1974

Panther

VIP

SUPPLEMENT TO 1974-75 PANTHER SERVICE MANUAL

Form No. 0153-034

TABLE OF CONTENTS

TABLE OF CONTENTS

SETTING UP INSTRUCTIONS

Install Skid Frame

Equipment Necessary: Torque Wrench, Cardboard, Rubber Mallet, Four 3/8-Inch Lock Washers, Four 3/8 x 1-1/4-Inch Bolts, 1/2-Inch Wrench, 1/2-Inch Socket, and 9/16-Inch Socket.

1. Clear a 12 foot by 12 foot area in set up area of the shop.

2. Remove all mounting hardware holding the snowmobile to the pallet. Lift the snowmobile off the pallet and set it on the floor.

3. Tip the snowmobile onto its side, using cardboard to protect against scratching.

● CAUTION ●

Before installing skid frame, the rear arm assembly of the skid frame must be checked. On VIP's between serial number 4003380 and 4003585, the wrong arm may have been installed. On these VIP's the shock absorber will bottom out before the arm contacts the bumper pads. This will cause additional stress on the rear springs and could possibly damage the arm assembly, shock absorber, and lower shock mount. To check for correct arm, measure the distance from outer end of arm assembly to center of spring guide loop. This distance should be 2-9/16 inch. If the distance is 2-3/4 inch, replace the arm with correct arm (Arctic part no. 0104-192).

4. Move front mounting arm of skid frame into position with front mounting holes in tunnel, Fig. 1. Slide lock washer onto bolt and secure skid frame to tunnel. DO NOT TIGHTEN - THREAD IN ONLY HALF WAY.

Fig. 1

NOTE: To aid in centering front arm with mounting holes in tunnel, position skid frame at a 45° angle to bottom of tunnel.

5. Push skid frame, track and tunnel together; then tip snowmobile onto opposite side. Use cardboard to protect against scratching.

6. Secure front mounting arm, following directions in step 4. TO NOT TIGHTEN.

7. Move rear mounting arm of skid frame into position with rear mounting holes in tunnel. Slide lock washer onto bolt and secure skid frame to tunnel, Fig. 2. DO NOT TIGHTEN BOLT - THREAD IN ONLY HALF WAY.

Fig. 2

NOTE: Rear mounting arm of skid frame may not line up with holes in tunnel. To obtain alignment, drive mounting arm in the required direction until it aligns with hole in tunnel, using a rubber mallet.

8. Tip snowmobile onto opposite side, using cardboard to protect against scratching.

9. Secure rear mounting arm to tunnel with a bolt and a lock washer. Tip snowmobile upright.

10. Tighten all skid frame mounting bolts to 35 ft-lb.

SETTING UP INSTRUCTIONS

Install Skis

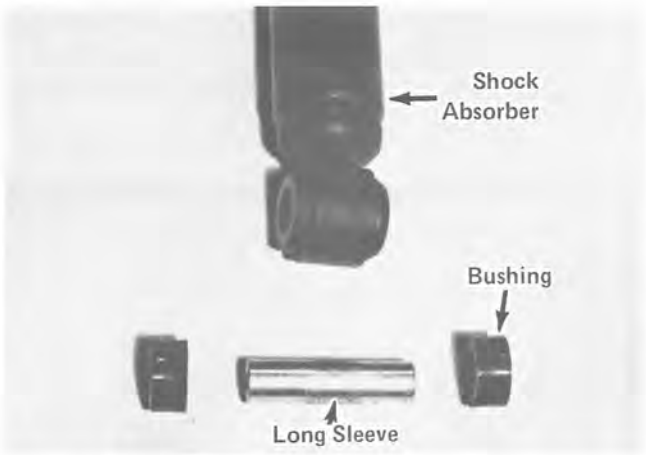
Equipment Necessary: Torque Wrench, Cardboard, Low-Temperature Grease, Shock Absorbers, Long Sleeves, Short Sleeves, Plastic Bushings, Two 7/16 x 2-1/4-Inch Bolts, Two 7/16 x 3-1/4-Inch Bolts, Four 7/16-Inch Lock Nuts, 9/16-Inch Socket, and 5/8-Inch Wrench.

1. Set the two skis and shock absorbers on a bench.

2. Slide a long sleeve through the stationary end of one shock absorber and place a plastic bushing on each end on the long sleeve, Fig. 3.

NOTE: Flat end surface of plastic bushing is to contact shock absorber; radiused end surface is to contact shock mounting bracket.

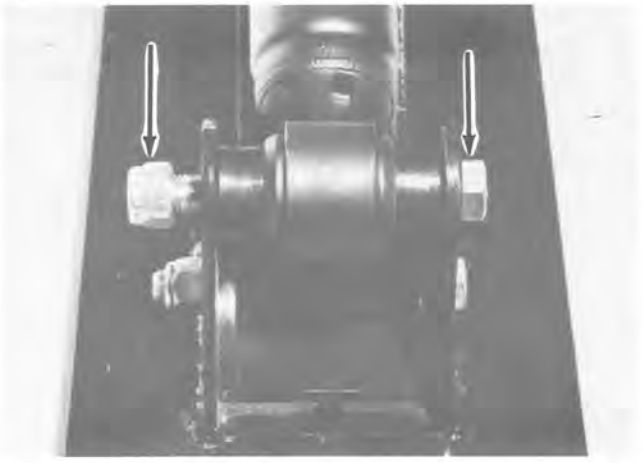
Fig. 3



3. Place shock assembly into position in shock mounting bracket and secure with bolt and lock nut, Fig. 4. Bolt is to be started from outside. Tighten the bolt to 50 ft-lb.

NOTE: Apply low-temperature grease (Texaco 2346 EP or equivalent) to non-threaded portion of bolt to prevent binding or corrosion.

Fig. 4



4. Install remaining shock absorber on other ski, following directions given in steps 2 and 3.

5. Tip snowmobile onto its side, using cardboard to protect against scratching.

6. Place ski assembly into position on spindle and secure with a bolt, Fig. 5. Threaded hole in ski saddle is to be to the inside, and therefore, the bolt must be started from the outside. Tighten the bolt to 30 ft-lb. Thread lock nut onto bolt and tighten to 30 ft-lb.

NOTE: Apply low-temperature grease (Texaco 2346 or equivalent) to non-threaded portion of bolt to prevent binding or corrosion.

Fig. 5

SETTING UP INSTRUCTIONS

7. Slide a short sleeve through moveable end of shock absorber; then position the end in the spindle mounting bracket. Secure with bolt and lock nut, making sure bolt is started from the outside. Tighten to 50 ft-lb.

8. Tip snowmobile on its opposite side, using cardboard to protect against scratching. Install remaining ski assembly to ski spindle, following directions in steps 6 and 7.

9. Position snowmobile upright.

Align Skis

Equipment Necessary: Tape Measure, Torque Wrench, 9/16-Inch Wrench, 9/16-Inch Socket, and 8-Inch Extension.

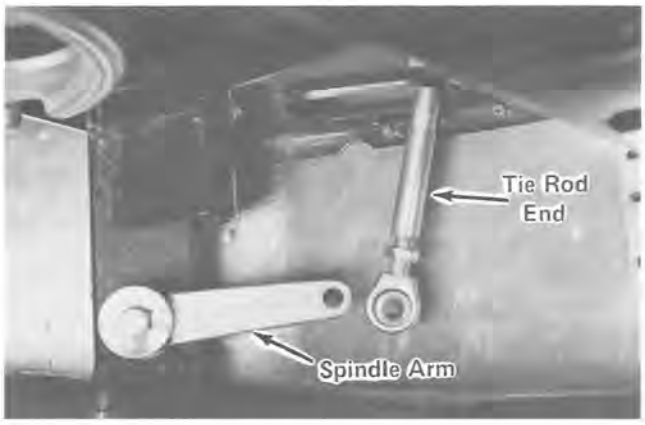
⚠ WARNING ⚠

On VIP's prior to serial number 4002777, there is a possibility that the spindle arms were installed incorrectly. This will cause a problem when aligning skis and can allow the steering post to go over center when turning hard. This could result in injury to the operator and passenger. All machines must be checked. When installed correctly, the rear end of the spindle arm will point inward about 4-1/2 degrees when the skis are straight. If the spindle arm points outward 4-1/2 degrees, remove the arm, turn it over and reinstall. Disregard the "L" or "R" cast onto the arm.

1. Open hood. Remove cap screw and lock nut securing tie rod to spindle arm, Fig. 6 (with chain case removed). Separate tie rod from spindle arm. Perform this operation also on opposite tie rod end.

NOTE: Because of limited working room on the PTO side, a 9/16-inch offset end wrench and a 9/16-inch wrench must be used to remove the cap screw and lock nut securing tie rod to spindle arm.

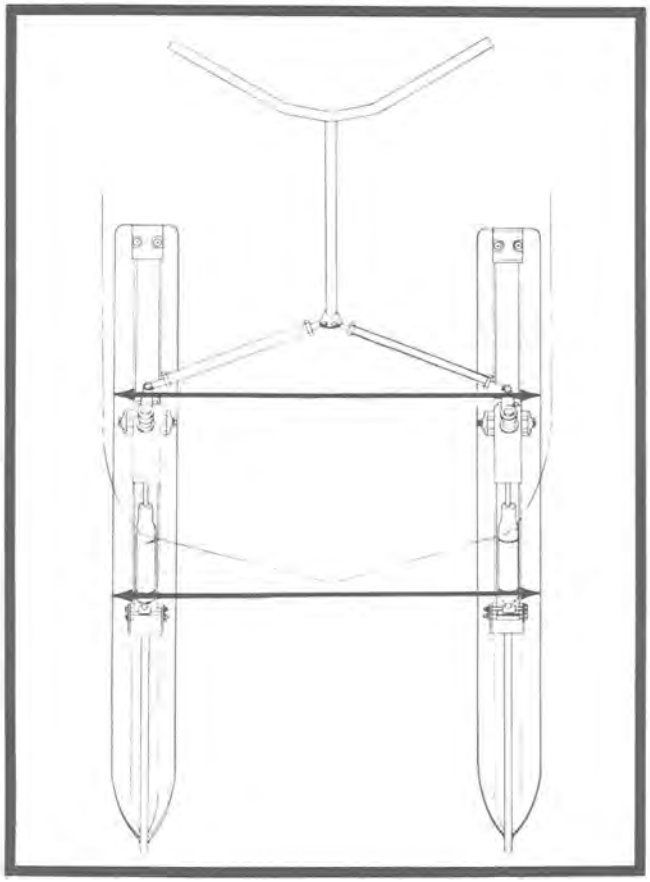
Fig. 6



2. Position skis straight forward and establish a parallel relationship, Fig. 7.

3. Measure the distance between skis, using a tape measure. Make sure measurement is taken behind front spring mounting bracket and ahead of rear spring mounting bracket, Fig. 7. Skis are to be parallel (same measurement at front and rear) or have a maximum of 1/4-inch "toe-in" (front measurement 1/4-inch less than rear).

Fig. 7



SETTING UP INSTRUCTIONS

4. Position handlebar straight forward in relation to skis.

5. Rotate tie rod until tie rod end mounting hole aligns with hole in spindle arm, see Fig. 6 (with chain case removed). Secure tie rod end to spindle with a cap screw and lock nut. Tighten cap screw to 35 ft-lb.

NOTE: Because of limited working room on the PTO side, a 9/16-inch offset end wrench and a 9/16-inch wrench must be used to install the cap screw and lock nut which secure tie rod end to spindle arm.

6. Bottom jam nut against tie rod.

7. Repeat steps 5 and 6 on remaining tie rod.

⚠ WARNING ⚠

To ensure the utmost safety of the operator, all cap screws, lock nuts, jam nuts, tie rods, and tie rod ends must be tightened correctly and be free of noticeable damage. Tie rod end must be threaded half way into tie rod to assure maximum steering linkage strength. If any of these conditions is neglected, or if parts are damaged or incorrectly assembled, serious injury to the operator or passenger may result.

Install Windshield

Equipment Necessary: Windshield Trim, 8 Rubber Well-Nuts, 8 Phillips Screws, and Phillips Screwdriver Having a No. 2 Blade.

1. Remove windshield from plastic bag. Dispose of plastic bag.

2. Separate windshield and trim by removing three twist-lock ties.

3. Push the 8 rubber well-nuts into mounting holes in hood.

4. Position windshield and trim on hood and secure with 2 Phillips screws on each side of center, Fig. 8. Thread screws 3/4 of the way in. DO NOT TIGHTEN SCREWS.

Fig. 8

5. Working from side to side, install remaining Phillips screws. DO NOT TIGHTEN SCREWS.

6. When all screws are installed and windshield is in place, tighten all screws, working from the center to the outside.

Check Hood Latches

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade, 11/32-Inch Wrench, and 3/8-Inch Wrench

1. Open hood. Allow hood to rest on the latch strike, Fig. 9.

2. Examine the alignment between the latch strike and the cut out in bottom of hood latch. The latch strike is to be positioned directly over the cutout in bottom of hood latch, Fig. 9. If correct alignment is evident, proceed to step 4. If correct alignment is not evident, proceed to step 3.

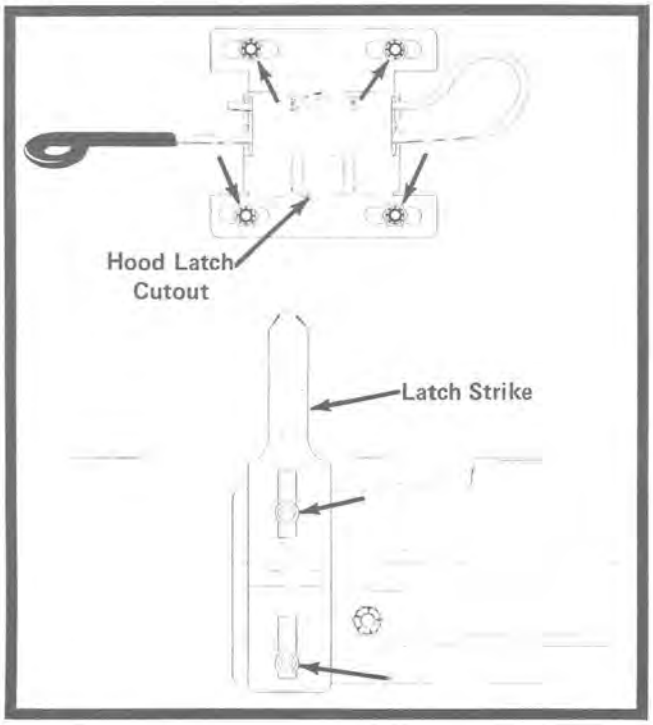
3. Loosen the 4 lock nuts and Phillips machine screws securing the hood latch, Fig. 9. Proceed to step 4.

4. Close hood. Push down on each side of the hood to determine how much "free-play" exists between hood latch and latch strike. Virtually no "free-play" is to be evident. If "free-play" is evident, proceed to step 5. If no "free-play" is evident, proceed to step 6.

5. Loosen the 2 carriage bolts and lock nuts securing the latch strike, Fig. 9. If hood is too tight and is difficult to open, move the latch

strike up. Proper adjustment is when hood is tightly secured (no "free-play") and opening and closing is possible without undue binding of hood latch and latch strike. When correct adjustment is obtained, tighten the 2 carriage bolts and lock nuts.

Fig. 9



6. Close hood and check again for correct operation.

Adjust Brake

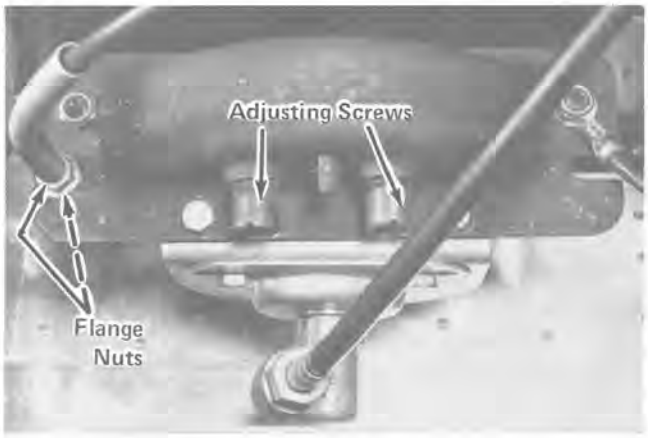
Equipment Necessary: Screwdriver Having a 7/16-Inch Blade, 1/2-Inch Wrench.

NOTE: Before brake can be adjusted correctly, check to ensure that brake disc is free to move on track drive shaft. Brake disc must be free on shaft to allow centering between brake pads and allow maximum efficiency of the brake.

1. Disconnect brake cable from brake unit by loosening the brake adjusting flange nuts on top and bottom side of brake cover, Fig. 10.

2. Alternately tighten the two large adjusting screws until both screws are bottomed out (when brake pads are against disc), Fig. 10.

Fig. 10



3. Rotate the two adjusting screws counterclockwise 3/4 turn.

NOTE: Adjusting screws must be adjusted evenly to prevent accelerated brake wear.

4. Connect brake cable to brake unit. Squeeze the brake lever. When brake is fully engaged, there is to be from 1/2 to 3/4 inch between the front of the brake lever and the brake lever stop. If distance is not within specifications, rotate the two adjusting nuts clockwise or counterclockwise until the specified adjustment is obtained.

5. Tighten brake cable jam nut.

Install New Sealing Washer and Adjust Chain Tension

Equipment Necessary: 1/2-Inch Wrench

1. Elevate front of snowmobile so the fluid level in chain case is below chain tightener bolt hole.

2. Loosen jam nut and remove the chain tensioner bolt, Fig. 11.

Fig. 11

SETTING UP INSTRUCTIONS

3. Replace existing sealing washer with new sealing washer (Arctic Part No. 0107-387).

4. Reinstall bolt into chain case and adjust chain tension.

NOTE: Chain must be very tight. When tightening chain tension, watch the rubber mount at rear of converter dropcase. When the rubber mount starts to compress, stop tightening tensioner bolt and back bolt out about 1/2 turn.

5. Tighten jam nut on chain tensioner bolt.

Adjust Suspension and Track

Equipment Necessary: Low-Temperature Grease (Texaco 2346 or Equivalent), Flexible Hose Grease Gun

1. Lubricate rear suspension arms with low-temperature grease (Texaco 2346 or equivalent).

NOTE: Position of grease fitting requires that a flexible hose grease gun be used.

2. Adjust suspension (See: Panther Service Manual, Section VI - Suspension, Suspension Adjustment, page VI-17).

3. Adjust track tension (See: Panther Service Manual, Section VI - Suspension, Track Tension, page VI-16).

4. Adjust track alignment (See: Panther Service Manual, Section VI - Suspension, Track Alignment, page VI-16,17).

Move Chain Case Vent

Equipment Necessary: Hammer, Rubber Mallet, Plug (Part No. 0109-578), Rubber Bushing, (Part No. 0109-413), Drill Having a 9/16-Inch Bit, and 1/2-Inch Cold Chisel

It has been found through extensive testing that relocating the chain case vent will eliminate the chance of torque converter fluid being blown out through the vent hose.

1. Remove the plug insert in the front of the chain case cover using a hammer and a 1/2-inch cold chisel. Use the chisel to rotate plug insert until it can be removed from cover.

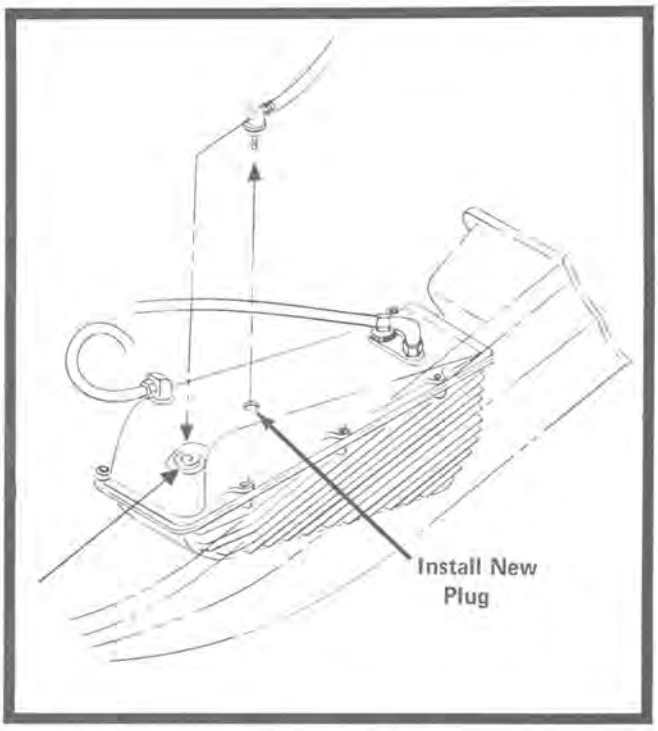
2. When plug is removed from cover, drill a hole in the center of plug, using a drill with a 9/16-inch bit.

3. Tap plug into place in cover, using a rubber mallet.

4. Remove the present vent hose plug w/hose and insert it in the new hole in chain case cover. Tap into place, using a rubber mallet. See Fig. 12.

5. Plug original vent hole with a plug (Part No. 0109-578), see Fig. 12, and a rubber bushing (Part No. 0109-413).

Fig. 12



Check Battery and Battery Hold-Down

Equipment Necessary: Drill With a 3/16-Inch Bit

When removing the battery to charge (fill) during pre-delivery, battery case must be checked for cracks and excessive warping. All damaged batteries must be replaced. The cracks or warping may be caused by too tight a battery hold-down. To correct this, new holes must be drilled in hold-down bracket.

1. Remove the battery hold-down by releasing the two latches, Fig. 13. If tension seems too tight, latches must be relocated. See steps 5-7.

SETTING UP INSTRUCTIONS

Fig. 13

2. Remove the battery; then examine battery for cracks or excessive warpage. If battery is cracked or warped, replace.

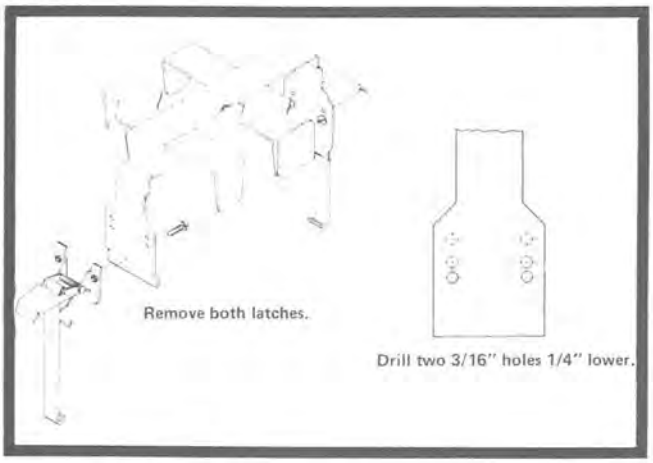
3. Fill battery with electrolyte to the proper level.

4. Fully charge battery (See: Panther Service Manual, Section IV - Electrical System, Battery Charge Table, page IV-33).

5. Remove latches from the hold-down.

6. Drill four new 3/16-inch holes 1/4 inch lower than original holes, using a drill with a 3/16-inch bit, Fig. 14.

Fig. 14



7. Reinstall latches.

8. Install battery in battery pan.

9. Secure in place with battery hold-down.

NOTE: If the snowmobile is to be operated over prolonged periods with the lights ON, or if the snowmobile is stopped and started quite often, the battery charge may become low. A very convenient accessory, called a Sta-Charge, is available through the local Arctic Cat snowmobile dealer. The Sta-Charge is a snowmobile mounted battery charger that can be plugged into any 115 volt AC outlet to charge the battery.

Change Battery Ground

Equipment Necessary: Torque Wrench, Screwdriver Having a 5/16-Inch Blade, 10mm Wrench, 13mm Wrench, and a 13mm Socket.

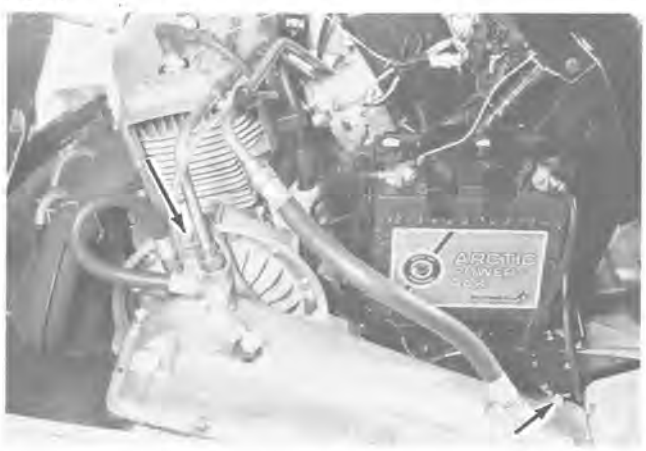
It is recommended that the battery ground wire be relocated during set-up.

1. Remove the negative battery cable (black) from the chassis ground.

2. Loosen opposite end of the negative battery cable on the battery.

3. Remove the top torque converter case assembly bolt, Fig. 15.

Fig. 15



4. Fasten open end of negative cable to top torque converter case assembly bolt. Tighten to 16 ft-lb.

5. Secure negative cable to battery terminal.

SETTING UP INSTRUCTIONS

Check Solenoid Wire

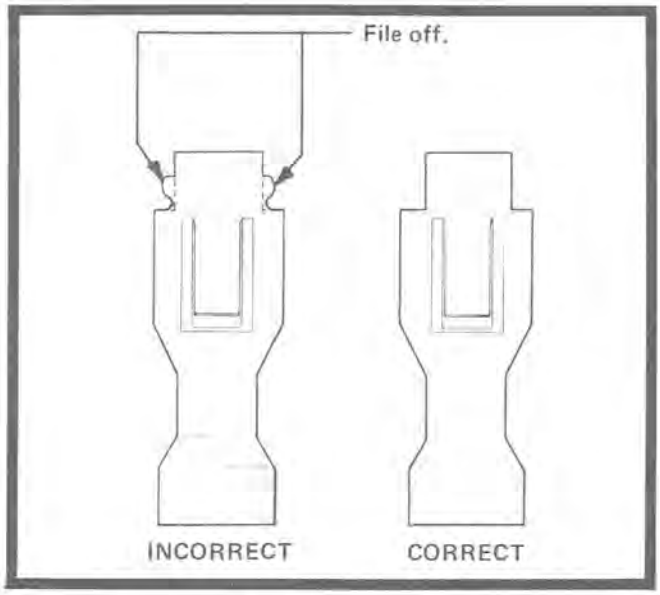
Equipment Necessary: Small File

The male terminal end of the heavy black wire running from the solenoid to the ignition switch connector may have burrs which prevent a positive connection.

1. Grasp heavy black wire from solenoid at ignition switch connector end and slightly pull. If wire does not pull out, terminal end is satisfactory. If wire pulls out, proceed to step 2.

2. Remove the burrs, Fig. 16, from the terminal end, using a small file.

Fig. 16



3. Position terminal locking tab at about a 45° outward angle. Insert terminal into switch connector. Check terminal again, following directions in step 1.

Adjust Choke and Throttle Controls

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

1. Loosen choke cable retaining screw, see Fig. 17. Move carburetor-mounted choke arm fully forward (toward engine) and hold in this position.

2. Position front edge of console-mounted choke knob 1/8 inch from console. When knob is in correct position, tighten choke cable retaining screw.

NOTE: The choke cable is adjusted with 1/8 inch between front edge of choke knob and console to ensure carburetor choke is fully forward when choke is not used (pushed in).

3. Loosen throttle cable retaining screw, see Fig. 17. Pull all slack from throttle cable plus an additional 1/16 inch to preload the throttle safety switch spring.

4. Hold throttle cable in place and tighten throttle cable retaining screw.

5. Adjust carburetor throttle controls (See: Panther Service Manual, Section III - Fuel System, Carburetor Installation/Adjustments, Throttle Adjustment, page III-19).

Install Carburetor Enrichener Bushing

Equipment Necessary: Hammer, Pin Punch, and Screwdriver Having a 5/16-Inch Blade

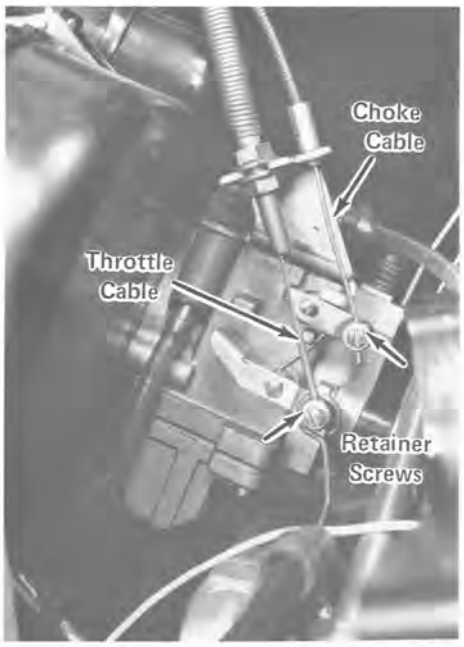
A carburetor enrichener bushing has been made available for installation in the carburetor. The bushing will allow richer and faster fuel delivery when starting. The bushing (Arctic Part No. 0109-623) is not supplied with the snowmobile but can be ordered by an authorized Arctic Cat Snowmobile dealer.

1. Loosen screw holding throttle cable to throttle arm, Fig. 17. Remove throttle cable.

2. Loosen screw holding choke cable to enrichener valve arm, see Fig. 17. Remove choke cable.

SETTING UP INSTRUCTIONS

Fig. 17

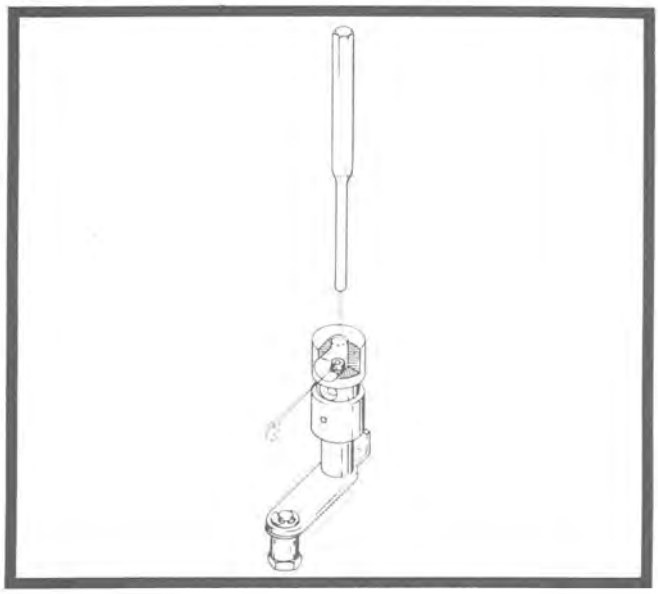


3. Loosen the four screws on top of carburetor until fuel pump assembly and throttle bracket can be raised to allow enrichener valve to be removed from carburetor body.

4. Slide enrichener valve out of carburetor body, using extreme care so small spring and retainer ball are not lost.

5. Install bushing (Arctic Part No. 0109-623) through large side hole into air bleed hole, small end first. Seat bushing even with edge of large side hole with a pin punch, Fig. 18.

Fig. 18



6. Lubricate enrichener valve and reinstall in carburetor body. Tighten the four screws at top of carburetor.

7. Secure choke cable to enrichener valve.

8. Install throttle cable in throttle arm. Remove all slack from throttle wire; then pull through an additional 1/16 inch of the throttle wire. This will preload the throttle safety switch. Secure throttle cable in throttle arm by tightening retaining screw.

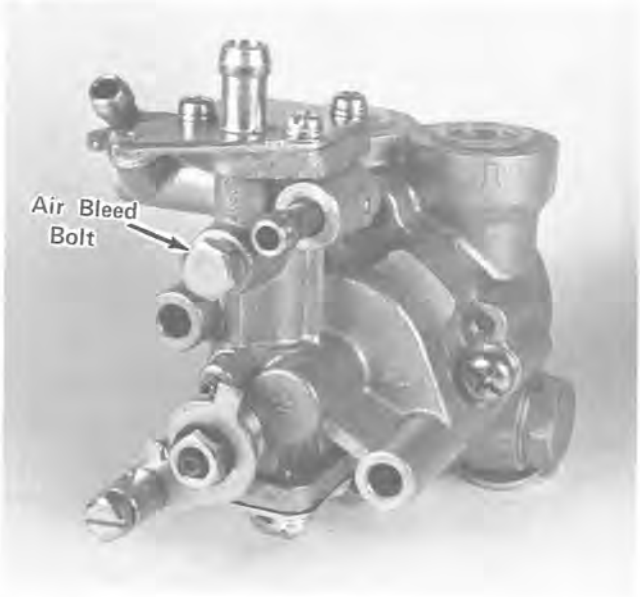
Check Oil Injection

Equipment Necessary: 10mm Wrench

1. Fill oil reservoir with Arctic VIP Inject-O-Lube Oil.

2. Loosen air bleed bolt located just below pump inlet tube on PTO side of injector pump, Fig. 19.

Fig. 19



3. Note clear plastic oil tube running from oil reservoir to oil injector pump. Allow oil to flow out air bleed hole. When clear plastic tube shows no trace of air, tighten air bleed bolt.

4. Mix one gallon of gas with oil in a 20:1 mixture. Add mixture to the gas tank.

SETTING UP INSTRUCTIONS

5. Start the engine. In a short time, excessive smoke will indicate the pump is working. Then, add regular gas (without oil) to fill fuel tank.

NOTE: This will dilute the rich fuel/oil mixture in the fuel tank.

Check Switch Operation

Equipment Necessary: No Special Tools Required

1. Turn ignition switch to START position and start engine.
2. With engine running, move light switch to ON position; headlight and taillight are to illuminate.
3. Move headlight dimmer switch to other position; headlight beam should change.
4. Squeeze brake lever; brakelight is to illuminate.
5. Move throttle safety/kill switch to either OFF position. Engine will stop if switch is operating properly.
6. With engine running, rotate ignition key to OFF position to ensure ignition switch will shut engine off.

Time The Engine (Ignition)

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

It is recommended that the ignition timing be checked at time of "set-up" and each time the engine is serviced. Incorrect ignition timing has a negative effect on engine performance.

1. Disconnect high tension wire from spark plug. Remove spark plug and washer. Check for correct type and heat range (Champion N-19V).

NOTE: The Arctic Cat VIP Snowmobile has a surface gap spark plug. No gap can be set as in conventional plugs.

2. Install spark plug and washer and tighten to 16-18 ft-lb.
3. Start engine and check ignition timing, using a timing light. (See: Panther Service Manual, Section IV - Electrical System, Check Ignition Timing, page IV-41).

Set Ignition Timing

Equipment Necessary: Torque Wrench, Timing Light, Quik-Jak, Screwdriver Having a 1/4-Inch Blade, and a 10mm Socket

1. Raise rear of snowmobile off the shop floor, using a Quik-Jak. Make sure track is free to rotate.
2. Turn ignition key to START position and start the engine.
3. Point timing light at timing mark on fan housing and note position of timing mark on flywheel.
4. Accelerate engine to 6000 rpm. Timing marks on flywheel and fan housing should align.

NOTE: Make sure timing mark advances as rpm is increased. Built in electronic advance cannot be adjusted.

5. If timing marks align at 6000 rpm, timing is correct. If marks do not align, proceed to step 6.
6. Stop Engine - To adjust ignition timing, magneto base assembly must be rotated either clockwise or counterclockwise.
7. Remove the three bolts securing recoil assembly to fan housing, Fig. 20. Set recoil aside.

Fig. 20

SETTING UP INSTRUCTIONS

8. Remove the three lock washers and nuts securing auxiliary starting pulley, Fig. 21. Remove the large plate, auxiliary starting pulley, and pump drive pulley.

Fig. 21

9. Remove the three bolts securing fan drive pulley to flywheel. Remove the pulley.

10. Rotate flywheel until magneto base plate screws can be seen. Loosen the two screws. Rotate base plate clockwise to advance the timing.

NOTE: If timing mark on flywheel was ahead of reference mark, rotate base plate clockwise. By contrast, if flywheel mark was behind reference mark, rotate base plate counterclockwise.

11. Tighten magneto base plate attaching screws.

12. Place axial fan belt on fan pulley and position on flywheel. Secure with three bolts and lock washers. Tighten bolts to 5 ft-lb.

13. Install in order, the pump drive pulley, pump belt, auxiliary starting pulley, and the large plate on the three studs of the fan drive pulley. Secure with three nuts and lock washers; then tighten to 5 ft-lb.

14. Start engine and check timing (step 3 to 5). If timing is correct, install recoil starter on fan housing. Secure with three bolts and lock washers; then tighten bolts to 5 ft-lb.

Adjust Headlight

Equipment Necessary: (See: Panther Service Manual, Section IV - Electrical System, Headlight Adjustment)

1. The headlight is to be adjusted for vertical and horizontal aim of the high/low beam (See: Panther Service Manual, Section IV - Electrical System, Headlight Adjustment, page IV-42).

Change Brakelight Wiring

Equipment Necessary: 6-Inch Piece of 16 Gauge Wire, One Insulated Wire Connector, One Female Terminal (Part No. 0109-195)

To prevent dimming of headlights when brake is applied, it is recommended that the brakelight be converted from ac to dc operation.

1. Cut red wire running from light switch to brakelight harness connector, using a side cutter.

2. Install a female terminal on one end of the 6-inch piece of 16 gauge wire.

3. Connect remaining end of 6-inch wire to red wire (cut in step 1) running to the brakelight harness connector. Tape end of red wire not being used.

4. Remove connector plug from back of ignition switch. Insert end of new wire into remaining open terminal hole in connector plug.

5. Plug connector into back of ignition switch.

6. Turn ignition switch to ON position. Squeeze brake lever. Brakelights should illuminate.

NOTE: If brakelights do not work, go back and check all connections or check brakelights (See: Panther Service Manual, Section IV - Electrical System, Check Brakelights, page IV-25).

7. Turn ignition switch to OFF position.

BREAK-IN

Strict adherence to the following break-in procedure will contribute to optimum performance and longevity of the Arctic Cat snowmobile engine.

Inform the customer that for the first 10 operating hours, the engine is not to be subjected to heavy load conditions or full throttle operation. During the initial break-in or just after the engine is overhauled, a maximum of 1/2 throttle is recommended. Operating speeds are to be varied and not maintained for a prolonged time.

NOTE: During break-in or after the engine is overhauled, one gallon ONLY of a 20:1 mixture (fuel:oil) should be used to help lubricate engine until excessive smoke indicates the injection pump is working.

After the customer operates his snowmobile for 10 hours (break-in), ask him to return the snowmobile to the dealership for a 10 hour maintenance check. This checkup, however, is at the expense of the snowmobile owner. The checkup will allow the dealer to talk with the customer and determine if any serious problems exist. If there are any problems, they may be easier to remedy at this time rather than to allow the snowmobile to be operated at the risk of further complications. If a defective part is found during the ten hour checkup and it is a warrantable part, submit a warranty claim form through normal Arctic channels (refer to the Warranty Policy and Procedure Booklet). The customer is not to pay for a warrantable part.

Arctic recommends that specific items be checked at the ten hour checkup. The specific items are critical adjustments, operating characteristics, and safety features (See: Ten Hour Checkup, page 13).

TEN HOUR CHECKUP

Arctic recommends that specific items be checked after the snowmobile has been operated in accordance with the break-in procedure described in the Operator's Manual. The cost of the checkup is to be assumed by the customer. This ten hour checkup will allow the Arctic dealer to talk with the customer and determine if a problem exists. If the customer is dissatisfied, the problem may be easier to remedy at this time rather than to allow the snowmobile to be operated until a possible failure occurs. If a defective part is found and it is a warrantable part, submit a warranty claim form through normal Arctic channels (refer to the Warranty Policy and Procedures Booklet).

The following items are to be checked:

1. Ask the customer if he is generally satisfied with the performance and operating characteristics of the snowmobile.
2. Check the operation of the ignition switch, headlight and taillight switch, brakelight switch, and the emergency shut-off switch. Make sure both high and low beams of the headlight work.
3. Test drive the snowmobile so that you can be certain all systems are working properly. Test the brake for proper braking characteristics.
4. Remove the spark plug and examine the center electrode. Determine the engine operating temperature by examining the color of the center electrode.
5. Check the fuel line, the in-line fuel filter, and the fuel tank filter.
6. Check the carburetor for proper adjustment.
7. Check the choke and throttle cables. Cables must not be bent, frayed, or kinked.
8. Check the skags and ski alignment.
9. Check the fluid level in the dropcase.
10. Check the condition of the oil pump drive belt.
11. Check all vent holes for obstructions and vent lines for kinks.
12. Check track tension and alignment.
13. Lubricate rear suspension arms.
14. Check ignition timing.
15. Tighten all nuts and bolts.
16. Tighten the intake, exhaust and recoil hardware to the correct torque value.
17. Make sure all safety decals are in place.
18. Test drive the snowmobile.
19. Clean the snowmobile prior to customer pick-up or delivery.

ELECTRICAL SYSTEM

Using the VIP electrical specifications given below, refer to instructions provided in the Panther Service Manual for electrical systems testing (see Panther Service Manual, Section IV, Electrical System, Before Trouble Shooting Ign. System, page IV-20 and following).

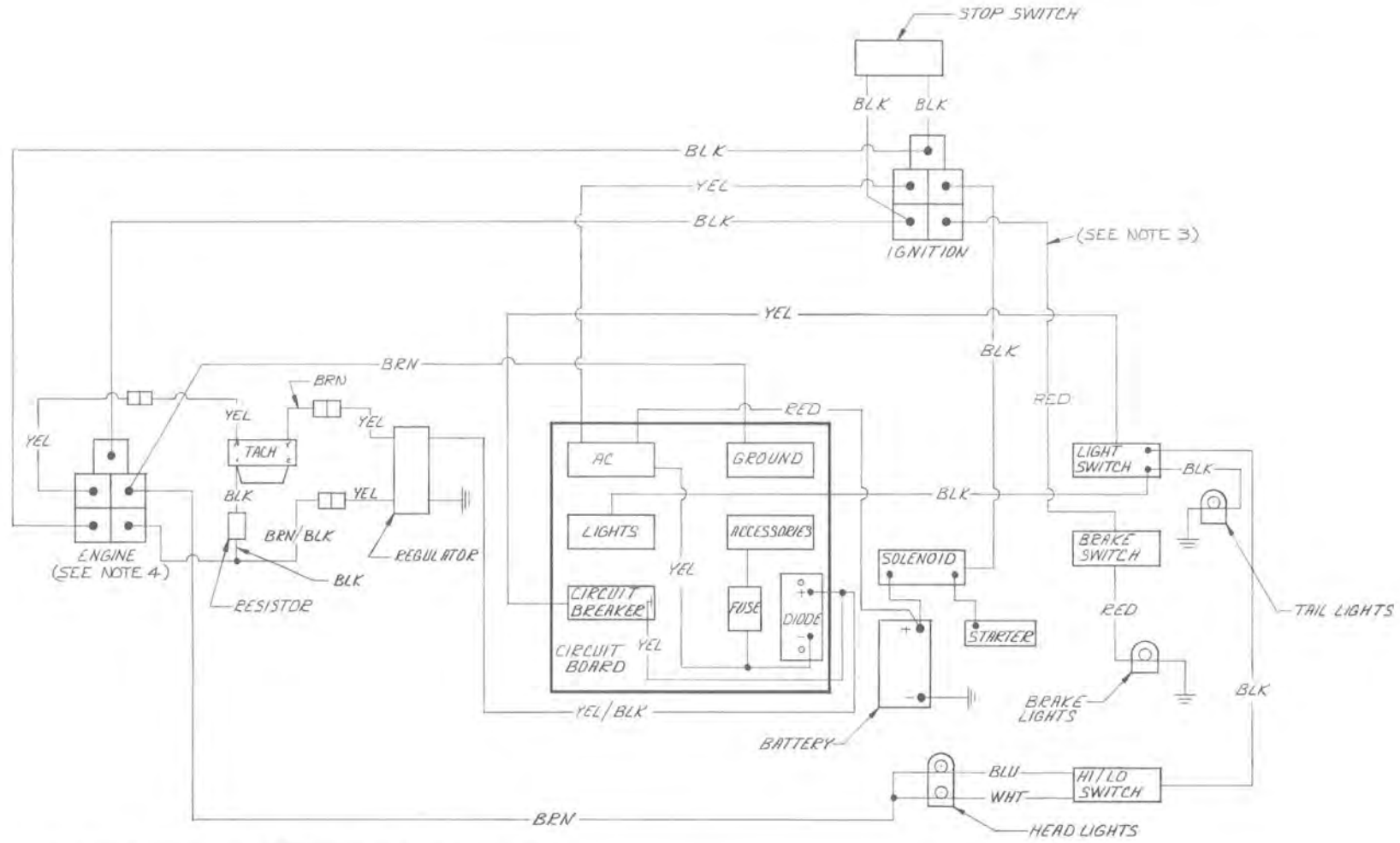
Description	Arctic P/N	Test Value	Tester Connections	
		OHMMETER TESTING		
Ignition Coil:				
Primary	3001-350	.036 ohms	+to blue	–To brown (ground)
Secondary	3001-350	680 ohms	+to high tension #1	–to high tension #2
Exciter Coil	3001-129	295 ohms	+to red	–to ground
Pulser Coil	3001-130	225 ohms	+to red	–to white
Lighting Coil	3001-338	.18 ohms	+to yellow	–to yellow
		OUTPUT TEST WITH ELECTRO SPECIALTIES CDI TESTER MODEL NO. 1 (Note: Red lead is positive, yellow lead is negative.)		
Ignition Coil	3001-350	70	+to ground	–to high tension
Exciter Coil	3001-129	50	+to ground	–to red from stator
Pulser Coil	3001-130	50	+to ground	–to white from stator
CDI Unit	3001-346	75	+to brown CDI lead	–to blue CDI lead Ground second Blue CDI lead
		VOLTMETER TEST		
Circuit Board	—	12-15 DC volts	+to AC terminal	–to ground terminal
		AMMETER TEST		
Alternator	—	7 amps*	+to yellow/black	–to circuit board diode

● CAUTION ●

The above measurement is for regulated voltage at from 2000 to 6500 engine rpm. Unregulated voltage measured at the two yellow leads in the main engine connector plug will vary considerably with engine rpm. Caution should be used when measuring this voltage as it may rise as high as several hundred volts. A low capacity voltmeter may be damaged.

*Output at 6500 rpm with all lights on and battery discharged.

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



4. ENGINE GROUND POINT ON BRAKE ASSEMBLY SHOULD BE FILED TO IMPROVE CONTACT, OR GROUND SHOULD BE CHANGED TO A DIFFERENT POINT ON CHASSIS
3. RECOMMENDED MODIFICATION TO PREVENT DIMMING OF HEADLIGHTS WHEN BRAKE IS APPLIED
2. TEMPERATURE GAUGE LIGHTS: CONNECT ONE WIRE TO LIGHTS AND ONE WIRE TO GROUND ON CIRCUIT BOARD

NOTE: 1. TACHOMETER AND SPEEDOMETER LIGHTS CONNECT TO LIGHT TERMINAL OF CIRCUIT BOARD.

GLOSSARY

A.C.	Abbreviation for alternating current.
Alternator	A generator which produces alternating current.
Amperes	An electrical unit of measure which shows the rate of current flow.
Armature	The iron core of an electro-magnet; best known as used as the drive shaft of a starter motor.
Battery	A storage cell for electrical energy. It changes electrical energy into chemical energy for storage and reverses the process to supply power.
Capacitor (condenser)	An electrical component which can store a small amount of electrical energy.
CDI	Capacitor Discharge Ignition. An ignition system which utilizes a capacitor to store exciter coil output for the primary ignition circuit. It releases this stored energy at the proper time by triggering an SCR switch with an impulse from the pulse coil. Stronger ignition at low engine RPMs and the elimination of breaker points are the foremost advantages.
Circuit	The path electric current takes from a power source to a lead and back to the source. To allow current to flow, a complete circuit must be formed.
Coil	A series of loops of an electrical conductor around an iron core, which form a magnetic field when an electric current is passed through the conductor.
Conductor	A substance which will allow electricity to pass through it easily.
Cycle	It describes the rise and fall of positive electrical voltage, reversal, and the rise and fall of negative voltage at alternator output terminals. One cycle is illustrated in wave form. 
D.C.	An abbreviation for Direct Current.
Diode	An electrical component which will allow current to flow in only one direction. A diode installed in an A.C. circuit will allow current to flow in only one half of the cycle resulting in a pulsating direct current.
Electrode	An electrical conductor which is used as a terminal for a high resistant or non-metalic portion of an electrical circuit.
Electro-Magnet	The core of magnetic material (iron) surrounded by coils of wire through which an electric current is passed to magnetize the core.
Electro-Motive Force	A term meaning voltage or electrical pressure which forces current to flow through a circuit.
Electrolysis	The process of changing electrical energy into chemical energy, as when charging a battery.
Electrolyte	The chemical used in a storage battery; most commonly sulphuric acid and distilled water.

GLOSSARY

Exciter	An induction coil used to produce electrical energy for the primary circuit of an ignition coil.
Farad	The unit of measure used to determine the amount of electrical energy which can be stored in a capacitor. The unit used in ignition systems is the micro-farad.
Field	The magnetic lines of force surrounding a magnet. In electrical motors, the electro-magnetic coils mounted in fixed positions in the case provide a field which attracts the armature. These coils are referred to as field coils.
Generator	A device that produces electricity by moving a conductor through a magnetic field, thus mechanical energy is changed into electrical energy.
Ground	A term used in referring to a common conductor, used as part of an electrical circuit. 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. This can be done by moving the conductor through a magnetic field, as in a magneto alternator, or by building and collapsing a magnetic field around a conductor. This second method is used in transformers or in an ignition coil.
Load	An electrical component or series of components requiring electrical energy for operation. The unit of measure is watts. The load on a snowmobile would be the lights, tachometer and the charge requirements of the battery. On the VIP this will total nearly 100 watts.
Magnet	A body which attracts ferrous materials, such as iron, and is surrounded by magnetic lines of force.
Magneto	A generator which uses permanent magnets for its field.
Ohms	A unit of measure used for the ability to resist the conducting of electricity.
Parallel	The method of connecting an electrical load component to a power source by attaching leads directly to the output terminals, positive to positive and negative to negative.
Polarity	The description of positive or negative poles of a magnet or an electrical circuit.
Primary	As referred to in ignition coils it is the low resistance winding of the coil to which exciter voltage is applied. The primary winding induces the high voltage in the secondary.
Rectifier	An electrical component which will allow current to flow in only one direction.
SCR	Silicone Controlled Rectifier. A device which will not conduct electric current until a given voltage is applied to it. It acts as a gate until enough voltage is applied to the triggering component; it then conducts very well.

GLOSSARY

Series	A method of connecting electrical components which requires the current from the power source to flow through all the components before returning. The leads of the components are connected in this manner, the positive lead of a component is attached to the negative lead from the preceding component. The first and last lead are then connected to the power source.
Secondary	As referred to in the ignition coil, it is the high resistance circuit, which produces the high voltage required to arc across the spark plug electrodes.
Solenoid	A cylindrical electro-magnet with a moveable iron core. In the electric start system the core closes a heavy duty switch to carry the high amperage required by the starter motor.
Volts	The unit of measure used for the amount of electrical pressure from a power source.
Watts	The unit of measure for a quantity of electrical energy.

THEORY OF OPERATION

General

The VIP 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 consists of the components listed below.

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 Plugs

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 accessories.

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 properly. Conversely, without maximum output from the flywheel magneto generator assembly, the engine and other electrical systems will not operate properly.

Ignition System

The function of the ignition system is to ignite the fuel/air mixture contained within 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.

1. 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. 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 exciter coil, 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 – Mounted on the coil bracket, it contains a rectifier, capacitor, and a solid state switch.

5. IGNITION COIL – Mounted on the coil bracket with a high tension lead going to both spark plugs.

As stated in the previous paragraph, 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. To accomplish this, current is induced in the exciting coil by the rotation of the four magnets. 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".

The CDI ignition system cannot utilize alternating current, so the current from the exciter is routed through a rectifier to eliminate the negative flow. The positive flow passes through the rectifier and is stored in a capacitor in the CDI unit. The capacitor is connected to the primary winding of the ignition coil through a SCR. The SCR acts as a switch for

THEORY OF OPERATION

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 for maximum output. Current for the battery charge system is supplied by the magneto alternator system. The generated current, which is induced in the lighting coils by the rotating magnets, is routed to the regulator/rectifier. This current is alternating current, the type that will not charge the battery. Therefore, for battery charging, alternating current must be changed to direct current. 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, thus preventing damage to the charging and lighting system.

TACHOMETER

The function of the engine tachometer is to register the engine mainshaft revolutions per minute. To accomplish this, the A and Y terminals on the back of the tachometer are connected in series with the yellow magneto alternator output lead, which sends pulses to the tachometer. These pulses flow through a coil in the tachometer, creating an electromagnetic force and producing tachometer needle movement against a spring. As the pulse rate of the magento generator increases, so does tachometer needle movement. Conversely, as the pulse rate decreases, so does the electro-magnetic force. This allows the indicator needle spring force to become dominant and indicate a reduction in RPM.

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

TEMPERATURE GAUGE

The function of the temperature gauge is to indicate cylinder head temperatures. The principle of thermoelectricity is used to operate the gauge. Some metals give up electrons readily while others readily accept electrons. An increase in temperature increases this quality. Zinc and copper are metals which possess these qualities respectively. By attaching a sender unit made of both of these metals sandwiched together to the base of the spark plug and running a lead to the temperature gauge, a circuit can be formed to allow electron flow. The gauge is then calibrated to show a temperature reading in relation to the electron flow.

DRIVE SYSTEM

Description	Specifications
Torque Converter Model	Kawasaki Model CIA440DIA
Applied Engine	TIB440DIA
Converter Type	3 Element, 1 Stage, 2 Phase
Maximum Efficiency	83%
Rotating Direction	Clockwise Facing Converter Input
Dry Weight	13-1/2 lb
Idle Speed	1500-1800 rpm
Stall Speed	5000 rpm
Stall Torque Ratio	3.0
Maximum Engine Speed	7500 rpm
Engine Speed at Coupling Point	6250 rpm or 1 to 1 Ratio
Recommended Oil	Arctic Cat Torque-O-Lube
	Alternates: ATF DEXRON (by GM) M2C33E/F (by Ford)
Oil Capacity - Chain Case	3 qt
System Temperatures:	
Maximum	250° F
Intermittent Maximum	280° F
Optimum	200° F

Description	Specifications
Filter	60 to 80 Mesh
System Pressures	
Line 1 (Pump Suction Line)	Suction Head Maximum - 150mm 14-30 psi
Line 2 (Pump to Converter)	0-3 psi (At Maximum Stall Speed)
Line 3 (Converter to Chain Case)	0 psi
System Temperatures (At Oil Reservoir):	
Maximum	250° F
Intermittent Maximum	280° F
Optimum Condition	200° F

DRIVE SYSTEM

Description	Specifications
Sprocket Ratio (Drive/Driven)	19/39
Chain Pitch	96
Chain Type - Link Belt	Silent Chain

Description	Specifications
Track Part Number	0110-790
Track Width	17 in.
Track Length on Ground	36 in.
Type of Drive	Internal Drive Lug
Cleat Part Number	0102-086
Cleat Type and Number of Solid Rivets Holding Each Side Belt	2/3 Flared 3 Rivets

CONVERTER BOLT TORQUE SPECIFICATIONS	
Description	Value (ft-lb)
Bolts securing input coupling and converter case (8mm)	14-16
Special lock nut on turbine shaft (12mm)	18-20
Bolts and nuts securing pump wheel and converter case (6mm)	5-7
Bolts securing pump wheel boss and pump wheel (5mm)	3-4
Bolts securing front case and rear case (8mm)	12-14
Socket bolts on rear cover (6mm)	5-7

DRIVE SYSTEM THEORY

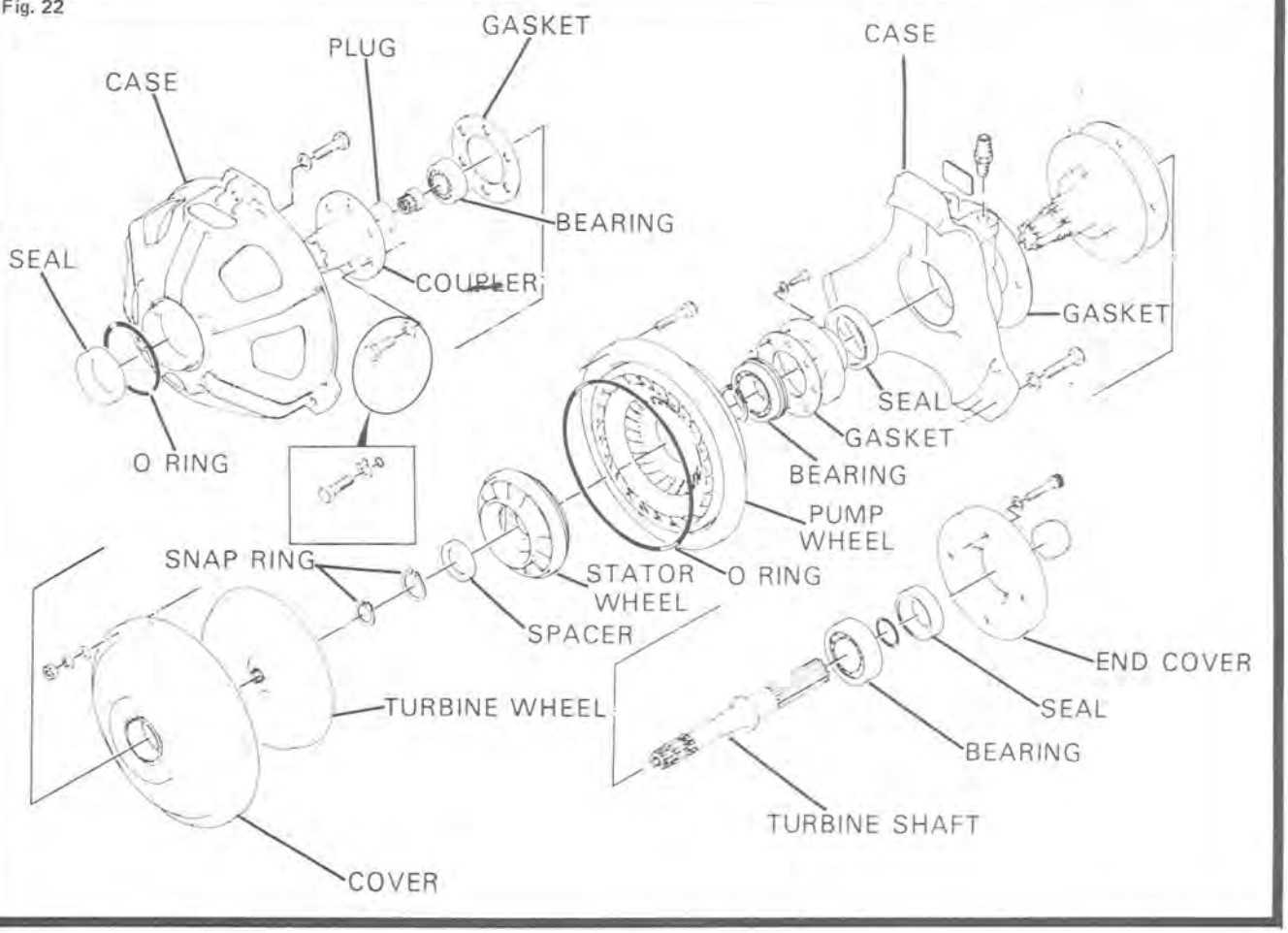
The Cat-A-Matic drive system, with the Hydro-Dynamic Torque Converter, has characteristics different from those found in conventional centrifugal drive clutch systems. The Cat-A-Matic transmission has no "clutch engagement speed". Instead, it always transmits power while the engine is running, even at idle speeds.

⚠ WARNING ⚠

Since the Cat-A-Matic transmission system transmits power whenever the engine is running, it is extremely important that the snowmobile never be left unattended while the engine is running.

TORQUE CONVERTER

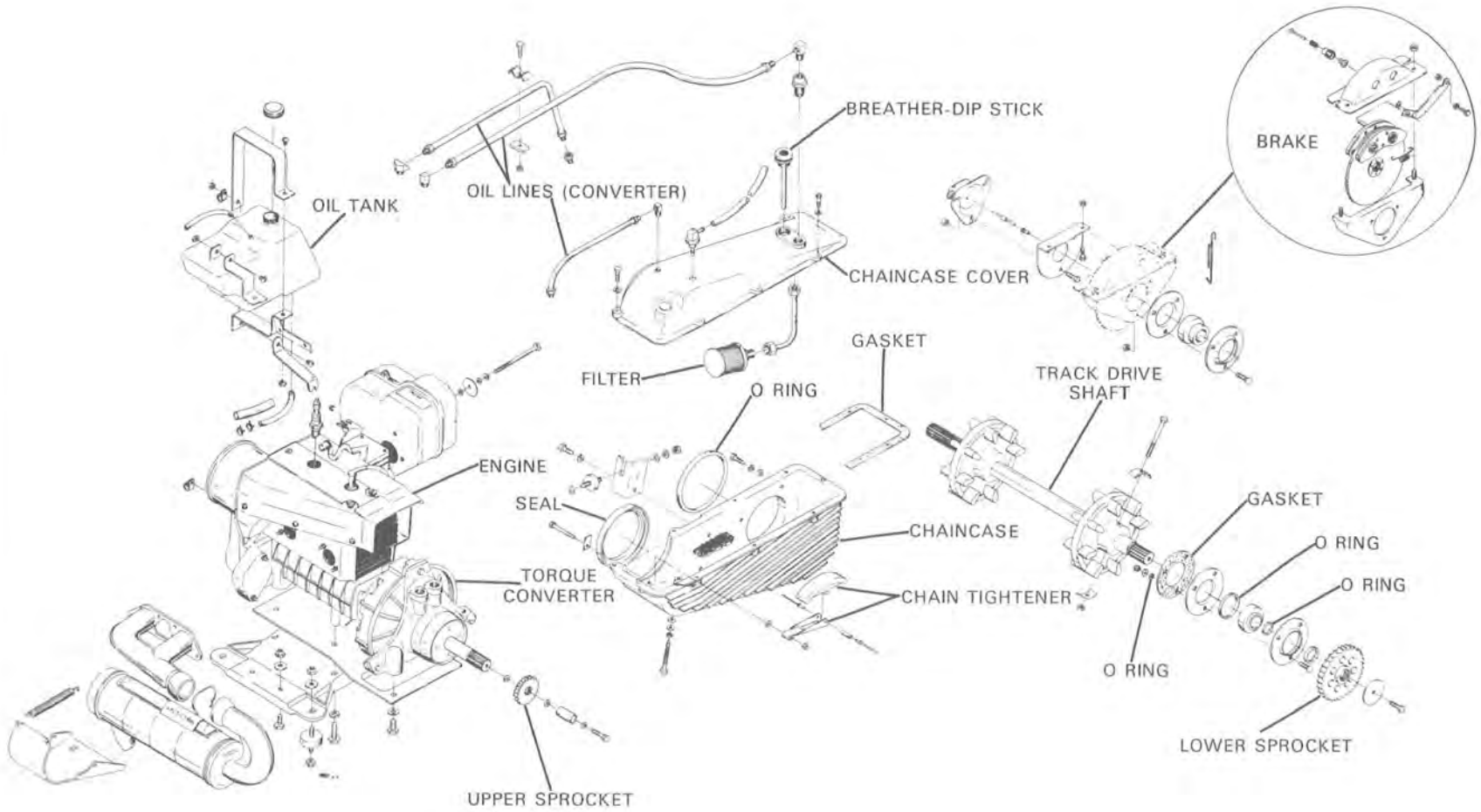
Fig. 22



The Hydro-Dynamic Torque Converter consists of 3 independent components or members. These are the impeller or pump wheel, which is the driving force; the turbine, which is the driven wheel to the applied load; and the reactor or stator, see Fig. 22.

The Hydro-Dynamic Torque Converter transmits power solely by the dynamic action of a fluid in a closed recirculating path. In operation, the impeller driven by the engine acts as a centrifugal pump. Oil which substantially fills the body of the converter flows into the impeller inlet (the part nearest the center of the wheel). It then passes outwardly through the impeller passages and leaves at the outer part of the pump wheel where it enters the turbine member. In the turbine member the oil flows inwardly through the passages to be discharged from the inner part of the wheel into the reactor member.

1974 VIP DRIVE SYSTEM



DRIVE SYSTEM

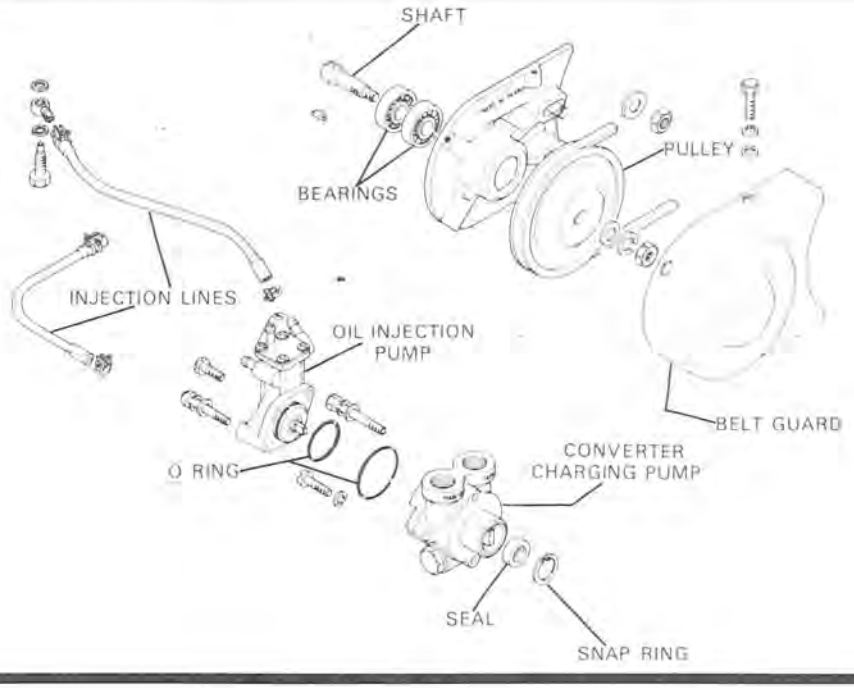
It is the reactor or stator member which gives the torque converter its ability to change torque and thereby distinguishes it from the similar but simpler fluid coupling system. In a fluid coupling device, torque ratio is the same for all speed ratios. In the torque converter, the unique reactor member performs the same basic function in the fluid circuit as the fulcrum point in a simple lever system. The primary cause of the torque reaction of the reactor member is the change in spin velocity of the fluid mass around the shaft centerline without any change in radius.

The circulation of oil between the impeller and the turbine results from the difference in centrifugal force developed in these two units. The impeller, turning at the higher speed, produces a greater centrifugal pressure difference between inlet and outlet than is produced by the turbine. The resulting net pressure difference from impeller circuit to turbine circuit causes fluid flow. As the turbine speed increases, its potential centrifugal pressure difference increases resulting in a smaller net pressure differential between impeller circuit and turbine circuit and, therefore, a lowered circulation rate. Since the torque transmitted is directly related to flow rate, the impeller speed must increase as turbine speed increases in order to transmit a constant torque.

By mounting the reactor assembly on a one-way clutch, the reactor remains stationary while subject to the reversing action of the backward spinning oil as it leaves the turbine. When the oil flow from the turbine begins to spin forward (as the slip is reduced between impeller and turbine wheels and they approach unity), the reactor is free to turn with it. As the slip is further reduced, the device acts as a fluid coupler with improved efficiency on a one-to-one match. Without the one-way clutch, turbine torque becomes less than impeller torque at higher speed ratios as a result of torque reversal on the reactor. With the one-way clutch, the reactor torque cannot reverse but remains zero. When the speed ratio becomes greater than that at the one-to-one torque condition, the reactor begins to rotate (free wheel) in the direction of the impeller.

Working in conjunction with the torque converter are the injector pump and the torque converter charge pump. The injector pump feeds lubricating oil into the combustion chambers. As it is belt driven by the engine, the injector pump provides oil in direct proportion to the speed of the engine; more oil when the engine is turning at high speed, less oil when the engine is idling. The charge pump circulates filtered oil under pressure to ensure constant efficiency of the torque converter. Also, the charge pump provides oil cooling through circulation.

PUMPS



TROUBLE SHOOTING DRIVE SYSTEM

Problem	Condition	Remedy
Vehicle moves when recoil starter is pulled.	Mechanically connected input and output member in converter.	Check converter inside.
Vehicle creeps at idling speed.	Idling speed too high.	Idle speed must be from 1500-1800 rpm.
Vehicle does not move when engine accelerated.	1. Shortage of converter fluid. 2. No fluid supply by charge pump due to mechanical damage or belt broken for the pump. 3. No fluid flow because oil strainer covered by dust or other particles. 4. Mechanical damage in converter, sprockets, or chain.	1. Supply fluid and check the level. 2. Check charge pump and its drive system. 3. Clean the strainer. 4. Check components.
Poor acceleration at full throttle operation.	1. Shortage of converter fluid. 2. Problem with stator wheel.	1. Supply fluid and check the level. 2. Replace stator wheel.
Extreme fluid temperature	1. Continuing operation at stall speed. 2. Relief valve defective. 3. Defective converter clutch.	1. Limit stall operation to 30 2. Replace valve. 3. Replace clutch.
Fluid leakage from converter	1. System pressure too high due to relief valve or pressure control valve defect. 2. Defective O-ring or fluid seals.	1. Replace pressure valve. 2. Replace seals.
Chattering noise in converter	Backlash between crankshaft and coupler. Coupler worn excessively.	Replace coupling.
Engine stalls when snowmobile is stationary and idling.	1. Engine idling speed too low. 2. Problem with stator wheel.	1. Reset idling speed. 2. Replace stator wheel.

TROUBLE SHOOTING DRIVE SYSTEM

Problem	Condition	Remedy
Poor performance and hot charge pump	1. Air in torque converter. 2. Shortage of converter fluid. 3. Air leak on intake side of charge pump. 4. Scored charge pump.	1. Bleed torque converter. 2. Supply fluid and check level. 3. Check all fittings and lines. 4. Replace pump.
Drive chain ratchets.	1. Chain too loose. 2. Broken motor mount.	1. Tighter chain. 2. Install new motor mount.
Converter fluid leaks around drive shaft bearing.	Poor seal around bearing retainers and bolts.	Apply liberal amount of silicone seal or bathtub seal to bolt holes and bearing retainer gasket.
Gasket will not seal. Chain case cover.	Warped chain case cover or chain case.	Replace necessary part.
Chain rattles in chain case.	1. Chain tension improperly adjusted - too loose. 2. Chain stretched beyond adjustable limit.	1. Adjust chain tension. 2. Install new chain and sprockets.
Chain slips on sprockets	1. Chain too loose - tension improperly adjusted. 2. Chain stretched beyond adjustable limit. 3. Sprocket teeth worn. 4. Broken motor mount.	1. Adjust chain tension. 2. Install new chain and sprockets. 3. Install new sprockets and chain. 4. Replace motor mount.
Chain slips off sprockets.	1. Chain tension improperly adjusted - too loose. 2. Sprocket teeth worn. 3. Sprockets misaligned.	1. Adjust chain tension. 2. Install new sprockets and chain. 3. Align sprockets.
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.

TROUBLE SHOOTING DRIVE SYSTEM

Problem	Condition	Remedy
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 time 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.

TORQUE CONVERTER REMOVAL

Remove Chain Case Cover

Equipment Necessary: Screwdriver Having a 5/16-Inch Blade, 1/2-Inch Socket, 5/8-Inch Wrench, 11/16-Inch Wrench, 13/16-Inch Wrench, and 6-Inch Extension.

● CAUTION ●
The battery must be removed before working on any part or component of the drive system. This will eliminate the possibility of accidental starter engagement.

1. Remove the five screws and lock washers securing chain case cover to chain case.
2. Remove the two bolts and lock washers securing chain case cover to chain case.
3. Disconnect the suction hose from the 90° elbow.
4. Disconnect the return hose from the chain case cover.
5. Pull vent hose fitting out of chain case cover.
6. Lift cover off chain case.
7. Remove filter and filter tube.
8. Remove return line elbow.
9. Remove suction hose elbow and adapter from cover.

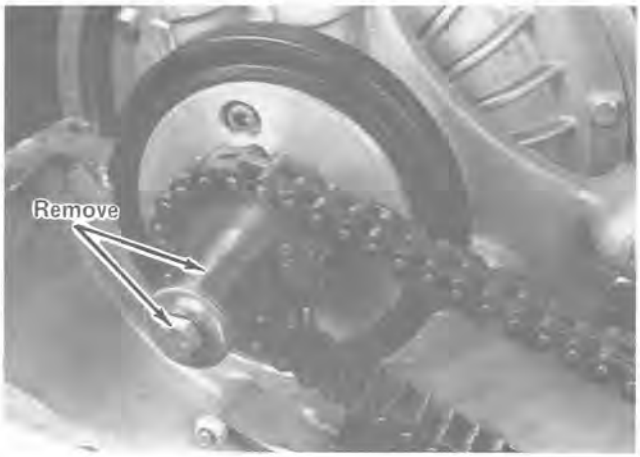
Remove Chain and Sprockets

Equipment Necessary: Suction Gun, Screwdriver Having a 5/16-Inch Blade, 1/2-Inch Socket, and 6-Inch Extension.

● CAUTION ●
The battery must be removed before working on any part or component of the drive system. This will eliminate the possibility of accidental starter engagement.

1. Remove chain case cover (See: Remove Chain Case Cover, page 31).
2. Drain fluid from chain case, using a suction gun.
3. Remove bolt, lock washer, and flat washer holding spacer and sprocket on engine PTO shaft, Fig. 23. Slide spacer off PTO shaft.

Fig. 23



4. Remove bolt, lock washer, and flat washer holding chain sprocket on track drive shaft.
5. Loosen jam nut on chain tensioner bolt, Fig. 24. Loosen chain tensioner bolt.

Fig. 24

6. Slide chain and sprockets off PTO shaft and track drive shaft.

Remove Engine and Torque Converter

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, 3-Inch Extension, 6-Inch Extension, 12-Inch Extension, 10mm Wrench, 10mm Socket, 13mm Wrench, 13mm Socket, 1/2-Inch Socket, 9/16-Inch Wrench, and 9/16-Inch Socket.

1. Remove chain case cover, chain, and sprockets (See: Remove Chain and Sprockets, page 31).

TORQUE CONVERTER REMOVAL

2. Working on PTO side of engine, disconnect positive (red) battery cable from solenoid terminal.

3. Remove ignition switch connector from back of ignition switch. Disconnect black single wire from starter solenoid in ignition switch connector.

4. Remove top torque converter case bolt. Remove battery ground cable.

5. Disconnect temperature gauge leads from sender units.

6. Remove two nuts, lock washers and flat washers securing carburetor to intake manifold. Loosen throttle wire retaining screw; then pull throttle wire out of throttle arm. Disconnect oil injector actuating rod from throttle arm, Fig. 25. Disconnect impulse line from fitting on carburetor.

NOTE: Impulse line must be disconnected at carburetor fitting because it is easily accessible.

Fig. 25

7. Remove two bolts and lock washers holding rear torque converter mounting bracket to chain case.

8. Remove PTO side front motor mount.

9. Remove PTO side rear motor mount.

10. Working on MAG side of engine, disconnect headlight harness plug from main wiring harness.

11. Remove lower fan cover screw securing wire harness to fan housing.

12. Disconnect main wiring harness from engine connector.

13. Remove bolt, lock washer, and flat washer securing wire harness to charge pump belt cover. Move harness away from engine.

14. Remove three bolts securing recoil assembly to fan housing.

NOTE: Engine to chassis ground cable (green) is secured to front recoil mounting bolt.

15. Remove two lock nuts and flat washers securing engine motor plate to front and rear motor mounts on MAG side of engine.

16. Lift engine and torque converter free of chassis.

17. Thoroughly clean engine compartment, engine, and torque converter.

18. With engine out of chassis, check ski alignment (See: Panther Service Manual, Section VII-Steering and Body, Ski Alignment, page 22).

Remove Torque Converter from Engine

Equipment Necessary: 10mm Socket, 7/16-Inch Socket, 7/16-Inch Wrench, 3/4-Inch Socket and 3/4-Inch Wrench

1. Unlock muffler ball joint clip.

2. Remove four bolts and lock washers securing motor plate to engine. Remove motor plate with muffler.

3. Disconnect heavy black cable running from solenoid to starter at terminal on starter motor.

4. Remove two bolts and lock washers securing support plate to torque converter. Remove support plate.

5. Loosen metal pressure tube bracket on engine shroud.

TORQUE CONERTER REMOVAL

6. Remove metal pressure tube.

7. Disconnect flexible hydraulic hose from converter.

8. Remove two bolts and lock washers securing torque converter case halves together.

NOTE: Top bolt and lock washer should have been removed previously when disconnecting battery ground cable during engine removal.

9. Slide torque converter off engine mainshaft splines.

10. Drain oil remaining in transmission by setting transmission on output shaft and allowing oil to drain from inlet fitting.

11. Remove large seal from rear cover.

Remove Torque Converter Drive Coupler

Equipment Necessary: Press and 13mm Socket

NOTE: If only drive coupler is to be replaced, proceed to step 1. If additional work will be performed on torque converter and drive coupler removal is unnecessary, disassemble torque converter (See: Disassemble Torque Converter, page 33).

1. Remove twelve bolts, lock washers, flat washers, and nuts holding converter case and pumpwheel together, Fig. 25. Separate converter and pumpwheel.

NOTE: It may be necessary to use a screwdriver to pry converter and pumpwheel apart. Use extreme care when prying and make sure contact surfaces are smooth to prevent leakage after reassembly.

2. Remove six bolts and lock washers securing coupler to converter, see Fig. 26.

3. Press coupler out of converter case, using a press.

4. Remove copper gasket.

Disassemble Torque Converter

Equipment Necessary: Rubber Mallet, Large Snap Ring Pliers, Two Screwdrivers Having a 7/16-Inch Blade, 9/16-Inch Socket (12-point), 5mm Hex Key Wrench, 10mm Socket, and 10mm Wrench.

1. Remove twelve bolts, lock washers, flat washers, and nuts holding converter case and pumpwheel together, see Fig. 26. Separate converter and pumpwheel.

NOTE: It may be necessary to use a screwdriver to pry converter and pumpwheel apart. Use extreme care when prying and make certain contact surfaces are smooth to prevent leaks after reassembly.

Fig. 26

2. Remove special lock nut with flange from the turbine shaft, Fig. 27. Carefully pry bearing free of turbine shaft, using two screwdrivers.

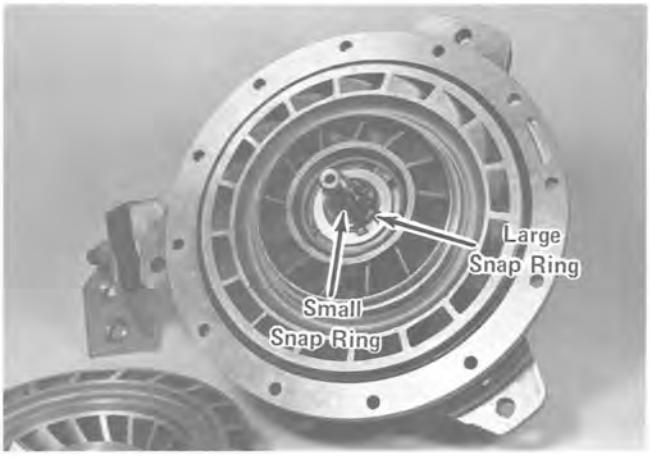
Fig. 27

3. Lift turbine wheel off turbine shaft.

TORQUE CONVERTER REMOVAL

4. Using a large snap ring pliers, remove small snap ring; then remove large snap ring, Fig. 28. Lift spacer off shaft.

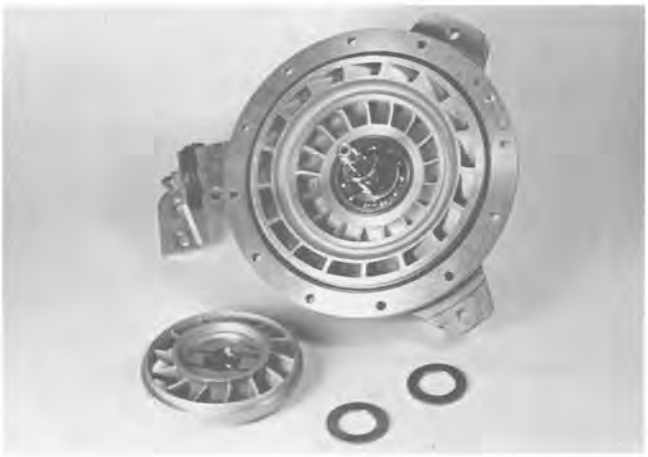
Fig. 28



5. Lift stator off turbine shaft, Fig. 29. Remove spacer washer.

NOTE: When removing stator, check by rotating stator counterclockwise. Stator must lock when turned counterclockwise but must turn freely when turning clockwise. If stator does not lock, it must be replaced.

Fig. 29



6. Remove snap ring from rigid shaft, using a large snap ring pliers.

7. Remove four socket head cap screws and lock washers securing rear cover and seal to case assembly, Fig. 30. Remove rear cover and seal, and gasket.

Fig. 30

8. Tap end of turbine shaft, using a rubber mallet, until turbine shaft is free of converter case. Remove gasket.

9. If necessary, press bearing and spacer off turbine shaft.

10. Remove pump wheel by prying out of case assembly.

11. Tap rigid shaft out of case, using a rubber mallet.

NOTE: Note position of oil holes when disassembling. Large hole should be at 1 o'clock position and small hole should be at 11 o'clock position.

12. If necessary, remove oil seal in converter case assembly.

CLEANING & INSPECTING

Clean and Inspect

Equipment Necessary: Cleaning Solvent, Compressed Air

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

1. Thoroughly wash all grease, fluid, or foreign matter off all parts, using cleaning solvent. Dry parts, using compressed air.

2. Inspect all gaskets, O-rings, and seals for wear or damage.

3. Check for cracks, holes, or imperfections in any of the torque converter castings.

4. Check for stripped or damaged threads in castings.

5. Check all machined mating surfaces for imperfections or damage.

6. Check stator operation. Place stator on turbine shaft. Rotate stator counterclockwise. Stator should lock after a few degrees of counterclockwise rotation. Clockwise rotation should allow stator to turn freely.

TORQUE CONVERTER INSTALLATION

Assemble Torque Converter

Equipment Necessary: Low Temperature Grease (Texaco 2346 EP or equivalent), Liquid Sealer (Arctic Part No. 3000-211), Torque Wrench, Large Snap Ring Pliers, 5mm Hex Key Socket, 10mm Socket, 10mm Wrench, and 9/16-Inch Socket (12-point)

1. Place a small amount of low temperature grease (Texaco 2346 EP or equivalent) between the two lips of the rear case oil seal. Insert seal into rear case. Open side of seal must face PTO shaft.

2. Apply liquid sealer to both sides of flange gasket for the rear case. Place gasket on rear case flange.

NOTE: Gasket can be installed only one way. Holes in gasket will not align if incorrectly installed.

3. Insert rigid shaft into rear case.

NOTE: Position of oil holes must be noted. The small oil hole must be in the eleven o'clock position; the large hole must be in the one o'clock position.

4. Apply liquid sealer to both sides of rear cover gasket. Place gasket on rigid flange surface.

NOTE: Gasket can be installed only one way. Holes in gasket will not align if incorrectly installed.

5. Working with the turbine shaft, press turbine shaft bearing until it bottoms against case casting on shaft. Place an O-ring in the corner of the bearing inner race. Press bushing onto turbine shaft (beveled edge toward PTO end).

6. Insert an oil seal into rear bearing cover. Open side of seal must face engine MAG side. Place a small amount of low temperature grease (Texaco 2346 EP or equivalent) between the two lips of the seal.

7. Install rear cover and seal over turbine shaft and against gasket on rigid shaft. Rotate cover until all holes are aligned. Secure cover to rear case with four socket head cap screws and lock washers. Tighten socket head screws to 4-5 ft-lb.

NOTE: If pump wheel was disassembled completely, proceed to step 8. If wheel was not disassembled, proceed to step 9.

8. Press pump wheel bearing into pump wheel case. Apply liquid sealer to both sides of pump wheel boss gasket.. Place gasket on machined surface. Place pump wheel boss in position on wheel. Secure in place with eight bolts and special washers. Tighten bolts to 3-4 ft-lb.

9. Slide assembled pump wheel onto rigid shaft. Secure in place with a snap ring, using a large snap ring pliers.

TORQUE CONVERTER INSTALLATION

10. Place spacer washer against snap ring; then install stator assembly with short blade side facing outward. Place remaining spacer washer onto shaft and secure parts in position with a snap ring, using a snap ring pliers.

NOTE: Spacer washers are identical. Either washer may be used in either location.

11. Check stator for rotation characteristics. Stator must rotate freely in a clockwise rotation but lock when rotated counterclockwise.

12. Install small snap ring on turbine shaft, using a snap ring pliers. Fig. 31 shows assembly to this point.

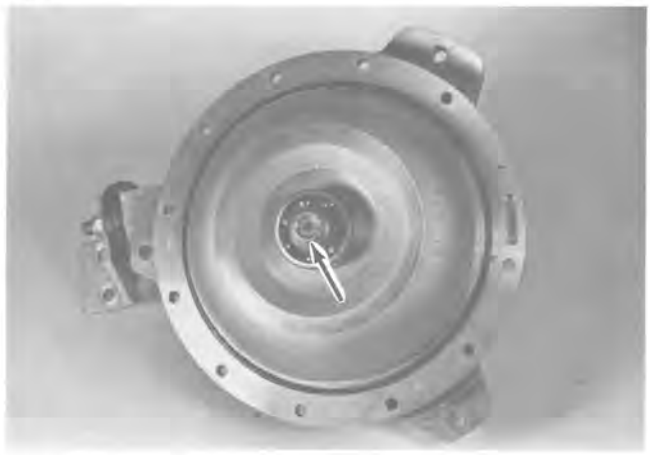
Fig. 31

13. Make sure large O-ring is properly seated in pump wheel.

14. Place turbine wheel on turbine shaft. Slide bearing onto end of turbine shaft. Secure parts in place with special lock nut, Fig. 32; tighten lock nut to 18-20 ft-lb. The bearing will be drawn evenly onto shaft as sprocket lock nut is tightened. Turbine wheel should have no freeplay on turbine shaft.

NOTE: If drive coupling was removed, assemble (See: Install Torque Converter Drive Coupler, page 37); then proceed with step 15.

Fig. 32



15. Ensure that machined surfaces of converter case and pump wheel are free of burrs and foreign particles. Again check large O-ring to ensure proper seating.

16. Align marks on outer edges of converter case and pump wheel, Fig. 33; then secure case and wheel together with twelve bolts, flat washers, lock washers, and nuts. Tighten nuts to 5-7 ft-lb.

Fig. 33

17. Place a small amount of low temperature grease (Texaco 2346 EP or equivalent), between two lips of large outside rear cover seal. Slide seal over rear cover. Open side of seal must be toward converter PTO shaft.

TORQUE CONVERTER INSTALLATION

Install Torque Converter Drive Coupler

Equipment Necessary: Liquid Sealer (Arctic Part No. 3000-211), Press, Torque Wrench, and 13mm Socket

1. Ensure all surfaces are smooth and clean.
2. Apply liquid sealer (part no. 3000-211) to both surfaces of copper gasket.
3. Place gasket on converter case and align bolt holes.
4. Press drive coupling into converter case until seated.

NOTE: If drive coupling is replaced, the coupling must be replaced for the specific torque converter model (See: Section IX-Parts Manual, page IX-21). Also new plug must be installed in coupling.

5. Install six bolts and lock washers and tighten to 14 - 16 ft-lb.

Install Torque Converter on Engine

Equipment Necessary: Torque Wrench, 7/16-Inch Socket, 7/16-Inch Wrench, 5/8-Inch Wrench, 3/4-Inch Socket, 3/4-Inch Wrench and 13mm Socket.

1. Slide torque converter onto crankshaft splines. Secure converter assembly in place with two bolts and lock washers in front and rear case mounting holes. Tighten bolts to 12-14 ft-lb.

NOTE: The top mounting bolt will be installed during engine installation.

2. Connect steel pressure line to converter and charge pump. Tighten securely.
3. Tighten pressure line bracket bolt to 10 ft-lb.
4. Connect one end of converter output line to converter and tighten.
5. Place torque converter support plate in position. Secure with two bolts, and lock washers. DO NOT tighten.
6. Connect heavy black cable to terminal on starter. Tighten nut securely.
7. Place motor plate and muffler in position. Secure assembly to engine with four bolts and lock washers. Tighten bolts to 45 ft-lb.
8. Now tighten support plate bolts to 45 ft-lb.
9. Secure muffler to exhaust manifold with muffler joint clip.

Install Engine and Torque Converter

Equipment Necessary: Silicone Seal or Bathtub Seal, Torque Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, 9/16-Inch Socket, 9/16-Inch Wrench, 5/8-Inch Wrench, 1-Inch Wrench, 10mm Socket, 10mm Wrench, 13mm Wrench, and a Screwdriver Having a 1/4-Inch Blade.

1. Set engine and torque converter assembly onto motor mounts.
2. Fasten rear torque converter mounting bracket to chain case with two bolts and lock washers. Tighten bolts to 17 ft-lb.
3. Working on MAG side of snowmobile, secure engine motor plate to motor mounts with two lock nuts and flat washers. Tighten lock nuts to 35 ft-lb. Install carburetor on intake manifold. Secure carburetor in place with two nuts, lock washers, and flat washers. Tighten nuts to 16 ft-lb.
4. Install impulse line to impluse fitting on top of carburetor.
5. Slide oil injector actuating wire over throttle arm on carburetor. Insert throttle wire in throttle arm bracket. Pull out all slack from throttle wire, plus an additional 1/16-inch to preload throttle safety switch. Secure throttle wire with throttle arm retaining screw.
6. Place recoil in position on fan housing. Install one recoil bolt through ground cable and secure front of recoil to fan housing. Install top recoil bolt so that injector tank mounting bracket is secured. Install lower recoil mounting bolt. Tighten all recoil bolts to 5 ft-lb.

TORQUE CONVERTER INSTALLATION

7. Secure wire harness to top of pump pulley cover with top rear mounting bolt. Tighten bolt to 5 ft-lb. Plug main harness plug into engine connector. Secure front of harness to fan cover mounting screw.

8. Connect headlight harness to main wiring harness.

9. Connect temperature gauge sender leads to temperature gauges.

10. Working on PTO side of snowmobile, connect black wire from solenoid to connector on back of ignition switch so it will match "S" terminal on ignition switch.

NOTE: Locking tab on wire terminal end must be bent to a 45° outward angle to ensure locking.

11. Connect heavy red battery cable to remaining terminal on starter solenoid.

12. Place spacer washers on torque converter PTO shaft.

13. Place track drive shaft spacer onto splines of shaft in chain case.

14. Install chain and sprockets (See: Install Chain and Sprockets, page 39.

15. Place flat washer and lock nut on rear motor mount stud. Tighten to 35 ft-lb.

16. Place flat washer and lock nut on front motor mount. Tighten to 35 ft-lb.

17. Tighten chain tensioner bolt located on underside of chain case.

NOTE: Chain must be very tight. While tightening chain tension, watch rubber mount at rear of converter case. When rubber mount starts to compress, stop tightening and back bolt off about 1/2 turn.

18. Tighten tensioner bolt jam nut.

19. Connect suction hose to chain case cover.

20. Connect converter output hose to chain case cover.

21. Install vent line fitting in vent hole in chain case cover.

22. Fill chain case with required amount of torque converter fluid.

23. Place battery in battery pan. Secure with battery hold-down bracket.

24. Connect red battery lead (positive lead) and red wire running to circuit board to positive (+) terminal on battery.

25. Connect black battery lead (negative lead) to negative (–) terminal on battery.

26. Start engine and check to ensure everything is adjusted correctly.

Install Chain and Sprockets

Equipment Necessary: Silicone Seal or Bathtub Seal, Torque Wrench, Screwdriver Having a 5/16-Inch Blade, 1/2-Inch Wrench, and 6-Inch Extension

1. Slide small chain sprocket halfway onto torque converter PTO shaft.

2. Loop drive chain over sprocket. Place chain around large chain sprocket.

3. Place sprocket on track drive shaft splines.

4. Slide both sprockets and chain onto shaft splines.

NOTE: Chain tightener mechanism must be loose when installing chain and sprockets.

5. Secure sprocket on track drive shaft with a large flat washer, lock washer, and bolt. Tighten bolt to 2 ft-lb.

6. Check sprocket alignment (See: Sprocket Alignment Adjustment, page 39).

7. Install long bushing and spacer washer on PTO shaft. Secure parts in place with a bolt, lock washer, and flat washer. Tighten bolt to 20 ft-lb. Fig. 34 shows small sprocket assembly.

TORQUE CONVERTER INSTALLATION

Install Chain Case Cover

Equipment Necessary: Silicone Seal or Bathtub Seal, 1/2-Inch Socket, 11/16-Inch Wrench, 13/16-Inch Wrench, 1-Inch Wrench, and 6-Inch Extension

1. Install suction hose elbow and adapter in chain case cover. Tighten securely.
2. Install return line elbow.
3. Install filter and filter tube.
4. Apply a liberal amount of silicone seal or bathtub seal on both sides of chain case cover gasket.
5. Place gasket on chain case surface.
6. Place chain case cover on gasket and secure with five screws and lock washers and two bolts and lock washers. Tighten screws. Tighten two bolts.

Fig. 34

7. Connect fluid return hose to chain case cover.
8. Connect suction hose to chain case cover fitting.
9. Install and connect battery.

CHAIN & SPROCKET ADJUSTMENTS

Chain Tension

Equipment Necessary: 1/2-Inch Wrench

1. Loosen chain tensioner bolt jam nut, Fig. 35.
2. Tighten chain tension bolt located on underside of chain case, Fig. 35.

NOTE: Chain must be very tight. While tightening chain tension, watch rubber mount at rear of converter case. When rubber mount starts to compress, stop tightening adjuster bolt and back bolt off about 1/2 turn.

Fig. 35

3. Tighten tension bolt jam nut.

Sprocket Alignment

Equipment Necessary: Torque Wrench, Screwdriver Having a 5/16 Inch Blade, 1/2-Inch Socket, 16-Inch Straight Edge.

CHAIN & SPROCKET ADJUSTMENTS

1. Remove five screws and lock washers and two bolts and lock washers securing chain case cover in position.

2. Lift chain case cover off chain case.

3. Check sprocket alignment by laying a 16-inch straight edge against faces of engine and drive shaft sprockets. No visible gap is to be evident between straight edge surface and sprocket face.

4. If adjustment is necessary, remove bolt and flat washer from engine PTO shaft.

NOTE: All adjustments must be made with engine sprocket.

5. Remove long spacer.

NOTE: If sprocket was inside of parallel, install a shim between torque converter and sprocket. If sprocket was outside of parallel, a shim must be removed from between torque converter and sprocket.

6. When correct sprocket alignment is established, place long spacer on engine PTO shaft; then secure in place with flat washer, lock washer, and bolt. Tighten bolt to 20 ft-lb.

CHARGE PUMP

Remove Charge Pump

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, Screwdriver Having a 5/16-Inch Blade, 3-Inch Extension, 6-Inch Extension, 10mm Socket, 1/4-Inch Bolt, 7/16-Inch Socket, 7/16-Inch Wrench, 3/4-Inch Wrench, and 1-Inch Wrench.

NOTE: Charge pump may be removed either with engine in chassis or with engine removed.

1. Remove recoil from engine by removing three recoil bolts, Fig. 36.

Fig. 36

2. Loosen steel hydraulic line clamp and remove steel hydraulic line.

3. Remove large suction line from charge pump.

4. Remove oil injector inlet line from injector, Fig. 37. Plug line with a 1/4-inch bolt.

Fig. 37

5. Loosen throttle wire retaining screw on throttle arm, Fig. 38. Pull throttle wire out of arm; then slide injector actuating lever off throttle arm.

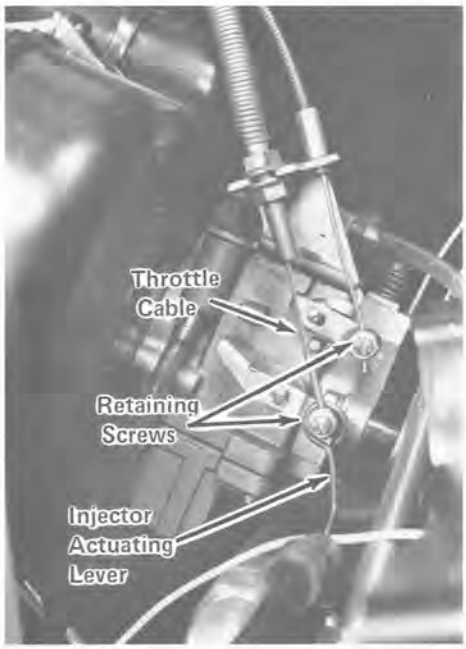
6. Remove two screws securing oil injector to chargepump. Slide injector pump free of charge pump.

7. Remove two bolts securing charge pump to pump holder. Slide charge pump out of pump holder.

NOTE: Charge pump is available only as an assembled unit. If pump is defective it must be replaced as a unit.

CHARGE PUMP

Fig. 38



Install Charge Pump

Equipment Necessary: Torque Wrench, Screwdriver Having a 1/4-Inch Blade, Screwdriver Having a 5/16-Inch Blade, 10mm Socket, 7/16-Inch Socket, 7/16-Inch Wrench, 3/4-Inch Wrench, and 1-Inch Wrench.

1. Place charge pump in position against pump holder. Secure pump in place with two bolts. Tighten bolts to 5 ft-lb.
2. Place injector in position against charge pump. Install two mounting screws and tighten to 5 ft-lb.
3. Remove plug from oil inlet line and secure line to injector oil inlet fitting with oil line clamp.
4. Install steel hydraulic line. Connect fittings to both torque converter and charge pump. Tighten clamp bolt to 10 ft-lb.
5. Install large hydraulic suction tube to charge pump and secure in place.
6. Slide end of injector actuating arm over throttle arm. Insert throttle wire into throttle arm bracket. Pull out all slack from throttle wire plus an additional 1/16 inch to preload throttle safety switch. Tighten throttle retaining screw.
7. Install recoil. Secure in place with three bolts. Tighten to 5 ft-lb.

NOTE: Green engine-to-chassis ground cable must be secured to one of the recoil mounting bolts.

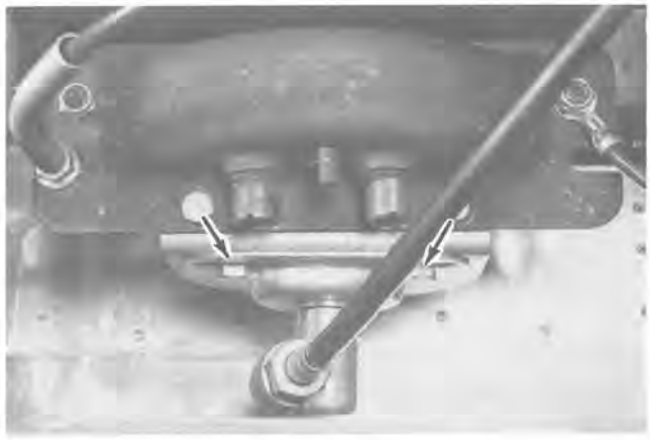
TRACK DRIVE

Remove Track Drive Shaft

Equipment Necessary: Hammer, Hoist, Suction Gun, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, 7/16-Inch Socket, 7/16-Inch Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, and 6-Inch Extension.

1. Remove chain case cover and sprockets (See: Remove Chain and Sprockets, page 31).
2. Remove skid frame from tunnel (See: Panther Service Manual, Section VI - Suspension, Skid Frame Removal, page VI-3).
3. Drain lubricant from chain case, using a suction gun.
4. Remove two bolts and lock nuts securing speedometer drive unit to brake assembly, Fig. 39.

Fig. 39



5. Remove brake assembly from mounting bracket.

6. Lift brake assembly up until it is free of mounting studs. Slide brake disc and brake assembly off drive shaft splines.

NOTE: Brake tension spring can be left connected.

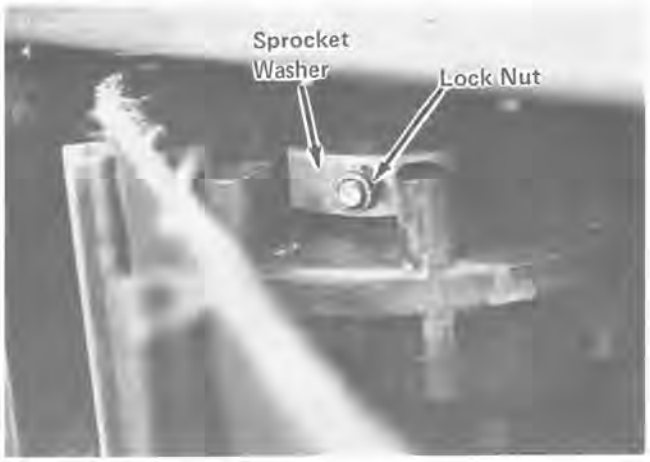
7. Raise back end of snowmobile off shop floor, using a hoist.

8. On PTO side of snowmobile, remove three lock nuts, flat washers, and O-rings securing bearing flanges to tunnel. Remove bolts, flange, spacer, O-ring, bearing, flange, and gasket in their respective order.

9. On MAG side of snowmobile, remove three bolts and lock nuts securing MAG side drive shaft bearing and flanges and brake mounting bracket to tunnel.

10. Remove two lock nuts, four sprocket washers, and two bolts securing PTO side track drive sprocket to track drive shaft, Fig. 40.

Fig. 40



11. Slide track drive sprocket toward center of drive shaft.

12. Push track drive shaft toward PTO side until MAG end of track drive shaft can be swiveled downward and free of chassis; then slide PTO end of shaft free of chassis.

NOTE: If complete disassembly of drive shaft is necessary, proceed to step 13.

13. Loosen set screw securing bearing lock collar on MAG end of track drive shaft.

14. Drive lock collar in opposite direction of shaft rotation to loosen, using a 5/16 x 1/8-inch flat end punch and hammer.

15. Remove flanges, bearing, and lock collar from the track drive shaft. Track drive shaft is completely disassembled at this time.

NOTE: The PTO side track drive shaft sprocket can be removed but is not available as a replacement part. If a track drive sprocket needs replacement, the entire drive shaft assembly must be replaced as a unit.

Install Track Drive Shaft

Equipment Necessary: Hammer, Hoist, Silicone Seal or Bathtub Seal, Steel Tape Measure, Torque Wrench, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, 7/16-Inch Socket, 7/16-Inch Wrench, 1/2-Inch Socket, and 1/2-Inch Wrench.

1. Set track drive shaft on bench. Slide lock collar (Large ID toward end of shaft), bearing retainer (flange toward lock collar), bearing (race toward sprocket), and bearing retainer (flange toward end of shaft) on MAG side of track drive shaft.

2. Raise rear of snowmobile off shop floor, using a hoist.

3. Place track drive shaft between track. Slide PTO side sprocket toward center of shaft.

4. Lift track drive shaft and track into position between front end assembly; then push short splined end of track drive shaft through hole in chain case and front end. Continue pushing until opposite end of track drive shaft can be pushed through hole in front end on MAG side of snowmobile.

5. Apply a liberal amount of bathtub sealer to both sides of PTO side flange gasket and around both holes. Place gasket in position.

6. Install bearing retainer (flange toward nylon sprocket), bearing (race toward end of shaft), O-ring, and bearing retainer (flange toward end of shaft) on PTO end of track drive shaft.

TRACK DRIVE

7. Install three carriage bolts through bearing retainers, gasket, and through front end. Place an O-ring, flat washer, and lock nut on each carriage bolt. DO NOT TIGHTEN nuts at this time.

NOTE: Head of carriage bolt is to be positioned on inside of chain case.

8. On PTO side of track drive shaft, slide bearing and retainer plates against inside of tunnel. Align holes in bearing retainer plates and tunnel; then insert three carriage bolts.

NOTE: Head of carriage bolt is to be toward inside of tunnel.

9. Place brake mounting bracket against tunnel and over carriage bolts so ends of carriage bolts are exposed; then secure with three lock nuts.

10. Now tighten six lock nuts securing drive shaft bearing flanges.

11. Slide PTO side track drive sprocket into position. Secure sprocket in place with two bolts, lock nuts, and four sprocket washers. Tighten lock nuts to 17 ft-lb.

12. Align track drive shaft sprockets so that sprocket edges are equidistant from inside edge of tunnel, using a steel tape measure.

13. When correct alignment is established, slide MAG side bearing lock collar against bearing. Drive lock collar in direction of normal shaft rotation, using a 5/16 x 1/8-inch flat end punch and hammer.

NOTE: Lock collar and bearing are locked when bearing begins to turn with lock collar.

14. Tighten lock collar set screw.

15. Install skid frame (See: Panther Service Manual, Section VI - Suspension, Skid Frame Installation, page VI-14).

16. Slide brake disc onto MAG end of track drive shaft. Ensure that disc slides freely on shaft.

17. Connect brake return spring to chassis and to brake arm; then place brake assembly onto brake mounting bracket studs. Secure in position with two lock nuts. Tighten lock nuts to 17 ft-lb.

18. Align square speedometer drive pin with hole in track drive shaft. Slide speedometer drive unit into position. Secure to brake unit with two bolts and lock nuts. Tighten lock nuts to 8 ft-lb.

19. Place sprocket spacer on PTO side of track drive shaft.

20. Install chain case cover and sprockets (See: Install Chain and Sprockets, page 38).

21. Add required amount of lubricant to chain case.

22. Install and connect battery.

TRACK

General

The track is composed of three belts, held together by three-quarter length cleats, which are riveted to the track belts. Both outer belts have molded internal drive lugs on their inside surfaces. These drive lugs engage the track drive shaft sprockets to provide efficient, smooth power transfer. The track not only drives the snowmobile, but also 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.

NOTE: When the molded internal drive lugs become worn on one side because of excessive usage, the track can be reversed to get maximum track life.

Remove Track

Equipment Necessary: Hammer, Hoist, Suction Gun, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, 7/16-Inch Socket, 7/16-Inch Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, and 6-Inch Extension

1. Remove chain and sprockets (See: Remove Chain and Sprockets, page 31).

2. Remove skid frame and track drive shaft (See: Remove Track Drive Shaft, page 41).

NOTE: At this time, the track drive shaft and track are removed from between the tunnel.

Install Track

Equipment Necessary: Hammer, Hoist, Torque Wrench, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, 7/16-Inch Socket, 7/16-Inch Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, and 6-Inch Extension.

1. Install track drive shaft and skid frame (See: Install Track Drive Shaft, page 42).

2. Install chain and sprockets (See: Install Chain and Sprockets, page 38).

NOTES