip ring. Next, move the carburetor-mounted enrichener valve fully forward (toward engine); then slide the choke wire through hole in enrichener valve swivel. Now, position the front edge of the console-mounted choke knob 1/8 inch away from the instrument panel. Finally, when knob is in proper position, tighten choke wire retaining screw, using a screwdriver having a 1/4-inch blade.

7. Connect electrical wires and cables for speedometer, tachometer and heat gauges if the snowmobile is so equipped.

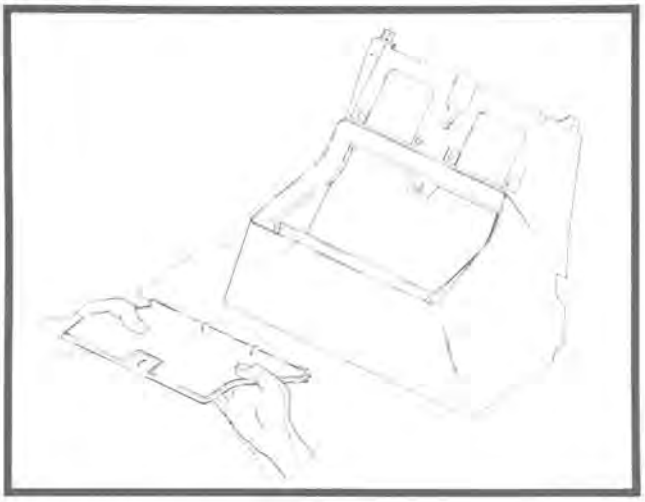
Fig. VII-84

Remove Lower Shroud (Toolbox)

Equipment Necessary: Air-Powered Drill, Screwdriver Having a 7/16-Inch Blade, 5/32-Inch Bit and 1/16-Inch Wrench

1. Open the toolbox door completely. Place both hands behind the door and thumbs around the sides. Exert pressure toward center of door and pull upward when door is bowed far enough to release it from mounting curve in lower shroud, Fig. VII-85.

Fig. VII-85



2. Remove the instrument panel (See: Remove Instrument Panel, page VII-24).

Note: It is not necessary to remove the light switch and complete choke assembly from the instrument panel when lower shroud is to be removed.

3. Remove the two machine screws, flat washers and lock nuts holding the recoil bracket to the side of the lower shroud, using a screwdriver having a 7/16-inch blade and a 7/16-inch wrench. Before the machine screws are removed, grasp recoil handle to prevent a sudden rewind; then pull out machine screws and allow the recoil handle to slowly rewind against the recoil housing.

4. Remove the seat from the tunnel.

5. Loosen the three quarter-turn studs holding the lower shroud against brackets on steering support tower, left side of tunnel and right side of tunnel, using a screwdriver having a 7/16-inch blade.

6. Slide lower shroud away from steering post, Fig. VII-86.

7. Drill out the pop rivets holding toolbox bottom to lower shroud, using an air-powered drill and a 5/32-inch bit.

Note: The toolbox pad is to be considered as a separate part if the lower shroud is being replaced.

Fig. VII-86

Install Lower Shroud (Toolbox)

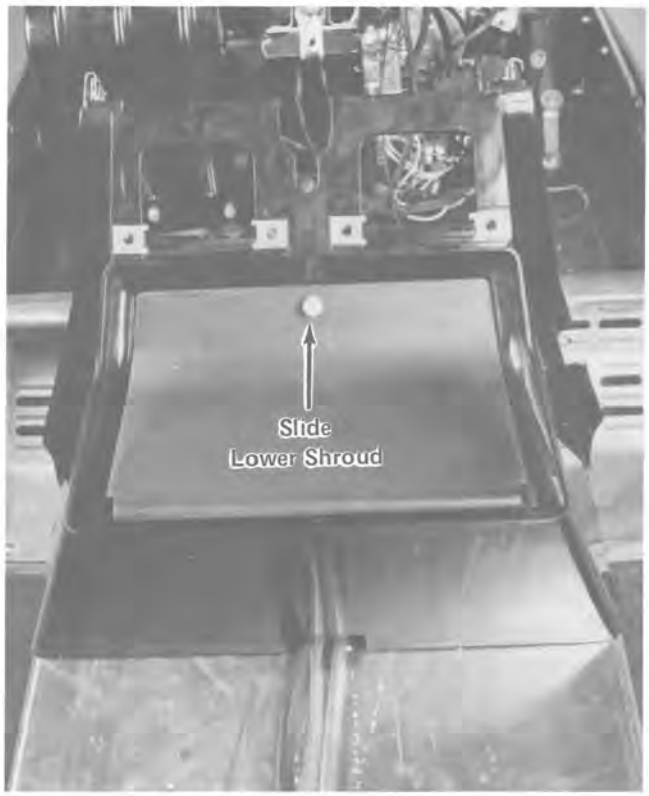
Equipment Necessary: Air-Operated Pop Rivet Tool, Screwdriver Having a 7/16-Inch Blade and 7/16-Inch Wrench

1. Assemble the toolbox bottom and lower shroud with pop rivets and washers, using an air-operated pop rivet tool.

2. Install toolbox pad on toolbox bottom.

3. Slide lower shroud into position against steering support tower, Fig. VII-87. Secure the lower shroud in place with three quarter-turn studs, washers and receptacles, using a screwdriver having a 7/16-inch blade.

Fig. VII-87



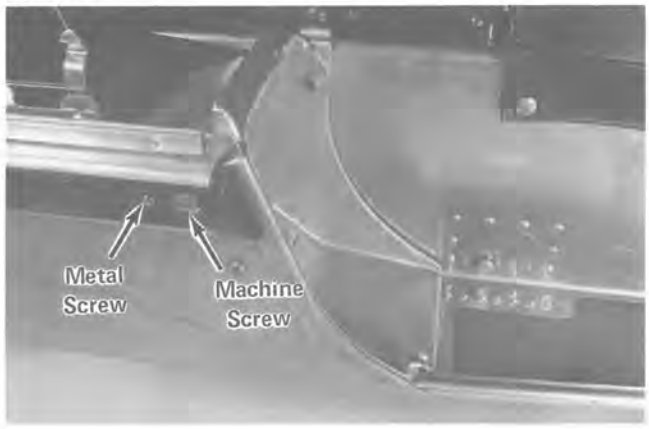
4. Install the seat on the tunnel.

5. Pull the recoil handle and bracket into position on the side of the lower shroud. Secure recoil bracket to lower shroud with two machine screws, flat washers and lock nuts, using a screwdriver having a 7/16-inch blade and a 7/16-inch wrench.

6. Install the toolbox door by placing both hands behind the door and thumbs around the sides. Exert pressure toward center of door and push it downward into the lower shroud mounting curve when door is bowed far enough, Fig. VII-88.

7. Install the instrument panel (See: Install Instrument Panel, page VII-25).

Fig. VII-96



6. Install machine screw that will hold end of bumper to footrest, Fig. VII-96, using a phillips screwdriver having a no. 3 blade.

7. Snap the reflector into the reflector housing.

Remove Bumper, Hood Channels and Hood Cushions

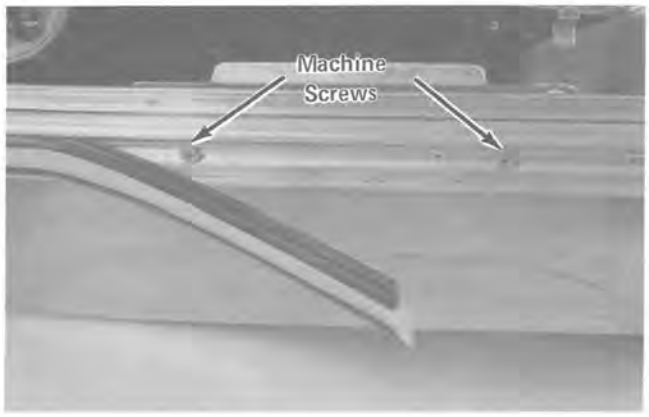
Equipment Necessary: Phillips Screwdriver Having a No. 3 Blade, 7/16-Inch Socket

1. Remove the reflector, reflectorized strip and vinyl strip (See: Remove Reflector, Reflectorized Strip and Vinyl Strip, page VII-28).

2. Remove the remaining five machine screws and lock nuts holding both sides of the bumper to the belly pan and front end, Fig. VII-97, using a phillips screwdriver having a no. 3 blade and a 7/16-inch socket.

3. At this time the bumper, hood channels and hood cushions are now disassembled completely from the belly pan.

Fig. VII-97



Install Bumper, Hood Channels and Hood Cushions

Equipment Necessary: Phillips Screwdriver Having a No. 3 Blade, 7/16-Inch Socket

1. Install the bumper, hood channels and hood cushions on the belly pan and front end with five machine screws and lock nuts, using a phillips screwdriver having a no. 3 blade and a 7/16-inch socket. DO NOT INSTALL REMAINING TWO MACHINE SCREWS THAT HOLD END OF BUMPER TO FOOTREST.

2. Install the vinyl strip, reflectorized strip and reflector (See: Install Vinyl Strip, Reflectorized Strip and Reflector, page VII-29).

Remove Footrest

Equipment Necessary: Jackknife, Phillips Screwdriver Having a No. 3 Blade, Screwdriver Having a 7/16-Inch Blade and a 7/16-Inch Box End Wrench

1. Insert jackknife tip between TOP AND BOTTOM of reflector housing and reflector, Fig. VII-98. Pry reflector away from the reflector housing.

Fig. VII-98

CAUTION

Do not try to remove reflector when it is cold. If an attempt is made to remove the reflector when it is cold, the reflector may break.

2. Remove the two machine screws holding footrest to end of bumper and belly pan, using a phillips screwdriver having a no. 3 blade.

3. Remove the machine screw and lock nut holding bottom of footrest to tunnel (running board), using a 7/16-inch box end wrench and screwdriver having a 7/16-inch blade.

4. Remove the skid frame from the tunnel (See: Section VI – Suspension, Skid Frame Removal, page VI-3).

5. Remove the two machine screws and nylon cap nuts holding inside of footrest to bracket at front side of tunnel, using a 7/16-inch box end wrench and screwdriver having a 7/16-inch blade. Slide footrest from between the belly pan and side of tunnel.

Install Footrest

Equipment Necessary: Phillips Screwdriver Having a No. 3 Blade, Screwdriver Having a 7/16-Inch Blade and 7/16-Inch Box End Wrench

1. Slide the footrest into position between the belly pan and tunnel. Line up holes in tunnel, bracket and footrest; then secure footrest to tunnel with two machine screws and nylon cap nuts, using a screwdriver having a 7/16-inch blade and a 7/16-inch box-end wrench.

2. Secure bottom of footrest to tunnel (running board) with machine screw and lock nut, Fig. VII-99, using screwdriver having a 7/16-inch blade and a 7/16-inch box-end wrench.

Fig. VII-99

3. Drain gasoline from fuel tank. Install the skid frame (See: Section VI – Suspension, Skid Frame Installation, page VI-14).

4. Retain the side of the footrest to end of bumper and belly pan with two machine screws, using a phillips screwdriver having a no. 3 blade.

5. Snap the reflector into the reflector housing.

Fuel Tank and Rear Shroud Removal

Equipment Necessary: Hammer, Stubby Screwdriver Having a 7/16-Inch Blade, Screwdriver Having a 1/4-Inch Blade, 1/8-Inch Bit, 7/16-Inch Socket, 1/2-Inch Cold Chisel and 9/16-Inch Socket

1. Remove the seat cushion. Next, pull the taillight/brakelight connectors apart, Fig. VII-100.

Fig. VII-100

2. Pull the fuel line fitting and the line extending into the tank from within the tank.

3. Remove the two cap screws and lock washers holding the rear of the skid frame to the skid side of the tunnel, Fig. VII-101, using a 9/16-inch socket.

Fig. VII-101

4. Raise the rear of the snowmobile approximately 2-1/2 feet off the shop floor. The entire rear section of the skid frame and track is to remain on the shop floor.

5. Remove the three rivets holding the rear bumper to the wear plate at the end of the running board, Fig. VII-102, using a 1/2-inch chisel and a hammer. Repeat this step on opposite side of rear bumper.

Fig. VII-102

6. Remove the eight slotted machine screws and cap nuts holding the back and sides of the rear bumper to the tunnel, using a stubby screwdriver having a 7/16-inch blade and 7/16-inch socket.

Note: When slotted machine screws holding back of rear bumper to tunnel are removed, Fig. VII-103, the snow flap and backing plate will be free.

7. Lift up on the fuel tank shroud and bumper assembly and set it on the front of the tunnel.

Fig. VII-103

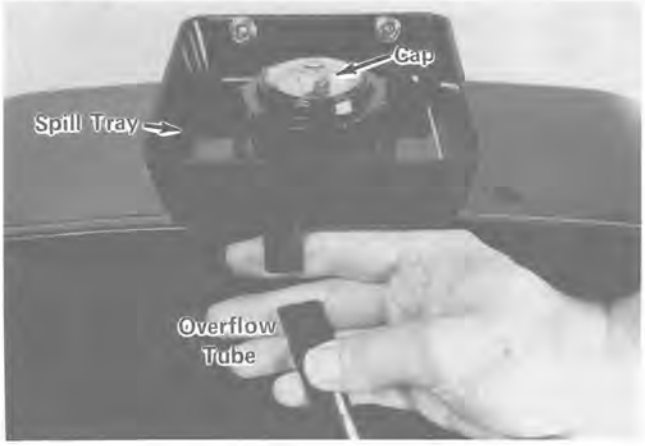
8. If the fuel tank shroud and rear bumper must be separated, remove the two screws holding the center taillight reflector against the shroud, using a screwdriver having a 1/4-inch blade. Next, remove the two slotted machine screws holding shroud against rear bumper brackets on inside of shroud. Finally, drill out the four rivets holding the shroud on the rear bumper, using a 1/8-inch drill bit.

Note: If the fuel tank shroud is to be replaced, drill out the rivet holding the ground wires against the tunnel, using a 1/8-inch bit. In addition, open the cover and place both thumbs at bottom inside center of cover. Exert pressure toward center of cover and pull rearward when cover is bowed far enough to release it from the mounting holes.

9. Pull the fuel over flow tube off of the fitting at the rear of spill tray, Fig. VII-104.

10. Remove the fuel tank gauge cap and spill tray from the fuel tank, Fig. VII-104. Next, slide fuel tank forward until it disengages from the lower rear shroud. Finally, carefully pull the rubber pad off the bottom of the fuel tank.

Fig. VII-104



11. If the lower rear shroud must be removed, drill out the eight rivets holding the shroud to the top of the tunnel, Fig. VII-105, using a 1/8-inch bit.

Fig. VII-105

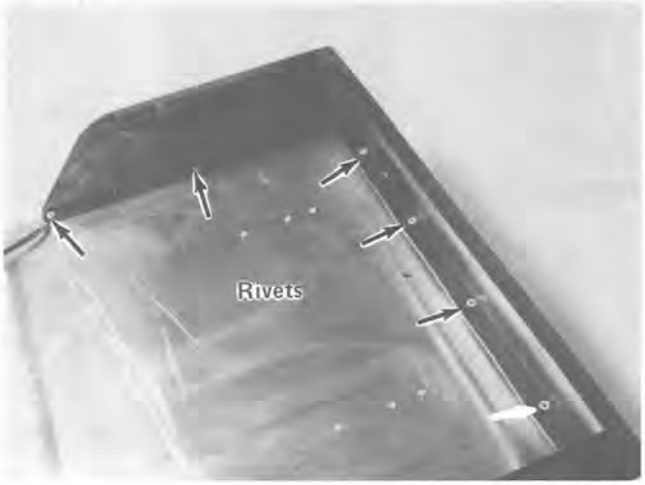
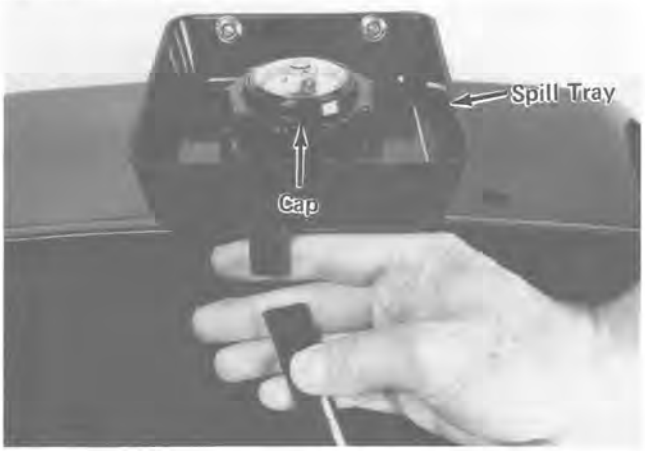


Fig. VII-106



Fuel Tank and Rear Shroud Installation

Equipment Necessary: Piece of Cardboard, Pop Rivets (18), Pop Rivet Tool, Torque Wrench, Stubby Screwdriver Having a 7/16-Inch Blade, 7/16-Inch Socket, 9/16-Inch Socket and 3-Inch Extension

Note: If the lower rear shroud was removed from the top of the tunnel, proceed to step 1. But if either the rear bumper or fuel tank shroud were separated, proceed to steps 2-4. However, if the lower rear shroud was not removed, or the rear bumper was not separated from the fuel tank shroud, proceed to step 5.

1. Install the lower rear shroud on top rear of tunnel with seven pop rivets, starting at left side of the shroud, using a pop rivet tool. However, do not install the front rivet at right side of shroud because the taillight ground wires (brown) must be secured at a later time.

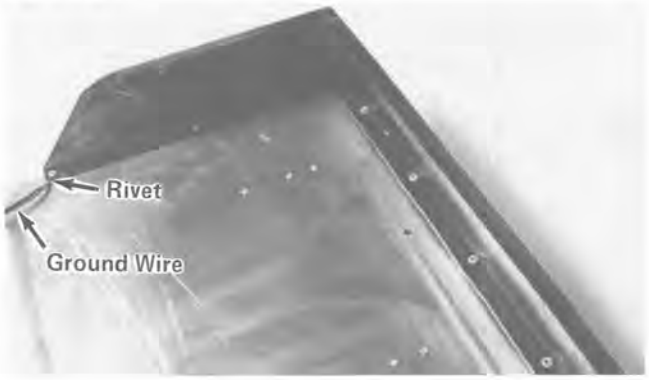
2. Slide the spill tray over the mouth in the fuel tank, making sure the snap fasteners are toward the front of the snowmobile. Install fuel tank gauge cap, Fig. VII-106.

3. Assemble the fuel tank shroud and the rear bumper together with four rivets, using a pop rivet tool. Next, secure rear shroud to rear bumper brackets with two slotted machine screws, using a screwdriver having a 7/16-inch blade. Finally, install the taillight reflector against the back center of the fuel tank shroud with two screws, using a screwdriver having a 1/4-inch blade.

Note: If a new fuel tank shroud is being installed, the cover must be reinstalled on the top of the shroud. To do this, place thumbs at bottom, inside center of cover; then exert pressure toward center of cover and push it into the mounting holes when bowed far enough.

4. Rivet the taillight ground wires (brown) and the right front of the lower rear shroud to the tunnel with one pop rivet, Fig. VII-107, using a pop rivet tool. Metal connector for ground wires must be positioned between the bottom of the lower rear shroud and the top of the tunnel to insure an adequate ground.

Fig. VII-107



5. Install the rubber pad on the bottom of the fuel tank.

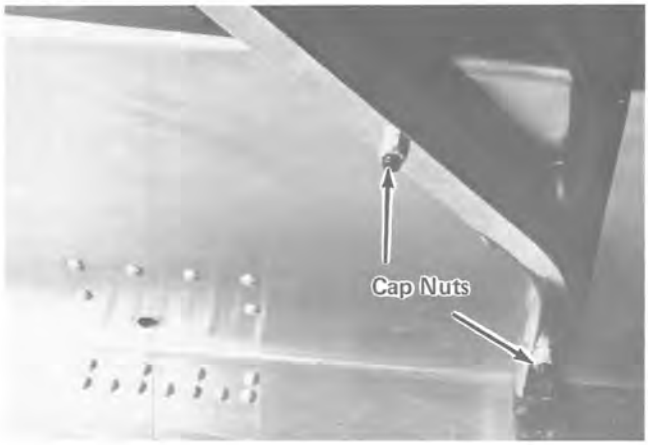
6. Slide the fuel tank into position between the sides and against the back of the lower rear shroud. Straight side of fuel tank must face to the rear of the snowmobile.

7. Set fuel tank shroud and rear bumper assembly on the lower rear shroud and on top of the fuel tank. The two locating pins in the side of rear bumper must fit into the holes on both sides of the rear shroud.

8. Secure both sides of the rear bumper (near hand grips) to the tunnel with four, 1-1/8 inch slotted machine screws and cap nuts, Fig. VII-108, using a stubby screwdriver having a 7/16-inch blade and a 7/16-inch socket.

Note: Cap nuts are to be positioned on the outside of the rear bumper.

Fig. VII-108



9. Secure the end plate, snow flap and back of rear bumper to the tunnel with four, 1-1/2 inch slotted machine screws and cap nuts, Fig. VII-109, using a stubby screwdriver having a 7/16-inch blade and a 7/16-inch socket.

Note: Cap nuts are to be positioned on the outside of the rear bumper.

Fig. VII-109

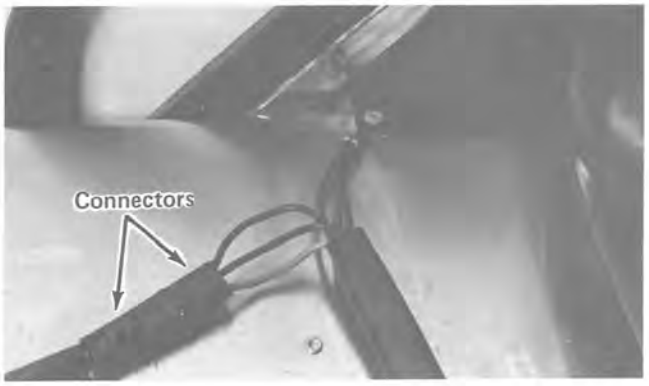
10. Secure the rear bumper to the wear plate with three rivets, Fig. VII-110, using a pop rivet tool.

11. Lower the rear of the snowmobile to the shop floor.

Fig. VII-110

12. Push the taillight/brakelight connectors together, Fig. VII-111.

Fig. VII-111

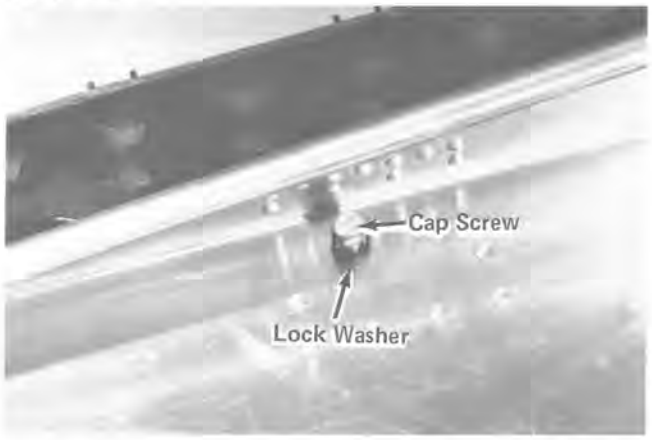


13. Install the fuel line with filter and the fitting into the hole at top right side of the fuel tank. Make sure the rubber around the fitting seats in the mounting hole.

14. Tip the snowmobile onto its side. Use a piece of cardboard to protect against scratching.

15. Install the rear of the skid frame between the sides of the tunnel with a cap screw and lock washer, Fig. VII-112, using a 9/16-inch socket and 3-inch extension. THREAD CAP SCREW ONLY HALFWAY INTO REAR AXLE.

Fig. VII-112



16. Tip the snowmobile on its opposite side. Use a piece of cardboard to protect against scratching. Next, repeat step 15.

17. Tip snowmobile upright. Tighten both rear cap screws holding rear of skid frame between tunnel to 35 ft-lb, using a torque wrench, 9/16-inch socket and 3-inch extension.

18. Install the seat cushion on the tunnel and fuel tank shroud.

19. Check the track tension (See: Section VI – Suspension, Track Tension, page VI-16).

20. Check the track alignment (See: Section VI – Suspension, Track Alignment, page VI-16).

Remove Hood, Headlight, Hinge Bracket and Hinge Support

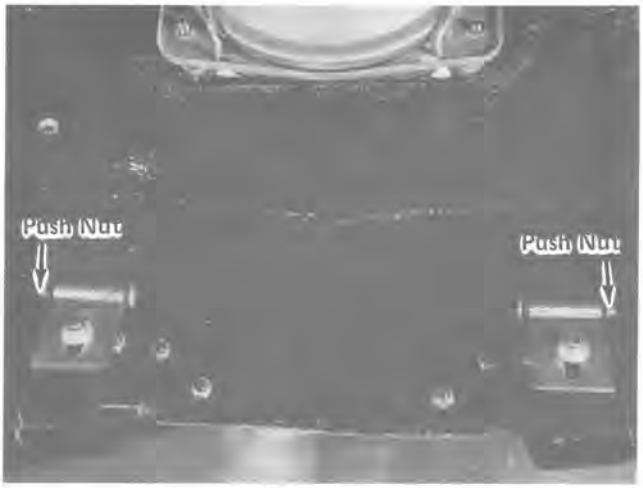
Equipment Necessary: Pliers, Phillips Screwdriver Having a No. 1 Blade, Screwdriver Having a 1/4-Inch Blade, Screwdriver Having a 7/16-Inch Blade, 3/8-Inch Wrench and 7/16-Inch Socket

1. Remove the hood cable from the hood by prying looped end over rivet, using a screwdriver having a 1/4-inch blade.

2. Disconnect the headlight harness from the main wiring harness.

3. Remove the push nut, Fig. VII-113, from the pins that hold hood to hinge support, using a pliers. After push nuts are removed, pull pins out of hood hinge and hinge support, Fig. VII-113, using a pliers.

Fig. VII-113



4. If the hood hinge bracket needs to be removed, proceed to step 5. If the headlight and/or headlight housing needs to be replaced, proceed to steps 6-8. If the belly pan-mounted hinge support needs to be replaced, proceed to step 9.

5. Remove the six slotted machine screws, rubber washers and lock nuts that hold the hinge bracket to the hood, using a screwdriver having a 7/16-inch blade and a 7/16-inch socket.

6. Disconnect the headlight harness from the headlight; then remove headlight harness from hood.

7. Press ends of headlight retaining wire together until it disengages from the keepers. Remove headlight from housing.

8. Remove the two machine screws, washers and lock nuts holding headlight housing in the hood, using a phillips screwdriver having a no.

1 blade and a 3/8-inch wrench. Slide headlight housing out of hood.

9. Remove the four machine screws and lock nuts holding hinge support to the front of the belly pan, using a screwdriver having a 7/16-inch blade and a 7/16-inch socket. Hinge support should now be free of the belly pan.

Install Hood, Headlight, Hinge Bracket and Hinge Support

Equipment Necessary: Phillips Screwdriver Having a No. 1 Blade, Screwdriver Having a 1/4-Inch Blade, Screwdriver Having a 7/16-Inch Blade, 3/8-Inch Wrench and 7/16-Inch Socket

1. If the belly pan-mounted hinge support was removed, proceed to step 2. If the headlight housing was removed, proceed to steps 3 to 5. If the hood hinge bracket was removed, proceed to step 6.

2. Place hinge support into position in front of belly pan. Retain hinge support to front of belly pan with four machine screws and lock nuts, using a screwdriver having a 7/16-inch blade and a 7/16-inch socket. DO NOT TIGHTEN MACHINE SCREWS AT THIS TIME.

3. Install headlight housing in hood with two machine screws, washers and lock nuts, using a phillips screwdriver having a no. 1 blade and a 3/8-inch wrench.

4. Install headlight on back of headlight housing with retaining wires.

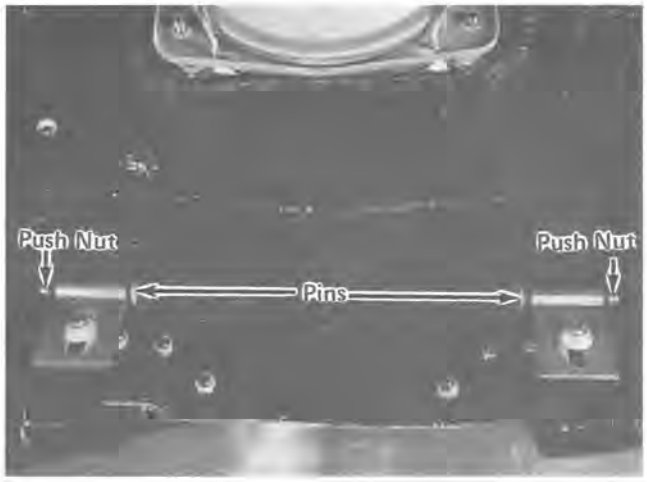
5. Install headlight harness on inside of hood; then push connector over headlight terminals.

6. Install hinge bracket on inside of hood with six slotted machine screws, rubber washers and lock nuts, using a screwdriver having a 7/16-inch blade and a 7/16-inch socket.

7. Place hood into position on hinge support. Retain hood in place with pins and push nuts, Fig. VII-114. Pins are to be installed from inside to outside of bracket.

8. Install looped ends of hood cable over rivet on hood, using a screwdriver having a 1/4-inch blade.

Fig. VII-114



9. Connect the headlight harness to the main wiring harness.

10. If the headlight and/or the headlight housing was removed, adjust the headlight (See: Headlight Aiming, page VII-36).

Headlight Aiming

Equipment Necessary: Tape Measure, Phillips Screwdriver Having a No. 1 Blade

The headlight can be adjusted for vertical and horizontal aim of the high/low beam. The geometric center of the high beam light zone is to be used for vertical and horizontal service aiming.

1. Make sure suspension is adjusted properly.

2. Position the snowmobile on a level floor so the headlight is approximately 25 feet away from a wall or similar aiming surface.

3. Measure the distance from the floor to midpoint of headlight, using a tape measure. REMEMBER THIS DISTANCE.

4. Using distance obtained in step 3, place an appropriate mark on the wall or similar headlight aiming surface.

5. Activate the headlight and make sure high beam is on. DO NOT USE LOW BEAM . . . IMPROPER HEADLIGHT AIM WILL RESULT.

6. Observe the headlight beam aim. Proper aim is when the most intense beam is focused and centered 2 inches below the mark made on the wall or similar aiming surface. If headlight aim is not as specified, a vertical and/or horizontal adjustment of the headlight is necessary (see step 7).

7. To adjust headlight aim, rotate the four spring-loaded tension screws until the center of the most intense beam is focused and centered 2 inches below the mark on the aiming surface.

NOTES

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NOTICE

New Address:
Electro Specialties, Inc.
11225 W. Bluemound Rd.
Wauwatosa, Wisconsin 53226
Phone: 414/475-7550

SPECIAL TOOLS-ENGINE, SACHS

Description: Flywheel Puller

Part Number: 6000-684

Usage: KM24, KM3, KM914 and RC18.5

How Used: To pull flywheel of mainshaft.

Description: Oil Seal Extractor — Includes hook, part number 0144-091 (3MM).

Part Number: 6000-674

Usage: KM3

Description: Hook, 3mm

Part Number: 0144-091

Usage: KM3

How Used: Remove seal from mag side.

Description: Hook, 4mm

Part Number: 0144-090

Usage: KM3

How Used: Remove seal from PTO side.

Description: Decarbonizing Tool

Part Number: 6000-528

Usage: All Sachs Rotary Engines

How Used: Remove carbon from rotor seal grooves.

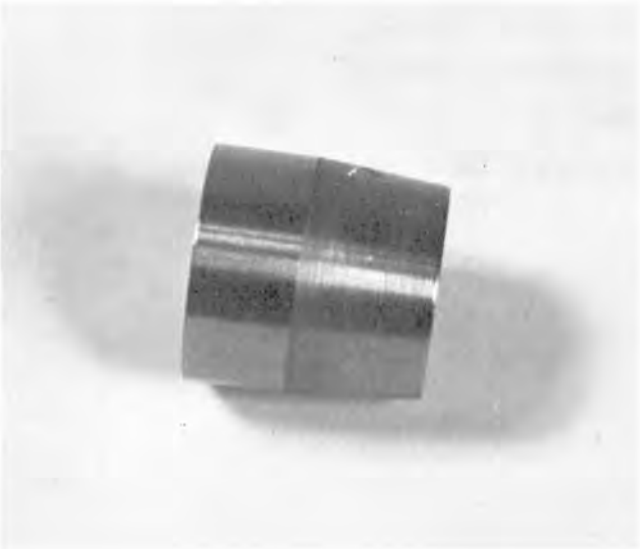
SPECIAL TOOLS-ENGINE, SACHS

Description: Oil Seal Mounting Sleeve

Part Number: 0144-088

Usage: KM3

How Used: Install oil seal in PTO end cover.



Description: Oil Seal Mounting Sleeve

Part Number: 0144-089

Usage: KM3

How Used: Install oil seal in magneto end cover.

Description: Bearing Puller Kit

Part Number: 0144-080

Usage: KM914, RC18.5, SB93, 50AMAX

How Used: Remove bearings from crankshaft.

Note: SB93 puller shells used to pull flywheel off crankshaft.

SPECIAL TOOLS-ENGINE, SACHS

Description: Protective Cap

Part Number: 6000-683

Usage: KM24, KM3, KM914 and RC18.5

How Used: Use with flywheel puller (6000-684) to protect mainshaft.

Part No. 2214-000
Sachs Mini-Bike Tool Kit

Description: Tool Kit

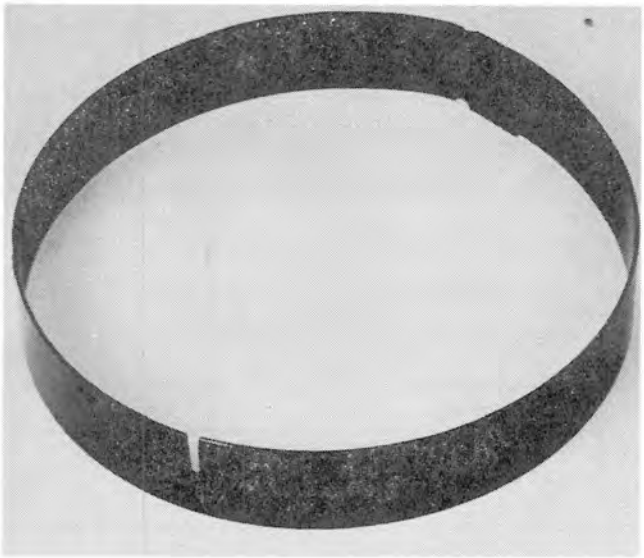
Part Number: 2214-000

Usage: 50AMAX

How Used: Used to pull flywheel, sprockets, piston pin and hold flywheel.

NOTES

SPECIAL TOOLS-ENGINE, ARCTIC CAT

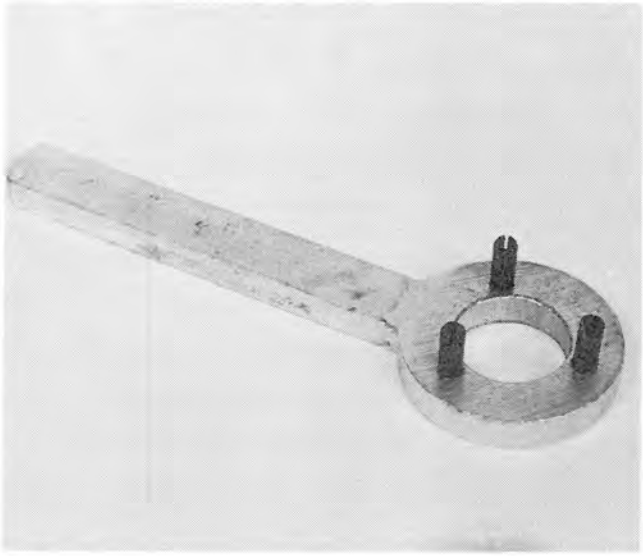


Description: Recoil Spring Retainer

Part Number: 0144-005

Usage: All Arctic Cat Engines Except T6A, T6B, T5A and T5B.

How Used: Used to wind and install recoil spring in recoil case.



Description: Fan Holder

Part Number: 0144-004

Usage: All "T" Series Axial Flow Engines

How Used: Used to hold axial fan pulley.

Description: Spanner Wrench, Flywheel

Part Number: 0144-007

Usage: All Arctic Cat Engines

How Used: Used to hold flywheel while removing flywheel nut.

SPECIAL TOOLS-ENGINE, ARCTIC CAT

Description: Flywheel Puller Kit

Part Number: 0144-064

Usage: All Arctic Cat Engines

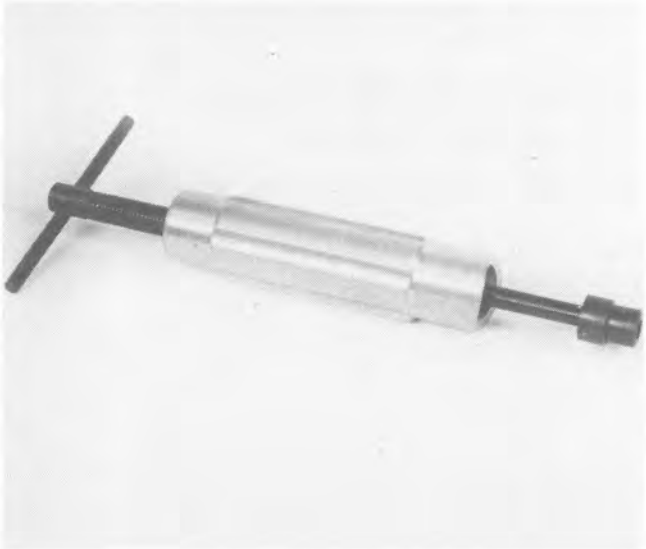
How Used: Used to pull flywheel off crankshaft.

Description: Flywheel Puller Bolt Kit

Part Number: 0144-063

Usage: Use with Flywheel Puller (0144-064)

How Used: For replacement purposes.



Description: Piston Pin Extractor

Part Number: 0144-003

Usage: All Arctic Cat Engines Except T5A and T6A

How Used: Used to remove piston pin.

SPECIAL TOOLS-ENGINE, ARCTIC CAT

Description: Piston Pin Extractor

Part Number: 0144-066

Usage: T5A and T6A

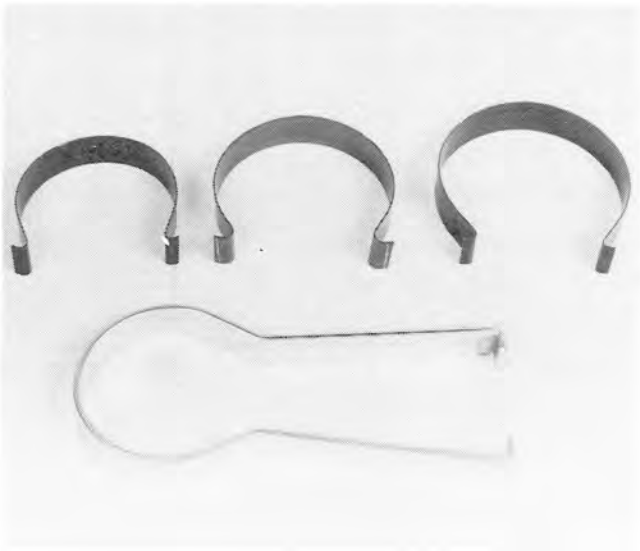
How Used: Used to remove piston pin.

Description: Bearing Puller Kit

Part Number: 0144-080

Usage: All Arctic Cat Engines

How Used: Remove bearings from crankshaft.



Description: Piston Ring Clamp with Compression Bands

Part Number: 0144-001

Usage: All Arctic Cat Engines

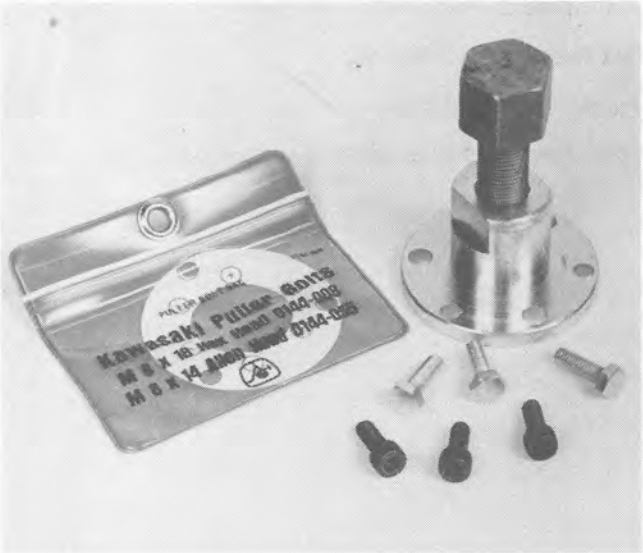
How Used: Used to compress piston ring.

Small – 250 & 295 cc engines

Medium – 340, 400, 440 cc engines

Large – 292 single

SPECIAL TOOLS-ENGINE, ARCTIC CAT



Description: Flywheel Puller Kit

Part Number: 0144-064

Usage: All Arctic Cat Engines

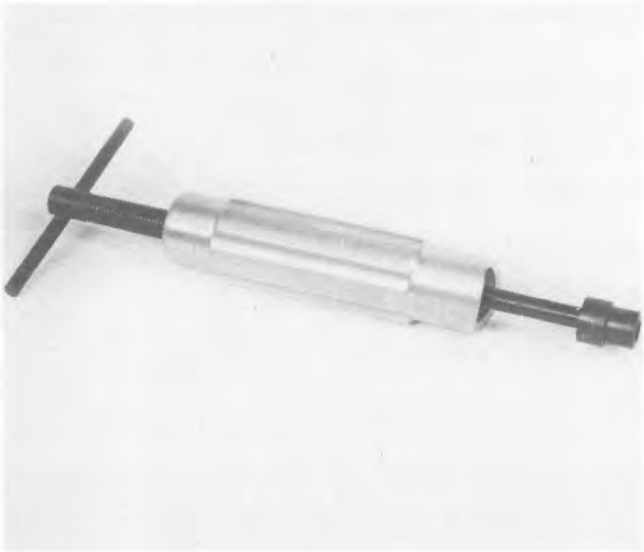
How Used: Used to pull flywheel off crankshaft.

Description: Flywheel Puller Bolt Kit

Part Number: 0144-063

Usage: Use with Flywheel Puller (0144-064)

How Used: For replacement purposes.



Description: Piston Pin Extractor

Part Number: 0144-003

Usage: All Arctic Cat Engines Except T5A and T6A

How Used: Used to remove piston pin.

SPECIAL TOOLS-ENGINE, ARCTIC CAT

Description: Piston Pin Extractor

Part Number: 0144-066

Usage: T5A and T6A

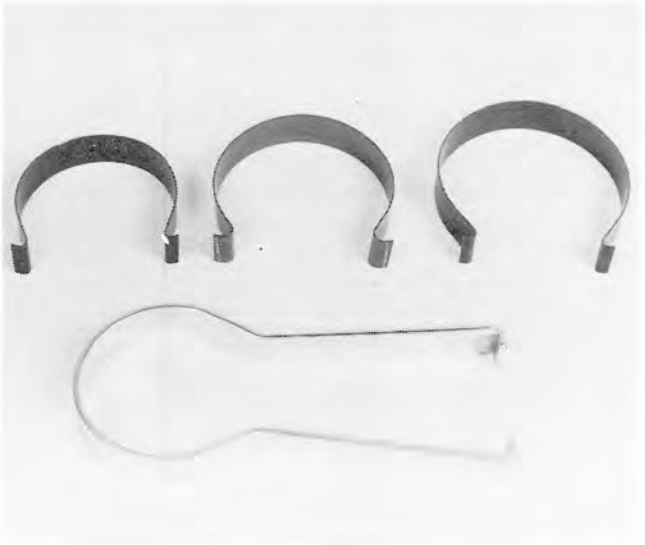
How Used: Used to remove piston pin.

Description: Bearing Puller Kit

Part Number: 0144-080

Usage: All Arctic Cat Engines

How Used: Remove bearings from crankshaft.



Description: Piston Ring Clamp with Compression Bands

Part Number: 0144-001

Usage: All Arctic Cat Engines

How Used: Used to compress piston ring.

Small – 250 & 295 cc engines

Medium – 340, 400, 440 cc engines

Large – 292 single

SPECIAL TOOLS-ENGINE, ARCTIC CAT

Description: Belt Tension Gauge

Part Number: 0144-012

Usage: All Arctic Cat Axial Flow Engines

How Used: Used to tension axial fan belt.

Description: Magneto Gauge

Part Number: 0144-011

Usage: T1A F Series Arctic Cat Engines

How Used: Used to install new excitor, pulser or lighting coil to base plate.

Description: CDI Gauge

Part Number: 0144-056

Usage: T3A and T8A Arctic Cat Engines

How Used: Used to install new excitor, pulser or lighting coil to base plate.

NOTES

SPECIAL TOOLS-ELECTRICAL

Description: Ohm Meter

Note: Order from
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

Description: Amp Meter

Note: Order from
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

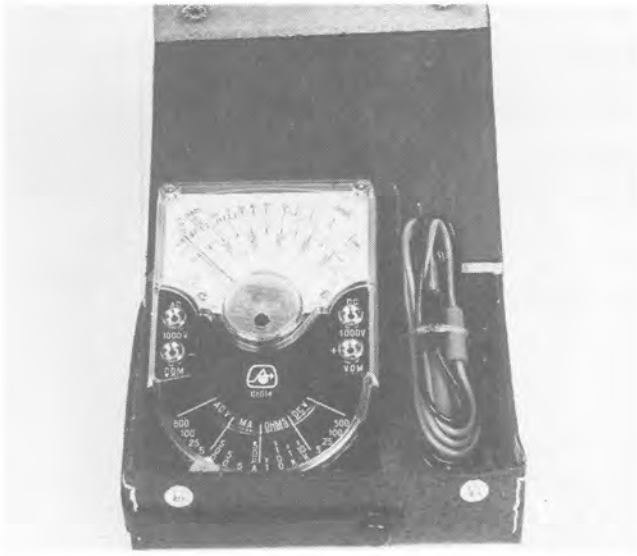
Description: Volt Meter

Note: Order from
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

SPECIAL TOOLS-ELECTRICAL

Description: CD Ignition Tester

Note: **Order from**
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

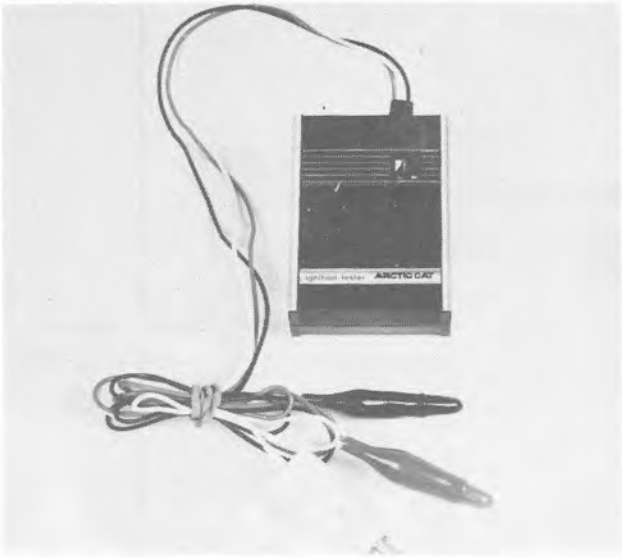


Description: Multitester

Part Number: 0144-053

Usage: All Arctic Cat Snowmobile Electrical Systems

How Used: Ability to read AC volts, DC volts and Ohms



Description: Timing Buzzer

Part Number: 0144-010

Usage: All Arctic Cat Engines

How Used: Used to time engines.

SPECIAL TOOLS-ELECTRICAL

Description: Engine Timing Gauge

Part Number: 0144-009

Usage: All Arctic Cat Engines Except Those Equipped with CDI

How Used: Used to time engines.

Description: Amp Terminal Extractor

Part Number: 0144-100

Usage: All 1974 Arctic Cat Snowmobiles Except Lynx I and Wankel Panther

How Used: Used to remove wire terminal from engine connector block.

NOTES

SPECIAL TOOLS-DRIVE SYSTEM

Description: Arctic Drive Clutch Puller

Part Number: 0144-104

Usage: All 1974 Arctic Cat Snowmobiles Except Wankel Panther Equipped with Arctic Clutch (0225-050 & 0225-010)

How Used: Used to pull drive clutch off crankshaft.

Description: Arctic Drive Clutch Puller

Part Number: 0144-054

Usage: 1974 Wankel Panther Equipped with Arctic Clutch (0225-050 & 0225-014) and 1973 Cheetah/Panther

How Used: Used to pull drive clutch off crankshaft.

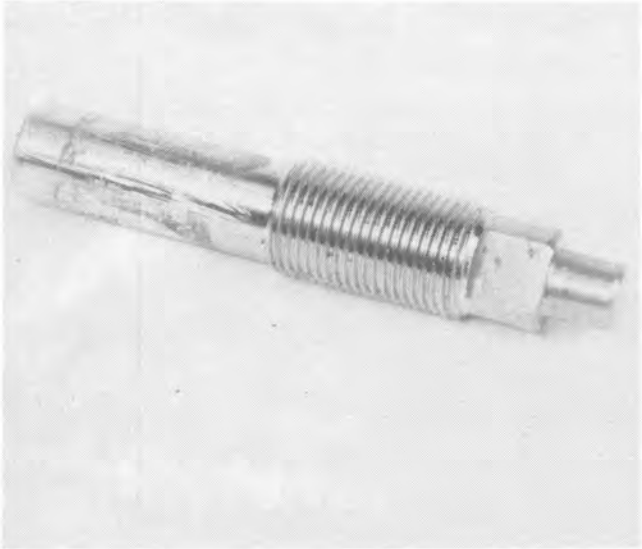
Description: Arctic Drive Clutch Puller

Part Number: 0144-068

Usage: All 1973 Arctic Cat El Tigre's

How Used: Used to pull drive clutch off crankshaft.

SPECIAL TOOLS-DRIVE SYSTEM

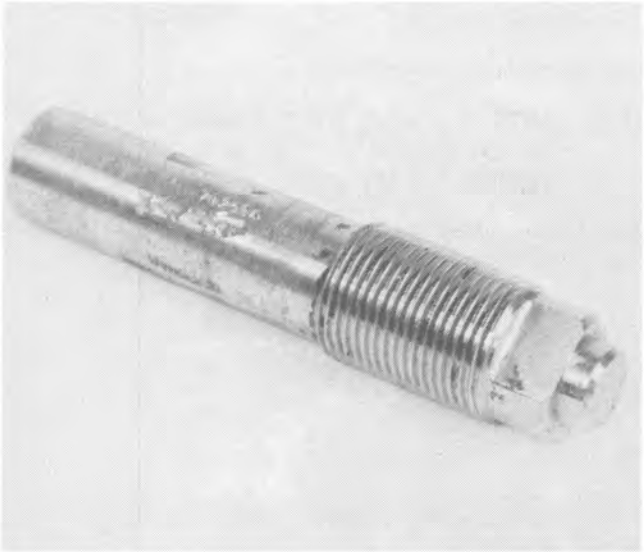


Description: Salsbury Drive Clutch Puller

Part Number: 0144-031

Usage: All 700 Series Salsbury Drive Clutches

How Used: Used to pull drive clutch off crankshaft.

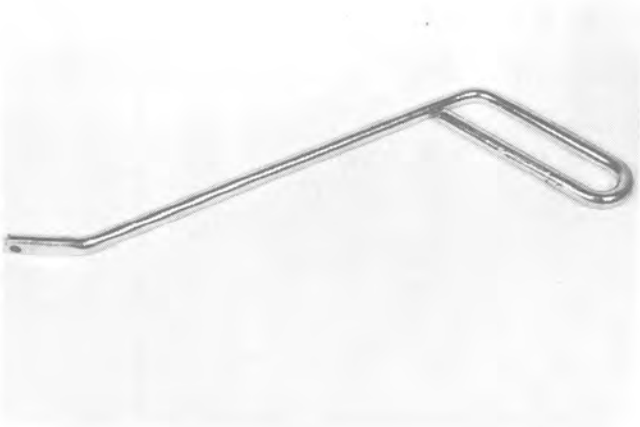


Description: Salsbury Drive Clutch Puller

Part Number: 0144-029

Usage: All Salsbury 910 Drive Clutches

How Used: Used to pull drive clutch off crankshaft.



Description: Spring Seating Tool

Part Number: 0144-014

Usage: All Salsbury Drive Clutches

How Used: Used to seat spring behind roller arm tab.

SPECIAL TOOLS-DRIVE SYSTEM

Description: St. Lawrence Drive Clutch Puller

Part Number: 0144-052

Usage: All St. Lawrence Clutches

How Used: Used to pull drive clutch off crankshaft.

Description: Salsbury Drive Clutch Puller

Part Number: 0144-026

Usage: Salsbury 9R & 11R Drive Clutch

How Used: Used to pull drive clutch off crankshaft.

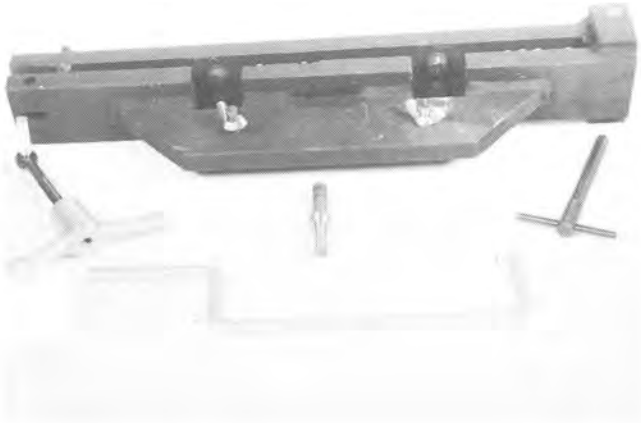
Description: Salsbury Drive Clutch Roller

Part Number: 0144-025

Usage: Salsbury 7R

How Used: Used to pull drive clutch off crankshaft.

SPECIAL TOOLS-DRIVE SYSTEM



Description: Solid Rivet Tool

Part Number: 0144-067

Usage: All Tracks Manufactured with Solid Rivets and Internal Drive Lugs

How Used: Used to rivet cleats and ice studs to track – TRACK REBUILDING.

Description: Solid Rivet Tool

Part Number: 0144-062

Usage: All Tracks Manufactured with Solid Rivets and Cleat Drive

How Used: Used to rivet cleats, track guides and ice studs to track – TRACK REBUILDING.

Description: Snowmobile Stand

Part Number: 0144-082

Usage: All Arctic Cat Snowmobiles

How Used: Used to hold snowmobile on its side while using solid rivet tools.

SPECIAL TOOLS-DRIVE SYSTEM

Description: Air Operated Solid Rivet Tool

Part Number: 0144-094

Usage: All Arctic Cat Snowmobile Tracks

How Used: Used to rivet cleats and ice studs to track.

Description: Drive Clutch Spanner Wrench

Part Number: 0144-069

Usage: 1973 El Tigre'

How Used: Used to hold drive clutch for removal purposes.

Description: Clutch Alignment Kit

Part Number: 0144-097 Spacer (.305)
0144-098 Spacer (.365)
0144-099 Bar

Usage: All Arctic Cat Snowmobiles

How Used: Used to establish "parallelism" and "offset" between drive clutch and driven pulley.