

**1987 Arctic Cat<sup>®</sup>**  
**AFS Models**  
*El Tigre™ - Pantera® - Cougar™ - Cheetah®*  
**Service Manual**

**ARCTIC CAT<sup>®</sup>**  
*Get on it.*



## FOREWORD

This manual contains service, maintenance, and troubleshooting information for the 1987 A.F.S. (Cougar-Pantera-Cheetah F/C-Cheetah L/C-El Tigre 5000-El Tigre 6000) Snowmobiles. The manual is designed to aid service personnel in service-oriented application and may be used as a textbook for service training.

The manual is divided into sections. Each section of the manual covers a specific snowmobile component or system and, in addition to the standard service procedures, includes assembling, disassembling, and inspecting instructions. A troubleshooting section is also included in this manual.

The service technician should become familiar with the operation and construction of each component or system by carefully studying this manual. This manual will assist the service technician in becoming more aware of and efficient with servicing procedures. Such efficiency not only helps build consumer confidence but also saves time and labor.

The procedures in this manual include the complete disassembly of all 1987 A.F.S. model components. When servicing the A.F.S. models, the technician should use discretion as to how much disassembly is needed to correct any given condition.

The manual uses the words Warning, Caution, and Note to emphasize certain information. The symbol **▲ WARNING ▲** identifies personal safety-related information. Therefore, be sure to read the directive because it deals with the possibility of personal injury. The symbol **● CAUTION ●** identifies snowmobile-related information. Be sure to read the directive because it deals with the possibility of damaging a part or parts of the snowmobile. If the directive is violated, the snowmobile will usually sustain major damage. The symbol **■ NOTE:** identifies supplementary information worthy of particular attention.

At the time of publication, all information, photographs, and illustrations were technically correct. Because Arctco, Inc. constantly refines and improves its products, no retroactive obligation is incurred.

All materials and specifications subject to change without notice.

Keep this manual accessible in the shop area for reference.

**Service Department**

**CERTIFIED PARTS**  
**CORPORATION**

1111 W. RACINE ST.

JANESVILLE, WISCONSIN 53545

PHONE 608/752-9441



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# SECTION 1 — GENERAL INFORMATION

**1**

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# Specifications\*

ENGINE AND DRIVE		COUGAR	PANTERA	EL TIGRE 5000	CHEETAH F/C	CHEETAH L/C	EL TIGRE 6000
Engine Model		AM50A3	AH44L4	AH44L4	AM50A3	AA53L2	AA53L2
Displacement	cc (cu in.)	500 (30.5)	435 (26.6)	435 (26.6)	500 (30.5)	529 (32.3)	529 (32.3)
Bore x Stroke	mm (in.)	70 x 65 (2.756 x 2.559)	68 x 60 (2.679 x 2.364)	68 x 60 (2.679 x 2.364)	70 x 65 (2.756 x 2.559)	72 x 65 (2.835 x 2.559)	72 x 65 (2.835 x 2.559)
Compression Ratio		6.4:1	6.8:1	6.8:1	6.4:1	6.6:1	6.6:1
Piston-Ring End Gap Range	mm (in.)	0.20-0.83 (0.008-0.033)	0.20-0.83 (0.008-0.033)	0.20-0.83 (0.008-0.033)	0.20-0.83 (0.008-0.033)	0.20-0.83 (0.008-0.033)	0.20-0.83 (0.008-0.033)
Piston Skirt/Cylinder Clearance Range	mm (in.)	0.084-0.15 (0.0033-0.006)	0.076-0.15 (0.0030-0.006)	0.076-0.15 (0.0030-0.006)	0.084-0.15 (0.0033-0.006)	0.113-0.15 (0.0044-0.006)	0.113-0.15 (0.0044-0.006)
Piston Pin Diameter Range	mm (in.)	17.995-18.000 (0.7085-0.7087)	17.995-18.000 (0.7085-0.7087)	17.995-18.000 (0.7085-0.7087)	17.995-18.000 (0.7085-0.7087)	17.995-18.000 (0.7085-0.7087)	17.995-18.000 (0.7085-0.7087)
Piston - Pin Bore Diameter Range	mm (in.)	17.998-18.006 (0.7086-0.7089)	17.998-18.006 (0.7086-0.7089)	17.998-18.006 (0.7086-0.7089)	17.998-18.006 (0.7086-0.7089)	18.002-18.010 (0.7087-0.7091)	18.002-18.010 (0.7087-0.7091)
Connecting-Rod Small End Diameter Range	mm (in.)	23.00-23.01 (0.9056-0.9059)	23.00-23.01 (0.9056-0.9059)	23.00-23.01 (0.9056-0.9059)	23.00-23.01 (0.9056-0.9059)	23.00-23.01 (0.9056-0.9059)	23.00-23.01 (0.9056-0.9059)
Crankshaft End Play Range	mm (in.)	0.05-0.10 (0.002-0.004)	0.05-0.10 (0.002-0.004)	0.05-0.10 (0.002-0.004)	0.05-0.10 (0.002-0.004)	0.05-0.10 (0.002-0.004)	0.05-0.10 (0.002-0.004)
Crankshaft Runout (max.) (Total Indicator Reading)	mm (in.)	0.05 (0.002)	0.05 (0.002)	0.05 (0.002)	0.05 (0.002)	0.05 (0.002)	0.05 (0.002)
Cylinder Trueness max.	mm (in.)	0.1 (0.0039)	0.1 (0.0039)	0.1 (0.0039)	0.1 (0.0039)	0.1 (0.0039)	0.1 (0.0039)
Drive Clutch/Driven Pulley Offset**	mm (in.)	34.7 (1.365)	34.7 (1.365)	34.7 (1.365)	34.7 (1.365)	34.7 (1.365)	34.7 (1.365)
Center-to-Center Distance	mm (in.)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)
Engagement Speed (RPM)		3600-4000	4200-4800	4200-4800	3600-4000	4000-4600	4000-4600
Peak RPM		6800-7000	8350-8600	8350-8600	6800-7000	8500-8750	8500-8750
Ramp (cam arm)	p/n	0146-294	0646-024	A-3 (44.5 Grams)	0146-294	A-1 (46.5 Grams)	A-1 (46.5 Grams)
Spring		Green	Green	Yellow/Green	Green	Yellow/Green	Yellow/Green
Weight	p/n	0146-286	0146-105	N/A	0146-286	N/A	N/A
Weight (high altitude)	p/n	0146-123	0146-136	0646-019	0146-123	0646-027	0646-027
Chain Pitch		68	72	72	68	72	72
Sprocket Ratio		20/35	24/39	24/39	20/35	24/39	24/39
Lighting Coil Output @ 3000 RPM		12V/150W	12V/150W	12V/150W	12V/150W	12V/120W	12V/120W
Ignition Type		CDI/NCI	CDI/NCI	CDI/NCI	CDI/NCI	CDI/NCI	CDI/NCI
Spark Plug		NGKBR9ES	NGKBR9ES	NGKBR9ES	NGKBR9ES	NGKBR10EV	NGKBR10EV
Spark-Plug Gap	mm (in.)	0.7 (0.028)	0.7 (0.028)	0.7 (0.028)	0.7 (0.028)	0.7 (0.028)	0.7 (0.028)
Brake Type		Mechanical Caliper Disc w/Parking Brake					
Track Width	cm (in.)	40.5 (16)	40.5 (16)	40.5 (16)	40.5 (16)	40.5 (16)	40.5 (16)
Overall Track Length	cm (in.)	307 (121)	307 (121)	307 (121)	396 (156)	396 (156)	307 (121)
Track Length On Ground	cm (in.)	76.2 (30)	76.2 (30)	76.2 (30)	76.2 (30)	76.2 (30)	76.2 (30)

CARBURETOR		COUGAR	PANTERA	EL TIGRE 5000	CHEETAH F/C	CHEETAH L/C	EL TIGRE 6000
Type		VM34	VM34	VM34	VM34	VM38	VM38
Main Jet***		260	280	280	260	370	370
Pilot Jet		35	27.5	27.5	35	30	30
Needle Jet		P-4 166	P-4 166	P-4 166	P-4 166	Q-6 166	Q-6 166
Jet Needle		6DH2-3	6DH3-3	6DH3-3	6DH2-3	6DH8-2	6DH8-2
Jet Needle (high altitude)		6DH2-2	6DH3-2	6DH3-2	6DH2-2	6DH8-2	6DH8-2
CHASSIS		COUGAR	PANTERA	EL TIGRE 5000	CHEETAH F/C	CHEETAH L/C	EL TIGRE 6000
Length w/Skis	cm (in.)	269.2 (106)	269.2 (106)	269.2 (106)	327.6 (129)	327.6 (129)	269.2 (106)
Length w/o Skis	cm (in.)	243.8 (96)	243.8 (96)	243.8 (96)	302.2 (119)	302.2 (119)	243.8 (96)
Height w/Windshield	cm (in.)	106.7 (42)	109.2 (43)	109.2 (43)	106.7 (42)	106.7 (42)	106.7 (42)
Height w/o Windshield	cm (in.)	88.9 (35)	88.9 (35)	88.9 (35)	88.9 (35)	88.9 (35)	88.9 (35)
Overall Width	cm (in.)	107.9 (42.5)	107.9 (42.5)	107.9 (42.5)	107.9 (42.5)	107.9 (42.5)	107.9 (42.5)
Ski "Center-to-Center" Distance	cm (in.)	94 (37)	94 (37)	94 (37)	94 (37)	94 (37)	94 (37)
MISCELLANY		COUGAR	PANTERA	EL TIGRE 5000	CHEETAH F/C	CHEETAH L/C	EL TIGRE 6000
Curb Weight (approx.)	kg (lb)	226 (497)	238 (524)	238 (524)	236 (519)	247 (544)	238 (524)
Dry Weight (approx.)	kg (lb)	200 (400)	211 (465)	211 (465)	209 (460)	220 (485)	211 (465)
Fuel Tank Capacity	l (U.S. Gal)	26.5 (7)	26.5 (7)	26.5 (7)	26.5 (7)	26.5 (7)	26.5 (7)
coolant Capacity	l (U.S. qt)	— —	2.4 (0.63)	2.4 (0.63)	— —	2.4 (0.63)	2.4 (0.63)
Chain Case Fluid Level	ml (fl oz)	236 (8)	236 (8)	236 (8)	236 (8)	236 (8)	236 (8)
Gasoline Octane (rating) Minimum		88	88	88	88	88	88
Engine Oil		50:1 Injection	50:1 Injection	50:1 Injection	50:1 Injection	50:1 Injection	50:1 Injection
Chain Case Lubricant		Arctco/Arctic Cat Chainlube					
Grease		Low Temperature					
Taillight/Brakelight	p/n	0109-460	0109-460	0109-460	0109-460	0109-460	0109-460
Headlight	p/n	0109-735	0109-735	0109-735	0109-735	0109-735	0109-735
Drive Belt	p/n	0227-030	0227-030	0227-032	0227-030	0227-032	0227-032
Ignition Timing****							
B.T.D.C.	degree	18	24	24	18	25	25
@ 6000 RPM	mm (in.)	2.032 0.080	3.226 0.127	3.226 0.127	2.032 0.080	3.835 0.151	3.835 0.151
Gas/Oil Mixture (Break-In)		50:1	50:1	50:1	50:1	50:1	50:1
Gas/Oil Mixture (After Break-In)		Oil Injection					

\*Specifications subject to change without notice.

\*\*Offset measurement given is when using special tool p/n 0644-003.

\*\*\*See Main Jet chart.

\*\*\*\*With the engine at operating temperature.

1

## Break-In Procedure

The A.F.S. model engines require a short break-in period (1 tankful of fuel). Use a gas/oil mixture of 50:1 in conjunction with the oil injection system for break-in purposes. Also, the break-in main jets should be used during the break-in period. The same procedure should be followed after an engine is overhauled.

During break-in, a maximum of 1/2 throttle is recommended. However, brief full-throttle accelerations and variations in driving speed contribute to good engine break-in. Following the break-in period, the carburetor main jets should be changed in accordance with the Main Jet Chart.

## Recommended Gasoline

The recommended gasoline to use is 88 minimum octane regular leaded or unleaded. Do not use gasolines containing either methanol or more than 5% ethanol.

### CAUTION

Gasoline additives, gasohol, methanol alcohol, and white gas **MUST NOT BE USED**, they will eventually cause engine damage.

## Recommended Oil

Both Arctco Injection Oil and Arctic Cat Injection Oil are recommended for all A.F.S. models. These oils are specially formulated to meet the lubrication requirements of the Arctic Cat injection system.

## Genuine Parts

When replacement of parts is necessary, use only genuine Arctco/Arctic Cat parts. They are precision-made to ensure high quality and correct fit. Refer to the Illustrated Parts Manual (p/n 2254-354) for the correct part number, quantity, and description.

## Summer Storage

Prior to storing the A.F.S. models for the summer, they must be properly serviced to prevent rusting and component deterioration. If a customer requests you to prepare the snowmobile for storage, use the following procedure:

1. Remove the seat cushion from the tunnel. Clean the seat cushion with a damp cloth and store in a dry place.
2. Clean the snowmobile thoroughly by hosing dirt, oil, grass, and other foreign matter from the skid frame, tunnel, hood, and belly pan. Allow the snowmobile to dry thoroughly. DO NOT get water into any part of the engine.
3. Place the rear of the snowmobile up on a jackstand. Remove the air intake silencer boots from the carburetors.
4. Start the engine and allow to idle. With the engine idling, spray engine preserver into the carburetors until the engine exhaust starts to smoke heavily, or until the engine starts to drop in rpm.
5. Install the intake silencer boots.
6. Drain fuel from the carburetor float bowls; then drain the fuel tank of all gasoline.
7. On the Cougar and Cheetah F/C models, remove the primer line from the T-fitting where it attaches to the fuel line. Place the end of the primer line into a small container of two-cycle oil and pump the primer until oil is seen in the line going to the intake manifold or carburetor(s). Install the primer line on the T-fitting.
8. Plug the hole in the muffler with a clean cloth.

9. With the ignition switch key in the OFF position:
  - A. Disconnect the spark plug caps from the spark plugs and remove the spark plugs.
  - B. Pour 29.5 ml (1 fl oz) of SAE #30 petroleum-based oil into each spark plug hole and pull the recoil handle slowly about 10 times.
  - C. Install spark plugs and connect the spark plug caps.
10. Every three years or 2000 miles, drain the chain case lubricant by removing the chain-case cover and seal. Allow the lubricant to flow onto rags placed in the belly pan. Inspect chain, sprockets, chain tensioner, and pads for wear and the chain for proper tension. Install chain-case cover and seal and pour 236 ml (8 fl oz) of either Arctco Chainlube or Arctic Cat Chainlube into the filler hole.
11. Remove the hitch pin securing the clutch shield; then swing the clutch shield forward. Remove the drive belt from the driven pulley and drive clutch. Lay the belt on a flat surface or slide it into a cardboard sleeve to prevent warping or distortion during storage. Secure the clutch shield with hitch pin.
12. Apply light oil to the upper steering post bushing, pivot bushings of the ski frame, and plungers of the shock absorbers.
13. Lubricate the rear suspension and spindles with a low-temperature grease.
14. Tighten all nuts, bolts, and screws. Make sure rivets holding components together are tight. Replace all loose rivets. Care must be taken that all calibrated nuts and bolts are tightened to specifications.
15. On the liquid cooled models, fill the cooling system to within 2.5 cm (1 in.) of the filler cap with properly mixed coolant.
16. Lightly sand the bottom of the skis; then using black paint p/n 0652-004, paint the entire bottom of the skis.
17. Clean and polish the hood, console, and chassis with an automotive-type cleaner wax. **DO NOT USE SOLVENTS OR SPRAY CLEANERS. THE PROPELLENT WILL DAMAGE THE FINISH.**

18. If possible, store the snowmobile indoors. Raise the track off the floor by blocking up the rear end making sure the snowmobile is secure. Loosen the rear idler wheel adjusting bolts to decrease track tension. Cover with a machine cover or a heavy tarpaulin to protect it from dirt and dust. If the snowmobile must be stored outdoors, block the entire snowmobile off the ground making sure it is secure. Loosen the rear idler wheel adjusting bolts to decrease track tension. Cover with a machine cover or a heavy tarpaulin to protect it from dirt, dust, and rain.

**NOTE: Avoid using a plastic cover as moisture will collect on the snowmobile causing rusting.**

## Preparation After Storage

Taking the snowmobile out of summer storage and correctly preparing it for another season will assure many miles and hours of trouble-free snowmobiling. Arctco recommends the following procedure to prepare the snowmobile.

1. Clean the snowmobile thoroughly. Polish the exterior of the snowmobile using an automotive-type cleaner wax.
2. Clean all engine cooling fins and vents. Remove the cloth from the exhaust system.
3. Check all control wires and cables for signs of wear or fraying. Replace if necessary. Use cable ties or tape to route wires and cables away from hot or rotating parts.
4. Inspect the drive belt for cracks and tears. Check belt specifications. Replace if damaged or worn. If the old belt is worn but yet in a reasonable condition, keep it in the tool box as a spare in case of emergency. Install drive belt.
5. Examine the in-line fuel filter and replace if necessary. Fill the fuel tank with gasoline.
6. Fill the oil-injection tank with either Arctco Injection Oil or Arctic Cat Injection Oil.
7. On the liquid cooled models, check the coolant level and add properly mixed coolant as necessary. Clean the radiator.

8. Check brake lever travel, wear indicator/jam nut clearance, all controls, headlight, taillight, brakelight, ski alignment, ski wear-bars, rail wear-strips, and headlight aim; adjust or replace if necessary.
9. Place the seat cushion into position and secure with the snaps.
10. Adjust the carburetors, throttle cable, and choke cable.
11. Tighten all nuts, bolts, and screws making sure all calibrated nuts and bolts are tightened to specifications.
12. Lubricate the rear suspension and spindles with a low-temperature grease.
13. Check the spark plugs. Clean or replace as necessary.
14. Adjust track to the proper tension and alignment.

# SECTION 2 — ENGINE

2

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## Engine Specifications

		CHEETAH F/C COUGAR	EL TIGRE 5000 PANTERA	EL TIGRE 6000 CHEETAH L/C
Engine Model		AM50A3	AH44L4	AA53L2
No. of Cylinders		2	2	2
Engine Lubrication		Oil Injection	Oil Injection	Oil Injection
Starter System		Recoil	Recoil	Recoil
Bore x Stroke	mm (in.)	70 x 65 (2.756 x 2.559)	68 x 60 (2.679 x 2.364)	72 x 65 (2.835 x 2.559)
Displacement	cc (cu in.)	500 (30.5)	435 (26.5)	529 (32.3)
Compression Ratio		6.4:1	6.8:1	6.6:1
Piston-Ring End Gap Range	mm (in.)	0.20-0.83 (0.008-0.033)	0.20-0.83 (0.008-0.033)	0.20-0.83 (0.008-0.033)
Piston Skirt/Cylinder Clearance Range	mm (in.)	0.084-0.15 (0.0033-0.006)	0.076-0.15 (0.0030-0.006)	0.113-0.15 (0.0044-0.006)
Piston Pin Diameter Range	mm (in.)	17.995-18.000 (0.7085-0.7087)	17.995-18.000 (0.7085-0.7087)	17.995-18.000 (0.7085-0.7087)
Piston-Pin Bore Diameter Range	mm (in.)	17.998-18.006 (0.7086-0.7089)	17.998-18.006 (0.7086-0.7089)	18.002-18.010 (0.7087-0.7091)
Connecting-Rod Small End Diameter Range	mm (in.)	23.00-23.01 (0.9056-0.9059)	23.00-23.01 (0.9056-0.9059)	23.00-23.01 (0.9056-0.9059)
Crankshaft End Play Range	mm (in.)	0.05-0.10 (0.002-0.004)	0.05-0.10 (0.002-0.004)	0.50-0.10 (0.002-0.004)
Crankshaft Runout (max.) (Total Indicator Reading)	mm (in.)	0.05 (0.002)	0.05 (0.002)	0.05 (0.002)
Cylinder Trueness (max.)	mm (in.)	0.1 (0.0039)	0.1 (0.0039)	0.1 (0.0039)

## Removing Engine

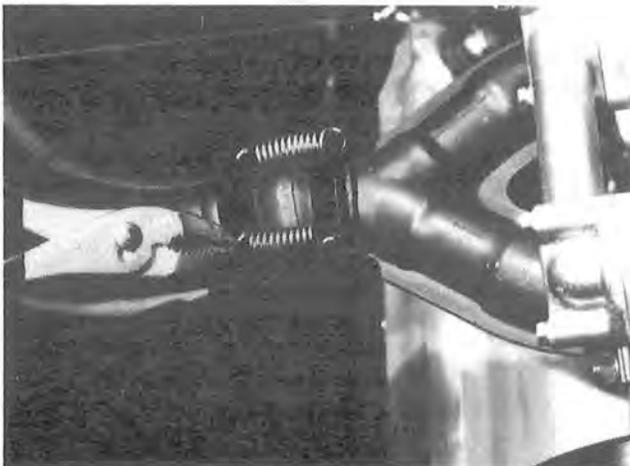
**NOTE:** Except for step 3, procedures designated "A" are for the Cougar and Cheetah F/C models; procedures designated "B" are for the El Tigre, Pantera, and Cheetah L/C models. On step 3, procedure "A" is for the Cougar, Cheetah F/C, Pantera, and El Tigre 5000.

1. Open the clutch shield; then remove the drive belt.
2. Remove the clutch (see Removing Drive Clutch section).

**NOTE:** On the El Tigre 6000 and Cheetah L/C it will be necessary to remove the torque link.

3. A. Remove the three springs securing the pulse charger to the exhaust manifold; then remove the springs securing the pulse charger to the front end and remove the pulse charger.  
B. Remove the three springs securing each expansion chamber to the exhaust manifold; then remove the two springs securing each expansion chamber to the muffler. Remove the springs securing the expansion chambers to the front end and remove the expansion chambers.

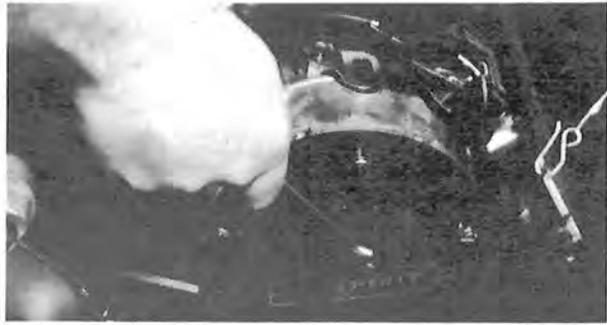
Fig. 2-1



B292

Remove the four bolts and lock washers securing the recoil; then remove recoil from the engine. Leave the recoil in the engine compartment.

Fig. 2-2



B293

5. Disconnect the main wiring harness, the ignition coil wiring harness, and the spark-plug caps.
6. Disconnect the impulse hose from the crankcase.
7. Loosen the flange clamp securing each carburetor to its flange; then remove the carburetors.

Fig. 2-3



B295

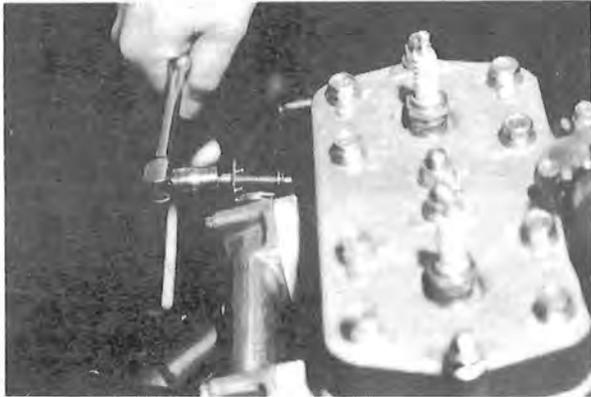
8. Disconnect the oil-injection cable from the injection pump. Disconnect the oil-supply hose from the pump and plug the hose to prevent oil drainage.

Fig. 2-4



9. B. Loosen the clamp securing the hose to the water-intake manifold; then remove the hose allowing the coolant to drain into a clean container.

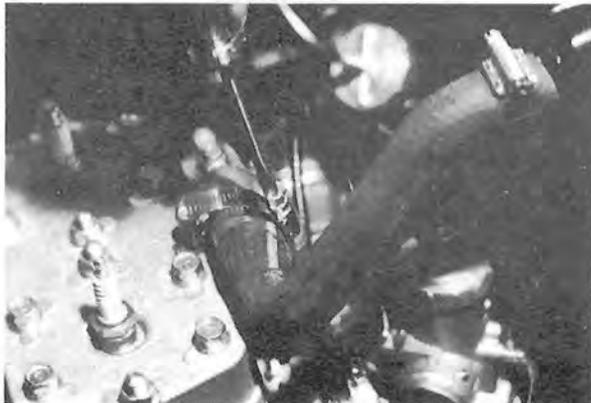
Fig. 2-5



B296

10. B. Loosen the clamp securing the hose to the thermostat cap; then loosen the clamp securing the supply hose to the heat-exchanger end cap. Remove the two hoses from their fittings.

Fig. 2-6



B297

11. B. Remove the temperature-gauge sender from the thermostat housing. While loosening the sender unit nut, secure the sender unit adaptor nut to prevent it from turning. If the adaptor is allowed to turn, the temperature gauge will be ruined.

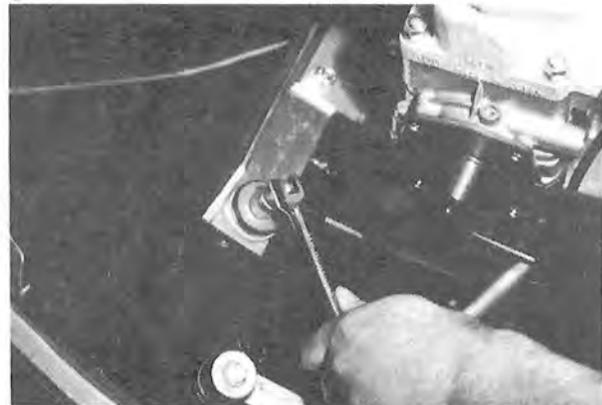
Fig. 2-7



B298

12. Remove the two cap-lock screws securing the rear of the engine plate to the front end. Account for two female mounts and cup washers.
13. Remove the two cap-lock screws securing the engine support to the front end. Account for two female mounts and cup washers.

Fig. 2-8

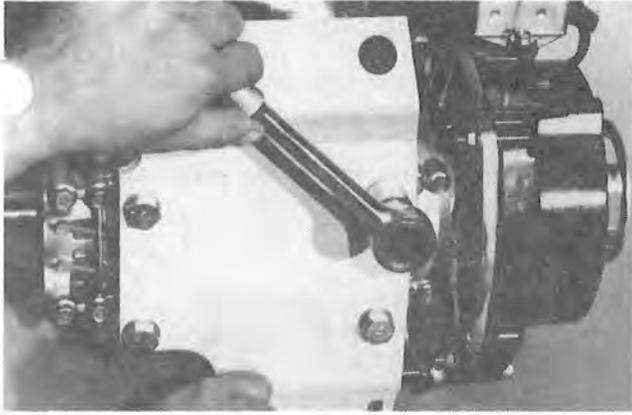


B299

**NOTE: Remove the hood cable.**

14. Lift the engine w/plate assembly out of the engine compartment.
15. Remove the four bolts and lock washers securing the plate assembly to the engine; then separate engine and plate assembly.

Fig. 2-9



## Disassembling Engine (Cougar-Cheetah F/C)

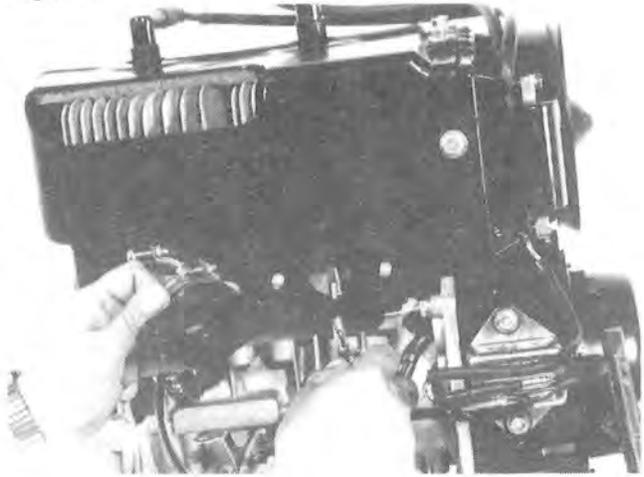
1. Remove the nuts securing the exhaust manifold; then remove the exhaust manifold. Account for two gaskets.
2. Remove the 15 bolts, lock washers, and washers securing the top and exhaust-side cooling shrouds.

Fig. 2-10



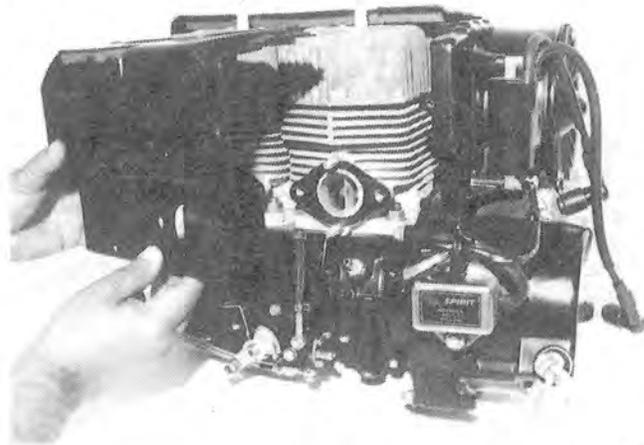
3. Disconnect the spark-plug caps from the spark plugs.
4. Loosen the clamps; then pull the two oil-injection hoses from their fittings on the intake insulator blocks. Remove the four nuts that secure the carburetor flanges and insulator blocks to the cylinders and remove. Remove the flanges and insulator blocks and discard all intake gaskets.

Fig. 2-11



5. Remove the intake cooling shroud from the engine. Remove the intake gaskets from behind the shroud and discard.

Fig. 2-12



024

6. Lift the upper cooling shroud from the engine. Slide the exhaust-side cooling shroud off the exhaust-manifold studs. Account for the two exhaust gaskets behind the shroud.

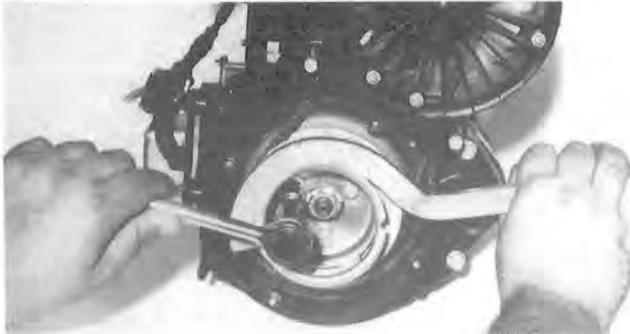
Fig. 2-13



025

- Using a spanner wrench to secure the crankshaft, remove the three bolts and lock washers that secure the starter pulley and fan pulley to the flywheel; then remove the starter pulley.

Fig. 2-14



026

- Using a screwdriver, pry the fan pulley free of the flywheel and remove.

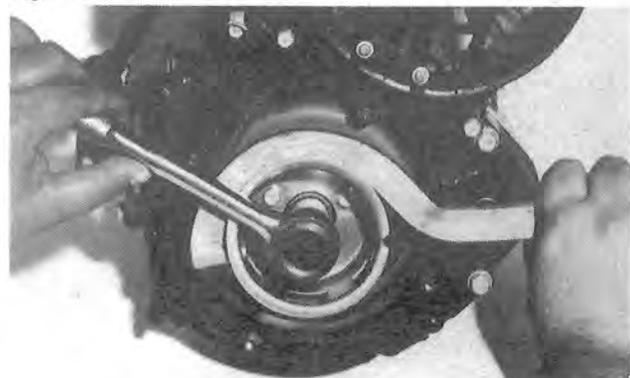
Fig. 2-15



027

- Temporarily install the starter pulley on the flywheel with three bolts. Using a spanner wrench to secure the crankshaft, loosen and remove the flywheel nut and washers. Remove the starter pulley from the flywheel.

Fig. 2-16



028

- Remove the six nuts securing the fan housing to the magneto backing plate and slide the fan housing free of the engine. Remove (if in need of replacement) the CDI unit and ignition coil from the fan housing.

**NOTE:** For further servicing of the axial fan components, see page 38.

Fig. 2-17



029

- Install a protective cap onto the end of the crankshaft.

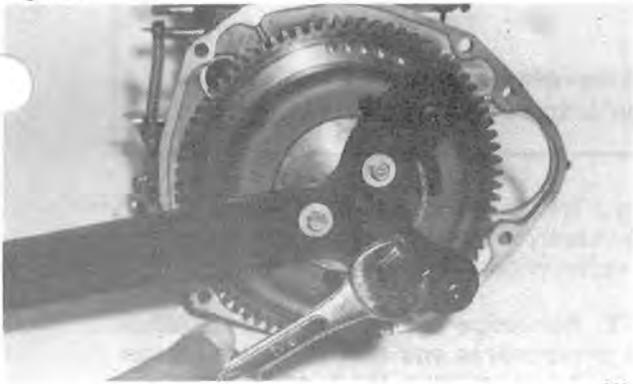
**NOTE:** A protective cap can be made by welding a 3 mm (1/8 in.) plate on one side of a spare flywheel nut.

● CAUTION ●

To prevent damage to the crankshaft, thread a protective cap onto the crankshaft. The puller must bottom on the cap and not on the crankshaft. Also, do not thread puller bolts more than 12.7 mm (1/2 in.) into the flywheel. Damage to the coils may result.

- Using the Arctic Flywheel Puller or suitable equivalent, remove the flywheel from the crankshaft by tightening the puller bolt, striking the head of the puller bolt with a brass hammer, and tightening again. Repeat procedure until the flywheel is free. Account for the key in the end of the crankshaft.

Fig. 2-18



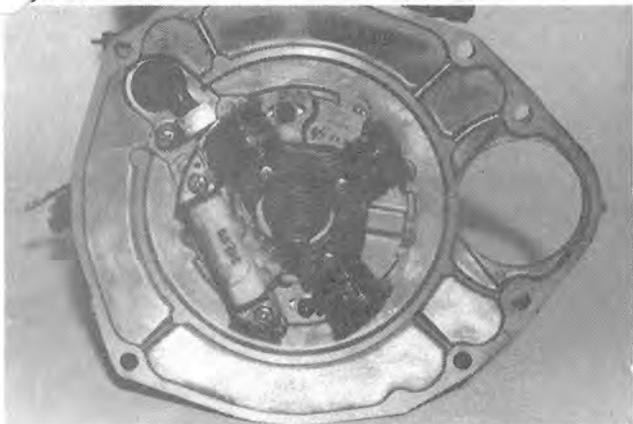
030

**NOTE:** To ensure the cleanliness of the flywheel magnets, place the flywheel (with the magnets facing upward) on a clean bench.

13. Scribe a line on the stator plate and crankcase to aid in assembly; then remove the two screws, lock washers, and washers securing the stator plate to the crankcase.

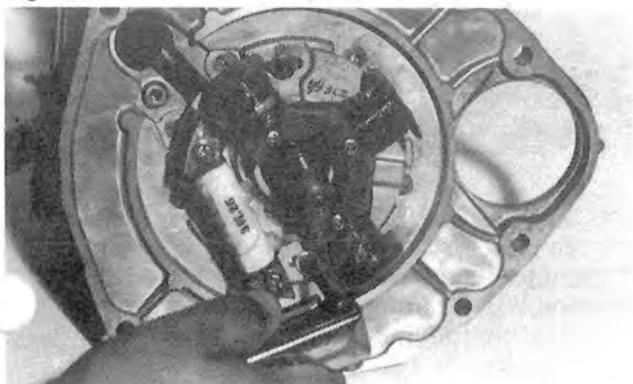
**NOTE:** The two stator plate screws have had LOCTITE applied to the threads during assembly. Before removing them, apply a sharp blow to the head of each screw to break the LOCTITE loose. If this isn't done, the screws can be very difficult to remove.

Fig. 2-19



031

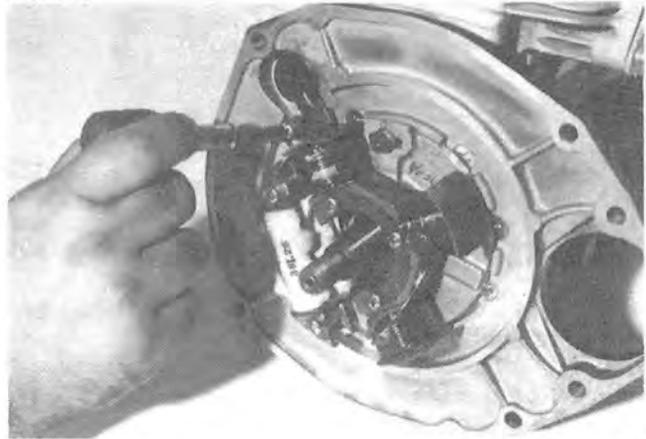
Fig. 2-20



032

14. Loosen the screw that secures the wire retainer bracket. Remove the wiring grommet from the magneto case and remove the stator plate from the engine.

Fig. 2-21



033

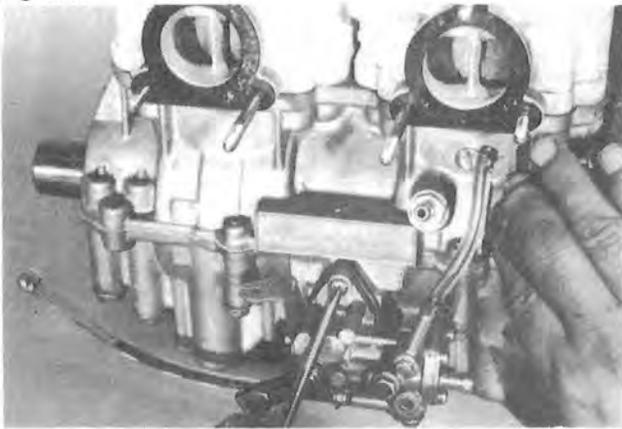
15. Using an impact screwdriver, remove the eight screws securing the magneto case to the crankcase. Using a plastic hammer, tap on the backside of the magneto case to free it from the crankcase.

Fig. 2-22



16. Remove the two bolts, lock washers, and washers securing the oil-injection pump; then remove the pump, retainer, shim, and gear. Account for two gaskets.

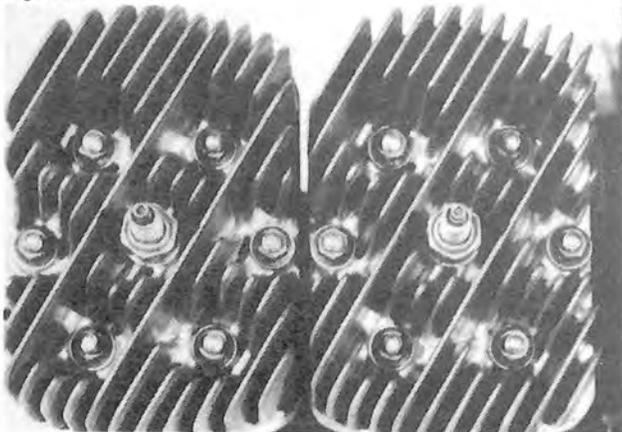
Fig. 2-23



035

17. Remove the spark plugs.
18. Remove the 12 nuts securing the cylinder heads to the cylinders. Remove the heads and account for two gaskets.

Fig. 2-24



19. Remove the four cylinder base nuts from each cylinder. Using a rubber hammer, gently tap on the side of each cylinder and remove from crankcase by lifting straight up off the studs. Remove and discard gaskets.

Fig. 2-25



● CAUTION ●

When removing a cylinder, make sure to support the piston so it will not be damaged.

20. Using a felt-tipped marker, mark an M on the MAG-side cylinder and piston and a P on the PTO-side cylinder and piston.

**NOTE:** For proper assembly, keep all MAG-side components and all PTO-side components separated. Assemble them on their proper sides.

21. Remove the PTO-side piston-pin circlip from the PTO-side piston; remove the MAG-side piston-pin circlip from the MAG-side piston.

Fig. 2-26



037

22. Using the Arctic Piston-Pin Puller (p/n 0144-003), remove the piston pins from both pistons.

Fig. 2-27

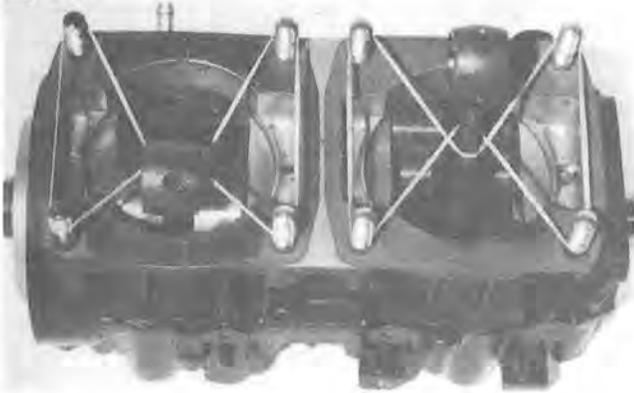


038

23. Lift the pistons clear of the connecting rods and remove the small end connecting-rod bearings; then remove the piston rings. Keep each piston with its rings; keep each piston, pin, and bearing together as a set.

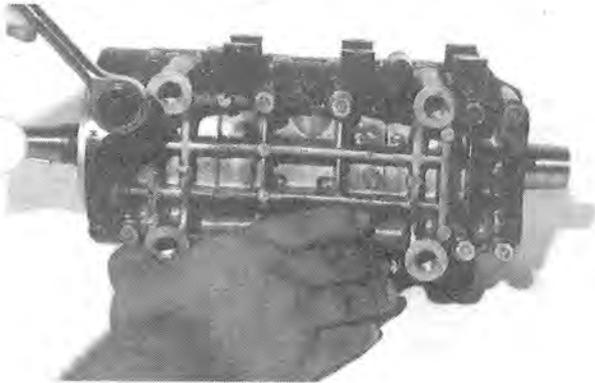
**NOTE:** Place rubber bands over the connecting rods and around the cylinder studs. This will keep the connecting rods from damaging the ankrase.

Fig. 2-28



24. Remove the 14 bolts, lock washers, and washers securing the crankcase halves. Note the position of the different-sized bolts.

Fig. 2-29



25. Using a rubber or plastic-tipped hammer, separate the crankcase halves. Account for the dowel pins.

● CAUTION ●

**DO NOT** drive any tool between halves to separate the crankcase. Damage to the sealing surfaces will result.

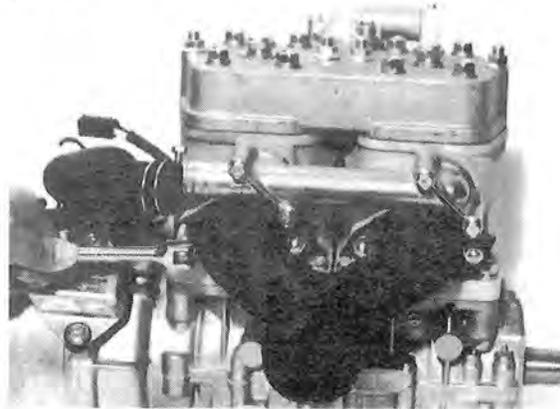
26. Remove the rubber bands holding the connecting rods, lift the crankshaft free from the crankcase half, and slide the two crankshaft seals off the crankshaft. Account for a C-ring. Be sure to prevent the connecting rods from dropping into the sealing surface of the lower crankcase half.

## Disassembling Engine (El Tigre-Cheetah L/C-Pantera)

**NOTE:** Procedures designated "A" are for the Pantera and El Tigre 5000 engines; procedures designated "B" are for the El Tigre 6000 and Cheetah L/C engines.

1. A. Remove the four nuts and lock washers securing the exhaust manifold; then slide the exhaust manifold off its studs. Account for two gaskets.

Fig. 2-30



B308

B. Remove the four nuts securing the two expansion chamber flanges to the cylinders. Remove the flanges and account for exhaust gaskets.

2. Remove the seven screws securing the magneto-case cover; then remove cover. Account for a wiring clamp.

Fig. 2-31



B309

3. Using a spanner wrench to secure the flywheel, remove the three bolts from the starter pulley. Remove the starter and belt pulleys; then temporarily install just the starter pulley. Secure the pulley with three bolts.

Fig. 2-32

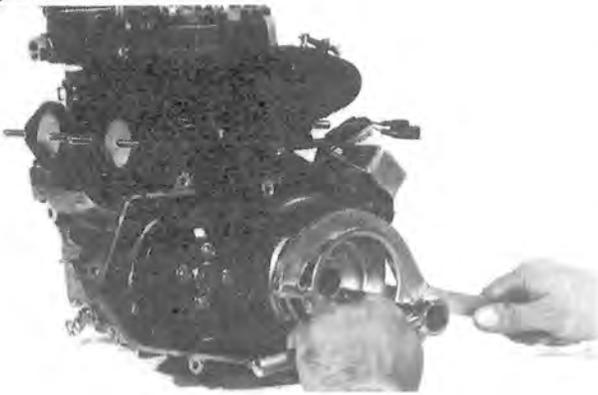
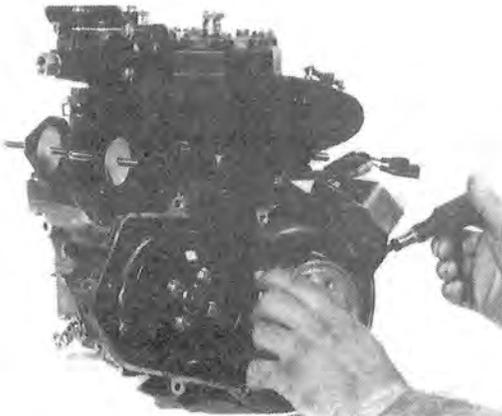
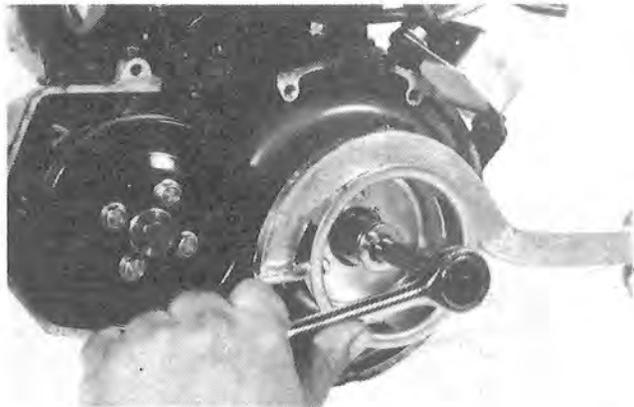


Fig. 2-33



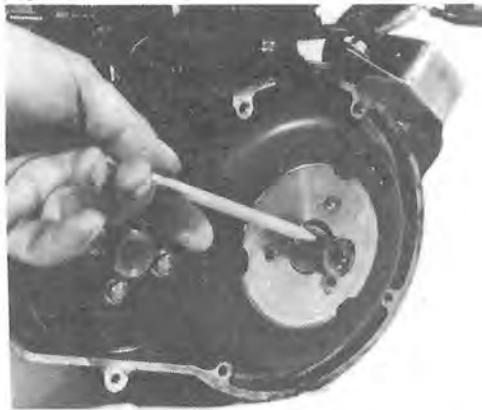
- Using a spanner wrench to secure the flywheel, remove the flywheel nut, lockwasher, and flat washer.

Fig. 2-34



- Install a protective cap onto the end of the crankshaft.

Fig. 2-35



**NOTE:** A protective cap can be made by welding a 3 mm (1/8 in.) plate on one side of a spare flywheel nut.

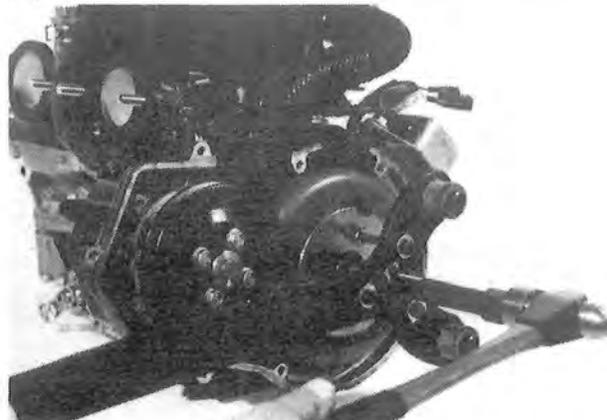
- Using the Arctic Flywheel Puller or suitable equivalent, remove the flywheel from the crankshaft by tightening the puller bolt, striking the head of the puller bolt with a brass hammer, and tightening again. Repeat procedure until the flywheel is free. Account for the key in the end of the crankshaft.

**NOTE:** The flywheel will not clear the water pump pulley, either remove the water pump pulley or loosen the water pump bolts and adjust the pump to attain adequate clearance.

● CAUTION ●

To prevent damage to the crankshaft, thread a protective cap onto the crankshaft. The puller must bottom on the cap and not on the crankshaft. Also, do not thread puller bolts more than 12.7 mm (1/2 in.) into the flywheel. Damage to the coils may result.

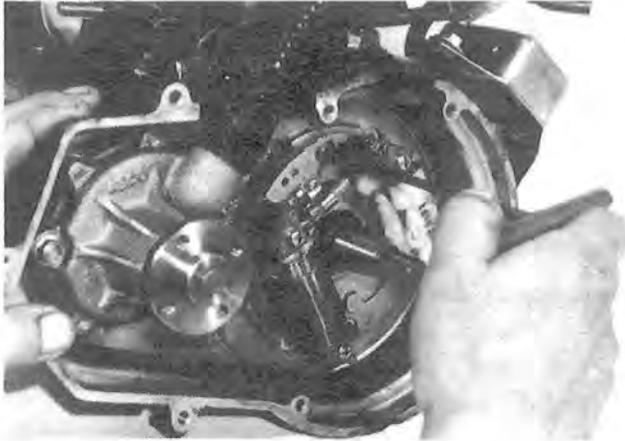
Fig. 2-36



**NOTE:** To ensure the cleanliness of the flywheel magnets, place the flywheel (with the magnets facing upward) on a clean bench.

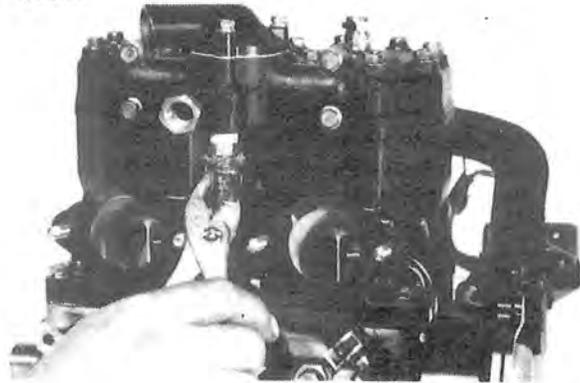
7. Scribe a line on the stator plate and magneto case to aid in assembly; then remove the two screws, lock washers, and washers securing the stator plate. Remove the wiring harness screw and clamp.

Fig. 2-37



8. Remove the two bolts and washers securing the CDI unit; then remove the CDI unit.
9. Compress and slide the clamp securing the bypass hose away from the end of the hose; then remove hose from the thermostat.

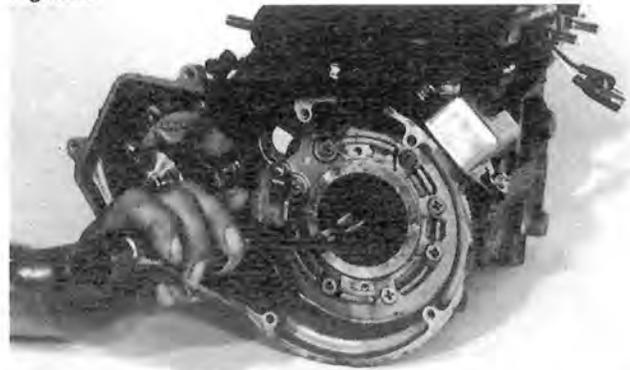
Fig. 2-38



B314

10. Using an impact driver, remove the eight screws securing the magneto case to the crankcase.

Fig. 2-39



B315

11. Using a rubber or plastic-tipped hammer, gently tap the magneto case until it separates from the crankcase; then remove the magneto case with water pump and stator plate.

**NOTE:** Step 12 should only be performed if there is a problem with either the water pump assembly or the magneto case.

12. Remove the five bolts, lock washers, and washers securing the water pump to the magneto case; then remove water pump.
13. Remove the three bolts, lock washers, and washers securing the thermostat cap; then remove cap, gasket, and thermostat.

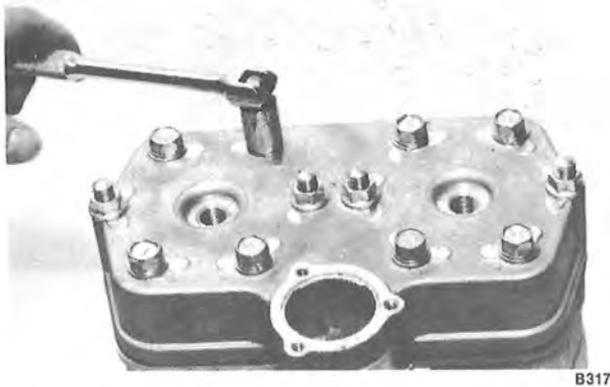
Fig. 2-40



B316

14. Remove the spark plugs.
15. A. Remove the eight bolts, lock washers, flat washers and the four nuts securing the head; then using a rubber hammer, gently tap the head until it separates from the cylinders and remove the head.

Fig. 2-41



- B. Remove the four bolts and washers that secure the thermostat manifold to the cylinder heads. Remove the manifold and discard the gaskets.

Fig. 2-42



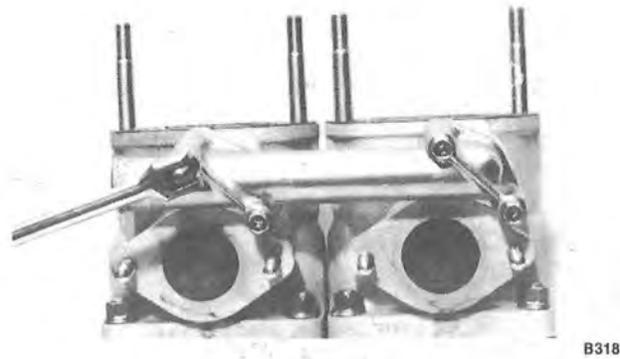
16. B. Remove the eight bolts and O-rings securing each head; then using a rubber hammer, gently tap each head until it separates from the cylinder. Account for two large O-rings beneath each head.

Fig. 2-43



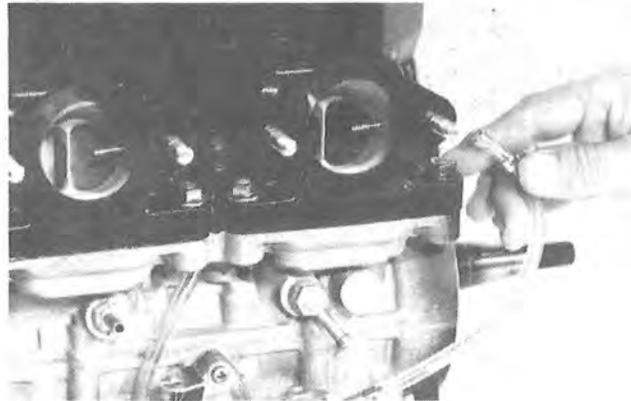
17. Remove the four bolts, lock washers, and washers securing the water-intake manifold and remove the manifold from the cylinders. Account for two gaskets.

Fig. 2-44



18. Pull the oil-injection lines from each cylinder nozzle.

Fig. 2-45



19. Remove the two bolts, lock washers, and washers securing the oil-injection pump to the crankcase. Remove the injection pump from the crankcase along with the retainer and gaskets. Discard the old gaskets. Using a pair of needle nose pliers, remove the shaft from the crankcase. Account for the shim.

Fig. 2-46



- Remove the eight nuts, lock washers, and washers and four flange nuts securing the cylinders to the crankcase; then using a rubber hammer, gently tap the cylinders and remove from the crankcase by lifting them straight up off their studs. Account for two gaskets.

Fig. 2-47



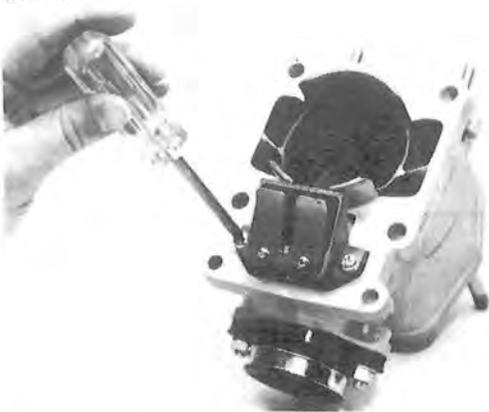
B319

● CAUTION ●

When removing a cylinder, be sure to support the piston so it will not be damaged.

- Remove the four screws and lock washers securing the reed-valve assemblies to the cylinders; then remove the reed-valve assemblies. Account for two gaskets.

Fig. 2-48



B320

NOTE: If the reed-valve assemblies are to be serviced, remove the two screws securing each of the reed-valve assemblies; then separate reed valve and stopper from the seat.

Fig. 2-49



B321

- Remove the PTO-side piston-pin circlip from the PTO-side piston; remove the MAG-side piston-pin circlip from the MAG-side piston.

2

Fig. 2-50



A508

- Using the Arctic Piston Pin Puller (p/n 0144-003), remove the piston pins from both pistons.

NOTE: For proper assembly, keep all MAG-side components and all PTO-side components separated. Assemble them on their proper sides.

Fig. 2-51



A509

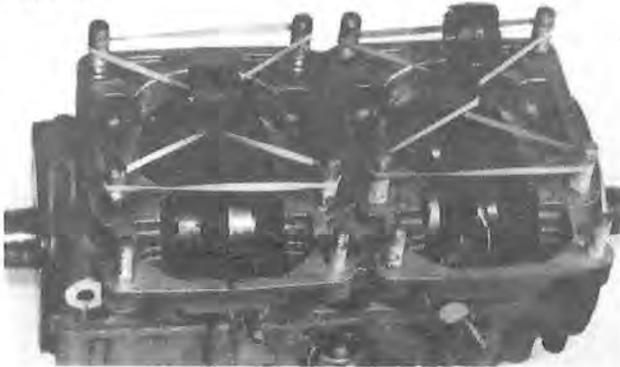
● CAUTION ●

DO NOT use any type of punch to drive the pin free of the piston; damage may result. Use a piston-pin puller only.

24. Lift the pistons clear of the connecting rods and remove the small-end connecting-rod bearings; then remove the piston rings. Keep each piston with its rings; keep each piston, pin, and bearing together as a set.

NOTE: Place rubber bands over the connecting rods and around the cylinder studs. This will keep the connecting rods from damaging the crankcase.

Fig. 2-52



25. Using an impact driver, remove the four screws securing the plate to the crankcase; then remove the plate.

Fig. 2-53



26. Remove the 16 bolts, lock washers, and washers securing the crankcase halves. Note the position of the different-sized bolts.

Fig. 2-54



27. Using a rubber or plastic-tipped hammer, tap on the side of the crankcase until the two halves start to separate. Remove the rubber bands and lift the top half of the crankcase off the bottom half. Grasp the connecting rods as the top half of the crankcase is removed. Do not allow them to drop onto the sealing surface of the bottom case half.

● CAUTION ●

DO NOT drive any tool between halves to separate the crankcase. Damage to the sealing surfaces will result.

28. Lift the crankshaft free from the crankcase half, and slide the crankshaft oil seals off the crankshaft. Account for the C-ring. Remove the bearing dowel pins.

## Cleaning and Inspecting Engine

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

### CYLINDER HEAD(S)

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

- Place the cylinder head(s) on a surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move the cylinder head in a figure eight motion. Inspect the sealing surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder head in a figure eight motion until a uniform bright metallic finish is attained.

Fig. 2-55



A572

**CAUTION**

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

**CYLINDERS**

- Using a non-metallic carbon removal tool, remove carbon buildup from the exhaust ports.
- Wash the cylinders in cleaning solvent.
- Inspect the cylinders for pitting, scoring, scuffing, and corrosion. If marks are found, repair the surface with a surface hone with #500 grit stones and honing oil.

Fig. 2-56



**NOTE:** To produce the proper 60° “cross-hatch” pattern, use a low rpm drill (600 rpm) at the rate of 30 strokes per minute. If honing oil is not available, use a lightweight petroleum-based oil. Thoroughly clean cylinders after honing using soap and hot water and dry with compressed air; then immediately apply oil to the cylinder bores. If a bore is severely damaged or gouged, the cylinder will have to be replaced.

**NOTE:** On all models except the 530 L/C, it is necessary to remove the stud bolts to perform step 4.

- Place the head surface of each cylinder on a surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each cylinder in a figure eight motion. Inspect the surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder in a figure eight motion until a uniform bright metallic finish is attained.

**CAUTION**

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

**PISTON ASSEMBLY**

- Using a non-metallic carbon removal tool, remove carbon buildup from the dome of each piston.
- Using an old piston ring as a tool, snap the ring in two pieces. Grind one end of the ring at a 45 degree angle and to a sharp edge. Clean the ring-groove of carbon using the ring. Be sure to position the ring with its tapered side up.

**CAUTION**

Improper cleaning of the ring grooves by the use of the wrong type of ring-groove cleaner will result in severe damage to the piston.

- Inspect each piston for cracks in the piston pin and skirt areas.
- Inspect each piston for seizure marks or scuffing. Repair with #400 grit wet-or-dry sandpaper and water or honing oil.

Fig. 2-57



A840

**NOTE:** If scuffing or seizure marks are too deep to correct with the sandpaper, it may be necessary to replace the piston.

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

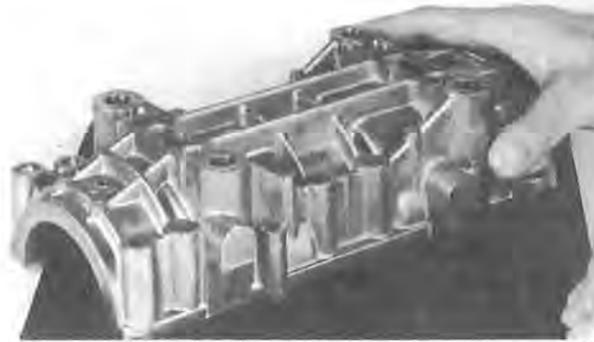
### CRANKCASE

1. Wash the crankcase halves in cleaning solvent.

**NOTE:** Before washing the crankcase halves, make sure the bearing dowel pins have been removed and accounted for.

2. Inspect crankcase halves for scoring, pitting, scuffing, or any imperfections in the casting.
3. Inspect all threaded areas for damaged or stripped threads.
4. Inspect the bearing areas for cracks or excessive bearing movement. If evidence of excessive bearing movement is noted, repair by peening the bearing area in a pinking (saw tooth) pattern using a center punch.
5. Inspect the bearing dowel pins for wear.
6. Inspect the sealing surfaces of the crankcase halves for trueness by placing each crankcase half on a surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each half in a figure eight motion. Inspect the sealing surfaces for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots by continuing to move the half in a figure eight motion until a uniform bright metallic finish is attained.

Fig. 2-58



A519

● CAUTION ●

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

### CRANKSHAFT

1. Wash the crankshaft w/bearings in cleaning solvent.
2. Inspect the bearings for wear, scoring, scuffing, damage, or discoloration. Rotate the bearings. Bearings must rotate freely and must not bind or feel rough. If any abnormal condition is noted, replace the bearing.

Fig. 2-59



A521

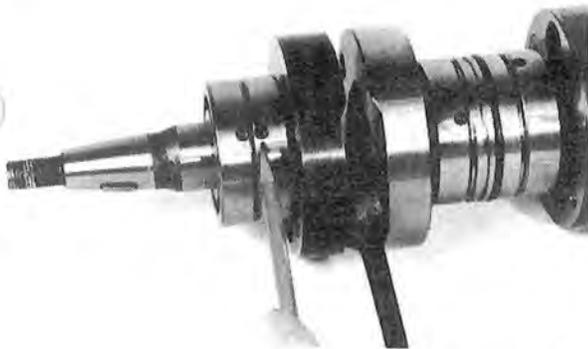
**NOTE:** To remove crankshaft bearings, use either Bearing Puller Kit (p/n 0144-080) or (p/n 0144-302). To install new bearings, squirt oil into the bearings; then holding the bearing with a pair of pliers and using a propane torch, heat the inner race. Keep the flame moving on the inner race, never allowing the flame to remain on one area for

any length of time. Heat the inner race until you note slight smoke coming from the bearing; then pop the bearing into position over the end of the crankshaft. Make sure to position the dowel-pin hole in the outer race correctly so it will align with the dowel-pin in the crankcase.

Fig. 2-60



Fig. 2-61



A659

● CAUTION ●  
DO NOT overheat the bearing.

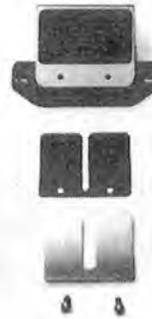
3. Inspect the connecting-rod bearings by rotating them. Bearings must rotate freely and must not bind or feel rough. If a connecting-rod bearing must be replaced, the connecting rod and crank pin must also be replaced.

**NOTE:** Lubricate bearings thoroughly prior to assembly.

## REED VALVES

1. Inspect the seats for cracks or wear.
2. Inspect the reeds for cracks.

Fig. 2-62



B321

3. Inspect the reed stopper height. Using a caliper, measure the distance from the seat to the bottom outer tip edge of the stopper. Measurement must not exceed specifications. If measurements are not within specifications, either bend or replace the reed stopper.

Reed Stopper Height			
440 L/C		530 L/C	
mm	8.0 ± 0.5	mm	9.0 ± 0.5
in.	0.315 ± 0.019	in.	0.354 ± 0.019

Fig. 2-63



A533

4. Inspect the reed-to-seat clearance. Using a feeler gauge, measure the clearance. Clearance must be less than 0.20 mm (0.008 in.). If clearance is not within specifications, replace the reed valve.

# Measuring Critical Components

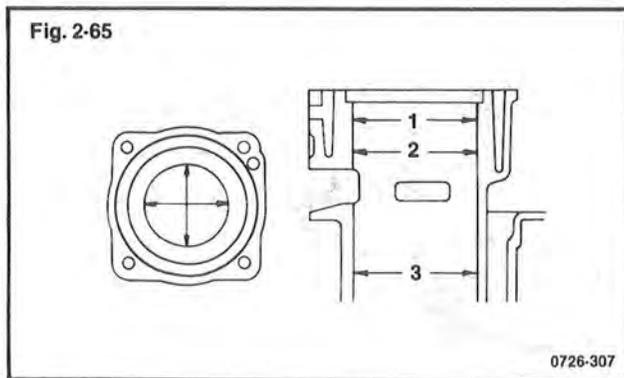
## CYLINDER TRUENESS

1. Measure each cylinder in the three locations shown from front to back and side to side for a total of six readings. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must not exceed specifications listed.

Fig. 2-64



Fig. 2-65



CYLINDER TRUENESS LIMIT	
mm	in.
0.1	0.0039

## PISTON SKIRT/CYLINDER CLEARANCE

1. Measure each cylinder front to back about 2.5 cm (1 in.) from the bottom of each cylinder.
2. Measure the corresponding piston diameter at a point 1 cm (0.394 in.) above the piston

skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be within specifications.

Fig. 2-66



PISTON SKIRT/CYLINDER CLEARANCE RANGE		
	mm	in.
500 F/C	0.084-0.15	0.0033-0.0060
530 L/C	0.113-0.15	0.0044-0.0060
440 L/C	0.076-0.15	0.0030-0.0060

## PISTON-RING END GAP

1. Place each piston ring in the wear portion above the exhaust port of its respective cylinder. Use the piston to position each ring squarely in each cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must fall within specifications.

Fig. 2-67



PISTON-RING END GAP RANGE	
mm	in.
0.20-0.83	0.008-0.033

### PISTON PIN AND PISTON-PIN BORE

1. Measure the piston pin diameter in several places. If any measurement varies by more than 0.02 mm (0.001 in.), the piston pin and bearing must be replaced as a set.

Fig. 2-68



A674

PISTON PIN DIAMETER RANGE	
mm	in.
17.995-18.000	0.7085-0.7087

2. Insert a snap gauge into each piston-pin bore; then remove the gauge and measure it with a micrometer. Diameter must be within specifications. Take two measurements to ensure accuracy.

Fig. 2-69



A676

PISTON-PIN BORE DIAMETER RANGE		
	mm	in.
530 L/C	18.002-18.010	0.7087-0.7091
500 F/C	17.998-18.006	0.7086-0.7089
440 L/C	17.998-18.006	0.7086-0.7089

### CONNECTING-ROD SMALL END

1. Insert a snap gauge into each connecting-rod small end bore; then remove the gauge and measure it with a micrometer. Diameter must be within specifications.

Fig. 2-70



CONNECTING-ROD SMALL END DIAMETER RANGE	
mm	in.
23.00-23.01	0.9056-0.9059

### CRANKSHAFT RUNOUT

1. Using a set of V-blocks, support the crankshaft on a surface plate.

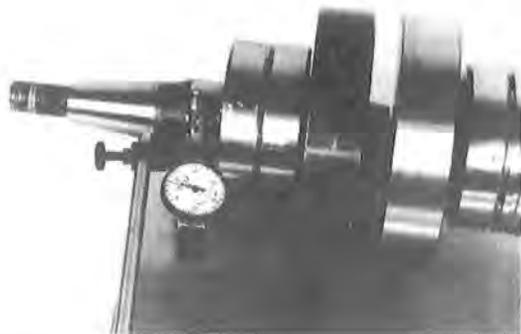
**NOTE:** The V-blocks should support the crankshaft on the outer bearings.

2. Mount a dial indicator and base on the surface plate. Position the indicator contact point against the crankshaft distance A (PTO end) from the crankshaft counterweight. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).

500 F/C	mm	in.
A	41.3	1.62
B	41.3	1.62
530-440 L/C	mm	in.
A	44.5	1.75
B	44.5	1.75

3. Position the indicator contact point against the crankshaft distance B (MAG end) from the crankshaft counterweight. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).

Fig. 2-71



A664

CRANKSHAFT RUNOUT (Total Indicator Reading)		
	mm	in.
Maximum	0.05	0.002

- If runout exceeds specifications at either end, the crankshaft must be either straightened or replaced.

## Assembling Engine (Cougar-Cheetah F/C)

**NOTE:** When use of a silicone sealer is indicated, use either RTV Silicone Sealant or Three Bond Sealant.

- Install the C-ring and dowel pins into the lower crankcase half.
- Lubricate the inner lips of the crankshaft oil seals with grease; then slide the seals onto the crankshaft making sure the spring side of each seal faces the center of the crankshaft.

Fig. 2-72



A685

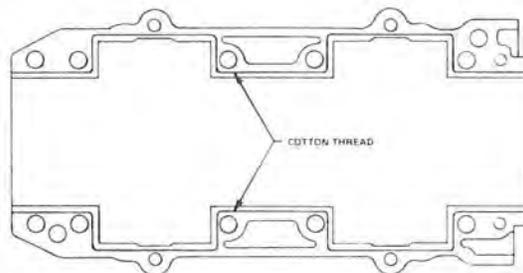
- Apply oil to the crankshaft bearings; then install the crankshaft into the lower crankcase half. Be sure the alignment hole in each bearing is positioned over its respective dowel pin in the crankcase; then seat the crankshaft.

### ● CAUTION ●

If the bearings are not properly seated during assembly, the crankcase halves will not bolt together tightly and engine damage will result.

- Apply a thin coat of silicone sealer to the lower crankcase sealing surface; then lay a length of #50 cotton thread next to the inner edge of and along the full length of the lower crankcase half.

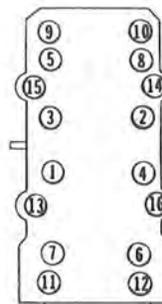
Fig. 2-73



0725-549

- Assemble the crankcase halves making sure the dowel pins are properly positioned; then apply LOCTITE LOCK N' SEAL to the crankcase bolts.
- Install the 16 crankcase bolts, lock washers, and washers making sure the proper-sized bolts are in the proper holes. Tighten in three steps the 8 mm bolts to 1.8-2.2 kg-m (13-16 ft-lb) and the 6 mm bolts to 0.8-1.2 kg-m (6-9 ft-lb) using the pattern shown.

Fig. 2-74



0725-321

**NOTE: Secure connecting rods with rubber bands on the cylinder studs.**

Install the piston rings on each piston so the letter on the top or inclined surface of each ring faces the dome of the piston.

Fig. 2-75



E454

● CAUTION ●

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

Apply oil to the connecting-rod small end bearings; then install the small-end bearings.

- Place each piston over the connecting rod so the arrow on the piston dome points toward the exhaust port; then secure with a piston pin.

**NOTE: Apply oil to the piston pin before installing.**

- Install the circlips so the open end is directed either down or up.

Fig. 2-76



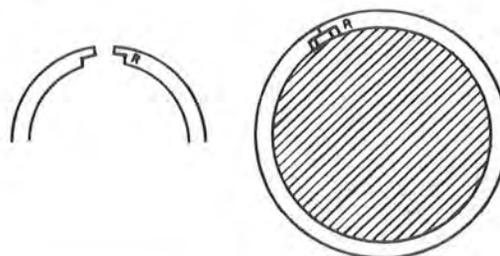
● CAUTION ●

Make sure circlips are firmly seated and the open end is directed either down or up before continuing with assembly.

- Apply a thin coat of silicone sealer to both sides of each cylinder-base gasket; then install gaskets on the crankcase.
- Rotate each piston ring until the ring ends are properly positioned on either side of the ring keeper; then apply oil to the piston assemblies and cylinder bores. Remove the rubber bands from the connecting rods.

**NOTE: Apply a generous amount of oil to the surface of the pistons, rings, and cylinder bores.**

Fig. 2-77



0726-306

- In turn on each piston, place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase; then using a ring compressor or the fingers, compress the rings and slide the cylinder over the piston. Remove the piston holder and seat the cylinder firmly onto the crankcase.

Fig. 2-78



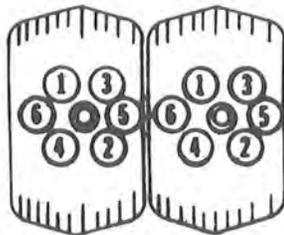
14. Install the four cylinder base nuts, flat washers, and lock washers. DO NOT TIGHTEN AT THIS TIME.
15. Temporarily install the exhaust manifold and secure with four nuts and lock washers to "square" the cylinders. Torque the manifold nuts to 1.8-2.2 kg-m (13-16 ft-lb).
16. With the exhaust manifold in place, torque the cylinder-base nuts in three steps to 3.0-4.0 kg-m (22-29 ft-lb) using a crisscross pattern. Remove the exhaust manifold.
17. Place each head w/gasket into position and install the twelve nuts, washers, and lock washers. Tighten in three steps to 2.0-2.5 k-gm (14.5-18 ft-lb) using the torque pattern shown.

Fig. 2-79



042

Fig. 2-80



0725-320

18. Install the spark plugs and tighten to 2.5-2.8 kg-m (18-20 ft-lb).
19. Apply a thin coat of silicone sealer to both sides of the oil-injection pump gaskets. In order, install the gear, shim, gasket, and oil-injection pump. Secure with two bolts, lock washers, and washers. Tighten and then torque to 0.7 kg-m (5 ft-lb).

Fig. 2-81



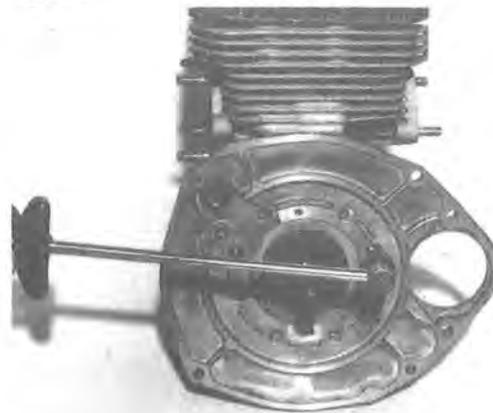
035

● CAUTION ●

Be sure the gear is properly aligned with the slot of the oil-injection pump shaft. The injection pump will be damaged if these two parts are not aligned.

20. Place the magneto case into position and secure with eight screws coated with LOCTITE LOCK N' SEAL. Tighten to 0.35 kg-m (31 in-lb).

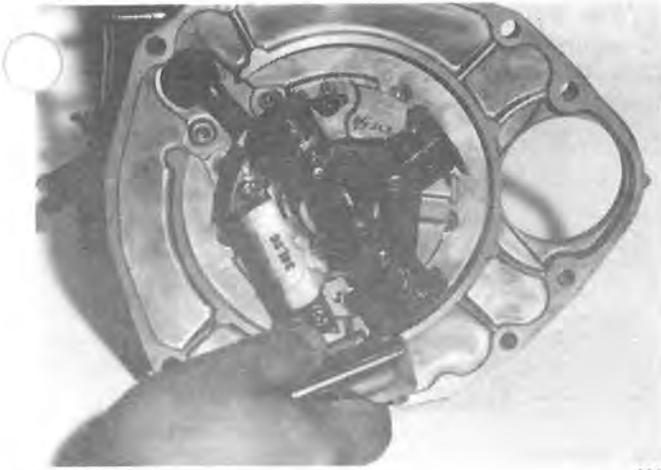
Fig. 2-82



045

21. Insert the stator plate wiring harness through the magneto case opening and place the stator plate into position. Align the stator plate timing marks and secure with two screws (coated with LOCTITE LOCK N' SEAL), lock washers, and washers.

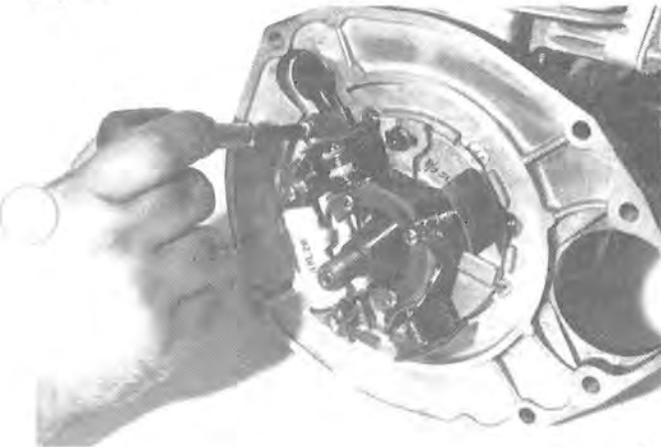
Fig. 2-83



032

22. Position the wiring harness clamp over wiring harness and secure with screw. Install grommet.

Fig. 2-84



033

23. Install the flywheel key in the crankshaft keyway and slide the flywheel onto the crankshaft making sure the keyways match. Install the flat washer, lock washer, and flywheel nut. Apply LOCTITE LOCK N' SEAL to the crankshaft threads before installing the nut.

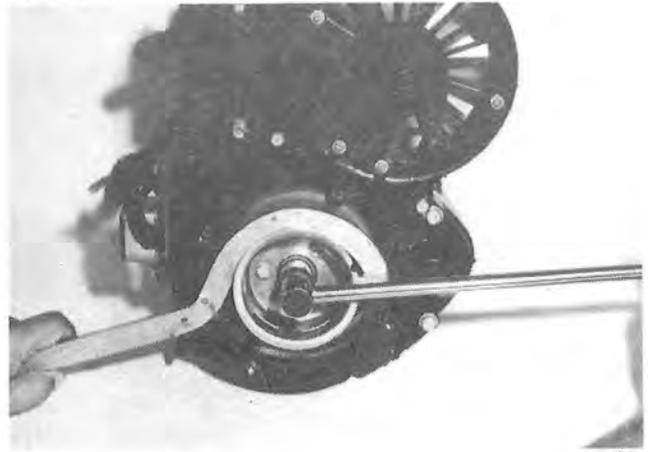
Fig. 2-85



046

24. Place the fan housing into position and secure with five nuts. Torque the six nuts to 1.5-1.9 kg-m (11-14 ft-lb).
25. Temporarily install the starter pulley on the flywheel with three bolts. Using a spanner wrench to secure the flywheel, torque the flywheel nut to 9.0-11.0 kg-m (65-79 ft-lb).

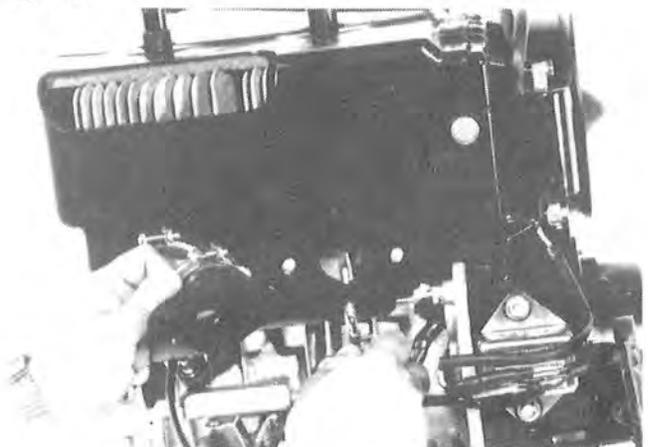
Fig. 2-86



047

26. Install an intake gasket lightly coated with silicone sealer on each cylinder. Install an exhaust gasket on each cylinder with its metal side positioned towards the cylinder exhaust flange. Install the cooling shrouds and secure with 15 screws, lock washers, and washers.
27. Install the outer intake gasket, coated lightly with silicone sealer on each cylinder next to the cooling shroud. Slide the gaskets, insulator blocks, and carburetor flanges into position on each cylinder. Secure with nuts and washers. Torque the four nuts to 1.8-2.2 kg-m (13-16 ft-lb) using a crisscross pattern.
28. Slide the two oil-injection hoses onto the fittings on the insulator blocks. Be certain all hose clamps are in place; then tighten the screw clamps.

Fig. 2-87



29. Pressure test the engine (see Pressure Testing Engine section).
30. Remove the starter pulley. Position the fan belt onto the fan-belt drive pulley; then place the fan-belt drive pulley and the starter pulley into position on the flywheel. Align one hole in the flywheel with one of those in the starter pulley and belt pulley and start a bolt fingertight only.

Fig. 2-88



048

31. Rotate the starter and drive pulleys counter-clockwise, causing the pulleys to pivot on the single bolt installed. As the pulleys pivot, watch for the remaining two holes in the pulleys to align with those in the flywheel. Install the remaining two bolts and tighten evenly until the belt pulley is firmly seated against the flywheel. Torque the three bolts to 0.8-1.0 kg-m (6-7 ft-lb).

Fig. 2-89

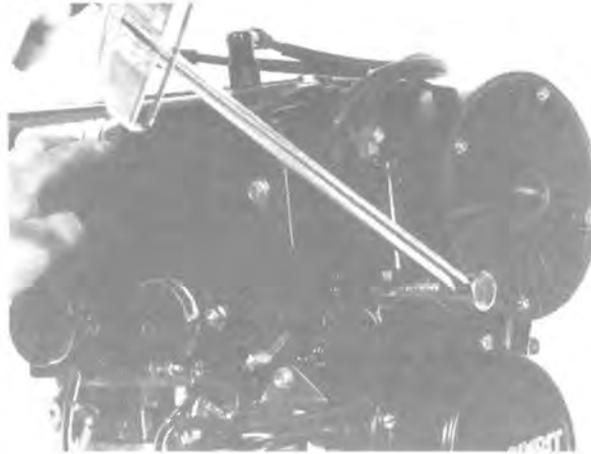


049

**NOTE: Affirm proper fan belt tension. Adjust as necessary.**

32. If removed, secure the CDI unit and external coil to the fan housing. Torque the bolts to 0.8-1.0 kg-m (6-7 ft-lb). Connect all wires following the color code of each. Attach the two spark plug high tension leads to the spark plugs.

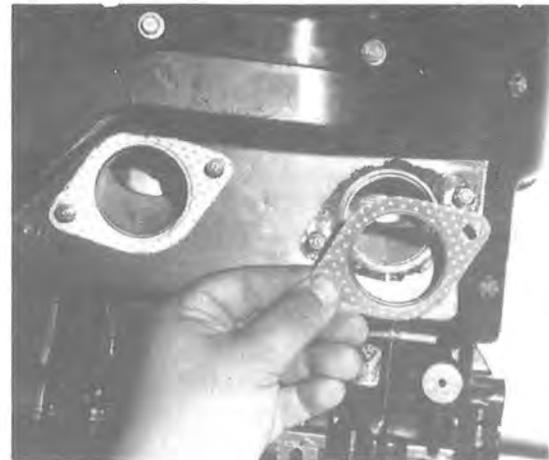
Fig. 2-90



050

33. Install an exhaust gasket on each cylinder with the metal side positioned out and away from the cooling shroud. Slide the exhaust manifold into position, securing with four nuts and lock washers. Torque the four nuts in three steps 1.5-1.9 kg-m (11-14 ft-lb).

Fig. 2-91



044

## Assembling Engine (El Tigre-Pantera-Cheetah L/C)

NOTE: Procedures designated "A" are for the 440 L/C engine; procedures designated "B" are for the 530 engine.

NOTE: When use of a silicone sealer is indicated, use either RTV Silicone Sealant or Three Bond Sealant.

1. Install the C-ring into the lower crankcase half.
2. Lubricate the inner lips of the crankshaft oil seals with grease; then slide the seals onto the crankshaft making sure the spring side of each seal faces the center of the crankshaft.

Fig. 2-92



A685

NOTE There is a MAG-side seal and a PTO-side seal.

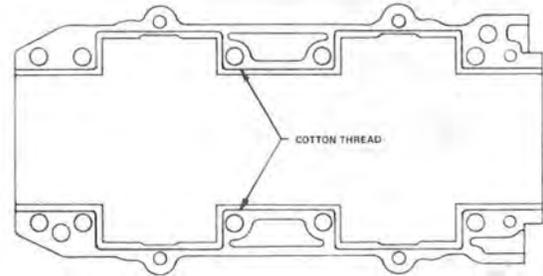
3. Apply oil to the crankshaft bearings; then install the crankshaft into the lower crankcase half. Be sure the alignment hole in each bearing is positioned over its respective dowel pin in the crankcase; then seat the crankshaft.

### ● CAUTION ●

If the bearings are not properly seated during assembly, the crankcase halves will not bolt together tightly and engine damage will result.

4. Apply a thin coat of silicone sealer to the lower crankcase sealing surface; then lay a length of #50 cotton thread next to the inner edge of and along the full length of the lower crankcase half.

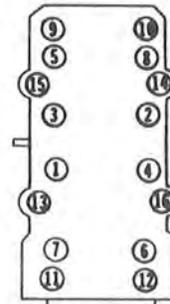
Fig. 2-93



0725-549

5. Assemble the crankcase halves; then apply LOCTITE LOCK N' SEAL to the crankcase bolts.
6. Install the 16 crankcase bolts, lock washers, and washers securing the crankcase halves making sure the proper-sized bolts are in the proper holes. Tighten in three steps the 8 mm bolts to 1.8-2.2 kg-m (13-16 ft-lb) and the 6 mm bolts to 0.8-1.2 kg-m (6-9 ft-lb) using the pattern shown.

Fig. 2-94



0725-321

Fig. 2-95

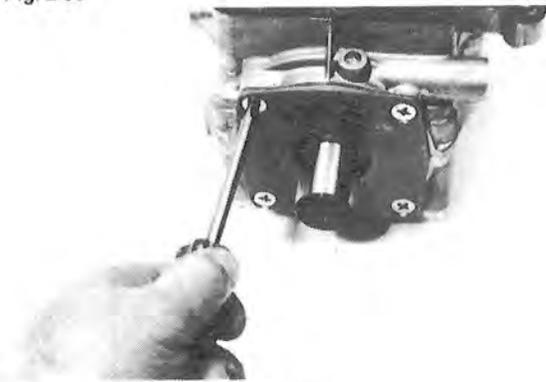


2

**NOTE:** Secure the connecting rods with rubber bands on the cylinder studs.

7. Place the plate into position on the crankcase; then apply LOCTITE LOCK N' SEAL to the four screws and tighten securely.

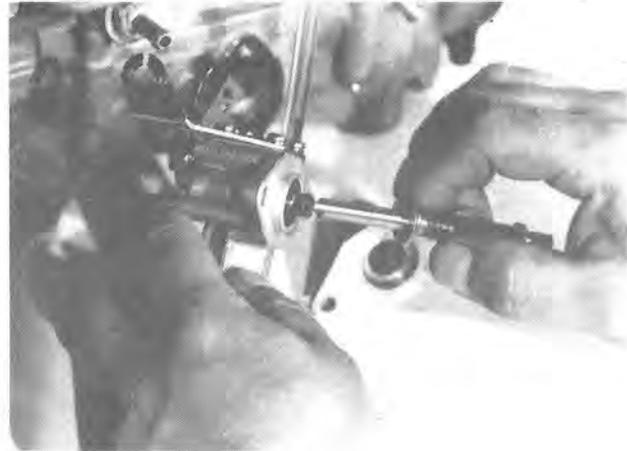
Fig. 2-96



B328

8. Install the oil-injection pump drive gear shaft into the crankcase. Position the shim on the outer end of the shaft. Apply a thin coat of silicone sealer to both sides of both gaskets and install the gasket, retainer, gasket, and oil-injection pump. Secure with two bolts and washers. Tighten the two bolts to 0.7 kg-m (5 ft-lb).

Fig. 2-97



9. Install the piston rings on each piston so the letter on the top or inclined surface of each ring faces the dome of the piston.

Fig. 2-98



E454

● CAUTION ●

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

10. Apply oil to the connecting-rod small end bearings; then install the small-end bearings.
11. Place each piston over the connecting rod so the arrow on each piston will point toward the exhaust port; then secure with a piston pin.

**NOTE:** The arrow is found up inside the piston.

12. Install the circlips so the open end is directed down.

Fig. 2-99



● CAUTION ●

Make sure circlips are firmly seated and the open end is directed down before continuing with assembly.

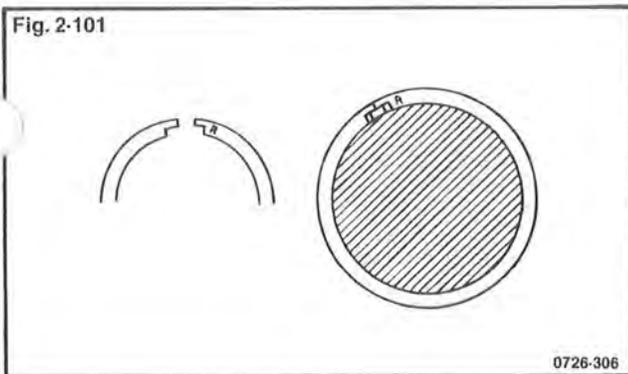
- Apply a thin coat of silicone sealer to both sides of each cylinder-base gasket; then install each gasket.

Fig. 2-100



- Rotate each piston ring until the ring ends are properly positioned on either side of the ring keeper; then apply oil to the piston assemblies and cylinder bores. Remove the rubber bands from the connecting rods.

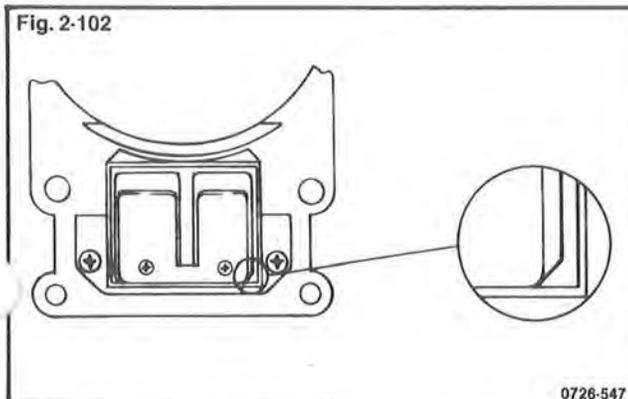
Fig. 2-101



0726-306

**NOTE:** If the reed-valve assemblies were serviced, place the reed valve (with the beveled corner positioned toward the lower right-hand corner) and stopper into position on the seat; then apply LOCTITE LOCK N' SEAL to the screws and tighten securely.

Fig. 2-102



0726-547

Fig. 2-103



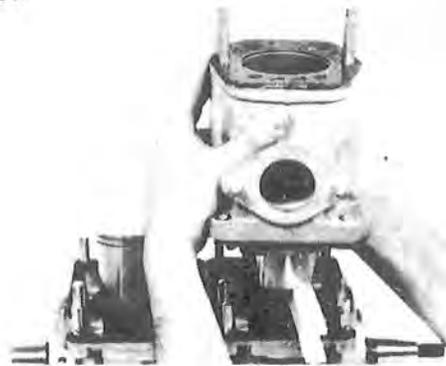
B321

- Place the reed-valve assemblies w/new gaskets into position on the cylinders; then apply LOCTITE LOCK N' SEAL to the four screws and lock washers and tighten securely.
- In turn on each cylinder, place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase; then using a ring compressor or the fingers, compress the rings and slide the cylinder over the piston. Remove the piston holder and seat the cylinder firmly onto the crankcase.

● CAUTION ●

When installing the cylinders, care must be taken not to bend or damage the reed stopper.

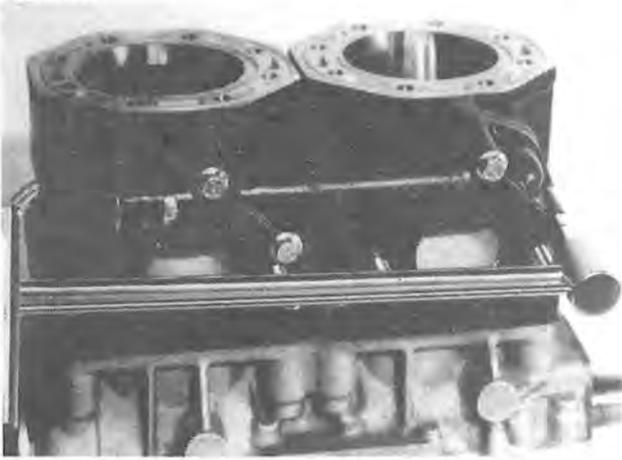
Fig. 2-104



A566

- Secure each cylinder by installing the six nuts, four washers, and lock washers. DO NOT TIGHTEN AT THIS TIME.
- Apply a thin coat of silicone sealer to both sides of the water-intake manifold gaskets; then place gaskets and manifold into position and secure with four bolts, lock washers, and washers. Tighten to 0.7-1.0 kg-m (5-7 ft-lb) using a crisscross pattern.

Fig. 2-105



19. With the water manifold torqued, secure the cylinders by tightening the 8 mm cylinder base nuts to 1.8-2.2 kg-m (13-16 ft-lb) and the 10 mm nuts to 3.0-4.0 kg-m (22-29 ft-lb). Torque all the nuts in three steps using the pattern shown.

Fig. 2-106

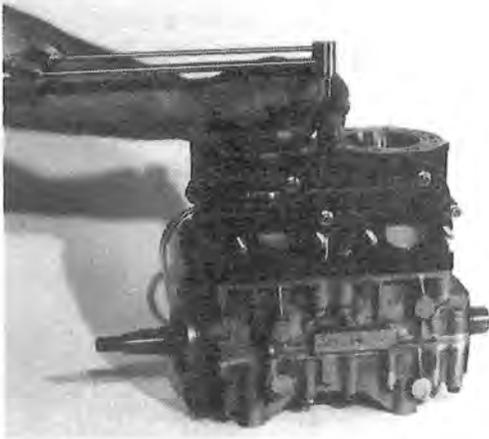
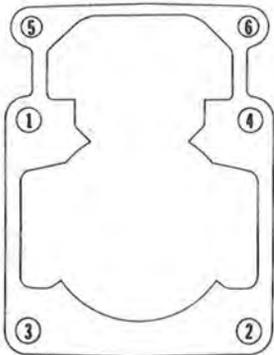


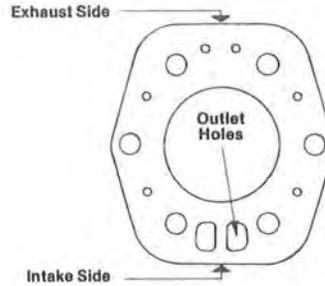
Fig. 2-107



0725-551

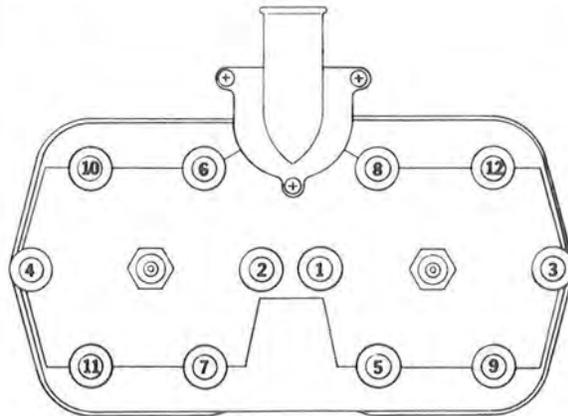
20. A. Apply a very thin coat of silicone sealer to each head gasket; then place head w/gaskets into position and secure with eight bolts, lock washers, and washers and four nuts, lock washers, and washers. Tighten in three steps to 3.0-4.0 kg-m (22-29 ft-lb) using the pattern shown. Install the spark plugs and tighten to 2.5-2.8 kg-m (18-20 ft-lb).

Fig. 2-108



0727-068

Fig. 2-109



0725-746

● CAUTION ●

Make sure the two large water passage holes in the gaskets are on the intake side of the cylinders. If the gaskets are improperly installed, severe engine damage will result.

B. Position the O-rings into position on the top of each cylinder.

NOTE: If reusing old O-rings and they are slightly stretched, shrink the O-rings by cooling them (in a refrigerator or in the snow) for a short period of time.

Fig. 2-110



- 21. B. Set the cylinder heads in position. Check sealing surface first to make sure the surface is clean. Slide an O-ring onto each of the sixteen head bolts and start all the head bolts. **DO NOT TIGHTEN AT THIS TIME.**

Fig. 2-111



- 22. B. Apply a thin coat of silicone sealer to the two thermostat housing gaskets. Place the gaskets and housing into position and secure with four bolts and washers. Torque the four bolts in a crisscross pattern to 0.7-1.0 kg-m (5-7 ft-lb).

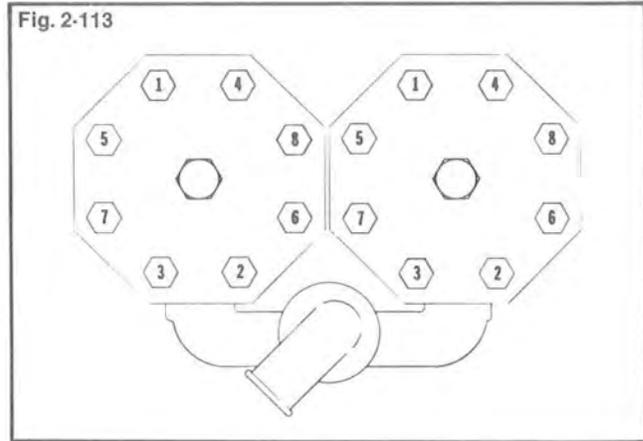
**NOTE:** The thermostat housing bolts must be torqued before tightening the head bolts. This will allow the gasket surfaces of the head to align with the housing and prevent any coolant leakage.

Fig. 2-112



- 23. B. Torque the head bolts in three steps to 2.0-2.5 kg-m (14.5-18 ft-lb) using the pattern shown.

Fig. 2-113



- 24. Test the engine for air leaks (see Pressure Testing Engine section).
- 25. Apply a very thin coat of silicone sealer to both sides of the thermostat gasket; then place the thermostat, gasket, and housing into position. Secure with three bolts, lock washers, and washers.

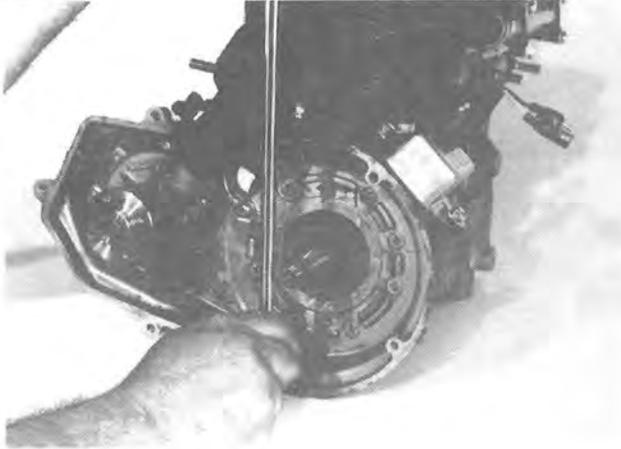
Fig. 2-114



26. Place the water pump, belt, and pulley into position in the magneto case; then secure the water pump to the magneto case with five bolts, lock washers, and washers.

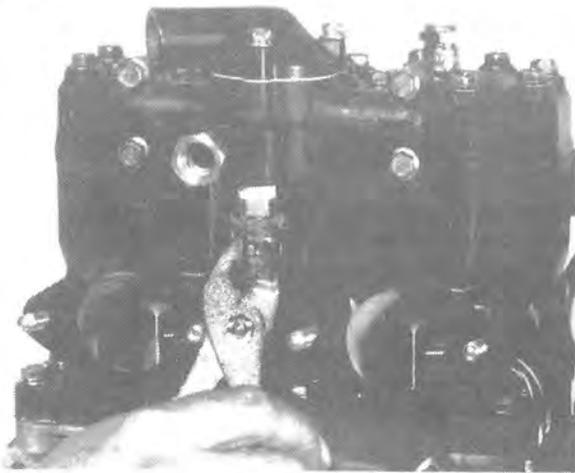
27. Place the magneto case into position on the crankcase; then apply LOCTITE LOCK N' SEAL to the eight screws and tighten securely.

Fig. 2-115



28. Slide the bypass hose onto the thermostat housing and secure with the clamp.

Fig. 2-116



29. Place the CDI unit into position and secure with two bolts and washers.

30. Place the stator plate into position, align the marks made during disassembly, and secure the stator plate with two screws coated with LOCTITE LOCK N' SEAL, lock washers, and washers. Insert the wiring harness through the cutout and install the grommet; then place the wiring harness clamp into position and secure.

Fig. 2-117

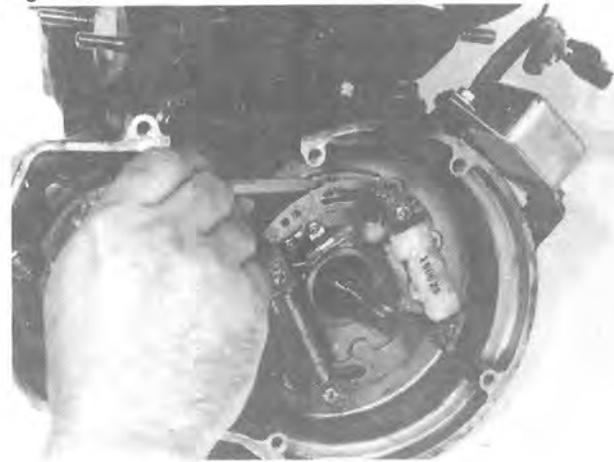
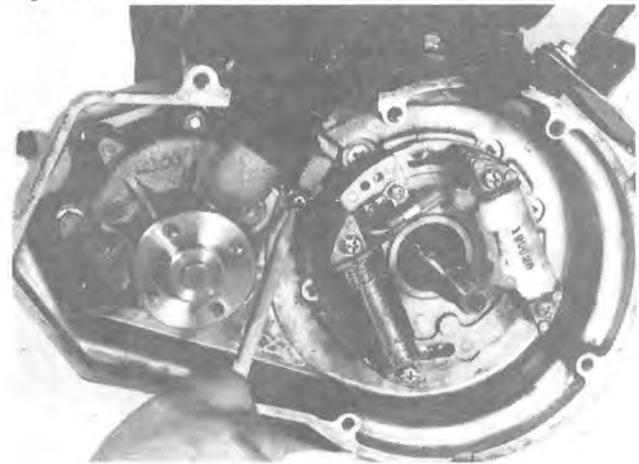


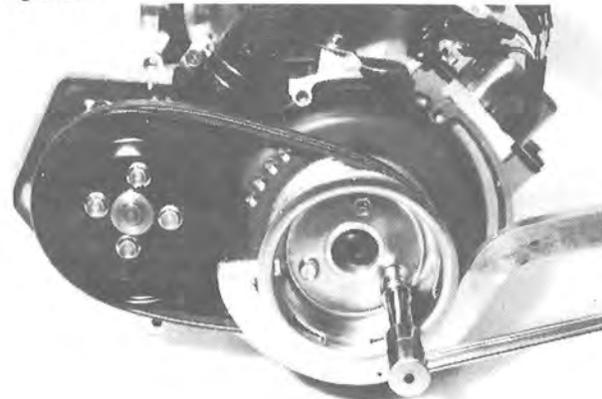
Fig. 2-118



31. Install the key in the crankshaft and slide the flywheel onto the crankshaft making sure the keyways match.

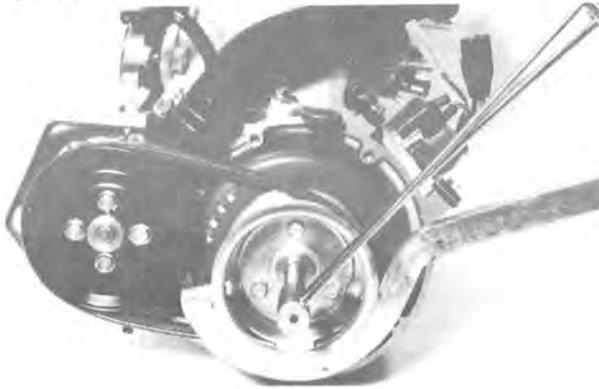
32. Place the belt onto the drive pulley; then place the drive pulley and the starter pulley into position on the flywheel and secure with three bolts and lock washers.

Fig. 2-119



33. Apply LOCTITE LOCK N' SEAL to the crankshaft threads; then install the washer, lock washer, and nut securing the flywheel. Using a spanner wrench, tighten the flywheel nut to 9.0-11.00 kg-m (65-79 ft-lb).

Fig. 2-120



**NOTE:** If the water-pump pulley was removed, install it at this time.

34. Check the belt deflection. Deflection must be less than 6 mm (1/4 in.) at midspan. If deflection is greater than specified, loosen the four bolts securing the water pump and adjust deflection by tightening the adjustment bolt on the magneto case. Secure the adjustment by tightening the four bolts.

Fig. 2-121



B335

35. Place the magneto-case cover into position and secure with seven screws.

Fig. 2-122



B309

36. A. Place an exhaust-manifold gasket on each exhaust port making sure the metal side of the gasket faces the engine; then place the exhaust manifold into position and secure with four nuts and lock washers. Tighten to 1.8-2.2 kg-m (13-16 ft-lb).

**NOTE:** The exhaust manifold spring bracket should be located on top.

Fig. 2-123



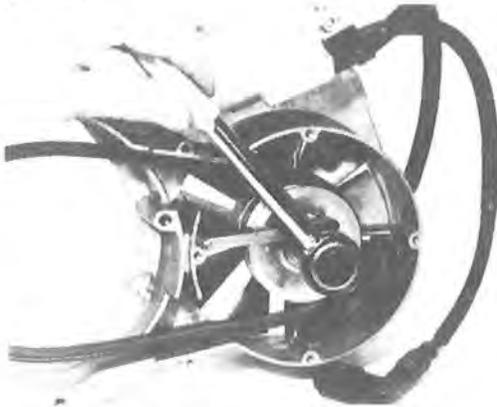
B336

- B. Place an exhaust gasket on each cylinder with its metal side facing toward the cylinder. Install the exhaust flanges and secure with four nuts and lock washers. Torque the four nuts to 1.8-2.2 kg-m (13-16 ft-lb).

## Disassembling Axial Fan

1. Remove the fan cover.
2. Using the Arctic Fan Holder (p/n 0144-113), remove the nut, lock washer, and washer securing pulley halves.

Fig. 2-124



A907

### CAUTION

Care must be taken when using the Arctic Fan Holder to avoid damaging the fan case.

3. Slide the outer pulley half, shim(s), fan belt, and inner pulley half off the shaft and account for the key. Account for the fan belt.

Fig. 2-125



A908

4. Remove the fan w/shaft.
5. Drive the bearings from the fan case and account for the spacer between the bearings.

Fig. 2-126

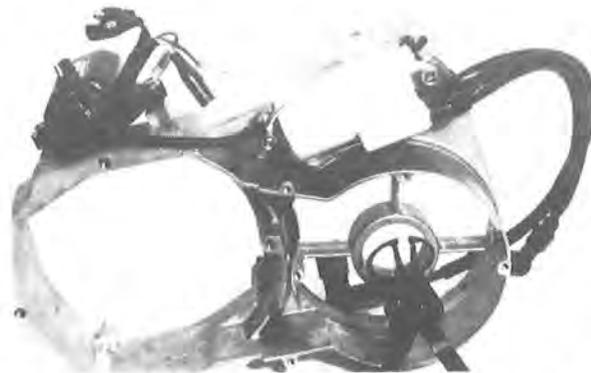


A910

**NOTE:** A circlip is positioned between the bearings. The bearings must be driven from the center to the outside of the fan case.

6. Remove the circlip from the fan case.

Fig. 2-127



A911

## Inspecting Axial Fan

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

1. Inspect fan case and shaft threaded areas for damage or stripped threads; then check shaft keyway and key for excessive wear.
2. Inspect the fan for broken, bent, or damaged vanes.
3. Inspect bearings for smooth rotation.

4. Inspect pulley halves for cracks, gouges, or other damage.
5. Inspect the fan belt for cracks, tears, or fraying.

## Assembling Axial Fan

1. Install the circlip into the groove of the fan case.

Fig. 2-128



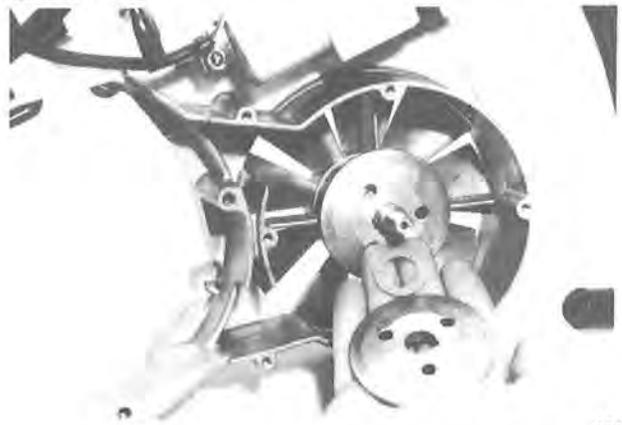
A911

2. Press a bearing into the fan case until it is "seated" against the circlip.
3. From the opposite side of the fan case, install the spacer and press the remaining bearing into the fan case until it is "seated".

**NOTE: The spacer is positioned between the two fan-case bearings.**

4. Insert the fan w/shaft through the fan bearings.
5. Install the key into the shaft.
6. Slide the inner pulley half, required shim(s), fan belt, and outer pulley half onto the shaft.

Fig. 2-129



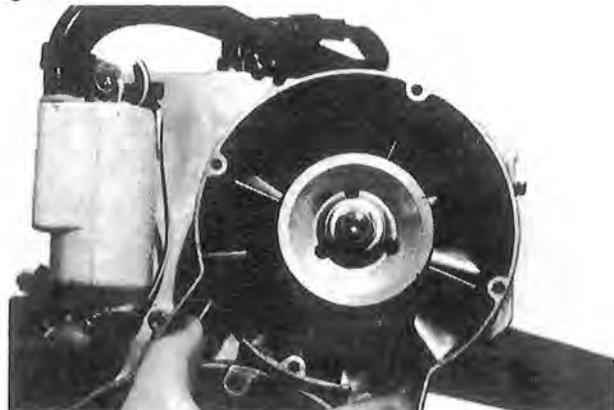
A913

7. Using the Arctic Fan Holder, secure the pulley with a washer, lock washer, and nut. Tighten the nut to 2.5-4.0 kg-m (18-29 ft-lb).
8. Affirm proper fan-belt tension; adjust if necessary.
9. Install the fan cover.

## Checking Axial Fan-Belt Tension

1. Remove the screws, lock washers, and washers securing the fan belt cover.
2. Squeeze the belt at midspan and observe the belt deflection. The maximum belt deflection on either side must not exceed 6 mm (1/4 in.). If the deflection is not within specifications, adjust the belt tension.

Fig. 2-130



B075

3. Install the fan belt cover.

2

## Adjusting Axial Fan-Belt Tension

1. Remove the fan cover.
2. Using the Arctic Fan Holder (p/n 0144-113), remove the nut, lock washer, and washer securing the pulley halves.
3. Slide the outer pulley half off the shaft and account for any shim(s).
4. Add or remove shim(s) to attain correct belt tension.

**NOTE:** To increase belt tension, remove shim(s); to decrease belt tension, install shim(s).

5. Install the fan belt and the outer pulley half on the shaft and, using the Arctic Fan Holder, secure pulley with a washer, lock washer, and nut.
6. Affirm fan-belt tension; adjust if necessary.
7. Install fan belt cover.

## Pressure Testing Engine

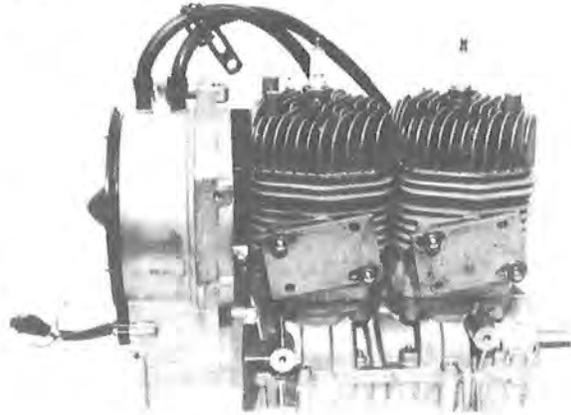
1. Test the engine for air leaks using the following procedure:
  - a. Install two intake-manifold port plugs and tighten the flange clamps securely.

Fig. 2-131



- b. Place a rubber plug and cover on each exhaust port and secure.

Fig. 2-132



A875

- c. Connect a pressure tester to the impulse fitting on the crankcase; then pressurize the crankcase to 12 psi and close the valve.

Fig. 2-133



### ● CAUTION ●

**DO NOT** exceed 15 psi pressure or damage to the seals will result.

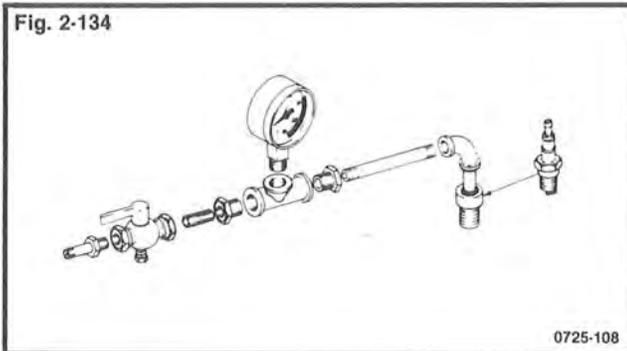
- d. Monitor the pressure gauge. Pressure must not drop at a rate of more than 1 psi per minute.
- e. If the pressure drops faster than specified, inspect for an air leak with soapy water or completely submerge the pressurized engine in clean fresh water. Repair as needed.

● CAUTION ●

When submerging the engine to test for air leaks, the CDI unit should be removed to avoid damage.

■ **NOTE:** A pressure tester can be made by drilling out an old spark plug and brazing a fitting to it; then install a tee (with a gauge), valve, and a valve stem. When using this type of pressure tester, the impulse fitting must be plugged and the pressure tester must be installed in one of the spark plug holes.

Fig. 2-134

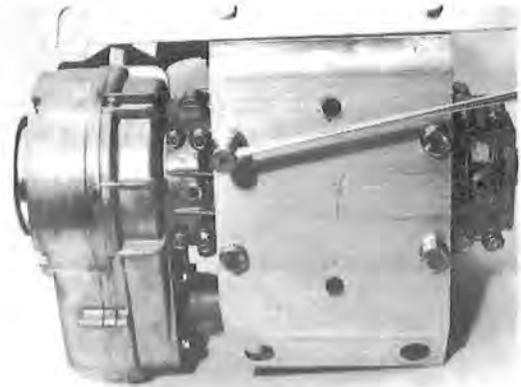


## Installing Engine

■ **NOTE:** Except for step 14, procedures designated "A" are for the Cougar and Cheetah F/C; procedures designated "B" are for the El Tigre, Pantera, and Cheetah L/C. On step 14, procedure "A" is for the Cougar, Cheetah F/C, and Pantera.

1. Place the plate assembly into position on the engine and secure with four bolts and lock nuts. Tighten to 7.6 kg-m (55 ft-lb).

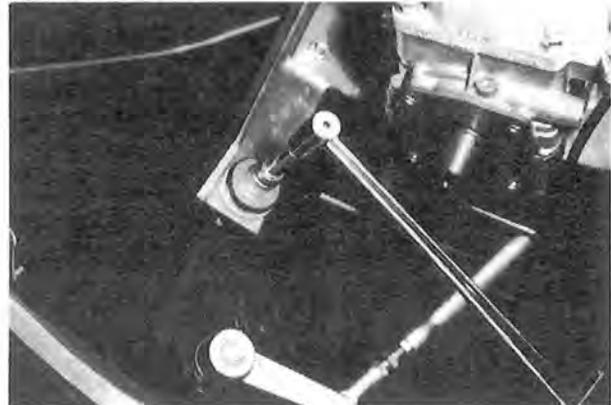
Fig. 2-135



B337

2. Place the engine w/plate assembly into position in the engine compartment and secure the engine support to the front end with two cap-lock screws making sure the female mounts and cup washers are properly positioned. Tighten to 2.8-3.5 kg-m (20-25 ft-lb).

Fig. 2-136



B300

3. Secure the rear of the engine plate to the front end with two cap-lock screws making sure the female mounts and cup washers are properly positioned. Tighten to 2.8-3.5 kg-m (20-25 ft-lb).

■ **NOTE:** Connect the hood cable.

4. B. Place the temperature-gauge sender into position on the thermostat housing, apply a thread sealant to the threads of the sender, and tighten securely.

2

Fig. 2-137



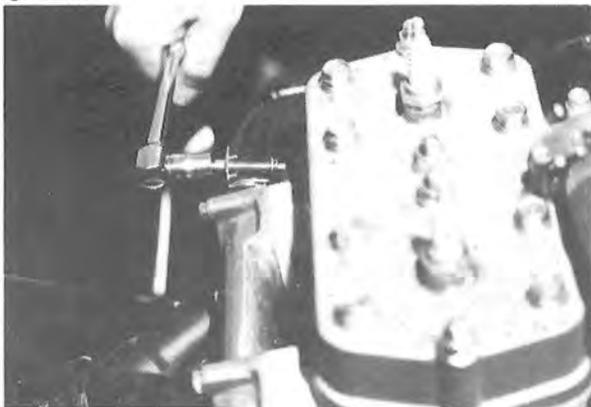
5. B. Place the supply hose and radiator hose into position and secure with the clamps.

Fig. 2-138



6. B. Place the hose into position on the water-intake manifold and secure with the clamp.

Fig. 2-139



7. Connect the oil-injection cable to the injection pump; then connect the oil-supply hose to the pump.

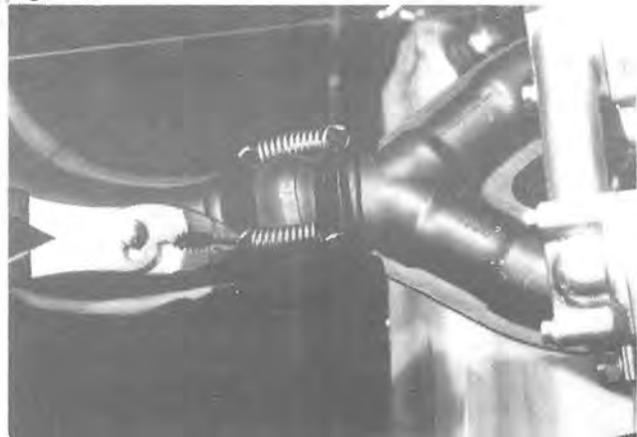
8. Connect the impulse hose to the crankcase.
9. Place the carburetors into position and secure with the flange clamps.
10. Connect the main wiring harness, ignition coil wiring harness, and the spark-plug caps.
11. Place the recoil into position and secure with four bolts and lock washers. Tighten bolts to 0.7 kg-m (5 ft-lb).

Fig. 2-140



12. A. Place the pulse charger into position and secure with five springs. Seal the ball joint with RTV 732 or equivalent.  
B. On the El Tigre 6000 and Cheetah L/C, place the expansion chambers into position and secure to the exhaust flanges and muffler with ten springs. Secure each expansion chamber to the front end with a spring. Seal the expansion chamber ball joints with RTV 732 or equivalent. On the Pantera and El Tigre 5000, place the pulse charger into position and secure to the exhaust manifold with two springs. Secure the pulse charger to the brackets with the two large springs. Seal the ball joints with RTV 732 or equivalent.

Fig. 2-141



**NOTE: Do not overapply the RTV 732.**

7. B. On the El Tigre 6000 and Cheetah L/C, place the torque link into position and secure. Adjust the torque link to fit snugly up to the engine using the adjusting stud. Secure the adjustment by tightening the jam nuts.
14. A. On the Cougar, Cheetah F/C and Pantera, place the drive clutch into position on the crankshaft and secure with the bolt and lock washer. Tighten to 7.6-8.3 kg-m (55-60 ft-lb).
- B. On the El Tigre and Cheetah L/C, place the clutch into position on the crankshaft and secure with the bolt, pilot washer, and lock washer. Tighten to 7.6-8.3 kg-m 55-60 ft-lb).
15. Install the drive belt and close the clutch shield.
16. Check drive clutch/driven pulley alignment.
17. B. Fill the cooling system to the bottom of the neck with the proper anti-freeze/water solution.
18. Bleed the oil-injection system.
19. Check ignition timing.
20. Test drive the snowmobile.

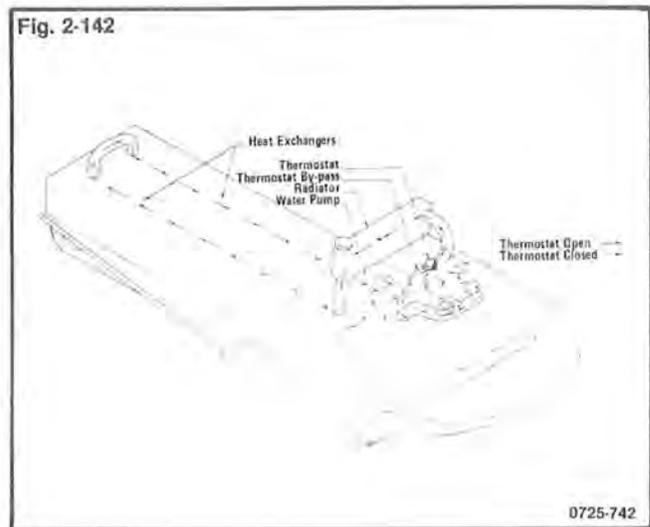
● CAUTION ●

If the engine had a major overhaul or if any major part was replaced, proper engine break-in procedures must be followed. If proper engine break-in procedures are not followed, severe engine damage may result.

## Liquid Cooling System

The liquid cooling system consists of a radiator, water pump, thermostat, thermostat by-pass, and two heat exchangers. The system should be inspected for leaks or damage whenever an overheating problem is experienced.

Fig. 2-142



### INSPECTING THERMOSTAT

1. Inspect the thermostat for corrosion, wear, or spring damage.
2. Using the following procedure, inspect the thermostat for proper operation.
  - a. Suspend the thermostat in a container filled with water.
  - b. Heat the water and monitor the temperature with a thermometer.
  - c. The thermostat should open at 50° C (122° F).



# SECTION 3 — FUEL SYSTEM

3

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## Carburetor Specifications

Low Altitude	Pantera El Tigre 5000	Cheetah L/C El Tigre 6000	Cougar Cheetah F/C
Number of Carburetors	2	2	2
Type	VM34	VM38	VM34
Main Jet	280	370	260
Pilot Jet	27.5	30	35
Pilot Air Screw (Turns Out)	1½	1½	1½
Needle Jet	P-4 (166)	Q-6 (166)	P-4 (166)
Jet Needle	6DH3-3	6DH8-2	6DH2-3
Slide Cut-away	2.5	3.5	2.5

High Altitude	Pantera El Tigre 5000	Cheetah L/C El Tigre 6000	Cougar Cheetah F/C
Number of Carburetors	2	2	2
Type	VM34	VM38	VM34
Main Jet	See Jet Chart	See Jet Chart	See Jet Chart
Pilot Jet	27.5	30	30
Pilot Air Screw (Turns Out)	1½	1½	1½
Needle Jet	P-4 (166)	Q-2 (166)* Q-0 (166)**	P-4 (166)
Jet Needle	6DH3-2	6DH8-2	6DH2-2
Slide Cut-away	2.5	3.5	2.5

\*Elevations between 1524 m (5000 ft) and 2440 m (8000 ft).

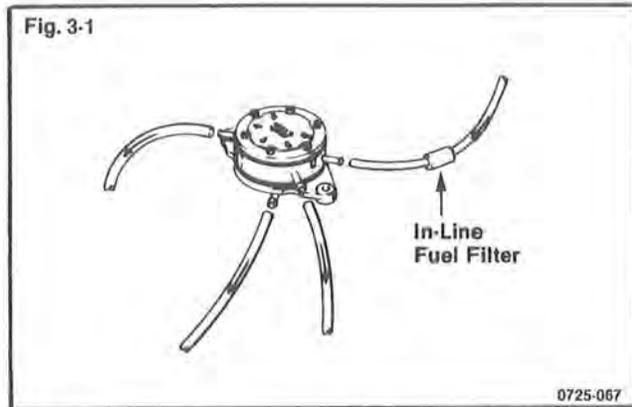
\*\*Elevations above 2440 m (8000 ft).

## Pre-Maintenance Checks

Before troubleshooting the fuel system, several simple checks should be performed. Many times what appears to be a serious problem is only a minor one.

1. Remove the in-line fuel filter; then plug the hose to prevent drainage. If the filter is dirty, either backflush with cleaning solvent or replace the filter.

Fig. 3-1



0725-067

2. Remove the plug from the hose; then install either a new or cleaned filter making sure the arrow on the filter is directed toward the fuel pump.
3. Check the hoses to ensure that all hoses are correctly connected; then check the hoses for cracks. If any cracks are evident in the hoses, replace the hoses making sure the hoses aren't against any hot or moving parts. Hoses must fit tightly. If hoses do not fit tightly, cut 6 mm (1/4 in.) from the end of the hose and install.
4. Check the impulse hose for correct connections on both the fuel pump and crankcase fittings. Hose must fit tightly.
5. Check each carburetor vent hose for obstructions; remove any obstructions.
6. Check fuel-tank vent and hose for obstructions; remove any obstructions.

## Removing Carburetor

1. Loosen the screw and lock washer securing the mixing-body-top plate.
2. Remove the mixing body top by rotating it counterclockwise; then remove the top with spring, plate, jet needle w/E-ring, and piston valve from the carburetor.

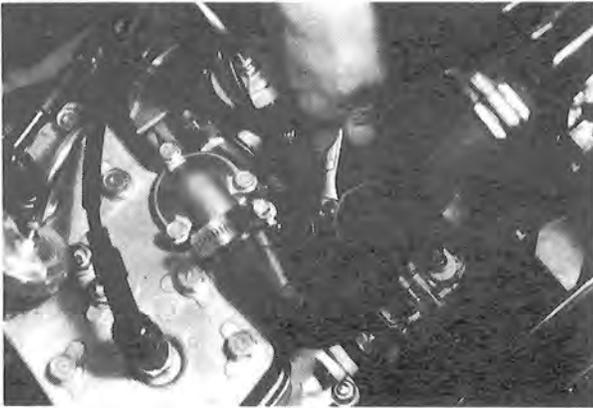
Fig. 3-2



B340

3. Remove the brass choke-cable housing from the carburetor. Account for a washer.

Fig. 3-3



B341

4. Disconnect the fuel hose from the carburetor inlet fitting.
5. Loosen the carburetor-flange clamp; then remove carburetor.

Fig. 3-4



B342

NOTE: Slide the carburetor into the boot until free of the flange; then remove carburetor.

## Disassembling Carburetor

NOTE: Procedures designated "A" are for the Cougar, Cheetah F/C, El Tigre 5000, and Pantera; procedures designated "B" are for the El Tigre 6000 and Cheetah L/C.

1. A. Remove the four screws and lock washers securing the float chamber; then remove the float chamber and gasket.  
B. Remove the four screws and lock washers securing the float chamber; then remove the float chamber and gasket. Remove the vent hoses. Account for the hose plates.

Fig. 3-5



B343

2. Remove the caps from the float towers; then remove the floats. Remove the drain plug and washer (O-ring on the Cougar, Cheetah F/C, El Tigre 5000, and Pantera).

Fig. 3-6



B344

NOTE: The floats should be removed only if replacement is necessary.

3. Remove the float-arm pin; then remove the float arm.

Fig. 3-7



B345

4. A. Remove the inlet needle valve; then remove the seat and washer.
- B. Remove the inlet needle valve retainer; then remove the inlet needle valve. Remove the seat. Account for two washers and a plate.

Fig. 3-8



B347

5. A. Remove the main jet and washer from the needle jet; then from the top of the carburetor, remove the needle jet.
- B. Remove the main jet from the screw guide; then remove the screw guide (from the top of the carburetor) and remove the needle jet.

Fig. 3-9



B348

Fig. 3-10



B349

6. Remove the pilot jet.

Fig. 3-11



B352

7. Remove the pilot air screw and spring.

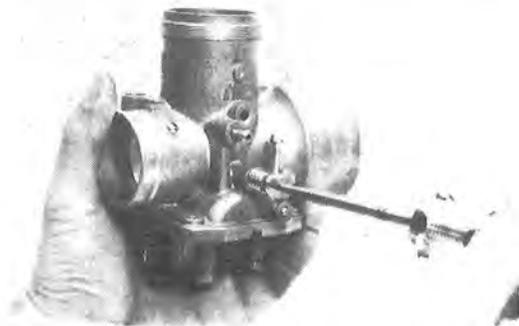
Fig. 3-12



B350

8. Remove the throttle stop screw and spring.

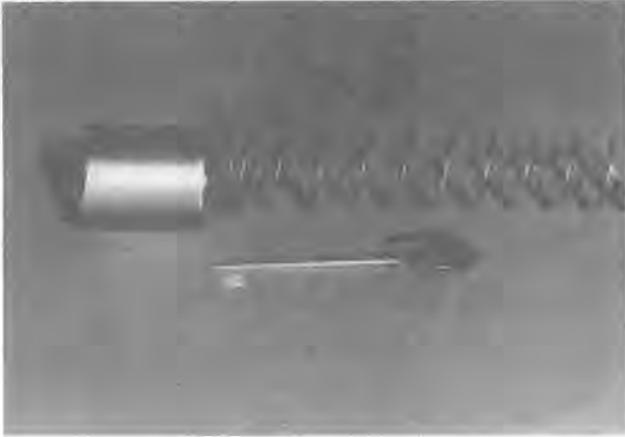
Fig. 3-13



B351

- Remove the throttle cable from the piston valve; then remove the piston valve. Account for the jet needle w/E-ring, washer, plate, spring, and top. Remove the E-ring and washer from the jet needle.

Fig. 3-14



- Separate the choke plunger assembly from the choke cable by compressing the spring and removing the plunger from the cable; then remove the spring, thread the plunger cap off the cable.

## Cleaning Carburetor

### CAUTION

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

- Place all metallic parts in a wire basket and submerge in carburetor cleaner.
- Soak parts for about 30 minutes; then rinse with fresh parts-cleaning solvent.
- Wash all non-metallic parts with soap and water. Rinse thoroughly.
- Dry all components with compressed air only making sure all holes, orifices, and channels are unobstructed.

### WARNING

When drying components with compressed air, be sure to protect eyes from the cleaning solvent.

### CAUTION

DO NOT use wire or small drill bits to clean carburetor orifices, holes, or channels. Distorted or damaged orifices, holes, or channels can result in poor carburetor operation.

## Inspecting Carburetor

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

- Inspect the carburetor body for cracks, nicks, stripped threads, and any other imperfections in the casting.
- Inspect the piston valve for cracks, score marks, or imperfections in the casting.
- Inspect the condition of the piston-valve spring.
- Inspect floats for damage.
- Inspect gaskets and washers for distortion, tears, or noticeable damage.
- Inspect tips of the throttle stop screw, jet needle, pilot air screw, and the inlet needle valve for wear, damage, or distortion.
- Inspect the pilot jet and main jet for obstructions or damage.

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

- Inspect plunger and seat for wear or damage.
- Inspect carburetor-mounting flange(s) for damage and tightness.

### CAUTION

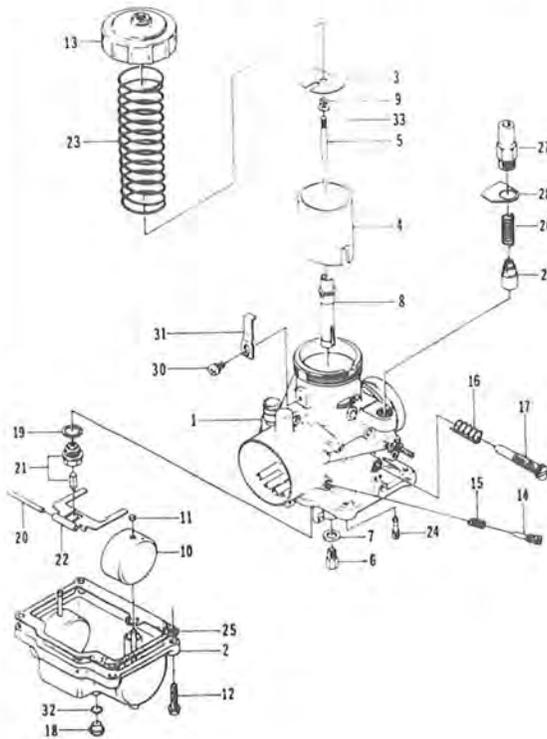
An air leak between the carburetor and engine will cause severe engine damage.

# Assembling Carburetor

**NOTE:** Procedures designated "A" are for the Cougar, Cheetah F/C, El Tigre 5000, and Pantera; procedures designated "B" are the El Tigre 6000 and Cheetah L/C.

Fig. 3-15

## Cougar-Cheetah F/C-Pantera-El Tigre 5000



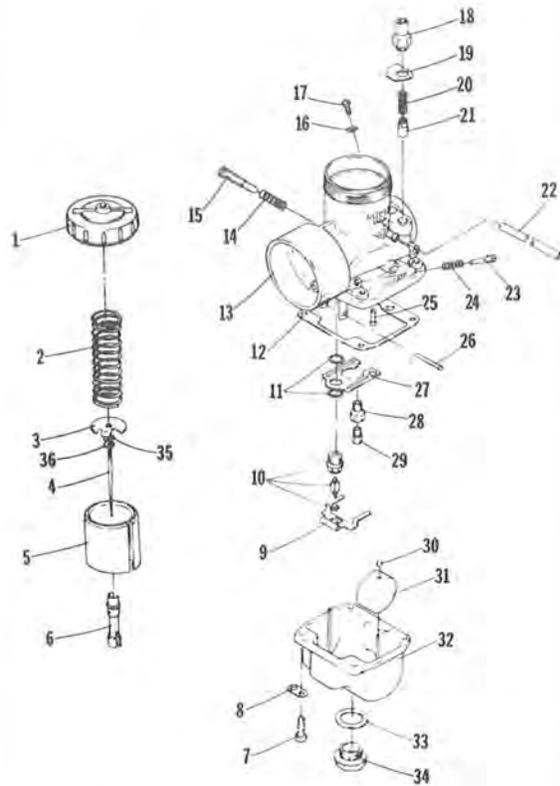
### KEY

- |                         |                           |
|-------------------------|---------------------------|
| 1. Mixing Body Assembly | 18. Drain Plug            |
| 2. Float Chamber        | 19. Washer                |
| 3. Plate                | 20. Float Pin             |
| 4. Piston Valve         | 21. Needle Valve Assembly |
| 5. Jet Needle           | 22. Float Arm             |
| 6. Main Jet             | 23. Spring                |
| 7. Washer               | 24. Pilot Jet             |
| 8. Needle Jet           | 25. Gasket                |
| 9. E-Ring               | 26. Spring                |
| 10. Float               | 27. Cap                   |
| 11. Cap                 | 28. Washer                |
| 12. Screw               | 29. Starter Plunger       |
| 13. Mixing Body Top     | 30. Screw                 |
| 14. Pilot Air Screw     | 31. Plate                 |
| 15. Spring              | 32. O-Ring                |
| 16. Spring              | 33. E-Ring Washer         |
| 17. Throttle Stop Screw |                           |

0700-064

Fig. 3-16

## El Tigre 6000-Cheetah L/C



### KEY

- |                           |                     |
|---------------------------|---------------------|
| 1. Mixing Body Top        | 19. Washer          |
| 2. Spring                 | 20. Spring          |
| 3. Plate                  | 21. Plunger         |
| 4. Jet Needle             | 22. Air Vent Hose   |
| 5. Piston Valve           | 23. Pilot Air Screw |
| 6. Needle Jet             | 24. Spring          |
| 7. Screw                  | 25. Pilot Jet       |
| 8. Hose Plate             | 26. Float Arm Pin   |
| 9. Float Arm              | 27. Plate           |
| 10. Needle Valve Assembly | 28. Screw Guide     |
| 11. Washer                | 29. Main Jet        |
| 12. Gasket                | 30. Cap             |
| 13. Mixing Body Assembly  | 31. Float           |
| 14. Spring                | 32. Float Chamber   |
| 15. Throttle Stop Screw   | 33. Washer          |
| 16. Washer                | 34. Drain Plug      |
| 17. Screw                 | 35. E-Ring          |
| 18. Cap                   | 36. E-Ring Washer   |

0700-317

1. Install the throttle stop screw and spring.

Fig. 3-17



B351

2. Install the pilot air screw and spring. Turn clockwise until lightly seated; then back out 1½ turns for an initial setting.

Fig. 3-18



B350

● CAUTION ●

**DO NOT** force the pilot air screw when seating. Forcing the screw will result in damage to the carburetor body.

3. Install the pilot jet.

Fig. 3-19



B352

4. A. Insert the needle jet into position from the top of the carburetor making sure the groove in the needle jet is aligned with the pin in the mixing body; then place the main jet and washer into position and secure.  
B. Insert the needle jet into position from the top of the carburetor making sure the groove in the needle jet is aligned with the pin in the mixing body; then place the screw guide into position and secure and main jet into position and secure.

Fig. 3-20



B349

Fig. 3-21



B348

5. A. Place the seat and washer into position and secure; then install the inlet needle valve.  
B. In order, place a washer, plate, washer, and seat into position and secure. Install the inlet needle valve and secure with the retainer.

Fig. 3-22



B347

6. Place the float arm into position and secure with the pin.

Fig. 3-23



B345

7. Check the float arm height. Using a caliper, measure the distance from the gasket surface to the top of the float arm (with the carburetor inverted). If measurement is not within specifications, adjust by bending the actuating tab.

Fig. 3-24



B346

FLOAT ARM HEIGHT		
	mm	in.
Cougar Cheetah F/C Pantera El Tigre 5000	22-24	0.86-0.95
El Tigre 6000 Cheetah L/C	17-19	0.66-0.74

8. Place the washer (O-ring on the Cougar, Cheetah F/C, El Tigre 5000, and Pantera) and drain plug into position and secure; then place the floats into position making sure UP is properly positioned. Press the caps onto the float towers.

Fig. 3-25



B344

9. A. Place the gasket and float chamber into position and secure with the four screws and lock washers.  
B. Place the gasket and float chamber into position and secure with four screws and lock washers making sure the hose plates are properly positioned on the two front screws. Install the vent hoses.

Fig. 3-26



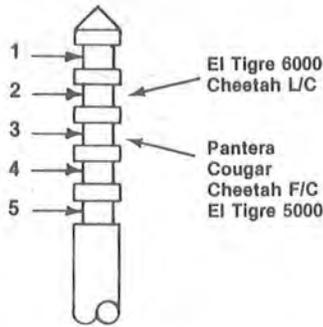
B343

10. Place the E-ring into position in the proper groove (see Fig 3-27) of the jet needle; then from the bottom of the jet needle, slide the E-ring washer up against the E-ring. Place the top into position on the throttle cable. Place the jet needle into the piston valve. Secure assembly by connecting the throttle cable to the piston valve; then place the plate on top of the jet needle and place the spring into position.

● CAUTION ●

For high altitude operation, see the Specifications Chart for proper positioning of the E-ring.

Fig. 3-27



(Low Altitude)

0725-266

11. Thread the plunger cap onto the choke cable. Place the spring over the cable end and compress. Position the cable end into the starter plunger and release the spring.

## Installing Carburetor

1. Place the carburetor into position in the flange and air silencer; then tighten the flange clamp making sure the carburetor is level and correctly positioned in the alignment notch of the flange.

Fig. 3-28



B342

**NOTE:** Slide the carburetor into the boot; then slide the carburetor into the flange.

2. Connect the fuel hose to the carburetor inlet fitting.
3. Thread the brass choke-cable housing into the carburetor making sure the washer is properly positioned and secure.

Fig. 3-29



B341

4. Place the mixing body top into position making sure the full-length groove in the piston valve is aligned with the pin in the mixing chamber bore; then secure the mixing body top.

Fig. 3-30



B340

5. Secure the mixing body top by tightening the screw and lock washer making sure the mixing-body-top plate is properly positioned.
6. Adjust carburetors.

## Adjusting Carburetors

### ● CAUTION ●

The air-intake silencer and boots must be in position whenever the engine is run. If the silencer is removed and the engine is run, a lean condition will result. Therefore, **DO NOT** run the engine when the air-intake silencer is removed.

1. Be sure ignition switch key is in the OFF position and the parking brake is set.
2. Loosen the jam nut securing each choke-cable adjuster. Rotate each choke-cable adjuster to obtain 1.5 mm (1/16 in.) free play between the choke-cable lever and console nut when the lever is in the DOWN position. Lock each adjuster in place by bottoming each jam nut against the brass plunger cap.

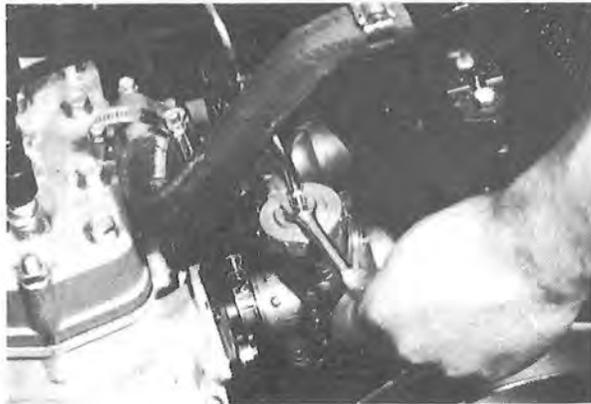
Fig. 3-31



B354

3. Loosen jam nut securing each swivel adapter.

Fig. 3-32



B355

4. Rotate each swivel adapter clockwise until free play is felt in the throttle cable.
5. Remove the air-intake silencer boots.
6. Rotate each throttle stop screw counterclockwise until its spring is fully extended. Rotate each screw clockwise until the screw contacts the piston valve; then compress the throttle lever to half throttle and, while holding the throttle lever, rotate the throttle stop screw clockwise an additional 1½ turns.

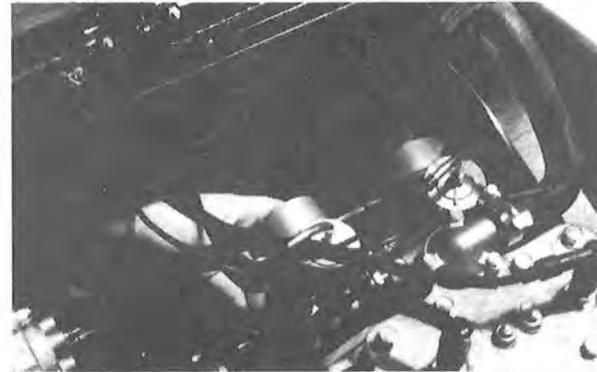
Fig. 3-33



B356

7. Rotate each swivel adapter until no free play is felt in the throttle cable.
8. Compress the throttle lever and, using the fingers, check the synchronization of the piston valves. Each piston valve must reach the top of the carburetor bore (at backside) at the same time. If one piston valve is lower than the other, rotate its swivel adapter until it is synchronized with the other piston valve. Lock both swivel adapters by bottoming the jam nuts.

Fig. 3-34



B357

9. Carefully rotate each pilot air screw clockwise until lightly seated.

Fig. 3-35



B358

● CAUTION ●

DO NOT overtighten the pilot air screws when seating; damage will result.

10. Rotate each pilot air screw counterclockwise  $1\frac{1}{2}$  turns from the seated position.

■ **NOTE:** Synchronize the oil-injection system before starting the snowmobile.

11. Install the air-intake silencer boots.
12. With the snowmobile on a shielded safety stand, start the snowmobile engine and thoroughly warm up. "Fine tune" the throttle stop screws and the pilot air screws until the engine idles smoothly at the desired rpm (2000-2500 rpm is recommended).

■ **NOTE:** If the engine does not start after the carburetors have been adjusted, repeat steps 4 and 7 because the throttle/ignition monitor switch may not be correctly tensioned. If all throttle-cable slack is not taken up, the monitor switch will prevent the ignition system from firing the spark plugs.

⚠ WARNING ⚠

DO NOT operate the snowmobile when any component in the throttle system is damaged, frayed, kinked, worn, or improperly adjusted. If the snowmobile is operated when the throttle system is not functioning properly, personal injury could result.

## Removing Oil-Injection Pump

1. Remove both carburetors.
2. Disconnect the oil-supply hose from the pump and plug to prevent oil drainage.
3. Remove the two bolts, lock washers, and washers securing oil-injection pump and retainer to the crankcase.

Fig. 3-36



4. Remove hoses from the insulator blocks or from the cylinders (depending upon model).
5. Disconnect the oil-injection adjustment cable.
6. Remove the oil-injection pump and retainer. Account for two gaskets and discard them.

## Installing Oil-Injection Pump

■ **NOTE:** When use of a silicone sealer is indicated, use either RTV Silicone Sealant or Three Bond Sealant.

1. Apply silicone sealer to both sides of the retainer gasket; then place gasket and retainer into position on the crankcase.
2. Apply silicone sealer to the oil-injection pump gasket; then place gasket and pump into position making sure the oil-injection pump gear is correctly aligned with the oil-injection pump drive gear.

● CAUTION ●

Be sure the gear is properly aligned with the slot of the oil-injection pump shaft.

3. Secure pump with two bolts, lock washers, and washers. Tighten bolts to 0.7 kg-m (5 ft-lb).

4. Connect the oil-injection cable to the pump.
5. Connect the two hoses to the fittings and check to make sure clamps are in place; then tighten clamps.
6. Connect oil-supply hose to the pump inlet fitting.
7. Bleed oil-injection system.
8. Install both carburetors.
9. Check oil-injection system synchronization.

## Synchronizing Oil- Injection Pump

### CHECKING

To check the oil-injection system synchronization, use the following procedure:

1. With the ignition switch key in the OFF position, move the throttle lever to the wide-open-throttle position.
2. Check the alignment of the mark on the pump housing and the mark on the control arm. If marks align, the oil-injection system is synchronized with the carburetors and no adjustment is necessary. If the marks do not align, adjust synchronization.

### ADJUSTING

To adjust the oil-injection system synchronization, use the following procedure:

1. Loosen the jam nut securing the adjustment cable.
2. Move the throttle lever to the wide-open-throttle position.

Fig. 3-37



3. Rotate the adjustment cable in the proper direction until alignment is achieved.
4. Lock the jam nut to secure adjustment.

## Bleeding Oil- Injection System

### ● CAUTION ●

Whenever bleeding the oil-injection system, use a 50:1 gas/oil mixture in the gas tank to ensure adequate engine lubrication. Failure to use the 50:1 mixture during oil-injection system bleeding will result in severe engine damage.

1. Fill oil reservoir with either Arctco Injection Oil or Arctic Cat Injection Oil.
2. Place a shop towel below the oil-injection pump bleed screw and remove the bleed screw from the pump. Allow oil to flow through the oil-supply hose until the hose is filled with oil and free of air; then install bleed screw.

**NOTE:** To aid in bleeding the system, blow into the vent line to force the oil toward the pump. The oil tank cap must be on for this procedure.

3. Using a shielded safety stand, raise the rear of the snowmobile off the floor. Start the engine and allow it to idle.
4. Using a stiff wire with a hooked end, pull the control arm upward to the wide-open position.

### ⚠ WARNING ⚠

Keep hands and clothing away from all moving or rotating parts.

5. Idle the engine until oil flows to the top of the oil-delivery hoses free of air bubbles.
6. When oil flows free of any air bubbles, shut the engine off.
7. Release the parking brake and check for leakage.

## Fuel Pump

The fuel pump is now a serviceable item. It may be either repaired or replaced as a complete unit. To test fuel pump pressure, use the following procedure:

- Using a tee, connect a pressure gauge between a fuel pump and one of the carburetors.
- Using a shielded safety stand, raise the rear of the snowmobile off the floor and check the pressure at various engine rpm.

FUEL PUMP PRESSURE		
RPM	PSI	g/cm <sup>2</sup>
1000-2000	3.0-3.5	200-240
3000-4000	4.5-5.5	310-375
5000-6000	6.0-7.0	420-490

## Air-Intake Silencer

The air-intake silencer is a specially designed component used to silence the incoming fresh air and also to catch the fuel that "spits back" out of the carburetors. The carburetors are calibrated with the air-intake silencer in position; therefore, the engine must never be run with the air-intake silencer removed.

### INSPECTING AND CLEANING

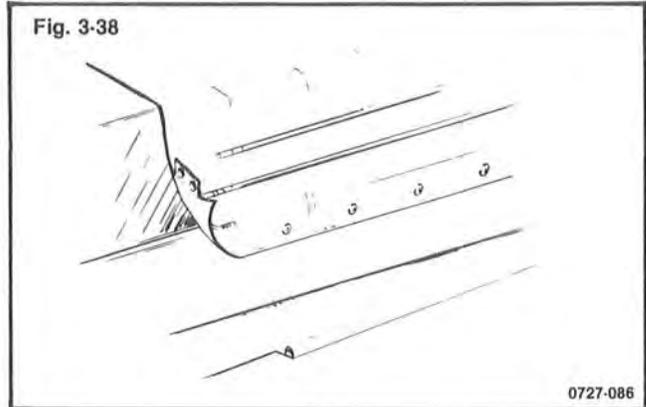
**NOTE:** The air-intake silencer cannot be disassembled; it must be replaced as a complete unit.

- With the silencer removed, check for holes or cracks in the silencer.
- Periodically clean the silencer by blowing fresh air through it.

## Removing Fuel Tank

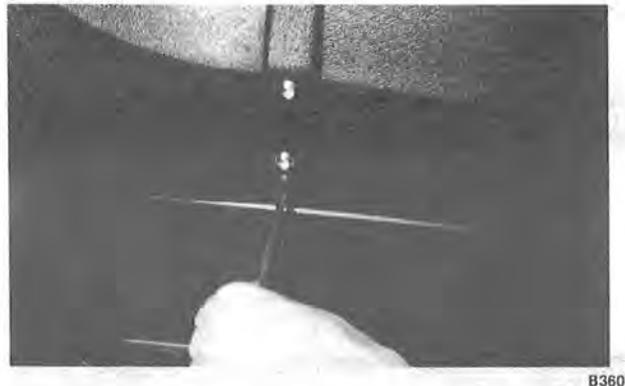
- Remove seat cushion from tunnel.

Fig. 3-38



- Remove the two machine screws securing the sides of the console; then remove the two machine screws and nuts securing the top of the console.

Fig. 3-39



- Remove the fuel cap and spill seal.
- Remove the spring securing the fuel tank to the tunnel.

Fig. 3-40



- Remove the vent hose and fuel hose from the tank and plug the fittings to prevent drainage; then raise the console to allow removal of the tank and remove the tank.

Fig. 3-41



B361

## Installing Fuel Tank

- Raise console to allow installation of the tank and place the fuel tank into position; then install the vent hose and fuel hose.
- Secure the tank to the tunnel with the spring.
- Install the spill seal and fuel cap.
- Secure the upper part of the console with the two machine screws and nuts and the sides of the console with two machine screws.
- Place the seat cushion into position and secure with the snaps.

## MAIN JET CHART\*

ALTITUDE · FEET (METERS)	◀ RICHER	EL TIGRE 6000 · CHEETAH L/C		LEANER ▶
8000 (2440)	280	270	250	240
6000 (1830)	300	290	270	260
4000 (1220)	330	310	300	280
2000 (610)	360	340	330	310
0 (0)	370	360	350	330
ALTITUDE · FEET (METERS)	◀ RICHER	COUGAR · CHEETAH F/C		LEANER ▶
8000 (2440)	190	180	170	160
6000 (1830)	210	200	190	180
4000 (1220)	230	220	210	200
2000 (610)	250	240	230	220
0 (0)	270	260	250	240
ALTITUDE · FEET (METERS)	◀ RICHER	PANTERA · EL TIGRE 5000		LEANER ▶
8000 (2440)	220	210	200	190
6000 (1830)	240	230	220	210
4000 (1220)	260	250	240	230
2000 (610)	270	260	250	240
0 (0)	290	270	260	250
TEMPERATURE — Fahrenheit (Celsius)	- 40 to - 20 (- 40 to - 29)	- 20 to 0 (- 29 to - 18)	0 to + 20 (- 18 to - 7)	+ 20 to + 40 (- 7 to + 4)

**NOTE:** Operating the EL TIGRE 6000 and CHEETAH L/C at high altitude requires the following carburetion changes: 5000-8000 feet, install a Q-2 (166) needle jet; 8000-10,000 feet, install a Q-0 (166) needle jet. Operating the PANTERA and EL TIGRE 5000 at an altitude of 5000 feet or more requires raising each jet needle circlip 1 clip position. Operating the COUGAR and CHEETAH F/C at an altitude of 5000 feet or more requires installing 30 pilot jets and raising each jet needle circlip 1 clip position. Operating the COUGAR and CHEETAH F/C at sea level requires installing 270 main jets.

\*After the break-in period the main jets should be changed in accordance to the appropriate Main Jet Chart.

# SECTION 4 — DRIVE SYSTEM

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## Drive Belt

The belt dimensions and construction are two factors that influence the performance of the drive system. The two belt dimensions that are important to the performance of the snowmobile are the outside circumference and the width. Both of these dimensions will influence shifting characteristics.

Specifications	Cougar Pantera Cheetah F/C	Cheetah L/C El Tigre 6000 El Tigre 5000
p/n	0227-030	0227-032
Outside Circumference (Range)	110-111 cm 43 5/16-43 11/16 in.	110.5-111.1 cm 43 1/2-43 3/4 in.
Width (Range)	34.1-35.7 mm 1 11/32-1 13/32 in.	34.1-35.7 mm 1 11/32-1 13/32 in.

If the drive belt is longer than specified, the drive clutch and driven pulley will not have the full shift ratio. Also, a too-long drive belt will cause poor acceleration and a decrease in top speed. A belt that is shorter than specified will cause a loss in performance and a bog on engagement as the drive clutch and driven pulley will have a different shift pattern because they are in different ratios than conditions for which they were originally matched.

**NOTE: A drive belt that is worn thin may produce the same effect as one that is too long.**

Drive belt construction has an influence on the way the drive clutch and driven pulley will shift and on the amount of power that will be transmitted through the system. ONLY EITHER ARCTCO OR ARCTIC CAT DRIVE BELTS SHOULD BE USED. Different brands of belts may not have the same construction causing more friction or more slippage when the belt is wedged between the sheaves and, thus, a loss of efficiency.

**NOTE: A stiff belt causes HP loss to the track. As a belt warms up, it gets more flexible and transmits power with less HP loss.**

## Drive Clutch Specifications \*

		Cougar Cheetah F/C	Pantera	El Tigre 5000	El Tigre 6000 Cheetah L/C
Clutch p/n		0725-010	0725-011	0726-016	0725-013
Weight	p/n	0146-286	0146-105	N/A	N/A
	Color				
Spring	p/n	0146-068	0146-068	0136-292	0136-292
	Color	Green	Green	Green/Yellow	Green/Yellow
Ramp	p/n	0146-294	0646-024	N/A	N/A
Roller	p/n	0146-421	0146-421	N/A	N/A
Cam Arm	p/n	N/A	N/A	0146-530	0646-021
Engagement RPM		3600-4000	4200-4800	4200-4800	4000-4600
Peak RPM		6800-7000	8350-8600	8500-8700	8500-8750
Offset	mm	34.7	34.7	34.7	34.7
Measurement	in.	1.365	1.365	1.365	1.365
Center-to-Center	cm	25.9	25.9	25.9	25.9
Distance	in.	10.2	10.2	10.2	10.2

\*Low Altitude

## Drive Clutch (Cougar-Pantera-Cheetah F/C)

### REMOVING

1. Open the clutch shield and remove the drive belt.
2. Remove the plug from the belly pan.
3. Using an impact wrench, remove the bolt and lock washer securing the drive clutch to the crankshaft.

Fig. 4-1



4. Using the Arctic Drive Clutch Puller and an impact wrench (or a breaker bar and a spanner wrench), tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat complete procedure until clutch releases.

**NOTE:** If an impact gun is not available, use the Drive Clutch Puller/Spanner Wrench (p/n 0144-007) to secure the drive clutch while loosening the clutch bolt and pulling the clutch.

5. Remove the clutch from the engine compartment.

### CHECKING BEARING WEAR

The 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.

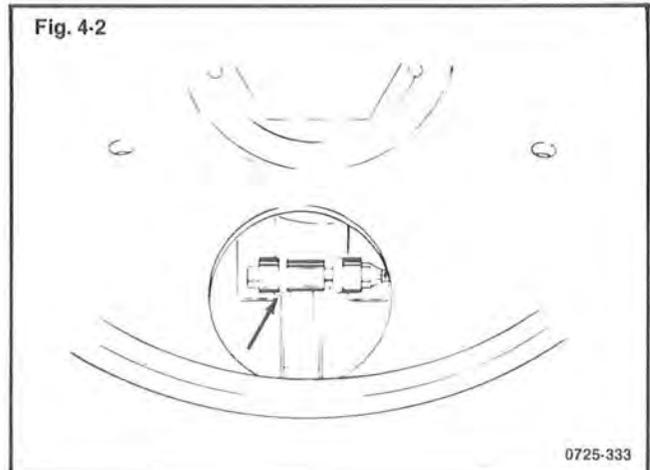
The maximum allowable bearing wear is limited by the clearance between the ramp and inside surface of the roller arm.

If the bearing appears 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. To check bearing wear, use either of the following procedures:

### Visual Inspection Procedure

1. While rotating the drive clutch clockwise and counterclockwise, inspect the inside surfaces of the roller arm; there must not be any contact between the roller arm and ramp.

Fig. 4-2



2. If there is no contact between the roller arm and ramp, the maximum allowable drive-clutch bearing wear is within tolerance. The drive clutch is acceptable.
3. If there is contact between the roller arm and ramp, the drive-clutch bearing wear is not within tolerance and the drive clutch movable sheave and housing bearings must be replaced.

### Measurement Method Procedure

1. Remove the drive clutch from the crankshaft.
2. Remove housing (cover) and spring.

Fig. 4-3



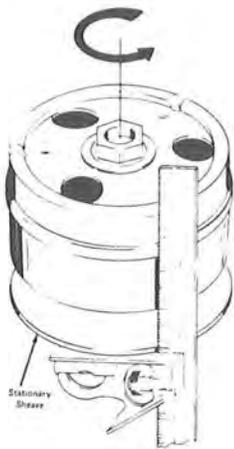


**WARNING**

The housing must be held down or personal injury may result.

3. Install housing and secure with three socket-head cap screws.
4. Keeping the stationary sheave fixed, rotate the movable sheave counterclockwise until all clearance is taken up. Using a scribe and tri-square, scribe a line on the movable sheave.

Fig. 4-4



0725-334

5. Keeping the stationary sheave and tri-square fixed, rotate the movable sheave clockwise until all clearance is taken up. Using the scribe and tri-square, scribe another line on the movable sheave.
6. Using a caliper or scale, measure the distance between the two scribed lines.
7. If distance between the two scribed lines is less than 4 mm (0.156 in.), the drive-clutch bearing wear is within tolerance and the drive clutch is acceptable.

Fig. 4-5



0725-335

8. If distance between the two scribed lines is more than 4 mm (0.156 in.), the maximum allowable drive-clutch bearing wear is not within tolerance. Drive clutch movable sheave and housing bearings must be replaced.

#### DISASSEMBLING

1. Firmly hold the housing (cover) to the movable sheave; then remove the three socket-head cap screws and washers securing the housing to the movable sheave. Remove housing. Note the balance marks on the movable sheave and housing to aid in assembly.

Fig. 4-6



**WARNING**

The housing must be held down or personal injury may result.

Fig. 4-7



2. Remove the spring; then remove the cup washer.

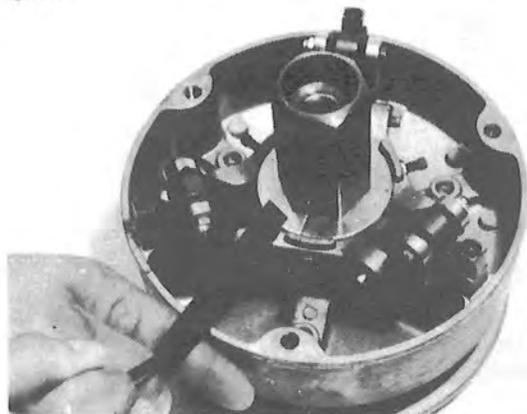
Fig. 4-8



A969

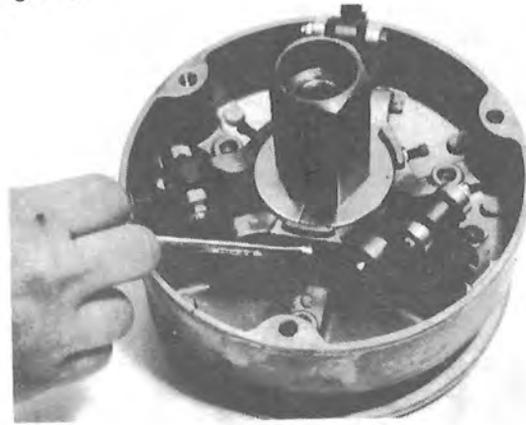
3. Scribe a line from the spider assembly to the movable sheave; then loosen the three jam nuts and the three set screws holding spider assembly on the hex shaft.

Fig. 4-9



A970

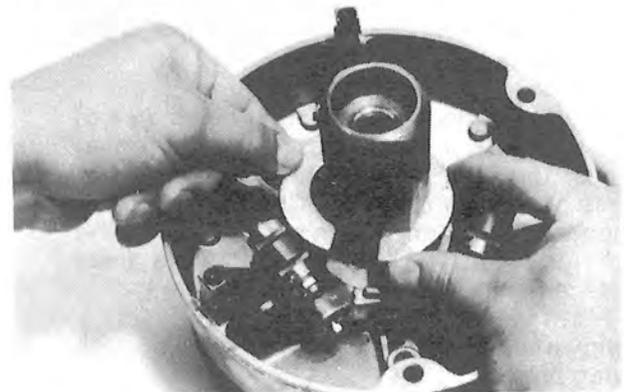
Fig. 4-10



A971

4. Push spider toward stationary sheave; then remove the split ring halves from the groove in the hex shaft.

Fig. 4-11



A972

5. Slide spider and movable sheave off hex shaft. Note the position of the split ring retainers to aid in assembly.

Fig. 4-12



A973

- Remove the three lock nuts and bolts securing the weights, the rollers, and the bushings to the spider arms; then slide rollers w/bushings from between swing arms.

**NOTE: The spider assembly should only be disassembled if it is found that the arm, pin, or bushings need replacement.**

Fig. 4-13



015

**NOTE: A complete roller kit w/bushings must be installed even if only one roller assembly is worn or damaged.**

- Inspect the swing arms for wear in the area of the swing arm pin bushings (located at either end of the pin). Inspect the swing arms for signs of wear or cracking. Check each thrust washer located on either side of the swing arm for wear. If any of these parts need replacement, disassemble the spider.
- Remove the snap ring from each end of each swing arm pin.

Fig. 4-14



- Using a hex wrench, remove the set screw from the back side of each swing arm.

Fig. 4-15



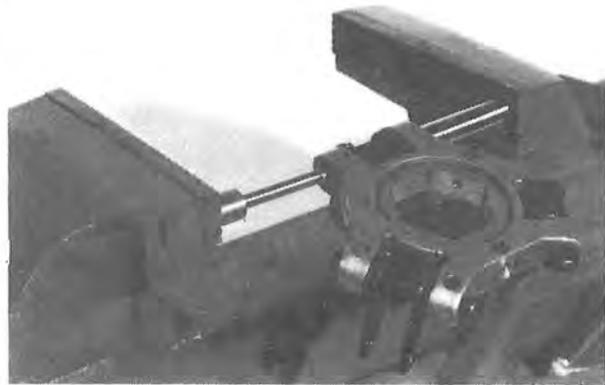
AA050

- Slide each pin out of the spider. Support spider pin boss on either side of the pin allowing room for the pin to be slid out.

● CAUTION ●

Do not drive the pin out of the spider or the end of the pin may mushroom causing it to damage the spider as it passes through the aluminum mounting boss.

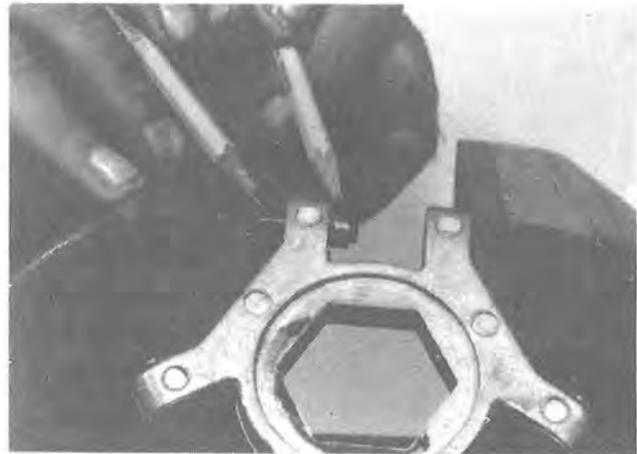
Fig. 4-16



**NOTE: If the swing arm pin is removed out for any reason, we recommend to replace the pin, arm, thrust washers, and bushings with new parts. Never reuse any one of these parts without replacing them all as a set.**

- Remove the two bushings from the spider using special tool kit p/n 0644-001.

Fig. 4-17



- After removing the bushings, inspect the area from which they were removed closely. If there is any sign of cracking or damage, replace the spider.

- Using a 9/64-in. hex wrench, remove the socket-head cap screws securing the ramps to the movable sheave.

Fig. 4-18



A975

**NOTE:** A complete set of ramps must be installed even if only one ramp is worn or damaged.

#### CLEANING

- Using parts-cleaning solvent, wash grease, dirt, and foreign matter off all parts. Dry the parts with compressed air.
- If drive belt dust accumulation is present on the stationary sheave or on the movable sheave Duralon bushing, remove the accumulation using parts-cleaning solvent only.

● CAUTION ●

**DO NOT** use steel wool or a wire brush to clean components having a Duralon bushing; damage will result if bushing is contacted with the steel wool or a wire brush.

#### INSPECTING

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

- Inspect stationary sheave, movable sheave, and housing for cracks and imperfections in the castings.
- Inspect the spider for cracks and imperfections in the casting. Arms, weights, and rollers must not be damaged or worn.

- Inspect the ramp settings on the inside of the movable sheave for wear and cracks.
- Inspect the spring for proper compression qualities. Spring compression must be within the range of 123-137 lb @ 2.187 in.
- Inspect the ramps for any uneven wear pattern.
- Inspect all threaded areas for any cracked or stripped threads.
- Inspect the hex shaft; no burrs or rough edges are to be evident. Use a fine file to remove any burrs or rough edges. Thoroughly clean and dry the hex shaft if any filing was done.
- Inspect bushing for any cracks or excessive gouging.

#### REPLACING BUSHINGS

Drive clutch bushings can be replaced using the Bushing Installation Tool (p/n 0644-006) and the following instructions:

##### Removing Outer Cover Bushing

- Using a 3/32 in. hex wrench, remove the three set screws that lock the hex bushing to the cover.

Fig. 4-19



- Turn the clutch cover over and set it into the sleeve support.
- Using the hex shaft driver, drive or press the hex bushing down and out.

Fig. 4-20



4. Inspect the cover bushing area for any signs of cracks or fatigue. If any sign of cracks or fatigue is present, replace the cover.

#### Installing Outer Cover Bushing

1. Set the cover upside down on a solid, flat surface.
2. Set the cover hex bushing into position in the cover.
3. Slide the hex shaft driver into the triangular-shaped bushing locator (with the machined ring located nearest the triangular plate).

Fig. 4-21



4. Position the hex shaft driver into the bushing and slide the triangular-shaped bushing locator plate down into position. Place the single, locating pin of the bushing locator into one of the three cover pin holes.

Fig. 4-22



5. Check to be sure the hex bushing is located squarely in the cover; then drive or press the bushing into position until it is flush with the outer cover surface.

**NOTE: If you are using a hammer to install the bushing, use a heavy brass or plastic hammer to prevent damage to the hex shaft driver.**

6. With the bushing in place, position the pilot drilling tool down into the bushing on the outside of cover. Using a No. 25 drill bit, drill three new holes (3/4 in. in depth) into the cover and bushing.

Fig. 4-23



● CAUTION ●

The pilot tool must be used to properly locate the holes.

7. Using a 10-24 tap, tap the three new holes.

Fig. 4-24



8. Apply LOCTITE (red) to the threads of the three set screws and install them into the three newly threaded holes.
9. Using a small punch, stake the top of the three holes to prevent the set screws from backing out.

Fig. 4-25



### Removing Movable Sheave Bushing

1. Using a 3/32 in. hex wrench, remove the three set screws from the movable sheave.
2. Set the movable sheave upside down on top of the sleeve support. The sleeve support must be used to support the area around the bushing as the bushing is being driven or pressed out of the sheave.

Fig. 4-26



3. Using the hex shaft driver, drive or press the hex bushing down and out.

Fig. 4-27



4. Inspect the movable sheave bushing area for any signs of cracks or fatigue. If any sign of cracks or fatigue is present, replace the movable sheave.

#### Installing Movable Sheave Bushing

1. Set the movable sheave into position on the sleeve support.

**NOTE:** One end of the sleeve support has been machined to match the angle of the movable sheave. This end of the tool must support the face of the sheave.

Fig. 4-28



2. Set the movable sheave bushing into position; then position the hex shaft driver and triangular-shaped bushing locator over the bushing.

Fig. 4-29



3. Locate the single, locking pin of the bushing locator in one of the three holes of the movable sheave and slide the hex shaft driver into the new bushing.

Fig. 4-30

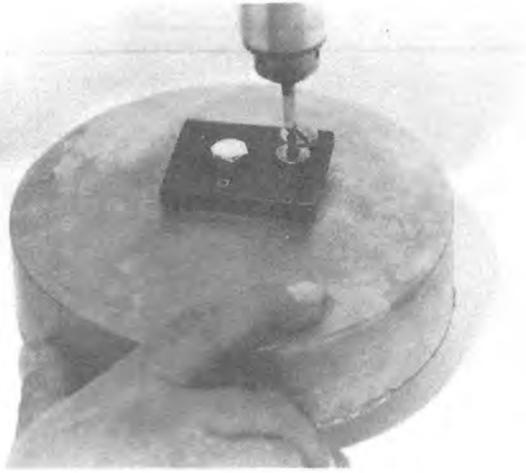


4. Check to be sure the bushing is positioned squarely in the sheave; then drive or press the bushing into the movable sheave.

**NOTE:** The movable sheave bushing area has a step machined into it. Drive or press the bushing into sheave until you feel the bushing seat against the step.

5. With the bushing in place, position the pilot drilling tool into the bushing from the outside of the sheave. Using a No. 25 drill bit, drill three new set screw holes through sheave and bushing.

Fig. 4-31



- Using a 10-24 tap, tap the three new holes. Apply LOCTITE (red) to the threads of the set screws and install.

Fig. 4-34



- Check the face of the sheave in the area of the three newly drilled holes. If any sharp edges are found, smooth area using fine emery paper.

Fig. 4-32

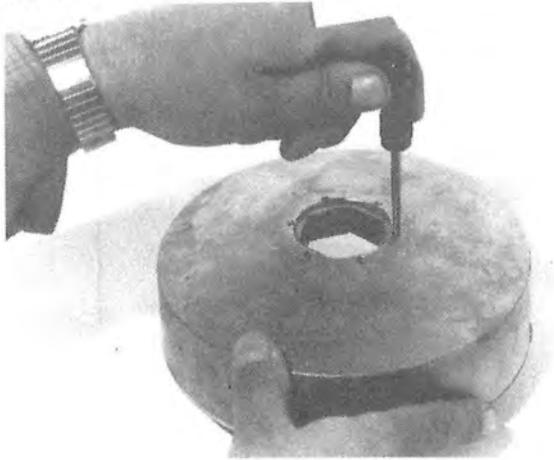


Fig. 4-35

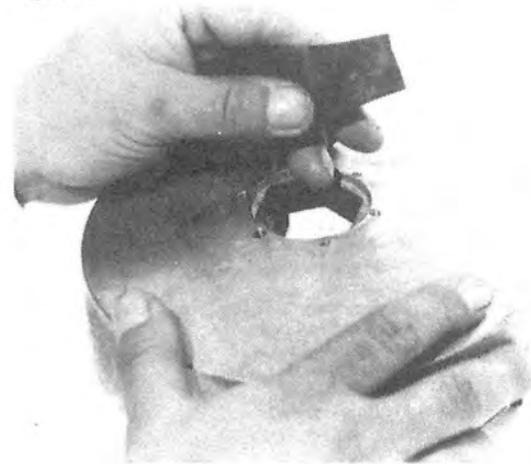


Fig. 4-33

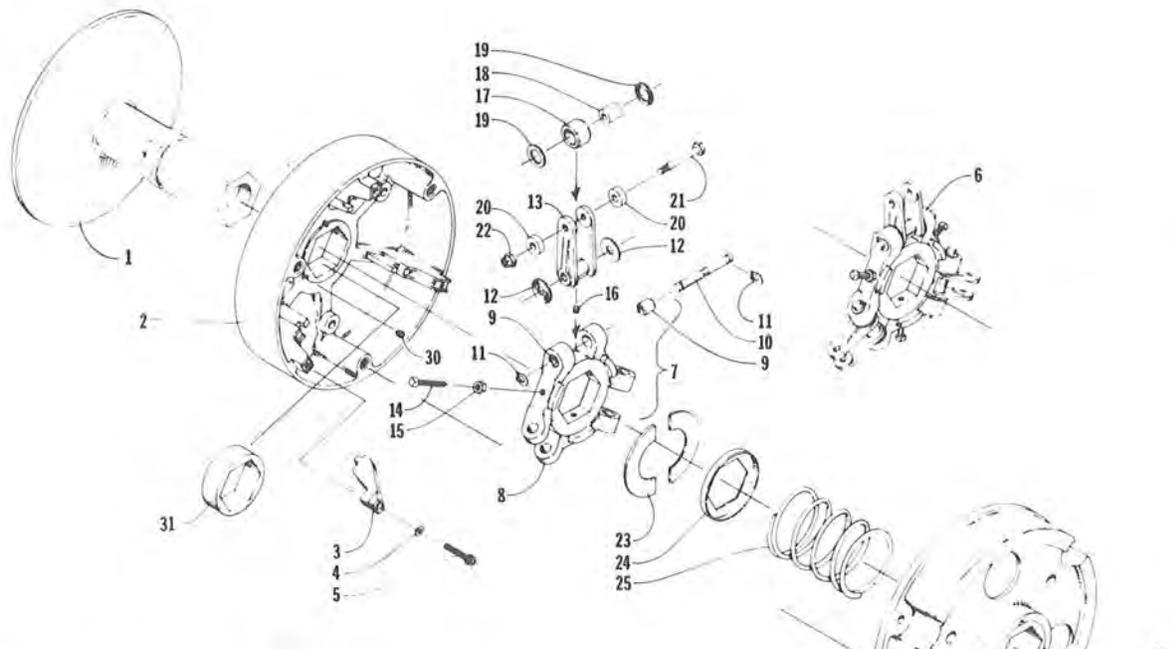


- Using a small punch, stake the top and bottom of the holes to prevent the set screws from backing out.

4

# ASSEMBLING

Fig. 4-36



**Key**

- |                        |                                 |
|------------------------|---------------------------------|
| 1. Sheave, Stationary  | 17. Roller Ass'y.               |
| 2. Sheave, Movable     | 18. Bushing, Upper Clutch Drive |
| 3. Ramp, Clutch        | 19. Washer, Roller Bearing      |
| 4. Washer, Lock        | 20. Weight, Clutch              |
| 5. Screw, Cap          | 21. Pin, Upper - Clutch Arm     |
| 6. Spider Ass'y.       | 22. Nut, Lock                   |
| 7. Spider w/Bearings   | 23. Ring, Split                 |
| 8. Spider              | 24. Washer, Cup                 |
| 9. Bearing, Clutch Pin | 25. Spring                      |
| 10. Pin, Clutch Arm    | 26. Housing                     |
| 11. Ring, Retaining    | 27. Washer, Lock                |
| 12. Washer, Thrust     | 28. Screw, Cap                  |
| 13. Arm, Clutch        | 29. Bearing, Hex.               |
| 14. Screw, Set         | 30. Screw, Set                  |
| 15. Nut                | 31. Bearing, Hex.               |
| 16. Screw, Set         |                                 |

0727-325

1. Install the ramps in the movable sheave and secure.

2. Slide the movable sheave onto the stationary sheave making sure balance marks on both sheaves are aligned.

Fig. 4-37

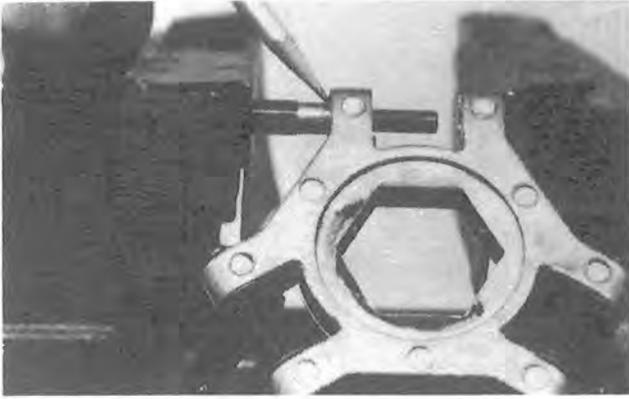


3. Assemble the spider using the following procedure:

A. Press the new bushings into the spider pin bosses. Use care to start the bushing straight and press slowly to prevent damage to the bushings. If the inner surface of a bushing is damaged, it must be replaced.

A975

Fig. 4-38



B. Position the swing arm between the spider bosses with a thrust washer on either side of the arm. Press the pin into position leaving enough room at either end of the pin to install the new snap rings.

**NOTE:** The thrust washers must be installed with the metal side of the washer next to the swing arm.

C. Apply LOCTITE 609 (or Perma-Lok HL 138) to the threads of the set screw; then install the set screw making sure the groove in the pin is aligned with the set screw.

● CAUTION ●

The groove in the pin must align with the set screw.

Fig. 4-39



AA050

D. Using a good snap-ring pliers, install the new snap rings. Be sure the snap rings are seated in the pin groove.

Fig. 4-40



E. Slide a metal bushing into each roller and position a thrust washer on either side with the bearing surface of the washer facing the roller. Insert the roller assembly between the arm.

Fig. 4-41



021

F. Slide a weight onto the bolt; then push the bolt w/weight through the roller arm and roller assembly. Install the remaining weight and self locking nut.

**NOTE:** The heads of the 3 bolts must all be positioned from the right side of the roller arm. If this isn't done, the clutch will be out of balance.

G. Tighten the lock nut to 0.4-0.5 kg-m (35-45 in.-lb). Apply LOCTITE LOCK N' SEAL to the threads of the bolt before installing nut. Perform steps B-G to the remaining two roller assemblies.

Fig. 4-42



015

4. Slide the spider assembly onto the hex shaft with the split ring retainers directed up. Make sure lines made during disassembly are aligned.

4

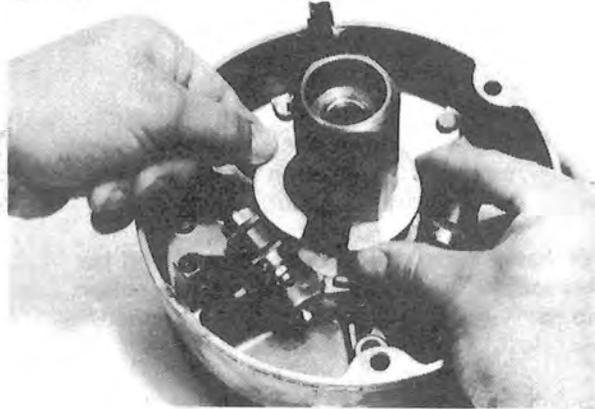
Fig. 4-43



A973

5. Install the split ring halves in the groove of the hex shaft.

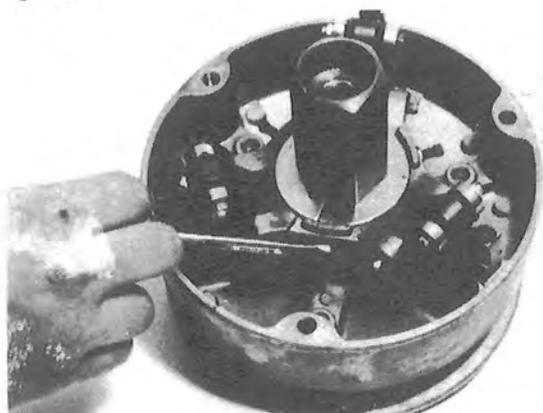
Fig. 4-44



A972

6. Pull the spider up against the split ring halves; then tighten the set screws. Lock the set screws by bottoming the jam nuts.

Fig. 4-45



A971

**NOTE:** To ensure that the set screws seat properly, tighten, then back out  $\frac{1}{4}$  turn, and tighten again.

7. Slide the cup washer and spring onto the hex shaft.

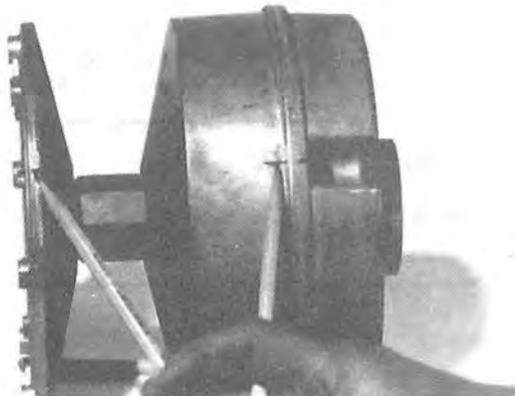
Fig. 4-46



A969

8. Place the housing on the spring and align the balance marks with those on the stationary and movable sheaves.

Fig. 4-47



9. Push down the housing and lift up the movable sheave until contact is made; then install the three socket-head cap screws. Be sure to use care when installing housing so the Duralon bushing is not damaged. Tighten and then torque the screws to 2.1-2.4 kg-m (15-17 ft-lb).

Fig. 4-48



## INSTALLING

1. Place the drive clutch into position on the crankshaft.
2. Install the bolt and lock washer. Tighten the bolt to 7.6-8.3 kg-m (55-60 ft-lb).

Fig. 4-49



3. Check alignment between the drive clutch and driven pulley.
4. Install the drive belt and secure the clutch shield.
5. Install plug in the belly pan.

## Drive Clutch (El Tigre-Cheetah L/C)

## REMOVING

1. Open the clutch shield and remove the drive belt.
2. Remove the plug from the belly pan.
3. Remove the bolt and lock washer securing the drive clutch to the crankshaft; then remove the pilot washer.

Fig. 4-50



B413

4. Using the Comet Drive Clutch Puller and an impact wrench (or a breaker bar and chain wrench), tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat step until clutch releases.

**NOTE:** Before installing the clutch puller, apply oil to the threads of the puller and a small amount of grease to the tip of the puller.

Fig. 4-51



B291

5. Remove the clutch from the engine compartment.

## DISASSEMBLING

1. Scribe a line across all components.
2. Using an impact wrench, loosen the six bolts securing the cover plate. Remove every other bolt and lock washer from the cover plate; then while firmly holding the cover plate, remove the three remaining bolts and lock washers equally.

Fig. 4-52



B362

Fig. 4-55



B366

**NOTE:** Applying heat to the clutch threaded area will aid in clutch disassembly. The heat will loosen the LOCTITE used during assembly.

Fig. 4-53



B363

3. Remove the cover plate and spring.

Fig. 4-56



B367

Fig. 4-54



B364

4. Using a spider removal tool, turn the spider counterclockwise; then remove spider, spacer rings, and movable sheave.

6. Using a vise, deep socket, and a smaller diameter press tool, press the pin and roller out of the spider. Position a deep socket on one side of the spider and the press pin on the opposite side between the opened vise jaws. Slowly close the vise and check to make sure the deep socket and press pin are aligned.

7. Remove the three arm pins and nuts securing the cam arms to the movable sheave; then remove the cam arms with washers.

Fig. 4-57



B368

## CLEANING

1. Using parts-cleaning solvent, wash grease, dirt, and foreign matter off all parts; dry with compressed air.
2. Remove any drive belt dust accumulation from the stationary sheave, movable sheave, and bushing using parts-cleaning solvent only.

● CAUTION ●

Do not use steel wool or a wire brush to clean components having a bushing; damage will result.

## INSPECTING

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

1. Inspect stationary sheave, movable sheave, spider, and cover plate for cracks or imperfections in the casting.
2. Inspect the arm pins for wear or bends.
3. Inspect the bushing in the cover plate for wear, damage, or cracks. Measure the inside diameter of the bushing and the outside diameter of the stationary sheave hub. The difference (clearance) must be less than 0.76 mm (0.030 in.).

Fig. 4-58



B371

Fig. 4-59



B372

4. Inspect the bushing in the movable sheave for wear, damage, or cracks. Measure the inside diameter of the bushing and the outside diameter of the stationary sheave hub. The difference (clearance) must be less than 0.76 mm (0.030 in.).

Fig. 4-60



B369

Fig. 4-61



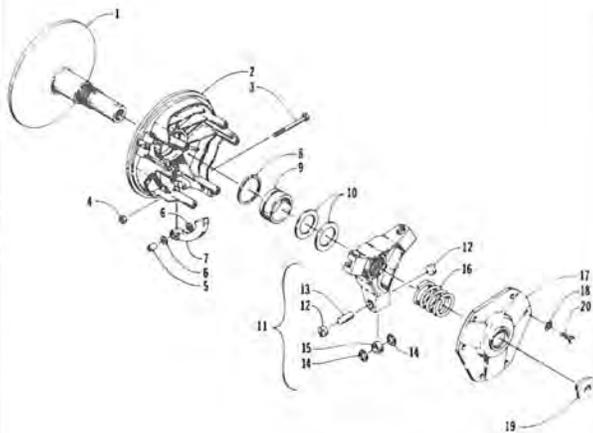
B370

5. Inspect the spring for proper compression qualities. Spring compression must be 53.4 kg (118 lb) when compressed 25.4 mm (1 in.) from normal length.

6. Inspect the cam arms for any uneven wear pattern or damage to the bushings.
7. Inspect all threaded areas for any cracked or stripped threads.
8. Inspect rollers for damage or wear.
9. Inspect the bushings for damage or fraying.
10. Inspect the stationary sheave hub for damage or wear.

## ASSEMBLING

Fig. 4-62



### KEY

- |                        |                     |
|------------------------|---------------------|
| 1. Fixed Face and Post | 11. Spider Assembly |
| 2. Movable Sheave      | 12. Spider Button   |
| 3. Pin                 | 13. Spider Pin      |
| 4. Lock Nut            | 14. Roller Washer   |
| 5. Bushing             | 15. Spider Roller   |
| 6. Washer              | 16. Spring          |
| 7. Cam Arm             | 17. Cover Plate     |
| 8. Retaining Ring      | 18. Lock Washer     |
| 9. Bushing Kit         | 19. Pilot Washer    |
| 10. Spacer Washer      | 20. Cap Screw       |

0727-331

1. Place a cam arm and washers (one on either side of the cam arm) into position on the movable sheave; then secure with the arm pin and nut coated with LOCTITE LOCK N' SEAL. Carefully tighten lock nut to a point just ensuring free cam arm movement. Repeat procedure on the other two cam arms making sure the head of each arm pin is positioned to the right side of each cam arm.

Fig. 4-63



B373

2. Place a roller and fiber/steel washers (one on either side of the roller with the fiber side of the washer positioned toward the roller) into position on the spider; then install the pin. Repeat procedure on the other two rollers.

Fig. 4-64



B374

3. Place the guide buttons into position making sure the two dots are positioned vertical; then tap into position until seated.

**NOTE: If a guide button does not fit tightly, it must be replaced.**

Fig. 4-65



B375

● CAUTION ●

The two dots must be positioned vertical. If the two dots are not vertical, the movable sheave may bind on the spider.

- Place the movable sheave, spacer rings, and spider into position on the stationary sheave hub. Make sure all threads are clean and free of oily residue. Apply LOCTITE STUD N' BEARING MOUNT to the entire threaded area of the hub and thread the spider onto the hub. Tighten the spider using the Spider Removal Tool to 17.25 kg-m (125 ft-lb). ALLOW THE LOCTITE TO CURE AT ROOM TEMPERATURE FOR 24 HOURS.

Fig. 4-66



B376

● CAUTION ●

Make sure the line made on the spider and movable sheave during disassembly is properly aligned.

- Place the spring and cover plate into position making sure the line on the cover plate is properly aligned; then compress the spring and install the six bolts coated with LOCTITE LOCK N' SEAL and lock washers. Tighten the six bolts evenly to 1.0 kg-m (7.0 ft-lb).

Fig. 4-67



B365

Fig. 4-68



B377

● CAUTION ●

Care must be taken when installing the cover plate not to damage the bushing.

### CHANGING CAM ARMS

The cam arms on the Comet clutch can be changed without disassembling the clutch. To change the cam arms, use the following procedure:

- Using a large slip-joint pliers, compress the clutch and place a bolt into the cross hole in the hub.

Fig. 4-69



B378

- Remove the arm pin and nut securing each cam arm; then remove cam arms and washers.
- Place the new cam arm and washers (one on either side of the cam arm) into position and secure with arm pin and nut coated with LOCTITE LOCK N' SEAL making sure the head of each arm pin is positioned to the right side of each cam arm. Carefully tighten lock nut to a point ensuring free cam arm movement. Repeat procedure on the other two cam arms.
- Compress the clutch and remove the bolt from the cross hole.

## INSTALLING

1. Place the clutch into position on the crankshaft.
2. Install the pilot washer, lock washer, and bolt. Tighten the bolt to 6.9 kg-m (50 ft-lb) maximum.

Fig. 4-70



B413

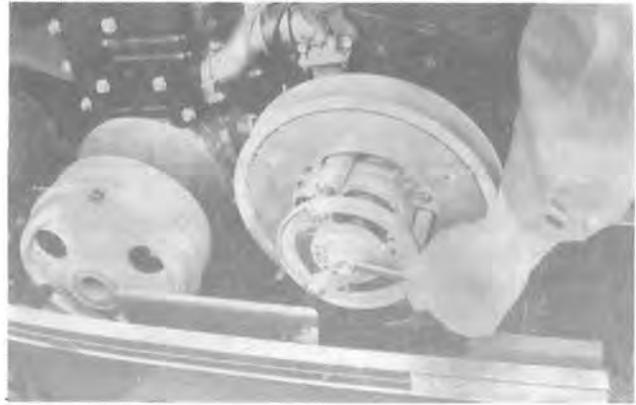
3. Check alignment between the drive clutch and driven pulley.
4. Install plug in the belly pan.
5. Install the drive belt and secure the clutch shield.

## Driven Pulley

## REMOVING

1. Open the clutch shield.
2. Remove the drive belt.
3. Remove the cap-lock screw and washer; then account for and note the position of any alignment washers.

Fig. 4-71



4. Slide the driven pulley off the driven shaft; then remove pulley from the engine compartment. Remove the stub shaft from the driven pulley.

Fig. 4-72

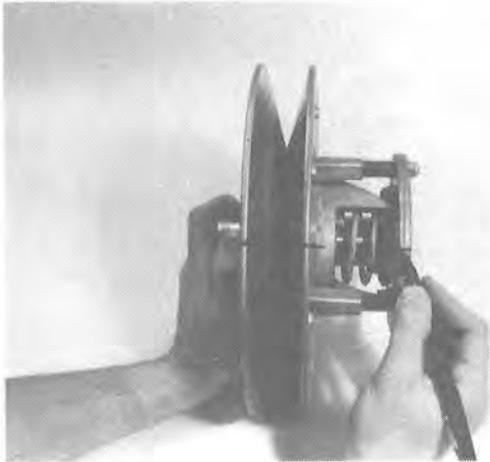


5. Remove the key and alignment washers from the driven shaft.

## DISASSEMBLING

1. Scribe a line across all driven pulley components to ensure correct assembly and pulley balance.

Fig. 4-73



B454

2. Place the driven pulley on a work fixture so the retainer bracket is directed upward.

Fig. 4-74



B455

**NOTE:** To aid in driven pulley servicing, use a roll of duct tape as a work fixture. The work fixture will increase stability of the pulley and decrease the spring tension during the repair procedure.

3. Remove the three lock nuts securing the retainer bracket; then carefully slide the retainer bracket off the stationary shaft allowing the spring to release tension.

Fig. 4-75



B456

4. Remove the spring.

Fig. 4-76



B458

5. Slide the movable sheave off the stationary shaft; then remove the washer(s) located between the sheaves.

Fig. 4-77



B459

Fig. 4-78



B460

- Remove the six screws securing each of the sheave covers and remove covers.

**NOTE:** Each cover needs to be removed only if sheave or sheave cover inspection or replacement is required.

Fig. 4-79



B461

- Remove the three cap-socket screws and lock washers securing the torque bracket to the stationary sheave; then remove torque bracket.

Fig. 4-80



B463

- Using a pliers, remove the buttons from the retainer bracket.

Fig. 4-81



B464

## CLEANING

- Using parts-cleaning solvent, wash grease, drive belt dust, and foreign matter off all parts.

### ● CAUTION ●

Do not use steel or a wire brush to clean driven pulley components. A wire brush or steel wool will cause the sheaves to be gouged (thus, the drive belt may not slide properly between sheaves) and decreased performance and possible accelerated drive belt wear will result.

## INSPECTING

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

- Inspect the buttons for damage, cracks or wear.
- Inspect the sheaves and sheave covers for any gouges, cracks, or other damage. Also inspect threaded areas of sheaves for damaged or stripped threads.
- Inspect the torque bracket for cracks or damage. The ramp portions of the bracket must be free of gouges and damage. Minor scratches may be repaired using #320 grit wet-or-dry sandpaper.

Fig. 4-82



B465

4. Inspect spring for distortion, crystallization, or breaks.
5. Inspect the retainer bracket and spring mounting holes for cracks, damage, or wear.
6. Inspect the retainer bracket and movable sheave bearings for wear. For each respective bearing, measure the outside diameter of the sheave shaft and the inside diameter of the sheave bearings. Compare the readings. Clearance between the shaft and the respective bearing must not exceed 0.5 mm (0.020 in.). If the clearance exceeds the specification, the bearing must be replaced.

Fig. 4-83



B466

Fig. 4-84



B467

## BEARINGS

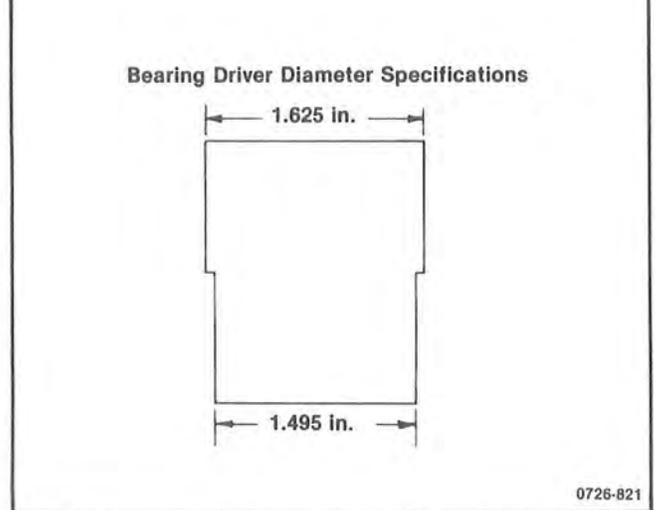
### Removing

To remove driven pulley bearings, use the following procedure:

**NOTE:** To remove the movable sheave bearing, heat must be applied around the bearing.

1. Place the movable sheave or retainer bracket flat on a press.
2. Using an appropriately sized bearing driver, press the bearing out.

Fig. 4-85



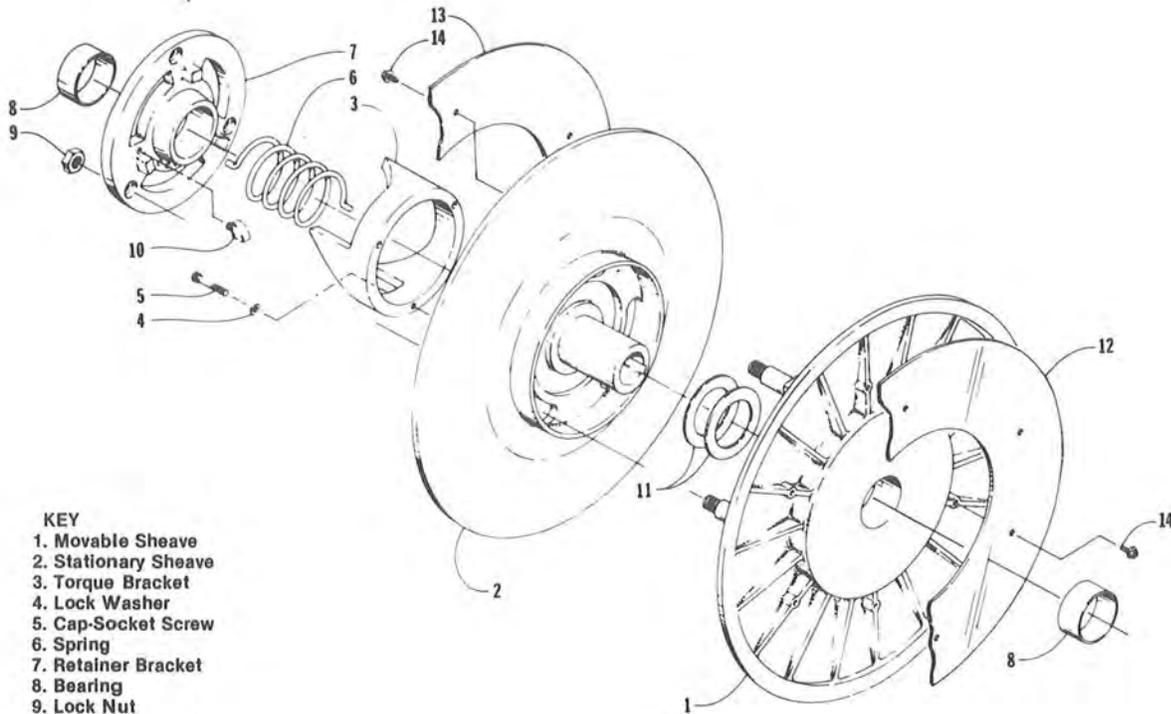
### Installing

**NOTE:** Before installing the bearing, apply **LOCTITE STUD N' BEARING MOUNT** to the outside face of the bearing.

1. Place the movable sheave or retainer bracket flat on a press.
2. Using an appropriately sized bearing driver, press the bearing into position. The bearing must be flush with both sides of the bearing boss.
3. Wipe off excess LOCTITE.

# ASSEMBLING

Fig. 4-86

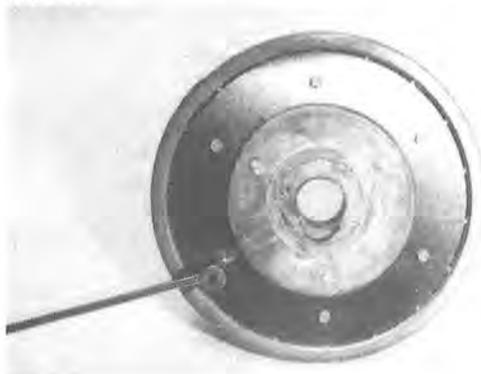


- KEY**
- 1. Movable Sheave
  - 2. Stationary Sheave
  - 3. Torque Bracket
  - 4. Lock Washer
  - 5. Cap-Socket Screw
  - 6. Spring
  - 7. Retainer Bracket
  - 8. Bearing
  - 9. Lock Nut
  - 10. Button
  - 11. Washer
  - 12. Movable Sheave Cover
  - 13. Stationary Sheave Cover
  - 14. Screw

0727-212

1. Place the sheave covers into position on the sheaves; then apply LOCTITE LOCK N' SEAL to the threads of the mounting screws and secure. Tighten the screws to 0.6-0.7 kg-m (50-60 in.-lb).
2. Install the buttons in retainer bracket.
3. Place the torque bracket into position on the stationary sheave making sure the degree number on the torque bracket aligns with the part number on the stationary sheave. Install the three cap-socket screws and lock washers. DO NOT tighten at this time.

Fig. 4-87



B462

Fig. 4-88



AI001

- Place the washer(s) on the stationary sheave shaft.

Fig. 4-89



B460

- Align the scribed line made during disassembly; then slide movable sheave onto the stationary sheave shaft.

Fig. 4-90



B459

- Place the sheaves on a work fixture (roll of duct tape, etc.).
- Place the spring over the stationary sheave hub and hook the turned down end of the spring into the hole in the casting of the stationary sheave.

Fig. 4-91



B458

- Place the retainer bracket over the spring and hook the turned up end of the spring in the 3rd hole (standard spring tension) of the bracket.
- While holding the sheaves from rotating, grasp the retainer bracket and rotate it approximately 120° clockwise until the mounting holes align; then push retainer bracket into position and install the three lock nuts. Tighten the lock nuts to 1.5-1.8 kg-m (11-13 ft-lb).

**NOTE:** The line made during disassembly should be aligned.

Fig. 4-92



B457

- Rotate the movable sheave to ensure movement without binding.
- Rotate the torque bracket until it is tight against the 3 buttons; then using a long hex wrench, tighten the three cap-socket screws securing the torque bracket.

Fig. 4-93



AI002

4

## INSTALLING

1. Slide the alignment washers onto the end of the driven shaft.
2. Install the key in the driven shaft keyway; then install the driven pulley on the shaft. Align its keyway with the driven shaft keyway.

**NOTE:** A small amount of LOCTITE ANTI-SEIZE COMPOUND applied to the driven shaft will aid in future driven pulley removal.

3. Secure the driven pulley by installing the stub shaft and bolt. Tighten the bolt to 2.6-3.3 kg-m (19-24 ft-lb).

Fig. 4-94



4. Check drive clutch/driven pulley alignment, adjust as necessary.
5. Install the drive belt and secure clutch shield.

## Drive Clutch/ Driven Pulley

### CHECKING PARALLELISM/OFFSET

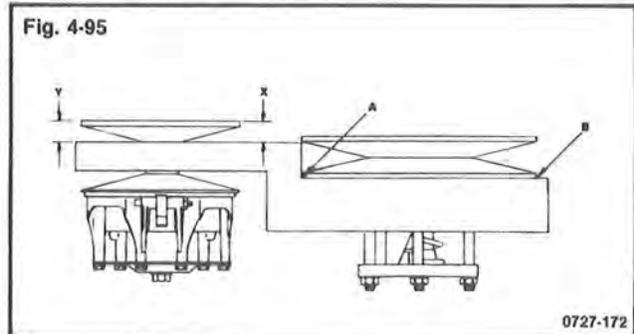
If premature drive belt failure is experienced or if the drive belt turns over, parallelism/offset must be checked. Also, parallelism/offset must be checked whenever either the drive clutch or driven pulley is serviced. To check the parallelism/offset, use the following procedure:

1. Open the clutch shield and remove the drive belt.
2. Install the Clutch Alignment Bar between the drive clutch sheaves and against the outside edge of the driven pulley stationary sheave.
3. Allow the alignment bar to rest on the drive clutch shaft.

**NOTE:** The alignment bar must extend beyond the front edge of the drive clutch.

4. With the bar against the outside edge of the driven pulley stationary sheave at points A and B, the bar should just clear the inside edge of the stationary sheave of the drive clutch and rest on the stationary shaft. If the bar will not either clear the inside edge or is more than 1.5 mm (0.060 in.) from the inside edge, the offset needs to be adjusted.

Fig. 4-95



0727-172

5. Check parallelism of the drive clutch/driven pulley using the alignment bar and reference points X and Y with the alignment bar against the driven pulley at points A and B. Using a calipers or a machinist's scale, measure X and Y from the back side of the alignment bar. Measurements X and Y must be equal or measurement Y must be more than measurement X but must not exceed measurement X by more than 1.6 mm (0.062 in.).

Fig. 4-96



**NOTE: The offset must correct before checking parallelism.**

6. If either the offset or parallelism is other than specified, proceed to Correcting Parallelism/Offset.

#### CORRECTING PARALLELISM/OFFSET

1. To correct offset, the driven pulley must be moved laterally on the driven shaft. Remove the cap-lock screw and washers securing the driven pulley; then remove the driven pulley.
2. To move the driven pulley inward on the shaft, remove washer(s) as required.
3. To move the driven pulley outward on the shaft, add additional alignment washer(s) behind the driven pulley.

**NOTE: When the correct offset is attained, use the large and small alignment washers to correctly position the driven pulley on the driven shaft. Arrange washers to allow the least amount of "float" on the driven shaft. A maximum of one washer thickness "float" is allowable.**

4. Install driven pulley and secure with a cap-lock screw and washers. Tighten screw to 2.6-3.3 kg-m (19-24 ft-lb).
5. To correct parallelism, minor adjustments can be made by shimming the rear motor mounts or by moving the engine on the engine plate.
6. Loosen the two front cap-lock screws securing the angle support to the front motor mounts.

7. Loosen the two rear cap-lock screws securing the engine plate to the motor mounts.

Fig. 4-97



8. If measurement Y is less than or equal to measurement X, insert a shim between the left rear motor mount and the front end.

**NOTE: Shims can be made by slotting an appropriately sized flat washer.**

9. If measurement Y exceeds measurement X by more than 1.6 mm (0.062 in.), insert a shim between the right rear motor mount and the front end.
10. In order, tighten the rear motor mount cap-lock screws and the front motor mount cap-lock screws to 3.2 kg-m (23 ft-lb).
11. Check both offset and parallelism to ensure accuracy and make further adjustments as necessary.
12. Install the drive belt and secure the clutch shield.

# Drive Train

## DISASSEMBLING

1. Remove either the expansion chambers and muffler or the pulse charger from the engine compartment. Account for two pads.
2. Open the clutch shield and remove the drive belt.
3. Remove the cap-lock screw and washer securing driven pulley; then account for and note the position of any alignment washers.
4. Slide the driven pulley off the driven shaft; then remove driven pulley from the engine compartment. Remove the key and alignment washers from the driven shaft. Account for the stub shaft.
5. Remove the four bolts and lock washers securing chain-case cover, remove the cover and seal, and allow the lubricant to flow onto rags placed in the belly pan.

Fig. 4-98



B474

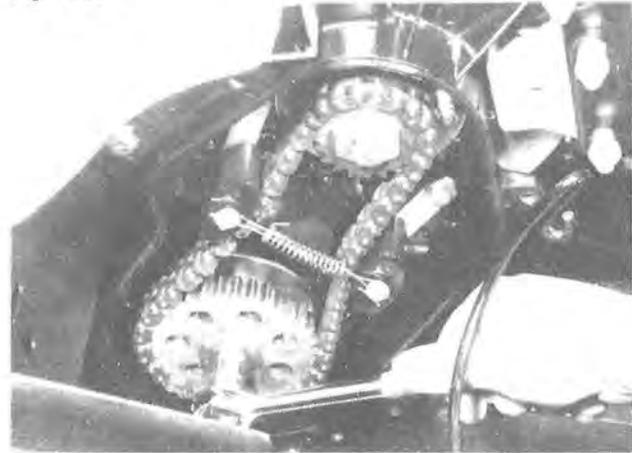
6. Remove cotter pins and washers securing tensioner spring to the link pins; then remove spring and pads.

Fig. 4-99



7. Remove the cap-lock screws and washers securing both top and bottom sprockets.

Fig. 4-100



8. Slide both sprockets w/chain off the shafts.

**NOTE:** If a sprocket will not slide off shaft, thread cap-lock screw back into the shaft; then use a puller to loosen the sprocket. The cap-lock screw is used for bottoming the puller bolt.

9. Remove the six lock nuts securing the upper and lower MAG-side flange plates. Remove flange plates, seals, and upper bearing.

**NOTE:** It may be necessary to use heat to loosen the LOCTITE securing the bearing to the driven shaft. If heat is used, examine the bearing seal for any damage before installation.

Fig. 4-101



B090

10. Loosen the set screw on the PTO-side driveshaft collar. Drive the collar clockwise (opposite shaft rotation) until it is free.

**NOTE:** A fine file should be used to remove any burrs left by the collar set screw.

11. Remove the three lock nuts and bolts securing the PTO-side driven shaft flange plates. Account for the torque link on the El Tigre 6000 and Cheetah L/C.

**NOTE:** It may be necessary to remove the PTO-side carburetor for this procedure. Also, it is necessary to use an extension and universal joint to remove the rear lock nut from upper flange plate.

Fig. 4-102



B381

12. Force the driven shaft toward the PTO side (rotating the shaft to prevent the brake disc from binding on the shaft) until brake disc is free. Account for the key. Remove the lock collar positioned next to the brake disc from the shaft.

**NOTE:** A fine file should be used to remove any burrs left by the collar set screw.

13. Continue to slide the driven shaft until it is out of the PTO side. Account for a bearing, two flange plates, and the PTO-side driveshaft collar.
14. Remove the skid frame from the tunnel (see Track/Suspension—Removing Skid Frame section).
15. Remove the three PTO-side lock nuts and bolts securing the driveshaft-bearing flange plates and drive adaptor. Remove drive adaptor and cable.

Fig. 4-103



B475

16. Tap the driveshaft toward the chain case to unseat MAG-side bearing. Remove bearing.
17. Slide the driveshaft toward the MAG side until the PTO end of the driveshaft is out of its mounting hole. Tilt the end of the driveshaft away from the tunnel and slide the driveshaft free of the tunnel. Remove track.

Fig. 4-104



B096

18. Scribe a line on the driveshaft along the edge of each sprocket to aid in assembly. Loosen the set screw on the collar, drive the collar clockwise until free, and remove the bearing and flange plates from the driveshaft.

19. Press the three sprockets off the driveshaft.
20. Remove the six socket-head cap screws and lock nuts securing the brake disc to the hub; then separate disc and hub.

Fig. 4-105



B193

1. Thoroughly wash all metallic components in parts-cleaning solvent. Dry using compressed air.
2. Wash all non-metallic components with soap and water.
3. Inspect driveshaft and driven shaft for damaged splines or stripped threads.
4. Inspect bearings for any roughness or damage.
5. Inspect seals for any breaks or damage.
6. Inspect the track for cuts, gouges, or wear.
7. Inspect the keyways in the driven shaft and the brake hub for wear or damage.
8. Inspect the brake disc for wear or cracks.
9. Inspect chain, sprockets, and chain tensioner components for wear or damage.
10. Inspect the track drive sprockets for wear or damage.

## CLEANING AND INSPECTING

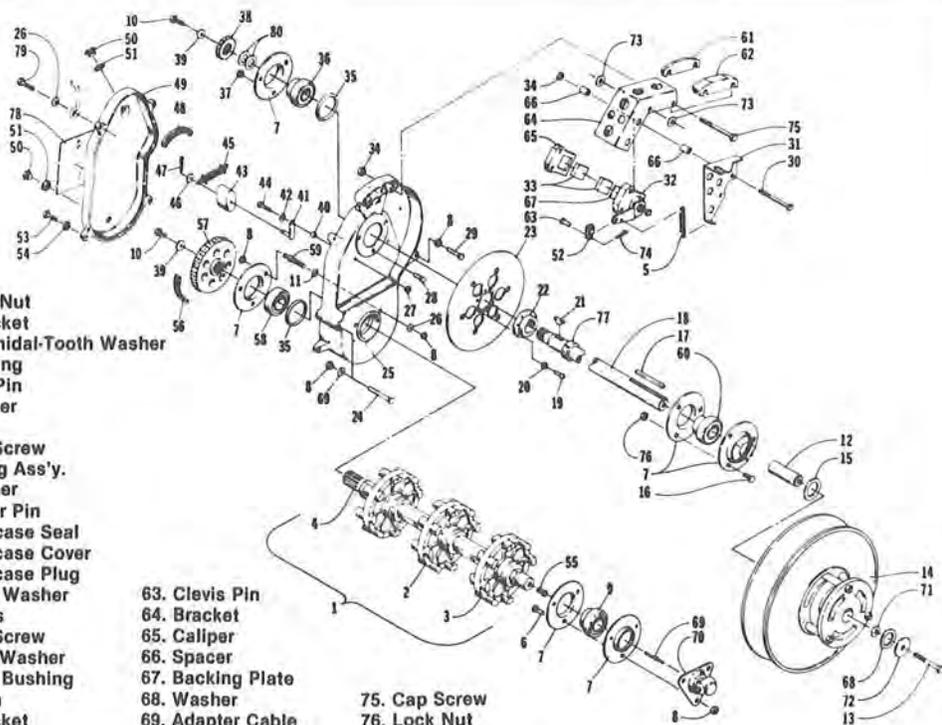
**NOTE:** Whenever a part is worn excessively, cracked, defective, or damaged in any way, replacement is necessary.

## ASSEMBLING

Fig. 4-106

### KEY

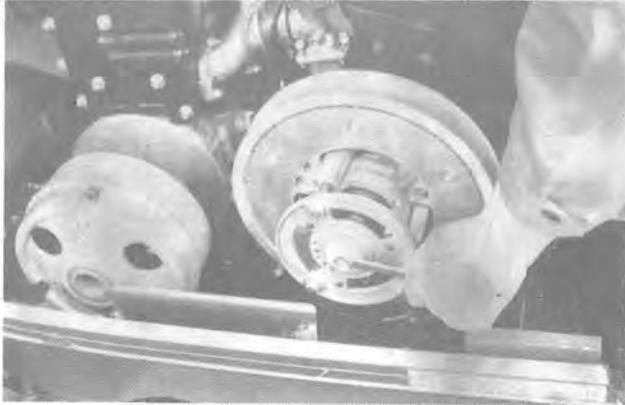
- |                        |                            |                   |                    |
|------------------------|----------------------------|-------------------|--------------------|
| 1. Driveshaft Assembly | 37. Lock Nut               | 63. Clevis Pin    | 75. Cap Screw      |
| 2. Drive Sprocket      | 38. Sprocket               | 64. Bracket       | 76. Lock Nut       |
| 3. Drive Sprocket      | 39. Pyramidal-Tooth Washer | 65. Caliper       | 77. Lock Collar    |
| 4. Driveshaft          | 40. Bushing                | 66. Spacer        | 78. Reflector Tape |
| 5. Return Spring       | 41. Link Pin               | 67. Backing Plate | 79. Cap Screw      |
| 6. Carriage Bolt       | 42. Washer                 | 68. Washer        | 80. Washer         |
| 7. Flange Plate        | 43. Pad                    | 69. Adapter Cable |                    |
| 8. Lock Nut            | 44. Cap Screw              | 70. Drive Adapter |                    |
| 9. Bearing             | 45. Spring Ass'y.          | 71. Washer        |                    |
| 10. Cap-Lock Screw     | 46. Washer                 | 72. Washer        |                    |
| 11. Stud O-Ring        | 47. Cotter Pin             | 73. Washer        |                    |
| 12. Stub Shaft         | 48. Dropcase Seal          | 74. Cotter Pin    |                    |
| 13. Cap-Lock Screw     | 49. Dropcase Cover         |                   |                    |
| 14. Driven Clutch      | 50. Dropcase Plug          |                   |                    |
| 15. Washer             | 51. Fiber Washer           |                   |                    |
| 16. Carriage Bolt      | 52. Clevis                 |                   |                    |
| 17. Key                | 53. Cap Screw              |                   |                    |
| 18. Driven Shaft       | 54. Lock Washer            |                   |                    |
| 19. Cap-Socket Screw   | 55. Drive Bushing          |                   |                    |
| 20. Lock Nut           | 56. Chain                  |                   |                    |
| 21. Key                | 57. Sprocket               |                   |                    |
| 22. Disc Hub           | 58. Bearing                |                   |                    |
| 23. Brake Disc         | 59. Stud                   |                   |                    |
| 24. Carriage Bolt      | 60. Bearing                |                   |                    |
| 25. Dropcase           | 61. Spacer                 |                   |                    |
| 26. Washer             | 62. Spacer                 |                   |                    |
| 27. Lock Nut           |                            |                   |                    |
| 28. Ribbed Bolt        |                            |                   |                    |
| 29. Cap Screw          |                            |                   |                    |
| 30. Cap Screw          |                            |                   |                    |
| 31. Cap Screw          |                            |                   |                    |
| 32. Caliper Ass'y.     |                            |                   |                    |
| 33. Brake Puck         |                            |                   |                    |
| 34. Crown Nut          |                            |                   |                    |
| 35. Seal               |                            |                   |                    |
| 36. Bearing            |                            |                   |                    |



17. Apply a light coat of grease or LOCTITE ANTI-SEIZE COMPOUND to the driven shaft; then install the driven shaft alignment washers (as required) and key. Install the driven pulley w/stub shaft, alignment washers (as required), washer, and cap-lock screw. Tighten cap-lock screw to 2.6-3.3 kg-m (19-24 ft-lb).

**NOTE:** Make sure keyways match when installing driven pulley. Arrange washers to allow the least amount of "float" on the driven shaft. A maximum of 1.5 mm (0.060 in.) "float" is allowable.

Fig. 4-115



18. Check alignment of the drive clutch/driven pulley.
19. Tip the snowmobile onto the PTO side using cardboard to prevent scratching the belly pan; then install the pads and spring and secure with two washers and cotter pins.

Fig. 4-116



B086

20. Pour 236 ml (8 fl oz) of Chainlube into the chaincase.

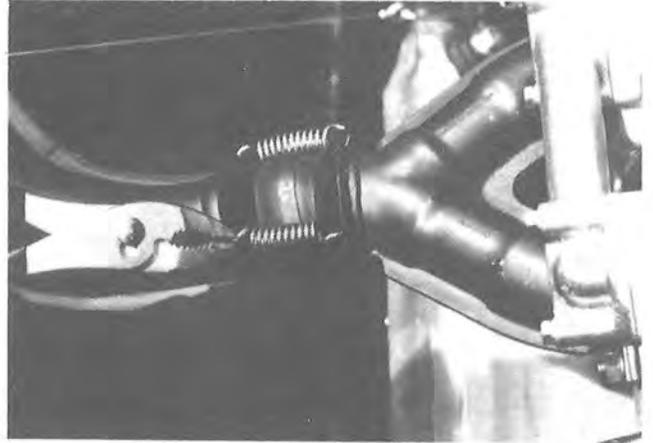
21. Place chain-case cover seal and chain-case cover into position and secure with four bolts and lock washers.

Fig. 4-117



22. Install drive belt and secure the clutch shield.
23. Install either the expansion chambers and muffler or the pulse charger. Make sure the muffler pads are properly positioned.

Fig. 4-118



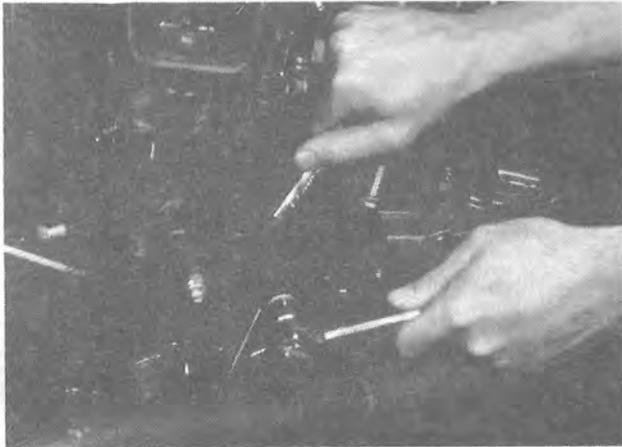
**NOTE:** Apply RTV 732 to the ball joints of the exhaust system.

# Brake System

## REMOVING

1. Remove the two cap screws and lock nuts securing brake bracket to the chain case. Move bracket clear of chain case accounting for the two bracket spacers and a washer.

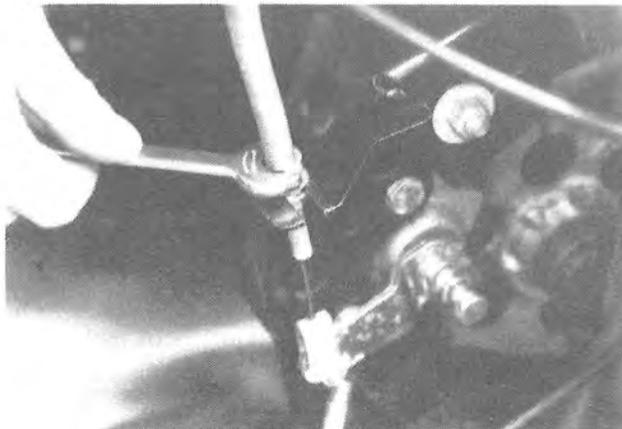
Fig. 4-119



B478

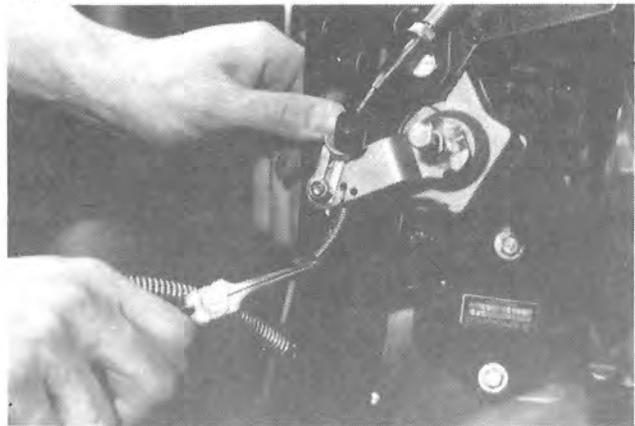
2. Loosen the brake cable flange nuts; then slide cable free of bracket.

Fig. 4-120



3. Remove the return spring.

Fig. 4-121



4. Remove the cotter key securing brake cable clevis; then remove clevis pin accounting for clevis. Disconnect cable from clevis.

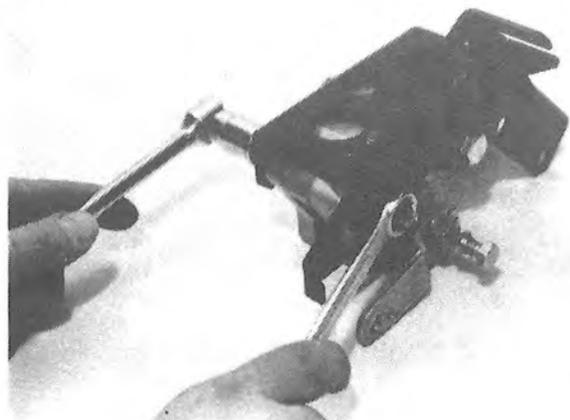
Fig. 4-122



## DISASSEMBLING

1. Remove the two crown nuts from the cap screws securing caliper assembly. Remove the cap screws accounting for four spacers.

Fig. 4-123



B483

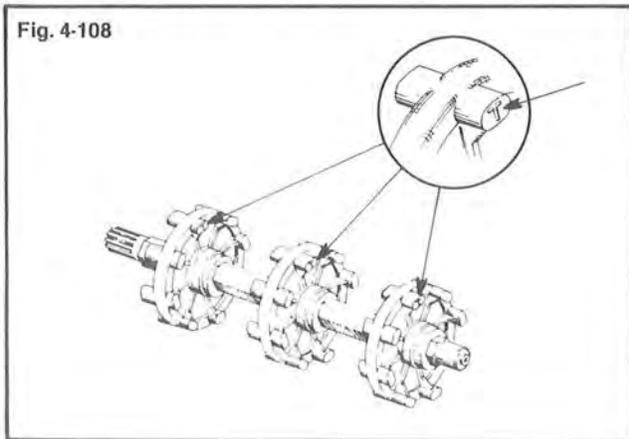
1. Secure the hub to the brake disc with the six socket-head cap screws and lock nuts. Tighten lock nuts to 0.4 kg-m (36 in.-lb).

Fig. 4-107



2. Press the sprockets on the driveshaft noting the scribed marks on the shaft and the timing mark found on one tooth of each sprocket. The timing mark is the letter "T" molded into the outer surface of one drive tooth. All the "T" markings must be in alignment.

Fig. 4-108



**NOTE:** Make sure all sprockets are installed correctly ensuring correct timing of both the center and outer sprockets. The bearing is positioned between the flange plates.

3. Assemble driveshaft components on the PTO-end of the driveshaft. Install bearing lock collar, flange plate, bearing (with flange towards sprocket), and the remaining flange plate.

Fig. 4-109



B096

4. Position front of track up into the tunnel. Install the driveshaft with the splined end through its mounting hole in the chain case.
5. Swing PTO end of driveshaft up; then align holes in the flange plates with holes in tunnel. Place the cable and drive adaptor into position.
6. Insert three bolts from the inside of the tunnel through flange plates, tunnel, and drive adaptor. Secure with three lock nuts. Tighten to 2.2-2.5 kg-m (16-18 ft-lb).

Fig. 4-110



B476

7. Slide MAG-side bearing onto driveshaft (inner race flange must be positioned toward drive chain); then install seal and flange plate. Secure with three lock nuts. Tighten to 2.2-2.5 kg-m (16-18 ft-lb).
8. Place the lower sprocket onto splines. Secure with a cap-lock screw (coated with LOCTITE LOCK N' SEAL) and pyramidal-tooth washer. DO NOT TIGHTEN AT THIS TIME.
9. Install the brake disc lock collar on the splined end of the driven shaft; then install brake hub key into driven shaft keyway.

10. Install the PTO-side bearing w/collar and flange plates on the driven shaft; do not tighten collar at this time. Place the driven shaft into position making sure the brake disc and flange plates are properly positioned. Secure with PTO-side bearing and flange plates with three bolts and lock nuts. Tighten and then torque to 2.2-2.5 kg-m (16-18 ft-lb).

**NOTE:** On the EI Tigre 6000 and Cheetah L/C, be sure to place the torque link into position before installing the lock nuts.

Fig. 4-111



B381

11. On the MAG-side driven shaft, apply Scotch-Bond Adhesive 4174 to the bearing seating area adjacent to the shaft splines. Install the bearing, seal, and flange plate and secure with three lock nuts. Tighten to 2.2-2.5 kg-m (16-18 ft-lb).
12. Loop the chain around the lower sprocket and slide the upper sprocket w/chain onto the driven shaft. Secure upper sprocket with a cap-lock screw (coated with LOCTITE LOCK N' SEAL) and pyramidal-tooth washer. Tighten both sprockets to 2.6-3.3 kg-m (19-24 ft-lb). Drive the driven shaft bearing collar in the direction of rotation to lock bearing; then tighten set screw.

Fig. 4-112



13. Slide the brake disc against the upper bearing of the chain case; then slide lock collar against brake hub and tighten the set screw securely.
14. On the PTO side of the track driveshaft, slide the lock collar against the bearing, drive the collar in the direction of rotation until tight, and tighten the collar set screw.

Fig. 4-113



B477

15. Install the skid frame (see Track/Suspension—Installing Skid Frame section).
16. Check alignment of the sprockets using the following procedure:
  - a. Place a straightedge against the faces of the sprockets.
  - b. Using a feeler gauge, check for clearance along the faces of both sprockets. If clearance exceeds 0.8 mm (0.030 in.), shimming is necessary.

Fig. 4-114

0.8 mm  
(0.030 in.)



0725-171

**NOTE:** Sprockets can only be shimmed out.

- Remove the cable bracket, caliper assembly, and carrier caliper w/stationary brake puck.
- Remove the movable puck and plate from the caliper assembly.

Fig. 4-124



B485

- Remove the spiral w/actuator lever from the caliper assembly.

Fig. 4-125



B486

- Bend the locking tab away from the adjusting bolt jam nut.
- Remove the adjusting bolt w/jam nut from the spiral. Remove the jam nut and locking tab.

Fig. 4-126



- Using a punch, remove the stationary brake puck from the carrier caliper. The carrier caliper has an access hole to aid in puck removal.

**NOTE: Do not remove the stationary brake puck unless replacement is necessary.**

Fig. 4-127



B488

#### CLEANING AND INSPECTING

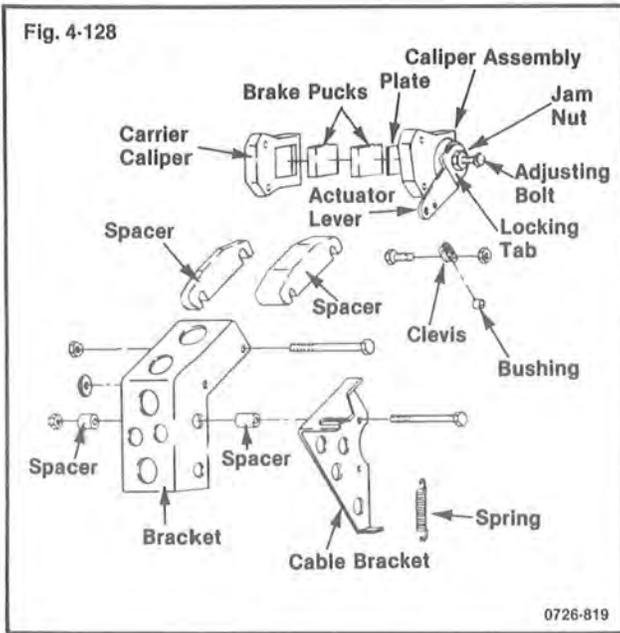
**NOTE: Whenever a part is worn excessively, cracked, defective, or damaged in any way, replacement is necessary.**

- Wash all brake components with parts-cleaning solvent and dry thoroughly.
- Inspect all brake components for signs of wear, fatigue, cracks, or stripped threads.
- Inspect the spring for cracks, stretching, or unusual bends.
- Inspect the brake pucks for wear. Pucks must be at least 6.2 mm (0.245 in.) in width.

**NOTE: When replacing brake pucks, replace both pucks as a set.**

## ASSEMBLING

Fig. 4-128



0726-819

1. Install the stationary brake puck in the carrier caliper using LOCTITE SUPERBONDER ADHESIVE or equivalent.
2. On the adjusting bolt, install the jam nut and locking tab.
3. Thread the spiral into the caliper assembly until it bottoms out; then place the actuator lever onto the spiral making sure the lever is vertical.

Fig. 4-129



B489



### WARNING

With the spiral bottomed on the caliper assembly, the actuator lever must be installed vertically.

4. Thread the adjusting bolt assembly into the spiral until the end of the bolt is flush with the end of the spiral.
5. Place the tab of the locking tab into position on the actuator lever; then finger-tighten jam nut against locking tab.
6. In the caliper assembly, install the plate and movable brake puck.

Fig. 4-130



B485

7. Place the caliper mounting cap screws into position in the cable bracket; then slide a spacer onto each of the cap screws. Install the cap screws through the bracket, caliper assembly, and carrier caliper.

Fig. 4-131

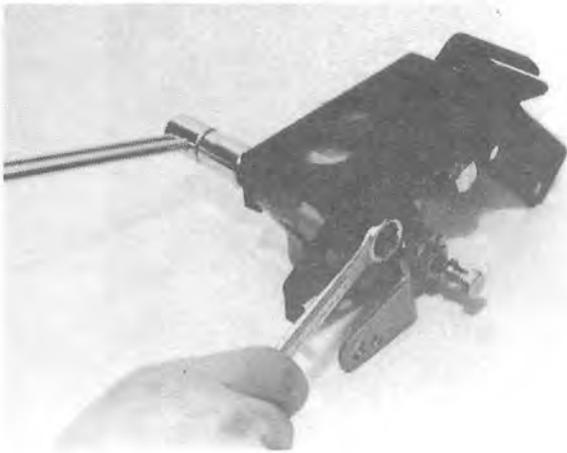


B490

**NOTE:** The forward cap screw has the head machined for additional actuator lever clearance. Also, the heads of the cap screws must face the engine.

8. Install a spacer and lock nut onto each cap screw. Tighten the cap screws to 3.5 kg-m (25 ft-lb).

Fig. 4-132

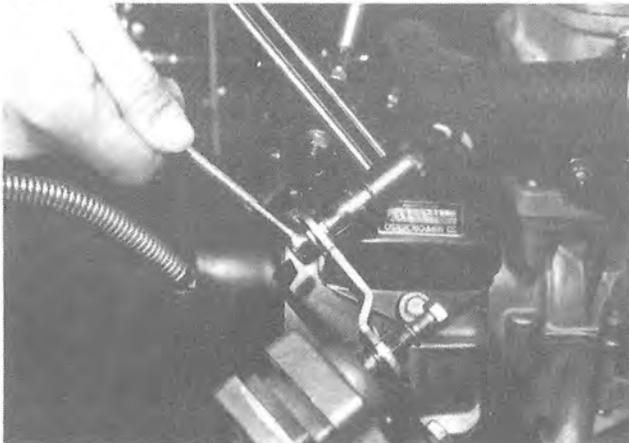


### INSTALLING

1. Place the clevis onto the end of the brake cable. Then place the clevis into position on the actuator lever and secure with a clevis pin and cotter key.

● CAUTION ●  
 Make sure clevis has free movement.

Fig. 4-133

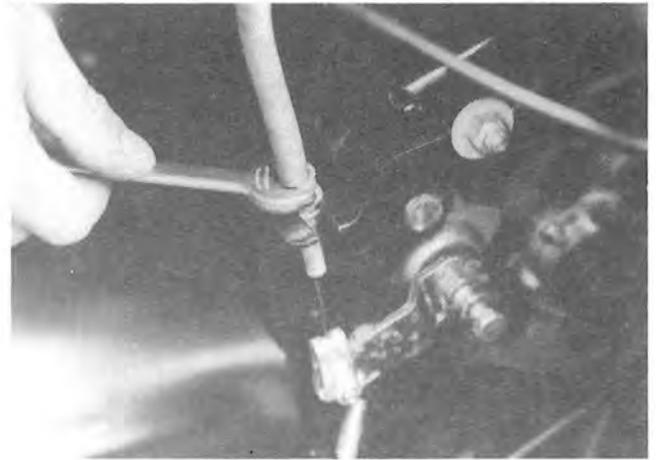


B491

2. Position the brake cable onto the cable bracket so a flange nut is positioned on either side of the bracket. Tighten securely.

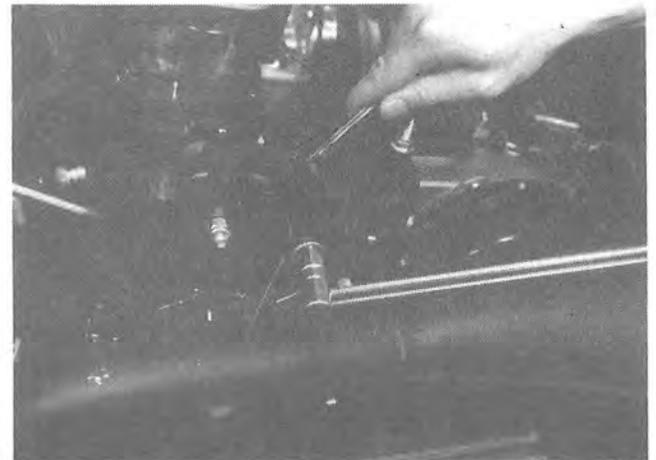
■ **NOTE:** The flange nuts should be centered on the brake cable end.

Fig. 4-134



3. Connect the return spring to the cable bracket and to the spring actuator lever.
4. Place the brake assembly and cable bracket into position on the chain case. Secure spacers and bracket with two cap screws and lock nuts; tighten lock nuts to 3.2 kg-m (23 ft-lb).

Fig. 4-135



B479

■ **NOTE:** On the Liquid Cooled models the forward cap screw is slightly longer. Secure the radiator bracket with the forward cap screw. The washer is positioned on the outside of the radiator bracket.

5. Adjust the brake.

## ADJUSTING BRAKE LEVER TRAVEL



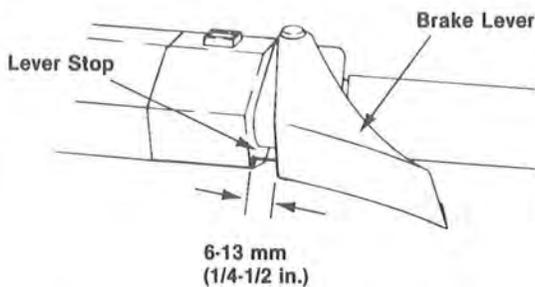
**WARNING**



Make all brake lever travel adjustments with the adjusting bolt only!

1. Rotate the brake disc alternately forward and backward while slowly compressing the brake lever.
2. At the point where the disc is locked, check the distance between the brake lever and the lever stop. The distance must be within a range of 6-13 mm ( $\frac{1}{4}$ - $\frac{1}{2}$  in.).

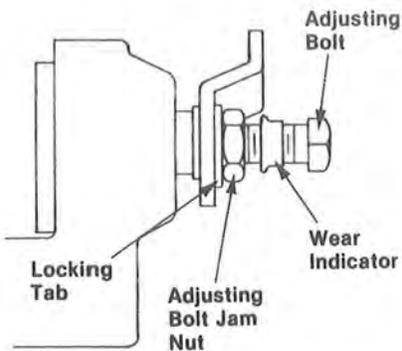
Fig. 4-136



0726-099

3. To decrease brake lever travel (set up the brake), bend the locking tab back and loosen the adjusting bolt jam nut. Tighten the adjusting bolt and check brake lever travel distance periodically until correct travel distance is attained.

Fig. 4-137



0726-753

Fig. 4-138



**CAUTION**

Do not attempt to adjust the brake with the flange nuts on the brake cable bracket. Incorrect brake adjustment may occur causing possible brake failure.

4. To increase brake lever travel (loosen the brake), bend the locking tab back and loosen the adjusting bolt jam nut. Loosen the adjusting bolt and check brake lever travel distance periodically until correct travel distance is attained.
5. Tighten the jam nut and secure with the locking tab after adjustment is completed.



**WARNING**



When the brake pucks are new, there will be 6 mm (0.240 in.) clearance between the wear indicator and the adjusting bolt jam nut. When the wear indicator bottoms on the jam nut with the jam nut tight against the actuator lever, both the brake pucks **MUST BE REPLACED**.

# SECTION 5 — ELECTRICAL SYSTEM

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## Specifications

**(Cougar-Pantera-  
El Tigre 5000-Cheetah F/C)**

Description	Test Value	Test Connections	
		+	-
	<b>Resistance Test</b>		
Ignition Coil Primary (Pantera & Secondary El Tigre 5000)	0.30 ohm $\pm$ 15% 6300 ohms $\pm$ 20%	white/blue high tension lead	black/white high tension lead
Ignition Coil Primary (Cougar & Secondary Cheetah F/C)	0.22 ohm $\pm$ 15% 5850 ohms $\pm$ 20%	white/blue high tension lead	black/white high tension lead
Charge Coil	160 ohms $\pm$ 20%	red/white	black/white
Trigger Coil	17 ohms $\pm$ 20%	black/red	red/white
Lighting Coil	0.22 ohm $\pm$ 20%	yellow	yellow
Spark-Plug Cap	5000 ohms $\pm$ 20%	cap	cap
<b>Description</b>	<b>Output Test*</b>	<b>+</b>	<b>-</b>
Ignition Coil	85 HIGH	high tension lead	ground
CDI Unit	72 HIGH	white/blue	black/white
Charge Coil	38 HIGH	red/white	black/white
Trigger Coil	85 LOW	red/white	black/red
Lighting Coil	80 LOW	yellow	yellow
Ignition Timing** (Cougar/Cheetah F/C)	18° BTDC @ 6000 rpm 2.032 mm (0.080 in.)		
Ignition Timing** (Pantera/El Tigre 5000)	24° BTDC @ 6000 rpm 3.226 mm (0.127 in.)		
Lighting Coil Output	12V/150W		
Spark Plug	NGK BR9ES		
Spark-Plug Gap	0.7 mm (0.028 in.)		

\*With CDI Model 1L Tester.

\*\*Engine timing must be checked with the engine at normal operating temperature. There is a 2 degree difference between a cold and hot engine.

## Specifications

(El Tigre 6000-Cheetah L/C)

Description	Test Value	Test Connections	
		+	-
	<b>Resistance Test</b>		
Ignition Coil Primary	0.30 ohm $\pm$ 15%	white/blue high tension lead	black/white high tension lead
Secondary	6300 ohms $\pm$ 20%		
Charge Coil	127.5 ohms $\pm$ 20%	red/white	black/white
Trigger Coil	46.5 ohms $\pm$ 20%	red/white	black/red
Lighting Coil	0.18 ohm $\pm$ 20%	yellow	yellow
Spark-Plug Cap	5000 ohms $\pm$ 20%	cap	cap
<b>Description</b>	<b>Output Test*</b>		
Ignition Coil	80 HIGH	high tension lead	ground
CDI Unit	65 HIGH	white/blue	black/white
Charge Coil	85 HIGH	red/white	ground
Trigger Coil	85 LOW	red/white	black/red
Lighting Coil	80 LOW	yellow	yellow
Lighting Coil Output	12V/120W		
Spark Plug	NGK BR10EV		
Spark-Plug Gap	0.7 mm (0.028 in.)		
Ignition Timing**	25° BTDC @ 6000 rpm 3.854 mm (0.151 in.)		

\*With CDI Model 1L Tester.

\*\*Engine timing must be checked with the engine at normal operating temperature. There is a 2 degree difference between a cold and hot engine.

5

## Testing Ignition System

The ignition system used on all A.F.S. models (KOKUSAN DENKI CDI) is of the "closed" type. The "closed" ignition system offers a safety advantage to the consumer in that the ignition is dependent on a complete circuit for its ground. If the circuit is broken (connection should lose contact or a connector should become pulled apart), ignition is lost and the engine will instantly stop.

The troubleshooting procedure for the standard "non-closed" ignition system cannot be used when troubleshooting the "closed" ignition system, use the following procedure.

1. Remove the spark plugs and visually check condition. Replace any fouled plug. Attach the spark plugs to the high tension leads and ground them on the cylinder head(s).

Fig. 5-1



B167

**NOTE:** Make sure all switches are in the ON position.

### CAUTION

Never crank the engine over without grounding the spark plugs. Damage to coils and/or CDI unit may result.

2. Crank the engine over quickly and check for spark. If no spark is present, check to make sure throttle cable is properly tensioned by compressing the throttle control. While holding the throttle control in this position, crank the engine over and check for spark. If

spark is now present, adjust throttle-cable tension to remove slack from the cable. If no spark is present, proceed to step 3.

3. Disconnect the main wiring harness from the engine; then using a short piece of wire, jump the black and brown in the engine four wire plug. Crank the engine over. If spark is present, the problem is either one or more of the following:
  - a. Defective ignition switch
  - b. Defective emergency stop switch
  - c. Defective safety switches in throttle-control handle
  - d. Corroded or loose wire connection at the throttle-control handle, ignition switch, or main wiring harness

To check these possible causes, proceed to Testing Main Wiring and Safety Switches. If no spark is present, proceed to Testing Ignition Coil Output.

## Testing Main Wiring and Safety Switches

1. Check wire connections at ignition switch and at the throttle-control handle for tightness and cleanliness. If connections appear dirty or corroded, clean with fine sandpaper and compressed air; then connect all wires and squeeze connections with a pliers for added tightness. Using an ohmmeter, connect one lead to the black wire in the main wiring harness. Connect the other ohmmeter lead to the brown wire in the harness.
2. With all switches in the ON position, the meter must read CLOSED.
3. If meter reads OPEN, disconnect the ignition switch and connect the ohmmeter leads to each of the probes on the back of the switch. If the meter reads OPEN (with switch in ON position), replace the switch. If the meter reads CLOSED, proceed to step 4.
4. Disconnect the two connectors from the throttle-control handle. Connect one ohmmeter lead to each of the two probes located on the front end of the throttle control. With the emergency stop switch, located on top of the control, in the ON (pulled-up) position, the meter must read CLOSED.

Fig. 5-2



B102

- Again, check to be sure throttle cable is properly tensioned by compressing the throttle lever and if the needle goes from OPEN to CLOSED, throttle-cable slack must be removed. If the meter reads OPEN, replace the throttle control. If the meter reads CLOSED, the problem is in the main wiring harness; therefore, replace the main wiring harness.

## Testing Brakelight and Headlight Dimmer Switches

**NOTE:** On the Cheetah models, disconnect the four prong plug and use the color codes listed in the chart to test the switches. Removal of the handlebar pad is not necessary.

- Cut cable ties and roll pad forward exposing wires.
- Disconnect the wire plug from the brake and headlight dimmer switches.
- Beginning from the front, the four terminals correspond to the following chart:

Terminal	Corresponding Wire Color	Wire Usage
1	Yellow	Power Supply
2	Blue	Headlight - High Beam
3	White	Headlight - Low Beam
4	Red	Brakelight

- To test the brakelight switch, connect one ohmmeter lead to the number 1 terminal; then connect the other lead to the number 4 terminal.

Fig. 5-3



B499

- With the brake lever compressed, the meter must read CLOSED. With the brake lever released, the meter must read OPEN. If the meter does not read as specified, the brakelight switch is defective and must be replaced.
- To test the headlight dimmer switch, use the tester connections indicated in the following chart. If the meter does not read as specified, the headlight dimmer switch is defective and must be replaced.

Position	Lead to Terminal	Lead to Terminal	Meter Reading
High Beam	1	2	CLOSED
High Beam	1	3	OPEN
Low Beam	1	2	OPEN
Low Beam	1	3	CLOSED

Fig. 5-4



B500

**NOTE:** If either the headlight dimmer switch or the brakelight switch is defective, the switch control must be replaced in its entirety.

## Testing Ignition Coil Output

Before testing ignition coil output after testing the main wiring harness and safety switches, all wiring harnesses must be connected. Also, check to be sure all switches (ignition switch and emergency stop switch) are in the ON position. Ignition coil output may be tested by using either one of the following procedures:

To test ignition coil output using the Electro-Specialties Model 1L Tester, use the following procedure:



### WARNING

For safety purposes raise the rear of the snowmobile off the floor using a shielded safety stand.

1. Remove the resistor spark plug from the MAG-side cylinder and the spark-plug cap; then install an NGK B8EV plug with a non-resistor-type spark-plug cap (or a metal connector).
2. Connect the MM-1 adapter to the spark-plug wire. Attach the red tester lead to the engine.



### CAUTION

Spark plugs must be installed or damage to the coils and/or CDI unit may result.

3. On the El Tigre 6000 and Cheetah L/C, set the tester on 80 HIGH scale. On the Cougar, El Tigre 5000, Pantera, and Cheetah F/C, set the tester on the 85 HIGH scale. Crank the engine over quickly. If the tester light illuminates, output is satisfactory. If the tester light fails to illuminate, proceed to Testing CDI Unit Output. Test 3 times for conclusive results.

To visually test ignition coil output, use the following procedure:

1. Remove the spark plugs from the cylinders; connect to the high tension leads and ground on the cylinder head(s).

2. Crank the engine over quickly and inspect for a bright blue spark. If a bright blue spark is present, ignition coil output is satisfactory. If no spark is present, proceed to Testing CDI Unit Output.

## Testing CDI Unit Output

1. Disconnect the double-wire plug from the CDI unit to the ignition coil.
2. Using the wire adapter harness, connect the yellow tester lead to the white/blue lead in the double-wire plug; connect the red tester lead to the black/white lead in the double-wire plug.
3. On the El Tigre 5000, Cougar, Pantera, and Cheetah F/C, set the tester on 72 HIGH scale. On the El Tigre 6000 and Cheetah L/C, set the tester on 65 HIGH scale. Crank the engine over quickly. If the tester light illuminates, CDI unit output is satisfactory. This pinpoints the ignition coil, spark plugs, or spark-plug caps as being defective if ignition coil output was not satisfactory. Test 3 times for conclusive results. Before replacing the ignition coil (if the ignition coil seems to be the problem), make sure its connections are not corroded or loose. If the tester light fails to illuminate, proceed to Testing Charge Coil Output.

## Testing Charge Coil Output (Cougar-Pantera- El Tigre 5000-Cheetah F/C)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Connect the red tester lead to the red/white wire in the triple-wire plug; connect the yellow tester lead to the black/white lead.
3. Set the tester on 38 HIGH scale. Crank the engine over quickly. If the tester light illuminates, charge coil output is satisfactory; then proceed to Testing Trigger Coil Output. If the tester light fails to illuminate, replace the charge coil. Test 3 times for conclusive results.

## Testing Trigger Coil Output

(Cougar-Pantera-  
El Tigre 5000-Cheetah F/C)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Connect the red tester lead to the red/white wire from the magneto; connect the yellow tester lead to the black/red wire from the magneto.
3. Set the tester on 85 LOW scale. Crank the engine over quickly. If the tester light illuminates, trigger coil output is satisfactory. If the tester light fails to illuminate, replace the trigger coil. Test 3 times for conclusive results.

**NOTE:** If the charge and trigger coils tested out satisfactory but the tester light did not illuminate in the CDI Unit Output Test, replace the CDI unit.

## Testing Charge Coil Output

(El Tigre 6000-Cheetah L/C)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Connect the red tester lead to the red/white wire in the triple-wire plug; connect the yellow tester lead to an engine ground.
3. Set the tester on 85 HIGH scale. Crank the engine over quickly. If the tester light illuminates, charge coil output is satisfactory; then proceed to Testing Trigger Coil Output. If the tester light fails to illuminate, replace the charge coil. Test 3 times for conclusive results.

## Testing Trigger Coil Output

(El Tigre 6000-Cheetah L/C)

1. Disconnect the triple-wire plug from the CDI unit to the magneto; disconnect the single black wire outside the triple-wire plug.
2. Connect the red tester lead to the red/white wire in the triple-wire plug; using the wire adapter harness, connect the yellow tester lead to the black/red wire in the triple-wire plug.
3. Set the tester on 85 LOW scale. Crank the engine over quickly. If the tester light illuminates, trigger coil output is satisfactory. If the tester light fails to illuminate, replace the trigger coil. Test 3 times for conclusive results.

**NOTE:** If the trigger and charge coils tested out satisfactory but the tester light did not illuminate in the CDI Unit Output Test, replace the CDI unit.

## Testing Lighting Coil Output

1. Disconnect the four-wire plug from the magneto.
2. Connect the red tester lead to one of the yellow wires; connect the yellow tester to the other yellow wire.
3. Set the tester on 80 LOW scale.
4. Crank the engine over quickly. If the tester light illuminates, lighting coil output is satisfactory. Test 3 times for conclusive results.
5. If the tester light fails to illuminate, the lighting coil wires should be checked for breaks, corrosion, and looseness. If the connections are tight and free of corrosion, replace the lighting coil.

## Testing Electrical Resistances

**NOTE:** All resistance tests of the engine electrical components can be made using a multimeter.

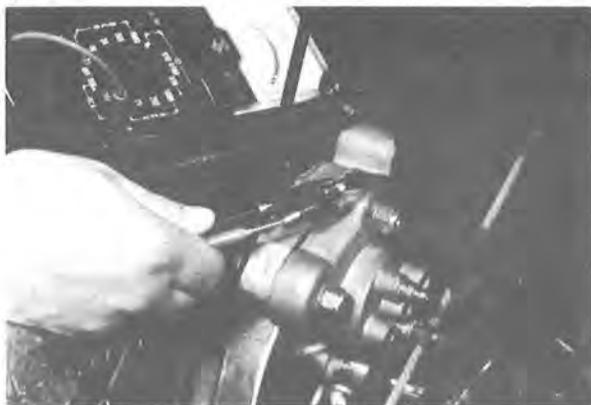
Replace any component that does not have a test value within specifications.

**NOTE:** Procedures designated "A" are for testing the ignition coil for the Cougar and Cheetah F/C; procedures designated "B" are for the El Tigre 6000, Pantera, Cheetah L/C, and El Tigre 5000.

### IGNITION COIL (PRIMARY)

1. Disconnect the double-wire plug from the CDI unit to the ignition coil.
2. Set the selector on the X1 position; then touch the leads and zero the meter.
3. Connect one meter lead to the white/blue lead; connect the other meter lead to the black/white lead.

Fig. 5-5



B387

- A. Ignition coil primary resistance must be 0.22 ohm  $\pm$  15%.
- B. Ignition coil primary resistance must be 0.30 ohm  $\pm$  15%.

### IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector on the X1K position; then touch the leads and zero the meter.

3. Connect one meter lead to each high tension wire.

Fig. 5-6



B388

- A. Ignition coil secondary resistance must be 5850 ohms  $\pm$  20%.
- B. Ignition coil secondary resistance must be 6300 ohms  $\pm$  20%.

**NOTE:** Procedures designated "A" are for testing the charge coil, trigger coil, and lighting coil for the Cougar, Pantera, El Tigre 5000, and Cheetah F/C; procedures designated "B" are for the El Tigre 6000 and Cheetah L/C.

### CHARGE COIL

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector on the X100 position; then touch the leads and zero the meter.
3. Connect one meter lead to the red/white lead; connect the other meter lead to the black/white lead.

Fig. 5-7



B103

4. A. Charge coil resistance must be 160 ohms  $\pm$  20%.

Fig. 5-8



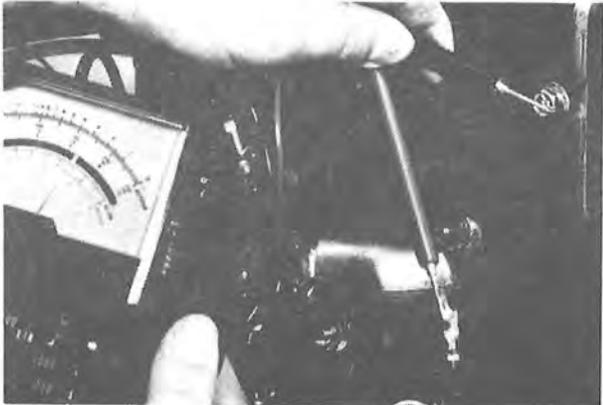
B389

B. Charge coil resistance must be 127.5 ohms  $\pm$  20%.

### TRIGGER COIL

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector on the X10 position; then touch the leads and zero the meter.
3. Connect one meter lead to the black/red lead; connect the other meter lead to the red/white lead.

Fig. 5-9



B104

A. Trigger coil resistance must be 17 ohms  $\pm$  20%.

Fig. 5-10



B390

B. Trigger coil resistance must be 46.5 ohms  $\pm$  20%.

### LIGHTING COIL

1. Disconnect main wiring harness from the engine.
2. Set the selector on the X1 position; then touch the leads and zero the meter.
3. Connect one meter lead to a yellow lead; connect the other meter lead to the other yellow lead.

Fig. 5-11



B391

4. A. Lighting coil resistance must be 0.22 ohm  $\pm$  20%.

B. Lighting coil resistance must be 0.18 ohm  $\pm$  20%.

## SPARK-PLUG CAP

1. Remove spark-plug cap from high tension wire.
2. Set the selector on the X1K position; then touch the leads and zero the meter.
3. Connect one meter lead to one end of the cap; connect the other meter lead to the other end of the cap.

Fig. 5-12



B170

4. Spark-plug cap resistance must be 5000 ohms  $\pm$  20%.

## Testing Low Oil Light Sending Unit

The low oil light sending unit is a magnetic switch. Its operation is based on a doughnut magnet located around the inside diameter of a  $\frac{1}{2}$  in. hole in a plastic float. The switch, located in the stem of the sending unit, is positioned through the hole in the float. When the float drops to the lower part of the stem, the magnet closes the electrical contacts (located in the stem) allowing current to pass on to the light in the console.

If the sending unit should fail, it must be replaced. To test the sending unit, use the following procedure:

1. Remove the sending unit from the oil tank by twisting and pulling upwards. Wipe oil from the sending unit with a cloth.
2. Unplug the sending unit wires from the wiring harness.

3. Using an ohmmeter, set the scale selector knob on X1K position.
4. Touch each of the meter leads to one of the two wires coming from the sending unit. With the sending unit in its normal position (float end down), the meter should read CLOSED.
5. If the meter reads OPEN, double check to make sure you have made good contact with each of the wires coming from the sending unit. If the meter still reads OPEN, replace the sending unit.
6. While maintaining contact between the meter leads and the sending unit, raise the float up. The meter must read OPEN. If the meter reads CLOSED, replace the sending unit.
7. If the sending unit tested out satisfactory but the light in the console doesn't illuminate with only a small amount of oil in the oil tank, check the bulb in the console.
8. If the bulb is in good condition, check for voltage at the connection where the sending unit plugs into the wiring harness. Using a voltmeter set on the 50 ACV scale, start the engine and allow it to idle. Touch the red lead of the voltmeter to the red wire in the two prong connector. Touch the black lead to the black lead in the wiring harness. At idle, the meter should read 5 to 6 volts (AC). If no voltage is present, but the lights on the snowmobile operate normally, either check the wiring harness for a broken wire or replace the harness.

## Checking Ignition Timing

■ **NOTE:** Procedures designated "A" are for the Cougar, and Cheetah F/C; procedures designated "B" are for the El Tigre, Pantera, and Cheetah L/C.

1. A. Remove the screws and lock washers securing the fan belt cover.  
B. Remove the bolt and lock washer securing the fix plate and cap to the magneto case; then remove the fix plate and cap.

Fig. 5-13



B392

2. Connect a timing light and a tachometer to the MAG-side spark-plug lead.
3. A. Using a shielded safety stand, raise the rear of the snowmobile off the floor and start the engine. Gradually increase the engine speed to 6000 rpm; the pointer should align with the 18° BTDC timing mark on the flywheel.
  - B. Using a shielded safety stand, raise the rear of the snowmobile off the floor and start the engine. Gradually increase the engine speed to 6000 rpm; the pointer should align with the 25° BTDC (El Tigre 6000 and Cheetah L/C) or 24° BTDC (Pantera and El Tigre 5000) timing mark on the flywheel.

**NOTE:** All timing specifications are given for engines at operating temperature. Before checking timing, run the engine long enough (4-5 minutes) to reach normal operating temperature. This is for all models.

4. If timing is not correct, adjust timing.
5. A. Install fan belt cover and secure with screws and lock washers.
  - B. Install cap and fix plate; then secure with a bolt and lock washer.

## Adjusting Ignition Timing

**NOTE:** Procedures designated "A" are for the Cougar and Cheetah F/C; procedures designated "B" are for the El Tigre, Pantera, and Cheetah L/C.

1. A. Remove the recoil, starter pulley, and fan drive pulley.
  - B. Remove the recoil, starter pulley, and water pump drive pulley.
2. Loosen the two screws securing the stator plate and rotate the stator plate in the proper direction to attain correct timing.

Fig. 5-14

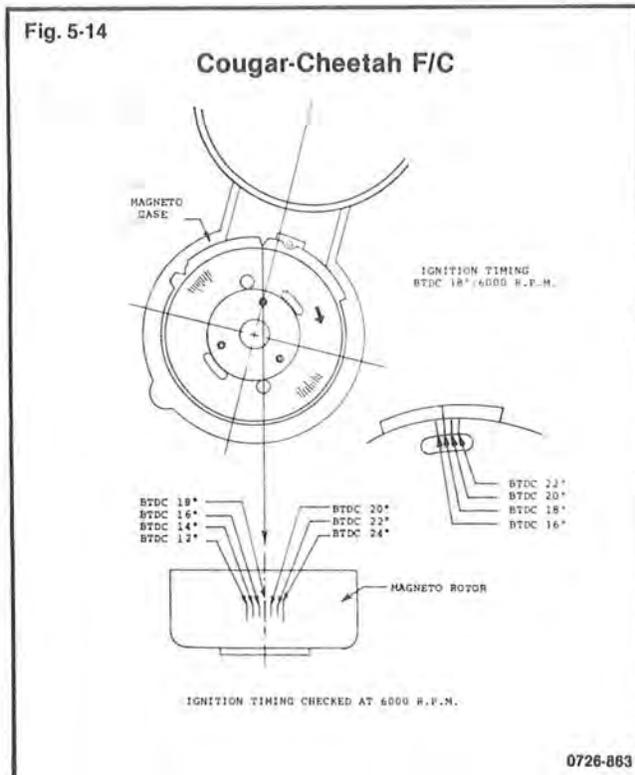


Fig. 5-15

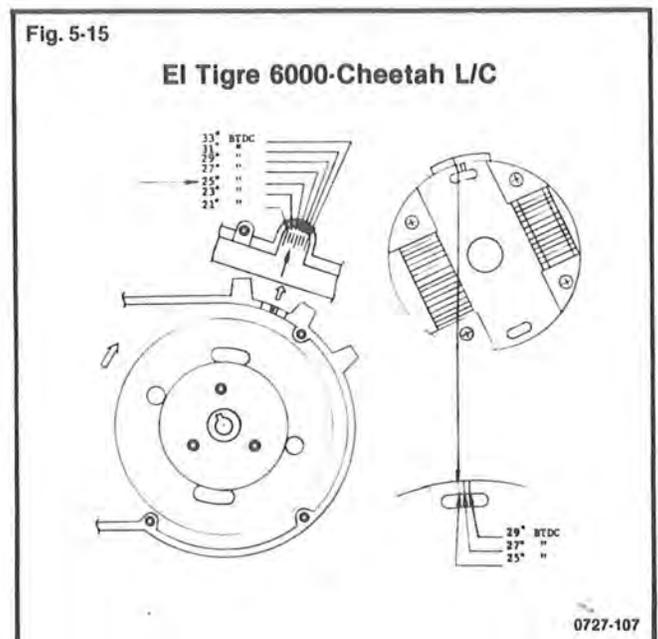
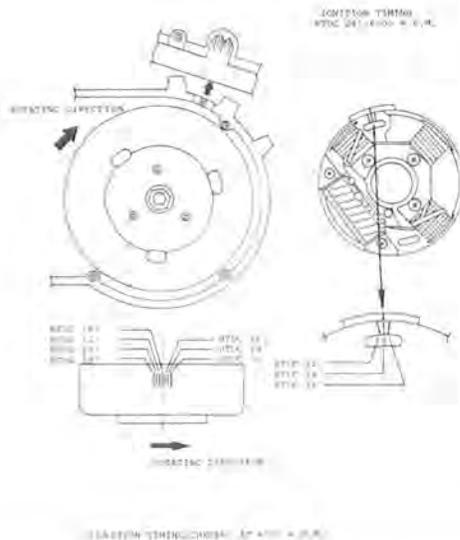


Fig. 5-16

### Pantera-El Tigre 5000



0726-862

**NOTE:** Rotate the stator plate clockwise to retard the timing or counterclockwise to advance the timing. The stamped marks on the stator plate at the upper socket-head cap screw mounting hole can be used for timing.

3. Tighten the screws securing the stator plate.
4. A. Install the fan drive pulley (making sure the fan belt is properly positioned), starter pulley, and the recoil.  
B. Install the water pump drive pulley, starter pulley, and recoil.
5. Affirm timing for accuracy and adjust if necessary.

## Testing Voltage Regulator

1. Using a shielded safety stand, raise the rear of the snowmobile off the floor.
2. Using a multitester, connect the red tester lead to a yellow lead and the black tester lead to a brown lead in the accessory harness connector.
3. Connect a tachometer to the engine to monitor rpm.
4. Set the selector on the 25 ACV position; then start the engine and allow it to idle. The meter must read 11-13 volts.
5. Increase engine speed to 2500-2700 rpm. The meter must read 11-13 volts. If the meter reads more than 13 volts, replace the voltage regulator.

## Servicing Starter Motor (Pantera & El Tigre 5000 Electric Start Kit)

### REMOVING

1. Disconnect the battery.
2. Remove the nut and lock washer securing the positive cable; then remove cable.
3. Remove the two bolts and lock washers securing front cover to the magneto case.
4. Remove the two bolts and lock washers securing starter-motor bracket to the crankcase; then remove the starter motor w/bracket.
5. Remove the two nuts and lock washers securing the bracket to the starter motor; then remove the bracket.

### DISASSEMBLING

1. Remove the two screws and lock washers securing dust cover; then remove cover and gasket.

Fig. 5-15



B267

2. Remove the two long bolts and lock washers; then loosen the terminal nut.

Fig. 5-16



B268

3. Remove the E-ring and washer securing the armature shaft; then remove armature shaft assembly and rear cover.

Fig. 5-17



B269

● CAUTION ●

When removing the rear cover, make sure the terminal stays with the yoke as it is connected to the field magnets.

4. Slide the stopper down the shaft, remove the retaining ring, and remove the stopper and spring.
5. Remove the pinion assembly and front cover. Account for any washers.

Fig. 5-18



### CLEANING AND INSPECTING

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

1. Thoroughly clean all components with a clean cloth and compressed air.
2. Inspect all threaded areas for damaged or stripped threads.
3. Inspect the brush holder assembly and brushes for damage or wear.

NOTE: Using a caliper, measure the length of the brushes. If any brush measurement is less than 7.5 mm (0.30 in.), replacement is necessary.

Fig. 5-19



E543

4. Inspect all wires for cracks, wear, or damage.
5. Inspect the commutator end of the armature for any burned spots or damage.

**NOTE:** If the commutator is only slightly burned or damaged, it may be repaired with #00 grit sandpaper. If it is severely burned or damaged, it may have to be turned down in a lathe.

● CAUTION ●

DO NOT use emery cloth because metallic particles may become imbedded in the commutator.

6. Inspect the commutator end of the armature for buildup in the grooves. Buildup in the grooves may be removed by carefully undercutting the grooves with a properly-ground hacksaw blade.

Fig. 5-20



E544

7. Inspect the armature for damage, wear, or signs of contact with the field magnets.

8. Inspect the pinion assembly for damage or wear.
9. Inspect the armature for shorting. Use a multi-tester and the following procedure:
  - a. Set the selector on the X1K position; then touch the leads and zero the meter.
  - b. Touch the black tester lead to the armature shaft.
  - c. Using the red tester lead, probe the commutator end of the armature. The meter indicator should not move. If the indicator moves, the armature is grounded and must be replaced.

Fig. 5-21



E454

10. Inspect the field winding for shorting. Use a multitester and the following procedure:

**NOTE:** The brush holder must not contact the frame and field assembly during this test.

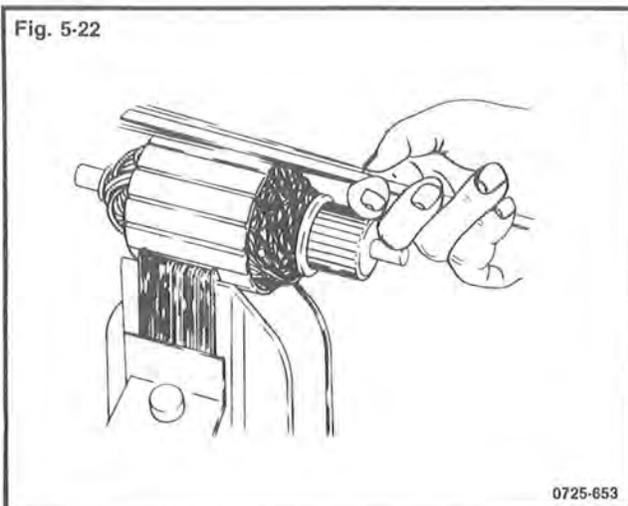
- a. Set the selector on the X1K position; then touch the leads and zero the meter.
- b. Touch the red tester lead to the insulated starter terminal.

- c. Touch the black tester lead to the frame and field assembly. The meter indicator should not move. If the indicator moves, field winding is grounded and must be replaced.
11. Inspect the ground of the ground brushes using a multitester and the following procedure:
    - a. Set the selector on the X1K position; then touch the leads and zero the meter.
    - b. Touch the black tester lead to a ground brush.
    - c. Touch the red tester lead to the brush holder. The meter indicator should move to the right. If the indicator does not move to the right, either solder the ground-brush wire to the holder or replace the brush assembly.

**NOTE:** Use only a rosin-core solder when soldering the brush connections.

- d. Perform this test on the other ground brush.
12. Inspect the armature for shorting. Use a "growler" and the following procedure:
    - a. Place the armature in the "growler".
    - b. While holding a metal strip over the armature, rotate the armature an entire revolution. If the metal strip vibrates at any point on the armature, the armature is shorted and must be replaced.

Fig. 5-22



## ASSEMBLING

1. In turn on the armature shaft, place the washers, front cover, and pinion assembly.

**NOTE:** Make sure the fiber washer is positioned next to the cover.

2. Place the spring and stopper into position; then slide the stopper down the shaft and install the retaining ring.

Fig. 5-23



E542

3. Slide the armature assembly into the yoke; then compress the brushes and slide brush holder assembly onto the commutator end of the armature.
4. Place the rear cover into position and secure with the washer and E-ring.

Fig. 5-24



B270

5. Place the two long bolts and lock washers into position and tighten securely. Tighten the terminal nut.

Fig. 5-25



B268

6. Place the dust cover and gasket into position and secure with two screws and lock washers.

Fig. 5-26



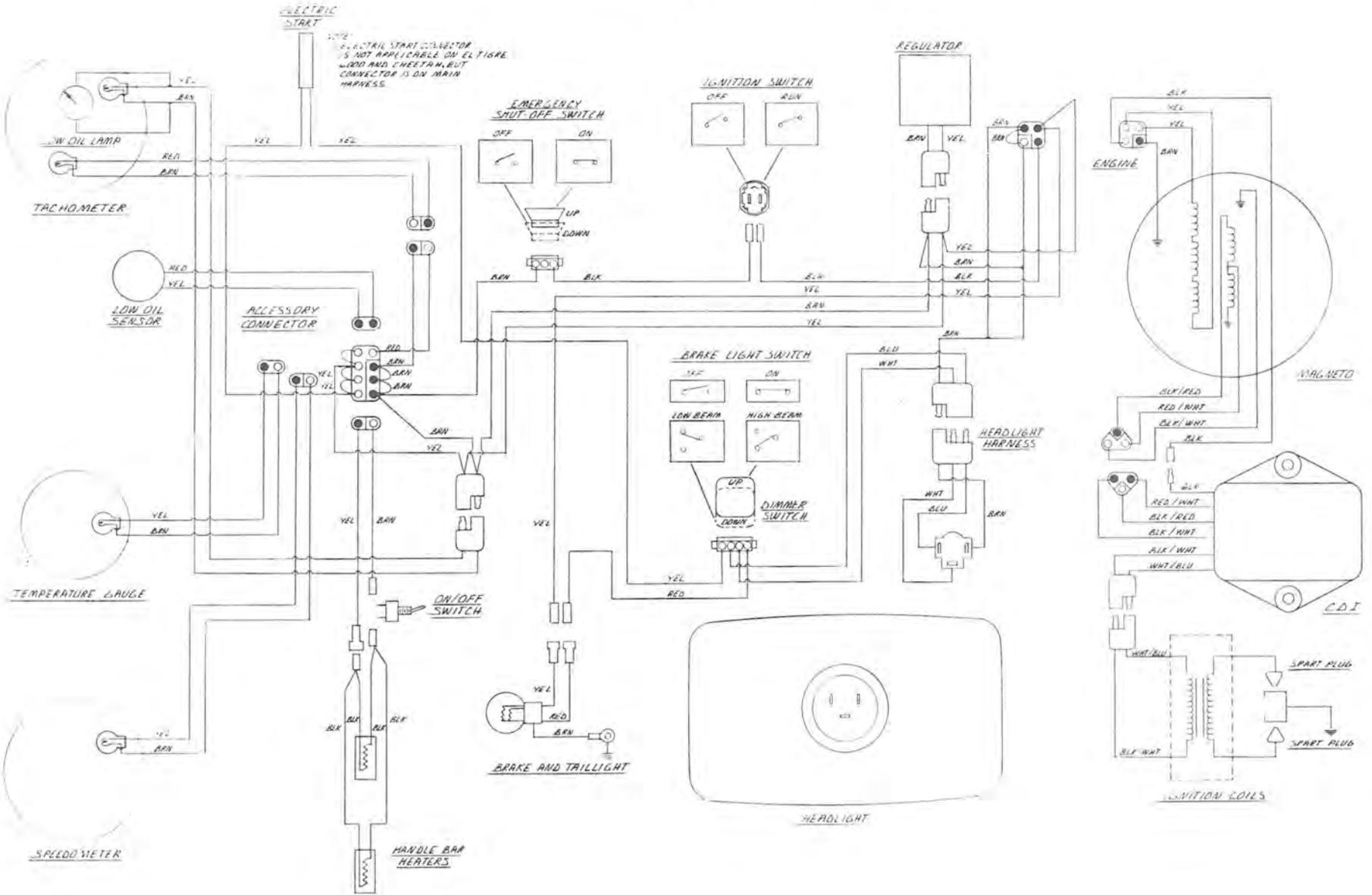
B267

## INSTALLING

1. Place the bracket into position on the starter motor and secure with two nuts and lock washers.
2. Place the starter motor w/bracket into position and secure the bracket to the crankcase with two bolts and lock washers.
3. Secure the front cover to the magneto case with two bolts and lock washers.
4. Place the positive cable onto the terminal and secure with a nut and lock washer.
5. Connect the battery.

EL TIGRE 6000 - CHEETAH L/C  
 COUGAR - PANTERA - CHEETAH F/C - EL TIGRE 5000  
 (MANUAL START)

Fig. 5-27



WIRING DIAGRAM





# SECTION 6 — STEERING AND BODY

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6

## Removing and Disassembling Throttle Switch

1. Remove the cable ties securing the handlebar pad; then roll the pad back exposing control wires and throttle cable.
2. Using a sharp knife, cut the grip off the handlebar. Using a solvent, clean the old adhesive from the handlebar.
3. Remove the retaining ring, seals, and pin securing throttle lever to the throttle switch.

**NOTE:** On the Cheetah models, account for a small flat washer found under the retaining ring.

Fig. 6-1



B026

4. Disconnect throttle cable from the seat in throttle lever and remove lever; then remove the retaining ring and slide cable free of throttle switch.
5. Disconnect harness from throttle switch.

Fig. 6-2



B028

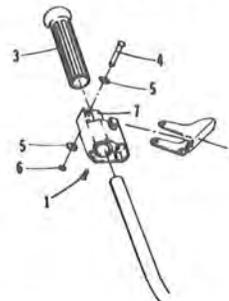
**NOTE:** On the Cheetah models, disconnect the two prong connector next to the steering post support.

6. Remove the tapping screw securing throttle switch on handlebar; then slide switch off handlebar.

## Assembling and Installing Throttle Switch

Fig. 6-3

### El Tigre-Cougar-Pantera



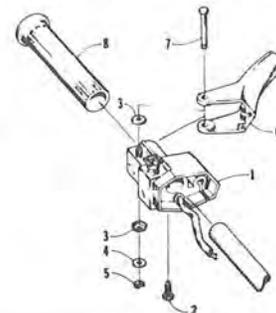
#### KEY

1. Tapping Screw
2. Lever
3. Grip
4. Pin
5. Seal
6. Retaining Ring
7. Throttle Assembly

0726-471

Fig. 6-4

### Cheetah L/C-Cheetah F/C



#### KEY

1. Throttle Switch
2. Screw
3. Seal
4. Washer
5. Retaining Ring
6. Throttle Lever
7. Pin
8. Handlebar Grip

0727-411

1. Slide throttle switch onto the handlebar; then secure with a tapping screw.
2. Slide throttle cable into groove of throttle switch and secure with retaining ring.
3. Connect end of throttle cable to the seat of throttle lever.
4. Secure throttle lever with pin, seals, and retaining ring.

**NOTE:** On the Cheetah models, install the small flat washer under the E-clip.

Fig. 6-5



B026

**NOTE:** Apply a light coat of water-resistant grease to the seals before installing seals.

5. Connect the throttle switch harness to the throttle switch.

**NOTE:** Switch harness must be properly connected. If switch harness is not connected, the engine will not start.



**WARNING**

Compress throttle control lever to ensure free movement. If throttle cable sticks or binds, correct the problem before the snowmobile is operated.

6. Apply Handlebar Adhesive to the bore of the handlebar grip and using a rubber hammer, drive the grip into position.



**WARNING**

The handlebar adhesive is extremely flammable. The product contains acetone and vapors released can be easily ignited. Keep away from heat, sparks, and open flame. Use only in area with adequate ventilation. Avoid prolonged breathing of vapor. Avoid eye and skin contact. Keep container closed when not in use.

7. Place the handlebar pad into position and secure with cable ties.

## Removing and Disassembling Brake Control

1. Remove the cable ties securing the handlebar pad; then roll the pad forward exposing control wires and cables.
2. Using a sharp knife, cut the grip off the handlebar. Using a solvent, clean the old adhesive from the handlebar.
3. Remove the retaining ring and pin securing brake lever and parking brake actuator to brake control. Remove the parking brake actuator and parking brake actuator spring.

**NOTE:** On the Cheetah models, remove the retaining ring and pin to remove the parking brake actuator and spring.

Fig. 6-6



4. Disconnect brake cable from the seat in brake lever and remove lever; then slide brake cable free of brake control.
5. Disconnect wiring harness from brake control.
6. Remove the machine screw securing brake control to the handlebar; then slide brake control off handlebar.

Fig. 6-7



B031

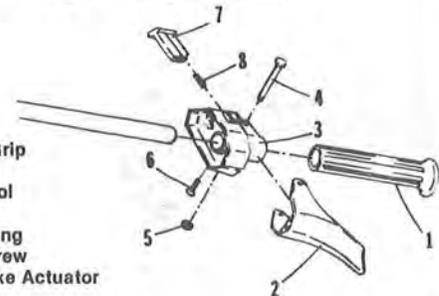
## Assembling and Installing Brake Control

Fig. 6-8

### El Tigre-Cougar-Pantera

**KEY**

1. Handlebar Grip
2. Brake Lever
3. Brake Control
4. Pin
5. Retaining Ring
6. Machine Screw
7. Parking Brake Actuator
8. Spring

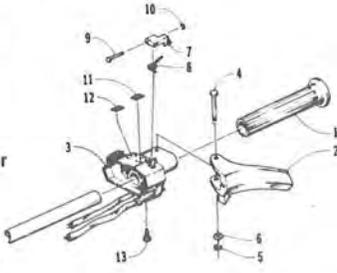


0726-210

Fig. 6-9 Cheetah L/C-Cheetah F/C

KEY

1. Handlebar Grip
2. Brake Lever
3. Brake Switch
4. Pin
5. Retaining Ring
6. Washer
7. Parking Brake Actuator
8. Actuator Spring
9. Pin
10. Retaining Ring
11. Parking Brake Decal
12. Dimmer Switch Decal
13. Screw



0727-410

1. Slide brake control onto the handlebar; then secure with a machine screw.

Fig. 6-10



B031

2. Slide brake cable into groove of brake control.
3. Connect end of brake cable to the seat of brake lever.
4. Place the parking brake actuator and parking brake actuator spring into position on the brake control; then secure the brake lever, actuator, and spring with the pin and retaining ring.

**NOTE:** On the Cheetah models, place the actuator and spring into position on the brake control and secure with the pin and retaining ring.

Fig. 6-11



B030

5. Connect the wiring harness to the brake control.

6. Apply Handlebar Adhesive to the bore of the handlebar grip and using a rubber hammer, drive the grip into position.



**WARNING**



The handlebar adhesive is extremely flammable. The product contains acetone and vapors released can be easily ignited. Keep away from heat, sparks, and open flame. Use only in area with adequate ventilation. Avoid prolonged breathing of vapor. Avoid eye and skin contact. Keep container closed when not in use.

7. Place the handlebar pad into position and secure with cable ties.

## Removing Steering Post

**NOTE:** For convenience, the engine may be removed for this procedure.

1. Remove the two carriage bolts and lock nuts securing steering-post bracket to the tunnel.

Fig. 6-12



B271

2. Remove the two bolts and lock nuts securing the tie-rod ends to the steering post.

Fig. 6-13



B273

3. Remove the four bolts and lock nuts securing the caps to the block; then remove the caps and the handlebar assembly. Account for the adjusting block.

Fig. 6-14



B396

1. Remove the two carriage bolts and lock nuts securing the upper steering-post bracket and backing plate; then remove the steering post.

Fig. 6-15



B398

## Inspecting Steering Post

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

1. Inspect all welded areas for cracks or deterioration.
2. Inspect steering post and steering-post brackets for cracks, bends, or wear.

## Installing Steering Post

1. Place the steering post into position and secure the upper steering-post bracket and backing plate with the two carriage bolts and lock nuts. Tighten to 1.4 kg-m (10 ft-lb).

Fig. 6-16



B399

2. Secure the lower steering-post bracket to the tunnel with the carriage bolts and lock nuts. Tighten to 2.5 kg-m (18 ft-lb).
3. Lubricate the steering-post brackets with a light oil. Check steering post for free movement.
4. Place the adjusting block, handlebar assembly, and caps into position; then secure with four bolts and lock nuts. Tighten the bolts and lock nuts evenly to 1.4 kg-m (10 ft-lb).

Fig. 6-17



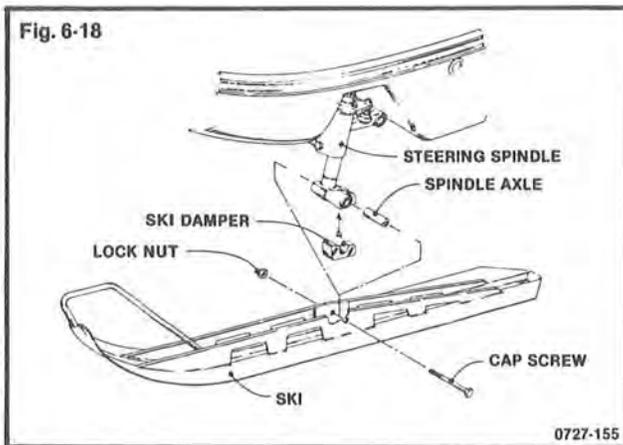
5. Secure the tie-rod ends to the steering post with two bolts (coated with LOCTITE LOCK N' SEAL) and lock nuts. Tighten and then torque to 3.2 kg-m (23 ft-lb).

**NOTE:** Tie rods must be attached to the lower side of the steering post.

## Removing Ski

1. Remove the lock nut; then remove the bolt securing ski assembly to the spindle. Remove ski. Account for the damper and inner axle.

Fig. 6-18



0727-155

## Inspecting Ski

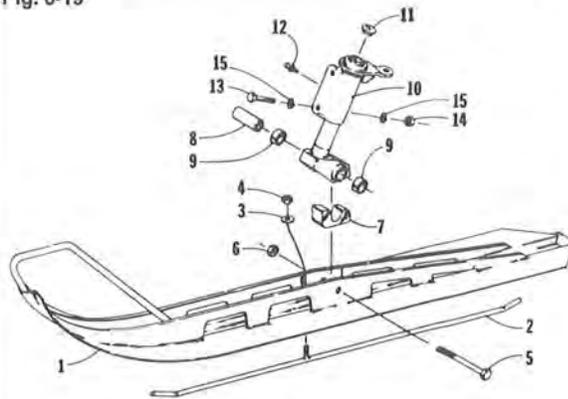
**NOTE:** Whenever a part is worn excessively, cracked, defective, or damaged in any way, replacement is necessary.

1. Inspect welded areas for cracks or deterioration.

2. Inspect ski for abnormal bends or cracks.
3. Inspect all bolts for wear and damage.

## Installing Ski

Fig. 6-19



KEY

- |             |                    |
|-------------|--------------------|
| 1. Ski      | 9. Bearing         |
| 2. Wear Bar | 10. Spindle        |
| 3. Washer   | 11. Cap            |
| 4. Nut      | 12. Grease Fitting |
| 5. Bolt     | 13. Bolt           |
| 6. Nut      | 14. Nut            |
| 7. Damper   | 15. Lock Washer    |
| 8. Axle     |                    |

0727-323

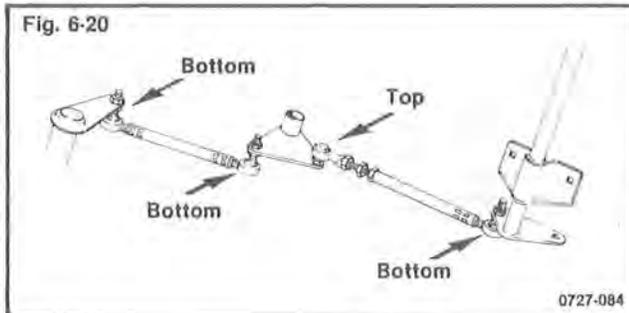
**NOTE:** All horizontal lock nuts are to be positioned toward the center of the snowmobile.

1. Place the front of the machine on a support stand to provide ample room for installing ski on spindle assembly.
2. Apply a light coat of grease to the axle surface and position in spindle.
3. Install rubber damper into bottom of spindle.
4. Position the ski onto the spindle. Apply a light coat of grease to the bolt and install. Always start the bolt from the outside and secure with lock nut torqued to 2.9-3.6 kg-m (21-26 ft-lb).

## Removing and Disassembling Tie Rods

**NOTE:** The engine must be removed for this procedure.

1. Remove the lock nuts and washers securing tie-rod ends to bell crank; then thread the tie-rod ends out of the bell crank.



2. Remove the lock nuts and washers securing tie-rod ends to the steering post.
3. Remove tie rod assemblies.
4. Loosen the jam nuts securing the tie-rod adjusting studs.
5. Remove tie-rod ends from the adjusting studs; then remove adjusting studs w/jam nuts.
6. Remove jam nuts from the adjusting studs.
7. Remove the lock nuts securing the fixed tie rod to the spindle and bell crank. Thread the tie-rod end out of the bell crank and separate the tie rod from the spindle and bell crank.

## Inspecting Tie Rods

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

1. Inspect tie rods for damaged threads or wear.
2. Inspect tie-rod ends for cracks or wear.

## Assembling and Installing Tie Rods

1. Install jam nuts on the adjusting studs.

**NOTE:** Since each adjusting stud has both right and left hand thread, each jam nut can be installed on only its end.

2. Install the adjusting studs on the tie rods; then install tie-rod ends on the adjusting studs.
3. Place tie-rod assemblies into position making sure adjusting studs are positioned toward the bell crank.
4. Secure tie-rod ends to steering post with washers and lock nuts. Tighten and then torque to 3.2 kg-m (23 ft-lb). Coat threads with LOCTITE LOCK N' SEAL before tightening.

**NOTE:** The tie-rod ends must be attached to the lower side of the steering post.

5. Thread tie-rod ends into the bell crank; tighten securely. Install the washers and lock nuts. Tighten to 3.2 kg-m (23 ft-lb).

**NOTE:** The tie-rod ends must be attached to the upper side of the bell crank.

6. Place the fixed tie rod into position; then thread the tie-rod end into the bell crank and tighten securely. Place the O-ring and washer onto the other tie-rod end and attach to spindle arm from the bottom side. The self-locking nut should be located on the top side of the spindle arm and torqued to 3.2 kg-m (23 ft-lb). Install the washer and lock nut on the tie-rod end attached to the bell crank and tighten to 3.2 kg-m (23 ft-lb).

### CAUTION

Make sure the O-ring is positioned on the fixed tie-rod end that attaches to the spindle.

Fig. 6-21



7. Check ski alignment, adjust as necessary.

## Removing & Inspecting Spindle

1. Remove the ski.
2. Remove the lock nut securing the tie-rod to the spindle arm.

Fig. 6-22



3. Remove the two bolts that secure the spindle assembly to the A-frame arms. Remove the spindle.
4. With the spindle removed, check spindle bushing wear. Position the spindle in a vise to secure it for inspection. Grasp the spindle arm and rotate the arm from left to right. The movement should be smooth and free.

Fig. 6-23

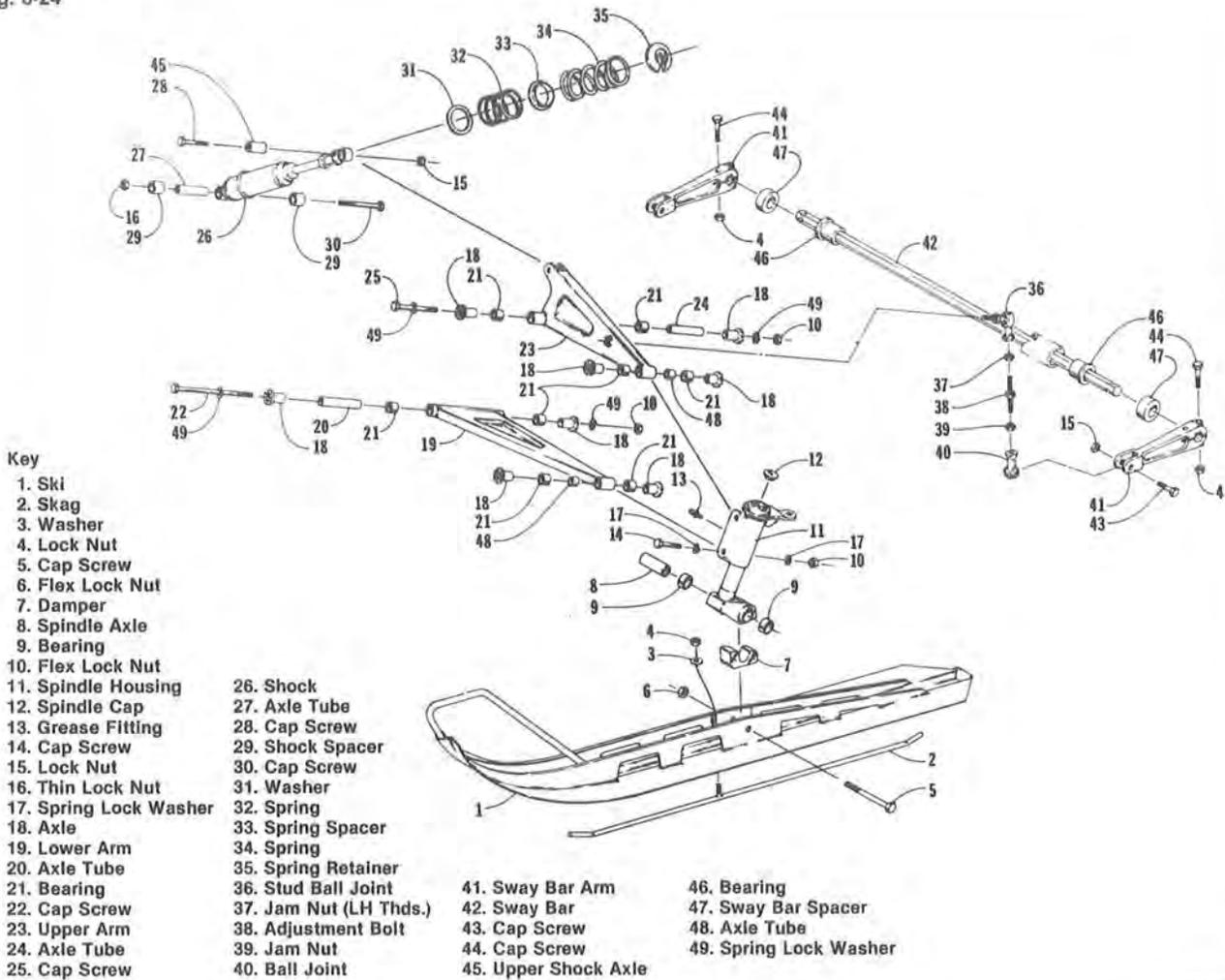


5. If the spindle movement is rough or binding, grease the spindle with a good low-temperature grease and again rotate the spindle from left to right. If the movement remains rough, replacement will be necessary. When greasing the spindle, pump in enough grease so it can be seen coming out at both the top and bottom of the spindle.
6. Inspect all welds for any signs of cracking.

## Installing Spindle

1. Lightly coat each axle with a good low-temperature grease and position in the A-frame arm.
2. Position the top arm into the spindle and secure with a bolt and lock nut. The bolt should be installed from the front. Perform the same step for securing the lower portion of the spindle. Torque both lock nuts to 2.9-3.6 kg-m (21-26 ft-lb).
3. Install ski (see Installing Ski section).
4. Place O-ring and lock washer on tie-rod ball joint stud and install to spindle arm from the bottom side. Secure tie-rod end to the spindle arm with lock nut tightened to 3.2 kg-m (23 ft-lb). Coat threads of tie-rod ball joint with LOC-TITE STUD N' BEARING MOUNT (red).
5. Check ski alignment, adjust as necessary.

Fig. 6-24

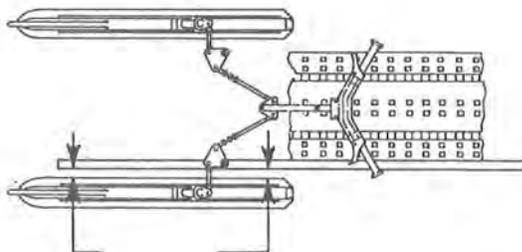


0727-271

## Checking & Adjusting Ski Alignment

**NOTE:** If adjustment becomes necessary, it is recommended that the four motor mounts be removed and the engine raised up 3 to 4 inches. Using a block of wood, block engine up securely.

Fig. 6-25



0726-804

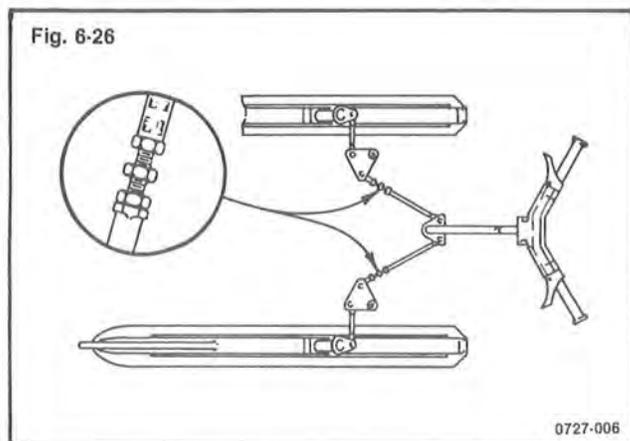
1. Turn the handlebar to the straight-ahead position.
2. Place a long straightedge against the outside edge of the track so it lies along the inside edge of the left ski.

**NOTE:** The straightedge should be long enough to extend from the back of the track to the front of the ski.

3. Measure the distance from the straightedge to the edge of the ski in two places. Take one measurement from the forward end and the other from the rearward end.

**NOTE:** Make sure measurements are taken on the flat surface of the ski edge and not on a bent or rounded edge.

- The measurement from the forward and rearward ends of the ski edge either must be equal or the forward measurement must not exceed the rearward measurement by more than 3 mm (1/8 in.).
- If an adjustment is necessary, only adjust those tie-rods located under the engine plate. Never change the length or make any adjustments on the fixed tie-rods (that attach to the spindle arms).



- After making necessary adjustments, apply LOCTITE LOCK N' SEAL to the threads of the stud and tighten the jam nuts.

**WARNING**

Neglecting to lock the adjusting stud by tightening the jam nuts may cause loss of snowmobile control and possible personal injury. Also, the exposed length of the adjusting stud must not exceed 44.5 mm (1 3/4 in.) as at least 13 mm (1/2 in.) of the adjusting stud must be threaded into both the tie rod and the tie rod end to assure maximum steering linkage strength.

- Repeat procedure for the right side ski.

**NOTE:** Ski alignment is correct when the skis are parallel to each other (equal measurements front and rear) or when the skis have a maximum of 6 mm (1/4 in.) "toe out" (front measurement 6 mm (1/4 in.) more than rear measurement).

## Removing & Inspecting Upper A-Frame Arm

**NOTE:** The A-frame arms can be removed without removing the engine. It is recommended to remove the drive clutch if the left side upper A-frame arm is removed and the exhaust expansion chambers or pulse charger if the right side upper A-frame arm is to be removed.

- Place a support stand under the front-end assembly to get both skis off the floor.
- Remove the spindle.

Fig. 6-27



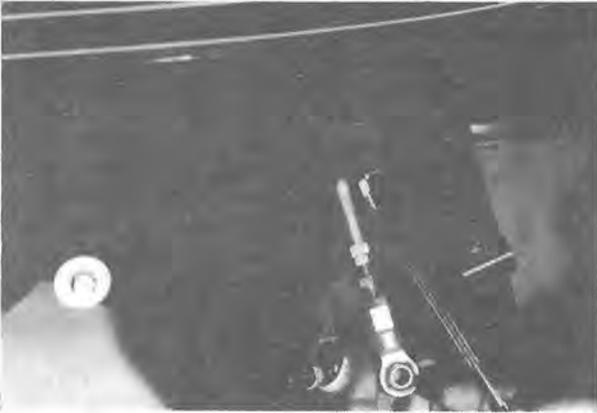
- Remove the bolt securing the front shock to the upper A-frame arm and slide the shock free of the arm.

Fig. 6-28



- Remove the sway bar linkage by rotating its mounting stud counterclockwise.

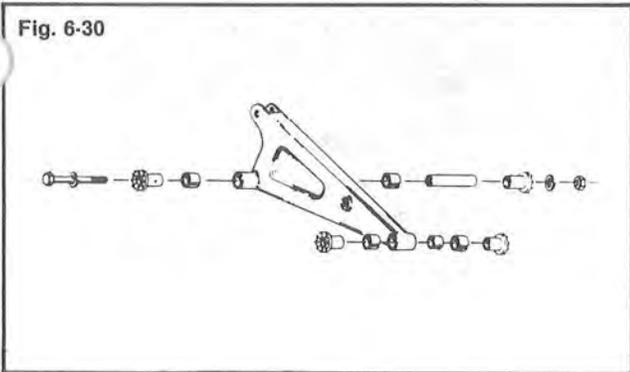
Fig. 6-29



057

- Remove the bolt securing the upper arm to the front end assembly. Using a long drift-punch, push the bolt free of the upper arm. Account for the two axle inserts and center spacer.
- Slide the two axles free of the upper arm so it and its bushings can be inspected.

Fig. 6-30



- Inspect all the upper arm welds for signs of cracking.
- Visually inspect the upper arm for signs of bending or twisting. If the arm shows signs of being twisted, bent or welds starting to separate, replace the arm.
- Inspect all bushings for signs of fraying, tearing or badly worn areas. If any of these are found, replace the bushing (see Replacing Bushing section).

**NOTE:** All bushings are made of a self-lubricating bearing material woven of Teflon. Although this material is very strong, it is possible to tear or nick the bearing surface if mishandled. The bearing material has a wall thickness of 0.060 in.

## Replacing Bushings

- To remove bushings from the wider end of the arm, use a long drift-punch and drive the bushings out of the arm while supporting the end of the arm in a large vise. To prevent the vise jaws from damaging the sides of the arm, place a piece of soft wood on both sides of the arm before closing the vise.

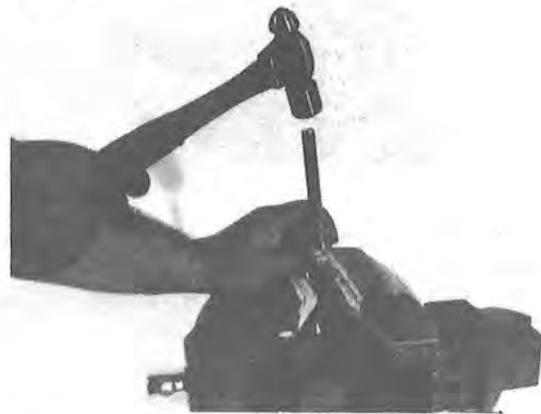
Fig. 6-31



059

- To remove the bushing from the narrow end of the arm, again support the arm in a vise with pieces of wood on both sides of the arm to protect it from the vise jaws.

Fig. 6-32



060

- Drive the bushings from the arm using a drift punch.

Fig. 6-33



060

Fig. 6-35



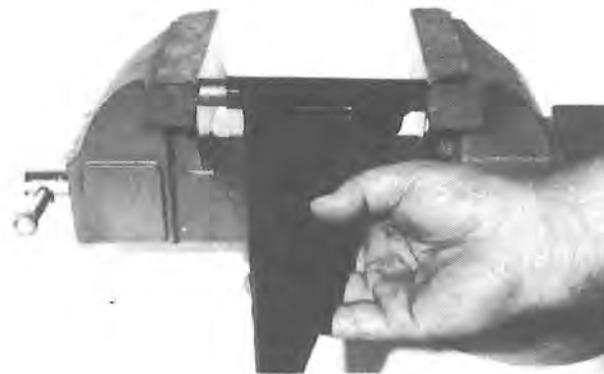
062

**NOTE:** Before installing new bushings, inspect the arm for nicks in the area where the new bushing is to be pressed into. If any nicks or rough surfaces are found, smoothen using emery paper or a fine file.

- Position the small arm end and new bushing squarely between vise jaws and slowly close the vise. Using the vise as a press, press the bushing into the arm until the bushing is flush with the edge of the arm bore.

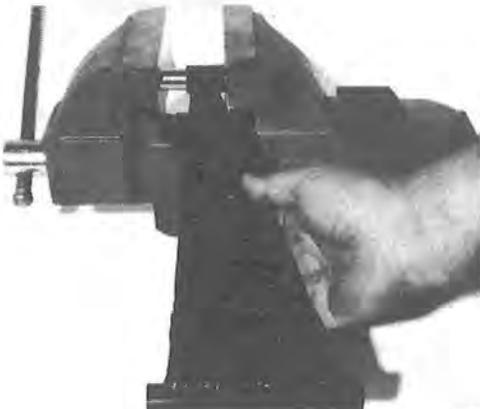
- Using the vise once again as a press, press the new bushings into both ends of the upper or lower arm at the wide end. Two bushings are used at this end of the arm and they should be pressed into the arm so they are flush with the outer edge of the bore.

Fig. 6-36



063

Fig. 6-34



061

- Using a socket or suitable tool of a smaller diameter, press the bushing an additional 4.7 mm (3/16 in.) into the bushing bore. There should now be equal space at either end of the bushing.

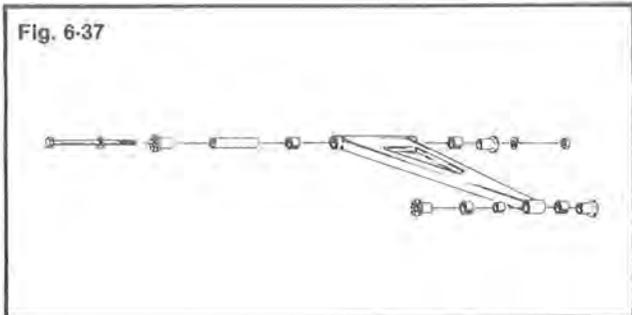
## Removing & Inspecting Lower A-Frame Arm

**NOTE:** Removing the exhaust expansion chambers or pulse charger will make the following procedure easier to accomplish. Also, before removing the lower left A-frame arm, remove the front motor mounts and lift the engine to provide ample room for removing the lock nut from the bolt that secures the lower arm to the front end assembly.

- Place a support stand under the front end assembly to get both skis off the floor.
- Remove the spindle.

- Remove the lock nut (found under the engine plate) from the bolt securing the lower arm.
- Grasp the bolt head with a pair of vise-grip pliers and rotate the bolt left to right while pulling outward at the same time. Pull the bolt free and remove the arm.

Fig. 6-37



- Remove the inner axle from the lower arm.
- Inspect all welds for signs of cracking or separation.
- Visually inspect the lower arm for signs of bending or twisting. If the arm shows any signs of being bent, twisted or any poor welds are evident, replace the arm.
- Inspect all bushings for signs of fraying, tearing, and worn areas.

## Installing Lower Arm

- Position the inner spacer into one of the outer axles. Using a soft hammer, tap the spacer firmly into axle recess. Slide axle and spacer into wide portion of lower arm and install the remaining axle from the opposite side. Use bolt to align if needed.

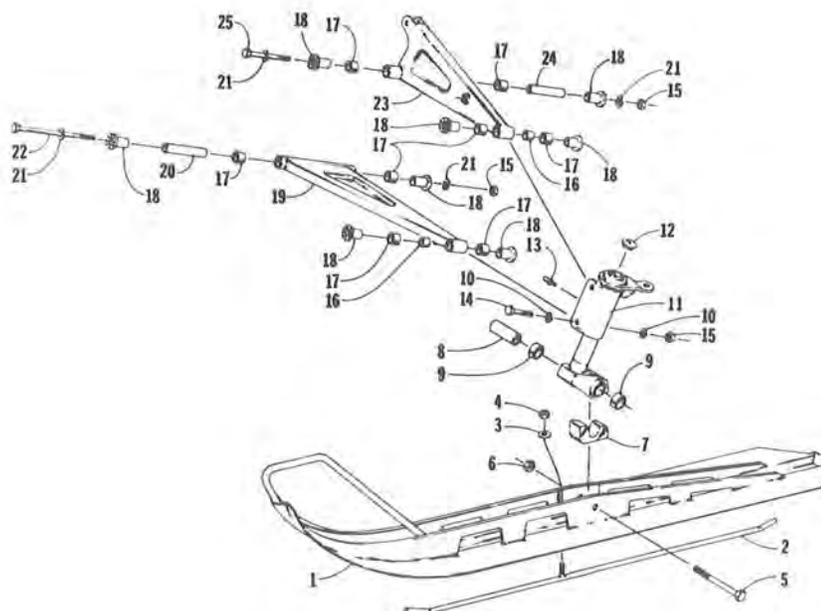
- Carefully slide the arm into position and secure with bolt and lock nut. Torque nut to 3.2 kg-m (23 ft-lb). Install bolt from the front.

**NOTE:** Install lower arm with its angled side positioned forward. Using a long drift punch, align the arm with its mounting hole and install the mounting bolt from the front.

- Swing the arm up and down to make sure it moves smoothly without binding.

Fig. 6-38

- KEY
- Ski
  - Wear Bar
  - Washer
  - Nut
  - Bolt
  - Nut
  - Damper
  - Axle
  - Bearing
  - Lock Washer
  - Spindle
  - Cap
  - Grease Fitting
  - Bolt
  - Nut
  - Axle Tube
  - Bearing
  - Axle
  - Lower Arm
  - Axle Tube
  - Lock Washer
  - Bolt
  - Upper Arm
  - Axle Tube
  - Bolt

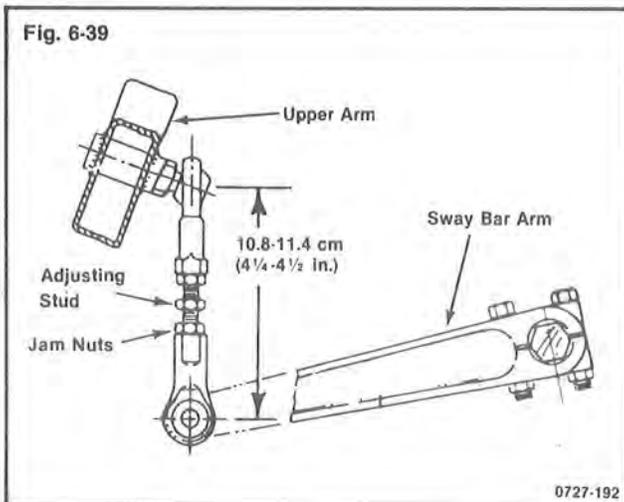


0727-324

## Installing Upper Arm

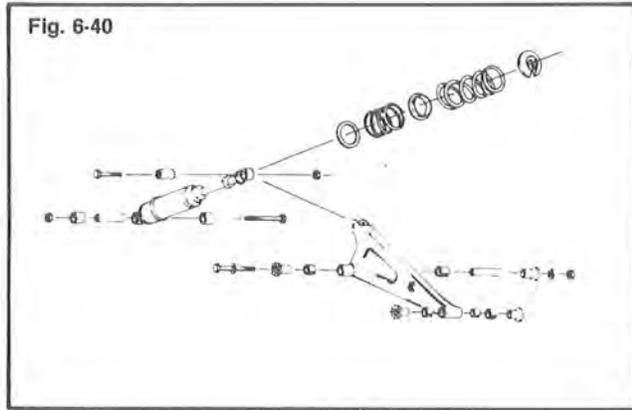
1. Insert the upper spacer into one of the outer axles. Firmly tap into position; then insert axle and spacer into upper arm. From the opposite side, install the remaining axle and seat it onto spacer.
2. Position upper arm in front end assembly and using a long drift punch, align with mounting hole. Secure the upper arm with a bolt and lock nut torqued to 3.2 kg-m (23 ft-lb). Install the bolt from the front.
3. Swing the arm up and down to make sure it moves freely.
4. Install the spindle and ski; then install the sway bar linkage. Coat the mounting stud threads with LOCTITE LOCK N' SEAL and attach it to the upper arm.

Fig. 6-39



## Replacing Front Suspension

Fig. 6-40



**NOTE:** It will be necessary to remove the expansion chambers or pulse charger before shock removal procedure is started.

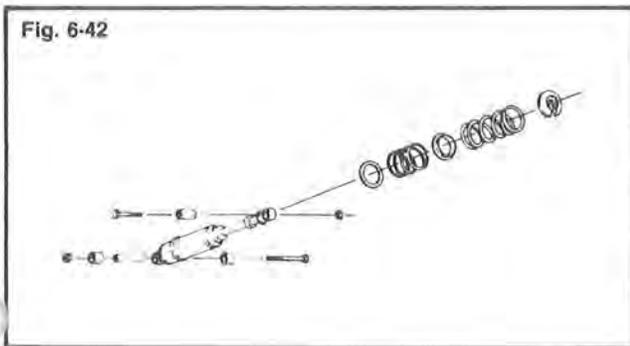
1. Position a support under front end assembly taking all the pressure off the skis.
2. Remove the lock nut from the bolt securing the top of the shock to the upper A-frame arm; then remove bolt. Account for the axle.

Fig. 6-41



3. Remove the lock nut from the bolt securing the lower end of the shock to the front end assembly. Push the bolt inward until the shock is free to be lifted clear of the front end. Account for the spacers and an axle.
4. Inspect shock-absorber body and seal areas for signs of fluid leakage.

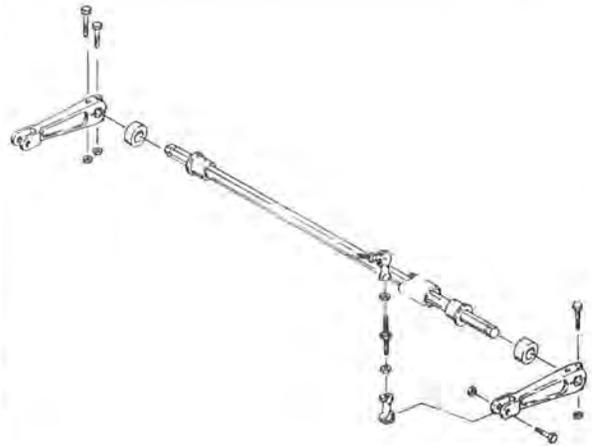
5. Inspect shock mounting hardware, bushing, axle spacer, and mounting holes for damage or wear.
6. Remove the spring from the shock body by compressing the spring and removing the spring retainer from the top of the spring. Inspect shock absorber by quickly compressing and extending the plunger while firmly holding the shock body. Resistance must be felt in both directions.
7. If the shock appears to be in good condition, re-assemble the washer, short spring, spring spacer, long spring and spring retainer on the shock body. This can be done by placing the bottom of the shock in a vise and compressing the springs with one hand, while inserting the spring retainer with the other.



8. Place the lower axle into position with a spacer on either side.
9. Place the lower end of the shock into position in the front end assembly and secure with bolt and lock nut torqued 3.2 kg-m (23 ft-lb).
10. Insert the upper axle into the shock eyelet. Pivot the shock towards the upper A-frame arm and secure with bolt and lock nut torqued 3.2 kg-m (23 ft-lb). Install upper bolt from the front.

## Removing Sway Bar

Fig. 6-43



**NOTE:** The sway bar adjustment is used to level the front end assembly. It has been preset at the factory and shouldn't need any further adjustment unless disassembly should become necessary. If disassembly is necessary, follow the procedure below for reassembly and adjusting purposes.

1. To remove the sway bar, remove the bolt securing the sway bar linkage to the sway bar arm at either end.
2. Remove the two bolts and lock nuts on each side that secure the sway bar arm to the sway bar. Remove the arm.
3. Pull the sway bar from its mounting area. Account for the two nylon bushings and spacers.

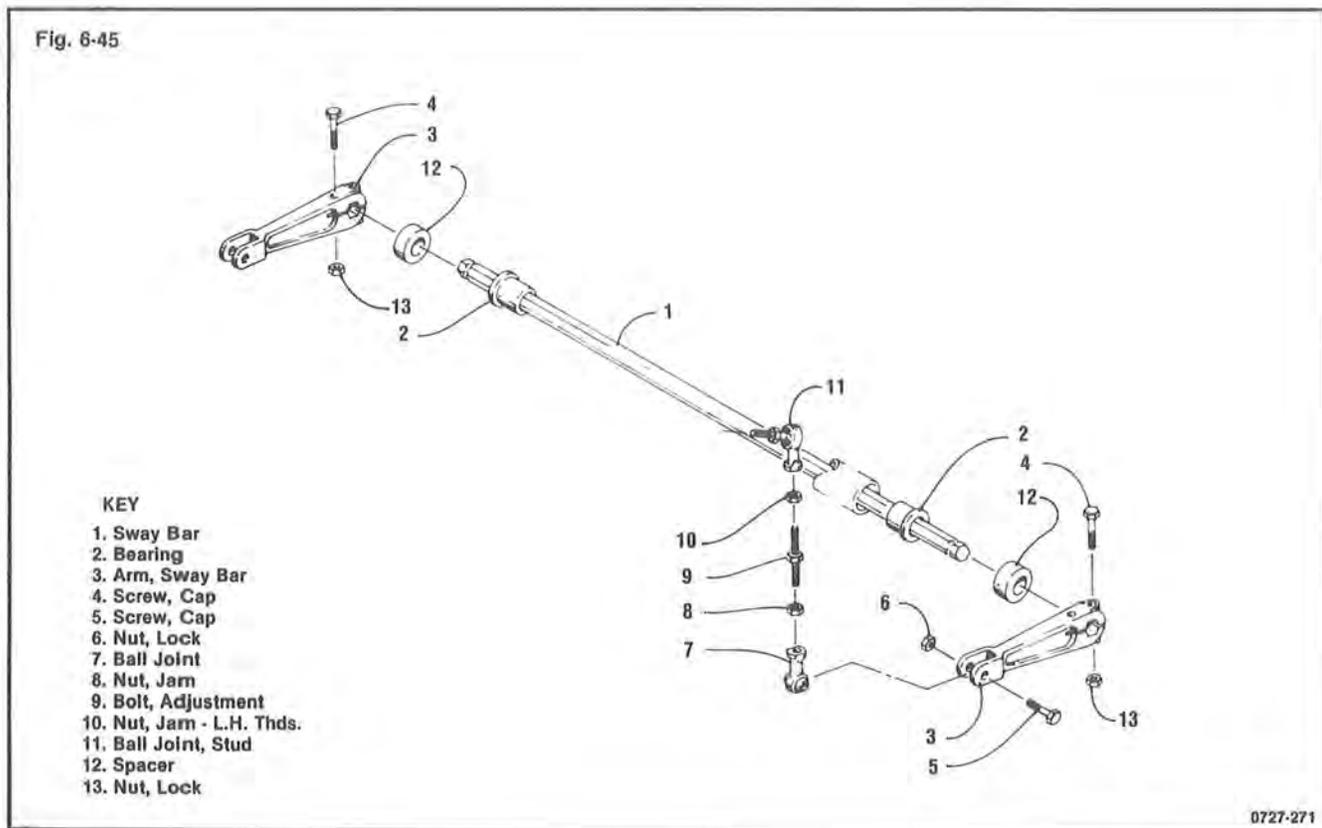
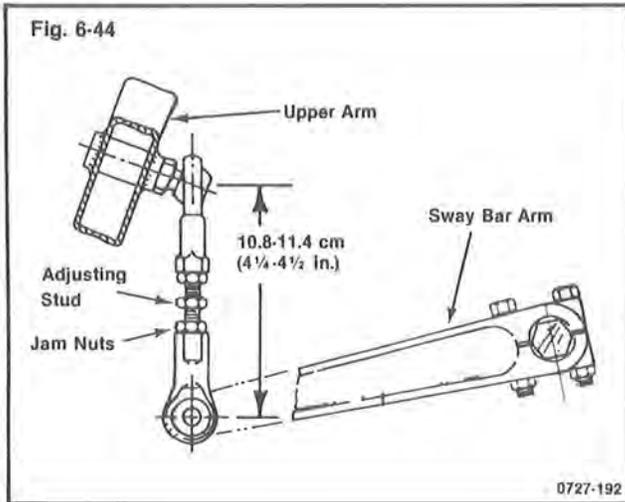
## Inspecting Sway Bar & Sway Bar Arm

1. Inspect the sway bar for any signs of twisting, fatigue or wear.
2. Inspect the sway bar arms for cracks or worn mounting holes.

- Inspect the bushings for wear on the inner and outer diameter.
- Inspect the sway bar arm linkage for any signs of damaged ball joint ends or threads. Inspect the length to determine if the linkage is at the recommended length of 10.8-11.4 (4¼-4½ in.). To check the length, measure from the center to center of each ball joint. If adjustment is needed, loosen jam nuts and rotate adjustment stud. Before tightening jam nuts, apply LOCTITE LOCK N' SEAL to the threads.

## Assembling Sway Bar

- Place the sway bar into position and install a bushing and spacer on either end.
- Slide the arm onto the bar until the bolt holes in the arm align with the notch in the shaft. Install the two bolts and lock nuts. Torque the nuts 1.8 kg-m (13 ft-lb).
- Check and adjust linkage length (see Adjusting Sway Bar Linkage section).



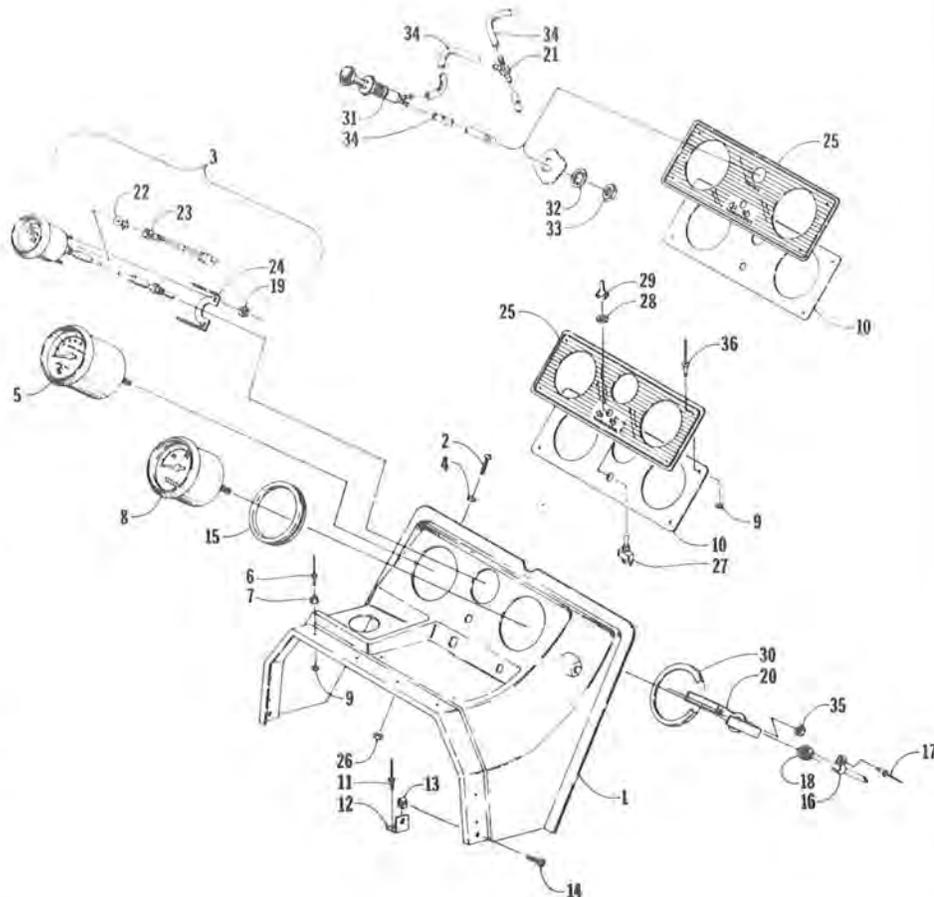
## Removing Console

1. Pull the recoil rope outward; then tie a slipknot in the recoil rope near the recoil case. Slowly allow the rope to retract to the knot.
2. Untie the knot in the end of the recoil rope; then remove handle from rope.
3. Remove the push nut securing recoil bushing; then remove bushing.
4. Remove the knurled nut securing the choke cable and the ignition nut and washer securing the ignition switch and disconnect the wires from the ignition switch; then remove the choke cable and ignition switch.
5. Disconnect the speedometer drive cable; then disconnect the wires from the speedometer, tachometer, and temperature gauge.
6. Remove the two machine screws securing the sides of the console; then remove the two screws and lock nuts securing the console to the front end.
7. On the Cougar and Cheetah F/C, remove the hoses from the primer; then plug to prevent drainage. Remove the nut and washer securing the primer; then remove primer.
8. Remove the fuel-tank cap and the spill seal.
9. Remove the console.
10. Remove the speedometer, tachometer, and temperature gauge. Account for the retainer plate and gasket.
11. Remove the two tapping screws securing console plate; then remove console plate.
12. Remove all decals and the oil-gauge backing.

Fig. 6-46

### KEY

1. Console
2. Machine Screw
3. Temperature Gauge
4. Flat Washer
5. Tachometer
6. Rivet
7. Snap
8. Speedometer
9. Washer
10. Plate
11. Rivet
12. Bracket
13. Speed Nut
14. Machine Screw
15. Rubber Cushion Ring
16. Clamp
17. Rivet
18. Speedometer Cable
19. Nut w/Washer
20. Speedometer Bracket
21. Primer Line Tee
22. Temp. Gauge Bulb
23. Lamp Cord Ass'y.
24. Gauge Mtg. Bracket
25. Decal
26. Lock Nut
27. Toggle Switch
28. Lock Washer
29. Toggle Switch Nut
30. Retaining Bracket Ring
31. Fuel Primer
32. Lock Washer
33. Jam Nut
34. Primer Hose
35. Nut w/Washer
36. Rivet



0727-310

## Installing Console

1. Place the tachometer, speedometer, and temperature gauge into position and secure making sure the gasket and retainer plate are properly positioned.
2. On the Cougar and Cheetah F/C, place the primer into position and secure with the nut and washer. Connect the hoses.
3. Place console into position; then secure the console with two tapping screws and two screws and lock nuts.
4. Install the fuel-tank cap and spill seal.
5. Install the seat cushion.
6. Connect the wires to the console lights; then connect the speedometer drive cable.
7. Install recoil bushing and secure with the push nut.
8. Thread the recoil rope through the recoil bushing and recoil handle. Tie a knot in the end of the recoil rope. Pull the rope to remove the slipknot near the recoil case; then allow the rope to retract.

9. Slide the ignition switch and the choke cable through the console; secure the choke cable with a knurled nut and the ignition switch with the ignition nut and washer. Connect the wires to the ignition switch.

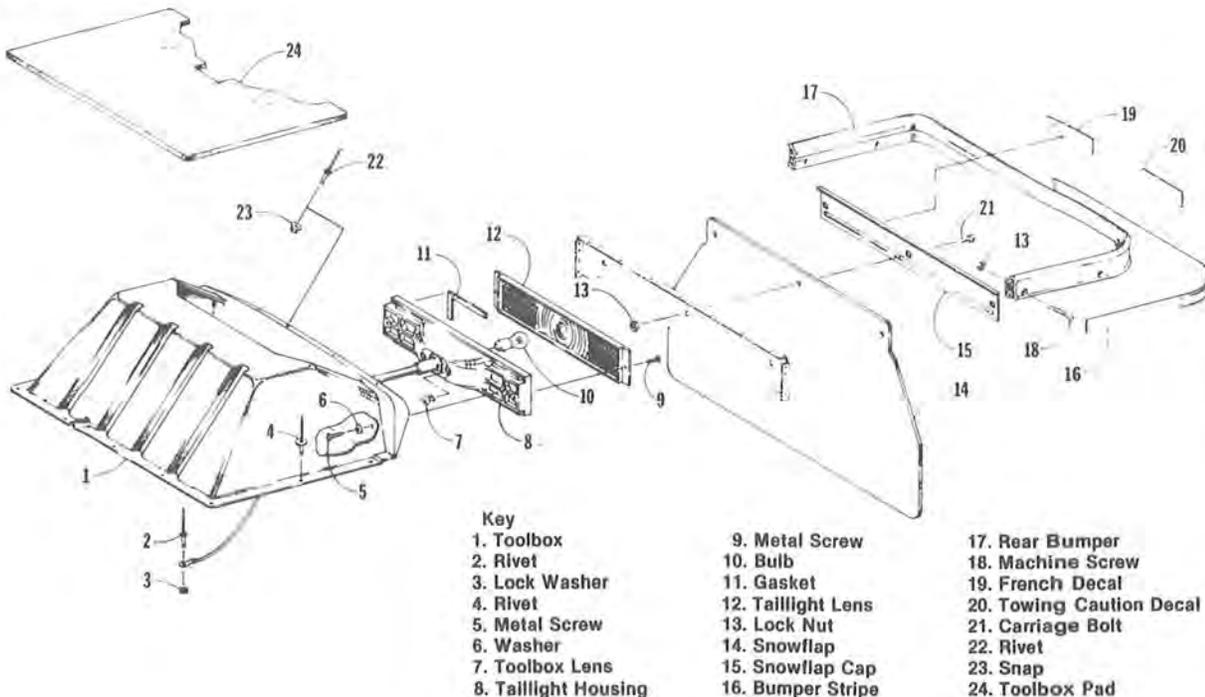
## Removing & Installing Tunnel Components

**NOTE:** Not all of the following steps in the first four subsections will be applicable to the long track models.

### REMOVING TOOLBOX AND TAILLIGHT

1. Remove the seat cushion.
2. Remove the toolbox pad.
3. Chisel or drill out the rivets securing the toolbox shroud to the tunnel; then remove the two metal screws and washers securing taillight assembly to the toolbox and remove toolbox.
4. Disconnect wiring harness from taillight; then remove the rivet securing the ground wire.
5. Remove the two metal screws securing taillight lens; then remove lens, gasket, and bulb.

Fig. 6-47



### INSTALLING TOOLBOX AND TAILLIGHT

1. Install the bulb; then install the gasket and lens and secure with two metal screws.
2. Connect the wiring harness; then rivet the ground wire to the tunnel.
3. Rivet the toolbox shroud to the tunnel; then secure the taillight assembly to the toolbox with two metal screws.
4. Install the toolbox pad.
5. Install the seat cushion.

### REMOVING REAR BUMPER, END PLATE, CAP, AND SNOWFLAP

1. Remove the seat cushion; then remove the reflectors and bumper tape. Remove the four machine screws and lock nuts securing rear bumper and bumper reinforcements to the tunnel. Remove the rear bumper and bumper reinforcements.
2. Remove the end caps.
3. Remove the three carriage bolts and lock nuts securing snowflap and cap; then remove cap and snowflap.
4. Chisel or drill out the rivets securing end plate to the tunnel; then remove plate.

### INSTALLING REAR BUMPER, END PLATE, CAP, AND SNOWFLAP

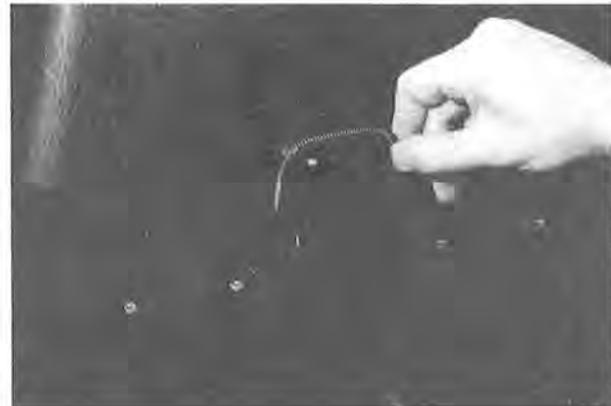
1. Place end plate into position and secure with rivets.
2. Place snowflap and cap into position and secure with three carriage bolts and lock nuts.
3. Install the end caps.
4. Place the rear bumper and bumper reinforcements into position; then secure with the four machine screws and lock nuts. Install the seat cushion, bumper tape, and reflectors.

### REMOVING BELLY PAN, HOOD, AND FRONT BUMPER

1. Remove the hood cable. Remove either the expansion chambers or pulse charger; then on the El Tigre 6000 and Cheetah L/C remove the machine screws, washers, and lock nuts securing the muffler to the belly pan.

2. Disconnect the headlight harness, remove the bolts and lock nuts securing the hood hinge to the belly pan hinge, and slide hood free of belly pan hinge. Account for two washers and bushings.
3. Remove the machine screws and lock nuts securing bumpers to the belly pan; then remove bumpers. Account for washers, end caps, and hood channels.
4. Position a support stand under the front end assembly taking all pressure off the skis.
5. Drain the coolant from the cooling system.
6. Remove the seat from the tunnel.
7. Remove the console. Remove the fuel line, vent line, and spring securing the rear of the fuel tank. Remove the tank.

Fig. 6-48



B361

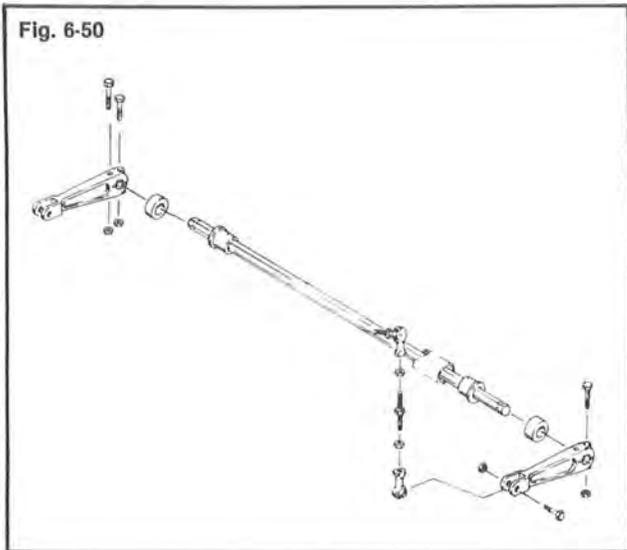
8. Remove the sway bar arms and sway bar (see Removing Sway Bar section).

Fig. 6-49



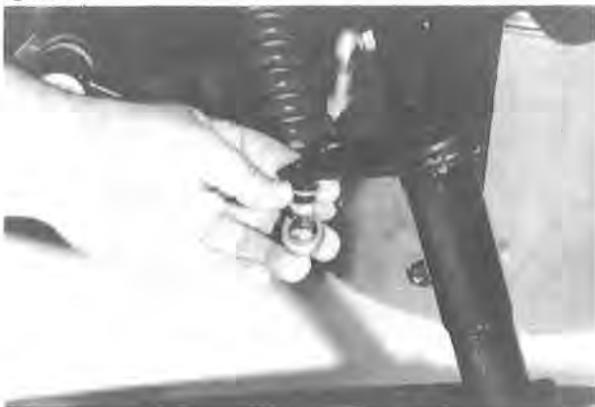
057

Fig. 6-50



9. Remove the tie rods from the spindle arms.

Fig. 6-51



10. Remove the bolts that secure the spindle and ski assemblies to the upper and lower A-frame arms. Remove the spindle assemblies from both sides.

Fig. 6-52



11. Remove the three screws securing the nose cone; then remove the nose cone.
12. Remove the hardware securing the hinge support and front bumper to the belly pan; then remove hinge support, and bumper, and backing plates.
13. Carefully position the machine upside down. Place a small support stand under the side panels of the front-end assembly.
14. Using a number 12 or 13/64 in. drill bit, drill out all rivets securing the belly pan to the front end assembly.
15. Remove the bolts and lock nuts securing the upper A-frame arms to the front suspension shocks. Free the shocks from the upper arms.
16. Carefully lift the belly pan free of the front end assembly, guiding the tie-rods and upper A-frame arms through the rubber boots as the pan is being removed.
17. Carefully drill out the rivets that secure the rubber boots to the belly pan. Remove both the tie-rod and upper A-frame boots.
18. Clean the belly pan mounting area of drill chips and rivets. Wipe excess oil and dirt from the front suspension. Check to be sure no rivet shanks remain in any of the rivet holes. Use a 1/8 in. drift punch to remove any rivet shanks.

#### INSTALLING BELLY PAN, HOOD, AND FRONT BUMPER

**NOTE:** It is recommended that the machine remain mounted upside down for ease of installing the belly pan. Use the same procedure for installing the belly pan on all A.F.S. models. Because of the liquid cooled engine used in the El Tigre and Cheetah L/C models, some extra steps are required for these models.

1. Using rivets, secure rubber boots for tie-rods and upper A-frame arms to the belly pan.
2. Set the belly pan into position, make sure tie-rods and A-frame arms are properly located.

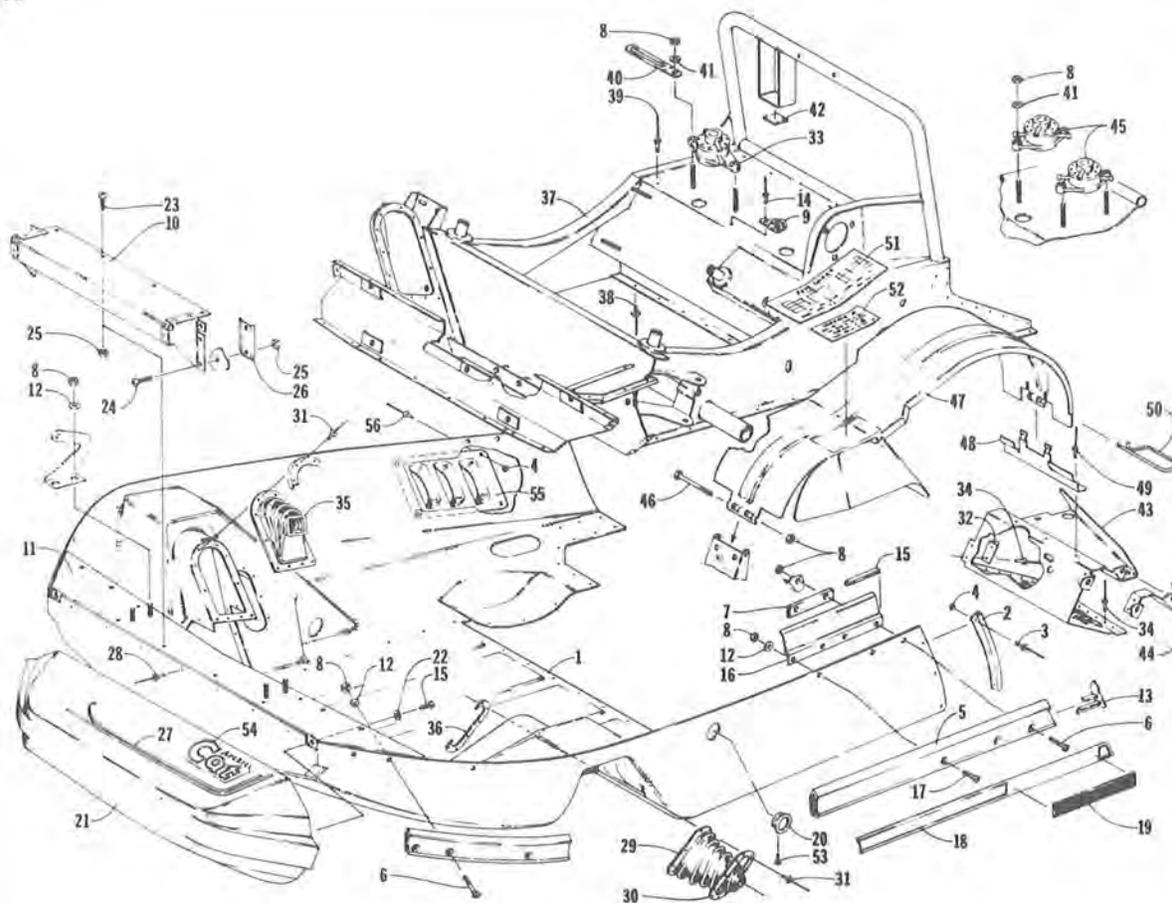
3. Align holes in belly pan with those found in the front end assembly. Install the front row of rivets just in front of the A-frame arms. Start in the center on the front row and work toward the outside.
4. After riveting the front row of rivets, install the rivets around each A-frame assembly and then work towards the back of the belly pan.

**NOTE:** After riveting is completed, apply silicone sealer to area where the belly pan meets the front end assembly around each set of A-frame arms.

5. Install the sway bar and arms. Torque the lock nuts securing the arms 1.8 kg-m (13 ft-lb).

6. Secure the sway bar linkages to the upper A-frame arms. Apply LOCTITE LOCK N' SEAL to the threads of studs that attach to A-frame arms. Tighten securely.
7. Secure the opposite end of each sway bar linkage to the sway bar arm with two bolts and lock nuts. Install the bolts from the outside, torque the lock nuts 3.2 kg-m (23 ft-lb).
8. Secure the spindle assemblies to the A-frame arms. Install bolts securing the spindles from the front and torque 3.2 kg-m (23 ft-lb).
9. Set the snowmobile upright.

Fig. 6-53



KEY

- |                       |                        |                          |                    |                        |
|-----------------------|------------------------|--------------------------|--------------------|------------------------|
| 1. Belly Pan          | 13. End Cap            | 25. Nut                  | 37. Front Frame    | 49. Rivet              |
| 2. Pan Trim           | 14. Rivet              | 26. Bumper Backing Plate | 38. Rivet          | 50. Hitch Pin          |
| 3. Rivet              | 15. Self-Tapping Screw | 27. Pinstripe            | 39. Rivet          | 51. Jet Chart Decal    |
| 4. Washer             | 16. Hood Channel       | 28. Rivet                | 40. Clamp          | 52. "Warning" Decal    |
| 5. Front Bumper       | 17. Machine Screw      | 29. Steering Boot        | 41. Washer         | 53. Self-Tapping Screw |
| 6. Machine Screw      | 18. Bumper Decal       | 30. Steering Boot Ring   | 42. Foam Pad       | 54. "Arctic Cat" Decal |
| 7. Footrest Spacer    | 19. Amber Reflector    | 31. Rivet                | 43. Footrest       | 55. Pan Louver         |
| 8. Lock Nut           | 20. Belly Pan Plug     | 32. Gusset               | 44. Bracket        | 56. Rivet              |
| 9. Clamp              | 21. Nose Cone          | 33. Fuel Pump            | 45. Fuel Pump      |                        |
| 10. Front Bumper      | 22. Flat Washer        | 34. Rivet                | 46. Cap Screw      |                        |
| 11. Pan Hinge Support | 23. Machine Screw      | 35. Suspension Boot      | 47. Clutch Shield  |                        |
| 12. Washer            | 24. Machine Screw      | 36. Reinforcement Ring   | 48. Shield Bracket |                        |

- Secure the tie-rods to the spindle arms from the bottom side. Torque to 3.2 kg-m (23 ft-lb).

Fig. 6-54



- Secure the hood hinge support plate to the belly pan.
- Place the side bumpers in position and secure with machine screws and lock nuts. Remember that the rear two machine screws secure bumper and footrest. The next two must have the longer hood channel attached. The fifth and sixth have the short hood channel attached.
- Place the front bumper into position and secure it to the hinge support plate with 10 bolts and lock nuts. All nuts are to be positioned on the inside of the belly pan.
- Place the nose cone into position and secure it with three self-tapping screws from the inside of the belly pan (one screw on either outer corner along the bottom and one in the center). After all three screws have been started, tighten them evenly and draw the nose cone back against the belly pan.

**NOTE: The center nose cone screw should be installed with a washer.**

- Thoroughly clean the side bumper surfaces; then place the reflectorized tape into position. Trim the ends of the tape to match contour of the bumper. Install new reflectors on either side near the ends of the side bumpers.
- Place either the exhaust expansion chambers and muffler or pulse charger into position. Secure the muffler with three machine screws, flat washer, and lock nuts. Secure the expansion chambers or pulse charger with springs.

- Place the hood into position and secure with bolts, bushings, washers, and lock nuts. Secure the hood cable and connect the headlight harness.
- Adjust the hood for proper fit. Use the slotted holes in the front bumper to align the hood.

## Removing Windshield and Headlight

- Remove the machine screws securing windshield and remove the windshield. Account for expansion nuts and snap caps.
- Disconnect the headlight harness.
- Remove the rivets securing the headlight bracket to the hood.
- Remove headlight assembly from the bracket by removing the four adjusting screws, adjusting nuts, and springs.

## Installing Windshield and Headlight

- Secure headlight assembly to the bezel with four adjusting screws, adjusting nuts, and springs.
- Secure bezel to hood with two machine screws, washers, and lock nuts making sure the cable clamp is secured by the PTO-side screw.
- Connect the headlight harness.
- Install the expansion nuts in the holes of the hood. Place the windshield into position and secure with machine screws and snap caps.

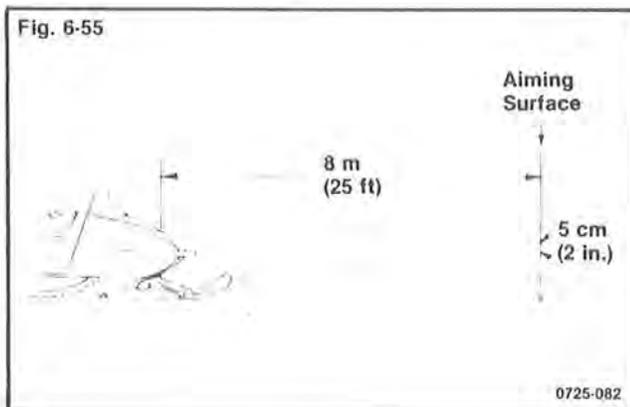
**NOTE: Tighten the screws starting from the center and working outward.**

- Adjust headlight aim.

## Adjusting Headlight Aim

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 aiming.

1. Position the snowmobile on a level floor so the headlight is approximately 8 m (25 ft) from an aiming surface (wall or similar surface).
2. Measure the distance from the floor to mid-point of the headlight.
3. Using the measurement obtained in step 2, make a horizontal mark on the aiming surface.
4. Make a vertical mark which intersects the horizontal mark on the aiming surface directly in front of the headlight.
5. Start the engine. Move the headlight dimmer switch to the HIGH beam position. **DO NOT USE LOW BEAM.**
6. Observe the headlight beam aim. Proper aim is when the most intense beam is centered on the vertical mark 5 cm (2 in.) below the horizontal mark on the aiming surface.



7. Adjust the four adjusting screws until the correct aim is obtained.



# SECTION 7 — TRACK/SUSPENSION

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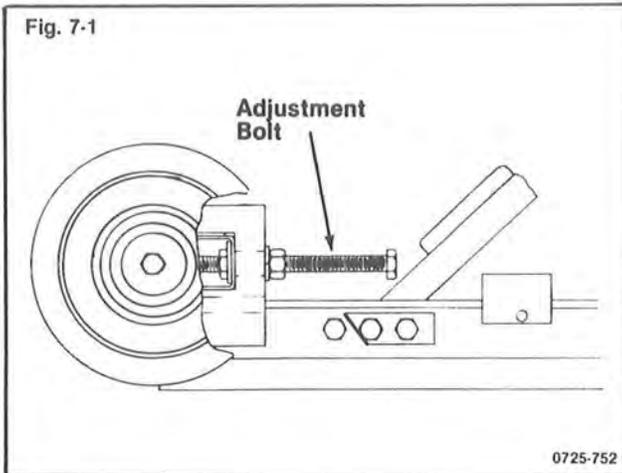
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7

## Removing Skid Frame (El Tigre- Pantera-Cougar)

1. Loosen the two track-tension adjustment bolts; then loosen the bolts securing the rear idler wheels.

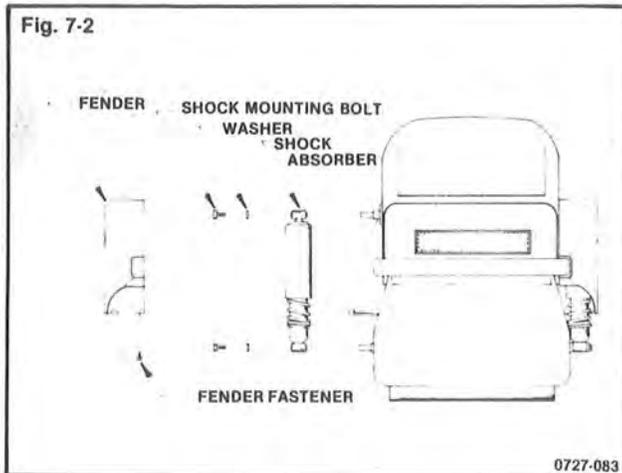
Fig. 7-1



0725-752

2. Place a support stand under the rear bumper; then remove the bolts securing the rear shock absorbers and slide the shocks free of the suspension and chassis.

Fig. 7-2



0727-083

3. Remove the four bolts and lock washers securing the skid frame to the tunnel.

Fig. 7-3



B408

4. Tip the snowmobile onto one side using a piece of cardboard to protect against scratching; then remove skid frame.

## Disassembling Skid Frame (El Tigre-Pantera-Cougar)

1. Remove the bolts and lock nuts securing the end caps to the rails; then remove the end caps.
2. Remove the lock nuts and machine screws securing the wear strips to the rails.

Fig. 7-4



AG058

3. Using a hammer and a piece of wood, drive the wear strips toward the rear of the rails to remove.

Fig. 7-5



064

● CAUTION ●

Be sure to use either a rubber hammer or a piece of wood to remove wear strips from rails. If a steel hammer or punch is used, the rails may be nicked and damaged.

4. Remove cap-lock screws and washers securing rear idler wheels to rear axle.

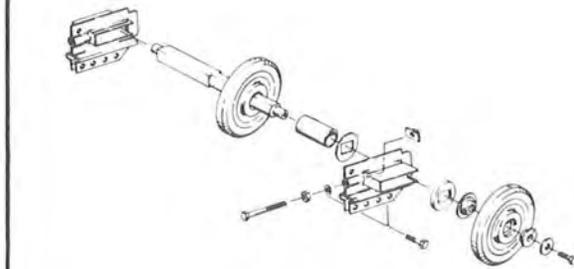
Fig. 7-6



065

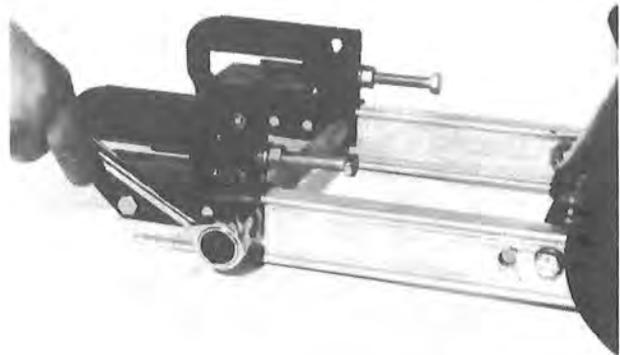
5. Slide the rear idler wheels and spacer washers off the rear axle.
6. Remove the rear axle from the axle housing. Account for washers, spacers, and center idler wheel.

Fig. 7-7



7. Remove the four bolts and two lock nuts securing the axle housings; then slide the housings off the rails.

Fig. 7-8



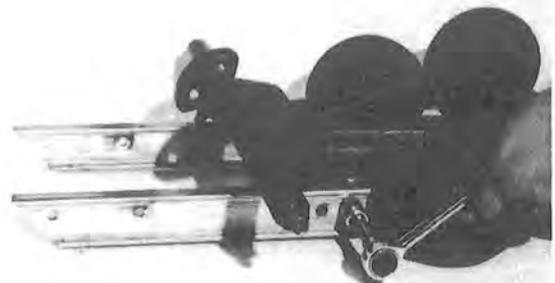
067

**NOTE:** Be sure to note the location of the rear rail support when removing axle housings. Support must be located between the front mounting holes.

7

8. Remove the two cap screws that secure the rear arm to the slide rails. Slide the rear arm off the back of the rails. Account for inner shaft and bushings.

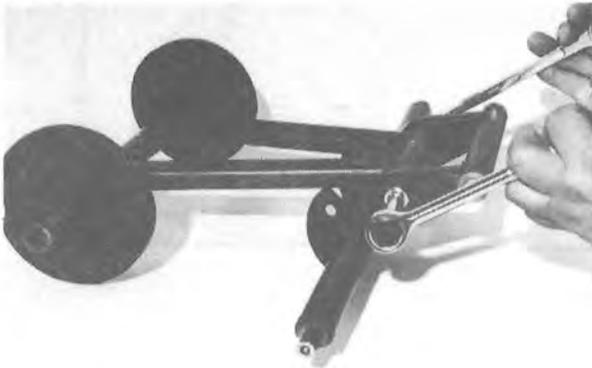
Fig. 7-9



068

9. Remove the single bolt that secures the rear idler arm to the rear arm. Account for inner axle and bushings.

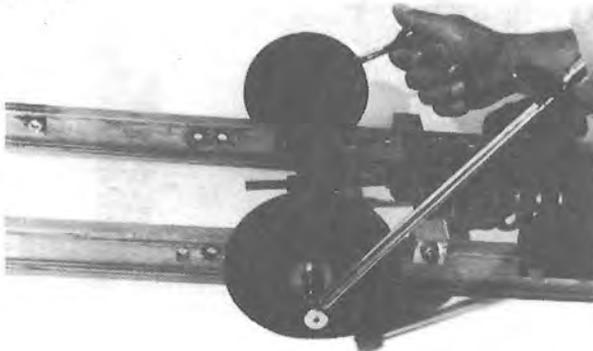
Fig. 7-10



069

10. Remove the cap screws that secure the center idler wheels. Remove the wheels, washers, and axle.

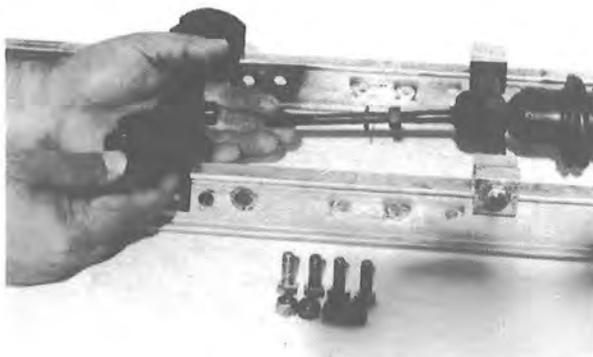
Fig. 7-11



070

11. Remove the four bolts and lock nuts securing the rear crossbrace. Slide the crossbrace off the rear of the skid frame.

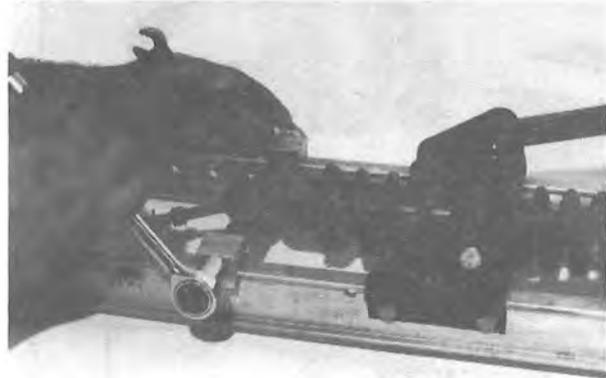
Fig. 7-12



071

12. Remove the long bolt which secures the center shock adjustment blocks. Account for the four adjustment blocks, two spacers, shock bushings, and adjustment fork.

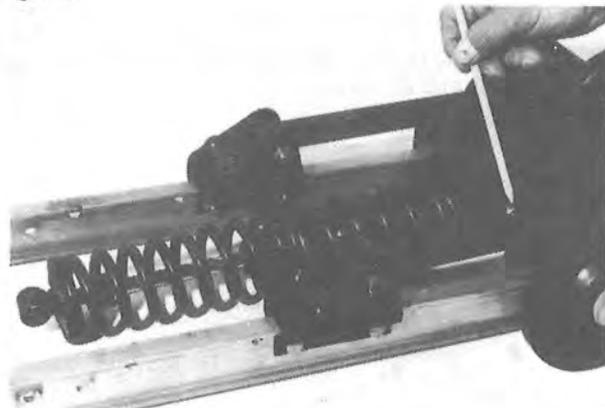
Fig. 7-13



072

13. Remove the bolt and lock nut securing the front of the shock absorber to the shock pivot bracket. Account for the two shock bushings.

Fig. 7-14



073

14. Remove the bolt and lock nut securing the front-arm stop to the front crossbrace. Remove the bolt, washers, and lock nut securing the front-arm stop to the front arm; then remove the front-arm stop.

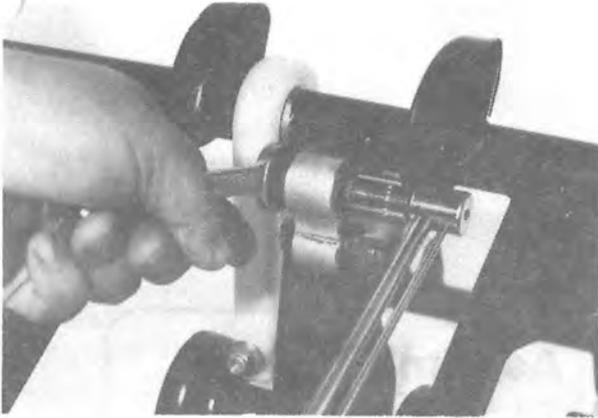
Fig. 7-15



074

15. Remove the two bolts and lock nuts securing the pivot link to the front arm.

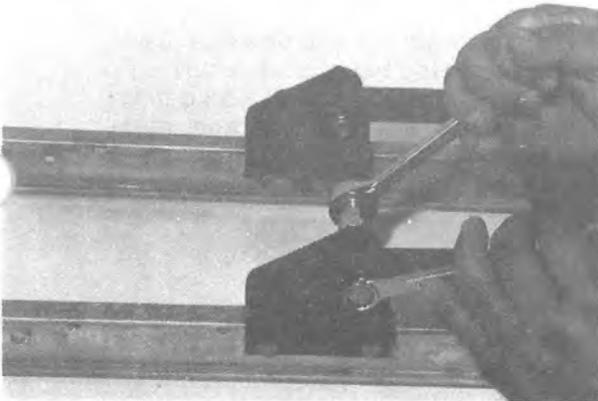
7-16



075

16. Remove the two bolts and lock nuts securing the front arm to the two front arm brackets. Account for the four bushings.

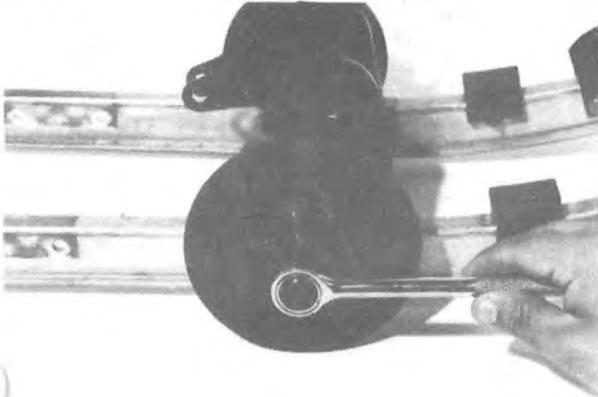
Fig. 7-17



076

17. Remove the cap screws securing the front idler wheels. Slide the idler wheels and washers off the axle.

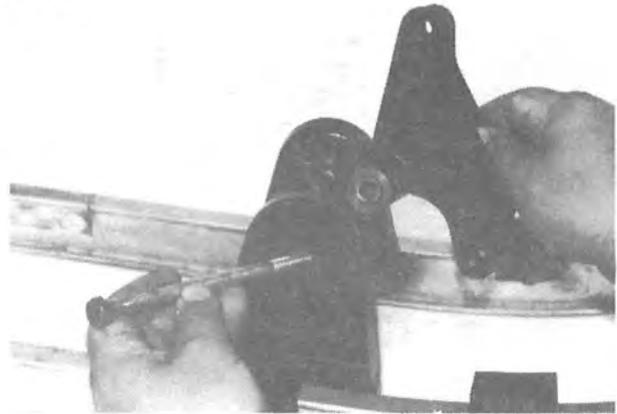
Fig. 7-18



077

18. Remove the bolt and lock nut securing the shock pivot to the two wheel mounting brackets. Account for axle and bushings.

Fig. 7-19



078

19. Remove the six bolts and lock nuts securing the left and right wheel mounting brackets to the rails and slide the brackets back off the rails.

Fig. 7-20



079

20. Remove the push nuts and pins securing the rubber shock pads and remove pads.

Fig. 7-21



080

- Remove the four bolts and lock nuts securing the front crossbrace to the slide rails. Slide the crossbrace off the front of the slide rails.

Fig. 7-22



081

## Cleaning Skid Frame

- Wash metallic components in parts-cleaning solvent and dry thoroughly.
- Wash plastic components in soap and water only; then dry thoroughly.
- Sand and apply touch-up paint to all rusted and chipped areas.

## Inspecting Skid Frame

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

- Inspect all threaded areas for stripped threads.
- Inspect all bushings and corresponding pivot areas for cracks, defects, or wear.
- Inspect idler wheels for wear and damage. Bearings must rotate freely.
- Inspect axles for straightness.

- Inspect all springs for abnormal bends or cracks.
- Inspect the eyebolts for separation of the eye or abnormal bends.
- Inspect suspension-mounting brackets (on the tunnel).
- Inspect the skid-frame rails for unusual bends.

## Assembling Skid Frame

**NOTE:** Refer to Fig. 7-24 during assembly.

- Slide the front crossbrace into position (using the last two mounting holes) and secure with four bolts and lock nuts torqued 1.5 kg-m (11 ft-lb). When installing the crossbrace, make sure the front arm stop bracket, which is welded off to one side of the crossbrace is positioned toward the left side of the skid frame.

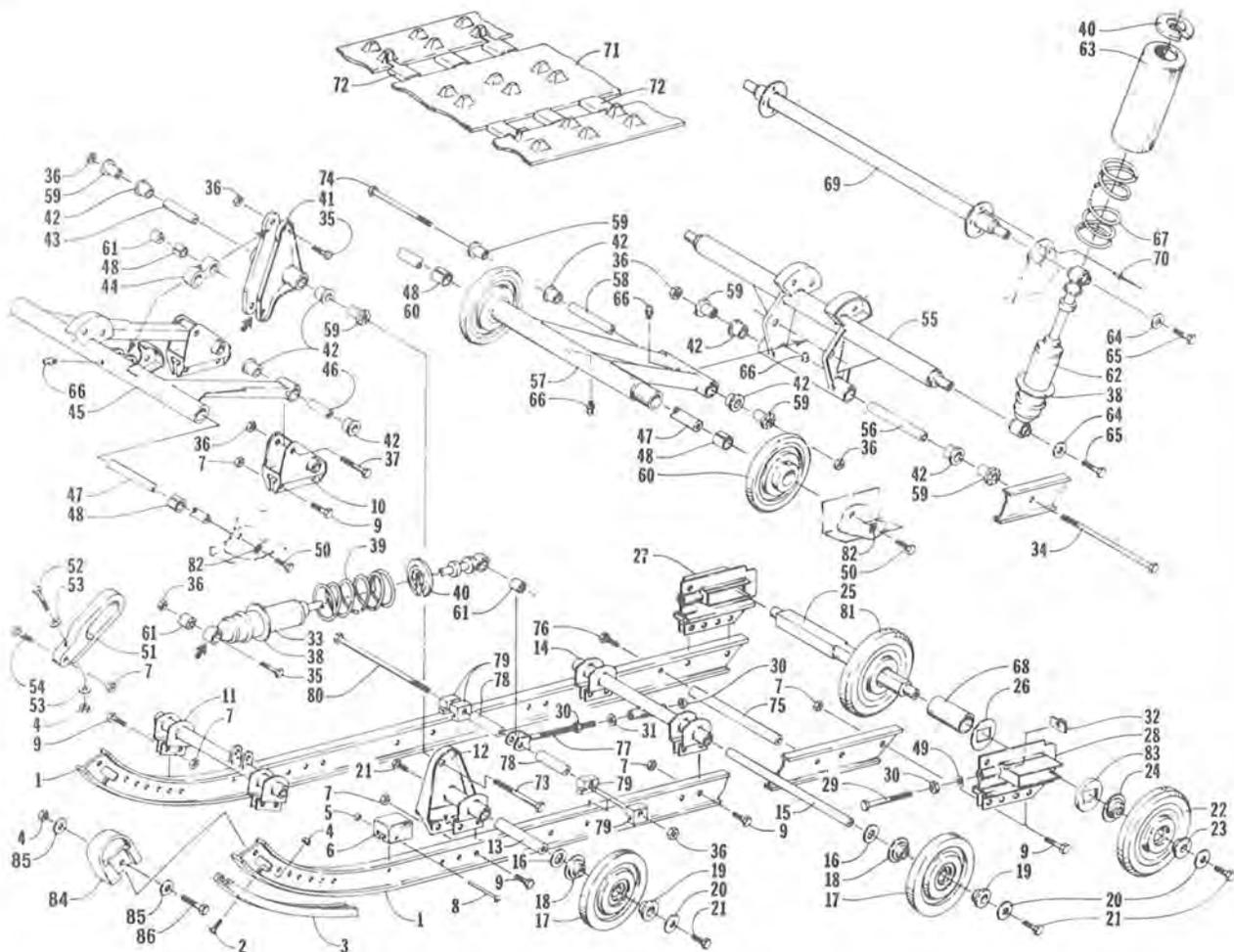
Fig. 7-23



082

- Install the shock pads and secure with pins and push nuts. Locate push nuts to the inside of the rails.

Fig. 7-24



KEY

- |                                 |                           |                              |
|---------------------------------|---------------------------|------------------------------|
| 1. Rail, Formed                 | 30. Nut, Hex              | 59. Axle                     |
| 2. Screw, Machine               | 31. Washer                | 60. Wheel, Idler             |
| 3. Strip, Wear                  | 32. Plate/Nut             | 61. Axle                     |
| 4. Nut, Lock                    | 33. Shock, Front Arm      | 62. Shock, Rear Arm          |
| 5. Nut, Push                    | 34. Screw, Cap            | 63. Cover, Suspension Spring |
| 6. Pad, Shock                   | 35. Screw, Cap            | 64. Washer                   |
| 7. Nut, Lock                    | 36. Nut, Lock             | 65. Screw, Cap               |
| 8. Rivet, Solid                 | 37. Screw, Cap            | 66. Zerk, Grease             |
| 9. Screw, Cap                   | 38. Washer, Shock         | 67. Spring, Rear Shock       |
| 10. Bracket, Front Arm Mounting | 39. Spring, Front Arm     | 68. Spacer, Rear Axle        |
| 11. Crossbrace, Front           | 40. Retainer, Spring      | 69. Tube, Rear Shock         |
| 12. Bracket, Wheel Mounting     | 41. Bracket, Shock Pivot  | 70. Rivet                    |
| 13. Axle, Front Aux., Wheel     | 42. Bushing               | 71. Track Assembly           |
| 14. Crossbrace, Rear            | 43. Tube, Axle            | 72. Clip, Guide              |
| 15. Axle, Rear Aux., Wheel      | 44. Link, Pivot           | 73. Screw, Cap               |
| 16. Washer                      | 45. Front Arm             | 74. Screw, Cap               |
| 17. Wheel, Idler                | 46. Spacer                | 75. Support, Rail            |
| 18. Insert, Wheel               | 47. Axle, Inner           | 76. Screw, Cap Lock          |
| 19. Insert, Wheel               | 48. Bearing, Axle         | 77. Bolt, Adjuster           |
| 20. Washer                      | 49. Washer, Lock          | 78. Spacer, Adjuster         |
| 21. Screw, Cap                  | 50. Screw, Cap            | 79. Block, Clamping          |
| 22. Wheel, Idler                | 51. Stop, Arm             | 80. Screw, Cap               |
| 23. Insert, Wheel               | 52. Screw, Cap            | 81. Wheel, Center Idler      |
| 24. Insert, Wheel               | 53. Washer                | 82. Washer, Lock             |
| 25. Axle, Rear                  | 54. Screw, Cap            | 83. Washer, Rectangular      |
| 26. Washer, Rectangular         | 55. Rear Arm              | 84. End Caps                 |
| 27. Housing                     | 56. Axle, Rear Arm        | 85. Washer, Flat             |
| 28. Housing                     | 57. Arm, Rear Idler       | 86. Screw, Cap               |
| 29. Screw, Cap                  | 58. Axle, Inner Idler Arm |                              |

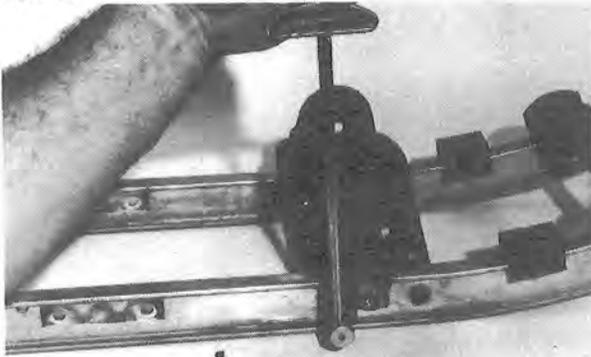
Fig. 7-25



080

3. Install the left and right wheel brackets. Secure with six bolts and lock nuts torqued 1.5 kg-m (11 ft-lb). Position all lock nuts to the inside of the rails.

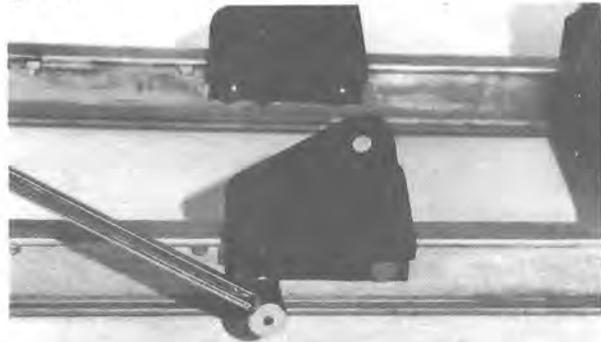
Fig. 7-26



083

4. Coat the shock pivot axle with low-temperature grease and slide into shock pivot bracket. Position a bushing at either end of the bracket axle bore and place assembly between wheel brackets. Secure shock pivot bracket assembly with bolt and lock nut torqued 3.2 kg-m (23 ft-lb).
5. Slide washers and front idler wheels into position on front idler wheel axles. Secure wheels to axle with large washer and cap screw torqued 1.5 kg-m (11 ft-lb).
6. Position the two front arm brackets on the slide rails and secure with bolts and lock nuts torqued 1.5 kg-m (11 ft-lb). Bolts should be installed from the outside.

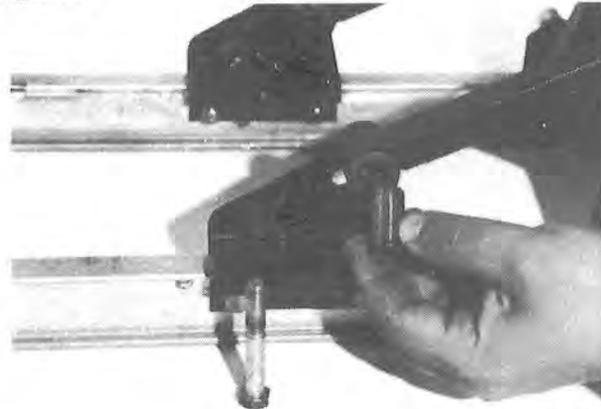
Fig. 7-27



084

7. Place front arm bushings into arm eyelets and position the arm into the mounting brackets. Secure with two bolts and lock nuts torqued 3.2 kg-m (23 ft-lb).

Fig. 7-28



085

8. Install pivot link. Position spacers into both link mounting holes and secure link to front arm and shock pivot bracket using two bolts and lock nuts. Torque to 3.2 kg-m (23 ft-lb). It is very important that the bolts be installed from the left. The nuts must be located on the right side of the shock pivot bracket.

● CAUTION ●

If the link mounting bolts are not installed as pointed out in step 8, the front arm stop will be damaged.

9. Place the front-arm stop into position around front arm and secure with a bolt, two washers, and lock nut torqued to 1.1 kg-m (8 ft-lb). Position arm as shown in Fig. 7-29.

Fig. 7-29



086

- Secure the front-arm stop to the front cross-brace with a bolt and lock nut torqued to 1.5 kg-m (11 ft-lb).

Fig. 7-30



087

- Place spacer into shock absorber eyelet and secure to bottom of shock pivot bracket. Secure with bolt and lock nut torqued 3.2 kg-m (23 ft-lb).

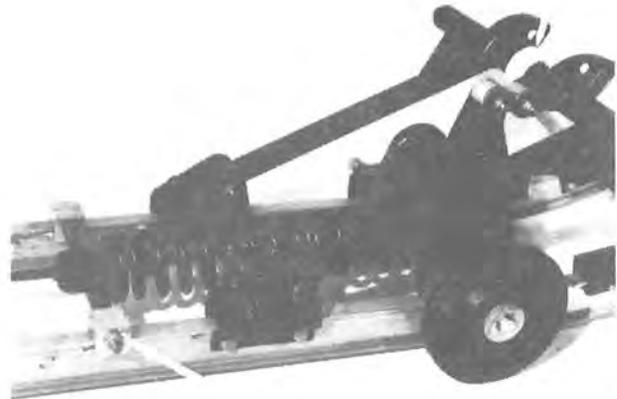
Fig. 7-31



088

- Place spacer into rear shock absorber eyelet. Attach shock absorber preload adjustment fork and securing blocks to rear of shock absorber and slide rails. Secure with long bolt and lock nut. Place a spacer on either side of the fork.

Fig. 7-32



089

- Position center crossbrace on slide rails. Guide threaded shock absorber adjustment stud through guide tube of crossbrace. Make sure that a nut and washer are located on the adjustment stud before it enters the guide tube. Align the crossbrace mounting holes with those in the slide rails and secure with four bolts and lock nuts. Torque nuts to 1.5 kg-m (11 ft-lb).

Fig. 7-33



071

- Adjust preload on skid frame forward shock absorber by rotating the adjustment nut clockwise or counterclockwise, until 18-25 mm ( $\frac{3}{4}$ " to 1") of threads is exposed behind the rear jam nut. Lock the adjustment with the jam nut behind the guide tube.

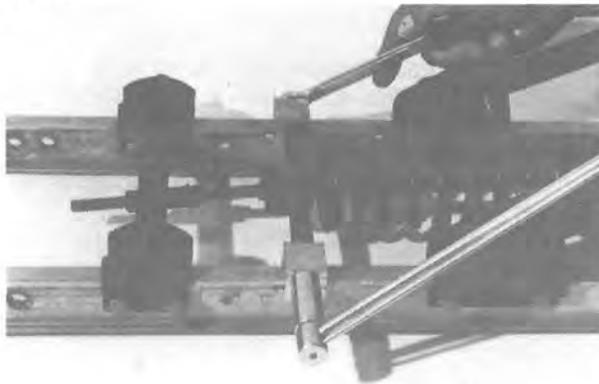
Fig. 7-34



090

15. Lock adjustment blocks securely in position. Torque adjustment block bolt to 3.2 kg-m (23 ft-lb).

Fig. 7-35



091

16. Slide center idler wheel axle into position. Position washers and idler wheels on axle. Secure wheels to axle using larger washer and cap screws. Torque cap screws to 1.5 kg-m (11 ft-lb).

Fig. 7-36



070

17. Assemble rear arm by placing its axle and bushings into the lower mounting crossbrace. Position arm between slide rails and secure with two bolts and lock washers. Torque bolts to 3.2 kg-m (23 ft-lb).

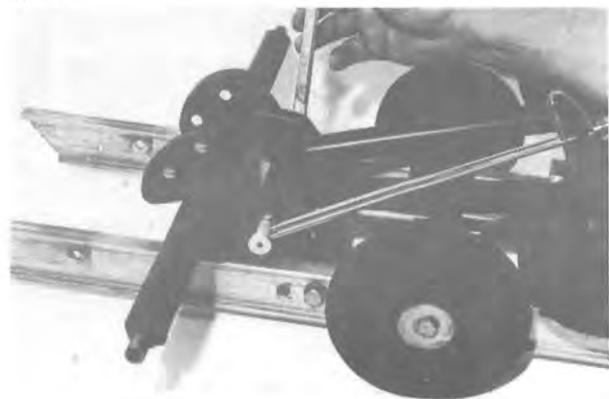
Fig. 7-37



068

18. Place axle and bushings into the upper idler arm mounting tube and secure the upper arm to the lower arm with a bolt and lock nut torqued to 3.2 k-gm (23 ft-lb). Assemble upper idler shaft and wheels to tube along with outer spacers and washers.

Fig. 7-38



092

19. Secure the rear axle housings to the rails using four bolts and two lock nuts. Align the rear rail support with the forward mounting bolts. Place lock nuts on the bolts. Torque bolts and lock nuts to 1.5 kg-m (11 ft-lb). Be sure that the wide portion of the axle bushings are positioned "out" on each rail.

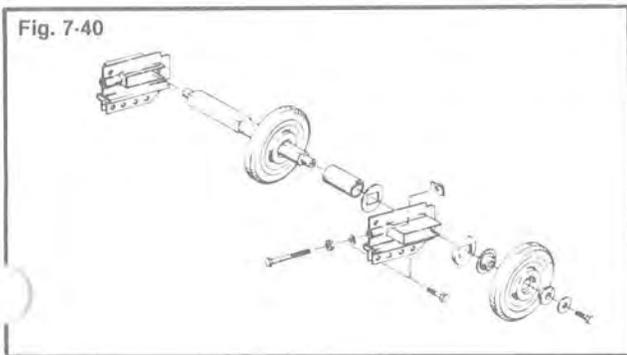
Fig. 7-39



093

- Slide the rear axle halfway into position. Install center spacer, center idler wheel, and remaining spacer on axle. Push axle through remaining axle housing.

Fig. 7-40



- Slide outer idler wheels and washer into position. In order on each axle end, install a washer, and cap lock screw. Torque cap screws to 1.5 kg-m (11 ft-lb).
- Apply grease to the inside of the wear strip mounting channel and the rails. Using a rubber or plastic hammer, drive the wear strips into position from the rear of the rails. Secure strips with two machine screws and lock nuts.

Fig. 7-41



- Place an end cap into position on the end of each slide rail; then secure with a bolt and lock nut. Torque to 1.5 kg-m (11 ft-lb).

## Installing Skid Frame (El Tigre-Pantera-Cougar)

- Tip snowmobile onto one side using a piece of cardboard to protect against scratching.
- Pull track away from the tunnel and install skid frame. Slide inner axles through front and rear arms of skid frame.

**NOTE: Track adjustment bolts must be in loosest position.**

- Move front of skid frame into position with front mounting hole in the tunnel. Slide lock washer onto bolt; then secure front arm to tunnel. Thread bolt in only halfway. **DO NOT TIGHTEN AT THIS TIME.**

Fig. 7-42



B411

**NOTE: To aid in centering front arm with holes in tunnel, position skid frame and track at a 45 degree angle to bottom of tunnel.**

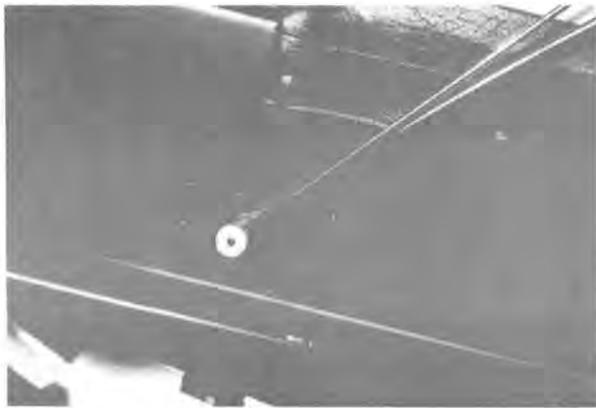
- Slide the skid frame and track into the tunnel.
- Tip the snowmobile onto the opposite side and secure front arm to tunnel using step 3.
- Move rear arm into position with rear mounting holes in tunnel. Slide lock washer onto bolt; then secure rear arm to tunnel. Thread in only halfway. **DO NOT TIGHTEN AT THIS TIME.**

**NOTE: Rear arm of skid frame may not align with mounting holes in tunnel. To obtain proper alignment of rear arm, drive the arm in the proper direction until alignment is obtained.**

- Again tip the snowmobile onto the opposite side and fasten rear arm to tunnel using step 6.

- Tighten mounting bolts to 3.2 kg-m (23 ft-lb).

Fig. 7-43



B409

- Tighten the two track-tension adjustment bolts. Tighten evenly until track deflection is within specifications; then lock jam nuts to secure adjustment.

**NOTE:** The bolts securing the rear idler wheels must be loosened when adjusting track tension. Be sure to tighten after making the adjustment.

Track Tension	mm	in.
New (100 miles or less)	13-19	1/2 - 3/4
Old (100 miles or more)	25-32	1-1 1/4

- Set rear bumper up on a support stand, taking all pressure off the skid frame. Install the rear shock absorbers and secure with washers and cap screws. Torque cap screws to 1.1 kg-m (8 ft-lb).
- Install rear shock absorber covers.
- Check track tension and alignment; adjust if necessary.
- Adjust suspension.

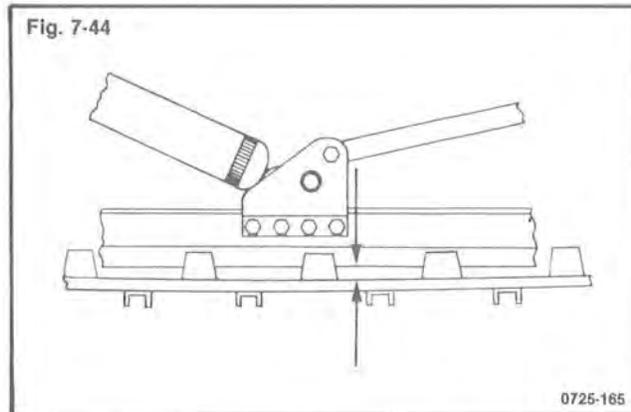
## Track Tension



Shut engine off and make sure ignition switch key is in the OFF position.

- Raise the rear of the snowmobile off the floor.
- Using moderate pressure (9 kg or 20 lb), press track down at mid-span and measure distance between bottom of the wear-strip and inside surface of the track. Track deflection must be within specifications.

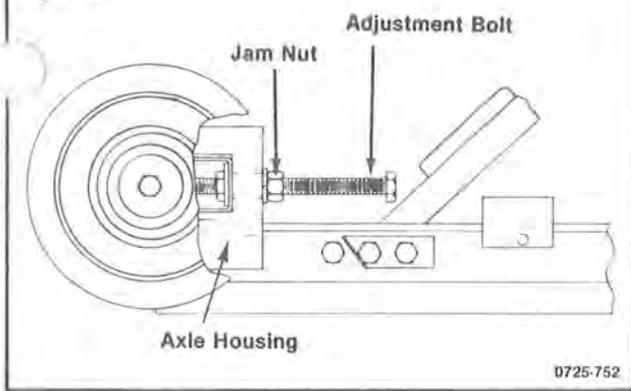
Track Tension	mm	in.
New (100 miles or less)	13-19	1/2 - 3/4
Old (100 miles or more)	25-32	1-1 1/4



**NOTE:** When the track is new, it will stretch slightly and take a "set" within the first 100 miles of operation.

- If measurement is not as specified, loosen the jam nuts of the adjustment bolts; then loosen the bolts securing the rear idler wheels.

Fig. 7-45



4. If measurement obtained in step 2 is more than specified, tighten adjustment bolts. If measurement obtained is less than specified, loosen adjustment bolts. When measurement is within specified range, lock adjustment by bottoming the jam nuts against the axle housings. Tighten the rear idler wheel bolts.

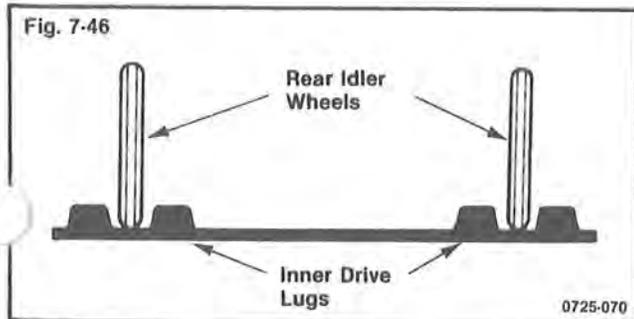
**NOTE:** Slide your hand along the inside of the tunnel and vigorously push the underside of the track up and down. Track must not hit top of tunnel or slap skid frame.

5. After correct track tension is obtained, check track alignment.

**NOTE:** Track tension and track alignment are interrelated; always check both even if only one adjustment seems necessary. Always establish correct track tension before checking and/or adjusting alignment.

## Track Alignment

Proper track alignment is when the rear idler wheels are equidistant from the inner drive lugs on the inside surface of the track.



1. Using a shielded safety stand, raise the rear of the snowmobile off the floor making sure the track is free to rotate.



**WARNING**



The tips of the skis must be positioned against a wall or similar object for safety.

2. Start the engine and accelerate slightly. Use only enough throttle to turn the track several revolutions. SHUT ENGINE OFF.

**NOTE:** Allow the track to coast to a stop. DO NOT apply the brake because it could produce inaccurate alignment conditions.

3. When the track stops rotating, check the relationship of the rear idler wheels and the track inner drive lugs. If the distance from the idler wheels to the inner drive lugs is the same on both sides, no adjustment is necessary.
4. If the distance from the idler wheels to the inner drive lugs is not the same on both sides, proceed to step 5.
5. On the side of the track which has the inner drive lugs closer to the rear idler wheel, loosen the adjustment bolt jam nut and both rear idler wheel bolts; then rotate the adjustment bolt clockwise 1-1½ turns.
6. Check track alignment and make necessary adjustments until proper alignment is obtained.

**NOTE:** Make sure correct track tension is maintained after adjusting track alignment.

7. After proper track alignment is obtained, lock adjustment bolt jam nut against the axle housing and tighten the rear idler wheel bolts.
8. Field test the track under actual conditions.
9. After the field test, check track alignment and track tension; adjust if necessary.

**7**

## Adjusting Suspension

The suspension has been designed to provide the operator with the best possible handling and ride with the least amount of adjustment and maintenance.

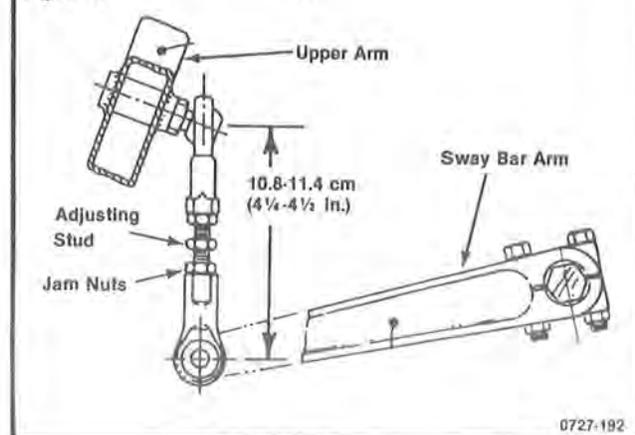
Under most conditions, little change in suspension adjustment will be required from the initial set-up at the factory. If, however, the customer feels a suspension change is necessary to fit his or her driving style, use the following instructions.

### ADJUSTING SWAY BAR LINKAGE

The sway bar linkage adjustment is used to level the front end assembly. It has been preset during manufacturing and shouldn't need any adjustment unless disassembly should become necessary. Use the following procedure for reassembly and adjusting of the sway bar linkage.

1. Set a support stand under the front belly pan to take pressure off the skis.
2. If the sway bar linkage has been removed from the snowmobile, measure its length from the center of the upper ball joint to the center of the lower ball joint hole. It must measure between 10.8 and 11.4 cm (4¼ and 4½ in.). To adjust, loosen the jam nuts on the adjustment stud and rotate the adjustment stud until the desired center-to-center distance is obtained. Adjust the linkage for the other side using the same procedure.
3. With both linkages preadjusted, install them on the snowmobile. Apply LOCTITE LOCK N' SEAL to the upper ball joint stud threads and secure to upper arm.
4. Using the bolt and nut, secure the lower portion of the linkage to the sway bar arm. Tighten to 2.9-3.6 kg-m (21-26 ft-lb).
5. Remove support stand from front end assembly and place the snowmobile on a level floor.
6. Position a level or angle finder on the engine cylinder head to check the levelness of the snowmobile.
7. If the snowmobile isn't level, make the final adjustment to either of the linkages to level the snowmobile. Be sure to lock all linkage jam nuts after completing the adjustment.

Fig. 7-47



### ADJUSTING SKID FRAME PRE-LOAD (El Tigre, Pantera, and Cougar)

The pre-load adjustment has been set at the factory for best handling and ride under normal trail riding conditions. Arcticco recommends that 18-25 mm (¾-1 in.) of thread be exposed behind the rear jam nut as an initial setting. If hard or fast riding is done over very rough trails, more pre-load may be desired. To increase pre-load follow these steps:

1. Loosen shock mounting bolt and nut.
2. Loosen the jam nut; then rotate adjusting nut clockwise to increase pre-load and counter-clockwise to decrease pre-load.

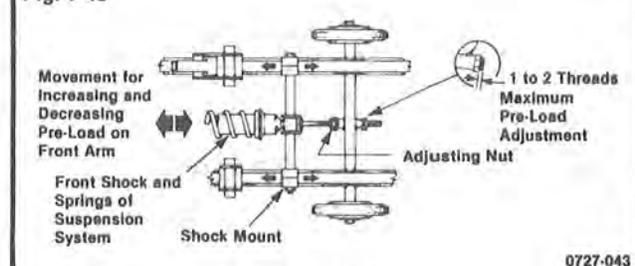
**NOTE:** The pre-load must not be set so that less than 1 to 2 threads are exposed behind the rear jam nut.

#### CAUTION

If pre-load is excessive, damage to the shock may occur. If pre-load is insufficient, damage to the tunnel may occur.

3. After pre-load is set, tighten the bolt and nut to 3.4 kg-m (23 ft-lb).
4. Have the owner test drive to ensure the proper adjustment.

Fig. 7-48

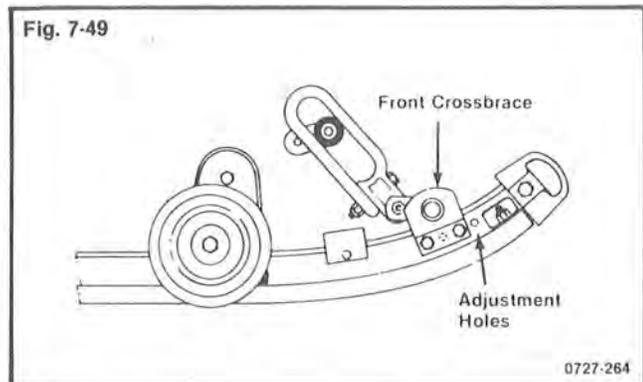


If more ski pressure is desired, once you have reached the maximum pre-load, use the following procedure:

Loosen the shock mounting bolt and return the shock pre-load adjustment back to the original recommended setting.

2. Remove the bolts securing the front cross-brace to the rails.

**NOTE:** The front crossbrace is initially assembled at the factory in the last adjustment holes of the skid frame (the best position for most trail riding conditions).



Move the front crossbrace forward one position on the rails; then install the bolts. Torque to 3.2 kg-m (23 ft-lb).

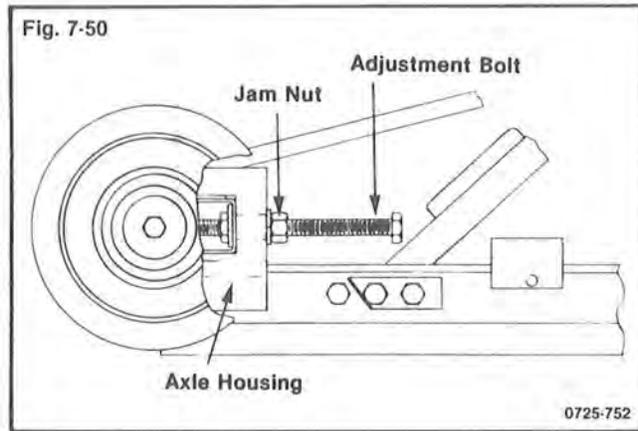
4. Secure the pre-load adjustment (shock mounting bolt and jam nut). Torque to 3.2 kg-m (23 ft-lb).
5. Test drive the snowmobile and fine tune the suspension using the pre-load adjustment.

## Adjusting Rear Shocks (El Tigre)

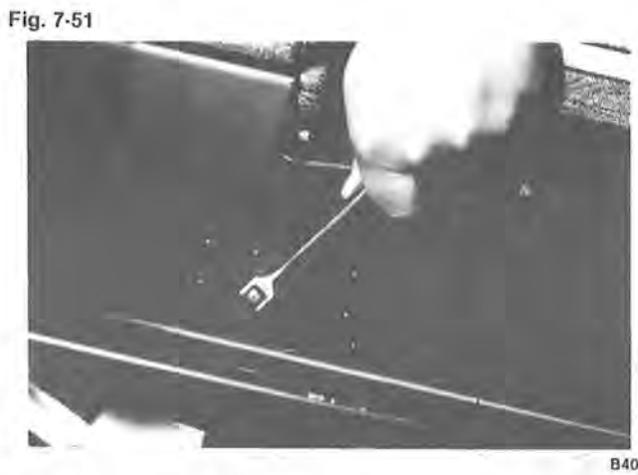
The rear shocks are adjustable on the El Tigre model. The shocks can be adjusted in five steps adding pre-load to the springs for different-weight riders. The cam adjusters on the shocks should be adjusted so the rider cannot bottom out the suspension. To check for proper adjustment, have the customer stand on the rear of the footrest area and bounce hard several times. Observe suspension travel, if the suspension reaches the limit of its travel, adjust the cam adjuster on each shock to the next step and repeat procedure. Suspension is adjusted correctly when only 1/2 to 3/4 of the total travel is used.

## Removing Skid Frame (Cheetah)

1. Loosen the two track-tension adjustment bolts.



2. Remove the four bolts and lock washers securing the skid frame to the tunnel.



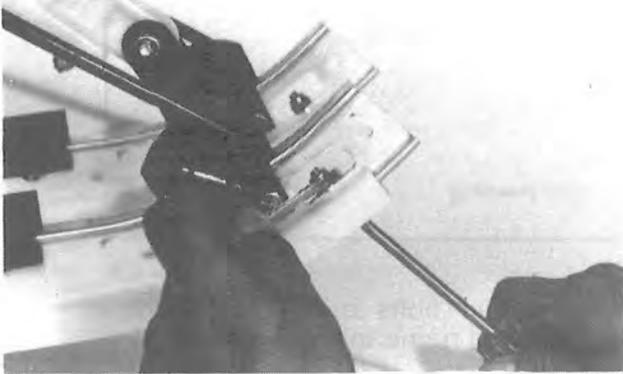
3. Tip the snowmobile onto one side. Use a piece of cardboard to protect against scratching.
4. Remove the skid frame.

**NOTE:** When removing the Cheetah skid frame, it isn't necessary to unlock or disconnect the rear suspension springs.

## Disassembling Skid Frame (Cheetah)

1. Remove the bolts and lock nuts securing the end caps to the rails; then remove the end caps.
2. Remove the lock nuts and machine screws securing the wear strips to the rails.

Fig. 7-52



AG058

3. Using a piece of wood and a hammer, drive the wear strips off the slide rails.

Fig. 7-53



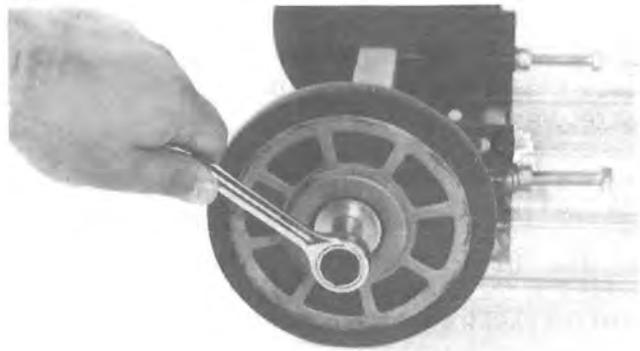
064

### ● CAUTION ●

Be sure to use a piece of wood or a rubber hammer to remove the wear strips from the rails. If a steel hammer is used, the bottom of the rails may be nicked and damaged.

4. Remove the cap-lock bolts and large washers securing rear idler wheels to rear axle.

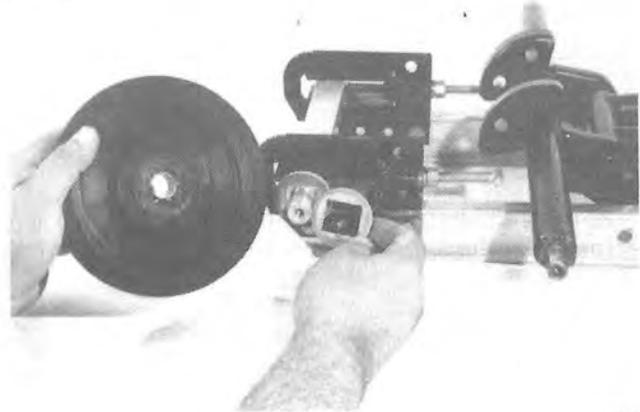
Fig. 7-54



065

5. Slide the rear idler wheels and spacer washers off the rear axle.

Fig. 7-55

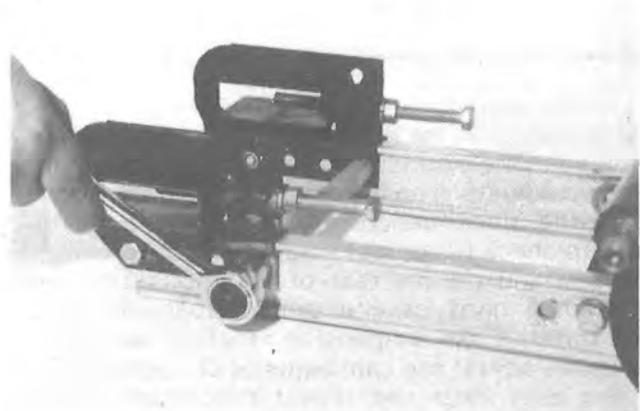


066

6. Remove the axle from the axle housing.

7. Remove the four bolts and lock nuts securing the axle housings; then slide the housings off the rails.

Fig. 7-56



067

**NOTE:** Be sure to note the location of the rear rail support when removing axle housings. Support must be located between front mounting holes.

8. Remove the two cap screws securing the forward spring support brackets and rollers to the idler wheels. Grasp the spring and retaining bracket and slide the bracket off the idler wheel shaft.

Fig. 7-57



**NOTE:** By following step 8, the spring tension can easily be removed from the rear suspension spring. Spring tension may also be reduced by removing the spring from the rear adjustment block using special tool (p/n 0144-311).

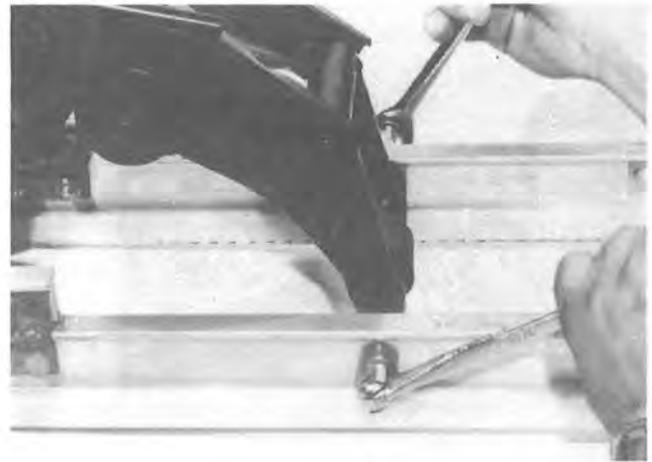
9. Remove the two cap screws securing the shock absorber to the rear arm. Remove the shock absorber.

Fig. 7-58



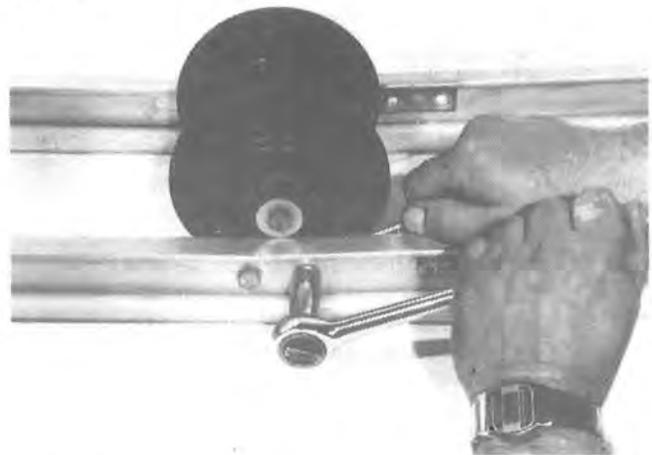
10. Remove the bolt securing the rear arm to the slide rails. Slide the rear arm back off the rails.

Fig. 7-59



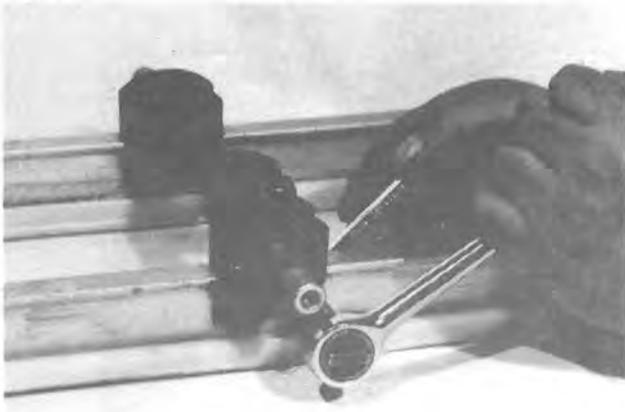
11. Remove the single bolt securing the two rear idler arm pieces together; then separate pieces. Account for inner axles.
12. Remove the cap screws securing the rear arm stops to the rails and remove stops.
13. Remove the four bolts and lock nuts securing the rear idler wheels to the rails. Remove idler wheel support brackets, shaft, wheels, and spacers from between the skid frame rails.

Fig. 7-60



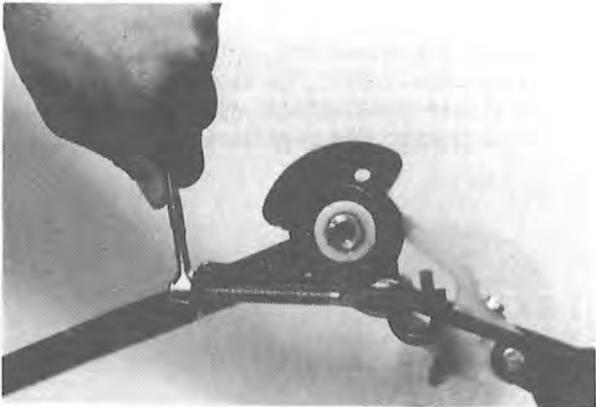
14. Remove the four bolts and nuts securing the center idler wheel crossbrace to the rails. Slide the crossbrace off the rear of the rails.

Fig. 7-61



15. Remove the nuts securing the front suspension spring eyebolts; then remove the eyebolts. Slide the front springs off the front arm.

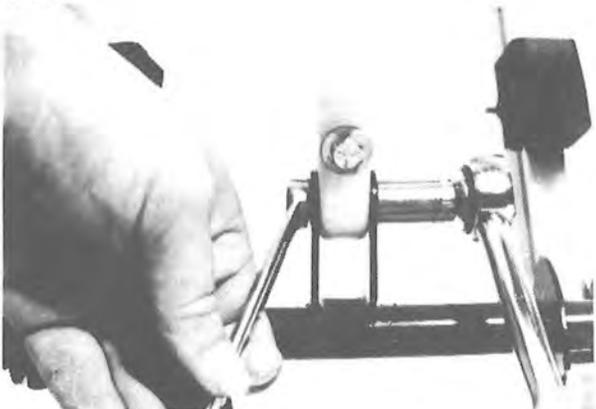
Fig. 7-62



B234

16. Remove the bolt and lock nut securing the front-arm stop to the front crossbrace. Remove the bolt, washers, and lock nut securing the front-arm stop to the front arm; then remove the front-arm stop.

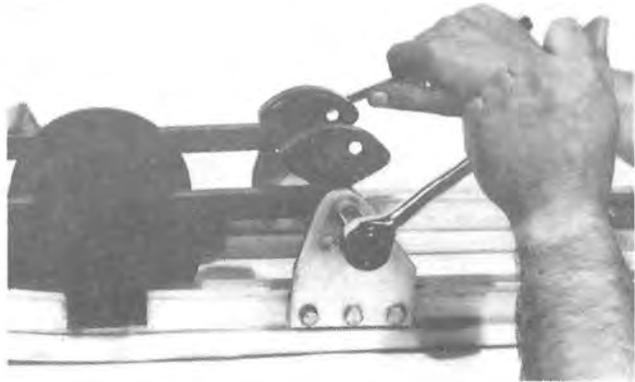
Fig. 7-63



B128

17. Remove the bolt and lock nut securing the front arm to the front arm mounting brackets. Remove the arm and account for axles.

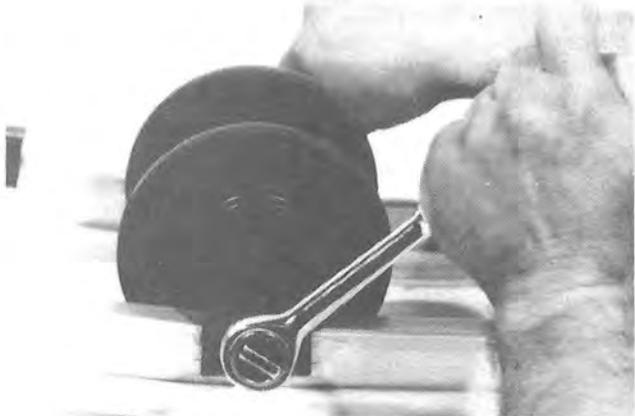
Fig. 7-64



18. Remove the four bolts and lock nuts securing the front-arm brackets to the slide rails; then remove brackets.

19. Remove the four bolts and nuts that secure the front idler wheel brackets. Remove brackets, wheels, spacers, and axles.

Fig. 7-65



20. Remove the four bolts and lock nuts securing the front crossbrace to the slide rails. Slide the crossbrace off the front of the rails.

21. Remove the push nuts and pins securing the front shock pads to the slide rails; then remove the pads.

## Cleaning Skid Frame (Cheetah)

1. Wash all metallic components in parts-cleaning solvent and dry with compressed air.
2. Wash all plastic parts in detergent soap and hot water; then dry thoroughly.
3. Sand and apply paint to all rusted or chipped areas.

## Inspecting Skid Frame (Cheetah)

**NOTE:** It is very important that a close inspection is made on all parts. Simple cleaning isn't enough as this area involves safety of the operator. All welded areas should be closely inspected for any signs of cracking or fatigue. All mounting holes should be checked for wear. All lock nuts should be replaced and torqued to specifications. Inspect all bushings, axles, and mounting brackets for wear and cracks. If a part appears questionable, replace the part.

1. Inspect all mounting bolts for any signs of thread damage, bending, stretch, and wear. If any of these conditions are found, replace the bolt.
2. Inspect all axles for signs of cracking or wear. Check each axle for tightness in its bushings.
4. Inspect front and rear arms in welded areas and entire length for any signs of cracks. Replace arms if any cracks are found.
5. Inspect all idler wheel bearings. Turn each bearing by hand and check for smoothness. If a bearing feels rough, replace the wheel and bearing as a set.
6. Inspect all idler wheel mounting axles for straightness.  
Inspect all springs for abnormal bends or cracks.
8. Inspect all mounting brackets for bending, wear, and cracks.

9. Inspect the skid-frame rails for unusual bends.

## Assembling Skid Frame (Cheetah)

1. Slide the front shock pads into position. Install pins and secure with push nuts.
2. Slide the front crossbrace into the rail from the front and secure with four bolts and new lock nuts. Torque to 2.4 kg-m (17 ft-lb).

Fig. 7-66



082

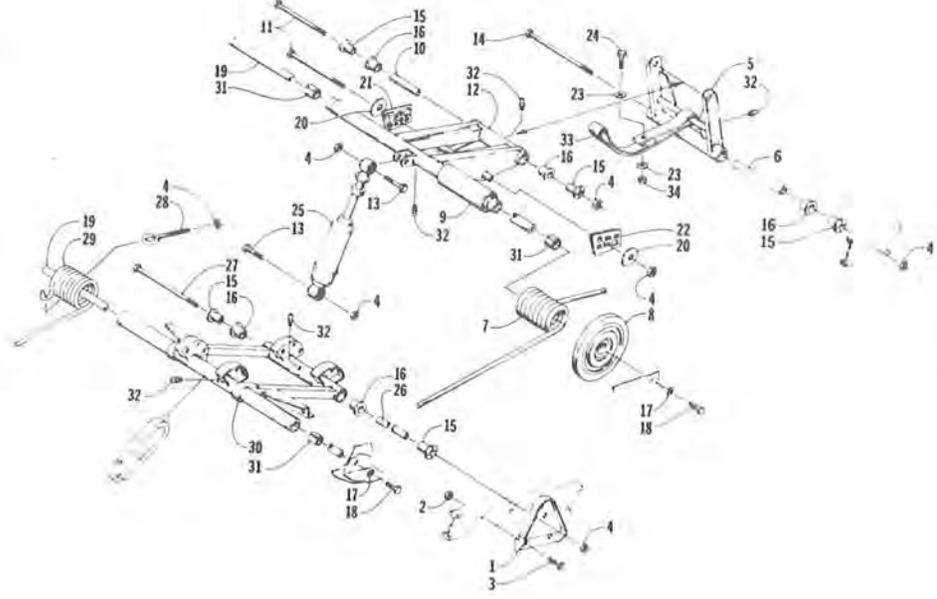
3. Install the front idler wheels, spacer, washers, axles, and mounting brackets. Secure the mounting brackets to the rails with four bolts and lock nuts torqued to 2.4 kg-m (17 ft-lb).
4. Install the front arm mounting brackets. Secure with four bolts and lock nuts torqued to 2.4 kg-m (17 ft-lb).
5. Position axles and spacer into the lower front arm mounting tube and place between mounting brackets. Secure the front arm to the mounting brackets with a long bolt and new lock nut torqued to 4.2 kg-m (30 ft-lb).
6. Secure the front-arm stop to the front arm with bolt, two washers, and lock nut. Nut should be positioned on bottom side of front-arm stop. Torque the bolt to 1.1 kg-m (8 ft-lb).

7

Fig. 7-67

**KEY**

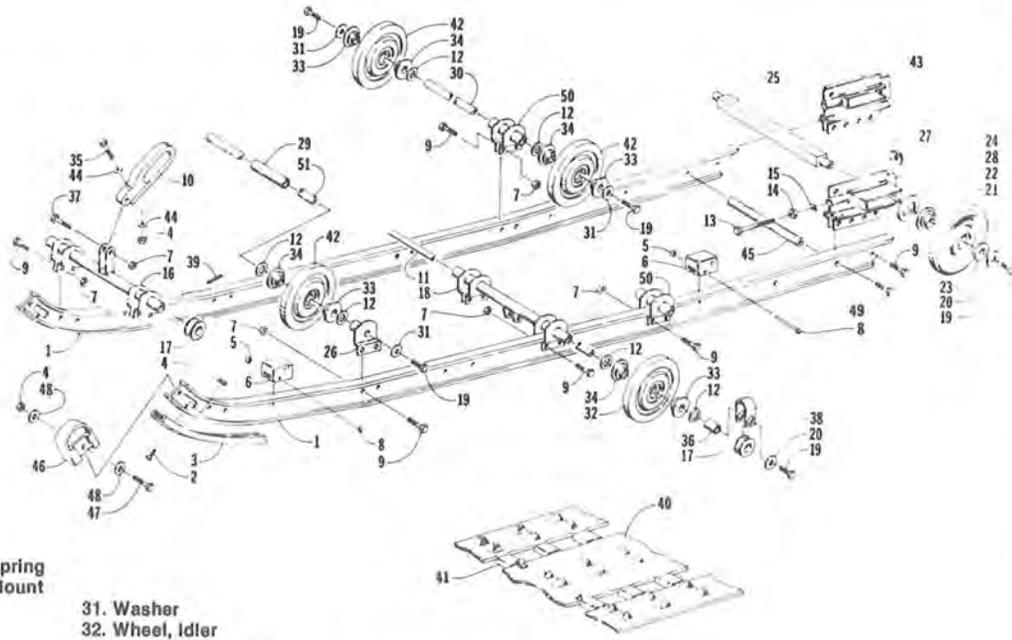
- 1. Bracket, Front Arm
- 2. Nut, Lock
- 3. Screw, Cap
- 4. Nut, Lock
- 5. Arm, Rear
- 6. Axle
- 7. Spring, Rear
- 8. Wheel, Idler
- 9. Sleeve, Spring
- 10. Axle, Idler Arm
- 11. Screw, Cap
- 12. Arm, Idler
- 13. Screw, Cap
- 14. Screw, Cap
- 15. Axle, Serrated
- 16. Bushing
- 17. Washer, Lock
- 18. Screw, Cap
- 19. Axle, Inner
- 20. Washer
- 21. Block, Adjustment
- 22. Block, Adjustment
- 23. Washer, Flat
- 24. Screw, Cap
- 25. Shock Absorber
- 26. Axle, Front Arm
- 27. Screw, Cap
- 28. Eyebolt
- 29. Spring, Front
- 30. Arm, Front
- 31. Bearing
- 32. Fitting, Grease
- 33. Strap, Limiter
- 34. Nut, Lock



0727-280

**KEY**

- 1. Rail, Formed
- 2. Screw, Machine
- 3. Strip, Wear
- 4. Nut, Lock
- 5. Nut, Push
- 6. Pad, Shock
- 7. Nut, Lock
- 8. Rivet, Solid
- 9. Screw, Cap
- 10. Stop, Arm
- 11. Axle, Inner
- 12. Washer
- 13. Screw, Cap
- 14. Nut, Hex
- 15. Washer, Lock
- 16. Crossbrace, Front
- 17. Roller, Suspension Spring
- 18. Crossbrace, Shock Mount
- 19. Screw, Cap-Lock
- 20. Washer
- 21. Wheel, Idler
- 22. Insert, Wheel
- 23. Insert, Wheel
- 24. Housing, Rear Axle
- 25. Axle, Rear
- 26. Support, Aux'l. Wheel
- 27. Plate/Nut
- 28. Washer, Rectangular
- 29. Spacer
- 30. Axle, Idler Wheel
- 31. Washer
- 32. Wheel, Idler
- 33. Insert, Wheel
- 34. Insert, Wheel
- 35. Screw, Cap
- 36. Tube, Spring Roller
- 37. Screw, Cap
- 38. Strap, Spring Retainer
- 39. Pin, Spring
- 40. Track Assembly
- 41. Clip, Guide
- 42. Wheel, Idler
- 43. Housing, Rear Axle
- 44. Washer
- 45. Support, Rear Rail
- 46. Nose Piece, Rail
- 47. Screw, Cap
- 48. Washer, Flat
- 49. Screw, Cap
- 50. Bracket, Aux'l. Wheel
- 51. Axle, Inner



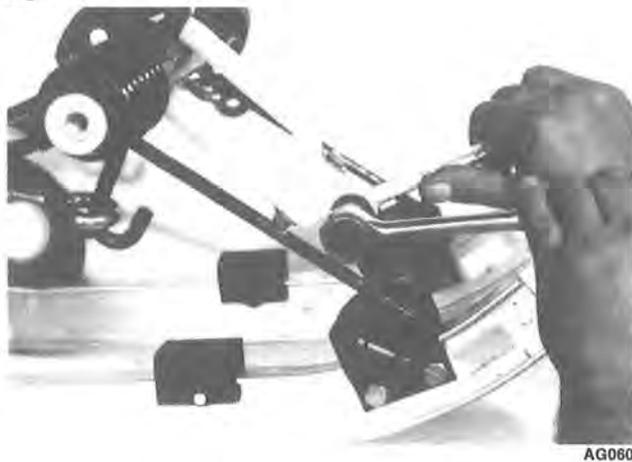
0727-278

Fig. 7-68



7. Secure the front arm stop to the crossbrace with a bolt and lock nut torqued to 1.1 kg-m (8 ft-lb). Check to make sure the stop is free to pivot.

Fig. 7-69

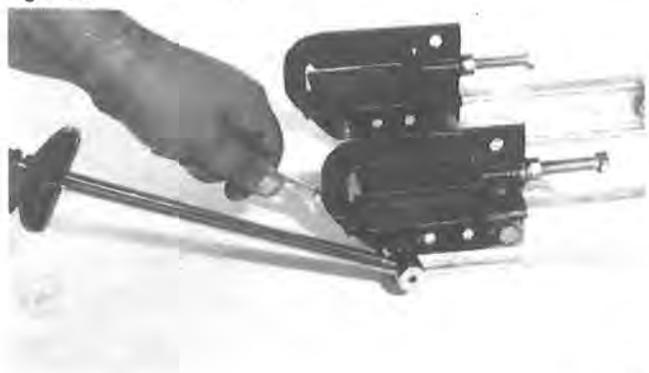


8. Place front springs into position on front arm and on front crossbrace rollers. Attach eyebolts to springs and secure eyebolts to front arm with lock nuts. Tighten so 12 mm (½ in.) of thread shows behind the nut.
9. Slide the center crossbrace onto the rear of the rails and into position. Secure with four bolts and lock nuts torqued to 2.4 kg-m (17 ft-lb). **DO NOT INSTALL THE IDLER WHEELS AT THIS TIME.**
10. Position the center idler wheel mounting brackets into position on the slide rails and secure with four bolts and lock nuts torqued to 2.4 kg-m (17 ft-lb).
11. Lubricate the center idler wheel axle with a good low-temperature grease and start into either of the mounting brackets. Arrange a washer, idler wheel, washer, spacer, washer, idler wheel, and washer onto the axle and

slide axle through all components and remaining mounting bracket. Secure with two large flat washers and cap screws torqued to 2.4 kg-m (17 ft-lb).

12. Place the rear shock pads into position and secure to the slide rails.
13. Assemble the axles and spacer in the upper rear arm and slide into position on lower arm. Secure upper arm to lower arm with a single long bolt and lock nut torqued to 4.2 kg-m (30 ft-lb).
14. Slide the rear arm assembly into position from the rear of the rails. Secure to the rails with a single long bolt and lock nut torqued to 4.2 kg-m (30 ft-lb).
15. Place the rear arm limiter strap around the bottom and upper arm. Secure strap with a flat washer on each side of the strap and a bolt and lock nut. Torque the lock nut to 1.1 kg-m (8 ft-lb).
16. Place the rear shock into position and secure to upper rear arm and center crossbrace with two bolts and lock nuts torqued to 4.2 kg-m (30 ft-lb).
17. Place the rear suspension springs onto the rear arm. Press the rear idler wheel into position on the rear arm.
18. Place the rear spring onto the adjustment block. Grasp the long portion of the spring and place it along with its roller and retainer on the center idler wheel shaft. Secure idler wheels and spring retainer to axle with cap screws torqued to 2.4 kg-m (17 ft-lb).
19. Slide the rear axle housings onto the slide rails and secure with four cap screws and lock nuts torqued to 2.4 kg-m (17 ft-lb). Be sure the wide portion of the axle housings are positioned out on each rail.

Fig. 7-70



093

20. Slide the rear axle through the housing; then position a spacer washer on either end of the axle and slide the rear idler wheels into position. Secure the idler wheels to the rear axle with two bolts and cap screws torqued to 2.4 kg-m (17 ft-lb).
21. Apply grease to the rails and wear strips; then using a hammer and a block of wood, drive the wear strips into position from the rear of the rails. Secure wear strips with two machine screws and lock nuts.
22. Place an end cap into position on the end of each slide rail; then secure with a bolt and lock nut. Torque to 1.5 kg-m (11 ft-lb).
23. Using a low-temperature grease, lubricate all grease fittings.

## Installing Skid Frame (Cheetah)

1. Tip snowmobile onto one side using a piece of cardboard to protect against scratching.
  2. Pull track away from the tunnel at a 45 degree angle and install skid frame. Slide inner axles through front and rear arms of skid frame.
  3. Move the front arm into position with front mounting hole in tunnel. Slide lock washer onto bolt; then secure front arm to tunnel. Thread bolt in only halfway. **DO NOT TIGHTEN AT THIS TIME.**
  4. Slide the skid frame and track into the tunnel.
  5. Tip the snowmobile onto the opposite side and secure front arm to tunnel using step 3.
  6. Swing the rear of the frame into position and secure rear arm to tunnel with remaining two bolts; then set the snowmobile upright and torque all four mounting bolts to 3.2 kg-m (23 ft-lb).
- NOTE:** If the rear arm doesn't align with its mounting holes, it can be pried forward using a long bar. Place the bar against upper track wear clip and arm.
7. Check and adjust track alignment and tension.

## Adjusting Suspension (Cheetah)

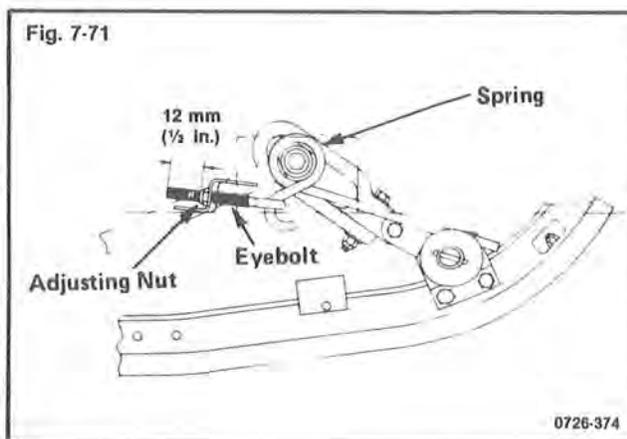
The suspension should be adjusted for the operator and normal average load. The rear springs should be adjusted for the weight and riding preference of the operator. The optimum adjustment on the rear springs prevents the suspension from "bottoming out" on all but the most severe bumps. The springs should not be adjusted so stiffly that the suspension will not work properly under normal conditions. A good test of a properly adjusted suspension is the operator should just be able to "bottom" the suspension when jumping up and down on the rearmost part of the running board.

The front spring adjustment primarily influences the way the snowmobile performs in snow and the effort required to steer the snowmobile. The optimum setting for the front spring (when spring tension is sufficiently stiff to prevent the suspension from collapsing in deep snow but not so stiff that steering becomes ineffective) is when 12 mm ( $\frac{1}{2}$  in.) of thread is apparent behind each lock nut.

### FRONT SPRING

To adjust spring tension, tighten or loosen the lock nut on the eyebolt connected to the spring until desired tension is attained.

Perform this procedure on both sides to maintain equal adjustment on both springs.



**NOTE:** When the lock nut is tightened spring tension is increased; when the lock nut is loosened, spring tension is decreased.



## WARNING



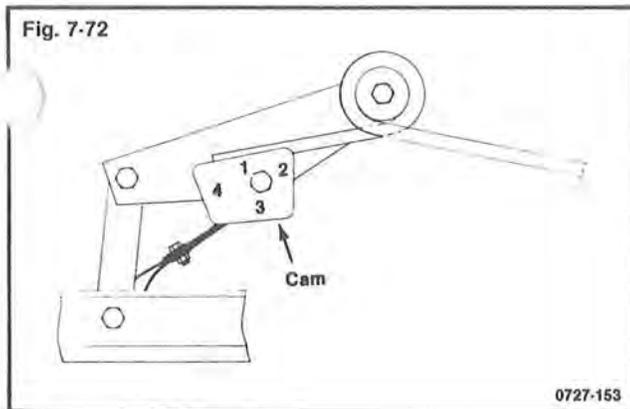
At least two threads must be maintained on the eyebolt behind the lock nut. Failure to maintain this distance may result in personal injury.

### REAR SPRING

Rear spring tension adjustment is accomplished by rotating the adjustment cam. Each cam is numbered 1-4 for easy identification with position 4 providing the stiffest ride and position 1 for the light driver or slow speed trail driving. Positions 2 and 3 are for the average operator under normal conditions with position 3 providing the stiffer ride.

To rotate the cam, insert the handle from the spark-plug wrench into one of the holes in the adjustment cam. Rotate the handle until the cam is in the desired position. Make the adjustment on the other cam making sure both cams are adjusted equally.

Fig. 7-72



## CAUTION

**DO NOT** rotate the adjustment cam directly from position 1 to position 4. Always adjust in numerical sequence. Cam failure or damage may result if the cam is rotated directly from position 1 to position 4.



# SECTION 8 — RECOIL STARTER

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## Removing

1. Tie a slipknot in the recoil rope below the console and allow the rope to slowly retract against the recoil case.
2. Remove the knot at the handle and remove the handle; then thread rope through the recoil bushing in the console.
3. Remove the four bolts and lock washers securing recoil assembly to the magneto-case cover.

## Disassembling

1. Clamp the recoil in a vise.
2. Rotate the recoil roller counterclockwise until the notch of the roller is near the recoil rope guide in the case. Guide the rope into the notch and slowly allow the roller to retract until all recoil spring tension is released.

Fig. 8-1



B522

3. While exerting downward pressure on the drive plate, remove the nut and washer.

Fig. 8-2



B523

4. Slowly release the drive plate and lift the drive plate w/spring clip free of the recoil roller.
5. Remove the spring clip from the drive plate.

Fig. 8-3



B524

6. Remove the pawl; then remove the pawl spring.

Fig. 8-4



B525

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

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

**NOTE:** Do not remove the recoil spring unless replacement is necessary. It should be visually inspected in place to save time.

- Unwind the rope from the recoil roller, untie the knot, and remove the rope.

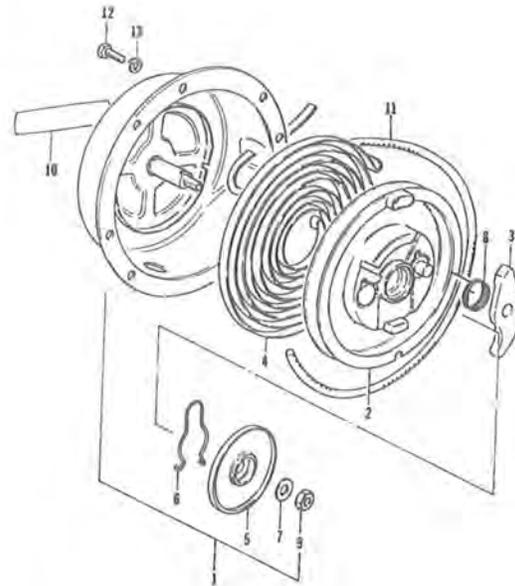
## Inspecting

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

- Inspect all springs, washers, and pawl for wear or damage.
  - Inspect the recoil roller and case for cracks or damage.
- Inspect the center hub for wear, cracks, or damage.
- Inspect the recoil rope for breaks or fraying.
- Inspect the recoil spring for cracks, crystallization, or abnormal bends.
- Inspect the handle for damage, cracks or deterioration.

## Assembling

Fig. 8-5



### KEY

- |                            |                 |
|----------------------------|-----------------|
| 1. Recoil Starter Assembly | 8. Spring       |
| 2. Roller                  | 9. Nut          |
| 3. Pawl                    | 10. Decal       |
| 4. Spring                  | 11. Rope        |
| 5. Drive Plate             | 12. Bolt        |
| 6. Spring Clip             | 13. Lock Washer |
| 7. Washer                  |                 |

0720-152

- Hook the end of the recoil spring around the mounting lug in the recoil case.
- Insert the recoil spring into the recoil case winding it in a counterclockwise direction until the complete recoil spring is installed.

**NOTE:** Recoil spring must seat evenly in the recoil case.

- Insert the rope through the hole in the recoil roller and tie a knot in the end; then wrap rope counterclockwise around roller leaving about 1/2 m (20 in.) of rope free of roller.
- Apply a low-temperature grease to the spring and hub.
- Align the hook in the end of the recoil spring with the notch in the recoil roller.

6. Carefully slide the recoil over hub and engage the spring with the roller.
7. Install the pawl spring making sure the end is properly installed in the hole in the recoil roller; then install the pawl making sure the pawl spring is properly preloaded.

Fig. 8-6



B525

8. Slide end of recoil rope through rope guide of the case; then tie a slipknot in the recoil rope.
9. Place the spring clip into position on the drive plate making sure the head of the clip is opposite the flat of the inner hole. Apply a low-temperature grease to the drive plate.

Fig. 8-7

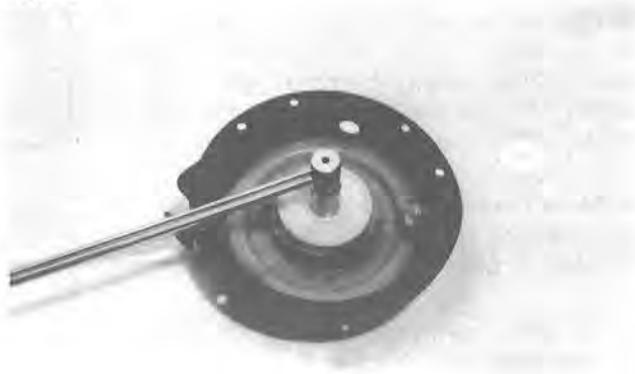


B524

10. Place the drive plate into position making sure the flat of the inner hole is correctly positioned in the hub; then secure drive plate with washer and nut. Tighten to 1.0 kg-m (7 ft-lb).

**NOTE: Apply LOCTITE LOCK N' SEAL (red) to the threads before installing.**

Fig. 8-8



B526

11. With about ½ m (20 in.) of rope exposed, hook the rope in the notch of the recoil roller.
12. Rotate the recoil roller four or five turns counterclockwise; then release the recoil rope from the notch and allow the rope to retract.
13. Pull recoil rope out two or three times to check for correct tension.

**NOTE: Increasing the rotations in step 12 will increase spring tension; decreasing the rotations will decrease spring tension.**

## Installing

1. Place recoil assembly into position against the magneto case.
2. Secure recoil with four bolts and lock washers. Tighten to 0.7 kg-m (5 ft-lb).

**NOTE: Before tightening the bolts, slowly pull recoil rope until the pawl engages; then tighten bolts. This will center the recoil on the magneto case.**

3. Thread recoil rope through recoil bushing in the console and install the handle. Secure with a knot.
4. Release the slipknot in the rope.

# SECTION 9 — AIDS FOR MAINTENANCE

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## Special Tools

P/N	DESCRIPTION	SUPPLIER	P/N	DESCRIPTION	SUPPLIER
0133-043	Imprinter	Arctco-CPC	0644-010	Clutch Puller (Arctic)	Arctco-OTC
0144-003	Piston Pin Puller	Arctco-CPC	0644-012	Wrench, Cylinder Base 14mm	OTC
0144-007	Flywheel Spanner Wrench	Arctco-CPC	0644-013	Wrench, Cylinder Base 12mm	OTC
0144-009	Engine Timing Gauge	Arctco-CPC	0644-014	Track Stud Hole Drill	Arctco
0144-053	Multitester	Arctco-CPC	0644-016	Surface Plate	Arctco
0144-109	Ramp Grinding Holder	Arctco-CPC	0644-018	Stud Runner 6mm	Arctco
0144-110	Arctic Clutch Puller	CPC	0644-019	Stud Runner 8mm	Arctco
0144-113	Fan Holder	Arctco-CPC	0644-020	Stud Runner 10mm	Arctco
0144-122	Surface Plate	CPC	0644-022	V Blocks	Arctco
0144-127	Pressure Testing Kit	Arctco-CPC	0644-023	Carburetor Synchronizing Tool Adapters	Arctco
0144-135	Comet Clutch Puller	Comet	0644-027	Carburetor Synchronizing Tool	Arctco
0144-136	Comet Grunt Tool	Comet	0644-028	Engine Tachometer	Arctco
0144-301	Track Clip Tool	Arctco-OTC	0644-029	Flywheel Puller	Arctco
0144-302	Bearing Remover (Crankshaft)	Arctco-OTC	0644-030	Rear Shock Adjuster	Arctco-OTC
0144-303	Bearing Tool Adapter Kit	OTC	0644-031	Rear Spring Adjuster	Arctco-OTC
0144-305	Cylinder Hone Set	Arctco-OTC	0144-112	Flywheel Puller	CPC
0144-306	Ignition Test Plug	OTC	0144-080	Bearing Puller	CPC
0144-307	Mikuni Carburetor Tool Set	Arctco-OTC	0144-227	Clutch Alignment Bar	CPC
0144-308	Spark Tester	Arctco-OTC		Model 1L CDI Tester	ESI
0144-309	Snowmobile Dolly	Arctco-OTC	0133-417	Imprinter Ink Roller	Arctco
0355-109	Snowmobile Dolly	CPC	0644-033	Multitester	Arctco
0144-310	Flywheel Puller/Spanner Wrench	Arctco-OTC	0644-034	Engine Compression Tester	Arctco
0144-311	Rear Suspension Spring Tool	Arctco-OTC	0644-035	Ball Hone (60-64 mm)	Arctco
0636-069	Sealant, Gasket	Arctco	0644-036	Ball Hone (65-70 mm)	Arctco
0636-070	Sealer, Crankcase	Arctco	0644-037	Ball Hone (72-74 mm)	Arctco
0636-071	Adhesive, H/B Grip	Arctco	0644-038	T-nut Tool	Arctco
0636-092	Copper Coat	Arctco	0644-041	Rigid Hone	Arctco
0644-001	Spider Repair Tool Kit	Arctco-OTC	0644-042	Rigid Hone Stone Set (2.5-2.7 in.)	Arctco
0644-002	Shock Spring Installation Tool	Arctco-OTC	0644-043	Rigid Hone Stone Set (2.7-4.1 in.)	Arctco
0644-003	Clutch Alignment Bar	Arctco-OTC	0644-044	Alcohol Test Kit	Arctco
0644-005	Spider Removal Tool Set (Comet)	Arctco-OTC	0644-046	Ignition Analyzer	Arctco
0644-006	Arctic Clutch Bushing Installation Tool	Arctco-OTC	0134-971	RTV Silicone	CPC
0644-008	Timing Light	Arctco	0132-105	Gasket Compound	CPC
0644-009	Clutch Puller (Comet)	Arctco-OTC	0644-007	Oil Injection Usage Tool	Arctco
0144-135	Clutch Puller (Comet)	CPC			

## General Bolt Torque Specifications

SIZE	SAE GRADE 2 ASSEMBLY TORQUE		SAE GRADE 5 ASSEMBLY TORQUE		SAE GRADE 8 ASSEMBLY TORQUE	
	DRY	LUB	DRY	LUB	DRY	LUB
8-32	19 in.-lb	14 in.-lb	30 in.-lb	22 in.-lb	41 in.-lb	31 in.-lb
8-36	20 in.-lb	15 in.-lb	31 in.-lb	23 in.-lb	43 in.-lb	32 in.-lb
10-24	27 in.-lb	21 in.-lb	43 in.-lb	32 in.-lb	60 in.-lb	45 in.-lb
10-32	31 in.-lb	23 in.-lb	49 in.-lb	36 in.-lb	68 in.-lb	51 in.-lb
1/4-20	66 in.-lb	50 in.-lb	8 ft-lb	75 in.-lb	9 ft-lb	10 ft-lb
1/4-28	76 in.-lb	56 in.-lb	10 ft-lb	86 in.-lb	14 ft-lb	12 ft-lb
5/16-18	11 ft-lb	8 ft-lb	17 ft-lb	13 ft-lb	25 ft-lb	18 ft-lb
5/16-24	12 ft-lb	9 ft-lb	19 ft-lb	14 ft-lb	28 ft-lb	20 ft-lb
3/8-16	20 ft-lb	15 ft-lb	30 ft-lb	23 ft-lb	45 ft-lb	33 ft-lb
3/8-24	23 ft-lb	17 ft-lb	35 ft-lb	25 ft-lb	50 ft-lb	35 ft-lb
7/16-14	32 ft-lb	24 ft-lb	50 ft-lb	35 ft-lb	70 ft-lb	55 ft-lb
7/16-20	36 ft-lb	27 ft-lb	55 ft-lb	40 ft-lb	80 ft-lb	60 ft-lb
1/2-13	50 ft-lb	35 ft-lb	75 ft-lb	55 ft-lb	110 ft-lb	80 ft-lb
1/2-20	55 ft-lb	40 ft-lb	90 ft-lb	65 ft-lb	120 ft-lb	90 ft-lb

**NOTE:** Lub indicates lubricants or plating on fasteners.

## Torque Conversions

kg-m x 7.235 = ft-lb  
ft-lb x 0.1383 = kg-m

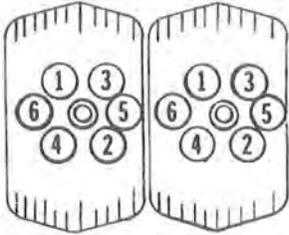
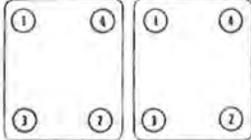
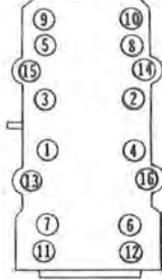
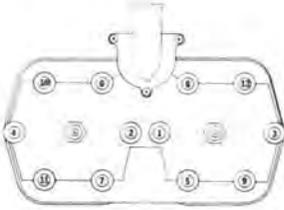
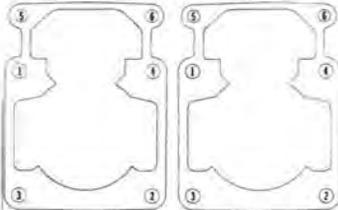
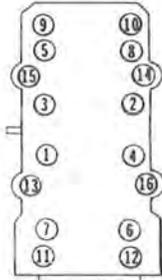
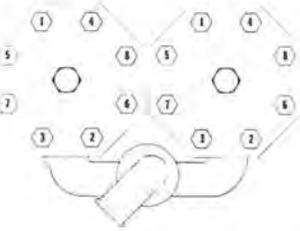
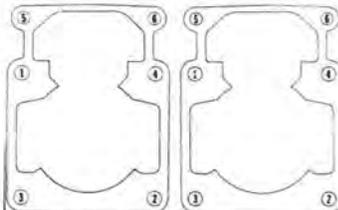
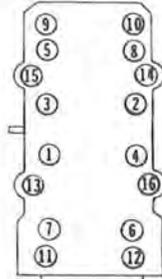
ft-lb	kg-m	ft-lb	kg-m	ft-lb	kg-m	ft-lb	kg-m	ft-lb	kg-m
1	0.1	21	2.9	41	5.7	61	8.4	81	11.2
2	0.3	22	3.0	42	5.8	62	8.6	82	11.3
3	0.4	23	3.2	43	5.9	63	8.7	83	11.5
4	0.6	24	3.3	44	6.1	64	8.9	84	11.6
5	0.7	25	3.5	45	6.2	65	9.0	85	11.8
6	0.8	26	3.6	46	6.4	66	9.1	86	11.9
7	1.0	27	3.7	47	6.5	67	9.3	87	12.0
8	1.1	28	3.9	48	6.6	68	9.4	88	12.2
9	1.2	29	4.0	49	6.8	69	9.5	89	12.3
10	1.4	30	4.2	50	6.9	70	9.7	90	12.5
11	1.5	31	4.3	51	7.1	71	9.8	91	12.6
12	1.7	32	4.4	52	7.2	72	10.0	92	12.8
13	1.8	33	4.6	53	7.3	73	10.1	93	12.9
14	1.9	34	4.7	54	7.5	74	10.2	94	13.0
15	2.1	35	4.8	55	7.6	75	10.4	95	13.1
16	2.2	36	5.0	56	7.7	76	10.5	96	13.3
17	2.4	37	5.1	57	7.9	77	10.7	97	13.4
18	2.5	38	5.3	58	8.0	78	10.8	98	13.6
19	2.6	39	5.4	59	8.2	79	10.9	99	13.7
20	2.8	40	5.5	60	8.3	80	11.1	100	13.8

## Engine Bolt Torque Specifications

Item	Cougar-Cheetah F/C		El Tigre 5000-Pantera		El Tigre 6000-Cheetah L/C	
	kg-m	ft-lb	kg-m	ft-lb	kg-m	ft-lb
Cylinder-Head Nuts	2.0-2.5	14-18	3.0-4.0	22-29	2.0-2.5	14-18
Cylinder-Base Nuts 8 mm	3.0-4.0	22-29	1.8-2.2	13-16	1.8-2.2	13-16
10 mm			3.0-4.0	22-29	3.0-4.0	22-29
Crankcase 6 mm	0.8-1.0	6-7	0.8-1.0	6-7	0.8-1.0	6-7
10 mm	1.8-2.2	13-16	1.8-2.2	13-16	1.8-2.2	13-16
Exhaust-Manifold Nuts	1.8-2.2	13-16	1.5-1.9	11-14	1.5-1.9	11-14
Intake-Manifold Nuts	N/A	N/A	N/A	N/A	N/A	N/A
Intake-Flange Nuts	1.5-1.9	11-14	1.5-1.9	11-14	1.5-1.9	11-14
Magneto-Case Screws	0.7-1.0	5-7	0.7-1.0	5-7	0.7-1.9	5-7
Flywheel Nut	9.0-11.0	65-79	9.0-11.0	65-79	9.0-11.0	65-79
Engine-Mounting Bolts	6.9-7.6	50-55	6.9-7.6	50-55	6.9-7.6	50-55
Fan-Case Nuts	1.5-1.9	11-14	N/A	N/A	N/A	N/A
Mounts	2.8-3.5	20-25	2.8-3.5	20-25	2.8-3.5	20-25

N/A = Not Applicable

# Engine Torque Patterns

CYLINDER HEAD	CYLINDER BASE	CRANKCASE
<p><b>Cougar-Cheetah F/C</b></p>  <p>0725-320</p>	 <p>0726-318</p>	 <p>0725-321</p>
<p><b>Pantera-EI Tigre 5000</b></p>  <p>0725-746</p>	 <p>0726-376</p>	 <p>0725-321</p>
<p><b>EI Tigre 6000-Cheetah L/C</b></p>  <p>0727-158</p>	 <p>0726-376</p>	 <p>0725-321</p>



# SECTION 10 — TROUBLESHOOTING

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Drive Belt .....	182
Track .....	183
Light System .....	184

# Engine

Problem: Engine Does Not Start	Condition	Remedy
A. No Spark At Spark Plugs	<ol style="list-style-type: none"> <li>1. Ignition switch malfunctioning—switch not in RUN position</li> <li>2. Wiring harness shorting—disconnected</li> <li>3. Emergency stop switch in DOWN position—switch malfunctioning</li> <li>4. Throttle/ignition monitor switch adjusted incorrectly—malfunctioning</li> <li>5. Spark plugs fouled—damaged</li> <li>6. Spark-plug caps damaged—leaking—shorting</li> <li>7. High tension wires/coil loose—grounded—defective</li> <li>8. CDI unit defective</li> <li>9. Charge coil defective</li> <li>10. Trigger coil defective</li> <li>11. Flywheel magnets weak</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace ignition switch—turn switch to RUN position</li> <li>2. Repair—replace—connect wiring harness</li> <li>3. Move switch to UP position—replace throttle switch</li> <li>4. Adjust throttle cable tension—replace throttle switch</li> <li>5. Clean—replace spark plugs</li> <li>6. Replace spark-plug caps</li> <li>7. Service—replace high tension wires/coil</li> <li>8. Replace CDI unit</li> <li>9. Replace charge coil</li> <li>10. Replace trigger coil</li> <li>11. Replace flywheel</li> </ol>
B. No Fuel At Cylinders	<ol style="list-style-type: none"> <li>1. Fuel tank empty</li> <li>2. Fuel hose broken—pinched</li> <li>3. Fuel-tank vent—hose obstructed</li> <li>4. In-line fuel filter obstructed—damaged</li> <li>5. Fuel pump malfunctioning—defective</li> <li>6. Impulse hose cracked—broken—pinched—disconnected</li> <li>7. Carburetor(s) adjusted incorrectly—dirty—damaged</li> <li>8. Primary compression absent</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill tank</li> <li>2. Replace—service hose</li> <li>3. Remove obstruction—replace vent—hose</li> <li>4. Remove obstruction—replace in-line fuel filter</li> <li>5. Replace—clean fuel pump</li> <li>6. Replace—connect impulse hose</li> <li>7. Troubleshoot carburetor(s)</li> <li>8. Repair—replace damaged—worn engine components</li> </ol>
C. Miscellany (Fuel Does Not Ignite)	<ol style="list-style-type: none"> <li>1. Carburetor-to-cylinder air leak</li> <li>2. Carburetor adjusted incorrectly—dirty—damaged</li> <li>3. Gasoline contaminated</li> <li>4. Engine flooded</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace—service gaskets—intake flange—manifold—connect oil delivery hose—service intake ports</li> <li>2. Troubleshoot carburetor</li> <li>3. Clean tank and entire delivery system</li> <li>4. Troubleshoot carburetor—clean—replace air-intake silencer</li> </ol>

<b>Problem: Engine Does Not Start (cont.)</b>	<b>Condition</b>	<b>Remedy</b>
Miscellaneous (Fuel Does Not Ignite)	5. Compression low  6. Timing adjusted incorrectly  7. Oil-injection pump malfunctioning—adjusted incorrectly	5. Repair—replace damaged—worn engine components  6. Time ignition  7. Replace—bleed—adjust oil-injection pump
<b>Problem: Engine Does Not Idle</b>	<b>Condition</b>	<b>Remedy</b>
	1. Carburetor(s) adjusted incorrectly—dirty—damaged 2. Fuel pump malfunctioning—defective 3. Impulse hose cracked—broken 4. Air-intake silencer obstructed—damaged	1. Troubleshoot carburetor(s)  2. Replace—clean fuel pump  3. Replace impulse hose 4. Remove obstruction—replace air-intake silencer
<b>Problem: Engine Loses Power</b>	<b>Condition</b>	<b>Remedy</b>
	1. Fuel-tank vent—hose obstructed 2. Fuel hose cracked—broken—pinched 3. In-line fuel filter obstructed—damaged 4. Carburetor(s) adjusted incorrectly—dirty—damaged—loose 5. Muffler obstructed—disconnected—damaged 6. Air-intake silencer obstructed—disconnected—damaged  7. Exhaust ports carboned 8. Spark plugs fouled—damaged 9. High tension wires/coil loose—defective 10. Spark-plug caps leaking—shorting 11. Timing adjusted incorrectly 12. Compression low  13. Charge coil defective 14. Trigger coil defective 15. CDI unit defective 16. Oil-injection pump malfunctioning—adjusted incorrectly	1. Remove obstruction—replace vent—hose 2. Replace—service fuel hose  3. Remove obstruction—replace in-line fuel filter 4. Troubleshoot—tighten carburetor(s) 5. Remove obstruction—connect—replace muffler 6. Remove obstruction—connect—replace air-intake silencer 7. Clean exhaust ports 8. Clean—replace spark plugs 9. Service—replace high tension wires/coil 10. Replace spark-plug caps  11. Time ignition 12. Repair—replace damaged—worn engine components 13. Replace charge coil 14. Replace trigger coil 15. Replace CDI unit 16. Replace—bleed—adjust oil-injection pump
<b>Problem: Engine Overheats</b>	<b>Condition</b>	<b>Remedy</b>
	1. Cooling fins obstructed  2. Spark plug heat range too hot  3. Coolant low—absent 4. Radiator obstructed—damaged 5. Carburetor(s) adjusted incorrectly—jetted incorrectly—dirty	1. Remove obstruction  2. Install lower heat-range spark plugs 3. Add coolant 4. Remove obstruction—replace radiator 5. Troubleshoot—clean carburetor(s)

<b>Problem: Engine Overheats (cont.)</b>	<b>Condition</b>	<b>Remedy</b>
	<ul style="list-style-type: none"> <li>6. Carburetor-to-cylinder air leak</li> <li>7. Drive system (drive clutch—driven pulley—track—drive belt) adjusted incorrectly—worn—damaged</li> <li>8. Rings/grooves carboned</li> <li>9. Exhaust ports obstructed</li> <li>10. Muffler obstructed</li> <li>11. Fuel mixture incorrect</li> <li>12. Primary compression low—absent</li> <li>13. Timing adjusted incorrectly</li> <li>14. Axial fan blades broken—bent—fan belt broken—stretched.</li> <li>15. Gasoline octane too low</li> <li>16. Water pump—thermostat damaged—defective</li> </ul>	<ul style="list-style-type: none"> <li>6. Replace—repair gaskets—intake flange(s)—manifold—service intake ports</li> <li>7. Troubleshoot—adjust drive system</li> <li>8. Clean—replace rings—pistons</li> <li>9. Remove obstruction</li> <li>10. Remove obstruction</li> <li>11. Replace with correctly mixed fuel</li> <li>12. Repair—replace damaged—worn engine components</li> <li>13. Time ignition</li> <li>14. Repair—replace axial fan components.</li> <li>15. Use 88 minimum octane regular leaded</li> <li>16. Replace water pump—thermostat</li> </ul>
<b>Problem: Engine Backfires</b>	<b>Condition</b>	<b>Remedy</b>
	<ul style="list-style-type: none"> <li>1. Throttle/ignition monitor switch adjusted incorrectly</li> <li>2. Spark plugs fouled—damaged</li> <li>3. Spark plug heat range too hot</li> <li>4. High tension wires/coil shorting</li> <li>5. Carburetor-to-cylinder air leak</li> <li>6. Carburetor(s) adjusted incorrectly—dirty—damaged—loose</li> <li>7. Fuel mixture incorrect</li> <li>8. Oil-injection pump malfunctioning—adjusted incorrectly</li> </ul>	<ul style="list-style-type: none"> <li>1. Adjust throttle cable tension—service spring</li> <li>2. Clean—replace spark plugs</li> <li>3. Install lower heat-range spark plugs</li> <li>4. Service—replace high tension wires/coil</li> <li>5. Repair—replace gaskets—intake flanges—manifold—service intake ports</li> <li>6. Troubleshoot—tighten carburetor(s)</li> <li>7. Replace with correctly mixed fuel</li> <li>8. Replace—bleed—adjust oil-injection pump</li> </ul>
<b>Problem: Engine Four-Cycles (Floods Excessively)</b>	<b>Condition</b>	<b>Remedy</b>
	<ul style="list-style-type: none"> <li>1. Carburetor(s) adjusted incorrectly—dirty—damaged</li> <li>2. Fuel mixture incorrect</li> <li>3. Oil-injection pump malfunctioning—adjusted incorrectly</li> <li>4. Air Intake Silencer obstructed</li> </ul>	<ul style="list-style-type: none"> <li>1. Troubleshoot—clean carburetor(s)</li> <li>2. Replace with correctly mixed fuel</li> <li>3. Replace—bleed—adjust oil-injection pump</li> <li>4. Remove obstruction</li> </ul>

<b>Problem: Engine Stops Suddenly</b>	<b>Condition</b>	<b>Remedy</b>
	<ol style="list-style-type: none"> <li>1. In-line fuel filter obstructed—damaged</li> <li>2. Fuel hose obstructed—broken—pinched</li> <li>3. CDI unit defective</li> <li>4. Ignition coil defective</li> <li>5. Charge coil defective</li> <li>6. Trigger coil defective</li> <li>7. Fuel-tank vent—hose obstructed—damaged</li> <li>8. Engine seized</li> <li>9. Throttle/ignition monitor switch defective—throttle cable adjusted incorrectly</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove obstruction—replace in-line fuel filter</li> <li>2. Remove obstruction—repair—replace fuel hose</li> <li>3. Replace CDI unit</li> <li>4. Replace ignition coil</li> <li>5. Replace charge coil</li> <li>6. Replace trigger coil</li> <li>7. Remove obstruction—replace vent—hose</li> <li>8. Overhaul engine</li> <li>9. Replace throttle control—adjust throttle cable</li> </ol>
<b>Problem: Engine Stops Gradually</b>	<b>Condition</b>	<b>Remedy</b>
	<ol style="list-style-type: none"> <li>1. In-line fuel filter obstructed—damaged</li> <li>2. Fuel hose obstructed—broken—pinched</li> <li>3. Head gasket(s) burning out</li> <li>4. Cylinder head(s) loosening</li> <li>5. Spark plugs loosening</li> <li>6. Impulse hose cracked</li> <li>7. High tension wires/coil defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove obstruction—replace in-line fuel filter</li> <li>2. Remove obstruction—replace—repair fuel hose</li> <li>3. Replace head gasket(s)—service cylinders—head(s)</li> <li>4. Tighten cylinder-head nuts</li> <li>5. Tighten spark plugs</li> <li>6. Replace impulse hose</li> <li>7. Replace high tension wires/coil</li> </ol>
<b>Problem: Engine Fails to Stop. (Continues to Run, even with all Switches Turned Off)</b>	<b>Condition</b>	<b>Remedy</b>
	<ol style="list-style-type: none"> <li>1. CDI unit shorted to ground</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace CDI unit</li> </ol>

# Fuel System

Problem: Carburetor (0-1/4 Opening)	Condition	Remedy
A. Too Rich	<ol style="list-style-type: none"> <li>1. Plunger will not seat</li> <li>2. Pilot air screw too far in</li> <li>3. Pilot air passage obstructed—damaged</li> <li>4. Float/inlet needle obstructed—damaged—adjusted incorrectly</li> <li>5. Pilot jet loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust—service—replace choke cable—plunger assembly</li> <li>2. Adjust pilot air screw</li> <li>3. Remove obstruction—replace pilot air screw—carburetor</li> <li>4. Remove obstruction—replace inlet needle—float—adjust float tab</li> <li>5. Tighten pilot jet</li> </ol>
B. Too Lean	<ol style="list-style-type: none"> <li>1. Plunger remains seated</li> <li>2. Pilot air screw too far out—damaged</li> <li>3. Throttle valve sticks open—damaged—worn</li> <li>4. Pilot outlet obstructed</li> <li>5. Float/inlet needle obstructed—damaged—adjusted incorrectly</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust—service—choke cable—plunger assembly</li> <li>2. Adjust—replace pilot air screw</li> <li>3. Service—replace throttle valve—throttle cable—spring</li> <li>4. Remove obstruction</li> <li>5. Remove obstruction—replace inlet needle—float—adjust float tab</li> </ol>
Problem: Carburetor (1/4-3/4 Opening)	Condition	Remedy
A. Too Rich	<ol style="list-style-type: none"> <li>1. Pilot air screw too far in</li> <li>2. Needle jet—jet needle worn—adjusted incorrectly—incorrect</li> <li>3. Pilot air passage obstructed—damaged</li> <li>4. Pilot jet loose</li> <li>5. Float/inlet needle obstructed—damaged—adjusted incorrectly</li> <li>6. Main jet loose—too large</li> <li>7. Primary air passage obstructed</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust pilot air screw</li> <li>2. Replace—adjust needle jet—replace jet needle</li> <li>3. Remove obstruction—replace pilot air screw—carburetor</li> <li>4. Tighten pilot jet</li> <li>5. Remove obstruction—replace inlet needle—float—adjust float tab</li> <li>6. Tighten—replace main jet</li> <li>7. Remove obstruction</li> </ol>
B. Too Lean	<ol style="list-style-type: none"> <li>1. Pilot air screw too far out—damaged</li> <li>2. Needle jet obstructed</li> <li>3. Pilot outlet—main jet obstructed</li> <li>4. Float/inlet needle obstructed—damaged—adjusted incorrectly</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust—replace pilot air screw</li> <li>2. Remove obstruction</li> <li>3. Remove obstruction</li> <li>4. Remove obstruction—replace inlet needle—float—adjust float tab</li> </ol>
Problem: Carburetor (3/4 —WOT Opening)	Condition	Remedy
A. Too Rich	<ol style="list-style-type: none"> <li>1. Main jet loose—too large</li> <li>2. Float/inlet needle obstructed—damaged—adjusted incorrectly</li> <li>3. Needle jet—jet needle worn—adjusted incorrectly—incorrect</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten—replace with smaller main jet</li> <li>2. Remove obstruction—replace inlet needle—float—adjust float tab</li> <li>3. Replace—adjust needle jet—replace jet needle</li> </ol>

<b>Problem: Carburetor (3/4-WOT Opening) (cont.)</b>	<b>Condition</b>	<b>Remedy</b>
B. Too Lean	<ol style="list-style-type: none"> <li>1. Main jet obstructed—too small</li> <li>2. Float/inlet needle obstructed—damaged—adjusted incorrectly</li> <li>3. Needle jet—jet needle obstructed</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove obstruction—replace with larger main jet</li> <li>2. Remove obstruction—replace inlet needle—float—adjust float tab</li> <li>3. Remove obstruction</li> </ol>
<b>Problem: General Fuel System</b>	<b>Condition</b>	<b>Remedy</b>
A. Engine Cuts Out At High RPM	<ol style="list-style-type: none"> <li>1. Inadequate fuel delivery</li> <li>2. In-line fuel filter obstructed—damaged</li> <li>3. Fuel contaminated</li> <li>4. Fuel-tank vent—hose obstructed</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace fuel pump—impulse hose</li> <li>2. Remove obstruction—replace in-line fuel filter</li> <li>3. Replace fuel—de-ice—clean carburetor</li> <li>4. Remove obstruction—replace vent—hose</li> </ol>
B. One Cylinder Runs Lean	<ol style="list-style-type: none"> <li>1. Carburetor-to-cylinder air leak</li> <li>2. Carburetor(s) not aligned</li> <li>3. Air-intake silencer obstructed—damaged</li> <li>4. Primary compression low</li> <li>5. Carburetors not synchronized</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair—replace gaskets—flange—manifold—service intake ports—tighten clamp(s)</li> <li>2. Align carburetor(s)</li> <li>3. Remove obstruction—replace air-intake silencer</li> <li>4. Troubleshoot engine</li> <li>5. Synchronize carburetors</li> </ol>

**Drive Clutch-Driven Pulley**  
(Pantera-Cougar-Cheetah F/C)

<b>Problem: Drive Clutch Engagement</b>	<b>Condition</b>	<b>Remedy</b>
A. Before Specified RPM	<ol style="list-style-type: none"> <li>1. Spring weak</li> <li>2. Spider assembly loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace spring</li> <li>2. Tighten spider assembly set screws</li> </ol>
B. After Specified RPM	<ol style="list-style-type: none"> <li>1. Drive clutch components dirty</li> <li>2. Rollers—ramps worn—damaged</li> <li>3. Bushing worn—damaged</li> <li>4. Bearing/movable sheave clearance excessive</li> <li>5. Spider assembly loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean drive clutch components</li> <li>2. Replace rollers—ramps</li> <li>3. Replace bushing</li> <li>4. Replace bearing/movable sheave</li> <li>5. Tighten spider assembly set screws</li> </ol>

<b>Problem: Maximum Drive Clutch RPM</b>	<b>Condition</b>	<b>Remedy</b>
A. Too High	1. Drive clutch components dirty	1. Clean drive clutch components
B. Too Low	1. Spring weak 2. Rollers—ramps worn—damaged	1. Replace spring 2. Replace rollers—ramps
<b>Problem: Midrange Shift-Up</b>	<b>Condition</b>	<b>Remedy</b>
A. Too Quickly (Lowers RPM)	1. Drive clutch spring weak 2. Driven pulley spring weak 3. Spring preload tension inadequate 4. Center-to-center distance too close 5. Driven pulley bushing (bearing) worn—damaged	1. Replace drive clutch spring 2. Replace driven pulley spring 3. Increase spring preload tension  4. Adjust center-to-center distance 5. Replace bearing—movable sheave
B. Too Slowly (Raises RPM)	1. Drive clutch components dirty 2. Driven pulley components dirty  3. Spring preload tension excessive 4. Shoe-ramp slides worn excessively 5. Driven pulley bushing (bearing) worn—damaged	1. Clean drive clutch components 2. Clean driven pulley components 3. Decrease spring preload tension 4. Replace shoe-ramp slides  5. Replace bearing—movable sheave
<b>Problem: Excessive Belt Deposits</b>	<b>Condition</b>	<b>Remedy</b>
	1. Offset adjusted incorrectly 2. Drive clutch/driven pulley sheaves rough—damaged—dirty 3. Driven pulley movable sheave travel impaired 4. Driven pulley bushing (bearing) worn—dirty	1. Adjust offset 2. Repair—replace—clean drive clutch/driven pulley sheaves 3. Service driven pulley 4. Clean—replace bushing movable sheave
<b>Problem: Excessive Belt Drag—Impaired Drive Clutch Disengagement</b>	<b>Condition</b>	<b>Remedy</b>
	1. Drive clutch components—dirty—damaged 2. Drive belt does not meet measurement specifications	1. Clean—replace drive clutch components 2. Replace drive belt
<b>Problem: Engine RPM Suddenly Increases—Drive Clutch Vibrates</b>	<b>Condition</b>	<b>Remedy</b>
	1. Spider-arm pin bent—damaged 2. Spider arm damaged—broken 3. Weight bolt broken 4. Drive clutch out of balance	1. Replace spider assembly 2. Replace spider assembly 3. Replace bolt 4. Align—replace components—clutch

<b>Problem: Driven Pulley Vibrates</b>	<b>Condition</b>	<b>Remedy</b>
	1. Sheave rivets loose—broken 2. Driven pulley out of balance	1. Replace sheave 2. Service—replace driven pulley

## Drive Clutch (El Tigre-Cheetah L/C)

<b>Problem: Drive Clutch Engagement</b>	<b>Condition</b>	<b>Remedy</b>
A. Before Specified RPM	1. Spring weak—broken 2. Cam arm(s) incorrect—worn	1. Replace spring 2. Replace cam arm(s)
B. After Specified RPM	1. Spring incorrect 2. Guide buttons worn	1. Replace spring 2. Replace guide buttons
<b>Problem: Drive Clutch Sticks</b>	<b>Condition</b>	<b>Remedy</b>
	1. Drive clutch components dirty 2. Movable sheave bent—binding 3. Guide buttons worn	1. Clean drive clutch components 2. Clean—replace movable sheave 3. Replace guide buttons
<b>Problem: Jerks—Shifts Erratically</b>	<b>Condition</b>	<b>Remedy</b>
	1. Drive clutch dirty 2. Rollers worn 3. Cam arms rough 4. Guide buttons worn 5. Sheaves dirty	1. Clean—repair drive clutch 2. Replace rollers 3. Polish—replace cam arms 4. Replace guide buttons 5. Clean sheaves

## Drive Belt

Problem: Drive Belt Glazed	Condition	Remedy
	<ol style="list-style-type: none"> <li>1. Drive belt does not meet measurement specifications</li> <li>2. Drive clutch spring tension inadequate</li> <li>3. Drive clutch components dirty—damaged</li> <li>4. Offset—parallelism—center-to-center distance adjusted incorrectly</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace drive belt</li> <li>2. Replace drive clutch spring</li> <li>3. Clean—replace drive clutch components</li> <li>4. Adjust offset—parallelism—center-to-center distance</li> </ol>
Problem: Drive Belt Lugs Torn Off—Frayed—Worn In One Spot	Condition	Remedy
	<ol style="list-style-type: none"> <li>1. Drive belt does not meet measurement specifications</li> <li>2. Offset—parallelism—center-to-center distance adjusted incorrectly</li> <li>3. Drive clutch engagement—idle rpm too high</li> <li>4. Drive clutch components dirty—damaged</li> <li>5. Driven pulley/shaft rotation impaired</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace drive belt</li> <li>2. Adjust offset—parallelism—center-to-center distance</li> <li>3. Service drive clutch—reduce idle rpm</li> <li>4. Clean—replace drive clutch components</li> <li>5. Service driven pulley/shaft—chain-case components</li> </ol>

# Track

<b>Problem: Track Edge Frayed— Drive Lugs Worn</b>	<b>Condition</b>	<b>Remedy</b>
	1. Track alignment adjusted incorrectly	1. Align track
<b>Problem: Track Worn Adjacent To Outer Drive Lugs</b>	<b>Condition</b>	<b>Remedy</b>
	1. Track tension adjusted incorrectly 2. Rear idler wheels dirty— damaged	1. Adjust track tension 2. Clean—replace idler wheels
<b>Problem: Track Ratchets— Slaps Tunnel</b>	<b>Condition</b>	<b>Remedy</b>
	1. Track tension adjusted incorrectly (too loose) 2. Drive sprockets misaligned— damaged	1. Adjust track tension 2. Align—replace sprockets
<b>Problem: Wear-Strip Wear Excessive</b>	<b>Condition</b>	<b>Remedy</b>
	1. Slide rail bent—broken— damaged 2. Track alignment adjusted incorrectly	1. Repair—replace slide rail 2. Adjust track alignment

## Light System

<b>Problem: Bulbs Burn Out Repeatedly</b>	<b>Condition</b>	<b>Remedy</b>
	1. Voltage regulator malfunctioning—damaged—defective— not connected	1. Replace—connect regulator
<b>Problem: Complete Lighting System Failure</b>	<b>Condition</b>	<b>Remedy</b>
	1. Wiring harness connectors disconnected—damaged 2. Lighting coil defective	1. Connect—replace harness— connectors 2. Replace lighting coil

# NOTES

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